DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DIRECT SUPPORT,

GENERAL SUPPORT AND

DEPOT MAINTENANCE MANUAL

RADAR SET AN/APN-158

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY

APRIL 1970

WARNING

EXTREMELY DANGEROUS VOLTAGES EXIST IN THE FOLLOWING UNITS

Indicator, Azimuth-Range IP-724/APN-158	**9,500 volts**
Synchronizer, Electrical SN-358/APN-158	**285 volts**
Receiver-Transmitter RT-711/APN-158	**700 volts**

CAUTION

An absorbing radar screen should be placed directly in front of the antenna when operating the radar system. When no screen is available, ensure the area in front of the antenna, to a minimum of 50 feet, is clear of personnel, flammable materials, and reflecting surfaces.

DON'T TAKE CHANCES.

WARNING

EXTREMELY DANGEROUS VOLTAGES (9,500 VOLTS) EXIST IN INDICATOR, AZIMUTH-RANGE IP-724/APN-158. Exercise extreme caution when working on this unit.

CAUTION

An absorbing radar screen should be placed directly in front of the antenna when operating the radar system. When no screen is available, ensure the area in front of the antenna, to a minimum of 50 feet, is clear of personnel, flammable materials, and reflecting surfaces. DON'T TAKE CHANCES.

TECHNICAL MANUAL) HADQUARTERS,
) DEPARTMENT OF THE ARMY
No. 11-5841-241-35) WASHINGTON, D. C. 16 April 1970

RADAR SET AN/APN-158

*This manual supersedes TM 11-5841-241-35, 24 March 1964.

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (cont)

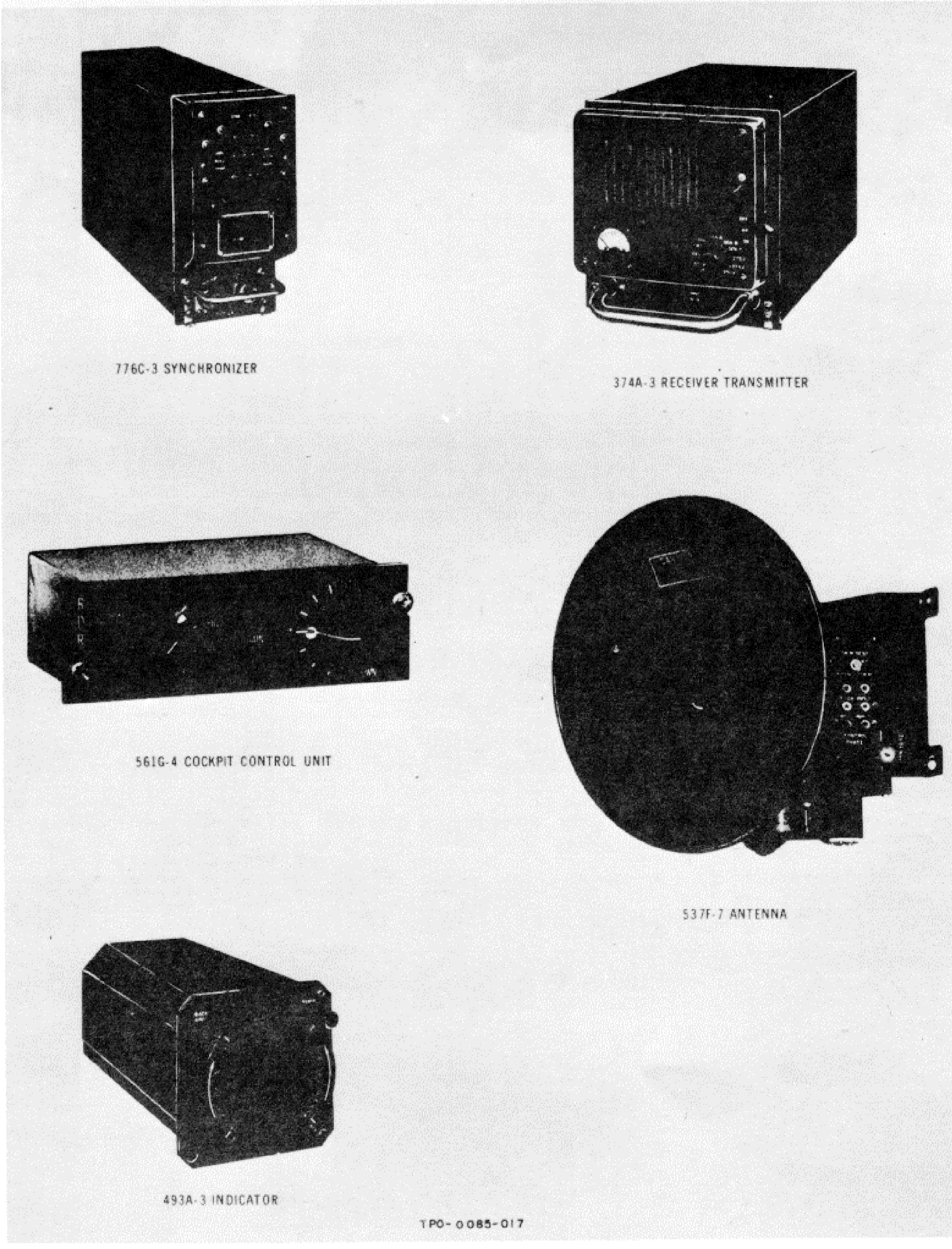
LIST OF ILLUSTRATION (cont)

LIST OF ILLUSTRATION (cont)

LIST OF ILLUSTRATION (cont)

LIST OF ILLUSTRATION (cont)

LIST OF ILLUSTRATION (cont)



Radar Set AN/APN-158
Figure 1-1

CHAPTER 1

RADAR SET AN/APN-158 SYSTEM

Section I. INTRODUCTION

1-1. SCOPE.

This manual provides the overall functioning of Radar Set AN/APN-158 and describes direct support, general support, and depot maintenance of the system. Chapter 1 contains information on the overall system functioning, troubleshooting, testing, aligning, and repair on a system level. Chapters 2 through 6 contain similar information on each of the five individual units of the system. Chapter 7 contains depot overhaul standards for the system.

1-2. INDEXES OF PUBLICATIONS.

A. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

B. DA Pam 310-7. Refer to the latest issue of DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. REPORTING OF EQUIPMENT MANUAL IMPROVEMENTS.

Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publication) and forwarded direct to Commanding General, U.S. Army Electronic Command, ATTN: AMSEL-ME-NMP-EM Fort Monmouth, N.J. 07703

NOTE: For applicable forms and records refer to TM 11-5841-241-12.

1-4. LIST OF COMPONENTS. (Refer to figure 1-1.)

The components of Radar Set AN/APN-158 (WP-103 Weather Radar System) are referred to in this manual by their commercial nomenclature. The system components are listed below with their commercial designations and associated military nomenclature.

COMMERCIAL NOMENCLATURE.	MILITARY NOMENCLATURE
Weather Radar System WP-103	Radar Set AN/APN-158
Receiver-Transmitter 374A-3	Receiver-Transmitter RT-711/APN-158
Synchronizer 776C-3	Synchronizer, Electrical SN-358/APN-158
Indicator 493A-3	Indicator, Azimuth-Range IP-724/APN-158
Antennas 537F-7 and 537F-8	Antennas AS-1520/APN-158 and AS-1642/APN-158
Control Unit 561G-4	Control, Radar Set C-4881/APN-158

Figure 1-2 is a list of equipment covered in this manual.

EQUIPMENT	DESCRIPTION	COLLINS PART NUMBER
374A-3 Receiver Transmitter	X-band pulse transmitter and receiver	522-6113-006
776C-3 Synchronizer	Generates synchronous sweep signal with antenna azimuth, provides line-of -sight stabilization to compensate for roll and pitch of aircraft	522-6114-006
493A-3 Indicator	Provides a high intensity visual output of the radar information including range and azimuth.	522-6104-005
537F-7 Antenna	Radiates the rf energy pulses and receives the reflected signals (12-inch reflector).	522-6117-005
* 537F-8 Antenna	Same as 537F-7 with 18-inch reflector.	522-6118-005
561G-4 Cockpit Control Unit	Provides system control functions.	522-5883-004
349B-4 Shockmount	Provides mounting facilities for the 776C-3 Synchronizer.	522-6116-004
349A-6/7 Shockmount	Provides mounting facilities for the 374A-3 Receiver-Transmitter.	772-5135-001/ 522-6115-004

* Optional equipment

Equipment Covered

Figure 1-2

1-5. MAINTENANCE CONCEPT.

A. General.

This manual contains maintenance instructions for use at the direct support level, general support level, and depot level. Maintenance capabilities are determined by the test equipments allocated to the different categories of maintenance as listed in the Maintenance Allocation Chart (appendix C of TM 11-5841-241-12). Maintenance personnel should refer to the MAC prior to performing any maintenance. In many instances, some of the maintenance procedures contained in this manual may be performed at the direct support, general support, or depot level. The nature and extent of maintenance for each category is described in the following paragraphs.

B. Direct Support Maintenance.

Maintenance personnel at this category of maintenance perform maintenance on the components and subassemblies of Radar Set AN/APN-158 and return the repaired item directly to the user. Maintenance at this level consists of troubleshooting, repair of conventional circuits, such as replacement of parts and subassemblies, and alignment and adjustments. Functional tests of system components are performed at this level as required.

C. General Support Maintenance.

Maintenance personnel at this category of maintenance repair components, subassemblies, modules, etc. and return the repaired item to the user. This level of maintenance is similar to that described in the preceding paragraph except that maintenance is extended to more complex circuitry and replacement of detail parts within the components and modules of the AN/APN-158.

D. Depot Level Maintenance.

Maintenance personnel at this level perform complete major overhaul of the equipment. Repair of components containing gear trains, synchros, etc. are performed at this level only by maintenance personnel possessing the necessary specialized skills.

Section II. SYSTEM DESCRIPTION AND OPERATION

1-6. GENERAL.

This section presents purpose, specifications, general description, and general theory of operation of the WP-103 Weather Radar System. Refer to figure 1-1 for an overall view of the WP-103 Weather Radar System. All units, except the 561G-4 Cockpit Control Unit, are shown in approximately true relative size. For clarity, the 561G-4 is shown approximately twice relative size.

1-7. PURPOSE OF EQUIPMENT.

The WP-103 Weather Radar System provides a PPI presentation of radar visible weather conditions within 60 degrees to either side of the aircraft heading. Through the use of the ANT tilt control, the system also provides radar visible presentations of outstanding terrain features, such as lakes, streams, shorelines, mountains, and cities, along the aircraft heading. The system has a selectable video range presentation of 30, 50, and 150 nautical miles.

Section III. THEORY

1-8. THEORY OF OPERATION.

A. General.

The following paragraphs describe the system theory of operation. The discussion is divided into a simplified block diagram section and a detailed functional block diagram section. For a more detailed discussion, refer to the individual units coverage in chapters 2 through 6.

B. Simplified Block Diagram Theory. (Refer to figure 1-3.)

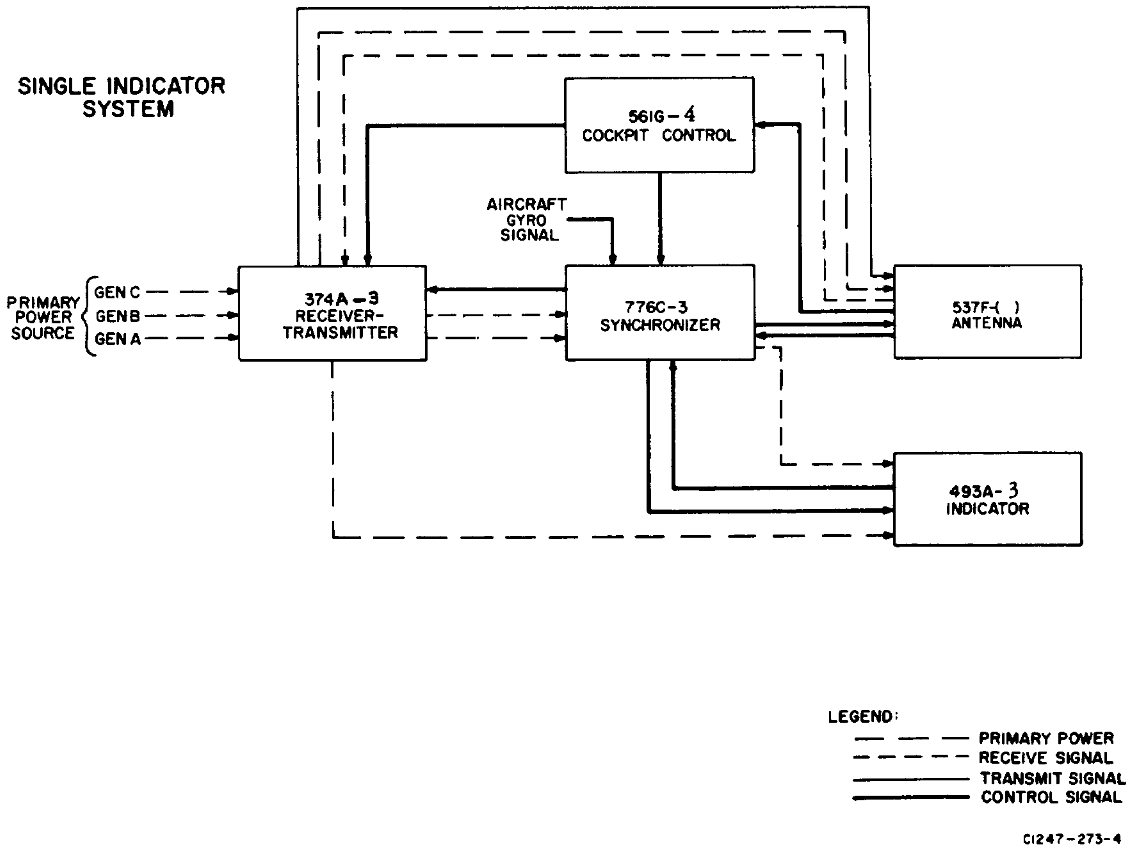
All primary power to the WP-103 Weather Radar System is applied through the 374A-3 Receiver-Transmitter.

The transmit pulses are generated in the receiver-transmitter and applied to the 537F-( ) Antenna. The reflected signals are received by the antenna and applied to the receiver-transmitter where they are heterodyned, preamplified, and applied to the 776C-3 Synchronizer. The synchronizer provides the video signals, control signals, and deflection currents to the 493A-3 Indicator.

Synchronization between the antenna reflector motion, in the azimuth plane, and the indicator sweep is accomplished by amplitude modulating the deflection currents that are generated in the synchronizer with azimuth information from the antenna.

Stabilization of the antenna is accomplished by providing a vertical reference for the antenna using an analog information voltage. The analog voltages are provided by the aircraft vertical reference gyro.

The WP-103 Weather Radar System is controlled by the 561G-4 cockpit control. The 561G-4 controls the application of primary power to the system. In addition, it permits manual antenna tilt, receiver gain control, and selection of standby, operate (normal), or contour mode of operation.

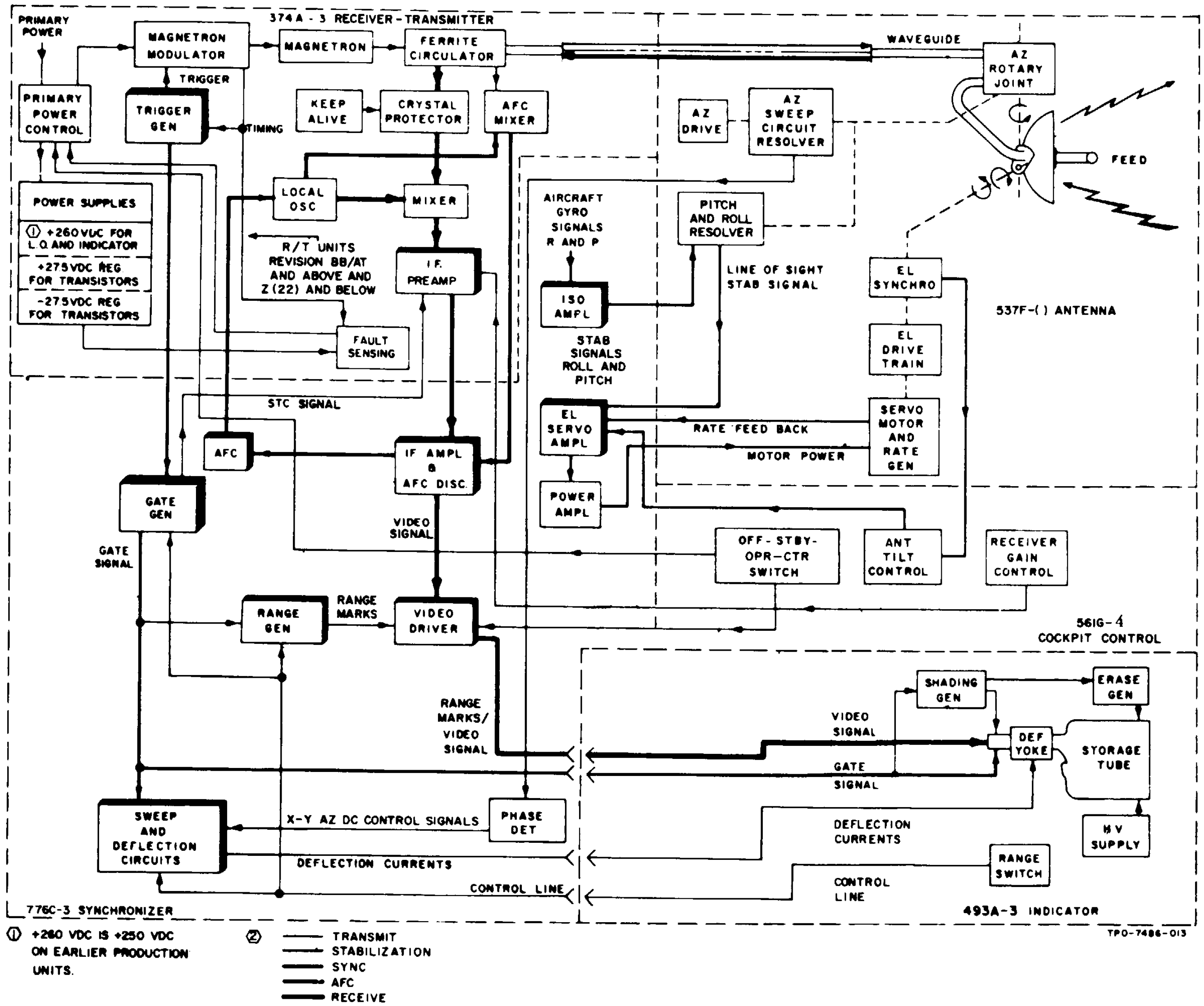


WP-103 Weather Radar System, Simplified Block Diagram
Figure 1-3

C. <u>Detailed Functional Block Diagram Theory.</u>

(1) General.

Figure 1-4 is a detailed block diagram of the WP-103 system. Primary functions (transmit, receive, synchronization, afc, and stabilization) are shown and identified. Secondary functions are not identified. Both the primary and secondary functions are discussed in detail in the following paragraphs.

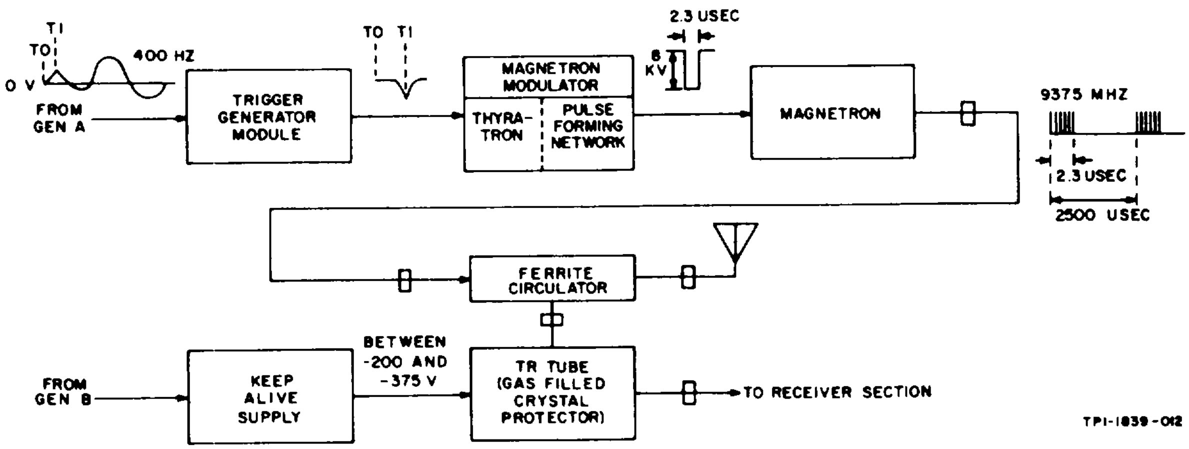


WP-103 Weather Radar System, Detailed Block Diagram, Figure 1-4

(2) Transmitter. (Refer to figure 1-5.)

(a) General.

The transmitter section consists of the trigger generator module, magnetron modulator (thyratron and pulse-forming network) magnetron, ferrite circulator (one-way isolator), TR tube (gas-filled crystal protector) and keep-alive supply, interconnecting waveguide, and antenna.



Transmitter Section, Functional Block Diagram
Figure 1-5

(b) Transmission.

The trigger generator produces the trigger pulse that fires the thyratron. The thyratron, triggered at the primary power frequency, provides a quick discharge path for the pulse-forming network. This produces a 2.3-microsecond high-voltage pulse that triggers the magnetron. The magnetron oscillates at 9375 MHz for the duration of each pulse. The ferrite circulator and interconnecting waveguide couple the magnetron output to the antenna.

(c) Receiver Isolation.

The WP-103 system uses the same antenna and interconnecting waveguide to transmit and receive. To prevent damage to the receiver mixer crystals during transmission, a TR tube is used to provide rf switching for the receiver.

The TR tube is located in the waveguide between the ferrite circulator and signal mixer. During transmission, a small portion of the transmitted pulse enters the receiver output of the ferrite circulator. This causes the TR tube to ionize.

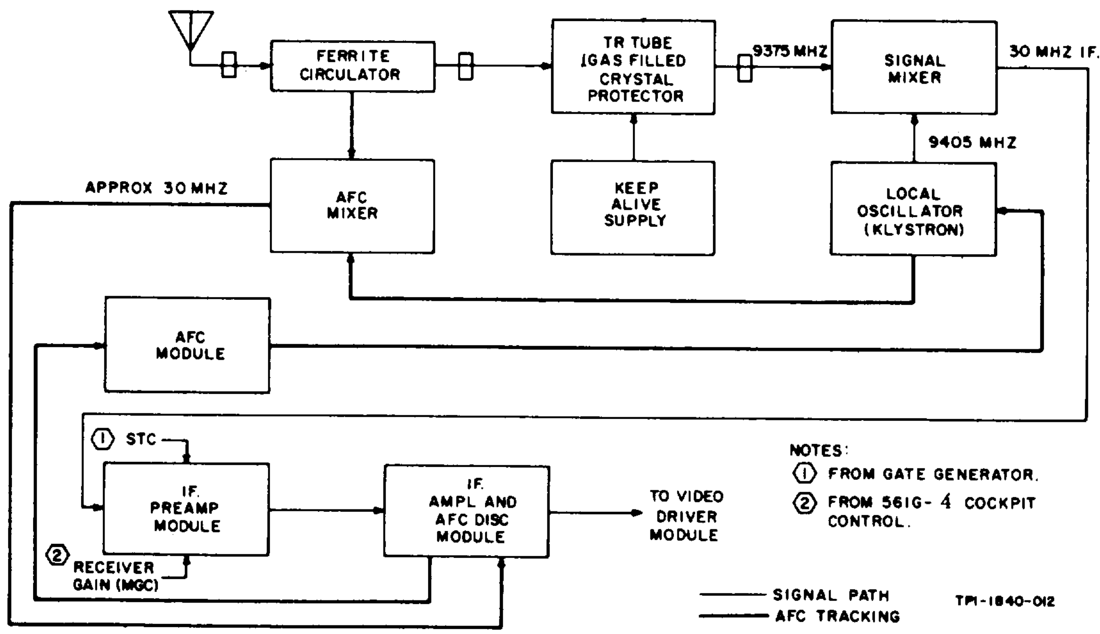
When the TR tube ionizes, the rf is blocked one-half wavelength away at the receiver output of the ferrite circulator. This prevents further entry of the transmitted pulse.

The keep-alive supply holds the TR tube near its ionization potential to minimize the amount of rf energy and time required for ionization.

During reception, the ferrite circulator and the waveguide twist assembly direct the received signal into the receiver and rotate the energy field of the received signal so that it is not absorbed by the magnetron.

(3) Receiver. (Refer to figure 1-6.)

The receiver section consists of the antenna, interconnecting waveguide, ferrite circulator, TR tube and keep-alive supply, signal mixer, local oscillator, if. preamplifier module, if. amplifier and afc discriminator module, and afc circuits.



Receiver Section, Functional Block Diagram
Figure 1-6

The ferrite circulator and waveguide twist assembly direct the receive signal into the signal mixer. During reception, the TR tube is deionized thereby allowing the received signal to enter the signal mixer.

The signal mixer heterodynes the received signal with the output of the local oscillator. This results in a 30-MHz if. that is applied to the if. preamplifier.

There are two factors that determine the gain of the if. preamplifier: stc (sensitivity time control), and mgc (manual receiver GAIN control on 561G-4 cockpit control). Stc, from gate generator module, controls the gain of the if. preamplifier up to a range of 25 miles. The stc varies the gain at an exponential rate. This is necessary to prevent close range target returns from overdriving the if. preamplifier. Mgc is set by the operator and it determines the receiver sensitivity by establishing the overall gain of the if. preamplifier.

The output of the if. preamplifier is amplified by the if. amplifier. The amplified video output of the if. amplifier varies logarithmically with the input.

(4) Automatic Frequency Control. (Refer to figure 1-6.)

The afc maintains a constant if. by controlling the local oscillator frequency. It consists of the afc mixer, afc discriminator, and afc module.

The afc mixer heterodynes the output of the local oscillator with the transmitted rf energy, sampled at the ferrite circulator. The resultant signal, approximately 30 MHz, is applied to the afc discriminator section of the if. amplifier and afc discriminator module. The afc discriminator detects any change in frequency of the 30-MHz signal and applies it to the afc module. The output is a series of pulses whose amplitude is a function of the frequency of the discriminator input. The afc module detects the amplitude of the input pulses, amplifies, and converts the signal to supply a negative de potential to the local oscillator (klystron repeller voltage). The level of the potential supplied by the afc module controls the frequency of oscillation of the klystron to hold the if. at 30 MHz.

The afc module also has a sweeping mode of operation in which the klystron frequency is scanned. This mode is used to acquire a lock-on condition immediately after the radar set is turned on.

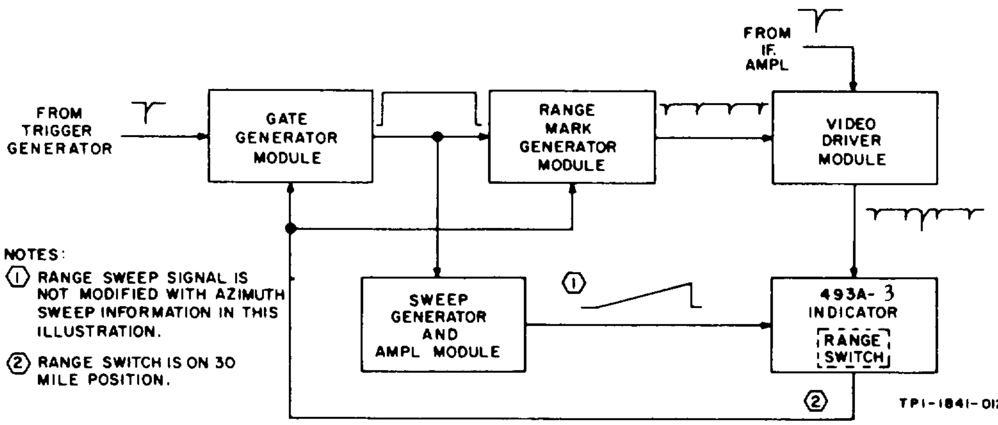
(5) Display. (Refer to figure 1-7.)

The display system consists of the circuits necessary for presentation of target and range information. The system incorporates the gate generator module, range mark generator module, sweep generator and amplifier module, video driver module, and all circuits in the indicator.

The gate generator, pulsed by the trigger generator, provides output gate pulses at a rate equal to that of the primary power (400 Hz) and a pulsed duration equivalent to the desired sweep time for the range selected. The range mark generator supplies 10-, 15-, or 25-mile range marks to the video driver module. The range mark generator is turned on and off by the output from the gate generator. The range marks are added to the target video in the video driver. When the system control switch is in the CTR (contour) position, received signals above a predetermined level are canceled by the video driver. This results in black spots or dark areas in the video presentation that represents severe storm cells.

The output of the video driver is applied to the indicator.

The RANGE switch, located on the front panel of the indicator, selects the gate time and the frequency of the range marks.



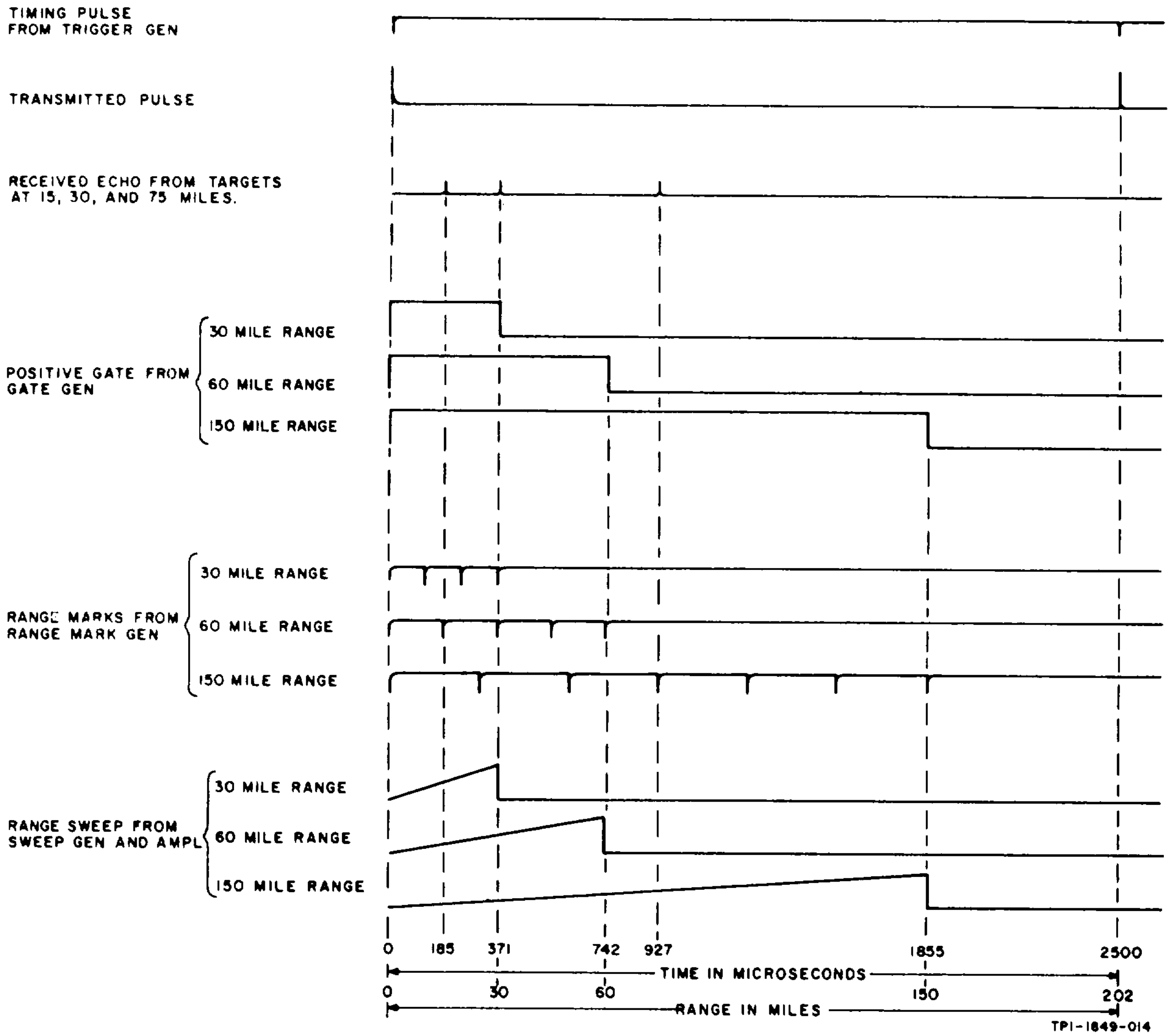
Display System, Functional Block Diagram
Figure 1-7

(6) Synchronization/Timing. (Refer to figures 1-7 and 1-8.)

The display circuits measure the time between the transmitted pulse and the received echo. This permits accurate display of range information on the indicator. To accomplish this, the triggering of the display circuits is coincident with the transmitted pulse. Figure 1-7 is a block diagram of the display system. Figure 1-8 is the system synchronization/timing chart.

The WP-103 system completes one cycle of operation every 2500 microseconds. During the first 2.3 microseconds, the system is in the transmit mode of operation. This is followed by the received mode. The received mode is followed by a quiescent period in which both the transmitter and receiver are silent. Figure 1-8 shows that the time for one cycle of operation is 645 microseconds greater than the longest range available (150 miles). This prevents received echoes from targets beyond 150 miles from appearing as close range targets on the next cycle of operation. Since 645 microseconds is equal to 52 radar miles,* only received echoes from targets beyond a range of 202 (150 + 52) miles could appear as close range targets. However, the signal level from targets at this range is not detectable.

*A radar mile is defined as the time it takes a transmitted pulse to travel 2 miles (1 mile out and 1 mile back).



WP-103 System, Synchronization/Timing
Figure 1-8

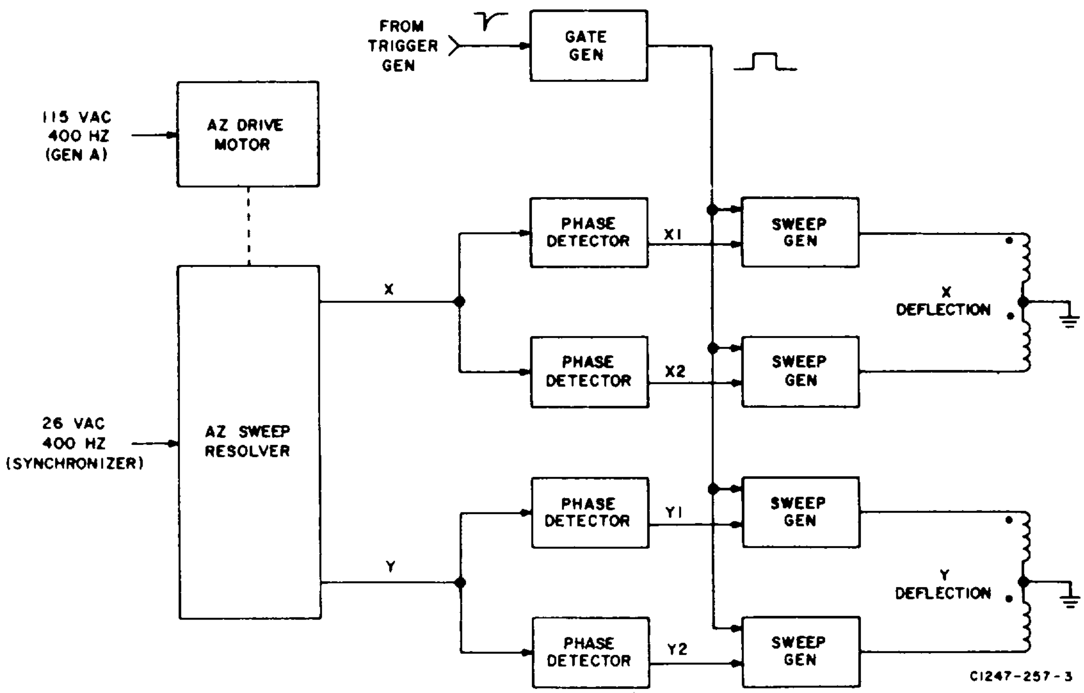
(7) Sweep. (Refer to figure 1-9.)

The sweep system consists of the azimuth sweep resolver, four phase-sensitive detectors, four synchronized sweep generators (sweep generator and amplifier module), and four isolated deflection coils (indicator deflection yoke).

The WP-103 uses an electromagnetically deflected sweep. The deflection currents are generated by the four sweep generators. These currents are modulated by azimuth information from the azimuth sweep resolver and applied to the indicator deflection yoke to produce a PPI sector scan presentation. This presentation is synchronous with the antenna reflector motion. Dc positioning currents, through one vertical yoke winding, position the sweep origin near the bottom center of the indicator face.

The two output windings of the azimuth sweep resolver provide antenna azimuth position information. The output signals from the azimuth sweep resolver are processed by the phase detectors to obtain the desired azimuth information. The output of each phase detector amplitude modulates the sweep of each respective sweep generator. The sweep time of each generator is controlled by the gate pulse from the gate generator module.

Each sweep generator drives a deflection coil located around the neck of the indicator crt. The composite magnetic field from all four deflection coils deflects the crt electron beam to produce an off-center, sector scan, PPI presentation.



Sweep System, Functional Block Diagram
Figure 1-9

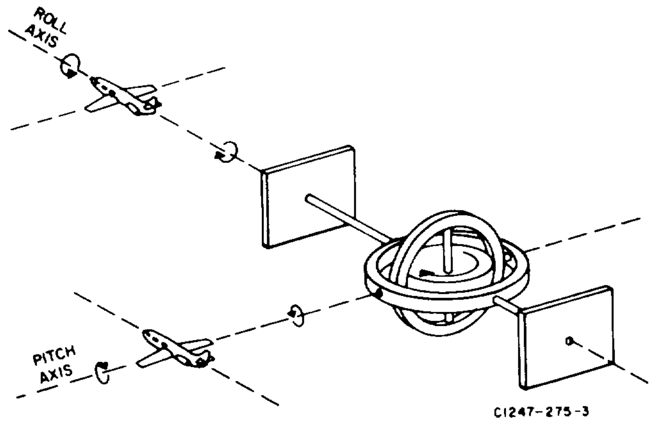
(8) Antenna Stabilization.

(a) General.

The antenna stabilization system maintains the antenna beam horizontal by compensating for pitch and roll of the aircraft to prevent loss of target presentation on the indicator. The antenna positioning circuits form a closed loop servo system. The input to the antenna stabilization system are analog voltage signals from the aircraft vertical reference gyro. These signals provide a vertical reference for the antenna. The ANT tilt control on the cockpit control panel modifies the signal to cause the antenna dish to tilt with respect to the vertical reference.

(b) Aircraft Gyro. (Refer to figure 1-10.)

The stabilization system is controlled by the pitch and roll error signals from the aircraft vertical reference gyro. Since the gyro is free to move within the mounting gimbals in any direction, a pitching or rolling aircraft actually moves around the gyro. Pitch and roll synchro transmitters (center-tapped potentiometers in’ some cases) are attached to the pitch and roll axes. When the aircraft pitches or rolls, an error signal is provided by the corresponding synchro transmitter. The magnitude of the error signal from either the pitch or roll synchro transmitter is determined by the amount and direction of the pitch and roll motion of the aircraft.



Gyro Application, Pictorial Diagram
Figure 1-10

(c) Stabilization System Operation. (See figure FO-1)

The pitch and roll error signals from the vertical reference gyro are applied to the isolation amplifier module in the synchronizer where the phase of the error signals is properly set and the sensitivity of the gyro is normalized for operation in the system. The phase-corrected, normalized output signals from the isolation amplifier module are applied to the pitch and roll resolver in the antenna.

The output of the resolver is added to the output of the antenna tilt synchro and applied to the input of the elevation servo amplifier in the synchronizer.

This signal is a combined elevation error and antenna tilt command signal that positions the antenna in elevation. The output of the amplifier is applied to the control winding of the tilt drive motor in the antenna. A rate generator, part of the tilt drive motor, produces an output voltage that is proportional to the speed of the motor rotation. This signal is returned to the input of the elevation servo-amplifier module as degenerative feedback to prevent overshoot or hunting of the antenna.

(d) ANT Tilt Control.

The ANT tilt control enables the operator to position the antenna at a fixed angle above or below horizontal (O-degree elevation). Since the antenna tilt control synchro receives excitation from the elevation synchro in the antenna, the antenna tilt signal is a combined elevation error and antenna tilt command signal. This signal is vectorially added to the output of the pitch and roll resolver, amplified, and applied to the tilt drive motor.

(e) Controls and Adjustments.

Several controls are available in the synchronizer for the proper orientation and adjustment of the stabilization system. PITCH PHASE and ROLL PHASE controls (R5 and R8) adjust the electrical phase of the pitch and roll signals. PITCH AMPLITUDE and ROLL AMPLITUDE controls (R7 and R10) adjust the gain of the pitch and roll channels in the WP-103 system. PITCH TRIM control (R7 in the antenna) is adjusted to compensate for minor inaccuracies in the physical alignment of the antenna relative to the vertical axis of the gyro. RATE control (R4 in the antenna) adjusts the level of the damping signal.

(9) Power Distribution. (Refer to figures 1-11, 1-12, 1-13, and 1-14)

The distribution of dc power is illustrated in figures 1-11, 1-12, and 1-13. All low-voltage dc power supplies are located in the receiver-transmitter. The distribution of ac power is shown in figure 1-14.

(10) Fault Sensing Circuit. (Refer to figure 3-15)

(a) General.

The fault sensing circuit monitors the +260- and +27.5-volt power supplies in the 374A-3 Receiver-Transmitter. In some units it also monitors the magnetron modulator charging circuit. If a failure occurs, it deenergizes operate relay K1.

The circuit consists of the fault sense board and relay K6 in receiver-transmitter units revision AA (23) and above. In units revision Z (22) and below, one additional relay, K5, is used.

(b) Operation.

1. Receiver-Transmitter Revision AA (23) and Above.

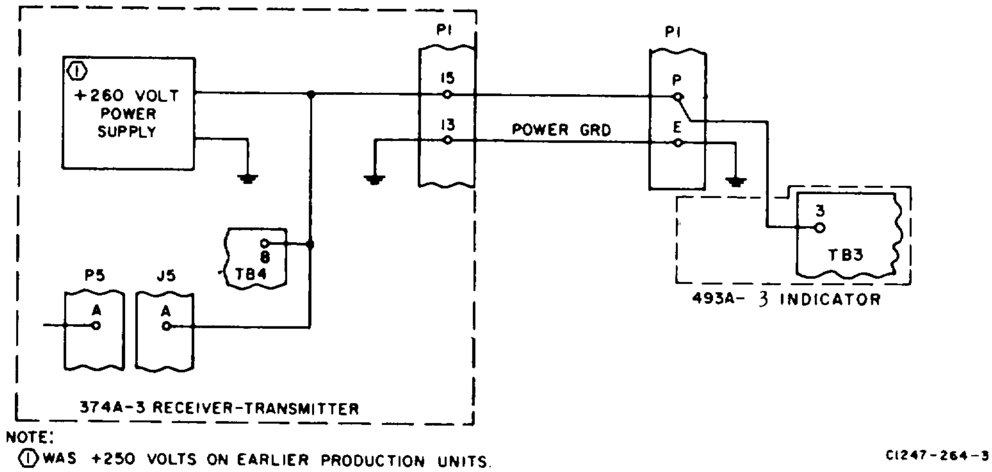
As shown in figure 1-15 (detail A), operate relay K1 is energized by the -27.5-volt relay power source. Ground is supplied to relay K1 through contacts 2 and 3 of relay K6. If a malfunction occurs, the circuits on the fault sense board detect the malfunction and energize the fault sensing relay K6. With relay K6 energized, ground is removed from relay K1 and applied to relay K6. This keeps relay K6 energized until the OFF-STBY-OPR-CTR switch is changed from OPR to STBY.

2. Receiver-Transmitter Revision Z (22) and Below.

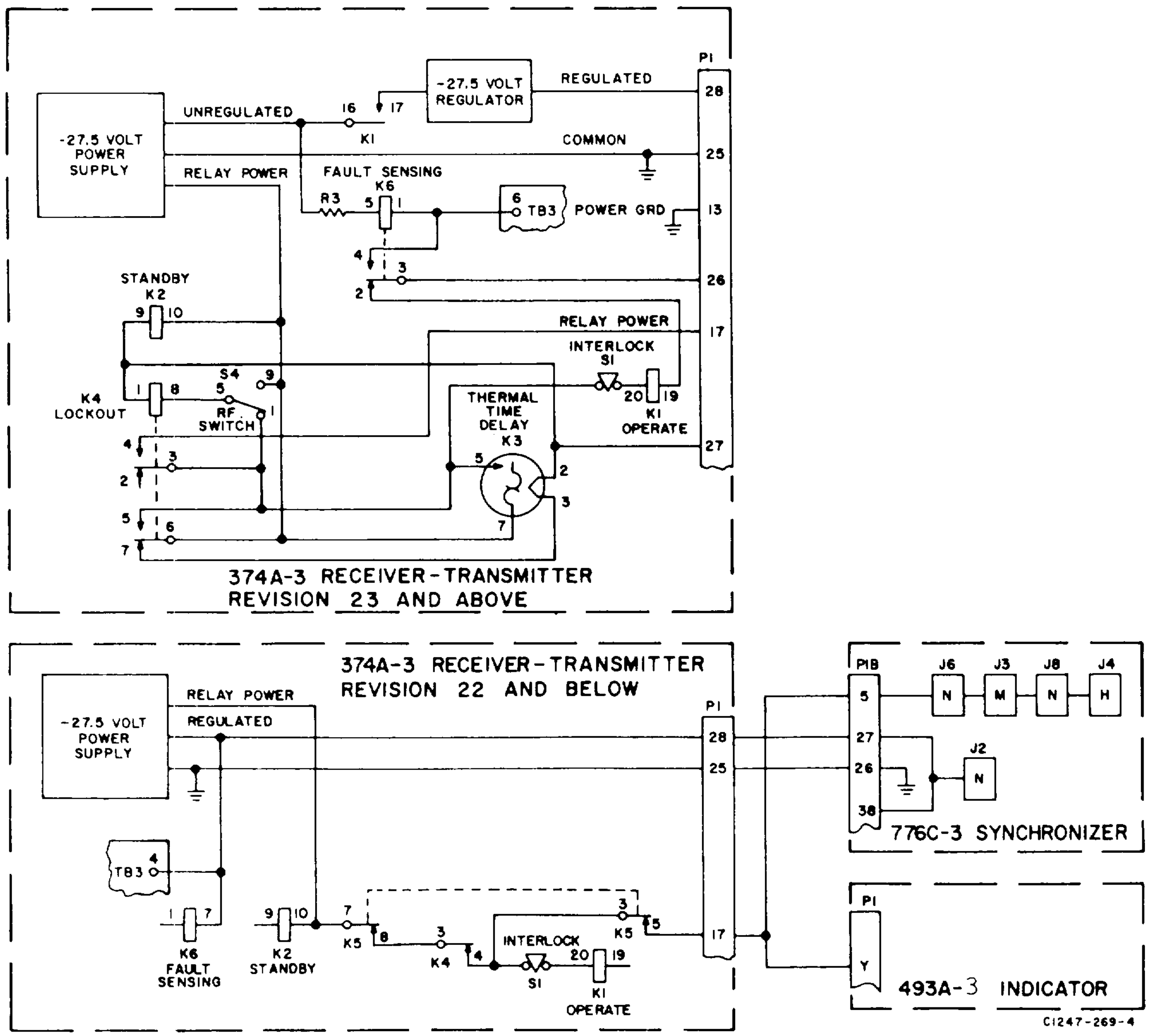
As shown in figure 1-15 (detail B), operate relay K1 is energized by the -27.5-volt relay power source supplied through contacts 7 and 8 of fault relay K5. Ground is applied directly from the OFF-STBY-OPR-CTR switch to relay K1. If a malfunction occurs, the circuits on the fault sense board detect the malfunction and energize fault sensing relay K6. With relay K6 energized, -27.5-volt relay power is applied to fault relay K5 through contacts 4 and 5 of relay K6. With relay K5 energized, -27.5-volt relay power is removed from operate relay K1 and applied directly. to relay K5, bypassing contacts 4 and 5 of relay K6. This keeps relay K5 energized until the OFF-STBY-OPR-CTR switch is changed from OPR to STBY.

(11) Operating Controls.

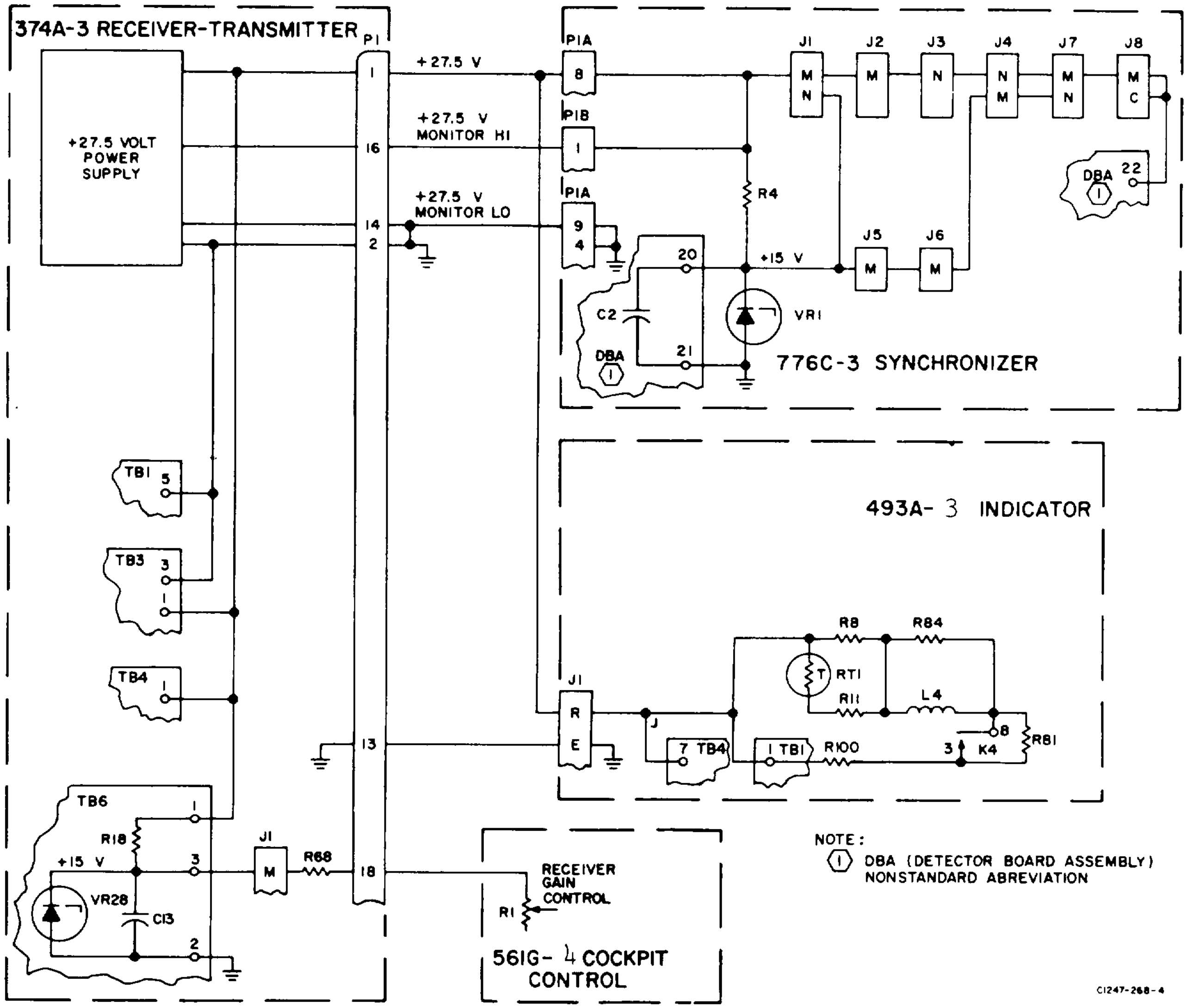
The locations and functions of the operating controls are listed in figure 1-16.



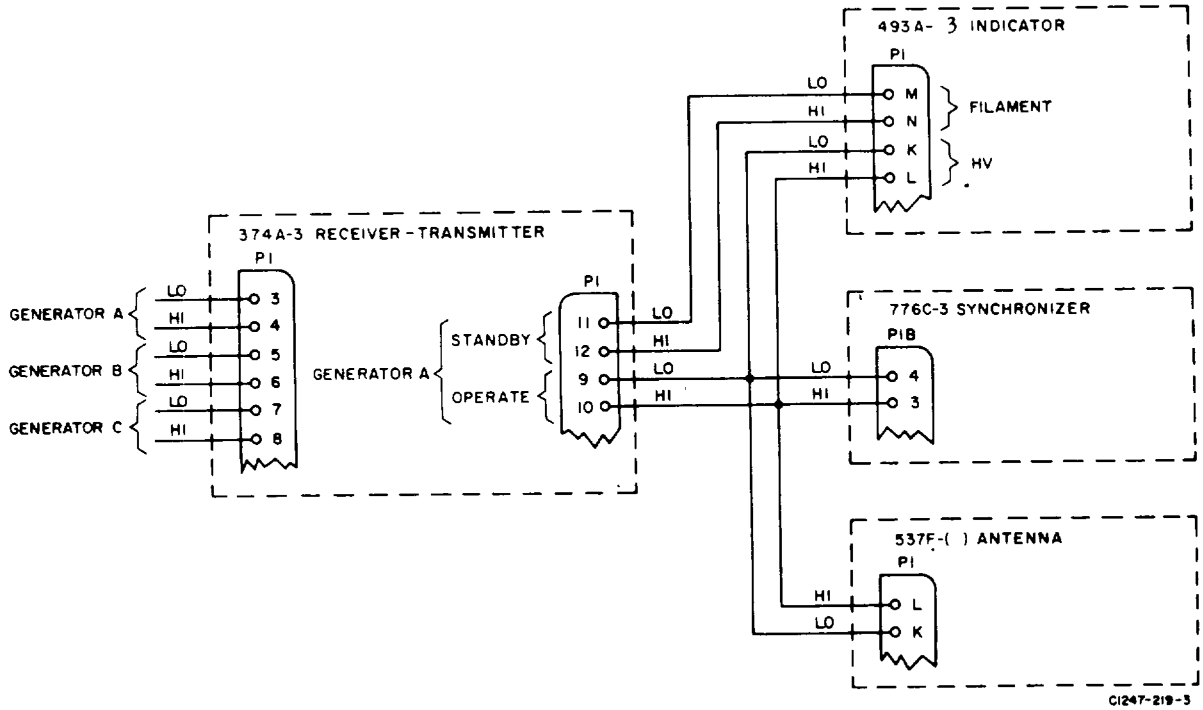
+260-Volt Power Distribution Diagram
Figure 1-11



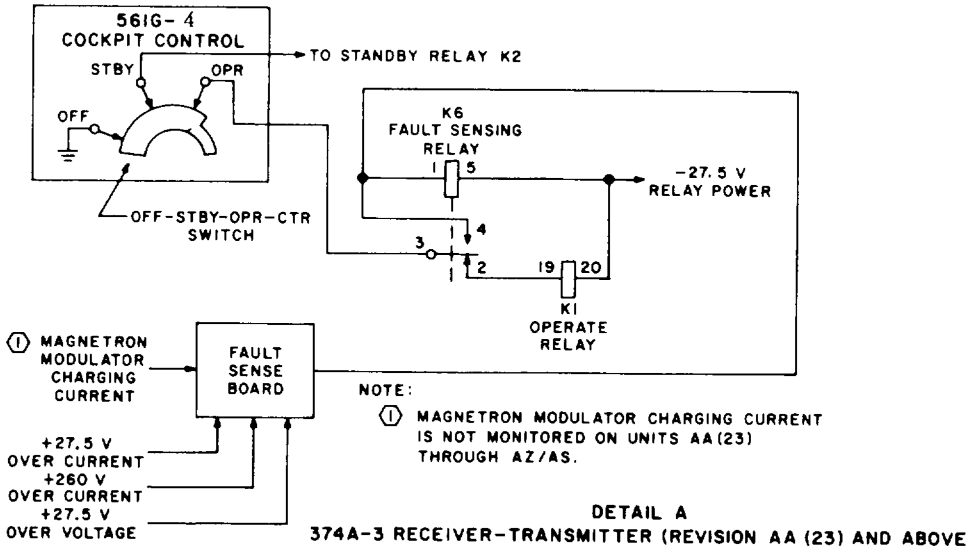
-27.5-Volt Power Distribution Diagram
Figure 1-12

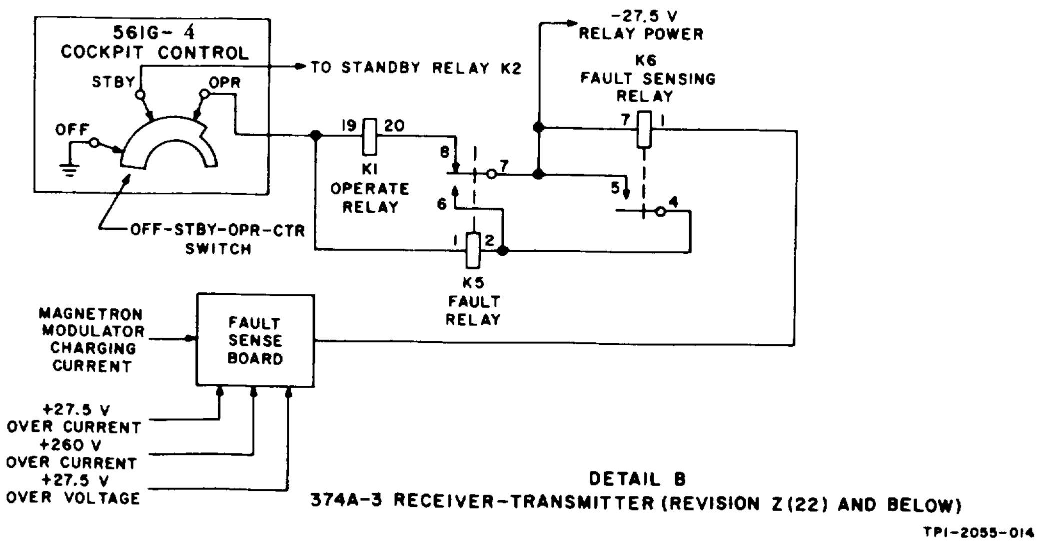


+27.5-Volt Power Distribution Diagram
Figure 1-13



AC Power Distribution Diagram
Figure 1-14





Fault Sense, Simplified Functional Block Diagram
Figure 1-15

CONTROL	LOCATION	FUNCTION
OFF-STBY-OPR-CTR switch	561G- 4 cockpit control	System power control switch. Selects standby, normal, or contour mode of operation.
METER switch	374A-3 Receiver-Transmitter	Selects the function measured by the meter.
BACKGRD	493A- 3 Indicator	Adjusts the contrast between the echo return and screen background.
RECEIVER GAIN	Part of 561G- 4 cockpit control	Controls the if. amplification of received signals.
ANT tilt	Part of 561G- 4 cockpit control	Varies the tilt of the antenna to a maximum of 15 degrees above or 15 degrees below 0-degree elevation.
RANGE switch	493A- 3 Indicator	Selects the range of operation and corresponding range marks.
SCAN-OFF switch	537F-( ) Antenna	Controls antenna scan motion (on or off).
ON-RF-OFF switch	374A-3 Receiver-Transmitter	Removes high voltage from modulator on OFF position.
DIM	493A-3 Indicator	Permits display intensity control.
RED	493A-3 Indicator	Permits display color from yellow to red control.

WP-103 System, Operating Controls
Figure 1-16

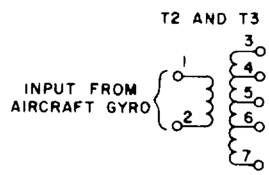
D. Vertical Reference Gyro (Associated Equipment).

The weather radar system stabilization circuitry receives pitch and roll error information from the aircraft vertical reference gyro.

The synchronizer stabilization circuitry is factory wired and adjusted for use with a vertical reference gyro that conforms to ARINC Characteristic 529. ARINC Characteristic 529 requires pitch and roll output linearity of 50 millivolts per degree (±10 percent) and that the electrical phase shift of the pitch and roll readouts lead the gyro excitation voltage 10 +2 degrees.

Synchronizer transformers T2 and T3 (chassis mounted on rear bracket) must be wired in accordance with figure 1-17 when used with gyros that do not conform to ARINC Characteristic 529. Pitch and roll phase shifting networks require readjustment when used with aircraft gyros that do not conform to ARINC 529. Alignment procedures are given in Chapter 3.

<u>NOTE</u>: Gyro excitation voltage must be from same source as GEN A.



GYRO OUTPUT VOLTAGE	TRANSFORMER SECONDARY TAPS FOR 50 MV/DEG OUTPUT TO ANT STAB SYSTEM
(1) 50 MV / DEG	7 AND 3
100 MV / DEG	7 AND 4
(2) 200 MV / DEG	7 AND 5
400 MV / DEG	7 AND 6

(1) ARINC CHARACTERISTIC 529

(2) ARINC CHARACTERISTIC 407

TPI-1045-012

Synchronizer Wiring Modification -
Depending on Aircraft Gyro
Figure 1-17

Section IV
System Adjustments and Test

1-9. PREINSTALLATION TEST.

NOTE: No internal adjustments should be attempted after the system is installed in the aircraft. Internal adjustments that may be made prior to installation are described in chapters 2 through 6.

A. General.

The preinstallation test/troubleshooting procedures are performed to ensure that the WP-103 Weather Radar System, as shipped from the factory, is operating properly prior to installation in the aircraft. Adjustments and controls required at a system level are externally located on the individual units. The preinstallation test/troubleshooting procedure also determines-the accuracy of systems that have been in operation for extensive periods.

Figure FO-2 is a system interconnect diagram.

The 978G-1 Radar Test Set (Military nomenclature AN/APM-247), Collins part number 522-5731-015, is used as a wiring harness. If using the 978G-1, the stc is defeated by shorting to ground at the synchronizer rear test panel, and the position loop is opened by shorting the manual elevation control rotor on the 561G-4 cockpit control.

B. Test Equipment Required.

(1) General.

Figure 1-18 lists the test equipment and fixtures required to perform the preinstallation test/troubleshooting procedures. While substitution of equipment other than manufacturer and type listed is not recommended, other equipment may be used if it equals or exceeds the minimum specifications of the equipment listed. Nomenclatures shown in parentheses identify military equipment equivalent to the commercial units described.

(2) Bench Test Power Requirements.

The weather radar system primary power requirements are 115 volts ac ±5 percent, 400 Hz ±5 percent, 325 volt-amperes. The primary power is obtained from either a single-phase or 3-phase 4-wire wye source. The system divides the primary power into three separate loads. Regardless of which source is used, fuse each of the three loads.

The ac requirements for each of the three loads (generators A, R, and C) are listed in figure 1-19.

EQUIPMENT		MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
Items 1 through 9 are required for preinstallation testing and troubleshooting when using the 978G-1 Radar Test Set and 979A-1 Wiring Harness Tester.			
1.	Radar test set also contains: (AN/APM-247) Cable assemblies as follows: CX-10242 CX-11555 CG-1464/U (6 ea) Adapters as follows: UG-273/U (3 ea) UG-201A/U (2 ea)	Collins 978G-1, part number 522-5731-015 and troubleshooting.	Used to interconnect the WP-103 units for preinstallation testing
2.	Wiring harness tester Consists of all extention cables and connectors required for mating to cables of 978G-1.	Collins 979A-1, part number (AN/APM-246)	Used to test the interconnect function of the 978G-1.
3.	Multimeter	Simpson 260 (AN/USM-210)	Sensitivity: 5,000 ohms/volt (ac). Voltage: 0 to 50 volts (ac). Accuracy: 3% (ac).
4.	Oscilloscope	AN/USM-281A (or equiv)	Vertical deflection sensitivity: 20 mv/cm to 20 v/cm. Sweep range: 0.1 us./cm to 5 s/cm, calibrated. External trigger input level: 0.2 to 10 v. Input impedance; 1 megohm. Bandwidth: dc to 10 MHz.

Test Equipment Required (Sheet 1 of 2)
Figure 1-18

EQUIPMENT		MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
5.	Radar test set	AN/UPM-56	Frequency range: 9.0 to 9.5 GHz. Power measurement range: -6 to +28 dbm.
6.	Echo box	Narda 830 (TS-488A/UP)	Frequency accuracy: 9.2 to 9.4 GHz (±2 MHz) Loaded Q: 75,000.
7.	Dummy load	Hewlett-Packard X912A (DA-383/APN-158)	Frequency range: 9.2 to 9.4 GHz. Power dissipation: 50 watts avg, 50 kw peak. Vswr: 1.1 to 1 maximum.
8.	Gyro simulator	Part of 978G-1 (AN/APM-247)	
9.	Vtvm	Hewlett-Packard 410B (ME-26A/U)	Voltage range: 0 to 1000 volts (dc). Input impedance: 100 megohms (dc).

Test Equipment Required (Sheet 2 of 2)
Figure 1-18

QUANTITY PER SYSTEM	NAME	TYPE	REQUIRED CHARACTERISTIC	POWER (volt-amperes)
1	Generator A	Primary power source	115 volts ac ±5 percent, 400 Hz ±5 percent	55
1	Generator B	Primary power source	115 volts ac ±10 percent, 400 Hz ±5 percent	160
1	Generator C	Primary power source 400 Hz ±5 percent	115 volts ac ±10 percent,	110

Generators A, B, and C, Primary Power Requirements
Figure 1-19

(3) Bench Test Setup.

Prior to interconnecting the units of the weather radar system shown in figure FO-2 the 537F-( ) Antenna should be checked as follows:

(a) Secure the antenna to a locally fabricated mount and position on its back.

(b) Position the dish (reflector) to align with center lubber line on the azimuth and elevation markers.

(c) Starting at 0 degree, measure the distance between reflector rim and mount at 90-degree intervals around the circumference of the dish.

NOTE: If the measurements are not the same for all readings, refer to the antenna overhaul manual for alignment procedures.

CAUTION: STRONG ELECTROMAGNETIC FIELDS EXIST WITHIN A 3-FOOT RADIUS OF THE RECEIVER-TRANSMITTER. MAINTAIN A DISTANCE OF 3 FEET (MINIMUM) BETWEEN THE RECEIVER-TRANSMITTER AND INDICATOR. DAMAGE TO WRIST WATCHES AND OTHER SUCH DEVICES MAY RESULT WITHIN THIS AREA.

(4) Bench Test Setup Using 978G-1

(a) Place AC POWER switch (978G-1) to OFF.

(b) Connect 978G-1 to bench primary power.

(c) Interconnect the units of the weather radar system using the appropriate cables on the 978G-1.

(d) Position TEST SET FUNCTION SELECTOR (978G-1) to SYSTEM OPERATION.

(e) Place the CONTROL UNIT SELECTOR (978G-1 to the EXT position).

(f) Place GYRO SIMULATOR ON-OFF switch (978G-1) to ON.

(g) Set GYRO SIMULATOR PITCH and ROLL controls (978G-1) to 0.

(h) Install jumper connector between R-T UNIT and SYNC receptacles (AFC section of front panel) on 978G-1.

(i) Install jumper connector between R-T UNIT and SYNC receptacles (IF section of front panel) on 978G-1.

(j) Position the AC POWER switch (978G-1) to ON.

(k) Through the use of the INPUT VOLTAGE ADJUST (978G-1), obtain 115 volts ac on the INPUT VOLTAGE meter (978G-1). Readjust as required.

(l) Observe the INPUT FREQUENCY meter and note that the frequency is 400 Hz ±5% (978G-1).

NOTE: The 978G-1 is now set up for system mode of operation All control settings and switch positions shall remain in their present position unless otherwise specified.

C. Preinstallation Test/Troubleshooting Procedures.

Before performing the preinstallation test/troubleshooting procedures position all switches and controls of the weather radar system as shown in figure 1-20 and remove the top dust cover from the receiver-transmitter and synchronizer.

The preinstallation test/troubleshooting procedures in figure 1-21 are a system test. Start with test 1 and perform all tests in the sequence shown.

WARNING: BEFORE OPERATING THE SYSTEM, INSTALL DUMMY LOAD AT WAVEGUIDE CONNECTION TO 374A-3.

The preinstallation test/troubleshooting procedures are in tabular form and are shown in figure 1-21. It is assumed that the WP-103 system being tested is interconnected as shown in figure FO-2 and all operating controls are positioned as shown in figure 1-20.

UNIT	CONTROL	POSITION
Gyro simulator (not part of weather radar system)	ON-OFF switch	OFF
	PITCH control	0
	ROLL control	0
561G-4 cockpit control	OFF-STBY-OPR-CTR switch	OFF
	ANT tilt control	0°
	GAIN control	Fully clockwise
374A-3 Receiver-Transmitter	Meter switch	**OFF
	RF switch	ON
537F-( ) Antenna	SCAN-OFF switch	SCAN
493A-3 Indicator	BACKGRD control	Fully counterclockwise
	RANGE control	30/10
	RED tab	DOWN
	DIM tab	DOWN
**374A-3 Receiver-Transmitter units, revision Z (22) and below, do not have an OFF position. On these units, place meter switch in KA position.		

Initial Control Settings
Figure 1-20

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
A. 374a-3 meter readings KA (steps 2 thru 11)	1	Pull out interlock switch on back of 374A-3. NOTE: Pull out to second detent.			
<u>WARNING</u>: THIS TEST CONSISTS OF HIGH-VOLTAGE MEASUREMENTS.	2	Disconnect cap lead from TR tube.			
	3	Set OFF-STBY-OPR-CRT switch (561g-4) to STBY.	374A-3 blower motor operates.	374A-3 blower motor fails to operate.	374A-3.
	4	Using the vtvm, measure the -dc voltage between cap lead and ground.	Between -600 and -800 volts.	Any other reading.	374A-3.
	5	Set OFF-STBY-OPR-CTR switch (561G-4) to OFF.			
(Cont)	6	Using clip lead, connect one end to TR tube and the other end to cap lead.			

Preinstallation Test/Troubleshooting Procedures (Sheet 1 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
A. (Cont)	7	Set OFF-STBY-OPR-CTR switch (561G-4) to STBY.			
	8	Using vtvm, measure the-dc voltage between TR tube cap and ground.	Between -200 and -375 volts	Any other reading	374A-3.
	9	Observe the meter reading on 374A-3.	Midscale +1 division on units revision Z(22) and below. Not monitored on units revision AA(23) and above.	Any other reading.	374A-3.
	10	Set OFF-STBY-OPR-CTR switch (561G-4) to OFF.			
(Cont)	11	Remove clip lead and connect cap lead (Cont) to TR tube.			

Preinstallation Test/Troubleshooting Procedures (Sheet 2 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
A. (Cont)	12	Set OFF-STBY-OPR-CTR switch (561G-4) to STBY. **<u>NOTE</u>: Allow 4 minutes before proceeding to step 13.**			
	13	Set meter switch (374A-3) to AFC.			
	14	Remove trigger generator module from 374A-3.			
	15	Set OFF-STBY-OPR-CTR switch ,(561G-4) to OPR.			
	16	Observe meter (374A-3) and record maximum needle deflection.	Meter needle sweeps at a rate of 5 to 10 times in 10 seconds.	No needle deflection. Meter needle sweeps at a rate other than specified.	374A-3 or 776C-3. 776C-3.
(Cont)	17	Set OFF-STBY-OPR-CTR switch (561G-4) to STBY.			

Preinstallation Test/Troubleshooting Procedures (Sheet 3 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
A. (Cont)	18	Insert trigger generator module in 374A-3.			
	19	Set OFF-STBY-OPR-CTR switch (561G-4) to OPR.			
	20	Observe afc meter reading on 374A-3.	Meter needle locks on within half a division of maximum deflection recorded in step 16. **NOTE: Must lock on between 3 and 10.**	Any other reading.	Refer to chapter 2 and chapter 3 for afc standardization and alignment procedures.
	21	Set meter switch (374A-3) to REV and note meter reading.	Meter needle is locked on between 3 and 10. **NOTE: Record the needle reading.**	Any other reading.	374A-3.
	22	Set meter switch (374A-3) to FWD and note meter reading.	Meter needle is locked on between 3 and 10 and within half a division of needle reading recorded in step 21.	Any other reading.	374A-3.
(Cont)	23	Set meter switch (374A-3) to MAG and observe meter.	Midscale +1 major division.	Any other reading.	374A-3.

Preinstallation Test/Troubleshooting Procedures (Sheet 4 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
A. (Cont)	24	Set OFF-STBY-OPR-CTR switch (561G-4) to STBY.			
	25	Set meter switch (374A-3) to GEN A and observe meter.	Midscale ±1 major division.	Any other reading.	Bench primary power or 374A-3.
	26	Set meter switch (374A-3) to GEN B and observe meter.	Midscale ±1 major division.	Any other reading.	Bench primary power or 374A-3.
	27	Set meter switch (374A-3) to GEN C and observe meter.	Midscale ±1 major division.	Any other reading.	Bench primary power or 374A-3.
	28	Set OFF-STBY-OPR-CTR switch to OPR.			
(Cont)	29	Set meter switch (374A-3) to -27.5V and observe meter.	Midscale ±1 major division.	Any other reading.	374A-3.

Preinstallation Test/Troubleshooting Procedures (Sheet 5 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
A. (Cont)	30	Set meter switch (374A-3) to +27.5V and observe meter. **<u>NOTE</u>: A more accurate measurement (±0.5 v) is available on 776C-3 (units 18/U and above) rear test panel.**	Midscale ±1 major division.	Any other reading.	374A-3.
	31	Set meter switch (374A-3) to +250V and observe meter.	Midscale ±1 major division.	Any other reading.	374A-3.
B. Display system	1	Set OFF-STBY- OPR-CTR switch(561G-4) to STBY and back to OPR. **<u>NOTE</u>: Audible change produced by magnetron.**	537F-( ) scans 60° to each side with no mechanical interference.-	537F-( ) dish remains stationary.	374A-3 or 537F-( ). **<u>NOTE</u>: If audible change was detected, 537 F-( ) is at fault**.
(Cont)				Any other indication.	537F-( ).

Preinstallation Test/Troubleshooting Procedures (Sheet 6 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
B. (Cont)	2	While observing 493A-3), rotate background control until uniform display is visible. (Some background noise should be visible.)			
	3	Set SCAN-OFF switch(537F-( )) to OFF and using manual sweep adjust, position dish to one side.	Sweep trace not visible on 493A-3 (range marks are acceptable).	Sweep trace visible.	537F-( ).
	4	While observing 493A-3 and using manual sweep adjust (537F-( )), rotate dish.	Trace is visible at all angles within 55° each side of dead ahead and is continuous.		
(Cont)	5	Using manual sweep adjust (537F-( )), position dish dead ahead.			

Preinstallation Test/Troubleshooting Procedures (Sheet 7 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
B. (Cont)	6	Using BACK- GRD control (493A-3), reduce background until trace is barely visible.	Trace should be located within 1/8 inch of the vertical lubber line and range display panel.	Any other indication.	493A-3.
	7	While observing (493A-3), select 30-, 60-, and 150-mile display respectively with the use of the RANGE switch.	Correct number of range marks and last range mark (all ranges) is within 3/16 ±1/8 inch of the top of the sweep trace.	Incorrect number of range marks. Last range mark present but not within 3/16 ±1/8 inch of top of 493A- 3.	776C-3. 493A-3 or 776C-3.
	8	Set SCAN-OFF switch (537F( )) to SCAN.			
	9	Rotate BACK - GRD control 493A-3 until background noise is just visible.	Background noise is uniform over entire sector and range marks are concentric, evenly spaced, and circular.	Any other indication.	493A- 3.
(Cont)	10	While observing 493A- 3, change ranges	Previous range marks disappear within 2 to 6 s.	Previous range marks disappear too soon or take too long to disappear.	493A-3.

Preinstallation Test/Troubleshooting Procedures (Sheet 8 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
B. (Cont)	11	Set RANGE switch to 60-mile range and adjust BACK-GRD control (493A-3) for a comfortable noise presentation.			
	12	Observe noise presentation on the other ranges.	Background noise is comfortable on all ranges.	Variations in degree of background noise between ranges.	493A-3. **<u>NOTE</u>: Internal adjustment of 493A-3 will correct problem.**
	13	Place RED control tab (493A-3) in the up position.	Presentation on 493A-3 changed to red.	No change.	493A-3
	14	Place DIM control tab(493A-3) in the up position.	Presentation on 493A-3 disappeared.	No change.	493A-3
	15	Place RED and DIM control tabs in down position.			

Preinstallation Test/Troubleshooting Procedures (Sheet 9 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
C. Stabilization system	1	Set OFF-STBY-OPR-CTR switch (561G4)to OPR.			
	2	Rapidly vary ANT tilt control (561G-4).	Dish scans smoothly.	Dish erratic or oscillates.	537F-( ). **<u>NOTE</u>: Adjustment of R4 on 537F-( ) should correct abnormal indication.**
	3	Adjust BACK-GRD control fully counterclockwise.			
	4	Lift front panel access shutter on 776C-3.			
	5	Set SCAN-OFF switch (537F( )) to OFF.			
(Cont)	6	Using manual sweep adjust (537F-( )), align dish with center lubber			

Preinstallation Test/Troubleshooting Procedures (Sheet 10 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
C. (Cont)		line on azimuth marker.			
	7	Observe alignment of dish with respect to elevation marker.	Aligned with center lubber on elevation marker.	Any other position.	537F-( ). **NOTE: When using a locally fabricated control unit, it must be aligned in accordance with procedure in chapter 6.**
	8	Adjust ANT tilt control(561G-4 15 degrees up and 15 degrees down.	Dish pitched 7.5 mechanical degrees up and down respectively. **NOTE: Outer lubber lines on elevation marker represent 15 mechanical degrees from center lubber line.**		537F-( ), 776C-3, or 561G- 4 **NOTE: Most expedient procedure may be to check 776C-3 first, in accordance with procedure in chapter 3**.
	9	Set ON-OFF switch on gyro simulator to ON.			
(Cont)	10	Using multimeter, adjust roll control on gyro simulator			

Preinstallation Test/Troubleshooting Procedures (Sheet 11 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
C. (Cont)		for 1 volt rms, right wing down. If using gyro simulator (978G-1), adjust ROLL control to 20 RIGHT WING DOWN position.			
	11	Jumper PITCH HI to LO on 776C-3 front panel.			
	12	Connect multi-meter to ROLL HI and LO on 776C-3 front panel.	Meter indicates 5 ±0.5 volts rms.	Any other reading.	ROLL AMP potentiometer on 776C-3 front panel. Adjust as necessary.
	13	Set SCAN-OFF switch (537F( )) to SCAN.			
(Cont)	14	Connect multi-meter to SERVO test jacks (J22 and J23) on 776C-3 rear test panel.	Needle sweeps and maximum deflection does not exceed 20 volts rms.	Any other reading.	ROLL PHASE potentiometer on 776C-3 front panel. Adjust as necessary.

Preinstallation Test/Troubleshooting Procedures (Sheet 12 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
C. (Cont)	15	Connect multimeter to STAB HI and LO on 776C-3 front panel.			
	16	Set SCAN-OFF switch (537F-( )) to OFF.			
	17	Using manual sweep adjust (537F-( )), position dish for null condition.	Pointer should be aligned with center lubber line on azimuth marker.	Any other indication.	537F-( ).
	18	Position dish 60 degrees to the right (SCAN switch side).	Dish is pitched up 8.6 ±0.1 mechanical degrees.	Any other indication.	537F-( ) or 776C-3.
	19	Remove jumper from PITCH HI and LO on 776C-3 front panel.			
(Cont)	20	Using multimeter, adjust PITCH control on gyro simulator for 1 volt rms, nose down, and set ROLL			

Preinstallation Test/Troubleshooting Procedures (Sheet 13 of 23)
Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
C. (Cont)		control to 0. If using gyro simulator (AN/ APM-247) ,adjust PITCH control to 20 degrees NOSE DOWN and ROLL con- trol to 0.			
	21	Jumper ROLL HI to LO on 776 C-3 front panel.			
	22	Connect multi- meter to PITCH HI and LO on 776C-3 front panel.	Meter indicates 5 ±0.5 volts rms.	Any other indication.	PITCH AMP potentiometer on 776C-3 front panel. Adjust as necessary.
	23	Set SCAN-OFF switch (537F- ( )) to SCAN.			
(Cont)	24	Connect multi- meter to SERVO test jacks (J22 and J23) on 776C-3 rear test panel.	Needle sweeps and maximum deflection does not exceed 20 volts rms.	Any other reading.	PITCH PHASE potentiometer on 776C-3 front panel. F Adjust as necessary (to minimum I voltage).

Preinstallation Test/Troubleshooting Procedures (Sheet 14 of 23)

Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
C. (Cont)	25	Set SCAN-OFF switch (537F-( )) to OFF.			
	26	Using manual sweep adjust (537F-( )), position dish dead ahead.	Dish is pitched up 10 ±0.1 mechanical degrees.	Any other indication.	537F-( ) or 776C-3.
	27	Set ON-OFF switch (gyro simulator) to OFF.			
	28	Remove jumper from ROLL HI and LO on 776C-3 front panel.			
	29	Adjust PITCH control (gyro simulator) to 0.			

Preinstallation Test/Troubleshooting Procedures (Sheet 15 of 23)

Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
D. Transmitter Power	1	Using coaxial cable, connect TP4 (374A-3) to oscillo-scope CHANNEL A input.			
(Cont)	2	Set AN/UPM-56 controls as follows: RF LEVEL SE-LECTOR to RF IN; RF LEVEL control fully clockwise; POWER to ON. Depress 1MW-CAL switch and adjust BRIDGE SET-FTNE control until RF POWER meter indicates SET POWER.			

Preinstallation Test/Troubleshooting Procedures (Sheet 16 of 23)

Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
D. (Cont)		Adjust ZERO SET control until RF POWER meter indicates SET ZERO. Connect RG-9A/U coaxial cable from RF INPUT/OUTPUT connector to TP6 (374A-3).			
	3	Set RF switch (374A-3) to ON.			
	4	Measure amplitude and pulse width of pulse displayed on oscilloscope. (Four-minute time delay must be energized).	Amplitude: between +60 and 110v. Width (at 50% amplitude): between 2.1 and 2.5 us.	Any other pulse amplitude and width.	374A-3.
(Cont)	5	Perform procedure given in AN/UPM-56 technical manual for measuring rf power.			

Preinstallation Test/Troubleshooting Procedures (Sheet 17 of 23)

Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
D. (Cont) (Cont)	6	Compute average power output of transmitter by adding the following: a. 374A-3 directional coupler loss (approx 20 db, exact amount stamped on coupler). b. RF LFVEL meter reading (in dbm). c. Coupling loss from cable connecting RF INPTTT/ OUTPUT connector to TP6 (374A-3).	Not less than +43 dbm.	Less than +43 dbm.	374A-3.

Preinstallation Test/Troubleshooting Procedures (Sheet 18 of 23)

Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
D. (Cont)					
	7	Calculate peak power output as follows: Peak power = PW avg x 1000 PW x prf	Not less than 20 kw for 115 vac input to 374A-3.	Less than 20 kw.	374A-3.
		NOTE 1: Peak power is in kw, average power is in watts, PW is in in us., and prf = primary power frequency (nominally 400 Hz). **NOTE 2: Average power output of +43 dbm is equal to approximately 20 watts. If required, refer to the dbm-watts conversion charts given in the AN/UPM-56 technical manual to convert power in dbm to watts.**			
(Cont)					

Preinstallation Test/Troubleshooting Procedures (Sheet 19 of 23)

Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
D. (Cont)	8	Rotate AN/-UPM-56 FRE-QUENCY meter control until dip is indi-cated on RF POWER meter.	9375 +40 MHz.	Any other frequency.	374A-3.
		NOTE: The frequency is read directly from the FREQUENCY scale, the frequency in Mhz being 10 times the dial reading.			

Preinstallation Test/Troubleshooting Procedures (Sheet 20 of 23)

Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
E. Ring time **NOTE: This test is essentially a test for receiver sensitivity.**	1 2	Connect oscilloscope TRIGGER INPUT to TP4 (374A-3). **Connect CHAN-NEL A input to VIDEO test jack on 776C-3 rear test panel.**			
	3	Short the stc at 776C-3 rear test panel to ground.			
(Cont)	4	**WARNING: HIGH VOLT-AGES ARE PRESENT IN THE IMMEDIATE AREA OF TP6.**			

Preinstallation Test/Troubleshooting Procedures (Sheet 21 of 23)

Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
E. (Cont)		Disconnect ROG-9A/U cable from AN/UPM-56 RF INPUT/OUTPUT connector and connect it to Echo Box TS-48R/UP.			
	5	**Using tuning control on echo box, obtain maximum deflection on meter.** **NOTE: Reduce sensitivity control as needed to keep reading on meter scale.**			
	6	Observe ring Observe tion on oscilloscope.	**Minimum ring time of 28 us.**	Below 25 us.	374A-3 or 776C-3.
(Cont)	7	Remove the short at 776C-3 rear test panel.	**Minimum ring time of approximately 90% of ring time recorded in step 6.**	Less than 90%.	776C-3.

Preinstallation Test/Troubleshooting Procedures (Sheet 22 of 23)

Figure 1-21

TEST	STEP	PROCEDURE	NORMAL INDICATION	ABNORMAL INDICATION	
				INDICATION	PROBABLE CAUSE
E. (Cont)					
	8	Disconnect all test equipment, and set OFF-STBY-OPR-CTR switch (561G- 4)to OFF.			

Preinstallation Test/Troubleshooting Procedures (Sheet 23 of 23)

Figure 1-21

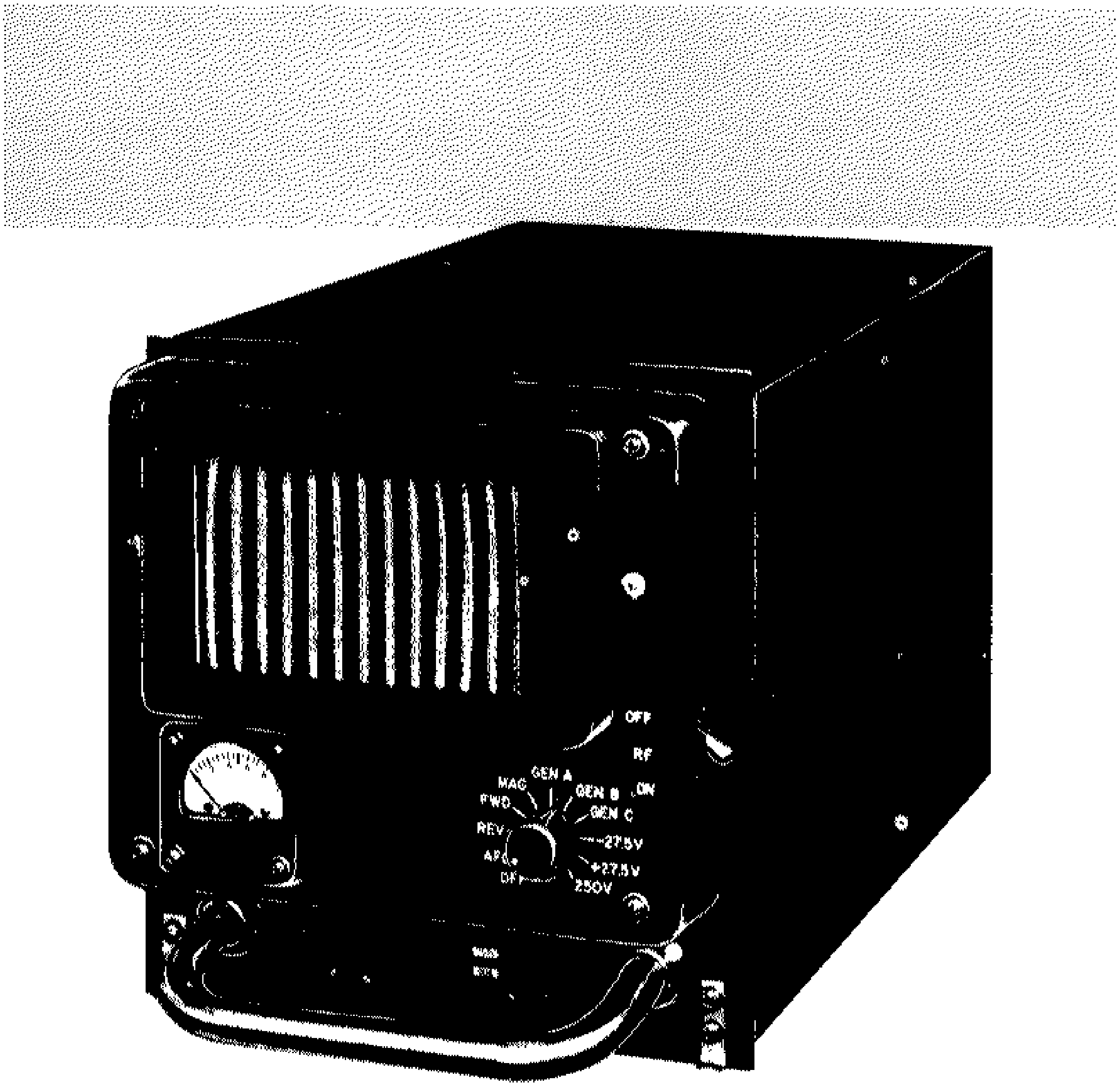
CHAPTER 2

RECEIVER-TRANSMITTER RT-711/APN-158 (374A-3)

AND

MOUNT, RECEIVER-TRANSMITTER MT-3068/APN-158 (349A-6/7)

NOTE: Receiver-Transmitter RT-711/APN-158 and Mount, Receiver-Transmitter MT-3068/APN-158 are referred to in this chapter by their commercial nomenclature: 374A-3 Receiver-Transmitter and 349A-6/7 Shockmount, respectively.



374A-3 Receiver-Transmitter, Overall View

Figure 2-1

Section I.

DESCRIPTION AND OPERATION

2-1. GENERAL.

Included within this section are the purpose of equipment, the equipment specifications, the equipment description, and theory of operation. Refer to figure 2-1 for an overall view of the 374A-3 Receiver-Transmitter. Figure 2-2 is a table of equipment covered in this manual.

EQUIPMENT	COLLINS PART NUMBER
374A-3 Receiver-Transmitter	522-6113-006
349A-6 Shockmount	522-6115-004
349A- 7 Shockmount	772-5135-001

Equipment Covered

Figure 2-2

2-2. PURPOSE OF EQUIPMENT.

The 374A-3 Receiver-Transmitter provides the receiving and transmitting circuits and all primary power for the WP-103 Weather Radar System. The transmitter is a fixed-frequency pulse unit operating in the X-band at 9375 MHz. The rf energy from the transmitter is radiated by the 537F-7 or 537F-8 Antenna. The return signals received by the antenna are applied to receiver circuits in the 374A-3. The output of the 374A-3 receiver is applied to the 776C-3 Synchronizer, where the signal is amplified and the video information is detected. The video output is applied to the 493A-3 Indicator for presentation.

The 349A-6/7 Shockmount provides mounting facilities for the 374A-3 Receiver-Transmitter.

2-3. EQUIPMENT SPECIFICATIONS.

The equipment specifications for the 374A-3 Receiver-Transmitter and the 349A-6/7 Shockmount are listed in figure 2-3.

Characteristic	Specification
374A-3 Receiver-Transmitter	
Weight	26.4 pounds (12 kg) (units with revision Z (22) and below) 25.8 pounds (11.7 kg) (units with revision AA (23) and above)
Physical dimensions (3/4 ATR short)	15-1/16 inches (38.26 cm) long, 7-13/16 inches (19.85 cm) high, and 7-5/8 inches (19.35 cm) wide
Cooling	Blower equipped, forced air cooling
Shock conditions	
Performance criteria	Eighteen 10-millisecond shocks at 7.5 g
Safety criteria	Six 10-millisecond shocks at 15 g
Vibration	1.5 g peak acceleration at 10 to 55 Hz when mounted in a solid mount and 5 g peak acceleration at 55 to 500 Hz when mounted in 349A-6/7 Shockmount
Power requirements	(Sources must be phase synchronous.)
Source A	115 v ±5%, 400 Hz ±5%
Standby	3 watts, 3 volt-amperes
Operating	50 watts, 55 volt-amperes
Source B	115 v ±10%, 400 Hz ±5%
Standby	45 watts, 50 volt-amperes
Operating	150 watts, 160 volt-amperes
Source C	115 v ±10%, 400 Hz ±5%
Standby	5 watts, 6 volt-amperes
Operating	100 watts, 110 volt-amperes

Equipment Specifications (Sheet 1 of 3)

Figure 2-3

Characteristic	Specification
374A-3 Receiver-Transmitter (Cont)	
Load vswr	2:1 maximum
Recovery time	10 microseconds maximum from leading edge of transmitted pulse
Preamplifier bandwidth	2.5 MHz
Local oscillator radiation	0.001 milliwatt maximum
Time delay	4 minutes (nominal)
Protective devices required	
Source A	1-ampere fuse
Source B	2-ampere fuse
Source C	2-ampere fuse
Protective devices provided	Fault sensing circuit (returns unit to standby)
Altitude	Category A, DO-108
	45,000 feet (units with revision Z (22) and above and units with revision Y (21) and below that have been modified by Service Bulletin No. 6)
	Category B, DO-108
	25,000 feet (units with revision Y (21) and below that have not been modified by Service Bulletin No. 6)
Temperature	
Continuous operation	-55 to +55 °C (-67 to +131 °F,
30-minute operation	+71 °C (+160 °F)
Relative humidity	95% to 100% at +55 °C (+131 °F)
Operating frequency	9375 ±40 MHz

Equipment Specifications (Sheet 2 of 3)

Figure 2-3

Characteristic	Specification
374A-3 Receiver-Transmitter (Cont)	
Duty cycle	Continuous duty
Transmitter power output	20 kw peak minimum at 115 v input
Pulse width	2.3 microseconds nominal
Pulse repetition rate	400 p/s (nominal) synchronized with primary power frequency
Duty factor	0.0008 to 0.001
Minimum discernible signal	-104 dbm measured beyond the range of stc action
Noise figure	10 db maximum at +25 °C (+77 °F)
349A-6/7 Shockmount	
Weight	
349A-7	4.3 pounds (1.95 kg)
349A-6	3.8 pounds (1.72 kg)
Physical dimensions (both)	17-3/4 inches (45 cm) long, 9-7/8 inches (25 cm) high, and 8-5/8 inches (22 cm) wide

Equipment Specifications (Sheet 3 of 3)

Figure 2-3

2-4. EQUIPMENT DESCRIPTION.

A. General.

This section presents a mechanical and an electrical description of the 374A-3 Receiver-Transmitter.

B. Mechanical Description.

The receiver-transmitter is housed in a 3/4-ATR short case and, for units with revision AA (23) and above, weighs 25.8 pounds. Units with revision Z (22) and below weigh 26.4 pounds. A 4-piece dust cover completely encloses the receiver-transmitter. Forced air cooling is provided by a blower on the front of the unit, with exhaust air routed through the base. A UG-39/U or UG-135/U choke flange that mates with an RG-52/U or RG-67/U waveguide is provided at the rear of the receiver-transmitter for the waveguide connection to the antenna. A DPX-32C2-33S connector (Collins part number 370-2159-00) on the rear panel provides power and signal interconnections to other units of the WP-103 system.

The 349A-6/7 Shockmount provides electrical connection of the receiver-transmitter with other units of the system and mechanical isolation of the receiver-transmitter from the aircraft. Furnished as part of the shockmount is a mating connector, type DPXLF-A32C2-34P (Collins part number 370-2143-00), for the receiver-transmitter power and signal connector. The 349A-7 Shockmount also contains a waveguide block which permits pressurization of the waveguide assembly.

The revision level of the receiver-transmitter is identified by numbers or letters stamped near the unit nameplate. Some units may be stamped with either a letter or number corresponding to the same revision level. Due to omission of letters I, O, Q, and X from the numbering system, revision level Z corresponds to revision level 22, revision level AA to 23, etc. Later production unit revisions are identified by two pairs of letters. The first pair indicates primarily electrical changes; the second pair, mechanical changes. All letters must be used to identify the unit revision level.

C. Electrical Description.

The receiver-transmitter consists of a magnetron oscillator, klystron local oscillator, trigger generator, mixer-duplexer, +260-v power supply, +27.5- and -27.5-v power supplies, -700-v keep-alive supply, modulator circuit, fault sensing circuit, metering circuit, and if. preamplifier. The receiver-transmitter provides transmitted pulses, preamplification of received signals, system trigger pulses, and power distribution to all other units in the WP-103 system.

2-5. BLOCK DIAGRAM ANALYSIS.

A. General.

This section presents a simplified and a detailed block diagram theory and a detailed theory of operation. The block diagram sections discuss the various functions of the receiver-transmitter. Detailed circuit analysis is discussed in the detailed theory of operation section. Throughout the discussion, the term "antenna" is used to reference the 537F-7 and 537F-8 Antenna respectively, as applicable to the particular configuration.

B. Simplified Block Diagram Theory. (Refer to figure 2-4)

(1) Trigger Generator.

The input to the trigger generator is obtained from the modulator network. The input synchronizes the trigger pulses to the 400-Hz frequency of the aircraft

power generator. Output trigger pulses from the trigger generator are applied to the thyratron tube and to the gate generator in the synchronizer.

(2) Thyratron.

The thyratron is triggered into conduction by positive pulses from the trigger generator. While it is conducting the thyratron provides a discharge path for the pulse forming network in the modulator.

(3) Modulator Network.

The modulator network contains a charging reactor, a pulse forming network (pfn), and a pulse transformer. A power transformer charges the pfn to a high potential. The thyratron tube, when triggered into conduction, allows the pfn to discharge through the pulse transformer. The pulse transformer supplies a very high-potential negative pulse to the magnetron cathode.

On units with revision Z (22) and below and BB/AT and above, a modulator overcharging fault signal is applied to the fault sensing circuit. This input to the fault sensing circuit is omitted in units with revisions AA (23) through AZ,/AS.

(4) Magnetron.

The magnetron produces an rf signal for the duration of the pulse applied from the pulse transformer to the magnetron cathode. This rf signal is waveguide coupled to the antenna through the mixer-duplexer.

Magnetron current is monitored by the metering circuit.

(5) Mixer-Duplexer.

The mixer-duplexer contains a ferrite circulator, TR tube, and afc and receiver if. mixer crystals. The plane of polarization of the rf energy from the magnetron is rotated by the circulator for proper orientation with the twist section of the waveguide. Rotation of signals through the circulator prevents returned signals from entering the magnetron instead of the receiving branch of the mixer-duplexer. During transmission, the TR tube is ionized. The ionized tube prevents the transmitted rf energy from entering the receiving branch of the mixer-duplexer, thereby protecting the if. mixer crystals.

A portion of the magnetron output signal is mixed with the klystron output in the afc crystal mixer to provide an afc signal to the synchronizer.

Signals returned from targets enter the mixer-duplexer from the antenna and are directed to the receiving branch of the mixer-duplexer. Here, the returned signals and the klystron signal are heterodyned in the if. mixer crystals. The output of the if. mixer is applied to the if. preamplifier.

The afc and if. mixer crystal currents are monitored by the metering circuit.

(6) Klystron Local Oscillator.

The klystron produces a signal 30 MHz above the magnetron frequency. In the afc crystal, the klystron output is heterodyned with a portion of the magnetron output. The resulting signal is applied to the afc circuit in the synchronizer. The klystron output is also heterodyned with the returned signals in the if. mixer crystals. The resulting signal is a 30-MHz if. which is applied to the if. preamplifier.

The synchronizer afc circuit supplies the klystron repeller voltage. When the if. changes from 30 MHz, the afc changes the repeller voltage which causes the klystron output to return the if. to 30 MHz.

(7) If. Preamplifier.

The low-level signals from the if. mixer crystals in the mixer-duplexer are amplified by the if. preamplifier. The amplified signals are applied to the if. amplifier in the synchronizer. A time varying voltage that reduces the gain of the if. preamplifier for close range targets is received from the stc (sensitivity time control) circuit in the synchronizer. A manual gain control voltage is also applied to the preamplifier from the radar control unit.

(8) Metering Circuit.

A metering circuit measures output from the primary power sources, power supplies in the receiver-transmitter, magnetron current, and mixer-duplexer crystal currents. A front panel switch selects the signal to be measured and applies it to the front panel meter of the receiver-transmitter.

(9) Power Supplies.

The receiver-transmitter provides dc voltages for all units of the radar system. The dc voltages from all power supplies except the keep-alive supply are regulated.

The positive dc power supplies are protected for overcurrent conditions by providing a fault signal to a fault sensing circuit. The -27.5-v supply also provides a fault signal for overvoltage protection.

The dc power supply voltages are monitored by the metering circuit. Units with revision AA (23) and above do not have provision for monitoring the keep-alive supply.

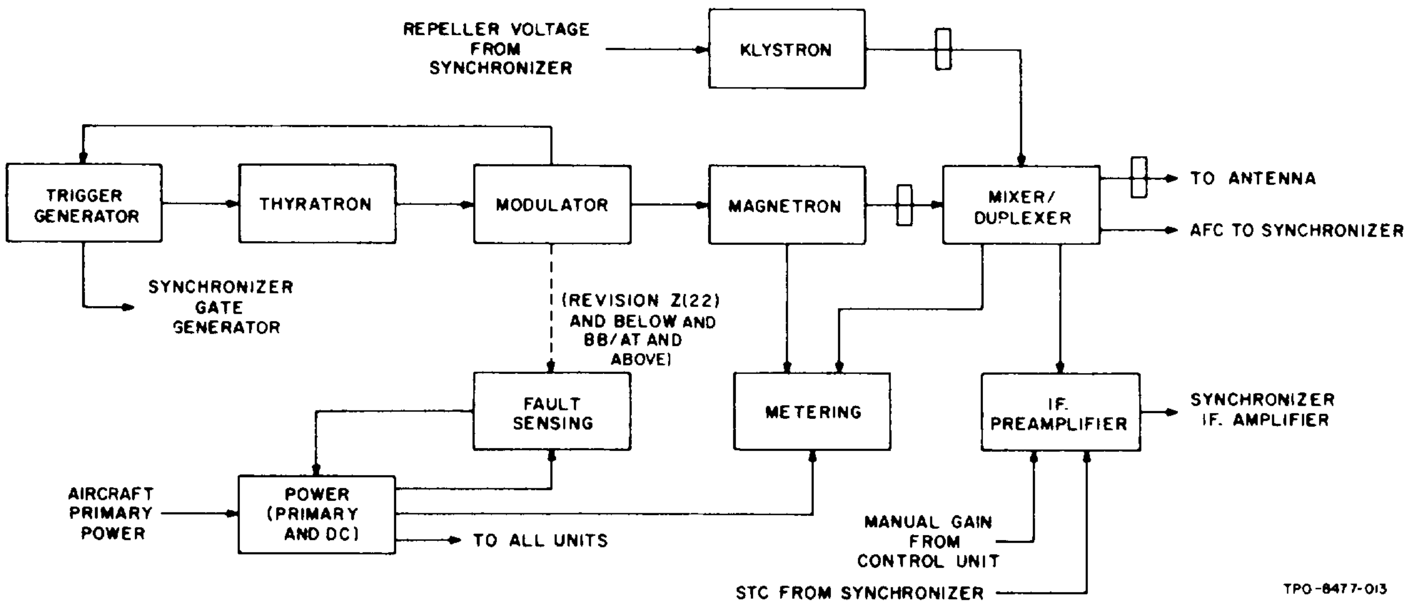
(10) Fault Sensing.

The fault sensing circuit receives fault signals from the positive dc power supplies (and modulator network on units with revision Z (22) and below and BB/AT and above). The fault sensing circuit has voltages from the protected circuits present at all times during operation. Abnormal operation in the protected circuits causes the fault sensing circuit input voltages to exceed a certain level, providing an output. The fault sensing circuit disables the relay which provides connection for part of the primary power to the radar system. The system then returns to the standby condition.

(11) Primary Power.

The aircraft power generator provides primary power to the radar system through the receiver-transmitter.

The aircraft primary power (380 to 420 Hz) supplied to the modulator charging circuit establishes the output trigger frequency of the trigger generator module.



374A-3 Receiver-Transmitter, Simplified Block Diagram

Figure 2-4

C. <u>Detailed Block Diagram Theory</u>. (Refer to figure FO-3)

(1) Trigger Generator.

The trigger generator provides trigger pulses which are synchronized to 400 Hz by a signal from the modulator network. This signal is a sampling of a combination of 400 Hz ac from the aircraft primary power supply and 600 Hz ac from the resonance of the modulator charging reactor and the pulse forming network. The signal to the trigger generator is obtained from the modulator power transformer when the RF switch, S4, is in the ON position and from the pulse transformer when the RF switch is set to OFF.

The combination of the two frequencies produces a waveshape which goes positive twice in one cycle of 400 Hz. (Refer to figure 2-6). The first positive crossing triggers a one-shot multivibrator in the trigger generator. The second positive crossing is ineffective since the multivibrator is already conducting. The differentiated output of the multivibrator triggers transistor Q6 into conduction and is also applied to the synchronizer gate generator module. The negative output pulse from Q6 is applied to the thyratron grid circuit through capacitor

C15. Trigger generator modules with revision G and below do not contain C15. In these modules, a pulse forming network is discharged through the thyratron grid circuit when Q6 is triggered into conduction by the differentiated pulse.

(2) Thyratron.

The thyratron is nonconducting until triggered into conduction by a positive pulse. This pulse is supplied by the trigger generator through a transformer and pulse shaping network on the thyratron grid module. When triggered into conduction, the thyratron provides a discharge path for the pulse forming network through the magnetron pulse transformer. Thyratron conduction continues for the duration of the pulse forming network discharge.

(3) Modulator Network.

The modulator network contains a magnetron pulse transformer, a pulse forming network (pfn), and a charging reactor and associated components. Due to the resonance of the circuit, the pfn charges to a potential several times that supplied by the power transformer. The pfn is kept from discharging by the nonconducting thyratron. When the maximum potential across the pfn occurs, the trigger generator output fires the thyratron. The pfn then discharges through the thyratron and magnetron pulse transformer.

The modulator network in units with revision Z (22) and below and revision BB/AT and above apply a voltage to the fault sensing circuit for overcurrent protection for the modulator.

(4) Magnetron.

The magnetron cathode is connected to the pulse transformer. When the pfn discharges through this transformer, a very high negative potential is applied to the magnetron cathode for the duration of the pulse. This high-potential pulse causes the magnetron to oscillate and generate an rf signal. The signal is wave-guide coupled through the mixer-duplexer to the antenna and is radiated into space.

Part of the rf energy from the magnetron is coupled to the afc crystal where it is heterodyned with the klystron output.

A voltage, developed from the magnetron current pulse, is applied to the metering circuit to provide monitoring of the magnetron current.

(5) Mixer-Duplexer.

The transmitted pulse from the magnetron enters the mixer-duplexer and is rotated 45° by the ferrite circulator for proper orientation with the twist section of the waveguide. During reception, signals enter the circulator and are rotated for proper orientation with the mixer-duplexer receiving branch probe where they are coupled to the mixer crystals.

A portion of the magnetron output is mixed with the klystron output in the afc crystal mixer. This if. (30 MHz) is applied to the afc circuit in the synchronizer.

Any deviation from 30 MHz causes a change in the afc voltage to the klystron repeller. The klystron frequency then changes to return the if. to 30 MHz.

Between transmitter pulses, returned signals are directed to the mixer crystals in the receiving branch of the mixer-duplexer. Here, the returned signals are mixed with the output of the klystron. The resulting 30-MHz if. is applied to the if. preamplifier.

The afc and forward and reverse mixer crystal currents are monitored by the front panel meter when the meter function selector switch is in the appropriate position.

(6) Keep-Alive Supply.

The keep-alive supply applies -700 v to the TR tube to partially ionize the gas about the electrodes in the tube. Energy from the magnetron causes complete ionization of the gas between the electrodes. When completely ionized, the tube prevents magnetron energy from entering the mixer-duplexer receiving branch and damaging the mixer crystals.

Units with revision Z (22) and below provide a keep-alive-voltage output to the metering circuit. On units with revision AA (23) and above, the keep-alive voltage is not metered.

(7) Klystron.

The klystron frequency is tuned to 30 MHz above the magnetron frequency. The klystron output is coupled to the balanced receiver if. mixer crystals and the afc mixer crystal. In the if. mixer crystals, returned signals are heterodyned with the klystron output to produce a 30-MHz if. The if. signal is applied to the if. preamplifier.

The klystron output is heterodyned with a portion of the magnetron output in the afc mixer crystal. The resulting signal is applied to the synchronizer afc circuit. The afc circuit senses any deviation from the 30-MHz if. and produces a corresponding change in the klystron repeller voltage. Since the klystron frequency is dependent upon the value of the repeller voltage, afc action maintains the klystron output at 30 MHz above the magnetron frequency.

(8) IF. Preamplifier.

The if. preamplifier is a Nuvistor, low-noise cascode amplifier. It amplifies the low-level 30-MHz if. signal from the mixer crystals. The amplified signal is coupled to the if. amplifier in the synchronizer. Positive 82-v plate voltage for the if. preamplifier is obtained from the junction of the zener diodes in the +260-v supply.

A sensitivity time control (stc) voltage from the synchronizer automatically reduces the gain of the if. preamplifier for short-range targets. This prevents nearby targets from appearing more intense than those farther away. Manual gain of the preamplifier is provided by the GAIN control on the radar control unit.

(9) Metering Circuit.

The metering circuit measures the following:

Afc crystal current	Generator B voltage
Reverse crystal current	Generator C voltage
Forward crystal current	-27.5-v supply voltage
Magnetron current	+27.5-v supply voltage
Generator A voltage	+260-v supply voltage
Keep-alive voltage on units with revision Z (22) and below	

Outputs from these circuits are connected to a wafer switch on the front panel of the receiver-transmitter. Rotating the switch to any of the meter positions selects the applicable signal. The signal is applied to the front panel meter through appropriate shunts to provide midscale reading on the meter for all measurements except crystal currents.

(10) Fault Sensing.

The fault sensing circuit has inputs from the +260- and +27.5-v supplies. Any condition causing these power supplies to draw excessive current changes the input voltage to the fault sensing circuit. These voltages bias the fault sensing circuit output transistor into conduction. The fault sensing relay in the transistor collector circuit is energized during conduction. When the fault sense relay is energized, the coil circuit of relay K1 is opened. This removes generator C power from the power supplies and the radar system returns to the standby condition.

In addition to the overcurrent protection, the fault sensing circuit also protects the +27.5-v supply for overvoltage conditions. Units with revision Z (22) and below and BB/AT and above provide overcurrent protection for the modulator.

NOTE: Units with revision Z (22) and below contain a fault relay that is energized when the fault sensing relay energizes. When the fault relay is energized, power is removed from operate relay K1 and the system returns to the standby condition.

(11) +260-V Supply.

NOTE: On some units the zener diodes that provide regulation for this supply have an output of +250 v. The following description is applicable to both supplies with the exception of the output voltage references.

The +260-v supply provides a regulated voltage for the klystron, the indicator unit, and the if. preamplifier. Aircraft generator C power is applied to the +260-v supply power transformer when operate relay K1 is energized. The transformer output is rectified, filtered, and applied to two series-connected zener diodes. The diodes provide regulation to +260 v. A +82-v output is taken from the junction of the diodes and applied to the if. preamplifier for plate voltage. An overcurrent voltage is applied to the fault sensing circuit when abnormal operation occurs.

An output voltage from the +260-v supply is applied to the metering circuit.

(12) +27.5-V Supply.

The +27.5-v supply provides a regulated voltage for all units of the radar system. Aircraft generator C power is applied to the +27.5-v supply when operate relay K1 is energized. A full-wave bridge rectifier provides a dc voltage for the regulator circuit. When excessive current is drawn from the +27.5-v supply or an overvoltage condition occurs, a voltage in excess of that required for normal operation is applied to the fault sensing circuit. The bridge rectifier for the +27.5-v supply also has an output of +32 v that is applied to the trigger generator module.

An output voltage is applied from the +27.5-v supply to the metering circuit.

(13) -27.5-V Supply.

The -27.5-v supply provides a regulated voltage for the fault sensing circuit, the synchronizer unit, and the indicator unit. Aircraft generator C power is applied directly to the -27.5-v supply power transformer when standby power is applied to the radar system. A full-wave bridge rectifier supplies dc voltage to the series regulator transistor and associated components.

Also on the -27.5-v regulator module is a zener diode regulator network for +15 v that is applied to the manual gain control in the radar control unit.

An output voltage is applied from the -27.5-v supply to the metering circuit.

(14) Power Control Circuit.

Aircraft generator A applies 115-v, 400-Hz power through standby relay K2 to all units. Generator B applies 115-v, 400-Hz power to internal circuits of the receiver-transmitter when relay K2 is energized. Relay K2 is energized when the operating mode switch on the radar control unit is in any position other than OFF.

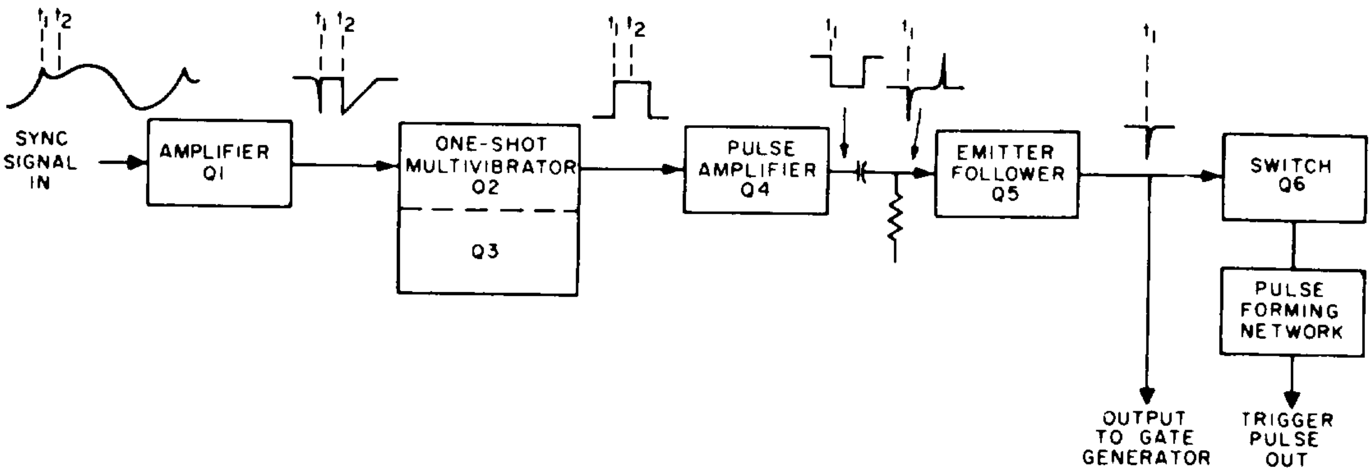
Operate relay K1 is energized when the operating mode switch on the control unit is in the OPR or CTR position. Input power from aircraft generator C is applied to the receiver-transmitter positive power supplies when relay K1 is energized, and to the -27.5-v power supply transformer when primary power is applied to the system.

NOTE: **Not all relay contact connections are shown in figure FO-3.**

2-6. DETAILED THEORY OF OPERATION

(1) Trigger Generator Module. Refer to figure 2-5 and to 1A11 on figure FO-4 or FO-5.

The trigger generator module generates the system timing pulse for the synchronizer and the trigger pulse to fire the modulator thyratron. The system timing (gate trigger) pulse is supplied to the synchronizer gate generator whenever operate relay K1 is energized.



Trigger Generator Module, Block Diagram

Figure 2-5

The synchronizing signal to the trigger generator is obtained from the modulator high-voltage power transformer, T4, when RF switch S4 is set to ON. When S4 is set to OFF, the synchronizing signal is obtained from magnetron filament transformer T5.

Operate relay K1 in the receiver-transmitter energizes when OPR (operate) is selected on the cockpit control. Generator B power (115 vac, 400 Hz from P1-5 and P1-6 is applied through relays K1 and K2 to RF switch S4. When S4 is set to ON, generator B power is applied to the primary of transformer T4.

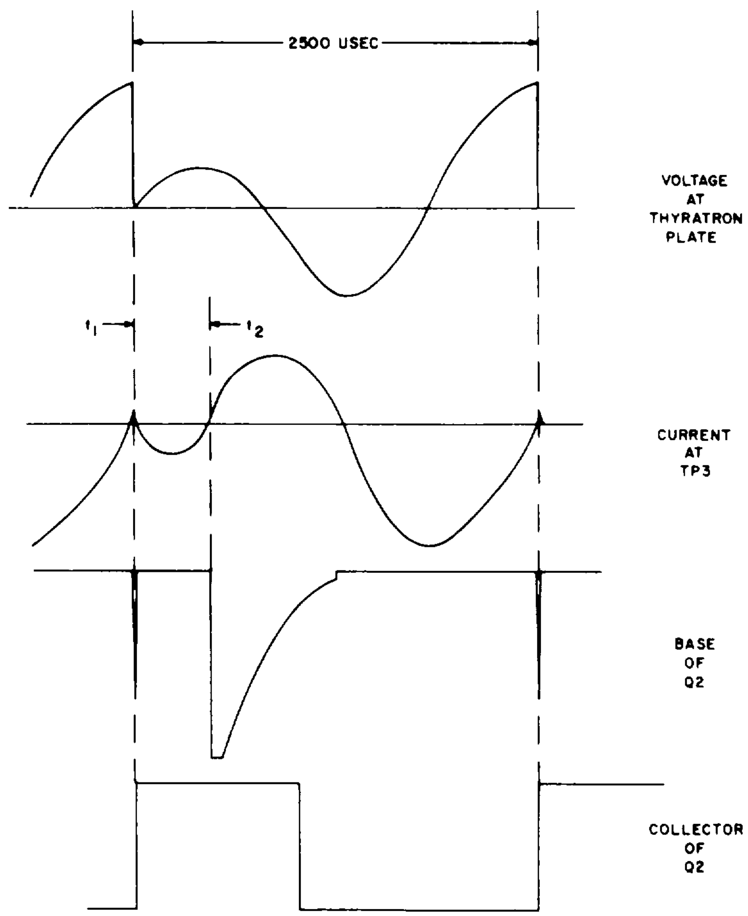
The secondary of T4 is connected to the modulator charging circuit. Current flows in the modulator charging circuit when T4 is energized, and a voltage is developed across resistor R48. This synchronizing voltage (refer to figure 2-6) is applied through S4-4 and S4-8 to terminal B of J1.

When RF switch S4 is set to OFF, a sample of the magnetron filament voltage is supplied to the trigger generator to initiate the trigger pulse. This voltage is supplied from the junction of R69 and C56 to terminal 12 of S4. When S4 is set to OFF, the voltage from S4-12 is applied through S4-8 to terminal B of J1.

The voltage waveform at J1-B is coupled through C1 and R1 to the base of inverter amplifier Q1. This waveform has two positive-going, 0-volt crossings, one at time t1 and one at time t2 (refer to figure 2-6). The inverted waveform at the collector of Q1 contains two negative-going pulses: a narrow spike at t1 and a wider pulse beginning at t2. These pulses are coupled through C2 and CR3 to monostable multivibrator Q2 and Q3. Before the negative spike at T1 occurs, Q3 is conducting and Q2 is cut off. The first negative spike at the base of Q2 turns Q2 on, and the second negative pulse has no effect on Q2 because Q2 is already on. As Q2 starts to conduct, the collector potential increases towards the +15-v emitter level. This positive-going pulse charges C3 and cuts off Q3. It remains off until C3 discharges sufficiently to permit Q3 to start conducting and return the multivibrator to the stable state.

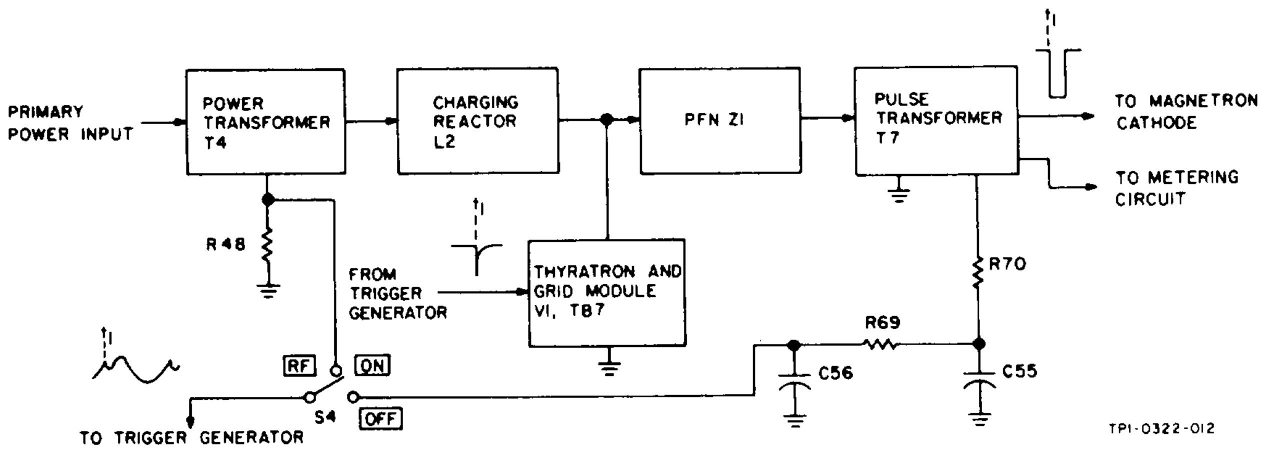
The positive-going pulse from the collector of Q2 is coupled through CR5 and C5 to the base of amplifier Q4. The amplified, negative-going pulse from the collector of Q4 is differentiated by C7 and R16 and applied to the base of emitter follower Q5. Diode CR6 clamps the differentiated spikes to the +32-v supply level. The negative spike from emitter follower Q5 is coupled to the base of switching transistor Q6. Switching transistor Q6 is normally cut off, and the pulse forming network is charged to the +32-v supply through R19. The negative spike turns Q6 on, and the pulse forming network discharges through the primary of thyratron grid transformer T3, located on TB7. The negative spike that turned Q6 on is applied through J1-F and J1-E to the synchronizer gate generator module.

NOTE: In modules with revision H and above, the pulse forming network consists of capacitor C15.



Modulator and Trigger Generator Waveforms

Figure 2-6



Modulator Pulse Circuit, Block Diagram

Figure 2-7

(2) Pulse Circuit. (Refer to figure 2-7, FO-4 or FO-5) The modulator pulse circuit generates high-voltage pulses of 2.3-microsecond duration. These pulses occur at 400 p/s and are applied to the magnetron cathode, causing the magnetron to oscillate. The magnetron generates rf (9375 ± 40 MHz) energy pulses that are waveguide coupled to the antenna.

The modulator pulse circuit consists of thyratron V1, thyratron grid module TB7, and the modulator charging network. The modulator charging network consists of high-voltage power transformer T4, R48, charging reactor L2, pulse forming network Z1, and the primary (terminals 1 and 2) of pulse transformer T7.

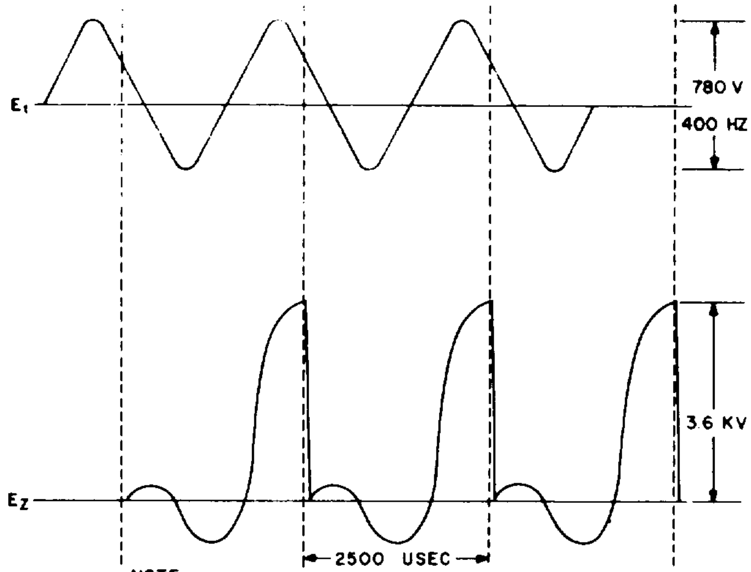
Operate relay K1 is energized, after the 4-minute delay of K3, when OPR is selected on the cockpit control. Generator B power (115 v, 400 Hz) is supplied through relays K1 and K2 and RF switch S4 to the primary of T4. The secondary of T4 is connected to 'a series resonant circuit consisting of charging reactor L2 and pulse forming network (pfn) Z1. The circuit is resonant at 600 Hz and the pfn appears primarily capacitive at 400 Hz. The voltage resulting from the combination of the voltages at the two frequencies charges the pfn to a potential several times that supplied by the power transformer (refer to figure 2-8). A sample of the charging waveform at T4-5 is supplied to the trigger generator module and to the fault sensing module in units with revision Z (22) and below and BB/AT and above. The waveform supplied to the trigger generator module (refer to fig 2-6)initiates the thyratron trigger pulse and the system timing pulse. The plate of thyratron V1 is connected to the junction of L2 and Z1. At the instant the voltage at Z1 and the plate of V1 is at the highest point, the trigger pulse from the trigger generator module is applied to the grid of V1. Thyratron V1 fires (conducts), and the pfn discharges through the low cathode-plate resistance of V1 and the primary (terminals 1 and 2) of pulse transformer T7. The conducting tube and the primary of T7 represent an impedance (50 ohms) that is approximately equal to the characteristic impedance of the pfn (52.5 ohms). The discharge of the pfn through T7 maintains a voltage at the primary for the 2.3-microsecond pulse duration.

The pulse through the primary of T7 (1 and 2) is stepped up by the secondary windings, 3 and 4 and 5 and 6, and applied to the magnetron cathode. The -8.0-kv pulse at the cathode causes the magnetron to oscillate for the duration of the pulse. The magnetron output pulses are coupled through the mixer-duplexer and other waveguide components to the antenna.

Spark gap E1 is connected to the magnetron cathode to protect pulse transformer T7 from excess voltage. If the magnetron misfires, the spark gap arcs (at 13.5-kv) and shorts the high-voltage pulse to ground. This direct path to ground does not dissipate the energy stored in the pfn. This energy is reflected back into the resonant circuit, and the potential across the pfn will continue to increase with each cycle if magnetron misfire continues. Modulator current develops a voltage across R48 in the charging circuit. In units with revision Z (22) and below and BB/AT and above, this voltage is also used as a signal to the fault sensing module. When the voltage exceeds that for normal operation, the fault sensing circuit causes the system to revert to the standby mode of operation.

(3) Mixer-Duplexer Module.

The mixer-duplexer module provides electronic switching to permit transmission and reception with a common antenna, a local oscillator signal, a received-signal if. for receiver input, an if. preamplifier load isolation for the magnetron of not less than 15 db, magnetron-receiver isolation of approximately 20 db, and an afc if. for control of local oscillator frequency.



Pulse Forming Network Waveforms

Figure 2-8

(a) Ferrite Circulator. (Refer to figure 2-9)

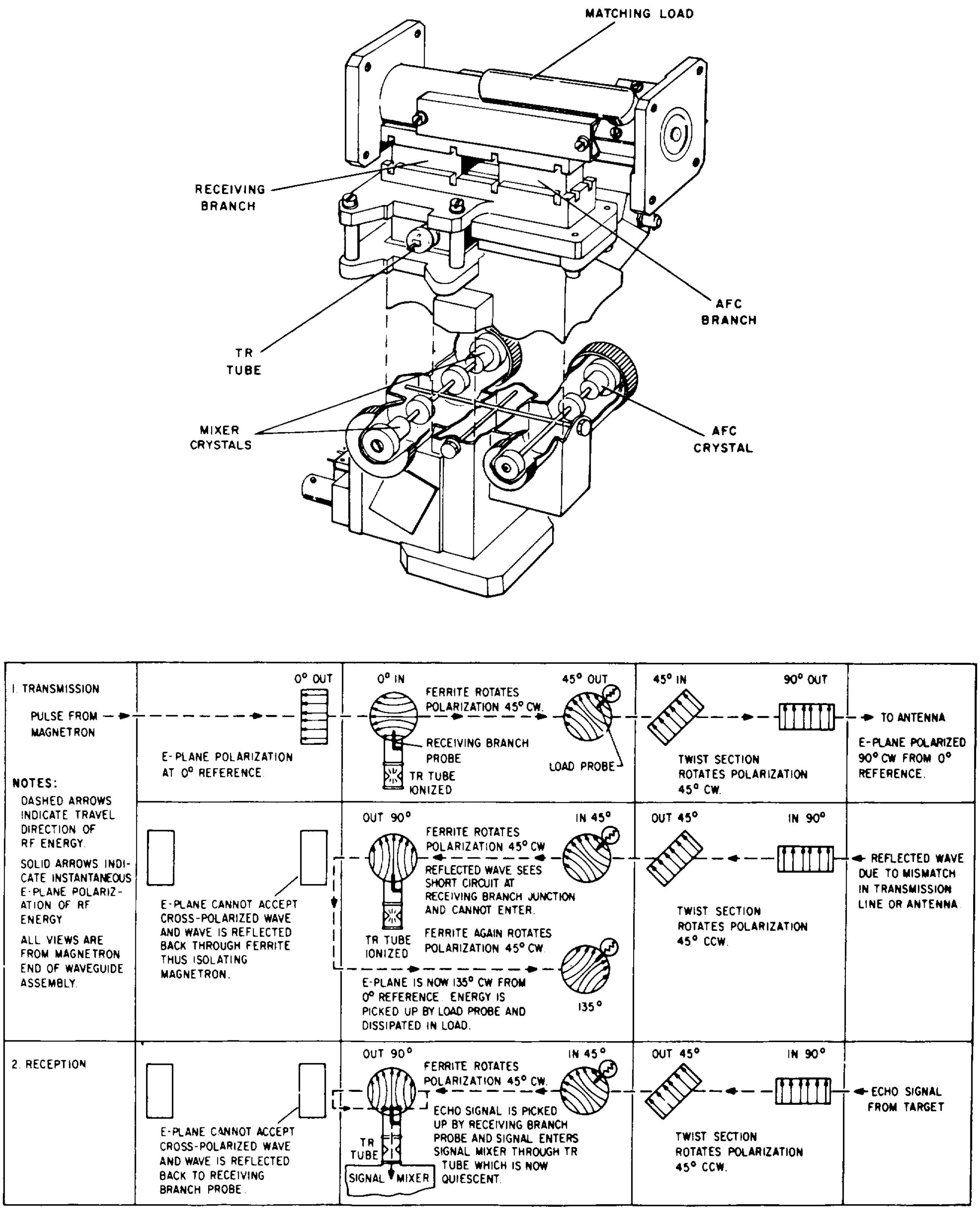
The ferrite circulator is a dielectric-filled section of the circular waveguide with a ferrite rod embedded along the center axis between a receiving branch probe and a matching load probe. The circulator acts as a one-way isolator to minimize the effects of mismatch, and it eliminates the need for ATR tubes. The receiving branch of the duplexer is near the input (magnetron) flange and is probe coupled to the circular waveguide section. The afc branch is near the output (antenna) flange and is aperture coupled to the circular waveguide.

The path of a magnetron-generated rf pulse through the waveguide assemblies is shown in figure 2-9. Starting at the magnetron output, the electric field (E-plane) polarization is shown across the narrow dimension (0° reference) of the waveguide. The rf pulse leaves the magnetron and enters the circular waveguide with E-plane polarization still at 0°. When the rf pulse reaches the junction of the receiving branch, a small portion of the pulse energy enters the receiving branch and ionizes TR tube V3. The ionized TR tube is a short circuit across the receiving branch and prevents the high-energy rf pulse from entering the signal mixer section. This protects the mixer crystals from the transmitted pulse.

As the rf pulse proceeds past the receiving branch, it meets a ferrite red embedded along the cylindrical axis of the circular waveguide section. The ferrite rod is magnetized to near saturation along the longitudinal axis by two permanent magnets attached to opposite outside surfaces of the circular waveguide section parallel to the ferrite rod. The combination of ferrite rod, permanent magnets, and circular waveguide rotates the polarization of the electromagnetic waves through 45°. As the transmitted pulse passes the far end of the ferrite rod, a small sample of the rf energy is aperture coupled to the afc mixer.

The E-plane polarization of the rf energy is now at the proper angle (45° clockwise respect to 0°) for transmission through the twist section of the waveguide. The twist section rotates the polarization clockwise another 45°. The E-plane polarization at the twist section output flange is in the proper plane (90° clockwise with respect to 0°) for transmission through the external waveguide to the antenna.

The frequency stability of a magnetron is closely dependent upon the impedance into which the magnetron is operated. In a typical radar system, an undesirable and possible time-varying mismatch, due to the scanning motion of the antenna, is connected to the magnetron. Discontinuities of the waveguide, waveguide joints, or the rotary joint can also contribute mismatches. Mismatches reflect rf energy back toward the magnetron and cause frequency pulling and a poor spectrum. The ferrite circulator acts as a one-way isolator to minimize the effects of mismatch, and it also eliminates the need for ATR tubes. Any reflected rf energy, due to mismatches, enters the twist section of waveguide, and the E-plane is rotated 45° counterclockwise (as viewed from the magnetron). Because the transmitted rf is rotated 90° clockwise and the reflected rf is rotated 45° counterclockwise (with respect to 90° clockwise), the reflected rf into the circulator has a relative



Mixer-Duplexer Assembly

Figure 2-9

position of 45° clockwise. The ferrite circulator rotates the reflected rf 45° clockwise, and the rf reaches the receiving branch junction with a relative 90° clockwise position. Reflected rf occurs during the pulse period and cannot enter the receiving branch, because the TR tube is ionized and reflects a short circuit at the receiving junction. The short circuit across the receiving branch junction is a reflection of the short circuit across the TR tube that is spaced 1/2 wavelength from the junction. Since the rf cannot enter the receiving branch, it continues toward the rectangular waveguide at the magnetron. This waveguide cannot accept the cross-polarized rf (90° clockwise with respect to the magnetron), and it is reflected back through the ferrite circulator. The circulator rotates the rf 45° clockwise to 135°, which is the pickup angle of the matching load probe. The reflected rf is probe-coupled to the matching load and absorbed by the load.

At the end of the magnetron pulse period, the TR tube deionizes. Echo signals entering the twist section of the waveguide from the antenna have the same polarization as the transmitted pulse (90° clockwise). Echo signals experience a polarization rotation of 45° counterclockwise through the twist section and 45° clockwise through the ferrite circulator, ending at the receiving branch junction with a 90° clockwise angle. Since the TR tube is now deionized, the short across the receiving branch junction no longer exists, and the echo signals are probe coupled into the receiving branch.

A small portion of the echo signals that are not intercepted by the receiving branch probe continue toward the magnetron. The echo signals have a 90° clockwise angle with respect to the magnetron, and the magnetron cannot accept these signals. These signals are reflected back toward the receiving branch probe and are coupled into the receiving branch. The spacing between the receiving branch probe and the waveguide at the magnetron is critically set so that the incident and reflected waves reinforce each other at the receiving branch probe. All echo signals coupled into the receiving branch pass through the deionized TR tube and enter the signal mixer section.

(b) TR Tube V3. (Refer to figure 2-9)

The TR tube is an rf switch placed in the receiving branch of the waveguide approximately 1/2 wavelength from the circulator junction. The TR tube is essentially a cavity resonator that is broadly fixed tuned to the transmitter frequency, filled at a low pressure with gas, and constructed with an internal spark gap. A small portion of the gas in the tube, near the gap but not across it, is kept ionized by the application of a negative, keep-alive voltage. The keep-alive voltage is supplied from keep-alive supply module TB2. The keep-alive voltage minimizes the TR tube ionizing time, which increases the crystal protective function of the tube. When the tube is ionized by the magnetron rf pulse, the high-power, rf pulse cannot reach the signal mixer section and damage the mixer crystals. The TR tube is deionized during receive time, and received signals pass through to the signal mixer section.

(c) Mixer Section. (Refer to figure 2-9)

The mixer section consists of a signal mixer, an afc mixer, and a local oscillator and feed section assembly. The local oscillator output is probe coupled into a coaxial-to-waveguide, crossbar transition.

The local oscillator energy is divided equally and connected by two coaxial lines to two equivalent magic-T hybrid mixers constructed of coaxial line and waveguide. Received-signal energy is coupled into the signal mixer section, and a sample of the transmitter pulse is coupled into the afc mixer section. The local oscillator energy and received-signal energy are heterodyned in the signal mixer to produce the received-signal if. Local oscillator energy and a sample of the magnetron rf energy are heterodyned in the afc mixer to produce the afc if.

The signal mixer section contains a forward signal crystal diode (CR42) and a reverse signal crystal diode (CR41) in identical, opposed, coaxial crystal mounts that are attached to the broad walls of the receiving branch waveguide. The local oscillator frequency, 30 MHz above the magnetron frequency, is probe coupled into the signal mixer. The signal mixer crystals are spaced 1/2 wavelength (signal frequency) apart in the waveguide, and the local oscillator output is probe coupled into the waveguide midway between the two crystals. The local oscillator probe radiates energy equally in opposite directions, and the crystals receive rf energy that is equal in amplitude and in phase. Because of the 180° (1/2 wavelength) spacing of the crystals, the received-signal rf energy applied to the crystals is equal in amplitude but 180° out of phase. The combination of the local oscillator frequency and the received-signal frequency produces two phase relationships, one in phase and the other 180° out of phase. The two crystal outputs (in phase and 180° out of phase) are combined by capacitor C30. Noise generated by the local oscillator is equal in amplitude but opposite in phase. Therefore, the noise signals cancel, and the low-noise if. (30 MHz) signal from C30 is supplied to the if. preamplifier. A crystal current filter network composed of capacitors C31 through C36, rf chokes L5 through L10, and resistors R59 and R60, provides dc crystal current outputs at pins 1 and 3 of plug P2 to meter circuit module TB4.

The afc mixer section contains a signal reverse crystal diode (CR40) in a coaxial crystal mount. Since the afc mixer is operated single ended, a coaxial termination is mounted on the broad wall of the waveguide opposite the crystal mount. A sample of the magnetron rf energy and the local oscillator output is heterodyned in the afc mixer. The difference frequency (near 30 MHz) is detected by CR40 and coupled through C28 to the afc discriminator circuit in the synchronizer. An attenuator between the klystron and the afc mixer permits adjustment of dc current through crystal diode CR40. A crystal current filter network composed of rf chokes L3 and L4, capacitors C29 and C58, and resistor R56 provide a dc crystal current output from J4 to meter circuit module TB4.

(d) Local Oscillator V4. (Refer to 1A10 on figure FO-4 or FO-5)

The local oscillator is a klystron that operates 30 MHz above the magnetron frequency. The cathode is grounded, and +260 v from TB1 is applied to the accelerating grid. The power mode of the BLK-022 klystron is ±20 MHz between the 3-db power points. The mode peak is -175 ±5 v at 9405 MHz. The mode set potentiometer (R71) serves to standardize the repeller voltage supply at -185 v. The electronic tuning rate for the klystron is 1 to 2 MHz/v.

Negative voltage from the synchronizer afc module is applied to the klystron repeller and maintains the klystron operating frequency 30 MHz above the magnetron frequency. If the magnetron shifts frequency, the afc output (intermediate frequency) will change. This causes a change in the synchronizer afc module output that changes the negative voltage applied to the klystron repeller. If the voltage applied to the repeller becomes more negative, the klystron frequency will increase, and, if the voltage becomes less negative, the klystron frequency will decrease. This "afc loop" maintains the klystron frequency at 30 MHz above the magnetron frequency.

NOTE: Potentiometer R71 is not present in the receiver-transmitter units with revisions AF1 and AG. It is recommended that this potentiometer be installed. Refer to Service Bulletin No. 11 for further information.

Receiver-transmitters with revision AF1 and above contain a network that applies a negative voltage to the klystron repeller when the WP-103 system is in standby. Negative 27.5-v from the -27.5-v supply is supplied to this network, consisting of resistors R76 and R77, capacitor C59, and diode CR45. This negative potential prevents ion bombardment of the repeller during standby operation.

(e) Directional Coupler and Twist Assembly. (Refer to figure 2-9)

The twist waveguide assembly is connected to the ferrite circulator and rotates the E-plane polarization 45° (clockwise during transmission and counterclockwise during reception). The rf energy coupled to the antenna has a 90° clockwise position with respect to the magnetron.

The cross-guide directional coupler is a section of rectangular waveguide that is secured at right angles to the broad wall of the twist waveguide assembly. Two cross-shaped apertures provide coupling between the cross-guide directional coupler and the twist waveguide assembly. Test point TP6 has a probe inserted into one end of the directional coupler to sample the rf energy for transmitter measurements and to inject signals for receiver measurements. A termination load assembly is contained in the waveguide opposite from TP6. The directional coupler introduces approximately 20-db attenuation between the twist section flange and the directional coupler output jack.

(f) IF. Preamplifier. (Refer to 1A10 on figure FO-4 or FO-5)

The if. preamplifier is a cascode amplifier circuit consisting of low-noise triodes V5 and V6. The 30-MHz signal from the signal mixer is coupled through a matching network and L17 to the grid of V5. Inductor L18 is a neutralizing choke which improves the noise figure of the amplifier.

NOTE: In units with revision Z (22) and below, the grid circuit of V5 can be tuned by variable capacitor C48 and the output circuit tuned by C43.

The amplified signal at the plate of V5 is coupled to the cathode of V6, amplified, and coupled through C49, L22, and P2-A1 (J6 on units with revision AA (23) and above) to the if. amplifier in the synchronizer.

The gain of the preamplifier can be controlled by the GAIN potentiometer in the cockpit control. This potentiometer controls the positive dc voltage applied to the cathode of V5, which limits the gain of the circuit. Positive 15 v from TB6-3 is supplied through R68 (located on the chassis) and the cockpit control to P2-10 (P2-7 in units with revision AA (23) and above).

The stc pulse from the synchronizer gate generator is applied to the grid of V5 in the if. preamplifier. This negative-going pulse, coincident with the magnetron firing has a sharp leading edge and an exponential decay. The purpose of the stc pulse is to decrease the gain of the if. preamplifier as a function of range, so a rainstorm will not appear to be getting heavier when actually it is only getting closer.

(4) +260-V Supply and Regulator. (Refer to 1A2 on figure FO-4 or FO-5)

NOTE: The regulated output from the +260-v supply may be +250 v on some units depending upon the tolerance of zener diodes CR22 and CR23. All references to +260 v applies to either +250 or +260 v as may be applicable. The output voltage' was increased and variation decreased to prevent klystron output power from decreasing below necessary operating power at -55 °C (-67 °F).

The +260-v supply and regulator provides +260 v for the klystron local oscillator, +260 v for the indicator, and +82 v for the plate of V6 in the if. preamplifier. Generator C power (115 vac, 400 Hz) is applied to the primary of transformer T1 when operate relay K1 is energized. One of the secondary windings of T1 is used for the +260-v supply and is connected to the full-wave bridge rectifier consisting of CR9 through CR12. Excessive current from the +260-v supply causes an increased voltage drop across resistor R10, which activates the fault sensing circuit. The rectified voltage from the bridge circuit is filtered by C6 and C7, C14, and R11 through R13.

NOTE: Resistor R13 and capacitor C7 are not included in units with revision AA (23) and above.

Zener diodes CR22 and CR23 regulate the output of the +260-v supply. Positive 82 v for V6 in the if. preamplifier is supplied from the junction of CR22 and CR23.

(5) +27.5-V Supply and Regulator. (Refer to 1A6 on figure FO-4 or FO-5)

The output of the +27.5-v supply and regulator is used in all units for transistor power. Generator C power (115 vac, 400 Hz) is applied to the primary of transformer T1 when operate relay K1 is energized. One of the secondary windings of T1 is used for the +27.5-v supply and is connected to a full-wave bridge rectifier consisting of diodes CR13 through CR16. The filter circuit consists of capacitors C8 and C9, resistor R14 (all located on TB1), and inductor L1, located on the chassis.

NOTE: **Resistor R14 is not present in units with revision AA (23) and above.**

Transistors Q3 through Q7 form a regulator circuit in which Q7 is a difference detector and Q4 and Q5 are series regulators. The +27.5-v output at the collectors of Q4 and Q5 is supplied through P1-1 and P1-2 to the synchronizer. A +27.5-v monitor line originates in the synchronizer and is returned to the receiver-transmitter at P1-14 and P1-16. Monitoring the voltage at the point of use in the synchronizer provides better regulation.

In the receiver-transmitter, the monitor line is connected to a voltage divider consisting of R23, R24, and R25. The wiper arm on potentiometer R24 is connected to the base of difference detector Q7. The setting of R24 determines the output voltage of the power supply. The emitter of Q7 is held at a constant potential by the action of Q6 and zener diodes CR26 and CR27. If the output voltage becomes more positive, the voltage at the base of Q7 becomes more positive, causing Q7 to conduct more. The increased current through Q7 and R22 causes a more positive voltage at the emitter of Q6. Since the base of Q6 is held at a constant potential by CR26 and CR27, the more positive voltage on the emitter causes Q6 to conduct less, decreasing the current through R22 and stabilizing the voltage at the emitter of Q7. This arrangement also compensates for temperature variations.

Assume again that the output voltage of the power supply increases: Q7 conducts more heavily, causing increased current through R20 and a more negative voltage at the base of Q3. This more negative voltage causes increased conduction of Q3, more current through R19, and a more positive voltage at the bases of Q4 and Q5. The more positive voltage at the bases of Q4 and Q5 causes the transistors to conduct less, resulting in lower current through the load and reducing the output voltage. Stabistors CR24 and CR25 aid in temperature compensation and ensure that transistors Q4 and Q5 divide the load.

Unregulated +32 v from TB1-7 is supplied to the trigger generator module. Regulated +15 v is provided by R18, CR28, and C13 on -27.5-v regulator module TB6. The -15 v is applied to the trigger generator module and to the GAIN potentiometer on the cockpit control.

The +27.5-v output of the power supply is applied to zener diode CR8 on fault sensing module TB3. Primary power to the power supply is removed by the fault sensing circuit if an overvoltage or overcurrent condition exists.

(6) -27.5-V Supply and Regulator. (Refer to 1A4 on figure FO-4 or FO-5)

The -27.5-v supply and regulator provides regulated -27.5-v power for the fault sensing circuit and for the synchronizer and indicator units. Generator C power (115 vac, 400 Hz) is supplied directly to the primary of transformer T2. The secondary of T2 is connected to a full-wave bridge rectifier consisting of diodes CR18 through CR21. The output of the rectifier is applied through K1-16, K1-17, and R15 to the collector of Q2. Transistor Q2 is a series regulator, with the base voltage held constant by zener diode CR17. The filter circuit, located on TB6, consists of resistors R16 and R17 and capacitors C11 and C12. If the output voltage increases (becomes more negative), the larger negative voltage at the emitter of Q2 causes Q2 to conduct less.

The smaller current through Q2 reduces the current through the load and decreases the voltage across the load.

(7) Power Distribution and Control Circuits.

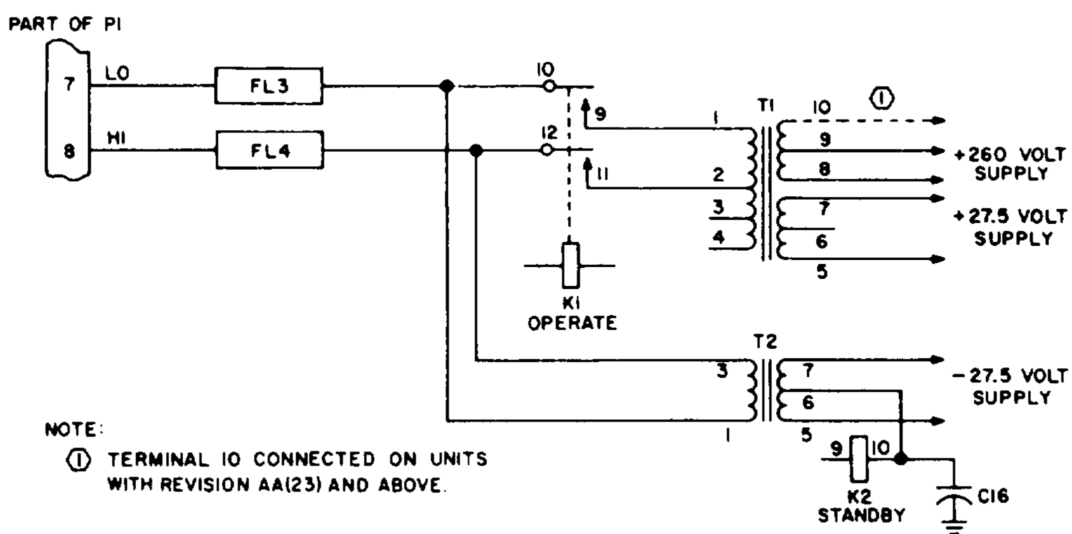
(a) Generator C Power Distribution Circuit. (Refer to figure 2-10)

Power from generator C of the aircraft supply is used as input voltage for the +260-, +27.5-, and -27.5-v power supplies. The 115-v, 400-Hz power is applied through P1-7 and P1-8 and filters FL3 and FL4 to the primary of transformer T2 and contacts 10 and 12 of operate relay K1. The secondary of T2 is connected to the -27.5-v bridge rectifier circuit. The secondary center tap of T2 is at approximately -27 v with respect to ground because of the bridge rectifier that is connected across the secondary winding. This negative voltage is supplied to standby relay K2 and permits K2 to energize when STBY (ground) is selected on the cockpit control. When operate relay K1 is energized, power is supplied from K1-9 and K1-11 to the primary of transformer T1. One secondary winding of T1 is connected to the +260-v power supply, and the other secondary is connected to the +27.5-v power supply.

(b) Generator B Power Distribution Circuit.

1. General.

Power from generator B of the aircraft power supply is used as supply voltage for the thyratron, klystron, and if. preamplifier filaments and for the keep-alive supply. Generator B power is also used to operate the blower motor and is the input to transformer T4 in the modulator circuit. The 115-v, 400-Hz power is applied through P1-5 and P1-6 and coupled through filters FL1 and FL2 to contacts 2 and 4 of standby relay K2. When K2 is energized, power is applied from K2-1 and K2-3 to blower motor B1 and to transformers T6 and T8.



374A-3 Receiver-Transmitter, Generator C Power Distribution Diagram

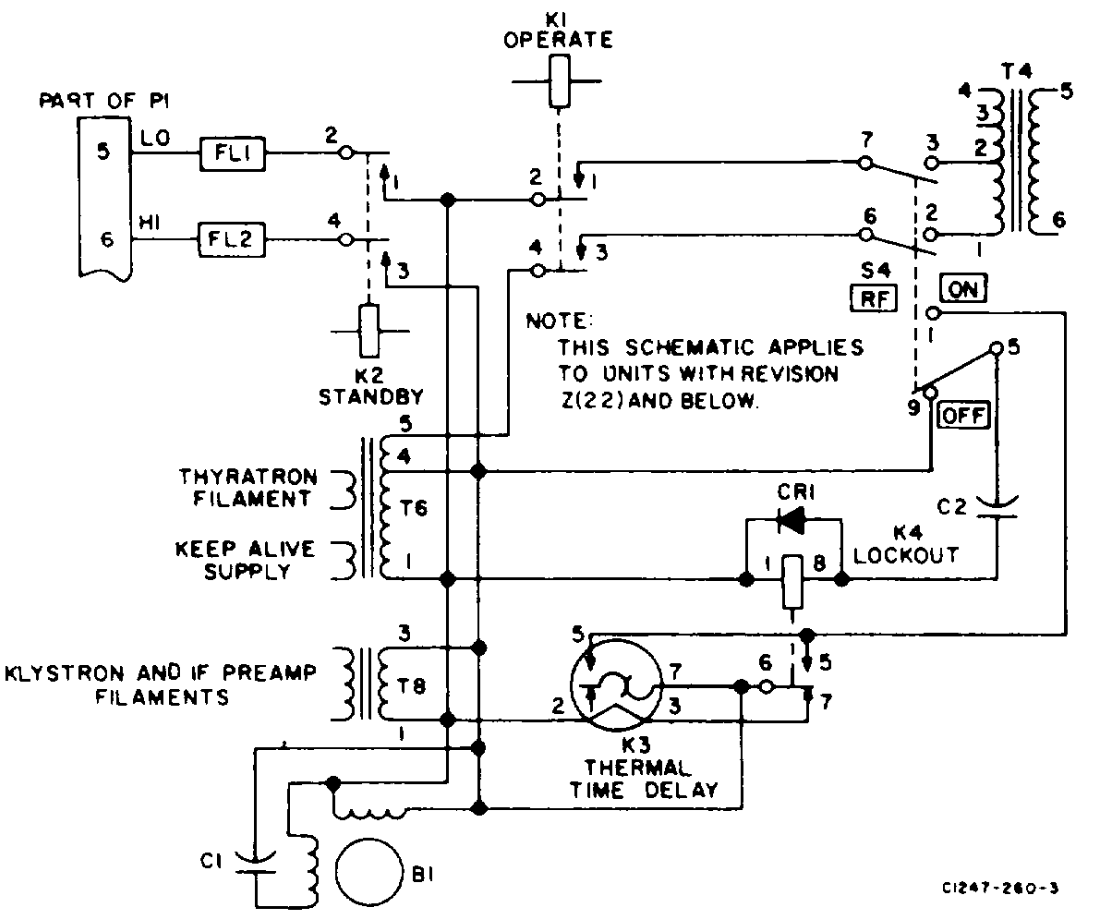
Figure 2-10

2. Units with Revision Z (22) and Below. (Refer to figure 2-11)

When K2 is energized, the low side (P1-5) of generator B power is applied from K2-1 to operate relay (contact 2) K1, to the coil (K4-1) of lockout relay K4, and to the heater element (K3-2) of thermal time delay relay K3. The high side (P1-6) from K2-3 is applied to terminal 9 of RF switch S4, to terminal 6 of K3, and through transformer T6 to K1-4. After the time delay of K3 (approximately 4 minutes), with S4 set to ON, power is applied from K3-5 through S4-1, S4-5, and C2 to the coil (K4-8) of the lockout relay. If S4 is set to OFF, power is applied from S4-9 through S4-5 and C2 to the coil (K4-8) of the lockout relay. When operate relay K1 is energized, power is applied from K1-1 and K1-3 to contacts 6 and 7 of RF switch S4. When S4 is set to ON, power is applied from S4-2 and S4-3 to the primary of transformer T4.

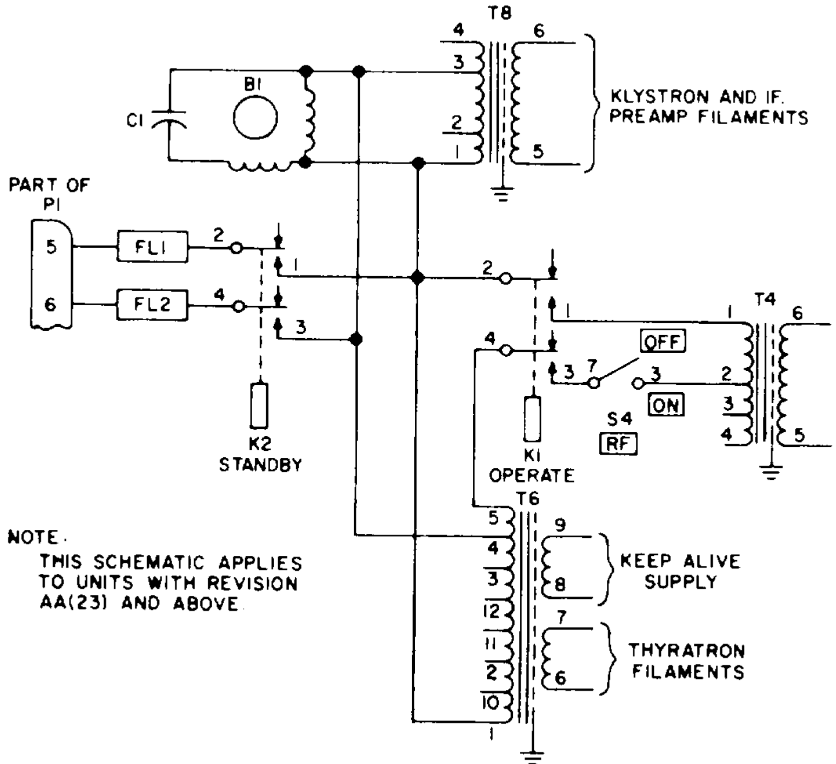
3. Units with Revision AA (23) and Above. (Refer to figure 2-12)

When K2 is energized, the low side (P1-5) of generator B power from K2-1 is applied to K1-2, and the high side (Pl-6) from K2-3 is applied through transformer T6 to K1-4. When operate



374A-3 Receiver-Transmitter (Revision Z (22) and Below), Generator B Power Distribution Diagram

Figure 2-11



374A-3 Receiver-Transmitter (Revision AA (23) and Above), Generator B Power Distribution Diagram

Figure 2-12

relay K1 is energized, power is applied from K1-1 to the primary of T4 and from K1-4 to contact 7 of RF switch S4. When S4 is set to ON, power from S4-3 is applied to the primary of T4.

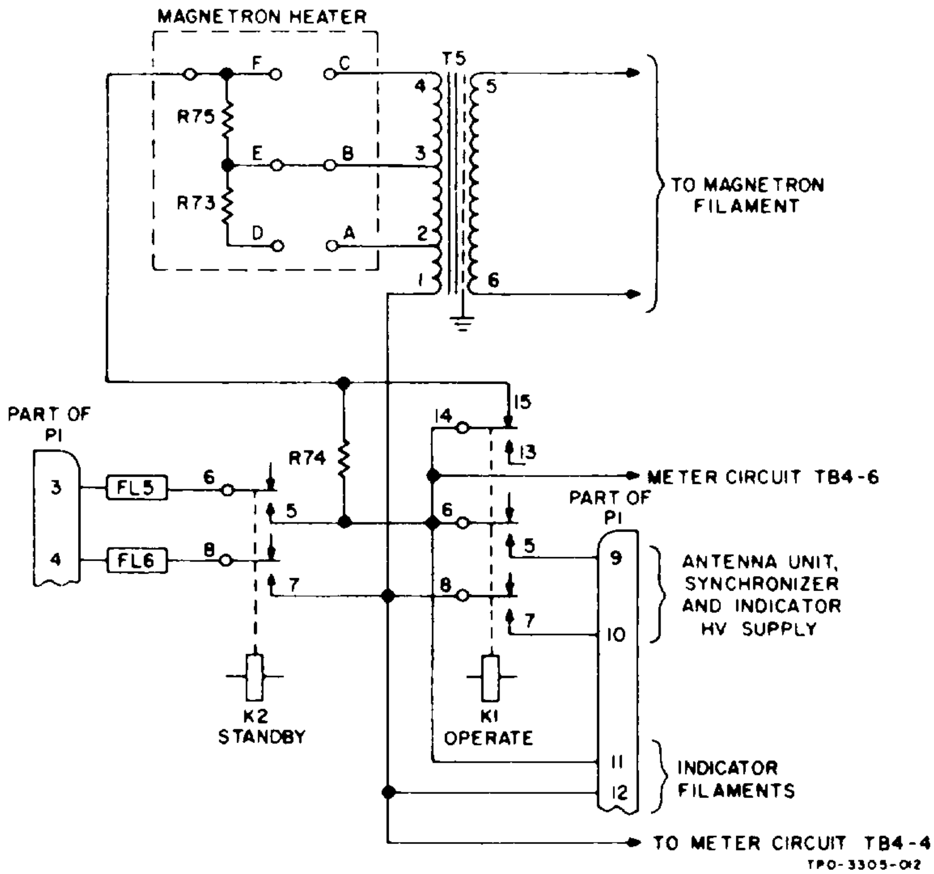
(c) Generator A Power Distribution Circuit.

1. General.

Power from generator A of the aircraft power supply is used as supply voltage for part of the receiver-transmitter, the indicator filaments, indicator high-voltage supply, synchronizer, and antenna servo. The 115-v, 400-Hz power is applied through P1-3 and P1-4 and filters FLO and FL6 to contacts 6 and 8 of standby relay K2. Relay K2 is energized when STBY is selected on the cockpit control, and power is supplied to the indicator filaments through P1-11 and P1-12, to contacts 6 and 8 of operate relay K1, and to magnetron filament transformer T5.

2. Units with Revision AG and Below. (Refer to figure 2-13)

The 115-v high side (P1-4) is applied through K2-8 and K2-7 to terminal 1 of magnetron filament transformer T5. The low side (P1-3) is applied through K2-6 and K2-5 and through K1-14 and K1-15 to terminal 1 (TB1-11 in units with revision AA (23) and above) of TB10.



374A-3 Receiver-Transmitter (Revision AG and Below), Generator A Power Distribution Diagram

Figure 2-13

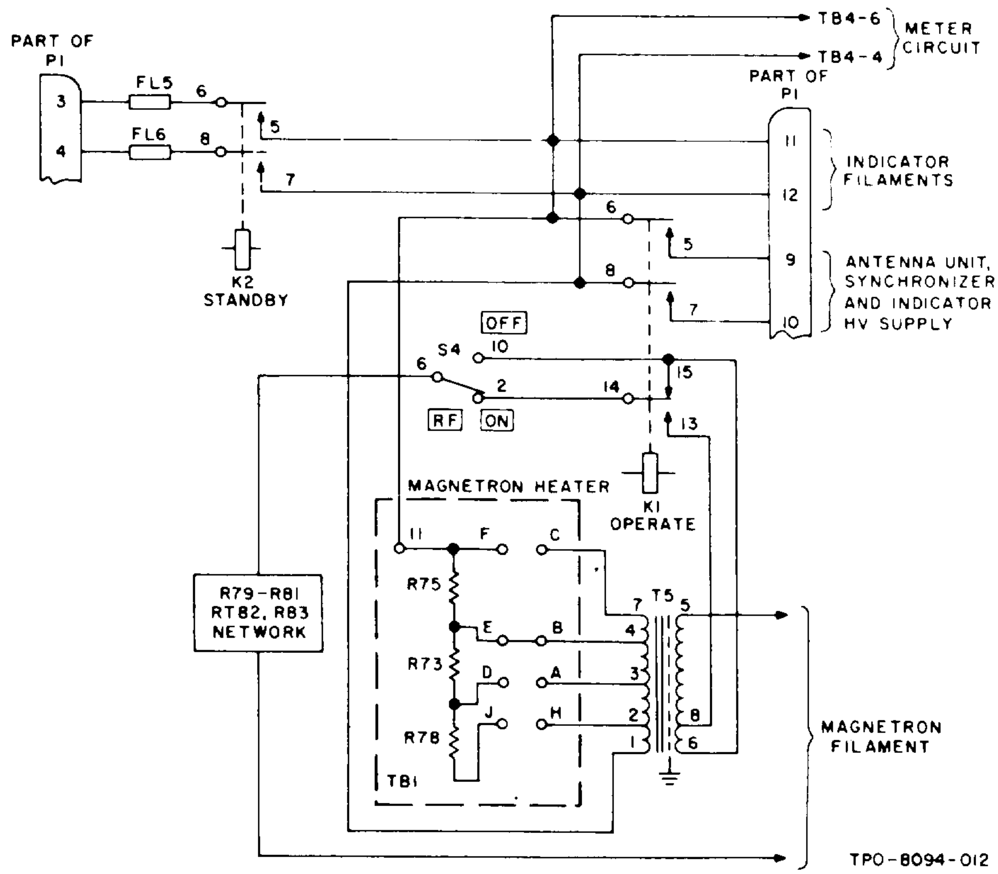
The connection from TB10-1 (TB1-11) to the primary of T5 is determined in test to provide 6.3 v from the secondary of T5 in standby.

NOTE: **In units with revision AA(23) and above, resistors R73 and R75 are located on TB1.**

Operate relay K1 is energized when OPR is selected on the cockpit control. With relay K1 energized, power is supplied to the receiver-transmitter, the antenna servo, the synchronizer sweep system, and the indicator high-voltage power supply. Resistor R74 is in series with the primary of magnetron filament transformer T5 when K1 is energized. This reduces the magnetron filament voltage from 6.3 to 4.5 v to prevent ion bombardment from-overheating the magnetron cathode during operation.

3. Units with Revision AH and Above. (Refer to figure 2-14)

The high side of generator A input (P1-4) is applied through K2-8 and K2-7 to terminal 1 of magnetron filament transformer T5. The low side (P1-3) is applied through K2-6 and K2-5 to terminal 11 of TB1. The connection from TB1-11 to the primary of T5 is determined in test to give 6.3 v between terminals 5 and 6 of T5. In standby, magnetron filament power is



374A-3 Receiver-Transmitter (Revision AH and Above), Generator A Power Distribution Diagram

Figure 2-14

obtained from terminal 5 of T5 and from terminal 6 of T5 through K1-15 and K1-14, S4-2 and S4-6, and temperature compensation network R79 through R81, RT82, and R83. Temperature compensation is necessary due to the change in resistance with temperature variation of the pulse transformer magnetron filament windings.

Operate relay K1 is energized when OPR is selected on the cockpit control. With relay K1 energized, power is supplied to the receiver-transmitter, the antenna servo, the synchronizer sweep system, and the indicator power supplies. Magnetron filament voltage is decreased from 6.3 to 4.5 v by connecting terminal 8 of T5 through K1-13 to K1-14. Decrease in filament power is necessary to prevent ion bombardment from overheating the magnetron cathode during operation.

(d) Power Control Circuits. (Refer to figures 2-15 and 2-16)

1. General.

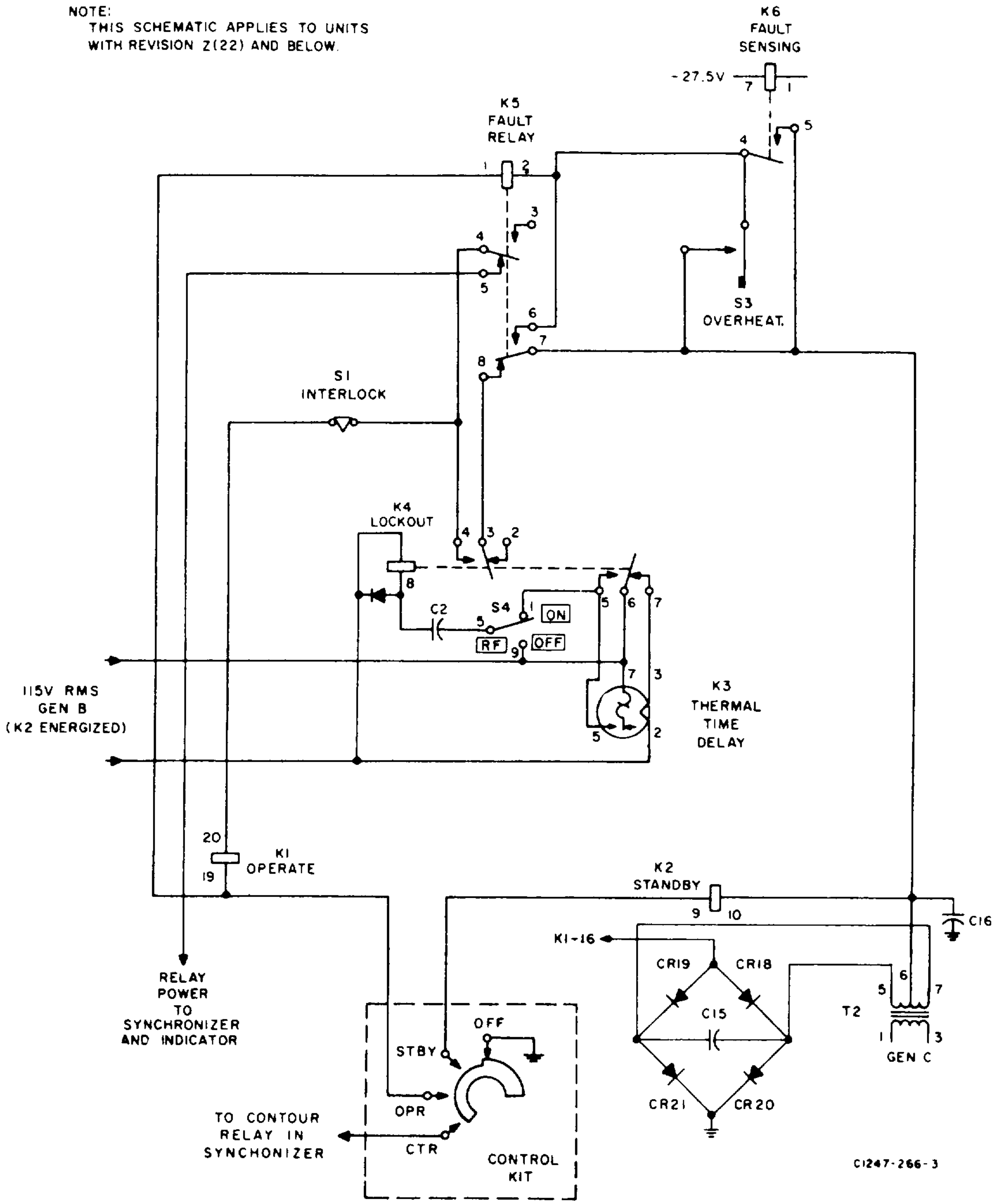
Relays in the power control circuit control the application of generator A, B, and C power to all other circuits. A fault sensing circuit interrupts the application of power whenever a potentially damaging fault occurs. Generator C power is applied to transformer T2 whenever aircraft power is applied to the equipment.

2. Units with Revision Z (22) and Below. (Refer to figure 2-15)

Negative 27.5-v relay power from T2-6 is applied to the coil (contact 10) of standby relay K2, terminal 5 of fault sensing relay K6, overheat switch S3, and terminal 7 of fault relay K5. Relay K2 is energized when STBY is selected on the cockpit control. When RF switch S4 is set to ON, relay K2 supplies generator B power to the heater element (contacts 2 and 3) of thermal time delay relay K3 through contacts 6 and 7 of lockout relay K4. When S4 is set to OFF, relay K4 is energized by generator B power through contacts 5 and 9 of S4. When S4 is set to ON and normally open contacts 5 and 7 of K3 have closed (approximately 4 minutes), power is supplied through contacts 1 and 5 of S4 and through C2 to the coil (contact 8) of K4. When K4 is energized, -27.5-v relay power from T2-6 is supplied through contacts 7 and 8 of fault relay K5, contacts 3 and 4 of lockout relay K4, and through interlock switch S1 to operate relay K1. Relay power to the synchronizer and indicator is supplied through contacts 4 and 5 of the fault relay. Operate relay K1 is energized when OPR is selected on the cockpit control.

Overheat switch S3 is located near the thyratron, the component most likely to reflect an overheating condition. When S3 closes because of excessive heat in the vicinity of the thyratron, -27.5-v relay power is applied to the coil (terminal 2) of fault relay K5. Contacts 7 and 8 of K5 remove relay power from operate relay K1, and the radar system reverts to the standby mode of operation. Relay K5 will remain energized until the cockpit control switch is changed from OPR to STBY, because the ground (through the cockpit control) completes the circuit to hold K5 energized. When the overheat condition has been corrected, S3 will return to the normally open position, and operate relay K1 can be energized by selecting STBY and then OPR on the cockpit control. When STBY is selected, the ground connection for K5 is removed, and K5 deenergizes.

When a fault is detected by the fault sensing module, fault sensing relay K6 is energized. Contacts 5 and 4 of K6 connect relay power to fault relay K5, relay K5 energizes, and relay power is removed from operate relay K1. Again, fault relay K5 remains energized until STBY is selected on the cockpit control.

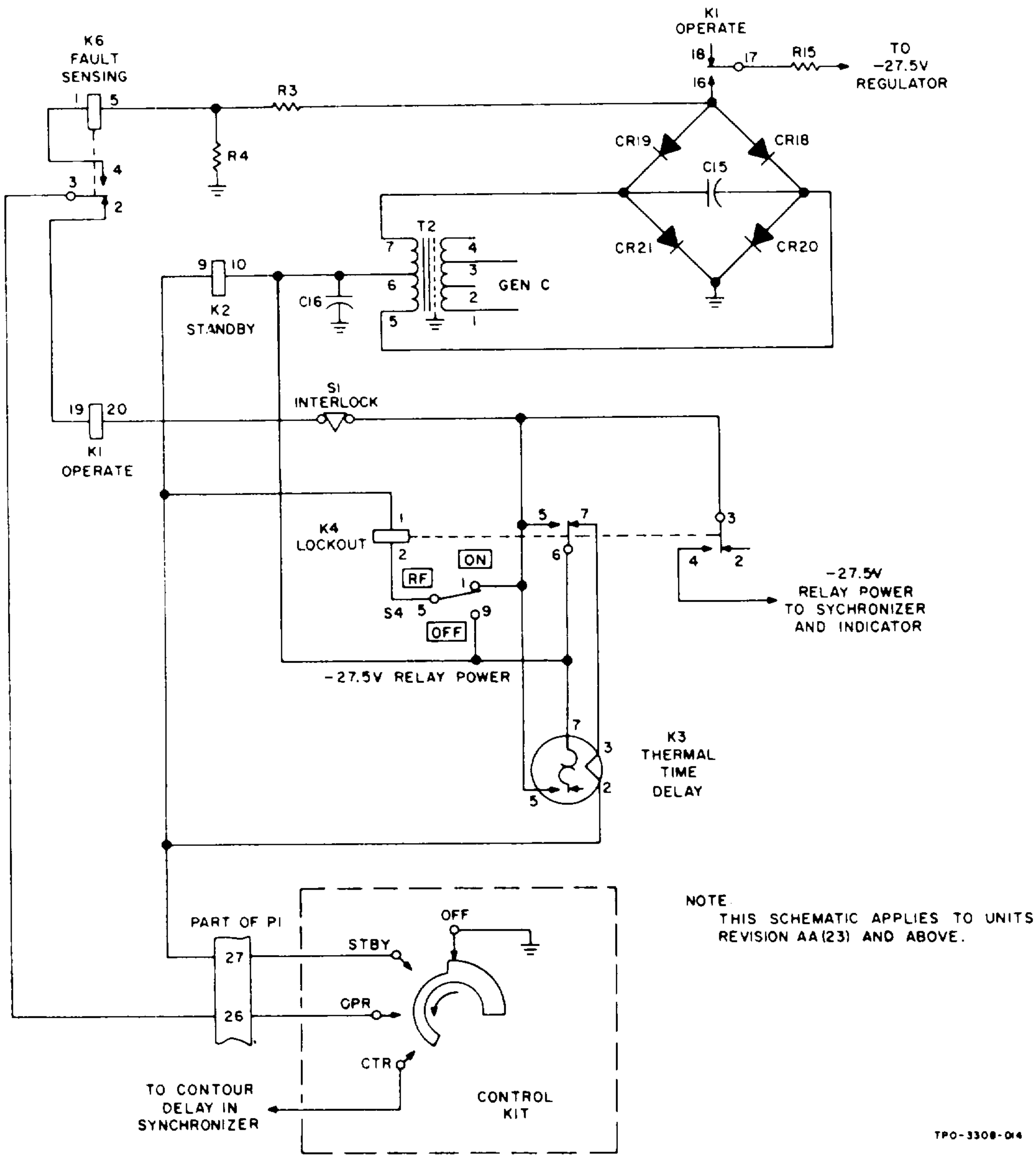


374A-3 Receiver-Transmitter (Revision Z (22) and Below), Control Circuits, Simplified Schematic Diagram

Figure 2-15

3. Units with Revision AA (23) and Above. (Refer to figure 2-16)

Negative 27.5-v relay power from T2-6 is supplied to the coil (terminal 10) of standby relay K2, contact 9 of RF switch S4, and through terminals 6 and 7 of lockout relay K4 to the heater element (terminal 3) of thermal time delay relay K3. Negative voltage from the -27.5-v rectifier is applied



374A-3 Receiver-Transmitter (Revision AA (23) and Above), Control Circuits, Simplified Schematic Diagram

Figure 2-16

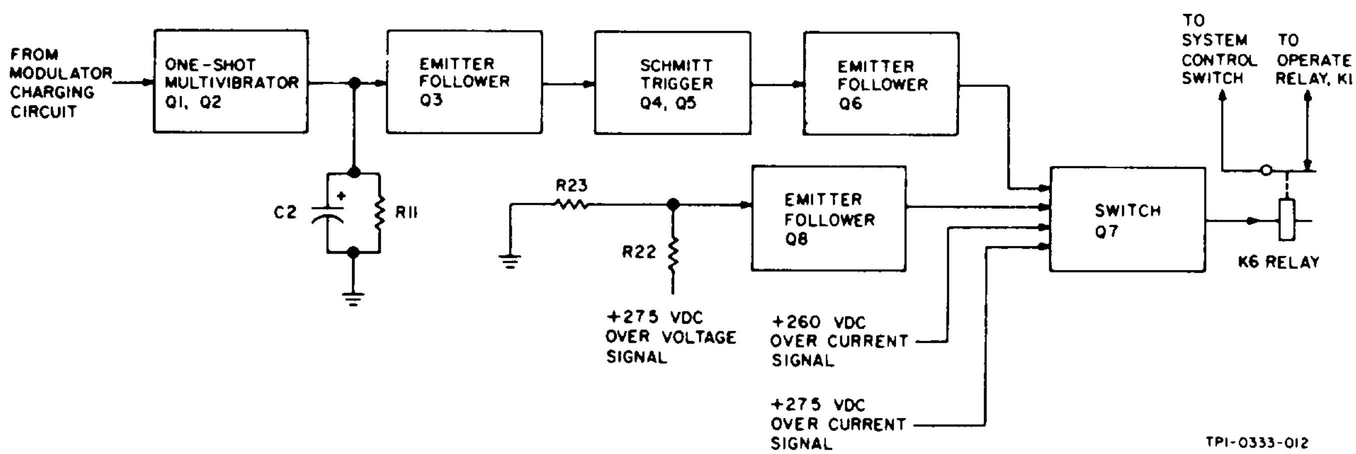
through R3 to the coil (terminal 5) of fault sensing relay K6. When STBY is selected on the cockpit control, a ground is connected to the coil of standby relay K2 and the heater element (terminal 2) of time delay relay K3. After a delay of approximately 4 minutes, contacts 5 and 7 of K3 close, and lockout relay K4 energizes. When K4 energizes, voltage is removed from the heater element of K3, and -27.5-v relay power is applied through contacts, 3 and 4 of K4 to the synchronizer and indicator and through interlock S1 to the coil of operate relay K1.

When OPR is selected on the cockpit control, a ground is applied through contacts 3 and 2 of fault sensing relay K6 to the coil of operate relay K1, and K1 energizes. When a fault is detected by the fault sensing circuit, K6 energizes, and operate relay K1 deenergizes.

(8) Fault Sensing Circuit. (Refer to fig. 2-17 and 1A7 on figs. FO-4 and FO-5)

The fault sensing circuit provides protection from abnormal operating conditions in the +260- and +27.5-v power supplies and, in some units, for the modulator charging circuit. When a fault is detected by the fault sensing module, the fault sensing relay is energized. When the fault sensing relay is energized, relay power is removed from operate relay K1 causing the system to revert to standby operation. The fault sensing relay will remain energized until the system control switch on the cockpit control unit is returned to the STBY position to remove the ground connection from the relay.

On units with revision AA (23) and above, the fault sensing circuit contains one relay, K6. The fault sensing module output energizes K6, which removes relay power from operate relay K1. On units with revision Z (22) and below, the fault sensing circuit contains two relays; fault relay K5 and fault sensing relay K6. The fault sensing module output energizes K6, which energizes K5 to remove relay power from operate relay K1.



Fault Sensing Circuit (Units With Revision BB/AT and Above), Block Diagram

Figure 2-17

The fault sensing circuit contains two resistors, R2 and R9, that are selected for each unit. Resistor R2 is selected to compensate for the differences in characteristics of individual transistors used as Q7 (Q1 in units with revision AZ/AS and below). Resistor R9 is selected to compensate for differences in the dc resistance of individual inductors used as L1.

Units with revision Z (22) and below contain switch S2 for disabling the fault sensing circuit for maintenance. Units with revision AA (23) and above do not include this switch. The fault sensing module in these units may be disabled by ' temporarily connecting together terminals 9 and 10 of TB3.

<u>CAUTION</u>: DO NOT DISABLE THE FAULT SENSING MODULE EXCEPT FOR MAINTENANCE PURPOSES.

(a) +260-V Overcurrent Sensing.

<u>NOTE</u>: Part reference designations preceded by an asterisk (*) apply to units with revision AZ/AS and below. Other reference designations apply to units with revision BB/AT.

Current through the +260-v power supply is sampled by resistor R10. When current through the power supply increases, the voltage applied to the cathode of CR6 (*CR7) increases (more negative). When the current increases beyond the safe level, the negative voltage exceeds the breakdown voltage of zener diode CR5 (*CR6). When CR5 (*CR6) conducts, the negative voltage is applied to the base of Q7 (*Q1). Transistor Q7 (*Q1) is normally off, and the negative voltage at the base causes it to conduct and energize fault sense relay K6. When K6 energizes, power is removed from the coil of operate relay K 1, deenergizing K1 and removing generator C power from transformer T1, the power transformer for the +260-v supply.

(b) +27.5-Overvoltage Sensing.

<u>NOTE</u>: The following description applies to units with revision BB/AT and above.

The output of the +27.5-v regulator (TB5-5) is connected to terminal 1 on fault sensing module TB3. The +27.5-v output is applied to a voltage divider consisting of resistors R22 and R23. The base of transistor Q3 is connected to the junction of R22 and R23. When the power supply output voltage increases, Q3 increases conduction, increasing the voltage drop across resistor R21. When the voltage increases beyond the safe level, zener diode CR7 conducts, applying the positive voltage to the emitter of Q7. Negative collector voltage for Q7 is applied through the coil of fault sensing relay K6. The positive voltage at the emitter causes Q7 to conduct heavily and energize K6. When K6 is energized, primary power for transformer T1 (power transformer for +27.5-v supply) is removed.

<u>NOTE</u>: The following description refers to units with revision AZ/AS and below.

The output of the +27.5-v regulator (TB5-5) is connected to terminal 1 on fault sensing module TB3. The +27.5-v output is applied to zener diode CR8 through resistor R5. When the power supply output voltage exceeds a safe level, CR8 conducts. 'The positive potential from the supply is then applied to the emitter of Q1, causing it to conduct. Negative collector voltage for Q1 is applied through the coil of fault sensing relay K6. When Q1 conducts, K6 energizes and removes primary power from transformer T1, the power transformer for the +27.5-v supply.

In units with revision Z (22) and below, the output from the +27.5-v regulator is applied to a voltage divider, CR8, R8, and R7, on the fault sensing module. When the supply output increases, CR8 increases conduction and more current flows through R8 and R7. The increased voltage at the junction of R8 and R7 is applied through CR4 to the cathode of zener diode CR2. When the voltage exceeds a safe level, CR2 conducts, biasing Q1 into conduction to energize relay K6.

(c) +27.5-V Overcurrent Sensing.

NOTE: Part reference designations preceded by an asterisk (*) apply to units with revision AZ/AS and below. Other reference designations apply to units with revision BB/AT and above.

Current through the +27.5-v supply is sampled by-inductor L1. As the current through the power supply increases, the voltage at the junction of R9 and R20 (*C3 and *R9) increases (more negative). This voltage is applied to the base of Q7 (*Q1) and, when the power supply current increases beyond the safe level, the increased negative voltage at the base of Q7 (*Q1) causes Q7 (*Q1) to conduct heavily and energize fault sensing relay K6. When K6 is energized, primary power is removed from transformer T1, the power transformer for the +27.5-v power supply.

Thermistor RT1 and resistor R25 provide compensation for the change in L1 due to temperature variations.

(d) Modulator Overcurrent Sensing.

NOTE: Units with revision AA (23) through AZ/AS do not provide modulator overcurrent sensing. This description applies to units with revision BB/AT and above.

The modulator charging current develops a voltage across resistor R48. This voltage is applied to terminal 11 on fault sensing module TB3. Misfire of the magnetron causes an excessive modulator current, and the voltage drop across R48 increases. When this voltage exceeds the breakdown volt-age of zener diodes CR2 and CR3, the voltage is applied to the base of Q1. Transistors Q1 and Q2, with associated components, form a one-shot multivibrator. The excessive modulator current resulting from magnetron misfiring triggers the multivibrator, and the multivibrator output charges capacitor C2. Forty consecutive misfires, or a 10-percent misfire rate, of the magnetron will produce a charge on C2 of sufficient level to trigger the Schmitt trigger circuit formed by transistors Q4 and Q5 and associated components. The output of the Schmitt trigger circuit is applied through Q6 and CR4 to the emitter of Q7. This positive output biases Q7 into conduction and energizes fault sensing relay K6. When K6 is energized, primary power is removed from modulator transformer T4.

NOTE: The following description applies to the modulator overcurrent sensing circuit in units with revision Z (22) and below.

Current through the modulator is sampled by resistor R48 and applied to terminal 7 on fault sensing module TB3. As the current through the modulator increases, the positive voltage at test point TP3 increases. When the current increases beyond the safe level, the positive voltage breaks down zener diode CR2 and is applied to the emitter of Q1. This positive voltage causes Q1 to conduct heavily and energize fault sensing relay K6. When K6 energizes, primary power is removed from modulator transformer T4.

(9) Metering Circuits. (Refer to figure 2-18 or 2-19)

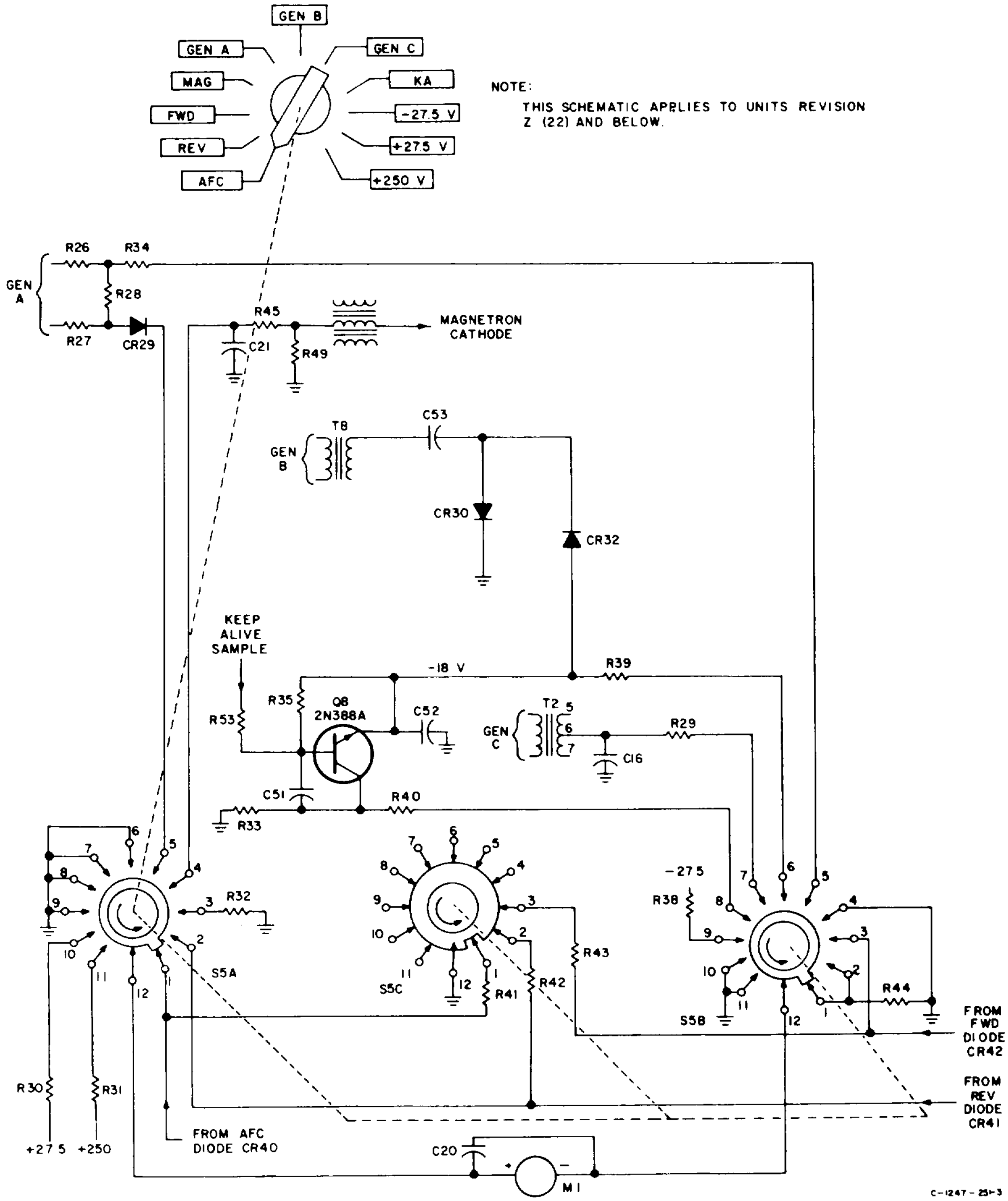
NOTE: In units with revision AA (23) and above, the keep-alive (KA) metering function has been deleted, and position 1 is designated OFF. In later production units the +250V position has been changed to read +260V.

(a) AFC Mixer Crystal Current Metering. The afc current is applied through rf choke IA to pin 1 (2 in units with revision AA (23) and above) of S5A. With the meter switch in the AFC position, metered afc current is applied into pin 1 (2) of S5A, out pin 12, through the meter into pin 12 of S5B, out pin 1 (2), and through R44 to ground. When the meter switch is not in the AFC position, afc current flows through R41 into pin 1 (2) of S5C and out pin 12 to ground. This provides a dc path for afc crystal current when the meter switch is not in the AFC position.

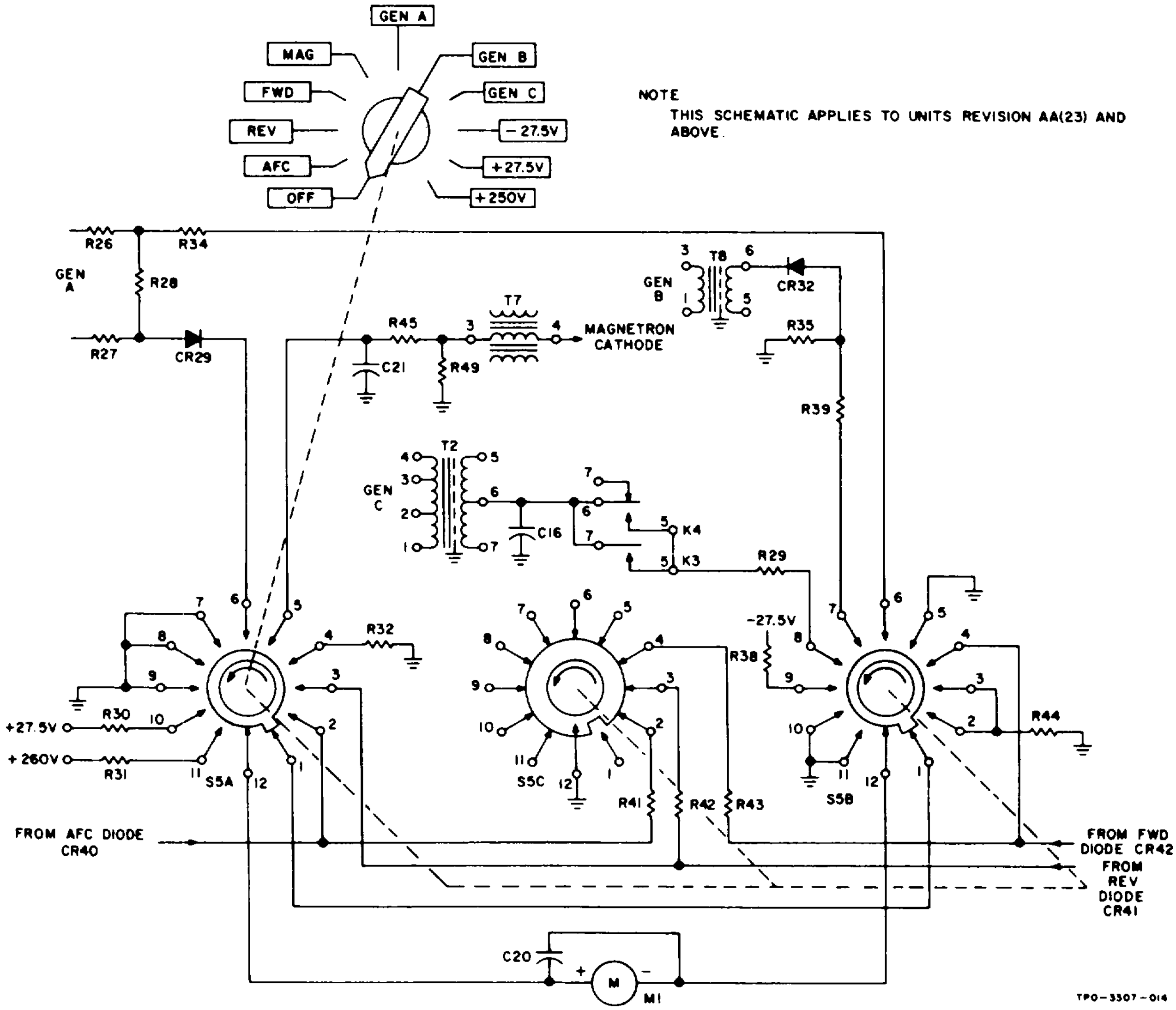
(b) Reverse (REV) Mixer Crystal Current Metering. Reverse mixer crystal current is applied through rf chokes L5, L7, and L9 to pin 2 (3 in units with revision AA (23) and above) of S5A. When the meter switch is in the REV position, current flow is into pin 2 (3) of S5A, out pin 12, through the meter into pin 12 of S5B, out pin 2 (3), and through R44 to ground. When the meter switch is not in the REV position, current flow is through R42 into pin 2 (3) of S5C and out pin 12 to ground. This provides a dc path for reverse crystal current when the meter switch is not in the REV position.

(c) Forward (FWD) Mixer Crystal Current Metering.

Forward mixer crystal current is applied through rf chokes L6, L8, and L10 to pin 3 (4 in units with revision AA (23) and above) of S5B. When the meter switch is in the FWD position, current flow is into pin 3 (4) of S5B, out pin 12, through the meter into pin 12 of S5A, out pin 3 (4), and through R32 to ground. When the switch is not in the FWD position, current flow is through R43 into pin 3 (4) of S5C and out pin 12 to ground. This provides a dc path for forward crystal current when the meter is not in the FWD position.



374A-3 Receiver-Transmitter (Revision Z (22) and Below), Metering Circuits, Simplified Schematic Diagram
Figure 2-18



374A-3 Receiver-Transmitter (Revision AA (23) and Above), Metering Circuits, Simplified Schematic Diagram
Figure 2-19

(d) Magnetron Current Metering.

The firing of the magnetron creates a voltage pulse across resistor R49. This pulsating voltage is filtered by R45 and C21 and applied to pin 4 (5 in units with revision AA (23) and above) of S5A. When the meter switch is in the MAG position, current flow is from ground into pin 4 (5) of S5B, out pin 12, through the meter into pin 12 of S5A, and out pin 4(5) to R49. The value of R45 is selected to provide midscale reading during normal operation of the magnetron.

(e) Generator A Metering.

When the meter switch is in the GEN A position, a rectified voltage from CR29 is applied to pin 5 (6 in units with revision AA (23) and above) of S5A. Current flow is into pin 5 (6) of S5B, out pin 12, through the meter into pin 12 of S5A, and out pin 5 (6) to CR29.

(f) Generator B Metering.

When the meter switch is in the GEN B position, a rectified voltage is applied from CR32 through R39 to pin 6 (7 in units with revision AA (23) and above) of S5B. Current flow is out pin 12 of S5B, through the meter into pin 12 of S5A, and out pin 6 (7) to ground.

(g) Generator C Metering.

When the meter switch is in the GEN C position, a sample of generator C voltage from the center tap of T2 is applied through R29 to pin 7 of S5B. Current flow is from pin 12 of S5B, through the meter into pin 12 of S5A, and out pin 7 to ground.

For units with revision AA (23) and above, current flow is from the center tap of T2 through contacts 6 and 5 of K4, through R29 into pin 8 of S5B, and out pin 12 into the meter. Current through the meter flows into pin 12 of S5A and out pin 8 to ground.

(h) Keep-Alive (KA) Voltage Metering (Units with Revision Z (22) and Below).

When keep-alive voltage is present, a small positive voltage from terminal 3 of TB2 is applied to the base of Q8. When the meter switch is in the KA position, Q8 collector current flows through the parallel circuit consisting of R33, R40, and the meter circuit to ground. When the meter switch is not in the KA position, Q8 conducts through R33 to ground.

(i) -27.5-V Metering.

When the meter switch is in the -27.5V position, negative 27.5 v from the emitter of Q2 is applied through R38 into pin 9 of S5B. Current flow is out pin 12, through the meter into pin 12 of S5A, and out pin 9 to ground.

(j) +27.5-V Metering.

When the meter switch is in the +27.5V position, positive 27.5 v from terminal 5 of TB5 is applied through R30 to pin 10 of S5A. Current flow is from ground into pin 10 of S5B, out pin 12, through the meter into pin 12 of S5A, and out pin 10 to R30.

(k) +260-V Metering.

When the meter switch is in the +260V position, positive 260 v from terminal 8 of TB1 is applied through R11 and R31 to pin 11 of S5A. Current flow is from ground into pin 11 of S5B, out pin 12, through the meter into pin 12 of S5A, and out pin 11 to R31.

NOTE: Positive 260-v power supply output may measure +250 v on some units due to tolerance specifications of CR22 and CR23.

Section II. DISASSEMBLY

2-7. GENERAL.

This section presents instructions for disassembling the 374A-3 Receiver-Transmitter and the 349A-6/7 Shockmount. These instructions are arranged so that disassembly of each major part is an individual operation. When it is necessary to disassemble the unit, locate the part in the table of contents and begin on the page indicated. The procedures begin with the highest assemblies, proceed to the next lower subassemblies, and end with the major parts. Reference is made to previous disassembly steps that must be per-formed before a part may be removed or disassembled. In any event, the disassembly procedure should be continued only as far as necessary to replace the faulty component. The disassembly of terminal strips on boards and of isolated components can usually be accomplished by inspection and determination of the extent of disassembly required. These instructions include special techniques, cautions, warnings, and unique procedures.

The numbers used to reference component parts shown in the illustrations in this section do not correspond to the item numbers of the component parts in the illustrated parts list.

2-8. PRECAUTIONS AND GENERAL TECHNIQUES.

Mark, tag, or otherwise identify all disconnected electrical wiring. Note the color coding, placement of leads, and method of applying insulation before unsoldering or removing any electrical components. These procedures supply sufficient information to completely remove the parts listed in the table of contents. In most cases, however, parts may be released and moved aside to gain access to other parts without unsoldering the connecting leads; this applies particularly to the printed circuit boards. Do not unsolder these leads unless absolutely necessary.

CAUTION: TO PREVENT DAMAGE TO A SOLID-STATE DEVICE, USE A HEAT SINK ON THE LEAD BETWEEN THE POINT BEING UNSOLDERED AND THE DEVICE.

NOTE: THE 374A-3 RECEIVER-TRANSMITTER USES EXTREMELY HIGH VOLTAGES. DO NOT ATTEMPT ANY DISASSEMBLY WHILE PRIMARY POWER IS APPLIED TO THE UNIT. ENSURE THAT THE POWER CABLE IS REMOVED TO PREVENT VOLTAGE TRANSIENTS WHICH COULD DAMAGE OR DESTROY SEMICONDUCTORS.

CAUTION: REMOVE WRISTWATCH BEFORE WORKING IN THE VICINITY OF THE MAGNETRON OR MIXER-DUPLEXER MODULE.

CAUTION: HANDLE THE MAGNETRON AND MIXER-DUPLEXER MODULE WITH EXTREME CARE. NEVER JAR THE UNITS OR STRIKE THEM WITH TOOLS. NEVER PLACE THEM ON A STEEL WORKBENCH OR ON A WORKBENCH THAT MAY HAVE IRON FILINGS OR STRANDS OF STEEL WOOL PRESENT. NEVER USE STEEL TOOLS, WHICH MAY CAUSE DEGAUSSING. NEVER ALLOW DELICATE INSTRUMENTS TO COME IN THE VICINITY OF THE MAGNETRON OR MIXER-DUPLEXER MODULE.

NOTE **CAPACITORS IN THE 374A-3 RECEIVER-TRANSMITTER MAY HOLD A CHARGE FOR LONG PERIODS OF TIME AFTER PRIMARY POWER HAS BEEN REMIIOVED. OBSERVE SAFETY PRECAUTIONS WHEN WORKING ON THE RE CEIVER-TRANSMITTER.**

These precautions are repeated in the text of the disassembly procedures where applicable.

2-9. DISASSEMBLY PROCEDURE.

NOTE: **Figure and index numbers preceded by an asterisk apply to 374A-3 Receiver-Transmitter units with revision AA (23) and above. Figure and index numbers not preceded by an asterisk apply to 374A-3 Receiver-Transmitter units with revision Z (22) and below.**

A. Remove and Disassemble Front Housing. (Refer to figures F0-6 and FO-7)

(1) Remove meter function switch knob (1, *1) by loosening two setscrews (2, *2) securing it to meter function switch S5 (56, *42).

(2) Remove front housing (5, *12) by loosening four machine screws (6, *13) securing it to four mounting posts (112, and *108).

(3) Remove filter bracket (17, *3) by releasing two turnlock fasteners (14, *4) securing it to front housing (5, *12).

(4) Remove air filter (20, *11).

B. Remove Meter M1. (Refer to figures FO-6 and'FO-7)

(1) Remove front housing (5, *12) in accordance with paragraphs A(1) and A(2) above.

(2) Remove four machine screws (23, *31) and four lockwashers (24, *32) securing meter MI1 (22, *30) to four meter posts (26, *112).

(3) Pull meter M1 (22, *30) forward, away from meter posts (26, *112), to expose the rear wiring.

(4) Unsolder and tag the meter leads.

(5) Remove meter M1 (22, *30).

C. Remove +27.5-V Regulator Module TB5. (Refer to figures FO-6 and' FO-7)

(1) Remove front housing (5, *12) in accordance with paragraphs A(1) and A(2) above.

(2) Remove four machine screws (49, *26), four lockwashers (50, *27), and four flat washers (51, *29) securing +27.5-v regulator module TB5 (47, *25) to four stand-offs (52, *110).

(3) Pull 427.5-v regulator module TB5 (47, *25) forward, away from standoffs (52, *110), to expose the rear wiring.

(4) Unsolder and tag the leads from the terminals of +27.5-v regulator module TB5 (47, *25).

(5) Remove the module.

D. Remove -27.5-V Regulator Module TB6. (Refer to figures FO-6 and FO-7)

(1) Remove front housing (5, *12) in accordance with paragraphs A(1) and A(2) above.

(2) Remove four machine screws (39, *34), four lockwashers (40, *35), and four flat washers (40A, *36) securing -27.5-v regulator module TB6 (38, *37) to four hexposts (46, *114).

(3) Remove four spacers (41, *38).

(4) Pull -27.5-v regulator module TB6 (38, *37) forward, away from meter circuit module TB4 (42, *39), to expose the rear wiring.

(5) Unsolder and tag the leads from terminals 1 through 6 of -27.5-v regulator module TB6 (38, *37).

(6) Remove the module.

E. Remove Meter Circuit Module TB4. (Refer to figures FO-6 and FO-7)

(1) Remove front housing (5, *12) in accordance with paragraphs A(1) and A(2) above.

(2) Release -27.5-v regulator module TB6 (38, *37) in accordance with paragraphs D(2) through D(4) above.

(3) Pull meter circuit module TB4 (42, *39) forward, away from hexposts (46, *114), to expose the rear wiring.

(4) Unsolder and tag the leads from the terminals of meter circuit module TB4 (42, *39).

(5) Remove the module.

F. Remove Meter Function Switch S5. (Refer to figures FO-6 and *FO-7)

(1) Remove front housing (5, *12) in accordance with paragraphs A(1) and A(2) above.

(2) Remove three machine screws (60, *41), three lockwashers (60A), and three flat washers (60B) securing switch bracket (62, *40) to three standoffs (61, *117).

(3) Pull wafer switch assembly (56, 59, 62, *40, *42, *43, *44) forward, away from standoffs (61, *117), to expose the switch wiring.

(4) Unsolder and tag the leads from the terminals of switch S5 (56, *42).

(5) Remove wafer switch assembly (56, 59, 62, *40, *42, *43, *44).

G. Remove RF ON/OFF Switch S4. (Refer to figures FO-6 and FO-7)

(1) Remove front housing (5, *12) in accordance with paragraphs A(1), and A(3) above.

(2) Unsolder and tag the leads from the terminals of switch S4 (36, *56).

(3) Release switch S4 (36, *56) from switch plate (118, *64) by removing retainer nut (part of 36, *56) and lockwasher (37, *57).

(4) Remove switch S4 (36, *56).

H. Remove Tubeaxial Fan B1. (Refer to figures FO-6 and FO-7)

(1) Remove front housing (5, *12) in accordance with paragraphs A(1) and A(2) above.

(2) Release three synchro clamps (28, *59).

(3) Pull fan B1 (27, *58) forward, away from front mounting plate (115, *60), to expose the fan terminal strip.

(4) Unscrew and tag the leads from the terminals of fan B1 (27, *58).

(5) Remove fan B1 (27, *58).

I. Disassemble and Remove Front Plate. (Refer to figures FO-6 and FO-7)

(1) Remove front housing (5, *12) in accordance with paragraphs A(1) and A(2) above.

(2) Remove meter M1 (22, *30) in accordance with paragraphs B(2) through B(5) above.

(3) Remove +27.5-v regulator module TB5 (47, *25) in accordance with paragraphs C(2) through C(5) above.

(4) Remove -27.5-v regulator module TB6 (38, *37) in accordance with paragraphs D(2) through D(6) above.

(5) Remove meter circuit module TB4 (42, *39) in accordance with paragraphs E(3) through E(5) above.

(6) Remove meter function switch S5 (56, *42) in accordance with paragraphs F(2) through F(5) above.

(7) Remove RF ON/OFF switch S4 (36, *56) in accordance with paragraphs G(2) through G(4) above.

(8) Remove tubeaxial fan B1 (27, *58) in accordance with paragraphs H(2) through H(5) above.

(9) Remove capacitor C1 (29, *49) and component clip (34, *53) as follows:

(a) Unsolder and tag the capacitor lead from terminal stud (53, *54A).

(b) Unscrew and tag the capacitor lead from the terminal strip of tubeaxial fan B1 (27, *58).

(c) Remove four machine screws (31, *51) and four lockwashers (32, *52) securing riveted bracket (30, *50) to front plate (115, *60).

(d) Remove capacitor (29, *49) and bracket (30, *50).

(10) Release front mounting plate (115, *60) by removing eight machine screws (116, *61) and two machine screws (4A, *62) securing it to chassis assembly (512, *446).

(11) Pull front mounting plate (115, *60) forward, away from chassis assembly (512, *446).

(12) The following components, attached to the rear of front mounting plate (115, *60), are now accessible and may be removed as required,

(a) Components Q2, Q3, Q4, and Q5

(b) Components CR17, CR22, CR23, CR24, and CR25

(13) The following components, attached to the front chassis assembly (512, *446), are now accessible and may be removed as required.

(a) Components R15, R19, and R11

(b) Terminal board TB8

J. Remove Outer Dust Covers. (Refer to figures FO-6 and F0-7)

(1) Remove top dust cover (120, *123) by releasing five turnlock studs (120A, 120B, *124, *125) securing it to chassis assembly (512, *446).

(2) Remove side dust covers (121, *137) by removing 12 machine screws (122, *138) securing them to chassis assembly (512, *446).

(3) Turn the unit on one side, and remove bottom dust cover (503, *130) by releasing four turnlock studs (504, 506, *131, *132) securing it to chassis assembly (512, *446).

K. Remove Trigger Generator Module. (Refer to figures Fo-6 and F0-7)

(1) Remove top dust cover (120, *123) in accordance with paragraph J(1) above.

(2) Remove trigger generator module (145, *139) by lifting it out of J1 (501, figure FO-8; *437, figure FO-9, and remove from printed board mount (332, *227) with a rocking motion.

L. Remove Pulse Forming Network Z1. (Refer to figures FO-6 and FO-7)

(1) Remove front housing (5, *12) in accordance with paragraphs A(1) and A(2) above.

(2) Release front mounting plate (115, *60) in accordance with paragraphs I(10) and I(11) above.

(3) Remove top dust cover (120, *123) in accordance with paragraph J(1) above.

(4) Remove right side dust cover (121, *137) in accordance with paragraph J(2) above.

(5) Remove and tag the coil and common high-voltage leads from pulse forming network Z1 (277, *168).

(6) Remove two machine screws (270, *172) and two lockwashers (272, *173) securing staked bracket (269, *171) to the right side of chassis assembly (512, *446).

(7) Remove four hexnuts (278, *169) and four lockwashers (279, *170) securing pulse forming network Z1 (277, *168) to the front of chassis assembly (512, *446).

(8) Remove pulse forming network Z1 (277, *168).

(9) Remove staked bracket (269, *171) by removing machine screw (271, *177) and lockwasher (273, *178) securing it to pulse forming network Z1 (277, *168).

M. Remove Thyratron V1. (Refer to figures FO-8 and FO-9)

(1) Remove top dust cover (120, *123) in accordance with paragraph J(1) above.

(2) Remove thyratron plate cap (267, *265).

(3) Release thyratron tube clamp (380, *385).

(4) Remove thyratron V1 (268, *264).

N. Remove Keep-Alive Supply Module TB2. (Refer to figures FO-6 and FO-7)

(1) Remove top dust cover (120, *123) in accordance with paragraph J(1) above.

(2) Remove left side dust cover (121, *137) in accordance with paragraph J(2) above.

(3) Disconnect keep-alive tube cap (126, *144).

(4) Remove cable clamp (135, *141) by removing machine screw (123, *142) and flat washer (124, *143) securing it to waveguide spacer (137, *149).

(5) Remove two machine screws and two lockwashers securing keep-alive supply module TB2 to the front of chassis assembly (512, figure FO-6; 446. Figure FO-7).

(6) On units with revision Z (22) and below, remove two machine screws, two lockwashers, two flat washers, two spacing sleeves, and cable clamp securing keep-alive supply module TB2 to magnetron mounting bracket.

(7) On units with revision AA (23) and above, remove machine screw, threaded stud, two lockwashers, two flat washers, two spacing sleeves, and cable clamp securing keep-alive supply module TB2 to magnetron mounting bracket.

(8) Pull keep-alive supply module TB2 forward, away from the unit, to expose the rear wiring.

(9) Unsolder and tag the leads from terminals 1 through 4 of keep-alive supply module TB2.

(10) Remove the module.

O. Remove Magnetron V2. (Refer to figures FO-6 and F0-7)

CAUTION: HANDLE THE MAGNETRON WITH EXTREME CARE. NEVER JAR THE UNIT OR STRIKE IT WITH TOOLS. NEVER PLACE IT ON A STEEL WORKBENCH OR ON A WORKBENCH T4HAT MAY HAVE IRON FILINGS OR STRANDS OF STEEL WOOL PRESENT. NEVER USE STEEL TOOLS WHICH MAY CAUSE DEGAUSSING. NEVER ALLOW DELICATE INSTRUMENTS TO COME IN THE VICINITY OF THE MAGNETRON.

(1) Remove front housing (5, *12) in accordance with paragraphs A(1) and A(2) above.

(2) Release front mounting plate (115, *60) in accordance with paragraphs I(10) and I(11) above.

(3) Remove top dust cover (120, *123) in accordance with paragraph J(1) above.

(4) Remove left side dust cover (121, *137) in accordance with paragraph J(2) above.

(5) Release keep-alive supply module TB2 in accordance with paragraphs N(3). through N(8) above.

(6) Release TP4 (280, *238) by removing two machine screws (282, *240), two flatwashers (283), two fiber washers (284), insulator (288), and lockwasher (*241) securing test-point bracket (286, *243) to the front of chassis assembly (512, *446).

(7) Remove four machine screws (128 *152), four flat washers (130, *153), four lockwashers (129), and four hexnuts (131) securing magentron V2 (127, *151) to magnetron mounting bracket.

(8) Remove waveguide spacer (317, *149) by removing four machine screws (133, *146) and four lockwashers (134, *147) securing it to magnetron V2 (127, *151).

(9) Unsolder and tag the yellow and green magnetron leads from transformer T7 (291, figure FO-8; *226, figure*FO-9).

(10) Remove the magnetron.

P. Remove Mixer-Duplexer Module. (Refer to figures FO-6 and'F0-7)

CAUTION: HANDLE THE MIXER-DUPLEXER MODULE WITH EXTREME CARE. NEVER JAR THE UNIT OR STRIKE IT WITH TOOLS. NEVER PLACE IT ON A STEEL WORKBENCH OR ON A WORKBENCH THAT MAY HAVE IRON FILINGS OR STRANDS OF STEEL WOOL PRESENT. NEVER USE STEEL TOOLS WHICH MAY CAUSE DEGAUSSING. NEVER ALLOW DELICATE INSTRUMENTS TO COME IN THE VICINITY OF THE MIXER-DUPLEXER MODULE.

(1) Remove the dust covers in accordance with paragraph J above.

(2) Remove two screwlock assemblies (497, *440), and disconnect electrical connector J2 (499, *439).

(3) Remove trigger generator module (145, *139) in accordance with paragraph K(2) above.

(4) Release keep-alive supply module TB2 in accordance with paragraphs N(3) through N(8) above.

(5) Release magnetron (127, *151) in accordance with paragraphs 0(6) through 0(8) above

(6) Disconnect interlock switch S1 (146, *206) by removing three machine screws (149, *207), three lockwashers (148, *208), and three spacers (*209) securing it to the rear of chassis assembly (512, *446).

(7) Disconnect P3 and P4 (500, *441).

(8) Disconnect J5.

(9) Remove two machine screws (139, *156), two lockwashers (140, *157), and two flat washers (*158) securing mixer-duplexer module (138, *154) to the rear of chassis assembly (512, *446).

(10) Remove the mixer-duplexer module.

NOTE: When the magnetron and the mixer-duplexer module have been removed, the internally mounted chassis components are readily accessible and and may be removed as required.

Q. Remove Fault Sensing Module TB3. (Refer to figures FO-8 and *FO-9)

(1) Remove bottom dust cover (503, figure FO-6; *130, figure *FO-7) in accordance with paragraph J (3) above.

(2) Unsolder and tag the leads from the terminals of fault sensing module TB3 (386, *244).

(3) Release fault sensing module TB3 (386, *244) by removing four machine screws (387, *245), four lockwashers (388, *246), and four flat washers (*247) securing it to chassis assembly (512, figure FO-6; *h446, figure*FO-7).

(4) Remove the module.

R. Remove Thyratron Grid Module TB7. (Refer to figures FO-8 and FO-9)

(1) Remove bottom dust cover (503, figure FO-6; *130, figure FO-9 in accordance with paragraph J(3) above.

(2) Release thyratron grid module TB7 (389, *381) by removing four machine screws (390), four lockwashers (391), two machine screws (*382), four lockwashers (*383), four flat washers (*384); four spacers (*384D), four hexnuts (*384A, *380B), and two solder lugs (*380A) securing it to chassis assembly (512, figure FO-6; *446, figure *F0-7).

(3) Pull thyratron grid module TB7 (389 *381) forward, away from chassis assembly (512, figure FO-6; *446, figure * FO-7) to expose the rear wiring.

(4) Unsolder and tag the leads from the terminals of thyratron grid module TB7 (389, *381).

(5) Remove the module.

S. Remove +260-V Supply Module TB1. (Refer to figures FO-8 and *FO-9)

(1) Remove bottom dust cover (503, figure FO-6; *130, figure *FO-7) in accordance with paragraph J(3) above.

(2) Release +260-v supply module TB1 (457, *248) by removing four machine screws (458, *249), four lockwashers (459, *250), and four flat washers (*251) securing it to chassis assembly (512, figure FO-6; *446. fibure*FO-7).

(3) Pull +260-v supply module TB1 (457, *248) forward, away from the chassis assembly (512, figure FO-6; *446, figure *FO-7).

(4) Unsolder and tag the leads from the terminals of +260-v.supply module TB1 (457, *248).

(5) Remove the module.

T. Remove Magnetron Heater Module TB10. (Refer to figure FO-8)

NOTE: On units with revision AA (23) and above, the magnetron heater circuit is an integral part of +260-v supply module TB1.

(1) Remove bottom dust cover (503, figure FO-6in accordance with paragraph J(3) above.

(2) Unsolder and tag the leads from terminals 1 through 4 of magnetron heater module TB10 (369).

(3) Release magnetron heater module TB10 (369) by removing two machine screws (370), two lockwashers (371), two flat washers (372), two spacers (374), hexnut (373), and terminal stud (375) securing it to chassis assembly (512, figure FO-6).

(4) Remove cable clamp by removing machine screw, two flat washers, lockwasher, and hexnut securing it to magnetron heater module TB10 (369, figure FO-8.)

(5) Remove the module.

U. Disassemble 349A-6 Shockmount. (Refer to figure FO-10)

NOTE: This procedure applies to all units.

(1) Remove extractor assembly (1) by removing two machine screws (24) and two machine screws (25).

NOTE: If necessary to replace thrust bearing (16), remove two machine screws (22), and remove bearing (16) from jaw (20).

(2) Remove front retainers (76) by removing cotter pin (78) and pin (79).

(3) Remove base plate (94) as follows:

(a) Remove two machine screws (70) and two spacers (71).

(b) Remove two machine screws (56), two lockwashers (58), two flat washers (57), and two spacers (59).

(c) Remove four machine screws (27), four flat washers (28), and four hexnuts (29) securing two ground straps (26) to base plate (94).

(d) Remove base plate (94).

(4) Remove the vibration isolators as follows:

(a) Remove two vibration isolators (32) by removing eight machine screws (33), eight lockwashers (34), and eight hexnuts (35) securing them to base plate (94).

(b) Remove two vibration isolators (60) by removing eight machine screws (61), eight lockwashers (62), and eight hexnuts (63) securing them to base plate (94).

(c) Remove vibration isolator (64) by removing four machine screws (65), four lockwashers (66), and four hexnuts (67) securing it to base plate (94).

NOTE: Further disassembly of the 349A-6 Shockmount is not recommended unless part replacement is necessary.

Section III. CLEANING

2-10. GENERAL.

This section presents instructions for cleaning the dismantled and disassembled components, parts, and subassemblies of the 374A-3 Receiver-Transmitter and the 349A-6/7 Shockmount. These instructions are tabulated and arranged to facilitate reference to the text procedure for cleaning the various parts and assemblies. All parts requiring particular methods of cleaning are considered separately, and parts which are similar enough to permit identical cleaning procedures are grouped together. Either Turcosol or Stoddard solvent may be used in the following procedures.

NOTE: PERFORM OPERATIONS INVOLVING CLEANING SOLVENT UNDER A VENTILATED HOOD. AVOID BREATHING SOLVENT VAPOR AND FUMES. WEAR A SUITABLE MASK WHEN NECESSARY. AVOID CONTINUOUS CONTACT WITH THE SOLVENT. USE GOGGLES, GLOVES, AND AN APRON TO PREVENT IRRITATION FROM PROLONGED CONTACT. CHANGE CLOTHING THAT HAS BECOME SATURATED WITH SOLVENT.

References to "air jet" in this section indicate a hand-operated air nozzle supplied with clean, dry, compressed air at a maximum pressure of 28 pounds per square inch.

NOTE: WEAR GOGGLES WHEN USING THE AIR JET TO BLOW DIRT AND DUST FROM EQUIPMENT PARTS. WARN OTHER PERSONS AWAY FROM HAZARDOUS AREA OR WORKING ENCLOSURE.

2-11. CLEANING PROCEDURE.

The following paragraphs present instructions and procedures for cleaning the various parts of the dismantled and disassembled equipment preparatory to performing inspection procedures. For convenience, components, parts, and subassemblies are alphabetically listed and cross-referenced to the appropriate paragraphs containing the cleaning instructions. Refer to figure 2-20.

NOTE: OBSERVE ALL FIRE PRECAUTIONS WHEN USING FLAMMABLE MATERIALS FOR CLEANING PURPOSES. THESE MATERIALS SHOULD ONLY BE USED OUTSIDE OR IN A VENTILATED BOOTH PRO(VIDED WITH EXPLOSION-PROOF ELECTRICAL EQUIPMENT AND AN EXHAUST FAN HAVING SPARK-PROOF BLADES.

A. Air Filters.

(1) Wash the filter in clean, warm (not hot) water.

CAUTION: A MILD SOAP MAY BE USED. DO NOT, HPWEVER, USE DETERGENTS TO CLEAN THE FILTER.

(2) Dry the filter with an air jet.

ITEM	REFER TO PARAGRAPH
Air filters	2-11A
Castings	2-11B
Connectors	2-11C
Covered cables	2-11D
Covers and shields	2-11E
Electron tubes	2-11F
Gaskets and washers (paper, fiber, cork, and rubber)	2-11G
Insulators (ceramic, Mycalex, and plastic)	2-11H
Jacks	2-11I
Knobs and panels	2-11J
Machined metal parts	2-11K
Mechanical metal parts	2-11L
Molded plastic parts	2-11M
Printed circuit boards	2-11N
Rf coils	2-110
Receptacles	2-11P
Relays	2-11Q
Switches	2-11R
Transformers and inductors	2-11S
Tube sockets	2-11T
Vibration isolators	2-11U
Waveguide assemblies	2-11V
Wired chassis	2-11W

Index of Cleaning Procedures
Figure 2-20

(3) Reinstall the filter when it is thoroughly dry.

B. Castings.

Unfinished, finished, or partly finished castings should be cleaned as follows:

(1) Remove bulk of surface dirt with rags.

(2) Blow dust from surfaces, holes, and recesses using an air jet.

(3) Immerse casting in washing bath of solvent, and scrub until clean, working over all surfaces and into all holes and recesses with a suitable nonmetallic brush. Flat, woodbacked brushes with soft fiber bristles are recommended for surfaces; round brushes, similar to those used for washing bottles and test tubes, are recommended for holes and recesses.

(4) Raise casting from bath, and permit solvent to drain into bath.

(5) Immerse casting in rinsing bath of clean solvent, rinse, and raise from bath. Position casting to drain dry so that solvent is not trapped in holes or recesses. When practical positioning will not permit complete draining, use an air jet to blow out any trapped solvent.

CAUTION: **WEAR PROTECTIVE CLOTHING WHEN USING THE AIR JET TO REMOVE EXCESS SOLVENT.**

(6) When thoroughly dry, touch up any minor damage to the finish.

(7) Protect casting from dust and moisture pending inspection.

C. Connectors

(1) Wipe dust and dirt from bodies, shells, and cable clamps, using a solvent-moistened, lintless cloth.. Wipe dry with a clean, dry, lintless cloth.

(2) Remove dust from inserts using a small, soft-bristled brush and an air jet.

(3) Wash dirt and any traces of lubricant from inserts, insulation, and contacts, using solvent applied sparingly with a small, camel-hair brush.

CAUTION: **DO NOT ALLOW SOLVENT TO RUN INTO SLEEVES OR CONDUIT COVERING ANY WIRES OR CABLES CONNECTED TO CONTACT TERMINALS OF THE INSERT.**

(4) Dry the insert with an air jet.

D. Covered Cables.

(1) Clean outer surfaces by wiping away dirt with a solvent-moistened, lintless cloth.

(2) Wipe dry, using a clean, dry, lintless cloth.

(3) Treat any connector terminations in accordance with paragraph C. Wipe lug terminations clean with a solvent-moistened, lintless cloth, and dry with a clean, dry, lintless cloth.

E. Covers and Shields.

Clean all unfinished, finished, and partly finished sheet-metal covers, such as dust covers, inspection covers, and housings, in accordance with the procedures given for castings in paragraph B above.

F. Electron Tubes.

(1) Remove dust and dirt from surfaces of glass or metal envelopes and sides of tube base with a solvent-moistened, lintless cloth. Apply the cloth lightly to avoid obliterating the tube-type markings.

(2) Dry and polish these surfaces by gently wiping them with a clean, dry, lintless cloth.

(3) Clean bottom of base and all tube contacts with a soft-bristled brush.

NOTE: Abrasives or metal tools should not be used to remove corrosion deposits occasionally present on tube contacts.

CAUTION: USE EXTREME CARE WHEN HANDLING THE MAGNETRON. DO NOT STRIKE OR JAR THE UNIT. DO NOT PLACE IT ON A METAL WORKBENCH OR ON A WORKBENCH THAT MAY HAVE IRON FILINGS OR STEEL WOOL PRESENT. DO NOT USE STEEL TOOLS ON THE UNIT. DO NOT ALLOW THE MAGNETRON TO COME IN THE VICINITY OF DELICATE INSTRUMENTS.

G. Gaskets and Washers (Paper, Fiber, Cork, and Rubber).

(1) Remove any grease from surfaces with a dry, lintless cloth.

(2) Wipe all surfaces with a solvent-moistened, clean, lintless cloth.

(3) Immediately dry all surfaces using a clean, dry, lintless cloth.

(4) Protect from dust, moisture, and lubricants pending inspection.

H. Insulators (Ceramic, Mycalex, and Plastic).

Clean all glazed procelain insulators, ceramic insulators, Mycalex insulators, and plastic standoff insulators as follows:

(1) Wipe clean with a solvent-moistened, clean, lintless cloth.

(2) Wipe dry and polish, using a clean, dry, lintless cloth.

I. Jacks.

(1) Remove dust from exteriors with a camel-hair brush and an air jet.

(2) Blow dust from interior of female contacts with an air jet.

J. Knobs and Panels.

Clean knobs and panels by gently wiping the surfaces with a clean, soft, lintless cloth. When clean, polish with tissue paper.

K. Machined Metal Parts.

Detached shafts, keys, pins, collars, and similar machined parts should be cleaned in a suitable cleaning machine if available. If a cleaning machine is not available, proceed as follows:

(1) Clean machined metal parts in accordance with paragraphs B(1) and B(3) through B(5) above.

NOTE: Do not touch any clean machined or unfinished parts with bare hands.

(2) Dry in dust-free, dry area or suitable enclosure. Radiant heat used in a ventilated enclosure is recommended for drying, particularly where atmospheric humidity is high.

(3) After the drying process is completed, apply a light coat of lubricating oil to any bare steel surfaces (MIL-L-6085).

L. Mechanical Metal Parts.

The detached miscellaneous mechanical metal parts include mounting plates, mounting clamps and brackets, nuts, bolts, screws, washers, fasteners, and other hardware. These should be cleaned in a suitable cleaning machine or in accordance with applicable steps of the procedures for castings contained in paragraph B above.

M. Molded Plastic Parts.

Plastic parts include such items as insulating members, terminal boards, and mounting blocks. These should be cleaned in the following manner:

(1) Using an air jet, blow loose dust and dirt from surfaces, holes, and crevices.

(2) Wipe with a solvent-moistened, clean, lintless cloth.

(3) Dry and polish with a clean, dry, lintless cloth.

N. Printed Circuit Boards.

(1) Using an air jet and a small, camel-hair brush, blow and brush dust and dirt from surfaces, holes, and crevices.

(2) Wipe clean using a lintless cloth slightly moistened with solvent.

CAUTION: THE EPOXY MOISTURE SEALANT ON THE PRINTED CIRCUIT BOARDS IS SUSCEPTIBLE TO SOFTENING IF SOLVENT IS APPLIED FOR EXCESSIVE PERIODS OF TIME OR IN EXCESSIVE AMOUNTS. USE CARE IN CLEANING THESE PRINTED CIRCUIT BOARDS WITH A SOLVENT-MOISTENED CLOTH. DRY WITH A CLEAN, LINTLESS CLOTH IMMEDIATELY AFTER CLEANING.

O. RF Coils.

Remove dust and dirt from rf coils with a small, soft-bristled brush.

P. Receptacles.

Clean receptacles in accordance with the applicable procedures given for connectors in paragraph C above.

Q. Relays.

(1) Clean dirty (not pitted or burned) contacts, using a relay burnishing tool. Before using the tool, clean burnishing surface with alcohol. Do not allow fingers to touch this surface after cleaning or prior to use.

CAUTION: CONTACT SUPPORTING MEMBERS SHOULD NOT BE BENT OR FORCED BEYOND NORMAL OPERATING LIMITS WHILE THEY ARE BEING BURNISHED.

(2) Remove dust and dirt by careful use of an air jet and soft-bristled brush. Direct the air jet onto contacts, operating the relay armature with fingers while blowing, so that dust will be blown from contact surfaces as they open and close.

(3) Wash all surfaces of all contacts with trichloroethylene.

(4) Dry contacts with the air jet, and then remove any residue by passing small strips of clean, white, writing paper back and forth between each pair of contacts while holding them with light finger pressure in a closed position.

R. Switches.

Clean phenolic wafer switches as follows:

(1) Remove all dust with an air jet, turning switch rotor back and forth several times.

(2) Wash all contacts and insulation with solvent lightly applied with a small, camel-hair brush.

(3) Dry with an air jet; then repeat wash using clean solvent and rotating switch rotor.

(4) Dry with an air jet; then apply a thin coating of Lubriplate 105 with a camel-hair brush.

S. Transformers and Inductors.

(1) Wipe dust and dirt from transformers and inductors with a clean, lintless cloth slightly moistened with solvent.

(2) Dry with a clean, dry, lintless cloth.

T. Tube Sockets.

Mica-filled, Bakelite tube sockets are cleaned as follows:

(1) Remove any rosin adhering to silver-plated contacts, using orange sticks dressed to wedge ends.

CAUTION: DO NOT USE METAL TOOLS TO REMOVE FOREIGN MATTER FROM THESE CONTACTS. DAMAGE TO CONTACT PLATING INVITES CORROSION WHICH MAY ULTIMATELY RESULT IN EQUIPMENT FAILURE.

(2) Wash contacts with solvent lightly applied with a small, soft-bristled brush.

(3) Using a solvent-moistened, lintless cloth, remove any foreign matter adhering to the socket body or wafer.

(4) Dry all parts with an air jet.

CAUTION: WEAR PROTECTIVE CLOTHING WHEN USING THE AIR JET TO REMOVE EXCESS SOLVENT.

U. Vibration Isolators.

Clean detached vibration isolators as follows:

(1) Blow dust and dirt from surfaces with an air jet.

(2) Immerse in solvent bath and wash until clean.

(3) Raise from bath and let solvent drain into bath.

(4) Use an air jet to remove any trapped solvent.

CAUTION: WEAR PROTECTIVE CLOTHING WHEN USING THE AIR JET TO REMOVE EXCESS SOLVENT.

(5) Protect from dust and moisture pending inspection.

V. Waveguide Assemblies.

(1) Clean the outside surfaces of waveguide assemblies with a clean, lintless cloth slightly moistened with solvent.

CAUTION: DO NOT ALLOW ANY SOLVENT TO GET INTO THE WAVEGUIDE.

(2) Remove any foreign matter adhering to the inside surfaces of waveguide assemblies by wiping them with a clean, dry, soft, lintless cloth.

(3) Protect from dust and moisture pending inspection.

W. Wired Chassis.

The following procedures should be used for chassis containing resistors, capacitors, switches, tube sockets, inductors, transformers, and other wired parts.

(1) Remove dust and dirt from all surfaces, including parts and wiring, using soft-bristled brushes and an air jet.

CAUTION: AVOID AIR-BLASTING DELICATE PARTS BY TOO CLOSE AN APPROACH WITH THE AIR JET NOZZLE. USE CAUTION WHEN BRUSHING DELICATE PARTS.

NOTE: When it is necessary to disturb the position and dress of wiring and cables, ensure that they are properly restored after cleaning is completed.

(2) With minimum disturbance of wiring, clean connectors in accordance with paragraph C above.

(3) Clean insulators in accordance with paragraph H above.

(4) Clean jacks in accordance with paragraph I above.

(5) Clean rf coils in accordance with paragraph 0 above.

(6) Clean switches in accordance with paragraph R above.

(7) Clean transformers and inductors in accordance with paragraph S above.

(8) Clean tube sockets in accordance with paragraph T above.

(9) Complete chassis cleaning by wiping all finished surfaces with a solvent-moistened, lintless cloth.

(10) Dry and polish these surfaces, using a clean, dry, lintless cloth.

(11) Protect from dust and moisture pending inspection.

Section IV. INSPECTION/CHECK

2-12. GENERAL.

This section presents instructions and procedures to assist in determining, by inspection, the condition of the dismantled, disassembled. and cleaned components, parts, and assemblies of the 374A-3 Receiver-Transmitter and the 349A-6/7 Shockmount. Defects resulting from wear, physical damage, deterioration, or other causes would be discovered by these inspection procedures. Detailed inspection procedures are alphabetically arranged. Refer to the repair section of this manual for replacement or repair of defective components.

2-13. INSPECTION PROCEDURES.

Figure 2-21 lists the mechanical and electrical parts to be inspected and contains cross-references to applicable paragraphs containing inspection routines.

ITEM	REFER TO PARAGRAPH
Air filters	2-13A
Capacitors	2-13B
Castings	2-13C
Chassis	2-13D
Connectors	2-13E
Covers and shields	2-13F
Electron tubes	2-13G
Gaskets and washers (paper, fiber, cork, and rubber)	2-13H
High-voltage wiring	2-13I
Insulators (ceramic, Mycalex, and plastic)	2-13J
Jacks	2-13K
Knobs and panels	2-13L

Index of Inspection Procedures (Sheet 1 of 2)

Figure 2-21

ITEM	REFER TO PARAGRAPH
Machined metal parts	2-13M
Mechanical metal parts	2-13N
Molded plastic parts	2-13O
Printed circuit boards	2-13P
Rf coils	2-13Q
Receptacles	2-13R
Relays	2-13S
Resistors	2-13T
Semiconductors	2-13U
Soldered terminal connections	2-13V
Switches	2-13W
Transformers and inductors	2-13X
Tube sockets	2-13Y
Vibration isolators	2-13Z
Waveguide assemblies	2-13AA
Wiring	2-13AB

Index of Inspection Procedures (Sheet 2 of 2)

Figure 2-21

A. Air Filters.

Inspect the air filter for physical damage and deformation, such as tears, creases, and imbedded foreign material. Diffused light should be visible through the filter.

B. Capacitors.

Inspect capacitors for the defects listed in figure 2-22.

DEFECT	METAL TYPE	MOLDED TYPE	CERAMIC TYPE
Leakage (at case seams or around terminal insulation)	X		
Cracked, broken, or charred terminal insulation	X		
Case damage (dents or holes)	X		
Case damage (cracks or breakage)		X	
Loose, broken, or corroded terminal studs, lugs, or leads	X	X	X
Loose, broken, or poorly soldered connections	X	X	X

Fixed Capacitor Inspection

Figure 2-22

C. Castings.

Inspect castings for cracks or breaks and marred or damaged machine surfaces, holes, counterbores, or threads. Check for damage to the finish that may require touchup.

D. Chassis.

Inspect chassis for deformation, dents, punctures, badly worn surfaces, and damaged connectors and fastening devices. Examine the chassis for corrosion and damage that may require refinishing.

E. Connectors.

Inspect connector bodies for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed, or out of alignment. Check for corroded or damaged plating on contacts and for loose, poorly soldered, broken, or corroded terminal connections.

F. Covers and Shields.

Inspect covers and shields for punctures, deep dents, and badly worn surfaces. Check for damaged fastening devices, corrosion, and other damage that may require refinishing.

G. Electron Tubes.

Inspect electron tube envelopes for cracked glass or dented metal, separation from the base, and obliterated markings. Check the base for a cracked, chipped, or broken body.

Inspect for deformed, broken, or misaligned base contacts. Inspect magnetron for cracked, chipped, or broken rf windows or element insulation.

CAUTION: HANDLE THE MAGNETRON WITH EXTREME CARE. DO NOT STRIKE OR JAR THE UNIT. DO NOT PLACE THE UNIT ON A METAL WORKBENCH OR ON A WORKBENCH THAT MAY HAVE IRON FILINGS OR STRANDS OF STEEL WOOL PRESENT. DO NOT USE STEEL TOOLS ON IT. DO NOT ALLOW IT TO COME IN THE VICINITY OF DELICATE INSTRUMENTS.

H. Gaskets and Washers (Paper, Fiber, Cork, and Rubber).

Inspect gaskets and washers for deformation and for damage such as tears, creases, rough surfaces, and imbedded foreign matter.

I. High-Voltage Wiring.

Inspect all high-voltage wiring. There should not be any leads of excessive length, and there should be no breaks, cracks, or other damage or evidence of deterioration. Solder joints should have ample solder to cover joints and should be rounded (no sharp edges). All high-voltage leads should be positioned equidistant from all metal objects. The thyratron tube cap ears should be bent almost together, and cap should be attached to the tube so that the lead is on the ear nearest the outside of the receiver-transmitter and positioned halfway between the mixer-duplexer, and the pulse forming network. The outer ear should be filled with a ball of solder.

J. Insulators (Ceramic, Mycalex, and Plastic).

Inspect ceramic, Mycalex, and plastic insulators for evidence of damage, such as broken or chipped edges, burned areas, or foreign material.

K. Jacks.

Inspect all jacks for corrosion, rust, loose or broken parts, cracked insulation, and other irregularities.

L. Knobs and Panels.

Inspect knobs and panels for physical damage and deformation, marred surfaces, and impairment of markings.

M. Machined Metal Parts.

Inspect machined metal parts for physical damage to surfaces, corners, and edges. Closely inspect all machined surfaces, holes, bores, counterbores, slots, grooves, shoulders, flanges, tapped holes, and all threaded members, both male and female, for damage of any sort, including roughness of surface, corrosion, or foreign matter. Inspect plated or finished areas for damage requiring replating or refinishing beyond touchup repair.

N. Mechanical Metal Parts.

Inspect unmachined mecanical metal parts, including mounting plates, chassis, mounting clamps, brackets, nuts, bolts, screws, washers, fasteners, and hardware for damage or deformation. Inspect for corrosion and any damage that would require replating or refinishing beyond touchup repair.

O. Molded Plastic Parts.

Inspect molded plastic parts, such as terminal boards, mounting blocks, and insulating members, for signs of corrosion, cracked or charred insulation, and loose or missing mounting hardware. Inspect for other abnormal indications which might be a source of future breakdown.

P. Printed Circuit Boards.

Inspect printed circuit boards for loose, broken, corroded, or poorly soldered terminal connections. Inspect for any evidence of damage, such as burned, broken, cracked, or corroded plating. Check for loose or improperly soldered components and for loose mounting of the circuit boards.

Q. RF Coils.

Inspect rf coils for broken leads, loose mountings, and loose, poorly soldered, or broken terminal connections. Also, check for crushed, scratched, cut, bruised, or charred windings; corrosion on windings, leads, terminals, connections; and for physical damage to forms.

R. Receptacles.

Inspect receptacles for cracked, broken, or charred insulation. Inspect for damage to all other parts, loose or bent contacts, damage to contact plating, corrosion, and other abnormal conditions.

S. Relays.

Inspect relay contacts for burned or pitted areas, welds, misalignment, and improper separation. Check contact support members for deformation causing contact misalignment or improper contact operation. With a finger, test movable contacts for sluggish action or sticking at any point of travel in either direction. Examine for physical damage to armature. Also, check for foreign matter between end of pole piece and armature. Inspect for loose coils, corrosion, loose leads or terminals, and for cuts and damage to the coil. Inspect for loose, broken, brittle, or charred insulalation on coils or leads between contact-support members and between terminals on the relay. Inspect for bent, loose, and broken terminals. Inspect relay case, mounting, and mechanical parts for looseness and physical damage or corrosion.

T. Resistors.

Inspect fixed composition resistors for cracked, broken, blistered, or charred bodies and for loose, broken, poorly soldered, or corroded terminal connections.

Inspect fixed, wirewound resistors for signs of heating; cracked, broken, or charred insulation; loose, poorly soldered, broken, or corroded terminal connections; and loose mounting Inspect variable resistors for corrosion of shafts, cases, or other visible parts; loose mountings; and physical damage. Where possible, rotate the shaft to determine whether action is too rough, too loose, or too tight.

U. Semiconductors.

Inspect diodes and transistors for cracked, broken, blistered, or damaged bodies and cases. Inspect for loose, broken, poorly soldered or corroded terminal connections.

V. Soldered Terminal Connections.

Inspect soldered terminal connections for cold-soldered or rosin joints. These joints present a porous or dull, rough appearance. Check for strength of bond using a pointed tool. Examine for excess of solder, protrusions from the joint, pieces adhering to adjacent insulation, and particles lodged between joints, conductors, or other parts. Inspect for insufficient solder and unsoldered strands of wire protruding from conductor joints. Check also for insulation that is stripped back too far from joints or badly frayed at the joint. Inspect for corrosion on copper conductor joints.

W. Switches.

Inspect temperature sensitive switches for cracked, broken, or charred bodies and for loose, poorly soldered, broken, or corroded terminal connections. Inspect for damaged operating mechanisms. Inspect wafer switch insulation for cracks or breaks and for charring. Inspect movable and stationary contacts for deformation, breaks, wear, burns, pits, and corrosion. Inspect terminals for loose, poorly soldered, broken, or corroded connections. Inspect mechanical parts for damage or corrosion and for irregular or rough action.

X. Transformers and Inductors.

Inspect transformers and inductors for signs of excessive heating, physical damage to cases, cracked or broken insulators, and other irregularities. Inspect for corroded, poorly soldered, or loose terminals and loose, broken, or missing mounting hardware.

Y. Tube Sockets.

Inspect tube sockets for loose, broken, missing or improperly seated mounting rings. Check for cracked, broken, or charred insulation. Inspect for broken, corroded, or deformed contacts and loose, poorly soldered, broken, or corroded terminal connections.

Z. Vibration Isolators.

Inspect the metal parts of vibration isolators for corrosion, damaged surfaces, and deformation. Inspect the elastic members for deep cracks and other physical damage. Inspect elastic members for loss of resiliency by distorting them manually and noting return to normal position upon release. Sluggish return or failure to return completely to normal position indicates a defective isolator.

AA. Waveguide Assemblies.

Inspect the external surfaces of waveguides and waveguide assemblies for cracks, dents, punctures, or chips. Check for broken, cracked, chipped, or missing mounting hardware. Inspect internal waveguide surfaces for deformation of any kind and the presence of any foreign matter. Check all surfaces for corrosion.

AB. Wiring.

Inspect open and laced wiring of chassis, terminal boards, and parts by checking insulation for physical damage and charring. Inspect wires for breakage and for improper dress in relation to adjacent wiring and chassis.

Section V. REPAIR

2-14. GENERAL.

This section presents instructions and procedures for the replacement or repair of damaged or defective components of the 374A-3 Receiver-Transmitter and the 349A-6/7 Shockmount. Faulty components are usually detected through procedures in the inspection/ check or testing sections of this manual. New parts should be inspected and/or tested before being installed. Most of the replacement or repair instructions apply to disassembled equipment. Refer to the disassembly section for proper instructions.

2-15. REPAIR PROCEDURES.

Figure 2-23 is an alphabetically arranged index of repair procedures. Each component, part, or assembly is cross-referenced to the appropriate paragraph containing the correct repair procedure.

ITEM	REFER TO PARAGRAPH
Air filters	2-15A
Capacitors	2-15B
Castings	2-15C
Connectors	2-15D
Covers and shields	2-15E
Electron tubes	2-15F
Finished surfaces	2-15G
Frames	2-15H
Gaskets and washers (paper, fiber, cork, and rubber)	2-15I
High-voltage wiring	2-15J
Insulators (ceramic, Mycalex, and plastic)	2-15K

Index of Repair Procedures (Sheet 1 of 2)

Figure 2-23

ITEM	REFER TO PARAGRAPH
Jacks	2-15L
Knobs and panels	2-15M
Machined metal parts	2-15N
Mechanical metal parts	2-15O
Molded plastic parts	2-15P
Printed circuit boards	2-15Q
Rf coils	2-15R
Receptacles	2-15S
Relays	2-15T
Resistors	2-15U
Semiconductors	2-15V
Soldered terminal connections	2-15W
Switches	2-15X
Transformers and inductors	2-15Y
Tube sockets	2-15Z
Vibration isolators	2-15AA
Waveguide assemblies	2-15AB
Wiring	2-15AC

Index of Repair Procedures (Sheet 2 of 2)

Figure 2-23

A. Air Filters.

If defective, replace air filters. Repair of air filters is not recommended.

B. Capacitors.

If defective or if performance is questionable, capacitors should be replaced. Clean all connections thoroughly, and apply new solder.

C. Castings.

Damaged castings should be replaced unless suitable machine shop facilities are available for their repair.

D. Connectors.

Straighten bent pins and damaged shell areas. Replace defective connectors, broken wires, or wires with split insulation. If a connector insert is broken, replace the connector.

E. Covers and Shields.

Replace damaged screws, straighten any dents or warped sections, and retouch scratched or worn painted surfaces.

F. Electron Tubes.

Replace defective tubes. Clean corroded pins with a clean, lintless cloth or soft-bristled brush.

G. Finished Surfaces.

Touch up minor scratches in all painted surfaces with a high-quality, black enamel applied with a small brush. Refinish black wrinkle as required in accordance with MIL-E-5558A and MIL-P-6889G. Refinish black lusterless surfaces as required in accordance with MIL-E-14072 (SigC). Touch up unpainted aluminum with Alodine 1200, or suitable water-lacquer mixture, applied with a pipe cleaner or small brush.

CAUTION: DO NOT TOUCH UP ANY AREA WHERE AN ELECTRICAL CONNECTION IS MADE.

H. Frames.

Straighten all misshapen areas. Remove all corrosion with a suitable cleaner. Retouch silk screening, and refinish where needed.

I. Gaskets and Washers (Paper, Fiber, Cork, and Rubber).

Replace all broken, deformed, or defective gaskets and washers.

J. High-Voltage Wiring.

Replace all cracked, broken, or otherwise damaged high-voltage wiring. Ensure that high-voltage wiring is properly soldered to terminal connections and that it is properly placed within the chassis.

K. Insulators (Ceramic, Mycalex, and Plastic).

Replace any insulators which show signs of physical damage such as cracks, burns, chips, or any other type of damage or deterioration.

L. Jacks.

Replace cracked, broken, or severely misshapen jacks or jacks with bent or broken center conductors or insulation.

M. Knobs and Panels.

Replace cracked, chipped, broken, or otherwise damaged knobs. Retouch or refinish panels in accordance with paragraph G above.

N. Machined Metal Parts.

If satisfactory machine shop facilities for suitable repair of these surfaces are not available, the defective or damaged part should be replaced.

O. Mechanical Metal Parts.

Straighten bent or misshapened mounts, clamps, and mounting plates. Replace broken, bent or cross-threaded bolts, screws, nuts, washers, and other hardware.

P. Molded Plastic Parts.

Replace cracked, chipped, or broken plastic parts, and replace any defective mounting hardware.

Q. Printed Circuit Boards.

Replace any cracked, broken, chipped, or otherwise damaged printed circuit boards. Repair of these boards is not recommended.

R. RF Coils.

Replace cracked, chipped, broken, or burnt rf coils or coils with damaged tuning slugs.

S. Receptacles.

Replace all receptacles with cracked, broken, chipped, or charred insulation or loose bent, or otherwise damaged contacts. Clean in accordance with the appropriate paragraph in the cleaning section of this manual.

T. Relays.

If a relay appears to be defective or is intermittent, replace it. Damaged relays are replaced as individual units. Make a sketch of wire connections to facilitate rewiring. Sealed relays cannot be repaired and must be replaced if found defective. Clean all connections thoroughly, and apply new solder.

U. Resistors.

If defective or if performance is questionable, resistors should be replaced. Clean all connections thoroughly, and apply new solder. Add a drop or two of contact cleaner (carbon tetrachloride) to the windings of variable resistors with rough or intermittent operation. Replace variable resistors if the shaft is loose in the case. Clean corroded terminals.

V. Semiconductors.

If a semiconductor appears defective or is suspected of questionable operation, it should be replaced. Replace semiconductors which show signs of overheating or which have damaged cases.

CAUTION: TO PREVENT DAMAGE, USE A HEAT SINK BETWEEN THE LEAD BEING SOLDERED AND THE SEMICONDUCTOR DEVICE.

W. Soldered Terminal Connections.

Resolder cold-soldered or rosin joints. Remove all traces of corrosion.

X. Switches.

Individual wafers or connector terminals may sometimes be replaced in certain types of wafer switches. Defective encapsulated switches must be replaced. Identify leads to facilitate rewiring.

Y. Transformers and Inductors.

Replace all cracked, chipped, broken, or charred transformers and inductors. Replace all transformers and inductors if defective or suspected of questionable performance. Identify leads to facilitate rewiring. Clean connections and apply new solder.

Z. Tube Sockets.

Replace cracked, chipped, or broken tube sockets, or tube sockets with broken or severely damaged terminals. Remove all traces of corrosion.

AA. Vibration Isolators.

Ensure that the metal parts of vibration isolators are clean and free from corrosion and physical defects. Isolators whose elastic members show loss of resiliency should be replaced.

AB. Waveguide Assemblies.

Deformed or defective waveguide assemblies or sections should be returned to the manufacturer for rework.

AC. Wiring.

Replace damaged wiring with wire of the same size and color coding. Ensure that no bare wires are touching the chassis, other bare wires, or metal cases of other parts. If a wire is to be removed from a terminal or component, it should be marked with an identification tag to minimize incorrect connections. Clean all terminals and apply new solder.

NOTE: When it is necessary to disturb the dress of wires or cables, carefully ensure that the original wire dress is restored.

Section VI. ASSEMBLY

2-16. GENERAL.

This section presents instructions for assembling the 374A-3 Receiver-Transmitter and the 349A-6/7 Shockmount. These instructions are arranged so that assembly of each major part is an individual operation. When it is necessary to assemble the unit, locate the part in the table of contents and begin on the page indicated. Reference is made to subsequent assembly steps that must be performed to completely restore the unit. The order of assembly begins with the lowest parts, proceeds to the next higher subassemblies, and ends with the completed unit. These instructions include special techniques, cautions, warnings, and unique procedures.

The numbers used to reference component parts shown in the illustrations referenced (in the disassembly section) do not correspond to the item numbers of the component parts in the illustrated parts list.

2-17. PRECAUTIONS AND GENERAL TECHNIQUES.

Before soldering any lead or component, refer to the notes of color coding, placement of leads, and wire insulation made during disassembly. If there is any doubt as to the placement of such leads or components, refer to the appropriate diagrams, and perform continuity tests to ensure proper replacement. Ensure also that proper dress or lacing of wires and cables is restored. Any component requiring removal of potting compound for disassembly must be repotted during/after assembly.

CAUTION: TO PREVENT DAMAGE TO A SOLID-STATE DEVICE, USE A HEAT SINK ON THE LEAD BETWEEN THE POINT BEING SOLDERED AND THE DEVICE.

WARNING: THE 374A-3 RECEIVER-TRANSMITTER USES EXTREMELY HIGH VOLTAGES. DO NOT ATTEMPT ANY ASSEMBLY WHILE PRIMARY POWER IS APPLIED TO THE UNIT. ENSURE THAT THE POWER CABLE IS REMOVED TO PREVENT VOLTAGE TRANSIENTS WHICH COULD DAMAGE OR DESTROY SEMICONDUCTORS.

CAUTION: REMOVE WRISTWATCH BEFORE WORKING IN THE VICINITY OF THE MAGNETRON OR MIXER-DUPLEXER MODULE.

CAUTION: HANDLE THE MAGNETRON AND MIXER-DUPLEXER MODULE WITH EXTREME CARE. NEVER JAR THE UNITS OR STRIKE THEM WITH TOOLS. NEVER PLACE THEM ON A STEEL WORKBENCH OR ON A WORKBENCH THAT MAY HAVE IRON FILINGS OR STRANDS OF STEEL WOOL PRESENT. NEVER USE STEEL TOOLS WHICH MAY CAUSE DEGAUSSING. NEVER ALLOW DELICATE INSTRUMENTS TO COME IN THE VICINITY OF THE MAGNETRON OR MIXER-DUPLEXER MODULE.

WARNING: CAPACITORS IN THE 374A-3 RECEIVER-TRANSMITTER MAY HOLD A CHARGE FOR LONG PERIODS OF TIME AFTER PRIMARY POWER HAS BEEN REMOVED. OBSERVE SAFETY PRECAUTIONS WHEN WORKING ON THE RECEIVER-TRANSMITTER.

These precautions are repeated in the text of the assembly procedures where applicable.

2-18. ASSEMBLY PROCEDURE.

NOTE: Figure and index numbers preceded by an asterisk apply to 374A-3 Receiver-Transmitter units with revision AA (23) and above. Figure and index numbers not preceded by an asterisk apply to 374A-3 Receiver-Transmitter units with revision Z (22) and below.

A. Assemble 349A-6 Shockmount. (Refer to figure FO-10)

NOTE: This procedure applies to all units.

(1) Replace the vibration isolators as follows:

(a) Replace vibration isolator (64) by securing it to base plate (94) with four machine screws (65), four lockwashers (66), and four hexnuts (67).

(b) Replace two vibration isolators (60) by securing them to base plate (94) with eight machine screws (61), eight lockwashers (62), and eight hexnuts (63).

(c) Replace two vibration isolators (32) by securing them to base plate (94) with eight machine screws (33), eight lockwashers (34), and eight hexnuts (35).

(2) Replace base plate (94) as follows:

(a) Secure two ground straps (26) to base plate (94) with four machine screws (27), four flat washers (28), and four hexnuts (29).

(b) Secure base plate (94) to shockmount tray (72) with four machine screws (56, 70), four spacers (59, 71), two lockwashers (58), and two flat washers (57).

(3) Replace front retainers (76) by replacing pin (79) and cotter pin (78).

NOTE: If thrust bearing (16) was removed, replace it in jaw (20) and secure with two machine screws (22). Lubricate the thrust bearing and the threaded end of the extractor shaft assembly (1) with aircraft and instrument grease (Collins part number 005-0234-00).

(4) Replace extractor assembly (1) by securing it to shockmount tray (72) with two machine screws (24) and two machine screws (25).

NOTE: Apply an ample coating of aircraft and instrument grease (Collins part number 005-0234-00) as per MIL-G-3278 to pin and bearing after assembly.

B. Replace Magnetron Heater Module TB10. (Refer to figure FO-8)

NOTE: On units with revision AA (23) and above, the magnetron heater circuit is an integral part of +260-v supply module TB1.

(1) Replace magnetron heater module TB10 (369) by securing it to chassis assembly (512, figure FO-6) with terminal stud (375), hexnut (373), two spacers (374), two flat washers (372), two lockwashers (371), and two machine screws (370).

(2) Solder the leads to the terminal of magnetron heater module TB10 (369).

(3) Replace cable clamp by securing it to magnetron heater module TB10 (369, figure FO-8 with hexnut, lockwasher, two flat washers, and machine screw.

(4) Replace bottom dust cover (503, figure FO-6) in accordance with paragraph L(1) below.

C. Replace +260-V Supply Module TB1. (Refer to figures FO-8 and *FO-9)

(1) Place +260-v supply module TB1 (457, *248) in mounting position, and solder the leads to the board terminals.

(2) Replace +260-v supply module TB1 (457, *248) by securing it to chassis assembly (512, figure FO-6;*446, figure *FO-7) with four flat washers (*251), four lockwashers (459, *250), and four machine screws (458, *249).

(3) Replace bottom dust cover (503, figure FO-6,*130, figure * FO-7)in accordance with paragraph L(1) below.

D. Replace Thyratron Grid Module TB7. (Refer to figures FO-8 and *FO-9)

(1) Place thyratron grid module TB7 (389, *381) in mounting position, and solder the leads to the board terminals.

(2) Replace thyratron grid module TB7 (389, *381) by securing it to chassis assembly (512, figure *FO-6;*446, figure *FO-7) with four machine screws (390), four lockwashers (391), two machine screws (*382), four lockwashers (*383), four flat washers (*384), four spacers (*384D), four hexnuts (*384A, *380B), and two solder lugs (*380A).

(3) Replace bottom dust cover (503, figure FO-6,130, figure *FO-7) in accordance with paragraph L(1) below.

E. Replace Fault Sensing Module TB3. (Refer to figures FO-8 and *FO-9)

(1) Place fault sensing module TB3 (386, *244) in mounting position, and secure it to chassis assembly (512, figure FO-6,*446,· figure * FO-7) with four machine screws (387, *245), four flat washers (*247), and four lockwashers (388, *246).

(2) Solder the leads to the terminals of fault sensing module TB3 (386, *244).

(3) Replace bottom dust cover (503, figure FO-6; *130, figure *FO-7) in accordance with paragraph L(1) below.

F. Replace Mixer-Duplexer Module. (Refer to figures FO-6 and *FO-7)

CAUTION: HANDLE THE MIXER-DUPLEXER MODULE WITH EXTREME CARE. NEVER JAR THE UNIT OR STRIKE IT WITH TOOLS. NEVER PLACE IT ON A STEEL WORKBENCH OR ON A WORKBENCH THAT MAY HAVE IRON FILINGS OR STRANDS OF STEEL WOOL, PRESENT. NEVER USE STEEL TOOLS WHICH MAY CAUSE DEGAUSSING. NEVER ALLOW DELICATE INSTRUMENTS TO COME IN THE VICINITY OF THE MIXER-DUPLEXER MODULE.

NOTE: The internally mounted chassis components should be replaced before the magnetron and mixer-duplexer module are replaced.

(1) Place the mixer-duplexer module (138, *154) in mounting position, and secure it to the rear of chassis assembly (512, *446) with two flat washers (*158), two lockwashers (140, *157), and two machine screws (139, *156).

(2) Connect J5.

(3) Connect P3 and P4 (500, *441).

(4) Replace interlock switch S1 (146, *206) by securing it to the rear of chassis assembly (512, *446) with three machine screws (149, *207), three lockwashers (148, *208), and three spacers (*209).

(5) Secure magnetron (127, *151) in accordance with paragraphs G(2) through G(4) below.

(6) Secure keep-alive supply module TB2 in accordance with paragraphs H(2) through H(6) below.

(7) Replace trigger generator module (145, *139) in accordance with paragraph K(1) below.

(8) Connect electrical connector J2 (499, *439), and replace two screwlock assemblies (497, *440).

(9) Replace the dust covers in accordance with paragraph L below.

G. Replace Magnetron V2. (Refer to figures FO-6 and *FO-7)

CAUTION: HANDLE THE MAGNETRON WITH EXTREME CARE. NEVER JAR THE UNIT OR STRIKE IT WITH TOOLS. NEVER PLACE IT ON A STEEL WORKBENCH OR ON A WORKBENCH THAT MAY HAVE IRON FILINGS OR STRANDS OF STEEL WOOL PRESENT. NEVER USE STEEL TOOLS WHICH MAY CAUSE DEGAUSSING. NEVER ALLOW DELICATE INSTRUMENTS TO COME IN THE VICINITY OF THE MAGNETRON.

(1) Place magnetron V2 (127, *151) in mounting position, and solder the yellow and green magnetron leads to transformer T7 (291, figure FO-8; *266, figure *FO-9).

NOTE: Magnetron leads to T7 must be potted with potting compound (DC 90-092), Collins part number 005-1196-010. Thoroughly clean connections with acetone and allow to dry. Apply potting primer (DC-1201). Collins part number 005-1210-020, to all surfaces to be potted. Apply potting compound to connections, being careful to fill all void spaces and eliminate air bubbles from compound. Compound must be applied to not less than 1/8-inch thickness, but need be no thicker.

(2) Replace waveguide spacer (137, *149) by securing it to magnetron V2 (127, *151) with four lockwashers (134, *147) and four machine screws (133, *146).

(3) Secure magnetron V2 (127, *151) to magnetron mounting bracket with four machine screws (128, *152), four flat washers (130 *153), four lockwashers (129), and four hexnuts (131).

(4) Secure TP4 (280, *238) to the front of chassis assembly (512, *446) with two machine screws (282, *240), two flat washers (283), two fiber washers (284), insulator (288), and lockwasher (*241).

(5) Secure keep-alive supply module TB2 in accordance with paragraphs H(2) through H(6) below.

(6) Replace left side dust cover (121, *137) in accordance with paragraph L(2) below.

(7) Replace top dust cover (120, *123) in accordance with paragraph L(3) below.

(8) Secure front mounting plate (115, *60) in accordance with paragraph M(3) below.

(9) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below.

H. Replace Keep-Alive Supply Module TB2. (Refer to figures FO-6 and *FO-7)

(1) Place keep-alive supply module TB2 in mounting position, and solder the leads to terminals 1 through 4.

(2) On units with revision AA (23) and above, secure keep-alive supply module TB2 to magnetron mounting bracket with machine screw (*233), two lockwashers, two flat washers, two spacing sleeves (*237), cable clamp, solder lug, and two hexnuts.

(3) On units with revision Z (22) and below, secure keep-alive supply module TB2 to magnetron mounting bracket with two machine screws, two lockwashers, two flat washers, two spacing sleeves, and cable clamp.

(4) Secure keep-alive supply module TB2 to the front of chassis assembly (512, figure FO-6; *446, figure *FO-7) with two machine screws and two lockwashers.

(5) Replace cable clamp (135, *141) by securing it to waveguide spacer (137, *149) with flat washer (124, *143) and machine screw (123, *142).

(6) Connect keep-alive tube cap (126, *144).

(7) Replace left side dust cover (121, *137) in accordance with paragraph L(2) below.

(8) Replace top dust cover (120, *123) in accordance with paragraph L(3) below.

I. Replace Thyratron V1. (Refer to figures FO-8 and *FO-9)

(1) Replace thyratron V1 (268, *264).

(2) Secure thyratron tube clamp (380, *385).

(3) Replace thyratron plate cap (267, *265).

(4) Replace top dust cover (120, figure FO-6; *123, figure* FO-7)in accordance with paragraph L(3) below.

J. Replace Pulse Forming Network Z1. (Refer to figures FO-6 and *FO-7)

(1) Replace staked bracket (269, *171) by securing it to pulse forming network Z1 (277, *168) with machine screw (271, *177) and lockwasher (273, *178).

(2) Replace pulse forming network Z1 (277, *168) by securing it to the front of chassis assembly (512, *446) with four lockwashers (279, *170) and four hexnuts (278, *169).

(3) Secure staked bracket (269, *171) to the right side of chassis assembly (512, *446) with two lockwashers (272, *173) and two machine screws (270, *172).

(4) Secure the coil and common high-voltage leads to pulse forming network Z1 (277, *168).

(5) Replace right side dust cover (121, *137) in accordance with paragraph L(2) below.

(6) Replace top dust cover (120, *123) in accordance with paragraph L(3) below.

(7) Secure front mounting plate (115, *60) in accordance with paragraph M(3) below.

(8) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below.

K. Replace Trigger Generator Module. (Refer to figures FO-6 and *FO-7)

(1) Replace trigger generator module (145, *139) by pushing it into J1 (501, figure FO-8; *437, figure *FO-9) and printed board mount (322, *227) with a rocking motion.

(2) Replace top dust cover (120, *123) in accordance with paragraph L(3) below.

L. Replace Outer Dust Covers. (Refer to figures FO-6 and *FO-7)

(1) Turn the unit on one side, and replace bottom dust cover (503, *130) by securing it to chassis assembly (512, *446) with four turnlock studs (504, 506, *131, *132).

(2) Replace side dust covers (121, *137) by securing them to chassis assembly (512, *446) with 12 machine screws (122, *138).

(3) Replace top dust cover (120, *123) by securing it to chassis assembly (512, *446) with five fastener studs (120A, 120B, *124, *125).

M. <u>Replace and Assemble Front Plate</u>. (Refer to figures FO-6 and *FO-7)

(1) The following components, attached to the front of chassis assembly (512, *446), may be replaced while the front plate (115, *60) is disassembled.

(a) Components R15 (470, *335), R19 (446, *330), and R11 (462, *326)

(b) Terminal board TB8 (474, *324)

(2) The following components, attached to the rear of front plate (115, *60), may be replaced while the plate is disassembled.

(a) Components Q2, Q3, Q4, and Q5

(b) Components CR17, CR22, CR23, CR24, and CR25

(3) Place front plate (115, *60) in mounting position, and secure it to chassis assembly (512, *446) with eight machine screws (116, *61) and two machine screws (4A, *62).

(4) Replace capacitor C1 (29, *49) and component clip (34, *53) as follows:

(a) Secure riveted bracket (30, *50) to front plate (115, *60) with four machine screws (31, *51) and four lockwashers (32, *52).

(b) Attach the capacitor lead to the terminal strip of tubeaxial fan B1 (27, *58).

(c) Solder the capacitor lead to terminal stud (53 and *54A).

(5) Replace tubeaxial fan B1 (27, *58) in accordance with paragraphs N(1) and N(2) below.

(6) Replace RF ON/OFF switch S4 (36, *56) in accordance with paragraphs O(1) and O(2) below.

(7) Replace meter function switch S5 (56, *42) in accordance with paragraphs P(1) and P(2) below.

(8) Replace meter circuit module TB4 (42, *39) in accordance with paragraph Q(1) below.

(9) Replace -27.5-v regulator module TB6 (38, *37) in accordance with paragraphs R(1) through R(3) below.

(10) Replace -27.5-v regulator module TB5 (47, *25) in accordance with paragraphs S(1) and S(2) below.

(11) Replace Meter M1 (22, *30) in accordance with paragraphs T(1) and T(2) below.

(12) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below.

N. Replace Tubeaxial Fan B1. (Refer to figures FO-6 and *FO-7)

(1) Replace the fan leads by securing them to the fan terminal strip.

(2) Replace tubeaxial fan B1 (27, *58) by securing it to front mounting plate (115, *60) with three synchro clamps (28, *59).

(3) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below.

O. Replace RF ON/OFF Switch S4. (Refer to figures FO-6 and *FO-7)

(1) Mount switch S4 (36, *56) by securing it to switch plate (118, *64) with lockwasher (37, *57) and retainer nut (part of 36, *56).

(2) Solder the leads to the switch terminals.

(3) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below.

P. Replace Meter Function Switch S5. (Refer to figures FO-6 and *FO-7)

(1) Place switch S5 (56, *42) in mounting position, and solder the leads to the switch terminals.

(2) Replace switch S5 (56, *42) by securing wafer switch assembly (56, 59, 62, *40, *42, *43, *44) to three standoffs (61, *117) with three machine screws (60, *41), three lockwashers (60A), and three flat washers (60B).

(3) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below.

Q. Replace Meter Circuit Module TB4. (Refer to figures FO-6 and FO-7)

(1) Place meter circuit module TB4 (42, *39) in mounting position, and solder the leads to the board terminals.

(2) Secure -27.5-v regulator module TB6 (38, *37) in accordance with paragraphs R(2) and R(3) below.

(3) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below.

R. Replace -27.5-V Regulator Module TB6. (Refer to figures FO-6 and *FO-7)

(1) Place -27.5-v regulator module TB6 (38, *37) in mounting position, and solder the leads to the board terminals.

(2) Replace four spacers (41, *38).

(3) Replace -27.5-v regulator module TB6 (38, *37) by securing it to four hexposts (46, *114) with four machine screws (39, *34), four lockwashers (40, *35), and four flat washers (40A, *36).

(4) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below.

S. Replace +27.5-V Regulator Module TB5. (Refer to figures FO-6 and *FO-7)

(1) Place +27.5-v regulator module TB5 (47, *25) in mounting position, and solder the leads to the board terminals.

(2) Replace +27.5-v regulator module TB5 (47, *25) by securing it to four standoffs (52, *110) with four machine screws (49, *26), four lockwashers (50, *27), and four flat washers (51, *29).

(3) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below

T. Replace Meter M1. (Refer to figures FO-6 and *FO-7)

(1) Place meter M1 (22, *30) in mounting position, and solder the meter leads.

(2) Replace the meter M1 (22, *30) by securing it to meter posts (26, *112) with four machine screws (23, *31) and four lockwashers (24, *32).

(3) Replace front housing (5, *12) in accordance with paragraphs U(3) and U(4) below.

U. Assemble and Replace Front Housing. (Refer to figures FO-6 and *FO-7)

(1) Replace air filter (20, *11).

(2) Replace filter bracket (17, *3) by securing it to front housing (5, *12) with two turnlock fasteners (14, *4).

(3) Replace front housing (5, *12) by securing it to four mounting posts (112, *108) with four machine screws (6, *13).

(4) Replace meter function switch knob (1, *1), securing it to meter function switch S5 (56, *42) by tightening two setscrews (2, *2).

Section VII. TESTING

2-19. GENERAL.

This section includes procedures for bench testing the 374A-3 Receiver-Transmitter. Instructions are given using the 979A-2 Maintenance Kit and the 978G-1 Radar Test Set.

When a malfunction is indicated, portions of the test relative to the malfunction should be performed. If the receiver-transmitter fails a test, refer to the troubleshooting section where test steps are referenced and possible causes of malfunctions are listed. Instructions for use of the 979A-2 Maintenance Kit and the 978G-1 Radar Test Set are in tabular format with suggested troubleshooting areas listed adjacent to the applicable test.

2-20. EQUIPMENT REQUIRED.

Refer to figure 2-24 for equipment required for testing the receiver-transmitter. Interconnecting cables for use with the maintenance kit and the radar test set are included with the respective equipments.

2-21. PRELIMINARY PROCEDURES.

Preliminary procedures for equipment setup prior to testing are given in each test procedure section.

2-22. TEST PROCEDURES.

A. 979A-2 (MK-774/APN-158) Maintenance Kit. (WP-103 Module Test Set)

This section presents the procedures for testing the receiver-transmitter trigger generator module using the 979A-2 Maintenance Kit. These procedures are presented in tabular form in figure 2-25.

When a malfunction is indicated, possible causes are referenced at the appropriate test in the TROUBLESHOOTING AREA OR ADJUSTMENT column. After a malfunction is corrected, the module should be completely tested to verify that repairs have not affected other portions of the circuit.

For a detailed description and maintenance instructions for the maintenance kit, refer to the applicable service manual.

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
Items 1 through 4 are required for testing with the 978G-1 Radar Test Set and 979A-2 Maintenance Kit.		
1. Maintenance kit also contains: Dummy load Demagnetizer Antenna fixture Module extender, MX-6424 (2 ea) Module extender, MX-6425 Module extender, MX-6426 Cable assemblies as follows: CG-1464/U (7 ea) CG-3109/U CX-9813 CX-10088 CX-10089 CX- 10090 CX-10091 Adapters as follows: MX-6637 MX-6638	Collins 979A-2, part number 522-5730-014 (MK-774/APN-158) (Module Test Set)	

Test Equipment Required (Sheet 1 of 2)

Figure 2-24

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
1. (Cont) UG-273/U (3 ea) UG-201A/U (2 ea) Test lead (2 ea) Test probe, 1000:1 Tuning tool Scale, 6 in.		
2. Radar test set also contains: Cable assemblies as follows: CX-10242 CX-11555 CG-1464/U (6 ea) Adapters as follows: UG-273/U (3 ea) UG-201A/U (2 ea)	Collins 978G-1, part number 522-5731-015 (AN/ APM-247)	
3. Radar Test Set	AN/UPM-56	Frequency range: 9.0 to 9.5 GHz. Power measurement range: -6 to +28 dbm.
4. Oscilloscope	Tektronix 535 (with CA plug-in unit) or AN/USM-281A (or equiv)	Vertical deflection sensitivity: 20 mv/ cm to 20 v/cm. Sweep range: 0.1 us./cm to 5 s/cm, calibrated. External trigger input level: 0.2 to 10 v. Input impedance: 1 megohm. Bandwidth: dc to 10 MHz.

Test Equipment Required (Sheet 2 of 2)
Figure 2-24

(1) Use of Test Procedures.

Procedures to be observed in using the test procedures follow.

(a) Module test set switches not specifically referenced in figure2-25 are not used during the module test and may be in any position.

(b) The correct position of all test set switches applicable to the module test are listed at the top of the MODULE TEST SET INSTRUCTIONS column on each page. Necessary changes of switch positions are noted at the appropriate test. All other switches are to remain in their last referenced position.

(c) The TEST POINT/RESULTS column lists the indications of a properly functioning module as displayed on the oscilloscope and module test set TEST METER.

(d) The TROUBLESHOOTING AREA OR ADJUSTMENT column lists trouble-shooting areas for a malfunctioning module.

(e) The following list of abbreviations and definitions are used in the test procedures.

ABBREVIATION	DEFINITION
ch	Channel
fall time	Measured from 90% to 10% of the amplitude of the waveform trailing edge
pulse width	Measured at 50% amplitude points
rise time	Measured from 10% to 90% of the amplitude of the waveform leading edge
sens	Sensitivity
us.	Microsecond

(2) Test Setup.

Using a UG-273/U adapter and a CG-1464/U cable assembly, connect the module test set output marked OSCILLOSCOPE CHANNEL A to the channel A input of the oscilloscope vertical amplifier. Repeat the procedure for the B channel connections. Using another CG-1464/U cable assembly and UG-273/U adapter, connect the module test set TRIGGER output to the oscilloscope external trigger input. Connect both equipments to primary power.

CAUTION: **DO NOT OPERATE THE WP-103 MODULE TEST SET FROM PRIMARY POWER THAT IS NOT 105 TO 125 V, 380 TO 420 HZ. DAMAGE TO THE EQUIPMENT WILL RESULT.**

(3) Oscilloscope Calibration.

Turn on the oscilloscope and adjust the controls to obtain a trace. (Refer to the oscilloscope instruction manual.) Not all controls will require changes of settings during the test procedure. The following list indicates initial settings for those controls which will require changes during testing. Necessary changes of control settings are noted at the appropriate test in the TEST FIXTURES INSTRUCTIONS column. Controls not noted in this column are to remain in their last noted position.

OSCILLOSCOPE CONTROL	SETTING
Vertical amplifier	
Vertical sens (ch A and B)	1 VOLT/CM
POLARITY (ch A and B)	NORMAL
MODE (sweep)	ALTERNATE
TIME BASE	A
TRIGGERING MODE	EXT
TRIGGERING SLOPE	- (negative)
HORIZONTAL DISPLAY	A
Sweep speed	0.5 MILLISEC/CM
MAGNIFIER	OFF

The module test set has an accurate 4-v dc calibration voltage present at the CHANNEL A and CHANNEL B output terminals when the TEST FUNCTION SELECTOR is in the CAL position.

The following steps outline the calibration procedure for the oscilloscope using the 4-v calibration voltage supplied by the module test set.

(a) Connect the module test set and the oscilloscope as in paragraph (2) above. Apply power to both equipments.

(b) Set the TEST FUNCTION SELECTOR switch on the module test set to OFF. (This grounds the oscilloscope inputs.)

(c) Adjust the dc balance of both oscilloscope channels. (Refer to the operating instructions for the oscilloscope.)

(d) Adjust the channel A trace on the oscilloscope to coincide with the bottom line on the graticule.

(e) Set the TEST FUNCTION SELECTOR switch on the module test set to CAL. Adjust the vertical gain of the oscilloscope so the trace falls 4 centimeters (fourth horizontal line) above the bottom line. The 1 v/cm deflection in this step provides accurate calibration for all ranges of channel A vertical sensitivity.

(f) Repeat steps (d) and (e) for channel B of the oscilloscope.

(4) Module Test Set Voltage Check.

Make the following switch settings to ensure that the voltages supplied by the module test set are correct.

METER FUNCTION SWITCH POSITION	TEST METER READING
115VAC	109 to 121 v
+27.5V	27.5 +1.1 v
-27V	27 +2.5 v
+15V	15 +2 v
TEST (X10)	Green area

NOTE: For any malfunction in the WP-103 Module Test Set, refer to the applicable service manual for maintenance and overhaul instructions.

(5) Performance Test.

This test measures the characteristics of both the gate trigger pulse and the thyratron trigger pulse outputs of the trigger generator module. Two types of trigger generator modules are covered; those with revision G (7) and below and those with revision H (8) and above. Test procedures apply to both types of modules. Specific reference is made to any significant differences in the TEST POINT/RESULTS or TROUBLESHOOTING AREA OR ADJUSTMENT column at the applicable point in the test.

CAUTION: EITHER THE POWER SWITCH OR THE TEST FUNCTION SELECTOR SWITCH MUST BE IN THE OFF POSITION BEFORE INSERTING ANY MODULE INTO THE WP-103 MODULE TEST SET.

Insert the trigger generator module into the TRIGGER GENERATOR receptacle on the module test set. Proceed through the test in the order of the steps outlined in figure 2-25.

STEP	TEST	TEST FIXTITRES INSTRUCTIONS	MODULE TEST SET INSTRUCTIONS	TEST POINT/RESULTS	TROUBLESHOOTNG AREA OR ADJUSTMENT
	Power supply loading		POWER -- ON; METER FUNCTION -- +15V		
			TEST FUNCTION SELEC-TOR -- switch between TRIGGER GEN and any other position	TEST METER -- +15V ± one-half of one minor scale division	Possible shorted wiring or defective component
			METER FUNCTION -- +27.5V		
			TEST FUNCTION SELEC-TOR -- switch between TRIGGER GEN and any other position	TEST METER -- +27.5V ± one-half of one minor scale division	Possible shorted wiring or defective component
2.	Gate trigger output pulse	Oscilloscope -- Display ch B Vert sens 5 VOLTS/CM Sweep 0.5 MILLI-SEC/CM		Pulse waveform -- Amplitude 29.5 v (min) Baseline +32 v	Amplitude and baseline -- Q4, Q5, Q6, and associated components
				Delay 1300 us.	Delay -- Q1 and associated components
		Oscilloscope -- Sweep 1 µ SEC/CM Sync INT, neg		Negative-going pulse Rise time -- 1.5 us.	C4 and C5
		Oscilloscope -- Sweep 20-µSEC/CM		Pulse width -- 50 to 150 us.	Modules G (7) and below -- C8 through C13 Modules H (8) and above -- C15

374A-3 Receiver-Transmitter Test Procedures Using the 979A-2 Maintenance Kit (Sheet 1 of 2)
Figure 2-25

STEP	TEST	TESTFIXTURES	MODULE TEST SET INSTRUCTIONS	TEST POINT/RESULTS	TROUBLESHOOTING AREA OR ADJUSTMENT
3.	Thyratron trigger output pulse	Oscilloscope -- Display ALTERNATE Sweep 0.5 MILLI-SEC/CM Sync EXT, neg Vert sens (ch A and B) 10 VOLTS/CM	POWER -- ON; METER FUNCTION--+27.5V; TEST FUNCTION SELEC-TOR-- TRIGGER GEN	Thyratron trigger (ch A) -- Negative-going pulse coincident with start of gate trigger pulse (ch B)	Modules G (7) and below -- Q6 and CS through C15 Is Modules H (8) and above -- Q6 and C15 ,
		Oscilloscope -- Display ch A Sync INT, neg Vert sens (ch A) 5 VOLTS/CM		Positive overshoot -- 7v Negative overshoot -- 2 v	Q5 gain
				Negative-going pulse peak amplitude (from baseline) -- 15 v min	Q2, Q3, and Q4
		Oscilloscope -- Sweep 1 µ SEC/CM		Pulse rise time -- 1.4 us. max	C4 and C5
				Pulse fall time -- 1.4 us. max Pulse width -- 4.5 us. max	Modules G (7) and below -- Q6 and C8 through C13 Modules H (8) and above -- Q6 and C15

374A-3 Receiver-Transmitter Test Procedures Using the 979A-2 Maintenance Kit (Sheet 2 of 2)
Figure 2-25

B. 978G-1 (AN/APM-247) Radar Test Set.

This section presents the procedures for testing the receiver-transmitter using the 978G-1 Radar Test Set. These procedures are presented in tabular form in figure 2-26.

When a malfunction is indicated, some possible causes are referenced at the appropriate test in the POSSIBLE TROUBLE AREAS column. After a malfunction is corrected, the unit should be tested again to verify that repairs have not affected normal operation.

For a detailed description and maintenance instructions for the radar test set, refer to the applicable service manual.

(1) Use of Test Procedures.

Procedures to be observed in using the test procedures follow.

(a) Switches not on the test set subpanels in use are not referenced and may be in any position.

(b) The correct position of all test set switches applicable to the tests are listed at the top of the 978G-1 INSTRUCTIONS column on each page. Necessary changes of switch positions are noted at the appropriate test step. All other switches are to remain in their last referenced position.

(c) The RESULTS column lists the indications of a properly functioning unit.

(d) The POSSIBLE TROUBLE AREAS column lists troubleshooting areas for a malfunction indicated by the appropriate test.

(e) The following list of abbreviations and definitions are used in figure 2-25.

ABBREVIATION	DEFINITION
Fall time the waveform trailing edge	Measured from 90% to 20% of amplitude of
Pulse width	Measured at 50% amplitude
Rise time of waveform leading edge	Measured from 10% to 90% of amplitude
R/T	374A-3 Receiver-Transmitter

(2) Test Setup.

NOTE: Throughout the test procedures the 978G-1 Radar Test Set and the Radar Test Set AN/UPM-56 will be referred to as the 978G-1 and AN/UPM-56 respectively.

Using cables and adapters supplied with the 978G-1, connect the 978G-1 OSCILLOSCOPE TRIGGER output to the oscilloscope TRIGGER INPUT connector, the 978G-1 OSCILLOSCOPE A channel output to the oscilloscope CHANNEL A input connector, and an unattached cable to the AN/UPM-56 E)-T TRP6 connector. This last cable is to be connected to the oscilloscope TRIGGER INPUT connector at the appropriate test step. Using an rf coaxial cable with appropriate connectors, connect the AN/UPM-56 RF INPUT/OUTPUT connector to TP6 on the receiver-transmitter. Connect the 978G-1 to receiver-transmitter P1 with the special purpose cable supplied. Connect the equipments to primary power.

CAUTION: DO NOT OPERATE THE 978G-1 RADAR TEST SET FROM PRIMARY POWER THAT IS NOT 115 V ±5 PERCENT, 400 HZ +5 PERCENT. DAMAGE TO THE EQUIPMENT WILL RESULT.

Connect the dummy load to the receiver-transmitter waveguide connection and position the RF switch to OFF. Set the 978G-1 AC POWER switch to ON and adjust the INPUT VOLTAGE ADJUST control for 115 ±1 v as indicated on the INPUT POWER meter. Note that the frequency is 400 +5 Hz as indicated on the INPUT FREQUENCY meter.

(3) Performance Test.

This test measures the performance of the 374A-3 Receiver-Transmitter. Differences in procedures or results for different revision levels of the receiver-transmitter are noted at the applicable test step.

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULTS	POSSIBLE TROUBLE AREAS
1.	Control circuits	TEST SET FUNCTION SELECTOR -- RECEIVER-TRANSMITTER TESTS; SYSTEM CONTROL-- STANDBY; METER MULTIPLIER -- X10.	Pull interlock switch (top rear of R/T) all the way up.	STANDBY RELAY lamp lights. R/T blower operates.	Relay K2. Blower motor.
			Set R/T meter switch to GEN A GEN B GEN C	R/T meter indicates 5 ±1 5 ±1 5 ±1 (after 4 min with R/T RF switch on)	Relay K2. Meter circuit module TB4.
		SYSTEM CONTROL -- OPERATE.		OPERATE RELAY lamp lights.	
			Push interlock switch down to first detent.	OPERATE RELAY lamp goes out.	Interlock switch S1.
			Pull interlock switch (top rear of R/T) all the way up.	OPERATE RELAY lamp lights.	Interlock switch S1.
		SYSTEM CONTROL -- STANDBY.		OPERATE RELAY lamp goes out.	
2.	Operating voltages	TEST FUNCTION (RECEIVER-TRANSMITTER TESTS subpanel) -- RELAY POWER (-50V).		TEST METER reading in green area.	
		METER MULTIPLIER -- X1.		TEST METER indicates -27.0 ± 3.0 v.	Transformer T2.
(Cont)		SYSTEM CONTROL-- OPERATE.		OPERATE RELAY lamp lights.	

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 1 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
2. (Cont)		TEST SET FUNCTION SELECTOR -- RECEIVER-TRANSMITTER TESTS; METER MULTIPLIER -- X10; TEST FUNCTION (RECEIVER-TRANSMITTER TESTS sub-panel) -- -27V (-50V); SYSTEM CONTROL -- OPERATE.		TEST METER reading in green area.	
		METER MULTIPLIER -- X1.		TEST METER indicates between -25.0 and -28.5 v.	-27.5-v regulator. -27.5-v supply circuit.
			Using oscilloscope, measure peak-to-peak ripple.	Not more than 0.06 v.	
			Set R/T meter switch to -27.5V.	R/T meter indicates 5 ±1.	Meter circuit module TB4.
		METER MULTIPLIER -- X10; TEST FUNCTION (RECEIVER- TRANSMITTER TESTS subpanel) -- +27 5V (+50V).		TEST METER reading in green area.	
		METER MULTIPLIER -- X1.		TEST METER indicates between +27.4 and +27.6 v.	+27.5-v regulator. +27.5-v supply circuit.
		FAULT SENSING +27.5V NORMAL LOAD -- NORMAL LOAD.		TEST METER indicates between +27.3 and +27.6 v.	+27.5-v regulator.
(Cont)			Compute difference between voltage readings in previous two steps.	Not more than 0.1 v.	

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 2 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
2. (Cont)		SYSTEM CONTROL -- OPERATE; TEST FUNCTION (RECEIVER-TRANSMITTER TESTS subpanel) -- +27.5V (+50V); METER MULTIPLIER -- XI; FAULT SENSING +27.5V NORMAL LOAD-- NORMAL LOAD; TEST SET FUNCTION SELECTOR -- RECEIVER-TRANSMITTER TESTS.	Measure peak-to-peak ripple on oscilloscope.	Not more than 0.03 v.	
			Set R/T meter switch to +27.5V.	R/T meter indicates 5 ± 1.	Meter circuit module TB4.
		METER MULTIPLIER -- X10; TEST FUNCTION (RECEIVER- TRANS-MITTER TESTS subpanel) -- +250V (+500V).		TEST METER reading in green area.	
		METER MULTIPLIER -- X1.		TEST METER indicates between +250 and +270 v.	+260-v supply circuit diodes CR22 and CR23.
		FAULT SENSING +250V SAFE LOAD -- SAFE LOAD.		TEST METER indicates between +245 and +266 v.	Diodes CR22 and CR23.
(Cont)			Compute difference between voltage readings in previous two steps.	Not more than 5.0 v.	
			NOTE: Refer to figures 2-7 and 2-8 (revision sheets) for changes in above circuit diodes.		

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 3 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
2. (Cont)		SYSTEM CONTROL -- OPERATE; TEST FUNCTION (RECEIVER-TRANSMITTER TESTS subpanel) -- +250V (+500V); METER MULTI-PLIER -- X1; FAULT SENSING +250V SAFE LOAD -- SAFE LOAD; TEST SET FUNCTION SELECTOR-- RECEIVER-TRANSMITTER TESTS.	Measure peak-to-peak ripple on oscilloscope.	Not more than 0.85 v.	Diodes CR22 and CR23.
			Set R/T meter switch to high voltage position +250V or +260V.	R/T meter indicates 5 ±1.	Meter circuit module TB4.
3.	Fault sensing		Remove bottom cover from R/T. __CAUTION__: **DO NOT PERMIT TP6 PRO-TECTOR CAP TO SHORT AGAINST COMPO-NENTS.**		
(Cont)			Connect test lead between FAULT SENSING TEST VOLT-AGE jack and TB3-10 on R/T.	OPERATE RELAY lamp goes out.	Fault sense module TB3.

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 4 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
3 (Cont)		SYSTEM CONTROL -- OPERATE; TEST FUNCTION (RECEIVER-TRANSMITTER TESTS subpanel> -- +250V (+500V); METER MULTI-PLIER -- X1; TEST SET FUNCTION SELECTOR -- RECEIVER-TRANSMITTER TESTS.			If necessary, select highest value for R2 on TB3 that will cause the lamp to go out.
			Remove test lead from TB3-10 and FAULT SENSING TEST VOLTAGE jack.		
		SYSTEM CONTROL -- STANDBY then to OPERATE.		OPERATE RELAY lamp lights.	
		FAULT SENSING +27.5V SAFE LOAD -- SAFE LOAD.		OPERATE RELAY lamp stays on.	
		FAULT SENSING +27.5V OVERLOAD-- OVERLOAD.		OPERATE RELAY lamp goes out.	Fault sense module TB3.
		SYSTEM CONTROL -- STANDBY then to OPERATE.		OPERATE RELAY lamp lights.	
		FAULT SENSING +27.5V OVERVOLTAGE -- OVERVOLTAGE.		OPERATE RELAY lamp goes out.	Fault sense module TB3.
		SYSTEM CONTROL -- STANDBY then to OPERATE.		OPERATE RELAY lamp lights.	
(Cont)		FAULT SENSING +250V SAFE LOAD-- SAFE LOAD.		OPERATE RELAY lamp stays on.	

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 5 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
3. (Cont)		SYSTEM CONTROL -- OPERATE; TEST FUNCTION (RECEIVER-TRANSMITTER TESTS subpanel) -- +250V (+500V); METER MULTI- _ PLIER -- X1; TEST SET FUNCTION SELECTOR -- RECEIVER- TRANSMITTER TESTS; FAULT SENSING +250V OVERLOAD -- OVERLOAD.	goes out.	OPERATE RELAY lamp TB3.	Fault sense module
		SYSTEM CONTROL -- STANDBY then to OPERATE.		OPERATE RELAY lamp lights.	
4.	Gate and thyratron trigger pulses	TEST FUNCTION (RECEIVER-TRANSMITTER TESTS sub-panel) -- TRIGGER.	Measure amplitude and pulse width of gate pulse displayed on oscilloscope.	Amplitude -- not less than -29.5 v. Pulse width -- 50 to 150 us.	Trigger generator module 1A11.
		SYSTEM CONTROL -- OFF	**<u>CAUTION</u>: THYRATRON TUBE MAY BE EXTREMELY HOT.** Remove thyratron tube from R/T. Remove bottom cover from R/T. Connect standard probe from oscilloscope channel A to pin 3 of thyra-tron tube socket.	**<u>CAUTION</u>: Check that TP6 cap does not touch any circuit elements.**	
(Cont)		SYSTEM CONTROL -- OPERATE.	Measure amplitude, rise time, fall time, and pulse width of trigger pulse displayed on oscilloscope.	Amplitude -- not less than 300 v. Rise time -- not more than 1.4 us. Fall time -- not more than 4.0 us. Pulse width -- not more than 4.5 us.	Thyratron grid module TB7. Trigger generator module 1A11.

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set (Sheet 6 of 15) Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
4. (Cont)		SYSTEM CONTROL --OFF TEST FUNCTION (RECEIVER-TRANSMITTER TESTS subpanel) -- +250V (+500V); METER MULTI-PLIER -- X1; TEST SET FUNCTION SELECTOR -- RECEIVER- TRANSMITTER TESTS.	Disconnect standard probe from thyratron socket and channel A of oscilloscope. Reconnect cable assembly from 978G-1 to oscillo-scope channel A. Replace thyratron tube in R/T.		
5.	KA-TR check	SYSTEM CONTROL -- OFF; AC POWER -- OFF.	Remove high-voltage cap from TR tube in R/T. Connect test lead (CX-10092) between KA-TR TEST LEAD jack and TR tube high-voltage cap.		
		TEST FUNCTION (RECEIVER-TRANSMITTER TESTS sub-panel) -- KA-TR (-1000V); METER MULTIPLIER -- X10; AC POWER-- ON; SYSTEM CONTROL-- STANDBY.		TEST METER reads in green area.	
(Cont)		METER MULTIPLIER -- X1.		TEST METER indicates -700 $\pm$100 v.	Keep-alive supply.

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 7 of 15)
Figure 2-26

STEP	TEST	INSTRUCTIONS	978G-1 PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
5. (Cont)		SYSTEM CONTROL -- OFF; AC POWER -- OFF; TEST FUNCTION (RECEIVER-TRANSMITTER TESTS sub-panel) -- KA-TR (-1000V); METER MUI,TIPLIER -- XI; TEST SET FUNCTION SELECTOR -- RECEIVER-TRANSMITTER TESTS.	Disconnect free end of test lead (CX-10092) from high-voltage cap. Connect test adapter (MX-6637) between TR tube cap and high-voltage cap. Connect free end of test lead (CX-10092) to metal portion of test adapter.		
		AC POWER -- ON; SYSTEM CONTROL -- STANDBY.		TEST METER indicates between -200 and -375 v.	TR tube V3.
			Remove test lead (CX-10092) from adapter (MX-6637). Set R/T meter switch to KA. **<u>NOTE</u>: R/T's with revision level AA (23) and above do not have KA position on switch.**	R/T meter indicates 5 ±1.	Meter circuit module TB4.
		SYSTEM CONTROL -- OFF; AC POWER-- OFF.	Remove test adapter and replace high-voltage cap on TR tube.		

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 8 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
6.	Filament voltage	AC POWER -- OFF; SYSTEM CONTROL -- STANDBY; TEST SET FUNCTION SELECTOR -- ANTENNA/INDICATOR/ CONTROL UNIT TESTS; ANTENNA TEST (ANTENNA TESTS subpanel) -- TRIM ADJ (10VAC); METER MUL-TIPLIER-- X10.	**NOTE: It is not necessary to perform this test unless the magnetron or magnetron heater circuitry has been repaired.** Connect test leads (CX-10092) from ANTENNA TEST LEADS jacks to terminals 4 and 6 of pulse transformer T7 in R/T. **NOTE: Probe must go through potting material and potting material must be resealed when test is completed.** Remove trigger generator module from R/T. Set RF switch to ON. **WARNING: TERMINALS ON TB1 HAVE 115 V ON THEM WHEN SYSTEM CONTROL IS IN STANDBY POSITION.**		
(Cont)		AC POWER -- ON; SYSTEM CONTROL-- STANDBY.		INPUT VOLTAGE meter indicates 115VAC; TEST METER reads in green area.	

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set (Sheet 9 of 15) Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
6. (Cont)		METER MULTIPLIER -- X1; SYSTEM CONTROL -- STANDBY; TEST SET FUNCTION SELECTOR -- ANTENNA/INDICATOR/ CONTROL UNIT TESTS; ANTENNA TEST (ANTENNA TESTS subpanel) -- TRIM ADJ (10VAC).	**NOTE: If voltage adjustment is necessary for correct results, move jumper wire on TB1 (TB10 on R/T's with revision level Z (22) and below). Adjust jumper wire for best compromise between 6.3 v on TEST METER when SYSTEM CONTROL SWITCH is in STANDBY position and 4.5 v when SYSTEM CONTROL switch is in OPERATE position.**	TEST METER indicates 6.3 ±0.2 v.	Module TB1 (*TB10). **R74. *Units with revision Z(22) and below. **Units with revision AG and below not modified by Service Bulletin No. 13.
		SYSTEM CONTROL -- OFF; TEST SET FUNCTION SELECTOR -- RECEIVER-TRANSMITTER TESTS.	Remove test leads (CX-10092) from test setup. Replace trigger generator module in R/T.		
7.	Thermal time delay		Set RF switch on R/T to ON.		
		Refer to PROCEDURES column.	Note time, then set SYSTEM CONTROL switch to OPERATE. Note time until OPERATE RELAY lamp lights.	After 4,0 ±1 minutes OPERATE RELAY lamp lights.	Relay K3 out of tolerance.

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 10 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
8.	Transmitter output power and Frequency	SYSTEM CONTROL -- STAND-BY; TEST SET FUNCTION SELECTOR -- RECEIVER-TRANSMITTER TESTS; METER MULTIPLIER -- X1.	Set up AN/UPM-56 controls for measuring rf power.		
				<u>NOTE</u>: Make sure cable to RF INPUT/OUTPUT connector is disconnected before calibrating the AN/UPM-56.	
			Disconnect coaxial cable from 978G-1 OSCILLOSCOPE A jack and connect to TP4 on R/T. Set RF switch to ON.		
		SYSTEM CONTROL -- OPERATE.	Measure amplitude and pulse width of pulse displayed on oscilloscope. (Be certain that 4-minute time delay relay has energized.)	Amplitude -- between +60 and +92.5 v. Width (at 50% amplitude) -- between 2.1 and 2.5 us.	Magnetron. Modulator circuit R49.
			Set R/T meter switch to MAG.	R/T meter indicates 5 ±1.	Meter circuit module TB4. R45.
(Cont)			Perform Procedures given in ATTTPM-56 technical manual for measuring rf power.		

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 11 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
8. (Cont)		SYSTEM CONTROL -- OPERATE; TEST SET FUNC-TION SELECTOR -- RECEIVER TRANSMITTER TESTS; METER MULTIPLIER -- X1.	Compute the average power output of the R/T by adding the following: a. R/T directional coupler loss (approximately 20 db, exact amount stamped on coupler) b. RF LEVEL meter reading (in dbm) c. Coupling loss from cable to TP6 and AN/UPM-56	Not less than +43 db.	Magnetron. Modulator circuit.
			Calculate the peak power as follows: Peak power (kw) = $\frac{\text{average power}}{\text{pulse width (us.)}} \times \frac{1000}{\text{prf}}$	Not less than 20 kw for 115-v input to the R/T. **<u>NOTE</u>: Average power output of +43 dbm is equal to approximately 20 watts. If required, refer to dbm-watts conversion chart in AN/UPM,-56 manual to convert power in dbm to watts.**	Magnetron. Modulator circuit.
(Cont)			Rotate AN/UPM-56 FREQUENCY meter control through its range until a dip is indicated on the power meter. **<u>NOTE</u>: The frequency is read directly from the FREQUENCY scale, the frequency in Mhz being 10 times the dial reading.**	9375 $\pm$40 MHz.	Magnetron.

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 12 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
8. (Cont)		SYSTEM CONTROL -- OPERATE; TEST SET FUNCTION SELECTOR -- RECEIVER-TRANSMITTER TESTS; METER MULTIPLIER -- X1.	Record the frequency indicated on the AN/UPM-56 FREQUENCY meter.		
		Vary INPUT VOLTAGE ADJUST from 105 to 125 v as indicated on INPUT METER.	Observe pulse displayed on oscilloscope.	Pulse should be steady and show no signs of arcing or moding. Arcing is indicated by large increases in pulse current. Moding is indicated by smaller changes in pulse current from pulse to pulse or during a single pulse.	Magnetron.
9.	Afc	SYSTEM CONTROL -- STANDBY; TEST FUNCTION (RECEIVER-TRANSMITTER TESTS subpanel) -- AFC MIXER (-500V).	Remove trigger generator module. Insert special purpose module extender into trigger generator chassis connector. Insert trigger generator module into module extender card.		
(Cont)		SYSTEM CONTROL -- OPERATE	Set R/T meter switch to AFC position.		

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set (Sheet 13 of 15)
Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
9. (Cont)		Adjust KLYSTRON REPELLER VOLTAGE ADJUST for 185 v on TEST METER (175 v for R/T's with revision levels AF1 and AG not modified by Service Bulletin No. 11). **NOTE: Sets not modified TY Sets do not have R71 potentiometer on bottom of set under klystron.**	Rotate klystron mechanical tuning control until maximum R/T meter indication is obtained. **CAUTION: TYPE BLK-022 KLYSTRON DOES NOT HAVE MECHANICAL STOPS DO NOT ATTEMPT CLOCKWISE ADJUSTMENT BEYOND POINT OF INCREASED RESISTANCE.**	**NOTE: Connect oscilloscope cable to OSCILLOSCOPE k jack; connect AFC RT UNIT jack and AFC MIXER TEST jack on radar test set.**	Klystron. Afc metering circuit.
			Observe oscilloscope and slowly rotate klystron mechanical tuning control. A negative pulse should be observed for two different positions of the tuning control. Adjust to obtain maximum amplitude of most counterclockwise pulse.	**NOTE: The clockwise pulse is at 30 MHz less than magnetron frequency. The counterclockwise pulse is at 30 MHz greater than magnetron frequency.**	Klystron.
(Cont)		SYSTEM CONTROL -- OPERATE; TEST SET FUNCTION SELECTOR -- RECEIVER-TRANSMITTER TESTS; TEST FUNCTION (RECEIVER-TRANSMITTER TESTS subpanel) -- AFC MIXER (-500V); METER MULTIPLIER -- X1.	Adjust R71 for peak amplitude of pulse displayed on oscilloscope. (If R71 is not present, ensure that repeller voltage is 175 v on TEST METER.)		R71. Klystron. Synchronizer afc output.

374A-3 Receiver-Transmitter Test Procedures Using the 978G1 Radar Test Set (Sheet 14 of 15) Figure 2-26

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURES	RESULTS	POSSIBLE TROUBLE AREAS
9. (Cont)			If necessary, adjust attenuator (accessible through hole in extender card) to obtain 10 ±0.5 v pulse amplitude.	<u>NOTE</u>: **Correct pulse amplitude corresponds to klystron output of -13 dbm.**	If peak amplitude of pulse occurs at less than 10 +0.5 v, the 978G-1 discriminator may not be calibrated. Refer to applicable instruction manual for calibration procedures.
			Alternately readjust mechanical tuning control, R71, and attenuator to obtain maximum peak pulse (10 ±0.5 v) and maximum AFC indication on R/T meter at same time.	If maximum indications do not occur simultaneously, carefully perform the adjustments again. Correct afc adjustment is necessary for proper system operation.	
10.	Crystal current checks		Set R/T meter switch to FWD.	R/T meter indicates between 3 and 10.	Mixer crystals CR40, CR41, and CR42. Local oscillator attenuator AT1. Metering circuit.
			Set R/T meter switch to REV.	R/T meter indicates within one major division of FWD reading.	
			Set R/T meter switch to AFC.	R/T meter indicates between 3 and 10.	

374A-3 Receiver-Transmitter Test Procedures Using the 978G-1 Radar Test Set
(Sheet 15 of 15)
Figure 2-26

Section VIII. ILLUSTRATED PARTS LIST

NOTE: This Illustrated Parts List is furnished for parts location information only. Do not use for provisioning purpose.

2-23. GENERAL.

This Illustrated Parts List is a complete list of parts for the 374A-3 Receiver-Transmitter and 349A-6 Shockmount (see figure 2-27).

Collins Radio Company part numbering system is comprised of a three-digit family number, a four-digit serial number, and two- or three-digit dash number:

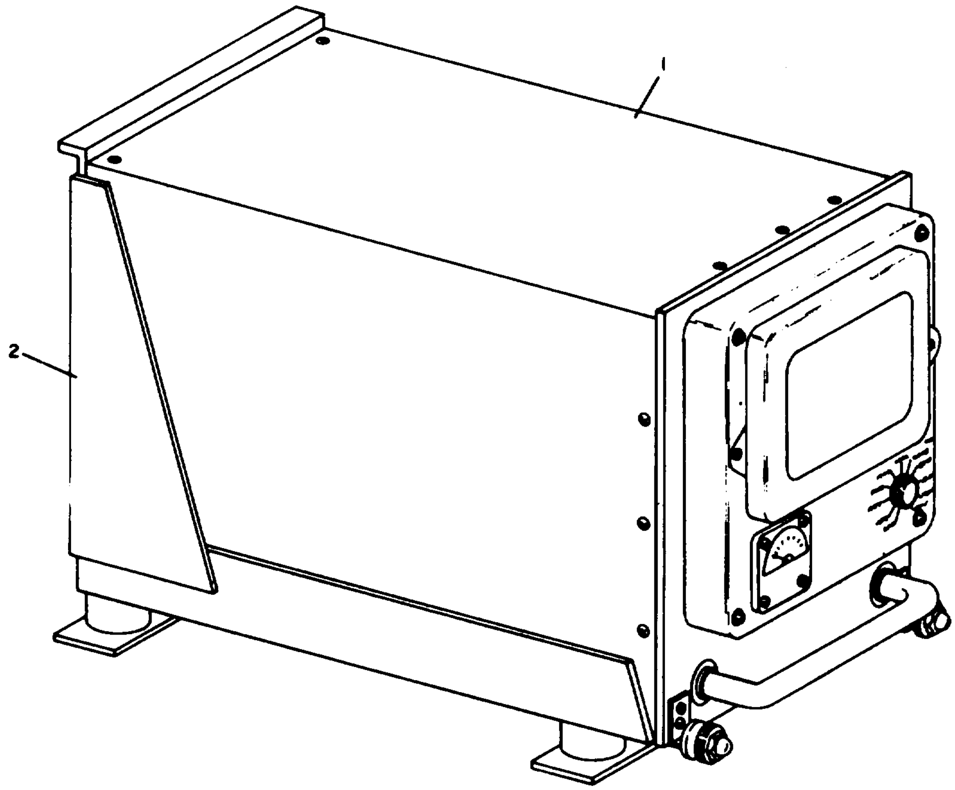
FAMILY NO.	SERIAL NO.	DASH NO.
XXX	XXXX	XX or XXX

If a part is purchased by Collins Radio Company from a vendor, the Federal Manufacturer's Code Number is listed in the nomenclature column. If this column does not include a Federal Manufacturer's Code Number, the item is either a MIL approved item, commercial item or manufactured by Collins. Where COML appears in this column, the part may be obtained commercially from various vendors. Part numbers appearing in this column are Collins assigned part numbers for that item. Serial numbers or MCN (manufacturing control number) effectivities, where applicable, are listed in this column. Serial number effectivities are designated on the nameplate. The MCN is stamped on each module and/or chassis. Changes made from service bulletins are so indicated by SB1, SB2, etc.

2-24. REFERENCE DESIGNATION PREFIXES.

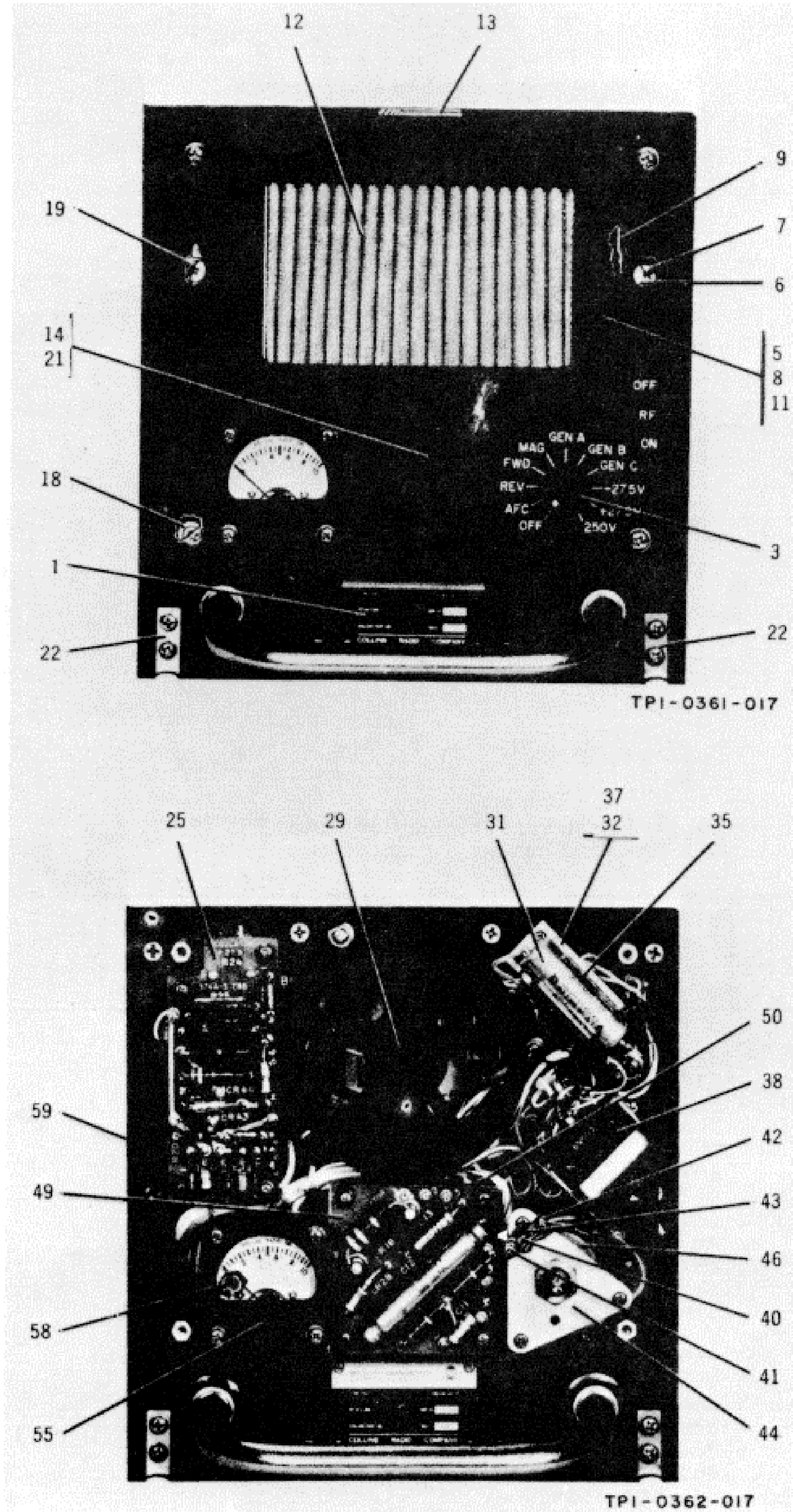
The following prefixes have been assigned in this manual:

PREFIX	UNIT	FIGURE
1	374A-3 Receiver-Transmitter	2-28
1A1	Chassis Assembly	2-46
1A2	Plus 250V Power Supply	2-39
1A2	Plus 260V Power Supply	2-40
1A3	Keep Alive Supply	2-38
1A4	Wired Minus 27.5V Regulator	2-30
1A5	Meter Circuit	2-31
1A5	Meter Circuit Board Assembly	2-32
1A6	Wired Plus 27.5V Regulator	2-29
1A7	Fault Sensing Board	2-41
1A7	Fault Sensing Board	2-42
1A7	Fault Sensing Board	2-43
1A8	Wired Thyratron Grid	2-45
1A9	Magnetron Heater Module	2-44
1A10	Mixer-Duplexer Module	2-37
1A10A1	Preamplifier Assembly	2-47
1A10A1	Preamplifier Assembly	2-48
1A11	Wired Trigger Generator	2-34
1A11	Trigger Generator Module	2-35
1A11	Trigger Generator Module	2-36
1A12	Front Plate Assembly	2-33
2	349A-6 Shockmount	2-49



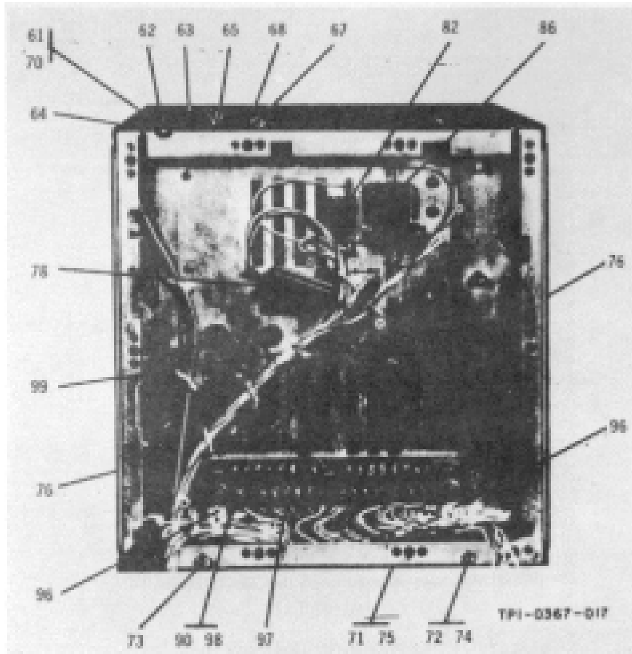
374A-3 Receiver-Transmitter and 349A-6 Shockmount
Figure 2-27

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-27 - 0	NO NUMBER	1	374A-3 RECEIVER TRANSMITTER AND 349A-6 SHOCKNOUNT	1	
1	522-6113-006	2	374A-3 RECEIVFR TRANSMITTER SEE FIG. 2-28	1	
2	522-6115-004	2	349A-6 SHOCKMOUNT SEE FIG. 2-49	1	



374A-3 Receiver-Transmitter (Sheet 1 of 14)

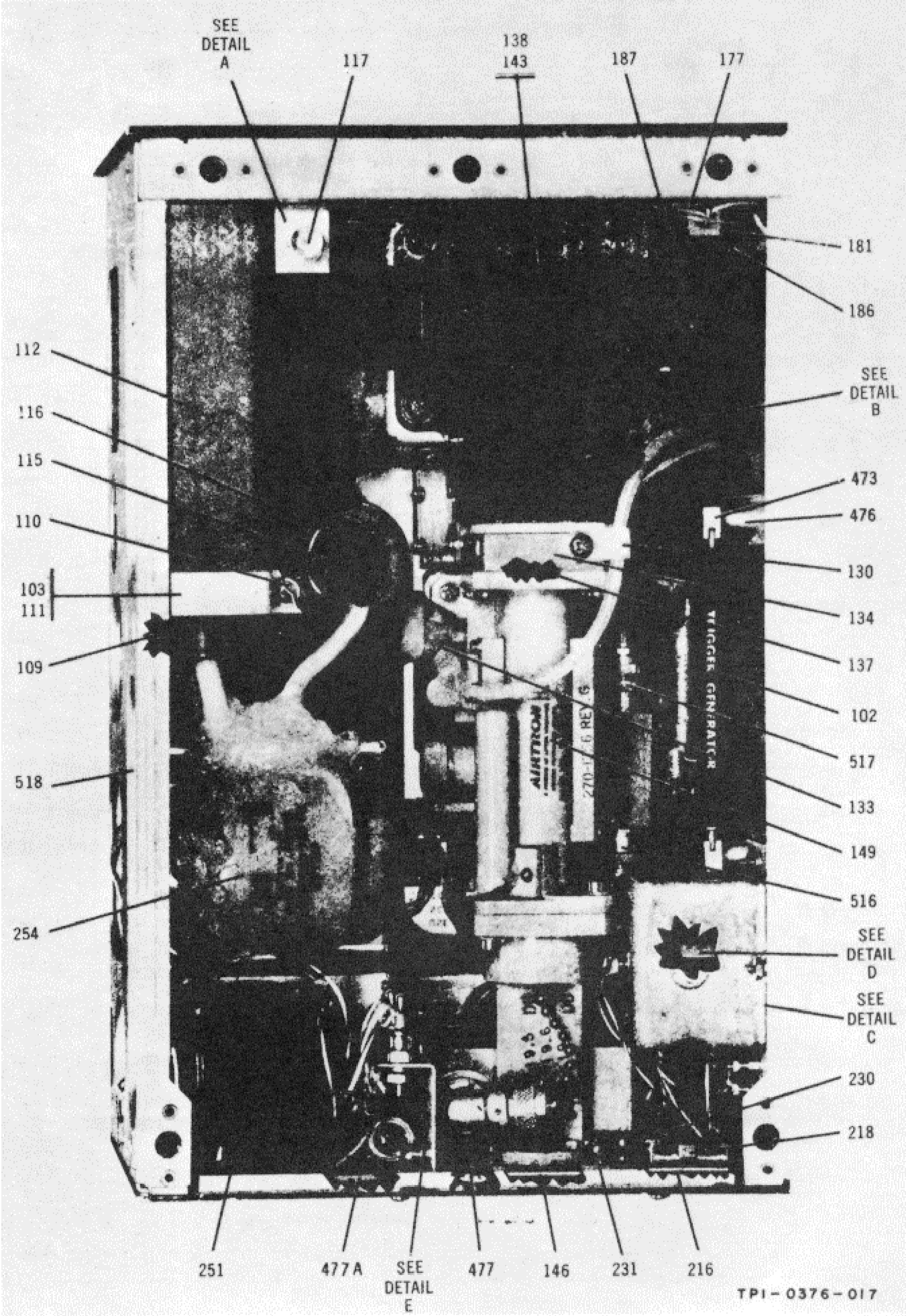
Figure 2-28



374A-3 Receiver-Transmitter (Sheet 2 of 14)

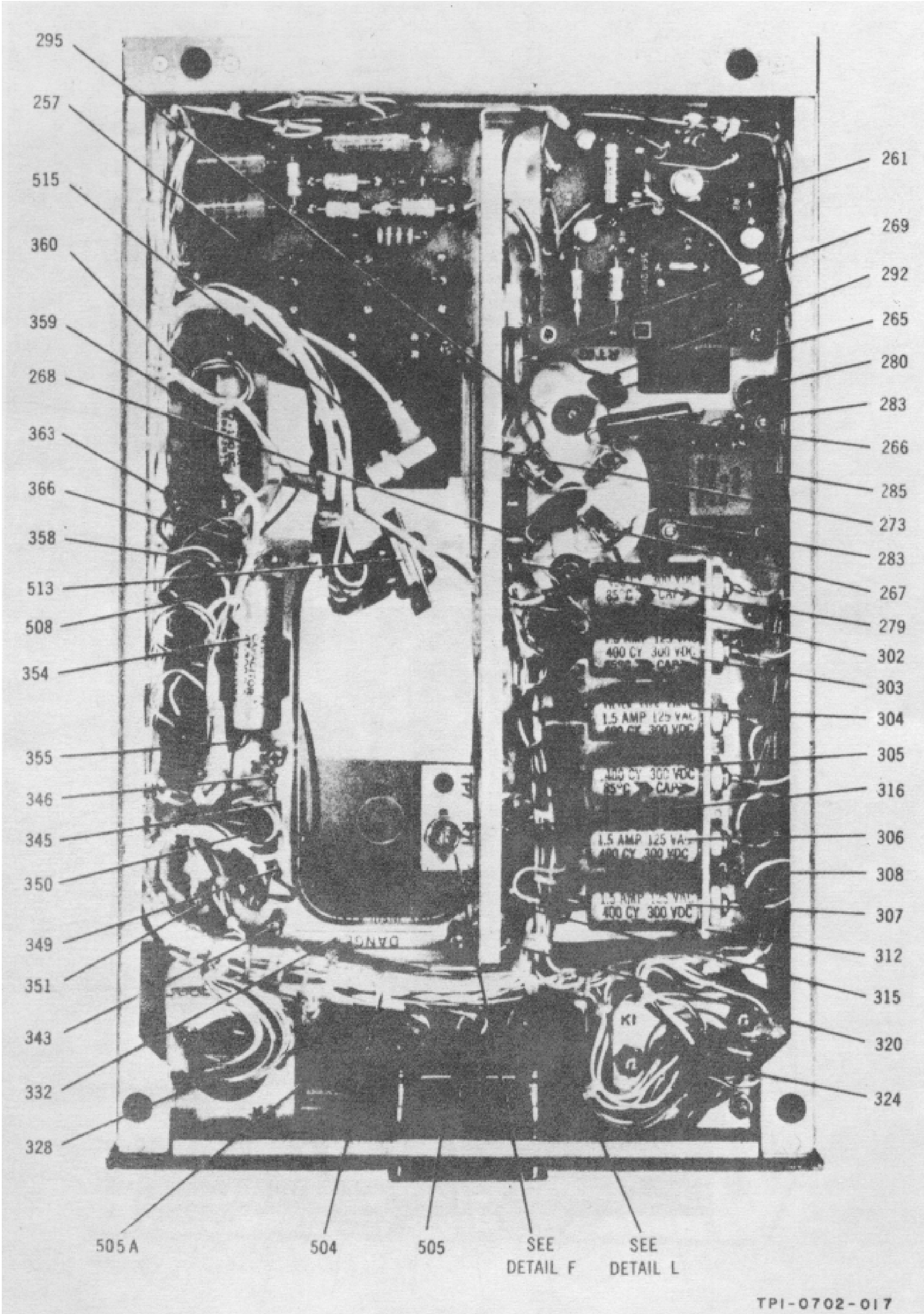
Figure 2-28

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE CODE
2-28 - 0	522-6113-006	1	374A-3 RECEIVER TRANSMITTER SEE FIG. 2-27 FOR NHA	1	
1	516-2895-001	2	PLATE. IDENT SB6	1	
1	516-7396-001	2	PLATE, IDENT SB6	1	
- 2	55Z2-2	2	SCREW. TAP., SST, 2-56 X 1/8 45722 330-1551-000 AP	4	
3	562-0521-002	2	KNOB	1	
- 4	335-0022-000	2	SETSCREW, SST. 6-40 X 1/8 COML AP	2	
5	563-5102-003	2	BRACKET ASSY	1	
6	5S1-5	3	STUD, TURNLOCK FASTENER, CAD PL STL, 0.306 DIA X U.094 71286 012-2934-000	2	
7	5S3-2	3	WASHER, SPLIT, SST, 0*156 ID X 0.271 OD 71286 012-2884-000	2	
8	563-5101-003	3	BRACKET ASSY	1	
9	563-5111-002	4	SPRING, RETAINER	1	
- 10	MS20426AD3-2	4	RIVET, SOLID, AL, 3/32 DIA X 1/8 305-1360-000 AP	2	
11	563-5100-003	4	BRACKET ASSY	1	
12	009-0032-000	2	AIR CLEANER 00736	1	



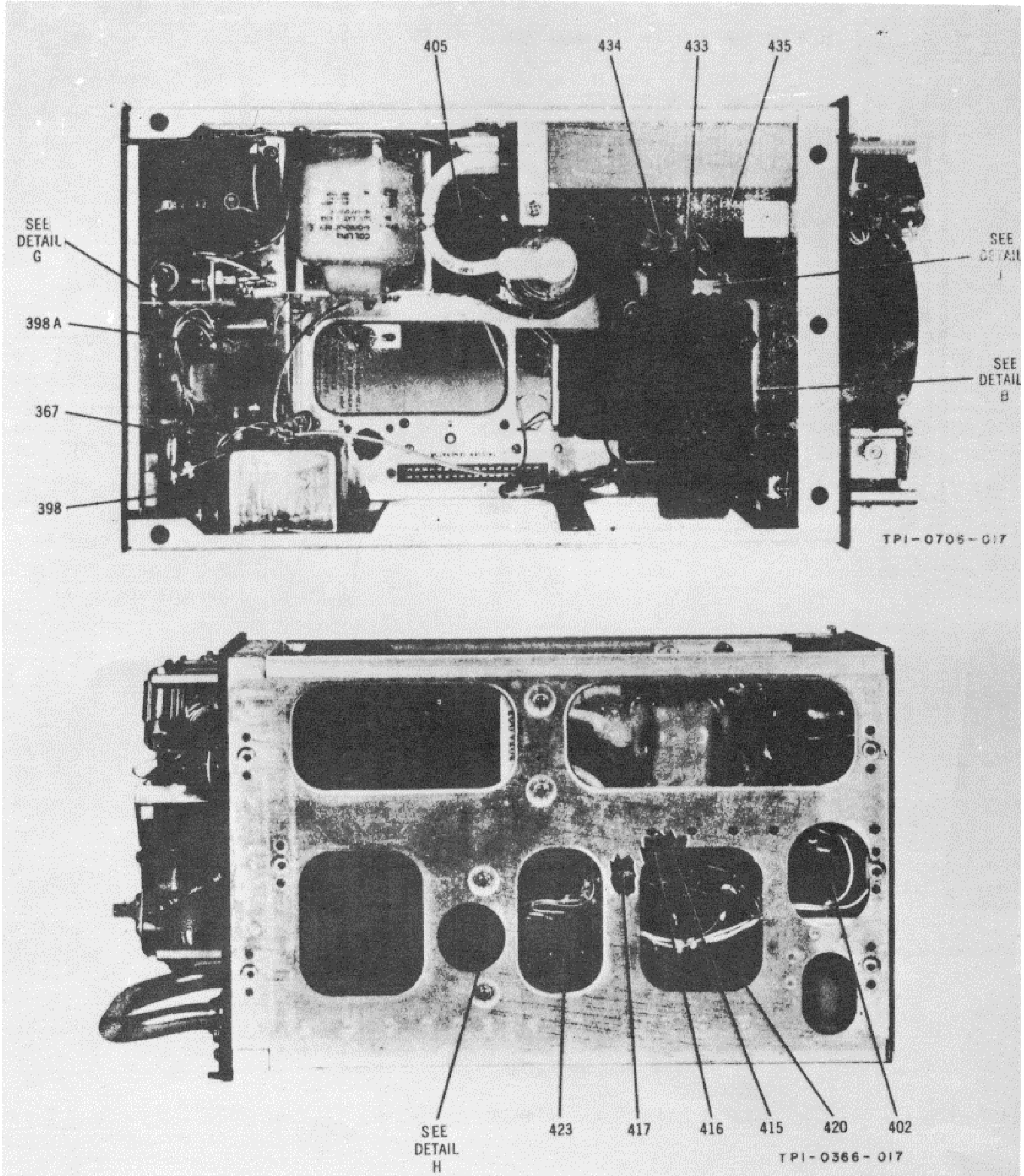
374A-3 Receiver-Transmitter (Sheet 3 of 14)

Figure 2-28



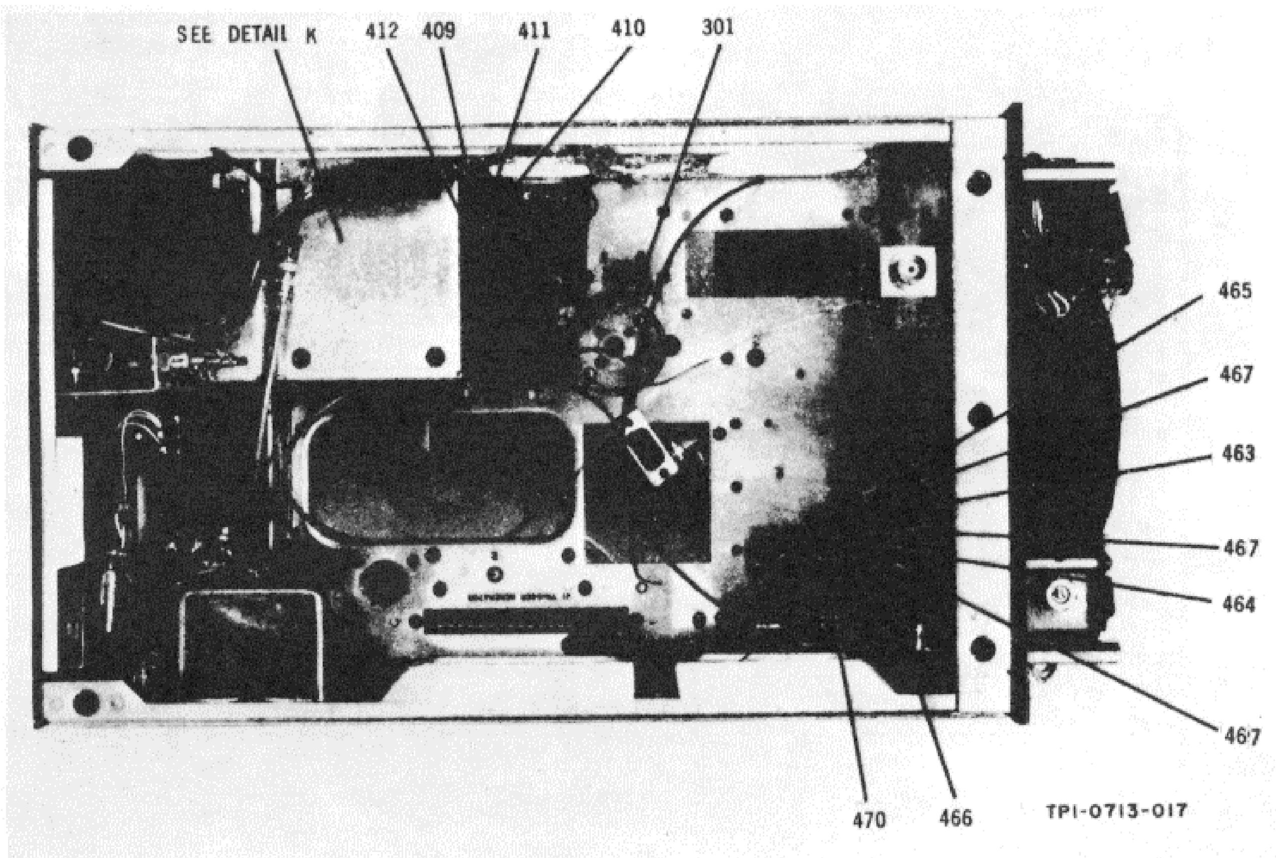
374A-3 Receiver-Transmitter (Sheet 4 of 14)

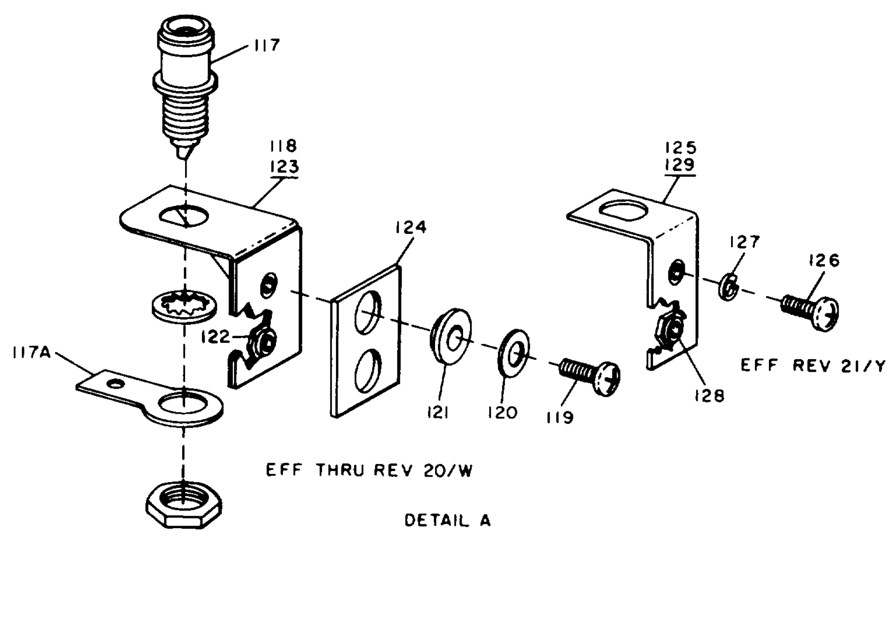
Figure 2-28



374A-3 Receiver-Transmitter (Sheet 5 of 14)

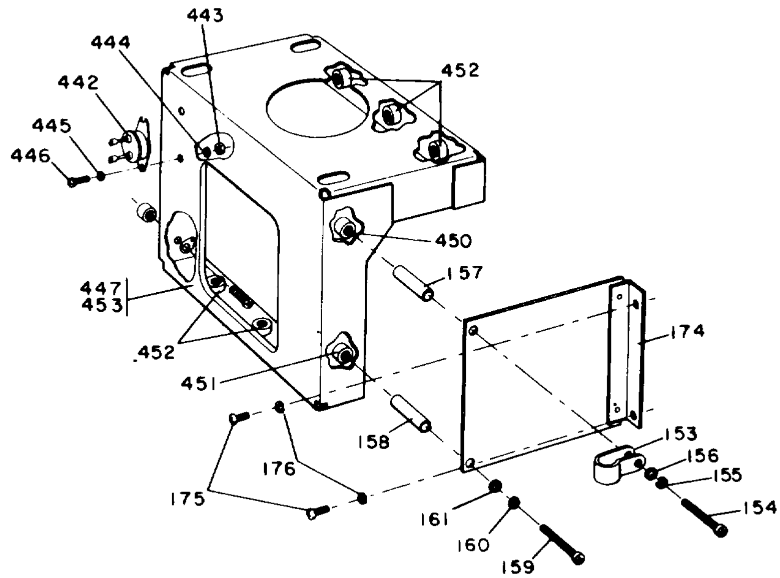
Figure 2-28



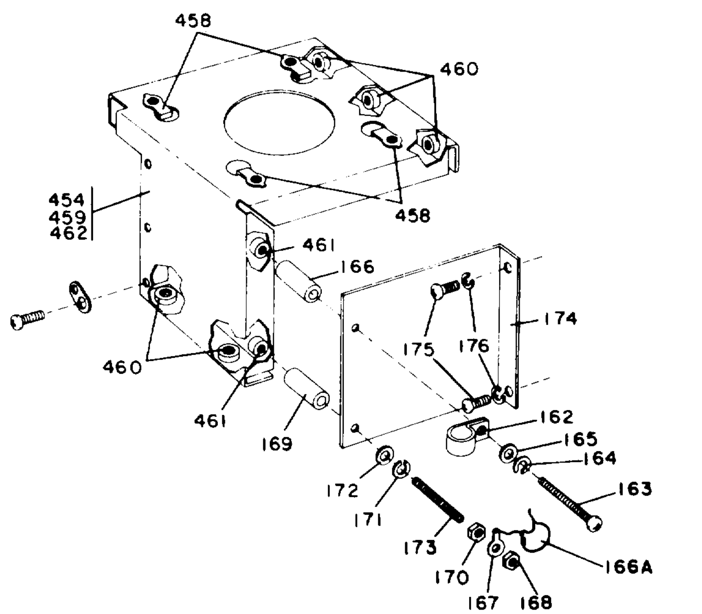


374A-3 Receiver-Transmitter (Sheet 6 of 14)

Figure 2-28

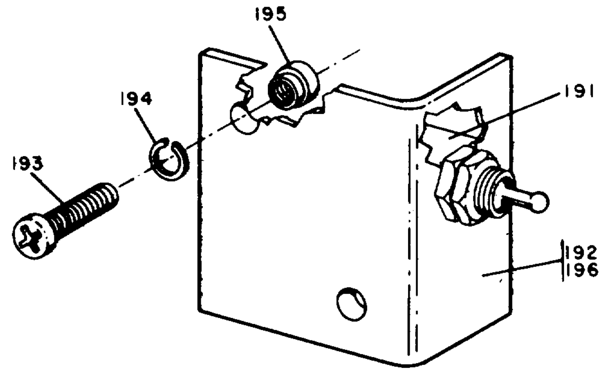


EFF. THRU REV 18/U DETAIL B

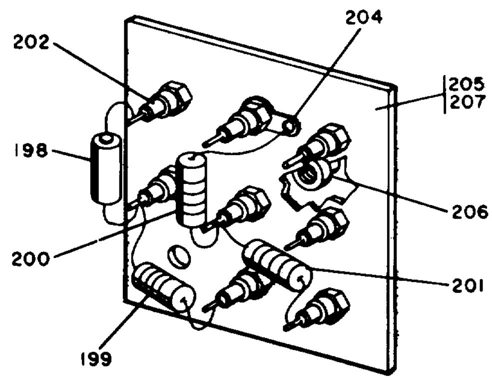


EFF. REV 19/V DETAIL B

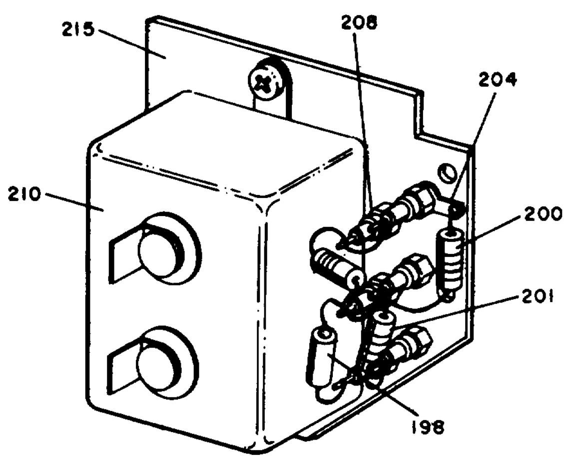
374A-3 Receiver-Transmitter (Sheet 7 of 14)
Figure 2-28



EFF THRU REV 20/W DETAIL "C"



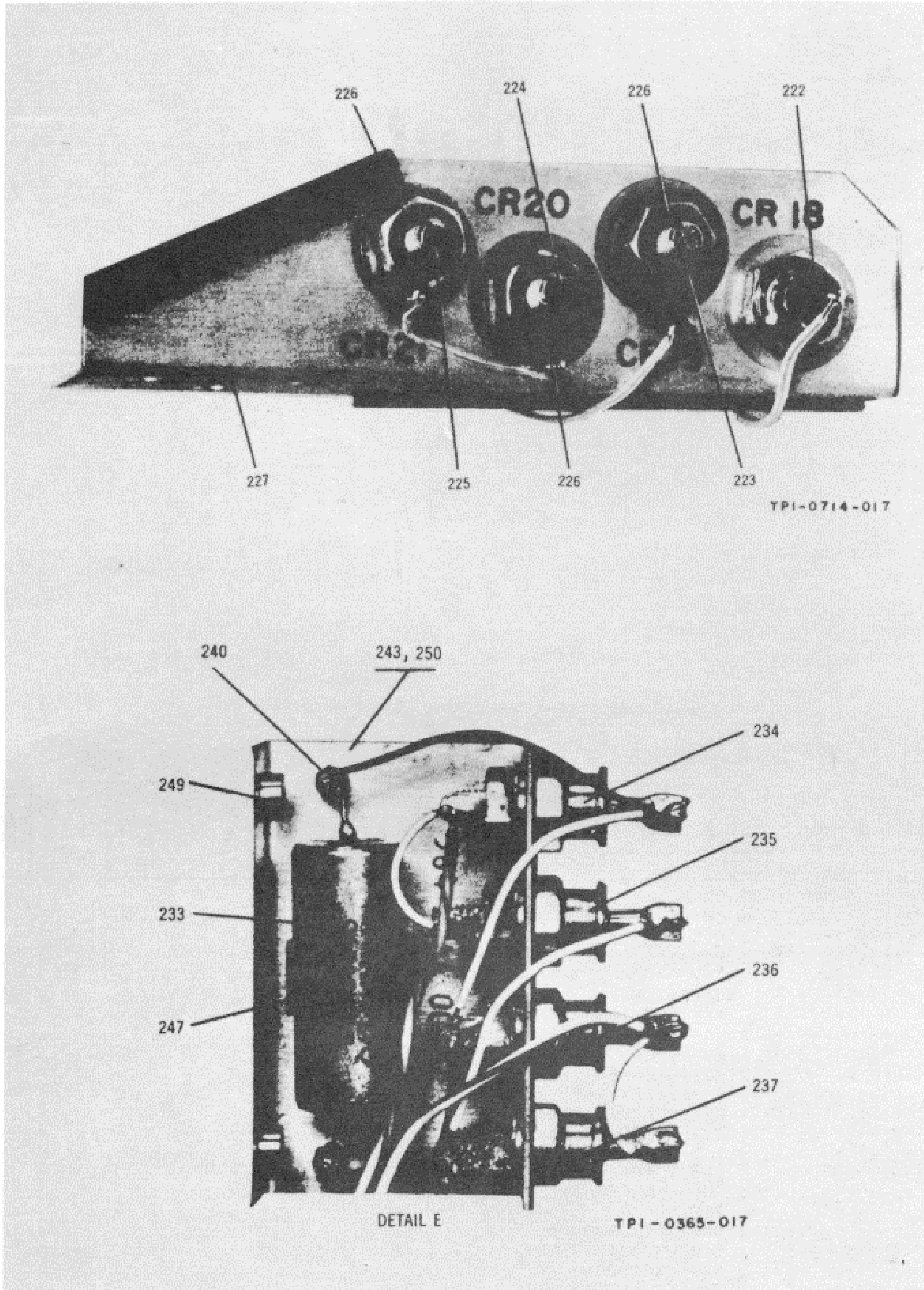
EFF REV 21/Y TO REV 22/Z DETAIL "C"



EFF REV 23/AA DETAIL "C"

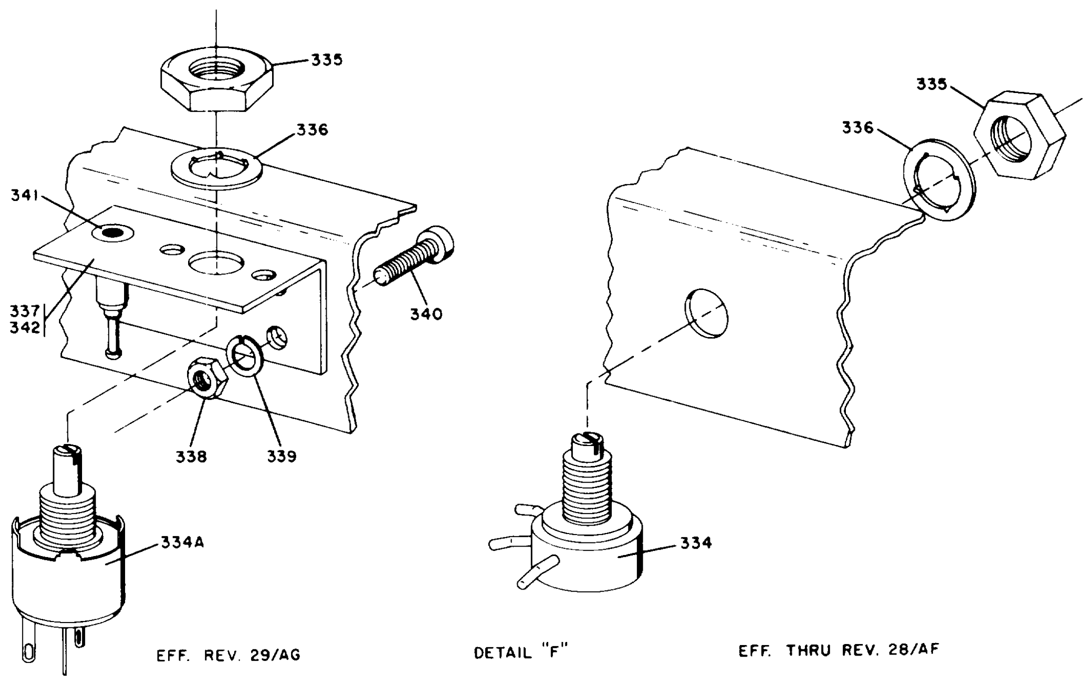
374A-3 Receiver-Transmitter (Sheet 8 of 14)

Figure 2-28



374A-3 Receiver-Transmitter (Sheet 9 of 14)

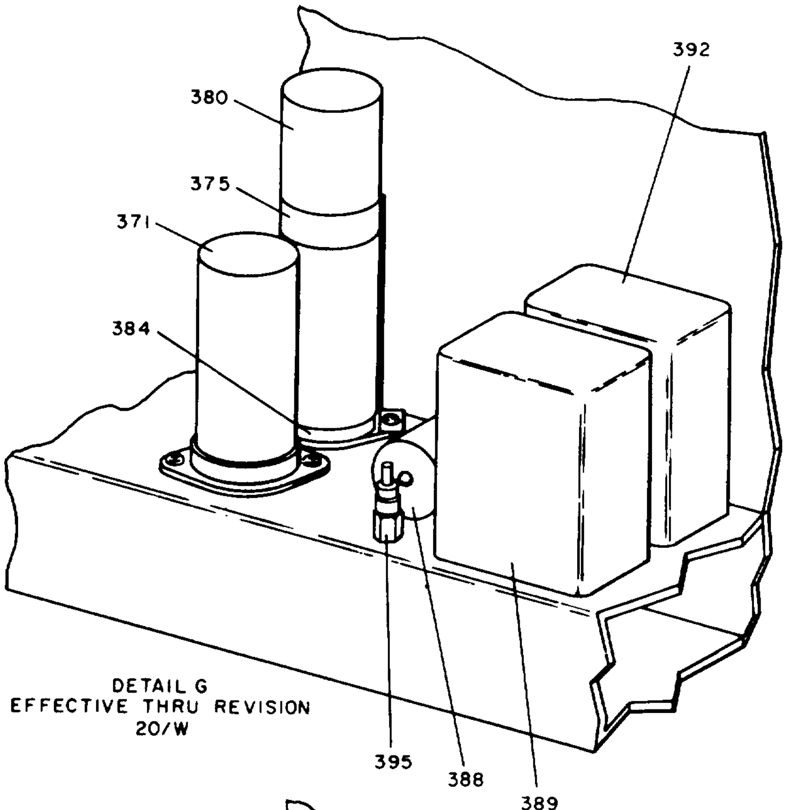
Figure 2-28

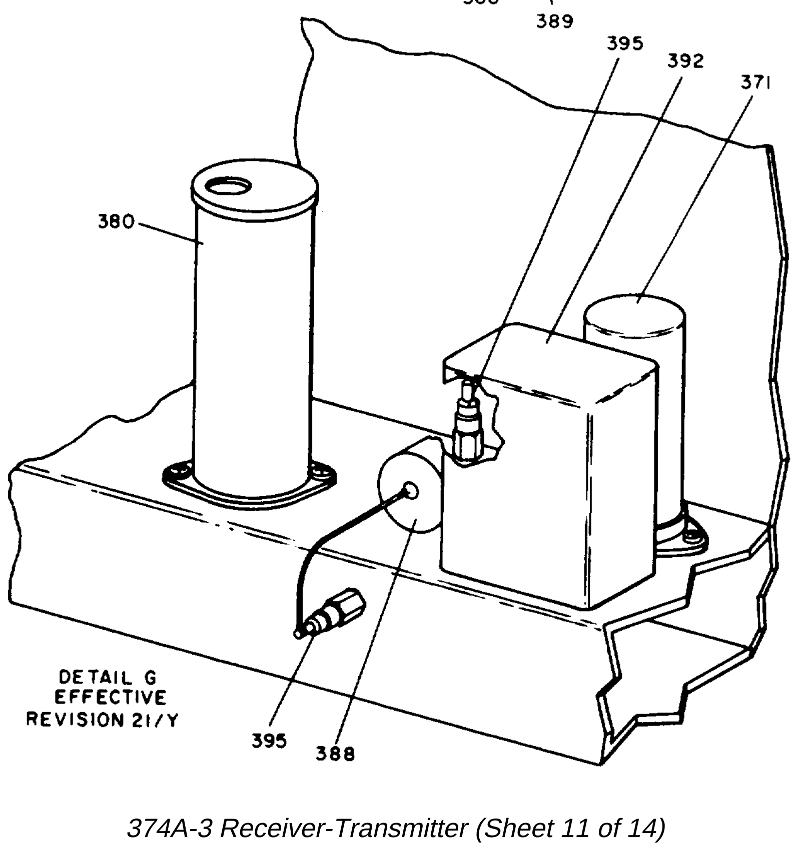


374A-3 Receiver-Transmitter (Sheet 10 of 14)

Figure 2-28

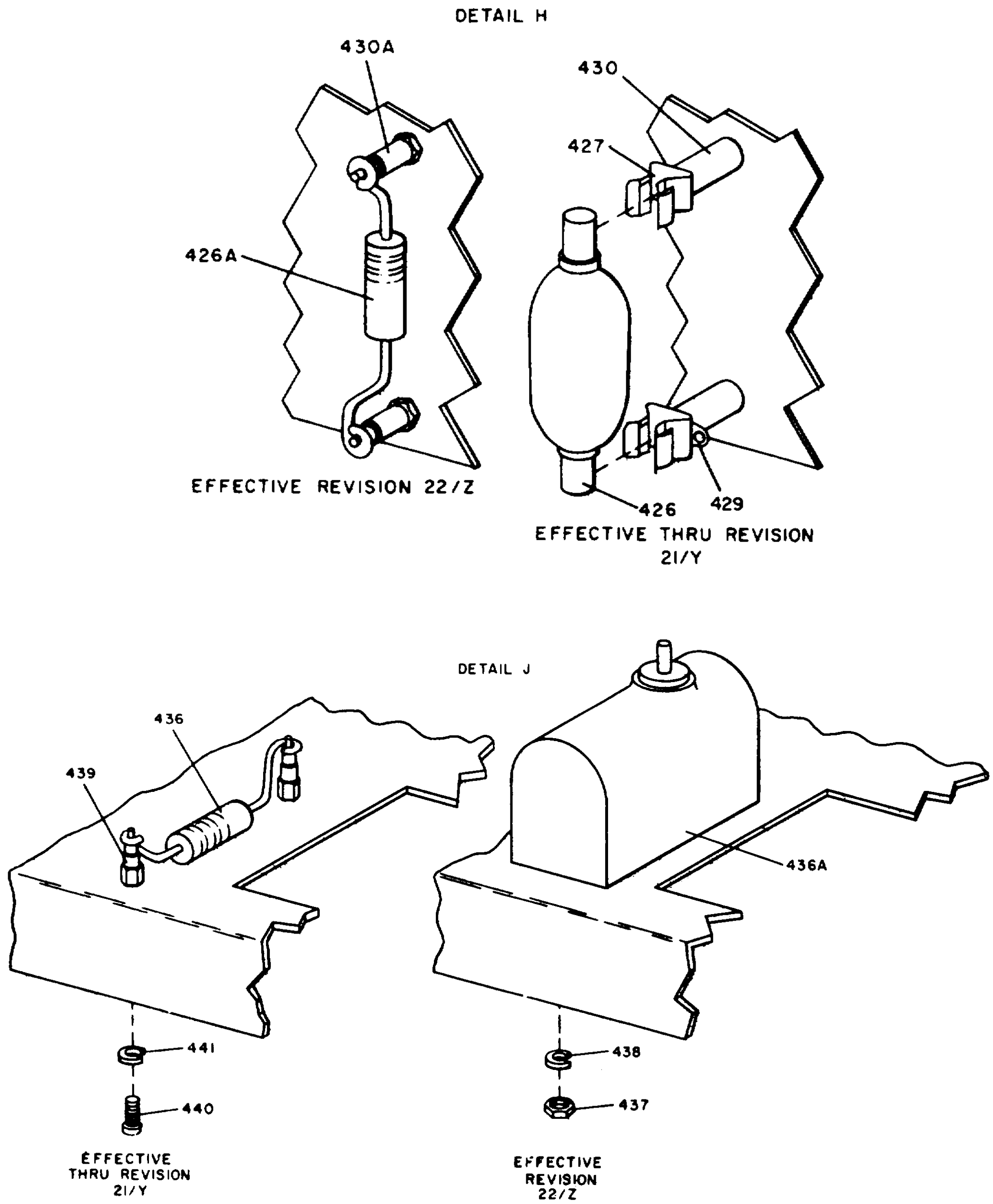
FIG.- ITEM		PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE CODE
2-28	13	280-3778-010	2	CHART, INFORMATION 93108 SB11	1	
	14	563-5075-004	2	HOUSING, FRONT EFF THRU REV 20/W	1	
	14	556-9084-002	2	HOUSING FRONT, RIVETED EFF REV 21/Y	1	
-	15	MS51957-31	2	SCREW, MACH., SST, 6-32 X 5/8 343-0173-000 AP	4	
-	16	MS35338-136	2	WASHER, LOCK, SST. 0.141 ID X 4 0.253 OD 310-0282-000 AP		
-	17	340-0641-000	2	SLEEVE, SPG 91314 AP	4	
	18	563-5110-002	3	RETAINER, CAPTIVE SCR	4	
	19	5R2-1	3	RECEPTACLE 71286 012-2786-000	2	
-	20	MS20426AD3-4	3	RIVET. SOLID, AL, 3/32 DIA X 1/4 305-1362-000 AP	4	
	21	563-5074-004	3	CASE, MODIFIED EFF THRU REV 20/W	1	
	21	556-9084-001	3	HOUSING FRONT, RIVETED EFF REV 21/Y	1	
	22	503-4970-001	2	BRACKET, ANGLE	2	
-	23	MS51957-29	2	SCREW. MACH., SST, 6-32 X 7/16 343-0170-000 AP	4	
-	24	MS35338-136	2	WASHER, LOCK, SST. 0.141 ID X 0.253 OD 316-0282-00 AP	4	





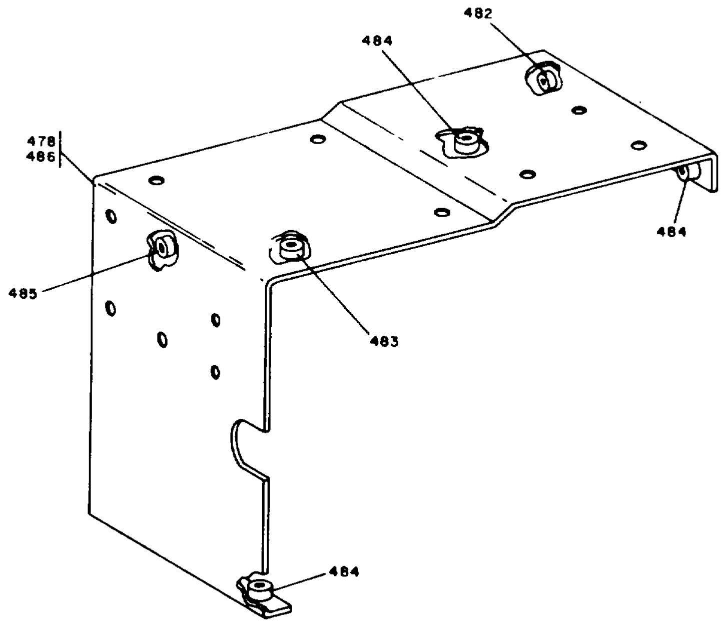
374A-3 Receiver-Transmitter (Sheet 11 of 14)

Figure 2-28



374A-3 Receiver-Transmitter (Sheet 12 of 14

Figure 2-28

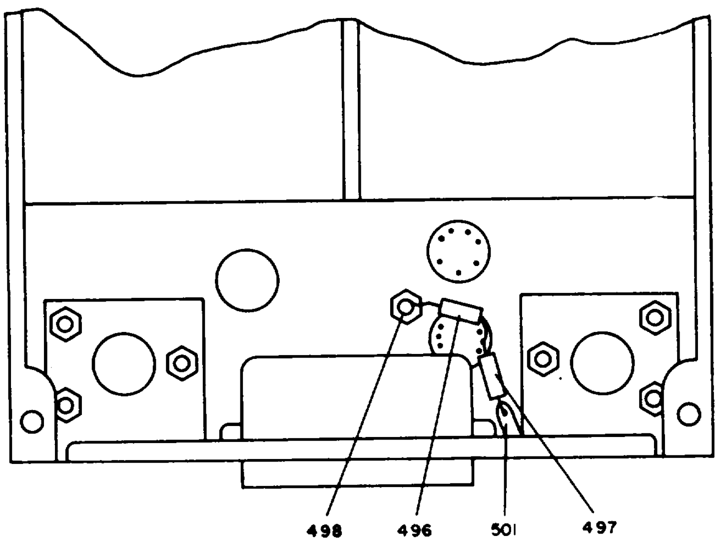


DETAIL K

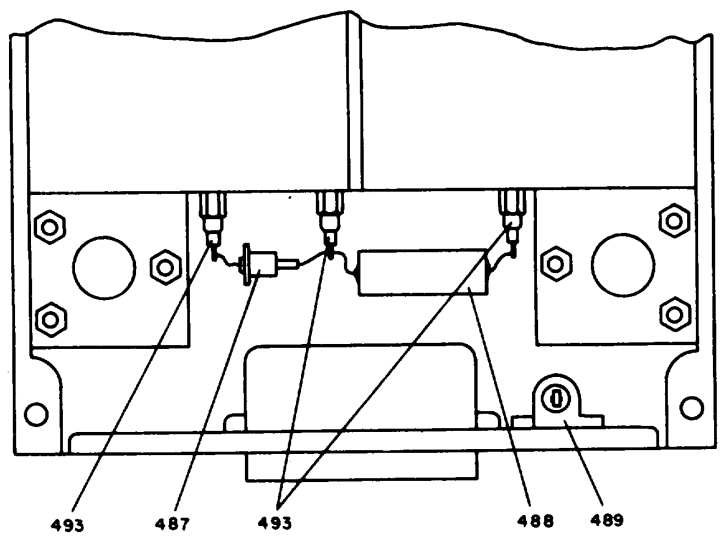
374A-3 Receiver-Transmitter (Sheet 13 of 14)

Figure 2-28

FIG.-	ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28	25	564-2106-003	2	PLUS 27.5V REGULATOR, WIRED SEE FIG. 2-29	1A6TB5	1	
-	26	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		4	
-	27	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		4	
-	28	DIE845	2	WASHER. FLAT. SST. U.218 ID X 0.119 OD 72606 310-0460-000 AP		4	
	29	PROPIMAX2M0T SER415ZS	2	FAN 82877 009-1545-000	1B1	1	
-	30	109074-337	2	CLAMP 06773 015-0980-000 AP		3	
	31	196P1545654	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.15UF. 5%, 600V 56289 931-9783-000	1C1	1	
	32	564-2037-002	2	BRACKET		1	
-	33	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		4	
-	34	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		4	
	35	100-200-9-0	3	CLIP 99378 139-0749-000		1	



DETAIL L
EFF REV 21/Y



DETAIL L
EFF THRU REV 20/W

374A-3 Receiver-Transmitter (Sheet 14 of 14)

Figure 2-28

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 - 36	MS20470AD4-3	3	RIVET, SOLID, AL, 1/8 DIA X 3/16 305-1168-000 AP	2	
37	564-2036-002	3	BRACKET	1	
38	7665K4	2	SWITCH 266-0072-000 1S4	1	
- 39	1722-01	2	WASHER, LOCK, SST, 0,480 ID X 0.607 OD 78189 373-0083-000 AP	2	
40	RC07GF101K	2	RESISTOR, FXD. COMP, 100 OHMS, 10%, 1/4W 745-0713-000 1R41	1	
41	RC07GF101K	2	RESISTOR, FXD, COMP, 1GO OHMS, 10%, 1/4W 745-C713-U00 1R42	1	
42	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS. 10%, 1/4W 745-0713-000 1R43	1	
43	RC07GF680K	2	RESISTOR, FXD, COMP, 68 OHMS, 10%, 1/4W 745-0707-000 1R44	1	
44	564-2041-002	2	BRACKET. SWITCH	1	
- 45	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	3	
46	203891F3	2	SWITCH 76854 259-1242-000 1S5	1	
- 47	P313-0064-00 0	2	NUT, PLAIN, HEX., SST, 3/8-32 77250 313-0064-OUO AP	1	
- 48	1720-02	2	WASHER, LOCK, SST, 0.391 ID X 0.507 OD 78189 373-0085-00C AP	1	
49	564-2676-003	2	MINUS 27.5V REGULATOR, WIRED SEE FIG.2-30 1A4TB6	1	
50	564-2694-003	2	METER CIRCUIT SELF FIG.2-31 EFF THRU REV 20/W 1A5TB4	1	
50	516-7422-003	2	BOARD ASSY, METER CIRCUIT SEE FIG. 2-32 EFF REV 21/Y 1A5TB4	1	
- 51	MS51957-20	2	SCREW, MACH., SST, 4-40 X 7/8 343-0140-000 AP FOR 49 AND 50	4	
- 52	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 GD 310-0279-000 AP FOR 49 AND 50	4	
- 53	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 726G6 310-0460-000 AP FOR 49 AND 50	4	
- 54	541-5987-002	2	SPACER, SLV AP FOR 49 AND 50	4	
55	3201-880	2	AMMETER 81030 458-0302-000 1M1	1	
- 56	MS51957-19	2	SCREW, MACH., SST, 4-40 X 3/4 343-0139-000 EFF THRU REV 23/AA AP	4	
- 57	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 EFF THRU REV 25/AC AP	4	
* 58	CM35E103J03	2	CAPACITOR, FXD, MICA DIELECTRIC. 10,000PF, 5%, 300V 935-2392-000 EFF THRU REV 20/W 1C20	1	
58	55C32A2	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 10,000PF, M20%P50%, 400V 01939 913-3731-000 EFF REV 21/Y 1C20	1	
59	NO NUMBER	2	FRONT PLATE ASSY SEE FIG. 2-33 1A12	1	
- 60	MS51959-28	2	SCREW, MACH., SST, 6-32 X 3/8 342-0062-000 AP	8	

* NONPROCURABLE ITEM. ORDER P/N 913-3731-000.

FIG.- ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28	61	564-2920-004	2	COVER ASSY EFF THRU REV 20/W		1	
	61	556-9086-002	2	COVER ASSY EFF REV 211Y		1	
	62	5S7-4	3	STUD, TURNLOCK FASTENER, CAD PL STL, 0.336 DIA X 0.252 71286 012-2874-000		3	
	63	5S7-7	3	STUD, TURNLOCK FASTENER, CAD PL STL, 0.336 DIA X 0.297 71286 012-2877-000		2	
	64	5S3-2	3	WASHER, SPLIT. SST, 0.156 ID X 5 0.271 OD 71286 012-2884-000			
-	65	563-5114-002	3	BLOCK, ACTUATOR EFF THRU REV 1 20/w			
-	66	MS51959-4	3	SCREW, MACH. SST9 2-56 X 5/16 342-0134-U00 EFF THRU REV 20/W AP		3	
	67	B412338	3	TUNING ROD 80006 235-0443-000 EFF THRU REV 20/W		1	
	68	6010-5A	3	CLIP 91506 139-2574-000		1	
-	69	MS20426AD3-3	3	RIVET, SOLID, AL, 3/32 DIA X 3/16 305-1361-000 AP		1	
	70	564-2919-004	3	COVER EFF THRU REV 20/W		1	
	70	556-9086-001	3	COVER ASSY EFF REV 21/Y		1	
	71	564-2918-004	2	COVER ASSY		1	
	72	5S7-4	3	STUD, TURNLOCK FASTENER, CAD PL STL, 0.336 DIA X 0.252 71286 012-2874-000		2	
	73	5S7-7	3	STUD, TURNLOCK FASTENER, CAD PL STL, 0.336 DIA X 0.297 71286 012-2877-000		2	
	74	5S3-2	3	WASHER, SPLIT, SST, 0.156 10 X 0.271 OD 71286 012-2884-000		4	
	75	564-2917-004	3	COVER 1			
	76	563-5086-003	2	COVER,SIDE		2	
-	77	MS51959-27	2	SCREW. MACH., SST, 6-32 X 5/16 342-0061-000 AP		12	
	78	RH25X000K100 OOH	2	RESISTOR, FXD, WW, 1K, 3%, 25W 91637 747-8652-000	1R11	1	
-	79	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		2	
-	80	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		2	
-	81	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP		2	
	82	RH10-250R0G	2	RESISTOR, FXD, WW, 250 OHMS. 3%, 10w 91637 747-8971-000	1R19	1	
-	83	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP		2	
-	84	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		2	
-	85	MS51957-4	2	SCREW, MACH., SST, 2-56 X 5/16 343-0125-000 AP		2	
	86	RH25X000D18R OOH	2	RESISTOR, FXD, WW, 18 OHMS, 3% 25W 91637 747-8619-000	1R15	1	
-	87	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 2 313-0043-000 AP			
-	88	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		2	

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28 - 89	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-G134-000 AP		2	
90	563-5104-003	2	TERMINAL BOARD	1TB8	1	
- 91	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		3	
- 92	MS51957-16	2	SCREW9 MACH., SST, 4-40 X 7/16 343-0136-000 AP		2	
- 93	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		3	
- 94	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 AP		3	
- 95	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		2	
96	TY35	2	CLAMP 59730 435-1085-000 EFF REV 19/V		2	
97	M164SBRTTIN	3	EYELET, MET., COP, 0.060 DIA X 0.088 23730 307-1268-000		68	
98	563-5103-003	3	TERMINAL BOARD		1	
99	HP3N	2	CLAMP U9922 150-1540-000		1	
- 100	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP		1	
- 101	310-6360-000	2	WASHER, FLAT, SST1 0.147 ID X 0.375 OD COML AP		1	
102	564-2103-004	2	TRIGGER GENERATOR MODULE SEE FIG.2-34 EFF THRU BOARD REV G/G	1A11	1	
102	564-2103-004	2	TRIGGER GENERATOR MODULE SEE FIG 2-35 EFF BOARD REV H/H THRU K/K	1A11	1	
102	564-2103-004	2	TRIGGER GENERATOR MODULE SEE FIG 2-36 EFF BOARD REV L/L	1A11	1	
103	564-2035-002	2	BRACKET		1	
- 104	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-U134-C00 AP		2	
-105	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP		1	
- 106	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		2	
- 107	MS35338-136	2	WASHER, LOCK, SST, C.141 ID X 0.253 OD 310-0282-000 AP		1	
- 108	310-6360-000	2	WASHER, FLAT, SST, 0.147 ID X 0.375 OD COML AP		1	
109	562-0855-0U2	3	NUT, RIVET		2	
110	502-6812-002	3	NUT, RIVET		1	
111	564-2034-002	3	BRACKET		1	
* 112	H912	2	NETWORK 56289 799-0065-000 EFF THRU REV AV/AN	1Z1	1	
112	799-0065-010	2	NETWORK, PULSE FORMING 56289 EFF REV AW/AN	1Z1	1	
- 113	P313-0046-00 0	2	NUT, PLAIN, HEX., SST, 8-32 77250 313-0046-000 AP		4	
- 114	MS35338-137	2	WASHER, LOCK, SST, 0.168 ID X 0.296 OD 310-0072-000 AP		4	
115	846671	2	CONNECTOR 00779 301-1038-010		1	
116	6777	2	ELECTRON TUBE 20948 257-0194-000	1V1	1	
117	UG1094U	2	CONNECTOR 357-9183-G00	1TP4	1	

*NONPROCURABLE ITEM. ORDER P/N 799-0065-010.

FIG.-ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28	117A	331	2	TERMINAL 79963 304-0466-000 EFF THRU REV 20/W		1	
	118	564-2039-002	2	BRACKET EFF THRU REV 20/W		1	
	119	MS51957-27	2	SCREW, MACH, SST, 6-32 X 5/16 343-U168-000 AP		2	
	120	310-6360-000	2	WASHER, FLAT, SST, 0.147 ID X 0.375 OD COML AP		2	
	121	302-3000-000	2	WASHER, SHLD, GRAY FIBER, 5/16 ID X 7/16 OD COML AP		2	
	122	540-6245-002	3	NUT, RIVET		2	
	123	564-2038-002	3	BRACKET		1	
	124	563-5115-002	2	INSULATOR EFF THRU REV 20/W		1	
	125	556-9088-002	2	BRACKET EFF REV 21/Y		1	
	126	MS51957-12	2	SCREW, MACH., SST, 4-40 X 3/16 343-G132-000 AP		2	
	127	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		2	
	128	NCN4-1-2	3	NUT, CAPTIVE, SST, 4-40 71313 334-0443-000 EFF REV 21/Y		2	
	129	556-9088-001	3	BRACKET EFF REV 21/Y		1	
	130	HP2N	2	CLAMP 09922 150-1554-000		1	
-	131	MS51957-3	2	SCREW, MACH., SST, 2-56 X 1/4 343-0124-000 AP		1	
-	132	31G-6360-000	2	WASHER, FLAT, SST, 0.147 ID X 0.375 OD COML AP		1	
	133	9015RLBC	2	CLIP 01009 301-1036-000		1	
	134	564-2677-002	2	SPACER, WAVEGUIDE		1	
-	135	MS51957-48	2	SCREW, MACH., SST, 8-32 X 7/8 343-0192-000 AP		4	
-	136	31C-C397-000	2	WASHER, LOCK, BRZ, 0.168 ID X 0.280 OD COML AP		4	
	137	MS90C64-5	2	GASKET 200-1801-000 EFF REV AU/AN		2	
*	138	L3890	2	ELECTRON TUBE 80080 257-0098-000 EFF THRU REV 21/Y	1V2	1	
-	139	P313-0056-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 10-32 77250 313-0056-000 AP		4	
-	140	M535338-138	2	WASHER, LOCK, SST, 0.194 ID X 0.337 OD 310-0284-000 AP		4	
-	141	310-0059-000	2	WASHER. FLAT, NI PL BRS, 0.203 ID X 0.437 OD COML AP		8	
-	142	P343-0347-00 0	2	SCREW, MACH., NI PL BRS, 10-32 X 1/2 77250 343-0347-000 AP		4	
	143	L3890A1	2	ELECTRON TUBE 80080 257-0224-010 EFF REV 22/Z 5B6	1V2	1	
-	144	P343-0348-00 0	2	SCREW, MACH., NI PL BRS, 10-32 X 5/8 77250 343-C348-000 AP		4	
-	145	310-0059-000	2	WASHER. FLAT, NI PL BRS, 0*203 ID X 0.437 OD COML AP		4	
	146	564-9909-002	2	COVER		1	
-	147	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP		2	
-	148	MS35338-137	2	WASHER, LOCK, SST, 0.168 ID X 0.280 OD 310-0283-000 AP		2	
	149	564-8243-004	2	MIXER SEE FIG 2-37 EFF THRU REV 20/W	1A10	1	
	149	556-9080-001	2	MIXER SEE FIG. 2-37 EFF REV 21/Y THRU AU/AN	1A10	1	

*NONPROCURABLE ITEM. ORDER P/N 257-0224-010.

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 149	556-9080-002	2	MIXER DUPLEXER MODULE SEE FIG.2-37 lA10 EFF REV AV/AN	1	
- 150	MS51957-42	2	SCREW, MACH., SST, 8-32 X 5/16 343-0186-000 AP	2	
- 151	MS35338-136	2	WASHER. LOCK9 SST, 0C141 ID X 0.253 OD 310-0282-000 AP	2	
- 152	310-0046-000	2	WASHER, FLAT, SST, 0.147 ID X 0.312 OD COML AP	2	
153	HP2N	2	CLAMP 09922 150-1554-000 EFF THRU REV 23/AA	1	
154	MS51957-19	2	SCREW, MACH., SST, 4-40 X 3/4 343-0139-000 EFF THRU REV 23/AA AP	1	
155	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	1	
156	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0119 OD 72606 310-0460-000 AP	1	
157	564-2712-002	2	SLEEVE, SPACER	1	
158	564-2712-002	2	SLEEVE, SPACER	1	
159	MS51957-19	2	SCREW, MACH., SST, 4-40 X 3/4 343-0139-000 EFF THRU REV 23/AA AP	1	
160	MS35338-135	2	WASHER, LOCK, SST, Oll5 ID X 0.212 OD 310-0279-000 AP	1	
161	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 AP	1	
162	HP3N	2	CLAMP 09922 150-1540-000 EFF REV 24/AB	1	
163	MS51957-20	2	SCREW, MACH., SST, 4-40 X 7/8 343-0140-000 EFF REV 24/AB AP	1	
164	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	1	
165	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 AP	1	
166	564-2712-002	2	SLEEVE, SPACER	1	
166A	560815	2	CAPACITOR, FXD, CERAMIC DIELECTRIC 100OPF. 20%, 2000V 01939 913-3960-000 EFF REV 26/AD SB10 1C59A	1	
167	4007-6HOTTIN NED	2	TERMINAL 77147 304-0016-000 EFF REV 24/A8 SB10	1	
168	P313-0132-00 0	2	NUT, PLAIN, HEX., SST, 4-40 77250 313-0132-000 EFF REV 24/AB SB10 AP	1	
169	564-2712-002	2	SLEEVE, SPACER	1	
170	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 EFF REV 24/AB S810 AP	1	
171	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	1	
172	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 AP	1	
173	P312-0017-00 0	2	STUD, CONTINUOUS THD, SST, 4-40 X 1 77250 312-0017-000 EFF REV 24/A8 SB10 AP	1	
174	564-2652-003	2	KEEP ALIVE SUPPLY SEE FIG. 2-38 1A3TB2	1	

FIG.-	ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28	175	MS51957-13	2	SCREW, MACH., SST, 4-40 X ¼ 343-0133-000 AP		2	
	176	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		2	
	177	RE65G10R0	2	RESISTOR, FXD, WW, 10 OHMS, 1% 10 W 91637 747-8954-000 EFF REV AJ/AJ 5813	1R80	1	
	- 178	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP		2	
	- 179	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		2	
	- 180	MS51957-4	2	SCREW, MACH,. SST, 2-56 X 5/1b 343-0125-000 AP		2	
	181	RH5-5R0-1	2	RESISTOR, FXD, WW, 5 OHMS, 1% 7.5W 91637 747-0984-070 EFF REV 30/AH TO REV AJ/AJ SB13	1R79	1	
	181	RH5-5R0-1	2	RESISTOR, FXD, WW, 5 OHMS, 1%, 7.5W 91637 747-0984-070 EFF REV AJ/AJ	1R79	1	
	- 182	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP		2	
	- 183	310-0070-000	2	WASHER, LOCK, SST, C0097 ID X 0.165 OD COML AP		2	
	- 184	MS51957-4	2	SCREW, MACH., SST, 2-56 X 5/16 343-0125-000 AP		2	
	186	RC20GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10% 1/2w 745-1310-000 EFF REV 30/AH SB13	1R83	1	
	187	RE65G12R4	2	RESISTOR, FXD, WW, 12.4 OHMS, 1%, 10W 747-8443-030 EFF REV 30/AH SB13	1R81	1	
	- 188	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP		2	
	- 189	310-0070-000	2	WASHER. LOCK, SST 0.097 ID X 0.165 OD COML AP		2	
	- 190	MS51C57-4	2	SCREW, MACH., SST, 2-56 X 5/16 343-0125-000 AP		2	
	191	TE3	2	SWITCH 04009 266-5045-000 EFF THRU REV 20/W	1S2	1	
	192	563-5106-003	2	BRACKET, SWITCH EFF THRU REV 20/W		1	
	193	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		2	
	194	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		2	
	195	562-0855-002	3	NUT, RIVET		2	
	196	563-5105-003	3	BRACKET		1	
	197		1	DELETED			
	198	CS13BH684M	2	CAPACITOR. FXD, ELECTROLYTIC, 0.68UF, 20%, 75V 184-6326-170 EFF REV 21/Y	1C59	1	
	199	1N488A	2	SEMICOND DEVICE 353-2663-000 EFF REV 21/Y	1CR45	1	
	200	RC07GF334K	2	RESISTOR, FXD, COMP, 330K, 1CS, 1/4W 745-0839-00O EFF REV 21/Y	1R77	1	
	201	RC07GF224K	2	RESISTOR, FXD, COMP, 220K, 10%, 1/4W 745-C833-C00 EFF REV 21/Y	1R76	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28 202	TF300	2	TERMINAL 98291 306-1018-000 EFF REV 21/Y		8	
- 203	MS51959-1	2	SCREW, MACH., SST, 2-56 X 1/8 342-0131-C00 AP		8	
204	SPL4040-2HOT TINNED	2	TERMINAL 77147 304-0331-000 SB11		1	
205	769-7193-002	2	PLATE SB11		1	
206	502-6302-002	3	NUT, RIVET2			
207	769-7193-003	3	PLATE 1			
208	TF300	2	TERMINAL 98291 306-1018-000 EFF REV 23/AA		6	
- 209	MS51959-3	2	SCREW, MACH., SST, 2-56 X 1/4 342-0133-000 AP		6	
210	144P40506	2	CAPACITOR, FXD, PAPER DIELECTRIC, 4UF, 20U. 600V 56289 951-4020-000 EFF REV 23/AA	1C6	1	
- 211	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		2	
- 212	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		2	
- 213	310-0045-000	2	WASHER, FLAT, SST. 0.125 ID X 0.312 OD COML AP		2	
- 214	MS51959-14	2	SCREW, MACH., SST, 4-40 X 5/16 342-0045-000 AP		2	
215	516-7409-001	2	PLATE EFF REV 23/AA		1	
216	564-2699-003	2	SPACER EFF THRU REV 20/W		1	
- 217	342-0811-000	2	SCREW, MACH., SST, 4-48 X 1/4 COML AP		3	
218	MS16106-4	2	SWITCH 266-8000-000 151		1	
- 219	MS51957-13	2	SCREW, MACH., SST. 4-40 X 1/4 343-0133-000 AP		3	
- 220	MS35338-135	2	WASHER, LOCK, SST 0.115 ID X 0.212 OD 310-0279-000 AP		3	
- 221	541-5977-002	2	SPACER. SLV EFF REV 21/Y AP		1	
222	1N253	2	SEMICOND DEVICE 353-1838-000	1CR18	1	
223	1N253	2	SEMICOND DEVICE 353-1838-000	1CR19	1	
224	1N253	2	SEMICOND DEVICE 353-1838-000	1CR20	1	
225	1N253	2	SEMICOND DEVICE 353-1838-000	1CR21	1	
226	HP35WIC	2	MOUNTING KIT 03877 015-0894-000 AP FOR 222 THRU 225		4	
227	564-2046-002	2	SUPPORT 1			
- 228	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP		3	
- 229	MS35338-136	2	WASHER. LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP		3	
230	SDB1K01104M	2	CAPACITOR, FXD, PAPER DIELECTRIC, O.1UF, 20%, 100V 53C21 931-4488-000	1C15	1	
231	TF300	2	TERMINAL 98291 306-1018-000		2	
- 232	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP		2	
233	196P47491S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.47UF, 10%, 100V 56289 931-9631-000	1C10	1	
234	1N253	2	SEMICOND DEVICE 353-1838-000	1CR13	1	
235	1N253	2	SEMICOND DEVICE 353-1838-000	1CR14	1	
236	1N253	2	SEMICOND DEVICE 353-1838-000	1CR15	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 237	1N253	2	SEMICOND DEVICE 353-1838-000 1CR16	1	
- 238	HP35WIC	2	MOUNTING KIT 03877 015-0894-000 AP FOR 234 THRU 237	4	
- 239	MS35333-73	2	WASHER, LOCK, SST, 0.204 ID X 0.381 OD 373-0043-000 AP FOR 234 THRU 237	4	
240	TF300	2	TERMINAL 98291 306-1018-000	2	
- 241	MS51957-2	2	SCREW. MACH., SST, 2-56 X 3/16 343-0123-000 AP	2	
- 242	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	2	
243	564-2045-002	2	BRACKET	1	
- 244	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP	2	
- 245	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	2	
- 246	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78189 373-0154-000 AP	2	
247	100-225-9-3	3	CLIP 99378 139-0763-000	1	
- 248	MS20470AD3-3	3	RIVET, SOLID. AL, 0.094 DIA X 0.187 305-1154-000 AP	1	
249	562-0855-002	3	NUT, RIVET	2	
250	564-2044-002	3	BRACKET	1	
251	29322	2	TRANSFORMER 80089 672-0023-000 1T1	1	
- 252	MS51957-27 343-0168-000 AP	2	SCREW, MACH., SST, 6-32 X 5/16	4	
- 253	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP	4	
254	11X116	2	REACTOR, 3.7HENRY 98278 1L2 674-0010-000	1	
- 255	MS51957-42	2	SCREW, MACH., SST, 8-32 X 5/16 343-0186-000 AP	4	
- 256	MS35338-137	2	WASHER, LOCK, SST, 0.168 ID X 0.296 OD 310-0072-000 AP	4	
257	563-5082-003	2	PLUS 250V POWER SUPPLY SEE FIG. 2-39 1A2TB1 EFF THRU REV 20/W	1	
257	556-9558-004	2	PLUS 260V MAGNETRON HEATER SEE 1A2TB1 FIG. 2-40 EFF REV 21/Y SB13	1	
- 258	MS51957-13	2	SCREW, MACH., SST1 4-40 X 1/4 343-0133-000 AP	4	
- 259	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	4	
- 260	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 AP	4	
* 261	564-2109-003	2	FAULT SENSING, WIRED SEE FIG. 2-41 1A7TB3 EFF THRU BOARD REV H	1	
* 261	564-2109-003	2	FAUI T SENSING. WIRED SEE FIG. 2-42 1A7TB3 EFF BOARD REV J	1	
261	783-6518-001	2	FAULT SENSE BOARD SEE FIG. 2-43 1A7TB3 EFF REV BB/AT	1	
- 262	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	4	
- 263	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	4	

*NONPROCURABLE ITEM. ORDER P/N 783-6518-001.

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 - 264	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 AP	4	
265	560815	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 100PF, 20%, 2000V 01939 913-3960-000 SB10 1C57	1	
266	565-5412-002	2	CHOKE GRID 1L24	1	
267	CM35E103J03	2	CAPACITOR, FXD, MICA DIELECTRIC. 10,000PF, 5%, 300V 935-2392-000 EFF THRU REV 20/W 1C25	1	
267	55C32A2	2	CAPACITOR, FXD, CERAMIC 1C25 DIELECTRIC, 10,000PF, M20%P50%, 400V 01939 913-3731-000 EFF REV 21/Y	1	
268	RC32GF470K	2	RESISTOR, FXD, COMP, 47 OHMS, 10%, 1W 745-3296-000 EFF THRU REV 26/AD 1R48	1	
268	RC42GF470K	2	RESISTOR, FXD, COMP, 47 OHMS, 10%, 2W 745-5596-000 EFF REV 27/AE 1R48	1	
269	9RT1A6	2	RESISTOR, THRM, 10 OHMS, 10% 02989 714-2846-000 EFF REV 30/AH SB13 1RT82	1	
- 270	MS35650-104	2	NUT, PLAIN, HEX., SST, 10-32 313-0019-000 5813 AP	1	
- 271	MS35338-138	2	WASHER, LOCKV SST, 0.194 ID X 0.337 OD 310-0284-090 SB13 AP	1	
- 272	347-0120-000	2	SCREW, MACH, SST, 10-32 X 3/4 COML SB13 AP	1	
* 273	565-5580-003	2	MAGFTRON HEATER MODULE SEE FIG. 2-44 EFF THRU REV 20/W 1A9TB10	1	
- 274	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP	1	
- 275	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	2	
- 276	310-6320-000	2	WASHER, FLAT, SST, 0C092 ID X 0.218 OD COML AP	2	
- 277	MS51957-7	2	SCREW, MACH., SST, 2-56 X 1/2 343-0128-000 AP	2	
- 278	502-1668-002	2	SPACER AP	2	
279	TF300	2	TERMINAL 98291 306-1018-000	1	
280	HP4N	2	CLAMP 09922 150-1541-000	1	
- 281	MS51957-29	2	SCREW, MACH., SST, 6-32 X 7/16 343-0170-000 AP	1	
- 282	310-6360-000	2	WASHER, FLAT, SST, 0.147 ID X 0.375 OD COML AP	1	
283	4007-6HOTTIN NED	2	TERMINAL 77147 304-0016-000 EFF REV 26/AD S810	2	
- 284	P313-0132-00	2	NUT, PLAIN, HEX., SST, 4-40 77250 313-0132-000 S10 AP	2	
285	563-5089-003	2	THYRATRON GRID, WIRED SEE FIG. 2-45 1A8TB7	1	
- 286	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 EFF REV 26/AD SB10 AP	2	

*NONPROCURABLE ITEM. ORDER P/N 777-7340-001.

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 - 287	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 EFF THRU REV 25/AC AP	2	
- 287	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 EFF REV 26/AD AP	4	
- 288	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 EFF THRU REV 25/AC AP	2	
- 288	DIE845	2	WASHER. FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 EFF REV 26/AD AP	4	
- 289	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 EFF THRU 25/AC AP	4	
- 289	MS51957-13	2	SCREW, MACH,. SST, 4-40 X 1/4 343-0133-000 EFF REV 26/AD AP	2	
- 290	P312-0009-00 0	2	STUD, CONTINUOUS THD, SST, 4-40 X 1/2 77250 312-0009-000 EFF REV 26/AD 5810 AP	2	
- 291	540-9168-003	2	POST, ELECTRICAL-MECHANICAL EQUIP. AP	4	
292	4007-8HOTTIN NED	2	TERMINAL 77147 304-0017-000 SB10	1	
- 293	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP	1	
- 294	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP	1	
* 295	220-1258-000	2	SOCKET, TUBE 74970 EFF THRU REV 28/AF	1	
295	122-224-200	2	SOCKET 74970 220-5450-000 EFF REV 29/AG	1	
- 296	P313-0045-00 0	2	NUT, PLAIN, HEX., SST, 6-32 77250 313-0045-000 EFF THRU REV 23/AA AP	2	
- 296	68NM62	2	NUT, SELF-LKG, HEX., AL, 6-32 72962 333-0368-000 EFF REV 24/AB AP	2	
- 297	310-6360-000	2	WASHER, FLAT, SST, 09147 ID X 0,375 OD COML EFF THRU REV 23/AA AP	4	
- 297	310-6360-000	2	WASHER, FLAT, SST, 0,147 ID X 0,375 OD COML EFF REV 24/AB AP	2	
- 298	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 EFF REV 24/AB AP	2	
- 299	302-0026-000	2	WASHER, NM, CORPRENE, 0.147 ID X 0.375 OD COML AP	4	
- 300	MS51957-31	2	SCREW, MACH., SST, 6-32 X 5/8 343-0173-000 AP	2	
** 301	PS120F6-22DR	2	RETAINER 91506 139-2638-000 EFF THRU REV 28/AF	1	
301	PS168F43-225 2D	2	RETAINER 91506 220-1583-010 EFF REV 29/AG SB9	1	
302	2JX49	2	FILTER 14101 241-0330-000 1FL6	1	
303	2JX49	2	FILTER 14101 241-0330-000 1FL5	1	

*NONPROCURABLE ITEM. ORDER P/N 220-5450-000.
**NONPROCURABLE ITEM. ORDER P/N 220-1583-010.

FIG.- ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28	304	2JX49	2	FILTER 14101 241-0330-000	1FL4	1	
	305	2JX49	2	FILTER 14101 241-0330-000	1FL3	1	
	306	2JX49	2	FILTER 14101 241-0330-000	1FL2	1	
	307	2JX49	2	FILTER 14101 241-0330-000	1FL1	1	
	308	HP5N	2	CLAMP 09922 150-1542-000		1	
-	309	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP		1	
-	310	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-0C0 AP		1	
-	311	310-6360-000	2	WASHER, FLAT, SST, 0.147 ID X 0.375 OD COML AP		1	
	312	563-5098-003	2	BRACKET, FIL		1	
-	313	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP		1	
-	314	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		1	
	315	RC32GF685K	2	RESISTOR, FXD, COMP, 6.8MEGO, 10%, 1W 745-3513-000 EFF THRU REV 28/AF	1R72	1	
	315	RC32GF106K	2	RESISTOR, FXD, COMP, 10MEGO, 10%, 1W 745-3520-000 EFF REV 29/AG TO 30/AH	1R72	1	
	315	RC32GF825K	2	RESISTOR, FXD, COMP, 8.2MEGA, 10%, 1W 745-3417-000 EFF REV 30/AH SB11	1R72	1	
	316	TF300	2	TERMINAL 98291 306-1018-000 EFF THRU REV 28/AF		1	
	316	ST1050-34	2	TERMINAL 11707 306-0091-000 EFF REV 29/AG SB11		1	
-	317	MS51957-4	2	SCREW, MACH., SST9 2-56 X 5/16 343-0125-000 EFF THRU REV 28/AF AP		1	
-	317	MS51957-12	2	SCREW, MACH., SST, 4-40 X 3/16 343-0132-000 EFF REV 29/AG SB11 AP		1	
-	318	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML EFF THRU REV 28/AF AP		1	
-	318	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 EFF REV 29/AG SB11 AP		1	
-	319	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML EFF REV 29/AG SB11 AP		1	
	320	TF300	2	TERMINAL 98291 306-1018-000		1	
-	321	MS51957-3	2	SCREW, MACH., SST, 2-56 X 1/4 343-0124-000 AP		1	
-	322	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		1	
-	323	SPL4040-2HOT TINNED	2	TERMINAL 77147 304-0331-000 EFF REV 29/AG S810 AP		1	
*	324	972-1523-000	2	RELAY, ARM. 04221 EFF THRU REV AN/AL	1K1	1	
*	324	972-1559-020	2	RELAY, ARM. 04221 EFF REV AP/AM THRU AR/AN	1K1	1	

*NONPROCURABLE ITEM. ORDER P/N 974-1083-020.

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 324	5397-44HS	2	RELAY 82415 974-1083-020 EFF REV AS/AN 1K1	1	
- 325	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP	2	
- 326	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP	2	
- 327	4706-05-01-4 102	2	WASHER, LOCK, SST, 0.150 ID X 0.333 OD 78189 373-0155-000 AP	2	
* 328	972-1516-000	2	RELAY, ARM. 04221 EFF THRU REV AN/AL 1K2	1	
* 328	972-1559-010	2	RELAY, ARM. 04221 EFF REV AP/AM THRU AR/AN 1K2	1	
328	5422-8HS	2	RELAY 82415 974-1083-010 EFF REV AS/AN 1K2	1	
- 329	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP	2	
- 330	MS35338-136	2	WASHER, LOCK, SST. 0.141 ID X 0.253 OD 310-0282-000 AP	2	
- 331	4706-05-01-4 102	2	WASHER, LOCK, SST, 0.150 ID X 0.333 OD 78189 373-0155-000 AP	2	
332	764-8622-001	2	PLATE, COVER EFF REV 29/AG SB11	1	
- 333	MS51959-13	2	SCREW, MACH., SST, 4-40 X 1/4 342-0044-000 EFF REV 29/AG AP	3	
334	RV5LAYSB255B	2	RESISTOR, VAR, 2.5MEGO, 20%, 1/2W 380-2915-000 EFF THRU REV 28/AF 1R71	1	
334A	RV6NAYSL105B	2	RESISTOR, VAR, 1MEGO, 20%, 1/2W 380-1555-000 EFF REV 29/AG 5811 1R71	1	
335	P334-0253-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0253-000 AP FOR 334 AND 334A	1	
336	1214-05	2	WASHER, LOCK, CAD PL STL, 0.267 ID X 0.408 OD 78189 373-0087-000 AP FOR 334 AND 334A	1	
337	764--8698-002	2	BRACKET, RESISTOR EFF REV 29/AG SB11	1	
338	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 EFF REV 29/AG SB11 AP	2	
339	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-C279-OCO EFF REV 29/AG AP	2	
340	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 EFF REV 29/AG SB11 AP	2	
341	SKT10RED	3	JACK, TIP. RED 98291 360-0092-000 EFF REV 29/AG 1TP7	1	
342	764-8698-001	3	BRACKET. RESISTOR	1	
343	500-6222-001	2	POST, ELECTRICAL-MECHANICAL EQUIP. EFF REV 29/AG SB11	3	
- 344	MS51957-13	2	SCREW, MACH., SST. 4-40 X 1/4 343-0133-000 EFF REV 29/AG SB11 AP	3	
345	RC20GF332K	2	RESISTOR, FXD, COMP, 3.3K 10%, 1/2W 745-1373-000 1R68	1	
346	TF300	2	TERMINAL 98291 306-1018-000	2	

*NONPROCURABLE ITEM. ORDER P/N 974-1083-010.

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 - 347	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	2	
- 348	310-0070-000	2	WASHER, LOCK, SST, 0C097 ID X 0.165 OD COML SB11 AP	2	
349	SPL4040-2HOT TINNED	2	TERMINAL 77147 304-0331-000 EFF REV 29/AG	1	
350	M5SLRN	2	CONNECTOR 81312 372-9005-000 1J5	1	
351	2H16D12	2	TERMINAL 92825 306-0958-000	2	
- 352	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	2	
- 353	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	2	
354	SDB1K03474M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.47UF, 20%, 300V 53021 931-4538-000 1C14	1	
355	TF300	2	TERMINAL 98291 306-1018-000	2	
- 356	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	2	
- 357	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	2	
358	40C73A1	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 1000PF, 20%, 500V 01939 913-3009-000 EFF REV 26/AD SB10 1C62	1	
359	196P4749154	2	CAPACITOR, FXD, PAPER DIELECTRICT, 0C47UF, 10%, 100V 56289 931-9631-000 1C19	1	
360	TF300	2	TERMINAL 98291 306-1018-000	1	
- 361	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	1	
- 362	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	1	
363	2H16D012	2	TERMINAL 92825 306-0958-000	1	
- 364	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	1	
- 365	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	1	
366	4007-6HOTTIN NED	2	TERMINAL 77147 304-0016-000 EFF REV 26/AD SB10	1	
367	76-0093-60	2	TRANSFORMER 95105 672-0009-000 1T2	1	
- 368	P313-0045-00 0	2	NUT, PLAIN, HEX., SST, 6-32 77250 313-0045-000 AP	4	
- 369	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP	4	
- 370	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 EFF THRU REV 28/AF AP	4	
- 370	MS51957-28	2	SCREW, MACH., SST, 6-32 X 3/8 343-0169-000 EFF REV 29/AG AP	4	
371	BR2SE7KB5-0-4-2-2	2	RELAY 09026 408-1061-000 EFF THRU REV 20/W 1K6	1	
371	SM4186	2	RELAY 77342 974-1019-000 EFF REV 21/Y 1K6	1	
- 372	MS35649-44	2	NUT, PLAIN, HEX,. SST, 4-40 313-0043-000 EFF THRU REV 20/W AP	2	
- 372	68NM40	2	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0347-000 EFF RCV 21/Y AP	2	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 - 373	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 EFF THRU REV 20/W AP	2	
- 374	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	2	
375	139-0887-000	2	CLAMP, COMPONENT 07387 EFF THRU REV 20/W	1	
- 376	P313-0045-00 0	2	NUT, PLAIN, HEX., SST, 6-32 77250 313-0045-000 AP	1	
- 377	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP	1	
- 378	310-6360-000	2	WASHER, FLAT, SST, 0.147 ID X 0.375 OD COML AP	1	
- 379	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP	1	
380	GT2818	2	RELAY 93929 402-0220-000 EFF THRU REV 20/W 1K3	1	
380	GT4784	2	RELAY 93929 402-0436-000 EFF REV 21/Y 1K3	1	
- 381	P313-0132-00	2	NUT, PLAIN, HEX., SST, 4-40 77250 313-0132-000 EFF REV 21/Y AP	2	
- 382	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 EFF REV 21/Y AP	2	
- 383	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 EFF REV 21/Y AP	2	
384	TS102P03	2	SOCKET 220-1235-000 EFF THRU REV 20/W 1XK3	1	
- 385	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP	2	
- 386	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	2	
- 387	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	2	
388	196P4749154	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.47UF, 10%, 100V 56289 931-9631-000 1C16	1	
389	22700-19	2	RELAY 80089 974-0207-000 EFF THRU REV 20/W 1K5	1	
- 390	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 EFF THRU REV 20/W AP	3	
- 391	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 EFF THRU REV 20/W AP	3	
392	22700-19	2	RELAY 80089 974-0207-000 1K4	1	
- 393	68NM40	2	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0347-000 AP	3	
- 394	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	3	
395	TF300	2	TERMINAL 98291 306-1018-000	2	
- 396	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	2	
- 397	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	2	
398	HJ696	2	TRANSFORMER 80223 672-0034-000 1T8 EFF THRU REV 20/W	1	

FIG.-ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28 -	398A	HJ696	2	TRANSFORMER 80223 672-0034-000 1T8 EFF REV 21/Y		1	
-	399	MS35649-44	2	NUT, PLAIN, HEX., SST. 4-40 313-0043-000 AP FOR 398 AND 398A		4	
-	400	MS35338-135	2	WASHER. LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP FOR 398 AND 398A		4	
-	401	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP FOR 398 AND 398A		4	
	402	29324	2	REACTOR, 17MH 80089 678-0013-000 1L1		1	
-	403	MS551957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP		4	
-	404	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP		4	
	405	30007	2	TRANSFORMER 80089 672-0032-000 EFF THRU REV 29/AG	1T5	1	
	405	124P34	2	TRANSFORMER 11700 672-0298-010 EFF REV 30/AH SB13	1T5	1	
-	406	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		4	
-	407	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		4	
-	408	MS51957-14	2	SCRFW, MACH., SST, 4-40 X .5/16 343-0134-000 EFF THRU REV 29/AG AP		4	
-	408	MS51957-23	2	SCREW, MACH., SST. 4-40 X 1/2 343-0143-000 EFF REV 30/AH SB13 AP		4	
	409	CM35E103J03	2	CAPACITOR. FXD, MICA DIELECTRIC, 10,000PF, 5%, 300V 935-2392-000 EFF THRU REV 20/W	1C21	1	
	409	55C32A2	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 10,000PF, M20%P50%, 400V 01939 913-3731-000 EFF REV 21/Y	1C21	1	
	410	55C32A2	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 10,000PF, M20%P50%, 400V 01939 913-3731-000 EFF REV 21/Y SB9	1C26	1	
	411	RC20GF820K	2	RESISTOR, FXD. COMP, 82 OHMS 10%, 1/2W 745-1307-000	1R45	AR	
	411	RC20GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/2W 745-1310-000	1R45	AR	
	411	RCZOGF121K	2	RESISTOR, FXD, COMP, 120 OHMS, 10%, 1/2W 745-1314-000	1R45	AR	
	412	TF300	2	TERMINAL 98291 306-1018-000		3	
-	413	MS51957-7	2	SCREW, MACH., SST9 2-56 X 1/2 343-0128-000 AP		3	
-	414	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		3	
	415	40C73A1	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 1000PF, 20%, 500V 01939 913-3009-000 EFF REV 26/AD S810	1C60	1	
	416	40C73A1	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 1000PF, 20%, 500V 01939 913-3009-000 EFF REV 26/AD SB10	1C61	1	

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28 417	TF300	2	TERMINAL 98291 306-1018-000		2	
- 418	MS51957-7	2	SCRFW, MACH. SST, 2-56 X 1/2 343-0128-000 AP		2	
- 419	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		2	
420	11J116	2	TRANSFORMER 98278 672-0031-000	1T4	1	
- 421	MS51957-43	2	SCREW, MACH., SST, 8-32 X 3/8 343-0187-000 AP		4	
- 422	MS35338-137	2	WASHER, LOCK, SST, 0,168 ID X 0.296 OD 310-0072-000 AP		4	
423	A12429	2	TRANSFORMER 70674 672-0030-000	1T6	1	
- 424	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP		4	
- 425	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0,253 OD 310-0282-000 AP		4	
* 426	TG77	2	ELECTRON TUBE 83298 257-9000-000 EFF THRU REV 21/Y		1	
426A	RC42GF100J	2	RESISTOR, FXDT COMP, 10 OHMS 5%, 2W 745-5567-000 EFF REV 22/Z SB6	1R49	1	
427	5682-02	2	CLIP 71400 265-1006-000 EFF THRU REV 21/Y		2	
- 428	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		2	
429	4007-BHOTTIN NED	2	TERMINAL 77147 304-0017-000 EFF THRU REV 21/Y		2	
430	3X3374	2	INSULATOR 71590 190-0113-000 EFF THRU REV 21/Y		2	
430A	RTMT1Z2M	2	TERMINAL 91663 306-0976-000 EFF REV 22/Z SB6		2	
- 431	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP		2	
- 432	302-0024-000	2	WASHER, NM, CORPRENE, 0.125 ID X 0.312 OD COML EFF THRU REV 21/Y AP		2	
433	CM35E103J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 10,000PF, 5%, 300V 935-2392-000 EFF THRU REV 20/W	1C27	1	
433	55C32A2	2	CAPACITOR. FXD, CERAMIC DIELECTRIC, 10,000PF, M20%P50%, 400V 01939 913-3731-000 EFF REV 21/Y 589	1C27	1	
434	CM35E103J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 10,000PF, 5%, 300V 935-2392-000 EFF THRU REV 20/W	1C26	1	
** 435	11P116	2	TRANSFORMER 98278 674-3055-000 EFF THRU REV 21/Y	1T7	1	
** 435	11P116	2	TRANSFORMER 98278 674-3085-010 EFF REV 22/Z THRU 26/AD SB6	1T7	1	
435	11P120	2	TRANSFORMER 98278 674-3085-020 EFF REV 27/AE SB9	1T7	1	
436	RC42GF100J	2	RESISTOR, FXD, COMP, 10 OHMS 5%, 2W 745-5567-000 EFF THRU REV 21/Y	1R49	1	
436A	516-2798-003	2	SPARK, GAP EFF REV 22/Z THRU AS/AN SB6		1	

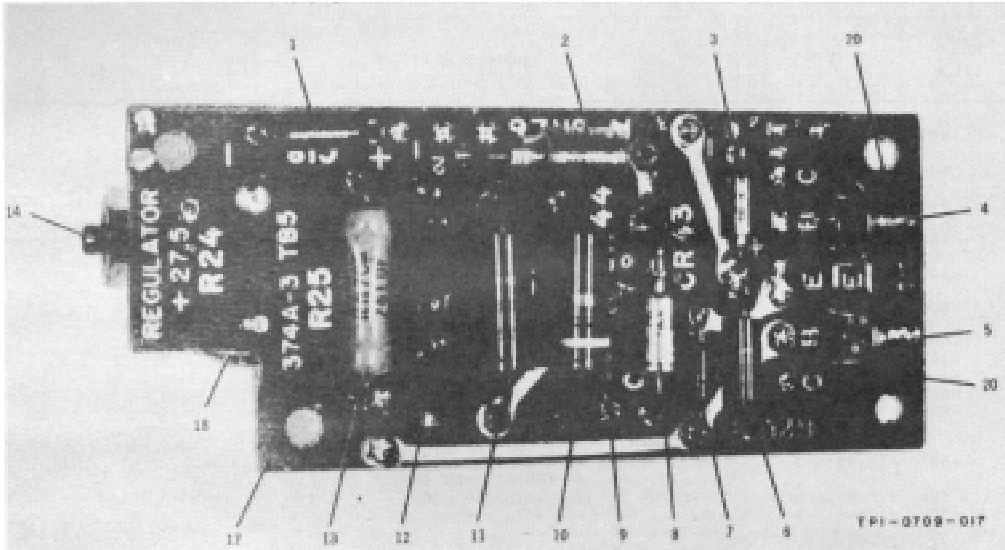
*NONPROCURABLE ITEM. ORDER P/N 257-0225-010.
**NONPROCURABLE ITEM. ORDER P/N 674-3085-000.

FIG.-	ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-28	436A	BLN045-2	2	SPARK CAP 88236 257-0225-020 EFF REV AT/AN		1	
	437	6922D	2	WASHER, LOCK, SST, 0.269 ID X 0.373 OD 76665 310-0043-000 AP		3	
	438	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		3	
	439	TF300	2	TERMINAL 98291 306-1018-000 EFF THRU REV 21/Y		2	
	440	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 EFF THRU REV 21/Y AP		2	
	441	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML EFF THRU REV 21/Y AP		2	
	442	C4344	2	SWITCH 96214 267-0100-000 EFF THRU REV 20/W	1S3	1	
	443	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 EFF THRU REV 20/W AP		2	
	444	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 EFF THRU REV 20/W AP		2	
	445	506-5906-003	2	WASHER, FLAT EFF THRU REV 20/W AP		2	
	446	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 EFF THRU REV 20/W AP		2	
	447	563-5079-004	2	BRACKET, MTG EFF THRU REV 18/U		1	
-	448	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP		6	
-	449	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP		6	
	450	561-6430-002	3	NUT, RIVET1			
	451	562-0855-002	3	NUT, RIVET2			
	452	502-6812-002	3	NUT, RIVET6			
	453	563-5078-004	3	BRACKET, MTG		1	
	454	566-9786-004	2	BRACKET, MTG EFF REV 19/V SB5		1	
-	455	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP		4	
-	456	MS51957-29	2	SCREW, MACH., SST, 6-32 X 7/16 343-0170-000 AP		1	
-	457	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP		5	
	458	SL88-1032-38 09	3	NUT, CLIP, CAD PL STL, 10-32 97393 334-1664-000		4	
	459	566-9785-004	3	BRACKET		1	
	460	502-6303-002	4	NUT, RIVET		5	
	461	502-6302-002	4	NUT, RIVET		2	
	462	566-9784-004	4	BRACKET		1	
	463	RC20GF561K	2	RESISTOR, FXD, COMP, 560 OHMS, 10%,1/2W 745-1342-000	1R69	1	
	464	RC20GF561K	2	RESISTOR, FXD. COMP, 560 OHMS, 10%,1/2W 745-1342-000	1R70	1	
	465	186P10303S3	2	CAPACITOR, FXD, PAPER DIELECTRIC, 1UF, 20%, 200V 56289 931-5947-000	1C55	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 466	186P1030353	2	CAPACITOR. FXD, PAPER DIELECTRIC, IUF, 20%, 200V 56289 931-5947-000 1C56	1	
467	TF300	2	TERMINAL 98291 306-1018-000	5	
- 468	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	5	
- 469	310-0070-000	2	WASHER. LOCK. SST, 0C097 ID X 0.165 OD COML AP	5	
470	563-5113-002	2	GROUND BUSS. FLARED	1	
- 471	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	2	
- 472	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 AP	2	
473	564-2043-002	2	MOUNT	2	
- 474	MS51959-19	2	SCREW, MACH., SST, 4-40 X 3/4 342-0050-000 AP	2	
- 475	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	2	
476	564-2050-001	2	SPACER	2	
477	2BUS422NIPL	2	BUTTON 24655 308-1000-000	1	
477A	764-8624-001	2	DECAL SB11	1	
478	564-2688-004	2	SUPPORT 1		
- 479	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP	6	
- 480	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP	3	
- 481	4706-05-01-4 102	2	WASHER, LOCK, SST, 0.150 10 X 0.333 OD 78189 373-0155-000 AP	3	
482	540-6245-002	3	NUT, RIVET1		
483	502-6304-002	3	NUT, RIVET2		
484	502-6812-002	3	NUT, RIVET	7	
485	562-0855-002	3	NUT, RIVET	4	
486	564-2687-004	3	SUPPORT	1	
487	1N540	2	SEMICOND DEVICE 353-1546-000 EFF THRU REV 20/W 1CR1	1	
488	SD81K03334M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.33UF, 20%, 300V 53021 931-4536-000 1C2	1	
489	RE65G2670	2	RESISTOR, FXD, WW, 267 OHMS, 1%, 10W 747-8972-000 EFF THRU REV 29/AG 1R74	1	
- 490	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP	2	
- 491	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	2	
- 492	MS51957-4	2	SCREW, MACH., SST, 2-56 X 5/16 343-0125-000 AP	2	
493	TF300	2	TERMINAL 98291 306-1018-000	3	
- 494	MS51957-2	2	SCREW, MACH, SST, 2-56 X 3/16 343-0123-000 AP	3	
- 495	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	3	
496	RC20GF332K	2	RESISTOR, FXD, COMP, 3.3K, 10%, 1/2W 745-1373-000 EFF REV 24/AB 1R3	1	
497	RC20GF682K	2	RESISTOR, FXD, COMP, 6.8K, 10%, 1/2W 745-1387-000 EFF REV 24/AB 1R4	1	
498	RTMT16M	2	TERMINAL 91663 306-0977-000 EFF REV 24/AB	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-28 - 499	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	1	
- 500	MS35338-135	2	WASHER, LOCK, SST9 0.115 ID X 0.212 OD 310-0279-000 AP	1	
501	4007-6HOTTIN NED	2	TERMINAL 77147 304-0016-000 EFF REV 24/AB	1	
- 502	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP	1	
- 503	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP	1	
504	564-2113-006	2	CABLE, RCVR-XMTR UNIT EFF THRU REV 20/W	1	
504	556-9087-001	2	CABLE. RF EFF REV 21/Y	1	
505	DPXLFA32C2-3 4P	3	CONNECTOR 71468 370-2143-000 1P1	1	
* 505A	772-4793-001	3	INDICATOR ASSY SB14	1	
- 506	68NM62	3	NUT, SELF-LKG, HEX., AL, 6-32 72962 333-0368-000 AP FOR 505 AND 505A	4	
- 507	MS51957-30	3	SCREW, MACH., SST, 6-32 X 1/2 343-0171-000 AP FOR 505 AND 505A	4	
508	2VH18-1AB8	3	CONNECTOR 05574 372-7018-000 1J1	1	
- 509	MS35649-44	3	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP	2	
- 510	Ms35338-135	3	WASHER, LOCK, SST, 0.115 ID X 09212 OD 310-0279-000 AP	2	
- 511	502-1664-002	3	SPACER AP	2	
- 512	MS51959-18	3	SCREW, MACH., SST, 4-40 X 5/8 342-0049-000 AP	2	
513	DA11C1S	3	CONNECTOR 71468 371-0229-000 EFF THRU REV 20/W 1J2	1	
513	DE9SC7	3	CONNECTOR 71468 371-0219-000 EFF REV 21/Y 1J2	1	
- 514	20419	3	SCREW LOCK ASSY 71468 371-0040-000 AP	2	
515	D19936-3	3	ADAPTER 71468 371-2147-000 EFF THRU REV 20/W 1P6	1	
515	MS35181-910B	3	CONNECTOR 357-9238-000 EFF REV 21/Y 1P6	1	
516	0701-23	3	CONNECTOR 94375 357-9225-000 1P4	1	
517	0701-23	3	CONNECTOR 94375 357-9225-000 1P3	1	
518	564-2100-006	2	CHASSIS ASSY SEE FIG. 2-46 EFF EFF THRU REV 20/W 1A1	1	
518	556-9073-002	2	CHASSIS SEE FIG. 2-46 EFF REV 21/Y 1A1	1	

*ITEM 1102 - 505A INSTALLED AT CUSTOMER OPTION.

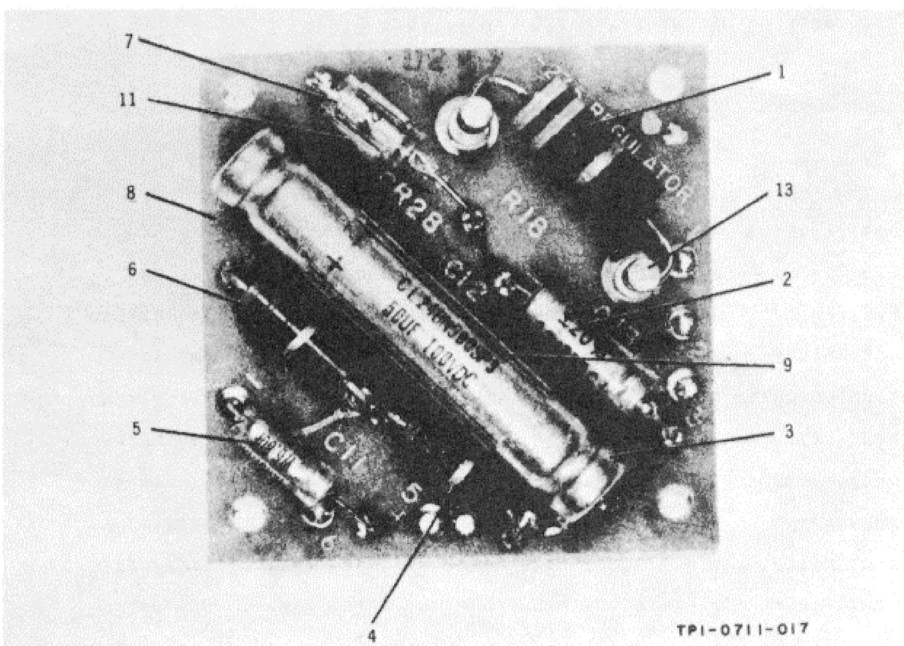


Wired Plus 27.5V Regulator

Figure 2-29

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-29 - 0	564-2106-003	1	PLUS 27.5V REGULATOR, WIRED SEE FIG. 2-28 -(25) FOR NHA	1A6TB5	REF
1	150D104X0035 A2	2	CAPACITOR, FXD, ELECTROLYTIC, 0.10UF, 20%, 35V 56289 184-7408-000 EFF THRU BOARD REV F/F	1A6C18	1
1	150D105X0035 A2	2	CAPACITOR, FXD, ELECTROLYTIC, IUF, 20%, 35V 56289 184-7398-000 EFF BOARD REV G/G	1A6C18	1
2	1N2621A	2	SEMICOND DEVICE 353-2939-000	1A6CR26	1
3	150D474X0035 A2	2	CAPACITOR, FXD, ELECTROLYTIC 0.47UF, 20%, 35V 56289 184-7399-000 EFF THRU BOARD REV F/F	1A6C17	1
3	150D105X0035 A2	2	CAPACITOR, FXD, ELECTROLYTIC, 1UF, 20%. 35V 56289 184-7398-000 EFF BOARD REV G/G	1A6C17	1
4	2N696	2	TRANSISTOR 352-0206-000	1A6Q6	1
5	2N498	2	TRANSISTOR 352-0112-000	1A6Q7	1
6	RC20GF101K	2	RESISTOR, FXDT COMP, 100 OHMS, 10%, 1/2W 745-1310-000	1A6R20	1

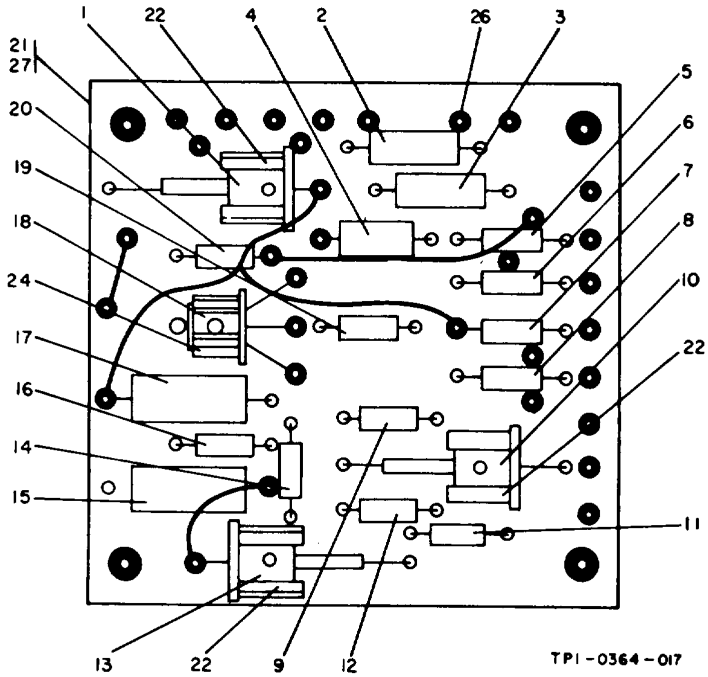
FIG.- ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-29	7	1N645	2	SEMICOND DEVICE 353-2607-000	1A6CR43	1	
	8	1N2621A	2	SEMICOND DEVICE 353-2939-000	1A6CR27	1	
	9	1N645	2	SEMICOND DEVICE 353-2607-000	1A6CR44	1	
	10	RC32GF391J	2	RESISTOR, FXD. COMP, 390 OHMS, 10%, 1W 745-3334-000	1A6R21	1	
	11	RC32GF222J	2	RESISTOR, FXDO COMP, 2.2K, 5%, 1W 745-3365-000	1A6R22	1	
	12	RSM2C650R0F	2	RESISTOR, FXD, WW. 650 OHMS, 1%, 2.5W 91637 746-9456-000	1A6R23	1	
	13	RN7OD2610F	2	RESISTOR, FXD, FILM, 261 OHMS, 1%, 3/4W 705-7568-000	1A6R25	1	
	14	FS19299	2	PESISTOR, VAR. 100 OHMS, 20%, 1/2W 71450 380-6295-000	1A6R24	1	
-	15	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-C00 AP		1	
-	16	1714-05	2	WASHER, LOCK, SST, 0.267 10D X 0.408 OD 78189 373-0090-000 AP		1	
	17	564-2105-003	2	BOARD		1	
	18	564-2048-002	3	BRACKET, RESISTOR		1	
-	19	AN456AD3-3	3	RIVET, SOLID, AL, 3/32 DIA X 3/16 305-0103-000 AP		2	
	20	6009-25	3	HOLDER 91506 139-2358-000		2	
-	21	SE34CADPL	3	EYELET, MET., CAD PL BRS, 0.092, DIA X 0.133 90030 307-1002-000 AP		2	



Wired Minus 27.5V Regulator

Figure 2-30

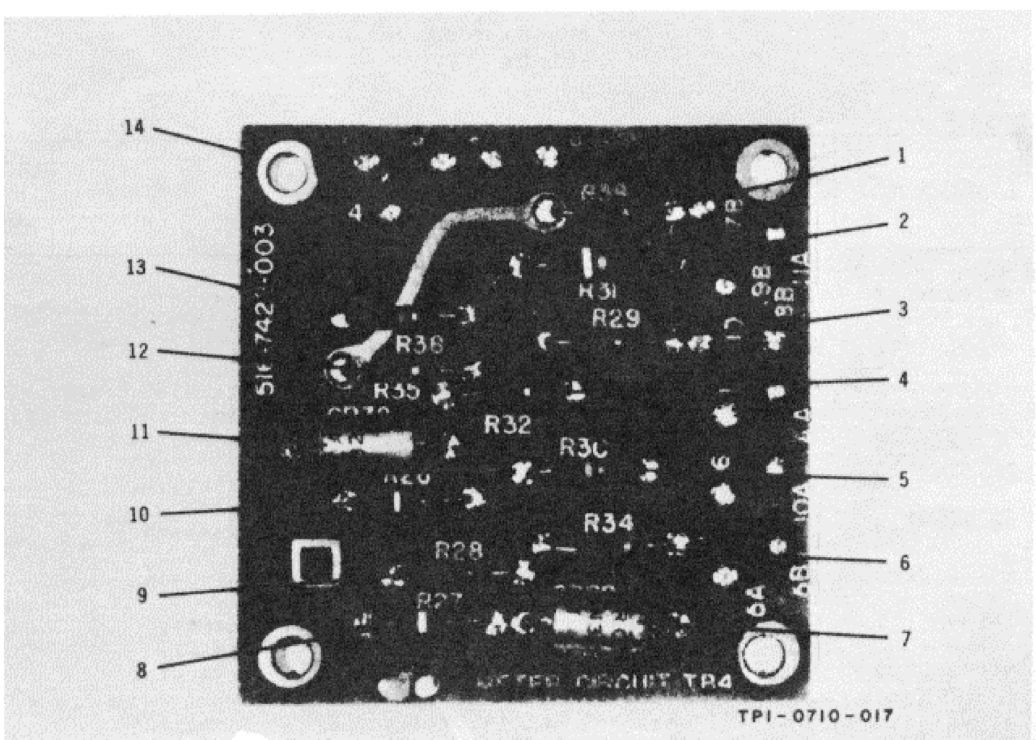
FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
2-30 - 0	564-2676-003	1	MINUS 27,5V REGULATOR, WIRED SEE FIG.2-28 (49) FOR NHA 1A4T86	REF	
1	RC42GF331K	2	RESISTORT, FXD, COMP, 330 OHMS, 10%, 2W 745-5631-000 1A4R18TB6	1	
2	1500226X0035 R2	2	CAPACITOR, FXD, ELECTROLYTIC, 22UF 20%, 35V 56289 184-7695-000 1A4C13TB6	1	
3	CL24BN500SP3	2	CAPACITOR, FXD, ELECTROLYTIC, 50UF, M15%P30%, 100V 184-7185-000 1A4C12TB6	1	
4	RC32GF681K	2	RESISTOR, FXDO COMP, 680 OHMS, 10%, 1W 745-3345-000 1A4R17TB6	1	
5	109D685X0075 C2	2	CAPACITOR, FXD, ELECTROLYTIC, 6.8UF, 20%, 75V 56289 184-7779-000 1A4CllTB6	1	
6	RC32GF681K	2	RESISTOR, FXD, COMP, 680 OHMS, 10%, 1W 745-3345-000 1A4R16TB6	1	
7	1M15Z10	2	SEMICOND DEVICE 80211 353-1832-000 EFF THRU BOARD REV D/4 1A4CR28 TB6	1	
7	1N3024A	2	SEMICOND DEVICE 353-1319-000 EFF BOARD REV E/4 1A4CR28 TB6	1	
8	564-2675-003	2	BOARD, MINUS 27.5 VOLT	1	
9	6001-12A	3	CLIP 91506 139-2337-000	1	
- 10	SE34CADPL	3	EYELET, MET., CAD PL BRS. 0.092 DIA X 0.133 90030 307-1002-000 AP	3	
11	6159-3A	3	CLIP 91506 139-2668-000	1	
- 12	SE24CADPL	3	EYELET, MET., CAD PL BRS, 0.062 DIA X 0.125 90030 307-1053-000 AP	1	
13	1300B	3	TERMINAL 88245 306-0229-000	2	
2-31 - 0	564-2694-003	1	METER CIRCUIT SEE FIG.2-28-(50) FOR NHA EFF THRU REV 20/W 1A5TB4	REF	
1 1	1N537	2	SEMICOND DEVILE 353-1525-000 1A5CR30 TB4	1	
2	RC20GF514J	2	RESISTOR, FXD. COMP, 510K, 5%, 1/2W 745-1466-000 1A5R31TB4	1	
3	RC2OGF152K	2	RESISTOR, FXD, COMP, 1.5K, 10%, 1/2W 745-1359-000 1A5R33TB4	1	
4	150D105X0035 A2	2	CAPACITOR, FXD, ELECTROLYTIC, 1UF, 20%, 35V 56289 184-7398-000 1A5C51TB4	1	
5	RC07GF273J	2	RESISTOR, FXD, COMP, 27K, 5%, 1/4W 745-0799-000 1A5R40TB	AR	
5	RC07GF303J	2	RESISTOR, FXD, COMP, 30K, 5%, 1/4W 745-0801-000 1A5R40TB4	AR	
5	RC07GF333J	2	RESISTOR, FXD, COMP, 33K. 5%, 1/4W 745-0802-000 1A5R40TB4	AR	
6	RC07GF513J	2	RESISTOR, FXD, COMP, 51K, 5%, 1/4W 745-0810-000 1A5R29TB4	1	
7	RC07CF68UK	2	RESISTOR, FXD, COMP, 68 OHMS, 10%. 1/4W 745-0707-000 1ASR32TB4	1	



Meter Circuit Figure 2-31.

FIG.- ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-31	8	RCC7GF563K	2	RESISTOR, FXD, COMP, 56K, 10%, 1/4W 745-0812-000	1A5R30TB4	1	
	9	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000	1A5R34TB4	1	
	10	1N537	2	SEMICOND DEVICE 353-1525-000	1A5CR29 TB4	1	
	11	RCU7GF273J	2	RESISTOR, FXD, COMP, 27K, 5%, 1/4W 745-0799-000	1A5R39TB4	AR	
	11	RC07GF303J	2	RESISTOR, FXD, COMP, 30K, 5%, 1/4W 745-0801-000	1A5R39T84	AR	
	11	RC07GF333J	2	RESISTOR, FXD, COMP, 33K, 5%, 1/4W 745-0802-000	1A5R39TB4	AR	
	12	RC07GF222J	2	RESISTOR, FXD, COMP, 2.2K, 5%, 1/4W 745-0760-000	1A5R28TB4	1	
	13	1N537	2	SEMICOND DEVICE 353-1525-000	1A5CR32 TB4	1	
	14	RC07GF393J	2	RESISTOR. FXD, COMP, 39K, 5%, 1/4W 745-0805-000	1A5R26TB4	1	
	15	150D276X9010 B2	2	CAPACITOR, FXD, ELECTROLYTIC, 27UF, 10%, 10V 56289 184-7649-000	1A5C53TB4	1	

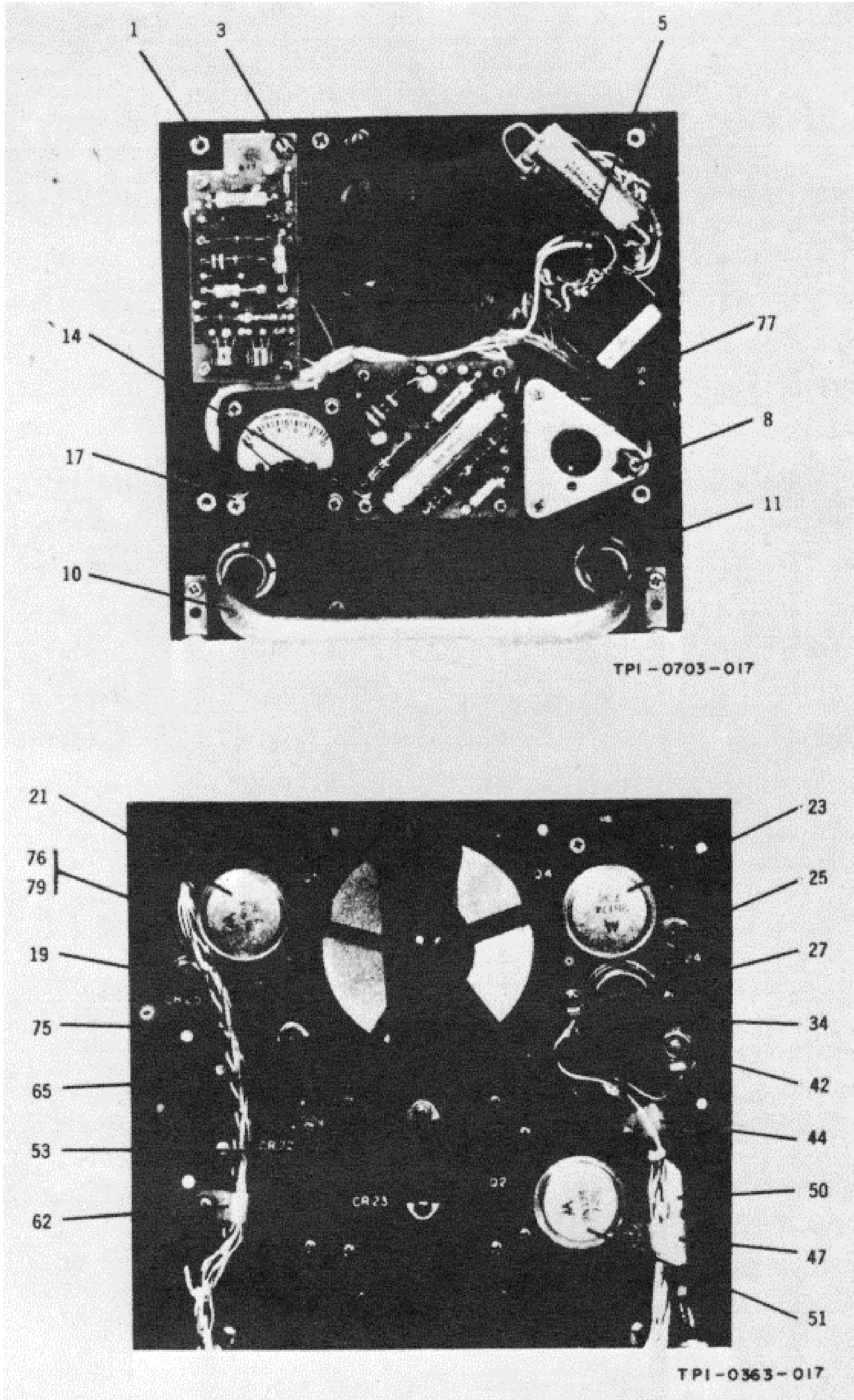
FIG.- ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
2-31	16	RC07GF393J	2	RESISTOR, FXD, COMP, 39K, 5%, 1/4W 745-0805-000	1A5R27TB4	1	
	17	150D106X0020 B2	2	CAPACITOR, FXD, ELECTROLYTIC, 10UF, 20%, 20V 56289 184-7375-000	1A5C52TB4	1	
	18	2N388A	2	TRANSISTOR 352-0352-000	1A508TB4	1	
	19	RCG7GF183K	2	RESISTOR, FXD. COMP, 18K, 10%, 1/4W 745-0794-000	1A5R35T84	1	
	20	RC07GF563K	2	RESISTOR, FXD, COMP, 56K, 10%, 1/4W 745-0812-000	1A5R38TB4	1	
	21	564-2693-003	2	BOARD ASSY		1	
	22	6159-3A	3	CLIP 91506 139-2668-000		3	
-	23	SE24CADPL	3	EYELET, MET., CAD PL BRS, 0.062 DIA X 0.125 90030 307-1053-000 AP		3	
	24	6009-25	3	HOLDER 91506 139-2358-000		1	
-	25	SE34CADPL	3	EYELET, MET., CAD PL BRS, 0.092 DIA X 0.133 90030 307-1002-000 AP		1	
	26	M153SBRTTIN	3	EYELET, MET., COP, 0.047 DIA X 0.085 23730 307-1270-000		64	
	27	564-2692-003	3	BOARD, PRINTED		1	



Meter Circuit Board Assembly

Figure 2-32

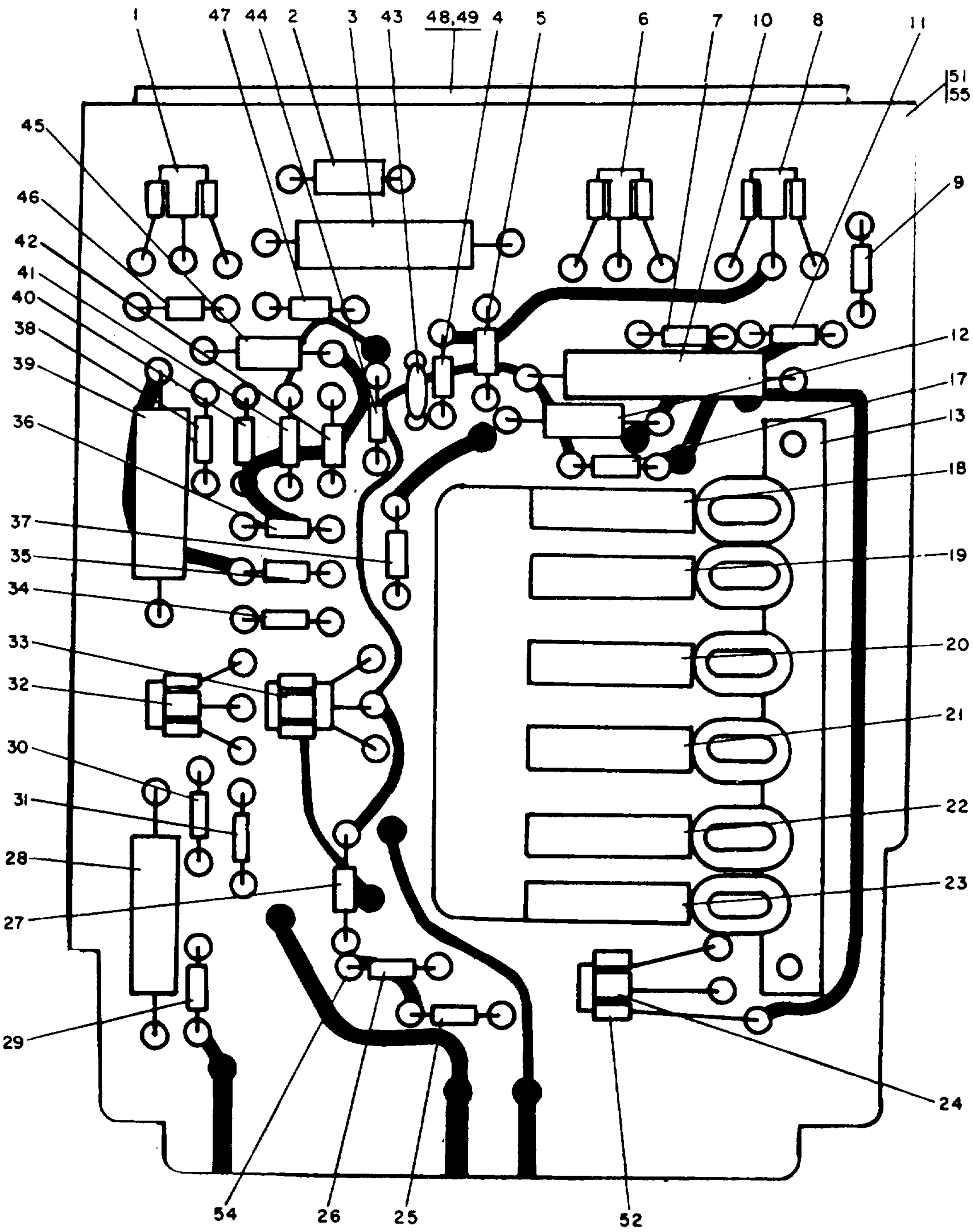
FIG- ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-32 - 0	516-7422-003	1	BOARD ASSY. METER CIRCUIT SEE FIG. 2-28 (50) FOR NHA EFF REV 21/Y	1A5TB4	REF	
1	RC07GF562J	2	RESISTOR, FXD, COMP, 5.6K, 5%. 1/4W 745-0775-000	1A5R39TB4	1	
2	RC20GF514J	2	RESISTOR. FXD, COMP, 510K, 5%. 1/2W 745-1466-000	1A5R31TB4	1	
3	RC07GF513J	2	RESISTOR, FXD, COMP, 51K, 5%, 1/4W 745-0810-000	1A5R29TB4	1	
4	RC07GF680K	2	RESISTOR, FXD, COMP, 68 OHMS, 10%. 1/4W 745-0707-000	1A5R32TB4	1	
5	RC07GF563K	2	RESISTOR, FXD, COMP, 56K, 10% 1/4W 745-0812-000	1A5R30TB4	1	
6	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000	1A5R34TB4	1	
7	1N3254	2	SEMICOND DEVICE 353-3275-000	1A5CR29 TB4	1	
8	RC07GF393J	2	RESISTOR, FXD, COMP, 39K* 5%, 1/4W 745-0805-000	1A5R27TB4	1	
9	RC07GF222J	2	RESISTOR, FXD. COMP, 2.2K, 5%, 1/4W 745-0760-000	1A5R28TB4	1	
10	RC07GF393J	2	RESISTOR, FXD, COMP, 39K, 5%. 1/4W 745-0805-000	1A5R26TB4	1	
11	1N3254	2	SEMICOND DEVICE 353-3275-000	1A5CR32 TB4	1	
12	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%,. 1/4W 745-0749-000	1A5R35TB4	1	
13	RC07GF563K	2	RESISTOR, FXD, COMP, 56K, 10%, 1/4W 745-0812-000	1A5R38TB4	1	
14	516-7422-002	2	BOARD ASSY		1	
2-33 - 0	NO NUMBER	1	FRONT PLATE ASSY SEE FIG. 2-28(59) FOR NHA	1A12	REF	
1	540-9225-003	2	POST, ELECTRICAL-MECHANICAL EQUIP		4	
- 2	MS51959-27	2	SCREW. MACH., SST. 6-32 X 5/10 342-0061-000 AP		4	
3	565-3000-002	2	STANDOFF, NO. 2		4	
- 4	MS51959-14	2	SCREW, MACH., SST, 4-40 X 5/16 342-0045-000 AP		4	
5	TF300	2	TERMINAL 98291 306-1018-000		1	
- 6	MS51957-4	2	SCREW, MACH. SST, 2-56 X 5/16 34A-0125-000 AP		1	
- 7	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		1	
8	565-2999-002	2	STANDOFF. NO. 1		3	
- 9	MS51957-16	2	SCREW, MACH., SST, 4-40 X 7/16 343-0136-000 AP		3	
10	564-2065-003	2	HANDLE		1	
11	563-5116-002	2	FERRULE		2	
- 12	MS51957-64	2	SCREW, MACH SST. 10-24 X 5/8 343-0210-000 AP FOR 10 AND 11		2	



Front Plate Assembly
Figure 2-33

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-33 - 13	MS35338-138	2	WASHER. LOCK, SST, 0.194 ID X 0.337 OD 310-0284-000 AP FOR 10 AND 11		2	
14	540-9168-003	2	POST, ELECTRICAL-MECHANICAL EQUIP		4	
- 15	MS51957-30	2	SCREW. MACH., SST. 6-32 X 1/2 343-0171-000 AP		4	
- 16	MS35338-135	2	WASHER. LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		4	
17	564-2040-002	2	POST		4	
- 18	MS51957-14	2	SCREW, MACH., SST. 4-40 X 5/16 343-0134-000 AP		4	
19	SM72	2	SEMICOND DEVICE 11242 353-2806-000	1A12CR25	1	
- 20	HP35WIC	2	MOUNTING KIT 03877 015-0894-000 AP		1	
21	2N174	2	TRANSISTOR 352-0127-000	1A1205	1	
- 22	7274633	2	MOUNTING KIT 16758 352-9803-000 AP		1	
23	2N174	2	TRANSISTOR 352-0127-000	1A1204	1	
- 24	7274633	2	MOUNTING KIT 16758 352-9803-000 AP		1	
25	SM72	2	SEMICOND DEVICE 11242 353-2806-000	1A12CR24	1	
- 26	HP35WIC	2	MOUNTING KIT 03877 015-0894-00 AP		1	
27	4007-4H0TTIN NED	2	TERMINAL 77147 304-0015-000 AP		1	
- 28	MS35649-44	2	NUT, PLAIN, HEX, SST. 4-40 313-0043-000 AP		1	
- 29	MS35336-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		1	
- 30	302-0385-000	2	INSULATOR, WASH 20999 AP		1	
31	310-0045-000	2	WASHER, FLAT, SST. 0.125 ID X 0.312 OD COML AP		1	
- 32	565-2985-002	2	BUSHING. INSULATING AP		1	
- 33	MS51957-17	2	SCREW, MACH., SST. 4-40 X 1/2 343-0137-000 AP		1	
34	2N458A	2	TRANSISTOR 352-0151-000 EFF REV Y THRU REV AD	1A1203	1	
34	2N553	2	TRANSISTOR 352-0178-000 EFF REV AE	1A1203	1	
- 35	DM103	2	INSULATOR 08289 352-9854-000 AP		1	
- 36	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		1	
- 37	MS35338-135	2	WASHER, LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP		1	
- 38	302-0365-000	2	INSULATOR, WASH 20999 AP		1	
- 39	310-0045-000	2	WASHER, FLAT, SST. 0.125 ID X 0.312 OD COML AP		1	
- 40	565-2985-002	2	BUSHING, INSULATING AP		1	
- 41	MS51957-17	2	SCREW, MACH., SST, 4-40 X 1/2 343-0137-000 AP		1	
42	1N2988B	2	SEMICOND DEVICE 353-1725-000	1A12CR17	1	
- 43	HP35WIC	2	MOUNTING KIT 03877 015-0894-000 AP		1	
44	HP3N	2	CLAMP 09922 150-1540-000		1	
- 45	MS51957-15	2	SCREW, MACH., SST. 4-40 X 3/8 343-0135-000 AP		1	

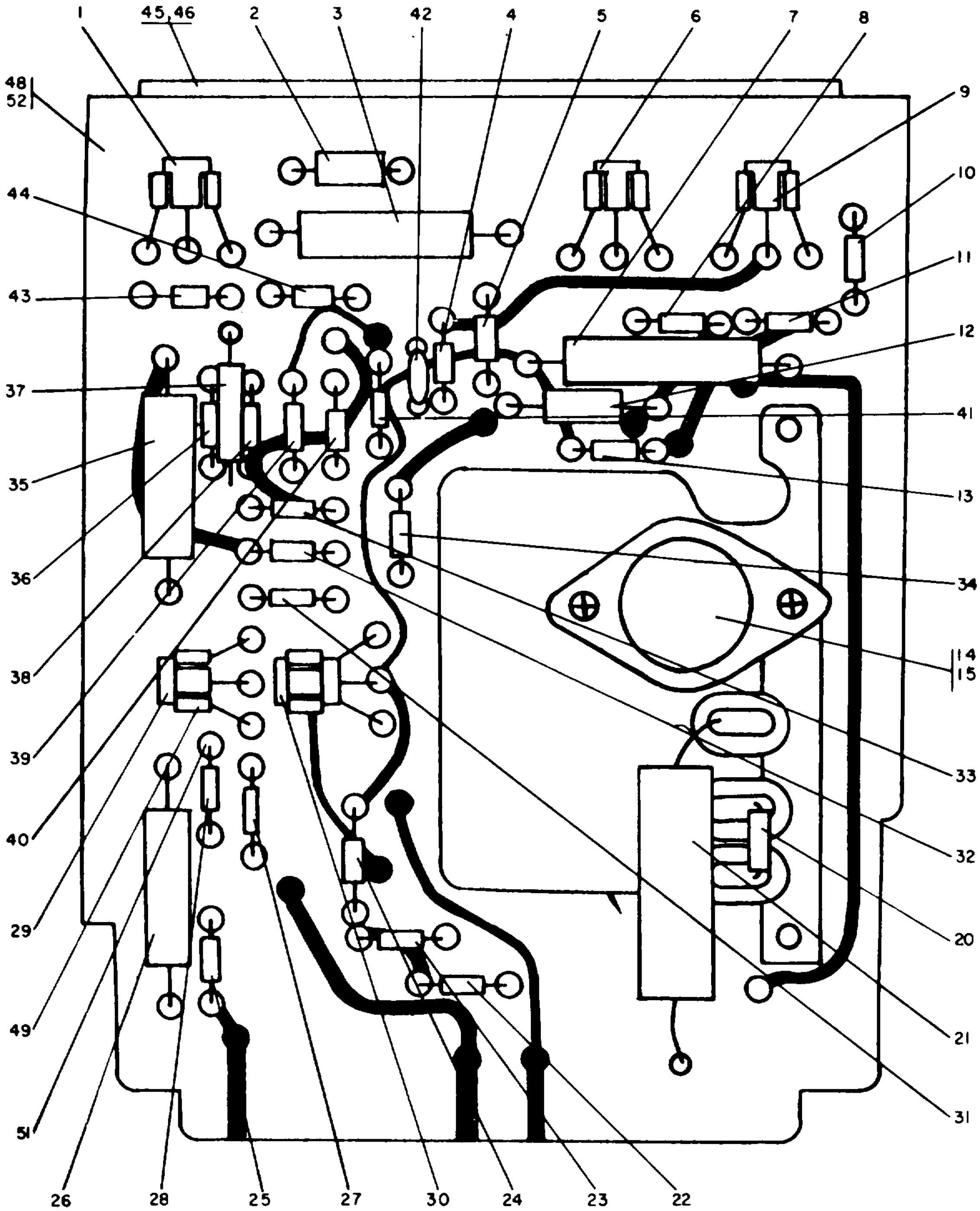
FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-33 - 46	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	1	
47	TY13	2	CLAMP 59730 435-1051-000 EFF REV AC THRU AF	1	
47	HP6N	2	CLAMP 09922 150-1543-000 EFF REV AG	1	
- 48	MS51957-15	2	SCREW. MACH., SST. 4-40 X 3/8 343-0135-000 AP	1	
- 49	DIE845	2	WASHER, FLAT, SST, 0.218 ID X 0.119 OD 72606 310-0460-000 AP	1	
50	563-5071-004	2	CABLE. NO. 1 EFF THRU REV 20/W	1	
51	2N174	2	TRANSISTOR 352-0127-000 1A12Q2	1	
- 52	7274633	2	MOUNTIN KIT 16758 352-9803-000 AP	1	
53	SZ948	2	SEMICOND DEVICE 04713 353-3434-000 1A12CR23	1	
- 54	DM103	2	INSULATOR 08289 352-9854-000 AP	1	
- 55	MS35649-44	2	NOT, PLAIN, HEX., SST. 4-40 313-0043-000 AP	2	
- 56	MS35338-135	2	WASHER, LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP	2	
- 57	4007-4HOTTIN NED	2	TERMINAL 77147 304-0015-000 AP	1	
- 58	302-0385-000	2	INSULATOR, WASH 20999 AP	2	
- 59	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	2	
- 60	565-2985-02	2	BUSHING INSULATING AP	2	
- 61	MS51957-17	2	SCREW, MACH., SST 4-4, X 1/2 343-0137-000 AP	2	
62	HP4N	2	CLAMP 09922 150-1541-000 EFF REV AB	1	
- 63	MS51957-15	2	SCREW, MACH., SST, 4-40 X 3/8 343-0135-00 AP	1	
- 64	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	1	
65	SZ948	2	SEMICOND DEVICE 04713 353-3434-000 1A12CR22	1	
- 66	DM103	2	INSULATOR C8289 352-9854-000 AP	1	
- 67	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP	2	
- 68	MS35338-135	2	WASHER, LOCK, SST, .115 ID X 0.212 OD 310-3279-000 AP	2	
- 69	MS35335-51	2	WASHER, LOCK, SST, 0.123 ID X 0.260 OD 373-8010-000 AP	2	
- 70	302-0385-000	2	INSULATOR, WASH 20999 AP	2	
- 71	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	2	
- 72	565-2985-002	2	BUSHING INSULATING AP	2	
- 73	4007-4HOTTIN NED	2	TERMINAL 77147 304-0015-000 AP	1	
- 74	MS51957-17	2	SCREW, MACH., SST, 4-4C X 1/2 343-0137-000 AP	2	
75	564-2066-003	2	CABLE, NO. 2 EFF THRU REV 20/W	1	
76	563-5083-003	2	PLATE FRONT, RIVETED	1	
77	563-5099-003	3	PLATE, DISABLE SWITCH	1	
- 78	MS20426AD3-5	3	RIVET. SOLID, AL, 3/32 DIA X 5/16 305-1363-600 AP	4	
79	563-5067-004	3	PLATE. FRONT	1	



Wired Trigger Generator
Figure 2-34

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-34 - 0	564-2103-004	1	TRIGGER GENERATOR WIRED SEE FIG. 2-28 (102) FOR NHA EFF THRU BOARD REV G/G	1A11	REF	
1	2N404A	2	TRANSISTOR 352-0378-000	1A11Q2	1	
2	150D224X0035 A2	2	CAPACITOR, FXD, ELECTROLYTIC, 0.22UF, 20% 35V 56289 184-7407-000	1A11C3	1	
3	SDB1K06332M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.0033UF, 20%, 600V 53C21 931-4566-000	1A11C4	1	
4	RC07GF332K	2	RESISTOR, FXD, COMP, 3.3K. 10%, 1/4W 745-0767-000	1A11R12	1	
5	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K,10%, 1/4W 745-0758-000	1A11R8	1	
6	2N404A	2	TRANSISTOR 352-0378-000	1A11Q3	1	
7	RC07GF181K	2	RESISTOR. FXD COMP, 180 OHMS, 10 1/4W 745-0722-000	1A11R15	1	
8	2N696	2	TRANSISTOR 352-0206-000	1A11Q4	1	
9	RC07GF562K	2	RESISTOR, FXD COMP, 5.6K, 10%. 1/4W 745-0776-000	1A11R14	1	
10	SDB1K02683M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.068UF, 20%, 20V 53021 931-4506-000	1A11C7	1	
11	RC07GF333K	2	RESISTOR, FXD. COMP, 33K, 10%, 1/4W 745-0803-000	1A11R13	1	
12	150D106X0020 B2	2	CAPACITOR, FXD, ELECTROLYTIC, 10UF, 20%, 20V 56289 184-7375-000	1A11C6	1	
13	564-2401-002	2	INDUCTOR	1A11L1	1	
- 14	MS51957-15	2	SCREW, MACH., SST, 4-40 X 3/8 343-0135-000 AP		2	
- 15	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		2	
- 16	563-5014-002	2	POST AP		2	
17	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/4W 745-0761-000	1A11R16	1	
18	SDB1K03223M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.022UF, 20%, 300V 53021 931-4524-000	1A11C13	1	
19	SDB1K01473M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.047UF, 20%, 100V 53021 931-4486-000	1A11C12	1	
20	SDB1K01473M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.047UF, 20%, 100V 53021 931-4486-000	1A11C11	1	
21	SDB1K01473M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.047UF, 20%, 100V 53021 931-4486-000	1A11C10	1	
22	SDB1K01473M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.047UF, 20%, 100V 53021 931-4486-000	1A11C9	1	
23	SDB1K03223M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.022UF, 20%, 300V 53021 931-4524-000	1A11C8	1	
24	2N670	2	TRANSISTOR 352-0238-000	1A11Q6	1	
25	RC07GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/4W 745-0746-000	1A11R18	1	

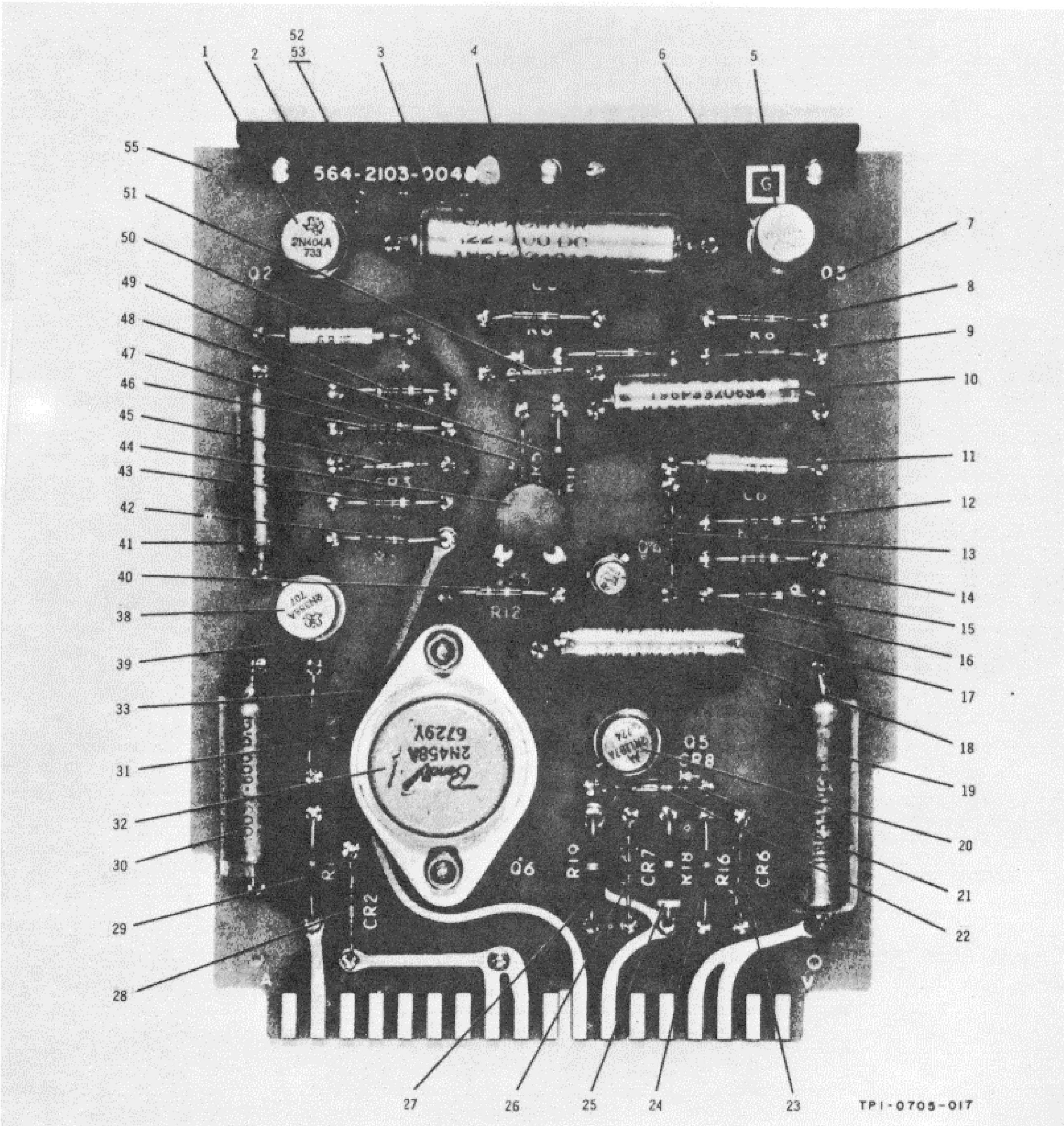
FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-34 - 26	RC07GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/4W 745-C746-000 1A11R19	1	
27	1N645	2	SEMICOND DEVICE 353-2607-000 1A11CR6	1	
28	SDB1K06332M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.0033UF, 20%, 600V 53021 931-4566-000 1A11C1	1	
29	RC07GF681K	2	RESISTOR, FXD, COMP, 680 OHMS, 10%, 1/4W 745-0743-000 1A11R1	1	
30	1N761	2	SEMICOND DEVICE 353-2614-000 1A11CR1	1	
31	1N626	2	SEMICOND DEVICE 353-2857-000 1A11CR2	1	
32	2N388A	2	TRANSISTOR 352-0352-000 1A11Q1	1	
33	2N1187A	2	TRANSISTOR 352-J475-000 1A11Q5	1	
34	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000 1A11R3	1	
35	RC07GF273K	2	RESISTOR, FXD, COMP, 27K, 10%, 114W 745-0800-000 1A11R4	1	
36	RC07GF472K	2	RESISTOR, FXD COMP, 4.7K, 10%, 1/4W 745-0773-00 1A11R5	1	
37	RC07GF682K	2	RESISTOR, FXD, COMP, 6.8K, 10%, 1/4W 745-0779-000 1A11R11	1	
38	1N626	2	SEMICOND DEVICE 353-2857-000 1A11CR3	1	
39	196P10301S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.01UF, 20%, 100V 56289 931-4481-000 1A11C2	1	
40	RC07GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%. 1/4W 745-0728-000 1A11R10	1	
41	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10, 1/4W 745-0758-000 1A11R6	1	
42	RC07GF822K	2	RESISTOR, FXD, COMP, 8.2K, 10%, 1/4W 745-0782-000 1A11R7	1	
43	20C156A	2	CAPACITOR, FXD. CERAMIC DIELECTRIC, 6800PF, M20%P50%, 500V 01939 913-3730-000 1A11C5	1	
44	1N626	2	SEMICOND DEVICE 353-2857-000 1A11CR5	1	
45	150D685X0035 B2	2	CAPACITOR, FXD. ELECTROLYTIC, 6.8UF, 20%, 35V 56289 184-7693-000 1A11C14	1	
46	1N626	2	SEMICOND DEVICE 353-2857-000 1A11CR4	1	
47	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 1A11R9	1	
48	563-4978-003	2	STRIP, IDENT	1	
49	563-5011-002	2	HANDLE	1	
- 50	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-171-000 AP	3	
51	564-2102-004	2	TRIGGER GENERATOR WIRED	1	
52	6009-25	3	HOLDER 91506 139-2358-000	6	
- 53	SE34CADPL	3	EYELET, MET., CAD PL BRS, 0.092 DIA X 0.133 90030 307-1002-000 AP	6	
54	M153SBRTTIN	3	EYELET, MET., COP, 0.047 DIA X 0.085 23730 307-1270-000	124	
55	564-2101-004	3	TRIGGER GENERATOR WIRED	1	



Trigger Generator Module
Figure 2-35

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-35 - 0	564-2103-004	1	TRIGGER GENERATOR MODULE SEE FIG. 2-28- (102) FOR NHA EFF BOARD REV H/H THRU K/K	1A11	REF	
1	2N404A	2	TRANSISTOR 352-0378-000	1A11Q2	1	
2	SDB1K01224M	2	CAPACITOR, FXD, PAPER DIELECTRIC 0.22UF. 20%, 100V 53021 931-4492-000	1A11C3	1	
3	SDB1K06332M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.0033UF, 20%. 600V 53021 931-4566-000	1A11C4	1	
4	RC07GF332K	2	RESISTOR, FXD, COMP, 3.3K, 10%, 1/4W 745-0767-000	1A11R12	1	
5	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000	1A11R8	1	
6	2N404A	2	TRANSISTOR 352-0378-000	1A1103	1	
7	SDB1K03223M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.022UF, 20%, 300V 53021 931-4524-000 588	1A11C7	1	
8	RC07GF181K	2	RESISTOR, FXD, COMP, 180 OHMS, 10%, 1/4W 745-0722-000	1A11R15	1	
9	2N718	2	TRANSISTOR 03508 352-0207-000 SB8	1A11Q4	1	
10	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K. 10%, 1/4W 745-0776-000	1A11R14	1	
11	RC07GF333K	2	RESISTOR, FXD, COMP, 33K, 10%, 1/4W 745-0803-000	1A11R13	1	
12	150D106X0020 B2	2	CAPACITOR, FXD, ELECTROLYTIC, 10UF, 20%, 20V 56289 184-7375-000	1A11C6	1	
13	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/4W 745-0761-000	1A11R16	1	
14	2N458A	2	TRANSISTOR 352-0151-000 SB8	1A11Q6	1	
15	10191DAP	2	INSULATOR 07047 352-9535-010		1	
- 16	MS35649-44	2	NUT, PLAIN. HEX., SST. 4-40 313-0043-000 AP		2	
- 17	MS35338-135	2	WASHER. LOCK, SST 0.115 ID X 0.212 OD 310-0279-000 AP		2	
- 18	310-0045-000	2	WASHER, FLAT, SST. 0.125 ID X 0.312 OD COML AP		4	
- 19	MS51957-17	2	SCREW, MACH., SST, 4-40 X 1/2 343-0137-000 AP		2	
20	1N645	2	SEMICOND DEVICE 353-2607-000 SB8	1A11CR7	1	
21	118P33402S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.33UF, 20%, 200V 56289 951-1039-000 588	1A11C15	1	
22	RC20GF47K	2	RESISTOR, FXD, COMP, 470 OHMS, 10% 1/2w 745-1338-000 SB8	1A11R18	1	
23	RC20GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/2W 745-1349-000 S88	1A11R19	1	
24	1N645	2	SEMICOND DEVICE 353-2607-000	1A11CR6	1	
25	RC07GF681K	2	RESISTOR, FXD, COMP, 680 OHMS, 10% 1/4W 745-0743-000	1A11R1	1	
26	SDB1K06332M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.0033UF, 20%, 600V 53021 931-4566-000	1A11C1	1	
27	1N626	2	SEMICOND DEVICE 353-2857-000	1A11CR2	1	
28	1N761	2	SEMICOND DEVICE 353-2614-000	1A11CR1	1	

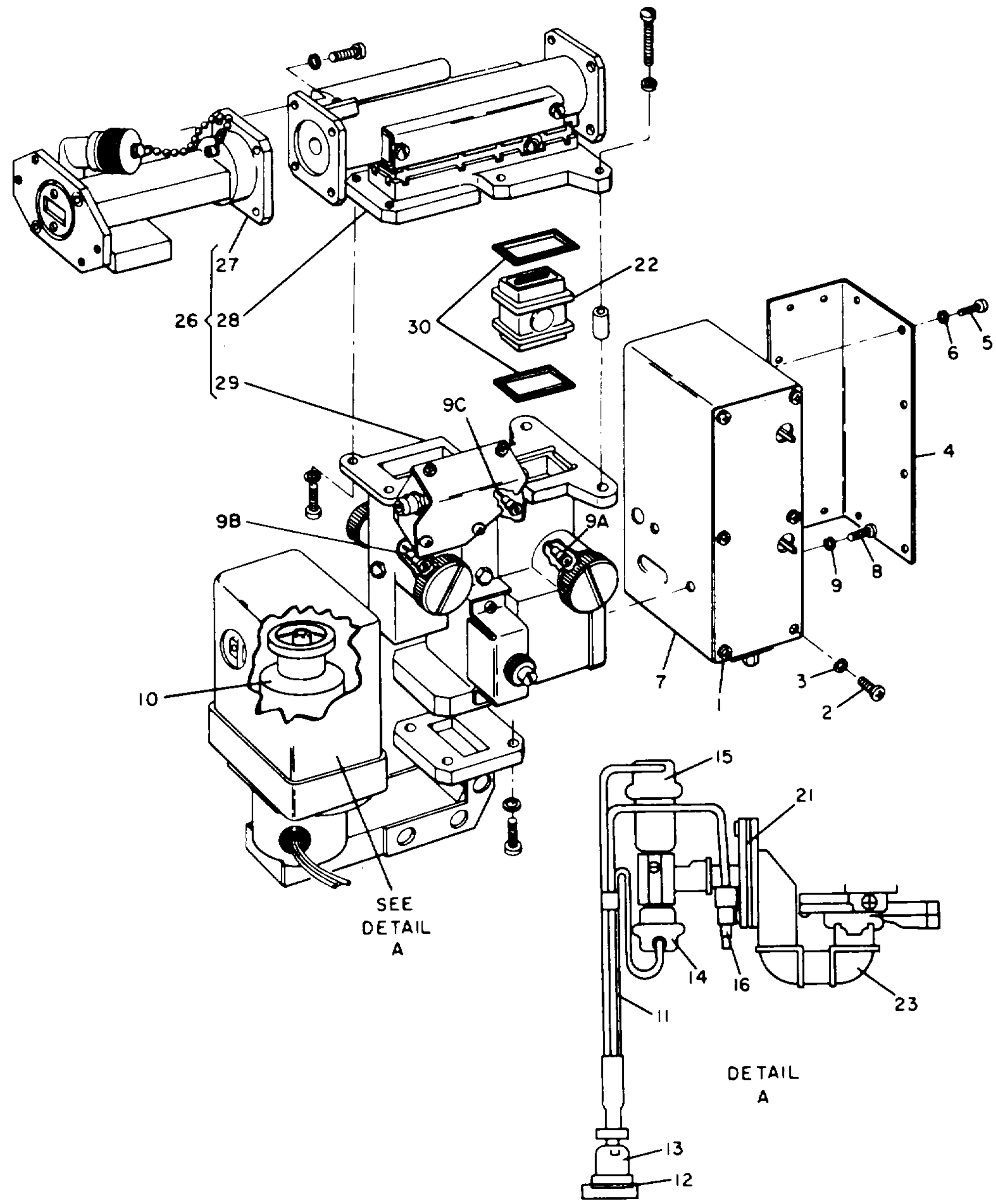
FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-35 - 29	2N388A	2	TRANSISTOR 352-0352-000 1A11Q1	1	
30	2N1187A	2	TRANSISTOR 352-0475-000 1A11Q5	1	
31	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000 1A11R3	1	
32	RC07GF273K	2	RESISTOR, FXD. COMP, 27K, 10% 1/4W 745-0800-000 1A11R4	1	
33	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 104, 1/4W 745-0773-000 1A11R5	1	
34	RC07GF682K	2	RESISTOR, FXD. COMP, 6.8K. 10%, 1/4W 745-0779-000 1A11R11	1	
35	196P10301S4	2	CAPACITOR. FXD. PAPER DIELECTRIC, 0.01UF, 20%, 100V 56289 931-4481-000 1A11C2	1	
36	1N626	2	SEMICOND DEVICE 353-2857-000 1A11CR3	1	
37	150D685X0035 B2	2	CAPACITOR, FXD, ELECTROLYTIC, 6.8UF. 20%. 35V 56289 184-7693-000 1A11C14	1	
38	RC07GF271K	2	RESISTOR, FXD. COMP, 270 OHMS, 10%, 1/4W 745-0728-000 1A11R10	1	
39	RC07GF182K	2	RESISTOR, FXD. COMP, 1.8K, 10%, 1/4W 745-0758-000 1A11R6	1	
40	RC07GF822K	2	RESISTOR, FXD. COMP, 8.2K, 10%, 1/4W 745-0782-000 1A11R7	1	
41	1N626	2	SEMICOND DEVICE 353-2857-000 1A11CR5	1	
42	20C156A	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 6800PF, M20%P50%, 500V 01939 913-3730-000 1A11C5	1	
43	1N626	2	SEMICOND DEVICE 353-2857-000 1A11CR4	1	
44	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 1A11R9	1	
45	563-4978-003	2	STRIP. IDENT	1	
46	563-5011-002	2	HANDLE	1	
- 47	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP	3	
48	564-2102-004	2	TRIGGER GENERATOR WIRED	1	
49	6009-25	3	HOLDER 91506 139-2358-000	6	
- 50	SE34CADPL	3	EYELET, MET., CAD PL BRS, 0.092 DIA X 0.133 90030 307-1002-000 AP	6	
51	M153SBRTTIN	3	EYELET, MET., COP, 0.047 DIA X 0.085 23730 307-1270-000	82	
52	564-2101-004	3	TRIGGER GENERATOR WIRED 1		



Trigger Generator Module
Figure 2-36

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-36 - 0	564-2103-004	1	TRIGGER GENERATOR MODULE SEE FIG. 2-28- (102) FOR NHA EFF BOARD REV L/L 1A11	REF	
1	2N404A	2	TRANSISTOR 352-0378-000 1A11Q2	1	
2	A10044DAP	2	INSULATOR 07047 352-9889-000	1	
3	SDB1K01224M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.22UF 20%, 100V 53021 931-4492-000 1A11C3	1	
4	RC07GF182K	2	RESISTOR, FXD. COMP, 1.8K, 10% 1/4W 745-C758-000 1A11R6	1	
5	2N404A	2	TRANSISTOR 352-0378-000 1A11Q3	1	
6	A10044DAP	2	INSULATOR 07047 352-9889-000	1	
7	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000 1A11R8	1	
8	RC07GF822K	2	RESISTOR, FXD, COMP, 8.2K9 10%, 1/4W 745-0782-000 1A11R7	1	
9	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 1A11R9	1	
10	SDB1K06332M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.0033UF, 20%, 600V 53021 931-4566-000 1A11C4	1	
11	150D106X0020 B2	2	CAPACITOR, FXD, ELECTROLYTIC, 10UF, 20%, 20V 56289 184-7375-000 1A11C6	1	
12	RC07GF181K	2	RESISTOR, FXD, COMP, 180 OHMS, 10%, 1/4W 745-0722-000 1A11R15	1	
13	FD100	2	SEMICOND DEVICE 07263 353-3024-000 SB12 1A11CR9	1	
14	RC07GF333K	2	RESISTOR, FXD, COMP, 33K, 10%, 1/4W 745-0803-000 1A11R13	1	
15	RC07GF562K	2	RESISTOR, FXD. COMP, 5.6K, 10%, 1/4W 745-0776-000 1A11R14	1	
16	2N718	2	TRANSISTOR 03508 352-0207-000 1A1104	1	
17	771-7-63	2	INSULATOR 13103 352-9944-000	1	
18	SDB1K03223M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.022UF 20%, 300V 53021 931-4524-000 1A11C7	1	
19	118P33402S4	2	CAPACITOR. FXD, PAPER DIELECTRIC, 0.33UF. 20%, 200V 56289 951-1039-000 1A11C15	1	
20	2N1187A	2	TRANSISTOR 352-0475-000 1A11Q5	1	
21	A10044DAP	2	INSULATOR 07047 352-9889-000	1	
22	FD100	2	SEMICOND DEVICE 07263 353-3024-000 SB12 1A11CR8	1	
23	FD100	2	SEMICOND DEVICE 07263 353-3024-000 5812 1A11CR6	1	
24	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K. 10%, 1/4W 745-0761-000 1A11R16	1	
25	RC20GF471K	2	RESISTOR, FXD. COMP, 470 OHMS, 10%, 1/2W 745-1338-000 1A11R18	1	
26	FD100	2	SEMICOND DEVICE U7263 353-3024-000 SB12 1A11CR7	1	
27	RC20GF821K	2	RESISTOR, FXD. COMP, 820 OHMS, 10%, 1/2W 745-1349-000 1A11R19	1	
28	1N626	2	SEMICOND DEVICE 353-2857-000 1A11CR2	1	
29	RC07GF681K	2	RESISTOR, FXD, COMP, 680 OHMS 10%, 1/4W 745-0743-000 1A11R1	1	

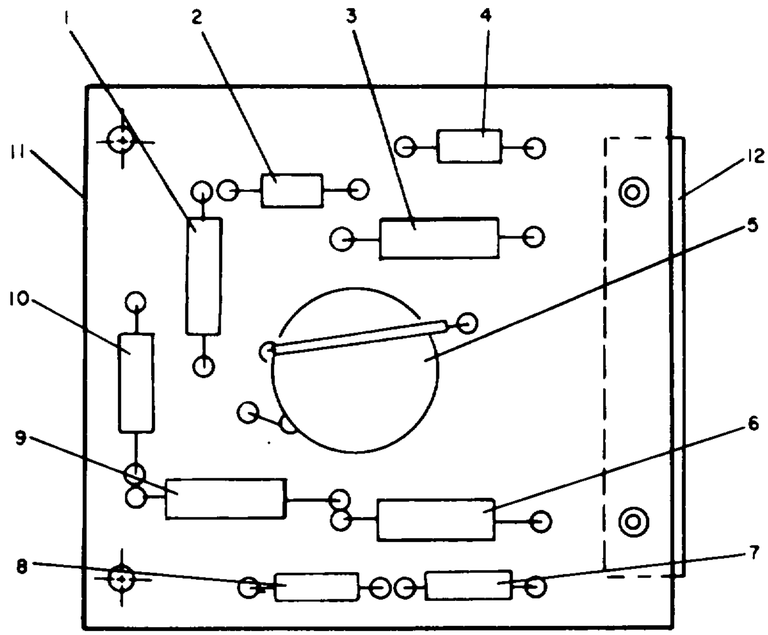
FIG- ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-36 -30	SDB1K06332M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.0033UF. 20%. 600V 53021 931-4566-000	1A11C1	1	
31	1N761	2	SEMICOND DEVICE 353-2614-000	1A11CR1	1	
32	2N458A	2	TRANSISTOR 352-0151-000	1A1106	1	
33	10191DAP	2	INSULATOR 07047 352-9535-010		1	
- 34	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		2	
- 35	MS35338-135	2	WASHER. LOCK. SST. 0.115 ID X 0.212 OD 310-0279-000 AP		2	
- 36	310-0045-000	2	WASHER FLAT, SST. 0.125 ID X 0.312 OD COML AP		4	
- 37	MS51957-17	2	SCREW, MACH, SST. 4-40 X 1/2 343-0137-000 AP		2	
38	2N388A	2	TRANSISTOR 352-0352-000	1A11Q1	1	
39	A10044DAP	2	INSULATOR 07047 352-9889-000		1	
40	RC07GF332K	2	RESISTOR, FXD, COMP, 3.3K, 10%, 1/4W 745-0767-000	1A11R12	1	
41	196P1030154	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.01UF, 20%, 100V 56289 931-4461-000	1A11C2	1	
42	RC07GF182K	2	RESISTOR. FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000	1A11R3	1	
43	RC07GF273K	2	RESISTOR, FXD. COMP, 27K, 10%, 1/4W 745-0800-000	1A11R4	1	
44	20C156A	2	CAPACITOR FXD, CERAMIC DIELECTRIC, 6800PF, M20%P50%, 500V 01939 913-3730-000	1A11C5	1	
45	1N626	2	SEMICOND DEVICE 353-2857-000	1A11CR3	1	
46	RC07GF271K	2	RESISTOR, FXD. COMP, 270 OHMS 10% 1/4W 745-0728-000	1A11R10	1	
47	FD100	2	SEMICOND DEVICE 07263 353-3024-000 SB12	1A11CR5	1	
48	RC07GF682K	2	RESISTOR, FXD, COMP, 6, 8K. 10%, 1/4W 745-0779-000	1A11R11	1	
49	RC07GF472K	2	RESISTOR. FXD. COMP, 4.7K, 10%, 1/4W 745-0773-00	1A11R5	1	
50	150D685X0035 B2	2	CAPACITOR. FXD, ELECTROLYTIC, 6.8UF, 20%. 35V 56289 184-7693-000	1A11C14	1	
51	1N626	2	SEMICOND DEVICE 353-2857-000	1A11CR4	1	
52	563-4978-003	2	STRIP, IDENT		1	
53	563-5011-002	2	HANDLE		1	
54	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP		3	
55	564-2102-004	2	TRIGGER GENERATOR WIRED		1	



Mixer-Duplexer Module
Figure 2-37

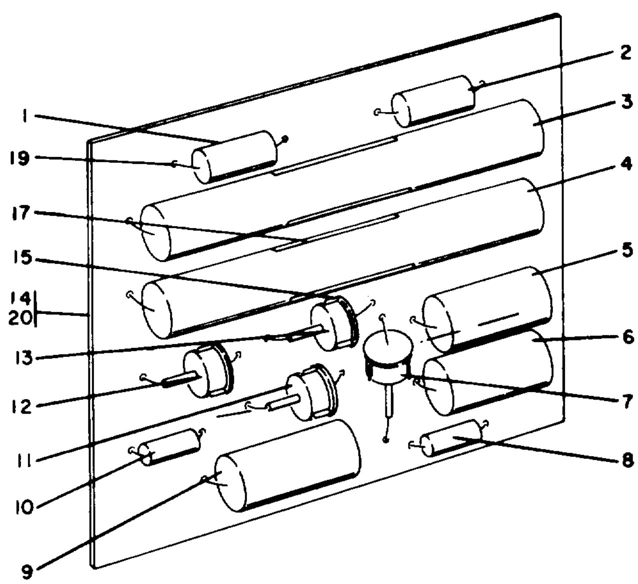
FIG- ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-37 - 0	564-8243-004	1	MIXER-DUPLEXER MODULE SEE FIG. 2-28-(149) FOR NHA EFF THRU REV 20/W 1A10	REF	
2-37 0	556-9080-001	1	MIXER-DUPLEXER MODULE SEE FIG. 2-28-(149)FOR NHA EFF REV 21/Y THRU AU/AN 1A10	REF	
2-37 0	556-9080-002	1	MIXER-DUPLEXER MODULE SEE FIG. 2-28-(149) FOR NHA EFF REV AV/AN 1A10	REF	
1	563-5109-002	2	SIDE, PREAMPLIFIER EFF THRU. REV 20/W	1	
1	556-9083-001	2	SIDE, PREAMPLIFIER EFF REV 21/Y	1	
2	MS51957-13	2	SCREW, MACH., SST. 4-40 X 1/4 343-0133-000 AP	6	
3	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	6	
4	563-5084-003	2	COVER	1	
5	MS51957-13	2	SCREW. MACH., SST. 4-40 X 1/4 343-0133-000 AP	13	
6	310-0278-000	2	WASHER, LOCK, SST. 0.115 ID X 0.202 OD COML AP	13	
7	563-5062-004	7	PREAMPLIFIER ASSY SEE FIG. 2-47 EFF THRU REV 20/W 1A10A1	1	
7	556-9081-001	2	PREAMPLIFIER ASSY SEE FIG. 2-47 EFF REV 21/Y 1A10A1	1	
8	MS51957-13	2	SCREW, MACH., SST. 4-40 X 1/4 343-0133-000 AP	2	
9	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	2	
9C	1N23ER	2	SEMICOND DEVICE 353-2931-000 1A10CR41	1	
9A	1N23E	2	SEMICOND DEVICE 353-2930-000 1A10CR42	1	
9B	1N23CR	2	SEMICOND DEVICE 353-2932-000 1A10CR40	1	
10	2K225	2	ELECTRON TUBE 49956 257-0196-000 EFF THRU REV 20/W 1A10V4	1	
11	764-8623-001	2	CABLE, KLYSTRON EFF REV 21/Y	1	
12	M5PLS	3	CONNECTOR 81312 372-9006-000 1A10P1	1	
13	372-5007-000	3	SHIELD, ELECTRICAL CONN 81312	1	
14	VA1011A	3	TUBE CAP 88236 257-0235-030 1A10P3	1	
15	VA1011B	3	PIN SOCKET 88236 257-0235-040 1A10P2	1	
16	BLK022	2	OSCILLATOR 88236 257-0235-010 EFF REV 21/Y S811	1	
- 17	MS51957-44	2	SCREW, MACH., SST 8-32 X 7/16 343-0188-000 AP	4	
- 18	310-0048-000	2	WASHER, FLAT, SST, 0.172 ID X 0.437 OD COML AP	4	
- 19	4708-06-02-4 102	2	WASHER, LOCK, SST, 0.176 ID X 0.383 OD 78189 373-0157-000 SB11 AP	4	
- 20	764-8625-001	2	BUSHING. KLYSTRON SB11 AP	4	
21	V1150	2	INSULATOR 88236 257-0235-020 SB11	1	
22	6795	2	ELECTRON TUBE 88236 257-0195-000 EFF THRU REV 20/W 1A10V3	1	
22	L3890A1	2	ELECTRON TUBE 80080 257-0224-010 EFF REV 21/Y 1A10V3	1	
23	110919	2	ADAPTER 80006 355-0147-010 SB11	1	
- 24	MS51957-44	2	SCREW. MACH SST. 8-32 X 7/16 343-0188-000 AP	4	
- 25	310-0048-000	2	WASHER. FLAT, SST. 0.172 ID X 0.437 OD COML AP	4	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-37 - 26	410-940	2	DUPLEXER 80006 270-1356-000 EFF THRU REV 20/W	1	
26	419463	2	DUPLEXER 80006 270-1356-010 EFF REV 21/Y	1	
27	NO NUMBER	3	CROSSGUIDE ASSY	1	
28	NO NUMBER	3	DUPLEXER ASSY	1	
29	NO NUMBER	3	MIXER ASSY	1	
30	NO NUMBER	3	GASKET ASSY	1	



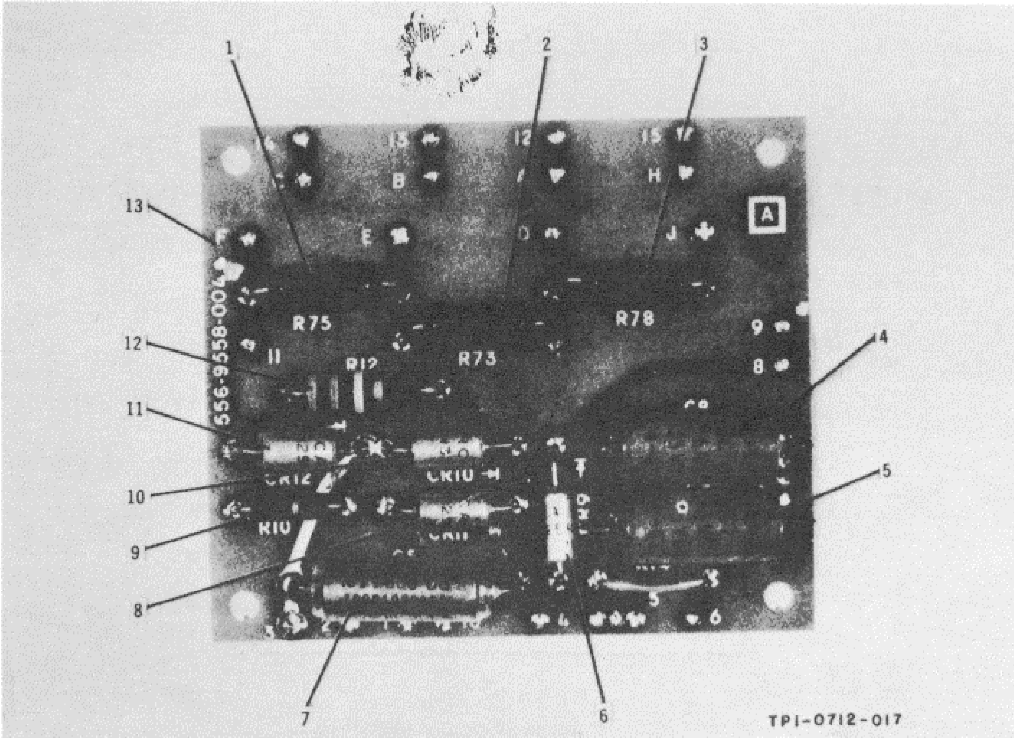
Keep Alive Supply
Figure 2-38

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-38 - 0	564-2652-003	1	KEEP ALIVE SUPPLY SEE FIG. 2-28 (174) FOR NHA	1A3TB2	REF	
1	RC32GF225K	2	RESISTOR, FXD COMP, 2.2 MEGO, 10%, 1W 745-3492-000	1A3R54	1	
2	RC20GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-1436-000	1A3R53	1	
3	1N3256	2	SEMICOND DEVICE 353-3277-000	1A3CR34	1	
4	RC20GF105K	2	RESISTOR. FXD, COMP, 1 MEGO, 10%, 1/2W 745-1478-000	1A3R50	1	
5	Y77590C1-4	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 10,000PF, 20%, 1500V 56289 913-4173-000	1A3C23	1	
6	1N3256	2	SEMICOND DEVICE 353-3277-000	1A3CR36	1	
7	RC20GF105K	2	RESISTOR. FXD. COMP, 1 MEGO, 10%, 1/2W 745-1478-000	1A3R52	1	
8	RC20GF105K	2	RESISTOR, FXD. COMP, 1 MEGO, 10%, 1/2W 745-1478-000	1A3R51	1	
9	1N3256	2	SEMICOND DEVICE 353-3277-000	1A3CR35	1	
10	RC32GF225K	2	RESISTOR, FXD, COMP, 2.2 MEGO, 10%, 1W 745-3492-000	1A3R55	1	
11	564-2651-003	2	BOARD		1	
12	564-2649-002	3	BRACKET, KEEP ALIVE		1	
- 13	MS16535-76	3	RIVET, TUBULAR, AL, 0.089 DIA X 0.125 305-1755-000 AP		2	



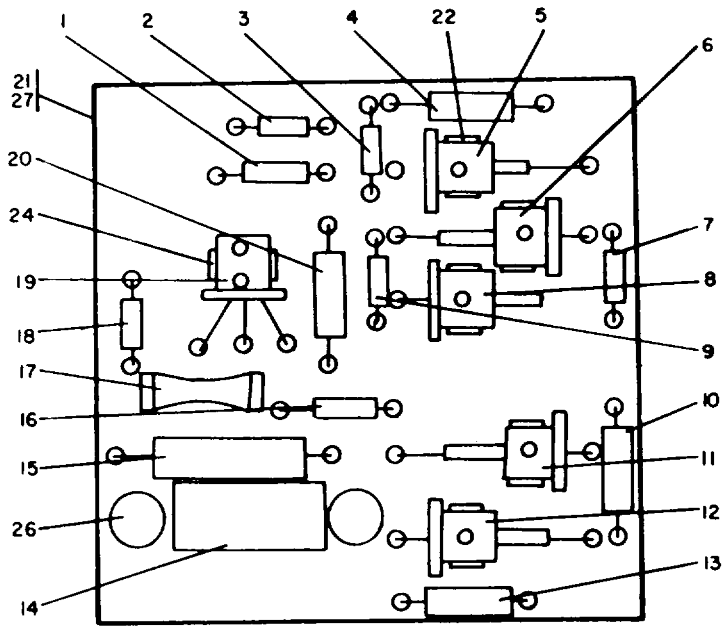
Plus 250V Power Supply
Figure 2-39

FIG- ITEM		PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-39	0	563-5082-003	1	PLUS 250V POWER SUPPLY SEE FIG. 2-28-(257) EFF THRU REV 20/W	1A2TB1	REF	
	1	RC32GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1W 745-3436-000	1A2R13	1	
	2	RC32GF104K	2	RESISTOR, FXD COMP, 100K, 10%, 1W 745-3436-000	1A2R12	1	
	3	110D126X8250 P1	2	CAPACITOR, FXD, ELECTROLYTIC, 12UF, 15%. 250V 56289 184-8197-000	1A2C6	1	
	4	110D126X8250 P1	2	CAPACITOR, FXD, ELECTROLYTIC, 12UF, 15% 250V 56289 184-8197-000	1A2C7	1	
	5	109D566X0075 T2	2	CAPACITOR, FXD. ELECTROLYTIC, 56PF, 20%, 75V 56289 184-7793-000	1A2C8	1	
	6	109D566X0075 T2	2	CAPACITOR, FXD, ELECTROLYTIC, 56PF, 20%. 75V 56289 184-7793-000	1A2C9	1	
	7	1N540	2	SEMICOND DEVICE 353-1546-000	1A2CR9	1	
	8	RC20GF101K	2	RESISTOR, FXD. COMP, 100 OHMS, 10% 1/2W 745-1310-000	1A2R14	1	
	9	SDB1K06103M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.01UF, 20%, 600V 53021 931-4572-000	1A2C5	1	
	10	RC20GF180K	2	RESISTOR, FXD, COMP, 18 OHMS, 10%, 1/2W 745-1279-000	1A2R10	1	
	11	1N540	2	SEMICOND DEVICE 353-1546-000	1A2CR11	1	
	12	1N540	2	SEMICOND DEVICE 353-1546-000	1A2CR12	1	
	13	1N540	2	SEMICOND DEVICE 353-1546-000	1A2CR10	1	
	14	563-5081-003	2	BOARD ASSY		1	
	15	6159-3A	3	CLIP 91506 139-2668-000		4	
	- 16	SE24CADPL	3	EYELET, MET., CAD PL BRS. 0.062 DIA X 0.125 90030 307-1053-000 AP		4	
	17	6001-12A	3	CLIP 91506 139-2337-000		2	
	- 18	SE34CADPL	3	EYELET. MET CAD PL BRS. 0.092 DIA X 0.133 90030 307-1002-000 AP		6	
	19	M164SBRTTIN	3	EYELET, MET., COP, 0.060 DIA X 0.088 23730 307-1268-000		38	
	20	563-5080-003	3	BOARD, PRINTED		1	
2-40	- 0	556-9558-004	1	PLUS 260v MAGNETRON HEATER SEE FIG. 2-28-(257) FOR NHA EFF REV 21/Y	1A2TB1	REF	
	1	RW69V220	2	RESISTOR, FXD, WW. 22 OHMS, 5%, 3W 747-5327-000	1A2R75	1	
	2	RW69V220	2	RESISTOR. FXD. WW, 22 OHMS, 5%. 3W 747-5327-000	1A2R73	1	
	3	RW69V220	2	RESISTOR, FXD, WW. 22 OHMS. 5%. 3W 747-5327-000	1A2R78	1	



Plus 260V Magnetron Heater
Figure 2-40

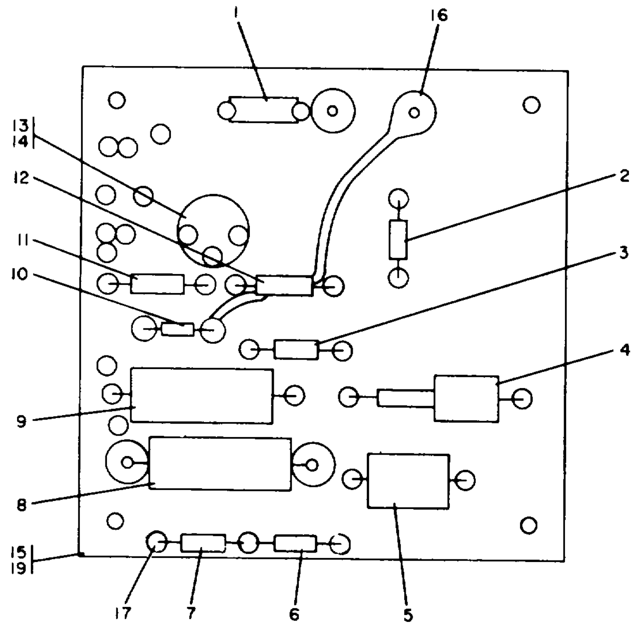
FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-40 - 4	109D566X0075 T2	2	CAPACITOR, FXD, ELECTROLYTIC, 56PF, 20%, 75V 56289 184-7793-000 1A2C8	1	
5	109D566X0075 T2	2	CAPACITOR, FXD, ELECTROLYTIC, 56PF, 20%, 75V 56289 184-7793-000 1A2C9	1	
6	1N3254	2	SEMICOND DEVICE 353-3275-000 1A2CR9	1	
7	SDB1K06103M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.01UF, 20%, 600V 53021 931-4572-000 1A2C5	1	
8	1N3254	2	SEMICOND DEVICE 353-3275-000 1A2CR11	1	
9	RC20GF180K	2	RESISTOR, FXD, COMP, 18 OHMS, 10%, 1/2W 745-1279-000 1A2R10	1	
10	1N3254	2	SEMICOND DEVICE 353-3275-000 1A2CR10	1	
11	1N3254	2	SEMICOND DEVICE 353-3275-000 1A2CR12	1	
12	RC32GF334K	2	RESISTOR, FXD, COMP, 330K, 10%, 1W 745-3457-000 1A2R12	1	
13	556-9558-002	2	PLUS 260V MAGNETRON HEATER	1	



Fault Sensing Board
Figure 2-41

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-41 - 0	564-2109-003	1	FAULT SENSING, WIRED SEE FIG. 2-28- (261) FOR NHA EFF THRU BOARD REV H	1A7TB3	REF	
1	1N746A	2	SEMICOND DEVICE 353-2938-000 EFF THRU BOARD REV H	1A7CR2	1	
2	RC07GF102K	2	RESISTOR, FXD, COMP, 1K9 10%, 1/4W 745-0749-000	1A7R2	1	
3	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 106 1/4W 745-0785-000 EFF THRU BOARD REV H	1A7R3	1	
4	150D106X002 B2	2	CAPACITOR, FXD, ELECTROLYTIC, 10UF, 20%. 20V 56289 184-7375-000 EFF THRU BOARD REV H	1A7C4	1	
5	1N537	2	SEMICOND DEVICE 353-1525-000 EFF THRU BOARD REV H	1A7CR3	1	
6	1N537	2	SEMICOND DEVICE 353-1525-000 EFF THRU BOARD REV H	1A7CR5	1	
7	RC07GF102K	2	RESISTOR. FXD, COMP, 1K, 10%, 1/4W 745-0749-000 EFF THRU BOARD REV H	1A7R4	1	

FIG- ITEM	PART NUMBER	I N D E N T.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2—41 - 8	1N537	2	SEMICOND DEVICE 353-1525-000 EFF THRU BOARD REV H	1A7CR4	1	
9	RC07GF102K	2	RESISTOR. FXD. COMP, 1K, 10%. 1/4W 745-0749-000 EFF THRU BOARD REV H	1A7R5	1	
10	RC20GF121K	2	RESISTOR, FXD, COMP. 120 OHMS, 10%, 1/2W 745-1314-000 EFF THRU BOARD REV H	1A7R8	1	
11	1N537	2	SEMICOND DEVICE 353-1525-000 EFF THRU BOARD REV H	1A7CR7	1	
12	1M27Z10	2	SEMICOND DEVICE 80211 353-1828-000 EFF THRU BOARD REV H	1A7CR8	1	
13	RC20GF820K	2	RESISTOR, FXD, COMP, 82 OHMS 10%, 1/2W 745-1307-000 EFF THRU BOARD REV H	1A7R7	1	
14	RC42GF122K	2	RESISTOR FXD, COMP, 1.2K, 10%, 2W 745-5656-000	1A7R9	1	
15	150D157X0006 R2	2	CAPACITOR, FXD, ELECTROLYTIC, 150UF, 20S% 6V 56289 184-7645-000 EFF THRU BOARD REV H	1A7C3	1	
16	1N746A	2	SEMICOND DEVICE 353-2938-000	1A7CR6	1	
17	763H6	2	RESISTOR, THRM, 1K, 10%, 1W 10646 714-1732-000	1A7RT1	1	
18	RC07GF224K	2	RESISTOR, FXD, COMP, 220K, 10%, 1/4W 745-0833-000 EFF THRU BOARD REV H	1A7R1	1	
19	2N1187A	2	TRANSISTOR 352-0475-000 EFF THRU BOARD REV H	1A7Q1	1	
20	RC20GF182K	2	RESISTOR, FXD. COMP, 1.8K, 10%, 1/2W 745-1363-000 EFF THRU BOARD REV H	1A7R6	1	
21	564-2108-003	2	FAULT SENSING WIRED		1	
22	6159-3A	3	CLIP 91506 139-2668-000		5	
- 23	SE24CADPL	3	EYELET. MET., CAD PL BRS, 0.062 DIA X 0.125 90030 307-1053-000 AP		5	
24	6009-25	3	HOLDER 91506 139-2358-000		1	
- 25	SE34CADPL	3	EYELET. MET., CAD PL BRS, 0.092 DIA X 0.133 90030 307-1002-000 AP		1	
26	1300B	3	TERMINAL 88245 306-0229-000		2	
27	564-2107-003	3	FAULT SENSING. WIRED		1	
2-42 - 0	564-2109-003	1	FAULT SENSING BOARD SEE FIG. 2-28- 261 FOR NHA EFF BOARD REV J	1A7TB3	REF	
1	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 EFF THRU BOARD REV J	1A7R2	1	
1	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 EFF BOARD REV K THRU R	1A7R2	AR	



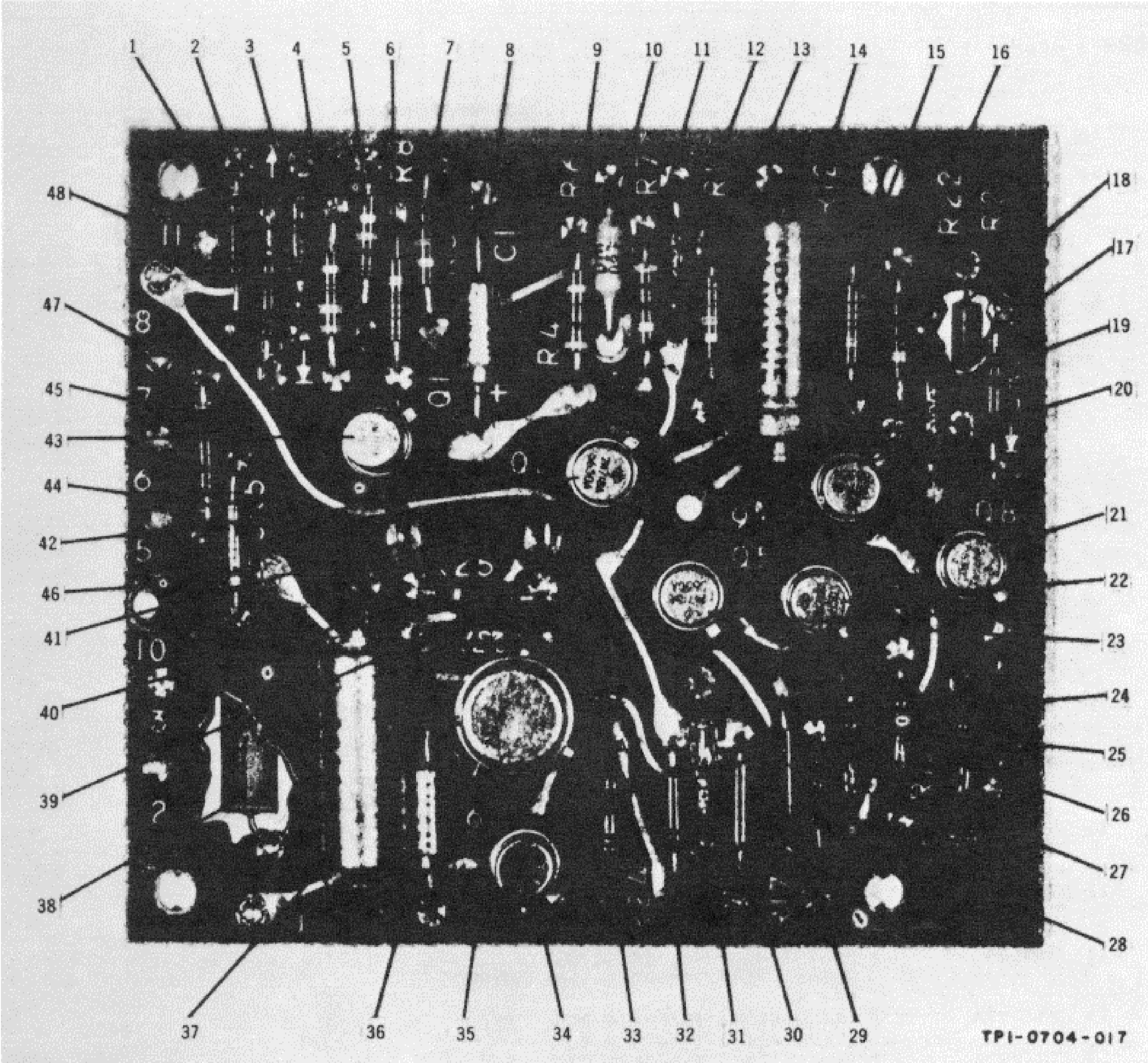
Fault Sensing Board
Figure 2-42

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-42 - 1	RC07GF391K	2	RESISTOR, FXD, COMP, 390 OHMS, 10%, 1/4W 745-0734-000 EFF BOARD REV K THRU R 1A7R2	AR	
1	RC07GF471K	2	RESISTOR, FXD, COMP, 470 OHMS, 10%, 1/4W 745-0737-000 EFF BOARD REV K THRU R 1A7R2	AR	
1	RC07GF561K	2	RESISTOR, FXD, COMP, 560 OHMS, 10%, 1/4 W 745-0740-000 EFF BOARD REV K THRU R 1A7R2	AR	
1	RC07GF681K	2	RESISTOR, FXD COMP, 680 OHMS, 10%, 1/4W 745-0743-000 EFF BOARD REV K THRU R 1A7R2	AR	
1	RC07GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/4W 745-0746-000 EFF BOARD REV K THRU R 1A7R2	AR	
1	RC07GF122K	2	RESISTOR. FXD, COMP, 1.2K. 10%, 1/4W 745-0752-000 EFF BOARD REV K THRU R 1A7R2	AR	
1	RC07GF331K	2	RESISTOR, FXD. COMP, 330 OHMS, 10%, 1/4W 745-0731-000 EFF BOARD REV R TO S 1A7R2	AR	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-42 - 1	RN60C2610F	2	RESISTOR, FXD, FILM, 261 OHMS 1%, 1/8W 705-6259-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C2870F	2	RESISTOR, FXD. FILM 287 OHMS, 1%, 1/8W 705-6260-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C3160F	2	RESISTOR, FXD, FILM. 316 OHMS, 1%, 1/8W 705-6261-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C3480F	2	RESISTOR, FXD, FILM, 348 OHMS, 1%, 1/8W 705-6262-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C3830F	2	RESISTOR, FXD, FILM, 383 OHMS, 1%, 1/8W 705-6263-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C4220F	2	RESISTOR, FXD, FILM, 422 OHMS, 1%, 1/8W 705-6264-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C4640F	2	RESISTOR, FXD, FILM, 464 OHMS, 1%, 1/8W 705-6265-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C5110F	2	RESISTOR, FXD, FILM, 511 OHMS, 1%, 1/8W 705-6266-000 EFF BOARD REV 1A7R2	AR	
1	RN60C5620F	2	RESISTOR. FXD. FILM, 562 OHMS, 1%, 1/8W 705-6267-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C6190F	2	RESISTOR, FXD, FILM, 619 OHMS, 1%, 1/8W 705-6268-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C6810F	2	RESISTOR, FXD, FILM, 681 OHMS, 1%, 1/8W 705-6269-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C7500F	2	RESISTOR, FXD, FILM, 750 OHMS, 1%, 1/8W 705-6270-000, EFF BOARD REV S 1A7R2	AR	
1	RN60C8250F	2	RESISTOR, FXD, FILM, 825 OHMS, 1%, 1/8W 705-6271-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C9090F	2	RESISTOR, FXD, FILM, 909 OHMS, 1%, 1/8W 705-6272-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C1001F	2	RESISTOR, FXD, FILM, 1K, 1%. 1/8W 705-6273-000 EFF BOARD REV S 1A7R2	AR	
1	RN60C1101F	2	RESISTOR, FXD, FILM. 1.1K, 1%, 1/8W 705-6274-000 1A7R2	AR	
1	RN60C1211F	2	RESISTOR, FXD, FILM, 1.21K, 1%, 1/8W 705-6275-000 EFF BOARD REV S 1A7R2	AR	
2	33C41	2	CAPACITOR FXO, CERAMIC DIELECTRIC, 0.1UF, M20%P80%, 50V 56289 913-3886-000 EFF BOARD REV J THRU L 1A7C4	1	
2	150D105X0050	2	CAPACITOR, FXO, ELECTROLYTIC. 1UF, A2 20%, 50V 56289 184-8965-000 EFF BOARD REV M 1A7C4	1	
3	1N746A	2	SEMICOND DEVICE 353-2938-000 1A7CR6	1	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-42 - 4	1N3254	2	SEMICOND DEVICE 353-3275-000 EFF BOARD REV J 1A7CR7	1	
5	1N3032A	2	SEMICOND DEVICE 353-1327-000 EFF BOARD REV J THRU REV R 1A7CR8	1	
5	1N3033B	2	SEMICOND DEVICE 353-3138-000 EFF BOARD REV S 1A7CR8	1	
6	36C175A	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 10,000PF, 20%, 500V 01939 913-3013-000 EFF BOARD REV N 1A7C2	1	
7	RC07GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%. 1/4W 745-0728-000 EFF BOARD REV N 1A7R5	1	
8	RC42GF181K	2	RESISTOR, FXD, COMP, 180 OHMS, 10%, 2W 745-5621-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF221K	2	RESISTOR, FXD, COMP, 220 OHMS, 10%, 2W 745-5624-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%, 2W 745-5628-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF331K	2	RESISTOR, FXD, COMP, 330 OHMS, 10%. 2W 745-5631-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF391K	2	RESISTOR, FXD, COMP, 390 OHMS, 10%, 2W 745-5635-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF471K	2	RESISTOR, FXD, COMP, 470 OHMS, 10%, 2W 745-5638-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF561K	2	RESISTOR, FXD, COMP, 560 OHMS, 10%, 2W 745-5642-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF681K	2	RESISTOR, FXD COMP. 680 OHMS, 10%, 2W 745-5645-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 2W 745-5649-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF102K	2	RESISTOR, FXD. COMP, 1K, 10%, 2W 745-5652-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF112J	2	RESISTOR, FXD, COMP, 1.1K, 5%, 2W 745-5654-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF122K	2	RESISTOR, FXD COMP, 1.2K, 10% 2W 745-5656-000 EFF BOARD REV L THRU R 1A7R9	AR	
8	RC42GF132J	2	RESISTOR, FXD, COMP, 1.3K, 5%, 2W 745-5657-000 EFF BOARD REV R TO S 1A7R9	AR	
8	RC42GF152J	2	RESISTOR, FXD, COMP, 1.5K, 5%, 2W 745-5658-000 EFF BOARD REV R TO S 1A7R9	AR	
8	RW69V181	2	RESISTOR. FXD. WW. 180 OHMS, 5% 3W 747-5345-000 EFF BOARD REV S 1A7R9	AR	
8	RW69V221	2	RESISTOR. FXD, WW. 220 OHMS, 5%, 3W 747-5347-000 EFF BOARD REV S 1A7R9	AR	

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-42 - 8	RW69V271	2	RESISTOR, FXD, WW, 270 OHMS, 5%, 3W 747-5349-000 EFF BOARD REV S	1A7R9	AR	
8	RW69V561	2	RESISTOR, FXD, WW, 560 OHMS, 5%, 3W 747-5355-000 EFF BOARD REV S	1A7R9	AR	
8	RW69V821	2	RESISTOR, FXD, WW, 820 OHMS, 5%, 3W 747-5358-000 EFF BOARD REV S	1A7R9	AR	
8	RW69V241	2	RESISTOR, FXD, WW, 240 OHMS, 5%, 3W 747-5386-000 EFF BOARD REV S	1A7R9	AR	
8	RW69V331	2	RESISTOR, FXD, WW, 330 OHMS, 5%, 3W 747-5388-000 EFF BOARD REV S	1A7R9	AR	
8	RW69V361	2	RESISTOR, FXD, WW, 360 OHMS9 5%, 3W 747-5389-000 EFF B)ARD REV S	1A7R9	AR	
8	RW69V391	2	RESISTOR. FXD, WW, 390 OHMS9 5% 3W 747-5390-000 EFF BOARD REV S	1A7R9	AR	
8	RW69V471	2	RESISTOR, FXD, WW, 470 OHMS, 5%, 3W 747-5391-000 EFF BOARD REV S	1A7R9	AR	
8	RW69V511	2	RESISTOR, FXD, WW, 510 OHMS, 5%, 3W 747-5392-000 EFF BOARD REV S	1A7R9	AR	
8	RW69V621	2	RESISTOR, FXD, WW, 620 OHMS. 5%, 3W 747-5393-000 EFF BOARD REV S	1A7R9	AR	
8	RW69V911	2	RESISTOR, FXD, WW, 910 OHMS, 5%, 3W 747-5396-000 EFF BOARD REV S	1A7R9	AR	
8	RW69G102	2	RESISTOR, FXD, WW, 1K, 5%, 2.5W 747-7600-250 EFF BOARD REV S	1A7R9	AR	
8	RW69G122	2	RESISTOR, FXD, WW, 1.2K, 5%, 2.5W 747-7600-260 EFF BOARD REV S	1A7R9	AR	
8	RW69G152	2	RESISTOR, FXD, WW, 1.5K, 5%, 2.5W 747-7600-270 EFF BOARD REV S	1A7R9	AR	
9	150D107X0010 R2	2	CAPACITOR, FXD, ELECTROLYTIC, 100UF, 20%, 10V 56289 184-7651-000 EFF BOARD REV J	1A7C3	1	
10	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 EFF BOARD REV L THRU R	1A7R1	1	
10	RN60C2371F	2	RESISTOR, FXD, FILM, 2.37K, 1%, 1/8W 705-6282-000 EFF BOARD REV S	1A7R1	1	
11	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 EFF BOARD REV S	1A7R10	1	
12	763H6	2	RESISTOR, THRM, 1K, 10%, 1W 10646 714-1732-000 EFF THRU BOARD REV K	1A7RT1	1	
12	763F84	2	RESISTOR, THRM, 1K, 10% 1W 10646 714-1720-000 EFF BOARD REV S	1A7RT1	1	
13	2N2043A	2	TRANSISTOR 352-0476-000 EFF BOARD REV J THRU REV R	1A701	1	
13	2N2905A	2	TRANSISTOR 352-0550-000 EFF BOARD REV S	1A701	1	
14	A10012	2	INSULATOR 07047 302-0437-000 EFF BOARD REV J		1	
15	564-2108-003	2	FAULT SENSING, WIRED		1	
16	1300B	3	TERMINAL 88245 306-0229-000		4	
17	TF300	3	TERMINAL 98291 306-1018-000		2	
- 18	MS51957-2	3	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP		2	
19	564-2107-003	3	FAULT SENSING, WIRED		1	



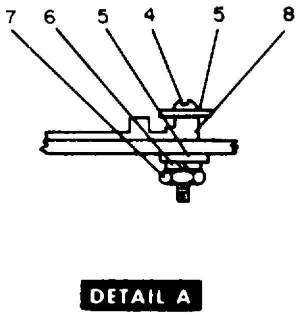
Fault Sensing Board

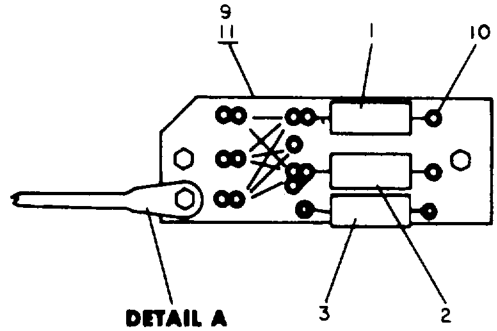
Figure 2-43

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-43 - 0	783-6518-001	1	FAULT SENSING BOARD SEE FIG. 2-28- (261)FOR NHA EFF REV BB/AT 1A7TB3	REF	
1	1N645	2	SEMICOND DEVICE 353-2607-000 1A7CR1	1	
2	1N751A	2	SEMICOND DEVICE 353-2710-000 1A7CR2	1	
3	1N752A	2	SEMICOND DEVICE 353-2712-000 1A7CR3	1	
4	RC07GF331K	2	RESISTOR, FXD, COMP, 330 OHMS, 10%, 1/4W 745-0731-000 1A7R1	1	
5	RC07GF103K	2	RESISTORT FXD, COMP, 10K, 10%. 1/4W 745-0785-000 1A7R3	1	
6	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 1A7R8	1	
7	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 1A7R5	1	
8	CS13BH105M	2	CAPACITOR, FXD, ELECTROLYTIC, 1UF, 20%, 75V 184-6326-200 1A7C1	1	
9	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10% 1/4W 745-0773-000 1A7R4	1	
10	RN55D1002F	2	RESISTOR, FXD, FILM, 10K, 1%, 1/8W 705-1044-000 1A7R6	1	
11	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10% 1/4W 745-0773-000 1A7R7	1	
12	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 1A7R10	1	
13	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000 1A7R11	1	
14	CS13BF226M	2	CAPACITOR, FXD, ELECTROLYTIC, 22UF, 20%S 35V 184-6225-000 1A7C2	1	
15	RC07GF272K	2	RESISTOR, FXD, COMP, 2.7K, 10%, 1/4W 745-0764-000 1A7R12	1	
16	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 1A7R13	1	
17	RN55D9091F	2	RESISTOR, FXD, FILM, 9.09K, 1%, 1/8W 705-1042-000 1A7R22	1	
18	RN60C2610F	2	RESISTOR, FXD, FILM, 261 OHMS 1%, 1/8W 705-6259-000 S 1A7R2	AR	
18	RN60C2870F	2	RESISTOR, FXD, FILM, 287 OHMS, 1%, 1/8W 705-6260-000 1A7R2	AR	
18	RN60C3160F	2	RESISTOR, FXD, FILM, 316 OHMS, 1%, 1/8W 705-6261-000 1A7R2	AR	
18	RN60C3480F	2	RESISTOR, FXD, FILM, 348 OHMS, 1%, 1/8W 705-6262-000 1A7R2	AR	
18	RN60C3830F	2	RESISTOR, FXD, FILM, 383 OHMS, 1%, 1/8W 705-6263-000 1A7R2	AR	
18	RN60C4220F	2	RESISTOR, FXD, FILM, 422 OHMS, 1%, 1/8W 705-6264-000 1A7R2	AR	
18	RN60C4640F	2	RESISTOR, FXD, FILM, 464 OHMS, 1%, 1/8W 705-6265-000 1A7R2	AR	
18	RN60C5110F	2	RESISTOR, FXD, FILM, 511 OHMS, 1%, 1/8W 705-6266-000 1A7R2	AR	
18	RN60C5620F	2	RESISTOR, FXD, FILM, 562 OHMS, 1%, 1/8W 705-6267-000 1A7R2	AR	
18	RN60C6190F	2	RESISTOR, FXD, FILM, 619, OHMS, 1%, 1/8W 705-6268-000 1A7R2	AR	
18	RN60C6810F	2	RESISTOR, FXD, FILM, 681 OHMS, 1%, 1/8W 705-6269-000 1A7R2	AR	
18	RN60C7500F	2	RESISTOR, FXD, FILM, 750 OHMS, 1%, 1/8W 705-6270-000 1A7R2	AR	

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-43 - 18	RN60C8250F	2	RESISTOR, FXD, FILM, 825 OHMS 1%, 1/8W 705-6271-000	1A7R2	AR	
18	RN60C9090F	2	RESISTOR, FXD, FILM, 909 OHMS 1%, 1/8W 705-6272-000	1A7R2	AR	
18	RN60C1001F	2	RESISTOR, FXD, FILM, 1K, 1%, 1/8W 705-6273-000	1A7R2	AR	
18	RN60C1101F	2	RESISTOR, FXD, FILM, 1.1K, 1%, 1/8W 705-6274-000	1A7R2	AR	
18	RN60C2150F	2	RESISTOR, FXD, FILM, 215 OHMS, 1%, 1/8W 705-6257-000	1A7R2	AR	
19	1N967B	2	SEMICOND DEVICE 353-3178-000	1A7CR7	1	
20	2N718A	2	TRANSISTOR 352-0318-000	1A7Q3	1	
21	2N718A	2	TRANSISTOR 352-0318-000	1A7Q8	1	
22	2N718A	2	TRANSISTOR 352-0318-000	1A7Q4	1	
23	2N718A	2	TRANSISTOR 352-0318-000	1A7Q5	1	
24	RN55D1001F	2	RESISTOR, FXD, FILM, 1K, 1%, 1/8W 705-0996-000	1A7R21	1	
25	RN55D1621F	2	RESISTOR, FXD, FILM, 1.62K, 1%, 1/8W 705-1006-000	1A7R23	1	
26	RN55D90R9F	2	RESISTOR, FXD, FILM, 90.9 OHMS, 1%, 1/8W 705-0946-000	1A7R15	1	
27	RN55D3481F	2	RESISTOR, FXD, FILM, 3.48K, 1% 1/8W 705-1022-000	1A7R14	1	
28	RN55D1622F	2	RESISTOR, FXD, FILM, 16.2K, 1%, 1/8W 705-1054-000	1A7R16	1	
29	RN55D5111F	2	RESISTOR, FXD, FILM, 5.11K, 1%, 1/8W 705-1030-000	1A7R17	1	
30	RN55D1331F	2	RESISTOR, FXD, FILM, 1.33K, 1%, 1/8W 705-1002-000	1A7R18	1	
31	1N750A	2	SEMICOND DEVICE 353-2708-000	1A7CR4	1	
32	RN55D1101F	2	RESISTOR, FXD, FILM, 1.1K, 1%, 1/8W 705-0998-000	1A7R24	1	
33	RN55D1961F	2	RESISTOR, FXD, FILM. 1.96K, 1%, 1/8W 705-1010-000	1A7R19	1	
34	2N718A	2	TRANSISTOR 352-0318-000	1A7Q6	1	
35	2N2905A	2	TRANSISTOR 352-0550-000	1A7Q7	1	
36	CS13BH104M	2	CAPACITOR, FXD, ELECTROLYTIC, 0.10UF, 20%, 75V 184-6326-020	1A7C4	1	
37	CS13BC107M	2	CAPACITOR, FXD, ELECTROLYTIC, 100UF, 20%, 10V 184-6150-000	1A7C3	1	
38	RW69V181	2	RESISTOR, FXD, WW, 180 OHMS, 5%, 3W 747-5345-000	1A7R9	AR	
38	RW69V221	2	RESISTOR, FXD, WW, 220 OHMS, 5%, 3W 747-5347-000	1A7R9	AR	
38	RW69V271	2	RESISTOR, FXD, WW, 270 OHMS, 5%, 3W 747-5349-000	1A7R9	AR	
38	RW69V561	2	RESISTOR, FXD, WW, 560 OHMS, 5%, 3W 747-5355-000	1A7R9	AR	
38	RW69V821	2	RESISTOR, FXD, WW, 820 OHMS, 5%, 3W 747-5358-000	1A7R9	AR	
38	RW69V241	2	RESISTOR, FXD, WW, 240 OHMS, 5%, 3W 747-5386-000	1A7R9	AR	
38	RW69V331	2	RESISTOR, FXD, WW, 330 OHMS, 5%, 3W 747-5388-000	1A7R9	AR	
38	RW69V361	2	RESISTOR, FXD, WW, 360 OHMS, 5%, 3W 747-5389-000	1A7R9	AR	
38	RW69V391	2	RESISTOR, FXD, WW, 390 OHMS, 5%, 3W 747-5390-000	1A7R9	AR	

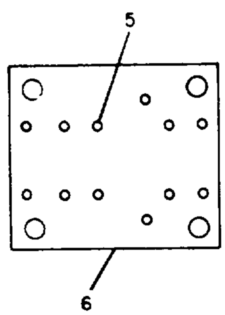
FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-43 - 38	RW69V471	2	RESISTOR, FXD, WW, 470 OHMS, 5%, 3W 747-5391-000 1A7R9	AR	
38	RW69V511	2	RESISTOR, FXD, WW, 510 OHMS, 5%, 3W 747-5392-000 1A7R9	AR	
38	RW69V621	2	RESISTOR, FXD, WW, 620 OHMS, 5%, 3W 747-5393-000 1A7R9	AR	
38	RW69V681	2	RESISTOR, FXD, WW, 680 OHMS, 5%, 3W 747-5394-000 1A7R9	AR	
38	RW69V911	2	RESISTOR, FXD, WW, 910 OHMS, 5%, 3W 747-5396-000 1A7R9	AR	
38	RW69G102	2	RESISTOR, FXD, WW, 1K, 5%, 2.5W 747-7600-250 1A7R9	AR	
38	RW69G122	2	RESISTOR, FXD, WW, 1.2K, 5%, 2.5W 747-7600-260 1A7R9	AR	
38	RW69G152	2	RESISTOR, FXD, WW, 1.5K, 5%, 2.5W 747-7600-270 1A7R9	AR	
39	RN60C2371F	2	RESISTOR, FXD, FILM, 2.37K, 1% 1/8W 705-6282-000 1A7R20	1	
40	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W, 745-0713-000 1A7R25	1	
41	763F84	2	RESISTOR, THRM, 1K, 10%, 1W 10646 714-1720-000 1A7RT1	1	
42	2N718A	2	TRANSISTOR 352-0318-000 1A702	1	
43	2N718A	2	TRANSISTOR 352-0318-000 1A701	1	
44	1N746A	2	SEMICOND DEVICE 353-2938-000 1A7CR5	1	
45	1N645	2	SEMICOND DEVICE 353-2607-000 1A7CR6	1	
46	MS17121-3	2	TERMINAL 306-2468-010	2	
47	M153SBRTTIN	2	EYELET, MET., COP, 0.047 DIA X 0.085 23730 307-1270-000	105	
48	783-6554-001	2	BOARD, ETCHED 1A7TB3	1	
2-44 - 0	565-5580-003	1	MAGETRON HEATER MODULE SEE FIG. 2-28-(273) FOR NHA 1A9TB10	REF	
2-44 - 0	777-7340-001	1	MAGNETRON HEATER MODULE SB13 1A9TB10	REF	
1	RW69V220	2	RESISTOR, FXD, WW, 22 OHMS, 5%, 3W 747-5327-000 1A9R73	1	
2	RW69V220	2	RESISTOR, FXD, WW, 22 OHMS, 5%, 3W 747-5327-000 1A9R75	1	
3	RW69V220	2	RESISTOR, FXD, WW, 22 OHMS, 5%, 3W 747-5327-000 1A9R78	1	
4	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP	1	
5	506-5907-003	2	WASHER, FLAT	2	
6	MS35338-135	2	WASHER, LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000	1	
7	P313-0132-00	2	NUT, PLAIN, HEX., SST, 4-40 77250 313-0132-000	1	
8	TY13	2	CLAMP 59730 435-1051-000	1	
9	565-5579-003	2	BOARD, WIRED	1	
10	M164SBRTTIN	3	EYELET, MET., COP, 0.060 DIA X 0.088 23730 307-1268-000	14	
11	565-5578-003	3	BOARD, WIRED	1	

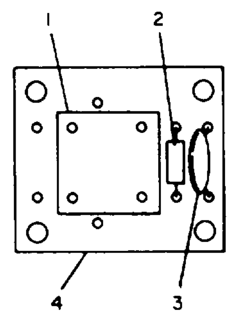




Magnetron Heater Module

Figure 2-44

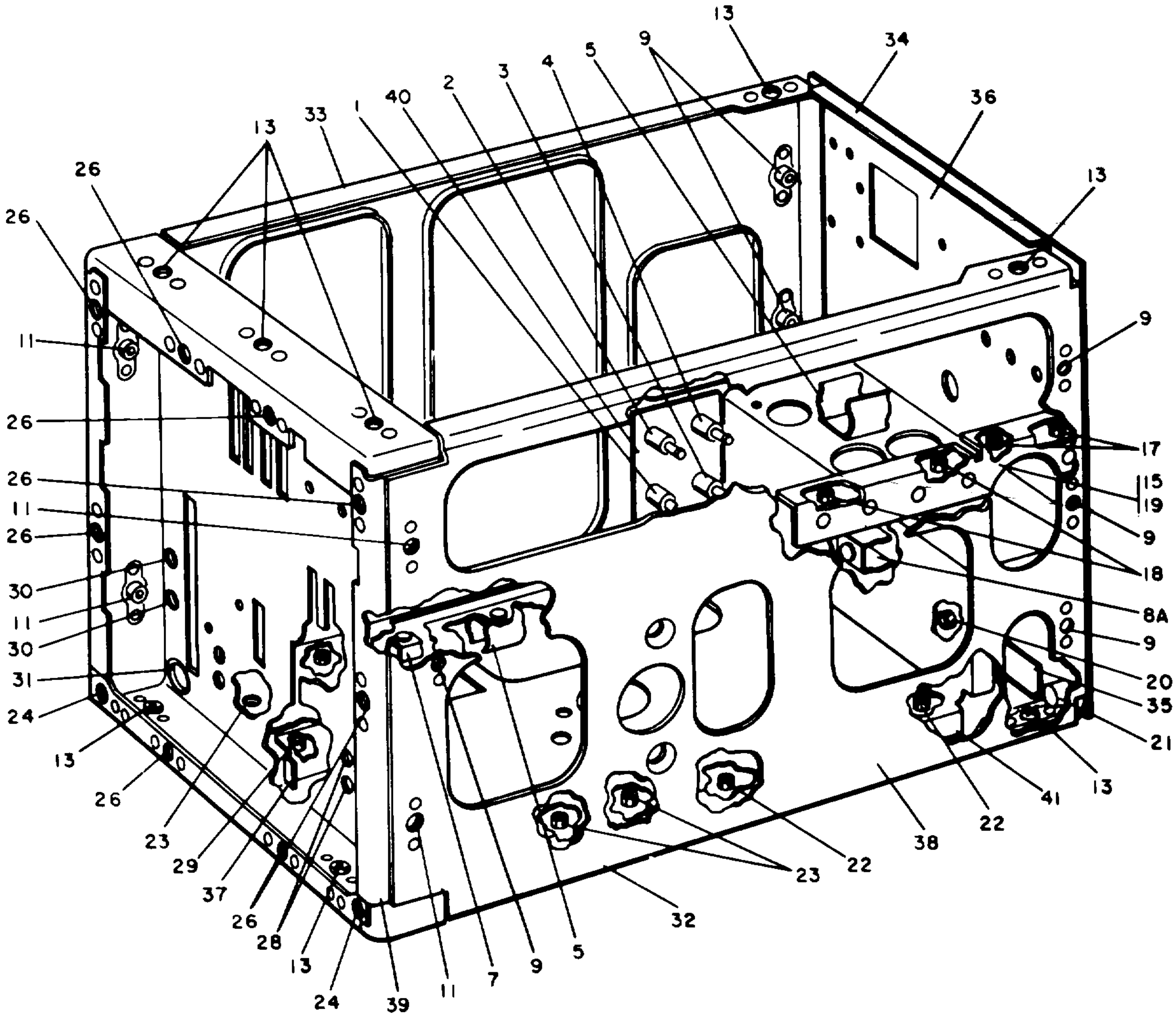




Wired Thyratron Grid

Figure 2-45

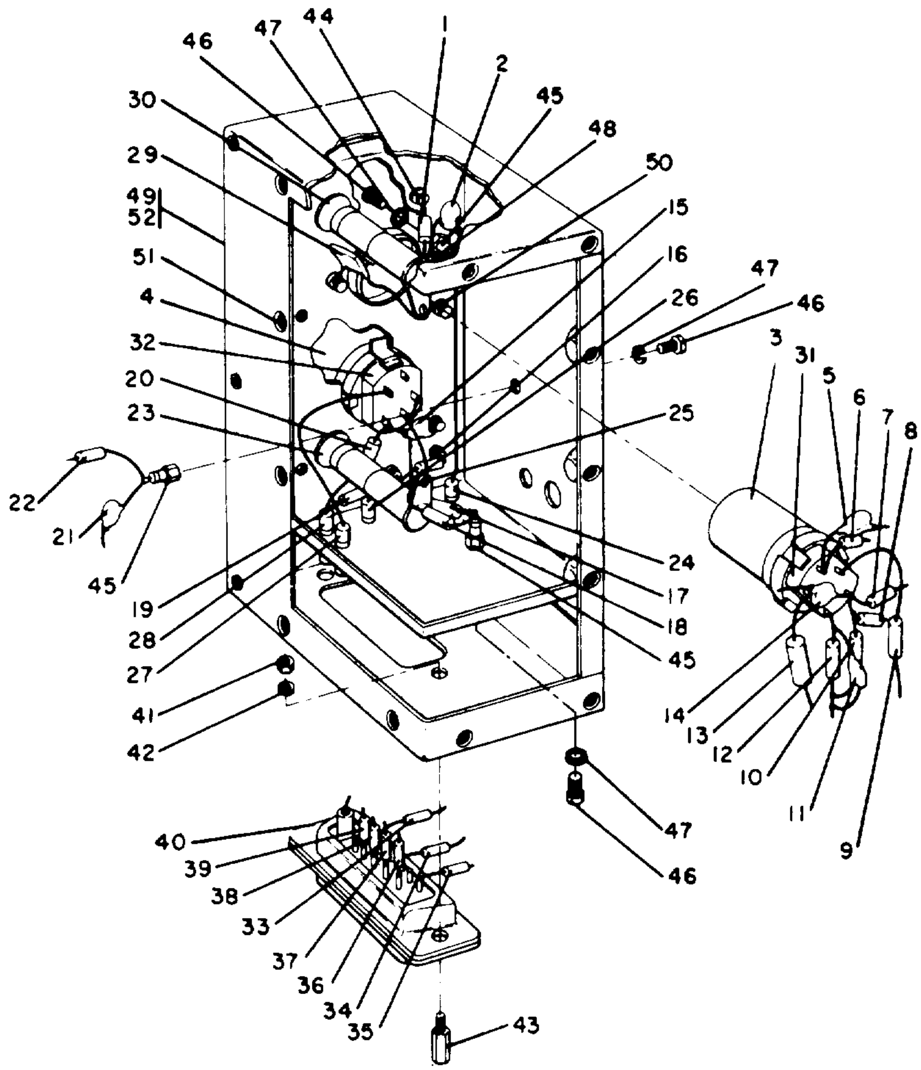
FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-45 - 0	563-5089-003	1	THYRATRON GRID, WIRED SEE FIG. 2-28-(285) FOR NHA 1A8TB7	REF	
1	Y18643	2	TRANSFORMER 56289 674-3053-000 AT3	1	
2	RC20GF100K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/2W 745-1394-000 EFF THRU BOARD REV F 1A8R46	1	
2	RC20GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/2W 745-1380-000 EFF BOARD REV G 1A8R46	1	
3	S60815	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 100PF, 20%, 2000V 01939 913-3960-000 1A8C22	1	
4	563-5088-003	2	THYRATRON GRID, WIRED	1	
5	M1645BRTTIN	3	EYELET, MET., COP, 0.060 DIA X 0.088 23730 307-1268-000	12	
6	563-5087-003	3	THYRATRON GRID, WIRED	1	
2-45 - 0	564-2100-006	1	CHASSIS ASSY SEE FIG. 2-28(518) FOR NHA EFF THRU REV 20/W 1A1	REF	
2-45 - 0	556-9073-002	1	CHASSIS ASSY SEE FIG. 2-28(518) FOR NHA EFF REV 21/Y 1A1	REF	
1	SKT5BCRED	2	JACK, TIP, RED 98291 360-0139-000 1A1TP3	1	
2	SKT5BCBRN	2	JACK, TIP, BROWN 98291 360-0138-000 1A1TP2	1	
3	SKTSBCORN	2	JACK, TIP, ORANGE 98291 360-0140-000 1A1TP5	1	
4	SKT5BCBLK	2	JACK, TIP, BLACK 98291 360-0137-000 1A1TP1	1	
5	100-225-9-3	2	CLIP 99378 139-0763-000	2	
- 6	MS20470AD3-3	2	RIVET, SOLID, AL, 0.094 DIA X 0.187 305-1154-000 AP	2	
7	100-200-12-2	2	CLIP 99378 139-0754-000	1	
- 8	MS20470AD4-4	2	RIVET, SOLID, AL, 1/8 DIA X 1/4 305-1169-000 AP	1	
8A	100-225-9-3	2	CLIP 99378 139-0763-000 EFF THRU REV 20/W	1	
- 8B	MS20470AD3-3	2	RIVET, SOLID, AL, 0.094 DIA X 0.187 305-1154-000 EFF THRU REV 20/W AP	1	
9	LHTA521-2860 62	2	NUT, SELF-LKG, PLATE, SST, 6-32 72962 333-0970-000	8	
- 10	CCR264SS5-3-3	2	RIVET, BLIND, CAD PL STL, 0.183 DIA X 1.093 11815 305-1089-010 AP	16	
11	LHTA521-2860	2	NUT, SELF-LKG, PLATE, SST, 6-32 72962 333-0970-000	4	
- 12	MS20426AD3-4	2	RIVET, SOLID, AL, 3/32 DIA X 1/4 305-1362-000 AP	8	
13	5R2-3	2	RECEPTACLE 71286 012-2882-000	9	
- 14	CCR26455-3-3	2	RIVET, BLIND, CAD PL STL, 0.183 DIA X 1.093 11815 305-1089-010 AP	18	



Chassis Assembly

Figure 2-46

FIG.- ITEM		PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-46 -	15	563-5094-003	2	BRACKET		1	
-	16	CCR264SS-3-3	2	RIVET, BLIND, CAD PL STL, 0.183 DIA X 1.093 11815 305-1089-010 AP		5	
	17	502-6812-002	3	NUT, RIVET		2	
	18	502-6304-002	3	NUT, RIVET		2	
	19	563-5093-003	3	BRACKET, ANGLE		1	
	20	540-6244-002	2	NUT, RIVET		3	
	21	563-5018-002	2	INSERT		2	
	22	502-6302-002	2	NUT, RIVET		2	
	23	564-2031-002	2	NUT, RIVET		12	
	24	12LHTA17M62	2	NUT, SELF-LKG, PLATE, CAD PL STL, 6-32 72962 333-1047-000		2	
-	25	CCR264SS-3-3	2	RIVET, BLIND, CAD PL STL, 0.183 DIA X 1.093 11815 305-1089-010 AP		4	
	26	MF1000-06	2	NUT, SELF-LKG, PLATE, CAD PL STL, 6-32 15653 334-1126-000		8	
-	27	CCR264SS-3-3	2	RIVET, BLIND CAD PL STL, 0.183 DIA X 1.093 11815 305-1089-010 AP		16	
	28	564-2028-002	2	NUT, RIVET		5	
	29	564-2029-002	2	NUT, RIVET		2	
	30	562-0855-002	2	NUT, RIVET		2	
	31	496CADPL	2	EYELET, MET., CAD PL BRS, 0.665 DIA X 0.152 01881 307-1049-000		2	
	32	556-9073-001	2	CHASSIS		1	
	33	556-9076-001	3	PLATE, SIDE BOARD		1	
	34	563-5117-002	3	STIFFENER		1	
	35	564-2032-002	3	STIFFENER		1	
	36	556-9074-001	3	PANEL, REAR		1	
	37	563-5070-004	3	RIB, CHASSIS		1	
	38	564-2052-004	3	PANEL		1	
	39	556-9089-001	3	CHAMBER, PLENUM		1	
	40	564-2033-002	3	BRACKET, TEST POINT		1	
	41	556-9075-001	3	MOUNTING, FLOOR		1	
2-47 -	0	563-5062-004	1	PRFAMPLIFIER ASSY SEE FIG-2-37(7) FOR NHA EFF THRU REV 20/2	1A10A1	REF	
	1	MS18130-12	2	COIL, RF, 2.20MH 240-0789-000	1A10A1L22	1	
	2	DA141-2888	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 500PF, 20%, 1000V 71590 913-3854-000	1A10A1C42	1	
	3	7586	2	ELECTRON TUBE 49671 255-0370-000	1A10A1V6	1	
	4	7586	2	ELECTRON TUBE 49671 255-0370-000	1A10A1V5	1	
	5	DA141-288B	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 500PF, 20%, 1000V 71590 913-3854-000	1A10A1C49	1	
	6	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L19	1	
	7	RC07GF474K	2	RESISTOR, FXD, COMP, 470K, 10%. 1/4W 745-0845-000	1A10A1R67	1	

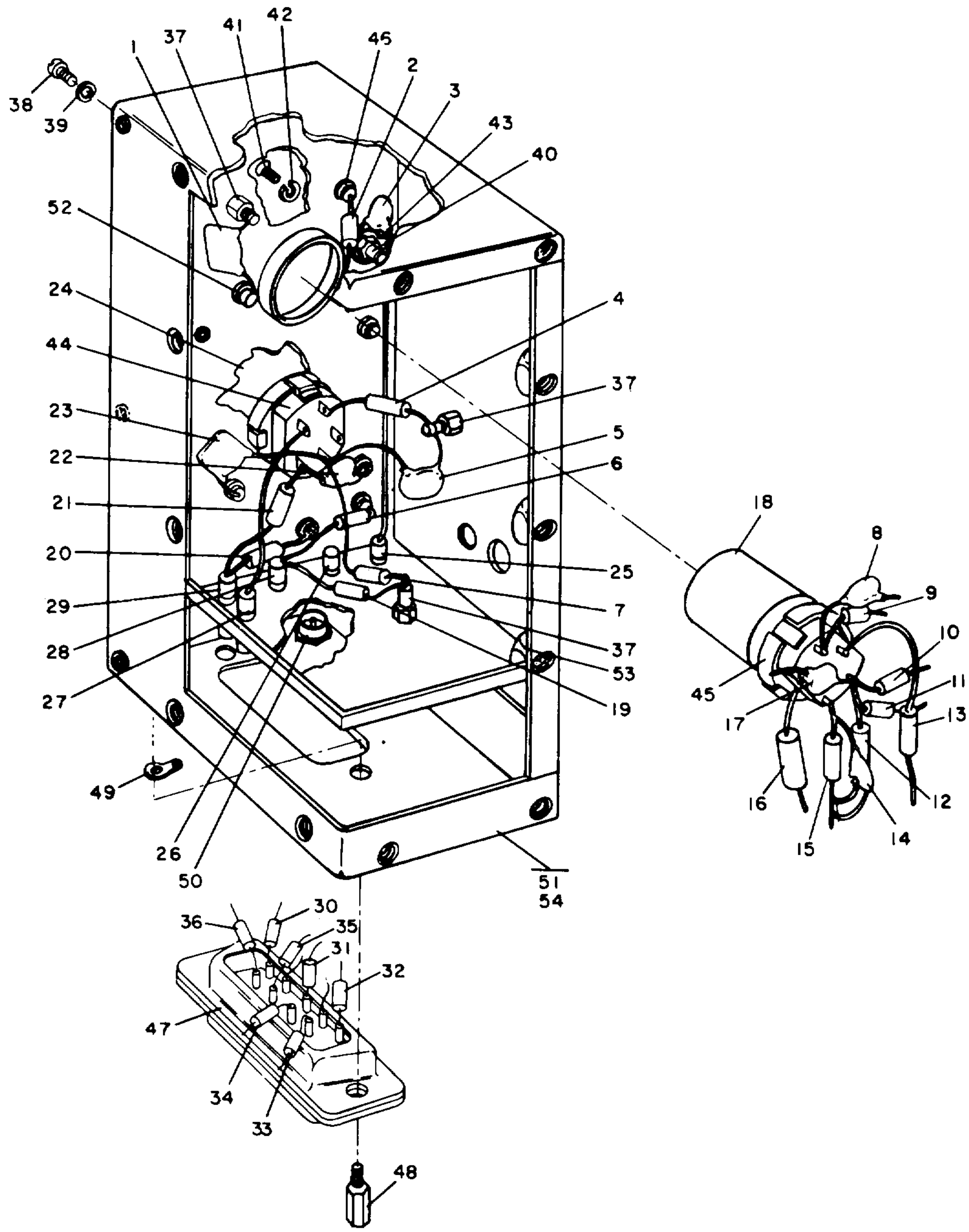


Preamplifier Assembly

Figure 2-47

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-47 - 8	RC07GF474K	2	RESISTOR, FXD, COMP, 470K, 10%, 1/4W 745-0845-000 1A10A1R66	1	
9	MS18130-16	2	COIL, RF, 4.70MH 240-0793-000 1A10A1L20	1	
10	MS18130-16	2	COIL, RF, 4.70MH 240-0793-000 1A10A1L23	1	
11	DA141-288B	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 500PF, 20%, 1000V 71590 913-3854-000 1A10A1C45	1	
12	RC07GF680K	2	RESISTOR, FXD, COMP, 68 OHMS, 10%, 1/4W 745-0707-000 1A10A1R63	1	
13	MS18130-16	2	COIL, RF, 4.70MH 240-C793-000 1A10A1L21	1	
14	CK60AW152M	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 1500PF, 20%, 500V 913-1191-000 1A1A1C44	1	
15	CK60AW152M	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 1500PF, 20%, 500V 913-1191-000 1A1A1C46	1	
16	RC07GF822K	2	RESISTOR, FXD, COMP, 8.2K, 10%, 1/4W 745-0782-000 1A10A1R61	1	
17	BP971	2	COIL, RF, 1.40UH 99800 240-1085-000 1A10A1L16	1	
18	C0047685	2	COIL, RF, 2.80UH 95265 240-1245-000 1A10A1L17	1	
19	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-C752-000 1A10A1R64	1	
20	RC07GF680K	2	RESISTOR, FXD, COMP, 68 OHMS, 10%, 1/4W 745-0707-000 1A10A1R62	1	
21	DA141-288B	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 500PF, 20%, 1000V 71590 913-3854-000 1A10A1C47	1	
22	BP970	2	COIL, RF, 7.6UH 99800 240-1084-000 1A10A1L18	1	
23	922-0298-000	2	CAPACITOR, VAR, GLASS DIELECTRIC, 1 TO 7.5PF, 500V 73899 1A10A1C48	1	
24	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 400PF, 360V 72982 913-2601-000 1A10A1C37	1	
25	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 400PF, 360V 72982 913-2601-00 1A10A1C40	1	
26	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 400PF, 360V 72982 913-2601-000 1A10A1C38	1	
27	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 400PF, 360V 72982 913-2601-000 1A10A1C41	1	
28	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 400PF, 360V 72982 913-2601-000 1A10A1C39	1	
29	DM15C050D01	2	CAPACITOR, FXD, MICA DIELECTRIC, 5PF, 0.5PF, 500V 72136 912-2750-000 1A10A1C54	1	
30	922-0298-000	2	CAPACITOR, VAR, GLASS DIELECTRIC, 1 TO 7.5PF, 500V 73899 1A10A1C43	1	
31	133-65-10-00 1	2	SOCKET 71785 220-1444-000 1A10A1XV6	1	
32	133-65-10-00 1	2	SOCKET 71785 220-1444-000 1A10A1XV5	1	

FIG.-ITEM		PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-47 -	33	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L15	1	
	34	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L9	1	
	35	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L10	1	
	36	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L11	1	
	37	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L13	1	
	38	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L14	1	
	39	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L12	1	
	40	DA11C1P	2	CONNECTOR 71468 371-0228-000	1A10A1P2	1	
	41	P313-0132-00 0	2	NUT, PLAIN, HEX., SST, 4-40 77250 313-0132-000 AP		2	
	42	310-0278-060	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP		2	
	43	CA20418-4	2	SCREW, ASSEMBLED CLIP 71468 371-0062-000 AP		2	
	44	AA40WPP	2	TERMINAL 20093 306-0070-000		1	
	45	TF300	2	TERMINAL 98291 306-1018-000		3	
	46	MS51957-1	2	SCREW, MACH., SST, 2-56 X 1/8 343-0122-000 AP		3	
	47	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		3	
	48	SPL4040-2HOT	2	TERMINAL 77147 304-0331-000 TINNED		1	
	49	564-8245-005	2	CHASSIS, PREAMPLIFIER		1	
	50	306-0757-000	3	TERMINAL 15849		8	
	51	504-7698-002	3	FASTENER, ANGLE		19	
	52	564-8244-005	3	CHASSIS, SOLDERED		1	
2-48 -	0	556-9081-001	1	PREAMPLIFIER ASSY SEE FIG.2-37(7) FOR NHA EFF REV 21/Y AND ABOVE	1A10A1	REF	
	1	DM15C100J01	2	CAPACITOR, FXD, MICA DIELECTRIC, 10PF, 0.5PF, 500V 72136 912-2753-600	1A10A1C54	1	
	2	MS18130-12	2	COIL, RF, 2.20MH 240-0789-000	1A10A1L22	1	
	3	DA141-288B	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 500PF, 20%, 1000V 71590 913-3854-000	1A10A1C42	1	
	4	BP970	2	COIL, RF, 7.6UH 99860 240-1084-000	1A10A1L18	1	
	5	DA141-2866	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 500PF, 20%, 1000V 71590 913-3854-000	1A10A1C47	1	
	6	RC07GFS22K	2	RESISTOR, FXD, COMP, 8.2K, 10%, 1/4W 745-0782-000	1A10A1R61	1	
	7	C0047685	2	COIL, RF, 2.80UH 95265 240-1245-000	1A10A1L17	1	
	8	DA141-288B	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 500PF, 20%, 1000V 71590 913-3854-000	1A10A1C49	1	
	9	MS18130-20	2	COIL, RF, 10MH 240-0791-000	1A10A1L19	1	
	10	RC07GF474K	2	RESISTOR, FXD, COMP, 470K, 10%, 1/4W 745-0845-000	1A10A1R67	1	

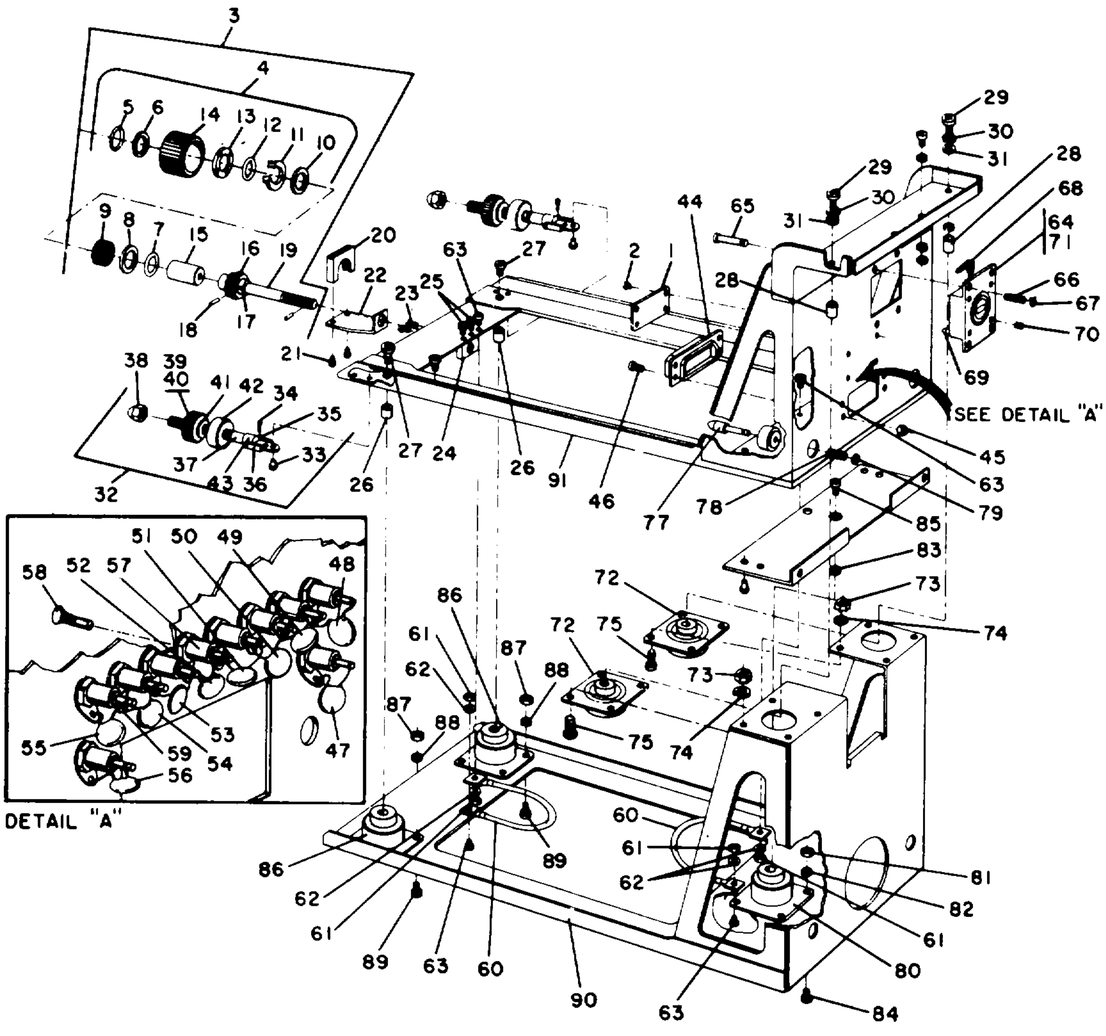


Preamplifier Assembly

Figure 2-48

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
2-48 - 11	RC07GF474K	2	RESISTOR, FXD, COMP, 470K, 10%, 1/4W 745-0845-000	1A10A1R66	1	
12	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-07459-00	1A10A1R65	1	
13	LT4K043	2	COIL, RF, 5.6UH 240-0146-000	1A10A1L20	1	
14	CK6SAW152M	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 1500PF, 20%, 500V 913-1191-000	1A10A1C45	1	
15	RC07GF680K	2	RESISTOR, FXD, COMP, 68 OHMS, 10%, 1/4W 745-0707-000	1A01A1R63	1	
16	LT4K043	2	COIL, RF, 5.6UH 240-0146-000	1A10A1L21	1	
17	CK60AW152M	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 150GPF, 20%, 500V 913-1191-000	1A10A1C44	1	
18	7586	2	ELECTRON TUBE 49671 255-0370-000	1A10A1V6	1	
19	BP971	2	COIL, RF, 1.400H 99800 240-1085-000	1A10A1L16	1	
20	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000	1A10A1R64	1	
21	RC07GF660K	2	RESISTOR, FXD, COMP, 68 OHMS, 10%, 1/4W 745-0707-000	1A10AR62	1	
22	CK60AW152M	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 1500PF, 20%, 500V 913-1191-000	1A10A1C46	1	
23	DM15C050D01	2	CAPACITOR, FXD, MICA DIELECTRIC, 5PF, 0.5PF, 500V 72136 912-275G-000	1A10A1C48	1	
24	7586	2	ELECTRON TUBE 49671 255-0370-000	1A10A1V5	1	
25	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 400PF, 360V 72982 913-2601-000	1A10A1C37	1	
26	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 400PF, 360V 72982 913-2601-000	1A10A1C40	1	
27	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 400PF, 360V 72982 913-2601-000	1A10A1C41	1	
28	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC. 400PF, 360V 72982 913-2601-000	1A10A1C38	1	
29	2404026W5P04 O1P	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 400PF, 360V 72982 913-261-000	1A10A1C39	1	
30	MS18130-20	2	COIL. RF, 10MH 240-0797-000	1A10A1L15	1	
31	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L9	1	
32	MS18130-20	2	COIL. RF, 10MH 240-0797-000	1A10A1L10	1	
33	LT4K043	2	COIL, RF, 5.6UH 240-0146-000	1A10A1L11	1	
34	MS18130-20	2	COIL, RF, 10MH 240-0797-000	1A10A1L13	1	
35	MS18130-20	2	COIL. RF, 10MH 240-0797-000	1A10A1L14	1	
36	LT4K043	2	COIL, RF, 5.6UH 240-0146-000	1A10A1L12	1	
37	TF300	2	TERMINAL 98291 306-1018-000		3	
38	MS51957-1	2	SCREW, MACH., SST, 2-56 X 1/8 343-0122-000 AP		3	
39	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		3	
40	TF300	2	TERMINAL 98291 306-1018-000		1	
41	MS551957-2	2	SCREW, MACH, SST, 2-56 X 3/16 343-0123-000 AP		1	

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-48 - 42	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	1	
43	SPL4040-2HOT TINNED	2	TERMINAL 77147 304-0331-000	1	
44	133-65-10-00 1	2	SOCKET 71785 220-1444-000 1A10A1XV5	1	
45	133-65-10-00 1	2	SOCKET 71785 220-1444-000 1A10A1XV6	1	
46	AA4UWPP	2	TERMINAL 20093 306-0070-000	1	
47	DE9PC33	2	CONNECTOR 71468 371-0168-000 1A10A1P2	1	
48	CA20418-4	2	SCREW, ASSEMBLED CLIP 71468 371-0062-000 AP	2	
49	4007-4HOTTIN NED	2	TERMINAL 77147 304-0015-000 AP	1	
50	0750	2	CONNECTOR 94375 357-9215-000 1A10A1J6	1	
51	556-9082-004	2	CHASSIS 1		
52	306-0757-000	3	TERMINAL 15849	9	
53	504-7698-002	3	FASTENER, ANGLE	19	
54	556-9082-003	3	CHASSIS 1		
2-49 - 0	522-6115-004	1	349A-6 SHOCKMOUNT SEE FIG. 2-27(2) FOR NHA	REF	
1	516-7400-001	2	PLATE, IDENT	1	
2	55Z2-2	2	SCREW, TAP., SST, 2-56 X 1/8 45722 330-1551-000 AP	4	
3	772-8950-001	2	EXTRACTOR	1	
4	541-7558-002	3	KNOB 1		
5	5100-37C	4	RING 79136 340-0043-000	1	
6	546-8182-002	4	WASHER, KEY	1	
7	5100-37C	4	RING 79136 340-0043-000	1	
8	546-3046-003	4	WASHER, FLAT	1	
8	764-8682-001	4	WASHER	1	
9	547-3186-002	4	SPRING, CLUTCH	4	
10	546-3022-003	4	WASHER, FLAT	1	
10	764-8682-001	4	WASHER	1	
11	541-7556-002	4	PLATE, DETENT	1	
12	5100-37C	4	RING 79136 340-0043-000	1	
13	541-7557-002	4	PLATE. DETENT	1	
14	541-7554-002	4	KNOB, CLUTCH	1	
15	541-7553-002	4	SHAFT, STR	1	
16	FR9	3	BEARING 43766 309-0167-000	1	
17	503-5781-001	3	COLLAR	1	
18	MS35672-12	3	PIN, GROOVED, HDLS, SST, 0.078 DIA X 0.375 311-1132-300 AP	1	
19	541-7564-002	3	SHAFT, STR	1	
20	566-9741-003	2	JAW 1		
21	MS51959-15	2	SCREW, MACH., SST, 4-40 X 3/8 342-0046-000 AP	2	
22	566-9740-003	2	PLATE, JAW	1	
23	MS51959-13	2	SCREW, MACH., SST, 4-40 X 1/4 342-0044-000 AP	2	
24	768-1530-001	2	RETAINER, BEARING	1	
25	MS51959-15	2	SCREW, MACH., SST, 4-40 X 3/8 342-0046-000 AP	2	



349A-6 Shockmount

Figure 2-49

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-49 - 26	541-6091-002	2	SPACER, SLV	2	
27	MS51959-46	2	SCREW, MACH., SST, 8-32 X 5/8 342-0081-000 AP	2	
28	541-6091-002	2	SPACER, SLV	2	
29	MS51957-46	2	SCREW, MACH., SST, 8-32 X 5/8 343-0190-000 AP	2	
30	MS35338-137	2	WASHER. LOCK, SST, 0.168 ID X 0.280 OD 310-0283-000 AP	2	
31	310-0048-000	2	WASHER, FLAT, SST, 0.172 ID X 0.437 OD COML AP	2	
32	541-6510-002	2	BOLT ASSY		2
33	MS20426AD4-5	2	RIVET, SOLID, AL, 1/8 DIA X 5/16 305-1374-000 AP	4	
34	338-2020-000	3	PIN, COTTER, SST, 3/64 DIA X 1/2 COML	1	
35	541-6506-002	3	CLEVIS	1	
36	541-6507-002	3	PIN	1	
37	541-6509-002	3	SHAFT ASSY	1	
38	334-0043-000	4	NUT, PLAIN, CAPTIVE, NI PL BRS, 4-40 COML	1	
39	541-6508-002	4	THUMB NUT ASSY	1	
40	541-6504-002	5	INSERT	1	
41	541-6505-002	5	INSERT, SCR THD	1	
42	541-6503-002	4	WASHER, LKG	1	
43	541-6502-002	4	SHAFT	1	
44	DPX32C2-33S	2	CONNECTOR 71468 370-2159-000 2J1	1	
45	68-1660-40	2	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0605-000 AP	4	
46	MS51957-15	2	SCREW, MACH., SST, 4-40 X 3/8 343-0135-000 AP	4	
47	19C267A4	2	CAPACITOR, FXD, CERAMIC 2C10 DIELECTRIC, 2200PF, 20%. 500CV 01939 913-3011-000 EFF REV M	1	
48	19C267A4	2	CAPACITOR, FXD, CERAMIC 2C9 DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 EFF REV M	1	
49	19C267A4	2	CAPACITOR, FXD, CERAMIC 2C8 DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 EFF REV M	1	
50	19C267A4	2	CAPACITOR, FXD, CERAMIC 2C7 DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 EFF REV M	1	
51	19C267A4	2	CAPACITOR, FXD, CERAMIC 2C6 DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 EFF REV M	1	
52	19C267A4	2	CAPACITOR, FXD, CERAMIC 2C5 DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 EFF REV M	1	
53	19C267A4	2	CAPACITOR, FXD, CERAMIC 2C4 DIELECTRIC. 2200PF, 20%, 500V 01939 913-3011-000 EFF REV M	1	
54	19C267A4	2	CAPACITOR, FXD, CERAMIC 2C3 DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 EFF REV M	1	
55	19C267A4	2	CAPACITOR, FXD, CERAMIC 2C2 DIELECTRIC. 2200PF, 20%, 500V 01939 913-3011-000 EFF REV M	1	

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
2-49 - 56	19C267A4	2	CAPACITOR, FXD, CERAMIC DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 EFF REV M 2C1	1	
57	RTMT12M	2	TERMINAL 91663 306-0976-000 EFF REV M		
58	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 EFF REV M AP	10	
59	2104-04-01-2 520N	2	TERMINAL 78189 304-0317-000 10 EFF REV M		
60	505-2784-002	2	LEAD, ELECTRICAL	2	
61	68-1660-40	2	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0605-000 AP	4	
62	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	4	
63	MS51959-13	2	SCREW, MACH., SST, 4-4, X 1/4 342-0044-000 AP	4	
64	768-1160-001	2	WAVEGUIDE ASSY	1	
65	768-1527-001	2	PIN, SPG AP	4	
66	768-1528-001	2	SPRING, HELICAL AP	4	
67	MS16633-1018	2	RING 340-0090-000 AP	4	
68	KF04-02PS90	3	CONNECTOR 30327 332-2164-010	1	
69	563-5056-002	3	PIN, GUIDE	2	
70	MS21209C0815	3	INSERT 012-2112-000	6	
71	768-1531-001	3	WAVEGUIDE	1	
72	H44AA6	2	MOUNT 81860 200-2359-130	2	
73	68-1660-40	2	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0605-000 AP	8	
74	MS35338-137	2	WASHER, LOCK, SST, 0.168 ID X 0.280 OD 310-0283-000 AP	8	
75	MS51957-43	2	SCREW, MACH., SST, 8-32 X 3/8 343-0187-000 AP	8	
77	564-2690-002	2	PIN	2	
78	565-5387-002	2	SPRING	2	
79	MS16633-1015	2	RING 340-0089-000	2	
80	H44AA10	2	MOUNT 81860 200-2359-140	1	
81	MS35649-84	2	NUT, PLAIN, HEX., STL, 8-32 313-0017-000 AP	4	
82	MS35338-137	2	WASHER, LOCK, SST, 0.168 ID X 0.280 OD 310-0283-000 AP	4	
83	310-0060-000	2	WASHER, FLAT, NI PL BRS, 0.203 ID X 0.500 OD COML AP	1	
84	MS51957-43	2	SCREW, MACH., SST, 8-32 X 3/8 343-0187-000 AP	4	
85	MS51959-43	2	SCREW, MACH., SS55 8-32 X 3/8 342-0078-000 AP	1	
86	H44AA10	2	MOUNT 81860 200-2359-140	2	
87	MS35649-84	2	NUT, PLAIN, HEX., STL, 8-32 313-0017-000 AP	8	
88	MS35338-137	2	WASHER, LOCK, SST, 0.168 ID X 0.280 OD 310-0283-000 AP	8	
89	MS51957-43	2	SCREW, MACH., SST. 8-32 X 3/8 343-0187-000 AP	8	
90	563-5051-005	2	BASE PLATE WELDED	1	
91	772-4898-001	2	TRAY	1	

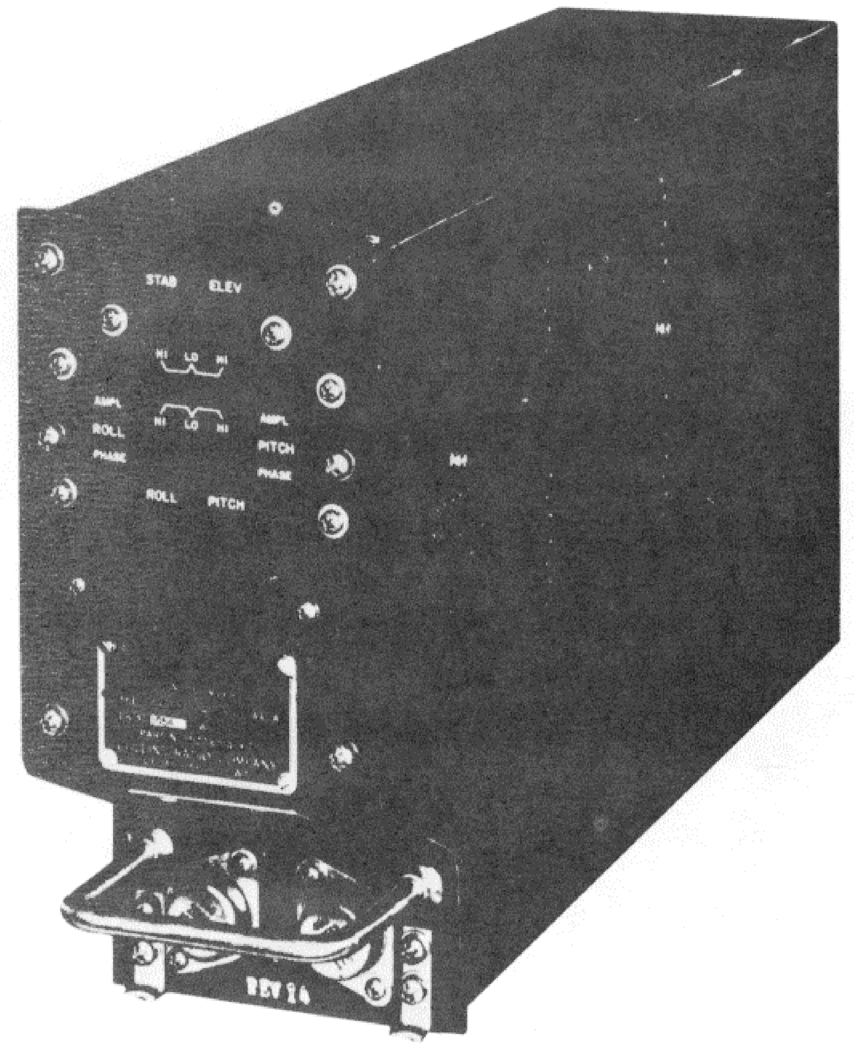
CHAPTER 3

SYNCHRONIZER, ELECTRICAL SN-358/APN-158(776C-3)

AND

MOUNT, SYNCHRONIZER MT-3069/APN-158(349B-4)

NOTE: Synchronizer, Electrical SN-358/APN-158 and Mount, Synchronizer MT-3069/APN-158 are referred to in this chapter by their commercial nomenclature; Synchronizer 776C-3 and Shockmount 349B-4 respectively.



776C-3 Synchronizer, Overall View

Figure 3-1

Section I. DESCRIPTION AND OPERATION

3-1. GENERAL.

This section presents the purpose of the equipment, equipment specifications, equipment description, and theory of operation of the equipment. Refer to figure 3-1. for an overall view of the equipment. Figure 3-2. is a table of equipment covered in this manual.

EQUIPMENT	DESCRIPTION	COLLINS PART NUMBER
776C-3	Synchronizer	522-6114-006
349B-4	Shockmount	522-6116-004

Equipment Covered

Figure 3-2

3-2. PURPOSE OF EQUIPMENT.

The 776C-3 Synchronizer and 349B-4 Shockmount are part of the Collins WP-103 Weather Radar System. The synchronizer provides synchronization with the antenna azimuth and antenna stabilization circuits to prevent disruption of the target display by roll and pitch of the aircraft. It also generates range mark signals and provides if. signal amplification, video detection, video amplification with signal cancellation for contour presentation, and afc detection and amplification for control of the klystron. The unit supplies a sensitivity time control (stc) pulse to compensate for video amplitude variation with range of close targets. The 349B-4 Shockmount provides mounting facilities for the synchronizer unit.

3-3. EQUIPMENT SPECIFICATIONS.

The equipment specifications for the 776C-3 Synchronizer and 349B-4 Shockmount are listed in figure 3-3

3-4. EQUIPMENT DESCRIPTION.

A. Mechanical Description.

The 776C-3 Synchronizer is housed in a 3/8-ATR short case (14-15/16 inches long, 7-3/4 inches high, and 3-11/16 inches wide) and is mounted in the 349B-4 Shockmount. A 1-piece dust cover encloses the 776C-3 with ventilating holes for convection cooling.

Characteristic	Specification
	776C-3 Synchronizer
Weight	10.5 pounds (4.76 kg).
Physical dimensions (3/8 ATR short)	14-15/16 inches (37.9 cm) long, 7-3/4 inches (19.7 cm) high, 3-11/16 inches (9.36 cm) wide.
Power requirements (supplied by 374A-3 Receiver-Transmitter)	109 to 121 v, 380 to 420 Hz at 4 watts, +27.5 v at 46 watts, -27.5 v at 13 watts. **NOTE: The 109- to 121-v source must be the same source that excites the gyro.**
Cooling	Convection.
Shock conditions	
Performance criteria	Eighteen 10-millisecond shocks at 7.5 g.
Safety criteria	Six 10-millisecond shocks at 15 g.
Vibration	0.030 in. total excursion at 10 to 55 Hz and 5.0 g peak acceleration at 55 to 500 Hz when mounted in the 349B-4 Shockmount and 1.5 g peak when mounted solid.
Mounting	349B-4 Shockmount, Collins part number 522-6116-004.
Duty cycle	Continuous.
Temperature	
Continuous operation	-55 to +55 °C (-67 to +131 °F).
30-minute operation	-55 to +71 °C (-67 to +160 °F).

Equipment Specifications (Sheet 1 of 2)

Figure 3-3

Characteristic	Specification
776C-3 Synchronizer (Cont)	
Relative humidity	100% at +50 °C (+122 °F).
Altitude	Category A.
349B-4 Shockmount	
Weight	1.7 pounds (0.77 kg).
Physical dimensions	17-3/16 inches (44.1 cm) long, 9-1/8 inches (23 cm) high,. 4-39/64 inches (11.6 cm) wide.

Equipment Specifications (Sheet 2 of 2)

Figure 3-3

The chassis frame is of box construction and provides mounting facilities for the eight plug-in modules in addition to the other electrical circuits that are chassis mounted. Two transistors are mounted on the outside of the front panel. These transistors are used in conjunction with the elevator servo amplifier to drive the antenna tilt motor. A group of control potentiometers and test points are located on a bracket mounted on the rear of the front panel. Access is provided through holes in the front panel. A sliding hatch covers the access holes when the equipment is in operation. An additional group of test points is located on the upper rear section of the chassis frame. The larger transformers and circuit elements are located on the lower right side of the chassis frame.

B. Electrical Description.

All electrical connections are made to the 776C-3 Synchronizer through a connector, type DPX2-H16C3P40P-33A-0073, Collins part number 370-2161-00, located on the rear panel. The unit contains eight plug-in modules and chassis circuits.

Each of the plug-in modules and chassis-mounted circuits are described in the following paragraphs.

(1) IF. Amplifier Module 3A6.

The if. amplifier module is approximately twice as large as the smaller modules and contains two sections: an if. section and an afc section. The if. section consists of six amplifier stages with transformer coupling and two detector stages. The afc section consists of an input amplifier stage and a discriminator circuit coupled to a detector network. The output stage is a cascaded emitter-follower circuit. The afc output is supplied to the afc module. The video output is supplied to the video driver module. The bias voltage in both the if. and afc sections is +15 volts.

(2) Video Driver Module 3All.

(a) Collins Part Number 565-5607-005.

The video driver module consists of several amplifiers, a Schmitt trigger circuit, and a canceling network. One of the amplifier circuits functions as an adder and another as a mixer stage. The output stage is a pair of driver amplifiers. The bias voltages are +15 and +27. 5 volts.

One amplifier circuit, the Schmitt trigger circuit, and the canceling network are used in conjunction with the contour (CTR) mode of operation.

(b) Collins Part Number 757-0719-003.

The video driver module consists of several amplifiers, a trigger circuit, a canceling circuit, a mixer-adder circuit, and a gain control circuit. The output to the indicator unit is applied through an emitter-follower. The bias voltages are +27 and +15 volts. The trigger circuit and the canceling circuit are used in conjunction with the contour (CTR) mode of operation. One amplifier is used to compensate the display for-the effects of stc action.

(3) Automatic Frequency Control (AFC) Module 3A10.

The afc module consists of a dc clamp, dc amplifier/sweep generator, and a dc-to-dc converter. The dc clamp consists of a single diode which establishes the operating level of the module. The dc amplifier/sweep generator consists of a dc amplifier and a multivibrator followed by a cascaded dc amplifier circuit. The dc-to-dc converter is as a push-pull, square-wave oscillator transformer coupled to a voltage doubling rectifier output circuit.

The bias voltage used is +15 volts. The input signal is generated in the afc discriminator portion of the if. amplifier module. The output signal is used to control the operation of the klystron in the 374A-3 Receiver/Transmitter unit.

(4) Isolation Amplifier Module 3A4 (20°) and 3A5 (40°).

The isolation amplifier module consists of two identical amplifier channels with stable gain and phase characteristics. The bias voltage used by both channels is +27.5 volts. The input signals are generated in the aircraft gyro and transformer coupled through a phase-shift network to the isolation amplifier module. The output signals are coupled to the pitch-roll resolver in the antenna.

(5) Elevation Servo-Amplifier Module 3A3.

(a) General.

The three input signals to the module are stabilization, manual elevation, and rate signals. These signals are combined in the first amplifier stage.

The output signal from the elevation servo-amplifier module is coupled to a push-pull power amplifier mounted on the synchronizer front panel. The output of this amplifier is applied to the antenna tilt motor, with a portion of the signal returned to pins V and U of the elevation servo amplifier to stabilize the servo system.

(b) Collins Part Number 563-4943-005.

This elevation servo-amplifier module consists of five transformers, three amplifier stages, and a phase-shift network. Two transformers are used in the input stage and one in the output stage. The remaining two transformers and the phase-shift network are used in the interstage coupling. The bias voltage used is +15 volts.

(c) Collins Part Number 556-9550-000.

This elevation servo-amplifier module consists of a phase-shift/filter network, three amplifier stages, and an output stage. The output stage is a double transistor driver stage. The bias voltages used are +15 and +27.5 volts.

(d) Collins Part Number 769-7195-001.

This elevation servo-amplifier module consists of a phase-shift/filter network, two amplifier stages, a limiting circuit, and three more amplifier stages. The bias voltages used are +15 and +27.5 volts.

(6) Gate Generator Module 3A2.

The gate generator module consists of a bistable multivibrator circuit, a differentiating circuit, four amplifier stages, a Schmitt trigger circuit, and two relays. The Schmitt trigger and one amplifier reset the multivibrator circuit which is set by the trigger input signal. The relay circuits, controlled by the 493A-3 Indicator RANGE switch, control the operation of another amplifier that provides the input to the Schmitt trigger circuit. The two remaining amplifiers provide the two output signals from the gate generator module. The sensitivity time control (stc) output is used in the if. preamplifier to reduce the gain for short-range, high intensity return signals. The gate output signal is used in the 493A-3 Indicator and in the sweep generator and amplifier module. The bias voltage used is +27.5 volts.

(7) Sweep Generator and Amplifier Module 3A7.

The sweep generator and amplifier module is approximately twice as large as the smaller plug-in modules and uses two connectors.

The sweep generator and amplifier module consists of one gate signal input amplifier followed by four similar sweep current generating channels. Each channel consists of one sweep cutoff transistor circuit and a relay selected charging network followed by three cascaded sweep amplifiers.

The two relays that control the charging network are controlled by the RANGE switch on the 493A-3 Indicator. Two +27. 5-volt sources, one through each connector, are used in the sweep generator and amplifier module.

A +15-volt source is used to base-bias the gate input amplifier and the first sweep amplifier in each channel.

(8) Range Mark Generator Module 3A9

The range mark generator module consists of two relays, a gate input amplifier, a Colpitts oscillator with tuned circuit, an emitter-follower circuit, a pair of cascaded amplifiers, and a blocking oscillator with transformer output.

The two relays control the switching in the tuned circuit. Bias voltage for the transistor circuits is +15 volts. The two relays are controlled by the RANGE switch on the 493A-3 Indicator. The output of the range mark generator module is applied to the video driver module.

(9) Chassis Mounted Circuits 3A1.

(a) General.

The chassis mounted circuits consists of components that are too large for convenient module mounting or require some form of heat dissipating mounting. This includes transformers, large power transistors, diodes, resistors, inductors, and capacitors.

Transistors Q1 and Q2 are mounted on the outside of equipment front panel. These transistors are part of the elevation amplifier and antenna tilt motor drive circuit. Bias voltage for this push-pull amplifier circuit is +27. 5 volts. Thermistor RT1, mounted at the rear of the front panel, compensates for variations in temperature.

Test jacks J10 through J15 and variable resistors R5, R7, R8, and R10 are located to the rear of the front panel. Access to these components is provided through holes in the front panel. The variable resistors are used in conjunction with the antenna stabilization system. Two capacitors and two transformers are mounted on the rear of the chassis frame. The capacitors, C11 and C12, are filters for the +27. 5-volt supply. The transformers, T2 and T3, are part of the isolation amplifier circuit.

Zener diode CR1 is part of the +15-volt supply and is located to the rear of the front panel.

(b) Units With Serial Number 1520 (Revision 17/T) and Below.

These units contain transformers T1, T4 through T7, resistors R4 and R11, and capacitors C1 and C15 mounted on a plate on the lower right side of the chassis frame. These components are part of the sweep excitation, power supply, antenna stabilization, and antenna tilt motor circuits.

The detector board assembly, 3A1A1, is mounted to and located in the lower right side of the chassis frame. This board contains four transistor circuits that generate the sweep excitation signals. The wired servo-phase board, 3A12, is mounted adjacent to the detector board assembly and contains five resistors and two capacitors. These components are used with the antenna sweep resolver and antenna tilt motor circuits.

The detector board assembly, 3A1A1, is mounted to and located in the lower right side of the chassis frame. This board contains four transistor circuits that generate the sweep excitation signals. The wired servo-phase board, 3A12, is mounted adjacent to the detector board assembly and contains five resistors and two capacitors. These components are used with the antenna sweep resolver and antenna tilt motor drive circuits..

(c) Units With Serial Number 1521 (Revision 18/U) and Above.

These units contain transformers T1 and T4 and resistors R4 and R11 mounted on the transformer plate located on the lower right side of the chassis. Transformer T4 and resistor R11 are part of the sweep excitation and antenna stabilization circuits. Transformer T1 is part of the -antenna tilt. motor circuit. Resistor R4 is part of the +15-v power supply. Zenner diode CR2 is mounted adjacent to CR1 at the rear of the front panel. It is part of the antenna stabilization circuit.

Test jacks J16 through J27 and J30 through J35 are located at the rear of the chassis frame. The synchronizer dust cover must be removed to gain access to these jacks.

The detector board assembly (DBA) is mounted to the lower left side of the chassis frame. This board consists of four transistor circuits, transformer T5, resistors and capacitors. These components are part of the sweep excitation, power supply, antenna stabilization, and antenna tilt motor circuits.

NOTE: Units with serial number 2001 (revision 25/AC) and above contain inductors L1 and L2, mounted on the lower right side of the chassis frame between the transformer plate and the front panel; C22, mounted to the rear of the front panel; and C20 and C21, located on the underside of the chassis.

3-5. THEORY OF OPERATION.

A. General.

This section presents a block diagram section and a detailed theory of operation section. The block diagram section presents a discussion of the various functions of the 776C-3 Synchronizer and the plug-in modules. Throughout paragraphs B, C, and D,-the term "antenna" will be used to describe the 537F-7 or 537F-8 Antenna, as applicable to the particular configuration. The 374A-3 Receiver-Transmitter will be referred to as the R/T.

B. Overall Block Diagram Theory. (Refer to figure 3-4)

The overall block diagram theory is divided into three separate functions: echo (video) signal processing, indicator drive signal processing, and antenna stabilization signal processing.

(1) Echo (Video) Signal Processing.

The echo signal processing section consists of an if. amplifier module, and afc module, and a video driver module.

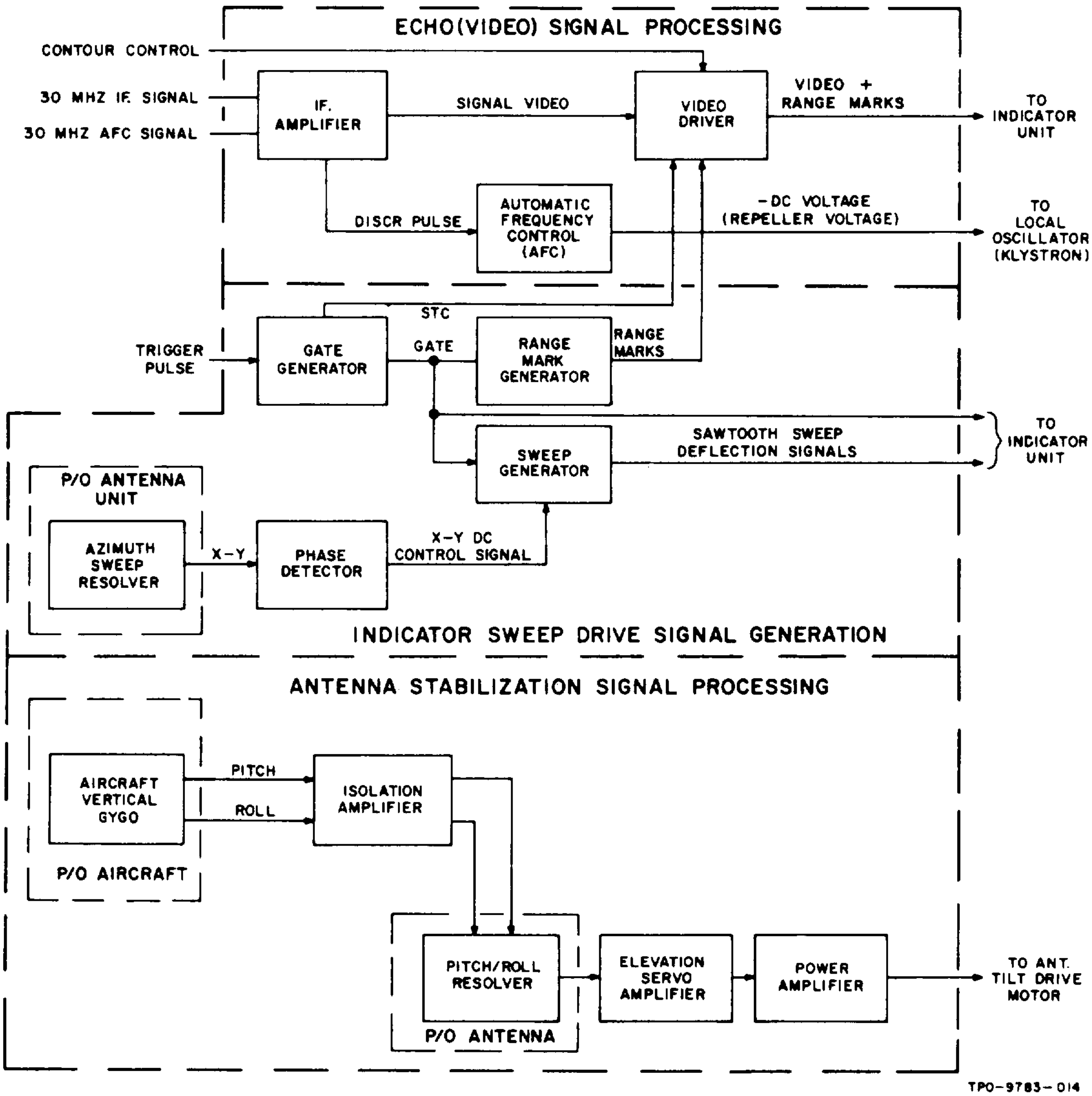
The 30-MHz if. and afc signals from the R/Tare applied to the if. amplifier module. The if. amplifier section processes the if. signal. The detected video signal is then applied to the video driver module. The video driver amplifies the signal, provides signal cancellation in the contour function, mixes range marks with the video signal and supplies the composite signal to the indicator for display.

The 30-MHz afc signal is applied to the afc discriminator section of the if amplifier module for discrimination and amplification. The detected afc signal is then applied to the afc module for voltage conversion. The afc module converts the detected afc signal, through a dc-to-dc converter, to a high negative voltage that is used in the R/T unit for frequency control of the klystron.

(2) Indicator Drive Signal Generation.

The indicator drive signal generation section consists of a gate generator module, a sweep generator module, and a range mark generator module. Other circuits associated with the section are contained in the R/T and indicator units.

The gate generator module generates a gate that is used as a switching command by the sweep generator module, the range mark generator module and the indicator unit. The gate is triggered by an input from the R/T unit for system synchronization.



776C-3 Synchronizer, Overall Block Diagram
Figure 3-4

The sweep generator receives the gate pulse and generates four sawtooth waveforms that are used to drive the sweep deflection coils in the indicator unit. The generator also receives inputs from a phase detector. These are a function of the angular position of the scanning antenna unit.

The range mark generator module also receives the positive gate input from the gate generator and generates range marks of selectable range as determined by the RANGE switch setting on the indicator unit.

Other circuits that are associated with this section are a phase detector in the synchronizer and the azimuth sweep resolver in the antenna.

(3) Antenna Stabilization Signal Processing.

The antenna stabilization signal processing section consists of an isolation amplifier module, an elevation servo-amplifier module, and a tilt drive motor amplifier, and the associated circuits in the antenna. The aircraft vertical reference gyro supplies the stabilization input to this section.

The isolation amplifier receives inputs from the pitch and roll vertical gyros. The inputs are applied into the synchronizer unit through isolation transformers. These signals are amplified and sent to the pitch/roll resolver in the antenna unit.

The pitch-roll resolver in the antenna unit computes the amount of stabilization required for proper elevation of the antenna. The computed elevation stabilization signal is summed with the manual tilt signal from the control unit and applied to the elevation servo-amplifier module.

The elevation servo-amplifier module amplifies the stabilization signal and applies a level to drive the pitch motor driver power amplifier. The power amplifier in turn amplifies to provide power to drive the antenna tilt motor.

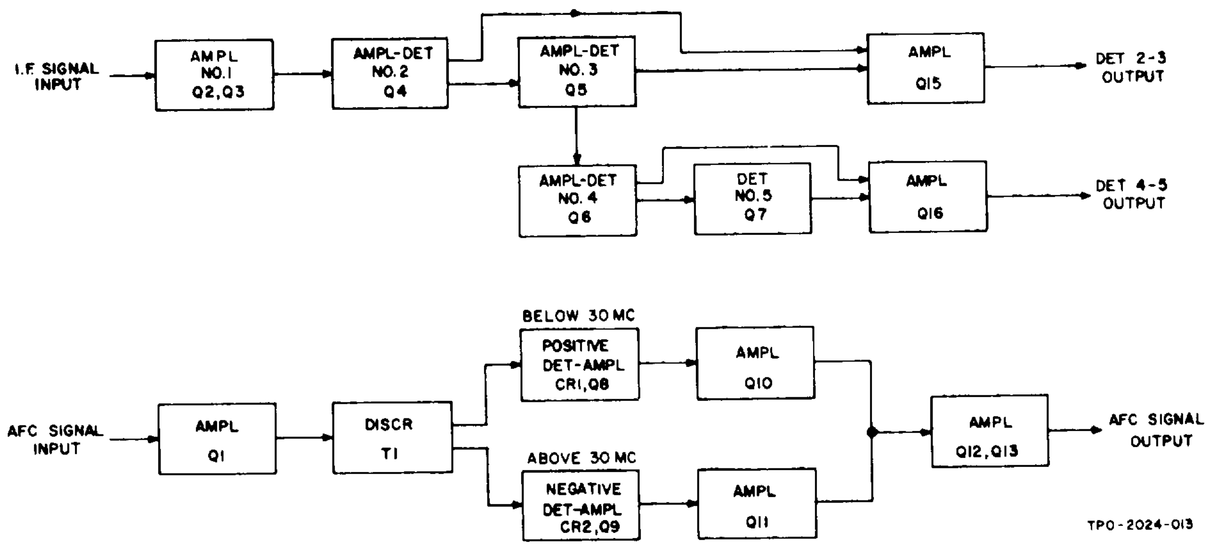
C. <u>Detailed Block Diagram Theory.</u>

(1) IF. Amplifier Module 3A6.

(a) Collins Part Number 564-2711-005. (Refer to figure 3-5) The input signals to this module are received from the R/T unit. The 30-MHz if. signal from the if. preamplifier (R/T) is amplified and detected by the log-linear amplifier consisting of Q2 through Q7. Q15 amplifies the outputs of detectors 2 and 3. Q16 amplifies the output of detectors 4 and 5. The outputs of Q15 and Q16 are applied to the video driver module.

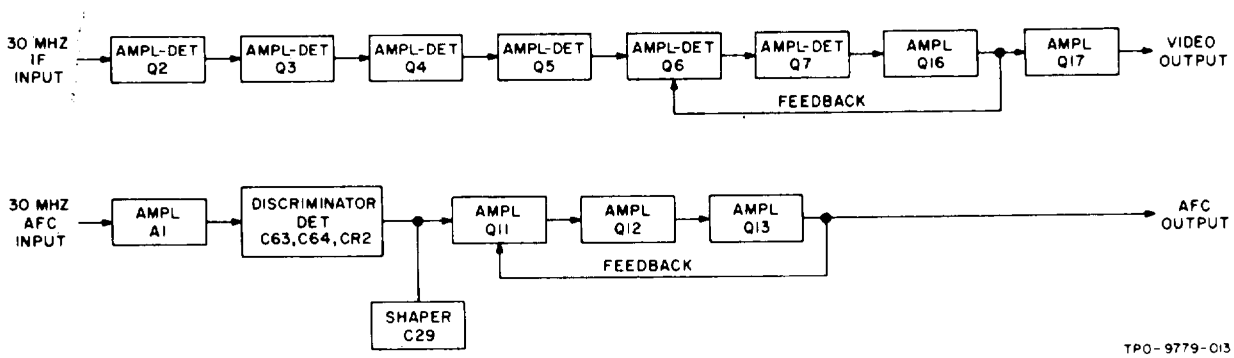
The afc signal input from the afc mixer is amplified by Q1 and applied to discriminator transformer T1. The output of T1 is detected, amplified, and applied to emitter-followers Q12 and Q13. The resultant output signal is applied to the afc module.

(b) Collins Part Number 757-0065-003. (Refer to figure 3-6) The input signals to this module are received from the R/T unit. The 30-MHz if. signal from the if. preamplifier (R/T) is amplified and detected by the loglinear amplifier consisting of Q2 through Q7. Q16 amplifies and provides a feedback signal to the input of Q6 for stabilization of the video. Q17 is the output amplifier. The output is applied to the video driver module.



IF. Amplifier Module (CPN 564-2711-006), Block Diagram
Figure 3-5

The afc signal input from the afc mixer (R/T) is amplified by A1 and applied to the discriminator circuit. The output of the discriminator is applied to amplifier Q11. A feedback is provided by Q13 to the emitter of Q11. The output of Q13 is applied to the afc module.

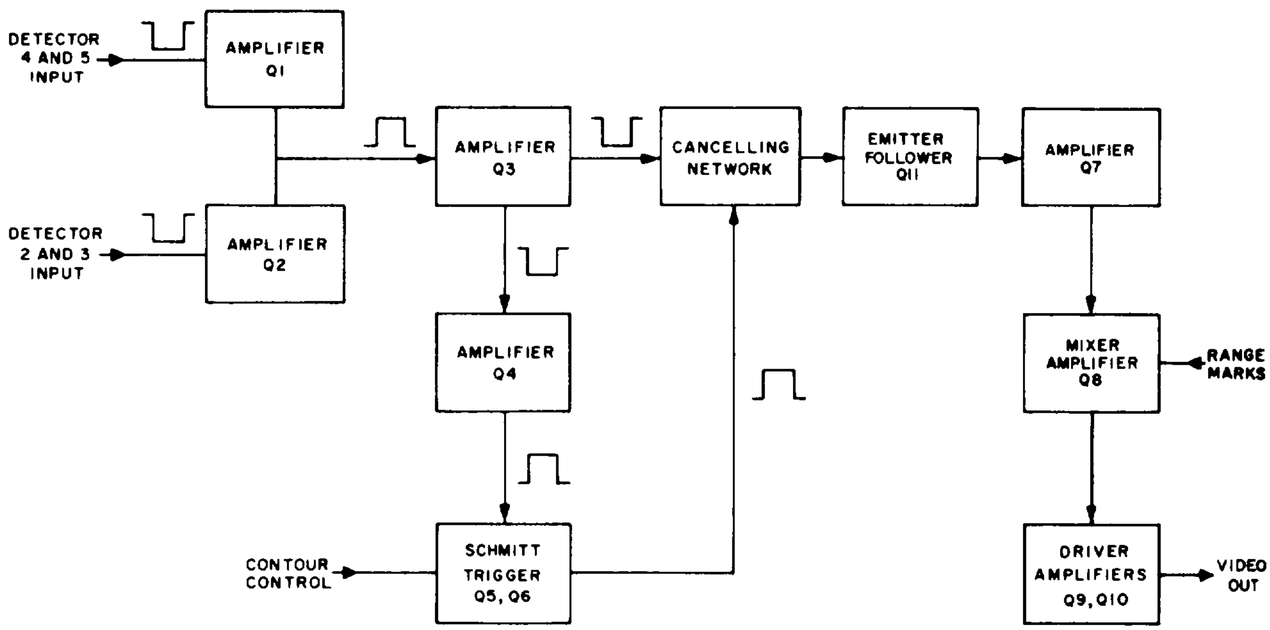


IF. Amplifier Module (CPN 757-0065-003), Block Diagram
Figure 3-6

(2) Video Driver Module 3All.

(a) Collins Part Number 565-5607-005. (Refer to figure 3-7

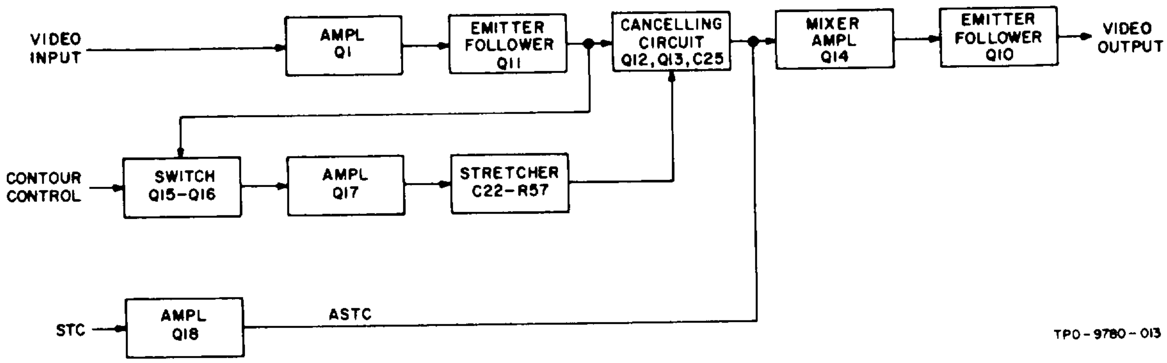
The input to the video driver consists of video (detector inputs) from the if. amplifier, range marks from the range mark generator, and contour (CTR), if selected. The detector inputs are amplified by Q1 and Q2 and combined by Q3. The output of Q3 is applied to a canceling network and to Q4. In the contour (CTR) mode of operation, video signals above a predetermined value are canceled rather than amplified. Q4 and the Schmitt trigger (Q5 and Q6) are part of the canceling network. The output of the canceling network is amplified by Q11 and Q7. Range marks are combined with the video signal in mixer-amplifiers Q9 and Q10. The video out signal is applied to the indicator.



Video Driver Module (CPN 565-5607-005), Block Diagram
Figure 3-7

(b) Collins Part Number 757-0719-003. (Refer to figure 3-8)

The input to the video driver consists of video from the if. amplifier, range marks from the range mark generator, contour (CTR) if selected, and an stc signal. The video input is amplified by Q1 and coupled through Q11 to the canceling circuit consisting of Q12, Q13, and C25. In the contour (CTR) mode of operation, the video signals above a predetermined value are canceled rather than amplified. A ground is applied to switch Q15 and Q16 to allow a bias value to be set up on the contour circuit. The output



Video Driver Module (CPN 75.7-0219-003), Block Diagram
Figure 3-8

from the canceling circuit is applied to mixer-amplifier Q14, where range marks are mixed with the video. The output of Q14 (video plus range marks) is applied through emitter-follower Q10 to the indicator unit. An anti-stc input is provided for sensitivity control display system during stc operation. An input is applied in to Q18, amplified, and coupled to the base of Q14, where it is combined with the range marks and video.

(3) Automatic Frequency Control Module 3A10.

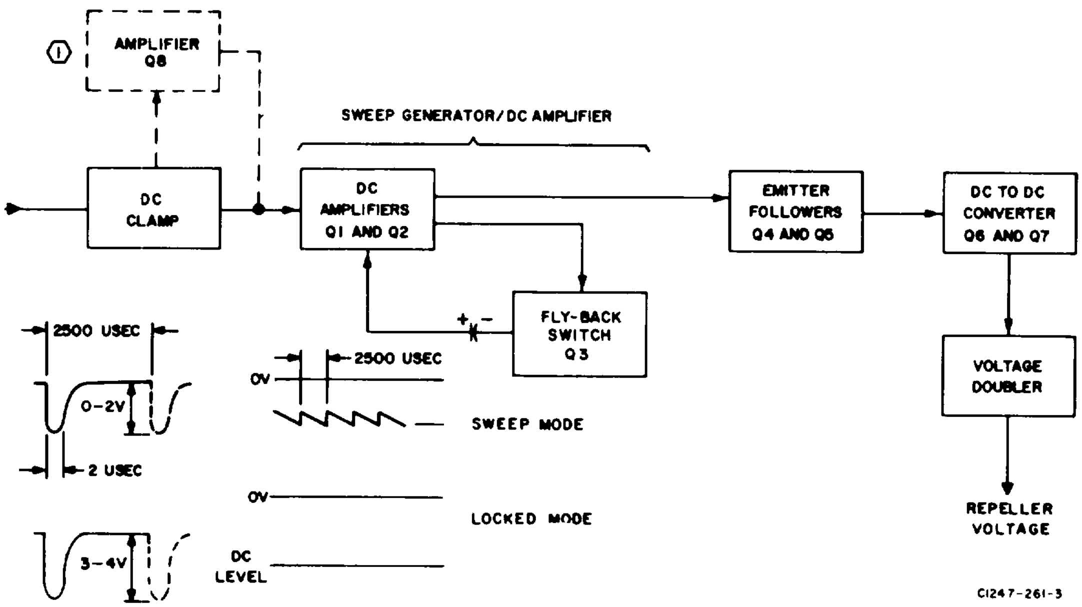
(a) Collins Part Numbers 563-4952-002 and 758-4825-004. (Refer to figure 3-9)

The input to this module is a negative waveform from the discriminator circuit in the if. amplifier module. The signal, clamped to a dc level at the input, is applied to dc amplifiers Q1 and Q2. The amplified dc is then applied through emitter-followers Q4 and Q5 to dc-to-dc converter Q6 and Q7. The dc is applied to the voltage doubler circuit. The high-level dc voltage output is applied out to the R/T unit as repeller voltage for the local oscillator. Multivibrator Q3 acts as a flyback switch to reset the level of dc amplifiers Q1 and Q2 during the sweeping (frequency searching) mode of operation.

On units with Collins part number 758-4825-004, an additional dc amplifier, Q8, is added at the input to increase the overall gain response of the module to the relatively small input waveform.

In the locked mode of operation, the multivibrator is biased off and the sweeping action does not occur.

(1) AMIPLIFIER Q8 IS PART OF MODULES
COLLINS PART NUMBER 758-4825-000



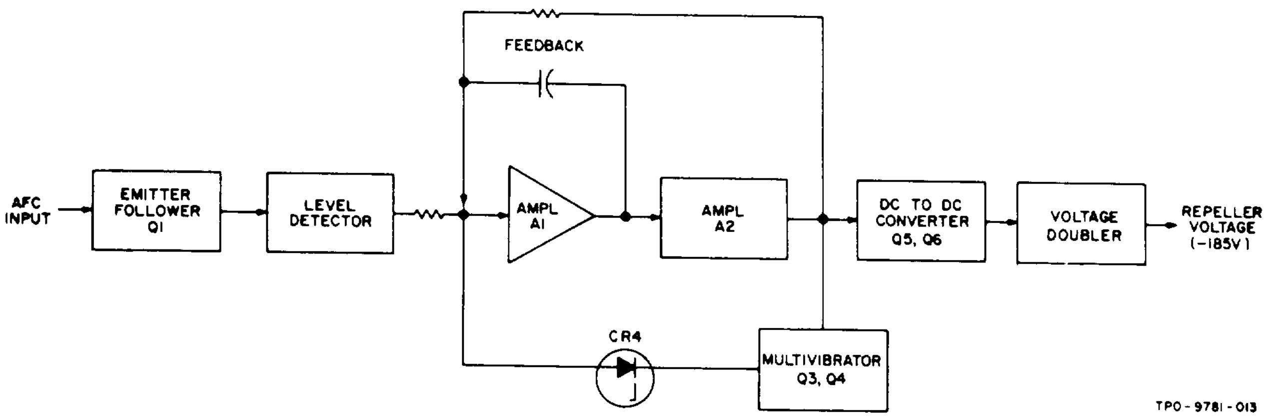
AFC Module (CPN's 563-4952-004 and 758-4825-000), Block Diagram
Figure 3-9

NOTE: The Collins part number 563-4952-004 afc module cannot be used with the Collins part number 757-0065-003 if. amplifier module. The Collins part number 758-4825-004 afc module may be used with either if. amplifier.

(b) Collins Part Number 772-0968-003. (Refer to figure 3-10)

The input to this module is a negative waveform from the discriminator circuit in the if. amplifier module. The signal is amplified by Q1, A1, and Q2. The amplified dc is applied to the dc-to-dc converter. The converter output is applied through a voltage doubler to the R/T for klystron repeller voltage.

In the sweeping (frequency searching) mode of operation, multivibrator Q3, Q4 generates a sawtooth voltage that is used to vary the output level of amplifier Al. In the locked mode, the multivibrator is biased off and sweeping does not occur.



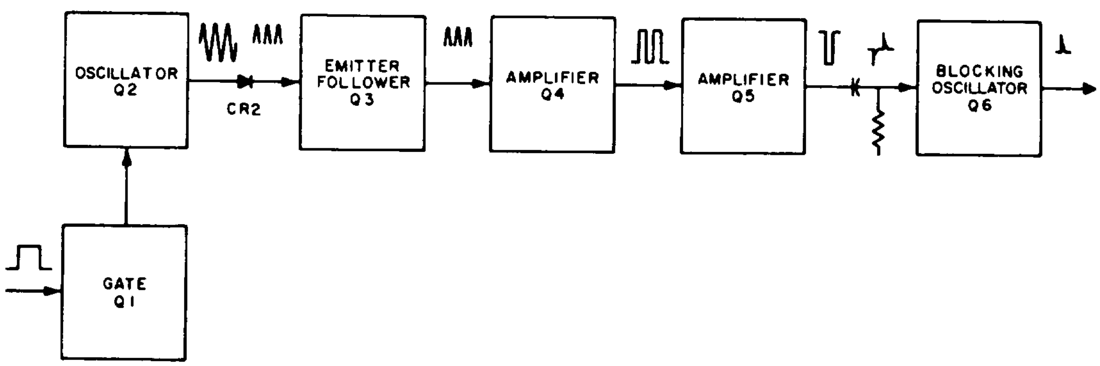
AFC Module (CPN 772-0968-003), Block Diagram
Figure 3-10

(4) Range Mark Generator Module 3A9. (Refer to figure 3-11

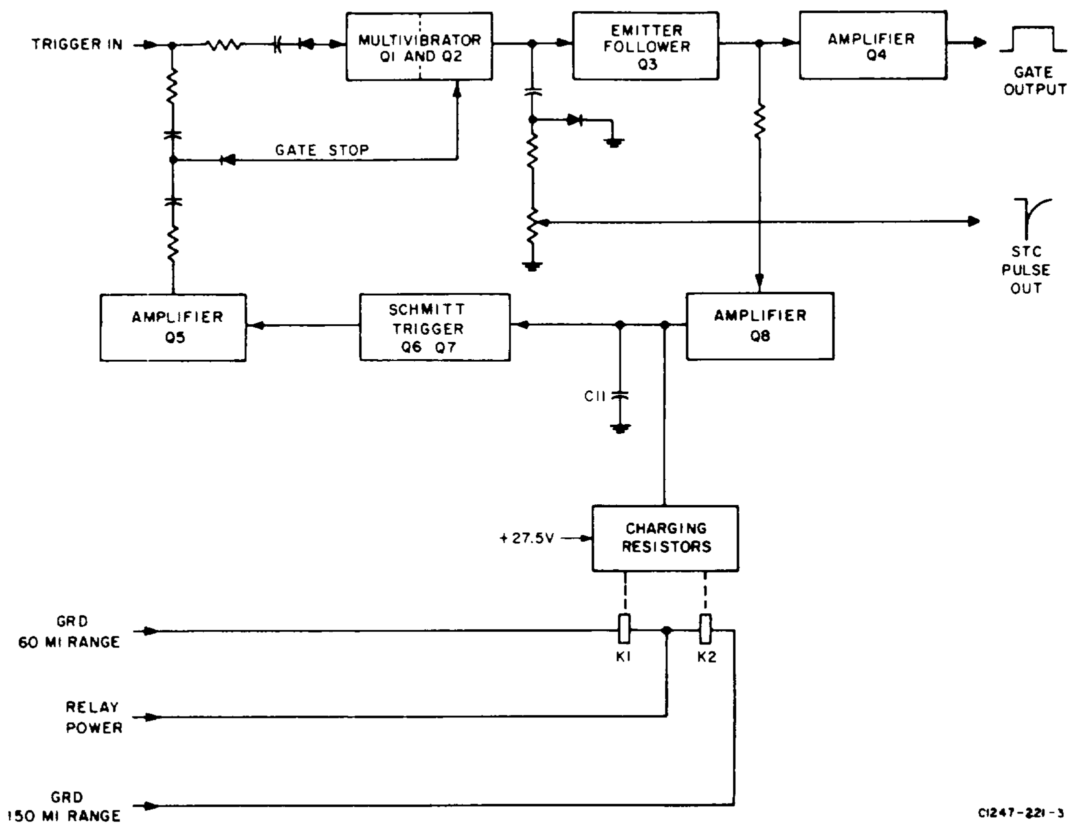
The input to this module is a positive gate from the gate generator module. The input cuts off gate transistor Q1 which permits Q2 to oscillate. The output of oscillator Q2 is clipped by CR2, and the positive pulses are applied to emitter-follower Q3. The output of Q3 is amplified by Q4 and amplified and inverted by Q5. The negative square-wave output of Q5 is differentiated, and the negative spike triggers blocking oscillator Q6. The range mark output of Q6 is applied to the video driver module.

(5) Gate Generator Module 3A2. (Refer to figure 3-12)

The trigger input to the gate generator is obtained from the R/T unit. This negative trigger changes the state of multivibrator Q1 and Q2. The output of the multivibrator is coupled to Q3 and to a differentiating circuit. A sensitivity time



Range Mark Generator Module, Block Diagram
Figure 3-11



Gate Generator Module, Block Diagram
Figure 3-12

control (stc) pulse is supplied to the if. preamplifier from the differentiating circuit. Emitter-follower Q3 provides a negative gate to Q4 and Q8. Q8 is driven into cutoff by the negative gate, and capacitor C11 begins to charge toward +27. 5 volts through the charging resistors. The positive charging of the capacitor changes the state of the Schmitt trigger, Q6 and Q7. The pulse from the Schmitt trigger is inverted and amplified by Q5. The output of Q5 changes the condition of multivibrator Q1 and Q2 which determines the length of the gate output. This is applied to the if. preamplifier, range mark generator, sweep deflection circuits, and the indicator.

(6) Isolation Amplifier Module. (Refer to 3A4 and 3A5 on figure FO-11 or FO-12)

(a) Collins Part Numbers 566-0050-004 and 563-4946-004.

The input to the isolation amplifier consists of pitch and roll reference signal, from the aircraft gyro. Since the amplifier contains two identical channels, the roll channel will be described as an example. The roll signal is applied to transformer T2 mounted on the synchronizer chassis. The output of T2 is applied through a chassis mounted phase-shift network to amplifier Q1. The output of Q1 is coupled to Q2. A negative feedback signal from Q2 is returned to the phase-shift network to control the gain of the module. The amplified output of Q2 is applied to the pitch-roll resolver in the antenna unit.

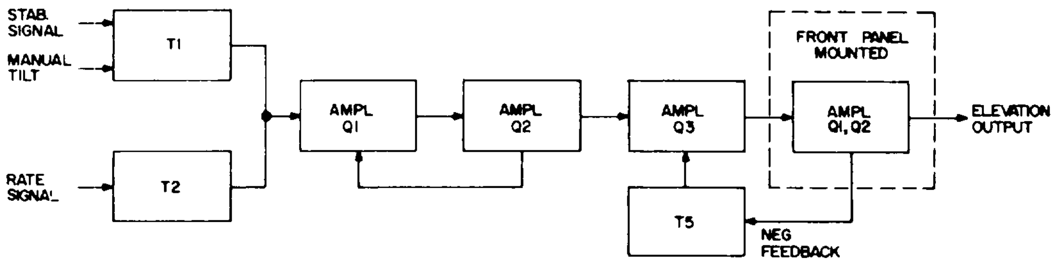
(b) Collins Part Number 769-7190-001.

The input to the isolation amplifier consists of pitch and roll reference signals from the aircraft gyro. Since the amplifier contains two identical channels, the roll channel will be described as an example. The roll signal is applied to transformer T2, mounted on the synchronizer chassis. The output of T2 is applied through a chassis mounted phase-shift network to emmiter-follower Q1. This signal is coupled through Q1 to Q2 where it is amplified and applied to emitter-followers Q3 and Q4. The output of Q4 is applied to the pitch-roll resolver in the antenna and to the phase-shift net-work to control the gain of the module.

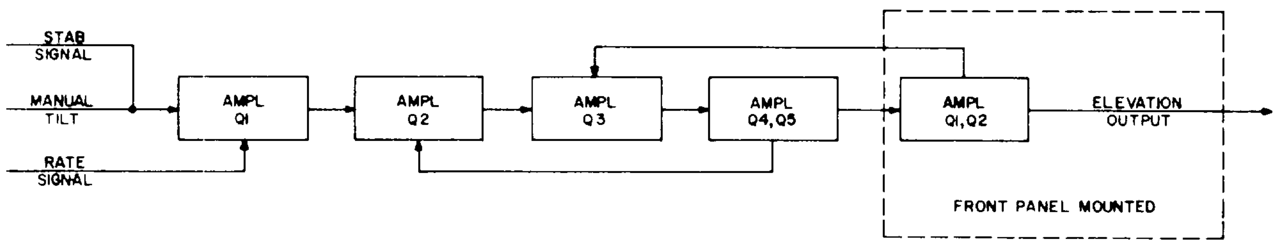
(7) Elevation Servo-Amplifier Module 3A3.

(a) Collins Part Number 563-4943-005. (Refer to figure 3-13)

The input to the elevation servo amplifier consists of stabilization, manual tilt, and rate signals. Manual tilt from the cockpit control and stabilization from the antenna pitch-roll resolver are applied to T1. A rate signal from the antenna is applied to T2. The outputs of T1 and T2 are combined and amplified by Q1. Q2 provides signal amplification with degenerative feed-back coupled back to Q1 to stabilize the gain of the module. The output of Q3 is applied to power amplifiers Q1 and Q2 mounted on the front panel. A negative feedback loop through T5 to amplifier Q3 provides overall stabilization for the servo system. The elevation output signal is applied to the antenna tilt drive motor.



Elevation Servo-Amplifier Module (CPN 563-4943-005), Block Diagram
Figure 3-13



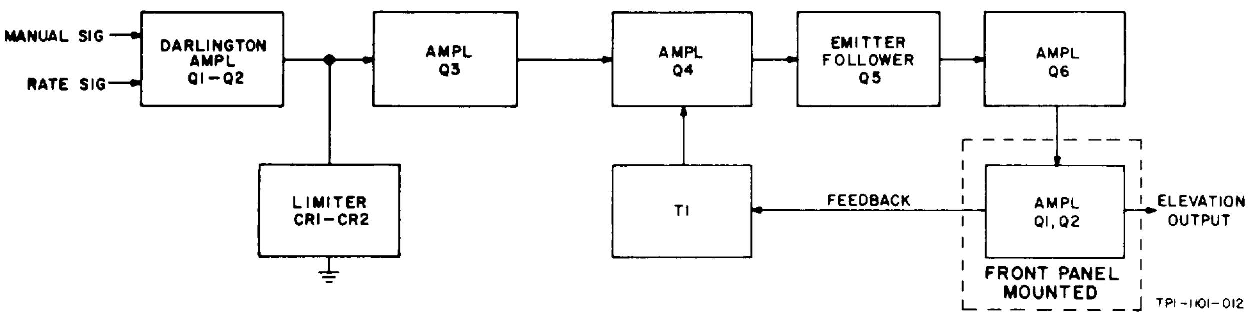
Elevation Servo-Amplifier Module (CPN 556-9550-004), Block Diagram
Figure 3-14

(b) Collins Part Number 556-9550-004. (Refer to figure 3-14)

The input to the elevation servo amplifier consists of manual tilt, stabilization, and rate signals. The manual tilt from the cockpit control is connected in series with the stabilization signal from the antenna pitch-roll resolver. This composite signal is combined with the rate signal from the antenna rate generator and applied to amplifier Q1. This signal is further amplified by Q2 and Q3. The output of Q3 is applied to parallel amplifiers Q4 and Q5. Degenerative feedback is coupled back to Q2 to stabilize the gain of the module. The output of Q4 and Q5 is applied to power amplifiers Q1 and Q2 mounted on the front panel. Negative feedback is coupled back to Q3 to provide overall stabilization for the servo system. The elevation output signal is applied to the antenna tilt drive motor.

(c) Collins Part Number 769-7195-001. (Refer to figure 3-15)

The inputs to the elevation servo amplifier are manual elevation and rate signals. The manual elevation signal from the cockpit control is combined with the stabilization signal from the antenna pitch-roll resolver. This composite signal is combined with the rate signal from the antenna rate



Elevation Servo-Amplifier Module (CPN 769-7195-001), Block Diagram
Figure 3-15

generator and applied in to Darlington amplifier Q1 and Q2. The amplified signal is then applied across a limiting circuit to amplifier Q3. The limiting circuit provides a set amplitude level for the module. Q3 amplifies the signal and applies it to transformer T1 and amplifier Q4. The signal from T1 is applied to the antenna tilt drive motor. The signal to Q4 is amplified and applied through emitter-follower Q5 to amplifier Q6. Q6 amplifies the signal and applies it out pin P as an interstage output to the power amplifiers.

(8) Sweep Generator and Amplifier Module 347. (Refer to figure 3-16)

The inputs to the sweep generator consist of a positive gate from the gate generator module and sweep excitation from the phase detectors. The operation of the four sweep generating circuits is identical, so the X1 sweep generator is described. The gate signal drives Q1 into conduction and Q2 into cutoff. With Q2 cut off, the charging network begins to charge to the instantaneous value of the sweep excitation. As the network charges, a negative sawtooth waveform is applied to the sweep amplifier circuit. In this manner, the deflection follows the azimuth position of the antenna. The output of the sweep amplifier is applied to power amplifier Q4 mounted on a heat sink. The output of Q4, X1 sweep current, is applied to the deflection yoke in the indicator.

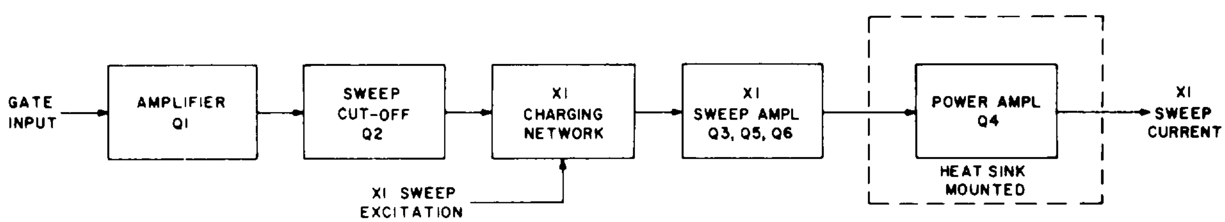
D. <u>Detailed Theory of Operation.</u>

(1) IF. Amplifier Module. (Refer to 3A6 on FO-11 or FO-12) The if. Amplifier has two configurations and consists of two sections: the if. amplifier section (paragraph 1) and the afc section (paragraph 2).

(a) Collins Part Number 565-5613-006.

<u>1</u>. IF. Amplifier.

The if. amplifier consists of tuned amplifiers Q2 through Q7, video amplifiers Q15 and Q16, and associated circuit elements. The if. amplifier amplifies the relatively small output of the if. preamplifier and provides a relatively large detected video output to the video driver module. The video output of the if. amplifier is approximately proportional to the logarithm of the if. signal input. Tuned amplifiers Q4 through



Sweep Generator and Amplifier Module, Block Diagram
Figure 3-16

Q7 successively saturate, and the addition of the outputs provides the log-linear response. These tuned amplifiers also serve as detectors, with the detected signals taken from the emitter circuits. The detected video signals from Q4 and Q5 are added and amplified by Q15 and sup-plied to the video driver module as detectors 2 and 3 output. The detected video signals from Q6 and Q7 are added and amplified by Q16 and supplied to the video driver module as detectors 4 and 5 output. As the if. input signal increases, the last amplifier stage, Q7, saturates. Upon saturation of Q7, the constant output signal from Q7 is added to the output signals of Q6, Q5, and Q4, which are still increasing. At a level above that which saturated Q7 (approximately 18 db), Q6 saturates, and the steady outputs of Q7 and Q6 are added to the increasing outputs of Q5 and Q4. If the if. input signal continues to increase, Q5 and then Q4 will saturate. When Q5 and Q4 are both saturated, the output of the if. amplifier will not increase with increasing signal input.

Q2 through Q7 are common-emitter amplifiers coupled through tunable transformers T2 through T6. Resistors R2 through R7 provide stabilization by degenerative feedback. Rf decoupling between emitters of successive stages is provided by capacitors C2 through C7 and inductors L2, L4, and L6. Decoupling of the base bias between stages is accomplished by inductors L11 through L14, capacitor C53, and the bypass capacitors which are enclosed in the cases of transformers T2 through T6. The detected video signals at the emitters of Q4 and Q5 are developed across resistor R70. The signal is then coupled through capacitor C58 to the emitter of amplifier Q15. The output of Q15 is coupled through capacitor.C56, clamped by diode CR11, and applied to pin D as detectors 2 and 3 output. The detected video signals at the emitters of Q6 and Q7 are developed across resistor R71 and coupled through capacitor C7 to the emitter of amplifier Q16. The output of Q16 is coupled through capacitor C57, clamped by diode CR12, and applied to pin B as detectors 4 and 5 output. Resistors R81 and zener diode CR10 establish a stable operating point for transistors Q2 through Q7. Thermistor R79 compensates for amplifier gain variations due to temperature changes.

2. AFC Discriminator.

The afc discriminator consists of transistors Q1 and Q8 through Q13 and associated elements. The afc signal input, obtained from the R/T, is applied to the emitter of amplifier Q1. Inductor L33 is the dc load for Q1, and capacitor C19 couples the amplified ac signal to the discriminator circuit. The discriminator circuit is the ac load for Q1. Resistor R64 and zener diode CR9 establish a stable operating point for Q1.

The primary of discriminator transformer T1 and the associated capacitor (C) in the transformer case form a parallel resonant circuit tuned to 31 MHz. The net inductance of T1 and C and the capacitance of C38 form a series resonant circuit tuned to 29 MHz. The combination of parallel and series resonance results in a greater rate of change of load impedance for frequency changes of the afc. input signal. Diode CR2 detects the signal across the entire collector load, and diode CR1 detects the signal at the high side of capacitor C38. When the input signal is 31 MHz, the amplitude of the signal detected by CR2 is larger than the signal detected by CR1. When the input signal is 29 MHz, the signal detected by CR1 is larger than the signal detected by CR2. The negative signal at the anode of CR2 is filtered by L17 and C30 and amplified by Q9 and Q11. The positive signal at the cathode of CR1 is filtered by L16 and C29 and amplified by Q8 and Q10. The signals from Q10 and Q11 are added at the base of Q12. If the afc input signal is above 30 MHz, the net signal at the base of Q12 will be negative, and the signal amplitude will decrease as the input approaches 30 MHz. (Refer to figure 3-17)

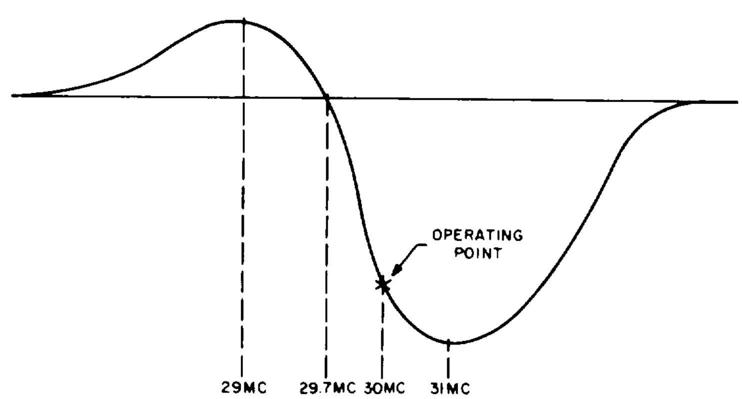
Cascaded emitter-followers Q12 and Q13 provide the negative signal to the afc module. Capacitor C47 and resistor R52 provide pulse stretching for the negative output signals. The output signal at pin U in the "afc locked" condition is a stretched negative pulse of approximately 3-volt, peak-to-peak amplitude. (Refer to figure 3-9)

(b) Collins Part Number 757-0065-003.

1. IF. Amplifier.

This if. amplifier consists of a 5-stage tuned amplifier, Q2 through Q6, detector Q7 and video amplifiers Q16 and Q17 with their associated components. The if. amplifier amplifies the relatively small output of the if. preamplifier and provides a relatively large detected video output td the video driver module. The video output of the if. amplifier is approximately proportional to the if. signal input.

The input to the 5-stage tuned amplifier is applied to the base of Q2 across impedance matching network L34 and R105. The network provides necessary matching from the 75-ohm transmission line to the input impedance of Q2. Each of the if. amplifiers is identical in operation. Each provides 14 db of amplification and is tuned to the center frequency, 30 MHz, in the associated transformer. Transistor Q4 has



Frequency Discriminator Response Curve
Figure 3-17

a selected resistor, R90, in the base circuit to set the overall amplification of the series of amplifiers. Resistors R2 through R5 provide stabilization by providing a fixed current through the amplifiers. Rf decoupling between emitters of successive stages is provided by capacitors C2 through C5 and inductors L2, L3, and L4. Decoupling of the base bias between stages is accomplished by inductors L11 through L14, capacitor C53, and the bypass capacitors that are enclosed in the cases of transformers T2 through T6. Resistors R65 through R69 stabilize the gain and bandwidth of each stage.

The gain of the overall amplifier is stabilized through the effect of thermal resistors R79 and R93. The action of these elements is to de-crease the current in all stages at low temperatures and thus offset the rising gain of each stage. Conversely, the gain is increased at elevated temperatures by an increase in the current in all stages.

The detected video signal current at the emitter of Q7 is supplied from resistor R71. Current is also applied to amplifier Q16 and emitter follower Q17. The video output from Q16 is developed across R86. Resistors R96 and R95 provide bias for CR13 so that signals greater than 0.6 v are applied as feedback across R99 to the emitter of Q6. Thus, the output of the if. amplifier is linear to a set fixed point and is logarithmic above that point. A particular output level is set on the logarithmic curve for operation of the contour circuit in the video driver module.

2. AFC Discriminator.

The discriminator section consists of limiter amplifier A1, transistors Q11, Q12, and Q13, and the associated circuit elements. The pulsed 30-MHz afc input from the R/T unit is applied to the input of amplifier A1. The output from amplifier Al is applied to a circuit that is double-tuned by capacitors C63 and C64. When the lower skirt of the double-tuned passband extends from approximately 29 to 31.5 MHz and operation is at 30 MHz, a slope-detector discriminator is formed.

The input to Al is applied through impedance matching network L18 and C59, and L9 and C69 to match the 72-ohm interconnecting coaxial cable. Resistor R106 is selected to set the gain of Al. The output of Al is applied to the discriminator, consisting of C62 through C65, and L35 and L36. The discriminator output is coupled through C51 to detector diode CR2. The detected output is applied, through thermistor RT97, to the base of amplifier Q11. Capacitor C29 provides pulse shaping of the input to Q11. The signal, amplified by Q11 and Q2, is coupled through emitter-follower Q13 to the output and applied to the afc module as a frequency discriminated signal.

Feedback from the emitter of Q13 through R104 and R48 to the emitter of Q11 control the dc characteristics of the amplifier. Ac gain is set by R104 and the parallel combination of R48 and R109.

(2) Video Driver Module. (Refer to 3All on figure FO-11 or FO-12)

(a) Collins Part Number 565-5607-005.

The video driver module combines and amplifies video and range mark signals from the if. amplifier module and from the range mark generator module. When contour (CTR) function is selected by the operator, all video signals above a predetermined level are canceled instead of being amplified. This signal-canceling function causes dark "holes" to appear within the targets on the indicator viewing screen in the area of the brightest video returns. When the contour function is off, video is displayed on the screen in a conventional manner.

The negative video output signal of detectors 4 and 5 from the if. amplifier module is amplified by Q1. The combination of C1 and R1 in the emitter circuit compensates for high-frequency attenuation in the amplifier. The output of detectors 2 and 3 is amplified by Q2, with the combination of C4 and 1I7 in the emitter circuit compensating for high-frequency attenuation. The outputs of Q1 and Q2 are added through the combination of R4 and R8 and the input impedance of Q3. Capacitors C2 and C3 compensate for high-frequency attenuation. A temperature-compensated amplifier, composed of Q3 and associated elements, amplifies and couples the video signal to a canceling network and to amplifier Q4. The canceling network is composed of R20 through IL-1, C10 and C11, and CR6 and CR7. Amplifier Q4 is part of the circuit that supplies a positive pulse to the canceling network when the contour function is selected and the input video from the detectors exceeds a predetermined amplitude. This circuit is composed of Q4, a Schmitt trigger (Q5 and Q6), and associated components.

When the contour function is off, breakdown voltage is applied to zener diode C'lR1 through a voltage divider network consisting of R12, R19, and R36. The positive voltage (+5.1 volts) from CR1 is applied to the Schmitt trigger circuit. This voltage is applied to the base of Q5, driving Q5 into saturation and cutting. The Schmitt trigger remains in this state until the contour function is selected.

When the contour function is selected, a ground is placed between R19 and R36. This removes the breakdown voltage from CR1, causing it to stop conducting. The positive voltage is removed from the base of Q5, cutting it off. When Q5 cuts off, Q6 starts to conduct. The Schmitt trigger remains in this state until the voltage applied to the base of Q5 is sufficient to turn it on. Positive video pulses are applied to the base of Q5 from the collector of Q4. When these pulses reach a certain amplitude, Q5 starts to conduct. Resistor R12, in the Schmitt trigger circuit, determines the amplitude of the video pulses necessary to cause Q5 to conduct. A negative pulse is applied to the base of Q6 from the collector of Q5. This negative pulse cuts off Q6, and a positive pulse is coupled from the collector through C9 to the canceling network. The positive pulse from Q6 is greater in amplitude than the negative video from Q3, thereby providing complete video cancellation in the combiner network. Since cancellation does not begin until the contour threshold is exceeded, the "dark hole" always be bounded by a narrow ring of bright video. The output video level can be adjusted by resistor R23. The output of the canceling network is coupled to amplifier Q7 by emitter-follower Q11.

The video signal from Q7 is applied to Q8, where the range marks are added by injection into the emitter circuit of Q8. Resistor R29 and capacitor C14 provide isolation between the output impedance of the range mark generator module and resistor R27 in the emitter of Q8. The amplitude of the range marks can be adjusted by R27. Transistors Q9 and Q10 form a complementary low-impedance output driver stage. The output is coupled through C16 and developed across R33 and CR9. Positive video pulses are clamped to ground by CR9. The negative video output across R33 is applied to pin S of the video driver module.

(b) Collins Part Number 757-0719-003. (Refer to figure FO-12)

The negative video output signal from the if. amplifier module is applied through capacitor C18, across the dc reference network (CR17, CR10, R42, and R75), to emitter-follower Q11. From Q11 the signal is applied to the video canceling circuit. The canceling circuit consists of amplifier Q13, emitter-follower Q12, and capacitor C25. This circuit is operational in the contour (CTR) mode of operation.

For normal operation, the video signal. from Q11 is applied past Q13 and through potentiometer R12 to the base of amplifier Q14: At Q14, the video is combined with range marks that are applied to the emitter through potentiometer R27 and capacitor C26. The combined video and range mark signal is applied through emitter-follower Q10 to the output at pin S. Diode CR9 clamps the positive pulses at ground. The output at pin S is negative in polarity.

In the contour (CTR) mode of operation, a ground is applied (through the 561-G4 Cockpit Control) to the emitter circuit of Q15 and Q16. If no signal equivalent to approximately 1.5-v video amplitude exists at pin B, the ground causes Q16, part of a Schmitt trigger circuit, to start conducting. When a contour level signal exists, its level will exceed the bias (set by R23) on Q16. When this occurs, Q15 and Q17 conduct, causing Q16 to stop conducting. Since targets have various return levels, Q17 would normally be pulsed on and off. To avoid this, and thus reduce the smear of contoured signals displayed on the indicator, the signal is applied to a pulse stretching network, C22 and R57. The stretched pulse is then applied to Q13, causing Q13 to conduct. With Q13 conducting, a path is provided through emitter-follower Q12 for C25 to discharge canceling the high-level video signals. Transistor Q12 is biased on by a filtered video signal that is applied from Q11 through CR11, CR12, and R60 to the base of Q12. Capacitor C25 charges to the level of the video signal to provide the bias level for Q12. As long as the video is of sufficient level, and contour (CTR) is selected, this circuit will cancel the video and provide the black "holes" in the presentation.

A sensitivity time control (stc) signal is applied through pin E to amplifier Q18. The signal is amplified and applied to the base of Q14 to reduce the gain for the first approximately 150 us. after the transmitter pulse. This prevents nearby targets from appearing more intense than similar targets at a greater distance away.

(3) Automatic Frequency Control (AFC) Module. (Refer to 3A10 on figure FO-11 or FO-12)

The afc module provides a controlled negative voltage which serves as both frequency control and repeller supply voltage for the klystron local oscillator. The signal that controls the negative output voltage is obtained from the discriminator circuit in the if. amplifier module. Circuit functions contained in the afc module include a peak detector, dc integrator, sweep generator, and a dc-to-dc converter. The modes of operation of this module are referred to as "afc sweeping," which is the initial operating mode, and "afc locked," which is the normal operating mode.

(a) Collins Part Numbers 563-4952-004 and 758-4825-004.

The dc-to-dc converter, Q6 and Q7, and dc driver amplifiers Q4 and Q5, function in the same manner for both modes of operation. The dc-to-dc converter may be visualized as a transformer-coupled, push-pull, square-wave oscillator with a voltage doubling rectifier in the transformer output circuit. Transistors Q6 and Q7 and the two center-tap windings of T1 make up the oscillator circuit. Because each transistor saturates during its conduction cycle, the output voltage of the converter is directly proportional to the input voltage at the emitters of Q6 and Q7. Resistor R12 limits the saturation base current of both transistors. The dc driver amplifiers, Q4 and Q5, control the input voltage to the converter and, consequently, the out-put voltage of the module. For a voltage swing of +2 to +8.5 volts at the base of Q4, the output voltage at pin U swings from -155 to -205 volts.

In the afc sweeping mode of operation, initially consider that no input signal is present at pin B and that capacitor C2 has zero charge. Under these conditions, transistor Q1 is conducting, Q2 is saturated, and Q3 is disabled. As C2 begins to charge through R5 and the base circuit of Q1, Q1 is forced into heavier conduction, causing the voltage at the collector of Q1 and the emitter of Q3 to become more positive. This charging action continues until the emitter of Q3 becomes more positive than the base. Q3 then begins to conduct and, by multivibrator action, the flyback portion of the sweep begins. As Q3 begins to conduct, the positive step voltage at the collector is coupled through C3 to the base of Q2, which disables Q2. The voltage at the collector of Q2 drops to nearly zero, and this voltage change is coupled through C2 to the base of Q1. This action drives Q1 nearly to saturation, drives Q3 to full saturation, and tends to keep Q2 disabled. Capacitor C2 charges rapidly under these conditions. As C3 begins to charge, the positive voltage at the base of Q2 decreases until Q2 is again enabled. At this point, the flyback portion of the sweep is completed. As Q2 begins to conduct, its collector voltage begins to rise, and this voltage change is coupled through C2 back to the base of Q1. The conduction of Q1 then decreases, Q3 is disabled, and Q2 again saturates. The charge which C2 acquired during the flyback now begins to leak back through R2, R3, and RT1. As C2 slowly discharges, the conduction of Q1 slowly increases, and the voltage at its collector slowly swings more positive. Since Q2 is now saturated, the voltage drop across R5 is essentially the same as the collector voltage of Q1. When the collector voltage of Q1 exceeds the base voltage of Q3, the flyback cycle begins again.

The sawtooth voltage developed across R5 is applied to the base of Q4 and, by the action previously described, a sawtooth voltage swinging from -155 to -205 volts is produced at pin U of the module connector. This voltage is applied to the klystron repeller circuit and causes the klystron output frequency to sweep through approximately 100 MHz of spectrum immediately above the magnetron frequency. When the frequency difference between the klystron and magnetron approaches 30 MHz, a control signal is developed in the discriminator section of the if. amplifier module and the sweeping action is stopped. The negative control pulse developed by the discriminator circuit is applied to pin B of the afc module and is clamped by diode CR2. The positive voltage developed by this clamping action stops the discharge of C2, which stops the sweeping mode of operation. As the amplitude of the control pulse increases, the clamping action further decreases conduction of Q1, which decreases the output voltage of the module.

NOTE: Modules with Collins part number 758-4825-000 contain an alternate input circuit consisting of transistor Q8 and associated components. This circuit provides signal amplification, isolation, and increased afc stability.

In the afc locked condition, if the klystron frequency drifts more than 30 MHz above the magnetron, the control pulse amplitude from the discriminator increases, the output voltage of the afc module decreases, and the reduced repeller voltage decreases the klystron output frequency. Conversely, if the klystron drifts low in frequency, the control pulse amplitude decreases, the afc module output voltage increases, and the klystron output frequency in-creases to maintain the 30-MHz if. frequency.

(b) Collins Part Number 772-0968-003.

The dc-to-dc converter functions in the same manner for both modes of operation. The converter, Q5, Q6, and T1, may be visualized as a transformer-coupled, push-pull, square-wave oscillator with a voltage doubling rectifier in the transformer output circuit. Transistors Q5 and Q6 and the two center-tap windings of T1 make up the oscillator circuit. Be-cause each transistor saturates during its conduction cycle, the output voltage of the converter is directly proportional to the input voltage of the emitters of Q5 and Q6.

In the sweeping mode of operation, initially consider no input signal at pin B and no charge existing on capacitor C6. Under these conditions, Q1, A1, Q2, Q3, and Q4 are disabled. With dc power applied to the module, +6.0 volts dc is applied from zener diode CR8 to pins 1 and 3 of differential amplifier A1. Also, the dc potential applied through CR1 to A1-2 is made more negative than the voltage at A1-3 by the voltage divider R4 and R5. This unbalance is amplified by Al. The dc difference starts charging capacitor C6. Thus, the output of Al is linearly rising. The output of Al is applied across Darlington amplifier Q2, which provides a unity gain factor. The output of Q2 is coupled to the emitters of dc-to-dc converter transistors Q5 and Q6. Simultaneously, the signal is applied to the base of transistor Q3, which is a part of a multivibrator circuit. At a preset level, Q3 will conduct and trip Q4. The output of Q4 is applied back to pin 2 of Al and resets the circuit, that is, drives the integrator negative to a base level of 6.0 v. With the reset, the output of Q2 decreases and Q3 will turn off. Until a signal is applied in at pin B, this cycling action will continue. C6 charges and discharges and Q3 and Q4 will reset the level. The output of Q2 applied to the converter circuit is converted into high-level dc that varies from -145 to -225 volts dc. This voltage is applied to the klystron repeller circuit and causes the klystron output frequency to sweep through approximately 100 MHz of spectrum immediately above the magnetron frequency. When the frequency difference between the klystron and magnetron approaches 30 MHz, a control signal is developed in the discriminator section of the if. amplifier module. The negative control pulse developed by the discriminator circuit is applied to pin B of the afc module.

In the locked mode of operation, an afc signal from the if. amplifier module is applied to pin B. The signal is a negative pulse of 3.25-v amplitude. This signal is applied to emitter-follower Q1 and coupled through C2 to A1-2. The negative peak is clamped to the level set by R7. If the amplitude of the control pulse increases, the clamping action further decreases conduction of Q11, decreasing the output voltage of the module. The baseline potential is such that the integrated voltage at pin 2 of Al is essentially equal to that at A1-3. With a 3.25-v input, the dc difference between A1-2 and -3 will be negligible; however, this small difference is amplified by Al and applied through Q2 to the converter circuit. The signal is converted to the nominal -185 volts of the klystron repeller for the 30-MHz output. Since the signal at the output of Q2 is not large enough in amplitude to trip Q3, the sweeping action does not occur. Resistor R10 across the integrator holds the differential conversion gain of the afc amplifier to (-)60.

In the afc locked condition, if the klystron frequency drifts more than 30 MHz above the magnetron, the control pulse amplitude from the discriminator increases, the output voltage of the afc module decreases, and the reduced repeller voltage decreases the klystron output frequency. Conversely, if the klystron drifts lower in frequency, the control pulse amplitude decreases, the afc module output voltage increases, and the klystron output frequency increases to return the if. to 30 MHz.

(4) Range Mark Generator Module. (Refer to 3A9 on figure FO-11 or FO-12) The range mark generator module supplies the 10-, 15-, and 25-mile range markers to the video driver module. The generator is turned on and off by the positive gate pulse from the gate generator module. Normally-conducting gate transistor Q1 is driven to cutoff by the positive gate pulse. When Q1 is conducting, the current through L1 prevents oscillations in the tuned circuit consisting of L1 and C1 through C6. When Q1 is cut off, the Colpitts oscillator containing the tuned circuit and transistor Q2 oscillates at the frequency of the tuned circuit. Oscillator frequencies of 8.07, 5.36, and 3.18 kHz are available by using the proper combinations of capacitors C1 through Q6 in the tuned circuit. All capacitors are in the circuit when the 30-mile range is selected. The oscillator operates at a frequency of 8.07 kHz and provides the 10-mile range markers. Relay K1 is energized when the 60-mile range is selected, shorting out capacitors C3 and C4. The oscillator then operates at a frequency of 5.36 kHz and provides

the 15-mile range markers. Relay K2 is energized when the 150-mile range is selected, shorting out capacitors C2, C3, C4, and C5. The oscillator then operates at a frequency of 3.1 kHz and provides the 25-mile range markers.

The output at the emitter of oscillator Q2 is clipped by diode CR2 so that only the positive half-cycles are applied to the base of emitter-follower Q3. The positive half-cycles at the output of emitter-follower Q3 are applied to the emitter of Q4. Amplifier Q4 is overdriven so that positive-going square waves are applied to the base of amplifier Q5. The square waves are inverted and amplified by Q5 and differentiated by C10 and R18. The resulting negative spike is used to trigger blocking oscillator Q6. Transistor Q6 is biased to be normally cut off so that the positive spike resulting from differentiation has no effect on the blocking oscillator. Diode CR5 shunts the output winding of transformer T1 to remove the positive backswing of the blocking oscillator. The output of the module is a series of negative spikes at the frequency of the Colpitts oscillator.

(5) Gate Generator Module. (Refer to 3A2 on figure FO-11 or FO-12)

The input to the gate generator module consists of a negative trigger input from the 374A-3 R/T. The output consists of a positive gate pulse which is used as an intensity gate by the indicator and as a switching pulse by the sweep generator and amplifier module and the range mark generator module. The duration of each gate pulse is controlled by the RANGE switch on the indicator. A sensitivity time control (stc) pulse is supplied to the if. preamplifier to reduce gain to normalize the target returns with respect to range.

The negative trigger input is coupled simultaneously to the bases of transistors Q1 and Q2, which form a bistable multivibrator circuit. The trigger pulse is coupled to the base of Q1 through R4, C2, and CR1 and to the base of Q2 through R5, C3, and CR2. Assuming that Q1 is conducting and Q2 is cut off before the arrival of the trigger, the trigger cuts off Q1. In this condition the collector voltage of Q1 is low and the collector voltage of Q2 is high. As Q1 is cut off by the negative trigger, the collector voltage rises rapidly towards the +27.5-volt supply. This positive voltage is coupled to the base of Q2 through C1 and R2, and the collector voltage of Q2 drops to a low positive potential. This negative-going voltage is applied to the base of emitter-follower Q3. This negative voltage is coupled through CR4, R15, and C12 to the base of amplifier Q4. The inverted waveform at the collector of Q4 is a positive voltage which is the start of the positive gate output. Zener diode CR4 provides dc coupling to the base of Q4 and Q8.

The negative voltage which is applied to the base of emitter-follower Q3 is also applied to the differentiating network consisting of C6, R13, and R35. The differentiating network forms the negative stc pulse, the amplitude of which can be adjusted by potentiometer R35. Diode CR3 protects Q3 from reverse voltage, and CR5 shunts positive voltage pulses to ground.

The negative gate at the junction of CR4 and C12 is coupled through R37 to the base of amplifier Q8. Before the arrival of the negative gate, Q8 was conducting and C11 was charged to the fairly small positive potential present at the junction of R26 and R34. The negative gate arrives, Q8 cuts off, and C11 begins charging toward the +27.5-volt potential through the series resistance network selected by relays K1 and K2, which are controlled by the position of the RANGE switch on the indicator. Prior to the arrival of the negative gate, Q7 is cut off and Q6 is conducting. Transistors Q6 and Q7 and associated components form a Schmitt trigger circuit. The time required for C11 to charge to a positive voltage sufficient to bring Q7 into conduction is determined by the resistors selected by relays K1 and K2. When C11 has charged sufficiently, the base of Q7 is positive enough to cause conduction of Q7. This causes Q7 collector voltage to drop rapidly, and this change is coupled to the base of Q6 which cuts off Q6. A positive voltage pulse is produced at the collector of Q6 and coupled to the base of amplifier Q5. The negative pulse at the collector of Q5 is coupled through R18 and C7 to the bases of Q1 and Q2. Q1 was cut off by the initial trigger, and Q2 is now conducting. The negative trigger from Q5 cuts off Q2 to change the state of the multivibrator. The trailing edge of the positive gate output is formed by changing the state of the multivibrator. When the multivibrator changes state, Q8 returns to the normally conducting state and discharges C11. This returns Q7, Q6, and Q5 to the conditions that existed before arrival of the trigger input.

(6) Isolation Amplifier Module. (Refer to 3A4 or 3A5 on figure FO-11 or FO-12)

(a) Collins Part Number 566-0050-004.

The isolation amplifier module contains two identical amplifier channels, one for pitch and one for roll. Each channel has 44-db gain, with an input impedance of 50,000 ohms and an output impedance of 50 ohms. The roll and pitch signals from the aircraft gyro are applied to transformers T2 and T3, respectively, in the synchronizer. The secondaries of T2 and T3 are connected to phase-shift networks, where the phase of each voltage is shifted to correspond to the phase of the aircraft generator. The amount of shift in the phase of the roll signal is controlled by potentiometer R5. The amount of shift in the phase of the pitch signal is controlled by potentiometer RS. The outputs of the phase-shift network are applied to the amplifier channels in the isolation amplifier module. Since the amplifier channels are identical, only the roll channel is described as an example. The output of the roll phase-shift network is applied to the base of emitter-follower Q1. The signal from the emitter of Q1 is coupled through capacitor C2 to the base of amplifier Q2. The output signal at the collector of Q2 is applied to the roll winding of the roll-pitch resolver in the antenna. The signal at the collector of Q2 is also applied through R8 to the roll phase-shift network in the synchronizer for degenerative feedback. The amplitude of the roll signal is controlled by potentiometer R7, which varies the amount of degenerative feedback through the phase-shift network to the isolation amplifier. The output of the roll channel may be monitored at jacks J13 and J15 on the synchronizer front panel, and the output of the pitch channel may be monitored at jacks J14 and J15.

NOTE: In synchronizers with serial number 1401 (revision level H) and above, thermistor RT1 in the isolation amplifier compensates for amplifier variations due to temperature changes.

(b) Collins Part Number 769-7190-001.

This isolation amplifier contains two identical channels, one for pitch and one for roll. Each channel has a controlled gain phase shift. The roll and pitch signals from the aircraft gyro are applied to transformers T2 and T3, respectively, in the synchronizer unit. The secondaries of T2 and T3 are connected to phase-shift networks, where the resulting phase from the individual gyro outputs is shifted to correspond to the phase of the elevation servo network. The amount of shift in phase of the roll is controlled by potentiometer R5. The amount of shift in phase of the pitch is controlled by potentiometer R8. Potentiometers R7 and R10 adjust the actual gyro (or gyro bootstrap) voltage-per-degree analog to the 20 mv/degree analog of the elevation servo amplifier network. The outputs of the phase-shift networks are applied to the amplifier channels in the isolation amplifier module. Since the amplifier channels are identical, only the roll channel is described as an example.

The output of the roll phase-shift network is applied into the isolation amplifier at pins C and B. The signal is applied to emitter-follower Q1, across amplifier Q2, and through emitter-followers Q3 and Q4. This output is applied to the roll windings of the roll-pitch resolver in the antenna and to the feedback control potentiometer R10.

(7) Elevation Servo-Amplifier Module.

(a) Collins Part Number 556-9550-000. (Refer to 3A3 on figure FO-11)

The elevation servo amplifier drives the antenna tilt drive motor in response to the varying combined pitch-roll resolver in the antenna and in response to the manual tilt signal from the cockpit control. The stabilization signal from the pitch-roll resolver in series with the manual tilt signal is applied to the primary of transformer T1. The attenuation of the stabilization plus manual tilt signal at the secondary of T1 is adjustable by potentiometer R2. The rate signal from the antenna rate generator, which is out of phase with the stabilization signal, is applied to the primary of T2.

The attenuation of the rate signal at the secondary of T2 is adjustable by potentiometer R5. The stabilization plus manual tilt signal and the rate signal are added at the base of amplifier Q1. The inverted signal output at the collector of Q1 is coupled through transformer T3 to the base of amplifier Q2. The signal at the collector of Q2 is coupled through C4 back to the base of Q1 as degenerative feedback to stabilize the gain of the module. The output signal at the collector of Q2 is also applied through a 90-degree phase-shift network consisting of C6, R13, C7, and R14 to the primary of transformer T4. The signal at the secondary of T4 is applied to the base of amplifier Q3. The signal at the collector of Q3 is connected through terminal P of the elevation servo-amplifier module to transformer T1 in the synchronizer. The secondary of T1 is connected to the bases of push-pull power amplifiers Q1 and Q2 mounted on the synchronizer front panel. The center tap on the secondary of T1 is connected through resistors R3 and R1 and thermistor RT1 to the emitters of Q1 and Q2. The thermistor compensates for amplifier variations due to heat. The push-pull output is applied to the control winding of the antenna tilt drive motor and through pins U and V to the primary of transformer T5 in the elevation servo-amplifier module. The secondary of T5 is connected to the emitter of Q3 to provide overall stabilization for the servo system.

(b) Collins Part Number 556-9550-000. (Refer to 3A3 on figure FO-12)

The elevation servo-amplifier module drives the antenna tilt drive motor in response to varying combined roll and pitch signals from the pitch-roll resolver in the antenna and in response to the manual tilt signal from the cockpit control. The stabilization signal from the antenna pitch-roll resolver is connected, through pins B and C, in series with the manual elevation signal (pins D and E). The resulting signal is applied through R1 to the junction of R1 and R3, where it is combined with the rate signal from the antenna rate generator to produce an elevation correction signal. This signal is applied through R3 to the base of amplifier Q1. The combination of resistors R1 through R4 and capacitors C1 and C2 provides the 90-degree phase shift required for proper phasing of the antenna tilt motor.

The 90-degree phase-shift network also provides harmonic filtering. The output signal at the collector of Q2 is coupled through R8 and C4 to the base of amplifier Q3. The signal at the emitter of Q3 is applied to the bases of parallel amplifier Q4 and Q5. The signal output at the collectors of Q4 and Q!5 is applied to the primary of transformer T1 in the synchronizer. A sample of the output of Q4 and Q5 is coupled back to the emitter of Q2 as degenerative feedback to stabilize the gain of the module.

The secondary of T1 is connected to the bases of power amplifiers Q1 and Q2, which are mounted on the synchronizer front panel. The center tap on the secondary of T1 is connected through resistors R1 and R3 and thermistor RT1 to the emitters of Q1 and Q2. The thermistor compensates for amplifier variations due to heat. The output at the collectors of Q1 and Q2 is applied to the antenna tilt motor and, through pins U and V, to the base of amplifier Q3 to provide overall stabilization for the servo system.

(c) Collins Part Number 769-7195-001. (Refer to 3A3 on figure FO-12)

The elevation servo-amplifier module drives the antenna tilt drive motor in response to varying combined roll and pitch signals from the pitch-roll resolver in the antenna and in response to the manual tilt signal from the cockpit control. The stabilization signal from the antenna pitch-roll resolver is connected, through pins B and C, in series with the manual elevation signal (pins D and E). The resulting signal is applied through R1 to the junction of R1 and R3, where it is combined with the rate signal (pin F) from the antenna rate generator to produce an elevation correction signal. This signal is applied through R3 to the base of amplifier Q1. The combination of resistors R1 through R4 and capacitors C1 and C2 provide the 90-degree phase shift required for proper phasing of the antenna tilt motor. The 90-degree phase-shift network also provides harmonic filtering. The output signal at the collector of the Darlington amplifier, Q1 and Q2, is applied across a limiter network, CR1, CR2, and C5, which provides a limiting gain control for the amplifier. The input is applied to the base of amplifier Q3, where it is amplified and applied to the base of amplifier Q4.

Q4 amplifies the signal and applies it across emitter-follower Q5 to amplifier Q6. The signal is further amplified and applied out through pin P to synchronizer transformer T1. The signal is coupled across T1 to the bases of power amplifiers Q1 and Q2, which are mounted on the synchronizer front panel. The center tap on transformer T1 is connected through resistors R1 and R3 and thermistor RT1 to the emitters of Q1 and Q2. The thermistor compensates for amplifier variations due to heat. The output at the collectors of Q1 and Q2 is applied to the antenna tilt motor and, as feedback, through pins U and V, to the base of amplifier Q4. This feedback is coupled through an isolation transformer, T1, across resistors R15, R16, and R14 as stabilization feedback.

(8) Phase Detectors. (Refer to 3A1A1, detector board assembly, on applicable figure.)

The phase detectors add the X and Y outputs of the antenna sweep resolver to a regulated ac reference voltage. The composite signals are rectified, filtered, and applied to the sweep generator and amplifier module to provide antenna azimuth position information for the sweep generating circuits.

(a) Refer to figure FO-11. The primary of transformer T4 receives 400-Hz, 115-volt excitation from the generator A power line. The secondary of T4, resistor R11. and zener diodes CR2 and CR3 form an ac voltage regulator. Each diode limits the peak value of the ac voltage on one-half cycle and provides a low-resistance path during the opposite half-cycle. Therefore, the amplitude of the peak-to-peak voltage applied to the primary of T5 remains constant. The output of one secondary winding of T5 (terminals 3 and 4) is applied to the rotor of the antenna sweep resolver.

The output of the other secondary winding (terminals 5, 6, and 7) is applied in series with the secondary windings of transformer T6. The Y signal from the antenna sweep resolver is applied to the primary winding of transformer T7. The outputs at the secondary windings of T6 are the sum of the X signal and the regulated ac reference voltage. The outputs of the secondary windings of T6 and T7 are rectified by emitter-followers Q3 through Q6 and filtered by the resistor-capacitor combinations in the emitter circuits. The low-impedance outputs of Q3 through Q6, a dc voltage plus a portion of a sine wave, are applied to the sweep generator and amplifier module. Potentiometers R13 and R14 adjust the level of the dc components, which control the start position of the sweep. Potentiometers R15 and R16 adjust the amplitude of the waveform which represents the antenna sweep resolver output. The four outputs are applied to the sweep generator and amplifier, where they are added vectorially to determine the length and azimuth position of the sweep.

(b) Refer to figure FO-12 The primary of transformer T4 receives 400-Hz, 115-volt excitation from the generator A power line. The secondary of T4, resistor R11, and diodes CR3 through CR6 form a switching diode bridge that maintains one direction current flow through zener diode CR2. The peak-to-peak amplitude of the ac waveform is limited by CR2.

The regulated ac reference voltage is applied to the primary of transformer T5. The X and Y outputs from the antenna sweep resolver are applied to the secondary of T5. The X and Y signals are coupled from terminals 33 and 35 through voltage dividers consisting of R23, R39, R22, and R38 and through capacitors C18 and C19. Resistors R12 and R16 develop a bias voltage for emitter-followers Q3 through Q6. Potentiometer R13 and R14 adjust the level of the X and Y signals to establish the start position of the sweep. The waveforms that result from combining the ac reference voltage and the X and Y signals are rectified by emitter-followers Q3 through Q6 and filtered by the resistor-capacitor combinations in the emitter circuits. The low-impedance outputs of Q3 through Q6, a dc voltage plus a portion of a sine wave, are applied to the sweep generator and amplifier module. These four outputs are applied to the sweep generator and amplifier, where they establish the amplitude of the four sweep voltages. The sweep voltages are combined in the indicator to determine the azimuth and range position of the sweep.

The regulated ac reference voltage at the secondary of T5 is also used for excitation of the antenna sweep resolver. The excitation voltage is coupled from terminal 15 of T5 and the wiper arm of R15. Potentiometer R15 adjusts the level of excitation voltage applied to the antenna sweep resolver.

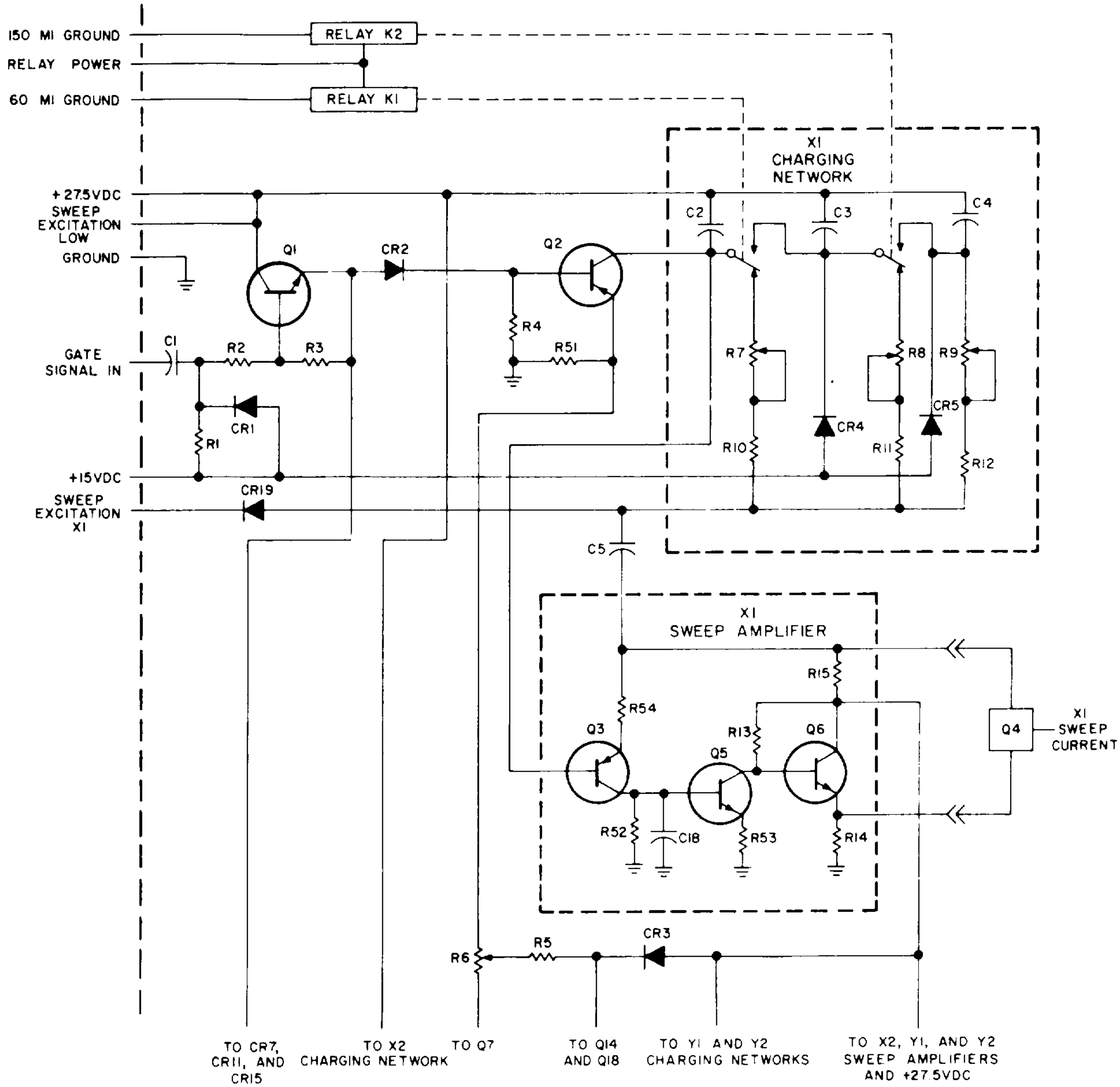
(c) Refer to figure F0-11. These units contain the same phase detector configuration and operate in the same manner as units in paragraph (b) with the following exceptions:

The 115-volt, 400-Hz generator A power line is connected to the primary of transformer T4 through a combination of capacitors and inductors. Capacitors C20, C21, and C22 and inductors L1 and L2 form a filter combination to improve the sweep phase detector circuit tolerance to ripple modulation on the 115-volt, 400-Hz generator A power line.

(9) Sweep Generator and Amplifier Module. (Refer to 3A7 of figure FO-11 or FO-12, and to figure 3-18)

The sweep generator and amplifier module provides X and Y sweep currents to the deflection yoke in the indicator. The four sweep generators each develop a linear sawtooth waveform which varies in amplitude in relationship to the antenna position information provided by the phase detectors. Since the sweep generators are identical in operation, the generator providing sweep current to the X1 winding of the deflection yoke is described as representative.

The simplified schematic, shown in figure 3-18 shows the details of the X1 sweep generator/amplifier only. In the 30-mile position, relays K1 and K2 are deenergized. The charging network consists of R7 through R12 and C2, C3, and C4. In the 60-mile position, K1 is energized, which places C2, C3, R8, and R11 in the charging circuit. In the 150-mile position, K1 and K2 are both energized, which places R9, R12, C2, C3, and C4 in the charging circuit. Similar changes occur in all four sweep generators.



Sweep Generator and Amplifier Module, Simplified Schematic

Figure 3-18

Variable resistors R7, R8, and R9 permit adjustment of the instantaneous slopes of the sweep waveforms for the individual ranges.

Prior to the arrival of the positive gate from the gate generator module, Q2 was conducting and Q1 was cut off. In the following discussion, C2, C3, and C4 will be referred to as capacitance C.

The conduction of Q2 shorts capacitance C, preventing it from charging. The positive gate at the base of emitter-follower Q1 causes Q1 to conduct. The positive gate at the emitter of Q1 is coupled through CR2 to the base of Q2 and drives Q2 into cutoff. Balance potentiometer R6 maintains proper position of the indicator presentation by compensating for differences in the bias of the X1 and X2 generators. With Q2 cut off, capacitance C begins to charge through the resistance selected by K1 and K2 to the instantaneous value of sweep excitation.

NOTE: Diodes CR19, CR20, CR21, and CR22 are present on modules with revision level H and below.

This excitation voltage contains antenna position information and is provided by the X1 phase detector. As capacitance C charges, a negative-going waveform is applied to the base of amplifier Q3. Transistor Q3 now conducts, and the negative waveform is applied by Q3 and Q5. Bootstrap voltage is applied through capacitor C5 to cause the charging current of C to remain constant during the entire sweep and to produce a highly linear sawtooth waveform.

NOTE: Capacitors C5, C9, C13, and C17 are present on modules with revision level .H and below.

The sawtooth waveform is amplified by emitter-follower Q6 and applied to the base of Q4. The sawtooth at the collector of Q4 is applied to the X1 deflection coil in the indicator. The current through Q4 and the deflection coil produce a sawtooth voltage waveform at the junction of CR6 and R15. This voltage is applied to the emitter of Q3 to provide constant charging of C and to provide inverse feedback to produce a sweep current that follows the sweep voltage at the base of Q3. The sawtooth waveforms generated by Y1 and Y2 sweep generators are combined at the junction of R38 and R39. This combined waveform is available at pin P as a ramp signal to be used by the gate generator module as a gate-stop signal.

NOTE: Later gate generator modules generate their own gate-stop signal, in which case the ramp signal is not used.

NOTE: Resistors R38, R39, and R40 are present on modules with revision level H and below.

Section II. DISASSEMBLY

3-6. GENERAL.

This section presents instructions for disassembling the 776C-3 Synchronizer and the 349B-4 Shockmount. These instructions are arranged so that disassembly of each major part is an individual operation. These procedures begin with the highest assemblies, proceed to the next lower subassemblies, and end with the major parts. Reference is made to previous disassembly steps that must be performed before a part may be removed or disassembled. In any event, the disassembly procedure should be continued only as far as necessary to replace the faulty component. The disassembly of terminal strips on boards and of isolated components can usually be accomplished by inspection and determination of the extent of disassembly required. These instructions include special techniques, cautions, warnings, and unique procedures.

3-7. PRECAUTIONS AND GENERAL TECHNIQUES.

Mark, tag, or otherwise identify all disconnected electrical wiring. Note the color coding, placement of leads, and method of applying insulation before unsoldering or removing any electrical components. These procedures supply information to remove the parts listed in the illustrated parts list. In most cases, however, parts may be released and moved aside to gain access to other parts without unsoldering the connecting leads; this applies particularly to printed circuit boards. Do not unsolder these leads unless absolutely necessary.

CAUTION: **TO PREVENT DAMAGE TO A SOLID-STATE DEVICE, USE A HEAT SINK ON THE LEAD BETWEEN THE POINT BEING UNSOLDERED AND THE DEVICE.**

WARNING: **THE SYNCHRONIZER USES EXTREMELY HIGH VOLTAGES. DO NOT ATTEMPT ANY DISASSEMBLY WHILE PRIMARY POWER IS APPLIED TO THE UNIT. ENSURE THAT THE POWER CABLE IS REMOVED PREVENT VOLTAGE TRANSIENTS WHICH COULD DAMAGE OR DESTROY SEMICONDUCTORS.**

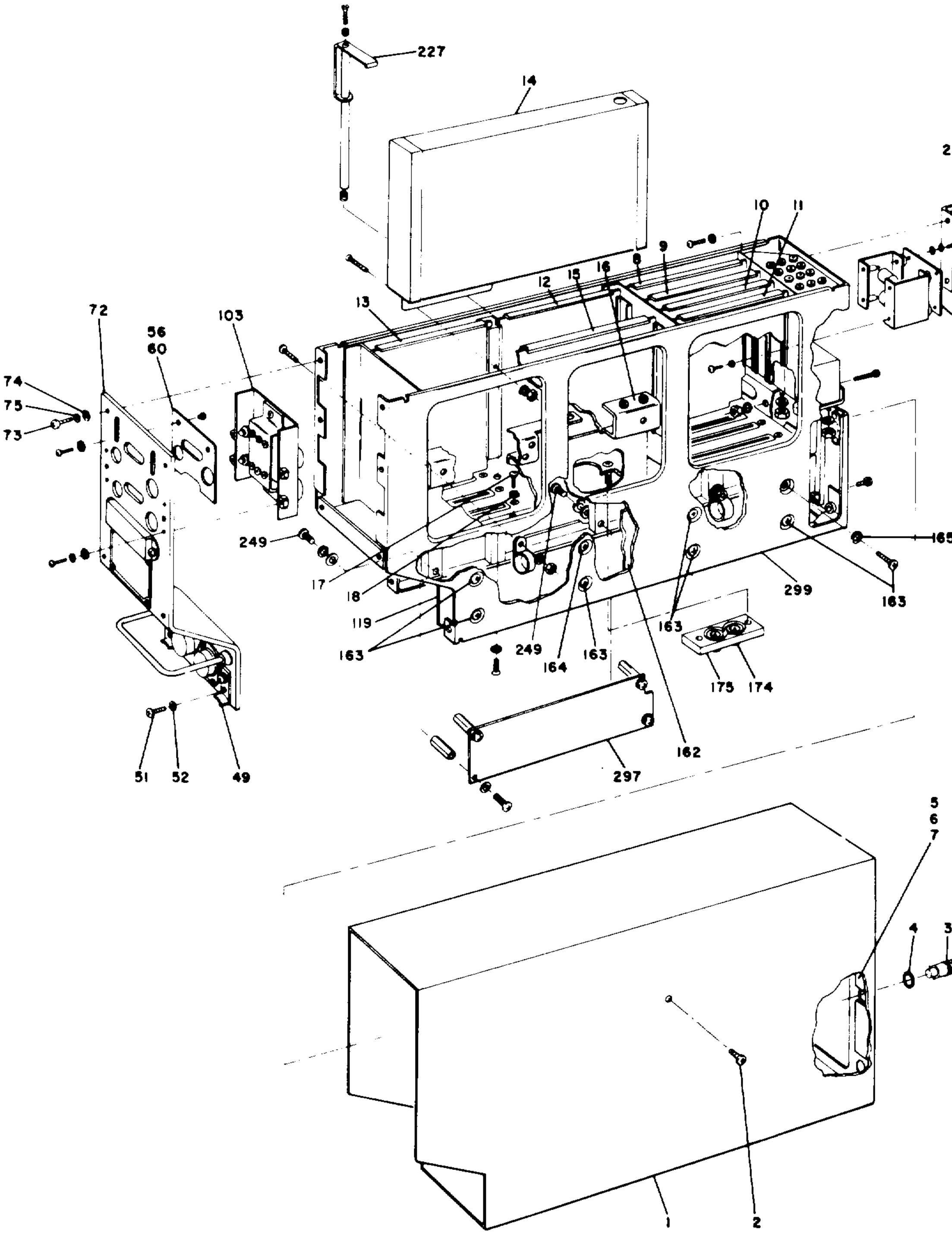
These precautions are repeated in the test of the disassembly procedures where applicable.

3-8. DISASSEMBLY PROCEDURE.

A. Remove Outer Dust Cover. (Refer to figure 3-19)

(1) Release dust cover (5) by releasing two twist lock fasteners (3) on the rear of the dust cover and by removing two machine screws (2) and two flat washers on the right side of the cover.

(2) Slide dust cover (5) off the chassis assembly (299).



776C-3 Synchronizer, Exploded View

Figure 3-19

B. Remove Plug-in Modules. (Refer to figure 3-19)

(1) Remove outer dust cover (5) in accordance with paragraph A above.

(2) Remove modules (8 through 13, 15) by grasping the top of the module and, while pulling upward, gently rock them from side to side.

NOTE: Disconnect J1 on wired heat sink (16) before attempting to remove sweep generator and amplifier module (15).

(3) Remove if. amplifier module (14) by rotating holddown bracket (227) then lifting the module out of chassis assembly (299).

C. Remove Wired Heat Sink. (Refer to figure 3-19)

(1) Remove outer dust cover (5) in accordance with paragraph A above.

(2) Remove sweep generator and amplifier module (15) in accordance with paragraph 3.B.(2).

(3) Remove wired heat sink (16) by removing five machine screws (17) and five lockwashers (18) securing it to chassis assembly (299).

D. Remove Front Panel. (Refer to figure 3-19)

(1) Remove front panel (72) by removing six machine screws (73), six lockwashers (75), six flat washers (74), two machine screws (51), and two lockwashers (52).

(2) Chassis mounted components located on the rear of front plate (72) are now accessible and may be removed as required.

E. Remove Transformer Plate. (Refer to figure 3-19)

(1) Remove outer dust cover (5) in accordance with paragraph A above.

(2) On units with serial number 1520 (revision level 17/T) and below, remove seven machine screws (163), one machine screw (164), and eight lockwashers (165) securing transformer plate (162) to the right side of chassis assembly (299).

(3) On units with serial number 1521 (revision level 18/U) and above, remove machine screws (163A, 271D) and lockwashers (165A, 271F) securing transformer plate (162A) to chassis assembly (299, figure 101).

(4) Gently pull the transformer plate (162, figure 101) away from chassis assembly (299).

(5) The components mounted on the transformer plate are not accessible and may be removed as required.

F. Remove Wired Servo Phase TB11. (Refer to figure 3-19)

NOTE: This procedure applies to units with serial number 1520 (revision level 17/T) and below. On units with serial number 1521 (revision level 18/U) and above, the wired servo phase is an integral part of detector board assembly TB1.

(1) Remove outer dust cover (5) in accordance with paragraph A above.

(2) Release transformer plate (162) in accordance with paragraphs E(2) through E(4) above.

(3) Remove wired servo phase TB11 (119) by removing four machine screws (120), four lockwashers (122), and four flat washers (121) securing it to five hexposts (123).

(4) Unsolder and tag the leads to the wired servo phase TB11 (119).

(5) Remove the board.

G. Remove Detector Board Assembly. (Refer to figure 3-19)

(1) Remove outer dust cover (5) in accordance with paragraph A above.

(2) On units with serial number 1520 (revision level 17/T) and below, remove four machine screws (249) securing detector board assembly (297) to chassis assembly (299).

(3) On units with serial number 1521 (revision level 18/U) and above, remove two ma(chine screws (271D), three machine screws (271E), and five lockwashers t271 F) securing detector board assembly TB1 (298) to chassis assembly (299).

(4) Pull the board away from chassis assembly and unsolder and tag the leads from the board terminals.

(5) Remove the board.

H. Disassemble 349B-4 Shockmount. (Refer to figure 3-20)

(1) Remove front retainers (34) by removing cotter pin (36) and pin (37).

(2) Remove shockmount tray (30) from baseplate (55) as follows:

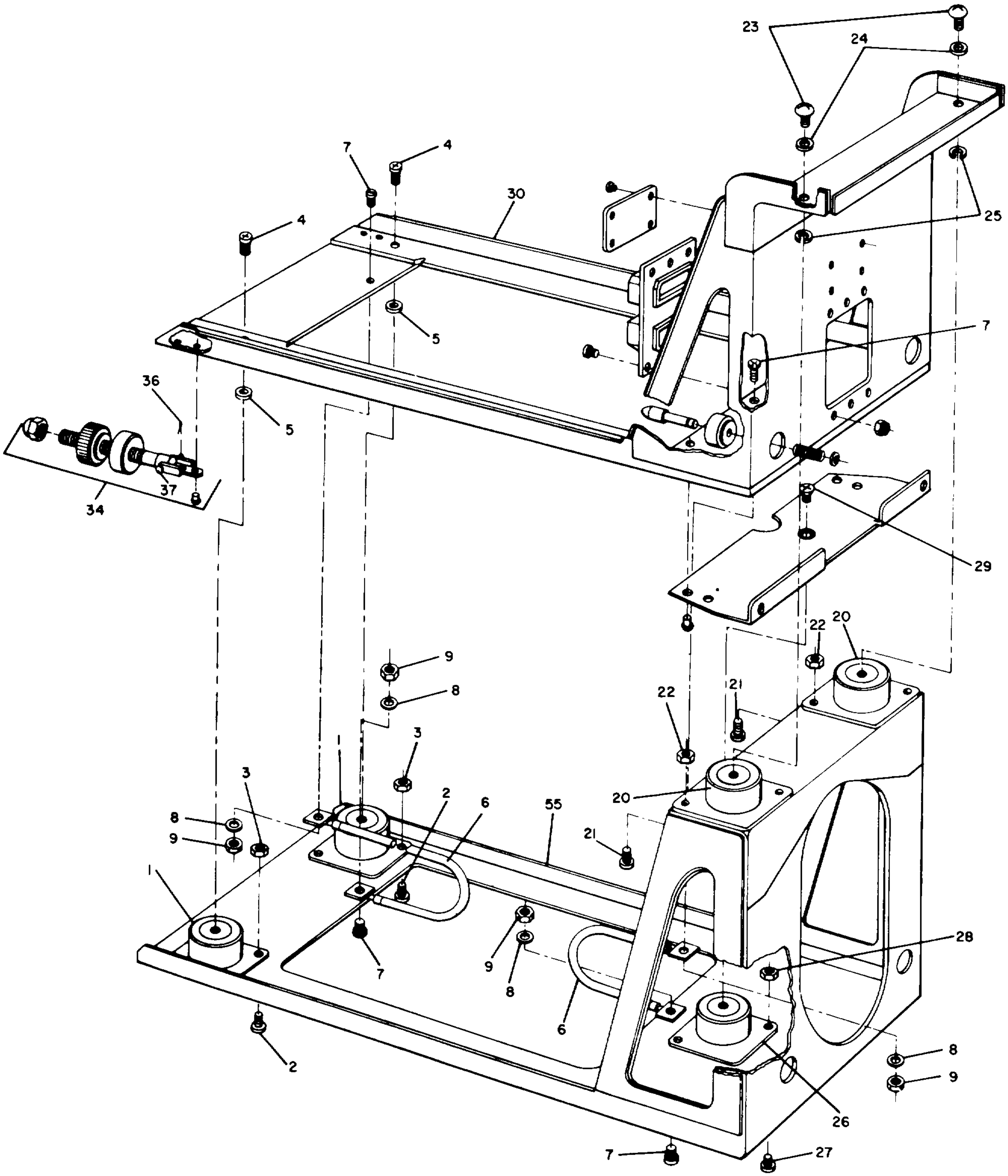
(a) Remove two machine screws (4) and two flat washers (5).

(b) Remove two machine screws (23), two flat washers (24), and lockwashers (25).

(c) Remove machine screw (29).

(d) Remove two grounding straps (6) by removing four machine screws (7), four flat washers (8), and four hexnuts (9) securing them to baseplate (55).

(e) Remove shockmount tray (30).



349B-4 Shockmount, Exploded View

Figure 3-20

(3) Remove the vibration isolators as follows:

(a) Remove two vibration isolators (1) by removing four machine screws (2) and four hexnuts (3) securing them to baseplate (55).

(b) Remove two vibration isolators (20) by removing four machine screws (21) and four hexnuts (22) securing them to baseplate (55).

(c) Remove vibration isolator (26) by removing two machine screws (27) and two hexnuts (28) securing it to baseplate (55).

NOTE: Further disassembly of the 349B-4 Shockmount is not recommended unless part replacement is necessary.

Section III. CLEANING

3-9.

GENERAL.

This section presents instructions for cleaning the dismantled and disassembled components, parts, and subassemblies of the 776C-3 Synchronizer and the 349B-4 Shockmount. These instructions are tabulated and arranged to facilitate reference to the text procedure for cleaning the various parts and assemblies. All parts requiring special methods of cleaning are considered separately, and parts which are similar enough to permit identical cleaning procedures are grouped together. Either Turcosol or Stoddard solvent may be used in the following procedures.

WARNING: PERFORM OPERATIONS INVOLVING CLEANING SOLVENT UNDER A VENTILATED HOOD. AVOID BREATHING SOLVENT VAPOR AND FUMES .WEAR A SUITABLE MASK WHEN NECESSARY. AVOID CONTINUOUS CONTACT WITH THE SOLVENT. USE GOGGLES, GLOVES, AND AN APRON TO PREVENT IRRITATION FROM PROLONGED CONTACT. CHANGE CLOTHING THAT HAS BECOME SATURATED WITH SOLVENT.

Reference to "air jet" in this section indicates a hand-operated air nozzle supplied with clean, dry, compressed air at a maximum pressure of 28 pounds per square inch.

WARNING: WEAR GOGGLES WHEN USING THE AIR JET TO BLOW DUST AND DIRT FROM EQUIPMENT PARTS. WARN OTHER PERSONS AWAY FROM HAZARDOUS AREA OR WORKING ENCLOSURE.

3-10.

CLEANING PROCEDURES.

The following paragraphs present instructions and procedures for cleaning the various parts of the dismantled and disassembled equipment preparatory to performing inspection procedures. For convenience, components, parts, and subassemblies are alphabetically listed and cross-referenced to the appropriate paragraphs containing the cleaning instructions. Refer to figure 3-21.

WARNING: OBSERVE ALL FIRE PRECAUTION S WHEN USING FLAMMABLE MATERIALS FOR CLEANING PURPOSES. THESE MATERIALS SHOULD ONLY BE USED OUTSIDE OR IN A VENTILATED BOOTH PROVIDED WITH EXPLOSION-PROOF ELECTRICAL EQUIPMENT AND AN EXHAUST FAN HAVING SPARK-PROOF BLADES.

A. Connectors.

(1) Wipe dust and dirt from bodies, shells, and cable clamps using a solvent-moistened, lintless cloth. Wipe dry with a clean, dry, lintless cloth.

(2) Remove dust from inserts, using a small, soft-bristled brush and an air jet.

ITEM	REFER TO PARAGRAPH
Connectors	3-10.A
Covered cables	3-10.B
Covers and shields	3-10.C
Insulators: Ceramic, Mycalex, and plastic	3-10.D
Jacks	3-10.E
Machined metal parts	3-10.F
Mechanical metal parts	3-10.G
Panels	3-10.H
Printed circuit boards	3-10.I
Vibration isolators	3-10.J
Wired chassis	3-10.K

Index of Cleaning Procedures

Figure 3-21

(3) Wash dirt and any traces of lubricant from inserts, insulation, and contacts using solvent applies sparingly with a small, camel-hair brush.

CAUTION: DO NOT ALLOW SOLVENT TO RUN INTO SLEEVES OR CONDUIT COVERING ANY WIRES OR CABLES CONNECTED TO CONTACT TERMINALS OF THE INSERT.

(4) Dry the insert with an air jet.

B. Covered Cables.

(1) Clean outer surfaces by wiping away dirt with a solvent-moistened, lintless cloth.

(2) Wipe dry using a clean, dry, lintless cloth.

(3) Treat any connector terminations in accordance with paragraph A above. Wipe lug terminations clean with a solvent-moistened, lintless cloth, and dry with a clean, dry, lintless cloth.

C. Covers and Shields.

Clean all unfinished, finished, and partly finished sheet-metal covers, such as dust covers, inspection covers, and housings as follows:

(1) Remove the bulk of surface dirt with rags.

(2) Blow dust from surfaces, holes, and recesses using an air jet.

(3) Immerse the cover or shield in a washing bath of solvent, and scrub until clean, working over all surfaces and into all holes and recesses with a suitable nonmetallic brush. Flat, wood-backed brushes with soft fiber bristles are recommended for surfaces; round brushes, similar to those used for washing bottles and test tubes, are recommended for holes and recesses.

(4) Raise casting from bath and permit solvent to drain into bath.

(5) Immerse the cover or shield in rinsing bath of clean solvent, rinse, and raise from bath. Position the cover or shield to drain dry so that solvent is not trapped in holes or recesses. When practical positioning will not permit complete draining, use an air jet to blow out any trapped solvent.

CAUTION: WEAR PROTECTIVE CLOTHING WHEN USING THE AIR JET TO REMOVE EXCESS SOLVENT.

(6) When thoroughly dry, touch up any minor damage to the finish.

(7) Protect the cover or shield from dust and moisture, pending inspection.

D. Insulators: Ceramic, Mycalex, and Plastic.

Clean all glazed porcelain insulators, ceramic insulators, Mycalex insulators, and plastic standoff insulators as follows:

(1) Wipe clean with a solvent-moistened, clean, lintless cloth.

(2) Wipe dry and polish using a clean, dry, lintless cloth.

E. Jacks.

(1) Remove dust and dirt from exteriors with a camel-hair brush and an air jet.

(2) Blow dust and dirt from interior of female contacts with an air jet.

F. Machined Metal Parts.

Detached shafts, keys, pins, collars, and similar machined parts should be cleaned in a suitable cleaning machine if available. If a cleaning machine is not available, proceed as follows:

(1) Clean machined metal parts in accordance with paragraphs C(1) and C(3) through C(5) above.

NOTE: Do not touch any clean machined or unfinished parts with bare hands.

(2) Dry in a dust-free, dry area or suitable enclosure. Radiant heat used in a ventilated enclosure is recommended for drying, particularly where atmospheric humidity is high.

(3) After the drying process is completed, apply a light coat of lubricating oil (MIL-L-6085) to any bare steel surfaces.

G. Mechanical Metal Parts.

The detached miscellaneous mechanical metal parts include mounting plates, mounting clamps and brackets, nuts, bolts, screws, washers, fasteners, and other hardware. These should be cleaned in a suitable cleaning machine or in accordance with applicable steps of the procedures for covers and shields contained in paragraph C above.

H. Panels.

Clean panels by gently wiping the surfaces with a clean, soft, lintless cloth. When clean, polish with tissue paper.

I. Printed Circuit Boards.

(1) Using an air jet and a small, camel-hair brush, blow and brush dust and dirt from surfaces, holes, and crevices.

(2) Wipe clean using a lintless cloth slightly moistened with solvent.

CAUTION: THE EPOXY MOISTURE SEALANT ON THE PRINTED CIRCUIT BOARDS IS SUSCEPTIBLE TO SOFTENING IF SOLVENT IS APPLIED FOR EXCESSIVE PERIODS OF TIME OR IN EXCESSIVE AMOUNTS. USE CARE IN CLEANING THESE PRINTED CIRCUIT BOARDS WITH A SOLVENT MOISTENED CLOTH. DRY WITH A CLEAN, LINTLESS CLOTH IMMEDIATELY AFTER CLEANING.

J. Vibration Isolators.

Clean detached, vibration isolators as follows:

(1) Blow dust and dirt from surfaces with an air jet.

(2) Immerse in solvent bath and wash until clean.

(3) Raise from bath and let solvent drain into bath.

(4) Use an air jet to remove any trapped solvent.

K. Wired Chassis.

The following procedures should be used for chassis containing resistors, capacitors, switches, tube sockets, inductors, transformers, and other wired parts.

(1) Remove dust and dirt from all surfaces, including parts and wiring, using soft-bristled brushes and an air jet.

CAUTION: AVOID AIR-BLASTING DELICATE PARTS BY TOO CLOSE AN APPROACH WITH THE AIR JET NOZZLE. USE CAUTION WHEN BRUSHING DELICATE PARTS.

(2) With a minimum disturbance of wiring, clean connectors in accordance with paragraph A above.

(3) Clean insulators in accordance with paragraph D above.

(4) Clean jacks in accordance with paragraph E above.

(5) Complete chassis cleaning by wiping all finished surfaces with a solvent-moistened, lintless cloth.

(6) Dry and polish these surfaces, using a clean, dry, lintless cloth.

(7) Protect from dust and moisture pending inspection.

Section IV. INSPECTION/CHECK

3-11.
GENERAL.

This section presents instructions and procedures to assist in determining, by inspection, the condition of the dismantled, disassembled, and cleaned components, parts, and assemblies of the 776C-3 Synchronizer and the 349B-4 Shockmount. Defects resulting from wear, physical damage, deterioration, or other causes would be discovered by these inspection procedures. Detailed inspection procedures are alphabetically arranged. Refer to section V of this chapter for replacement or repair of defective components.

3-12.
INSPECTION PROCEDURES.

Figure 3-22 lists the mechanical and electrical parts to be inspected and contains cross references to applicable paragraphs containing inspection procedures.

ITEM	REFER TO PARAGRAPH
Capacitors	3-12A
Chassis	3-12B
Connectors	3-12C
Covers and shields	3-12D
Insulators: Ceramic, Mycalex, and plastic	3-12E
Jacks	3-12F
Machined metal parts	3-12G
Mechanical metal parts	3-12H
Panels	3-12I
Printed circuit boards	3-12J
Rf coils	3-12K

Index of Inspection Procedures (Sheet 1 of 2)

Figure 3-22

ITEM	REFER TO PARAGRAPH
Receptacles	3-12L
Relays	3-12M
Resistors	3-12N
Semiconductors	3-120
Soldered terminal connections	3-12P
Transformers and inductors	3-12Q
Vibration isolators	3-12R
Wiring	3-12S

Index of Inspection Procedures (Sheet 2 of 2)

Figure 3-22

A. <u>Capacitors.</u>

Inspect capacitors for the defects listed in figure 3-23.

DEFECT	METAL TYPE	MOLDED TYPE	CERAMIC TYPE
Leakage (at case seams or around terminal insulation)	X		
Cracked, broken, or charred terminal insulation	X		
Case damage (dents or holes)	X		
Case damage (cracks or breakage)		X	
Loose, broken, or corroded terminal studs, lugs, or leads	X	X	X
Loose, broken, or poorly soldered connections	X	X	X

Fixed Capacitor Inspection

Figure 3-23

B. Chassis.

Inspect chassis for deformation, dents, punctures, badly worn surfaces, damaged connectors and fastening devices. Examine the chassis for corrosion and damage that may require refinishing.

C. Connectors.

Inspect connector bodies for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed, or out of alignment. Check for corroded or damaged plating on contacts and for loose, poorly soldered, broken, or corroded terminal connections.

D. Covers and Shields.

Inspect covers and shields for punctures, deep dents, and badly worn surfaces. Check for damaged fastening devices, corrosion, and other damage that may require refinishing.

E Insulators: Ceramic, Mycalex, and Plastic.

Inspect ceramic, Mycalex, and plastic insulators for evidence of damage, such as broken or chipped edges, burned areas, or foreign material. Check for loose, corroded, or poorly soldered connections.

F. Jacks.

Inspect all jacks for corrosion, loose or broken parts, cracked insulation, and other irregularities.

G. Machined Metal Parts.

Inspect machined metal parts for physical damage to surfaces. corners, and edges. Closely inspect all machined surfaces, holes, bores, counterbores, slots, grooves, shoulders, flanges, tapped holes, and all threaded members, both male and female, for damage of any sort including roughness of surface, corrosion, or foreign matter. Inspect plated or finished areas for damage requiring replating or refinishing beyond touchup repair.

H. Mechanical Metal Parts.

Inspect unmachined mechanical metal parts, including mounting plates, chassis, mounting clamps, brackets, nuts, bolts, screws, washers, fasteners, and other hardware for damage or deformation. Inspect for corrosion and any damage that would require replating or refinishing beyond touchup repair.

I. Panels.

Inspect all panels for physical damage and deformation, marred surfaces, and impairment of markings.

J. Printed Circuit Boards.

Inspect printed circuit boards for loose, broken, corroded, or poorly soldered terminal connections. Inspect for any evidence of damage, such as burned, broken, cracked, or corroded plating. Check for loose or improperly soldered components and for loose mounting of the circuit boards.

K. RF Coils.

Inspect rf coils for broken leads, loose mountings, and loose, poorly soldered, or broken terminal connections. Also, check for crushed, scratched, cut, bruised, or charred windings, corrosion on windings, leads, terminals, and connections, and for physical damage to forms.

L. Receptacles.

Inspect receptacles for cracked, broken, or charred insulation. Inspect for damage to all other parts, loose or bent contacts, damage to contact plating, corrosion, and other abnormal conditions.

M. Relays.

Inspect encapsulated relay cases, mountings, and terminal connections for looseness, physical damage, corrosion, and improperly soldered connections.

N. Resistors.

Inspect fixed composition resistors for cracked, broken, blistered, or charred bodies and for loose, broken, poorly soldered, or corroded terminal connections.

Inspect fixed wirewound resistors for signs of heating, cracked, broken, or charred insulation, loose, poorly soldered, broken, or corroded terminal connections, and loose mounting.

Inspect variable resistors for corrosion of shafts, cases, or other visible parts, loose mountings, and physical damage. Where possible, rotate the shaft to determine whether action is too rough, too loose, or too tight.

O. Semiconductors.

Inspect diodes and transistors for cracked, broken, blistered, or damaged bodies and cases. Inspect for loose, broken, poorly soldered or corroded terminal connections.

P. Soldered Terminal Connections.

Inspect soldered terminal connections for cold-soldered or rosin joints. These joints present a porous or dull, rough appearance. Check for strength of bond using a pointed tool. Examine for excess of solder, protrusions from the joint, pieces adhering to adjacent insulation, and particles lodged between joints, conductors, or other parts. Inspect for insufficient solder and unsoldered strands of wire protruding from conductor joints. Also check for insulation that is stripped back too far from joints or badly frayed at the joint. Inspect for corrosion on copper conductor joints.

Q. Transformers and Inductors.

Inspect transformers and inductors for signs of excessive heating, physical damage to cases, cracked or broken insulators, and other irregularities. Inspect for corroded, poorly soldered, or loose terminals and for loose, broken, or missing mounting hardware.

R. Vibration Isolators.

Inspect the metal parts of vibration isolators for corrosion, damaged surfaces, and deformation. Inspect the elastic members for deep cracks and other physical damage. Inspect elastic members for loss of resiliency by manually distorting and noting return to normal position upon release. Sluggish return or failure to return completely to normal position indicates a defective isolator.

S. Wiring.

Inspect open and laced wiring of chassis, terminal boards, and parts by checking insulation for physical damage and charring. Inspect wires for breakage and for improper dress in relation to adjacent wiring and chassis.

Section V. REPAIR

3-13.

GENERAL.

This section presents instructions and procedures for the replacement or repair of damaged or defective components of the 776C-3 Synchronizer and the 349B-4 Shockmount. Faulty components are usually detected through procedures in the inspection/check or testing sections of this manual. New parts should be inspected and/or tested before being installed. Most of the replacements or repair instructions apply to disassembled equipment. Refer to the disassembly section for proper instructions.

3-14.

REPAIR PROCEDURES.

Figure 3-24 lists an alphabetically arranged index of repair procedures. Each component, part, or assembly is cross referenced to the appropriate paragraph containing the correct repair procedure.

ITEM	REFER TO PARAGRAPH
Capacitors	3-14A
Connectors	3-14B
Covers and shields	3-14C
Finished surfaces	3-14D
Frames	3-14E
Insulators: Ceramic, Mycalex, and plastic	3-14F
Jacks	3-14G
Machined metal parts	3-14H
Mechanical metal parts	3-14I
Panels	3-14J
Printed circuit boards	3-14K

Figure 3-24. Index of Repair Procedures (Sheet 1 of 2)

ITEM	REFER TO PARAGRAPH
Rf coils	3-14L
Relays	3-14M
Resistors	3-14N
Semiconductors	3-140
Soldered terminal connections	3-14P
Transformers and inductors	3-14Q
Vibration isolators	3-14R
Wiring	3-14S

Figure 3-24. Index of Repair Procedures (Sheet 2 of 2)

A. Capacitors.

If defective or if performance is questionable, capacitors should be replaced. Clean all connections thoroughly and apply new solder.

B. Connectors.

Straighten bent pins and damaged shell areas. Replace defective connectors, broken wires, or wires with split insulation. If a connector insert is broken, replace the connector.

C. Covers and Shields.

Replace damaged screws, straighten any dents or warped sections, and retouch scratched or worn painted surfaces.

D. Finished Surfaces.

Touch up minor scratches in all painted surfaces with a high-quality, black enamel applied with a small brush. Refinish black wrinkle as required, in accordance with MIL-E-5558A and MIL-P-6889G. Refinish black lusterless surfaces, as required, in accordance with MIL-E-14072 (SIGC). Touch up unpainted aluminum with Alodine 1200, or suitable water-lacquer mixture, applied with a pipe cleaner or small brush.

E. Frames.

Straighten all misshapen areas. Remove all corrosion with a suitable cleaner. Retouch silk screening, and refinish where needed.

F. Insulators.

Replace any insulators which show signs of physical damage, such as cracks, burns, chips, or any other type of damage or deterioration.

G. Jacks.

Replace cracked, broken, or severely misshapen jacks or jacks with bent or broken center conductors or insulation.

H. Machined Metal Parts.

If satisfactory machine shop facilities for suitable repair of these surfaces are not available, the defective or damaged part should be replaced.

I. Mechanical Metal Parts.

Straighten bent or misshapen mounts, clamps, and mounting plates. Replace broken, bent or cross-threaded bolts, screws, nuts, washers, and other hardware.

J. Panels.

Replace cracked, chipped, broken, or otherwise damaged panels. Retouch or refinish in accordance with paragraph D above.

K. Printed Circuit Boards.

Replace any cracked, broken, chipped, or otherwise damaged printed circuit boards. Repair of these boards is not recommended.

L. RF Coils.

Replace cracked, chipped, broken or burned rf coils or coils with damaged tuning slugs.

M. Relays.

If a relay appears to be defective or intermittent, the relay should be replaced. Damaged relays are replaced as individual units. Make a sketch of wire connections to facilitate rewiring. Sealed relays cannot be repaired if found defective. Clean all connections and apply new solder.

N. Resistors.

If defective or if performance is questionable, resistors should be replaced. Clean all connections thoroughly and apply new solder. Add a drop or two of contact cleaner (carbon tetrachloride) to the windings or variable resistors with rough or intermittent operation. Replace variable resistors if the shaft is loose in the case. Clean corroded terminals.

O. Semiconductors.

If a semiconductor appears defective or is suspected of questionable operation, it should be replaced. Replace any semiconductor which shows signs of overheating or which has damaged cases.

CAUTION: TO PREVENT DAMAGE, USE A HEAT SINK BETWEEN THE LEAD BEING SOLDERED AND THE SEMICONDUCTOR DEVICE.

P. Soldered Terminal Connections.

Resolder cold-soldered or rosin joints. Remove all traces of corrosion.

Q. Transformers and Inductors.

Replace all cracked, chipped, or charred transformers and inductors. Replace all transformers and inductors if defective or suspected of questionable performance. Identify leads to facilitate rewiring. Clean all connections thoroughly and apply new solder.

R. Vibration Isolators.

Ensure that the metal parts of vibration isolators are clean and free from corrosion and physical defects. Isolators whose elastic members show loss of resiliency should be replaced.

S. Wiring.

Replace damaged wiring with wire of the same size and color coding. Ensure that no bare wires are touching the chassis, other bare wires, or metal cases of other parts. If a wire is to be removed from a terminal or component, it should be marked with an identification tag to minimize incorrect connections. Clean all terminals and apply new solder.

NOTE: When necessary to disturb the dress of wires or cables, carefully ensure that the original wire dress is restored.

Section VI. ASSEMBLY

3-15.

GENERAL.

This section presents instructions for assembling the 776C-3 Synchronizer and the 349B-4 Shockmount. These instructions are arranged so that assembly of each major part is an individual operation. Reference is made to subsequent assembly steps that must be performed to completely restore the unit. The order of assembly begins with the lowest parts, proceeds to the next higher subassemblies, and ends with the completed unit. These instructions include special techniques, cautions, warnings, and unique procedures.

3-16.

PRECAUTIONS AND GENERAL TECHNIQUES.

Before soldering any lead or component, refer to the notes of color coding, placement of leads, and wire insulation made during disassembly. If there is any doubt as to the placement of such leads of components, refer to the appropriate diagrams and perform continuity tests to ensure proper replacement. Ensure, also, that proper dress or lacing of wires and cables is restored.

CAUTION: **TO PREVENT DAMAGE TO A SOLID-STATE DEVICE, USE A HEAT SINK ON THE LEAD BETWEEN THE POINT BEING SOLDERED AND THE DEVICE.**

WARNING: **THE SYNCHRONIZER USES EXTREMELY HIGH VOLTAGES. DO NOT ATTEMPT ANY ASSEMBLY WHILE PRIMARY POWER IS APPLIED TO THE UNIT. ENSURE THAT THE POWER CABLE IS REMOVED TO PREVENT VOLTAGE TRANSIENTS WHICH COULD DAMAGE OR DESTROY SEMICONDUCTORS.**

These precautions are repeated in the text of the assembly procedures, where applicable.

3-17.

ASSEMBLY PROCEDURE.

A. Assemble 349B-4 Shockmount. (Refer to figure 3-2w)

(1) Replace the vibration isolators as follows:

(a) Replace vibration isolator (26) by securing it to baseplate (55) with two machine screws (27) and two hexnuts (28).

(b) Replace two vibration isolators (20) by securing them to baseplate (55) with four machine screws (21) and four hexnuts (22)

(c) Replace two vibration isolators (1) by securing them to baseplate (55) with four machine screws (2) and four hexnuts (3).

(2) Secure shockmount tray (30) to baseplate (55) as follows:

(a) Place shockmount tray (30) in mounting position.

(b) Replace two grounding straps (6) by securing them to baseplate (55) with four machine screws (7), four flat washers (8), and four hexnuts (9).

NOTE: Liquid-stake isolator screws (4, 29) using grade C sealant (Collins part number 005-0548-00).

(c) Replace machine screw (29).

(d) Replace two machine screws (4) and two flat washers (5).

(e) Replace two machine screws (23), two flat washers (24), and two lockwashers (25).

(3) Replace front retainers (34) by replacing pin (37) and cotter pin (36).

NOTE: Apply an ample coating of aircraft and instrument grease (Collins part number 005-0234-00), as per MIL-G-3278, to pin and hearing after assembly.

B. Replace Detector Board Assembly. (Refer to figure 3-19)

(1) Place the detector board assembly in mounting position and solder the leads to the board terminals.

(2) On units with serial number 1520 (revision level 17/T) and below, secure detector board assembly (297) to chassis assembly (299) with four machine screws (249).

(3) On units with serial number 1521 (revision level 18/U) and above, secure detector board assembly TB1 (298) to chassis assembly (299) with two machine screws (271D), three machine screws (271E), and five lockwashers (271F).

(4) Replace outer dust cover (5) in accordance with paragraph 3.H.

C. Replace Wired Servo Phase TB11. (Refer to figure 3-19)

NOTE: This procedure applies to units with serial number 1520 (revision level 17/T) and below. On units with serial number 1521 (revision level 18/U), and above, the wired servo phase is an integral part of the detector board assembly TB1.

(1) Place wired servo phase TB11 (119) in mounting position and solder the leads to the board terminals.

(2) Secure wired servo phase TB11 (119) to five hexposts (123) with four machine screws (120), four lockwashers (122), and four flat washers (121).

(3) Replace transformer plate (162) in accordance with paragraph D(2) below.

(4) Replace outer dust cover (5) in accordance with paragraph H below.

D. Replace Transformer Plate. (Refer to figure 3-19)

NOTE: Components mounted on the transformer plate should be replaced before proceeding with this procedure.

(1) Place the transformer plate in mounting position.

(2) On units with serial number 1520 (revision level 17/T) and below, secure transformer plate (162) to chassis assembly (299) with seven machine screws (163), one machine screw (164), and eight lockwashers (165).

(3) On units with serial number 1521 (revision 18/U) and above, secure transformer plate (162A) to chassis assembly (299, figure 3-19) with machine screws (163A, 271D) and lockwashers (165A, 271F).

(4) Replace outer dust cover (5) in accordance with paragraph H below.

E. Replace Front Panel. (Refer to figure 3-19)

NOTE: Components mounted on the rear of the front panel should be replaced before proceeding with this procedure.

Replace front panel (72) by securing it to chassis assembly (299) with six machine screws (73), six lockwashers (75), six flat washers (74), two machine screws (51), and two lockwashers (52).

F. Replace Wired Heat Sink. (Refer to figure 3-19)

(1) Replace wired heat sink (16) by securing it to chassis assembly (299) with five machine screws (17) and five lockwashers (18).

(2) Replace sweep generator and amplifier module (15) in accordance with paragraph G(2) below.

(3) Replace outer dust cover (5) in accordance with paragraph H below.

G. Replace Plug-in Modules. (Refer to figure3-19)

(1) Replace if. amplifier module (14) and secure it in position by rotating holddown bracket (227).

(2) Replace modules (8 through 13, 15).

NOTE: Connect J1 on wired heat sink (16) after replacing sweep generator and amplifier module (15).

(3) Replace outer dust cover (5) in accordance with paragraph H below.

H. Replace Outer Dust Cover. (Refer to figure 3-19)

(1) Slide dust cover (5) over chassis assembly (299).

(2) Secure two twist lock fasteners (3) on the rear of the dust cover, and replace two machine screws (2) and two flat washers on the right side of the cover.

Section VII. TESTING

3-18.

GENERAL.

This section presents information and procedures to test and align the 776C-3 Synchronizer.

3-19.

TEST EQUIPMENT REQUIRED.

Figure 3-25 lists the equipment and test fixtures required to test and/or overhaul the synchronizer. While substitution of equipment other than manufacturer and type listed is not recommended, other equipment may be used if it equals or exceeds the minimum specifications of the equipment listed. Nomenclatures shown in parentheses identify military equipment equivalent to the commercial units described.

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
Items 1 through 6 are required for testing with the 978G-1 Radar Test Set and 979A-2 Maintenance Kit.		
1. Maintenance kit also contains: Dummy load Demagnetizer Antenna fixture Module extender, MX-6424 (2 ea) Module extender, MX-6425 Module extender, MX-6426 Cable assemblies as follows: CG-1464/U (7 ea) CG-3109/U CX-9813 CX-10088 CX-10089 CX-10090 CX-10091	Collins 979A-2, part number 522-5730-014 (MK-774/APN-158)	

Figure 3-25.Test Equipment Required (Sheet 1 of 3)

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
1. (Cont) Adapters as follows: MX-6637 MX-6638 UG-273/U (3 ea) UG-201A/U (2 ea) Test lead (2 ea) Test probe, 1000:1 Tuning tool Scale, 6 in.		
2. Radar test; set also contains: Cable assemblies as follows: CX-10242 CX-11555 CG-1464/U (6 ea) Adapters as follows: UG-273/U (3 ea) UG-201A/U (2 ea)	Collins 978G-1, part number 522-5731-015 (AN/APM-247)	
3. Oscilloscope	AN/USM-281A (or equiv)	Vertical deflection sensitivity: 20 mv/ cm to 20 v/cm. Sweep range: 0.1 us./cm to 5 s/cm, calibrated. External trigger input level: 0.2 to 10 v. Input impedance: 1 megohm. Bandwidth: dc to 10 MHz.
4. 374A-3 Receiver-Transmitter	Collins, 522-6113-006 (RT-711/APN-158)	

Figure 3-25. Test Equipment Required (Sheet 2 of 3)

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
5. Vhf signal generator	Hewlett-Packard 608D (AN/USM-44A)	Frequency range, accuracy: 20 to 40 MHz ±5% full range. Output level: 0.1 uv to 0.5 v +1 db into 50-ohm resistive load. External pulse modulation: +5 v peak required, 350 to 450 Hz. Internal crystal calibrator.
6. Pulse generator	Hewlett-Packard 212A (AN/PPM-1A)	Pulse length: 2 to 10 us. at 50-v peak. Attenuator range: to 50 db in 10-db steps with variable amplitude on 10-db range. Pulse repetition rate: 350 to 450 p/s (internal sync), 350 to 450 p/s (external sync). Synchronization voltage: ±5 v minimum (input), +28 v or -15 v into 2000-ohm load (output). Internal impedance: 50 ohms or less.

Figure 3-25. Test Equipment Required (Sheet 3 of 3)

3-20. USE OF TEST PROCEDURES.

A. Overall Test Procedures.

The test setup using the 978G-1 Radar Test Set is shown in Figure 3-26. The overall unit test procedures for testing the unit with a 978G-1 WP-103 Radar Test Set are contained in figure 3-28 in tabular form. The STEP/TEST column denotes the step number and test nomenclature of each complete test, the PROCEDURE column gives direction or commands to be performed on the equipment or associated test equipment, the 978G-1 INSTRUCTIONS column gives instructions necessary to operate the 978G-1 WP-103 Radar Test Set, and the RESULTS/NOTES column gives the indication expected for the test being performed. Each unit function is tested separately.

B. Overall System Test Setup Procedures Using the 978G-1 (AN/APM-247) Test Set.

(1) Connect the 776C-3 Synchronizer into the system harness with the associated equipment per figure 3-2w.

(2) Initially set the 978G-1 test set controls as follows:

(a) Set the AC POWER switch to OFF.

(b) Set the METER MULTIPLIER switch to X10.

(c) Set the SYSTEM CONTROL switch to OFF.

(d) Set the INPUT VOLTAGE ADJUST control to counterclockwise stop.

(e) Set the TEST FUNCTION switch on the RECEIVER/TRANSMITTER TEST subpanel to OFF.

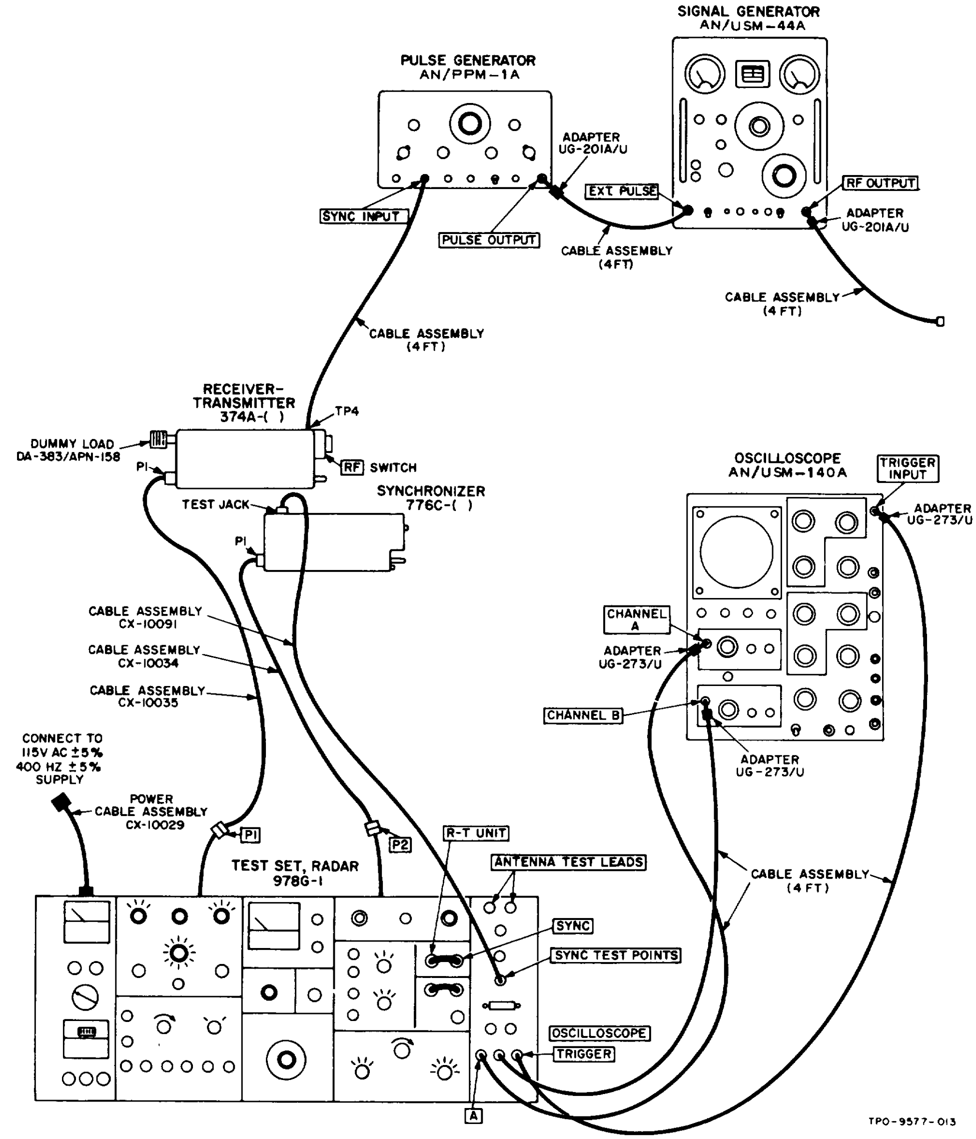
(f) Set the TEST FUNCTION switch on the SYNCHRONIZER TEST subpanel to OFF.

(g) Set the ANTENNA TESTS switch to OFF.

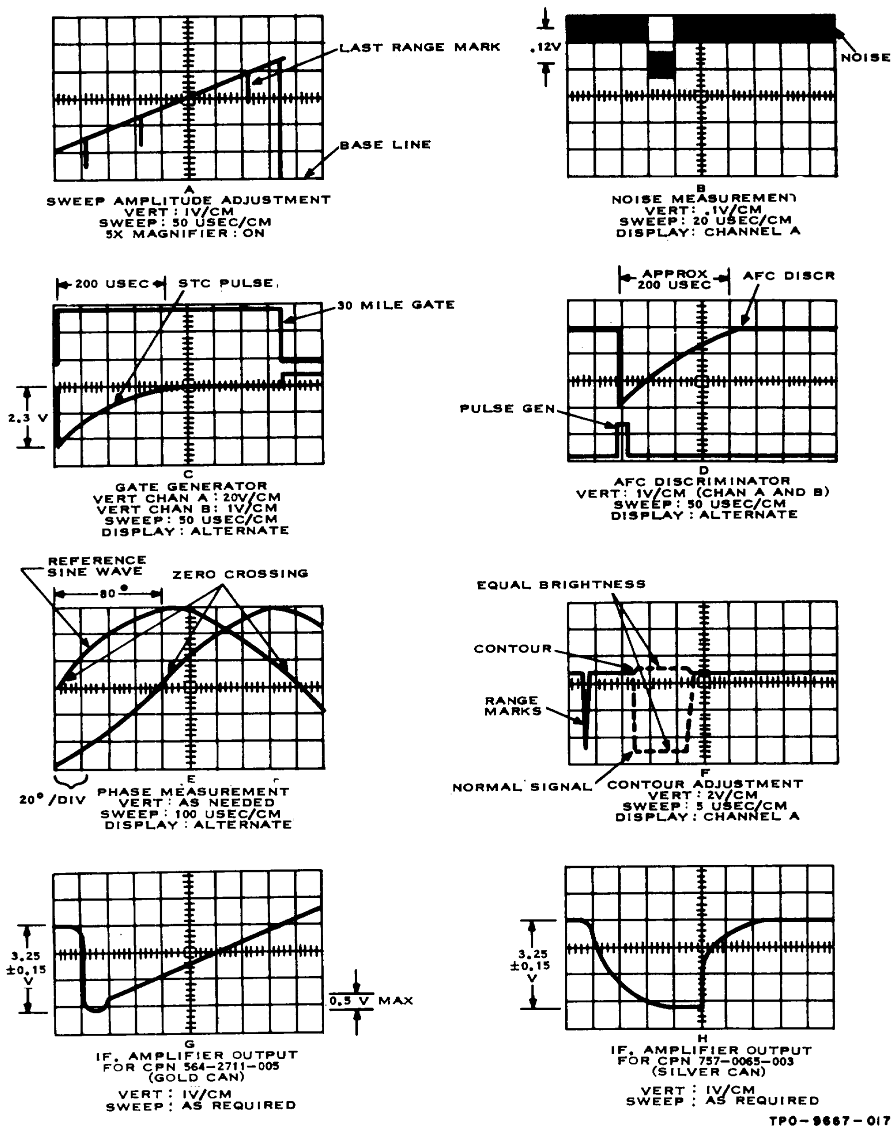
(h) Set the GYRO SIMULATOR switch to OFF.

(i) Connect the electrical power cable assembly (CX-10029) to the 115-volt, 400-Hz power source.

(j) Perform the procedures as outlined in figure 3-28.



776C-3 Bench Test Setup Diagram Using the 978G-1 Test Set Figure 3-26



Waveforms for Testing
Figure 3-27

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
1.Preliminary setup	a. Set all switches to OFF or fully counterclockwise. b. Connect and/or verify equipment (per figure 3-26). c. Apply power to the 978G-1 WP-103 Radar Test Set. d. Note input frequency on 978G-1 FREQUENCY METER. e. Set up the 978G-1. f. Set the mode selector on the oscilloscope to A ONLY.	c. AC POWER switch to ON. e. TEST FUNCTION SELECTOR switch to SYNCHRONIZER TESTS, SYSTEM CONTROL to OPERATE, and TEST FUNCTION switch on the SYNCHRONIZER TESTS subpanel to GATE.	c. AC POWER lamp lights. d. Frequency is 400 +5 Hz. f. Check oscilloscope setup and ensure that a signal will appear on channel A.
2. Gate pulse	a. Measure the peak-to-peak amplitude and rise time of the pulse displayed on the oscilloscope (figure 3-27). b. Set the 978G-1.	b. TEST RANGE SELECTOR switch to 30, 60, and 150 in sequence. (On modules revision H and above, adjust R31 for all ranges. On modules revision G and below, adjust R29 for 30-mi. range, R31 for 60-mi. range, and R33 for 150-mi. range.)	a. Amplitude: Not less than 20 v. Rise time: Not more than 2.5 us. (10 and 90% points). b. POSITION / PULSE WIDTH 30 430 ± 30 us. 60 860 ±50 us. 150 2100±90 us.

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 1 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
3. Range marks	a. Set the 978G-1.	a. TEST FUNCTION switch on the SYNCHRONIZER TESTS subpanel to RANGE and the TEST RANGE SELECTOR switch to 30, 60, and 150 in sequence. (Measure the amplitude and width of pulse on oscilloscope.)	a. Amplitude: Negative, not less than 5 v. Width: Not more than 4 us. NOTE: Pulse is displayed on channel A.
	b. Set the 978G-1.	b. TEST RANGE SELECTOR switch to 30, 60, and 150 in sequence. (Measure the time between the start of the sweep and the third, fourth, and sixth range mark.	b. RANGE MARK TIME (us.) 30 Third 370 +25 60 Fourth 740 40 150 Sixth 1855 +75
4. Phase detector	**NOTE: Remove gate generator module from synchronizer chassis.**		
	a. Set the 978G-1.	a. TEST FUNCTION switch on the SYNCHRONIZER TESTS subpanel to PHASE DETECTOR, PHASE DETECTOR switch to Y BAL (NULL), and TEST RANGE SELECTOR to 30.	
(Cont)		b. **Note TEST METER.**	b. Meter indicates in the green range (scale X10).

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 2 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
4. (Cont)		c. METER MULTIPLIER switch to X1 and note TEST METER. (Y-position potentiometer R14 on lower left side of synchronizer may be adjusted.)	c. Meter indicates center scale null of less than one-half of one minor scale division.
	d. Set the 978G-1.	d. PHASE DETECTOR switch to Y-LENGTH (50) and note TEST METER. (Adjust Y-LENGTH potentiometer R16. on units with serial number 1520 (revision level 18/T) and below or EXC LEVEL potentiometer R15 on lower left side of synchronizer). **<u>NOTE</u>: All units do not have separate X and Y length adjustments.**	d. Meter indicates 22.5 $\pm$1.0 v.
	e. Set the 978G-1.	e. PHASE DETECTOR switch to X BAL (NULL) and note TEST METER. (Adjust X-position potentiometer R13 on lower left side of synchronizer.)	e. Meter indicates center scale null of less than one-half of one minor scale division.
	f. Set the 978G-1.	f. PHASE DETECTOR switch to X-LENGTH (50) and note TEST METER. (Adjust X-LENGTH potentiometer on lower left side of synchro-nizer on units with serial number 1520 (revision level 18/T) and below.)	f. Meter indicates 22.5 $\pm$1.0 v.

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 3 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G1 INSTRUCTIONS	RESULTS/NOTES
5. Sweep balance	a. Set the 978G-1. b. Set the 978G-1. c. Set the 978G-1. d. Reinstall gate generator module. e. Set the 978G-1.	a. TEST FUNCTION switch on SYNCHRONIZER TESTS subpanel to SWEEP BAL (NULL), SWEEP BAL (NULL) switch to X, and note TEST METER- (Adjust X-balance potentiometer R6 on the sweep generator and amplifier module.) b. SWEEP BAL (NULL) switch to Y and note TEST METER. (Adjust Y-balance potentiometer R28 on the sweep generator and amplifier module.) c. SYSTEM CONTROL to STANDBY. e. SYSTEM CONTROL to OPERATE.	a. Meter indicates center scale null of less than one-half of one minor division. b. Meter indicates center scale null of less than one-half of one minor division.
6. Sweep calibration	a. Set the 978G-1. b. Set the 978G-1.	a. TEST FUNCTION switch on the SYNCHRONIZER TESTS subpanel to SWEEP CAL, SWEEP CAL, switch to SCOPE CAL (5V), and note the TEST METER. NOTE: **Check the calibration of the oscilloscope.** b. SWEEP CAL to UP and TEST RANGE SELECTOR switch to 30.	b. Meter indicates 4.0 +0.2 v. Oscilloscope indicates a dc level of 4.0 +0.2 v on channel A and B.

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 4 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
6. (Cont)	c. Adjust channel A and channel B vertical controls of the oscilloscope until the base lines of the two waveforms coincide. Observe the difference at last range mark voltage that is displayed on oscilloscope.		c. Oscilloscope indicates 4.0 +0.2 v. NOTE: **Adjust R42 on sweep generator and amplifier module for step c reading.**
	d. Set the 978G-1.	d. TEST RANGE SELECTOR switch to 60 and repeat step c between the fourth range marks.	d. Oscilloscope indicates 4.0 +0.1 v. NOTE: **Adjust R43 for the sweep generator and amplifier module.**
	e. Set the 978G-1.	e. TEST RANGE SELECTOR switch to 150 and repeat step c between the sixth range mark.	e. Oscilloscope indicates 4.0 +0.1 v. NOTE: **Adjust R44 on the sweep generator and amplifier module.**
	f. Set the 978G-1.	f. SWEEP CAL to DOWN. TEST RANGE SELECTOR to 30, 60, and 150.	f. Oscilloscope indicates 4.0 +0.1 v for each range. NOTE: **Adjust Y1-R29, R30, R31 on sweep generator and amplifier module.**

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 5 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
6. (Cont)	g. Set the 978G-1.	g. SWEEP CAL to RIGHT. TEST RANGE SELECTOR to 30, 60, and 150.	g. Oscilloscope indicates I 4.0 ±0. 1 v for each range. **NOTE: Adjust X1-R7, R8, R9 on sweep generator and amplifier module.**
	h. Set the 978G-1.	h. SWEEP CAL to LEFT. TEST RANGE SELECTOR to 30, 60, and 150.	h. Oscilloscope indicates 4.0 +0. 1 v for each range. **NOTE: Adjust X2-R17, R18, R19 on sweep generator and amplifier module.**
7. Automatic frequency control (afc)	a. Set RF switch on transmitter/receiver to ON. b. Set the meter switch on the receiver/transmitter to AFC.		
	c. Set the 978G-1.	c. TEST FUNCTION switch on SYNCHRONIZER TESTS subpanel to AFC OUT (-500V).	
	d. Disconnect the coax jumper from the AFC SYNC jack on the 978G-1.		

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 6 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G1 INSTRUCTIONS	RESULTS/NOTES
7. (Cont)	e. Connect cable assembly from RF OUTPUT jack of the AN/USM-44A to the AFC SYNC jack on the 978G-1. f. Remove cable from 978G-1 OSCILLOSCOPE TRIGGER. Using a "T" connector, connect oscilloscope TRIGGER INPUT to AN/USM-44A EXT. PULSE (PULSE OUTPUT from AN/PPM-1A). g. Set the output of the pulse generator for a positive 5-us., 20-v pulse. h. Set the AN/USM-44A for a pulsed 5-us., 30.00-MHz signal at a level of -13 db. **NOTE: The db level is very critical and should be adjusted with the utmost care.** **NOTE: Temporarily connect RF output to channel A of oscilloscope, and observe RF in both CW and PULSE positions. The two peak-to-peak levels must be identical.** i. Using extender (MX-6424), extend the afc module. j. Connect cable assembly with a X10 probe to the oscilloscope channel A.		

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 7 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
7. (Cont)	k. Set oscilloscope MODE switch to A ONLY.		
	l. Connect channel A standard test probe to pin B of the afc module and observe the oscilloscope.		l. Observe 3.25 +0.25-v negative pulse for if. amplifier module CPN 757-0065-003 (silver can). Adjust T1 to give 3.25 +0.1 v (peak) stretched waveform for if. ampli-fier module CPN 564-2711-003 (gold can).
	m. Connect X10 probe (channel A) to AFC test point on rear of synchronizer (dc coupled oscilloscope).		
	n. Set AN/USM-44A attenuation to -25 dbm.		n. Display sweeps from 150 +10 to 215 +10 v. **<u>NOTE:</u> Observe voltage at pin M of afc module. The level should re-main constant during sweeping action. If vari-ation is noted, check the value of R21 on 3A1A1 for 100 ohms.**

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 8 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
7. (Cont)	o. Set AN/USM-44A attenuation to -13 dbm. (Check SET LEVEL on AN/USM-44A.)		
	p. Adjust the AN/USM-44A frequency for an indication of -185 v on the 978G-1 TEST METER.		p. AN/USM-44A reads 30.00 MHz +0.2 MHz
	(1) If necessary, adjust R7 on afc module CPN 772-0967-001 for -185 v at 30.00 MHz.		
	(2) R19 on afc module CPN 758-4825-000 for -185 v at 30.00 MHz.		
	NOTE: Afc module CPN 563-4952-004 must be used with if. amplifier CPN 564-2711-003 e (gold can) only.		
	q. Increase frequency to obtain -150 vdc.		q. AN/USM-44A reads less than 31.0 MHz.

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 9 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
7. (Cont)	r. Decrease frequency to cause sweeping indication, then raise to just stop sweeping. s. Disconnect cable of step e and reconnect receiver/ transmitter to AFC SYNC jack.		r. TEST METER reads 215 ±15. AN/USM-44A reads not less than 29 MHz.
8. STC pulse	a. Set the 978G-1. b. Connect oscilloscope trigger input to 978G-1 OSCILLO-SCOPE TRIGGER and oscil-loscope CHANNEL A input to OSCILLOSCOPE A on 978G-1. c. Measure the amplitude and pulse width of the signal on the oscilloscope. (Adjust R35 on the gate generator module.)	a. TEST FUNCTION switch on the SYNCHRONIZER TESTS subpanel to STC.	c. Amplitude, 4. 0 ± 0. 2 v p-p; rise time, 15 us. or less; fall time, approx 200 us.
9. Receiver gain	a. Set the 978G-1. b. Connect cable from TP4 on the R/T to the SYNC INPUT jack on the pulse generator. c. Connect a cable from the PULSE OUTPUT jack on the pulse generator to the EXT PULSE jack on the AN/USM-44A and oscillo-scope trigger input. (Use "T" connector.)	a. TEST FUNCTION switch on SYNCHRONIZER TESTS subpanel to VIDEO	

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 10 of 14)
Figure 3-28

STEP/TEST	PROCEDURE	978G-1INSTRUCTIONS	RESULTS/NOTES
9. (Cont)	d. Disconnect the jumper from the IF SYNC jack on the 978G-1 subpanel (IF). e. Connect a cable from the RF OUTPUT Jack on the AN/USM-44A to the IF SYNC Jack on the 978G-1 IF subpanel. f. Set the MODE SELECTOR switch on the AN/USM-44A to CW and adjust for 30-MHz output signal. g. Set the output level of the AN/USM-44A by setting the panel meter to SET LEVEL with the OUTPUT LEVEL control. (This calibrates the attenuator in the AN/USM-44A for direct dial indication readings.) h. Set the pulse generator for a 10-us. output pulse. i. Set the MODE SELECTOR on the AN/USM-44A to PULSE. j. Observe the video display on the oscilloscope.		j. Display is negative going with noise and range K marks visible along the base line.

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 11 of 14)

Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
9. (Cont)	k. Increase (negative) the output level of the AN/USM-44A until the video pulse reaches maximum. (Adjust R23 in the video driver module.) l. Set the 978G-1. m. Observe range mark amplitude on oscilloscope. (Adjust R27 in the video driver module.)	l. TEST RANGE SELECTOR switch on the SYNCHRONIZER TESTS subpanel to 60.	k. Oscilloscope displays a 6-volt peak signal. m. Display is 4.5 to 5.5 v.
10. Contour	a. Set the 978G-1. b. Adjust the attenuator on the AN/USM-44A for a contoured display on the oscilloscope.	a. SYSTEM CONTROL switch to CONTOUR.	b. Attenuator dial reading is -75 ± 2 dbm. NOTE: **Adjust R23 on video driver module CPN 757-0719-003 or R12 on CPN 565-5607-005.**
11. Isolation-amplifier gain	a. Set the 978G-1.	a. TEST FUNCTION switch on SYNCHRONIZER TESTS subpanel to ISO AMP GAIN, GYRO SIMULATOR switch to ON, ISO AMP (10VAC) switch to PITCH.	

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 12 of 14)

Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
11. (Cont)	b. Set the 978G-1.	b. PITCH control knob to 20 NOSE UP and note TEST METER indication. (Adjust PITCH AMPL potentiometer R10 on front of chassis.)	b. Meter indicates 5.0 v nominal.
	c. Set the 978G-1.	c. ISO AMP switch to ROLL. CD ROLL control to 20 LEFT WING DOWN and note TEST METER indication. (Adjust ROLL AMP potentiometer R7 on front of chassis.)	c. Meter indicates 5.0 v nominal.
12. Isolation-amplifier phase	a. Set the 978G-1.	a. TEST FUNCTION switch on the SYNCHRONIZER TESTS subpanel to ISO AMP PHASE, and ISO AMP switch to PITCH.	
	b. Set the MODE switch on the oscilloscope to ALTERNATE.		
	c. Adjust the waveforms on the oscilloscope to equal amplitude.		
	d. Set the 978G-1.	d. PITCH control to 10.	d. Display on oscilloscope (channel A and B) coincides at the zero crossing points. NOTE: **Adjust PITCH PHASE potentiometer R8 on front of unit if necessary.**

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 13 of 14)

Figure 3-28

STEP/TEST	PROCEDURE	978G-1 INSTRUCTIONS	RESULTS/NOTES
12. (Cont)	e. Set the 978G-1.	e. ISO AMP switch to ROLL, ROLL control to 10, and r observe oscilloscope.	e. Same as step d. NOTE: **Adjust ROLL PHASE potentiometer R5 on front of the unit if necessary.**
13. Servo amplifier	a. Set the 978G-1.	a. TEST FUNCTION switch on SYNCHRONIZER TESTS subpanel to SERVO(50VAC), SERVO(50VAC) switch to STAB, and observe TEST METER. (Adjust R2 on the elevation servo-amplifier module.) NOTE: **Newer units do not have the adjustment.**	a. Meter indicates 16 v or greater for older units and 10 v or greater for newer units.
	b. Set the 978G-1.	b. SERVO(50VAC) switch to RATE and note indication on TEST METER. (Adjust R5 on the elevation servo-amplifier module.) NOTE: **Newer units do not have the adjustment.**	b Meter indicates 16 v or greater for older units and 10 v or greater for newer units.

776C-3 Test Procedures Using 978G-1 Test Set (Sheet 14 of 14)

Figure 3-28

C. Individual Module Test Procedures.

The test setup using the 979A-2 Module Test Set is shown in figure 3-29. The individual module test procedures testing the modules with the 979A-2 WP-103 Module Test Set are contained in figure 3-30 in tabular form. The STEP/TEST column denotes the step number and test nomenclature for each complete test, the PROCEDURE column gives direction or commands to be performed on the equipment or associated test equipment, the 979A-2 SETTING column gives instructions necessary to operate the 979A-2 WP-103 Radar Test Set, the RESULTS/NOTES column gives the indication expected for the test being performed, and the ALIGNMENT/TROUBLESHOOTING column gives alignment instructions and/or possible cause of malfunction.

D. Module Test Procedures Using the 979A-2 (MK-774/APN-158) Test Set.

Perform the following starting procedures before attempting any testing of modules in this section.

(1) Remove the top cover from the 979A-2 test set.

(2) Set the switches as follows:

(a) POWER to OFF

(b) DEMAGNETIZING COIL to OFF

(c) METER FUNCTION to OFF

(d) TEST FUNCTION SELECTOR to OFF

(e) All other switches may be in any position.

(3) Connect the power cable to the POWER connector on the front panel of the test set and the other end to a 115-volt, 400-Hz power source.

(4) Connect the standard test equipment to test set as shown in figure3-29.

(5) Perform the following steps to ensure that the test set is operating properly:

(a) Set the POWER switch to ON.

(b) Set the METER FUNCTION switch to 115V AC, and check that the input voltage is between 109 and 121 volts ac.

(c) Set the METER FUNCTION switch to +27.5V, and check that the TEST METER indicates 27.5 ±1.1 volts dc on the 50-volt range.

(d) Set the METER FUNCTION switch to -27V, and check that the TEST METER indicates -27.0 ±2.5 volts dc on the -50-volt range.

(e) Set the METER FUNCTION switch to +15V, and check that the TEST METER indicates 15 ±2 volts dc on the +50-volt range.

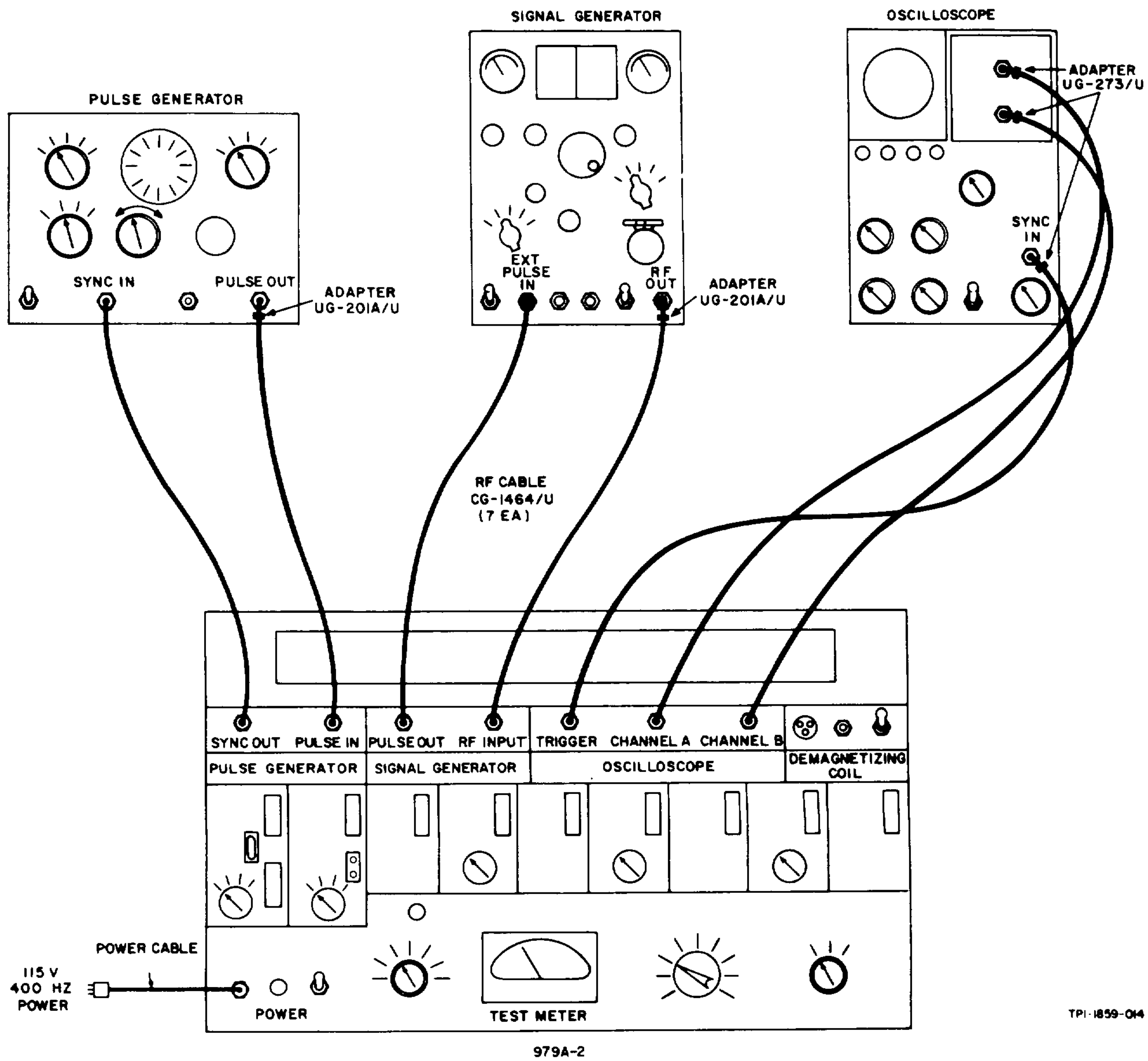
(f) Return the METER FUNCTION and POWER switches to the OFF positions.

CAUTION: MAKE CERTAIN THAT EITHER THE POWER SWITCH OR THE TEST FUNCTION SELECTOR SWITCH IS IN THE OFF POSITION BEFORE PLUGGING MODULE INTO TEST SET.

(6) Plug in the module to be tested into the appropriate connector on the front of the test set, connectors are marked with module names. Module should be removed after testing is completed.

(7) Set the POWER switch to ON.

(8) Perform the procedures in figure 3-30.



776C-3 Bench Test Setup Diagram Using the 979A-2 Test Set

Figure 3-29

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
1. Sweep generator and amplifier	**NOTE: Perform starting procedures in paragraph 3-20 D. prior to starting of testing.** **NOTE: Check power connections and set up.**			
a. Power supply loading	(1) Set the 979A-2,	(1) METER FUNCTION to +27. 5V. TEST FUNCTION SELECTOR to SWEEP GEN. (2) Rotate SWEEP GENERATOR TEST SELECTOR and the TEST RANGE SELECTOR through all possible combinations, observing the TEST METER for +27.5-v indications. (3) METER FUNCTION to +15V; repeat step (2).	(2) Meter indicates less than one-half of one minor scale division deviation for all positions. (3) Refer to step (2).	(2) Possible shorted wiring or defective components in power supply. (3) Refer to step (2).
b. X amplifier balance	(1) Set the 979A-2.	(1) SWEEP GENERATOR TEST SELECTOR to X BAL. (2) METER FUNCTION to TEST(X1); note TEST METER.	(2) Meter indicates a NULL ±1 minor scale division.	(2) Adjust the X BAL potentiometer R6. on the sweep generator module.

Module Test Procedures Using 979A-2 Module Test Set (Sheet 1 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
1. (Cont) c. Y amplifier balance	(1) Set the 979A-2.	(1) SWEEP GENERATOR TEST SELECTOR to Y BAL. (2) METER FUNCTION to TEST(X1); note TEST METER.	(2) Meter indicates a NULL ±1 minor scale division.	(2) Adjust Y balance potentiometer R28 on the sweep generator module.
d. General operation	(1) Set the 979A-2. (2) Set the oscilloscope as follows: a. MODE to ALTERNATE b. Sweep speed to 500 us./cm c. Sensitivity (A) to 2 v/cm d. Sensitivity (B) to 10 v/cm	(1) METER FUNCTION OFF, SWEEP GENERATOR TEST SELECTOR to X1, and TEST RANGE SELECTOR to 150.		

Module Test Procedures Using 979A-2 Module Test Set (Sheet 2 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
1.d (Cont)	(3) Observe channel A and channel B waveforms.		(3) Display on channel B is 2100 us. long and has an amplitude of +20 v; channel A is 2100 us. long and has an amplitude of 4.5 v.	(3) With sweep generator unplugged and the gate on, the input channel B signal is shorted and/or X1 sweep amplifier or range relay circuits are defective. If oscillations appear on the signals, select a new value for C18 in the range of 0 to 4700 pf.
	(4) Set the 979A-2.	(4) TEST RANGE SELECTOR to 60 and 30, individually.	(4) Display is same amplitude as in step (3) with 860-us. pulse width for 60 and 430 us. for 30.	(4) Same as step (3).
	(5) Set the 979A-2 and repeat steps (:3) and (4).	(5) SWEEP GENERATOR TEST SELECTOR to X2.	(5) Refer to steps (3) and (4).	(5) Same as step (3) with X2 amplifier; select C19.
	(6) Set the 979A-2 and repeat steps (3) and (4).	(6) SWEEP GENERATOR TEST SELECTOR to Y1.	(6) Refer to steps (3) and (4).	(6) Same as step (3) with Y1 amplifier; select C20.
	(7) Set the 979A-2 and repeat steps (3) and (4).	(7) SWEEP GENERATOR TEST SELECTOR to Y2.	(7) Refer to steps (3) and (4).	(7) Same as step (3) with Y2 amplifier; select C21.

Module Test Procedure Using 979A-2 Module Test Set (Sheet 3 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
1. (Cont)				
e. 150-mile range sweep amplitude checks (preliminary)	(1) Recalibrate the oscilloscope. (2) Set the oscilloscope as follows: a. MODE to channel A ONLY. b. Sweep speed to 500 us./cm c. Sensitivity (A) to 1 v/cm d. Sweep magnifier to 5X (3) Set the 979A-2.	(3) TEST X RANGE SELECTOR to 150.		
f. X1 amplifier	(1) Set the 979A-2.	(1) SWEEP GENERATOR TEST SELECTOR to X1.		
	(2) Observe display on channel A of oscilloscope.		(2) Display is a saw-tooth waveform with superimposed range marks.	
(Cont)	(3) Adjust the hori-zntal control on the oscilloscope so that CD both the baseline and the last range			

Module Test Procedures Using 979A-2 Module Test Set (Sheet 4 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
1. f (Cont)	mark on the saw-tooth waveform are displayed (figure 3-27). (4) Adjust the vertical control on the oscilloscope so that the baseline of the waveform exactly coincides with the bottom horizontal graticule line on the face of the oscilloscope. (5) Verify amplitude of oscilloscope display.		(5) Display amplitude is 4.0 ±0.1 v at the intersection of the last range mark.	(5) Adjust X1-150 potentiometer R9 on the sweep generator.
g. X2 amplifier	(1) Set the 979A-2.	(1) SWEEP GENERATOR TEST SELECTOR to X2.	(1) Repeat steps f.(2) through f.(5).	(1) Adjust X2-150 potentiometer R19 on the sweep generator.
h. Y1 amplifier	(1) Set the 979A-2.	(1) SWEEP GENERATOR TEST SELECTOR to Y1.	(1) Repeat steps f.(2) through f.(5).	(1) Adjust Y1-150 potentiometer R31 on the sweep generator.
i. Y2 amplifier	(1) Set the 979A-2.	(1) SWEEP GENERATOR TEST SELECTOR to Y2.	(1) Repeat steps f.(2) through f.(5).	(1) Adjust Y2-150 potentiometer R-44 on the sweep generator.

Module Test Procedures Using 979A-2 Module Test Set (Sheet 5 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
1. (Cont) 60-mile range sweep amplitude checks	Set the oscilloscope sweep speed to 100 us./cm.			
j. X1 amplifier	(1) Repeat steps f.(2) through f.(5).			(1) Adjust X1-60 potentiometer R8 on the sweep generator.
k. X2 amplifier	(1) Repeat steps f.(2) through f.(5) and g.(1).			(1) Adjust X2-60 potentiometer R18 on the sweep generator.
l. Y1 amplifier	(1) Repeat steps f.(2) through f.(5) and h.(1).			(1) Adjust Y1-60 potentiometer R30 on the sweep generator.
m. Y2 amplifier	(1) Repeat steps f.(2) through f.(5) and i.(1).			(1) Adjust Y2-60 potentiometer R43 on the sweep generator.

Module Test Procedures Using 979A-2 Module Test Set (Sheet 6 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
1. (Cont) 30-mile range sweep amplitude				
	Set-oscilloscope sweep speed to 50 us./cm.			
n. X1 amplifier	(1) Repeat step j. (1).			(1) Adjust X1-30 potentiometer R7 on the sweep generator.
o. X2 amplifier	(1) Repeat step k. (1).			(1) Adjust X2-30 potentiometer R17 on the sweep generator.
p. Y1 amplifier	(1) Repeat step 1. (1).			(1) Adjust Y1-30 potentiometer R29 on the sweep generator.
q. Y2 amplifier	(1) Repeat step m.(1).			(1) Adjust Y2-30 potentiometer R42 on the sweep generator.
2. If. Amplifier	<u>**NOTE:**</u> **Perform starting procedures in paragraph 3-20D.**			
a. Setup	(1) Set up the 979A-2.	(1) METER FUNCTION to +15V, TEST FUNCTION SELECTOR to IF AMPL, and IF AMPLIFIER TEST SELECTOR to DET 2&3 (old unit only) or 4&5 (new unit only).		

Module Test Procedure Using 979A-2 Module Test Set (Sheet 7 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
2.a (Cont)	(2) Set the oscilloscope as follows: a. Sweep speed to 5 us./cm b. MODE to channel B ONLY c. Vertical sensi-tivity (B) to 0.5 v/cm (3) Observe oscilloscope and set the pulse generator as follows: a. Pulse polarity to positive. b. Pulse amplitude to 1 v peak. c. Pulse width to 5 us. d. Sync to external negative e. Display to 25 us. from sync pulse (4) Set the signal gener-ator as follows: a. Frequency to 30 MHz			

Module Test Procedure Using 979A-2 Module Test Set (Sheet 8 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
2.a (Cont)	b. Modulation to external pulse. c. Amplitude to -65 dbm.			
b. Power supply loading	(1) Set the 979A-2.	(1) IF AMPLIFIER OUT-PUT SELECTOR to each position; note TEST METER for each indication and position.	(1) Meter indicates 15 v for each position with a deviation of less than one-half of one minor scale division.	(1) Defective wiring or components.
c. Detectors 2 and 3	(1) Set the oscilloscope as follows: a. MODE to ALTERNATE b. Sweep speed to 10 us./cm c. Sensitivity (A) to 0.05 v/cm d. Sensitivity (B) to 1 v/cm			
	(2) Set the 979A-2.	(2) IF. AMPLIFIER TEST SELECTOR to DET 2&3 (old unit only).		
	(3) Observe oscilloscope display on channel A with respect to the signal generator display on channel B.		(3) Display on channel A negative and coincident with the channel B display.	(3) Increase the signal generator output; if no signal is present, the if. amplifier is defective or misaligned.

Module Test Procedures Using 979A-2 Module Test Set (Sheet 9 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
2. c (Cont)	(4) Adjust the signal generator output for a 0.1-v peak display on channel A of the oscilloscope.			
	(5) Vary the signal generator frequency about 30 MHz and check for peak output.		(5) Peak output appears at 30 ±0.1 MHz.	(5) Set the signal generator to 30 MHz, and use a tuning tool to adjust transformers T4, T3, and T2 (in order) on the if. amplifier for maximum pulse amplitude on channel A of the oscilloscope. **NOTE: The transformers are numbered in sequence starting at the end of the amplifier containing the coaxial connectors.**
d. Detectors 4 and 5 center frequency check	(1) Set the 979A-2.	(1) IF AMPLIFIER TEST SELECTOR to DET 4&5.		
	(2) Set the signal generator to 30 MHz at I -90 dbm.			

Module Test Procedures Using 979A-2 Module Test Set (Sheet 10 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
2. d (Cont)	(3) Set the vertical sensitivity of the oscilloscope (channel A) to 0.1 v/cm (ac).			
°	(4) Vary signal generator frequency about 30 MHz and check for peak output.		(4) Peak output appears at 30.0 ±0.1 MHz.	(4) Set the signal generator to 30 MHz, and use a tuning tool to adjust transformers T6 and T5 (in order) for maximum pulse amplitude on channel A of the oscilloscope.
e. Detectors 4 and 5 noise check	(1) Set the oscilloscope as follows: a. Sweep speed to 20 us./cm b. Vertical sensitivity (A) to 0.1 v/cm			
	(2) Set the signal genator to 30 MHz at -90 dbm and observe signal displayed on channel A of the oscilloscope.		(2) Average display level of baseline noise is 0.02 to 0.10 v and has no apparent oscillation.	(2) Select a value for R90 in the range of 180 to 390 ohms to obtain the proper noise level.

Module Test Procedure Using 979A-2 Module Test Set (Sheet 11 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
2. (Cont) f. If. Amplifier sensitivity	(1) Set the signal generator output frequency to 30 MHz, and adjust the output level to 1.5 volts on channel A of the oscilloscope (figure 3-27).		__NOTE:__ **This pattern represents a signal-plus-noise ratio of 2:1.**	
	(2) Note output level.		(2) Level is -75 ±2 dbm.	(2) If sensitivity remains low, check the individual gain of the transistors,
	(3) Set output level to -90 dbm.		(3) Oscilloscope indicates 0.1 volt or greater.	
g. If. Amplifier bandwidth	(1) Set the signal generator output level for -90 dbm and record oscilloscope indication on channel A.			
	(2) Set signal generator dbm level to -87 dbm.			
	(3) Vary the signal generator frequency above and below 30 MHz and record the two frequencies that reduce the waveform level to that god of step (1).		(3) Compute difference in two frequencies; difference is 1.2 ±0.4.	__NOTE:__ **No bandwidth adjustment is possible. The center frequency adjustment should be made.**

Module Test Procedures Using 979A-2 Module Test Set (Sheet 12 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
2. g (Cont)	**NOTE: Maintain rf set level.**		**NOTE: When signal generator frequency has been changed, recalibration of set level may be required.**	
h. Afc discriminator center frequency test	(1) Set the 979A-2.	(1) IF. AMPLIFIER SELECTOR switch to AFC DISC.		
	(2) Set the oscilloscope as follows: a. Sweep speed to 50 us./cm (old unit) or 5 us./cm (new unit). b. Vertical sensitivity (A) to 1 v/cm. c. Vertical sensitivity (B) to 1 v/cm. d. MODE to ALTERNATE. (3) Observe pulse generator output on channel B and adjust for delay of 100 us. (old unit) or 25 us. (new unit). (4) Set the signal generator frequency to 30.00 MHz at -13 dbm.			

Module Test Procedure Using 979A-2 Module Test Set (Sheet 13 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
2. h (Cont)				**NOTE: Troubleshooting in step (5) applicable to old unit only.**
	(5) Observe and measure display on channel A. .		(5) Display is a negative pulse with a peak amplitude of 3.25 ±0.25 v and is coincident with the pulse generator output on channel B. Pulse is 200 ±30 us. long.	(5) Decrease the signal generator output to -15 dbm, and adjust T1 on the module for maximum amplitude of the display on channel A. Select the largest value of R2 9 (range of 220 to 1300 ohms) which will produce a display on channel A of 8 to 9.5 v peak (without limiting). Then increase the signal generator output to -13 dbm, and adjust T1 on the module for 3.25 ±0.25 v on channel A.
i. Afc discriminator bandwidth and slope checks (old unit only)	(1) Set the vertical sensitivity of channel A to 2 v/cm.			
	(2) Increase signal generator frequency and note that the display on channel A increases in amplitude.			(2) Recheck alignment step 2.h.(5).

Module Test Procedure Using 979A-2 Module Test Set (Sheet 14 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
2. i (Cont)	(3) Continue increasing signal of step (2) until display no longer increases.		(3) Display is 8 to 10.0 v peak at 31 to 32 MHz.	(3) See step 2.i(2).
j. Afc discriminator bandwidth and slope checks (new unit only).	(1) Reduce input dbm level to -15 dbm and set the frequency to 31.5 MHz.		(1) Oscilloscope indicates 6.5 volts or greater.	(1) See step i.
	(2) Set input frequency to 30.00 MHz and reduce dbm input level to -25 dbm.			
	(3) Slowly raise dbm input level until waveform on oscilloscope starts to saturate (limit).		(3) Dbm level is 19 ±3.	(3) See step i.

Module Test Procedures Using 979A-2 Module Test Set (Sheet 15 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROULESHOOTING
3. Gate generator	**NOTE: Perform starting procedures in paragraph 3-20D.**			
a. Setup	(1) Set the 979A-2.	(1) METER FUNCTION to +27.5V, T'EST FUNCTION SELEC-''OR to GATE GEN, and TEST RANGE SELECTOR to 30.		
	(2) Set the oscilloscope as follows: a. Sweep speed at 500 us./cm b. MODE to channel A ONLY c. Vertical sensitivity (A) to 5 v/cm (de)			
b. Power supply loading	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR through positions; note TEST METER.	(1) Meter indicates normal +27.5 v with a deviation of less than one-half of one minor scale division.	(1) Shorted wiring or defective components.

Module Test Procedure Using 979A-2 Module Test Set (Sheet 16 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
3. (Cont) c. 30-mile gate.	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 30.		
	(2) Check display on channel A of oscilloscope.		(2) Display is two positive pulses that have an amplitude of 20 v peak (minimum).	(2) Set the 979A-2 TEST FUNCTION SELECTOR to SWEEP GEN and check for gate signal. If pulses are present, the gate generator module is defective. Return switch to GATE GEN.
	(3) Set the oscilloscope sweep to 50 us./cm and check pulse width of display.		(3) Pulse width is 430 ±15 us. at 50% points.	(3) On older units, adjust R29; on newer units, adjust R31.
	(4) Set the oscilloscope sweep speed to 1 us./cm and check rise time of display.		(4) Rise time (10 and 90% points) is less than 2.5 us.	(4) Check C1, C5, and C12 in the gate generator.
d. 60-mile gate	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 60; note that dc level of display does not shift noticeably.		(1) Check dc coupling between Q2 and Q4 on the gate generator.

Module Test Procedure Using 979A-2 Module Test Set (Sheet 17 of 38)

Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
3.d (Cont)	(2) Set the oscilloscope sweep speed to 100 us. and check pulse width of display.		(2) Pulse width is 860 ±30 us. at 50% points.	(2) Adjust R31 in the gate generator. If adjustment is made, recheck the 30-mile gate.
	(3) Set the oscilloscope sweep speed to 1 us./cm and check rise time of display.		(3) Rise time (10 and 90% points) is less than 2.5 us.	(3) Check C1, C5, and C12 on the gate generator.
e. 150-mile gate	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 150; note that dc level of display does not shift noticeably.		(1) Check dc coupling between A2 and Q4 on the gate generator.
	(2) Set the oscilloscope to 500 us./cm and check the pulse width of the display	.	(2) Pulse width is 2100 ±50 us. at 50% points.	(2) On older units, adjust R33; on newer units, adjust R31. Then check the 30- and 60-mile gates.
	(3) Set the oscilloscope sweep speed to 1 us./cm and check the rise time of the display.		(3) Rise time (10 and 90% points) is less than 2.5 us.	(3) Check C1, C5, and C12 on the gate generator.
f. Sensitivity time control	(1) Set the oscilloscope as follows: a. MODE to ALTERNATE b. Sensitivity (A) to H 10 v/cm			

Module Test Procedures Using 97A-2 Module Test Set (Sheet 18 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
3.f (Cont)	c. Sensitivity (B) to 1 v/cm d. Sweep speed to 50 us./cm		(2) Display on channel B	
	(2) Set the 979A-2.	(2) TEST RANGE SELECTOR to 30.	is negative-going step that is coincident with the leading edge of the gate pulse on channel A (Figure 3-27). Amplitude is 4.0 ±0.2 v.	(2) Adjust R35 on the gate generator.
	(3) Check recovery time of display.		(3) Recovery time (20 and 90% points) is approximately 200 us. generator.	(3) Check C6, R13, R35, CR3, and CR5 on the gate
	(4) Set the 979A-2.	(4) TEST RANGE SELECTOR to all positions; observe display on channel B of oscilloscope.	(4) No variation appears in the waveform for each position for the first 200 us.	
	(5) Set the 979A-2.	(5) TEST RANGE SELECTOR to 30.		
	(6) Set the oscilloscope sweep speed to 5 us./cm and check rise time of the display on channel B.		(6) Rise time is less than 15 us.	(6) Recheck rise time of steps c, d, and e.

Module Test Procedures Using 97A-2 Module Test Set (Sheet 19 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
4. Elevation servo amplifier	**<u>NOTE</u>: Perform start--ing procedures in paragraph 3-20D.**			
a. Setup	(1) Set the 979A-2.	(1) METER FUNCTION to +15V and TEST FUNC-TION SELECTOR to SERVO AMPL and POWER switch to ON.		
	(2) Set the oscilloscope as follows: a. Sweep speed to 500 us./cm b. MODE to ALTERNATE c. Vertical sensi-tivity (A) to 2 v/cm (ac) d. Vertical sensi-tivity (B) to 0.1 v/cm (ac)			
b. Power supply loading	(1) Set the 979A-2.	(1) SERVO AMPLIFIER TEST SELECTOR to all positions; note TEST METER.	(1) Meter indicates +15 v for each position with a deviation less than one-half of one minor scale division.	**<u>NOTE</u>: For steps (1) and (2), shorted wiring and/or defective - components may cause a malfunction.**

Module Test Procedures Using 97A-2 Module Test Set (Sheet 20 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
4.b (Cont)				
	(2) Set the 979A-2.	(2) METER FUNCTION to +27.5V and TEST RANGE SELECTOR to all positions; observe TEST METER.	(2) Meter indicates ±27.5 v for each position with a deviation less than one-half of one minor scale division.	
c. Stabilization input	(1) Set the 979A-2.	(1) SERVO AMPLIFIER TEST SELECTOR to SET INPUT and METER FUNCTION to TEST(X1); adjust the SERVO AMPLI-FIER INPUT control for 0.1 v on the TEST METER.		
	(2) Set the 979A-2.	(2) METER FUNCTION to TEST(X10) and SERVO AMPLIFIER TEST SELECTOR to STAB; observe on TEST METER.	(2) Meter indicates in the green range.	(2) On older units, check R1, R2, R3, Q2, and Q3. On newer units, check R2, R3, R4, Q2, Q4, and Q5.
	(3) Set the 979A-2.	(3) METER FUNCTION to TEST(X1); note TEST METER.	(3) Meter indicates 10 to 16 v.	(3) On older unit, adjust R2.
	(4) Measure phase lag of channel A display with respect to channel B.		(4) Lag is 90 +20, -0 degrees.	(4) On newer units, check C6, C7, R13, and R14. On older units, check RI through R4 and C1 and C2.

Module Test Procedures Using 97A-2 Module Test Set (Sheet 21 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
4. (Cont)				
d. Rate inputs	(1) Set the 979A-2.	(1) SERVO AMPLIFIER TEST SELECTOR to SET INPUT and METER FUNCTION to TEST(X1); adjust the SERVO AMPLIFIER INPUT for 0.1 TEST METER.		
	(2) Set the 979A-2.	(2) METER FUNCTION to TEST (X10) and the SERVO AMPLIFIER TEST SELECTOR to RATE; note TEST METER.	(2) Meter indicates in green range.	(2) On older units, check R3, R4, R5, Q2, and Q3. On newer units, check R2, R3, R4, Q2, Q4, and Q5.
	(3) Set the 979A-2.	(3) METER FUNCTION to TEST(X1); note TEST METER.	(3) Meter indicates 10 to 16 v.	(3) On older units, adjust R5.
5. Video driver amplifier	<u>NOTE</u>: **Perform starting procedures in paragraph 3-20D.**			
a. Setup	(1) Set the 979A-2.	(1) METER FUNCTION to +27.5V, TEST FUNCTION SELECTOR to VIDEO AMPL, VIDEO AMPLIFIER TEST SELECTOR to DET 2&3, and TEST RANGE SELECTOR to 30.		

Module Test Procedures Using 97A-2 Module Test Set (Sheet 22 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
5.a (Cont)	(2) Set the oscilloscope as follows: a. MODE to ALTERNATE b. Vertical sensitivity (A) to 2 v/cm (dc) c. Vertical sensitivity (B) to 1 v/cm (dc) d. Sweep speed to us./cm (3) Set the pulse generator as follows: a. Pulse polarity to negative b. Pulse amplitude to 2 v c. Sync to external negative d. Pulse width to 10 us. e. Delay to 10 us.			

Module Test Procedures Using 97A-2 Module Test Set (Sheet 23 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
5. (Cont)				
b. Power supply loading	(1) Set the 979A-2.	(1) METER FUNCTION to +27.5V and VIDEO AMPLIFIER TEST SELECTOR to all positions; note TEST METER.	(1) Meter indicates +27.5 v for each position with a deviation of less than one-half of one minor scale division.	(1) For steps (1) and (2), defective wir-ing and components are most probable causes of malfunctions.
	(2) Set the 979A-2.	(2) METER FUNCTION to +15V and VIDEO AMPLIFIER TEST SELECTOR to all positions; note TEST METER.	(2) Same as step (1) with a +15-v indication.	(2) See step (1).
c. Range mark amplitude	(1) Set the oscilloscope sweep speed to 50 us./cm.			
	(2) Observe display on channel A of oscilloscope.		(2) Display (10-mile markers) is 5.0 ±0.5 v with four range marks in view.	(2) Adjust R27 for proper amplitude.
	(3) Increase the oscilloscope sweep speed to 1 us./cm and note range Mark pulse width.		(3) Range marks are approximately 2 us. wide at the 50% points.	(3) Check Q8 and associated components.
d. Gain check	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 30.		

Module Test Procedures Using 97A-2 Module Test Set (Sheet 24 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
5.d (Cont)				
	(2) Set the oscilloscope as follows: a. MODE to ALTERNATE b. Sensitivity (A) to 1 v/cm (dc) c. Sensitivity (B) to 1 v/cm (dc) d. Sweep speed to 5 us./cm			
	(3) Set the pulse generator for a 1-v pulse on channel B of the oscilloscope.			
	(4) Observe display on channel A of oscilloscope.		(4) Display is 4.0d 0.5 v.	(4) Adjust R23 on older modules or R27 on new modules for amplitude. If an adjustment is made, recheck the range mark amplitude.
e. Limiting	(1) Set the oscilloscope vertical sensitivity (A) to 5 v/cm.			

Module Test Procedures Using 97A-2 Module Test Set (Sheet 25 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
5.e (Cont)				
	(2) Increase the pulse generator output level until the display on channel A is at maximum (no limiting). Note amplitude.		(2) Amplitude of display is 7.5 peak or greater.	
f. Rise time and overshoot	(1) Set the pulse generator delay time for the minimum delay that prevents coincidence of the output pulse and the first range mark on channel A of oscilloscope.			
	(2) Set the oscilloscope sweep speed to 1 us./cm and set X5 magnifier to on. Observe waveform.		(2) Rise time of the display is 0.5 us. maximum at 10 and 90% points. **<u>NOTE</u>: Disregard any overshoot.**	(2) Check C1, C2, C3, C4, and C6.
g. Detector	(1) Set the 979A-2.	(1) VIDEO AMPLIFIER TEST SELECTOR to DET 4&5.		
	(2) Repeat steps d, e, and f.			

Module Test Procedures Using 97A-2 Module Test Set (Sheet 26 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
5. (Cont) h. Contour level	(1) Set the 979A-2. (2) Set the oscilloscope as follows: a. MODE to ALTERNATE b. Sensitivity (B) to 1 v/cm c. Sweep speed to 5 us./cm (3) Set the pulse generator for a 1.5-v, 10-us. output on channel B. (4) Observe display on channel A.	(1) VIDEO AMPLIFIER TEST SELECTOR to , CONTOUR.	(4) Display is contoured.	(4) Adjust R12 on old modules or R23 on new modules for correct display.
6. Range mark generator a. Setup	**NOTE: Perform starting procedures in paragraph 3-20D.** (1) Set the 979A-2.	(1) METER FUNCTION to +27.5V, TEST FUNCTION SELECTOR to RANGE MARK GEN, and TEST RANGE SELECTOR to 30.		

Module Test Procedures Using 97A-2 Module Test Set (Sheet 27 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
6.a (Cont)	(2) Set the oscilloscope as follows: a. MODE to ALTERNATE b. Sensitivity (A) to 2 v/cm c. Sensitivity (B) to 10 v/cm d. Sweep speed to 50 us./cm			
b. Power supply Loading	(1) Set the 979A-2.	(1) METER FUNCTION to +15V and TEST RANGE SELECTOR to all positions; note TEST METER.	(1) Meter indicates +15 v for each position with a deviation of less than one-half of one minor scale division.	(1) See step 5.b.(1).
	(2) Set the 979A-2.	(2) METER FUNCTION to +27.5V; repeat step (1).	(2) Repeat step (1) for +15 v.	
c. 10-mile range marks	(1) Observe display on channel A of oscilloscope.		(1) Display on channel A is four range marks that are within the gate presentation of channel B.	(1) Check the range relays, C1 through C6, and Q1 and associated circuitry.
d. 15-mile range marks	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 60.		
	(2) Set the oscillo-scope sweep speed to 100 us./cm.			

Module Test Procedures Using 97A-2 Module Test Set (Sheet 28 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
6.d (Cont)				
	(3) Observe channel A display.		(3) Display on channel A is five range marks that are within the gate presentation on channel B (including the one coincident with the start of the gate). No more than one mark should be outside of the gate.	(3) Check the range relays, C1 through C6, and Q1 and associated circuitry.
e. 25-mile range marks	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 150.		
	(2) Set the oscillo- scope sweep speed to 500 us./cm and observe display on channel A.		(2) Display on channel A is seven range marks within the gate on channel B (including the one coincident with the start of the gate). No more than one mark should be outside the gate.	(2) See step d.(3).
f. Range mark amplitude	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 30.		
	(2) Set the oscillo- scope sweep speed to 50 us./cm and observe display on channel A.		(2) Amplitude of channel A display is 5 v minimum.	(2) Check generator output circuit.
g. Range mark delay (10- miles)	(1) Set the oscilloscope sweep speed to 1 us./cm and observe display on channel A.		(1) Leading edge of first range mark occurs less than 3 us. after start of trace.	(1) Check Q1 and associated circuitry.

Module Test Procedures Using 97A-2 Module Test Set (Sheet 29 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
6. (Cont) h. Range mark delay (15 miles)	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 60.		
	(2) Observe channel A display.		(2) Leading edge of the first range mark occurs less than 4 us. after the start of the trace.	(2) Check Q1 and associated circuitry.
i. Range mark delay (25 miles)	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 150.		
	(2) Observe channel A display.		(2) Leading edge of the first range mark occurs less than 10 us. after the start of the trace. **<u>NOTE</u>: A small amount of jitter is normal for the 25-mile range.**	(2) Check Q1 and associated circuitry.
j. Range mark pulse width	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 30.		
	(2) Set the oscilloscope sweep speed to 0.5 us./cm and measure first range mark i pulse width on channel A.		(2) Pulse width is 3 us. maximum.	(2) Check Q6 and associated circuitry.

Module Test Procedures Using 97A-2 Module Test Set (Sheet 30 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
6. (Cont)				
k. 10-mile range mark spacing	(1) Set the oscilloscope sweep speed to 50 us./cm and measure time between first and fourth range marks on channel A.		(1) Distance between range marks (1 and 4) is 371 ±5 us.	(1) Check range relays and C1 through C6.
l. 15-mile range mark spacing	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 60.		
	(2) Set the oscilloscope sweep speed to 100 us./cm and measure time between first and fifth range marks on channel A.		(2) Distance between range marks (1 and 5) is 742 ±10 us.	(2) Check range relays and C1, C2, C5, and C6.
m. 25-mile range mark spacing	(1) Set the 979A-2.	(1) TEST RANGE ELECTOR to 150.		
	(2) Set the oscilloscope sweep speed to 200 us./cm and measure the time between first and seventh range marks on channel A.		(2) Distance between range marks (1 and 7) is 1854 ±25 us.	(2) Check range relays and C1 and C6.
n. 10-mile mark-to-mark Spacing	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 30.		
	(2) Set oscilloscope sweep speed to 50 us./cm.			

Module Test Procedures Using 97A-2 Module Test Set (Sheet 31 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
6. (Cont)	(3) Adjust oscilloscope horizontal sweep speed to position first and second range marks under any two vertical graticule lines not closer together than three major lines (3 cm.).			
	(4) Using the horizontal position control, align the second range mark under the same graticule line used for the first range mark in step (3).		(4) Third range mark falls within ±1/2 minor scale division (±0. 1 cm) of the graticule used for the second range mark in step (3) of the procedure column.	(4) Check range relays and C1 through C6.
	(5) Repeat step (4) for fourth range mark.			
o. 15-mile mark-to-mark spacing	(1) Set the 979A-2.	(1) TEST RANGE SELECTOR to 60.		
	(2) Set the oscilloscope sweep speed to 100 us./cm.			
	(3) Repeat step n for the 15-mile spacing.			

Module Test Procedures Using 97A-2 Module Test Set (Sheet 32 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
6. (Cont)				
p. 25-mile mark-to-mark spacing	(1) Set the oscilloscope sweep speed to 200 us./cm and repeat step n for the 25-mile spacing. **<u>NOTE</u>: The 25-mile spacing is checked for the fourth, fifth, sixth, and seventh range marks.**			
7. Isolation amplifier	**<u>NOTE</u>: Perform starting procedures in paragraph 3-20D.**			
a. Setup	(1) Set the 979A-2.	(1) METER FUNCTION to ±27.5V, TEST FUNCTION SELECTOR to ISOLATION AMPL, and ISOLATION AMPLIFIER INPUT fully counter-clockwise.		

Module Test Procedures Using 97A-2 Module Test Set (Sheet 33 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
7.a (Cont)	(2) Set the oscilloscope as follows: a. MODE to ALTERNATE b. Sensitivity (A) to 5 v/cm c. Sensitivity (B) to 5 v/cm d. Sweep speed to 500 us./cm			
b. Power supply loading	(1) Set the 979A-2.	(1) ISOLATION AMPLI-FIER TEST SELECTOR to all positions; note TEST METER. one minor scale division. (2) METER FUNCTION to -27V; repeat step (1).	(1) Meter indicates +27.5 v for each position with a deviation of less than one-half of	(1) Defective wiring or components.
c. Pitch channel gain	(1) Set the 979A-2.	(1) ISOLATION AMPLI-FIER TEST SELECTOR to SET INPUT, METER FUNCTION to TEST(X1), and ISOLATION AMPLI-of FIER INPUT adjusted for 2 v on TEST METER.	**NOTE: A signal appears on channel B of the oscilloscope which is similar to the input signal. This signal is used only for phase measurements.**	

Module Test Procedures Using 97A-2 Module Test Set (Sheet 34 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
7.c (Cont)				
		(2) ISOLATION AMPLIFIER TEST SELECTOR to PITCH; note TEST METER.	(2) Meter indicates 4 to 6 v.	(2) Check Q4 and associated circuitry.
	(3) Observe channel A display.		(3) Display shows no sign of oscillation or clipping.	(3) Check dc bias on Q3 and Q4.
			<u>NOTE</u>: Normally there may be some high-frequency components superimposed on the waveform caused by power source irregularities.-	Check C6, C2, C8, and C11.
d. Pitch channel phase shift	(1) Check phase difference of channel A and channel B on the oscilloscope.		(1) Channel A lags channel B by 0 to 10 degrees.	
e. Roll channel Gain	(1) Set the 979A-2.	(1) ISOLATION AMPLIFIER TEST SELECTOR to SET INPUT, METER FUNCTION to TEST(X1), and ISOLATION AMPLIFIER INPUT adjusted for 2 v on TEST METER.	See note of step c.(l).	

Module Test Procedures Using 97A-2 Module Test Set (Sheet 35 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
7.e (Cont)	(2) Repeat step c.(3) and step d.	(2) ISOLATION AMPLI-FIER TEST SELEC-TOR to ROLL; note TEST METER.	(2) Meter indicates 4 to 6 v.	(2) Check Q2 and associated circuitry.
8. Automatic frequency control a. Setup	**<u>NOTE</u>: Perform starting procedures in paragraph 3-20D.** (1) Set the 979A-2. (2) Set the oscilloscope as follows: a. MODE to channel A ONLY b. Sensitivity (A) to 0.5 v/cm (dc) c. Sweep speed to 500 us./cm.	(1) METER FUNCTION to ±27.5V and TEST FUNCTION SELEC-TOR to AFC.		

Module Test Procedures Using 97A-2 Module Test Set (Sheet 36 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
8. (Cont)				
b. Power supply loading	(1) Set the 979A-2.	(1) Set the TEST FUNCTION SELECTOR to any other position other than AFC and then back to AFC; note TEST METER.	(1) Meter indicates a deviation of less than one-half of one minor scale division.	(1) Defective wiring or components.
c. Search condition	**NOTE: Any voltage indicated on channel A of the oscilloscope is multiplied by 100 for a true value.**			
	(1) Set the 979A-2.	(1) TEST FUNCTION SELECTOR to OFF.		
	(2) With the vertical control on the oscilloscope, set up a dc reference on the top horizontal graticule line.			
	(3) Set the 979A-2.	(3) TEST FUNCTION SELECTOR to AFC. METER FUNCTION switch to TEST (X1). Check trace.	(3) Trace moves up and down in a search condition. Trace varies from -150 ±10 to 215 ±10 vdc (reading X100).	(3) Check Q1, Q2, Q3, and associated circuitry. Adjust R16 on new modules only for proper amplitude.
d. Search rate	(1) Set the oscilloscope sweep speed to 0.5 s./cm.			
	(2) Check sawtooth sweep period.		(2) Period should be 2 ±1 seconds.	

Module Test Procedures Using 97A-2 Module Test Set (Sheet 37 of 38)
Figure 3-30

STEP/TEST	PROCEDURE	979A-2 SETTING	RESULTS/NOTES	ALIGNMENT/ TROUBLESHOOTING
8. (Cont) e. Locked-in condition	(1) Set the oscilloscope as follows: a. MODE to ALTERNATE b. Sensitivity (A) to 0.5 v/cm (dc) c. Sensitivity (B) to 1 v/cm (dc) d. Sweep speed to 10 us./cm (2) Set the pulse generator as follows: a. Polarity to negative b. Width to 5 us. c. Delay to 0			
	(3) Slowly increase the pulse generator output and observe display on oscilloscope.		(3) Sweep rate on channel A will slow down.	(3) Check Q1, Q2, Q3, and associated circuits.
	(4) Continue to increase output of generator until sweep stops at -185 v on TEST METER.		(4) Amplitude of pulse on channel B is 3.25 ±0.25 v peak.	(4) On newer units, I adjust R7 or R19 for correct amplitude. On older units, select a value for R17 (2.7 to 10 ohms).

Module Test Procedures Using 97A-2 Module Test Set (Sheet 38 of 38)
Figure 3-30

Section VIII. TROUBLESHOOTING

3-21. GENERAL.

Figure 3-31 lists troubles and probable causes with the applicable test reference step to the test procedures in figure 3-28. The TEST REFERENCE column of the table gives the test step of the test procedures. The TROUBLE column gives a possible trouble for the individual step referenced, and the PROBABLE CAUSE column gives the most probable failure for the unit or module that would cause the trouble listed for the step.

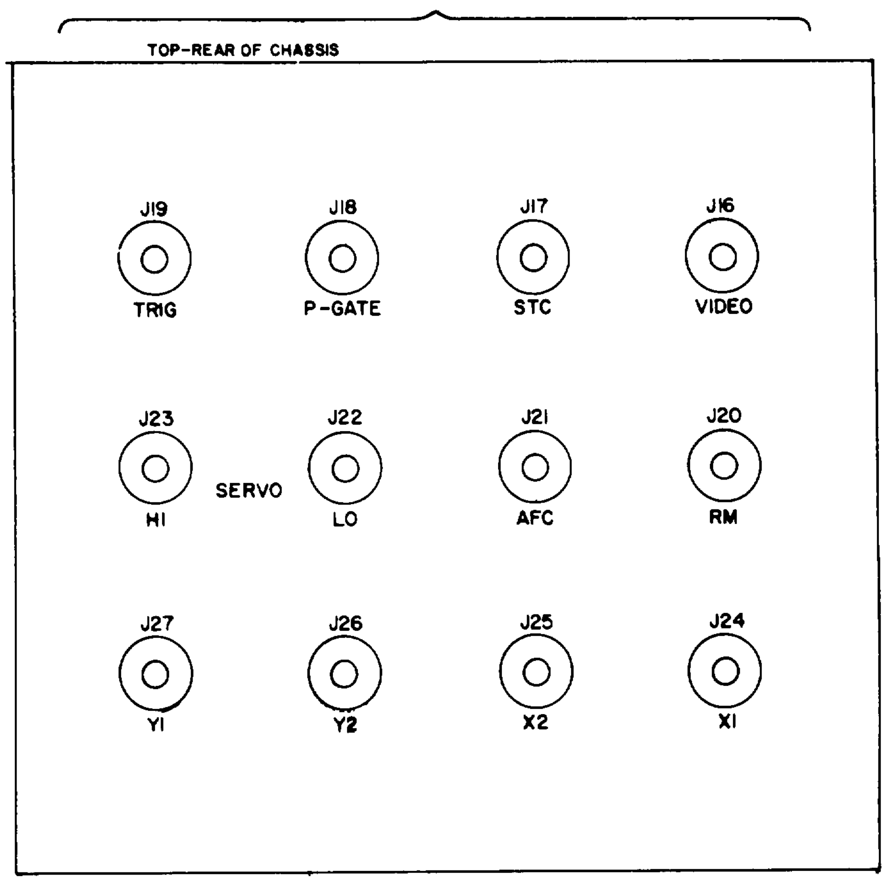
3-22. TEST EQUIPMENT.

The test equipment required for troubleshooting is listed in figure 3-25.

3-23. TROUBLESHOOTING PROCEDURES.

Figure 3-31 is the troubleshooting table to be used for the 776C-3 Synchronizer. Figures 3-32 and 3-33 illustrate test-point locations on the rear of the equipment.

Rear Test Jacks Serial No. 1520 and below



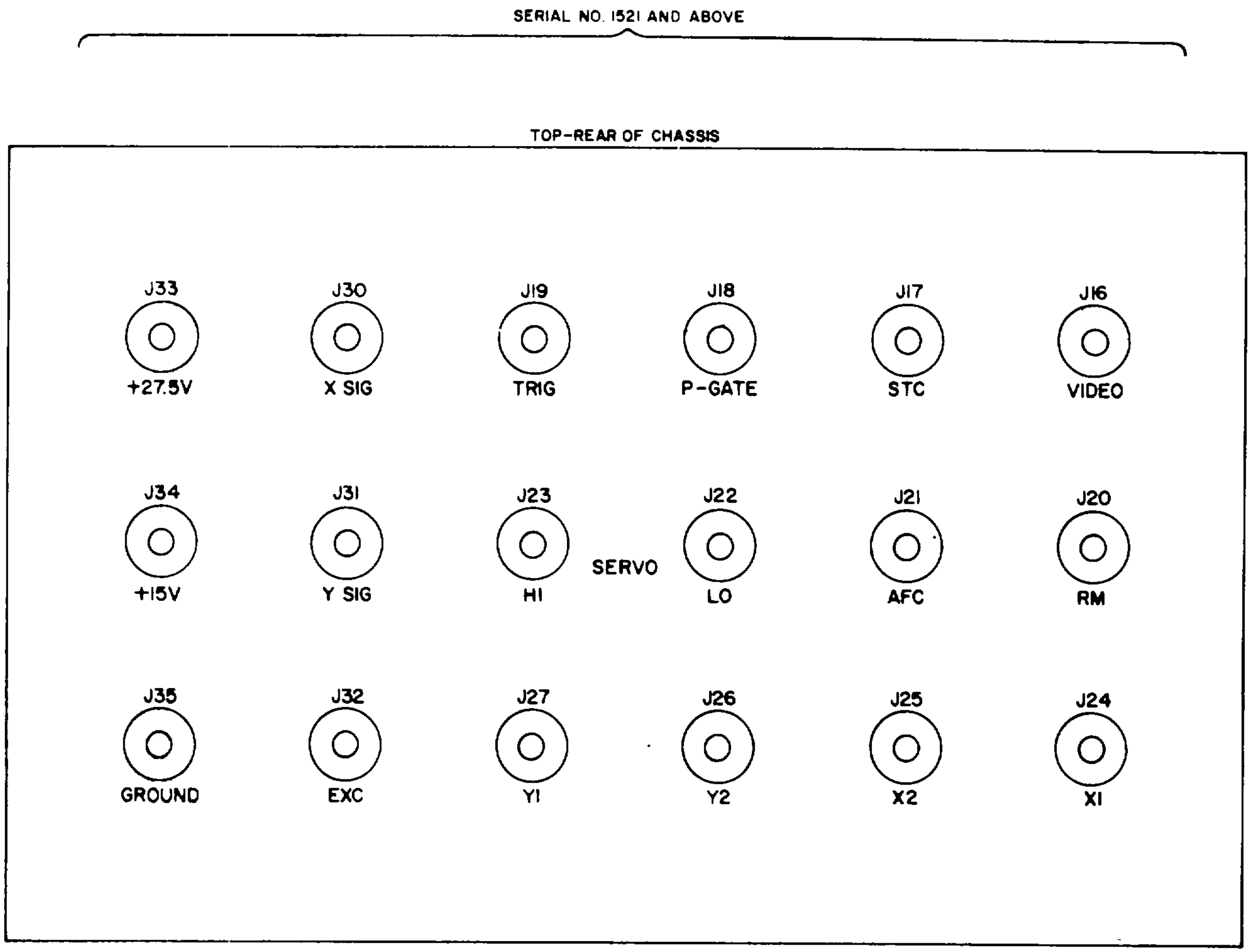
Rear Test Jacks
Figure 3-32

TEST REFERENCE	TROUBLE	PROBABLE CAUSE
1.c	Power lamp does not light.	1. Lamp defective.
		2. Power not connected. 3. Defective test set.
2.a	Gate pulse out of tolerance.	Gate generator module.
2.b	Pulse widths not within specified tolerances.	Gate generator module.
3.a and b	Range marks out of tolerance.	1. Gate generator module. 2. Range mark generator module.
4.b and c	Green range and/or null out of tolerance.	1. R14 on synchronizer chassis misadjusted. 2. Q5 and/or Q6 on detector board 3A1A1.
4.d	Voltage out of tolerance.	T5, R15, and/or R16 on detector board 3A1A1.
4.e	Null out of tolerance.	1. R13 on synchronizer chassis misadjusted. 2. Q3 and/or Q4 on detector board 3A1A1.
5.a and b	Null out of tolerance.	1. Potentiometer misadjusted. 2. Sweep generator and amplifier module.
6.a through h	Values out of tolerance.	1. Potentiometer not adjusted. 2. Sweep generator and amplifier module.
7.k	Levels out of tolerance.	If. amplifier module.
7.m, o, p, and q	Voltage out of tolerance.	1. If. amplifier module. 2. Afc module. 3. Adjustment.

776C-3 Troubleshooting Chart for Figure 3-28 (Sheet 1 of 2)
Figure 3-31

TEST REFERENCE	TROUBLE	PROBABLE CAUSE
8. c	Pulse out of tolerance.	Gate generator module.
9.j	No signal or incorrect signal displayed.	1. If. amplifier module. 2. Video driver module.
9.k	Output not 6 volts.	Video driver module.
10.b	Contour not within tolerances.	Video driver module.
11	Values out of tolerance.	Isolation amplifier module.
12	Phase not as specified.	Isolation amplifier module.
13	Values out of tolerance.	Elevation servo-amplifier module.

776C-3 Troubleshooting Chart for Figure 3-28 (Sheet 2 of 2)
Figure 3-31



Rear Test Jacks
Figure 3-33

Section IX. STORAGE INSTRUCTIONS

3-24. GENERAL.

Before storing, clean dirt, grease, and moisture from the 776C-3 Synchronizer. Ensure that all modules are secured to the chassis and that the dust cover is installed. Store the unit in a clean, dry area where the possibility of impact damage is minimized. If the unit is to be stored for an extended period of time, place it in the original shipping carton.

Section X. ILLUSTRATED PARTS LIST

NOTE: This Illustrated Parts List is furnished for parts location information only. Do not use for provisioning purposes.

3-25. GENERAL.

This Illustrated Parts List is a complete list of parts for the 776C-3 Synchronizer and 349B-4 Shockmount. (See figure 3-34.)

Collins Radio Company part numbering system is comprised of a three-digit family number, a four-digit serial number, and two- or three-digit dash number:

FAMILY NO.	SERIAL NO.	DASH NO.
XXX	XXXX	XX or XXX

If a part is purchased by Collins Radio Company from a vendor, the Federal Manufacturer's Code Number is listed in the nomenclature column. If this column does not include a Federal Manufacturer's Code Number, the item is either a MIL approved item commercial item or manufactured by Collins. Where COML appears in this column, the part may be obtained commercially from various vendors. Part numbers appearing in this column are Collins assigned part numbers for that item. Serial numbers or MCN (manufacturing control number) effectivities, where applicable, are listed in this column. Serial number effectivities are designated on the nameplate. The MCN is stamped on each module and/or chassis. Changes made from service bulletins are so indicated by SB1, SB2, etc.

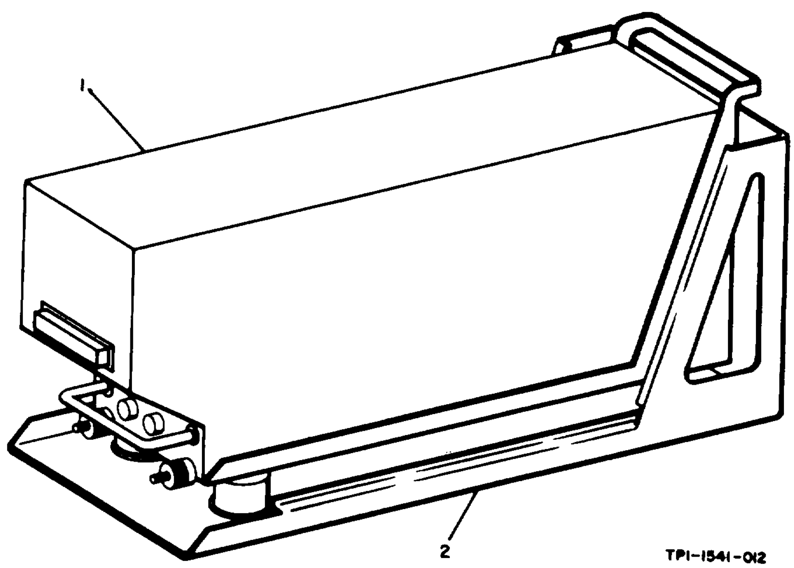
3-26. REFERENCE DESIGNATION PREIXES.

The following codes have been assigned in this manual:

USAGE CODE	UNIT	FIGURE
3A2	Board Assembly (565-5590-004)	3-42
3A3	Elevation Servo Amplifier (563-4943-005)	3-43
3A3	Board Assembly (556-9550-003)	3-44
3A3	Elevation Servo Amplifier (769-7195-001)	3-45
3A4	Isolation Amplifier (566-0050-004)	3-39
3A4	Printed Circuit Board (769-7190-001)	3-40
3A6	IF Amplifier Assembly (564-2711-005)	3-50
3A6	Wired IF Assembly (757-0065-003)	3-51
3A7	Generator and Amplifier Sweep (565-5576-005)	3-52
3A8	Heatsink (565-5602-004)	3-53
3A9	Range Mark Generator (563-4949-004)	3-41
3A10	Automatic Frequency Control (758-4825-001)	3-46
3A10	Automatic Frequency Control (772-0968-003)	3-47
3A11	Video Driver Board (565-5607-005)	3-48
3A11	Video Driver (757-0719-003)	3-49

3-26. REFERENCE DESIGNATION PREFIXES (cont)

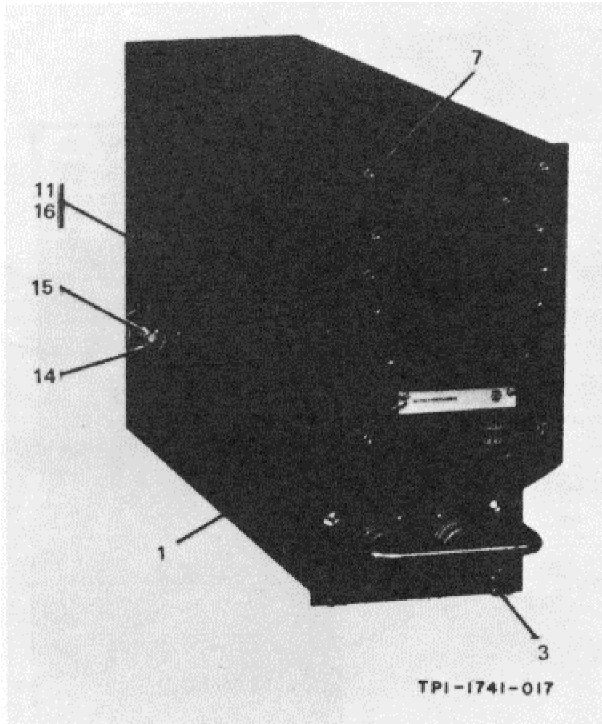
USAGE CODE	UNIT	FIGURE
3TR1	Detector 9oard Assembly (565-5621-004)	3-5
3TB1	Board Assembly (556-9552-003)	3-56
3TB1	Board Assembly (556-9552-006)	3-56
3TB10	Resistor Board (564-9473-003)	3-54
3TB11	Servo Phase (565-3499-003)	3-35(143)
3TB20	Board Assembly (774-6470-003)	3-38



776C-3 Synchronizer and 349B-4 Shockmount

Figure 3-34

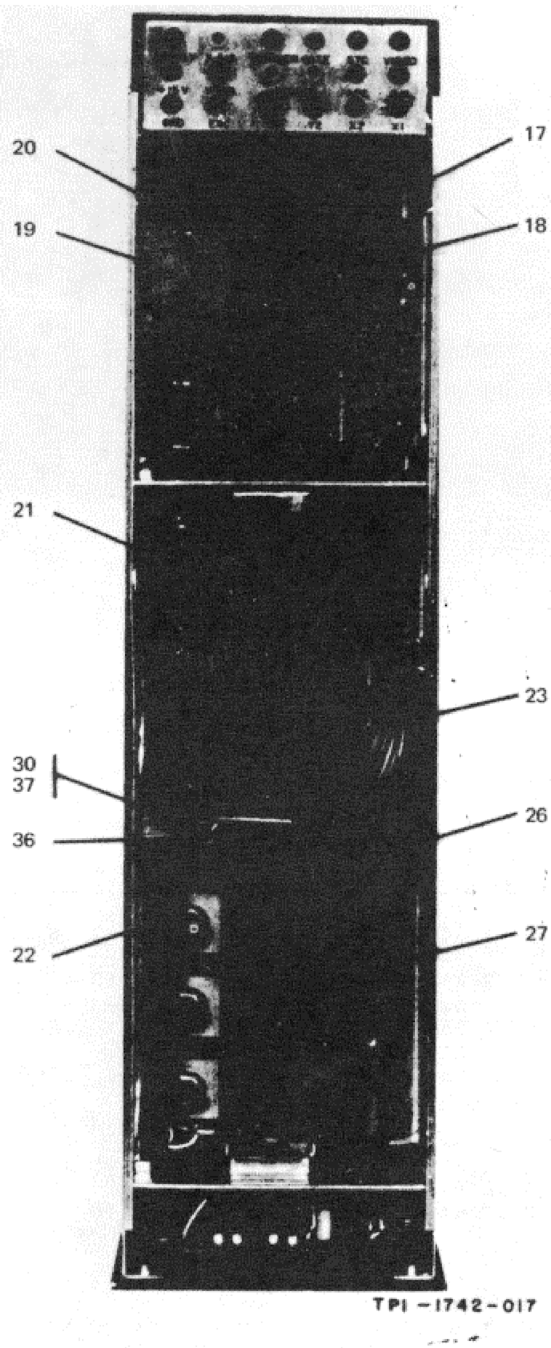
FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-34 - 0	NO NUMBER	1	776C-3 SYNCHRONIZER AND 349B-4 SHOCKMOUNT	1	
1	522-6114-006	2	776C-3 SYNCHRONIZER SEE FIG. 3-35	1	
2	522-6116-004	2	349B-4 SHOCKMOUNT ASSY SEE FIG. 3-58	1	
3-35 - 0	522-6114-006	1	776C-3 SYNCHRONIZER SEE FIG. 3-34(1) FOR NHA	REF	
1	564-2685-003	2	PLATE, IDENT EFF REV 14/P THRU 16/S	1	
1	516-7397-001	2	PLATE, IDENT EFF REV 17/T	1	
- 2	2X1-8PANHDTY PEBCADPL	2	SCREW, TAP., SST, 2-S6 X 1/8 45722 330-1551-000 AP	4	
3	503-4970-001	2	BRACKET, ANGLE	2	
4	MS51957-28	2	SCREW, MACH., SST, 6-32 X 3/8 343-0169-000 AP	2	



776C-3 Synchronizer (Sheet 1 of 5)

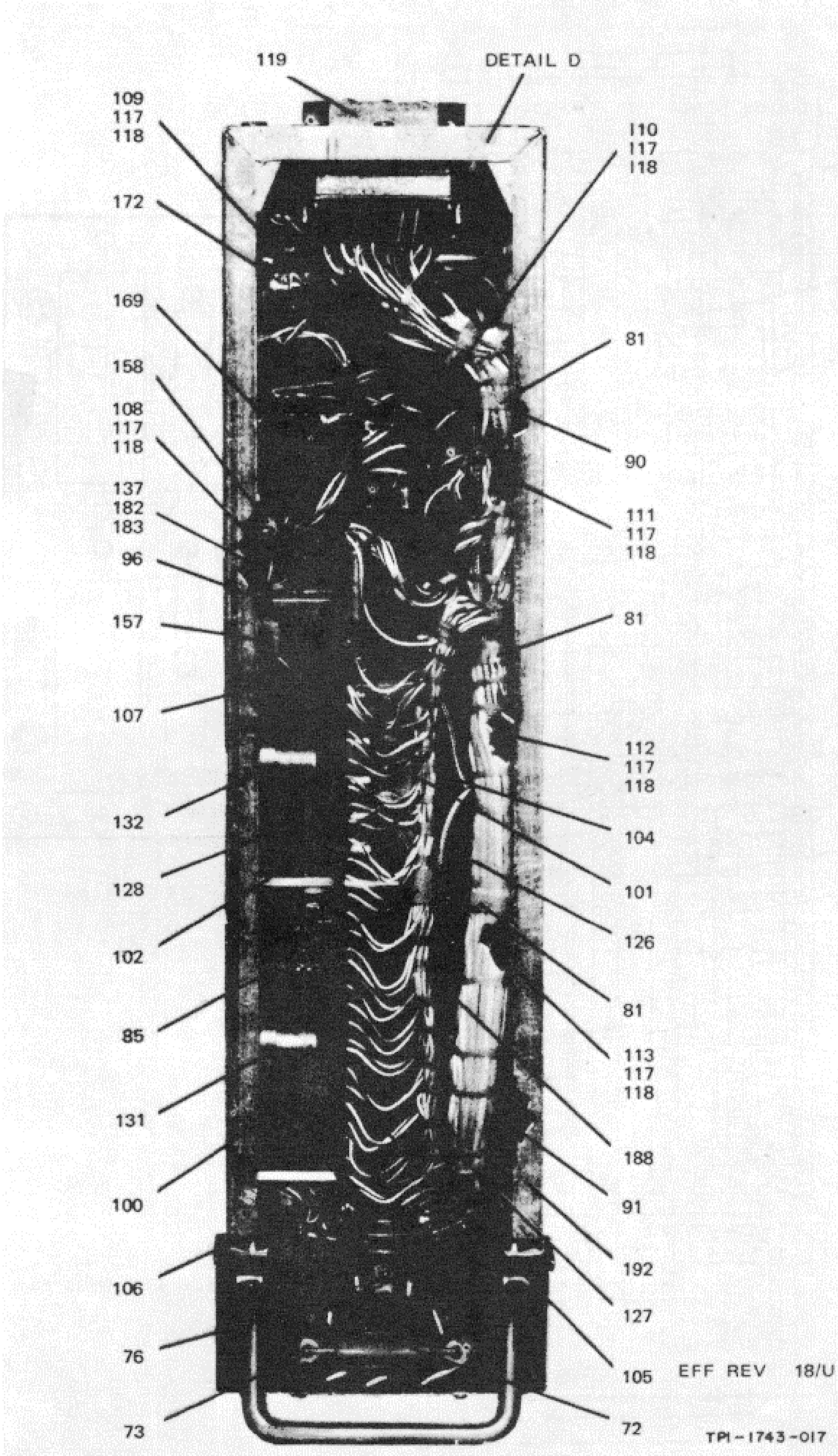
Figure 3-35

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-35 - 5	MS51957-29	2	SCREW, MACH., SST. 6-32 X 7/16 343-0170-000 AP	2	
- 6	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP	2	
7	NO NUMBER	2	PANEL ASSY SEE FIG. 3-36 EFF REV 17/T THRU AJ/AG	1	
7	NO NUMBER	2	PANEL ASSY SEE FIG.3-36 EFF REV AK/AH	1	
- 8	MS51957-29	2	SCREW, MACH., SST, 6-32 X 7/16 343-0170-000 AP	6	
- 9	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP	6	
- 10	310-0046-000	2	WASHER, FLAT, SST. 0.147 ID X 0.312 OD COML AP	6	
11	563-4921-005	2	COVER ASSY, DUST	1	
- 12	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	2	
- 13	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78187 373-0154-000 AP	2	
14	2600LW	3	PUSH ON NUT 71286 012-9019-000	2	



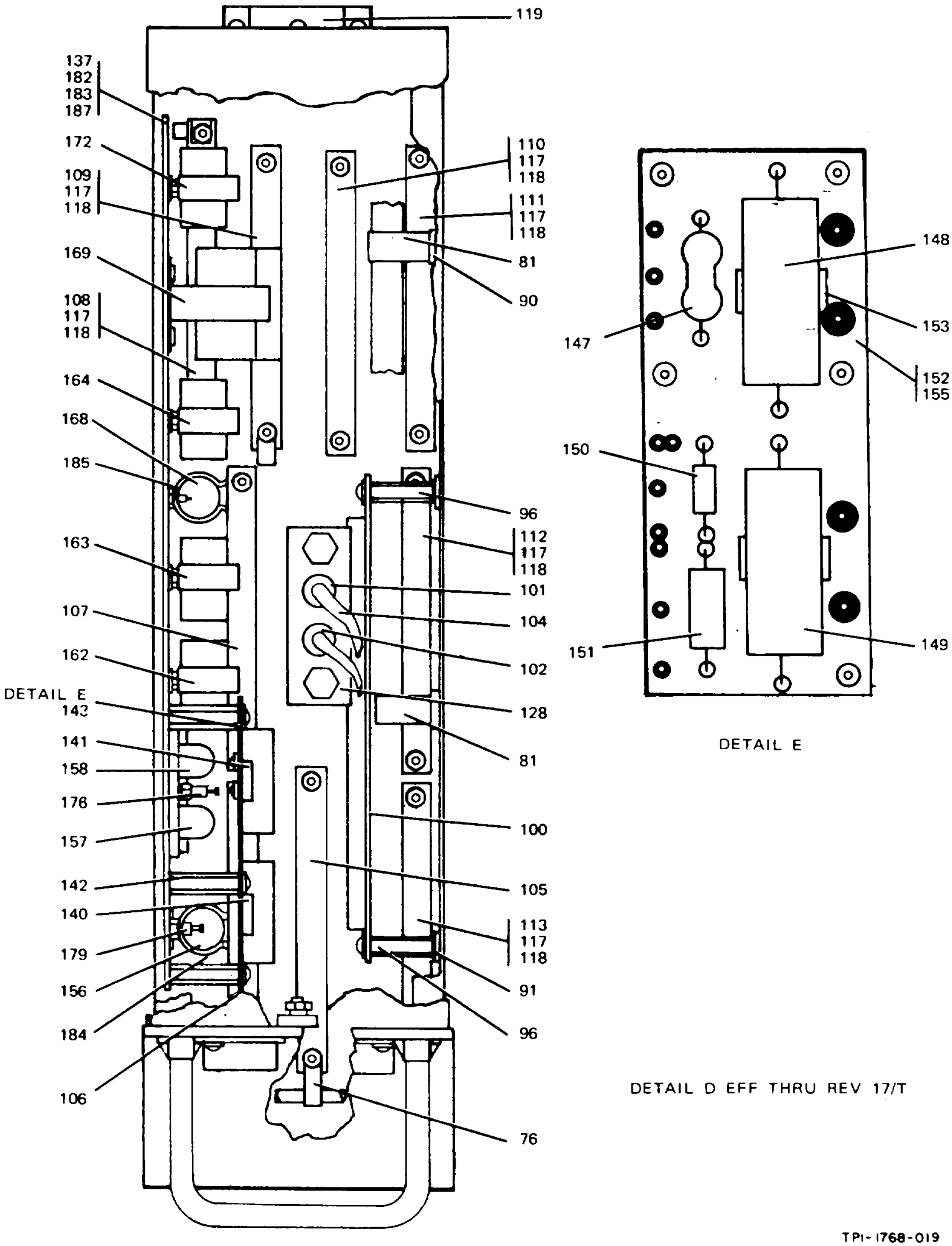
776C-3 Synchronizer (Sheet 2 of 5)

Figure 3-35



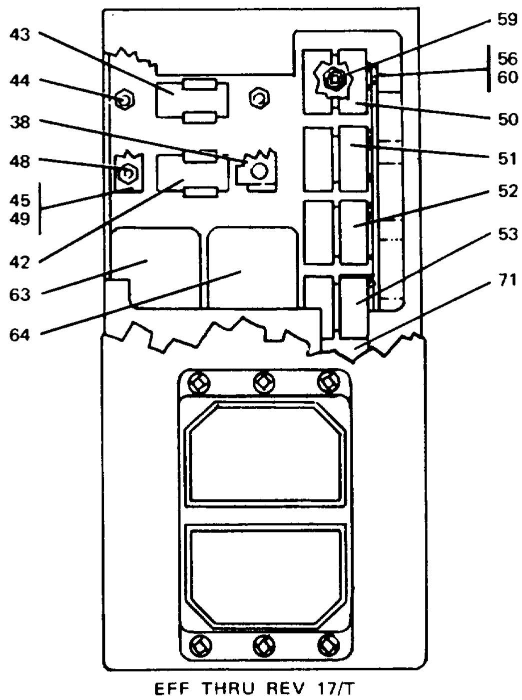
776C-3 Synchronizer (Sheet 3 of 5)

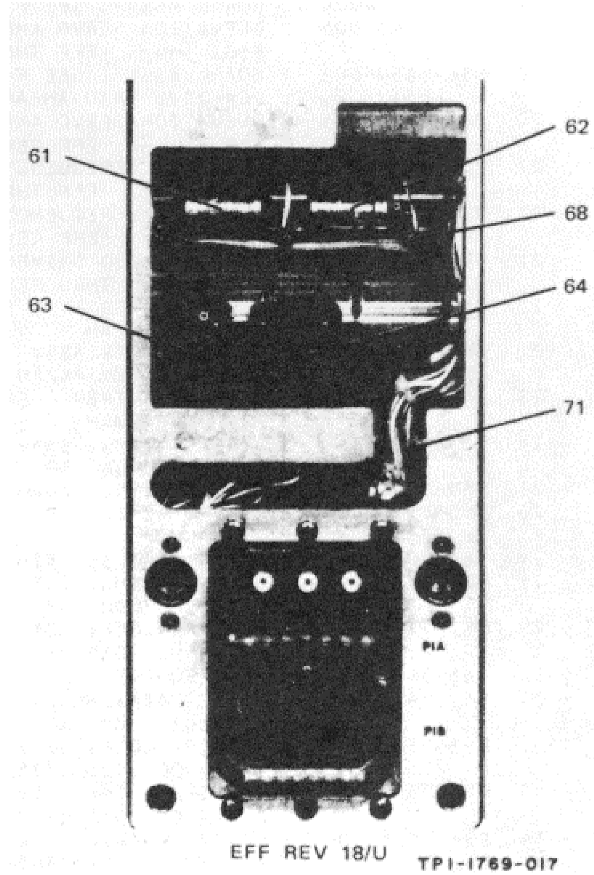
Figure 3-35



776C-3 Synchronizer (Sheet 4 of 5)

Figure 3-35





776C-3 Synchronizer (Sheet 5 of 5)

Figure 3-35

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-35 - 15	2700-3	3	STUD ASSY 71286 012-2004-000		2	
16	563-4920-005	3	COVER ASSY, DUST		1	
17	566-0050-004	2	ISOLATION AMPLIFIER SEE FIG. 3-39 EFF REV 12/M THRU AG/AG	3A4	1	
17	769-7190-001	2	PRINTED CIRCUIT BOARD SEE FIG. 3-40 EFF REV AH/AG	3A4	1	
18	563-4949-004	2	RANGE MARK GENERATOR SEE FIG. 3-41	3A9	1	
19	565-5590-004	2	BOARD ASSY SEE FIG. 3-42	3A2	1	
20	563-4943-005	2	ELEVATION SERVO AMPLIFIER SEE FIG. 3-43 EFF THRU REV 17/T	3A3	1	
20	556-9550-003	2	BOARD ASSY SEE FIG. 3-.4 EFF REV 18/U THRU AH/AG	3A3	1	
20	769-7195-001	2	ELEVATION SERVO AMPLIFIER SEE FIG. 3-45 EFF REV AJ/AG	3A3	1	
21	758-4825-001	2	AUTOMATIC FREQUENCY CONTROC SEE FIG. 3-46 EFF THRU REV AF/AG	3A10	1	
21	772-0968-003	2	AUTOMATIC FREQUENCY CONTROL SEE FIG. 3-47 EFF REV AG/AG	3A10	1	
22	565-5607-005	2	BOARD. VIDEO DRIVER SEE FIG. 3-48 EFF THRU REV AL/AH	3A11	1	
22	757-0719-003	2	VIDEO DRIVER P SEE FIG. 3-49 EFF REV AM/AH	3A11	1	
23	564-2711-005	2	IF AMPLIFIER ASSY SEE FIG. 3-50 EFF THRU REV AK/AH	3A6	1	
23	757-0065-003	2	IF ASSY. WIRED SEE FIG. 3-51 EFF REV AL/AH	3A6	1	
- 24	MS51959-14	2	SCREW MACH., SST, 4-40 X 5/16 342-0045-000 AP		1	
- 25	565-3661-003	2	BRACKET, HOLD DOWN AP		1	
26	565-5576-005	2	SWEEP, GENERATOR AND AMPL SEE FIG. 3-52	3A7	1	
27	565-5602-004	2	HEATSINK SEE FIG. 3-53	3A8	1	
- 28	MS51957-27	2	SCREW, MACH., SST. 6-32 X 5/16 343-0168-000 AP		5	
- 29	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP		5	
30	565-3660-002	2	PIN. SUPPORT		1	
- 31	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP		1	
- 32	MS35338-134	2	WASHER. LOCK, SST, 0.088 ID X 0.175 OD 310-0275-000 AP		1	
- 33	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		1	
- 34	P342-0363-00 0	2	SCREW, MACH., CAD. PL STL, 2-56 X 1 77250 342-0363-000 AP			
- 35	MS551957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		1	
36	MS21209C0420	3	INSERT 012-2140-000		2	
37	565-3659-002	3	PIN, SUPPORT		1	
38	564--9473-003	2	RESISTOR BOARD SEE FIG.3-54 EFF THRU REV 17/T	3TB10	1	
- 39	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		4	
- 40	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP		4	
- 41	DIE845	2	WASHER, FLAT, SST, 0.119 ID X 0.218 OD 72606 310-0460-000 AP		4	
42	109D566X0075 T2	2	CAPACITOR, FXD, ELECT., 56PF, 20%, 75V 56289 184-7793-000 EFF THRU REV 17/T	3C11	1	

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-35 - 43	109D566X0075 T2	2	CAPACITOR, FXD, ELECT., 56PF, 20%, 75V 56289 184-7793-000 EFF THRU REV 17/T 3C12	1	
44	TF300	2	TERMINAL 98291 306-1018-000 EFF THRU REV 17/T	4	
45	564-9475-003	2	BRACKET, STAKED EFF THRU REV 17/T	2	
- 46	MS51957-3	2	SCREW, MACH., SST, 2-56 X 1/4 343-0124-000 AP FOR 44 AND 45	4	
- 47	MS35338-134	2	WASHER, LOCK, SST, 0.088 ID X 0.175 OD 310-0275-000 AP FOR 44 AND 45	4	
48	562-0855-002	3	RIVET, NUT	4	
49	564-9474-003	3	BRACKET. STAKED	2	
50	BAS103-006	2	RESISTOR, VAR, COMP, 500 OHMS, 10%, 1/4W 71590 38C-3296-000 EFF THRU REV 17/T 3R16A 3R16B	1	
51	BAS103-006	2	RESISTOR, VAR, COMP, 500 OHMS, 10% 1/4W 71590 380-3296-000 EFF THRU REV 17/T 3R15A 3R15B	1	
52	BAS103-029	2	RESISTOR, VAR, COMP, 1K, 10%, 1/4W 71590 380-3297-000 EFF THRU REV 17/T 3R14A 3R14B	1	
53	BAS103-029	2	RESISTOR, VAR, COMP, 1K. 10% 1/4W 71590 380-3297-000 EFF THRU REV 17/T 3R13A 3R13B	1	
- 54	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 AP FOR 50 THRU 53	4	
- 55	MS35333-74	2	WASHER, LOCK, STL, 0.267.ID X 0.478 OD 373-0005-000 AP FOR 50 THRU 53	4	
56	563-4997-003	2	BRACKET. REAR EFF THRU REV 17/T	1	
57	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	2	
58	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	2	
59	502-6302-002	3	NUT, PLATE	2	
60	563-4996-003	3	BRACKET, REAR	1	
61	109D566X0075 T2	2	CAPACITOR, FXD, ELECT., 56PF, 20%, 75V 56289 184-7793-000 EFF REV 3C11	1	
62	109D566X0075 T2	2	CAPACITOR, FXD, ELECT., 56PF, 20%, 75V 56289 184-7793-000 EFF REV 18/U 3C12	1	
63	954-0166-400	2	TRANSFORMER 83003 677-0004-000 3T2	1	
64	954-0166-400	2	TRANSFORMER 83003 677-0004-000 3T3	1	
- 65	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML AP FOR 63 AND 64	4	
- 66	310-0278-000	2	WASHER, LOCK, SST, 0115 10 X 0.202 OD COML AP FOR 63 AND 64	4	
- 67	DIE845	2	WASHER, FLAT, SST, 0.119 ID X 0.218 OD 72606 310-0460-000 AP FOR 63 AND 64	4	
68	TF300	2	TERMINAL 98291 306-1018-000 EFF REV 18/U	3	
- 69	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	3	
70	MS35338-134	2	WASHER, LOCK, SST, 0.088 ID X 0.175 OD 310-0275-000 AP	3	

FIG.- ITEM		PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-35	71	MS21266-1N	2	PLASTIC CHANNEL 150-0173-000		AR	
	72	196P33493S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.33UF, 10%, 300V 56289 931-9639-000 EFF REV 25/AC	3C22	1	
	73	2H16D12	2	TERMINAL 92825 306-0958-000 EFF REV 25/AC		2	
-	74	MS51957-13	2	SCREW, MACH., SST. 4-40 X 1/4 343-0133-000 AP		2	
-	75	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP		2	
	76	TY35	2	CLAMP 59730 435-1085-000		3	
-	77	68NM40	2	NUT, SELF-LKG. HEX., AL, 4-40 72962 333-0347-000 AP		3	
-	78	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		6	
-	79	502-1664-001	2	SPACER AP		3	
-	80	MS51959-20	2	SCREW, MACH., SST, 4-40 X 7/8 342-0051-000 AP		3	
	81	TY35	2	CLAMP 59730 435-1085-000		3	
-	82	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 EFF THRU REV 20/W AP		3	
-	82	68NM40	2	NUT, SELF-LKG, HEX., AL. 4-40 72962 333-0347-000 EFF REV 21/Y AP		3	
-	83	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		3	
-	84	MS51959-18	2	SCREW, MACH., SST. 4-40 X 5/8 342-0049-000 AP		3	
	85	HP3N	2	CLAMP 09922 150-1540-000 EFF REV 20/W		1	
-	86	P343-0142-00 0	2	SCREW, MACH., SST. 4-40 X 1-1/4 77250 343-0142-000 AP		1	
-	87	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP		1	
-	88	DIE845	2	WASHER, FLAT, SST, 0.119 ID X 0.218 OD 72606 310-0460-000 AP		2	
-	89	541-5995-002	2	SPACER, SLV AP		1	
	90	564-9895-003	2	BLOCK EFF THRU REV 20/W		2	
	91	564-9894-003	2	BLOCK EFF THRU REV 20/W		2	
-	92	68NM40	2	NUT, SELF-LKG6 HEX., AL, 4-40 72962 333-0347-000 AP FOR 90 AND 91		4	
-	93	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP FOR 90 AND 91		4	
-	94	P342-0053-00 0	2	SCREW, MACH., SST, 4-40 X 1-1/8 77250 342-0053-000 AP FOR 90 AND 91		4	
-	95	563-4907-006	2	CABLE ASSY, SYNCHRONIZER EFF THRU REV 17/T		1	
-	95	556-9094-001	2	WIRING HARNESS EFF REV 18/U		1	
	96	540-9051-003	3	POST, ELECTRICAL-MECHANICAL EQUIP. EFF THRU REV 17/T		4	
	96	540-9054-003	3	POST, ELECTRICAL-MECHANICAL EQUIP. EFF REV 18/U THRU 24/AB		2	
	96	540-9053-003	3	POST, ELECTRICAL-MECHANICAL EQUIP. EFF REV 25/AC		2	
	96	540-9054-003	3	POST, ELECTRICAL-MECHANICAL EQUIP. EFF REV 18/U		3	

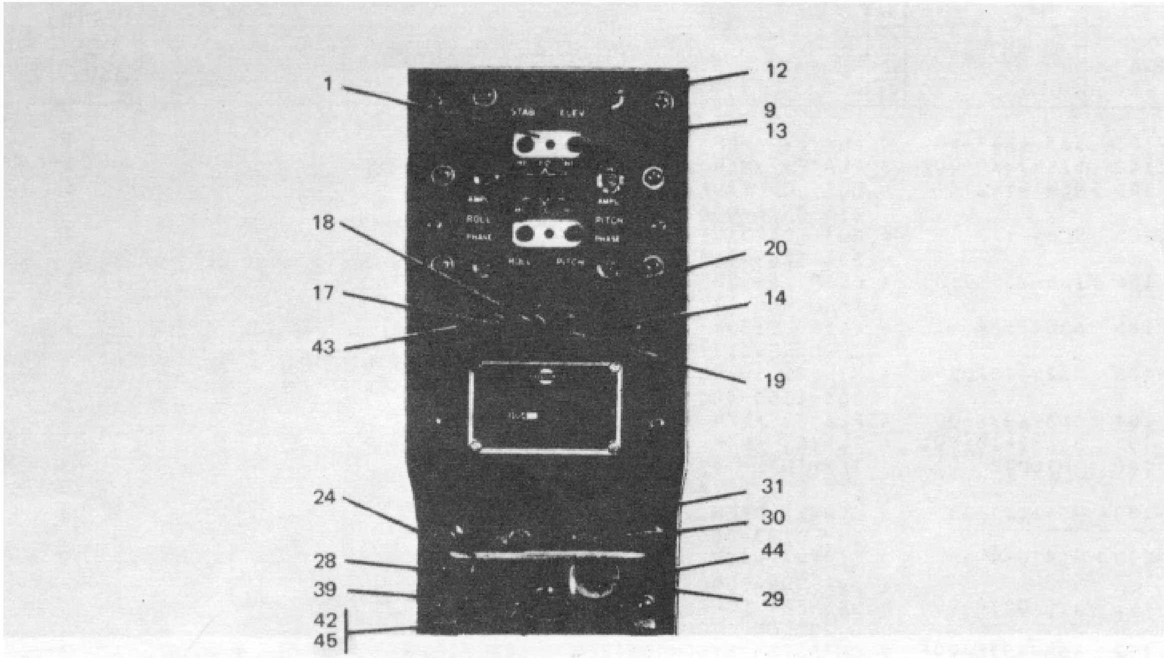
FIG.- ITEM		PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-35	97	MS51959-17	3	SCREW, MACH., SST. 4-40 X 1/2 342-0048-000 EFF THRU REV 17/T AP		4	
-	97	MS51957-15	3	SCREW, MACH., SST, 4-40 X 3/8 343-0135-000 EFF THRU REV 17/T AP		4	
-	97	MS51957-14	3	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 EFF REV 18/U AP		5	
-	97	MS51957-15	3	SCREW, MACH., SST. 4-40 X 3/8 343-0135-000 EFF REV 18/U AP		4	
-	98	310-0278-000	3	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML EFF REV 17/T AP		4	
-	99	DIE845	3	WASHER, FLAT, SST, 0.119 ID X 0.218 OD 72606 310-0460-000 EFF REV 17/T AP		4	
	100	565-5621-004	3	DETECTOR BOARD ASSY SEE FIG. 1122 EFF THRU REV 17/T	3TB1	1	
	100	556-9552-003	3	BOARD ASSY SEE FIG. 3-56 EFF REV 18/U THRU AJ/AG	3TB1	1	
	100	556-9552-006	3	BOARD ASSY SEE FIG. 3-56 EFF REV AK/AH	3TB1	1	
	101	9921X23T	3	CONNECTOR 94375 357-9590-000	3J29	1	
	102	9921X23T	3	CONNECTOR 94375 357-9590-000	3J28	1	
-	103	P334-0215-00 0	3	NUT, PLAIN HEX., NI PL BRS, 5/16-32 77250 34-0215-000 EFF REV AF/AF AP FOR 101 AND 102		2	
	104	RG179BU	3	CABLE 425-1129-000		AR	
	105	2VH18-1AB8	3	CONNECTOR 05574 372-7018-000	3J5	1	
	106	2VH18-1AB8	3	CONNECTOR 05574 372-7018-000	3J6	1	
	107	2VH18-1AB8	3	CONNECTOR 05574 372-7018-000	3J7	1	
	108	563-5005-003	3	CONNECTOR, MODULE NO. 2	3J2	1	
	109	563-5006-003	3	CONNECTOR, MODULE NO. 3	3J6	1	
	110	563-5007-003	3	CONNECTOR, MODULE NO. 4	3J3	1	
	111	563-5005-003	3	CONNECTOR, MODULE NO. 2	3J1	1	
	112	563-5004-003	3	CONNECTOR, MODULE NO. 1	3J9	1	
	113	563-5007-003	3	CONNECTOR, MODULE NO. 4	3J4	1	
-	114	68NM40	3	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0347-000 AP FOR 105 THRU 113		17	
-	115	502-1664-001	3	SPACER AP FOR 105 THRU 113		16	
-	116	MS51959-18	3	SCREW, MACH., SST, 4-40 X 5/8 342-0049-000 AP FOR 105 THRU 113		16	
	117	KY1313R	4	KEY, CONN MOLDED PRODUCTS CO. 372-7020-000 P/O 105 THRU 113		6	
	118	2VH18-1AB8	4	CONNECTOR 05574 372-7018-000 P/O 105 THRU 113		6	
	119	DPX2B16C3P40 P34A1073	3	CONNECTOR 71468 370-2161-000	3P1A,3P1B	1	
-	120	313-0132-000	3	NUT, PLAIN, HEX, SST. 4-40 COML AP		1	
-	121	68NM40	3	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0347-000 AP		5	
-	122	310-0278-000	3	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP		6	
-	123	516-1020-001	3	POST AP		1	
-	124	MS51957-23	3	SCREW, MACH., SST. 4-40 X 1-1/2 343-0143-000 AP		1	
-	125	MS51957-16	3	SCREW, MACH., SST, 4-40 X 7/16 343-0136-000 AP		6	
	126	196P3349354	2	CAPACITOR, FXD, PAPER-DIELECTRIC, 0.33UF, 10%. 300V 56289 931-9639-000 EFF REV 25/AC	3C20	1	

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-35 - 127	196P33494S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.33UF, 10%, 400V 56289 931-9640-000 EFF REV 25/AC 3C21	1	
128	563-5000-003	2	BRACKET, COAX CONN	1	
- 129	MS51957-16	2	SCREW, MACH., SST. 4-40 X 7/16 343-0136-000 AP	2	
- 130	563-5022-002	2	STUD, MTG AP	2	
131	764-8507-002	2	CHOKE, MODIFIED, 860MH EFF REV 25/AC 3L1	1	
132	764-8507-001	2	CHOKE, MODIFIED, 300MH EFF REV 25/AC 3L2	1	
- 133	313-0132-000	2	NUT, PLAIN,HEX., SST, 4-40 COML EFF REV 25/AC THRU 27/AE AP FOR 131 AND 132	2	
- 133	68NM40	2	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0347-000 EFF REV AF/AF AP FOR 131 AND 132	2	
- 134	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML EFF REV 25/AC THRU 27/AE AP FOR 131 AND 132	2	
- 135	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML EFF REV 25/AC THRU 27/AE AP FOR 131 AND 132	2	
- 136	P342-0053-00 0	2	SCREVW MACH., SST, 4-40 X 1-1/8 77250 342-0053-000 EFF REV 25/AC AP FOR 131 AND 132	2	
137	NO NUMBER	2	PLATE ASSY EFF THRU REV 17/T	1	
137	NO NUMBER	2	PLATE ASSY EFF REV 18/U	1	
- 138	MS51957-26	2	SCREW, MACH., SST, 6-32 X 1/4 343-0167-000 EFF THRU REV 17/T AP	8	
- 138	MS51957-12	2	SCREW, MACH., SST, 4-40 X 3/16 343-0132-000 EFF REV 18/U AP	2	
- 139	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0-253 OD 310-0282-000 EFF THRU REV 17/T AP	8	
- 139	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML EFF REV 18/U AP	4	
140	RC20GF821K	3	RESISTOR, FXD, COMP, 820 OHMS, 101% 1/2W 745-1349-000 EFF THRU REV 17/T 3R39	AR	
140	RC20GF102K	3	RESISTOR, FXD, COMP, 1K. 10% 1/2W 745-1352-000 EFF THRU REV 17/T 3R39	AR	
140	RC20GF122K	3	RESISTOR, FXD, COMP, 1.2K, 10% 112W 745-1356-000 EFF THRU REV 17/T 3R39	AR	
140	RC20GF152K	3	RESISTOR, FXD, COMP, 1.5K, 10%, 1/2W 745-1359-000 EFF THRU REV 17/T 3R39	AR	
140	RC20GF182K	3	RESISTOR, FXD, COMP, 1.8K, 10%, 1/2W 745-1363-000 EFF THRU REV 17/T 3R39	AR	
140	RC20GF222K	3	RESISTOR, FXD, COMP, 2.2K, 10%, 1/2W 745-1366-000 EFF THRU REV 17/T 3R39	AR	
140	RC20GF272K	3	RESISTOR, FXD, COMP, 2.7K, 10%, 1/2W 745-1370-000 EFF THRU REV 17/T 3R39	AR	
140	RC20GF332K	3	RESISTOR, FXD, COMP, 3.3K, 10%, 1/2W 745-1373-000 EFF THRU REV 17/T 3R39	AR	

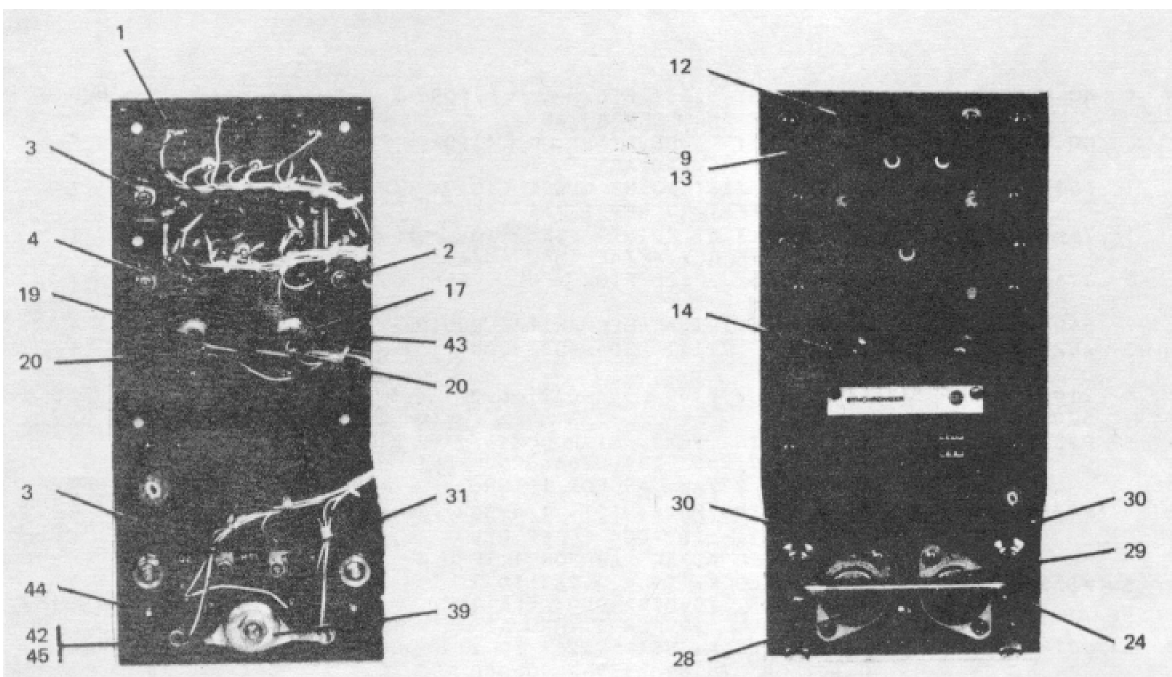
FIG.- ITEM		PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-35	140	RC20GF392K	3	RESISTOR, FXD, COMP, 3.9K, 10%, 1/2W 745-1377-000 EFF THRU REV 17/T	3R39	AR	
	141	RC20GF821K	3	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/2W 745-1349-000 EFF THRU REV 17/T	3R38	AR	
	141	RC20GF102K	3	RESISTOR, FXD, COMP, 1K, 10%, 1/2W 745-1352-000 EFF THRU REV 17/T REV 17/T	3R38	AR	
	141	RC20GF122K	3	RESISTOR, FXD, COMP, 1.2K, 10%, 1/2W 745-1356-000 EFF THRU REV 17/T	3R38	AR	
	141	RC20GF152K	3	RESISTOR, FXD, COMP, 1.5K, 10%, 1/2W 745-1359-000 EFF THRU REV 17/T	3R38	AR	
	141	RC20GF182K	3	RESISTOR, FXD, COMP, 1.8K, 10% 1/2W 745-1363-000 EFF THRU REV 17/T	3R38	AR	
	141	RC20GF222K	3	RESISTOR, FXD, COMP, 2.2K, 10%, 1/2W 745-1366-000 EFF THRU REV 17/T	3R38	AR	
	141	RC20GF272K	3	RESISTOR, FXD, COMP, 2.7K, 10%, 1/2W 745-1370-000 EFF PCB REV C 17/T	3R38	AR	
	141	RC20GF332K	3	RESISTOR, FXD, COMP, 3.3K, 10%, 1/2W 745-1373-000 EFF THRU REV 17/T	3R38	AR	
	141	RC20GF392K	3	RESISTOR, FXD, COMP, 3.9K, 10%, 1/2W 745-1377-000 EFF THRU REV 17/T	3R38	AR	
	142	540-9051-003	3	POST, ELECTRICAL-MECHANICAL EQUIP. EFF THRU REV 17/T		5	
	143	565-3499-003	3	SERVO, PHASE EFF THRU REV 17/T	3TB11	1	
-	144	MS51957-14	3	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP FOR 142 AND 143		10	
-	145	310-0278-000	3	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP FOR 142 AND 143		10	
-	146	DIE845	3	WASHER, FLAT, SST, 0.119 ID X 0.218 OD 72606 310-0460-000 AP FOR 142 AND 143		5	
	147	RW69V2RO	4	RESISTOR, FXD, WW, 2 OHMS, 10%, 3W 747-5306-000	3TB11R3	1	
	148	118P33402S4	4	CAPACITOR, FXD, PAPER DIELECTRIC, 0.33UF, 20%, 200V 56289 931-5943-000	3TB11C18	1	
	149	118P33402S4	4	CAPACITOR, FXD, PAPER DIELECTRIC, 0.33UF, 20S% 200V 56289 931-5943-000	3TB11C17	1	
	150	RC20GF100K	4	RESISTOR, FXD, COMP, 10 OHMS, 10%, 1/2W 745-1268-000	3TB11R1	1	
	151	RC32GF821K	4	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1W 745-3349-000	3T811R2	1	
	152	565-3498-003	4	SERVO, PHASE		1	
	153	100-200-16-8	5	CLIP 99378 139-0759-000		2	
-	154	MS20470AD3-4	5	RIVET, SOLID, AL, 0.094 DIA X 1/4 305-1155-000 AP		4	
	155	565-3497-003	5	SERVO, PHASE		1	
	156	196P47491S4	3	CAPACITOR, FXD, PAPER DIELECTRIC, 0.47UF, 10%, 100V 56289 931-9631-000 EFF THRU REV 17/T	3C1	1	

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-35 -157	RE65G10R0	3	RESISTOR, FXD, WW, 10 OHMS, 10%, 10W 747-8954-000 3R11	1	
158	RH10-40R00G	3	RESISTOR, FXD, WW, 40 OHMS, 3% 10W 91637 747-8962-000 3R4	1	
- 159	MS35649-24	3	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP FOR 157 AND 158	4	
- 160	MS35338-134	3	WASHER, LOCK, SST, 0.088 ID X 0.175 OD 310-0275-000 AP FOR 157 AND 158	4	
- 161	MS51957-6	3	SCREW, MACH., SST, 2-56 X 7/16 343-0127-000 AP FOR 157 AND 158	4	
162	950-0975-400	3	TRANSFORMER 83003 672-0024-000 EFF THRU REV 17/T 3T7	1	
163	950-0975-400	3	TRANSFORMER 83003 672-0024-000 EFF THRU REV 17/T 3T6	1	
164	950-0974-400	3	TRANSFORMER 83003 672-0025-000 EFF THRU REV 17/T 3T5	1	
- 165	P313-0156-00 0	3	NUT, PLAIN, HEX., NI PL BRS, 4-40 77250 313-0156-000 AP FOR 162 AND 164	6	
- 166	310-0278-000	3	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP FOR 162 THRU 164	6	
- 167	P343-0285-00 0	3	SCREW, MACH., NI PL BRS, 4-40 X 1/4 77250 343-0285-000 AP FOR 162 THRU 164	6	
168	SDB1K01823J	3	CAPACITOR, FXD, PAPER DIELECTRIC, 0.082UF, 5%, 100V 53021 931-5008-000 EFF THRU REV 17/T 3C15	1	
169	29318	3	TRANSFORMER 80089 672-0036-000 3T4	1	
- 170	MS51957-26	3	SCREW, MACH., SST, 6-32 X 1/4 343-0167-000 AP	4	
- 171	1806-00	3	WASHER, LOCK, CAD, PL BRZ, 0.150 ID X 0.317 OD 78189 373-7020-000 AP	4	
172	956-0484-400	3	TRANSFORMER 83003 677-0005-000 3T71	1	
- 173	P313-0156-00 0	3	NUT, PLAIN, HEX., NI PL BRS, 4-40 77250 313-0156-000 EFF THRU REV 17/T AP	2	
- 173	313-0132-000	3	NUT, PLAIN, HEX., SST, 4-40 COML EFF REV 18/U AP	2	
- 174	310-0278-000	3	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	2	
- 175	P343-0285-00 0	3	SCREW, MACH., NI PL BRS, 4-40 X 1/4 77250 343-0285-000 EFF THRU REV 17/T AP	2	
- 175	MS51957-13	3	SCREW, MACH., SST, A-40 X 1/4 343-0133-000 EFF REV 18/U AP	2	
176	2H16D12	3	TERMINAL 92825 306-0958-000 EFF THRU REV 17/T	1	
- 177	MS51957-14	3	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP	1	
- 178	310-0278-000	3	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	1	
179	TF300	3	TERMINAL 98291 306-1018-000	4	
- 180	MS51957-2	3	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	4	
- 181	MS35338-134	3	WASHER, LOCK, SST, 0.088 ID X 0.175 OD 310-0275-000 EFF THRU REV 17/T AP	4	

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-35 - 182	563-4937-004	3	PLATE, XMFR EFF THRU REV 17/T	1	
182	516-7410-002	3	PLATE, XMFR EFF REV 18/U	1	
183	NCN6-1-2	4	NUT, CAPTIVE, SST, 6-32 07886 334-0426-000 EFF THRU REV 17/T	8	
183	NCN4-1-2	4	NUT, CAPTIVE, SST, 4-40 07886 334-0443-000 EFF REV 18/U	2	
184	100-225-9-3	4	CLIP 99378 139-0763-000 EFF THRU REV 17/T	1	
185	6002-10A	4	CLIP 91506 139-2338-000 EFF THRU REV 17/T	1	
- 186	MS20470AD3-4	4	RIVET, SOLID, AL, 0.094 DIA X 1/4 305-1155-000 AP FOR 184 AND 185	3	
187	563-4936-004	4	PLATE, XMFR EFF THRU REV 17/T	1	
187	516-7410-001	4	PLATE, XMFR EFF REV 18/U	1	
188	2H16D12	2	TERMINAL 92825 306-0958-000 EFF REV 25/AG	5	
- 189	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	3	
- 190	MS51959-13	2	SCREW, MACH., SST, 4-40 X 1/4 342-0044-000 AP	2	
- 191	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	5	
192	563-4916-005	2	CHASSIS, SYNCHRONIZER SEE FIG.3-57 EFF THRU REV 17/T	1	
192	556-9093-011	2	CHASSIS, SYNCHRONIZER SEE FIG.3-57 EFF REV 18/U	1	
3-36 - 0	NO NUMBER	1	PANEL ASSY SEE FIG. 3-35(7) FOR NHA EFF THRU REV AJ/AG 3	REF	
3-36 0	NO NUMBER	1	PANEL ASSY SEE FIG.3-35(7) FOR NHA EFF REV AK/AH 3	REF	
1	563-4932-004	2	BRACKET, TEST POINT SEE FIG.3-37 EFF THRU REV 27/AE	1	
1	764-8639-004	2	BRACKET, TEST POINT SEE FIG.3-37 EFF REV AF/AF THRU AJ/AG	1	
1	774-6470-003	2	BOARD ASSY SEE FIG.3-38 EFF REV AK/AH 3TB20	1	
2	540-9035-003	2	POST, ELECTRICAL-MECHANICAL EQUIP.	4	
3	4021HOTTINNED	2	TERMINAL 77147 304-0087-000	1	
4	2104-04-01-2520N	2	TERMINAL 78189 304-0317-000	1	
- 5	P334-0266-000	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 EFF THRU REV 27/AE AP FOR 1 THRU 4	4	
- 5	P334-0287-000	2	NUT, PLAIN, HEX., SST, 1/4-32 77250 334-0287-000 EFF REV AF/AF THRU AJ/AG AP FOR 1 THRU 4	4	
- 6	MS35333-74	2	WASHER, LOCK, STL, 0.267 ID X 0.478 OD 373-0005-000 EFF THRU REV 27/AE AP FOR 1 THRU 4	4	
- 6	1714-05	2	WASHER, LOCK, SST, 0.267 ID X 0.408 OD 78189 373-0090-000 EFF REV AF/AF THRU AJ/AG AP FOR 1 THRU 4	4	



EFF THRU REV AJ/AG



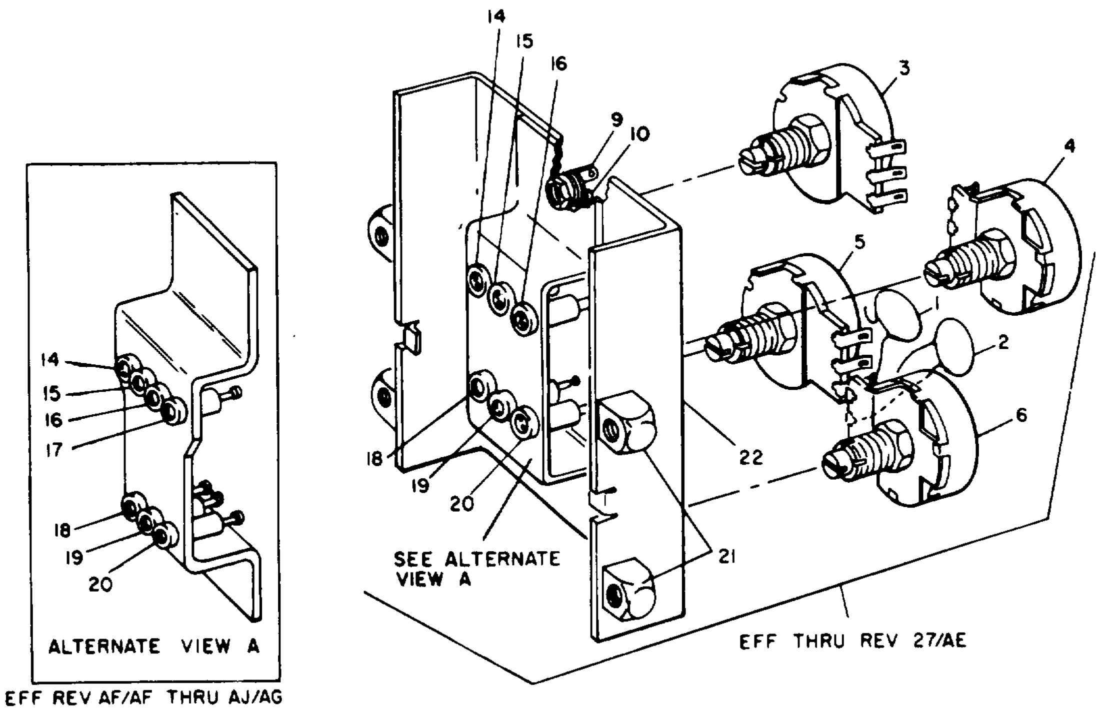
Panel Assembly

Figure 3-36

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-36 - 6	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 EFF REV AK/AH AP FOR 1 THRU 4		8	
- 7	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 4 0.312 OD COML EFF THRU REV AJ/AG AP FOR 1 THRU 4			
- 7	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 8 0.312 OD COML EFF REV AK/AH AP FOR 1 THRU 4			
- 8	MS51957-16	2	SCREW, MACH., SST, 4-40 X 7/16 343-0136-000 EFF THRU REV AJ/AG AP FOR 1 THRU 4		4	
- 8	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 EFF REV AK/AH AP FOR 1 THRU 4		8	
9	563-4999-003	2	HATCH, ACCESS		1	
- 10	MS51957-15	2	SCREW, MACH., SST, 4-40 X 3/8 343-0135-000 AP		2	
- 11	310-0045-000	2	WASHER, FLAT, SST, 0125 ID X 2 0.312 OD COML AP			
12	R22NCFMA1-40	3	NUT, SELF-LKG, CLINCH, CAD. PL STL, 4-40 72962 333-0839-000		2	
13	563-4998-003	3	HATCH, ACCESS		1	
14	563-5019-002	2	COVER, DIODE		1	
- 15	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP		2	
- 16	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78187 373-0154-000 AP		2	
17	1N2047-1	2	SEMICOND DEVICE 353-1745-000 OR	3CR1	1	
17	1N2979RB	2	SEMICOND DEVICE 353-6463-430 EFF REV AF/AF	3CR1	1	
18	1N2041-1	2	SEMICOND DEVICE 76881 353-1749-000 EFF THRU REV 17/T	3CR3	1	
19	1N2041-1	2	SEMICOND DEVICE 76881 353-1749-000 EFF THRU REV 17/T	3CR2	1	
19	1N3996A	2	SEMICOND DEVICE 353-6232-000 EFF REV 18/U	3CR2	1	
20	4021HOTTINNE D	2	TERMINAL 77147 304-0087-000		2	
- 21	MS35650-104	2	NUT PLAIN, HEX, SST, 10-32 313-0019-000 AP FOR 17 THRU 20		3	
- 22	MS35333-73	2	WASHER, LOCK, SST, 0.204 ID X 0.022 373-0043-000 AP FOR 17 THRU 20		3	
- 23	310-0059-000	2	WASHER, FLAT, NI PL BRS, 0.203 ID X 0.437 OD COML AP FOR 17 THRU 20		3	
24	563-5025-002	2	HANDLE		1	
- 25	P313-0148-00 0	2	NUT, PLAIN, HEX NI PL BRS, 1/4-20 77250 313-0148-000 AP		2	
- 26	310-0287-000	2	WASHER, LOCK, SST, 0.255 ID X 0.489 OD COML AP		2	
- 27	503-4943-001	2	HANDLE, STOP AP		2	
28	2N1022	2	TRANSISTOR 352-0247-000	3Q1	1	
29	2N1022	2	TRANSISTOR 352-0247-000	3Q2	1	
30	DM103	2	INSULATOR 08289 352-9854-000		2	
31	2104-04-01-2 520N	2	TERMINAL 78189 304-0317-000		2	

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-36 - 32	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP FOR 28 THRU 31	4	
- 33	MS35335-51	2	WASHER, LOCK, SST, 0.123 ID X 0.260 OD 373-8010-000 AP FOR 28 THRU 31	2	
- 34	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML EFF THRU REV 17/T AP FOR 28 THRU 31	2	
- 35	565-2985-002	2	BUSHING, INSULATOR AP FOR 28 THRU 31	4	
- 35	769-7039-002	2	BUSHING EFF REV AF/AF AP FOR 28 THRU 31	4	
- 36	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP FOR 28 THRU 31	4	
- 37	302-0385-000	2	INSULATOR, WASH, 20999 AP FOR 28 THRU 31	4	
- 38	MS51957-17	2	SCREW, MACH., SST, 4-40 X 1/2 343-0137-000 AP FOR 28 THRU 31	4	
39	9RT1A6	2	RESISTOR, THRM, 10 OHMS, 10%, 02989 714-2846-000 3RT1	1	
- 40	MS35650-104	2	NUT, PLAIN, HEX., SST, 10-32 313-0019-000 EFF THRU REV 17/T AP	1	
- 40	MS35649-84	2	NUT, PLAIN, HEX., STL, 8-32 313-0017-000 EFF REV 18/U AP	1	
- 41	MS51958-66	2	SCREW, MACH., SST, 10-32 X 7/8 343-0230-000 AP	1	
42	563-4935-004	2	PANEL, FRONT EFF THRU REV 17/T	1	
42	556-9098-002	2	PANEL, FRONT EFF REV 18/U THRU 27/AE	1	
42	764-8638-002	2	PANEL, FRONT EFF REV AF/AF	1	
43	NCN4-1-4	2	NUT, CAPTIVE, SST, 4-40 07886 334-0441-000	2	
44	NCN6-1-4	2	NUT, CAPTIVE, SST, 6-32 07886 334-0428-000	2	
45	563-4934-004	2	PANEL, FRONT EFF THRU REV 17/T	1	
45	556-9098-001	2	PANEL, FRONT EFF REV 18/U THRU 27/AE	1	
45	764-8638-001	2	PANEL, FRONT EFF REV AF/AF	1	
3-37 - 0	764-8639-004	1	BRACKET, TEST POINT SEE FIG.3-36(1) FOR NHA EFF REV AF/AF THRU AJ/AG	REF	
3-37 - 0	563-4932-004	1	BRACKET, TEST POINT SEE FIG.3-36(1) FOR NHA EFF THRU REV 27/AE	REF	
* 1	CM05F101J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 100PF, 5%, 500V 912-2816-000 EFF THRU REV AJ/AG 3C17	1	
* 2	CM05F101J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 100PF, 5%, 500V 912-2816-000 EFF THRU REV AJ/AG 3C16	1	
* 3	RV5LAXSB104B	2	RESISTOR, VAR, COMP, 100K, 20%, 1/2W 380-6300-000 EFF THRU REV AJ/AG 3R7	1	

*Items 1 through 3 are P/0 522-6114-006.

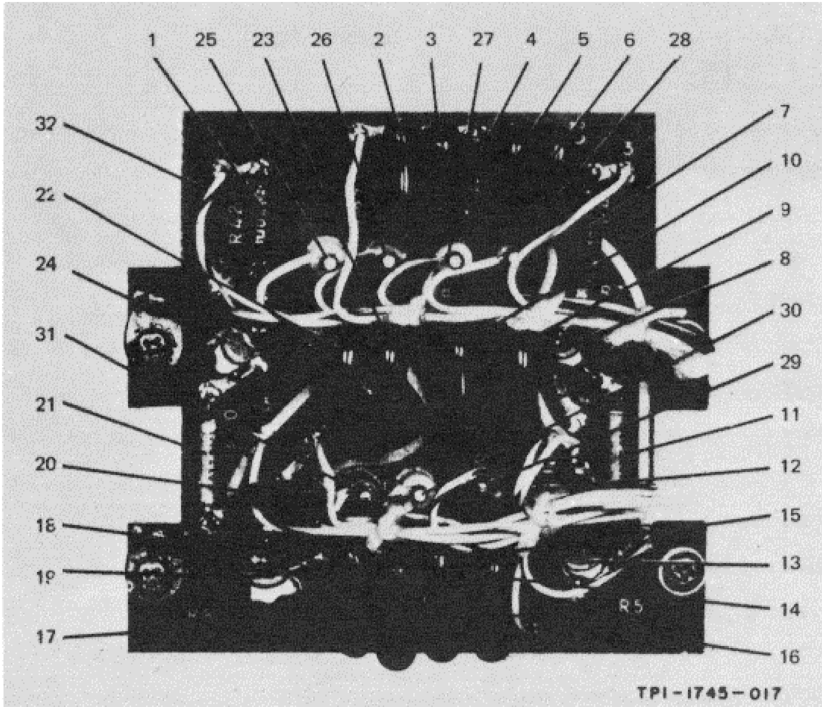


Test Point Bracket

Figure 3-37

FIG.-ITEM		PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-37	* 4	RV5LAXSB104B	2	RESISTOR, VAR, COMP, 100K, 20% 1/2W 380-6300-000 EFF THRU REV AJ/AG	3R10	1	
	* 5	RV5LAXSB503B	2	RESISTOR, VAR, COMP, 50K, 20%, 1/2W 380-6289-000 EFF THRU REV AJ/AG	3R5	1	
	* 6	RV5LAXSB503B	2	RESISTOR, VAR, COMP, 50K, 20%, 1/2W 380-6289-000 EFF THRU REV AJ/AG	3R8	1	
	* 7	CS54	2	NUT, SELF-LKG, HEX., NI PL BRS, 1/4-32 94375 334-0495-000 EFF THRU REV AJ/AG AP FOR 3 THRU 6		4	
	* 8	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML EFF THRU REV AJ/AG AP FOR 3 THRU 6		4	
	* 9	2104-04-01-2 520N	2	TERMINAL 78189 304-0317-000 EFF THRU REV AJ/AG		2	
	* 10	4021HOTTINNE D	2	TERMINAL 77147 304-0087-000 EFF REV 15/R THRU AJ/AG		2	
	* 11	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 EFF THRU REV AJ/AG AP FOR 9 AND 10		1	
	* 12	MS35335-51	2	WASHER, LOCK, SST, 0.123 ID X 0.260 OD 373-8010-000 EFF THRU REV AJ/AG AP FOR 9 AND 10		1	
	* 13	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 EFF THRU REV AJ/AG AP FOR 9 AND 10		1	
	14	SKT10BLU	2	JACK, TIP, BLU 98291 360-0096-000 EFF THRU REV AJ/AG	3J10	1	
	15	SKT10WHT	2	JACK, TIP, WHT 98291 360-0090-000 EFF THRU REV AJ/AG	3J12	1	
	16	SKT10BLU	2	JACK, TIP, BLU 98291 360-0096-000 EFF THRU REV AJ/AG	3J11	1	
	17	SKT10WHT	2	JACK, TIP, WHT 98291 360-0090-000 EFF REV AF/AF	3J36	1	
	18	SKT10GRN	2	JACK, TIP, GRN 98291 360-0095-000 EFF THRU REV AJ/AG	3J13	1	
	19	SKT10WHT	2	JACK, TIP, WHT 98291 360-0090-000 EFF THRU REV AJ/AG	3J15	1	
	20	SKT10GRN	2	JACK, TIP, GRN 98291 360-0095-000 EFF THRU REV AJ/AG	3J14	1	
	21	504-9478-002	2	INSERT, TAPPED EFF THRU REV AJ/AG		4	
	22	764-8639-003	2	BRACKET, TEST POINT EFF REV AF/AF THRU AJ/AG		1	
	22	563-4931-004	2	BRACKET, TEST POINT EFF THRU REV 27/AE		1	

*Items 4 through 13 are P/O 522-6114-006.

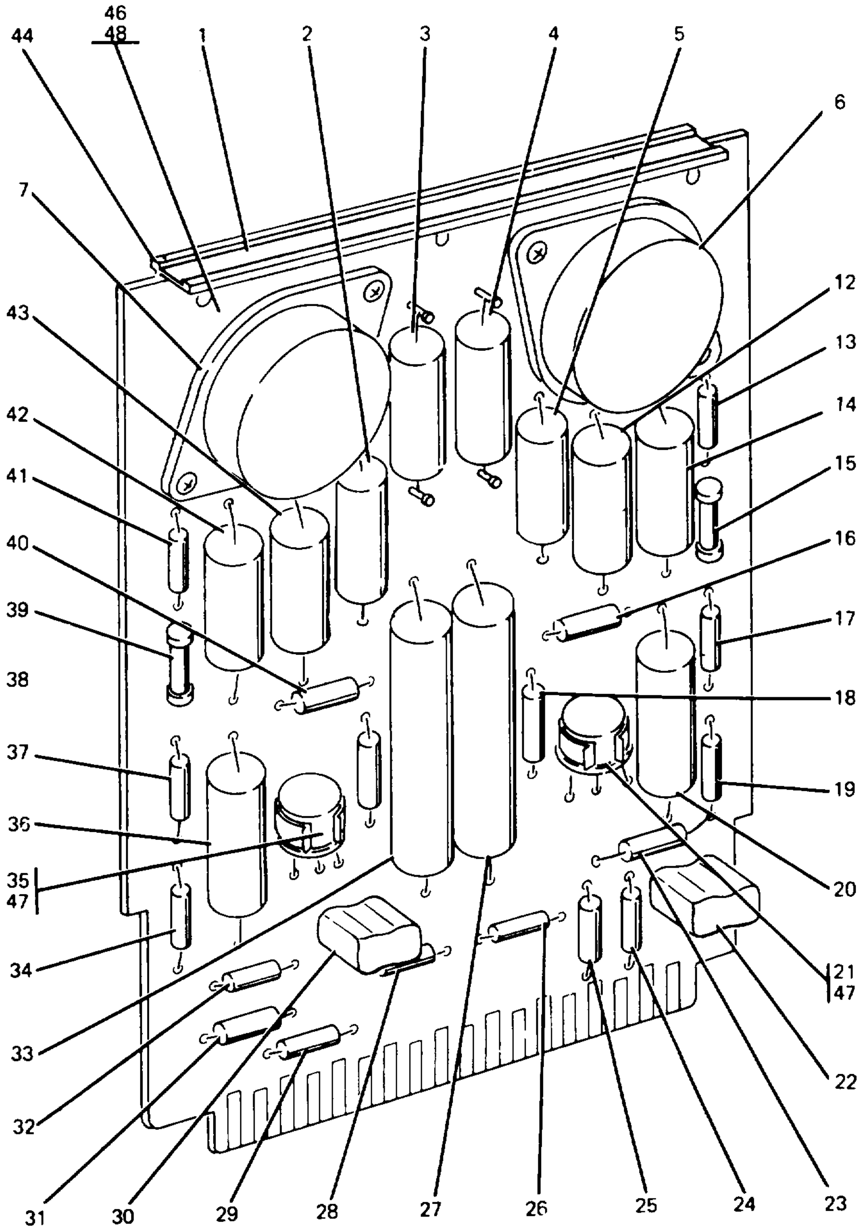


Board Assembly, TB20

Figure 3-38

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-38	774-6470-003	1	BOARD ASSY SEE FIG.3-36(1) FOR NHA EFF REV AK/AH	3T820	REF	
1	RN60C1002F	2	RESISTOR, FXD, FILM, 10K, 1%, 1/8W 705-6297-000	3TB20R42	1	
2	CM06FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3TB20C27	1	
3	CM06FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3TB20C26	1	
4	RN60C2872F	2	RESISTOR, FXD, FILM, 28.7K, 1%, 1/8W 705-6308-000	3TB20R6	1	
5	CMG6FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3T820C23	1	
6	CM06FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3TB20C3	1	
7	RN60C1002F	2	RESISTOR, FXD, FILM, 10K, 1%, 1/8W 705-6297-000	3TB20R41	1	
8	CT100-50K	2	RESISTOR, VAR, WW, 50K, 5%, 1W 75042 381-1473-000	3TB20R7	1	
9	CM06FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3T820C4	1	

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-38 - 10	CM06FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3TB20C24	1	
11	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.BUF, 20%, 35V 56289 184-7693-000	3TB20C25	1	
12	CM05F101J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 100PF, 5%, 500V 912-2816-000	3TB20C16	1	
13	CT100-50K	2	RESISTOR, VAR, WW, 50K, 5%, 1W 75042 381-1473-000	3TB20R5	1	
14	CM06FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3TB20C32	1	
15	CMC6FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3TB20C31	1	
16	RN60C2872F	2	RESISTOR, FXD, FILM, 28.7K, 1%, 1/8W 705-638-000	3TB20R9	1	
17	CM06FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3TB20C28	1	
18	CM06FD272J03	2	CADACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3TB20C5	1	
19	CT100-50K	2	RESISTOR, VAR, WW, 50K, 5%, 1W 75042 381-1473-000	3TB20R8	1	
20	CM05F101J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 100PF, 5%, 500V 912-2816-000	3TB20C17	1	
21	150D681X0035 B2	2	CAPACITOR, FXD, FLECT., 6.8UF, 20%, 35V 56289 184-7693-000	3TB20C30	1	
22	CM06FD272J03	2	CAPACITOR, FXD, MICA DIELECTPIC, 2700PF, 5%, 500V 912-3034-000	3TB20C29	1	
23	CM06FD272J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 2700PF, 5%, 500V 912-3034-000	3TB20C6	1	
24	CT100-50K	2	RESISTOR, VAR, WW, 50K, 5%, 1W 75042 381-1473-000	3TB20R10	1	
25	SKT10WHT	2	JACK, TIP, WHT 98291 360-0090-000	3TB20J36	1	
26	SKT10BLU	2	JACK, TIP, BLU 98291 360-0096-000	3TP20J11	1	
27	SKT10WHT	2	JACK, TIP, WHT 98291 360-0090-000	3TB20J12	1	
28	SKT10BLU	2	JACK, TIP, FLU 98291 360-0096-000	3TB20J10	1	
29	SKT10GRN	2	JACK, TIP, GRN 98291 360-0095-000	3TB20J13	1	
30	SKT10WHT	2	JACK, TIP, WHT 98291 360-0090-000	3TB20J15	1	
31	SKT10GRN	2	JACK, TIP, GRN 98291 360-0095-000	3TB20J14	1	
32	774-6470-002	2	BOARD ASSY		1	

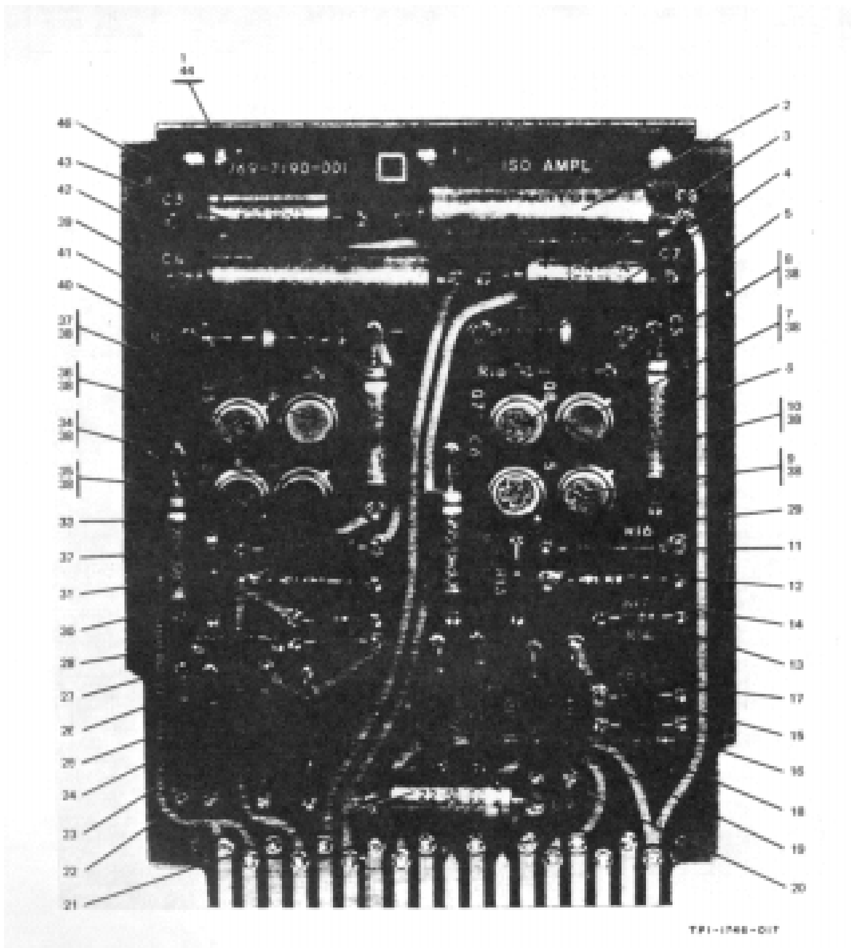


Isolation Amplifier

Figure 3-39

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-39 - 0	566-0050-004	1	ISOLATION AMPLIFIER SEE FIG.3-35(17) FOR NHA EFF THRU REV AG/AC 3A4	REF	
1	563-4973-003	2	STRIP, IDENT	1	
2	151D116X0035 Y2	2	CAPACITOR, FXD, ELECT., 11UF, 20%, 35V 56289 184-8272-000 3A4C3	1	
3	RC42GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 2W 745-5649-000 3A4R6	1	
4	RC42GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 2W 745-5649-000 3A4R14	1	
5	151D116X0035 Y2	2	CAPACITOR, FXD, ELECT., 11UF, 20%, 35V 56289 184-8272-000 3A4C7	1	
6	2N553	2	TRANSISTOR 352-0178-000 3A4Q4	1	
7	2N553	2	TRANSISTOR 352-0178-000 3A4Q2	1	
- 8	313-0132-000	2	NUT, PLAIN, HEX. SST, 4-40 COML AP FOR 6 AND 7	4	
- 9	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP FOR 6 AND 7	4	
- 10	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP FOR 6 AND 7	4	
- 11	MS51957-14	2	SCREW, MACH., SST. 4-40 X 5/16 343-0134-000 AP FOR 6 AND 7	4	
12	150D476X0035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 20%, 35V 56289 184-7411-000 3A4C5	1	
13	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10% 1/4W 745-0752-000 3A4R13	1	
14	150D476X0035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 20%, 35V 56289 184-7411-000 3A4C8	1	
15	763H7	2	RESISTOR, THRM, 10K, 10%, 1W 10646 714-1733-000 3A4RT2	1	
16	RC20GF151K	2	RESISTOR, FXD, COMP, 150 OHMS, 10%, 1/2W 745-1317-000 3A4R15	1	
17	RC07GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/4W 745-0770-000 3A4R12	1	
18	RC20GF820K	2	RESISTOR FXD, COMP, 82 OHMS, 10%, 1/2W 745-1307-000 3A4R9	1	
19	RC07GF123K	2	RESISTOR, FXD, COMP, 12K, 10% 1/4W 745-0788-000 3A4R11	1	
20	150D226X0035 R2	2	CAPACITOR, FXD, ELECT., 22UF, 20%, 35V 56289 184-7695-000 3A4C6	1	
21	2N651	2	TRANSISTOR 352-0194-000 EFF BASIC PCB ONLY 3A4Q3	1	
21	2N1187A	2	TRANSISTOR 352-0475-000 EFF PCB REV A/A 3A4Q3	1	
22	CM05F391J03	2	CAPACITOR FXD, MICA DIELECTRIC, 390PF, 5%, 500V 912-2858-000 3A4C14	1	
23	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 10%, 1/4W 745-0809-000 3A4R10	1	
24	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 10%, 1/4W 745-0809-000 3A4R18	1	
25	150D105X0035 A2	2	CAPACITOR, FXD, ELECT., 1UF, 20%, 35V 56289 184-7398-000 3A4C11	1	
26	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10% 1/4W 745-0785-000 3A4R16	1	
27	186P22401S3	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.22UF, 20%, 100V 56289 931-5652-000 3A4C12	1	
28	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 10%, 1/4W 745-0809-000 3A4R17	1	
29	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A4R8		

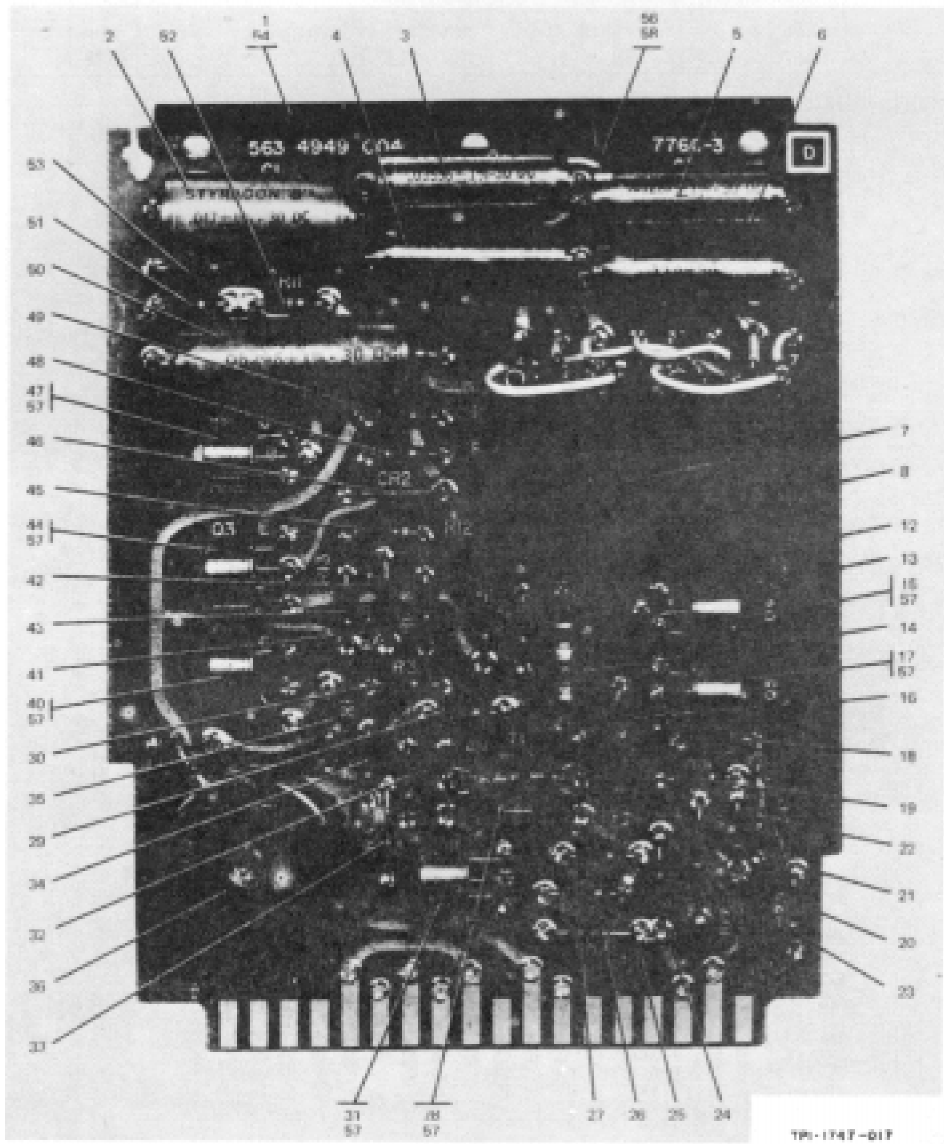
FIG.-ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-39 -	30	CM05F391J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 390PF, 5%, 500V 912-2858-000	3A4C13	1	
	31	150D105X0035 A2	2	CAPACITOR, FXD, ELECT., 1UF, 20%, 35V 56289 184-7398-000	3A4C1	1	
	32	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 10%, 1/4W 745-0809-000	3A4R2	1	
	33	186P22401S3	2	CAPACITOR, FXD, PAPER DIELECTRIC. 0.22UF 20%, 100V 56289 931-5652-000	3A4C10	1	
	34	RC07GF123K	2	RESISTOR, FXD, COMP, 12K, 10%, 1/4W 745-0788-000	3A4R3	1	
	35	2N651	2	TRANSISTOR 352-0194-000 EFF BASIC PCB ONLY	3A4Q1	1	
	35	2N1187A	2	TRANSISTOR 352-0475-000 EFF PCB REV A/A	3A4Q1	1	
	36	150D226X0035 R2	2	CAPACITOR, FXD, ELECT., 22UF, 20%, 35V 56289 184-7695-000	3A4C2	1	
	37	RC07GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/4W 745-0770-000	3A4R4	1	
	38	RC20GF820K	2	RESISTOR, FXD, COMP, 82 OHMS, 10%, 1/2W 745-1307-000	3A4R1	1	
	39	763H7	2	RESISTOR, THRM, 10K, 10%,1W 10646 714-1733-000	3A4RT1	1	
	40	RC20GF151K	2	RESISTOR, FXD, COMP, 150 OHMS, 10%, 1/2W 745-1317-000	3A4R7	1	
	41	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000	3A4R5	1	
	42	150D476X0035 S2	2	CAPACITOR, FXO, ELECT,, 47UF, 20%, 35V 56289 184-7411-000	3A4C4	1	
	43	150D476X0035 S2	2	CAPACITOR, FXD, ELECT,, 47UF, 20%, 35V 56289 184-7411-000	3A4C9	1	
	44	563-5011-002	2	HANDLE, SHORT		1	
-	45	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP		3	
	46	566-0049-004	2	ISOLATION AMPLIFIER		1	
	47	6009-25	3	HOLDER 91506 139-2358-000		2	
	48	566-0048-004	3	ISOLATION AMPLIFIER		1	
3-40-	0	769-7190-001	1	PRINTFD CIRCUIT BOARD SEE FIG. 3-34(17) FOR NHA EFF REV AH/AG	3A4	REF	
	1	563-4973-003	2	STRIP, IDENT		1	
	2	196P22451S4	2	CAPACITOR, FXD, PAPER DIELECTRIC. 0.22UF, 5, 100V 56289 931-9635-000	3A4C8	1	
	3	150D476X9035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 10%, 35V 56289 184-7714-000	3A4C7	1	
	4	RC42GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 2W 745-5652-000	3A4R19	1	
	5	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%. 1/4W 745-0821-000	3A4R18	1	
	6	150D107X9020 S2	2	CAPACITOR, FXD, ELECT., 100UF, 10%, 20V 56289 184-7721-000	3A4C5	1	
	7	2N1711	2	TRANSISTOR 352-0400-000	3A4Q8	1	
	8	2N1711	2	TRANSISTOR 352-0400-000	3A4Q7	1	
	9	2N1711	2	TRANSISTOR 352-0400-000	3A4Q5	1	



Printed Circuit Board
Figure 3-40

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-40 - 10	2N1711	2	TRANSISTOR 352-0400-000 3A4Q6	1	
11	RN65D2740F	2	RESISTOR, FXO, FILM, 274 OHMS, 1%, 3A4R16 1/2W 705-7069-000	1	
12	RN6502152F	2	RESISTOR, FXD, FILM, 21.5K, 1%, 3A4R17 1/2W 705-7160-000	1	
13	RC07GF104K	2	RESISTOR, FXD, COMP, 10OK, 10%, 3A4R14 1/4W 745-0821-000	1	
	RC07GF106K	2	RESISTOR, FXD. COMP, 10 MEGO, 10%, 3A4R13 1/4W 745-0893-000 EFF PCB REV A/A	1	
15	1N816	2	SEMICOND DEVICE 353-2564-000 3A4CR3	1	
16	1N816	2	SEMICOND DEVICE 353-2564-0G0 3A4CR4	1	
17	RN65D01871F	2	RESISTOR, FXD, FILM, 1.78K, 1%, 3A4R12 1/2W 705-7108-000 EFF BASIC PCB ONLY	1	
17	RN6501621F	2	RESISTOR, FXD, FILM, 1.62K, 1%, 3A4R12 1/2W 705-7106-000 EFF PCB REV A/A	1	
18	RN65D6811F	2	RESISTOR, FXD. FILM, 6.81K 1%, 3A4R11 1/2W 705-7136-000	1	
19	RN65D4642F	2	RESISTOR, FXD. FILM, 46.4K, 1%, 3A4R15 1/2W 705-7176-000	1	
20	RN65D1002F	2	RESISTOR, FXD, FILM, 10K. 1%, 1/2W 3A4R20 705-7144-000 EFF BASIC PCB ONLY	1	
20	RN65D1332F	2	RESISTOR. FXD, FILM9 13.3K, 1%, 3A4R20 1/2W 705-7150-000 EFF PCB REV A/A	1	
21	150D226X0050 S2	2	CAPACITOR, FXD, ELECT., 22UF, 20%, 3A4C9 50V 56289 184-8973-000	1	
22	RN65D6811F	2	RESISTOR. FXD. FILM, 6.81K 1%, 3A4R1 1/2W 705-7136-000	1	
23	RN6501871F	2	RESISTOR, FXD, FILM, 1.78K, 1%, 3A4R2 1/2W 705-7108-000 EFF BASIC PCB ONLY	1	
23	RN65D1621F	2	RESISTOR, FXD, FILM, 1.62K, 1%, 3A4R2 1/2W 705-7106-000 EFF PCB REV A/A	1	
24	RN65D4642F	2	RESISTOR, FXD, FILM, 46.4K, 1%, 3A4R5 1/2W 705-7176-000	1	
25	RN65D1002F	2	RESISTOR, FXD, FILM, 10K 1%, 1/2W 3A4R10 705-7144-000 EFF BASIC PCB ONLY	1	
25	RN65D1332F	2	RESISTOR, FXD, FILM, 13.3K, 1%, 3A4R10 1/2W 705-7150-000 EFF PCB REV A/A	1	
26	1N816	2	SEMICOND DEVICE 353-2564-000 3A4CR1	1	
27	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 3A4R4 1/4W 745-0821-000	1	
28	1N816	2	SEMICOND DEVICE 353-2564-000 3A4CR2	1	
29	150D226X0035 R2	2	CAPACITOR, FXD, ELECT, 22UF, 20%, 3A4C6 35V 56289 184-7695-000	1	
30	RN65D2152F	2	RESISTOR, FXD, FILM, 21.5K, 15, 3A4R7 1/2W 705-7160-000	1	
31	RC07GF105J	2	RESISTORT FXD, COMP, 1MEGO, 5%, 3A4R3 1/4W 745-0856-000 EFF BASIC PCB ONLY	1	
31	RC07GF106K	2	RESISTOR, FXD, COMP, 10 MEGO, 10%, 3A4R3 1/4W 745-0893-000 EFF PCB REV A/A	1	
32	RN65D2740F	2	RESISTOR, FXD, FILM, 274 OHMS, 1%, 3A4R6 1/2W 705-7069-000	1	

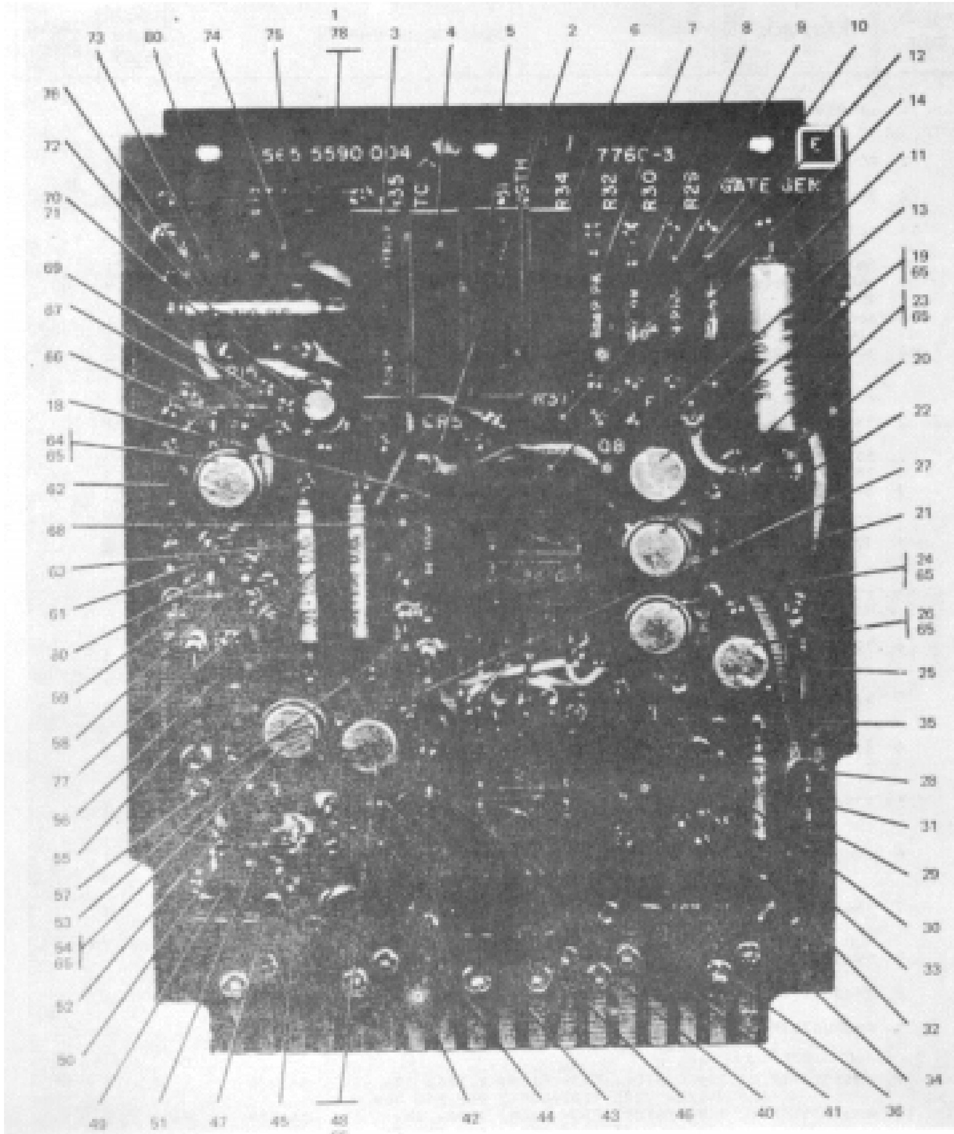
FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-40 - 33	150D226X0035 R2	2	CAPACITOR, FXD, ELECT, 22UF, 20%, 35V 56289 184-7695-000	3A4C2	1	
34	2N1711	2	TRANSISTOR 352-0400-000	3A4Q1	1	
35	2N1711	2	TRANSISTOR 352-0400-000	3A4Q2	1	
36	2N1711	2	TRANSISTOR 352-0400-000	3A4Q3	1	
37	2N1711	2	TRANSISTOR 352-0400-000	3A4Q4	1	
38	A10044DAP	2	INSULATOR 07047 352-9889-000		8	
39	1500107X9020 S2	2	CAPACITOR9 FXD, ELECT, 100UF, 10%, 20V 56289 184-7721-000	3A4C1	1	
40	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000	3A4R8	1	
41	RC42GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 2W 745-5652-000	3A4R9	1	
42	196P2245154	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.22UF, 5%, 100V 56289 931-9635-000	3A4C4	1	
43	150D476X9035 S2	2	CAPACITOR, FXD, ELECT, 47UF, 10%, 35V 56289 184-7714-000	3A4C3	1	
44	563-5011-002	2	HANDLE, SHORT		1	
- 45	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP		3	
46	769-7190-002	2	PRINTED CIRCUIT BOARD		1	
3-41 - 0	563-4949-004	1	RANGE MARK GENERATOR SEE FIG. 3-35(18) FOR NHA	3A9	REF	
1	563-4974-003	2	STRIP, IDENT		1	
2	114P147345	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.047UF, 1%, 30V 56289 933-0296-000	3A9C1	1	
3	114P146879	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.03555UF, 1%, 30V 56289 933-0295-000	3A9C2	1	
4	114P2231R3S4	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.022UF, 1%, 30V 56289 933-0294-000	3A9C5	1	
5	114P147343	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.01287UF, 1%, 30V 56289 933-0292-000	3A9C3	1	
6	114P147344	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.015UF, 1%, 30V 56289 933-0293-000	3A9C4	1	
7	3SAE2053A2	2	RELAY 01526 974-0599-000	3A9K1	1	
8	3SAE2053A2	2	RELAY 01526 974-0599-000	3A9K2	1	
- 9	313-0132-000	2	NUT, PLAIN, HEX, SST, 4-40 COML AP FOR 7 AND 8		4	
- 10	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 4 0.202 OD COML AP FOR 7 AND 8			
- 11	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP FOR 7 AND 8		4	
12	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%. 1/4W 745-0773-000	3A9R15	1	
13	RC07GF152K	2	RESISTOR, FXD, COMP, 1.5K, 10%. 1/4W 745-0755-000	3A9R17	1	
14	109D505C2050 C2	2	CAPACITOR,-FXD, ELECT, 5UF, M15%P20%, 50V 56289 184-7792-000	3A9C12	1	



Range Mark Generator
Figure 3-41

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-41 - 15	2N404A	2	TRANSISTOR 352-0378-000 3A9Q4	1	
16	CM15E361K	2	CAPACITOR, FXD, MICA DIELECTRIC, 360PF, 10%, 500V 72136 912-0534-000 3A9C10	1	
17	2N388A	2	TRANSISTOR 352-0352-000 3A9Q5	1	
18	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000 3A9R16	1	
19	RC07GF123K	2	RESISTOR, FXD, COMP, 12K, 10%, 1/4W 745-0788-000 3A9R18	1	
20	RC20GF100K	2	RESISTOR, FXD, COMP, 10 OHMS, 10% 1/2w 745-1268-000 3A9R19	1	
21	RC07GF123K	2	RESISTOR, FXD, COMP, 12KP 10%, 1/4W 745-0788-000 3A9R6	1	
22	1500684X0035 A2	2	CAPACITOR, FXD, ELECT., 0.68UF, 20%, 35V 56289 184-7685-000 3A9C11	1	
23	RC07GF123K	2	RESISTOR, FXD, COMP, 12K, 10%, 1/4W 745-0788-000 3A9R23	1	
24	HD2658	2	SEMICOND DEVICE 73293 353-0166-000 3A9CR5	1	
25	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10% 1/4W 745-0749-000 3A9R20	1	
26	RC07GF561K	2	RESISTOR, FXD, COMP, 560 OHMS, 10%, 1/4W 745-0740-000 3A9R21	1	
27	1N626	2	SEMICOND DEVICE 353-2857-C00 3A9CR3	1	
28	94-871	2	TRANSFORMER 80483 674-3047-000 3A9T1	1	
29	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000 3A9R5	1	
30	RC07GF332K	2	RESISTOR, FXD, COMP, 3.3K, 10%, 1/4W 745-0767-000 3A9R3	1	
31	2N404A	2	TRANSISTOR 352-0378-000 3A9Q6	1	
32	RC07GF183K	2	RESISTOR, FXD, COMP, 18K, 10%, 1/4W 745-0794-000 3A9R2	1	
33	1N626	2	SEMICOND DEVICE 353-2857-000 3A9CR4	1	
34	RC07GF333K	2	RESISTOR, FXD, COMP, 33K, 10%, 1/4W 745-0803-000 3A9R22	1	
35	RC07GF681K	2	RESISTOR, FXD, COMP, 680 OHMS, 10%, 1/4W 745-0743-000 3A9R1	1	
36	12329	2	COIL, RF, 100MH 07388 240-2667-000 3A9L1	1	
- 37	MS51957-30	2	SCREW, MACH, SST, 6-32 X ½ 343-0171-000 AP	1	
- 38	310-0071-000	2	WASHER, LOCK, SST, 0.151 ID X 0.239 OD COML AP	1	
- 39	310-0046-000	2	WASHER, FLAT, SST, 0.147 ID X 0.312 OD COML AP	1	
40	2N1187A	2	TRANSISTOR 352-0475-000 3A9Q1	1	
41	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000 3A9R14	1	
42	1N761	2	SEMICOND DEVICE 353-2614-000 3A9CR1	1	
43	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000 3A9R13	1	
44	2N404A	2	TRANSISTOR 352-0378-000 3A9Q3	1	
45	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000 3A9R12	1	
46	1N626	2	SEMICOND DEVICE 353-2857-000 3A9CR2	1	
47	2N404A	2	TRANSISTOR 352-0378-000 3A9Q2	1	
48	RC07GF682K	2	RESISTOR, FXDO COMP, 6.8K, 10%, 1/4W 745-0779-000 3A9R7	1	
49	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 100 1/4W 745-0758-000 3A9R9	1	

FIG.-ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-41 -	50	114P147346	2	CAPACITOR, FXD, FILM DIELECTRIC. 0.05296UF, 1%, 30V 56269 933-0297-000 SB7	3A9C6	1	
	51	RC07GF123K	2	RESISTOR, FXD, COMP, 12K, 10%, 3A9R10 1/4W 745-0788-000		1	
	52	RC07GF224K	2	RESISTOR, FXD, COMP, 220K, 10%, 1/4W 745-0833-000	3A9R11	1	
	53	RC20GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/2W 745-1352-000	3A9R4	1	
	54	563-5011-002	2	HANDLE, SHORT		1	
	55	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP		3	
	56	563-4948-004	2	RANGE MARK GENERATOR		1	
	57	6009-25	3	HOLDER 91506 139-2358-000		7	
	58	563-4947-004	3	RANGE MARK GENERATOR		1	
3-42 -	0	565-5590-004	1	BOARD ASSY SEE FIG. 3-35(19FOR NHA	3A2	REF	
	1	563-4979-003	2	STRIP, IDENT		1	
	2	1N645	2	SEMICOND DEVICE 353-2607-000	3A2CR5	1	
	3	3067PD22-103	2	RESISTOR, VAR, WW, 10K, 0.4%, 1/4W 80294 381-1588-000 EFF THRU PCB REV G	3A2R35	1	
	3	3067P649-103	2	RESISTOR, VAR, WW, 10K, 10%, 1/4W 80294 377-0675-000 EFF PCB REV H THRU M	3APR35	1	
	3	77PR10K	2	RESISTOR, VART, 10K, 10%, 3/4W 73138 382-0012-100 EFF PCB REV N	3A2R35	1	
	4	3067PD22-103	2	RESISTOR, VAR, WW, 10K, 9 0.4%, 1/4W 80294 381-1588-000 EFF THRU PCB REV G	3A2R33	1	
	5	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV G	3A2R31	1	
	5	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-000 EFF PCB REV H THRU M	3A2R31	1	
	5	77PR5K	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV N	3A2R31	1	
	6	3067PD22-202	2	RESISTOR, VAR, WW, 2K, 0.6%, 0.25W 80294 381-1586-000 EFF THRU PCB REV G	3A2R29	1	
	7	RN65D4022F	2	RESISTOR, FXD, FILM, 40.2K, 1%, 1/2W 705-7173-000 EFF THRU PCB REV G	3A2R34	1	
	7	RN65D4222F	2	RESISTOR, FXD, FILM, 42.2K, 1%, 1/2W 705-7174-000 EFF PCB REV H	3A2R34	1	
	8	RN65D1622F	2	RESISTOR, FXD, FILM, 16.2K, 1%, 1/2W 705-7154-000	3A2R32	1	
	9	RN65D8251F	2	RESISTOR, FXD, FILM, 8.25K, 1%, 1/2W 705-7140-000 EFF THRU PCB REV G	3A2R30	1	
	9	RN65D1211F	2	RESISTOR, FXDO FILM, 1.21K, 1%, 1/2W 705-7100-000 EFF PCB REV H	3A2R30	1	
	10	RN65D7501F	2	RESISTOR, FXD, FILM, 7.5K, 1%, 1/2W 705-7138-000 EFF PCB REV H	3A2R29	1	

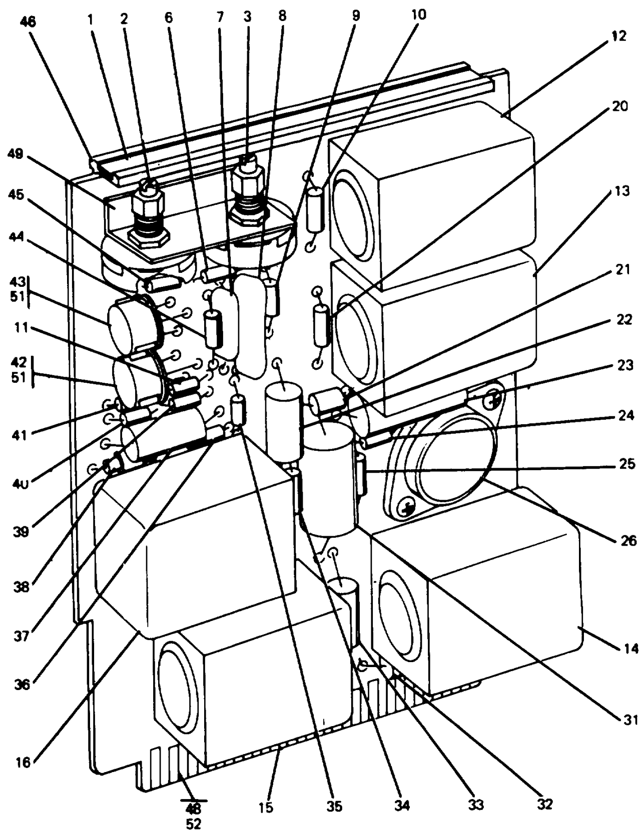


Board Assembly, A2
Figure 3-42

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-42 - 11	114P147347	2	CAPACITOR, FXD, FILM DIELECTRIC. 0.1UF, 5%, 30V 56289 933-0298-000 EFF THRU PCB REV E 3A2C11	1	
11	LP9A1B104JCR 3	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.1UF, 5% 30V 01884 933-0986-000 EFF PCB REV F 3A2C11	1	
12	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%. 1/4W 745-0761-000 3A2R37	1	
13	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 3A2R26	1	
14	3SAE2053A2	2	RELAY 01526 974-0599-000 3A2K2	1	
- 15	P313-0156-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 4-40 77250 313-0156-000 AP	2	
- 16	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	2	
- 17	310-6325-000	2	WASHER, FIAT, SST, 0.118 ID X 9/32 OD COML AP	2	
18	RN65D6191F	2	RESISTOR, FXD, FILM, 6.19K, 1%, 1/2W 705-7134-000 3A2R25	1	
19	2N696	2	TRANSISTOR 352-0206-000 3A208	1	
20	RN65D6811F	2	RESISTOR, FXD, FILM, 6.81K, 1%, 1/2W 705-7136-000 3A2R24	1	
21	RN65D8251F	2	RESISTOR, FXD, FILM, 8.25K, 1%, 1/2W 705-7140-000 3A2R28	1	
22	1N645	2	SEMICOND DEVICE 353-2607-000 3A2CR6	1	
23	2N696	2	TRANSISTOR 352-0206-000 3A207	1	
24	2N696	2	TRANSISTOR 352-0206-000 3A206	1	
25	CM06FD102J03	2	CAPACITOR, FXD, MICA DIELECTRIC. 1000PF, 5%, 500V 912-3001-000 EFF THRU PCB REV G 3A2C10	1	
26	2N696	2	TRANSISTOR 352-0206-000 3A205	1	
27	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A2Q18	1	
28	CM06FD102J03	2	CAPACITOR, FXD, MICA DIELECTRIC. 1000PF, 5%, 500V 912-3001-000 3A2C9	1	
29	150D685X0035 B2	2	CAPACITOR, FXD, ELECT, 6.8UF. 20%, 35V 56289 184-7693-000 3A2C8	1	
30	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A2R20	1	
31	763F92	2	RESISTOR, THRM, 50 OHMS, 10%, 1W 10646 714-1729-000 EFF THRU PCB REV G 3A2RT1	1	
31	CM06FD102J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 1000PF, 5%, 500V 912-3001-000 EFF PCB REV H 3A2C10	1	
32	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%. 1/4W 745-0773-000 3A2R22	1	
33	RC07GF563K	2	RESISTOR, FXD, COMP, 56K, 10%, 1/4W 745-0812-000 3A2R21	1	
34	RN65D8251F	2	RESISTOR, FXD, FILM, 8.25K, 1%, 1/2W 705-7140-000 EFF THRU PCB REV G 3A2R27	1	
34	RN65DS621F	2	RESISTOR, FXD, FILM, 5.62K, 1%, 1/2W 705-7132-000 EFF PCB REV H 3A2R27	1	
35	RN65D1622F	2	RESISTOR, FXD, FILM, 16.2K, 1%, 1/2W 705-7154-000 3A2R23	1	
36	3SAE2053A2	2	RELAY 01526 974-0599-000 3A2K1	1	
- 37	P313-0156-00 0	2	NUT, PLAIN, HEX, NI PL BRS, 4-40 77250 313-0156-000 AP	2	
- 38	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	2	
- 39	310-6325-000	2	WASHER, FLAT, SST, 0.118 ID X 9/32 OD COML AP	2	

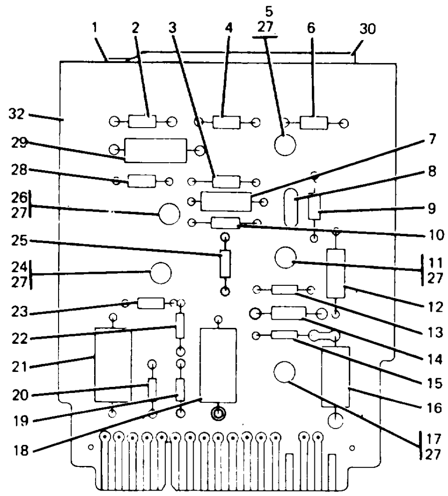
FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-42 - 40	CM06FD102J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 1000PF, 5%, 500V 912-3001-000 3A2C3	1	
41	CM06FD102J03	2	CAPACITOR, FXD, MICA DIELECTRIC. 1000PF, 5%, 500V 912-3001-000 3A2C7	1	
42	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A2R5	1	
43	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%. 1/4W 745-0785-000 3A2R2	1	
44	855-502XSVO 203Z	2	CAPACITOR, FXDO CER DIELECTRIC. 0.02UF, M20%P80%, 100V 72982 913-3678-000, EFF PCB REV E 3A2C1	1	
45	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%. 1/4W 745-0749-000 3A2R4	1	
46	RC07GF183K	2	RESISTOR, FXD, COMP, 18K, 10%, 1/4W 745-0794-000 3A7R6	1	
47	CM06FD102J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 1000PF9 5%, 500V 912-3001-000 3A2C2	1	
48	2N696	2	TRANSISTOR 352-0206-000 3A202	1	
49	1N645	2	SEMICOND DEVICE 353-2607-000 3A2CR1	1	
50	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000 3A2R3	1	
51	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A2R9	1	
52	805-014x5V01 03Z	2	CAPACITOR, FXD, CER DIELECTRIC, 0.01UF, M20%P80%, 100V 72982 913-3680-000 EFF PCB REV E 3A2C5	1	
53	RC07GF561K	2	RESISTOR, FXD, COMP, 560 OHMS. 10%, 1/4W 745-0740-000 3A2R7	1	
54	2N696	2	TRANSISTOR 352-0206-000 3A201	1	
55	RC20GF332K	2	RESISTOR, FXD, COMP, 3.3K, 10%. 1/2W 745-1373-000 3A2R8	1	
56	RC20GF332K	2	RESISTOR, FXD, COMP, 3.3K, 10%, 1/2W 745-1373-000 3A2R1	1	
57	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A2R19	1	
58	1N645	2	SEMICOND DEVICE 353-2607-000 3A2CR2	1	
59	RC07GF183K	2	RESISTOR, FXD, COMP, 18K, 10%, 1/4W 745-0794-000 3A2R10	1	
60	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000 3A2R11	1	
61	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS. 10%, 1/4W 745-0713-000 3A2R12	1	
62	1N645	2	SEMICOND DEVICE 353-2607-000 3A2CR3	1	
63	196P10301S4	2	CAPACITOR FXD, PAPER DIELECTRIC, 0.01UF, 20%, 100V 56289 931-4481-000 3A2C4	1	
64	2N696	2	TRANSISTOR 352-0206-000 3A203	1	
65	A10012	2	INSULATOR 07047 302-0437-000 EFF PCB REV C	7	
66	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 10%. 1/4W 745-0809-000 3A2R14	1	
67	1N758	2	SEMICOND DEVICE 353-2723-000 3A2CR4	1	
68	RC07GF102K	2	RESISTOR, FXDO COMP, 1K, 10%, 1-4W 745-0749-000 3A2R13	1	
69	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A2R15	1	
70	2N696	2	TRANSISTOR 352-0206-000 EFF THRU PCB REV K 3A204	1	
70	2N3011	2	TRANSISTOR 352-0579-030 EFF PCB REV L 3A204	1	
71	A10012	2	INSULATOR 07047 302-0437-000 EFF PCB REV C THRU K	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-42 - 71	771-7-63	2	INSULATOR 13103 352-9944-000 EFF PCB REV L	1	
72	RC07GF820K	2	RESISTOR, FXD, COMP, 82 OHMS, 10%, 1/4W 745-0710-000 3A2R38	1	
73	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A2R17	1	
74	RC32GF202J	2	RESISTOR, FXD, COMP, 2K, 5%, 1W 745-3364-000 3A2R16	1	
75	RC32GF202J	2	RESISTOR, FXD, COMP, 2K, 5%, 1W 745-3364-000 3A2R36	1	
76	196P10301S4	2	CAPACITOR, FXD, PAPER DIELECTRIC. 0.01UF, 20%, 100V 56289 931-4481-000 EFF PC8 REV A 3A2C12	1	
77	196P10301S4	2	CAPACITOR, FXD, PAPER DIELECTRIC. 0.01UF,20%, 100V 56289 931-4481-000 3A2C6	1	
78	563-5011-002	2	HANDLE, SHORT	1	
- 79	MS16535-73	2	RIVET, TUBULAR, AL, 0.089 DIA X 5/32 305-0008-000 AP	3	
80	565-5589-004	2	BOARD ASSY	1	
3-43 - 0	563-4943-005	1	ELEVATION SFRVO AMPLIFIER SEE FIG. 3-35(20)FOR NHA EFF THRU REV 17/T 3A3	REF	
1	563-4977-003	2	STRIP, IDENT	1	
2	380-1751-000	2	RESISTOR, VAR, COMP, 100K, 20%, 1/4W 71590 3A3R2	1	
3	380-1751-000	2	RESISTOR, VAR, COMP, 100K, 20%. 1/4W 71590 3A3R5	1	
- 4	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 AP FOR 2 AND 3	2	
- 5	1714-05	2	WASHER, LOCK, SST, 0.267 ID X 0.408 OD 78189 373-0090-000 AP FOR 2 AND 3	2	
6	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 10%, 1/4W 745-0809-000 3A3R4	1	
7	CM05F391J03	2	CAPACITOR, FXDO MICA DIELECTRIC, 390PF, 5% 500V 912-2858-000 3A3C4	1	
8	DM20F152J500 WV	2	CAPACITOR, FXD, MICA DIELECTRIC, 1500PF, 5%, 500V 72136 912-3327-000 3A3C1	1	
9	RC07GF682K	2	RESISTOR, FXD, COMP, 6.8K, 10%, 1/4W 745-0779-000 3A3R8	1	
10	150D474X0035 A2	2	CAPACITOR, FXD, ELECT, 0.47UF, 20%, 35V 56289 184-7399-000 3A3C3	1	
11	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A3R7	1	
12	956-0546-400	2	TRANSFORMER 83003 677-0007-000 3A3T3	1	
13	956-0545-400	2	TRANSFORMER 83003 677-0008-000 3A3T4	1	
14	956-0546-400	2	TRANSFORMER 83003 677-0007-000 3A3T5	1	
15	956-0482-400	2	TRANSFORMER 83003 677-0006-000 3A3T1	1	
16	956-0482-400	2	TRANSFORMER 83003 677-0006-000 3A3T2	1	
- 17	MS35649-24	2	NUT, PLAIN, HEX, SST, 2-56 313-0037-000 AP FOR 12 THRU 16	10	
- 18	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP FOR 12 THRU 16	10	



Elevation Servo Amplifier
Figure 3-43

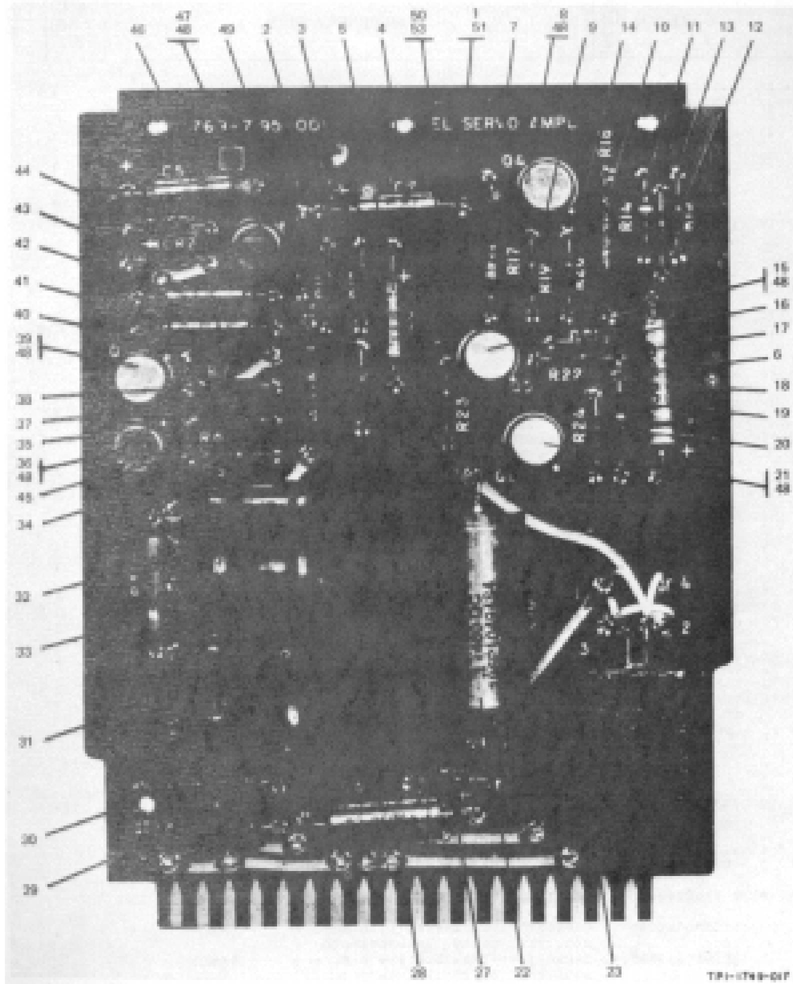
FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-43 - 19	310-6320-000	2	WASHER, FLAT, SST, 0.092 ID X 0.218 OD COML AP FOR 12 THRU 16		10	
20	RC07GF682K	2	RESISTOR, FXD, COMP, 6.8K, 10%, 1/4W 745-0779-000	3A3R9	1	
21	RC07GF472J	2	RESISTOR, FXD, COMP, 4.7K, 5%. 1/4W 745-0772-000	3A3R13	1	
22	150D107X0010 R2	2	CAPACITOR, FXD, ELECT., 10OUF. 20%, 10V 56289 184-7651-000	3A3C5	1	
23	SDB1K01104J	2	CAPACITOR, FXD, PAPER DIELECTRIC. 0.1UF, 5%, 100V 53021 931-4994-000	3A3C6	1	
24	RC07GF472J	2	RESISTOR FXD, COMP, 4.7K, 5%. 3A3R14 1/4W 745-0772-000		1	
25	RC20GF100K	2	RESISTOR, FXD, COMP, 10 OHMS, 10%, 1/2W 745-1268-000	3A3R17	1	
26	2N553	2	TRANSISTOR 352-0178-000	3A303	1	
- 27	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML AP		2	
- 28	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP		2	
- 29	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		2	
- 30	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP		2	
31	SDB1K01104J	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.1UF, 5%, 100V 53021 931-4994-000	3A3C7	1	
32	RC32GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1W 745-3366-000	3A3R18	1	
33	RC32GF681K	2	RESISTOR, FXD, COMP, 680 OHMS, 10%, 1W 745-3345-000	3A3R16	1	
34	RC20GF150K	2	RESISTOR, FXD, COMP, 15 OHMS, 10%, 1/2W 745-1275-000	3A3R15	1	
35	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000	3A3R11	1	
36	RC07GF561K	2	RESISTOR, FXD, COMP, 560 OHMS, 10%, 1/4W 745-0740-000	3A3R19	1	
37	150D107X0010 R2	2	CAPACITOR, FXD, ELECT., 100UF. 20%, 10V 56289 184-7651-000	3A3C2	1	
38	1N758A	2	SEMICOND DEVICE 353-2724-000	3A3CR1	1	
39	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000	3A3R3	1	
40	RC07GF183K	2	RESISTOR, FXD, COMP, 18K, 10% 1/4W 745-0794-000	3A3R6	1	
41	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-C00	3A3R12	1	
42	2N651	2	TRANSISTOR 352-0194-000	3A302	1	
43	2N651	2	TRANSISTOR 352-0194-000	3A301	1	
44	RC07GF224K	2	RESISTOR, FXD, COMP, 220K, 10%, 1/4W 745-0833-000	3A3R10	1	
45	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 10%, 1/4W 745-0809-000	3A3R1	1	
46	563-5011-002	2	HANDLE, SHORT		1	
- 47	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP		3	
48	563-4942-005	2	ELEVATION SERVO AMPLIFIER		1	
49	563-5013-002	3	BRACKET 1			
- 50	MS16535-73	3	RIVET, TUBULAR, AL, 0.089 DIA X 5/32 305-0008-000 AP		2	
51	6009-25	3	HOLDER 91506 139-2358-000		2	
52	563-4941-005	3	ELEVATION SERVO AMPLIFIER		1	



Board Assembly, A3
Figure 3-44

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-44 - 0	556-9550-003	1	BOARD ASSY SEE FIG. 3-35(20)FOR NHA EFF REV 18/U THRU AH/AC 3A3	REF	
1	563-4977-003	2	STRIP, IDENT	1	
2	RC07GF822K	2	RESISTOR, FXDO COMP, 8.2K. 10%, 1/4W 745-0782-000 3A3R7	1	
3	RC07GF100J	2	RESISTOR, FXDO COMP, 10 OHMS, 5%, 1/4W 745-0676-000 3A3R6	1	
4	RC07GF183K	2	RESISTOR, FXD, COMP, 18K, 10%, 1/4W 745-0794-000 3A3R11	1	
5	4JX1182023	2	TRANSISTOR 03508 352-0207-000 3A3Q3	1	
6	RC07GF154J	2	RESISTOR, FXD. COMP, 150K, 5%, 1/4W 745-0826-000 3A3R9	1	
7	150D685x0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 3A3C4 20S, 35V 56289 184-7693-000	1	
8	55C32A2	2	CAPACITOR, FXD, CER DIELECTRIC, 10,000PF, M20%P50%, 400V 01939 913-3731-000 3A3C5	1	
9	RC07GF183K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A3R12	1	
10	RC07GF183K	2	RESISTOR, FXDT COMP, 18K, 10%, 1/4W 745-0794-000 3A3R10	1	

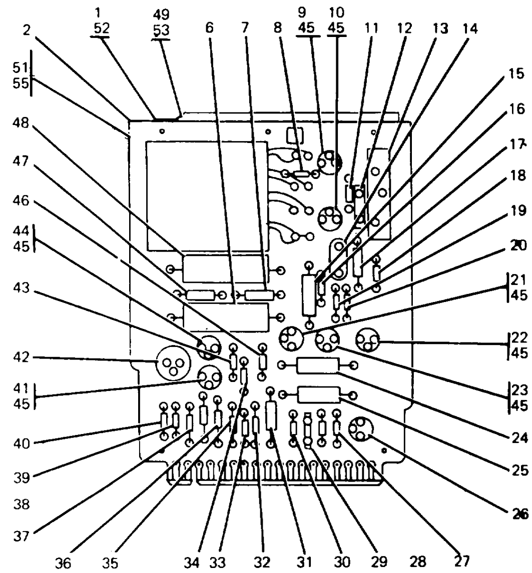
FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-44 - 11	4JX11B2023	2	TRANSISTOR 03508 352-0207-000	3A3Q4	1	
12	RC32GF182J	2	RESISTOR, FXD, COMP, 1,8K, 5%, 1W 745-3362-000	3A3R16	1	
13	RC07GF330K	2	RESISTOR, FXD, COMP, 33 OHMS, 10%, 1/4W 745-0695-000	3A3R14	1	
14	RC20GF681K	2	RESISTOR, FXD COMPT 680 OHMS, 10%,1/2W 745-1345-000	3A3R13	1	
15	RC07GF330K	2	RESISTOR, FXD, COMP, 33 OHMS, 10% 1/4W 745-0695-000	3A3R15	1	
16	150D474X0035 A2	2	CAPACITOR, FXD, ELECT., 0.47UF 20%, 35V 56289 184-7399-000 EFF THRU PCB REV B	3A3C6	1	
16	150D476X9035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 10%, 35V 56289 184-7714-000 EFF PCB REV C	3A3C6	1	
17	4JX11B2023	2	TRANSISTOR 03508 352-0207-000	3A3Q5	1	
18	SDB1K01104J	2	CAPACITOR, FXD, PAPER DIELECTRIC. 0.1UF, 5% 100V 53021 931-4994-000	3A3C2	1	
19	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000	3A3R2	1	
20	RC07GF103K	2	RESISTOR, FXD, COMP 10K, 10%, 1/4W 745-0785-000	3A3R1	1	
21	SD1K01104J	2	CAPACITOR, FXD, PAPER DIELECTRIC. 0.1UF, 5%, 100V 53021 931-4994-000	3A3C1	1	
22	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000	3A3R3	1	
23	RC07GF183K	2	RESISTOR, FXD, COMP, 18K, 10%, 1/4W 745-0794-000	3A3AR4	1	
24	4JX11B2023	2	TRANSISTOR 03508 352-0207-000	3A301	1	
25	RC07GF682K	2	RESISTOR, FXD, COMP, 6.8K, 10%, 1/4W 745-0779-000	3A3R5	1	
26	4JX11B2023	2	TRANSISTOR 03508 352-0207-000	3A302	1	
27	771-7-63	2	INSULATOR 13103 352-9944-000		5	
28	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000	3A3R8	1	
29	150D107X0010 R2	2	CAPACITOR, FXD, ELECT., 100UF, 20%, 10V 56289 184-7651-000	3A3C3	1	
30	563-5011-002	2	HANDLE, SHORT		1	
31	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP		3	
32	556-9550-002	2	BOARD ASSY		1	
3-45 - 0	769-7195-001	1	ELEVATION SERVO AMPLIFIER SEE FIG.3-35(20)FOR NHA EFF REV AJ/AG	3A3	REF	
1	563-4977-003	2	STRIP, IDENT		1	
2	RC07GF563K	2	RESISTOR, FXD, COMP, 56K, 10%, 1/4W 745-0812-000	3A3R11	1	
3	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000	3A3R12	1	
4	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF. 20%, 35V 56289 184-7693-000	3A3C7	1	
5	150D685X0035 B2	2	CAPACITOR, FXD ELECT 6.8UF 20%, 35V 56289 184-7693-000	3A3C3	1	



Elevation Servo Amplifier
Figure 3-45

FIG.- ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-45 -	6	RC07GF821K	2	RESISTOR, FXDO COMP, 820 OHMS, 10%, 1/4W 745-0746-000	3A3R23	1	
	7	RN65D1783F	2	RESISTOR, FXD, FILM9 178K, 1%, 1/2W 705-7204-000	3A3R17	1	
	8	2N1711	2	TRANSISTOR 352-0400-000	3A3Q4	1	
	9	RC07GF273K	2	RESISTOR, FXD, COMP, 27K, 10%, 1/4W 745-0800-000	3A3R19	1	
	10	RN65D4642F	2	RESISTOR, FXD, FILM, 46.4K, 1%, 1/2W 705-7176-000	3A3R18	1	
	11	RC07GF224J	2	RESISTOR, FXD, COMP, 220K, 5%, LJ4W 745-0832-000	3A3R14	1	
	12	RC07GF362J	2	RESISTOR, FXD, COMP, 3.6K, 5%, 1/4W 745-0786-000	3A3R15	1	
	13	RC07GF102J	2	RESISTOR, FXD COMP, 1K, 5%, 1/4W 745-0748-000	3A3R16	1	
	14	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000	3A3R20	1	
	15	2N1711	2	TRANSISTOR 352-0400-000	3A3Q5	1	
	16	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 101 1/4W 745-0809-000	3A3R21	1	
	17	RC07GF223K	2	RESISTOR, FXD, COMP, 22K, 10%, 1/4W 745-0797-000	3A3R22	1	
	18	1500476X9035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 10%, 35V 56289 184-7714-000	3A3C9	1	
	19	RC20GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/2W 745-1352-000	3A3R25	1	
	20	RC07GF330J	2	RESISTOR, FXD, COMP, 33 OHMS, 5%, 1/4W 745-0694-000	3A3R24	1	
	21	2N1711	2	TRANSISTOR 352-0400-000	3A3Q6	1	
	22	SDB1K04104K	2	CAPACITOR, FXD, PAPER DIELECTRIC. 0.1UF, 101, 400V 53021 931-5003-000	3A3C10	1	
	23	956-0546-400	2	TRANSFORMER 83003 677-0007-000	3A3T1	1	
-	24	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP		2	
-	25	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP		2	
-	26	310-6320-000	2	WASHER, FLAT, SST, 0.092 ID X 0.218 OD COML AP		2	
	27	PR07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/4W 745-0761-000	3A3R10	1	
	28	150D226X0035 R2	2	CAPACITOR, FXD, ELECT., 22UF, 20%, 35V 56289 184-7695-000	3A3C6	1	
	29	RN65D8252F	2	RESISTOR, FXD, FILM, 82.5K, 1%, 1/2W 705-7188-000	3A3R1	1	
	30	RN65D8252F	2	RESISTOR, FXD, FILM, 82.5K, 11. 1/2W 705-7188-000	3A3R2	1	
	31	CM07FD153J03	2	CAPACITOR, FXDT MICA DIELECTRIC, 15,000PF, 51, 500V 912-2741-000	3A3C1	1	
	32	CM07FD103J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 10,000PF, 51, 500V 912-2735-000	3A3C2	1	
	33	RN65D3162F	2	RESISTOR, FXD, FILM, 31.6K, 11, 1/2W 705-7168-000	3A3R3	1	
	34	RC07GF224K	2	RESISTOR, FXD, COMP, 220K, 10%, 1/4W 745-0833-000	3A3R5	1	
	35	RC07GF473J	2	RESISTOR, FXD, COMP, 47K, 51 1/4W 745-0808-000	3A3R6	1	
	36	2N1711	2	TRANSISTOR 352-0400-000	3A3Q1	1	
	37	RN65D1473F	2	RESISTOR, FXD, FILM, 147K, 1%, 1/2W 705-7200-000	3A3R4	1	

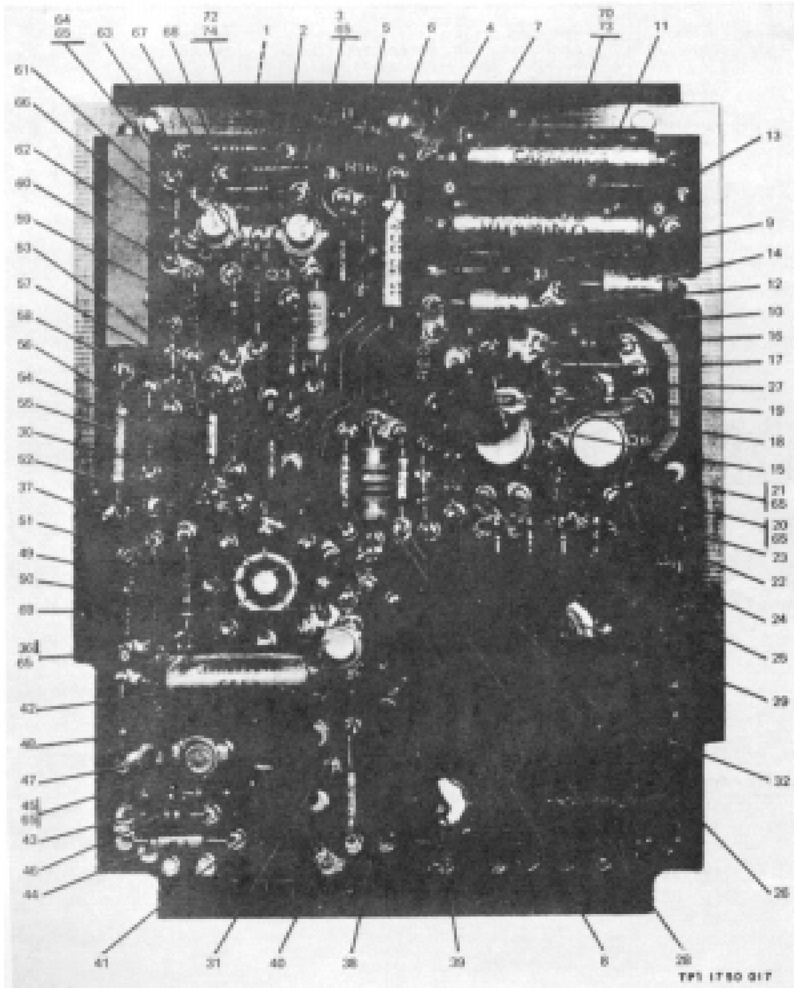
FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-45 - 38	RC07GF103J	2	RESISTOR, FXD, COMP, 10K. 5%, 1/4W 745-0784-000 3A3R8	1	
39	2N1711	2	TRANSISTOR 352-0400-000 3A3Q2	1	
40	RC07C,F223J	2	RESISTOR, FXD, COMP, 22K, 5%, 1/4W 745-0796-000 3A3R7	1	
41	150D685x0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 35V 56289 184-7693-000 3A3C4	1	
42	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6,8UF, 20%. 35V 56289 184-7693-000 3A3C8	1	
43	1N645	2	SEMICOND DEVICE 353-2607-000 3A3CR2	1	
44	1N645	2	SEMICOND DEVICE 353-2607-000 3A3CR1	1	
45	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A3R13	1	
46	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 35V 56289 184-7693-000 3A3C5	1	
47	2N1711	2	TRANSISTOR 352-0400-000 3A3Q3	1	
48	A10044DAP	2	INSULATOR 07047 352-9889-000	6	
49	RC07GF684J	2	RESISTOR, FXD, COMP, 680K, 5%, 1/4W 745-0850-000 3A3R9	1	
50	769-7195-002	2	ELEVATION SERVO AMPLIFIER BOARD	1	
51	563-5011-002	3	HANDLE, SHORT	1	
- 52	R4C08X1-8CHR OMATEDP	3	RIVET, TUBULAR, AL. 0.089 DIA X 1/8 12014 305-0170-000 AP	3	
53	769-7195-003	3	ELEVATION SERVO AMPLIFIER BOARD	1	
3-46 - 0	758-4825-001	1	AUTOMATIC FREOUENCY CONTROL SEE FIG.3-35(21) FOR NHA EFF REV 23/AA THRU AF/AG 3A10	REF	
1	563-4972-003	2	STRIP, IDENT EFF THRU PCB REV B	1	
2	94-0706-00	2	SATURABLE REACTOR 95105 3A10T1 674-5037-000	1	
- 3	MS51957-26	2	SCREW, MACH., SST, 6-32 X ¼ 343-0167-000 AP	4	
- 4	310-0071-000	2	WASHER, LOCK, SST, 0.151 ID x 0.239 OD COML AP	4	
- 5	310-0046-000	2	WASHER, FLAT, SST, 0.147 ID X 0.312 OD COML AP	4	
6	SDP1K04473M	2	CAPACITOR, FXD, PAPER DIELECTRIC. C.047UF, 20%, 400V 53021 931-4548-000 3A10C7	1	
7	1N3254	2	SEMICOND DEVICE 353-3275-000 3A10CR4	1	
8	RC07GF182K	2	RESISTOR, FXD. COMP, 18K, 10%, 1/4W 745-0758-000 3A10R12	1	
9	2N651	2	TRANSISTOR 352-0194-000 3A10Q6	1	
10	2N651	2	TRANSISTOR 352-0194-000 3A10Q7	1	
11	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 10%, 1/4W 745-0809-000 3A10R14	1	
12	DM20F392K500 WV	2	CAPACITOR, FXD, MICA DIELECTRIC, 3900PF, 10%, 500V 72136 912-3361-000 3A10C9	1	
13	RP254M	2	RESISTOR, VAR, COMP, 250K, 20%. 1/4W 01121 380-9178-000 3A10R16	1	
14	DM2CF392K500 WV	2	CAPACITOR, FXD, MICA DIELECTRIC, 3900PF, 10%, 500V 72136 912-3361-000 3A10C8	1	



Automatic Frequency Control
Figure 3-46

FIG.-ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-46 -	15	RC32GF121K	2	RESISTOR, FXD, COMP, 120 OHMS, 10%, 1W 745-3314-000	3A10R10	1	
	16	RC07GF124K	2	RESISTOR, FXD, COMP, 120K, 10%, 1/4W 745-0824-000	3A10R13	1	
	17	150D475X0035 B2	2	CAPACITOR, FXD, ELECT., 4.7UF, 20%, 35V 56289 184-7396-000	3A10C5	1	
	18	RC07GF824K	2	RESISTOR, FXD, COMP, 820K, 10%, 1/4W 745-0854-000 EFF THRU PC8 REV A	3A10R15	1	
	18	RC07GF684K	2	RESISTOR, FXD, COMP, 680K, 10%, 1/4W 745-0851-000 EFF PCB REV B	3A10R15	1	
	19	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000	3A10R9	1	
	20	RC07GF151J	2	RESISTOR, FXD, COMP, 150 OHMS, 5%, 1/4W 745-0718-000	3A10R11	1	
	21	2N404A	2	TRANSISTOR 352-0378-000	3A10Q3	1	
	22	2N651	2	TRANSISTOR 352-0194-000	3A10Q5	1	
	23	2N404A	2	TRANSISTOR 352-0378-000	3A10Q2	1	
	24	150D476X9035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 10%, 35V 56289 184-7714-000	3A10C2	1	
	25	1500226X0035 R2	2	CAPACITOR, FXD, ELECT., 22UF, 20%, 35V 56289 184-7695-000	3A10C3	1	
	26	2N651	2	TRANSISTOR 352-0194-000	3A1004	1	
	27	RC07GF273K	2	RESISTOR, FXD, COMP, 27K, 10%, 1/4W 745-0800-000	3A10R4	1	
	28	RC07GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/4W 745-0770-000	3A10R5	1	
	29	20C109	2	CAPACITOR, FXD, CER DIELECTRIC, 0.02UF, N40SP60,, 250V 01939 913-2097-000	3A10C10	1	
	30	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000	3A10R7	1	
	31	1N3024B	2	SEMICOND DEVICE 353-3129-000	3A10CR1	1	
	32	1500105x0035 A2	2	CAPACITOR, FXD, ELECT., 1UF, 20%, 35V 56289 184-7398-000	3A10C4	1	
	33	RC07GF332J	2	RESISTOR, FXD, COMP, 3.3K, 5%, 1/4W 745-0766-000	3A10R8	1	
	34	RC07GF272J	2	RESISTOR, FXD, COMP, 2.7K,5%, 1/4W 745-0763-000	3A10R6	1	
	35	150D223X0035 A2	2	CAPACITOR, FXD, ELECT., 0022UF, 201, 35V 56289 184-7673-000	3A10C11	1	
	36	1N645	2	SEMICOND DEVICE 353-2607-000	3A10CR6	1	
	37	1N645	2	SEMICOND DEVICE 353-2607-000	3A10CR7	1	
	38	150D223X0035 A2	2	CAPACITOR, FXD, ELECT, 0.022UF, 20%, 35V 56289 184-7673-000	3A10C12	I	
	39	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000	3A10R21	1	
	40	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%,. 1/4W 745-0761-000	3A10R20	1	
	41	2N1711	2	TRANSISTOR 352-0400-000	3A10Q8	1	
	42	CT100-20K	2	RESISTOR, VAR, WW, 20K, 5%, 1W 75042 381-1472-000	3A01R19	1	
	43	RC0TGF683K	2	RESISTOR, FXD, COMP, 68K, 10%, 1/4W 745-0815-000	3A10R2	1	
	44	HA9606	2	TRANSISTOR 73293 352-0474-000	3A10Q1	1	
	45	A10012	2	INSULATOR 07047 302-0437-000		8	
	46	RC07GF331K	2	RESISTOR, FXD, COMP, 330 OHMS. 10%, 1/4W 745-0731-000 EFF THRU BASIC PCB	3A10R22	1	
	46	RC07GF100K	2	RESISTOR, FXD, COMP, 10 OHMS, 10%, 1/4W 745-0677-000 EFF PCB REV A	3A10R22	1	

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-46 - 47	1N3254	2	SEMICOND DEVICE 353-3275-000 3A10CR5	1	
48	SD81K04473M	2	CAPACITOR, FXD,PAPER DIELECTRIC 00047UF, 20%, 400V 53021 931-4548-000 3A10C6	1	
49	563-5011-002	2	HANDLE, SHORT EFF THRU PCB REV B	1	
- 50	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP	3	
51	758-4825-002	2	AUTOMATIC FREQUENCY CONTROL BOARD EFF THRU PCB REV B	1	
51	758-4825-003	2	AUTOMATIC FREQUENCY'CONTROL BOARD EFF PCB REV C	1	
52	563-4972-003	3	STRIP, IDENT	1	
53	563-5011-002	3	HANDLE, SHORT	1	
- 54	R4008X3-16CH ROMATEDP	3	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP	3	
55	758-4825-002	3	AUTOMATIC FREQUENCY CONTROL BOARD	1	
3-47 - 0	772-0968-003	1	AUTOMATIC FRFOUENCY CONTROL SEE FIG, 3-35(21YOR NHA EFF REV AG/AG 3A10	REF	
1	563-4972-003	2	STRIP, IDENT	1	
2	RN60D1101F	2	RESISTOR, FXD, FILM, 1.1K, 1%, 1/4W 705-6598-000 3A10R16	1	
3	2N3904	2	TRANSISTOR 352-0722-020 EFF THRU PCB REV A/A 3A10Q3	1	
3	2N930	2	TRANSISTOR 352-0517-010 EFF PC8 REV B/B 3A10Q3	1	
4	RN60D1001F	2	RESISTOR, FXD, FILM, 1K, 1%, 1/4W 705-6596-000 3A10R13	1	
5	RN60D1001F	2	RESISTOR, FXD, FILM, 1K, 1%, 1/4W 705-6596-000 3A10R12	1	
6	1N3064	2	SEMICOND DEVICE 353-3404-000 3A10CR2	1	
7	150D156X9050 R2	2	CAPACITOR, FXD, ELECT., 15UF, 10%, 50V 56289 184-9063-310 3A10C6	1	
8	150D224X0035 A2	2	CAPACITOR, FXD, ELECT., 0.22UF, 20%, 35V 56289 184-7407-000 3A10C7	1	
9	RN60D1373F	2	RESISTOR, FXD, FILM, 137K, 1%, 1/4W 705-6741-000 3A10R10	1	
10	RC07GF823J	2	RESISTOR, FXD, COMP, 82K, 5%, 1/4W 745-0817-000 3A10R20	AR	
10	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000 3A10R20	AR	
10	RC07GF124J	2	RESISTOR, FXD, COMP, 120K, 5% 1/4W 745-0823-000 3A10R20	AR	
10	RC07GF154J	2	RESISTOR, FXD, COMP, 150K, 5%, 1/4W 745-0826-000 3A10R20	AR	
10	RC07GF184J	2	RESISTOR, FXD, COMP, 180K, 5%, 3A10R20 AR 1/4W 745-0829-000		
10	RC07GF224J	2	RESISTOR, FXD, COMP, 220K, 5% 1/4W 745-0832-000 3A10R20	AR	
10	RC07GF274J	2	RESISTOR, FXD, COMP, 270K, 5%, 1/4W 745-0835-000 3A10R20	AR	
11	SDB1K04473M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.047UF, 20%, 400V 53021 931-4548-000 3A10C9	1	

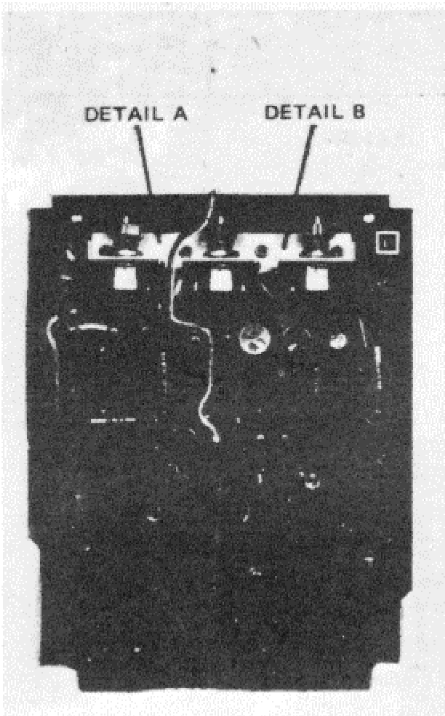


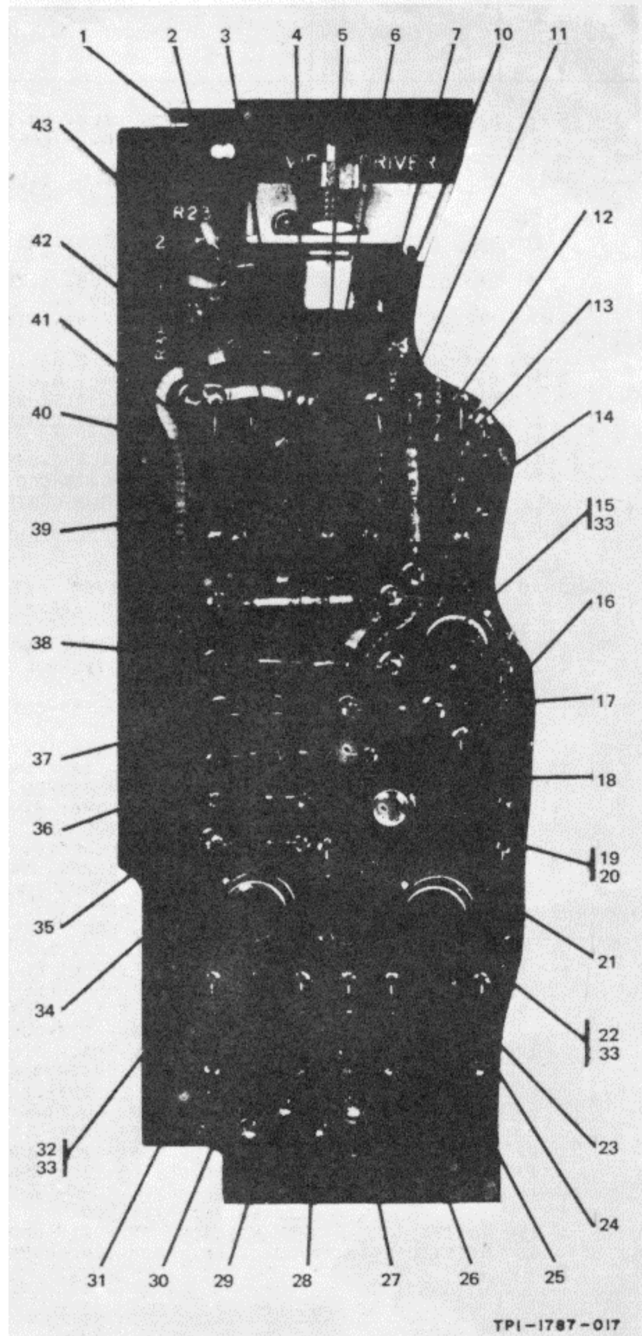
Automatic Frequency Control
Figure 3-47

FIG.-ITEM		PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-47 -	12	1N3254	2	SEMICOND DEVICE 353-3275-000	3A10CR7	1	
	13	SDB1K04473M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.047UF, 20% 400V 53021 931-4548-000	3A10C10	1	
	14	1N3254	2	SEMICOND DEVICE 353-3275-000	3A10CR6	1	
	15	33C2	2	CAPACITOR, FXD, CER DIELECTRIC. 0.02UF, M20%P100%, 500V 01939 913-2142-000	3A10C11	1	
	16	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 3A10R21 1/4W 745-0821-000		1	
	17	RC07GF105K	2	RESISTOR, FXD, COMP, 1MEGO, 10%, 1/4W 745-0857-000	3A10R22	1	
	18	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000	3A10R24	1	
	19	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000	3A10R25	1	
	20	2N2905A	2	TRANSISTOR 352-0550-000	3A10Q5	1	
	21	2N2905A	2	TRANSISTOR 352-0550-000	3A10Q6	1	
	22	1N3064	2	SEMICOND DEVICE 353-3404-000	3A10CR10	1	
	23	33C2	2	CAPACITOR, FXD, CER DIELECTRIC 0.02UF, M20SP100S, 500V 01939 913-2142-000	3A10C12	1	
	24	1N3064	2	SEMICOND DEVICE 353-3404-000	3A10CR11	1	
	25	1N3064	2	SEMICOND DEVICE 353-3404-000	3A10CR12	1	
	26	150D0224X0035 A2	2	CAPACITOR, FXD, ELECT., 0.22UF 201, 35V 56289 184-7407-000	3A10C8	1	
	27	36C175A	2	CAPACITOR, FXD, CER DIELECTRIC. 10,000PF, 201, 500V 01939 913-3013-000	3A10C16	1	
	28	MS90539-08	2	COIL, RF, 500UH 240-2533-000	3A10L1	1	
	29	36C175A	2	CAPACITOR FXD, CER DIELECTRIC, 10,000PF, 201, 500V 01939 913-3013-000	3A10C17	1	
	30	805-014X5V01 03Z	2	CAPACITOR, FXD, CER DIELECTRIC, 0.01UF, M20%P80%, 100V 72982 913-3680-000	3A10C4	1	
	31	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000	3A10R19	1	
	32	94-0706-00	2	SATURABLE REACTOR 95105 674-5037-000	3A10T1	1	
-	33	MS51957-26	2	SCREW, MACH., SST, 6-32 X ¼ 343-0167-000 AP		4	
-	34	310-0071-000	2	WASHER, LOCK, SST, 0.151 ID X 0.239 OD COML AP		4	
-	35	310-0046-000	2	WASHER, FLAT, SST, 0.147 ID X 0.312 OD COML AP		4	
	36	JAN2N1711	2	TRANSISTOR 352-9097-000 EFF THRU PCB REV B/B	3A10Q2	1	
	36	2N997	2	TRANSISTOR 01295 352-0803-010 EFF PCB REV C/C	3A10Q2	1	
	37	MDB1-09PH001	2	INTEGRATED CIRCUIT 07263 351-7042-010	3A10A1	1	
	38	1N3024B	2	SEMICOND DEVICE 353-3129-000	3A10CR9	1	
	39	RN65D2610F	2	RESISTOR, FXD, FILM, 261 OHMS, 1%, 1/2W 705-7068-000 EFF PCB REV C/C ONLY	3A10R26	I	
	40	150D105X0035 A2	2	CAPACITOR, FXD, ELECT., 1UF, 20%, 35V 56289 184-7398-000	3A10C13	1	
	41	825-213X5V01 04Z	2	CAPACITOR, FXD, CER DIELECTRIC, 0.1UF, M20%P80%, 200V 72982 913-3681-000	3A10C5	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-47 - 42	SDA3K01104M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.1UF, 20%, 100V 53021 931-9093-000 3A10C2	1	
43	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000 3A10R2	1	
44	150D105X0035 A2	2	CAPACITOR, FXD, ELECT., 1UF, 20%, 35V 56289 184-7398-000 3A10C1	1	
45	2N3962	2	TRANSISTOR 352-0741-010 EFF THRU PCB REV A/A 3A10Q1	1	
45	2N3964	2	TRANSISTOR 352-0741-030 EFF PCB REV B/B 3A10Q1	1	
46	RC07GF223K	2	RESISTOR, FXD, COMP, 22K, 10%, 1/4W 745-0797-000 3A10R1	1	
47	CM04ED470J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 47PF, 5%, 500V 912-3856-000 3A10C15	1	
48	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A10R3	1	
49	RN60D4222F	2	RESISTOR, FXD, FILM, 42.2K, 1%, 1/4W 705-6674-000 3A10R5	1	
50	1N3070	2	SEMICOND DEVICE 353-3083-000 3A10CR1	1	
51	RC20GF431J	2	RESISTOR, FXD, COMP, 430 OHMS, 5%, 1/2W 745-1336-000 EFF THRU PCB REV C/C 3A10R23	1	
51	RC07GF152K	2	RESISTOR, FXD, COMP, 1.5K, 10%, 1/4W 745-0755-000 EFF PCB REV D/D 3A10R23	1	
52	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000 3A10R11	1	
53	RN60D2152F	2	RESISTOR, FXD, FILM, 21.5K, 1%, 1/4W 705-6660-000 3A10R9	1	
54	150D475X9010 A2	2	CAPACITOR, FXD, ELECT., 4.7UF, 10%, 10V 56289 184-9063-070 3A10C14	1	
55	150D226X0015 B2	2	CAPACITOR, FXD, ELECT., 22UF, 20%, 15V 56289 184-7373-000 3A10C3	1	
56	RC07GF471J	2	RESISTOR, FXD, COMP, 470 OHMS, 5%, 1/4W 745-073b-000 3A10R8	1	
57	1N3064	2	SEMICOND DEVICE 353-3404-000 3A10CR3	1	
58	1N749A	2	SEMICOND DEVICE 353-2706-000 EFF THRU PCB REV C/C 3A10CR8	1	
58	LVA60B	2	SEMICOND DEVICE 01281 353-6532-210 EFF PCB REV D/D 3A10CR8	1	
59	1N3064	2	SEMICOND DEVICE 353-3404-000 3A10CR5	1	
60	RC07GF223K	2	RESISTOR, FXD, COMP, 22K, 10%, 1/4W 745-0797-000 3A10R18	1	
61	1N755A	2	SEMICOND DEVICE 353-2718-000 3A10CR4	1	
62	RP102M	2	RESISTOR, VAR, COMP, 1K, 20%, 1/4W 01121 380-9171-000 3A10R7	1	
63	RN60D5620F	2	RESISTOR, FXD, FILM, 562 OHMS 1%, 1/4w 705-6584-000 EFF THRU PCB REV B/B 3A10R14	1	
63	RN55D6190F	2	RESISTOR, FXD, FILM, 619 OHMS 1%, 1/8W 705-0986-000 EFF PCB REV C/C 3A10R14	1	
64	2N3904	2	TRANSISTOR 352-0722-020 EFF THRU PCB REV A/A 3A10Q4	1	
64	2N930	2	TRANSISTOR 352-0517-010 EFF PCB REV B/B 3A10Q4	1	
65	A10012	2	INSULATOR 07047 302-0437-000 EFF THRU PCB REV A/A	4	
65	A10012	2	INSULATOR 07047 302-0437-000 EFF PCB REV B/B	6	

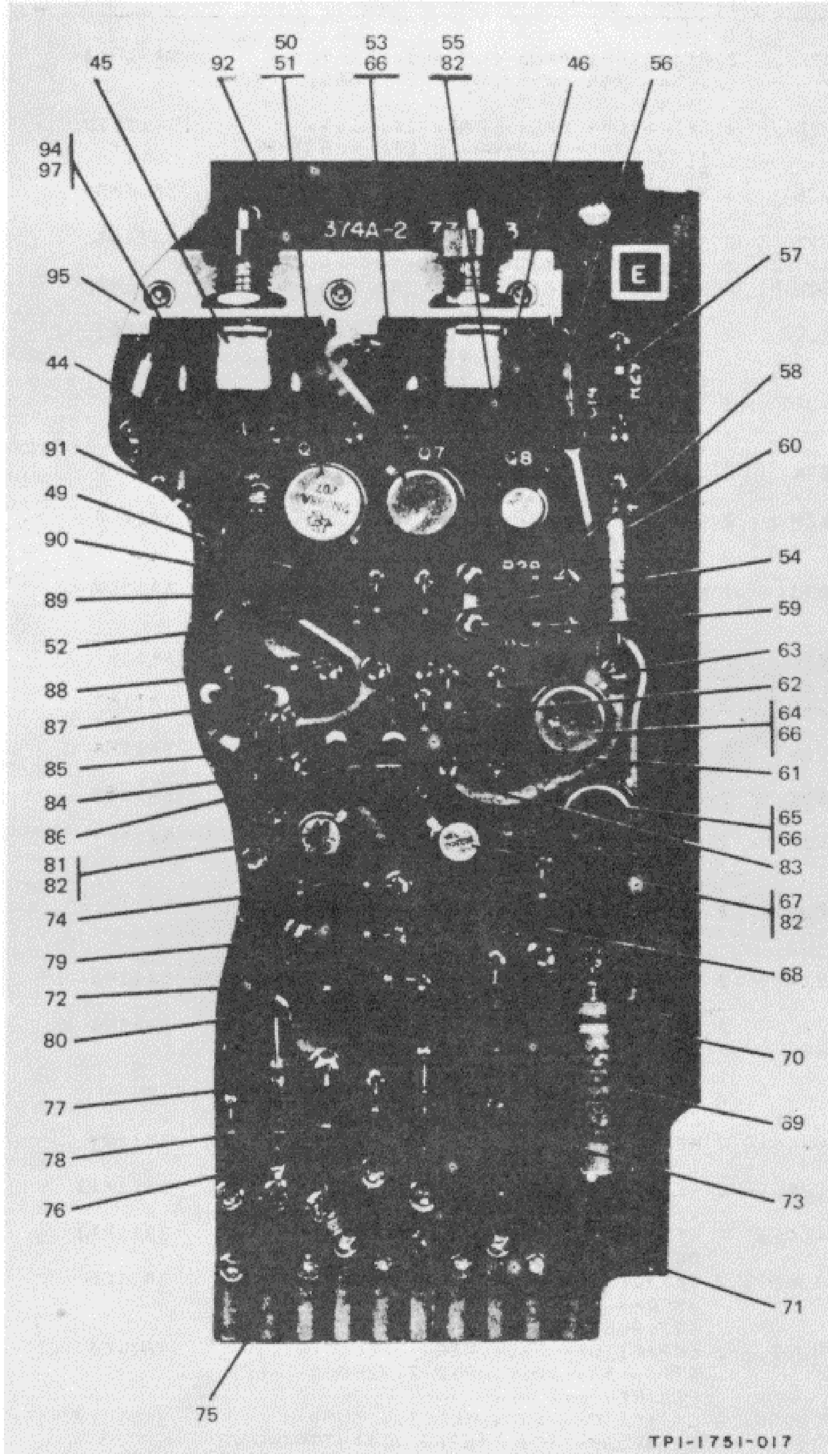
FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-47 66	RN60D8252F	2	RESISTOR, FXD, FILM, 82.5K. 1%, 1/4W 705-6688-000 EFF THRU PCB REV C/C	3A10R4	1	
66	RN60D1103F	2	RESISTOR, FXD, FILM, 110K, 1%, 1/4W 705-6694-000 EFF PCB REV D/D	3A10R4	1	
67	RN6OD8250F	2	RESISTOR, FXD, FILM, 825 OHMS. 11, 1/4W 705-6592-000	3A10R17	1	
68	RN60D1781F	2	RESISTOR, FXD, FILM, 1.78K,1, 1/4W 705-6608-000	3A10R11	1	
69	1N270	2	SEMICOND DEVICE 353-2018-000 EFF PCB REV D/D	3A10CR13	1	
70	563-5011-002	2	HANDLE, SHORT EFF BASIC PCB ONLY		1	
- 71	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP		3	
72	772-0968-002	2	AUTOMATIC FREQUENCY CONTROL		1	
73	543-5011-002	3	PLATE, TOP		1	
- 74	R4008XI-8CHR OMATEDP	3	RIVET, TUBULAR, AL, 0.089 DIA X 1/8 12014 305-0170-000 AP		3	
75	772-0968-001	3	AUTOMATIC FREQUENCY CCNTROL		1	
3-48- 0	565-5607-005	1	BOARD, VIDEO DRIVER SEE FIG3-35(22) FOR NHA EFF REV AL/AH	3A11	REF	
1	563-4975-003	2	STRIP, IDENT		1	
2	RC07GF391K	2	RESISTOR, FXD, COMP, 390 OHMS. 10%, 1/4W 745-0734-000 EFF THRU PCB REV E	3A11R21	1	
2	1N270	2	SEMICOND DEVICE 353-2018-000 EFF PC8 REV F	3A11CR2	1	
3	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.BUF, 20%, 35V 56289 184-7693-000	3A11C7	1	
4	1N270	2	SEMICOND DEVICE 353-2018-000	3A11CR6	1	
5	RCO7GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/4W 745-0770-000	3A11R20	1	
6	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20%, 50V 56289 184-7792-000	3A11C18	1	
7	380-1758-000	2	RESISTOR, VAR, COMP, 1OK, 20%, 1/4W 71590 EFF BASIC PCB ONLY	3A11R23	1	
7	380-1755-000	2	RESISTOR, VAR, COMP, 1K, 20%, 1/4W 71590 EFF PCB REV A	3A11R23	1	
- 8	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 AP		1	
- 9	1714-05 2		WASHER. LOCK, SST, 0.267 ID X 0.408 OD 78189 373-0090-000 AP		1	
10	CM05E680J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 68PF, 5S, 500V 912-2804-000	3A11C10	1	
11	1N251	2	SEMICOND DEVICE 353-2883-000	3A1CR7	1	
12	150D685X035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 35V 56289 184-7693-000	3A11C9	1	
22	2N1131	2	TRANSISTOR 352-0219-000	3A1102	1	
13	1N816	2	SEMICOND DEVICE 353-2564-000	3A11CR3	1	
14	RCO7GF272K	2	RESISTOR, FXD, COMP, 2.7K, 10%, 1/4W 745-0764-000	3A11R24	1	
15	2N1131	2	TRANSISTOR 352-0219-000	3A1104	1	
16	MS18130-24	2	COIL, RF, 22UH 240-0801-000	3A11L2	1	





Video Driver Board (Sheet 1 of 2)

Figure 3-48



Video Driver Board (Sheet 2 of 2)

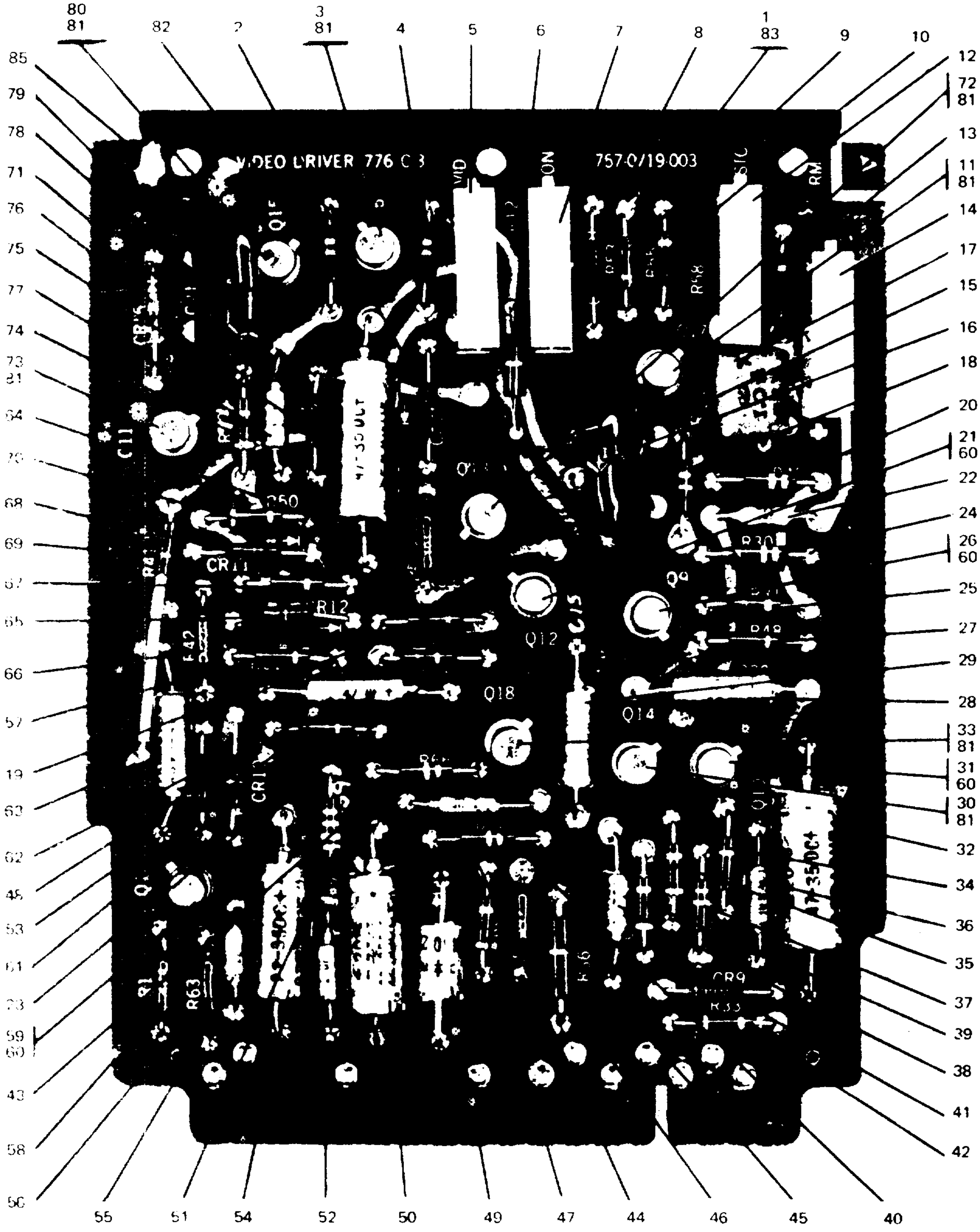
Figure 3-48

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-48- 17	RC07CF182K	2	RESISTOR, FXD, COMP, 1.8K 10%, 1/4W 745-0758-000 EFF BASIC PCB ONLY 3A11R13	1	
17	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 EFF PCB THRU REV D 3A11R13	1	
18	RCO7GF101K	2	RESISTOR, FXD, COMP, 100 OHMS 10% 1/4W 745-0713-000 3A11R34	1	
19	4JX1182023	2	TRANSISTOR 03508 352-0207-000 3A1103	1	
20	A1OO44DAP	2	INSULATOR 07047 352-9889-000	1	
21	RCO7GF102K	2	RESISTOR. FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A11R8	1	
23	CM05F331J03 2		CAPACITOR, FXD, MICA DIELECTRIC, 330PF. 5S% 500V 912-2852-000 EFF BASIC PCB ONLY 3A11C2	1	
23	DM15C100J0	2	CAPACITOR. FXD, MICA DIELECTRIC, 10PF. 05PF. 500V 72136 912-2753-000 EFF PC8 REV A 3A11C2	1	
24	RCO7GF683K	2	RESISTOR. FXD, COMP, 68K. 10% 1/4W 745-0815-000 3A11R6	1	
25	CK60AW152M	2	CAPACITOR, FXD, CER DIELECTRIC 1500PF. 20%, 500V 913-1191-000 EFF THRU PCB REV F 3A11C4	1	
25	DM15C100J01	2	CAPACITOR. FXD, MICA DIELECTRIC, 10PF, 0.5PF. 500V 72136 912-2753-000 EFF PCB REV F-1/H 3A11C4	1	
26	RC07GF181K	2	RESISTOR, FXD, COMP, 180 OHMS. 10%, 1/4W 745-0722-000 3A11R7	1	
27	RCO7GF102K	2	RESISTOR, FXD, COMP, 1K 10%, 1/4W 745-0749-000 3A11R3	1	
28	RCO7GF102K	2	RESISTOR, FXD, COMP. 1K. 10%, 1/4W 745-0749-000 3A1R4	1	
29	RC07GF683K	2	RESISTOR. FXD. COMP. 68K. 10O%, 1/4W 745-0815-000 3A11R2	1	
30	CK60AW152M	2	CAPACITOR, FXD, CER DIELECTRIC, 1500PF, 20%. 500V 913-1191-000 EFF BASIC PCB ONLY 3A11C1	1	
30	DM15C100J01	2	CAPACITOR FXD, MICA DIELECTRIC, 10PF, 0.5PF, 500V 72136 912-2753-000 EFF PCB REV A 3A1C1	1	
31	RC07GF181K	2	RESISTOR, FXD, COMP, 180 OHMS, 10% 1/4W 745-0722-000 3A11R1	1	
32	2N1131	2	TRANSISTOR 352-0219-000 3A11Q1	1	
33	A10044DAP	2	INSULATOR 07047 352-9889-000 EFF THRU PCB REV B	3	
33	A10012	2	INSULATOR 07047 302-0437-000 3 EFF PCB REV C		
34	RCO7GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A11R9	1	
35	RC07GF102K	2	RESISTOR, FXD, COMP, 1K. 10%, 1/4W 745-0749-000 3A11R11	1	
36	TM1-8 1000-1 0	2	RESISTOR, FXD, 1K, 10% 1/8W 06668 714-2796-000 3A11RT1	1	
37	DM15F431J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 430PF. 5%, 500V 72136 912-2861-000 EFF THRU PCB REV F 3A11C6	1	
37	CM05E470J03	2	CAPACITOR, FXD, MICA DIELECTRIC 47PF, 5%, 500V 912-2792-000 EFF PCB REV F-1 3A11C6	1	
38	109D505C2050 C2	2	CAPACITOR, FXD, ELECT, 5UF, M15%P20%, 50V 56289 184-7792-000 3A11C12	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-48-39	RC07GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/4W 745-0770-000	3A11R22	1	
40	CM05E680J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 68PF, 5%, 500V 912-2804-000 EFF THRU PCB REV F	3A11C11	1	
40	CM05E470J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 47PF. 5% 500V 912-2792-000 EFF PCB REV F-1	3A11C11	1	
41	1N251	2	SEMICOND DEVICE 353-2883-000	3A11CR5	1	
42	RC07GF820K	2	RESISTOR, FXD, COMP, 82 OHMS, 10% 1/4W 745-0710-000 EFF PCB REV A	3A11R38	1	
43	RC07GF820K	2	RESISTOR, FXD, COMP, 82 OHMS, 105, 1/4W 745-0710-000 EFF PCB REV A	3A11R39	1	
44	CK60AW821M	2	CAPACITOR, FXD, CER DIELECTRIC, 820PF, 20%, 1000V 913-1190-000 EFF BASIC PCB ONLY	3A11C17	1	
44	CK60AW102M	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 20%, 1000V 913-1186-000 EFF PCB REV A THRU REV C	3A11C17	1	
44	CK60AX471M	2	CAPACITOR, FXD, CER DIELECTRIC, 470PF, 20%, 500V 913-1189-000 EFF PCB REV D	3A11C17	1	
45	380-1755-000	2	RESISTOR, VAR, COMP, 1K, 20%, 1/4W 71590	3A1R12	1	
46	380-1755-000	2	RESISTOR, VAR, COMP, 1K, 20%, 1/4W 71590	3A11R27	1	
- 47	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 AP FOR 45 AND 46		2	
- 48	1714-05	2	WASHER, LOCK, SST, 0.267 ID X 0.408 OD 78189 373-0090-000 AP FOR 45 AND 46		2	
49	CK60AW102M	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 20% 1000V 913-1186-000 EFF PCB REV B AND C	3A11C13	1	
50	2N388A	2	TRANSISTOR 352-0352-000 EFF PCB REV A	3A11Q11	1	
51	A10012	2	INSULATOR 07047 302-0437-000 EFF PCB REV C		1	
52	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000 EFF PCB REV A	3A11R37	1	
53	2N1131	2	TRANSISTOR 352-0219-000	3A1107	1	
54	RC07GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/4W 745-0746-000 EFF PCB REV A THRU C	3A11R26	1	
54	RC07GF102K	2	RESISTOR, FXD, COMP. 1K. 10%, 1/4W 745-0749-000 EFF PCB REV D	3A11R26	1	
55	4JX11B2023	2	TRANSISTOR 03508 352-0207-000	3A11Q8	1	
56	CM05F181J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 180PF. 5% 500V 912-2834-000 EFF BASIC PCB ONLY	3A11C14	1	
56	DM15C100J01	2	CAPACITOR, FXD, MICA DIELECTRIC, 10PF. 0.5PF, 500V 72136 912-2753-000 EFF PCB REV A	3A11C14	1	
57	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K. 10% 1/4W 745-0761-000 EFF PCB REV A	3A11R29	1	
58	RC07GF272K	2	RESISTOR, FXD, COMP, 2.7K. 100 1/4W 745-0764-000 EFF THRU PCB REV C	3A11R28	1	
58	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000 EFF PCB REV D	3A11R28	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-48- 59	RC07GF272K	2	RESISTOR, FXD, COMP, 2.7K., 10%, 1/4W 745-0764-000 3A11R31	1	
60	1500D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%. 35V 56289 184-7693-000 3A1115	1	
61	RC07GF332K	2	RESISTOR, FXD, COMP, 3.3K, 10%, 1/4W 745-0767-000 3A11R18	1	
62	RC07GF683K	2	RESISTOR, FXD, COMP, 68K. 10%, 1/4W 745-0815-000 EFF BASIC PCB ONLY 3A11R30	1	
62	RC07GF563K	2	RESISTOR, FXD, COMP, 56K. 10%, 1/4W 745-0812-000 EFF PCB REV A 3A11R30	1	
63	RC07GF221K	2	RESISTOR, FXD, COMP, 220 OHMS, 10%, 1/4W 745-0725-000 3A11R32	1	
64	2N1131	2	TRANSISTOR 352-0219-000 3A1109	1	
65	2N1131	2	TRANSISTOR 352-0219-000 3A112Q10	1	
66	A10044DAP	2	INSULATOR 07047 352-9889-000 EFF THRU PCB REV B	1	
66	A10012	2	INSULATOR 07047 302-0437-000 EFF PCB REV C	3	
67	4JX11B2023	2	TRANSISTOR 03508 352-0207-000 3A1106	1	
68	RC07GF152K	2	RESISTOR, FXD, COMP, 1.5K. 10%, 1/4W 745-0755-000 3A11R17	1	
69	150D476X9035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 10%, 35V 56289 184-7714-000 3A11C16	1	
70	MS18130-24	2	COIL, RF, 22UH 240-0801-000 3A11L1	1	
71	CK63AW103M	2	CAPACITOR, FXD, CER DIELECTRIC, 10,000PF, 20%, 500V 913-1188-000 EFF PC8 REV A 3A11C19	1	
72	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000 3A11R36	1	
73	1N251	2	SEMICOND DEVICE 353-2883-000 3A11CR9	1	
74	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/4W 745-0761-000 EFF THRU PCB REV C 3A11R14	1	
74	RC07GF152K	2	RESISTOR, FXD, COMP, 1.5K. 10%, 1/4W 745-0755-000 EFF PCB REV D 3A11R14	1	
75	RC07GF103K	2	RESISTOR, FXD, COMP, 10K. 10%, 1/4W 745-0785-000 3A11R33	1	
76	RC20GF181K	2	RESISTOR, FXD, COMP, 180 OHMS, 10%, 1/2W 745-1321-000 EFF PCB REV A 3A11R35	1	
77	1N3028B	2	SEMICOND DEVICE 353-3133-000 3A11CR8	1	
78	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A11R5	1	
79	RC07GF221K	2	RESISTOR, FXD,-COMP, 220 OHMS, 10%, 1/4W 745-0725-000 3A11R19	1	
80	CM05F331J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 330PF, 5%, 500V 912-2852-000 EFF BASIC PCB ONLY 3A11C3	1	
80	DM15C100J01	2	CAPACITOR, FXD, MICA DIELECTRIC, 10PF, 0.5PF, 500V 72136 912-2753-000 EFF PCB REV A 3A11C3	1	
81	4JX11B2023	2	TRANSISTOR 03508 352-0207-000 3A11Q5	1	
82	A10044DAP	2	INSULATOR 07047 352-9889-000	3	
83	CMOSF151J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 150PF, 5%, 500V 912-2828-000 3A11C8	1	
84	1N751	2	SEMICOND DEVICE 353-2709-000 3A11CR1	1	
85	RC07GF391K	2	RESISTOR, FXD, COMP, 390 OHMS, 10%, 1/4W 745-0734-000 ECF THRU PCB REV C 3A1R16	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-48 85	RC07GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1/4W 745-0728-000 EFF PCB REV D 3A11R16	1	
86	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 EFF THRU PCB REV C 3A11R15	1	
86	RC07GF153K	2	RESISTOR, FXD, COMP, 15K. 10%, 1/4W 745-0791-000 EFF PCB REV D 3A11R15	1	
87	CK60AW152M	2	CAPACITOR, FXD. CER DIELECTRIC, 1500PF, 20%, 500V 913-1191-000 3A11C5	1	
88	RC07GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1/4W 745-0728-000 EFF THRU REV C 3A11R10	1	
88	RC07GF221K	2	RESISTOR, FXD, COMP, 220 OHMS 10%. 1/4W 745-0725-000 EFF PCB REV D 3A11R10	1	
89	1N816	2	SEMICOND DEVICE 353-2564-000 EFF THRU PCB REV C 3A11CR4	1	
90	RCO7GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1/4W 745-0728-000 EFF THRU PCB REV C 3A11R25	1	
90	RC07GF181K	2	RESTSTOR, FXD, COMP, 180 OHMS, 10%, 1/4W 745-0722-000 EFF PCB REV D 3A11R25	1	
91	TM1-8 1000-1 0	2	RESISTOR, FXD, 1K, 10% 1/8W 06668 714-2796-000 EFF THRU PCB REV C 3A11RT2	1	
91	763F84	2	RESISTOR, THRM, 1K, 10%, 1W 10646 714-1720-000 -EFF PCB REV D 3A11RT2	1	
92	563-5011-002	2	HANDLE, SHORT	1	
- 93	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP	3	
94	565-5606-005	2	BOARD, VIDEO DRIVER	1	
95	563-5010-002	3	BRACKET	1	
- 96	MS16535-73	3	RIVET, TUBULAR, AL, 0.089 DIA X 5/32 305-0008-000 AP	4	
97	565-5605-005	3	BOARD, VIDEO DRIVER	1	
3-49- 0	757-0719-003	1	VIDEO DRIVER P SEE FIG. 3-35(22) FOR NHA EFF REV AM/AH 3A11	REF	
1	563-4975-003	2	STRIP, IDENT	1	
2	1N4310	2	SEMICOND DEVICE 353-3564-000 EFF PCB REV A 3A11CR13	1	
2	1N3064	2	SEMICOND DEVICE 353-3404-000 EFF BASIC PCB ONLY 3A11CR13	1	
3	2N930	2	TRANSISTOR 352-0517-010 3A11016	1	
4	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10% 1/4W 745-0785-000 3A11R51	1	
5	79PR	2	RESISTOR, VAR. 5K. 10%. 3/4W 73138 382-0012-280 3A11R12	1	
6	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A11R54	1	
7	79PR	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-280 3A11R23	1	
8	1N752	2	SEMICOND DEVICE 353-2711-000 3A11CR14	1	



TPI-1788-017

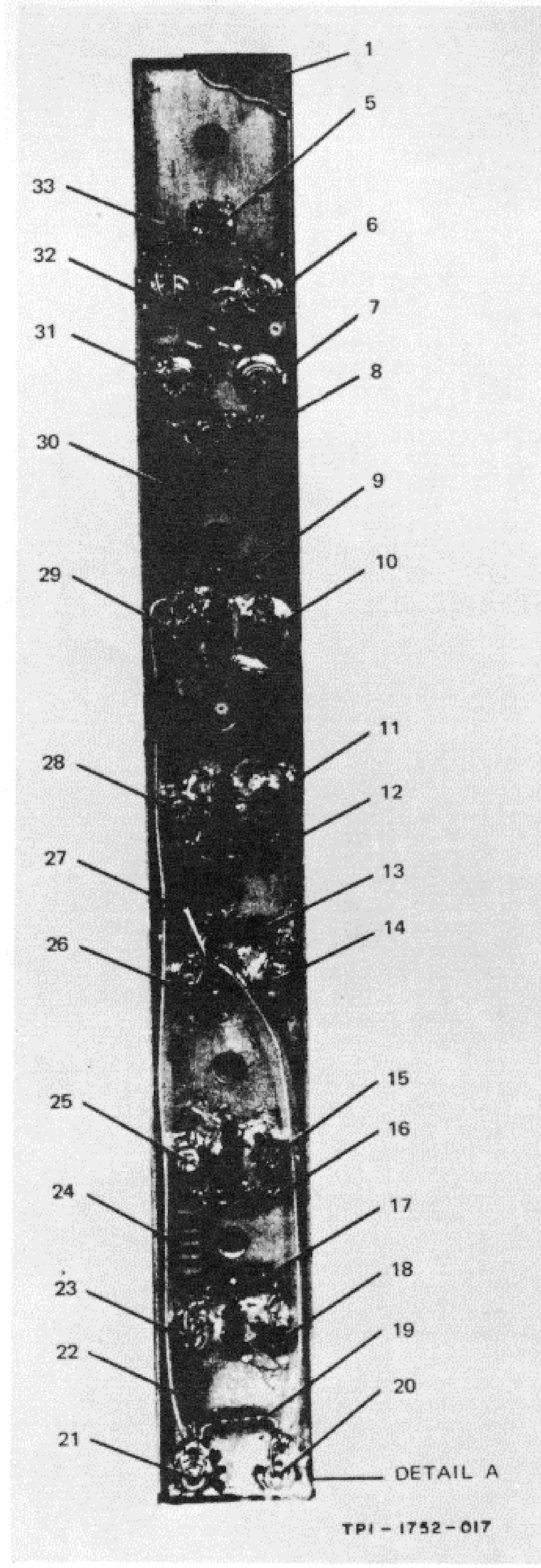
Video Driver

Figure 3-49

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-49- 9	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000	3A11R53	1	
10	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K9 10% 1/4W 745-0761-000	3A11R55	1	
11	2N3251	2	TRANSISTOR 352-0626-020	3A11017	1	
12	79PR	2	RESISTOR, VAR 5, 10%, 3/4W 73138 382-0012-280	3A11R58	1	
13	RC07GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1/4W 745-0728-000	3A11R73	1	
14	79PR	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-280	3A11R27		
15	CM06FD392J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 3900PF, 5%, 500V 912-3046-000	3A11C22	1	
16	RC07GF103K	2	RESISTOR, FXD, COMP, 10K. 10%, 1/4W 745-0785-000	3A11R57	1	
17	CK60AW102M	2	CAPACITOR, FXD, CER DIELECTRIC, 100OPF, 20%, 1000V 913-1186-000	3A11C26	1	
18	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10% 1/4W 745-0785-000	3A11R56	1	
19	RC07GF1L1K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000’	3A11R60	1	
20	RC07GF223K	2	RESISTOR, FXD, COMP, 22K, 10% 1/4W 745-0797-000	3A11R45	1	
21	2N3251	2	TRANSISTOR 352-0626-020	3A11012	1	
22	RNS5D9090F	2	RESISTOR, FXD, FILM, 909 OHMS, 1%, 1/8W 705-0994-000	3A11R46	1	
23	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10% 1/4W 745-0776-000	3A11R62	1	
24	RC07GF223K	2	RESISTOR, FXD, COMP, 22K, 10% 1/4W 745-0797-000	3A11R30	1	
25	RC07GF272K	2	RESISTOR, FXD, COMP, 2.7K, 10% 1/4W 745-0764-000	3A11R31	1	
26	2N3251	2	TRANSISTOR 352-0626-020	3A1109	1	
27	RC07GF221K	2	RESISTOR, FXD, COMP, 220 OHMS. 10%. 1/4W 745-0725-000	3Al1148	1	
28	150D476X0006 B2	2	CAPACITOR, FXD, ELECT., 47UF, 20%, 6V 56289 184-7401-000	3A11C30	1	
29	1500D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 5V 56289 184-7693-000	3A11C15	1	
30	2N930	2	TRANSISTOR 352-0517-010	3A11014	1	
31	2N3251	2	TRANSISTOR 352-0626-020	3A11010	1	
32	150D476X0035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 20%, 35V 56289 184-7411-000	3A11C16	1	
33	2N930	2	TRANSISTOR 352-0517-010	3A11Q18	1	
34	RC07GF221K	2	RESISTOR, FXD, COMP, 220 OHMS. 10%. 1/4W 745-0725-000	3A11R32	1	
35	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000	3A11R64	1	
36	150D685X0006 A2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 6V 56289 184-7378-000	3A11C28	1	
37	RC07GF123K	2	RESISTOR, FXD, COMP, 12K. 10%, 1/4W 745-0788-000	3A11R71	1	
38	150D105X0035 A2	2	CAPACITOR. FXD, ELECT., 1UF. 20%, 35V 56289 184-7398-000	3A11C27	1	
39	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000	3A11R70	1	
40	150D105X0035 A2	2	CAPACITOR, FXD, ELECT., 1UF. 20%, 35V 56289 184-7398-000	3A11C29	1	
41	1N4310	2	SEMICOND DEVICE 353-3564-000 EFF PCB REV A	3A1CR9	1	

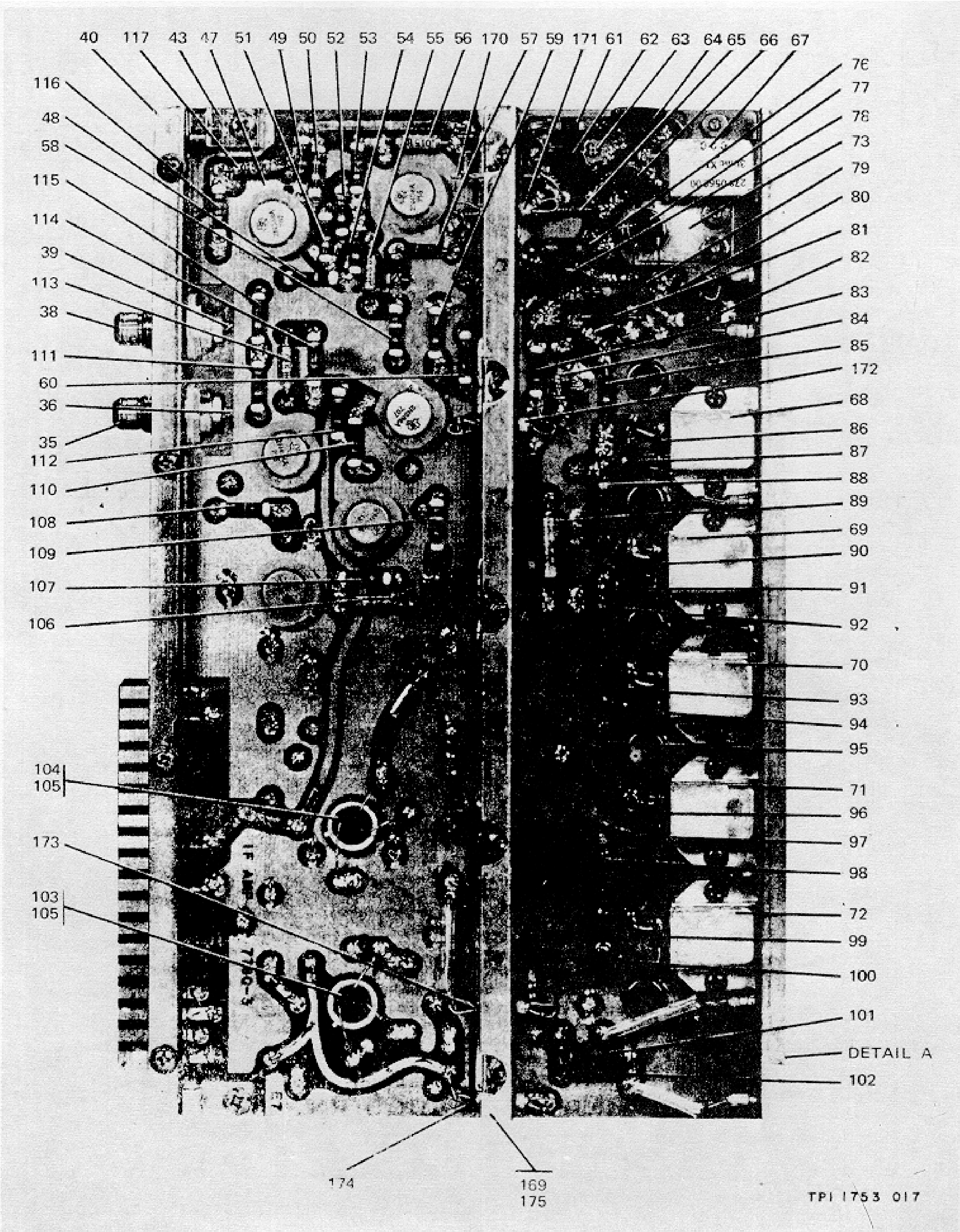
FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-49- 41	1N3064	3	SEMICOND DEVICE 353-3404-000 EFF BASIC PCB ONLY 3A11CR9	1	
42	RC07GF472K	2	RESISTOR, FXD. COMP, 4.7K, 10%, 1/4W 745-0773-000 3A11R33	1	
43	RC07GF124K	2	RESISTOR, FXD. COMP, 120K. 10%, 1/4W 745-0824-000 3A11R66	1	
44	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A11R65	1	
45	RC20GF181K	2	RESISTOR, FXD, COMP, 180 OHMS, 10%, 1/2W 745-1321-000 3A11R36	1	
46	RN55D1472F	2	RESISTOR, FXD, FILM, 14.7K, 1%, 1/8W 705-1052-000 3A11R47	1	
47	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K. 10%, 1/4W 745-0773-000 3A11R67	1	
48	150D476X0006 B2	2	CAPACITOR, FXD, ELECT., 47UF. 20%, 6V 56289 184-7401-000 3A11C25	1	
49	lN3028B	2	SEMICOND DEVICE 353-3133-000 3A11CR8	1	
50	150D226X0035 R2	2	CAPACITOR, FXD, ELECT., 22UF, 20%. 35V 56289 184-7695-000 3A11C23	1	
51	RC07GF393K	2	RESISTOR, FXD, COMP, 39K. 10%, 1/4W 745-0806-000 3A11R74	1	
52	1500105X0035 A2	2	CAPACITOR, FXD, ELECT., 1UF, 20%, 35V 56289 184-7398-000 3A11C24	1	
53	RC07GF273K	2	RESISTOR, FXD, COMP, 27K, 10% 1/4W 745-0800-000 3A11R68	1	
54	150D226X0035 R2	2	CAPACITOR, FXD, ELECT., 22UF. 20%, 35V 56289 184-7695-000 3A11C12	1	
55	RN55D3322F	2	RESISTOR, FXD, FILM, 32.2K. 1%, 1/8W 705-1069-000 3A11R2	1	
56	RN55D4641F	2	RESISTOR, FXD, FILM, 4.64K, 1%, 1/8W 705-1028-000 3A11R63	1	
57	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A11R61	1	
58	RN55D4640F	2	RESISTOR, FXD, FILM. 464 OHMS, 1%, 1/8W 705-0980-000 3A11R1	1	
59	2N3251	2	TRANSISTOR 352-0626-020 3A11Q	1	
60	A10012	2	INSULATOR 07047 302-0437-000	4	
61	1N4310	2	SEMICOND DEVICE 353-3564-000 3A11CR10	1	
62	RN55DS25F	2	RESISTOR, FXD, FILM, 825 OHMS, 1%, 1/8W 705-0992-000 3A11R3	1	
63	150D476X0020 R2	2	CAPACITOR, FXD, ELECT., 47UF, 20%, 20V 56289 184-7664-000 3A11C18	1	
64	RN55D1211F	2	RESISTOR. FXD, FILM, 1.21K, 1%, 1/8W 705-1000-000 3A11R44	1	
65	1N4310	2	SEMICOND DEVICE 353-3564-000 3A11CR12	1	
66	RN55D5621F	2	RESISTOR, FXD, FILM, 5.62K, 1%, 1/8W 705-1032-000 3A11R42	1	
67	RC07GF152K	2	RESISTOR, FXD, COMP, 1.5K. 10%, 1/4W 745-0755-000 3A11R43	1	
68	1N4310	2	SEMICOND DEVICE 353-3564-000 EFF PCB REV A 3A11CR11	1	
68	1N3064	2	SEMICOND DEVICE 353-3404-000 EFF BASIC PCB ONLY 3A11CR11	1	
69	RCO7GF273K	2	RESISTOR, FXD, COMP, 27K, 10%, 1/4W 745-0800-000 3A11R41	1	
70	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000 3A11R50	1	
71	150D476X0035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 20%, 35V 56289 184-7411-000 3A11C19	1	
72	2N930	2	TRANSISTOR 352-0517-010 3A11013	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-49- 73	2N930	2	TRANSISTOR 352-0517-010 3A11011	1	
74	RC07GF270K	2	RESISTOR, FXD, COMP, 27 OHMS, 10%, 1/4W 745-0692-000 3A11R59	1	
75	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10% 1/4W 745-0752-000 3A1R72	1	
76	1N270	2	SEMICOND DEVICE 353-2018-000 3A11CR15	1	
77	150D105X0035 A2	2	CAPACITOR, FXD, ELECT., 1UF, 20%, 35V 56289 184-7398-000 3A11C17	1	
78	CM06FD17J03	7	CAPACITOR, FXD, MICA DIELECTRIC, 1000PF, 5%, 500V 912-3001-000 3A11C21	1	
79	RC07GF73K	7	RESISTOR, FXD, COMP, 27K. 10%, 1/4W 745-0800-000 3A11R49	1	
80	2N930	2,	TRANSISTOR 352-0517-010 3A1115	1	
81	A10044DAP	7	INSULATOR 07047 352-9889-000	7	
82	RC07GF103K	7	RESISTOR, FXD, COMP, 10K, 10, 1/4W 745-0785-000 3A11R52	1	
83	563-5011-002	2	HANDLE, SHORT	1	
- 84	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP	3	
85	777 0197-001	2	PRINTED CIRCUIT BOARD P	1	
3-50- 0	561-2711-005	1	AMPLIIFIER ASSY SEE FIG3-35(23) 3A6 FOR NHA EFF THRU REV	REF	
1	563 -4956-003	2	COVER, IF	1	
- 2	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	16	
- 3	310 0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	16	
-4	310-6320 000	2	WASHER, FLAT, SST, 0.092 ID X 0.218 OD COML AP	8	
5	RC07GF27K	2	RESISTOR, FXD, COMP, 2.2K, 10% 1/4W 745-0761-000 3A6R1	1	
6	DF303	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 50V 04222 913-4198-000 EFF THRU PCB REV D 3A6C1	1	
6	X5S2433500GM V	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 EFF PCB REV E 3A6C1	1	
7	2465-009W5T0 102P		CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 500V 72982 913-3209-000 EFF THRU PCB REV D 3A6C10	1	
7	X5V24331000G MV	2	CAPACITOR, FXD, CER DIELECTRIC, 100PF, 360V 72982 913-5512-000 EFF PCB REV E 3A6C10	1	
8	RCO7GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/4W 745-0746-000 3A6R2	1	
9	RCO7GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10% 1/4W 745-0746-000 3A6R3	1	
10	2465-009W5T0 102P	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 360V 72982 913-3209-000 EFF THRU PCB REV D 3A6C11	1	
10	X5V24331000G MV	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 360V 72982 913-5512-000 EFF PCB REV E 3A6C11	1	



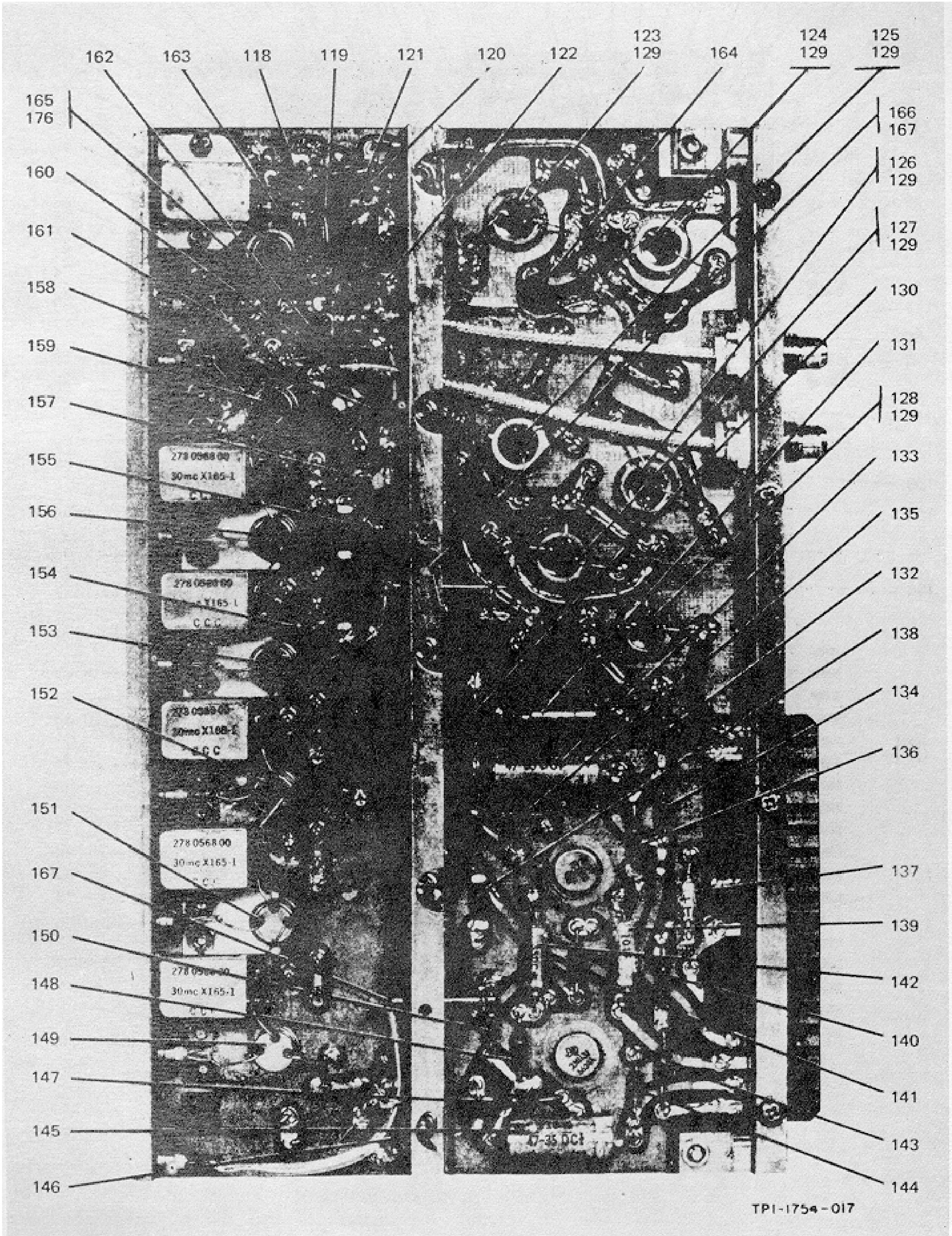
IF. Amplifier Assembly (Sheet 1 of 3)

Figure 3-50



IF. Amplifier Assembly (Sheet 2 of 3)

Figure 3-50



IF. Amplifier Assembly (Sheet 3 of 3)

Figure 3-50

FIG- ITEM	PART NUMBER	I N D E N T.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-50 - 11	2465-009W5T0 102P	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 500V 72982 913-3209-000 EFF THRU PCB REV D 3A6C12	1	
11	X5V24331000G MV	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 360V 72982 913-5512-000 EFF PCB REV E 3A6C12	1	
12	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS. 10%. 1/4W 745-0713-000 3A6R4	1	
13	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS. 10%o 1/4W 745-0713-000 3A6R5	1	
14	2465-009W5T0 102P	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 500V 72982 913-3209-000 EFF THRU PCB REV D 3A6C13	1	
14	X5V24331000G MV	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 360V 72982 913-5512-000 EFF PCB REV E 3A6C13	1	
15	2404032W5P04 01P	2	CAPACITOR, FXD, CER DIELECTRIC, 400PF, 360V 913-2602-000 EFF THRU PCB REV D 3A6C14	1	
15	X5V24331000G MV	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 360V 72982 913-5512-000 EFF PCB REV E 3A6C14	1	
16	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 3A6R6	1	
17	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 3A6R7	1	
18	2465-009W5T0 102P	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 500V 72982 913-3209-000 EFF THRU PCB REV D 3A6C15	1	
18	X5V24331000G MV	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 360V 72982 913-5512-000 EFF PCB REV E 3A6C15	1	
19	RC07GF331K	2	RESISTOR, FXD, COMP, 330 OHMS, 10%, 1/4W 745-0731-000 3A6R70	1	
20	2404032W5P04 01P	2	CAPACITOR, FXD, CER DIELECTRIC, 400PF, 360V 913-2602-000 EFF THRU PCB REV D 3A6C58	1	
20	X5S2433500GM V	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 EFF PCB REV E 3A6C58	1	
21	2404032W5P04 01P	2	CAPACITOR, FXD, CER DIELECTRIC, 400PF, 360V 913-2602-000 EFF THRU PCB REV D 3A6C16	1	
21	X5S2433500GM V	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 EFF PCB REV E 3A6C16	1	
22	RC07GF331K	2	RESISTOR, FXD, COMP, 330 OHMS, 10%, 1/4W 745-0731-000 3A6R71	1	
23	2404032W5P04 01P	2	CAPACITOR, FXD, CER DIELECTRIC, 400PF, 360V 913-2602-000 EFF THRU PCB REV D 3A6C7	1	
23	X5S2433500GM V	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 EFF PCB REV E 3A6C7	1	
24	MS18130-24	2	COIL, RF, 22UH 240-0801-000 3A6L6	1	
25	DF303	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 50V 04222 913-4198-000 EFF THRU PCB REV D 3A6C6	1	
25	X5S2433500GM V	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF. 360V 72982 913-5511-000 EFF PCB REV E 3A6C6	1	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-50 - 26	DF303	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 50V 04222 913-4198-000 EFF THRU PCB REV D 3A6C5	1	
26	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 EFF PCB REV E 3A6C5	1	
27	MS18130-24	2	COIL, RF, 22UH 240-0801-000 3A6L4	1	
28	DF303	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 50V 04222 913-4198-000 EFF THRU PCB REV D 3A6C4	1	
28	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 EFF PCB REV E 3A6C4	1	
29	DF303	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 50V 04222 913-4198-000 EFF THRU PCB REV D 3A6C3	1	
29	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 EFF PCB REV E 3A6C3	1	
30	MS18130-24	2	COIL, RF, 22UH 240-0801-000 3A6L2	1	
31	DF303	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 50V 04222 913-4198-000 EFF THRU PCB REV D 3A6C2	1	
31	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 EFF PCB REV E 3A6C2	1	
32	2465-009W5T0102P	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 500V 72982 913-3209-000 EFF THRU PCB REV D 3A6C9	1	
32	X5V24331000GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 360V 72982 913-5512-000 EFF PCB REV E 3A6C9	1	
33	563-4927-004	2	STRIP, IF	1	
- 34	563-4955-003	2	CABLE ASSY	1	
35	9925X23T	3	CONNECTOR 94375 357-9593-000 3A6P2	1	
36	RG179U	3	CABLE 425-1498-000	AR	
- 37	563-4954-003	2	CABLE ASSY	1	
38	9925X23T	3	CONNECTOR 94375 357-9593-000 3A6P1	1	
39	RG179U	3	CABLE 425-1498-000	AR	
40	563-4962-003	2	BASE, IF	1	
- 41	P347-0005-000	2	SCREW, MACH., SST, 4-40 X 3/16 77250 347-0005-000 AP	4	
- 42	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	4	
43	563-5026-002	2	BRACKET, IF AMPL	4	
- 44	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML AP	2	
- 45	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	2	
- 46	MS51957-16	2	SCREW, MACH., SST, 4-40 X 7/16 343-0136-000 AP	2	
47	565-5626-006	2	IF AMPLIFIER	1	
48	RC07GF271K	3	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1/4W 745-0728-000 3A6R28	1	
49	RC07GF104K	3	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000 3A6R59	1	
50	RC07GF332K	3	RESISTOR, FXD, COMP, 3.3K, 10%, 1/4W 745-0767-000 3A6R27	1	
51	RC07GF104K	3	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000 3A6R60	1	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-50 - 52	RC07GF332K	3	RESISTOR, FXD, COMP, 3.3K, 10%, 1/4W 745-0767-000	3A6R30	1	
53	RC07GF333K	3	RESISTOR, FXD, COMP, 33K, 10%, 1/W4 745-0803-000	3A6R25	1	
54	RC07GF332K	3	RESISTOR, FXD, COMP, 33K, 10%, 1/4W 745-0767-000	3A6R31	1	
55	150D153X0035 A2	3	CAPACITOR, FXD, ELECT., 0.015UF, 20%, 35V 56289 184-7417-000	3A6C44	1	
56	150D153X0035 A2	3	CAPACITOR, FXD, ELEC., 0.015UF, 20%, 35V 56289 184-7417-000	3A6C52	1	
57	RC07GF271K	3	RESISTOR, FXD, COMP, 270 OHMS, 10%. 1/4W 745-0728-000 EFF SUBASSEMBLY REV E	3A6R29	AR	
57	RC07GF331K	3	RESISTOR, FXD, COMP, 330 OHMS, 10%, 1/4W 745-0731-000	3A6R29	AR	
57	RC07GF391K	3	RESISTOR, FXD, COMP, 390 OHMS, 10%. 1/4W 745-0734-000	3A6R29	AR	
57	RC07GF471K	3	RESISTOR, FXD, COMP, 470 OHMS, 10%, 1/4W 745-0737-000 SUBASSEMBLY REV E	3A6R29 EFF	AR	
57	RC07GF561K	3	RESISTOR, FXD, COMP, 560 OHMS, 10%, 1/4W 745-0740-000 EFF SUBASSEMBLY REV E	3A6R29	AR	
57	RC07GF681K	3	RESISTOR, FXD, COMP, 680 OHMS, 10%, 1/4W 745-0743-000 EFF SUBASSEMBLY REV E	3A6R29	AR	
57	RC07GF821K	3	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/4W 745-0746-000 EFF SUBASSEMBLY REV E	3A6R29	AR	
57	RC07GF911J	3	RESISTOR, FXD, COMP, 910 OHMS, 5%, 1/4W 745-0747-000 EFF SUBASSEMBLY REV H	3A6R29	AR	
57	RC07GF102K	3	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 EFF SUBASSEMBLY REV H	3A6R29	AR	
57	RC07GF112J	3	RESISTOR, FXD COMP, 1.1K, 5%, 1/4W 745-0750-000 EFF SUBASSEMBLY REV H	3A6R29	AR	
57	RC07GF122K	3	RESISTOR, FXD COMP, 1.2K, 10%, 1/4W 745-0752-000 EFF SUBASSEMBLY REV H	3A6R29	AR	
57	RC07GF132J	3	RESISTOR, FXD, COMP, 1.3K, 5%, 1/4W 745-0753-000 EFF SUBASSEMBLY REV H	3A6R29	AR	
58	RC07GF392K	3	RESISTOR, FXD, COMP, 3.9K, 10%, 1/4W 745-0770-000	3A6R46	1	
59	RC07GF471K	3	RESISTOR, FXD, COMP, 470 OHMS, 10%, 1/4W 745-0737-000	3A6R48	1	
60	RC07GF333K	3	RESISTOR, FXD, COMP, 33K, 10%, 1/4W 745-0803-000	3A6R50	1	
61	MS18130-20	3	COIL, RF, 100H 240-0797-000	3A6L16	1	
62	CM05E330J03	3	CAPACITOR, FXD, MICA DIELECTRIC 33PF, 5%, 500V 912-2780-000	3A6C30	1	
63	353-3301-000	3	SEMICOND DEVICE 03877 EFF THRU SUBASSEMBLY REV H	3A6CR1	1	
63	1N914	3	SEMICOND DEVICE 353-2906-000 EFF SUBASSEMBLY REV J	3A6CR1	1	
64	280901511E91 170G	3	CAPACITOR, FXD, MICA DIELECTRIC, 117PF, 2%, 500V 72982 912-0118-000 EFF BASIC SUBASSEMBLY ONLY	3A6C38	1	

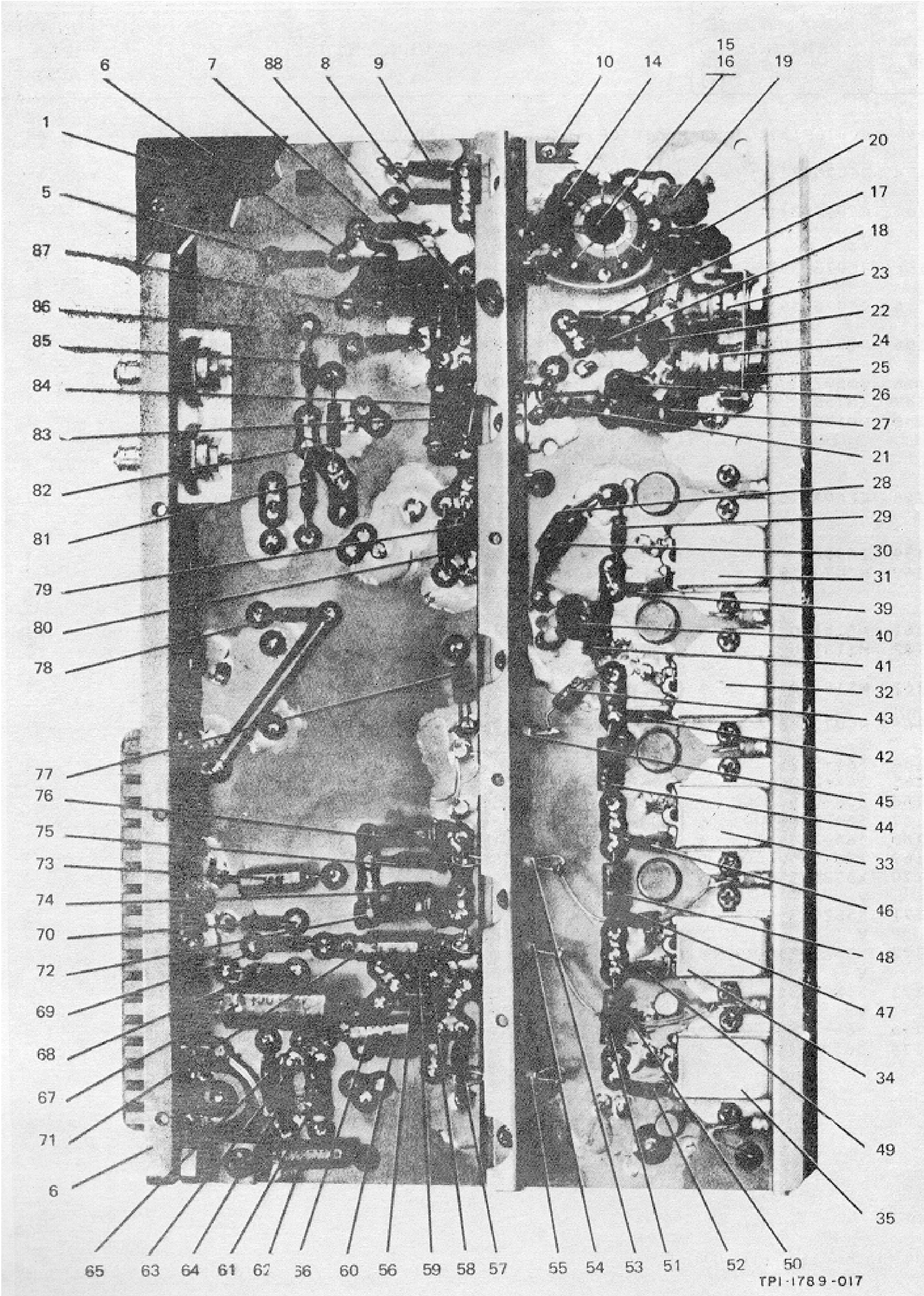
FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-50 - 64	CM05E330J03	3	CAPACITOR, FXD, MICA DIELECTRIC, 33PF, 5%, 500V 912-2780-000 EFF SUBASSEMBLY REV A 3A6C38	1	
65	353-3301-000	3	SEMICOND DEVICE 03877 EFF THRU SUBASSEMBLY REV H 3A6CR2	1	
65	1N914	3	SEMICOND DEVICE 353-2906-000 EFF SUBASSEMBLY REV J 3A6CR2	1	
66	GTC75T20G	3	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 20%, 1000V 86335 913-3854-000 3A6C51	1	
67	X165-1	3	TRANSFORMER 81815 278-0568-000 3A6T1	1	
68	X165-1	3	TRANSFORMER 81815 278-0568-000 3A6T2	1	
69	X165-1	3	TRANSFORMER 81815 278-0568-000 3A6T3	1	
70	X165-1	3	TRANSFORMER 81815 278-0568-000 3A6T4	1	
71	X165-1	3	TRANSFORMER 81815 278-0568-000 3A6T5	1	
72	X165-1	3	TRANSFORMER 81815 278-0568-000 3A6T6	1	
73	563-5027-002	3	CLIP, TSTR, IF	7	
- 74	334-1124-000	3	NUT, PLAIN, HEX., SST, 2-56 COML EFF THRU SUBASSEMBLY REV C AP FOR 67 THRU 73	15	
- 74	MS35649-24	3	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 EFF SUBASSEMBLY REV D AP FOR 67 THRU 73	15	
- 75	MS51957-2	3	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP FOR 67 THRU 73	15	
76	MS18130-20	3	COIL, RF, 10UH 240-0797-000 3A6L33	1	
77	2N502A	3	TRANSISTOR 352-0288-000 3A6Q1	1	
78	CM05F121J03	3	CAPACITOR, FXD, MICA DIELECTRIC, 120PF. 5%. 500V 912-2822-000 3A6C59	1	
79	MS18130-2	3	COIL, RF, 0.22UH 240-0780-000 EFF BASIC SUBASSEMBLY ONLY 3A6L9	1	
79	MS18130-1	3	COIL, RF, 0.15UH 240-0779-000 EFF SUBASSEMBLY REV A 3A6L9	1	
80	RC07GF471K	3	RESISTOR, FXD, COMP, 470 OHMS, 10% 1/4W 745-0737-000 3A6R8	1	
81	RC07GF101K	3	RESISTOR, FXD, COMP, 100 OHMS, 10% 1/4W 745-0713-000 3A6R63	1	
82	RC07GF822K	3	RESISTOR, FXD, COMP, 8.2K, 10%, 1/4W 745-0782-000 3A6R15	1	
83	RC07GF561K	3	RESISTOR, FXD, COMP, 560 OHMS, 10%, 1/4W 745-0740-000 3A6R64	1	
84	1N758	3	SEMICOND DEVICE 353-2723-000 3A6CR9	1	
85	RC07GF102K	3	RESISTOR FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R72	1	
86	RC07GF122K	3	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000 3A6R65	1	
87	RC07GF102K	3	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R73	1	
88	MS18130-24	3	COIL, RF, 22UH 240-0801-000 3A6L11	1	
89	150D685X0035 B2	3	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 35V 56289 184-7693-000 3A6C53	1	
90	RC07GF122K	3	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000 3A6R66	1	
91	RC07GF102K	3	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R74	1	
92	MS18130-24	3	COIL, RF, 22UH 240-0801-000 3A6L12	1	
93	RC07GF122K	3	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000 3A6R67	1	
94	RC07GF102K	3	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R75	1	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-50 - 95	MS18130-24	3	COIL, RF, 22UH 240-0801-000	3A6L13	1	
96	RC07GF122K	3	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000	3A6R68	1	
97	RC07GF102K	3	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000	3A6R76	1	
98	MS18130-24	3	COIL, RF, 22UH 240-0801-000	3A6L14	1	
99	RC07GF122K	3	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000	3A6R69	1	
100	RC07GF102K	3	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000	3A6R77	1	
101	763F84	3	RESISTOR, THRM, 1K, 10%, 1W 10646 714-1720-000	3A6R79	1	
102	RC07GF681K	3	RESISTOR, FXD, COMP, 680 OHMS, 10%, 1/4W 745-0743-000	3A6R78	1	
103	2N1131	3	TRANSISTOR 352-0219-000	3A6Q16	1	
104	2N1131	3	TRANSISTOR 352-0219-000	3A6Q15	1	
105	A51043	3	HOLDER 08289 139-2423-000		2	
106	150D104X0035 A2	3	CAPACITOR, FXD, ELECT., 0.10UF, 20%, 35V 56289 184-7408-000	3A6C47	1	
107	RC07GF332K	3	RESISTOR, FXD, COMP, 3.3K, 10%, 1/4W 745-0767-000	3A6R52	1	
108	RC07GF104K	3	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000	3A6R61	1	
109	RC07GF392K	3	RESISTOR, FXD, COMP, 3.9K, 10%, 1/4W 745-0770-000	3A6R51	1	
110	RC07GF104K	3	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000	3A6R62	1	
111	RC07GF472K	3	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000	3A6R45	1	
112	RC07GF472K	3	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000	3A6R49	1	
113	150D153X0035 A2	3	CAPACITOR, FXD, ELECT., 0.015UF, 20%, 35V 56289 184-7417-000	3A6C43	1	
114	RC07GF391K	3	RESISTOR, FXD, COMP, 390 OHMS, 10%, 1/4W 745-0734-000	3A6R47	1	
115	RC07GF332K	3	RESISTOR, FXD, COMP, 3.3K, 10%, 1/4W 745-0767-000	3A6R26	1	
116	RC07GF333K	3	RESISTOR, FXD, COMP, 33K, 10%, 1/4W 745-0803-000	3A6R24	1	
117	150D153X0035 A2	3	CAPACITOR, FXD, ELECT., 0.015UF, 20%, 35V 56289 184-7417-000	3A6C48	1	
118	GTC75T20G	3	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 20%, 1000V 86335 913-3854-000	3A6C50	1	
119	CM05F101J03	3	CAPACITOR, FXD, MICA DIELECTRIC, 100PF, 5%, 500V 912-2816-000	3A6C19	1	
120	MS18130-20	3	COIL, RF, 10UH 240-0797-000	3A6L17	1	
121	CM05E330J03	3	CAPACITOR, FXD, MICA DIELECTRIC, 33PF, 5%, 500V 912-2780-000	3A6C29	1	
122	GTC75T20G	3	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 20%, 1000V 86335 913-3854-000	3A6C22	1	
123	2N404A	3	TRANSISTOR 352-0378-000	3A6Q9	1	
124	2N388A	3	TRANSISTOR 352-0352-000	3A6Q8	1	
125	2N388A	3	TRANSISTOR 352-0352-000	3A6Q11	1	
126	2N404A	3	TRANSISTOR 352-0378-000	3A6Q10	1	
127	2N404A	3	TRANSISTOR 352-0378-000	3A6Q12	1	
128	2N404A	3	TRANSISTOR 352-0378-000	3A6Q13	1	
129	A51043	3	HOLDER 08289 139-2423-000		6	
130	RC07GF561K	3	RESISTOR, FXD, COMP, 560 OHMS, 10%, 1/4W 745-0740-000	3A6R82	1	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-50 - 31	150D685X0035 B2	3	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 35V 56289 184-7693-000 3A6C54	1	
132	RC07GF273K	3	RESISTOR, FXD, COMP, 27K, 10%, 1/4W 745-0800-000 3A6R85	1	
133	1500476X9035 S2	3	CAPACITOR, FXD, ELECT., 47UF., 10%, 35V 56289 184-7714-000 3A6C56	1	
134	1N270	3	SEMICOND DEVICE 353-2018-000 3A6CR11	1	
135	RC07GF104K	3	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000 3A6R83	1	
136	RC07GF821K	3	RESISTOR, FXD, COMP, 820 OHMS, 10% 1/4W 745-0746-000 3A6R84	1	
137	150D106X0020 B2	3	CAPACITOR, FXD, ELECT., 10UF, 20%, 20V 56289 184-7375-000 3A6C45	1	
138	RC07GF181K	3	RESISTOR, FXD, COMP, 180 OHMS, 10% 1/4W 745-0722-000 3A6R81	1	
139	150D106X0020 B2	3	CAPACITOR, FXD, ELECT., 10UF, 20% 20V 56289 184-7375-000 3A6C46	1	
140	RC07GF273K	3	RESISTOR, FXD, COMP, 27K, 10% 1/4W 745-0800-000 3A6R89	1	
141	RC07GF121K	3	RESISTOR, FXD, COMP, 120 OHMS, 10% 1/4W 745-0716-000 3A6R91	1	
142	150D685X0035 B2	3	CAPACITOR, FXD, ELECT., 6.8UF, 20%. 35V 56289 184-7693-000 3A6C55	1	
143	RC07GF821K	3	RESISTOR, FXD, COMP, 820 OHMS, 10% 1/4W 745-0746-000 3A6R88		
144	1N270	3	SEMICOND DEVICE 353-2018-000 3A6CR12	1	
145	150D476X9035 S2	3	CAPACITOR, FXD, ELECT., 47UF, 10%, 35V 56289 184-7714-000 3A6C57	1	
146	RC07GF271K	3	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1/4W 745-0728-000 3A6R80	1	
147	RC07GF121K	3	RESISTOR, FXD, COMP, 120 OHMS, 10%, 1/4W 745-0716-000 3A6R92	1	
148	RC07GF103K	3	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A6R87	1	
149	2N502A	3	TRANSISTOR 352-0288-000 3A6Q7	1	
150	RC07GF222K	3	RESISTOR, FXD, COMP, 2.2K, 10% 1/4W 745-0761-000 3A6R86	1	
151	2N502A	3	TRANSISTOR 352-0288-000 3A6Q6	1	
152	2N502A	3	TRANSISTOR 352-0288-000 3A6Q5	1	
153	2N502A	3	TRANSISTOR 352-0288-000 3A6Q4	1	
154	RC07GF470K	3	RESISTOR, FXD, COMP, 47 OHMS, 10%, 1/4W 745-0701-000 EFF SUBASSEMBLY REV E 3A6R90	AR	
154	RC07GF560K	3	RESISTOR, FXD, COMP, 56 OHMS, 10% 1/4W 745-0704-000 EFF SUBASSEMBLY REV E 3A6R90	AR	
154	RC07GF680K	3	RESISTOR, FXD, COMP, 68 OHMS, 10%, 1/4W 745-0707-000 EFF SUBASSEMBLY REV E 3A6R90	AR	
154	RC07GF820K	3	RESISTOR, FXD, COMP, 82 OHMS, 10%, 1/4W 745-0710-000 EFF SUBASSEMBLY REV E 3A6R90	AR	
154	RC07GF101K	3	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 EFF SUBASSEMBLY REV E 3A6R90	AR	
154	RC07GF121K	3	RESISTOR, FXD, COMP, 120 OHMS, 10%, 1/4W 745-0716-000 EFF SUBASSEMBLY REV E 3A6R90	AR	
154	RC07GF151K	3	RESISTOR. FXD, COMP, 150, OHMS, 10%, 1/4W 745-0719-000 3A6R90	AR	

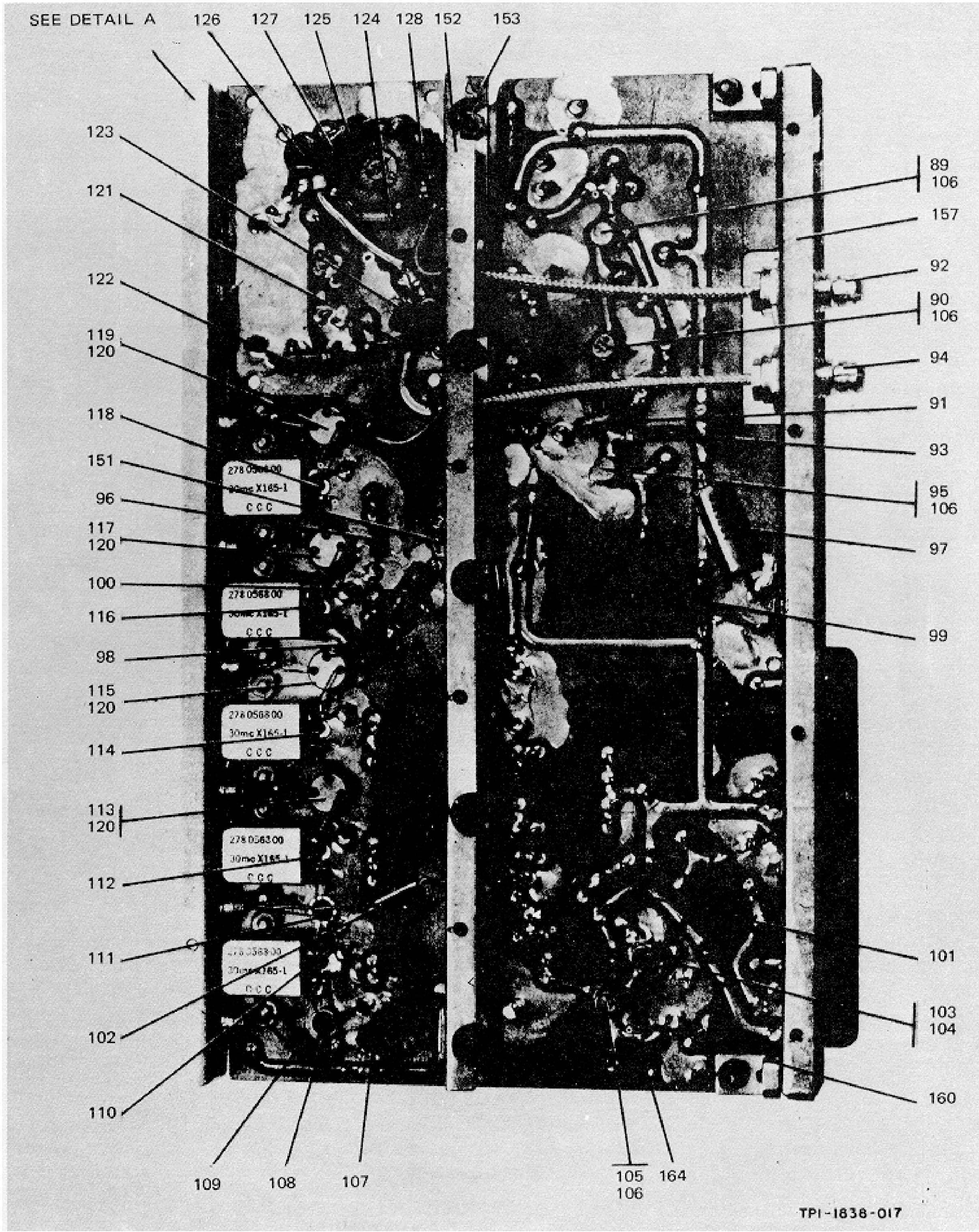
FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-50 -154	RC07GF181K	3	RESISTOR FXD, COMP, 180 OHMS, 10%, 1/4W 745-0722-000	3A6R90	AR	
154	RC07GF221K	3	RESISTOR, FXD, COMP, 220 OHMS, 10%, 1/4W 745-0725-000	3A6R90	AR	
154	RC07GF271K	3	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1/4W 745-0728-000 EFF SUBASSEMBLY REV E	3A6R90	AR	
154	RC07GF331K	3	RESISTOR, FXD, COMP, 330 OHMS, 10%. 1/4W 745-0731-000	3A6R90	AR	
154	RC07GF391K	3	RESISTOR, FXD, COMP, 390 OHMS, 10%. 1/4W 745-0734-000	3A6R90	AR	
155	RC07GF102K	3	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000	3A6R23	1	
156	2N502A	3	TRANSISTOR 352-0288-000	3A6Q3	1	
157	1N755A	3	SEMICOND DEVICE 353-2718-000	3A6CR10	1	
158	DM15F431J03	3	CAPACITOR, FXD, MICA DIELECTRIC, 430PF, 5%, 500V 72136 912-2861-000 EFF THRU SUBASSEMBLY REV F	3A6C8	1	
158	CK60AW152M	3	CAPACITOR, FXD, CER DIELECTRIC, 1500PF, 20%, 500V 913-1191-000 EFF SUBASSEMBLY REV G	3A6C60	1	
159	2N502A	3	TRANSISTOR 352-0288-000	3A6Q2	1	
160	RC07GF101K	3	RESISTOR, FXD, COMP, 100 OHMS, 10%. 1/4W 745-0713-000 EFF SUBASSEMBLY REV G	3A6R93	1’	
161	MS18130-24	3	COIL, RF, 22UH 240-0801-000	3A6L1	1	
162	MS18130-2	3	COIL, RF, 0.22UH 240-0780-000 EFF THRU SUBASSEMBLY REV F	3A6L34	1	
162	MS18130-4	3	COIL, RF, 0.47UH 240-0782-000 EFF SUBASSEMBLY REV G	3A6L35	1	
163	RC07GF682K	3	RESISTOR, FXD, COMP, 6, 8K, 10%, 1/4W 745-0779-000	3A6R58	1	
164	565-5625-006	3	IF AMPLIFIER BOARD		1	
165	564-2707-003	4	FRONT BARRIER ASSY		1	
166	306-0650-000	5	TERMINAL, COMPRESSION 83241		5	
167	564-2706-003	5	FRONT BARRIER ASSY		1	
168	564-2704-003	4	REAR BARRIER ASSY		1	
169	306-0650-000	5	TERMINAL, COMPRESSION 83241		1	
170	X5S2433500GMV	5	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000	3A6C39	1	
171	X5S2433500GMV	5	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000	3A6C17	1	
172	X5S2433500GMV	5	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000	3A6C41	1	
173	X5S2433500GMV	5	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000	3A6C42	1	
174	564-2703-003	5	REAR BARRIER ASSY		1	
175	565-5624-006	4	IF AMPLIFIER BOARD		1	

*ITEM 161 IS P/O 522-6114-006.



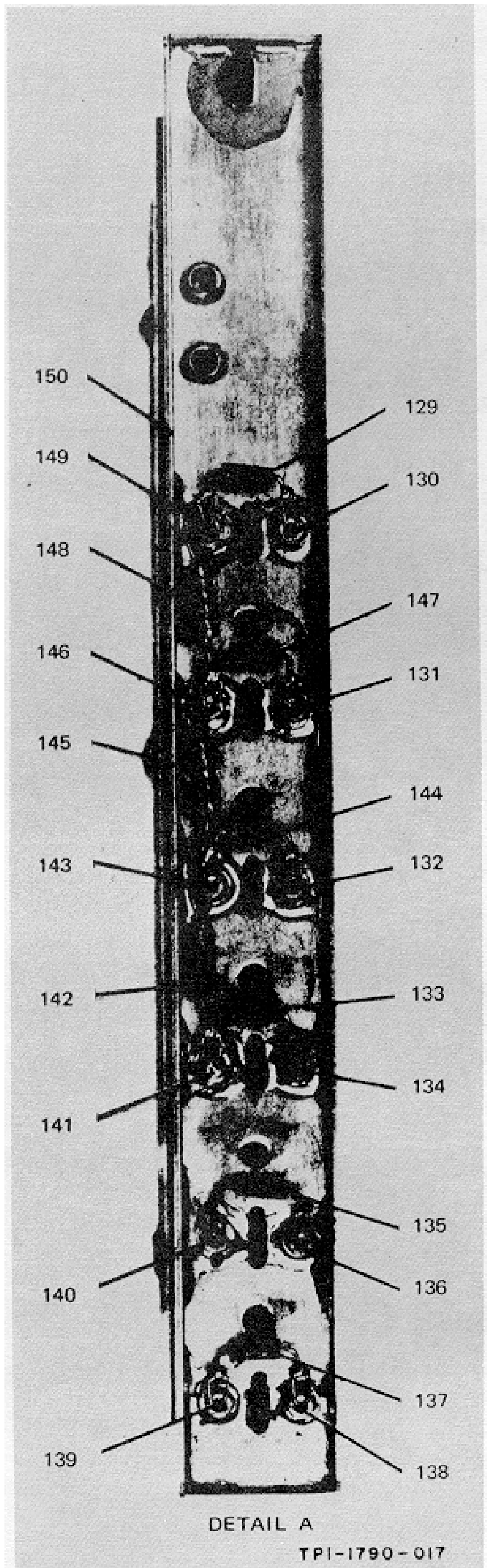
Wired IF. Assembly (Sheet 1 of 3)

Figure 3-51



Wired IF. Assembly (Sheet 2 of 3)

Figure 3-51



Wired IF. Assembly (Sheet 3 of 3)

Figure 3-51

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-51 - 0	757-0065-003	1	IF ASSY, WIRED SEE FIG- 3-35(23) 3A6 FOR NHA EFF REV AL/AH	REF	
1	757-0074-000	2	COVER, IF EFF PCB REV A	1	
- 2	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	17	
- 3	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	17	
- 4	310-6320-000	2	WASHER. FLAT, SST, 0.092 ID X 0.218 OD COML AP	8	
5	RN55D1212F	2	RESISTOR, FXD, FILM, 12.1K, 1%, 3A6R25 1/8W 705-1048-000	1	
6	CM05F391J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 3A6C29 390PF, 5%, 500V 912-2858-000 EFF THRU PCB REV 8	1	
6	CM05F101J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 3A6C29 100PF, 5%. 500V 912-2816-000 EFF PCB REV C	1	
7	RN55D1623F	2	RESISTOR, FXD, FILM, 162K, 1% 3A6R46 1/8W 705-1102-000	1	
8	RC07GF561K	2	RESISTOR, FXD, COMP, 560 OHMS, 3A6R101 10%, 1/4W 745-0740-000 EFF THRU PCB REV B	1	
8	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 3A6R101 1/4W 745-0752-000 EFF PCB REV C	1	
9	1N749A	2	SEMICOND DEVICE 353-2706-000 3A6CR14	1	
10	'757-0073-001	2	COVER, DISCR EFF PCB REV A	1	
- 11	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP,	4	
- 12	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP	4	
- 13	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	4	
14	CC22CH070D	2	CAPACITOR, FXD, CER DIELECTRIC, 3A6C59 7PF, 1/2PF, 500V 928-0126-000	1	
15	CA3005	2	INTEGRATED CIRCUIT 02735 3A6A1 351-7188-010	1	
16	A51043	2	HOLDER 08289 139-2423-000	1	
17	MS18130-4	2	COIL, RF, 0.47UH 240-0782-000 3A6L35	1	
18	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 3A6R102 1/4W, 745-0749-000	1	
19	19C267A4	2	CAPACITOR, FXD, CER DIELECTRIC, 3A6C9 2200PF, 20%, 500V 01939 913-3011-000	1	
20	338011C0H036 0J	2	CAPACITOR, FXD, CER DIELECTRIC, 3A6C62 36PF, 5%, 500V 72982 928-4347-000	1	
21	MS18130-21	2	COIL, RF, 12UH 240-1581-000 3A6L17	1	
22	CM04CD050D03	2	CAPACITOR. FXD, MICA DIELECTRIC, 3A6C1 5PF, 0. 5PF, 500V 912-3836-000	1	
23	MC601Y	2	CAPACITOR, VAR, GLASS DIELECTRIC, 3A6C63 1 TO 14PF, 1000V 73899 922-3038-010	1	
24	MC601Y	2	CAPACITOR, VAR, GLASS DIELECTRIC, 3A6C64 1 TO 14PF, 1000V 73899 922-3038-010	1	
25	757-0072-001	2	BRACKET EFF PCB REV A	1	
26	CM04ED330J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 3A6C51 33PF, 5%, 500V 912-3848-000	1	
27	CC22SH390J	2	CAPACITOR, FXD, CER DIELECTRIC, 3A6C65 39PF, 5%, 500V 928-0692-000	1	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-51 - 28	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 3A6R105	1	
29	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R72	1	
30	MS18130-4	2	COIL, RF, 0.47UH 240-0782-000 3A6L34	1	
31	X165-1	2	TRANSFORMER 81815 278-0568-000 3A6T2	1	
32	X165-1	2	TRANSFORMER 81815 278-0568-000 3A6T3	1	
33	X165-1	2	TRANSFORMER 81815 278-0568-000 3A6T4	1	
34	X165-1	2	TRANSFORMER 81815 278-0568-000 3A6T5	1	
35	X165-1	2	TRANSFORMER 81815 278-0568-000 3A6T6	1	
- 36	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP FOR 32 THRU 36	11	
- 37	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML AP FOR 32 THRU 36	11	
- 38	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP FOR 32 THRU 36	11	
39	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R73	1	
40	19C267A4	2	CAPACITOR, FXD, CER DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 3A6C8	1	
41	MS18130-24	2	COIL, RF, 22UH 240-0801-000 EFF PCB REV A 3A6L11	1	
42	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R74	1	
43	IN755A	2	SEMICOND DEVICE 353-2718-000 3A6CR10	1	
44	MS18130-24	2	COIL, RF, 22UH 240-0801-000 EFF PCB REV A 3A6L12	1	
45	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 3A6C17	1	
46	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R75	1	
47	RN55D80R6F	2	RESISTOR, FXD, FILM, 80.6 OHMS, 1%, 1/8W 705-3600-440 EFF THRU PCB REV C 3A6R80	1	
47	RN55D8060F	2	RESISTOR, FXD, FILM, 806 OHMS, 1% 1/8W 705-3600-920 EFF PCB REV D 3A6R80	1	
48	MS18130-24	2	COIL, RF, 22UH 240-0801-000 EFF PCB REV A 3A6L13	1	
49	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R76	1	
50	RC20GF103	2	RESISTOR FXD, COMP, 10K, 20%, 1/2W 745-1395-000 EFF THRU PCB REV B 3A6R98	1	
50	RC07GF562J	2	RESISTOR, FXD, COMP, 5.6K, 5% 1/4W 745-0775-000 EFF PCB REV C 3A6R98	1	
51	MS18130-24	2	COIL, RF, 22UH 240-0801-000 EFF PCB REV A 3A6L14	1	
52	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 3A6R77	1	
53	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 3A6C42	1	
54	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 3A6C58	1	
55	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000 3A6C61	1	
56	RC07GF474K	2	RESISTOR, FXD, COMP, 470K, 10%, 1/4W 745-0845-000 3A6R96		

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-51- 57	RN55D1782F	2	RESISTOR, FXD, FILM, 17.8K, 1%, 1/8W 705-1056-000 EFF PCB REV A	3A6R95	1	
58	1N3064	2	SEMICOND DEVICE 353-3404-000	3A6CR13	1	
59	RC07GF273K	2	RESISTOR, FXD, COMP, 27K, 10%, 1/4W 745-0800-000	3A6R94	1	
60	RCU7GF562J	2	RESISTOR, FXD, COMP, 5.6K. 5%, 1/4W 745-0775-000 EFF PCB REV C	3A6R71	1	
60	RC07GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/4W 745-C746-000 EFF PCB REV D	3A6R71	1	
61	RC07GF473	2	RESISTOR, FXD, COMP, 47K, 10%, 1/4W 745-0809-000	3A6R87	1	
62	150D685XOU35 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 35V 56289 184-7693-000	3A6C55	1	
63	RC08GF242J	2	RESISTOR, FXD, COMP, 2.4K. 5%, 1/10W 745-0633-000 EFF THRU PCB REV B	3A6R86	AR	
63	RC08GF302J	2	RESISTOR, FXD, COMP, 3K. 5%, 1/10W 745-0634-000 EFF THRU PCB REV B	3A6R86	AR	
63	RC07GF621J	2	RESISTOR, FXD, COMP, 620 OHMS. 5%, 1/4W 745-0741-000 EFF THRU PCB. REV B	3A6R86	AR	
63	RCO7GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/4W 745-0761-000 EFF PC8 REV C	3A6R86	1	
64	RC07GF273K	2	RESISTOR, FXD, COMP, 27K, 10%, 1/4W 745-0800-000	3A6R85	1	
65	RC07GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/4W 745-0746-000	3A6R84	1	
66	150D156X0020 B2	2	CAPACITOR, FXD, ELECT., 15UF, 20% 20V 56289 184-7371-000	3A6C60	1	
67	150D476X9035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 10%, 35V 56289 184-7714-000	3A6C57	1	
68	1N270	2	SEMICOND DEVICE 353-2018-000	3A6CR12	1	
69	RC07GF821K	2	RESISTOR, FXD, COMP, 820 OHMS 10%, 1/4W 745-0746-000	3A6R88	1	
70	RC07GF273K	2	RESISTOR, FXD, COMP, 27K, 10%, 1/4W, 745-0800-000	3A6R89	1	
71	150D156X0020 B2	2	CAPACITOR, FXD, ELECT., 15UF, 20%M 20V 56289 184-7371-000	3A6C67	1	
72	763H7	2	RESISTOR, THRM, 10K, 10%, 1W 10646 714-1733-000	3A6R93	1	
73	150D106X0020 B2	2	CAPACITOR, FXD, ELECT., 10UF, 20%, 20V 56289 184-7375-000	3A6C46	1	
74	RN55D4221F	2	RESISTOR, FXD, FILM, 4.22K, 1% 1/8W 705-1026-000	3A6R107	1	
75	RN55D1211F	2	RESISTOR, FXD, FILM, 1.21K, 1% 1/8W 705-1000-000	3A6R78	1	
76	763H16	2	RESISTOR, THRM, 2.5K, 10%, 1W 10646 714-1739-000	3A6R79	1	
77	RC07GF181K	2	RESISTOR. FXD, COMP, 180 OHMS 10%, 1/4W 745-0722-000	3A6R81	1	
78	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000	3A6R52	1	
79	1N758	2	SEMICOND DEVICE 353-2723-000	3A6CR9	1	
80	RC07GF561K	2	RESISTOR, FXD, COMP, 560 OHMS, 10%, 1/4W 745-0740-000 EFF THRU PCB REV B	3A6R64	1	

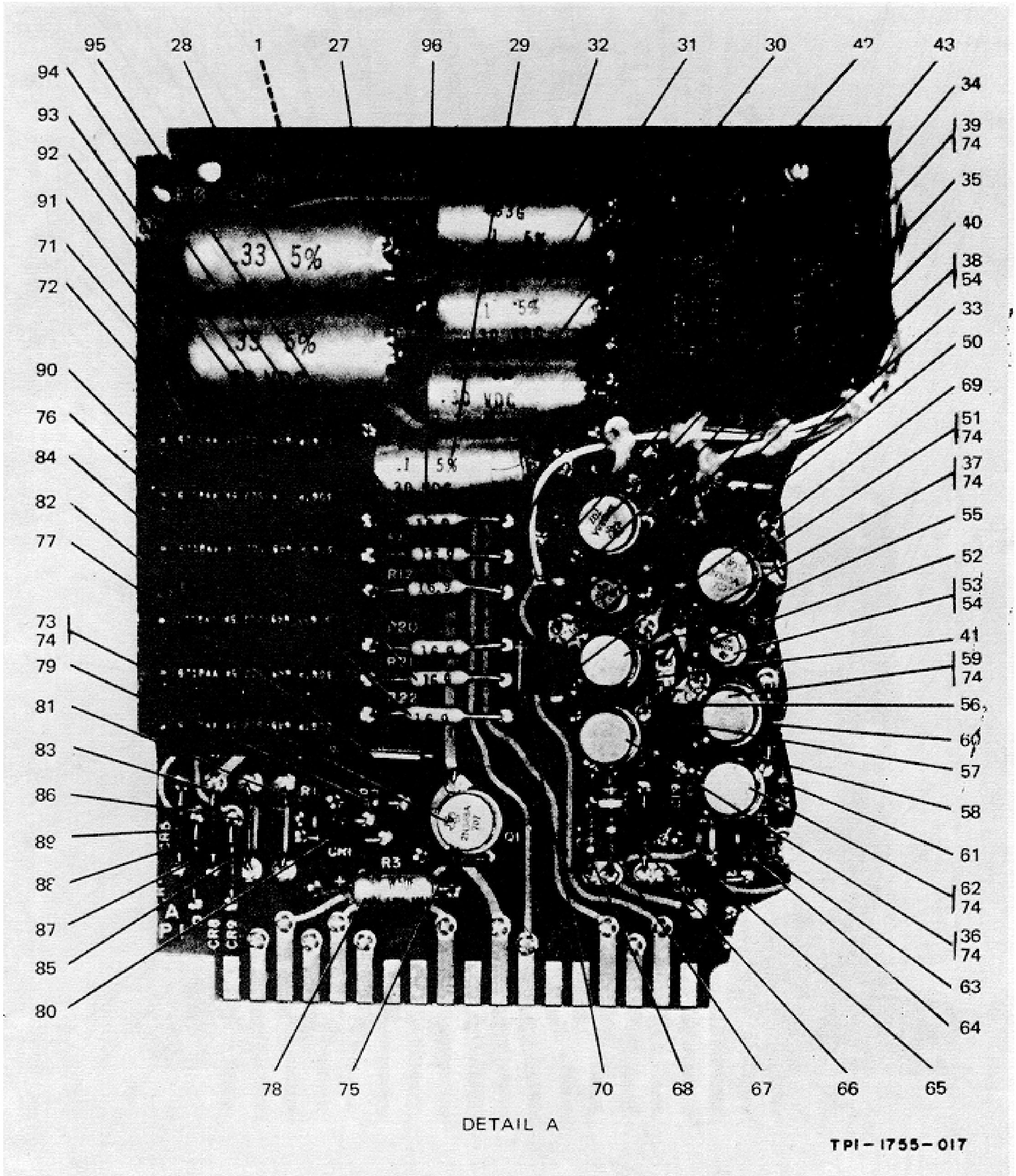
FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-51- 80	RC07GF681K	2	RESISTOR, FXD, COMP, 680 OHMS, 10%, 1/4W 745-0743-000 EFF PCB REV C 3A6R64	1	
81	RN55D1472F	2	RESISTOR, FXD, FILM9 14.7K. 1%, 3A6R104 1 1/8W 705-1052-000		
82	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000 3A6R109	AR	
82	RN55D1331F	2	RESISTOR, FXD, FILM, 1.33K, 1%, 1/8W 705-1002-000 3A6R109	AR	
82	RN55D1691F	2	RESISTOR, FXD, FILM, 1.69K, 1%, 1/8W 705-1007-000 3A6R109	AR	
82	RC07GF123K	2	RESISTOR, FXD, COMP, 12K 10%, 1/4W 745-0788-000 3A6R109	AR	
82	RN55D2741F	2	RESISTOR, FXD, FILM, 2.74K, 1%, 1/8W 705-1017-000 3A6R109	AR	
83	763H16	2	RESISTOR, THRM, 2.5K, 10% 1W 10646 714-1739-000 3A6R97	1	
84	RC07GF272K	2	RESISTOR, FXD, COMP. 2.7K. 10%, 1/4W 745-0764-000 3A6R103	1	
85	RN55D1001F	2	RESISTOR, FXD, FILM, 1K, 1%, 1/8W 705-0996-000 3A6R48	1	
86	RC07GF911J	2	RESISTOR, FXD, COMP, 910 OHMS, 5%, 1/4W 745-0747-000 EFF THRU PCB REV B 3A6R50	1	
86	RC07GF223K	2	RESISTOR, FXD, COMP 9 22K, 10%, 1/4W, 745-0797-000 EFF PCB REV C 3A6R50	1	
87	150D104x0035 A2	2	CAPACITOR, FXD, ELECT., 0.10UF, 20%, 35V 56289 184-7408-000 3A6C52	1	
88	RCU7GF334K	2	RESISTOR, FXD, COMP, 330K, 10%, 1/4W 745-0839-000 3A6R60	1	
89	2N3906	2	TRANSISTOR 352-0721-020 EFF BASIC PCB ONLY 3A6011	1	
89	2N3251	2	TRANSISTOR 352-0626-020 EFF PCB REV A 3A6011	1	
90	2N3904	2	TRANSISTOR 352-0722-020 EFF BASIC PCB ONLY 3A6012	1	
90	2N930	2	TRANSISTOR 352-0517-010 EFF PCB REV A 3A6012	1	
91	CS13BF105M	2	CAPACITOR, FXD, ELECT., 1UF 20%, 35V 184-6201-000 3A6C70	1	
92	757-0730-001	2	CONNECTOR ASSY EFF PCB REV A 3A6P1	1	
93	RC07GF911J	2	RESISTOR, FXD, COMP, 910 OHMS, 5S% 1/4W 745-0747-000 EFF THRU PC8 REV B 3A6R51	1	
93	RC07GF223K	2	RESISTOR, FXD, COMP, 22K, 10%, 1/4W 745-0797-000 EFF PCB REV C 3A6P51	1	
94	757-0730-001	2	CONNECTOR ASSY EFF PCB REV A 3A6P2	1	
95	2N3906	2	TRANSISTOR 352-0721-020 EFF BASIC PC8 ONLY 3A6013	1	
95	2N3251	2	TRANSISTOR 352-0626-020 EFF PCB REV A 3A6013	1	
96	RC07GF102K	2	RESISTOR, FXD, COMP, 1K. 10%, 1/4W 745-0749-000 3A6R23	1	
97	CS13BF226M	2	CAPACITOR, FXD, ELECT., 22UF, 20%, 35V 184-6225-000 EFF PCB REV C 3A6C71	1	
98	RC07GF470K	2	RESISTOR, FXD, COMP, 47 OHMS, 10%, 1/4W 745-0701-001 EFF THRU PCB REV B 3A6R90	AR	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-51- 98	RC07GF560K	2	RESISTOR, FXD, COMP, 56 OHMS, 10%, 1/4W 745-0704-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF680K	2	RESISTOR, FXD, COMP, 68 OHMS, 10%, 1/4W 745-0707-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF820K	2	RESISTOR, FXD, COMP, 82 OHMS, 10%, 1/4W 745-0710-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 EFF THRU PCB REV B	3A6R90 AR	
98	RC07GF121K	2	RESISTOR, FXD, COMP, 120 OHMS, 10%, 1/4W 745-0716-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF151K	2	RESISTOR, FXD, COMP, 150 OHMS, 10%, 1/4W 745-0719-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF181K	2	RESISTOR, FXD, COMP, 180 OHMS, 10%, 1/4W 745-0722-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF221K	2	RESISTOR, FXD, COMP, 220 OHMS, 10%. 1/4W 745-0725-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1/4W 745-0728-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF331K	2	RESISTOR, FXD, COMP, 330 OHMS, 10%, 1/4W 745-0731-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF391K	2	RESISTOR, FXD, COMP, 390 OHMS, 10%, 1/4W 745-0734-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF471K	2	RESISTOR, FXD, COMP, 470 OHMS, 10%, 1/4W 745-0737-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF561K	2	RESISTOR, FXD, COMP, 560 OHMS, 10%, 1/4W 745-0740-000 EFF THRU PCB REV B	3A6R90	AR
98	RC07GF681K		RESISTOR, FXD, COMP, 680 OHMS, 10%, 1/4W 745-0743-000 EFF PCB REV B	3A6R90	AR
98	RC07GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10%, 1/4W 745-0746-000 EFF PCB REV C	3A6R90	AR
98	RC07GF102K	2	RESISTOR, FXD, COMP, 1K. 10%, 1/4W 745-0749-000 EFF PCB REV C	3A6R90	AR
99	RC07GF470K	2	RESISTOR, FXD, COMP, 47 OHMS, 10%, 1/4W 745-0701-000 EFF PCB REV C	3A6R112	1
100	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 35V 56289 184-7693-000	3A6C53	1
101	RC07GF682K	2	RESISTOR, FXD, COMP, 6.8K. 10%. 1/4W 745-0779-000	3A6R111	1
102	RC20GF222K	2	RESISTOR, FXD, COMP, 2.2K. 10%, 1/2W 745-1366-000	3A6R99	1
102	RC20GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/2W 745-1363-000 EFF PCB REV C	3A6R99	AR
102	RC20GF272K	2	RESISTOR. FXD, COMP, 2.7K, 10%, 1/2W 745-1370-000 EFF PCB REV C	3A6R99	AR

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-51- 102	RC20GF332K	2	RESISTOR, FXD, COMP, 3.3K, 10%, 1/2W 745-1373-000 EFF PCB REV C 3A6R99	AR	
103	2N3251	2	TRANSISTOR 352-0626-020 EFF PCB REV C 3A6017	1	
104	A10012	2	INSULATOR 07047 302-0437-000 EFF PCB KEV C	1	
105	2N3906	2	TRANSISTOR 352-0721-020 EFF BASIC PCB ONLY 3A6016	1	
105	2N3251	2	TRANSISTOR 352-0626-020 EFF PCB REV C 3A6016	1	
106	7717-16N	2	INSULATOR 13103 352-9552-240 EFF PCB REV A	4	
107	CK46M392M	2	CAPACITOR. FXD, CER DIELECTRIC, 3900PF, 10%, 100V 86335 913-4489-150 3A6C68	1	
108	2N4080	2	TRANSISTOR 352-0771-010 3A607	1	
109	RC07GF470K	2	RESISTOR, FXD, COMP, 47 OHMS, 10%, 1/4W 745-0701-000 3A6R108	1	
110	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10% 1/4W 745-0752-000 3A6R69	1	
111	2N4080	2	TRANSISTOR 352-0771-010 3A606	1	
112	RC07GFL22K	2	RESISTOR, FXD, COMP. 1.2K, 10%, 1/4W 745-0752-000 3A6R68	1	
113	2N502A	2	TRANSISTOR 352-0288-000 3A605	1	
114	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000 3A6R67	1	
115	2N502A	2	TRANSISTOR 352-0288-000 3A604	1	
116	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K. 10%, 1/4W 745-0752-000 3A6R66	1	
117	2N502A	2	TRANSISTOR 352-0288-000 3A6Q3	1	
118	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000 3A6R65	1	
119	2N502A	2	TRANSISTOR 352-0288-000 3A602	1	
120	563-5027-002	2	CLIP, TSTR, IF	4	
121	1N3064	2	SEMICOND DEVICE 353-3404-000 3A6CR2	1	
122	MS18130-4	2	COIL, RF, 0.47UH 240-0782-000 3A6L36	1	
123	19C267A4	2	CAPACITOR, FXD, CER DIELECTRIC, 2200PF, 20%. 500V 01939 913-3011-000 3A6C66	1	
124	RN55D1782F	2	RESISTOR, FXD, FILM, 17.8K, 1%, 1/8W 705-1056-000 3A6R106	AR	
124	RN55D2372F	2	RESISTOR, FXD, FILM, 23.7K, 1%, 1/8W 705-1062-000 3A6R106	AR	
125	RCO7GF822K	2	RESISTOR, FXD, COMP. 8.2K, 10% 1/4W 745-0782-000 3A6R110	1	
126	805-014X5V01 03Z	2	CAPACITOR. FXD, CER DIELECTRIC, 0.01UF, M20%P80%, 100V 72982 913-3680-000 3A6C69	1	
127	M518130-8	2	COIL. RF, 1UH 240-1568-000 EFF BASIC PCB ONLY 3A6L9	1	
127	M518130-21	2	COIL, RF, 12UH 240-1581-000 EF PCB REV A 3A6L9	1	
128	MS75008-32	2	COIL, RF, 2.20UH 240-1592-000 3A6L18	1	
129	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K. 10%, 1/4W 745-0773-000 3A6R2	1	
130	2404-007-250 OPFGMV	2	CAPACITOR, FXD, CER DIELECTRIC, 2500PF, 500V 72982 913-3111-010 3A6C10	1	
131	2404-007-250 OPFGMV	2	CAPACITOR, FXD, CER DIELECTRIC, 2500PF, 500V 72982 913-3111-010 3A6C11	1	

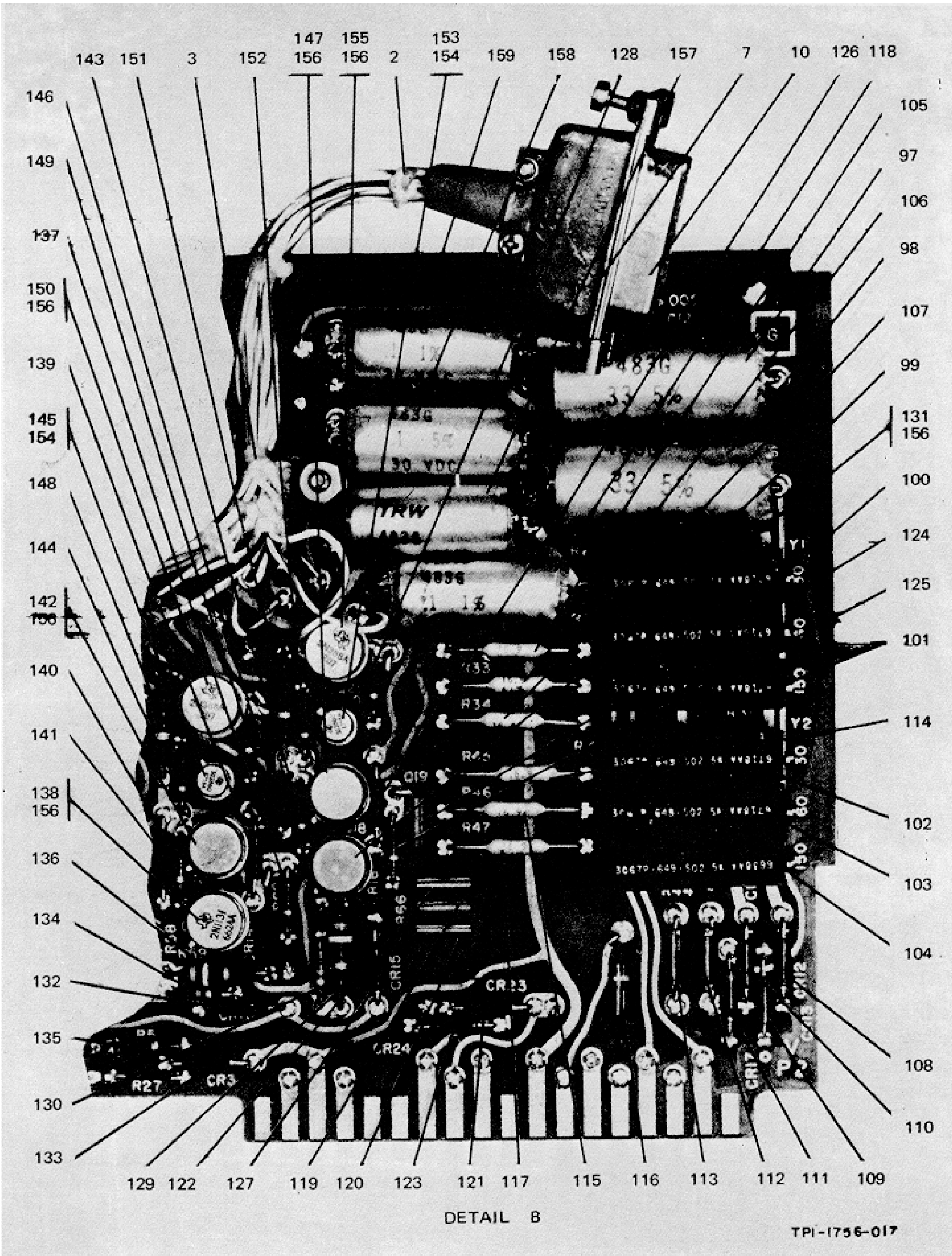
FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-51- 132	2404-007-250 OPFGMV	2	CAPACITOR, FXD, CER DIELECTRIC, 2500PF, 500V 72982 913-3111-010	3A6C12	1	
133	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000	3A6R5	1	
134	2404-007-250 OPFGMV	2	CAPACITOR, FXD, CER DIELECTRIC, 2500PF, 500V 72982 913-3111-010	3A6C13	1	
135	RC07GF272K	2	RESISTOR, FXD, COMP, 2.7K, 10%, 1/4W 745-0764-000	3A6R6	1	
136	X5V24331000GMV	2	CAPACITOR, FXD, CER DIFLECTRIC, 1000PF, 360V 72982 913-5512-000	3A6C14	1	
137	RCU7GF560K	2	RESISTOR, FXD, COMP, 56 OHMS, 10% 1/4W 745-0704-000	3A6R7	1	
138	X5V24331000GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 360V 72982 913-5512-000	3A6C15	1	
139	2404-007-250 OPFGMV	2	CAPACITOR, FXD, CER DIELECTRIC, 2500PF, 5V 72982 913-3111-010	3A6C7	1	
140	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000	3A6C6	1	
141	X552433500GMV	2	CAPACITOR, FXD. CER DIELECTRIC, 500PF, 360V 72982 913-5511-000	3A6C5	1	
142	M518130-24	2	COIL, RF, 22UH 240-0801-000	3A6L4	1	
143	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 500PF, 360V 72982 913-5511-000	3A6C4	1	
144	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000	3A6R4 1		
145	M518130-24	2	COIL, RF, 22UH 240-0801-000	3A6L3	1	
146	X5S2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC, 50OPF, 360V 72982 913-5511-000	3A6C3	1	
147	RC07GF472K	2	RESISTOR, FXD, COMP, 4.7K, 10%, 1/4W 745-0773-000	3A6R3	1	
148	MS18130-24	2	COIL, RF, 22UH 240-0801-000	3A6L2	1	
149	XSS2433500GMV	2	CAPACITOR, FXD, CER DIELECTRIC. 50OPF, 360V 72982 913-5511-000	3A6C2	1	
150	757-0069-001	2	BRACKET, STRIP		1	
151	306-0650-000	2	TERMINAL, COMPRESSION 83241		5	
152	757-0071-001	2	BARRIER, REAR EFF PCB REV A		1	
153	757-0070-001	2	BARRIER, FRONT EFF PCB REV A		1	
- 154	MS535649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP FOR 152 AND 153		5	
- 155	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 5 0.165 OD COML AP FOR 152 AND 153			
- 156	M551957-2	2	SCREW, MACH., SST, 2-56 X 3/16 5 343-0123-000 AP FOR 152 AND 153			
157	563-4962-003	2	BASE, IF		1	
- 158	P347-0006-00O	2	SCREW, MACH., SST, 4-40 X 1/4 77250 347-0006-000 AP		4	
- 159	M535338-135	2	WASHER, LOCK, SST, 0.115 ID X 4 0.212 OD 310-0279-000 AP			
160	563-5026-002	2	BRACKET, IF AMPL		4	
- 161	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML AP		2	
- 162	M535338-135	2	WASHER, LOCK, SST, 0.115 ID X 2 0.212 OD 310-0279-000 AP			
- 163	MS51957-17	2	SCPEW, MACH., SST, 4-40 X 1/2 2 343-0137-000 AP			
164	757-0065-002	2	BOARD, FLARED			

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-52- 0	555-5576-005	1	SWEFP, GENERATOR AND AMPL SEE FIG. 3-3 (26) FOR NHA	3A7	REF	
1	563-4981-0U3	2	STRIP, IDENT		1	
2	565-5572-003	2	CABLE ASSY, SWEEP NO. 2		1	
3	TY13	3	CLAMP 59730 435-1051-000		1	
- 4	MS35649-44	3	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		1	
- 5	310-0045-000	3	WASHER, FLAT, SST9 0.125 ID X 0.312 OD COML AP		1	
- 6	M551957-15 343-0135-000	3	SCREW, MACH., SST, 4-40 X 3/8 AP		1	
7	JSDA19678-1	3	SHELL 71468 371-0035-000		1	
- 8	M551957-5	3	SCREW, MACH., SST, 2-56 X 3/8 343-0126-000 AP		2	
- 9	20419	3	SCREW LOCK ASSY 71468 371-0040-000 AP		2	
10	DA1SS	3	CONNECTOR 71468 371-0019-000 3A7P1		1	
11	565-5571-003	2	CABLE ASSY, SWEEP NO. 1		1	
12	TY13	3	CLAMP 59730 435-1051-000 EFF REV B		1	
13	200L1-200	3	RESISTOR, VAR, WW, 20 OHMS, 1.7%, 1/4W 80294 377-9157-000	3A7R28	1	
14	200L1-200	3	RESISTOR, VAR, WW, 20 OHMS, 1.7%, 1/4W 80294 377-9157-000	3A7R6	1	
- 15	M535649-24	3	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP FOR 13 AND 14		4	
- 16	310-00’0-000	3	WASHER, LOCK, SST. 0.097 ID X 0.165 OD COML AP FOR 13 AND 14		4	
- 17	MS51957-6	3	SCREW, MACH., SST, 2-56 X 7/16 343-0127-000 AP FOR 13 AND 14		4	
18	H125	2	BRACKET 80294 381-1501-000		2	
- 19	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML AP		4	
- 20	M535338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		4	
- 21	M551959-13	2	SCREW, MACH.9 SST. 4-40 X 1/4 342-0044-000 AP		4	
22	RSM2C20R00F	2	RESISTOR, FXD, WW, 20 OHMS. 1%, 2.5W 91637 746-9454-000	3A7R15	1	
23	RSM2C20R00F	2	RESISTOR, FXD, WW, 20 OHMS, 1%, 2.5W 91637 746-9454-000	3A7R25	1	
24	PRS2C20R00F	2	RESISTOR, FXD, WW, 20 OHMS. 1%, 2.5W 91637 746-9454-000	3A7R37	1	
25	RSM2C20R00F	2	RESISTOR, FXD, WW, 20 OHMS, 1%, 2.5W 91637 746-9454-000	3A7R50	1	
26	RCL7TGF120K	2	RESISTOR, FXD, COMP, 12 OHMS, 10%, 1/4W 745-0680-000	3A7R27	1	
27	114P147348	2	CAPACITOR, FXD, FILM DIELECTRIC 0.33UF, 5%, 3UV 56289 933-0299-000 EFF THRU PCB REV C	3A7C4	1	
27	LP9AIB334JCR 3	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.33UF, 5%, 30V 01884 933-0989-000 EFF PCB REV 0	3A7C4	1	
28	114P147348	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.33UF, 5%, 30V 56289 933-0299-000 EFF THRU PCB REV C	3A7C8	1	
29	LP9AE1334JCR 3	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.33UF, 5%, 30V U1884 933-0989-000 EFF PCB REV D	3A7C8	1	



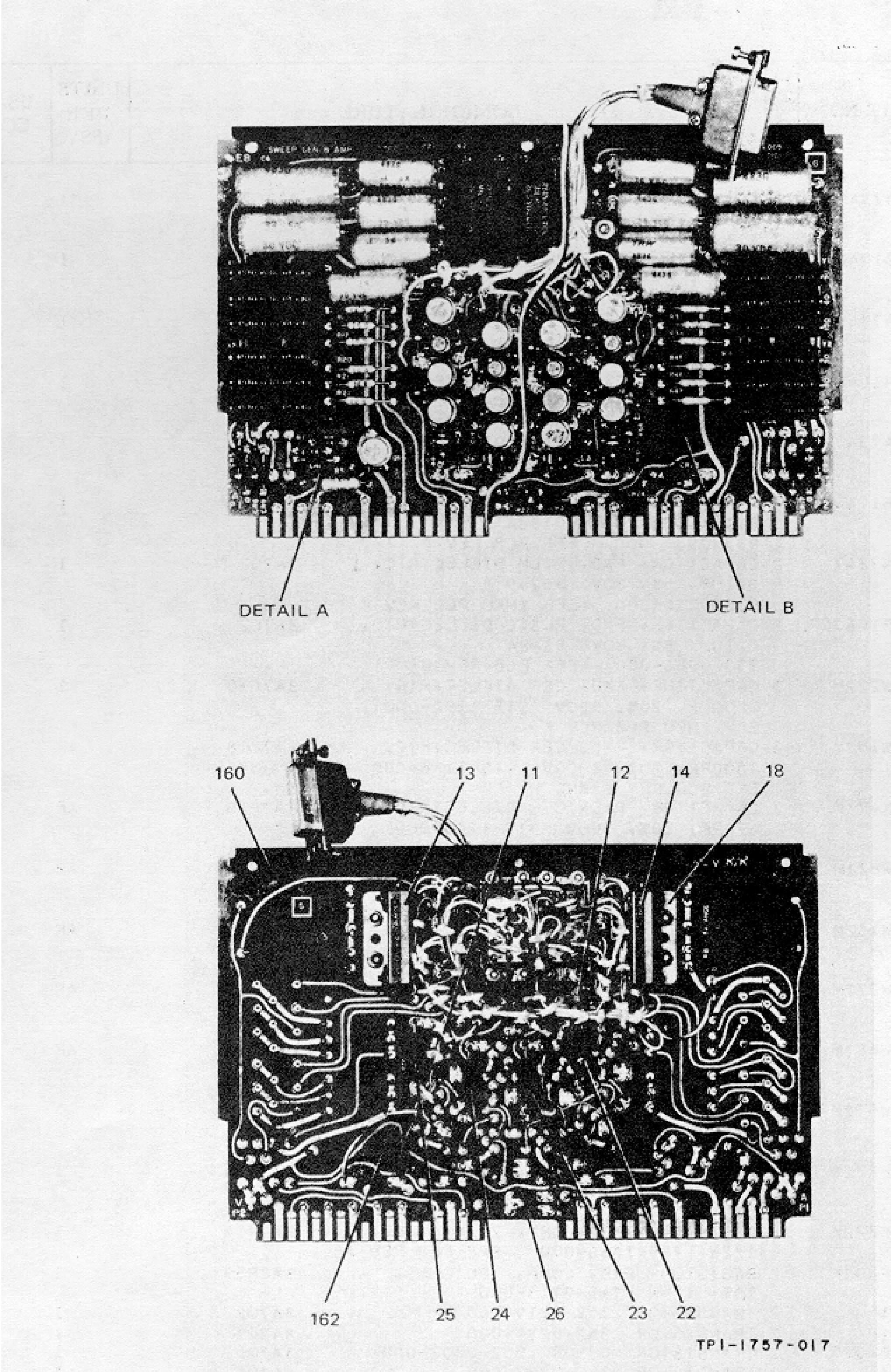
Generator and Amplifier Sweep (Sheet 1 of 3)

Figure 3-52



Generator and Amplifier Sweep (Sheet 2 of 3)

Figure 3-52



Generator and Amplifier Sweep (Sheet 3 of 3)

Figure 3-52

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-52- 29	114P147347	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.1UF, 5% 30V 56289 933-0298-000 EFF THRU PCB REV C	3A7C7	1	
29	LP9A1B1U4JCR 3	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.1UF, 5% 30V 01884 933-0986-000 EFF PCB REV D	3A7C7	1	
30	114P147347	2	CAPACITOR. FXD, FILM DIELECTRIC, 0.1UF, 5%, 30V 56289 933-0298-000 EFF THRU PCB REV C	3A7C6	1	
30	LP9AB1104JCR 3	2	CAPACITOR. FXD, PLSTC DIELECTRIC 0.1UF, 5%. 30V 933-0986-000 EFF PCB REV D	3A7C6 01884	1	
31	114P147347	2	CAPACITOR. FXD, FILM DIELECTRIC, 0.1UF, 5%, 30V 56289 933-0298-000 EFF THRU PCB REV C	3A7C3	1	
31	LP9A1B104JCR 3	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.1UF, 5%. 30V 01884 933-098f 000 EFF PCB REV D	347C3	1	
32	114P147347	2	CAPACITOR, FXD, FILM DIELECTRIC 0.1UF, 5%. 30V 56289 933-0298-000 EFF THRU PCB REV C	3A7C2	1	
32	LP9A1B104JCR 3	2	CAPACITOR. FXD, PLSTC DIELECTRIC, 0.1UF, 5% 30V 01884 933-0986-000 EFF PCB REV D	3A7C2	1	
33	CK61AW222M	2	CAPACITOR, FXD. CER DIELECTRIC, 2200PF, 20%, 500V 913-1192-000 EFF THRU PCB REV F	3A7C18	1	
33	CK60AW102M	2	CAPACITOR, FXD, CER DIELECTRIC 1000PF, 20%, 1000V 913-1186-000 EFF PCB REV G AND H	3A7C18	AR	
33	CK60AX471M	2	CAPACITOR, FXD, CER DIELECTRIC, 470PF, 20%, 500V 913-1189-000 EFF PCB REV G AND H	3A7C18	AR	
33	CK60AW821M	2	CAPACITOR, FXD. CER DIELECTRIC, 820PF, 20%. 1000V 913-1190-000 EFF PCB REV G AND H	3A7C18	AR	
33	CK60AW152M	2	CAPACITOR. FXD, CER DIELECTRIC, 1500PF, 20%, 500V 913-1191-000 EFF PCB REV G AND H	3A7C18	AR	
33	CK61AW222M	2	CAPACITOR, FXD, CER DIELECTRIC, 2200PF, 20%, 500V 913-1192-000 EFF PCB REV G AND H	3A7C18	AR	
33	CK60AW681M	2	CAPACITOR, FXD, CER DIELECTRIC9 680PF, 20%, 1000V 913-1194-000 EFF PCB REV G AND H	3A7C18	AR	
33	CK06CW472M	2	CAPACITOR, FXD. CER DIELECTRIC, 4700PF, 20%, 200V 913-3997-000 EFF PCB REV J	3A7C18	1	
34	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10% 1/4W 745-0761-000 EFF BASIC PCB ONLY	3A7R14	1	
34	RC20GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/2W 745-1366-000 EFF PCB REV A	3A7R14	1	
35	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000	3A7R53	1	
36	2N1131	2	TRANSISTOR 352-0219-000	3A702	1	
37	2N1131	2	TRANSISTOR 352-0219-000	3A703	1	
38	4JX11B2023	2	TRANSISTOR 03508 352-0207-000	3A705	1	
39	2N388A	2	TRANSISTOR 352-0352-000	3A706	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-52-40	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10% 1/4W 745-0761-000	3A7R13	1	
41	1N645	2	SEMICOND DEVICE 353-2607-000	3A7CR6	1	
42	352791FB100K 9C	2	RELAY 01526 974-0731-000 EFF THRU PCB REV G	3A7K2	1	
42	RY4N4B3L	2	RELAY 974-0787-000 EFF PCB REV H	3A7K2	1	
43	3S2791FB100K 9C	2	RELAY 01526 974-0731-000 EFF THRU PCB REV G	3A7K1	1	
43	RY4N4B3L	2	RELAY 974-0787-000 EFF PCB REV H	3A7K1	1	
- 44	MS35649-24	2	NUT, PLAIN, HEX., SST, 2-56 313-0037-000 AP FOR 42 AND 43		8	
- 45	310-0070-000	2	WASHER, LOCK, SST. 0.097 ID X 0.165 OD COML AP FOR 42 AND 43		7	
- 46	310-0071-000	2	WASHER, LOCK, SST. 0.151 ID X 0,239 OD COML AP FOR 42 AND 43		7	
- 47	310-0044-000	2	WASHER, FLAT, SST, 0.093 ID X 0.250 OD COML AP FOR 42 AND 43		1	
- 48	MS51957-3	2	SCREW, MACH., SST, 2-56 X 1/4 343-0124-000 AP FOR 42 AND 43		7	
- 49	MS51957-5	2	SCREW, MACH., SST, 2-56 X 3/8 343-0126-000 AP FOR 42 AND 43		1	
50	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K. 10%, 1/4W 745-0761-000 EFF BASIC PCB ONLY	3A7R24	1	
50	RC20GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/2W 745-1366-000 EFF PCB REV A	3A7R24	1	
51	2N388A	2	TRANSISTOR 352-0352-000	3A7012	1	
52	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000	3A7R57	1	
53	4JX11B2023	2	TRANSISTOR 03508 352-0207-000	3A7011	1	
54	A10044DAP	2	INSULATOR 07047 352-9889-000		2	
55	RC07GF222K	2	RESISTOR, FXD. COMP, 2.2K, 10%, 1/4W 745-0761-000	3A7R23	1	
56	RC07GF10K	2	RESISTOR, FXD, COMP. 100 OHMS, 10%, 1/4W 745-0713-000	3A7R54	1	
57	CK61AW222M	2	CAPACITOR, FXD. CER DIELECTRIC, 2200PF, 20%, 500V 913-1192-000 EFF THRU PCB REV F	3A7C19	1	
57	CK60AW102M	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 20%, 1000V 913-1186-000 EFF PCB REV G AND H	3A7C19	AR	
57	CK60AX471M	2	CAPACITOR, FXD, CER DIELECTRIC, 470PF, 20%, 500V 913-1189-000 EFF PCB REV G AND H	3A7C19	AR	
57	CK60AW821M	2	CAPACITOR, FXD, CER DIELECTRIC, 820PF, 20%, 1000V 913-1190-000 EFF PCB REV G AND H	3A7C19	AR	
57	CK60AW152M	2	CAPACITOR, FXD, CER DIELECTRIC, 1500PF, 20%, 500V 913-1191-000 EFF PCB REV G AND H	3A7C19	AR	
57	CK61AW222M	2	CAPACITOR, FXD, CER DIELECTRIC, 2200PF, 20%, 500V 913-1192-000 EFF PCB REV G AND H	3A7C19	AR	
57	CK60AW681M	2	CAPACITOR, FXD, CER DIELECTRIC, 680PF, 20% 1000V 913-1194-000 EFF PCB REV G AND H	3A7C19	AR	
57	CK06CW472M	2	CAPACITOR, FXD, CER DIELECTRIC, 4700PF, 20%, 200V 913-3997-000 EFF PCB REV G AND H	3A7C19	AR	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-52- 58	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000	3A7R56	1	
59	2N1131	2	TRANSISTOR 352-0219-000	3A709	1	
60	1N645	2	SEMICOND DEVICE 353-2607-000	3A7CR10	1	
61	PC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000	3A7R58	1	
62	2N1131	2	TRANSISTOR 352-0219-000	3A708	1	
63	RC20GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/2W 745-1377-000	3A7R55	1	
6	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000	3A7R16	1	
65	1N645	2	SEMICOND DEVICE 353-2607-000	3A7CR7	1	
66	1N645	2	SEMICOND DEVICE 353-2607-000	3A7CR2	1	
67	RC20GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/2W 745-1377-000	3A7R51	1	
68	RC07GF103K	2	RESTSTOR, FXD, COMP, 10K, 10% 1/4W 745-0785-000	3A7R4	1	
69	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000	3A7R52	1	
70	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20%, 50V 56289 184-7792-000 EFF THRU PCB REV H	3A7C5	1	
71	RSM2C17501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H	3A7R20	1	
71	MF5CD1962F	2	RESISTOR, FXD, FILM, 19.6K, 1%, 1/4W 19701 705-1419-290 EFF PCB REV J	3A7R20	1	
71	MF5CD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 EFF PCB REV K THRU N	3A7R20	1	
71	MF5CD1692F	2	RESISTOR, FXD, FILM, 16.9K. 1%, 1/4W 19701 705-1419-230 EFF PCB REV P	3A7R20	1	
72	RSM2C17501F	2	RESISTOR, FXD, WW, 17.5K. 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H	3A7R21	1	
72	MF5C01962F	2	RESISTOR, FXD, FILM, 19.6K, 1%, 1/4W 19701 705-1419-290 EFF PCB REV J	3A7R21	1	
72	MF5CD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 FFF PCB REV K THRU N	3A7R21	1	
72	MF5CD1692F	2	RESISTOR, FXD, FILM, 16.9K, 1%, 1/4W 19701 705-1419-230 EFF PCB REV P	3A7R21	1	
73	2N388A	2	TRANSISTOR 352-0352-000	3A701	1	
74	A10044DAP	2	INSULATOR 07047 352-9889-000 EFF THRU PCB REV B		7	
74	A1C012	2	INSULATOR 07047 302-0437-000 EFF PCB REV C		7	
75	RC07GF1C4K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000	3A7R3	1	
76	RSM2C17501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H	3A7R22	1	
76	MF5CD1962F	2	RESISTOR, FXD, FILM, 19.6K, 1% 1/4W 19701 705-1419-290 FF PCB REV J	3A7R22	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-52- 76	MF5CD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 EFF PCB REV K THRU N	3A7R22	1	
76	MF5CD1692F	2	RESISTOR, FXD, FILM, 16.9K9 1%, 1/4W 19701 705-1419-230 EFF PCB REV P	3A7R22	1	
77	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20% 50V 56289 184-7792-000 EFF THRU PCB RFV H	3A7C9	1	
78	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20%, 50V 56289 184-7792-000	3A7C1	1	
79	RC07GF103K	2	RESISTOR, FXD, COMP, 1OK, 10%, 1/4W 745-0785-000	3A7R2	1	
80	1N645	2	SEMICOND DEVICE 353-2607-000	3A7CR1	1	
81	RC07GF473K	2	RESISTOR, FXD, COMP, 47K, 10% 1/4W 745-0809-000	3A7R1	1	
82	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB RFV D	3A7R19	1	
82	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10% 114W 80294 377-0674-000 EFF PCR REV E THRU 0	3A7R19	1	
82	77PR5K	2	RESISTOR, VAR, 5K. 10%, 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R19	1	
83	1N645	2	SEMICOND DEVICE 353-2607-000 EFF THRU PCB REV H	3A7CR20	1	
84	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%. 0.25W 80294 381-1587-000 EFF THRU PCB REV D	3A7R18	1	
84	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-000 EFF PCB REV E THRU 0	3A7R18	1	
84	77PR5K	2	RESISTOR, VAR9 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R18	1	
85	1N645	2	SEMICOND DEVICE 353-2607-000	3A7CR9	1	
86	1N645	2	SEMICOND DEVICE 353-2607-000 EFF THRU PCB REV H	3A7CR19	1	
87	1N645	2	SEMICOND DEVICE 353-2607-000	3A7CR4	1	
88	1N645	2	SEMICOND DEVICE 353-2607-000	3A7CR8	1	
89	1N645	2	SEMICOND DEVICE 353-2607-000	3A7CR5	1	
90	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV D	3A7R17	1	
90	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-000 EFF PCB REV E THRU Q	3A7R17	1	
90	77PR5K	2	RESISTOR, VAR, 5K, 10%. 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R17	1	
91	3067PD22-502	2	RESISTOR, VAR, WW, 5K. 0.5%. 0.25W 80294 381-1587-000 EFF THRU PCB REV D	3A7R9	1	
91	3067P649-502	2	RESISTOR, VAR, WW. 5K. 10%. 1/4W 80294 377-0674-000 EFF PCB REV E THRU Q	3A7R9	1	
91	77PR5K	2	RESISTOR, VAR, 5K, 10% 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R9	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-52- 92	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV D 3A7R8	1	
92	3067P649-502	2	RESISTOR, VAR, WW. 5K, 10%, 1/4W 80294 377-0674-000 EFF PCB REV E THRU Q 3A7R8	1	
92	77PR5K	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV R 3A7R8	1	
93	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV D 3A7R7	1	
93	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-000 EFF PCB REV E THRU Q 3A7R7	1	
93	77PR5K	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV R 3A7R7	1	
94	RSM2C17501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H 3A7R12	1	
94	MF5CD1962F	2	RESISTOR, FXD, FILM, 19.6K. 1%, 1/4W 19701 705-1419-230 EFF PC8 REV J 3A7R12	1	
94	MF5CD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 EFF PCB REV K THRU N 3A7R12	1	
94	MF5CD1692F	2	RESISTOR, FXD, FILM, 16.9K. 1% 1/4W 19701 705-1419-230 EFF PCB REV P 3A7R12	1	
95	RSM2C17501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H 3A7R11	1	
95	MF5CD1962F	2	RESISTOR, FXD, FILM, 19.6K, 1%, 1/4W 19701 705-1419-290 EFF PCB REV J 3A7R11	1	
95	MF5CD1542F	2	RESISTOR, FXD, FILM, 15.4K. 1% 1/4W 19701 705-1419-190 EFF PCB REV K THRU N 3A7R11	1	
95	MFSCD1692F	2	RESISTOR, FXD, FILM, 16.9K, 1% 1/4W 19701 705-1419-230 EFF PCB REV P 3A7R11	1	
96	RSM2C17501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H 3A7R10	1	
96	MFSCD1962F	2	RESISTOR, FXD, FILM, 19.6K. 1%, 1/4W 19701 705-1419-290 EFF PCB REV J 3A7R10	1	
96	MF5CD1542F	2	RESISTOR. FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 EFF PCB REV K THRU N 3A7R10	1	
96	MF5C01607	2	RESISTOR, FXD, FILM, 16.9K, 1%, 1/4W 19701 705-1419-230 EFF PCB REV P 3A7R10	1	
97	114P147348	2	CAPACITOR, FXD, FILM DIELECTRIC, 0,33UF, 5%, 30V 56289 933-0299-000 EFF THRU PCB REV C 3A7C12	1	
97	LP9A1B334JCR 3	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.33UF, 5%, 30V 01884 933-0989-000 EFF PCO REV D 3A7C12	1	
98	114P147348	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.33UF, 5%, 30V 56289 933-0299-000 EFF THRU PCP REV C 3A7C16	1	

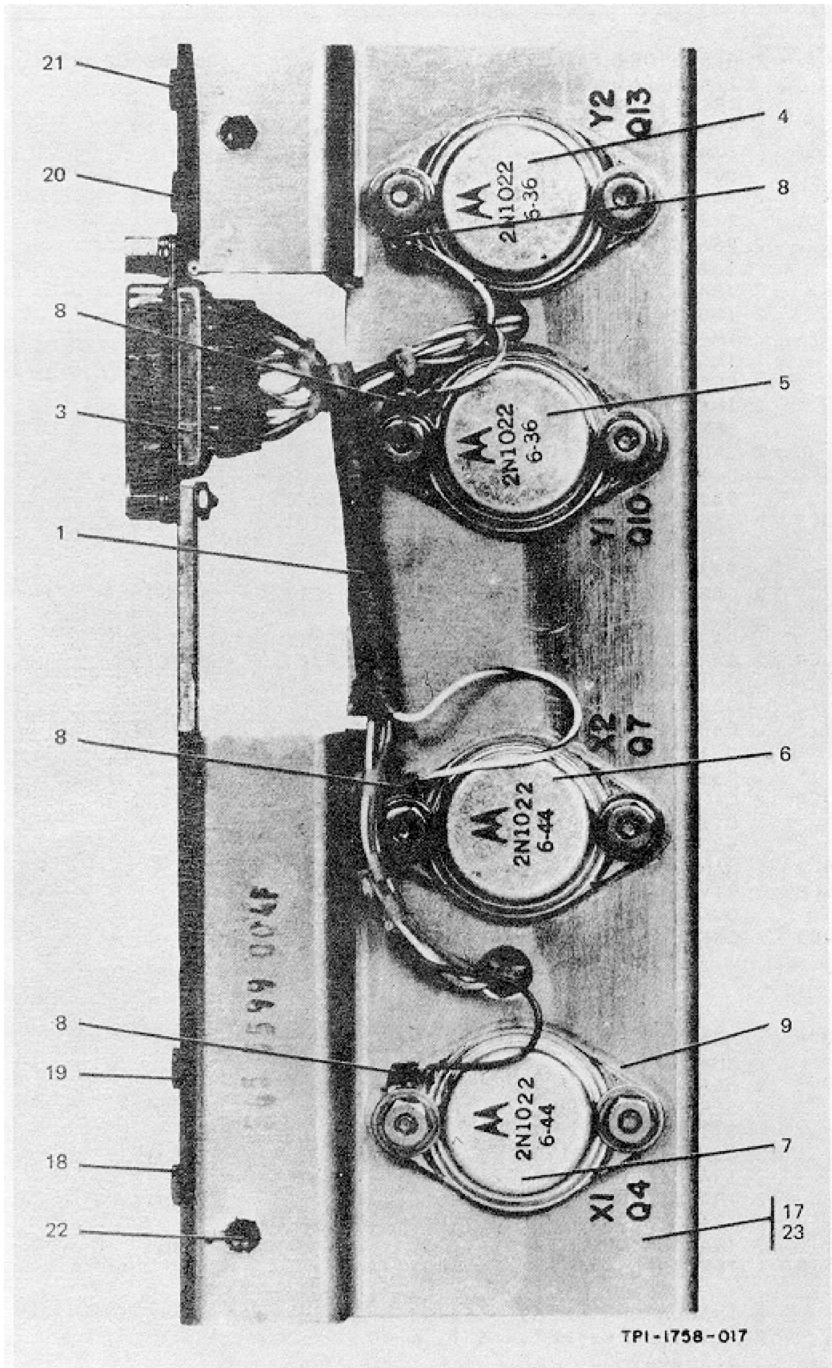
FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-52- 98 3	LP9AlB334JCR	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.33UF, 5%, 30V 01884 933-0989-000 EFF PCB REV D	3A7C16	1	
99	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV D	3A7R29	1	
99	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-000 EFF PCB REV E THRU Q	3A7R29	1	
99	77PR5K	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R29	1	
100	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV D	3A7R30	1	
100	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-000 EFF PCB REV E THRU Q	3A7R30	1	
100	77PR5K	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R30	1	
101	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV D	3A7R31	1	
101	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-000 EFF PCB REV E THRU Q	3A7R31	1	
101	77PR5K	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R31	1	
102	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV D	3A7R42	1	
102	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-C00 EFF PCB REV E THRU Q	3A7R42	1	
102	77PR5K	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R42	1	
103	3067PD22-502	2	RESISTOR, VAR, WW, 5K, 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV D	3A7R43	1	
103	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-000 EFF PCB REV E THRU Q	3A7R43	1	
103	77PR5K	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R43	1	
104	3067PD22-502	2	RESISTOR, VAR, WW, 5K. 0.5%, 0.25W 80294 381-1587-000 EFF THRU PCB REV D	3A7R44	1	
104	3067P649-502	2	RESISTOR, VAR, WW, 5K, 10%, 1/4W 80294 377-0674-000 EFF THRU PC8 REV E THRU Q	3A7R44	1	
104	77PR5K	2	RESISTOR, VAR, 5K, 10%, 3/4W 73138 382-0012-090 EFF PCB REV R	3A7R44	1	
105	RSM2C17501F	2	RESISTOR, FXD, WW, 17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H	3A7R32	1	
105	MF5CD1962F	2	RESISTOR, FXD, FILM, 19.6K, 1% 1/4W 19701 705-1419-290 EFF PCB REV J	3A7R32	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-52- 105	MFSCD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 EFF PCB REV K THRU N 3A7R32	1	
105	MF5CD1692F	2	RESISTOR, FXD, FILM, 16.9K, 1% 1/4W 19701 705-1419-230 EFF PCB REV P 3A7R32	1	
106	RSM2Cl7501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H 3A7R33	1	
106	MF5CD1962F	2	RESISTOR, FXD, FILM, 19.6K, 1%, 1/4W 19701 705-1419-290 EFF PCB REV J 3A7R33	1	
106	MF5CD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 FFF PCB REV K THRU N 3A7R33	1	
106	MF5CD1692F	2	RESISTOR, FXD, FILM, 16.9K, 1%, 1/4W 19701 705-1419-230 EFF PCB REV P 3A7R33	1	
107	RSM2C17501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H 3A7R34	1	
107	MF5CD1962F	2	RESISTOR, FXD, FILM, 19.6K, 1%, 1/4W 19701 705-1419-290 EFF PCB REV J 3A7R34	1	
107	MF5CD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 FFF PCB REV K THRU N 3A7R34	1	
107	MF5CDI692F	2	RESISTOR, FXD, FILM, 16.9K, 1%, 1/4W 19701 705-1419-230 EFF PCB REV P 3A7R34	1	
108	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR12	1	
109	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR13	1	
110	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR16	1	
111	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR17	1	
112	1N645	2	SEMICOND DEVICE 353-2607-000 EFF THRU PCB REV H 3A7CR22	1	
113	1N645	2	SEMICOND DEVICE 353-2607-000 EFF THRU PCB REV H 3A7CR21	1	
114	RSM2C17501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H 3A7R45	1	
114	MF5CD1962F	2	RESISTOR, FXD, FILM, 19.6K, 1%, 1/4W 19701 705-1419-290 EFF PCB REV J 3A7R45	1	
114	MFSCD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 EFF PCB REV K THRU N 3A7R45	1	
114	MF5CD1692F	2	RESISTOR, FXD, FILM, 16.9K, 1%, 1/4W 19701 705-1419-230 EFF PCB REV P 3A7R45	1	
115	RSM2C17501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H 3A7R46	1	
115	MFSCD1962F	2	RESISTOR, FXD, FILM, 19.6K, 1%, 1/4W 19701 705-1419-290 EFF PCB REV J 3A7R46	1	
115	MFSCD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 EFF PCB REV K THRU N 3A7R46	1	
115	MF5CD1692F	2	RESISTOR, FXD, FILM, 16.9K, 1%, 1/4W 19701 705-1419-230 EFF PCB REV P 3A7R46	1	

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-52 116	RCO7GF392K	2	RESISTOR, FXDO COMP, 3.9K, 10%, 1/4W 745-0770-000 EFF THRU PCB REV M 3A7R40	1	
117	RSM2C17501F	2	RESISTOR, FXD, WW,17.5K, 1%, 5W 91637 746-9455-000 EFF THRU PCB REV H 3A7R47	1	
117	MF5CD1962F	2	RESISTOR, FXD, FILM, 19.6K, 1%, 1/4W 19701 705-1419-290 EFF PCB REV J 3A7R47	1	
117	MF5CD1542F	2	RESISTOR, FXD, FILM, 15.4K, 1%, 1/4W 19701 705-1419-190 EFF PCB REV K THRU N 3A7R47	1	
117	MF5CD1692F	2	RESISTOR, FXD, FILM, 16.9K, 1%, 1/4W 19701 705-1419-230 FFF PCB REV P 3A7R47	1	
118	114P147347	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.1UF, 5% 30V 56289 933-0298-000 EFF THRU PCB REV C 3A7C14	1	
118	LP9A1B104JCR 3	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.1UF, 5% 30V 01884 933-0986-000 EFF PCB REV D 3A7C14	1	
119	RN65D9090F	2	RESISTOR, FXD, FILM, 909 OHMS, 1%, 1/2W 705-7094-000 EFF THRU PCB REV M 3A7R39	1	
120	RN65D9090F	2	RESISTOR, FXD, FILM, 909 OHMS, 1% 1/2W 705-7094-000 EFF THRU PCB REV M 3A7R38	1	
121	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR23	1	
122	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF , M15%P20% 50V 56289 184-7792-000 EFF THRU PCB REV H 3A7C17	1	
123	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR24	1	
124	1090505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%, P20% 50V 56289 184-7792-000 EFF THRU PCB RFV H 3A7C13	1	
125	RCO7GF1O1K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 3A7R66	1	
126	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR18	1	
127	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR15	1	
128	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10% 1/4W 745-0761-000 3A7R48	1	
129	RC20GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/2W 745-1377-000 3A7R63	1	
130	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A7R41	1	
131	2N1131	2	TRANSISTOR 352-0219-000 3A7018	1	
132	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR11	1	
133	1N645	2	SEMICOND DEVICE 353-2607-000 3A7CR3	1	
134	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3A7R26	1	
135	RC07GF120K	2	RESISTOR, FXD, COMP, 12 OHMS, 10%, 1/4W 745-0680-000 3A7R5	1	
136	RC20GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/2W 745-1377-000 3A7R59	1	
137	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 3A7R62	1	
138	2N1131	2	TRANSISTOR 352-0219-000 3A7014	1	
139	1N645	2	SEMICOND DEVIC- 353-2607-000 3A7CR14	1	
140	RC07GF187K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000 3A7R60	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-52- 141	CK61AW222M	2	CAPACITOR. FXD, CER DIELECTRIC, 2200PF, 20%, 500V 913-1192-000 EFF THRU PCB REV F	3A7C20	1	
141	CK60AW102M	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 20%, 100V 913-1186-000 EFF PCB REV G AND H	3A7C20	AR	
141	CK6OAX471M	2	CAPACITOR, FXD, CFR DIELECTRIC, 470PF, 20%, 500V 913-1189-000 EFF PCB REV G AND H	3A7C20	AR	
141	CK60AW821M	2	CAPACITOR. FXD, CER DIELECTRIC, 820PF, 20%, 1000V 913-1190-000 EFF PCB REV G AND H	3A7C20	AR	
141	CK60AW152M	2	CAPACITOR, FXD, CER DIELECTRIC, 1500PF, 20%, 500V 913-1191-000 EFF PC8 REV G AND H	3A7C20	AR	
141	CK61AW222M	2	CAPACITOR, FXD, CER DIELECTRIC, 2200PF, 20%, 500V 913-1192-000 EFF PCB REV G AND H	3A7C20	AR	
141	CK60AW681M	2	CAPACITOR, FXD, CER DIELECTRIC, 680PF, 20%, 1000V 913-1194-000 EFF PCB REV G AND H	3A7C20	AR	
141	CK06CW472M	2	CAPACITOR, FXD, CER DIELECTRIC, 4700PF, 20%, 200V 913-3997-000 EFF PCB REV J	3A7C20	1	
142	2N1131	2	TRANSISTOR 352-0219-000	3A7015	1	
143	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K, 10%, 1/4W 745-0758-000	3A7R64	1	
144	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%. 1/4W 745-0713-000	3A7R61	1	
145	4JX1182023	2	TRANSISTOR 03508 352-0207-000	3A7016	1	
146	CK61AW222M	2	CAPACITOR, FXD, CER DIELECTRIC. 2200PF, 20%, 500V 913-1192-000 EFF THRU PCB REV F	3A7C21	1	
146	CK60AW102M	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 20%, 1000V 913-1186-000 EFF PCB REV G AND H	3A7C21	AR	
146	CK60AX471M	2	CAPACITOR, FXD, CER DIELECTRIC, 470PF, 20%, 500V 913-1189-000 EFF PCB REV G AND H	3A7C21	AR	
146	CK60AW821M	2	CAPACITOR, FXD, CER DIELECTRIC, 820PF, 20%, 1000V 913-1190-000 EFF PCB REV G AND H	3A7C21	AR	
146	CK60AW152M	2	CAPACITOR, FXD, CER DIELECTRIC, 1500PF, 20%, 500V 913-1191-000 EFF PCB REV G AND H	3A7C21	AR	
146	CK61AW222M	2	CAPACITOR. FXD, CER DIELECTRIC, 2200PF, 20%, 500V 913-1192-000 EFF PCB REV G AND H	3A7C21	AR	
146	CK60AW681M	2	CAPACITOR, FXD, CER DIELECTRIC, 680PF, 20%, 1000V 913-1194-000 EFF PCB REV G AND H	3A7C21	AR	
146	CK06CW472M	2	CAPACITOR. FXD, CER DIELECTRIC, 4700PF, 20%, 200V 913-3997-000 EFF PCB REV J	3A7C21	1	
147	2N1131	2	TRANSISTOR, 352-0219-000	3A7019	1	
148	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K. 10%, 1/4W 745-0761-000 EFF BASIC PCB ONLY	3A7R36	1	
148	RC20GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/2W 745-1366-000 EFF PCB REV A	3A7R36	1	

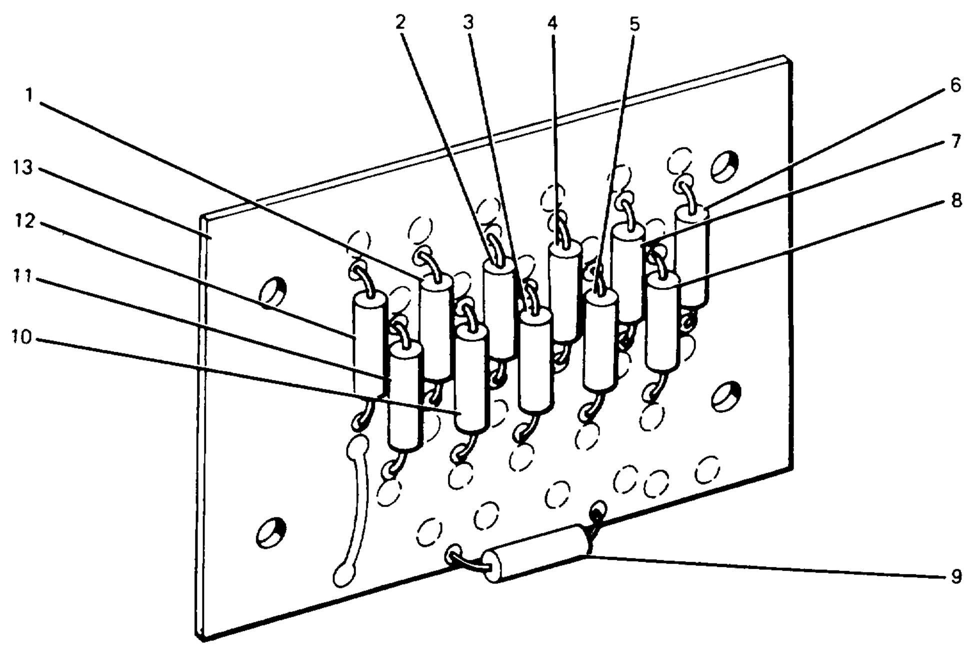
FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-52- 149	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/4W 745-0761-000 3A7R35	1	
150	2N388A	2	TRANSISTOR 352-0352-000 3A7017	1	
151	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/4W 745-0761-000 EFF BASIC PCB ONLY 3A7R49	1	
151	RC20GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/2W 745-1366-000 EFF PCB REV A 3A7R49	1	
152	RC07GF101K	2	RESISTOR, FXD, COMP, 100 OHMS, 10%, 1/4W 745-0713-000 3A7R65	1	
153	4JX11B2023	2	TRANSISTOR 03508 352-0207-000 3A7020	1	
154	A10044DAP	2	INSULATOR 07047 352-9889-000	2	
155	2N388A	2	TRANSISTOR 352-0352-000 3A7Q21	1	
156	A10044DAP	2	INSULATOR 07047 352-9889-000 EFF THRU PCB REV B	6	
156	A10012	2	INSULATOR 07047 302-0437-000 6 EFF PCB REV C		
157	114P147347	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.1UF, 5%, 30V 56289 933-0298-000 EFF THRU PCB RSV C 3A7C10	1	
157	LP9A1B104JCR 3	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.1UF, 5%, 30V 01884 933-0986-000 EFF PCB REV D 3A7C10	1	
158	114P147347	2	CAPACITOR, FXD, FILM DIELECTRIC, 0,1UF, 5%, 30V 56289 933-0298-000 EFF THRU PCB REV C 3A7C15	1	
158	LP9A1B104JCR 3	2	CAPACITOR, FXD, PLST, DIELECTRIC, 0.1UF, 5%, 30V 01884 933-0986-000 EFF PCB REV D 3A7C15	1	
159	114P147347	2	CAPACITOR, FXD, FILM DIELECTRIC, 0.1UF, 5%, 30V 56289 933-0298-000 EFF THRU PCB REV C 3A7C11	1	
159	LP9A1B104JCR 3	2	CAPACITOR, FXD, PLSTC DIELECTRIC, 0.1UF, 5%, 30V 01884 933-0986-000 EFF PCB REV D 3A7C11	1	
160	563-5012-002	2	HANDLE, LONG	1	
- 161	R4008X3-16CH ROMATEDP	2	RIVET, TUBULAR, AL, 0.089 DIA X 0.187 12014 305-0171-000 AP	3	
162	565-5575-005	2	SWEEP, GENERATOR AND AMPL	1	
3-53- 0	565-5602-004	1	HEATSINK SEE FIG. 3-35(27) FOR 3A8 NHA	REF	
1	563-4994-003	2	HEATSINK ASSY	1	
- 2	CA20418-4	2	SCREW, ASSEMBLED CLIP 71468 371-0062-000 AP	2	
3	DAI5P	3	CONNECTOR 71785 371-0020-000 3A8J1	1	
4	2N1022	2	TRANSISTOR 352-0247-000 3A8013	1	
5	2N1022	2	TRANSISTOR 352-0247-000 3A8Q10	1	
6	2N1022	2	TRANSISTOR 352-0247-000 3ABQ7	1	
7	2N1022	2	TRANSISTOR 352-0247-000 3AB04	1	
8	4007-SHOTTIN NED	2	TERMINAL 77147 304-0017-000	4	
9	DM103	2	INSULATOR 08289 352-9854-000	4	
- 10	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP FOR 4 THRU 9	8	
- 11	310-0278-000	2	WASHER, LOCK. SST, 0.115 ID X 0.202 OD COML AP FOR 4 THRU 9	8	
- 12	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP FOR 4 THRU 9	8	
- 13	302-0385-000	2	INSULATOR, WASH, 20999 AP FOR 4 THRU 9	8	



Heatsink

Figure 3-53

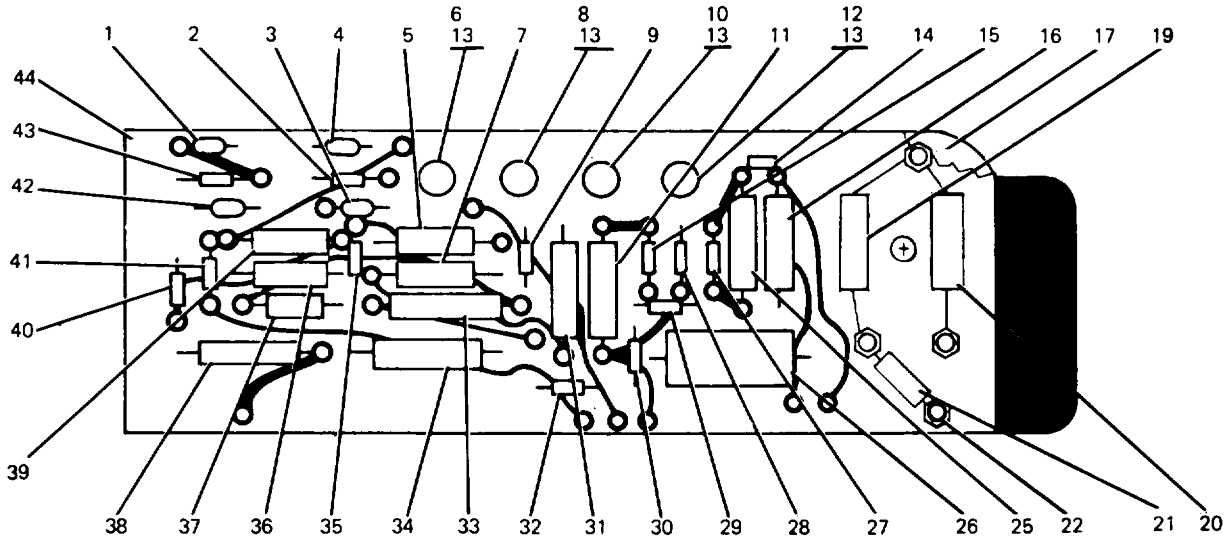
FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-53- 14	310-0057-000	2	WASHER, FLAT, NI PL BRS5 0.172 ID X 0.375 OD COML AP FOR 4 THRU 9	8	
- 15	562-2984-U02	2	BUSHING AP FOR 4 THRU 9	8	
- 15	769-7039-002	2	BUSHING EFF HEATSINK REV B AP FOR 4 THRU 9	8	
- 16	M551959-17	2	SCREW, MACH.9 SST, 4-40 X ½ 342-0048-000 AP FOR 4 THRU 9	8	
17	565-5600-004	2	HEATSINK, STAKED	1	
18	SKT5BCGRN	3	JACK, TIP, GRN 98291 A8J2 360-0142-000	1	
19	SKT5BCGRN	3	JACK, TIP, GRH 98291 3ABJ3 360-0142-000	1	
20	SKT5BCBLU	3	JACK, TIP, BLU 98291 3A8J4 360-0143-600	1	
21	SKTSBCBLU	3	JACK, TIP, BLU 98291 3A8J5 360-0143-000	1	
22	561-6430-002	3	RIVET. NUT	2	
23	565-5599-004	3	HEATSINK, STAKED	1	



Resistor Board

Figure 3-54

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
3-54- 0	564-9473-003	1	RESISTOR BOARD SEE FIG. 3-35(38) FOR NHA EFF THRU REV 17	3TB10	REF	
1	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K. 10%, 1/4W 745-0776-000	3TB10R27	1	
2	RC07GF562K	2	RESISTOR, FXD0 COMP. 5.6K, 10% 1/4W 745-0776-000	3TN10R29	1	
3	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000	3TB10R30	1	
4	RC07GF562K	2	RESISTOR, FXD, COMP. 5.6K, 10%, 1/4W 745-0776-000	3TB10R31	1	
5	RC07GF562K	2	RESISTOR. FXD, COMP. 5.6K, 10% 1/4W 745-0776-000	3TB10R32	1	
6	RC07GF562K	2	RESISTOR, FXD, COMP. 5.6K. 10% 1/4W 745-0776-000	3TB10R35	1	
7	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000	3TB10R33	1	
8	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K. 10%, 1/4W 745-0776-000	3TB10R34	1	
9	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000	3TB10R24	1	
10	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000	3TB10R28	1	
11	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10% 1/4W 745-0776-000	3TB10R26	1	
12	RC07GF562K	2	RESISTOR, FXD, COMP, 5.6K, 10%, 1/4W 745-0776-000	3TB10R25	1	
13	564-9472-003	2	RESISTOR BOARD		1	
3-55- 0	565-5621-004	1	DETFCTOR BOARD ASSY SEE FIG. 3-35(100) FOR NHA EFF THRU REV 17/T	3T81	REF	
1	DM20F332J500	2	CAPACITOR, FXD, MICA DIELECTRIC, 1/4W 3300PF, 5%, 500V 72136 912-3354-000	3TB1C5	1	
2	RC07GF273K	2	RESISTOR. FXD, COMP, 27K. 10% 1/4W 745-0800-000	3TB1R6	1	
3	DM20F332J500 WV	2	CAPACITOR, FXD, MICA DIELECTRIC, 3300PF. 5%, 500V 72136 912-3354-000	3TB1C4	1	
4	DM20F332J500 WV	2	CAPACITOR, FXD, MICA DIELECTRIC, 3300PF. 5%, 500V 72136 912-3354-000	3TBIC3	1	
5	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20%50V 56289 184-7792-000	3TB1C9	1	
6	2N2043A	2	TRANSISTOR 352-0476-000	3TB1Q5	1	
7	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20%, 50V 56289 184-7792-000	3TB1C23	1	
8	2N2043A	2	TRANSTSTOR 352-0476-000	3TB106	1	
9	RC07GF100K	2	RESISTOR, FXD, COMP, 10 OHMS, 10%. 1/4W 745-0677-000	3TB1R47	1	
10	2N2043A	2	TRANSISTOR 352-0476-000	3TB1Q4	1	
11	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20%, 50V 56289 184-7792-000	3TB1C7	1	
12	2N2043A	2	TRANSISTOR 352-0476-000	3TB103	1	
13	A10044DAP	2	INSULATOR 07047 352-9889-000 EFF THRU PCB REV C		4	

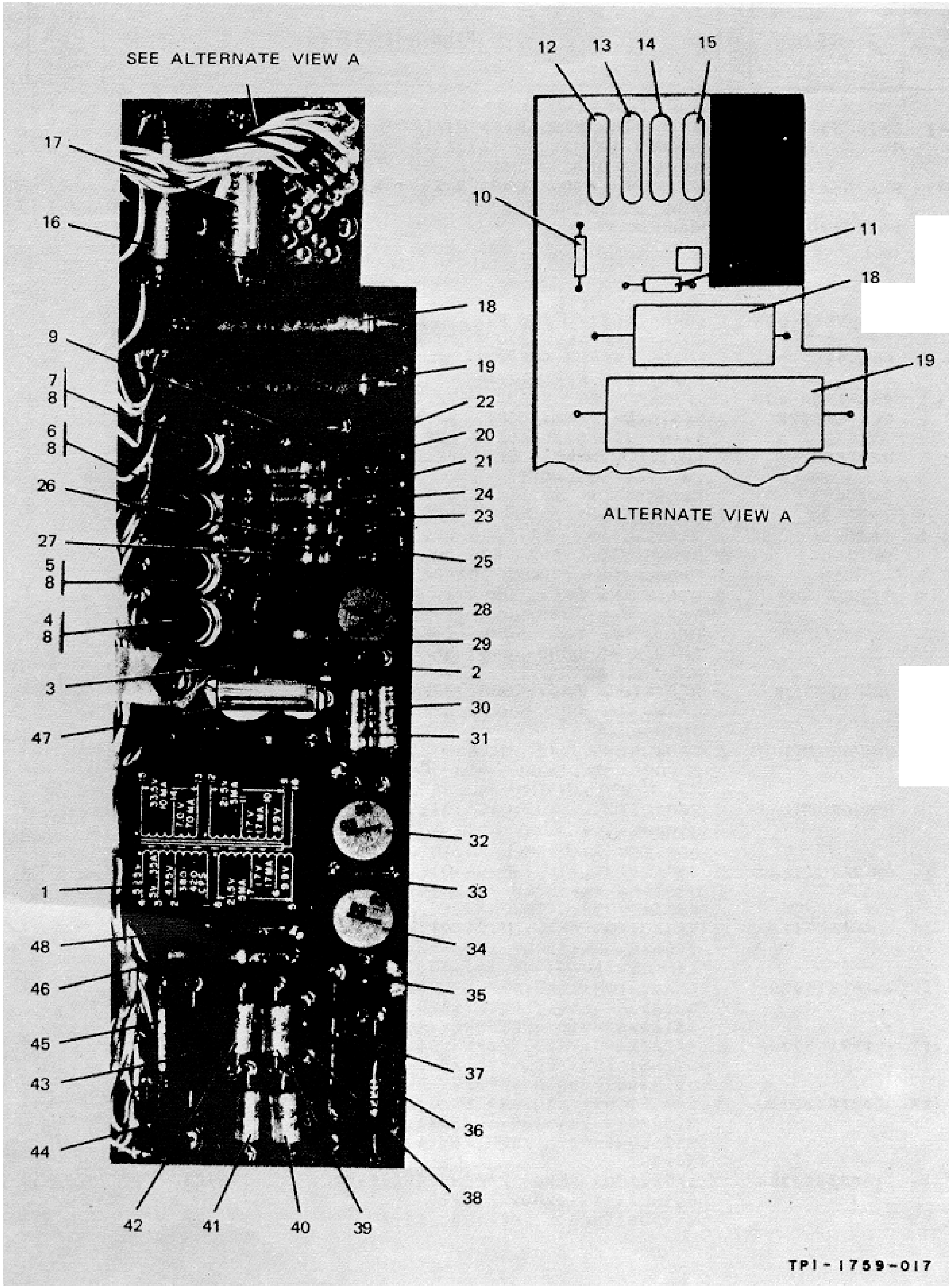


Detector Board Assembly

Figure 3-55

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
3-55- 13	A10012	2	INSULATOR 07047 302-0437-000 EFF PCB REV D	4	
14	RC07GF100K	2	RESISTOR, FXD, COMP, 10 OHMS, 10%, 1/4W 745-0677-000 3T81R44	1	
15	RC07GF100K	2	RESISTOR, FXD, COMP. 10 OHMS, 10% 1/4W 745-0677-00U 3T81R45	1	
16	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20%, 50V 56289 184-7792-000 3T81C20	1	
17	MP848-5B	2	COIL, RF, 4.3MH 95105 240-0459-000 S85 3TB1L1	1	
- 18	M551957-30	2	SCREW, MACH., SST, 6-32 X 1/2 343-0171-000 S85 AP	1	
19	150D476X0035 S2	2	CAPACITOR, FXD, ELECT., 47UF, 201% 35V 56289 184-7411-000 585 3TB1C24	1	
20	109D566X0075 T2	2	CAPACITOR, FXD, ELECT., 56PF, 20%, 75V 56289 184-7793-000 SB5 3TB1C25	1	
21	RC20GF180K	2	RESISTOR, FXD, COMP, 18 OHMS. 10%, 1/2W 745-1279-000 S85 3TR1R49	1	
22	TF300	2	TERMINAL 98291 306-1018-000 4 SB5		
- 23	MS51959-2	2	SCREW, MACH., SST, 2-56 X 3/1 342-0132-000 SB5 AP	1	
- 24	P342-0123-00 0	2	SCREW, MACH.. SST, 12-24 X 1-1/4 77250 342-0123-000 585 AP	3	
25	109D505C2050 C2	2	CAPACITOR% FXD, ELECT., 5UF, M15SP20%, 50V 56289 184-7792-000 3TB1C8	1	
26	109D566X0075 T2	2	CAPACITOR, FXD, ELECT., 56PF, 20%, 75V 56289 184-7793-000 3TB1C14	1	
27	RC07GF104K	2	RESISTOR. FXD. COMP. 100K, 10%, 1/4W 745-0821-000 3TB1R18	1	
28	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000 3TB1R17	1	
29	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10%, 1/4W 745-0785-000 3TB1R23	1	
30	RC07GF100K	2	RESISTOR. FXD, COMP, 10 OHMS, 10%, 1/4W 745-0677-000 EFF THRU PCB REV A 3TB1R22	1	
30	RC07GF121K	2	RESISTOR, FXD, COMP, 120 OHMS, 10%, 1/4W 745-0716-000 EFF PCB REV B 3TB1R22	1	
31	109D505C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M151P20%, 50V 56289 184-7792-000 3TB1C21	1	
32	1N645	2	SEMICOND DEVICE 353-2607-000 3TB1CR4	1	
33	150D226X0035 R2	2	CAPACITOR, FXD, ELECT., 22UF, 20%, 35V 56289 184-7695-000 3TB1C13	1	
34	RC42GF131J	2	RESISTOR, FXD, COMP, 130 OHMS, 5% X 2W 745-5615-000 3TB1R21	1	
35	RC07GF104K	2	RESISTOR. FXD, COMP,100K. 10%, 1/4W 745-0821-000 3TB1R19	1	
36	109D505C2U50 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20%. 50V 56289 184-7792-000 3TB1C22	1	
37	RC20GF105K	2	RESISTOR, FXD, COMP, 1MEGO, 10%, 1/2W 745-1478-000 3TB1R36	1	
38	150D226X0035 R2	2	CAPACITOR. FXD, ELECT, 22UF, 20%, 35V 56289 184-7695-000 3TB1C2	1	
39	109DS05C2050 C2	2	CAPACITOR, FXD, ELECT., 5UF, M15%P20%, 50V 56289 184-7792-000 3TB1C01	1	
40	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000 3TB1R20	1	
41	RC07GF100K	2	RESISTOR, FXD, COMP, 10 OHMS, 10%, 1/4W 745-0677-000 3TB1R46	1	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-55 - 42	DM20F332J500 WV	2	CAPACITOR, FXD, MICA DIELECTRIC, 3300PF, 5% 500V 72136 912-3354-000	3TB1C6	1	
43	RC07GF273K	2	RESISTOR, FXD, COMP, 27K, 10%, 1/4W 745-0800-000	3TB1R9	1	
44	565-5620-004	2	BOARD ASSY		1	
3-56 - 0	556-9552-003	1	BOARD ASSY SEE FIG. 3-35 (100) FOR NHA EFF REV 18/U THRU AJ/AG	3TB1	REF	
3-56 - 0	556-9552-006	1	BOARD ASSY SEE FIG. 3-35 (100) FOR NHA EFF REV AK/AH	3TB1	REF	
1	950-1404-400	2	TRANSFORMER 83003 672-0207-000	3TB1T5	1	
2	RC07GF392K	2	RESISTOR, FXD, COMP, 3.9K 10%, 1/4W 745-0770-000 EFF PCB REV A	3TB1R12	1	
3	RC42BF820J	2	RESISTOR, FXD, COMP, 82 OHMS, 5%, 2W 745-5306-000	3TB1R3	1	
4	2N2043A	2	TRANSISTOR 352-0476-000	3T781Q3	1	
5	2N2043A	2	TRANSISTOR 352-0476-000	3TB1Q4	1	
6	2N2043A	2	TRANSISTOR 352-0476-000	3TB1Q6	1	
7	2N2043A	2	TRANSISTOR 352-0476-000	3TB1Q5	1	
8	A10012	2	INSULATOR 07047 302-0437-000		4	
9	RC20GF100K	2	RESISTOR, FXD, COMP, 10 OHMS, 10%, 1/2W 745-1268-000	3TB1R1	1	
10	RC07GF273K	2	RESISTOR, FXD, COMP, 27K, 10%, 1/4W 745-0800-000 EFF REV 18/U THRU AJ/AG	3TB1R6	1	
11	RC07GF273K	2	RESISTOR, FXD, COMP, 27K 10%, 1/4W 745-0800-000 EFF REV 18/U THRU AJ/AG	3TB1R9	1	
12	CM06FD332J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 3300PF, 5%, 500V 912-3040-000 EFF REV 18/U THRU AJ/AG	3TB1C3	1	
13	CM06FD332J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 3300PF, 5% 500V 912-3040-000 EFF REV 18/U THRU AJ/AG	3TB1C4	1	
14	CM06FD332J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 3300PF, 5% 500V 912-3040-000 EFF REV 18/U THRU AJ/AG	3TB1C5	1	
15	CM06FD332J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 3300PF, 5% 500V 912-3040-000 EFF REV 18/U THRU AJ/AG	3TB1C6	1	
16	118P82392S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.082UF, 10%, 200V 56289 951-0867-050 EFF REV AK/AH	3TB1C5	1	
17	118P10492S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.1UF, 10%, 200V 56289 951-2487-000 EFF REV AK/AH	3TB1C34	1	
18	SDB1K01823J	2	CAPACITOR FXD, PAPER DIELECTRIC, 0.082UF, 5%, 100V 53021 931-5008-000 EFF REV 18/U THRU AJ/AG	3TB1C15	1	
18	118P15452S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.15UF, 5%, 200V 56289 951-0867-060 EFF REV AK/AH	3TB1C33	1	

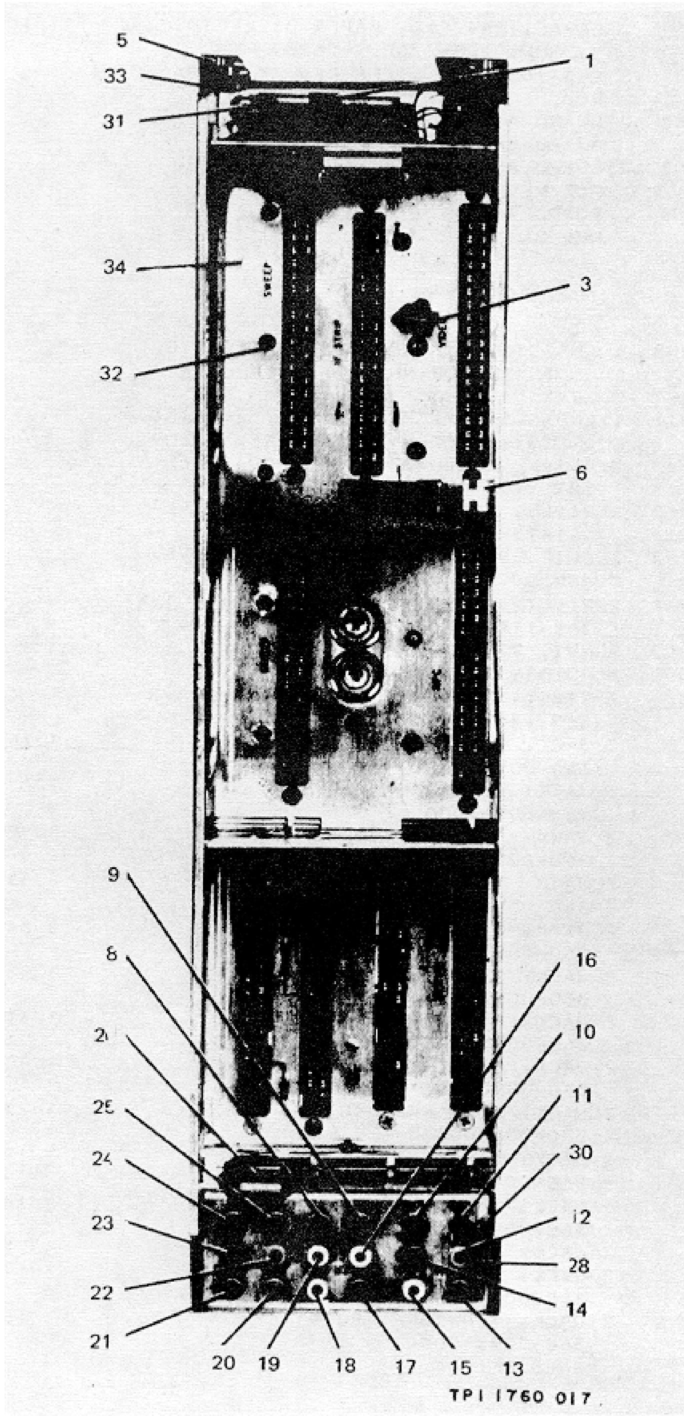


Board Assembly, TB1
Figure 3-56

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
3-56 - 19	196P4749154	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.47UF, 10%, 100 56289 931-9631-000 EFF REV 18/U THRU AJ/AG	3TB1C1	1	
19	118P2749254	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.027UF, 10%, 200V 56289 951-2502-000 EFF REV AK/AG	3TB1C1	1	
20	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000	3TB1R19	1	
21	RC07GF104K	2	RESISTOR, FXD COMP, 100K, 10%, 1/4W 745-0821-000	3TB1R20	1	
22	109D106X0050 C2	2	CAPACITOR, FXD, ELECT., 10PF, 20%, 50V 56289 184-7785-000	3TB1C9	1	
23	RC07GF104K	2	RESISTOR, FXD, COMP, 100K, 10%, 1/4W 745-0821-000	3TB1R18	1	
24	109D106X0050 C2	2	CAPACITOR, FXD, ELECT., 10PF, 20%, 50V 56289 184-7785-000	3TB1C10	1	
25	RC07GF104K	2	RESISTOR FXD, COMP, 100K 10%, 1/4W 745-0821-000	3TB1R17	1	
26	109D106X0050 C2	2	CAPACITOR, FXD, ELECT., 10PF, 20%, 50V 56289 184-7785-000	3TB1C8	1	
27	109D106X0050 C2	2	CAPACITOR. FXD, ELECT 10PF, 20%, 50V 56289 184-7785-000	3TR1C7	1	
28	CT100-100	2	RESISTOR, VAR, WW, 100 OHMS, 5% 1W 75042 381-1465-000	3TB1R15	1	
29	RC42GF821K	2	RESISTOR, FXD, COMP, 820 OHMS, 10% 2W 745-5649-000	3TB1R2	1	
30	109D106X0050 C2	2	CAPACITOR, FXD, ELECT., 10PF, 20%, 50V 56289 184-7785-000 EFF REV 18/U THRU AJ/AG PCB REV A	3TB1C18	1	
30	1090106X0050 C2	2	CAPACITOR FXD, ELECT., 10PF, 20%, 50V 56289 184-7785-000 EFF REV AK/AH BASIC PCB	3TB1C18	1	
31	109D0106X0050 C2	2	CAPACITOR FXD, ELECT., 10PF, 20%, 50V 56289 184-7785-000 EFF REV 18/U THRU AJ/AG PCB REV A	3TB1C19	1	
31	109D106X0050 C2	2	CAPACITOR. FXD, ELECT 10PF, 20%, 50V 56289 184-7785-000 EFF REV AK/AG BASIC PCB	3TB1C19	1	
32	CT100-100	2	RESISTOR, VAR, WW, 100 OHMS, 5%, 1W 75042 381-1465-000	3TB1R14	1	
33	RC07GF392K	2	RESISTOR, FXD, COMP, 3.9K, 10%, 1/4W 745-0770-000	3TB1R16	1	
34	CT100-100	2	RESISTOR, VAR WW, 100 OHMS, 5%, 1W 75042 381-1465-000	3TB1R13	1	
35	RC07GF820J	2	RESISTOR, FXD, COMP, 82 OHMS, 5%, 1/4W 745-0709-000 EFF REV 18/U THRU AJ/AG THRU PCB REV D	3TB1R22	1	
35	RC07GF270K	2	RESISTOR, FXD, COMP, 27 OHMS, 10%, 1/4W 745-0692-000 EFF REV 18/U THRU AJ/AG PCB REV E	3TB1R22	1	
35	RC07GF270K	2	RESISTOR, FXD, COMP, 27 OHMS, 10%, 1/4W 745-0692-000 EFF REV AK/AG BASIC PCB	3TB1R22	1	
36	RN65D3830F	2	RESISTOR, FXD, FILM, 383 OHMS 1% 1/2W 705-7076-000 EFF REV 18/U THRU AJ/AG THRU PCB REV D	3TB1R38	1	
36	RN65D4220F	2	RESISTOR. FXD, FILM, 422 OHMS, 1%, 1/2W 705-7078-000 EFF REV 18/U THRU AJ/AG PCB RV E	3TB1R38	1	

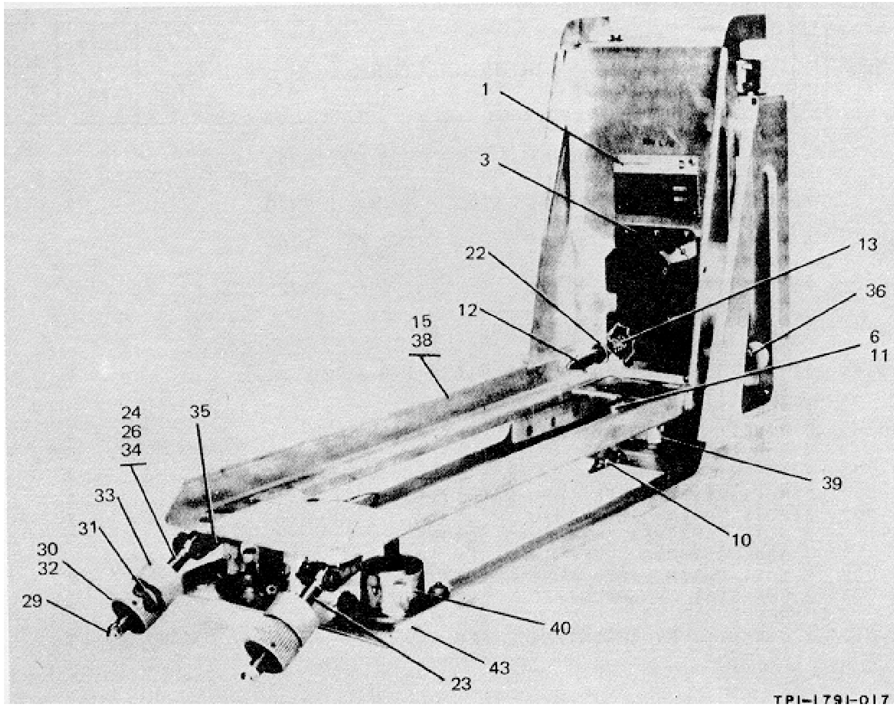
FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-56 - 36	RN65D4220F	2	RESISTOR, FXD, FILM, 422 OHMS, 1%, 1/2W 705-7078-000 EFF REV AK/AG BASIC PCB 3TB1R38	1	
37	RN6503830F	2	RESISTOR, FXD, FILM, 383 OHMS, 1%, 1/2W 705-7076-000 EFF REV 18/U THRU AJ/AG THRU PCB REV D 3TB1R39	1	
37	RN65D4220F	2	RESISTOR, FXD, FILM, 422 OHMS, 1%, 1/2W 705-7078-000 EFF REV 18/U THRU AJ/AG PCB REV E 3TB1R39	1	
37	RN6504220F	2	RESISTOR, FXD, FILM, 422 OHMS, 1%, 1/2W 705-7078-000 EFF REV AK/AG BASIC PCB 3TB1R39	1	
38	RC075F820J	2	RESISTOR, FXD, COMP, 82 OHMS, 5%, 1/4W 745-0709-000 EFF REV 18/U THRU AJ/AG THRU PCB REV D 3TR1R23	1	
38	RC07GF270K	2	RESISTOR, FXD, COMP, 27 OHMS, 10%, 1/4W 745-0692-000 EFF REV 18/U THRU AJ/AG PCB REV E 3TB1R23		
38	RC07GF270K	2	RESISTOR, FXD, COMP, 27 OHMS, 10%, 1/4W 745-0692-000 EFF REV AK/AG BASIC PCB 3TB1R23	1	
39	1N3254	2	SEMICOND DEVICE 353-3275-000 3TB1CR6	1	
40	1N3254	2	SEMICOND DEVICE 353-3275-000 3TB1CR5	1	
41	1N3254	2	SEMICOND DEVICE 353-3275-000 3TB1CR3	1	
42	1N3254	2	SEMICOND DEVICE 353-3275-000 3TB1CR4	1	
43	RC42GF131J	2	RESISTOR, FXD, COMP, 130 OHMS, 5%, 2W 745-5615-000 EFF REV 18/U THRU AJ/AG THRU PCB REV C 3TB1R21		
43	RC42GF131J	2	RESISTOR, FXD, COMP, 130 OHMS, 5%, 2W 745-5615-000 EFF REV AK/AG THRU PCB REV B 3TB1R21	1	
43	RW69V101	2	RESISTOR, FXD, WW, 100 OHMS, 5%, 3W 747-5340-000 EFF REV 18/U THRU AJ/AG PCB REV D 3TB1R21	1	
43	RW69V101	2	RESISTOR, FXD, WW, 100 OHMS, 5%, 3W 747-534C-000 EFF REV AK/AG PCB REV C 3TB1R21	1	
44	RC20GF105K	2	RESISTOR, FXD, COMP, 1MEGO, 10%, 1/2W 745-1478-000 EFF REV 18/U THRU AJ/AG THRU PCB REV B 3TB1R36	1	
44	RC07GF105K	2	RESISTOR, FXD COMP, 1MEGO, 10%, 1/4W 745-0857-000 EFF REV 18/U THRU AJ/AG PCB REV C 3TB1R36	1	
44	RC07GF105K	2	RESISTOR, FXD, COMP, 1MEGO, 10%, 1/4W 745-0857-000 EFF REV AK/AG BASIC PCB 3TB1R36	1	
45	150D104X0035 A2	2	CAPACITOR, FXD, ELECT., 0.10UF, 20%, 35V 56289 184-7408-000 EFF REV 18/U THRU AJ/AG THRU PCB REV P 3TB1C13	1	
45	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 15V 56289 184-7693-000 EFF REV 18/U THRU AJ/AG PCB REV C 3TB1C13	1	
45	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 35V 56289 184-7693-000 EFF REV AK/AG BASIC PCB 3TB1C13	1	
46	150D226X0035 R2	2	CAPACITOR, FXD, ELECT., 22UF, 20%, 35V 56289 184-7695-000 3TB1C2	1	
47	118P33402S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.33UF, 20%, 200V 56289 951-1039-000 EFF REV 18/U THRU AJ/AG PCB REV A 3TB1C14	1	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-56 - 47	118P3340254	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.33UF, 20%, 200V 56289 951-1039-000 EFF REV AK/AG BASIC PCB 3TB1C14	1	
48	556-9552-002	2	BOARD ASSY EFF REV 18/U THRU AJ/AG BASIC PCB	1	
48	556-9552-002	2	BOARD ASSY EFF REV AK/AG THRU PCB REV A	1	
48	556-9552-005	2	BOARD ASSY EFF REV AK/AG PCB REV B	1	
3-57 - 0	563-4916-005	1	CHASSIS, SYNCHRONIZER SEE FIG. 3-35 (192) FOR NHA EFF THRU REV 17/T 3	REF	
3-57 - 0	556-9093-011	1	CHASSIS, SYNCHRONIZER SEE FIG. 3-35 (192) FOR NHA EFF REV 18/U 3	REF	
1	100-225-9-3	2	CLIP 99378 139-0763-000 EFF SB7	2	
- 2	MS20470AD3-3	2	RIVET, SOLID, AL, 0.094 DIA X 0.187 305-1154-000 AP	2	
3	100-200-12-2	2	CLIP 99378 139-0754-000 EFF SB7	1	
4	MS20470AD4-4	2	RIVET, SOLID, AL, 0.125 DIA X 1/4 305-1169-000 AP	1	
5	502-6812-002	2	NUT, RIVET	6	
6	563-5017-002	2	GUIDE, CARD	1	
- 7	MS20426AD3-1 C	2	RIVET, SOLID, AL, 3/32 DIA X 5/8 305-1368-000 AP	3	
8	SKT10BLU	2	JACK, TIP, BLU 98291 3J26 360-0096-000	1	
9	SKT10BLU	2	JACK, TIP, BLU 98291 3J27 360-0096-000	1	
10	SKT10GY	2	JACK, TIP, GY 98291 3J32 360-0097-000 EFF REV 18/U	1	
11	SKT10BLK	2	JACK, TIP. BLK 98291 3J35 360-0098-000 EFF REV 18/U	1	
12	SKT100RN	2	JACK, TIP, ORN 98291 3J34 360-0093-000 EFF REV 18/U	1	
13	SKT10RED	2	JACK, TIP, RED 98291 3J33 360-0092-000 EFF REV 18/U	1	
14	SKT10BRN	2	JACK, TIP, BRN 98291 3J31 360-0091-000 EFF REV 18/U	1	
15	SKT10WHT	2	JACK, TIP, WHT 98291 3J30 360-0090-000 EFF REV 18/U	1	
16	SKT10WHT	2	JACK, TIP, WHT, 98291 3J23 360-0090-000	1	
17	SKT10GRN	2	JACK, TIP, GRN 98291 3J19 360-0095-000	1	
18	SKT10YEL	2	JACK, TIP, YEL 98291 3J18 360-0094-000	1	
19	SKT10YEL	2	JACK, TIP, YEL 98291 3J22	1	
20	SKT10BLU	2	JACK, TIP, BLU 98291 3J17 360-0096-000	1	
21	SKT10GRN	2	JACK, TIP, GRN 98291 3J16 360-0095-000	1	



Synchronizer Chassis
Figure 3-57

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-57 - 22	SKT100RN	2	JACK, TIP, ORN 98291 360-0093-000 3J21	1	
23	SKT10BRN	2	JACK, TIP, BRN 98291 360-0091-000 3J20	1	
24	SKT10GRN	2	JACK, TIP, GRN 98291 360-0095-000 3J24	1	
25	SKT10GRN	2	JACK, TIP, GRN 98291 360-0095-000 3J25	1	
26	100-200-6-6	2	CLIP 99378 139-0761-000 EFF THRU REV 17/T	2	
- 27	MS20470AD3-4	2	RIVET, SOLID, AL, 0.094 DIA X 1/4 305-1155-000 AP	4	
28	212-12N	2	RECEPTACLE 71286 012-2412-000	2	
- 29	MS20426AD3-5	2	RIVET, SOLID, AL, 3/32 DIA X 5/16 305-1363-000 AP	4	
30	563-5018-002	2	INSERT	2	
31	502-6812-002	2	NUT, RIVET EFF THRU REV 17/T	6	
31	540-6244-002	2	NUT, PLAIN .EFF 18/U	2	
32	NCN6-2-2-1	2	NUT, CAPTIVE, SST. 4-40 07886 334-0857-000 EFF THRU REV 17/T	5	
33	540-6244-002	2	NUT, PLAIN EFF THRU REV 17/T	2	
34	563-4915-005	2	CHASSIS, SYNCHRONIZER EFF THRU REV 17/T	1	
34	556-9093-010	2	CHASSIS, SYNCHRONIZER EFF REV 18/U	1	
3-57 - 0	522-6116-004	1	3498-4 SHOCKMOUNT ASSY SEE FIG. 3-34 (2) FOR NHA	REF	
1	516-7393-001	2	TRIM STRIP, MODIFIED EFF REV J AND K	1	
1	516-7398-001	2	3498-4 SHOCKMOUNT EFF REV L	1	
- 2	2X1-8PANHDTY PEBCADPL	2	SCREW, TAP., SST, 2-56 X 1/8 45722 330-1551-000 AP	4	
3	DPX2M16C3S40 S33A1073	2	CONNECTOR 71468 370-2203-000 4J1A, 4J1B	1	
- 4	68-1660-40	2	NUT SELF-LKG, HEX., AL, 4-40 72962 333-0605-000 AP	6	
- 5	MS51957-14	2	SCREW. MACH., SST, 4-40 X 5/16 343-0134-000 EFF REV F AP	6	
- 5	MS51957-15	2	SCREW, MACH., SST, 4-40 X 3/8 343-0135-000 EFF THRU REV E AP	6	
6	505-2784-002	2	LEAD, ELECTRICAL	2	
- 7	68-1660-40	2	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0605-000 AP	4	
- 8	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	4	
- 9	MS51959-13	2	SCREW, MACH., SST, 4-40 X 1/4 342-0044-000 AP	4	
10	2052-10H0TTI NNED	3	TERMINAL 77147 304-1900-000	4	
11	36062	3	BRAID 75818 425-0001, 000	2	
12	564-2690-002	2	PIN	2	
13	565-5387-002	2	SPRING	2	
- 14	MS16633-1015	2	RING 340-0089-000 AP FOR 12 AND 13	2	
15	563-5061-003	2	TRAY, SHOCKMOUNT	2	



349B-4 Shockmount Assembly

Figure 3-58

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-58 - 16	MS51957-28	2	SCREW, MACH., SST. 6-32 X 3/8 343-0169-000 AP	2	
- 17	310-0071-000	2	WASHER, LOCK, SST, 0.151 ID X 0.239 OD COML AP	2	
- 18	310-6360-000	2	WASHER, FLAT, SST, 0.147 ID X 0.375 OD COML AP	2	
- 19	MS51959-28	2	SCREW MACH., SST, 6-32 X 3/8 342-0062-000 AP	2	
- 20	310-6360-000	2	WASHER. FLAT, SST, 0.147 ID X 0.375 OD COML AP	2	
- 21	MS51959-27	2	SCREW, MACH., SST, 6-32 X 5/16 342-0061-000 AP	1	
22	541-3620-002	3	BEARING, SLV P	2	
23	541-6510-002	3	BOLT ASSY, CLAMP	1	
24	541-6510-003	3	BOLT ASSY, CLAMP	1	
- 25	MS20426AD4-5	3	RIVET, SOLID, AL, 1/8 DIA X 5/16 305-1374-000 AP FOR 22 AND 23	4	
26	541-6509-002	4	BOLT SUBASSEMBLY, CLAMP	2	
- 27	338-2020-000	4	PIN, COTTER, SST, 3/64 DIA X 1/2 COML AP	2	
- 28	541-6507-000	4	PIN, STR AP	2	

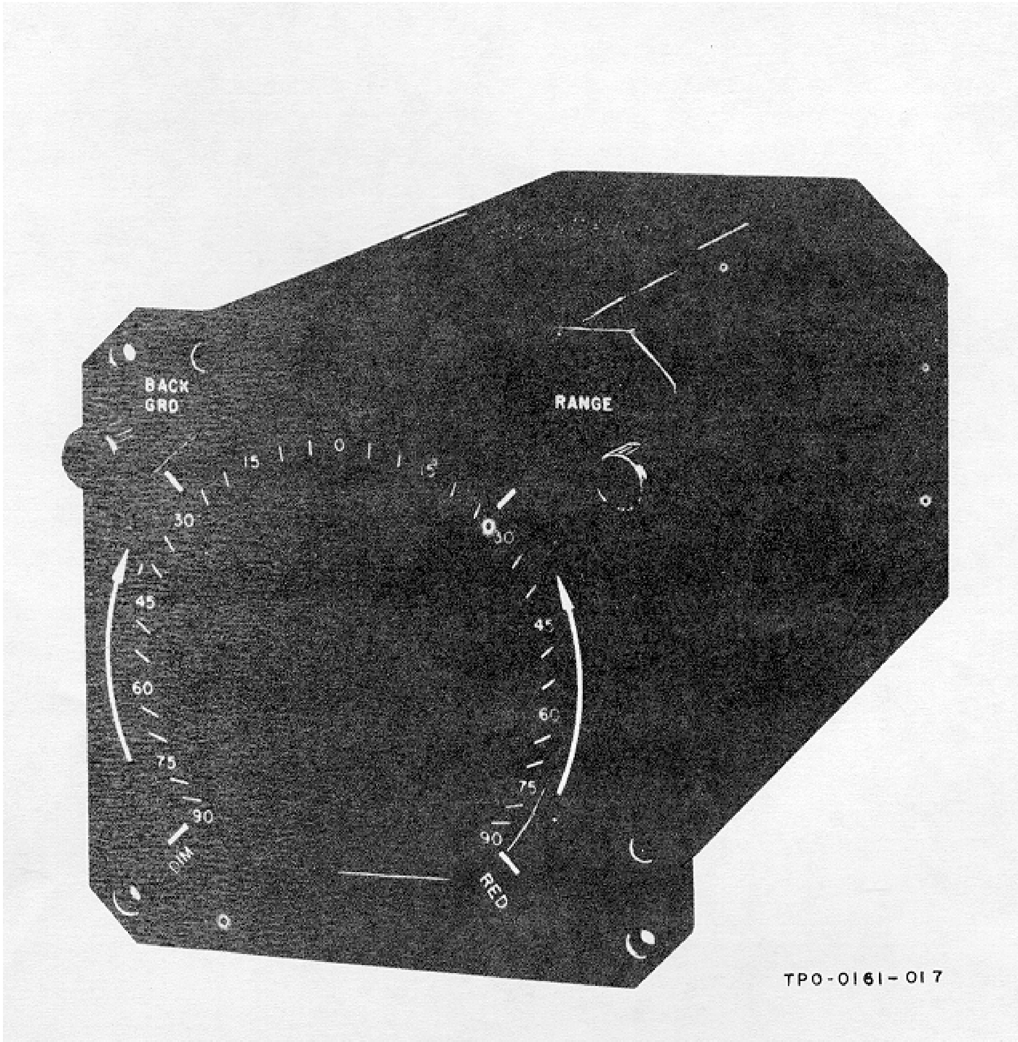
FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
3-58 - 29	334-0043-000	5	NUT, PLAIN, CAP, NI PL BRS, 4-40 COML	2	
30	541-6508-002	5	THUMBNUT ASSY	2	
31	541-6505-002	6	INSERT, SCREW THD	2	
32	541-6504-002	6	SHELL, NUT	2	
33	541-6503-002	5	COLLAR, BOLT ASSY	2	
34	541-6502-002	5	SHAFT, SHOULDERED	2	
35	541-6506-002	4	BRACKET, BOLT ASSY	2	
36	564-2691-003	3	BRACKET, SHAFT	1	
- 37	MS20426AD4-4	3	RIVET, SOLID, AL, 1/8 DIA X 1/4 305-1373-000 AP	4	
38	563-5059-005	3	TRAY, WELDED	1	
39	J6677-3	2	MOUNT 76005 200-0992-000	3	
40	J6677-2	2	MOUNT 76005 200-0991-000	2	
- 41	68NM62	2	NUT, SELF-LKG, HEX., AL, 6-32 72962 333-0368-000 AP FOR 39 AND 40	10	
- 42	MS51957-28	2	SCREW, MACH., SST, 6-32 X 3/8 343-0169-000 AP FOR 39 AND 40	10	
43	563-5060-005	2	BASE. WELDED	1	

CHAPTER 4

INDICATOR, AZIMUTH-RANGE IP-724/APN-158

(493A-3)

NOTE: Indicator, Azimuth-Range IP-724/APN-158 is referred to in this chapter by its commercial nomenclature, Indicator 493A-3.



493A-3 Indicator, Overall View
Figure 4-1

Section I. DESCRIPTION AND OPERATION

4-1. GENERAL.

Included within this section is the purpose of the equipment, equipment specifications, equipment description, and theory of operation. Refer to figure 4-1 for an overall view of the 493A-3 Indicator. Figure 4-2 is a table of equipment covered in this manual.

EQUIPMENT	COLLINS PART NUMBER
493A-3 Indicator	522-8961-005

Table of Equipment Covered
Figure 4-2

4-2. PURPOSE OF EQUIPMENT.

The 493A-3 Indicator provides visual presentation of information from detected signals returned from targets struck by the transmitted signal of the WP-103 Weather Radar System. The 493A-3 uses a bright cathode-ray tube designed specifically for direct daytime viewing.

4-3. EQUIPMENT SPECIFICATIONS.

The 493A-3 Indicator specifications are listed in figure 4-3.

CHARACTERISTIC	SPECIFICATION
Power requirements (supplied by 374A-3 Receiver-Transmitter):	+260 volts at 15 ma. +27.5 volts regulated at 235 ma. -27.5-volt relay power at 100 ma. -27.5 volts regulated at approximately 0 ma. 115 volts ac, 400 Hz at 220 ma.
Duty cycle	Continuous.

Table of Equipment Specifications (Sheet 1 of 2)
Figure 4-3

CHARACTERISTIC	SPECIFICATION
Weight	15.1 pounds (6.86 kg).
Physical dimensions	6-1/4 inches (15.9 cm) high, 6-1/4 inches (15.9 cm) wide, and 14-23/64 inches (36.47 cm) long.
Temperature	
Continuous operation	-40 to +55 °C, (-40 to +131 °F).
30-minute operation	+71 °C, (+160 °F).
Relative humidity	95 to 100 percent at +55 °C (+131 °F).
Shock conditions	
Performance criteria	Eighteen 10-millisecond shocks at 7.5 g.
Safety criteria	Six 10-millisecond shocks at 15 g.
Vibration	0.030-inch total excursion at 10 to 55 Hz, and 1.5-g peak acceleration at 55 to 500 Hz.
Cooling	Convection.
Altitude	20, 000-feet pressure equivalent altitude.

Table of Equipment Specifications (Sheet 2 of 2)
Figure 4-3

4-4. EQUIPMENT DESCRIPTION.

A. General.

This section presents a mechanical and electrical description and a description of the external operating controls for the 493A-3 Indicator.

B. Mechanical Description.

The indicator is housed in a black, 2-piece dust cover. The unit weighs 15.1 pounds and is 6-1/4 inches high, 6-1/4 inches wide, and 14-23/64 inches long. Convection cooling is provided through holes in the dust cover.

The main chassis frame essentially consists of four sections. In proceeding from front to rear, the sections are as follows:

The first section includes the front cover, operating control knobs and tabs, polarizing filters, range indicator light panel and board, viewing screen grid, and mounting plate.

The second section is a channel frame assembly containing the front section of the storage cathode-ray tube surrounded by the tube shield.

The third section provides mounting facilities for most of the circuits contained within the 493A-3 Indicator. The front vertical portion serves as a mounting plate for the deflection yoke assembly.

The 2 encapsulated power supplies are located on either side, adjacent to the deflection yoke. Two terminal boards are mounted vertically to the rear of the power supplies. TB1 is located on the right side, and TB3 on the left. High voltage circuit TB2 is mounted horizontally on the top rear of this section. A transparent shield covers TB2 and provides protection to personnel from high voltage. Shading circuit TB4 is located on the bottom rear of this section and is secured to the transformer plate. The transformer plate is located to the rear of the power supplies at the bottom rear of the section.

The fourth section forms the rear cover of the 493A-3, and 2 zener diodes are mounted on the outside of this section.

C. Electrical Description.

The major electrical components of the 493A-3 Indicator are as follows: power supplies, sweep positioning and erase circuit TB1, high-voltage circuit TB2, low-voltage bias circuit TB3, shading circuit TB4, storage cathode-ray tube and deflection yoke, and chassis circuits. Range lights board TB5 is described under chassis circuits.

(1) Power Supplies.

High and low voltages for biasing the cathode-ray tube are provided by 2 encapsulated power supplies. The low-voltage power supply provides +200 volts, -500 volts, and +2 kilovolts. A zener diode regulator regulates the output of this supply to within ±2 percent for ±10 percent variation of the 115-volt, 400-cps primary power source. The high-voltage power supply provides a pulsating dc voltage with a peak value of +9.5 kv and an average value of +7.5 kv for the crt (cathode-ray tube) viewing screen.

(2) Sweep Positioning and Erase Circuit TB1.

The sweep positioning circuits consist of a symmetrical arrangement of resistors and inductors that provide horizontal and vertical sweep positioning currents to the deflection coils. The erase pulse shaping network is located on this board. Five potentiometers located on TB1 control the following functions: ERASE AMPL, ERASE WIDTH, VIDEO AMPL, HOR POS (horizontal position), and VERT POS (vertical position).

(3) High-Voltage Circuit TB2.

The high-voltage circuit consists of two voltage divider networks and coupling components for the erase pulse.

One voltage divider provides biasing voltages for flood gun elements of the storage cathode-ray tube, and the other permits adjustment of the deflection sensitivity. The erase pulse from TB1 is coupled through TB2 to the crt storage mesh (backing electrode).

(4) Low-Voltage Bias Circuit TB3.

The low-voltage bias circuit contains components to control the background level, focus voltage, positive gate, shading waveform, and blanking function. The shading driver amplifier (V2) is located on TB3. The blanking (ground) function from the antenna is applied to TB3. The positive gate from the synchronizer is coupled through TB3 to the crt.

(5) Shading Circuit TB4.

The shading circuit contains a transistor gate amplifier and a multivibrator circuit that generate the shading waveform, dunking pulse, and erase pulse. The erase pulse amplifier is located on TB1. The shading waveform driver amplifier is located on TB3. TB4 generates the writing beam current correction waveform (shading) that is applied to write gun grid 2.

(6) Storage Cathode-Ray Tube with Deflection Yoke.

The storage cathode-ray tube (crt) is a special direct-view storage tube that provides a very bright display with controlled persistance. The crt is capable of storing halftone images for variable durations of up to 60 seconds with a brightness level suitable for viewing in direct sunlight. This is accomplished by the use of 2 electron guns. The writing gun "writes" an electrostatic image on a storage surface within the tube; while the flooding gun illuminates the viewing screen phosphor proportional to the image on the storage surface. The stored image is gradually erased by an erase pulse train whose duty cycle may be varied to control the persistance of the display.

The crt incorporates several unique features. These include a second grid in the writing gun that permits correction of writing beam current for convergence of sweep lines in the PPI display; a special mixed phosphor for improved halftone definition; an integral magnetic shield with mounting studs on the magnetic shield to simplify tube mounting; and silicone rubber filler between the tube and shield to provide shock and vibration isolation.

A 4-coil fixed deflection yoke provides electromagnetic deflection of the electron beam within the crt, resulting in the sweeping trace that is synchronized with the 537F-( ) Antenna azimuth scanning motion. The sweep origin is depressed 1.5 inches below the center of the viewing screen by fixed dc bias current through 1 vertical deflection coil. Positioning control potentiometers permit adjustment of the sweep origin +1/4 inch both horizontally and vertically.

(7) Chassis Circuits.

Range lights board TB5 is illuminated by 3 miniature lamps located on TB5. Relays K1 and K2, controlled by the RANGE switch, are used to switch the outputs of the shading integration circuits on TB4.

Relay K4, also controlled by the RANGE switch, is used to correct the vertical position of the sweep trace on the 150-mile range.

Two 115-volt, 400-Hz power sources are used in the 493A-3. One source is applied to the two power supplies as previously described, and the other is applied to transformer T1. T1 provides filament voltage for the crt and the shading circuit driver amplifier (V2). When STBY (standby) is selected, power is applied to T1. When OPR (operate) is selected, power is applied to T1 and to the two power supplies.

The two zener diodes, mounted on the outside of the rear cover, are part of the ac regulator circuit.

D. External Operating Controls.

There are four external operating controls for the 493A-3; DIM, RED, RANGE, and BACKGRD.

The BACKGRD (background) control adjusts the intensity of background noise.

The RANGE switch controls the range indicator lamps and range relays in the radar system. The range relays select the proper gate and sweep duration, range marks, shading waveform, and storage tube bias for the range selected.

The RED control varies the color of the display from the normal yellow-green to deep red by use of polarizing filters.

The DIM control permits dimming the display for night viewing by use of a variable density polarizing filter.

4-5. THEORY OF OPERATION.

A. General.

This section presents a block diagram and a detailed theory of operation.

B. Block Diagram Theory. (Refer to figure FO-13)

(1) Power Supplies.

(a) PS1.

Generator A power (115 volts ac, 400 Hz) from the receiver-transmitter is supplied to the ac regulator circuit. The regulator output is 112 volts ac that is supplied to power supply PS2 and autotransformer T2. The output of T2 is 82 volts ac that is supplied to PS1. PS1 has three outputs: +200 volts, -500 volts, and +2 kilovolts, all of which are used for operation of the storage cathode-ray tube (crt). The +2 kv is applied to high-voltage circuit TB2. The +200 volts, which is referenced to the +2-kv output, is applied to TB2. The -500 volts is applied to low-voltage bias circuit TB3.

(b) PS2.

The regulated 112 volts ac from the ac regulator is applied to PS2. The output of PS2 is a pulsating dc voltage with a peak value of +9.5 kv and an average value of +7.5 kv. This +9.5-kv output is applied to the viewing screen of the crt. A positive dunking pulse from shading circuit TB4 is applied to PS2 to prevent illumination of the crt during the erase pulse.

(2) Sweep Positioning and Erase Circuit TB1.

Video and X and Y sweep currents from the synchronizer are applied to this circuit. The X and Y sweep currents are applied to the cathode-ray tube (crt) deflection yoke. A fixed dc bias current is applied through vertical deflection coil Y1 to off-center and hold the sweep origin near the bottom of the crt. HOR POS (horizontal position) and VERT POS (vertical position) potentiometers permit adjustment of the sweep trace.

The amplitude of the video information may be adjusted by VIDEO AMPL (video amplitude) potentiometer, with the resultant video applied to the cathode of the crt write gun. The erase pulse from shading circuit TB4 is applied to the erase circuit on TB1. The amplitude and width of the erase pulse can be adjusted by ERASE AMPL and ERASE WIDTH potentiometers. The resulting erase pulse is applied to high-voltage circuit TB2.

Regulated +27.5 volts from the receiver-transmitter is used in the sweep positioning and erase circuits.

(3) High-Voltage Circuit TB2.

Inputs to this circuit consist of +200 volts, +2 kv, and the erase pulse. The +200-volt input from power supply PS1 is referenced to the +2-kv input from PS1 by a voltage divider on TB2. The +2 kv is used to establish the deflection sensitivity of the crt; the +200 volts supplies bias voltages for crt flood gun elements. Potentiometers permit adjustment of voltages for the flood gun cathode, grids 1 through 4, collector, and the storage mesh. The erase pulse from TB1 is applied through TB2 to the crt storage mesh (backing electrode) to erase the stored video information during erase time.

(4) Low-Voltage Bias Circuit TB3.

Inputs to this circuit consist of -500 volts, +260 volts, a positive gate, a shading waveform, and a blanking (ground) pulse.

The -500 volts from PS1 is used for focusing control of the crt and write gun grid 1 biasing.

The +260 volts from the receiver-transmitter is used by the shading amplifier and write gun grid 2 biasing.

The shading waveform from TB4 is applied through relay circuits K1 and K2 to TB3. The RANGE switch selects the proper circuit on TB4 to provide the correct shading waveform to TB3.

The shading waveform from TB3 is clamped to the background level and applied to grid 2 of the write gun.

The positive gate from the synchronizer is applied to TB3. This gate is applied to write gun grid 1 and enables the write gun during sweep time.

The blanking pulse from the 537F( ) Antenna applies a ground to TB3. This ground is applied at each scan limit (60 degrees either side of dead ahead) to reduce the positive gate to the write gun and prevent a bright sweep line at each scan limit.

(5) Shading Circuit TB4.

The inputs to this circuit are a positive gate from the synchronizer and +27.5 volts from the receiver-transmitter.

NOTE: Units with serial number 1792 (revision 17 or T) and above have an input of -15 volts from a chassis mounted rectifier circuit.

The positive gate input is used to generate the erase pulse, the shading waveform, and the dunking pulse.

The erase pulse from TB4 is shaped by TB1 and applied through TB1 and TB2 to the crt. This pulse is used to erase the stored video information from the crt storage mesh.

The shading waveform is applied through relay circuits K1 and K2 to TB3. This waveform modifies the writing beam current to compensate for sweep line convergence near the center of the display.

The dunking pulse is applied to PS2 from TB4 and lowers the viewing screen potential during the erase pulse. This prevents illumination of the viewing screen as the stored video information is being erased.

(6) Storage Cathode-Ray Tube (CRT) and Deflection Yoke.

The storage crt provides a visual presentation of weather information detected by the transmit and receive sections of the WP-103 Weather Radar System.

Inputs to the crt are received from TB1, TB2, TB3, and PS2. Sweep positioning information for the deflection yoke is received from TB1.

Power supply PS2 supplies +9.5 kv for the viewing screen. This voltage is reduced by a dunking pulse during erase time.

Sweep positioning and erase circuit TB1 supplies video information and the erase pulse. The video is supplied to the write gun cathode. The erase pulse is supplied through TB2 to the storage mesh to erase the stored video information.

High-voltage circuit TB2 supplies biasing voltages for the flood gun cathode, grids 1 through 4, the collector, and the storage mesh.

Low-voltage bias circuit TB3 supplies a shading waveform, a blanking pulse, and a focusing voltage. Also, it controls the background level. The shading waveform modifies the writing beam current to compensate for sweep line convergence near the center of the display. The blanking pulse prevents the occurrence of a bright sweep line at each scan limit. The focusing voltage produces a sharp, distinct display. The background level establishes the sweep trace and background noise intensity level.

The deflection yoke receives X and Y sweep positioning information from TB1.

This information produces a sweeping trace synchronous with the antenna azimuth position.

(7) Chassis Circuits.

The chassis mounted circuits consist of transformers T1 (not shown) and T2; an ac regulator; a -15-volt supply (not shown); and relays K1, K2, and K4 and associated components (K4 not shown).

Transformer T1 provides filament voltage for the crt and shading driver amplifier V2 and illumination voltage for range indicator lamps DS1 through DS3. Transformer T2 supplies PS1, PS2, and the -15-volt supply.

The ac regulator output is supplied to PSI and PS2. The -15-volt supply output is supplied to TB4.

NOTE: The -15-volt supply circuit is used on units with serial number 1792 (revision 17 or T) and above.

Relays K1. K2, and K4 are controlled by the RANGE switch. These relays switch the proper shading waveform, background level, and write gun bias voltages to provide a uniform video presentation on each range. Relay K4 is energized in the 150-mile range and corrects the vertical position of the sweep trace.

C. Detailed Theory of Operation.

(1) Power Supplies. (Refer to figure FO-14)

(a) PS1.

When ()PR (operate) is selected on the 561G(4) Cockpit Control, generator A power (115 volts ac, 400 Hz) from the 374A-3 Receiver-Transmitter is applied to pins L and K of J1. The high side from J1-L is applied through J3-A to series-dropping resistors R80, R87, R82, R83, R85, and R86. These resistors are connected to one side of an ac regulator circuit consisting of divides CR12 through CR15 and zener diodes CR19 and CR20.

NOTE: Units with serial number 1676 (revision 13 or N) and above do not contain R83 and R85.

The low side of generator A from J1-K is supplied to the opposite side of the regulator circuit. The 112-volt ac regulated output is applied to terminals 1 and 3 of transformer T2 and to terminals 1 and 2 of power supply PS2.

T2 is connected as an autotransformer, with 82 volts ac from terminals 1 and 2 supplied to power supply PS1.

NOTE: In units with serial number 1792 (revision 17 or T) and above, the secondary of T2 is connected to a rectifier circuit consisting of CR21 through CR24 and C21. The negative output (approximately -15 volts) is applied to shading circuit TB4.

The -500-volt output from terminal 6 is applied to terminal 6 of low-voltage bias circuit TB3.

The +200-volt output of PS1 is applied to terminals 3 and 6 of power supply PS2. The high side (terminal 9) is also applied to terminal 4 of high-voltage circuit TB2. The low side (terminal 8) is applied to filament transformer T1 and terminal 2 of TB2. This +200-volt output is referenced to the +2-kv output through a voltage divider on TB2.

The +2-kv output is applied to terminal 3 of high-voltage circuit TB2. A voltage divider network consisting of R22 through R35 references the +200-volt output of PS1 to +2 kv.

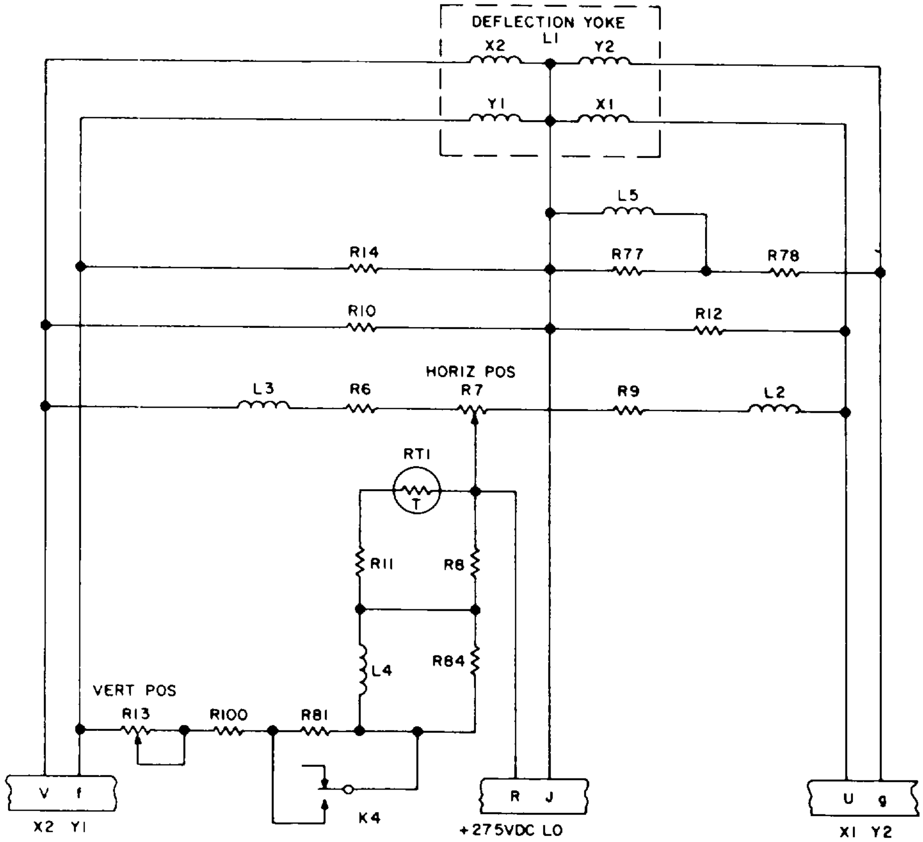
(b) PS2.

Regulated 112 volts ac from the ac regulator circuit (CR19, CR20, and CR12 through CR15) is applied to terminals 1 and 2 of power supply PS2. PS2 has a pulsating dc output with a peak value of +9.5 kv and an average value of +7.5 kv. This voltage is the accelerating potential for the electron beam and is applied to the crt viewing screen.

A dunking pulse is applied to PS2 that lowers the viewing screen potential during erase time. The positive dunking pulse from terminal 5 on shading circuit TB4 is applied to terminal 7 of PS2. This pulse is coupled through a capacitor to the grid of V3. The +9.5-kv output of PS2 is applied to the crt viewing screen through a 1.2-megohm resistor. The plate of V3 is connected to the viewing screen side of this resistor. When the positive dunking pulse is applied to the grid of V3, the tube conducts and lowers the output voltage to less than +1 kv. This prevents illumination of the viewing screen during the erase pulse.

(2) Sweep Positioning and Erase Circuit TB1. (Refer to figures FO-14 and 4-4) Sweep currents from the synchronizer are applied to pins V, U, f, and g of J1.

The X-axis sweep currents vary as the sine of the angle formed by the aircraft's line of flight and the orientation of the antenna (in the horizontal plane). The Y-axis sweep currents vary as the cosine of this angle. The X-axis sweep currents from J1-U and J1-V are applied to the X1 and X2 deflection coils and to a parallel combination of resistors and inductors. Resistors R6, R9, R10, and R12 and inductors L2 and L3 provide damping for the X1 and X2 deflection coils. HOR POS (horizontal position) control R7 permits i1/4-inch horizontal adjustment of the sweep origin.



493A-3 Indicator Sweep Deflection Circuit,
Simplified Schematic Diagram
Figure 4-4

The Y-axis sweep currents from J1-f and J1-g are applied to the Y1 and Y2 deflection coils and to a parallel combination of resistors and inductors. A fixed dc bias current through vertical deflection coil Y1 depresses the sweep origin 1-1/2 inches below the center of the viewing screen. The fixed bias current flows through Y1; resistors R13, R100, and R81; and the parallel network consisting of L4, R84, R8, R11, and RT1 to the +27.5-volt supply. Thermistor RT1 has a negative temperature coefficient to compensate for the positive temperature coefficient of other components in the Y1 deflection coil bias circuit.

<u>NOTE</u>: In units with serial number 1101 (revision 10) and above, R100 may be jumpered as required by test selection of value.

Resistors R14, R77, and R78 and inductor L5 (mounted on TB4) provide damping for Y1 and Y2 deflection coils.

When the RANGE switch is in the 150-mile position, relay K4 is energized and R81 is bypassed. In the 150-mile range, the vertical position of the sweep trace tends to rise because of the increased voltage drop across vertical deflection coil Y1. The increased voltage drop is due to the longer duration of the sweep waveform on the 150-mile range. When R81 is bypassed, more dc bias current flows through Y1 and maintains the sweep trace at the same vertical position as on the 30- and 60-mile range. VERT POS (vertical position) control R13 permits ±1/4-inch vertical adjustment of the sweep trace.

Video information from the synchronizer video driver module is applied to pin A of J1. The negative video information, which contains range marks, is coupled through C17 and clamped to ground by CR18. VIDEO AMPL (video amplitude) control R5 adjusts the video level that is applied to the write gun cathode.

The negative-going erase pulse from TB4-4 is applied to terminal 8 of TB1. This pulse is differentiated by C16, R1, and R2. The resulting negative spike is applied to the base of normally cutoff Q4. The leading edge of the negative spike is shunted through forward biased diode CR16. The positive-going, trailing edge of the spike turns Q4 on. With Q4 on, the emitter voltage rises rapidly toward the +27.5-volt collector potential. This positive voltage spike is applied to the crt storage mesh to erase the stored video information. The width and amplitude of the erase pulse may be adjusted by ERASE WIDTH control R1 and ERASE AMPL control R3. Zener diode CR17 limits the amplitude of the positive spike to approximately 33 volts.

(3) High-Voltage Circuit TB2.

The high-voltage circuit is a voltage-divider network that provides biasing voltages for crt flood gun elements. TB2 has 3 voltages and the erase pulse supplied to it. The +2-kv output from PS1-7 is applied to TB2-3. The low side of the +200-volt output (terminal 8) from PS1 is applied to TB2-2. This places the +200-volt output from PS1 near the +2-kv output from PS1. The above ground potential of the +200-volt supply is determined by the connection to the voltage divider on TB2. This voltage divider consists of R22 through R35 and establishes the deflection sensitivity of the write gun electron beam. When the connection is made to point A, terminal 2 is at the same potential as terminal 3 (+2 kv). Changing the connection from TB2-2 to point C, B, or A decreases the sweep length, and the connection to point E increases the sweep length. Changing the sweep length (deflection sensitivity) is possible because flood gun grid 3 (pin 6) is internally connected to an accelerating grid for the write gun electron beam. Moving the connection to points A through E changes the voltage on flood gun grid 3 and the write gun accelerating grid.

Terminal 4 of TB2 is connected to the high side of the +200-volt output of PS1. Terminal 2 of TB2 is connected to the low side of the +200-volt output of PS1. Therefore, the effective difference in potential between R43 and R36 is 200 volts.

Another voltage-divider network consists of R36 through R39, R41 through R43, R79, R88, R89, and zener diode CR5.

NOTE: Units with serial numbers 1501 through 1680 (TB2 revision C and above) do not contain R79. Units with serial number 1500 (TB2 revision B and below) and below do not contain R79, R88, and R89; they do include zener diode CR6.

The flood gun biasing voltages are supplied from TB2 in the following manner:

(a) Units With Serial Number 1501 and Above.

The storage mesh (backing electrode) voltage is supplied from the junction of a. R38 and R79 (R38 and R37 in units with serial numbers 1501 through 1680). The collector voltage is supplied from the junction of R43 and R42. The grid 4 (A-3) voltage is adjustable and is supplied from the wiper of FGG4 control R41. The grid 3 (A-2) voltage is adjustable and is supplied from the wiper of FGG3 control R39. The grid 2 (A-1) voltage is supplied from the junction of R41 and R42. The grid 1 voltage is adjustable and is supplied from the wiper of FGG control R36. The cathode voltage is supplied from the junction of R37 and R36. Zener diode CR5 limits the cathode voltage to approximately +30 volts.

(b) Units With Serial Number 1500 and Below.

The storage mesh (backing electrode) voltage is supplied from the junction of R38 and R39. The collector voltage is supplied from the junction of R41 and R43. The grid 4 (A-3) voltage is adjustable and is supplied from the wiper of A-3 control R38. The grid 3 (A-2) voltage is adjustable and is supplied from the wiper of A-2 control R37. The grid 2 (A-1) voltage is supplied from the junction of R41 and R42. The grid 1 voltage is adjustable and is supplied from the wiper of FLOOD GUN GRID control R36. The cathode voltage is supplied from the junction of R36 and R37. Zener diodes CR5 and CR6 limit the cathode voltage to approximately +10 volts.

The erase pulse from TB1-6 is applied to terminal 12 of TB2. This positive pulse is coupled through R40 and parallel capacitors C8 and C19 to the storage mesh. This pulse erases the stored video information from the storage mesh during the erase cycle.

(4) Low-Voltage Bias Circuit TB3.

This circuit controls the background level, shading waveform, and focus voltage. The blanking function from the antenna is applied through this circuit.

When the antenna is at either of the two scan limits (60 degrees either side of dead ahead), a switch in the antenna is closed and applies a ground to pin j of J1. The positive gate from pin C of J1 is applied through C14 to write gun grid 1. When J1-j is at ground, the gate is shunted to ground through R60. This cuts off the write gun and extinguishes the writing beam during the time the switch is closed. This blanking action occurs at each scan limit and prevents the occurrence of a bright sweep line on the viewing screen.

Negative 500 volts from PS1-1 is applied to TB3-6. This negative voltage is used for focusing and write gun grid 1 biasing. The focus voltage-divider network consists of R53, R54, R55, and zener diode CR9. The negative focus voltage applied to write gun grid 4 may be adjusted by FOCUS control R55.

The negative bias level for write gun grid 1 is obtained from the junction of R54 and R55. A voltage-divider network consisting of thermistor RT2 and resistors R56 and R57 establish this bias level. The negative bias voltage is taken from the wiper of WG GRID control R56 through CR10 and R62 to write gun grid 1. When the cockpit control is switched from OPR (operate) to STBY (standby), the negative charge on C13 holds the writing gun cutoff until power supply voltages bleed off. This prevents a bright spot from appearing on the screen.

The negative shading waveform from TB4-1, TB4-2, or TB4-3 is applied through contacts of K1 and K2 to TB3-11. The amplitude of this waveform may be adjusted by SHADING control R48. The waveform is coupled through C11 to the grid of shading driver amplifier V2. Diode CR8 prevents the grid of V2 from going positive. V2 is normally conducting heavily, and the plate voltage is low. The negative shading waveform at the grid cuts off V2, and the plate voltage rises rapidly. The positive shading waveform from the plate of V2 is coupled through C12 to write gun grid 3. The positive shading waveform is clamped to the background level by CR7. The positive background level is adjusted by BACKGRD control R66. Positive 260 volts from J1-P is used as plate voltage for V2 and for the background voltage-divider network.

When the RANGE switch is in the 30-mile position, the background voltage-divider network consists of R44, R66, and R47. In the 60-mile position, the background voltage-divider network consists of R58, R66, and R47. In the 150-mile position, the background voltage-divider network consists of R45, R66, and R47. Variable resistors R45 (150 MI) and R58 (60 MI) eliminate the necessity of readjusting BACKGRD control when the 60- or 150-mile range are selected.

(5) Shading Circuit TB4.

The positive gate from the synchronizer gate generator module is applied to J1-C. This gate is used to generate the dunking pulse, erase pulse, and shading waveform. The gate is coupled through C14 on TB3 to write gun grid 1 to unblank the write gun during sweep time. The gate is also coupled to the erase multivibrator circuit, Q2 and Q3, and through CR1 to the shading waveform generator, Q1. Q1 is normally on, and the positive gate applied to the base cuts off Q1. The negative-going gate from the collector of Q1 is applied to 3 similar integrating networks. There is a separate integrating network for the 30-, 60- and 150-mile ranges. The operation of the integrating networks is identical, and the network for the 30-mile range will be described as representative.

The 30-mile integrating network consists of R73, R74, R75, CR2, and C15. Prior to the arrival of the positive gate, Q1 is saturated and C15 is charged to the positive voltage level at the collector of Q1. The positive gate cuts off Q1, permitting C15 to discharge. The discharging of C15, through R73 and R48, produces a negative-going waveform. This negative-going shading waveform from TB4-1 is applied through the contacts of K1 and K2 to the shading amplifier on TB3. At the end of the positive gate from the synchronizer, Q1 again saturates and C15 is charged through forward-biased diode CR2. This cycle is repeated each time a gate pulse is received.

The 60-mile integrating network consists of R69, R70, R71, C6, and CR4. Relay K1 is energized when the RANGE switch is in the 60-mile position.

The 150-mile integrating network consists of R65, R67, R68, C5, and CR3. Relay K2 is energized when the RANGE switch is in the 150-mile position.

The monostable multivibrator circuit, Q2 and Q3, generates the high-voltage dunking pulse and the erase pulse for the crt storage mesh. Prior to the arrival of the positive gate, Q3 is conducting and Q2 is cut off. Q2 is cut off by the positive _ voltage on the base due to the positive charge on C2. Capacitor C2 is charged toward +27.5 volts through R17. The positive gate is coupled through C1 and applied to the base of Q2. The negative-going, trailing edge of the positive gate turns Q2 on, and C2 begins to discharge. As Q2 is turned on, a positive-going dunking pulse is generated at the collector. This pulse is coupled through C4 to the base of Q3 and cuts off Q3. As Q3 is cut off, C2 begins charging toward +27.5 volts. When C2 is charged sufficiently, Q2 is cut off and the multivibrator is returned to the stable state.

The positive-going dunking pulse from the collector of Q2 is applied through R18 to terminal 7 of PS2. This lowers the viewing screen potential during the erase cycle. As Q3 is cut off, a negative-going erase pulse is generated at the collector. This erase pulse is applied to Q4 on TB1.

Diodes CR12 through CR15 are part of the ac regulator circuit. The remainder of the ac regulator components, zener diodes CR19 and CR20 and resistors R80, R82, R83, R85, R86, and R87, are mounted on the chassis. Inductor L5 is part of the damping network for the Y1 and Y2 deflection coils.

(6) Storage Cathode-Ray Tube (CRT) and Deflection Yoke.

The crt is a direct-view storage type that produces an image of sufficient brightness for viewing in direct sunlight. The tube contains a writing gun and a flooding gun. Biasing voltages for flood gun elements are supplied by two voltage-divider networks on high-voltage circuit TB2. Accelerating voltage for the viewing screen is supplied by power supply PS2. Biasing voltages for write gun elements are supplied by low-voltage bias circuit TB3.

The writing gun uses electrostatic focus and electromagnetic deflection and has 2 control grids. Focusing voltage for write gun grid 3 is supplied from the FOCUS control on TB3. Electromagnetic deflection is obtained from a 4-coil fixed deflection yoke which surrounds the tube neck containing the write gun. Write gun grid 1 is unblanked by the positive gate from the synchronizer. At each scan limit (60 degrees either side of dead-ahead), grid 1 is blanked to prevent a bright sweep line at each scan limit. Write gun grid 2 receives a shading waveform from TB3. This permits correction of the writing beam current to provide a uniform PPI display for each range. The sweep lines in a PPI display converge near the origin, causing an increase in brightness. This increase in brightness is more apparent in storage tubes than in conventional cathode-ray tubes and must be corrected to obtain a useable display. The positive shading waveform from TB3-5 is applied to write gun grid 2 and decreases the brightness of the sweep near the origin.

Negative video information from the synchronizer is applied through TB1 to the write gun cathode to modulate the writing beam current. The intensity of the writing beam is determined by the video level at the cathode, the positive gate at grid 1, and the shading waveform and background level on grid 2. The combined effect of the video level, positive gate, background level, and positive shading waveform provides a uniform video display on all ranges. The horizontal and vertical position of the sweep is determined by the X and Y sweep currents through the deflection yoke.

The flood gun provides a constant flow of low-energy electrons that provide uniform illumination of the viewing screen. The flood gun illuminates the viewing screen in proportion to the charge on the storage mesh that is produced by the video-modulated electron beam from the write gun. The flood gun electrons strike the storage mesh at right angles to the surface because of the electrostatic field created by the collimating electrodes (grids 1 through 4). The tube is enclosed in a magnetic shield because the low-energy electrons are easily affected by external magnetic fields.

The storage element is a dielectric film deposited on a nickel mesh. The area adjacent to each opening in the mesh controls the number of flood gun electrons passing through the opening and onto the viewing screen. In the unwritten state, the storage mesh is uniformly negatively charged by the accumulation of flood gun electrons on the mesh and the action of the erase pulse. Thus, no flood gun electrons can pass through to the viewing screen and it cannot be illuminated. During writing, the high-energy electron beam from the write gun strikes the storage mesh, causing it to emit secondary electrons that are attracted to the collector electrode. The quantity of secondary electrons emitted in this manner is greater than that supplied by the write gun beam. This causes the mesh to become positively charged in the local area struck by the write gun beam. The areas of positive charge correspond to the pattern of the write gun beam on the mesh. Flood gun electrons can pass through the mesh in these areas and can thus illuminate the viewing screen in the same pattern as that written by the writing gun beam. Since the writing beam is intensity modulated, the positive charge on the storage mesh varies accordingly and the viewing screen can be illuminated by varying quantities of flood gun electrons to produce halftone images.

Positive charges produced from the residual gas within the tube slowly neutralize the negatively charged storage mesh. Flood gun electrons will pass through a neutralized mesh to uniformly illuminate the viewing screen; thus, useful persistence is limited to approximately 60 seconds.

In practical application for a PPI display, the image must be completely erased in one scanning cycle. Incomplete erasure will cause a buildup of charge in a bright area that will increase with each scan cycle and will finally obliterate the image area with overall brightness. Erasure of the stored image is accomplished by applying a positive erase pulse to the storage mesh. The erase pulse from TB1-6 is coupled through R40, C19, and C8 on TB2 to the storage mesh. The storage mesh, positively charged by the erase pulse, attracts flood gun electrons until the charge is neutralized. When the storage mesh is re-turned to normal operating bias (erase pulse removed), the neutralized storage mesh is then negative and cuts off flood gun electrons from the viewing screen.

During the time the storage mesh charge is being neutralized, flood gun electrons can pass through the mesh to illuminate the viewing screen. To prevent this, the viewing screen potential is reduced during the erase pulse by a dunking pulse applied to high-voltage power supply PS2. The positive dunking pulse from TB4-5 is applied to PS2-7 and reduces the +9.5-kv output of PS2 to less than +1 kv during the erase pulse.

The deflection yoke is a fixed arrangement of four coils that provide an off-centered sweep trace synchronous with antenna azimuth scan motion. The deflection yoke surrounds the write gun tube neck and provides electromagnetic sweep deflection. The X sweep currents represent the sine of the antenna azimuth position, and the Y sweep currents represent the cosine of the antenna azimuth position. The X and Y sweep currents from the synchronizer sweep generator and amplifier module are applied to J1. From J1, the sweep currents are applied to sweep centering and damping components on TB1, TB4, and the chassis. The sweep origin is depressed 1-1/2 inches below the center of the viewing screen by a fixed de bias current through the Y1 deflection coil. The resultant sweep currents from TB1 are applied to the four coils in the deflection yoke.

(7) Chassis Circuits.

The chassis circuits consist of range lights board TB5; transformers T1 and T2; relays K1, K2,and K4; the ac regulator ; and the -15-volt power supply. Transformer T2, the -15-volt power supply, and the ac regulator circuit are described in paragraph (1)(a) above. Relay K4 is described in paragraph (2) above.

Range lights board TB5 contains indicator lamps DS1, DS2, and DS3 that provide a visual indication of the RANGE switch position. Illumination voltage for the lamps is supplied from T1-7 through R72 to common terminal 4 on TB5. Generator A powe2 (115 volts ac, 400 Hz) from J1-N and J1-M is supplied to the primary of T1. Transformer T1 provides filament voltage for V1 and V2 and illumination voltage for the range indicator lamps on TB5. The secondary winding of T1 that supplies filament voltage for V1A (flood gun) is referenced to the +200-volt output of PS1. This is necessary to prevent a large voltage difference between the filament and cathode of VIA. The other secondary winding of T1 provides filament voltage for V1B and V2 and illumination voltage for the range indicator lamps.

Relays K1 and K2, controlled by the RANGE switch, select the correct shading waveform, range indicator lamp, and background voltage-divider network. The shading waveform integrating networks are located on TB4, and the background voltage dividers are located on TB3. Relay K1 is energized in the 60-mile range, and relay K2 is energized in the 150-mile range.

Section II. DISASSEMBLY

4-6. GENERAL.

This section presents instructions for disassembly of the 493A-3 Indicator. These instruc-tions are arranged so that disassembly of each major part is an individual procedure. her it is necessary to disassemble the unit, locate the part in the table of contents, and begin on the page indicated. Reference is made to previous disassembly steps that must be performed before a part may be removed or disassembled. In any event, the disassembly procedure should be continued only as far as necessary to replace the faulty component. These instructions include special techniques, cautions, warnings, and unique procedures.

4-7. PRECAUTIONS AND GENERAL TECHNIQUES.

Mark, tag, or otherwise identify all disconnected electrical wiring. Note the color coding, placement of leads, and method of applying insulation before unsoldering or removing any electrical components. These procedures supply sufficient information to completely remove the parts listed in the table of contents. In many cases, however, parts may be released and moved aside to gain access to other parts without unsoldering the connecting leads; particularly, this applies to the printed circuit boards. Do not unsolder these leads unless absolutely necessary.

CAUTION: TO PREVENT DAMAGE TO A SOLID-STATE DEVICE, USE A HEAT SINK BETWEEN THE POINT BEING UNSOLDERED AND THE DEVICE.

CAUTION: THE 493A-3 INDICATOR USES EXTREMELY HIGH VOLTAGES. DO NOT ATTEMPT ANY DISASSEMBLY WHILE PRIMARY PO" ER IS APPLIED TO THE UNIT.

WARNING: CAPACITORS IN THE 493A-3 INDICATOR MAY HOLD A CHARGE FOR LONG PERIODS OF TIME AFTER PRIMARY POVYER HAS BEEN REMOVED. OBSERVE SAFETY PRECAUTIONS TWHEN WORKING ON THE INDICATOR.

WARNING: BREAKAGE OF THE HIGH-VACUUM, CATHODE-RAY TUBE MAY RESULT IN INJURY FROM FLYING GLASS. DO NOT STRIKE OR SCRATCH THE TUBE AT ANY TIME. DO NOT APPLY MORE THAN MODERATE PRESSURE WHEN INSERTING OR REMOVING THE TUBE. USE PROTECTIVE DEVICES, SUCH AS GOGGLES. FACE MASKS, AND RUBBER GLOVES.

These precautions are repeated in the test of the disassembly procedures where applicable

4-8. DISASSEMBLY PROCEDURE.

A. Remove Filter Assembly and Front Plate. (Refer to figure FO-15)

(1) Remove BACKGRD and RANGE knobs (1) by loosening setscrews (2) located in the knobs.

(2) Remove front plate (52) by removing eight machine screws (54) securing it to front brace (152).

(3) Pull front plate (52) forward, separating it from front brace (152).

NOTE: Front plate (52) is held to the cathode-ray tube assembly by four wires that are soldered to range lights board TB5. To remove range lights board TB5, proceed to paragraph E(2) below.

B. Remove and Disassemble Polarizing Filter Assembly No. 1. (Refer to figure 4-5)

NOTE: Perform this procedure on units with serial number 1050 and below. For units with serial numbers 1051 through 1100, proceed to paragraph C below. For units with serial number 1101 and above, proceed to paragraph D below.

(1) Remove filter assembly and front plate (94A, 52, figure FO-15) in accordance with paragraph 4-8A.

(2) Tip filter assembly and front plate (17, 51) forward, and release range lights board TB5 (6) and panel light indicator (13) by removing two machine screws (5) securing them to front mounting plate (51).

NOTE: Range lights board TB5 (6) is held to the cathode-ray tube assembly by four wires. Do not unsolder these wires to disassemble the polarizing filters.

(3) Remove grid (3) by removing three machine screws (4) securing it to the rear of front mounting plate (51).

(4) Remove filter assembly (17) by removing the four machine screws securing it to the back of front mounting plate (51).

(5) Remove DIM tab (41) by removing two machine screws (42) securing it to circular filter assembly (43).

(6) Remove RED tab (24) by removing two machine screws (25) securing it to red filter assembly (26).

(7) Remove filter guide (22) by removing two machine screws (23) securing it to red filter assembly (26).

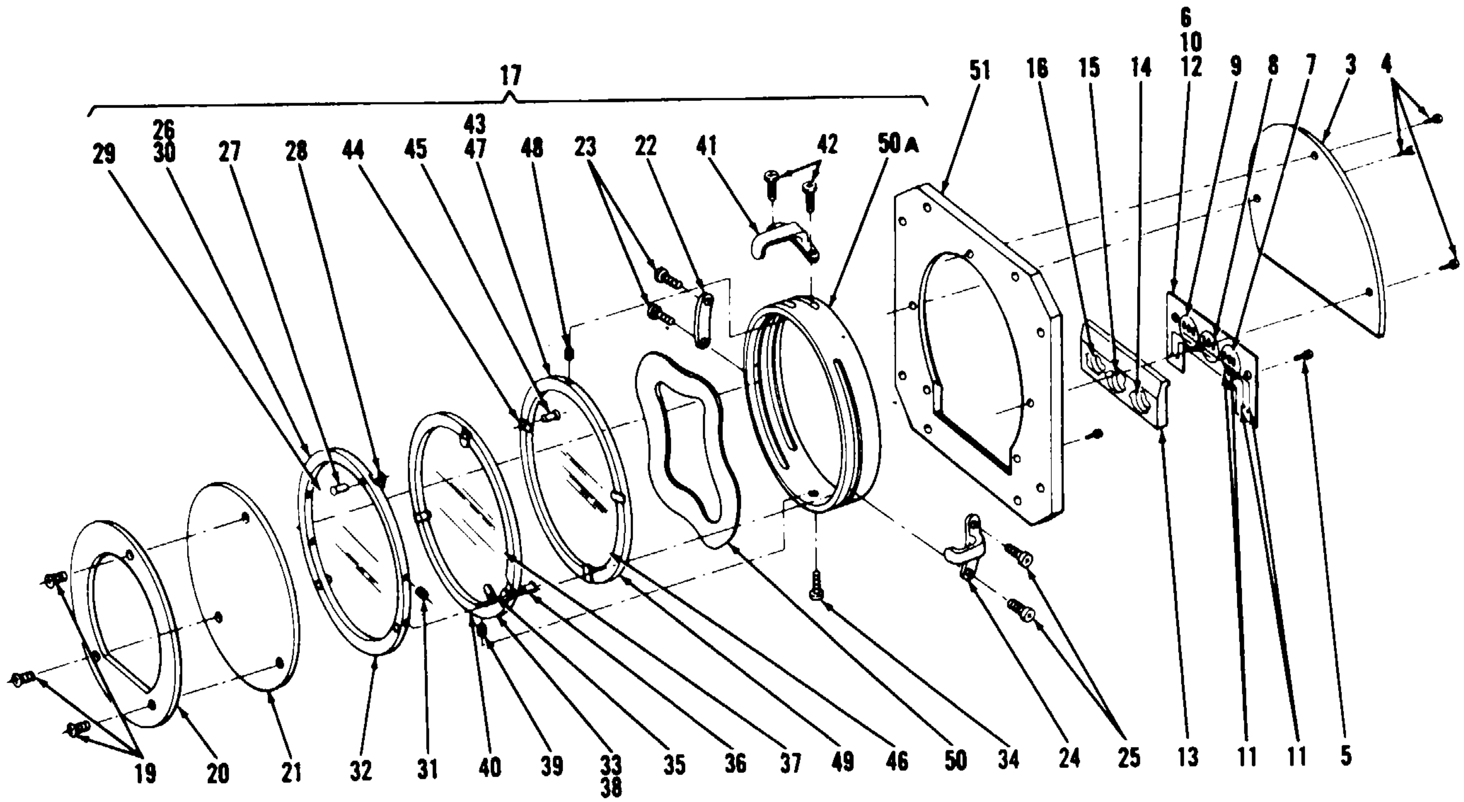
(8) Remove filter cover (20) by removing three machine screws (19).

(9) The following filter components are now free and may be removed. Note the order of removal:

(a) Indicator window (21).

(b) Red filter assembly (26).

(c) Linear filter assembly (33).



Polarizing Filter Assembly No. 1,
Exploded View (S/N 1050 and Below)
Figure 4-5

(d) Circular filter assembly (43).

(e) Wavewasher (50).

NOTE: Handle the filters by their edges or by the filter assembly rings. Do not touch them with bare fingers.

C. Remove and Disassemble Polarizing Filter Assembly No. 2. (Refer to figure 4-6).

NOTE: Perform this procedure on units with serial numbers 1051 through 1100. For units with serial number 1050 and below, refer to preceding paragraph 4-8B. For units with serial number 1101 and above, proceed to paragraph D below.

(1) Remove filter assembly and front plate (94A, 52, figure FO-15) in accordance with paragraph A above.

(2) Tip the filter assembly and front plate (53, 94) forward, and release range lights board TB5 (78) and panel light indicator (85) by removing two machine screws (77) securing them to spacer ring (89).

NOTE: Range lights board TB5 (78) is held to the cathode-ray tube assembly by four wires. Do not unsolder these wires to disassemble the polarizing filters.

(3) Remove grid (75) by removing three machine screws (76) securing it to the rear of front mounting plate (94).

(4) Remove filter cover (58) by removing four machine screws (55) securing it to mounting blocks (90).

(5) The following filter components are now free and may be removed. Note the order of removal:

(a) Filter window (57).

(b) Compression ring assembly (59).

(c) Red polarized ring assembly (64).

(d) Linear polarized ring assembly (67).

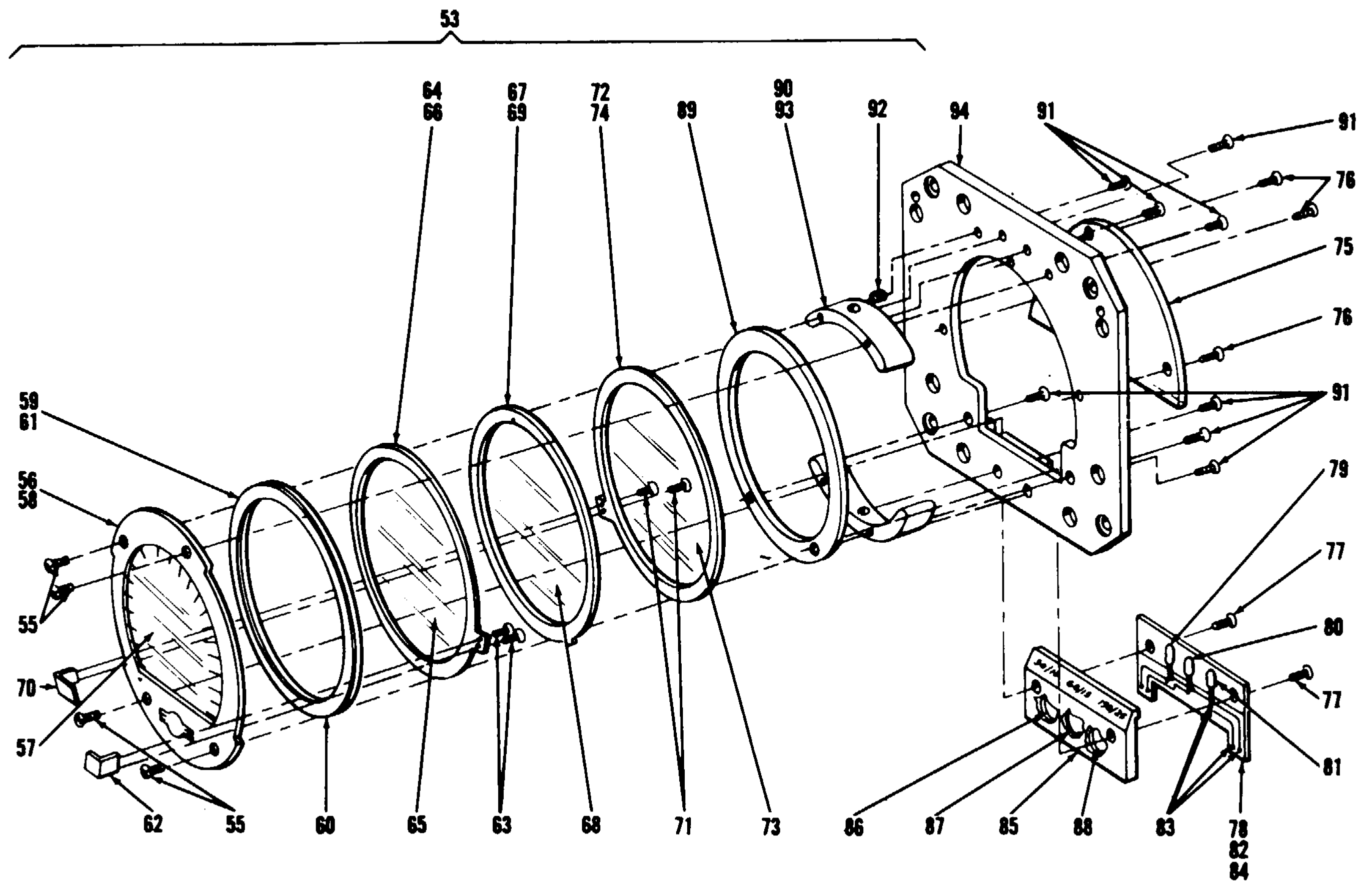
(e) Dim polarized ring assembly (72).

(f) Spacer ring (89).

NOTE: Handle the filters by their edges or by the filter assembly rings. Do not touch them with bare fingers.

(6) Remove mounting blocks (90) by removing eight machine screws (91) from the rear of front mounting plate (94).

(7) Remove DIM tab (70) by removing two screws (71) securing it to dim ring (74).



Polarizing Filter Assembly No. 2,
Exploded View (S/N 1051 Through 1100)
Figure 4-6

(8) Remove RED tab (62) by removing two screws (63) securing it to red ring (66).

D. Remove and Disassemble Polarizing Filter Assembly No. 3. (Refer to figure 4-7)

NOTE: Perform this procedure on units with serial number 1101 and above. For units with serial number 1050 and below, refer to preceding paragraph B. For units with serial numbers 1051 through 1100, refer to paragraph C above.

(1) Remove filter assembly and front plate (94A, 52, figure FO-15) in accordance with paragraph A above.

(2) Tip filter assembly and front plate (1, 18) forward, and release range lights board TB5 (22) and panel light indicator (27) by removing two machine screws (21 securing them to front mounting plate (18).

NOTE: Range lights board TB5 (22) is held to the cathode-ray tube assembly by four wires. Do not unsolder these wires to disassemble the polarizing filters,

(3) Remove grid (19) by removing three machine screws (20) securing it to the rear of front mounting plate (18).

(4) Remove lens frame (1) by removing four machine screws (2) securing it to the front of front mounting plate (18).

(5) The following filter components are now free and may be removed. Note the order of removal:

(a) Filter window (3).

(b) Compression ring assembly (4).

(c) Filter spacer (7).

(d) Red polarizer (8).

(e) Filter spacer (11).

(f) Linear polarizer (12).

(g) Filter spacer (13);

(h) Circular polarizer (14).

(i) Filter spacer (17).

NOTE: Handle the filters by their edges. Do not touch them with bare finger

(6) Remove DIM tab (15) by removing two machine screws (16) securing it to circular polarizer (14).

(7) Remove RED tab (9) by removing two machine screws (10) securing it to red polarizer (8).

E. Remove Range Lights Board TB5. (Refer to figures 4-5, 4-6, and 4-7)

(1) Remove filter assembly and front plate (94A, 52, figure FO-15)in accordance with paragraph A above.

(2) On units with serial number 1050 and below, release and remove range lights board TB5 (E;, figure 4-5) from front mounting plate (51, figure 4-5) in accordance with paragraph B.(2) above. Proceed to paragraph (5) below.

(3) On units with serial numbers 1051 through 1100, release and remove range lights board TB5 (78, figure 4-6) from spacer ring (89, figure 4-6) in accordance with paragraph C(2) above. Proceed to paragraph (5) below.

(4) On units with serial number 1101 and above, release and remove range lights board TB5 (22, figure 4-7) from front mounting plate (18, figure 4-7) in accordance with paragraph D(2) above. Proceed to paragraph (5) below.

(5) Unsolder and tag the leads from terminals 1 through 4 of range lights board TB5.

F. Remove Outer Dust Covers. (Refer to figure FO-15)

(1) Remove two-piece dust cover (95) by removing six machine screws (96) securing it to the indicator frame.

(2) Lift off (lust covers (95).

G. Remove Rear Cover Plate. (Refer to figure FO-16)

(1) Remove 2-piece dust cover (95, figure FO-15) in accordance with paragraph F above.

(2) Remove rear cover plate (142) by removing eight machine screws (143) securing it to rear chassis assembly (110, figure FO-15)

(3) Pull rear cover plate (142) away from rear chassis assembly (110, figure FO-15).

(4) Remove cable clamp (109) from rear cover plate (142) by removing machine screw (110), flat washer (111), and hexnut (112).

(5) Unsolder and tag the yellow lead from standoff terminal (133).

(6) Unsolder and tag the three red leads from standoff terminal (117).

(7) Unsolder and tag the orange and brown leads from CR19 and the yellow and brown leads from CR20.

CAUTION: USE A HEAT SINK BETWEEN THE LEAD BEING UNSOLDERED AND THE SEMICONDUCTOR DEVICE.

(8) Remove electrical connector (141) by removing four machine screws (138, 136), two lockwashers (139), two standoff terminals (133, 135), and two hexnuts (140) securing it to rear cover plate (142).

(9) Unsolder and tag the leads from relay K4 (127).

NOTE: Units with serial number 1792 and above and units with serial number 1791 and below that have been modified in accordance with Service Bulletin No. 6 have additional leads to unsolder and tag from CR21 through CR24.

(10) Rear cover plate (142) is now free from rear chassis assembly (110, figure FO-15) and the components attached to it may be removed as required.

H. Remove High-Voltage Circuit TB2. (Refer to figure FO-16)

(1) Remove two-piece dust cover (95, figure FO-15)in accordance with paragraph F above.

(2) Separate rear cover plate (142) from rear chassis assembly (110, figure FO-15) in accordance with paragraphs G(2) and G(3) above.

(3) Remove plastic high-voltage cover (8) by removing four machine screws (7) securing it and high-voltage circuit TB2 (10) to brackets (151, 156).

(4) Remove four spacing sleeves (9) separating plastic high-voltage cover (8) and high-voltage circuit TB2 (10).

(5) Lift high-voltage circuit TB2 (10) up to gain access to the bottom of the board.

(6) Unsolder and tag the red, white, and blue high-voltage leads from terminals 6, 7, and 9 of high-voltage circuit TB2 (10).

(7) Unsolder and tag the remaining leads from terminals 1 through 5, 8, and 10 through 12 of high-voltage circuit TB2 (10).

(8) Remove cable clamp by removing machine screw, flat washer, lockwasher, and hexnut securing it to high-voltage circuit TB2 (10).

(9) High-voltage circuit TB2 (10) is now free and may be removed.

I. Separate the Cathode-Ray Tube Assembly from the Rear Chassis Assembly. (Refer to figures FO-15 and FO-16).

(1) Remove two-piece dust cover (95, figure FO-15)in accordance with paragraph F above.

(2) Separate rear cover plate (142, figure FO-16) from rear chassis assembly (110, figure FO-15) in accordance with paragraphs G(2) and G(3) above.

(3) Remove plastic high-voltage cover (8, figure FO-16 release high-voltage circuit TB2 (10, figure FO-16) and unsolder and tag the leads from terminals 6, 7, and 9 of high-voltage circuit TB2 in accordance with paragraphs H(3) through H(6) above.

<u>NOTE</u>: Refer to figure FO-16 for the performance of steps (4) and (5) below.

(4) Disconnect electrical connector (62) from the cathode-ray tube writing gun.

(5) Disconnect the viewing-screen, high-voltage lead from terminal 4 of power supply PS2 (64).

<u>NOTE</u>: Refer to figure FO-15 for the performance of steps (6) through (14) below.

(6) Turn RANGE control knob (1) or RANGE control shaft (113) until setscrews (111) of coupler (112) are accessible.

(7) Remove RANGE switch control shaft (113) from RANGE switch control (114) by loosening two setscrews (111) in coupler (112).

(8) Turn BACKGRD control knob (1) or BACKGRD control shaft (102) until setscrews (100) of coupler (101) are accessible.

(9) Remove BACKGRD control shaft (102) from BACKGRD control (103) by loosening two setscrews (100) of coupler (101).

(10) Remove RANGE switch bracket (114) by removing two machine screws (115) securing it to front brace (143).

(11) Remove BACKGRD control bracket (106) by removing two machine screws (107) securing it to front brace (143).

(12) Release entire front brace (143) from rear chassis assembly (110) by removing eight machine screws (ll0A).

(13) Disconnect connectors (116, 117).

(14) Gently separate rear chassis assembly (110) from front brace (143) until flood-gun tube socket (32, figure FO-16 is accessible.

(15) Remove flood-gun tube socket (32, figure FO-15 and completely separate the two chassis.

<u>WARNING</u>: EXTREME CARE SHOULD BE EXERCISED WHEN REMOVING THE FRONT TUBE SECTION FROM THE REAR CHASSIS ASSEMBLY. NO STRAIN OR STRESS SHOULD BE: EXERTED ON THE NECKS OF THE CATHODE-RAY TUBE. USE PROTECTIVE DEVICES, SUCH AS GOGGLES, FACE MASKS, AND RUBBER GLOVES.

J. <u>Remove Cathode-Ray Tube</u>. (Refer to figure FO-15)

(1) Remove two-piece dust cover (95, figure FO-15 in accordance with paragraph F above.

(2) Separate rear cover plate (142, figure FO-16 from rear chassis assembly (110, figure FO-15 in accordance with paragraphs G(2) and G(3) above.

(3) Remove plastic high-voltage cover (8, figure FO-16) release high-voltage circuit TB2 (10, figure FO-16) and unsolder and tag the leads from terminals 6, 7, and 9 of high-voltage circuit TB2 in accordance with paragraphs H(3) through H(6) above.

(4) Separate the cathode-ray tube assembly from the rear chassis assembly (110, figure FO-15 in accordance with paragraphs I(4) through I(15) above.

(5) Remove eight tube fasteners (97) securing cathode-ray tube (142) to front brace (143).

(6) Remove cathode-ray tube (142) from front brace (143).

WARNING: BREAKAGE OF THE HIGH-VACUUM, CATHODE-RAY TUBE MAY RESULT IN INJURY FROM FLYING GLASS. DO NOT STRIKE OR SCRATCH THE TUBE AT ANY TIME. DO NOT APPLY MORE THAN MODERATE PRESSURE WHEN INSERTING OR REMOVING THE TUBE. USE PROTECTIVE DEVICES, SUCH AS GOGGLES, FACE MASKS, AND RUBBER GLOVES.

K. Remove Sweep Deflection Yoke L1. (Refer to figure FO-16)

(1) Remove two-piece dust cover (95, figure FO-15)in accordance with paragraph F above.

(2) Separate rear cover plate (142, figure FO-16) from rear chassis assembly (110, figure FO-15) in accordance with paragraphs G(2) and G(3) above.

(3) Remove plastic high-voltage cover (8, figure FO-16) release high-voltage circuit TB2 (10, figure FO-16) and unsolder and tag the leads from terminals 6, 7, and 9 of high-voltage circuit TB2 in accordance with paragraphs H(3) through H(6) above.

(4) Separate the cathode-ray tube assembly from rear chassis assembly (110, figure FO-15) in accordance with paragraphs I(4) through I(15) above.

(5) Remove yoke adjuster (3) by loosening machine screw (4).

(6) Loosen yoke clamp (75) by loosening yoke clamp screw (76).

(7) Loosen one foot of yoke clamp (75) by loosening machine screw (80).

(8) Withdraw yoke (79) from yoke clamp (75).

(9) Unsolder and tag the yoke leads from terminals 2 through 4, 9, and 10 of the sweep positioning and erase circuit TB1 (68).

L. Remove and Disassemble Rear Cover Semiconductor Device Set. (Refer to figure 4-8)

(1) Remove two-piece dust cover (95, figure FO-15) in accordance with paragraph 3.F.

(2) Separate rear cover plate (142, figure FO-16) from rear chassis assembly (110, figure FO-15) in accordance with paragraphs G(2) and G(3) above.

(3) Unsolder and tag the orange and brown leads from CR19 and the yellow and brown leads from CR20.

CAUTION: USE A HEAT SINK BETWEEN THE LEAD BEING UNSOLDERED AND THE SEMICONDUCTOR DEVICE.

NOTE: The two semiconductor device sets on rear cover plate (142, figure FO-16) are identical. Disassembly procedures describe only one of these sets. Refer to detail A, figure 4-8 for the performance of steps (4) through (7) below.

(4) Remove cover (84) by removing two machine screws (85), two flat washers (87), and two lockwashers (86) securing it to heat sink (88).

(5) Remove heat sink (88) by removing two machine screws (89), two spacers (90), two flat washers (91), and two hexnuts (92) securing it to rear cover plate (142, figure FO-16).

(6) Remove two machine screws (101), two hexnuts (106), two lockwashers (105), four flat washers (102), two insulating sleeves (104), two insulating washers (103), and terminal lug (107).

(7) Remove semiconductor (100) and mica insulator (108).

M. Remove Sweep Positioning and Erase Circuit TB1. (Refer to figure FO-16)

(1) Remove two-piece dust cover (95, figure FO-15)in accordance with paragraph F above.

(2) Separate rear cover plate (142, figure FO-16) from rear chassis assembly (110, figure FO-15) in accordance with paragraphs G(2) and G(3) above.

(3) Remove four machine screws (69) and four flat washers (70) securing sweep positioning and circuit TB1 (68) to bracket (156) and transformer plate (49).

(4) Pull sweep positioning and erase circuit TB1 (68) forward away from bracket (156) and transformer plate (49).

(5) Unsolder and tag the leads from terminals 1 through 11 of sweep positioning and erase circuit TB1 (68).

(6) Remove two cable clamps by removing two machine screws, two flat washers, two lockwashers, and two hexnuts securing clamps to sweep positioning and erase circuit TB1 (68).

(7) Sweep positioning and erase circuit TB1 (68) is now free and may be removed.

N. Remove Low-Voltage Bias Circuit TB3. (Refer to figure FO-16)

(1) Remove two-piece dust cover (95, figure FO-15 in accordance with paragraph F above.

(2) Separate rear cover plate (142, figure FO-16)from rear chassis assembly (110, figure FO-15)in accordance with paragraphs G(2) and G(3) above.

(3) Remove four machine screws (12) and four flat washers (13) securing low-voltage bias circuit TB3 (11) to bracket (151) and transformer plate (49).

(4) Pull low-voltage bias circuit TB3 (11) forward, away from bracket (151) and transformer plate (49), to expose the rear wiring.

(5) Unsolder and tag the leads from terminals 1 through 11, 13, and 14 of low-voltage bias circuit TB3 (11).

(6) Unsolder and tag the leads from the center tap of R55 and pins 10 and 12 (filaments) of V2 tube socket of low-voltage bias circuit TB3 (11).

(7) Remove cable clamp by removing machine screw, flat washer, lockwasher, and hexnut securing it to low voltage bias circuit TB3 (11).

O. Remove Shading Circuit TB4. (Refer to figure FO-16)

(1) Remove two-piece dust cover (95, figure FO-15) in accordance with paragraph F above.

(2) Separate rear cover plate (142, figure FO-16) from rear chassis assembly (110, figure FO-15) in accordance with paragraphs G(2) and G(3) above.

(3) Unsolder and tag the leads from terminals 1 through 14 of shading circuit TB4 (16) and terminals 1 and 2 of power supply PS2 (64).

(4) Release shading circuit TB4 (16) from transformer plate (49) by removing four machine screws (50), four flat washers (52), and four lockwashers.

(5) Remove cable clamp by removing machine screw, flat washer, lockwasher, and hexnut securing it to shading circuit TB4 (16).

(6) Loosen two machine screws (153) securing transformer plate (49) to chassis frame (164).

(7) Separate rear chassis channel braces (164, 166), and slide shading circuit TB4 (16) out the rear of the unit.

P. Remove Transformer Plate. (Refer to figure FO-16)

(1) Remove two-piece dust cover (95, figure FO-15) in accordance with paragraph F above.

(2) Separate rear cover plate (142, figure FO-16) from rear chassis assembly (110, figure FO-15) in accordance with paragraphs G(2) and G(3) above.

(3) Release high-voltage circuit TB2 (10) and plastic high-voltage cover (8) in accordance with paragraphs H(3) through H(5) above.

(4) Release sweep positioning and erase circuit TB1 (68) in accordance with paragraph M(3) and M(4) above.

(5) Release low-voltage bias circuit TB3 (11) in accordance with paragraphs 4-8 N(3) and 4-8 N(4).

(6) Release shading circuit TB4 (16) in accordance with paragraph 0(4) above.

(7) Remove four machine screws (14) and lockwashers (15) securing transformer plate (49) to chassis frame (164).

(8) Pull transformer plate (49) toward the rear of the unit to expose all wiring.

(9) Unsolder and tag the leads from terminals 1, 4, and 6 through 9 of transformer T1 (33).

(10) Unsolder and tag the lead from solder lug (48).

(11) Unsolder and tag the leads from terminals 1 through 4 of transformer T2 (19).

NOTE: Units with serial number 1792 and above and units with serial number 1791 and below that have been modified in accordance with Service Bulletin No. 6 have additional leads to unsolder and tag from terminals 13 and 9 of transformer T2 (19).

(12) Remove solder lug (25) by removing machine screw (21), flat washer (22), lockwasher (23), and hexnut (24).

(13) Unsolder and tag the leads from terminals 1, 3, 4, 7, and 8 of relay K2 (38).

(14) Unsolder and tag the leads from terminals 1 through 3, 6, and 7 of relay K1 (41).

(15) Remove cable clamp (26) by removing machine screw (27), flat washer (28), and hexnut (29).

(16) Transformer plate (49) is now free and may be removed from the unit.

Q. Remove Power Supply PS1. (Refer to figure FO-16)

(1) Remove two-piece dust cover (95, figure FO-15) in accordance with paragraph F above.

(2) Separate rear cover plate (142, figure FO-16) from rear chassis assembly (110, figure FO-15) in accordance with paragraphs G(2) and G(3) above.

(3) Release high-voltage circuit TB2 (10) and plastic high-voltage cover (8) in accordance with paragraphs H(3) through H(6) above.

(4) Separate the cathode-ray tube assembly from rear chassis assembly (110, figure FO-15) in accordance with paragraphs I(4) through I(15) above.

(5) Release sweep positioning and erase circuit TB1 (68) in accordance with paragraphs M(3) and M(4) above.

(6) Release low-voltage bias circuit TB3 (11) in accordance with paragraphs N(3) and N(4) above.

(7) Release transformer plate (49) in accordance with paragraphs P(7) and P(8) above.

(8) Unsolder and tag the leads from terminals 1, 2, and 6 through 9 of power supply PSI (55).

(9) Remove bracket (147) by removing two machine screws (148) securing it to chassis brace (164).

(10) Remove four hexnuts (56), four lockwashers (57), and four flat washers (58) securing power supply PS1 (55) to front brace (157).

(11) Power supply PS1 (55) is now free and may be removed from the unit.

R. Remove Power Supply PS2. (Refer to figure FO-16)

(1) Remove two-piece dust cover (95, figure FO-15) in accordance with paragraph F above.

(2) Separate rear cover plate (142, figure FO-16) from rear chassis assembly (110, figure FO-15) in accordance with paragraphs G(2) and G(3) above.

(3) Release high-voltage circuit TB2 (10) and plastic high-voltage cover (8) in accordance with paragraphs H(3) through H(6) above.

(4) Separate the cathode-ray tube assembly from rear chassis assembly (110, figure FO-15) in accordance with paragraphs I(4) through I(15) above.

(5) Release sweep positioning and erase circuit TB1 (68) in accordance with paragraphs M(3) and M(4) above.

(6) Release low-voltage bias circuit TB3 (11) in accordance with paragraphs N(3) and N(4) above.

(7) Release transformer plate (49) in accordance with paragraphs P(7) and P(8) above.

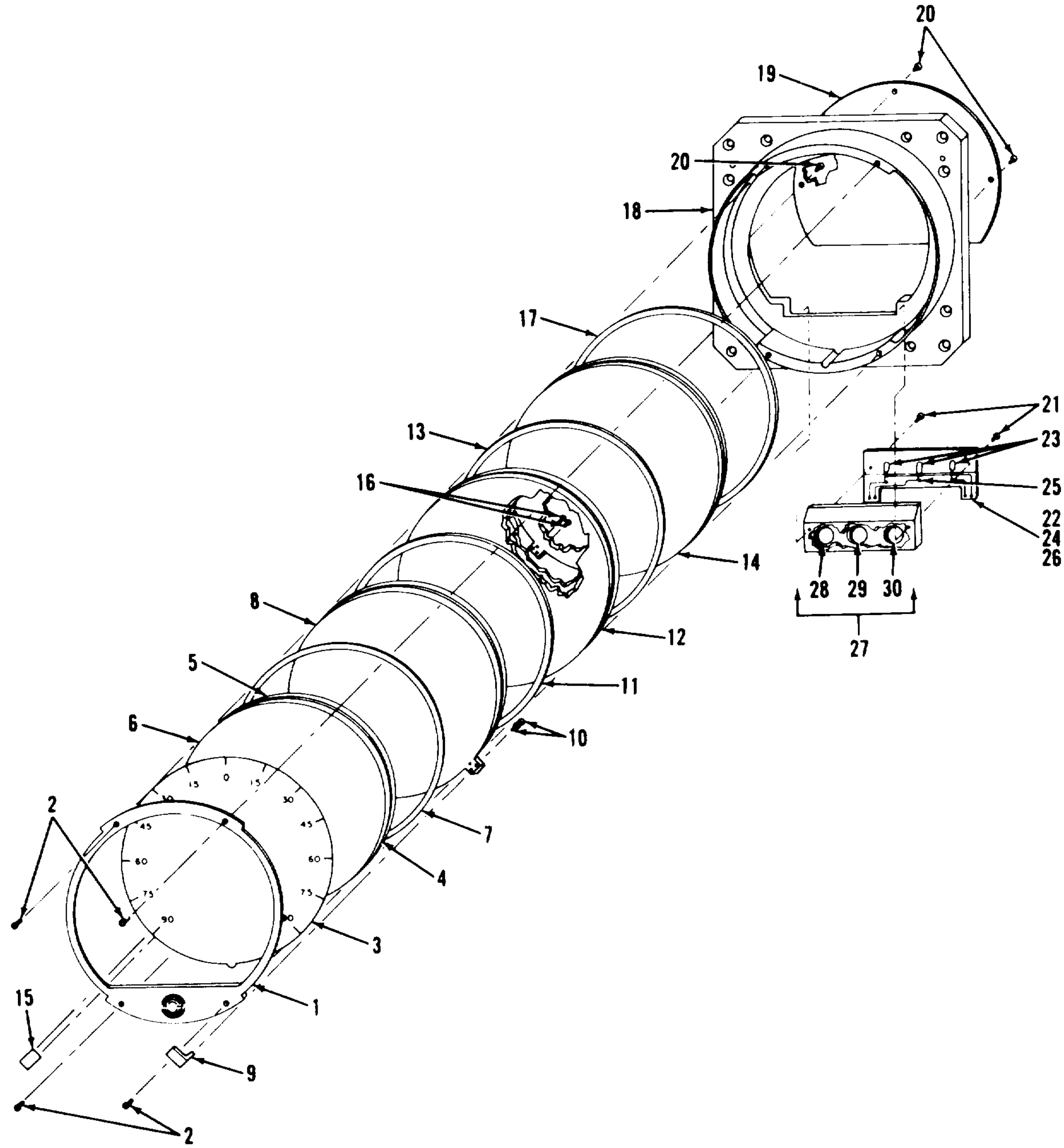
(8) Unsolder and tag the leads from terminals 1 through 3, 6, and 7 of power supply PS2 (64).

(9) Remove the viewing-screen lead from terminal 4 of power supply PS2 (64).

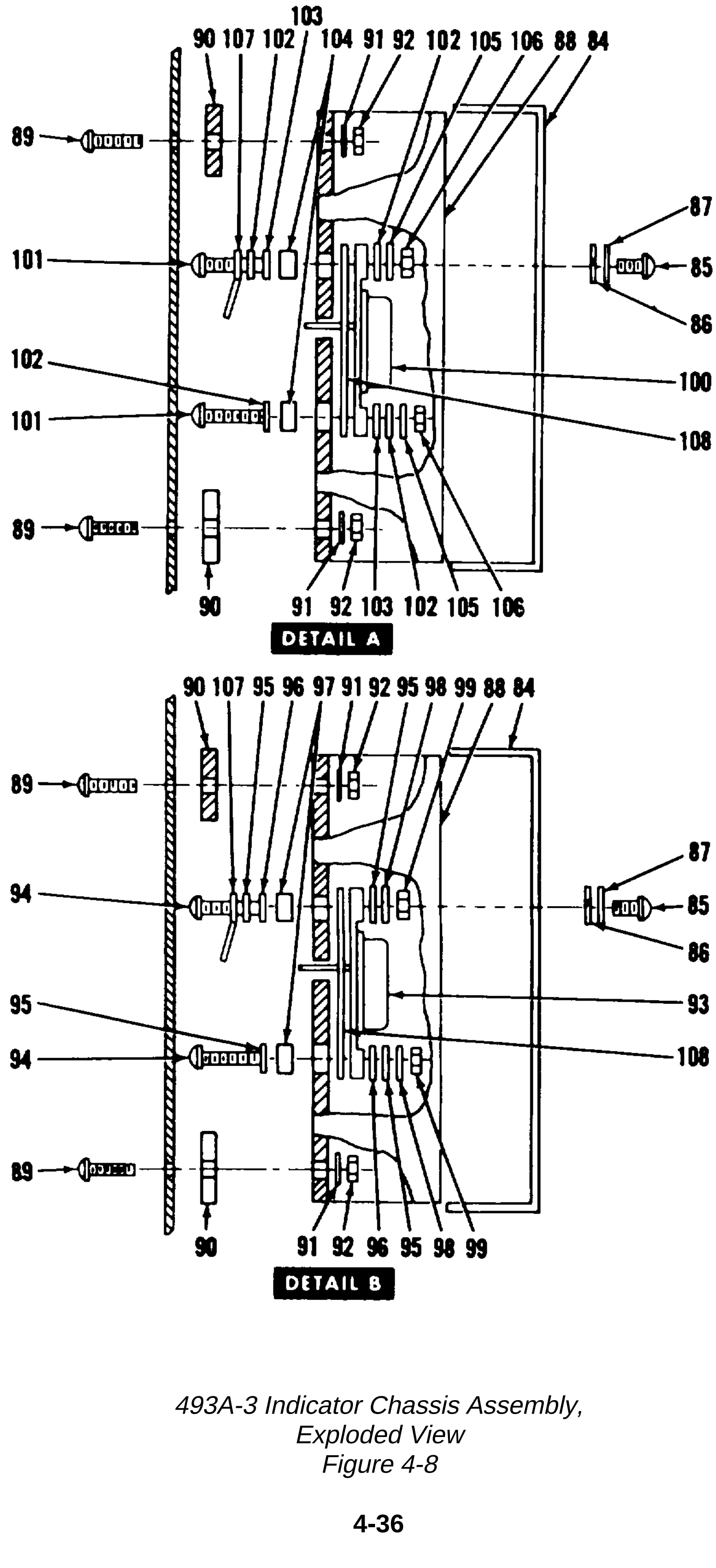
(10) Remove bracket (152) by removing two machine screws (153) securing it to chassis brace (164).

(11) Remove four hexnuts (65), four lockwashers (66), and four flat washers (67) securing power supply PS2 (64) to front brace (157).

(12) Power supply PS2 (64) is now free and may be removed from the unit.



Polarizing Filter Assembly No. 3,
Exploded View (S/N 1101 and Above)
Figure 4-7



493A-3 Indicator Chassis Assembly,
Exploded View
Figure 4-8

Section III. CLEANING

4-9. GENERAL.

This section presents instructions for cleaning the dismantled and disassembled components, parts, and subassemblies of the 493A-3 Indicator. These instructions are tabulated and arranged to facilitate reference to the test procedure for cleaning the various parts and assemblies. All parts requiring particular methods of cleaning are considered separately, and parts which are similar enough to permit identical cleaning procedures are grouped together. Either Turcosol or Stoddard solvent may be used in the following procedures.

WARNING: PERFORM OPERATIONS INVOLVING CLEANING SOLVENT UNDER A VENTILATED HOOD. AVOID BREATHING SOLVENT VAPOR AND FUMES. WEAR A SUITABLE MASK WHEN NECESSARY. AVOID CONTINUOUS CONTACT WITH THE SOLVENT. USE GOGGLES, GLOVES, AND AN APRON TO PREVENT IRRITATION FROM PROLONGED CONTACT. CHANGE CLOTHING THAT HAS BECOME SATURATED WITH SOLVENT.

References to "air jet" in this section indicate a hand-operated air nozzle supplied with clean, dry, compressed air at a maximum pressure of 28 pounds per square inch.

WARNING: WEAR GOGGLES WHEN USING THE AIR JET TO BLOW DUST AND DIRT FROM EQUIPMENT PARTS. WARN OTHER PERSONS AWAY FROM HAZARDOUS AREA OR WORKING ENCLOSURE.

4-10. CLEANING PROCEDURE

The following paragraphs present instructions and procedures for cleaning the various parts of the dismantled and disassembled equipment preparatory to performing inspection procedures. For convenience, components, parts, and subassemblies are alphabetically listed and cross-referenced to the appropriate paragraphs containing the cleaning instruc-tions. Refer to figure 4-9.

WARNING: OBSERVE ALL FIRE PRECAUTIONS WHEN USING FLAMMABLE MATERIALS FOR CLEANING PURPOSES. THESE MATERIALS SHOULD ONLY BE USED OUTSIDE OR IN A VENTILATED BOOTH PROVIDED WITH EXPLOSION-PROOF ELECTRICAL EQUIPMENT AND AN EXHAUST FAN HAVING SPARK-PROOF BLADES.

A. Connectors.

(1) Wipe dust and dirt from bodies, shells, and cable clamps, using a solvent-moistened lintless cloth. Wipe dry with a clean, dry, lintless cloth.

(2) Remove dust from inserts, using a small soft-bristled brush and an air jet.

(3) Wash dirt and any traces of lubricant from inserts, insulation, and contacts, using solvent applied sparingly with a small, camel-hair brush.

ITEM	REFER TO PARAGRAPH
Connectors	4-10A
Covered cables	4-10B
Covers and shields	4-10C
Electron tubes	4-10D
Knobs and panels	4-10E
Machined metal parts	4-10F
Mechanical metal parts	4-10G
Polarizing filters	4-10H
Printed circuit boards	4-10I
Tube sockets	4-10J
Wired chassis	4-10K

Index of Cleaning Procedures
Figure 4-9

<u>CAUTION</u>: DO NOT ALLOW SOLVENT TO RUN INTO SLEEVES OR CONDUIT COVERING ANY WIRES OR CABLES CONNECTED TO CONTACT TERMINALS OF THE INSERT.

(4) Dry the insert with an air jet.

B. <u>Covered Cables</u>.

(1) Clean outer surfaces by wiping away dirt with a solvent-moistened, lintless cloth.

(2) Wipe dry, using a clean, dry, lintless cloth.

(3) Treat any connector terminations in accordance with paragraph A above. Wipe lug terminations clean with a solvent-moistened, lintless cloth; dry with a clean, dry, lintless cloth.

C. <u>Covers and Shields</u>.

Clean all unfinished, finished, and partly finished sheet-metal covers, such as dust covers, inspection covers, and housings, as follows:

(1) Remove bulk of any surface grease with rags.

(2) Blow dust from surfaces, holes, and recesses with an air jet.

(3) Immerse in a washing bath of solvent, and scrub until clean, working over all surfaces and into all holes and recesses with suitable nonmetalic brushes. Flat, wood-backed brushes with soft-fiber bristles are recommended for surfaces; round brushes similar to those used for washing bottles and test tubes are recommended for holes and recesses.

(4) Raise from bath, and permit solvent to drain into bath.

(5) Immerse in rinsing bath of clean solvent, rinse, and raise from bath. Position to drain dry so that solvent is not trapped in holes or recesses. Where practical positioning will not permit complete drainage, use an air jet to remove any trapped solvent.

CAUTION: USE PROTECTIVE DEVICES WHEN USING THE AIR JET TO REMOVE EXCESS SOLVENT.

(6) When thoroughly dry, touch up minor damage to the finish in accordance with paragraph 4-14 F. Extensive damage to the finish may require complete refinishing.

(7) Protect from dust and moisture pending inspection.

D. Electron Tubes.

(1) Remove dust and dirt from surface of glass or metal envelope and side of tube base with solvent-moistened, lintless cloth. Apply the cloth lightly to avoid obliterating the tube type markings.

(2) Dry and polish these surfaces by gently wiping them with a clean, dry, lintless cloth.

(3) Clean bottom of base and all tube contacts with a soft-bristled brush.

NOTE: Abrasives or metal tools should not be used to remove corrosion deposits occasionally present on tube contacts.

CAUTION: USE EXTREME CARE WHEN CLEANING THE CATHODE-RAY TUBE. DO NOT STRIKE O)R SCRATCH THE TUBE AT ANY TIME. DO NOT ALLOW IT TO C()ME WITHIN 4 FEET OF MAGNETIC MATERIALS. BREAKAGE OF THE TUBE MAY RESULT IN INJURY FROM FLYING GLASS. WEAR PROTECTIVE CLOTHING WHEN HANDLING THE TUBE.

E. Knobs and Panels.

Clean knobs and panels by gently wiping the surfaces with a clean, soft, lintless cloth. When clean, polish with tissue paper.

F. Machined Metal Parts.

Detached shafts, keys, pins, collars, and similar machined parts should be cleaned in a suitable cleaning machine, if available. If a cleaning machine is not available, proceed as follows:

(1) Clean machined metal parts in accordance with paragraphs C(1) and C(3) through C(5) above.

NOTE: Do not touch any clean machined or unfinished parts with bare hands.

(2) Dry in dust-free, dry area or suitable enclosure. Radiant heat used in a ventila enclosure is recommended for drying, particularly where atmospheric humidity is high.

(3) After the drying process is completed, apply a light coat of lubricating oil to any bare steel surfaces.

G. Mechanical Metal Parts.

The detached miscellaneous mechanical metal parts include mounting plates, mounting clamps and brackets, nuts, bolts, screws, washers, fasteners, and other hardware. These should be cleaned in a suitable cleaning machine or in accordance with applicable steps of the procedures for covers and shields contained in paragraph C above.

H. Polarizing Filters.

Clean the polarizing filters by wiping them with a soft, lintless cloth or lens tissue.

NOTE: The polarizing material is sandwiched between two discs of acrylic plastic. This material is easy to scratch and is damaged by some solvents such as acetone and benzine. The plastic can be cleaned with Permatex 403 or other compound complying with MIL-C-18767. If solvent of any kind is used for cleaning the filters, it should be used sparingly. A Nuclear Staticmaster brush may be used to remove static, lint, and dust. Wipe lubricant from filter rings with a dry cloth or a cloth dampened with solvent. Do not touch clean filters with bare hands.

I. Printed Circuit Boards.

(1) Using an air jet and a small, camel-hair brush, blow and brush dust and dirt from surfaces, holes, and crevices.

(2) Wipe clean using a lintless cloth slightly moistened with solvent.

CAUTION: THE EPOXY MOISTURE SEALANT ON THE PRINTED CIRCUIT BOARDS IS SUSCEPTIBLE TO SOFTENING IF SOLVENT IS APPLIED FOR EXCESSIVE PERIODS OF TIME OR IN EXCESSIVE AMOUNTS. USE CARE IN CLEANING THESE PRINTED CIRCUIT BOARDS WITH A SOLVENT-MOISTENED CLOTH. DRY WITH A CLEAN, LINTLESS CLOTH IMMEDIATELY AFTER CLEANING.

J. Tube Sockets.

Mica-filled Bakelite sockets are cleaned as follows:

(1) Remove any rosin adhering to silver-plated contacts, using orange sticks depressed to wedge ends.

CAUTION: DO NOT USE METAL TOOLS TO REMOVE FOREIGN MATTER FROM THESE CONTACTS. DAMAGE TO CONTACT PLATING INVITES CORROSION WHICH MAY ULTIMATELY RESULT IN EQUIPMENT FAILURE.

(2) Wash contacts with solvent lightly applied with a small, soft-bristled brush.

(3) Using solvent-moistened, lintless cloth, remove any foreign matter adhering to the socket body or wafer.

(4) Dry all parts with an air jet.

CAUTION: USE PROTECTIVE DEVICES WHEN USING THE AIR JET TO REMOVE EXCESS SOLVENT.

K. Wired Chassis.

The following procedures should be used for chassis containing resistors, capacitors, switches, tube sockets, inductors, transformers, and other wired parts.

(1) Remove dust and dirt from all surfaces, including parts and wiring, using soft-bristled brushes and an air jet.

CAUTION: AVOID AIR-BLASTING DELICATE PARTS BY TOO CLOSE AN APPROACH WITH THE AIR-JET NOZZLE. USE CAUTION WHEN BRUSHING DELICATE PARTS.

NOTE: When necessary to disturb the position and dress of wiring and cables, ensure that they are properly restored after cleaning is completed.

(2) Clean tube sockets in accordance with paragraph J above.

(3) With minimum disturbance of wiring, clean connectors in accordance with paragraph A above.

(4) Complete chassis cleaning by wiping all finished surfaces with a solvent-moistened, lintless cloth.

(5) Dry and polish these surfaces, using a clean, dry, lintless cloth.

(6) Protect the chassis from dust, moisture, and damage pending inspection.

Section IV. INSPECTION/CHECK

4-11. GENERAL.

This section presents instructions and procedures to assist in determining, by inspection, the condition of the dismantled, disassembled, and cleaned components, parts, and assemblies of the 493A-3 Indicator. Defects resulting from wear, physical damage, deterioration, or other causes would be discovered by these inspection procedures. Detailed inspection procedures are alphabetically arranged. Refer to the repair section of this manual for replacement or repair of defective components.

4-12. INSPECTION PROCEDURE.

Figure 4-10 lists the mechanical and electrical parts to be inspected and contains cross-references to applicable paragraphs containing inspection routines.

ITEM	REFER TO PARAGRAPH
Capacitors	4-12A
Chassis	4-12B
Connectors	4-12C
Covers and shields	4-12D
Electron tubes	4-12E
Filter assemblies	4-12F
Insulators: Ceramic, Mycalex	4-12G
Knobs and panels	4-12H
Machined -metal parts	4-12J
Mechanical metal parts	4-12K
Printed circuit boards	4-12L
Receptacles	4-12M
Relays	4-12N
Resistors	4-12P

Index of Inspection Procedures (Sheet 1 of 2)
Figure 4-10

ITEM	REFER TO PARAGRAPH
Semiconductors	4-12Q
Soldered terminal connections	4-12R
Switches	4-12S
Transformers, power supplies, and inductors	4-12T
Tube sockets	4-12U
Wiring	4-12V

Index of Inspection Procedures (Sheet 2 of 2)
Figure 4-10

A. Capacitors.

Inspect capacitors for the defects listed in figure 4-11.

DEFECT	METAL TYPE	MOLDED TYPE	CERAMIC TYPE
Leakage (at case seams or around terminal insulation)	X		
Cracked, broken, or charred terminal insulation	X		
Case damage (dents or holes)	X		
Case damage (cracks or breakage)		X	
Loose, broken, or corroded terminal studs, lugs, or leads	X	X	X
Loose, broken, or poorly soldered connections	X	X	X

Table of Fixed Capacitor Inspection
Figure 4-11

B. Chassis.

Inspect chassis for deformation, dents, punctures, badly worn surfaces, damaged connectors, and fastening devices. Examine the chassis for corrosion and damage that may require refinishing.

C. Connectors.

Inspect connector bodies for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed, or out of alignment. Check for corroded or damaged plating on contacts and for loose, poorly soldered, broken, or corroded terminal connections.

D. Covers and Shields.

Inspect covers and shields for punctures, deep dents, and badly worn surfaces. Check for damaged fastening devices, corrosion, and other damage that may require refinishing.

E. Electron Tubes.

Inspect electron tube envelopes for cracked glass, or dented metal, separation from base, and obliterated markings. Check the base for a cracked, chipped, or broken body. Inspect for deformed, broken, or misaligned base contacts. Check for corrosion or other damage to contact plating. Inspect cathode-ray tube phosphor for burns.

CAUTION: USE EXTREME CARE WHEN INSPECTING THE CATHODE-RAY TUBE. DO NOT STRIKE OR SCRATCH THE TUBE AT ANY TIME. DO NOT ALLOW MAGNETIC MATERIALS TO COME WITHIN FOUR FEET OF THE TUBE. BREAKAGE OF THE TUBE MAY RESULT IN INJURY FROM FLYING GLASS. WEAR PROTECTIVE CLOTHING WHEN HANDLING THE TUBE.

F. Filter Assemblies.

Inspect filter assemblies for severe scratches, warps, discoloration, breaks, cracks, and chips. When the unit is assembled, check the filter assemblies for smooth operation of the DIM and RED controls.

G. Insulators: Ceramic and Mycalex.

Inspect ceramic and Mycalex insulators for cracks, burns, chips, or other physical damage. Check for corrosion and loose, broken, or poorly soldered terminal connections.

H. Knobs and Panels.

Inspect knobs and panels for physical damage and deformation, marred surfaces, and impairment of markings.

J. Machined Metal Parts.

Inspect machined metal parts for physical damage to surfaces, corners, and edges, Inspect closely all machined surfaces, holes, bores, counterbores, slots, grooves, shoulders, flanges, tapped holes, and all threaded members, both male and female, for damage of any sort including roughness of surface, corrosion, or foreign replating or refinishing beyond touchup repair.

K. Mechanical Metal Parts.

Inspect unmachined mechanical metal parts, including mounting plates, chassis, mounting clamps, brackets, nuts, bolts, screws, washers, fasteners, and hardware for damage or deformation. Inspect for corrosion and any damage that would require replating or refinishing beyond practical touchup.

L. Printed Circuit Boards.

Inspect printed circuit boards for loose, broken, corroded, or poorly soldered terminal connections. Inspect for any evidence of damage, such as burned, broken, cracked, or corroded plating. Check for loose mounting of printed circuit boards.

M. Receptacles.

Inspect receptacles for cracked, broken, or charred insulation. Inspect for damage to all other parts, loose or bent contacts, damage to contact plating, corrosion, and other abnormal conditions.

N. Relays.

Inspect encapsulated relays for bent, cracked, and punctured cases. Check for corroded, poorly soldered or loose terminals, and for loose, broken, or missing mounting hardware.

P. Resistors.

Inspect fixed, composition resistors for cracked, broken, blistered, or charred bodies and for loose, broken, poorly soldered, or corroded terminal connections.

Inspect fixed, wirewound resistors for signs of heating, cracked, broken, or charred insulation, loose, poorly soldered, broken, or corroded terminal connections, and for loose mounting.

Inspect variable resistors for corrosion of shafts, cases, or other visible part damage, loose mountings, and any other physical damage. Where possible, rotate the shaft to determine whether the action is too rough, too loose, or too tight.

Q. Semiconductors.

Inspect diodes and transistors for cracked, broken, blistered, or damaged bodies and cases. Inspect for loose, broken, poorly soldered, or corroded terminal connections.

R. Soldered Terminal Connections.

Inspect soldered terminal connections for cold-soldered or rosin joints. These joints present a porous or dull, rough appearance. Check for strength of bond using a pointed tool. Examine for excess of solder, protrusions from the joint, pieces adhering to adjacent insulation, and particles lodged between joints, conductors, or other parts.

Inspect for insufficient solder and unsoldered strands of wire protruding from conductor joints. Check, also, for insulation that is stripped back too far from joints or badly frayed at the joint. Inspect for corrosion on copper conductor joints.

S. Switches.

Inspect encapsulated switches for cracked, bent, or punctured cases. Check for loose, broken, or poorly soldered terminal connections. Check, also, to ensure that switch operation is smooth and free from unnecessary binding.

T. Transformers, Power Supplies, and Inductors.

Inspect transformers, power supplies, and inductors for signs of excessive heating, physical damage to cases, cracked or broken insulators, and other irregularities. Inspect for corroded, poorly soldered, or loose terminals and loose, broken, or missing mounting hardware.

U. Tube Sockets.

Inspect tube sockets for loose, broken, missing, or improperly seated mounting rings. Check for cracked, broken, or charred insulation. Inspect for broken, corroded, or deformed contacts and loose, poorly soldered, broken, or corroded terminal connections.

V. Wiring.

Inspect open and laced wiring of chassis, terminal boards, and parts by checking insulation for physical damage and charring. Inspect wires for breakage and for improper dress in relation to adjacent wiring and chassis.

Section V. REPAIR

4-13. GENERAL.

This section presents instructions and procedures for the replacement or repair of damaged or defective components of the 493A-3 Indicator. Faulty components are usually detected through procedures in the inspection/check or testing sections of this manual. New parts should be inspected and/or tested before being installed. Most of the replacement or repair instructions apply to disassembled equipment. Refer to the disassembly section for proper instructions.

4-14. REPAIR PROCEDURES.

Figure 4-12 lists an alphabetically arranged index of repair procedures. Each component, part, or assembly is cross-referenced to the appropriate paragraph containing the correct repair procedure.

A. Capacitors.

If defective or if performance is questionable, capacitors should be replaced. Clean all connections thoroughly and apply new solder.

B. Connectors.

Straighten bent pins and damaged shell areas. Replace defective connectors, broken wires, or wires with split insulation. If a connector insert is broken, replace the connector.

C. Covers and Shields.

Replace damaged screws, straighten any dents or warped sections, and retouch scratched or worn painted surfaces.

D. Electron Tubes.

Replace defective tubes. Clean corroded pins with a clean, lintless, Index of Repair Procedures (Sheet 1 of 2) cloth or soft-bristled brush.

ITEM	REFER TO PARAGRAPH
Capacitors	4-14A
Connectors	4-14B
Covers and shields	4-14C
Electron tubes	4-14D
Filter assemblies	4-14E
Finished surfaces	4-14F
Frames	4-14G
Insulators: Ceramic, Mycalex	4-14H
Knobs and panels	4-14J
Machined metal parts	4-14K
Mechanical metal parts	4-14L
Printed circuit boards	4-14M
Receptacles	4-14N
Relays	4-14P
Resistors	4-14Q
Semiconductors	4-14R

Index of Repair Procedures (Sheet 1 of 2)
Figure 4-12

ITEM	REFER TO PARAGRAPH
Soldered terminal connections	4-14S
Switches	4-14T
Transformers, power supplies and inductors	4-14U
Tube sockets	4-14V
Wiring	4-14W

Index of Repair Procedures (Sheet 2 of 2)
Figure 4-12

E. Filter Assemblies.

Replace cracked, broken, chipped, or severely scratched filters and filter assembly rings.

F. Finished Surfaces.

Touch up minor scratches in all painted surfaces with a high quality, black enamel applied with a small brush. Refinish black wrinkle as required, in accordance with MIL-E-5558A and MIL-P-6889G. Refinish black, lusterless surfaces as required in accordance with MIL-E-14072 (SIGC). Touch up Index of Repair Procedures (Sheet 2 of 2) unpainted aluminum with Alodine 1200, or suitable water-lacquer mixture, applied with a pipe cleaner or small brush.

CAUTION: DO NOT TOUCH UP ANY AREA WHERE AN ELECTRICAL CONNECTION IS MADE.

G. Frames.

Straighten all misshapen areas. Remove all corrosion with a suitable cleaner. Retouch silk screening, and refinish where needed.

H. Insulators: Ceramic and Mycalex.

Replace any insulators which show physical damage such as cracks, burns, or chips.

J. Knobs and Panels.

Replace cracked, chipped, broken, or otherwise damaged knobs. Retouch or refinish panels in accordance with paragraph F above.

K. Machined Metal Parts.

If satisfactory machine shop facilities for suitable repair of these surfaces are not available, the defective or damaged part should be replaced.

L. Mechanical Metal Parts.

Straighten bent or misshapen mounts, clamps, and mounting plates. Replace broken, bent, or cross-threaded bolts, screws, nuts, washers, and other hardware.

M. Printed Circuit Boards.

Replace any cracked, broken, chipped, or otherwise damaged printed circuit boards. Repair of these boards is not recommended.

N. Receptacles.

Replace all receptacles with cracked, broken, or charred insulation or loose, bent, or otherwise damaged contacts. Clean in accordance with the appropriate paragraph in section III.

P. Relays.

Defective encapsulated relays should be replaced. Repair is not recommended.

Q. Resistors.

If defective or if performance is questionable, resistors should be replaced. Clean all connections thoroughly and apply new solder. Add a drop or two of contact cleaner (carbon tetrachloride) to the windings of variable resistors with rough or intermittent operation. Replace variable resistors if the shaft is loose in the case. Clean corroded terminals.

R. Semiconductors.

If a semiconductor appears defective or is suspected of questionable operation, it should be replaced.

CAUTION: TO PREVENT DAMAGE, USE A HEAT SINK BETWEEN THE LEAD BEING SOLDERED AND THE SEMICONDUCTOR DEVICE.

S. Soldered Terminal Connections.

Resolder cold-soldered or rosin joints. Remove all traces of corrosion.

T. Switches.

Replace defective encapsulated switches. Repair is not recommended.

U. Transformers, Power Supplies, and Inductors.

If defective or if performance is questionable, transformers, power supplies, and inductors should be replaced. Make a sketch of wire connections to simplify rewiring. Do not attempt repair of sealed transformers, power supplies, or inductors. Clean all connections thoroughly and apply new solder.

V. Tube Sockets.

Replace cracked, chipped, or broken tube sockets, or tube sockets with broken or severely damaged terminals. Remove all traces of corrosion.

W. Wiring.

Replace damaged wiring with wire of the same size and color coding. Ensure that no bare wires are touching chassis, other bare wires, or metal cases of other parts.

If a wire is to be removed from a terminal or component, it should be marked with an identification tag to minimize incorrect connections.

NOTE: **When necessary to disturb the dress of wires or cables, carefully ensure that the original wire dress is restored.**

Section VI. ASSEMBLY

4-15. GENERAL.

This section presents instructions for assembling the 493A-3 Indicator. These instructions are arranged so that assembly of each major part is an individual operation. When it is necessary to assemble the unit, locate the part in the table of contents and begin on the page indicated. Reference is made to subsequent assembly steps that must be performed to restore the indicator to a completely assembled unit. The order of assembly begins with the lowest parts, proceeds to the next higher subassemblies, and ends with the completed unit. These instructions include lubrication data, special techniques, cautions, warnings, tolerances, and unique procedures.

4-16. LUBRICATION DATA.

Figure 4-13 lists the items requiring lubrication and specifies the lubricant to be used. Substitute lubricants are not recommended.

ITEM	LUBRICATION	COLLINS PART NUMBER
Units with serial numbers 1001 through 1050 (refer to figure 4-5):	Dow-Corning DC33	005-0274-00
Black outer rim of filter rings (32, 40, and 49).		
Units with serial numbers 1051 through 1100 (refer to figure 4-6):	Dow-Corning DC33	005-0274-00
Black outer rim of filter rings (66, 69, and 74).		
Units with serial numbers 1101 and above:		
None.		

Table of Lubricants
Figure 4-13

4-17. PRECAUTIONS AND GENERAL TECHNIQUES.

Before soldering any lead or component, refer to the notes of color coding, placement of leads, and wire insulation made during disassembly. If there is any doubt as to the placement of such leads or components, refer to the appropriate diagrams and perform continuity tests to ensure proper replacement. Ensure, also, that proper dress or lacing of wires and cables is restored.

CAUTION: TO PREVENT DAMAGE TO A SOLID-STATE DEVICE, USE A HEAT SINK ON THE LEAD BETWEEN THE POINT BEING SOLDERED AND THE DEVICE.

CAUTION: THE 493A-3 INDICATOR USES EXTREMELY HIGH VOLTAGES. DO NOT ATTEMPT ANY ASSEMBLY WHILE PRIMARY POWER IS APPLIED TO THE UNIT.

WARNING: CAPACITORS IN THE 493A-3 INDICATOR MAY HOLD A CHARGE FOR LONG PERIODS OF TIME AFTER PRIMARY POWER HAS BEEN REMOVED. OBSERVE SAFETY PRECAUTIONS WHEN WORKING ON THE INDICATOR.

WARNING: BREAKAGE OF THE HIGH-VACUUM, CATHODE-RAY TUBE MAY RESULT IN INJURY FROM FLYING GLASS. DO NOT STRIKE OR SCRATCH THE TUBE AT ANY TIME. DO NOT APPLY MORE THAN MODERATE PRESSURE WHEN INSERTING OR REMOVING THE TUBE. USE PROTECTIVE DEVICES, SUCH AS GOGGLES, FACE MASKS, AND RUBBER GLOVES.

These precautions are repeated in the text of the assembly procedures where applicable.

4-18. ASSEMBLY PROCEDURES.

A. Replace Power Supply PS2. (Refer to figure FO-16)

(1) Secure power supply PS2 (64) to front brace (157) with four flat washers (67), four lockwashers (66), and four hexnuts (65).

(2) Solder the leads to terminals 1 through 3, 6, and 7 of power supply PS2 (64).

(3) Install the viewing-screen lead of the cathode-ray tube to terminal 4 of power supply PS2 (64).

(4) Secure bracket (152) to brace (164) with two machine screws (153).

(5) Secure transformer plate (49) in accordance with paragraph C(8) below.

(6) Secure low-voltage bias circuit TB3 (11) in accordance with paragraph E(3) below.

(7) Secure sweep positioning and erase circuit TB1 (68) in accordance with paragraph F(3) below.

(8) Attach the cathode-ray tube assembly to rear chassis assembly (110, figure FO-15) in accordance with paragraphs K(1) through K(20) below.

(9) Secure plastic high-voltage cover (8) and high-voltage circuit TB2 (10) in accordance with paragraphs L(4) through L(6) below.

(10) Secure rear cover plate (142, figure FO-16) to rear chassis assembly (110, figure FO-15) in accordance with paragraph M(7) below.

(11) Replace two-piece dust cover (95, figure FO-15) according to paragraph N.

B. Replace Power Supply PS1. (Refer to figure FO-15)

(1) Secure power supply PS1 (55) to front brace (157) with four flat washers (58), four lockwashers (57), and four hexnuts (56).

(2) Solder the leads to terminals 1, 2, and 6 through 9 of power supply PS1 (55).

(3) Secure bracket (147) to brace (164) with two machine screws (148).

(4) Secure transformer plate (49) in accordance with paragraph C(8) below.

(5) Secure low-voltage bias circuit TB3 (11) in accordance with paragraph E(3) below.

(6) Secure sweep positioning and erase circuit TB1 (68) in accordance with paragraph F(3) below.

(7) Attach the cathode-ray tube assembly to rear chassis assembly (110, figure FO-15) in accordance with paragraphs K(1) through K(20) below.

(8) Secure plastic high-voltage cover (8) and high-voltage circuit TB2 (10) in accordance with paragraphs L(4) through L(6) below.

(9) Secure rear cover plate (142, figure FO-16) to rear chassis assembly (110, figure FO-15) in accordance with paragraph M(7) below.

(10) Replace two-piece dust cover (95, figure FO-15)according to paragraph N.

C. Replace Transformer Plate. (Refer to figure FO-16

(1) Place transformer plate (59) in mounting position.

(2) Solder the leads to terminals 1 through 3, 6, and 7 of relay K1 (41).

(3) Secure cable clamp (26) to transformer plate (49) with machine screw (27), flat washer (28), and hexnut (29).

(4) Solder the leads to terminals 1, 3, 4, 7, and 8 of relay K2 (38).

(5) Replace solder lug (25) by securing it to transformer plate (49) with machine screw (21), flat washer (22), lockwasher (23), and hexnut (24).

(6) Solder the leads to terminals 1 through 4 of transformer T2 (19).

<u>NOTE</u>: Units with serial number 1792 and above, and units with serial number 1791 and below that have been modified in accordance with Service Bulletin No. 6, have additional leads to solder to terminals 6 and 9 of transformer T2 (19).

(7) Solder the lead to solder lug (48).

(8) Solder the leads to terminals 1, 4, and 6 through 9 of transformer T1 (33).

(9) Secure transformer plate (49) to chassis frame (164) with four machine screws (14) and four lockwashers (15).

<u>NOTE</u>: Ensure that proper dress or lacing is restored.

(10) Secure shading circuit TB4 (16) in accordance with paragraph D(3) below.

(11) Secure low-voltage bias circuit TB3 (11) in accordance with paragraph E(3) below.

(12) Secure sweep positioning and erase circuit TB1 (68) in accordance with paragraph F(3) below.

(13) Secure plastic high-voltage cover (8) and high-voltage circuit TB2 (10) in accordance with paragraphs L(4) through L(6) below.

(14) Secure rear cover plate (142) to rear chassis assembly (110, figure FO-15) in accordance with paragraph M(7) below.

(15) Replace two-piece dust cover (95, figure FO-15)in accordance with paragraph N below.

D. <u>Replace Shading Circuit TB4</u>. (Refer to figure FO-16)

(1) Solder the leads to terminals 1 through 14 of shading circuit TB4 (16) and terminals 1 and 2 of power supply PS2 (64).

(2) Install cable clamp with machine screw, flat washer, lockwasher, and hexnut.

(3) Secure shading circuit TB4 (16) to transformer plate (49) with four machine screws (50), four flat washers (52), and four lockwashers.

(4) Secure rear channel brace (164) to transformer plate (49) by tightening two machine screws (153).

(5) Secure rear cover plate (142) to rear chassis assembly (110, figure FO-15) in accordance with paragraph M(7) below.

(6) Replace two-piece dust cover (95, figure FO-15) in accordance with paragraph N below.

E. Replace Low Voltage Bias Circuit TB3. (Refer to figure FO-16)

(1) Solder the leads to terminals 1 through 11, 13, and 14 of low-voltage bias circuit TB3 (11).

(2) Solder the leads to the center tap of R55 and pins 10 and 12 (filaments) of V2 tube socket of low-voltage bias circuit TB3 (11).

(3) Install cable clamp with machine screw, two flat washers, lockwasher, and hexnut.

(4) Secure low-voltage bias circuit TB3 (11) to bracket (151) and transformer plate (49) with four machine screws (12) and four flat washers (13).

(5) Secure rear cover plate (142) to rear chassis assembly (110, figure FO-16) in accordance with paragraph M(7) below.

(6) Replace two-piece dust cover (95, figure FO-15) according to paragraph N.

F. Replace Sweep Positioning and Erase Circuit TB1. (Refer to figure FO-16)

(1) Solder the leads to terminals 1 through 11 of sweep positioning and erase circuit TB1 (68).

(2) Replace two cable clamps by securing them to sweep positioning and erase circuit TB1 (68), with two machine screws, four flat washers, two lockwashers, and two hexnuts.

(3) Secure sweep positioning and erase circuit TB1 (68) to bracket (156) and transformer plate (49) with four machine screws (69) and four flat washers (70).

(4) Secure rear cover plate (142) to rear chassis assembly (110, figure FO-15) in accordance with paragraph M(7) below.

(5) Replace two-piece dust cover (95, figure FO-15)according to paragraph N.

G. Assemble and Replace Rear Cover Semiconductor Device Set. (Refer to figure 4-8)

NOTE: The two semiconductor device sets on rear cover plate (142, figure FO-16) are identical. Assembly procedures describe one of these sets. Refer to detail A, figure 4-8 in performing steps (1) through (4) below.

(1) Secure semiconductor (100) and mica insulator (108) to heat sink (88) with two machine screws (101), terminal lug (107), four flat washers (102), two insulating sleeves (104), two insulating washers (103), two lockwashers (105), and two hexnuts (106).

(2) Secure heat sink (88) to rear cover plate (142, figure FO-16) with two machine screws (89), two spacers (90), two flat washers (91), and two hexnuts (92).

(3) Secure heat sink cover (84) to heat sink (88) with two flat washers (87), two lockwashers (86), and two machine screws (85).

(4) Solder the orange and brown leads to CR19 and the yellow and brown leads to CR20.

<u>CAUTION</u>: USE A HEAT SINK BETWEEN THE LEAD BEING SOLDERED AND THE SEMICONDUCTOR DEVICE.

(5) Secure rear cover plate (142, figure FO-16) to rear chassis assembly (110, figure FO-15) according to paragraph M(7) below.

(6) Replace two-piece dust cover (95, figure FO-15) in accordance with paragraph N below.

H. <u>Replace Sweep Deflection Yoke L1</u>. (Refer to figure FO-16)

(1) Solder yoke (79) leads to terminals 2 through 4, 9, and 10 of sweep positioning and erase circuit TB1 (68).

(2) Insert yoke (79) into yoke clamp (75).

<u>NOTE</u>: Orient yoke (79) so that the alignment mark is approximately vertical.

(3) lighten yoke clamp screw (76) just enough to hold yoke (79) in place.

(4) Place yoke adjuster (3) over yoke (79).

<u>NOTE</u>: Orient yoke adjuster (3) so that holding screw (4) is above the yoke.

(5) Tighten holding screw (4) of yoke adjuster (3).

(6) Secure the cathode-ray tube assembly to rear chassis assembly (110, figure FO-15) in accordance with paragraphs K(1) through K(20) below.

(7) Replace plastic high-voltage cover (8) and high-voltage circuit TB2 (10) in accordance with paragraphs L(4) through L(6) below.

(8) Secure rear cover plate (142) to rear chassis assembly (110, figure FO-15) in accordance with paragraph M(7) below.

(9) Replace two-piece dust cover (95, figure FO-15)in accordance with paragraph N below.

J. <u>Replace Cathode-Ray Tube</u>. (Refer to figure FO-15)

<u>WARNING</u>: BREAKAGE OF THE HIGH-VACUUM, CATHODE-RAY TUBE MAY RESULT IN INJURY FROM FLYING GLASS. DO NOT STRIKE OR SCRATCH THE TUBE AT ANY TIME. DO NOT APPLY MORE THAN MODERATE PRESSURE WHEN INSERTING OR REMOVING THE TUBE. USE PROTECTIVE DEVICES, SUCH AS GOGGLES, FACE MASKS, AND RUBBER GLOVES.

(1) Insert the cathode-ray tube into the center of front brace (143).

(2) Secure cathode-ray tube (142) to front brace (143) with eight tube fasteners (97).

NOTE: Visually align the cathode-ray tube in the center of the brace while tightening the fasteners.

(3) Secure the cathode-ray tube assembly to rear chassis assembly (110, figure FO-15) in accordance with paragraphs K(1) through K(20) below.

(4) Replace plastic high-voltage cover (8, figure FO-16) and high-voltage circuit TB2 (10, figure FO-16) as described in L(4) through L(6) below.

(5) Secure rear cover plate (142, figure FO-16) to rear chassis assembly (110, (figure FO-15) as described in paragraph M(7) below.

(6) Replace two-piece dust cover (95, figure FO-15) in accordance with paragraph N below.

K. Attach Cathode-Ray Tube Assembly to Rear Chassis Assembly. (Refer to figure FO-15) and FO-16).

(1) Place the rear of the cathode-ray tube assembly to within a few inches of the front of rear chassis assembly (110, figure FO-15).

(2) Insert the three high-voltage leads (red, white, and blue) from the cathode-ray tube through the clearance hole of rear chassis assembly (110, figure FO-15)

(3) Insert the viewing-screen lead of the cathode-ray tube through the key slot of flood gun tube socket (32, figure FO-16) on the front of rear chassis assembly (110, figure FO-15).

NOTE: Refer to figure FO-16 for the performance of steps (4) and (5) below.

(4) Connect flood gun tube socket (32).

(5) Insert the neck of the cathode-ray tube writing gun into sweep deflection yoke L1 (79).

WARNING: EXTREME CARE SHOULD BE EXERCISED WHEN INSERTING THE FRONT TUBE SECTION INTO THE REAR CHASSIS ASSEMBLY. NO STRAIN OR STRESS SHOULD BE EXERTED ON THE NECKS OF THE CATHODE-RAY TUBE. USE PROTECTIVE DEVICES, SUCH AS GOGGLES, FACE MASKS, AND RUBBER GLOVES.

NOTE: Refer to figure FO-15 for the performance of steps (6) through (13).

(6) Secure RANGE switch bracket (114) to front brace (143) with two machine screws (115).

(7) Secure RANGE switch control shaft (113) to RANGE control (114) by tightening two setscrews (111) in coupler (112).

(8) Secure BACKGRD control bracket (106) to front brace (143) with two machine screws (107).

(9) Secure BACKGRD control shaft (102) to BACKGRD control (103) by tightening two setscrews (100) in coupler (101).

(10) Loosen cathode-ray tube fasteners (97) and align the channels of the front and rear assemblies.

NOTE: Use a straight edge or flat surface to align the channels of both assemblies.

(11) Engage the front and rear assemblies.

(12) Connect electrical connectors (116, 117).

(13) Secure front brace (143) to rear chassis assembly (110) with eight machine screws (110A).

NOTE: Refer to figure FO-16 for the performance of steps (14) through (17).

(14) Connect writing gun tube socket (62).

(15) Connect the viewing-screen, high-voltage lead to terminal 4 of power supply PS2 (64).

(16) Solder the three high-voltage leads (red, white, and blue) to terminals 6, 7, and 9 of high-voltage circuit TB2 (10).

(17) Loosen screws (80) in the feet of yoke clamp (75).

(18) Tighten cathode-ray tube fasteners (97, figure FO-15).

(19) Position yoke (79, figure FO-16) around the glass neck of cathode-ray tube (142, figure FO-15) so that the yoke is approximately 1/16 of an inch from the rear of the cathode-ray tube and equidistant from the sides of the glass neck (not touching it).

(20) Tighten screws (80, figure FO-16) in the feet of yoke clamp (75) and clamp screw (76).

(21) Replace plastic high-voltage cover (8) and high-voltage circuit TB2 (10) as described in steps L(4) through L(6) below.

(22) Secure rear cover plate (142) to rear chassis assembly (110, figure FO-15) in accordance with paragraph M(7) below.

(23) Replace two-piece dust cover (95, figure FO-15) in accordance with paragraph N below.

L. Replace High Voltage Circuit TB2. (Refer to figure FO-16)

(1) Solder the red, white, and blue high-voltage leads to terminals 6, 7, and 9 of high-voltage circuit TB2 (10).

(2) Solder the remaining leads to terminals 1 through 5, 8, and 10 through 12 of high-voltage circuit TB2 (10).

(3) Replace cable clamp by securing it to high-voltage circuit board TB2 (10), with machine screw, flat washer, lockwasher, and hexnut.

(4) Place high-voltage circuit TB2 (10) in mounting position.

(5) Insert four spacing sleeves (9) separating plastic high-voltage cover (8) and high-voltage circuit TB2 (10).

(6) Secure plastic high-voltage cover (8) and high-voltage circuit TB2 (10) to brackets (151, 156) with four machine screws (7).

(7) Secure rear cover plate (142) to rear chassis assembly (110, figure FO-15) in accordance with paragraph M(7) below.

(8) Replace two-piece dust cover (95, figure FO-15) in accordance with paragraph N below.

M. Replace Rear Cover Plate. (Refer to figure FO-16)

(1) Solder the leads to relay K4 (127).

(2) Replace electrical connector (141) by securing it to rear cover plate (142) with four machine screws (138, 136), two lockwashers (139), two standoff terminals (133, 135), and two hexnuts (140).

(3) Solder the orange and brown leads to CR19 and the yellow and brown leads to CR20.

CAUTION: USE A HEAT SINK BETWEEN THE LEAD BEING SOLDERED AND THE SEMICONDUCTOR DEVICE.

(4) Solder the three red leads to standoff terminal (117).

(5) Solder the yellow lead to standoff terminal (133).

NOTE: Units with serial number 1792 and above, and units with serial number 1791 and below that have been modified in accordance with Service Bulletin No. 6, have additional leads to solder to CR21 through CR24.

(6) Secure cable clamp (109) to rear cover plate (142) with machine screw (110), flat washer (111), and hexnut (112).

NOTE: Restore proper dress or lacing to wires and cables.

(7) Secure rear cover plate (142) to rear chassis assembly (110, figure FO-15) with eight machine screws (143).

(8) Replace two-piece dust cover (95) in accordance with paragraph 4.N.

N. Replace Outer Dust Covers. (Refer to figure FO-15)

(1) Place two-piece dust cover (95) in position around the indicator as shown in the figure.

(2) Secure two-piece dust cover (95) to the indicator frame with six machine screws (96).

P. Replace Range Lights Board TB5. (Refer to figures 4-5, 4-6, and 4-7)

(1) Solder the leads to terminals 1 through 4 of range lights board TB5.

NOTE: Restore insulating sleeves to these leads.

(2) On units with serial number 1050 and below, secure the range lights board TB5 (6, figure 4-6) to front mounting plate (51, figure 4-6) in accordance with paragraphs S(12) and S(13) below and proceed to step (5) below.

(3) On units with serial numbers 1051 through 1100, secure range lights board TB5 (78, figure 4-6) to spacer ring (89, figure 4-6) in accordance with paragraph R(6) below and proceed to step (5) below.

(4) On units with serial number 1100 and above, secure range lights board TB5 (22, figure 4-7) to front mounting plate (18, figure 4-7) in accordance with paragraphs Q(6) and Q(7). Then proceed to step (5) below.

(5) Replace filter assembly and front plate (94A and 52, figure FO-15) in accordance with paragraph T below.

Q. Assemble and Replace Polarizing Filter Assembly No. 3. (Refer to figure 4-7)

NOTE: Perform this procedure on units with serial number 1101 and above. For units with serial number 1050 and below, proceed to paragraph S below. For units 1051 through 1100, proceed to paragraph R below.

NOTE: Handle the filters by their edges. Do not touch them with bare fingers. ensure that they are clean (refer to the cleaning section for instructions). No lubrication is required.

(1) Attach DIM tab (15) to circular polarizer (14) with two screws (16).

(2) Attach RED tab (9) to red polarizer (8) with two screws (10).

(3) Install the filter components as follows:

(a) Install spacer ring (17) in mounting plate (18).

(b) Install circular polarizer (14) on spacer ring (17) with DIM tab (15) in the position shown.

(c) Install spacer ring (13) on circular polarizer (14).

(d) Install linear polarizer (12) on spacer ring (13) with the guide lip aligned with the matching notch in front plate (18).

(e) Install spacer ring (11) on linear polarizer (12).

(f) Install red polarizer (8) on spacer ring (11) with RED tab (9) in the position shown.

(g) Install spacer ring (7) on red polarizer (8).

(h) Install compression ring assembly (4) on spacer ring (7) with the foam against the spacer.

(i) Install filter window (3) with the guide lip aligned with the matching notch in front plate (18).

(4) Attach lens frame (1) to front mounting plate (18) with four machine screws (2).

(5) Secure grid (19) to the back of front mounting plate (18) with three machine screws (20).

(6) Install panel light indicator (27) in front mounting plate (18).

(7) Secure range lights board TB5 (22) and panel light indicator (27) to front plate (18) with two machine screws (21).

(8) Replace filter assembly and front plate (94A and 52, figure FO-15) in accordance with paragraph T. below.

R. Assemble and Replace Polarizing Filter Assembly No. 2. (Refer to figure 4-6.)

NOTE: **Perform this procedure on units with serial numbers 1051 through 1100. For units with serial number 1050 and below, proceed to paragraph S below. For units with serial number 1101 and above, refer to preceding paragraph Q.**

NOTE: **Handle the filters by their edges or by the filter assembly rings. Do not touch them with bare fingers. Ensure that they are clean and properly lubricated (refer to the cleaning section for cleaning instructions and to figure 4-13 for lubrication instructions).**

(1) Attach two mounting blocks (90) to front plate (94) with eight machine screws (91).

(2) Attach DIM tab (70) to dim ring (74) with two machine screws (71).

(3) Attach RED tab (62) to red ring (66) with two machine screws (63).

(4) Place spacer ring (89) against front plate (94) between two mounting blocks (90).

(5) Attach grid (75) to front plate (94) with three machine screws (76).

(6) Attach panel light indicator (85) and range lights board TB5 (78) to spacer ring (89) with two machine screws (77).

NOTE: Each of the polarized filter rings has an alignment notch inside the black outer rim. These notches must be aligned at the top of the assembly.

(7) Replace the filter components as follows:

(a) Insert dim ring assembly (72) with DIM tab (70) in the position shown.

(b) Insert linear ring assembly (67).

(c) Insert red ring assembly (64) with RED tab (62) in the position shown.

(d) Insert compression ring assembly (59).

(8) Replace filter window (57) and attach filter cover (58) to two mounting blocks (90) with four machine screws (55).

(9) Check dim ring (72) and red ring (64) for freedom from binding by moving DIM tab (70) and RED tab (62). If there is evidence of binding, loosen screws (91) that hold two mounting blocks (90) in place.

(10) Readjust mounting blocks (90) until dim ring (72) and red ring (64) are free from binding. Tighten screws (91).

(11) Replace filter assembly and front plate (94A, 52, figure FO-15) in accordance with paragraph T. below.

S. Assemble and Replace Polarizing Filter Assembly No. 1. (Refer to figure 4-5.)

NOTE: Perform this procedure on units with serial number 1050 and below. For units with serial numbers 1051 through 1100, refer to preceding paragraph R above. For units with serial number 1101 and above, refer to preceding paragraph Q above.

NOTE: Handle the filters by their edges or by the filter assembly rings. Do not touch them with bare fingers. Ensure that they are clean and properly lubricated (refer to the cleaning section for cleaning instructions and to figure 4-13 for lubrication instructions).

(1) Secure grid (3) to the rear of front mounting plate (51) with three machine screws (4).

(2) Insert wave washer (50) into filter assembly case (50A).

(3) Insert circular filter assembly (43) with the filter retaining tabs up and the 2-56 screw holes in a position where they will be accessible from the DIM tab control slot when the filter assembly is completed.

NOTE: The circular filter assembly has four 2-56 holes and one 4-40 hole in the mounting ring. The filter material is colorless.

(4) Insert linear filter assembly (33) with the filter retaining tabs up, so that keeper screw (34) of filter mounting ring (40) fits into the hole in filter assembly case (50A).

(5) Insert red filter assembly (26) with the filter retaining tabs down, in a position that will permit access to all of the holes in the mounting ring through the two slots in filter assembly case (50A). The 2-56 holes for RED tab control (24) should be positioned in the slot, opposite the side for DIM tab control (41).

(6) Install filter guide (22) to ring assembly (30) with two machine screws (23).

(7) Install DIM tab (41) to ring assembly (47) with two machine screws (42).

(8) Install RED tab (24) to ring assembly (30) with two machine screws (25).

(9) Install indicator window (21).

(10) Secure filter cover (20) with three machine screws (19).

(11) Secure filter assembly (17) to front plate (51) with four machine screws.

(12) Secure panel light indicator (13) to front mounting plate (51).with two machine screws.

(13) Install range lights board TB5 (6) to the panel light indicator with two machine screws (5).

(14) Replace filter assembly and front plate (94A, 52, figure FO-15) in accordance with paragraph T below.

T. Replace Filter Assembly and Front Plate. (Refer to figure FO-15)

NOTE: If range lights board TB5 has been removed, begin with paragraph P above.

(1) Secure front plate (52) to front brace (152) with eight machine screws (54).

(2) Mount BACKGRD and RANGE knobs (1) on their shafts and tighten setscrews (2).

(3) Check BACKGRD and RANGE knobs (1) for freedom of movement.

4-19. FITS AND CLEARANCES.

The tolerances that apply to the cathode-ray tube of the 493A-3 Indicator are compensated for by the adjustment of the yoke clamp. The yoke clamp facilitates the positioning of the yoke around the neck of the tube. The cathode-ray tube must be free to move within the yoke.

The indicator mounting screws for the alternate installation mounting must not exceed one-half of an inch in length.

The screws that secure the dust cover to the indicator must not exceed one-fourth of an inch in length.

Section VII. TESTING

4-20. GENERAL.

This section presents procedures for bench testing the 493A-3 Indicator. Procedures are given for testing with the 978G-1 Radar Test Set, and the 979A-2 Maintenance Kit.

When a malfunction is indicated, portions of the test relative to the malfunction should be performed. If the indicator fails a test, refer to the troubleshooting section where test steps are referenced and some possible causes for malfunctions are listed. Instructions for use of the 978G-1 Radar Test Set are given in paragraph 4-23. These instructions are in a tabular format with suggested troubleshooting areas listed adjacent to the applicable test. Instructions for demagnetizing the indicator with the 979A-2 Maintenance Kit degaussing coil are given in paragraph 4-24.

4-21. EQUIPMENT REQUIRED.

Refer to figure 4-14 for equipment required for testing the indicator. Interconnecting cables are included with the respective test sets.

4-22. PRELIMINARY PROCEDURES.

Preliminary procedures for equipment setup prior to testing are given in each test procedure.

4-23. TEST PROCEDURES USING THE 978G-1 (AN/APM-247) RADAR TEST SET.

This paragraph presents procedures for testing the indicator using the 978G-1 Radar Test Set. These procedures are presented in tabular form in figure 4-15.

When a malfunction is indicated, some possible causes are referenced at the appropriate test in the POSSIBLE TROUBLE AREA column. After a malfunction is corrected, the unit should be tested again to verify that repairs have not affected normal operation.

For a detailed description and maintenance instructions for the radar test set, refer to the applicable service manual.

A. Use of Test Procedures.

Procedures to be observed in using the test procedures follow.

(1) Switches on the test set subpanels not in use are not referenced and may be in any position.

(2) The correct position of all test set switches applicable to the tests are listed at the top of the 978G-1 INSTRUCTIONS column on each page. Necessary changes of switch positions are noted at the appropriate test step. All other switches are to remain in their last referenced position

(3) The RESULT column lists the indications of a properly functioning unit.

(4) The POSSIBLE TROUBLE AREA column lists troubleshooting areas for a malfunction indicated by the appropriate test.

(5) The following definitions are used in figure 4-15.

Fall time	Measured from 90 to 20 percent of amplitude of waveform trailing edge
Pulse width	Measured between50 percent points of amplitude of leading and trailing edges
Rise time	Measured from 10 to 90 percent of amplitude of waveform leading edge

B. Test Setup.

Verify that the jumper cable on the radar test set IF subpanel is connected from R-T UNIT to SYNC. Using cables supplied with the radar test set, make the following connections:

(1) Radar test set P1 to receiver-transmitter P1

(2) Radar test set P2 to synchronizer P1

(3) Radar test set P3 to antenna J1

(4) Radar test set P4 to indicator J1

Using appropriate coaxial cables and connectors, make the following connections:

(1) Radar test set OSCILLOSCOPE TRIGGER output to oscilloscope TRIGGER INPUT connector

(2) Receiver-transmitter TP6 to echo box

(3) Receiver-transmitter TP4 to pulse generator SYNC INPUT

(4) Pulse generator output cable left disconnected until appropriate test step

Attach dummy load to receiver-transmitter waveguide connection and set receiver-transmitter RF switch to ON. Apply primary power to equipment.

<u>CAUTION</u>: DO NOT OPERATE THE 978G-1 RADAR TEST SET FROM PRIMARY POWER THAT IS NOT 115 VOLTS ±5 PERCENT, 400 HZ ±5 PERCENT. DAMAGE TO THE EQUIPMENT WILL RESULT.

Set the radar test set AC POWER switch to ON and adjust the INPUT VOLTAGE ADJUST control for 115 ±1 volts as indicated on the INPUT POWER meter. Note that the frequency is 400 ±5 Hz as indicated on the INPUT FREQUENCY meter.

C. <u>Performance Test</u>.

This test measures the performance of the 493A-3 Indicator. Differences in procedures for different revision levels of the indicator are noted at the applicable test step.

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
Items 1 through 5 are required with the 978G-1 Radar Test Set and the 979A-2 Maintenance Kit.		
1. Maintenance kit Contains the following: Dummy load Demagnetizer Antenna fixture Module extender, MX-6424 (two each) Module extender, MX-6425 Module extender, MX-6426	Collins 979A-2, part number 522-5730-014 (MK-774/APN-158).	

Test Equipment Required (Sheet 1 of 3)
Figure 4-14

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
Cable assemblies as follows: CG-1464/U (seven each) CG-3109/U CX-9813 CX-10088 CX-10089 CX-10090 CX-10091 Adapters as follows: MX-6637 MX-6638 UG-273/U (three each) UG-201A/U (two each) Test lead (two each) Test probe 1000:1 Tuning tool Scale, 6 in.		
2. Radar test set Contains the following: Cable assemblies as follows: CX-10242 CX-11555 CG-1464/U (six each) Adapters as follows: UG-273/U (three each) UG-201A/U (two each)	Collins 978G-1, part number 522-5731-015 (AN/APM-247).	

Test Equipment Required (Sheet 2 of 3)
Figure 4-14

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
3. Vtvm	Hewlett-Packard 410B (ME-26A/U).	AC range: 1 to 300 volts. DC range: 1 to 1000 volts. DC input impedance: 100 megohms.
4. Pulse generator	Hewlett-Packard 212A (AN/PPM-1A)	Pulse length: 5 us. at 6 volts. Pulse repetition rate: 5000 pulses/second. Internal impedance: 50 ohms or less. Synchronization voltage: ±5 volts.
5. Oscilloscope	Tektronix 535 (with C-A plug-in unit) AN/USM-281A (or equiv)	Vertical sensitivity: 20 mv/cm to 20 v/cm. Sweep range: .1 us./cm to 5 s/cm, calibrated. Input impedance: 1 megohm.

Test Equipment Required (Sheet 3 of 3)
Figure 4-14

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
1.	Power supplies	TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- STANDBY; INDICATOR TESTS switch -- down position	Remove dust covers and rear cover plate from indicator.		
		SYSTEM CONTROL -- OPERATE	Pull out interlock switch lever on R/T unit to second detent.	OPERATE lamp lights. **NOTE: 4-minute time delay relay must energize first.**	
			Set SCAN/OFF switch on antenna to SCAN. Adjust BACKGRD control on front panel of indicator to desired level.		
1a.	PS1		Measure voltage between TB3-6 and ground.	-500 ±50 volts.	Diodes CR19 and CR20. Power supply PS1. Low-voltage circuit TB3.
			Remove plastic cover over TB2.		
(Cont)			**<u>WARNING</u>: 2000 VOLTS IS PRESENT ON BOTH LEADS OF THE VTVM WHEN MEASURING VOLTAGES IN STEP BELOW.** Measure voltage between TB2-4(+) and TB2-2(-).	+200 ±30 volts	Diodes CR19 and CR20. Power supplies PS1 and PS2. Flood gun bias circuit TB2.

493A-3 Indicator Test Procedure Using the 978G-1 Radar Test Set (Sheet 1 of 13).
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
1a. (Cont)		TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- OPERATE; INDICATOR TESTS switch -- down position	Measure voltage at TB2-3 using 1000:1 test prod (MX-6639) and oscilloscope.	+2000 ±300 volts.	Diodes CR19 and CR20. Power supplies PS1 and PS2. High-voltage circuit TB2.
1b.	PS2	SYSTEM CONTROL -- STANDBY	Connect MX-6637 Test Adapter between plate cap of V3 and high-voltage cap on PS2.		
		SYSTEM CONTROL -- OPERATE	Measure voltage at test adapter using 1000:1 prod and oscilloscope.	+7000 ±1500 volts.	Diodes CR19 and CR20. Power supply PS2. Transformer T2.
		SYSTEM CONTROL -- STANDBY	Remove test adapter and replace high-voltage cap on plate of V3.		
	-	SYSTEM CONTROL -- OPERATE	Measure amplitude, width, and rise time of pulse at PS2-7 using standard probe and oscilloscope.	Amplitude -- not less than 20 volts peak. Width -- 120 to 200 us. Rise time --NMT 60us.	Gate and trigger pulse circuit TB4. Power supply PS2.
		SYSTEM CONTROL -- STANDBY	Replace plastic cover over TB2.		

493A-3 Indicator Test Procedures Using the
978G-1 Radar Test Set (Sheet 2 of 13)
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
1c.	Flood gun bias	TEST SET FUNCTION SELECTOR -- ANTENNA/INDICATOR/ CONTROL UNIT TESTS; SYSTEM CONTROL -- OPERATE; INDICATOR TESTS switch -- down position	WARNING: FOLLOWING VOLTAGE MEASURE- t MENTS ARE REFERENCED TO +2000 VOLTS. EXTREME CAUTION SHOULD BE EXERCISED TO ENSURE AGAINST PERSONNEL INJURY AND TO ASSURE THAT METER OR TEST LEADS DO NOT COME INTO CONTACT WITH GROUND. ALL VOLTAGE MEASUREMENTS SHOULD BE MADE THROUGH ACCESS HOLES IN PROTECTIVE COVER OVER TB2. SHAFT OF POTENTIOMETERS R36,R39,AND R41 (R36, R37, AND R38 ON UNITS WITH SERIAL NUMBER 1500 AND BELOW) ARE ALSO +2000 VOLTSABOVE GROUND. AN INSULATED SCREWDRIVER MUST BE USED TO MAKE ADJUSTMENTS.		
			Measure voltage between TB2-10 (F.G. CATH.) and TB2-11 (F.G. GRID 1).	Voltage approximately that written on top of indicator tube. Adjust R36 on TB2 as necessary.	Power supply PS2. Flood gun bias circuit TB2.
(Cont)			Measure voltage between TB2-10 (F.G. CATH.) and TB2-8 (F.G. GRID 3).	Voltage approximately that written on top of indicator tube. Adjust R39 on TB2 as necessary.	Power supply PS2. Flood gun bias circuit TB2.

493A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 3 of 13) Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
1c. (Cont)			Measure voltage between TB2-10 (F.G. CATH.) and TB2-7 (F.G. GRID 4).	Voltage approximately that written on top of indicator tube. Adjust R41 on TB2 as necessary.	Power supply PS2. Flood gun bias circuit TB2.
1d.	Writing gun bias	TEST SET FUNCTION SELEC-TOR -- ANTENNA/INDICATOR/ CONTROL UNIT TESTS; SYS-TEM CONTROL -- OPERATE, INDICATOR TESTS switch -- down position	Measure voltage at TB3-5 with RANGE switch on indicator set to: 30 60 150	+75 to +250 volts. +68 to +250 volts. +68 to +250 volts. +68 to +250 volts.	Low-voltage circuit TB3. Power supply PS1.
2.	Erase pulse		Connect 10:1 oscilloscope probe to junction of R40 and C8 on TB2 (ERASE PULSE test point on some units) and observe waveform.	Amplitude -- adjustable by R3 on TB1; +4 to +16 volts peak. Width adjustable by R1 on TB1; 10 to 50 us.	Erase pulse generator circuit TB1. Storage mesh coupling circuit TB2.
3.	Gate pulse		Connect 10:1 oscilloscope probe to TB3-4 and observe waveform.	Amplitude -- +20 ±4 volts. Clamped to -16 to -75 volts. **NOTE: Periodic change in amplitude is due to operation of blanking switch.**	Writing gun grid circuit TB3. Gate input circuit TB4.
4.	Shading pulse		Connect 10:1 oscilloscope probe to TB3-5, set indi-cator RANGE switch to 150, and observe waveform.	Amplitude -- not less than +40 volts peak.	Shading circuit TB4. Relays K1 and K2. and RANGE switch S1.
5. (Cont)	Video pulse	TEST SET FUNCTION SELECTOR -- SYNCHRO-NIZER	Remove video driver mod-ule from synchronizer. Connect cable (CG-1464/U) n from pulse generator PULSE OUTPUT to oscillo-scope channel A input. r		

493A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 4 of 13) Figure 4-5

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
5. (Cont)		TEST SET FUNCTION SELECTOR -- SYNCHRONIZER; SYSTEM CONTROL -- OPERATE; INDICATOR TESTS switch -- down position	Observe pulse generator output and adjust for negative 4-volt peak amplitude, 10-us. wide pulse.		
			Disconnect pulse generator from oscilloscope and connect to synchronizer VIDEO test point J16.		
			Connect 10:1 oscilloscope probe to junction of C18 and wiper of R5 on TB1. Observe waveform.	Amplitude -- 2 volts peak. Width -- 10 us. **<u>NOTE</u>: If necessary, adjust VIDEO AMPL potentiometer (R5) on TB1 for proper amplitude.**	Video amplitude circuit TB1.
		TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- STANDBY	Replace video driver module in synchronizer.		
6. (Cont)	Sweep deflection	SYSTEM CONTROL -- OPERATE	Set SCAN/OFF switch on antenna to OFF. Set BACKGRD control on indicator front panel for visible sweep trace. Position antenna dish straight ahead.		

493A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 5 of 13)
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
6. (Cont)		TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- OPERATE; INDICATOR TESTS switch -- ZERO AZIMUTH	Observe alignment of sweep trace.	Sweep trace should be parallel to vertical scribe line running from top of indicator (0°) to bottom center of indicator faceplate. **NOTE: If necessary, loosen yoke clamp and rotate yoke to proper position.**	For absence of sweep, check the following: Sweep current circuit TB-1. Deflection yoke L1. Storage tube filaments.
			Observe position of sweep trace.	Sweep trace should be directly under vertical scribeline from top (0°) to bottom center of indicator faceplate. **NOTE: If necessary, adjust HOR POS (R7) on TB1.**	
			Observe beginning of sweep trace.	Sweep trace should begin at vertex of indicator faceplate. **NOTE: If necessary, adjust VERT POS (R13) on TB1.**	Sweep position circuits TB1.
(Cont)			Set RANGE switch on indicator to 30. Note position of third range mark on sweep trace.	Range mark should be 1/4 ±1/8 inch below top of sweep trace. (Refer to following note.)	Sweep position circuits TB1. High-voltage circuit TB2.

498A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 6 of 13)
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
6. (Cont)		TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- OPERATE; INDICATOR TESTS switch -- ZERO AZIMUTH		<u>NOTE</u>: **If necessary, loosen yoke clamp and move yoke forward or backward to obtain proper position. If yoke adjustment will not obtain proper position, adjust tap on resistors R22 through R25 on TB2. HOR POS and VERT POS controls may require readjustment.**	
			Set RANGE switch on indicator to 60. Note position of fifth range mark on sweep trace.	Same as above except observe fifth range mark.	
			Set RANGE switch on indicator to 150. Note position of fifth range mark on sweep trace.	Same as above except observe fifth range mark.	
			Manually rotate antenna dish 45° to left and 45 to right while observing sweep trace on indicator.	Sweep trace corresponds to setting of antenna dish ±+5°.	Antenna resolver B4 (Refer to 537F-( ) Antenna Overhaul Manual)
			Position antenna to one of the extremes of azimuth to close blanking switch.	Closing of blanking switch blanks out sweep trace on indicator.	R60 and writing gun grid circuit on TB3. Blanking switch.
7. (Cont)	Collimation	SYSTEM CONTROL -- STANDBY; INDICATOR TESTS switch -- down position	Set antenna SCAN/OFF switch to SCAN. Leave system in STANDBY until indicator filaments cool.		

493A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 7 of 13)
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
7. (Cont)		TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; INDICATOR TESTS switch -- down position; SYSTEM CONTROL -- OPERATE	Observe indicator display.	During filament warm-up, faint green glow is present on face and covers full viewing area. column.	Indicator tube not properly collimated. Perform following col-limating adjustments in PROCEDURE
			Stop erasure by rotating ERASE AMP (R3) fully counterclockwise. Write screen to full brightness by rotating BACKGRD control fully clockwise. <u>NOTE</u>: **Flood gun beam may not cover entire screen.**		
(Cont)			Stop writing by rotating BACKGRD control counterclockwise.		

493A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 8 of 13)
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
7. (Cont)		TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- OPERATE; INDICATOR Adjust TESTS --down position	Adjust FG GRID 1 (R36) for maximum screen coverage.		
			FDGRID4 (R41) (R38 on module revision B and be- low) for maximum screen coverage.		
			Adjust FG GRID 3 (R39) (R37 on module revision Band be- low) for maximum screen coverage and uniformity of illuminated area.		
			Readjust FG GRID 4 and FG GRID 3 for maximum screen coverage and uniformity of illuminated area.		
			Rotate ERASE AMP (R3) clockwise. Parts of dis- play erase more rapidly than others. Stop erasure before entire display is erased.		
			Readjust FD GRID 4 and FD GRID 3 for display uniformity without de- creasing diameter of display.		
(Cont)			Write screen to full brightness by rotating BACKGRD control clockwise, and repeat two preceding steps until most uniform ids- play and maximum dia- meter are obtained.		

493A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 9 of 13)
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
7. (Cont)		TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- OPERATE; INDICATOR TESTS -- down position	**NOTE**: **If difficulty is encountered in collimation tests and bright spots appear on screen that do not erase as they should, the indicator should be demagnetized. Refer to test procedures for 979A-2 Maintenance Kit for demagnetizing instructions.**		
8.	Erasure		Set indicator RANGE switch to 60.		
			Rotate ERASE WIDTH (R1) clockwise. Rotate ERASE AMP (R3) counterclockwise.		
			Write screen to full brightness by rotating BACKGRD control clockwise.		
			Rotate ERASE AMP (R3) slowly clockwise until display is just barely erased.		
(Cont)			Measure peak voltage of erase pulse at junction of R40 and C8 on TB2 (ERASE PULSE test point on some units) with oscilloscope.	10 to 15 volts peak.	

493A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 10 of 13)
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
8. (Cont)		TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- OPERATE; INDICATOR TESTS -- down position	Adjust ERASE AMP (R3) until voltage is I volt higher than that measured in step above.		
			Adjust BACKGRD control for suitable video display. (If external antenna is not connected, use signal from echo box and short stc signal from synchro-nizer J17 to ground.)		
			Adjust ERASE WIDTH (R1) to obtain desired persistence. <u>NOTE</u>: **Too long a per-sistence time results in bloom-ing and lack of good contrast.**		
			Check that there is no green glow present on the screen. (This can be de-termined best in the absence of writing. Set antenna SCAN/OFF switch to OFF.)		
			Tighten locknuts on potentiometers R1 and R3.		

493A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 11 of 13)
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
9.	Writing gun	TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- OPERATE; INDICATOR TESTS -- down position	Set BACKGRD control to midrange position. Set RANGE switch to 30.	Note that video display has slight background noise and that writing gun does not store. If necessary, adjust WGG 1 (R56).	
			Tighten locknut on potentiometer R56.		
			Adjust FOCUS (R55) for best range mark definition.		
			Tighten locknut on potentiometer R55.		
10.	BACKGRD control		Adjust BACKGRD control for barely discernible noise presentation.		
			Set RANGE switch to 60. Observe indicator presentation.	Presentation should be same as in preceding step. If necessary, adjust R58.	
			Set RANGE switch to 150. Observe indicator presentation.	Presentation should be same as for 30-mile range. If necessary, adjust R45.	

493A-3 Indicator Test Procedures Using the 978G-1 Radar Test Set (Sheet 12 of 13)
Figure 4-15

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
11.	Shading	TEST SET FUNCTION SELECTOR -- ANTENNA/ INDICATOR/CONTROL UNIT TESTS; SYSTEM CONTROL -- OPERATE; INDICATOR TESTS -- down position	Adjust BACKGRD for normal target presentation. Observe that presentation is uniform from center to outside edge of display. If necessary, perform following four steps.		
			Set SHADING (R48) counterclockwise.		
			Adjust BACKGRD control for normal presentation at center of sweep. Slowly adjust SHADING (R48) clockwise while adjusting BACKGRD control counterclockwise to maintain normal presentation from center to outer edge of display.		
			Set RANGE switch to 60 and note that presentation brightness does not change.		
			Set RANGE switch to 30 and note that presentation brightness does not change.		

493A-3 Indicator Test Procedures Using the
978G-1 Radar Test Set (Sheet 13 of 13)
Figure 4-15

4-24. TEST PROCEDURES USING THE 979A-2 MAINTENANCE KIT.

This section presents the procedures for demagnetizing the indicator storage tube using the 979A-2 Maintenance Kit. After the demagnetization procedure has been completed, connect the indicator into a system and verify that demagnetization is complete.

To demagnetize the storage tube, perform the following steps.

CAUTION: THE MAXIMUM DUTY CYCLE OF THE DEMAGNETIZING COIL IS 2 MINUTES ON AND 10 MINUTES OFF. EXCEEDING THESE LIMITS WILL CAUSE OVERHEATING OF THE COIL.

NOTE: Transients produced during steps A through C may cause magnetization of the storage tube. Place indicator at least 3 feet from demagnetizing coil before power is applied.

A. Connect power to the maintenance kit.

B. Set the DEMAGNETIZING COIL switch to OFF and connect the coil to the DEMAGNETIZING COIL connector.

C. Set the POWER and DEMAGNETIZING COIL switches to ON.

D. Insert the indicator (rear end first) into the demagnetizing coil until the mounting flange contacts the demagnetizing coil.

E. Using a slow, steady movement, remove the indicator from the demagnetizing coil to a distance of at least 3 feet.

F. Set the DEMAGNETIZING COIL switch to OFF.

Section VIII. STORAGE INSTRUCTIONS

Before storage, clean dirt, grease, and moisture from the 493A-3 Indicator. Store the 493A-3 in a clean, dry area where the possibility of impact damage is minimized. If the indicator is to be stored for an extended period, place the unit in the original shipping carton.

Section IX. ILLUSTRATED PARTS LIST

NOTE: This Illustrated Parts List is furnished for parts location information only. Do not use for provisioning purposes.

4-25. GENERAL.

This Illustrated Parts List is a complete list of parts for the 493A-3 Indicator.

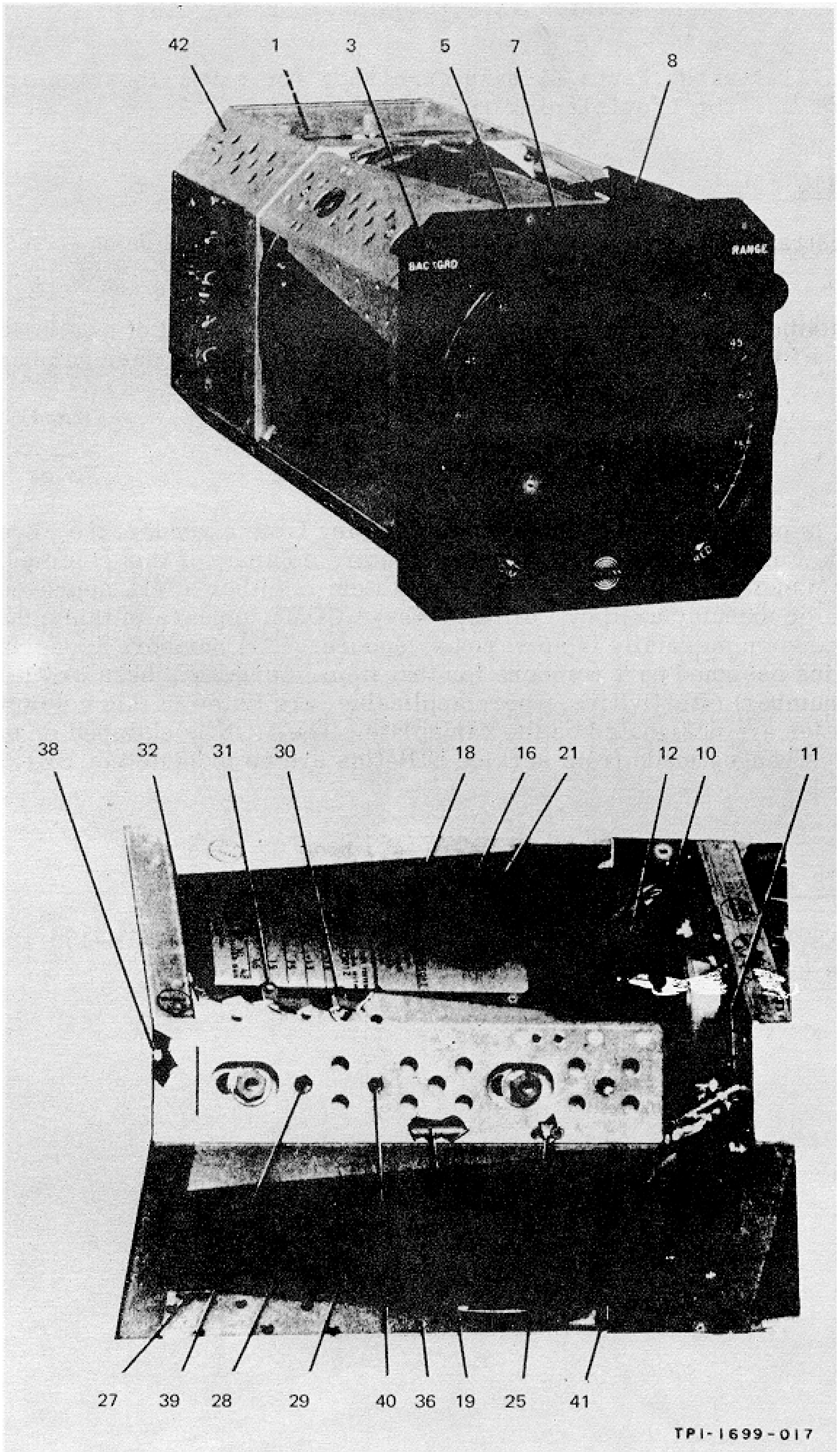
Collins Radio Company part numbering system is comprised of a three-digit family number, a four-digit serial number, and two- or three-digit dash number:

FAMILY NO.	SERIAL NO.	DASH NO.
XXX	XXXX	XX or XXX

If a part is purchased by Collins Radio Company from a vendor, the Federal Manufacturer's Code Number is listed in the nomenclature column. If this column does not include a Federal Manufacturer's Code Number, the item is either a MIL approved item, commercial item or manufactured by Collins. Where COML appears in this column, the part may be obtained commercially from various vendors. Part numbers appearing in this column are Collins assigned part numbers for that item. Serial numbers or MCN (manufacturing control number) effectivities, where applicable, are listed in this column. Serial number effectivities are designated on the nameplate. The MCN is stamped on each, module and/or chassis. Changes made from service bulletins are so indicated by SB1, SB2, etc.

4-26. PARTS LOCATION.

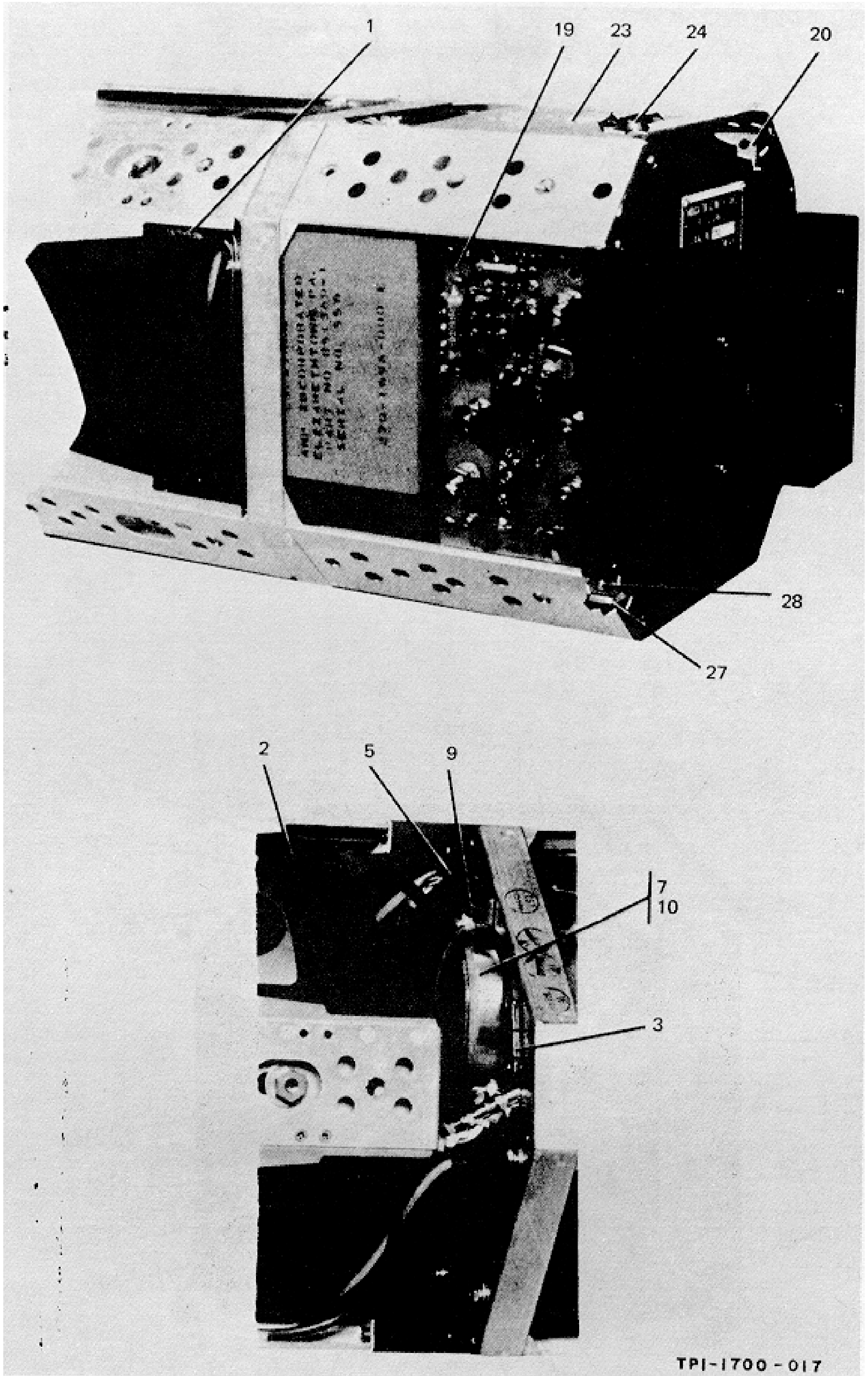
Parts location for Indicator, Azimuth Range IP-724/APN-158 are contained in figures 4-16 through 4-22.



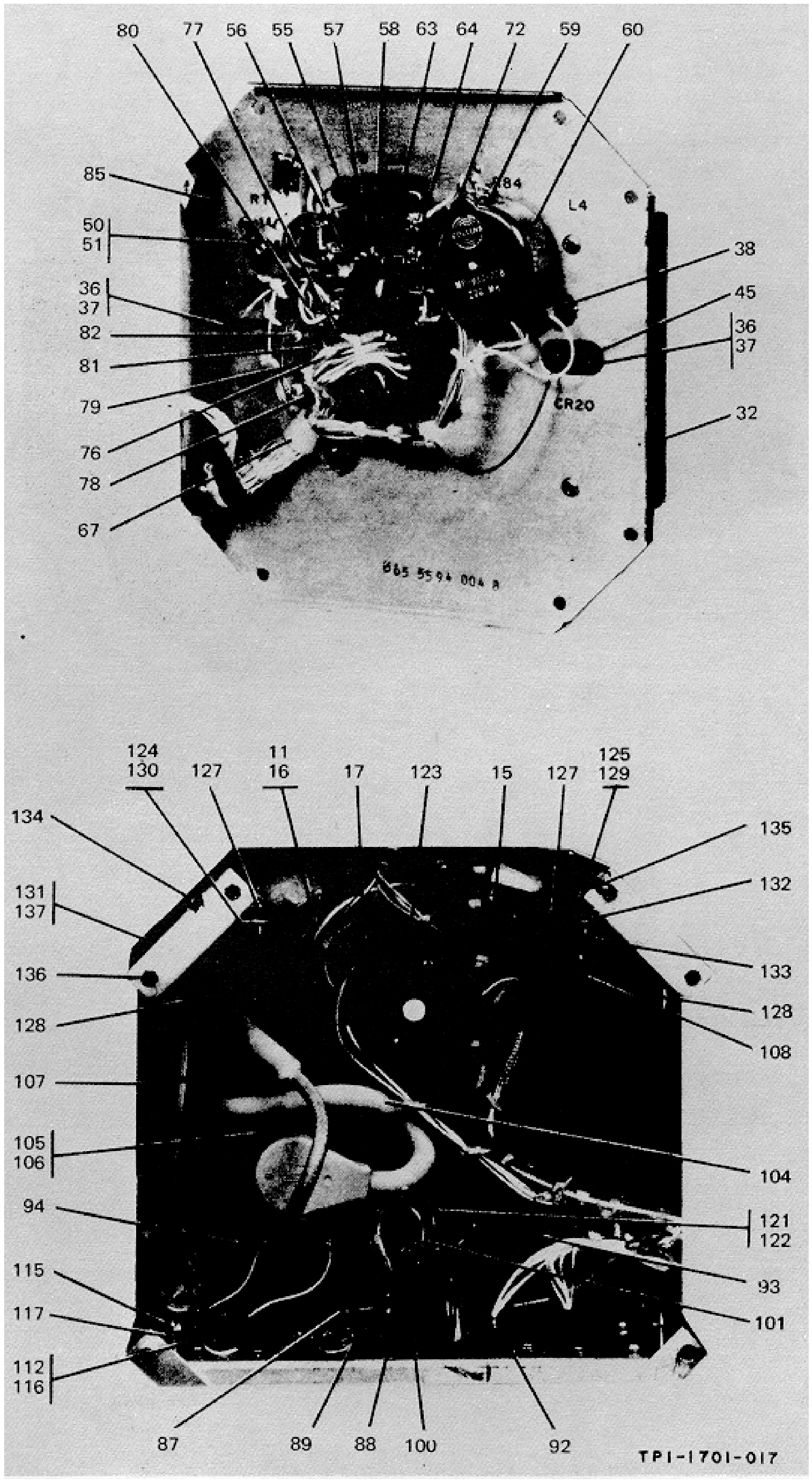
493A-3 Indicator Assembly
Figure 4-16

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4--16-0	522-8961-005	1	493A-3 INDICATOR ASSY 5	1	
1	564-7554-003	2	PLATE, IDENT EFF THRU REV K	1	
1	516-7399-001	2	PLATE, IDENT EFF REV L	1	
- 2	2X1-BPANHOTY PEBCADPL	2	SCREW, TAP., SST, 2-56 X 1/8 45722 330-1551-000 AP	4	
3	564-2628-002	2	KNOB EFF THRU REV H	2	
3	565-5503-002	2	KNOB EFF REV J	2	
- 4	4-48Xl-8 6SP LINE416SST	2	SETSCREW, SST, 4-48 X 1/8 08664 328-0005-000 AP	4	
5	565-2169-004	2	FILTER ASSY, POLARIZING EFF THRU 1 REV H		
5	566-9592-005	2	FILTER ASSY, POLARIZING EFF REV 1 J		
- 6	P342-0025-00 0	2	SCREW, MACH., SST, 6-32 X 7/16 77250 342-0025-000 EFF THRU REV L AP	8	
- 6	P342-0026-00 0	2	SCREW, MACH., SST, 6-32 X 1/2 77250 342-0026-000 EFF REV M AP	8	
7	565-2180-004	2	PLATE, FRONT EFF THRU REV	1	
8	564-2242-004	2	COVER, INDICATOR	2	
- 9	P342-0311-00 0	2	SCREW, MACH., BRS, 4-40 X 1/4 77250 342-0311-000 EFF THRU REV M AP	6	
- 9	330-3099-000	2	SCREW, MACH., SST, 4-40 X 1/4 COML EFF REV N AND P AP	6	
- 9	P330-3598-00 0	2	SCREW, MACH., SST, 4-40 X 1/4 77250 330-3598-000 EFF REV R AP	6	
10	JF3S1PACD	2	CONNECTOR 81312 372-5013-000 SPR	1	
11	JF2P	2	CONNECTOR 81312 372-5338-000 5P2 EFF REV G	1	
12	C74317	2	ELECTRON TUBE 49671 257-9001-000 5V1 EFF THRU REV J	1	
12	H1116AP20	2	ELECTRON TUBE 00816 257-0214-000 5V1 EFF REV K	1	
- 13	564-7959-002	2	FASTENER AP	8	
- 14	310-0004-000	2	WASHER, FLAT, CAD. PL STL, 17/64 ID X 9/16 OD COML AP	16	
- 15	P313-0083-00 0	2	NUT, PLAIN, HEX, SSTO 1/4-28 77250 313-0083-000 AP	8	
16	564-2125-002	2	COUPLER, SHAFT	2	
- 17	4-48X1-8 6SP LINE41655T	2	SETSCREW, SST, 4-48 X 1/8 08664 328-0005-000 AP	4	
18	565-2401-002	2	SHAFT, VAR RESISTOR	1	
19	564-2627-002	2	SHAFT, SWITCH	1	
- 20	4-48X1-8 6SP LINE416SST	2	SETSCREW, SST, 4-48 X 1/8 08664 328-0005-000 AP FOR 18 AND 19	4	
21	564-9908-002	2	BRACKET, VAR RESISTOR	1	
- 22	P334-0271-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0271-000 AP	1	
- 23	MS35333-74	2	WASHER, LOCK, STLI 0.267 ID X 0.478 OD 373-0005-000 AP	1	
- 24	MS51959-2	2	SCREW, MACH., SST, 2-56 X 3/16 342-0132-000 AP	2	
25	564-2640-002	2	BRACKET, SWITCH	1	
- 26	MS51959-2	2	SCREW, MACH., SST, 2-56 X 3/16 342-0132-000 AP	2	
27	RHS00D15R00F	2	RESISTOR, FXD, WW, 15 OHMS, 3%, 5W 5R82 91637 747-3850-000	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
4-16- 28	RH500D15R00F	2	RESISTOR, FXD, WW, 15 OHMS, 3%, 5W 91637 747-3850-000	5R87	1	
29	RH500D15R00F	2	RESISTOR, FXD, WW, 15 OHMS, 3%, 5W 91637 747-3850-000	5R80	1	
30	RH500D15R00F	2	RESISTOR, FXD, WW, 15 OHMS, 3%, 5W 91637 747-3850-000	5R86	1	
31	RH500D15ROOF	2	RESISTOR, FXD, WW, 15 OHMS, 3%, 5W 91637 747-3850-000 EFF REV G THRU M	5R85 SB6A	1	
32	RH500D15R00F	2	RESISTOR, FXD, WW, 15 OHMS, 3%, 5W 91637 747-3850-000 EFF REV G THRU M SB6A	5R83	1	
- 33	334-1124-000	2	NUT, PLAIN, HEX., SST, 2-56 COML EFF REV G THRU M AP FOR 27 THRU 32		12	
- 33	334-1124-000	2	NUT, PLAIN, HEX., SST, 2-56 COML EFF REV N SB6A AP FOR 27 THRU 30		8	
- 34	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML EPF REV G THRU M AP FOR 27 THRU 32		12	
- 34	310-0070-000	2	WASHER, LOCK, SST, 0.097 ID X 0.165 OD COML EFF REV N SB6A AP FOR 27 THRU 30		8	
- 35	MS51959-3	2	SCREW, MACH., SST, 2-56 X 1/4 342-0133-000 EFF REV G THRU M AP FOR 27 THRU 32		12	
- 35	MS51959-3	2	SCREW, MACH., SST, 2-56 X 1/4 342-0133-000 EFF REV N SB6A AP FOR 27 THRU 30		8	
36	564-2237-004	2	BRACE, FRONT		1	
- 37	MS551957-13	2	SCREW, MACH., SST. 4-40 X 1/4 343-0133-000 AP		8	
38	R12NCFMA1-62	3	NUT, SELF-LKG. CLINCH, CAD. PL STL, 6-32 72962 333-0841-000		8	
39	563-5118-002	3	NUT		8	
40	R12NCFMA1-82	3	NUT, SELF-LKG, CLINCH, CAD. PL STL, 8-32 72962 333-0843-000		4	
41	R22NCFMA1-40	3	NUT, SELF-LKG, CLINCH, CAD. PL STL, 4-40 72962 333-0839-000		8	
42	565-5563-005	2	CHASSIS ASSY SEE FIG.4-17		1	



Chassis Assembly (Sheet 1 of 2)
Figure 4-17



Chassis Assembly (Sheet 2 of 2)
Figure 4-17

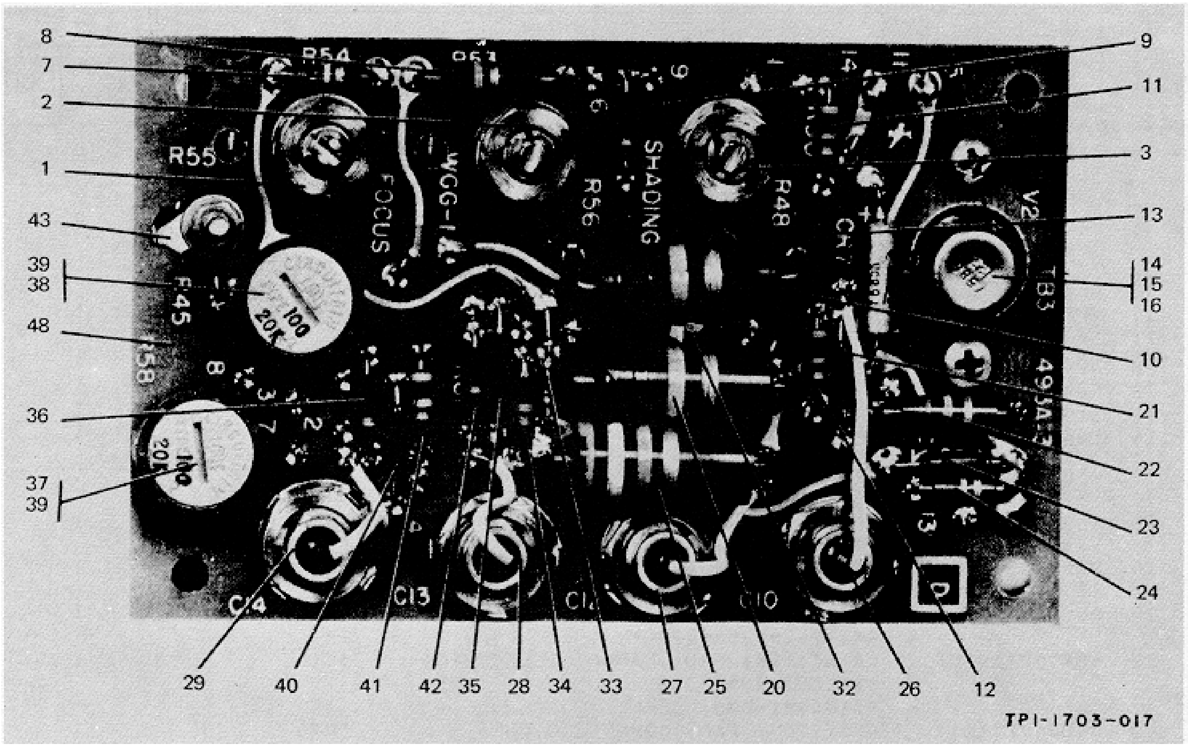
FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-17- 0	565-5563-005	1	CHASSIS ASSY SEE FIG. 4-16(42) FOR NHA	REF	
1	38GM3		2 SWITCH 17870 259-9277-000 5S1	1	
2	BJ24223	2	RESISTOR, VAR, COMP, 10OK, 20%, 1/2W 71450 380-1582-000 5R66	1	
3	JF2S		2 CONNECTOR 81312 372-5339-000 5J3	1	
- 4	M551959-3	2	SCREW, MACH., SST, 2-56 X 1/4 342-0133-000 EFF THRU REV F AP	1	
- 4	MS51959-4	2	SCREW, MACH., SST, 2-56 X 5/16 342-0134-000 EFF REV G AP	1	
5	JF3P1SACD	2	CONNECTOR 81312 372-5012-000 5J2	1	
- 6	MS51959-5	2	SCREW, MACH., SST, 2-56 X 3/8 342-0135-000 AP	2	
7	564-2639-002	2	ADJUSTER YOKE	1	
- 8	MS51957-15	2	SCREW, MACH., SST, 4-40 X 3/8 343-0135-000 EFF REV D AP	1	
9	R22NCFMA1-40	3	NUT, SELF-LKG, CLINCH, CAD. PL STL, 4-40 72962 333-0839-000	1	
10	564-2638-002	3	ADJUSTER YOKE	1	
11	564-2253-003	2	CLAMP	1	
- 12	P313-0045-00 0	2	NUT, PLAIN, HEX., SST. 6-32 77250 313-0045-000 AP	3	
- 13	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 3 0.253 OD 310-0282-000 AP		
- 14	M551957-26	2	SCREW, MACH., SST, 6-32 X ¼ 343-0167-000 AP	3	
15	R12NCFMA1-62	3	NUT, SELF-LKG, CLINCH. CAD. PL STL, 6-32 72962 333-0841-000	1	
16	564-2252-003	3	CLAMP	1	
17	564-2247-003	2	YOKE 5Y2	1	
- 18	MS51957-29	2	SCREW, MACH., SST, 6-32 X 7/16 343-0170-000 AP	1	
19	565-5593-004	2	TERMINAL BOARD ASSY SEE FIG.4-18 5TB1	1	
20	565-5584-004	2	TERMINAL BOARD ASSY SEE FIG,. 4-19 5TB3	1	
- 21	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP FOR 19 AND 20	8	
- 22	506-5907-003	2	WASHER AP FOR 19 AND 20	8	
23	565-5543-004	2	COVER, HV EFF THRU REV G	1	
23	758-0338-001	2	COVER, HV EFF REV H	1	
24	565-5548-004	2	TERMINAL BOARD ASSY SEE FIG. 4-20 EFF THRU REV G 5T82	1	
24	758-0336-001	2	HIGH VULTAGE CIRCUIT SUBASSEMBLY SEE FIG. 4-21 EFF REV H 5TB2	1	
- 25	M551959-19	2	SCREW, MACH., SST, 4-40 X 3/4 342-0050-000 AP FOR 23 AND 24	4	
- 26	541-5983-002	2	SPACER, SLV AP FOR 23 AND 24	4	
27	565-5587-004	2	TERMINAL BOARD ASSY SEE FIG. 4-22 5TB4	1	
28	540-9035-003	2	POST, ELECTRICAL-MECHANICAL EQUIP.	4	
- 29	MS51957-12	2	SCREW. MACH., SST, 4-40 X 3/16 343-0132-000 AP FOR 27 AND 28	8	
- 30	MS35338-135	2	WASHER. LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP FOR 27 AND 28	4	
- 31	506-5907-003	2	WASHER AP FOR 27 AND 28	4	
32	565-5596-002	2	COVER EFF THRU REV F	2	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-17 32	758-0296-001	2	COVER EFF REV G	2	
- 33	MS51957-2	2	SCREW, MACH., SST, 2-56 X 3/16 343-0123-000 AP	4	
- 34	MS35338-134	2	WASHER, LOCK, SST. 0.088 ID X 0.175 OD 310-0275-000 AP	4	
- 35	310-6320-000	2	WASHER, FLAT, SST, 0.092 ID X 0.218 OD COML AP	4	
36	50MS6Z10B2	2	SEMICOND DEVICE SET 16333 353-6209-000 5CR19 5CR20	1	
37	DM103	2	INSULATOR 08289 352-9854-000	2	
38	2522-06-00-2 0	2	TERMINAL 78189 304-4200-000	2	
- 39	MS35649-44	2	NUT, PLAIN, HEX., SST. 4-40 313-0043-000 AP FOR 36 THRU 38	4	
- 40	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP FOR 36 THRU 38	4	
- 41	506-5907-003	2	WASHER AP FOR 36 THRU 38	8	
- 42	302-0385-000	2	INSULATOR, WASH. 20999 AP FOR 36 THRU 38	4	
- 43	565-2985-002	2	BUSHING, INSULATING AP FOR 36 THRU 38 OR	4	
- 43	769-7039-003	2	BUSHING, INSULATING AP FOR 36 THRU 38	4	
- 44	MS51957-17	2	SCREW, MACH., SST. 4-40 X 1/2 343-0137-000 AP FOR 36 THRU 38	4	
45	565-5597-003	2	HEAT SINK EFF THRU REV F	2	
45	758-0297-001	2	HEAT SINK EFF REV G	2	
- 46	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP	4	
- 47	506-5907-003	2	WASHER AP	4	
- 48	565-5595-002	2	SPACER AP	4	
- 49	MS51957-18 343-0138-000 AP	2	SCREW, MACH, SST, 4-40 X 5/8	4	
50	9RT1A1	2	RESISTOR, THRM, 415 OHMS, 10% 02989 714-2841-000 5RT1	1	
51	566-0056-002	2	MOUNT EFF BASIC ONLY	1	
- 52	MS35649-264	2	NUT, PLAIN, HEX., SST, 6-32 313-0002-000 EFF REV A AP FOR 50 AND 51	1	
- 53	1W751	2	RESISTOR, THRM, 415 OHMS, 10% 02989 714-2339-000 EFF BASIC ONLY AP FOR 50 AND 51	1	
- 54	MS51957-30	2	SCREW, MACH., SST, 6-32 X 1/2 343-0171-000 EFF BASIC ONLY AP FOR 50 AND 51	1	
- 54	MS51957-32	2	SCREW, MACH., SST, 6-32 X 3/4 343-0174-000 EFF REV A AP FOR 50 AND 51	1	
55	RW67V680	2	RESISTOR, FXD, WW, 68 OHMS, 5%, 6.5W 747-5437-000 EFF THRU REV E 5R8	1	
55	RW67V910	2	RESISTOR, FXD, WW, 91 OHMS, 5%, 6.5W 747-5439-000 EFF REV F 5R8	1	
56	RC20GF681K	2	RESISTOR, FXD, COMP, 680 OHMS, 10%, 1/2W 745-1345-000 EFF BASIC ONLY 5R11	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-17- 56	RC20GF101K	2	RESISTOR, FXD, COMP. 100 OHMS, 10%, 1/2W 745-1310-000 EFF REV A THRU E 5R11	1	
56	RC32GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1W 745-3328-000 EFF REV F 5R11	1	
57	RS2C5R000J	2	RESISTOR, FXD, WW, 5 OHMS, 5%, 3W 91637 747-5314-000 5R81	1	
58	3SAE2019A3	2	RELAY 01526 974-0587-000 5K4	1	
59	RC07GF152K	2	RESISTOR, FXD, COMP, 1.5K. 10%, 1/4W 745-0755-000 5RB4	1	
60	MP930-228	2	COIL, RF, 200MH 95105 240-0386-000 5L4	1	
- 61	MS51957-28	2	SCREW, MACH., SST9 6-32 X 3/8 343-0169-000 AP	1	
- 62	310-0048-000	2	WASHER, FLAT, SST, 0.172 ID X 0.437 OD COML AP	2	
63	RC42GF120K	2	RESISTOR, FXD, COMP, 12 OHMS, 10%, 2W 745-5572-000 EFF BASIC ONLY 5R100	1	
63	RC42GF220K	2	RESISTOR, FXD, COMP, 22 OHMS, 10%, 2W 745-5582-000 EFF REV A THRU E 5R100	1	
63	RC42GF150K	2	RESISTOR, FXD, COMP, 15 OHMS, 10%, 2W 745-5575-000 EFF REV B 5R100	1	
64	T571050-30	2	TERMINAL 11707 306-0090-000	6	
- 65	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	2	
- 66	MS51959-12	2	SCREW, MACH., SST. 4-40 X 3/16 342-0043-000 AP	4	
67	HP5N	2	CLAMP 09922 150-1542-000	2	
- 68	P313-0045-00 0	2	NUT, PLAIN, HEX., SST, 6-32 77250 313-0045-000 AP	2	
- 69	310-6360-000	2	WASHER, FLAT, SST, 0.147 ID X 0.375 OD COML AP	2	
- 70	MS51957-28	2	SCREW, MACH., SST, 6-32 X 3/8 343-0169-000 AP	2	
- 71	565-5555-005	2	CABLE, MAIN	1	
72	PT02A18-32P	3	CONNECTOR 77820 371-2005-000 5J1	1	
- 73	MS35649-44	3	NUT, PLAIN, HEX.. SST, 4-40 313-0043-000 AP	2	
- 74	MS35338-135	3	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	2	
- 75	MS51957-14	3	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP	2	
76	RG179U	3	CABLE 425-1498-000	AR	
77	1N645	2	SEMICOND DEVICE 353-2607-000 EFF REV J 5868 5CR24	1	
78	1N645	2	SEMICOND DEVICE 353-2607-000 EFF REV J SB68 5CR22	1	
79	1N645	2	SEMICOND DEVICE 353-2607-000 EFF REV J 5868 5CR21	1	
80	1N645	2	SEMICOND DEVICE 353-2607-000 EFF REV J 5868 5CR23	1	
81	150D476X9035 S2	2	CAPACITOR, FXD, ELECT.. 47UF, 10%, 35V 56289 184-7714-000 EFF REV J 5C21	1	
82	TF300	2	TERMINAL 98291 306-1018-000 EFF REV J	4	
- 83	MS51957-2	2	SCERW, MACH., SST, 2-56 X 3/16 343-0123-000 EFF REV J AP	4	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-17- 84	MS35338-134	2	WASHER, LOCK, SST, 0.088 ID X 0.175 00 310-0275-000 EFF REV J SB68 AP	4	
85	565-5594-004	2	PLATE COVER, REAR	1	
- 86	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP	8	
87	7-16A54F15-0 PORMSPCT	2	RESISTOR, FXD. WW, 15 OHMS, 5X. 3W 44655 710-2864-000 5R72	1	
88	2A1DB12	2	TERMINAL 92825 306-0234-000	1	
89	2104-04-01-2	2	TERMINAL 78189 304-0317-000 520N	1	
- 90	MS551957-12	2	SCREW, MACH., SST, 4-40 X 3/16 343-0132-000 AP FOR 88 AND 89	1	
- 91	MS35338-135	2	WASHER. LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP FOR 88 AND 89	1	
92	2104-06-02-2	2	TERMINAL 78189 304-0318-000 520N	1	
93	76-0087-62	2	TRANSFORMER 71590 672-0045-000 5T2	1	
94	76-0087-62	2	TRANSFORMER 71590 672-0045-060 5T1	1	
- 95 0	P313-0045-00	2	NUT, PLAIN. HEX., SST, 6-32 77250 313-0045-000 AP FOR 92 THRU 94	4	
- 96	MS35338-136	2	WASHER, LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP FOR 92 THRU 94	4	
- 97	310-0046-000	2	WASHER, FLAT,.SST, 0.147 ID X 0.312 OD COML AP FOR 92 THRU 94	1	
- 98	MS51957-28	2	SCREW, MACH., SST. 6-32 X 3/8 343-0169-000 AP FOR 92 THRU 94	1	
- 99	MS51957-27	2	SCREW, MACH., SST, 6-32 X 5/16 343-0168-000 AP FOR 92 THRU 94	3	
100	3SAE2059A2	2	RELAY 01526 974-0658-000 EFF THRU REV A 5K2	1	
100	3SAF1131	2	RELAY 01526 974-0722-000 EFF REV B 5K2	1	
101	3SAE2059A2	2	RELAY 01526 974-0658-000 EFF THRU REV A 5K1	1	
101	35AF1131	2	RELAY 01526 974-0722-000 EFF REV B 5K1	1	
- 102	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP FOR 100 AND 101	4	
- 103	MS35338-135	2	WASHER, LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP FOR 100 AND 101	4	
104	426-5323-000	2	LEAD ASSY 89110	1	
105	TR6-2260158	2	INSERT 98978 141-0743-000	1	
106	7234	2	ELECTRON TUBE 04961 257-9009-000 5V3	1	
107	999-4516-400	2	POWER SUPPLY 83003 270-1696-000 5PS2	1	
108	999-4502-400	2	POWER SUPPLY 83003 270-1384-000 5PS1	1	
- 109	P313-0045-00 O	2	NUT, PLAIN, HEX., SST, 6-32 77250 313-0045-000 AP FOR 107 AND 108	8	
- 110	MS35338-136	2	WASHER. LOCK, SST. 0.141 ID X 0.253 OD 310-0282-000 AP FOR 107 AND 108	8	
- 111	310-0446-000	2	WASHER. FLAT, SST. 0.172 ID X 0.750 OD COML EFF THRU REV R AP FOR 107 AND 108	8	

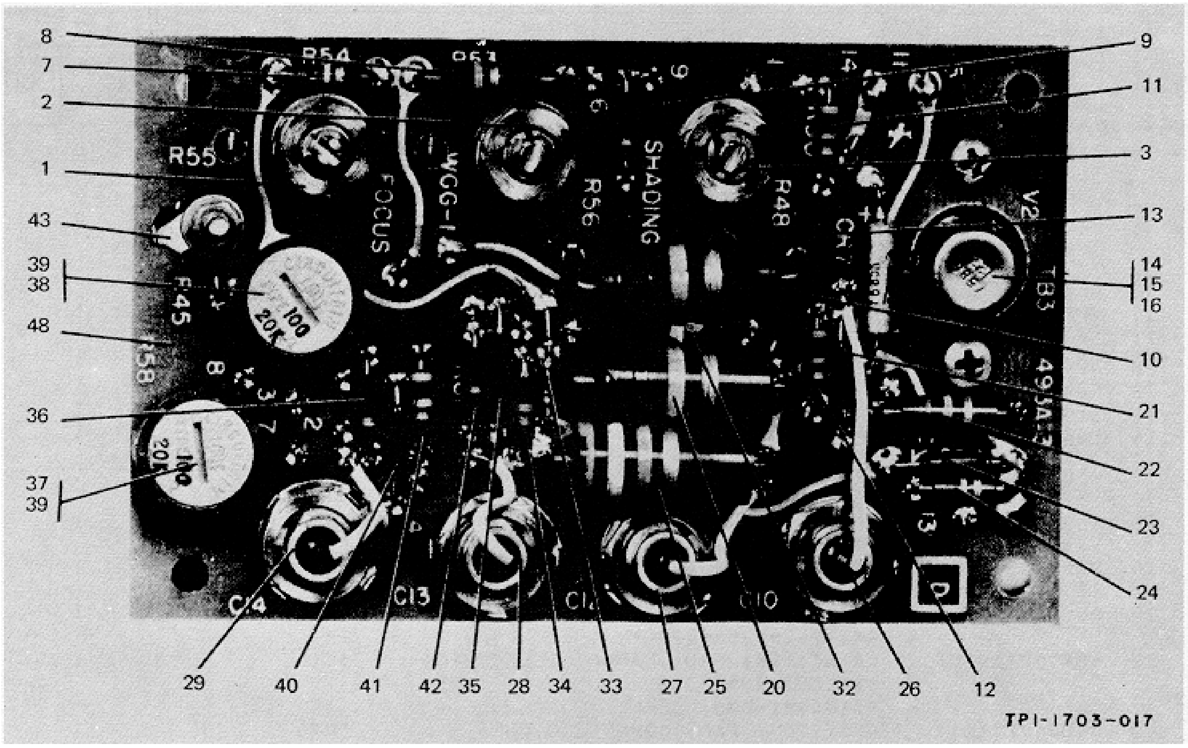
FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-17 111	310-0048-000	2	WASHER, FLAT, SST, 0.172 ID X 0,437 OD COML EFF REV C AP FOR 107 AND 108	8	
112	564-2626-003	2	PLATE, XMFR	1	
- 113	MS51957-12	2	SCREW, MACH., SST, 4-40 X 3/16 343-0132-000 AP	4	
- 114	MS35338-135	2	WASHER, LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP	4	
115	R22NCFMA1-40	3	NUT, SELF-LKG, CLINCH, CAD. PL STL. 4-40 72962 333-0839-000	4	
116	564-2625-003	3	PLATE9 XMFR	1	
117	564-2642-002	2	BAR	2	
- 118	MS551957-12	2	SCREW, MACH., SST. 4-40 X 3/16 343-0132-000 AP	4	
- 119	MS35338-135	2	WASHER, LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP	4	
- 120	565-5566-004	2	CABLE, FLOOD GUN	1	
121	769-0866-001	3	COVER	1	
122	111-01-10-01	3 2	SOCKET 71785 372-1779-000	1	
123	7550-0049	2	SOCKET 94991 220-1448-000 EFF THRU REV J	1	
123	758-0438-001	2	SOCKET, TUBE EFF REV K	1	
124	564-2635-002	2	BRACKET. RH	1	
125	564-2633-002	2	BRACKET,	1	
- 126	MS51957-12	2	SCREW, MACH., SST, 4-40 X 3/16 343-0132-000 AP FOR 124 AND 125	4	
127	562-0855-002	3	RIVET, NUT	4	
128	R22NCFMA1-40	3	NUT, SELF-LKG, CLINCH, CAD. PL STL, 4-40 72962 333-0839-000	8	
129	564-2634-002	3	BRACKET USED ON 124 ONLY	1	
130	564-2632-002	3	BRACKET USED ON 125 ONLY	1	
131	564-2240-004	2	BRACE, INTERNAL	1	
132	R22NCFMA1-26	3	NUT, SELF-LKG, CLINCH, CAD. PL STL, 2-56 72962 333-0837-000	2	
133	A951NIPL	3	EYELET. MET., NI PL BRS, 0.375 DIA X 0.090 57771 307-1287-000	2	
134	R12NCFMAl-82	3	NUT, SELF-LKG, CLINCH, CAD. PL 4 STL. 8-32 72962 333-0843-000		
135	563-5118-002	3	NUT	4	
136	R22NCFMA1-40	3	NUT, SELF-LKG, CLINCH, CAD. PL STL, 4-40 72962 333-0839-000	8	
137	564-2239-004	3	BRACE, INTERNAL	1	



Terminal Board Assembly, No. 1
Figure 4-18

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-18- 0	565-5593-004	1	TERMINAL BOARD ASSY, NO. 1 SEE FIG. 4-17(19 OR NHA	REF	
1	RV5LAYSB102B	2	RESISTOR, VAR, COMP, 1K, 20%, 1/2W 5R5 380-2904-000	1	
2	381-0910-000	2	RESISTOR, VAR, WW, 2.5K, 5% 1W 5R7 12697	1	
3	381-0905-000	2	RESISTOR, VAR, WW, 25 OHMS, 5%, 1W 5R13 12697	1	
4	RV5LAXSB252B	2	RESISTOR, VAR, COMP, 2.5K, 20%, 5R3 1/2W 380-6286-000	1	
5	RVSLAXSB103B	2	RESISTOR. VAR, COMP, 10K, 20%, 5R1 1/2W 380-6290-000	1	
- 6	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 AP FOR 1 THRU 5	5	
- 7	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 EFF THRU REV B AP FOR I THRU 5	5	
- 7	1214-05	2	WASHER, LOCK, CAD. PL STL, 0.267 ID X 0.408 OD 78189 373-0087-000 EFF REV C AP FOR 1 THRU 5	5	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-18 8	310-0419-000	2	WASHER, FLAT, SST, 0.260 ID X 0.438 OD COML EFF THRU REV A AP FOR 1 THRU 5	10	
- 8	310-0419-000	2	WASHER, FLAT, SST. 0.260 ID X 0.438 OD COML EFF REV B AP FOR .1, 4 AND 5	8	
9	MPF050-16B	2	REACTOR, 72MH 95105 668-0401-000 5L2	1	
10	MPF050-16B	2	REACTOR, 72MH 95105 668-0401-000 5L3	1	
- 11	566-0041-002	2	SCREW, MODIFIED AP FOR 9 AND 10	1	
- 12	506-5907-003	2	WASHER AP FOR 9 AND 1	16	
13	4JX1182023	2	TRANSISTOR 03508 352-0207-000 504	1	
14	A10044DAP	2	INSULATOR 07047 352-9889-000	1	
15	1N645	2	SEMICOND DEVICE 353-2607-000 5CR16	1	
16	1N9738	2	SEMICOND DEVICE 353-3184-000 5CR17	1	
17	RC07GF471K	2	RESISTOR, FXD, COMP, 470 OHMS, 10%, 1/4W 745-0737-000 5R4	1	
18	RC07GF182K	2	RESISTOR, FXD, COMP, 1.8K. 10%, 1/4W 745-0758-000 5R2	1	
19	RW69V561	2	RESISTOR, FXD. WW. 560 OHMS, 5%, 3W 747-5355-000 5R9	1	
20	RW69V561	2	RESISTOR, FXD. WW, 560 OHMS, 5% 3W 747-5355-000 5R6	1	
21	SDB1K01103M	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.01UF. 20%, 100V 53021 931-4481-000 5C16	1	
22	RC07GF271K	2	RESISTOR, FXD. COMP, 270 OHMS, 10%, 1/4W 745-0728-000 EFF BASIC ONLY 5R78	1	
22	RC07GF102K	2	RESISTOR, FXD, COMP, 1K. 10%, 1/4W 745-0749-000 EFF REV A 5R78	1	
23	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 5R77	1	
24	RC07GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 1/4W 745-0752-000 EFF BASIC ONLY 5R14	1	
24	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 EFF REV A 5R14	1	
25	1N645	2	SEMICOND DEVICE 353-2607-000 5CRI8	1	
26	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 5R12	1	
27	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 5R10	1	
28	CM05E330J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 33PF, 5%, 500V 912-2780-000 5C1	1	
29	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.SUF, 20%, 35V 56289 184-7693-000 5C17	1	
30	TY13	2	CLAMP 59730 435-1051-000	2	
- 31	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML AP	2	
- 32	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	2	
- 33	506-5907-003	2	WASHER AP	2	
- 34	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP	2	
35	565-5592-004	2	BOARD ASSY	1	



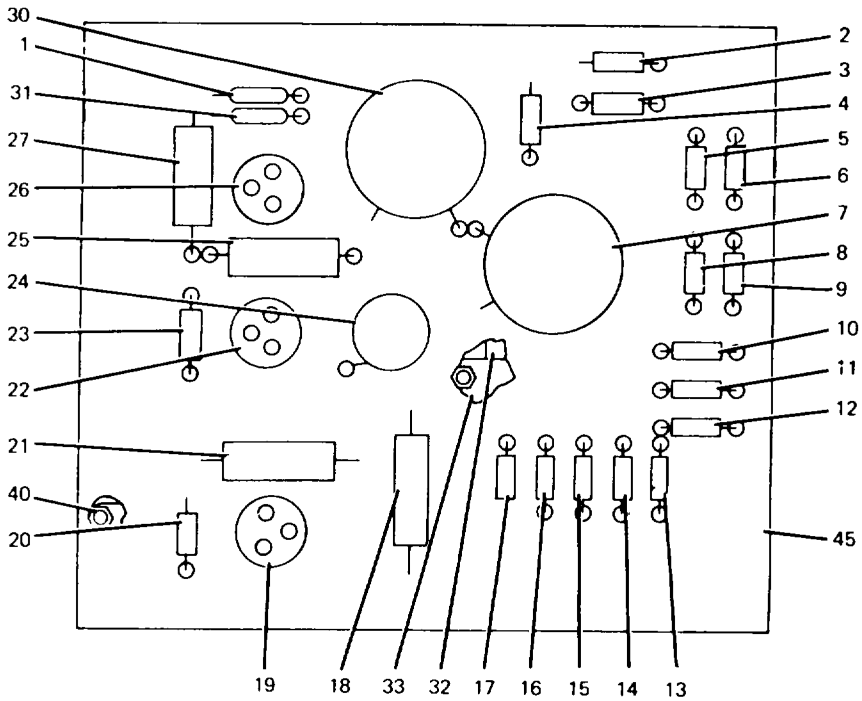
Terminal Board Assembly, No. 3
Figure 4-19

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-19- 0	5584-004	1	TERMINAL BOARD ASSY, NO. 3 SEE FIG. 4-17(20) FOR NHA	REF	
1	RV5LAYSB254B	2	RESISTOR, VAR, COMP, 250K, 20%, 1/2W 380-2911-000 5R55	1	
2	RV5LAYS8503B	2	RESISTOR, VAR, COMP, 50K, 20%, 1/2W 380-2909-000 5R56	1	
3	RV5LAYSB253B	2	RESISTOR, VAR, COMP, 25K, 20%, 1/2W 380-2908-000 5R48	1	
- 4	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 EFF REV C AP FOR I THRU 3	3	
- 5	1214-05		2 WASHER, LOCK, CAD, PL STL. 0.267 ID X 0.408 OD 78189 373-0087-000 EFF REV C AP FOR 1 THRU 3	3	
- 6	310-0419-000	2	WASHER, FLAT, SST, 0.260 ID X 0.438 OD COML EFF REV C AP FOR 1 THRU 3	3	
7	RC07GF684K	2	RESISTOR. FXD, COMP, 680K, 10%, 1/4W 745-0851-000 5R64	1	
8	RC20GF124K	2	RESISTOR, FXD, COMP, 120K, 10%, 1/2W 745-1440-000 5R53	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-19- 9	RC07GF102K	2	RESISTOR, FXD, COMP, 1K, 10%, 1/4W 745-0749-000 5R44	1	
10	RC42GF123K	2	RESISTOR, FXD, COMP. 12K, 10%, 2W 745-5698-000 5R50	1	
11	RC07GF474K	2	RESISTOR, FXD, COMP, 470K, 10%, 1/4W 745-0845-000 EFF REV E SB5 5R90	1	
12	RC07GF474K	2	RESISTOR, FXD, COMP, 470K, 10% 1/4W 745-0845-000 5R46	1	
13	150D685X0035 B2	2	CAPACITOR, FXD, ELECT., 6.8UF, 20%, 35V 56289 184-7693-000 5C11	1	
14	7586	2	ELECTRON TUBE 49671 255-0370-000 5V2	1	
15	564-2202-002	2	PLATE, MTG	1	
16	133-65-10-00 1	2	SOCKET 71785 220-1444-000	1	
- 17	313-0132-000	2	NUT, PLAIN, HEX, SST, 4-40 COML AP FOR 15 AND 16	4	
- 18	MS35338-135	2	WASHER, LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP FOR 15 AND 16	2	
- 19	MS51957-14	2	SCREW, MACH., SST. 4-40 X 5/16 343-0134-000 AP FOR 15 AND 16	2	
20	RC42GF123K	2	RESISTOR, FXD, COMP, 12K, 10%, 2W 745-5698-000 5R51	1	
21	1N645		2 SEMICOND DEVICE 353-2607-000 5CR7	1	
22	RC20GF563K	2	RESISTOR, FXD. COMP, 56K. 10%, 1/2W 745-1426-000 5R47	1	
23	1N645	2	SEMICOND DEVICE 353-2607-000 5CR8	1	
24	RC07GF224K	2	RESISTOR, FXD. COMP, 220K, 10%. 1/4W 745-0833-000 5R49	1	
25	RC42GF393K	2	RESISTOR, FXD. COMP, 39K. 10% 2W 745-5719-000 5R52	1	
26	186P22404S15	2	CAPACITOR. FXD, PAPER DIELECTRIC, 0.22UF, 20%, 400V 56289 931-1650-000 5C10	1	
27	186P22404S15	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.22UF, 20%, 400V 56289 931-1650-000 5C12	1	
28	118P10502S15	2	CAPACITOR, FXD, PAPER DIELECTRIC, 1UF, 20%, 200V 56289 951-1105-000 5C13	1	
29	118P10502515	2	CAPACITOR. FXD, PAPER DIELECTRIC, 1UF, 20%, 200V 56289 951-1105-000 EFF THRU REV D 5C14	1	
29	186P10402515	2	CAPACITOR, FXD, PAPER DIELECTRIC, 1.1UF, 20%- 200V 56289 931-1644-000 EFF REV E SB5 5C14	1	
- 30	P334-0254-00 0	2	NUT, PLAIN, HEX.. NI PL BRS, 5/16-24 77250 334-0254-000 AP FOR 26 THRU 29	4	
- 31	564-2629-002	2	WASHER, LKG AP FOR 26 THRU 29	4	
32	T1TM1-4 10K1 OPCT	2	RESISTOR, THRM, 10K, 10%, 1/4W 96214 714-2368-000 5RT2	1	
33	1N9818	2	SEMICOND DEVICE 353-3192-000 SCR9	1	
34	RC07GF273J	2	RESISTOR, FXD, COMP, 27K, 5%, 1/4W 745-0799-000 5R57	1	
35	1N645	2	SEMICOND DEVICE 353-2607-000 5CR10	1	
36	RC07GF682K	2	RESISTOR, FXD, COMP, 6.8K, 10%, 1/4W 745-0779-000 5R60	1	

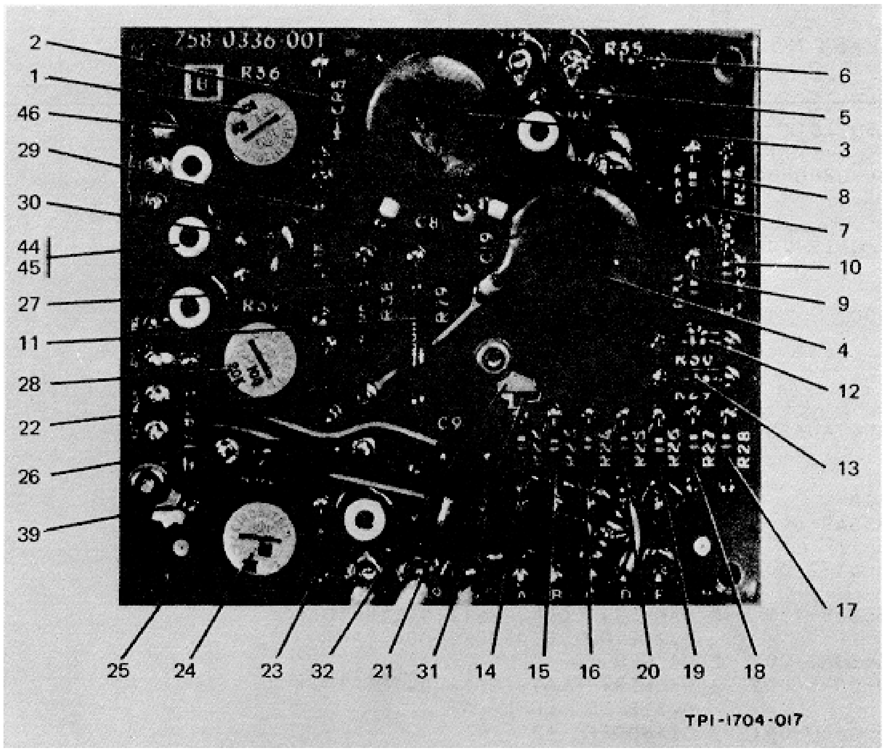
FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
4-19- 37	CT100-20K	2	RESISTOR, VAR, WW, 2OK, 5%, 1W 75042 381-1472-000	5R58	1	
38	CT100-20K	2	RESISTOR, VAR, WW, 2OK, 5%, 1W 75042 381-1472-000	5R45	1	
39	A10044DAP	2	INSULATOR 07047 352-9889-000		2	
40	1N645	2	SEMICOND DEVICE 353-2607-000	5CR11	1	
41	RC07GF474K	2	RESISTOR, FXD. COMP, 470K, 10%, 1/4W 745-0845-000	5R62	1	
42	RC07GF275K	2	RESISTOR, FXD, COMP, 2.7MEGO, 10%, 1/4W 745-0872-000	5R61	1	
43	TY13	2	CLAMP 59730 435-1051-000		1	
- 44	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML AP		1	
- 45	M535338-135	2	WASHER, LOCK, SSTY 0.115 ID X 0.212 OD 310-0279-000 AP		1	
- 46	506-5907-003	2	WASHER AP		1	
- 47	MS51957-14	2	SCREW, MACH., SST. 4-40 X 5/16 343-0134-000 AP		1	
48	565-5583-004	2	BOARD ASSY		1	
4-20- 0	565-5548-004	1	TERMINAL BOARD ASSY, NO. 2 SEE FIG. 4-17(24) FOR NHA EFF THRU REV G		REF	
1	1N751	2	SEMICOND DEVICE 353-2709-000 EFF THRU REV B	5CR5	1	
1	1N972A	2	SEMICOND DEVICE 353-3234-000 EFF REV C	5CR5	1	
2	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000	5R35	1	
3	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%. 1/4W 745-0848-000	5R34	1	
4	RC07GF271K	2	RESISTOR, FXDT COMP, 270 OHMS, 10%. 1/4W 745-0728-000	5R40	1	
5	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000	5R33	1	
6	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000	5R32	1	
7	77500	2	CAPACITOR, FXD, CER DIELECTRIC, 10,00PF, 20%, 3000V 56289 913-4174-000 EFF REV C	5C1	1	
8	RCC7GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000	5R30	1	
9	RCO7GF564K	2	RESISTOR, FXD. COMP, 560K, 10%, 1/4W 745-0848-000	5R31	1	
10	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000	5R29	1	
11	PC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000	5R28	1	
12	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000	5R27	1	
13	RC07GF-564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000	5R26	1	
14	RCU7GF274K	2	RESISTOR, FXD, COMP, 270K, 10%, 1/4W 745-0836-000 EFF THRU REV D	5R25	1	

FIG.- ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-20- 14	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 EFF REV E 5R25	1	
15	RC07GF274K	2	RESISTOR, FXD, COMP, 270K, 10%, 1/4W 745-0836-000 EFF THRU REV D 5R24	1	
15	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 EFF REV E 5R24	1	
16	RC07GF274K	2	RESISTOR, FXD, COMP, 270K, 10%, 1/4W 745-0836-000 EFF THRU REV D 5R23	1	
16	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 EFF REV E 5R23	1	
17	RC07GF274K	2	RESISTOR, FXD, COMP, 270K. 10%, 1/4W 745-0836-000 EFF THRU REV D 5R22	1	
17	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 EFF REV E 5R22	1	
18	RC07GF103K	2	RESISTOR, FXD, COMP, 10K, 10% 1/4W 745-0785-000 EFF THRU REV B 5R43	1	
18	RN65D01782F	2	RESISTOR, FXD, FILM, 17.8K, 1% 1/2W 705-7156-000 EFF REV C 5R43	1	
19	RC2UGF333K	2	RESISTOR, FXD, COMP, 33K, 10%, 1/2W 745-1415-000 EFF THRU REV B 5R41	1	
19	CT100-20K	2	RESISTOR, VAR, WW, 20K, 5%, 1W 75042 381-1472-000 EFF REV C 5R41	1	
20	RC07GF154K	2	RESISTOR, FXD, COMP, 150K, 10%, 1/4W 745-0827-000 EFF REV C 5R88	1	
21	RC07GF103K	2	RESISTOR, FXD, COMP, 1OK, 10%, 1/4W 745-0785-000 EFF THRU REV B 5R42	1	
21	RN65D1782F	2	RESISTOR, FXD, FILM, 17.8K, 1%, 1/2W 705-7156-000 EFF REV C 5R42	1	
22	RC07GF222K	2	RESISTOR, FXD, COMP, 2.2K, 10%, 1/4W 745-0761-000 EFF THRU REV B 5R39	1	
22	CT100-20K	2	RESISTOR, VAR, WW, 2OK, 5%, 1W 75042 381-1472-000 EFF REV C 5R39	1	
23	RC07GF223J	2	RESISTOR. FXD, COMP, 22K, 5%, 1/4W 745-0796-000 EFF REV C 5R89	1	
24	CK06CW103K	2	CAPACITOR, FXD, CER DIELECTRIC, 10,000PF, 10%, 200V 913-4030-000 EFF THRU REV B 5C9	1	
24	55C47A	2	CAPACITOR, FXD, CER DIELECTRIC, 0.01UF, 20%, 200V 56289 913-4098-000 EFF REV C 5C9	1	
25	RV5LAYS8503B	2	RESISTOR, VAR, COMP, 5OK, 20%, 1/2W 380-2909-000 EFF THRU REV B 5R38	1	
25	RN65D2151F	2	RESISTOR, FXD, FILM, 2.15K, 1%, 1/2W 705-7112-000 EFF REV C 5R38	1	
26	RV5LAYSB1048	2	RESISTOR, VAR, COMP, 10OK, 20% 1/2W 380-2910-000 EFF THRU REV 5R36	1	
26	CT100-50K	2	RESISTOR VAR WW 50K, 5% 1W 75042 381-1473-000 EFF REV C 5R36	1	
27	RV5LAYS8503B	2	RESISTOR, VAR, COMP, 50K, 20% 1/2W 380-2909-000 EFF THRU REV B 5R37	1	



Terminal Board Assembly, No. 2
Figure 4-20

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-20- 27	RN65D2151F	2	RESISTOR, FXD, FILM, 2.15K, 1% 1/2W 705-7112-000 EFF REV C 5R37	1	
- 28	P334-0266-00 0	2	NUT, PLAIN, HEX, NI PL BRS 1/4-32 77250 334-0266-000 EFF THRU REV 8 AP FOR 25 THRU 27	6	
- 29	310-0419-000	2	WASHER, FLAT, SST. 0.260 ID X 0.438 OD COML EFF THRU REV B AP FOR 25 THRU 27	6	
30	77500	2	CAPACITOR. FXDO, CER DIELECTRIC, 10,000PF, 20%, 3000V 56289 913-4174-000 5C8	1	
31	1N751	2	SEMICOND DEVICE 353-2709-000 EFF THRU REV B 5CR6	1	
32	118P4740654	2	CAPACITOR. FXD, PAPER DIELECTRIC, 0.47UF, 20%, 600V 56289 951-1067-000 5C7	1	
33	HP11N	2	CLAMP 09922 150-1552-000	1	
- 34	MS35649-44	2	NUT, PLAIN, HEX., SST. 4-40 313-0043-000 EFF THRU REV B AP	1	
- 34	313-0132-000	2	NUT, PLAIN, HEX., SSTO 4-40 COML EFF REV C AP	1	
- 35	MS35338-135	2	WASHER, LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP	1	
- 36	506-5907-003	2	WASHER AP	1	
- 37	310-0045-000	2	WASHER. FLAT, SST, 0.125 ID X 0.312 OD COML AP	1	
- 38	500-0249-001	2	STANDOFF AP	1	
- 39	MS51957-18	2	SCREW, MACH., SST, 4-40 X 5/8 343-0138-000 AP	1	
40	TY13	2	CLAMP 59730 435-1051-000	1	
- 41	313-0132-000	2	NUT, PLAIN, HEX.. SST, 4-40 COML AP	1	
- 42	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	1	
- 43	506-5907-003	2	WASHER AP	1	
- 44	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP	1	
45	565-5547-004	2	BOARD ASSY	1	

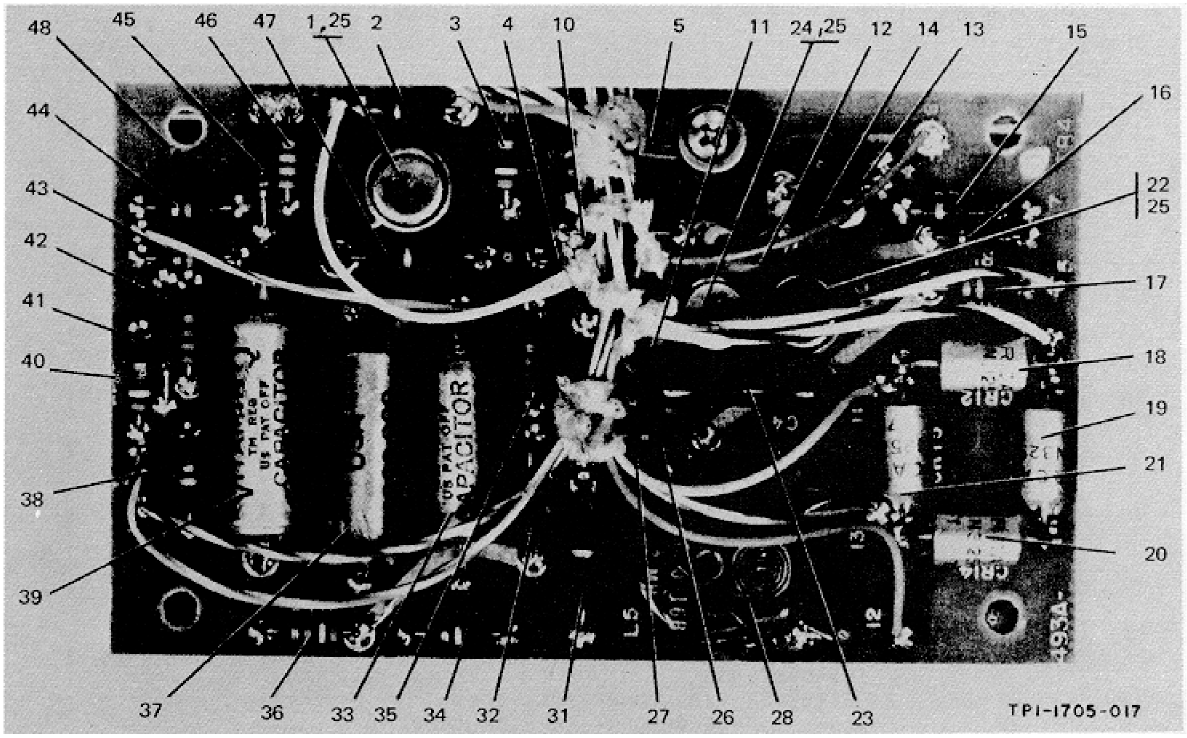


High-Voltage Circuit Subassembly
Figure 4-21

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-21-0	758-0336-001	1	HIGH VOLTAGE CIRCUIT SU8ASSEMBLY SEE FIG- 4-17(24 OR NHA	REF	
1	CT100-50K	2	RESISTOR, VAR, WW, 50K, 5%, 1W 75042 381-1473-000 5R56	1	
2	1N972A	2	SEMICOND DEVICE 353-3234-000 5CR5	1	
3	77500	2	CAPACITOR, FXD, CER DIELECTRIC, 10,000PF, 20%, 3000V 56289 913-4174-000 5C8	1	
4	77500	2	CAPACITOR, FXD, CER DIELECTRIC, 10,000PF, 20%, 3000V 56289 913-4174-000 5C19	1	
5	RC07GF271K	2	RESISTOR, FXD, COMP, 270 OHMS, 10%, 1/4W 745-0728-000 5R40	1	
6	RC07GF564K	2	RESISTOR, FXD, COMP, 560K. 10% 1/4W 745-0848-000 5R35	1	
7	RC07GF564K	2	RESISTOR. FXD, COMP, 560K, 10% 1/4W 745-0848-000 5R33	1	
8	RC07GF564K	2	RESISTOR, FXD, COMP, 560K. 10% 1/4W 745-0848-000 5R34	1	
9	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R31	1	

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-21- 10	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R32	1	
11	RN65D1001F	2	RESISTOR, FXD, FILM, 1K, 1%, 1/2W 705-7096-000 5R79	1	
12	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R30	1	
13	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R29	1	
14	RC07GF564K	2	RESTSTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R22	1	
15	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R23	1	
16	RC07GF564K	2	RESISTOR9 FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R24	1	
17	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10% 1/4W 745-0848-000 5R28	1	
18	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R27	1	
19	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R26	1	
20	RC07GF564K	2	RESISTOR, FXD, COMP, 560K, 10%, 1/4W 745-0848-000 5R25	1	
21	CM06FD222JO3	2	CAPACITOR, FXD, MICA DIELECTRIC, 2200PF, 5%, 500V 912-3025-000 5C9	1	
22	RC07GF223J	2	RESISTOR, FXD, COMP, 22K, 5%, 1/4W 745-0796-000 5R89	1	
23	RC07GF154K	2	RESISTOR, FXD, COMP, 150K, 10%, 1/4W 745-0827-000 5R88	1	
24	CT100-20K	2	RESISTOR, VAR, WW, 20K, 5%. 1W 75042 381-1472-000 5R41	1	
25	RN65D1782F	2	RESISTOR. FXD, FILM, 17.8K, 1%, 1/2W 705-7156-000 5R42	1	
26	RN65D1782F	2	RESISTOR, FXD. FILM. 17.8K. 1% 1/2W 705-7156-000 5R43	1	
27	RN65D2151F	2	RESISTOR, FXD, FILM, 2.15K, 1%, 1/2W 705-7112-000 5R38	1	
28	CT100-20K	2	RESISTOR, VAR, WW, 20K. 5%, 1W 75042 381-1472-000 5R39	1	
29	RN65D1101F	2	RESISTOR. FXD. FILM, 1.1K, 1%, 1/2W 705-7098-000 5R37	1	
30	CM05F221J03	2	CAPACITOR, FXD, MICA DIELECTRIC, 220PF, 5%, 500V 912-2840-000 5C2	1	
31	118P4740654	2	CAPACITOR, FXD, PAPFR DIELECTRIC, 0.47UF. 20%, 600V 56289 951-1067-000 5C7	1	
32	HP11N	2	CLAMP 09922 150-1552-000	1	
- 33	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML AP	1	
- 34	MS35338-135	2	WASHER, LOCK, SST. 0.115 ID X 0.212 OD 310-0279-000 AP	1	
- 35	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	1	
- 36	506-5907-003	2	WASHER, AP	1	
- 37	500-0249-001	2	STANDOFF AP		1
- 38	MS51957-18	2	SCREW. MACH., SST, 4-40 X 5/8 343-0138-000 AP	1	
39	TY13	2	CLAMP 59730 435-1051-000	1	
- 40	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML AP	1	

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-21- 41	MS35338-135	2	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP	1	
- 42	506-5907-003	2	WASHER AP	1	
- 43	MS51957-14	2	SCREW, MACH.9 SST. 4-40 X 5/16 343-0134-000 AP	1	
44	31B-8	2	HOOD 81073 360-0287-000	5	
45	31-1	2	JACK, TIP 81073 360-0279-000	5	
46	758-0337-001	2	PRINTED CIRCUIT BOARD EFF THRU REV A	1	
46	758-0336-002	2	BOARD, EYELETTED EFF REV B	1	
4-22- 0	565-5587-004	1	TERMINAL BOARD ASSY, NO. 4 SEE FIG-4-17(27) FOR NHA	REF	
1	2N1187A	2	TRANSISTOR 352-0475-000 501	1	
2	RC07GF102K	2	RESISTOR, FXD. COMP, 1K, 10%, 1/4W 745-0749-000 5R63	1	
3	RC07GF391K	2	RESISTOR, FXD, COMP, 390 OHMS, 10% 1/4W 745-0734-000 5R76	1	
4	RC07GF153K	2	RESISTOR, FXD. COMP, 1K. 10%, 1/4W 745-0791-000 5R59	1	
5	TY13	2	CLAMP 59730 435-1051-000	1	
- 6	313-0132-000	2	NUT, PLAIN, HEX., SST. 4-40 COML AP	1	
- 7	MS35338-135	2	WASHER, LOCK, SST. O.115 ID X 0.212 OD 310-0279-000 AP	1	
- 8	506-5907-003	2	WASHER AP	1	
- 9	MS51957-14	2	SCREW, MACH., SST. 4-40 X 5/16 343-0134-000 AP	1	
10	1N645	2	SEMICOND DEVICE 353-2607-000 5CR1	1	
11	CK60AW102M	2	CAPACITOR. FXD, CER DIELECTRIC. 100PF, 20%, 1000V 913-1186-000 5C3	1	
12	CK60AW102M	2	CAPACITOR, FXD, CER DIELECTRIC, 1000PF, 20%, 1000V 913-1186-000 5C1	1	
13	RC07GF223K	2	RESISTOR, FXD, COMP, 22K. 10% 1/4W 745-0797-000 EFF THRU REV E 5R16	1	
13	RC07GF223J	2	RESISTOR, FXD. COMP, 22K. 5%, 1/4W 745-0796-000 EFF REV F 5R16	1	
14	CK60AW102M	2	CAPACITOR. FXD, CER DIELECTRIC, 1000PF, 20%, 1000V 913-1186-000 5C2	1	
15	RC07GF820K	2	RESISTOR, FXD, COMP, 82 OHMS. 10%, 1/4W 745-0710-000 5R20	1	
16	RC07GF152K	2	RESISTOR, FXD, COMP, 1.5K, 10%, 1/4W 745-0755-000 5R17	1	
17	RC07GF10O3K	2	RESISTOR, FXD, COMP. 10K, 10%, 1/4W 745-0785-000 5R18	1	
18	1N3254	2	SEMICOND DEVICE 353-3275-000 5CR12	1	
19	1N3254	2	SEMICOND DEVICE 353-3275-000 5CR13	1	
20	1N3254	2	SEMICOND DEVICE 353-3275-000 5CR14	1	
21	1N3254	2	SEMICOND DEVICE 353-3275-000 5CR15	1	
22	2N1187A	2	TRANSISTOR 352-0475-000 EFF THRU REV D 5Q2	1	
22	2N2043A	2	TRANSISTOR 352-0476-000 EFF REV E SB6B 5Q2	1	



Terminal Board Assembly, No. 4
Figure 4-22

FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE	UNITS PER ASSY	USABLE ON CODE
4-22- 23	DM20F392J500 WV	2	CAPACITOR, FXD, MICA DIELECTRIC, 3900PF, 5#, 500V 72136 912-3360-000 5C4	1	
24	2N1187A	2	TRANSISTOR 352-0475-000 EFF THRU REV D 503	1	
24	2N2043A	2	TRANSISTOR 352-0476-000 EFF REV E 5B6B 503	1	
25	A10044DAP	2	INSULATOR 07047 352-9889-000 EFF THRU REV B	3	
25	A10012	2	INSULATOR 07047 302-0437-000 EFF REV C	3	
26	RC07GF272K	2	RESISTOR, FXD, COMP, 2.7K. 10% 1/4W 745-0764-000 5R21	1	
27	RC07GF563K	2	RESISTOR, FXD, COMP, 56K, 10%, 1/4W 745-0812-000 5R15	1	
28	MPF050-16B	2	REACTOR, 72MH 95105 668-0401-00 5L5	1	
- 29	P343-0384-00 0	2	SCREW, MACH., NI PL BRS, 3-48 X 1/4 77250 343-0384-000 AP	1	
- 30	506-5907-003	2	WASHER AP	1	
31	RC20GF272K	2	RESISTOR, FXD. COMP, 2.7K, 10%, 1/2W 745-1370-000 5R19	1	

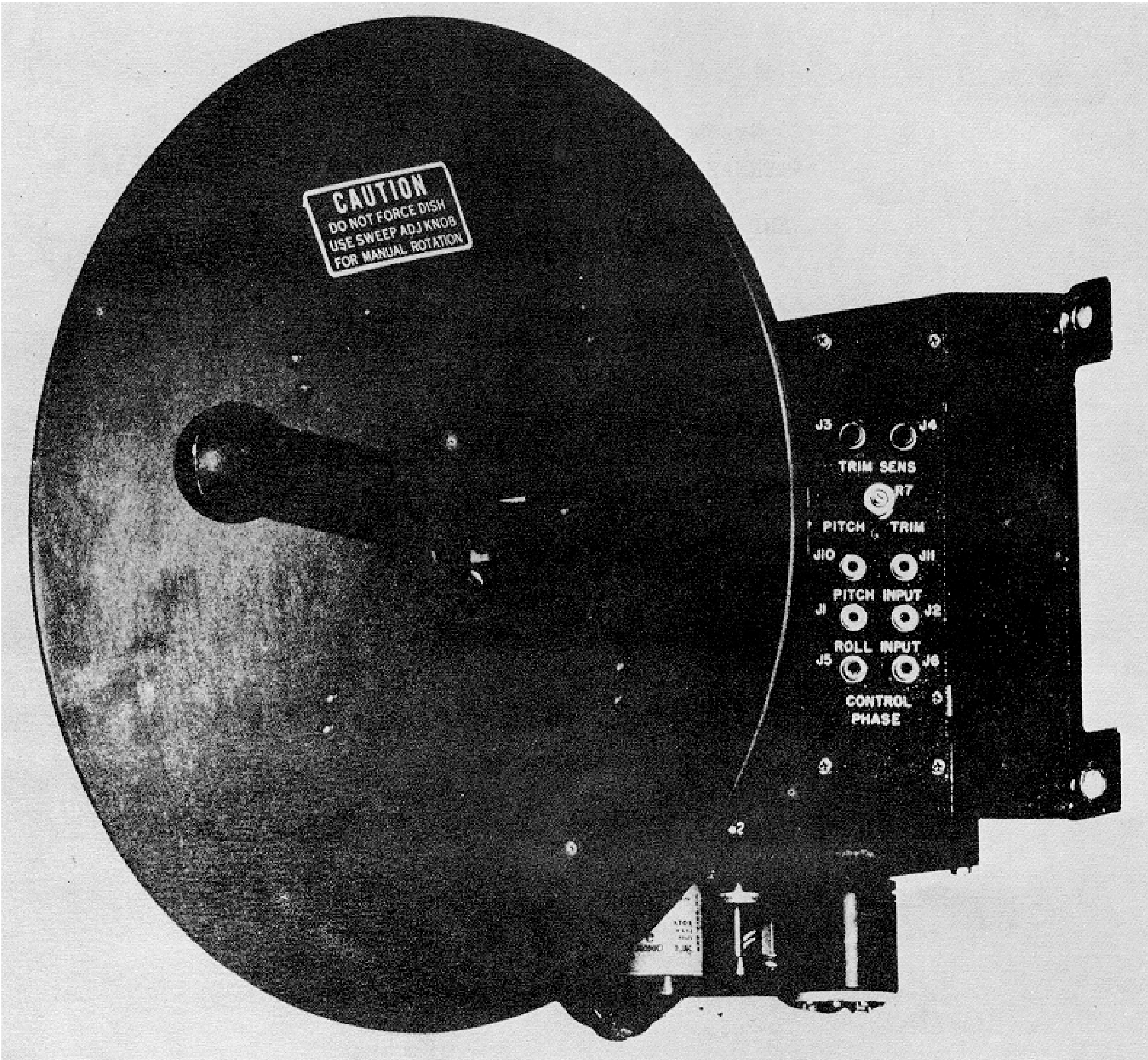
FIG.-ITEM	PART NO.	INDENT.	NOMENCLATURE		UNITS PER ASSY	USABLE ON CODE
4-22- 32	1N645	2	SEMICOND DEVICE 353-2607-000	5CR2	1	
33	186P1030153	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.01UF, 20%, 100V 56289 931-5649-000	5C15	1	
34	RC07GF124K	2	RESISTOR, FXD, COMP, 120K, 10%, 1/4W 745-0824-000	5R74	1	
35	RC07GF333J	2	RESISTOR, FXD, COMP, 33K, 5%, 1/4W 745-0802-000	5R75	1	
36	RC07GF393K	2	RESISTOR, FXD, COMP, 39K, 10%, 1/4W 745-0806-000	5R73	1	
37	186P223935S3	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.022UF, 10%. 300V 56289 931-8449-000	5C6	1	
38	RC07GF124K	2	RESISTOR# FXD, COMP, 120K, 10%, 1/4W 745-0824-000	5R71	1	
3	186P68392S3	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.068UF, 10%, 200V 56289 931-8451-000 EFF THRU REV C	5C5	1	
39	SDB1K01104M	2	CAPACITOR, FXD. PAPER DIELECTRIC, 0.1UF, 20%, 100V 53021 931-4488-000 EFF REV D SB5	5C5	1	
40	RC07GF393K	2	RESISTOR, FXD, COMP, 39K, 10%, 1/4W 745-0806-000	5R70	1	
41	1N645	2	SEMICOND DEVICE 353-2607-000	5CR4	1	
42	RC07GF333J	2	RESISTOR, FXD, COMP, 33K, 5%, 1/4W 745-0802-000	5R69	1	
43	RC07GF393K	2	RESISTOR, FXD, COMP, 39K, 10%, 1/4W 745-0806-000 EFF THRU REV C	5R67	1	
43	RC07GF303J	2	RESISTOR, FXD, COMP, 30K, 5%, 1/4W 745-0801-000 EFF REV D SB5	5R67	1	
44	RC07GF683K	2	RESISTOR, FXD, COMP, 68K, 10%, 1/4W 745-0815-000	5R68	1	
45	1N645	2	SEMICOND DEVICE 353-2607-000	5CR3	1	
46	RC07GF333J	2	RESISTOR, FXD, COMP, 33K, 5%, 1/4W 745-0802-000	5R65	1	
47	RC20GF122K	2	RESISTOR, FXD, COMP, 1.2K, 10%, 1/2W 745-1356-000	5R64	1	
48	565-5586-004	2	BOARD. FLARED		1	

CHAPTER 5

ANTENNAS AS-1520/APN-158 (537F-7)

AND AS-1642/APN-158 (537F-8)

NOTE: Antenna AS-1520/APN-158 and Antenna AS-1642/APN-158 are referred to in this chapter by their commercial nomenclature; Antenna 537F-7 and Antenna 537F-8 respectively.



537 F-7 Antenna
Figure 5-1

Section I. DESCRIPTION AND OPERATION

5-1.

GENERAL.

This section presents the purpose of the equipment, equipment specifications, equipment description, and theory of operation. Refer to figure 5-1 for an overall view of the 537F-7 Antenna. Figure 5-2 is a table of equipment covered in this manual.

EQUIPMENT	COLLINS PART NUMBER
537F-7 Antenna	522-6117-005
537F-8 Antenna	522-6118-005

Equipment Covered

Figure 5-2

5-2.

PURPOSE OF EQUIPMENT.

The 537F-7 and 537F-8 Antennas radiate rf energy pulses from the 374A-3 Receiver-Transmitter and receive the signals reflected from targets.

5-3.

EQUIPMENT SPECIFICATIONS.

The equipment specifications for the 537F-7 and 537F-8 Antennas are listed in figure 5-3.

CHARACTERISTIC	SPECIFICATION
537F-7 Antenna	
Weight	6.6 pounds (2.99 kg)
Physical dimensions	12 inches (30.48 cm) long
(Approximate overall space)	12 inches (30.48 cm) long 14-1/2 inches (36.83 cm) wide

Equipment Specifications (Sheet 1 of 4)

Figure 5-3

CHARACTERISTIC	SPECIFICATION
537F-7 Antenna	
Shock conditions	
Performance criteria	Eighteen 10-millisecond shocks at 7.5 g
Safety criteria	Six 10-millisecond shocks at 15 g
Vibration	0.030 in. total excursion at 10 to 15 Hz and 1.5 g peak acceleration at 55 to 500 Hz
Power requirements	
(Supplied by the 374A-3 Receiver-Transmitter)	
Standby	None
Operate	115 ± 6 volts, 400 ± 20 Hz, 20 watts, 24 va
Rf power rating	35 kw peak power, maximum
Pressurization	None required
Azimuth scan rate	A function of the applied voltage and frequency; for the specified range of voltage and frequency, the scan rate is 28- to 32-scan cycles per minute (240°/cycle)
Radiation pattern	
3-db response points	
E plane (horizontal)	7.3 degrees maximum
H plane (vertical)	7.3 degrees maximum
Side lobes	At least 17 db down from main lobe

Equipment Specifications (Sheet 2 of 4)

Figure 5-3

CHARACTERISTIC	SPECIFICATION
537F-7 Antenna	
Polarization	E plane is horizontal
Antenna gain	26.5 db
Input vswr	1.50: 1 maximum, 9345 to 9405 MHz
Power loss Less than 1/2 db at 9375 MHz	
Stabilization	
Accuracy	±2.5 degrees with respect to servo-system error signal from horizontal plane under ±20 degrees maximum combined pitch and roll condition
Rate	20 degrees per second maximum
Tilt elevation	±15 degrees from horizontal
Radome (aircraft)	Supplied by airframe manufacturer
Ambient temperature range	
Continuous operation	-55 ° to +71 °C (-67 ° to +160 °F)
30-minute operation	-55 ° to +80 °C (-67° to +176 °F)
Ambient humidity range	95 percent at +55 °C (+131 °F)
537F-8 Antenna	
Weight	7.8 pounds (3.54 kg)
Physical dimensions	18 inches (45.72 cm) long
(Approximate overall space)	18 inches (45.72 cm) long 22 inches (55.88 cm) wide

Equipment Specifications (Sheet 3 of 4)

Figure 5-3

CHARACTERISTIC	SPECIFICATION
537F-8 Antenna	
Radiation pattern	
3-db response points	
E plane (horizontal)	4.9 degrees maximum
H plane (vertical)	4.9 degrees maximum
Side lobes	At least 17 db down from main lobe
Antenna gain	30. 0 db
All other specifications listed for the 537F-7 Antenna are applicable for the 537F-8 Antenna	

Equipment Specifications (Sheet 4 of 4)

Figure 5-3

5-4. EQUIPMENT DESCRIPTION.

A. General.

This section presents a mechanical and electrical description of the 537F-7 and 537F-8 Antennas.

B. Mechanical Description.

The 537F-7 and 537F-8 Antennas differ only in the diameter of the reflector and the length of the waveguide feeds. The 537F-7 Antenna has a 12-inch reflector and the 537F-8 Antenna has an 18-inch reflector. The 537F-8 Antenna includes a mount to space the antenna from the bulkhead to allow full scan by 'the larger reflector.

C. Electrical Description.

The 537F-7 and 537F-8 Antennas are used with the WP-103 Weather Radar System. The antenna radiates rf energy pulses originating in the 374A-3 Receiver-Transmitter and receives the signals reflected from targets. The radiation pattern is a pencil beam, specifically suited for detection and observation of weather by radar. The antenna has a scan capability of 60 degrees either side of dead-ahead (0 degree) and a scan rate of approximately 60 scans per minute.

A stabilization system maintains a constant elevation position of the antenna by compensating for pitch and roll of the aircraft. An elevation command signal, derived from the roll and pitch outputs of the aircraft gyro, is compared with the elevation signal. The elevation signal is developed by the tilt synchro transmitter in the antenna and by the control transformer in the 561G-4 Cockpit Control. Any difference between the two signals is amplified and applied to the antenna tilt motor which controls the elevation angle of the reflector. The manual tilt control on the cockpit control unit permits a variation in the antenna tilt of from 15 degrees above to 15 degrees below horizontal.

5-5. THEORY OF OF OPERATION.

A. Basic Theory of Operation.

The 537F-7 and the 537F-8 Antennas radiate rf energy pulses from the 374A-3 Receiver-Transmitter and receive reflected signals from targets. The antennas consist of a waveguide assembly for transmitting and receiving rf energy; an azimuth drive motor for horizontal scanning; a sweep resolver to provide azimuth position for the indicator sweep circuits; a tilt motor generator to change the antenna elevation; and a pitch and roll resolver and tilt synchro to compensate for aircraft pitch and roll and manual elevation control. The 537F-7 and the 537F-8 Antennas function identically and any further reference to "antenna" applies to either unit as applicable to the particular system configuration.

B. Detailed Theory of Operation. (Refer to figure FO-17)

Azimuth motor B5 drives the antenna in the azimuth plane, 60 degrees either side of dead-ahead, through reduction gears and a scanning mechanism at a rate of 60-scan cycles per minute. The drive motor is powered by 115-volt, 400-Hz generator A primary power that is applied to the antenna through J1-L and -K. Power is applied to the motor from the terminals of SCAN-OFF switch S1. Capacitor C4 shifts the phase of the control voltage by the required 90 degrees for the control phase winding of the motor. Resistor R8, across the control phase winding, reduces circuit Q and permits the control phase to operate from the 115-volt source.

Sweep resolver B4 is geared to the azimuth motor of the antenna and follows the antenna scan to produce antenna azimuth information for the sweep circuits in the synchronizer. A 400-Hz sweep excitation signal from the synchronizer is applied through J1-X and -E to the rotor windings of the sweep resolver. Capacitors C3 and C5 form a tuned circuit with the rotor windings. The value of C5 is selected to obtain accurate tuning. The two stator windings are physically spaced 90 degrees apart. The voltages induced are coupled through amplititude adjusting resistor R6 and R9 and form the X and Y sweep signals that are applied to the sweep circuits in the synchronizer.

Pitch-roll resolver B3 produces a pitch and roll error voltage necessary to establish a constant antenna angle with respect to the horizon. The two stator and the two rotor windings are physically spaced 90 degrees apart. The resolver acts like a variable transformer with two primary windings. Each rotor winding is capable of maximum coupling with one of the stators for each 90 degrees of rotation. Pitch and roll data from the isolation amplifier module in the synchronizer is applied through pins J1-U and -C (pitch) and J1-V and -C (roll) to the stator windings. The voltage induced in the rotor windings is the vector sum of the roll and pitch error voltages and represents antenna angle correction. PITCH TRIM potentiometer R7, in series with the pitch winding input, provides a trim signal to level the antenna when the antenna mounting surface is not exactly vertical. The voltage for R7 is provided by transformer T2. Inductor L1, in series with the primary of T2, shifts the phase of the trim voltage to compensate for the phase lag in the resolver winding.

Tilt motor-generator B2 is geared to the tilt axis of the antenna, through reduction gears, to drive the antenna reflector to any desired tilt angle between 15 degrees above and 15 degrees below the horizontal axis. Control voltage from the elevation servo amplifier module in the synchronizer is applied through J1-F, -G, and -H to the control phase winding. The control voltage determines the speed and direction of the tilt drive. Capacitor C1, across the control phase, tunes the winding for a unity power factor. Capacitor C2 and resistor R2, in series with the rate generator winding, shift the rate generator output phase to zero reference phase. The output voltage is applied across RATE potentiometer R4 through J1-h and -j to the elevation servo-amplifier module in the synchronizer.

The rotor of tilt synchro transmitter B1 is geared to the tilt axis of the antenna with a gear ratio of 2:1. The rotor acts as the primary winding of a transformer and is energized with a 17-volt, 400-Hz reference voltage from T1. The 17-volt level is established by potentiometer R1. The primary of T1 is connected to the autopilot phase (generator A) through J1-L and -K. The voltage induced in each of the three stator secondary windings varies with the tilt angle of the antenna and provides the reference voltage for the three stator windings of the manual elevation control synchro in the cockpit control unit.

SCAN-OFF switch S1 permits the azimuth scan to be disabled during maintenance checks on the antenna by removing power from azimuth motor B5. The MANUAL SWEEP ADJ control permits positioning of the antenna when SCAN-OFF switch is OFF.

Limit switch S2 provides blanking of the indicator for approximately 1 to 1.5 degrees at either end of the azimuth scan. This blanking prevents a bright straight line from appearing at both ends of the sweep scan when the 493A-3 Indicator is used.

The rf antenna waveguide section consists of an input section, a rotary coupler, a coaxial line section, and a twist and taper section. Rf energy is radiated out the end of the twist and taper section to a dipole and parasitic reflector where it is reflected back to the parabolic dish.

Section II. DISASSEMBLY

5-6. GENERAL.

This section presents instructions for disassembling the 537F-7 and 537F-8 Antennas. Instructions are arranged so that disassembly of each major part is an individual operation. When it is necessary to disassemble the units, locate the part in the table of contents and begin on the page indicated. Reference is made to previous disassembly steps that must be performed before a part may be removed or disassembled. The disassembly procedure should be continued only as far as necessary to replace the faulty component. The instructions include special techniques, cautions, warnings, and unique procedures.

5-7. PRECAUTIONS AND GENERAL TECHNIQUES.

Mark, tag, or otherwise identify all disconnected electrical wiring. Note the color coding, placement of leads, and method of applying insulation before unsoldering or removing any electrical components. These procedures supply sufficient information to completely remove the parts listed in the table of contents. In many cases, however, parts may be released and moved aside to gain access to other parts without unsoldering the connecting leads.

CAUTION: DO NOT ATTEMPT ANY DISASSEMBLY WHILE PRIMAIRY POWER IS APPLIED TO THE UNIT.

5-8.

DISASSEMBLY PROCEDURE.

A. Remove Antenna Dish.

(1) First remove grounding strap from antenna dish (6A, figure 5-4).

(2) Remove two dowel pins (9) in each end of linkage beam (169) by loosening setscrews (8) in the associated spacer clamps (168).

(3) Remove two dowel pins (26, figure 5-5) located in gimbal (38) by removing setscrews (25).

(4) Remove elevation indicator (5) from the mounting support of the antenna dish by removing two machine screws (6) and two lockwashers (7).

(5) Remove the antenna dish (29) from the gimbal assembly (36).

(6) Nylon bushings (28) in the mounting support may be removed if necessary.

B. Remove and Disassemble Azimuth Gear Train Assembly. (Refer to figure 5-6)

(1) Remove synchro resolvers (15, 16) from outer cover plate (52by loosening machine screw (12) and then rotating two half-moon synchro clamps (19) one half turn for each resolver. Remove the resolvers from the gear train assembly.

(2) Remove nylon cable clamp (62, figure 5-4) from cover plate (52, figure 5-6) by removing hexnut (63, figure 5-4) and flat washer (65) from threaded stud (66).

(3) Remove nylon cable clamp (59) by removing machine screw (60, and two flat washers (61) securing it to hex post (24, figure 5-6)

(4) Disconnect and tag the wires attached to solder lugs (70, figure 5-4) from microswitch (1, figure 5-6) by loosening two machine screws on the side of the switch.

(5) Disconnect and tag three wires from induction motor (22) by removing the appropriate solder lugs and machine screws from the rear of the motor.

(6) Remove two panhead machine screws (87, figure 5-4) two flat washers, and two lockwashers from the top of cover plate (52).

(7) Remove two hexnuts (63, 56,) and two flat washers (65, 54,) from threaded studs (66, 86,).

(8) Loosen two setscrews (83) in the collar of gimbal (36, figure 5-5).

(9) Remove azimuth gear train assembly (45, figure 5-6)from frame (199, figure 5-4) by carefully pulling the assembly over two threaded studs (66, 86),

NOTE: The gear train assembly may now be placed on the bench for remaining disassembly procedures (figure 5-6).

(10) Remove microswitch (1) from gear train assembly (45) by removing machine screw (2), flat washer (4), split lockwasher (3), nuts (2A, 4A), and solder lug (3A) on the side of the switch.

(11) Remove sweep adjustment knob (6) and cam (7) from the shaft of gear F (47) by loosening setscrew (8) in the knob and setscrew (8) in the cam.

(12) Remove four flathead machine screws (53) from outer cover plate (52).

(13) Lift outer cover plate (52) from gearbox casting (67) over the shaft of gear F (47).

(14) Remove induction motor (22) from cover plate (52) by removing four machine screws (23) on the opposite side of the cover plate.

NOTE: If necessary, three ball bearings (9, 57) may be removed from the outer cover plate by applying moderate pressure to the outer race.

(15) Remove gear A (59) and then gear C (65) from the gearbox casting (67) by gently pulling them free of the ball bearings (57).

(16) Remove resolver gear (55) by loosening setscrews (56) and then pulling the gear off the shaft of crank (39).

(17) Remove inner cover plate (26) by removing four machine screws (27).

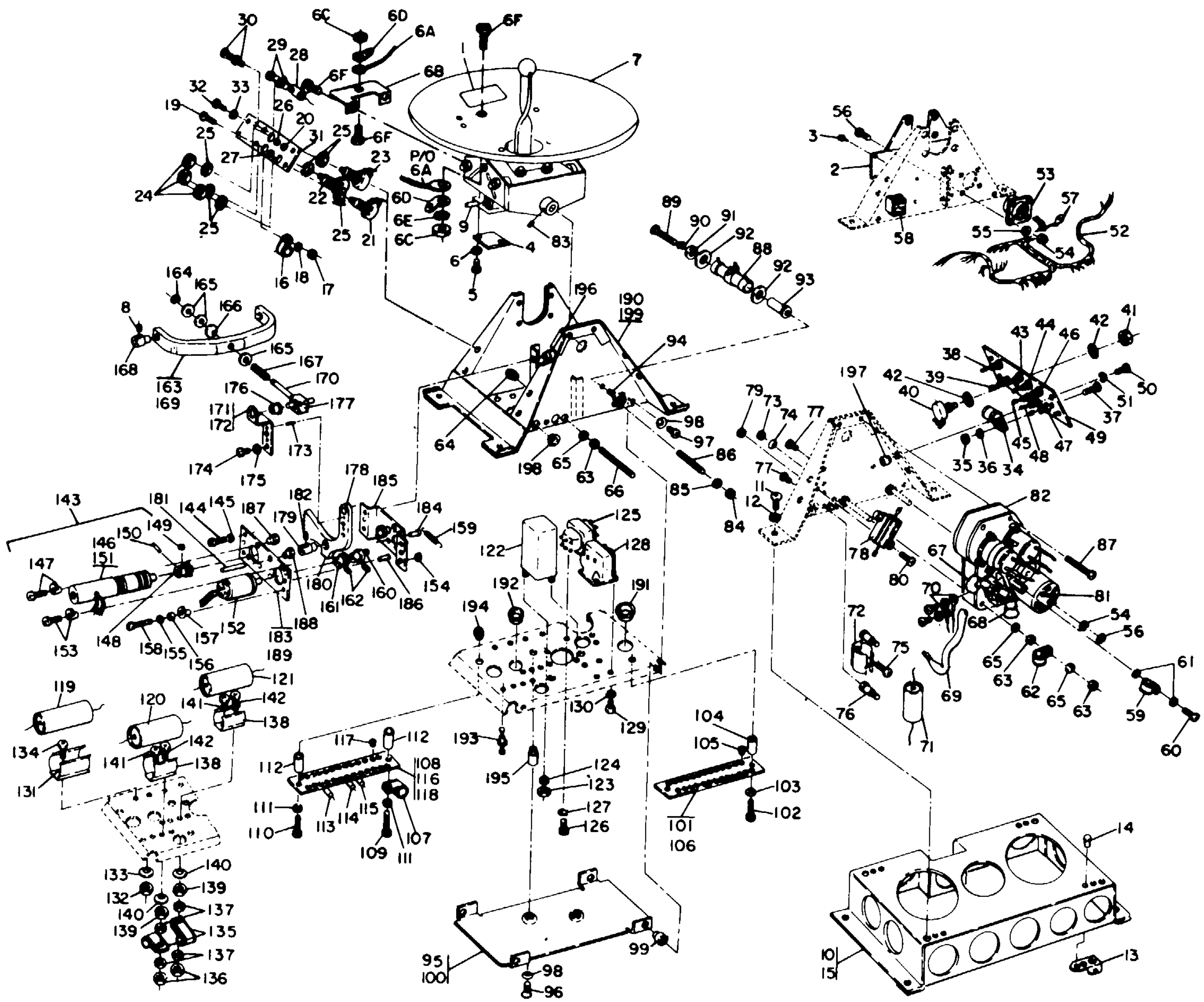
NOTE: If necessary, three ball bearings (31, 43, 65) may be removed from inner cover plate (26) by applying moderate pressure to the race.

(18) Lift linkage (30) from cranks (35, 41) and gear F (47).

(19) Pull crank no. 1 (35) and crank no. 2 (41) free of two ball bearings (38, 51) in the gearbox casting.

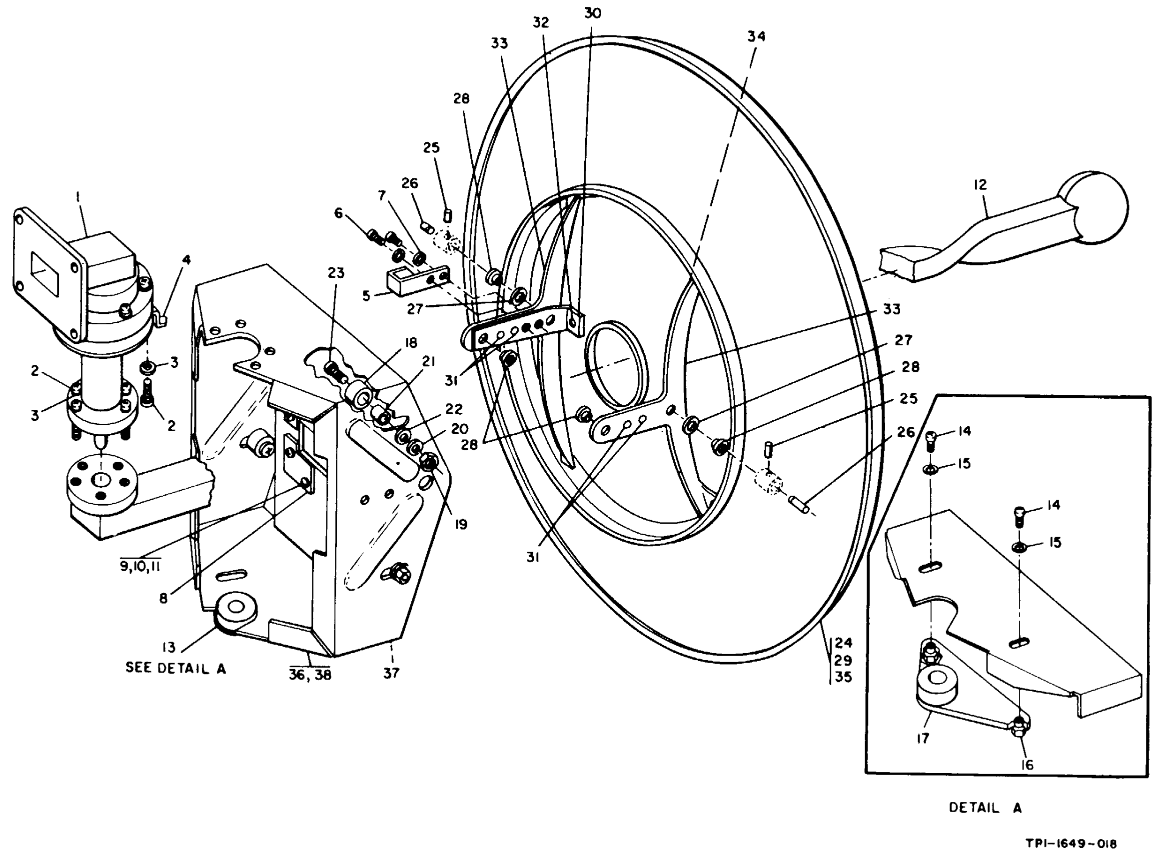
(20) Pull gear F (47) free of ball bearing (50) in the gearbox casting.

NOTE: If necessary, four ball bearings (38, 50, 51, 66) in the gearbox casting may be removed by applying moderate pressure to the outer race.



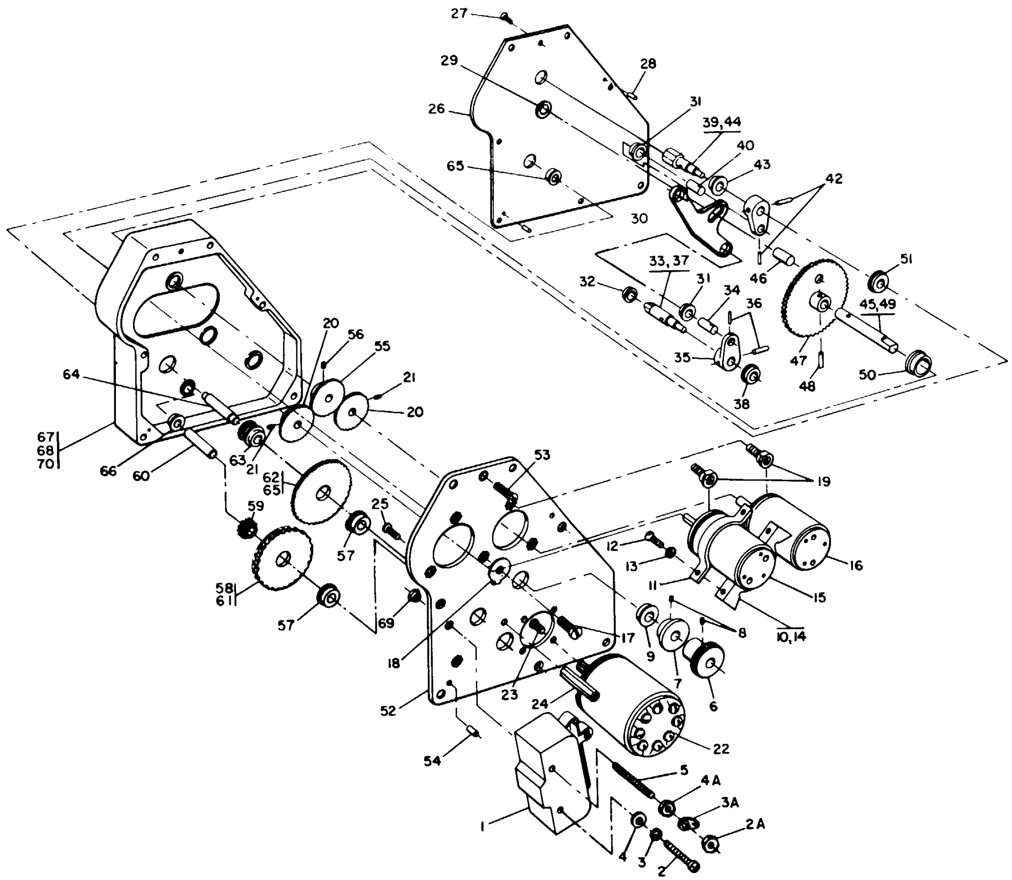
537F-7 and 537F-8 Antennas, Exploded View

Figure 5-4



Antenna Gimbal Assembly, Exploded View

Figure 5-5



Antenna Azimuth Gearbox Assembly, Exploded View

Figure 5-6

C. Remove and Disassemble Gimbal and Waveguide Assembly. (Refer to figure 5-5)

(1) Remove antenna dish (29) in accordance with paragraph A above.

(2) Release the azimuth gear train assembly in accordance with paragraphs B(2) and B(6) through B(8) above.

(3) Pull the azimuth gear train assembly away from frame (199, figure 5-4) until it is free of gimbal collar.

(4) Remove four capscrews (2) and four flat washers (3) securing rotary joint wave-guide (1, 2) and azimuth indicator frame (4) to frame (199, figure 5-4).

CAUTION: ENSURE THAT NO COMPONENTS ARE ALLOWED TO FALL WHEN THESE FOUR SCREWS ARE REMOVED.

(5) Remove the gimbal and waveguide assembly from the frame.

(6) Loosen eight machine screws (11) supporting four nylon feed. clamps (8) in gimbal (38).

(7) Remove four socket-head capscrews (2) and four split lockwashers (3) mounting gimbal (38) to the coaxial line section of rotary joint waveguide (1, 3).

(8) Remove antenna feed waveguide (12) from the gimbal assembly.

(9) Remove five socket-head capscrews (2) and five split lockwashers (3) securing antenna feed waveguide (12) to the coaxial line section of the waveguide.

(10) Gently pull the two outer sections of rotary joint waveguide (1) and azimuth indicator (4) free of the joint on the coaxial line section of the waveguide.

(11) If replacement is necessary, four rubber shockmounts (18) may be disassembled from the gimbal by removing four hexnuts (19), four split lockwashers (20), and eight flat washers (22).

D. Remove and Disassemble Elevation Gear Train Assembly. (Refer to figure 5-4)

(1) Remove right frame panel (31) from frame (199) by removing four machine screws (32) and four dished washers (33) at the ends of the panel.

NOTE: Removal of components from this panel is not required.

(2) Remove motor generator (146) from front gear-housing plate (189) by loosening the three machine screws and rotating three synchro clamps (147) one-half turn.

(3) Remove tension spring (159) from the supports on spring wheel (160) and on rear gear-housing cover (185).

(4) Remove synchro transmitter (152) from front gear-housing plate (189) by loosening three machine screws (158) and rotating two synchro clamps one-half turn.

(5) Remove toggle switch (58) from frame (199).

(6) Remove three machine screws (144) and three dished washers (145) from the end of front gear-housing plate (189).

(7) Remove machine screw (158), synchro clamp (157), flat washer (156), and lock-washer (155) from mounting hole at lower right corner of front gear-housing plate (189).

(8) Carefully remove the elevation gear train assembly.

(9) Remove rear gear-housing cover (185) from front gear-housing plate (189) by sliding bearing (188) in the cover over pin (181) in elevation segment (180).

(10) Loosen the setscrew (182) and slide elevation segment (180) off pin (181).

(11) Remove spring wheel (160) and elevation synchro gear (161) on the shaft of synchro transmitter (152) by loosening setscrews (162) in the side of the wheel and the gear.

NOTE: If necessary, the two bearings (187, 188) in the two gear-housing plates may be removed by applying moderate pressure to the bearings.

Section III. CLEANING

5-9.

GENERAL.

This section presents instructions for cleaning the dismantled and disassembled, components, parts, and subassemblies of the 537F-7 and 537F-8 Antennas.

WARNING: **PERFORM OPERATIONS INVOLVING CLEANING SOLVENT UNDER A VENTILATED HOOD PROVIDED WITH EXPLOSION-PROOF ELECTRICAL EQUIPMENT AND AN EXHAUST FAN HAVING SPARK-PROOF BLADES. AVOID BREATHING SOLVENT VAPOR AND FUMES. WEAR A SUITABLE MASK WHEN NECESSARY. AVOID CONTINUOUS CONTACT WITH THE SOLVENT. USE GOGGLES, GLOVES, AND AN APRON TO PREVENT IRRITATION FROM PROLONGED CONTACT. CHANGE CLOTHING THAT HAS BECOME SATURATED WITH SOLVENT.**

References to "air jet" in this section indicate a hand-operated air nozzle supplied with clean, dry, compressed air at a maximum pressure of 28 pounds per square inch.

WARNING: **WEAR GOGGLES WHEN USING THE AIR JET TO BLOW DIRT AND DUST FROM EQUIPMENT PARTS. WARN OTHER PERSONS AWAY FROM HAZARDOUS AREA OR WORKING ENCLOSURE.**

5-10.

CLEANING PROCEDURE.

The following paragraphs present instructions and procedures for cleaning the various parts of the dismantled and disassembled equipment preparatory to performing inspection procedures. For convenience, components, parts, and subassemblies are alphabetically listed and cross referenced to the appropriate paragraphs containing the cleaning instructions. Refer to figure 5-7.

A. Bearings.

(1) Clean dust and dirt from ball bearing assemblies with an air jet.

CAUTION: **DO NOT CLEAN BALL BEARING ASSEMBLIES WITH SOLVENT.**

(2) Clean sleeve bearings with solvent and dry with a clean, dry, lintless cloth.

B. Connectors.

(1) Wipe dust and dirt from bodies, shells, and cable clamps using a solvent-moistened, lintless cloth. Wipe dry with a clean, dry, lintless cloth.

(2) Remove dust from inserts using a small soft-bristled brush and an air jet.

(3) Wash dirt and any traces of lubricant from inserts, insulation, and contacts using solvent applied sparingly with a small, camel-hair brush.

ITEM	REFER TO PARAGRAPH
Bearings	5-10A
Connectors	5-10B
Covered cables	5-10C
Covers and shields	5-10D
Insulators: Ceramic, Mycalex, and plastic	5-10E
Jacks	5-10F
Knobs and panels	5-10G
Machined metal parts	5-10H
Mechanical metal parts	5-10I
Nylon, epoxy, and plastic parts	5-10J
Switches	5-10K
Transformers and inductors	5-10L
Waveguide assemblies	5-10M
Wired chassis	5-10N

Index of Cleaning Procedures

Figure 5-7

CAUTION: DO NOT ALLOW SOLVENT TO RUN INTO SLEEVES OR CONDUIT COVERING ANY WIRES OR CABLES CONNECTED TO CONTACT TERMINALS OF THE INSERT.

(4) Dry the insert with an air jet.

C. Covered Cables.

(1) Clean outer surfaces by wiping away dirt with a solvent-moistened, lintless cloth.

(2) Wipe dry using a clean, dry, lintless cloth.

(3) Treat any connector terminations in accordance with paragraph B. above. Wipe lug terminations clean with a solvent-moistened, lintless cloth and dry with a clean, dry, lintless cloth.

D. Covers and Shields.

Clean all unfinished, finished, and partly finished sheet-metal covers, such as dust covers, inspection covers, and housings as follows:

(1) Remove the bulk of surface dirt with rags.

(2) Blow dust from surfaces, holes, and recesses using an air jet.

(3) Immerse cover or shield in a washing bath of solvent and scrub until clean, working over all surfaces and into all holes and recesses with a suitable nonmetallic brush. Flat, wood-backed brushes with soft fiber bristles are recommended for surfaces; round brushes, similar to those used for washing bottles and test tubes, are recommended for holes and recesses.

(4) Raise the cover or shield from the bath and permit solvent to drain into the bath.

(5) Immerse the cover cr shield in rinsing bath of clean solvent, rinse, and raise from bath. Position the cover or shield to drain dry so that solvent is not trapped in holes or recesses. When practical positioning will not permit complete draining, use an air jet to blow out any trapped solvent.

CAUTION: WEAR PROTECTIVE CLOTHING WHEN USING THE AIR JET TO REMOVE EXCESS SOLVENT.

(6) When thoroughly dry, touch up any minor damage to the finish.

(7) Protect from dust and moisture pending inspection.

E. Insulators: Ceramic, Mycalex, and Plastic.

Clean all glazed porcelain insulators, ceramic insulators, Mycalex insulators, and plastic standoff insulators as follows:

(1) Wipe clean with a solvent-moistened, clean, lintless cloth.

(2) Wipe dry and polish using a clean, dry, lintless cloth.

F. Jacks.

(1) Remove dust from exteriors with a camel-hair brush and an air jet.

(2) Blow dust from interior of female contacts with an air jet.

G. Knobs and Panels.

Clean knobs and panels by gently wiping the surfaces with a clean, soft, lintless cloth. When clean, polish with tissue paper.

H. Machined Metal Parts.

Detached shafts, keys, pins, collars, gears, metal bushings, and similar machined parts (except rf fittings) should be cleaned in a suitable cleaning machine if available. If a cleaning machine is not available, proceed as follows:

(1) Clean machined metal parts in accordance with paragraphs D(1) and D(3) through D(5) above.

NOTE: Do not touch any cleaned machined or unfinished parts with bare hands.

(2) Dry in a dust-free, dry area, or suitable enclosure. Radiant heat used in a ventilated enclosure is recommended for drying, particularly where atmospheric humidity is high.

(3) After the drying process is completed, apply a light coat of lubricating oil (MIL-L-6085) to any bare steel surfaces with the exception of gears and other moving parts which should be greased in accordance with the applicable paragraphs contained in the assembly section of this manual.

I. Mechanical Metal Parts.

The detached mounting plates, mounting clamps and brackets, nuts, bolts, screws, washers, fasteners, and other hardware should be cleaned in a suitable cleaning machine or in accordance with paragraph D above.

J. Nylon, Epoxy, and Plastic Parts.

The following procedure does not apply to rf fittings.

(1) Prepare a cleaning solution of two ounces of detergent powder in one gallon of water.

(2) Scrub all parts with a suitable, soft-bristled brush.

(3) Rinse the parts thoroughly in clean water.

(4) Dry parts with a clean, dry, lintless cloth.

K. Switches.

Clean encapsulated switches as follows:

(1) Wipe dust, dirt, and any traces of lubricant from external surfaces with a clean, solvent-moistened, lintless cloth.

(2) Dry with a clean, dry, lintless cloth.

L. Transformers and Inductors.

(1) Wipe dust and dirt from transformers and inductors with a clean, lintless cloth, slightly moistened with solvent.

(2) Dry with a clean, dry, lintless cloth.

M. Waveguide Assemblies.

(1) Clean the exterior surfaces of waveguide assemblies with a clean, dry, lintless cloth or a soft-bristled brush.

(2) Clean the interior surfaces of waveguide assemblies with a clean, dry, lintless cloth or an air jet.

CAUTION: DO NOT USE SOLVENT OF ANY KIND ON THE INTERIOR SURFACES OF WAVEGUIDE ASSEMBLIES.

N. Wired Chassis.

The following procedures should be used for chassis containing resistors, capacitors, switches, inductors, transformers, and other wired parts:

(1) Remove dust and dirt from all surfaces, including parts and wiring, using a soft-bristled brush and an air jet.

CAUTION: AVOID A DIRECT CONCENTRATION OF AIR ON DELICATE PARTS. USE CAUTION WHEN BRUSHING DELICATE PARTS.

NOTE: When necessary to disturb the position and dress of wiring and cables, ensure that they are properly restored after cleaning is completed.

(2) With a minimum disturbance of wiring, clean connectors in accordance with paragraph B above.

(3) Clean insulators in accordance with paragraph E above.

(4) Clean jacks in accordance with paragraph F above.

(5) Clean switches in accordance with paragraph K above.

(6) Clean transformers and inductors in accordance with paragraph L above.

(7) Complete chassis cleaning by wiping all finished surfaces with a solvent-moistened, lintless cloth.

(8) Dry and polish these surfaces using a clean, dry, lintless cloth.

(9) Protect from dust and moisture pending inspection.

Section IV. INSPECTION/CHECK

5-11.

GENERAL.

This section presents instructions and procedures to assist in determining, by inspection, the condition of the dismantled, disassembled, and cleaned components, parts, and assemblies of the 5371F-7 and 537F-8 Antennas. Detailed inspection procedures are alphabetically arranged. Refer to the repair section of this manual for replacement or repair of defective components.

5-12.

INSPECTION PROCEDURES.

Figure 5-8 lists the mechanical and electrical parts to be inspected and contains cross-references to applicable paragraphs containing inspection routines.

ITEM	REFER TO PARAGRAPH
Bearings	5-12A
Capacitors	5-12B
Chassis	5-12C
Connectors	5-12D
Covers and shields	5-12E
Gears	5-12F
Insulators: Ceramic, Mycalex, and plastic	5-12G
Jacks	5-12H
Knobs and panels	5-12I
Machined metal parts	5-12J
Mechanical metal parts	5-12K
Nylon, epoxy, and plastic parts	5-12L

Index of Inspection Procedures (Sheet 1 of 2)

Figure 5-8

ITEM	REFER TO PARAGRAPH
Resistors	5-12M
Switches	5-12N
Synchros and motors	5-12O
Transformers and inductors	5-12P
Waveguide assemblies	5-12Q
Wiring	5-12R

Index of Inspection Procedures (Sheet 2 of 2)

Figure 5-8

A. Bearings.

Inspect bearings for breaks, cracks. dents, scoring, and signs of overheating or excessive wear. Inspect bearing mounts or mounting shafts for similar physical damage or defects.

B. Capacitors.

Inspect capacitors for the defects listed in figure 5-9.

DEFECT	METAL TYPE	MOLDED TYPE	CERAMIC TYPE
Leakage (at case seams or around terminal insulation)	X		
Cracked, broken, or charred terminal insulation	X		
Case damage (dents or holes)	X		
Case damage (cracks or breakage)		X	
Loose, broken. or corroded terminal studs, lugs, or leads	X	X	X
Loose, broken, or poorly soldered connections	X	X	X

Fixed Capacitor Inspection

Figure 5-9

C. Chassis.

Inspect chassis for deformation, dents, punctures, badly worn surfaces, damaged connectors and fastening devices. Examine the chassis for corrosion and damage that may require refinishing.

D. Connectors.

Inspect connector bodies for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed, or out of alignment. Check for corroded or damaged plating on contacts and for loose, poorly soldered, broken, or corroded terminal connections.

E. Covers and Shields.

Inspect covers and shields for punctures, deep dents, and badly worn surfaces. Check for damaged fastening devices, corrosion, and other damage that may require refinishing.

F. Gears.

Inspect all gears for broken, chipped, or badly worn teeth. The presence of a sharp burr on one side of a gear at the edges of the teeth is an indication of excessive wear. Inspect gear bodies for cracks and deformation. Inspect the bore of gears for excessive wear.

G. Insulators: Ceramic, Mycalex, and Plastic.

Inspect ceramic, Mycalex, and plastic insulators for evidence of damage, such as broken or chipped edges, burned areas, or foreign matter.

H. Jacks.

Inspect all jacks for corrosion, loose or broken parts, cracked insulation, or other irregularities.

I. Knobs and Panels.

Inspect knobs and panels for physical damage and deformation, marred surfaces, and impairment of markings.

J. Machined Metal Parts.

Inspect machined metal parts for physical damage to surfaces, corners, and edges. Inspect closely all machined surfaces, holes, bores, counterbores, slots, grooves, shoulders, flanges, tapped holes, shafts, and all threaded members, both male and female, for damage of any sort including roughness of surface, corrosion, or foreign matter. Inspect plated or finished areas for damage requiring replating or refinishing beyond touchup repair.

K. Mechanical Metal Parts.

Inspect unmachined mechanical metal parts including mounting plates, chassis, mounting clamps, brackets, nuts, bolts, screws, washers, fasteners, and other hardware for damage or deformation. Inspect for corrosion and any damage that would require replating or refinishing beyond touchup repair.

L. Nylon, Epoxy, and Plastic Parts.

Inspect nylon, epoxy, and plastic parts, for chips, cracks, burns, breaks, or signs of excessive wear.

M. Resistors.

Inspect fixed composition resistors for cracked, broken, blistered, or charred bodies and for loose, broken, poorly soldered, or corroded terminal connections.

Inspect fixed wirewound resistors for signs of heating, cracked, broken, or charred insulation, loose, poorly soldered, broken, or corroded terminal connections, and loose mounting.

Inspect variable resistors for corrosion of shafts, cases, or other visible parts, loose mountings, and physical damage. Where possible, rotate the shaft to determine whether action is too rough, too loose, or too tight.

N. Switches.

Inspect encapsulated switches for chipped, cracked, broken, or burned bodies. Check for loose, broken, poorly soldered, or corroded terminal connections.

O. Synchros and Motors.

Inspect synchro and motor cases for chips, cracks, burns, or other physical damage. Check for bent, scored, cracked, or otherwise physically damaged shafts. Check for loose, broken, or corroded terminal connections.

P. Transformers and Inductors.

Inspect transformers and inductors for signs of excessive heating, physical damage to cases, cracked or broken insulation, and other irregularities. Inspect for corroded, poorly soldered, loose, bent, or broken terminal connections and for loose, broken, or missing mounting hardware.

Q. Waveguide Assemblies.

Inspect the external surfaces of waveguide assemblies and waveguides for cracks, dents, punctures or chips. Check for broken, cracked, chipped, or missing mounting hardware. Inspect internal surfaces for deformation of any kind and the presence of foreign matter. Check all surfaces for corrosion.

R. Wiring.

Inspect open and laced wiring of chassis, terminal boards, and parts by checking the insulation for physical damage and charring. Inspect wires for breakage and for improper dress in relation to adjacent wiring and chassis.

Section V. REPAIR

5-13.

GENERAL.

This section presents instructions and procedures for the replacement or repair of damaged or defective components of the 537F-7 and 537F-8 Antennas. Faulty components are usually detected through procedures in the inspection/check or testing sections of this manual. New parts should be inspected and/or tested before being installed. Most of the replacement or repair instructions apply to disassembled equipment. Refer to the disassembly section for proper instructions.

5-14.

REPAIR PROCEDURES.

Figure 5-10 lists an alphabetically arranged index of repair procedures. Each component, part, or assembly is cross referenced to the appropriate paragraph containing the correct repair procedure.

ITEM	REFER TO PARAGRAPH
Antenna dish	5-14A
Bearings	5-14B
Capacitors	5-14C
Connectors	5-14D
Covers and shields	5-14E
Finished surfaces	5-14F
Frames	5-14G
Gears	5-14H
Insulators: Ceramic, Mycalex, and plastic	5-14I
Jacks	5-14J
Knobs and panels	5-14K

Index of Repair Procedures (Sheet 1 of 2)

Figure 5-10

ITEM	REFER TO PARAGRAPH
Machined metal parts	5-14L
Mechanical metal parts	5-14M
Nylon, epoxy, and plastic parts	5-14N
Resistors	5-14O
Soldered terminal connections	5-14P
Switches	5-14Q
Synchros and motors	5-14R
Transformers and inductors	5-14S
Waveguide assemblies	5-14T
Wiring	5-14U

Index of Repair Procedures (Sheet 2 of 2)

Figure 5-10

A. Antenna Dish.

Minor dents and deformations of the parabolic dish can generally be repaired by gently bending the dish with the hands. If the antenna is severely damaged, it should be replaced or returned to the manufacturer for rework.

B. Bearings.

Defective ball bearings should be replaced. No repair is recommended for these components.

C. Capacitors.

If defective or if performance is questionable, capacitors should be replaced. Clean all connections and apply new solder.

D. Connectors.

Straighten bent pins and damaged shell area. Replace defective connectors, broken wires, or wires with split insulation. If a connector insert is broken, replace the connector.

E. Covers and Shields.

Replace damaged screws, straighten any dents or warped sections and retouch scratched or worn painted surfaces.

F. Finished Surfaces.

Touch up minor scratches in all painted surfaces with a high-quality, black enamel applied with a small brush. Refinish black wrinkle as required in accordance with MIL-E-5558A and MIL-P-6889G. Refinish black, lusterless surfaces as required in accordance with MIL-E-14072 (SIGC). Touch up unpainted aluminum with Alodine 1200 or suitable water-lacquer mixture, applied with a pipe cleaner or small brush.

CAUTION: THE AIRCRAFT RADOME MUST NOT BE PAINTED WITH A METALLIC BASE PAINT.

CAUTION: DO NOT TOUCH UP ANY AREA WHERE AN ELECTRICAL CONNECTION IS MADE.

G. Frames.

Straighten all misshapen areas. Remove all corrosion with a suitable cleaner. Retouch silk screening and refinish where needed.

H. Gears.

Replace gears that show signs of excessive wear, cracking, or other forms of deformation.

I. Insulators: Ceramic, Mycalex, and Plastic.

Replace any insulators which show signs of physical damage such as cracks, burns, chips, or any other type of damage or deterioration.

J. Jacks.

Replace cracked, broken, or severely misshapen jacks or jacks with bent or broken center conductors or insulation.

K. Knobs and Panels.

Replace cracked, chipped, broken, or otherwise damaged knobs. Retouch or refinish panels in accordance with paragraph F above.

L. Machined Metal Parts.

If satisfactory machine shop facilities for suitable repair of these surfaces are not available, the defective or damaged part should be replaced.

M. Mechanical Metal Parts.

Straighten bent or misshapen mounts, clamps, and mounting plates. Replace broken, bent, or cross-threaded bolts, screws, nuts, washers, and other hardware.

N. Nylon, Epoxy, and Plastic Parts.

Replace cracked, broken, chipped, burned, worn, or otherwise damaged nylon, epoxy, and plastic parts.

O. Resistors.

If defective or if performance is questionable, resistors should be replaced. Clean all connections thoroughly and apply new solder. Add a drop or two of contact cleaner (carbon tetrachloride) to the windings of variable resistors with rough or intermittent operation. Replace variable resistors if the shaft is loose in the case.

P. Soldered Terminal Connections.

Resolder cold-soldered or rosin joints. Remove all traces of corrosion.

Q. Switches.

Replace defective encapsulated switches. Repair of these parts is not recommended.

R. Synchros and Motors.

Replace defective or severely damaged synchros and motors.

S. Transformers and Inductors.

Replace all cracked, chipped, broken, or charred transformers and inductors. Replace all transformers and inductors if defective or suspected of questionable performance. Identify leads to facilitate rewiring. Clean all connections thoroughly and apply new solder.

T. Waveguide Assemblies.

Deformed and damaged waveguides and waveguide assemblies should be replaced and/or returned to the manufacturer for rework.

U. Wiring.

Replace damaged wiring with wire of the same size and color coding. Ensure that no bare wires are touching the chassis, other bare wires, or metal cases of other parts. If a wire is to be removed from a terminal or component, it should be marked with an identification tag to minimize incorrect connections. Clean all terminals and apply new solder.

NOTE: **When necessary to disturb the dress of wires and cables, carefully ensure that the original wire is restored.**

Section VI. ASSEMBLY

5-15. GENERAL.

This section presents instructions for assembling the 537F-7 and 537F-8 Antennas. Instructions are arranged so that assembly of each major part is an individual operation. When it is necessary to assemble the unit, locate the part in the table of contents and begin on the page indicated. Instructions include lubrication data, mechanical alignment procedures, special techniques, cautions, warnings, and unique procedures.

5-16. LUBRICATION DATA.

Figure 5-11 lists the items that can be lubricated prior to assembly and specifies the type of lubricant to be used. The lubricant listed for each item must be used; substitute lubricants are not recommended.

LUBRICANT	MANUFACTURER	APPLIED TO
MIL-G-15793 (Anderol L-793) or MIL-G-3278A	Lehigh Chemical Co. Chesterton, Maryland Shell Oil Co. New York City, New York	All gear teeth and internal moving parts in azimuth gear-train assembly.

Lubricants

Figure 5-11

A. Contamination and Compatibility.

Major contamination problems which arise between conventional lubricants and silicone lubricants or hydraulic fluids are a result of some additives used in conventional lubricants (oxidation inhibitors, corrosion inhibitors, etc.). Many of these additives are not soluble in silicone lubricants and will be precipitated as gummy or crystalline sludges when the fluids are mixed. When inadequate cleaning procedures lead to this type of contamination, high torques, sticking mechanisms, lubrication failure, and ultimate equipment failure may result. The importance of maintaining the correct lubricant in bearings or other areas cannot be over emphasized. Since failure can result from improper use of lubricants, it is imperative that the required lubricants be used in the proper areas and in the correct amounts.

5-17. PRECAUTIONS AND GENERAL TECHNIQUES.

Before soldering or replacing any lead or component, refer to the notes of color coding, placement of leads, and wire insulation made during disassembly. If there is any doubt as to the placement of such leads or components, refer to the appropriate diagram and perform continuity tests to ensure proper placement. Ensure, also, that proper dress or lacing of wires and cables is restored.

CAUTION: DO NOT ATTEMPT ANY ASSEMBLY WHILE PRIMARY POWER IS APPLIED TO THE UNIT.

5-18. ASSEMBLY PROCEDURE.

A. Assemble and Replace Elevation Gear Train Assembly. (Refer to figure 5-4)

NOTE: Before assembly, all gears and bearings should be cleaned with a good grade commercial solvent. Refer to the cleaning section of this manual.

(1) Replace two bearings (187, 188) in gear-housing plates (189, 185).

(2) Replace elevation synchro gear (161) and spring wheel (160) on the shaft of synchro transmitter (152) and tighten the setscrews (162) in the components.

(3) If linkage beam (169), elevation swivel (177), and associated hardware have been disassembled, reassemble these components.

(4) If pin (173) has been removed from elevation segment (178), replace the pin but do not tighten the setscrew.

(5) Mount synchro transmitter (152) on the front gear-housing plate (189), rotating two half-moon synchro clamps (157) by tightening two machine screws (158).

(6) Slide elevation segment (178) onto pin (173).

(7) Slide pin (181) into bearing (188) in the front gear-housing plate (189).

CAUTION: WHEN MESHING THE ELEVATION SEGMENT WITH THE SYNCHRO GEAR, THE ANGULAR LOCATION OF SPRING WHEEL (160) MUST CONFORM TO THE POSITION SHOWN IN FIGURE 5-12.

(8) Replace rear gear-housing plate (185) on the gear train assembly by sliding bearing in the rear cover over the end of pin (184).

(9) Replace spring (159) by attaching to spring wheel (160) and rear housing plate (185).

(10) Place gear train (143) in mounting position on frame (199).

(11) Secure the gear train assembly (143) to frame (199) by installing and tightening three machine screws (144) and three split lock-washers (145) in the mounting holes on the left and upper right ends of the assembly.

NOTE: An offset or thin-shafted screwdriver may be required to tighten machine screw (144) at the lower left corner of the assembly.

(12) Lock synchro transmitter (152) by rotating synchro clamps (157) one-half turn and tightening machine screws (158).

(13) Replace toggle switch (58) on frame (199).

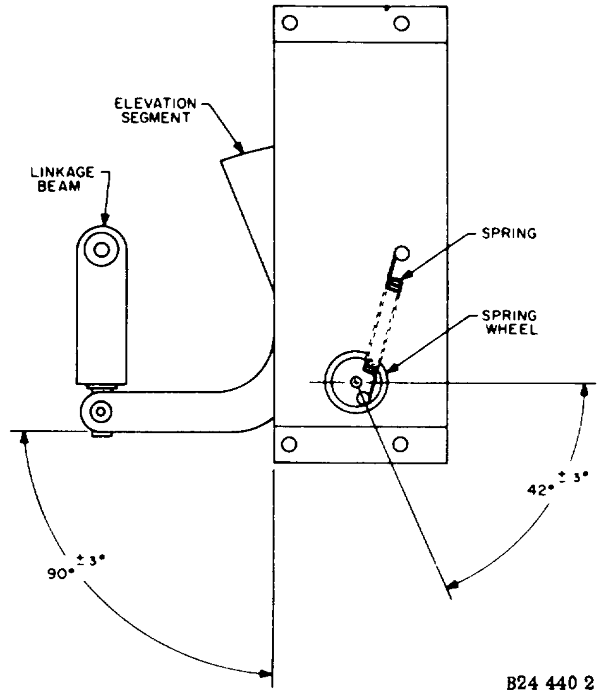
(14) Mount motor generator (146) on front gear-housing plate (189), rotating the three half-moon synchro clamps one-half turn and tightening three machine screws (147).

(15) Replace right frame panel (31) on frame (199) by inserting and tightening four machine screws (32) and four split lockwashers at the end of the panel.

B. Assemble and Replace Gimbal and Waveguide Assembly. (Refer to figure 5-5)

(1) Replace four rubber shock mounts (18) on the four corners of gimbal (36) and secure with eight flat washers (22), four split lockwashers (20), and four hexnuts (19).

(2) Clean the rotary joint sections of (1) but do not lubricate.



Angular Position of Spring Wheel waveguide

Figure 5-12

CAUTION: DO NOT USE SOLVENT FOR CLEANING. THE BALL BEARING OF THE JOINT IS A PRELUBRICATED, SEALED UNIT.

(3) Slip azimuth indicator (4) and retaining ring over coaxial line section (1).

(4) Align the four mounting holes in the end of gimbal (36) with the four holes in the coaxial line section of rotary joint waveguide (1).

(5) Secure the two components with four socket-head capscrews (2) and four split lockwashers (3).

(6) Insert antenna feed waveguide (12) through the slot in gimbal (36).

(7) Align the five mounting holes in the antenna feed waveguide with the five holes in the coaxial line section of waveguide. Secure the two components with five socket-head capscrews (2) and five split lockwashers (3).

(8) Tighten eight machine screws (11) supporting four nylon feed clamps (8) in gimbal (36).

(9) Place the outer section of the rotary joint waveguide on the ball bearing joint on the coaxial line section of the waveguide.

(10) Replace and tighten four capscrews (2) and four flat washers (3) securing the gimbal and waveguide assembly to frame (199, figure 5-4).

(11) Slide azimuth gear train assembly (82, figure 5-4) toward frame (199, figure 5-4) until crank No. 1 shaft (39, figure 5-6) fits into gimbal collar.

(12) Secure azimuth gear train assembly (82, figure 5-4) to frame (199, figure 5-4) in accordance with paragraphs C(20) through C(22) and C(27) below.

(13) Replace antenna dish (29, figure 5-5)in accordance with paragraph D below.

C. Assemble and Replace Azimuth Gear Train Assembly . (Refer to figure 5-6)

NOTE: Before assembly, all internal components should be cleaned with a good commercial solvent(refer to the cleaning section of this manual). A coating of aircraft grease, MIL-G-3278A, should be applied to all gear teeth and other internal moving parts (refer to figure 5-11).

(1) Replace four ball bearings (38, 50, 51, 66) in the proper sockets in gearbox casting (70).

(2) Replace three ball bearings (57, 9) in the proper sockets in outer cover plate (52).

(3) Push shaft (49) of gear F (47) through ball bearing (50) in gearbox casting (70) from the side shown in figure 103.

(4) Push crank no. 1 (41) into ball bearing (51) at the top of gearbox casting (70).

NOTE: Crank no. 1 is the crank with the two flat surfaces on the drive shaft for the gimbal collar.

(5) Push crank no. 2 (35) into ball bearing (38) at the lower left corner of gearbox casting (70).

(6) Replace two linkage bushings (32) on linkage (30).

(7) Replace linkage (30) over three shafts on crank no. 1 (41), crank no. 2 (35), and gear F (47).

NOTE: Ensure that linkage (30) is not installed backwards.

(8) Replace bushing (29) in the slot of linkage (30) over the shaft (46) of gear F (47).

(9) Replace bearing (65) in inner cover plate (26) and replace the cover plate on gearbox casting (70).

(10) Secure inner cover plate (26) with four flathead machine screws (27).

(11) Install resolver gear (20) on protuding shaft (39) of crank no. 1 (41) through the opposite side of gearbox casting (70). Tighten setscrew (21) in the gear against the shaft.

(12) Replace gear C (65) by gently pushing shaft (64) of the gear through ball bearing (65) in inner plate (26).

(13) Replace gear A (59) by pushing gearshaft (60) through ball bearing (66) in gearbox casting (70).

(14) Install induction motor (22) on outer cover plate (52) with four machine screws (23) from the opposite side of the cover plate.

(15) Replace outer cover plate (52) on gearbox casting (70) over the shaft of gear F (47). Secure the plate with four flathead machine screws(53).

NOTE: Ensure that the gears are meshed before applying force to the cover.

(16) Replace cam (7) and then sweep adjustment knob (6) on the shaft of gear F (47). Tighten setscrews (8) in each component.

(17) Install microswitch (1) broadside on outer cover plate (52 with machine screw (2), split lockwasher (3), flat washer (4), stud (5) nuts (69, 4A, and 2A), and solder lug (3A).

(18) Ensure that hexnuts (63, 64, figure 5-4)on threaded stud (66, figure 5-4) are secure.

(19) Carefully slide gear train assembly (82, figure 5-4) over threaded studs (66, 86, figure 5-4) toward frame (199, figure 5-4). Rotate the drive shaft of crank no. 1 (41) to the proper point so that shaft (39) will fit properly into the collar of gimbal (36, figure 5-5).

(20) Replace and secure two split lockwashers (65, 54, figure 5-4) and two plain hexnuts (63, 56, figure 5-4)onto two threaded studs (66, 86, figure 5-4) at the bottom of cover plate (52).

(21) Replace and secure two panhead machine screws (87, figure 5-4)and two flat washers securing gear train assembly (82, figure 5-4) to frame (199, figure 5-4).

(22) Tighten two setscrews (83, figure 5-4)in the gimbal collar against the drive shaft of crank no. 1 (41).

NOTE: The gimbal must be properly centered before tightening the setscrews.

(23) Connect three wires to induction motor (22).

NOTE: The red and white wire connects to terminal 1 on the motor. The green and white wire connects to terminal 2. The blue and white wire connects to terminal 3.

(24) Connect two wires to microswitch (1).

NOTE: The red, black, and white wire connects to the common (upper) terminal on the microswitch. The orange, black, and white wire connects to the normally open (lower) terminal on the switch.

(25) Fasten solder lugs (70, figure 5-4,) to the terminals on the left side of microswitch (1) with two machine screws and two washers.

(26) Fasten nylon cable clamp (59, figure 5-4) to the top of hex spacing post (24) with machine screw (60, figure 5-14) and two flat washers (61, figure 5-4).

(27) Fasten nylon cable clamp (62, figure 5-4) to threaded stud (66, figure 5-4)with hexnut (63, figure 5-4) and flat washer (65, figure 5-4).

(28) Install two synchro resolvers (15, 16) in the left and right mounting holes.

<u>NOTE:</u> The resolver with stop assembly clamp (10) is resolver (15).

<u>CAUTION:</u> ENSURE THAT THE GEARS ON SYNCHRO RESOLVERS (15, 16,) ARE PROPERLY MESHED WITH RESOLVER GEAR (14) BEFORE THE RESOLVERS ARE FASTENED.

(29) Fasten each resolver (15, 16) to cover plate (52), rotating three synchro clamps (19) and by tightening machine screws (12).

D. <u>Replace Antenna Dish</u>. (Refer to figure 5-5)

<u>NOTE:</u> Before assembly, bushings should be cleaned with a good commercial solvent (refer to the cleaning section). A thin coating of aircraft grease, MIL-G-3278A, should be applied to the four nylon bushings (28, figure 5-5) and the four dowel pins (26, figure 5-5; 9, figure 5-4) for the antenna dish mounting supports (refer to figure 5-11).

(1) Install elevation indicator (5) on mounting support (30) of the dish with two machine screws (6) and two lockwashers (7).

(2) Position antenna dish (29) onto gimbal (36).

(3) Insert two dish supports (33) and two flat washers (27) for two dowel pins (26) between the mounting supports of the gimbal.

(4) Insert each of two dowel pins (26) through the metal bushing of the gimbal support and the nylon bearing (28) for dish supports (33).

<u>NOTE:</u> Position the pins so that the outer ends protrude about 1/16 inch beyond the metal bushing.

(5) Tighten setscrew (25) in each dish support.

(6) Insert the two mounting supports on linkage beam (169, figure 5-4) for two dowel pins (93, figure 5-4 between two mounting supports (33) of the dish.

<u>NOTE:</u> Ensure that the linkage beam is not rotated so that setscrews (8, figure 5-4) are not accessible for tightening.

(7) Insert each of two dowel pins (9, figure 5-4) through nylon bearings (28) of the dish support and metal bushing (168, figure 5-4) of linkage beam (169, figure 5-4).

<u>NOTE:</u> Position the pins so that the outer ends protrude 1/16 inch beyond the nylon bushings.

(8) Tighten setscrews (8) in bushing (168, figure 5-4)

(9) Replace grounding strap (6A) on antenna dish.

5-19. FITS AND CLEARANCES

The 537 F-7 and 537 F-8 Antenna drive systems tend to correct for errors which may exist in the mechanical drive assembly. Stringent clearance requirements are not applicable. If the antenna drive system operates smoothly, the fit of the parts is acceptable. During disassembly, components should be inspected as outlined in the inspection/check section. Parts showing obvious signs of wear, deformation, or deterioration should be replaced or repaired.

Section VII. TESTING

5-20. GENERAL.

This section presents the method for bench testing the 537F-7 and 537F-8 Antennas. Complete tests should be performed after any repair to ensure that the malfunction has been corrected and that no other malfunctions exist.

The antenna test uses the 978G-1 Radar Test Set. When an antenna malfunction is indicated, portions of the antenna test relative to the malfunction should be performed and, if the antenna fails a test, refer to the troubleshooting section where test steps are referenced and possible causes of malfunctions are listed.

NOTE: The 776C-3 Synchronizer that is used for antenna testing must be set for 50 mv/ degree.

5-21. TEST EQUIPMENT REQUIRED.

Refer to figure 5-13 for equipment required for test.

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
Items 1 - 8 are required for testing with the 978G-1 Radar Test Set.		
1. Radar Test Set also contains: Cable assemblies as follows: CX-10242 CX-11555 CG-1464/U (6 ea) Adapters as follows: UG-273/U (3 ea) UG-201A/U (2 ea)	Collins 978G-1, part number 522-5731-015 (AN/APM-247)	
2. Antenna mounting fixture.	Collins part number 516-3081-001 (contained in 979A-2 Maintenance Kit) (MX-6640/APN-158)	
3. Test lead (2 ea)	Collins part number 516-3088-001 (contained in 979A-2 Maintenance Kit) (CX-10092/APN-158)	

Test Equipment Required (Sheet 1 of 2)

Figure 5-13

EQUIPMENT	MANUFACTURER AND TYPE OR PART NUMBER	MINIMUM SPECIFICATIONS
4. Combination square	Collins part number 516-3075-001 (contained in 979A-1 Radar Test Set) (MX-6613/APN-158)	
5. Synchronizer	Collins 776C-4, part number 777-1768-001; or 776C-4A, part number 777-1777-001	
6. Receiver-transmitter	Collins 374A-3A, part number 777-1922-001; or 374A-4, part number 777-1572-001.	
7. Oscilloscope	AN/USM-281A (or equiv)	Vertical deflection sensitivity: 20 mv/cm to 20 v/cm. Sweep range: 1 us./cm to 1 s/cm, calibrated. External trigger input level: 0.5 v to 10 v Input impedance: 1 megohm Bandwidth: dc to 1 kHz
8. Multimeter (vom)	Simpson 260 (AN/USM -210)	Sensitivity: 5000 ohms/vac Voltage range: 0 to 1000 vac Resistance range: 0 to 1000 ohms Accuracy: 3%

Test Equipment Required (Sheet 2 of 2)

Figure 5-13

5-22. TEST PROCEDURES USING THE 978G-1 (AN/APM-247) RADAR TEST SET.

A. Test Setup.

Equipment must be set up as shown in figure 5-14. Power required is 115 volts, 400 Hz.

NOTE: A known good 374A-3 Receiver-Transmitter and 776C-3 Synchronizer must be used with these tests.

NOTE: Figure 5-15 shows test points and adjustments for the antenna. Figure 5-16 is the antenna terminal board wiring diagram.

B. Preliminary Settings.

Before starting tests, perform the following steps:

(1) Set the 978G-1 controls as follows (figure 5-17:

(a) AC POWER switch to OFF

(b) METER MULTIPLIER switch to X10

(c) INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OFF

(d) INPUT VOLTAGE ADJUST control fully ccw.

(e) RECEIVER TRANSMITTER TESTS-TEST FUNCTION switch to OFF

(f) SYNCHRONIZER TESTS-TEST FUNCTION switch to OFF

(g) ANTENNA TESTS switch to OFF

(h) GYRO SIMULATOR switch to OFF

(i) CONTROL UNIT TEST-CONTROL UNIT SELECTOR switch to INT

(2) Connect power cable assembly to 978G-1 test set and to 115-volt 400-Hz source.

(3) Set the RF switch on the 374A-3 to OFF.

(4) Set AC POWER switch on 978G-1 test set to ON. The AC POWER lamp should light.

(5) Set the INPUT VOLTAGE ADJUST control for 115 ±1.0 volts as indicated on the INPUT VOLTAGE meter.

(6) The INPUT FREQUENCY meter should indicate from 395 to 405 Hz.

C. Antenna Rotation.

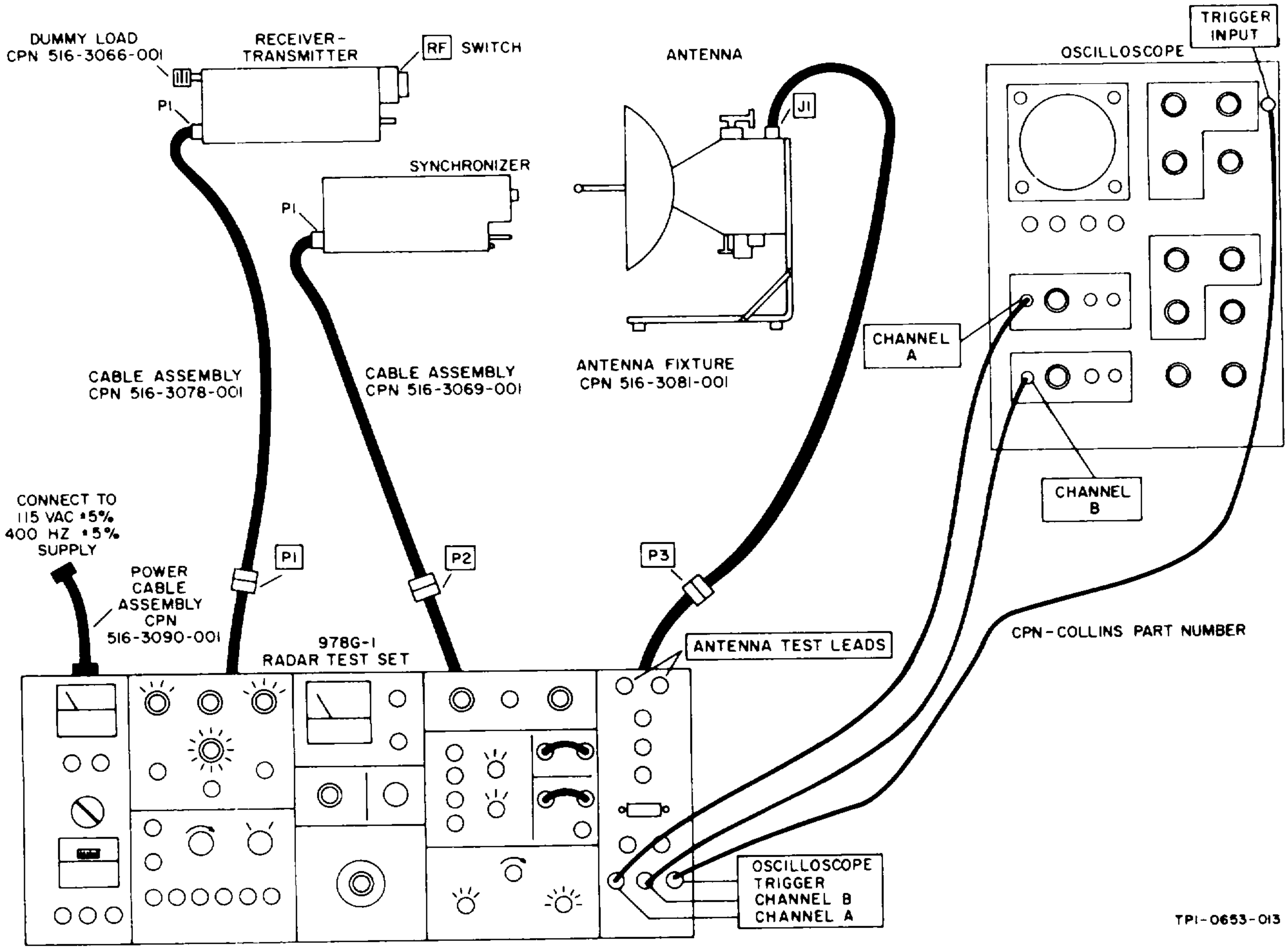
(1) Set the RF switch on the RT unit to OFF.

(2) Set the TEST SET FUNCTION SELECTOR switch to ANTENNA/INDICATOR/ CONTROL UNIT TESTS.

(3) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE.

(4) Set the SCAN switch on the antenna to ON. The antenna should scan at a rate of 30 ±3 cprn.

(5) Observe that the rotational movement of the manual scan adjust knob is counterclockwise when viewed from below.



Antenna Test Setup

Figure 5-14

(6) Observe that the azimuth movement of the antenna is not less than 58 degrees nor more than 61 degrees either side of dead ahead.

(7) Set the SCAN switch on the antenna to OFF. Manually position the antenna dish until it is parallel to the antenna housing mount. Verify that the antenna is centered in azimuth and elevation by measuring from the rim of the antenna dish to a flat surface in back of the antenna. Observe alignment of the azimuth and elevation pointers in reference to their respective zero scribe marks. If necessary, reposition the pointers.

D. Elevation Synchro.

(1) Set the ANTENNA TESTS switch to EL SYNC.

(2) Connect test leads from the ANTENNA TEST LEADS jacks to the TRIM SENS jacks (J3 and J4) on the antenna.

(3) Set input voltage to 115 volts ac by means of the INPUT VOLTAGE ADJUST control on the test set.

WARNING: EXERCISE CARE IN MAKING THE FOLLOWING ADJUSTMENT AS 115 VOLTS IS PRESENT ON THE RESISTOR. AN INSULATED SCREWDRIVER SHOULD BE USED TO PREVENT ACCIDENTAL SHORTING OUT OF THE 115 VOLTS.

(4) Set METER MULTIPLIER switch to X1. The TEST METER should indicate 17 ±0.5 volts. If necessary, adjust potentiometer R1 on the antenna.

(5) Disconnect the test leads from ANTENNA TEST LEAD jacks and the TRIM SENS jacks (J3 and J4).

(6) Ensure that the GYRO SIMULATOR switch is in the OFF position.

(7) Set the INTERNAL CONTROL UNIT-ELEVATION control to 0 (zero). Observe that the elevation indicator at the side and to the rear of the antenna dish is in alignment with the center scribe mark on the gimbal. If necessary, loosen the locking screws and position the tilt synchro (B1) in the antenna for proper alignment of the marks. Retighten the locking screws, being careful not to disturb the setting.

(8) Set the INTERNAL CONTROL UNIT-ELEVATION control to 10 degrees UP. Observe that the antenna dish moves up.

E. Pitch and Roll Resolver Alignment.

(1) Set the ANTENNA TESTS switch to TRIM ADJ.

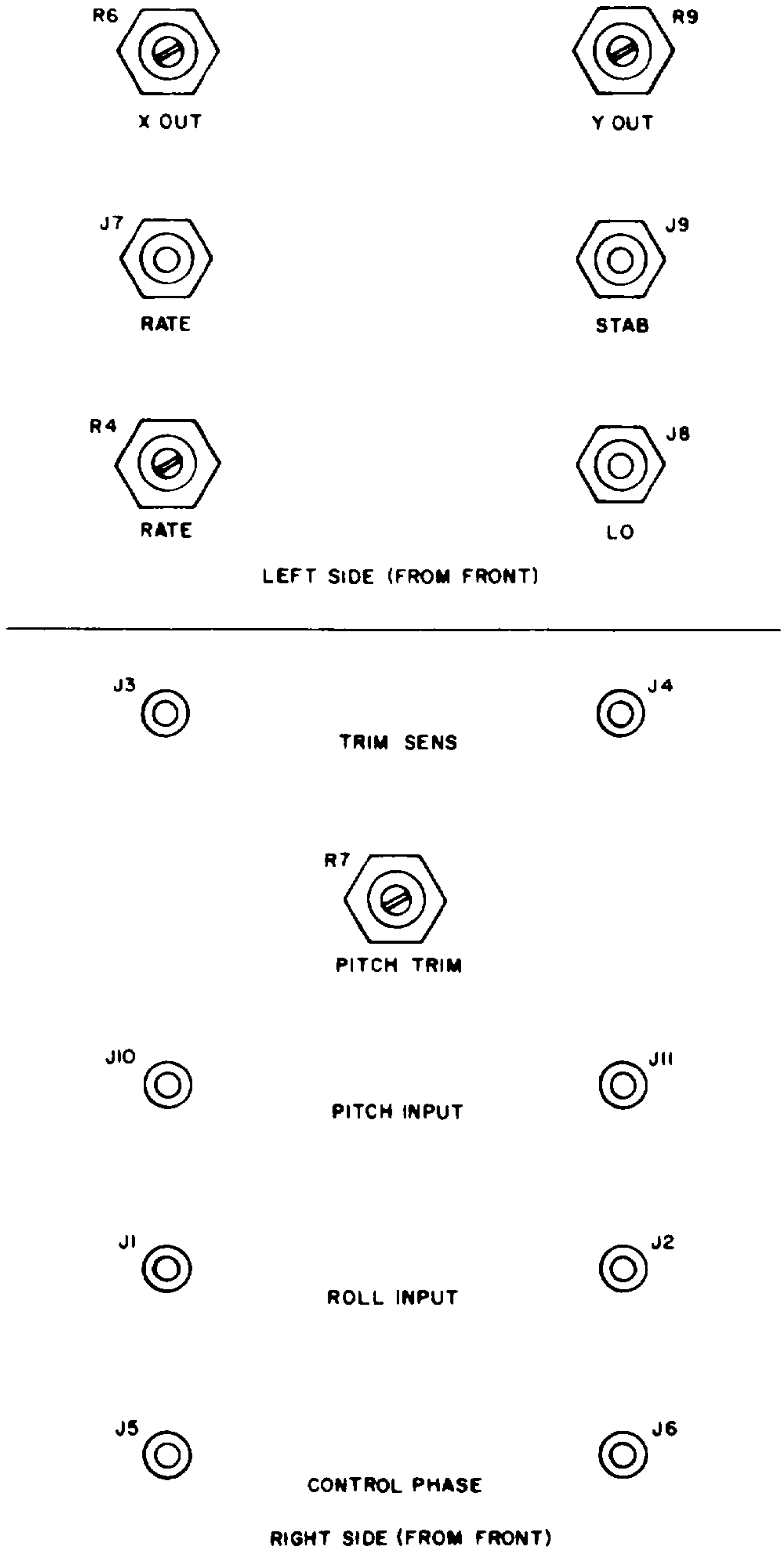
(2) Set the GYRO SIMULATOR switch to ON.

(3) Set the GYRO SIMULATOR-ROLL control to 0.

(4) Set the GYRO SIMULATOR-PITCH control to 20 degrees NOSE DOWN. The antenna should move up to compensate for the PITCH control position.

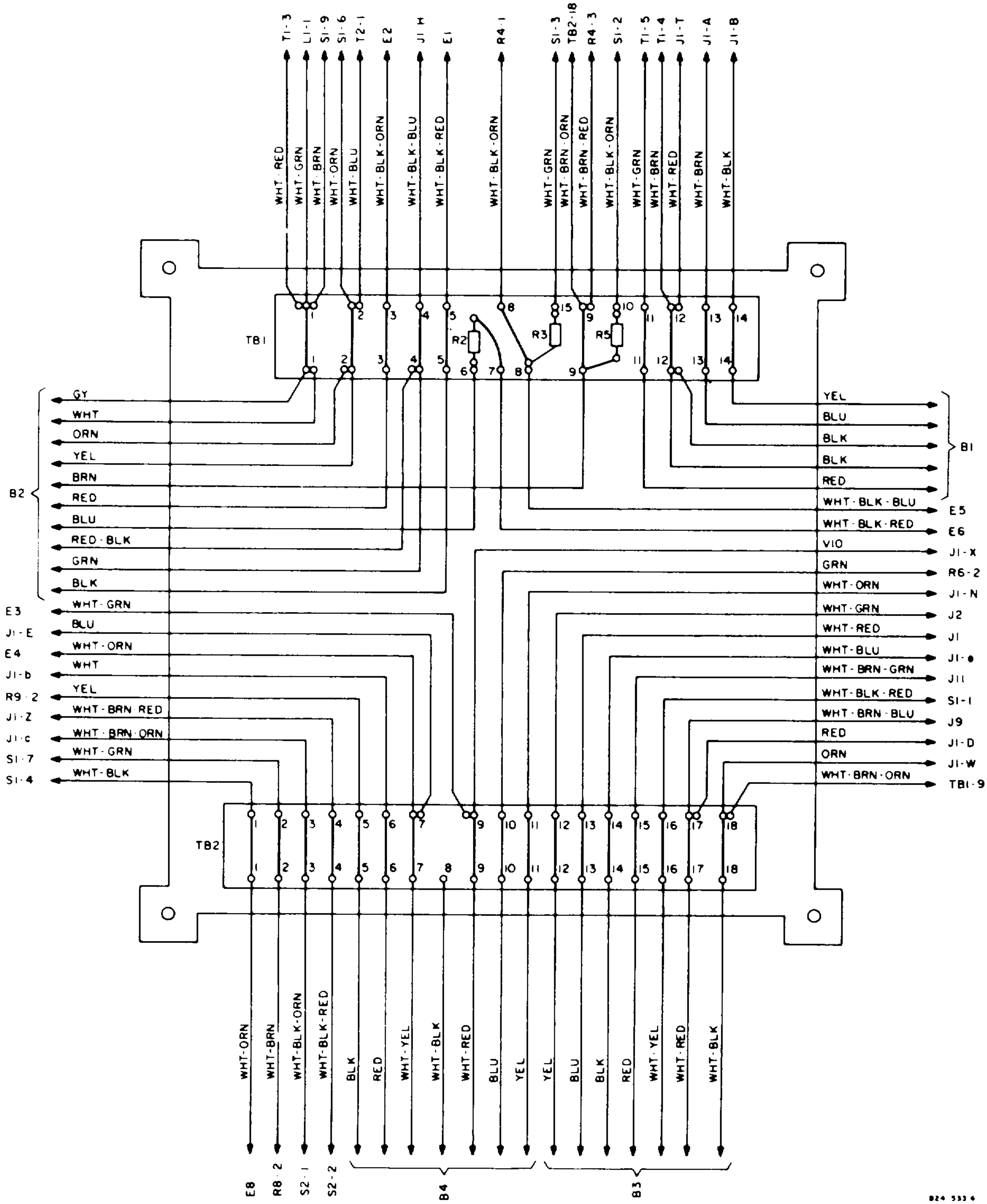
(5) Position the antenna 60 degrees left as viewed from the front. Set the GYRO SIMULATOR-ROLL control to 20 degrees RIGHT WING DOWN. The antenna should move up to compensate for the ROLL control position. If necessary, rotate pitch-roll resolver B3 on the antenna 180 degrees and repeat steps (4) and (5).

(6) Set the GYRO SIMULATOR switch to OFF.



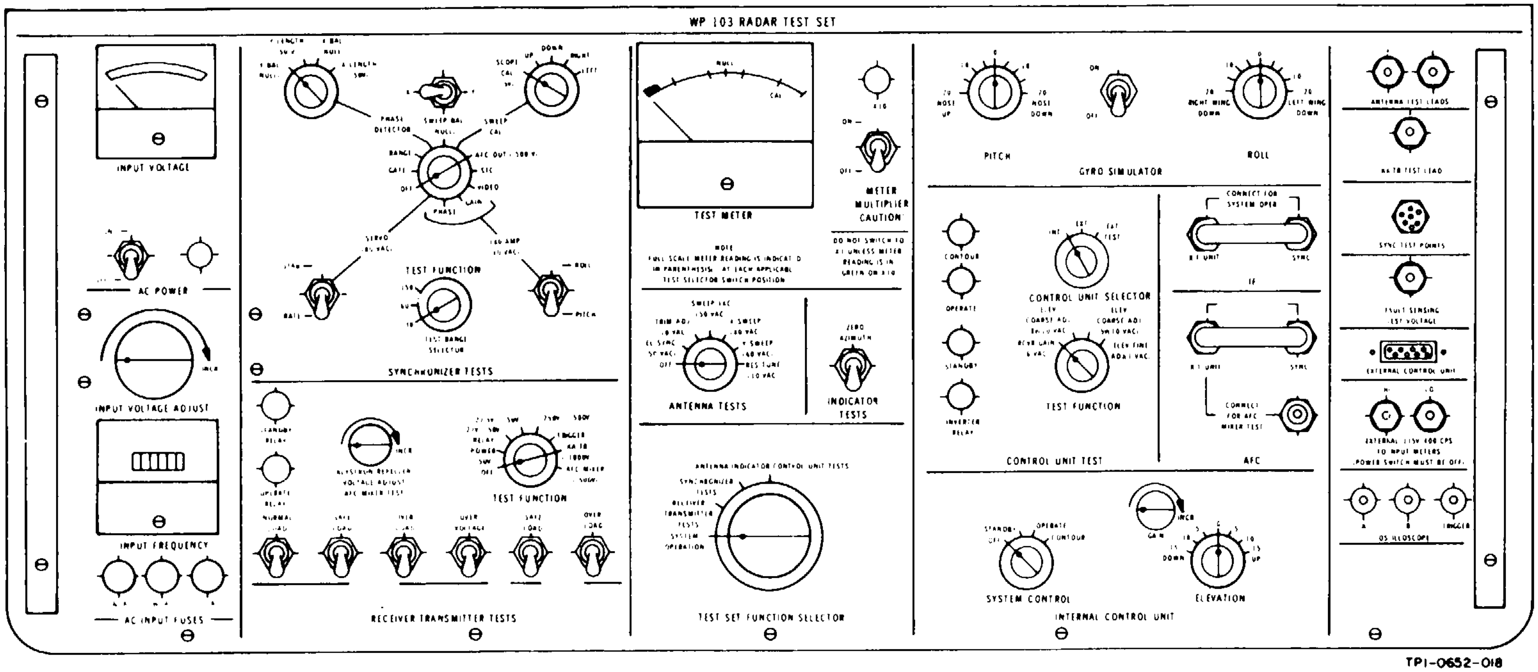
537F-7 and 537F-8 Antennas, Test Points and Adjustments

Figure 5-15



537F-7 and 537F-8 Antennas, Terminal Board Wiring Diagram

Figure 5-16



978G-1 Radar Test Set

Figure 5-17

(7) Connect the test leads from the ANTENNA TEST LEADS jacks to J10 and J11 on the antenna.

(8) Position the antenna in a dead-ahead position, and adjust PITCH TRIM potentiometer R7 on the antenna for a minimum voltage as indicated on the TEST METER.

(9) Set the GYRO SIMULATOR switch to ON.

(10) Connect multimeter between J8 and J9 on the antenna, and adjust GYRO SIMULATOR-PITCH control for zero reading on the multimeter.

(11) Set the GYRO SIMULATOR-ROLL control maximum clockwise. Observe that, as the antenna is moved in azimuth, a null occurs in the dead-ahead position as indicated on the attached multimeter and by the alignment marks. If necessary, rotate resolver B3 on the antenna until the null does occur at the dead-ahead position of the antenna. Lock the resolver in this position.

(12) Disconnect the test leads from the antenna.

F. Elevation Position Accuracy.

(1) Connect combination square (Collins part number 516-3075-001) to the antenna dish. Be careful not to displace the dish with pressure of the square.

(2) Set the GYRO SIMULATOR switch to ON.

(3) Set the GYRO SIMULATOR-PITCH control to 20 NOSE UP. Adjust GYRO SIMULATOR-PITCH control so that 5.0 ±0.25 volts ac is measured between PITCH HI and GND on synchronizer.

(4) Connect a jumper wire between ROLL HI and LO on the front of the synchronizer.

(5) Set the GYRO SIMULATOR-ROLL control to 0.

(6) Position the antenna dead ahead.

(7) The level bubble on the combination square should indicate 10 ±2 degrees down in the elevation axis.

(8) Set the GYRO SIMULATOR-PITCH control to 0.

(9) Change the jumper wire connected in step (4) so that it is now connected between PITCH HI and LO on the synchronizer.

(10) Set the GYRO SIMULATOR-ROLL control to 20 RIGHT WING DOWN. Adjust GYRO SIMULATOR-ROLL so that 5.0 ±0.25 volts ac is measured between ROLL HI and LO on the synchronizer.

(11) Position the antenna dish to 60 degrees right as viewed from the front. The level bubble on the combination square should indicate 0.87 of the reading obtained in step (6) ±0.5 degree down in the elevation axis.

(12) Remove jumper wire connected in step (9).

<u>**NOTE:**</u> **In those cases where antenna interchangeability is desired, the following step (pitch trim adjustment) must be performed only on the particular aircraft on which the antenna will be used.**

(13) If a standard pitch trim adjustment is necessary, perform the following steps:

(a) Set the GYRO SIMULATOR-ROLL control to 0.

(b) Position the antenna dish straight ahead.

(c) Adjust PITCH TRIM potentiometer R7 on the antenna for the desired elevation angle.

G. <u>Rate Adjustment</u>.

(1) Rapidly move the antenna dish up and down using the INTERNAL CONTROL UNIT-ELEVATION control. Observe that the antenna dish does not overshoot or oscillate.

(2) If the antenna dish overshoots or oscillates, adjust RATE control potentiometer R4 on the antenna for proper operation of the dish.

H. <u>Sweep Excitation</u>.

(1) Set the ANTENNA TESTS switch to SWEEP EXC. The TEST METER should indicate approximately 35 volts.

I. <u>Sweep Resolver Alignment</u>.

(1) Set the ANTENNA TESTS switch to X SWEEP.

(2) Position the antenna dish straight ahead. A null should be measured between X SIG and GND (synchronizer modification 18/U and above) or between TB11 :}A12, points 2 and 4 (synchronizer modification below 18/U). If necessary, loosen screws holding resolver B4 and rotate for a null as indicated on the meter.

<u>**NOTE:**</u> **If 493A-3 Indicator display is opposite to antenna azimuth position, loosen clamps around resolver B4 and rotate resolver 180 degrees. Perform steps (1) and (2) again.**

J. <u>X Sensitivity Adjustment</u>.

(1) Loosen the bracket on sweep resolver B4 on the antenna, and position it to make contact with the case of pitch-roll resolver B3. Secure the bracket in place.

(2) Loosen the three screws that secure resolver B4 in place. (Mark the original position of B4.) Rotate B4 until the other end of bracket makes contact with the case of resolver B3. Resolver B4 has now been rotated 90 degrees from its original position.

(3) Position the antenna dish straight ahead. The TEST METER should indicate 10.6 volts if the voltage recorded in step H. was 35 volts. (If the voltage recorded in step H was greater or smaller than 35 volts, the voltage indicated in this step will be greater or smaller than 10.6 volts. For example, 11.7 volts for 38.5 volts or 9.5 volts for 31.5 volts.) If necessary, adjust X-OUT potentiometer R6 on the antenna for the proper indication on the TEST METER.

K. Y Sensitivity Adjustment.

(1) Set the ANTENNA TESTS switch to Y SWEEP.

(2) Rotate resolver B4 on the antenna back to its original position and secure in place. Check for null as in step I(2) above.

(3) Position the antenna dish straight ahead. The TEST METER should indicate the same as step J(3). If necessary, adjust Y-OUT potentiometer R9 on the antenna for the proper indication on TEST METER.

L. Resolver Tune.

(1) Set the ANTENNA TESTS switch to RES TUNE.

(2) The TEST METER should indicate not more than 3.0 volts.

M. Manual Elevation.

(1) Set the GYRO SIMULATOR switch to OFF.

(2) Set the INTERNAL CONTROL UNIT-ELEVATION control to 0 degree. With the combination square, observe that the antenna dish is level as measured parallel to the axis of rotation of the tilt mechanism.

(3) Set the INTERNAL CONTROL UNIT-ELEVATION control to 15 degrees UP. The combination square should indicate 7-1/2 ±1 degrees of elevation with respect to the reading obtained in step.(2) above.

(4) Set the INTERNAL CONTROL UNIT-ELEVATION control to 15 degrees DOWN. The combination square should indicate 7-1/2 ±1 degrees of elevation with respect to the reading obtained in step (2) above.

N. Limits.

(1) Set the INTERNAL CONTROL UNIT-ELEVATION control to 15 degrees DOWN.

(2) Set the GYRO SIMULATOR to the ON position and the PITCH control to 15 degrees NOSE UP. Observe the combination square to see that the antenna dish elevation movement is not less than 12 degrees from that recorded in step M(2). If necessary, adjust the rubber stops on the antenna.

(3) Set the INTERNAL CONTROL UNIT-ELEVATION control to 15 degrees UP.

(4) Set the GYRO SIMULATOR-PITCH control to 15 degrees NOSE DOWN. Observe the combination square to see that the antenna dish elevation movement is not less than 12 degrees from that recorded in step M(2) above.

(5) Rapidly move the INTERNAL CONTROL UNIT-ELEVATION control between 15 degrees UP and 15 degrees DOWN. Observe that the antenna dish or tilt linkage do not strike the gimbal.

Section VIII. STORAGE INSTRUCTIONS

This section presents instructions for storage of the 537F-7 and 537F-8 Antennas. Before storage, clean dirt, grease, and moisture from the antenna and cover the open end of the waveguide. If the antenna is to be stored for an extended period of time, place the unit in the original shipping carton and store the unit in a clean, dry area where the possibility of impact damage is minimized.

Section IX. ILLUSTRATED PARTS LIST

NOTE: This Illustrated Parts List is furnished for parts location information only. Do not use for provisioning purposes.

5-23. GENERAL.

This Illustrated Parts List is a complete list of parts for the above equipment manufactured by Collins Radio Company

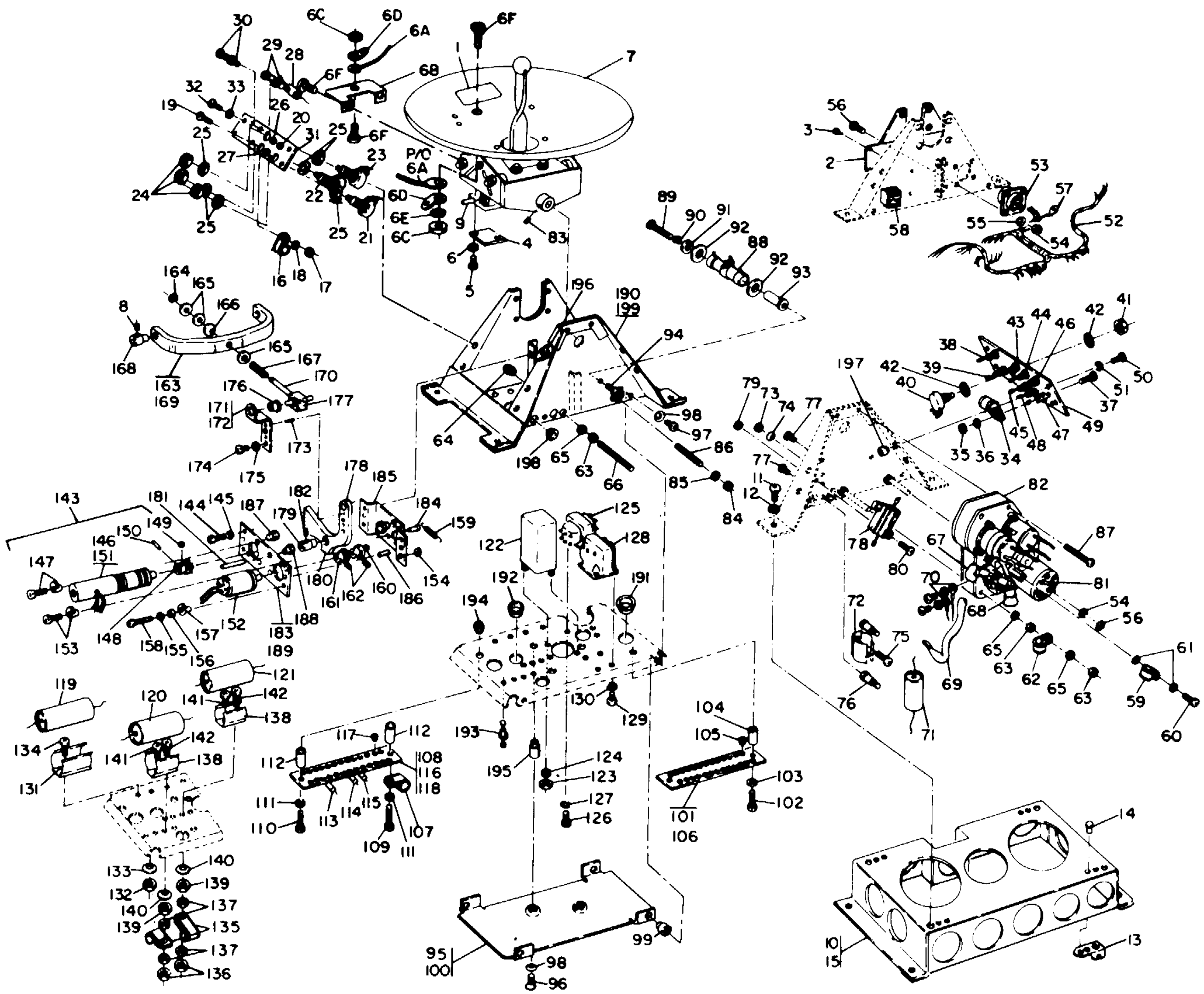
Collins Radio Company part numbering system is comprised of a three-digit family number, a four-digit serial number, and two- or three-digit dash number:

FAMILY NO.	SERIAL NO.	DASH NO.
XXX	XXXX	XX or XXX

If a part is purchased by Collins Radio Company from a vendor, the Federal Manufacturer's Code Number is listed in the nomenclature column. If this column does not include a Federal Manufacturer's Code Number, the item is either a MIL approved item, commercial item or manufactured by Collins. Where COML appears in this column, the part may be obtained commercially from various vendors. Part numbers appearing in this column are Collins assigned part numbers for that item. Serial numbers or MCN (manufacturing control number) effectivities, where applicable, are listed in this column. Serial number effectivities are designated on the nameplate. The MCN is stamped on each module and/or chassis. Changes made from service bulletins are so indicated by SB1, SB2, etc.

5-24. PARTS LOCATION.

Parts location for Antennas AS-1520/APN-158 and AS-16h2/APN-158 are contained in figures 5-18 through 5-20.



537F-7/8 Antenna
Figure 5-18

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
5-18 - 0	522-6117-005	1	537F-7 ANTENNA	1	A
0	522-6118-005	1	537F-8 ANTENNA	1	B
1	564-9917-002	2	CAUTION PLATE	1	
2	516-2769-001	2	PLATE, IDENT	1	A
2	516-7401-001	2	PLATE, IDENT	1	A
2	516-2809-001	2	PLATE, IDENT	1	B
2	516-7403-001	2	PLATE, IDENT	1	B
3	2X1-BPANHDTY PEBCADPL	2	SCREW. TAP., SST, 2-56 X 1/8 45722 330-1551-000 AP	4	
4	564-9909-002	2	COVER	1	
5	MS51957-41	2	SCREW, MACH. SST. 8-32 X 1/4 343-0185-000 AP	2	
6	310-0283-000	2	WASHER, LOCK, SST 0.168 ID X 0.280 OD COML AP	2	
6A	772-0963-001	2	STRAP, GROUNDING EFF REV T/U	1	A
6A	772-0963-001	2	STRAP, GROUNDING EFF REV U/U	1	B
6B	772-0964-001	2	BRACKET, MTG EFF REV T/U	1	A
6B	772-0964-001	2	BRACKET, MTG EFF REV U/U	1	B
6C	510-041810-0 1STCADPL	2	NUT, ASSEMBLED WASH., CAD. PL STL 4-40 78189 334-0852-000 AP FOR 6A AND 68	2	
6D	3017-6HOTTIN NED	2	TERMINAL 77147 304-3020-000 AP FOR 6A AND 6B	2	
6E	MS35335-51	2	WASHER, LOCK, SST. 0.123 ID, 0.260 OD 373-8010-000 AP FOR 6A AND 6B	1	

FIG- ITEM		PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
5-18	6F	MS51957-14	2	SCREW, MACH., SST. 4-40 X 5/16 343-0134-000 AP FOR 6A AND 6B		2	
	7	563-9723-005	2	GIMBAL ASSY SEE FIG. 5-19		1	A
	7	563-9721-005	2	GIMBAL ASSY SEE FIG. 5-19		1	B
	8	2-56X3-32 65 PLINE416SST	2	SETSCREW, SST, 2-56 X 3/32 08664 328-0050-000 AP		2	
	9	MS16555-629	2	PIN, STR, SST, 0.1253 DIA X 3/4 311-0839-000 AP		2	
	10	564-2206-005	2	MOUNT		1	B
	11	MS51957-81	2	SCREW, MACH., SST. 1/4-20 X 3/4 343-0267-000 AP		4	B
	12	310-0050-000	2	WASHER. FLAT, SST, 0.265 1D X 0.625 OD COML AP		4	B
	13	68NA17A040	3	NUT, SELF-LKG PLAIN, AL, 1/4-20 72962 333-0898-000		4	B
	14	MS20426AD3-5	3	RIVET, SOLID. AL. 3/32 DIA X 5/16 305-1363-000 AP		8	B
	15	564-2205-005	3	MOUNT		1	B
	16	HP3N	2	CLAMP 09922 150-1540-000		1	
	17	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		1	
	18	310-0045-000	2	WASHER. FLAT. SST, 0.125 ID X 0.312 OD COML AP		1	
	19	MS51957-15	2	SCREW. MACH., SST. 4-40 X 3/8 343-0135-000 AP		1	
	20	MS16108-1A	2	JACK, TIP. WHT 360-0149-000	J8	1	
	21	RV5LAXSB252B	2	RESISTOR, VAR, COMP, 25K, 20%, 1/2W 380-6286-000 EFF THRU REV T/U	R4	1	A
	21	RV5LAXSB252B	2	RESISTOR, VAR, COMP, 2.5K, 20%, 1/2W 380-6286-000 EFF THRU REV U/U	R4	1	B

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
5-18 - 21	RV5LAYSB103B	2	RESISTOR, VAR, COMP, 10K, 20%, 1/2W 380-2907-000 EFF REV U/U	R4	1	A
21	RV5LAYSB103B	2	RESISTOR, VAR COMP, 10K, 20%, 1/2W 380-2907-000 EFF REV V/U	R4	1	B
22	RV5LAXSB251B	2	RESISTOR, VAR, COMP, 250 OHMS, 20%, 1/2W 380-6296-000	R6	1	
23	RV5LAXSB251B	2	RESISTOR, VAR, COMP, 250 OHMS, 20%, 1/2W 380-6296-000	R9	1	
24	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 AP FOR 21 THRU 23		3	
25	1914-05-00-2 480	2	WASHER. LOCK, NI PL BRZ, 0.267 ID X 0.408 OD 78189 373-0035-000 AP FOR 21 THRU 23		6	
26	MS1608-7A	2	JACK, TIP, BLU 360-0155-000	J9	1	
27	MS16108-5A	2	JACK, TIP, GRN 360-0153-000	J7	1	
28	SDB1K02683K	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.068UF, 10%, 200V 53021 931-5000-000	C5	AR	
28	SDB1K02333K	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.33UF, 10%, 200V 53021 931-5002-000	C5	AR	
28	196P33392S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.1UF, 10%, 400V 56289 931-5003-000	CS	AR	
28	SDB1K03124K	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.012UF. 10%. 300V 53021 931-5021-000	C5	AR	
28	196P15493S4	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.15UF, 15%, 300V 56289 931-9779-000	C5	AR	
29	ST1050-34	2	TERMINAL 80786 306-0091-000		2	
30	MS51957-12	2	SCREW, MACH., SST, 4-40 X 3/16 343-0132-000 AP		2	
31	563-4882-002	2	PANEL, RIGHT		1	
32	MS51957-14	2	SCREW, MACH., SST, 4-40 X 5/16 343-0134-000 AP		4	
33	4704-04-01-4 102	2	WASHER, LOCK, SST. 0.124 ID X 0.275 OD 78189 373-0154-000 AP		4	
34	HP4N	2	CLAMP 09922 150-1541-000		1	
35	MS35649-44	2	NUT PLAIN, HEX. SST, 4-40 313-0043-000 AP		1	
36	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		1	
37	MS51957-15	2	SCREW, MACH., SST, 4-40 X 3/8 343-0135-000 AP		1	
38	MS16108-4A	2	JACK, TIP, BRN 360-0152-000	J4	1	
39	MS16108-4A	2	JACK, TIP, BRN 360-0152-000	J3	1	
40	RV5LAXSB251B	2	RESISTOR, VAR, COMP, 250 OHMS, 20%, 1/2W 380-6296-000	R7	1	
41	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 AP		1	
42	1914-05-00-2 480	2	WASHER LOCK, NI PL BRZ, 0.267 ID X 0.408 OD 78189 373-0035-000 AP		2	
43	MS16108-6A	2	JACK, TIP, ORN 360-0154-000	J11	1	
44	MS16108-SA	2	JACK, TIP, YEL 360-0156-000	J2	1	

FIG- ITEM		PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
5-18	45	MS16108-6A	2	JACK, TIP, ORN 360-0154-000	J10	1	
	46	MS16108-2A	2	JACK, TIP, RED 360-0150-000	J6	1	
	47	MS16108-2A	2	JACK, TIP, RED 360-0150-000	J5	1	
	48	MS16108-1A	2	JACK, TIP, WHT 360-0149-000	J1	1	
	49	563-4866-002	2	PANEL, LEFT		1	
	50	MS51957-14	2	SCREW, MACH., SST. 4-40 X 5/16 343-0134-000 AP		4	
	51	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78189 373-0154-000 AP		4	
	52	563-4883-005	2	CABLE ASSY		1	
	53	PT02A18-32P	3	CONNECTOR 77820 371-2005-000	J1	1	
	54	MS35649-44	3	NUT, PLAIN, HEX SST. 4-40 313-0043-000 AP		4	
	55	4704-04-01-4 102	3	WASHER. LOCK, SST. 0.124 ID X 0.275 OD 78189 373-0154-000 AP		4	
	56	MS51957-14	3	SCREW, MACH., SST. 4-40 X 5/16 343-0134-000 AP		4	
	57	RA1113	3	TERMINAL 59730 304-0332-000		1	
	58	6AT10	2	SWITCH 91929 266-7009-000	S1	1	
	59	HP3N	2	CLAMP 09922 150-1540-000		1	
	60	MS51957-28	2	SCREW. MACH., SST. 6-32 X 3/8 343-0169-000 AP		1	
	61	310-6360-000	2	WASHER. FLAT, SST 0.147 ID X 0.375 OD COML AP		2	
	62	HP3N	2	CLAMP 09922 150-1540-000		1	
	63	MS35649-44	2	NUT, PLAIN, HEX SST. 4-40 313-0043-000 AP		3	
	64	68NM40	2	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0347-000 AP		1	
	65	310-0045-000	2	WASHER FLAT SST, 0.125 ID X 0.312 OD COML AP		4	
	66	P312-0025-00 0	2 2	STUD, CONTINUOUS THD, SST. 4-40 X 77250 312-0025-000 AP		1	
	67	19C267A4	2	CAPACITOR, FXD. CER DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 EFF REV 13/N	C6	1	A
	67	19C267A4	2	CAPACITOR, FXD, CER DIELECTRIC, 2200PF. 20S, 500V 01939 913-3011-000 EFF REV 14/0	C6	1	B
	68	19C267A4	2	CAPACITOR, FXD, CER DIELECTRIC, 2200PF, 20%, 500V 01939 913-3011-000 EFF REV 13/N	C7	1	
	68	19C267A4	2	CAPACITOR. FXD, CER DIELECTRIC, 220OPF, 20%, 500V 01939 913-3011-000 EFF REV 14/0	C7	1	B
	69	563-4823-004	1	CABLE ASSY NO. 2		1	
	70	2522-06-00-2 0	1	TERMINAL 78189 304-4200-000		2	
	71	196P3645454	2	CAPACITOR FXD, PAPER DIELECTRIC, 0.36UF 5%, 400V 56289 931-9636-000	C4	1	
	72	100-200-11-0	2	CLIP 99378 139-0751-000		1	
	73	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		2	
	74	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78189 373-0154-000 AP		2	
	75	MS51957-13	2	SCREW MACH., SST, 4-40 X 1/4 343-0133-000 AP		2	

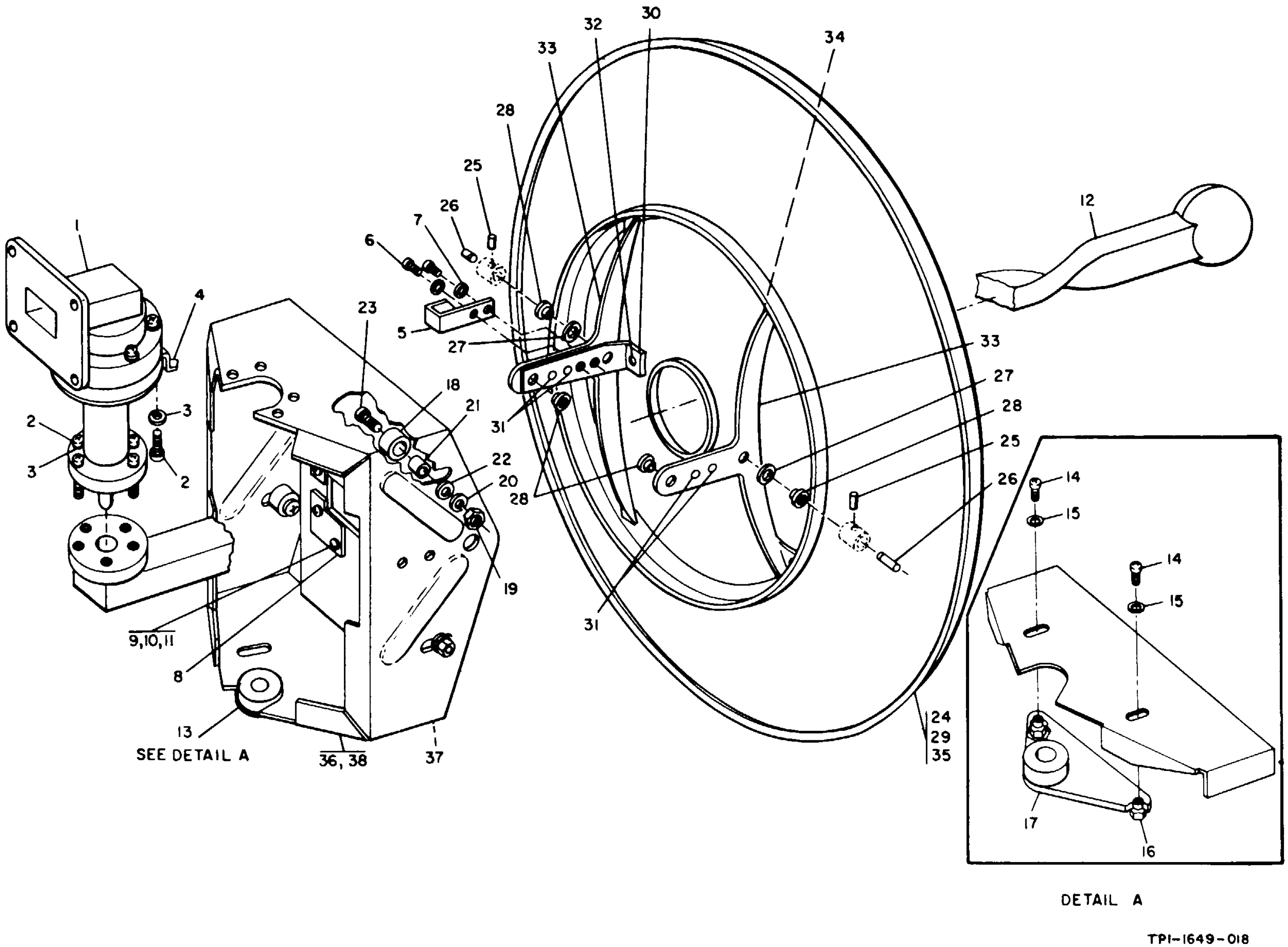
FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
5-18 - 76	ST1050-34	2	TERMINAL 80786 306-0091-000		2	
77	MS51957-12	2	SCREW, MACH., SST, 4-40 X 3/16 343-0132-000 AP		2	
78	RH25X000K160 OOH	2	RESISTOR, FXD, WW, 1.6K, 3%, 25W 91637 747-8656-000	R8	1	
79	MS35649-44	2	NUT, PLAIN, HEX., SST. 4-40 313-0043-000 AP		2	
80	MS51957-14	2	SCREW, MACH., SST. 4-40 X 5/16 343-0134-000 AP		2	
81	2522-06-00-2 0	2	TERMINAL 78189 304-4200-000		4	
82	563-9724-005	2	GEARTRAIN ASSY SEE FIG. 5-20		1	
83	328-0473-000	2	SETSCREW, CAD. PL STL, 8-32 X 3/16 COML AP		2	
84	68NM40	2	NUT, SELF-LKG, HEX., AL. 4-40 72962 333-0347-000 AP		1	
85	310-0045-000	2	WASHER. FLAT, SST, 0.125 ID X 0.312 OD COML AP		2	
86	P312-0024-00 0	2	STUD, CONTINUOUS THD, SST, 4-40 X 1-7/8 77250 312-0024-000 AP		1	
87	MS51957-23	2	SCREW. MACH SST. 4-40 X 1-1/2 343-0143-000 AP		2	
88	716-0014-000	2	RESISTOR ADJUSTABLE, WW, 250 OHMS, 10%, 10W 44655	R1	1	
89	MS51957-35	2	SCREW, MACH., SST 6-32 X 1-1/4 343-0178-000 AP		1	
90	MS35338-136	2	WASHER, LOCK, SST 0.141 ID X 0, 253 OD 310-0282-000 AP		1	
91	310-6360-000	2	WASHER. FLAT. SST. 0.147 ID X 0.375 OD COML AP		1	
92	302-0348-000	2	INSULATOR, WASH, 91500 AP		2	
93	P015-0552-00 0	2	POST 77250 015-0552-000		1	
94	MS51957-28	2	SCREW, MACH., SST, 6-32 X 3/8 343-0169-000 AP		1	
95	563-4806-004	2	COVER		1	
96	MS51957-13	2	SCREW, MACH. SST 4-40 X 1/4 343-0133-000 AP		2	
97	MS51957-15	2	SCREW MACH., SST 4-40 X 3/8 343-0135-000 AP		4	
98	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78189 373-0154-000 AP		6	
99	502-6302-002	3	NUT		4	
100	563-4805-004	3	COVER		1	
101	563-4843-003	2	BOARD, FLARED	TB2	1	
102	MS51957-17	2	SCREW, MACH., SST, 4-40 X 1/2 343-0137-000 AP		2	
103	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		2	
104	502-1664-001	2	SLEEVE AP		2	
105	M153SBRTTIN	3	EYELET. MET CAP 0.047 DIA X 0.085 23730 307-1270-000		39	
106	563-4842-003	3	BOARD, PRINTED		1	
107	HP5N	2	CLAMP 09922 150-1542-000		1	
108	563-4827-003	2	BOARD, WIRED	TB1	1	
109	MS51957-18	2	SCREW, MACH., SST, 4-40 X 5/8 343-0138-000 AP		1	

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
5-18 - 110	MS51957-17	2	SCREW, MACH., SST 4-40 X 1/2 343-0137-000 AP		1	
111	310-0045-000	2	WASHER, FLAT, SST, 0125 ID X 0.312 OD COML AP		2	
112	502-1664-001	2	SLEEVE AP		2	
113	RC07GF182K	3	RESISTOR, FXD, COMP, 1.8K, 10% 1/4W 745-0758-000	R5	1	
114	RC07GF563K	3	RESISTOR, FXD, COMP, 56K, 10%, 1/4W 745-0812-000	R3	1	
115	RC07GF472K	3	RESISTOR, FXD, COMP, 4.7K, 101, 1/4W 745-0773-000	R2	1	
116	563-4826-003	3	BOARD, FLARED		1	
117	M153SBRTTIN	4	EYELET, MET., CAP. 0.047 DIA X 0.085 23730 307-1270-000		42	
118	563-4825-003	4	BOARD		1	
119	118P12592S4	2	CAPACITOR, FXD, PAPER DIELECTRIC 1.2UF, 10%, 200V 56289 951-2485-000	C1	1	
120	196P27451S4	2	CAPACITOR FXD, PAPER DIELECTRIC, 0.27UF, 5%, 100V 90634 931-5016-000	C3	1	
121	196P2249254	2	CAPACITOR, FXD, PAPER DIELECTRIC, 0.22UF 101. 200V. 56289 931-4990-000	C2	1	
122	30052	2	REACTOR, 2.5 HENRIES 80089 678-0014-000	L1	1	
123	P313-0045-00 0	2	NUT, PLAIN, HEX., SST, 6-32 77250 313-0045-000 AP		2	
124	MS35338-136	2	WASHER LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP		2	
125	29416	2	TRANSFORMER 80089 672-0022-000	T2	1	
126	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		2	
127	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78189 373-0154-000 AP		2	
128	76-0093-61	2	TRANSFORMER 95105 672-0021-000	T1	1	
129	MS51957-28	2	SCREW, MACH., SST, 6-32 X 3/8 343-0169-000 AP		4	
130	MS35338-136	2	WASHER LOCK, SST, 0.141 ID X 0.253 OD 310-0282-000 AP		4	
131	100-200-9-0	2	CLIP 99378 139-0749-000		1	
132	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		2	
133	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78189 373-0154-000 AP		2	
134	MS51957-13	2	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		2	
135	HP4N	2	CLAMP 09922 150-1541-000		2	
136	MS35649-44	2	NUT, PLAIN. HEX., SST, 4-40 313-0043-000 AP		2	
137	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		4	
138	100-200-9-0	2	CLIP 99378 139-0749-000		2	
139	MS35649-44	2	NUT, PLAIN. HEX., SST, 4-40 313-0043-000 AP		4	
140	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78189 373-0154-000 AP		4	

FIG-ITEM		PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
5-18	-141	MS51957-13	2	SCREW, MACH., SST 4-40 X 1/4 343-0133-000 AP		2	
	142	MS51957-17	2	SCREW, MACH., SST, 4-40 X 1/2 343-0137-000 AP		2	
	143	563-4848-003	2	GEAR TRAIN ASSY		1	
	144	MS51957-16	2	SCREW, MACH., SST, 4-40 X 7/16 343-0136-000 AP		3	
	145	4704-04-01-4 102	2	WASHER, LOCK, SST, 0.124 ID X 0.275 OD 78189 373-0154-000 AP		3	
	* 146	563-4872-002	3	SWIVEL ASSY		1	
	147	109054-337	3	CLAMP 06773 015-0974-000 AP		3	
	* 148	563-4879-002	4	GEAR		1	
	* 149	2-56X3-32 6S PLINE416SST	4	SETSCREW, SST, 2-56 X 3/32 08664 328-0050-000 AP		1	
	* 150	311-0005-000	4	PIN, GROOVED, SST, 3/64 DIA X 1/4 COML AP		1	
	151	CR10342505	4	MOTOR, GENERATOR 88878 229-0281-000	B2	1	
	152	RS911-1E	3	SYNCHRO 88818 229-0076-000	B1	1	
	153	109054-337	3	CLAMP 06773 015-0974-000 AP		2	
	154	MS35649-44	3	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 AP		1	
	155	MS35338-135	3	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		1	
	156	310-0045-000	3	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		1	
	157	563-4876-002	3	CLAMP AP		1	
	158	323-0108-000	3	SCREW, MACH., STL, 4-40 X 1/2 COML AP		1	
	159	564-9981-002	3	SPRING		1	
	160	563-4881-002	3	SPRING WHEEL		1	
	161	563-4878-002	3	GEAR, SYNCHRO		1	
	162	MS51053-103	3	SETSCREW, CAD, PL STL, 2-56 X 3/16 328-0374-000 AP FOR 160 AND 161		2	
	163	563-4841-003	3	BEAM, LINKAGE		1	
	164	5144-9MD	3	RING 79136 340-0913-000 AP		1	
	165	565-5557-002	3	SPACER AP		3	
	166	563-4865-002	3	BALL JOINT AP		1	
	167	565-5558-002	3	SPRING AP		1	
	168	563-4840-003	4	HUB		2	
	169	563-4839-003	4	BEAM		1	
	170	565-5556-002	3	PIN		1	
	171	563-4838-003	3	SEGMENT ASSY		1	
	172	563-4873-002	4	SUPPORT		1	
	173	M516555-601	4	PIN, STR, SST, 0.062 DIA X 3/16 311-0773-000 AP		2	
	174	MS51957-13	4	SCREW, MACH., SST, 4-40 X 1/4 343-0133-000 AP		2	
	175	MS35338-135	4	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		2	
	176	563-4874-002	4	BEARING		2	
	177	563-4871-002	4	SWIVEL		1	
	178	563-4855-003	4	SEGMENT		1	
	179	563-4853-003	5	GEAR		1	
	180	563-4854-003	5	SHAFT		1	
	181	MS16555-0631	3	PIN, STR, SST, 0.1253 DIA X 1 311-0853-000		1	

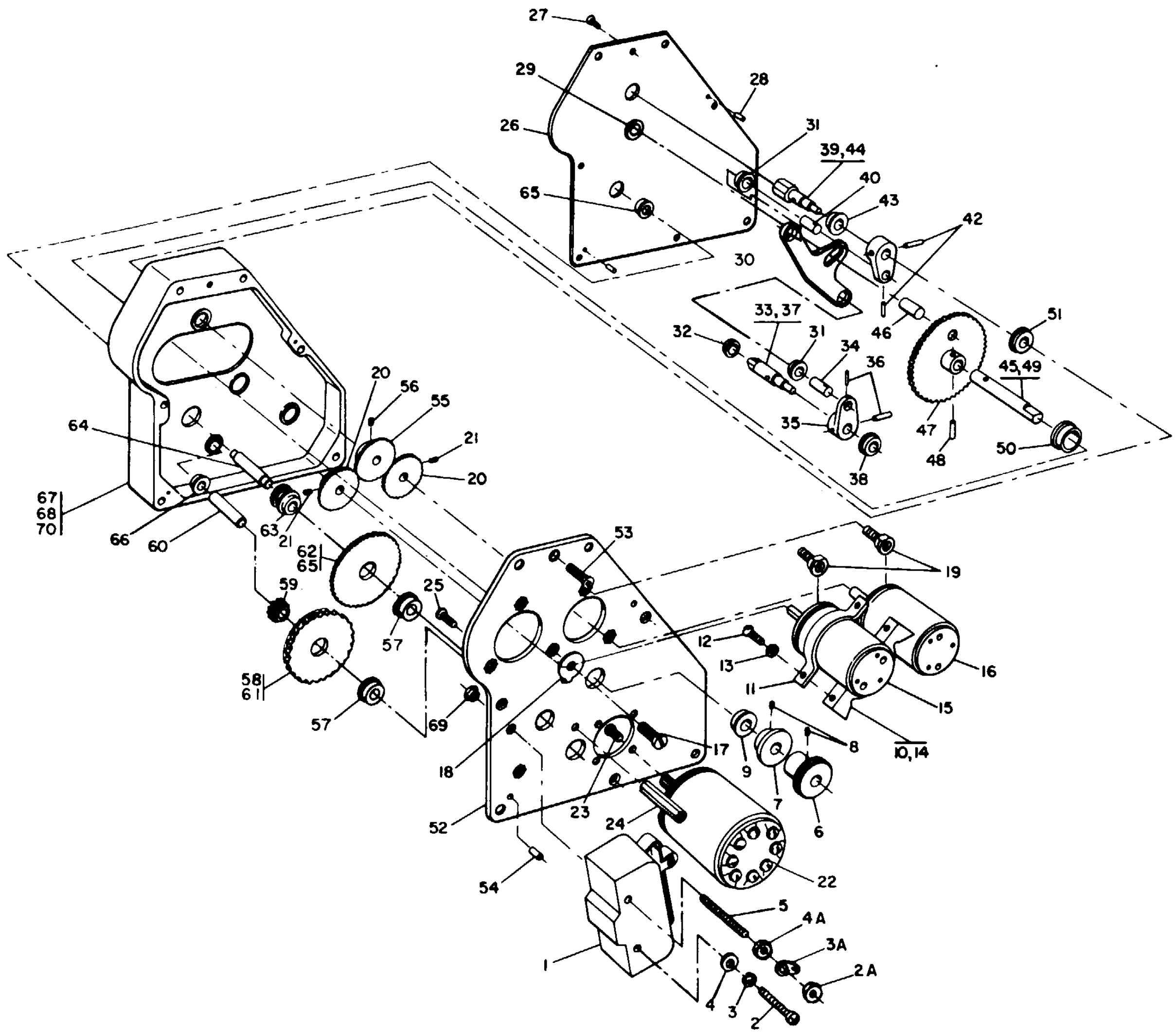
*USE UNTIL EXHAUSTED. FOR REPLACEMENT ORDER
PART NUMBER 229-0281-010

FIG-ITEM		PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
5-18 -	182	MS51053-103	3	SETSCREW, CAD. PL STL, 2-56 X 3/16 328-0374-000 AP	1	
	183	563-4822-004	3	HOUSING	1	
	184	563-4821-004	4	PIN	1	
	185	563-4820-004	4	COVER, REAR	1	
	186	311-0783-000	4	PIN, STR, SST, 0.125 DIA X 1/4 COML AP	2	
	187	561-6430-002	4	NUT	5	
	188	563-4874-002	4	BEARING	2	
	189	563-4819-004	4	PLATE, FRONT	1	
	190	563-4792-005	2	FRAME ASSY	1	
	191	SE396CADPL	3	EYELET, MET., CAD. PL BRS. 0.560 DIA X 0.103 61957 307-1061-000	2	
	192	A36	3	EYELET, MET., NI PL BRS, 0.460 DIA X 0.090 57771 307-1293-000	2	
	193	1122	3	TERMINAL 12615 306-0606-000	6	
	194	68NC2-40	3	NUT, SELF-LKG. CLINCH, AL, 4-40 72962 333-0198-000	4	
	195	563-4791-005	3	POST	2	
	196	MS21209C0415	3	INSERT 012-2316-000	6	
	197	562-0855-002	3	NUT	12	
	198	SE75N1PL	3	EYELET, MET NI PL BRS, 0.219 DIA X 0.159 90030 307-1010-000	2	
	199	563-4790-005	3	FRAME	1	
5-19 -	0	563-9723-005	1	GIMBAL ASSY SEE FIG. 5-18(7)FOR NHA	REF	A
5-19 -	0	563-9721-005	1	GIMBAL ASSY SEE FIG. 5-18(7)FOR NHA	REF	B
	1	411576	2	COUPLER 80006 355-0261-000	1	
	2	324-0050-000	2	SCREW, CAP, SST. 4-40 X 3/8 COML AP	9	
	3	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	9	
	4	563-4863-002	2	INDICATOR. AZIMUTH	1	
	5	563-4869-002	2	INDICATOR	1	
	6	MS51957-1	2	SCREW, MACH SST, 2-56 X 1/8 343-0122-000 AP	2	
	7	MS35338-134	2	WASHER LOCK, SST, 0.088 ID X 0.175 OD 310-0275-000 AP	2	
	8	563-4864-002	2	CLAMP	4	
	9	68NM40	2	NUT, SELF-LKG, HEX., AL, 4-40 72962 333-0347-000 AP	8	
	10	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	16	
	11	MS51957-16	2	SCREW, MACH SST, 4-40 X 7/16 343-0136-000 AP	8	
	12	412014	2	WAVEGUIDE ASSY 80006 355-0262-000	1	A
	12	90RU29-1K1	2	WAVEGUIDE ASSY 01456 255-0263-000	1	B
	3	563-9712-003	2	HUB	1	



Gimbal Assembly
Figure 5-19

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
5-19 - 14	MS51957-15	2	SCREW, MACH., SST, 4-40 X 3/8 343-0135-000 AP	2	
15	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	2	
16	F22NC1-40	3	NUT, SELF-LKG, CLINCH, CAD, PL STL, 4-40 72962 333-0262-000	2	
17	563-9711-003	3	HUB	1	
18	563-4860-002	2	SHOCK MOUNT	4	
19	P313-0046-00 0	2	NUT, PLAIN, HEX., SST, 8-32 77250 313-0046-000 AP	4	
20	310-0283-000	2	WASHER, LOCK, SST, 0.168 ID X 0.280 OD COML AP	4	
21	541-6060-002	2	SLEEVE AP	4	
22	310-0048-000	2	WASHER, FLAT, SST, 0.172 ID X 0.437 OD COML AP	12	
23	MS51957-47	2	SCREW, MACH., SST, 8-32 X 3/4 343-0191-000 AP	4	
24	563-9722-005	2	DISH BRACKET	1	
25	4-48X1-8 6SP LINEOVPT18-8 SST	2	SETSCREW, SST, 4-48 X 1/8 08664 335-0019-000 AP	2	
26	MS16555-627	2	PIN, STR, SST, 0.1253 DIA X 1/2 311-0811-000 AP	2	
27	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	2	
28	564-2689-002	3	BEARING	4	
29	563-4803-004	3	DISH	1	
30	563-4802-004	4	BRACKET, SUPPORT	2	
31	MS20426AD4-3	4	RIVET, SOLID, AL, 1/8 DIA X 1/4 305-1372-000 AP	4	
32	MS520470AD4-3	4	RIVET, SOLID, AL, 0.125 DIA X 3/16 305-1168-000 AP	2	
33	563-4801-004	4	BRACKET	2	
34	MS20470AD4-3	4	RIVET, SOLID, AL, 0.125 DIA X 3/16 305-1168-000 AP	8	
35	563-4800-004	4	DISH	1	
36	563-9719-005	2	GIMBAL, MODIFIED	1	
37	563-9718-005	3	BOSS, SIDE	2	
38	563-9717-005	3	GIMBAL	1	
5-20 - 0	563-9724-005	1	GEARTRAIN ASSY SEE FIG, 5-l8(82) FOR NHA	REF	
1	BZRW922A2	2	SWITCH 91929 266-7008-000 S2	1	
2	MS51957-20	2	SCREW, MACH., SST, 4-40 X 1 343-0141-000 AP	2	
2A	313-0132-000	2	NUT, PLAIN, HEX., SST, 4-40 COML EFF REV 13/N P/O KIT NO, 5 AP	1	A
2A	313-0132-000	2	NUT, PLAIN HEX., SST, 4-40 COML EFF REV 14/0 P/O KIT NO. 5 AP	1	B
3	310-0278-000	2	WASHER, LOCK, SST, 0.115 ID X 0.202 OD COML AP	2	
3A	4007-6HOTTIN NED	2	TERMINAL 77147 304-0016-000 EFF REV 13/N P/O KIT NO. 5 AP	1	A



Geartrain Assembly
Figure 5-20

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE		UNITS PER ASSY	USAGE CODE
5-20 - 3A	4007-6HOTTIN NED	2	TERMINAL 77147 304-0016-000 EFF REV 14/0 P/O KIT NO. 5 AP		1	B
4	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP		2	
4A	MS35649-44	2	NUT, PLAIN, HEX., SST, 4-40 313-0043-000 EFF REV 13/N P/0 KIT NO. 5 AP		1	A
4A	MS35649-44	2	NUT, PLAIN HEX., SST, 4-40 313-0043-000 EFF REV 14/0 P/0 KIT NO. 5 AP		1	B
5	P312-0019-00 0	2	STUD. CONTINUOUS THD, SST, 4-40 X 1-1/4 77250 312-0019-000 EFF REV 13/N P/O KIT NO. 5 AP		1	A
5	P312-0019-00 0	2	STUD, CONTINUOUS THD, SST, 4-40 X 1-1/4 77250 312-0019-000 EFF REV 14/0 P/O KIT NO. 5 AP		1	B
6	563-4877-002	2	KNOB		1	
7	563-4862-002	2	CAM		1	
8	335-0022-000	2	SETSCREW, SST, 6-40 X 1/8 COML AP FOR 6 AND 7		2	
9	S6632FRHHEP2 5G31	2	BEARING 40920 309-1467-000		1	
10	563-4834-003	2	STOP ASSY		1	
11	563-4833-003	3	CLAMP		1	
12	MS51957-14	3	SCREW, MACH., SST 4-40 X 5/16 343-0134-000 AP		2	
13	MS35338-135	3	WASHER, LOCK, SST, 0.115 ID X 0.212 OD 310-0279-000 AP		2	
14	563-4832-003	3	STOP		1	
15	R235-1A	2	RESOLVER 88818 229-0035-000	B4	1	
16	CS11B4	2	SYNCHRO 86197 229-0103-000	B3	1	
17	323-0108-000	2	SCREW, MACH., STL, 4-40 X 1/2 COML AP		1	
18	563-4861-002	2	CLAMP AP		1	
19	106064-337	2	CLAMP 06773 015-0977-000 AP		4	
20	563-4880-002	2	RESOLVER GEAR		2	
21	2-56X3-32 6S PLINE416SST	2	SETSCREW, SST, 2-56 X 3/32 08664 328-0050-00 AP		2	
22	S15F6	2	MOTOR 19070 230-0360-000	B5	1	
23	MS51959-13	2	SCREW, MACH., SST. 4-40 X 1/4 342-0044-000 AP		4	
24	540-9221-003	2	POST		1	
25	MS51959-28	2	SCREW, MACH., SST. 6-32 X 3/8 342-0062-000		1	
* 26	563-4804-004	2	PLATE		1	
* 27	MS51959-14	2	SCREW, MACH., SST, 4-40 X 5/16 342-0045-000 AP		4	
* 28	311-0783-000	2	PIN, STR, SST, 0.125 DIA X 1/4 COML		2	
29	757-0741-001	2	BUSHING		1	
30	757-0742-002	2	LINKAGE		1	
31	S614FCHHEP25 G31	2	BEARING 40920 309-1466-000		2	
32	S614FCHHEP25 G31	2	BEARING 4092G 309-1465-000		1	
33	563-4812-004	2	CRANK		1	
34	563-4808-004	3	SHAFT, BEARING		1	

*SEE ITEM NO. 68 FOR NEXT HIGHER ASSEMBLY

FIG-ITEM	PART NUMBER	INDENT.	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
5-20 - 35	563-4807-004	3	CRANK	1	
36	MS16562-192	3	PIN, SPG, SST. 0.062 DIA X 3/8 311-0419-000 AP FOR 34 AND 35	2	
37	563-4810-004	3	SHAFT	1	
38	S6632FRHHEP2 5G31	2	BEARING 40920 309-1467-000	1	
39	563-9716-004	2	CRANK	1	
40	563-9714-004	3	SHAFT, BEARING	1	
41	563-9713-004	3	CRANK	1	
42	MS16562-192	3	PIN, SPG, SST, 0.062 DIA X 3/8 311-0419-000 AP FOR 40 AND 41	2	
43	S614FCHHEP25 G31	3	BEARING 40920 309-1465-000	1	
44	563-9715-004	3	SHAFT	1	
45	563-4859-003	2	GEAR ASSY	1	
46	563-4858-003	3	SHAFT, BEARING	1	
47	563-4857-003	3	GEAR F	1	
48	MS16555-603	3	PIN, STR, SST. 00062b DIA X 5/16 311-0787-000 AP	1	
49	563-4856-003	3	SHAFT	1	
50	S8516FRHHEP2 5G31	2	BEARING 40920 309-1468-000	1	
51	S6632FRHHEP2 5G31	2	BEARING 40920 309-1467-000	1	
* 52	563-4804-004	2	PLATE	1	
* 53	MS51959-14	2	SCREW, MACH., SST, 4-40 X 5/16 342-0045-000 AP	4	
* 54	311-0783-000	2	PIN, STR, SST, 0.125 DIA X 1/4 COML	2	
55	563-4880-002	2	RESOLVER GEAR	1	
56	2-56X3-32 6S PLINE416SST	2	SETSCREW, SST. 2-56 X 3/32 08664 328-0050-000 AP	1	
57	S614FCHHEP25 G31	2	BEARING 40920 309-1466-000	2	
58	563-4852-003	2	GEAR COMPOUND	1	
59	563-4851-003	3	GEAR B	1	
60	563-4849-003	3	SHAFT	1	
61	563-4850-003	3	GEAR A	1	
62	563-4831-003	2	COMPOUND GEAR	1	
63	563-4829-003	3	GEAR C	1	
64	563-4828-003	3	SHAFT	1	
65	563-4830-003	3	GEAR D	1	
66	S614FCHHEP25 G31	2	BEARING 40920 309-1466-000	2	
67	563-4788-006	2	GEAR BOX	1	
68	563-4787-006	3	CASTING	1	
69	68NC3-40	4	NUT, SELF--LKG, CLINCH, AL, 4-40 72962 333-0199-000	7	
70	563-4786-006	4	CASTING	1	

*SEE ITEM NO. 68 FOR NEXT HIGHER ASSEMBLY

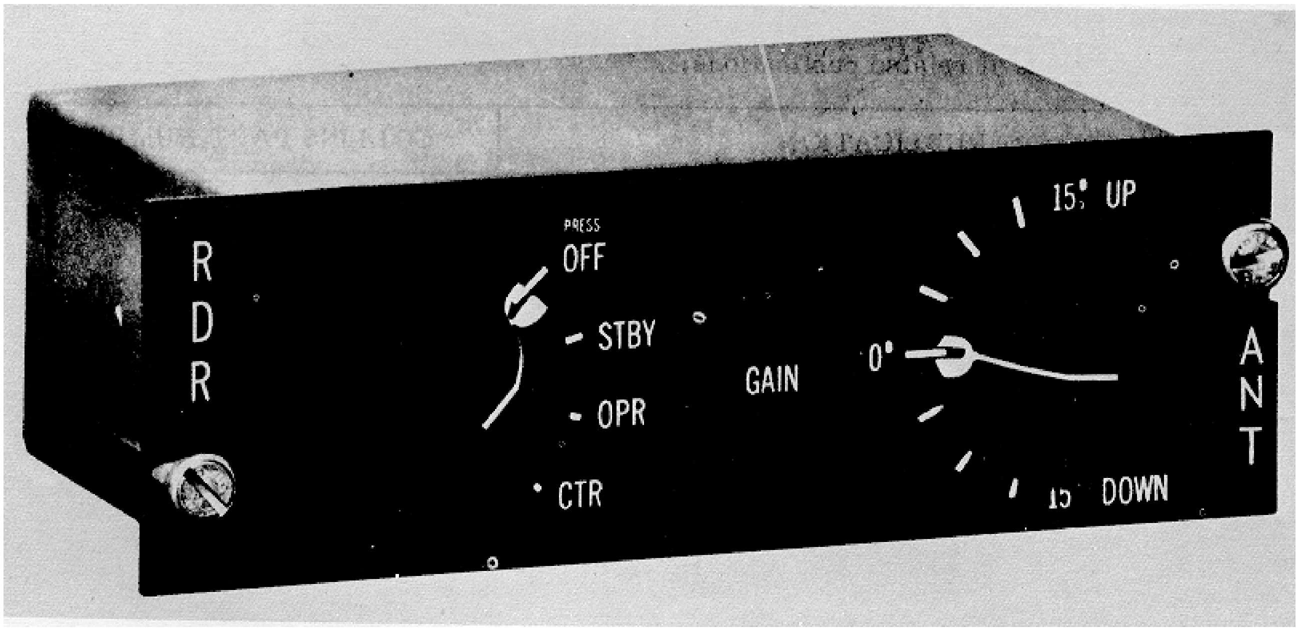
CHAPTER 6

CONTROL, RADAR SET

C-4881/APN-158

(561G-4)

NOTE: Control, Radar Set C-4881/APN-158 is referred to in this chapter by its commercial nomenclature, 561G-4 Cockpit Control Unit.



561G-4 Cockpit Control Unit, Overall View
Figure 6-1

Section I. DESCRIPTION AND OPERATION

6-1.

GENERAL.

This section presents the purpose of the equipment, equipment specifications, equipment description, and theory of operation. Figure 6-1 is an overall view of the 561G-4 Cockpit Control Unit. Figure 6-2 is a table of equipment covered in this manual

EQUIPMENT	COLLINS PART NUMBER
561G-4 Cockpit Control Unit	522-5883-004

Equipment Covered
Figure 6-2

6-2.

PURPOSE OF EQUIPMENT.

The 561G-4 Cockpit Control Unit provides remote control facilities for the WP-103 Weather Radar System.

6-3.

EQUIPMENT SPECIFICATIONS.

The 561G-4 Cockpit Control Unit specifications are listed in figure 6-3.

CHARACTERISTIC	SPECIFICATION
Power requirements	Supplied by the WP-103 Weather Radar System 374A-3 Receiver-Transmitter
Duty cycle	Continuous

Equipment Specifications (Sheet 1 of 2)
Figure 6-3

CHARACTERISTIC	SPECIFICATION
Ambient temperature range	-62 °C (-79. 6 °F) to +71 °C (+159 °F)
Ambient humidity range	95 percent relative humidity at +55 °C (+131 °F)
Shock conditions	
Performance criteria	Eighteen 10 millisecond shocks at 7.5 g
Safety criteria	Six 10 millisecond shocks at 15 g
Vibration	0.030 in. total excursion at 10 to 55 Hz and 1.5 g peak acceleration at 55 to 500 Hz

Equipment Specifications (Sheet 2 of 2)
Figure 6-3

6-4.
EQUIPMENT DESCRIPTION.

A. General.

This section presents a mechanical and electrical description and a description of -he external operating controls for the 561G-4 Cockpit Control Unit.

B. Mechanical Description.

The 561G-4 Cockpit Control Unit consists of three controls and a panel illumination lamp mounted on an engraved aluminum panel and housed in a one-piece dust cover. The unit provides three separate controls for remotely controlling the WP-103 Weather Radar System. The 561G-4 provides a switch for OFF, STBY (standby), OPR (operate), and CTR (contour) modes of operation; a potentiometer for GAIN control; and a synchro for antenna elevation control. The unit is designed for overhead panel or pedestal mounting.

C. Electrical Description.

The electrical description is presented in paragraph B above.

D. Operating Controls.

The operating controls are described in paragraph B above.

6-5. THEORY OF OPERATION.

A. General.

This section presents a detailed theory of operation for the 561G-4 Cockpit Control Unit.

B. Detailed Theory of Operation. (Refer to figure 6-4.)

(1) General.

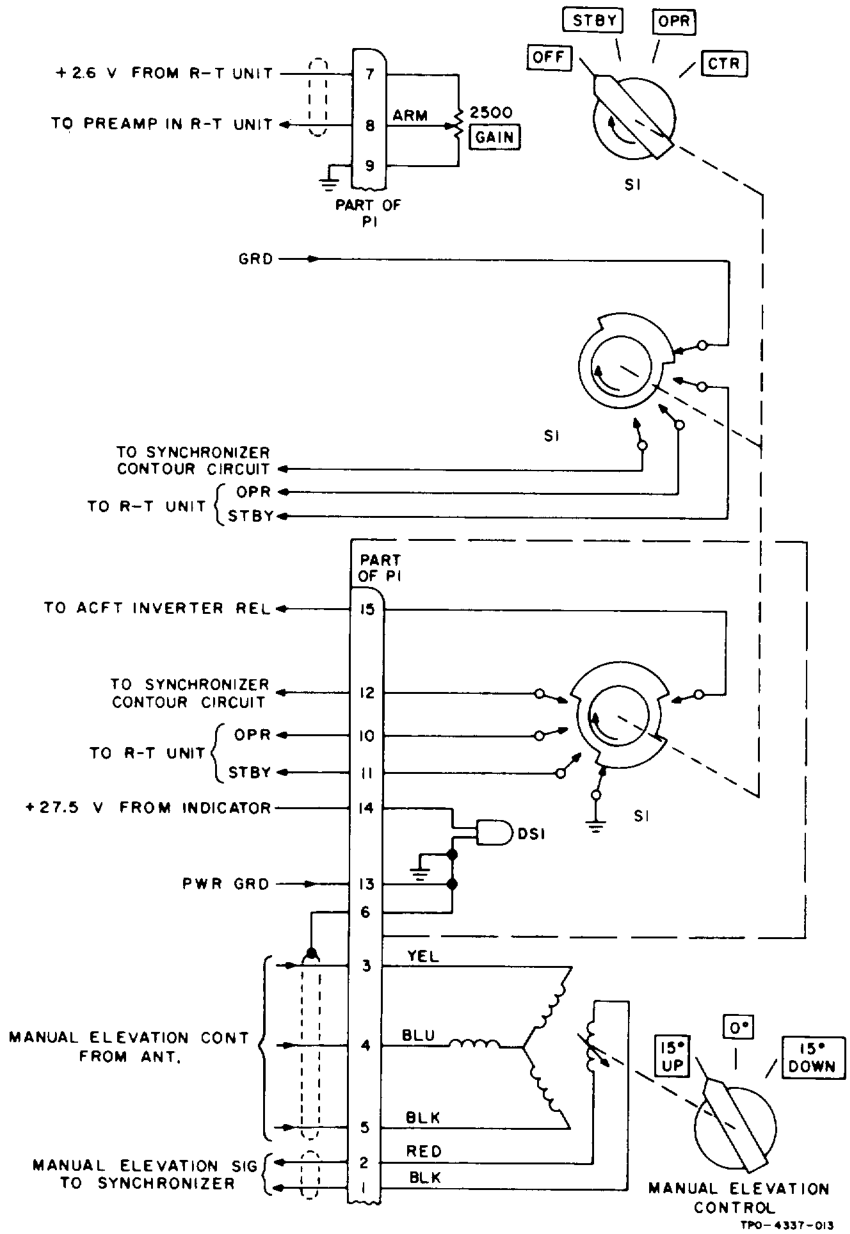
The 561G-4 provides remote control facilities for the WP-103 Weather Radar System.

(2) 561G-4 Cockpit Control Unit.

The 561G-4 Cockpit Control Unit enables the operator to control the gain of the receiver if. preamplifier, the application of primary power, and the elevation of the antenna. Switch S1 controls the application of primary power in the system. Ground is applied to the switch at all times. In the OFF position, the switch does not make contact with any of the remaining contacts, and there is no output. When the switch is in the STBY (standby) position, ground is applied through the switch to the standby relay in the receiver-transmitter unit. When the switch is in the OPR (operate) position, ground is applied through the switch to both the standby and operate relays in the receiver-transmitter unit. When the switch is in the CTR (contour) position, ground is applied through the switch to both the standby and operate relays in the receiver-transmitter unit and to the video driver module in the synchronizer. When S1 is in any position except OFF, ground is applied to the aircraft inverter relay. The GAIN potentiometer controls the gain of the if. preamplifier. Positive 15 volts from the receiver-transmitter unit is applied to the high side of the 2500-ohm GAIN potentiometer. The low side of the potentiometer is connected to ground. Varying the GAIN control varies the wiper arm voltage that is coupled to the receiver-transmitter unit to control the gain of the if. preamplifier.

The manual elevation control allows the operator to position the antenna from 15 degrees above to 15 degrees below the horizontal attitude. A 400-cps control voltage from the tilt synchro transmitter in the antenna is applied to the 3 stator windings of the manual elevation control. The control voltage corresponds to the actual physical tilt of the antenna. When the rotor of the manual elevation control synchro corresponds to the physical position of the antenna, no voltage is induced into the rotor winding. When the rotor does not correspond to the physical position of the antenna, an error signal is induced into the rotor. The error signal is applied to the elevation servo-amplifier module in the synchronizer as a correction signal, and the antenna position will change until the error signal is reduced to zero.

Positive 27.5 volts is supplied from the indicator to illuminate DS1.



561 G-4 Cockpit
Control Unit, Schematic Diagram
Figure 6-4

Section II. MAINTENANCE

6-6. DISASSEMBLY.

Disassembly of the 561G-4 Cockpit Control Unit is obvious, and no detailed explanation is necessary. Follow the necessary precautions given in the disassembly sections of the other chapters.

6-7. CLEANING.

Clean the 561G-4 Cockpit Control Unit in accordance with the applicable procedures given in the cleaning sections of the 374A-3 Receiver-Transmitter and the 537F-7 and 537F-8 Antenna chapters.

6-8. INSPECTION/CHECK.

Inspect the 561G-4 Cockpit Control Unit in accordance with the applicable procedures given in the inspection/check sections of the 374A-3 Receiver-Transmitter and the 537F-7 and 537F-8 Antenna chapters.

6-9. REPAIR.

Repair the 561G-4 Cockpit Control Unit in accordance with the applicable procedures given in the repair sections of the 374A-3 Receiver-Transmitter and the 537F-7 and 537F-8 Antenna chapters.

6-10. ASSEMBLY.

Assembly of the 561G-4 Cockpit Control Unit is obvious, and no detailed explanation is necessary. Follow the necessary precautions given in the assembly sections of the other chapters.

Section III. TESTING

6-11. GENERAL.

This section presents the procedures for testing the cockpit control unit using the 978G-1 Radar Test Set. These procedures are presented in tabular form in figure 6-5.

When a malfunction is indicated, some possible causes are referenced at the appropriate test in the POSSIBLE TROUBLE AREA column. After a malfunction is corrected, the unit should be tested again to verify that repairs have not affected normal operation.

For a detailed description and maintenance instructions for the radar test set, refer to the applicable service manual.

6-12. TEST PROCEDURES.

(1) Use of Test Procedures.

Procedures to be observed in using the test procedures follow.

(a) Switches not on the test set subpanel in use are not referenced and may be in any position.

(b) The correct position of all test set switches applicable to the tests are listed at the top of the 978G-1 INSTRUCTIONS column on each page. Necessary changes of switch positions are noted at the appropriate test step. All other switches are to remain in their last referenced position.

(c) The RESULT column lists the indications of a properly functioning unit.

(d) The POSSIBLE TROUBLE AREA column lists troubleshooting areas for a malfunction indicated by the appropriate test.

(2) Test Setup.

Using the cable supplied, connect J1 on the 561G-4 Cockpit Control Unit to the EXTERNAL CONTROL UNIT connector on the 978G-1 Radar Test Set. Connect the radar test set to primary power.

<u>CAUTION</u>: DO NOT OPERATE THE 978G-1 RADAR TEST SET FROM PRIMARY POWER THAT IS NOT 115 VOLTS ±5 PERCENT, 400 HZ +5 PERCENT. DAMAGE TO THE EQUIPMENT WILL RESULT.

Set the 978G-1 AC POWER switch to ON, and adjust the INPUT VOLTAGE ADJUST control for 115 +1 volts as indicated on the INPUT POWER meter. Note that the frequency is 400 +5 Hz as indicated on the INPUT FREQUENCY meter. Proceed to the tests outlined in figure 6-5.

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
1.	Function switch	TEST SET FUNCTION SELECTOR -- ANT-ENNA/INDICATOR/ CONTROL UNIT TESTS; CONTROL UNIT TEST subpanel, CONTROL UNIT SELECTOR -- EXT TEST	System control switch (on con-. trol unit) -- STBY.	STANDBY lamp lights. <u>NOTE</u>: **If system control switch has de- tent at OFF position, INVERT- ER RE- LAY lamp lights in STBY, OPR, and CTR posi- tions.**	Switch S1.
			System control switch -- OPR.	OPERATE lamp lights.	Switch S1.
			System control switch -- CTR.	CONTOUR lamp lights.	Switch S1.
2.	Receiver gain	CONTROL UNIT TEST subpanel, TEST FUNCT-ION -- RCVR GAIN	Position GAIN control (on control unit) to counterclock- wise stop.	TEST METER indicates 2.6 ±0.2 v.	Potentiometer R1 +15 v from receiver- transmitter.
			Position GAIN control to clockwise stop.	TEST METER indicates not more than ' 2.0 v.	Potentiometer R1.

561G-4 Cockpit Control Unit Test Procedures
Using the 978G-1 Radar Test Set (Sheet 1 of 2)
Figure 6-5

STEP	TEST	978G-1 INSTRUCTIONS	PROCEDURE	RESULT	POSSIBLE TROUBLE AREA
3.	Elevation control	CONTROL UNIT TEST subpanel, TEST FUNCT-ION -- ELEV COARSE ADJ 8V	Set ELEVATION control (on control unit) to 0.	TEST METER indicates 8.0 ±0.5 v.	Misalignment of synchro. If necessary, loosen screws hold-ing elevation synchro and rotate synchro for correct indica-tion.
		CONTROL UNIT TEST subpanel, TEST FUNCT-IONS -- ELEV COARSE ADJ 5V		TEST METER indicates 5.0 ±0.5 v.	Misalignment of synchro. If necessary, rotate synchro 180 degrees and repeat 8- and 5v adjust test.
		CONTROL UNIT TEST subpanel, TEST FUNCT-ION -- ELEV FINE ADJ (1 VAC)		TEST METER indicates less than 50 mv.	Misalignment of synchro. If necessary, rotate synchro for null indication of less than 50 mv.
			Secure synchro in place.	Ensure that null reading remains at voltage ob-tained in step above.	

561G-4 Cockpit Control Unit Test Procedures
Using the 978G-1 Radar Test Set (Sheet 2 of 2)
Figure 6-5

Section IV. STORAGE INSTRUCTIONS

Before storing, clean dirt, grease, and moisture from the 561G-4 Cockpit Control Unit. Store the unit in a clean, dry area where the possibility of impact damage is minimized. If the equipment is to be stored for an extended period, place the unit in the original shipping cartons.

Section V. ILLUSTRATED PARTS LIST

NOTE: This Illustrated Parts List is furnished for parts location information only. Do not use for provisioning purposes.

6-13. GENERAL.

This Illustrated Parts List is a complete list of parts for the 561 G-4 Cockpit Control-Unit manufactured by Collins Radio Company.

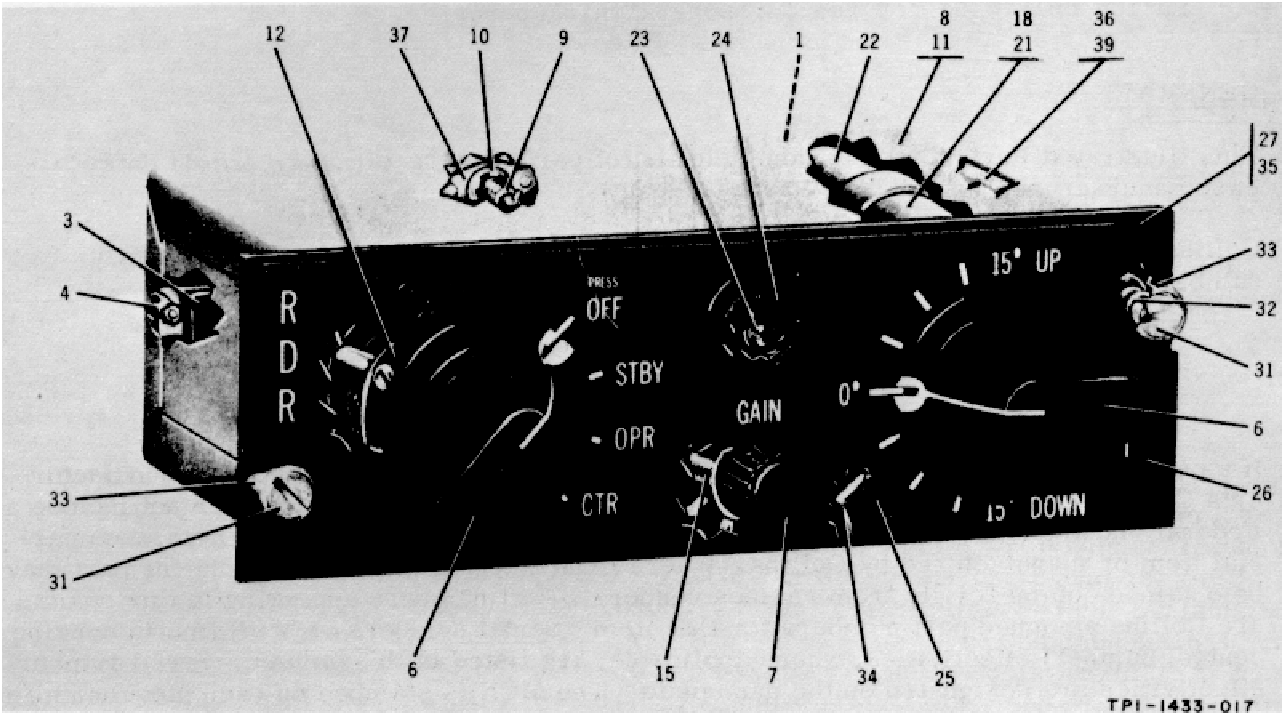
Collins Radio Company part numbering system is comprised of a three-digit family number, a four-digit serial number, and two- or three-digit dash number:

FAMILY NO.	SERIAL NO.	DASH NO.
XXX	XXXX	XX or XXX

If a part is purchased by Collins Radio Company from a vendor, the Federal Manufacturer's Code Number is listed in the nomenclature column. If this column does not include a Federal Manufacturer's Code Number, the item is either a MIL approved item, commercial item or manufactured by Collins. Where COML appears in this column, the part may be obtained commercially from various vendors. Part numbers appearing in this column are Collins assigned part numbers for that item. Serial numbers or MCN (manufacturing control number) effectivities, where applicable, are listed in this column. Serial number effectivities are designated on the nameplate. The MCN is stamped on each module and/or chassis. Changes made from service bulletins are so indicated by SB1, SB2, etc.

6-14. PARTS LOCATION.

Parts location for Control, Radar Set C-4881/APN-158 is contained in figure 6-6.



Cockpit Control Unit 561G-4
Figure 6-6

FIG.-ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
6-6 - 0	522-5883-004	1	561G-4 RADAR CONTROL UNIT	1	
1	280-1254-000	2	PLATE, IDENT 12998	1	
- 2	MS16535-65	2	RTVET, TUBULAR, BRS, 0.089 DIA X 0.156 305-1744-000 AP	4	
3	DA15P	2	CONNECTOR 71785 371-0020-000 J1	1	
4	4007-4HOTTIN NED	2	TERMINAL 77147 304-0015-000	1	
- 5	CA20418-4	2	SCREW, ASSEMBLED CLIP 71468 371-0062-000 AP FOR 3 AND 4	2	
6	MS25169P2B	2	KNOB 281-0612-010	2	
7	MS91528-ON1B	2	KNOB 281-0384-000	1	
8	556-9944-007	2	COVER ASSY	1	
9	2600-1	3	STUD 71286 012-1968-000	1	
10	2600LW	3	PUSH ON NUT 71286 012-9019-000	1	
11	556-9944-003	3	COVER	1	
12	242703F1	2	SWITCH 76854 259-2414-010 S1	1	

FIG.- ITEM	PART NO.	INDENT	NOMENCLATURE	UNITS PER ASSY	USAGE CODE
15	RV5NAXSD252B	2	RESISTOR, VAR, COMP, 2.5K, 20% 1/2W 380-6902-000 R1	1	
- 16	P334-0266-00 0	2	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 77250 334-0266-000 AP	1	
- 17	1214-05	2	WASHER, LOCK, CAD. PL STL, 0.267 ID X 0.408 OD 78189 373-0087-000 AP	1	
18	563-5048-002	2	SYNCHRO ASSY B1	1	
19	P313-0064-00 0	2	NUT, PLAIN, HEX., SST, 3/8-32 77250 313-0064-000 AP	1	
20	1720-02	2	WASHER, LOCK, SST, 0.391 ID X 0.507 OD 78189 373-0085-000 AP	1	
21	563-5049-002	3	GEAR HEAD, SYNCHRO	1	
22	TTC11F40	3	SYNCHRO 86197 229-0113-000	1	
23	MS25237-327- 15	2	LAMP 262-1106-000 DS1	1	
24	TT61	2	LIGHT 72619 262-9007-000	1	
25	556-9879-001	2	OVERLAY	1	
- 26	3675-6R6-373 5	2	SCREW, FASTENER, CAD. PL STL, 6-32 X 3/8 18412 330-2888-000 AP	2	
27	556-9944-005	2	PLATE ASSY	1	
- 28	MS21044N04	2	NUT, SELF-LKG, HEX., STL, 4-40 333-0344-000 AP	4	
- 29	310-0045-000	2	WASHER, FLAT, SST, 0.125 ID X 0.312 OD COML AP	4	
30	AN507-440R5	2	SCREW, MACH., CAD. PL STL, 4-40 X 5/16 330-2447-000 AP	4	
31	PF3 1-2CADPL	3	STUD 72794 012-1521-000	2	
32	PS3 1-2CADPL	3	SPRING 72794 012-1522-000	2	
33	PC3 1-2CADPL	3	CUP 72794 012-1523-000	2	
34	NCN6-1-4	3	NUT, CAPTIVE, SST, 6-32 07886 334-0428-000	2	
35	556-9944-001	3	PLATE	1	
36	556-9944-006	2	CHASSIS ASSY	1	
37	212-12	3	RECEPTACLE 71286 012-9017-000	1	
- 38	MS20426AD3-4	3	RIVET, SOLID, AL 3/32 DIA X 1/4 305-1362-000 AP	2	
39	556-9944-002	3	CHASSIS	1	

CHAPTER 7
DEPOT OVERHAUL STANDARDS

7-1. Applicability of Depot Overhaul Standards

The tests outlined in this chapter are designed to measure the performance capability of repaired equipment. Equipment that is to be returned to should meet the standards given in these tests.

7-2. Applicable References

A. *Repair Standards.* Applicable procedures of the depots performing these tests, and the general standards for repaired electronic equipment given in TB SIG 355-1, TB SIG 355-2, and TB SIG 355-3 form a part of the requirements for testing this equipment.

B. *Technical Publication.* TM 11-6625-664-12, is also applicable to this equipment.

7-3. Test Facilities Required

Use the following equipment (or suitable equivalent to determine compliance with requirements of this specific standard.

Test equipment	Stock No.	Quantity Req	Technical manual
Test Sets, Radar AN/APM-246 and AN/APM-247	--------------------	1	TM 11-6625-664-12
Pulse Generator AN/PPM-1A	--------------------	1	TM 11-2678
Radar Test Set AN/UPM-56	665-643-4346	1	
Multimeter AN/USM-223	6625-553-0142	1	
Signal Generator AN/USM-44A	6625-539-9685	1	TM 11-6625-508-10
Oscilloscope AN/USM-281A	6625-053-3112	1	
Echo Box TS-488A/UP (outside antenna preferred)	6625-519-7594	1	TM 11-6625-220-10
Maintenance Kit, Electronic Equipment MK-774/APN-158	5841-868-8232	1	TM 11-5841-259-12
Dummy Load, Electrical DA-383/APN-158	6625-923-1090	1	
Adapter UG-201A/U	5935-258-7429	2	
Adapter UG-273/U	5935-149-3534	3	
Cable Assembly, Radio frequency CG-1464/U (4 ft)	5995-931-1047	7	
Cable Assembly, Special Purpose CX-10091/APN-158	5995-926-0842	1	
Lead, Test CX-10092/APN-158	6625-930-7952	2	
Prod, Test MX-6639/APN-158	6625-923-1089	1	
Adapter, Test MX-6637/APN-158	6625-926-7679	1	
Antenna Fixture MX-6640/APN-158	6625-923-1029	1	
Extender Module MX-6424/APN-158.			
Receiver-Transmitter RT-711/APN-158	5841-082-3538	1	
Synchronizer, Electrical SN-358/APN-158	5841-082-3545	1	
Antenna AS-1642/APN-158	5841-082-3803	1	
Indicator, Azimuth-Range IP-724/APN-158	5841-082-3544	1	
Control, Radar Set C-4881/APN-158	5841-082-3540	1	

7-4. General Test Requirements, Radar Set AN/APN-158

Most of the tests for Radar Set AN/APN-158 will be performed under the conditions listed below and as illustrated in figures 7-1 through 7-7. Testing will be simplified if connections and panel control settings are made initially and modifications made as required for the individual tests. Set the AN/APM-247 controls as follows:

A. AC POWER switch to OFF.

B. METER MULTIPLIER switch to X10.

C. INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OFF.

D. INPUT VOLTAGE ADJUST control fully counterclockwise.

E. RECEIVER TRANSMITTER TESTS-TEST FUNCTION switch to OFF.

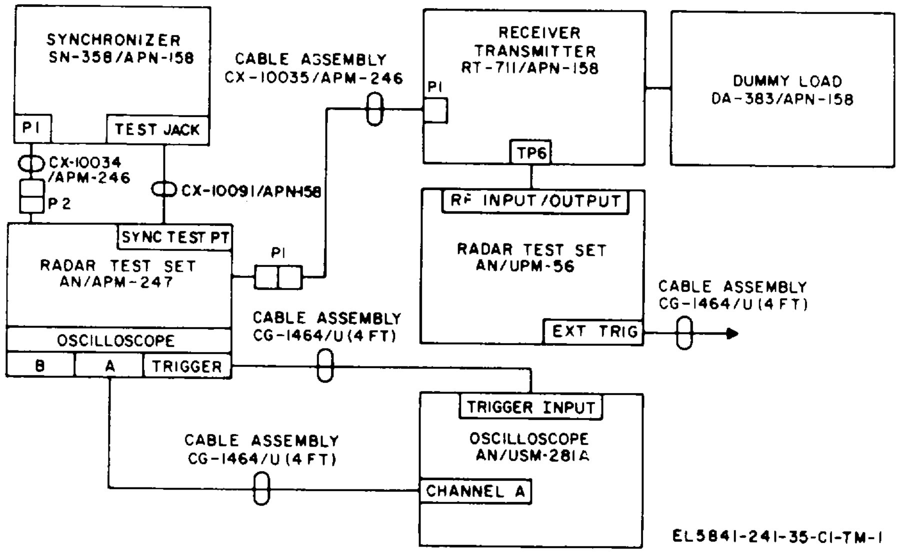


Figure 7-1. Testing Receiver-Transmitter RT- 711/APN-158, block diagram.

F. SYNCHRONIZER TESTS-TEST FUNCTION switch to OFF.

G. ANTENNA TESTS switch to OFF.

H. GYRO SIMULATOR switch to OFF.

I. CONTROL UNIT TESTS-CONTROL UNIT SELECTOR switch to INT.

J. Connect Electrical Power Cable Assembly CX-10029,/APM-2,47 to 115 volts, 400 Hertz (Hz).

7-5. Receiver-Transmitter RT-711 /APN-158 Tests

Interconnect the equipment as shown in figure 7-1. Perform the procedures given below to check out the circuits in the RT-711/APN-158. All control settings are for the AN/APM-247, unless indicated otherwise.

A. *Input Voltage and Frequency Check.*

(1) Set the RT-711 ’APN-158 RF switch to OFF.

(2) Set the AC POWER switch to ON; the AC POWER lamp should light.

(3) Set the INPUT VOLTAGE ADJUST control for 115 ± 1.0 volts as indicated on the INPUT VOLTAGE meter.

(4) The INPUT FREQUENCY meter should indicate 400 ± 5 Hz.

B. *Control Circuit Checks.*

CAUTION

Be sure that dummy load, electrical DA-383/APN-158 is connected to the waveguide output of the RT-711/APN-158.

(1) Set the TEST SET FUNCTION SELECTOR switch to RECEIVER TRANSMITTER TESTS.

(2) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY. The STANDBY RELAY lamp should light and the RT-711/APN-158 blower should operate.

(3) Set the RT-711/APN-158 meter switch to GEN A, GEN B, and GEN C, in sequence; the meter should indicate 5.0 ± 1.0.

(4) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE; the OPERATE RELAY lamp should light.

(5) Remove top cover from the RT-711/APN-158. The OPERATE RELAY lamp should extinguish.

(6) Pull interlock switch S1, located at the top rear of the RT-711/APN-158, all the way up; the OPERATE RELAY lamp should light.

(7) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL to OFF.

C. *Operating Voltage Checks.*

(1) Set Oscilloscope AN/USM-281A (oscilloscope) for operation on channel A using negative trigger.

(2) Set the RECEIVER TRANSMITTER TESTS-TEST FUNCTION switch to RELAY POWER.

(3) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY: the TEST METER should indicate within the green area.

(4) Set the METER MULTIPLIER switch to X1. The TEST METER should indicate -27.0 ± 3.0 volts.

(5) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE.

(6) Set the METER MULTIPLIER switch to X10.

(7) Set the RECEIVER TRANSMITTER TESTS-TEST FUNCTION switch to -27V. The TEST METER should indicate within the green area.

(8) Set the METER MULTIPLIER switch to the X1. The TEST METER should indicate between -24.0 and -28.5 volts.

(9) The peak-to-peak ripple should be not more than 0.06 volt peak-to-peak as measured on the oscilloscope.

(10) Set the RT-711,/APN-158 meter switch -27.5V. The RT-711/APN-158 meter should 5.0 ±+1.0.

(11) Set the METER MULTIPLIER switch to X10.

(12) Set the RECEIVER TRANSMITTER TESTS-TEST FUNCTION switch to +27.5V. TEST METER should indicate within the green area.

(13) Set the METER MULTIPLIER switch to XI. The TEST METER should indicate between +27.4 and +27.6 volts. If necessary, remove the front cover of the RT-711/APN-158 and adjust R24 for a proper indication.

(14) Hold the FAULT SENSING +27.5V NORMAL LOAD switch to NORMAL LOAD. The TEST METER should read between +27.3 and +27.6 volts.

(15) The indications obtained in (13) and (14) above should be within 0.1 volt of each other.

(16) While holding the FAULT SENSING +27.5V NORMAL LOAD switch to NORMAL LOAD, measure the peak-to-peak ripple displayed the on oscilloscope. It should be not more than 0.03 volt peak-to-peak. Release the FAULT SENSING + 27.5V switch.

(17) Set the RT-711/APN-158 meter switch to +27.5V. The meter should indicate within 5.0 ± 1.0.

(18) Set the METER MULTIPLIER switch to X10.

(19) Set the RECEIVER TRANSMITTER TESTS-TEST FUNCTION switch to + 250V. The TEST METER should indicate within the green area.

(20) Set the METER MULTIPLIER switch to X1. The TEST METER should indicate between +250 and +270 volts.

(21) Hold the FAULT SENSING +250V SAFE LOAD switch to SAFE LOAD. The TEST METER should indicate between +245 and +266 volts.

(22) The indications obtained in (20) and (21) above should be within 5.0 volts of each other.

(23) While holding the FAULT SENSING +250V SAFE LOAD switch to SAFE LOAD, measure the peak-to-peak ripple displayed on the oscilloscope; it should be not more than 0.85 volt peak-to-peak. Release the FAULT SENSING +250V SAFE LOAD SWITCH.

(24) Set the RT-711/APN-158 meter switch to +250V. The meter should indicate 5.0 ± 1.0.

(25) Set the METER MULTIPLIER switch to X10.

D. *Fault Sensing Circuits.*

(1) Connect Lead, Test CX-10092/APN-158 between the FAULT SENSING TEST VOLTAGE jack and fault sensing terminal board TB3 terminal 10 in the RT-711/APN-158. THE OPERATE RELAY lamp should extinguish.

NOTE

If the OPERATE RELAY lamp does not extinguish select the highest value for R2 on TB3 in the RT-711/APN-158 that will cause the lamp to extinguish.

(2) Remove the Lead, Test CX-10092/APN-158 from TB3 and the FAULT SENSING TEST VOLTAGE jack.

(3) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY, and to OPERATE. The OPERATE RELAY should light.

(4) Momentarily set the FAULT SENSING +27.5V SAFE LOAD switch to SAFE LOAD.

The OPERATE RELAY lamp should remain lighted.

(5) Momentarily set the FAULT SENSING +27.5V OVER LOAD switch to OVER LOAD. The OPERATE RELAY lamp should extinguish.

(6) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY, and then to OPERATE. The OPERATE RELAY lamp should light.

(7) Momentarily set the FAULT SENSING +27.5V OVER VOLTAGE switch to OVER VOLTAGE. The OPERATE RELAY lamp should extinguish.

(8) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY, and then to OPERATE. The OPERATE RELAY lamp should light.

(9) Momentarily set the FAULT SEINSING +250V SAFE LOAD switch to SAFE LOAD. The OPERATE RELAY lamp should remain lighted.

(10) Momentarily set the FAULT SENSING +250V OVER LOAD switch to OVER LOAD. The OPERATE RELAY lamp should extinguish.

(11) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY, and then to OPERATE. The OPERATE RELAY lamp should light.

E. *Gate and Thyratron Trigger Pulses.*

(1) Set the RECEIVER TRANSMITTER TESTS-TEST FUNCTION switch to TRIGGER.

(2) Measure the ampliture and risetime of the trigger pulse displayed on the oscilloscope. The amplitude should be not less than -29.5 volts with a width of from 50 to 150 microseconds measured at the 50%, voltage level.

(3) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY.

WARNING

The thyratron tube may be extremely hot.

(4) Remove the thyratron tube from the RT-711 APN-158.

(5) Remove the RT-711/APN-158 bottom cover.

(6) Disconnect Cable Assembly, Radio Frequency CG-1464/U from channel A of the oscilloscope and connect a standard probe from channel A of the oscilloscope to pin 3 of the thyratron tube socket in RT--711/APN-158.

(7) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE.

(8) The amplitude of the pulse displayed on the oscilloscope should be not less than 300 volts, with a risetime of not more than 1.4 microsecond, a falltime of not more than 4.0 microseconds, and a pulse width of not more than 4.5 microseconds.

(9) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY.

(10) Disconnect the probe and reinstall the thyratron tube in its socket.

(11) Reconnect the CG-1464/U to channel A of the oscilloscope.

F. *KA-TR Voltage Checks.*

(1) Set the AC POWER switch to OFF.

(2) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OFF.

(3) Remove the high voltage cap from the TR tube in the RT-711/APN-158.

(4) Connect Lead, Test CX-10092/APN-158 from the KA-TR TEST LEAD jack to the high voltage cap.

(5) Set the RECEIVER TRANSMITTER TESTS-TEST FUNCTION switch to KA-TR.

(6) Set the METER MULTIPLIER switch to X10.

(7) Set the AC POWER switch to ON.

(8) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY. The TEST METER should indicate within the green area.

(9) Set the METER MULTIPLIER to X1. The TEST METER should indicate -700 ± 100 volts. Set the AC POWER switch and the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OFF.

(10) Disconnect the free end of the CS-10092/APN-158 from the high voltage cap.

(11) Connect Adapter, Test MX-6637/APN-158 between the TR tube cap and the high voltage cap.

(12) Connect the CX-10092/APN-158 to the metal portion of the MX-6637/APN-158.

(13) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY.

(14) Set the AC POWER switch to ON. The TEST METER should indicate between -200 and -375 volts.

(15) Remove the CX-10092/APN-158 form the MX-6637/APN-158. Set the RT-711/APN-158 meter switch to KA. The meter should indicate 5.0 ± 1.0.

NOTE

On some units, the meter switch does not have a KA position.

(16) Set the AC POWER switch and the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OFF.

(17) Remove Adapter, Test MX-6637/APN-158 and replace the high voltage cap on the TR tube.

NOTE

It is necessary to perform the procedures given in G below unless the magnetron or associated circuitry has been repaired; perform only G(6), (7), and (11) below to check time relay.

G. *Filament Voltage Check and Thermal Time Delay.*

(1) Set the TEST FUNCTION SELCTOR switch to ANTENNA/INDICATOR CONTROL UNIT TESTS.

(2) Set the ANTENNA TEST switch to TRIM ADJ.

(3) Connect Leads, Test CX-10092/APN-158 from ANTENNA TEST LEADS jacks to terminals 4 and 6 fo pulse transformer T7 in RT-711/APN-158.

NOTE

Probes must go through potted material. Potting material must be resealed when test is completed.

(4) Set the METER MULTIPLIER switch to X10.

(5) Remove the trigger generator module from the RT-711/APN-158.

(6) Set the RT-711/APN-158 RF switch to ON.

(7) Set the AC POWER switch to ON.

WARNING

TB1 terminals have 115 volts (ac) present when the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch is to STANDBY.

(8) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY.

(9) Set METER MULTIPLIER switch to X1. The TEST METER should indicate 6.3 ± 0.2 volts. If necessary, move the jumper on TB10 in the bottom of the RT-711/APN-158 (TB1 on units with order No. 34845-PM-64 serial numbers 77 and above, Collins serial numbers 2521 and above).

(10) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OFF.

(11) Note the time; then set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE. The elapsed time until the OPERATE RELAY lamp lights should be 4.0 ± 1 minutes. The TEST METER should indicate 4.2 volts -0.1 and +0.2 volts.

NOTE

Adjust jumper wire on TB1 or TB10 in RT-711/APN-158 (whichever is applicable) for best compromise between a TEST METER indication of 6.3 volts with the INTERNAL CONTORL UNIT-SYSTEM CONTORL switch set to STANDBY, and for a TEST METER indication 4.2 - 0.1 and +0.2v with INTERNAL CONTROL UNIT-SYSTEM CONTROL switch set to OPERATE.

(12) Set the INTENAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY.

(13) Remove the test leads.

(14) Set the TEST SET FUNCTION SELECTOR switch to RECEIVER TRANSMITTER TESTS.

(15) Replace the trigger generator module in the RT-711/APN-158.

H. *Magnetron Pulse.*

(1) Disconnect the CG-1464/U from the OSCILLOSCOPE A jack and connect it to TP4 on RT-711/APN-158.

(2) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE.

NOTE

The time delay may note have engaged at this time. The elapsed time must be 4 ± 1 minutes since (1) above.

(3) Measure the amplitude and pulse width of the pulse displayed on the oscilloscope; the amplitude should be from +60 to +92.5 volts, and the pulse width form 2.1 to 2.5 microseconds wide at the 50% amplitude points.

(4) Set the RT-711/APN-158 meter switch to MAG. The RT-711/APN-158 meter should indicate between 4 and 6.

I. *Transmitter Peak Power.*

(1) Set the AN UPM-56 POWER switch to ON.

NOTE

Prior to using the AN/UPM-56, allow a 1-hour warmup.

(2) Set the AN/,UPM-56 for power measurement. Refer to the applicable technical manual for AN, UPM-56 operation.

(3) Set the TEST SET FUNCTION SELECTOR switch to RECEIVER TRANSMITTER TESTS.

(4) Set the RT-711, APN-158 RF switch to ON.

(5) With the AN UPM-56, measure the power output.

(6) Compute the average power output by adding the RT-711/APN-158 directional coupler loss, the AN/UPM--56 RF LEVEL meter setting, and the cable loss connecting the AN/UPM-56 RF INPUT/OUTPUT connector to TP6 on the RT-711/APN-158. The total should be approximately +43 decibels (referred to 1 milliwatt in 600 ohms) (dbm) or more. (+43 dbm = approximately 20 watts average power.)

(7) Measure and record the magnetron pulse width with the oscilloscope.

(8) Calculate the peak power as follows:

$$\text{Peak power (kilowatts} = \frac{\text{Average power x 1000}}{\text{Pulse width (microseconds) x PRF}}$$

The minimum acceptable peak power output is 20 kilowatts.

J. *Transmitter Frequency Measurement.*

(1) Adjust the AN/UPM-56 FREQUENCY meter slowly for maximum RF POWER meter dip. The frequency should be 9,375 ±40 mega-hertz as indicated on the AN/UPM-56 FREQUENCY scale.

(2) With the INPUT VOLTAGE ADJUST control, vary input voltage from 105 to 125 volts ac as indicated on the INPUT VOLTAGE meter. While varying the voltage, monitor the pulse displayed on the oscilloscope. The pulse should be steady and show no signs of arcing or moding. Arcing is indicated by large increases in pulse current, and moding is indicated by a smaller change in pulse current from pulse to pulse, or during a single pulse.

K. *Afc Mixer Output.*

(1) Set the RECEIVER TRANSMITTER TESTS-TEST FUNCTION switch to AFC MIXER. Disconnect the CG-1464/U from TPP4 on the RT-711/APN-158 and connect it to OSCILLOSCOPE A.

(2) Disconnect the coaxial jumper from the AFC SYNC jack and connect it to the MIXER TEST jack.

(3) Adjust the KLYSTRON REPELLER VOLTAGE ADJUST control for an indication of - 185 volts on the TEST METER (-175 volts for RT-711/APN-158 units without a KLYSTRON ADJUST potentiometer (R71)).

(4) Set the RT-711,'APN-158 meter switch to AFC.

(5) Turn the RT-711/APN-158 klystron mechanical tuning control to clockwise stop.

(6) Mechanically tune the klystron, slowly counterclockwise for maximum amplitude pulse as observed on the oscilloscope.

(7) Again, mechanically tune the klystron, slowly, counterclockwise for a second maximum ampliture negative pulse as observed on the oscilloscope. The pulse amplitude should be 10 ± 0.5 volts. If necessary, extend the RT-711/APN-158 trigger generator module with Extender Module MX-6424/APN-158. Insert a screwdriver through the hole in the MX-6424/APN-158 and adjust the attenuator for the proper amplitude signal.

L. *Crystal Current Check.*

(1) Set the RT-711/APN-158 meter switch to FWD. The RT-711/APN-158 meter should indicate between 3 and 10.

(2) Set the RT-711/APN:158 meter switch to REV. The RT-711jAPN-158 meter should indicate within +1 major division of the reading obtained in (1) above.

(3) Set the RT-711-APN-158 meter switch to AFC. The RT-711/APN-158 meter should indicate between 3 and 10.

(4) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY.

(5) Disconnect the coaxial jumper from the AFC MIXER TEST jack and reconnect it to AFC SYNC jack.

M. *Receiver Tangential Sensitivity.* Refer to paragraph 7-10R for receiver tangential sensitivity.

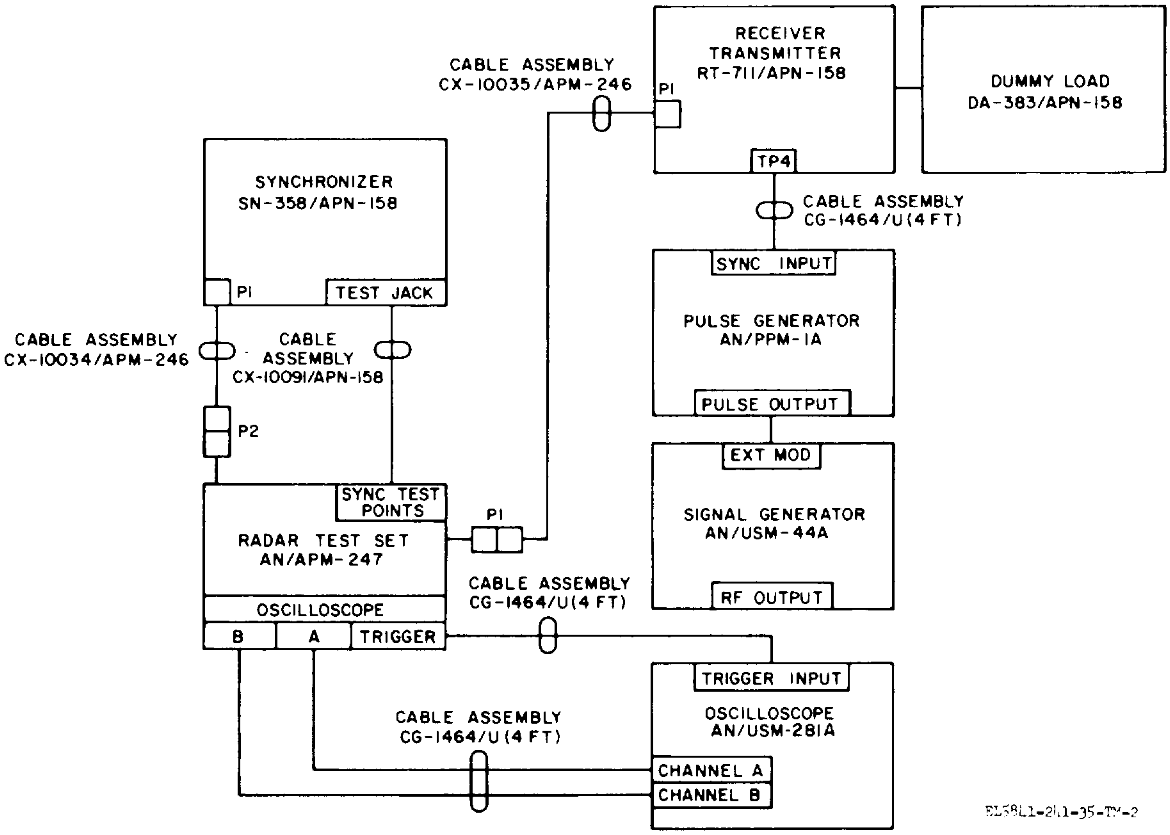


Figure 7-2. Testing Synchronizer, Electrical SN-358/APN-158, block diagram.

7-6. Synchronizer, Electrical SN-358/APN-158 Tests

Interconnect the equipment as shown in figure 7-2. Perform the preliminary procedures given in paragraph 7-4 and 7-5A. All control settings are for the AN/APM-247, unless indicated otherwise.

NOTE

A known good RT-711/APN-158 must be connected during these tests.

A. *Gate Pulse.*

(1) Set the RT-711/APN-158 RF switch to OFF.

(2) Set the TEST SET FUNCTION SELECTOR switch to SYNCHRONIZER TESTS.

(3) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE.

(4) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to GATE.

(5) Measure the peak-to-peak amplitude and risetime of the pulse displayed on the oscilloscope. The amplitude should be not less than 20 volts with a maximum risetime of 2.5 microseconds from the 10- to 90-percent points.

(6) Set the SYNCHRONIZER TESTS-TEST RANGE SELECTOR switch to 30, 60, and 150 in sequence. The width of the pulse displayed on the oscilloscope should be 430 ±20 microseconds, 860 ± 40 microseconds, and 2,100 ± 60 microseconds in that order. If the pulse widths are not within tolerance, adjust R31 on SN-358/APN-158 gate generator module.

NOTE

The pulse widths are measured at the 50% amplitude points.

B. *Rangemarks*

(1) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to RANGE.

(2) Set the SYNCHRONIZER TESTS-TEST RANGE SELECTOR switch to 30, 60, and

150 in sequence. Measure the amplitude and width of the pulse displayed on the oscilloscope at each switch position. The pulse should be negative-going and not less than 5 volts in amplitude with a maximum pulse width of 3 microseconds.

NOTE

The pulse widths are measured at the 50%. amplitude points.

(3) Set the SYNCHRONIZER TESTS-TEST RANGE SELECTOR switch to 30. The time from the start of the sweep to the third rangemark, as measured on the oscilloscope, should be 370 +10 microseconds.

(4) Set the SYNCHRONIZER TESTS-TEST RANGE SELECTOR switch to 60. The time from the start of the sweep to the fourth rangemark, as measured on the oscilloscope, should be 740 + 20 microseconds.

(5) Set the SYNCHRONIZER TESTS-TEST RANGE SELECTOR switch to 150. The time from the start of sweep to the sixth rangemark, as measured on the oscilloscope, should be 1,855 + 45 microseconds.

C. *Phase Detector*.

(1) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to PHASE DETECTOR.

(2) Set the PHASE DETECTOR switch to Y BAL.

(3) Set the SYNCHRONIZER TESTS-TEST RANGE SELECTOR switch to 30. The TEST METER should indicate in the green area.

(4) Set the METER MULTIPLIER switch to X1. The TEST METER should indicate a null ± one-half of one minor division. If necessary, adjust Y-position potentioneter R14 on the SN-358/APN-158.

(5) Set the PHASE DETECTOR switch to Y LENGTH. The TEST METER should indicate 22.5+0.5 volts. If necessary, adjust Y-length potentiometer R16 (EXC LEVEL potentiometer R15 on units with order No. 34845-PM-64 serial numbers 77 and above, Collins serial numbers 1521 and above) on the SN-358 APN-158.

NOTE

Units with order No. 34845-PM-64 serial numbers 77 and above, Collins serial numbers 1521 and above, do not have separate X-and Y-length adjustments.

(6) Set the PHASE DETECTOR switch to X BAL. The TEST METER should indicate a null ± one-half of one minor division. If necessary, adjust SN-358/APN-158 X-position potentiometer R13.

(7) Set the PHASE DETECTOR switch to X-LENGTH. The TEST METER switch should indicate 22.5 + 0.5 volts. If necessary, adjust X-length potentiometer R15 on units prior to order No. 34845-PM-64 serial number 77, or Collins serial number 1521 in the SN-358/APN-158.

D. *Sweep Balance.*

(1) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to SWEEP BAL.

(2) Set the SWEEP BAL switch to X. The TEST METER should indicate a null ± one-half of one minor division. If necessary, adjust X-balance potentiometer -R6 on the SN-358/APN-158 sweep generator and amplifier module.

(3) Set the SWEEP BAL switch to Y. The TEST METER should indicate a null ± one-half of one minor division. If necessary, adjust Y balance potentiometer R28 on the SN-358/APN-158 sweep generator and amplifier module.

E. *Sweep Calibration.*

(1) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to SWEEP CAL.

(2) Set the SWEEP CAL switch to SCOPE CAL. The TEST METER should indicate 4.0 ± 0.2 volts.

NOTE

Check the calibration of channels A and B on the oscilloscope. The dc level displayed on both channels should be 4.0 ± 0.2 volts.

(3) Set the SWEEP CAL switch to UP.

(4) Set the oscilloscope MODE switch to ALTERNATE.

(5) Set the SYNCHRONIZER TESTS-TEST RANGE SELECTOR switch to 30.

(6) Adjust the oscilloscope channels A and B vertical controls until the baselines of the two waveforms coincide. The voltage difference between the third rangemarks, as measured on the oscilloscope, should be 4.0 ±0.2 volts.

(7) Set the SYNCHRONIZER TESTS-TEST RANGE SELECTOR switch to 60.

(8) Repeat (6) above, except measure the voltage difference between the fourth rangemarks; difference should be 4.0 ± 0.2 volts. fig. 7-3).

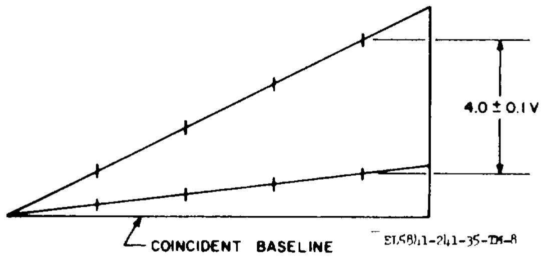


Figure 7-3. Waveform for channels A and B calibration.

(9) Set the SYNCHRONIZER TESTS-TEST RANGE SELECTOR switch to 150.

(10) Repeat (6) above, except measure the voltage difference between the sixth rangemarks; difference should be 4.0 ± 0.2 volts.

(11) Set the SWEEP CAL switch to DOWN. Repeat the procedures in (5) through (10) above; the results should be the same.

(12) Set the SWEEP CAL switch to RIGHT. Repeat the procedures in (5) through (10) above; the results should be the same.

(13) Set the SWEEP CAL switch to LEFT. Repeat the procedures in (5) through (10) above results should be the same.

F. *Automatic Frequency Control (Afc).*

(1) Set the RT-711/APN-158 RF to ON. Allow for a 4-minute warmup period.

(2) Set the RT-711/APN-158 meter switch to AFC.

(3) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to AFC OUT.

(4) The TEST METER should indicate -185v ± 2v (-175 volts on RT-711/APN-158 units without a KLYSTRON ADJUST potentiometer (R71)). If necessary, adjust RT-711/APN-158 KYLSTRON ADJUST potentiometer R71 for the proper voltage reading.

(5) Disconnect the coaxial jumper from the AFC SYNC jack. Connect the CG-1464/U from the RF OUTPUT jack of the AN/USM-44A to the AFC SYNC jack.

(6) Set the output of Pulse Generator AN/PPM-1A for a positive, 5-microsecond, 20-volt pulse.

(7) Set the output of the AN/USM-44A for a 400-Hz, pulsed 5-microsecond, 30-megahertz at a level of - 13 dbm.

(8) With the MX-6424/APN-158, extend the afc module located in the SN-358/APN-158.

(9) Connect a standard probe from channel A of the oscilloscope to pin B of the afc module. The waveforms displayed on the oscilloscope should be a stretched negative pulse with a peak-to-peak amplitude of approximately 3 volts. (Do include the negative spike at the bottom of waveform.)

(10) Disconnect Cable Assembly, Special CX-10091/APN-158 from the SN358/APN-158, and connect a 10:1 probe from channel A of the oscilloscope to the AFC test point at the rear of the SN-358/APN-158.

(11) Reduce the output signal level of the AN/USM-44A to -33 dbm. The oscilloscope should indicate a sweeping direct current (dc) voltage from -155 ± 5 to -203 ± 5 volts. Adjust R16 on AFC module if required.

(12) Reconnect Cable Assembly, Special e CX-10091/APN-158 to the SN-358/APN-158, and OSCILLOSCOPE A to channel A of the oscilloscope.

(13) Increase the signal level of the AN/USM-44A to -13 dbm.

(14) Adjust the frequency of the AN/USM-44A until the TEST METER indicates-185 volts (-175 volts for the RT-711/APN-158 units without a KLYSTRON ADJUST potentiometer (R71)).

(15) Measure the amplitude of the signal displayed on channel A of the oscilloscope. The peak-to-peak amplitude should be 3.25 ± 0.25 volts. (Do not include the negative-going spike bottom of the waveform.)

(16) Disconnect the CG-1464/U from the AFC SYNC jack, and reconnect the R-T UNIT coaxial cable to the AFC SYNC jack.

G. *Stc Pulse.*

(1) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to STC.

(2) Measure the amplitude and pulse width signal displayed on the oscilloscope. The peak-to-peak amplitude should be 2.5 ± 0.1 volts, with a pulse width of 125 ± 25 microseconds at the 50-percent amplitude points. If necessary, adjust R33 on the SN-358/APN-158 gate generator module for proper amplitude of signal.

H. *Video Gain.*

(1) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to VIDEO.

(2) Connect a CG-1464,/U from TP4 on the RT-711 APN-158 to the SYNC INPUT jack or the AN/PPM-1A.

(3) Connect a CG-1464, U from the PULSE OUTPUT jack on the AN, PPM-1A to the EXT MOD jack on the AN/USM-44A.

(4) Disconnect the coaxial jumper from the IF SYNC jack.

(5) Connect a CG-1464 U (4 ft.) cable from the RF OUTI'UT jack on the AN USM-44A to the IF SYNC jack.

(6) Set the AN'USM-44A POWER switch to ON.

(7) Set the AN USM-44A MODE SELECTOR to CW.

(8) Adjust the AN/USM-44A for a 30-megahertz output signal.

(9) Set the output level to SET LEVEL on the meter of the AN/USM-44A with the OUTPUT LEVEL control. This action calibrates the AN/USM-44A attenuator and the output can now be read directly from the dial in dbm.

(10) Set the AN PPM-1A POWER switch to ON.

(11) Set the AN'PPM-1A for a 10-microsecond output pulse.

(12) Set the AN, USM-44A MODE SELECTOR switch to PULSE.

(13) Observe the output on the oscilloscope. The video pulse should be negative-going with noise and rangemarks visible on the baseline.

(14) Increase the output of the AN/USM-44A until the video pulse reaches a maximum indication. The oscilloscope should indicate a 6-volt peak signal. If necessary, adjust VIDEO GAIN control R23 on the SN-358/APN-158 video module for the proper amplitude signal. VIDEO GAIN control on SN-358A/APN-158 is R12.

(15) Set the TEST RANGE SELECTOR switch to 60. The rangemarks amplitude should be 4 volts. If necessary, adjust R27 on the SN-358/APN-158 video driver module for the proper amplitude rangemarks.

I. *Receiver Tangential Sensitivity.*

(1) Adjust the AN/USM-44A attenuator control until a tangential signal is displayed on the oscilloscope (fig. 7-4).

(2) The AN/USM-44A attenuator indication is the tangetial sensitivity. The sensitivity should be from -95 to -100 dbm.

J. *Contour Check.*

(1) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to CONTOUR.

(2) Set the AN,/USM-44A attenuator for an output of -69 dbm. On the RT-711/APN-158 meter, note that afc is in the locked condition.

(3) Observe that the video pulse that appears on the oscilloscope contours on half the input pulse (equal intensity at the top of pulse and the baseline). If necessary, adjust potentiometer R12 on the SN-358/APN-158 video driver module.

K. *Isolation Amplifier Gain and Phase Checks.*

(1) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to ISO AMP GAIN.

(2) Set the GYRO SIMULATOR switch to ON.

(3) Set the SYNCHRONIZER TESTS-ISO AMP switch to PITCH.

(4) Set the GYRO SIMULATOR-PITCH control to 20 NOSE UP. The TEST METER should indicate 5.0 volts (nominal). If necessary, adjust PITCH AMPL control R10 on the front of the SN-358/APN-158 for a proper indication.

(5) Set the GYRO SIMULATOR-ROLL control to 20 LEFT WING DOWN. The TEST METER should indicate 5.0 volts (nominal). If necessary, adjust ROLL AMPL R7 on the front of the SN-358/APN-158 for a proper indication.

(6) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to ISO AMP PHASE.

(7) Set the SYNCHRONIZER TESTS-ISO AMP switch to PITCH.

(8) Set the Oscilloscope MODE switch to ALTERNATE. Set the PITCH control to 0. The waveforms (as observed on channels A and B of the oscilloscope) should coincide at the zero crossing points. If necessary, adjust PITCH PHASE control R8 on the front panel of the SN-358/APN-158 for zero phase shift.

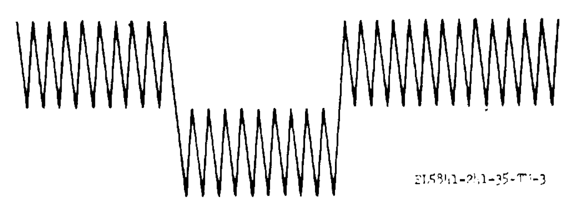


Figure 7-4. Tangential signal display.

(9) Set the SYNCHRONIZER TEST-ISO AMP switch to ROLL.

(10) Adjust the GYRO SIMULATOR-ROLL to control 0. The waveforms should coincide at zero crossing points. If necessary, adjust ROLL PHASE control R5 on the front panel of the SN-358/APN-158 for zero phase shift.

L. *Elevation Servo.*

(1) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to SERVO.

(2) Set the SERVO switch to STAB. The TEST METER should indicate not less than 16 volts (not less than 10 volts on units with Order No. 34845-PM-64 serial numbers 77 and above, Collins serial numbers 1521 and above). If necessary adjust potentiometer R2 on the SN-358/158 elevation servoamplifier module (units with order No. 34845-PM-64 serial numbers 77 and above, Collins serial numbers 1521 and above do not have an adjustment).

(3) Set the SERVO switch to RATE. The TEST METER should indicate not less than 16 volts (not less than 10 volts on units with order No. 34845-PM-64 serial numbers 77 and above, Collins serial numbers 1521 and above) If necessary adjust potentiometer R5 on the SN-358/APN-158 elevation servoamplifier module (units with order No. 34845-PM-64 serial numbers above, Collins serial numbers 1521 and above do not have an adjustment).

7-7. Antenna AS-1642/APN-158 Tests

Interconnect the equipment as shown in figure 7-5. Perform the preliminary procedures given in paragraphs 7-4 and 7-5A. All control settings are for the AN/APM-247, unless indicated otherwise.

NOTE

A known good RT-711/APN-158 and SN-358/APN-158 must be used with these tests.

A. *Antenna Rotation.*

(1) Set the RT-711/APN-158 RF switch to OFF.

(2) Set the TEST SET FUNCTION SELECTOR switch to ANTENNA/INDICATOR CONTROL UNIT TESTS.

(3) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE.

(4) Set the AS-1642/APN-158 SCAN switch to ON. The antenna should scan at a rate of 30 ± 3 revolutions per minute.

(5) Observe that the rotational movement of the manual scan adjust knob in counterclockwise when viewed from below.

(6) Observe that the azimuth movement of the Antenna is not less than 58° nor more than 61° either side of dead ahead:

(7) Set the AS-1642/APN-158 SCAN

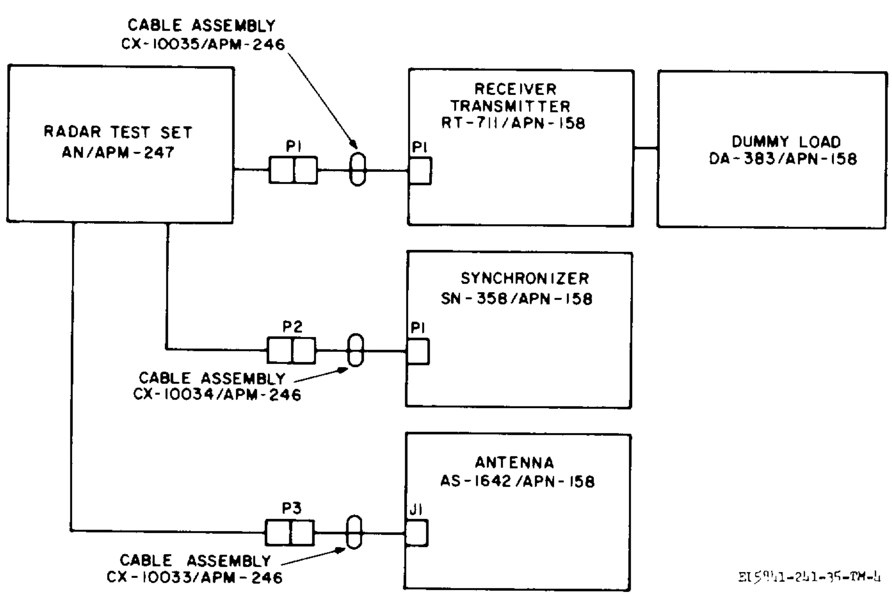


Figure 7-5. Testing Antenna AS-1642/APN-158, block diagram.

switch to OFF. Manually position the antenna dish until it is parallel to the antenna housing mount ± 1/4° using Combination Square MX-6613, APM-246. Observe the alignment of the antenna pointer mark and the zero scribe mark on the gimbal. If necessary, reposition the pointer.

B. *Elevation Synchro.*

(1) Set the ANTENNA TESTS switch to EL SYNC.

(2) Connect Leads, Test CX-10092/APN-158 from the ANTENNA TEST LEADS jacks to the AS-1642/APN-158 TRIM SENS jacks (J3 and J4).

CAUTION

Be careful in making the following adjustment; 115 volts is present on the resistor. An insulated screwdriver should be used to prevent accidental shorting out of the 115 volts.

(3) The TEST METER should indicate 17 ± 0.2 volts. If necessary, adjust AS-1642/APN-158 potentiometer R1.

(4) Disconnect the test leads from ANTENNA TEST LEAD jacks and TRIM SENS jacks (J3 and J4).

(5) Check to see that the GYRO SIMULATOR is set to OFF.

(6) Set the INTERNAL CONTROL UNIT-ELEVATION control to 0. Observe that the pointer at the rear of the antenna dish is in alignment with the scribe mark on the gimbal. If necessary, loosen the locking screws and position the AS-1642/APN-158 tilt synchro (B1) for proper alignment of the marks.

(7) Set the INTERNAL CONTROL UNIT-ELEVATION control to 10' UP. Observe that the antenna dish moves up.

C. *Pitch and Roll Resolver Alignment.*

(1) Set the ANTENNA TESTS switch to TRIM ADJ.

(2) Set the GYRO SIMULATOR switch to ON.

(3) Set the GYRO SIMULATOR-ROLL control to 0.

(4) Set the GYRO SIMULATOR-PITCH control to NOSE DOWN. The antenna should move up to compensate for the PITCH control position.

(5) Position the antenna 60' left, as viewed from the front. Set the GYRO SIMULATOR-ROLL controlled to RIGHT WING DOWN. The antenna should move up to compensate for the ROLL control position. If necessary, rotate pitch-roll resolver B3 on the AS-1642/APN-158 180° and repeat the procedures given in (4) and (5) above.

(6) Set the GYRO SIMULATOR switch to OFF.

(7) Connect Leads, Test CX-10092/APN-158 from the ANTENNA TEST LEADS jacks to jacks J8 and J9 on the AS-1642/APN-158.

(8) Position the antenna in a dead ahead position and adjust PITCH TRIM potentiometer R7 on the antenna for a minimum voltage as indicated on the TEST METER.

(9) Set the GYRO SIMULATOR switch to ON.

(10) Adjust the GYRO SIMULATOR-PITCH control for a minimum indication on the TEST METER.

(11) Set the GYRO SIMULATOR-ROLL control fully clockwise. Observe that, as the antenna is moved in azimuth, a null occurs in the dead ahead position as indicated on the TEST METER and by the alignment marks. If necessary, rotate pitch-roll resolver B3 on the AS-1642/APN-158 until a null does occur at the dead ahead position of the antenna. Lock pitch-roll resolver B3 in this position.

(12) Disconnect the test leads from the ANTENNA TEST LEADS jacks and from jacks J8 and J9 on the AS-1642/APN-158.

D. *Pitch and Roll Resolver Output.*

(1) Connect Combination Square MX-66-13/APM-246 to the AS-1642/APN-158 antenna dish.

(2) Set the GYRO SIMULATOR switch to ON.

(3) Set the GYRO SIMULATOR-PITCH to 20 NOSE UP.

(4) Set the GYRO SIMULATOR-ROLL control to 0.

(5) Position the antenna dead ahead.

(6) The level bubble on the MX-6613/APM-246 should indicate 10° ± 20° in the elevation axis.

(7) Set the GYRO SIMULATOR-PITCH control to 0.

(8) Set the GYRO SIMULATOR-ROLL control to 20 RIGHT WING DOWN.

(9) Position the AS-1642/APN-158 antenna dish to 60° right as viewed from the front. The level bubble on the MX-6613/APM-246 should indicate 0.87° ±0.5° of the reading obtained in (6) above in the elevation axis.

(10) If a standard pitch trim adjustment is necessary, perform the following procedures:

(a) Set the GYRO SIMULATOR-ROLL control to 0.

(b) Position the AS-1642 APN-158 antenna dish straight ahead.

(c) Adjust AS-1642 APN-158 PITCH TRIM potentiometer R7 for the desired elevation angle.

E. *Sweep Excitation.* Set the ANTENNA TESTS switch to SWEEP EXC; the TEST METER should indicate approximately 35 volts. Note indicated voltage.

F. *Sweep Resolver Alignment.*

(2) Position the AS-1642/APN-158 antenna dish straight ahead. The TEST METER should indicate not more than 50 millivolts. If necessary, loosen stops that hold resolver B4 and rotate for a null as indicated on the TEST METER.

(3) Set the SYNCHRONIZER TESTS-TEST FUNCTION switch to ISO AMP-PHASE. Connect Oscilloscope Trigger and Chan B to appropriate jacks of test set, and Chan A connected to R9 (Y out)of antenna, the waveforms displayed on channels A and B of the oscilloscope should be approximately 180° out of phase. If they are not, rotate AS-1642/APN-158 reverse B4 180° and repeat the procedures given in (2) and (3) above.

G. *X-Sensitivity Adjustment.*

(1) Loosen the bracket on AS-1642/.APN-158 sweep resolver B4 and position it to make contact with the case of pitch-roll resolver B3. Secure the bracket in place.

(2) Loosen the three screws that secure resolver B4 in place. (Mark the original position of B4.) Rotate B4 until the other end of the bracket makes contact with the case of resolver B3. Resolver B4 has now been rotated 90° from its original position.

(3) The test meter should indicate 30.3% of the voltage noted in E above. If necessary, adjust AS-1642/APN-158 X-out potentiometer R6 for proper indication on the TEST METER.

H. *Y-Sensitivity Adjustment.*

(1) Set the ANTENNA TESTS switch to Y SWEEP.

(2) Rotate AS-1642,/APN-158 resolver B4 back to its original position and secure it in place.

(3) Position the AS-1642,/APN-158 antenna dish straight ahead. The TEST METER should indicate the same as in G(3) above. If necessary, adjust AS-1642/APN-158 Y-out potentiometer R9 for the proper indication on the TEST METER.

I. *Resolver Tune.*

(1) Set the ANTENNA TESTS switch to RES TUNE.

(2) The TEST METER should indicate not more than 3 volts.

J. *Rate Adjustment.*

(1) Rapidly move the AS-1642/APN-158 antenna dish up and down with the INTERNAL CONTROL UNIT-ELEVATION control. Observe that the antenna dish does not overshoot or oscillate.

(2) If the antenna dish overshoots or oscillates, adjust AS-1642/APN-158 rate control potentiometer R4 for proper operation of the dish.

K. *Manual Elevation.*

(1) Set GYRO SIMULATOR switch to OFF.

(2) Set the INTERNAL CONTROL UNIT-ELEVATION control to 0°. With the MX-APM-246, observe that the antenna dish is as level as measured parallel to the axis of on of the tilt mechanism.

(3) Set the INTERNAL CONTROL UNIT-ELEVATION control to 15° UP. The MX-APM-246 should indicate 7 1/2 ± 1° of elevation respect to the reading obtained in (2) above.

(4) Set the INTERNAL CONTROL UNIT-ELEVATION control to 15° DOWN . The MX-APM-246 should indicate 7 1/2 ± 1° of elevation with respect to the reading obtained in (2) above.

L. *Limit Switch.*

(1) Set the INTERNAL CONTROL UNIT-ELEVATION control to 15° DOWN.

(2) Set the GYRO SIMULATOR-PITCH control to 15° NOSE UP. Observe the MX-6613/APM-246 to see that the antenna dish elevation movement is not less than 12° from that recorded in K(2) above. If necessary, adjust the rubber stops on the antenna.

(3) Set the INTERNAL CONTROL UNIT-ELEVATION control to 15° UP.

(4) Set the GYRO SIMULATOR-PITCH control to 15° NOSE DOWN. Observe the MX-6613/APM-246 to see that the antenna dish elevation movement is not less than 12° from that recorded in K(2) above.

(5) Rapidly move the GYRO SIMULATOR-ELEVATION control between 15° UP and 15° DOWN. Observe that the antenna dish or tilt linkage do not strike the gimbal.

7-8. Indicator, Azimuth-Range IP-724/APN-158 Tests

Interconnect the equipment as shown in figure 7-6. Perform the preliminary procedures given in paragraphs 7-4 and 7-5A. All control settings are for the AN/APM-247, unless otherwise indicated.

NOTE

A known good RT-711/APN-158, SN-358/APN-158, and AS-1642/APN-158 must be connected during these tests.

A. *Power Supplies.*

WARNING

Be extremely careful when working on PS-1 and PS-2. Assume that very high voltages are present on all terminals in steps (6) through (17) below.

(1) Set the RT-711 APN-158 RF switch to ON.

(2) Set the TEST SET FUNCTION SELECTOR switch to ANTENNA Indicator, CONTROL UNIT TESTS.

(3) Remove the covers and rear plate from Indicator, Azimuth-Range IP-724/APN-158.

(4) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE. There is a 4-minute time delay before the OPERATE lamp lights.

(5) Set the AS-1642/APN-158 SCAN OFF switch to SCAN. If necessary, adjust the BACK-GRD control on the IP-724 APN-158 front panel to the desired level.

(6) With Multimeter AN USM 223, measure the voltage between terminal 6 and ground on PS-1 in the IP-724/APN-158. The voltage should be -500 ± 50 volts dc.

(7) With the AN USN-223, measure the voltage between terminals 8 and 9 of PS-1 ill the IP-724/APN 158. The voltage should be +200 ± 30 volts dc.

(8) Remove the plastic cover over TB2 in the IP-724/APN 158.

(9) With Prod, Test MX-6639/APN-158 (1000:1 probe) and the oscilloscope, measure the voltage at terminal 3 of TB2 in the IP-724 /APN-158. The voltage should be +2,000 ± 300 volts dc.

(10) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY.

(11) Connect Adapter, Test MX-6637 APN-158 between the V3 plate cap and the high voltage cap on PS-2 in the IP-724/APN-158.

(12) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE.

(13) Measure the voltage at Adapter, Test MX-6636/APN-152 with Prod, Test MX-6639/APN-158 (1000:1 probe) and the oscilloscope. Voltage should be 7,500 ± 1500 vdc average, with a peak not more than 9,500 vdc.

(14) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY.

(15) Remove Adapter, Test MX-6637/APN-158 and replace the high voltage cap on the V3 plate in the IP-724/APN-158.

(16) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OPERATE.

(17) With a standard probe and the oscilloscope, measure the amplitude, width, and risetime of the pulse at terminal 7 of PS-2 in the IP-724/APN-158. The pulse amplitude should be NLT 20 volts peak, the pulse width should be 120 to 200 microseconds, and the risetime should not be more than 60 us.

(18) Replace the plastic cover over TB2 in the IP-724 APN-158.

B. *Flood Gun Bias.*

WARNING

The following voltage measurements are relatively low dc voltages, but are referenced to +2,000 volts. Be extremely careful to insure against personnel injury and be certain that the meter or test leads do not come in contact with ground. All high voltages should be measured through the access holes in the protective cover over TB2. The shaft of potentiometers R36, R37, and R38 (R36, R39, and R41 in units with order No. 34845-PM-64 serial numbers 77 and above, or collins serial numbers 1501 and above) are also +2,000 volts above ground. An insulated screwdriver must be used to make these adjustments.

(1) With the AN/USM-223, measure the voltage between terminals 10 and 11 of TB2 in the

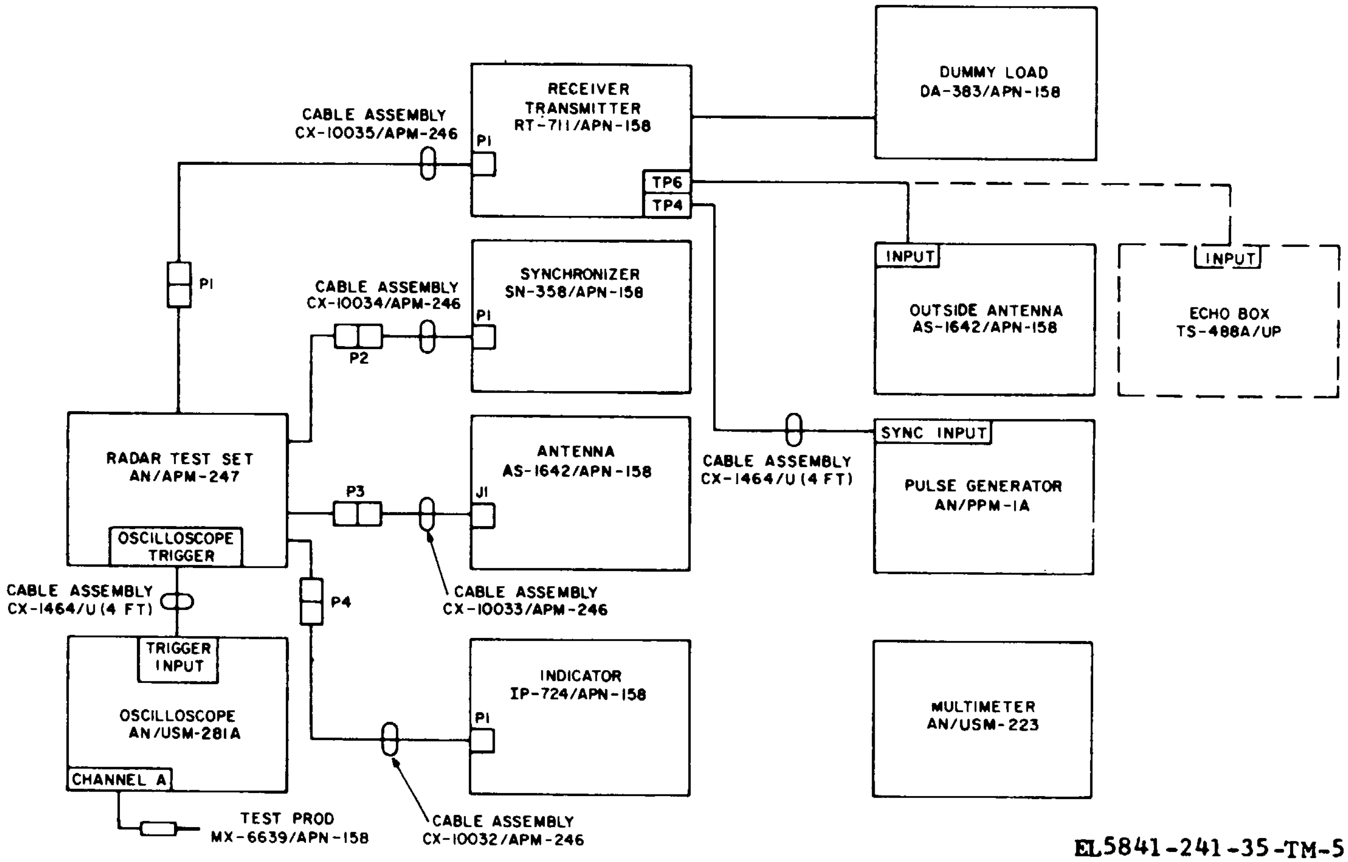


Figure 7-6. Testing Indicator, Azimuth-Range IP-724/APN-158, block diagram.

IP-724/APN-158. The voltage should be approximately the value written on the top of the IP-724 /APN-158.

(2) With the AN/USM-223, measure the J voltage between terminals 10 and 8 of TB2 in the IP-724 /APN-158. The voltage should be approximately the value written on the top of the IP734,APN-158.

(3) With the AN/'USM-223, measure the voltage between terminals 10 and 7 of TB2 in the IP-724,/APN-158. The voltage should be approximately the value written on the top of the IP-724/APN-158.

C. Writing Gun Bias

(1) With the AN/USM-223, measure the voltage at terminal 4 of TB3 in the IP-724/APN158. The voltage should be -16 to -75 volts dc.

(2) With the AN/USM-223, measure the voltage at terminal 5 of TB3 in the IP-724/APN158 with the IP-724/APN-158 RANGE switch set to the following positions:

(a) 30: 75 to 250 volts dc.
(b) 60: 68 to 250 volts dc.
(c) 150: 68 to 250 volts dc.

D. Erase Pulse

(1) Connect the standard probe (10: 1) on the oscilloscope to the junction of R40 and C8 on TB2 in the IP-724/APN-158 (test point ERASE PULSE on some units).

(2) Measure the amplitude and width of the pulse displayed on the oscilloscope. The amplitude should be adjustable from not more than 4 to not less than 16 volts peak with a width of 10 to 120 microseconds at the 50-percent points.

E. Gate Pulse

(1) Connect the standard probe (10: 1) on the oscilloscope to terminal 4 of TB3 in the IP 724,/APN-158.

(2) Measure the amplitude and negative level to which the gate pulse is clamped, with the oscilloscope.

NOTE

The periodic change in amplitude is caused by the operation of the blanking switch.

(3) The amplitude should be 20 +4 volts, and the negative level to which it is clamped should be -16 to -75 volts dc.

F. Shading Pulse.

Connect the standard probe (10: 1) on the oscilloscope to terminal 5 of TB3 in the IP724,/APN-158.

(2) Set the IP-724/APN-158 RANGE switch to 150.

(3) Measure the amplitude of the pulse displayed on the oscilloscope; amplitude should be not less than 40 volts peak.

G. Video Pulse.

(1) Remove the video driver module from Synchronizer, Electrical SN-358/APN-158.

(2) Connect the CG-1464/U from the PULSE OUTPUT jack on Pulse Generator AN/ PPM-1A to OSCILLOSCOPE A.

(3) Set the TEST SET FUNCTION SELECTOR switch to SYNCHRONIZER.

(4) Set the output of the AN/PPM-1A for a -4-volt peak amplitude, 10-microsecond wide pulse.

(5) Connect the standard probe (10: 1) on the oscilloscope to the R5 wiper side of C18 on TB1 in the IP-724/APN-158.

(6) Measure the amplitude and width of the pulse displayed on the oscilloscope. The pulse amplitude should be 2 volts peak and 10 microseconds wide. If necessary, adjust video amplitude potentiometer R5 on TB1 in the IP-724/APN158 for proper amplitude.

(7) Disconnect the CG-1464/U from the OSCILLOSCOPE A jack and replace the video driver module in the SN-358/APN-158.

(8) Set the TEST SET FUNCTION SELECTOR switch to ANTENNA/INDICATOR/ CONTROL UNIT TESTS.

(9) Set the INTERNAL CONTROL UNITSYSTEM CONTROL switch to STANDBY.

H. Sweep Deflection.

(1) Set the AS-1642/APN-158 SCAN/OFF

(2) Measure the amplitude and negative switch to OFF.

(3) Set the INTERNAL CONTROL UNITSYSTEM CONTROL switch to OPERATE.

(4) Position the AS-1642/APN-158 antenna dish straight ahead.

(5) Adjust theIP-724/APN-158BACKGRDAPN-158 control for a visible sweep trace.

(6) Set the INDICATOR TESTS switch to ZERO AZIMUTH. The sweep/trace should be parallel to the vertical scribe line on the IP-724

APN-158 filter. If necessary, loosen the yoke clamp on the IP-724/APN-158 and rotate the yoke to the proper position.

(7) The sweep trace should be directly underneath the vertical scribe line on the IP-724/ APN-158. If necessary, adjust horizontal position potentiometer R7 on TB1 in the IP-724/APN-158 until the sweep trace is positioned directly underneath the vertical scribe line.

(8) The sweep trace should start at the vertex of the IP-724/APN-158 faceplate. If necessary, adjust vertical position potentiometer R13 on TB1 in the IP-724/APN-158 to position the start of the sweep trace at the vertex of the faceplate.

(9) Set the IP-724/APN-158 RANGE switch to 30. The third rangemark on the sweep trace should be 1/4 inch (± 1/8 inch) below the top opening of the IP-724/APN-158 faceplate. If necessary, loosen the clamp on the yoke and move the yoke forward to shorten the sweep and backward to lengthen the sweep. This action may change the deflection center and R7 and R13 may have to be readjusted. If adjustment of the yoke is not sufficient to position the third rangemark as desired, move the tap on resistors R22-R25 on TB2 in the IP-724/APN-158 until the third rangemark is properly positioned.

(10) Set the IP-724/APN-158 RANGE NOTE switch to 60. Repeat the procedures given in (9) above, except observe the fifth rangemark on the sweep trace.

(11) Set the IP-724/APN-158 RANGE switch to 150. Repeat the procedures given in (9) above, except observe the fifth rangemark on the sweep trace.

(12) Manually rotate the AS-1642/APN-158 antenna dish 45° to the left and then 45° to the right. The position of the sweep trace at each setting of the antenna dish should be 45° ± 5°.

NOTE

A visual performance check and further adjustments of the IP-724/APN-158 are outlined in paragraph 7-10. The applicable test must be performed to insure proper operation of the IP-724/ sure proper operation of the IP-724/ APN-158.

(13) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to OFF.

7-9. Control, Radar Set C-4881/APN-158 Tests

Interconnect the equipment as shown in figure 7-7. Perform the preliminary procedures given in paragraphs 7-4 and 7-5A. All control settings are for the AN/.APM-247, unless indicated otherwise.

(1) Set the TEST SET FUNCTION SELECTOR switch to ANTENNA/INDICATOR/ CONTROL UNIT TESTS.

(2) Set the CONTROL UNIT TEST-CONTROL UNIT SELECTOR switch to EXT TEST.

(3) Set the C-4881,/APN-158 SYSTEM CONTROL switch to STANDBY. The STANDBY lamp should light.

NOTE

If the SYSTEM CONTROL switch has a detent position before turning to OFF, the INVERTER RELAY lamp should light in STANDBY, OPERATE, and CONTOUR positions.

(4) Set the C-4881,/APN-158 SYSTEM CONTROL switch to OPERATE. The OPERATE lamp should light.

(5) Set the C-4881/APN-158 SYSTEM CONTROL switch to CONTOUR. The CONTOUR lamp should light.

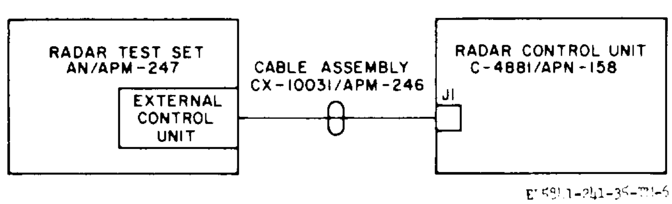


Figure 7-7. Testing Control, Radar Set C-4881/APN-158, block diagram.

B. Receiver Gain.

(1) Set the CONTROL UNIT TEST-TEST FUNCTION switch to RCVR GAIN. Connect jumper between terminals 13 and 20, P1, /APM-247.

(2) Set the C-4881/APN-158 GAIN control to counterclockwise stop. The TEST METER should indicate 1.7 ± 0.2 volts.

(3) Set the C-4881/APN-158 GAIN control to clockwise stop. The TEST METER should indicate not more than 0.2 volt (lower 1/3 green area) Remove jumper from P1.

C. Elevation Control.

(1) Set the CONTROL UNIT TEST-TES1 FUNCTION switch to ELEV COARSE ADJ 8V

(2) Set the C-4881/APN-158 ELEVATION control to 0. The TEST METER should indicate 8.0+ 0.5 volts. If necessary, loosen the screws that hold the elevation synchro in the C-4881./APN158 and rotate the elevation synchro for the correct indication.

(3) Set the CONTROL UNIT TEST-TES1 FUNCTION switch to ELEV COARSE ADJ 5V The TEST METER should indicate 5.0+0.5 volts If necessary, rotate the C-4881/APN-158 elevation synchro to 180 and repeat the procedure given in (1) and (2) above.

(4) Set the CONTROL UNIT TEST-TES1 FUNCTION switch to ELEV FINE ADJ. The TEST METER should indicate less than 50 millivolts. If necessary, rotate the C-4881/APN-151 elevation synchro for a null indication of less than 50 millivolts.

(5) Secure the elevation synchro in place Be sure that a null reading is still indicated on the TEST METER (same as (4) above).

7-10. System Performance Tests

Interconnect the equipment as shown in figure 7-8. All control settings are for the AN/APM247, unless indicated otherwise. Perform the starting procedures below.

NOTE

When the AN APM-247 is operated in the SYSTEM OPERATION mode, the only function of the AN APM-247 is to interconnect the complete radar system. All panel controls, except the INPUT VOLTAGE ADJUST, INPUT VOLTAGE meter, INPUT FREQUENCY meter, and (GYRO SIMULATOR, are disabled.

A. Preliminary Control Settings.

(1) Set the INTERNAL CONTROL UNIT SYWSTEM CONTROL switch to OFF.

(2) Set the AC POWER switch to OFF.

(3) Set the TEST SET FUNCTION SELECTOR to SYSTEM OPERATION.

(4) Set the RT-711/APN-158 RF switch to ON.

(5) Set the AS-1642/APN-158 SCAN'OF switch to SCAN.

(6) Set the CONTROL UNIT TEST-CO) TROL UNIT SELECTOR switch to EXT.

NOTE

If the INTERNAL CONTROL UNIT of the AN/APN-247 is to be used, set the CONTROL UNIT TEST-CONTROL UNIT SELECTOR switch to INT.

(7) Set the INPUT VOLTAGE ADJUS control fully counterclockwise.

(8) Set the AC POWER switch to ON. At just the voltage on the INPUT VOLTAGE mete for 115 volts ac. Observe that the INPUT FRE QUENCY meter indicates approximately 400 Hz.

B. Collimation.

(1) Set the INTERNAL CONTROL UNIT SYSTEM CONTROL switch to OPERATE. Allow for a 4-minute time delay.

(2) Set the INTERNAL CONTROL UNIT SYSTEM CONTROL switch to STANDBY and allow filaments in the IP-724/APN-158 to cool.

(3) Set the INTERNAL CONTROL UNIT SYSTEM CONTROL switch to OPERATE; note that, for a short period of time (warm-up of filaments) a faint green glow is present on the IP 724/APN-158 screen and covers the full viewing face of the tube. If the preceding requirements are not met, the following adjustments will be necessary.

NOTE

Reference designations in parentheses are for units with order No. 34845-PM64 serial numbers 77 and above, or Collins serial numbers 1501 and above.

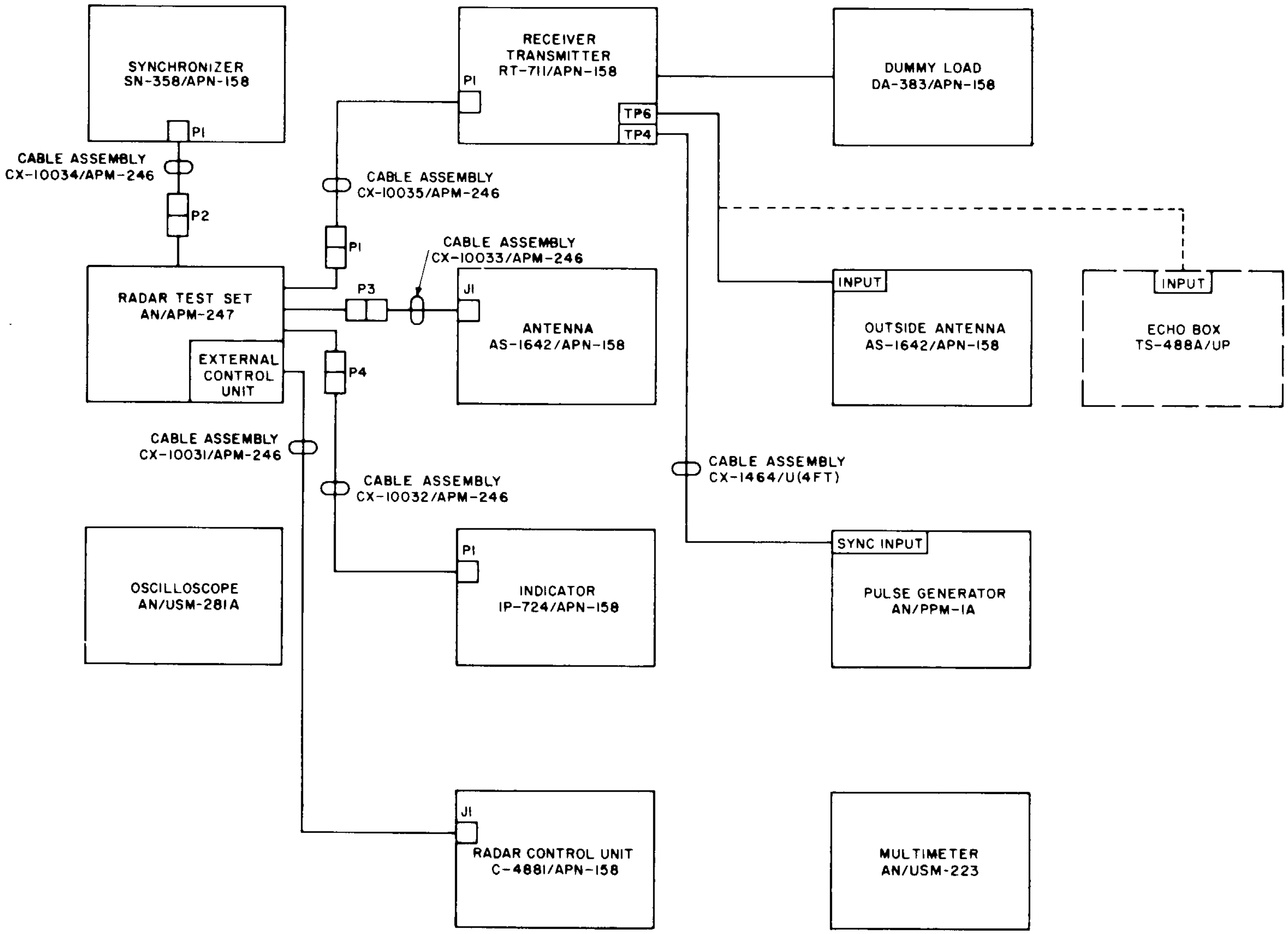
(4) Set the erasure by rotating IP-724 APN-158 ERASE AMP control R3 counterclockwise.

(5) Write the screen to full brightness b rotating the IP-724 APN-158 BACKGRD control clockwise.

NOTE

The flood gun beam may not cover the entire screen at this time.

(6) Stop writing by rotating the IP-724 APN-158 BACKGRD control counterclockwise.



NOTE:
AN OUTSIDE ANTENNA IS PREFERRED
BUT AN ECHO BOX MAY BE USED

Figure 7-8. System performance test of AN/APN-158, .
block diagram.

See WARNING paragraph 7-8 B.

(7) Adjust IP-724/APN-158 F.G. GRID control R36 for maximum screen coverage.

(8) Adjust IP 724/APN-158 F.G. GRID control R38 for maximum screen coverage.

(9) Adjust IP-724/APN-158 F.G. GRID control R37 for maximum screen coverage an maximum uniformity of illuminated area.

(10) Readjust IP-724/APN-158 F.G. GRII 4 control R38 (R41) and F.G. GRID 3 control R3 (R39) for maximum screen coverage and max mum uniformity of illuminated area.

(11) Rotate IP-724/APN-158 ERASE AMP control R3 clockwise. Certain portions of the display will erase more rapidly than others. Stop the erasure before the entire display is erased.

(12) Slightly readjust F.G. GRID 4 control R38 (R41) and F.G. GRID 3 control R37 (R39 for display uniformity without decreasing the diameter of the display.

(13) Write screen to full brightness by rotating the IP-724 APN-158 BACKGRD control clockwise and repeat the procedures given in (11 and (12) above several times until the most uniform display and maximum diameter are obtained.

NOTE

If difficulty is encountered in the collimation test, and bright spots appear on the screen that do not erase as they should, refer to TM 11-5841-259-12 for procedures to demagnetize the IP-724/APN158.

C. Erasure.

(1) Set the IP-724 APN-158 RANG switch to the 60-mile range position.

(2) Set IP-724/APN-158 ERASE WIDT control R1 fully clockwise.

(3) Set IP-724 APN-158 ERASE AM control R3 fully counterclockwise.

(4) Write screen to full brightness by momentarily rotating the IP-724 APN-158 BACI GRD control clockwise.

(5) Slowly rotate IP-724,APN-158 ERAS AMP control R3 clockwise until the display just barely erased. With the oscilloscope, measure the peak voltage of the erase pulse at the ERAS PULSE TEST POINT (junction of R40 and (on TB2 in units without an ERASE PULS TEST POINT). The erase pulse amplitude should be 10 to 15 volts peak.

(6) Adjust IP-724/APN-158 ERASE AMI control R3 so that the voltage, is 1 volt higher than that obtained in (5) above.

(7) Adjust IP-724/APN-158 BACKGRI control for a suitable video display.

(8) Adjust IP-724/APN-158 ERASE WIDTH control R1 to obtain desired persistence NOTE

Too long a persistence time will result in blooming and lack of good contrast.

(9) Check to see that there is not agree glow present on the screen. This can be determined best in the absence of writing.

(10) Tighten the locknuts on IP-724/APN 158 controls R1 and R3.

D. Writing Gun.

(1) Set the IP-724/APN-158 BACKGRI control to its midrange position.

(2) Set the IP-724/APN-158 RANGI switch to the 30-mile range position.

(3) Observe that the video display has slight background noise and the writing gun does no store. If necessary, loosen the locknut and ad just IP-724/APN-158 W.G.G. 1 control R56.

(4) Tighten the R56 locknut.

(5) Loosen the locknut and adjust FOCU control R55 for the best rangemark definition.

(6) Tighten the R55 locknut.

E. BACKGRD Control.

(1) Set the IP-724/APN-158 RANG] switch to the 30-mile range position. Adjust the IP-724/APN-158 BACKGRD control for a barely discernible noise presentation.

(2) Set the RANGE switch to the 60-mi range position. Observe the presentation on the screen; it should be the same as (1) above. If necessary, adjust R58 on the IP-724/APN-158.

(3) Set the RANGE switch to the 150-mi range position. Observe the presentation on the screen; it should be the same as (1) above. If necessary, adjust R45 on the IP-724/APN-15

F. Shading.

(1) Set the IP-724/APN-158 RANG switch to the 150-mile range position.

(2) Adjust the IP-724/APN-158 BACKGR control for a normal target presentation. Observe that the target presentation is uniform from the center to the outside edge of the display.

If necessary, perform the procedures given in (3) through (6) below

(3) Set IP-724/APN-158 SHADING control R48 fully counterclockwise.

(4) Adjust IP-724/APN-158 BACKGRD control for a normal target presentation at the center of the sweep. Slowly adjust SHADING control R48 clockwise while adjusting the BACKGRD control counterclockwise, as necessary, to achieve a normal target presentation from enter to the outer edge of the display.

(5) Set the IP-724/APN-158 RANGE switch to the 60-mile range position and observe each the presentation brightness does not change.

(6) Set the RANGE switch to the 30-mile range position and observe that the presentation brightness does not change.

G. Blanking

(1) Set the AS-1642/APN-158 SCAN OFF switch to OFF.

(2) Position the antenna to one of the extreme of its azimuth movement to close the blanking switch.

(3) With a normal display on the IP-724/APN-158, check to see that closing the blanking switch blanks out the display on the IP-724/APN-158.

(4) Set the SCAN OFF switch to ON.

NOTE

The tests below are designed to evaluate the performance of the radar system. If adjustments are necessary, refer to P the unit tests given for the individual units.

H. Sweep. Set the IP-724 APN-158 RANGE switch to each of its range positions and observe the intensity of the rangemarks is approximately the same on all ranges.

I. BACKGRD Control. Set the IP-724/APN-158 BACKGRD control for a barely visible trace he screen. Check the BACKGRD control for the east a one-quarter turn in either direction from this setting.

J. Indicator Trace. When viewing the antenna 1 the front, observe that as the antenna moves to the left, the indicator sweeps from left to right.

K. Video Level Adjust. Connect an outside antenna for this test. Use the C-4881/APN-158 GAIN control to adjust the video level for the best t presentation. (When the TS-488A/UP is used, the target presentation is adjustable with the C-4881/APN-158 GAIN control.)

NOTE

If the TS-488A/UP is used, STC control R35 on the gate generator module in he SN-358/ APN-158 must be turned 11 the way down and then reset after he check performed in K above.

L. Rangemarks. Set the IP-724/APN-158 RANGE switch to each range position, and in position observe the last rangemark; it should be 1/4 inch (±1/8 inch) from the top of facemask.

M. Sweep Start. Set the IP-724/APN-158 SCAN/OFF switch to OFF. Observe that the of the sweep is within 1/8 inch of the cross ally. and within 3 32 inch of the lubber line horizontally. Set the AS-1642/APN-158 SCAN switch to ON.

N. Pitch and Roll Phasing. Set the GYRO SIMULATOR switch to ON. Observe that as the GYRO SIMULATOR-PITCH control is moved NOSE UP position, the antenna will move and that as the GYRO SIMULATOR-PITCH control is moved to the NOSE DOWN position, the antenna will move up. Set the GYRO SIMULATOR switch to OFF.

O. Gate Length. Observe that there is no sweep foldover and there is not more than 1/4-inch band at the top of the normal viewing area.

P. Output Power.

NOTE

This test is required if a system check only is being run.

(1) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to STANDBY. Observe the INPUT VOLTAGE meter; it should 115 volts ac.

(2) Remove the TS-488A/UP from TP6 on the RT-711/APN-158.

(3) Connect the oscilloscope to TP4 on the RT-711/APN-158.

(4) Connect the AN-UPM-56 to TP6 on the RT-711/APN-158.

(5) Set the AN/UPM-56 POWER switch to ON..

(6) Set up the AN/UPM-56 for power measurement.

(7) Set the TEST SET FUNCTION SELECTOR switch to RECEIVER TRANSMITTER TESTS.

(8) Set the INTERNAL CONTROL UNITSYSTEM ('CONTROL switch to STANDBY.

(9) Set the RT 711/APN 158 RF switch to ON.

(10) With the AN UPM-56 measure the power output.

(11) Compute the average power output by adding the RT-711 APN-158 directional coupler loss, the AN UPM 56 RF LEVEL meter setting, and the cable loss connecting the AN/'UPM-56 RF INPUT OUTPUT connector to TP6 on the RT-711 APN-158. The total should be approximately +43 decibels (referred to 1 milliwatt in 600 ohms) (dbm) or more. (+43 dbm = approximately 20 watts average power.)

(12) Measure and record the magnetron pulse width with the oscilloscope.

(13) Calculate the peak power as follows: Peak power (kw) = $\frac{\text{Average power x 1000}}{\text{Pulse width } (\mu\text{sec}) \text{ x PRF}}$

The minimum acceptable peak power output is 20 kw.

Q. Transmitter Frequency Measurement.

(1) With AN UPM-56 FREQUENCY meter control measure the frequency output of the RT-711/ APN-158.

(2) The frequency should be 9,375 +40 MHz.

R. Receiver Tangential Sensitivity.

NOTE 1

Set the AN UPM-56 for receiver sensitivity measurement. Refer to the applicable technical manual covering AN/UPM-56 operation.

NOTE 2

Prior to starting the following test, the sensitivity time control (STC) pulse must be set to zero volts. This is accomplished by adjusting R34 in Synchronizer Gate Generator Module.

(1) Connect oscilloscope to TP5 on left side of RT-711 APN-158.

(2) Disconnect the CG-1464 U coaxial cable from the TRIG INPUT jack on the oscilloscope and connect it to the EXT TRIG jack on the AN/ UPM-56.

(3) Connect a (G-1464 U coaxial cable from the AN/UPM-56 TRIGGER OUT jack to the oscilloscope TRIG INPUT jack.

(4) Connect oscilloscope vertical amplitude input to VIDEO test jack J16 on rear of Synchronizer unit.

(5) Set the receiver GAIN control on the AN/APM-247 for maximum receiver gain.

(6) Set the AN/UPM-56 to approximately 9,375 MHz.

(7) Set the AN/UPM-56 controls as follows:

(a) PULSE LENGTH (µsec):	10
(b) DELAY (µsec): (lower knob to X10)	Approximately 80
(c) REP RATE PPS (lower knob to X100)	400
(d) TRIGGER:	+ TRIG
(e) RF LEVEL SELECTOR:	RF OUT B

(8) Observe video output pulse from Synchronizer VIDEO jack J16. Increase AN/UPM56 RF LEVEL control to approximately 50 dbm. Slowly vary the SIGNAL FREQUENCY control until a maximum pulse amplitude is observed on the oscilloscope.

(9) While observing the video output pulse, increase RF LEVEL control. Lower the signal level until pulse just disappears into the background noise.

(10) Indication of RF LEVEL meter (dbm), cable attenuation, directional coupler loss, and any other attenuators used; total dbm should be at least 90 dbm.

S. Sensitivity Time Control Slope.

NOTE

Prior to starting the following test, the sensitivity time control (STC) pulse should be set between 3.8 volts and 4.2 volts. This is accomplished by adjusting R34 in Synchronizer Gate Generator Module.

(1) Adjust the AN./UPM-56 DELAY (µsec) control until the pulse displayed on the oscilloscope is delayed 150 microseconds after the transmitter pulse.

(2) Adjust the AN/UPM-56 RF LEVEL 1 until a 4-volt pulse, measured from the LEI re to the average noise on the pulse, is displayed on the oscilloscope. Record the setting of RF LEVEL control.

(3) Decrease the AN/UPM-56 DELAY (µsec) control until the pulse displayed on the delayed 37 microseconds after the transmitter pulse.

(4) Decrease the AN/UPM-56 RF LEVEL control until a 4-volt pulse is again displayed on the oscilloscope. The RF LEVEL setting should have decreased 12 ± 3 db from the setting in (2) above.

T. Receiver Gain.

(1) Set the INTERNAL CONTROL UNIT-GAIN as control fully clockwise.

(2) Adjust the AN/UPM-56 DELAY (µsec) control until the pulse displayed on the oscilloscope is delayed at least 200 microseconds from the transmitter pulse.

(3) Adjust the AN/UPM-56 RF LEVEL control for a pulse amplitude of 4 volts. Record setting of the RF LEVEL control.

(4) Set the INTERNAL CONTROL UNIT-SYSTEM CONTROL switch to control fully counterclockwise.

(5) Decrease the AN/UPM-56 RF LEVEL control until a 4-volt pulse is again displayed on the oscilloscope. The RF LEVEL setting should have decreased not less than 15 db from the in (3) above.

U. Contour.

(1) Set the INTERNAL CONTROL UNIT SYSTEM CONTROL switch to CONTOUR.

(2) Adjust the AN /UPM-56 PULSE LENGTH control for a 10-microsecond output pulse.

(3) Adjust the AN/UPM-56 RF TUNING control for a maximum amplitude of the pulse displayed on the oscilloscope. (Note that the afc is in the locked condition.)

(4) Adjust the AN/UPM-56 RF LEVEL control until the signal level of the pulse displayed on the oscilloscope is contour (the top of the pulse and the baseline are of equal intensity).

V. RF Pulse. Observe that the pulse width at TP4 on the RT-711/APN-158 is 2.1 to 2.5 microseconds wide at the 50-percent amplitude points, as measured with the oscilloscope.

W. Manual Elevation Control. Rotate the C-4881/APN-158 ELEVATION control UP; the antenna dish should move up. Rotate the ELEVATION control DOWN; the antenna dish d move down.

X. Video Signal. Measure the saturated video at the SN-358/APN-158 VIDEO jack; it should not measure less than 6 volts nor more 7 volts.

Y. Panel Meter Indications. Check the RT-711/APN-158 front panel meter; all meter positions should indicate 5.0 ± 1.0 except as follows:

(1) AFC should indicate 3-10.
(2) FWD should indicate 3-10.
(3) REV should indicate + 1.0 of the indication obtained in (2) above.

APPENDIX A

REFERENCES

The following is a list of references available to the repairmen of Radar Set AN/APN-158.

DA Pam 310-4	Military Publication: Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	Military Publication: Index of Modification Work Orders.
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used By the Army.
TR SIG 355-1	Depot Inspection Standards for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standards for Refinished Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standards for Moisture and Fungus Resistance Treatment.
TB 746-10	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 9-6625-2362-12	Operator's Manual: Oscilloscope AN/USM-281.
TM 11-2678	Operator, Organizational, field and depot Maintenance Manual: Pulse Generator MA/PPM-1 and AN/PPM-1A.
TM 11-5841-259-12	Organizational Maintenance Manual: Maintenance Kit, Electronics Equipment , MK-774/APN-158.
TM 11-6625-200-15	Operator, Organizational, , GS, and Depot Maintenance Manual: Multimeters ME-26A/U, ME-26B/U, ME-26C/U, and ME-26D/U.

APPEDDIX A (cont)

REFERENCES

TM 11-6625-,508-10	Operator's Manual: Signal Generators Ai/USMI-44 and An/USM-44A.
TM 11-6625-519-10	Operation: Echo Box TS-488A/A1P.
TM 11-6625-664-12	Organizational Maintenance Manual: Test Set, Radar AT/APlIM-246 and Test Set, Radar AM/APN-247.
TM 38-750	Army Equipment Record Procedures.
TM 740-90-1	Administrative Storage of Equipment.

By Order of the Secretary of the Army:

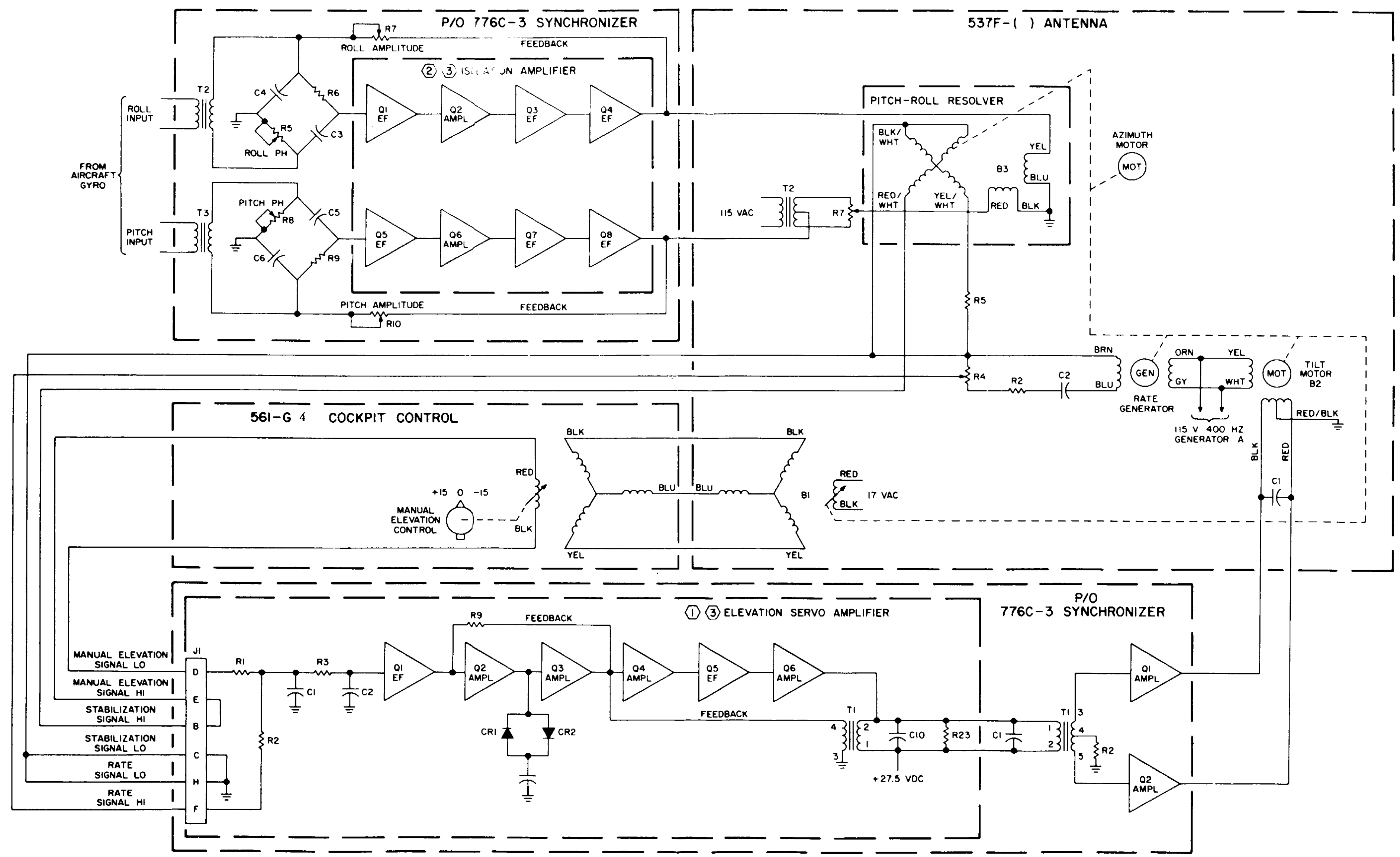
W .C. WESTMORELAND,
General, United States Army
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:
To be distributed in accordance with DA Form 12-36, direct and general support maintenance requirements for the U-8D and U-8F aircraft.

* U.S. GOVERNMENT PRINTING OFFICE : 1992 0 - 311-831 (60573)

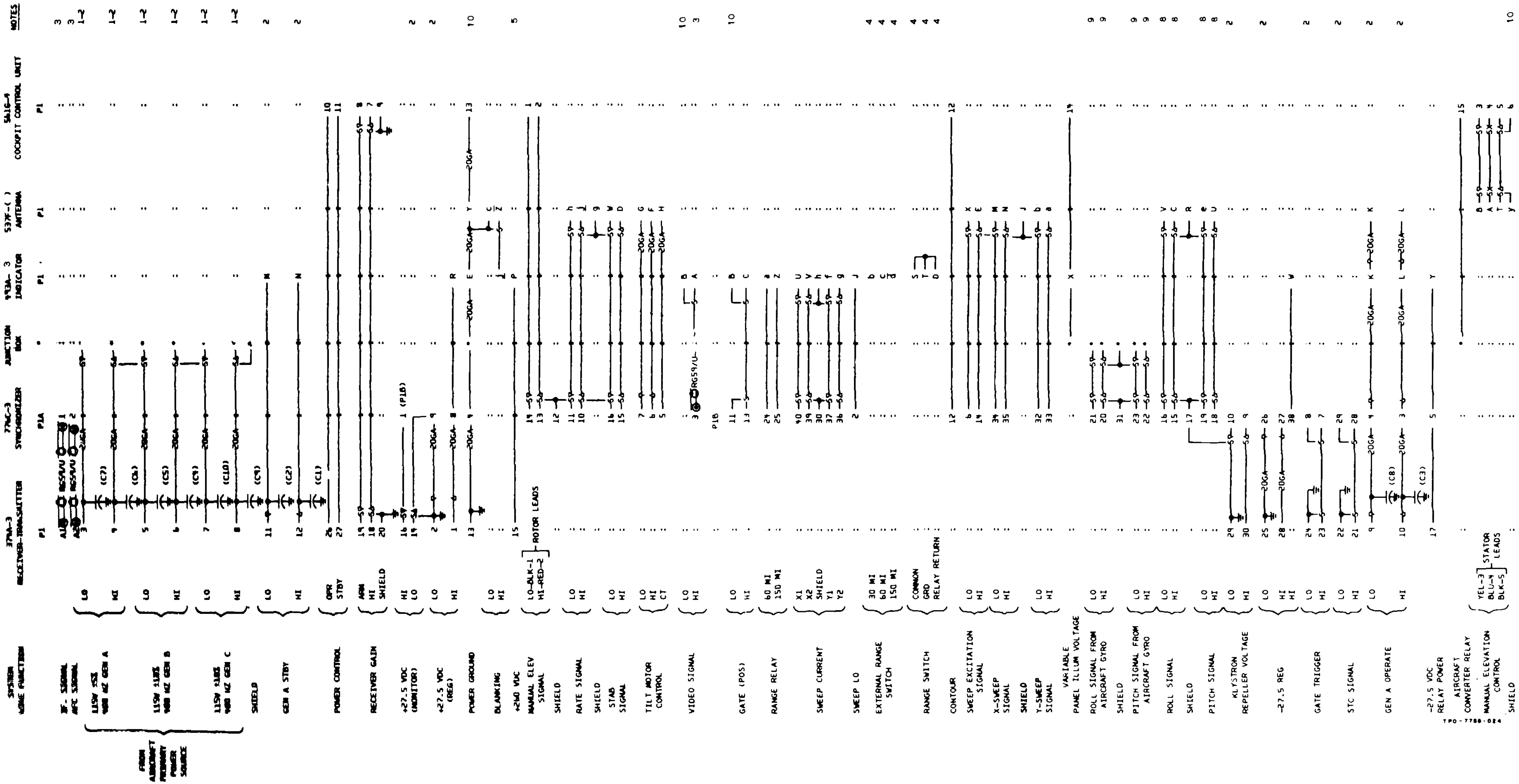
TM 11-5841-241-35



NOTES:
1. USED ON 776C-3 SYNCHRONIZER-REVISION AJ/AG AND ABOVE.
2. USED ON 776C-3 SYNCHRONIZER-REVISION AH/AG AND ABOVE.
3. REFER TO CHAPTER 3 FOR APPLICABLE EFFECTIVITY OF ELEVATION SERVO AMPLIFIER AND ISOLATION AMPLIFIER USED PRIOR TO THE ONES SHOWN IN THIS ILLUSTRATION

Stabilization System, Simplified Schematic Diagram
Figure FO-1

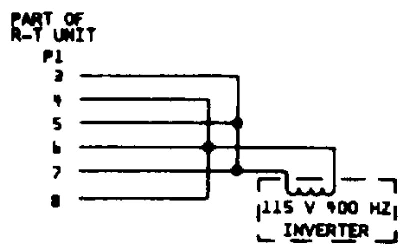
Stabilization System, Simplified Schematic Diagram
Figure FO-1



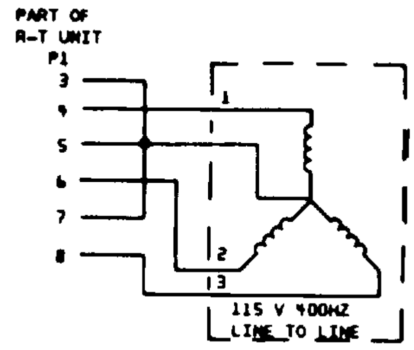
WP-103 Weather Radar System, Interconnect Diagram (Sheet 1 of 2)
Figure FO-2

NOTES:

1 FROM AIRCRAFT PRIMARY POWER SOURCE.



PRIMARY POWER INTERCONNECT TO
WP-103 WEATHER RADAR SYSTEM
FROM AIRCRAFT USING A SINGLE
PHASE PRIMARY POWER SOURCE

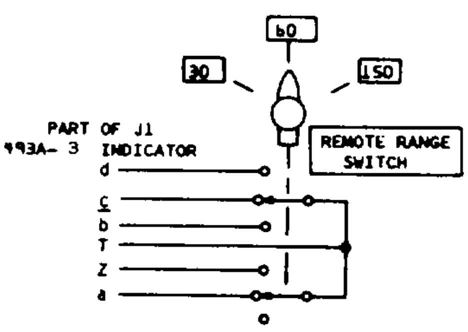


PRIMARY POWER INTERCONNECT TO
WP-103 WEATHER RADAR SYSTEM
FROM AIRCRAFT USING A THREE-PHASE
FOUR-WIRE WYE PRIMARY POWER SOURCE.

2. CAPACITORS AND GROUNDS (SHOWN ON INTERCONNECT) ARE LOCATED ON 349A-6 SHOCKMOUNT. COLLINS PART NUMBER 522-6115-004.

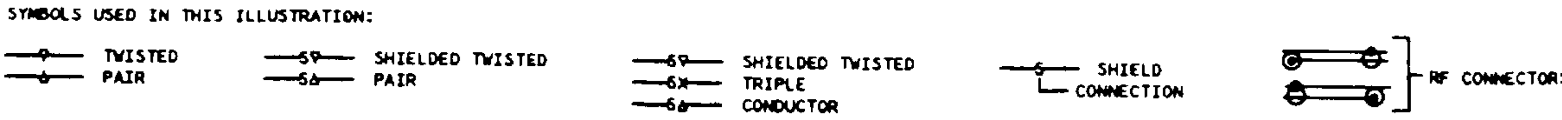
3 CONNECTOR' FOR RF CABLE (TYPE RG 59/U) ARE TYPE RF 6621-78. COLLINS PART NUMBER 357-9887-00.

4 WHEN MOUNTING REQUIREMENTS OF THE 493A- 3 INDICATOR NECESSITATE THE USE OF A REMOTE RANGE SWITCH. REMOVE JUMPERS FROM PINS S, T, AND D OF J1 AND CONNECT REMOTE RANGE SWITCH AS SHOWN BELOW.



5 +250 VDC ON EARLIER UNITS.

6 SYMBOLS USED IN THIS ILLUSTRATION:



7 UNLESS OTHERWISE INDICATED, ALL WIRING IS NO 22 GAUGE.

8 WHEN NO GYRO IS PRESENT, CONNECT JUMPERS BETWEEN ANTENNA PINS C AND V, U AND e.

9 PITCH AND ROLL GYRO SIGNALS MUST BE PHASE-SYNCHRONOUS WITH SOURCE GEN A.

10 PIN Y ON ANTENNA AND PIN B ON INDICATOR ARE REFERENCED TWICE ON INTERCONNECT.

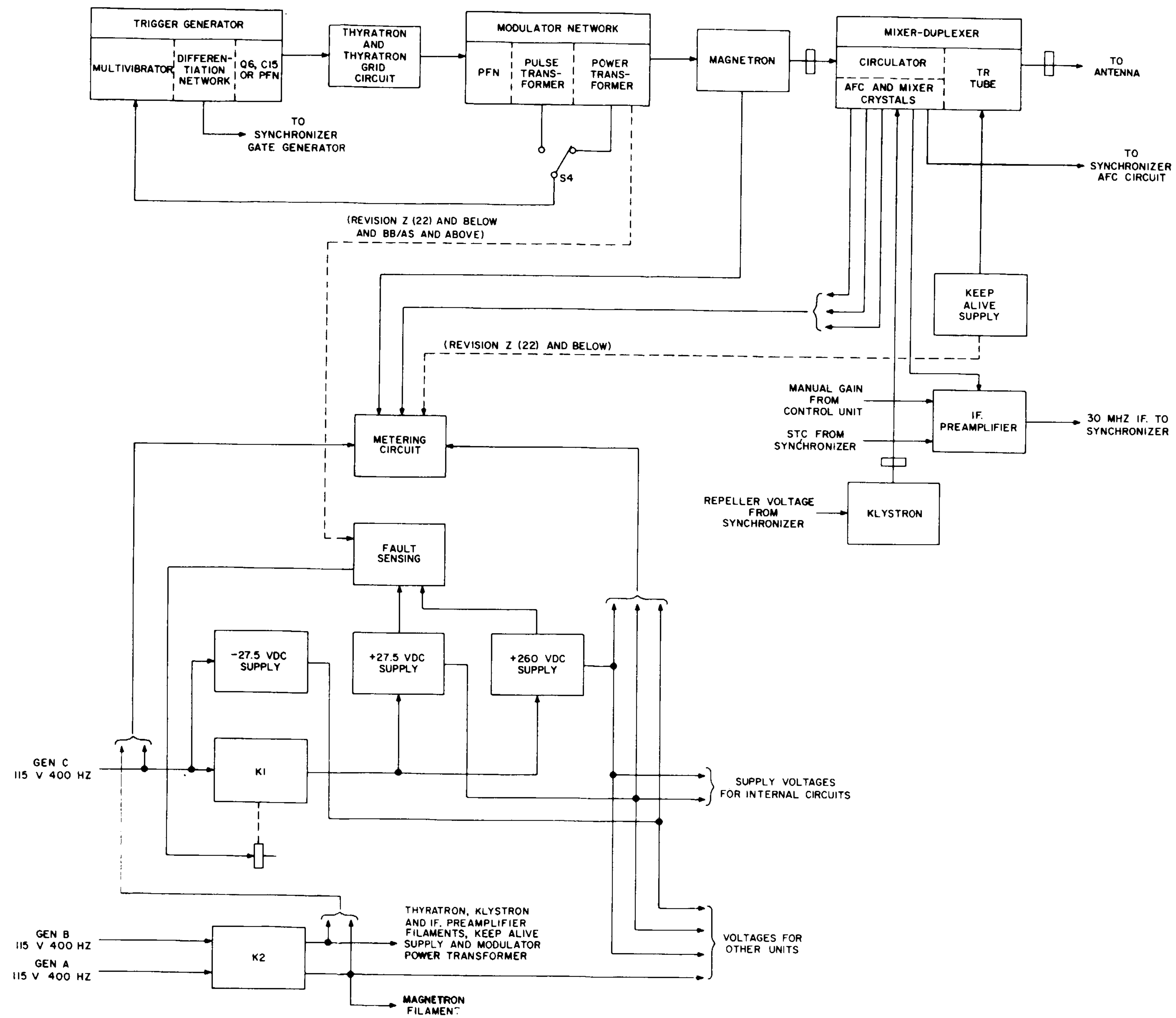
11 GEN A AND GEN C MUST BE PHASE-SYNCHRONOUS.

12 MATING CONNECTOR INFORMATION:

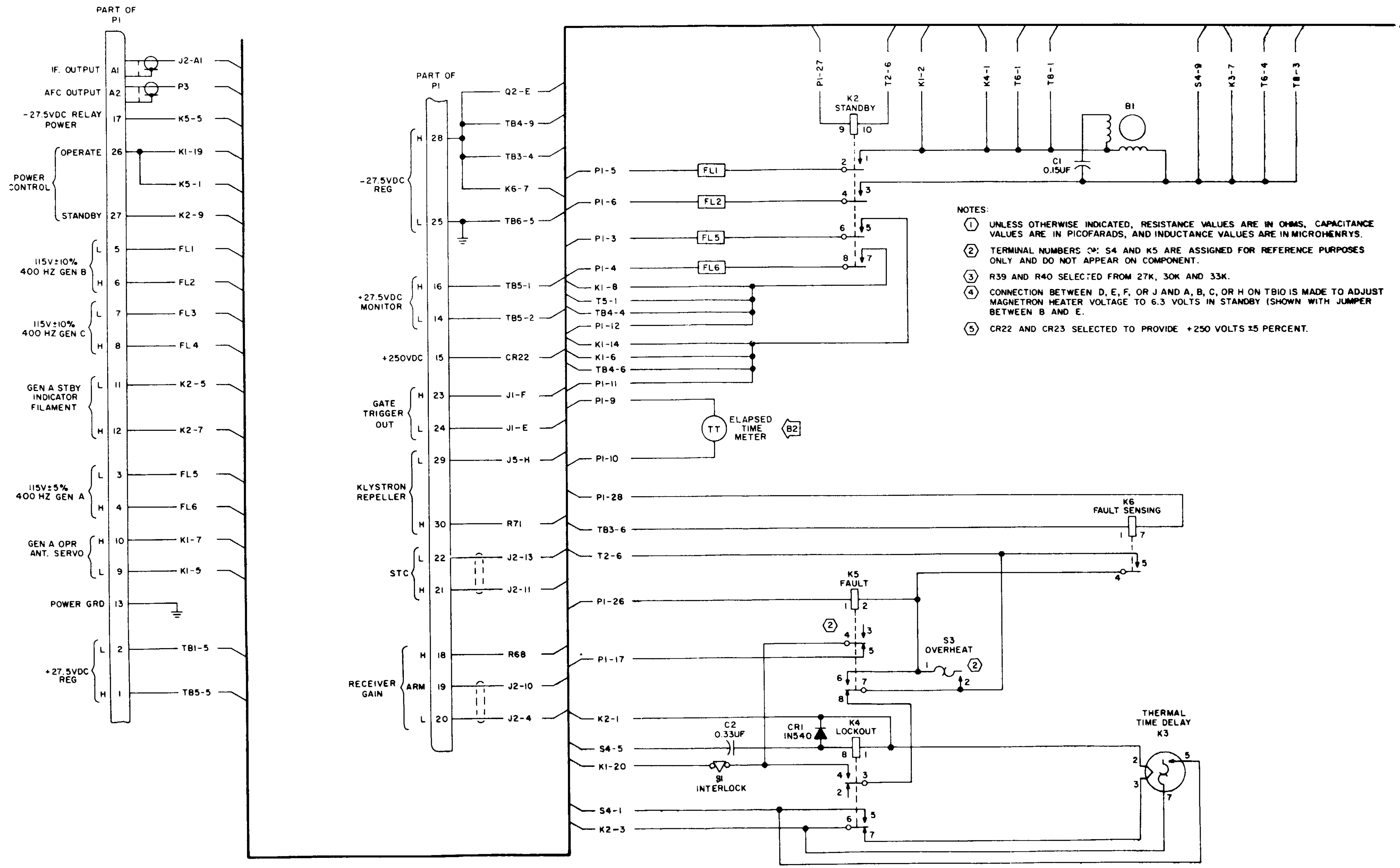
UNITS	UNIT CONNECTOR		MATING CONNECTOR DESIGNATION	MATING CONNECTOR	
	TYPE	COLLINS PART NUMBER		TYPE	COLLINS PART NUMBER
374A-3	DPXLF-A32C2-34P	370-2143-000	P1	DPX-32C2-33S	370-2159-000
776C-3	DPX2-B16C3P40P-34A-1073	370-2161-000	P1A & P1B	DPX2-M16C3S40S-33A-1073	370-2203-000
493A- 3	PT02A-18-32P	371-2005-000	P1	PT06A-32S(SR)	371-2476-000
537F-( )	PT02A-18-32P	371-2005-000	P1	PT06A-18-32S(SR)	371-2478-000
561G-4	DA-15P-C33	371-0169-000	P1	DA-15S-C?	371-0220-000

TPO-7788-024

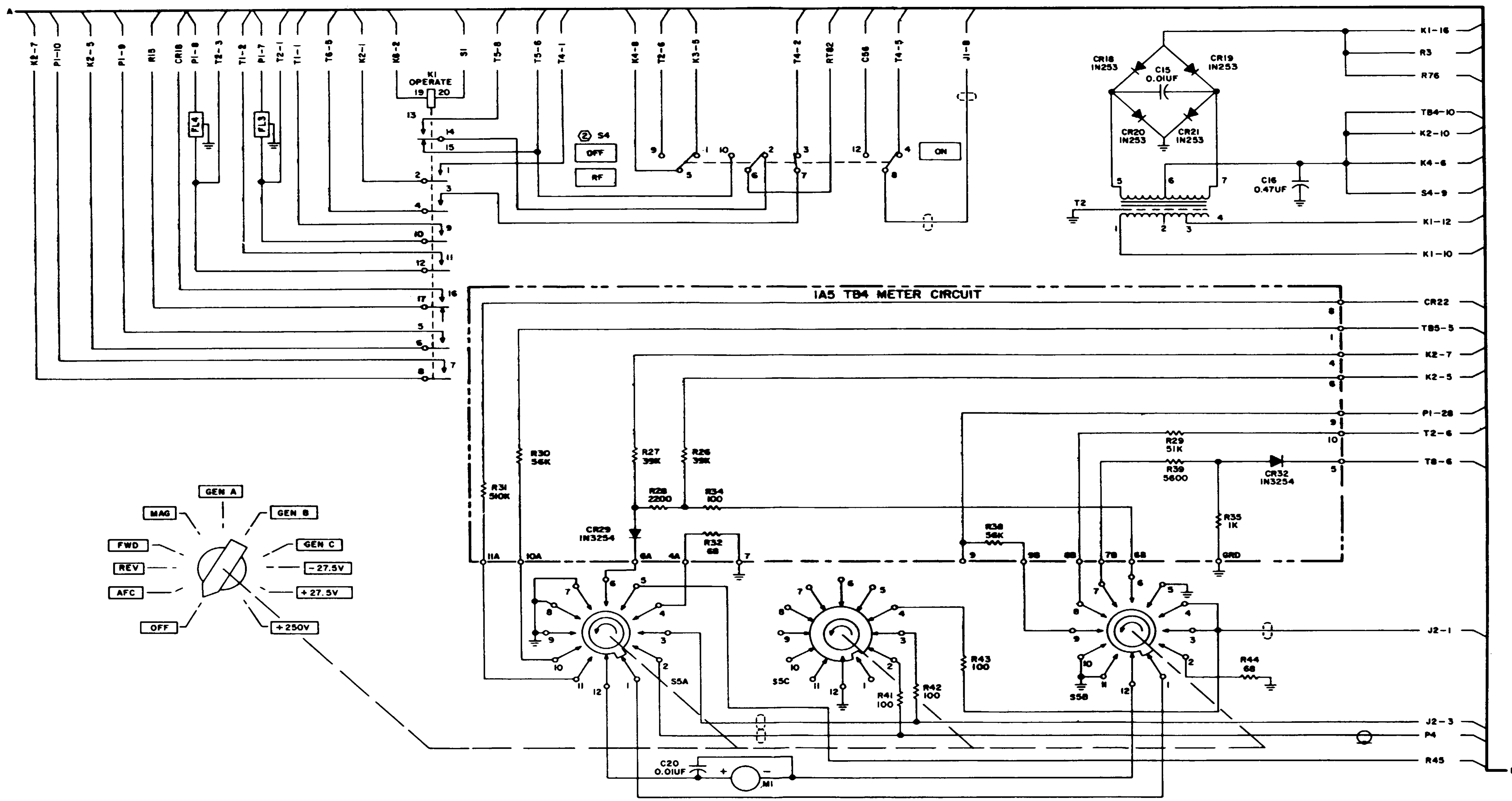
WP-103 Weather Radar System, Interconnect Diagram (Sheet 2 of 2)
Figure F0-2



374A-3 Receiver-Transmitter, Detailed Block Diagram
Figure FO-3

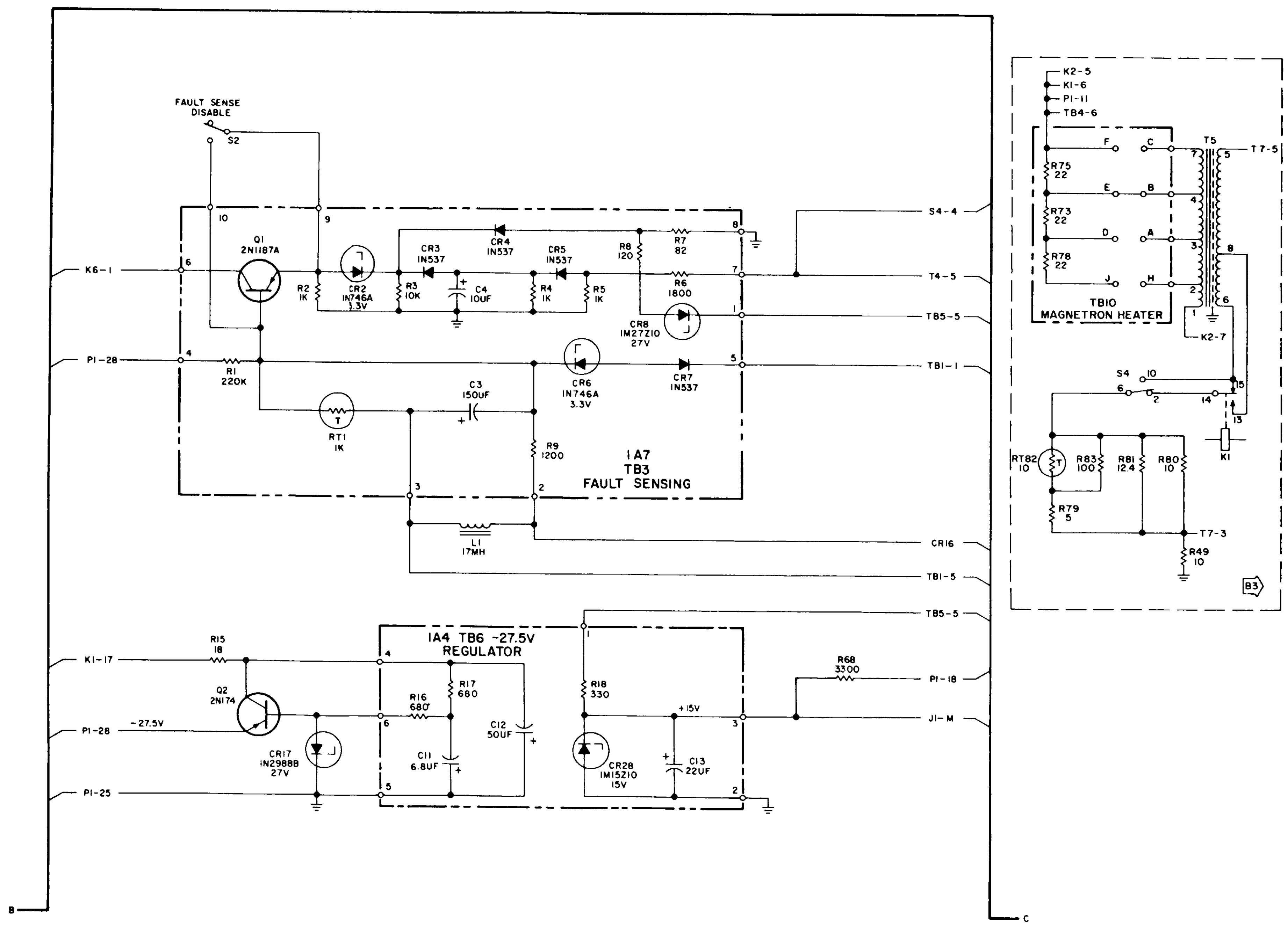


374A-3 Receiver-Transmitter (Revision Z(22) and Below), Schematic Diagram (Sheet 1 of 8)
Figure F0-4

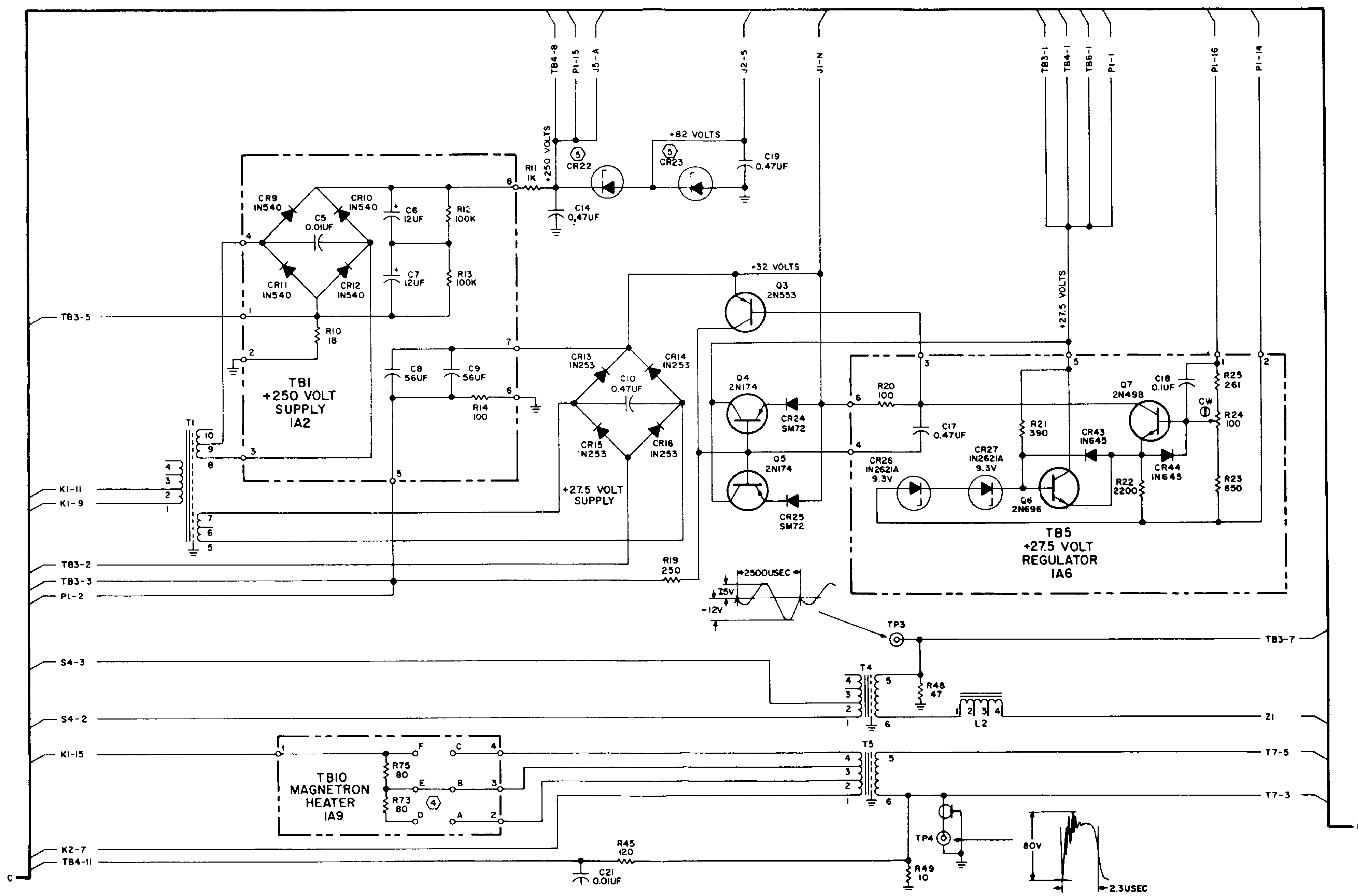


374A-3 Receiver-Transmitter (Revision AA(23) and Above), Schematic Diagram (Sheet 2 of 8)

Figure FO-4

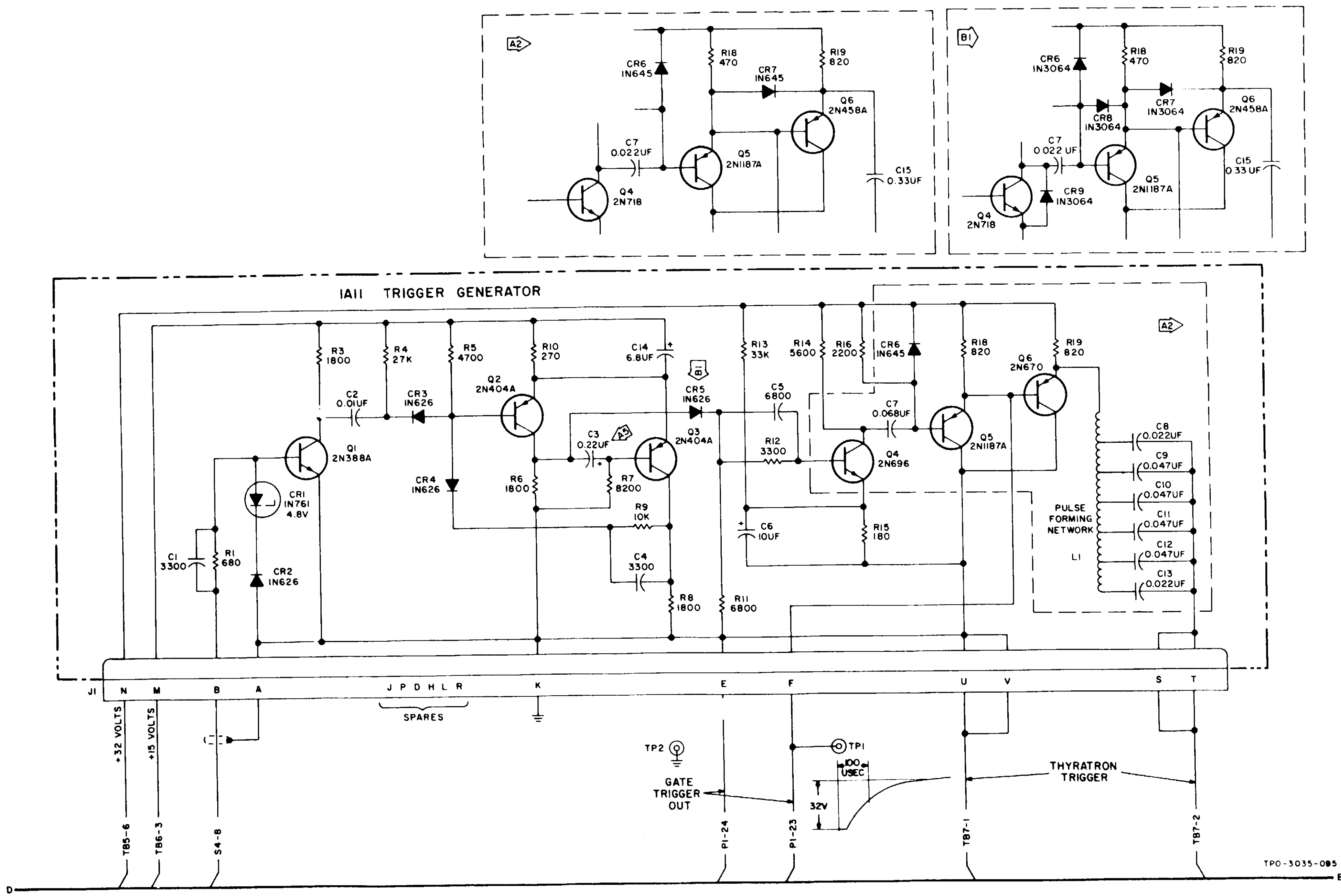


374A-3 Receiver-Transmitter (Revision AA(23) and Above), Schematic Diagram (Sheet 3 of 8)
Figure FO-4

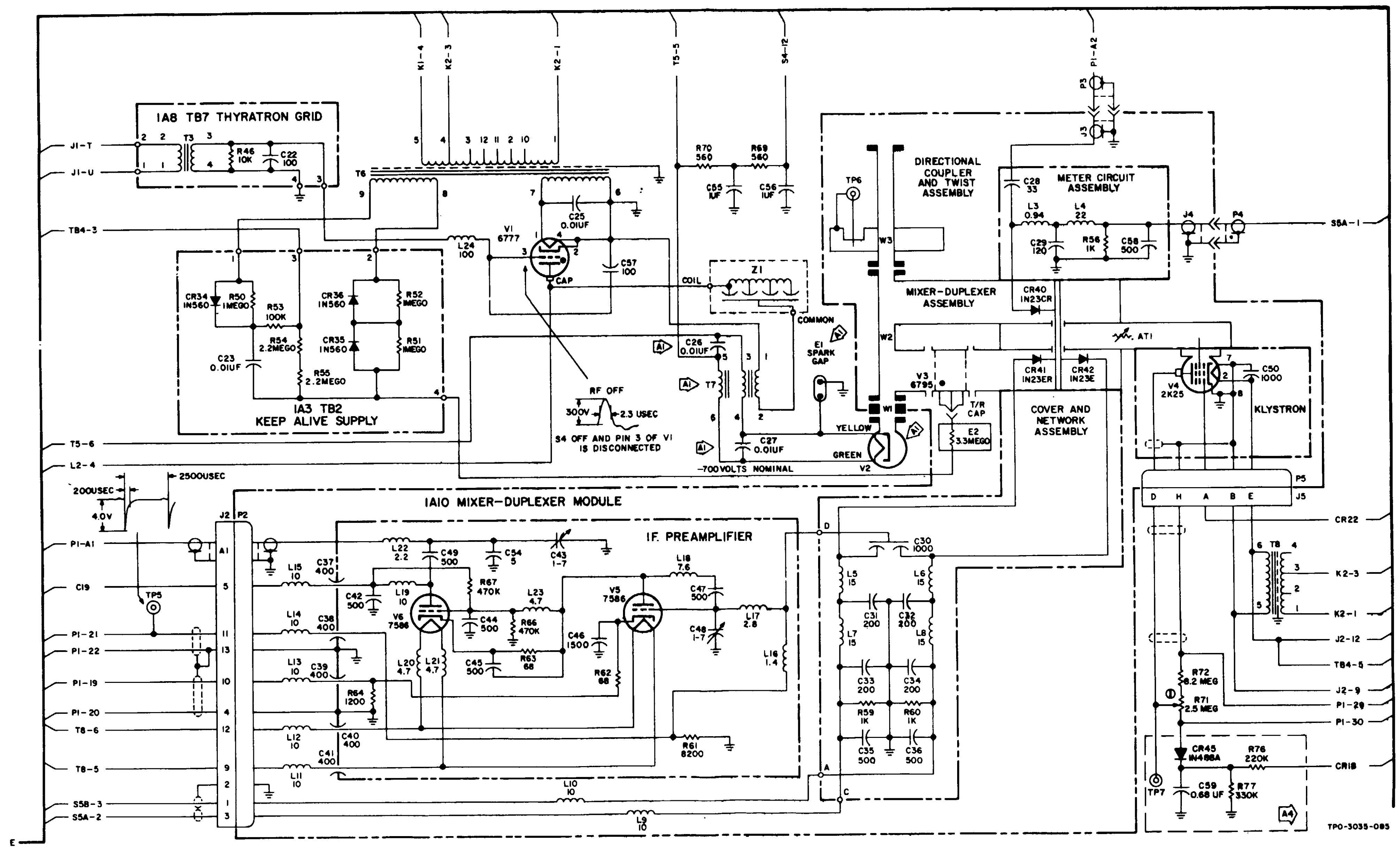


374A-3 Receiver-Transmitter (Revision AA(23) and Above), Schematic Diagram (Sheet 4 of 8)

Figure FO-4



374A-3 Receiver-Transmitter (Revision AA(23) and Above), Schematic Diagram (Sheet 5 of 8)
Figure FO-4



374A-3 Receiver-Transmitter (Revision AA(23) and Above), Schematic Diagram (Sheet 6 of 8)
Figure FO-4

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A1	Modification to conform to revised TSO category A requirements; magnetron V2 was Collins part number 257-0098-00, changed to 257-0224-010; spark gap E1 was Collins part number 257-9000-00, changed to 674-3055-010; capacitors C26 and C27 were Collins part numbers 935-2392-00, changed to 913-3731-00.	6	Units with revision Z (22) and above
A2	Redesign of trigger generator circuit for improved reliability; alternate circuit applies to modules with revision H through K.	8	Modules with revision H through K
A3	Modification to reduce the amount of radiated radio frequency interface (rfi).	10	None
A4	Improved klystron local oscillator and associated components. V4 was 2K25, changed to Collins part number 257-0235-010; R71 was 2.5M, changed to 1M; CR45, C59, R76, R77, and TP7 were added. Refer to Service Information Letter 42-67 for further information.	11	None
A5	Corrected component value: C3 was 22 uf, changed to 0.22 uf.		Modules with revision H and above.

374A-3 Receiver-Transmitter (Revision Z (22) and Below), Schematic Diagram (Sheet 7 of 8)

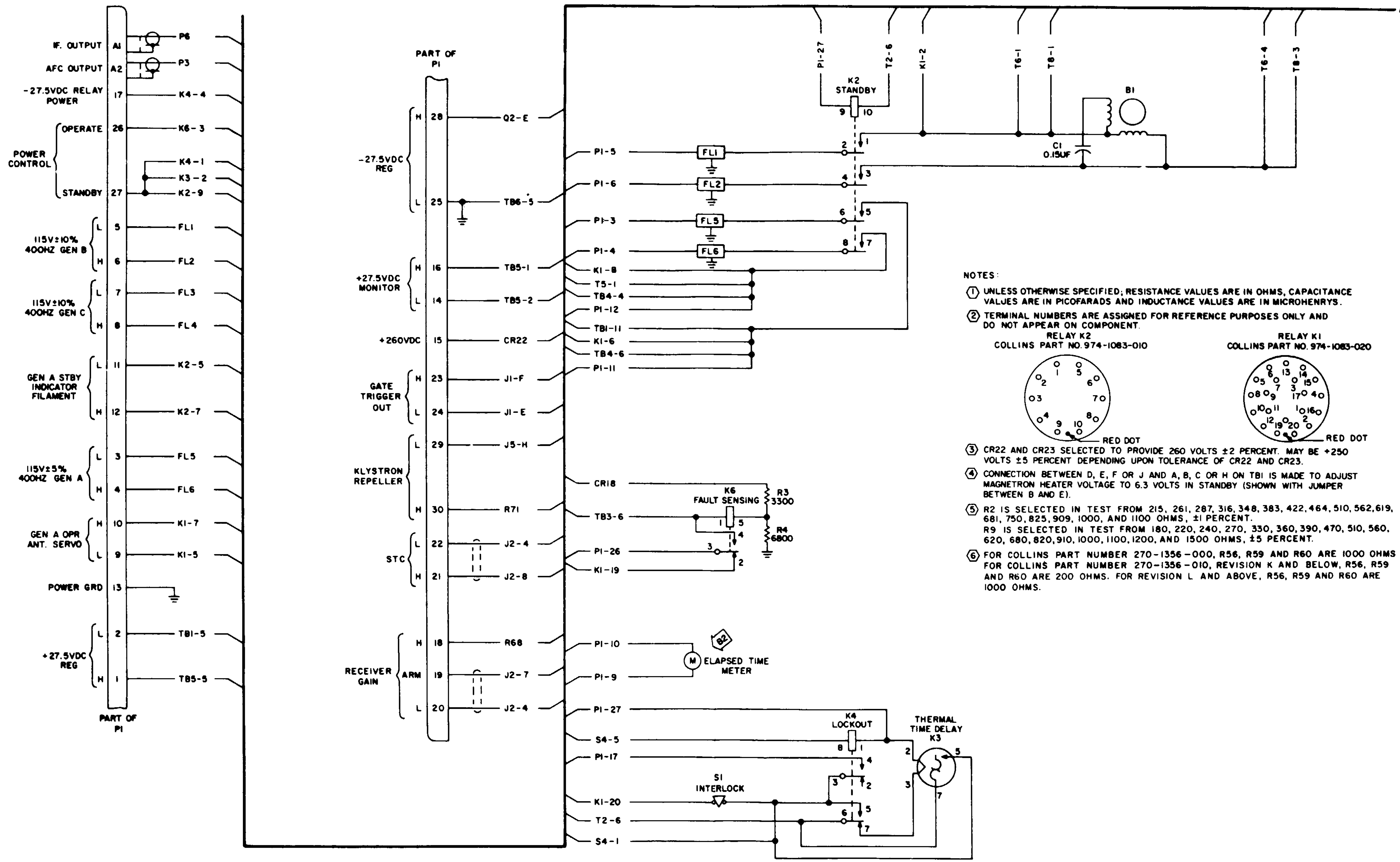
Figure FO-4

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
B1	Modification to improve trigger generator reliability. CR5 was 1N626, changed to 1N3064; CR6 and CR7 were 1N645, changed to 1N3064. CR8 and CR9 were added.	12	Modules with revision L and above
B2	Install elapsed time meter to monitor magnetron emission time.	14	None (customer option)
B3	Modification to improve receiver-transmitter operation at low temperatures. T5 was Collins part number 672-0032-000, changed to 672-0298-000; R73 and R75 were 80 ohms, changed to 22 ohms; R78, 22 ohms, added; resistor-thermistor network R79, R80, R81, RT82, and R83 added.	13	None

374A-3 Receiver-Transmitter (Revision Z (22) and Below), Schematic Diagram (Sheet 8 of 8

Figure FO-4



NOTES:

1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN PICOFARADS AND INDUCTANCE VALUES ARE IN MICROHENRYS.
2. TERMINAL NUMBERS ARE ASSIGNED FOR REFERENCE PURPOSES ONLY AND DO NOT APPEAR ON COMPONENT.

RELAY K2
COLLINS PART NO. 974-1083-010

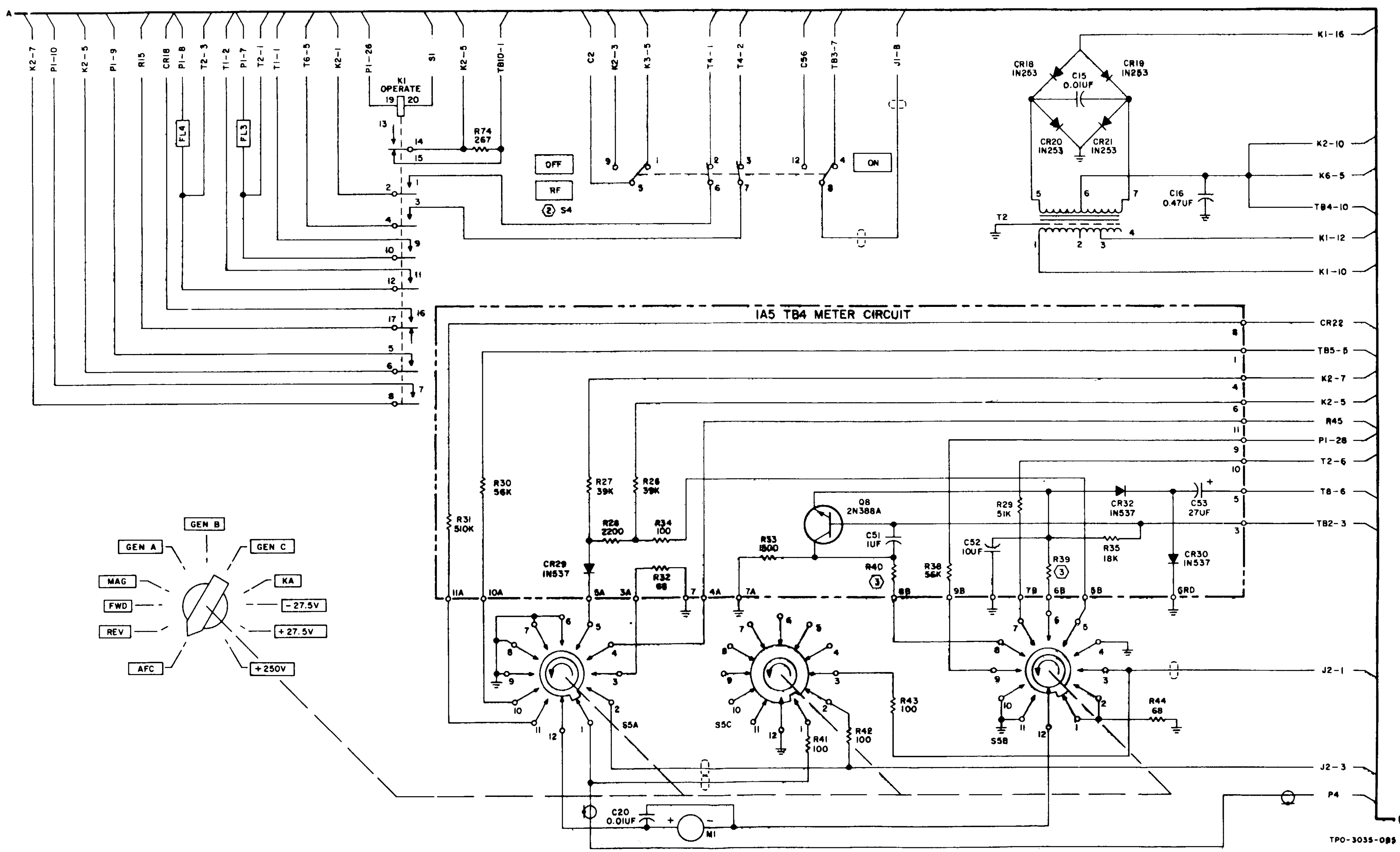
RELAY K1
COLLINS PART NO. 974-1083-020

RED DOT

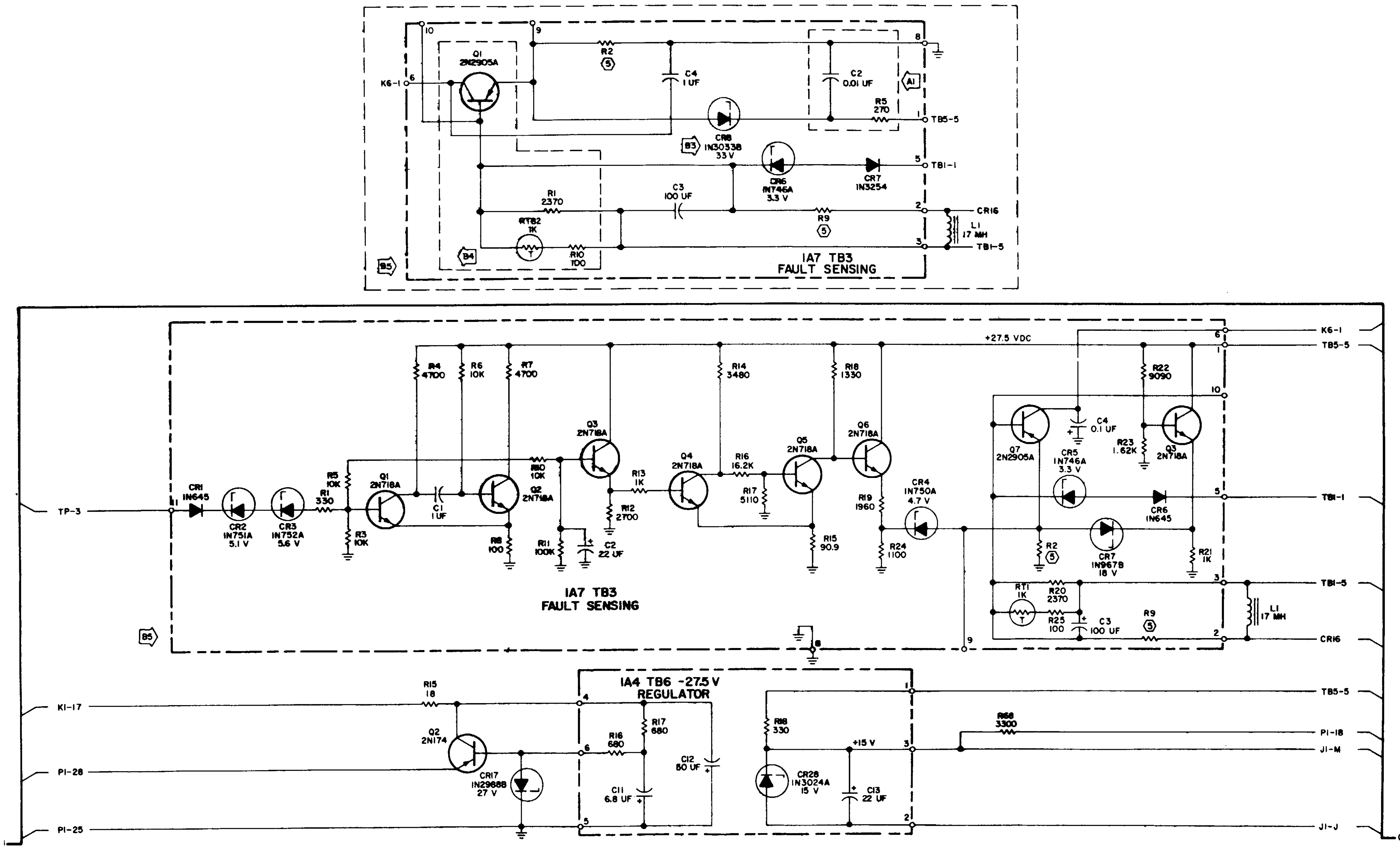
RED DOT

3. CR22 AND CR23 SELECTED TO PROVIDE 260 VOLTS ±2 PERCENT. MAY BE +250 VOLTS ±5 PERCENT DEPENDING UPON TOLERANCE OF CR22 AND CR23.
4. CONNECTION BETWEEN D, E, F OR J AND A, B, C OR H ON TB1 IS MADE TO ADJUST MAGNETRON HEATER VOLTAGE TO 6.3 VOLTS IN STANDBY (SHOWN WITH JUMPER BETWEEN B AND E).
5. R2 IS SELECTED IN TEST FROM 215, 261, 287, 316, 348, 383, 422, 464, 510, 562, 619, 681, 750, 825, 909, 1000, AND 1100 OHMS, ±1 PERCENT.
R9 IS SELECTED IN TEST FROM 180, 220, 240, 270, 330, 360, 390, 470, 510, 560, 620, 680, 820, 910, 1000, 1100, 1200, AND 1500 OHMS, ±5 PERCENT.
6. FOR COLLINS PART NUMBER 270-1356-000, R56, R59 AND R60 ARE 1000 OHMS FOR COLLINS PART NUMBER 270-1356-010, REVISION K AND BELOW, R56, R59 AND R60 ARE 200 OHMS. FOR REVISION L AND ABOVE, R56, R59 AND R60 ARE 1000 OHMS.

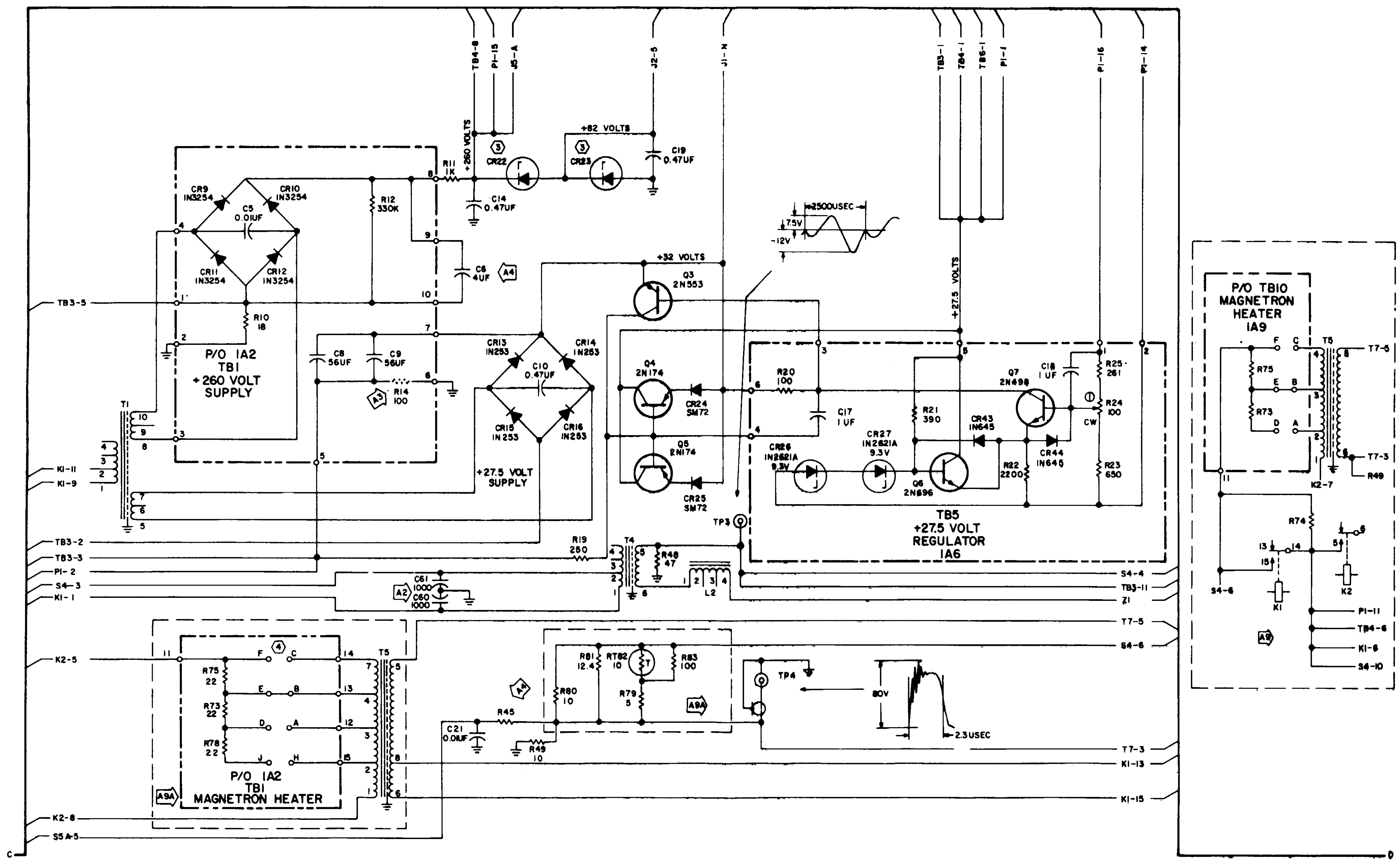
37A-3 Receiver-Transmitter (Revision AA (23) and Above), Schematic Diagram (Sheet 1 of 9)
Figure FO-5



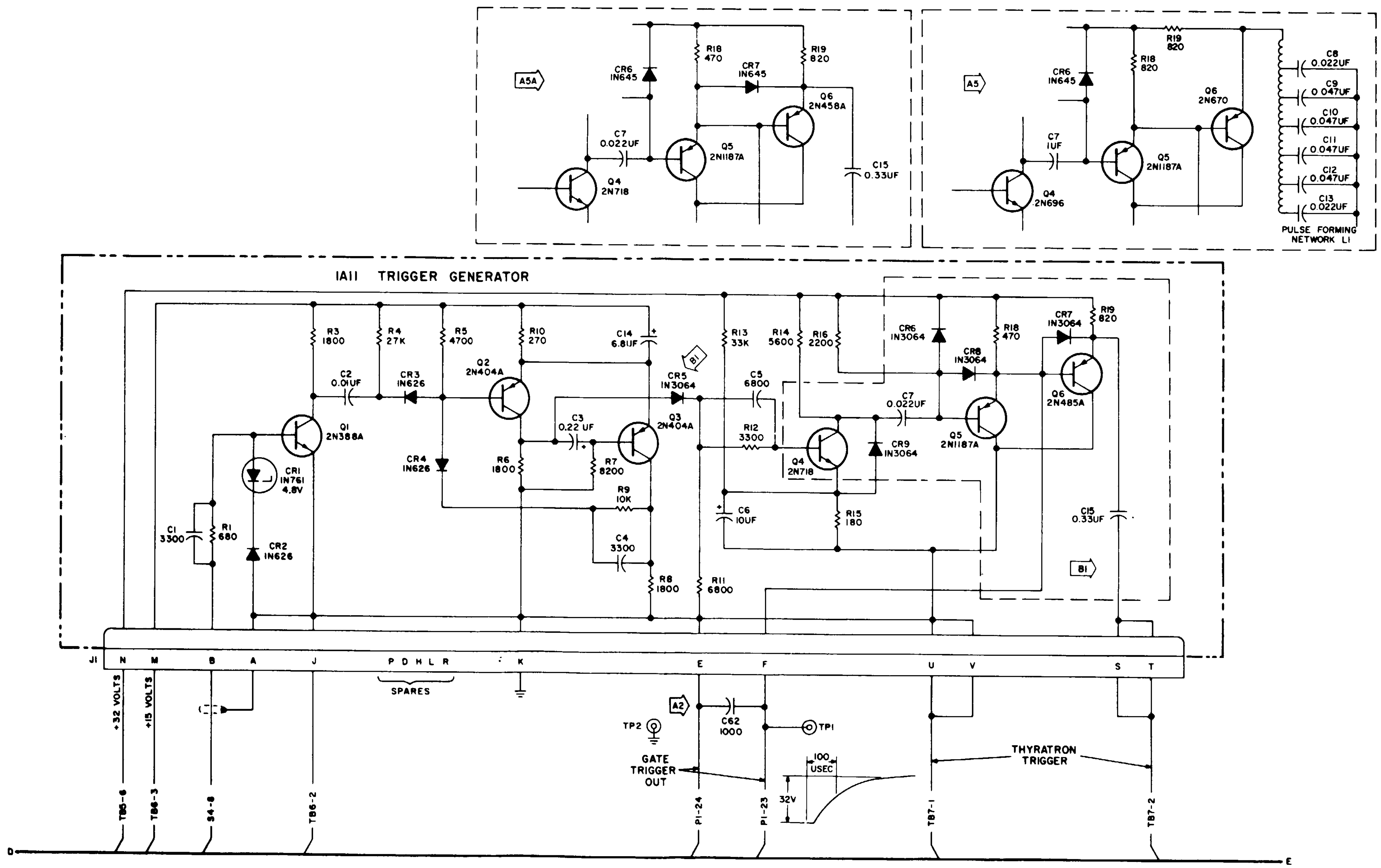
37A-3 Receiver-Transmitter (Revision AA (23) and Above), Schematic Diagram (Sheet 2 of 9)
Figure FO-5



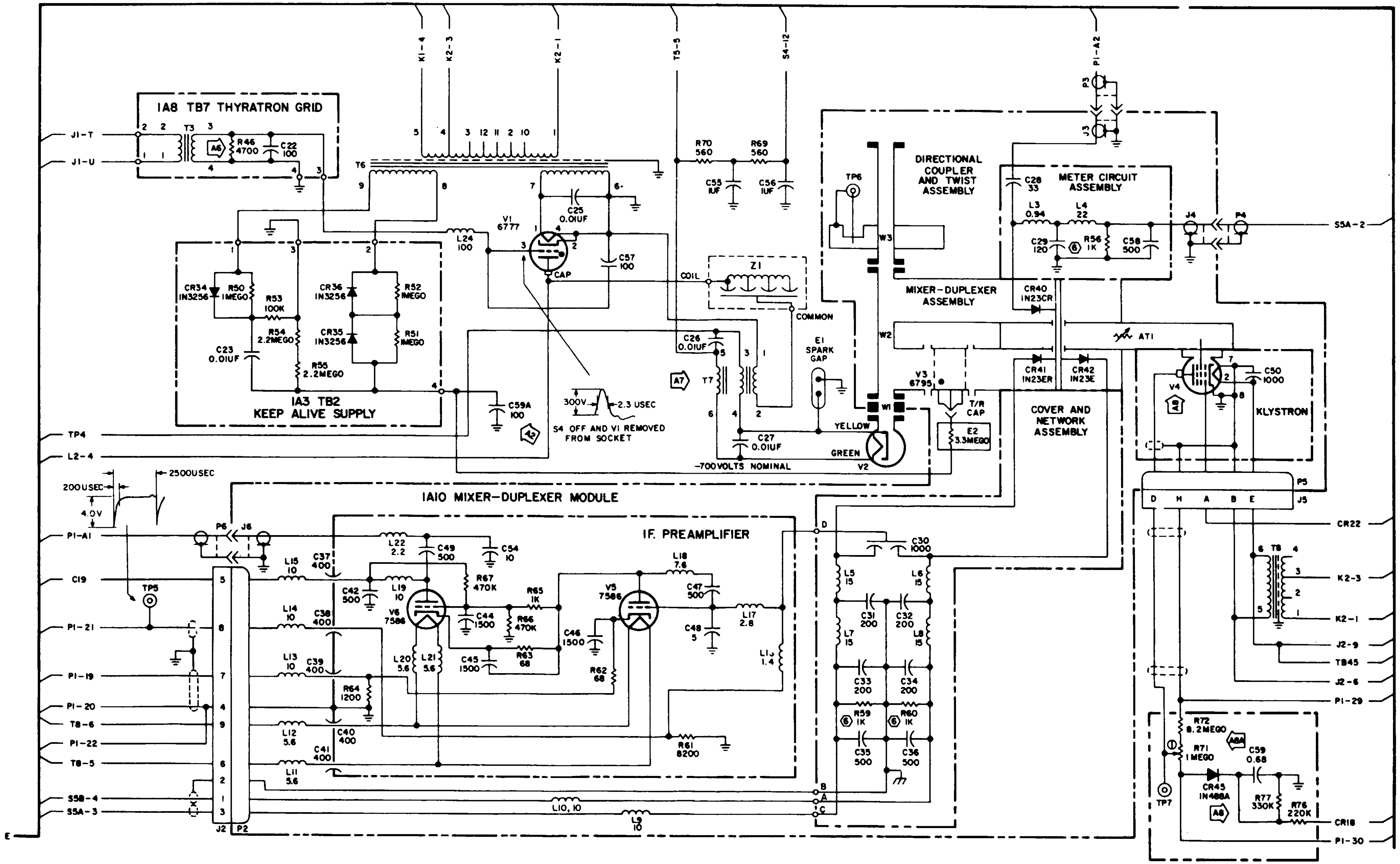
37A-3 Receiver-Transmitter (Revision AA (23) and Above), Schematic Diagram (Sheet 3 of 9)
Figure FO-5



37A-3 Receiver-Transmitter (Revision AA (23) and Above), Schematic Diagram (Sheet 4 of 9)
Figure FO-5



37A-3 Receiver-Transmitter (Revision AA (23) and Above), Schematic Diagram (Sheet 5 of 9)
Figure FO-5



37A-3 Receiver-Transmitter (Revision AA (23) and Above), Schematic Diagram (Sheet 6 of 9)
Figure FO-5

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A1	Redesign of fault sensing circuit; C2 and R5 installed as shown.		TB3 with revision N and above
A2	Modification to reduce the amount of radiated radio frequency interference (rfi).	10	Units with revision AD and above
A3	Circuit redesigned: R14 removed and replaced with a jumper wire.		TB1 with revision A and above
A4	Corrected component values: C6 was 5 uf, changed to 4 uf; R45 was 120 ohms, changed to selected in test from 82, 100, or 120 ohms to obtain center-scale meter reading in MAG position.		Units with revision AB (24) and above
A5	Trigger generator circuit for modules with revision G and below		Modules with revision G and below
A5A	Redesign of trigger generator circuit for improved reliability; circuit applies to modules with revision H through K.	8	Modules with revision H through K
A6	Corrected component value: R46 was 10K, changed to 4.7K.		TB7 with revision G and above
A7	Improved high altitude operation. Pulse transformer T7 was Collins part number 674-3085-010,, changed to 674-3085-020	9	Units with revision AE and above

37A-3 Receiver-Transmitter (Revision AA (23) and Above), Schematic Diagram (Sheet 7 of 9)
Figure FO-5

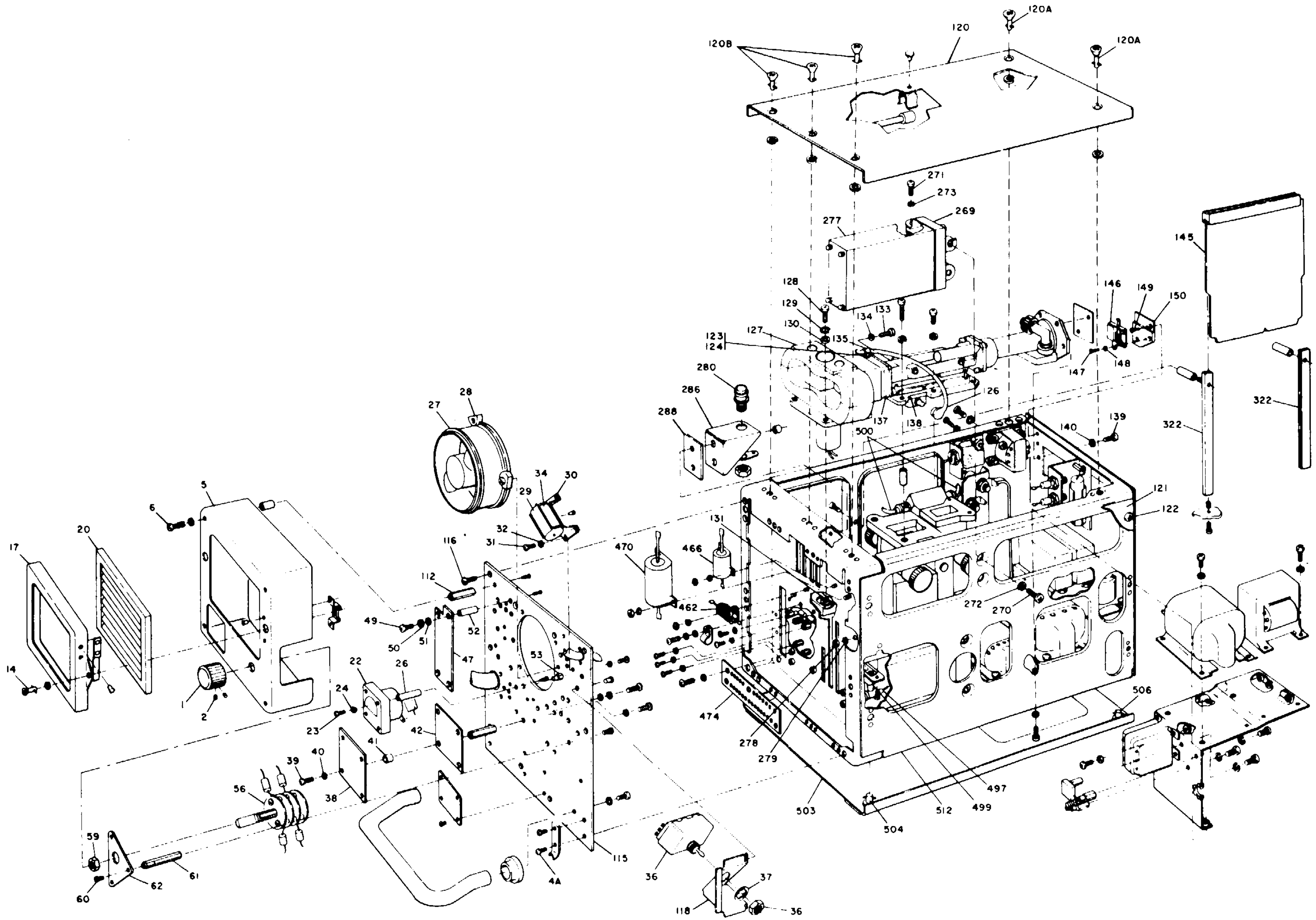
REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A8	Improved klystron local oscillator and associated components. V4 was, changed 1M; to Collins part number 257-0235-010; R71 was 6.8M, changed to 8.2M; CR45, C59, R76, R77, and TP7 added.	11	Units with revision AH and above
A8A	Units with revisions AF1 and AG contain part of the modification covered by Service Bulletin No. 11. These units contain all of the components covered by Service Bulletin No. 11 with the following exceptions: R71 was deleted, and R72 was 10M. To install the modification in Service Bulletin No. 11 in these units, change R72 from 10M to 8.2M, and install R71, 1M.		
A9	Magnetron heater circuit for units with revision AG and below.		Units with revision AG and below
A9A	Modification to improve receiver-transmitter operation at low temperatures: T5 was Collins part number 672-0032-000, changed to 672-0298-000; R73 and R75 were 80 ohms, changed to 22 ohms; R78, 22 ohms added; resistor-thermistor network R79, R80, R81, RT82, and R83 added.	13	Units with revision AH and above, TB1 With Collins part number 556-9558-004

37A-3 Receiver-Transmitter (Revision AA (23) and Above), Schematic Diagram (Sheet 8 of 9)
Figure FO-5

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
B1	Improved trigger generator reliability. CR5, type 1N626, CR6 and CR7, type 1N645, changed to type 1N3064. CR8 and CR9, type 1N3064 added.	12	Modules with revision L and above
B2	Install elapsed time meter to record magnetron emission time.	14	None (customer option)
B3	Changed component type to improve low temperature operation. CR8 was 1N3022A, changed to 1N3033B.		Modules with revision S and above
B4	Improved low temperature operation. R1 was 1K, changed to 2.37K. R10 and RT1 added. Q1 was 2N2043A, changed to 2N2905A.		Modules with revision T and above
B5	Redesign of fault sensing module for improved operation. Alternate circuit applies to units with revision levels AA (23) through AZ/AS.		Units with revision BB/AT and above

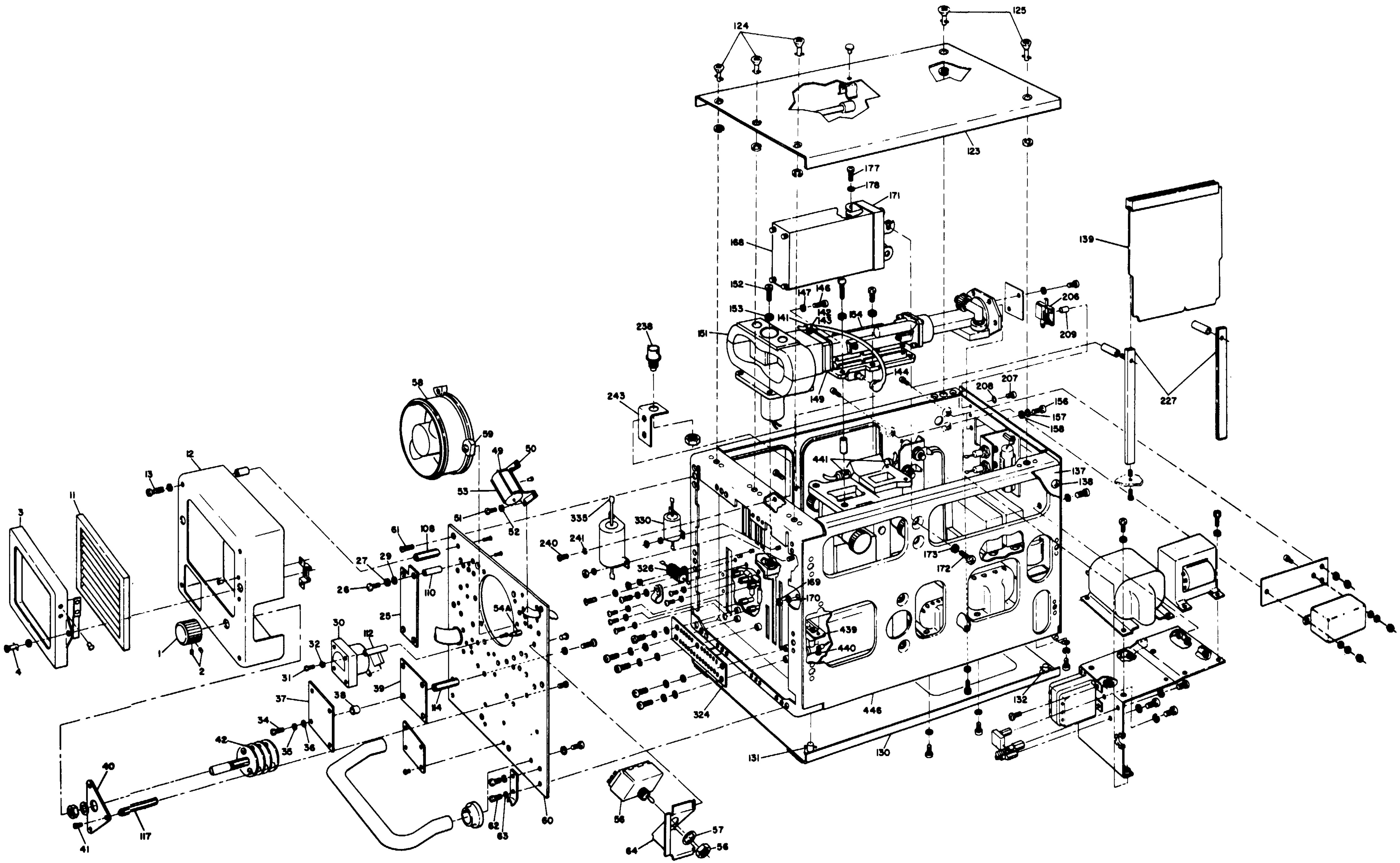
374A-3 Receiver-Transmitter (Revision AA (23) and Above), Schematic Diagram (Sheet 9 of 9)

Figure FO-5



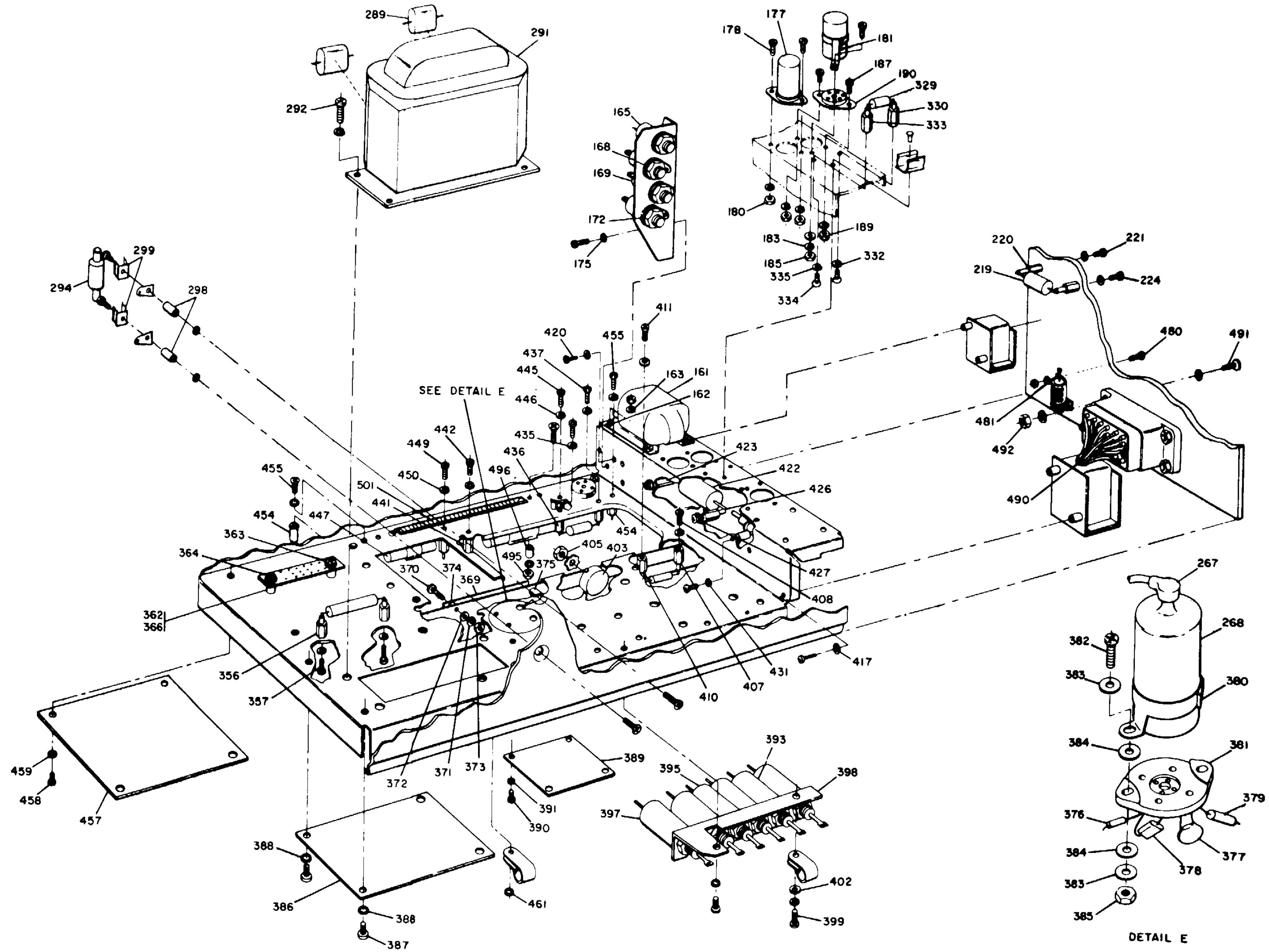
374A-3 Receiver-Transmitter (Revision Z (22) and Below), Exploded View

Figure FO-6



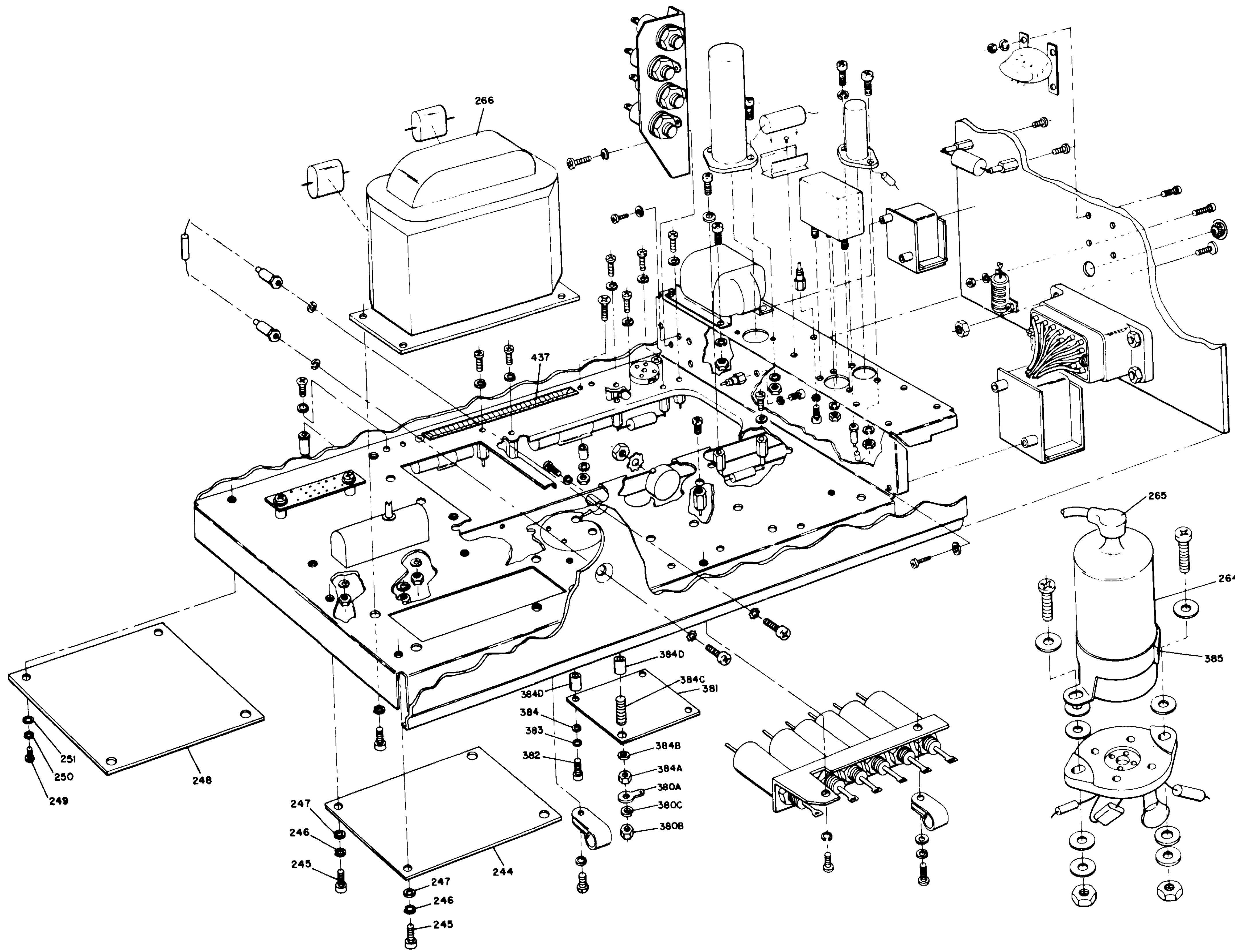
374A-3 Receiver-Transmitter (Revision AA (23) and Above), Exploded View

Figure FO-7



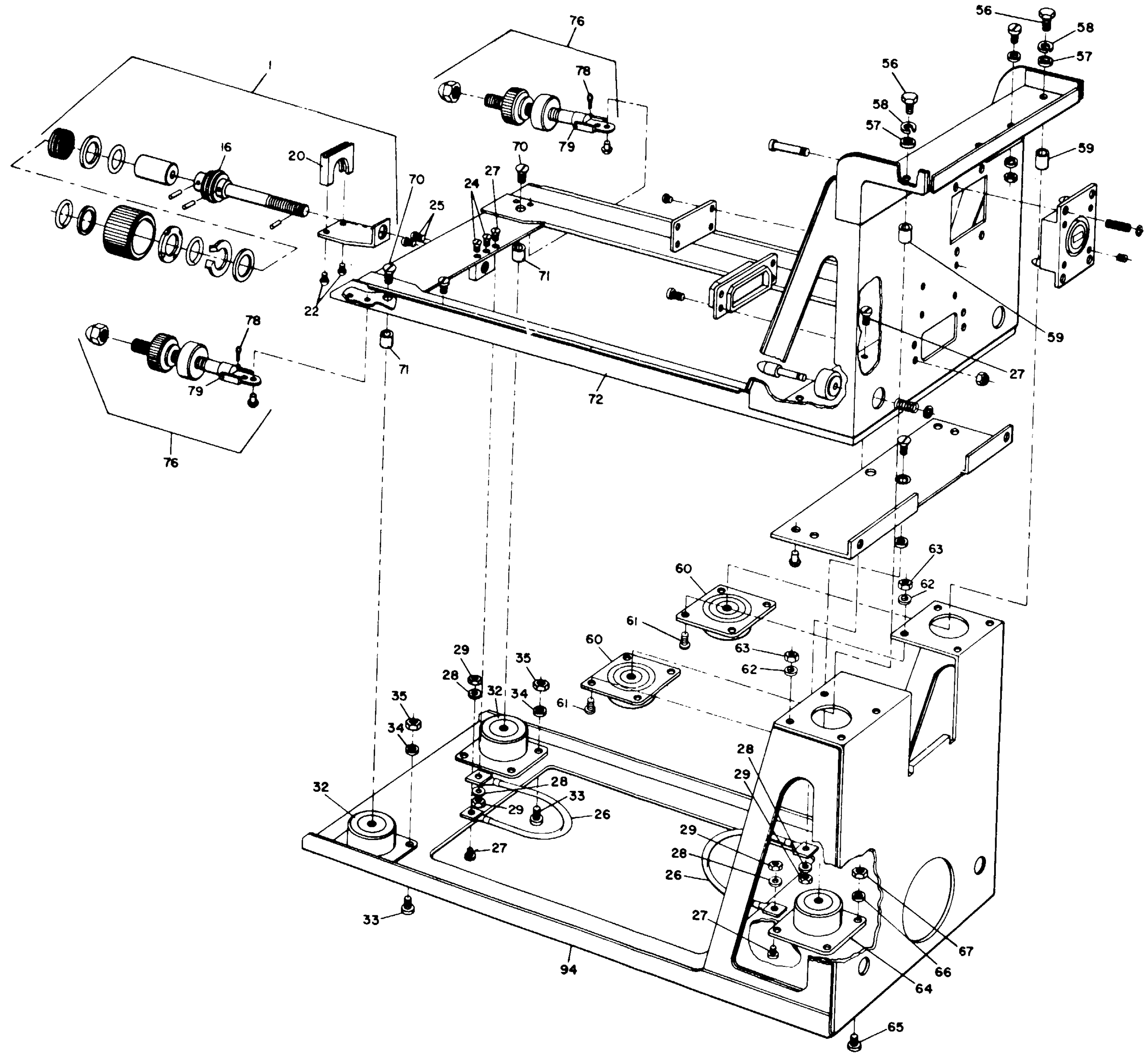
374A-3 Receiver -Transmitter (Revision Z (22) and Below), Partial Exploded View

Figure FO-8



374A-3 Receiver-Transmitter (Revision AA (23) and Above), Partial Exploded View

Figure FO-9



349A-6 Shockmount, Exploded View
Figure FO-10

(6) R29 SELECTED IN TEST FROM 270, 330, 390, 470, 560, 680, 820, 910, 1K, 1100, 1200, AND 1300 OHMS.

(7) R90 SELECTED IN TEST FROM 47, 56, 68, 82, 100, 120, 180, 220, 270, 330, AND 390 OHMS.

(8) SYNCHRONIZERS SERIAL NUMBER 1520 AND BELOW MAY BE MODIFIED AT THE DISCRETION OF THE USER. UNITS SERIAL NUMBER 1521 AND ABOVE CONTAIN AN IMPROVED ELEVATION SERVO AMPLIFIER MODULE FOR WHICH NO MODIFICATION IS REQUIRED.

(9) OSCILLATION FREQUENCY OF LC CIRCUITS
A. 30 MILE RANGE – 8.07KC
B. 60 MILE RANGE – 5.36KC
C. 150 MILE RANGE – 3.18KC

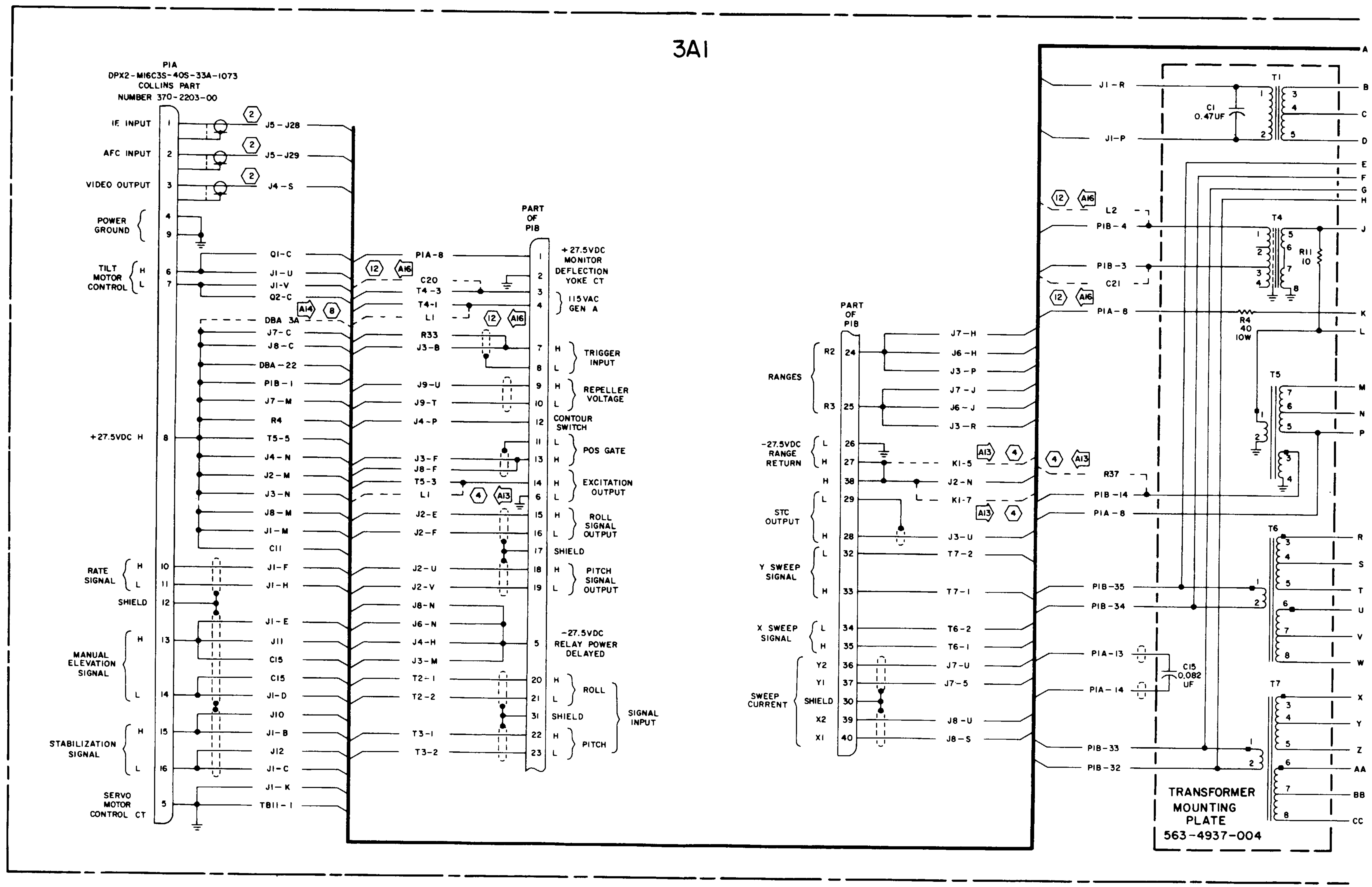
(10) CONNECTION BETWEEN A ANB B, C, OR D IS MADE TO SET MODULE GAIN. IF VALUES INDICATED DO NOT PROVIDE CORRECT GAIN, R17 MAY BE SELECTED FROM 300, 330, 360, 510, 560, 620, 680 OR 750 OHMS.

(11) NONSTANDARD ABBREVIATION: DBA–DETECTOR BOARD ASSEMBLY.

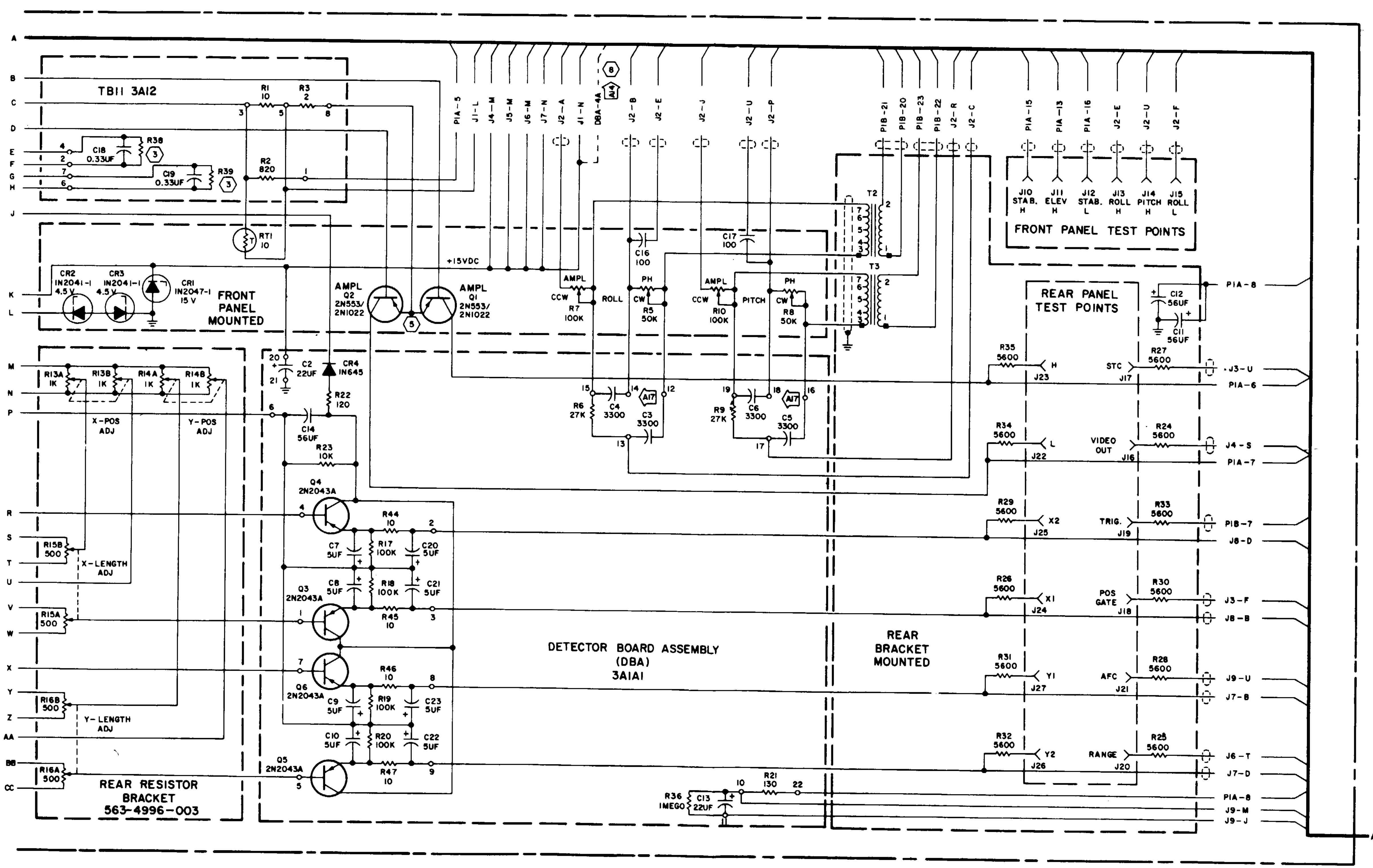
(12) SYNCHRONIZERS SERIAL NUMBER 2001 AND ABOVE CONTAIN THIS MODIFICATION AS SHOWN. UNITS SERIAL NUMBER 2000 AND BELOW MAY BE MODIFIED AT THE DISCRETION OF THE USER.

776C-3 Synchronizer, Revision 17/T and Below,
Schematic Diagram (Sheet 1 of 12)
Figure FO-11

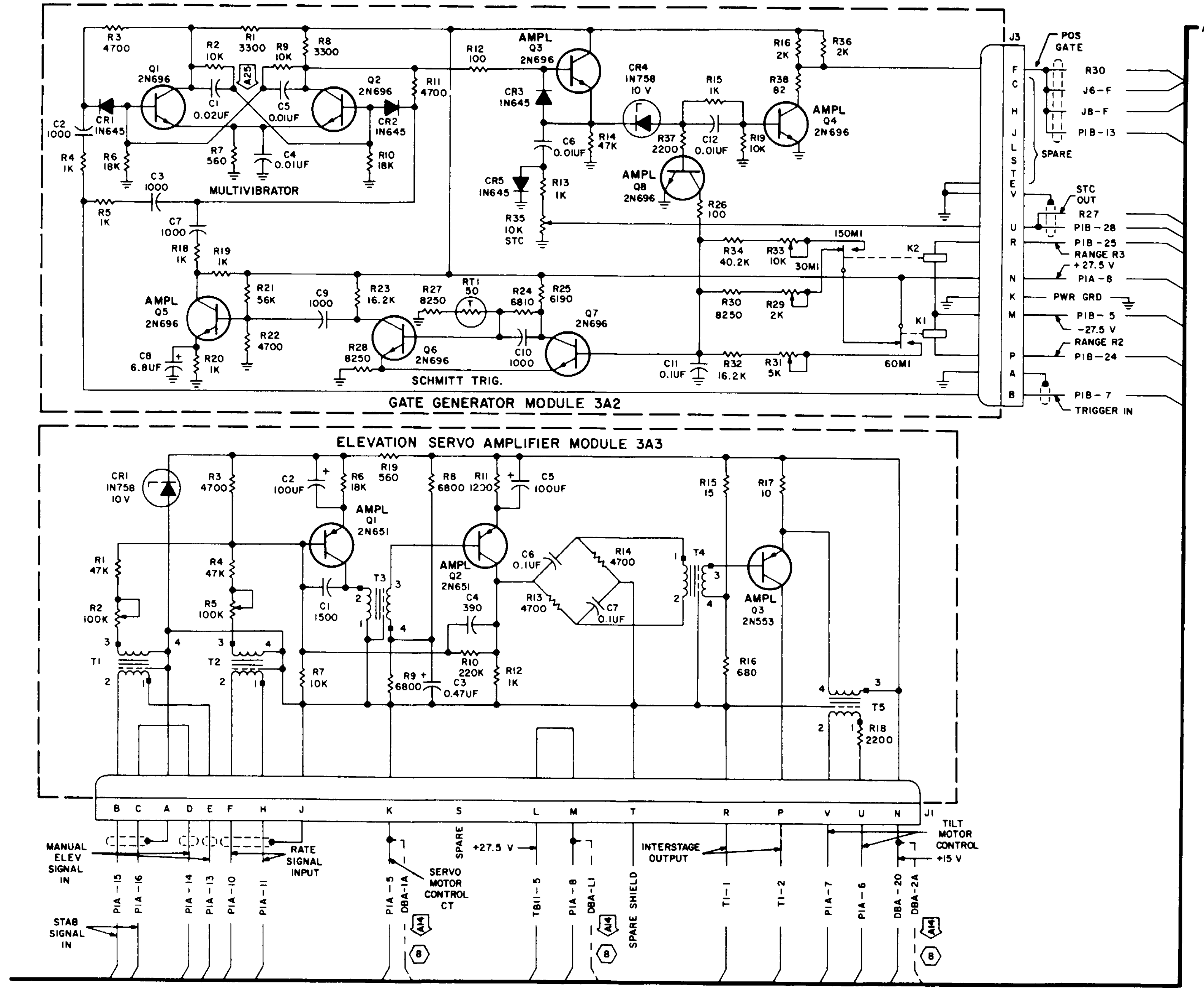
776C-3 Synchronizer, Revision 17/T and Below, Schematic Diagram (Sheet 1 of 12)
Figure FO-11



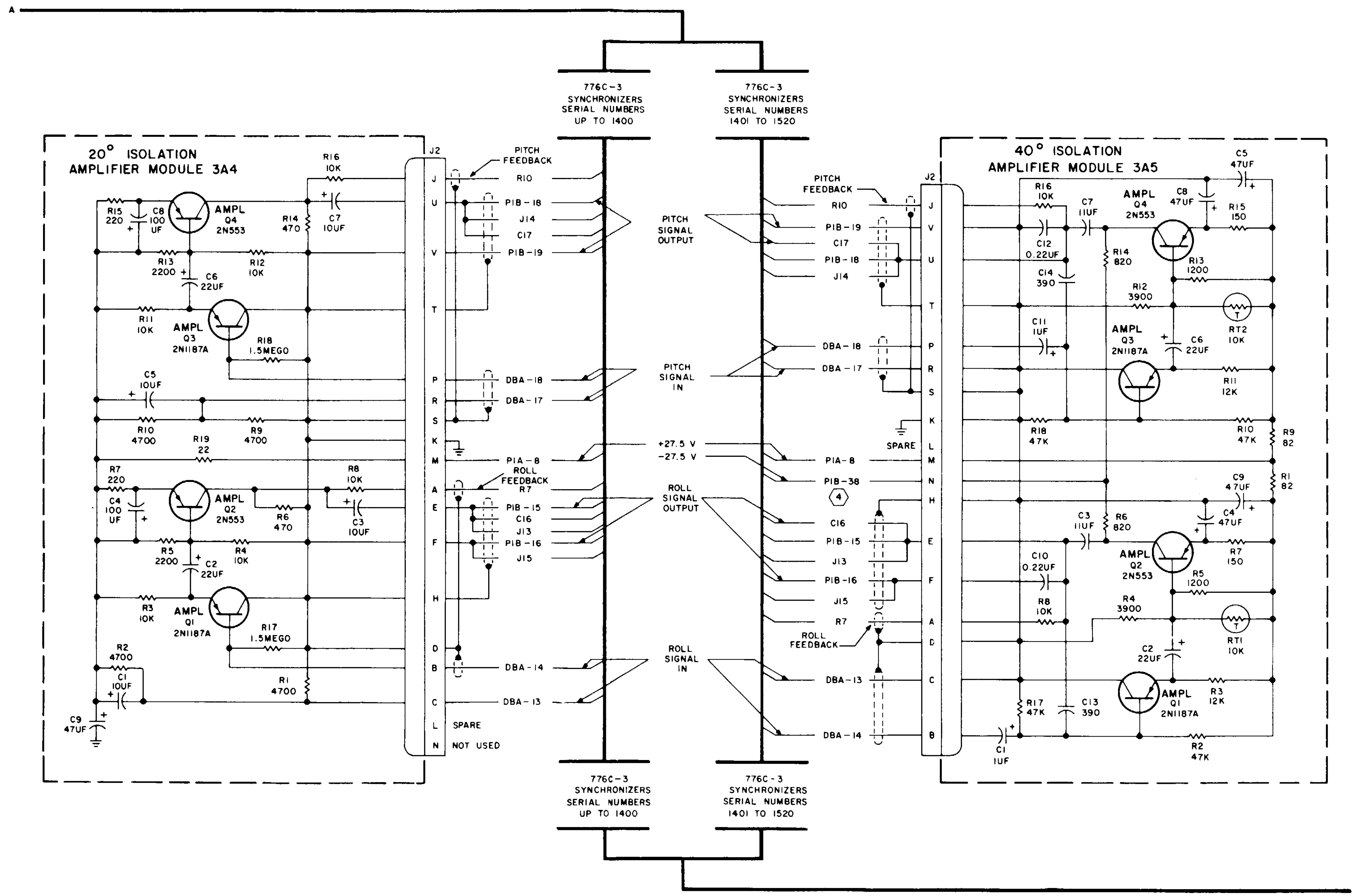
776C-3 Synchronizer, Revision 17/T and Below, Schematic Diagram (Sheet 2 of 12)
Figure FO-11



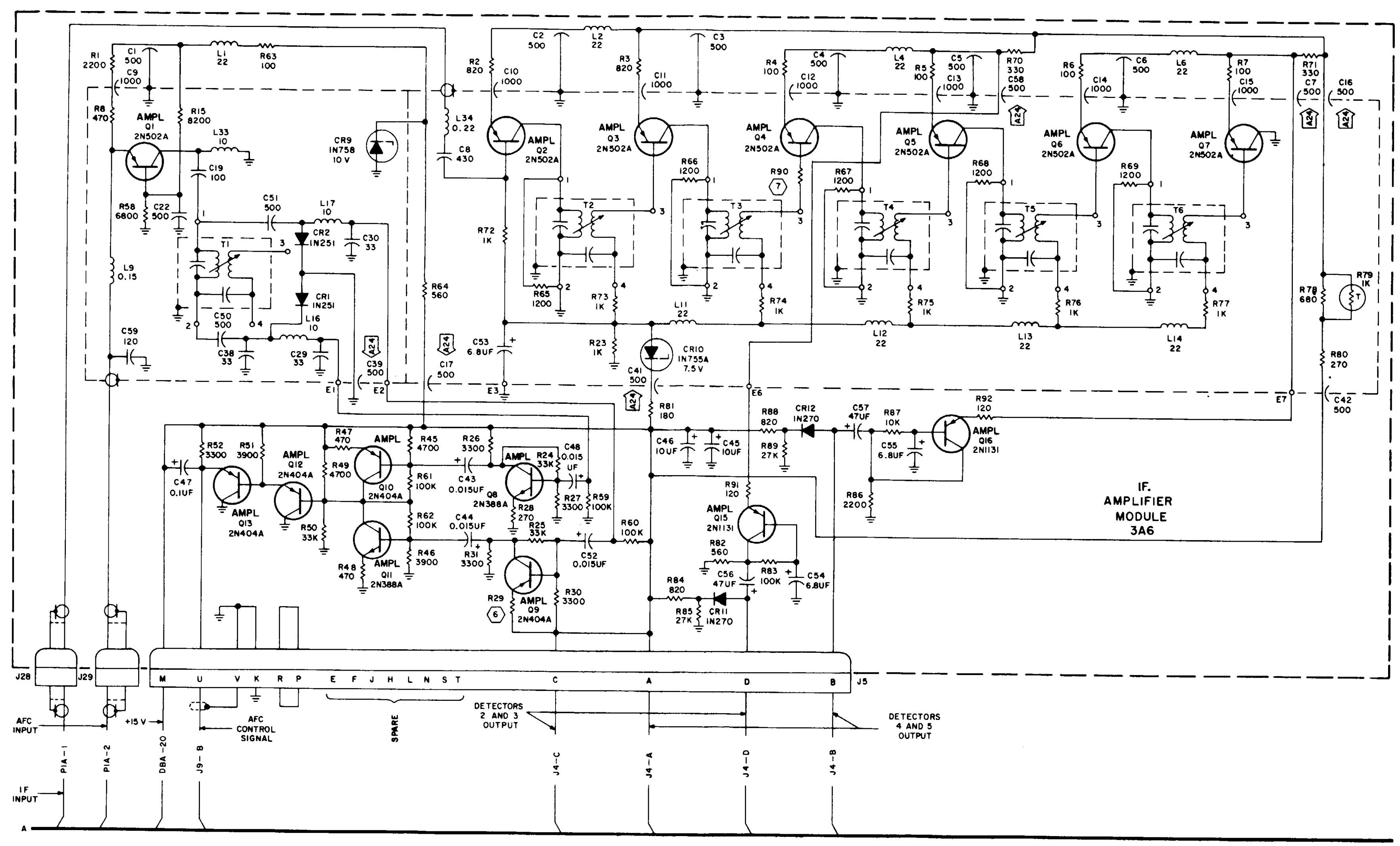
776C-3 Synchronizer, Revision 17/T and Below, Schematic Diagram (Sheet 3 of 12)
Figure FO-11



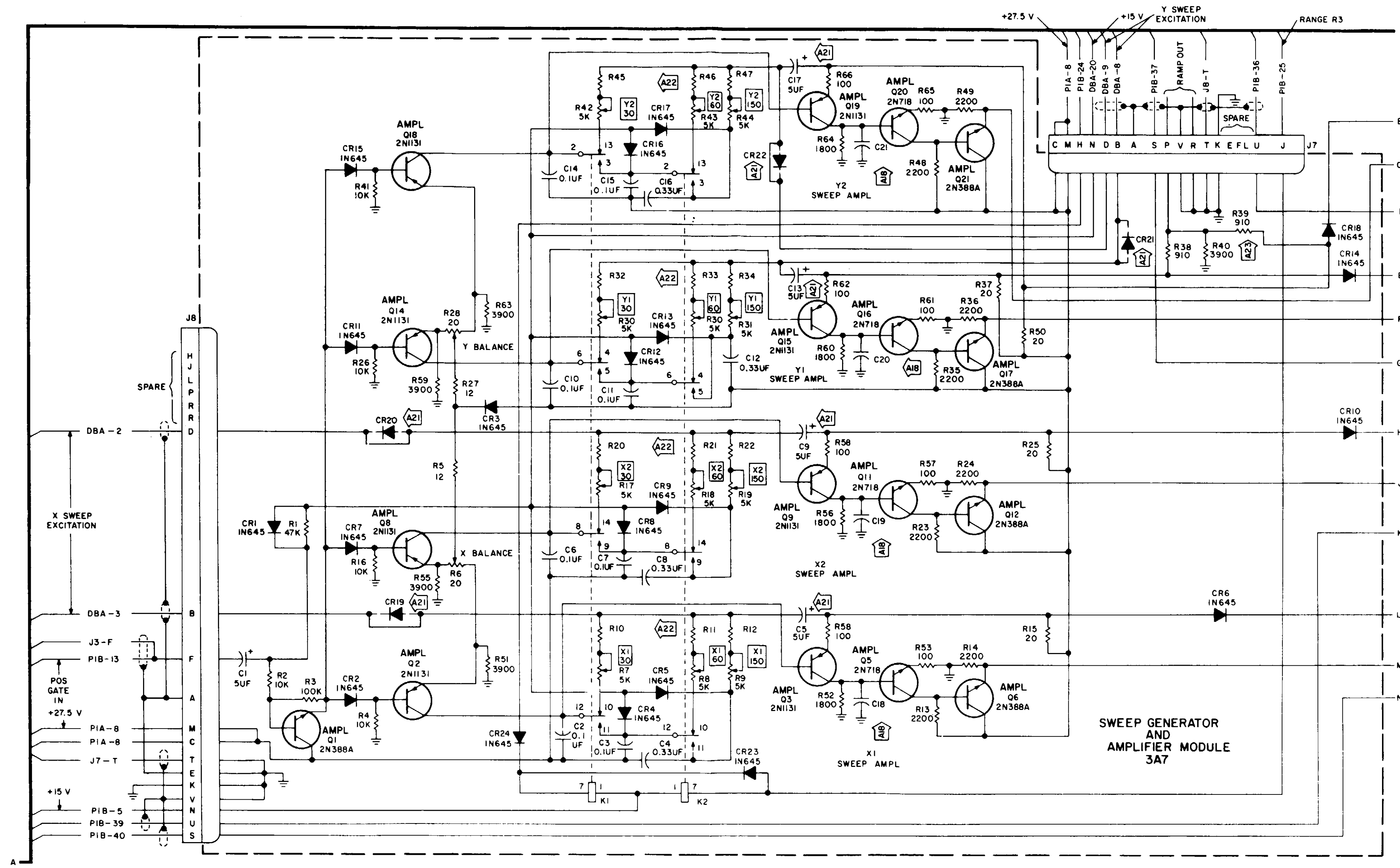
776C-3 Synchronizer, Revision 17/T and Below, Schematic Diagram (Sheet 4 of 12)
Figure FO-11



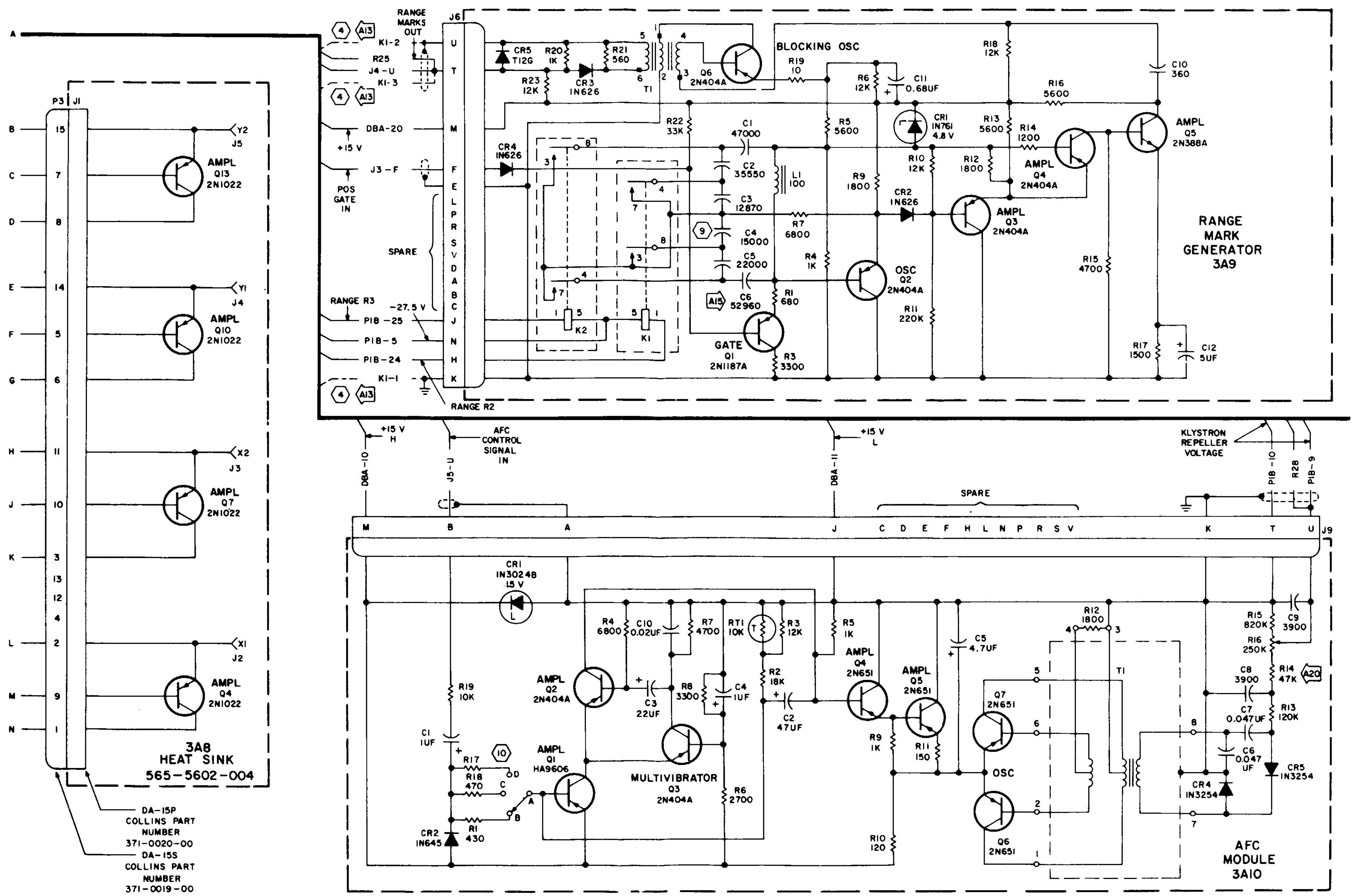
776C-Synchronizer, Revision 17/T and Below, Schematic Diagram (Sheet 5 of 12)
Figure FO-11



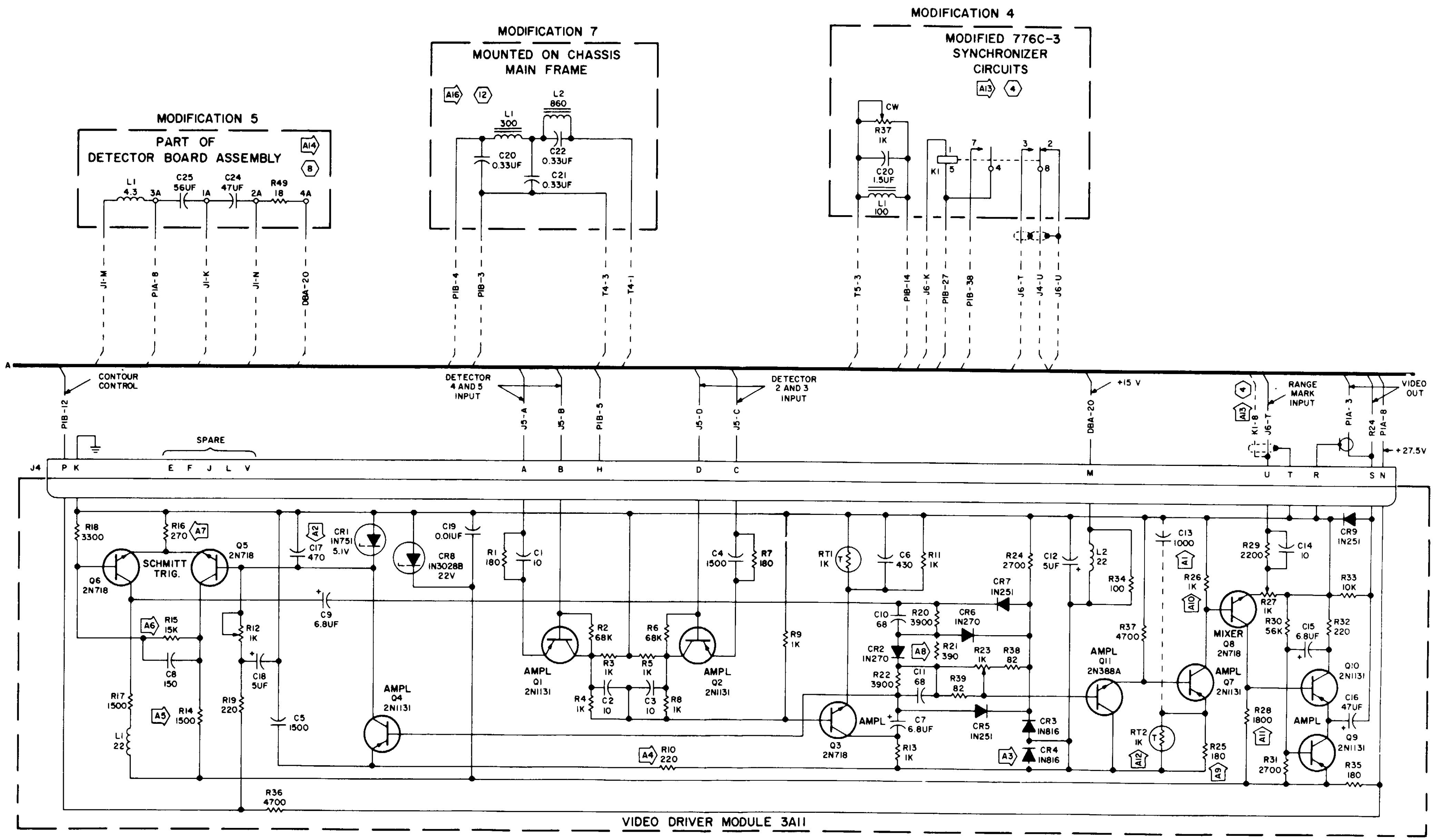
776C-Synchronizer, Revision 17/T and Below, Schematic Diagram (Sheet 6 of 12)
Figure FO-11



776C-Synchronizer, Revision 17/T and Below, Schematic Diagram (Sheet 7 of 12)
Figure FO-11



776C-Synchronizer, Revision 17/T and Below, Schematic Diagram (Sheet 8 of 12)
Figure FO-11



776C-Synchronizer, Revision 17/T and Below, Schematic Diagram (Sheet 9 of 12)
Figure FO-11

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OR REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A1 through A12	To increase video output and improve contour presentation.	3	Modules, revision D and above
A1	C13 removed.		
A2	C17 was 1000 pf, changed to 470 pf.		
A3	CR4 removed or shorted.		
A4	R10 was 270 ohms, changed to 220 ohms.		
A5	R14 was 2200 ohms, changed to 1500 ohms.		
A6	R15 was 10K, changed to 15K.		
A7	R16 was 390 ohms, changed to 270 ohms.		
A8	R21 was removed, replaced by CR2 as shown (SB3 erroneously called this diode CR10).		Modules, revision F and above
A9	R25 was 270 ohms, changed to 180 ohms.		
A10	R26 was 820 ohms, changed to 1K.		
A11	R28 was 2.7K, changed to 1.8K.		
A12	RT2, part number change only.		

776C-3 Synchronizer, Revision 17/ T and Below, Schematic Diagram (Sheet 10 of 12) Figure FO-11

REVISION IDENTIFICATION	DESCRIPTION OR REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A13	Modification to permit interchangeability of 776C-3 Synchronizers. (refer to note 4 on schematic for description).	4	None
A14	Modification to reduce the intensity modulation caused by large stabilization signals in some systems (refer to SB5 for instructions).	5	None
A15	C6, part number change only.	6	Modules, revision J and above.
A16	Modification to improve the sweep phase detector circuit tolerance to ripple modulation on the generator A 115-vac supply.	7	Units, revision 25 and above
A17	Corrected component values: C3, C4, C5, C6 were 3000 pf, changed to 3300 pf.		Detector board assembly, revision A and above
A18	Corrected component values: C18, C19, C20, C21 were 2200 pf, changed to selected in test from 2200, 1500, 1000, 820, 680, 470 pf or 0.		Modules, revisions G and H
	C18, C19, C20, C21 were selected in test, changed to 4700 pf.		Modules, revision J and above
A19	Added note 15.		

776C-3 Synchronizer, Revision 17 / T and Below, Schematic Diagram (Sheet 11 of 12) Figure FO-11

REVISION IDENTIFICATION	DESCRIPTION OR REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A20	Corrected component value: R14 was 120K, changed to 47K.		Modules, revision S and above
A21	Circuit redesigned: C5, C9, C13, C17, CR19, CR20, CR21, CR22 removed.		Modules, revision J and above
A22	Corrected component values: R10-12, R20-22, R32-34, R45-47 were 17.5K, changed to 19.6K.		Modules, revision J
	Changed from 19.6K to 15.4K.		Modules, revision K through N
	Changed from 15.4K to 16.9K.		Modules, revision P and above
A23	Circuit redesigned: R38, R39, R40, and associated wiring removed.		Modules, revision N and above
A24	Corrected component values: C7, C16, C17, C39, C41, C58 were 400 pf, changed to 500 pf.		Modules, revision 5(E) and above
A25	Corrected component values: C1 was 1200 pf, changed to 0.02 uf; C5 was 1200 pf, changed to 0.01 uf.		Modules, revision D and above

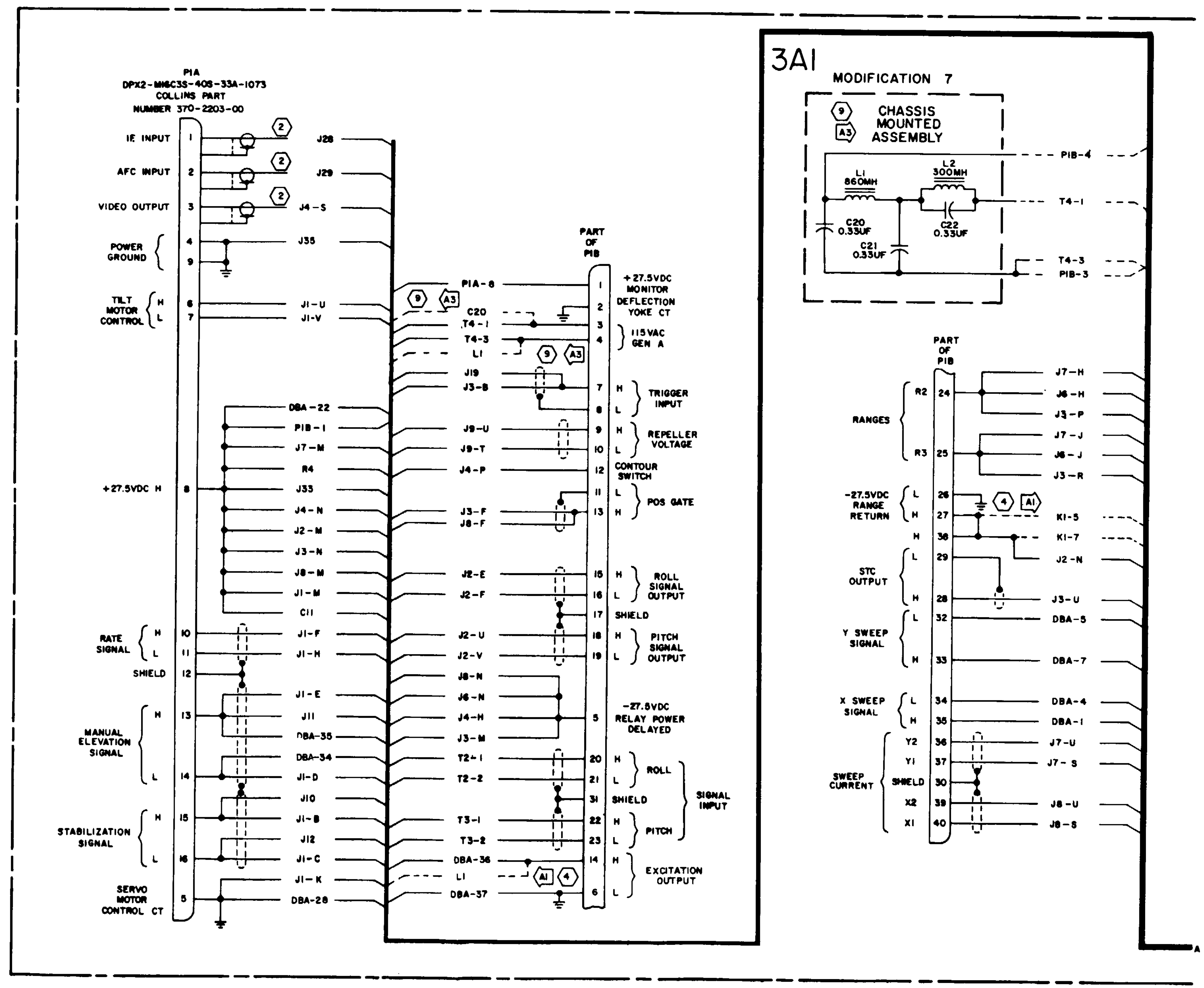
776C-3 Synchronizer, Revision 17/ T and Below, Schematic Diagram (Sheet 12 of 12) Figure FO-11

NOTES:

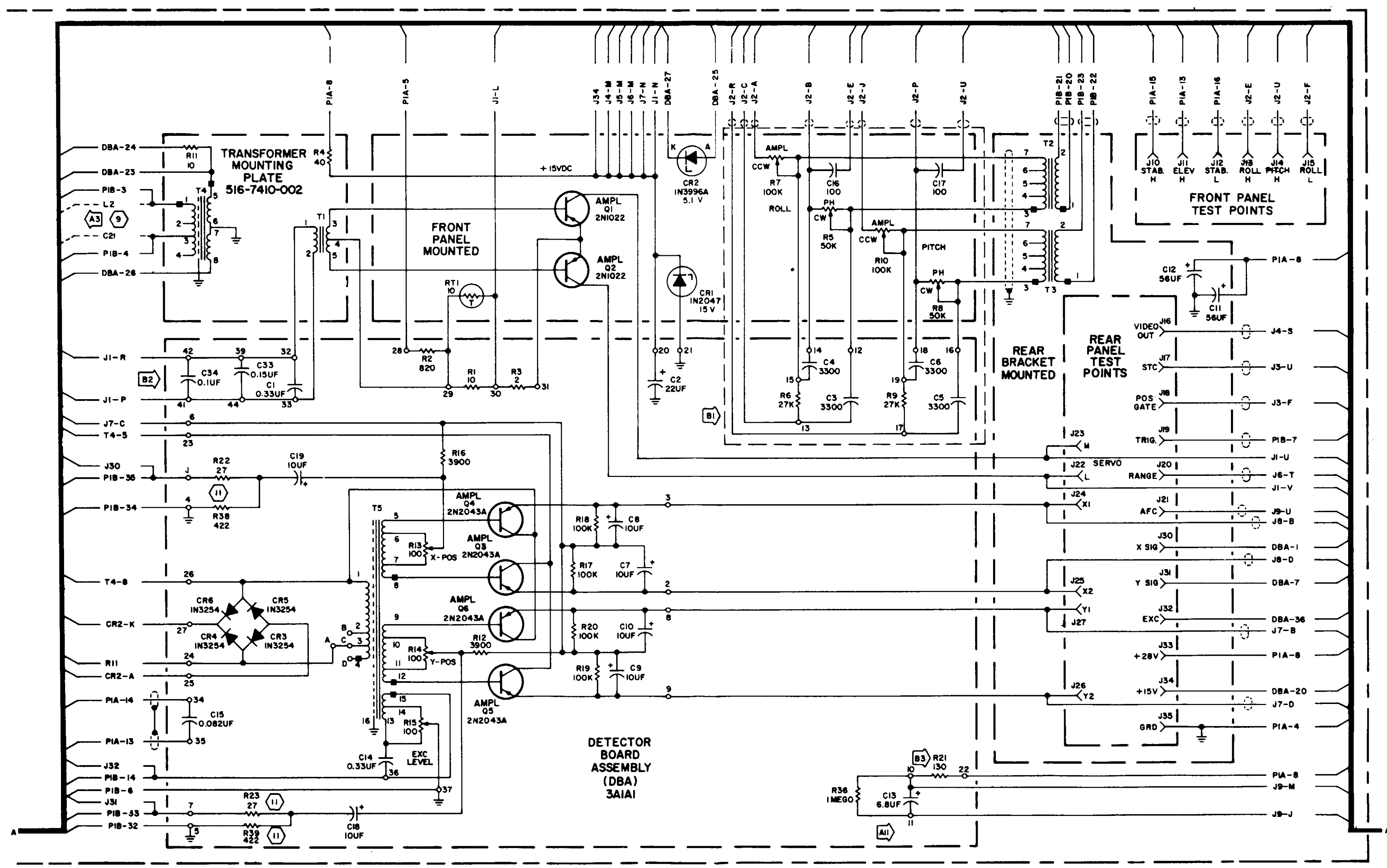
1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS. CAPACITANCE VALUES ARE IN PICOFARADS, AND INDUCTANCE VALUES ARE IN MICROHENRYS.
2. TYPE RG59/U, RF-6621-78 COLLINS PART NUMBER 357-9887-00.
3. R29 SELECTED IN TEST FROM 270, 330, 390, 470, 560, 680, 820, 910, 1K, 1100, 1200, AND 1300 OHMS.
4. THESE COMPONENTS AND ASSOCIATED WIRING ARE AVAILABLE IN FACTORY-MODIFIED SYNCHRONIZERS COLLINS PART NUMBER 552-6114-016, OR MAY BE INSTALLED BY THE EQUIPMENT USER. THIS MODIFICATION IS AVAILABLE AS COLLINS PART NUMBER 516-7407-003.
5. R90 SELECTED IN TEST FROM 47, 56, 68, 82, 100, 120, 180, 220, 270, 330, OR 390 OHMS.
6. OSCILLATION FREQUENCY OF LC CIRCUITS
   - A. 30 MILE RANGE - 8.07 KC
   - B. 60 MILE RANGE - 5.36 KC
   - C. 150 MILE RANGE - 3.18 KC
7. CONNECTION BETWEEN A AND B, C, OR D IS MADE TO SET MODULE GAIN. IF VALUES INDICATED DO NOT PROVIDE CORRECT GAIN, R17 MAY BE SELECTED FROM 300, 330, 360, 510, 560, 620, 680, OR 750 OHMS.
8. NONSTANDARD ABBREVIATION: DBA-DETECTOR BOARD ASSEMBLY.
9. SYNCHRONIZERS REVISION 24-1/AB-1 AND ABOVE CONTAIN THIS MODIFICATION AS SHOWN. UNITS 24/AB AND BELOW MAY BE MODIFIED AT THE DESCRETION OF THE USER.
10. PRODUCTION MODULES, COLLINS PART NUMBER 758-4825-000, CONTAIN THE ALTERNATE CIRCUIT.
11. ON UNITS 1521 THROUGH 1563 WITH TRANSFORMER T5 REVISION 0, RESISTORS R22 AND R23 ARE 82 OHMS AND R38 AND R39 ARE 383 OHMS.
12. R90 SELECTED IN TEST FROM 100 TO 1000 OHMS.
13. R99 SELECTED IN TEST FROM 1800 TO 3300 OHMS.
14. R86 SELECTED IN TEST FROM 2000 TO 3900 OHMS.
15. R109 SELECTED IN TEST FROM 1330 TO 2740 OHMS.
16. R106 SELECTED IN TEST FROM 17.8K TO 23.7K.

776C-3 Synchronizer, Revision 18/U and Above,
Schematic Diagram (Sheet 1 of 20)
Figure FO-12

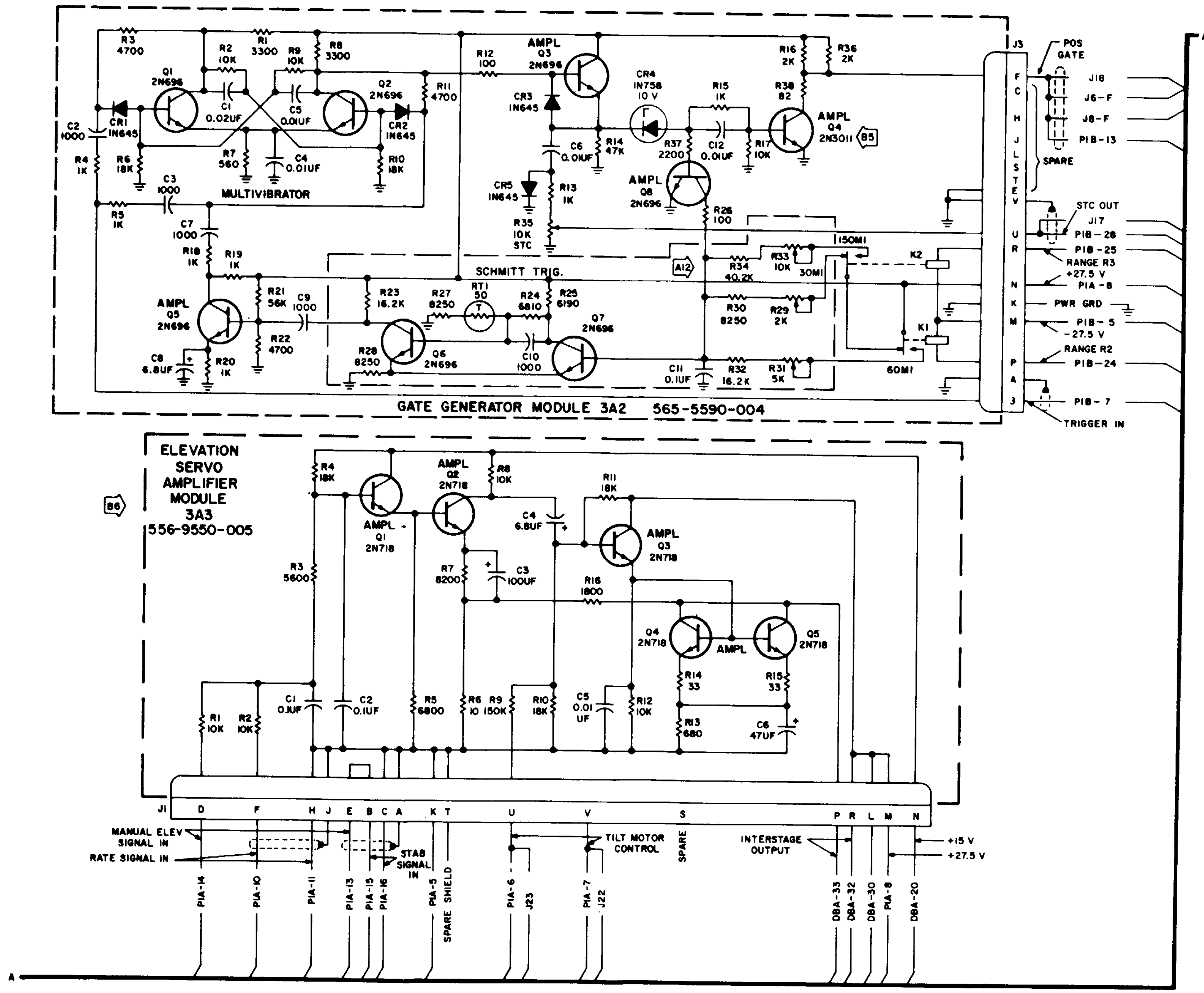
776C-3 Synchronizer, Revision 18 / U and Above, Schematic Diagram (Sheet 1 of 20) Figure FO-12



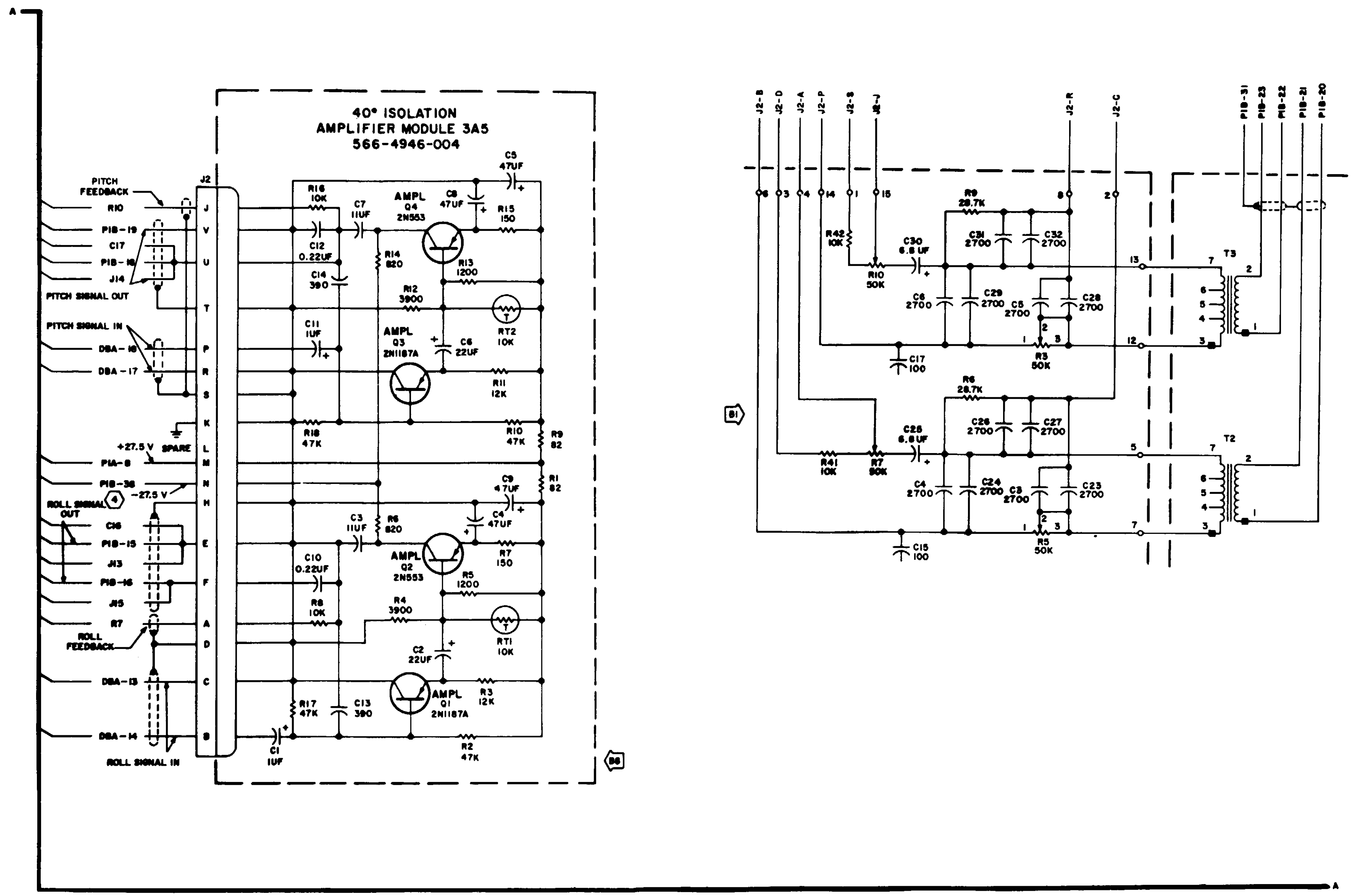
776C-3 Synchronizer, Revision 18 / U and Above, Schematic Diagram (Sheet 2 of 20) Figure FO-12



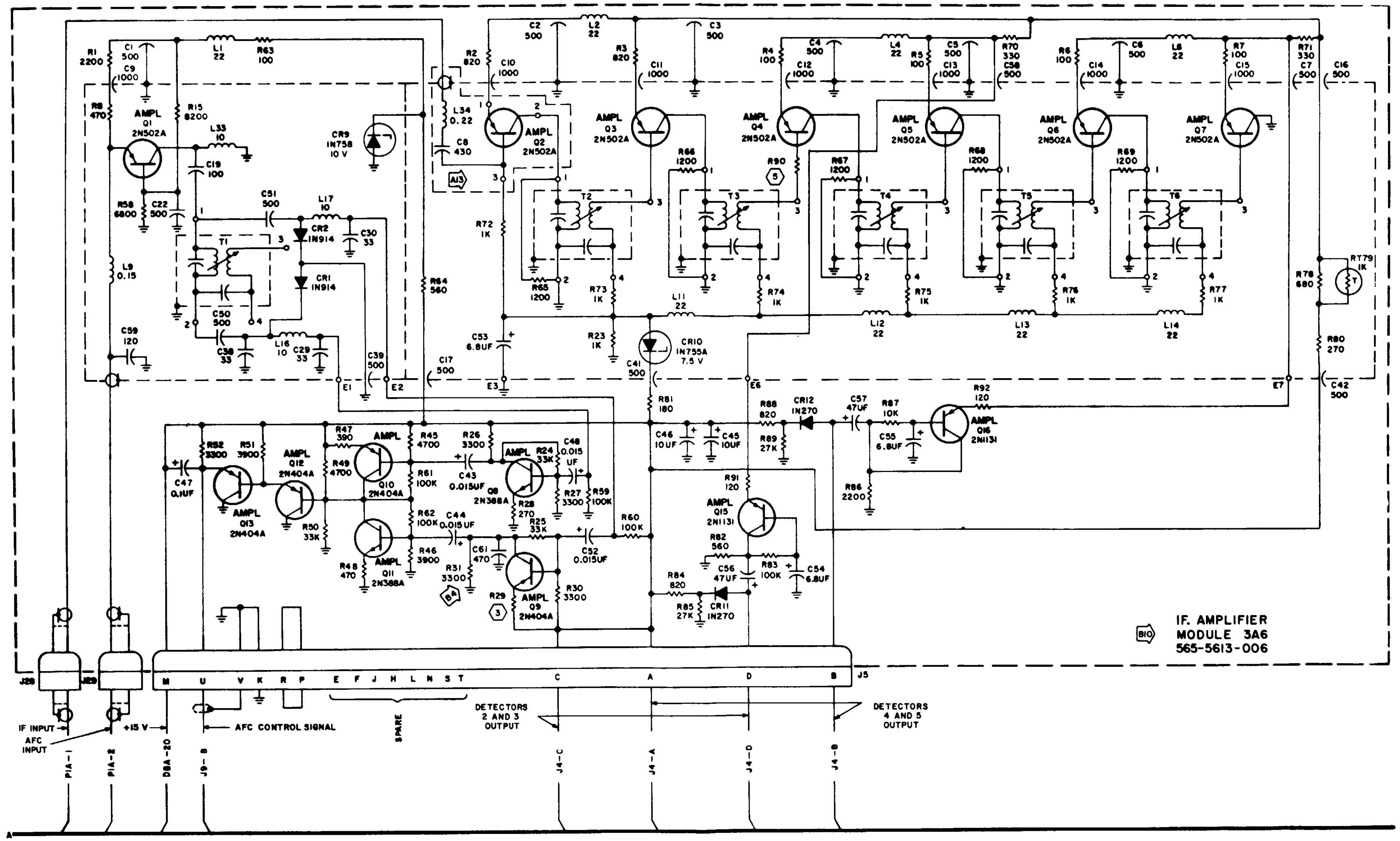
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 3 of 20)
Figure FO-12



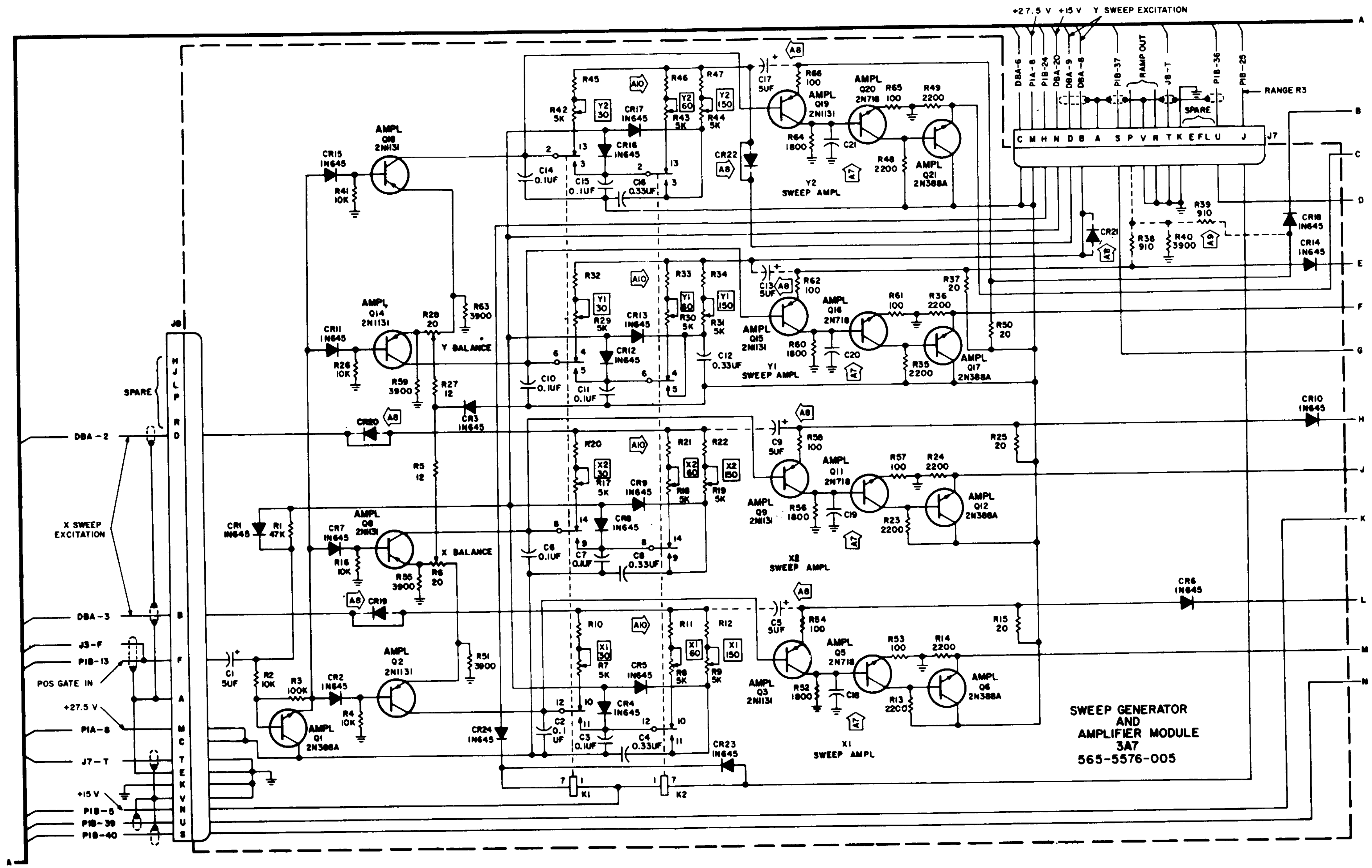
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 4 of 20)
Figure FO-12



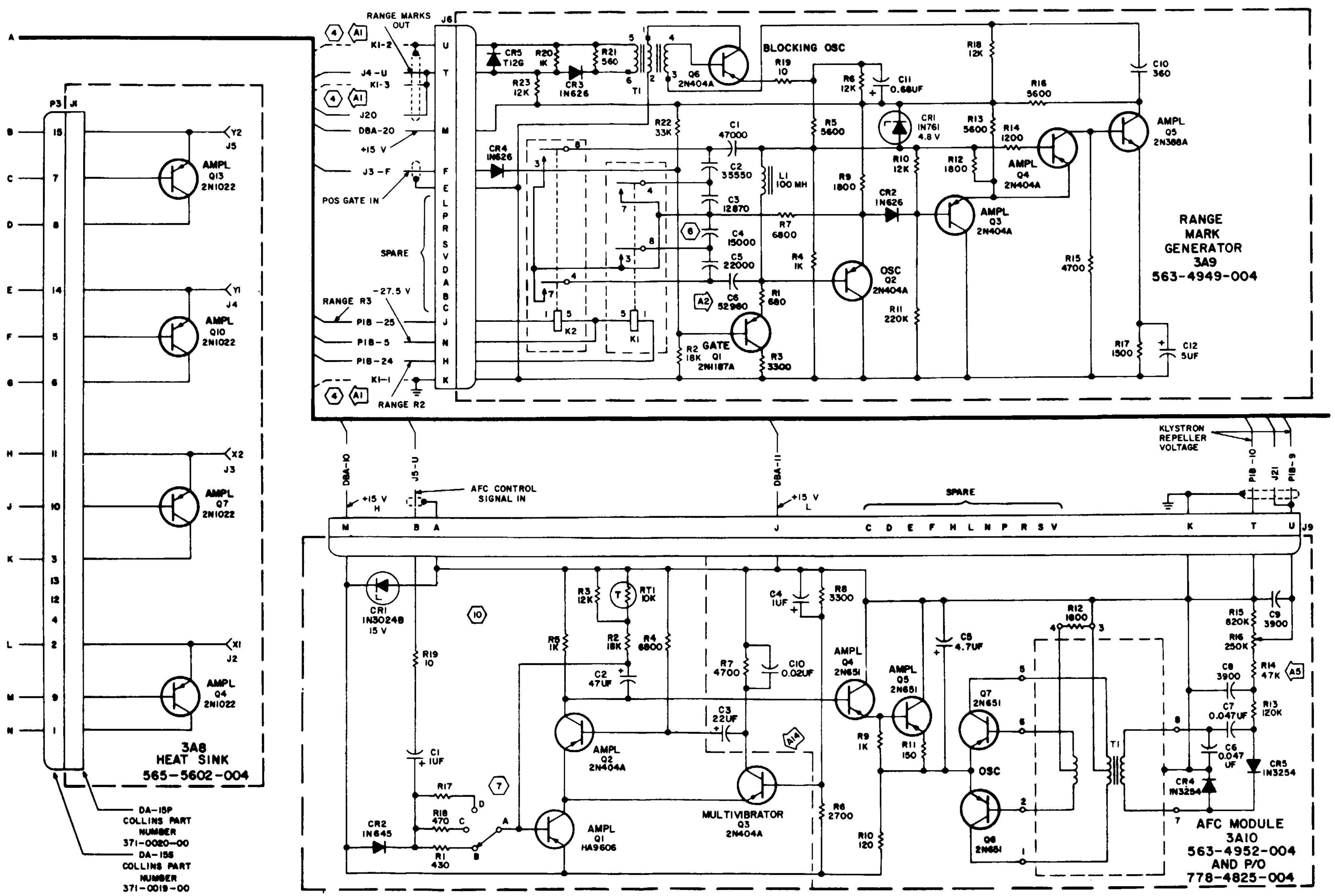
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 5 of 20)
Figure FO-12



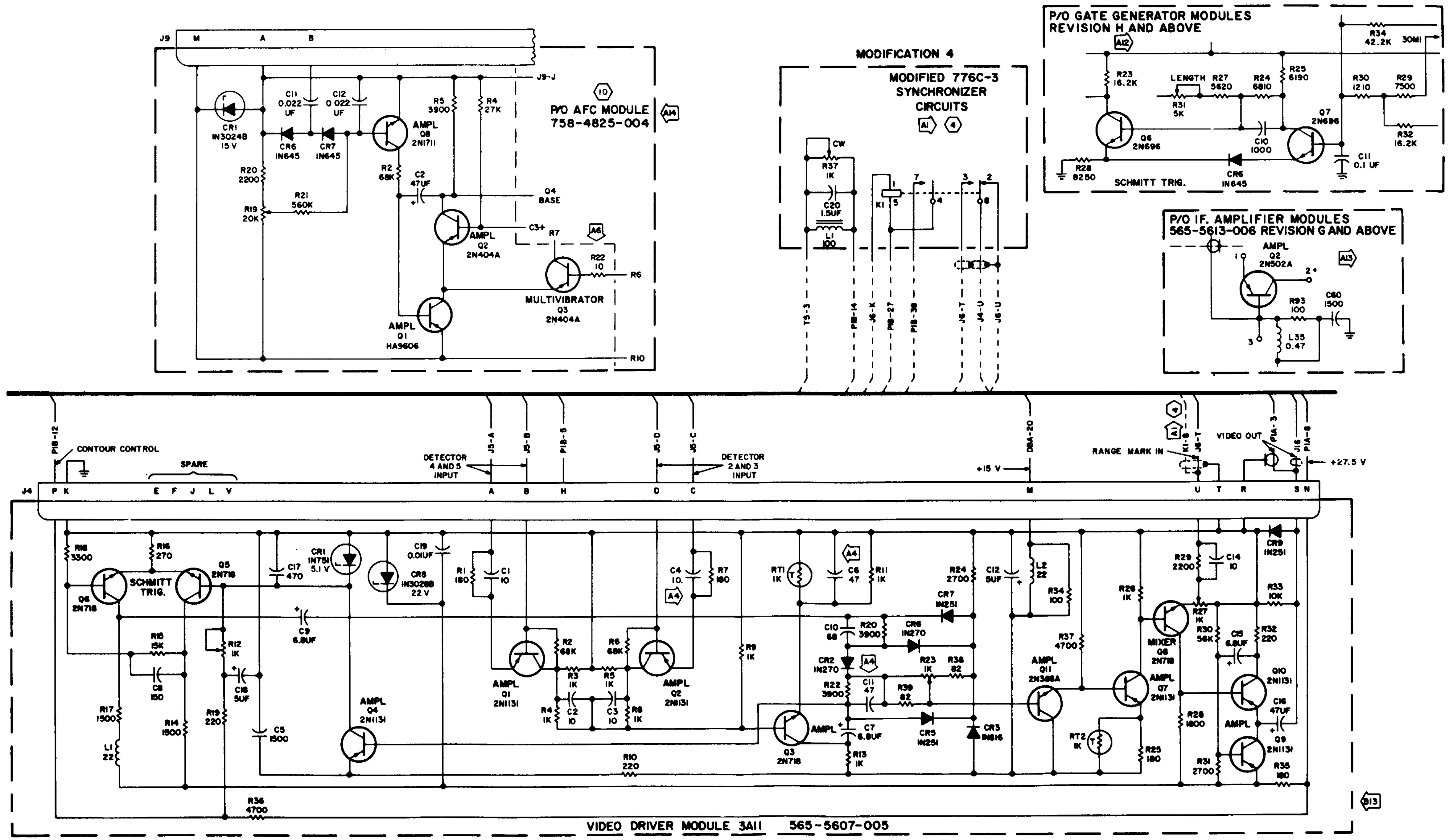
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 6 of 20)
Figure FO-12



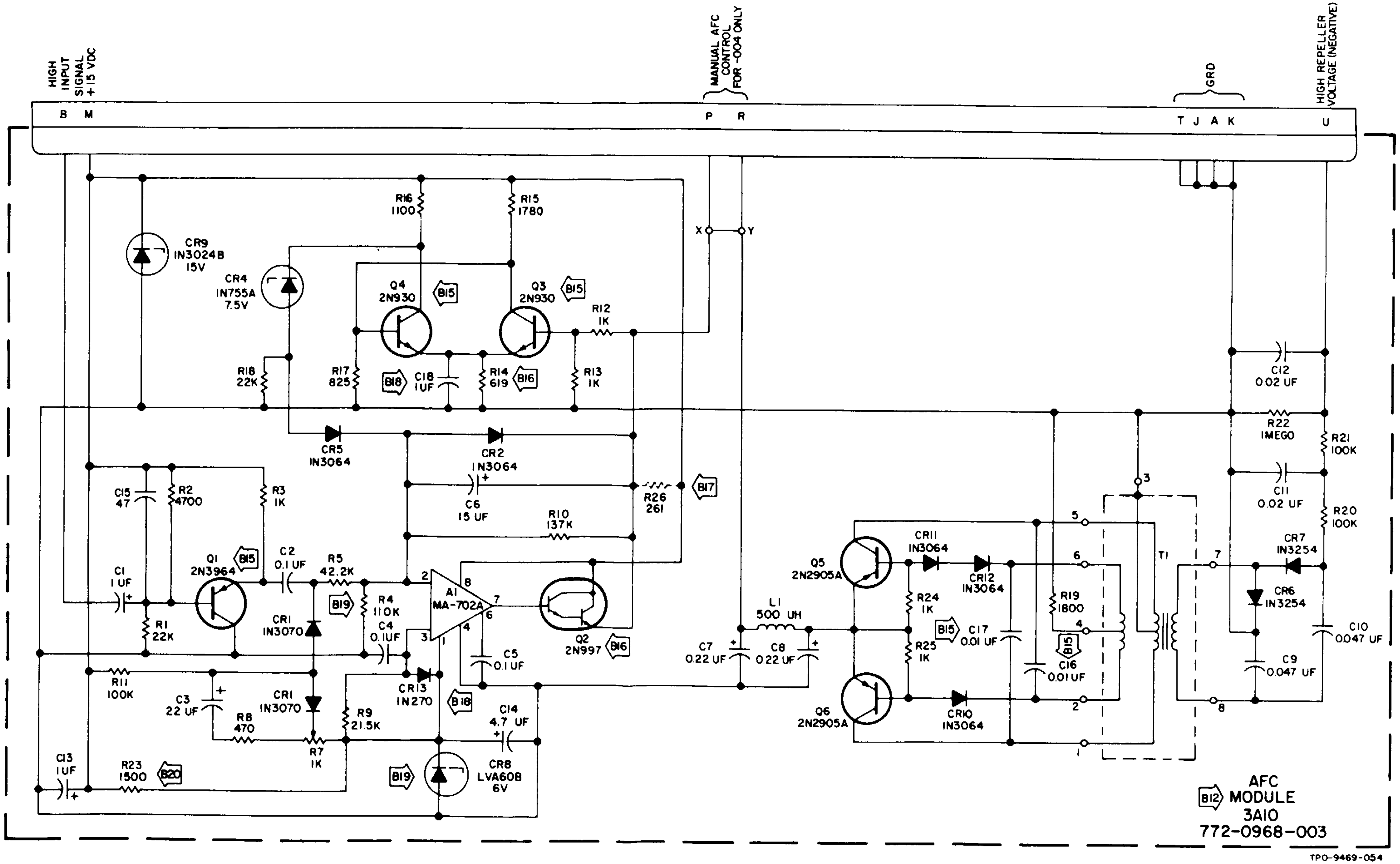
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 7 of 20)
Figure FO-12



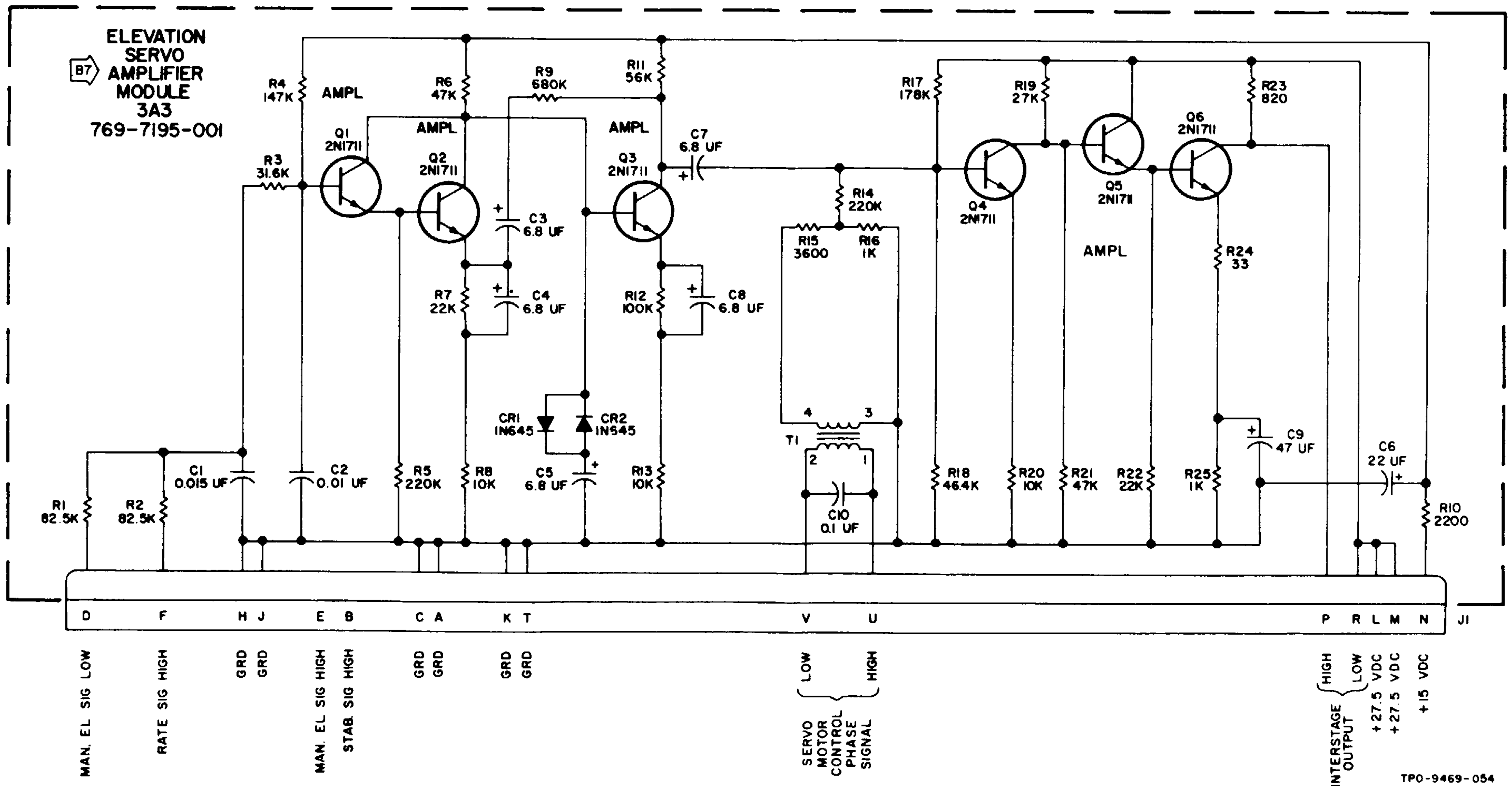
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 8 of 20)
Figure FO-12



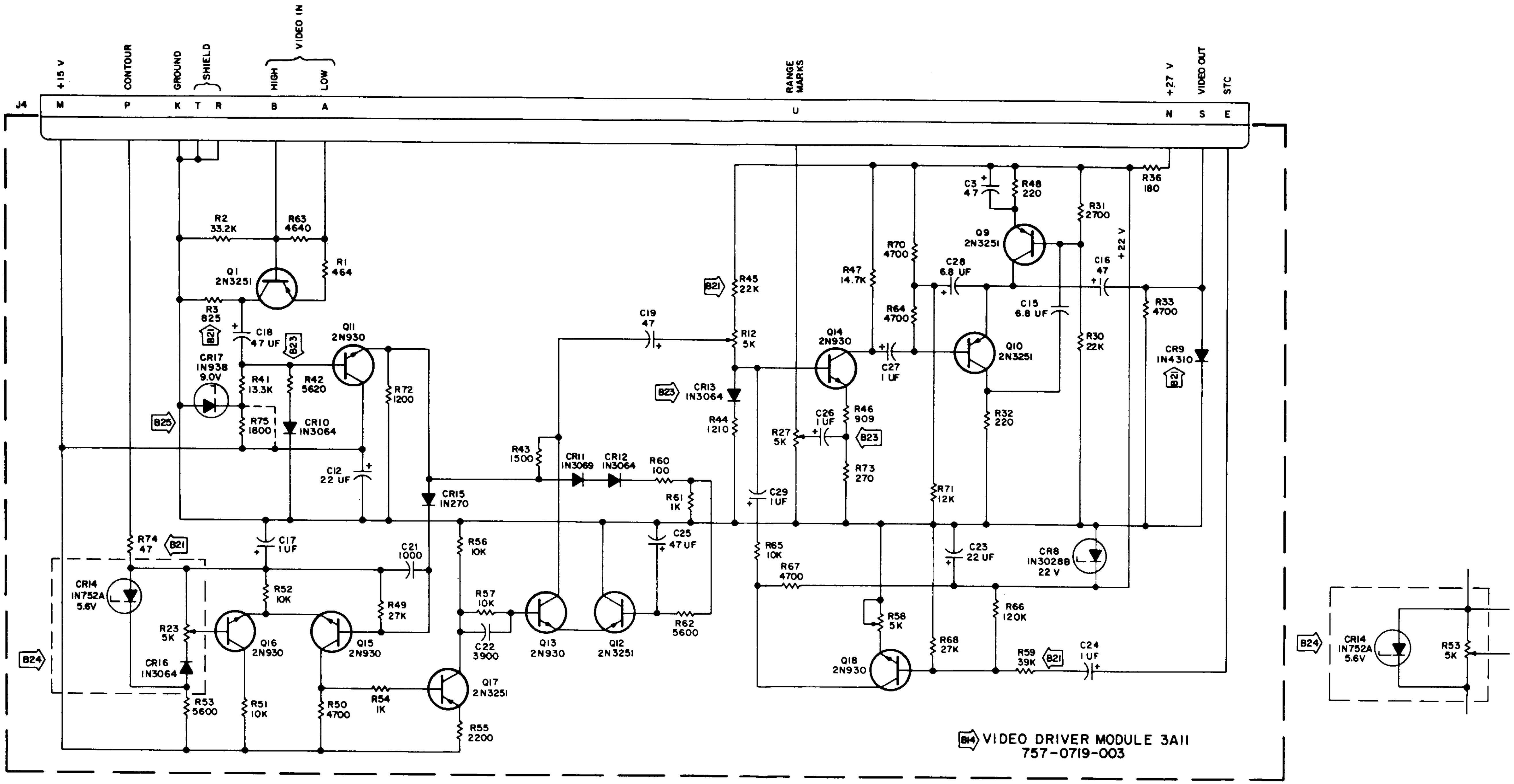
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 9 of 20)
Figure FO-12



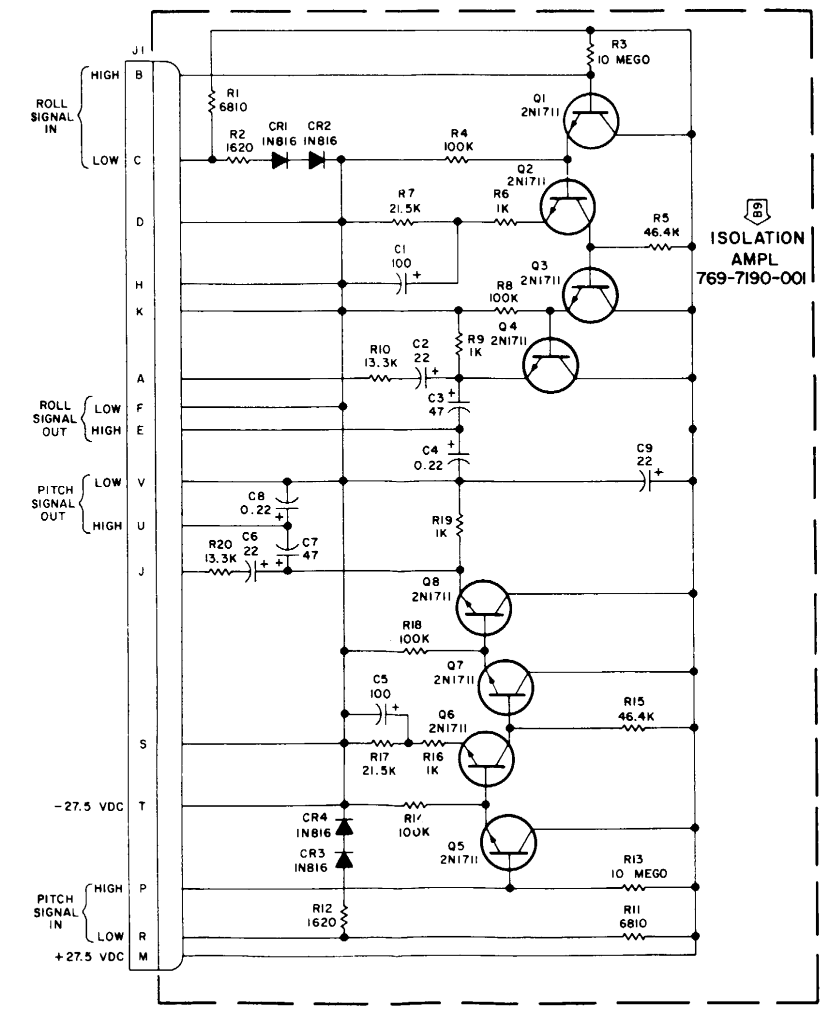
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 10 of 20)
Figure FO-12



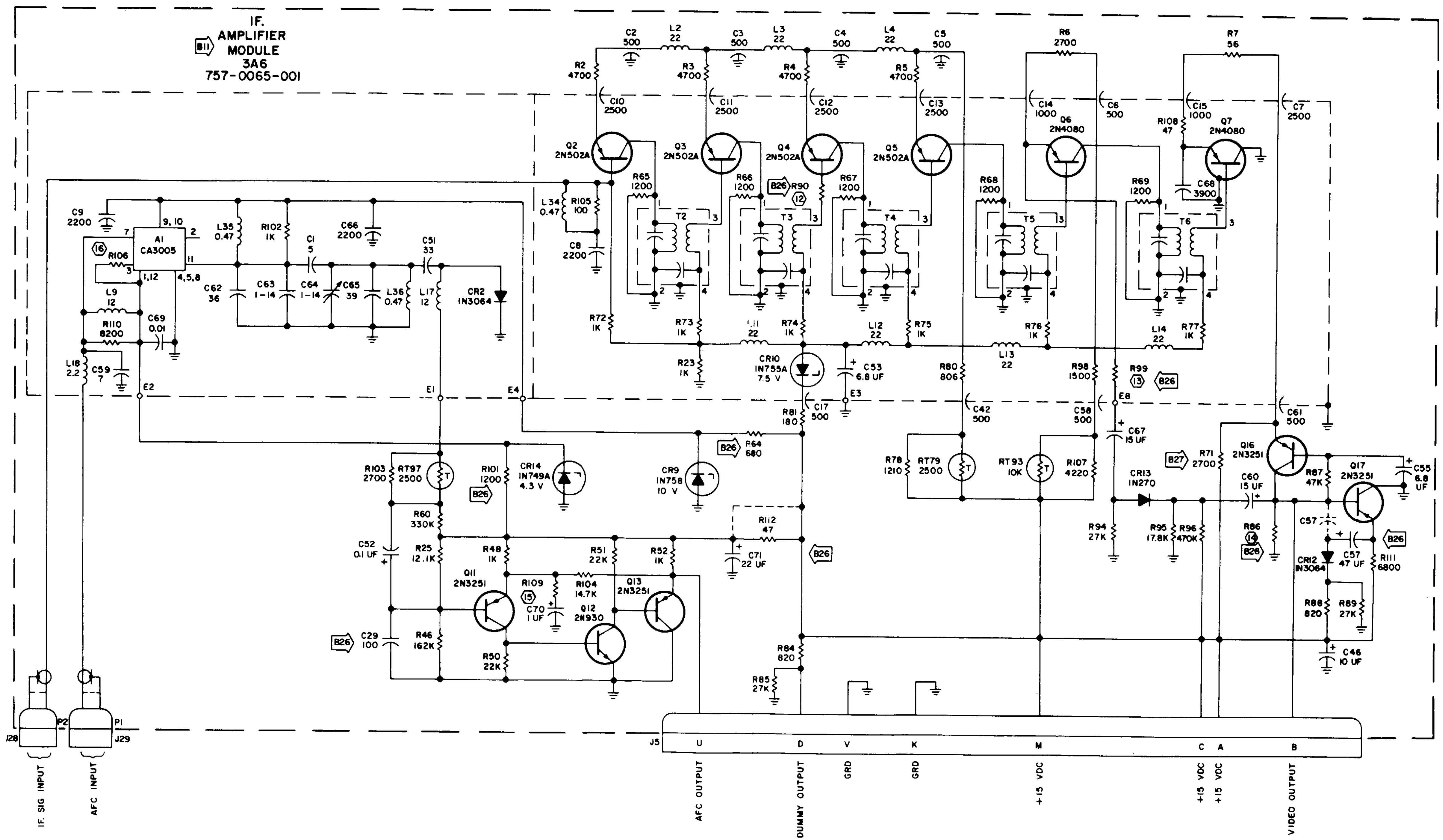
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 11 of 20)
Figure FO-12



776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 12 of 20)
Figure FO-12



776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 13 of 20) Figure FO-12



776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 14 of 20) Figure FO-12

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OR REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A1	Modification to permit interchangeability of 776C-3 Synchronizers. (refer to note 4 on schematic for description).	4	None
A2	C6, part number change.	6	Modules, revision J and above
A3	Modification to improve the sweep phase detector tolerance to ripple modulation on the generator A 115-vac supply.	7	Units, revision 25/AC and above
A4	Corrected component values: C4 was 1500 pf, changed to 10 pf; C6 was 430 pf, changed to 47 pf; C11 was 68 pf, changed to 47 pf.		Modules, revision G and above
A5	Corrected component value: R14 was 120K, changed to 47K.		Modules, revision S and above
A6	Corrected component value: R22 was 330 ohms, changed to 10 ohms.		Modules, Collins part number 758-4825-000, revision A and above
A7	Corrected component values: C18, C19, C20, C21 were 2200 pf, changed to selected in test from 2200, 1500, 1000, 820, 680, 470 pf or 0.		Modules, revisions G and H

776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 15 of 20) Figure FO-12

REVISION IDENTIFICATION	DESCRIPTION OR REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A7 (Cont)	Changed from selected in test to 4700 pf.		Modules, revision J and above
A8	Circuit redesigned: C5, C9, C13, C17, CR19, CR20, CR21, CR22 removed.		Modules, revision J and above
A9	Circuit redesigned: R38, R39, R40, and associated wiring removed.		Modules, revision N and above
A10	Corrected component values: R10-12, R20-22, R32-34, R45-57 were 17.5K, changed to 19.6K.		Modules, revision J
	Changed from 19.6K to 15.4K.		Modules, revisions K through N
	Changed from 15.4K to 16.9K.		Modules, revision P and above
A11	Corrected component value: C13 was 1 uf, changed to 6.8 uf.		Units, revision 20/w and above
A12	Improved circuit design; alternate circuit applies to modules, revision H and above.		Modules, revision H and above
A13	Improved circuit design; alternate circuit applies to modules, revision G and above.		Modules, revision G and above
A14	Performance improvement; added new afc module, Collins part number 758-4825-004.		Chassis, revision 23/AA through AF/AG.

776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 16 of 20) Figure FO-12

REVISION IDENTIFICATION	DESCRIPTION OR REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
B1	Modification to improve stability and permit use of isolation amplifier module, Collins part number 769-7190-001, and elevation servo amplifier module, Collins part number 769-7195-001. Components were removed from TB1 and new printed circuit board and plug-in modules installed. (Refer to schematic for circuit changes.)	9	Chassis, revision AH/AK and above
B2	Performance improvement; added C33, 0.1 uf, and C34, 0.15 uf. Changed C1 from 0.47 uf to 0.33 uf.		Chassis, revision AK/AH and above
B3	Obtain proper afc sweep voltage; R21 was changed from 130 ohms to 100 ohms.	10	Chassis revision AH and above
B4	Modification to preclude necessity of realignment when interchanging if. amplifier module, Collins part number 564-2711-005, with if. amplifier module, Collins part number 757-0065-003: C61, 470 pf, was added.	11	None
B5	Component change; Q4 was 2N696, changed to 2N3011.		Modules, revision level L and above
B6	Design change. Module replaced with elevation servo amplifier module, Collins part number 769-7195-005.		Chassis, revision AJ/AG

776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 17 of 20) Figure FO-12

REVISION IDENTIFICATION	DESCRIPTION OR REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
B7	Performance improvement; added elevation servo amplifier module, Collins part number 769-7195-005.	9	Chassis, revision AJ/AG and above
B8	Design change. Module replaced with isolation amplifier module, Collins part number 769-7190-001.		Chassis, revision AH/AG
B9	Performance improvement; added isolation amplifier module, Collins part number 769-7190-001.	9	Chassis, revision AH/AG and above
B10	Design change. Module replaced with if. amplifier module, Collins part number 757-0065-001.		Chassis, revision AL/AH
B11	Performance improvement; added if. amplifier module, Collins part number 757-0065-001.		Chassis, revision AL/AH and above
B12	Performance improvement; added afc module, Collins part number 772-0968-003.		Chassis, revision AG/AG and above
B13	Design change. Module replaced with video driver module, Collins part number 757-0719-003.		Chassis, revision AM/AH
B14	Performance improvement; added video driver module, Collins part number 757-0719-003.		Chassis, revision AM/AH and above

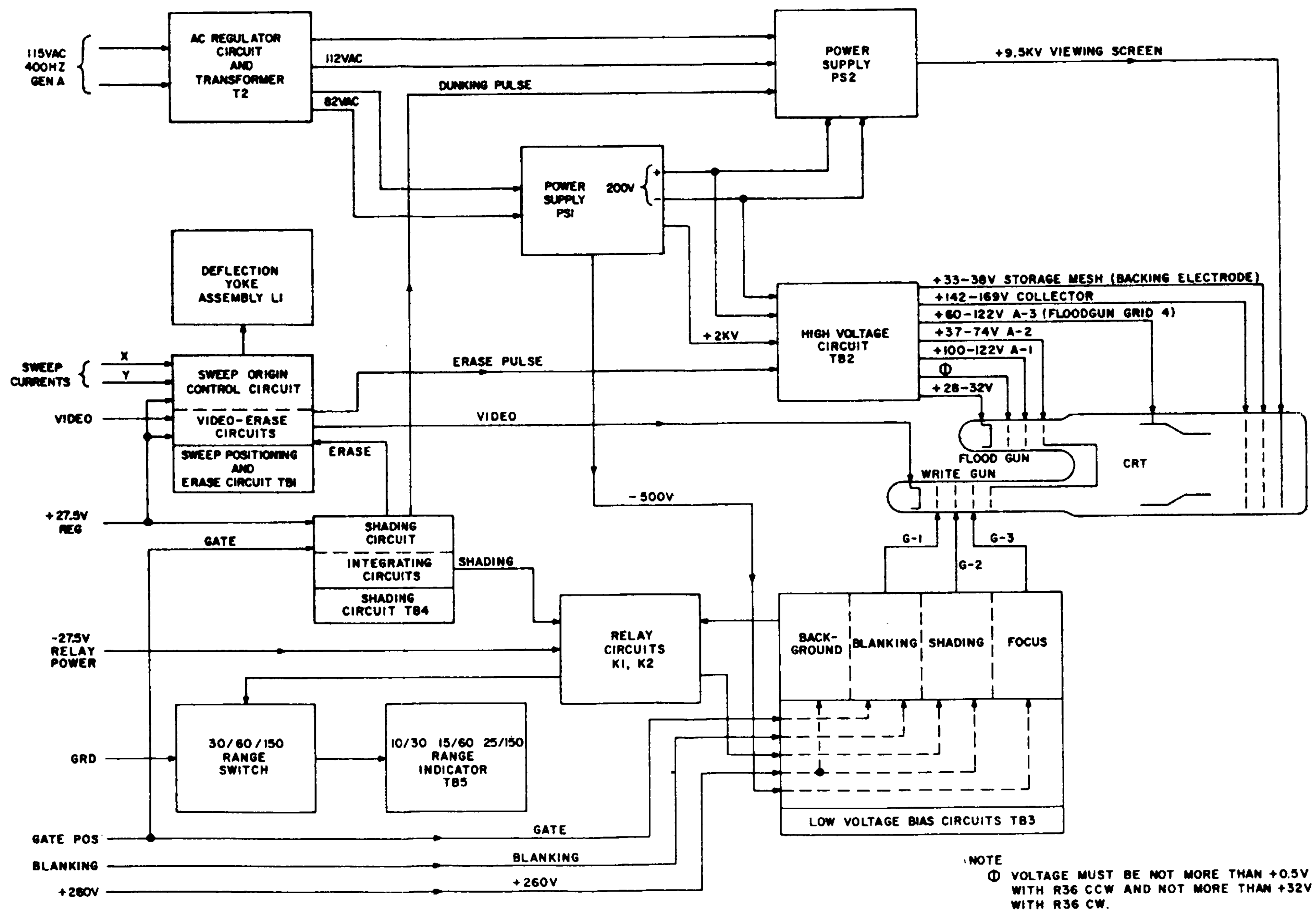
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 18 of 20) Figure FO-12

REVISION IDENTIFICATION	DESCRIPTION OR REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
B15	Circuit redesigned; C16 and C17, 0.01 uf, added. Q3 and Q4 were 2N3904, changed to 2N930; Q1 was 2N3962, changed to 2N3964.		Modules, revision B and above
B16	Corrected component values; Q2 was 2N1711, changed to 2N997; R14 was 562 ohms, changed to 619 ohms.		Modules, revision C and above
B17	Design change; R26, 261 ohms, was added.		Modules, revisions C, D, and E
B18	Performance improvement; added C18, 1.0 uf, and CR13, 1N270.		Modules, revision D and above
B19	Modification to improve afc sweep circuit operation: CR8 was 1N749A, changed to LVA60B.		Modules, revision E and above
	Component value changed; R4 was 32.3K, changed to 90.9K.		Module, revision E
	Component value corrected; R4 was 90.9K, corrected to 110K.		Modules, revision F and above
B20	Correct zener diode current; R23 was 430 ohms, changed to 1.5K.		Modules, revision G and above
B21	Component values corrected; R3 was 2370 ohms, changed to 825 ohms; R45 was 22.6K, changed to 22K; CR9 was 1N3064, changed to 1N4310.		Modules, revision C and above

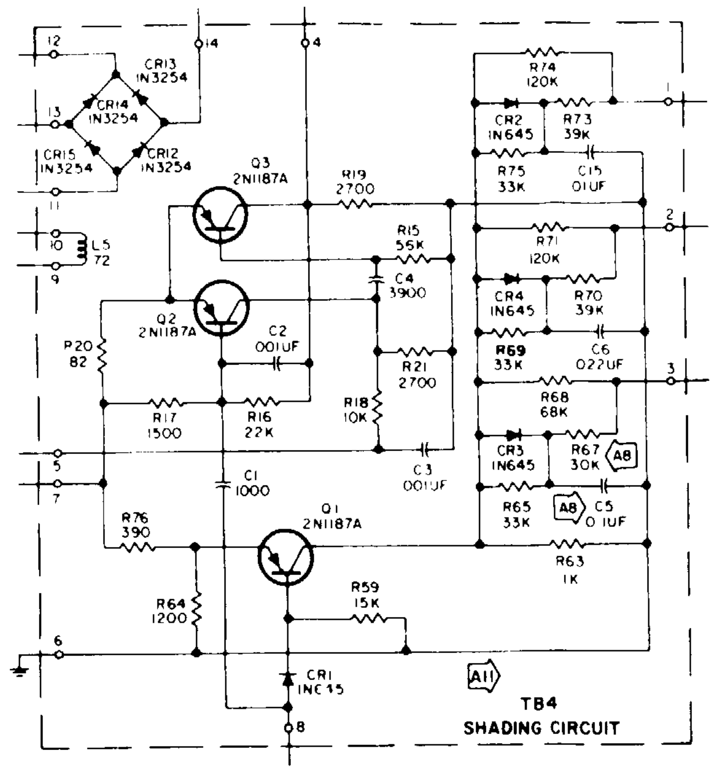
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 19 of 20) Figure FO-12

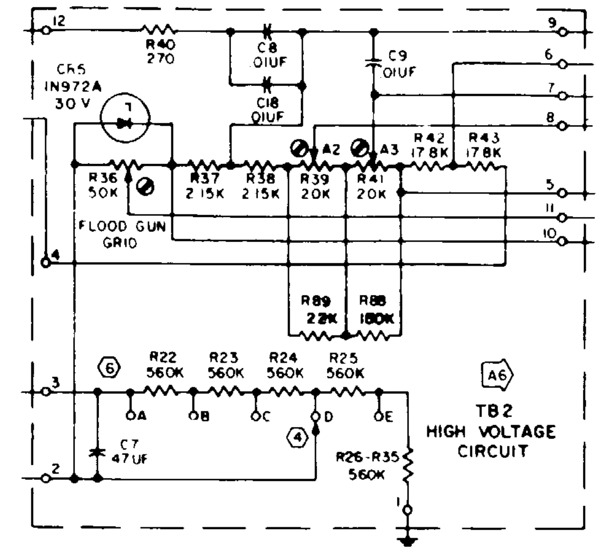
REVISION IDENTIFICATION	DESCRIPTION OR REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
B22	Design change: R59 was 27K, changed to 39K; R74 was 39K, changed to 47 ohms.		Modules, revision C and above
B23	Corrected component values; CR13 was 1N3043, changed to 1N3064; R41 was 27K, changed to 13.3K; C26 was 0.001 uf, changed to 1.0 uf.		Modules, revision D and above
B24	Design change: CR16, 1N3064, added.		Modules, revision D and above
B25	Performance improvement: Added R75, 1.8K, and CR17, 1N938; R41 was connected to C12.		Modules, revision D and above
B26	Modification to improve output (driving) impedance into video amplifier. R90 was selected from 0 to 390 ohms, changed to selected from 100 to 1000 ohms; R99 was 2.7K, changed to selected from 1.8K to 3.3K; R86 was 2.2K, changed to selected from 2K to 3.9K; R101 was 560 ohms, changed to 1.2K; R64 was 560 ohms, changed to 680K; C29 was 390 pf, changed to 100 pf; Added Q17, 2N3251, and R11, 6.8K, and moved C57; added R112, 47 ohms, and C71, 22 uf. (R22 was connected to R84.)		Modules, revision D and above
B27	Corrected component value; R71 was 1.5K, changed to 2.7K.		Modules, revision H and above

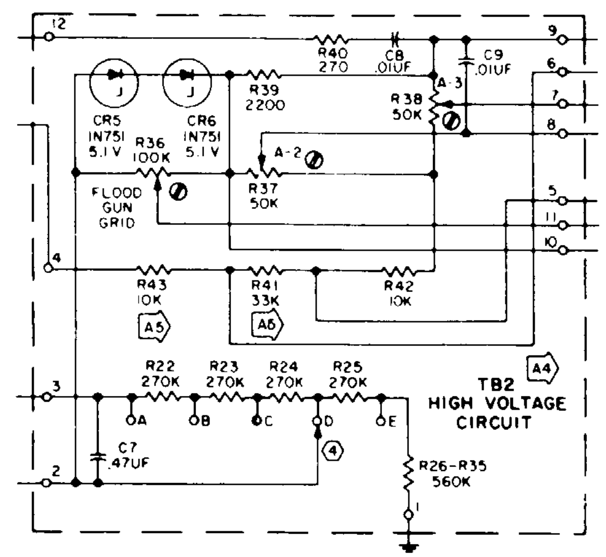
776C-3 Synchronizer, Revision 18/U and Above, Schematic Diagram (Sheet 20 of 20) Figure FO-12



493A-3 Indicator, Block Diagram Figure FO-13





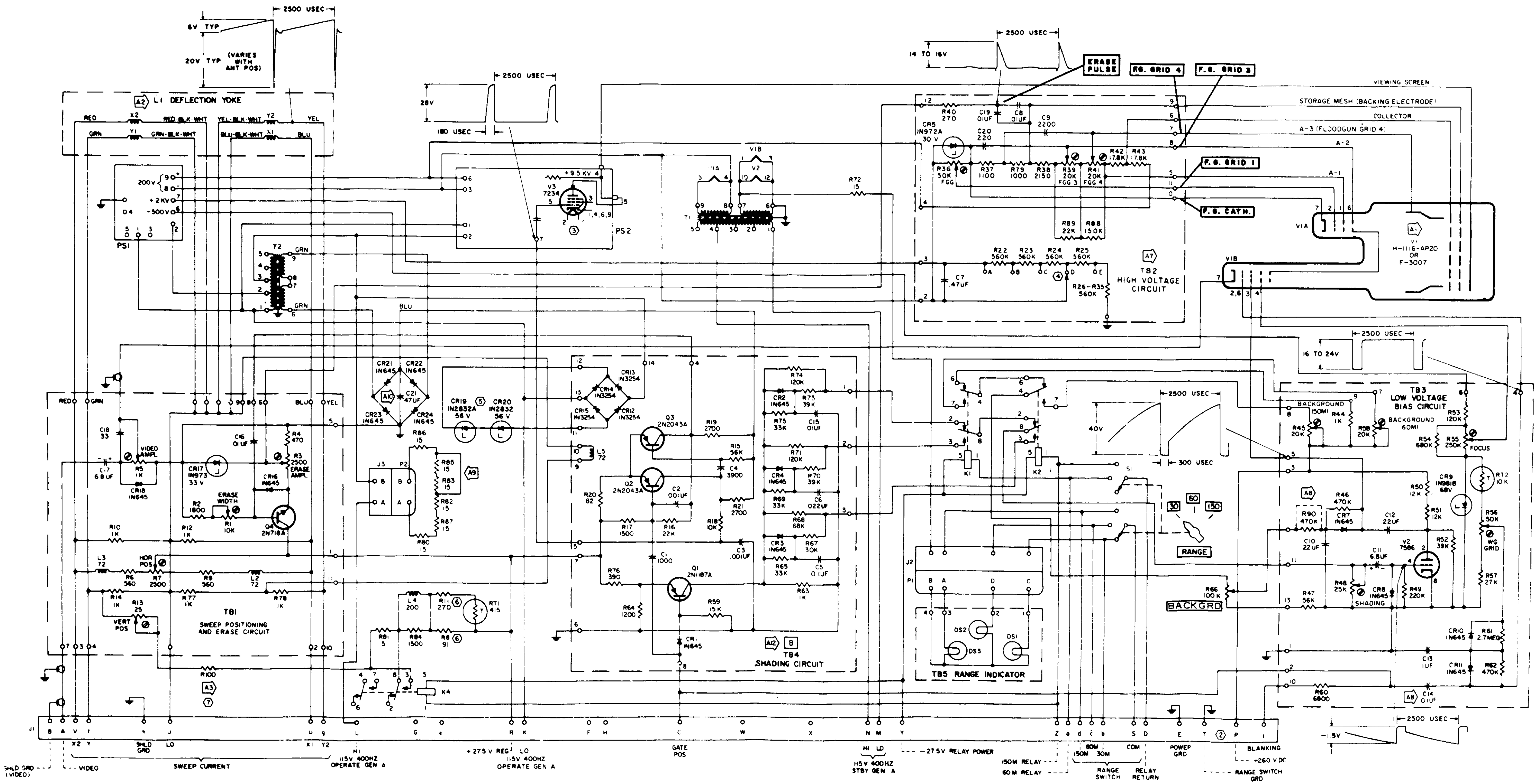


NOTES:

1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN PICOFARADS, AND INDUCTANCE VALUES ARE IN MILLIHENRYS.
2. FOR OPERATION OF INTERNAL RANGE SWITCH, EXTERNAL JUMPERS BETWEEN S AND T AND D AND T MUST BE PROVIDED.
3. TERMINALS FOR XV3 ARE INTERNALLY WIRED IN PS2
4. CONNECTION TO POINT A, B, C, D, OR E MADE IN TEST TO SET DEFLECTION SENSITIVITY.
5. CR19 AND CR20 ARE A MATCHED PAIR OF ZENER DIODES.
6. SOME UNITS MAY CONTAIN VALUES OTHER THAN THOSE INDICATED FOR R8, R11, AND R22 THROUGH R25 THESE VALUES WILL BE R8 68 OHMS, R11 100 OHMS, R22 THROUGH R25 270K.
7. R100 SELECTED IN TEST FROM 22 OHMS, 15 OHMS, OR JUMPERED

TPO - 3611 - 026

493A-3 Indicator, Schematic Diagram (Sheet 1 of 4) Figure FO-14



493A-3 Indicator, Schematic Diagram (Sheet 2 of 4)

Figure FO-14

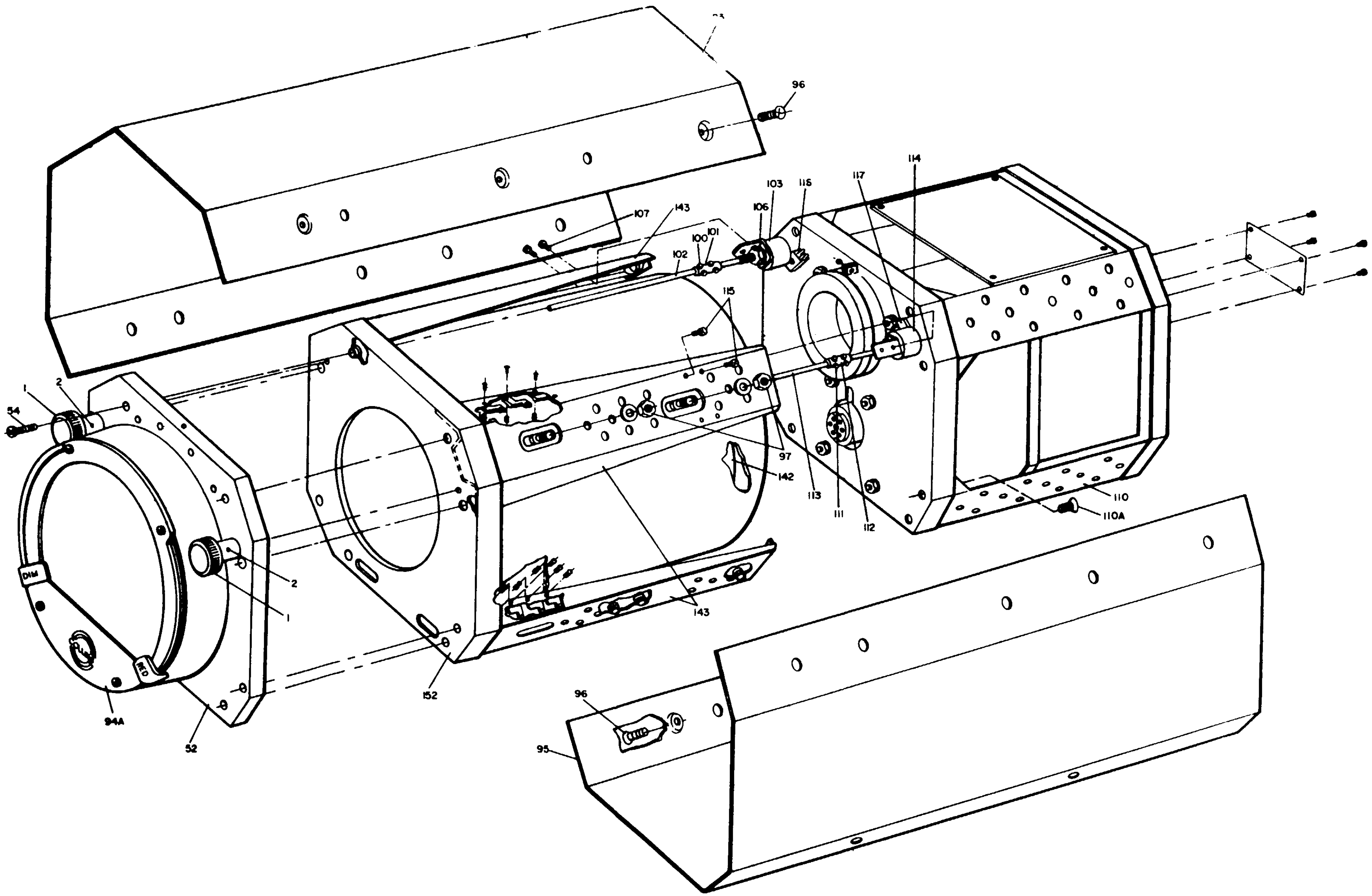
REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A1	Availability of improved storage cathode-ray tube V1.		Serial number 1101 (revision 10) and above.
A2	Availability of improved deflection yoke Y1.		Serial number 1101 (revision 10) and above.
A3	R100 was 15 ohms, changed to selected in test from 22 ohms, 15 ohms, or jumpered.		Serial number 1101 (revision 10) and above.
A4	Original design of high-voltage circuit TB2; Collins part number 595-5548-004.		Serial number 1500 and below; TB2 (revision B) and below.
A5	Modification to improve display uniformity and ease storage tube collimation.	4	As required for serial number 1500 and below; TB2 (revision B) and below.
A6	Modification to improve storage tube performance (change from A4).		Serial number 1501 through 1680; TB2 (revision C) and above.
A7	Modification to improve storage tube performance (change from A6 or A4).		Serial number 1681 and above. TB2; Collins part number 758-0336-001.
A8	Modification to reduce turn-on transients; C5 was 0.068 uf, changed to 0.1 uf; C14 was 1.0 uf, changed to 0.1 uf; R67 was 39K, changed to 30K; R90, 470K added.	5	Serial number 1676 and above. TB3 (revision E) and above; TB4 (revision D).
A9	Modification to eliminate spoking and flickering on the 150-mile/range; R83 and R85 removed.	6	Serial number 1676 (revision 13) and above.

493A-3 Indicator, Schematic Diagram (Sheet 3 of 4)
Figure FO-14

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A10	Modification to eliminate spoking and flickering on all ranges; CR21 through CR24, C21, and additional wiring added.	6	Serial number 1792 (revision T) and above.
A11	Original shading circuit TB4.		Serial number 1791 (revision S) and below. TB4 (revision D) and below.
A12	Redesign of shading circuit TB4.		Serial number 1792 (revision T) and above. TB4 (revision E) and above.

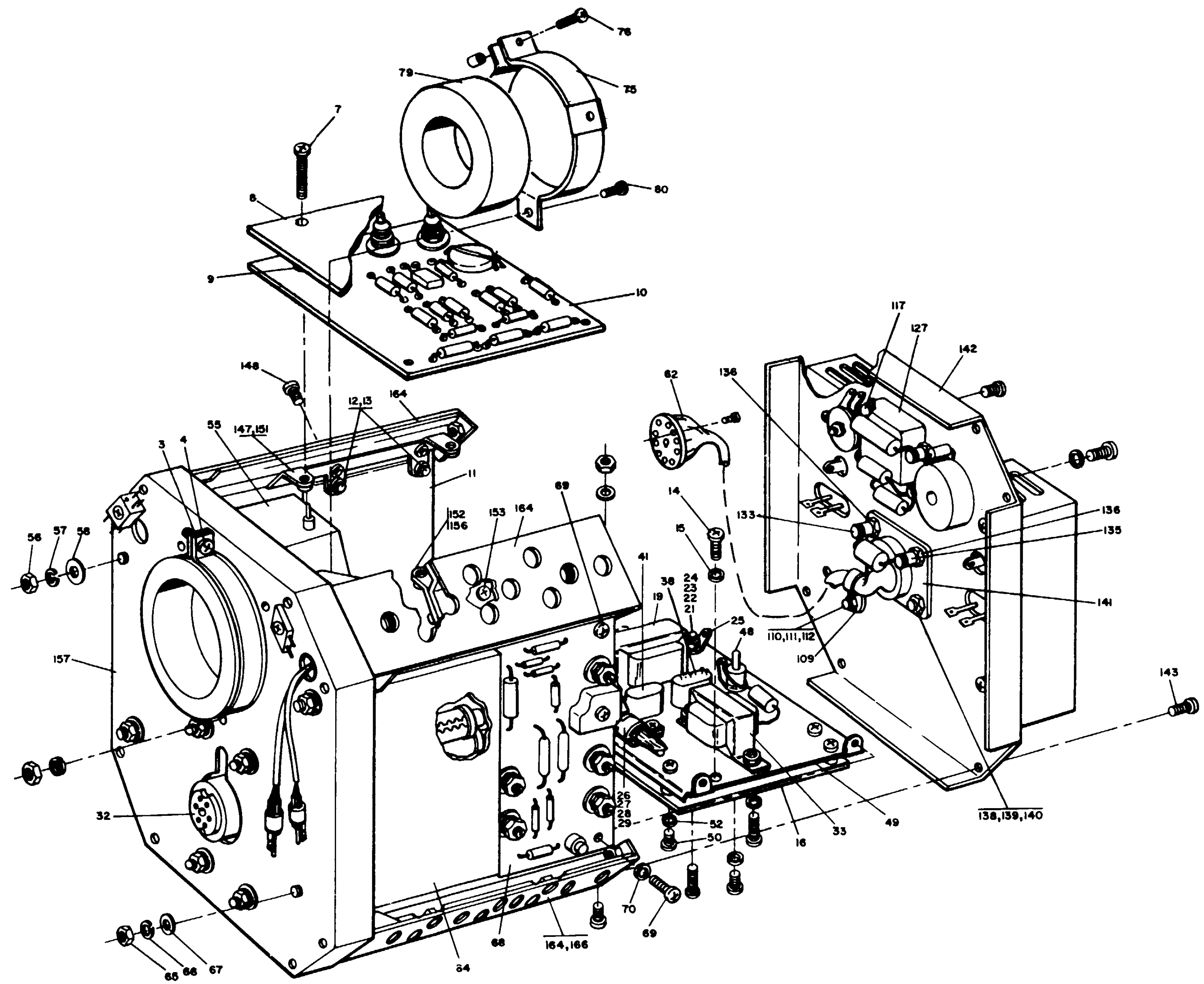
493A-3 Indicator, Schematic Diagram (Sheet 4 of 4)

Figure FO-14



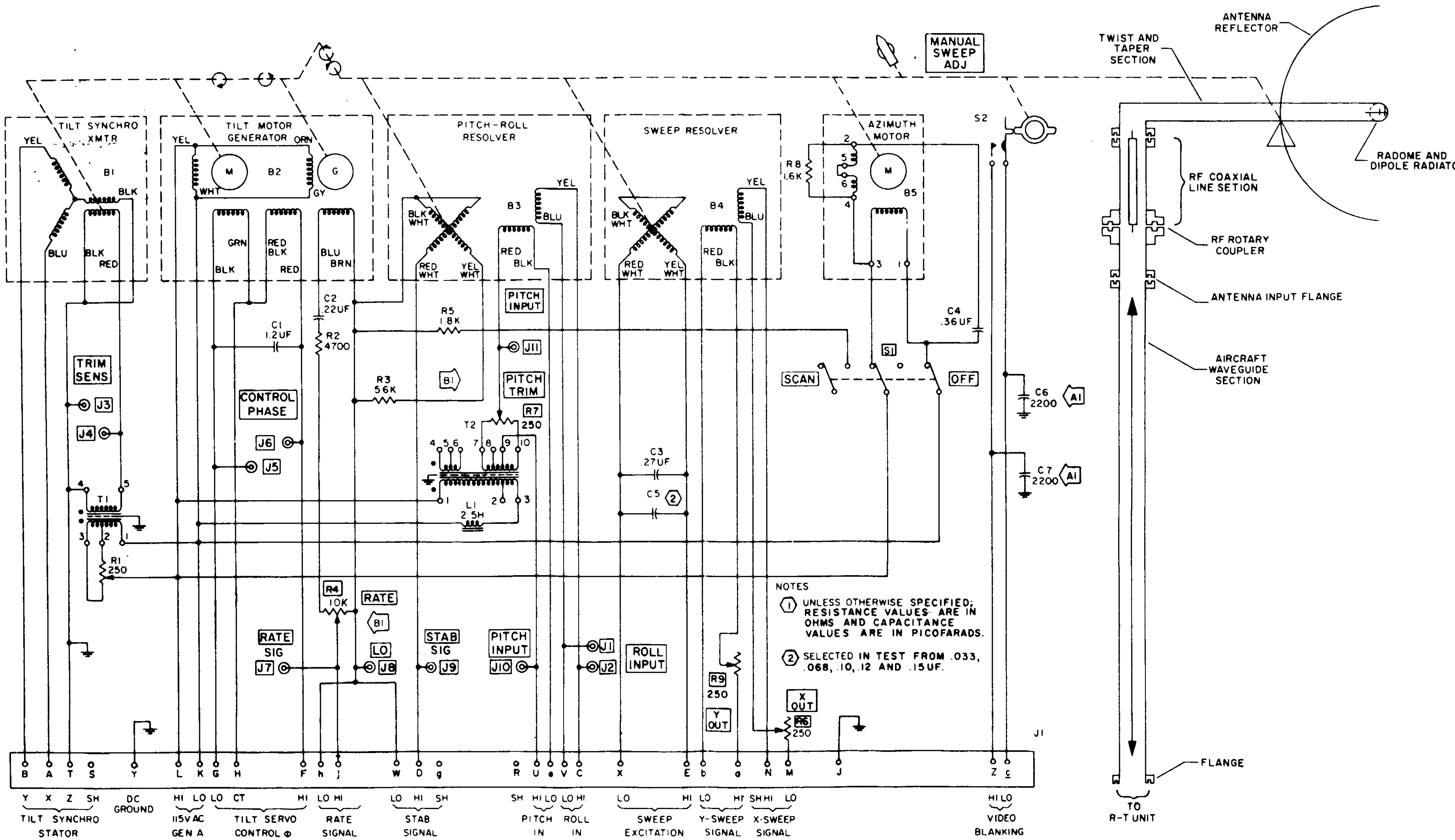
493A-3 Indicator, Exploded View

Figure FO-15



493A-3 Indicator Chassis Assembly, Exploded View

Figure FO-16



537F-7 and 537F-8 Antennas, Schematic Diagram
Figure FO-17 (Sheet 1 of 2)

SCHEMATIC CHANGES

The following descriptions identify the changes to the schematic diagram of the 537F-7 and 537F-8 Antennas:

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A1	Capacitors C6 and C7 added to reduce radiated radio frequency interference (RFI)	5	537F-7 Revision 13; 537F-8 Revision 14
B1	R4 changed to 10K. R3 rewired.		All

537F-7 and 537F-8 Antennas, Schematic Diagram (Sheet 2 of 2)
Figure FO-17

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT. . .PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA-GRAPH	FIGURE NO	TABLE NO.	

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE:

DA FORM 1 JUL 79 2028-2 PREVIOUS EDITIONS • ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG PERFORATED LINE

PIN: 018530-000