TM 9-4935-474-14

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL FOR

TOW SUBSYSTEM TEST SET
4935-01-108-0442
BASIC SIGHT ASSEMBLY SUPPORT EQUIPMENT
4935-01-108-2968
ALIGNMENT BREAKOUT BOX
4935-01-107-7619

BRADLEY FIGHTING VEHICLE TOW SUBSYSTEM

This copy is a reprint which includes current pages from Changes 1 through 11.

DEPARTMENT OF THE ARMY 12 AUGUST 1983

SAFETY PRECAUTIONS

WARNING

HIGH VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electronic equipment unless there is another person nearby. He should be familiar with the operation and hazards of the equipment. He should also be competent in giving first aid, When the technician is helped by operators, he must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take special care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections when installing or operating this equipment.

Whenever possible, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body,

Do not be misled by the term “low voltage.” Potentials as low as 50 volts may cause death under adverse conditions.

For artificial respiration, refer to FM 21-11.

WARNING

RADIATION HAZARD

The antireflective coating on all infrared optics contain thorium fluoride which is slightly radioactive. The only potential hazard involves ingestion (swallowing or inhaling) of this coating material. Dispose of broken lens, etc., in accordance with AR 755-15.

DON’T TAKE CHANCES!

WARNING

Space in vehicle is limited. Use lifting handles when placing the TC in vehicle and be careful to avoid possible injury to personnel or equipment damage.

WARNING

Removing and installing the TC, MS, and D/NSC are awkward tasks involving heavy lifts. When handling this equipment, use proper lifting techniques - Lift with the arms and legs, not the back - Do not twist the torso while lifting or holding a heavy load, turn with the legs. Insure sound footing. Two persons are required to safely accomplish removal and installation of D/NSC.

WARNING

Space in vehicle is limited. When removing the TC from the vehicle, use care to avoid possible injury or equipment damage. Use lifting handles provided.

WARNING

Set POWER switch to OFF before removing or installing circuit cards or components to prevent possible injury to personnel.

WARNING

Methyl alcohol is a toxic and flammable material. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapor or contact with the skin. Keep away from heat and open flames.

WARNING

Solvents are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapors or contact with the skin. Keep away from heat and open flame.

WARNING

Tilt stage assembly is spring loaded and will move outward with great force when retaining socket head screws and are loosened. Be sure tilt stage assembly is secure before last screw is loosened to prevent damage to equipment and possible injury to personnel.

WARNING

Solvents and alcohol are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapor or contact with the skin, Keep away from heat and open flame.

WARNING

High voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions.

WARNING

Dropping cylinder of compressed nitrogen gas in enclosed areas can cause suffocation. Use extreme care not to drop cylinder.

WARNING

Leak test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.

WARNING

Missile simulator in transit case is heavy, Use caution when lifting missile simulator in transit case. Have helper assist.

Insert the latest changed pages in accordance with the instructions on the transmittal sheet.

LIST OF EFFECTIVE PAGES

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand. However, change symbols are not used when a complete part, chapter, section or troubleshooting procedure is changed. A new illustration is indicated by a miniature pointing hand.

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Change	4	30 June 87
Change	5	28 June 88
Change	6	24 April 89
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Change	10	15 November 93
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Technical Manual)
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HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., 12 August 1983

OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR TOW SUBSYSTEM TEST SET BASIC SIGHT ASSEMBLY SUPPORT EQUIPMENT ALIGNMENT BREAKOUT BOX (BRADLEY FIGHTING VEHICLE TOW SUBSYSTEM)

REPORTING OF ERRORS

You can help improve this publication. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, U.S. Army Missile Command, ATTN: AMSMI-MMC-LE-FPA, Redstone Arsenal, AL 35898-5238. A reply will be furnished to you.

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LIST OF ILLUSTRATIONS - continued

LIST OF TABLES

CHAPTER 1
INTRODUCTION

Section L GENERAL

1-1. Scope. This manual describes the Guided Missile System Test Set for the Bradley Fighting Vehicle and provides maintenance instructions for this equipment at the operator, unit, direct support, and general support maintenance levels.

1-2. Maintenance Forms, Records, and Reports. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, the Army Maintenance Management System (TAMMS). The DA PAM is published in the maintenance management UP-DATE. Units may subscribe to maintenance management UPDATE by submitting a completed form DA form 12-13.

1-3. Reporting Equipment Improvement Recommendations (EIR's). EIR's will be prepared using SF 368, Quality Deficiency Report. Instructions for preparing EIR's are provided in DA PAM 738-750, the Army Maintenance Management System. EIR's should be mailed directly to: Commander, U.S. Army Missile Command, ATTN: AMSMI-QA-CF, Redstone Arsenal AL, 35898-5290. A reply will be furnished directly to you.

1-4. Non-Standard Abbreviations and Nomenclature Cross-References. The following non-standard abbreviations are used in this manual:

ABOB	Alignment Breakout Box
BFV	Bradley Fighting Vehicle
BIT	Built In Test
BSA	Basic Sight Assembly
BSAC	BSA Controller
BSAHF	BSA Holding Fixture
BSASE	Basic Sight Assembly Support Equipment
CGE	Command Guidance Electronics
CSS	Contact Support Set
D/NSC or DNSC	Day/Night Sight Collimator
DS	Day Sight
EIR	Equipment Improvement Recommendation
EMI	Electromagnetic Interference
ENT	Enter
EPROM	Erasable Program Read Only Memory
F	Fire
HLT	Halt
Hz	Hertz
Isu	Integrated Sight Unit
MAC	Maintenance Allocation Chart
MRT	Minimum Resolvable Temperature
MS	Missile Simulator
NF	Narrow Field
NS	Night Sight
NSMF	Night Sight Maintenance Facility
PCU	Power Control Unit
PF	Prefire
PIA	Peripheral Interface Adapter
RAM	Random Access Memory
RPC	Remote Position Control
RPT	Repeat
SE	Support Equipment
STP	Step
TC	Test Controller
TMDE	Test Measurement and Diagnostic Equipment
TOW	Tube Launched, Optically Tracked, Wire Guided
TSS	TOW Subsystem
TSSSE	TOW Subsystem Support Equipment
TSSTS	TOW Subsystem Test Set
WC	Wire Cut
WF	Wide Field

TM Nomenclature	Official Nomenclature
Contact Support Set	Contact Support Set Shelter S-250
Night Sight Maintenance Facility	Night Sight Maintenance Facility Shelter S-280
TOW Subsystem Test Set	Test Set, Guided Missile System AN/TSM-154
BSA Controller	BSA Control Unit
Autocollimator	Autocollimation Eyepiece Assembly
Remote Position Control	Remote Control

1-5. Destruction of Army Materiel to Prevent Enemy Use. Destruction of equipment will be done only by order of unit commander. Destruction of equipment by mechanical means, explosives, gun fire, or burning will make it useless to the enemy. To keep the enemy from getting useful information, the equipment should be completely destroyed if possible.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-6. Equipment Characteristics, Capabilities, and Features. The support equipment (SE) described in this manual provides the means for automatic testing, alinement, and fault isolation of the TOW subsystem (TSS) in the M2 or M3 Bradley Fighting Vehicle (BFV). The SE, shown in figure 1-1, includes the TOW subsystem test set (TSSTS) and the basic sight assembly support equipment (BSASE), as well as an alignment breakout box (ABOB) used for testing and troubleshooting of the TSSTS.

a. TOW Subsystem Test Set. The TOW subsystem test set (TSSTS) provides on-vehicle testing and fault isolation of the TSS. It consists of the test controller (TC), the day/night sight collimator (D/NSC), the missile simulator (MS), and a set of interconnection cables. The TSSTS is completely portable, with the TC, D/NSC, MS and cables protected in three transit cases when not in use. The TSSTS units are modular in construction for ease of fault isolation and repair when necessary. During use, the TSSTS is connected to the turret and TSS units in the M2 or M3 vehicle. Using +18 to + 30 volt vehicle power, the TSSTS generates and supplies electrical and optical stimuli to the turret and TSS subassemblies and performs testing of TSS output signals. The TSSTS also incorporates built in test (BIT) circuitry and programming capable of performing self tests and fault isolation. The TSSTS is operated by entering instructions through a keyboard located on the TC front panel. These instructions are then implemented by firmware programs stored in the memory of the TC to perform specific tests. Test results and supplementary operator instructions are displayed to the operator on a front panel display on the TC. The TSSTS provides testing and fault isolation of the following TSS assemblies and subassemblies:

(1) *Integrated sight unit (ISU).*

(a) Periscope Head Assembly
(b) Superelevation Circuit Card
(c) Error Detector Assembly
(d) TOW Visual Module
(e) Basic Sight Assembly (BSA)
(f) Reticle Projector/ISU Housing
(g) Afocal Telescope Assembly

(2) *Command guidance electronics (CGE).*

(a) Output Card Al
(b) Yaw Card A2
(c) Pitch Card A3
(d) G-Bias and CVAC Card A4
(e) Programmer Card AS
(f) BIT Card A6
(g) Squib Card A7

(3) *Power* control *unit (PCU).*

(a) Switching Regulator Assembly Al
(b) Converter Assembly A2
(c) Linear Regulator I Assembly A3
(d) Linear Regulator II Assembly A4
(e) AC Generator Assembly A5
(f) EMI Filter Assembly A6

(4) *TOW missile launcher*

(a) Remote Armament control
(b) Current Limiter

b. Basic Sight Assembly Support Equipment. The basic sight assembly support equipment (BSASE) is used at the night sight maintenance facility (NSMF) for field level maintenance of the basic sight assembly (BSA) of the integrated sight unit (ISU). The BSASE consists of the BSA holding fixture (BSAHF) with transit case and rail assembly, and the BSA controller (BSAC) with transit case and cables. When used in conjunction with the AN/TAM-3 collimator, the BSASE supplies the necessary power and control functions to operate the BSA unit during test and repair operations.

Alignment Breakout Box. The alignment breakout box (ABOB) facilitates testing and fault isolation of the TSSTS units and associated cables. Two cables are supplied with the ABOB for use with the TC: a self test cable and an auxiliary power cable. When not in use, the ABOB and its cables are stored in a rugged transit case.

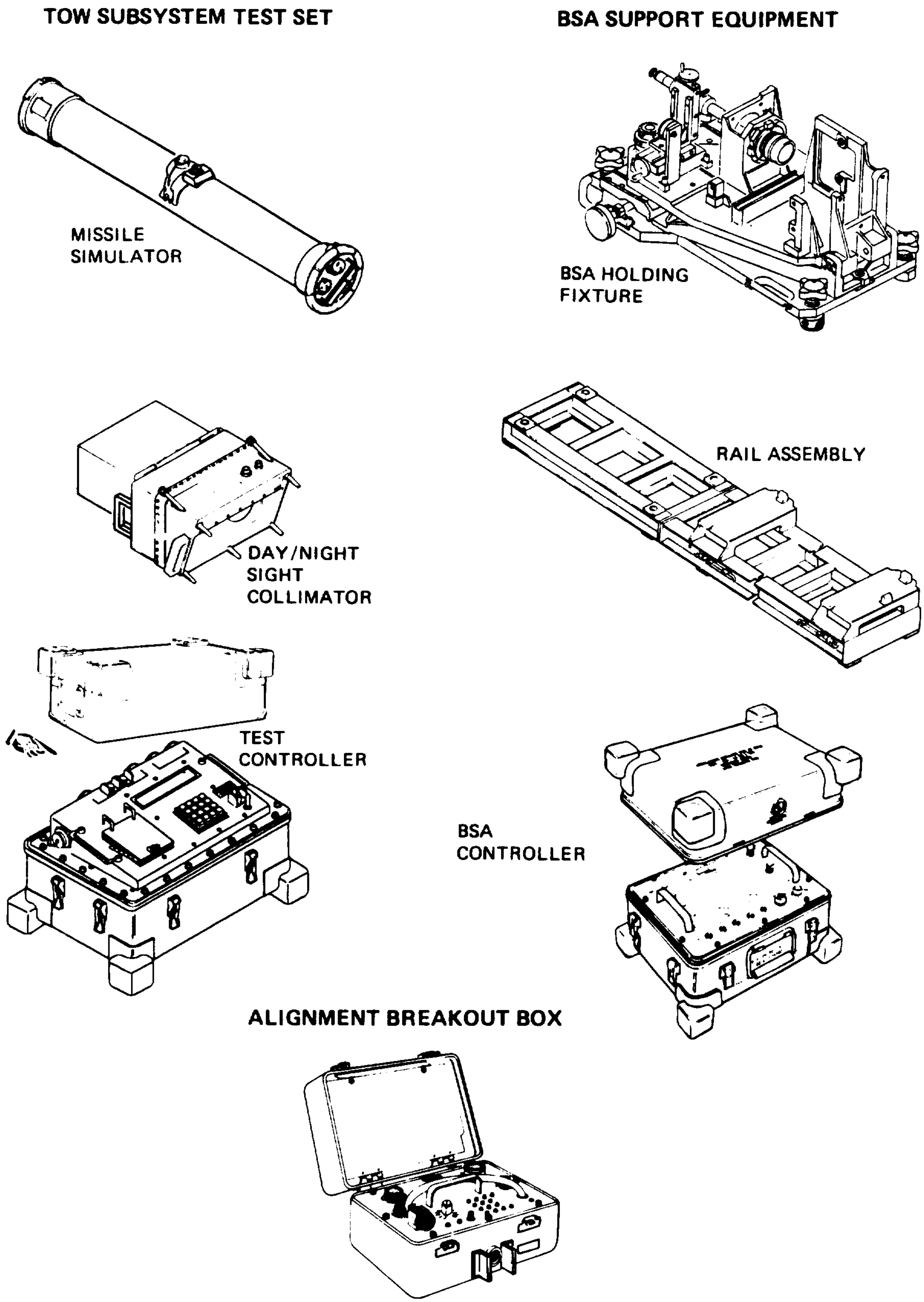


Figure 1-1. TOW Subsystem Support Equipment.

1-7. Location and Description of Major Components. *a. Test Controller (TC).* The TC (figure 1-2) is used with the D/NSC and MS to provide automatic verification testing and fault isolation of the TSS. It is a computer-based unit that provides stimuli required for testing the TSS, processes and measures TSS signals, and controls the D/NSC and MS. The TC continuously monitors the status of the D/NSC and MS, and has self test capabilities. The TC front panel has a keyboard for entering data and operating commands. An alphanumeric display reads out all keyboard entries, test status messages, and special operator instructions. Indicators on the front panel indicate TC, D/NSC, and MS power supply status. The front panel also has operating instructions for the test set printed on flip cards. These cards are tab indexed for ready reference and are made of a material to withstand the field environment. Testing is done by picking a test program from the TC memory. Each test program consists of a logical sequence of steps which test a major equipment function or subassembly. Each test program can be executed without prior setup and contains at least one measurement that is compared against limits to determine a pass or fail condition. The TC is protected by a rugged transit case capable of withstanding harsh physical surroundings, such as rough handling, water, dust, pressure, and temperature extremes. The top cover of the TC transit case provides storage for the TC interconnection cables.

b. Day/Night Sight Collimator (D INS C). The D/NSC (figure 1-3) provides all optical stimuli and targets required for TSS testing. The D/NSC is mounted on the front of the ISU during testing, and is powered and controlled by the TC. Target sources in the D/NSC are mounted in a movable tilt stage assembly that allows target positioning in azimuth and elevation. Control of target positioning is normally done by the operator using the remote position control (RPC); however, for some tests target positioning is controlled automatically by the TC. The D/NSC produces visual and thermal target patterns for testing the day and night vision capabilities of the ISU, and modulated IR targets for testing the TOW missile tracking functions of the TSS. When not in use, the D/NSC is protected by a rugged transit case that also stores the D/NSC interconnection cable(s) and RPC.

c. Missile Simulator (MS). The MS (figure 1-4) is installed in the TOW launcher to simulate TOW missile functions during TSS testing. The MS fits in either launcher tube and mates mechanically with the launcher's locking mechanism and electrically with the umbilical connector. The missile functions simulated by the MS are wire signal demodulation, squib and self balance loads, and missile present. The squib simulators test the TSS prefire, fire, and wirecut signals. The MS is controlled by the TC and has BIT which monitors its electronic subassemblies and reports its power and BIT status to the TC. The MS and its cable are stored in a transit case that consists of a polyethylene container that is heavily cushioned inside to protect the equipment.

d. Basic Sight Assembly Support Equipmen[(BSASE). The BSASE includes the BSA holding fixture (BSAHF), the rail assembly, and the BSA controller (B SAC). The BSAHF (figures 1-5 and 1-5.1) holds the BSA unit being tested, provides the necessary optics for BSA testing, and provides an optical path to the AN/TAM-3 collimator. The BSAHF is supplied with a reference mirror and an autocollimator that are used for checking alignment of the BSAHF prior to use. In addition, an FVS eyepiece is supplied that can be installed in place of the microscope assembly for viewing the entire raster of the BSA unit under test. The BSAHF and accessories are stored in a transit case when not in use. The rail assembly (figure 1 -6) provides a reference mounting plane for the BSAHF and AN/TAM-3 collimator, which are secured with clamping hardware. The rail assembly may be permanently mounted to a work bench in the NSMF. The BSAC (figure 1-7) provides the power supplies, controls, and test access required to test the BSA. It is contained in an integral transit case, with associated interconnection cables stored in the lid of the case.

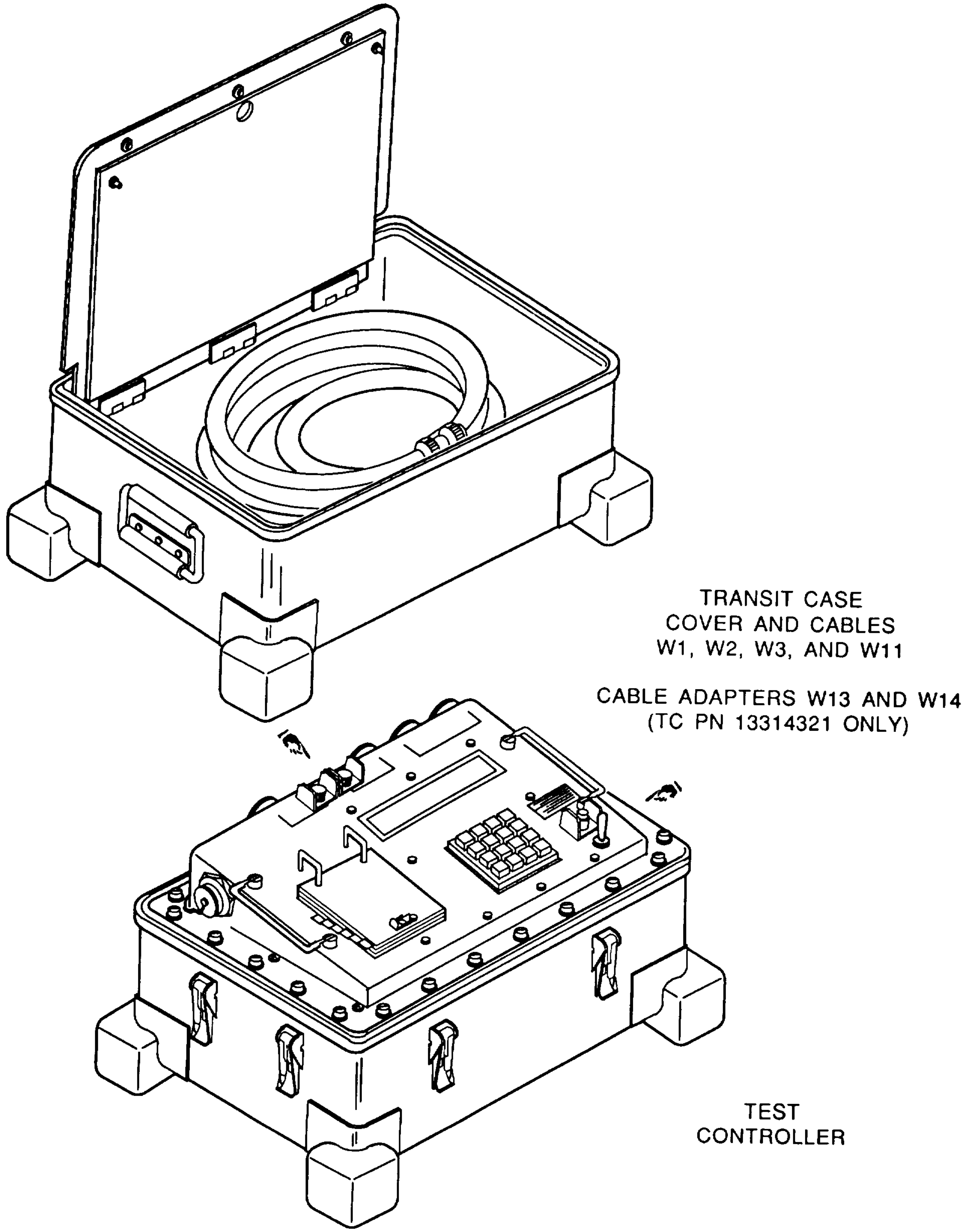


Figure 1-2. Test Controller

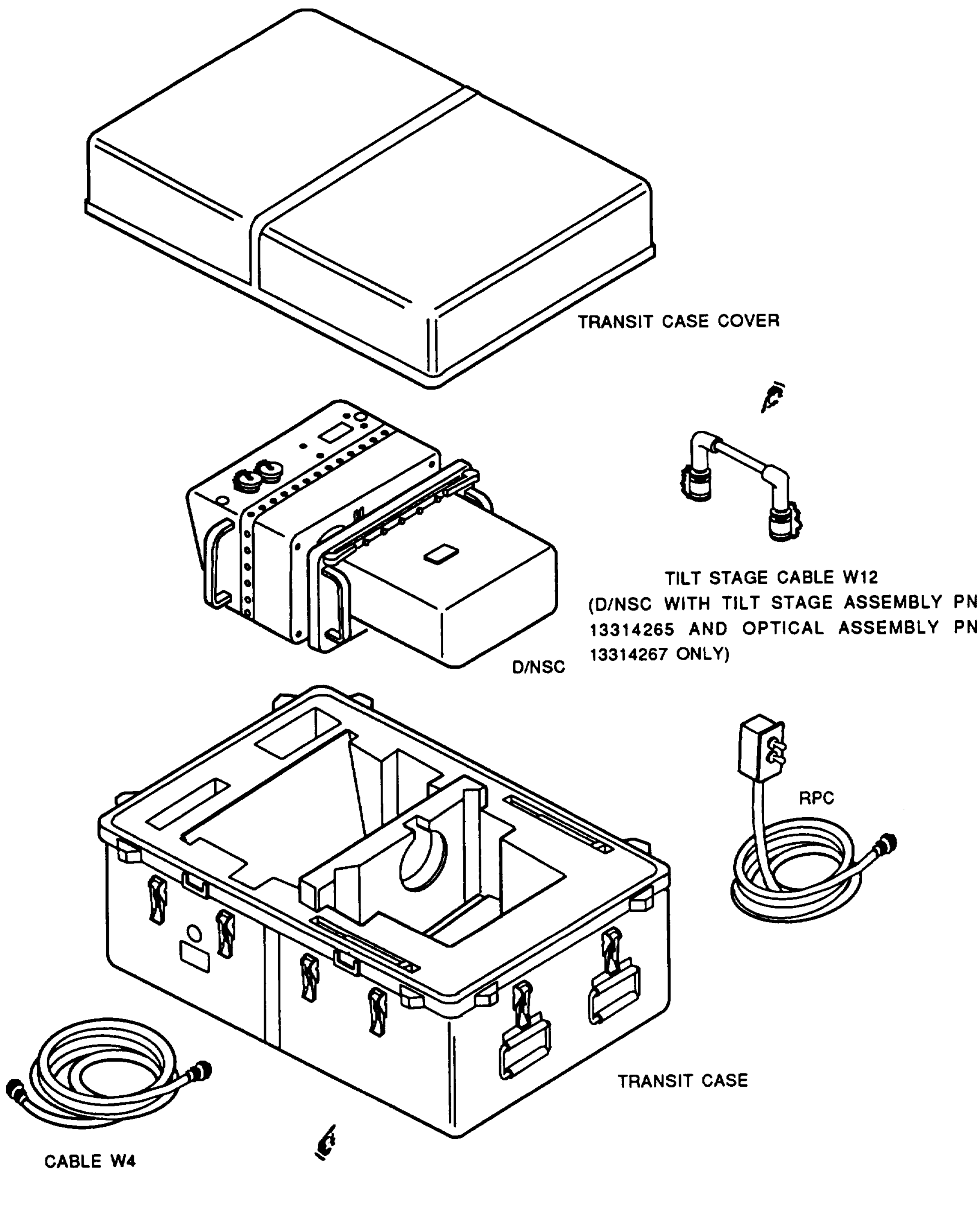


Figure 1-3. Day/Night Sight Collimator

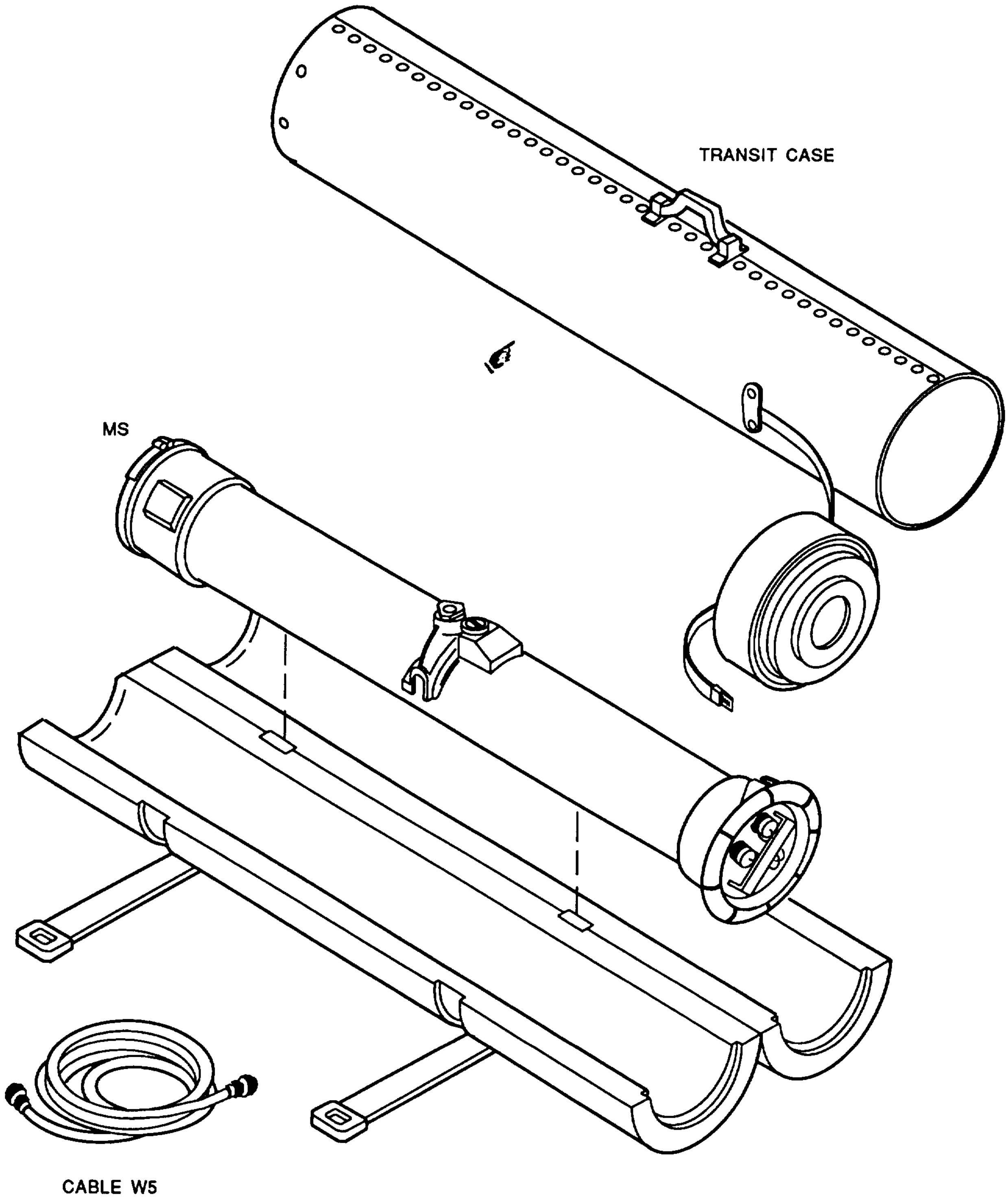


Figure 1-4. Missile Simulator

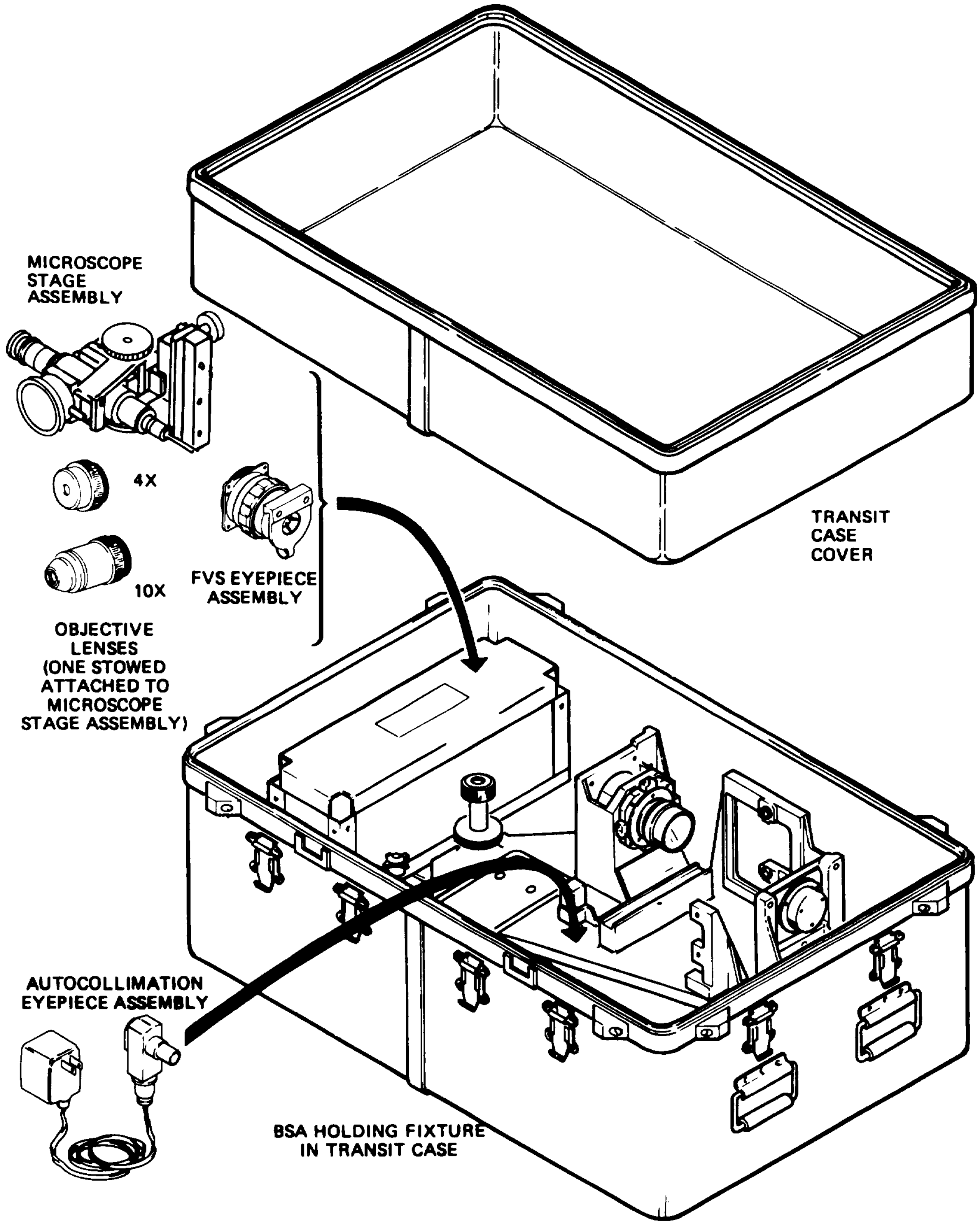


Figure 1-5. BSA Holding Fixture (Serial Numbers 2001 to 200.5).

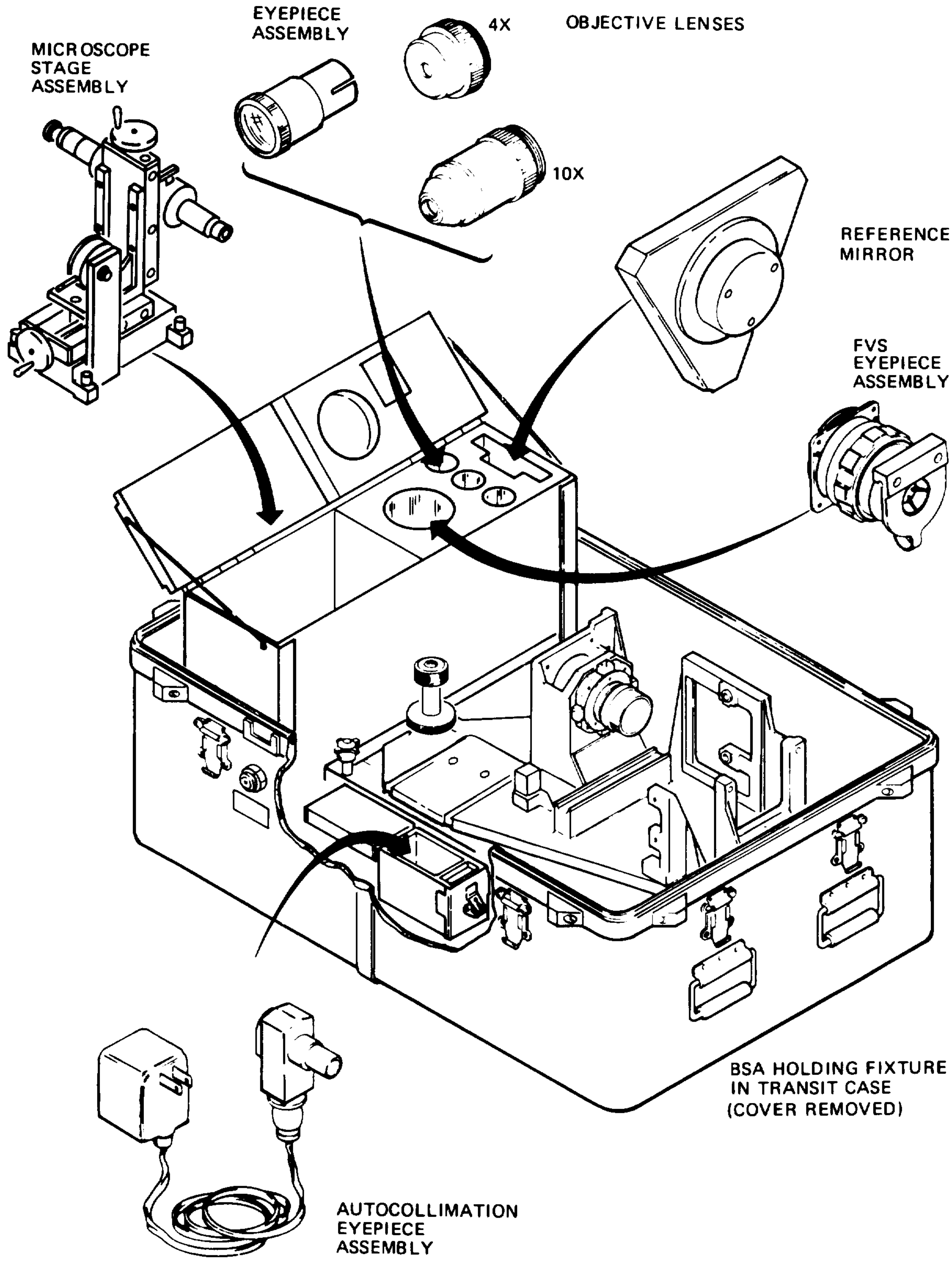


Figure 1-5.1. BSA Holding Fixture (Serial Numbers 2006 and Up).

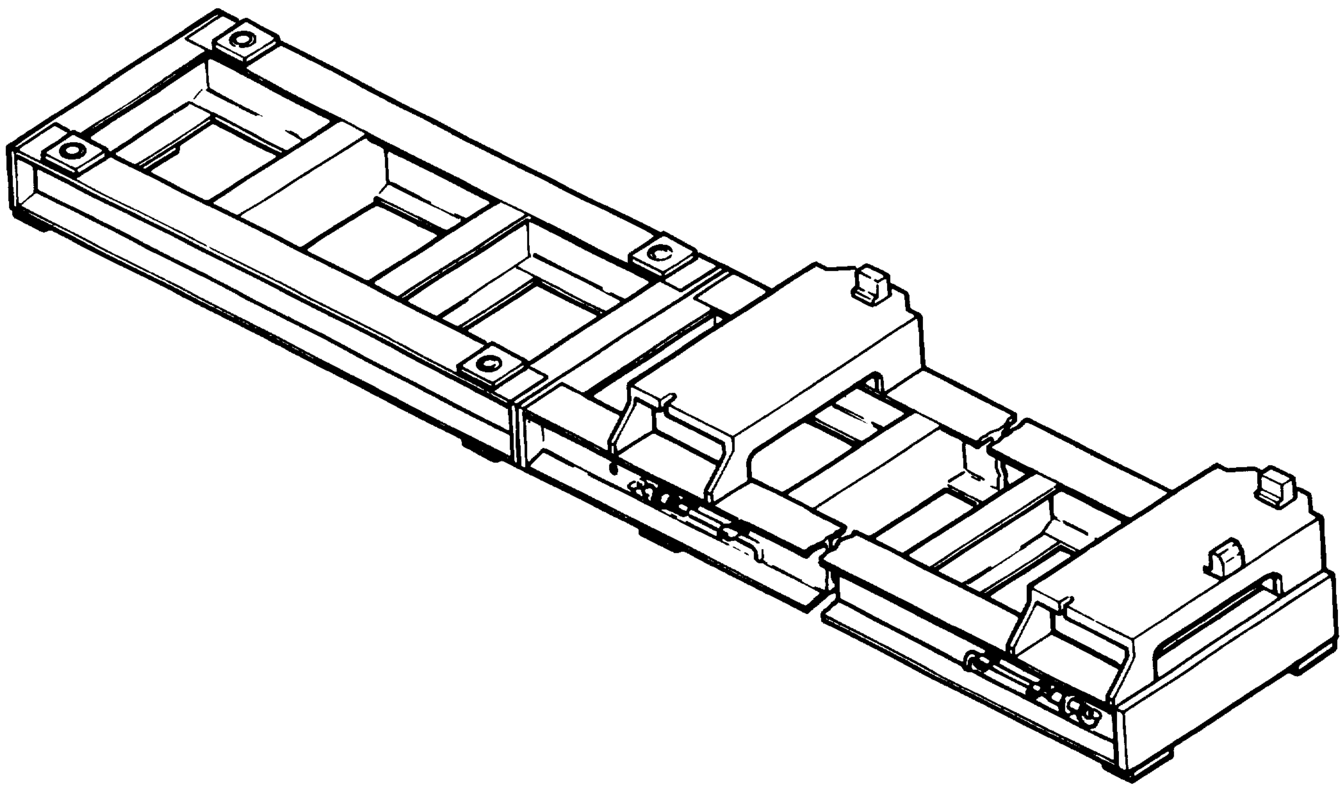


Figure 1-6. Rail Assembly.

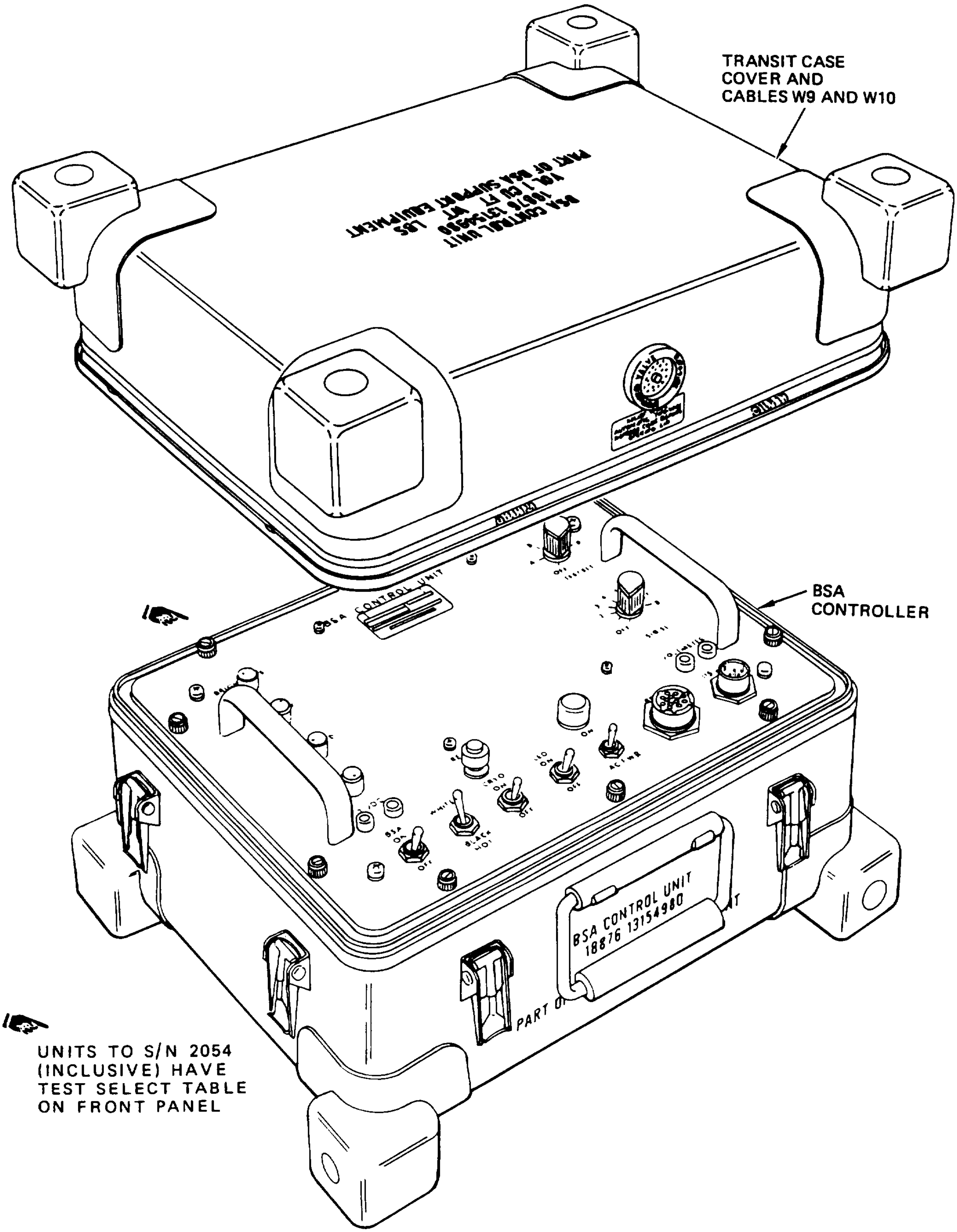


Figure 1-7. BSA Controller.

e. Alignment Breakout Box (ABOB). The ABOB (figure 1-8) facilitates maintenance of the TSSTS components by providing test points that allow the operator to measure voltage and signal levels on a non-interference basis. It is also used with the test controller to check and fault isolate cables of the TSSTS. The self test cable provided with the ABOB connects between the inputs and outputs of the TC to allow an extended diagnostic self test to be performed. The auxiliary power cable provided with the ABOB is used to supply power to the TC when the TSSTS is being tested or repaired in the maintenance shop.

1-8. Equipment Data. The following is a summary of the physical measurements and performance characteristics of the SE.

a. TOW Subsystem Test Set (TSSTS).

(1) TC (with transit case and cables).

Length	21.8 inches (55.4 cm)
Width	15 inches (38 cm)
Height	14 inches (35.6 cm)
Weight	80 pounds (36.3 kg)
Power Required	18 to 30 volts
Heat Dissipation	48 watts; 60 watts max with blower; 100 watts max with MS and D/NSC
Operating Temp.	-25.9° F to +131°F (-31.6°C to +55°C)
Storage Temp.	-65°F to +160°F (-53.9°C to +71.1°C)

(2) *D/NSC (with transit case and cables).*

Length	39.7 inches (100.8 cm)
Width	25.4 inches (64.5 cm)
Height	19.2 inches (48.8 cm)
Weight	190 pounds (86.2 kg)
Power Required	+24 volts (from TC)
Operating Temp.	-25.9°F to +131°F (-31.6°C to +55°C)
Storage Temp.	-65°F to +160°F (-53.9°C to +71.1°C)

(3) MS *(with transit case and cable).*

Length	57.5 inches max. (146 cm)
Diameter	13.8 inches (35 cm)
Weight	46 pounds (20.9 kg)
Power Required	+24 volts (from TC)
Operating Temp.	-25.9 °F to +131°F (-31.6°C to +55°C)
Storage Temp.	-65°F to +160°F (-53.9°C to +71.1°C)

b. Basic Sight Assembly Support Equipment (BSASE).

(I) BSAHF (with transit case).

Length	39.7 inches (100.8 cm)
Width	25.4 inches (64.5 cm)
Height	19.2 inches (48.8 cm)
Weight	208 pounds (94.3 kg)

(2) *Rail assembly.*

Length	70 inches (178 cm)
Width	13.4 inches (34 cm)
Height	6.7 inches (17 cm)
Weight	60 pounds (27.2 kg)

(3) *BSAC (with transit case and cables).*

Length	16.3 inches (41.4 cm)
Width	12.8 inches (32.5 cm)
Height	10 inches (25.4 cm)
Weight	45 pounds (20.4 kg)
Power Required	115 volts, 60 hertz, single phase
Operating Temp.	60°F to 80°F (15.5°C to 26.7°C)
Storage Temp.	-65°F to +160°F (-53.9°C to +71.1°C)

c. ABOB (with transit case and cables).

Length	9 1/4 inches (23,5 cm)
Width	13 1/4 inches (33.7 cm)
Height	8 l/2 inches (21.6 cm)
Weight	15 pounds (6.8 kg)

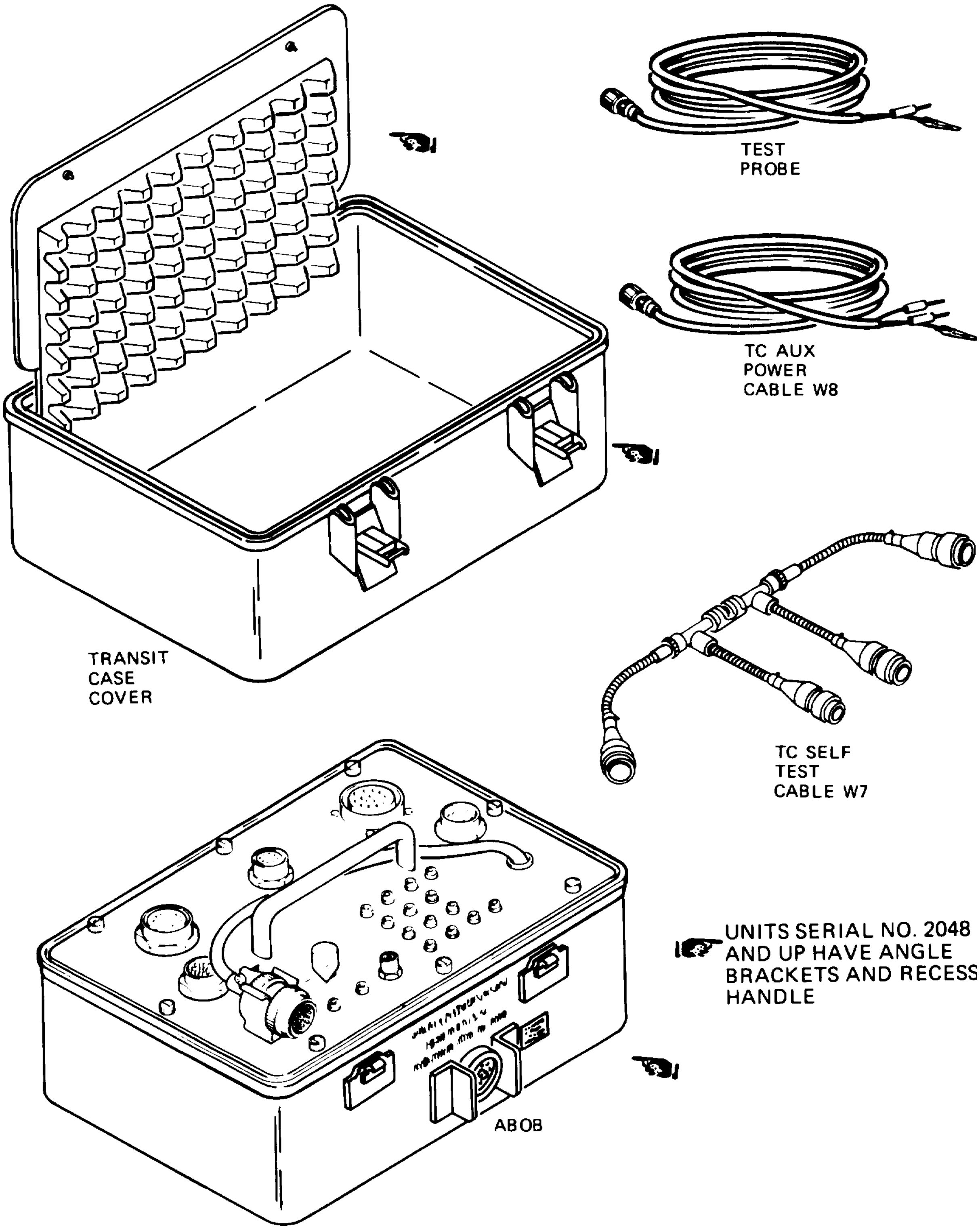


Figure 1-8. Alignment Breakout Box.

Section III. PRINCIPLES OF OPERATION

1-9. Overall. A general description of the TOW Subsystem SE, which consists of the TSSTS, the BSASE, and the ABOB, is provided in section II. A functional description of this equipment follows. Schematic diagrams for the SE components are provided in appendix G of this manual.

1-10, TOW Subsystem Test Set. The TSSTS, which includes the test controller (TC), missile simulator (MS), and day/night sight collimator (D/NSC), supplies electrical and optical stimuli to the turret and TSS units and performs testing of TSS output signals. The TSSTS subassemblies interface with the turret, the TSS units, and each other through five cables and the launcher umbilical as shown in figure 1-9. The operation of the TSSTS subassemblies is described in the following paragraphs.

a. Test Controller The TC is a microprocessor based unit that generates and applies test stimuli to the TSS, processes and measures TSS signals, and controls and monitors the MS and D/NSC. The TC has self test capabilities for user confidence and fault isolation of the TSSTS and associated cables. The unit is powered by +24 volts from the turret, and provides power to the MS and D/NSC, A block diagram of the TC is shown in figure 1-10. The major components of the TC are the power conversion assembly, the keyboard and display assemblies on the front panel, and the 17 plug-in printed circuit card assemblies identified in table 1-1, The power conversion assembly has two power supplies that convert +24 volt turret power to the voltages required for internal circuitry operation. The 16 key keyboard assembly and 24-character alphanumeric display assembly provide operator interface with microprocessor circuitry contained on cards A14 through A17, As directed by the operator selected test program, this microprocessor circuitry controls the operation of the other circuit cards which perform stimuli, switching, and measurement functions.

Table 1-1. Printed Circuit Card Assemblies

Reference designator	Nomenclature	Mating card connector
Al	Signal Shorting Card	XA1
A2	Signal Selection and Switching Card A	XA2
A3	Signal Selection and Switching Card C	XA3
A4	Signal Selection and Switching Card A	XA4
AS	Signal Selection and Switching Card A	XA5
A6	Signal Selection and Switching Card A	XA6
A7	Signal Selection and Switching Card A	XA7
A8	Signal Selection and Switching Card B	XA8
A9	Digital Voltmeter (DVM) Card	XA9
A1O	Analog Stimuli Card	XA1O
Al 1	Analog Processor Card	XA11
A12	MS and D/NSC Interface Card	XA12
A13	Program Interface Card	XA13
A14	Interface Buffer Card	XA14
A15	Processor Card	XA15
A16	Program Memory 1 Card	XA16
A17	Program Memory 2 Card	XA17

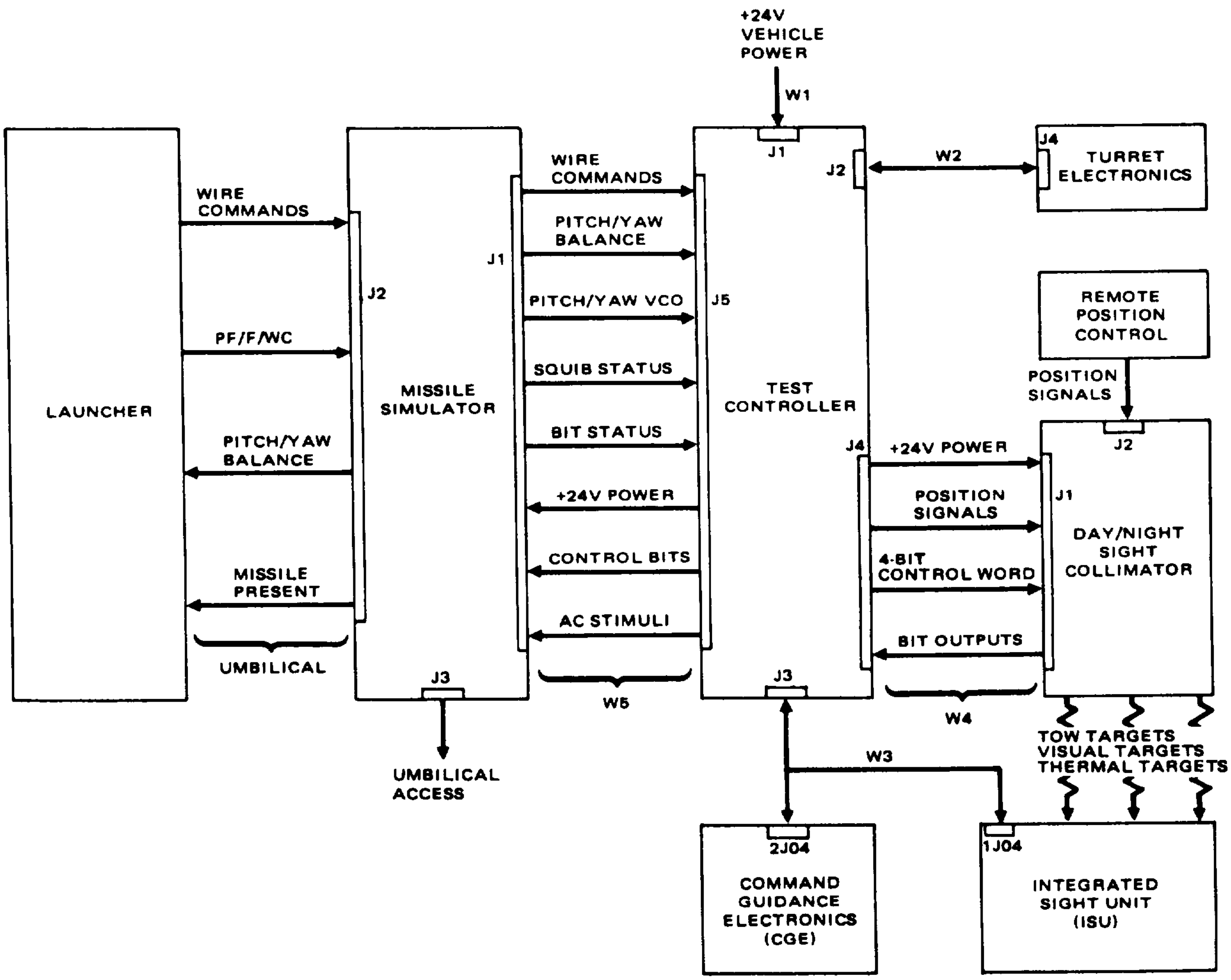


Figure 1-9. TOW Subsystem Test Set Block Diagram.

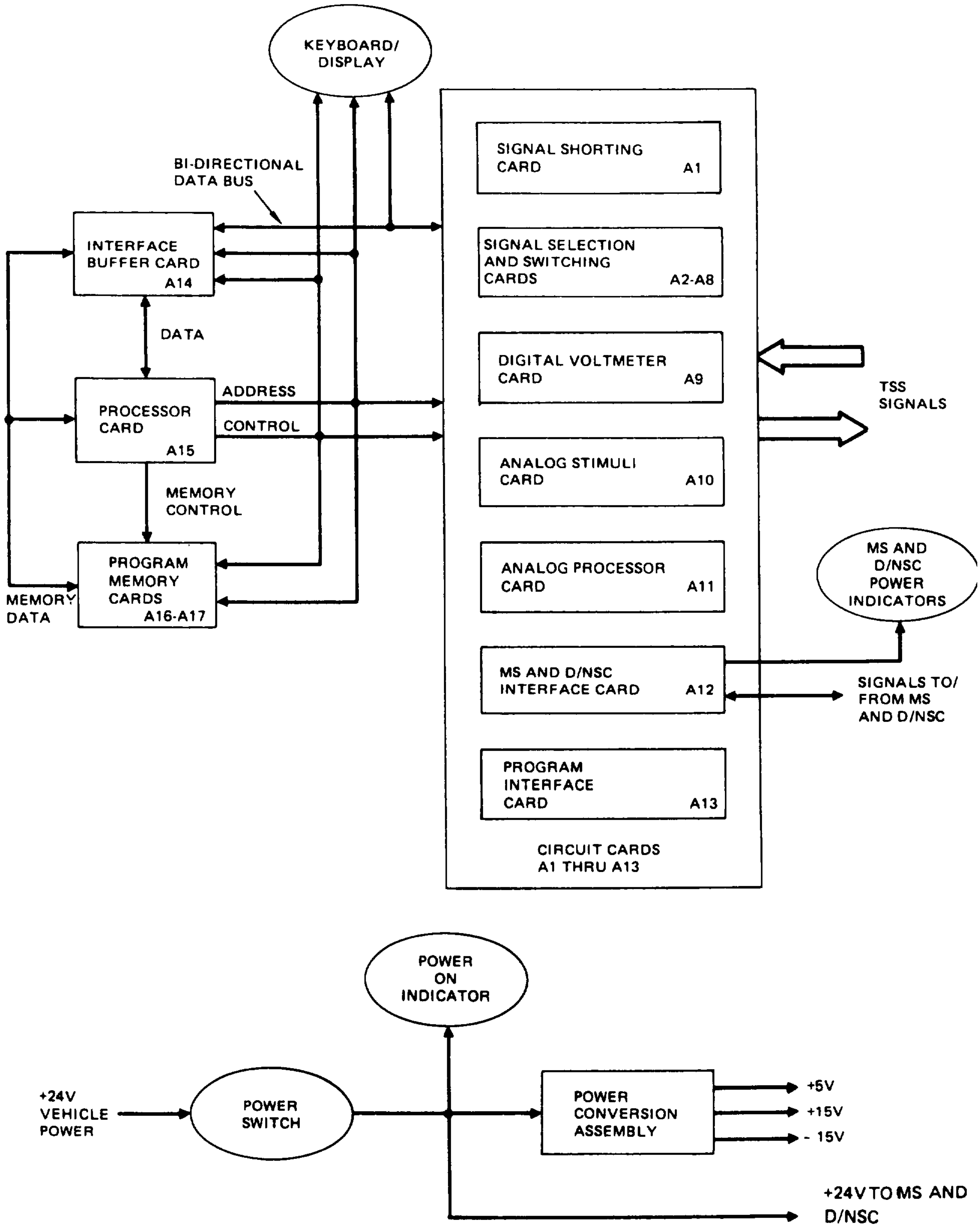


Figure 1-10. Test Controller Block Diagram.

(1) *Power conversion assembly.* The power conversion assembly (figure 1-11) receives +24 volts from the turret through the POWER switch. When the POWER switch is ON, this +24 volts drives two power supply modules and a cooling blower. Power supply module PS 101 produces ±15 volts and PS 102 produces + 5 volts to power the TC internal circuitry. Isolated ±15 and + 5 volts outputs are provided to the DVM card (A9) by two power converters, PS1 and PS2. The power conversion assembly also includes a relay driver circuit that supplies + 15 volt coil voltage for the switching relays on cards A 1 through A 11.

(2) *Signal shorting card Al.* The signal shorting card has logic circuitry and relays to allow measurement channels to be selectively shorted under test program control. Address, data, and control signals are received by a peripheral interface adapter (PIA) having a 14-bit output, each bit of which controls the operation of a particular relay. The PIA outputs are buffered as required, passed through resistor networks, and applied as control inputs to the switching relays.

(3) *Signal selection and switching cards A2 through A8.* The signal selection and switching cards, under test program control, route stimuli signals from the TC stimuli generation circuitry to the test interfaces, and route all TSS/turret signals requiring measurement from the test interface connectors to the TC measurement circuitry. Three types of signal selection and switching cards are used, types A, B, and C. Five cards (A2, A4 through A7) are type A, card A8 is type B, and card A3 is type C; all three types function similarly. Type A cards are interchangeable. In each card, address, data and control signals are received by a peripheral interface adapter (PIA) integrated circuit having a 16-bit output, each bit of which controls a single switching relay. The PIA outputs are buffered as required, then fed to the relay coils through relay drivers. Signals being switched by the relays are current and voltage limited as required by resistor and diode networks.

(4) *Digital voltmeter card A9.* The digital voltmeter (DVM) card measures DC and AC voltages as required by the test program. Operating ranges of 2.000, 20.00, and 200.0 volts full scale are available by attenuating the inputs of the 2.000 volt range basic DVM circuitry by 10X or l00X as required. The DVM can measure voltages down to 1.0 millivolts and to accuracies within 0.5% for DC signals and 2% for AC signals. Time dependent waveforms are measured by sampling at different times, with a minimum sampling rate of 100 samples per second. In addition, the DVM can store a minimum of ten samples of a waveform under test. The DVM input impedance is greater than 1 megohm, and input bandwidth is greater than 10 kilohertz.

(5) *Analog stimuli card A10.* The analog stimuli card provides DC stimuli up to ±10 volts and AC stimuli up to 20 volts peak-to-peak at frequencies from 20 to 1000 hertz to perform various tests under test program control. This card also has a 1 milliamp fixed current source, and provides certain logic commands to the TSS. A precision + 10 volt source is also included for use by the DVM function.

(6) *Analog processor card All.* The analog processor card detects, measures, and demodulates certain TSS test signals, and provides certain analog stimuli signals to the TSS. A peak-to-peak detector circuit accurately measures peak-to-peak voltages of signals between 10 millivolts and 10 volts. An X1/X10 amplifier is provided for amplification of signals to be applied to the DVM. Level detection circuits detect TSS signals required to iniate reference timing functions and detect occurrence of squib signals from the TSS and MS for the purpose of fault isolation. As directed by the test program, circuitry in this card also supplies 20 to 1000 hertz reference frequencies to the analog stimuli card. These frequencies are generated by a voltage controlled oscillator that is driven by a digital-to-analog converter under PIA control.

(7) *D/NSC and MS inteface card A12.* The D/NSC and MS interface card, under microprocessor control, supplis control signals to the MS and D/NSC, and monitors the MS and D/NSC BIT status and MS squib simulator status signals. The card is functionally divided into two sections, one each for the MS and and the D/NSC. In each section a PIA circuit converts data and control inputs from the processor circuitry into control words for the MS or D/N SC, which are inverted or buffered as required. For the D/NSC, one control word controls generation of day and night targets, and a second control word controls positioning of the D/NSC tilt stage when not under manual control. For the MS, one control word controls the operation of the MS squib simulator and yaw/pitch discriminator functions. BIT status words from the MS and D/NSC, and squib simulator status words from the MS are received and isolated by opto-couplers, then inverted or buffered, and supplied to the applicable PIA

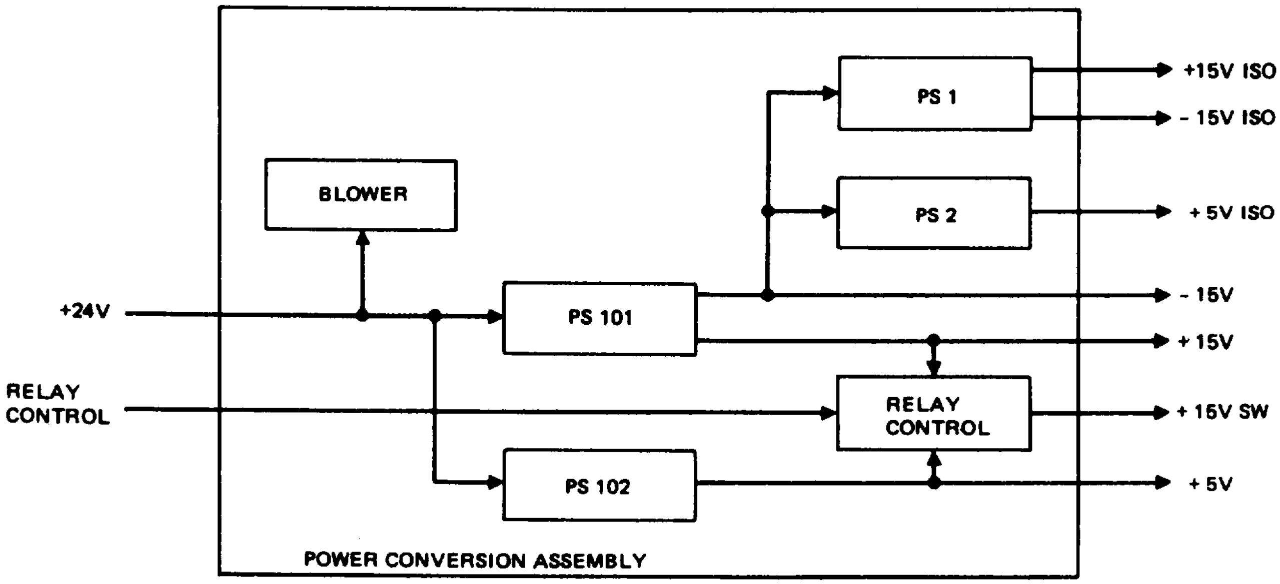


Figure 1-11. Power Conversion Assembly Block Diagram.

circuit. A lamp driver circuit monitors MS and D/NSC power supply status and controls power to the MS and D/NSC power indicator lamps on the TC front panel. In addition, a precision 10 volt source for the DVM is provided.

(8) *Program interface card A13.* The program interface card monitors the timing signals from the TSS programmer and BIT output signals from various TSS circuits for correct levels and timing. If the levels or timing of these signals are incorrect, a program interrupt signal, under microprocessor control, may be sent to the TSS programmer.

(9) *Interface buffer card A14.* This card provides data bus buffers to handle loading requirements of the interface ports for the peripheral interface adapters (PIA's) on the various circuit cards of the TC. Each PIA interfaces a circuit card to the microprocessing unit through one or more 8-bit tri-state data busses and several control lines. The interface buffer card also provides a random-access working memory to store in-process data while the microprocessor is performing a specific test function. A programmable counter/timer provides specific timing intervals for time out functions and frequency or period comparisons.

(10) *Processor card A15.* The processor card provides an 8-bit integrated circuit microprocessor with an internal clock oscillator. The clock oscillator is controlled by a 4-megahertz control crystal external to the microprocessor. The 4 megahertz output is divided by four within the microprocessor to provide the 1 megahertz, 2 phase system clock. Power on reset circuitry on the processor card allows the microprocessor to organize the proper sequence of operation when power is initially applied. Address decoding logic identifies the circuitry the microprocessor is addressing.

(11) *Program memory cards A16 and A17.* Each program memory card is capble of providing 16,384 bytes of read only memory for storage of test programs. These cards also include priority interrupt circuitry for control of the timer, keyboard, and display functions.

b. Missile Simulator The MS, under control of the TC, simulates the TOW missile squib and pitch and yaw discriminator functions. It also reports squib and BIT status to the TC. MS circuitry is contained on two PCB assemblies: Al providing timing and demodulation functions,. and A2 providing control, squib simulator, and BIT functions. Power for the MS is provided by a DC-to-DC power supply that receives +24 volts from the TC. A block diagram of the MS is provided in figure 1-12.

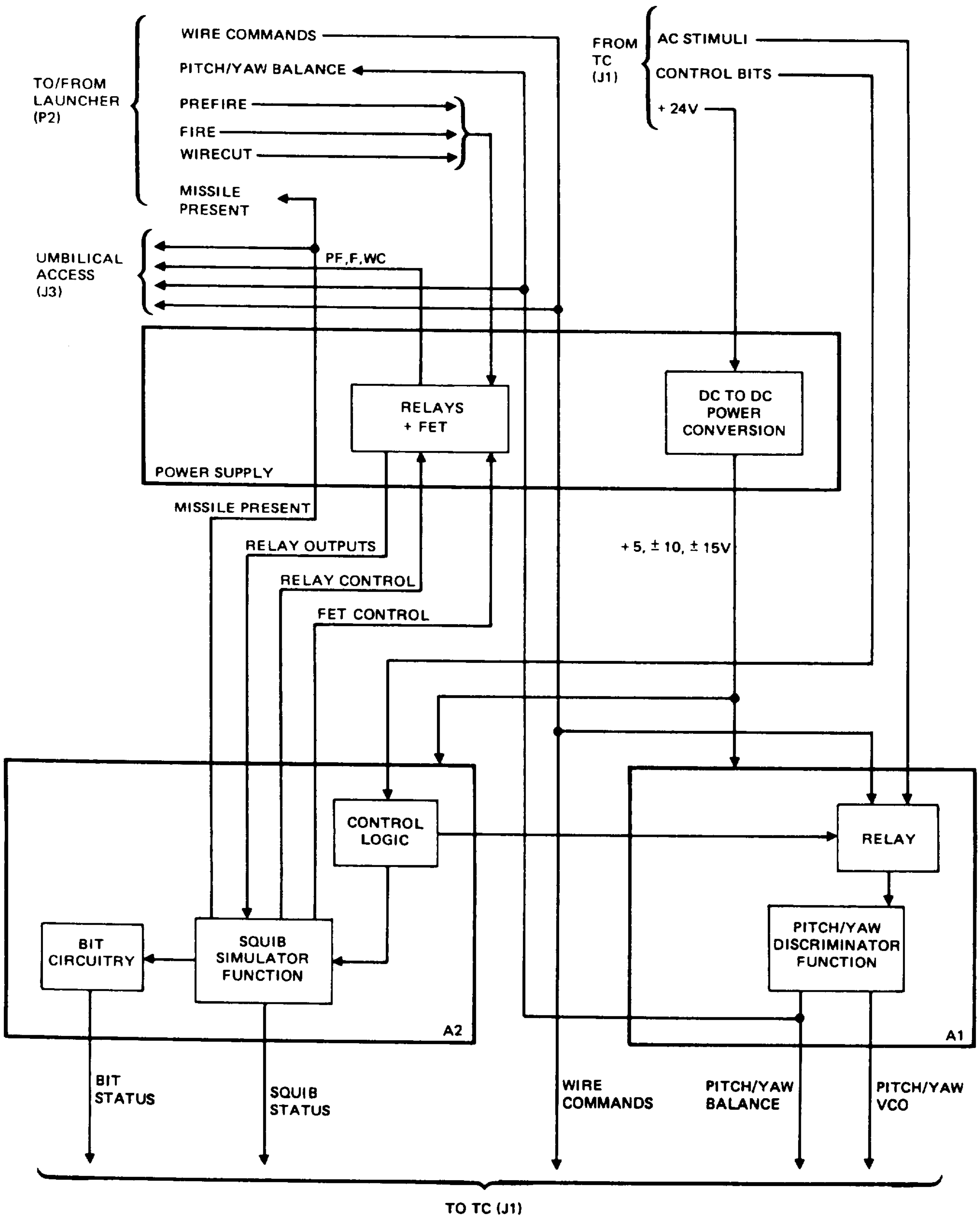


Figure 1-12. Missile Simulator Block Diagram.

(1) *DC/DC power supply.* The DC/DC power supply has three power supply modules that convert +24 volts from the TC to +5, + 10, and ±15 volts used by the MS circuitry. In addition, the power supply functions as an interface between the MS and the launcher and has prefire, fire, and wire cut relays that are controlled by and provide outputs to the A2 card.

(2) *Timing and demodulation card Al.* The timing and demodulation card receives wire commands from the TSS, via the launcher and power supply, and converts these to pitch and yaw signals that are sent to the TC and back to the TSS. The pitch and yaw discriminator functions on this card are controlled by control words from the A2 card. The pitch and yaw circuitry o this card are self-tested using AC stimuli from the TC.

(3) *BIT and squib card A2.* This card receives and decodes MS control signals from the TC and provides the squib simulator and BIT functions of the MS. Control signals from the TC are 4-bit digital words that control the squib simulator circuitry on this card and the pitch/yaw discriminator function on card Al. The status of the squib simulator function is provided as a continuous 3-bit output to the TC. Also supplied to the TC are two bits for MS BIT, one bit monitoring MS power and one bit monitoring the MS squib simulator circuitry.

c. Day/Night Sight Collimator The D/NSC, which generates visual and IR target images for TSS testing, consists of a tilt stage assembly and an optics assembly, A block diagram of the D/NSC is provided in figure 1-13.

(1) *Tilt stage assembly.* The tilt stage assembly provides mounting for the optics assembly, which pivots around two axes for positioning of target images. The tilt stage has drive circuitry (card Al) and motors to move the optics assembly as required, based on positioning signals from either the RPC or the TC. The tilt stage also has a power supply that converts +24 volt power from the TC to +5, + 7.5, and + 15 volts for D/NSC operation.

(2) Optics *assembly.* The optics assembly consists of an electronics assembly, the day and night sight target assemblies, and optics for generation of target images. It has two optical sections, one for the day sight and one for the night sight. The day sight optical section produces visual target patterns for checking the ISU gun reticles and TOW reticle alinement, and modulated IR targets for testing the TOW missile tracking functions of the TSS. The night sight optical section produces thermal targets for testing the night vision functions of the ISU, including minimum resolvable temperature (MRT), scan/interlace, and wide/narrow field of view performance. The electronics assembly, under control of the TC, powers and controls target sources in the day and night sight target assemblies and provides BIT outputs to the TC. It has two circuit card assemblies, the IR LED control card (A2) and the BIT and E-target compensation card (A3). Card A2, based on control words from the TC, provides target inputs to the day sight target assembly and controls the A3 card. The A3 card monitors IR target signals from the A2 card and provides BIT status outputs to the TC. It also monitors and controls the temperature of the target source in the night sight target assembly. The day and night sight target assemblies generate test target images based on inputs from the electronics assembly. The day sight (DS) target assembly produces visual target images using an array of light emitting diodes (LED's). It also produces modulated IR targets to simulate the TOW missile using an array of IR LED's. The night sight (NS) target assembly produces thermal target images using a heater element controlled to a precise temperature above ambient by the electronics assembly. All target images are collimated by special optics and transmitted to the ISU through windows in the tilt stage assembly.

1-11. Basic Sight Assembly Support Equipment. a. BSA *Holding* Fixture. The BSAHF provides a secure and accurate means of mounting a BSA unit for testing and repair work. It is mounted on a rail assembly that also provides mounting for the AN/TAM-3 collimator, The BSAHF includes a set of augmented optics for viewing the BSA LED display, and a flat mirror that is used for checking the holding fixture alinement.

b. BSA Controlled The BSAC provides the power sources, switches, controls, and test points required to power, control, and functionally test the basic sight assembly (BSA) of the TSS. A block diagram of the BSAC is provided in figure 1-14. The BSAC is powered by 115 volt, 60 hertz, single phase power that is converted by power supply circuitry into ±5, ±7, ±10 volts for BSA power, which is sent to the BSA through relays controlled by the BSA power switch. The BSAC also supplies + 17.5 volts for cryogenic power, which is controlled by the CRYO switch. An adjustable voltage source provides an additional + 2 volts for LED illumination. Testing is performed using the TEST SEL and SIGN SEL switches, which connect signals to be measured to the voltmeter test points. Control of BSA display functions is provided by the LED switch, WHITE HOT/BLACK HOT switch, BRIGHTNESS control, and CONTRAST control.

1-12. Alignment Breakout Box. The ABOB provides test points and a connector (P7) that allow test access to missile umbilical signals and certain internal signals of the test controller. It also provides connectors that receive cables from the test controller when the cable continuity test (test 91) is performed. Other than test points, connectors, and internal wiring, the only electrical components in the ABOB are several resistors and the TC SIGNALS switch that selects test controller signals to be measured at the OUTPUT and COM test points.

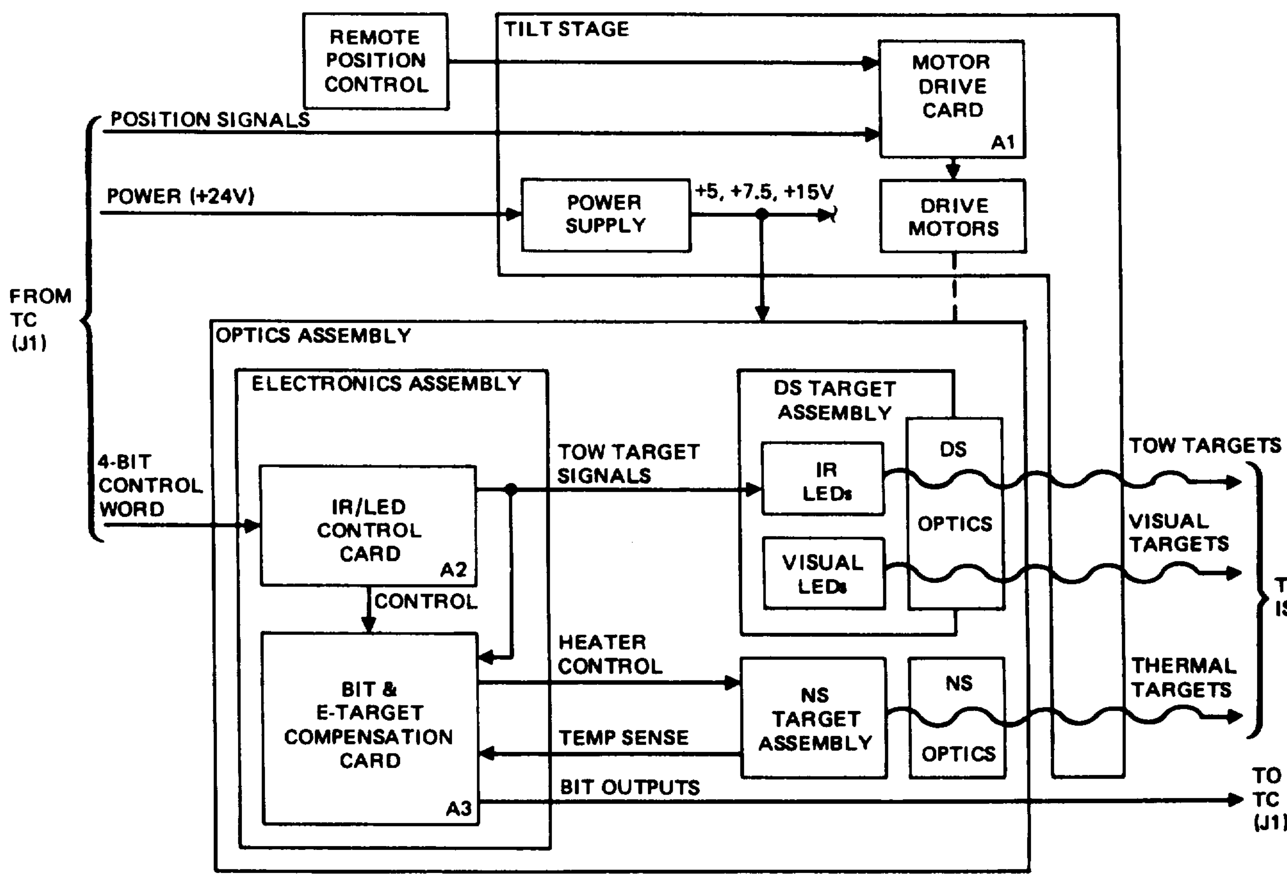


Figure 1-13. D/NSC Block Diagram.

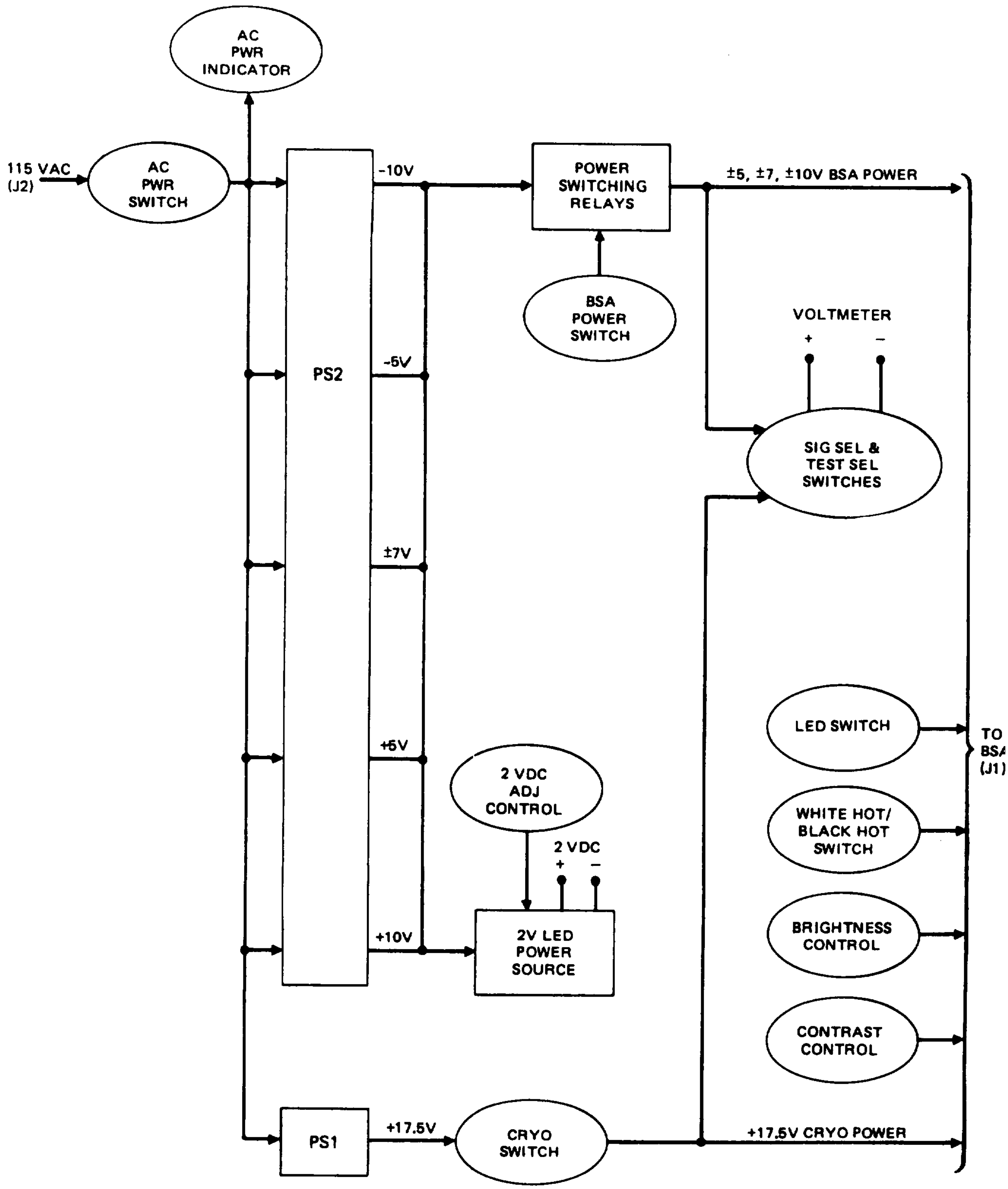


Figure 1-14. BSA Controller Block Diagram.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I DESCRIPTION AND USE OF CONTROLS AND INDICATORS

2-1. General. Most of the controls and indicators for operation of the TSSTS are located on the front panel of the TC. In addition, the remote position control (RPC) of the D/NSC is used to comand manual positioning of day and night test targets. Instructions for operating the TSSTS are summarized on flip cards on the TC front panel. Controls and indicators for operating the BSASE are provided on the BSAC. Controls and indicators provided on the ABOB are used during maintenance of the TSSTS.

2-2. TOW Subsystem Test Set. *a. Test Controller*. A description of the controls and indicators on the TC front panel (figure 2-1) is provided in table 2-1.

b. Missile Simulator The MS has no operator controls or indicators.

c. Day/Night Sight Collimator Positioning of day and night test targets generated by the D/NSC is controllable by the operator using the remote position control (RPC). The controls on the RPC, shown in figure 2-2, are described in table 2-2.

d. Alignment Breakout Box. The controls and indicators on the front panel of the ABOB (figure *2-3)* are described in table 2-3.

Table 2-1. TC Controls and Indicators

Control or indicator	Function
POWER ON/OFF Switch (1)	ON position applies +24 volt power to the test set. This causes initialization program to run, setting all programmable devices in the test set to a safe, standby condition in preparation for testing.
	OFF position removes all power from the test set.
POWER ON Indicator (2)	Lights to indicate +24 volt power is applied to the TC.
D/NSC Indicator (3)	Lights to indicate power is applied to D/NSC.
MS Indicator (4)	Lights to indicate power is applied to MS.
Keyboard (5)	Allows operator to input data and instructions to the test set.
HLT Key	Stops program execution and returns the TC to the ready state.
RUN Key	Causes the program to execute continuously to end, unless failure occurs or operator intervention is required.
STP Key	Causes the program to advance one step, pause, and display results each time the key is pressed.
ENT Key	Allows the operator to enter test data shown on display and/or continues execution.
RPT Key	Causes program step to repeat continuously and display results, with 1 second delay between repeats, until RUN or HLT key is pressed.
O through 9 Keys	Used for entry of numerical data, such as test program numbers.
: Key	Allows operator to enter program step number.
Display (6)	Displays a maximum 24 character alphanumeric readout.

Table 2-1. TC Controls and Indicators (continued)

Control or indicator	Function
	Note: Flashing asterisk on display indicates test set at test waiting.
Operation Cards (7)	Contain operating instructions for the test set,
JI PWR Jack (8)	Receives +24 volt power for unit operation through cable W1.
J2 TURRET Jack (9)	Provides connection to turret electronics through cable W2.
J3 TSS Jack (10)	Provides connection to ISU and CGE through cable W3.
J4 D/NSC Jack (11)	Provides connection to D/NSC through cable W4.
J5 MS Jack (12)	Provides connection to MS through cable W5.
, TEST Jack (13)	Provides connection to alignment breakout box for maintenance purposes.

Table 2-2. RPC Controls

Control	Function
EL Switch (1)	Commands target movement in elevation when moved from center.
AZ Switch (2)	Commands target movement in azimuth when moved from center.
Speed Switch (3)	Commands high or low rate of target movement when EL and AZ switches are used.

Table 2-3. ABOB Controls and Indicators

Control or indicator	Function
TC SIGNALS Switch (1)	Selects one of ten outputs of test controller for direct access at the OUTPUT test point when plug P7 is connected to test controller jack TEST.
OUTPUT Test Point (2)	Provides access to test controller signals as selected by the TC SIGNALS switch. Used with COM test point.
COM Test Point (3)	(See OUTPUT test point).
DVM Output (4)	Provides access to test controller timing signals when plug P7 is connected to test controller jack TEST.
UMBILICAL ACCESS Test Points (5)	Provide access to umbilical signals when plug P7 is connected to missile simulator jack TEST.
Plug P7 (6)	Connects to missile simulator jack J3 to receive umbilical signals, or to test controller jack J7 to receive test controller signals.

Table 2-3. ABOB Controls and Indicators - Continued

Control or indicator	Function
Cable Jacks	Receive cables from test controller for performing cable continuity test 91.
DNSC J1 Jack (7) CGE 2J04 Jack (8) ISU 1J04 Jack (9) TURRET J4 Jack (10) MS J1 Jack (11)	

2-3, Basic Sight Assembly Support Equipment. a. *BSA Holding Fixture and Rail Assembly.* The controls and indicators on the BSAHF serial numbers 2001 to 2005 (figure 2-4) are described in table 2-4. The controls and indicators for the BSAHF serial numbers 2006 and up (figure 2-4.1) are described in table 2-4.1. The rail assembly has no controls or indicators.

b. BSA Controller. The controls and indicators provided on the BSAC front panel (figure 2-5) are dcscribed in table 2-5.

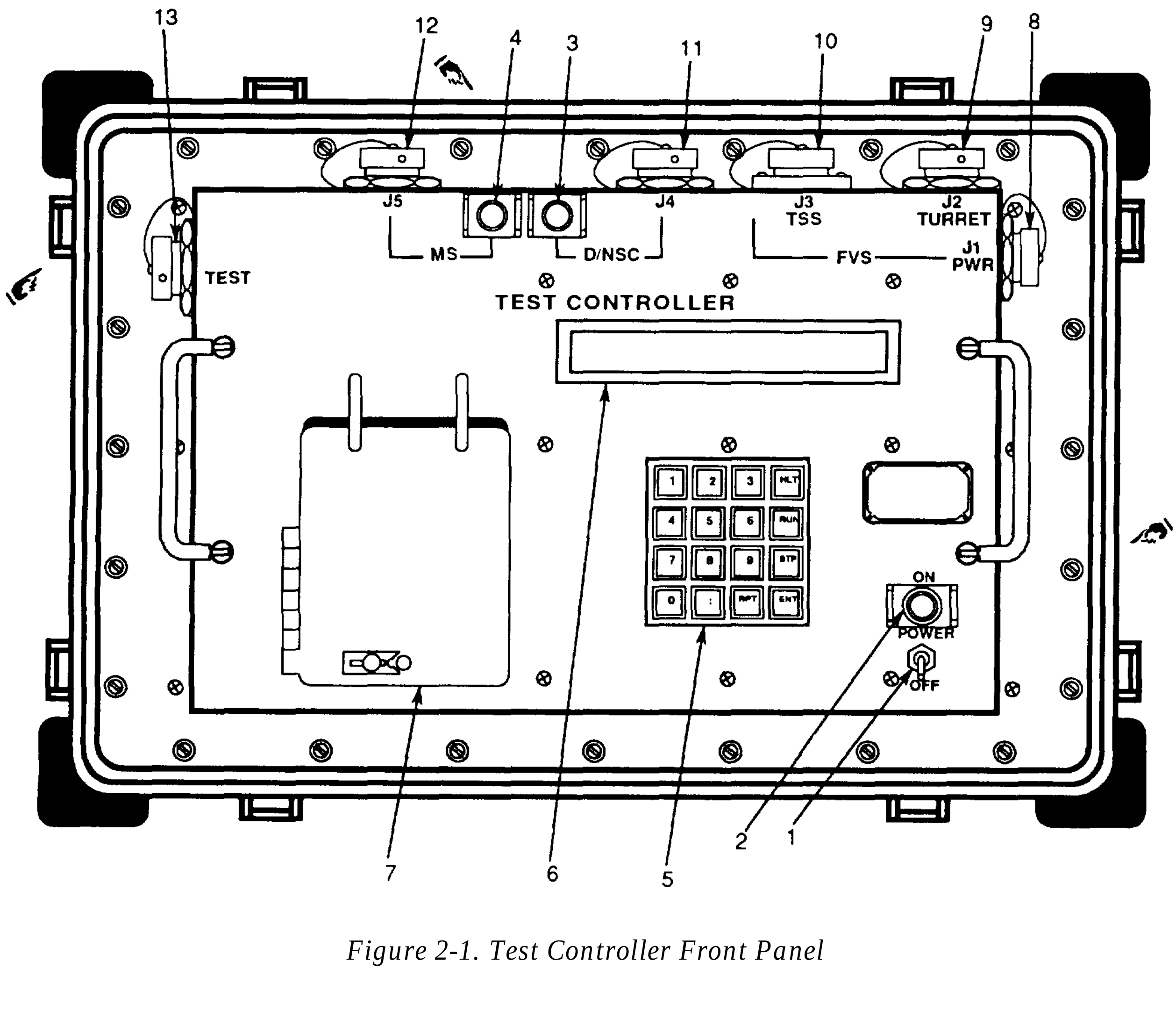
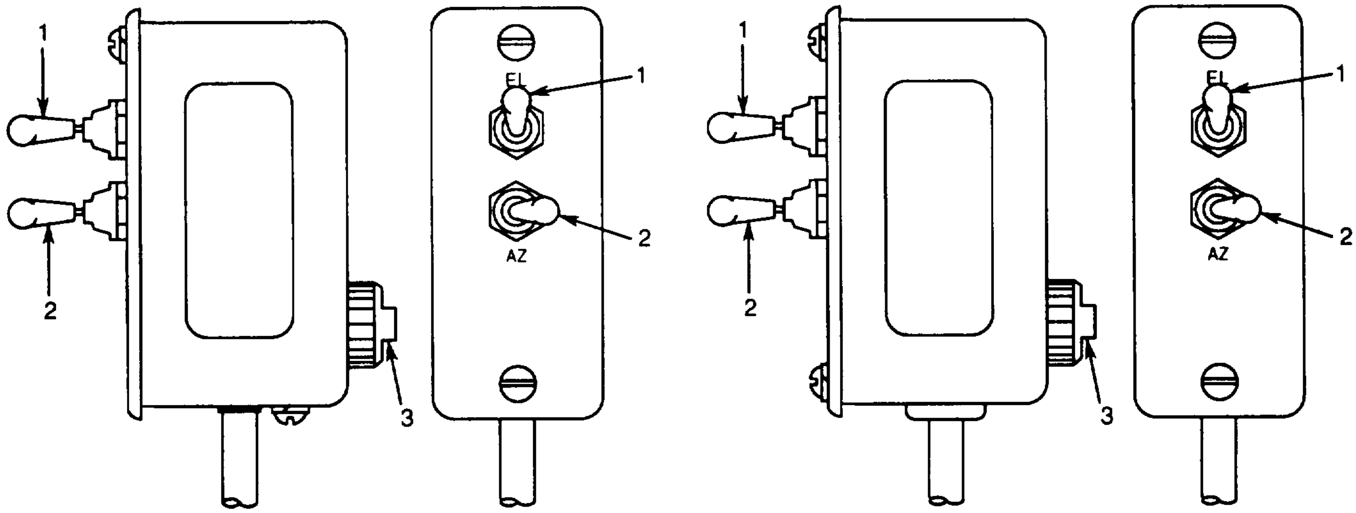


Figure 2-1. Test Controller Front Panel



S/N 2001 to 2195

S/N 2196 and up

Figure 2-2. RPC Controls.

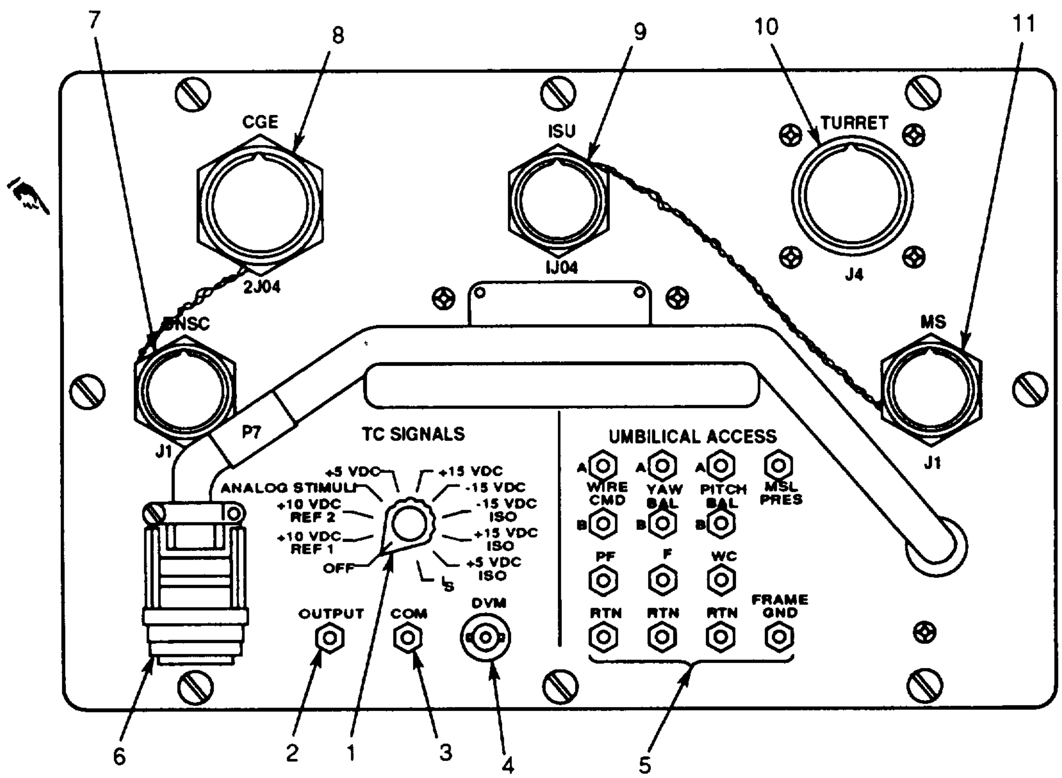


Figure 2-3. ABOB Front Panel.

Table 2-4. BSAHF (Serial Numbers 2001 to 2005) Controls and Indicators

Control or indicator	Function
Base Leveling Nuts (1)	Adjust leveling of fixture base on rail assembly.
Leveling Lock Screws (2)	Secure fixture base in position after leveling.
Azimuth Adjustment Knob (3)	Adjusts holding fixture horizontal alinement.
Elevation Adjustment Knob (4)	Adjusts holding future vertical alinement
Dial Indicator (5)	Indicates microscope focus setting.
Microscope Eyepiece Assembly (6)	Provides view of microscope image. Includes eyepiece reticle focus adjustment. Removes for installation of autocollimator.
Microscope Focus Control (7)	Focus microscope image.
Microscope Elevation Control (8)	Adjusts position of microscope vertically.
Microscope Azimuth Control (9)	Adjusts position of microscope horizontally.
F-Stop Control (10)	Sets aperture of imaging lens.
Reference Mirror Assembly (11)	Used for checking holding fixture alinement. Removes for installation of BSA unit to be tested.
Elevation Lock (12)	Secures holding fixture vertical alinement.
Azimuth Lock (13)	Secures holding fixture horizontal alinement.
No Mar Setscrews (14)	Used to secure elevation shaft assembly for shipping,
Imaging Lens (15)	Used to check optical alinement in BSA under test.
Imaging Lens Adjusting Setscrews (16)	Used to fine adjust imaging lens reticle.
Imaging Lens Locking Setscrews (17)	Locks adjusting setscrews in place.
Imaging Lens Adjustment Screws (18)	Used to aline imaging lens reticle.

Table 2-4.1. BSAHF (Serial Numbers 2006 and up) Controls and Indicators

Control or indicator	Function
Base Leveling Nuts (1.1 and 1.2)	Adjust leveling of fixture base on rail assembly.
Leveling Lock Screws (2)	Secure fixture base in position after leveling.
Azimuth Adjustment Knob (3)	Adjusts holding fixture horizontal alinement.
Elevation Adjustment Knob (4)	Adjust holding fixture vertical alinement.
Focus Dial Indicator (5)	Indicates microscope focus setting.
Azimuth Dial Indicator (6)	Indicates microscope azimuth setting.

Table 2-4.1. BSAHF (Serial Numbers 2006 and up Controls and Indicators (continued)

Control or indicator	Function
Microscope Eyepiece Assembly (7)	Provides view of microscope image. Includes eyepiece reticle focus adjustment. Removes for installation of autocolimator.
Microscope Focus Control (8)	Focus microscope image.
Microscope Elevation Control (9)	Adjusts position of microscope vertically.
Microscope Azimuth Control (10)	Adjusts position of microscope horizontally.
F-Stop Control (11)	Sets aperture of imaging lens.
Reference Mirror Assembly (12)	Used for checking holding fixture alinement. Removes for installation of BSA unit to be tested.
Elevation Lock (13)	Secures holding fixture vertical alinement.
Azimuth Lock (14)	Secures holding fixture horizontal alinement.
No Mar Setscrews (15)	Used to secure elevation shaft assembly for shipping.
Imaging Lens (16)	Used to check optical alinement of BSA under test.
Imaging Lens Adjusting Setscrews (17)	Used to fine adjust imaging lens reticle.
Imaging Lens Locking Setscrews (18)	Locks adjusting setscrews in place.
Imaging Lens Adjustment Screws (19)	Used to aline imaging lens reticle.

Table 2-5. BSAC Controls and Indicators

Control or indicator	Function
AC PWR Switch (1)	ON position applies 115 volts AC power to DC power supplies.
	OFF position removes all power from the BSA controller.
AC Power ON Indicator (2)	Lights to indicate 115 volts AC is applied to BSA controller and AC PWR switch is in ON position.
BSA Switch (3)	ON position applies ±5, ±7, and ±10 volt power to the BSA under test.
	OFF position removes ±5, ±7, and ±10 volt power from the BSA under test.
CRYO Switch (4)	ON position applies + 17.5 volt power to the BSA cryogenic cooler.
	OFF position removes power from the BSA cryogenic cooler.
CRYO READY Indicator (5)	No longer used.

Table 2-5. BSAC Controls and Indicators (continued)

Control or indicator	Function
TEST SEL Switch (6)	Position A allows measurement of output voltages to the BSA unit under test at the VOLTMETER test points, as selected by the SIG SEL switch. Position B allows measurement at VOLTMETER test points of voltage drop across SIG SEL switch resistors per SIG SEL switch setting. This provides an indication of current flow to the BSA unit under test. Position C no longer used. Position D no longer used.
SIG SEL Switch (7)	Connects DC supply voltages sent to BSA unit under test to VOLTMETER "+" test point as follows: Position 1: -10 Volts Position 2: - 7 Volts Position 3: - 5 Volts Position 4: + 5 Volts Position 5: + 7 Volts Position 6: + 10 Volts Position 7: + 17.5 Volts Position 8: Ground
VOLTMETER Test Points (8)	Provide connection to external voltmeter for measurement of signals as selected by the TEST SET and SIG SEL switches. Signal applied to "-" test point is controlled by TEST SEL switch, and signal applied to " +" test point is controlled by SIG SEL switch.
SELF TEST D Control (9)	No longer used.
LED Switch (10)	ON position turns on display in BSA unit under test. OFF position turns off display in BSA unit under test.
2 VDC ADJ Control (11)	Adjusts voltage level available at 2 VDC outputs.
2 VDC Outputs (12)	Provide adjustable 2 volt source for LED illumination.
WHITE HOT/BLACK HOT Switch (13)	Selects display polarity of BSA unit under test.
BRIGHTNESS Control (14)	Adjusts display brightness of BSA unit under test.
CONTRAST Control (15)	Adjusts display contrast of BSA unit under test.
BSA Jack (16)	Provides connection to BSA unit under test through BSA test cable.
115 VAC Jack (17)	Receives 115 volts AC power for unit operation through power cable.

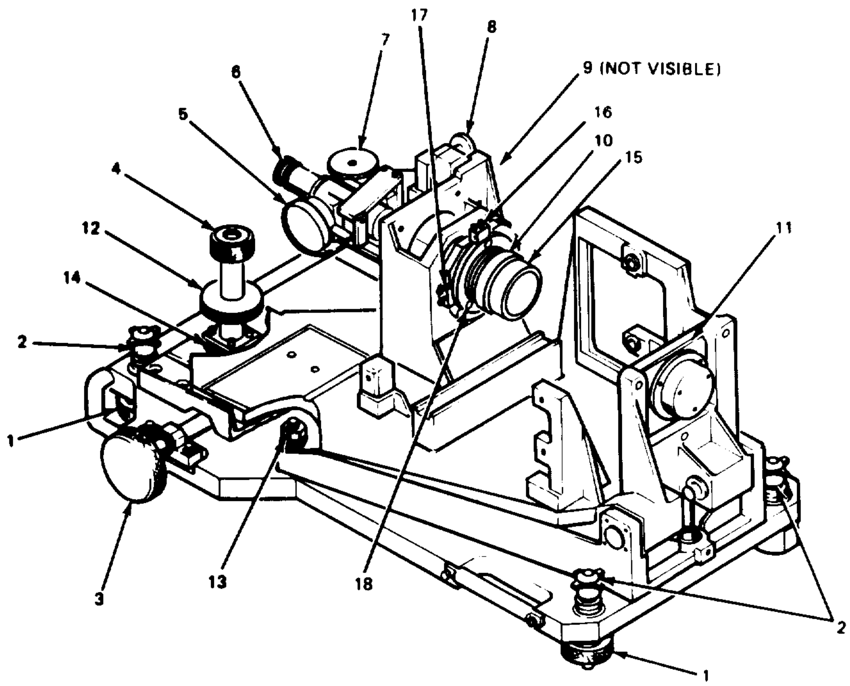


Figure 2-4. BSAHF (Serial Numbers 2001 (o 2005) Controls and indicators

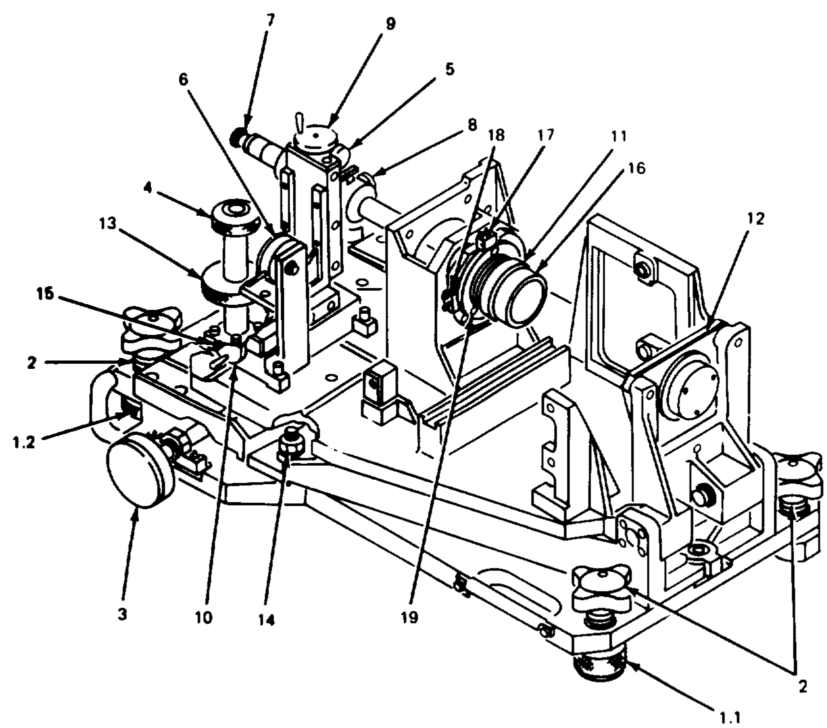
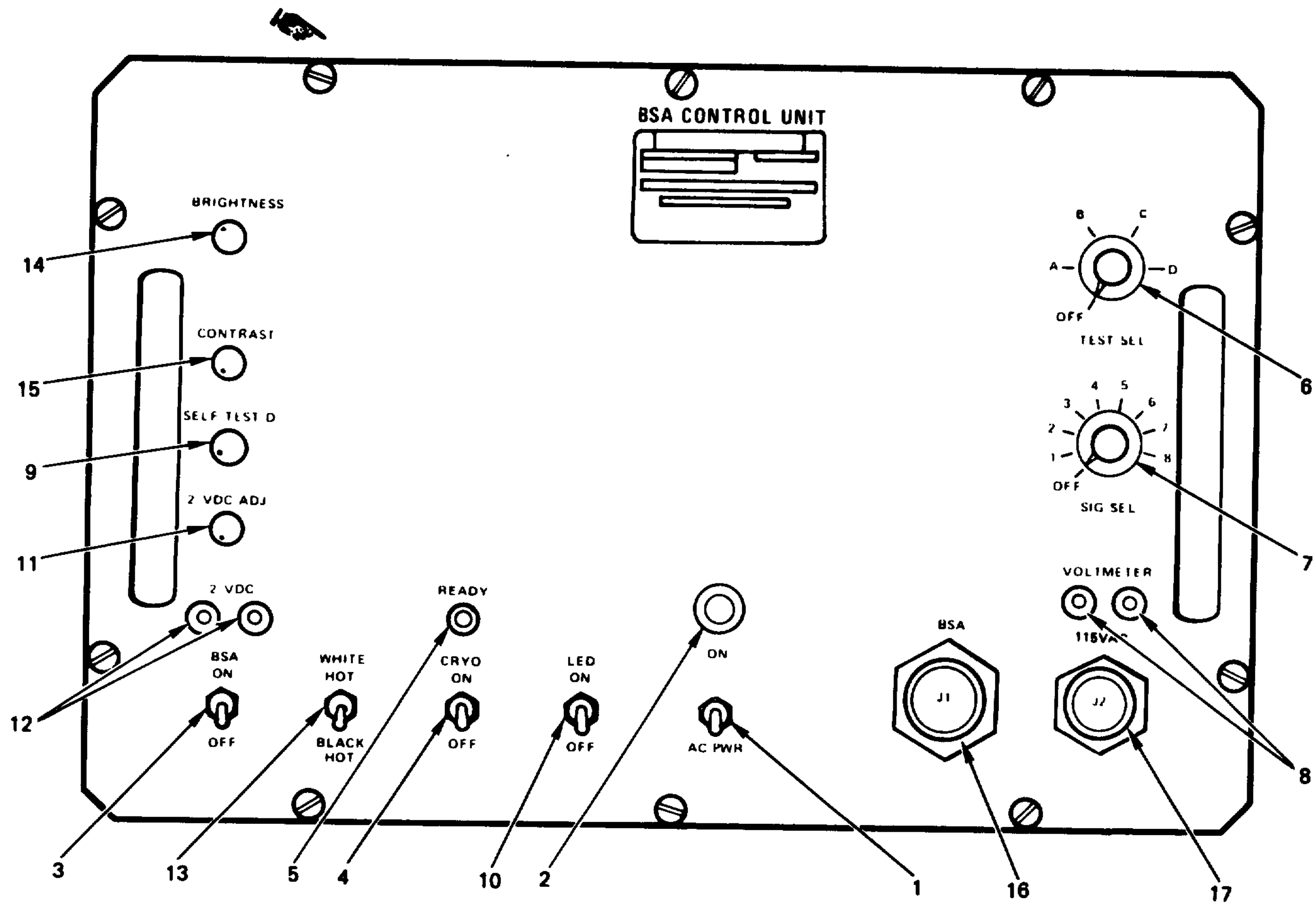


Figure 2-4.1. BSAHF (Serial Numbers 2006 and Up) Controls and indicators.



UNITS TO S/N 2054 (INCLUSIVE) HAVE TEST SELECT TABLE ON FRONT PANEL

Figure 2-5. BSA Controller Front Panel.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-4. General. To ensure that the equipment remains in ready condition, it is important that certain preventive maintenance checks and services (PMCS) be performed regularly as directed in table 2-6. Systematic performance of these tasks will help keep the equipment in good operating condition and allow defects to be discovered and corrected before they result in serious damage or failure. Instructions for equipment inspection, cleaning, painting, and lubrication are provided in chapter 3, paragraphs 3-3, 3-10, 3-11, and 3-12. Defects discovered during inspection or operation of the equipment must be noted for further correction. Stop operation immediately if a deficiency is noted that is hazardous or would damage the equipment. Record all deficiencies and corrective actions taken on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest opportunity. When performing preventive maintenance, keep in mind the following general information regarding the use of table 2-6:

a. Column 1 - ***Item No.*** Numbers the checks and services to be performed in chronological order. This column will also be used as a source of item numbers for the "TM Number" column on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) in recording results on PMCS.

b. Column 2- Interval. Specifies the intervals at which the PMCS procedures should be performed. A dot (•) in any "Interval" column indicates when you are to perform that PMCS. The PMCS intervals are indicated by letters as follows:

B - Before operation
D - During operation
A - After operation
W - Once a week (weekly)
S - Semiannual (180 days)

NOTE

Within each inspection interval, perform the indicated procedures in the order given.

c. Column 3 - ***Item to be Inspected.*** Identifies the part of the equipment to be checked.

d. ***Column*** 4- ***Procedures.*** Identifies the specific checks to be performed.

e. ***Column 5- Equipment Will Be Reported Not Ready/Available If*** Identifies the criteria which will cause the equipment to be unable to perform its primary mission. If equipment is damaged, refer to chapter 3 for maintenance procedures. Report any deficiencies using the proper forms. (See TM 38-750).

Table 2-6. Preventive Maintenance Checks ***and Services (PMCS)***

NOTE: Within designated interval, these checks are to be performed in the order listed.

B - Before **D - During** **A - After** **W - weekly** S - Semiannually

Item No.	Interval B	D	A	W	S	Item to be inspected	Procedure Check for and have repaired or adjusted as necessary	For readiness reporting equipment is not ready/available if:
						TEST CONTROLLER		
1	•						Visually inspect the TC and its four cables for extensive damage or missing hardware	Any parts damaged beyond use or hardware missing
2		•					Perform self test (paragraph 2-9a)	TC fails self test

Table 2-6, Preventive Maintenance Checks and Services(PMCS) - **Continued**

NOTE: Within designated interval, these checks are to be performed in the order listed,

B - Before D . During A - After W - Weekly S - Semiannually

Item No.	Interval B	D	A	W	S	Item to be inspected	Procedure Check for and have repaired or adjusted as necessary	For readiness reporting equipment is not ready/available if:
3					●		Perform 180 day test (paragraph 3-152)	TC fails 180 day test
						MISSILE SIMULATOR		
4	●						Visually inspect the MS and its cable for extensive damage or missing hardware (paragraph 3-3.1)	Any parts damaged beyond use or hardware missing
5		●					Perform self test (paragraph 2-9a)	MS fails self test
6					●		Perform 180 day test (paragraph 3-152)	MS fails 180 day test
7	●					DAY/NIGHT SIGHT COLLIMATOR	Visually inspect the D/NSC, cable(s) , and remote position control for extensive damage or missing hardware	Any parts damaged beyond use or hardware missing
							Make sure optics are clean and not scratched, chipped, or cracked. If dirty, clean per paragraph 3-10	Optics badly damaged
8		●					Perform self test (paragraph 2-9a)	D/NSC fails self test
9					●		Perform 180 day test (paragraph 3-152)	D/NSC fails 180 day test
9.1					●		Daysight Collimator Service (paragraph 3-102.25) Nightsight Collimator Service (paragraph 3-102.29)	Daysight or Nightsight Collimator fails leak test

Table 2-6. Preventive Maintenance Checks and Services (PMCS) - Continued

NOTE: Within designated interval, these checks are to be performed in the order listed.

B - Before **D - During** **A - After** **W - Weekly** **S - Semiannually**

Item No.	Interval B	Interval D	Interval A	Interval W	Interval S	Item to be inspected	Procedure Check for and have repaired or adjusted as necessary	For readiness reporting equipment is not ready/available if:
						BSA CONTROLLER		
10	•						Visually inspect the BSAC and its two cables for extensive damage or missing hardware	Any parts damaged beyond use or hardware missing
11		•					Perform BSAC checkout procedure (paragraph 2-9b)	BSAC fails checkout procedure
					•		Perform 180 day test (paragraph 3-152)	BSAC fails 180 day test
						BSA HOLDING FIXTURE		
12	•						Visually inspect the BSAHF and all accessories for extensive damage or missing hardware	Any parts damaged beyond use or hardware missing
13		•					Perform alignment check (paragraph 2-8b or 2-8c)	BSAHF fails alignment check
						RAIL ASSEMBLY		
14	•						Visually inspect the rail assembly for extensive damage or missing hardware	Any parts damaged beyond use or hardware missing
						ALIGNMENT BREAKOUT BOX		
15	•						Visually inspect the ABOB and cables for extensive damage or missing hardware	Any parts damaged beyond use or hardware missing
16					•		Refer to figures H-35, H-36, and H-37 for wiring diagrams and perform continuity: checks.	ABOB fails during testing.

Section III. OPERATION UNDER USUAL CONDITIONS

2-5. General. The TSSTS and BSASE are designed to provide reliable service under a wide range of environmental conditions, provided that recommended operating and preventive maintenance procedures are followed. Procedures for normal operation of the equipment are provided in this section. Additional procedures that are necessary when operating the equipment under unusually cold, humid, or dusty conditions are provided in section IV.

2-6. Preliminary set-up Procedures for TSSTS.

NOTE

Refer to TM 9-4935-474-24P-1 and Appendix B for proper configuration of TSSTS.

a. To set up the TSSTS for on-vehicle operation, proceed as follows:

(1) Referring to TM 9-2350-252-10-2, perform the following:

(a) Rotate turret to missile loading position. If possible, disable turret to prevent accidental rotation.

(b) Raise launcher to upright (launch) position. Set launcher controls to manual to prevent launcher from accidentally being lowered.

(c) Remove any live missiles from launcher.

(2) Remove MS from its transit case.

NOTE

The danger warning on umbilical connector applies only to a live missile, not the MS,

(3) Remove protective cover from MS umbilical connector and install in one of the launcher tubes per missile loading procedure in TM 9-2350-252-10-2.

WARNING

Installing the TC, MS, and D/NSC are awkward tasks involving heavy lifts. When handling this equipment, use proper lifting techniques - Lift with the arms and legs, not the back - Do not twist the torso while lifting or holding a heavy load, turn with the legs. Insure sound footing.

(4) Remove D/NSC from its transit case.

WARNING

Two persons are required to safely accomplish steps 5 thru 6.2. This will avoid possible injury to personnel or damage to equipment.

(5) Install D/NSC tilt stage in position on ISU window and secure by tightening two large knurled captive screws.

NOTE

For D/NSCs with tilt stage assembly PN 13314265 and optical assembly PN 13314267, go to step 6.1.

(6) Assemble D/NSC optical stage on tilt stage using guide pins to aline connector J8 to plug P8 and secure by pushing down the four expando grip pin handles.

NOTE

Steps 6.1 and 6.2 are for D/NSCs with tilt stage assembly PN 13314265 and optical assembly PN 13314267 only. For all other D/NSC configurations, go to step 7.

(6.1) Assemble D/NSC optical assembly on tilt stage assembly using guide pins and secure by pushing down the four expando grip pin handles.

(6.2) Connect cable W12 by installing connector W12P5 on tilt stage assembly connector J5 and connector W12P8 on optical assembly connector J8.

(7) Open TC transit case by pressing release valve and removing cover. Check that the POWER switch is OFF.

WARNING

Space in vehicle is limited. Use lifting handles when placing the TC in vehicle and be careful to avoid possible injury to personnel or equipment damage.

(8) Place TC on or next to right side seat in vehicle.

(9) Open gunner's hatch (left side) fully and be sure hatch is locked in open position.

(10) Complete all cable connections as shown in figure 2-6. Note that existing cables must be disconnected from the ISU and CGE test access jacks before connecting test cable W3. The CGE unit and test interface jacks 2A42J1 and 2A42J4 are located under test access panel in vehicle floor.

b. To set up the TSSTS for operation off-vehicle, proceed as follows:

NOTE

Refer to table 2-6.1 for possible TSSTS configurations and cable requirements.

(1) Remove MS from its transit case.

(2) Remove D/NSC optical assembly and tilt stage from its transit case.

WARNING

Two **persons are required to safely accomplish step 3 thru 3.2. This will avoid possible injury to personnel or damage to equipment.**

NOTE

For D/NSCs with tilt stage assembly PN 13314265 and optical assembly PN 13314267, go to step 3.1.

(3) Assemble D/NSC tilt stage on optical assembly using guide pins to aline connector J8 to plug P8, and secure by pushing down the four expando grip pin handles.

NOTE

Steps 3.1 and 3.2 **are for D/NSCs with tilt stage assembly PN 13314265 and optical assembly PN 13314267 only. For all other D/NSC configurations, go to step 4.**

(3.1) Assemble D/NSC optical assembly on tilt stage assembly using guide pins and secure by pushing down the four expando grip pin handles.

(3.2) Connect cable W12 by installing connector W12P5 on tilt stage assembly connector J5 and connector W12P8 on optical assembly connector J8.

(4) Open TC transit case by pressing release valve and removing cover. Check that the POWER switch is OFF.

(5) Connect cables as instructed in TSSTS functional test procedure chapter 3, figure 3-1.

Table 2-6.1 TSSTS Configurations

			D/NSC REQUIREMENTS		
TSSTS	**TC**	**MS**	**D/NSC**	**Cable W12**	**Cable Adapters W13, W14**
13314320	13314321	13314305	13314306	YES	YES
		13163005	13163006	See NOTE 1.	YES
			13143603	NO	YES
		13143604			NO
13143602	13155001	13143604	13314306	YES	NO
			13163006	See NOTE 1.	NO
			13143603	NO	NO

NOTES: 1. Cable W12 may or may not be present with D/NSC PN 13163006.

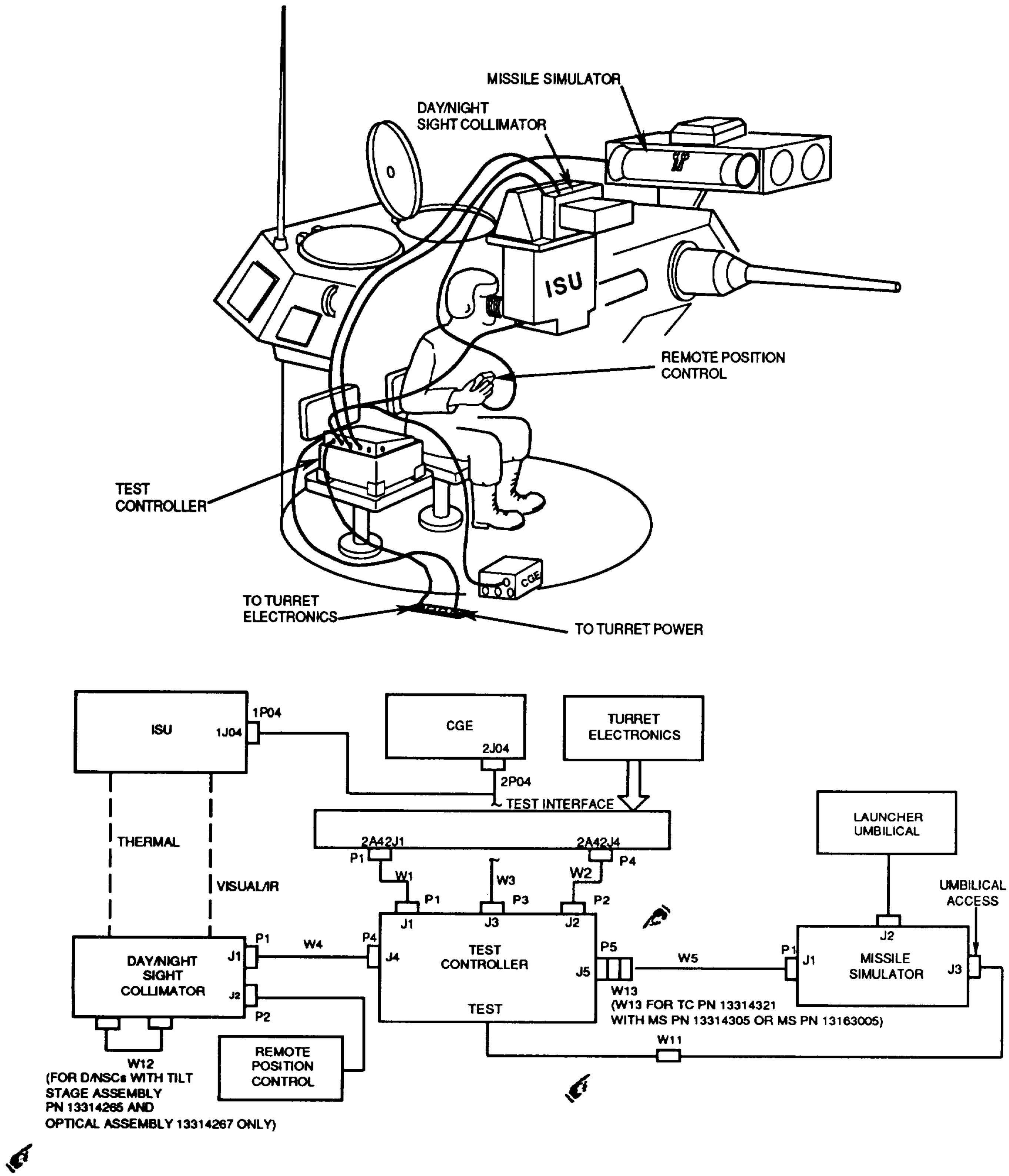


Figure 2-6. TSSTS Connections for Normal Operation.

2-7. Preliminary Set-Up Procedure For BSASE. To set up the BSASE for operation, proceed as follows:

a. If rail assembly is in storage, remove from storage and mount to bench.

b. Using handles in base assembly, remove BSAHF from its transit case and install on rail assembly (two men required).

c. Remove shroud from AN/TAM-3 thermal sight collimator.

NOTE

Uneven or unequal tightening of the hookbolts may prevent the fixture from being leveled properly in later steps.

d. Place AN/TAM-3 thermal sight collimator in position on rail assembly and secure hookbolts evenly so that both sides are level.

2-8. Initial Adjustments.

NOTE

Turn on AN/TAM-3 thermal sight collimator at least 10 minutes before use with BSA.

a. TOW Subsystem Test Set. The TSSTS equipment (TC, MS, and D/NSC) requires no adjustment procedure prior to use.

NOTE

To adjust holding fixtures aerial numbers 2001 to 2005 proceed to step b. To adjust holding fixtures aerial numbers 2006 and up, proceed to step c.

b. BSASE Using Holding Fixture Serial Number 2001 to 2005. Before each use, the alinement of the BSAHF with the AN/ TAM-3 thermal sight collimator should be checked as directed in the following steps. This is to be done before the BSA unit to be tested is installed on the BSAHF. If the BSAHF is found to be out of alinement return it to depot for repair.

(1) Install reference mirror assembly (11, figure 2-4) in place (assembly has stenciled reference marks) with three captive screws. Be sure screws are tightened securely, so there is no movement in the reference mirror assembly (11, figure 2-4). See paragraph 3-140 for installation procedure. Remove protective cap from reference mirror.

(2) Install microscope stage onto BSAHF. See paragraph 3-136 for installation procedure.

(3) Remove microscope eyepiece assembly (6, figure 2-4) if installed on microscope stage and stow in transit case. The eyepieces have a friction mount and slide in and out.

(4) Remove autocollimation eyepiece and lamp assembly (figure 1-5) from transit case compartment. Insert lamp assembly into autocollimation eyepiece, and install on microscope stage. See paragraph 3-142 for installation.

CAUTION

Be careful that the microscope objective lens does not contact the fixture reticle window, When searching for the focus point, do not move the microscope too far in from the expected focus point (approximately 1 inch).

(5) Install 4X (low-power) objective lens into front of microscope. (This is the shorter of the two objective lenses.)

CAUTION

Aperture (F-stop) on auxiliary lens (10, figure 2-4) is permanently fixed at F7 (between F5.6 and F8) for correct optical performance. Do not disturb this setting at any time or depot maintenance will be required.

(6) Viewing microscope from above, use microscope azimuth and elevation adjustment knobs (8 and 9, figure 2-4) to position microscope objective lens as near to centerline of reticle as possible and slightly below center. This is to minimize searching.

NOTE

If no fixture reticle image is visible, the autocollimation eyepiece lamp may be burned out. In this case, slide lamp socket out from bottom to replace the lamp. The lamp is GE No. 44 or equivalent. See paragraph 3-143 for installation procedure.

(7) Viewing through autocollimation eyepiece (figure 1-5), slowly turn microscope focus control (7, figure 2-4) to find reticle image, then use microscope azimuth and elevation adjustment knobs (8 and 9, figure 2-4) to center the image horizontally and vertically.

(8) Check to see if two reticle images (figure 2-7) are present. If two reticles can be seen in eyepiece go to step 11. If two reticles cannot be seen in eyepiece go to step 9.

(9) If the dark image is not visible, verify it is present by slightly loosening one of the reference mirror screws and pressing on it. A dark image should then move out from behind the bright image. If the dark image does not appear, go to step 10. If the dark image appears, go to step 11.

(10) Locate two reticles as follows:

(a) Loosen four locking setscrews (17, figure 2-4) securing four adjusting setscrews (16, figure 2-4) on imaging lens (15, figure 2-4).

(b) Loosen four adjusting setscrews (16, figure 2-4) securing imaging lens (15, figure 2-4).

(c) Loosen three screws (18, figure 2-4) securing imaging lens (15, figure 2-4) to holding fixture reticle housing until imaging lens can move.

(d) Move imaging lens (15, figure 2-4) until bright reticle image and dark reticle image (figure 2-7.1) are near each other.

(e) If two reticle images can be seen carefully tighten three screws (18, figure 2-4) to secure imaging lens (15, figure 2-4) to fixture reticle housing.

(f) If two reticles cannot be seen the holding fixture is way out of alinement and depot level maintenance is required.

(11) Using microscope focus control (7, figure 2-4) **focus autocollimation eyepiece assembly on fixture reticles. If both reticles are in focus go to step 12. If both reticles are not in focus, depot level maintenance is required.**

NOTE

Correct alinement of imaging lens will show the bright reticle covering the dark reticle, where there is no space between both reticles on both axes.

(12) If corner of reference mirror (11, figure 2-4) was loosened in **step 9, torque reference mirror to 14 to 18 in-lbs. If there is no space between bright and dark reticles (figure 2-7) go to step 13. If there is space between bright and dark reticles (figure 2-7.1) proceed as follows:**

(a) Loosen four locking setscrews (17, figure **2-4) securing adjusting setscrews (16, figure 2-4) on imaging** lens (15, figure 2-4).

(b) Loosen four adjusting setscrews (16, figure 2-4) securing imaging lens **(15, figure 2-4).**

(c) Loosen three screws **(18, figure 2-4) securing imaging** lens (15, figure **2-4) to fixture reticle housing until imaging lens can move when slight pressure is applied.**

(d) Move **imaging lens (15, figure 2-4) until bright and dark reticles are near each other (figure 2-7.1).**

CAUTION

Adjusting setscrews can be damaged. Before tightening adjusting setscrew, make sure opposite adjusting setscrew is loosened.

(e) Carefully loosen and tighten two adjusting **setscrews (16, figure 2-4) until bright reticle horizontal line is positioned over dark reticle horizontal** line (figure 2-7).

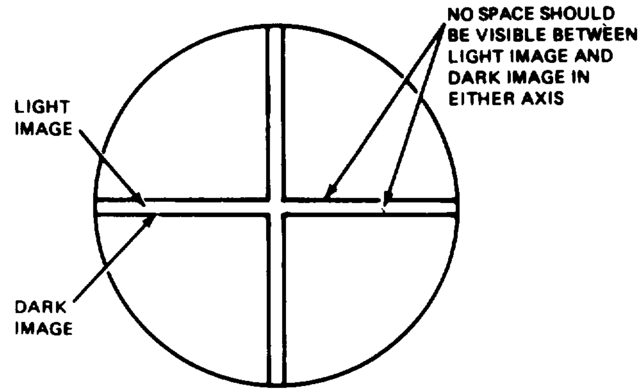


Figure 2-7. Autocollimator Reticles

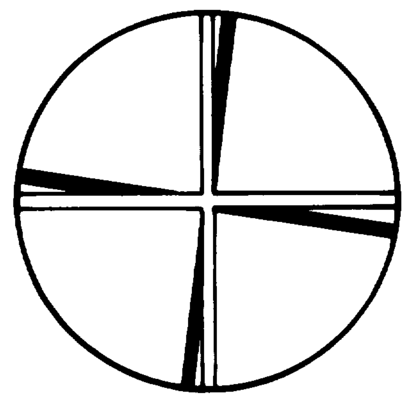


Figure 2-7.1 Fixture Reticles Out of Alinement

(f) Carefully loosen and tighten two adjusting setscrews (16, figure 2-4) until bright reticle vertical line is positioned over dark reticle vertical line (figure 2-7).

(g) Carefully tighten three screws (18, figure 2-4) alternately, making sure fixture reticle stays in alinement.

(h) Tighten four locking setscrews (17, figure 2-4).

(i) If there is no space between bright and dark reticles go to step 13. If there is any space between bright and dark reticles, go to step 12(a).

(13) Disconnect autocollimation eyepiece assembly power cord from 115 volt power and remove from microscope stage. Remove lamp assembly from autocollimation eyepiece and stow in transit case compartment.

(14) Replace protective cap on reference mirror and remove reference mirror assembly from BSAHF.

NOTE

It may help to hold a piece of white paper in front of the auxiliary lens while searching for the reticle for the first time. The focusing control is very sensitive and the depth of field is very narrow.

(15) Reinstall microscope eyepiece in microscope. Focus the microscope reticle as follows:

(a) Defocus the microscope by one quarter turn using microscope focus control (7, figure 2-4).

(b) Unscrew the knurled focus ring on the eyepiece (6, figure 2-4) until the eyepiece is unfocused, then screw it in to just barely focus the microscope reticle with the eye relaxed. The eyepiece reticle is the only point of interest and reference.

(c) Keeping attention on eyepiece reticle (figure 2-8), refocus microscope on BSAHF reticle. There is no need to have the eyepiece reticle superimposed on the BSAHF reticle. The BSAHF reticle is the only point of interest and reference.

(16) Select BAR target on AN/TAM-3 thermal sight collimator. It is not necessary to have AN/TAM-3 thermal sight collimator turned on. It may be necessary to shine some sort of light (flashlight, etc.) on the target during the following steps.

CAUTION

Trying to adjust the azimuth or elevation of the BSAHF with the two no-mar setscrews, azimuth lock, or elevation lock (14, 13, 12, figure 2-4) tightened could damage the precision screw threads.

(17) Loosen the BSAHF azimuth and elevation locks (13 and 12, figure 2-4). Loosen two no-mar setscrews (14, figure 2-4) under elevation lock (12, figure 2-4).

(18) Loosen all four leveling lock screws (2, figure 2-4).

(19) Observe bar target through microscope and focus as required. Adjust fixture azimuth and elevation adjustment knobs (3 and 4, figure 2-4) if required to bring bar target into view.

(20) Level the fixture base as follows:

(a) Using fixture azimuth adjustment knob (3, figure 2-4), bring the bar target next to the fixture reticle to produce a narrow slit of light between the two (figure 2-8).

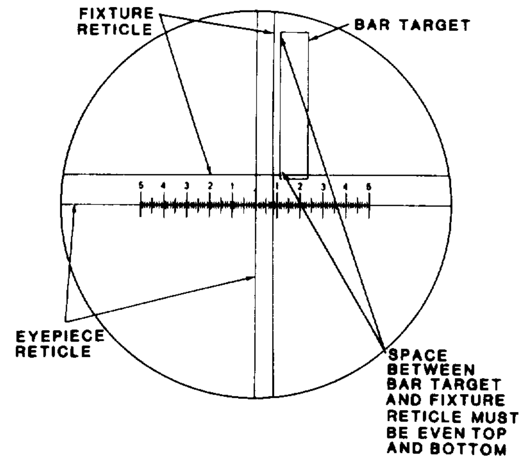


Figure 2-8. Fixture Leveling

(b) Loosen the front base leveling nut (1, figure 2-4) so that this corner of the base is not supported.

NOTE

If insufficient leveling adjustment is provided by the rear base leveling nut (1, figure 2-4), loosen hookbolts holding AN/TAM-3 to rail assembly and carefully retighten evenly so both sides are level.

(c) While viewing through micoscope eyepiece, adjust the rear base leveling nut (1, figure 2-4) down against the rail assembly to bring the vertical line of the fixture reticle parallel to the bar target. This will occur when the narrow slit of light between the two is equal top and bottom. Repeat step (a) as required to keep the slit of light very narrow.

(d) Snug front base leveling nut (1, figure 2-4) down to gently support the base, and tighten all four leveling lock screws (2, figure 2-4).

(e) Check that holding fixture remains level by viewing through microscope to be sure the narrow slit of light remains equal top and bottom. Readjust leveling if necessary.

(21) Select MTF target on AN/TAM-3 thermal sight collimator.

(22) Using fixture azimuth and elevation adjustment knobs (3 and 4, figure 2-4), center fixture reticle on target circle as shown in figure 2-9. Tighten azimuth and elevation locks (13 and 12, figure 2-4), noting that the azimuth lock nut requires a 7/8 inch box wrench.

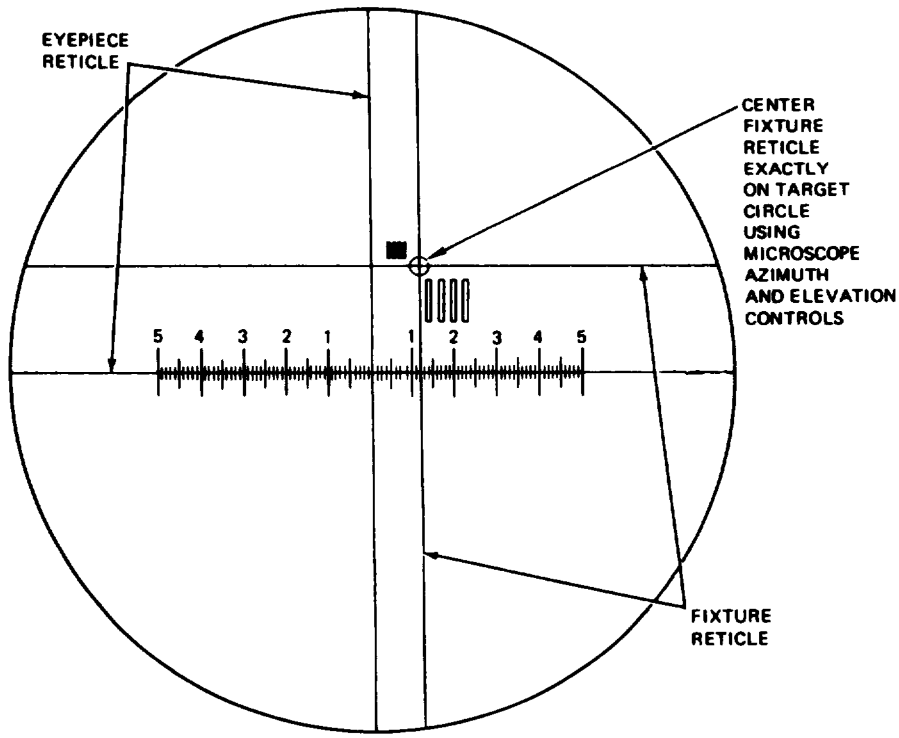


Figure 2-9. Fixture Reticle Alinement

(23) Check that the fixture reticle remains centered after locks have been tightened. If fixture reticle is not centered, loosen fixture azimuth and elevation locks *(13* and *12,* figure *2-4)* and go to step (19). Tighten two no-mar setscrews (14, figure 2-4).

(23.1) Install shroud on AN/TAM-3 thermal sight collimator.

NOTE

Do not yet install the BSA unit to be tested in the BSA holding fixture.

(24) Refer to TM 9-1425-474-34-2 for testing of the BSA.

c. *BSASE Using l-folding Fixture Serial Number 2006 and Up.* Before each use, the alinement of the BSAHF with the AN/ TAM-3 thermal sight collimator should be checked as directed in the following steps. This is to be done before the BSA unit to be tested is installed on the BSAHF. If the BSAHF is found to be out of alinement return it to depot for repair.

(1) Remove reference mirror assembly (12, figure 2-4.1) from transit case compartment.

(2) Install reference mirror assembly (12, figure 2-4.1) in place (assembly has stenciled reference marks) with three captive screws. See paragraph 3-140 for installation procedure. Be sure screws are tightened securely, so there is no movement in the reference mirror assembly (12, figure 2-4.1).

(3) Remove protective cap from reference mirror.

(4) Loosen four captive screws and remove microscope stage assembly from transit case compartment (figure 1-5.1). Install microscope stage onto BSAHF. See paragraph 3-136.2 for installation procedure.

(5) Remove microscope eyepiece assembly (7, figure 2-4.1) if installed on microscope stage, and stow in transit case compartment. The eyepiece has a friction mount and slides in and out of microscope stage.

(6) Remove autocollimation eyepiece and lamp assembly from transit case compartment. Insert lamp assembly into autocollimation eyepiece, and install on microscope stage. See paragraph 3-142 for autocollimation eyepiece installation.

CAUTION

Aperture (F-stop) on auxiliary lens (11, figure 2-4.1) is permanently fixed at F7 (between F5.6 and F8) for correct optical perfonnance. Do not disturb this setting at any time or depot maintenance will be required.

(7) Install 4X(low-power) objective lens into front of microscope. (This is the shorter of the two objective lenses.)

(8) Use microscope azimuth and elevation controls (10 and 9, figure 2-4.1) to position microscope objective lens as close to center of fixture reticle as possible. This is to minimize searching.

(9) Viewing through autocollimation eyepiece assembly (figure 1-5. 1), slowly turn microscope focus control (8, figure 2-4.1) to find fixture reticle, then use microscope azimuth and elevation controls (10 and 9, figure 2-4.1) to center the image horizontally and vertically.

NOTE

If no fixture reticle image is visible, the autocollimator eyepiece lamp may be burned out. In this case, slide lamp socket out from bottom to replace the lamp. The lamp is GE No. 44 or equivalent. See paragraph 3-143 for installation procedure.

(10) Check to see if two reticle images (figure 2-9.1) are present. The two reticle images should consist of a bright image superimposed over a dark image. If two reticles can be seen in eyepiece, go to step 13. If two reticles cannot be seen in eyepiece, go to step 11.

(11) If the dark image is not visible, verify it is present by slightly loosening one of the reference mirror mounting screws and pressing on it. A dark image should then move out from behind the bright image. If the dark image does not appear, go to step 12. If the dark image appears, go to step 13.

(12) Locate two reticles as follows:

(a) Loosen four locking setscrews (18, figure 2-4.1) securing four adjusting setscrews (17, figure 2-4.1) on imaging lens (16, figure 2- 4.1)

(b) Loosen four adjusting setscrews (17, figure 2-4.1) securing imaging lens (16, figure 2-4.1).

(c) Loosen three screws (19, figure 2-4.1) securing imaging lens (16, figure 2-4.1) to holding fixture reticle housing until imaging lens can move.

(d) Move imaging lens (16, figure 2-4.1) until bright reticle image and dark reticle image (figure 2-7.1) are near each other.

(e) If two reticle images can be seen, carefully tighten three screws (19, figure 2-4.1) to secure imaging lens (16, figure 2-4.1) to fixture reticle housing.

(f) If two reticles cannot be seen, the holding fixture is way out of alinement and depot level maintenance is required.

(13) Using microscope focus control (8, figure 2-4.1) focus autocollimation eyepiece assembly on fixture reticles (figure 2-9.1). If both reticles are in focus, go to step 14. If both reticles are not in focus, depot level maintenance is required,

NOTE

Correct alinement of imaging lens will show the bright reticle covering the dark reticle, where there is no space between both reticlea on both axes.

(14) If corner of reference mirror(12, figure 2-4.1) was loosened in step 11, torque reference mirror to 14 to 18 in-lbs. If there is no space between bright , and dark reticles (figure 2-9.1), go to step 15. If there is space between bright and dark reticles (figure 2-7.1), proceed as follows:

(a) Loosen four locking setscrews (18, figure 2-4,1) securing adjusting setscrews (17, figure 2-4,1) on imaging lens (16, figure 2- 4.1).

(b) Loosen four adjusting setscrews (17, figure 2-4.1) securing imaging lens (16, figure 2-4.1).

(c) Loosen three screws (19, figure 2-4.1) securing imaging lens (16, figure 2-4. 1) to fixture reticle housing until imaging lens can move when slight pressure is applied.

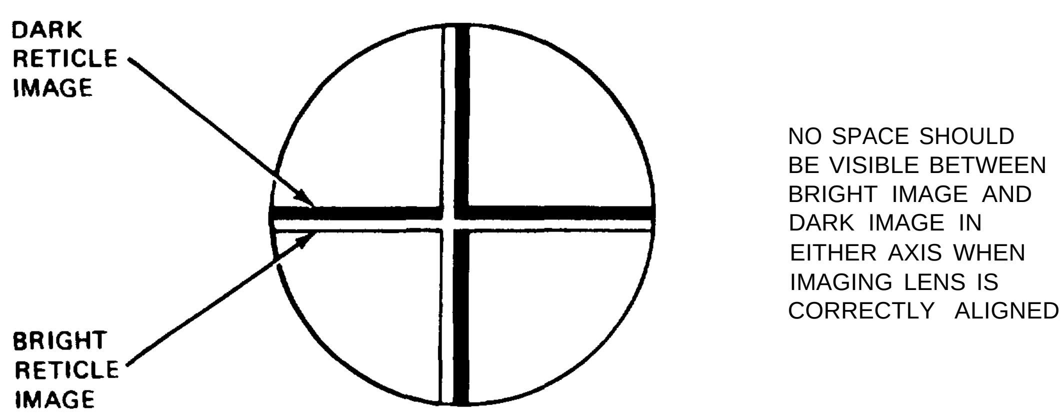


Figure 2-9.1. Fixture Reticles

(d) Move imaging lens (16, figure 2-4.1) until bright and dark reticles are near each other (figure 2-7.1).

CAUTION

Adjusting setscrews can be damaged. Before tightening adjusting setscrews, make sure opposite adjusting setscrew is loosened.

(e) Carefully loosen and tighten two adjusting setscrews (17, figure 2-4.1) until bright reticle horizontal line is positioned over dark reticle horizontal line (figure 2-9.1).

(f) Carefully loosen and tighten two adjusting setscrews (17, figure 2-4.1) until bright reticle vertical line is positioned over dark reticle vertical line (figure 2-9.1).

(g) Carefully tighten three screws (19, figure 2-4.1) alternately, making sure fixture reticle stays in alinement.

(h) Tighten four locking setscrews (18, figure 2-4.1)

(i) If there is no space between bright and dark reticles go to step 15. If there is any space between bright and dark reticles, go to step 14(a).

(15) Disconnect autocollimation eyepiece assembly power cord from 115 volt power and remove autocollimation eyepiece assembly from microscope stage. Remove lamp assembly from autocollimation eyepiece and stow in transit case compartment.

(16) Install protective cap on reference mirror, Remove reference mirror assembly from BSAHF, and stow in transit case compartment.

NOTE

Hold a piece of white paper in front of the imaging lens when searching for the microscope reticle.

(17) Install microscope eyepiece on microscope. Focus the microscope reticle as follows:

(a) Defocus the microscope by turning the microscope focus control (8, figure 2-4.1) until fixture reticle cannot be seen.

(b) Turn focus ring on microscope eyepiece (7, figure 2-4.1) until the eyepiece reticle (figure 2-9.2) is focused.

(c) Focus the microscope by turning the microscope focus control (8, figure 2-4. 1) until fixture reticle can be *seen*.

NOTE

It is not necessary to have thermal sight collimator turned on. It may be necessary to use a flashlight to shine light on target duting the following steps,

(18) Select BAR target on thermal sight collimator.

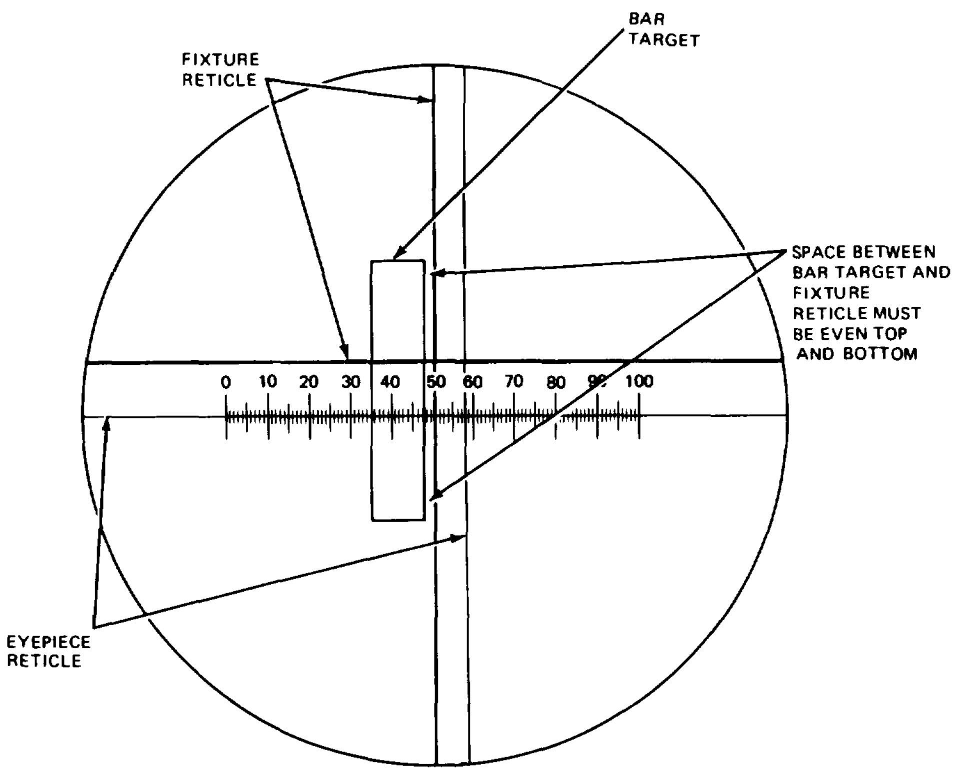


Figure 2-9.2. Fixture Leveling

CAUTION

Trying to adjust the azimuth or elevation of the BSAHF with the two no-mar setscrews, azimuth lock, or elevation locks (15, 14, 13, figure 2-4.1) tightened could damage the precision screw threads.

(19) Loosen the BSAHF azimuth and elevation locks (14 and 13, figure 2-4.1). Loosen two no-mar setscrews (15, figure 2-4.1) under elevation lock (13, figure 2-4.1),

(20) Loosen all four leveling lockscrews(2, figure 2-4.1).

(21) Observe bar target through microscope and focus as required. Adjust fixture azimuth and elevation adjustment knobs (3 and 4, figure 2-4.1) as needed to bring bar target into view.

(22) Level the fixture base as follows:

(a) Using fixture azimuth adjustment knob (3, figure 2-4.1), bring the bar target next to the fixture reticle (figure 2-9.2) to produce a narrow slit of light between the two.

(b) Loosen base leveling nut (1.1, figure 2-4.1) so that this corner of the base is not supported.

NOTE

If insufficient leveling adjustment is provided by the rear base leveling nut (1.2, figure 2-4.1), loosen hookbolts holding AN/TAM-3 to rail assembly and carefully retighten evenly so both sides are level.

(c) While viewing through microscope eyepiece, adjust base leveling nut (1.2, figure 2-4.1) down against the rail assembly to bring the vertical line of the fixture reticle parallel to the bar target, This will occur when the narrow slit of light between the two is equal top and bottom. Repeat step (a) as required to keep the slit of light very narrow.

(d) Snug front base leveling nut (1, figure 2-4,1) down to gently support the base, and tighten all four leveling lock screws (2, figure 2-4.1).

(e) Check that holding fixture remains level by viewing through microscope to be sure the narrow slit of light remains equal top and bottom. Readjust leveling if necessary.

(23) Select MTF target on AN/TAM-3 thermal sight collimator.

(24) Using azimuth and elevation adjustment knobs (3 and 4, figure 2-4.1) center fixture reticle on target circle as shown in figure 2-9.3. Tighten fixture azimuth and elevation locks (14 and 13, figure 2-4.1).

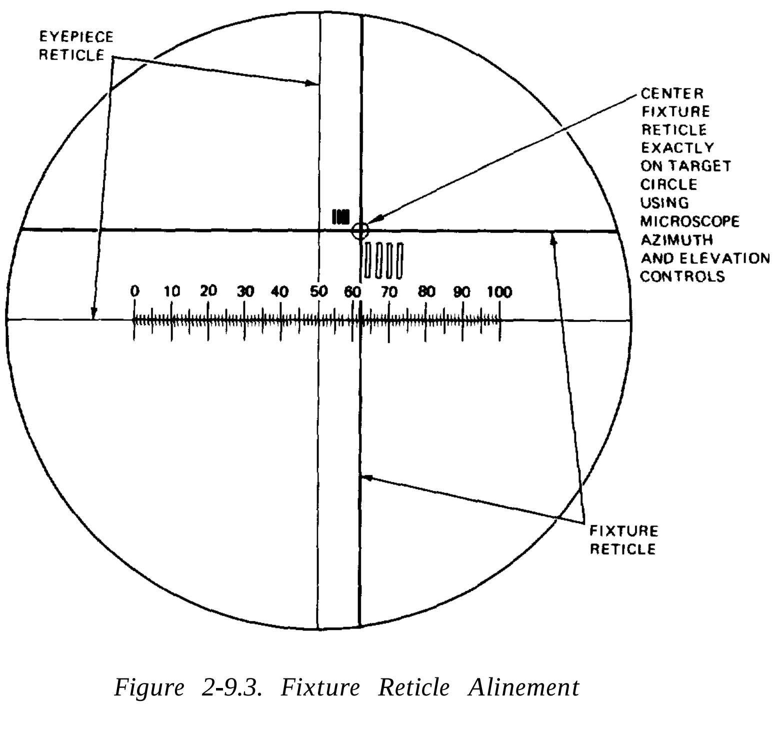


Figure 2-9.3. Fixture Reticle Alinement

(25) Check that the fixture reticle remains centered after locks have been tightened. If fixture reticle is not centered, loosen fixture azimuth and elevation locks (14 and 13, figure 2-4.1) and go to step (21). Tighten no-mar setscrews (15, figure 2-4.1).

(25.1) Install shroud on AN/TAM-3 thermal sight collimator.

NOTE

Do not yet install the BSA unit to be tested in the BSA holding fixture.

(26) Refer to TM 9-1425 -474-34-2 for testing of the BSA.

2-9. **Operating Procedures.** a. TOW Subsystem Test Set. *To* operate the TSSTS, proceed as follows:

(1) Perform preliminary set-up procedures as directed in paragraph 2-6.

NOTE

Make sure TOW is not selected on the vehicle TOW *control* panel or false failure indication may occur.

(2) Set POWER switch on TC to ON. This applies power to the test set and initiates the self test (test 00). Observe that all three power indicators on the TC light, then observe TC display for display test. A flow chart for self test is provided in figure 2-10. Self test takes approximately 30 seconds to execute.

(3) Observe TC display for self test results. To repeat self test, if desired, enter 00 and press RUN.

(4) If self test repeatedly fails and the cause cannot be determined, remove TSSTS from turret and perform the diagnostic self tests (tests 90, 91, 97, or 98) to further isolate the source of the problem. The diagnostic self tests are only performed when the TSSTS is no longer installed *in* the vehicle to prevent false failure indications. For detailed instructions, refer to the troubleshooting procedures in paragraph 3-6.

(5) To operate the test set, use the TC keyboard to enter the desired operations in accordance with the operating instructions provided on flip cards on the TC front panel. Any special operator actions required will be indicated on the TC display. A generalized flow chart for normal operation of the test set is provided in figure 2-11. For detailed test set operating procedures and flow charts, refer to TM 9-1425 -474-34-1/-2 as required.

(6) To terminate operation of the test set after use, proceed as follows:

(a) Set TC POWER switch to OFF.

(b) Remove all cables attached to TC, D/NSC, and MS. Where applicable, install protective caps on connectors.

(c) Reconnect vehicle cables at ISU jack IJ04 and CGE jack 2J04.

WARNING

Removing the TC, MS, and D/NSC from the vehicle are awkward tasks involving heavy lifts. When handling this equipment, use proper lifting techniques - Lift with the arms and legs, not the hack - Do not twist the torso while lifting or holding a heavy load, turn with the legs. Ensure sound footing. Two persons are required to safely accomplish steps (d) and (e).

(d) Pull up four expando grip handles and remove D/NSC optical stage from tilt stage.

(e) Loosen two large knurled captive screws and remove D/NSC tilt stage from ISU window.

NOTE

Tilt stage cable (W12) is present in D/NSCs with tilt stage assembly PN 13314265 and optical assembly PN 13314267 only.

(f) Off vehicle, assemble D/NSC optical stage to tilt stage and secure by pushing down the four expando grip handles. Store D/NSC, D/NSC cable (W4), tilt stage cable (W12), and RPC in D/NSC transit case.

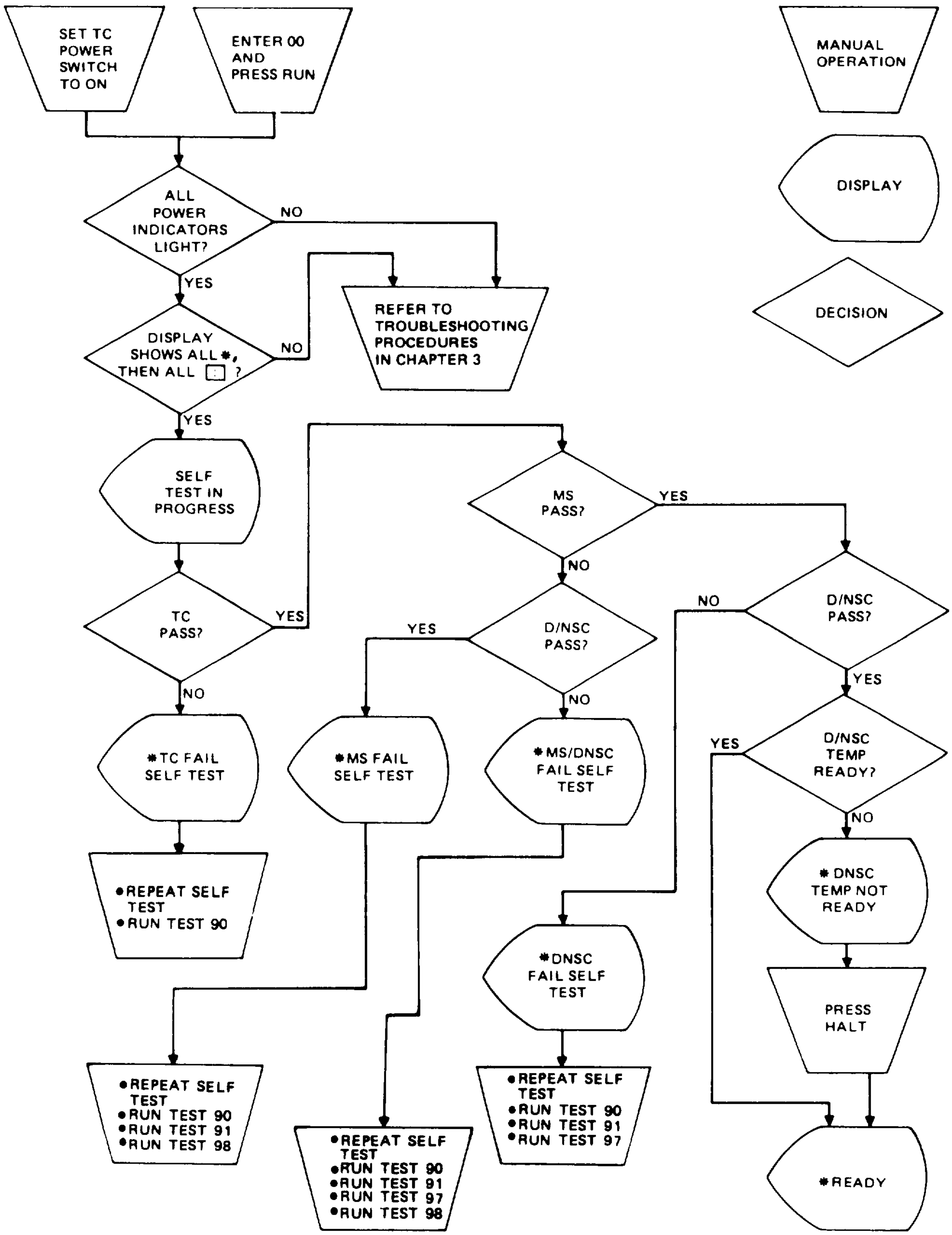


Figure 2-10. Test Set Self Test Flow Chart.

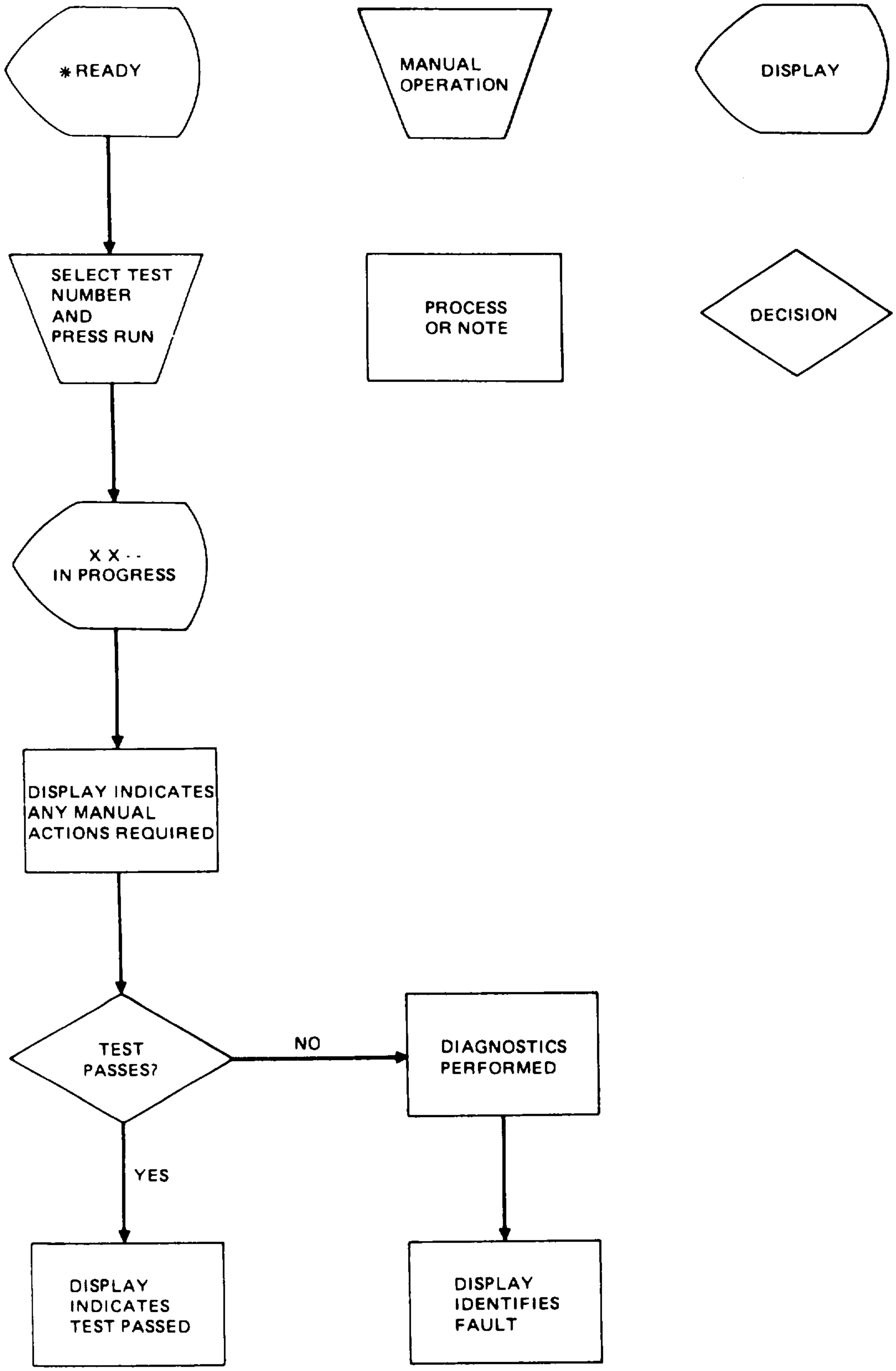


Figure 2-11. Test Set Typical Operation Flow Chart.

WARNING

Space in vehicle is limited. When removing the TC from the vehicle, use care to avoid possible injury or equipment damage. Use lifting handles provided.

CAUTION

Make sure chains on protective caps do not interfere when installing transit case top cover.

NOTE

TC cable adapters (W13, W14) are present with TC PN 13314321 only.

(g) Remove TC from vehicle, store cables (Wl through W3, and W11), and cable adapters (W13 and W14) in transit case top cover, and install transit case top cover on TC.

(h) Remove MS from launcher per missile unloading procedure in TM 9-2350-252-10-2. Store MS and MS cable (W5) in MS transit case.

b. BSA Support Equipment. Before installing the BSA unit to be worked on in the BSA holding fixture, check the alinement of the BSA holding fixture and AN/TAM-3 collimator as directed in paragraph 2-8, then proceed as follows:

WARNING

High voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions.

(1) Open BSAC transit case by pressing breather valve and releasing latches.

(2) Check that all switches on BSAC are in OFF position.

NOTE

If this procedure is performed in the ICSS or NSMF, a 115-volt, 150 volt-ampere fault isolation transformer must be connected between the BSA controller and 115 VAC source.

(3) Connect BSAC power cable between 115 VAC jack and 115 volt, 60 hertz single phase power source.

(4) Set AC PWR, BSA, and CRYO switches to ON position.

(5) Connect voltmeter across VOLTMETER test points.

(6) Set TEST SEL switch to position A.

NOTE

Do not use test select table on front panel of BSAC serial numbers 2001 to 2054. It is not accurate.

(7) Set SIG SEL switch to positions 1 through 7, one at a time, and measure voltages at the VOLTMETER test points. The voltage readings should be as follows:

Normal Indication Volts DC	SIG SEL Switch Position
-10.2 to -9.8	1
-7.14 to -6.86	2
-5.1 to -4.9	3
5.145 to 5.355	4
6.86 to 7.14	5
9.8 to 10.2	6
17.15 to 17.85	7

After all voltages have been compared, if any voltage is missing, refer to the BSAC fault isolation procedures in paragraph 3-8a. If voltage at switch position 7 is out of tolerance, replace 17.5 V power supply PS1. If voltages at switch positions 1 through 6 are out of tolerance, replace multivoltage power supply PS2. Refer to paragraph 3-110 for maintenance procedures.

(8) Adjust 2 VDC ADJ control while measuring voltage at 2 VDC test points, and verify that voltage can be adjusted from less than or equal to 2.0 VDC to greater than or equal to 5.5 VDC. If voltage is incorrect, refer to BSAC fault isolation procedures in paragraph 3-8a.

(9) Set BSA and CRYO switches to OFF position.

(10) Any time testing operations are in question, set BSA and CRYO switches to OFF position, disconnect cable from BSA, and repeat steps (3) through (9) to check the BSAC.

(11) To terminate operation, set all switches on BSAC to OFF, remove power and BSA cables, and remove VOLTMETER and 2 VDC test leads from front panel.

(12) Remove the BSA unit under test and AN/TAM-3 thermal sight collimator from the BSAHF and reinstall reference mirror assembly using three captive screws.

Section IV OPERATION UNDER UNUSUAL CONDITIONS

2-10. General. The TSSTS and BSASE are designed to operate at temperature, humidity, and altitude extremes and to withstand electromagnetic interference and thermal shock. However, under some conditions, condensation or dirt can impair equipment operation. Therefore, when operating the equipment under adverse environmental conditions, observe the applicable precautions outlined in the following paragraphs.

2-11. **TOW Subsystem Test Set. a.** ***Operation in Cold Climates.*** Freezing or subfreezing temperatures can affect the efficient use of the test set. Extreme changes from cold to warm areas, such as movement of the equipment into a heated area, will cause condensation. To maintain operating efficiency under these conditions, take the following precautions.

(1) Operate the test set in a heated area if possible.

(2) When cold equipment is brought into a warm area, allow the equipment to reach room temperature. Wipe condensation off with a clean, dry cloth before putting the test set into operation.

NOTE

For additional advice regarding operation of equipment in cold climates, refer to TM 9-207, Operation and Maintenance of Army Materiel in Extreme Cold Weather (O Degrees to -65 Degrees F).

b. Operation in Tropical Climates. In tropical climates, moisture conditions are more acute than normal. Ventilation in closed areas is usually very poor, and the high relative humidity causes condensation of moisture on the equipment. If necessary, wipe the test set dry with a clean dry cloth, noting the following:

CAUTION

To remove condensation from optical surfaces, use a clean cotton cloth or tissue pad. Use gentle wiping motions in one direction. Do not rub. Refer to the lens cleaning instructions in paragraph 3-10.

c. Operation in Desert Conditions. When operated in desert conditions, sand, dust, or dirt will reach the moving parts of the test set and cause binding of controls and switches. Foreign particles in connectors may cause faulty operation and test results. Make the operating area as dust-proof as possible with available materials. Wipe off accumulated sand, dust, dirt, or condensation with clean dry cloth. Inspect connectors and clean as necessary before making test connections. Not that a rapid fall in temperature at night often causes condensation. When the test set is not in use, secure equipment in appropriate transit cases.

2-12. **Basic Sight Assembly Support Equipment.** The recommended precautions for operating the BSASE under unusual conditions are the same as those given for the TSSTS in paragraph 2-11.

CHAPTER 3
MAINTENANCE PROCEDURES

Section I. REPAIR PARTS, SPECIAL TOOLS, TEST MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE)

3-1. *General.* This section identifies the repair parts, special tools, and TMDE required for maintenance of the TSSTS and BSASE.

a. Repair Parts. Refer to TM 9-4935-474-24P-1.

b. ***Special Tools. No*** special tools are required.

c. ***Test Measurement and Diagnostic Equipment*** The TMDE consists of the following items:

(1) Alinement Test Set (see figure 3-O).

(a) Main Frame TM 503, NSN 6625-00-373-7528 (one each).

(b) Function Generator FG501A, NSN 6625-01-106-9873, Tektronix (one each).

(c) Counter Timer DC503A, Tektronix NSN 6625-01-114-4890 (one each).

(d) Infrared Viewer, NSN 5855-01-295-2313 (one each).

(e) Electrical Container, NSN 5855-01-071-6277 (one each).

(f) Blank Panel, NSN 6110-01-033-3708 (one each).

(g) protective Cover, NSN 5855-01-072-7995 (one each).

(h) BNC Tee Adapter 3285, NSN 5935-00-926-7523 (two each).

(i) Cable BNCC-18, NSN 5995-00-764-2288 (four each).

(j) Test Leads B36-2, NSN 6150-00-809-7855 (four each).

(k) Test Leads B36-0, NSN 6625-00-883-9746 (four each).

(1) Adapter 1614-2, NSN 5935-00-789-6077 (two each).

(m) Adapter 1614-0, NSN 5935-00-789-6078 (two each)

(n) Cable 2241 C-36, NSN 5995-00-400-5268 (four each).

(o) Adapter 3221, NSN 6625-00-230-6388 (two each).

(2) Night Vision Sight Test Set, AN/TAM-3. NSN 5855-01-037-7341.

(a) Oscilloscope SC502, Tektronix, NSN 6625-01-023-7092 (one each).

(b) Digital Multimeter DM501A, Tektronix, NSN 6625-01-075-8583 (one each).

(c) DC Power Supply HP 6284A Hewlett Packard (one each).

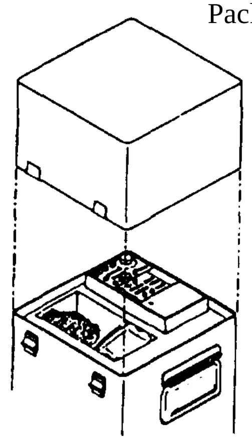


Figure 3-O. Alinement Test Set

Section II. SERVICE UPON RECEIPT

3-2. **General.** This section provides instruction for inspection and operational testing of the TSSTS and BSASE.

NOTE

D/NSC tilt stage cable (W12) is present in D/NSCs with tilt stage assembly PN 13314265 and optical assembly PN 13314267 only.

TC cable adapters (PNs 13314312-1, 13314312-2), (W13, W14) are present with TC PN 13314321 only. These adapters are required when using T2SSTS MS PN 13314306 or MS PN 13163006 with TC 13314321.

3-3. **Inspection.** Make sure all components of the TSSTS and the BSASE are present in the assemblies carrying cases. This includes all associated cables (Wl thru W8, W11, and W12), cable adapters (W13 and W 14), and RPC for TSSTS; W9 and W 10 for BSASE. Inspection consists of a visual examination of equipment to make sure the components are in good condition. Normally, inspection should be performed weekly to make sure the equipment is maintained in a ready state. If equipment is in continuous use, inspection should be performed daily. Perform inspection in accordance with the preventive maintenance checks identified in chapter 2, table 2-6. All inspected parts should be free of all dirt, grease, or other foreign material. If cleaning is required, refer to paragraph 3-10. If any painted areas are scratched, chipped, or worn, refer to paragraph 3-11. Any parts found to be damaged or worn near or beyond serviceable limits should be replaced. Repair functions that are authorized for various levels of maintenance are identified in the maintenance allocation chart (MAC) provided in appendix C. After completing visual inspection and any necessary repairs, it is recommended that the TSSTS self test be performed or BSASE alignment be checked, as directed in section V, to ensure equipment is operational.

3-3.1 Missile Simulator Inspection. This paragraph is performed as a precaution to prevent damage to the TOW subsystem, in particular, the Command Guidance Electronics (CGE). Refer to figure 3-0.1 for parts location.

(a) To inspect missile simulator, proceed as follows:

(1) Inspect black ring of electrical connector for dents or out of roundness.

(2) Inspect for presence of green ring of electrical connector and for cracks.

(3) Depress plunger and examine center pin. Center pin should be straight and plunger movement should be smooth.

(4) If missile simulator failed any of the conditions in steps 1 through 3, replace missile case per paragraph 3-49.1.

(5) Inspect for presence of connector label.

CAUTION

When removing connector label, be sure to remove all parts of label. No residue is permissible. Damaged label can cause connector shorting which can damage CGE.

(6) If any part of label is present, remove connector label completely.

NOTE

There are two types of missile cases. Acceptable position for fixed aft coupling is different. Each is illustrated.

Proper alignment of fixed aft coupling to a type 1 missile case is when self-locking screw is not directly opposite to connector. Proper alignment of fixed aft coupling to a type 2 missile case is when ridge is aligned with dent of fixed aft coupling.

(7) Inspect position of self-locking screw of fixed aft coupling.

(8) If position of fixed aft coupling is unacceptable, perform the following:

(a) Loosen self-locking screw.

(b) Reposition self-locking screw of fixed aft coupling to an acceptable position.

(c) Tighten self-locking screw.

(d) Torque self-locking screw to 32 to 34 in- lbs.

NOTE

Art is shown with assemblies apart for clarity.

(9) Inspect fixed forward coupling ring and ensure that it is securely seated and that tang on the fixed forward coupling ring is positioned in the slots of the missile case and the forward extension ring.

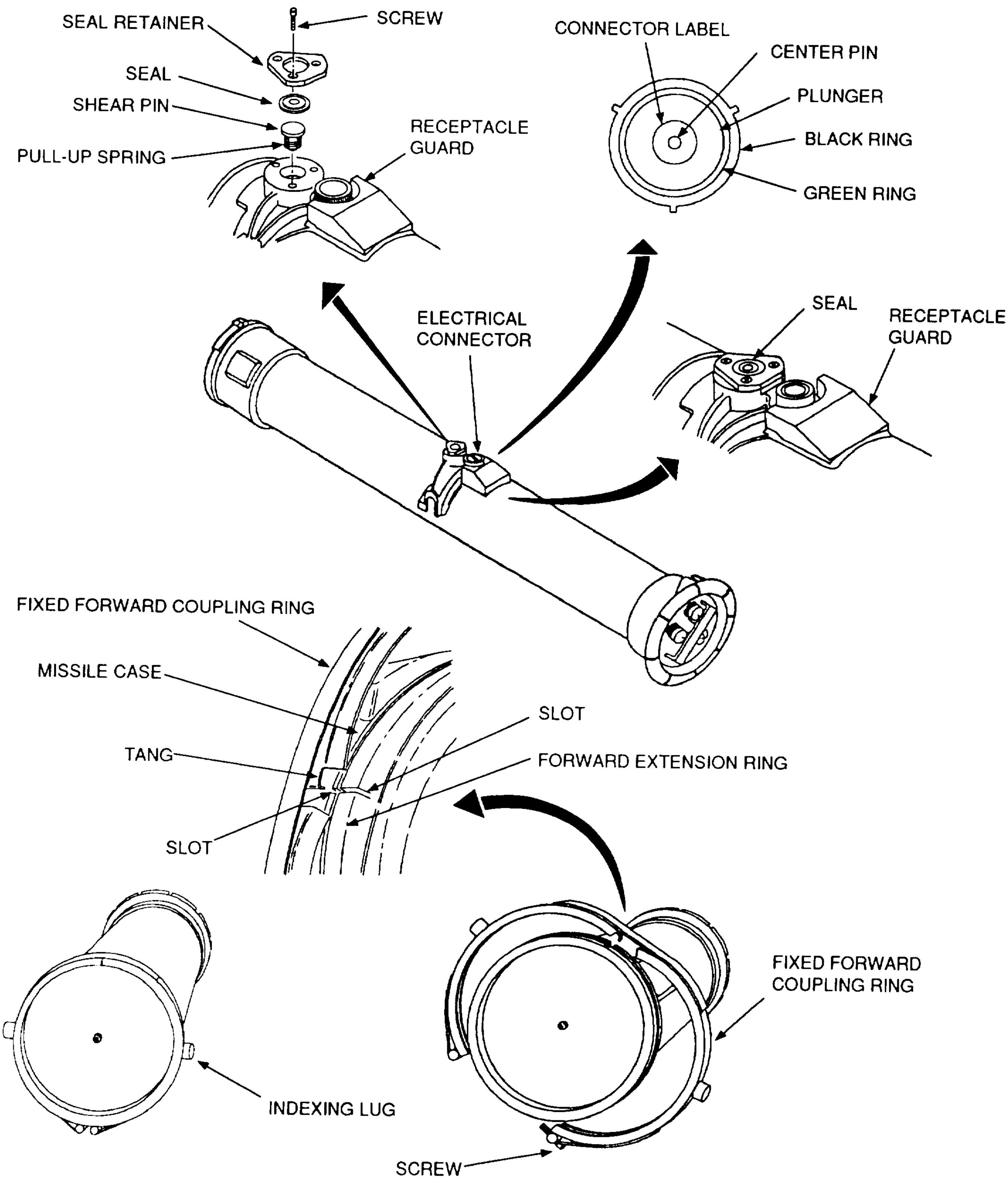


Figure 3-0.1. *Missile Simulator Inspection Points (Sheet 1 of 2)*

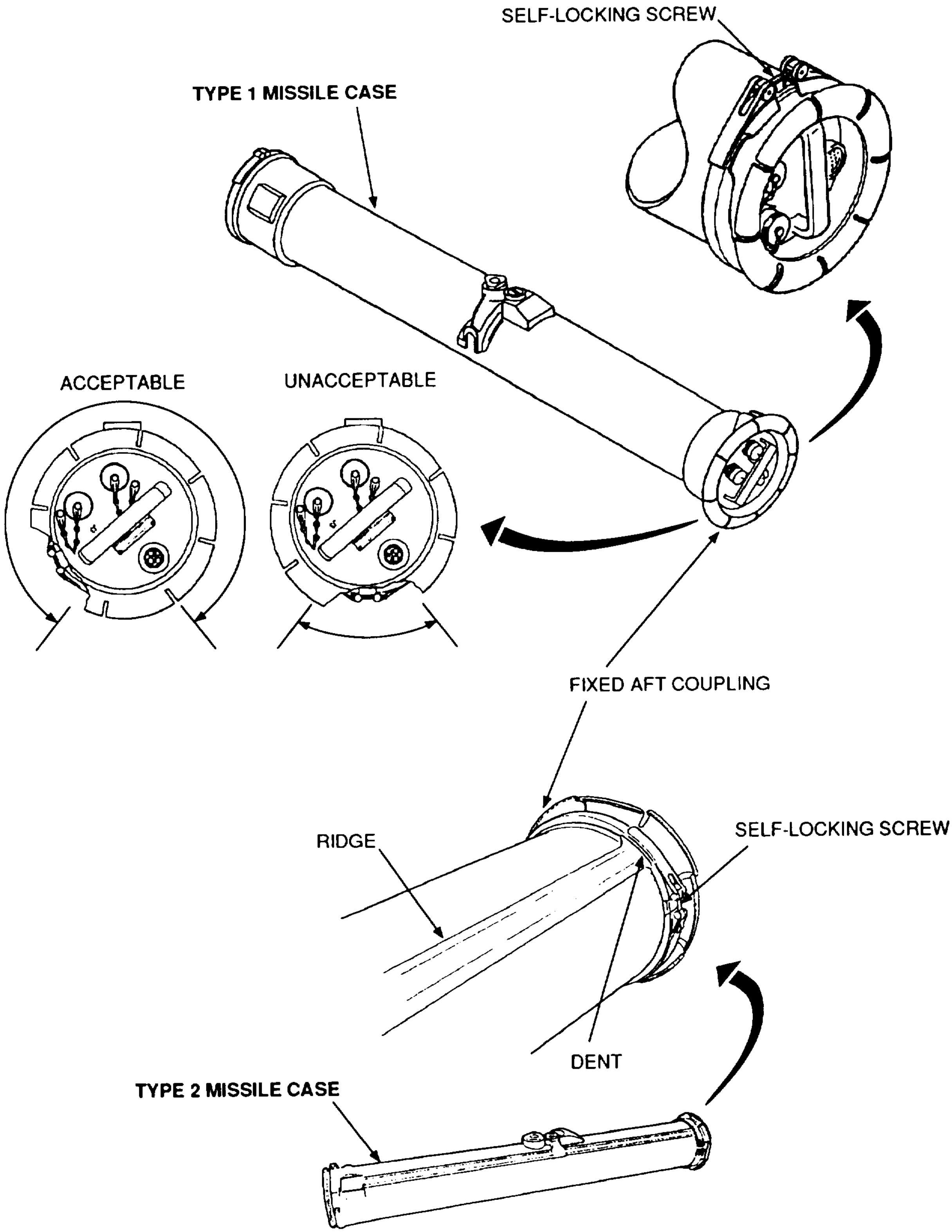


Figure 3-0.1. Missile Simulator Inspection Points (Sheet 2 of 2)

This will ensure that the indexing lugs are properly positioned with respect to the electrical connector.

(10) If fixed forward coupling ring is not secure and properly positioned, perform the following:

(a) Loosen screw.

(b) Remove fixed forward coupling ring from missile case,

(c) Line up longer slot of forward extension ring with slot of missile case.

(d) Position fixed forward coupling tang in slot of forward extension ring.

(c) Clamp fixed forward coupling ring and install screw.

(f) Torque screw to 32 to 34 in-lbs.

(11) Inspect the indexing lugs on the fixed forward coupling ring for gouges or dents.

(12) If indexing lugs on fixed forward coupling ring are not free of gouges or dents, replace fixed forward coupling. Refer to figure 3-16 for parts location.

(13) Inspect seal of missile case for damage.

(14) Depress seal and ensure that seal can be depressed. There should be no resistance.

(15) If seal is damaged or seal cannot be depressed perform the following:

(a) Remove three screws, seal retainer, and seal.

(b) Replace seal as necessary.

(c) If present, remove shear-pin and pull-up spring.

(d) Install seal, seal retainer, and three screws.

(16) Inspect missile case for receptacle guard.

(17) If receptacle guard is damaged or missing, install or replace with new receptacle guard per paragraph 3-49.5.

3-4. Operational **Test For TSSTS.** Perform steps (1) thru (6) of paragraph 2-9a.

3-5. Operational **Test For BSASE.** Perform steps 1 thru 10 of paragraph 2-9b,

Section III. TROUBLESHOOTING PROCEDURES

3-6. Introduction. This section explains the testing and troubleshooting procedures for the TSSTS and BSASE. Functional tests are presented in flow chart form. If a fault is found in a particular assembly, the operator is referenced to the applicable fault isolation procedure for that assembly.

CAUTION

Test controller contains circuit cards that **are** electrostatic discharge sensitive and are subject to damage by a discharge of static electricity. Wear a wrist ground strap while handling these cards and handle them by the edges only.

If, in any fault isolation procedure circuit cards are reseated; cards should be-handled by edges only and exposed pins and components should not be touched. During these procedures, a wrist ground strap (item 41, appendix F) must be worn. Functional test may require the use of TMDE listed in paragraph 3-1 c.

3-7. Troubleshooting Tests For **TSSTS.** A series of tests is performed to isolate malfunctions in the TSSTS to one of its three assemblies, and then to a replaceable subassembly. Self test (test 00), figure 3-l is used to troubleshoot to the assembly level of the test Set. If one or more assemblies are malfunctioning self test will identify them. Once the faulty assembly is identified, the operator is instructed to perform the appropriate test listcd in table 3-1 to troubleshoot to the responsible subassembly.

a. ***TSSTS Functional Test Procedure.*** The TSSTS functional test (figure 3-1) procedures consists of the following parts:

POWER, MS, D/NSC lamp checks
Display check
Self test (test 00)
Keyboard test

(1) The operator can fault isolate an assembly by referring to the appropriate flow chart as called out in the procedure. Faults such as no POWER light or no display must be corrected before other tests can be initiated. All stimuli sources, current paths and BIT lines in the TSSTS arc checked using self

test. The TC keyboard test is done by exercising the TC keyboard and observing the correct responses. Self test is activated automatically when the power is turned on and is completed in approximately 30 to 50 seconds. It can also be activated by entering 00 on the TC keyboard and pressing RUN. Self test, or test 00, consists of 52 steps. The first 30 steps check all logic, signal generation, and measurement capabilities of the TC. This is the highest priority of test 00 failures, and results in an immediate TC FAIL SELF TEST message on the TC display. The next 14 steps deal with MS power forms and signal generation. A failure in this section of test 00 will not cause an immediate failure message and the test will continue to completion. At the end of the test the message MS FAIL SELF TEST will be displayed. The last eight steps of test 00 check the D/NSC power forms, temperature sensing lines, driver operations, and target presence. As in the previous 14 steps, the test will run all the way to the end before the D/NSC failure message, DNSC FAIL SELF TEST, is indicated on the TC display. If both the MS and DNSC fail, the message MS / DNSC FAIL SELF TEST appears on the TC display.

(2) The message DNSC TEMP NOT READY may **be** displayed. This indicates the temperature circuits in the D/NSC have not reached operating temperature, although the remainder of the D/NSC circuits have passed self test. This is considered a conditional ready message. When HLT is pressed on the TC keyboard, the TC display indicates READY. The TSSTS is now operational and the TSSTS functional test procedure can be completed. After waiting approximately five minutes for the D/NSC to reach operating temperature, test 00 should be run again. If the TSSTS passes self test, the TC display will read READY. Before TSSTS can be considered fully operational, tests 90, 91, 97 and 98 must be run. Figure 3-1 refers the operator to the proper fault isolation test for the failed assembly.

b. Test 90 *Operation.* The test 90 **TC** fault isolation (figure 3-9) procedure is used to check out all signal paths, stimuli generation, and measurement accuracy within the TC. The test consists of two sections. The first section is the first 30 steps of test 00 (self-test) in a stop-on-fail format. The second part is a continuity check of switching circuit paths within the TC, also in a stop-on-fail format.

(1) To activate test 90, enter 90 on the TC keyboard and press RUN. The TC display will indicate CONN. WRAP-AROUND CABLE. After connecting the wrap-around cable, press ENT. TC display indicates CON WI 1 AND SET TO TEST. After connecting the Wll cable and setting the switch to TEST position, press ENT on TC. Test 90 takes approximately 90 seconds to complete when no failures arc encountered. A failure is identified by the test number, step number, and circuit card(s) failed as shown in the following example.

90	001,	XX...
⇓	⇓	⇓
Test Number	Step Number	Card(s) Fail

(2) When a failure is detected pressing RUN on the TC keyboard allows the test program to continue to the next failure, or if no other failure occurs, to completion. Each failure must be corrected in the order of its occurrence. The test 90 fault isolation table (table 3-2) provides a description of the relay being checked, the normal failure indication, and the corrective action required for each step that fails. If a failure occurs on circuit card A9 thru A13, the operator must attempt to align the cards using the alignment procedure in section V before replacing the card. After aligning indicated circuit card(s), repeat test 90 to verify fault has been corrected. If the same failure occurs, replace the circuit card, perform the alignment procedures in section V, and repeat test 90 to verify no faults.

c. Test 91 *Operation.* The test 91 cable fault isolation (figure 3-10) procedure is used to troubleshoot cables W2 thru W5 and W11. It is essentially the same test as the second portion of test 90; however, all communication between the TC and A BOB is through the W2 thru W5 cables. Therefore, any failures can be traced to a defective cable. To initiate this test, enter 91 on the TC keyboard and press RUN. The TC display will read CONNECT BREAKOUT BOX. After the cables and ABOB have been connected, press ENT. TC display indicates CON Wll AND SET TO TEST. After connecting the Wll cable and setting the switch to TEST position, press ENT on TC. If the cables pass the test, the TC display will indicate TEST 91 COMPLETED. If a cable or cables fail the test, the TC display will indicate; 91: XXX FAIL WX... (XXX represents the step; failed, X represents the cable to be fault isolated). The test 91 cable fault isolation table (table 3-3) provides a description of the signal or relay being activated, the normal failure indication, and the corrective action required for each step that fails. Repeat test 91 after replacing or repairing cable to verify the fault has been corrected. Test 91 does not check power cable W1. However, a separate continuity check of power cable WI can be performed to verify its performance.

d. ***Test*** 97 ***Operation.*** Test ***97*** D/NSC fault isolation (figure 3-11) procedure is used to fault isolate four functional areas of the D/NSC:

Power
DS collimator
NS collimator
Tilt Stage

(1) Step 1 of test 97 contains all fault isolation routines in test 97 to check the operation of the two collimators, their associated cards, and power. The next six steps (steps 2 thru 7) check the visibility of the DSC targets using an IR viewer. If in any step the target is not visible, the optical assembly must be replaced. Steps 2 thru 8 of test 97 allow the operator to manually control the tilt stage with the RPC. By listening to the motors and looking at the movement of the tilt stage, the operator can make sure the tilt stage motors and the RPC are operating properly. The function of each step in test 97 is listed in table 3-4. To perform this test, the D/NSC must be connected to the TC through cable W4 and power must be applied to the TC. Allow five minutes for D/NSC to warm up.

(2) To initiate test 97, enter 97 on the TC keyboard and press RUN. The TC display will indicate test 97: XXX IN PROGRESS (where XXX equals the step number). At the end of step 1 the TC display will either indicate test 97:001 PASSED or test 97:001, REPLACE XX, XX. If the first step passes, the operator must press STP or RUN to progress to each of the following steps. If the first step fails, the operator must respond to the failure indicated on the TC display.

e. *Test* 98 *Operation*. Test *98 is* used to fault isolate five functional areas of the MS; these are:

Power
Squib simulators
Pitch demodulation
Yaw demodulation
Missile present/gone

(1) The first six steps of the test 98 MS fault isolation (figure 3- 13) procedure consist of built in tests. These BIT's check the power forms and signal generation circuitry in the MS. The next eight steps make sure the signals generated by the MS fall within specified parameters. The last two steps are manual continuity checks that verify the operation of relays on the A2 card, All steps are listed in table 3-5. To perform this test the MS must be connected to the TC through cable W5, and power must be applied to the TC.

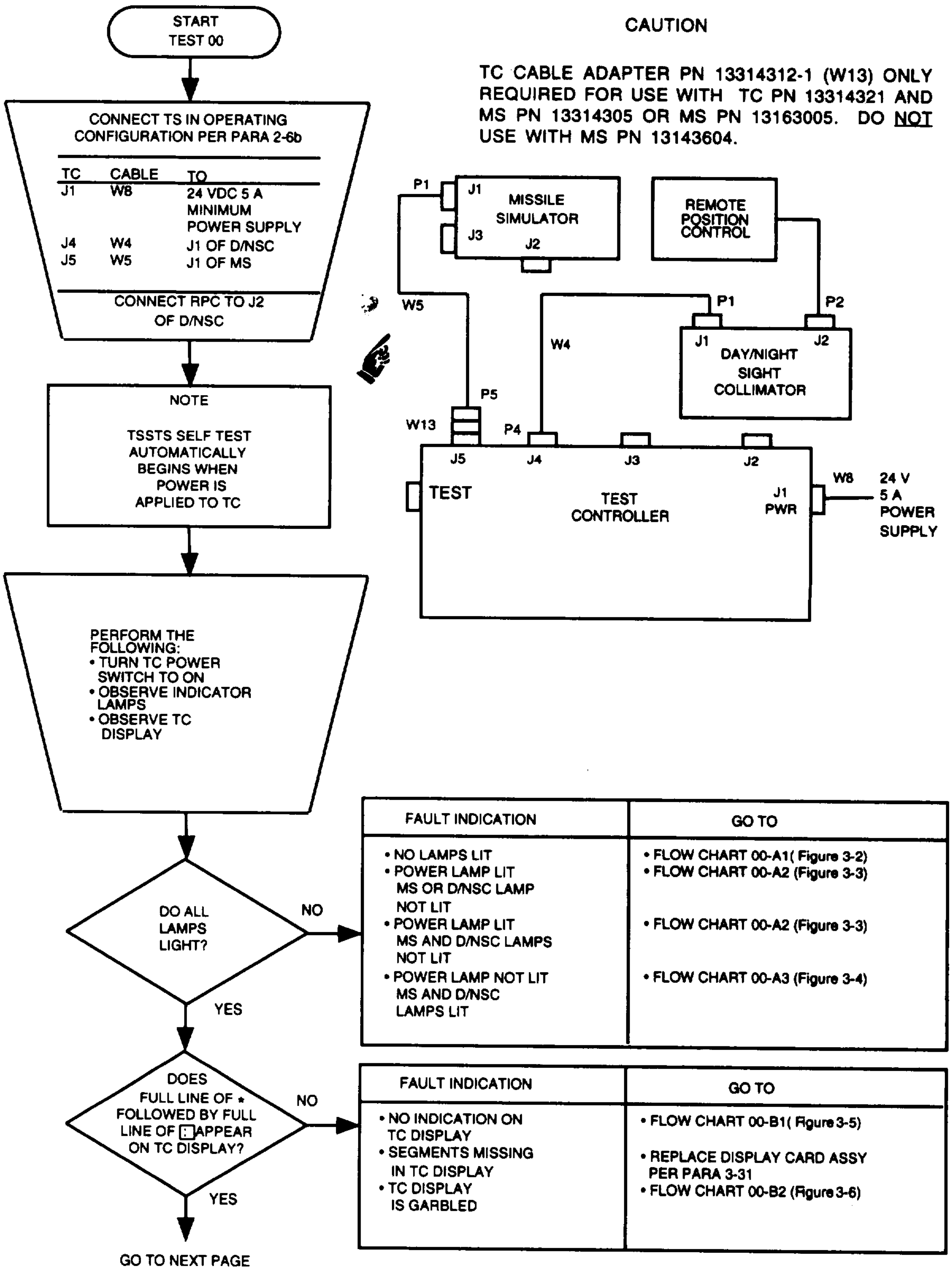
(2) To initiate test 98, enter 98 on the TC keyboard and press RUN. The TC display will indicate test 98: XXX IN PROGRESS (where XXX equals the step number). The program will continue through step 14 even if one of the steps fail. When step 14 is completed, the display indicates whether the entire test passed or failed. If failed, the fault isolation for all the steps is displayed. If a failure is indicated, press HLT, enter 98, and press STP. Pressing STP after each step will cause test 98 to proceed step by step and display a PASS or FAIL message after each of the first 14 steps. In the STP (step) or RUN mode of operation, the display will show IN PROGRESS for step 15 and 16. If one of the first six steps fails, the card(s) indicated on the TC display must be replaced. If a failure occurs during steps 7 thru 14, the MS alignment procedure must be attempted before any cards are replaced. At the end of the test sequence, the TC display will indicate 98:014 PASSED if the MS has successfully passed all test steps.

3-8. **Troubleshooting Tests For BSASE.** *a. BSA Controller Self Test.* BSAC self test consists of performing the BSASE operating procedures, paragraph 2-9b, steps 1 thru 12, and referring to the BSAC fault indication flowcharts, figure 3-14, when a failure is detected.

b. BSA Holding Fixture Self Test. The self test procedure for the BSAHF consists of performing the BSASE initial adjustments, paragraph 2-8b, steps 1 thru 9 for holding fixture serial numbers 2001 to 2005, or paragraph 2-8c, steps 1 thru 11 for serial numbers 2006 and up. If the self test procedure shows a fault and it cannot be corrected following the alignment procedures in section V of this chapter, the BSAHF must be returned to depot for maintenance.

Table 3-1. Troubleshooting Tests

Test Number	Test Name
90	TC Test
91	Cable Test
97	D/NSC Test
98	MS Test



FAULT INDICATION	GO TO
• NO LAMPS LIT	• FLOW CHART 00-A1(Figure 3-2)
• POWER LAMP LIT MS OR D/NSC LAMP NOT LIT	• FLOW CHART 00-A2 (Figure 3-3)
• POWER LAMP LIT MS AND D/NSC LAMPS NOT LIT	• FLOW CHART 00-A2 (Figure 3-3)
• POWER LAMP NOT LIT MS AND D/NSC LAMPS LIT	• FLOW CHART 00-A3 (Figure 3-4)

FAULT INDICATION	GO TO
• NO INDICATION ON TC DISPLAY	• FLOW CHART 00-B1(Figure3-5)
• SEGMENTS MISSING IN TC DISPLAY	• REPLACE DISPLAY CARD ASSY PER PARA 3-31
• TC DISPLAY IS GARBLED	• FLOW CHART 00-B2 (Figure3-6)

Figure 3-1. TSSTS Functional Test

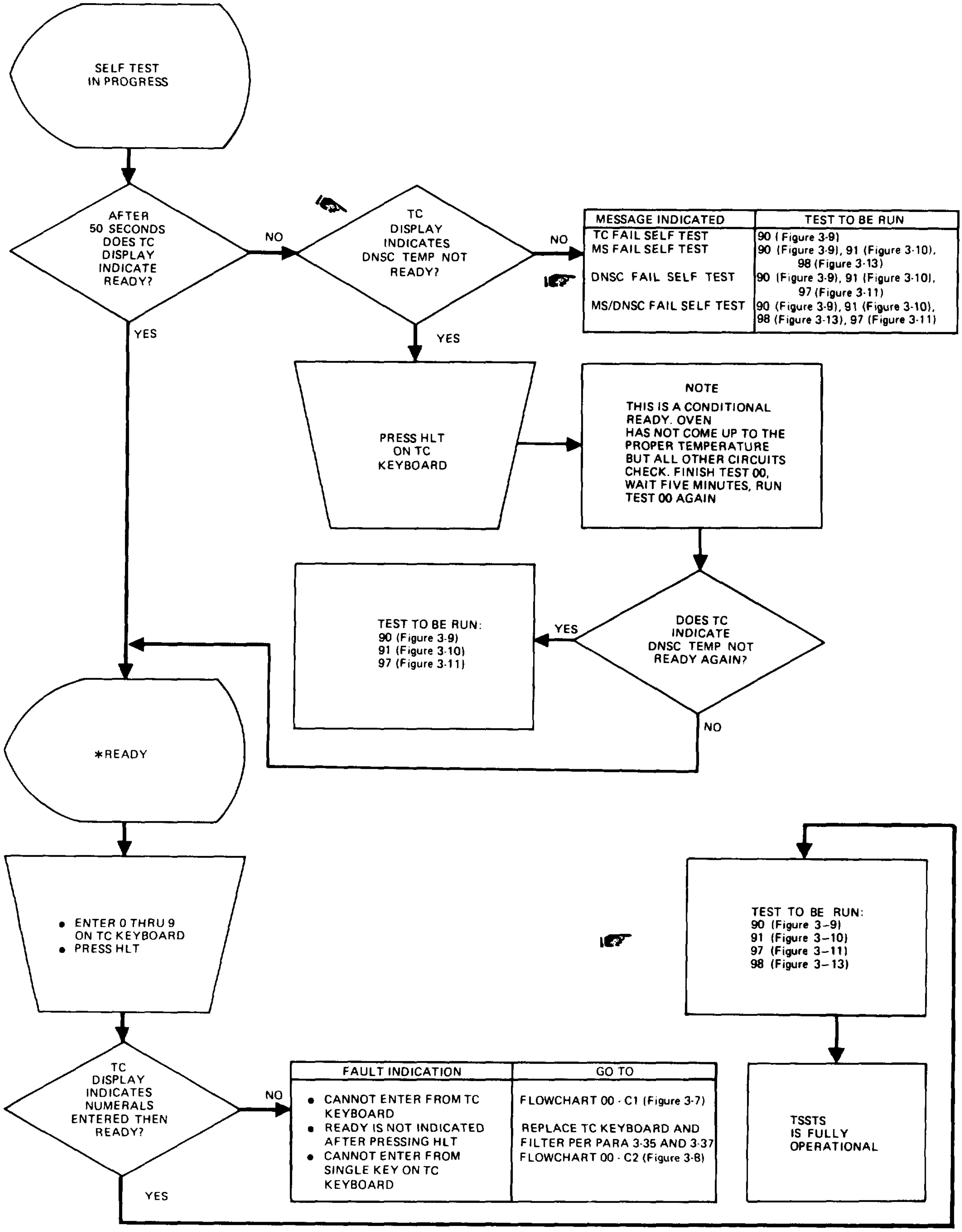


Figure 3-1. TSSTS Functiona/ Test procedure (sheet2 of 2).

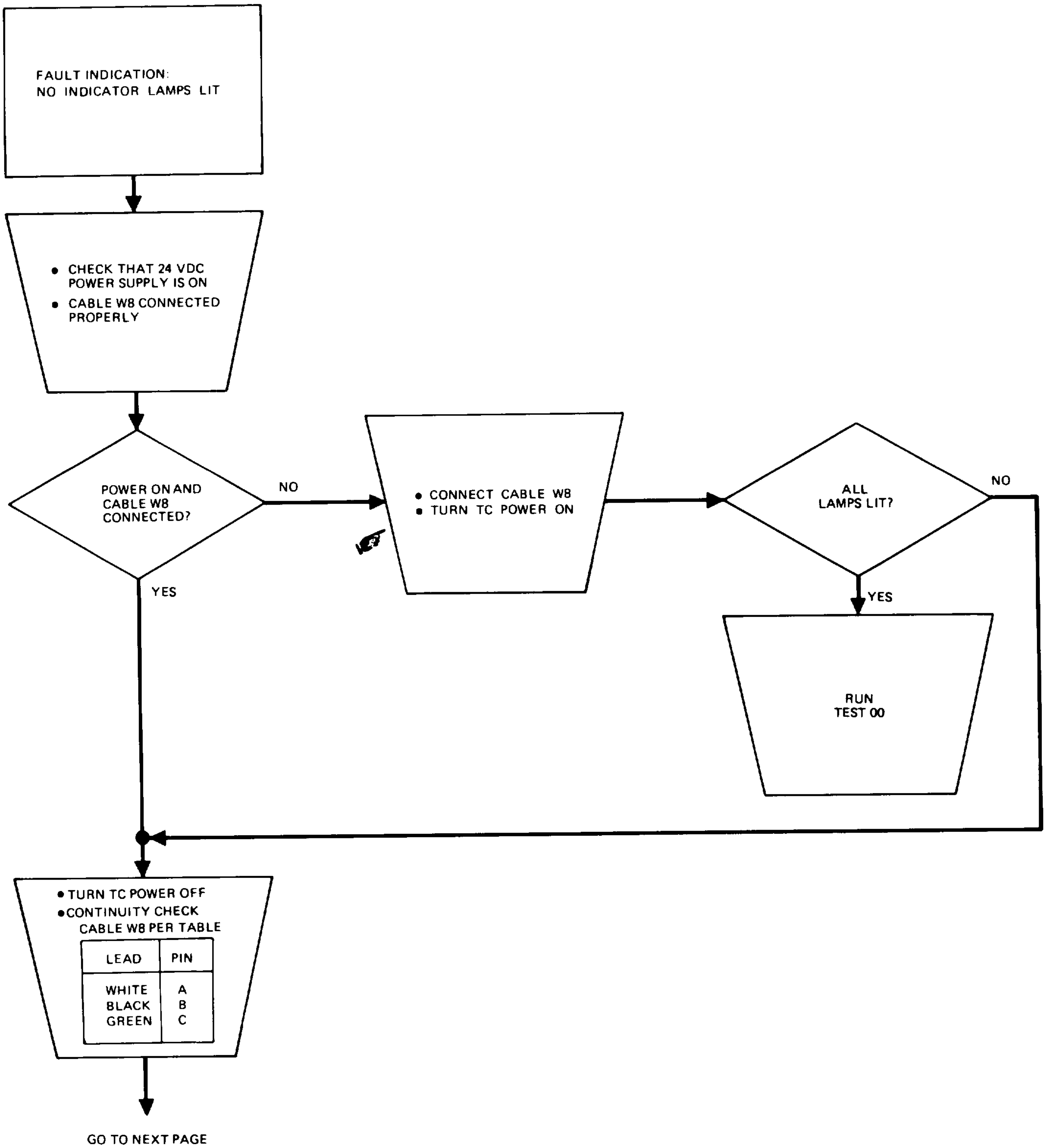
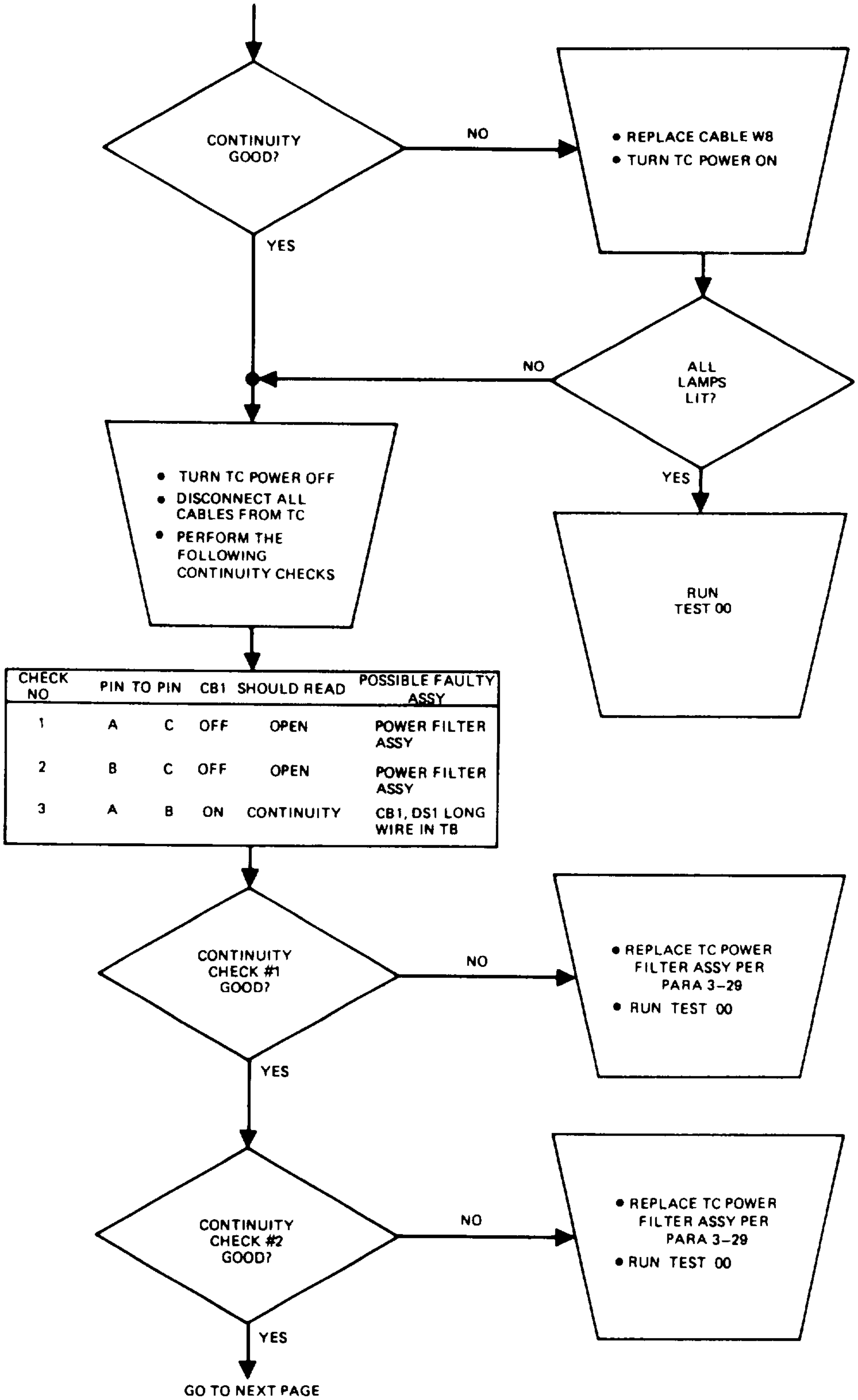


Figure 3-2. TC Fault Indication 00-A1 (Sheet 1 of 3)



CHECK NO	PIN TO PIN		CB1	SHOULD READ	POSSIBLE FAULTY ASSY
1	A	C	OFF	OPEN	POWER FILTER ASSY
2	B	C	OFF	OPEN	POWER FILTER ASSY
3	A	B	ON	CONTINUITY	CB1, DS1 LONG WIRE IN TB

Figure 3-2. TC Fault indication 00-A1 (Sheet 2 of 3).

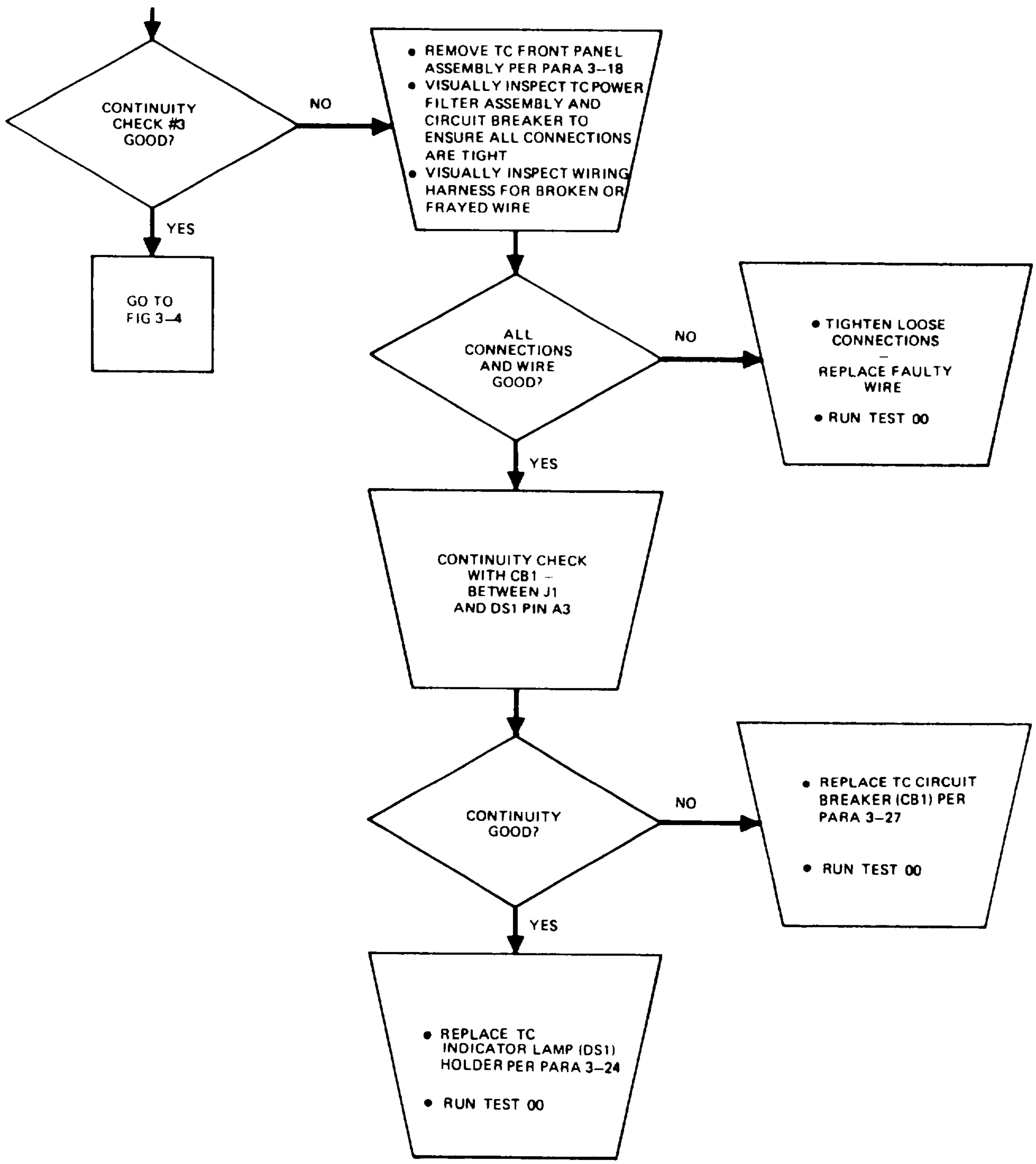


Figure 3-2. TC Fault Indication 00-A1 (Sheet 3 of' 3).

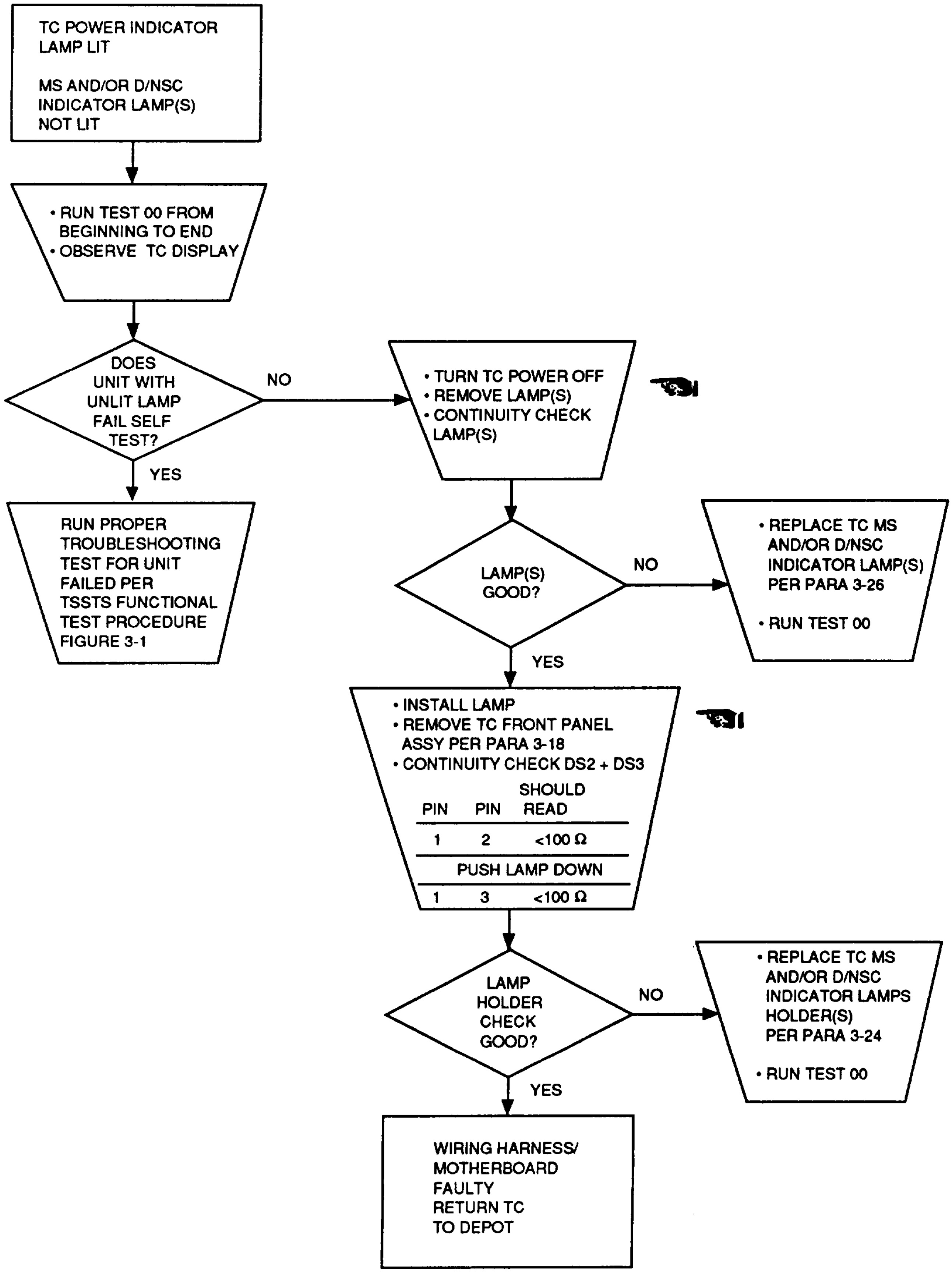


Figure 3-3. TC Fault Indication 00-A2

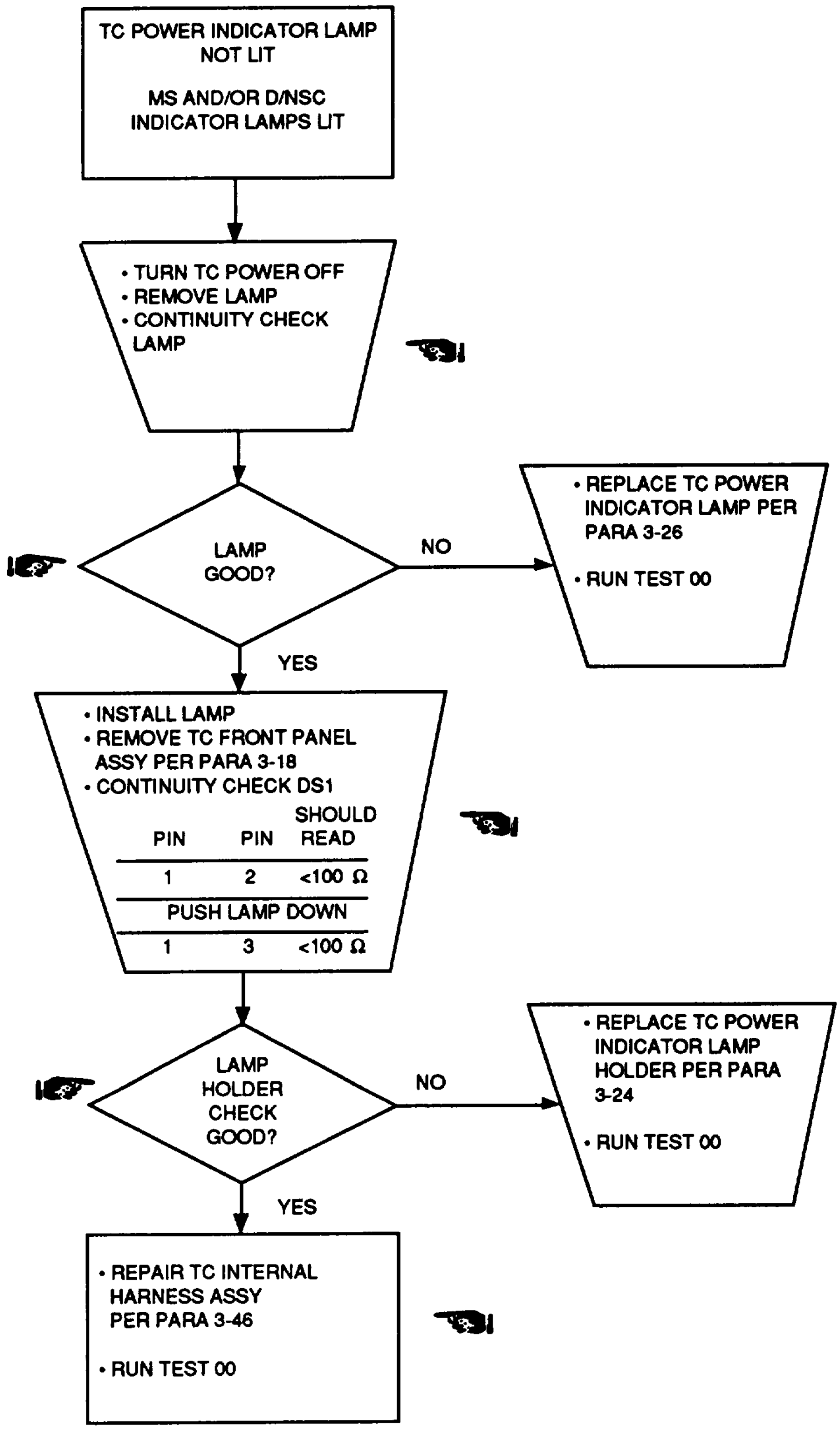


Figure 3-4. TC Fault Indication 00-A3.

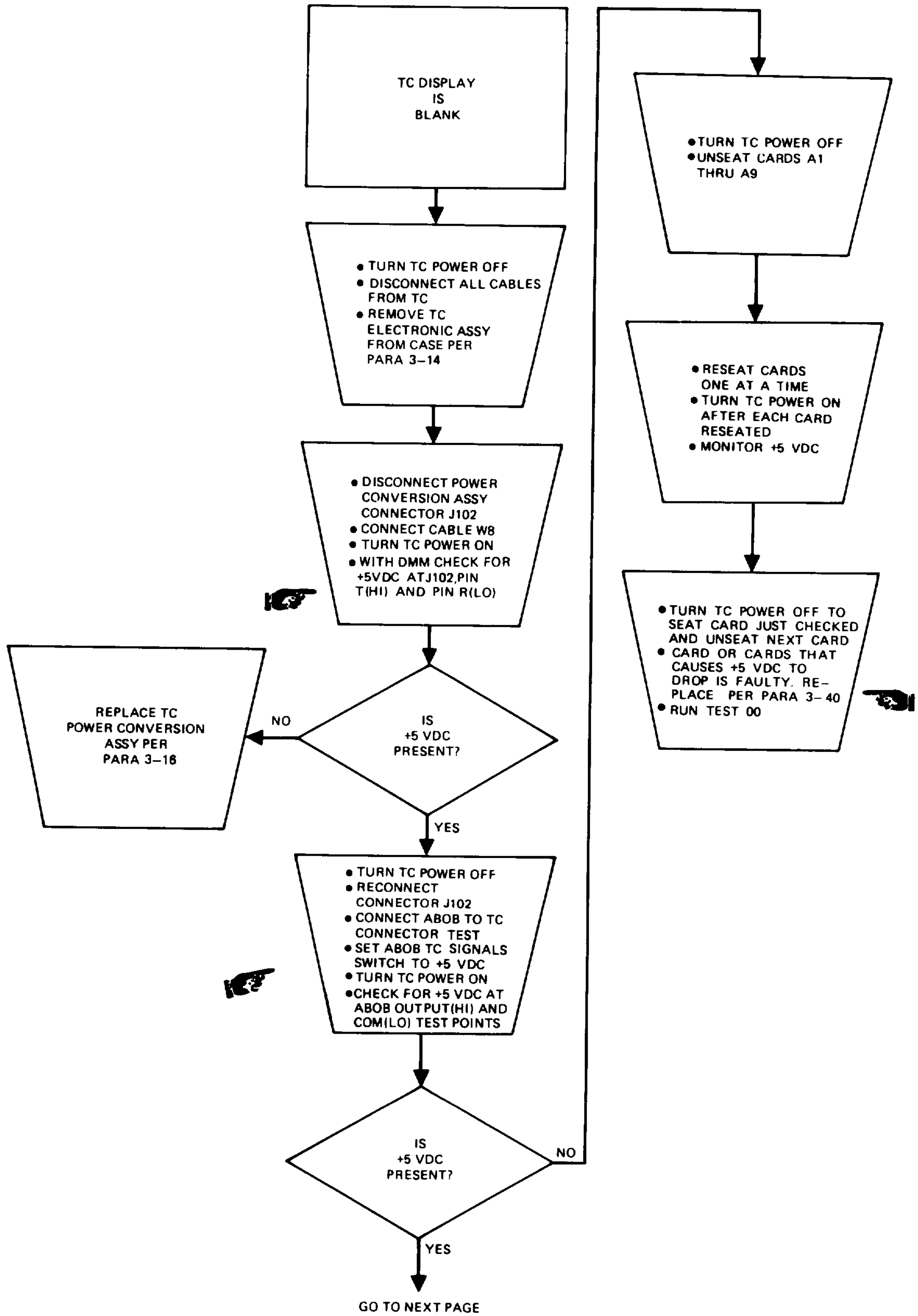


Figure 3-5. TC Fault Indication 00-B1 (Sheet 1 of 2).

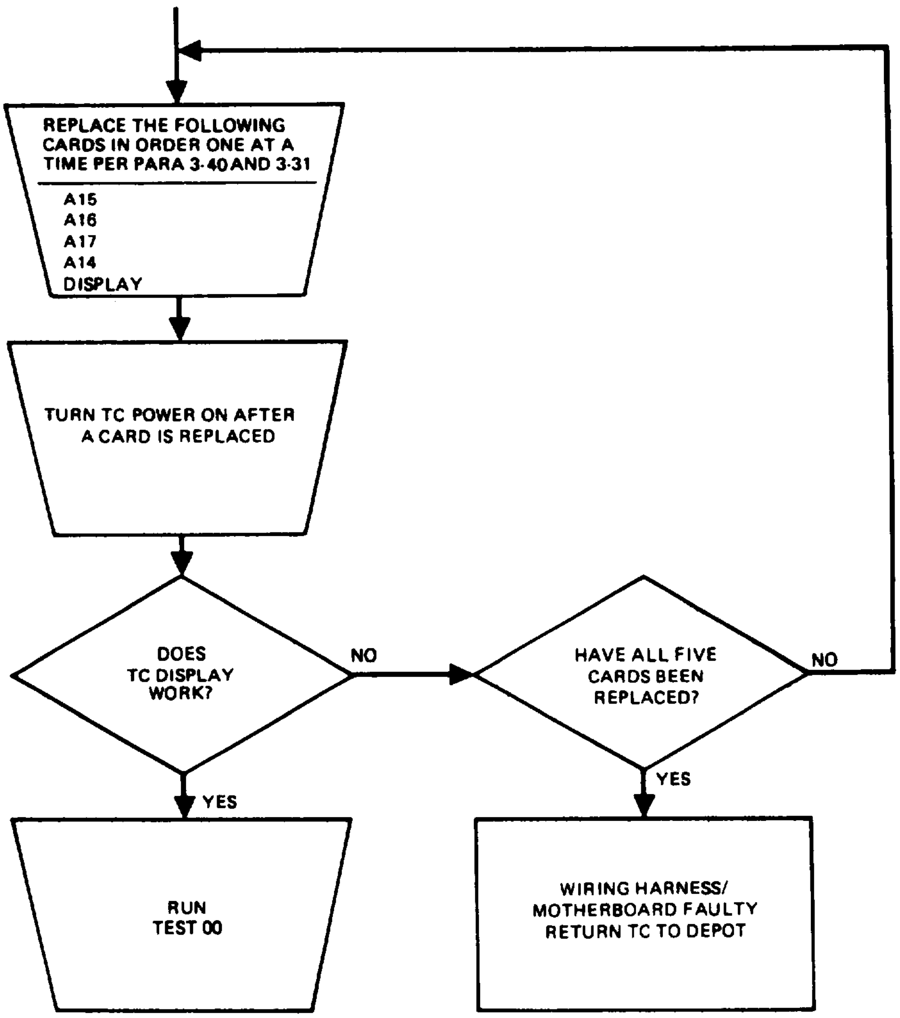


Figure 3-5. TC Fault Indication 00-B1 (Sheet **2** *of* **2)**

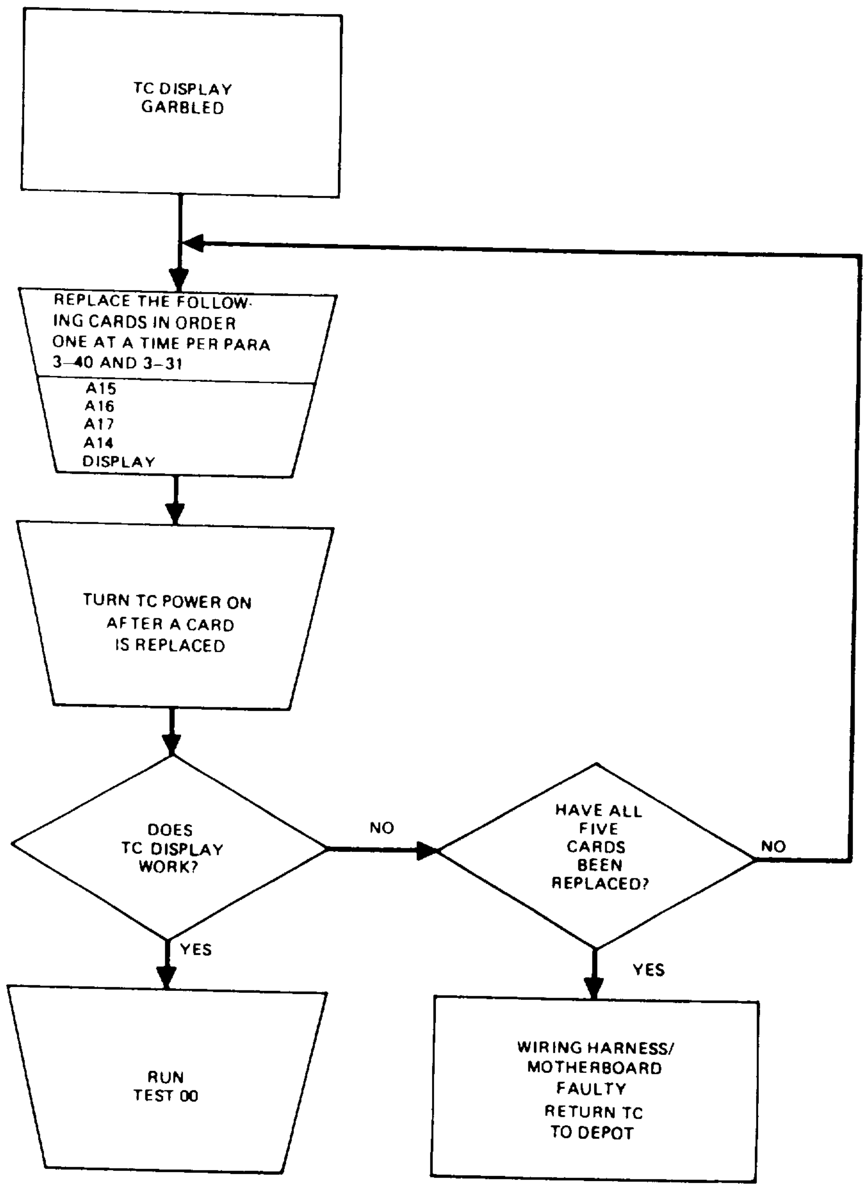


Figure 3-6. TC Fault Indication 00-B2.

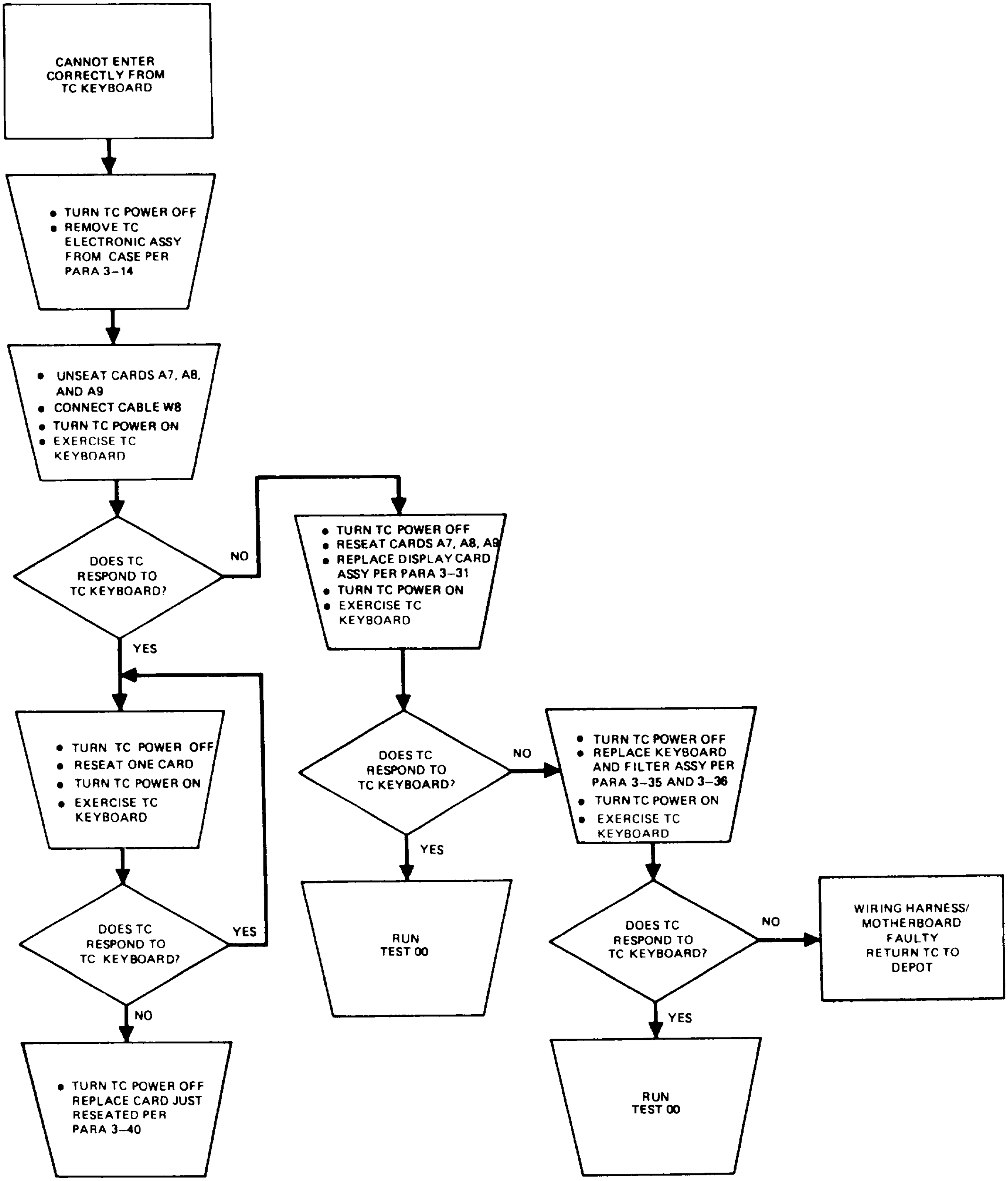


Figure 3-7. TC Fault Indication OO-C1.

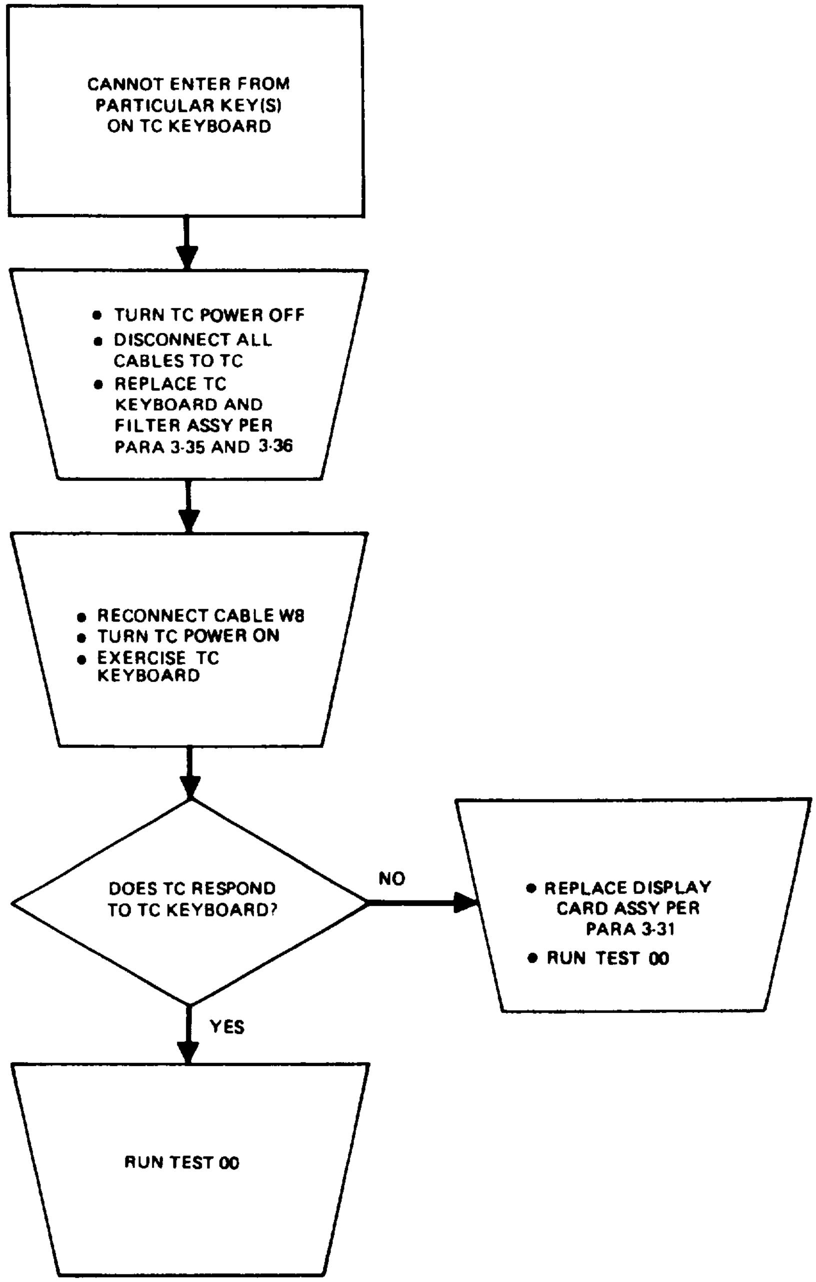


Figure 3-8. TC Fault Indication 00-C2.

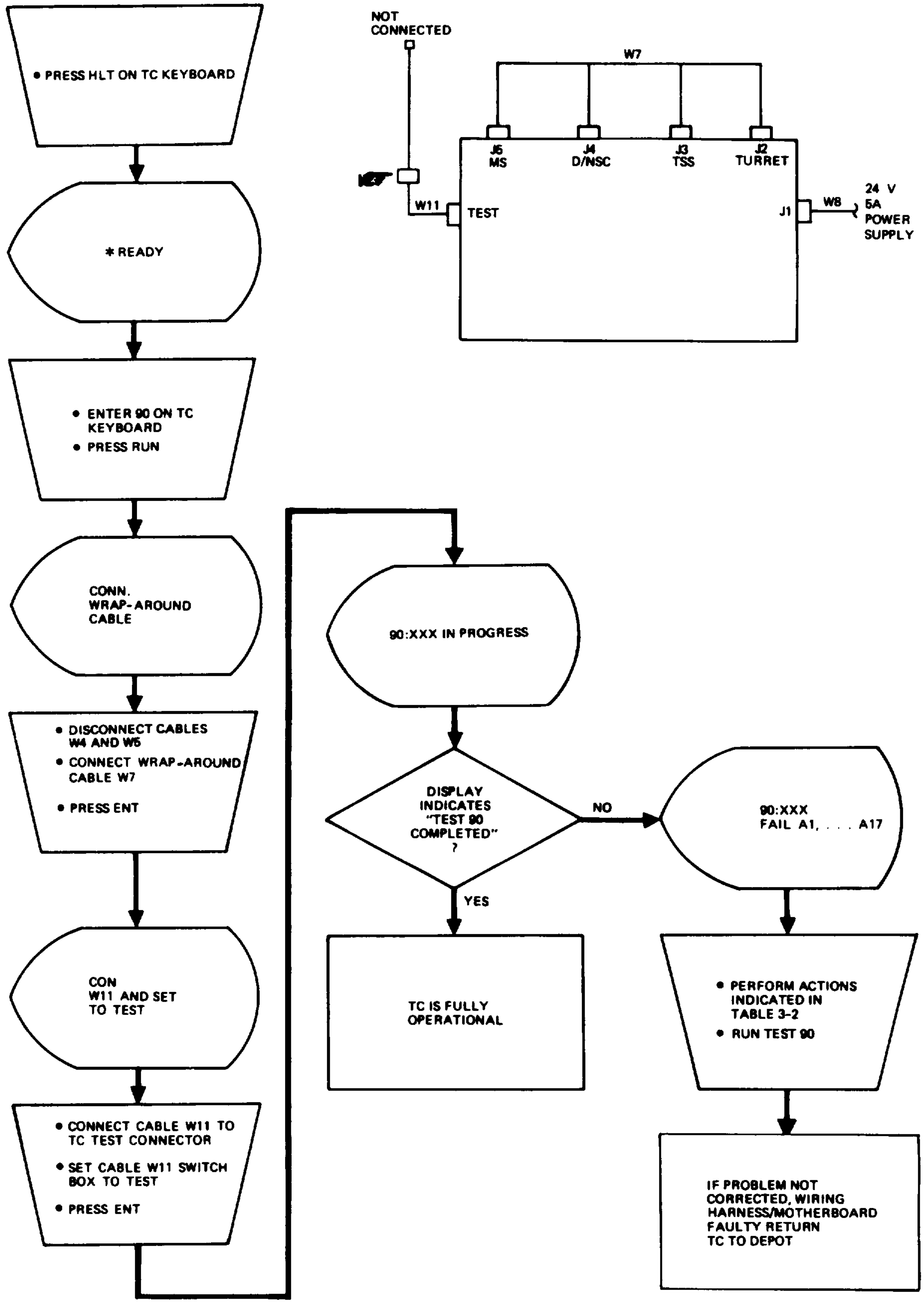


Figure 3-9. Test 90 TC Fault Isolation.

Table 3-2. Test 90 TC Fault Isolation

Step Number	Description	Indication	Action
			WARNING **Set POWER switch to OFF before removing or installing circuit cards or components to prevent possible injury to personnel.** **CAUTION** **The circuit cards in the TC are electrostatic discharge sensitive devices and are subject to damage by discharge of static electricity, Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.**
1	RAM Test	A14	Replace as indicated.
2	EPROM Test	A16, A17	Replace as indicated.
3	Display Test	Missing display segments.	Replace display card.
4	DVM Null	A8, A9, PWR	NOTE If A9 card is found to be faulty, perform alignment procedures for A9 card per paragraph 3-147b and c. If card will not align replace card. (1) Connect ABOB P7 to TC TEST jack. Check the following voltage settings on **ABOB** between OUTPUT and COM test points. TC Signal Setting. +5 VDC ±0.5 VDC +15 VDC ±0.75 VDC -15 VDC ±0.75 VDC -15 VDC ISO ±0.75 VDC +15 VDC ISO ±0.75 VDC +5 VDC ISO ±0.5 VDC If one or more voltages are missing, replace power conversion assembly. (2) Turn POWER OFF. (3) Put A8 card on extender card. Turn POWER ON. With external DVM, measure across A8 Pin 69 (HI) and A10 TP4 (LO) for logic low (0.8 VDC max). If logic low is not present replace A8 card. (4) With external DVM check across A8 Pin 25 (HI) and Al0 TP4 (LO) for +15 ±O.75 VDC, If +15 VDC is not present replace power conversion assembly; if +15 VDC is present replace A9 card.
5	Precision 10V	a. A8, A9, A10	NOTE If Al0 card is found to be faulty, perform alignment procedures for Al0 card per paragraph 3-147e and f. If card will not align replace card.

Table 3-2. Test 90 TC Fault Isolation-Continued

Step Number	Description	Indication	Action
5 (cont)			If A9 card is found to be faulty perform alignment procedures for A9 card per paragraph 3-147b and c. If card will not align replace card.
			(1) Connect ABOB P7 to TC TEST jack.
			(2) Check +10 VDC REF 1 ±0.3 VDC on ABOB between OUTPUT and COM test points, using DVM. If +10 ±0.3 VDC is not present replace A10 card.
			(3) With external DVM check A9 DVM Bus. Place probe on A9 TP1 (LO) and metal portion of Cl (HI). If +10 ±0.3 VDC is not present replace A8 card.
			(4) On ABOB check +15 IS0 and -15V IS0. If +15 and -15 ±0.75 VDC is present replace A9 card; if voltage is not present replace power conversion assembly.
		b. A2, A4, AS, A8	(1) Turn POWER OFF.
			(2) Unseat all indicated cards, except A8, in card cage.
			(3) Turn POWER ON.
			(4) Enter 90,:,5. Press STP.
			(5) If step 5 does not pass replace A8 card; if it does pass step 5, turn POWER OFF.
			(6) Reseat one card at a time. Turn POWER ON. Run step 5 after each card is reseated. Replace the card which causes step 5 to fail,
		C. A4, A5, A6, A7, A8	Same as step 5b.
6	Precision **10V** inverted	a. **A8, A9**	**NOTE** If A9 card is found to be faulty perform alignment procedures for A9 card per paragraph 3-147b and c. If card will not align replace card,
			With external DVM check A9 card on DVM Bus. Place probe on A9 TP1 (LO) and metal portion of Cl (HI) and check for -10 ±0.3 VDC. If voltage is present replace A9 card; if voltage is not present replace A8 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
6 (cont)		b. A2 thru A8	(1) Turn POWER OFF. (2) Unseat all indicated cards, except A8. (3) Turn POWER ON. (4) Enter 90,:,6. Press STP. (5) If step 6 does not pass replace A8 card; if it does pass step 6 turn POWER OFF (6) Reseat one card at a time. Turn POWER ON. Run step 6 after each card is reseated. Replace the card which causes step 6 to fail.
7	5V Bus	A8, PWR	Connect ABOB P7 to TC TEST jack. Check + 5 VDC on ABOB between COM and OUTPUT test points. If + 5 ± 0.5 VDC is present replace A8 card; if + 5 ± 0.5 VDC is not present replace power conversion assembly.
8	15V Bus	A8, PWR	Connect ABOB P7 to TC TEST jack. Check + 15 VDC on ABOB between COM and OUTPUT test points. If + 15 ± 0.75 VDC is present replace A8 card; if + 15 +0. 75 VDC is not present replace power conversion assembly.
9	-15V Bus	A8, PWR	Connect ABOB P7 to TC TEST jack. Check -15 VDC on ABOB between COM and OUTPUT test points. If -15 ± 0.75 VDC is present replace A8 card. If -15 ±0.75 VDC is not present replace power conversion assembly.
10	DVM OFF SET	A9	NOTE Perform alinement procedures for A9 card per paragraph 3-147c and d. If card will not aline replace card. Replace as indicated.
11	DVM Accuracy	A9	NOTE Perform alinement procedures for A9 card per paragraph 3-147c and d. If card will not aline replace card. Replace as indicated.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
12	Precision REF #2	A8, A12	Connect ABOB P7 to TC TEST jack. Check + 10 VDC on ABOB REF #2 between COM and OUTPUT test points. [f + 10 *0.3 VDC is not present replace A12 card if voltage is present replace A8 card.
13	ANALOG STIMULI 3.33V	A4, A l0	NOTE If A l0 card is found to be faulty perform alinement procedures for A l0 card per paragraph 3-147e and f. If card will nt aline replace card. (1) Turn POWER OFF. (2) Tag and switch A4 and A2 cards. (3) Turn POWER ON. (4) Enter 98,:,13. Press STP. (5) If step 13 passes replace A4 card; if step 13 fails replace A 10 card. (6) Remove all tags from cards.
14	ANALOG STIMULI -3.33V	A lO	Perform alinement procedures for A l0 card per paragraph 3-147e and f. If card will not aline replace card.
15	2VRMS Square wave	A9	Perform alinement procedure for A9 card per paragraph 3-147d. If card will not aline, replace card.
16	RMS Test	A1O, Al 1	NOTE If All card is found to be faulty perform alinement procedures for Al 1 card per paragraph 3-147g and h. If card will not aline properly replace card. Check for 7 ± 0.01 VRMS, 341 ±17 Hz signal between TP2 (HI) and TP3 (LO) on All card. If signal is present, replace Al0 card; if not replace Al 1 card.
17	ANALOG Processor @1341 Hz	A9, Al 1, 14	NOTE If Al 1 card is found to be faulty perform alinement procedures for Al 1 card per paragraph 3-147g and h. If card will not aline properly replace card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
17 (cont)			(1) Turn POWER OFF. (2) Replace A14 card. (3) Turn POWER ON. (4) Enter 90,:,17. Press STP. (5) If step 17 does not pass replace A11 card and re-enter 90,:,17. Press STP. (6) If step 17 does not pass replace A9 card.
18	ANALOG Processor @683 Hz	A11	Perform alinement procedures for A11 card per paragraph 3-147g and h. If card will not aline replace card.
19	Pk-Pk Detection	A2, A6, A11	(1) Turn POWER OFF. (2) Tag and switch A2 and A4 cards. (3) Turn POWER ON. (4) Enter 90,:,19. Press STP. (5) If step 19 passes replace tagged A2 card. If step 19 does not pass tag and switch A6 and A5 cards. (6) Enter 90,:,19. Press STP. (7) If step 19 passes replace tagged A6 card; if step 19 does not pass replace A11 card. (8) Remove all tags from cards.
20	X1 Reference	A4, A10	(1) Turn POWER OFF. (2) Tag and switch A4 and A2 cards. (3) Turn POWER ON. (4) Enter 90,:,20. Press STP. (5) If step 20 passes, replace A4 card; if step 20 does not pass replace A10 card. (6) Remove all tags from cards.
21	Signal Shorting	A1, A3	(1) Turn POWER OFF. (2) Put Al card on extender card. (3) Turn POWER ON. (4) Enter 90,:,21. Press STP.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
21 (cont)			(5) Measure across A1 Pin 55 (HI) and Pin 21 (LO) for +0.90 to +1.10 VDC. If +1.00 VDC is present replace A1 card; if +1.00 VDC is not present replace A3 card.
22	X1 Amplifier	A4, A7, A11	(1) Turn POWER OFF.
			(2) Tag and switch A4 and A2 cards.
			(3) Turn POWER ON.
			(4) Enter 90,:,22. Press STP.
			(5) If step 22 passes replace tagged A4 card; if step 22 does not pass tag and switch A7 and A6 cards.
			(6) Enter 90,:,22. Press STP.
			(7) If step 22 passes replace tagged A7 card; if step 22 does not pass replace A11 card.
			(8) Remove all tags from cards.
23	X10 Amplifier	A11	Replace as indicated.
24	PSD Rejection	A3, A5, A11	(1) Place oscilloscope probe on A9 TP1 (LO) and metal portion of C1 (HI) and check for a 1 ±0.5 VRMS, 100 ±5 Hz signal. If signal is present replace A11 card; if signal is not present, turn POWER OFF. Tag and switch A7 and A5 card.
			(2) Turn POWER ON.
			(3) Enter 90,:,24. Press STP.
			(4) If step 24 passes replace tagged A5 card; if step 24 does not pass replace A3 card.
25	PSD Slope	A11	Replace as indicated.
26	Programmer Interface Bit	A13	Replace as indicated.
27	Programmer Interface Bit	A13	Replace as indicated.
28	Programmer Interface Bit	A13	Replace as indicated.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
29	Programmer Interface Bit	A13	Replace as indicated.
30	Printer	Not Used	None
31	Close A6-K5 relay.	A6	Replace A6 card.
32	Close A6-K7 relay.	A6	Replace A6 card.
33	Close A6-K11 relay.	A6	Replace A6 card.
34	Close A6-K12 relay.	A6	Replace A6 card.
35	Close A6-K15 relay.	A6	Replace A6 card.
36	Close A6-K16 relay.	A6	Replace A6 card.
37	Close A6-K1 relay.	A6	Replace A6 card.
38	Close A6-K2 relay.	A6	Replace A6 card.
39	Close A6-K4 relay.	A6	Replace A6 card.
40	Close A7-K1 relay.	A7	Replace A7 card.
41	Close A7-K2 relay.	A7	Replace A7 card.
42	Close A7-K3 relay.	A7	Replace A7 card.
43	Close A7-K4 relay.	A7	Replace A7 card.
44	Close A7-K5 relay.	A7	Replace A7 card.
45	Close A7-K6 relay.	A7	Replace A7 card.
46	Close A7-K7 relay.	A7	Replace A7 card.
47	Close A7-K9 relay.	A7	Replace A7 card.
48	Close A7-K10 relay.	A7	Replace A7 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
49	Close A7-K11 relay.	A7	Replace A7 card.
50	Close A7-K12 relay.	A7	Replace A7 card.
51	Close A7-K13 relay.	A7	Replace A7 card.
52	Close A7-K14 relay.	A7	Replace A7 card.
53	Close A7-K15 relay.	A7	Replace A7 card.
54	Close A7-K16 relay.	A7	Replace A7 card.
55	Close A4-K3 relay.	A4	Replace A4 card.
56	Close A4-K5 relay.	A4	Replace A4 card.
57	Close A4-K6 relay.	A4	Replace A4 card.
58	Close A4-K7 relay.	A4	Replace A4 card.
59	Close A5-K4 relay.	A5	Replace AS card.
60	Close A5-K6 relay.	A5	Replace A5 card.
61	Close A5-K7 relay.	A5	Replace A5 card.
62	Close A5-K10 relay.	A5	Replace A5 card.
63	Close A5-K11 relay.	A5	Replace A5 card.
64	Close A5-K12 relay.	A5	Replace A5 card.
65	Close A5-K13 relay.	A5	Replace A5 card.
66	Close A5-K14 relay.	A5	Replace A5 card.
67	Close A5-K15 relay.	A5	Replace A5 card.
68	Close A5-K16 relay.	A5	Replace A5 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
69	Close A5-K3 relay.	A5, A12	(1) Turn POWER OFF. (2) Tag and switch A5 and A6 cards. (3) Turn POWER ON. (4) Enter 90,:,69. Press STP. (5) If step 69 passes replace tagged A5 card; if step 69 does not pass replace A12 card.
70	Close K13, K14, K15, and K16 relays on AZ card. Test K7, K11, K12, K13 and K14 relays on A1 card for short to ground.	A1	Replace A1 card.
71	Close A2-K13 relay.	A2	Replace A2 card.
72	Close A2-K14 relay.	A2	Replace A2 card.
73	Close A2-K15 relay.	A2	Replace A2 card.
74	Close A2-K16 relay.	A2	(1) Perform alinement procedure for A10 card per paragraph 3-147i. If card will not aline replace card. (2) Replace A2 card.
75	Close A5-K1 and A5-K5 relays. Test current source on A10 card.	A10	Replace A10 card.
76	Close A5-K1 relay.	A5	Replace A5 card.
77	Close A5-K5 relay.	A5	Replace A5 card.
78	Close A5-K2 relay.	A5	Replace A5 card.
79	close A5-K9 relay.	A5	Replace A5 card.

Table 3-2. ***Test*** *90* ***TC Fault Isolation*** *- Continued*

Step Number	Description	Indication	Action
80	Close A8-K1 and A8-K4 relay.	A8	Replace A8 card.
81	Close A8-K1 A8-K5 relay.	A8	Replace A8 card.
82	Close A8-K12 relay.	A8	Replace A8 card.
83	Close A8-K13 relay.	A8	Replace A8 card.
84	Close A8-K14 relay.	A8	Replace A8 card.
85	Close A8-K15 relay.	A8	Replace A8 card.
86	Close A8-K16 relay.	A8	Replace A8 card.
87	Close A4-K2 relay.	A4	Replace A4 card.
88	Close A4-K1 relay.	A1, A4	(1) Turn POWER OFF. (2) Tag and switch A4 and A5 cards. (3) Turn POWER ON. (4) Enter 90,:,88. Press STP. (5) If step 88 passes, replace tagged A4 card; if step 88 does not pass, replace A1 card.
89	Close A7-K8 relay. Test A4-K10 relay.	A4	Replace A4 card.
90	Close A7-K8 relay. Test A4-K11 relay.	A4	Replace A4 card.
91	Close A7-K8 relay. Test A4-K12 relay	A4	Replace A4 card.
92	Close A5-K8 relay. Test A3-K2 relay.	A3	Replace A3 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
92	Close A5-K8 relay. Test A3-K2 relay.	A3	Replace A3 card.
93	Close A6-K13 and A6-K14 relays. Test K7 on A3 card.	A3	Replace A3 card.
94	Close K7 on A3 card. Test A6-K13 relay.	A6	Replace A6 card.
95	Close K7 on A3 card. Test A6-K14 relay.	A6	Replace A6 card.
96	Close A13-K2 relay. Read PIA U13-PBO = 1.	A13	Replace A13 card.
97	Close A13-K2 relay. Read PIA U13-PA (0 thru 6) = 1.	A13	Replace A13 card.
98	Close A13-K2 relay. Read PIA U7-PB (2,4, 5,7) = 1 and U7-PB (0,1, 3,6) = 1	A13	Replace A13 card.
99	Close A13-K2 relay. Read PIA U7-PA (1,2, 4,5,6,7) = 1 and U7-PA (0,3) = 0.	A13	Replace A13 card.
100	Close A13-K12 and A13-K13 relays. Read PIA U7-PA (6,7) = 0.	A13	Replace A13 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
101	Leave A11 PIA in initial state. Read PIA U1-PB4 = 1 and U1-PB (5,6,7)=0	A10, A11, A12	(1) Turn POWER OFF. (2) Unseat A10 card. (3) Turn POWER ON. (4) Enter 90,:,101. Press STP. (5) If step 101 passes, replace A10 card. (6) If step 101 fails turn POWER OFF. (7) Reseat A10 and unseat A12 card. (8) Turn POWER ON. (9) Enter 90,:,101. Press STP. (10) If step 101 passes replace A12 card; if step 101 does not pass replace A11 card.
102	Close A13-K2 relay. Read A11 PIA U1-PB (4,7) = 1 and U1PB (5,6) = 0	A11	Replace A11 card.
103	Close A10-K and A10-K2 relays. Read A11 PIA U1-PB5 = 1.	A1, A11	(1) Turn POWER OFF. (2) Unseat A1 card. (3) Turn POWER ON. (4) Enter 90,:,103, Press STP. (5) If step 103 passes replace A1 card; if step 103 does not pass replace A11 card.
104	Close A10-K3 and A10-K4 relays. Read A11 PIA U1-PB6 = 1.	A11	Replace A11 card.
105	Close A10-K3 relay. Read A11 PIA U1-PB6 = 1.	A10	Replace A10 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
106	Close A10-K2 relay. Read A11 PIA U1-PB5 = 1.	A1, A10	(1) Turn POWER OFF. (2) Unseat A1 card. (3) Turn POWER ON. (4) Enter 90,:,106. Press STP. (5) If step 106 passes replace A1 card; if step 106 does not pass replace A10 card.
107	Close A10-K1 relay. Read A11 PIA U1-PB5 = 1.	A10	Replace A10 card.
108	Close A10-K2 and A1-K8 relays. Read A11 PIA U1-PB5 = 0.	A1	Replace A1 card.
109	Clear A12 PIA U6-PB (0 thru 7). Read U6-PA (1 thru 5) = 0.	A12	Replace A12 card.
110	Set A12 PIA U6-PB (0 thru 3) = 1. Read U6-PA (1 thru 5) = 1.	A12	Replace A12 card.
111	Reset-Enable A12 F/F. Clear PIA U1-PB (0 thru 7). Read PIA U6-PB (4 thru 7) = 0.	A12	Replace A12 card
112	Reset-Enable A12 F/F. Set PIA U1-PB (4 thru 7) = 1. Read PIA U6-PB (4 thru 7) = 1.	A12	Replace A12 card.

*Table 3-2. **Test** 90 **TC** Fault Isolation - Continued*

Step Number	Description	Indication	Action
113	Clear A12 PIA U1-PB (0 thru 7). Read U1-PA.	A12	Replace A12 card.
114	Set 12 PIA U1-PB (0 thru 3) = 1. Read U1-PA (0 thru 3) = 1 .	A12	Replace A12 card.
115	Set A12 PIA U1-CA2 = 1. Read A11 PIA U1-PB4 = 0.	A11, A12	(1) Replace A12 card. (2) Replace A11 card.
116	Close A11-K1 relay. Read PIA U1-PB4 = 1.	A11	Replace A11 card.
117	Close A13-K2 relay. Test A3-K9 relay.	A3	Replace A3 card.
118	Close A13-K2 relay. Test A3-K10 relay.	A3	Replace A3 card.
119	Close A13-K2 relay. Test A3-K11 relay.	A3	Replace A3 card.
120	Close A13-K2 relay. Test A3-K12 relay.	A3	Replace A3 card.
121	Close A13-K2 relay. Test A3-K13 relay.	A3	Replace A3 card.
122	Close A13-K2 relay. Test A3-K14 relay.	A3	Replace A3 card.
123	Close A13-K2 relay. Test A3-K15 relay.	A3	Replace A3 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
124	Close A2-K11 and A2-K12 relays. Test A1-K1, A1-K9, and A1-K10 relays for short to ground.	A1	Replace A1 card.
125	Close A2-K11 relay.	A2	Replace A2 card.
126	Close A2-K12 relay.	A2	Replace A2 card.
127	Close A6-K8, A4-K13, and A4-K14 relays. Test A1-K1, A1-K9, and A1-K10 for short to ground.	A1	Replace A1 card.
128	Close A6-K8 relay. Test A4-K13 relay.	A4	Replace A4 card.
129	Close A6-K8 relay. Test A4-K14 relay.	A4	Replace A4 card.
130	Close A6-K8 relay. Test A2-K1 relay.	A2	Replace A2 card.
131	Close A2-K3, A2-K4, A3-K3, and A3-K4 relays. Test A1-K3 and A1-K4 relays for short to ground.	A1	Replace A1 card.
132	Close A3-K3 and A3-K4 relays. Test A2-K3 relay.	A2	Replace A2 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
133	Close A3-K3 and A3-K4 relays. Test A2-K4 relay.	A2	Replace A2 card.
134	Close A2-K3 and A2-K4 relays. Test A3-K3 relay.	A3	Replace A3 card.
135	Close A2-K3 and A2-K4 relays. Test. A3-K4 relay.	A3	Replace A3 card.
136	Close A2-K11 and A2-K12 relays. Test A1-K1 relay.	A1	Replace A1 card.
137	Close A2-K11 and A2-K12 relays. Test A1-K9 relay.	A1	Replace Al card.
138	Close A2-K11 and A2-K12 relays. Test A1-K10 relay.	A1	Replace Al card.
139	Close A2-K9, A2-K10, A3-K5, and A3-K6 relays. Test A1-K5 and A1-K6 relays for short to ground.	A1	Replace Al card.
140	Close A3-K5 and A3-K6 relays. Test A2-K9 relay.	A2	Replace A2 card.
141	Close A3-K5 and A3-K6 relays. Test A2-K10 relay.	A2	Replace A2 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
142	Close A2-K9 and A2-K10 relays. Test A3-K6 relay.	A3	Replace A3 card.
143	Close A2-K13 thru A2-K16 relays. Test A1-K7 relay.	A1	Replace A1 card.
144	Close A2-K13 thru A2-K16 relays. Test A1-K11 relay.	A1	Replace A1 card.
145	Close A2-K13 thru A2-K16 relays. Test A1-K12 relay.	A1	Replace A1 card.
146	Close A2-K13 thru A2-K16 relays. Test A1-K13 relay.	A1	Replace A1 card.
147	Close A2-K13 thru A2-K16 relays. Test A1-K14 relay.	A1	Replace A1 card.
148	Close A4-K1 relay. Test A1-K2 relay.	A1	Replace A1 card.
149	Close A10-K4 relay. Read A11 PIA U1-PB6 = 1.	A10	Replace A10 card.
150	Close A2-K9, A2-K10, and A3-K5 relays. Test A1-K6 relay.	A1	Replace A1 card.
151	Close A3-K5 and A7-K8 relays. Test A2-K5 relay.	A2	Replace A2 card.
152	Close A3-K5 and A7-K8 relays. Test A2-K6 relay.	A2	Replace A2 card.

Table 3-2. Test 90 TC Fault Isolation - Continued

Step Number	Description	Indication	Action
153	Close A2-K3, A2-K4, and A3-K3 relays. Test A1-K3 relays.	A1	Replace A1 card.
154	Close A2-K3, A2-K4, and A3-K3 relays. Test A1-K4 relay.	A1	Replace A1 card.
155	Close A8-K2 and A8-K1 relays. Test A8-K2 relay.	A8	Replace A8 card.
156	Close A6-K9 relay. Test A6-K9 relay.	A6	Replace A6 card.
157	Close A6-K10 relay. Test A6-K10 relay.	A6	Replace A6 card.
158	Close A4-K15 and A6-K9 relays. Test A4-K15 relay.	A4	Replace A4 card.
159	Close A4-K16 and A6-K9 relays. Test A4-K16 relay.	A4	Replace A4 card.
160	Close A2-K11, A2-K12, and A8-K3 relays. Test A8-K3 relay.	A8	Replace A8 card.
161	Close A2-K11, A2-K12, and A8-K3 relays. Test A8-K3 relay.	A8	Replace A8 card.

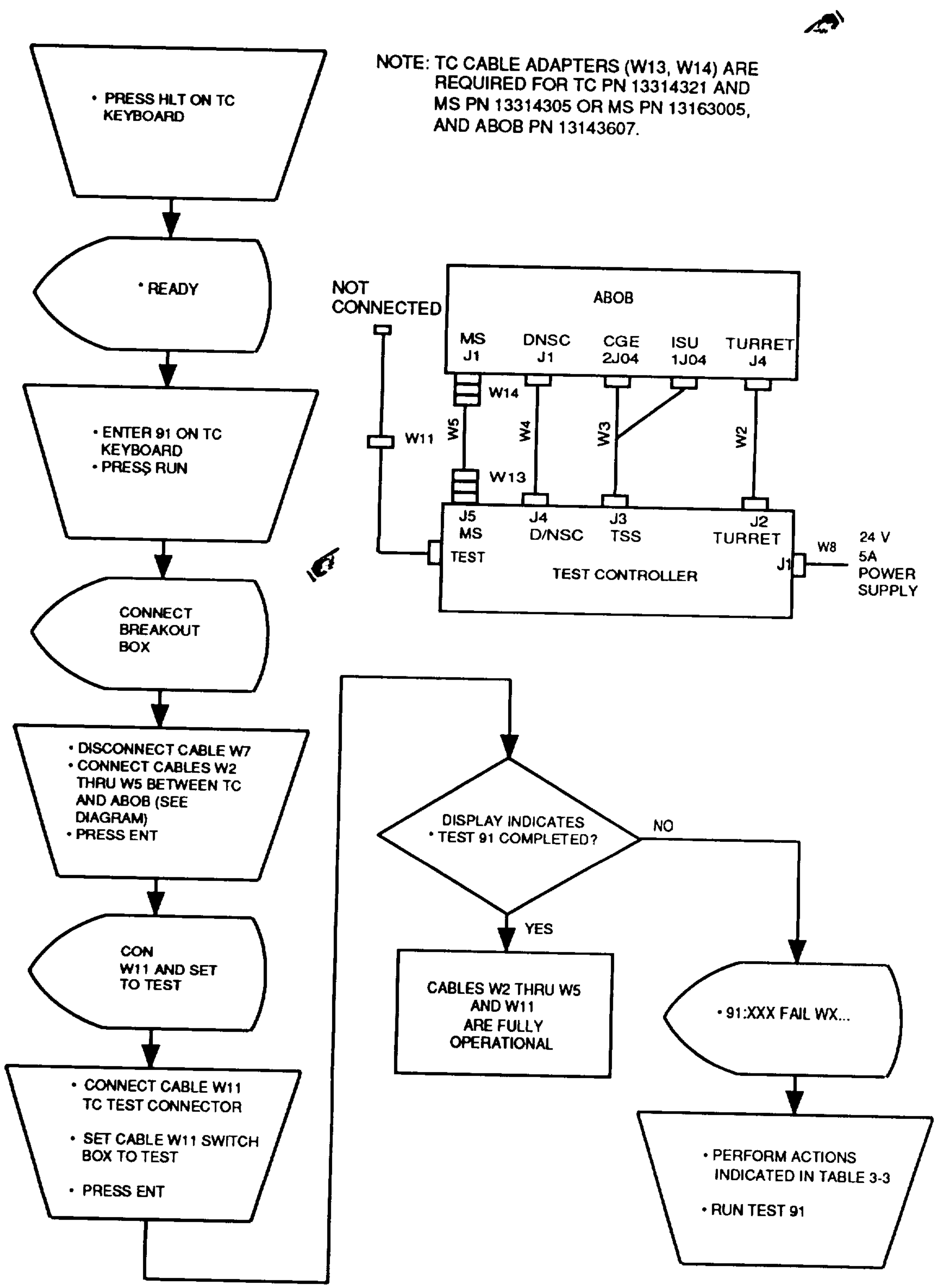


Figure 3-10. Test 91 Cable Fault Isolation

Table 3-3. Test 91 Cable Fault Isolation

Step Number	Description	Indication	Action
1	Close A6-K5 relay.	W2, W4	(1) If D/NSC failed in test 00, replace W4 cable. If D/NSC passed, replace W2 cable.
2	Close A6-K7 relay.	W2	Replace W2 cable.
3	Close A6-K11 relay.	W2	Replace W2 cable.
4	Close A6-K12 relay.	W2	Replace W2 cable.
5	Close A6-K15 relay	W2	Replace W2 cable.
6	Close A6-K16 relay	W2	Replace W2 cable.
7	Close A6-K1 relay.	W2	Replace W2 cable.
8	Close A6-K2 relay.	W2	Replace W2 cable.
9	Close A6-K4 relay.	W2	Replace W2 cable.
10	Close A7-K1 relay.	W2	Replace W2 cable.
11	Close A7-K2 relay.	W2	Replace W2 cable.
12	Close A7-K3 relay.	W2	Replace W2 cable.
13	Close A7-K4 relay.	W2	Replace W2 cable.
14	Close A7-K5 relay.	W2	Replace W2 cable.
15	Close A7-K6 relay.	W2	Replace W2 cable.
16	Close A7-K7 relay.	W2	Replace W2 cable.
17	Close A7-K9 relay.	W2	Replace W2 cable.
18	Close A7-K10 relay.	W2	Replace W2 cable.
19	Close A7-K11 relay.	W2	Replace W2 cable.
20	Close A7-K12 relay.	W2	Replace W2 cable.
21	Close A7-K13 relay.	W2	Replace W2 cable.
22	Close A7-K14 relay.	W2	Replace W2 cable.
23	Close A7-K15 relay.	W2	Replace W2 cable.
24	Close A7-K16 relay.	W2	Replace W2 cable.
25	Close A4-K3 relay.	W3	Replace W3 cable.
26	Close A4-K5 relay.	W3	Replace W3 cable.
27	Close A4-K6 relay.	W3	Replace W3 cable.
28	Close A4-K7 relay.	W3	Replace W3 cable.
29	Close A5-K4 relay.	W3	Replace W3 cable.
30	Close A5-K6 relay.	W3	Replace W3 cable.

Table 3-3. Test 91 Cable Fault Isolation - Continued

Step Number	Description	Indication	Action
31	Close A5-K7 relay.	W3	Replace W3 cable.
32	Close A5-K 10 relay.	W3	Replace W3 cable.
33	Close A5-K11 relay.	W3	Replace W3 cable.
34	Close A5-K12 relay.	W3	Replace W3 cable.
35	Close A5-K13 relay	W3	Replace W3 cable.
36	Close A5-K14 relay.	W3	Replace W3 cable.
37	Close A5-K15 relay.	W3	Replace W3 cable.
38	Close A5-K16 relay.	W3	Replace W3 cable.
39	Close A5-K3 relay.	W3, W5	If MS failed in test 00, replace W5 cable. If MS passed, replace W3 cable.
40	Close K13, K14, K15, and K16 relays on A2 card. Test K7, K11, K12, K13, and K14 relays on A1 card.	W3	Replace W3 cable.
41	Close A2-K13 relay.	W3	Replace W3 cable.
42	Close A2-K14 relay.	W3	Replace W3 cable.
43	Close A2-K15 relay.	W3	Replace W3 cable.
44	Close A2-K16 relay.	W3	Replace W3 cable.
45	Close A5-K1 and A5-K5 relays. Test current source on A10 card.	W3	Replace W3 cable.
46	Close A5-K1 relay.	W3	Replace W3 cable.
47	Close A5-K5 relay.	W3	Replace W3 cable.
48	Close A5-K2 relay.	W3, W4	(1) If D/NSC failed in test 00, replace W4 cable. If D/NSC passed, replace W3 cable.
49	Close A5-K9 relay.	W3, W4	(1) If D/NSC failed in test 00, replace W4 cable. If D/NSC passed, replace W3 cable.
50	Close A8-K1 and A8-K4 relays.	W3, W4	(1) If D/NSC failed in test 00, replace W4 cable. If D/NSC passed, replace W3 cable.

Table 3-3. Test 91 Cable Fault Isolation - Continued

Step Number	Description	Indication	Action
51	Close A8-K1 and A8-K5 relays.	W3	Replace W3 cable.
52	Close A8-K12 relay.	W5	Replace W5 cable.
53	Close A8-K13 relay.	W5	Replace W5 cable.
54	Close A8-K14 relay.	W5	Replace W5 cable.
55	Close A8-K15 relay.	W5	Replace W5 cable.
56	Close A8-K16 relay.	W5	Replace W5 cable.
57	Close A4-K2 relay.	W3	Replace W3 cable.
58	Close A4-K1 relay.	W3	Replace W3 cable.
59	Close A7-K8 relay. Test A4-K10 relay.	W3	Replace W3 cable.
60	Close A7-K8 relay. Test A4-K11 relay.	W3	Replace W3 cable.
61	Close A7-K8 relay Test A4-K14 relay.	W3	Replace W3 cable.
62	Close A5-K8 relay. Test A3-K2 relay.	W3	Replace W3 cable.
63	Close A6-K13 and A6-K14 relays. Test K7 on A3 card.	W2	Replace W2 cable.
64	Close K7 on A3 card. Test A6-K13 relay.	W2	Replace W2 cable.
65	Close K7 on A3 card. Test A6-K14 relay.	W2	Replace W2 cable.
66	Close A13-K2 relay. Read PIA U13-PBO = 1.	W3	This is an internal test. Do not replace W3 cable. Run test 90.
67	Close A13-K2 relay. Read PIA U13-PA (0 thru 6) = 1.	W3	Replace W3 cable.
68	Close A13-K2 relay Read PIA U7-PB (2, 4, 5, 7)= 1 and U7-PB (0,1 ,3,6) = 0.	W3	Replace W3 cable.

Table 3-3. Test 91 Cable Fault Isolation - Continued

Step Number	Description	Indication	Action
69	Close A13-K2 relay. Read PIA U7-PA (1, 2,4,5,6,7) = 1 and U7-PA (0,3) = 0.	W3	Replace W3 cable.
70	Close A13-K2 and A13-K3 relays. Read PIA U7-PA (6,7) = 0.	W3	Replace W3 cable.
71	Leave A11 PIA in initial state. Read PIA U1-PB4 = 1 and U1-PB (5,6,7) = 0.	W3	Replace W3 cable.
72	Close A13-K2 relay. Read A11 PIA U1-PB (4,7) = 1 and U1-PB (5,6) = 0.	W3	Replace W3 cable.
73	Close A10-K1 and A10-K2 relays. Read A11 PIA U1-PB5 = 1.	W3	Replace W3 cable.
74	Close A10-K3 and A10-K4 relays. Read A11 PIA U1-PB6 = 1.	W3	Replace W3 cable.
75	Close A10-K3 relay. Read A11 PIA U1-PB6 = 1.	W3	Replace W3 cable.
76	Close A10-K2 relay. Read A11 PIA U1-PB5 = 1.	W3	Replace W3 cable.
77	Close A10-K1 relay. Read A11 PIA U1-PB5 = 1.	W3	Replace W3 cable.
78	Close A10-K2 and A1-K8 relays. Read A11 PIA U1-PB5 = 0.	W3	Replace W3 cable.
79	Clear A12 PIA U6-PB (0 thru 7). Read U6-PA (1 thru 5) = 0.	W5	Replace W5 cable.
80	Set A12 PIA U6-PB (0 thru 3) = 1. Read U6-PA (1 thru 5) = 1.	W5	Replace W5 cable.

Table 3-3. Test 91 Cable Fault Isolation - Continued

Step Number	Description	Indication	Action
81	Reset-Enable A12 F/E Clear PIA U1-PB (0 thru 7). Read PIA U6-PB (4 thru 7) = 0.	W2, W4	(1) If D/NSC failed in test 00, replace W4 cable. If D/NSC passed, replace W2 cable.
82	Reset-Enable A12 F/F. Set PIA U1-PB (4 thru 7) = 1. Read PIA U6-PB (4 thru 7) = 1.	W2, W4	(1) If D/NSC failed in test 00, replace W4 cable. If D/NSC passed, replace W2 cable.
83	Clear A12 PIA U1-PB (0 thru 7). Read U1-PA (0 thru 3) = 0.	W4	Replace W4 cable.
84	Set A12 PIA U1-PB (0 thru 3) = 1. Read U1-PA (0 thru 3) = 1.	W4	Replace W4 cable.
85	Set 12 PIA U1-CA2 = 1. Read A11 PIA U1-PB4 = 0.	W4, W5	If MS failed in test 00, replace W5 cable. If MS passed, replace W4 cable.
86	Close A11-K1 relay. Read PIA U1-PB4 = 1.	W3	Replace W3 cable.
87	Close A13-K2 relay. Test A3-K9 relay.	W3	Replace W3 cable.
88	Close A13-K2 relay. Test A3-K10 relay.	W3	Replace W3 cable.
89	Close A13-K2 relay. Test A3-K11 relay.	W3	Replace W3 cable.
90	Close A13-K2 relay. Test A3-K12 relay.	W3	Replace W3 cable.
91	Close A13-K2 relay. Test A3-K13 relay.	W3	Replace W3 cable.
92	Close A13-K2 relay. Test A3-K14 relay.	W3	Replace W3 cable.
93	Close A13-K2 relay. Test A3-K15 relay.	W3	Replace W3 cable.

Table 3-3. Test 91 Cable Fault Isolation - Continued

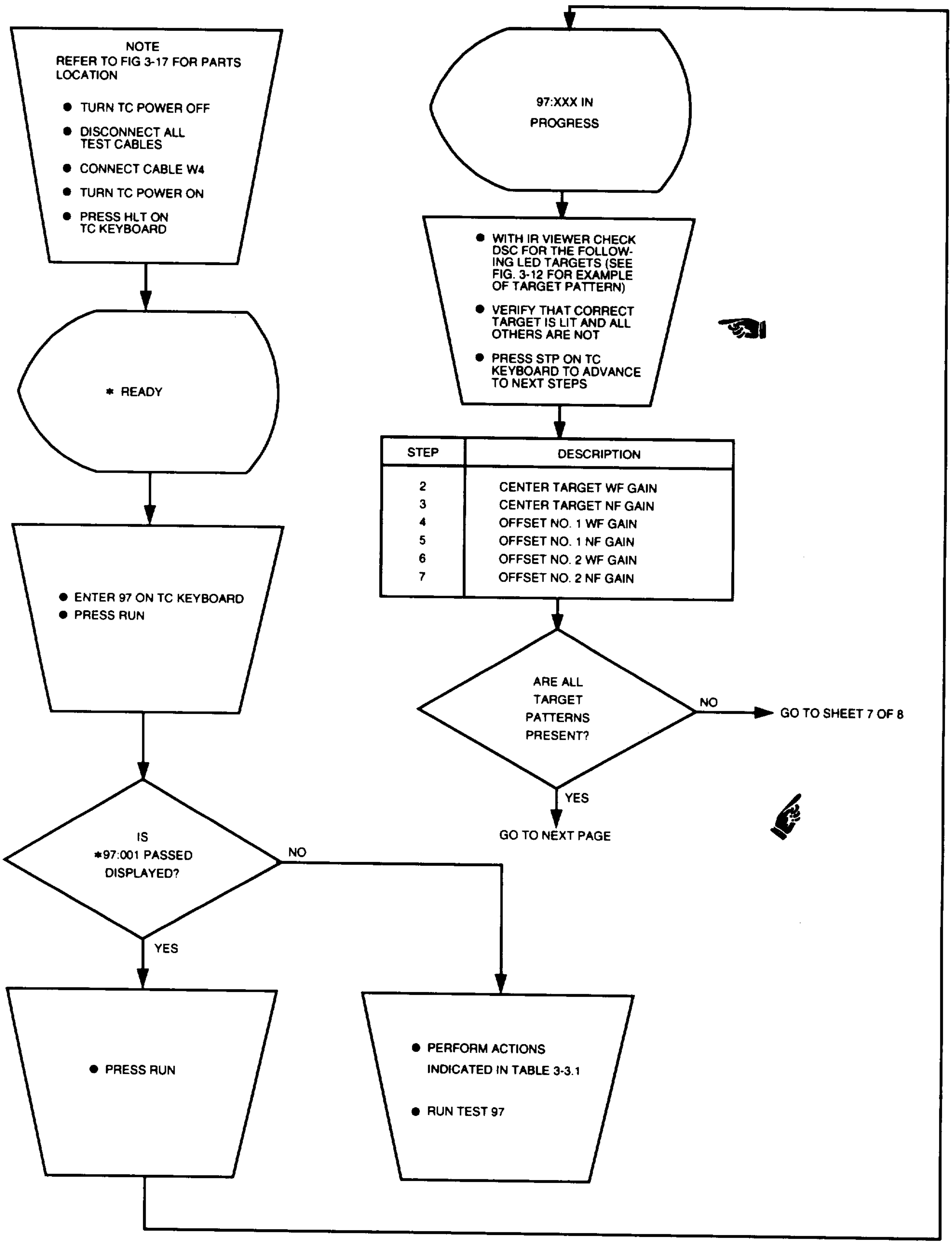
Step Number	Description	Indication	Action
94	Close A2-K11 and A2-K12 relays. Test A1-K1, A1-K9, and A1-K10 relays.	W3, W5	If MS failed in test 00, replace W5 cable. If MS passed, replace W3 cable.
95	Close A2-K11 relay.	W3	Replace W3 cable.
96	Close A2-K12 relay.	W3	Replace W3 cable.
97	Close A6-K8, A4-K13 and A4-K14 relays. Test A1-K1, A1-K9, and A1-K10 relays.	W3, W5	If MS failed in test 00, replace W5 cable. If MS passed, replace W3 cable.
98	Close A6-K8 relay. Test A4-K13 relay.	W3	Replace W3 cable.
99	Close A6-K8 relay. Test A4-K14 relay.	W3	Replace W3 cable.
100	Close A6-K8 relay. Test A2-K1 relay.	W3	Replace W3 cable.
101	Close A2-K3, A2-K4, A3-K3, and A3-K4 relays. Test A1-K3 and A1-K4 relays.	W3	Replace W3 cable.
102	Close A3-K3 and A3-K4 relays. Test A2-K3 relay.	W3	Replace W3 cable.
103	Close A3-K3 and A3-K4 relays. Test A2-K4 relay.	W3	Replace W3 cable.
104	Close A2-K3 and A2-K4 relays. Test A3-K3 relay.	W3	Replace W3 cable.
105	Close A2-K3 and A2-K4 relays. Test A3-K4 relay.	W3	Replace W3 cable.
106	Close A2-K11 and A2-K12 relays. Test A1-K1 relay.	W3, W5	If MS failed in test 00, replace W5 cable. If MS passed, replace W3 cable.
107	Close A2-K11 and A2-K12 relays. Test A1-K9 relay.	W3, W5	If MS failed in test 00, replace W5 cable. If MS passed, replace W3 cable.
108	Close A2-K11 and A2-K12 relays. Test A1-K10 relay.	W3, W5	If MS failed in test 00, replace W5 cable. If MS passed, replace W3 cable.

Table 3-3. Test 91 Cable Fault Isolation - Continued

Step Number	Description	Indication	Action
109	Close A2-K9, A2-K10, A3-K5, and A3-K6 relays. Test A1-K5 and A1-K6 relays.	W3	Replace W3 cable.
110	Close A3-K5 and A3-K6 relays. Test A2-K9 relay.	W3	Replace W3 cable.
111	Close A3-K5 and A3-K6 relays. Test A2-K10 relay.	W3	Replace W3 cable.
112	Close A2-K9 and A2-K10 relays. Test A3-K6 relay.	W3	Replace W3 cable.
113	Close A2-K13 thru A2-K16 relays. Test A1-K7 relay.	W3	Replace W3 cable.
114	Close A2-K13 thru A2-K16 relays. Test A1-K11 relay.	W3	Replace W3 cable.
115	Close A2-K12 thru A2-K16 relays. Test A1-K12 relay.	W3	Replace W3 cable.
116	Close A2-K13 thru A2-K16 relays. Test A1-K13 relay.	W3	Replace W3 cable.
117	Close A2-K13 thru A2-K16 relays. Test A1-K14 relay.	W3	Replace W3 cable.
118	Close A4-K1 relay. Test A1-K2 relay.	W3	Replace W3 cable.
119	Close A10-K4 relay. Read A11 PIA U1-PB6 = 1.	W3	Replace W3 cable.
120	Close A2-K9, A2-K10, and A3-K5 relays. Test A1-K6 relay.	W3	Replace W3 cable.
121	Close A3-K5 and A7-K8 relays. Test A2-K5 relay.	W3	Replace W3 cable.

Table 3-3. Test 91 Cable Fault Isolation - Continued

Step Number	Description	Indication	Action
122	Close A3-K5 and A7-K8 relays. Test A2-K6 relay.	W3	Replace W3 cable.
123	Close A2-K3, A2-K4, and A3-K3 relays. Test A1-K3 relay.	W3, W4	This is an internal test. Do not replace W3 or W4 cables. Run test 90.
124	Close A2-K3, A2-K4, and A3-K3 relays. Test A1-K4 relay.	W3, W4	(1) If D/NSC failed in test 00, replace W4 cable. If D/NSC passed, replace W3 cable.
125	Close A8-K1 and A8-K2 relays. Test A8-K2 relays.	W11	Replace W11 cable.
126	Close A6-K9 relay. Test A6-K9 relay.	W3	Replace W3 cable.
127	Close A6-K10 relay. Test A6-K10 relay.	W3	Replace W3 cable.
128	Close A4-K15 and A6-K9 relays. Test A4-K15 relay.	W3	Replace W3 cable.
129	Close A4-K16 and A6-K9 relays. Test A4-K16 relay.	W3	Replace W3 cable.
130	Close A2-K11, A2-K12, and A8-K3 relays. Test A8-K3 relay.	W3	Replace W3 cable.
131	Close A2-K11, A2-K12, and A8-K3 relays. Test A8-K3 relay.	W3	Replace W3 cable.



STEP	DESCRIPTION
2	CENTER TARGET WF GAIN
3	CENTER TARGET NF GAIN
4	OFFSET NO. 1 WF GAIN
5	OFFSET NO. 1 NF GAIN
6	OFFSET NO. 2 WF GAIN
7	OFFSET NO. 2 NF GAIN

Figure 3-11. Test 97 D/NSC Fault Isolation (Sheet 1 of 8)

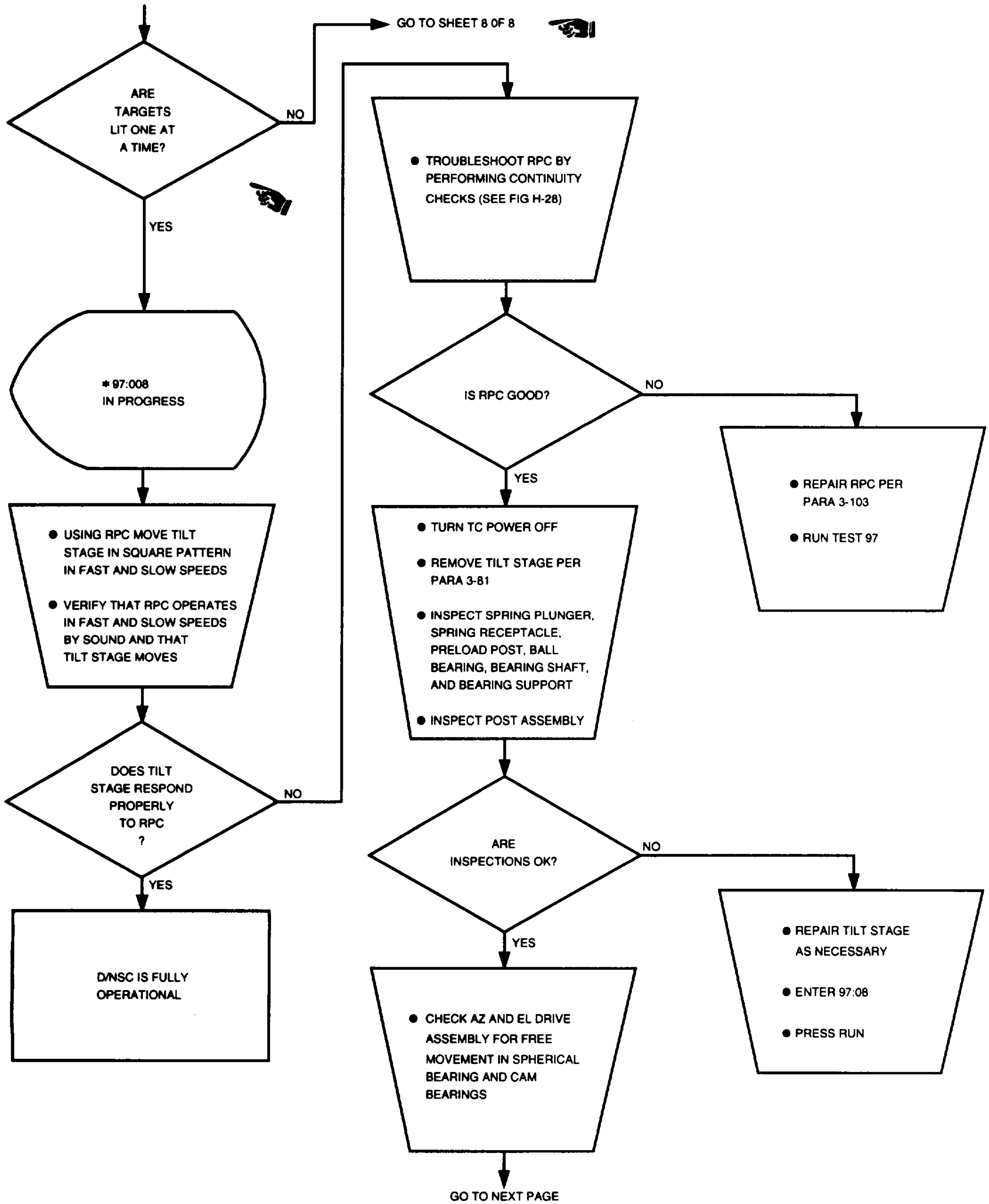


Figure 3-11. Test 97 D/NSC Fault Isolation (Sheet 2 of 8)

ARE BEARINGS GOOD?

NO →

- REPLACE AZ DRIVE ASSEMBLY PER PARA 3-83 AS REQUIRED
- REPLACE EL DRIVE ASSEMBLY PER PARA 3-90 AS REQUIRED
- ENTER 97:08
- PRESS RUN

YES ↓

WERE BOTH THE AZ AND EL MOTORS HEARD?

NO → GO TO NEXT PAGE

YES ↓

WITH SPEED SWITCH DEPRESSED, DID TILT STAGE AZ AND EL MOTOR SPEED UP?

NO →

- REPLACE A1 CARD PER PARA 3-96
- RUN TEST 97

YES ↓

- CHECK LINKAGE BETWEEN AZ MOTOR AND ECCENTRIC CAM SHAFT BY GRABBING ROLL PIN AND ATTEMPTING TO ROTATE SHAFT
- CHECK LINKAGE BETWEEN EL MOTOR AND ECCENTRIC CAM SHAFT

↓

DID SHAFT MOVE ?

YES →

- TIGHTEN SCREWS TO SECURE LINKAGE(S)
- ENTER 97:08
- PRESS RUN

NO ↓

- REPLACE AZ GEAR MOTOR PER PARA 3-84.1 AS REQUIRED
- REPLACE EL GEAR MOTOR PER PARA 3-91.1 AS REQUIRED
- RUN TEST 97

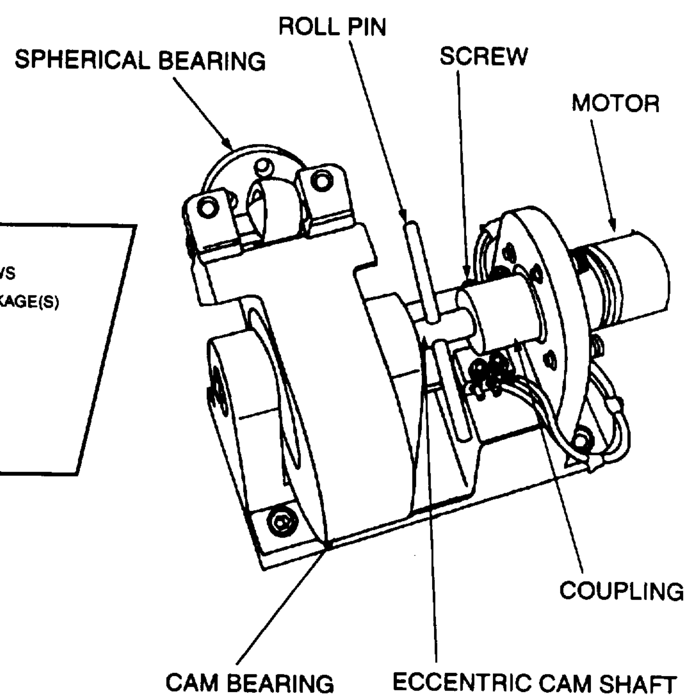


Figure 3-11. Test 97 D/NSC Fault Isolation (Sheet 3 of 8)

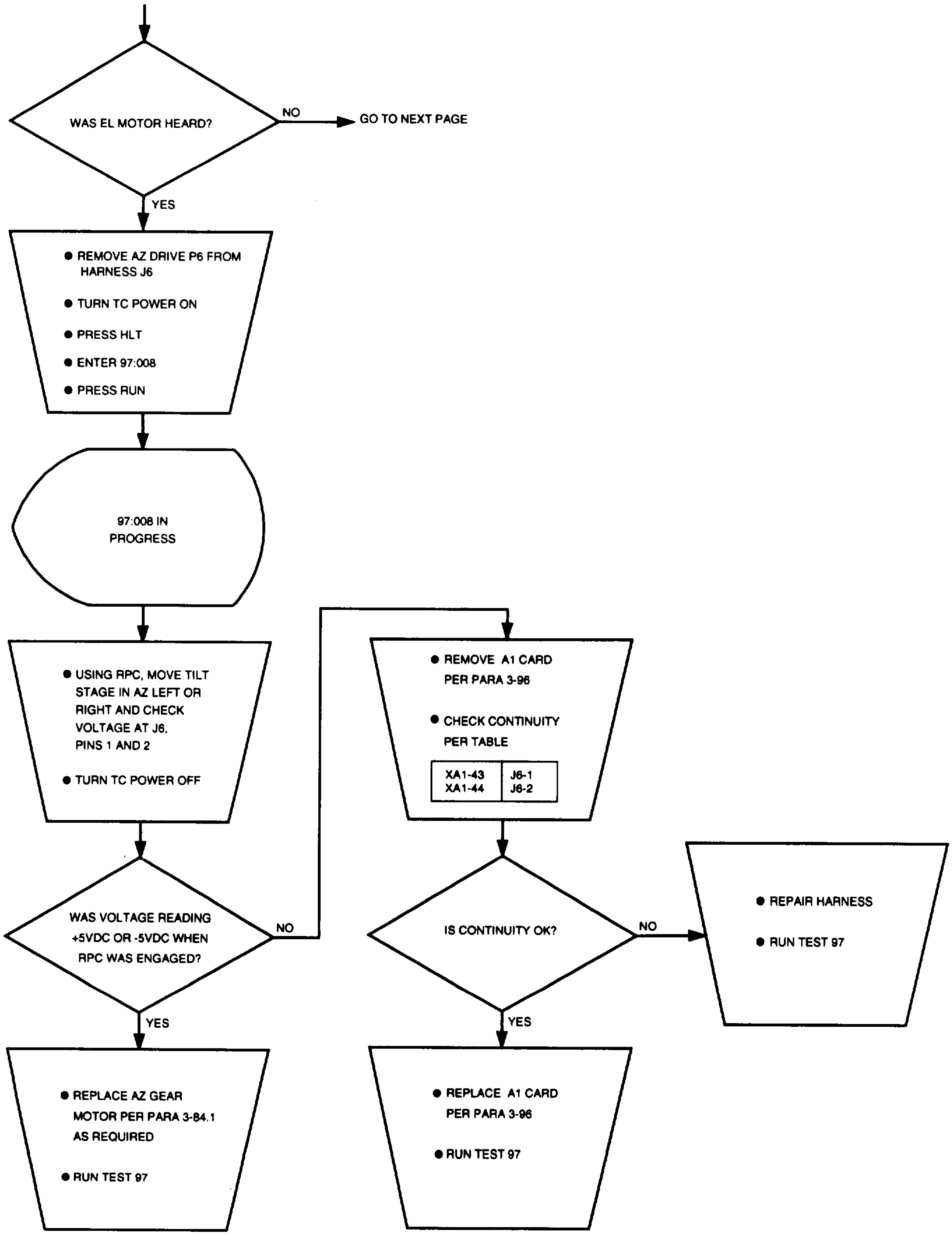
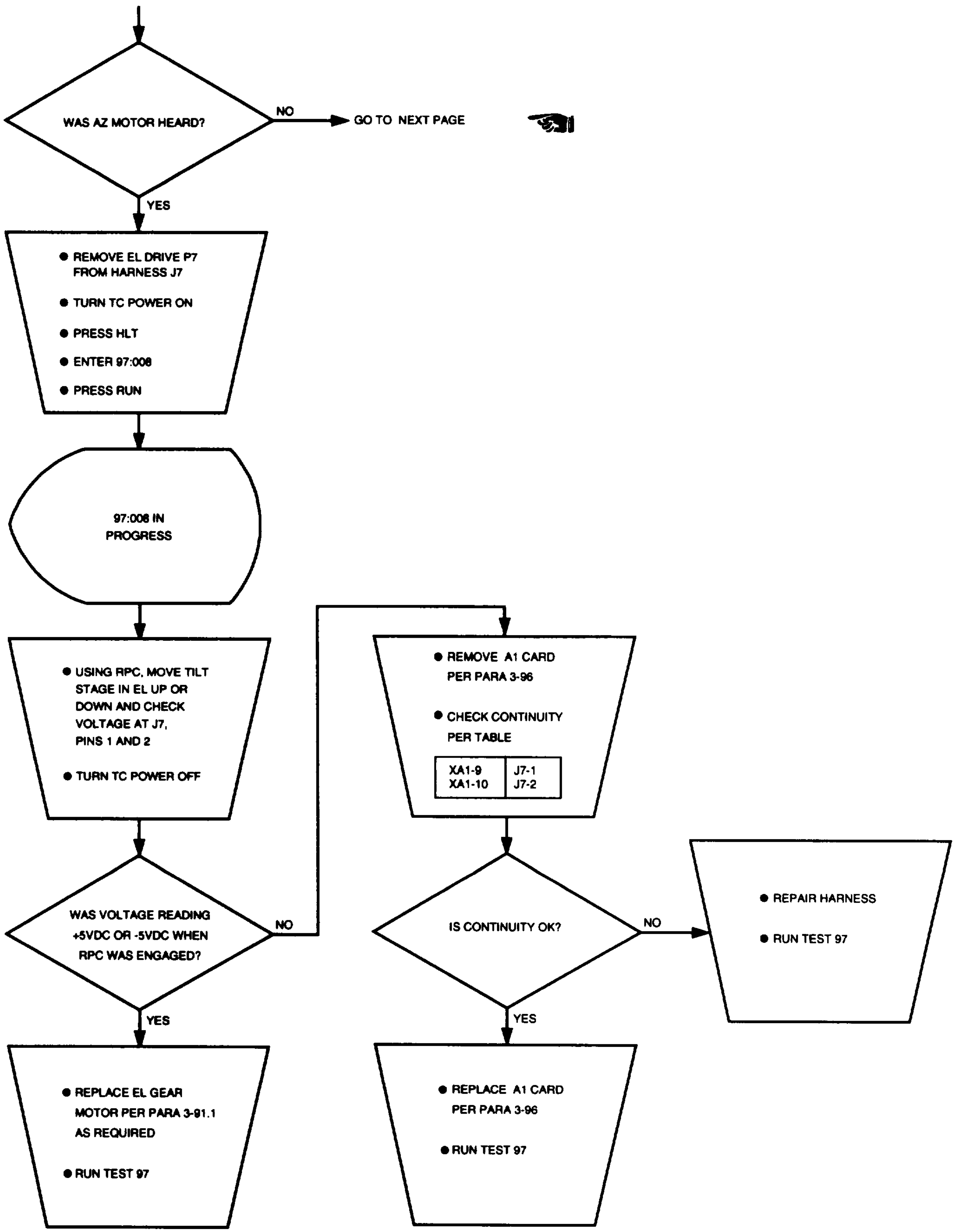


Figure 3-11. Test 97 D/NSC Fault Isolation (Sheet 4 of 8)



Fugure 3-11. Test 97 D/NSC Fault Isolation (Sheet 5 of 8)

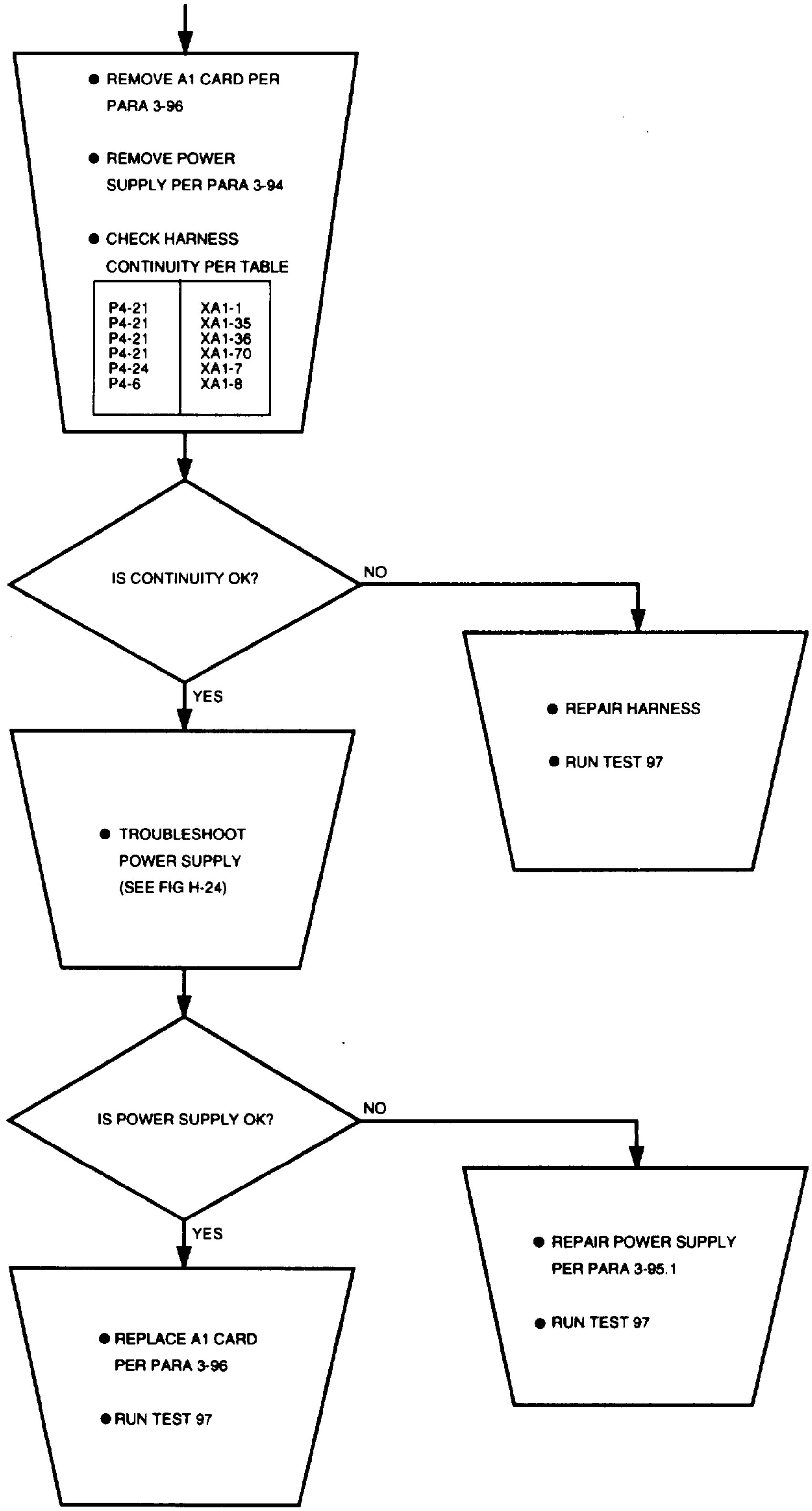


Figure 3-11. Test 97 D/NSC Fault Isolation (Sheet 6 of 8)

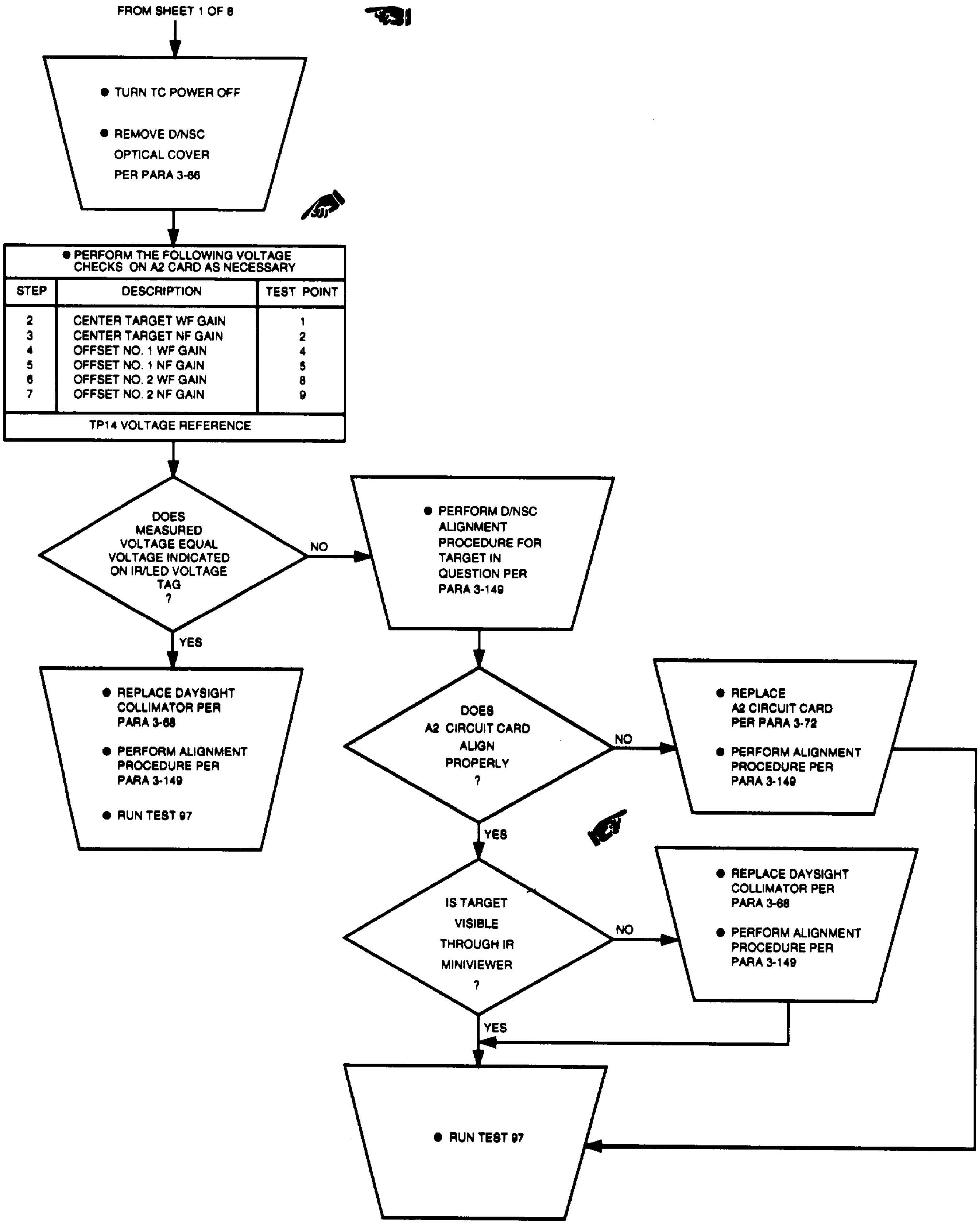


Figure 3-11. Test 97 D/NSC Fault Isolation (Sheet 7 of 8)

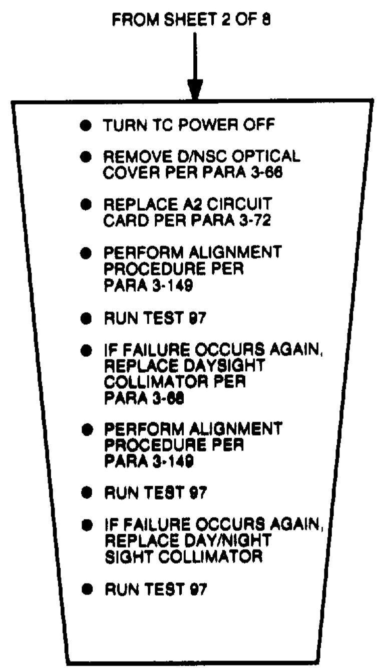


Figure 3-11. Test 97 D/NSC Fault Isolation (Sheet 8 of 8)

Table 3-3.1. Test 97 D/NSC Fault Isolation

Step Number	Description	Indication	Action

WARNING

Set POWER switch to OFF before removing or installing any component to prevent possible injury to personnel.

CAUTION

The circuit cards in the D/NSC are electrostatic discharge sensitive and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.

Step Number	Description	Indication	Action
1	BIT Test	a. REPLACE PWR	(1) Turn POWER OFF. **NOTE** Refer to figure 3-17 for parts location. (2) Remove electronic assembly cover and gasket from tilt stage. (3) Turn POWER ON. (4) Check voltage between power supply test points, TP 1 (HI) and TP 2 (LO), for +18 to +30 VDC. Turn POWER OFF. If +18 to +30 VDC is present, go to step 5. If +18 to +30 VDC is not present, go to step 10. (5) Turn POWER ON, **(6)** Check voltage between power supply test points, TP 5 (HI), TP 6 (HI), TP 7 (HI) and TP 2 (LO). DMM indication should be as follows: **TP 5** and TP 2 +13.85 to +16.75 VDC TP 6 and TP 2 +4.45 to +5.55 VDC TP 7 and TP 2 +6.75 to +8.36 VDC Turn POWER OFF. If one or more voltages are missing or out of tolerance, troubleshoot power supply. Refer to figure H-24. Repair power supply. If all voltages are within tolerance, go to step 7. (7) Remove power supply. (8) Check continuity between power supply test points and jack J4. TP 5 and J4-4, J4-22 TP 6 and J4-16, J4-33, J4-34 TP 7 and J4-18 If continuity check passes, go to step 9. If continuity check does not pass, go to step 13.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)			(9) Replace A3 card. Align D/NSC. If alignment cannot be done, go to step 14. (10) Remove power supply. (11) Turn POWER ON. (12) Check voltage between harness plug P4 pins, P4-25 and P4-26, for +18 to +30 VDC. Turn POWER OFF. If +18 to +30 VDC is present, go to step 13. If +18 to +30 VDC is not present, repair tilt stage harness assembly. Refer to figure H–23. (13) Troubleshoot power supply. Refer to figure H-24. Repair power supply. (14) Visually inspect tilt stage harness assembly and optical harness assembly. Repair as necessary. If repair was made, align D/NSC. If repair was not made or repair was made and alignment failed, replace D/NSC.
		b. REPLACE A3, PWR	The procedure for this indication is the same as for REPLACE PWR above. Go to step 1.
		c. REPLACE DS, A3	(1) Turn POWER OFF. (2) Replace A3 card. Align D/NSC. If alignment cannot be done, go to step 3. (3) Visually inspect tilt stage harness assembly and optical harness assembly. Repair as necessary. If repair was made, align D/NSC. If repair was not made or repair was made and alignment failed, go to step 4. (4) Replace daysight collimator. Align D/NSC. If alignment cannot be done, replace D/NSC.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)		d. REPLACE DS, A2, A3, PWR	(1) Turn POWER OFF. (2) Remove electronic assembly cover and gasket from tilt stage. (3) Turn POWER ON. (4) Check voltage between power supply test points, TP 1 (HI) and TP 2 (LO), for +18 to +30 VDC. Turn POWER OFF. If +18 to +30 VDC is present, go to step 5. If +18 to +30 VDC is not present, go to step 9. (5) Turn POWER ON. (6) Check voltage between power supply test points, TP 5 (HI), TP 6 (HI), TP 7 (HI) and TP 2 (LO). DMM indication should be as follows: TP 5 and TP 2 +13.85 to +16.75 VDC TP 6 and TP 2 +4.45 to +5.55 VDC TP 7 and TP 2 +6.75 to +8.36 VDC Turn POWER OFF. If one or more voltages are missing or out of tolerance, troubleshoot power supply. Refer to figure H-24. Repair power supply. If all voltages are within tolerance, go to step 7. (7) Remove power supply. (8) Check continuity between power supply test points and jack J4. TP 5 and J4-4, J4-22 TP 6 and J4-16, J4-33, J4-34 TP 7 and J4-18 If continuity check passes, go to step 13. If continuity check does not pass, go to step 12. (9) Remove power supply. (10) Turn POWER ON. (11) Check voltage between harness plug P4 pins P4-25 and P4-26, for +18 to +30 VDC. Turn POWER OFF. If +18 to +30 VDC is present, go to step 12. If +18 to +30 VDC is not present, repair tilt stage harness assembly. Refer to figure H–23. (12) Troubleshoot power supply. Refer to figure H-24. Repair power supply.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)			(13) Check alignment of AZ card. If A2 card is aligned, go to step 14. If A2 card is not aligned, go to step 16. (14) Replace A3 card. Align D/NSC. If alignment cannot be done, go to step 15. (15) Visually inspect tilt stage harness assembly and optical harness assembly. Repair as necessary. If repair was made, align D/NSC. If repair was not made or repair was made and alignment failed, replace D/NSC. (16) Align D/NSC. If A2, card cannot be aligned and A2 card potentiometer(s) fails to produce correct voltage reading(s), go to step 17. If A2 card potentiometer(s) produced correct voltage reading(s), but failed to display correct target pattern(s), go to step 19. (17) Replace A2 card. Align D/NSC. If alignment cannot be done, go to step 18. (18) Replace A3 card. Align D/NSC. If both A2 card and A3 card alignments or only A3 card alignment cannot be done, go to step 15. If only A2 card alignment cannot be done, go to step 19. (19) Replace daysight collimator. Align D/NSC. If alignment cannot be done, go to step 15.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)		e. REPLACE DS, NS, A3, PWR	(1) Turn POWER OFF. (2) Remove electronic assembly cover and gasket from tilt stage. (3) Turn POWER ON. (4) Check voltage between power supply test points, TP 1 (HI) and TP 2 (LO), for +18 to +30 VDC. Turn POWER OFF. If +18 to +30 VDC is present, go to step 5. If +18 to +30 VDC is not present, go to step 9. (5) Turn POWER ON. (6) Check voltage between power supply test points, TP 5 (HI), TP 6 (HI), TP 7 (HI) and TP 2 (LO). DMM indication should be as follows: TP 5 and TP 2 +13.85 to +16.75 VDC TP 6 and TP 2 +4.45 to +5.55 VDC TP 7 and TP 2 +6.75 to +8.36 VDC Turn POWER OFF. If one or more voltages are missing or out of tolerance, troubleshoot power supply. Refer to figure H-24. Repair power supply. If all voltages are within tolerance, go to step 7. (7) Remove power supply. (8) Check continuity between power supply test points and jack J4. TP 5 and J4-4, J4-22 TP 6 and J4- 16, J4-33, J4-34 TP 7 and J4-18 If continuity check passes, go to step 13. If continuity check does not pass, go to step 12. (9) Remove power supply. (10) Turn POWER ON. (11) Check voltage between harness plug P4 pins P4-25 and P4-26, for +18 to +30 VDC. Turn POWER OFF. If +18 to +30 VDC is present, go to step 12. If +18 to +30 VDC is not present, repair tilt stage harness assembly. Refer to figure H–23. (12) Trouble shoot power supply. Refer to figure H-24. Repair power supply.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)			(13) Remove cover from optical assembly. (14) Turn POWER ON. (15) Wait 10 minutes for D/NSC to warm up. **NOTE** When daysight collimator is cold, DMM shows a TTL logic HI of +2.4 to +5.5 VDC. After daysight collimator warms up, DMM should show a TTL LO of -0.25 to +0.8 VDC. (16) Check A3 card voltage across TP 12 (HI) and TP 17 (LO). Turn POWER OFF. If voltage reading was between +2.4 to +5.5 VDC, go to step 17. If voltage reading was between -0.25 to +0.8 VDC, go to step 26. (17) Remove harness plug P9 from daysight collimator jack J9. (18) Turn POWER ON. (19) Check voltage across harness plug P9 pins P9-SS(HI) and P9-T (LO). Turn POWER OFF. If +18 to +30 VDC is present, go to step 20. If +18 to +30 VDC is not present, go to step 37. **NOTE** The following steps check daysight assembly oven and oven circuits. The following resistances change with temperature. The daysight collimator should still be warm, and this should make resistance readings lower than those obtained at room temperature. (20) Check resistance between pins J9-L and J9-N. DMM should show less than 50 k ohms. Check resistance between J9-M and J9-N. DMM should show less than 7 k ohms. (21) Wait for daysight collimator assembly to cool off somewhat. Repeat resistance check above. Resistance reading should increase slightly. If resistance readings passed, go to step 22. If resistance readings failed, go to step 42.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)			**NOTE** Daysight collimator assembly cools off slowly. It must be allowed to cool enough for thermostat to close. Thermostat is in series with heater and can affect heater resistance reading if it is still open. (22) Check heater resistance between J9-S and J9-T. DMM should read between 14.6 to 17.8 ohms. If resistance readings passed, go to step 23. If resistance readings failed, go to step 42. (23) Remove A2 and A3 cards. (24) Check continuity between harness connector XA3 and plug P9 as follows: P9-L XA3-9 P9-M XA3-8 P9-N XA3-7 If continuity check passes, go to step 25. If continuity check does not pass, repair optical harness assembly. (25) Replace A3 card. Align D/NSC. If alignment cannot be done, go to step 26. (26) Remove plug P3 from nightsight collimator jack J3. (27) Turn POWER ON. (28) Check voltage across pins P3-N (HI) and P3-S (LO). Turn POWER OFF. If +13.3 to +16.3 VDC is present, go to step 29. If +13.3 to +16.3 VDC is not present, go to step 43.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)			**NOTE** The resistance value checked in the next step changes with temperature. (29) Check resistance between pins J3-C and J3-D. DMM should show less than 3 k ohms if nightsight collimator is still warm. (30) Wait for nightsight collimator assembly to cool off somewhat. DMM should show an increased resistance. After D/NSC reaches room temperature the following should be obtained:

Room temperature		DMM indication	
Degrees F	Degrees C	Min	Max
41	5	7252 ohms	8006 ohms
50	10	5692 ohms	6265 ohms
59	15	4500 ohms	4939 ohms
68	20	3583 ohms	3922 ohms
77	25	2872 ohms	3135 ohms
86	30	2317 ohms	2523 ohms
95	35	1880 ohms	2042 ohms

If resistance readings passed, go to step 31. If resistance readings failed, go to step 35.

NOTE

Nightsight collimator assembly cools slowly. It may have to cool off before thermostat will close.

Thermostat is in series with heater and can affect heater resistance reading if it is still open.

(31) Check heater resistance between J3-N and J3-S. DMM should read between 12.6 to 15.4 ohms.

If resistance readings passed, go to step 32. If resistance readings failed, go to step 35.

Table 3-3.l. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cent)			(32) Remove A2 and A3 cards. (33) Check continuity between harness connector XA3 and plug P3 as follows: P3-D XA3-68 P3-C XA3-34 If continuity check passes, go to step 34. If continuity check does not pass, repair optical harness assembly. (34) If A3 card was replaced in step 25, go to step 35. If A3 card was not replaced in step 25, replace A3 card and align D/NSC. If alignment cannot be done, go to step 35. (35) Replace nightsight collimator. Align D/NSC. If alignment cannot be done, go to step 36. (36) Visually inspect tilt stage harness assembly and optical harness assembly. Repair as necessary. If repair was made, align D/NSC. If repair was not made or repair was made and alignment failed, replace D/NSC. (37) Remove optical assembly from tilt stage assembly. (38) For optical assembly PN 13143650 or 13163050, check harness continuity between pins P8-1 and P9-S and pins P8-18 and P9-T. For optical assembly PN 13314267, check harness continuity between pins J8-A and P9-S and pins J8-U and P9-T. If continuity check passes, go to step 39. If continuity check does not pass, repair optical harness assembly.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)			(39) Check continuity between power supply test points and tilt stage harness assembly jack J8 or J5 as follows:

FOR OPTICAL ASSEMBLY PN 13163050 AND 13143650		FOR OPTICAL ASSEMBLY PN 13314267	
TP 1	J8-1	TP 1	J5-A
TP 2	J8-18	TP 2	J5-U

If continuity check passes for optical assembly PN 13163050 or 13143650, repair optical harness plug P8 and tilt stage harness jack J8. If continuity check passes for optical assembly PN 13314267, repair cable W12. Refer to figure H-29.1. If continuity check does not pass, go to step 40.

(40) Remove power supply.

(41) Check continuity between tilt stage harness jacks J8 or J5 and plug P4 as follows:

FOR OPTICAL ASSEMBLY PN 13163050 AND 13143650		FOR OPTICAL ASSEMBLY PN 13314267	
J8-1	P4-8	J5-A	P4-8
J8-18	P4-9	J5-U	P4-9

If continuity check passes, troubleshoot power supply. Refer fo figure H-24. Repair power supply. If continuity check does not pass, repair tilt stage harness assembly.

(42) Replace daysight collimator. Align D/NSC.

If A2 card can be aligned and A3 card cannot be aligned, go to step 26. If both cards cannot be aligned, go to step 36.

(43) Turn POWER ON.

(44) Check voltage between power supply test points TP 4 (HI) and TP 2 (LO). Turn POWER OFF.

If +13.3 to +16.3 VDC is present, go to step 45. If +13.3 to +16.3 VDC is not present, troubleshoot power supply. Refer to figure H-24. Repair power supply.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)			(45) Check continuity between power supply test point TP 4 and optical harness assembly plug pin P3-N. If continuity check passes, go to step 46. If continuity check does not pass, go to step 49.
			(46) Remove A2 and A3 cards.
			(47) Check continuity between optical harness assembly plug pin P3-S and connector pin XA3-15. If continuity check passes, go to step 48. If continuity check does not pass, repair optical harness assembly.
			(48) Replace A3 card. Align D/NSC. If alignment cannot be done, go to step 36.
			(49) Remove optical assembly from tilt stage.
			(50) For optical assembly PN 13143650 or 13163050 check continuity between harness plugs P8-17 and P3-N. For optical assembly PN 13314267 check continuity between harness connectors J8-T and P3-N. If continuity check passes, go to step 51. If continuity check does not pass, repair optical harness assembly.
			(51) For optical assembly PN 13143650 or 13163050 check continuity between tilt stage harness jack pin J8-17 and power supply test point TP 4. For optical assembly PN 13314267 check continuity between tilt stage harness jack pin J5-T and power supply test point TP 4. If continuity check passes for optical assembly PN 13163050 or 13143650, repair optical harness plug P8 and tilt stage hamessjack J8. If continuity check passes for optical assembly PN 13314267, repair cable W12. Refer to figure H-29.1. If continuity check does not pass, go to step 52.

Table 3-3.1. Test 97 D/NSC Fault Isolation - Continued

Step Number	Description	Indication	Action
1 (cont)			(52) Remove power supply. (53) For optical assembly PN 13143650 or 13163050 check continuity between tilt stage harness connectors J8-17 and P4-2. For optical assembly PN 13314267 check continuity between tilt stage harness connectors J5-T and P4-2. If continuity check passes, troubleshoot power supply. Refer to figure H-24. Repair power supply. If continuity check does not pass, repair tilt stage harness assembly

Table 3-4. Test 97 Step Description

Step Number	Description
1	Bit Test
2	Center Target WF Gain
3	Center Target NF Gain
4	Offset No. 1 WF Gain
5	Offset No. 1 NF Gain
6	Offset No. 2 WF Gain
7	Offset No. 2 NF Gain
8	Tilt Stage Response

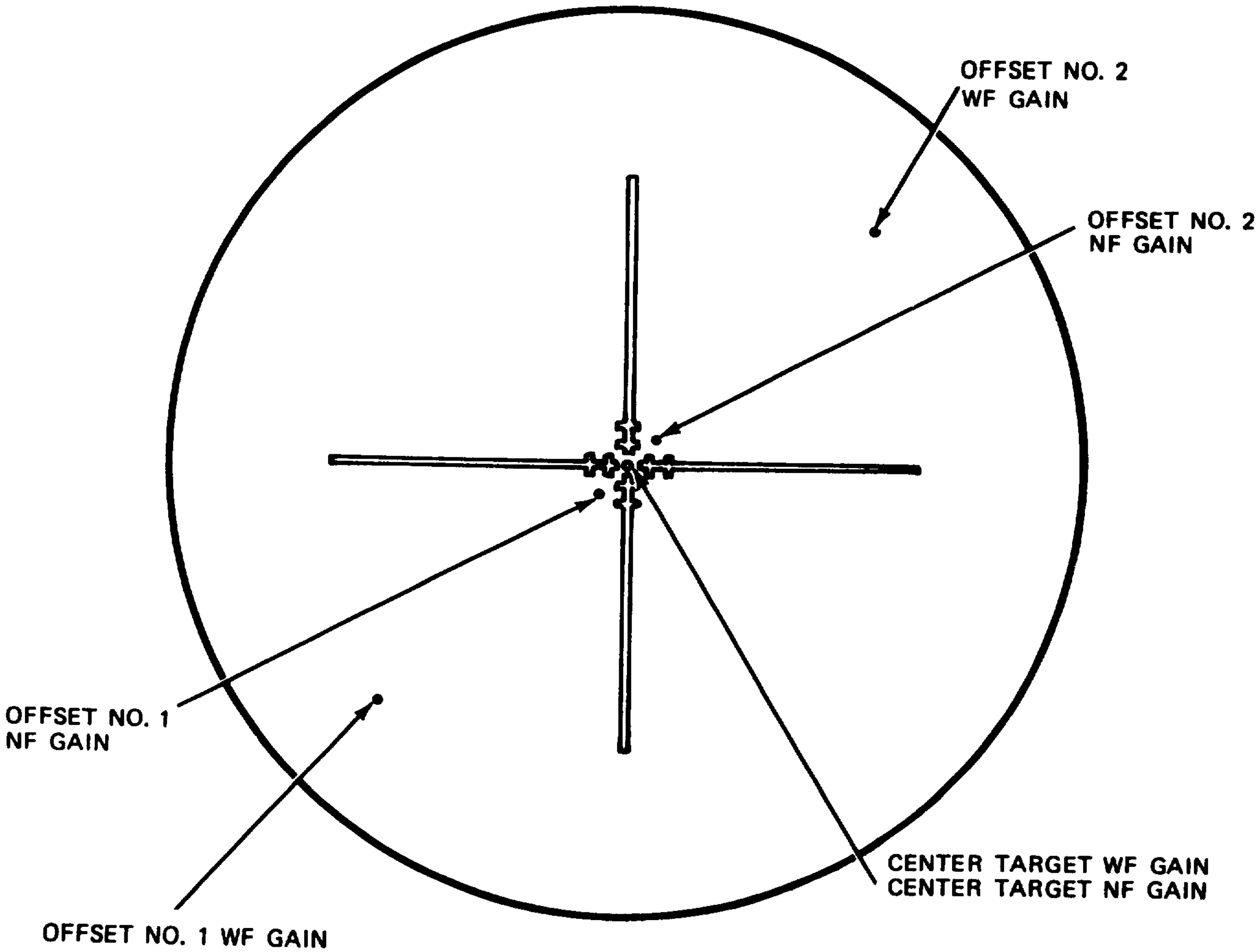


Figure 3-12. DSC Target Pattern.

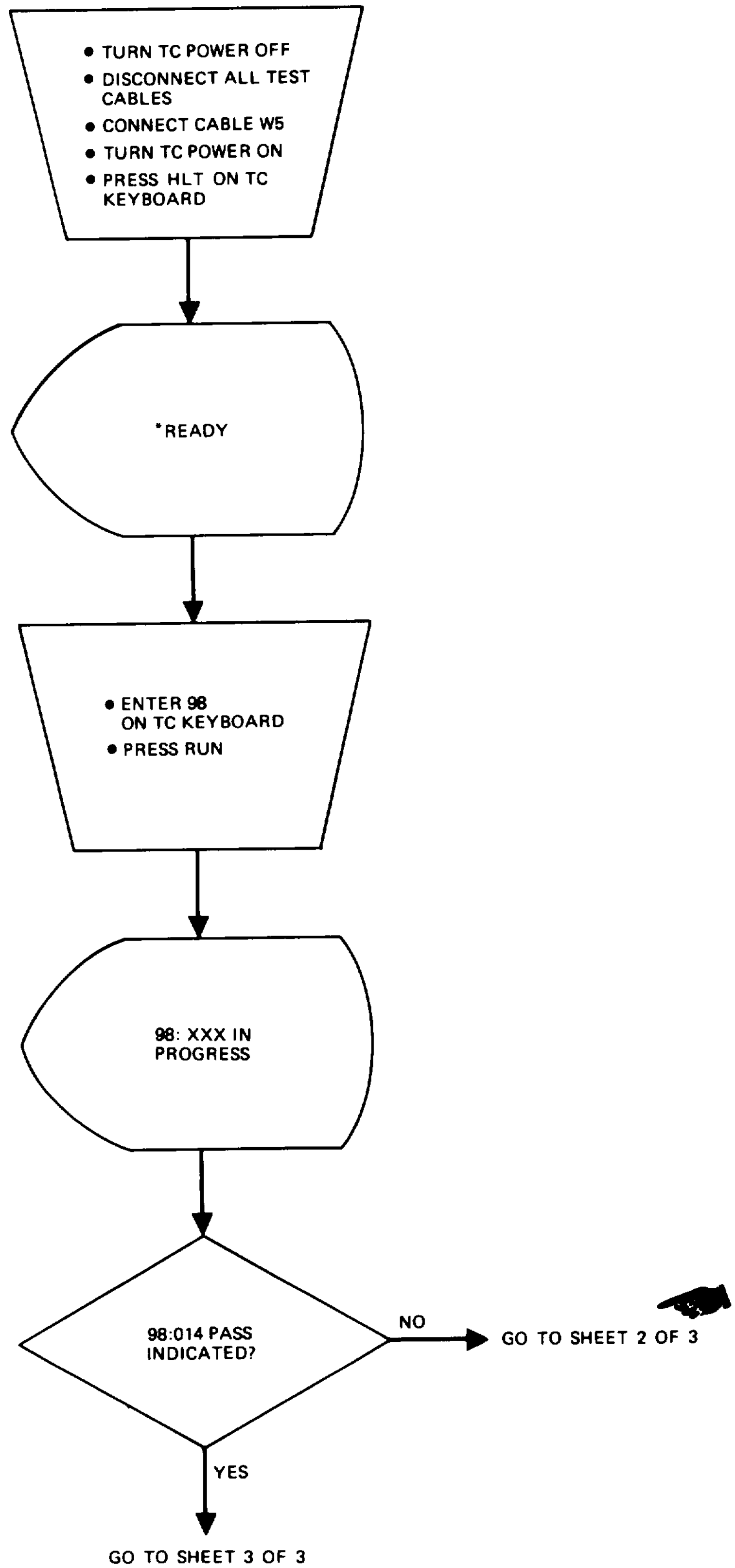


Figure 3-13. Test 98 MS Fault Isolation (Sheet 1 of 3).

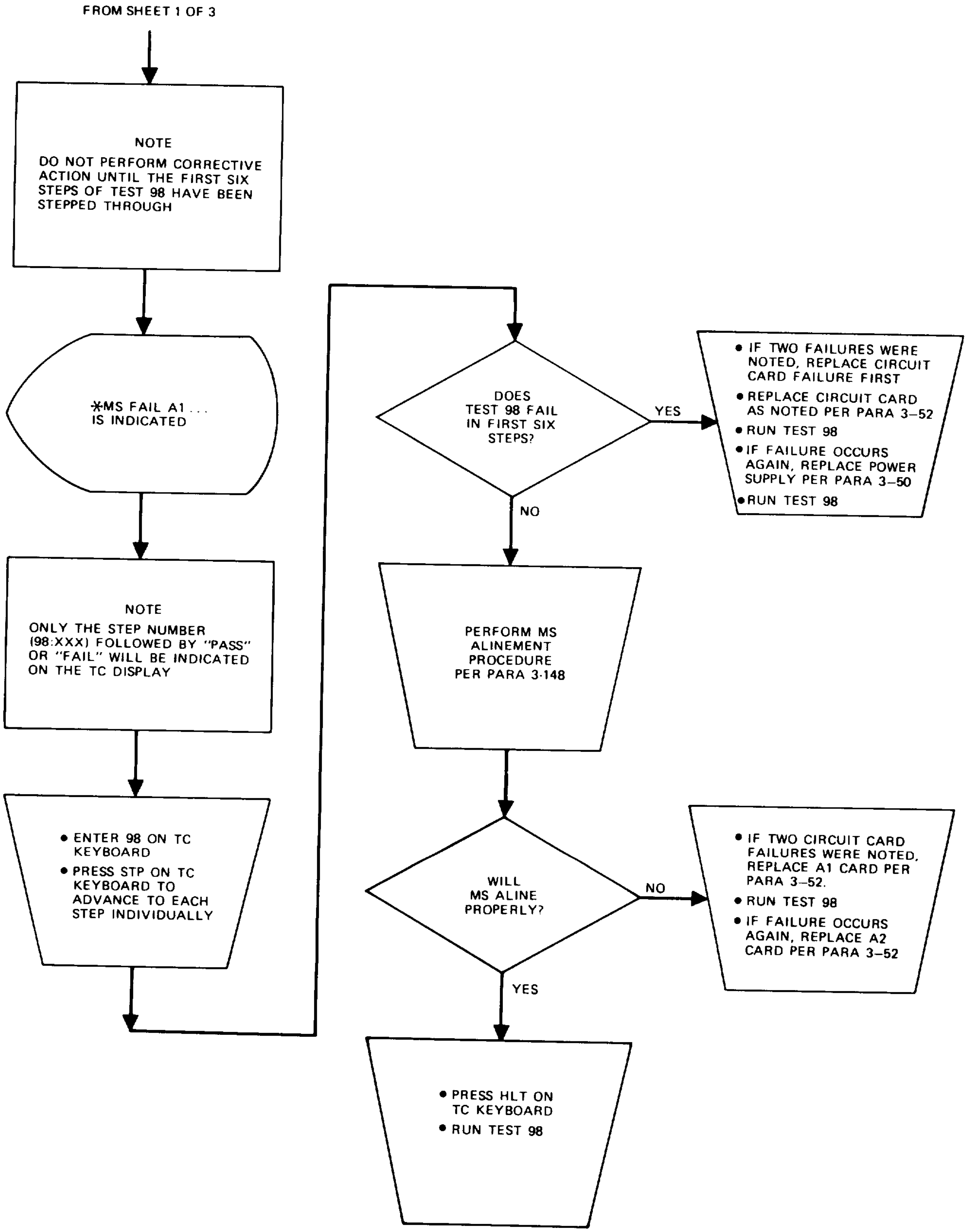


Figure 3-13. Test 98 MS Fault Isolation (Sheet 2 of 3).

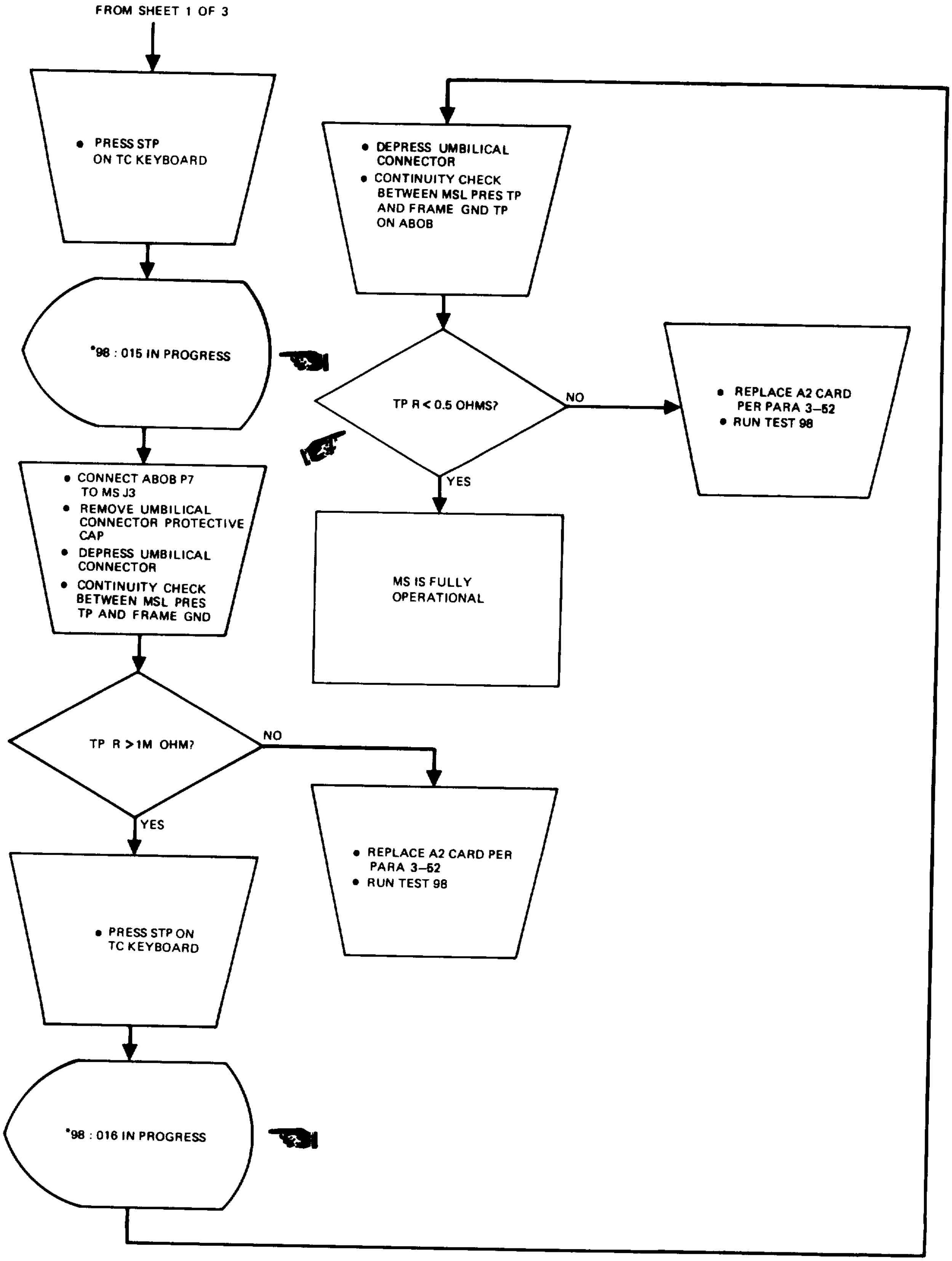


Figure 3-13. Test 98 MS Fault Isolation (Sheet 3 of 3).

Table 3-5. Test 98 MS Fault Isolation

Step number	Step description	Card/module fault indication
1	Power Supply Bit	PS or A2
2	Squib Bits Reset	A2
3	Bit Bit 2	A2 or PS
4	Prefire Squib Bit	A2 or PS
5	Fire Squib Bit	A2 or PS
6	Wire Cut Squib Bit	A2 or PS
7	Pitch Center Frequency	Al, A2
8	Pitch SBI Center Voltage	Al, A2
9	Pitch SBI Volts/Hz (Positive)	Al
10	Pitch SBI Volts/Hz (Negative)	Al
11	Yaw Center Frequency	Al, A2
12	Yaw SBI Center Voltage	Al, A2
13	Yaw SBI Volts/Hz (Positive)	Al
14	Yaw SBI Volts/Hz (Negative)	Al
15	Missile Gone	A2
16	Missile Present	A2

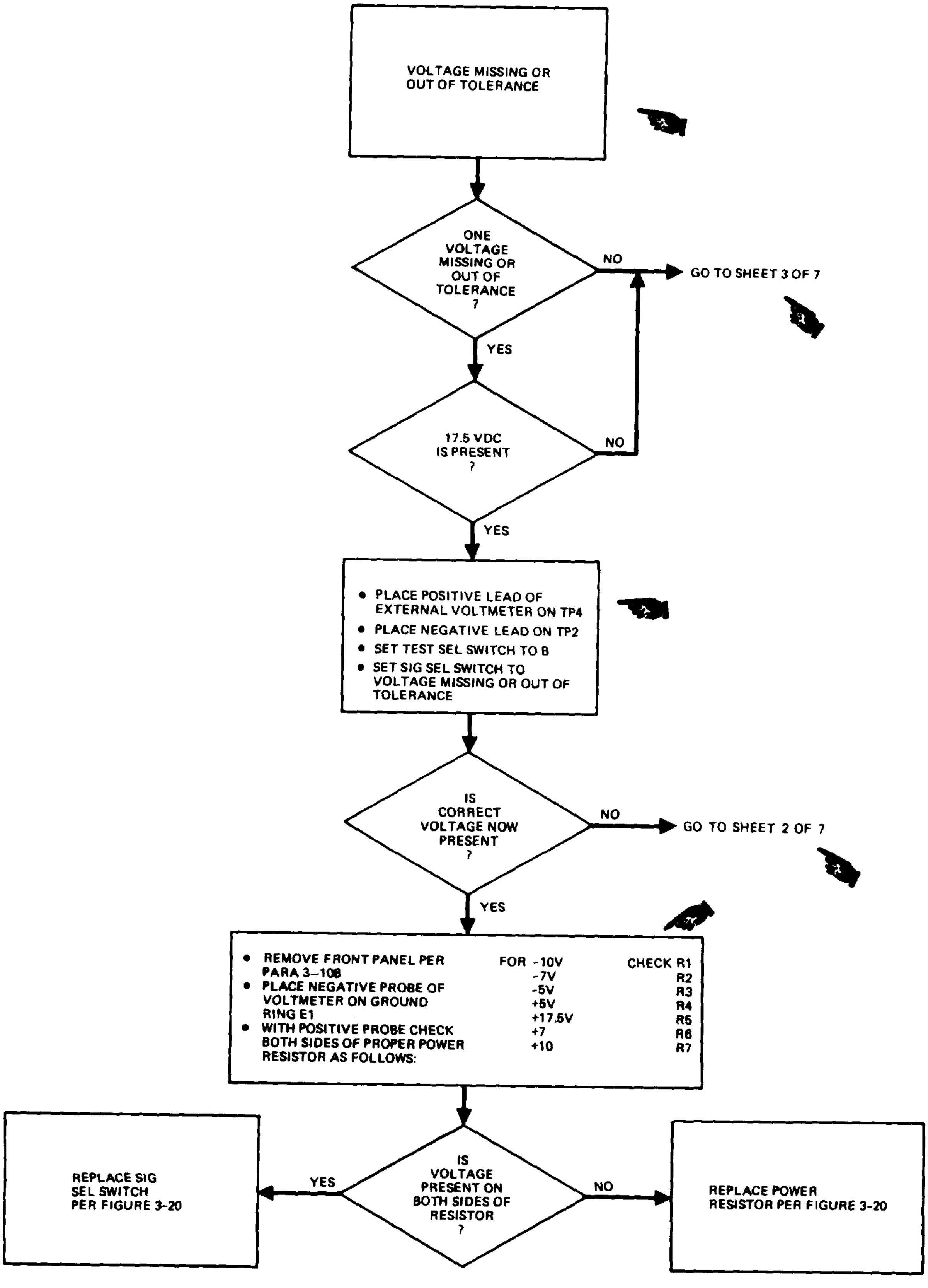


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Figure 3-14. BSAC Fault Indication (Sheet 1 of 7).

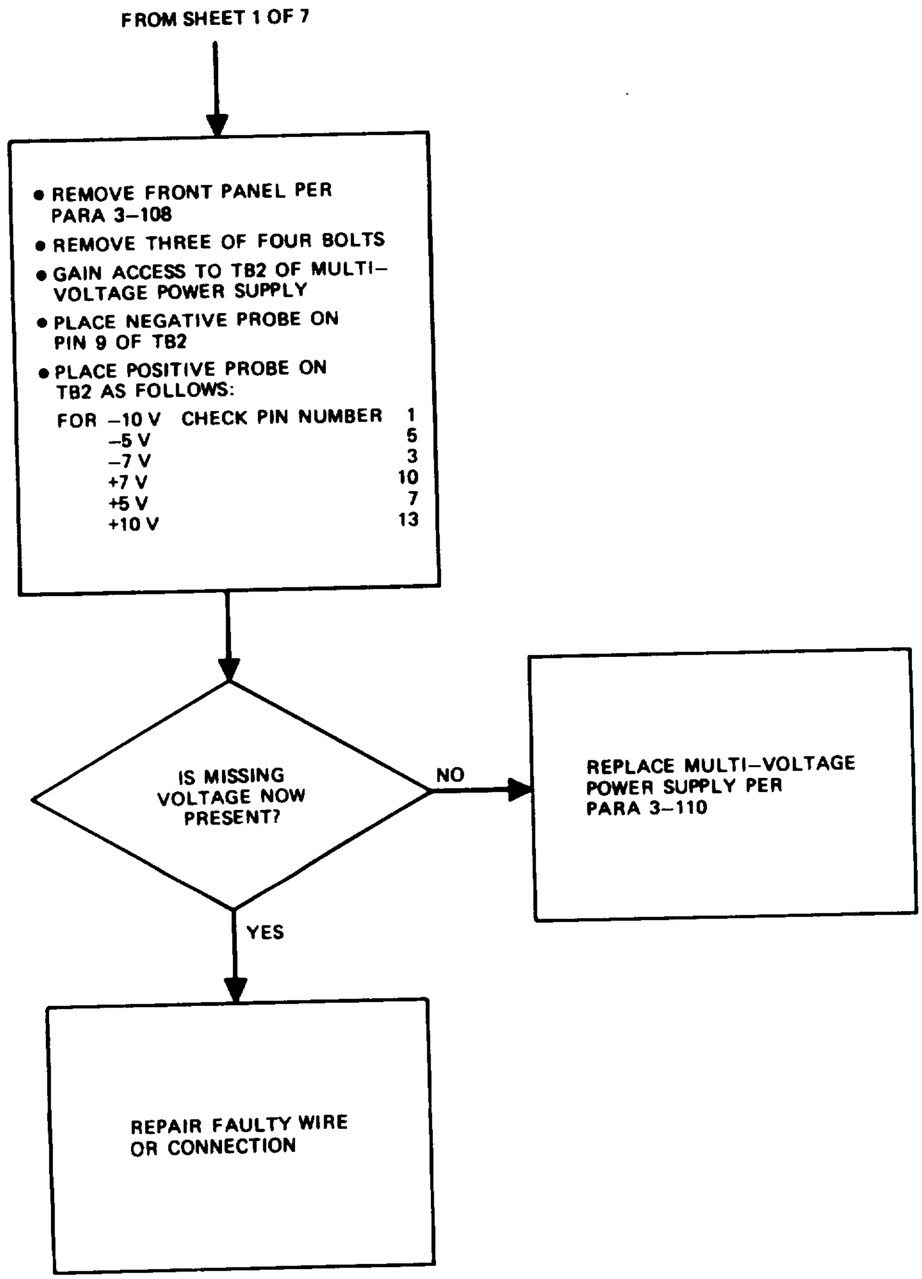


Figure 3-14. BSAC Fault Indication (Sheet 2 of 7).

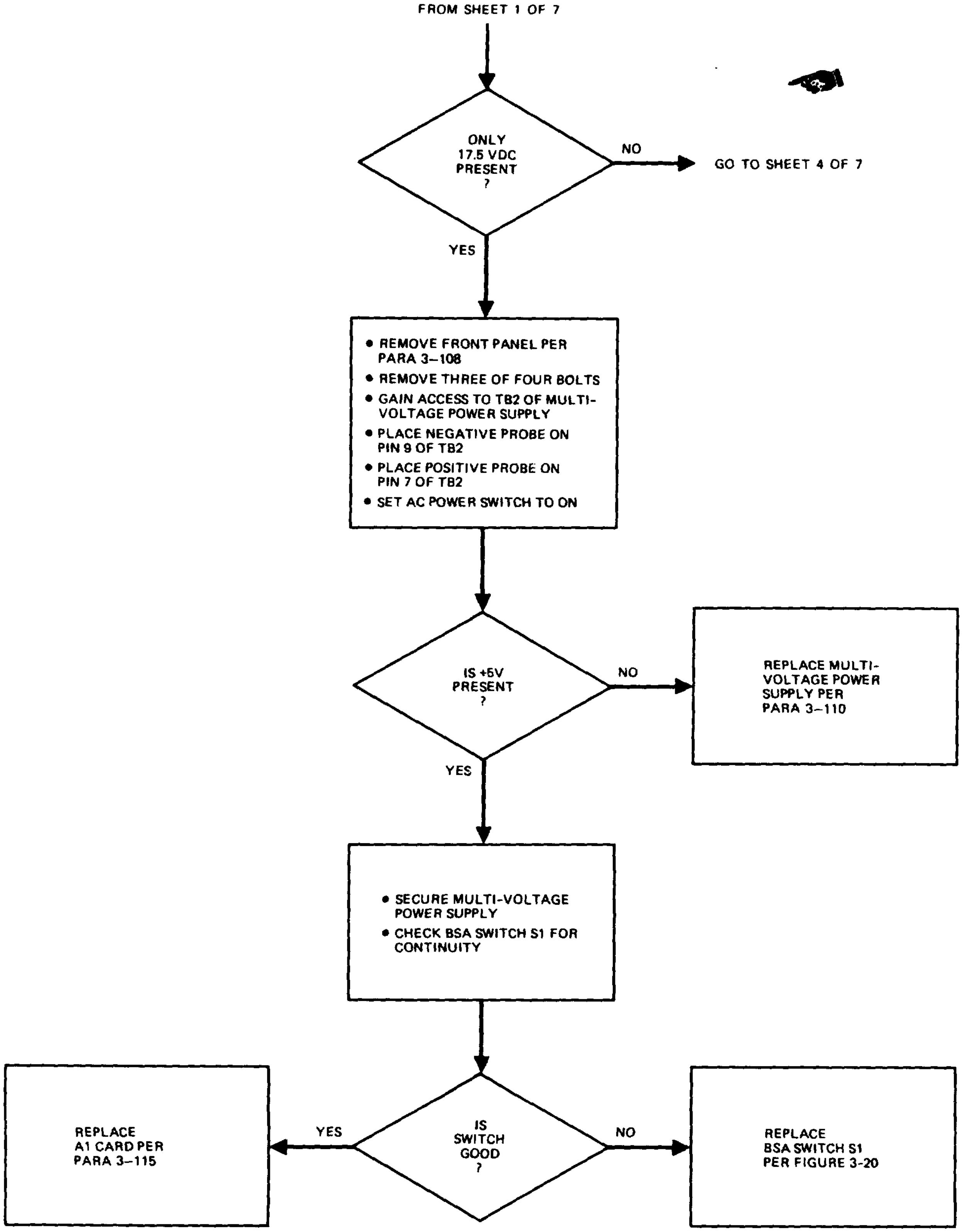


Figure 3-14. BSAC Fault Indication (Sheet 3 of 7).

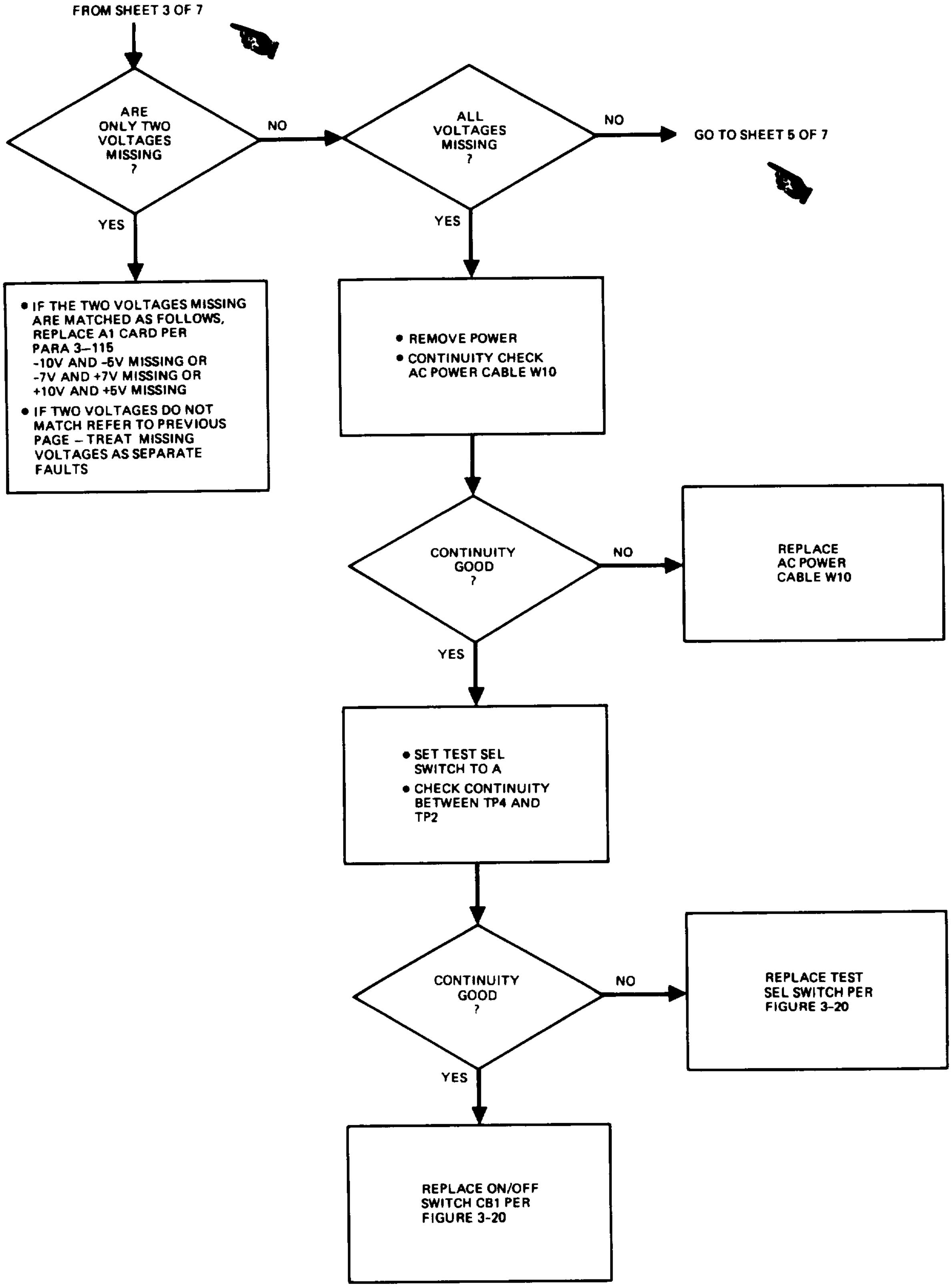


Figure 3-14. BSAC Fault Indication (Sheet 4 of 7)

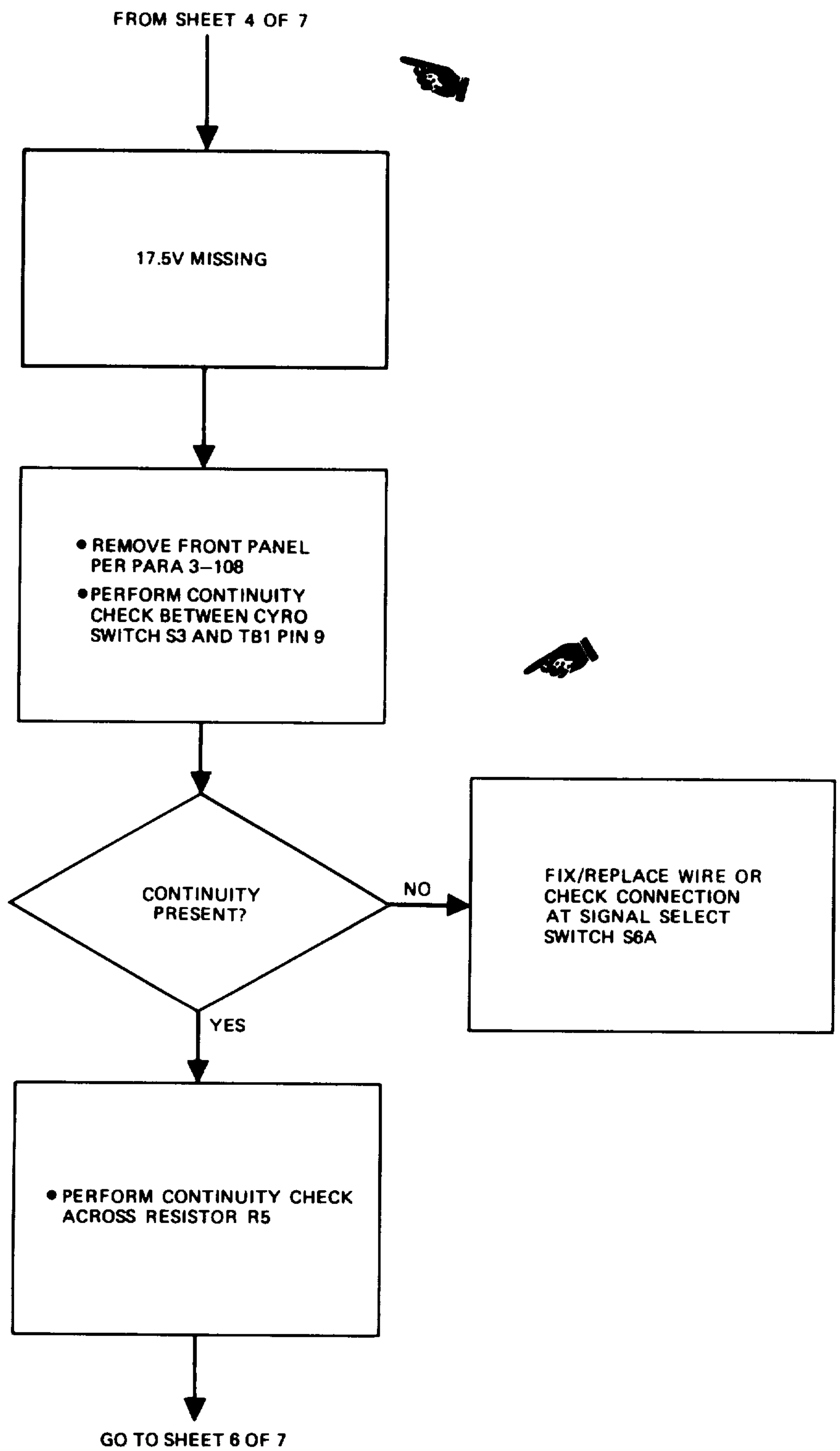


Figure 3-14. BSAC Fault Indication (Sheet 5 of 7)

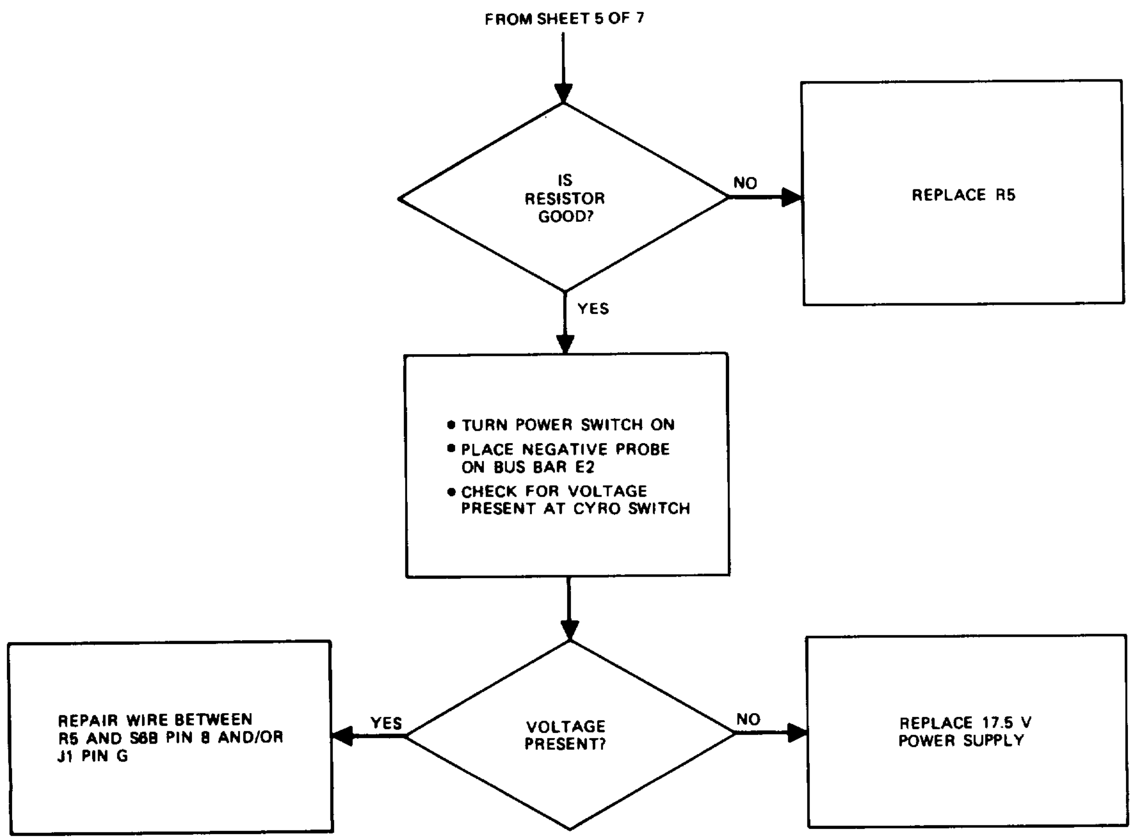


Figure 3-14. BSAC Fault Indication (Sheet 6 of 7)

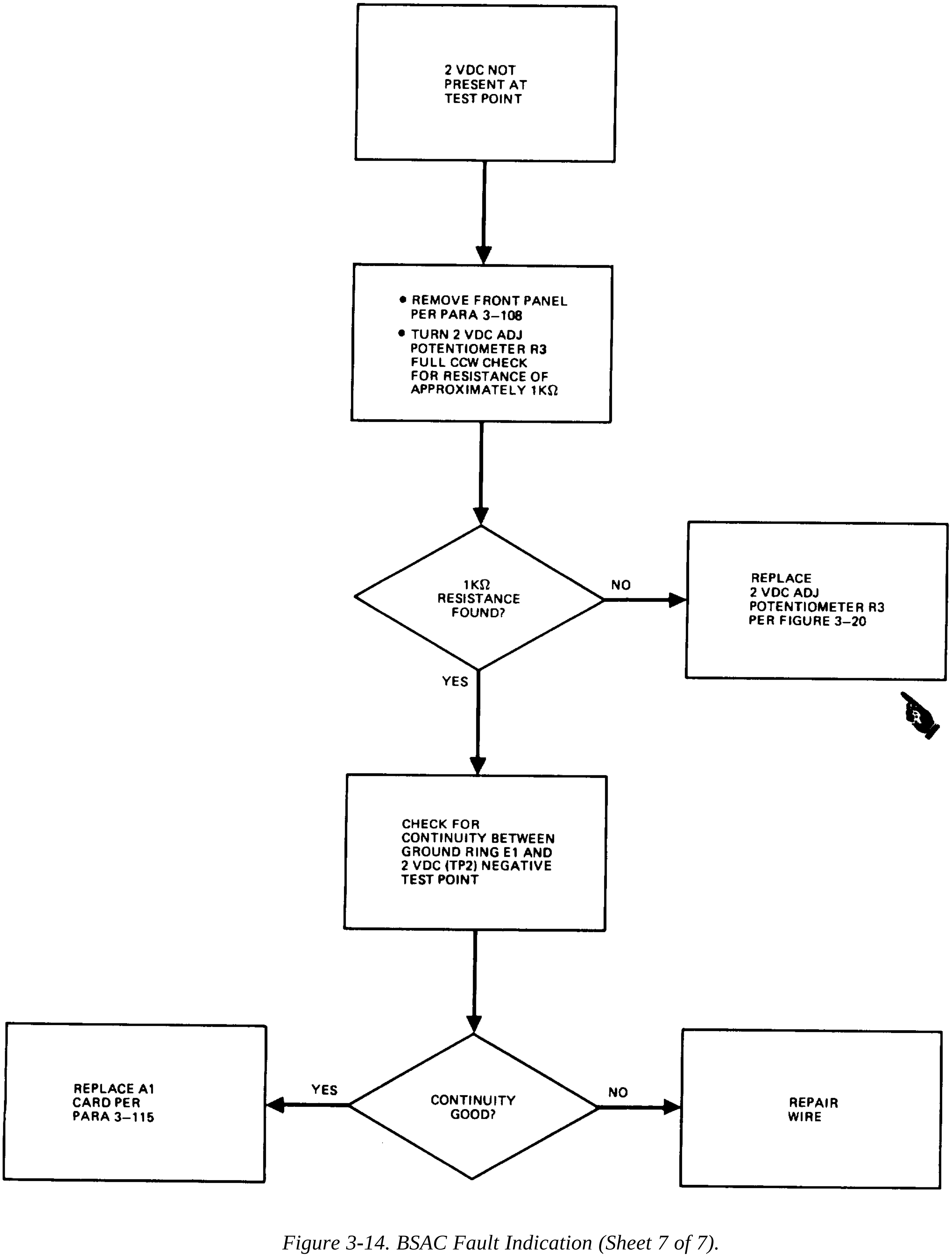


Figure 3-14. BSAC Fault Indication (Sheet 7 of 7).

Section IV. MAINTENANCE PROCEDURES

3-9. General. This section provides cleaning, painting, lubrication, disassembly, assembly, and repair procedures for the TSSTS and BSASE. Refer to section III for fault isolation procedures.

3-10. Cleaning. Equipment should always be kept clean. Otherwise, performance may be degraded, and defects that would be noticed in a visual inspection may be hidden by dust, grease, or other foreign matter. Cleaning of the equipment should be performed when required using the following procedures:

a. Remove dust and loose dirt from equipment and transit cases using a clean, soft cloth. Remove dust or dirt from plugs and connectors with a clean acid swabbing brush. Clean lenses and other optical surfaces as directed in step c.

b. Remove grease and ground-in dirt using a general purpose detergent based cleaning solution (item 8, appendix F) and a soft cloth or paper towel. If the temperature is below freezing, add glycerine (item 9, appendix F) to the cleaning solution to prevent it from freezing on the parts being cleaned. Do not use cleaning solution on plugs or connectors.

c. Clean lenses and other optical surfaces as follows:

CAUTION

DO not clean optical surfaces with rags, paper towels or other materials that might cause scratches and thereby degrade equipment performance.

(1) If moisture or condensation is on optical surface, pat the surface dry with a clean cotton wiping cloth (item 7, appendix F). DO NOT RUB. If the moisture has frozen, first apply deicer or place the component in a warm area until the ice melts.

(2) Use a clean camel hair brush or rubber syringe to remove loose particles.

(3) If dirt or smears remain, prepare a cleaning solution of mild detergent (item 8, appendix F) and clean water, mixed per directions on detergent container. If the temperature is below freezing, add glycerin (item 9, appendix F) to the cleaning solution to prevent it from freezing on the parts being cleaned.

CAUTION

DO not use warm liquids on cold glass surfaces since thermal shock can cause breakage.

To avoid scratches, do not rub cleaning solution on glass.

(4) Apply cleaning solution to glass and allow one to three minutes soak time.

(5) Rinse with clean water.

(6) Repeat steps (4) and (5) until contamination is removed.

CAUTION

Wiping motion should be in one direction only. Discard pad after each wipe.

(7) Clean glass in small sections by applying cleaning solution and gently wiping with a clean cotton cloth (item 7, appendix F) or lens tissue pad (item 18, appendix F).

(8) Rinse with clean water.

(9) Dry by gently wiping in one direction with a clean cotton cloth or lens tissue pad.

WARNING

Methyl alcohol is a toxic and flammable material. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapor or contact with the skin. Keep away from heat and open flames.

(10) Moisten cotton (item 6, appendix F) or lens tissue pad with methyl alcohol (item 5, appendix F) and apply using gentle strokes in one direction from one edge of the surface to the other.

3-11. Painting.

CAUTION

Any **components which might be damaged by masking or paint must be removed before proceeding.**

Use masking tape to ensure that no paint is applied to any areas or parts that were not originally painted.

Maintenance personnel are authorized to touch up paint on TOW subsystem support equipment if required. For applicable painting procedures, refer to TM 43-0139. Before beginning any painting, thoroughly clean all surfaces to be painted as directed in paragraph 3-10. The types of paint specified for touching up the equipment are as follows:

a. Olive Drab Paint No. 24087, MIL-C-46168.

(1) D/NSC transit case exterior painted surfaces.

(2) BSAHF transit case exterior painted surfaces.

(3) MS transit case exterior painted surfaces.

b. Black Enamel, No. 37038, MIL-C-46168.

(1) TC transit case, inside lower half only.

(2) MS front panel.

(3) D/NSC optical panel.

(4) BSAHF black parts.

(5) ABOB front panel.

(6) BSAC transit case, inside lower half only.

(7) TC Front Panel.

(8) BSAC Front Panel.

c. White Enamel, No. 37875, MIL-I-43553.

(1) TC front panel nomenclature.

(2) MS front panel nomenclature.

(3) BSAC front panel nomenclature.

(4) ABOB front panel nomenclature.

d. White Ink, MIL-I-43553.

(1) All transit case nomenclature.

(2) RPC nomenclature,

e. Green 383, No. 34094, MIL-C-46168.

(1) TC transit case, except inside lower half; paint flange to edge of EMI gasket but not under gasket surface.

(2) BSAC transit case, except inside lower half; paint flange to edge of EMI gasket but not under gasket surface.

(3) ABOB transit case exterior painted surface.

(4) D/NSC mounting adapter/tilt stage assembly. Apply one coat of epoxy primer MIL-P-23377 in accordance with TM 43-0139. Apply 2 coats of polyurethane coating, 1.8-2.4 mils, in accordance with TM 43-0139. Overspray is permissible.

(5) D/NSC optical assembly. Apply one coat of epoxy primer MIL-P-23377 in accordance with TM 43-0139. Apply 2 coats of polyurethane coating, 1.8-2.4 mils, in accordance with TM 43-0139.

(6) RPC. Apply one coat of epoxy primer MIL-P-23377 in accordance with TM 43-0139. Apply 2 coats of polyurethane coating, 1.8-2.4 mils, in accordance with TM 43-0139.

3-12. Lubrication. Periodic lubrication of the TOW subsystem support equipment is not required.

3-13. Test Controller Maintenance. Maintenance of the TC consists primarily of removal and replacement of TC subassemblies. Refer to figure 3-15 for component location.

3-14. TC Electronic Assembly Removal.

a. Depress pressure relief valve (1) in carrying case (2) cover (4). Release latches (3) on carrying case (2) and remove cover (4).

b. Remove electronic assembly (5) from carrying case (2) by loosening 24 captive screws (6). Lift out using two front handles (7).

3-15. TC Electronic Assembly Installation.

a. Install electronic assembly (5) into carrying case (2) and secure 24 captive screws (6). Torque captive screws (6) to 11 to 13 in-lbs.

CAUTION

Make sure chains on protective caps do not interfere when installing cover (4).

b. Replace cover (4) on carrying case (2) and close by securing latches (3).

3-15.1 TC Front Panel Assembly Repair.

a. Remove electronic assembly (5) per paragraph 3-14.

b. Screw removal adapter by hand into basic tool unit until bottomed.

c. Place knurled head end of captive screw (6) in opening of removal adapter with handle in open position.

d. Squeeze handles together pulling captive screw (6) from panel by straightening flared end of sleeve.

e. Place captive screw (6) through prepared hole in panel.

f. Turn captive screw (6) into nose of tool either by rotating tool or captive screw,

g. Squeeze handles together firmly.

h. Unscrew tool from captive screw (6).

i. Install electronic assembly (5) per paragraph 3-15.

3-16. TC Power Conversion Assembly Removal.

a. Remove electronic assembly (5) from carrying case (2) per paragraph 3-14.

CAUTION

Connectors may be damaged if the power conversion assembly (11) is pulled away too far from electronic assembly (S).

b. Loosen four captive screws (8) and remove power conversion assembly (11) from electronic assembly (5) as far as wires will allow.

CAUTION

Connectors may crack or break if jack-screws are not loosened one-half turn alternately.

c. Disconnect connectors P101 (9) and P102 (10) from power conversion assembly (11).

d. Remove power conversion assembly (11).

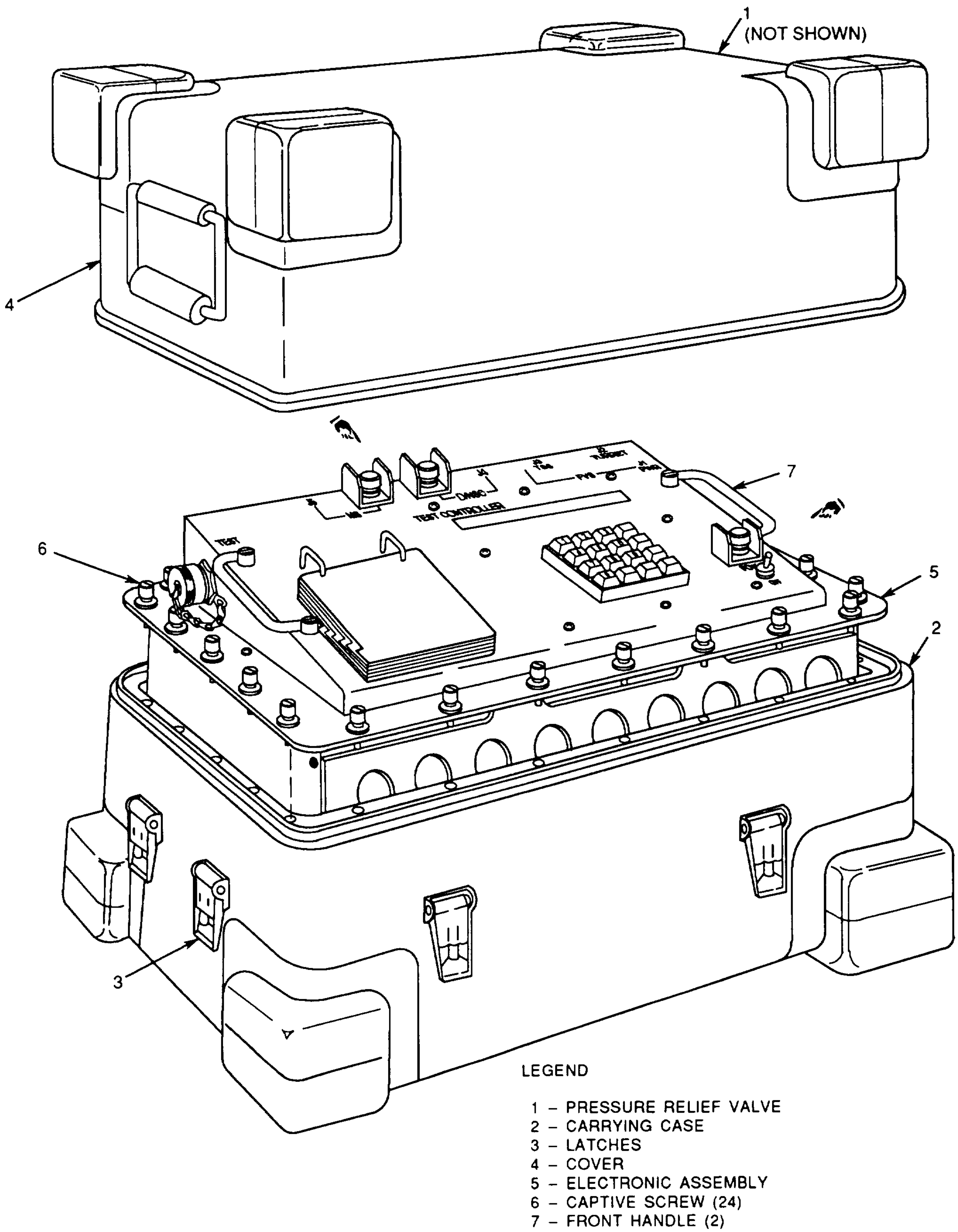
3-17. TC Power Conversion Assembly Installation.

CAUTION

Connectors may crack or break if jack-screws are not tightened one-half turn alternately.

a. Connect connectors P101 (9) and P102 (10) to power conversion assembly (11).

b. Install power conversion assembly (11) in electronic assembly (5) and tighten four captive screws (8). Torque captive screws (8) to 28 to 32 in-lbs.



LEGEND

1 – PRESSURE RELIEF VALVE
2 – CARRYING CASE
3 – LATCHES
4 – COVER
5 – ELECTRONIC ASSEMBLY
6 – CAPTIVE SCREW (24)
7 – FRONT HANDLE (2)

Figure 3-15. TC Maintenance (Sheet 1 of 7).

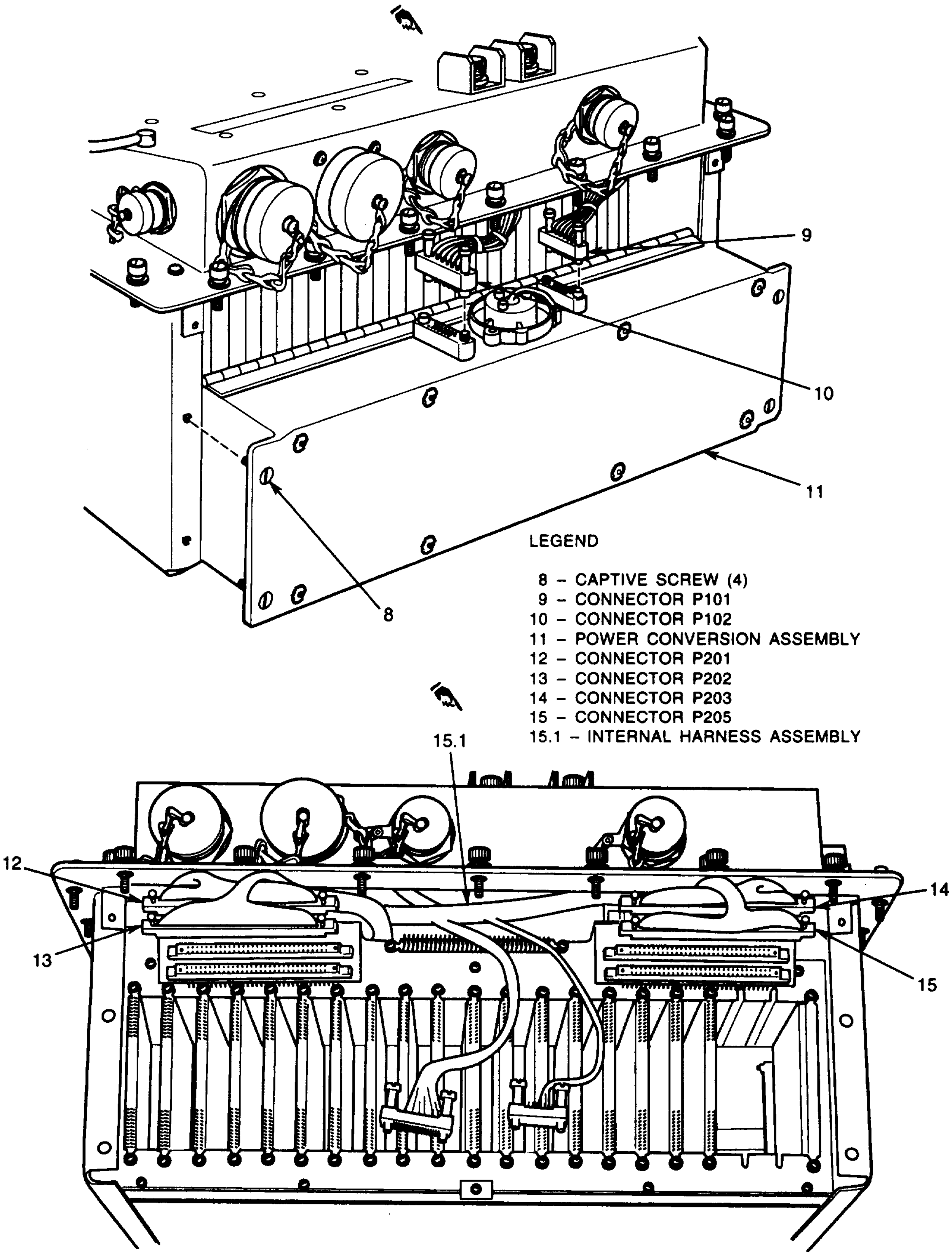
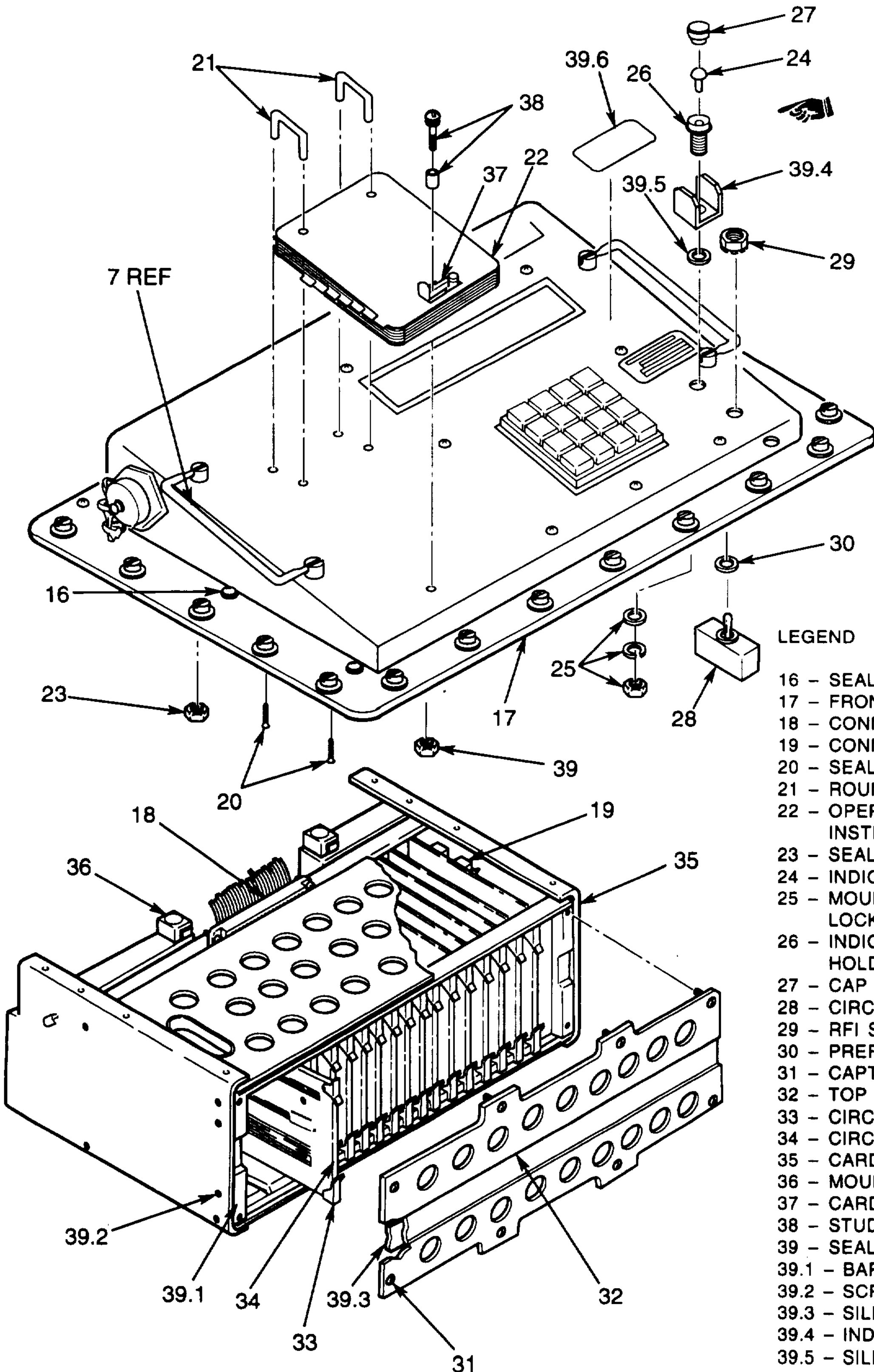


Figure 3-15. TC Maintenance (Sheet 2 of 7).



LEGEND

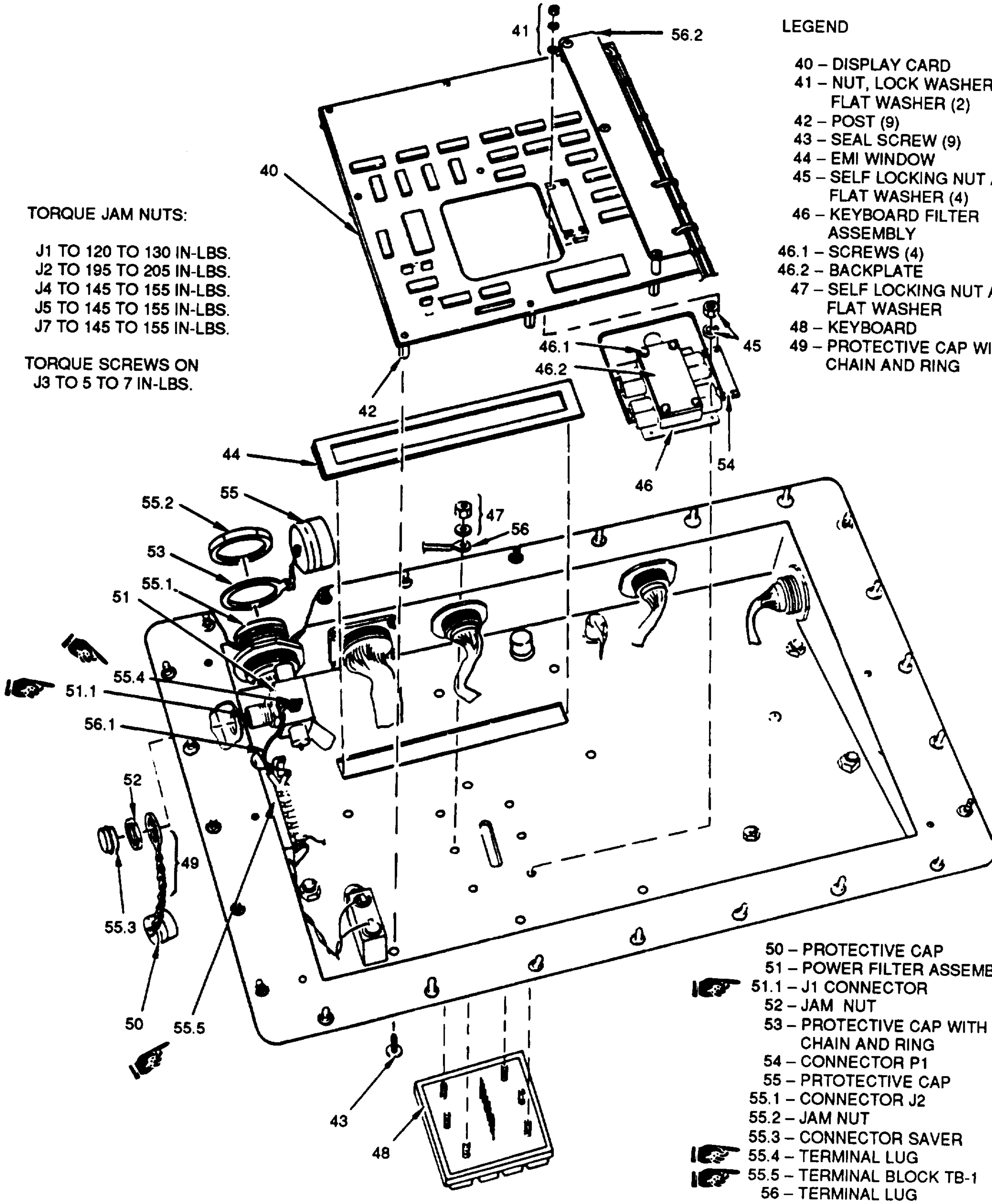
16 – SEAL SCREW (6)
17 – FRONT PANEL ASSEMBLY
18 – CONNECTOR P204
19 – CONNECTOR P206
20 – SEAL SCREW (4)
21 – ROUND HANDLE (2)
22 – OPERATING INSTRUCTION CARDS
23 – SEAL NUT (4)
24 – INDICATOR LAMP (3)
25 – MOUNTING NUT, LOCK WASHER, GASKET (3)
26 – INDICATOR LAMP HOLDER (3)
27 – CAP ASSEMBLY (3)
28 – CIRCUIT BREAKER
29 – RFI SEAL NUT
30 – PREFORMED PACKING
31 – CAPTIVE SCREW (8)
32 – TOP PLATE ASSEMBLY
33 – CIRCUIT CARD TAB
34 – CIRCUIT CARD
35 – CARD CAGE ASSEMBLY
36 – MOUNTING BASE (2)
37 – CARD LATCH
38 – STUD AND SPACER
39 – SEAL NUT
39.1 – BAR ASSEMBLY (2)
39.2 – SCREW (4)
39.3 – SILICONE RUBBER
39.4 – INDICATOR LAMP GUARD (3)
39.5 – SILICONE RUBBER WASHER (3)
39.6 – DA LABEL 80

Figure 3-15. TC Maintenance (Sheet 3 of 7).

TORQUE JAM NUTS:

J1 TO 120 TO 130 IN-LBS.
J2 TO 195 TO 205 IN-LBS.
J4 TO 145 TO 155 IN-LBS.
J5 TO 145 TO 155 IN-LBS.
J7 TO 145 TO 155 IN-LBS.

TORQUE SCREWS ON
J3 TO 5 TO 7 IN-LBS.



LEGEND

40 – DISPLAY CARD
41 – NUT, LOCK WASHER, FLAT WASHER (2)
42 – POST (9)
43 – SEAL SCREW (9)
44 – EMI WINDOW
45 – SELF LOCKING NUT AND FLAT WASHER (4)
46 – KEYBOARD FILTER ASSEMBLY
46.1 – SCREWS (4)
46.2 – BACKPLATE
47 – SELF LOCKING NUT AND FLAT WASHER
48 – KEYBOARD
49 – PROTECTIVE CAP WITH CHAIN AND RING

50 – PROTECTIVE CAP
51 – POWER FILTER ASSEMBLY
51.1 – J1 CONNECTOR
52 – JAM NUT
53 – PROTECTIVE CAP WITH CHAIN AND RING
54 – CONNECTOR P1
55 – PRTOTECTIVE CAP
55.1 – CONNECTOR J2
55.2 – JAM NUT
55.3 – CONNECTOR SAVER
55.4 – TERMINAL LUG
55.5 – TERMINAL BLOCK TB-1
56 – TERMINAL LUG
56.1 – GROUND WIRE
56.2 – HARNESS SUPPORT

Figure 3-15. TC Maintenance (Sheet 4 of 7).

LEGEND

56.3 – TIE DOWN STRAP (5)
56.4 – SCREW (3)
56.5 – LOCK WASHER (3)
56.6 – SPACER (3)
56.7 – FLAT WASHER (6)
56.8 – FLAT WASHER (3)
56.9 – SPACER (3)
56.10 – FLAT WASHER (3)

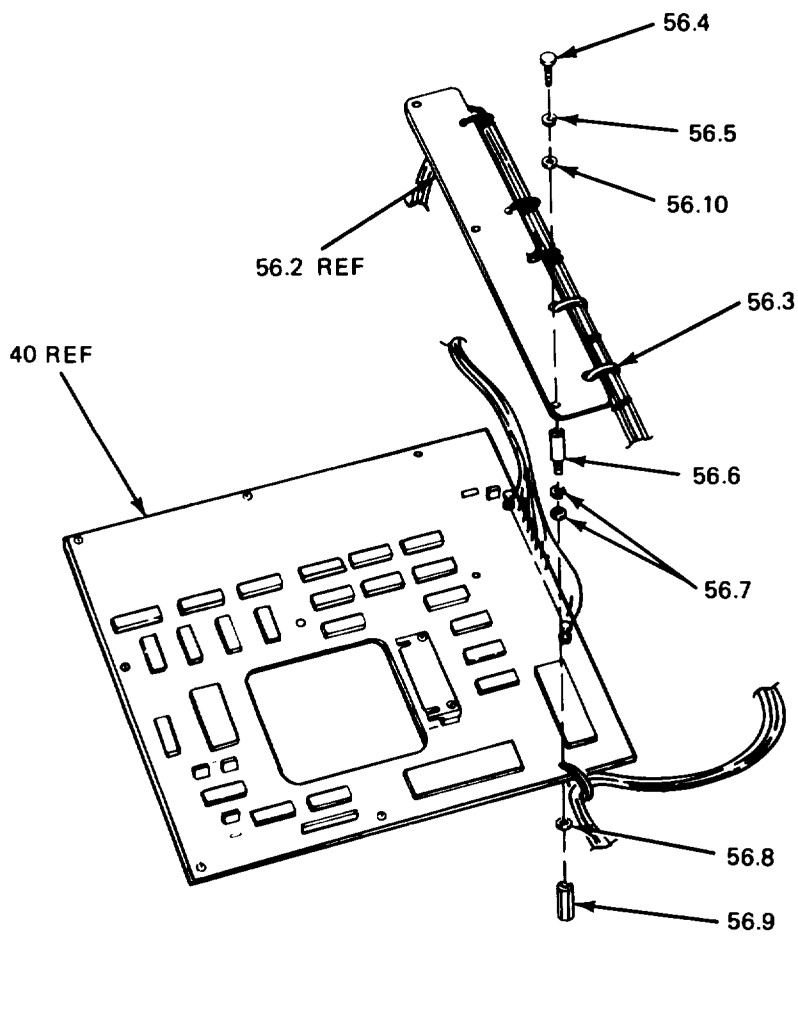
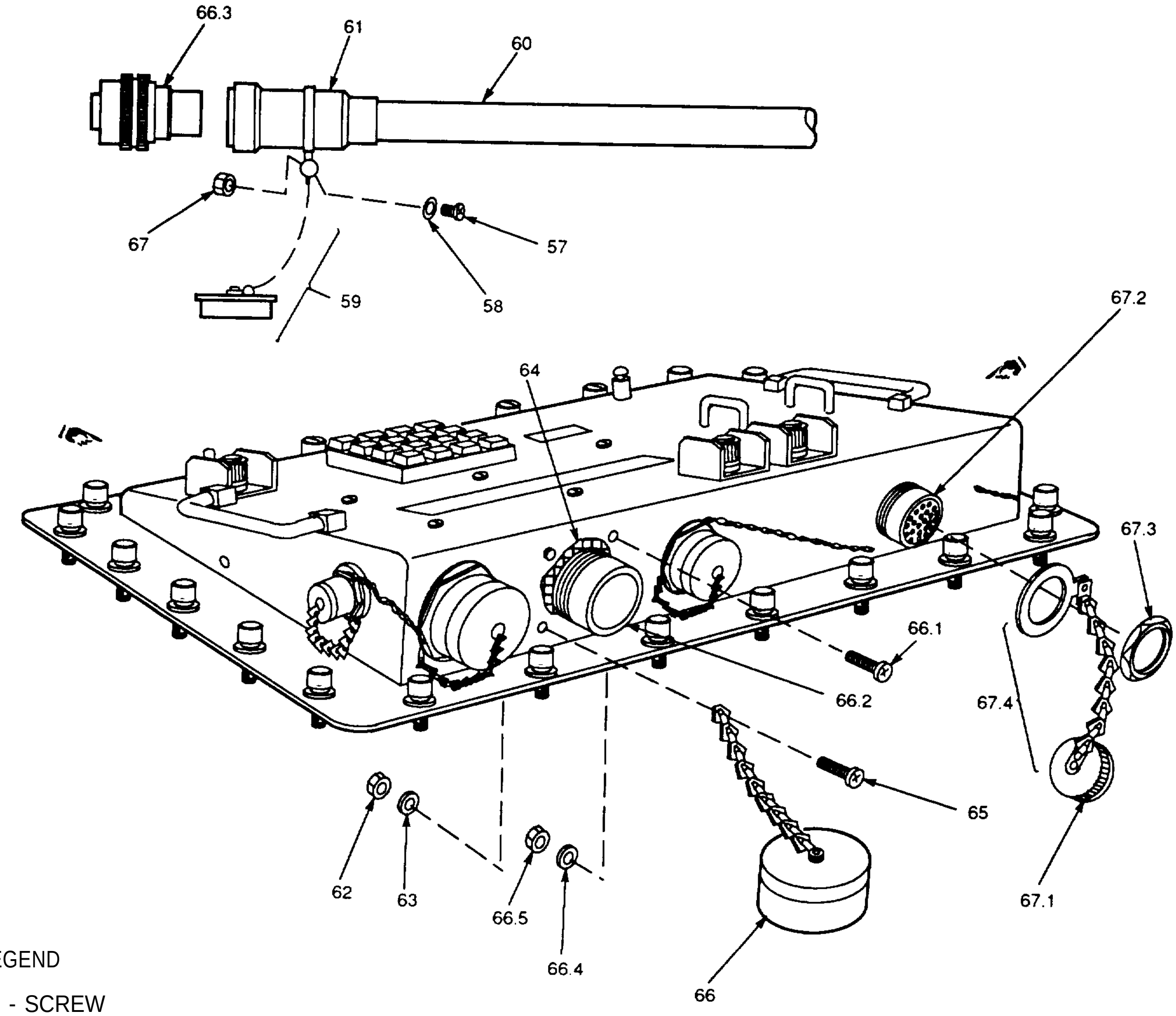


Figure 3-15. TC Maintenance (Sheet 5 of 7).



LEGEND

57 - SCREW
58 - FLAT WASHER
59 - CABLE STRAP AND PROTECTIVE CAP
60 - CABLE
61 - BACKSHELL
62 - SELF LOCKING NUT
63 - FLAT WASHER
64 - EMI GASKET
65 - SEAL SCREW
66 - PROTECTIVE CAP AND CHAIN
66.1 - SEAL SCREW (3)
66.2 - CONNECTOR J3
66.3 - CONNECTOR SAVER
66.4 - FLAT WASHER (3)
66.5 - SELF LOCKING NUT (3)
67 - LOCK NUT
67.1 - PROTECTIVE CAP
67.2 - CONNECTOR J5
67.3 - JAM NUT
67.4 - PROTECTIVE CAP WITH CHAIN AND RING

Figure 3-15. TC Maintenance (Sheet 6 of 7)

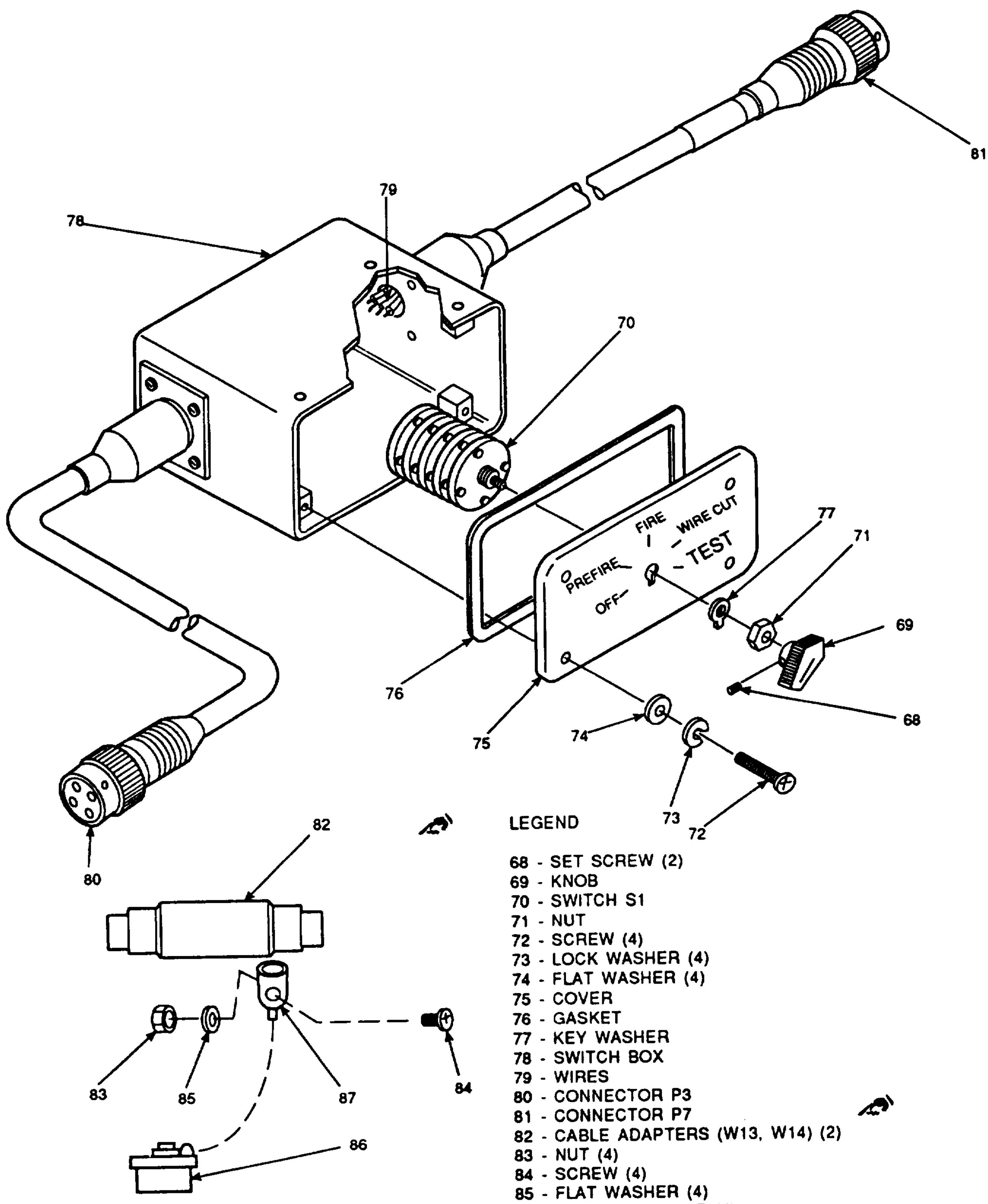


Figure 3-15. TC Maintenance (Sheet 7 of 7)

c. Install electronic assembly (5) in carrying case (2) per paragraph 3-15.

3-18. TC Front Panel Assembly Removal. *a.* Remove power conversion assembly (11) per paragraph 3-16.

b. Remove circuit cards A1 through A6 for access per paragraph 3-40.

CAUTION

Connectors may crack or break if jack-screws are not loosened one-half turn alternately.

c. Disconnect connectors P201 (12), P202 (13), P203 (14), P205 (15), and P206 (19).

CAUTION

Do not pull up on front panel assembly (17). Front panel assembly (17) is still attached to electronic assembly (5) by connector P204 (18).

d. Remove six seal screws (16) from front panel assembly (17).

CAUTION

Connectors may crack or break if jack-screws are not loosened one-half turn alternately.

e. Carefully lift front panel assembly (17) and disconnect connector P204 (18).

f. Carefully cut two cable ties from two mounting bases (36).

g. Remove front panel assembly (17) from electronic assembly (5).

h. Install circuit cards, removed for access, per paragraph 3-4].

3-19. TC Front Panel Assembly Installation. *a.* Remove circuit cards Al through A6 for access per paragraph 3-40.

CAUTION

Connectors may crack or break if jack-screws are not tightened one-half turn alternately.

b. Connect connector P204 (18) and P206 (19) to electronic assembly (5).

CAUTION

To prevent damage or shorts caused by abrasion, tie internal harness assembly, from connectors P204 (18) and P206 (19) to mounting bases (36) to insure a minimum clearance of 1/4 to 1/2 inch between inside edge of front panel assembly (17) and internal harness.

c. Install two cable ties to two mounting bases (36) using lacing tape (item 28, appendix F).

d. Position front panel assembly (17) on electronic assembly (5) and install six seal screws (16). Torque screws (16) to 28 to 32 in-lbs.

CAUTION

Connectors may crack or break if jack-screws are not tightened one-half turn alternately.

e. Connect connectors P201 (12), P202 (13), P203 (14), and P205 (15) to electronic assembly (5).

f. Install circuit cards, removed for access, per paragraph 3-41.

g. Install power conversion assembly (11) per paragraph 3-17.

3-20. TC Operation Instructions Removal. *a.* Remove front panel assembly (17) per paragraph 3-18,

b. Remove four sea screws (20) from inside of front panel assembly (17). Remove two round handles (21).

c. Unlatch card latch (37) from operation instruction cards (22) and remove operating instruction cards (22).

d. Remove seal nut (39) stud and spacer (38).

3-21. TC Operation Instructions Installation. *a.* Install stud and spacer (38) to front panel assembly (17) with seal nut (39). Torque seal nut (39) to 5 to 7 in-lb.

b. Install operation instruction cards (22) on two round handles (21).

c. Apply sealant (item 16, appendix F) to four seal screws (20).

d. Secure two round handles (21) to front panel assembly (17) with four seal screws (20). Torque four seal screws (20) to 5 to 7 in-lb.

e. Install front panel assembly (17) per paragraph 3-19.

3-22. TC Handles Removal. *a.* Remove front pane1 assembly (17) per paragraph 3-18.

a.1 Cut safety wire attaching jam nuts (52) and (55.2) as required.

b. Loosen jam nut (52) on connector J1 (51.1) and turn power filter assembly (51) to provide access to seal nuts (23).

c. Remove four seal nuts (23) from inside of front panel assembly (17).

d. Remove front handles (7).

3-23. TC Handles Installation. *a.* Install front handles (7) on front panel assembly (17) with four seal nuts (23). Torque four seal nuts (23) to 5 to 7 in-lbs.

b. Position power filter assembly (51) and torque jam nut (52) to 120 to 130 in-lbs.

b.1 Install safety wire (item 66, appendix F) on jam nuts (52) and (55.2).

c. Install front panel assembly (17) per paragraph 3- 19.

3-24. TC Indicator (POWER, MS, D/NSC) Lamp Holders Removal. *a.* Remove front panel assembly (17) per paragraph 3-18.

b. Remove sleeving, tag and unsolder three wires from indicator lamp holder(s) (26).

c. Remove one mounting nut, lock washer, and gasket (25) per indicator lamp.

d. Remove indicator lamp holder (26) from front panel assembly (17).

3-24.1. TC Indicator (POWER, MS, D/NSC) Lamp Guards Removal. *a.* Remove TC indicator lamp holders per paragraph 3-24.

b. Remove indicator lamp guard (39.4) and silicone rubber washer (39.5) from front panel assembly (17).

3-24.2. TC Indicator (POWER, MS, D/NSC) Lamp Guards Installation. *a.* Clean surface of front panel assembly (17) and indicator lamp guard (39.4) using cleaning compound (item 34, appendix F).

b. Install silicone rubber washer (39.5) to indicator lamp guard (39.4).

c. Bond indicator lamp guard (39.4) to front panel assembly (17) using adhesive (item 22, appendix F).

d. Install TC indicator lamp holders per paragraph 3-25.

3-25. TC Indicator (POWER, MS, D/NSC) Lamp Holders Installation. *a.* Install indicator lamp holder (26) in front panel assembly (17).

b. Using one gasket, lock washer and mounting nut (25) per indicator lamp holder (26), secure indicator lamp holder (26) to front panel assembly (17).

c. Install sleeving (item 20, appendix F) and solder three wires to correct indicator lamp holder(s) (26) and remove tags.

d. Install front panel assembly (17) per paragraph 3-19.

3-26. TC Indicator Lamps Replacement. TC indicator lamps may be replaced by referring to figure 3-15 for parts location.

3-27. TC Circuit Breaker Removal. *a.* Remove front panel assembly (17) per paragraph 3-18.

b. From rear of front panel assembly (17), remove sleeving, tag, and unsolder two wires from circuit breaker (28).

NOTE

Retain mounting hardware from circuit breaker. It will be used to mount replacement.

c. Remove RFI seal nut (29) from circuit breaker (28) on front panel assembly (17).

d. Remove circuit breaker (28) and preformed packing (30).

3-28. TC Circuit Breaker Installation. *a.* Install preformed packing (30) on circuit breaker (28).

NOTE

Discard mounting hardware supplied with a new circuit breaker.

b. Install circuit breaker (28) with keyway positioned toward ON lamp on front panel assembly (17), and secure with one RFI seal nut (29).

c. Install sleeving (item 20, appendix F) and solder two wires to terminals of circuit breaker (28) and remove tags.

d. Install front panel assembly (17) per paragraph 3-19.

3-29. TC Power Filter Assembly Removal. Remove front panel assembly (17) per paragraph 3-18.

NOTE

If ground wire (56.1) is present on power filter assembly (51), tag and desolder before removing.

b. Tag and unsolder two wires from terminals of power filter assembly (51).

c. Remove protective cap (50) from connector Jl (51.1).

d. Cut safety wire and remove connector saver (55.3) from connector J1 (51.1).

d.1 Cut safety wire attaching jam nuts (52) and (55.2).

e. Remove jam nut (52) from connector J1 (51.1). Remove protective cap with chain and ring (49) from connector J1 (51.1).

f. Remove protective cap (55) from connector J2 (55.1).

g. Remove jam nut (55.2) from connector J2 (55.1). Remove protective cap with chain and ring (53) from connector J2 (55.1)

h. Remove power filter assembly (51).

3-30. TC Power Filter Assembly Installation. *a.* Move connector J2 (55.1) as necessary for clearance and install power filter assembly (51) in front panel assembly (17).

b. Install protective cap with chain and ring (49) and tighten jam nut (52) securely on connector J1 (55.1). Torque jam nut (52) to 120 to 130 in-lbs.

c. Install connector saver (55.3) on connector J1 (55.1).

d. Install safety wire (item 39, appendix F) on connector saver (55.3) and jam nut (52).

e. Install protective cap with chain and ring (53) and jam nut (55.2) securely on connector J2 (55.1). Torque jam nut (55.2) to 195 to 205 in-lbs.

e.1 Install safely wire (item 66, appendix F) on jam nuts (52) and (55.2).

f. Install protective caps (50, 55).

NOTE

If ground wire (56.1) is present, do steps h thru j. If ground wire (56.1) is not present, do steps g thru j.

g. Attach terminal lug (item 62, appendix F) to ground wire (item 53, appendix F). See TM 55-1500-323-25. Install ground wire (56.1) on ground lug on terminal black TB-1 (56.4).

h. Solder ground wire (56.1) to terminal lug (56.3) on power filter assembly (51). Remove tag, if present.

i. Solder two wires to proper terminals of power filter assembly (51) and remove tags.

j. Install front panel assembly (17) per paragraph 3-19.

3-31. TC Display Card Removal. *a.* Remove front panel assembly (17) per paragraph 3-18.

NOTE

Display card (40) is mounted on nine posts (42) secured to the front panel assembly (17) by nine seal screws (43).

Display card (40) is still connected to front panel assembly (17) by connector P1 (54). Do not remove display card (40).

b. Remove nine seal screws (43) from front panel assembly (17).

c. Disconnect connector P1 (54) from display card (40) by loosening two nuts, lock washers, and flat washers (41) and sliding out connector P1 (54).

CAUTION

The display card (40) is an electrostatic discharge sensitive device subject to damage by discharge of static electricity. Wear a wrist ground strap when handling card and handle it by edges only. It must be transported in an antistatic bag.

d. Remove display card (40) from front panel assembly (17). Place card in antistatic bag (item 42, appendix F).

3-32. TC Display Card Installation. *a.* Apply sealant (item 16, appendix F) to threads of nine seal screws (43).

CAUTION

The display card (40) is an electrostatic discharge sensitive device subject to damage by discharge of static electricity. Wear a wrist ground strap when handling card and handle it by edges only. It must be transported in an antistatic bag.

b. Position display card (40) on front panel assembly (17) and install nine seal screws (43).

c. Connect connector P1 (54) to display card (40). Install two flat washers, lock washers, and nuts (41).

d. Install front panel assembly (17) per paragraph 3-19.

3-32.1 TC Display Card Repair. *a.* Remove display card (40) per paragraph 3-31.

b. Remove five tiedown straps (56.3) from harness support (56.2) on display card (40).

c. Remove three screws (56.4), three lock washers (56.5), three flat washers (56.10), three spacers (56.6), six flat washers (56.7), three flat washers (56.8), and three spacers (56.9).

d. Remove harness support (56.2) from display card (40).

e. Position serviceable harness support (56.2) on display card (40) and install three spacers (56.9), three flat washers (56.8), six flat washers (56.7), three spacers (56.6), three flat washers (56.10), three lock washers (56.5), and three screws (56.4).

f. Secure harness support (56.2) to display card (40) with five tiedown straps (56.3).

3-33. TC EMI Window Removal. *a.* Remove display card (40) per paragraph 3-31.

b. Remove EMI window (44) from front panel assembly (17).

3-34. TC EMI Window Installation.

WARNING

Solvents are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapors or contact with the skin. Keep away from heat or open flame.

a. Clean surface of EMI window (44) and front panel assembly (17) using alcohol (item 4, appendix F).

b. Apply primer (item 25, appendix F) and bonding agent (item 26, appendix F) to bonding surface of EMI window (44) and front panel assembly (17).

c. Install EMI window (44),

3-35. TC Keyboard and Filter Assembly Removal.

a. Remove display card (40) per paragraph 3-31.

CAUTION

Be careful when removing keyboard and filter assembly (46). Wire on single filter capacitor at top of keyboard and filter assembly (46) is easily broken.

b. Remove four self locking nuts and flat washers (45).

c. Remove keyboard and filter assembly (46).

3-36. TC Keyboard and Filter Assembly Installation.

CAUTION

Keyboard (48) pins may be bent if filter is not properly aligned for installation.

a. Remove four screws (46.1) from keyboard and filter assembly (46) and remove backplate (46.2).

b. Carefully install keyboard and filter assembly (46) with filters tilted fully towards front panel.

c. Install four self locking nuts and flat washers (45). Torque nuts (45) to 5 to 7 in-lbs.

d. Install backplate (46.2) on keyboard and filter assembly (46) with four screws (46.1).

e. Install display card (40) per paragraph 3-32.

3-37. TC Keyboard Removal. *a.* Remove keyboard and filter assembly (46) per paragraph 3-35.

b. Remove two self locking nuts and flat washers (47) and one terminal lug (56) from front panel assembly (17).

c. Remove keyboard (48) from front panel assembly (17).

3-38. TC Keyboard Installation. *a.* Align and install keyboard (48) in front panel assembly (17).

b. Install two self locking nuts and two flat washers (47) and one terminal lug (56).

c. Install keyboard and filter assembly (46) per paragraph 3-36.

3-39. TC Protective Caps J2, J3, J4, J5, TEST Repair.

NOTE

On units serial number 2098, 2102, and up, screw (65) retaining protective cap and chain (66) is longer than other three screws (66.1) securing connector J2 (66.2).

TC protective caps J2, J3, J4, J5, and TEST may be repaired by referring to figure 3-15 for parts location, safety wire (item 66, appendix F) location, and torque values.

3-40. TC Circuit Card Removal. *a.* Remove electronic assembly (5) per paragraph 3-14.

b. Loosen eight captive screws (31) and remove top plate assembly (32).

CAUTION

The circuit cards in the TC are electrostatic discharge sensitive devices and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.

c. Unlock circuit card tabs (33). Remove circuit card (34) and place in antistatic bag (item 42, appendix F).

3-41. TC Circuit Card Installation.

CAUTION

The circuit cards in the TC are electrostatic discharge sensitive devices and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.

NOTE

Make sure circuit card (34) is positioned to allow connector on card to mate with card connector in card cage assembly (35).

a. Insert circuit card (34) into card guide slots and insert, pushing firmly until card is mated with card connector. Lock circuit card tabs (33).

b. Install top plate assembly (32) and secure with eight captive screws (31).

c. Install electronic assembly (5) per paragraph 3-15.

3-42. TC Card Cage Assembly Removal.
a. Remove front panel assembly (17) per paragraph 3-18.

b. Remove all circuit cards (34) per paragraph 3-40.

c. Card cage assembly (35) is removed.

3-43. TC Card Cage Assembly Installation.
a. Install circuit cards (34) in card cage (35) per paragraph 3-41.

b. Install front panel assembly (17) per paragraph 3-19.

3-43.1 TC Card Cage Assembly Repair. *a.* Remove card cage assembly (35) per paragraph 3-42.

b. Remove two screws (39.2) from bar assembly (39.1).

c. Remove bar assembly (39.1) from card cage assembly (35).

d. Position serviceable bar assembly (39.1) on card cage assembly (35) and secure with two screws (39.2).

e. Install card cage (35) per paragraph 3-43.

3-43.2 TC Top Plate Assembly Repair. *a.* Remove electronics assembly (5) per paragraph 3-14.

b. Loosen eight captive screws (31) and remove top plate assembly (32).

c. Remove damaged silicone rubber (39.3).

WARNING

Solvents and alcohol are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapor or contact with the skin. Keep away from heat and open flame.

d. Clean top plate assembly (32) using alcohol (item 4, appendix F).

e. Bond new silicone rubber (39.3) on top plate assembly (3) using adhesive (item 27, appendix F).

f. Install top plate assembly (32) on card cage assembly (35) and tighten eight captive screws (31).

g. Install electronics assembly (5) per paragraph 3-15.

3-44. TC Cable (W1, W2, W3) Repair. *a.* Remove one screw (57), flat washer (58), lock nut (67), cable strap and protective cap (59) from cable (60).

NOTE

Connector saver (66.3) is only used on W1 cable TC end.

b. Remove shrink sleeving and remove connector saver (66.3) from W1 cable.

c. Position shrink sleeving (item 38, appendix F) on cable W1 and install connector saver (66.3). Shrink sleeving over cable plug, coupler, and backshell (61) using heat gun.

d. Attach protective cap and cable strap (59) to backshell (61) of connector and secure with one screw (57), flat washer (58), and lock nut (67). Torque lock nut (67) as follows: Cable W1 to 45 to 55 in-lbs, cable W2 to 65 to 75 in-lbs, cable W3 to 55 to 65 in-lbs.

Paragraph 3-45 has been deleted.

3-46. TC Internal Harness Assembly Repair. Repair of internal harness assembly (15.1) consists of fault isolation per step a and replacement of faulty wires, lugs or connectors per step b.

a. Fault isolate internal harness assembly (15.1) per steps (1) thru (3).

(1) Remove front panel assembly (17) per paragraph 3-18.

(2) Visually inspect internal harness assembly (15.1) for damaged parts. Replace parts as necessary per step b thru g.

(3) Perform continuity check of internal harness assembly per figures H-1 and H-2. Replace parts as necessary per step b thru g.

b. Replace faulty wires or lugs per TM 55-1500-323-25 using expendable items 28 and 43 thru 62, appendix F.

c. Replace connector J2 per steps (1) thru (9).

(1) Remove protective cap (55). Cut safely wire attaching jam nuts (52) and (55.2). Remove jam nut (55.2) from J2 (55.1).

(2) Remove protective cap (50). Cut safety wire and remove connector saver (55.3) from J1 (51.1). Remove jam nut (52) from J1 (51.1). Remove J1 (51.1) for access.

NOTE

Tag wires before removing wires from connector. Remove tags after replacing wires in connector.

(3) Remove J2 (55.1) from front panel assembly (17). Inspect J2 (55.1) and repair or replace as needed. See TM 55-1500-323-25.

CAUTION

Position J2 as needed to avoid damaging J2 wires when installing J1.

(4) Position J2 (55.1) in front panel assembly (17).

CAUTION

Jam nut on J1 should only be hand tightened.

(5) Position J1 (51.1) in front panel assembly (17). Install protective cap with chain and ring (49) and jam nut (52) on J1 (51.1). Hand tighten jam nut (52). Cover J1 (51.1) with protective cap (50).

CAUTION

Jam nut on J2 should only be hand tightened.

(6) Install protective cap with chain and ring (53) and jam nut (55.2) on J2 (55.1). Hand tighten jam nut (55.2). Cover J2 (55.1) with protective cap (55).

(7) Install front panel assembly (17) per paragraph 3-19.

(8) Remove protective cap (50) from J1 (51.1). Torque jam nut (52) to 120 to 130 in-lbs. Install connector saver (55.3) on J1 (55.1). Install safety wire (item 39, appendix F) on connector saver (55.3) and jam nut (52). Cover J1 (51.1) with protective cap (50).

(9) Remove. protective cap (55) from J2 (55.1). Torque jam nut (55.2) to 195 to 205 in-lbs. Install safety wire (item 66, appendix F) on jam nuts (52) and (55.2). Cover J2 (55.1) with protective cap (55).

d. Replace connector J3 per steps (1) thru (7).

(1) Remove protective cap (66) from J3 (66.2). Remove one seal screw (65), chain of protective cap and chain (66), flat washer (63), and self locking nut (62) from J3 (66.2).

(2) Remove three remaining self locking nuts (66.5), flat washers (66.4), and seal screws (66.1) from J3 (66.2).

NOTE

Tag wires before removing wires from connector. Remove tags after replacing wires in connector.

(3) Remove J3 (66.2) from front panel assembly (17). Inspect J3 (66.2) and repair or replace as needed. See TM 55-1500-323-25.

(4) Remove EMI gasket (64) from J3 (66.2). Inspect and replace as needed.

NOTE

On units serial number 2098, 2102, and up, seal screw (65) is longer than other three seal screws (66.1) securing J3 (66.2).

(5) Install EMI gasket (64) on J3 (66.2). Position J3 (66.2) in front panel assembly (17). Install chain of protective cap and chain (66) on J3 (66.2) with one seal screw (65), flat washer (63), and self locking nut (62). Do not tighten.

(6) Install remaining three seal screws (66.1), flat washers (66.4), and self locking nuts (66.5) on J3 (66.2). Torque four seal screws (65, 66.1) to 5 to 7 in-lbs. Cover J3 (66.2) with protective cap (66).

(7) Install front panel assembly (17) per paragraph 3-19.

e. Replace connector J4, J5, or TEST per steps (1) thru (5).

NOTE

This procedure is the same for connectors J4, J5, and TEST. Connector J5 is shown.

(1) Remove protective cap (67.1) from J5 (67.2). Cut safety wire and remove jam nut (67.3) and protective cap with chain and ring (67.4).

NOTE

Tag wires before removing wires from connector. Remove tags after replacing wires in connector.

(2) Remove J5 (67.2) from front panel assembly (17). Inspect J5 (67.2) and repair or replace as needed. See TM 55-1500-323-25.

(3) Position J5 (67.2) in front panel assembly (17). Install protective cap with chain and ring (67.4) and jam nut (67.3) on J5 (67.2). Hand tighten jam nut (67.3).

(4) Cover J5 (67.2) with protective cap (67.1). Install front panel assembly (17) per paragraph 3-19.

(5) Remove protective cap (67.1) from J5 (67.2). Torque jam nut (67.3) to 145 to 155 in-lbs. Install safety wire (item 66, appendix F) as shown in figure 3-15. Cover J5 (67.2) with protective cap (67.1).

f. Replace connector P101 or P102 per steps (1) and (2).

CAUTION

Avoid pulling on Internal harness assembly when doing repairs.

NOTE

This procedure is the same for connectors P101 and P102. Connector P101 is shown.

Tag wires before removing wires from connector. Remove tags after replacing wires in connector.

(1) Inspect P101 (9) and repair or replace as needed. See TM 55-1500-323-25.

(2) Install front panel assembly (17) per paragraph 3-19.

g. Replace connector P201, P202, P203, P205, or P206 per steps (1) and (2).

CAUTION

Display circuit card assembly is electrostatic sensitive. Avoid touching circuit card or contacting circuit card with metal tools.

NOTE

Repair of circuit card harness connector 1P204 is a depot level task.

This procedure is the same for connector P201, P202, P203, P205, and P206. Connector P201 is shown.

Tag wires before removing wires from connector. Remove tags after replacing wires in connector.

(1) Inspect P201 (12) and repair or replace as needed. See TM 55-1500-323-25.

(2) Install front panel assembly (17) per paragraph 3-19.

3-46.1 TC Special Purpose Cable W11 Repair.

a. Loosen two set screws (68) and remove knob (69) from switch S1 (70).

b. Remove nut (71) from switch S1 (70).

c. Remove four screws (72), lockwashers (73), and flat washers (74) from cover (75).

d. Remove cover (75), gasket (76), and key washer (77) from switch box (78). Inspect gasket (76) and replace if necessary.

e. Tag and desolder wires (79), and remove switch S1 (70).

f. Inspect connectors P3 (80) and P7 (81). Replace or repair as necessary. See TM 55-1500-323-25.

g. Solder wires (79) to switch S1 (70). Remove tags.

h. Position gasket (76) and cover (75) on switch box (78) and install key washer (77), nut (71), four flat washers (74), lockwashers (73), and screws (72).

i. Install knob (69) on shaft of switch S1 (70) and tighten two set screws (68).

NOTE

TC cable adapters (W13, W14) are present with TC PN 13314321 only.

3-46.2 TC cable adapters (W13, W14) repair. Cable adapters W13 and W14 may be repaired by referring to figure 3-15 for parts location.

3-46.3. Missile Simulator Maintenance (PN 13314305, PN 13163005). For maintenance of MS PN 13314305 and MS PN 13163005, refer to TM 9-4935-474-14-2.

3-47. Missile Simulator Maintenance (PN 13143604). Maintenance on the MS PN 13143604 consists primarily of removal and replacement of MS subassemblies. Refer to figure 3-16 for component location.

3-48. MS Electronic Assembly Removal.

a. Press breather valve (1) to release internal pressure.

b. Loosen screw (2) from fixed aft coupling (3).

c. Remove fixed aft coupling (3) and exhaust nozzle (4).

d. Using front handle (5), pull electronic assembly (6) from missile case (7) until connector P2 (8) can be reached.

CAUTION

Connectors may crack or break if jack screws are not loosened one-half turn alternately.

e. Disconnect connector P2 (8) from connector J2.

f. Remove electronic assembly (6) from missile case (7).

g. Remove preformed packing (17) from missile case (7). Inspect preformed packing (17). Replace as necessary.

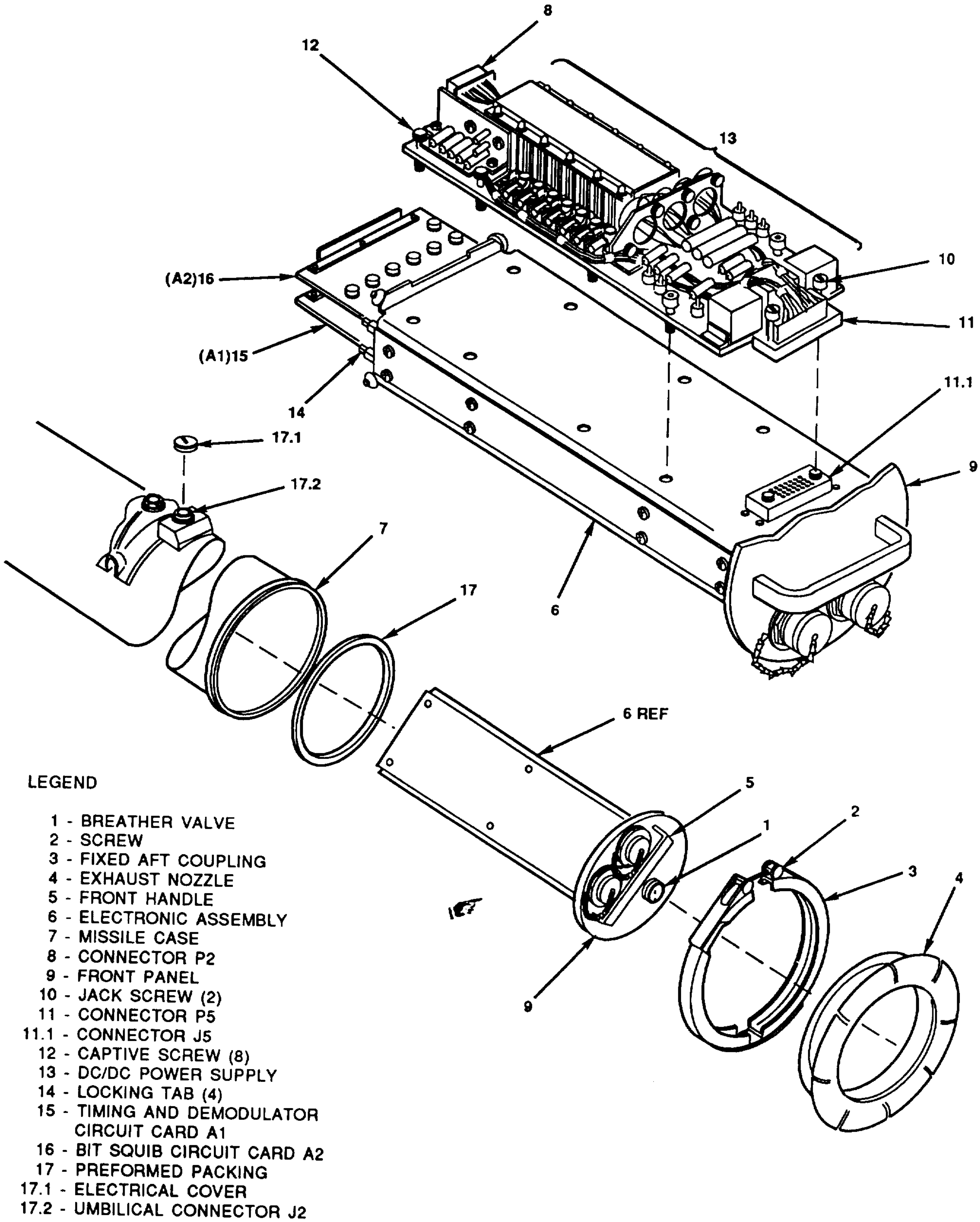
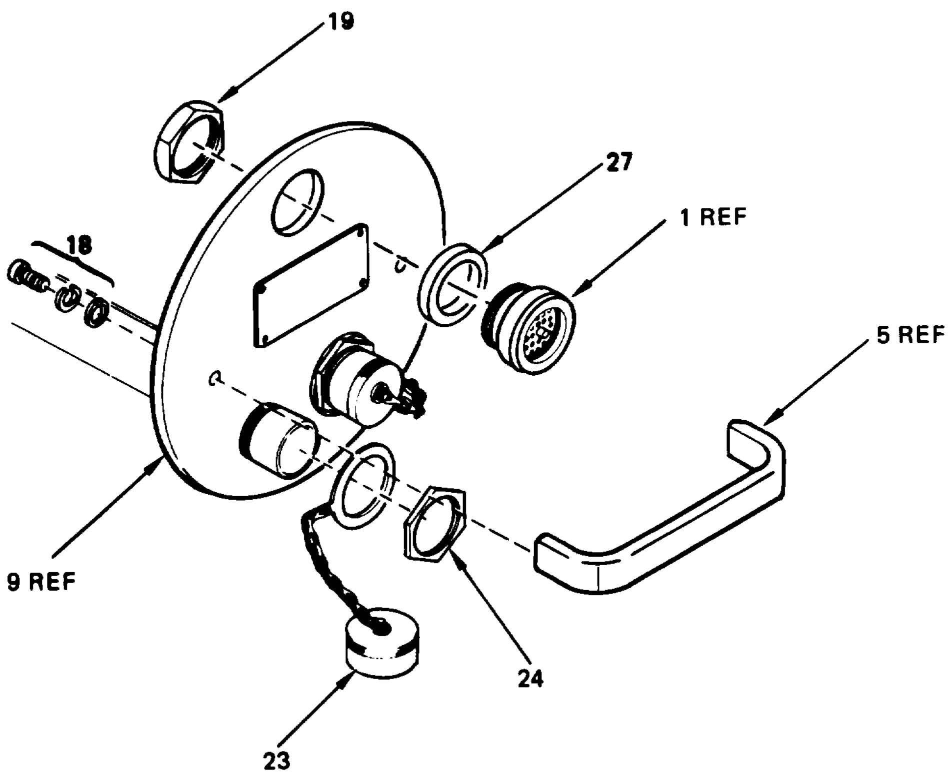
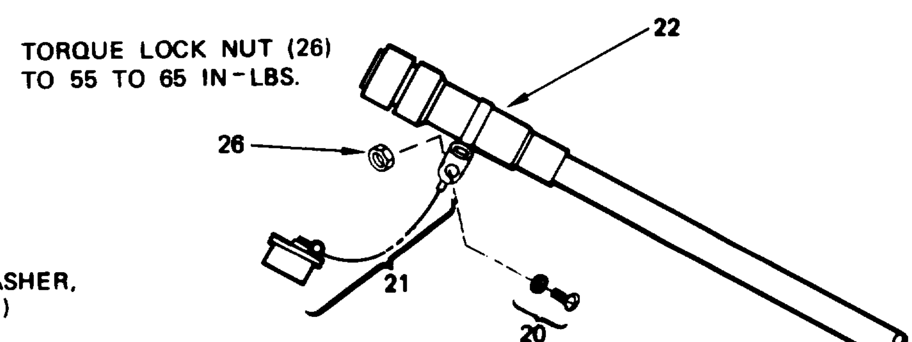


Figure 3-16. MS Maintenance (Sheet 1 of 5)

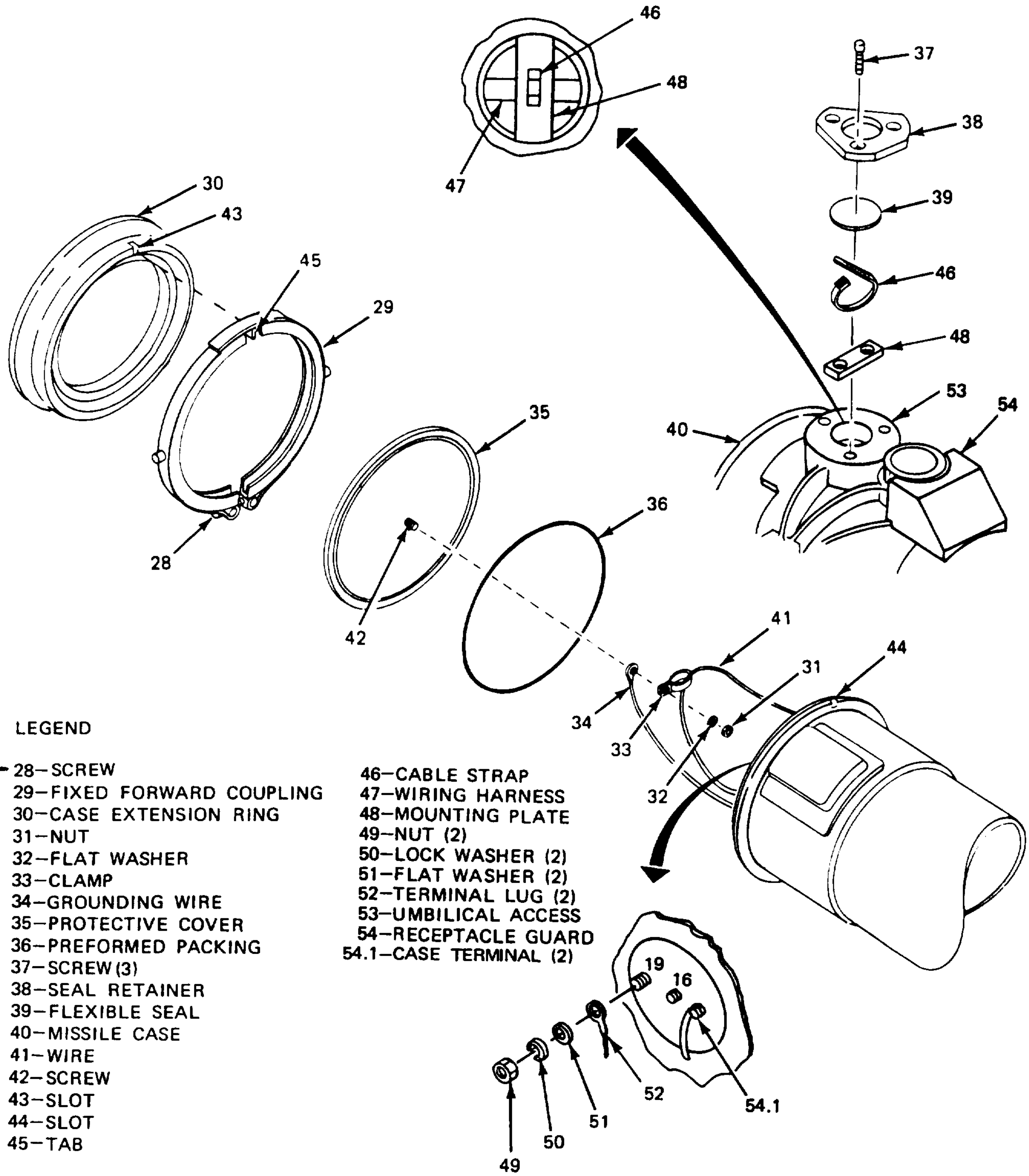




LEGEND

18 – SCREW, FLAT WASHER,
LOCK WASHER (2)
19 – HEX NUT
20 – SCREW, FLAT WASHER,
21 – PROTECTIVE CAP AND
CABLE STRAP
22 – BACKSHELL
23 – PROTECTIVE CAP WITH
CHAIN AND RING
24 – JAM NUT
25 – DELETED
26 – NUT
27 – PREFORMED PACKING

Figure 3-16. MS Maintenance (Sheet 2 of 5)



LEGEND

28–SCREW
29–FIXED FORWARD COUPLING
30–CASE EXTENSION RING
31–NUT
32–FLAT WASHER
33–CLAMP
34–GROUNDING WIRE
35–PROTECTIVE COVER
36–PREFORMED PACKING
37–SCREW (3)
38–SEAL RETAINER
39–FLEXIBLE SEAL
40–MISSILE CASE
41–WIRE
42–SCREW
43–SLOT
44–SLOT
45–TAB
46–CABLE STRAP
47–WIRING HARNESS
48–MOUNTING PLATE
49–NUT (2)
50–LOCK WASHER (2)
51–FLAT WASHER (2)
52–TERMINAL LUG (2)
53–UMBILICAL ACCESS
54–RECEPTACLE GUARD
54.1–CASE TERMINAL (2)

Figure 3-16. MS Maintenance (Sheet 3 of 5)

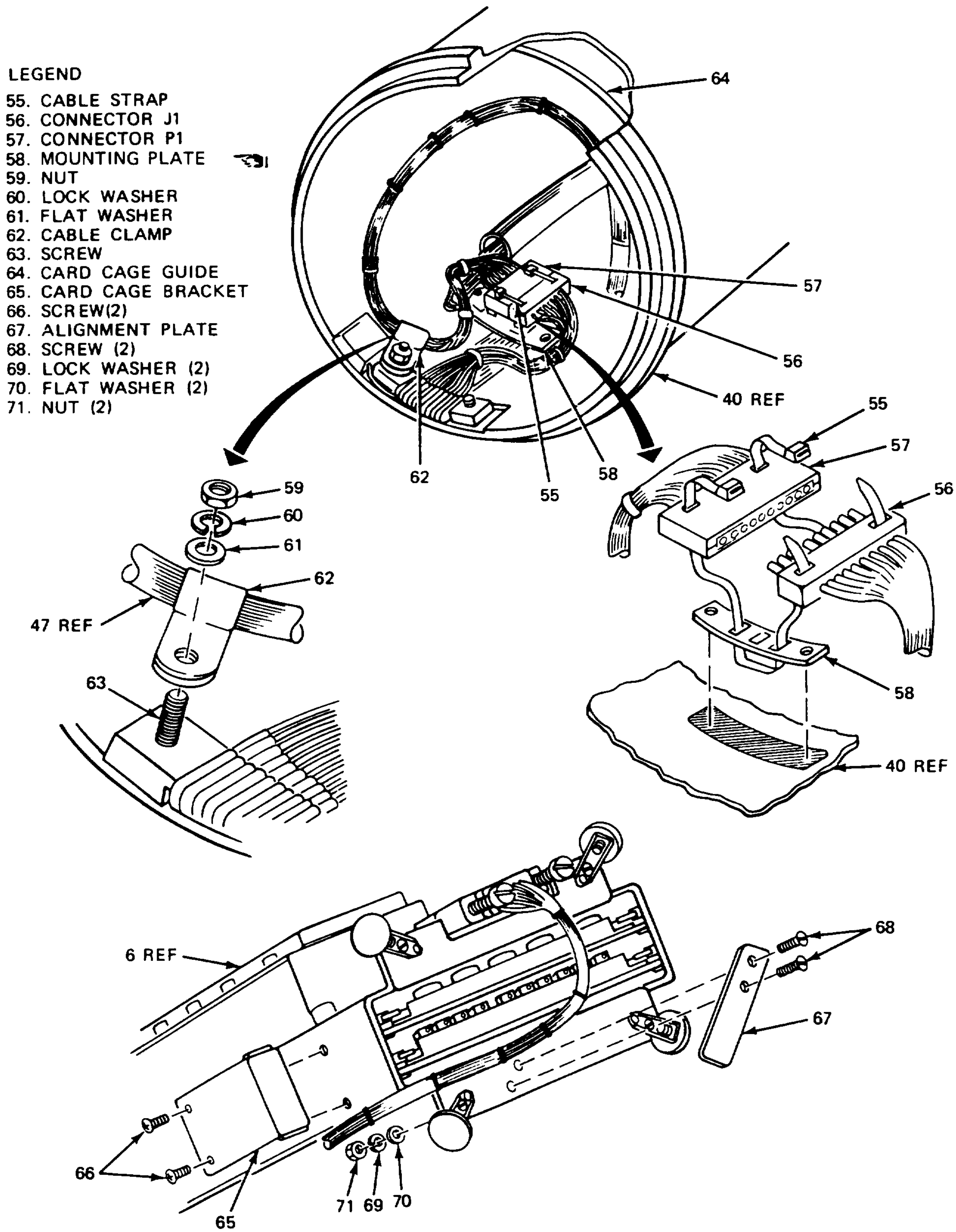
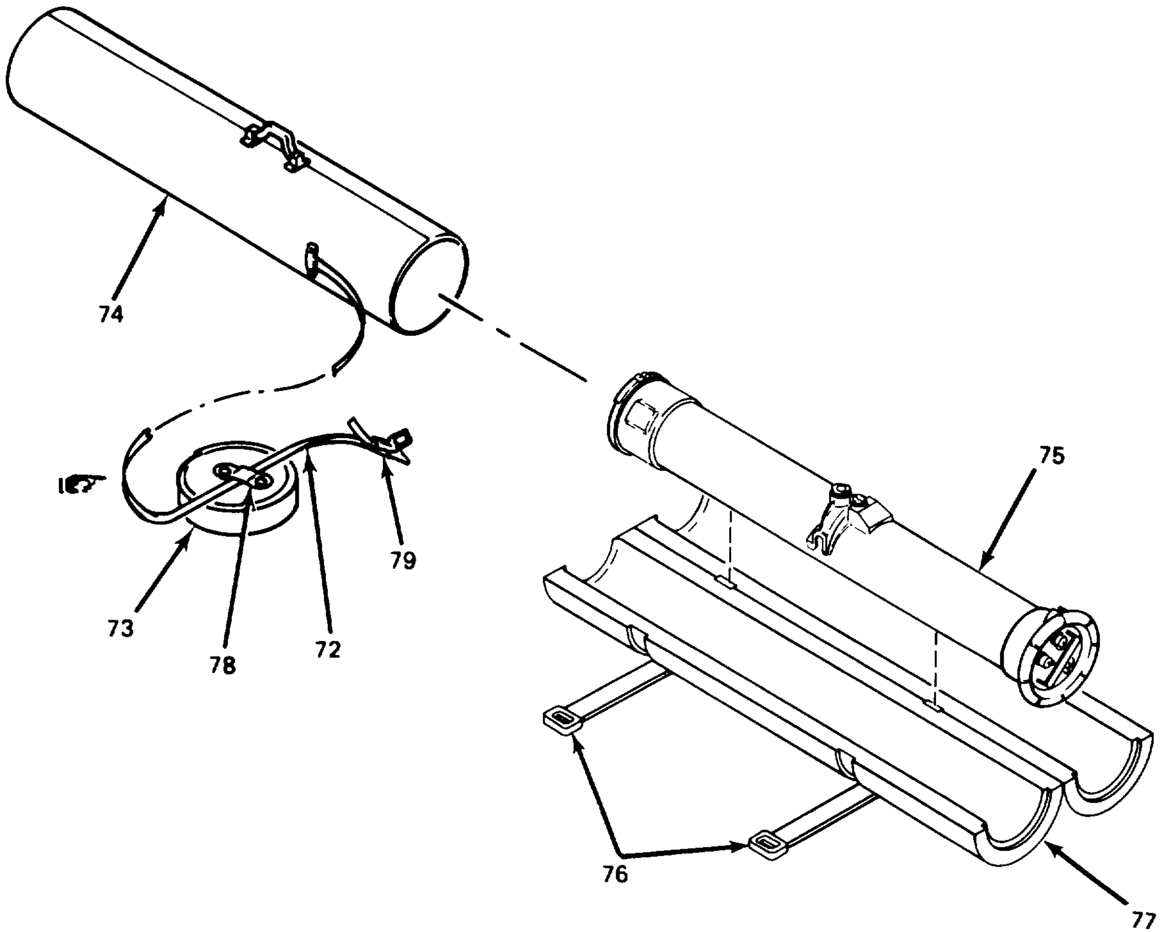


Figure 3-16. MS Maintenance (Sheet 4 of 5)



LEGEND

72 – STRAP
73 – COVER ASSEMBLY
74 – TRANSIT CASE
75 – MISSILE SIMULATOR
76 – STRAP (2)
77 – CUSHION (2)
☞ 78 – HOLDING TAB
☞ 79 – BUCKLE

Figure 3-16. MS Maintenance (Sheet 5 of 5)

3-49. MS Electronic Assembly Installation. *a.* Install preformed packing (17) on missile case (7).

CAUTION

Connectors may crack or break if jack-screws are not tightened one-half turn alternately.

Be careful when installing electronic assembly in missile case to avoid damage to missile case internal wiring harness and connector.

b. Position electronic assembly (6) near rear end of missile case (7) with connectors J1 and J3 on front panel (9) facing left with respect to umbilical connector on missile case (7). Connect connector P2 (8) to connector J2.

c. Using front handle (5), slide electronic assembly (6) into missile case (7) until front panel (9) is flush with tube edge.

d. Apply sealant (item 16, appendix F) to the threads of screw (2).

e. Install fixed aft coupling (3) and exhaust nozzle (4). Torque screw (2) to 32 to 34 in-lbs.

3-49.1. MS Case Modification Removal. *a.* Remove electronic assembly (6) per paragraph 3-48.

b. Loosen screw (28) and remove fixed forward coupling (29).

c. Remove case extension ring (30).

d. Remove nut (31), flat washer (32), cable clamp (33), and grounding wire (34) from protective cover (35).

e. Tag and remove two nuts (49), lock washers (50), flat washers (51) and terminal lugs (52) from missile case (40).

f. Tag and unsolder two wires from case terminals (54.1).

g. Remove protective cover (35) and preformed packing (36).

h. Remove three screws (37), seal retainer (38), and flexible seal (39) from missile case (40).

3-49.2. MS Case Modification Installation. *a.* Position flexible seal (39) and install seal retainer (38) with three screws (37). Torque screws to 13 to 15 in-lbs.

b. Install preformed packing (36).

c. Install wires (41) through cable clamp (33).

d. Position grounding wire (34) and cable clamp (33) on screw (42) in protective cover (35).

e. Install flat washer (32) and nut (31) on screw (42).

f. Install two terminal lugs (52) with two flat washers (51), lock washers (50), and nuts (49). Remove tags.

g. Solder two wires to case terminals (54.1). Remove tags.

h. Line up slot (43) in case extension ring (30) with slot (44) in missile case (40).

i. Install case extension ring (30) on missile case (40).

j. Position fixed forward coupling (29) on case extension ring (30) with tab (45) in slot (43).

k. Apply sealant (item 16, appendix F) to threads of screw (28).

l. Tighten screw (28) to secure freed forward coupling (29) on missile case (40). Torque screw (28) to 32 to 34 in-lbs.

m. Install electronic assembly (6) per paragraph 3-49.

3-49.3 MS Case Removal. *a.* Remove case modification per paragraph 3-49.1.

b. Remove cable straps (55) securing connectors J1 (56) and P1 (57) to mounting plate (58).

c. Disconnect connector J1 (56) from connector P1 (57).

WARNING

Solvents are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapors or contact with the skin. Keep away from heat or open flame.

d. Remove mounting plate (58) from missile case (40) using cleaning compound (item 21, appendix F).

e. Remove cable strap (46) securing wiring harness (47) to missile case (40) umbilical access (53).

f. Remove mounting plate (48) from missile case (40) umbilical access (53).

g. Remove nut (59), lock washer (60), flat washer (61) and cable clamp (62).

h. Inspect screw (63). Replace as necessary.

i. Remove wiring harness (47) from missile case (40).

j. Inspect connectors and terminal lugs. Replace and repair as necessary. See TM 55-1500-323-25.

WARNING

Solvents are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapors or contact with the skin. Keep away from heat or open flame,

3-49.4 MS Case Installation. *a.* Clean mounting plate (58) bonding surface of missile case (40) using cleaning compound (item 21, appendix F).

b. Install mounting plate (58) on missile case (40) using adhesive (item 22, appendix F). Keep strap holes free of adhesive.

c. Connect connector P1 (57) to connector J1 (56).

d. Thread cable strap (55) through mounting plate (58) and secure connectors P1 (57) and J1 (56) to missile case (40).

e. Perform mounting plate (48) to snap into hole in umbilical access (53).

j. Coat head and upper threads of screw (63) with adhesive (item 22, appendix F). Bond screw (63) to missile case (40).

g. Thread cable strap (46) through mounting plate (48) and around wiring harness (47).

h. Install cable clamp (62), flat washer (61), lockwasher (60), and nut (59) to secure wiring harness (47) to screw (63).

i. Install case modification per paragraph 3-492.

3-49.5 MS Case Receptacle Guard Repair.
a. Remove damaged receptacle guard (54) from missile case (40).

WARNING

Solvents are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapors or contact with the skin. Keep away from heat or open flame.

b. Clean surface of missile case (40) using cleaning compound (item 21, appendix F).

c. Bond receptacle guard (54) to missile case (40) with adhesive (item 22, appendix F).

3-49.6 MS Case Card Cage Guide Repair.
a. Remove card cage guide (64) from missile case (40).

WARNING

Solvents are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapors or contact with the skin. Keep away from heat or open flame.

b. Clean surface of missile case (40) using cleaning compound (item 21, appendix F).

c. Bond card cage guide (64) to missile case (40) with adhesive (item 22, appendix F).

NOTE

If MS BIT and Squib A2 PN 13162725 or PN 13163019 is used, DO NOT use DC/DC power supply PN 13162858. Refer to TM 9-4935-474-24P-1 for proper configuration.

3-50. MS DC/DC Power Supply Removal.

a. Remove electronic assembly (6) per paragraph 3-48.

CAUTION

Connectors may crack or break if jackscrews are not loosened one-half turn alternately.

b. Loosen two jackscrews (10) and disconnect connector P5 (11) from connector J5 (11.1).

c. Loosen eight captive screws (12).

d. Remove DC/DC power supply (13) from electronic assembly (6).

3-51. MS DC/DC Power Supply Installation.

a. Position DC/DC power supply (13) on electronic assembly (6).

b. Tighten eight captive screws (12).

CAUTION

Connectors may crack or break if jackscrews (10) are not tightened one-half turn alternately.

c. Connect connector P5 (11) to connector J5 (11.1) and tighten two jackscrews (10).

d. Install electronic assembly (6) per paragraph 3-49.

NOTE

If MS DC/DC power supply PN 13162858 is used, DO NOT use BIT and SQUIB A2 PN 13162725 or PN 13163019. Refer to TM 9-4935-474-24P-1 for proper configuration.

3-52. MS Circuit Cards Removal. *a.* Remove electronic assembly (6) per paragraph 3-48.

b. Remove card cage bracket (65) per paragraph 3-53.1.

CAUTION

The circuit cards in the MS are electrostatic discharge sensitive devices and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle cards by edges only. Circuit cards must be transported in antistatic bags.

NOTE

Procedure for both circuit cards is the same.

c. Open locking tabs (14).

d. Remove circuit card(s) (15 and 16), tag card and note orientation. Place card(s) in antistatic bag (item 42, appendix F).

e. Close locking tabs (14).

3-53. MS Circuit Cards Installation.

CAUTION

The circuit cards in the MS are electrostatic discharge sensitive devices and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle cards by edges only. Circuit cards must be transported in antistatic bags.

a. Open locking tabs (14).

b. Remove tags and install circuit card(s) (15 and 16) in card guide slots and insert, pushing firmly until card is mated with card connector.

c. Close locking tabs (14).

d. Install card cage bracket (65) per paragraph 3-53.2.

e. Install electronic assembly (6) per paragraph 3-49.

3-53.1 MS Card Cage Bracket Removal. *a.* Remove electronic assembly (6) per paragraph 3-48.

b. Remove two screws (66).

c. Remove card cage bracket (65) from electronic assembly (6).

3-53.2 MS Card Cage Bracket Installation. *a.* Apply sealant (item 16, appendix F) to two screws (66).

NOTE

Before tightening screws (66) push the bracket foam rubber against the two cards until the foam rubber is fully compressed. Maintain the foam rubber in the fully compressed condition until the screws (66) are tightened and sealed.

b. Position card cage bracket (65) on electronic assembly (6) and secure with two screws (66).

c. Install electronic assembly (6) per paragraph 3-49.

3-53.3 MS Alignment Plate Removal. *a.* Remove electronic assembly (6) per paragraph 3-48.

b. Remove two screws (68), lockwashers (69), flat washers (70), and nuts (71) from alignment plate (67).

3-53.4 MS Alignment Plate Installation. *a.* Position alignment plate (67) and secure with two screws (68), flat washers (70), lockwashers (69), and nuts (71).

b. Install electronic assembly (6) per paragraph 3-49.

3-54. MS Handle Removal. MS front handle(s) (5) may be repaired by referring to figure 3-16 for parts location.

3-55. MS Handle Installation. MS front handle(s) (5) may be installed by referring to figure 3-16 for parts location. Secure handle(s) (5) with two screws (18).

3-56. MS Breather Valve Removal. ***a.*** Remove electronic assembly (6) per paragraph 3-48.

b. Remove hex nut (19).

c. Remove breather valve (1).

d. Inspect preformed packing (27). Replace if necessary.

3-57. MS Breather Valve Installation. *a.* Replace preformed packing (27) if necessary.

b. Install new breather valve (l).

c. Install hex nut (19).

d. Install electronic assembly (6) per paragraph 3-49.

3-58. MS Cable (W5) Repair. MS cable (W5) may be repaired by referring to figure 3-16 for parts location.

3-59. MS Protective Caps Repair. MS protective cap and cable strap (21) and protective cap with chain and ring (23) may be repaired by referring to figure 3-16 for parts and safety wire location. Secure protective cap with chain and ring (23) with jam nut (24) and safely wire (item 66, appendix F).

Paragraph 3-60 has been deleted.

3-60.1 MS Transit Case Cushion Assembly Repair (Units 2145 and Up). *a.* Unhook strap (72) and open cover assembly (73) of transit case (74).

b. Remove missile simulator (75) from transit case (74).

c. Unhook and remove two straps (76) and two cushions (77) from missile simulator (75).

d. Inspect two cushions (77). Replace as necessary.

e. Install two cushions (77) and two straps (76) on missile simulator (75).

f. Install missile simulator (75) into transit case (74) and secure cover assembly (73) with strap (72).

3-60.2 MS Transit Case Cover Assembly Repair (Units 2145 and Up). *a.* Unhook strap (72) and open cover (73) of transit case (74).

b. Remove buckle (79) from strap (72).

c. Pull strap (72) through holding tab (78) and remove cover assembly (73).

d. Inspect cover assembly (73). Replace as necessary.

e. Push strap (72) through holding tab (78) on cover assembly (73).

f. Install buckle (79) on strap (72).

g. Install cover assembly (73) on transit case (74) and latch strap (72).

3-60.3 Day/Night Sight Collimator Maintenance (PN 13314306, PN 13163006). For maintenance of D/NSC PN 13314306, PN 13163006, refer to TM 9-4935474-14-2. Refer to TM 9-4935-474-24P-1 for proper configuration.

3-61. Day/Night Sight Collimator Maintenance (PN 13143603). Maintenance on the D/NSC consists primarily of removing and replacing faulty subassemblies. Refer to figure 3-17 for component location.

3-62. D/NSC Removal. *a.* Press breather valve (1) in carrying case (2).

b. Release twelve latches (3) on carrying case (2) and remove cover (4).

CAUTION

Damage to connectors P8 and J8 (21.7 and 9) may occur. Ensure that mating surfaces between optical assembly (7) and tilt stage (8) are not placed face down.

c. Remove D/NSC (5) optical assembly (7) and tilt stage (8) from carrying case (2).

d. Remove two captive screws (68) from carrying case (2).

3-63. D/NSC Installation.

CAUTION

Be sure plastic on carrying case (2) does not catch on optics or connectors when installing optical assembly (7) and tilt stage (8) in carrying case (2).

a. Install D/NSC (5) optical assembly (7) and tilt stage (8) into carrying case (2).

b. Install two captive screws (68) in carrying case (2).

c. Replace cover (4) and close by securing twelve latches (3).

3.64. D/NSC Tilt Stage/Optical Assembly Removal. *a.* Remove D/NSC per paragraph 3-62.

b. Lift and turn handles of four expando grip pins (6) to unlock pins.

CAUTION

Optical assembly (7) is still connected to tilt stage (8) by connector J8 (9) and mating connector P8 (21.7) on optical assembly (7). Pull directly forward to prevent damage to connector pins.

c. Slowly pull optical assembly (7) directly forward using two hand grips (16).

3-65. D/NSC Tilt Stage/Optical Assembly Installation.

CAUTION

Pins of connector J8 (9) and mating connector P8 (21.7) on optical assembly (7) may be damaged by forcing the connectors together.

a. Holding optical assembly (7) with two hand grips (16) use guide pins on connector P8 (21.7) to aline connector J8 (9) to plug P8 (21.7).

b. Firmly push optical assembly (7) towards tilt stage (8) until four expando grip pins (6) and connector J8 (9) are mated firmly.

c. Turn and pull down handles of four expando grip pins (6) to lock optical assembly (7) in place.

d. Install D/NSC per paragraph 3-63.

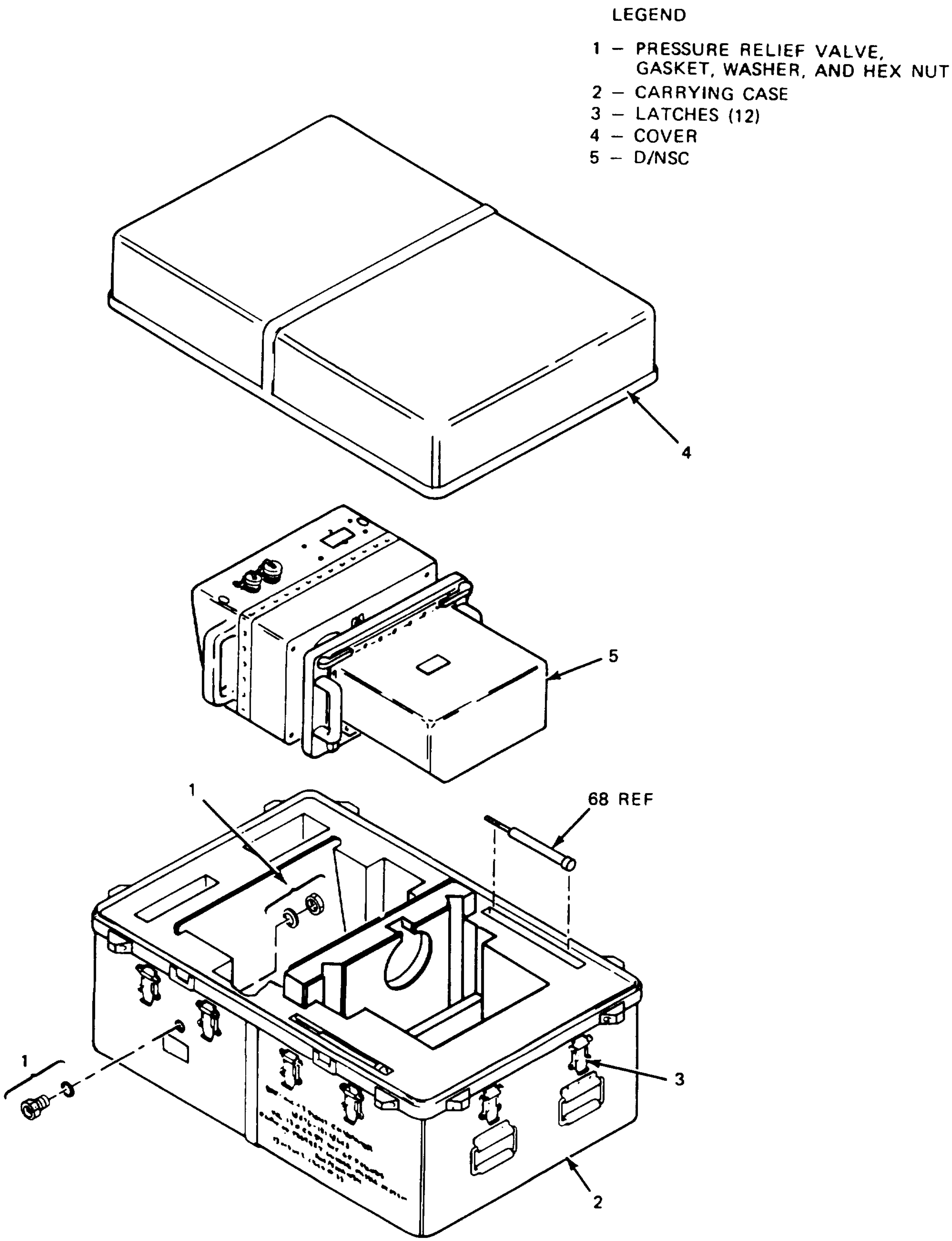


Figure 3-17. D/NSC Maintenance (Sheet 1 of 11)

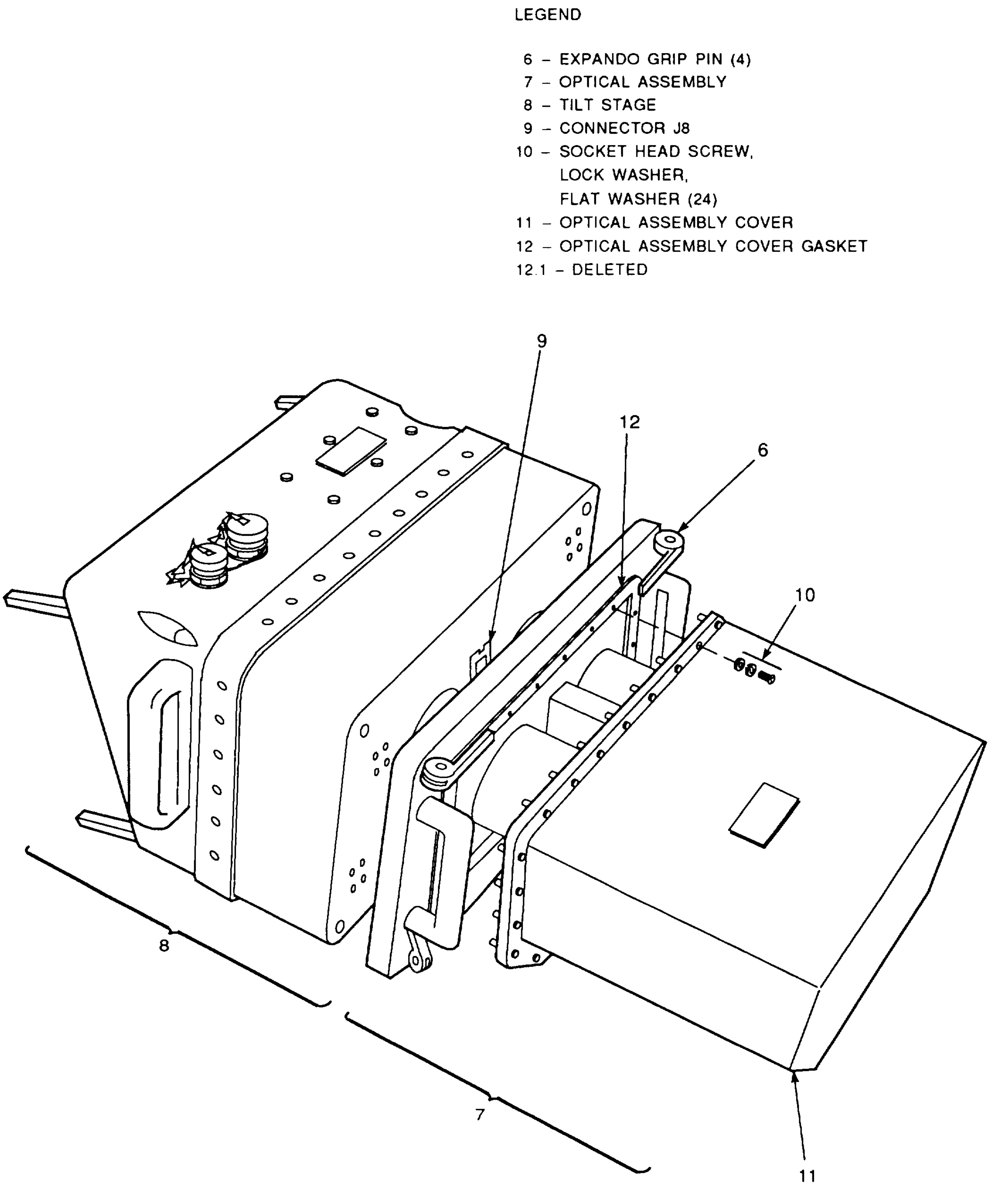


Figure 3-17. D/NSC Maintenance (Sheet 2 of 11)

LEGEND

13 – CONNECTOR P3
14 – CONNECTOR P9
15 – DAYSIGHT COLLIMATOR
16 – HAND GRIP (2)
17 – SOCKET HEAD SCREW (4)
18 – INNER PIN AND WASHER (4)
19 – SET SCREW (4)
20 – BARREL NUT AND LOCKING PIN (4)
21 – NIGHTSIGHT COLLIMATOR
21.1 – SCREW (4)
21.2 – LOCK WASHER (4)
21.3 – FLAT WASHER (4)
21.4 – SCREW (2)
21.5 – LOCK WASHER (2)
21.6 – FLAT WASHER (2)
21.7 – CONNECTOR P8 AND PLATE
21.8 – SCREW (2)
21.9 – LOCK WASHER (2)
21.10 – FLAT WASHER (2)
21.11 – CONNECTOR XA2
21.12 – CONNECTOR XA3

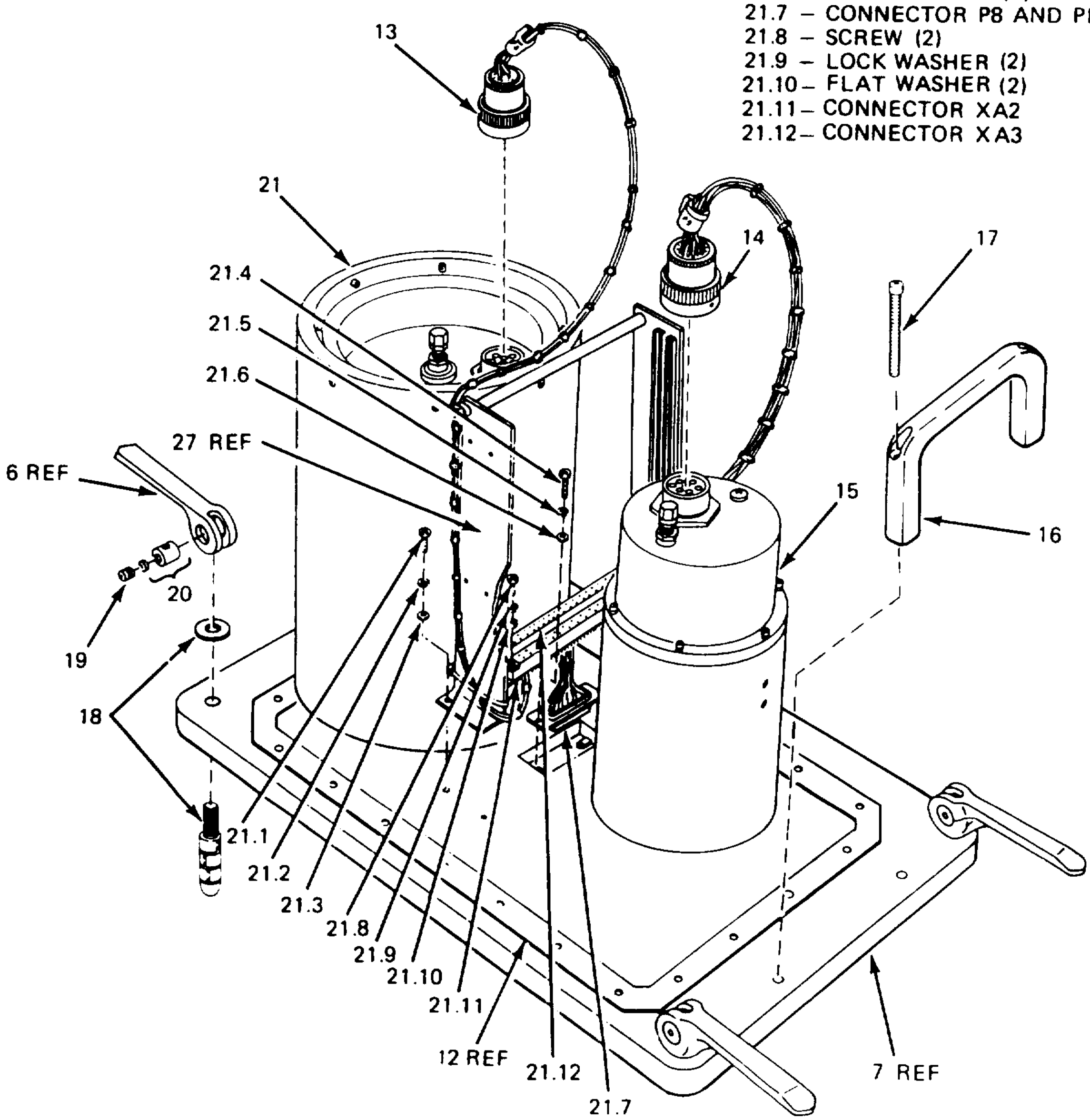


Figure 3-17. D/NSC Maintenance (Sheet 3 of 11)

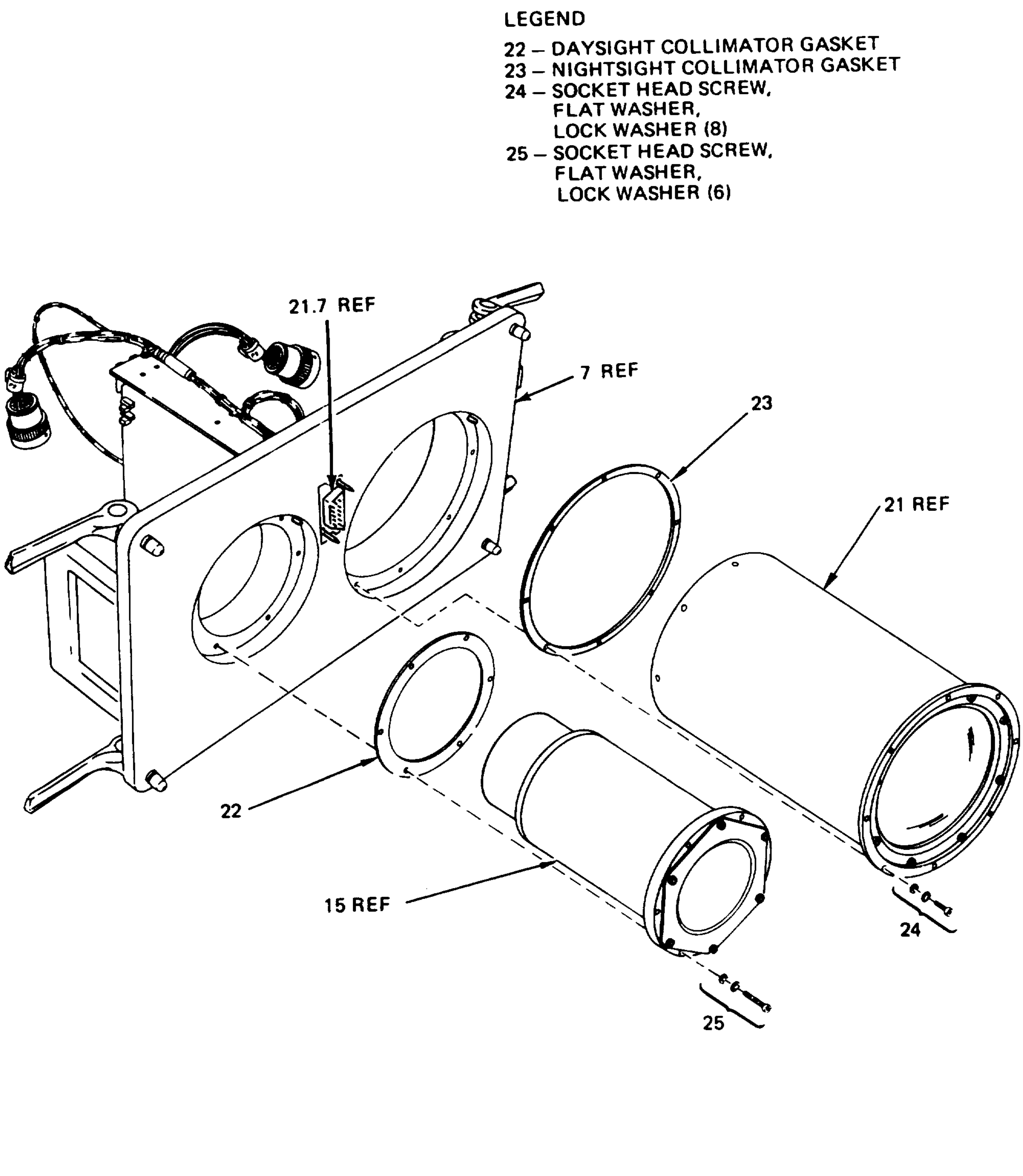
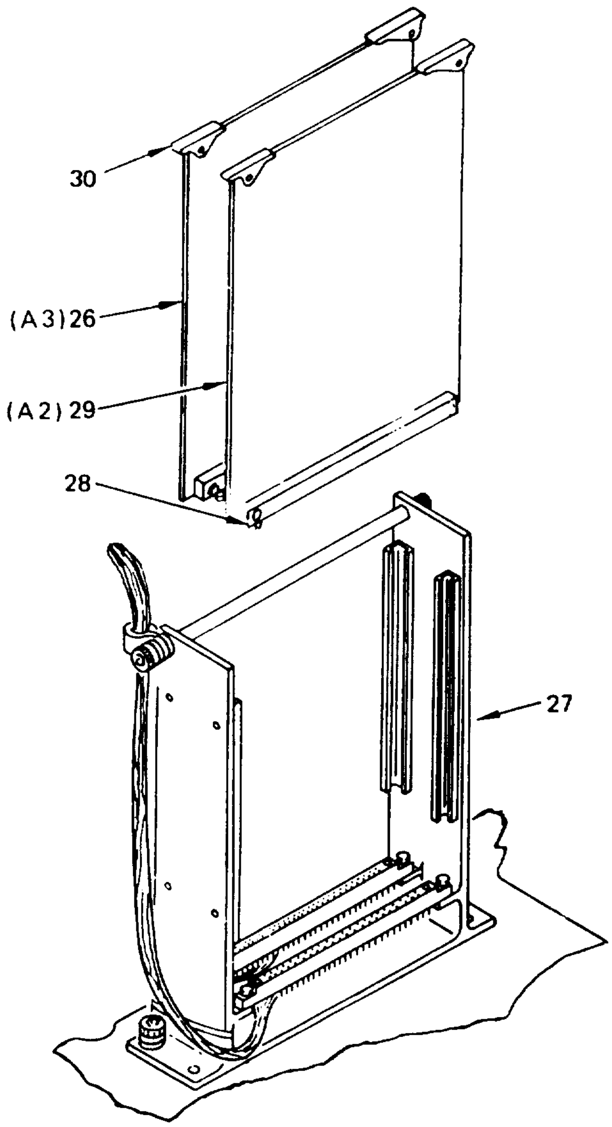


Figure 3-17. D/NSC Maintenance (Sheet 4 of 11)



LEGEND

26 – BIT MONITOR CIRCUIT CARD A3
27 – ELECTRONIC ASSEMBLY
28 – KEYED PINS
29 – IR/LED CONTROL CIRCUIT CARD A2
30 – CIRCUIT CARD TAB
31 – BACKSHELL
32 – CABLE
33 – SCREW AND FLAT WASHER
34 – CABLE STRAP AND PROTECTIVE CAP
35 – LOCK NUT

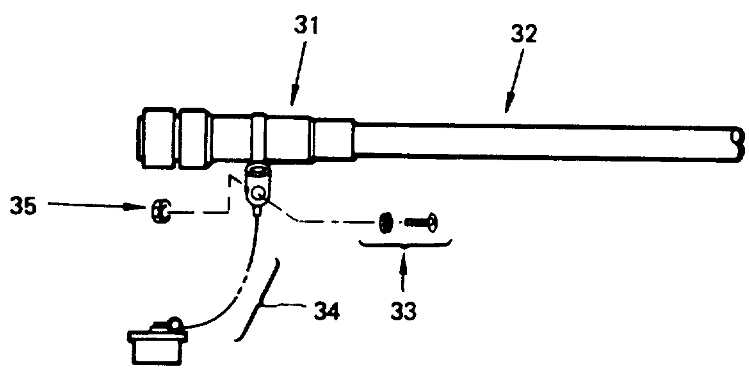
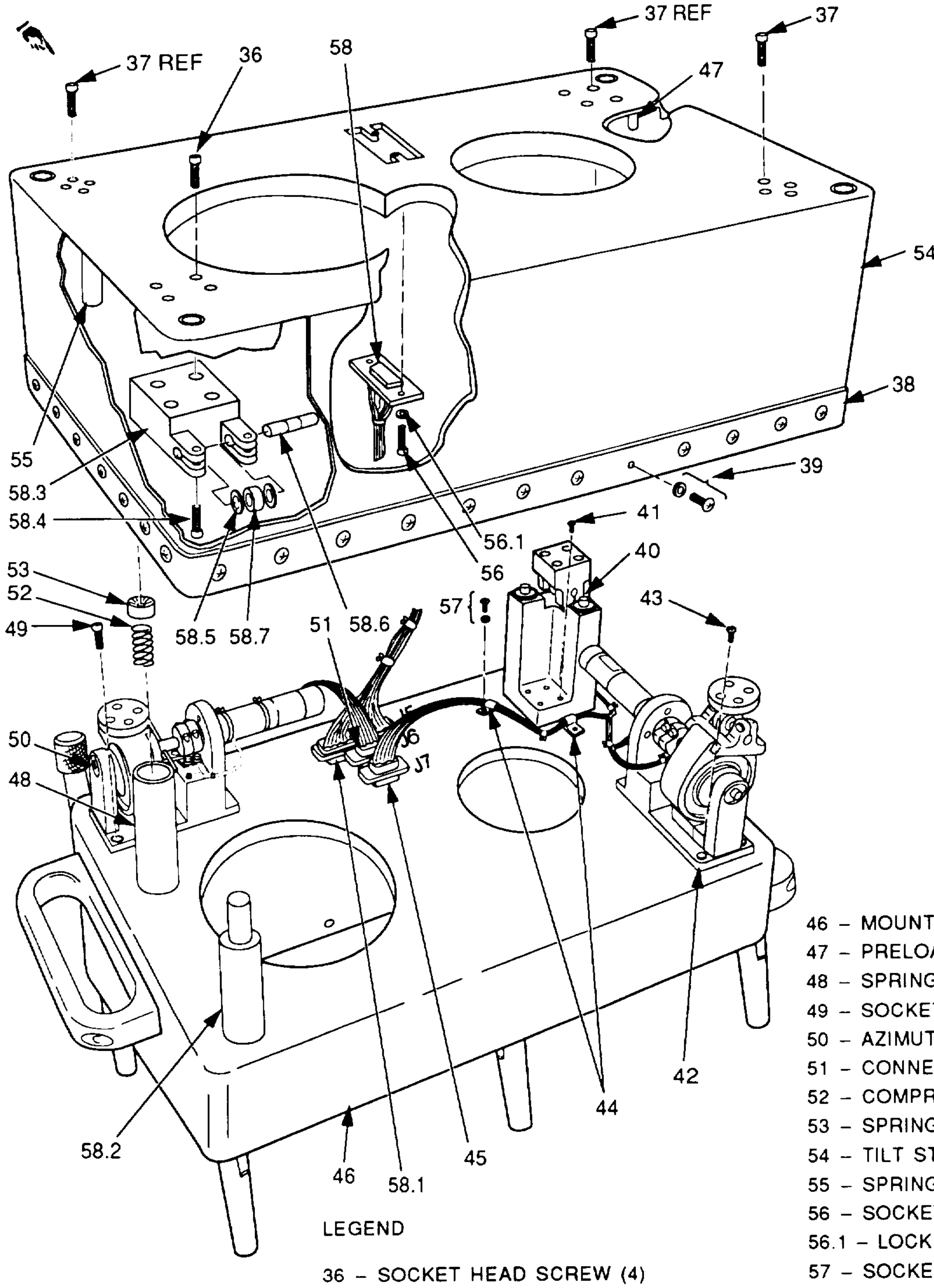


Figure 3-17. D/NSC Maintenance (Sheet 5 of 11)



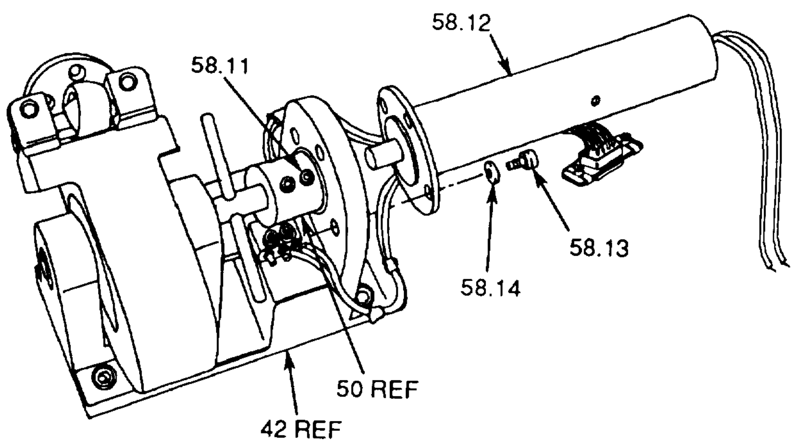
LEGEND

36 – SOCKET HEAD SCREW (4)
37 – SOCKET HEAD SCREW (12)
38 – SEAL
39 – SCREW AND FLAT WASHER (36)
40 – POST ASSEMBLY
41 – SOCKET HEAD SCREW (4)
42 – ELEVATION DRIVE ASSEMBLY
43 – SOCKET HEAD SCREW (4)
44 – WIRING STRAP (2)
45 – CONNECTOR P7
46 – MOUNTING ADAPTER ASSEMBLY
47 – PRELOAD POST (2)
48 – SPRING RECEPTACLE
49 – SOCKET HEAD SCREW (4)
50 – AZIMUTH DRIVE ASSEMBLY
51 – CONNECTOR P6
52 – COMPRESSION SPRING
53 – SPRING CAP
54 – TILT STAGE ASSEMBLY
55 – SPRING PLUNGER
56 – SOCKET HEAD SCREW (2)
56.1 – LOCK WASHER (2)
57 – SOCKET HEAD SCREW AND FLAT WASHER (2)
58 – CONNECTOR J8 AND PLATE
58.1 – CONNECTOR P5 AND PLATE
58.2 – BEARING POST
58.3 – BEARING SUPPORT
58.4 – SCREW (2)
58.5 – RETAINING RING (2)
58.6 – BEARING SHAFT
58.7 – BALL BEARING

Figure 3-17. D/NSC Maintenance (Sheet 6 of 11)

LEGEND

58.8 – SOCKET HEAD SCREW (8)
58.9 – FLAT WASHER (8)
58.10 – MICROSWITCH (4)
58.11 – SCREW (4)
58.12 – PLANETARY GEAR MOTOR (2)
58.13 – SOCKET HEAD SCREW (8)
58.14 – FLAT WASHER (8)



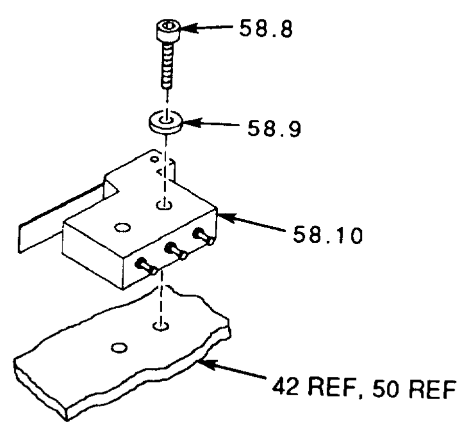


Figure 3-17. D/NSC Maintenance (Sheet 7 of 11)

LEGEND

58.15 – SCREW (13155048) (8); (13250622) (14)
58.16 – FLAT WASHER (13153048) (11); (13250622) (8)
58.17 – TRANSISTOR Q1, Q2, Q3 (3)
58.18 – INSULATOR (13155048) (3); (13250622) (6)
58.19 – SLEEVE SPACER (12)
58.20 – CIRCUIT CARD ASSEMBLY
58.21 – LOCK WASHER (12)
58.22 – NUT (12)
58.23 – CHANNEL ASSEMBLY
58.24 – INSULATOR (3)
58.25 – MICROCIRCUIT U1, U2, U3 (3)
58.26 – SCREW (6)
58.27 – FLAT WASHER (2)
58.28 – TERMINAL LUG (13155048) (3); (13250622) (6)
58.29 – CARD GUIDE (2)
58.30 – BRACKET
58.31 – FLAT WASHER (2)
58.32 – SCREW (2)
58.33 – CONNECTOR J4
58.34 – CONNECTOR J1

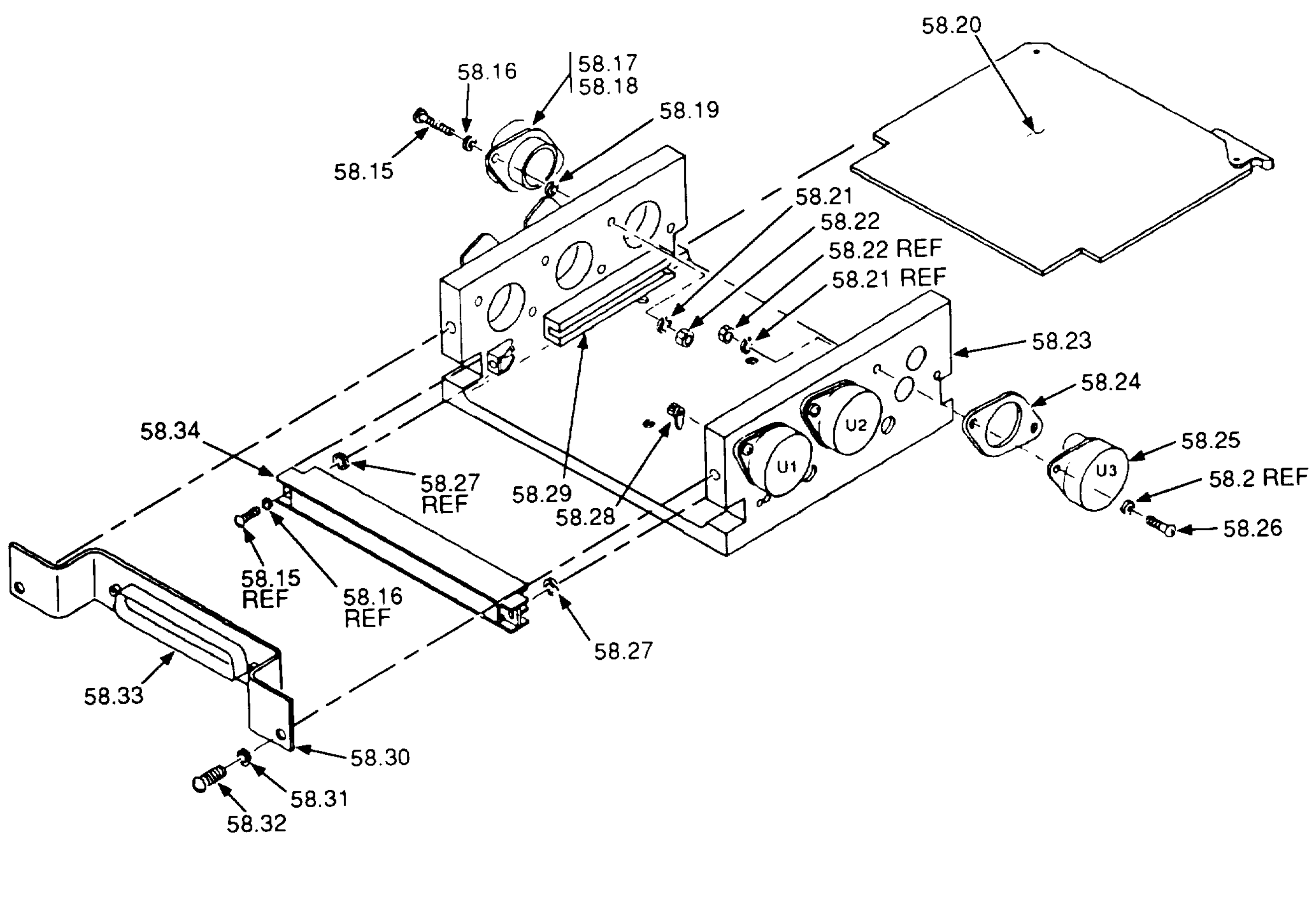
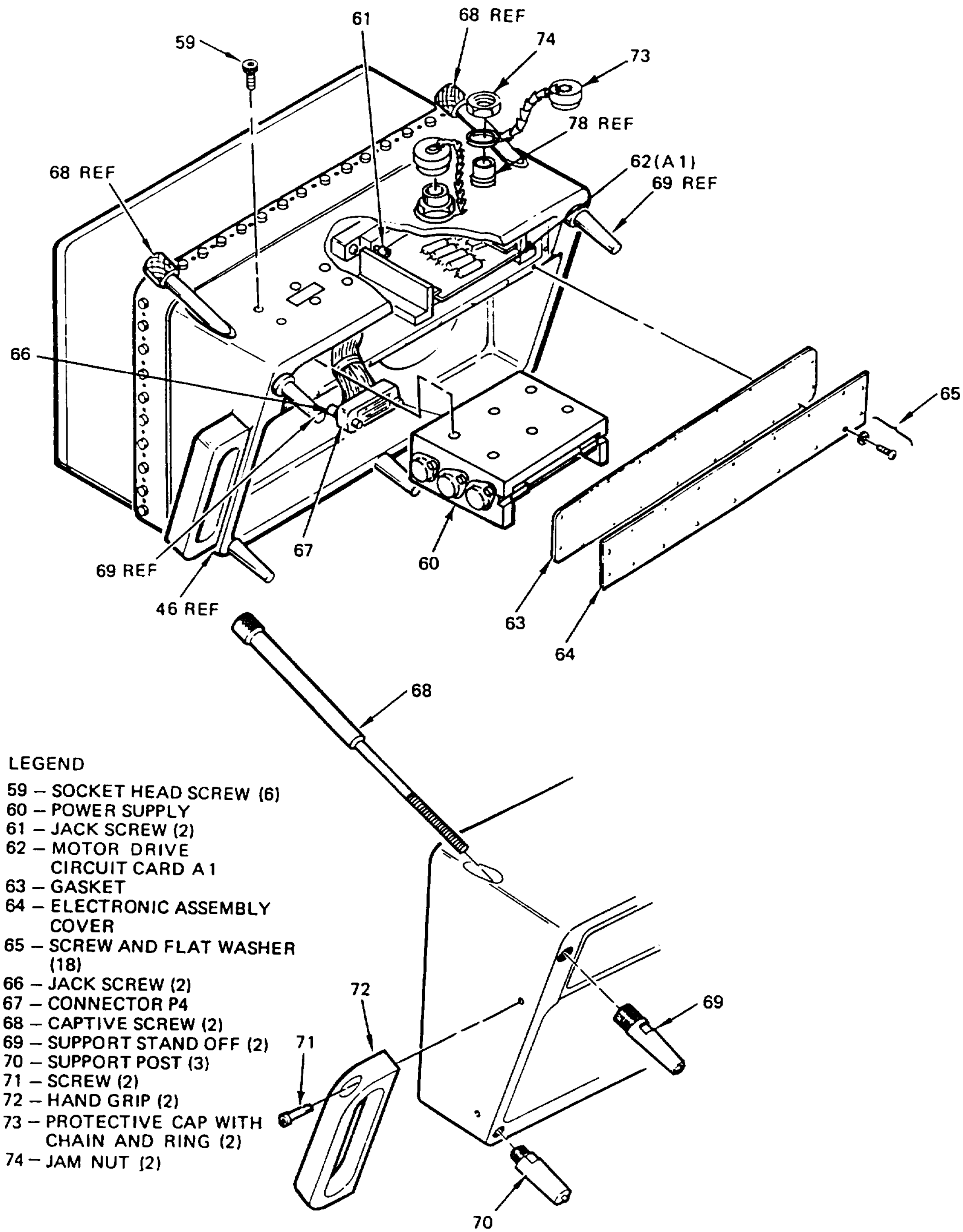


Figure 3-17. D.NSC Maintenance (Sheet 8 of 11)



LEGEND

59 – SOCKET HEAD SCREW (6)
60 – POWER SUPPLY
61 – JACK SCREW (2)
62 – MOTOR DRIVE CIRCUIT CARD A1
63 – GASKET
64 – ELECTRONIC ASSEMBLY COVER
65 – SCREW AND FLAT WASHER (18)
66 – JACK SCREW (2)
67 – CONNECTOR P4
68 – CAPTIVE SCREW (2)
69 – SUPPORT STAND OFF (2)
70 – SUPPORT POST (3)
71 – SCREW (2)
72 – HAND GRIP (2)
73 – PROTECTIVE CAP WITH CHAIN AND RING (2)
74 – JAM NUT (2)

Figure 3-17. D/NSC Maintenance (Sheet 9 of 11)

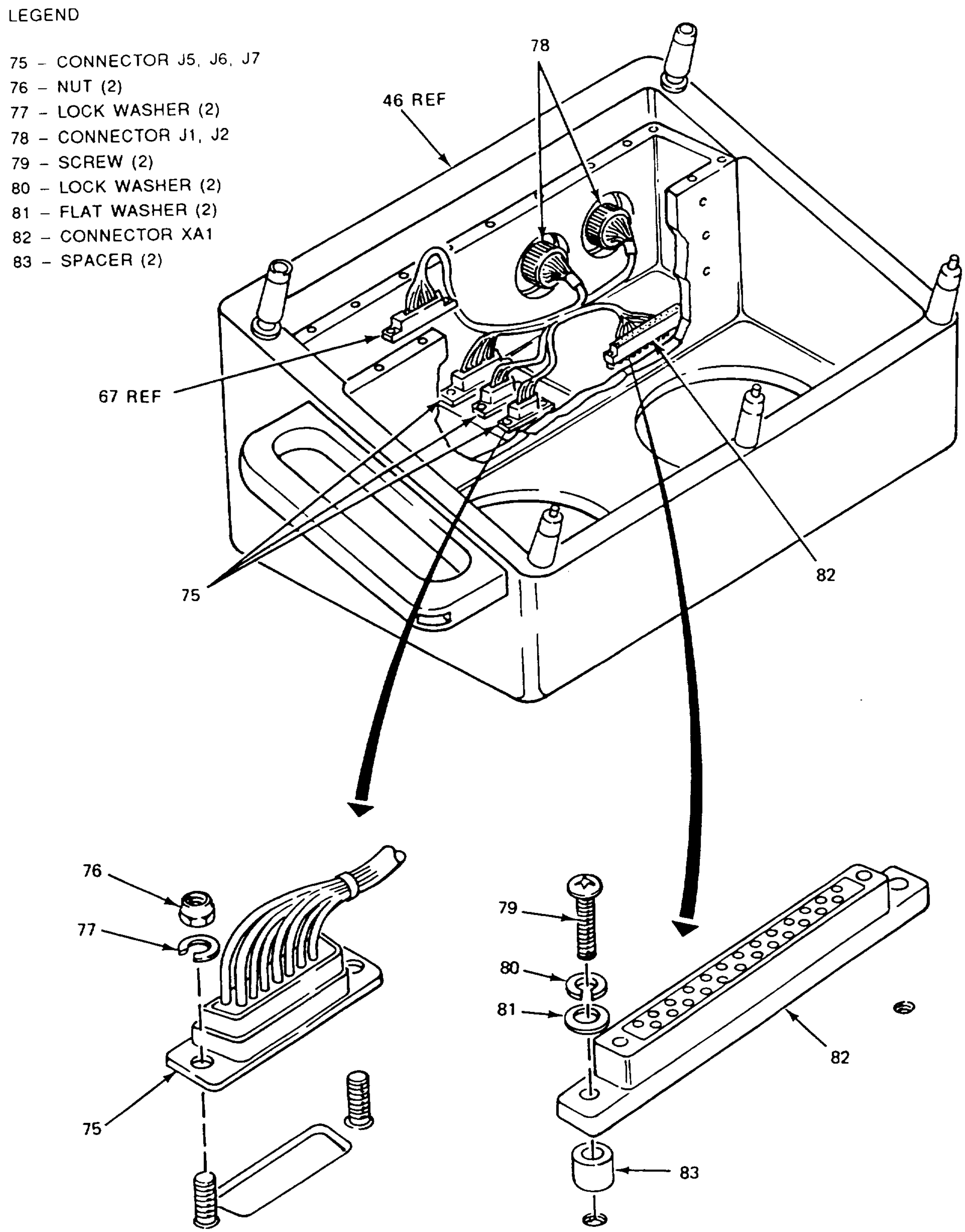


Figure 3-17. D/NSC Maintenance (Sheet 10 of 11)

LEGEND

84 – SCREW (4)
85 – ALUMINUM FOOT (4)
86 – PREFORMED PACKING (4)
87 – DECAL
88 – RPC
89 – BASE CUSHION ASSEMBLY
90 – COVER CUSHION ASSEMBLY

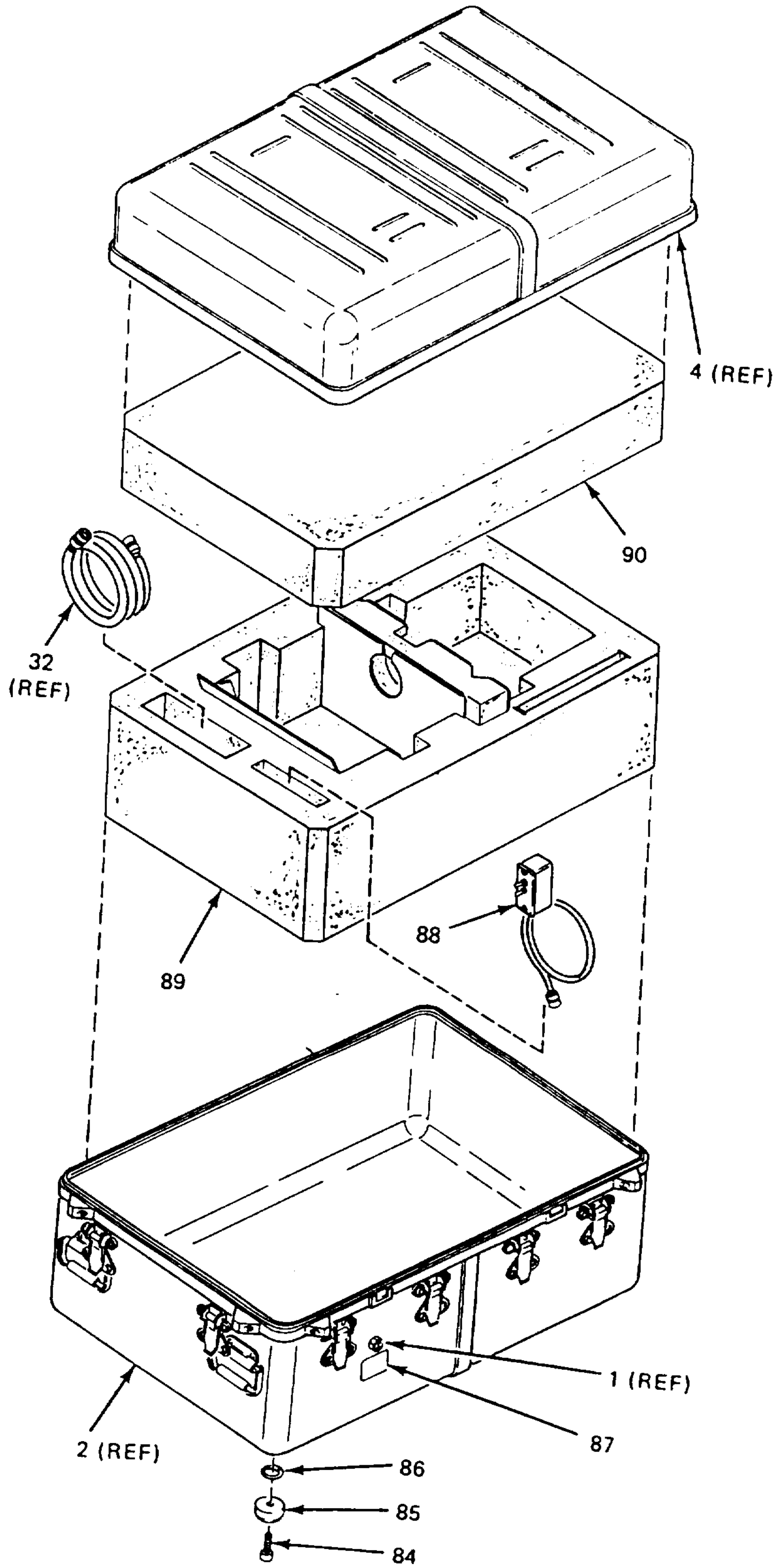


Figure 3-17. DINSC Maintenance (Sheet 11 of 11)

3-66. D/NSC Optical Assembly Cover Removal.

a. Remove optical assembly (7) per paragraph 3-64.

b. Remove 24 socket head screws, lock washers, flat washers (10) securing optical assembly cover (11) to optical assembly (7).

c. Remove optical assembly cover (11) and optical assembly cover gasket (12). Inspect optical assembly cover gasket (12) for damage. Replace if necessary.

3-67 D/NSC Optical Assembly Cover Installation.

a. Align optical assembly cover (11) and optical assembly cover gasket (12) on optical assembly (7).

b. Install 24 socket head screws, lock washers, flat washers (10). Torque screws (l0) to 7 to 9 in-lbs.

c. Install optical assembly (7) per paragraph 3-65.

3-68. D/NSC Daysight Collimator Removal.

a. Remove optical assembly cover (11) per paragraph 3-66.

b. Remove connector P9 (14) from daysight collimator (15).

CAUTION

Six screws mounted on connector side of the daysight collimator assembly must remain in place and secure at all times. If these screws are loosened, extensive damage will occur. The six screws mentioned below are removed from the front of the daysight collimator assembly.

Circuit cards are electrostatic discharge sensitive devices. Do not allow metal tools or parts to come into contact with cards. Damage to card components may result.

c. Remove six socket head screws, flat washers and lock washers (25).

d. Remove daysight collimator (15) and daysight collimator gasket (22).

3-69. D / NSC Daysight Collimator Installation.

CAUTION

Circuit cards are electrostatic discharge sensitive devices. Do not allow metal tools or parts to come into contact with cards. Damage to card components may result.

a. Install daysight collimator gasket (22) on daysight collimator (15).

b. Align daysight collimator (15) with guide pin in optical assembly (7).

c. Secure daysight collimator (15) with six socket head screws, lock washers and flat washers (25). Torque screws (25) to 7 to 9 in-lbs.

d. Connect connector P9 (14) to daysight collimator (15).

e. Install optical assembly cover (11) per paragraph 3-67.

3-70. D / NSC Nightsight Collimator Removal.

a. Remove optical assembly cover (11) per paragraph 3-66.

b. Remove connector P3 (13) from nightsight collimator (21).

CAUTION

Eight screws mounted on connector side of the nightsight collimator assembly must remain in place and secure at all times. If these screws are loosened, extensive damage will occur. The eight screws mentioned below are removed from the optics side of the nightsight collimator assembly from an outer ring around eight inner screws.

Circuit cards are electrostatic discharge sensitive devices. Do not allow metal tools or parts to come into contact with cards. Damage to card components may result.

c. Remove eight socket head screws, flat washers, and lock washers (24).

d. Remove nightsight collimator (21) and nightsight collimator gasket (23).

3-71. D/NSC Nightsight Collimator Installation.

CAUTION

Circuit cards are electrostatic discharge sensitive devices. Do not allow metal tools or parts to come into contact with cards. Damage to card components may result.

a. Install nightsight collimator gasket (23) on nightsight collimator (21).

b. Align nightsight collimator (21) with guide pin in optical assembly (7).

c. Secure nightsight collimator (21) with eight socket head screws, lock washers, and flat washers (24). Torque screws (24) to 7 to 9 in- lb.

d. Connect connector P3 (13) to nightsight collimator (21).

e. Install optical assembly cover (11) per paragraph 3-67.

3-72. D/NSC Circuit Card (BIT, IR/LED) RemovaL a. Remove optical assembly cover (11) per paragraph 3-66.

CAUTION

The circuit cards in the D/NSC are electrostatic sensitive and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.

b. Lift card tabs (30) and remove circuit cards (26 and 29). Place cards in antistatic bags (item 42, appendix F).

3-73. D/NSC Circuit Card (BIT, IR/LED) Installation.

CAUTION

The circuit cards in the D/NSC are electrostatic sensitive and are subject to damage by discharge of static **electricity,** Wear a wrist ground strap when handling cards **and handle them by edges only.** Circuit cards must be transported in antistatic **bags.**

U. Carefully insert circuit card (BIT, IR/LED) (26 and 29) into card guides, pressing firmly until two keyed pins (28) are flush against connector.

b. Install optical assembly cover (11) per paragraph 3-67.

3-74. D/NSC **Optical Assembly Hand Grip(s)** Removal. D/NSC optical assembly hand grips (16) may be removed by referring to figure 3-17 for parts location.

3-75. D/NSC Optical Assembly Hand Grip(s) Installation. a. Aline hand grip (16) to optical assembly (7).

b. Secure with two socket head screws (17).

3-76. D/NSC Expando Grip Pin Handle Removal. *a.* Remove optical assembly (7) per paragraph 3-64.

b. Loosen set screw (19) in handle of expando grip pin (6).

c. Holding handle of expando grip pin (6), unscrew inner pin and washer (18).

d. Remove expando grip in (6) handle, and barrel nut and locking pin (20).

3-77. D/NSC Expando Grip Pin Handle Installation. *a.* Aline handle of expando grip pin (6) and inner pin and washer (18) in optical assembly (7).

b. Holding handle of expando grip pin (6), tighten inner pin and washer (18) until handle locks securely when lifted.

c. Tighten set screw (19) and barrel nut and locking pin (20) in handle of expando grip pin (6).

d. Install optical assembly (7) per paragraph 3-65.

3-78. D/NSC Cable Assembly W4 Repair. a. Remove screw and flat washer (33), lock nut (35), and cable strap and protective cap (34) from cable (32).

b. Attach protective cap and cable strap (34) to backshell (31) of connector.

c. Install and torque one screw and flat washer (33) and lock nut (35) to 55 to 65 in-lbs.

3-78.1. D/NSC Optical Harness Connector P8 Repair.

CAUTION

Connector plate and pins should always be replaced when connector is replaced. Bent pins, plate or restricted movement of connector could damage new connector P8 or mating connector J8.

u. Remove circuit cards (BIT, IR/LED) (26 and 29) per paragraph 3-72.

b. Disconnect connector P3 (13) from nightsight collimator (21).

c. Disconnect connector P9 (14) from daysight collimator (15).

d. Remove four *screws* (21 .1), four lock washers (21 .2), and four flat washers (21.3) from electronic assembly (27).

CAUTION

Electronic assembly (27) is connected to optical assembly at connector P8 (21.7). Move carefully to avoid damage to wires.

e. Move electronic assembly (27) to access connector P8 (21.7).

f. Remove two screws (21.4), two lock washers (21.5), two flat washers (21 .6), and connector P8 (21.7) from optical assembly (7).

g. Inspect connector plate (21.7) and replace as necessary.

h. Inspect connector P8 (21.7). Replace or repair as necessary. See TM 55-1500-323-25.

i. Position connector P8 (21 .7) and install two flat washers (21 .6), two lock washers (21 .5), and two screws (21 .4).

j. Position electronic assembly (27) and secure with four flat washers (21.3), four lock washers (21.2), and four screws (21.1).

k. Connect connector P9 (14) to daysight collimator (15).

Z. Connect connector P3 (13) to nightsight collimator (21).

m. Install circuit cards (BIT, IR/LED) (26 and 29) per paragraph 3-73.

n. Inspect mating connector J8 and plate (58). Replace or repair as necessary per paragraph 3-102.7.

3-78.2. D/NSC Optical Assembly Connector XA2, XA3 Repair. ***a.*** Remove optical harness connector P8 per paragraph 3-78.1, steps a thru f.

b. Remove two screws (21.8), two lock washers (21.9) and two flat washers (21.10) from the XA2 or XA3 connector (21.11, 21.12) needing repair.

c. Remove connector XA2 or XA3 (21.1 I, 21.12) from electronic assembly (27) and replace or repair as necessary. See TM 55-1500-323-25.

d. Position XA2 or XA3 connector (21.11, 21.12) on electronic assembly (27) and install two flat washers (21.10), two lock washers (21.9), and two screws (21.8).

e. Install optical harness connector P8 per paragraph 3-78.1, steps i thru m.

3-79. D/NSC Tilt Stage Seal Removal. a. Unscrew and remove two captive screws (68).

b. Remove 36 screws and flat washers (39) from seal (38).

c. Remove seal (38) from tilt stage assembly (54).

3-80, D/NSC Tilt Stage Seal installation. a.Inspect seal (38) and replace as necessary.

b. Apply lubricant (item 23, appendix F) to threads of screw (39).

c. Align seal (38) with ends overlapping on underside of tilt stage assembly (54).

d. Secure overlap with one screw and one flat washer (39).

e. Install remaining 35 screws and 35 flat washers (39).

f. Install two captive screws (68). The long one is installed next to electrical connectors.

3-81. D/NSC Tilt Stage Assembly Removal.
a. Remove optical assembly (7) per paragraph 3-64.

CAUTION

Connectors may crack or break if jack-screws are not loosened one-half turn alternately.

b. Remove two socket head screws (56) securing connector J8 (58) to tilt stage assembly **(54).**

WARNING

Tilt stage assembly (54) is spring loaded and will move outward with great force when retaining socket head screws (37) and (36) are loosened. Be sure tilt stage assembly (56) is secure before last screw is loosened to prevent damage to equipment and possible injury to personnel.

c. Remove eight socket head screws (37) and four socket head screws (36) securing tilt stage assembly (54) to elevation drive assembly (42), azimuth drive assembly (50), and post assembly (40).

d. Remove tilt stage assembly (54).

Inspect connector J8 (58) for damage. Replace or repair as necessary. See TM 55-1500-323-25.

f. Inspect guide pin plate. Replace as necessary.

3-82. D/NSC Tilt Stage Assembly Installation. a. Align tilt stage assembly (54) with elevation drive assembly (42), azimuth drive assembly (50), post assembly (40), and spring receptacle (48).

b. Apply sealant (item 16, appendix F) to threads of eight socket head screws (37).

Install eight socket head screws (37) securing tilt stage assembly (54) to elevation drive assembly (42) and azimuth drive assembly (50). Torque screws (37) to 8 to 10 in-lbs.

d. Apply sealant (item 16, appendix F) to threads of four socket head screws (36).

e. Install four socket head screws (36) securing tilt stage assembly (54) to post assembly (40). Torque screws (36) to 8 to 10 in-lbs.

CAUTION

Connectors may crack or break if jack-screws are not tightened one-half turn alternately.

f. Elevate tilt stage assembly (54) to allow clearance for positioning connector J8 in tilt stage assembly (54). Install connector J8 (58) to tilt stage assembly (54) with two socket head screws (56) and lock washers (56.1).

g. Install optical assembly (7) per paragraph 3-65.

3-83. D/NSC Azimuth Drive Assembly Removal. u. Remove tilt stage assembly (54) per paragraph 3-81.

CAUTION

Connectors may crack or break if jackscrews are not loosened one-half turn alternately.

b. Disconnect connector P6 (51) from mounting adapter assembly (46).

c. Loosen four socket head screws (49) securing azimuth drive assembly **(50)** to mounting adapter assembly (46).

d. Remove azimuth drive assembly (50).

3-84. D/NSC Azimuth Drive Assembly Installation. a. Aline azimuth drive assembly (50) on mounting adapter assembly (46).

b. Apply sealant (item 16, appendix F) to threads of four socket head screws (49).

c. Install four socket head screws (49).

CAUTION

Connectors may crack or break if jackscrews are not tightened one-half turn alternately.

d. Connect connector P6 (51) to mounting adapter assembly (46).

e. Install tilt stage assembly (54) per paragraph 3-82.

3-84.1 D/NSC Azimuth Drive Assembly Repair a. Remove tilt stage assembly (54) per paragraph 3-81.

b. The following items may be repaired by referring to figure 3-17 for parts location:

Microswitch (58.10) (2)
Planetary Gear Motor (58.12)
Connector P6 (51)

c. Install tilt stage assembly (54) per paragraph 3-82.

3-85. D/NSC Spring Plunger Removal. a. Remove tilt stage assembly (54) per paragraph 3-81.

b. Remove spring plunger (55) from tilt stage assembly (54).

c. Remove spring cap (53) and compression spring (52) from inside spring receptacle (48).

d. Remove spring receptacle (48) from mounting adapter assembly (46).

3-86. D/NSC Spring Plunger Installation. a. Secure spring receptacle (48) to mounting adapter assembly (46).

b. Insert compression spring (52) and spring cap (53) inside spring receptacle (48).

c. Secure spring plunger (55) to tilt stage assembly (54).

d. Install tilt stage assembly (54) per paragraph 3-82.

3-87. D/NSC Post Assembly Removal. *a.* Remove tilt stage assembly (54) per paragraph 3-81.

b. Remove four socket head screws (41) securing post assembly (40) to mounting adapter assembly (46).

c. Remove post assembly (40).

3-88. D/NSC Post Assembly Installation. a. Aline post assembly (40) on mounting adapter assembly (46).

b. Install four socket head screws (41).

Install tilt stage assembly (54) per paragraph 3-82.

3-89. D/NSC Preload Post Repair. *a.* Remove tilt stage assembly (54) per paragraph 3-81.

b. Remove preload post (47) by hand from tilt stage assembly (54).

c. Install serviceable preload post (47) by hand to tilt stage assembly (54).

d. Install tilt stage assembly (54) per paragraph 3-82.

3-90. D/NSC Elevation Drive Assembly Removal. a. Remove tilt stage assembly (54) per paragraph 3-81.

CAUTION

Connectors may crack or break if jackscrews are not loosened one-half turn alternately.

b. Disconnect connector P7 (45) from mounting adapter assembly (46).

c. Remove two socket head screws and flat washers (57) securing two wiring straps (44) to mounting adapter assembly (46).

d. Remove four socket head screws (43) securing elevation drive assembly (42) to mounting adapter assembly (46).

e. Remove elevation drive assembly (42).

3-91. D/NSC Elevation Drive Assembly Installation. *a.* Aline elevation drive assembly (42) on mounting adapter assembly (46).

b. Apply sealant (item 16, appendix F) to threads of four socket head screws (43).

c. Install four socket head screws (43).

CAUTION

Connectors may crack or break if jackscrews are not tightened one-half turn alternately.

d. Connect connector P7 (45) to connector J7.

e. Apply sealant (item 16, appendix F) to threads of two socket head screws (57).

f. Install two socket head screws and flat washers (57) to secure two wire straps (44) to mounting adapter assembly (46).

Install tilt stage assembly (54) per paragraph 3-82.

3-91.1 D/NSC Elevation Drive Assembly Repair. *a.* Remove D/NSC elevation drive assembly (42) per paragraph 3-90.

b. The following items may be repaired by referring to figure 3-17 for parts location:

Microswitch (58.10) (2)
Planetary Gear Motor (58. 12)
Connector P7 **(45)**

c. Install D/NSC elevation drive assembly per paragraph 3-91.

3-91.2 D/NSC Bearing Post/Support Repair. a. Remove tilt stage (54) per paragraph 3-81.

b. D/NSC bearing post (58.2) and bearing support (58.3) may be repaired by referring to figure 3-17 for parts location.

3-92. D/NSC Electronics Assembly Cover Removal. *a.* Remove 18 screws and flat washers (65) from electronic assembly cover (64).

b. Remove electronic assembly cover (64) and gasket (63) from mounting adapter assembly (46).

c. Inspect gasket (63) for damage and replace if necessary.

3-93. D/NSC Electronics Assembly Cover Installation. a.. Aline electronics assembly cover (64) and gasket (63) with mounting adapter assembly (46).

b. Install 18 screws and flat washers (65).

3-94. D/NSC Power Supply Removal. a. Remove electronics assembly cover (64) per paragraph 3-92.

CAUTION

Power supply (60) is still connected to mounting adapter assembly (46) by connector P4 (67). Do not attempt to remove power supply.

The circuit cards in the D/NSC are electrostatic discharge sensitive and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.

b. Remove six socket head screws (59) securing power supply (60) to mounting adapter assembly (46).

CAUTION

Connectors may crack or break if jackscrews are not loosened one-half turn alternately.

c. Pull power supply (60) forward until connector P4 (67) can be reached. Disconnect connector P4 (67).

d. Remove power supply (60) from mounting adapter assembly (46).

Inspect connector P4 (67) for damage. Replace or repair as necessary. See TM 55-1500-323-25.

3-95. D/NSC Power Supply Installation.

CAUTION

Connectors may crack or break if jackscrews are not tightened one-half turn alternately.

The circuit cards in the D/NSC are electrostatic discharge sensitive and are subject to damage by discharge of static electricity. Wear a wrist **ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.**

a. Position power supply (60) close to mounting adapter assembly (46). Connect connector P4 (67).

b. Aline power supply (60) in mounting adapter assembly (46) and install six socket head screws (59).

Install electronics assembly cover (64) per paragraph 3-93.

3-95.1 D/NSC Power Supply Repair. ***a.*** Remove D/NSC power supply (60) per paragraph 3-94.

CAUTION

The circuit cards in the D/NSC are electrostatic discharge sensitive and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.

b. D/NSC power supply (60) may be repaired by referring to figure 3-17 for parts location.

Install D/NSC power supply (60) per paragraph 3-95.

3-96. D/NSC **Motor Drive Circuit Card Removal.**

CAUTION

The circuit cards in the D/NSC are electrostatic discharge sensitive and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.

Remove electronics assembly cover (64) per paragraph 3-92.

CAUTION

Connectors may crack or break if jackscrews are not tightened one-half turn alternately.

b. Loosen two jackscrews (61) securing motor drive circuit card (62) to connector XA1.

c. Remove circuit card (62). Place card in antistatic bag (item 42, appendix F).

3-97. D/NSC Motor Drive Circuit Card Installation.

CAUTION

The circuit cards in the D/NSC are electrostatic discharge sensitive and are subject to damage by discharge of static electricity. Wear a wrist **ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.**

Connectors may crack or break if jackscrews are not tightened one-half turn alternately.

a. Slide circuit card (62) into card guide and push firmly until two jackscrews (61) are flush against connector. Tighten two jackscrews (61).

b. Install electronics assembly cover (64) per paragraph 3-93.

3-98. D/NSC Hand Grip Repair. D/NSC hand grip **(72)** may be repaired by referring to **figure** 3-17 for parts location.

3-99. D/NSC Support Standoff Removal. ***a.*** If installed, remove two captive screws (68) from two support standoffs (69).

b. Remove two support standoffs (69) from mounting adapter assembly (46).

3-99.1 D/NSC Support Standoff Installation. ***a.*** Install the longer support standoff (69), PN 13143687-2, on the connector side of the mounting adapter assembly (46).

b. Install the shorter support standoff (69), PN 13143687-1, on the mounting adapter assembly (46).

If they were in place, install two captive screws (68) in two support standoffs (69). The longer captive screw, PN 13143689-2, is installed on the connector side of the mounting adapter assembly (46).

3-100. **D/NSC Support Post Repair.** D/NSC support post (70) may be repaired by referring to figure 3-17 for parts location.

3-101. D/NSC Protective Caps Repair. D/NSC protective caps with chain and ring **(73)** may be repaired by referring to figure 3-17 for parts and safety wire (item 66, appendix F) location,

Paragraph 3-102 has been deleted.

3-102.1 D/NSC **Connector** .J5, .J6, or J7 Repair.

CAUTION

Connectors may crack or break if jack-screws are not loosened one-half turn alternately.

a. Disconnect connector P5 (58.1), P6 (51), or P7 (45) from connector J5, J6, or J7 (75) being repaired.

b. Remove power supply (60) per paragraph 3-94.

c. Remove two nuts (76) and lock washers (77) from jackpost set of connector J5, J6, or J7 (75) needing repair.

d. Remove connector J5, J6, or J7 (75) from mounting adapter assembly (46).

e. Repair connector J5, J6, or J7 (75). See TM 55-1500-323-25.

f. Apply sealant (item 29, appendix F) to connector J5, J6, or J7 (75) jackpost set.

g. Position in mounting adapter assembly (46) and install two lock washers (77) and nuts (76).

CAUTION

Connectors may crack or break if jack-screws are not tightened one-half turn alternately.

h. Connect connector P5 (58.1), P6 (51), or P7 (45) to connector J5, J6, or J7 (75).

i. Install power supply (60) per paragraph 3-95.

3-102.2 D/NSC Connector J1 or J2 Repair. a. Remove motor drive circuit card (62) per paragraph 3-96.

b. Cut safety wire and remove jam nut (74) from connector J1 or J2 (78).

c. Remove protective cap with chain and ring (73) from connector Jl or J2 (78).

d. Remove connector J1 or J2 (78) from mounting adapter assembly (46).

e. Inspect connector J1 or J2 (78) and replace or repair as necessary. See TM 55-1500-323-25.

f. Position connector J1 or J2 (78) in mounting adapter assembly (46).

g. Install protective cap with chain and ring (73) on connector J1 or J2 (78).

h. Install jam nut (74) on connector J1 or J2 (78),

h.1 Install safety wire (item 66, appendix F) between two jam nuts (74).

i. Install motor drive circuit card (62) per paragraph 3-97.

3-102.3 D/NSC Connector XA1 Repair. a. Remove D/NSC motor drive circuit card (62) per paragraph 3-96.

b. Remove two screws (79), two lock washers (80), and two flat washers (81).

c. Remove connector XA1 (82) and two spacers (83) from mounting adapter assembly (46).

d. Inspect connector XA1 (82) and replace or repair as necessary. See TM 55-1500-323-25. Cut lacing tape (item 28, appendix F) as needed for access.

e. Install two spacers (83), connector XA1 (82), flat washers (8 1), lock washers (80), and screws (79) in mounting adapter assembly (46).

f. Install D/NSC motor drive circuit card (62) per paragraph 3-97.

3-102.4. D/NSC Tilt Stage P5/J8 Harness Assembly Removal. *a.* Remove optical assembly (7) per paragraph 3-64.

b. Remove two socket head screws (56) and two lock washers (56.1) securing connector J8 and plate (58) to tilt stage assembly (54).

CAUTION

Connectors may crack or break if jack-screws are not loosened one-half turn alternately.

c. Disconnect connector P5 (58.1) from connector J5 on mounting adapter assembly (46).

3-102.5. D/NSC Tilt Stage P5/J8 Harness Assembly Installation.

CAUTION

Connectors may crack or break if jack-screws are not tightened one-half turn alternately.

a. Connect connector P5 (58. I) to connector J5 on mounting adapter assembly (46).

CAUTION

Connector plate and pins should always be replaced when connector is replaced. Bent pins, plate, or restricted movement of connector could damage new connector J8 or mating connector P8.

b. Position connector J8 and plate (58) on tilt stage assembly (54) and install two lock washers (56. I) and two socket head screws (56).

c. Install optical assembly (7) per paragraph 3-65.

3-102.6. D/NSC Connector P5 Repair. *a.* Remove tilt stage P5/J8 harness assembly per paragraph 3-102.4.

b. Inspect connector P5 (58. 1) and replace or repair as necessary. See TM 55-1500-323-25.

c. Install tilt stage P5/J8 harness assembly per paragraph 3-102.5.

3-102.7. D/NSC Connector J8 Repair.

CAUTION

Make sure connector J8 moves freely (floats) within connector plate, to prevent damage to new connector J8 or mating connector P8.

Connector plate and pins should always be replaced when connector is replaced. Bent pins or plate could damage new connector.

***a.* Remove tilt** stage **P5/J8 harness assembly per** paragraph 3-102.4.

b. Inspect connector J8 and plate (58) and replace or repair as necessary. See TM 55-1500-323-25.

c. Inspect mating connector P8 and plate (2 1.7) per paragraph 3-78.1.

d. Install tilt stage P5/J8 harness assembly per paragraph 3-102.5.

3-102.8. D/NSC Aluminum Foot Repair (Units 2153 and Up). *a.* Remove screw (84) and aluminum foot (85) from carrying case (2).

b. Inspect preformed packing (86). Replace as necessary.

c. Apply sealer (item 40, appendix F) to threads of screw (84).

d. Position aluminum foot (85) on case (2) and install screw (84).

3-102.9 D/NSC Pressure Relief Valve Repair (Units 2153 and Up).

NOTE

Push back base cushion assembly **(89) to** gain access to pressure relief valve (1) nut.

a. Remove nut, washer, gasket, and pressure relief valve (1) from carrying case (2).

b. Install pressure relief valve (l), gasket, washer, and nut into carrying case (2).

3-102.10 D/NSC Decal Repair (Units 2153 and Up). a. Remove damaged decal (87) from carrying case (2).

WARNING

Solvents and alcohol are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of vapors, or contact with the skin. Keep away from heat and open flame.

b. Clean surface with isopropyl alcohol (item 4, appendix F).

c. Position and press decal (87) into place on carrying case (2).

3-102.11 D/NSC Base Cushion Assembly Repair (Units 2153 and Up). a. Remove D/NSC (5) from carrying case (2) per paragraph 3-62.

b. Remove RPC (88) and cable (32) from carrying case (2).

c. Remove base cushion assembly (89) from carrying case (2).

WARNING

Solvents and alcohol are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of vapors, or contact with the skin. Keep away from heat and open flame.

d. Clean bonding surface of carrying case (2) with toluene (item 34, appendix F) and cleaning compound (item 35, appendix F).

e. Bond base cushion assembly (89) into carrying case (2) using adhesive (item 36, appendix F),

f. Install RPC (88) and cable (32) into carrying case (2).

g. Install D/NSC (5) into carrying case (2) per paragraph 3-63.

3-102.12 D/NSC Cover Cushion Assembly Repair (Units 2153 and Up), a. Remove cover (4) from carrying case (2).

b. Remove cover cushion assembly (90) from cover (4).

WARNING

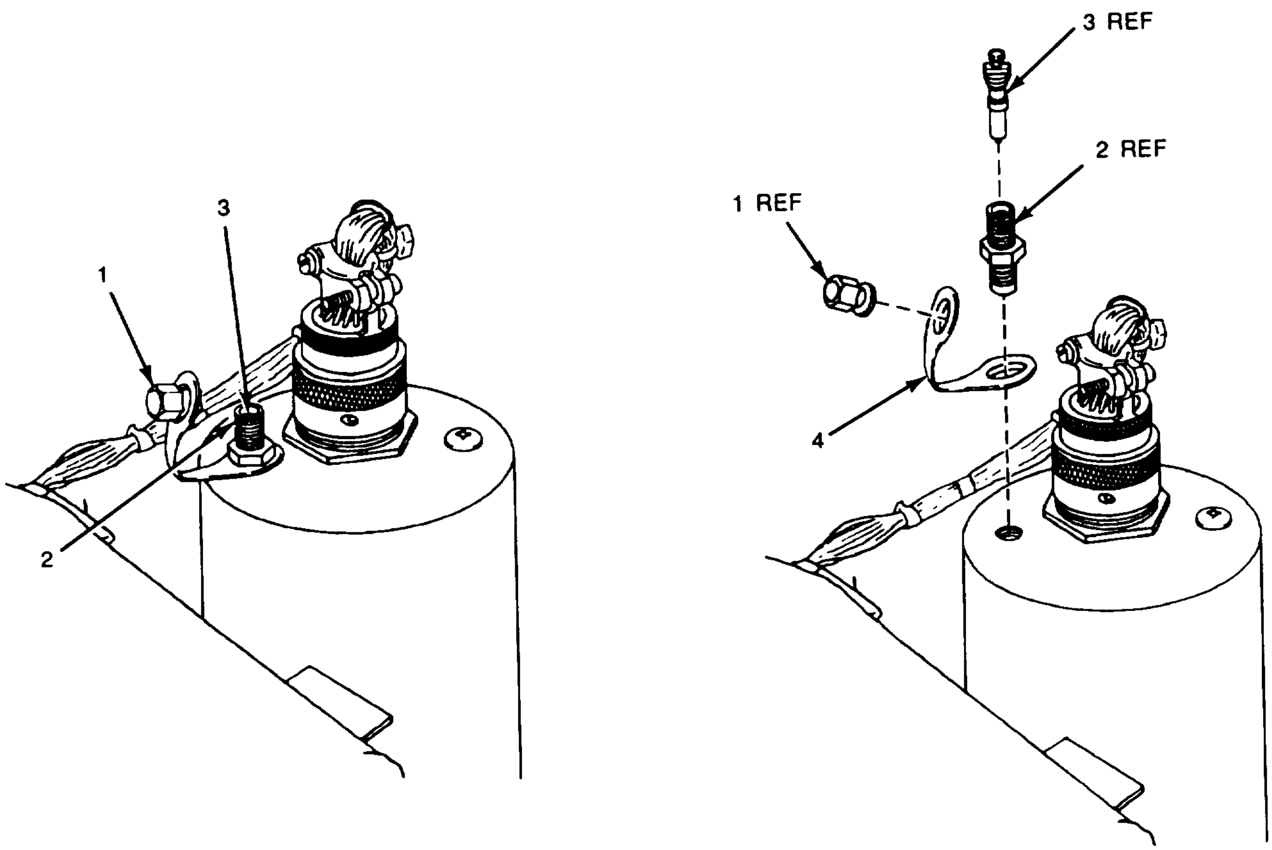
Solvents and alcohol are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of vapors, or contact with the skin. Keep away from heat and open flame.

c. Clean bonding surface of cover (4) with toluene (item 34, appendix F) and cleaning compound (item 35, appendix F).

d. Bond cover cushion assembly (90) into cover (4) using adhesive (item 36, appendix F).

e. Install cover (4) on carrying case (2).

3-102.13 Day/Night Sight Collimator Repair. Repair on the D/NSC consists primarily of removal and replacement of valve stem and valve core. For daysight collimator repair refer to figure 3-17.1 and for nightsight collimator repair refer to figure 3-17.2 for component location.



LEGEND
1 - VALVE CAP
2 - VALVE STEM
3 - VALVE CORE
4 - RETAINER STRAP

Figure 3-17.1. *D/NSC* Daysight Collimator Repair.

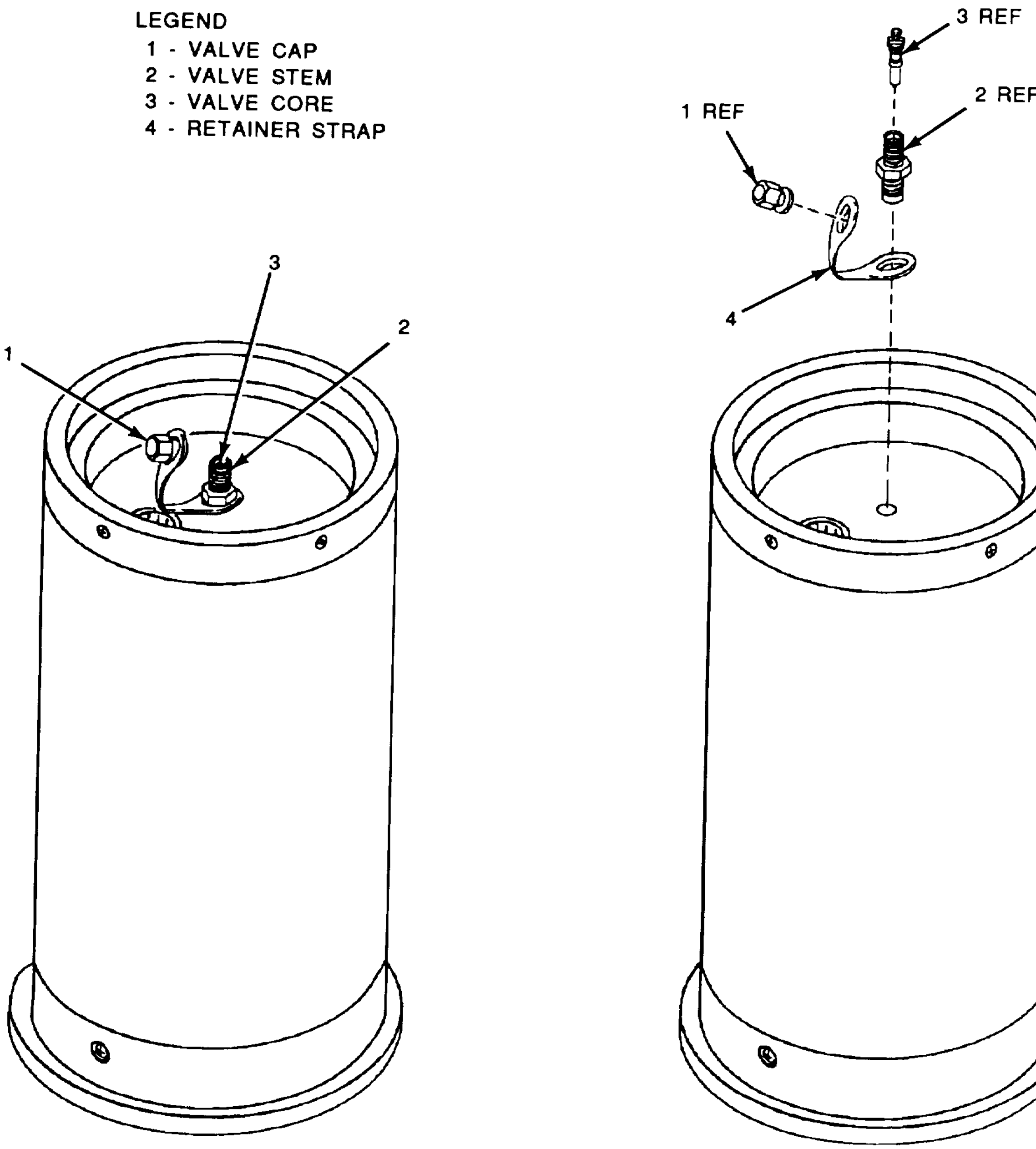


Figure 3-17.2. D/NSC NightSight Collimator Repair.

1-102.14 D/NSC Daysight Collimator Valve Stem Removal. a. Remove optical assembly cover(11, figure 3-17) per paragraph 3-66.

b. Remove valve cap (1, figure 3-17.1) from valve tern (2).

c. Depress valve core (3) to relieve pressure.

d, Remove valve stem (2).

e. Remove retainer strap (4) from valve stem (2).

f. Inspect valve cap (1) for damage. Remove valve cap (1) from retainer strap (4) if necessary.

3-102.15 D/NSC Daysight Collimator Valve Stem installation. *a.* Install serviceable valve cap (1, figure 3-17.1) on retainer strap (4) as required.

b. Install retainer strap (4) on valve stem (2).

c. Apply sealing tape (item 65, appendix F) to threads of valve stem (2).

d. Install valve stem (2).

e. Install valve cap (1) on valve stem (2).

NOTE

If servicing collimator, go to paragraph 3-l02.27f(2).

f. Install optical assembly cover (11, figure 3-17) per paragraph 3-67.

3-102.16 D/NSC Daysight Collimator Valve Core Removal. a. Remove optical assembly cover (11, figure 3-17) per paragraph 3-66.

b. Remove valve cap (1, figure 3-17.1) from valve stem (2).

c. Depress valve core (3) to relieve pressure.

d. Remove valve core (3) from valve stem (2). Use pneumatic tire valve repair tool.

3-102.17 D/NSC Daysight Collimator Valve Core Installation. *a.* Install serviceable valve core (3, figure 3-17.1) into valve stem (2). Use pneumatic tire valve repair tool.

b. Install valve cap (1) on valve stem (2).

NOTE

If servicing collimator, go to paragraph 3-l02.27f(2).

c. Install optical assembly cover (11, figure 3-17) per paragraph 3-67.

3-102.18 D/NSC Nightsight Collimator Valve Stem Removal. a. Remove nightsight collimator (21, figure 3-17) per paragraph 3-70.

b. Remove valve cap (1, figure 3-17.2) from valve stem (2).

c. Depress valve core (3) to relieve pressure.

d. Remove valve stem (2).

e. Remove retainer strap (4) from valve stem (2)

f’. Inspect valve cap (1) for damage. Remove valve cap (1) from retainer strap (4) if necessary.

3-102.19 D/NSC Nightsight Collimator Valve Stem Installation.

WARNING

Solvents and alcohol are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of vapors, or contact with the skin. Keep away from heat and open flame.

a. Wash new valve stem (2, figure 3-17.2) with isopropyl alcohol (item 4, appendix F).

b. Install serviceable valve cap (1) on retainer strap (4) as required.

c. Install retainer strap (4) on valve stem (2).

d. Apply sealing tape (item 65, appendix F) to threads of valve stem (2).

e. Install valve stem (2).

f. Install valve cap (1) on valve stem (2).

NOTE

If servicing collimator, go to paragraph 3-l02.31f(2).

g. Install nightsight collimator (21, figure 3-17) per paragraph 3-71.

3-102,20 D/NSC Nightsight Collimator Valve Core Removal. a. Remove nightsight collimator (21, figure 3-17) per paragraph 3-70.

b. Remove valve cap (1, figure 3-17.2) from valve stem (2),

c. Depress valve core (3) to relieve pressure.

d. Remove valve core (3) from valve stem (2). Use pneumatic tire valve repair tool.

3-102.21 D/NSC Nightsight Collimator Valve Core installation.

WARNING

Solvents and alcohol are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of vapors, or contact with the skin. Keep away from heat and open flame.

a. Wash valve core (3, figure 3-17.2) with isopropyl alcohol (item 4, appendix F).

b. Install serviceable valve core (3) into valve stem (2). Use pneumatic tire valve repair tool.

c. Install valve cap (1) on valve stem (2).

NOTE

If servicing collimator, go to paragraph 3-l02.31f(2).

d. Install nightsight collimator (21, figure 3-17) per paragraph 3-71.

3-102.22 Day/Night Sight Collimator Service. Service on the D/NSC consists primarily of installment and removal of purging kit and leak tests on the daysight and nightsight collimators. Refer to figure 3-17.3 for component location.

NOTE

This procedure is the same for the daysight collimator (10) and nightsight collimator (15),

3-102.23 D/NSC Purging Kit Removal. ***a.*** **Remove hose** (6) from valve stem (12 or 17) per steps (1) thru (3).

(1) Turn cylinder valve (4) right to close.

(2) Remove hose (6) from valve stem (12 or 17),

(3) Install valve cap (11 or 16) on valve stem (12 or 17).

6. Repressurize regulator (5) per steps (1) and (2)

(1) Turn regulator valve (7) right until high pressure gage (8) reads zero.

(2) Turn regulator valve (7) left to close.

c. Remove hose (6) from regulator (5).

d. Remove regulator (5) from compressed cylinder (2)

e. Install cap **(3)** on compressed cylinder (2).

f. Install cover (1) on compressed cylinder (2).

3-102.24 D/NSC Purging Kit Installation.

WARNING

Dropping cylinder of compressed nitrogen gas in enclosed areas can cause suffocation. Use **extreme care not to drop cylinder.**

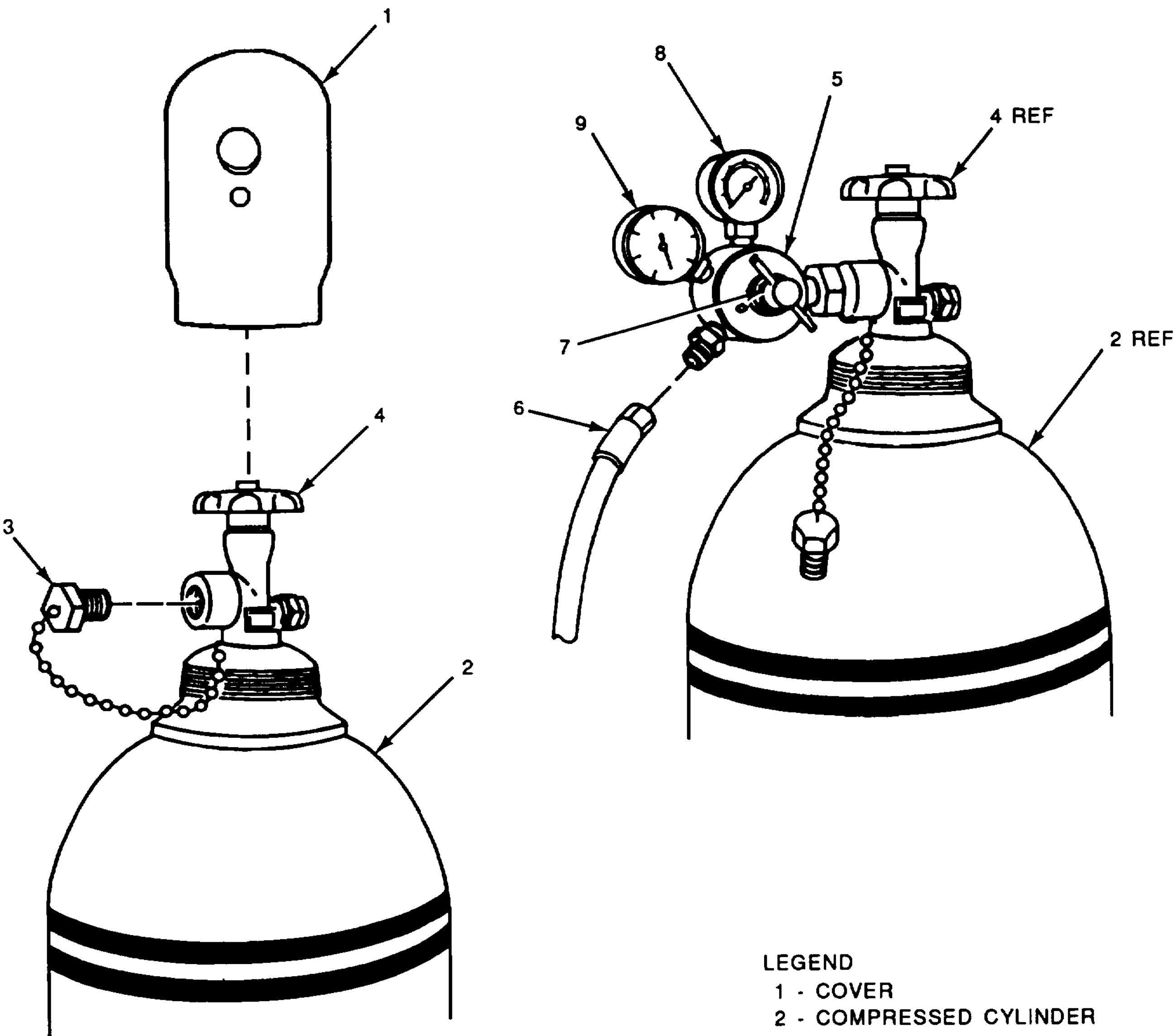
CAUTION

Compressed cylinder must have two black bands on upper part of cylinder. Do not use cylinder without two black bands.

a. If regulator (5) is installed on compressed cylinder (2), (item 64, appendix F), go to step f.

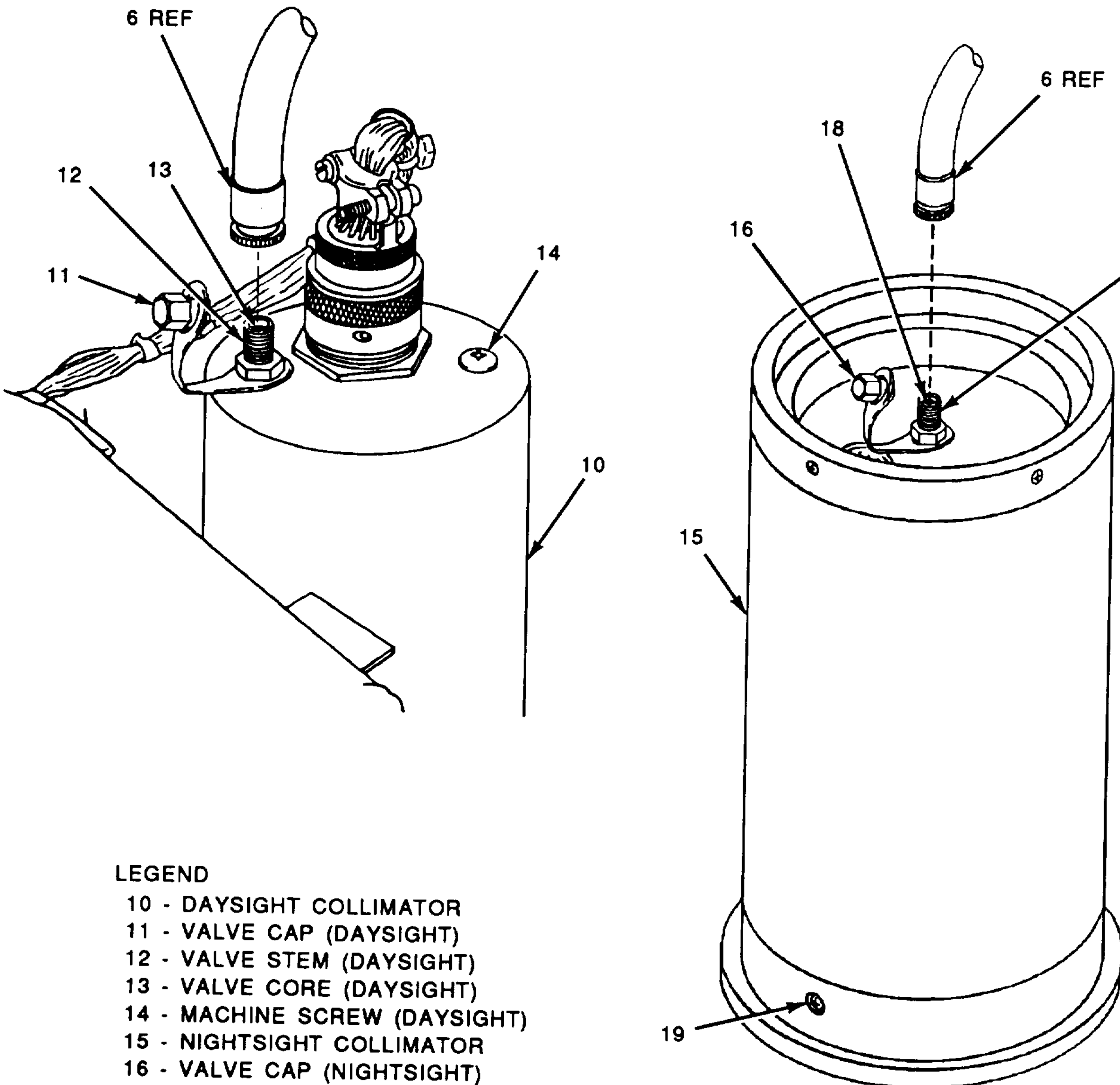
b. Remove cover (1) from compressed cylinder (2).

c. Remove cap (3) from compressed cylinder (2).



LEGEND
1 - COVER
2 - COMPRESSED CYLINDER
3 - CAP
4 - CYLINDER VALVE
5 - REGULATOR
6 - HOSE
7 - REGULATOR VALVE
8 - HIGH PRESSURE GAGE
9 - LOW PRESSURE GAGE

Figure 3-17.3. D/NSC Service (Sheet 1 of **2)**



LEGEND
10 - DAYSIGHT COLLIMATOR
11 - VALVE CAP (DAYSIGHT)
12 - VALVE STEM (DAYSIGHT)
13 - VALVE CORE (DAYSIGHT)
14 - MACHINE SCREW (DAYSIGHT)
15 - NIGHTSIGHT COLLIMATOR
16 - VALVE CAP (NIGHTSIGHT)
17 - VALVE STEM (NIGHTSIGHT)
18 - VALVE CORE (NIGHTSIGHT)
19 - MACHINE SCREW (NIGHTSIGHT)

Figure 3-17.3. D/NSC Service (Sheet 2 of 2).

d. Slowly turn cylinder valve (4) left until nitrogen leaves compressed cylinder (2). Leave cylinder valve (4) open for 1 to 2 seconds, then turn cylinder valve (4) right to close.

e. Install regulator (5) on compressed cylinder (2).

f. Install hose (6) on regulator (5).

g. Check pressure in compressed cylinder (2) per steps (1) thru (4).

(1) Turn regulator valve (7) left to close.

(2) Turn cylinder valve (4) left until maximum cylinder pressure shows on high pressure gage (8).

(3) If cylinder pressure is less than 100 psi, replace compressed cylinder (2).

(4) If cylinder pressure is greater than 100 psi, go to step h.

h. Check hose (6) for blocking per steps (1) thru (4).

(1) Turn regulator valve (7) right until 8 psi hews on low pressure gage (9).

(2) Check hose (6) for blocking.

(3) Turn regulator valve (7) left to close.

(4) If flow of nitrogen was not heard, replace hose (6).

3-102.25 D/NSC Daysight Collimator Service. a. Remove optical assembly cover (11, figure 3-17) per paragraph 3-66.

WARNING

Dropping **cylinder of compressed nitrogen gas in enclosed areas can cause suffocation. Use extreme care not to drop cylinder.**

b. Install purging kit to compressed cylinder (item 54, appendix F) per paragraph 3-102.24.

c. Repressurize daysight collimator (10, figure 3-17.3) per steps (1) and (2).

(1) Remove valve cap (11) from valve stem (12).

(2) Repressurize daysight collimator (10) by depressing valve core (13).

d. Remove machine screw (14) from daysight collimator (10). Discard machine screw.

e. Purge daysight collimator (10) per steps (1) thru (7).

(1) Install hose (6) on valve stem (12).

CAUTION

Daysight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(2) Turn regulator valve (7) right until 8 psi shows on low pressure gage (9).

NOTE

Do not purge for more than 10 minutes.

(3) Allow gas to purge through collimator for 1 to 2 minutes or until all visible signs of moisture are gone from daysight collimator window.

(4) Turn regulator valve (7) left until 5 psi shows on low pressure gage (9).

(5) Install new machine screw (14) on daysight collimator (10).

CAUTION

Daysight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(6) Turn regulator valve (7) right until 8 psi shows on low pressure gage (9).

(7) Wait 3 minutes and go to paragraph 3-102.28f

3-102.26 D/NSC Daysight Collimator Purging Kit Leak Test. a. Pressurize daysight collimator (10) per steps (1) thru (3).

(1) Install hose (6) on valve stem (12).

(2) Turn cylinder valve (4) left to open.

CAUTION

Daysight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(3) Adjust regulator valve (7) to maintain 8 **psi** on low pressure gage (9).

b. Check purging kit for leaks per steps (1) thru (3).

WARNING

Leak test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.

(1) Apply leak test compound (item 63, appendix F) to connections between regulator (5), hose (6), and valve stem (12). Check for bubbles.

(2) If there are no bubbles within 3 minutes, wipe off leak test compound. Go to paragraph 3-102.27b.

(3) If there are bubbles, go to step c.

c. Turn regulator valve (7) left to close.

NOTE

If connection between valve stem (12) and hose (6) does not show bubbles, go to step g.

d. Check connection between valve stem (12) and hose (6) per steps (1) thru (3).

(1) Remove hose (6) from valve stem (12).

(2) Inspect valve stem (12) and hose (6) for dirt or damage. Replace as necessary per paragraph 3-102.27f.

(3) Install hose (6) on valve stem (12).

e. Check purging kit for leaks per steps (1) thru (4).

CAUTION

Daysight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(1) Turn regulator valve (7) right until 8 psi shows on low pressure gage (9).

WARNING

Leak test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.

(2) Apply leak test compound (item 63, appendix F) to connections between regulator (5), hose (6), and valve stem (12). Check for bubbles.

(3) If there are no bubbles within 3 minutes, wipe off leak test compound. Go to paragraph 3-102 .28f.

(4) If there are bubbles, go to step f.

f. Turn regulator valve (7) left to close.

g. Check connection between hose (6) and regulator (5) per steps (1) thru (3).

(1) Remove hose (6) from regulator (5).

(2) Inspect hose (6) and regulator (5) for dirt or damage. Replace as necessary.

(3) Install hose (6) on regulator (5).

h. Check purging kit for leaks per steps (1) thru (4).

CAUTION

Daysight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(1) Turn regulator valve (7) right until 8 psi shows on low pressure gage (9).

WARNING

Leak test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.

(2) Apply leak test compound (item 63, appendix F) to connections between regulator (5), hose (6), and valve stem (12). Check for bubbles.

(3) If there are no bubbles within 3 minutes, wipe off leak test compound. Go to paragraph 3-102 .28g.

(4) If there are bubbles, go to step b.

-102.27 **D/NSC Daysight Collimator Valve Assembly Leak Test.** a. Pressurize daysight collimator (10) per steps (1) and (2).

(1) Install hose (6) on valve stem (12).

CAUTION

Daysight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(2) Turn regulator valve (7) right until 8 psi hews on low pressure gage (9).

b, Turn regulator valve (7) left to close.

c. Remove hose (6) from valve stem (12).

d. Check valve stem (12) and valve core (13) for leaks per steps (1) thru (3).

WARNING

Leak test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.

(1) Apply leak test compound (item 63, appendix F) around valve stem (12) and valve core (13).

(2) If bubbles appear around valve stem (12) or valve core (13) within 3 minutes, go to step e.

(3) If there are no bubbles within 3 minutes, wipe off leak test compound. Go to paragraph 3-102.28.

NOTE

If valve stem (12) and valve core (13) have already been tightened, go to step f.

e. Tighten valve stem (12) or valve core (13) per steps (1) and (2).

(1) Tighten valve stem (12).

(2) Tighten valve core (13), Use pneumatic tire valve repair tool.

(3) Go to step d.

NOTE

If valve stem (12) and valve core (13) have already been replaced, go to paragraph 3-102 .28d.

f. Replace valve stem (12) or valve core (13) per step (l).

(1) Replace valve stem (12) per paragraphs 3-102.14 and 3-102.15 or valve core (13) per paragraphs 3-102.16 and 3-102.17 as required.

(2) Go to paragraph 3-102 .25e.

3-102.28 **D/NSC Daysight Collimator Machine Screw Leak Test.** a. Pressurize daysight collimator (10) per steps (1) and (2).

(1) Install hose (6) on valve stem (12).

CAUTION

Daysight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(2) Turn regulator valve (7) right until 8 psi shows on low pressure gage (9).

b. Check machine screw (14) for leaks per steps (1) thru (3).

WARNING

Leak **test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.**

(1) Apply leak test compound (item 63, appendix F) to machine screw (14).

(2) If bubbles appear around machine screw (14 within 3 minutes, wipe off leak test compound and go to step c.

(3) If there are no bubbles within 3 minutes, wipe off leak test compound and go to step f.

NOTE

If machine screw (14) has already been tightened, go to step d.

c. Tighten machine screw (14) per step (l).

(l) Tighten machine screw (14).

(2) Go to step b.

d. Remove purging kit per paragraph 3-102.23.

e. Replace daysight collimator per paragraphs 3-68 and 3-69. Return to 180 day test procedure.

NOTE

If pressure reading does not decrease and valve assembly has been leak tested, go to step h.

f. Check for change in pressure reading on low pressure gage (9) per steps (1) thru (4).

(l) Turn cylinder valve(4) right to close.

(2) Observe pressure reading on low pressure gage (9) for 3 minutes.

(3) If pressure reading decreases, go to step g.

(4) If pressure reading does not decrease, turn cylinder valve (4) left to open. Go to paragraph 3-102.27.

g. Go to paragraph 3-102.26. If daysight collimator cannot hold pressure, replace daysight collimator per paragraphs 3-68 and 3-69.

h. Remove purging kit per paragraph 3-102.23.

i. Return to 180 day test procedure.

3-102.29 D/NSC Nightsight Collimator Service.

WARNING

Dropping cylinder of compressed nitrogen gas unenclosed areas can cause suffocation. Use extreme care not to drop cylinder.

a. Install purging kit to compressed cylinder (item 64, appendix F) per paragraph 3-102.24.

b. Remove nightsight collimator (21, figure 3-17) per paragraph 3-70.

c. Repressurize nightsight collimator (15, figure 3-17.3) per steps (1) and (2).

(l) Remove valve cap(16) from valve stem (17).

(2) Repressurize nightsight collimator (15) by depressing valve core (18).

d. Remove machine screw (19) from nightsight collimator (15). Discard machine screw.

e. Purge nightsight collimator (15) per steps (1) thru (8).

(l) Install hose (6) on valve stem (17)

CAUTION

Nightsight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(2) Turn regulator valve (7) right **until** 8 psi shows on low pressure gage (9).

NOTE

Do not purge for more than 10 minutes,

(3) Allow gas to purge through collimator for 1 to 2 minutes or until all visible signs of moisture are gone from nightsight collimator window.

(4) Turn regulator valve (7) left until 5 psi shows on low pressure gage (9).

WARNING

Solvents and alcohol are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of vapors, or contact with the skin. Keep away from heat and open flame.

(5) Clean new machine screw (19) with isopropyl alcohol (item 4, appendix F).

(6) Install new machine screw(19) on nightsight collimator (15).

CAUTION

Nightsight collimator seals could rupture if **pressure is too high. Never let low pressure gage get higher than 8.5 psi.**

(7) Turn regulator valve (7) right until 8 psi hews on low pressure gage (9).

(8) Wait 3 minutes and go to paragraph 3-102.32f.

3-102.3O D/NSC Nightsight Collimator Purging Kit leak Test. *a.* Pressurize nightsight collimator (15) per steps (1) thru (3).

(1) Install hose (6) on valve stem (17).

(2) Turn cylinder valve (4) left to open.

CAUTION

Nightsight collimator seals could rupture if **pressure is too high. Never let low pressure gage get higher than 8.5 psi.**

(3) Adjust regulator valve (7) to maintain 8 psi on low pressure gage (9).

b. Check purging kit for leaks per steps (1) thru (3).

WARNING

Leak test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.

(1) Apply leak test compound (item 63, appendix F) to connections between regulator (5), hose (6), and valve stem (17). Check for bubbles.

(2) If there are no bubbles within 3 minutes, wipe off leak test compound. Go to paragraph 3-102 .31b.

(3) If there are bubbles, go to step c.

c. Turn regulator valve (7) left to close.

NOTE

If connection between valve stem (17) and hose (6) does not show bubbles, go to step g.

d. Check connection between valve stem (17) and hose (6) per steps (1) thru (3).

(1) Remove hose (6) from valve stem (17).

(2) Inspect valve stem (17) and hose (6) for dirt or damage. Replace as necessary per paragraph 3-l02.31f.

(3) Install hose (6) on valve stem (17).

e. Check purging kit for leaks per steps (1) thru (4).

CAUTION

Nightsight collimator seals could rupture if **pressure is too high. Never let low pressure gage get higher than 8.5 psi.**

(1) Turn regulator valve (7) right until 8 psi shows on low pressure gage (9).

WARNING

Leak test compound will irritate eyes. Avoid **contact with eyes. If contact is made, flush with water and call a physician.**

(2) Apply leak test compound (item 63, appendix F) to connections between regulator (5), hose (6), and valve stem (17). Check for bubbles.

(3) If there are no bubbles within 3 minutes, wipe off leak test compound. Go to paragraph 3-102 .32f.

(4) If there are bubbles, go to step f.

f. Turn regulator valve (7) left to close.

g. Check connection between hose (6) and regulator (5) per steps (1) thru (3).

(1) Remove hose (6) from regulator (5).

(2) Inspect hose (6) and regulator (5) for dirt or damage. Replace as necessary.

(3) Install hose (6) on regulator (5).

h Check purging kit for leaks per steps (1) thru (4).

CAUTION

Nightsight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(1) Turn regulator valve (7) right until 8 psi shows on low pressure gage (9).

WARNING

Leak test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.

(2) Apply leak test compound (item 63, appendix F) to connections between regulator (5), hose (6), and valve stem (17). Check for bubbles.

(3) If there are no bubbles within 3 minutes, wipe off leak test compound. Go to paragraph 3-102 .32f.

(4) If there are bubbles, go to step b.

3-102.31 D/NSC Nightsight Collimator Valve Assembly Leak Test. a. Pressurize nightsight collimator (15) per steps (1) and (2).

(1) Install hose (6) on valve stem (17).

CAUTION

Nightsight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(2) Turn regulator valve (7) right until 8 psi shows on low pressure gage (9).

b. Turn regulator valve (7) left to close.

c. Remove hose (6) from valve stem (17).

d. Check valve stem (17) and valve core (18) for leaks per steps (1) thru (3).

WARNING

Leak test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.

(1) Apply leak test compound (item 63, appendix F) around valve stem (17) and valve core (18).

(2) If bubbles appear around valve stem (17) or valve core (18) within 3 minutes, go to step e.

(3) If there are no bubbles within 3 minutes, wipe off leak test compound. Go to paragraph 3-102.32,

NOTE

If valve stem (17) and valve core (18) have already been tightened, go to step f.

e. Tighten valve stem (17) or valve core (18) per steps (1) and (2).

(1) Tighten valve stem (17).

(2) Tighten valve core (18). Use pneumatic tire valve repair tool.

(3) Go to step d.

NOTE

If valve stem (17) and valve core (18) have already been replaced, go to paragraph 3-102 .32d.

f. Replace valve stem (17) or valve core (18) per step (l).

(1) Replace valve stem (17) per paragraphs 3-102.18 and 3-102.19 or valve core (18) per paragraphs 3-102.20 and 3-102.21 as required.

(2) Go to paragraph 3-102 .29e.

3-102.32 D/NSC Nightsight Collimator Machine Screw Leak Test. a. Pressurize nightsight collimator (15) per steps (1) and (2).

(1) Install hose (6) on valve stem (17).

CAUTION

Nightsight collimator seals could rupture if pressure is too high. Never let low pressure gage get higher than 8.5 psi.

(2) Turn regulator valve (7) right until 8 psi shows on low pressure gage (9).

b. Check machine screw (19) for leaks per steps (1) thru (3).

WARNING

Leak **test compound will irritate eyes. Avoid contact with eyes. If contact is made, flush with water and call a physician.**

(1) Apply leak test compound (item 63, appendix (F) to machine screw (19).

(2) If bubbles appear around machine screw (19) within 3 minutes, wipe off leak test compound and go o step c.

(3) If there are no bubbles within 3 minutes, wipe 0ff leak test compound and go to step f.

NOTE

If machine screw (19) has already been tightened, go to step d.

c. Tighten machine screw (19) per step (l).

(1) Tighten machine screw (19).

(2) Go to step b.

d. Remove purging kit per paragraph 3-102.23.

e. Replace nightsight collimator (21, figure 3-17) per paragraphs 3-70 and 3-71. Return to 180 day test procedure.

NOTE

If pressure reading does not decrease and valve assembly has been leak tested, go to step h.

f. Check for change in pressure reading on low pressure gage (9) per steps (1) thru (4).

(1) Turn cylinder valve (4) right to close.

(2) Observe pressure reading on low pressure gage (9) for 3 minutes.

(3) If pressure reading decreases, go to step g

(4) If pressure reading does not decrease, turn cylinder valve (4) left to open. Go to paragraph 3-102.31.

g. Go to paragraph 3-102.30. If nightsight collimator cannot hold pressure, replace nightsight collimator per paragraphs 3-70 and 3-71.

h. Remove purging kit per paragraph 3-102.23.

i. Install nightsight collimator (21, figure 3-17) per paragraph 3-71.

j. Return to 180 day test procedure.

3-103. Remote Position Control Maintenance. Maintenance of the RPC consists primarily of removal and replacement of faulty subassemblies. For maintenance of RPC, refer to figure 3-18.

LEGEND

1 – HEX NUT SEAL
2 - AZIMUTH SWITCH
3 - ELEVATION SWITCH
4 - SCREW, LOCK WASHER AND FLAT WASHER (2)
5 - COVER
6 - COVER GASKET
7 - ROUND NUT
8 – SPEED SWITCH
9 - CASE
10 - CABLE CLAMP
11 - SCREW, FLAT WASHER, LOCK WASHER AND NUT
12 – IDENTIFICATION PLATE
13 – RUBBER GROMMET
14 - TIEDOWN STRAP

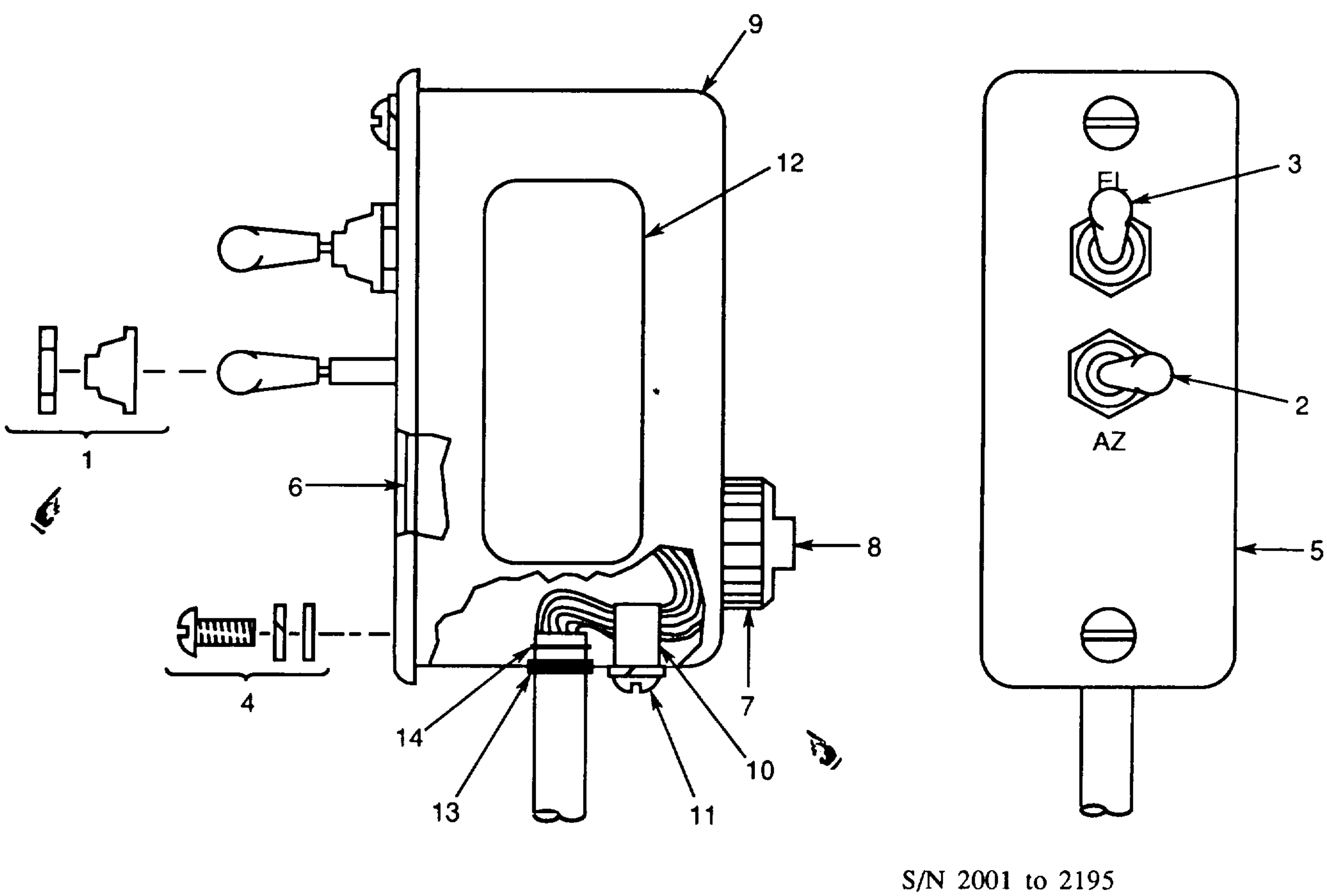


Figure 3-18. RPC Maintenance (Sheet 1 of 2).

LEGEND

15 – HEX NUT SEAL
16 – AZIMUTH SWITCH
17 – ELEVATION SWITCH
18 – SCREW, LOCK WASHER AND FLAT WASHER (2)
19 – COVER
20 – COVER GASKET
21 – ROUND NUT
22 – SPEED SWITCH
23 – CASE
24 – STRAIN RELIEF BUSHING
25 – IDENTIFICATION PLATE

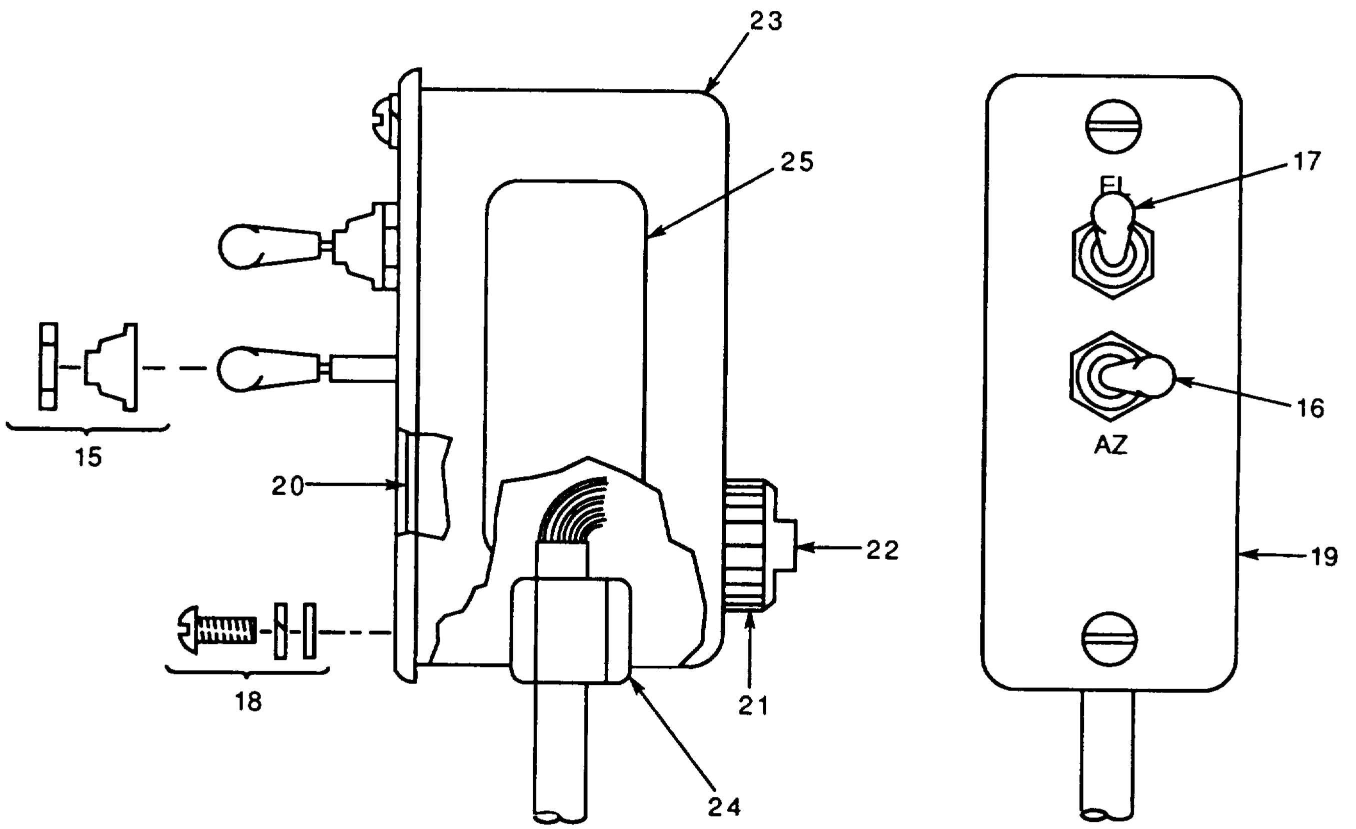


Figure 3-18. RPC Maintenance (Sheet 2 of 2).

3-104. Alignment Breakout Box Maintenance. Maintenance of the ABOB consists primarily of fault isolation of cables and front panel, and removing and replacing faulty subassemblies. For maintenance of ABOB, refer to figure 3-19. Refer to figures H-35, H-36, and H-37 for wiring diagrams. Cables and connectors may be repaired per TM 55-1500-323-25. To repair connector saver on power cable W8, see paragraph 3-44, steps b and c.

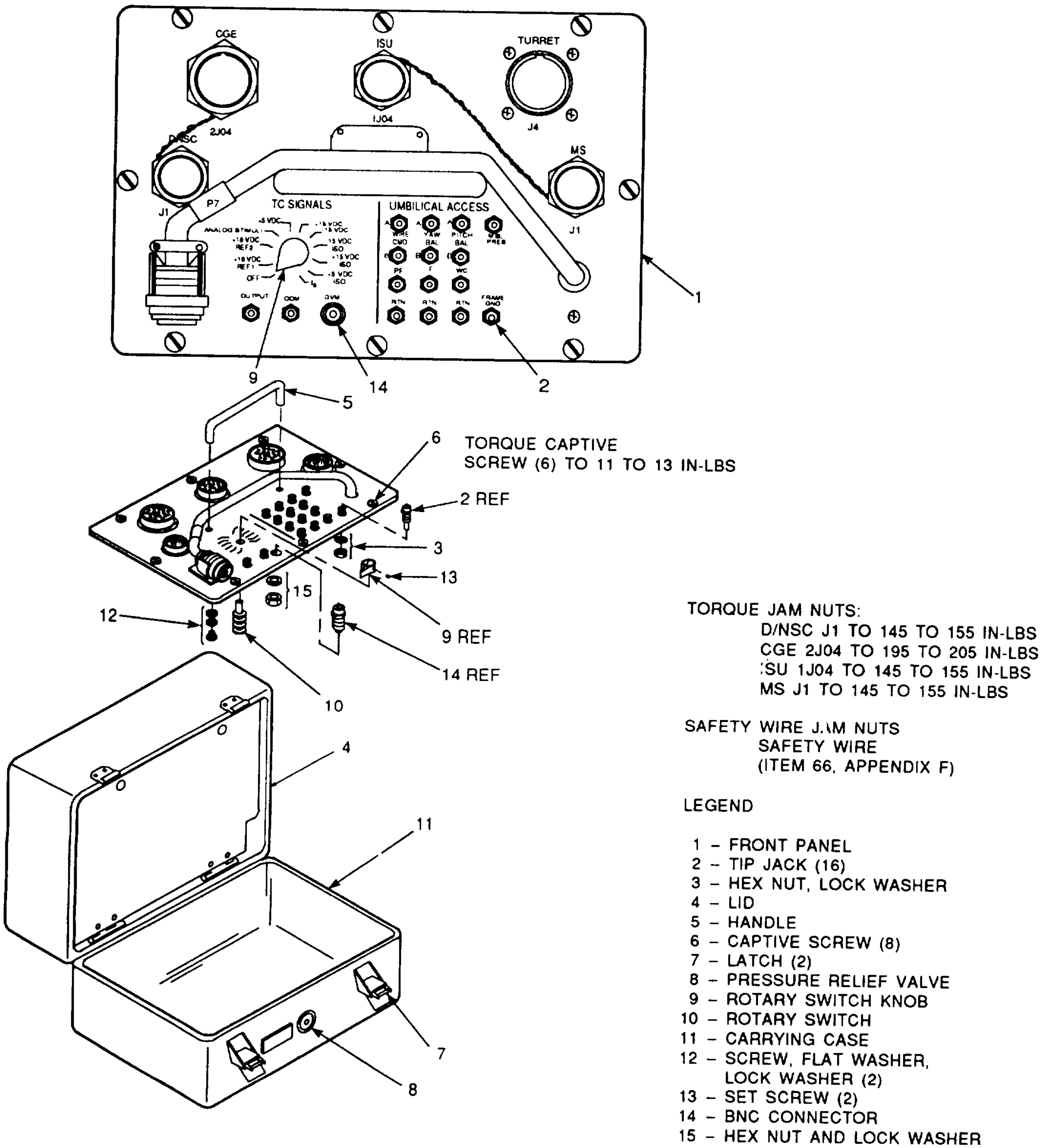


Figure 3-19. ABOB Maintenance.

3-104.1. BSA Controller Maintenance (PN 13163007). For maintenance of BSAC PN 13163007, refer to TM 9-4935-474-14-2.

3-105. BSA Controller Maintenance (PN 13154980). Maintenance of the BSAC PN 13154980 consists primarily of removal and 1
replacement of faulty subassemblies. Refer to figure 3-20 for component location.

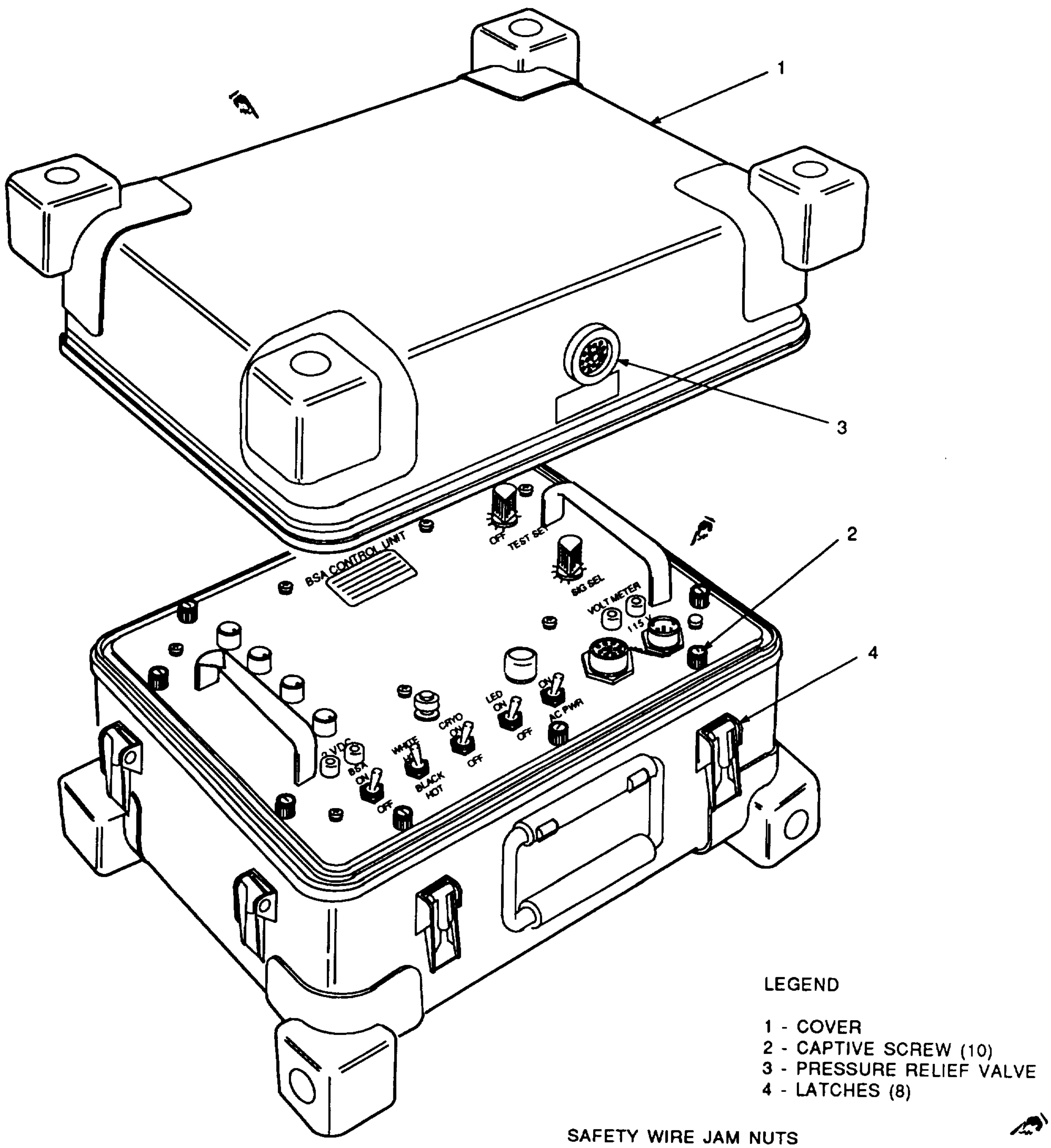


Figure 3-20. BSAC Maintenance (Sheet 1 of 4).

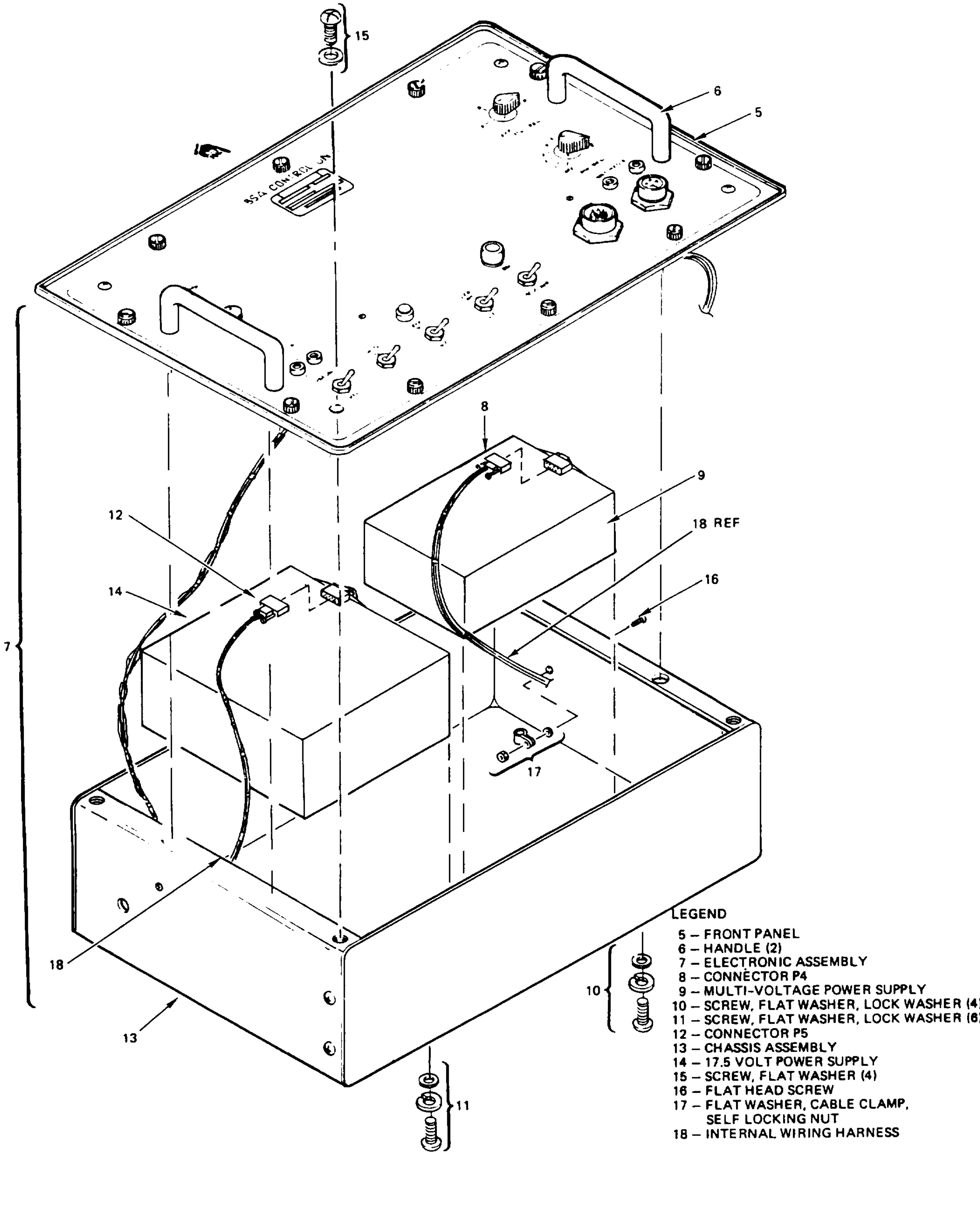


Figure 3-20. BSAC Maintenance (Sheet 2 of 4).

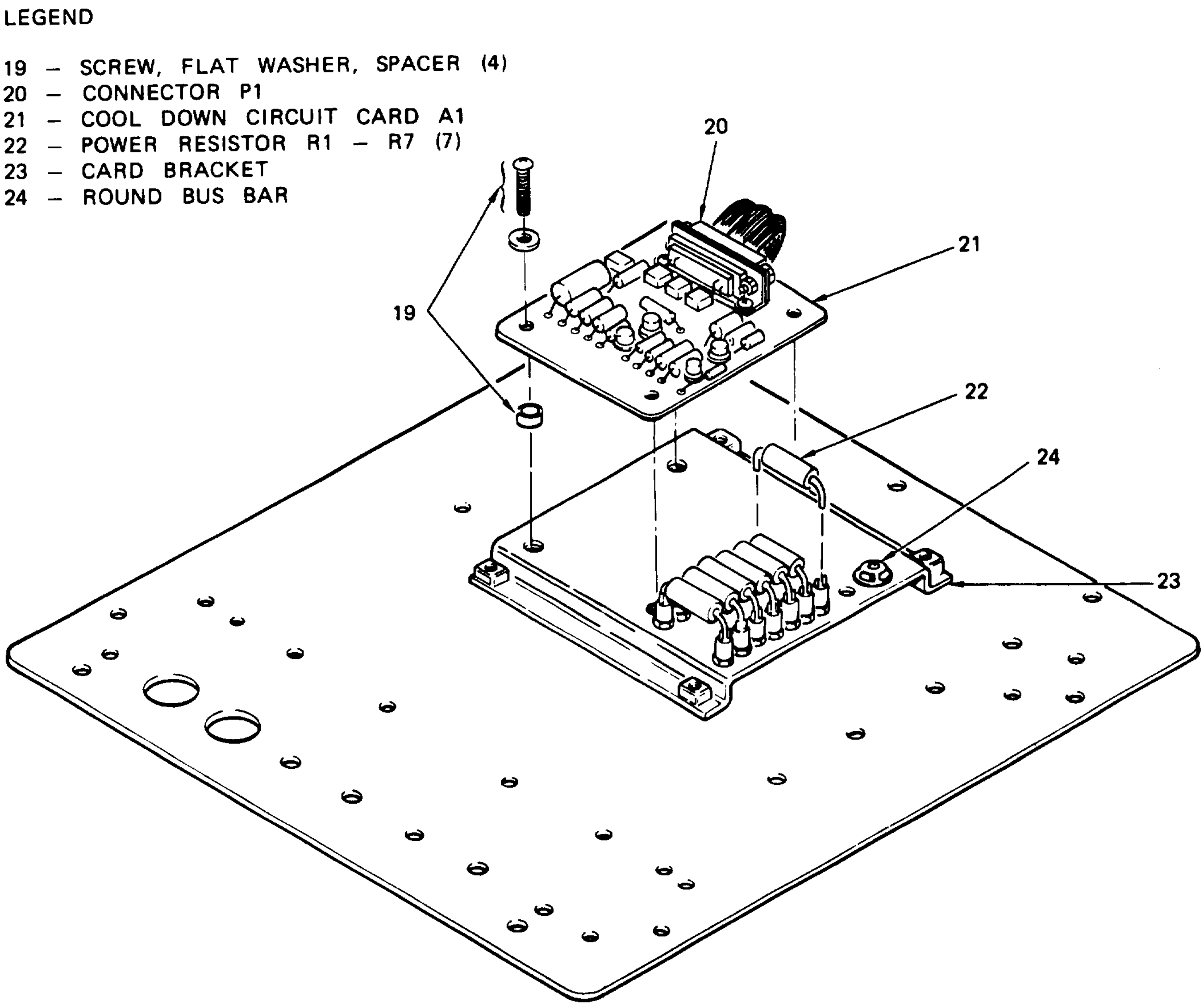


Figure 3-20. BSAC Maintenance (Sheet 3 of 4).

LEGEND

25 – LAMP ASSEMBLY
25.1 – LAMP
26 – 115 VAC CONNECTOR J2
27 – CIRCUIT BREAKER CB1
28 – ROTARY SWITCHES S5 AND S6
29 – TOGGLE SWITCHES S1-S4
30 – POTENTIOMETERS R1-R4
31 – TEST POINTS TP1-TP4
32 – INDICATOR READY LAMP AND HOLDER
33 – BSA CONNECTOR J1
34 – SCREW, FLAT WASHER
35 – DA LABEL 80
36 – KNOB

TORQUE JAM NUTS:
J1 TO 145 TO 155 IN-LBS.
J2 TO 120 TO 130 IN-LBS.

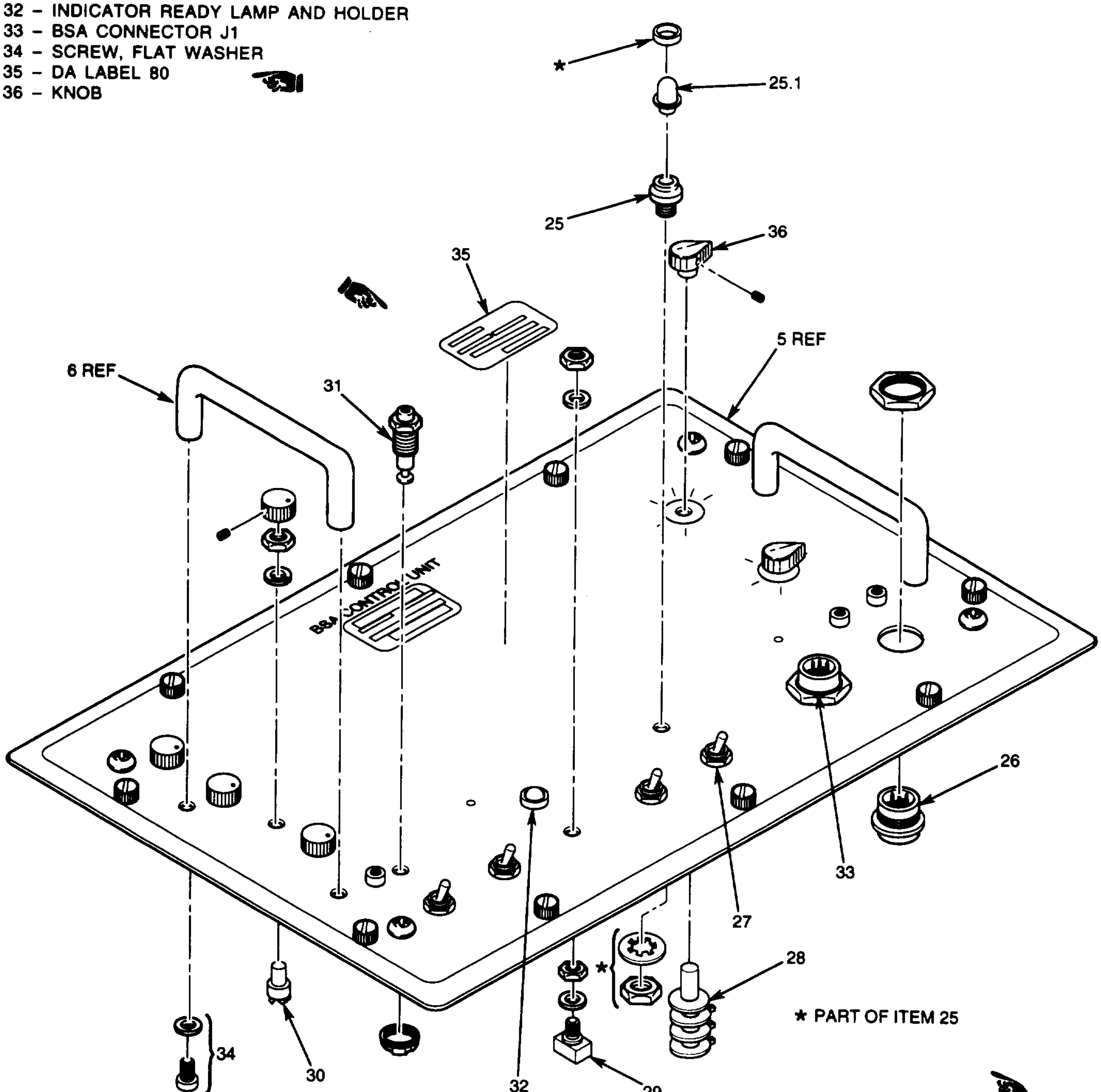


Figure 3-20. BSAC Maintenance (Sheet 4 of 4).

3-106. BSAC Electronic Assembly Removal. *a*. Press pressure relief valve (3) in carrying case cover (l).

b. Lift eight case latches (4) and remove cover (1).

c. Loosen ten captive screws (2).

d. Lift out electronic assembly (7) by front handles (6),

3-107. BSAC Electronic Assembly Installation. a. Lower electronic assembly (7) into carrying case by front handles (6).

b. Tighten ten captive screws (2). Torque screws (2) 5 to 7 in-lbs.

c. Replace cover (1) on carrying case and close by securing eight case latches (4).

3-108. BSAC Front Panel Assembly Removal. a. Remove electronic assembly (7) from carrying case per paragraph 3-106.

CAUTION

Front panel (5) is connected to electronic assembly by internal wiring harness. Do not attempt to completely separate front panel from electronic assembly.

b. Loosen and remove four screws and flat washers (15) securing front panel (5) to electronic assembly (7).

c. Place front panel (5) down in front of electronic assembly (7).

d. Remove two flat head screws (16) and two flat washers, cable clamps, and self locking nuts (17) securing internal wiring harness to chassis assembly (13).

CAUTION

Connectors may crack or break if jackscrews are not loosened one-half turn alternately.

e. Loosen jackscrews and disconnect connector P4 (8) from connector J4 and P5 (12) from connector J5; remove front panel (5).

f. Inspect connectors P4 (8) and P5 (12) and repair if necessary. See TM 55-1500-323-25.

3-109. BSAC Front Panel Assembly Installation.

CAUTION

Connectors may crack or break if jackscrews are not loosened one-half turn alternately.

a. Install connector P4 (8) to connector J4 and connector P5 (12) to connector J5; tighten jackscrews.

b. Secure internal wiring harness (18) to chassis assembly (13) using two flat head screws (16) and two flat washers, cable clamps and self locking nuts (17), Torque two screws (16) to 23 to 27 in-lbs.

c. Align front panel (5) with electronic assembly (7).

d. Install four screws and flat washers (15) into front panel (5). Torque four screws (15) to 8 to 12 in-lbs,

e. Install electronic assembly (7) in carrying case per paragraph 3-107.

3-110. BSAC Multi-Voltage Power Supply Removal. ***a.*** Remove front panel assembly (5) per paragraph 3-108.

b. From bottom of electronic assembly (7) remove four screws, lock washers, and flat washers (10) securing multi-voltage power supply (9) to electronic assembly (7) frame.

c. Remove multi-voltage power supply (9).

3-111. BSAC Multi-Voltage Power Supply Installation. ***a.*** Position multi-voltage power supply (9) in chassis assembly (13).

b. Install four screws, flat washers, and lock washers (10). Torque to 23 to 27 in-lbs.

c. Install front panel assembly (5) per paragraph 3-109.

3-112. BSAC 17.5 Volt Power Supply Removal. *a*. Remove front panel assembly (5) per paragraph 3-108.

b. From bottom of electronic assembly (7) remove six screws, flat washers, and lock washers (11) securing 17.5 volt power supply (14) to electronic assembly (7).

c. Remove 17.5 volt power supply (14).

3-113. BSAC 17.5 Volt Power Supply Installation. a. Place 17.5 volt power supply (14) in chassis assembly (13),

b. Secure power supply (14) to electronic assembly (7) with six screws, lock washers, and flat washers (1 1). Torque six screws (11) to 23 to 27 in-lbs.

Install front panel assembly (5) per paragraph 3-109.

Paragraph 3-114 has been deleted,

3-115. BSAC Cool Down Circuit Card A1 Removal.

CAUTION

The circuit card in the BSAC is electrostatic discharge sensitive and subject to damage by discharge of static electricity. Wear a wrist ground strap when handling card and handle it by edges only. Circuit card must be transported in an antistatic bag,

a. Remove front panel assembly (5) per paragraph 3-108.

CAUTION

Connectors may crack or break if jackscrews are not loosened one-half turn alternately.

b. Disconnect connector P1 (20).

c. Remove four screws, flat washers, and spacers (19) from cool down circuit card Al (21).

d. Remove cool down circuit card Al (2 1). Place card in antistatic bag (item 42, appendix F),

e. Inspect connector P1 (20) and repair if necessary. See TM 55-1500-323-25.

3-116, BSAC Cool Down Circuit Card Al Installation.

CAUTION

The circuit card in the BSAC Is electrostatic discharge sensitive and subject to damage by discharge of static electricity. Wear a wrist ground strap when handling card and handle it by edges only. Circuit card must be transported in an antistatic bag.

a. Align cool down circuit card Al (21) on front panel assembly (5) and secure with four screws, flat washers, and spacers (19).

CAUTION

Connectors may crack or break if Jackscrews are not loosened one-half turn alternately,

b. Connect connector PI (20) and secure with two jackscrews.

c. Install front panel assembly (5) per paragraph 3-109.

3-117. Repairable Items. The following items may be repaired by referring **to figure** 3-20 for parts location:

Power Resistors R1-R7 (22)
Round Bus Bar (24)
Potentiometers R1-R4 (30)
Toggle Switches S1-S4 (29)
Test Points TP1-TP4 (31)
Handles (6)
Lamp Assembly (25)
Circuit Breaker CB1 (27)
Indicator Ready Lamp and Holder (32)
Rotary Switches S5 and S6 (28)
115 VAC Connector J2 (26)
BSA Connector J1 (33)

3-118. BSA Holding Fixture Maintenance. Maintenance of the BSAHF consists of removal and replacement of faulty or missing subassemblies. Refer to figure 3-21 for component location.

3-119. BSAHF Base Assembly Removal. ***a.*** Loosen pressure relief valve (1) on carrying case (2).

b. Unlatch 12 latches (3) and remove lid (4). Remove BSAHF (5) from carrying case (2).

CAUTION

Microscope assembly (S4) is normally stowed in case compartment (6) **when not in use. However, if installed on holding fixture (5), remove before performing task to prevent damage to equipment. Refer to paragraphs 3- 135 and 3-136 for microscope assembly removal and installation.**

Do not turn knob on drive azimuth nut assembly (50) when flange nut (36) is tight to prevent possible damage to drive azimuth nut assembly.

c. Remove one self locking hex nut (16), remove set screw (14), and remove brass lock pin (15) from azimuth yoke (1 1).

d. Remove shoulder screw (10) from base assembly (21).

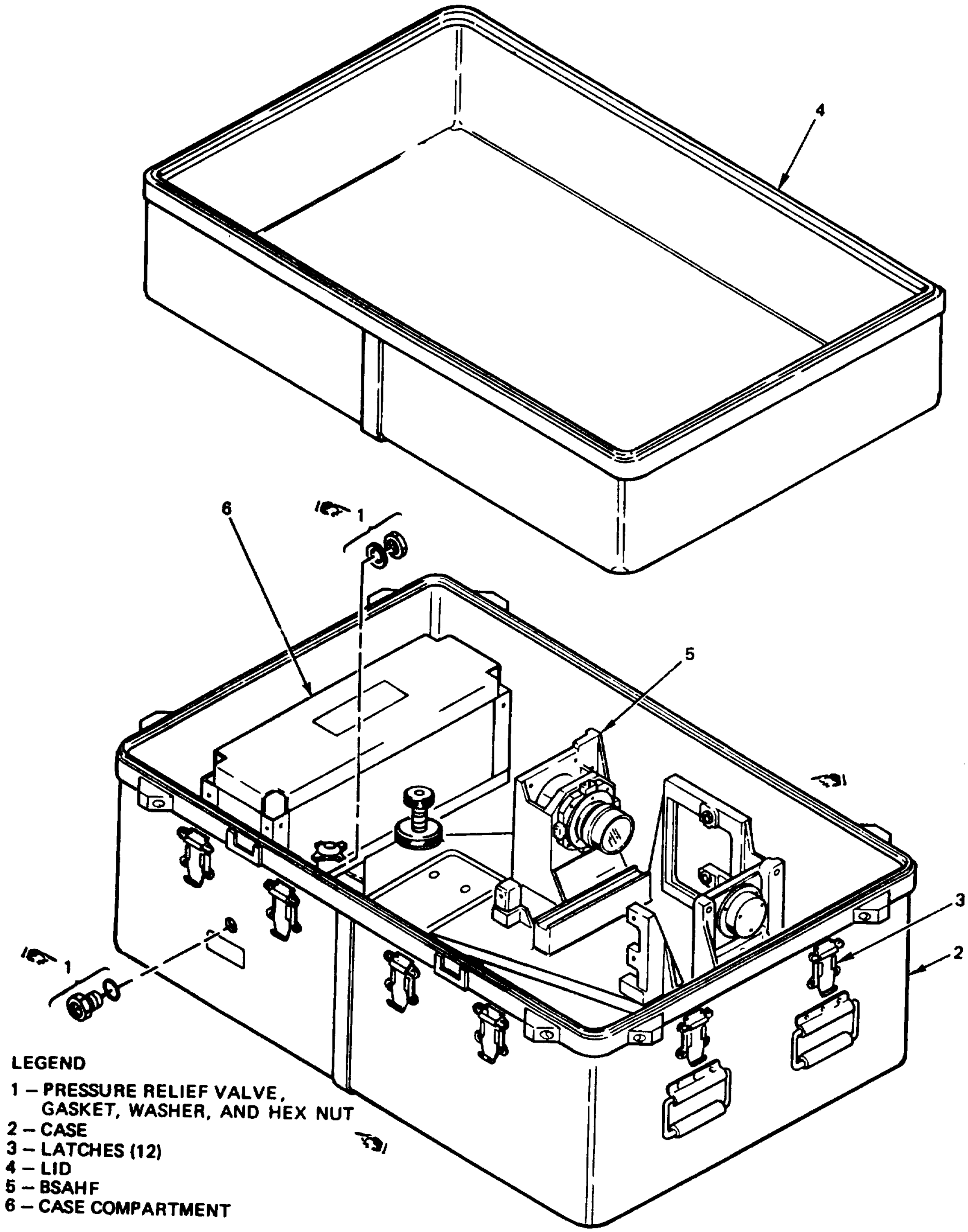


Figure 3-21. BSAHF Maintenance (Sheet 1 of 5)

LEGEND

7 – HOLDING FIXTURE
8 – FLAT WASHER (AS REQUIRED)
9 – SIDE LOADING PLATE
10 – SHOULDER SCREW
11 – AZIMUTH YOKE
12 – STRAIGHT PIN (2)
13 – COTTER PIN (2)
14 – SET SCREW
15 – BRASS LOCK PIN
16 – SELF LOCKING HEX NUT
17 – THUMB SCREW ASSEMBLY (4)
18 – THRUST WASHER
19 – SPHERICAL WASHER ASSEMBLY (4)
20 – THREADED REST BUTTON (2)
21 – BASE ASSEMBLY
22 – LEVELING NUT PAD (2)
23 – THREADED LEVELING BUTTON (2)
24 – BALL PLUNGER (4)
25 – SCREW, FLAT WASHER, LOCK WASHER (4)
26 – STRAIGHT HANDLE (2)
27 – SOCKET HEAD SCREW
28 – FLAT CLAMP
29 – T–BOLT
30 – HEX NUT, FLAT WASHER AND LOCK WASHER (8)
31 – ROUND HANDLE (2)
32 – SCREW, FLAT WASHER, LOCK WASHER (4)
33 – BALLWAY GIB (2)
34 – SPACER BEARING (2)
35 – SCREW (8)
36 – SPHERICAL FLANGED NUT AND BOTTOM WASHER
37 – SCREW (12)
38 – BEARING PLATE
39 – LOCK WASHER, FLAT WASHER, HEX NUT (12)
40 – HEX NUT
41 – SET SCREW
42 – STRAIGHT PIN
43 – YOKE DRIVE PLATE
44 – SET SCREW, FLAT WASHER, LOCK WASHER (2)
45 – ELEVATION SHAFT ASSEMBLY
46 – SPHERICAL WASHER ASSEMBLY
47 – ELEVATION LOCKING NUT
48 – KNOB
49 – SET SCREW (2)
50 – DRIVE AZIMUTH NUT ASSEMBLY
51 – SCREW
52 – NO MAR SET SCREW (2)
52.1 – DELETED

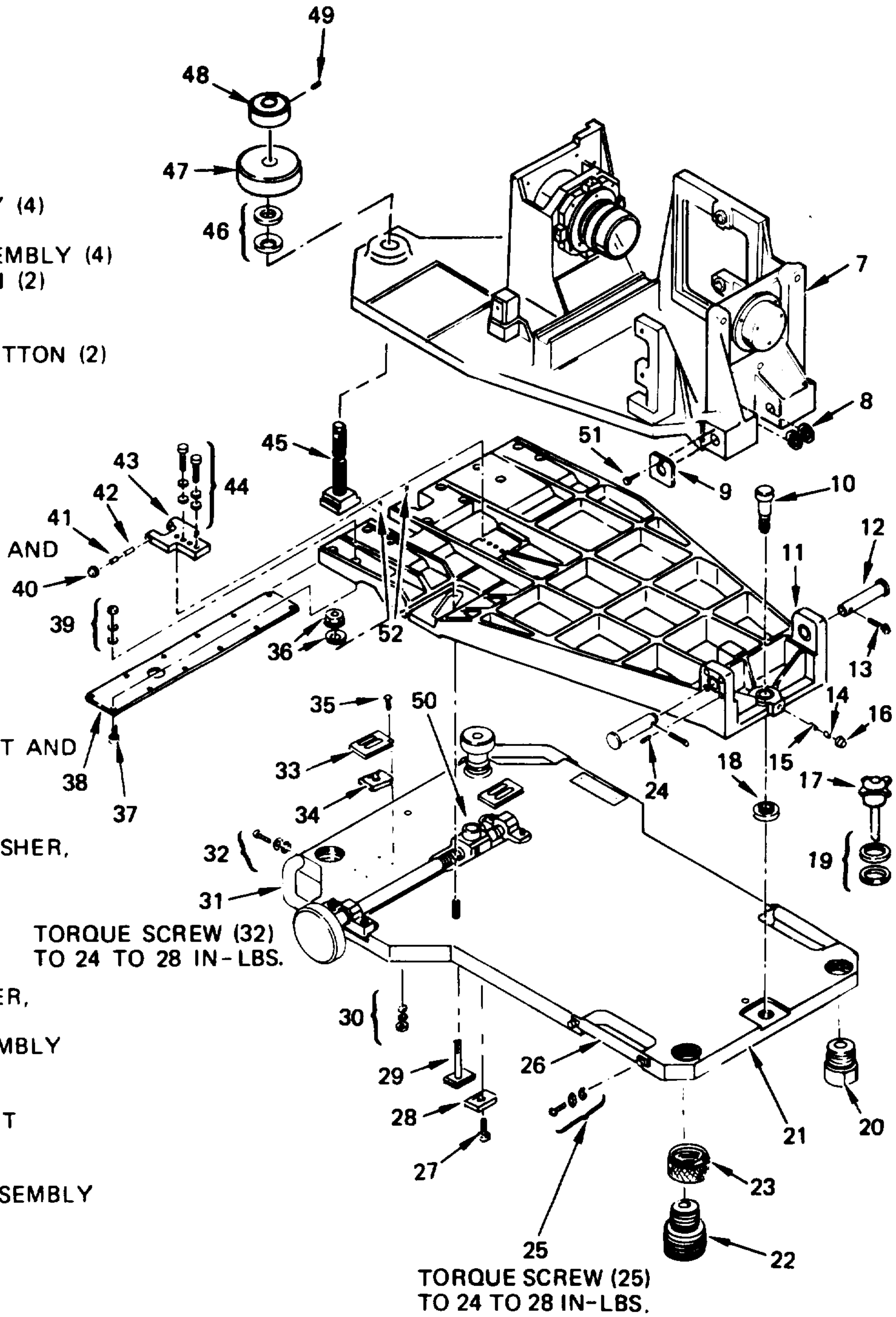
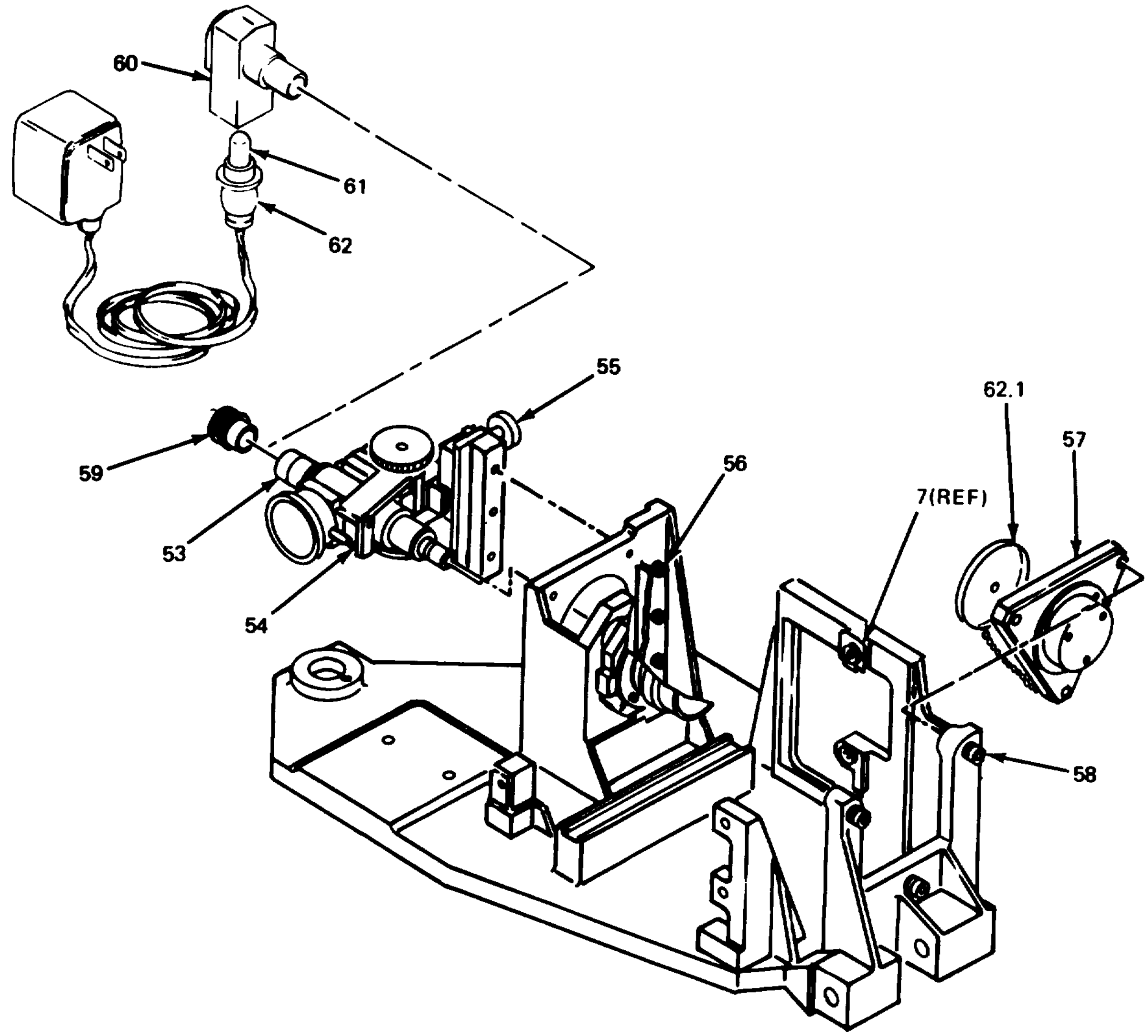


Figure 3-21. BSAHF Maintenance (Sheet 2 of 5)



LEGEND

53 – FOCUSING TUBE
54 – MICROSCOPE STAGE ASSEMBLY (P/N 13143730)
55 – MICROSCOPE ELEVATION CONTROL
56 – CAPTIVE SCREW, LOCK WASHER, FLAT WASHER (3)
57 – REFERENCE MIRROR
58 – SCREW, FLAT WASHER, LOCK WASHER (3)
59 – MICROSCOPE EYEPIECE ASSEMBLY
60 – AUTOCOLLIMATION EYEPIECE ASSEMBLY
61 – LAMP
62 – LAMP HOLDER
62.1 – PROTECTIVE CAP

Figure 3-21. BSAHF Maintenance (Sheet 3 of 5)

LEGEND

63 – CAPTIVE SCREW (4)
64 – MICROSCOPE STAGE ASSEMBLY (P/N13162691)
65 – GUIDE PIN (2)

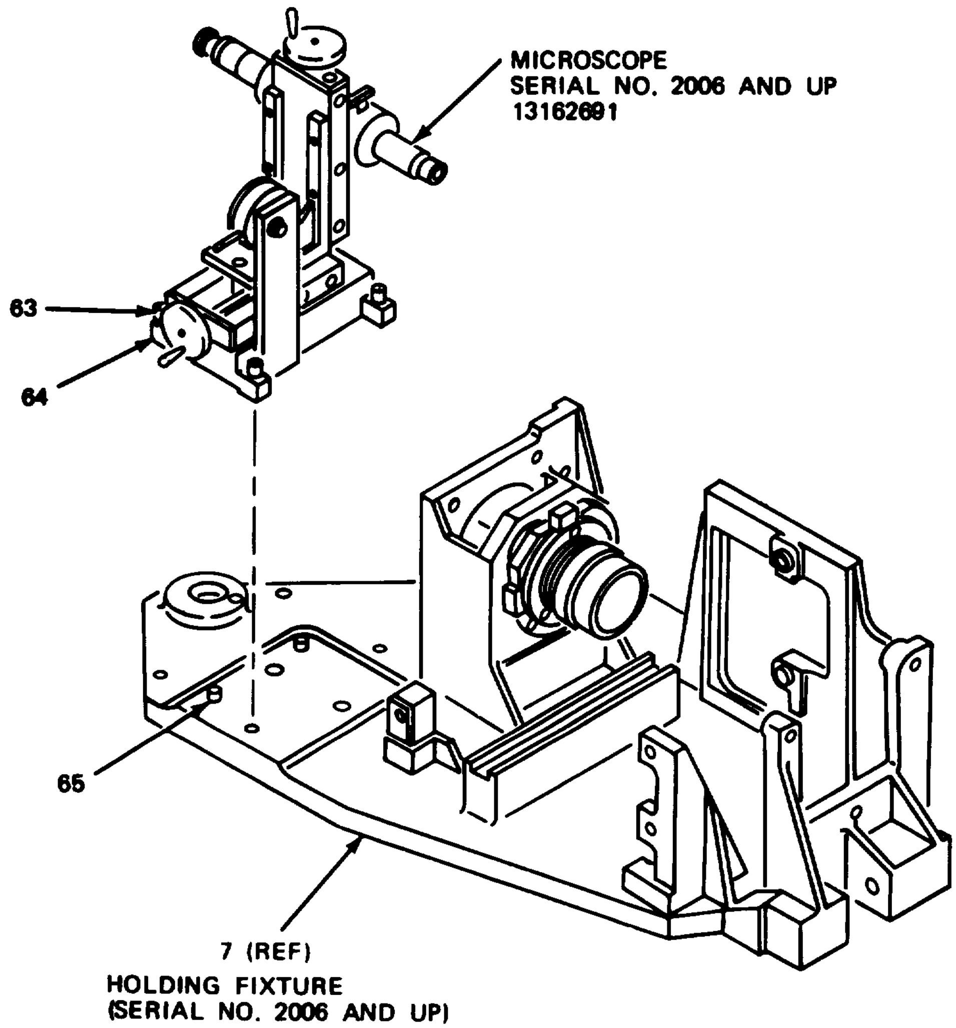


Figure 3-21. BSAHF Maintenance (Sheet 4 of 5)

LEGEND

66– SCREW (4)
67– CHAMFERED FOOT (4)
68– PREFORMED PACKING (4)
69– NOT USED
70– DECAL
71– COMPONENT HOLDER ASSEMBLY NO. 1
72– COMPONENT HOLDER ASSEMBLY NO. 2
73– EYEPIECE CUSHION
74– MOUNTING PLATE
75– FILLER CUSHION
76– COVER CUSHION
77– SCREW (16)
78– FLAT WASHER (16)
79– RUBBER WASHER (16)
80– SELF–LOCKING NUT (16)
81– CARRIAGE ASSEMBLY
82– SPACER (4)
83– NUTS (4)
84– LOCK WASHER (4)
85– FLAT WASHER (4)
86– CAPTIVE STUD (4)
87– CUSHION
88– CAVITY CUSHION
89– NUTS (4)
90– LOCK WASHER (4)
91– FLAT WASHER (4)
92– CAPTIVE STUD (4)

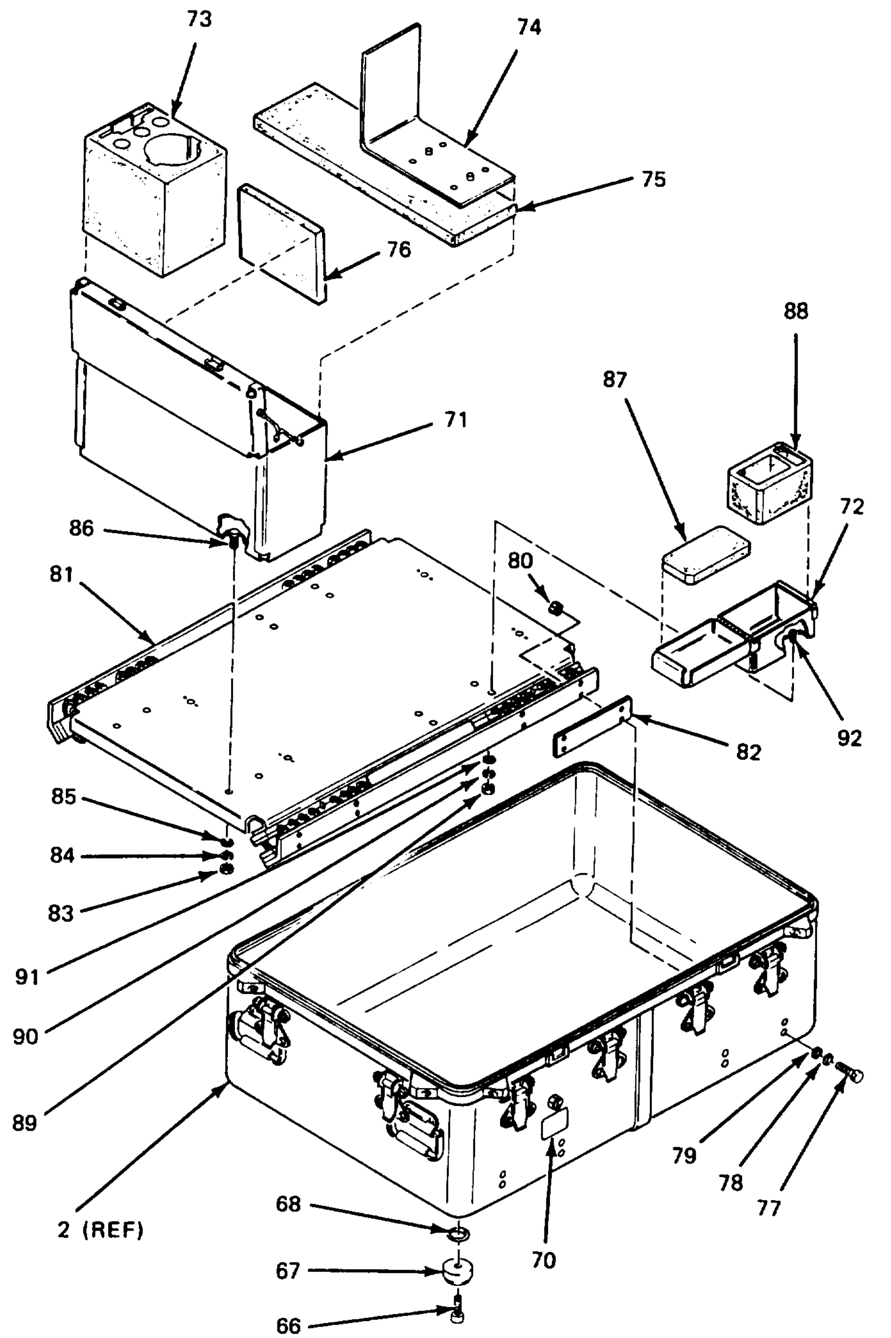


Figure 3-21. BSAHF Maintenance (Sheet 5 of 5)

e. Remove spherical flange nut and bottom washer (36) from T-bolt (29) securing azimuth yoke (11) to base assembly (21).

f. Remove azimuth yoke (11) from base assembly (21). Remove thrust washer (18) from base assembly (21).

3-120. BSAHF Base Assembly Installation. *a.* Apply lubricant (item 10, appendix F) to thrust washer (18) and place thrust washer (18) with lip seated in base assembly (21).

b. Place azimuth yoke (11) on top of base assembly (21).

c. Apply lubricant (item 10, appendix F) to threads of shoulder screw (10), insert screw into azimuth yoke (11) and secure.

d. Torque shoulder screw (10) to 90 to 110 in-lb.

e. Apply lubrication (item 10, appendix F) to threads of T-bolt (29) and secure azimuth yoke (11) with spherical flange nut and bottom washer (36).

f. Insert brass lock pin (15) into azimuth yoke (11). Apply sealant (item 16, appendix F) to threads of set screw (14) and insert in azimuth yoke (1 1). Torque to 60 to 65 in-lb, then back off and retorque to 10 to 12 in-lb.

g. Lock set screw (14) with self locking hex nut (16). Spot bond self locking nut (16) using adhesive (item 1, appendix F).

h. Place BSAHF (5) in carrying case (2) and secure with four thumbscrew assemblies (17). Close lid (4) and secure 12 latches (3).

i. Tighten pressure relief valve (l).

3-121. BSAHF Rest Button and Leveling Nut Removal. *a.* Remove base assembly (21) per paragraph 3-119.

NOTE

Each of four spherical washer assemblies (19) consists of two washers; one thicker than the other. Observe orientation of these washers before removing.

b. Unscrew four thumb screw assemblies (17) and remove four spherical washer assemblies (19) from base assembly (21).

c. Remove two threaded rest buttons (20) from base assembly (21).

d. Remove two leveling nut pads (22) from base assembly (21) with spanner wrench. Remove two threaded leveling buttons (23).

3-122. BSAHF Rest Button and Leveling Nut Installation. *a.* Install threaded leveling buttons (23) on leveling nut pads (22) and apply lubricant (item 10, appendix F) to threaded leveling buttons (23). Apply sealant (item 16, appendix F) to threads of two leveling nut pads (22) and install in base assembly (21) with spanner wrench.

b. Apply sealant (item 16, appendix F) to threads of two threaded rest buttons (20) and install into base assembly (21).

NOTE

Each of four spherical washer assemblies (19) consists of two washer; one thicker than the other. Place two thicker waahers on two threaded rest buttons (20) and two thicker washers on two threaded leveling buttons (23) with concave side up. Place each of four thinner washers convex side down on top side of thicker washers.

c. Place four spherical washer assemblies (19) on two threaded rest buttons (20) and two threaded leveling buttons (23) and apply lubricant (item 10, appendix F) to four spherical washer assemblies (19).

d. Apply lubricant (item 10, appendix F) to threads of four thumb screw assemblies (17) and secure in two threaded rest buttons (20) and two leveling nut pads (22).

Install base assembly (21) per paragraph **3-120.**

3-123. BSAHF Straight Handle Repair. BSAHF straight handle (26) may be repaired by referring to figure 3-21 for parts location. Seal screws per item 16, appendix F.

3-124. BSAHF Round Handle Repair. BSAHF round handles (31) may be repaired by referring to figure 3-21 for parts location.

3-125. BSAHF Ballway Gib Removal. a. Remove base assembly (21) per paragraph 3-119.

b. Remove eight screws (35) and eight hex nuts, flat washers and lock washers (30) securing two ballway gibs (33) and spacer bearings (34) to base assembly (21).

3-126. BSAHF Ballway Gib Installation. a. Apply sealant (item 16, appendix F) to threads of eight screws (35).

b. Install two ballway gibs (33) and spacer bearings (34) to base assembly (21) with eight screws (35) and eight hex nuts, flat washers, and lock washers (30). Torque screws (35) to 5 to 7 in-lb.

c. Install base assembly **(21)** per paragraph 3-120.

3-127. BSAHF T-Bolt Removal. *a.* Remove base assembly (21) per paragraph 3-119.

b. Remove socket head screw (27) and flat clamp (28).

c. Remove T-bolt (29).

3-128. BSAHF T-bolt Installation. *a*. Apply sealant (item 16, appendix F) to threads of socket head screw (27). Apply lubricant (item 10, appendix F) to threads of T-bolt (29). Install T-bolt (29) in base assembly (21) and secure with flat clamp (28) and socket head screw (27). Torque screw to 60 to 65 in-lb.

b. Install base assembly (21) per paragraph 3-120.

3-129. BSAHF Azimuth Yoke Removal. a. Remove base assembly (21) per paragraph 3-119.

b. Remove two cotter pins (13) and two straight pins (12) that secure azimuth yoke (11) to holding fixture (7).

c. Remove flat washers (8) as required. Tag flat washers (8) as a group, noting which group was removed from side of azimuth yoke (11) with side loading plate (9).

d. Remove two straight pins (12).

e. Loosen two no-mar set screws (52) in azimuth yoke (1 1).

f. Loosen four ball plungers (24) to remove load on side loading plate **(9).**

CAUTION

Use extreme care in removing holding fixture (7) from azimuth yoke (11). Rough handling may damage optical alinement.

g. Lift holding fixture (7) and slide elevation shaft assembly (45) away from azimuth yoke (11).

h. Remove two set screws (49) from knob (48). Unscrew knob (48) from elevation shaft assembly (45).

i. Unscrew elevation locking nut (47) from elevation shaft assembly (45) by hand.

j. Remove spherical washer assembly (46) from elevation shaft assembly (45).

k. Unscrew elevation shaft assembly (45) from holding fixture (7).

I. Remove four ball plungers (24) from azimuth yoke (1 1).

3-130. BSAHF Azimuth Yoke Installation. a. Apply lubricant (item 10, appendix F) to threads of elevation shaft assembly (45) and screw into holding fixture (7) by hand.

b. Place spherical washer assembly (46) on elevation shaft assembly (45) and secure with elevation locking nut (47). Apply lubricant (item 10, appendix F) to spherical washer assembly (46) and elevation locking nut (47).

c. Install knob (48) on elevation shaft assembly (45) and **secure with** two set screws (49).

CAUTION

Use **extreme care in placing holding fixture (7) on azimuth yoke (11), Rough handling may damage optical alinement.**

d. Apply lubricant (item 10, appendix F) to two straight pins (12).

e. Slide elevation shaft assembly (45) onto azimuth **yoke (11). Place holding fixture (7) on azimuth yoke (11). Aline and install two straight pins (12) and flat washers (8) as required; the same number and size of washers removed from each** side.

f. Secure two straight pins (12) with two cotter pins (13).

CAUTION

Side loading plate may be damaged and binding may occur if ball plungers are screwed in too far.

g. Install four ball plungers (24). Screw in ball plungers (24) until ball makes solid contact with side loading plate (9).

h. Tighten two no-mar set screws (52).

d. Install base assembly (19) per paragraph 3-120.

3-131. BSAHF Bearing Plate Removal. a. Remove base assembly **(21)** per paragraph **3-119.**

b. Remove **12 screws (37), leek washers, fiat washers and hex nuts** (39). Remove bearing plate (38) from **azimuth yoke** (11).

3-132. BSAHF Bearing P]ate Installation. a. Apply sealant (item 16, appendix F) to threads of twelve screws (37).

b. Install bearing plate (38) to azimuth yoke **(11)** with 12 screws (37) lock washers, flat washers, and hex nuts (39). Torque hex nuts (39) to 14 to 18 inlb.

c. Install base assembly (21) per paragraph 3-120.

3-133. BSAHF Yoke Drive Plate Removal. a. Remove holding fixture (7) from azimuth yoke (1 1) per paragraph 3-129, steps a thru h.

b. Remove hex nut (40), set screw (41), and straight pin (42) from yoke drive plate (43).

c. Remove two set screws, flat washers, and lock washers (44).

d. Remove yoke drive plate (43).

3-134. BSAHF Yoke Drive Plate Installation. ***a.*** Apply sealant (item 16, appendix F) to threads of set screw (41) and start set screw (41) in yoke drive plate (43).

b. Apply lubricant (item 10, appendix F) to straight pin (42) and install in yoke drive plate (43).

c. Position yoke drive plate (43) so yoke drive plate is centered on center post in drive azimuth nut assembly (50); slotted portion of yoke drive plate (43) mounting holes down.

d. Torque set screw (41) to 60 to 65 in-lb. Back off and retorque to 10 to 12 in-lb.

e. Lock set screw (41) with hex nut (40). Torque to 60 to 65 in-lb.

f. Spot bond hex nut (40) with adhesive (item 3, appendix F).

NOTE

Be careful not to pull yoke drive plate (43) from drive azimuth nut assembly (50).

g. Tilt yoke drive plate (43) up enough to allow azimuth yoke (1 1) to be installed in place over base assembly (21) and pull yoke drive plate (43) through opening in azimuth yoke (1 1).

h. Adjust drive azimuth nut assembly (50) in base assembly (21) to aline mounting pins on azimuth yoke (1 1) with slots in yoke drive plate (43).

i. Apply sealant (item 16, appendix F) to threads of two set screws (44).

j. Install two set screws, flat washers and lock washers **(44).** Torque screws to 24 to 28 in-lb.

k. Replace holding fixture (7) in azimuth yoke **(11)** per paragraph 3-130.

3-135. BSAHF **Side Mounted Microscope Stage Assembly P/N 13143730 Removal.**

CAUTION

Use **extreme card when removing microscope stage assembly (54). Rough handling may damage optics.**

NOTE

This microscope stage assembly (54) is used with holding fixture serial numbers 2001 10 2005.

a. Loosen three captive screws, lock washers, and flat washers **(56).**

b. Remove microscope assembly (54) from holding fixture (7).

3-136. BSAHF **Side Mounted Microscope Stage Assembly P/N 13143730 Installation.**

CAUTION

Use extreme care when installing microscope stage assembly (54). **Rough handling may damage optics.**

NOTE

This microscope stage assembly (54) is used with holding fixture serial numbers 2001 to 2005,

a. Install microscope stage assembly (54) on holding fixture (7) with three captive screws, lock washers, and flat washers (56).

b. Torque screws to 14 to 18 in-lb.

3-136.1. BSAHF Base Mounted Microscope Stage Assembly P/N 13162691 Removal.

CAUTION

Use extreme care when handling microscope stage assembly (64). Rough handling may damage optics.

NOTE

This microscope stage assembly (64) is used with holding fixture serial numbers 2006 and up,

a. Loosen four captive screws (63).

b. Remove microscope stage assembly (64) from holding fixture (7).

3-136.2. BSAHF Base Mounted Microscope Stage Assembly P/N 13162691 Installation.

CAUTION

Use extreme care when handling microscope stage assembly (64). Rough handling may damage optics.

NOTE

This microscope stage assembly (64) is used with holding fixture serial numbers 2006 and up.

a. Install microscope stage (64) on holding fixture (7) using guide **pins (65).**

b. Tighten four captive screws (63).

3-137. BSAHF Microscope Eyepiece Assembly Removal. BSAHF microscope eyepiece assembly (59) may be removed by referring to figure 3-21 for parts location. The procedure is the same for either microscope stage assembly.

3-138. BSAHF Microscope Eyepiece Assembly Installation. BSAHF microscope eyepiece assembly (59) may be installed by referring to figure 3-2 I for parts location. The procedure is the same for either microscope stage assembly.

3-139. BSAHF Reference Mirror Removal,

NOTE

For holding fixture, serial numbers 2006 and up, the reference mirror (57) is stowed in the case compartment. For holding fixture serial numbers 2001 through 2005 the reference mirror is stowed on the holding fixture.

a. Install protective cap (62.1) on reference mirror (57).

b. Loosen three captive screws (58) and remove reference mirror (57) from holding fixture (5).

3-140. BSAHF Reference Mirror Installation.

NOTE

For holding fixture. serial numbers 2006 and up, the reference mirror (57) is stowed in the case compartment, For holding fixture serial numbers 2001 through 2005 the reference mirror is stowed on the holding fixture.

a. Position reference mirror (57) on holding fixture (5) and tighten three captive screws (58).

b. Torque three captive screws (58) to 14 to 18 in-lb.

3-141. BSAHF Autocollimation Eyepiece Assembly Removal.

CAUTION

Use extreme care when handling autocollimation eyepiece assembly (60). Rough handling may damage optics or lamp.

a. Unplug autocollimation eyepiece assembly (60) from 115-120 VAC outlet.

b. Slide autocollimation eyepiece assembly (60) out of focusing tube (53).

3-142. BSAHF Autocollimation Eyepiece Assembly Installation.

CAUTION

Use extreme care when handling autocollimation eyepiece assembly (60). Rough handling may damage optics of lamp.

a. Remove microscope eyepiece assembly (59) from focusing tube (53),

b. Slide autocollimation eyepiece assembly (60) into focusing tube (53),

c. Plug cord of autocollimation eyepiece assembly (60) into electrical outlet.

3-143. BSAHF Autocollimation Eyepiece Assembly Repair. *a.* Pull lamp holder (62) from base of autocollimation eyepiece assembly (60).

b. Remove lamp (61) from lamp holder (62) and replace with serviceable lamp.

c. Install lamp holder (62) **in base of autocollimation eyepiece assembly (60).**

Paragraph 3-143.1 has been deleted.

3-143.2. BSAHF Chamfered Foot Repair (Units 2052 and Up).

CAUTION

BSAHF is removed from case (2) and all components **are removed from component holder assemblies No. 1 and No. 2 (71, 72).**

a. Remove screw (66) and chamfered foot (67) from case **(2).**

b. Inspect preformed packing **(68).** Replace as necessary.

c. Apply sealer (item 40, appendix F) to threads of screw (66).

d. Position chamfered foot (67) on case (2) and install screw (66).

3-143.3. BSAHF Pressure Relief Valve Repair (Units 2052 and Up). a. Remove nut, washer, gasket, and pressure relief valve (1) from case (2).

b. Install pressure relief valve (I), gasket, washer, and nut into case (2).

3-143.4. BSAHF Decal Repair (Units 2052 and Up). *a.* Remove damaged decal (70) from case (2).

WARNING

Solvents and alcohol are toxic and flammable materials. Use only in a well ventilated area. Avoid prolonged or repeated breathing of vapors, or contact with the skin. Keep away from heat and open flame.

b, Clean surface with alcohol (item 4, appendix F).

c. Position and press decal (70) into place on case **(2).**

3-144. BSA Rail Assembly Maintenance. Maintenance of the BSA rail assembly consists primarily of removal and replacement of faulty subassemblies. For maintenance of the BSA rail assembly, refer to figure 3-22.

Section V. ALINEMENT PROCEDURES

3-145. General. This section provides direct support and general support level alinement procedures for the TSSTS and BSASE.

3-146. **TSSTS Alinement.** Alinement of the TSSTS consists of TC, MS, and D/NSC alinements.

3-147. TC Alinement. The **TC alinement** procedures require use of the ABOB and the TMDE listed in paragraph 3-lc. To perform TC alinement, proceed as follows:

CAUTION

The **circuit cards In the TC are electrostatic sensitive devices and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported In antistatic bags.**

Make **sure power supply (HP6284A) is off when connecting or removing test leads.**

Use nonconductive tools only when adjusting circuit cards. The use of metal tools may result in faulty readings and/or damage to circuit cards.

a. initial Alinement Configuration Set-up.

(1) Remove TC electronic assembly from carrying case per paragraph 3-14 and proceed as follows:

(a) Connect cable W8 between TC connector J1 and 24 VDC power supply,

(b) Connect ABOB P7 to TC connector TEST.

(c) Connect cable W3 between TC connector J3 and ABOB connector 1J04.

(2) Set TC POWER switch to ON. Wait 5 minutes before beginning alinement procedures.

(3) Loosen eight captive screws (31, figure 3-15) and remove top plate assembly (32).

CAUTION

Do not remain at any test number more than 5 minutes without pressing HLT and reselecting the test.

NOTE

All entries are made on the TC control panel keyboard,

b. DVM A9 card Alinement.

(1) Press HLT.

(2) Connect BNC tee adapter to ABOB DVM connector. Connect ABOB test lead to BNC tee adapter. Connect external DVM test leads to external DVM. Connect external DVM leads to ABOB test leads. Connect cable 7W3 to BNC tee adapter and power supply (HP6284A). Adjust power supply (HP6284A) to obtain a reading of -1.999 to -2.001 VDC on external DVM,

(3) Enter 94.

(4) Press RUN.

(5) Adjust R13 on A9 card for a TC display of -1,999 to -2.001 VDc.

(5.1) Reverse leads on power supply (HP6284A). Adjust power supply (HP6284A) to obtain a reading of 1.999 to 2.001 VDC on external DVM.

(6) Adjust R17 on A9 card for a TC display of 1.999 to 2.001 VDc.

(7) Repeat steps (1) thru (6) until no adjustments are required for R13 and R17.

(8) Replace A9 if card will not aline properly.

(9) Disconnect test leads and 7W3 cable. If circuit card will aline and is not replaced, stake adjusted potentiometers using adhesive (item 24, appendix F).

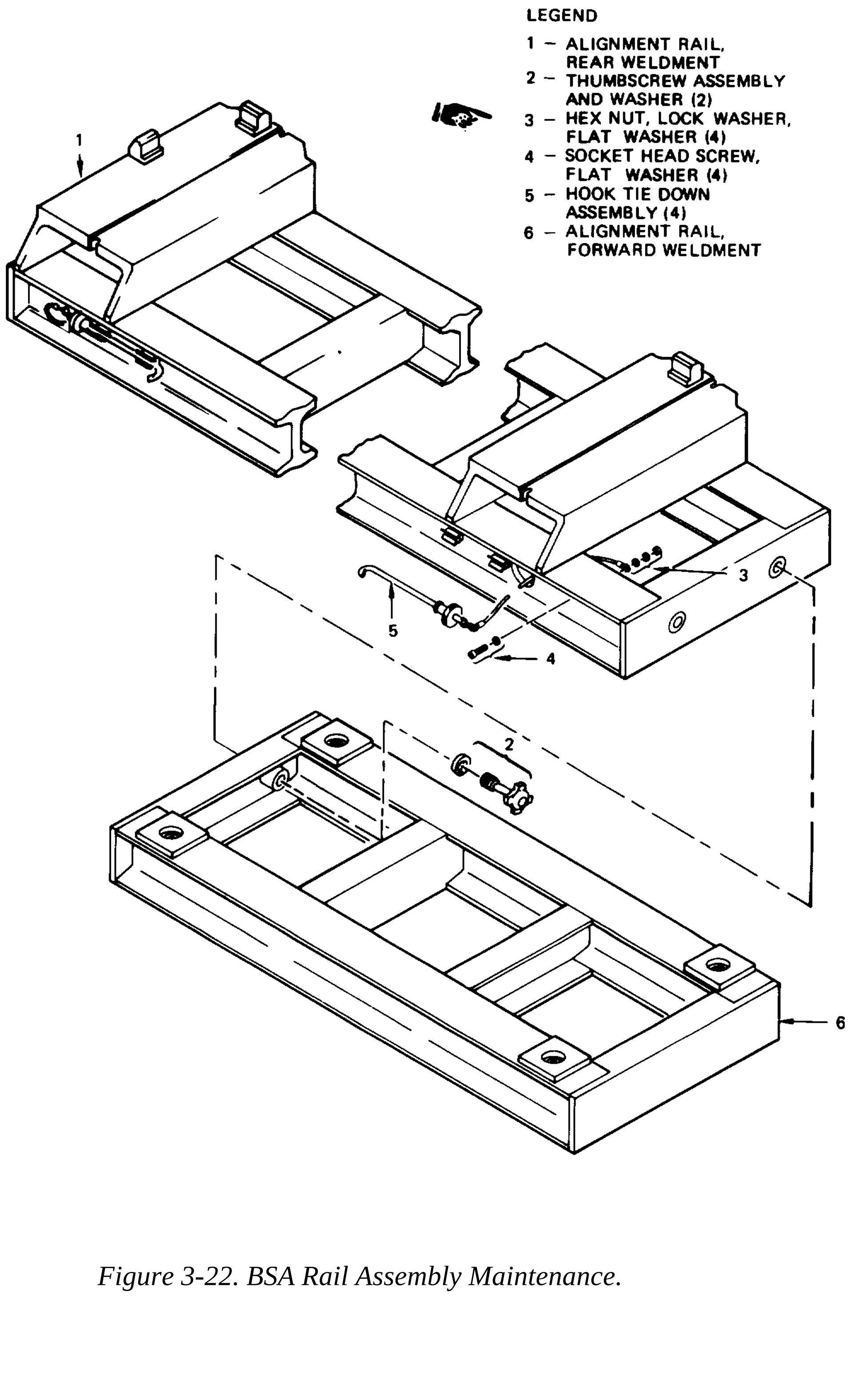


Figure 3-22. BSA Rail Assembly Maintenance.

c. *Attenuator Frequency Compensation.*

(1) Press HLT.

(1.1) Set oscilloscope to the following settings:

(a) Turn CH 1 VOLTS/DIV switch to 2.

(b) Turn MODE to CH 1,

(c) Move DC/GND/AC switch to GND, Zero the trace and return switch to DC.

(d) Press SOURCE CH1 switch.

(e) Press AUTO switch.

(f) Turn SECONDS/DIV switch to 5m.

(g) Turn CAL knob CW to detent.

(h) Connect a BNC cable from CH 1 input to OUTPUT of function generator,

(1.2: Set function generator to the following settings:

(a) Press FUNCTION to square wave,

(b) Set MULTIPLIER to 10,

(c) Turn VAR fully CW,

(d) Press VAR SYM button to in position.

(e) Set FREQUENCY Hz control to 10.

(f) Press FREE RUN key.

(g) Press O dB key.

(h) Set output AMPL to 1.9 to 2.1 V peak-to-peak on oscilloscope.

(i) Disconnect BNC cable from oscilloscope and connect to CH A input on frequency counter.

(1,3) Set frequency counter to the following settings:

(a) Set FUNCTION switch to FREQUENCY A.

(b) Set AVGS/TIMING switch to 10^7.

(c) Set SLOPE to +.

(d) Set ATTEN switch to xl.

(e) Set COUPL switch to DC.

(f) Set SOURCE switch to EXT.

(g) Turn LEVEL control to center position.

(h) Turn DISPLAY TIME control fully CCW or until gate pulse comes on,

(i) Adjust frequency knob on function generator for a reading of 0.100 on frequency counter,

(j) Remove function generator output cable from CH A input and connect to BNC tee adapter on ABOB.

(1.4) Connect a BNC cable from BNC tee adapter on ABOB to CH 1 input on oscilloscope.

(2) Adjust function generator AMPL switch to 9.5 to 10.5 V peak-to-peak on oscilloscope,

(3) Enter 80.

(4) Press RUN.

(5) Measure waveform with oscilloscope at TP2 (HI) and TPl (LO) on A9 card, and adjust Cl on A9 card for the least amount of overshoot possible.

(6) Replace A9 if card will not aline properly.

(7) Disconnect test leads and BNC cables. If circuit card will aline and is not replaced, stake potentiometers using adhesive (item 24, appendix F).

d. RMS ConverterAlinement.

(1) Press HLT.

(2) Adjust the following equipment to:

(a) Connect cable 7W3 from function generator OUTPUT to external DVM. Turn RANGE/FUNCTION switch to 20 V.

(b) Set external DVM to AC VOLTS TRUE RMS.

NOTE

Ensure that OFFSET control is pushed in to the O VDC position and set to the MIN (counterclockwise) position.

(c) Press FUNCTION to sine wave on frequency generator. Press 0 dB key. Adjust amplitude for 1,999 to 2.001 VRMS on external DVM.

(d) Remove 7W3 cable from function generator OUTPUT and connect to BNC tee adapter on DVM connector on ABOB.

(e) Connect a BNC cable from function generator OUTPUT to frequency counter CH A input.

(f) Set MULTIPLIER to 10^2 on function generator.

(g) Set ATTEN switch to x5 on frequency counter.

(h) Set COUPL switch to AC on frequency counter.

(i) Adjust DISPLAY TIME and LEVEL until a display reading appears on frequency counter.

(j) Adjust frequency knob on function generator for a reading of 0.380 to 0.420 on frequency counter.

(k) Remove function generator output from CH A input and connect it to BNC tee adapter on ABOB.

(3) Enter 82.

(4) Press RUN.

NOTE

If the TC display is not in the 2 VAC range, lower function generator output to less than 1,9 VRMS then gradually increase output to 2.000 VRMS.

(5) Adjust R6 on A9 card for a display reading of 1.995 to 2.005 VAC on TC.

(5.1) Adjust the following equipment to:

(a) Press -40 dB key on function generator.

(b) Set RANGE/FUNCTION switch to 2 V on external DVM.

NOTE

Ensure that OFFSET control is pushed in to the O VDC position and set to the MIN (counterclockwise) position.

(c) Adjust amplitude for 0.0195 to 0.0205 VRMS on external DVM.

(6) Adjust R8 on A9 card for a display reading of 0.019 to 0.021 VAC on TC display.

(7) Repeat steps (1) thru (6) until no adjustments are required for R6 and R8.

(7.1) Adjust the following equipment to:

(a) Press O dB key on function generator.

(b) Set RANGE/FUNCTION switch to 20 V on external DVM.

NOTE

Ensure that OFFSET control is pushed in to the O VDC position and set to the MIN (counterclockwise) position,

(c) Adjust amplitude for 6.999 to 7.001 VRMS on external DVM.

(d) Set MULTIPLIER to 10^3 on frequency generator.

(e) Connect a BNC cable from function generator OUTPUT to CH A on the frequency counter.

(f) Adjust frequency on function generator for a reading of 3,95 to 4.05 on frequency counter,

(g) Remove function generator output from CH A input and connect to the BNC tee adapter on ABOB.

(8) Adjust C2 on A9 card to set the display to 6.99 to 7.01 VAC.

(9) Replace A9 if card will not aline properly, If circuit card will aline and is not replaced, stake adjusted potentiometers using adhesive (item 24, appendix F),

e. Stimuli Offset

(1) Press HLT,

(2) Enter 92,:, 01.

(3) Press STP,

(3.1) Set external DVM to DC VOLTS.

(4) Measure voltage between A1O TP2 (HI) and TP4 (LO) with external DVM and adjust R4 for a meter indication of 0,001 to -0,001 VDC.

(5) Measure voltage between A1O TP3 (HI) and TP4 (LO) with external DVM and adjust R11 for 0,001 to -0.001 VDC,

(6) On ABOB, set TC SIGNALS switch to ANALOG STIMULI, Measure between OUTPUT and COM test points for a voltage between -0.005 and + 0.005 VDC.

(7) Replace A10 card if card will not aline properly. If circuit card will aline and is not replaced, stake adjusted potentiometers using adhesive (item 24, appendix F).

f. DC Stimuli Gain.

(1) Press HLT.

(2) Enter 92, :, 01.

(3) Press STP.

(4) Measure voltages across OUTPUT and COM test points on ABOB as shown in table 3-6.

(5) Replace A10 card if proper voltage is not obtained.

g. AC Stimuli Gain and Frequency.

(1) Press HLT.

(2) Enter 93, :, 01.

(3) Press STP.

NOTE

Use the X10 probe to stabilize oscilloscope display.

(4) Measure the frequency across TP2 (HI) and TP3 (LO) test points on A11 card and adjust R3 on Al 1 for a frequency of 999 to 1001 Hz. Observe the waveform across TP2 and TP3 using an oscilloscope; if the waveform does not appear as a *sine* wave, replace A11 card.

(5) Press STP. The TC display should read TEST 93 : 02 IN PROGRESS. Set R6 on the A11 card to full counterclockwise position.

(6) On the A11 card measure the AC voltage across TP2 and TP3. Adjust R9 of the A11 card to set the voltage to 6.99 to 7.01 VRMS. If R9 will not reduce to the proper value, set R9 to lowest output and adjust R6 to set output to 6.99 to 7.01 VRMS.

(7) Repeat steps (1) thru (4). If adjustment is necessary also repeat steps (5) and (6).

(8) Replace A11 if card will not aline properly. If circuit card will aline and is not replaced, stake adjusted potentiometers using adhesive (item 24, appendix F).

h. AC Stimuli Frequency Response.

(1) Press HLT.

(2) Enter 93, :, 01.

(3) Press STP.

(4) Measure the frequencies across TP2 and TP3 of Al 1 card as shown in table 3-7.

(5) Replace All card if proper frequencies are not obtained.

i. Current Source.

(1) On ABOB, set TC SIGNALS switch to Is.

(2) Measure the DC voltage across the OUTPUT and COM test points and adjust R26 on the A10 card for 0.999 to 1.001 VDC.

(3) Replace A10 if card will not aline properly. If circuit card will aline and is not replaced, stake adjusted potentiometers using adhesive (item 24, appendix F).

j. Voltage Reference.

(1) On the A13 card, measure the DC voltage across TP1 (HI) and TP2 (LO) and adjust R31 on the A13 card for 7.5 to 8.5 VDC.

(2) Replace A13 if card will not aline properly. If circuit card will aline and is not replaced, stake adjusted potentiometers using adhesive (item 24, appendix F).

k. TC Alinement Completed. After the TC alinement procedures are finished, proceed as follows:

Table 3-6. DC Stimuli Gain

*Step**	*Voltage*
01	-0.0050 VDC to +0.0050 VDC
02	+10.055 VDC to -9.945 VDC
03	+3.315 VDC to +3.358 VDC
04	-0.3389 VDC to -0.3255 VDC
05	+0.3255 VDC to +0.3389 VDC
06	-3.358 VDC to -3.315 VDC
07	+9.945 VDC to +10.055 VDC

*To advance to steps 02 to 07, press STP key once for each step.

Table 3-7. AC Stimuli Frequency Response Settings

Step*	Frequency
01	999 Hz to 1001 Hz
02	475 Hz to 525 Hz
03	190 Hz to 210 Hz
04	95 Hz to 105 Hz
05	47 Hz to 53 Hz
06	17 Hz to 23 Hz

*To advance to steps 02 to 06, press STP key once for each step.

(1) Set TC POWER switch to OFF.

(2) Disconnect all cables.

(3) Replace TC electronic assembly in carrying case per paragraph 3-15.

3-147.1 MS Alinement (PN 13314305, PN 13163005). For alinement of MS PN 13314305 and PN 13163005, refer to TM 9-4935 -474-14-2

3-148. MS Alinement (PN 13143604). The MS alinement procedures require use of the TC, cable W5, and the test controller auxiliary power cable. A continuity check is performed on the case modification/umbilical harness assembly prior to performing MS alinement during the TSSTS 180 day test. If card will not aline properly, replace A1 card and rerun test 98. If symptom is still present, replace A2 card. If circuit card will aline and is not replaced, stake adjusted potentiometers using adhesive (item 24, appendix F). To perform MS alinement, proceed as follows:

CAUTION

Circuit card A1 is electrostatic sensitive and subject to damage by discharge of static electricity. Wear a wrist ground strap when handling card and handle by edges only. Circuit cards must be transported in an antistatic bag.

Use nonconductive tools only when adjusting circuit cards. The use of metal tools may result in faulty readings and/ or damage to circuit cards.

a. MS Continuity Check Procedure. Refer to figure 3-16 for component location.

(1) Remove MS electronics assembly per paragraph 3-48. Remove electrical cover (17.1) from umbilica1 connector J2 (17.2).

CAUTION

Ensure that insert of umbilical connector is held down evenly to avoid pin damage.

(2) Depress insert in umbilical connector J2 (17.2). Inspect insert and umbilical connector J2 (17.2). If damaged, replace missile case per paragraph 3-49.1.

(3) Loosen screw (28) and remove fixed forward coupling (29). Remove case extension ring (30).

CAUTION

Be careful when removing protective cover not to damage wires attached to protective cover.

(4) Lift protective cover (35) to gain access to nut (31). Remove nut (31), flat washer (32), cable clamp (33), and grounding wire (34) from protective cover (35). Remove protective cover (35). Inspect preformed packing (36). Replace as necessary.

CAUTION

Ensure that insert of umbilical connector is held down evenly to avoid pin damage. Insert must be held down completely to obtain proper readings.

(5) Depress insert of umbilical connector J2 (17.2) and perform continuity check of missile simulator case modification/umbilical harness assembly at plug P2 and umbilical connector J2. See figure H-30.1 for point-to point wire list. Repair harness assembly as needed. See TM 55-1500-323-25.

(6) Position grounding wire (34) and cable clamp (33) on screw (42) on protective cover (35).

(7) Install flat washer (32) and nut (31) on screw (42).

(8) Install preformed packing (36) and protective cover (35).

(9) Line up slot in case extension ring (30) with slot (44) in missile case (40). Install case extension ring (30) on missile case (40).

(10) Position fixed forward coupling (29) on case extension ring (30) with tab (45) in slot (43).

(11) Apply sealant (item 16, appendix F) to threads of screw (28).

(12) Tighten screw (28) to secure fixed forward coupling (29) on missile case (40). Torque screw (28) to 32 to 34 in-lbs.

(13) Partially install MS electronics assembly in missile case per paragraph 3-49, a and b. Install electrical cover (17.1) on umbilical connector J2 (17.2).

a.1 Initial Alinement Configuration.

(1) Connect cable W5 between MS J1 and TC J5. Connect TC auxiliary power cable between TC and 24 VDC power supply.

(2) Set TC POWER switch to ON. Wait 5 minutest before beginning alinement procedures.

CAUTION

Do not remain at any test number more than 5 minutes without pressing HLT and reselecting the test.

NOTE

All alinement adjustments for MS are located on the leading edge of the A1 (Timing and Demodulator) card. All test entries are made on the TC keyboard.

b. Pitch VCO.

(1) Press HLT.

(2) Enter 98, :, 07.

(3) Press STP.

NOTE

If A1 R16 will not adjust to 557 to 563 Hz, set R16 as close as possible to 560 Hz and adjust A1 R17 for a TC display of 557 to 563 Hz.

(4) Adjust A1 R16 for TC display of 557 to 563 Hz. Repeat steps (1) thru (4) until these requirements are met.

c. Pitch Self Balance.

(1) Press STP.

(2) Adjust Al R24 for TC display of -0.70 to 0.70 VDC.

(3) Press STP.

(4) Adjust Al R34 for TC display of 4.16 to 5.16 VDC.

d. Yaw VCO.

(1) Press HLT.

(2) Enter 98, :, 11.

(3) Press STP.

NOTE

If Al R14 will not adjust to 867 to 873 Hz, set R14 as close as possible to 870 Hz and adjust A1 R15 for a TC display of 867 to 873 Hz.

(4) Adjust Al R14 for TC display of 867 to 873 Hz. Repeat steps (1) thru (4) until these requirements are met.

e. Yaw Self Balance.

(1) Press STP.

(2) Adjust Al R25 for TC display of -0.70 to 0.70 VDC.

(3) Press STP.

(4) Adjust Al R35 for TC display of 4.16 to 5.16 VDC.

f. MS Alignment Complete. After the MS alignment procedures are finished, proceed as follows:

(1) Set TC POWER switch to OFF.

(2) Disconnect the MS from the TC.

(3) Replace MS electronic assembly in MS tube per paragraph 3-49.

3-148.1 D/NSC Alignment (PN 13314306, PN 13163006). For alignment of D/NSC PN 13314306 and PN 13163006, refer to TM 9-4935-474-14-2.

3-149. D/NSC Alignment (PN 13143603). The D/NSC alignment procedures require the use of the TC, cable W4, the test controller auxiliary power cable, an IR miniviewer and external DVM. To perform D/NSC alignment, proceed as follows:

CAUTION

The circuit cards in the D/NSC are electrostatic discharge sensitive devices and are subject to damage by discharge of static electricity. Wear a wrist ground strap when handling cards and handle them by edges only. Circuit cards must be transported in antistatic bags.

Use nonconductive tools only when adjusting circuit cards, The use of metal tools may result In faulty readings and/or damage to circuit cards.

a. Initial Alignment Configuration,

(1) Remove D/NSC from case per paragraph 3-62.

(2) Remove optical assembly cover per paragraph 3-66.

(3) Install optical assembly to tilt stage without optical assembly cover installed per paragraph 3-65.

(4) Connect the following cables:

(a) Connect cable W4 between D/NSC J1 and TC J4.

(b) Connect TC auxiliary power cable between TC and 24 VDC power supply.

(5) Set TC POWER switch to ON. Wait 5 minutes before beginning alignment procedures.

CAUTION

Do not remain at any test number more than 5 minutes without pressing HLT and reselecting the test.

NOTE

If wrong target(s) appear during alignment of DSC (paragraphs 3-149b thru h), run D/NSC test 97 per figure 3-11.

All alignment adjustments for D/NSC are located on the leading edge of the A2 (IR/LED monitor) and A3 (BIT monitor) cards. If card(s) will not align properly, replace card(s) and repeat D/NSC Alignment.

All test entries are made on the TC keyboard.

b. Center Target WF Gain.

(1) Press HLT.

(2) Enter 97, :, 2.

(3) Press STP.

(4) Attach probes of DVM to A2 TP14 (HI) and A2 TP1 (LO).

(5) Adjust A2 R3 to obtain DVM reading that equals voltage indicated on IR/LED voltage tag ±0.002 VDC.

(6) With IR miniviewer verify that correct target (figure 3-12) is lit and all others are not.

c. Center Target NF Gain.

(1) Press HLT.

(2) Enter 97, :, 3.

(3) Press STP.

(4) Attach probes of DVM to A2 TP14 (HI) and A2 TP2 (LO).

(5) Adjust A2 R1 to obtain DVM reading that equals voltage indicated on IR/LED voltage tag ±0.002 VDC.

(6) With IR miniviewer verify that correct target (figure 3-12) is lit and all others are not.

d. Offset No. 1 WF Gain.

(1) Press HLT.

(2) Enter 97, :, 4.

(3) Press STP.

(4) Attach probes of DVM to A2 TP14 (HI) and A2 TP4 (LO).

(5) Adjust A2 R15 to obtain DVM reading that equals voltage indicated on IR/LED voltage tag ±0.002 VDC.

(6) With IR miniviewer verify that correct target (figure 3-12) is lit and all others are not.

e. Offset No. 1 NF Gain.

(1) Press HLT.

(2) Enter 97, :, 5.

(3) Press STP.

(4) Attach probes of DVM to A2 TP14 (HI) and A2 TP5 (LO).

(5) Adjust A2 R13 to obtain DVM reading that equals voltage indicated on IR/LED voltage tag ±0.002 VDC.

(6) With IR miniviewer verify that correct target (figure 3-12) is lit and all others are not.

f. Offset No. 2 WF Gain.

(1) Press HLT.

(2) Enter 97, :, 6.

(3) Press STP.

(4) Attach probes of DVM to A2 TP14 (HI) and A2 TP8 (LO).

(5) Adjust A2 R27 to obtain DVM reading that equals voltage indicated on IR/LED voltage tag ±0.002 VDC.

(6) With IR miniviewer verify that correct target (figure 3-12) is lit and all others are not.

g. Offset No. 2 NF Gain.

(1) Press HLT.

(2) Enter 97, :, 7.

(3) Press STP.

(4) Attach probes of DVM to A2 TP14 (HI) and A2 TP9 (LO).

(5) Adjust A2 R25 to obtain DVM reading that equals voltage indicated on IR/LED voltage tag ±0.002 VDC.

(6) With IR miniviewer verify that correct target (figure 3-12) is lit and all others are not.

h. Thermal Target Heater.

(1) Attach probes of DVM to A3 TP13 (HI) and A3 TP17 (LO).

(2) Adjust A3 R30 to obtain DVM reading that equals voltage indicated on night sight collimator tag ±0.001 VDC.

i. D/NSC Alignment Completed. After the D/NSC alignment procedures are finished, proceed as follows:

(1) Set TC power switch to OFF.

(2) Stake adjusted potentiometers using adhesive (item 24, appendix F).

(3) Disconnect D/NSC from the TC.

(4) Replace D/NSC optical assembly cover per paragraph 3-67.

3-150. BSA Controller Alignment. There are no alignment procedures required for the BSAC.

Section VI. 180 DAY TEST PROCEDURES

3-151. General. This section provides direct support and general support level test procedures for the TSSTS. These procedures are to be followed every 180 days to ensure the TSSTS is maintained and operating properly.

3-152. TSSTS 180 Day Test. The TSSTS 180 day test procedures require use of the ABOB and the TMDE listed in paragraph 3-1c. To perform the TSSTS 180 day test, proceed as follows:

a. Visual Inspection.

(1) Remove TC from carrying case per paragraph 3-14. Inspect carrying case for missing or damaged hardware and repair as necessary.

(2) Inspect front panel for broken or missing switches, lamps, lamp covers, and identification plate. Repair as necessary.

NOTE

TC cable adapters (W13, W14) are present with TC PN 13314321 only.

(3) Inspect cables W1, W2, and W3, and cable adapters W13 and W14 for missing or damaged protective caps and attaching hardware; replace caps and hardware as necessary. Inspect cables for frayed wire, exposed cables, damaged or missing connectors, and damaged or missing connector pins; replace cable(s) as necessary.

b. TC Alignment. *Perform TC alignment per paragraph 3-147.*

c. Test 90. *Perform test 90 per paragraph 3-7b.*

d. Test 91. *Perform test 91 per paragraph* 3-7c.

e. D/NSC Service. *Service daysight and nightsight collimators per paragraphs 3-102.25 and 3-102.29.*

f. MS Alignment. *Perform MS alignment per paragraph 3-148.*

g. Test 98. *Perform test 98 per paragraph 3-7e.*

h. D/NSC Alignment. *Perform* D/NSC *alignment per paragraph 3-149.*

i. Test 97. *Perform* test *97 per paragraph* 3-7d.

j. BSAC Test. *Perform BSAC test per paragraph 2-9b.*

k. 180 Day Test Completed. After *completion of 180 day* test, *remove all cables; stow cables and test equipment in proper containers.*

1. TC DA Label. *Affix DA Label 80 (39.6, figure 3-15) to TC Front Panel Assembly (17).*

m. BSAC DA Label. *Affix DA* Label *80 (35, figure 3-20) to BSAC Front Panel (5).*

Section VII. PREPARATION FOR MOVEMENT

3-153. General. All equipment is supplied with suitable transit cases which must be used whenever the equipment is to be transported or is not in use. To prepare equipment for storage or movement, proceed as directed in paragraphs 3-154 and 3-155, as applicable.

3-154. TOW Subsystem Test Set.

a. Test Controller.

(1) Before storing, inspect the TC, associated transit case, and cables as directed in PMCS section of chapter 2.

NOTE

TC cable adapters (W13, W14) are present with TC PN 13314321 only.

(2) Place cables (W1, W2, W3, and W11) and cable adapters (W13 and W14) in top cover of TC transit case and secure the inner lid.

CAUTION

Make sure chains on protective caps do not interfere when installing top cover.

(3) Install top cover of TC transit case and secure all latches.

(4) For field storage, secure the TC in the CSS shelter.

(5) For extended storage or shipment, package the TC with desiccant bag as shown in figure 3-23.

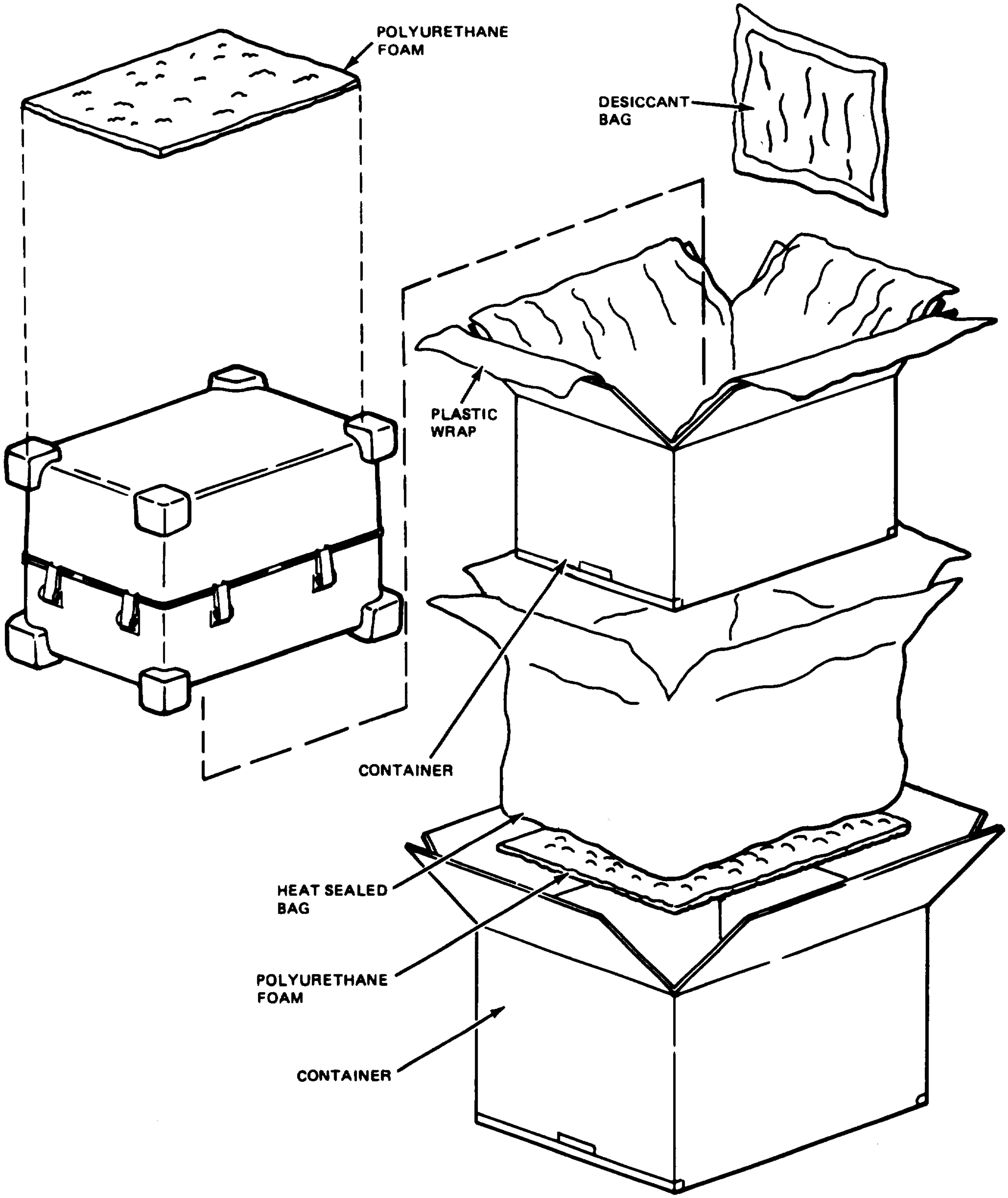


Figure 3-23. Preparation for Movement.

(6) Mark outer container with content information and handling instructions in accordance with AR 746-1.

(7) If unit is to be stored, keep in a clean and dry location.

b. Missile Simulator.

(1) Before storing, inspect the MS, its cable, and transit case as directed in PMCS section of chapter 2.

(2) Place the MS into its transit case (with handle toward open end) and place coiled MS cable (W5) in transit case cover.

(3) Close transit case and secure cover with locking strap.

WARNING

Missile simulator in transit case is heavy. Use caution when lifting missile simulator in transit case. Have helper assist.

(4) For field storage, secure the MS in the CSS shelter.

(5) For extended storage or shipment, prepare the unit in the same manner as directed for the TC.

c. Day/Night Sight Collimator.

NOTE

Tilt stage cable W12 is present in D/NSCs with tilt stage assembly PN 13314265 and optical assembly PN 13314267.

(1) Before storing, inspect the D/NSC, remote position control, D/NSC cable(s), and transit case as directed in the PMCS section of chapter 2.

(2) Place the D/NSC, tilt stage cable W12, and RPC in the D/NSC transit case, and place coiled D/NSC cable (W4) in the transit case top cover.

(3) Close the transit case and secure all latches.

(4) For field storage, secure the D/NSC in the CSS shelter.

(5) For extended storage or shipment, prepare the unit in the same manner as directed for the TC.

d. Alignment Breakout Box.

(1) Before storing, inspect the ABOB, cables, and transit case as directed in the PMCS section of chapter 2.

(2) Place the self test cable (W7), TC auxiliary power cable (W8), and test probe in the transit case top cover and secure inner lid.

(3) Install transit case top cover and secure all latches.

(4) For field storage, secure the ABOB in the NSMF shelter.

(5) For extended storage or shipment, prepare the unit in the same manner as directed for the TC.

3-155. BSA Support Equipment.

a. BSA Controller.

(1) Before storing, inspect the BSAC, cables, and transit case as directed in PMCS section of chapter 2.

(2) Place the BSA cable (W9) and power cable (W10) in the transit case top cover and secure the inner lid.

(3) Install transit case top cover and secure all latches.

(4) For field storage, secure the BSAC in the NSMF shelter.

(5) For extended storage or shipment, prepare the unit in the same manner as directed for the TC.

b. BSA Holding Fixture.

(1) Before storing, inspect the BSAHF and transit case as directed in the PMCS section of chapter 2. If required, clean optical surfaces as directed in paragraph 3-10.

(2) Using handles on base assembly, remove BSAHF from rail assembly and carefully install in transit case (two men required).

(3) Be sure autocollimator and eyepiece assembly are stored in metal box in transit case.

(4) Install transit case top cover and secure all latches.

(5) For field storage, secure the BSAHF in the NSMF shelter.

(6) For extended storage or shipment, prepare the unit in the same manner as directed for the TC.

c. Rail Assembly.

(1) Inspect the rail assembly to be sure it is clean and free of obvious physical damage and loose or missing hardware.

(2) For field storage, the rail assembly may remain in place, attached to the NSMF bench. If possible, cover with a protective padding, cloth, or plastic sheet.

(3) For extended storage or shipment, remove the rail assembly from the NSMF bench, disassemble into two main pieces, and package with hardware in a suitable protective container. Then prepare the unit in the same manner as directed for the TC.

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APPENDIX A

REFERENCES

A-1. PUBLICATION INDEX. The following publication index should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to materiel covered in this manual.

Consolidated Index of Army Publications and Blank Forms . . . . DA PAM 25-30

A-2. ARMY REGULATIONS

Disposal of Supplies and Equipment . . . . AR 755-5

Accident Reporting and Records . . . . AR 385-40

Dictionary of United States Army Terms. . . . . AR 320-5

Safeguarding Defense Information . . . . AR 380-5

Army Safety Program . . . . AR 385-10

Authorized Abbreviations and Brevity Codes . . . . AR 320-50

Packaging of Army Material for Shipment or Storage . . . . . . AR 746-1

A-3. FORMS. In addition to the forms required by The Army Maintenance Management System (DA PAM 738-750), the following forms pertain to this materiel:

Recommended Changes to DA Technical Manuals, Parts Lists, or Supply Manuals 7, 8, or 9.	DA Form 2028
Transportation Discrepancy Report.	SF 361
Request for Issue or Turn-in	DA Form 1546
Requisition for Initial Distribution of Publications and Blank Forms	DA Form 12–32
Requisition for Publications and Blank Forms.	DA Form 17
Equipment Inspection and Maintenance Worksheet	DA Form 2404
Quality Deficiency Report.	SF 368

A-4. SHIPMENT AND STORAGE PUBLICATIONS

The Army Maintenance Management System	DA PAM 738-750
Requisitioning, Receipt, and Issue System	AR 725-50
Storage and Materiels Handling	TM 743-200-1
Painting and Protective Coatings	TM 5-618
Operating and Maintenance of Army Materiel in Extreme Cold Weather (O Degrees to -65 Degrees F)	TM 9-207

A-5. FIELD MANUALS

First Aid for Soldiers. FM 21-11

A-6. TECHNICAL MANUALS .

Operator, Organizational, Direct Support and General Support Maintenance Manual Including Repair Parts for:

Power Module, Tektronix, Model 503. . . . . TM 9-6625-474-14 and P-1
Function Generator, Tektronix, Model FG501A . . . . TM 9-6625-474-14 and P-2
Universal Counter/Timer, Tektronix, Model DC503A . . . . TM 9-6625-474-14 and P-3
Digital Multimeter, Tektronix, Model DM501A . . . . TM 9-6625-474-14 and P-5
oscilloscope, Tektronix, Model SC502 . . . . TM 9-6625-474-14 and P-4

Organizational, DS, GS, and Depot Maintenance Manual Installation Practices for Aircraft Electric and Electronic Wiring. . . . . TM 55-1500-323-25

Operators Manual for Fighting Vehicle Infantry, M2 (2350-01-084-5920) and Fighting Vehicle, Cavalry, M3 (2350-01-094-2695) Turret . . . . TM 9-2350-252-10-2

Direct Support and General Support Maintenance Manual for Integrated Sight Unit (1240-01-096-5151) . . . . TM 9-1425-474-34

Operator, Unit, Direct Support and General Support Maintenance Manual for TOW 2 Subsystem Test Set PN 13314301 OR PN 13163001, Basic Sight Assembly Support Equipment PN 13163003, Alignment Breakout Box PN 13163002 . . . . TM 9-4935-474-14-2

Organizational, Direct Support and
General Support Maintenance
Repair Parts and Special Tools List
(including Depot Maintenance Repair Parts and
Special Tools) for
TOW Subsystem Test Set 4935-01-108-0442
Basic Sight Assembly Support Equipment 4935-01-108-2968
Alignment Breakout Box 4935-01-107-7619
Alignment Test Set 4935-01-143-3186 . . . . TM 9-4935-474-24P-1

APPENDIX B

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

B-1. SCOPE. This appendix lists components of end items and basic issue items for the BFV TOW Subsystem Support Equipment to help you inventory items required for safe and efficient operation.

B-2. GENERAL. The Components of End Items and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts.

b. Basic Issue Items. There are no Basic Issue Items for the FVS TOW Subsystem Support Equipment.

B-3. EXPLANATION OF COLUMNS. The following provides an explanation of columns found in the tabular listings:

a. Column 1 - National Stock Number. Indicates the national stock number assigned to the item, and will be used for requisitioning purposes.

b. Column 2 - Description. Indicates the National item name and, if required, a minimum description to identify and locate the item.

c. Column 3 - Quantity Required (Qty Reqd). Indicates the quantity of each item required for a complete major item.

d. Column 4 - Quantity. This column is left blank for use during an inventory. Under the Rcv'd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item at a later date; such as for shipment to another site.

Section II. COMPONENTS OF END ITEM

National Stock Number	Description	Qty. Req'd.	Quantity. Rcv'd	Date	Date	Date
	TOW Subsystem Test Set, 13314320, consisting of:	**l each**				
4935-01-364-4247	Test Controller, 13314321, consisting of:	1 each				
	Electronic Assembly 13154995	leach				
	Carrying Case 13314314	1 each				
6150-01-107-7836	Power Cable (W1) 13143571 or 13280636	1 each				
6150-01-107-7625	Turret Cable (W2) 13143572 or 13280637	1 each				
6150-01-107-7963	CGE/ISU Cable (W3) 13143573 or 13280638	1 each				
6150-01-190-3952	Special Purpose Cable (W11) 13162870 (Units 2172 and up) 20209-01 (Units 2171 and lower)	1 each				
	Cable Adapters (W13, W14) 13314312-1, 13314312-2	1 each				
4935-01-359-4461	Day/Night Sight Collimator, 13314306 consisting of:	1 each				
6650-01-350-2453	Collimator Optics Assembly 13314267	1 each				

Section II. COMPONENTS OF END ITEM - Continued

National Stock Number	Description	Qty. Req'd.	Quantity Rcv'd	Date	Date	Date
4935-01-289-7254	Tilt Stage Assembly 13314265	1 each				
  4935-01-177-4181 4935-01-107-7616	Remote Position Control 13163149 or 13143645	1 each				
 6150-01-297-4756 6150-01-107-7841 6150-01-167-1349	D/NSC Cable (W4) 13314284 or 13143574 or 13163022 or 13280639	1 each				
6150-01-285-3727	D/NSC Cable (W12) 13162747 or 13314317	1 each				
	Transit Case 13314272	1 each				
	OR					
4935-01-169-7090	Day/Night Sight Collimator, 13163006, consisting of:	1 each				
6650-01-350-2452	Collimator Optics Assembly 13163050	1 each				
4935-01-167-1330	Tilt Stage Assembly 13163040	1 each				
  4935-01-177-4181 4935-01-107-7616	Remote Position Control 13163149 or 13143645	1 each				
 6150-01-167-1349 6150-01-297-4756 6150-01-107-7841	D/NSC Cable (W4) 13163022 or 13314284 or 13143574 or 13280639	1 each				
4935-01-169-7155	Transit Case 13163136	1 each				

Section II. COMPONENTS OF END ITEM - Continued

National Stock Number	Description	Qty. Req'd.	Quantity Rcv'd	Date	Date	Date
	OR					
4935-01-108-2974	Day/Night Sight Collimator, 13143603, consisting of:	1 each				
	Collimator Optics Assembly 13143650-9	1 each				
4935-01-107-7614	Tilt Stage Assembly 13143640	1 each				
4935-01-107-7616 4935-01-177-4181	Remote Position Control 13143645 or 13163149	1 each				
6150-01-107-7841 6150-01-297-4756 6150-01-167-1349 6150-01-271-7309	D/NSC Cable (W4) 13143574 or 13314284 or 13163022 or 13280639	1 each				
4935-01-124-8046	Transit Case 13143608	1 each				
4935-01-359-2970	Missile Simulator, 13314305, consisting of:	1 each				
	Missile Simulator Case Assembly 13314310	1 each				
5995-01-321-3360 5995-01-167-1350	MS Cable (W5) 13314285 or 13163013	1 each				
	Transit Case 13314309 or 13314316	1 each				
	OR					
4935-01-169-7091	Missile Simulator, 13163005, consisting of:	1 each				

Section II. COMPONENTS OF END ITEM - Continued

National Stock Number	Description	Qty. Req'd	Quantity			
			Rcv'd	Date	Date	Date
	Missile Simulator Case Assembly 13163011	1 each				
5995-01-167-1350 5995-01-321-3360	MS Cable (W5) 13163013 or 13314285	1 each				
	Transit Case 13163138	1 each				
	OR					
4935-01-107-7618	Missile Simulator, 13143604, consisting of:	1 each				
	Missile Simulator Case Assembly 13143672	1 each				
6150-01-113-8118 6150-01-273-2601	MS Cable (W5) 13143575 or 13280640	1 each				
	Transit Case 13143605	1 each				
4935-01-108-2968	**BSA Support Equipment, 13143606, consisting of:**	**1 each**				
1240-01-172-4521	BSA Controller, 13163007, including:	1 each				
	Electronic Panel Assembly 13163009	1 each				
6130-01-167-1341	Power Supply 13163108	1 each				
4935-01-110-2129	BSA Cable (W9) 13143579	1 each				
4935-01-124-6321	Power Cable (W10) 13143580	1 each				

Section II. COMPONENTS OF END ITEM - Continued

National Stock Number	Description	Qty. Req'd.	Quantity Rcv'd	Date	Date	Date
6150-01-167-1336	Cable Assembly (W11) 13163120	1 each				
5895-01-167-1333	Case 13163132	1 each				
	OR					
6130-01-133-0566	BSA Controller, 13154980, consisting of:	1 each				
	Electronic Assembly 13154981, including:	1 each				
6130-01-133-0847	Power Supply 13154988	1 each				
6130-01-133-0848	Power Supply 13154989	1 each				
4935-01-110-2129	BSA Cable (W9) 13143579	1 each				
4935-01-124-6321	Power Cable (W10) 13143580	1 each				
4935-01-132–7598	Case 13154979	1 each				
	BSA Holding Fixture Assembly, 13163166, including:	1 each				
6650-01-110-2124	Focusing Eyepiece Assembly 13143734	1 each				
	Eyepiece Assembly 12333959	1 each				
4935-01-123-6756	Autocollimation Eyepiece Assembly 13143748	1 each				
4935-01-170-0852	Microscope Stage Assembly 13162691 or 13143730	1 each				

Section II. COMPONENTS OF END ITEM - Continued

National Stock Number	Description	Qty. Req'd.	Quantity Rcv'd	Date	Date	Date
	Objective Lens 4X 13162748	1 each				
	Objective Lens 10X 13162749	1 each				
4935-01-111-1172	Reference Mirror 13143755	1 each				
8145-01-170-8960	Transit Case 13163167	1 each				
4940-01-160-6997	Rail Assembly 13143717	1 each				
4935-01-108-0442	**TOW Subsystem Test Set, 13143602, consisting of:**	**1 each**				
4935-01-133-0564 4935-01-364-4247	Test Controller, 13155001 or 13314321, consisting of:	1 each				
	Electronic Assembly 13154995	1 each				
4935-01-124-4307 5895-01-125-3168	Carrying Case 13143629 or 13314314	1 each				
6150-01-107-7836 6150-01-271-7307	Power Cable (W1) 13143571 or 13280636	1 each				
6150-01-107-7625 6150-01-271-7308	Turret Cable (W2) 13143572 or 13280637	1 each				
6150-01-107-7963 6150-01-271-7383	CGE/ISU Cable (W3) 13143573 or 13280638	1 each				
6150-01-190-3952	Special Purpose Cable (W11) 13162870 (Units 2172 and up)	1 each				

Section II. COMPONENTS OF END ITEM - Continued

National Stock Number	Description	Qty. Req'd.	Quantity Rcv'd	Date	Date	Date
	20209-01 (Units 2171 and lower)					
4935-01-108-2974	Day/Night Sight Collimator, 13143603, consisting of:	1 each				
	Collimator Optics Assembly 13143650-9	1 each				
4935-01-107-7614	Tilt Stage Assembly 13143640	1 each				
	Remote Position Control	1 each				
4935-01-107-7616	13143645 or					
4935-01-177-4181	13163149					
	D/NSC Cable (W4)	1 each				
6150-01-107-7841	13143574 or					
6150-01-297-4756	13314284 or					
6150-01-167-1349	13163022 or					
6150-01-271-7309	13280639					
4935-01-124-8046	Transit Case 13143608	1 each				
	OR					
4935-01-359-4461	Day/Night Sight Collimator, 13314306, consisting of:	1 each				
6650-01-350-2453	Collimator Optics Assembly 13314267	1 each				
4935-01-289-7254	Tilt Stage Assembly 13314265	1 each				
	Remote Position Control	1 each				
4935-01-177-4181	13163149 or					
4935-01-107-7616	13143645					

Section II. COMPONENTS OF END ITEM - Continued

National Stock Number	Description	Qty. Req'd.	Quantity Rcv'd	Date	Date	Date
	D/NSC Cable (W4)	1 each				
6150-01-297-4756	13314284 or					
6150-01-107-7841	13143574 or					
6150-01-167-1349	13163022 or					
6150-01-271-7309	13280639					
6150-01-285-3727	D/NSC Cable (W12) 13162747 or 13314317	1 each				
	Transit Case 13314272	1 each				
	OR					
4935-01-169-7090	Day/Night Sight Collimator, 13163006, consisting of:	1 each				
6650-01-350-2452	Collimator Optics Assembly 13163050	1 each				
4935-01-167-1330	Tilt Stage Assembly 13163040	1 each				
	Remote Position Control	1 each				
4935-01-177-4181	13163149 or					
4935-01-107-7616	13143645					
	D/NSC Cable (W4)	1 each				
6150-01-167-1349	13163022 or					
6150-01-297-4756	13314284 or					
6150-01-107-7841	13143574 or					
6150-01-271-7309	13280639					
4935-01-169-7155	Transit Case 13163136	1 each				
4935-01-107-7618	Missile Simulator, 13143604, consisting of:	1 each				
	Missile Simulator Case Assembly 13143672	1 each				

Section II. COMPONENTS OF END ITEM - Continued

National Stock Number	Description	Qty. Req'd.	Quantity Rec'd	Date	Date	Date
6150-01-113-8118 6150-01-273-2601	MS Cable (W5) 13143575 or 13280640	1 each				
	Transit Case 13143605	1 each				
4935-01-107-7619	**Alignment Breakout Box, 13143607, consisting of:**	**1 each**				
	Front Panel Assembly 13143703	1 each				
4935-01-107-7620	Self Test Cable (W7) 13143577 or 13314313	1 each				
4935-01-108-2975	TC Auxiliary Power Cable (W8) 13143578	1 each				
	Combination Case 13162690	1 each				
	Test Probe 4857-C-48	1 each				

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1. GENERAL

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

C-2. MAINTENANCE FUNCTIONS. Maintenance functions used in the MAC will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. “Replace” is authorized by the MAC and is shown as the 3rd position code of the SMR code.

i. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

C-3. EXPLANATION OF COLUMNS - MAC. The following is an explanation of columns in the MAC, section II:

a. Column 1 - Group Number. Lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2 - Component/Assembly. Contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3 - Maintenance Function. Lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph C-2.)

d. Column 4 - Maintenance Level. Specifies the level of maintenance authorized to perform the function listed in column 3. The worktime figure listed in the appropriate subcolumn represents the active time required to perform that maintenance function at the indicated category of maintenance. The number of task hours specified by the worktime figure represents the average time required to restore the component/assembly item to a serviceable condition. The symbol designations for the various maintenance categories are as follows:

C. . . . . Operator or crew

O. . . . . Unit Maintenance

F. . . . . Direct Support Maintenance

H. . . . . General Support Maintenance

D. . . . . Depot Maintenance

e. Column 5 - Tools and Equipment. Specifies, by code, those common tool sets (not individual tools) and special tools, TDME, and support equipment required to perform the designated function.

C-4. EXPLANATION OF COLUMNS. The following is an explanation of columns in the Tool and Test Equipment Requirements, section III:

a. Column 1 - Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.

b. Column 2 - Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

c. Column 3 - Nomenclature. Name or identification of the tool or test equipment.

d. Column 4 - National Stock Number. The National stock number of the tool or test equipment.

e. Column 5 - Tool Number. The manufacturer's part number.

Section II. MAINTENANCE ALLOCATION CHART

Group no.	Component/assembly	Maintenance function	Maintenance level					Tools and equipment
			Unit		DS/GS		Depot	
			C	O	F	H	D	
0010	TSSTS	Inspection			.50			
		Test (unscheduled)			.20			1,2
		Adjust			.20			3
		Fault Locate			.20			3
		Test (scheduled)			.85			1,2
0020	Test Controller	Test (scheduled)			.09			1,2,3
		Test (unscheduled)			.38			1,2,3
		Adjust			.24			1,2,3
		Repair			.26			3
		Fault Locate			.25			1,2,3
	Top Plate Assy	Remove/Replace			.01			3
		Repair			.01			3
	Cable Assy, Power	Repair*			.02			3
	Cable Assy, Turret	Repair*			.02			3
	Cable Assy, CGE/ISU	Repair*			.02			3,4
	Cable, Special Purpose	Repair*			.02			3
0040	Electronic Assy	Install			.22			3
		Repair*			.26			3

* = Partial

Section II. MAINTENANCE ALLOCATION CHART – Continued

Group no.	Component/assembly	Maintenance function	Maintenance level Unit C	O	DS/GS F	H	Depot D	Tools and equipment
0060	Front Panel Assy	Remove/Replace			.45			3
		Repair*			.27			3,4
	Front Panel	Repair			.05			3,4
0080	Internal Harness Assy	Repair			.66			3,4
0100	Display Circuit Card Assy	Remove/Replace			.31			3
0120	Keyboard and Filter Assy	Remove/Replace			.37			3
0140	Card Cage Assy	Remove/Replace			.45			3
		Repair*			.04			3
0180	Power Conversion Assy	Remove/Replace			.29			3
0220	Circuit Card A1 Assy	Remove/Replace			.24			3
0240	Circuit Card A2, A4,A5,A6,A7 Assy	Remove/Replace			.24			3
0260	Circuit Card A8 Assy	Remove/Replace			.24			3
0280	Circuit Card A3 Assy	Remove/Replace			.24			3
0300	Circuit Card A9 Assy	Remove/Replace			.24			3
0320	Circuit Card A10 Assy	Remove/Replace			.24			3
0340	Circuit Card All Assy	Remove/Replace			.24			3

* = Partial

Section II. MAINTENANCE ALLOCATION CHART - Continued

Group no.	Component/assembly	Maintenance function	Maintenance level Unit C	O	DS/GS F	H	Depot D	Tools and equipment
0360	Circuit Card A12 Assy	Remove/Replace			.24			3
0380	Circuit Card A13 Assy	Remove/Replace			.24			3
0400	Circuit Card A14 Assy	Remove/Replace			.24			3
0420	Circuit Card A15 Assy	Remove/Replace			.24			3
0440	Circuit Card A16 Assy	Remove/Replace			.24			3
0460	Circuit Card A17 Assy	Remove/Replace			.24			3
0480	Day/Night Sight Collimator	Test (scheduled)			.07			1,2,3
		Test (unscheduled)			.16			1,2,3
		Adjust			2.0			1,2,3
		Repair			.06			3
	Transit Case, D/NSC	Repair			.20			3
	Remote Control Assy	Repair*			.08			3
	Cable Assy, D/NSC	Repair*			.02			3
0500	Tilt Stage Assy	Remove/Replace			.08			3
		Repair*			.30			3
0520	Drive Mount Assy	Repair*			.21			3
	Tilt Stage	Remove/Replace			.41			3

* = Partial

Section II. MAINTENANCE ALLOCATION CHART - Continued

Group no.	Component/assembly	Maintenance function	Maintenance level Unit C	O	DS/GS F	H	Depot D	Tools and equipment
	Az Drive Assy	Remove/Replace			.22			3
	El Drive Assy	Remove/Replace			.24			3
	Post Assy	Remove/Replace			.18			3
	Harness Assy, Tilt Stage	Remove/Replace			1.5			3
		Repair			2.48			3,4
0540	Mounting Adapter Assy	Repair*			.28			3,4
0560	Drive Circuit Card Assy	Remove/Replace			.25			3
0580	Power Supply Assy	Remove/Replace			.32			3
0620	Optical Assy	Remove/Replace			.04			3
		Repair*			.28			3
	Harness Assy, Optical Assy	Remove/Replace			.50			3
		Repair			.96			3
0640	Day Sight Colli-mator Assy	Service			.61			3,4,5
		Remove/Replace			.27			
		Repair			.52			3
0700	Bit Monitor Cir-cuit Card Assy	Remove/Replace			.23			3
0720	IR/LED Control Circuit Card Assy	Remove/Replace			.23			3
0740	Night Sight Colli-mator Assy	Service			.61			3,4,5
		Remove/Replace			.29			
		Repair			.57			3

* = Partial

Section II. MAINTENANCE ALLOCATION CHART - Continued

Group no.	Component/assembly	Maintenance function	Maintenance level: Unit C	O	DS/GS F	H	Depot D	Tools and equipment
0760	Missile Simulator	Test (scheduled)			.07			1,2,3
		Test (unscheduled			.16			1,2,3
		Adjust			.50			1,2,3
		Repair			.04			3
	Cable Assy, MS (W5)	Repair*			.02			3
	Transit Case, Missile Simulator	Remove/Replace			.16			
		Repair			.80			3
	Missile Case Assy	Remove/Replace			.03			3
		Repair*			.02			3
	Case Modification	Remove/Replace			.79			3
		Repair			.86			3, 4
	Missile Case	Remove/Replace			2.95			3
		Repair			.84			3, 4
0780	Missile Simulator Sub-Assy	Remove/Replace			.04			3
		Repair*			.10			3,4
0800	DC/DC Power Supply	Remove/Replace			.17			3
0820	Circuit Card A2 Assy	Remove/Replace			.06			3
0840	Circuit Card Al Assy	Remove/Replace			.06			3
0860	BSA Support Equip	Assemble			.25			3
0880	Rail Assy	Repair			.13			3

* = Partial

Section II. MAINTENANCE ALLOCATION CHART - Continued

Group no.	Component/assembly	Maintenance function	Maintenance level Unit C	O	DS/GS F	H	Depot D	Tools and equipment
	Alignment Rails-Forward	Remove/Replace			.04			
		Repair			.08			3
	Alignment Rails-Rear	Remove/Replace			.13			
		Repair			.08			3
0900	BSA Control Unit	Test (scheduled)			.40			1
		Test (unscheduled)			.20			1
		Adjust			.25			1
		Repair			.12			3
		Fault Location			.75			1,3
	BSA Electronic Assy	Repair			.12			3
	Circuit Card Assy	Remove/Replace			.13			3
		Repair*			TBD			
	Front Panel	Repair*			.08			3
	Power Supply (17.5V)	Remove/Replace			.12			3
	Power Supply (Multi-Volt)	Remove/Replace			.21			3
	Cable Assy, BSA	Repair			.11			3
0920	Circuit Card Assy	Remove/Replace			.15			3
0940	BSA Holding Fixture Assy	Repair			.64			3,4

* = Partial

Section II. MAINTENANCE ALLOCATION CHART - Continued

Group no.	Component/assembly	Maintenance function	Maintenance level Unit C	O	DS/GS F	H	Depot D	Tools and equipment
	Transit Case, BSA Holding Fixture	Repair			.18			3
	Azimuth Yoke	Remove/Replace			.50			3,4
	Autocollimation Eyepiece Assy	Remove/Replace			.04			3
		Repair*			.20			3
0960	Base Assembly	Remove/Replace			.19			3,4
		Repair			.79			3,4
1000	Microscope Stage	Remove/Replace			.05			3
		Repair*			.02			3,4
	Eyepiece Assy	Remove/Replace			.05			3
		Repair*			.02			3
1020	Eyepiece Assy, FVS	Remove/Replace			TBD			3
		Repair			TBD			
1040	Alignment Breakout Box	Test (scheduled)			.30			1
		Repair			.09			3
	Front Panel Assy	Repair*			.04			3
	Cable Assy, Pwr (W8)	Repair			.06			3
	Cable Assy, Self Test	Repair			.12			

* = Partial

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

Tool or test equipment reference code	Maintenance level	Nomenclature	National stock number	Tool number
1	F	Night Vision Sight Test Set	5855-01-037-7341	AN/TAM-3
		DC Power Supply, Hewlett Packard		HP 6284A
		Digital Multimeter, Tektronix	6625-01-075-8583	DM501A
		Oscilloscope, Tektronix	6625-01-023-7092	SC502
		Main Frame	6625-00-373-7528	TM 503
2	F	Alinement Test Set	4935-01-107-7619	13143607
		Counter/Timer, Tektronix	6625-01-114-4890	DC5033A
		Function Generator, Tektronix	6625-01-106-9873	FG501A
		Infrared Mini-Viewer	5855-00-168-7831	10682432
		Case		BT1FA16H18
		Main Frame	6625-00-373-7528	TM 503
		Electrical Container	5855-00-071-6277	
		Black Panel	6110-01-033-3708	
		Protective Cover	5855-01-072-7995	
		BNC Tee Adapter	5935-00-926-7523	3285

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS - Continued

Tool or test equipment reference code	Maintenance level	Nomenclature	National stock number	Tool number
		Cable	6625-00-764-2288	BNCC-18
		Test Leads	6825-00-809-7855	B36-2
		Test Leads	6825-00-883-9746	B36-0
		Adapter	5935-00-789-6077	1614-2
		Adapter	5935-00-789-6078	1614-0
		Cable	5995-00-400-5268	2241C-36
		Adapter	6625-00-230-6388	3221
3		Tool Kit, Guided Missile Maintenance: Wire Guided Missile System Repairman, MOS27ED3	5180-00-179-3574	5180-95CLA52
4	F	Tool Kit, Supplemental	5180-01-128-5446	12308512
5	F	Purging Kit	4931-00-065-1110	SC493l-95CLJ54

APPENDIX D

REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

D-1. SCOPE. The spares and repair parts authorized for use in the performance of maintenance is provided in TM 9-4935-474-24P-1. There are no special tools authorized for the performance of maintenance.

APPENDIX E

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

E-1. SCOPE. There are no additional items authorized for the support of the BFV TOW Subsystem Support Equipment.

APPENDIX F

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

F-1. SCOPE. This appendix lists expendable supplies and materials you will need to operate and maintain the BFV TOW Subsystem Support Equipment. These items are authorized to you by CTA 50-970. Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items) .

F-2. EXPLANATION OF COLUMNS.

a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, Item 5, Appendix F") .

b. Column 2 - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

O - Unit Maintenance

F - Direct Support Maintenance

H - General Support Maintenance

c. Column 3 - National Stock Number. This is the National Stock Number assigned to the item; use it to request or requisition the item.

d. Column 4 - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Commercial and Government Entity (CAGE) code in parentheses, if applicable.

e. Column 5 - Unit of Measure (U/M) . Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr) . If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

Item number	Level	National stock number	Description	U/M
1	F	8040-01-033-0892	Adhesive	QT
2	F	8040-01-025-6357	Adhesive	QT
3	F	8040-01-102-2098	Adhesive	QT
4	F	6810-00-286-5435	Alcohol, Isopropyl, TTI735GDA1GL	GL
5	F	6810-00-856-2914	Alcohol, Methyl	PT
6	F		Cotton	LB
7	F		Cotton Cloth	PT
8	F	7930-00-050-5139	Detergent, Mild	PT
9	F		Glycerine, MIL-C-675	PT
10	F	9150-01-L19-2622	Lubricant, TIOLON X20 (CAGE 34568)	QT
11	F		Paint Olive Drab, No. 24087 FED-STD-595, MIL-C-46168 Black Enamel, No. 37038 FED-STD-595, MIL-C-46168 White Enamel, No. 37875 FED-STD-595, MIL-I-43553 White Ink, MIL-I-43553 Green 383, No. 34094 FED-STD-595, MIL-C-46168	QT
12	F		Primer, MIL-P-23377	QT
13			Deleted	
14			Deleted	

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST - Continued

Item number	Level	National stock number	Description	U/M
15	F	8030-00-081-2337	Sealant, MIL-S-22473, Grade A	PT
16	F	8030-00-964-7537	Sealant, SM9060-3 (Avco Systems Textron, CAGE 04614)	PT
17	F	6810-00-257-2488	Solvent	QT
18	F	6640-00-597-6745	Tissue, Lens	
19	F		Primer, MIL-S-22473, Grade T, Form R	QT
20	F		Sleeving, CLI, Clear, .250/.12 Dia	
21	F	6850-00-935-1082	Cleaning compound, MIL-C-81302, Type 2 (CAGE 81349)	EA
22	F	8040-01-197-7406	Adhesive, Epoxy Resin and Hardener, HMS 2177, Type II (Scotchweld 3501 A/B or equivalent)	QT
23	F		Lubricant Lubeco MS-16	QT
24	F	8040-00-530-4820	Adhesive retaining compound, HMS 20-1850 (Glyptal No. 7526F, General Electric or equivalent)	QT
25	F		Primer, MIL-A-46146, Type II	QT
26	F	8040-00-181-7162	Adhesive, silicone compound and dibutylin dilaurate curing agent (RTV 560, dibutylin dilaurate kit, General Electric or equivalent)	QT
27	F	8040-00-426-0652	Adhesive, MIL-A-46146, Type I (CAGE 81344)	QT
28	F	4020-00-656-1125	Lacing tape, Type I, finish B, size 3, MIL-T-43435 (CAGE 81349)	FT
29	F		Sealant, silicone rubber (RTV 3140, Dow Corning or equivalent)	PT

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST - Continued

Item number	Level	National stock number	Description	U/M
30		Deleted		
31		Deleted		
32		Deleted		
33	F	8040-00-273-8717	Adhesive, polychloroprene, MMM-A-121 (EC 1300L or equivalent) (CAGE 81348)	QT
34	F	6810-00-290-0046	Toluene, technical, TT-T-548 (CAGE 81348)	QT
35	F	6850-00-965-2329	Cleaning compound, P-C-436 (CAGE 81348)	PT
36	F	8040-00-079-7158	Adhesive, Rubber No. 4693 (Minnesota Mining and Manufacturing Co. CAGE 04963 or equivalent)	QT
37	F	8040-00-809-8252	Adhesive, EC 2210 (Minnesota Mining and Manufacturing Co. CAGE 04963 or equivalent) conform to MMM-A-121	QT
38	F	5970-00-717-1474	Shrink sleeving, M23053/5-211-C, MIL-I-23053/5 (CAGE 81349)	FT
39	F	9505-00-221-2650	Safety wire, MS 20995C20, per MS 33540 (CAGE 96906)	
40	F		Sealer, 14000103-0 (Environmental Container Systems, CAGE 24995)	
41	F	4240-01-063-4880	Strap, Wrist ground, 2500 (Legge, Walter G. Inc., CAGE 84832)	EA
42	F	8105-01-227-1704	Bag, antistatic, 2202156-164 (CAGE 82577)	EA
43	F	5970-00-990-9912	Shrink sleeving, MIL-I-23053/5, M23053/5-204-C (CAGE 81349)	FT

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST - Continued

Item number	Level	National stock number	Description	U/M
44	F	5940-01-135-7076	Solder sleeve, MIL-S-83519/1, M83519/1-l (CAGE 81349)	EA
45	F	6145-01-024-8568	Wire, twisted triple, MIL-C-27500, M27500-24TM3UO0 (CAGE 81349)	FT
46	F	6145-01-001-0580	Wire, twisted triple, MIL-C-27500, M27500-22RC3UO0 (CAGE 81349)	FT
47	F	6145-01-007-0579	Wire, twisted pair, MIL-C-27500, M27500-22RC2UO0 (CAGE 81349)	FT
48	F	5970-01-169-7999	Shrink sleeving, MIL-I-23053/3, M23053/3-103-9 (CAGE 81349)	EA
49	F	6145-01-148-1211	Wire, hook-up, white, MIL-W-16878/4, M16878/4BDE9 (CAGE 81349)	FT
50	F	5940-01-136-2540	Solder sleeve, MIL-S-83519/1, M83519/1-2 (CAGE 81349)	EA
51	F	6145-00-890-5436	Wire, twisted pair, MIL-C-27500, M27500-20RC2UO0 (CAGE 81349)	FT
52	F	6145-01-038-2329	Wire, shielded pair, MIL-C-27500, M27500-22RC2S06 (CAGE 81349)	FT
53	F	6145-00-062-5700	Wire, hook-up, white, MIL-W-16878/4, M16878/4BFE9 (CAGE 81349)	FT
54	F	6145-01-059-2052	Wire, twisted triple, MIL-C-27500, M27500-18RC3UO0 (CAGE 81349)	FT
55	F	6145-00-088-0404	Wire, hook-up, white, MIL-W-16878/4, M16878/4BGE9 (CAGE 81349)	FT
56	F	6145-00-144-0103	Wire, shielded triple, MIL-C-27500, M27500-22RC3S06 (CAGE 81349)	FT
57	F	6145-01-117-9796	Wire, twisted pair, MIL-C-27500, M27500-24TM2UO0 (CAGE 81349)	FT
58	F	6145-00-144-0102	Wire, shielded, MIL-C-27500, M2/500-22RClS06 (CAGE 81349)	FT

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST - Continued

Item number	Level	National stock number	Description	U/M
59	F	6145-01-241-0322	Wire, hook-up, white, MIL-W-16878/4, M16878/4BEE9 (CAGE 81349)	FT
60	F	5940-01-135-7077	Solder sleeve, MIL-S-83519/1, M83519/1-3 (CAGE 81349)	EA
61	F	5975-00-419-9812	Tie, identification MS3368-3-9C (CAGE 81349)	EA
62	F	5940-00-113-9820	Terminal lug, MS25036-148 (CAGE 96906)	EA
63	F	6850-00-186-2963	Leak test compound, MIL-L-25567 TY1-80Z (CAGE 81349)	OZ
64	F	6830-00-782-2641	Cylinder, Compressed (Nitrogen gas) 7916197 (CAGE 81348)	CF
65	F	0800-00-889-3535	Tape, Sealing, MIL-T-27730 (CAGE 81349)	EA
66	F	9525-00-355-6072	Safety Wire, MS20995NC32, per MS33540 (CAGE 96906)	FT

APPENDIX G

TEST LOGIC DIAGRAMS

G-10 LIST OF TEST LOGIC DIAGRAMS. The following list identifies the material provided in this appendix:

Table G-1. Test 90 and Test 91 Execution Procedure (28 Sheets)

Figure G-1. Test 90 and Test 91 Logic Diagram (18 Sheets)

NOTE

Circled numbers in figure G-1 refer to test 90 step numbers.

Table G-1. Test 90 and Test 91 Execution Procedure

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
*1	-	RAM Test (A14)	The processor card (A15) verifies that it can read from and write into the 1024 memory locations on the RAM card (A14). The processor reads whatever data is in the RAM location (starting from 1023) into the accumulator, then writes the complement into that same location. The accumulator data and the complement data are "exclusive-or'ed" in the accumulator and the result should be all 1's. This operation is done for all 1024 locations (1023 down to 0).	
*2	-	EPROM Test (A16, A17)	The processor card (A15) does a checksum of all the bytes in the A16 and A17 cards to check the integrity of the program in the EPROMs.	
*3	-	Display Test	The display is illuminated with 26 characters followed by 26 * characters to make sure all the display segments are working. In the process, this step exercises the display card and the interface to the processor card (A15).	
*4	-	DVM Null	This step is performed on the DVM card (A9) and shorts the high input to the low input by way of a relay. With both inputs shorted together, the output should be 0.000 ±0.030 VDC.	

*These steps cannot be measured manually.

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
5	-	Precisicn +10 VDC	The precision +10 VDC source on the analog stimuli card (A10) is routed through the A8-K9 relay. The DVM reading should be +10 ±0.3 VDC.	1
6	-	Precision +10 VDC Inverted	The precision +10 VDC source used in step 5 is routed through the A8-K10 relay but the polarity is reversed. The DVM reading should be -10.0 ±o.3 VDC.	1
7	-	+5 VDC Bus	This step checks out the +5 VDC bus from the power supply through the A8-K8 relay. The DVM reading should be +5.0 ±0.5 VDC.	1
8	-	+15 VDC Bus	This step checks out the +15 VDC bus from the power supply through the A8-K6 relay. The DVM reading should be +15.00 ±0.75 VDC.	1
9	-	-15 VDC Bus	This step checks out the -15 VDC bus from the power supply through the A8-K7 relay. The DVM reading should be -15.00 ±0.75 VDC.	1
*10	-	DVM Offset	This step is performed by adding the measurements in step 5 and step 6. V step 5 + V step 6 = 0.00 ±o.20 VDC.	-
*11	-	DVM Accuracy	This step is performed by subtracting the measurement in step 5 from step 6. V step 6 - V step 5 = -20.00 ±0.25 VDC.	-

*These steps cannot be measured manually.

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
12	-	Precision Reference No. 2	The precision +10 VDC source on the MS/DNSC interface card (A12) is routed through the A8-K11 relay. The DVM reading should be +10.0 +0.3 VDC.	1
13	-	Analog Stimuli +3.33 VDC	The D/A converter on the analog stimuli card (A10) is programmed by the processor card (A15) to generate a +3.33 VDC level which is routed to the A4-K8 and A8-K1 relays. The DVM reading should be +3.33 +0.07 VDC.	2
14	-	Analog Stimuli -3.33 VDC	The D/A converter in step 13 is programmed for a -3.33 VDC level. The DVM reading should be -3.33 ±0.07 VDC.	2
15	-	2V RMS Squarewave	The D/A converter in step 13 is programmed by the processor card (A15) to generate a +2.0 VDC level for 5 msec., then a -2.0 VDC level for 5 msec. By alternating between these two levels, a 2.0 VRMS squarewave of 100 Hz is generated. The DVM is concerned only in measuring the RMS voltage, 2.0 ±0.2 VRMS.	2

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
16	-	RMS Test	This step checks whether the analog processor card (A11) can generate AC signals. The processor card (A15) programs the analog processor to generate a 7.00 VRMS 341 Hz sinewave. This signal is routed to the analog stimuli card (A10) where it is used as the D/A reference voltage. The D/A is then programmed by the processor card to attenuate the reference voltage so the output from the analog stimuli card is 0.50 at 341 Hz. The DVM only measures for the RMS voltage, 0.50 ±0.05 VRMS.	2
17	-	Analog Processor @341 Hz	This step checks the frequency of the AC signal generated in step 16 by sending the signal from the DVM card (A9) to the interface buffer card (A14). The frequency should be 341 ±17 Hz.	3
18	-	Analog Processor @683 Hz	This step uses the same path as step 17 and checks to see that the analog processor card (A11) can generate a different frequency. The measured frequency should be 683 ±33 Hz.	3

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
19	-	Peak-Peak Detection	This step generates a 400 Hz signal on the analog processor card (A11) and the D/A converter on the analog stimuli card (10) attenuates the voltage level to 0.50 VRMS. The signal is sent to the A2-K2 relay and the peak to peak detector circuit on the A11 card. The DVM reading through the A6-K8 and A8-K1 relays should be +1.40 ±0.26 VDC.	3
20	-	X1 Reference	This step generates a +1.0 VDC signal on the analog stimuli card (A10) and sends it to the DVM card (A9) through the A4-K4 and A8-K1 relays. The DVM reading should be +1.0 ±0.1 VDC.	4
21	-	Signal Shorting	This step uses the same set-up as step 20. Relays A3-K5 and A1-K5 short the signal across A10-2 and 16 (the DC stimuli source is current limited). The DVM reading should be 0.00 ±0.15 VDC.	4
22	-	X1 Amplifier	This step sets up the same X1 reference signal as step 20 and sends it to relay A4-K9 and the X1 amplifier circuit on the A11 card. The output is sent to the DVM card (A9) through the A7-K8 an A8-K1 relays. The DVM reading should be +1.00 ±0.12 VDC.	4
23	-	X10 Amplifier	This step uses the same set-up as step 22. A relay on the All card switches in the X10 amplifier. The DVM reading should be +10.0 ±1.1 VDC.	4

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
24	-	PSD (Phase Sensitive Detector) Rejection	This step generates a 7.00 VRMS 100 Hz sinewave on the A11 card and sends it to the the A10 card where it is attenuated to a 3.50 VRMS 100 Hz sinewave. The signal is sent to the A3-K1 relay and the PSD filter circuit on the All card. The PSD filter is low pass with a -3 dB bandwidth of 50 Hz. The DVM reading through the A5-K8 and A8-K1 relays should be 1.0 ±0.5 VRMS.	5
25	-	PSD (Phase Sensitive Detector) Slope	This step uses the same path as step 24 but use a 3.50 VRMS 200 Hz sinewave. The DVM reading should be 0.0 ±0.4 VRMS. (The attenuation between 100 Hz and 200 Hz is designed to yield a -12 dB/octave slope.	5
26	-	Programmer Interface Bit	This step is performed internal to the programmer interface card (A13). The processor card (A15) closes the A13-K1 relay which puts data onto the U7-PB (0 thru 7) input lines. The processor card should read 10110100 on the U7-D7 thru D0 output lines, respectively.	5
27	-	Programmer Interface Bit	This step is set up like step 26. The data is put onto the-U7-PA (0 thru 7) input lines. The processor card (A15) should read 11110110 on the U7-D7 thru D0 output lines, respectively.	5

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
28	-	Programmer Interface Bit	This step is set up like step 26. The data is put onto the U13-PA (0 thru 6) input lines. The processor card (A15) should read X1111111 on the U13-D7 thru D0 output lines, respectively.	5
29	-	Programmer Interface Bit	This step is performed internal to the programmer interface card (A13). The processor card (A15) closes the A13-K2 relay which puts data onto the U13-PB0 input line. The processor card should read XXXXXXX1 on the U13-D7 thru D0 output lines, respectively.	5
30	-	Printer	This step is not used.	
31	1	Close A6-K5 relay.	This step checks out a relay on the A6 card. The DVM reading should be +5.0 ±0.5 VDC.	6
32	2	Close A6-K7 relay.	This step checks out a relay on the A6 card. The DVM reading should be +5.0 ±0.5 VDC.	6
33	3	Close A6-K11 relay.	This step checks out a relay on the A6 card. The DVM reading should be +5.0 ±0.5 VDC.	6
34	4	Close A6-K12 relay.	This step checks out a relay on the A6 card. The DVM reading should be +5.0 ±0.5 VDC.	6
35	5	Close A6-K15 relay.	This step checks out a relay on the A6 card. The DVM reading should be +5.0 ±0.5 VDC.	6

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
36	6	Close A6-K16 relay.	This step checks out a relay on the A6 card. The DVM reading should be +5.0 ±0.5 VDC.	6
37	7	Close A6-K1 relay.	This step checks out a relay on the A6 card. The DVM reading should be +5.0 ±0.5 VDC.	6
38	8	Close A6-K2 relay.	This step checks out a relay on the A6 card. The DVM reading should be +5.0 ±0.5 VDC.	6
39	9	Close A6-K4 relay.	This step checks out a relay on the A6 card. The DVM reading should be +5.0 ±0.5 VDC.	6
40	10	Close A7-K1 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
41	11	Close A7-K2 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
42	12	Close A7-K3 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
43	13	Close A7-K4 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
44	14	Close A7-K5 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
45	15	Close A7-K6 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
46	16	Close A7-K7 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5	7
47	17	Close A7-K9 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
48	18	Close A7-K10 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
49	19	Close A7-K11 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
50	20	Close A7-K12 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
51	21	Close A7-K13 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
52	22	Close A7-K14 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
53	23	Close A7-K15 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7

Table G-1. Test 90 and Test 91 Execution Procedure - continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
54	24	Close A7-K16 relay.	This step checks out a relay on the A7 card. The DVM reading should be +5.0 ±0.5 VDC.	7
55	25	Close A4-K3 relay.	This step checks out a relay on the A4 card. The DVM reading should be +5.0 ±0.5 VDC.	13
56	26	Close A4-K5 relay.	This step checks out a relay on the A4 card. The DVM reading should be +5.0 ±0.5 VDC.	13
57	27	Close A4-K6 relay.	This step checks out a relay on the A4 card. The DVM reading should be +5.0 ±0.5 VDC.	13
58	28	Close A4-K7 relay.	This step checks out a relay on the A4 card. The DVM reading should be +5.0 ±0.5 VDC.	13
59	29	Close A5-K4 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8
60	30	Close A5-K6 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8
61	31	Close A5-K7 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8
62	32	Close A5-K10 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
63	33	Close A5-K11 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8
64	34	Close A5-K12 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8
65	35	Close A5-K13 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8
66	36	Close A5-K14 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8
67	37	Close A5-K15 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8
68	38	Close A5-K16 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8
69	39	Close A5-K3 relay.	This step checks out a relay on the A5 card. The DVM reading should be +5.0 ±0.5 VDC.	8

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
70	40	Close K13, K14, K15, and K16 relays on A2 card. Test K7, K11, K12, K13, and K14 relays on A1 card for short to ground.	This set-up assumes a multiple relay failure will not occur on the same card. Providing four parallel paths through the A2 card eliminates the A2 card as a cause of a failure. The DVM normally measures +5.0 ±0.5 VDC, but if any of the shorting relays (A1-K7, K11, K12, K13, or K14) is permanently shorted to ground, the DVM will measure 0 VDC indicating the A1 card is faulty.	14
71	41	Close A2-K13 relay.	This step checks out a relay on the A2 card. The DVM reading should be +5.0 ±0.5 VDC.	14
72	42	Close A2-K14 relay.	This step checks out a relay on the A2 card. The DVM reading should be +5.0 ±0.5 VDC.	14
73	43	Close A2-K15 relay.	This step checks out a relay on the A2 card. The DVM reading should be +5.0 ±0.5 VDC.	14
74	44	Close A2-K16 relay.	This step checks out a relay on the A2 card. The DVM reading should be +5.0 ±0.5 VDC.	14
75	45	Close A5-K1 and A5-K5 relays. Test current source on A10 card.	This set-up assumes a multiple relay failure will not occur on the same card. Providing two parallel paths through A5-K1 and A5-K5 eliminates the A5 card as a cause of a failure. This step tests the current source on the A10 card. The DVM reading should be +1.0 ±0.1 VDC.	8

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
76	46	Close A5-K1 relay.	This step uses the current source on the Al0 card, checked out in step 75 (sheet 8), to check out relay A5-K1. The DVM reading should be +1.0 ±0.1 VDC.	8
77	47	Close A5-K5 relay.	This step uses the current source on the A1O card, checked out in step 75 (sheet 8), to check out relay A5-K5. The DVM reading should be +1.0 ±0.1 VDC.	8
78	48	Close A5-K2 relay.	This step checks out a relay on the A5 card. The DVM reading should be +15.00 ±0.75 VDC.	8
79	49	Close A5-K9 relay.	This step checks out a relay on the A5 card. The DVM reading should be +15.00 ±0.75 VDC.	8
80	50	Close A8-K1 and A8-K4 relays.	This step checks out relays A8-K1 and A8-K4 on the A8 card. The DVM reading should be +17.3 to 30.0 VDC.	9
81	51	Close A8-K1 and A8-K5 relays. Test A8-K5 relay.	This step checks out a relay on the A8 card. The DVM reading should be +17.3 to 30.0 VDC.	9
82	52	Close A8-K12 relay.	This step checks out a relay on the A8 card. The DVM reading should be +17.3 to 30.0 VDC.	9
83	53	Close A8-K13 relay.	This step checks out a relay on the A8 card. The DVM reading should be +17.3 to 30.0 VDC.	9

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
84	54	Close A8-K14 relay.	This step checks out a relay on the A8 card. The DVM reading should be +17.3 to 30.0 VDC.	9
85	55	Close A8-K15 relay.	This step checks out a relay or the A8 card. The DVM reading should be +17.3 to 30.0 VDC.	9
86	56	Close A8-K16 relay.	This step checks out a relay or the A8 card. The DVM reading should be +17.3 to 30.0 VDC.	9
87	57	Close A4-K2 relay.	This step checks out a relay or the A4 card. The DVM reading should be +17.3 to 30.0 VDC.	13
88	58	Close A4-K1 relay.	This step checks out a relay or the A4 card. The DVM reading should be +17.3 to 30.0 VDC.	13
89	59	Close A7-K8 relay. Test A4-K1O relay.	This step uses a path, checked out in step 22 (sheet 4), to check out relay A4-K12. The DVM reading should be +5.0 ±0.5 VDC.	13
90	60	Close A7-K8 relay. Test A4-K11 relay	This step uses a path, checked out in step 22 (sheet 4), to check out relay A4-K11. The DVM reading should be +5.0 ±0.5 VDC.	13
91	61	Close A7-K8 relay. Test A4-K12 relay.	This step uses a path, checked out in step 22 (sheet 4), to check out relay A4-K12. The DVM reading should be +5.0 ±0.5 VDC.	13
92	62	Close A5-K8 relay. Test A3-K2 relay.	This step was a path checked out in step 22 (sheet 4) to check out relay A3-K2.	16

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
93	63	Close A6-K13 and A6-K14 relays. Test A3-K7 relay.	This set-up assumes a multiple relay failure will not occur on the same card. Providing two parallel paths through A6-K13 and A6-K14 eliminates the A6 card as a cause of failure. This step tests A3-K7 (sheet 10). The DVM reading should be +5.0 ±0.5 VDC.	6
94	64	Close A3-K7 relay. Test A6-K13 relay.	This step uses A3-K7 checked out in step 93 (Sheet 10), to check Out relay A6-K13. The DVM reading should be +5.0 ±0.5 VDC.	6
95	65	Close A3-K7 relay. Test A6-K14 relay.	This step uses A3-K7 checked out in step 93 (Sheet 10), to check out relay A6-K14. The DVM reading should be +5.0 ±0.5 VDC.	6
96	66	Close A13-K2 relay. Read PIA U13-PB0 = 1.	This step checks out PIA input line U13-PB0 and output line U13-PB6 on the A13 card (sheet 12). Setting U13-PB6 to a logic "1" closes relay A13-K2 and the voltage divider puts a logic "1" at U13-PB0.	12
97	67	Close A13-K2 relay. Read PIA U13-PA (0 thru 6) = 1.	This step checks out PIA input lines U13-PA (0 thru 6) on the A13 card (sheet 12). Setting U13-PB6 to a logic "1" closes relay A13-K2 and puts logic "l"s at U13-PA (1 thru 5). +24 VDC from J4-A gets converted on the A13 card and puts logic "1"s at U13-PA (0,6).	12

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
98	68	Close A13-K2 relay. Read PIA U7-PB (2, 4, 5, 7) = 1 and U7-PB (0, 1, 3, 6) = 0.	This step checks out PIA input lines U7-PB (0 thru 7) on the All card (sheet 12). Setting U13-PB6 to a logic "1" closes relay A13-K2 and puts logic "1"s at U7-PB (2, 4, 5, 7) and puts logic "0"s at U7-PB (0, 1, 3, 6) because of the inverters.	12
99	69	Close A13-K2 relay. Read PIA U7-PA (1, 2, 4, 5, 6, 7) = 1 and U7-PA (0, 3) = 0.	This step checks out PIA input lines U7-PA (O thru.7) on the A13 card (sheet 12). Setting U13-PB6 to a logic "1" closes relay A13-K2 and puts logic "1"s at U7-PA (1,2,4,5,6,7) and logic "0" at U7-PA (0,3) because of the inverters.	12
100	70	Close A13-K2 and A13-K3 relays. Read PIA U7-PA (6, 7) = 0.	This step checks out PIA output line U13-PB5 on the A13 card (sheet 12). Setting U13-PB6 and PB5 to logic "1" closes relays A13-K2 and K3 respectively and puts logic "0" at U7-PA (6,7).	12
101	71	Leave A11 PIA in initial state.Read PIA U1-PB4 = 1 and U1-PB (5, 6, 7) =0.	This step checks out PIA input lines U1-PB (4 thru 7) on the All card (sheet 10) for a logic "l" at U1-PB4 and logic "0"s at U1-PB (5 thru 7). A logic "0" from U1-CA2 on the A12 card (sheet 11) puts a logic "1" at U1-PB4. Relays A10-K1, K2, K3, and K4 (sheet 10) and A13-K2 (sheet 12) are all open and put logic "0"s at U1-PB (5 thru 7).	10

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
102	72	Close A13-K2 relay. Read A11 PIA U1-PB (4, 7) = 1 and U1-PB (5, 6) = 0.	This step checks out PIA input lines U1-PB (4,7) on the All card (sheet 10) for logic "1"s. A logic "0" from U1-CA2 on the A12 card (sheet 11) puts a logic "1" at U1-PB4. Closing relay A13-K2 (sheet 12) puts a logic "l" at U1-PB7.	10
103	73	Close A10-K1 and A10-K2 relays. Read A11 PIA U1-PB5 = 1.	This step checks out PIA input line U1-PB5 on the A11 card (sheet 10) for a logic "1". This set-up assumes a multiple relay failure will not occur on the same card. Providing two parallel paths through A10-K1 and A10-K2 eliminates the A10 card (sheet 10) as a cause of a failure. A10-K2 puts a logic "l" at U1-PB5.	10
104	74	Close A10-K3 and A10-K4 relays. Read A11 PIA U1-PB6 = 1.	This step checks out PIA input line U1-PB6 on the A11 card (sheet 10) for a logic "l". This set-up assumes a multiple relay failure will not occur on the same card. Providing two parallel paths through relays A10-K3 and A10-K4 eliminates the Al0 card (sheet 10) as a cause of a failure. Closing A10-K1 and A10-K2 puts a logic "1" at U1-PB6.	10
105	75	Close A10-K3 relay. Read A11 PIA U1-PB6 = 1.	This step uses a path, checked out in step 104 (sheet 10), to check out relay A10-K3. Closing A10-K3 puts a logic "1" at U1-PB6.	10

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
106	76	Close A10-K2 relay. Read A11 PIA U1-PB5 = 1.	This step uses a path, checked out in step 103 (sheet 10), to check out relay A10-K2. Closing A10-K2 puts a logic "1" at U1-PB5.	10
107	77	Close A10-K1 relay. Read A11 PIA U1-PB5 = 1.	This step uses a path, checked out in step 103 (sheet 10), to check out relay A10-K1. Closing A10-K1 puts a logic "I" at U1-PB5.	10
108	78	Close A10-K2 and A1-K8 relays. Read A11 PIA U1-PB5 = 0.	This step uses a path, checked out in step 106 (sheet 10), to check out relay A1-K8. Closing A1-K8 puts.a logic "0" at U1-PB5.	10
109	79	Clear A12 PIA U6-PB (0 thru 7). Read U6-PA (1 thru 5) = 0 .	This step checks out PIA output lines U6-PB (0 thru 3) and input lines U6-PA (1 thru 5) on the A12 card (sheet 11). Clearing U6 puts logic "0"s on UG-PB (0 thru 3) which are read in as logic "0"s at U6-PA (1 thru 5).	11
110	80	Set A12 PIA U6-PB (0 thru 3) = 1. Read U6-PA (1 thru 5) = 1.	This step uses the same path checked out in step 109 (sheet 11). Setting U6-PB (0 thru 3) to logic “1”s puts logic "1"s at U6-PA (1 thru 5).	11

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
111	81	Reset-Enable A12 F/F. Clear PIA U1-PB (0 thru 7). Read PIA U6-PB (4 thru 7) = 0.	This step checks out PIA output lines U1-PB (4 thru 7) and input lines U6-PB (4 thru 7) on the A12 card (sheet 11). Performing Reset-Enable on the A12 F/F sets up the initial conditions. Clearing U1 puts logic "0"s on U1-PB (4 thru 7) which are read in as logic "0"s at U6-PB (4 thru 7).	11
112	82	Reset-Enable A12 F/F. Set U1-PB (4 thru 7) = 1. Read U6-PB (4 thru 7) = 1.	This step uses the same path checked out in step 111 (sheet 11). Setting U1-PB (4 thru 7) to logic "1"s puts logic "1"s at U6-PB (4 thru 7).	11
113	83	Clear A12 PIA U1-PB (0 thru 7). Read U1-PA (0 thru 3) = 0.	This step checks out PIA output lines U1-PB (0 thru 3) and input lines U1-PA (0 thru 3) on the A12 card (sheet 11). Clearing U1 puts logic "0"s on U1-PB (0 thru-3) which are read in as logic "0"s at U1-PA (o thru 3).	11
114	84	Set A12 PIA U1-PB (0 thru 3) = 1. Read U-PA (0 thru 3) = 1.	This step uses the same path checked out in step 113 (sheet 11). Setting U1-PB (0 thru 3) to logic "1"s put logic "1"s at U1-PA (0 thru 3).	11
115	85	Set A12 PIA U1-CA2 = 1. Read A11 PIA U1-PB4 = 0.	This step uses a path, checked out in step 101 (sheet 10), to check out PIA input line U1-PB4 on the A11 card (sheet 10) for a logic "0". A logic "1" from U1-CA2 on the A12 card (sheet 11) puts a logic "0" at U1-PB4.	10

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
116	86	Close A11-K1 relay. Read PIA U1-PB4 = 1.	This step uses input line U1-PB4, checked out in step 101 (sheet 10), to check out relay A11-K1 (sheet 10). Closing A11-K1 brings in +15 VDC from A5-52 (sheet 8) and puts a logic “1” at U1-PB4.	10
117	87	Close A13-K2 relay. Test A3-K9 relay.	The A13-K2 relay path to J3-15 was checked out in step 97 (sheet 12). This step checks out a relay on the A3 card. The DVM reading should be +14.0 ±1.5 VDC.	15
118	88	Close A13-K2 relay. Test A3-K10 relay.	The A13-K2 relay path to J3-15 was checked out in step 97 (sheet 12) . This step checks out a relay on the A3 card. The DVM reading should be +14.0 ±1.5 VDC.	15
119	89	Close A13-K2 relay. Test A3-K11 relay.	The A13-K2 relay path to J3-15 was checked out in step 97 (sheet 12). This step checks out a relay on the A3 card. The DVM reading should be +14.0 ±l.5 VDC.	15
120	90	Close A13-K2 relay. Test A3-K12 relay.	The A13-K2 relay path to J3-15 was checked out in step 97 (sheet 12). This step checks out a relay on the A3 card. The DVM reading should be +14.0 ±1.5 VDC.	15

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
121	91	Close A13-K2 relay. Test A3-K13 relay.	The A13-K2 relay path to J3-15 was checked out in step 97 (sheet 12). This step checks out a relay on the A3 card. The DVM reading should be +14.0 ±1.5 VDC.	15
122	92	Close A13-K2 relay. Test A3-K14 relay.	The A13-K2 relay path to J3-15 was checked out in step 97 (sheet 12). This step checks out a relay on the A3 card. The DVM reading should be +14.0 ±1.5 VDC.	15
123	93	Close A13-K2 relay. Test A3-K15 relay.	The A13-K2 relay path to J3-15 was checked out in step 97 (sheet 12). This step checks out a relay on the A3 card. The DVM reading should be +14.0 ±l.5 VDC.	15
124	94	Close A2-K11 and A2-K12 relays. Test A1-K1, A1-K9, and A1-K10 relays for short to ground.	This set-up assumes a multiple relay failure will not occur on the same card. Providing two parallel paths through A2-K11 and A2-K12 eliminates the A2 card as a cause of a failure. The DVM normally measures 5.0 ±0.5 VRMS (at 400 Hz) but if any of the shorting relays (A1-K1, K9, or K10) is permanently shorted to ground, the DVM will measure 0 V_{RMS} indicating the A1 card is faulty.	16
125	95	Close A2-K11 relay.	This step checks out a relay on the A2 card. The DVM reading should be 5.0 ±0.5 V_{RMS} (at 400 Hz) .	16

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
126	96	Close A2-K12 relay.	This step checks out a relay on the A2 card. The DVM reading should be 5.0 ±0.5	16
127	97	Close A6-K8, A4-K13, and A4-K14 relay Test A1-K1, A1-K9, and A1-K10, for short to ground.	This step uses a path (A11-7 & 6, A6-K8) checked out in step 19 (sheet 3). This set-up assumes a multiple relay failure will not occur on the same card. Providing two parallel paths through A4-K13 and A4-K14 eliminates the A4 card as a cause of a failure. A10-1 puts out a 1.77 +0.09 V_{RMS}' 400 Hz signal. The DVM normally measures +5.0 ±0.5 VDC out-of the peak to peak detector on All card. If any of the shorting relays (A1-K1, K9, or K10) is permanently shorted to ground, the DVM will measure 0 VDC indicating A1 card is faulty.	16
128	98	Close A6-K8 relay. Test A4-K13 relay.	This step uses a path, checked out in step 127 (sheet 16), to check out relay A4-K13. The DVM reading should be +5.0 +0.5 VDC.	16
129	99	Close A6-K8 relay. Test A4-K14 relay.	This step uses a path, checked out in step 127 (sheet 16), to check out relay A4-K13. The DVM reading should be +5.0 ±0.5 VDC.	16
130	100	Close A6-K8 relay. Test A2-K1 relay.	This step uses a path, checked out in step 127 (sheet 16), to check out relay A2-K1. The DVM reading should be +5.0 ±0.5 VDC.	16

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
131	101	Close A2-K3, A2-K4, A3-K3, and A3-K4 relays. Test A1-K3 and A1-K4 relays for short to ground.	This set-up assmes a multiple relay failure will not occur on the same card. Providing parallel paths through A2-K3 & K4 and A3-K3 & K4 eliminates the A2 and A3 cards as causes of a failure. The DVM normally measures 5.00 ±0.25 VRMS (at 400 Hz) but if either the A1-K3 or K4 shorting relay is permanently shorted to ground, the DVM will measure 0 VRMS indicating the A1 card is faulty.	16
132	102	Close A3-K3 and A3-K4 relays. Test A2-K3 relay.	This step uses a path, checked out in step 131 (sheet 16), to check out relay A2-K3. The DVM reading should be 5.0 ±0.5 VRMS (at 400 Hz).	16
133	103	Close A3-K3 and A3-K4 relays. Test A2-K4 relay.	This step uses a path, checked out in step 131 (sheet 16), to check out relay A2-K3. The DVM reading should be 5.0 ±0.5 VRMS (at 400 Hz).	16
134	104	Close A2-K3 and A2-K4 relays. Test A3-K3 relay.	This step uses a path, checked out in step 131 (sheet 16), to check out relay A3-K3. The DVM reading should be 5.0 ±0.5 VRMS (at 400 Hz).	16
135	105	Close A2-K3 and A2-K4 relays. Test A3-K4 relay.	This step uses a path, checked out in step 131 (sheet 16), to check out relay A3-K4. The DVM reading should be 5.0 ±0.5 VRMS (at 400 Hz).	16

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
136	106	Close A2-K11 and A2-K12 relays. Test A1-K1 relay.	This step uses a path, checked out in step 124 (sheet 16), to check out relay A1-K1. The DVM reading should be 0.00 ±0.15 VRMS.	16
137	107	Close A2-K11 and A2-K12 relays. Test A1-K9 relay.	This step uses a path, checked out in step 124 (sheet 16), to check out relay A1-K9. The DVM reading should be 0.00 +0.15 VRMS.	16
138	108	Close A2-K11 and A2-K12 relays. Test A1-K10 relay.	This step uses a path, checked out in step 124 (sheet 16), to check out relay A1-K10. The DVM reading should be 0.00 ±0.15 VRMS.	16
139	109	Close A2-K9, A2-K10, A3-K5, and A3-K6 relays. Test A1-K5 and A1-K6 relays for short to ground.	This set-up assumes a multiple relay failure will not occur on the same card. Providing two parallel paths through A3-K5 & K6 and A2-K9 & K10 eliminates the A2 and A3 cards as causes of a failure. The DVM normally measures +5.0 ±0.5 VDC from the A10 card but if either A1-K5 or K6 is permanently shorted to ground, the DVM will measure 0 VDC indicating the A1 card is faulty. Note: A10 is current limited.	14
140	110	Close A3-K5 and A3-K6 relays. Test A2-K9 relay.	This step uses a parallel path, checked out in step 139 (sheet 14), to check out relay A2-K9. The DVM reading should be +5.0 ±0.5 VDC.	14

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
141	111	Close A3-K5 and A3-K6 relays. Test A2-K10 relay.	This step uses a parallel path, checked out in step 139 (sheet 14), to check out relay A2-K9. The DVM reading should be +5.0 ±0.5 VDC.	14
142	112	Close A2-K9 and A2-K10 relays. Test A3-K6 relay.	This step uses a parallel path, checked out in step 139 (sheet 14), to check out relay A2-K9. The DVM reading should be +5.0 ±0.5 VDC.	14
143	113	Close A2-K13 through A2-K16 relay. Test A1-K7 relay.	This step uses a parallel path, checked out in step 70 (sheet 14), to check out relay A1-K7. The DVM reading should be 0.00 ±0.15 VDC.	14
144	114	Close A2-K13 through A2-K16 relays. Test A1-K11 relay.	This step uses a parallel path, checked out in step 70 (sheet 14), to check out relay A1-K11. The DVM reading should be 0.00 ±0.15 VDC.	14
145	115	Close A2-K13 through A2-K16 relays. Test A1-K12 relay.	This step uses a parallel path, checked out in step 70 (sheet 14), to check out relay A1-K12. The DVM reading should be 0.00 +0.15 VDC.	14
146	116	Close A2-K13 through A2-K16 relays. Test A1-K13 relay.	This step uses a parallel path, checked out in step 70 (sheet 14), to check out relay A1-K13. The DVM reading should be 0.00 +0.15 VDC.	14

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

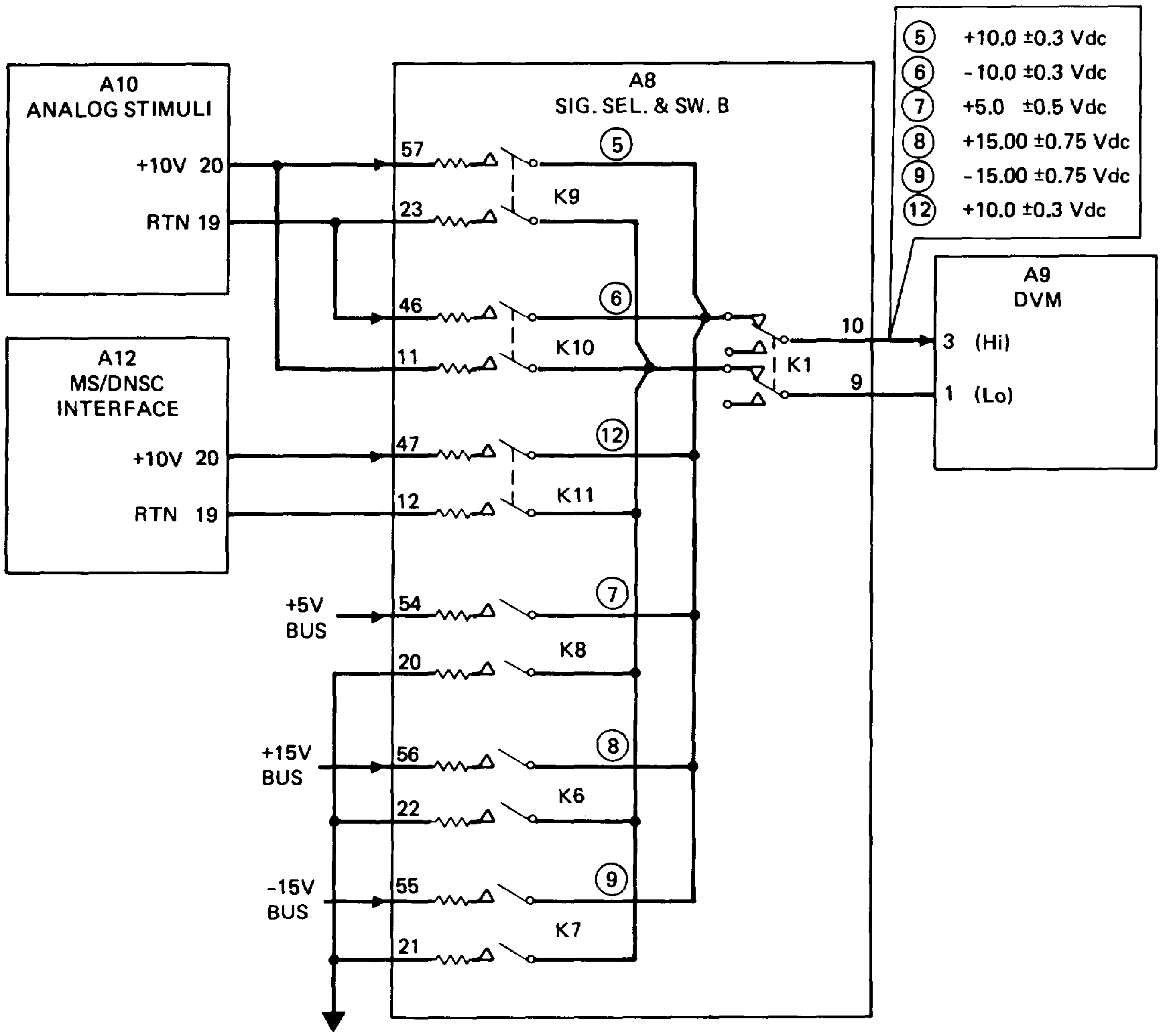
Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
147	117	Close A2-K13 through A2-K16 relays. Test A1-K14 relay.	This step uses a parallel path, checked out in step 70 (sheet 14), to check out relay A1-K14. The DVM reading should be 0.00 ±0.15 VDC.	14
148	118	Close A4-K1 relay. Test A1-K2 relay.	This step uses a path, checked out in step 88 (sheet 13), to check out relay A1-K2. The DVM reading should be 0.00 ±0.15 VDC.	13
149	119	Close A10-K4 relay. Read A11 PIA U1-PB6 = 1.	This step uses a path, checked out in step 104 (sheet 10), to check out relay A10-K4. Closing A10-K4 puts a logic "1" at U1-PB6.	10
150	120	Close A2-K9, A2-K10, and A3-K5 relays. Test A1-K6 relay.	Relay A3-K5 was checked out in step 21 (sheet 4) and relays A2-K9 & K10 were checked out in steps 140 & 141 (sheet 14) respectively. This step checks out relay A1-K6. Closing A1-K6, the DVM reading should be 0.00 ±0.15 VDC.	14
151	121	Close A3-K5 and A7-K8 relays. Test A2-K5 relay.	Relay A3-K5 was checked out in step 21 (sheet 4). Relays A7-K8 and A11-9 & 10 were checked out in step 22 (sheet 4). This step checks out relay A2-K5. Closing A2-K5, the DVM reading should be +5.0 ±0.5 VDC.	14

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
152	122	Close A3-K5 and A7-K8 relays. Test A2-K6 relay.	Relay A3-K5 was checked out in step 21 (sheet 4). Relays A7-K8 and A11-9 & 10 were checked out in step 22 (sheet 4). This step checks out relay A2-K6. Closing A2-K6, the DVM reading should be +5.0 ±0.5 VDC.	14
153	123	Close A2-K3, A2-K4, and A3-K3 relays. Test A1-K3 relay.	This step uses a path, checked out in step 134 (sheet 16), to check out relay A1-K3. The DVM reading should be 0.00 ±0.15 VDC.	16
154	124	Close A2-K3, A2-K4, and A3-K3 relays. Test A1-K4 relay.	This step uses a path, checked out in step 134 (sheet 16), to check out relay A1-K4. The DVM reading should be 0.00 ±0.15 VRMS.	16
155	125	Close A8-K1 and A8-K2 relays. Test A8-K2 relay.	This step checks out a relay on the A8 card. The DVM reading should be +5.0 ±0.5 VDC.	17
156	126	Close A6-K9 relay. Test A6-K9 relay.	Relay A6-K9 is checked out. The DVM reading should be +2.5 ±0.25 VDC.	17
157	127	Close A6-K10 relay. Test A6-K10 relay.	Relay A6-K10 Is checked out. The DVM reading should be -2.5 ±.25 VDC.	17
158	128	Close A4-K15, A6-K9, and A8-K1 relays. Test A4-K15 relay.	This step checks out a path on the A4 card. The DVM reading should be +5.0 ±0.5 VDC.	18

Table G-1. Test 90 and Test 91 Execution Procedure - Continued

Test 90 step number	Test 91 step number	Description	Comment	Block diagram sheet number
159	129	Close A4-K16, A6-K9, and A8-K1 relays. Test A4-K16 relay.	This step checks out a path on the A4 card. The DVM reading should be +5.0 ±0.5 VDC.	18
160	130	Close A2-K11, A2-K12, and A8-K3 relays. Test A8-K3 relay.	This step checks out a path on the A8 card by applying 5 VDC. The DVM reading should be 0.00 ±0.15 VDC.	18
161	131	Close A2-K11, A2-K12, and A8-K3 relays. Test A8-K3 relay.	This step checks out a path on the A8 card by applying 5 VP-P. The DVM reading should be 1.77 +0.177 VRMS.	18



NOTES:
(1) STEPS 1 THRU 4 CANNOT BE MEASURED MANUALLY.
(2) STEP 10 IS CALCULATED FROM THE MEASUREMENTS IN STEPS 5 & 6 ($V_{STEP\ 5} + V_{STEP\ 6}$ = 0.00 ±0.20 Vdc).
(3) STEP 11 IS CALCULATED FROM THE MEASUREMENTS IN STEPS 5 & 6 ($V_{STEP\ 6} - V_{STEP\ 5}$ = -20.00±0.25 Vdc).
(4) TEST 90 CONSISTS OF STEP NUMBERS 1 THRU 154.
(5) TO FIND THE CORRESPONDING STEP NUMBER FOR TEST 91 SUBTRACT 30 FROM THE STEP NUMBER SHOWN IN THE BLOCK DIAGRAM.

Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 1 of 18)

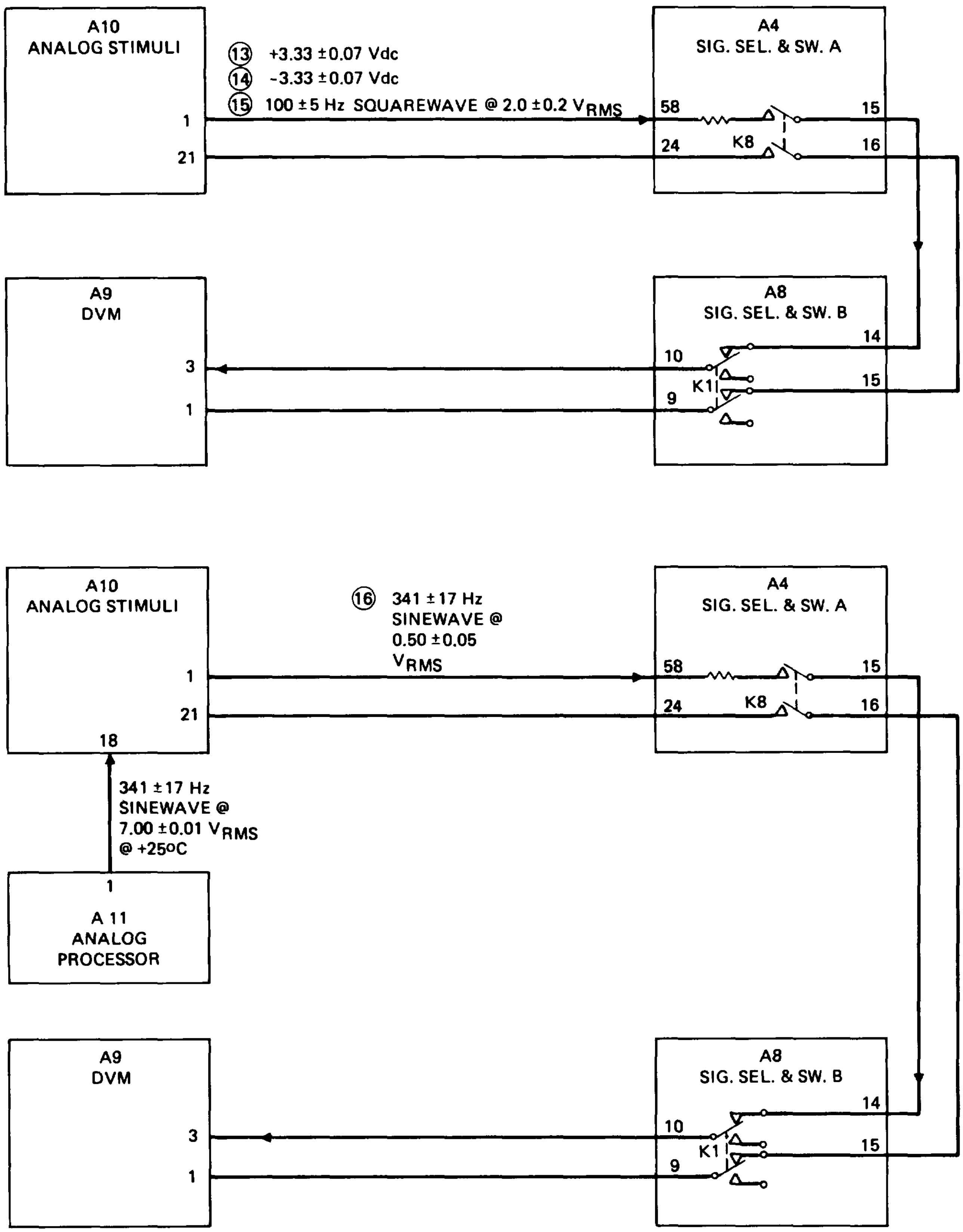


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 2 of 18)

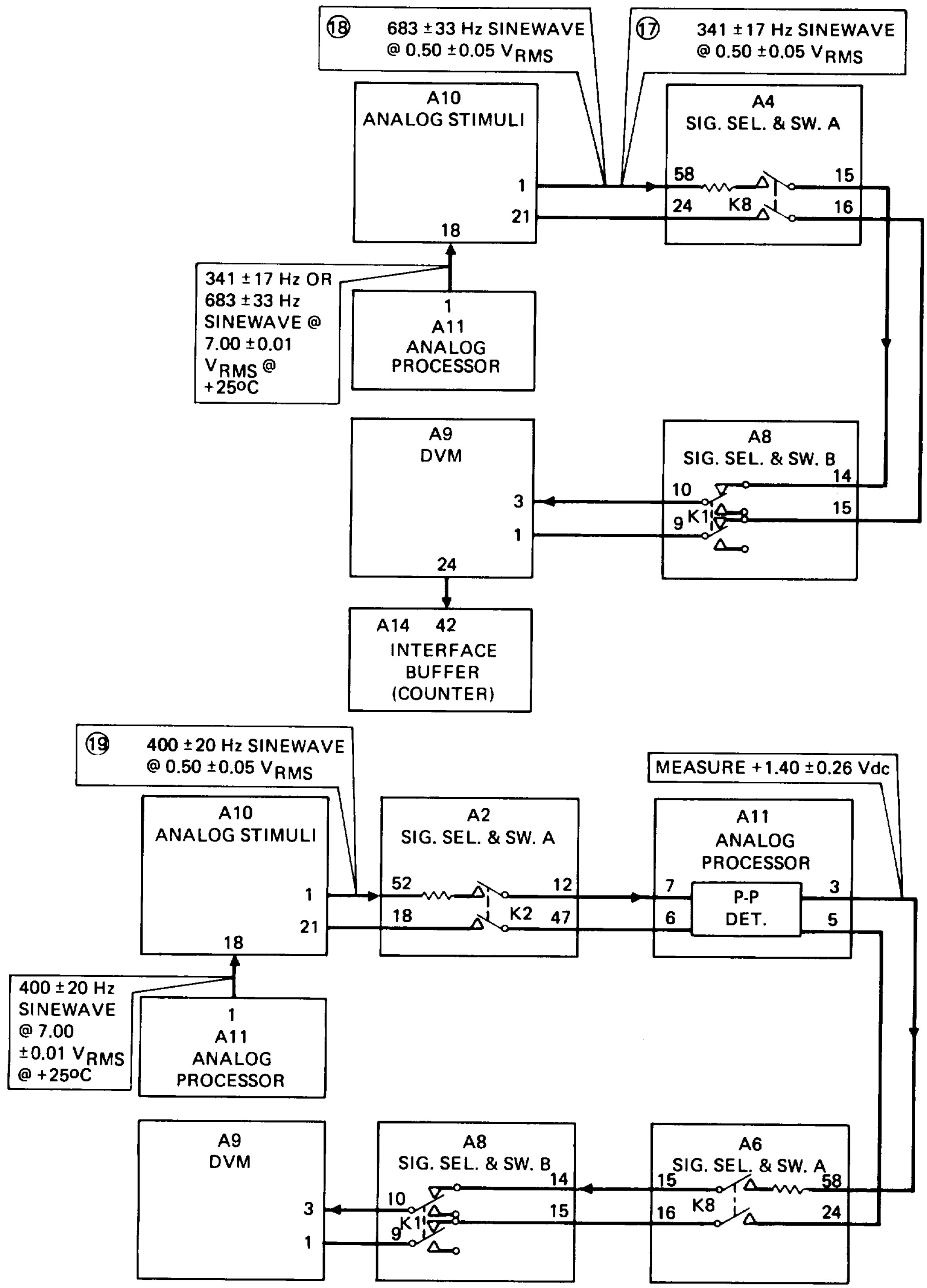


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 3 of 18)

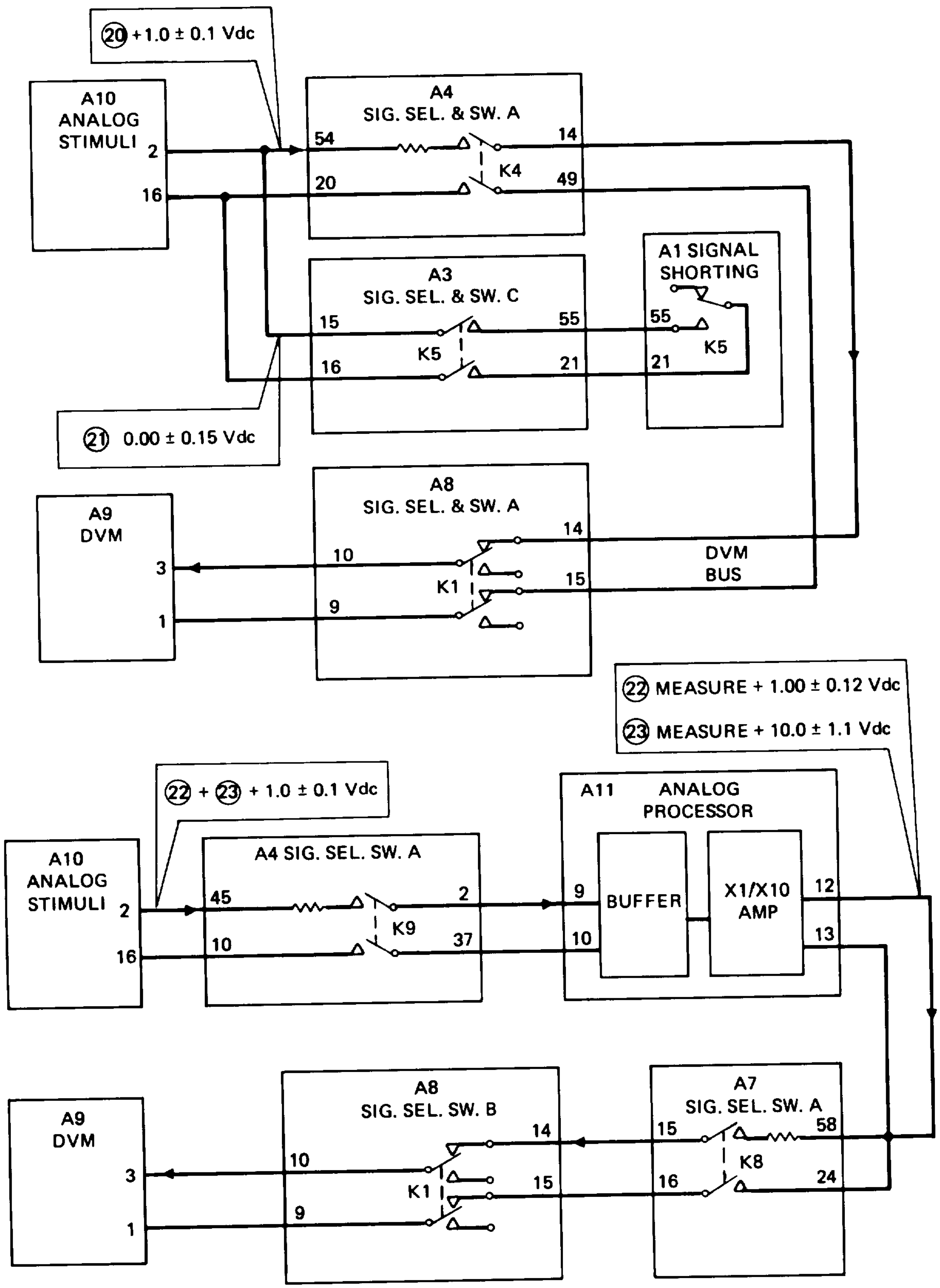
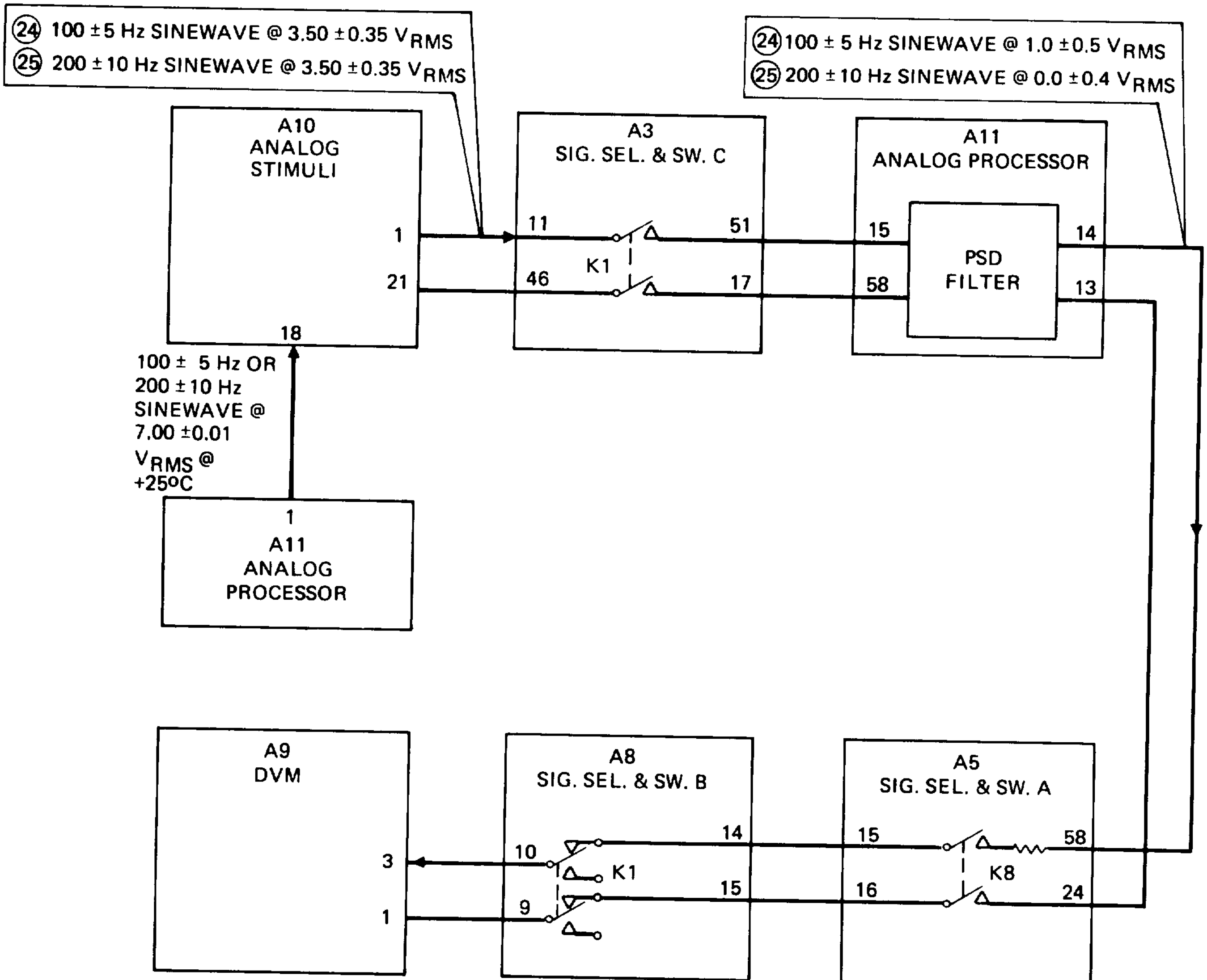


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 4 of 18)



NOTE: (1) STEPS 26 THRU 29 ARE PROGRAMMABLE INTERFACE BIT TESTS INTERNAL TO THE A13 CARD.
(2) STEP 30 (PRINTER) IS NOT USED.

Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 5 of 18)

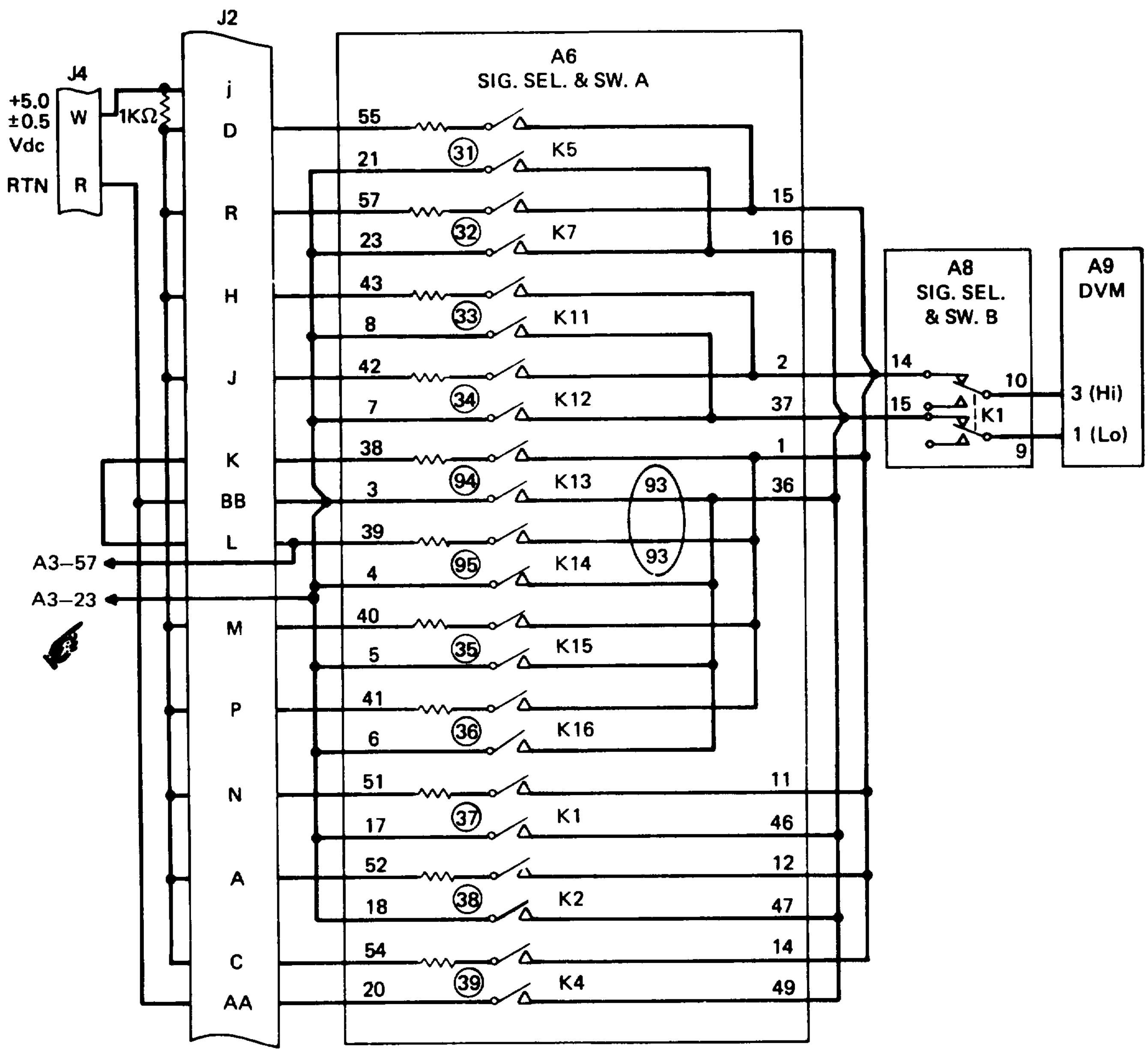


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 6 of 18)

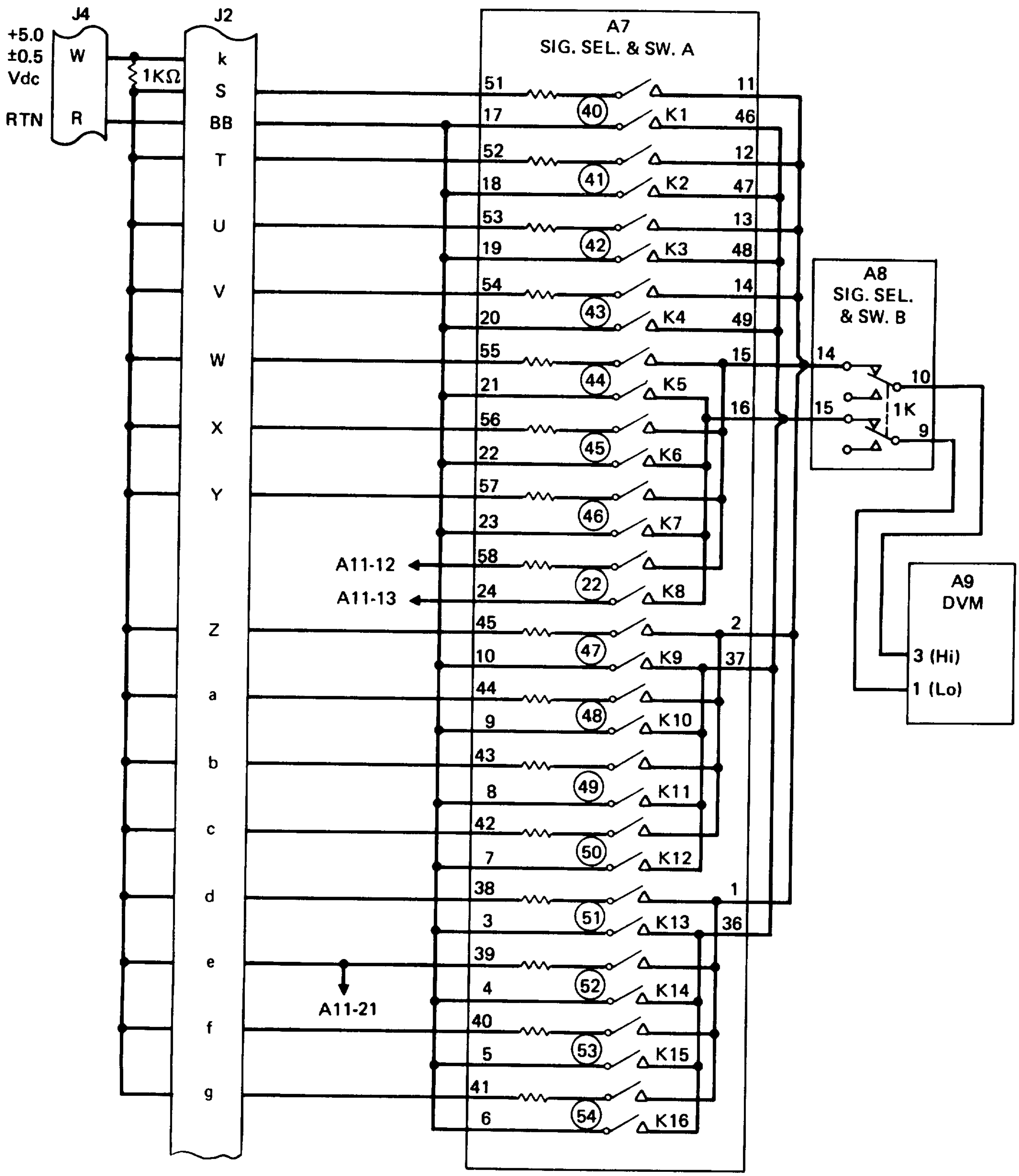


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 7 of 18)

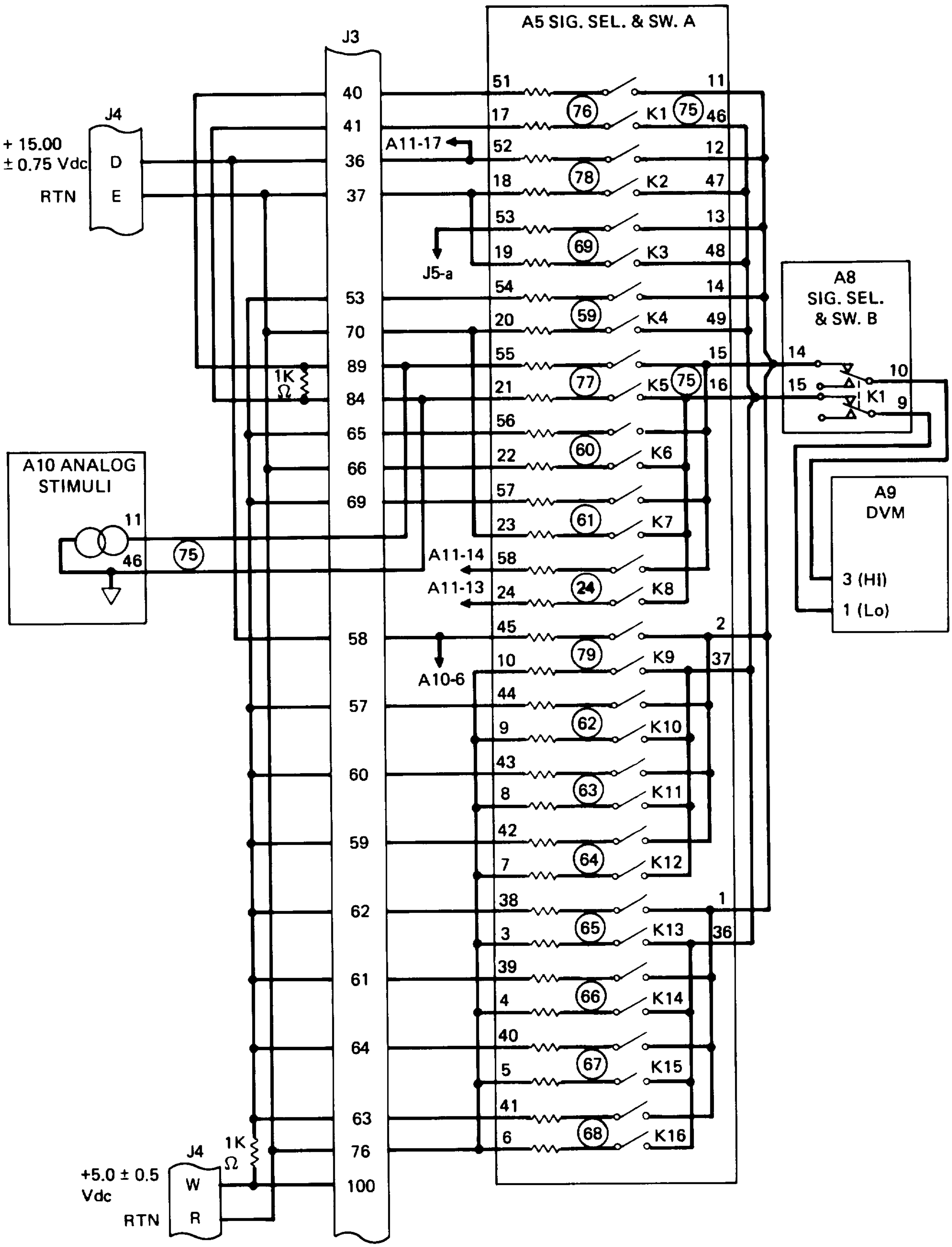


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 8 of 18)

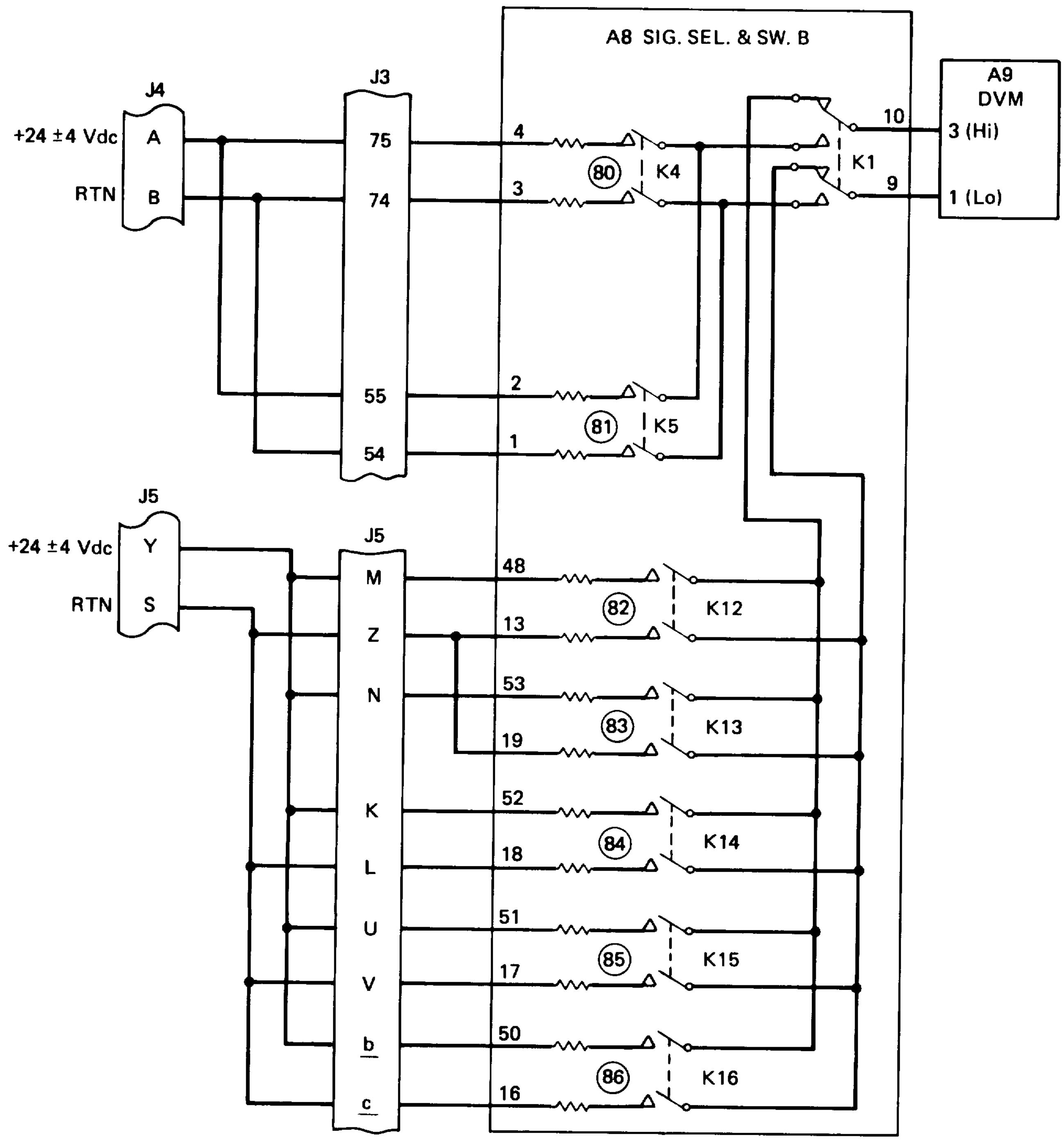


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 9 of 18)

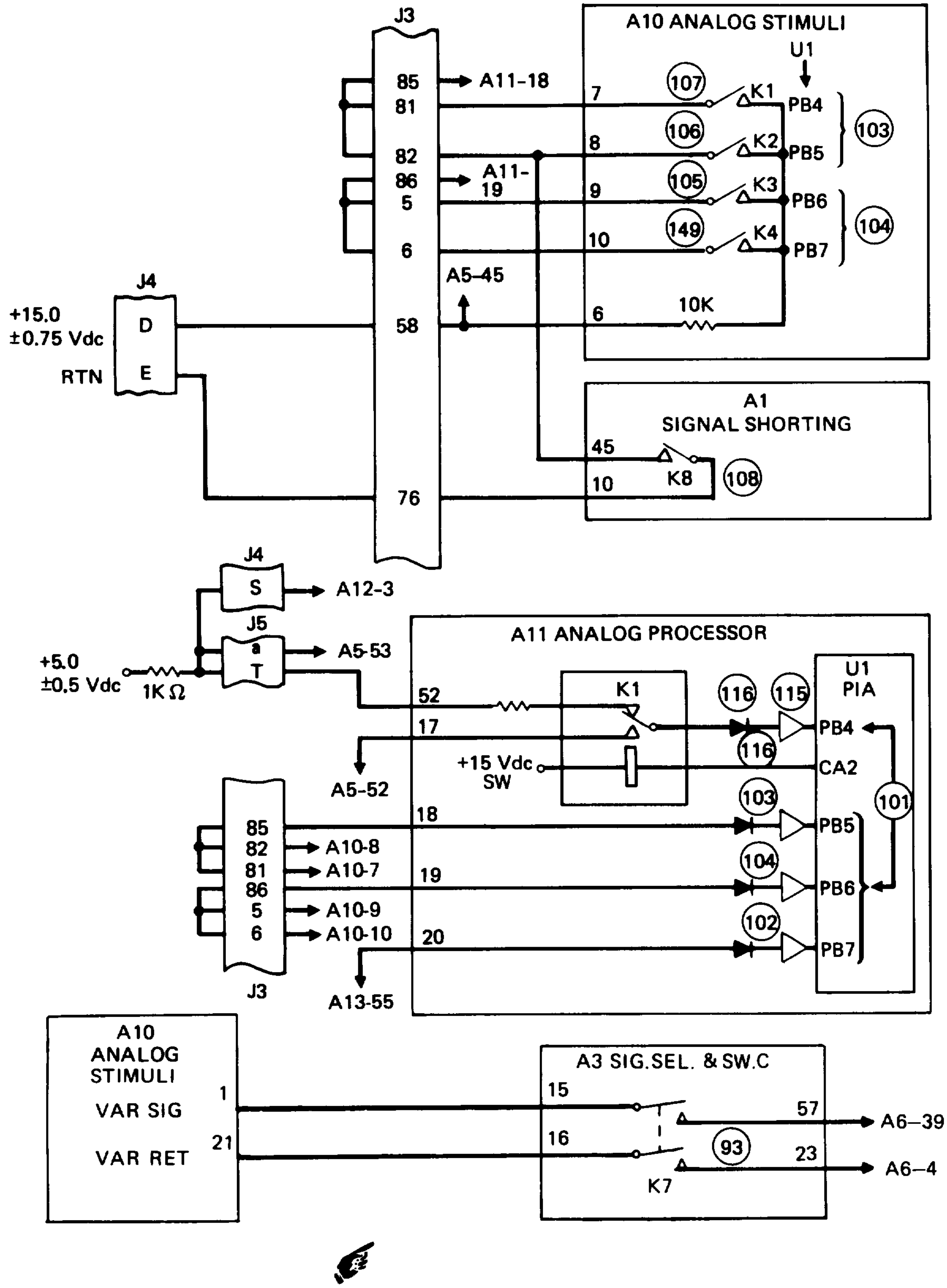


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 10 of 18)

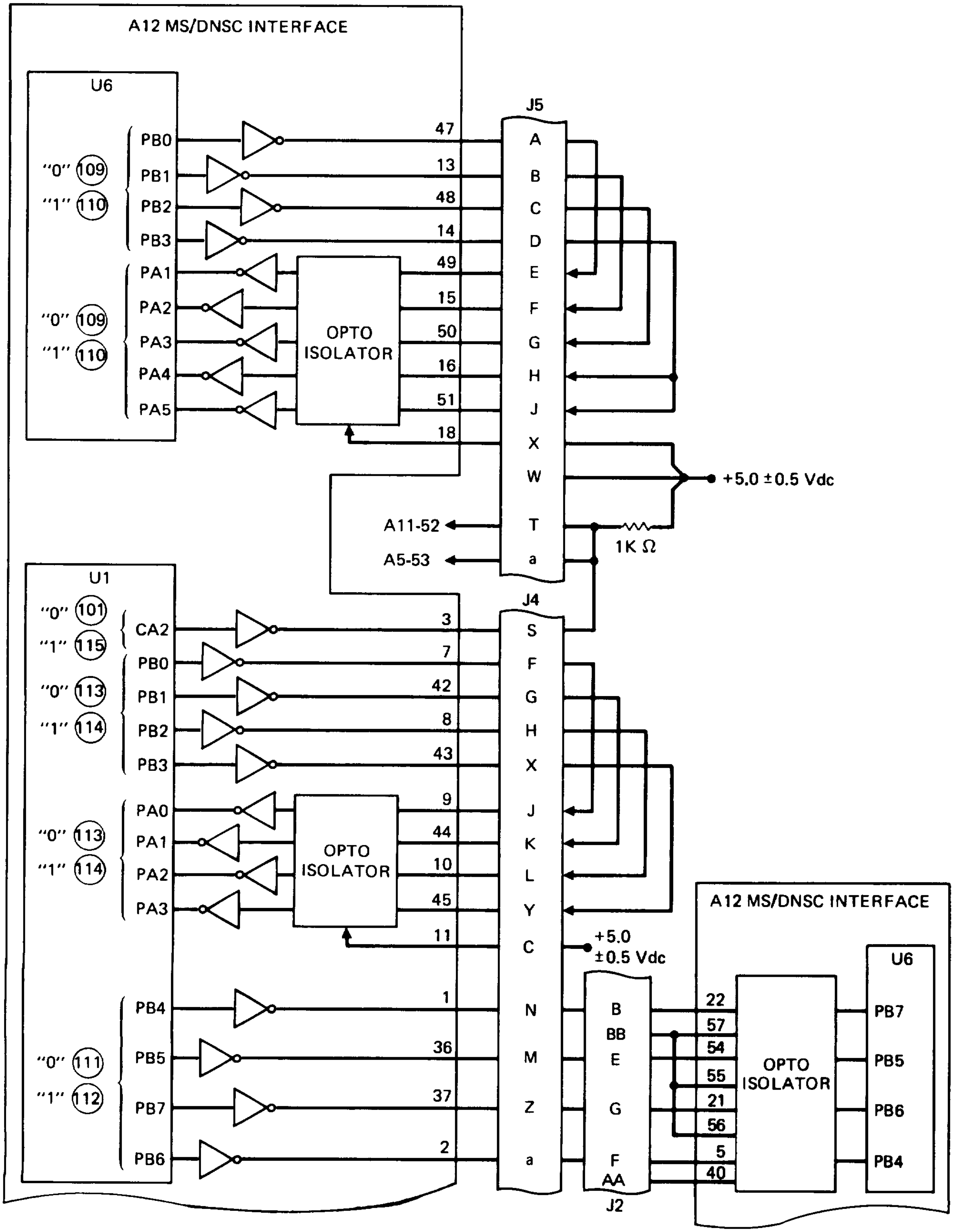


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 11 of 18)

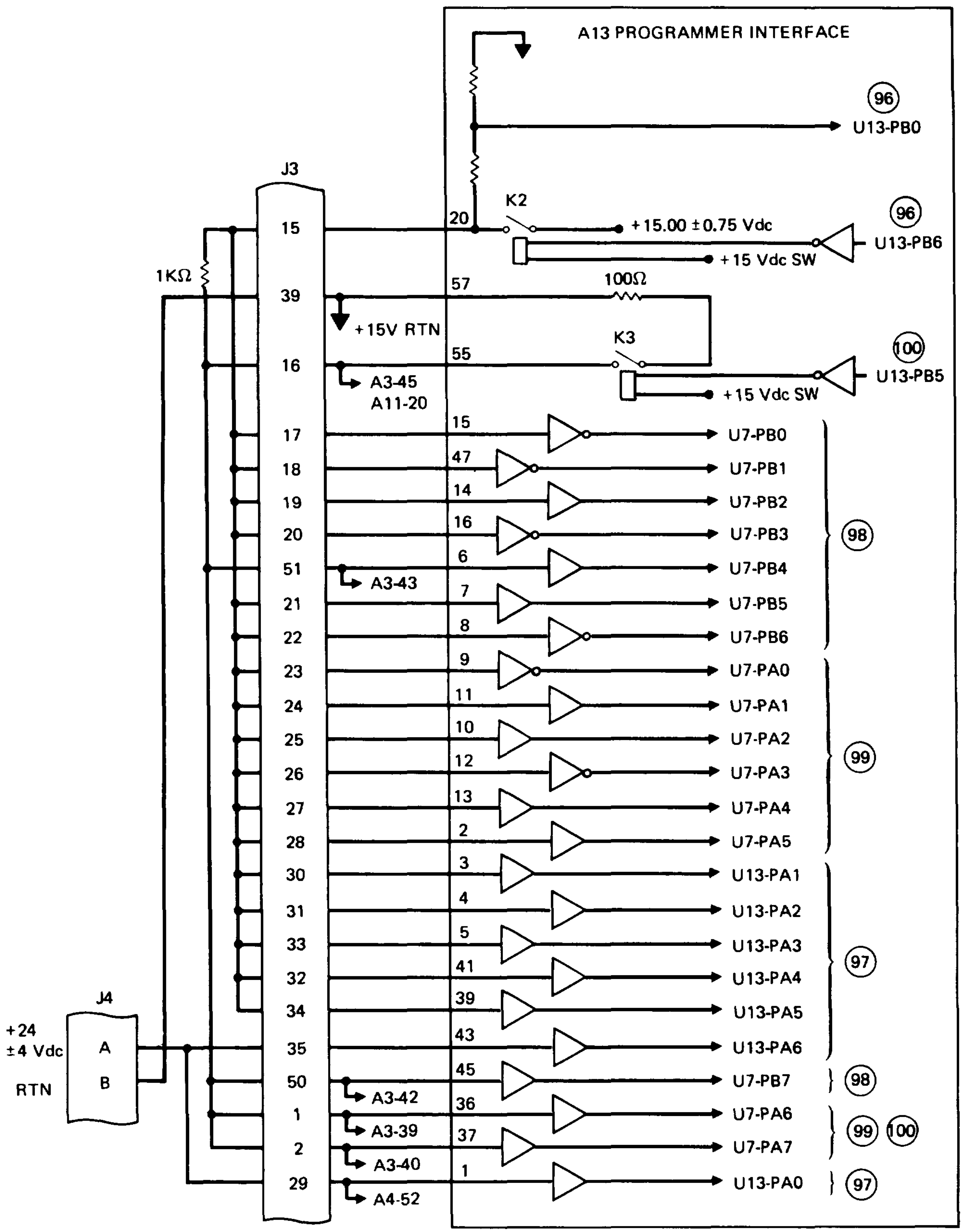


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 12 of 18)

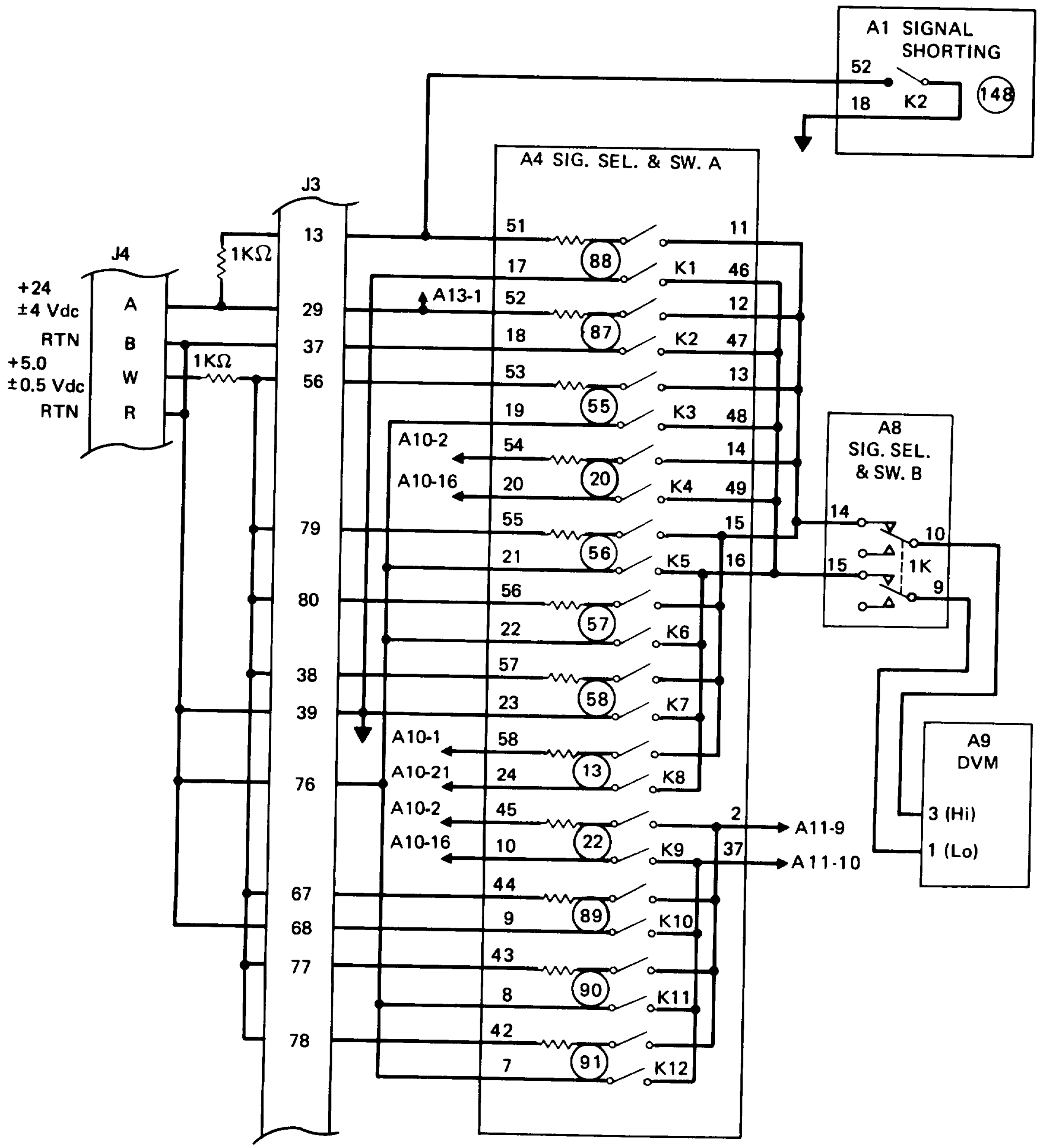


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 13 of 18)

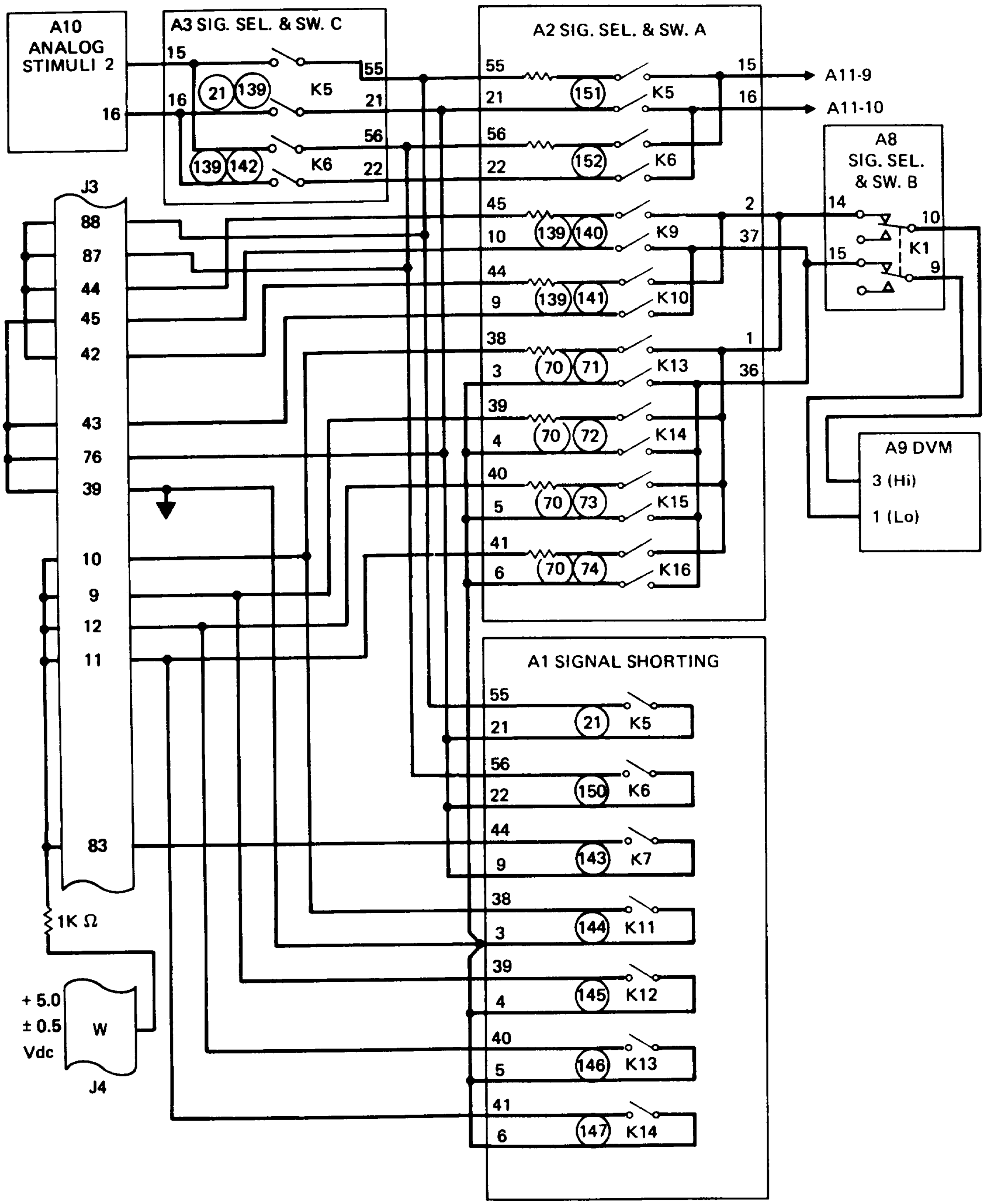


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 14 of 18)

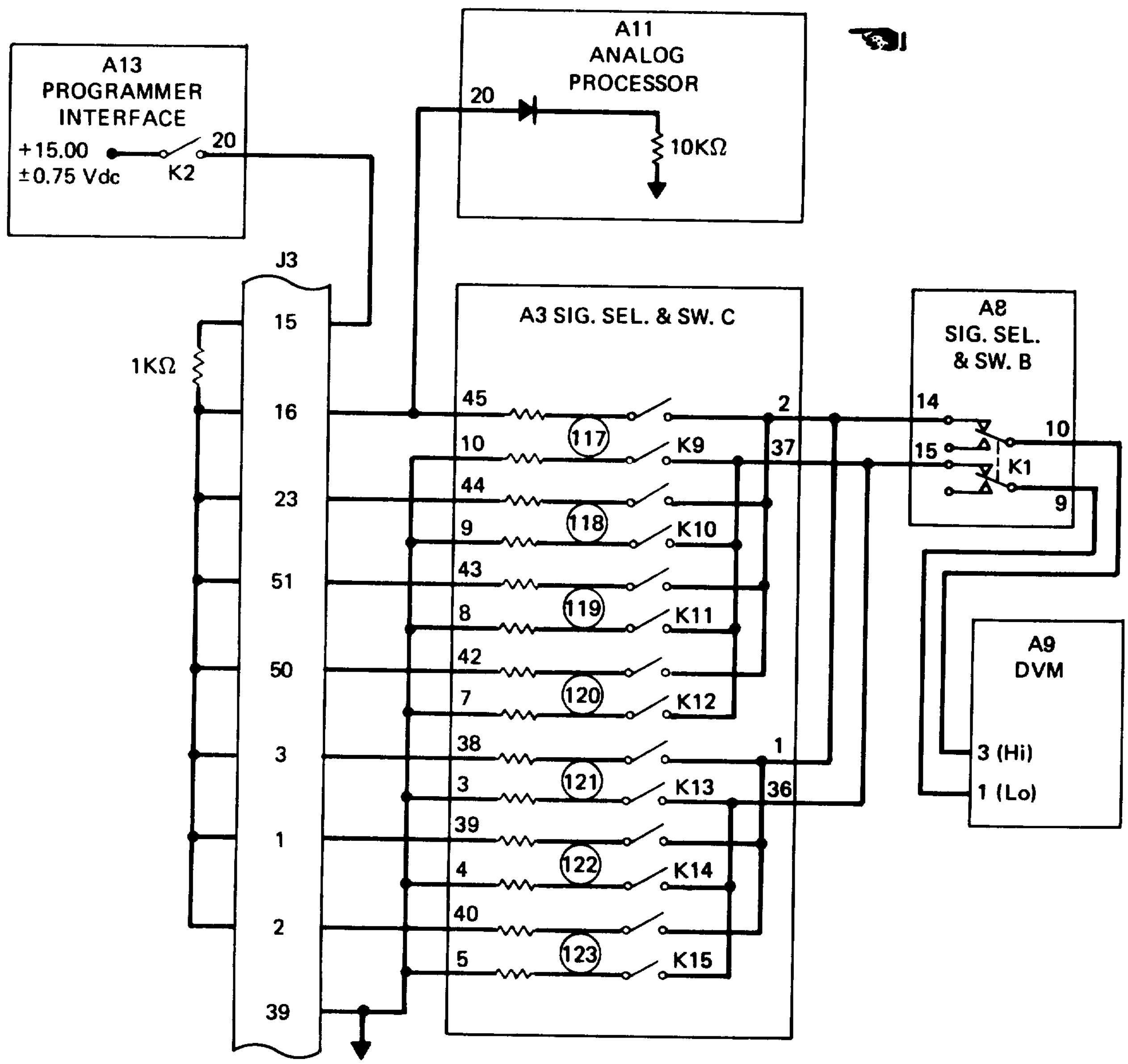


Figure G-1 . Test 90 and Test 91 Logic Diagram (Sheet 15 of 18)

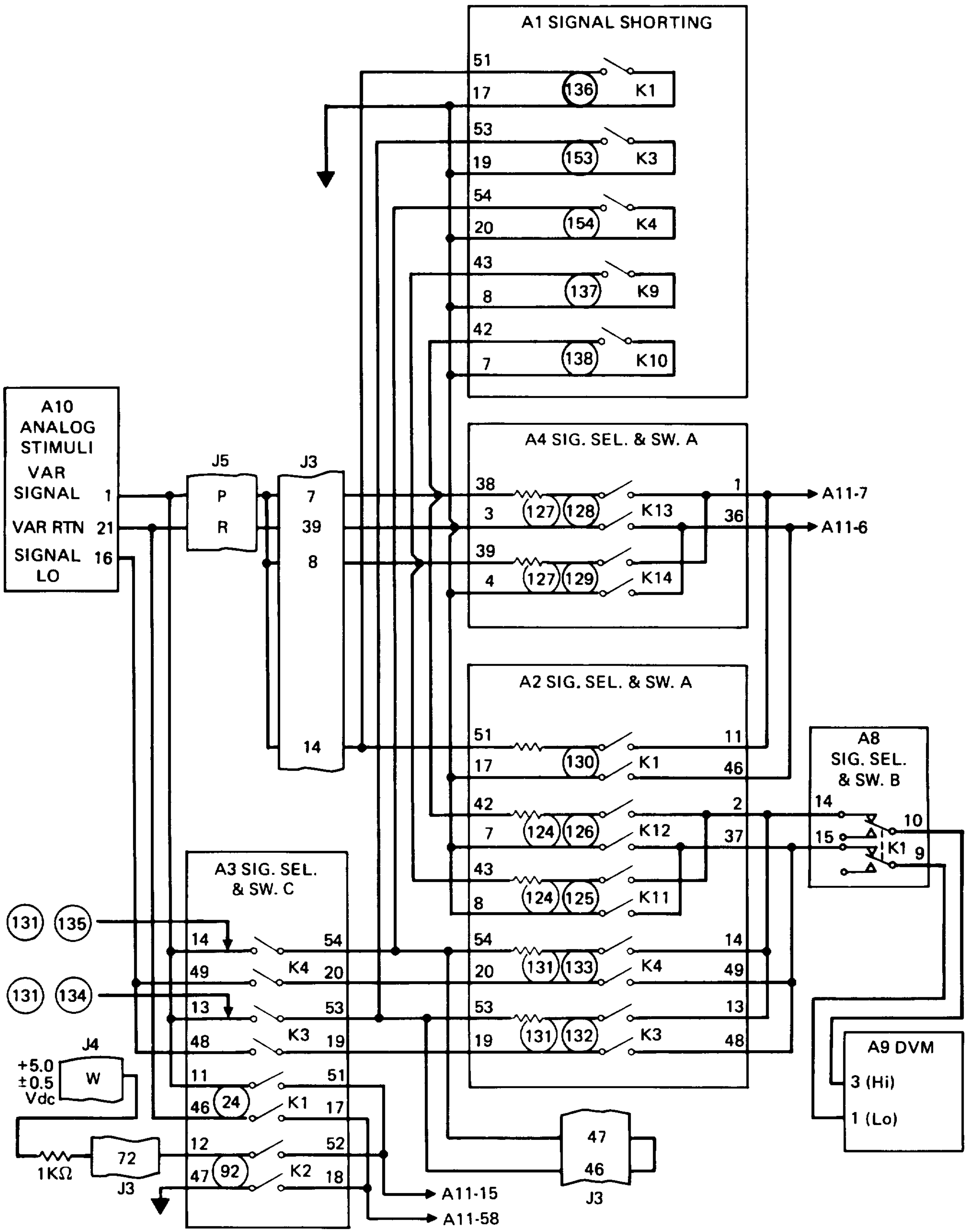


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 16 of 18)

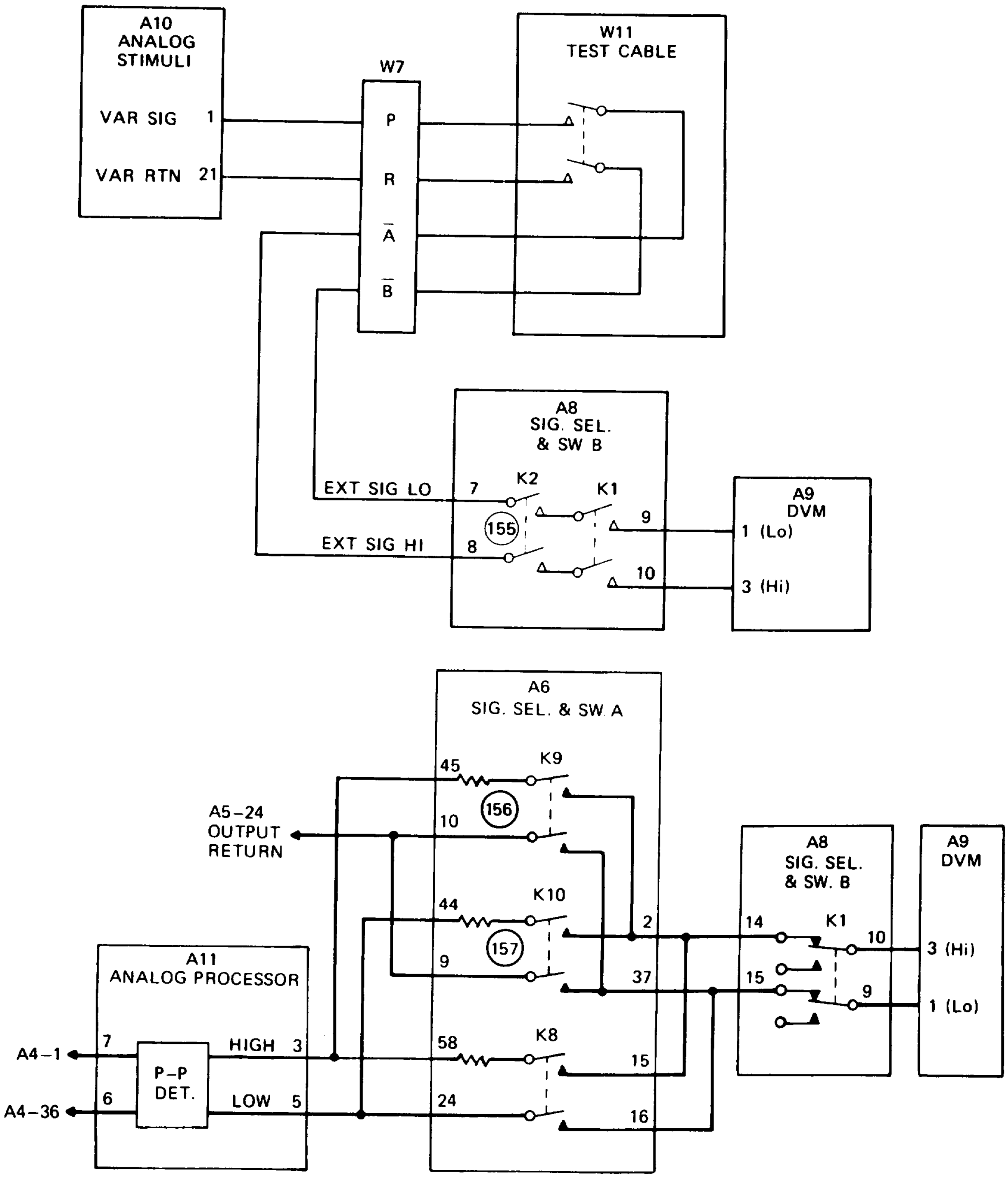


Figure G-1. Test 90 and Test 91 Logic Diagram (Sheet 17 of 18)

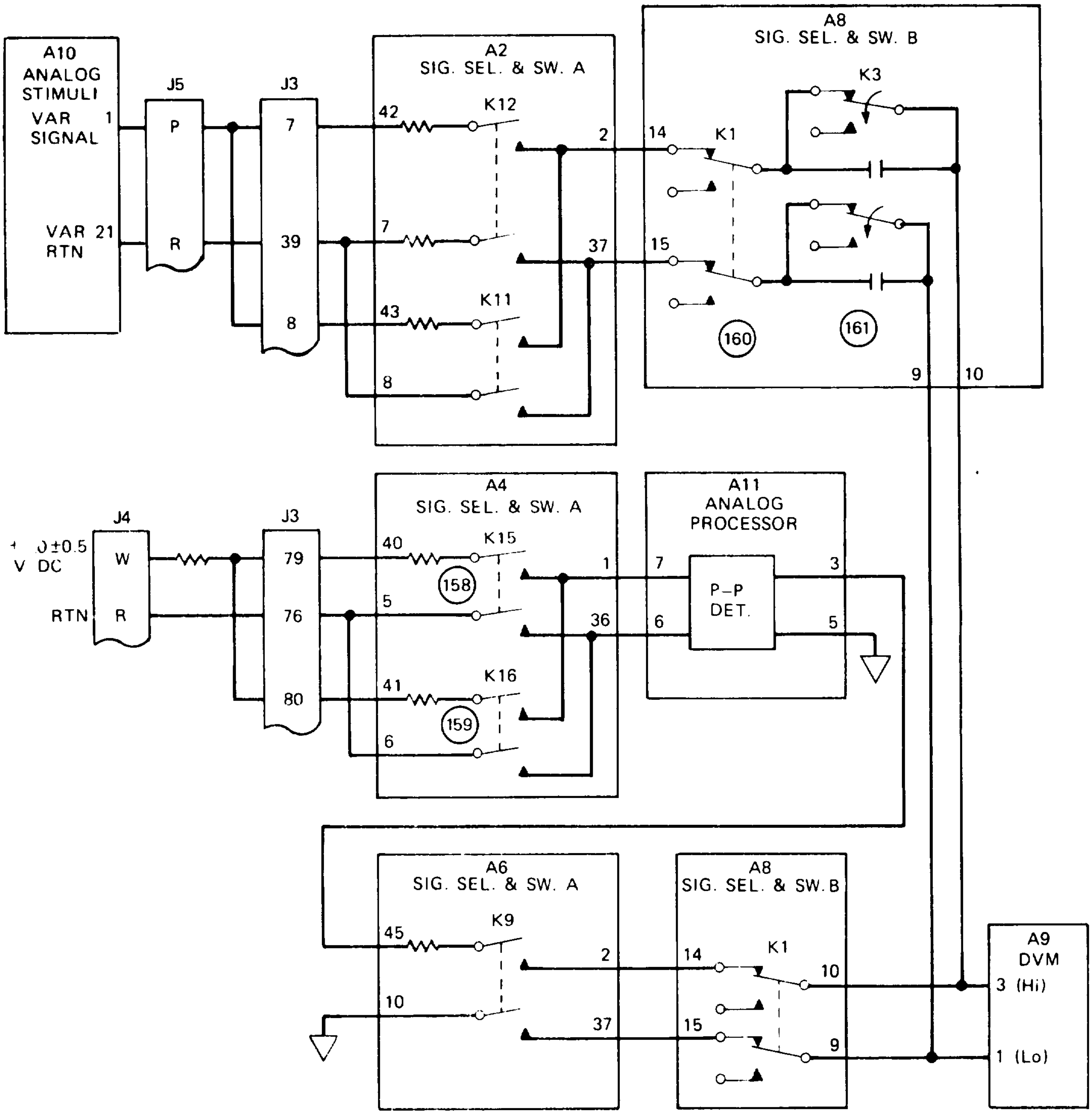


Figure G- 1 . Test 90 and Test 91 logic Diagrams (Sheet 18 of 18)

APPENDIX H

SCHEMATIC DIAGRAMS

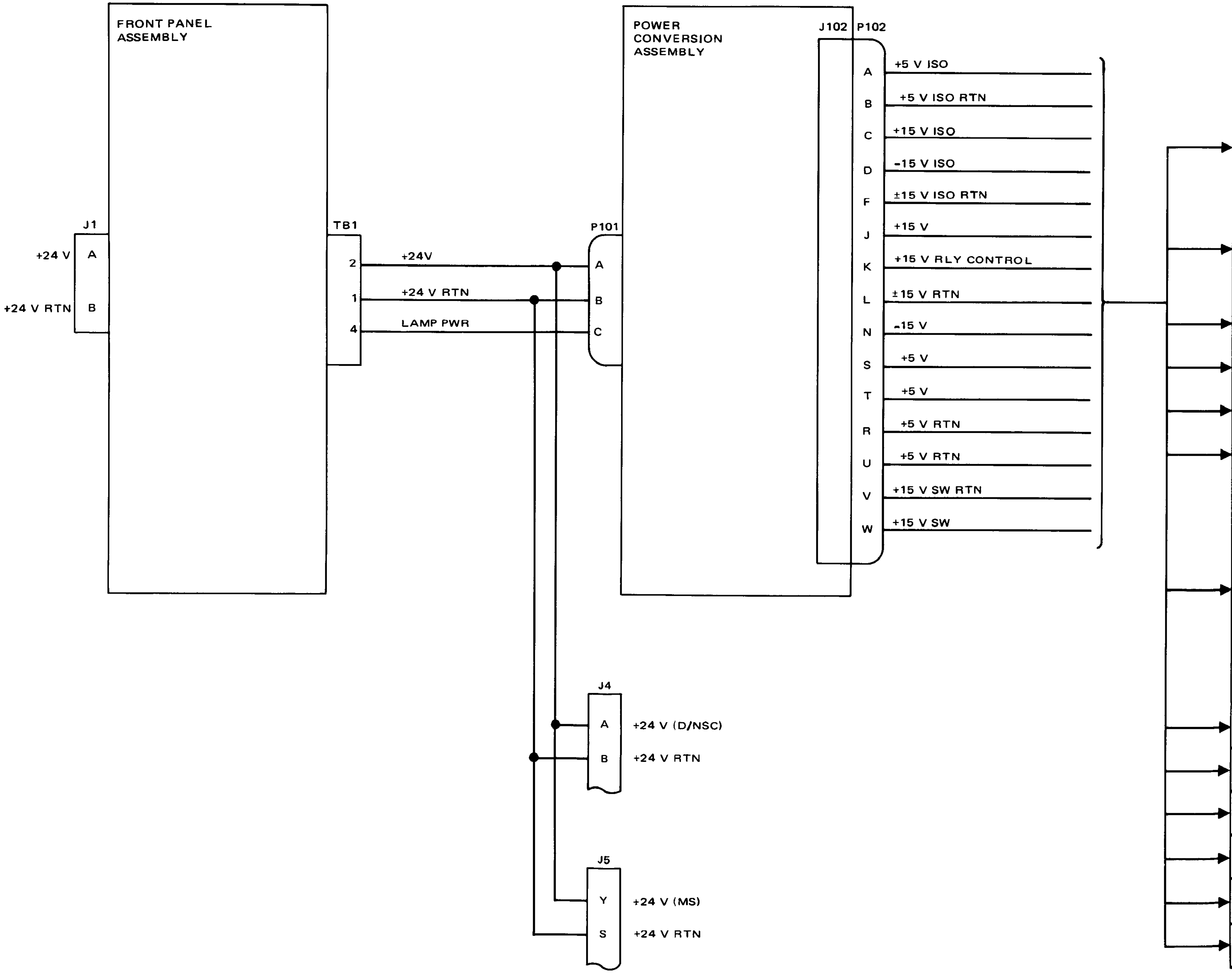
H-1. LIST OF SCHEMATIC DIAGRAMS. The following list identifies the schematic diagrams provided in this appendix. For schematic diagrams of alternate parts not contained in this appendix, refer to TM 9-4935-474-14-2.

Equipment Item	Title	Figure Number
Test Controller	Test Controller Assembly	H-1 (5 Sheets)
	Front Panel Assembly	H-2
	Power Conversion Assembly	H-3
	Terminal Board TB101	H-4
	Keyboard and Filter Assembly	H-5
	Display Card Assembly	H-6 (2 Sheets)
	Signal Shorting Card A1	H-7
	Signal Selection and Switching A Cards A2, A4-A7	H-8
	Signal Selection and Switching C Card A3	H-9
	Signal Selection and Switching B Card A8	H-10

Equipment Item	Title	Figure Number
	DVM Card A9	H-11
	Analog Stimuli Card A10	H-12
	Analog Processor Card A11	H-13 (2 Sheets)
	D/NSC and MS Interface Card A12	H-14 (2 Sheets)
	Programmer Interface Card A13	H-15 (2 Sheets)
	Interface Buffer Card A14	H-16
	Processor Card A15	H-17
	Program Memory 1 Card A16	H-18
	Program Memory 2 Card A17	H-19
	Power Cable W1	H-20 (2 Sheets)
	Turret Cable W2	H-21 (2 Sheets)
	CGE/ISU Cable W3	H-22
	Special Purpose Cable W11	H-22.1
	TC Cable Adapters W13, W14	H-22.2
Day/Night Sight Collimator	D/NSC Assembly	H-23 (2 Sheets)
	Power Supply	H-24

Equipment Item	Title	Figure Number
	Motor Drive Card A1	H-25
	IR LED Control Card A2	H-26
	BIT Monitor Card A3	H-27
	Remote Position Control	H-28
	D/NSC Cable W4	H-29 (2 Sheets)
	D/NSC Cable W12	H-29.1
Missile Simulator	Missile Simulator Assembly	H-30
	Missile Simulator Case Modification/Umbilical Harness Assembly Point-to-Point Wiring List	H-30.1
	DC/DC Power Supply	H-31 (2 Sheets)
	Timing and Demodulation Card Al	H-32
	BIT and Squib Card A2	H-33 (4 Sheets)
	Case Modification	H-33.1
	MS Cable W5	H-34 (2 Sheets)
Alignment Breakout Box	Front Panel Assembly	H-35
	Self Test Cable W7	H-36

Equipment Item	Title	Figure Number
	TC Auxiliary Power Cable W8	H-37
BSA Controller	BSAC Front Panel Assembly	H-38
	BSA Cable W9	H-39
	Power Cable W10	H-40



SIGNAL \ CONNECTOR	P/J102	P/J201	P/J202	P/J204	P/J205	P/J206	J3	J4	J5	J7	DS2, DS3	XA01	XA02	XA03	XA04	XA05, 6, 7	XA08	XA09	XA10, 11, 12	XA13	XA14	XA15	XA16, 17
+5 V PIN	S T			52 53	33 68	21 22 23 29 30 31		W	W	K	1	26	26	26	26	26	26 54	26	26	26	3 26 38	26	26 33 57 58
+5 V RTN PIN	R U			54 55	60 66 67	25 26 27 33 34 35		R		T Y	3	35	35	35	35	35	20 35	35	35	35	35	35	35
+5 V ISO PIN	A				28	19				E								6					
+5 V ISO RTN PIN	B				63	17				V								7					
+15 V PIN	J				32	63 64		D		J							56		24	24			
-15 V PIN	N				31	57 58				H							55		59	59			
± 15 V RTN PIN	L	4 18 20 22 24 26 28 30 42 44 46 48 66	2 4 64 68		39 65	60 61	39	E		X		3 4 5 6 7 8 17 18	3 4 5 6 7 8 17	3 4 5 7 8 10 17 47	3 4 17 23		21 22		23 58	23 57 58			
+15 V SW PIN	W					66 67						25	25	25	25	25	25	25	25	25			
+15 V SW RTN PIN	V					69 70						70	70	70	70	70	70	70	70	70			
+15 V ISO PIN	C					51				F								9					
-15 V ISO PIN	D					55				G								10					
± 15 V ISO RTN PIN	F					53				W								8					
+15 V RELAY CONTROL PIN	K					49											69						

Figure H-1. Test Controller Assembly Schematic Diagram
(Sheet 1 of 5)

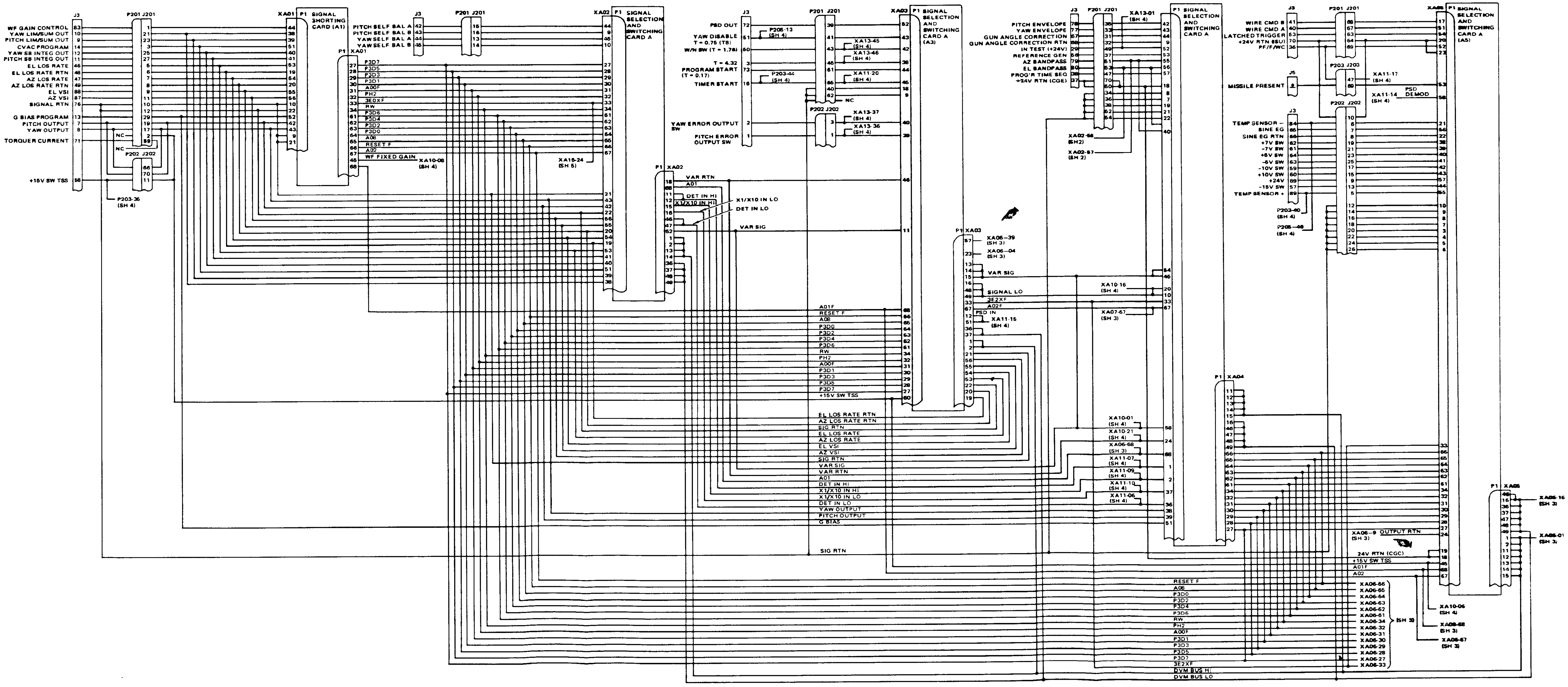


Figure H-1. Test Controller Assembly Schematic Diagram
(Sheet 2 of 5)

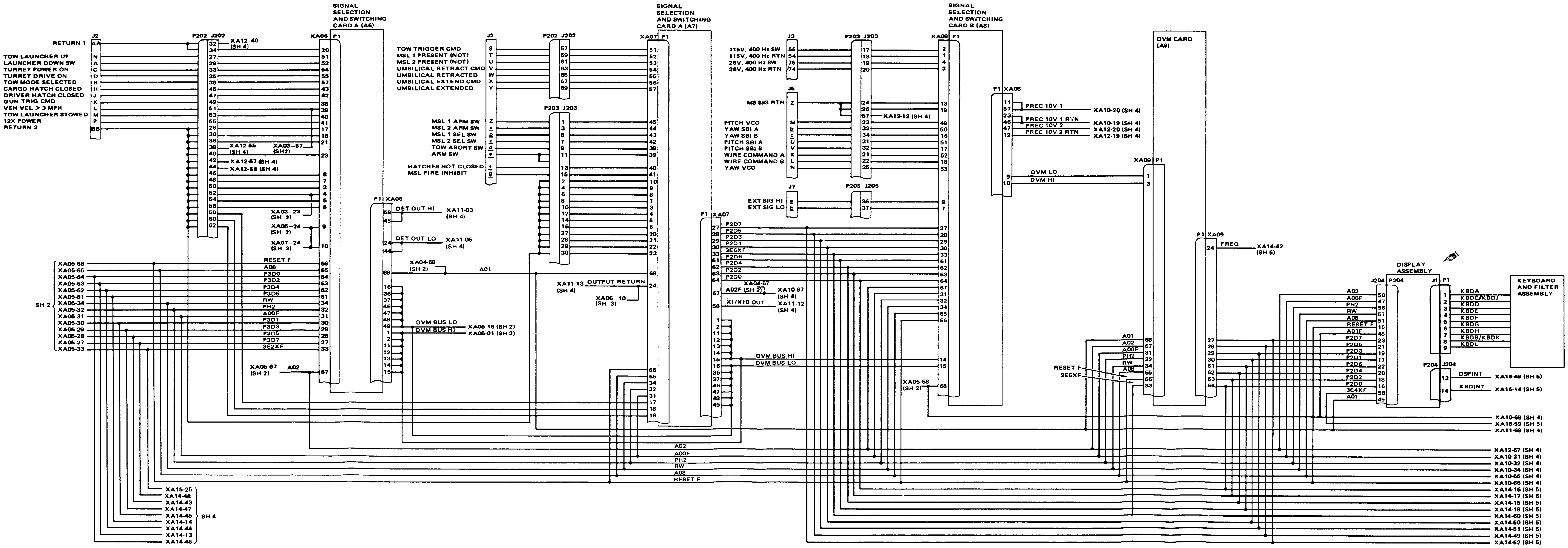


Figure H-1. Test Controller Assembly Schematic Diagram
(Sheet 3 of 5)

Figure H-1. Test Controller Assembly Schematic Diagram
(Sheet 4 of 5)

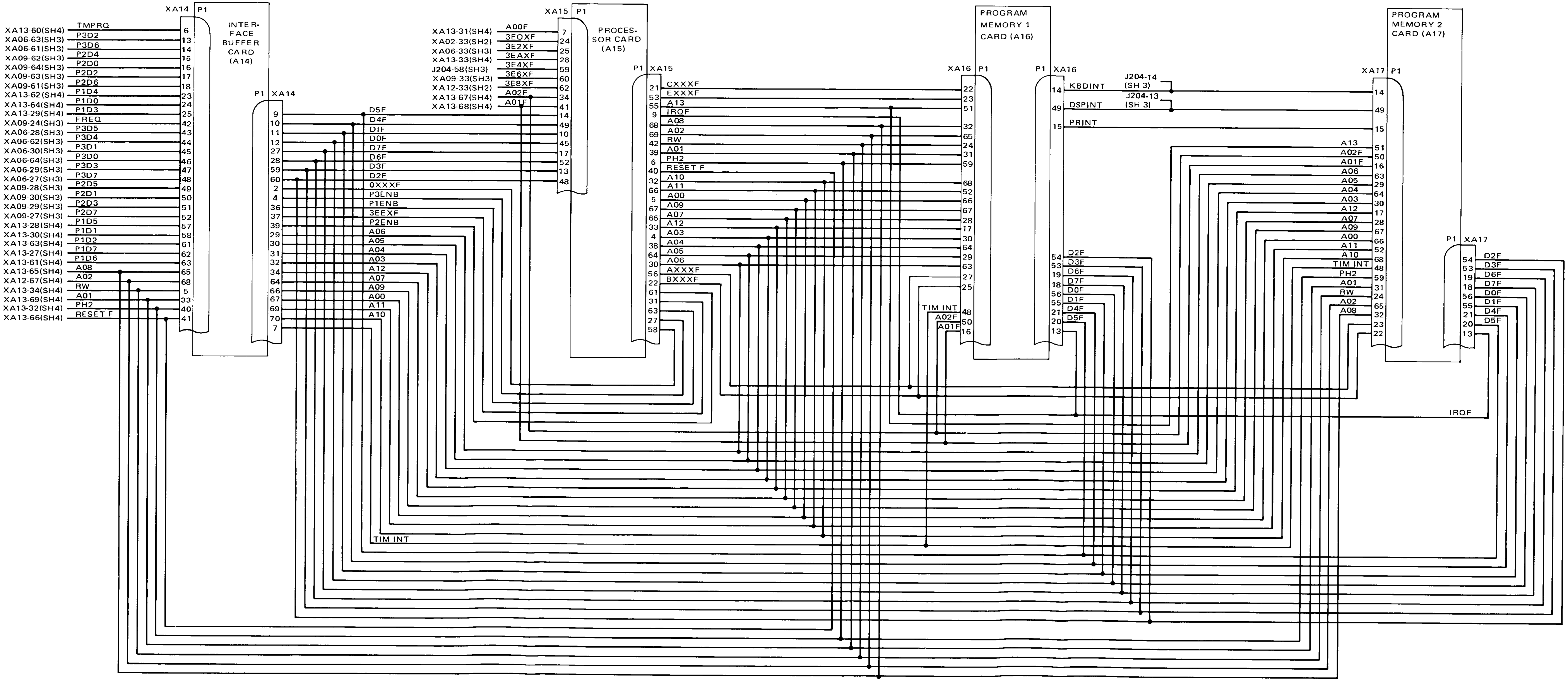


Figure H-1. Test Controller Assembly Schematic Diagram (Sheet 5 of 5)

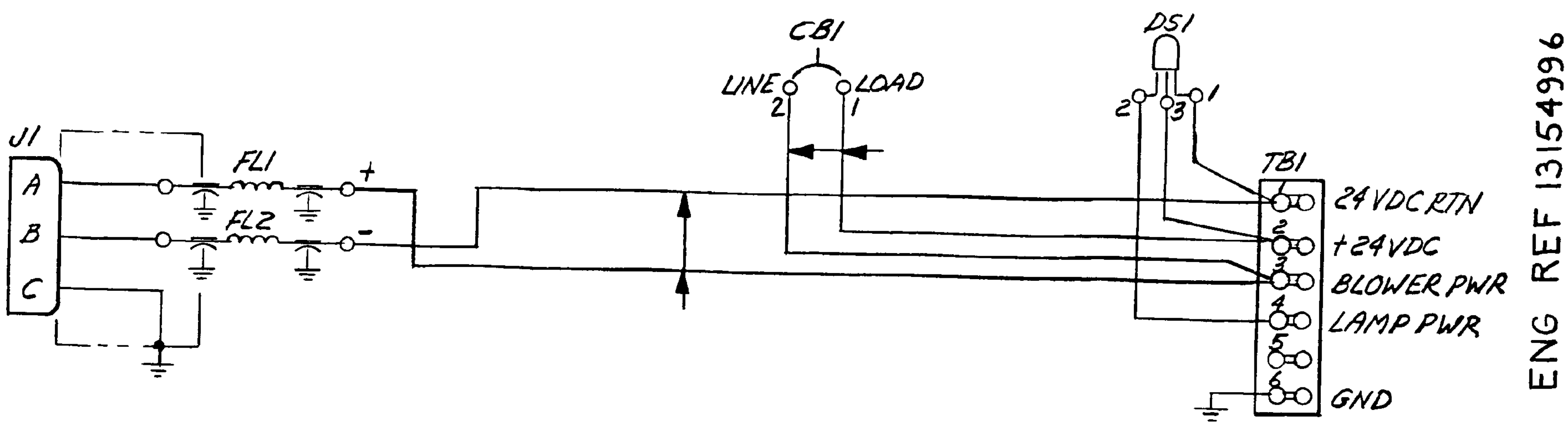


Figure H-2. Front Panel Assembly Schematic Diagram

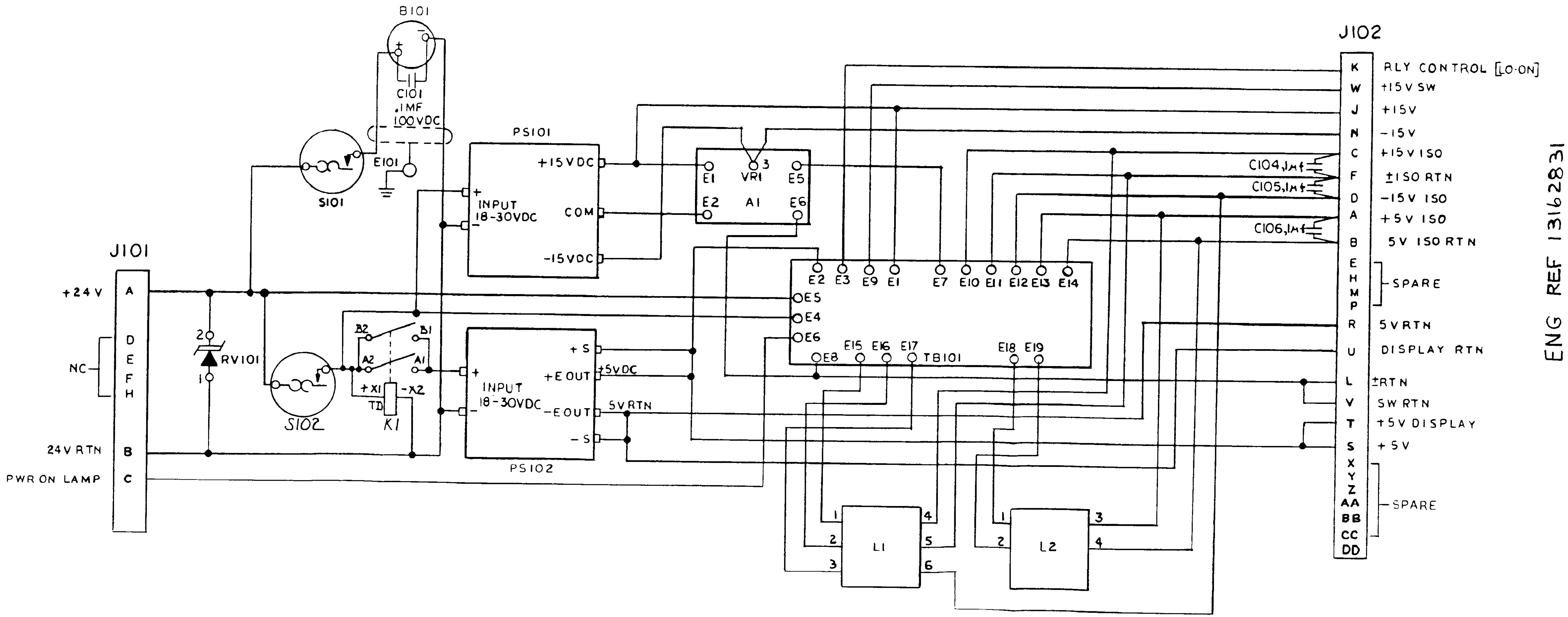
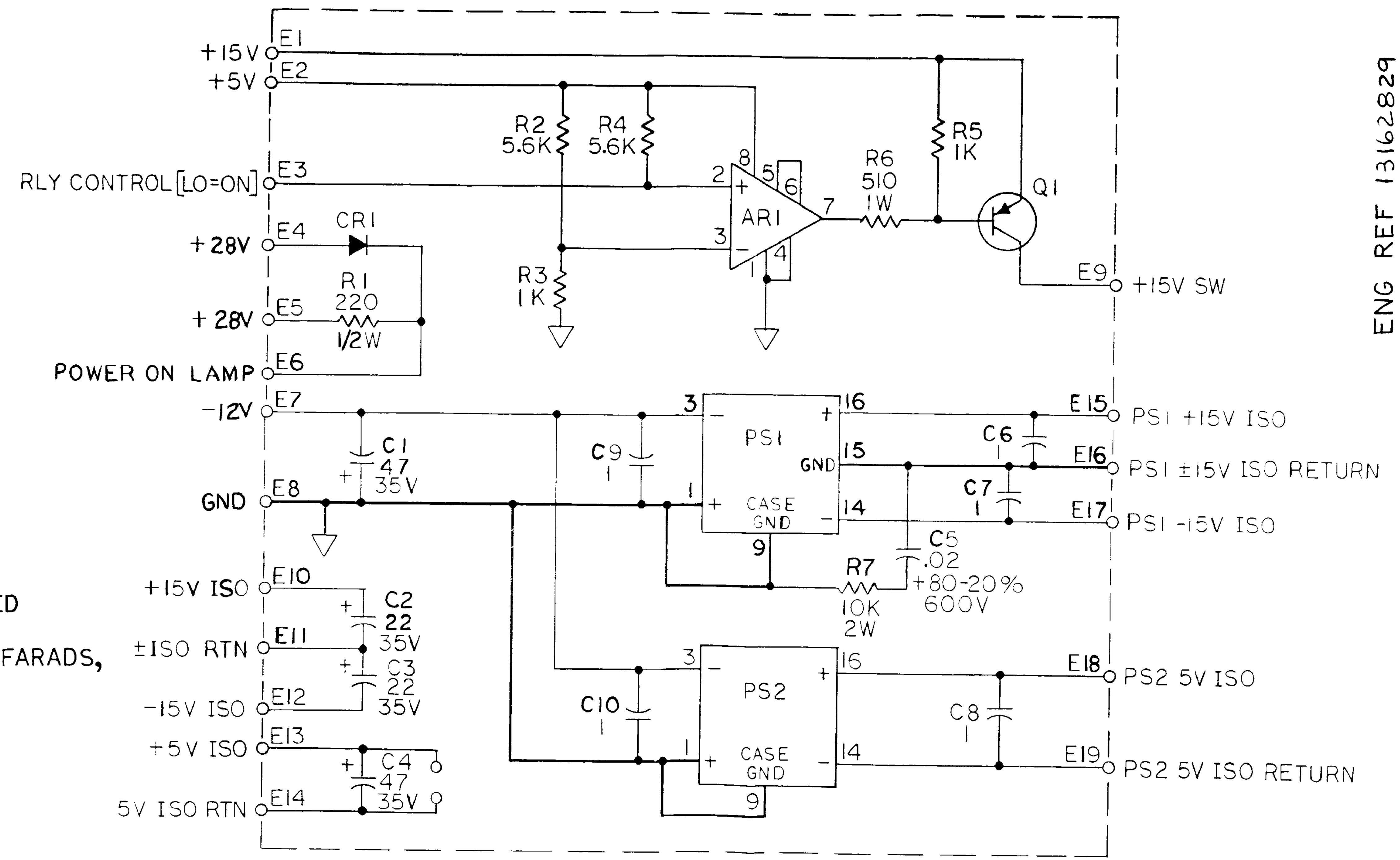


Figure H-3. Power Conversion Assembly Schematic Diagram



NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROFARADS, ±10%, 50V
2. RESISTOR VALUES ARE IN OHMS, 1/8 W, 5%.

Figure H-4. Terminal Board TB101 Schematic Diagram

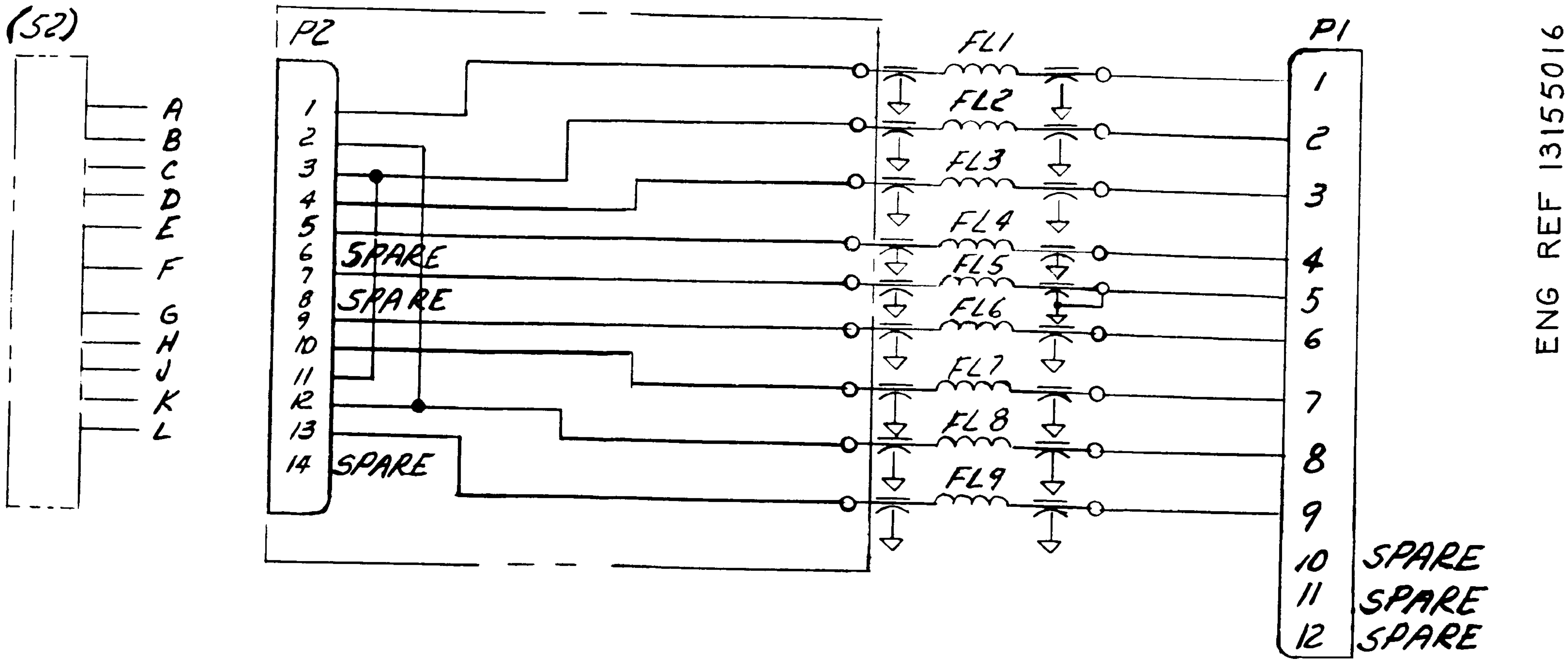


Figure H-5. Keyboard and Filter Assembly Schematic Diagram

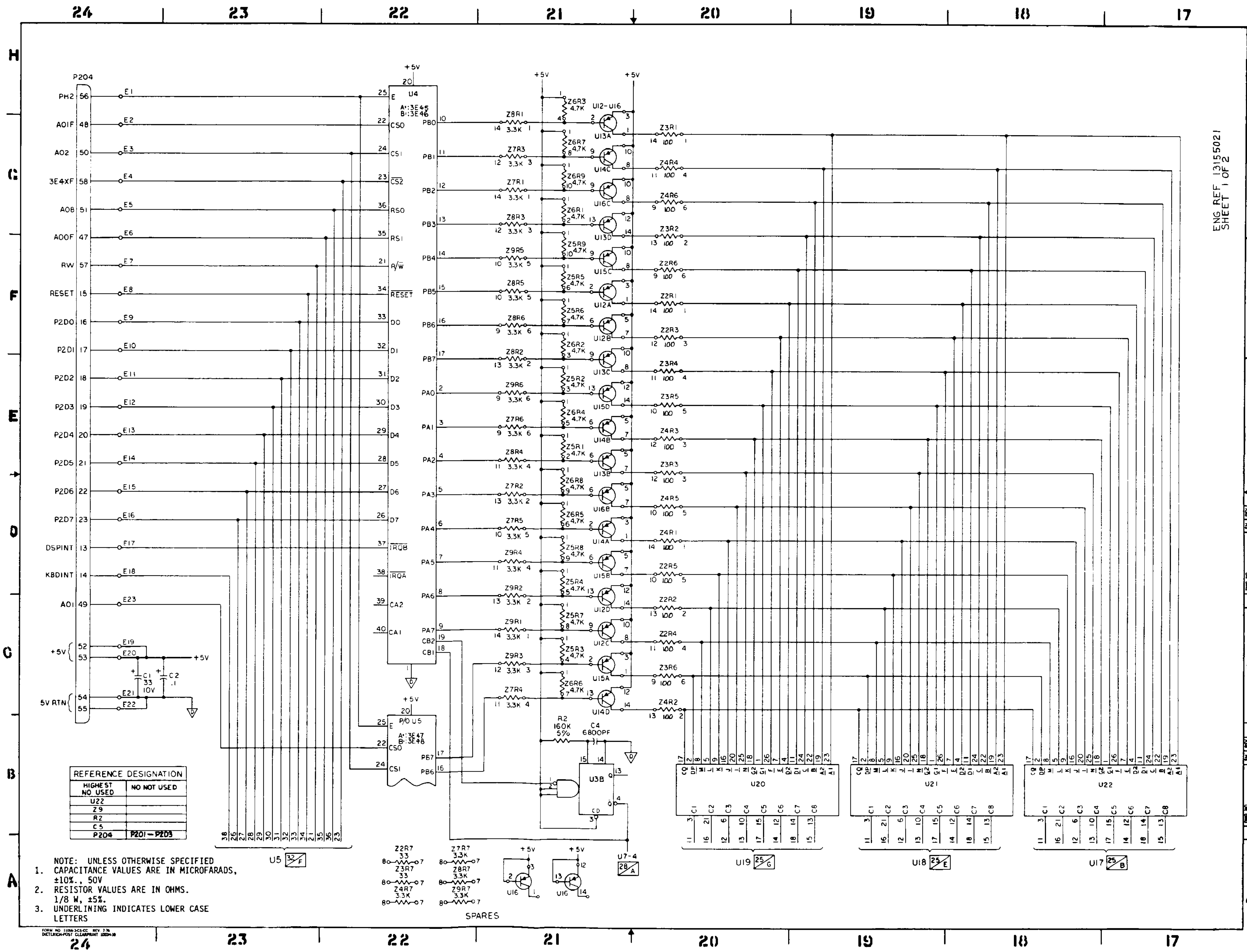


Figure H-6. Display Card Assembly Schematic Diagram
(Sheet 1 of 2)

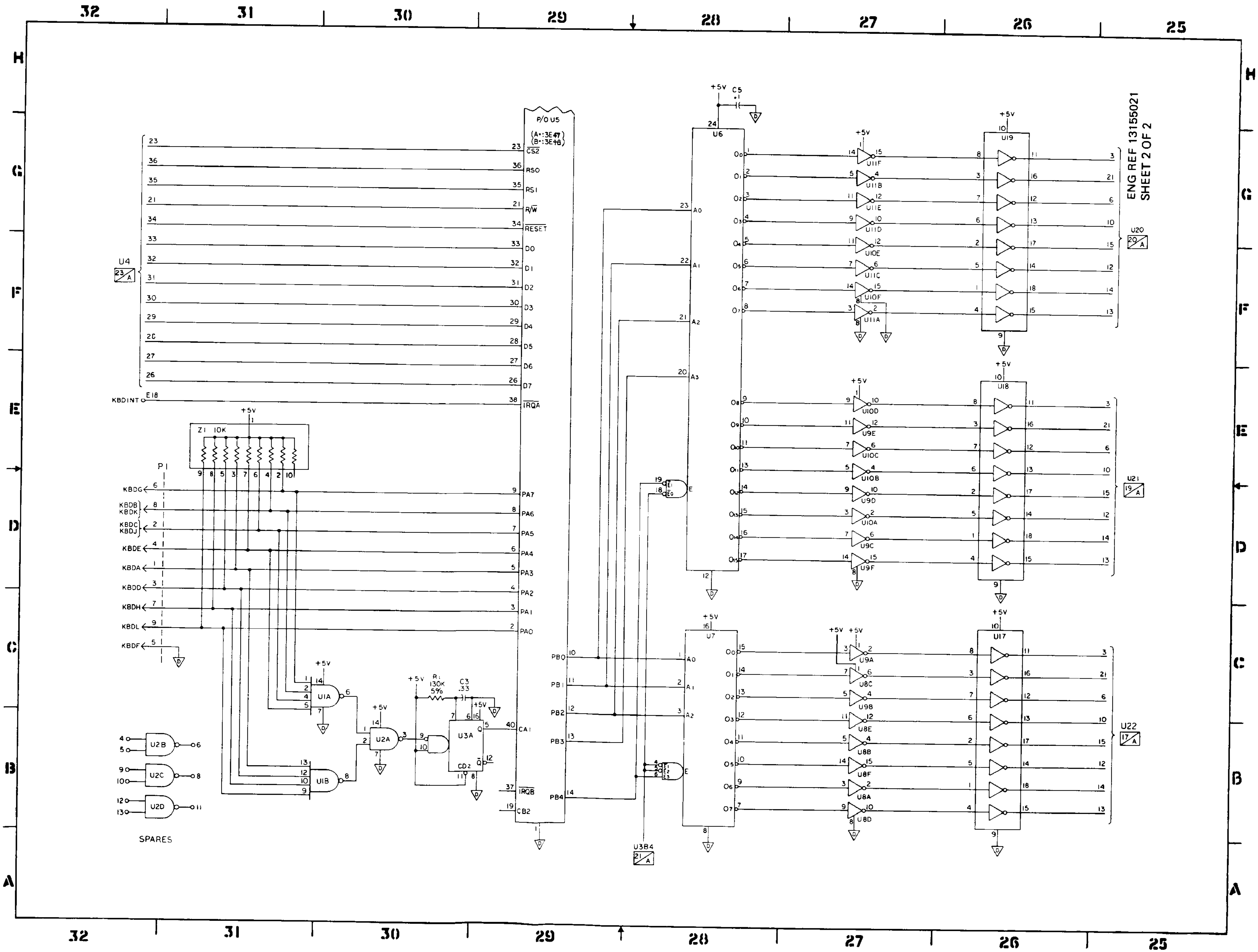
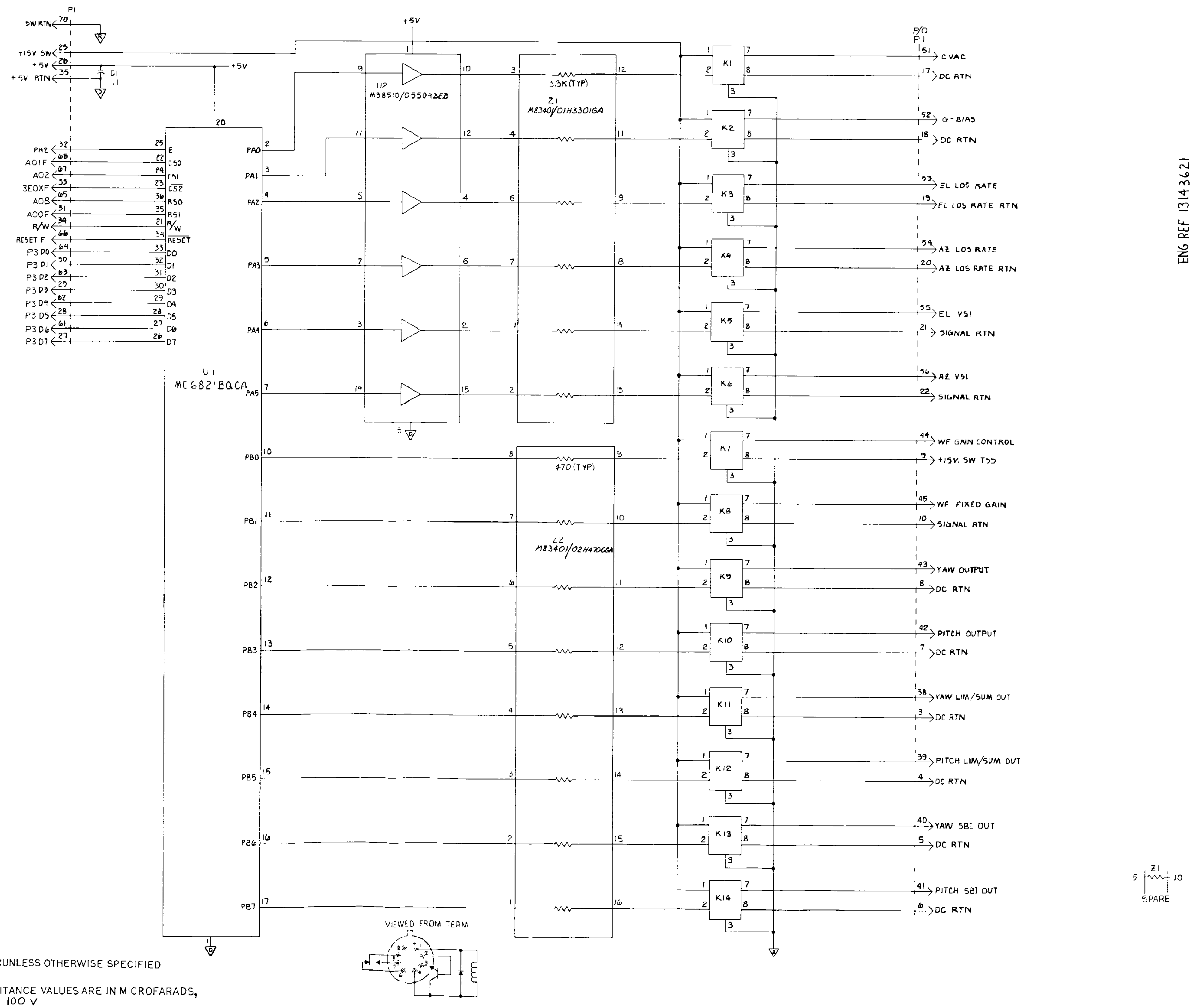


Figure H-6. Display Card Assembly Schematic Diagram (Sheet 2 of 2)



NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROFARADS, ±10%, 100 V

Figure H-7. Signal Shorting Card A1 Schematic Diagram

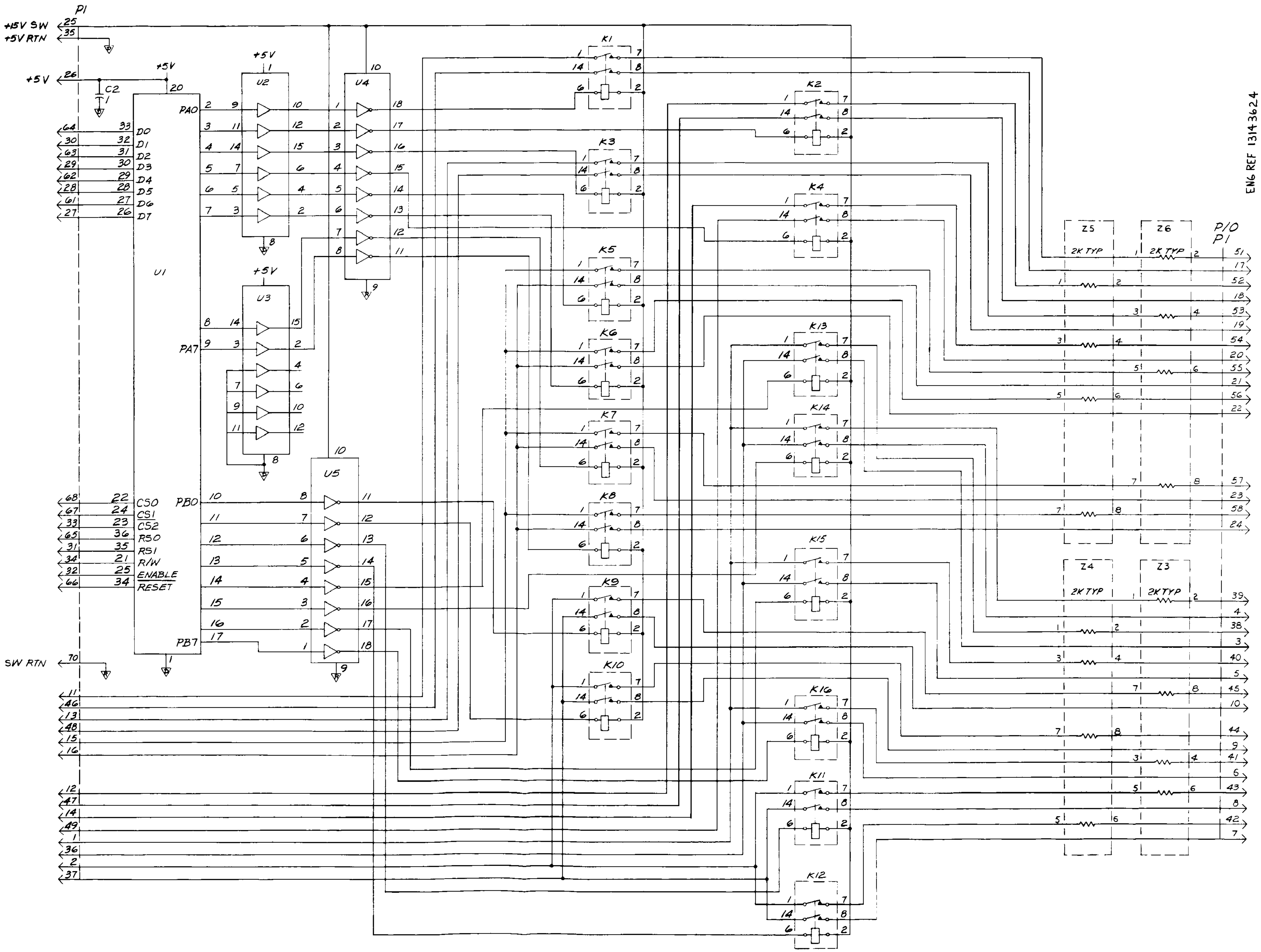


Figure H-8. Signal Selection and Switching A Cards A2, A4-A7 Schematic Diagram

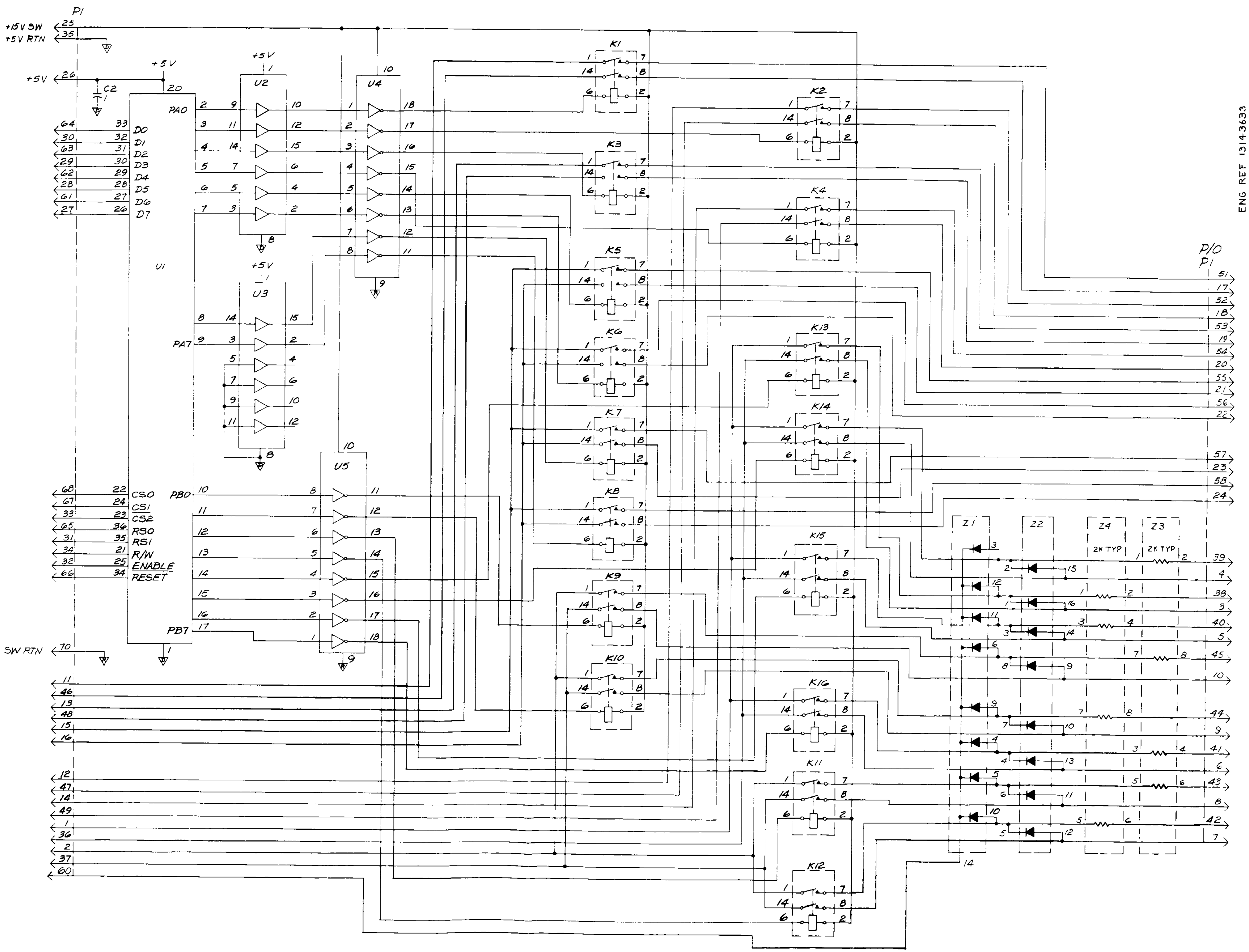


Figure H-9. Signal Selection and Switching C Card A3 Schematic Diagram

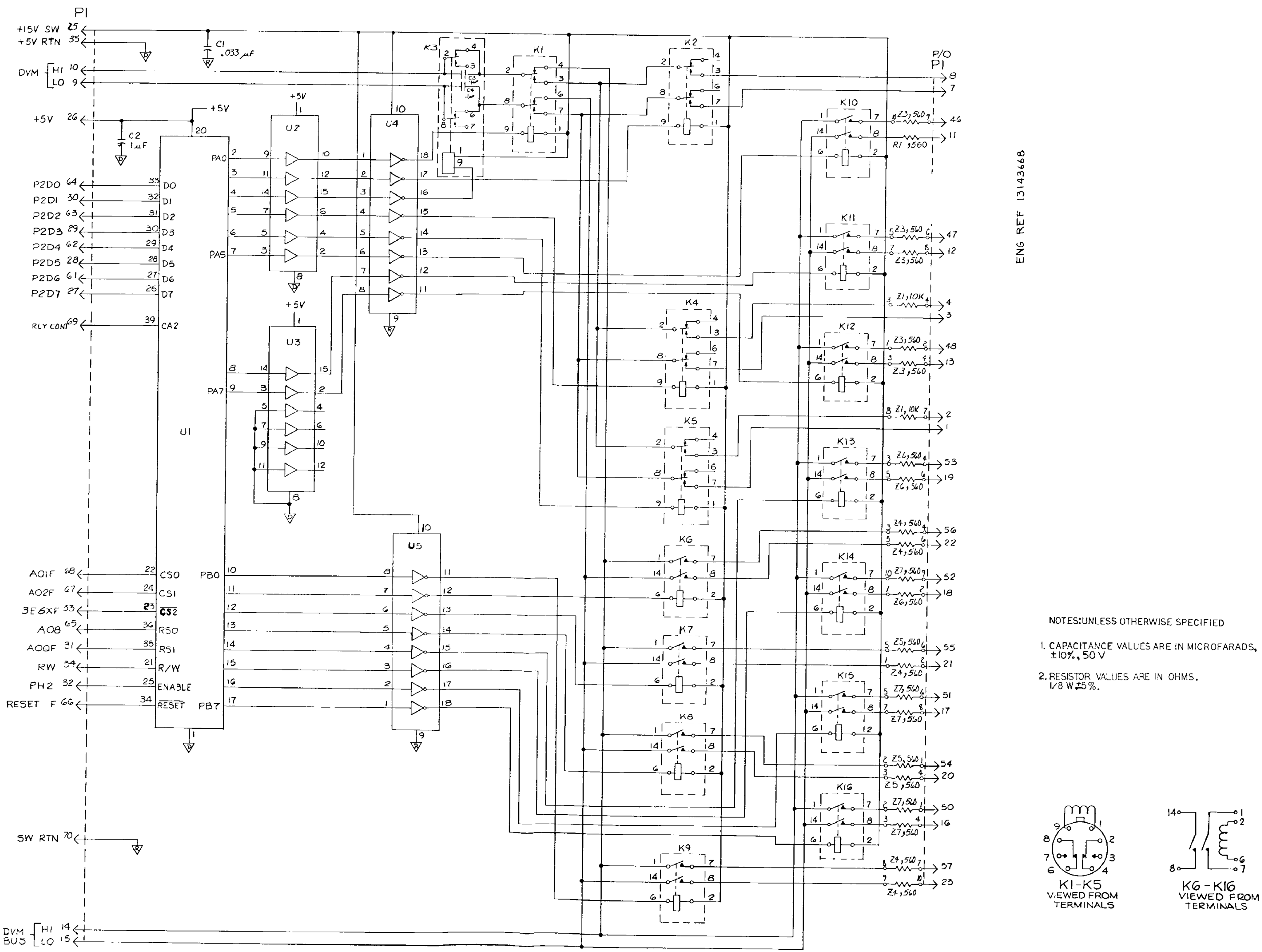
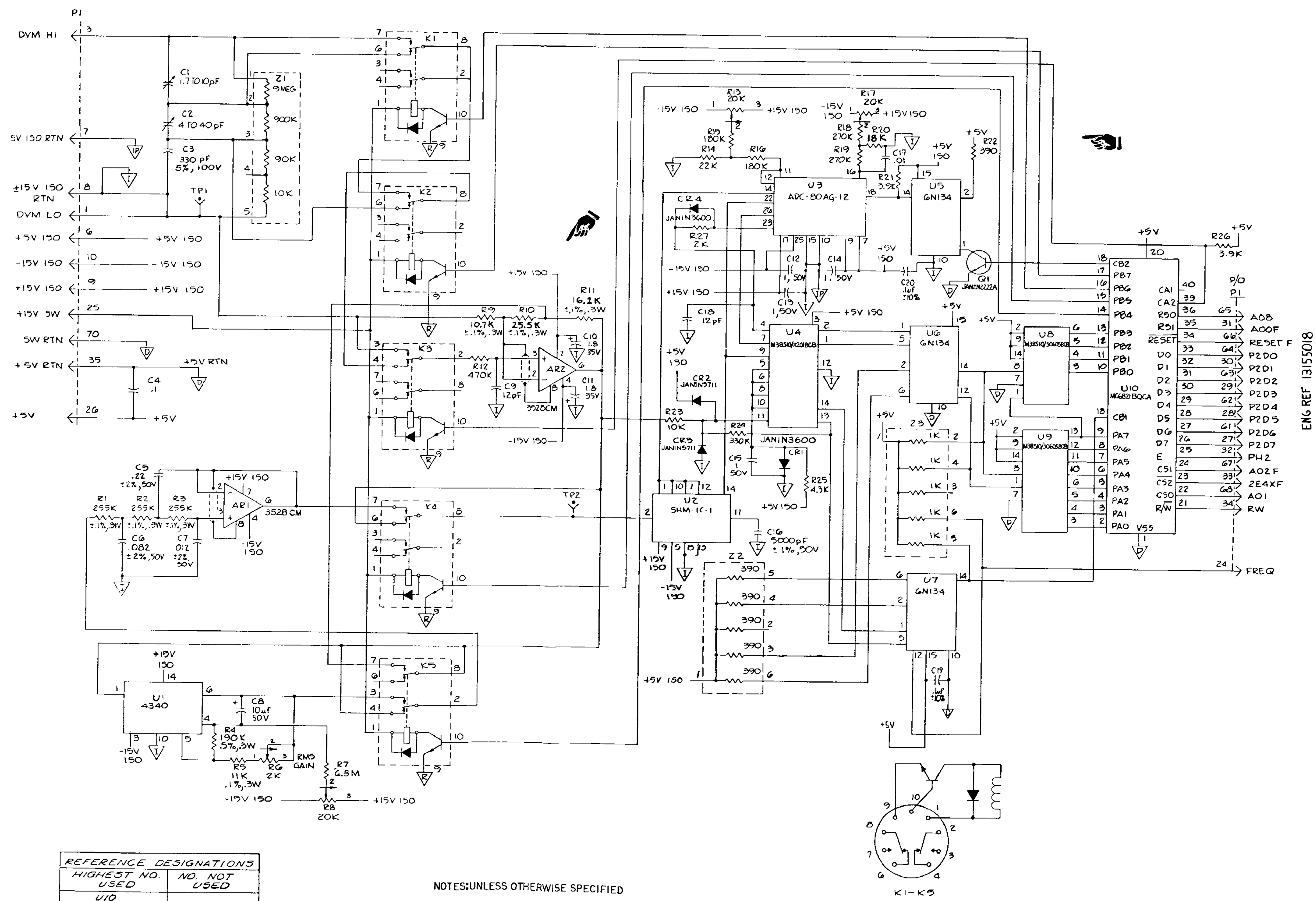


Figure H-10. Signal Selection and Switching B Card A8 Schematic Diagram

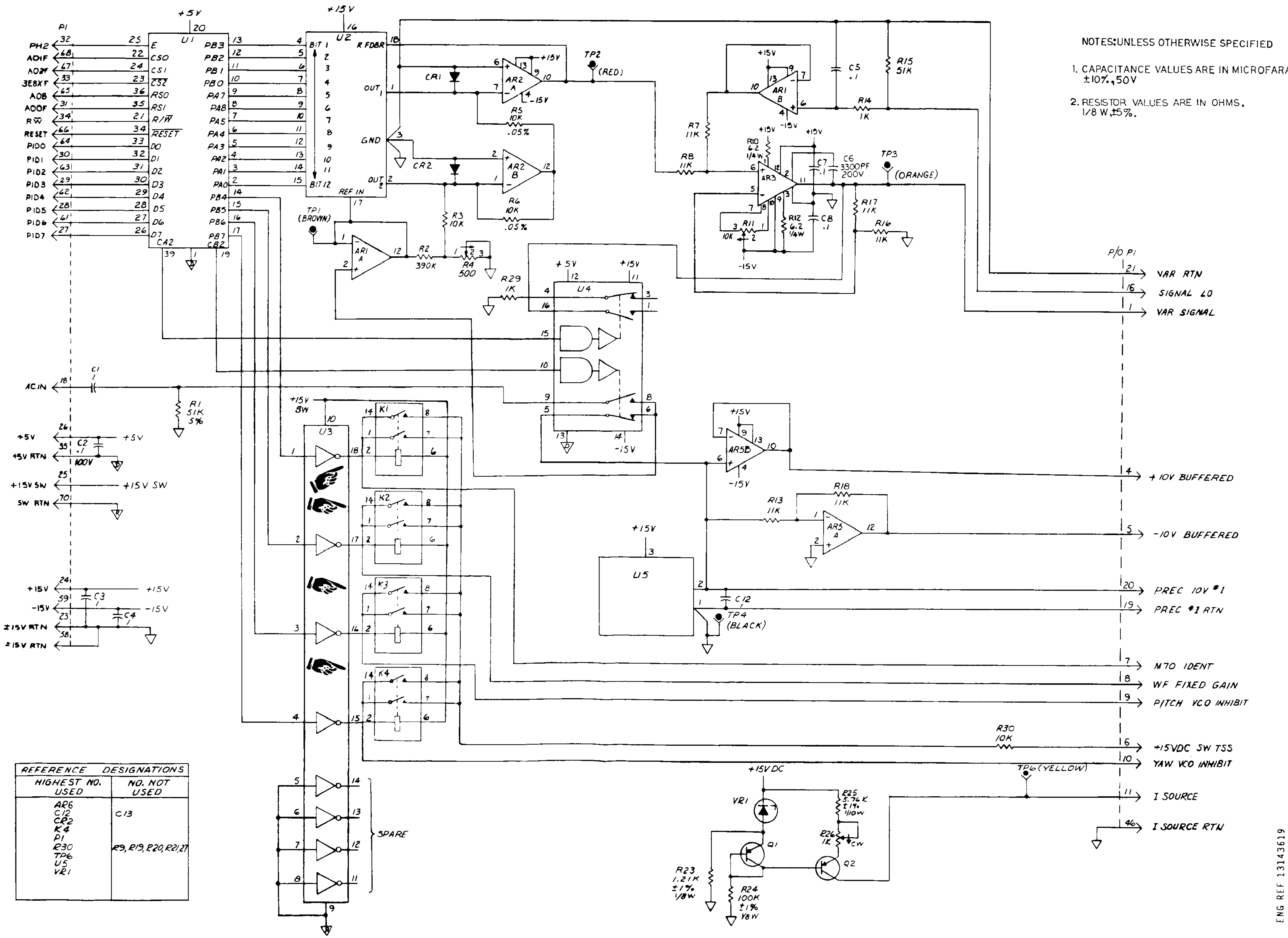


REFERENCE DESIGNATIONS	
HIGHEST NO. USED	NO. NOT USED
U10	
K5	
AR2	
Q1	
R27	
Z3	
C20	
CR4	
TP2	

NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROFARADS, ±5%, 50V
2. RESISTOR VALUES ARE IN OHMS. 1/8 W ±5%.

Figure H-11. DVM Card A9 Schematic Diagram



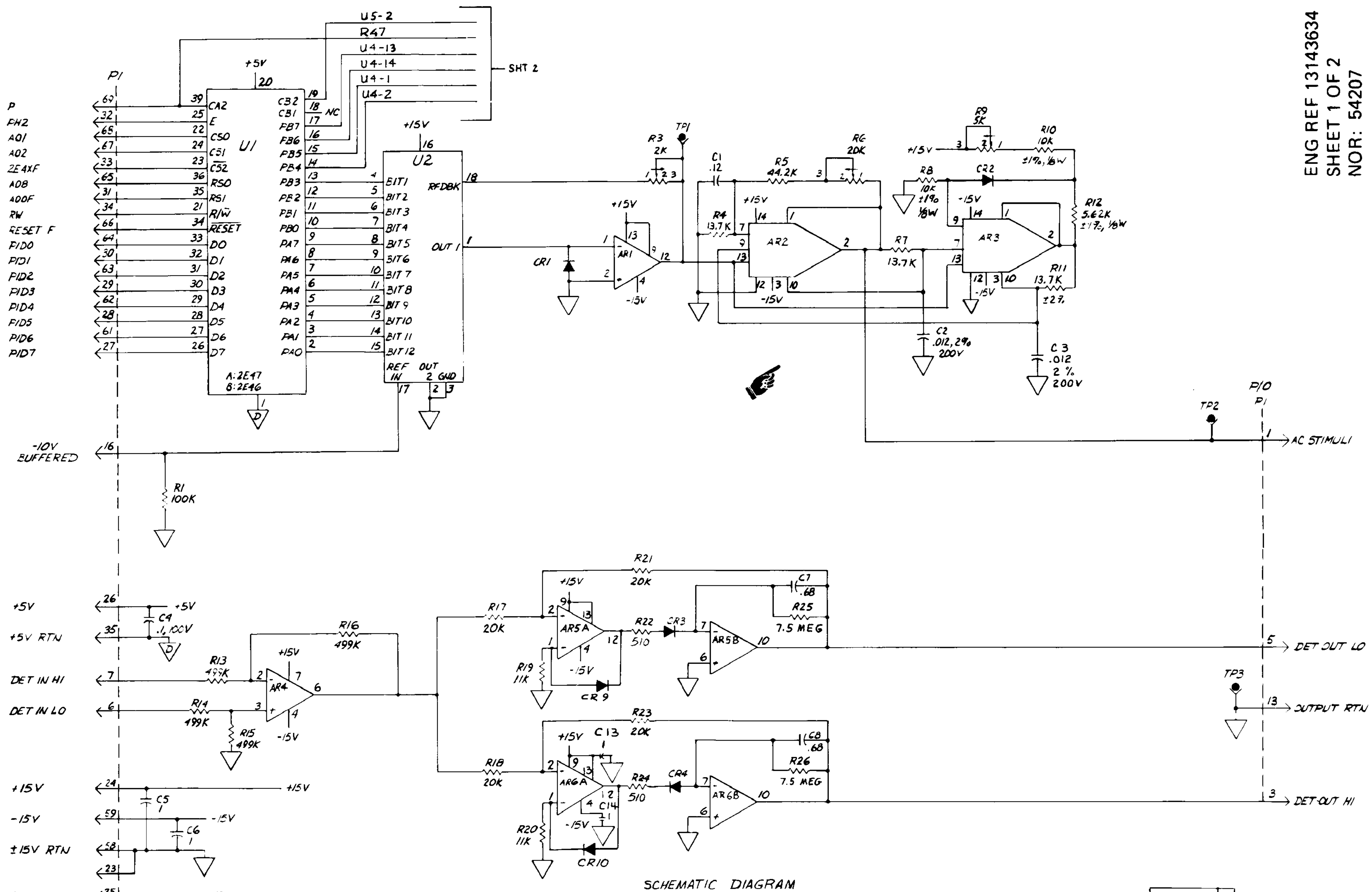
NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROFARADS, ±10%, 50V
2. RESISTOR VALUES ARE IN OHMS, 1/8 W, ±5%.

REFERENCE DESIGNATIONS	
HIGHEST NO. USED	NO. NOT USED
AR6	
C12	C13
CR2	
K4	
P1	
R30	R9, R19, R20, R21, 27
TP6	
U5	
VR1	

Figure H-12. Analog Stimuli Card A10 Schematic Diagram

ENG REF 13143634
SHEET 1 OF 2
NOR: 54207

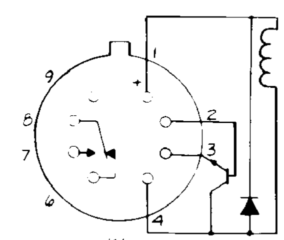


SCHEMATIC DIAGRAM

REFERENCE DESIGNATIONS	
HIGHEST NO. USED	NO. NOT USED
AR9	
U6	U3
CR10	
C14	
TP3	
R47	R2
P1	
K1	
Z3	

NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROFARADS ±10%, 100 V
2. RESISTOR VALUES ARE IN OHMS, 1/8 W, ±5%



K1
PIN ARRANGEMENT
VIEWED FROM TERMINALS

Figure H-13. Analog Processor Card A11 Schematic Diagram (Sheet 1 of 2)

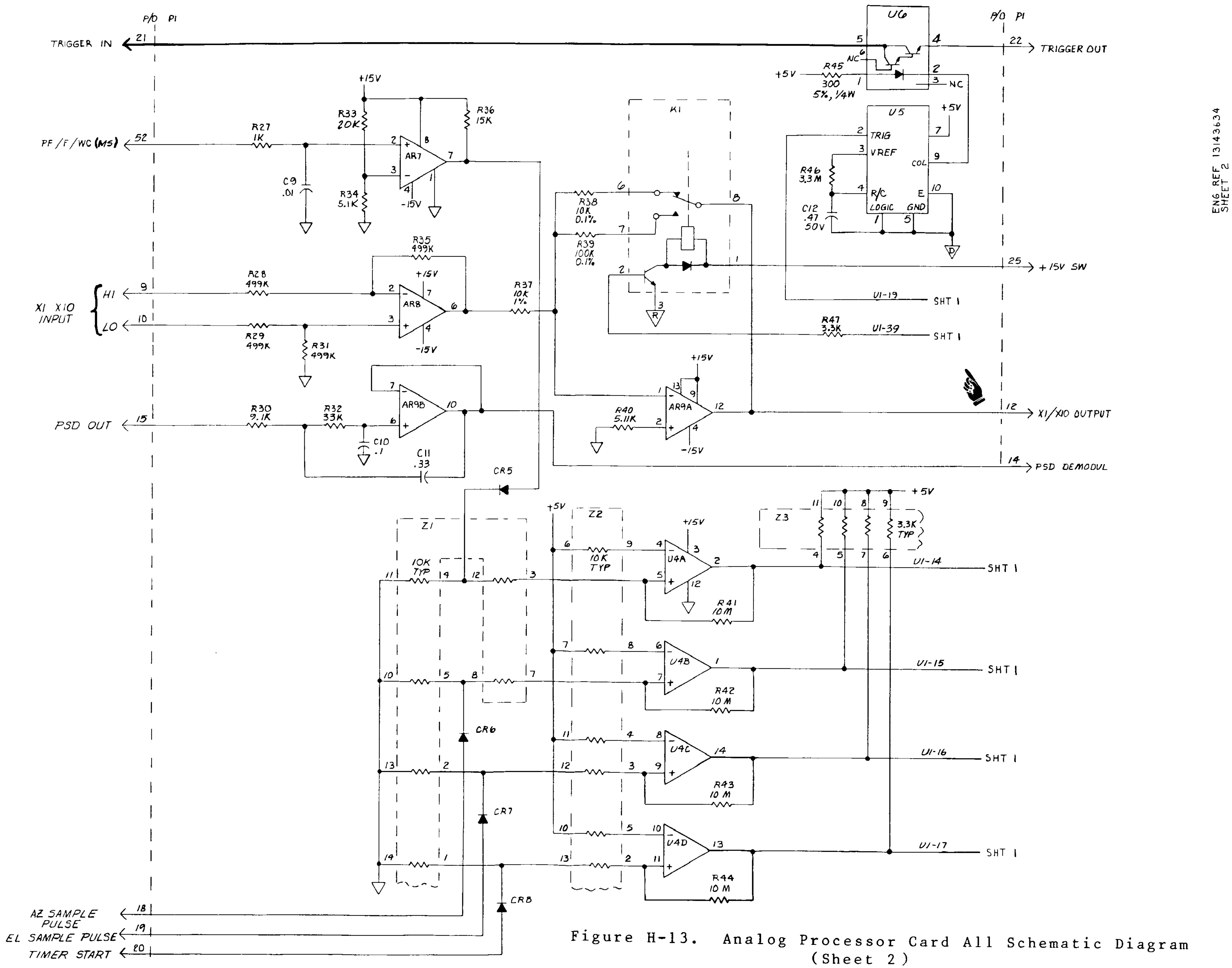


Figure H-13. Analog Processor Card All Schematic Diagram (Sheet 2)

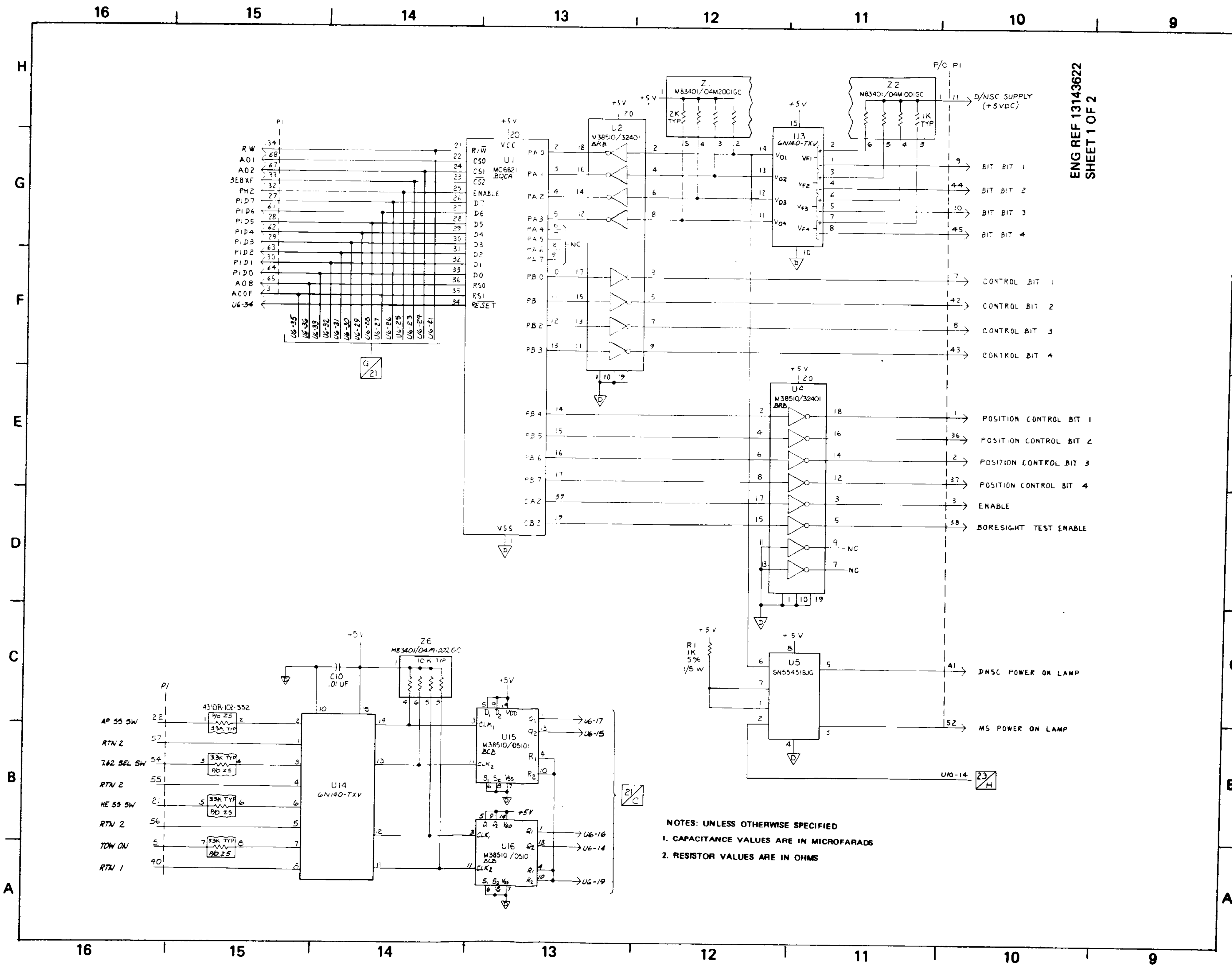


Figure H-14. D/NSC and MS Interface Card A12 Schematic Diagram (Sheet 1 of 2)

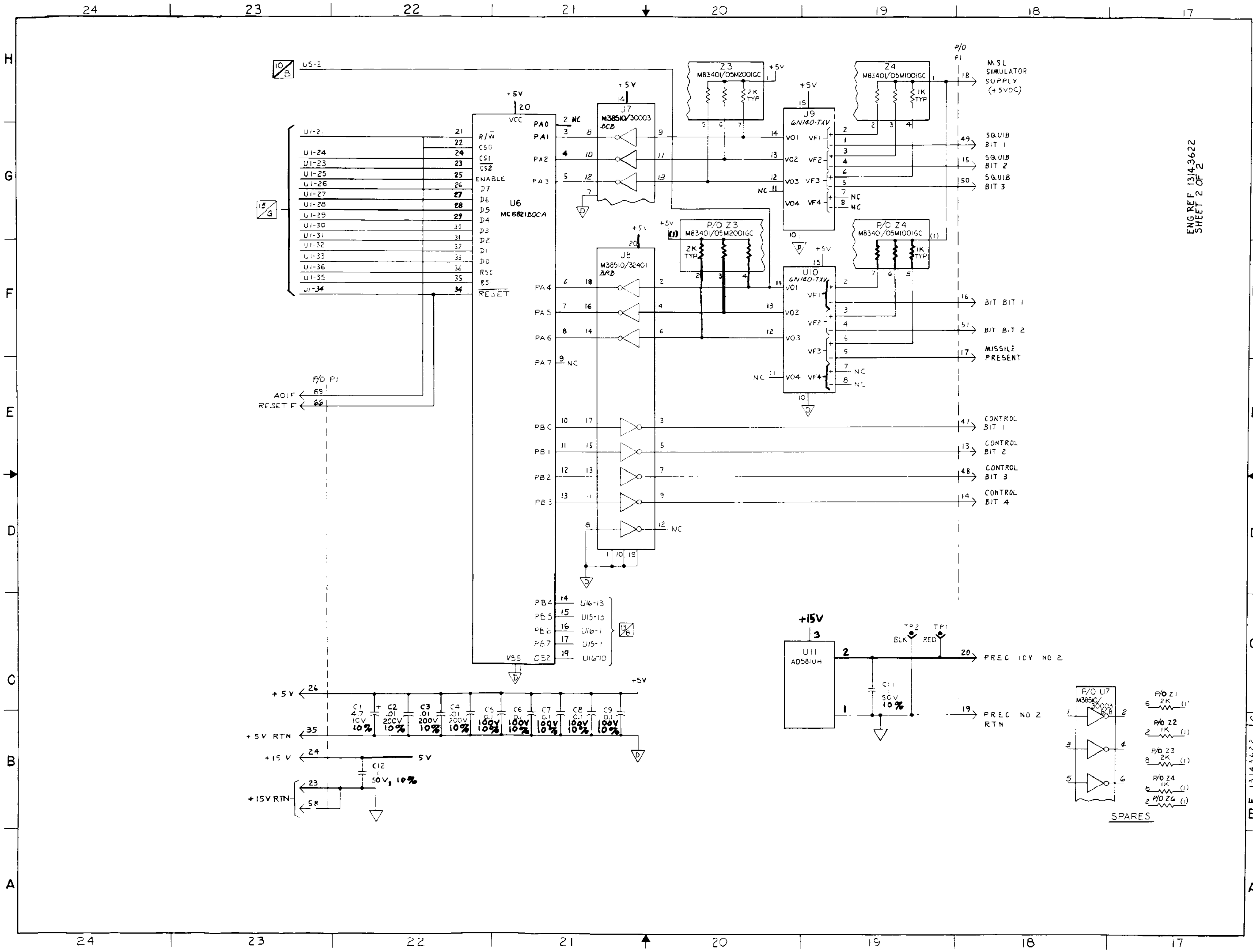


Figure H-14. D/NSC and MS Interface Card A12 Schematic Diagram (Sheet 2 of 2)

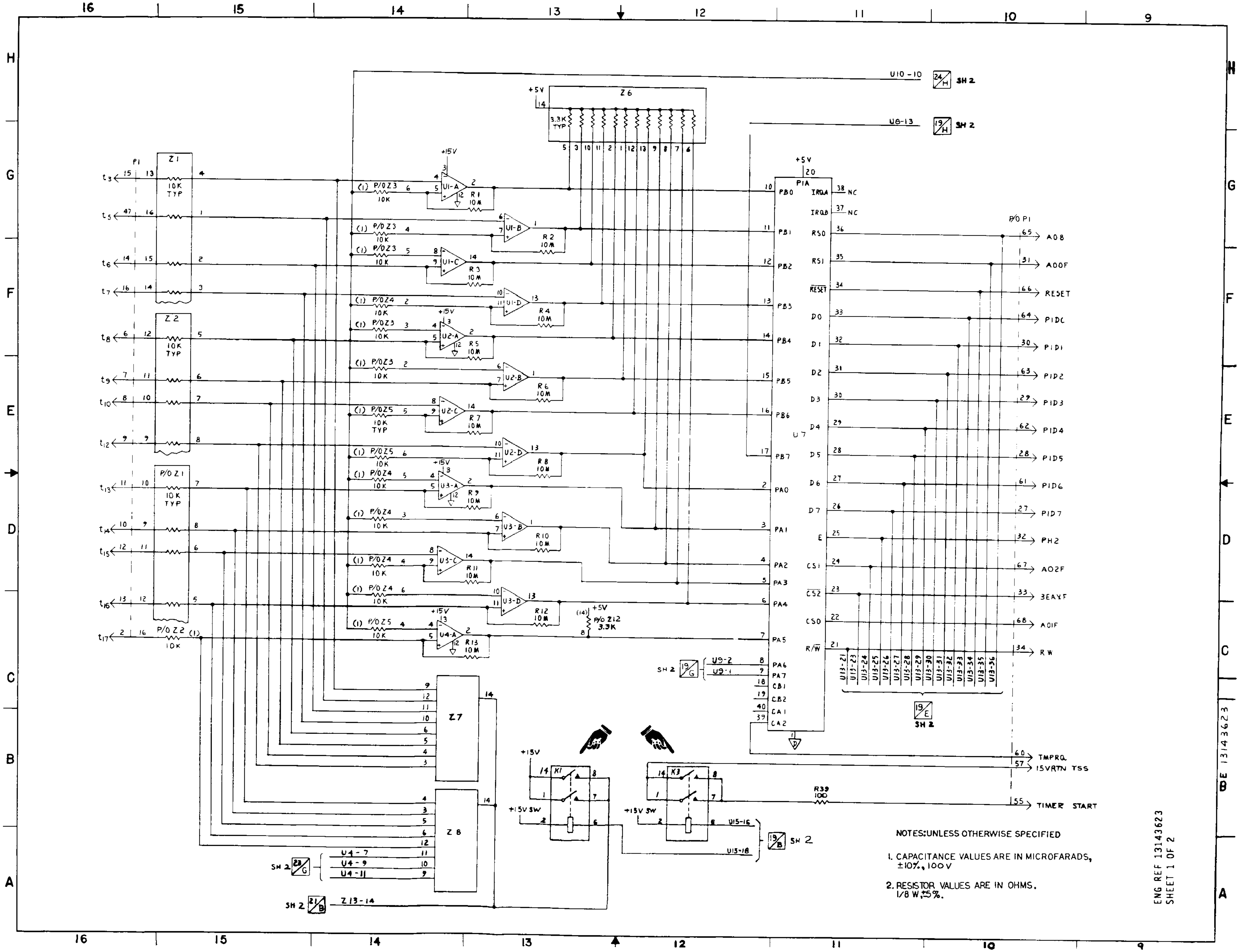


Figure H-15. Programmer Interface Card A13 Schematic Diagram (Sheet 1 of 2)

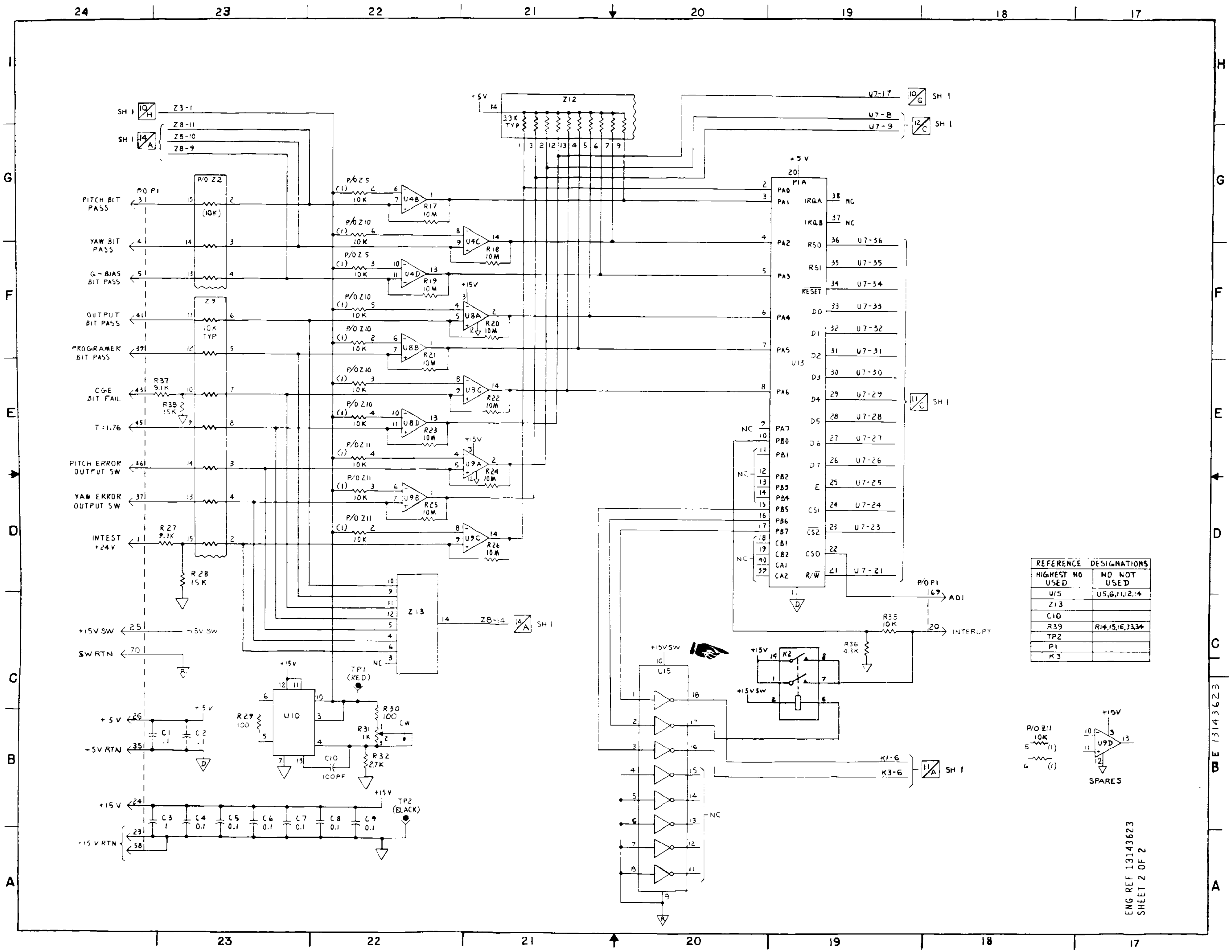


Figure H-15. Programmer Interface Card A13 Schematic Diagram
(Sheet 2 of 2)

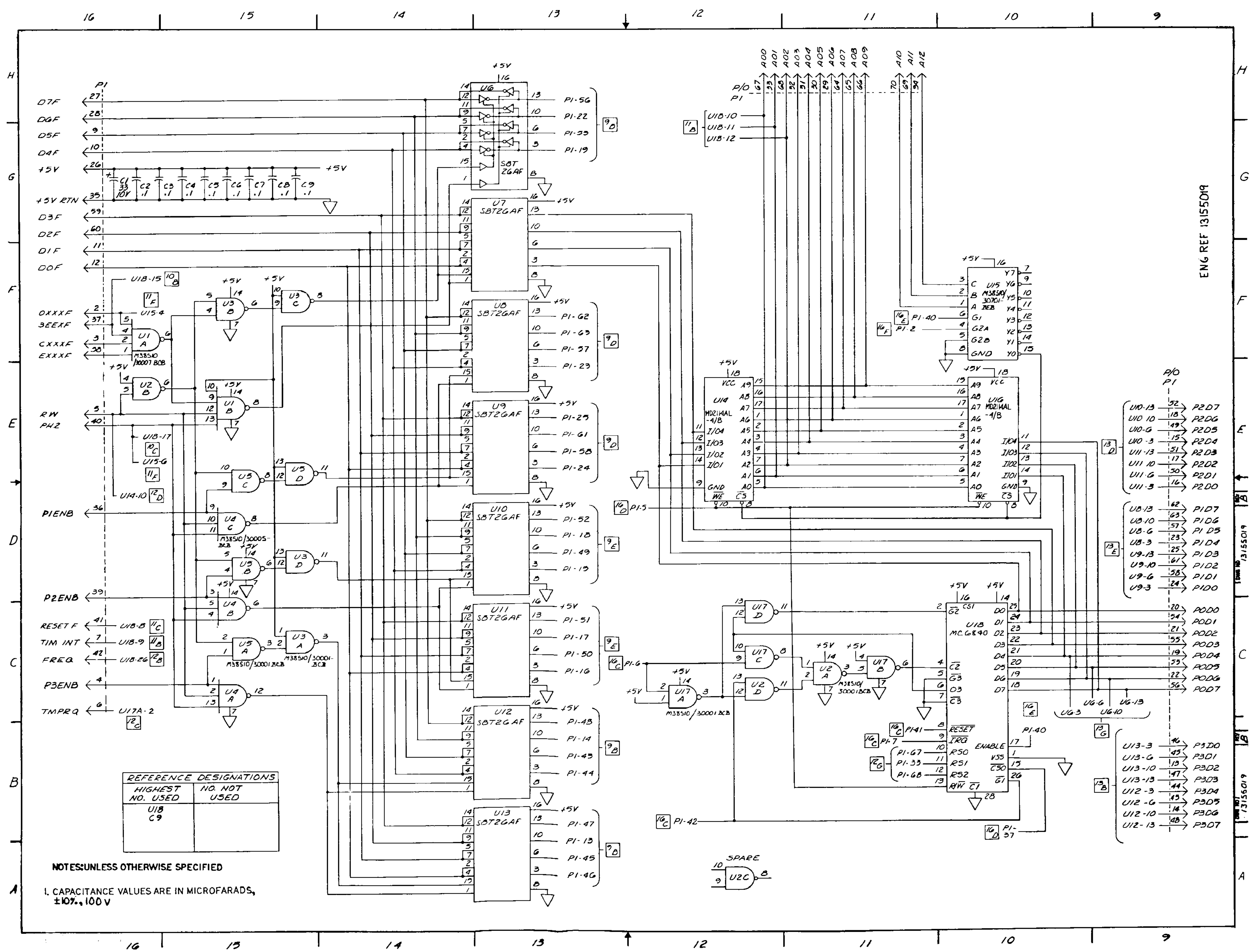


Figure H-16. Interface Buffer Card A14 Schematic Diagram

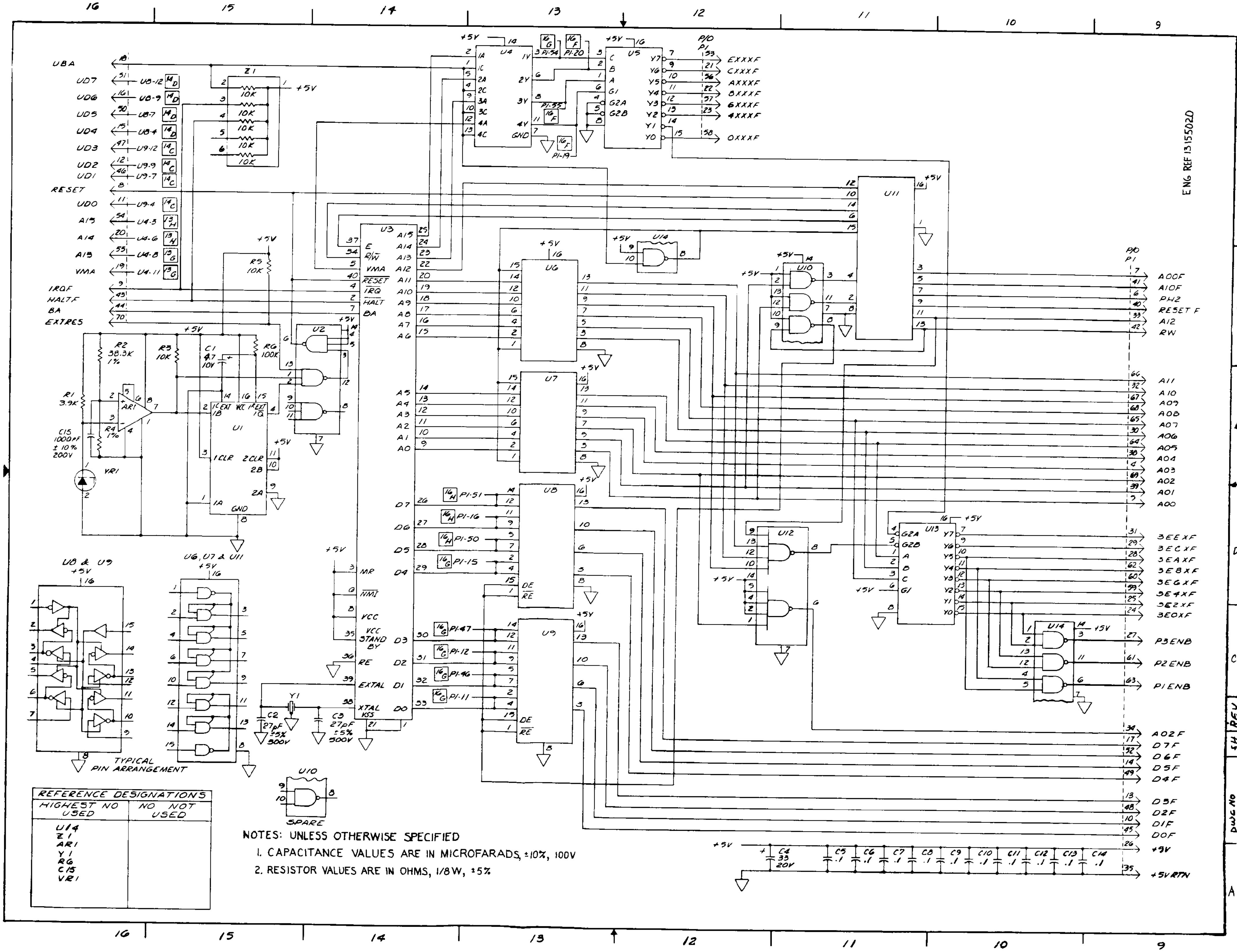


Figure H-17. Processor Card A15 Schematic Diagram

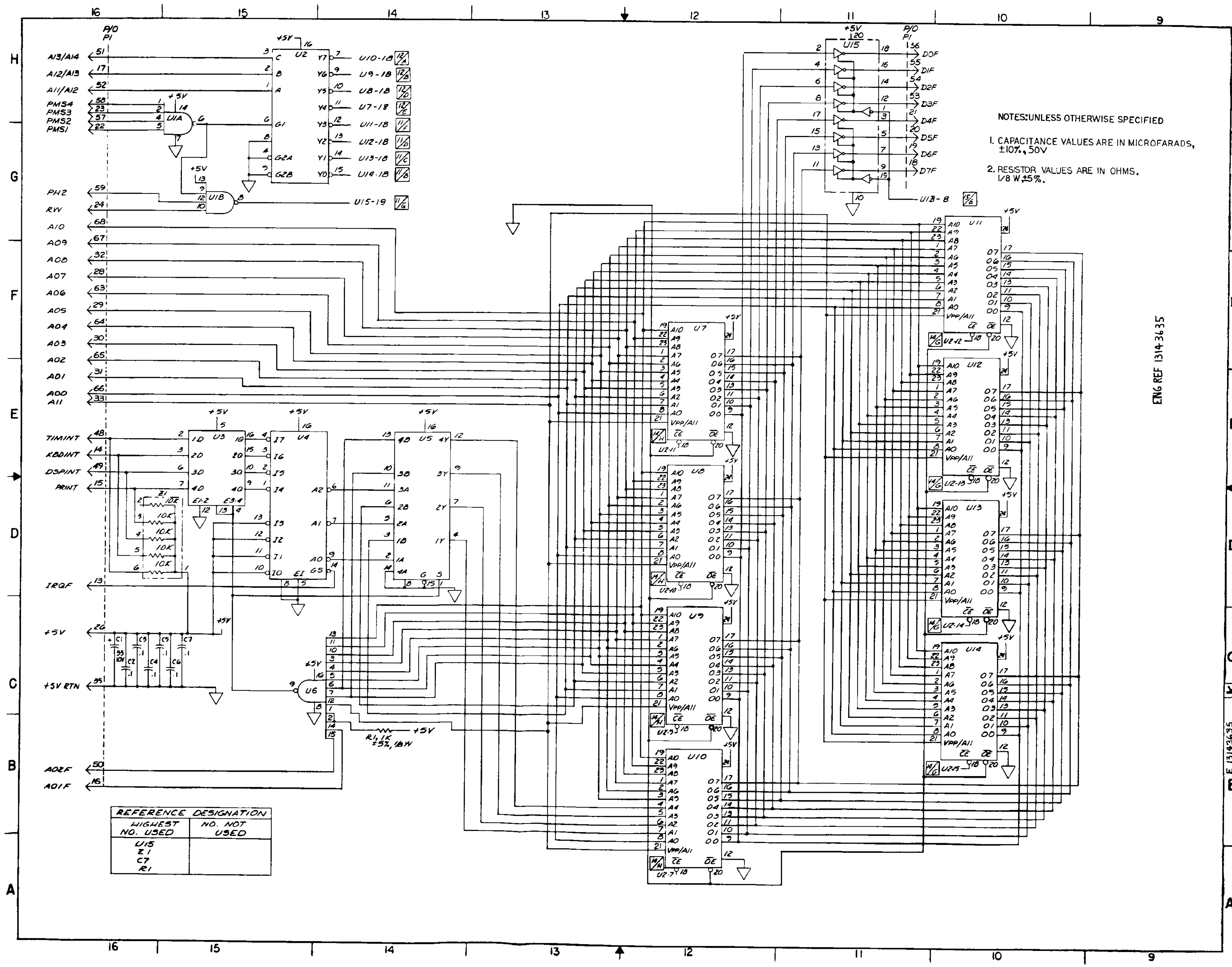


Figure H-18. Program Memory 1 Card A16 Schematic Diagram

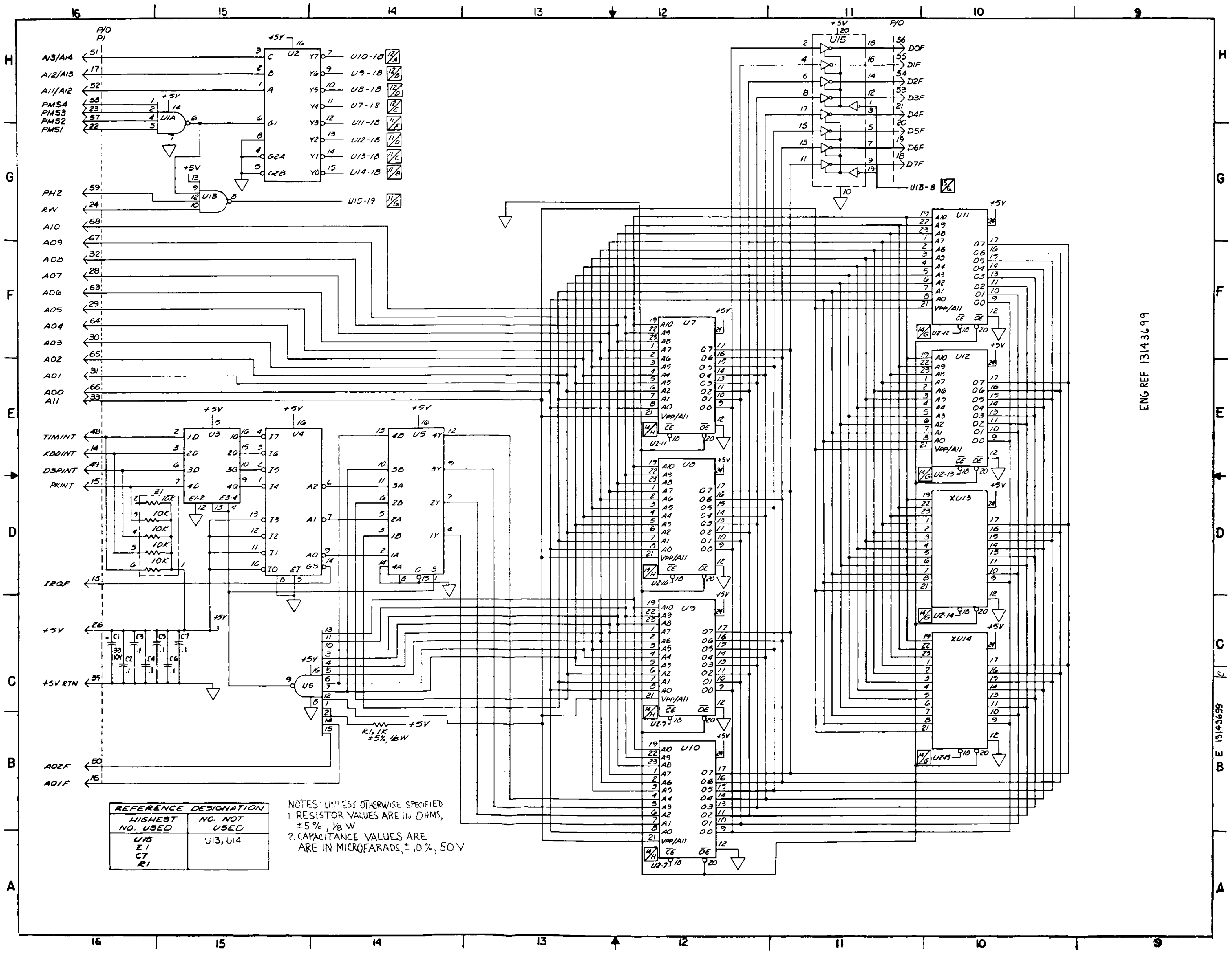


Figure H-19. Program Memory 2 Card A17 Schematic Diagram

ENG REF 13143571

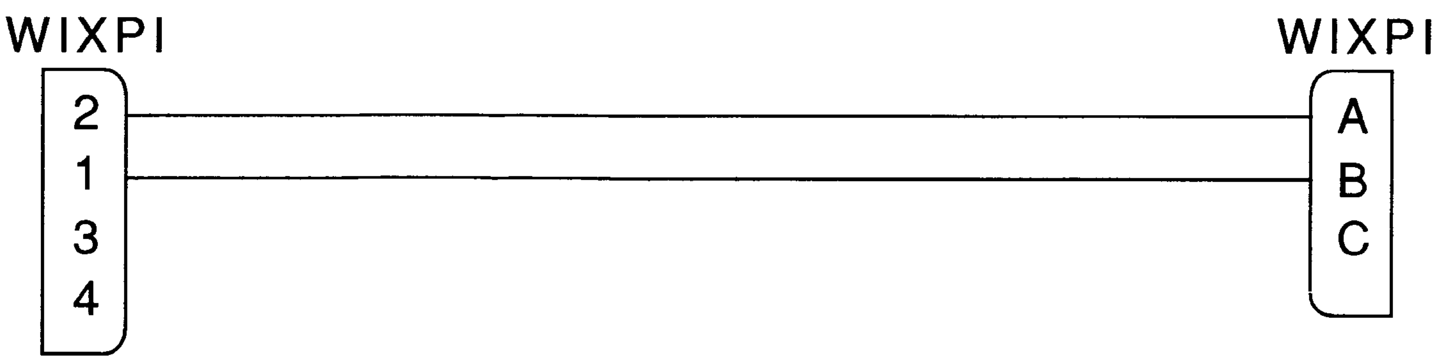


Figure H-20. Power Cable W1 Schematic Diagram
(Sheet 1 of 2)

ENG REF 13280636

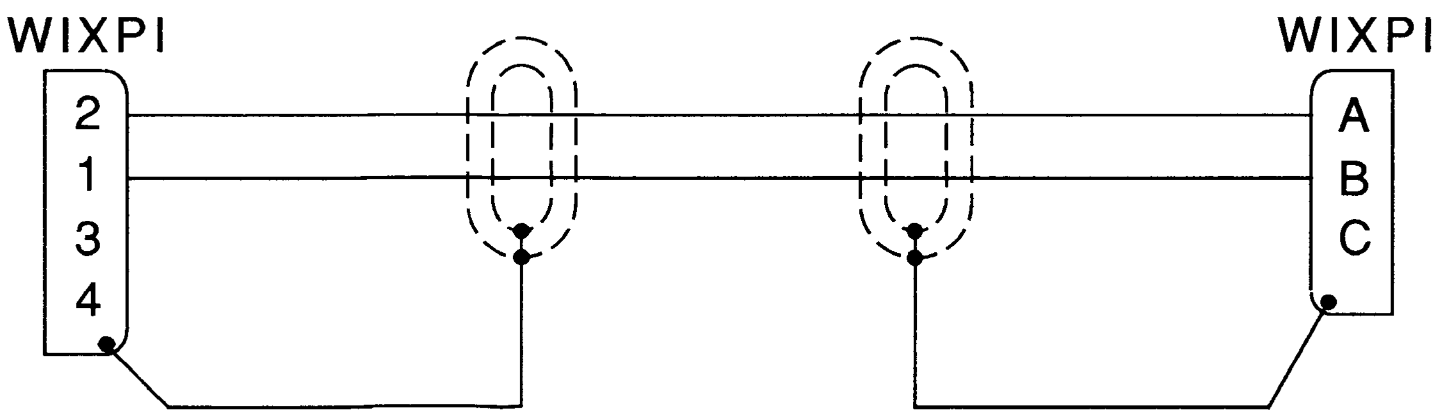
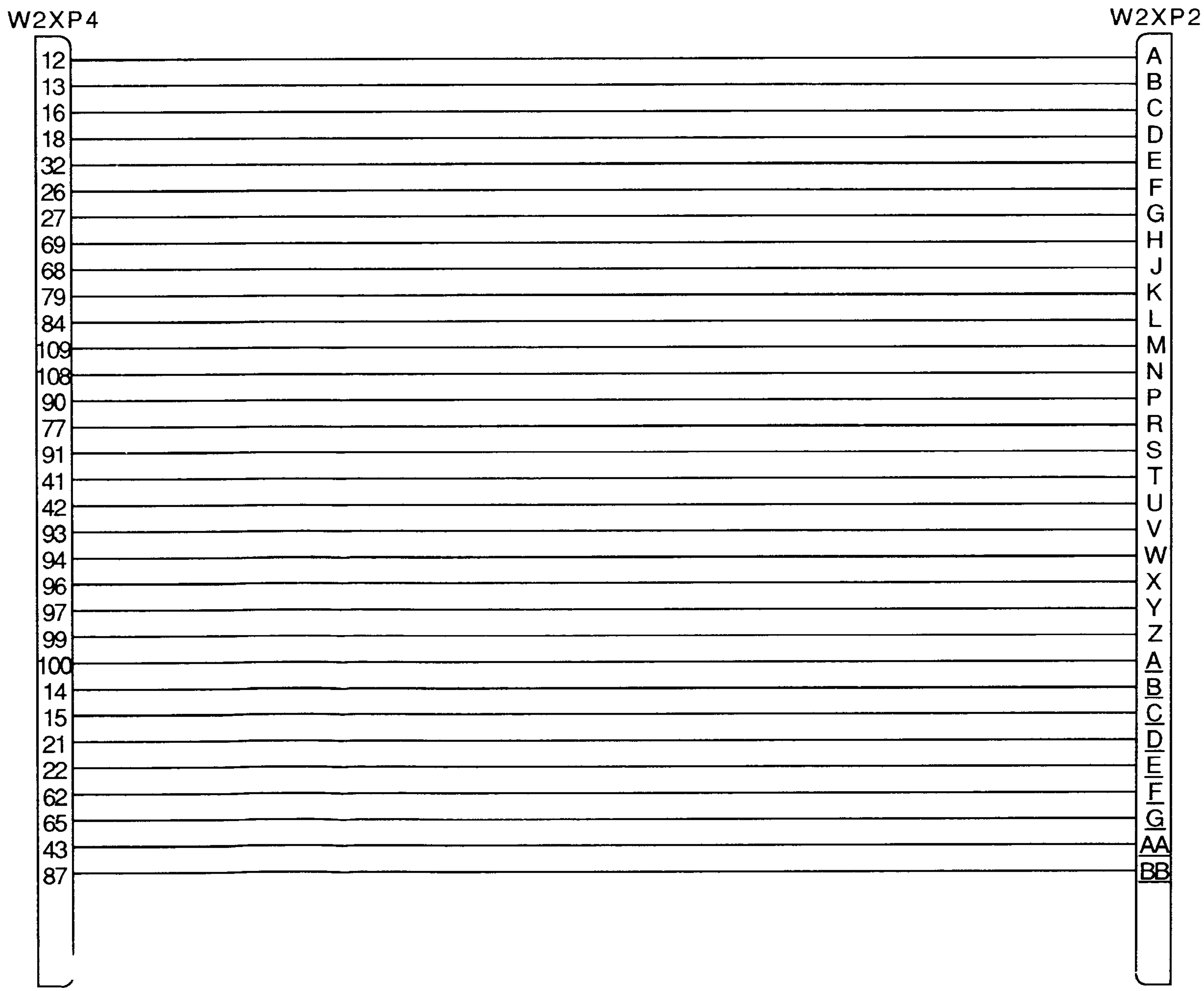


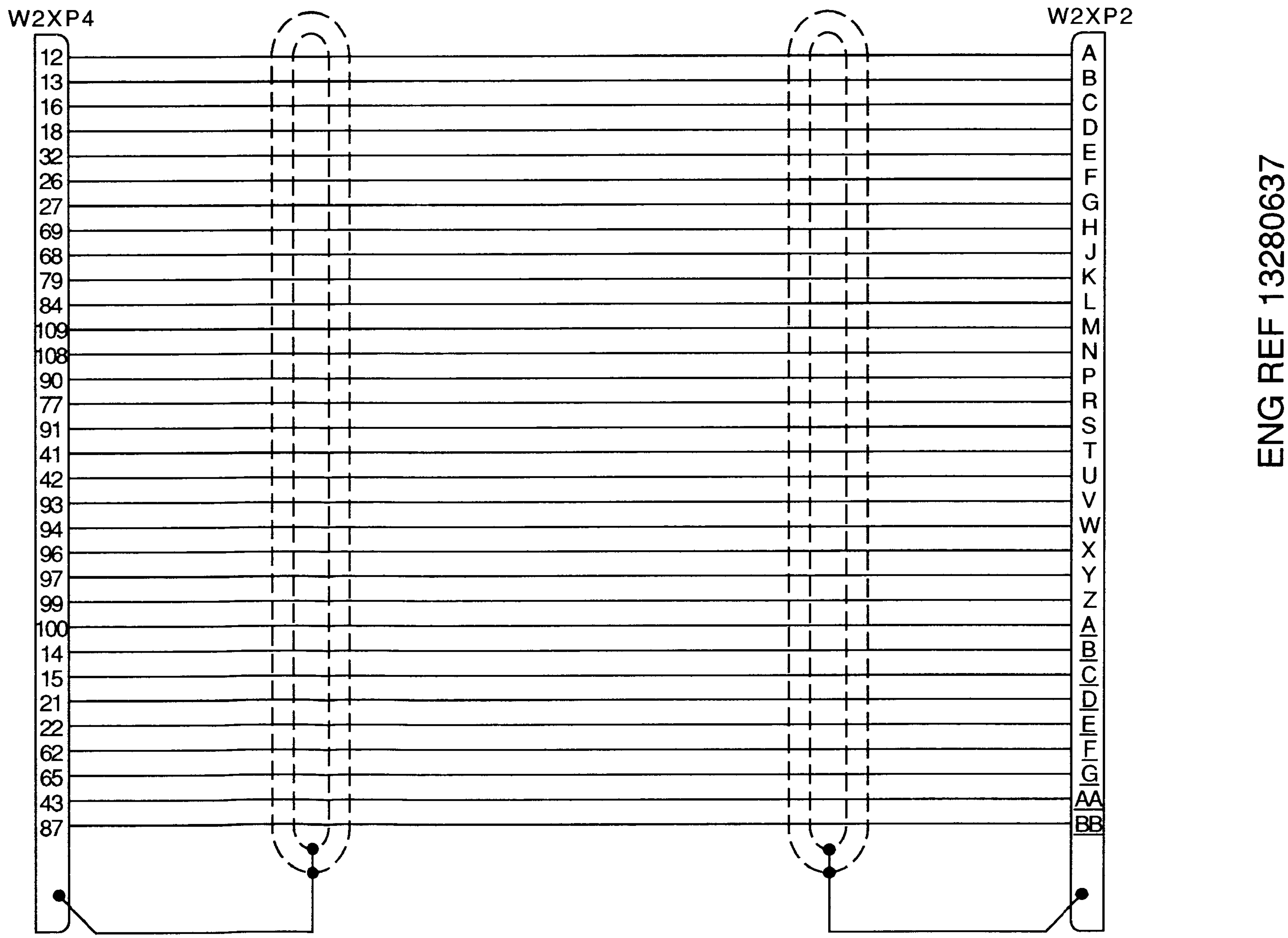
Figure H-20. Power Cable W1 Schematic Diagram
(Sheet 2 of 2)



NOTES: UNLESS OTHERWISE SPECIFIED
UNDERLINING INDICATES LOWER CASE LETTERS

WIRING SCHEMATIC

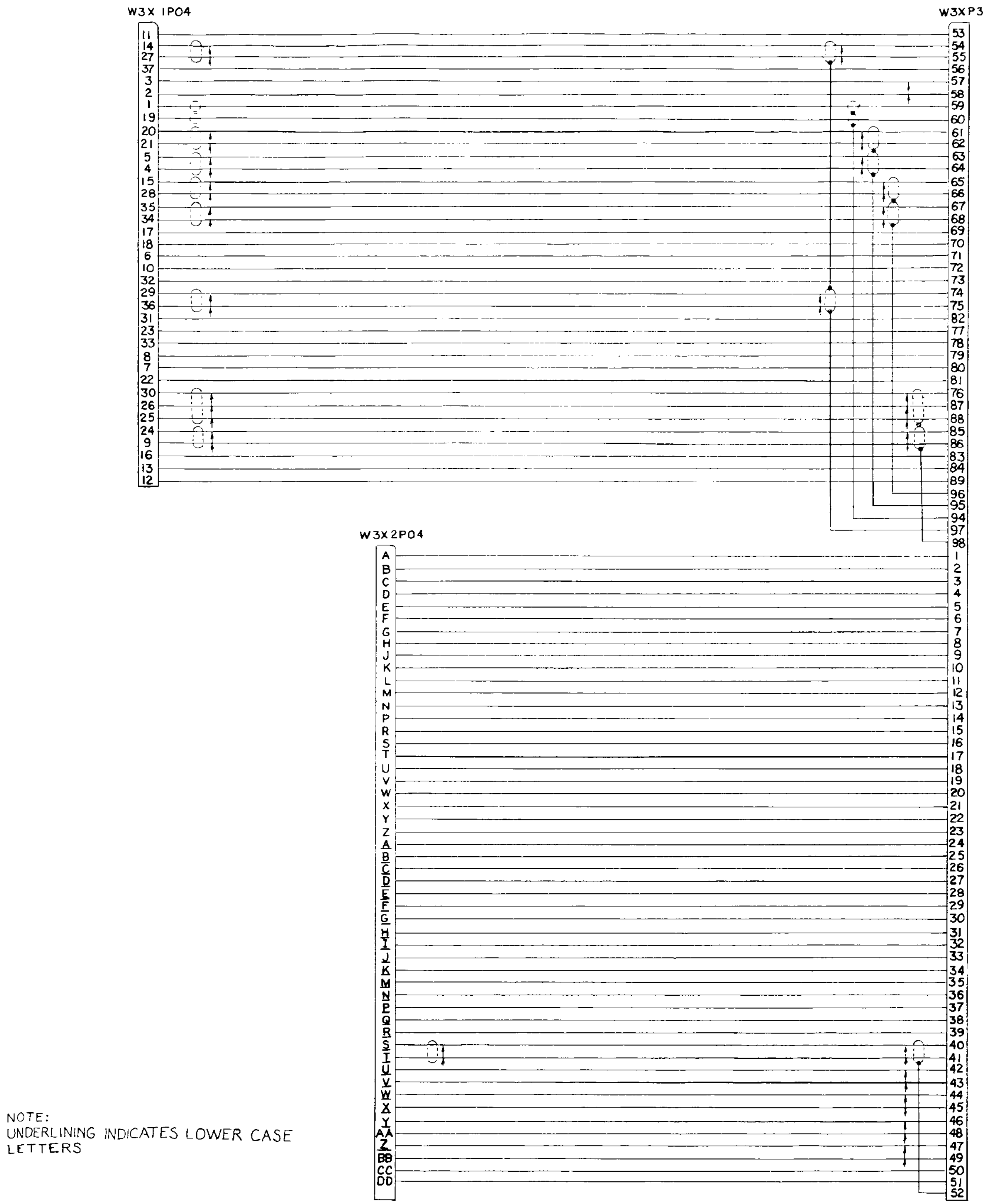
Figure H-21. Turret Cable W2 Schematic Diagram
(Sheet 1 of 2)



NOTES: UNLESS OTHERWISE SPECIFIED
UNDERLINING INDICATES LOWER CASE LETTERS

WIRING SCHEMATIC

Figure H-21. Turret Cable W2 Schematic Diagram
(Sheet 2 of 2)



ENG REF 13143573 or 13280638

Figure H-22. CGE/ISU Cable W3 Schematic Diagram

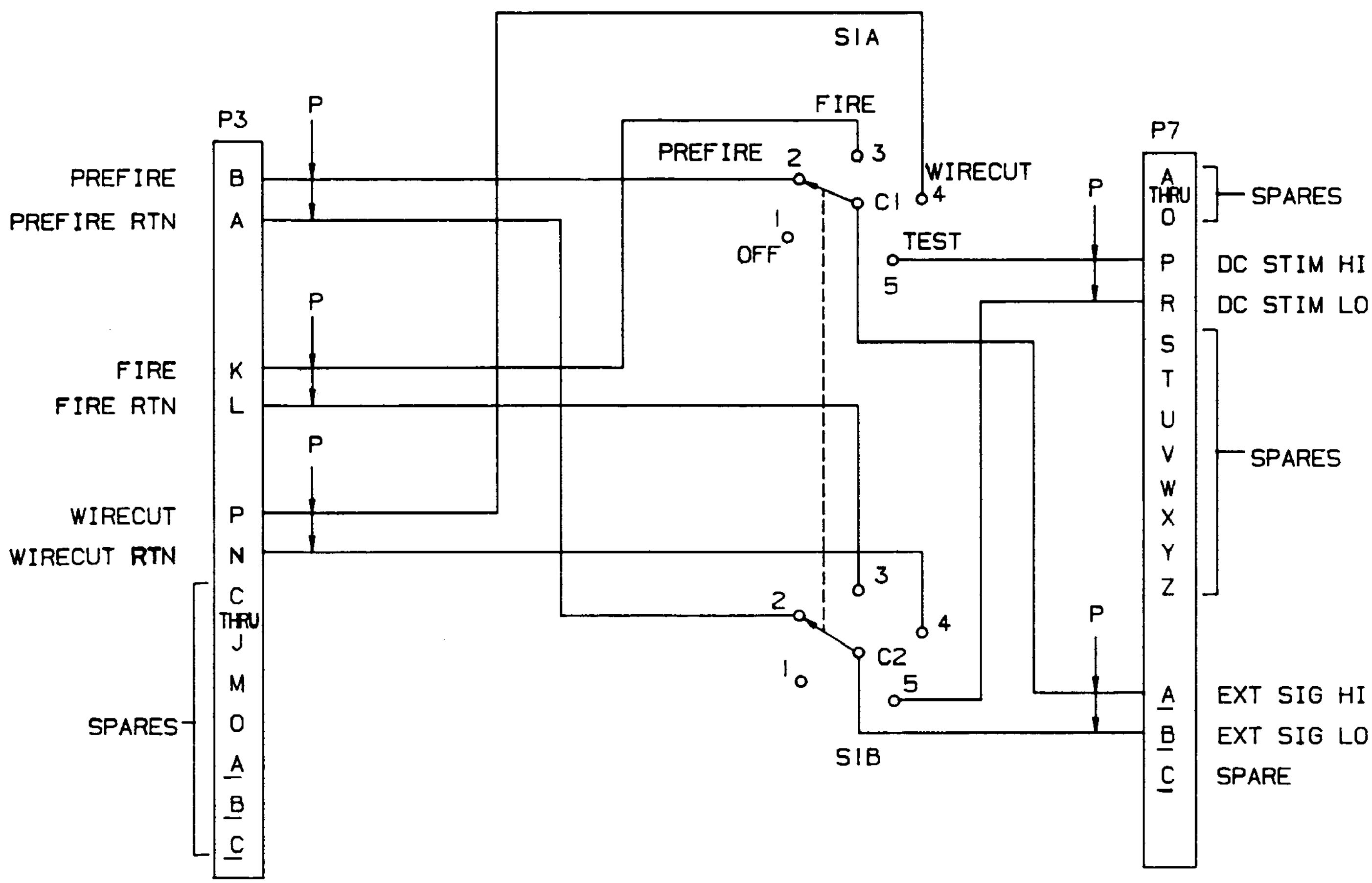


Figure H-22.1. Special Purpose Cable W11 Schematic Diagram

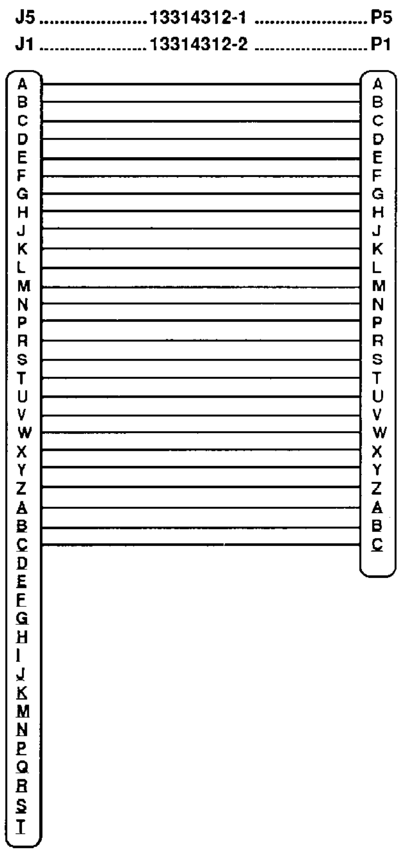


Figure H-22.2 TC Cable Adapters W13, W14

SIGNAL / CONNECTOR	P4	J1	P/J5	P/J6	P/J7	P/J8	P/J9	XA1	XA2	XA3
+5V PIN	16, 33, 28	C	13	3	3	13		3, 38	3, 38	3, 38
+7.5V PIN	29		14			14			4, 39	4, 39
+15V PIN	4, 30		15			15		5, 40	5, 40	5, 40
+24V (OVEN) PIN	6		1			1	S			
DC RTN PIN	9, 10, 21, 37		4, 16, 18			4, 16, 18	C	1, 35 36, 70	1, 35 36, 70	1, 17, 35, 36, 70

Figure H-23. D/NSC Assembly Schematic Diagram (Sheet 1 of 2)

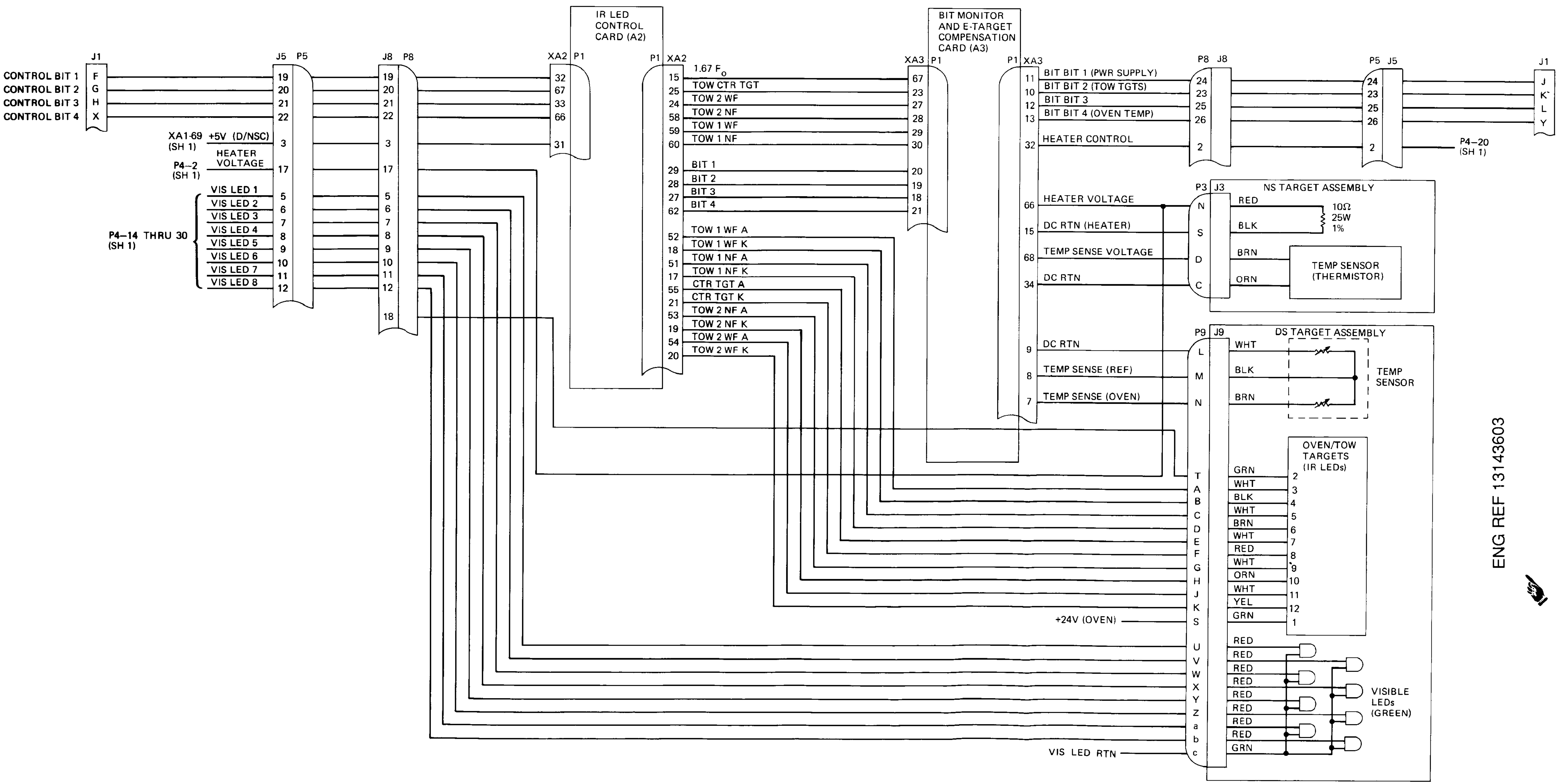
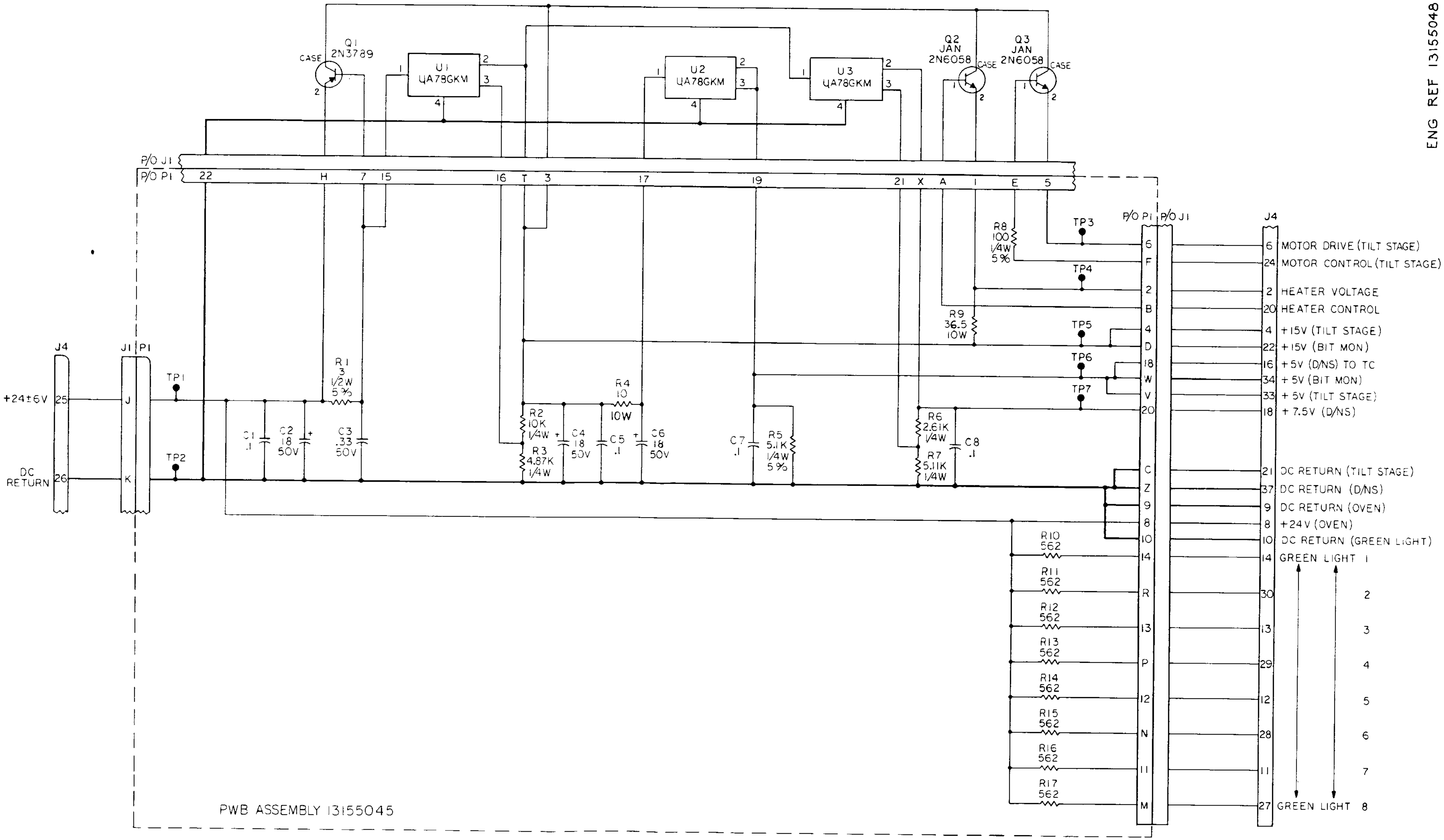


Figure H-23. D/NSC Assembly Schematic Diagram (Sheet 2 of 2)

ENG REF 13155048

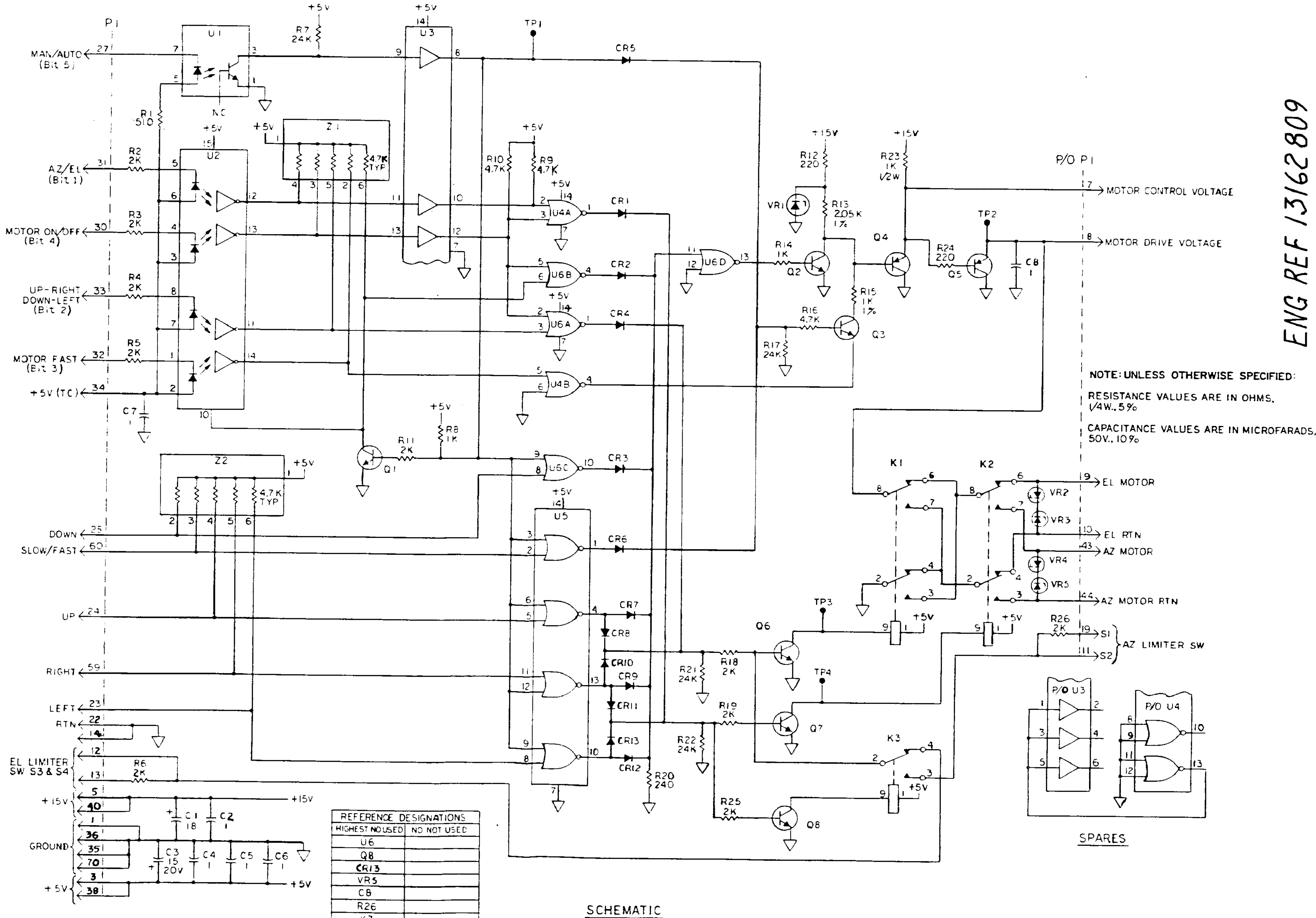


REFERENCE DESIGNATION	
HIGHEST NO USED	NO. NOT USED
U3	
Q3	
C8	
R17	
TP7	

NOTES UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTOR VALUES ARE IN OHMS, 5W, ±1%
2. ALL CAPACITOR VALUES ARE IN MICROFARADS, 100V, ±10%

Figure H-24. Power Supply Schematic Diagram



REFERENCE DESIGNATIONS	
HIGHEST NO. USED	NO. NOT USED
U6	
Q8	
CR13	
VR5	
C8	
R26	
K3	
TP4	

ENG REF 13162809

Figure H-25. Motor Drive Card A1 Schematic Diagram

ENG REF 13143662

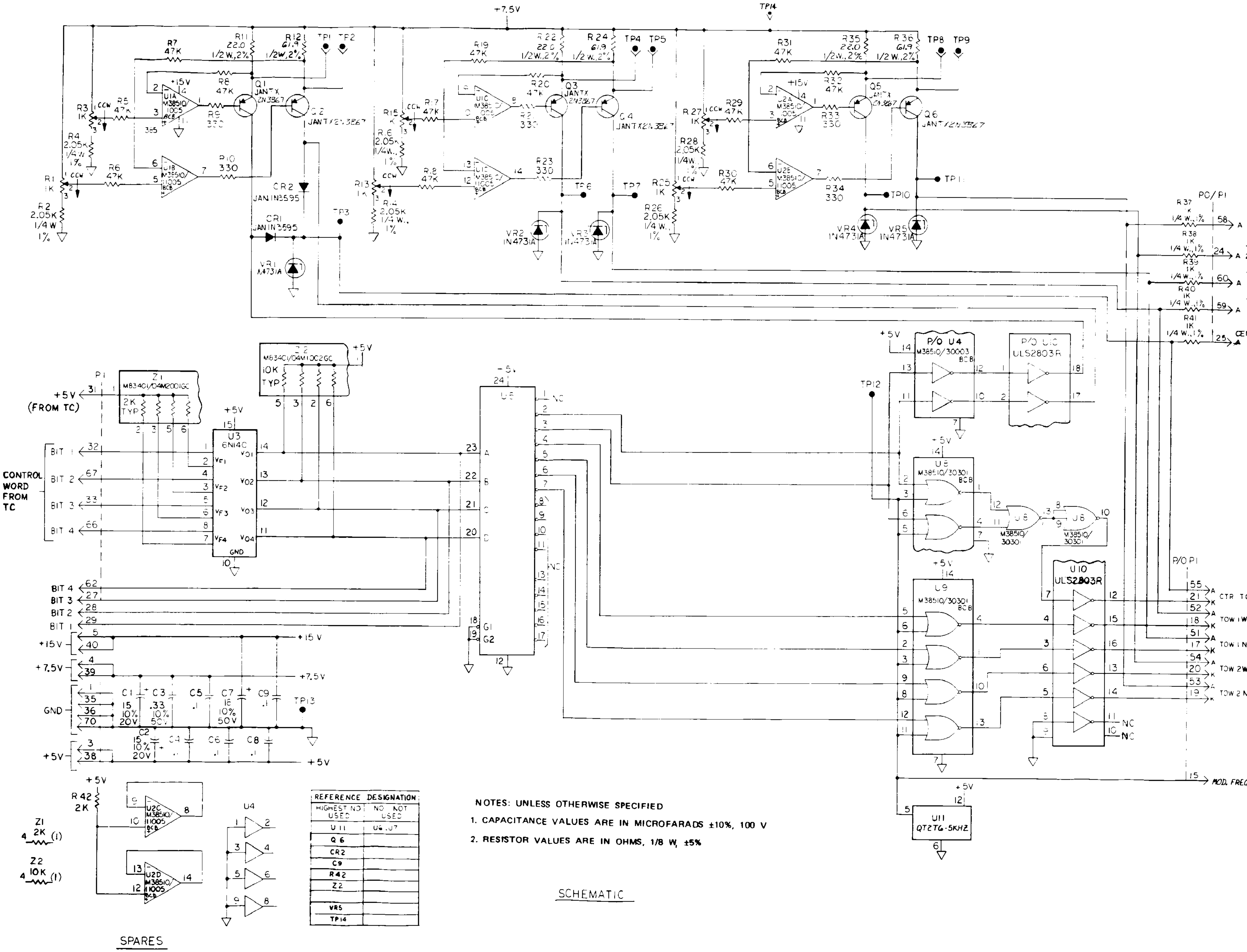


Figure H-26. IR LED Control Card A2 Schematic Diagram

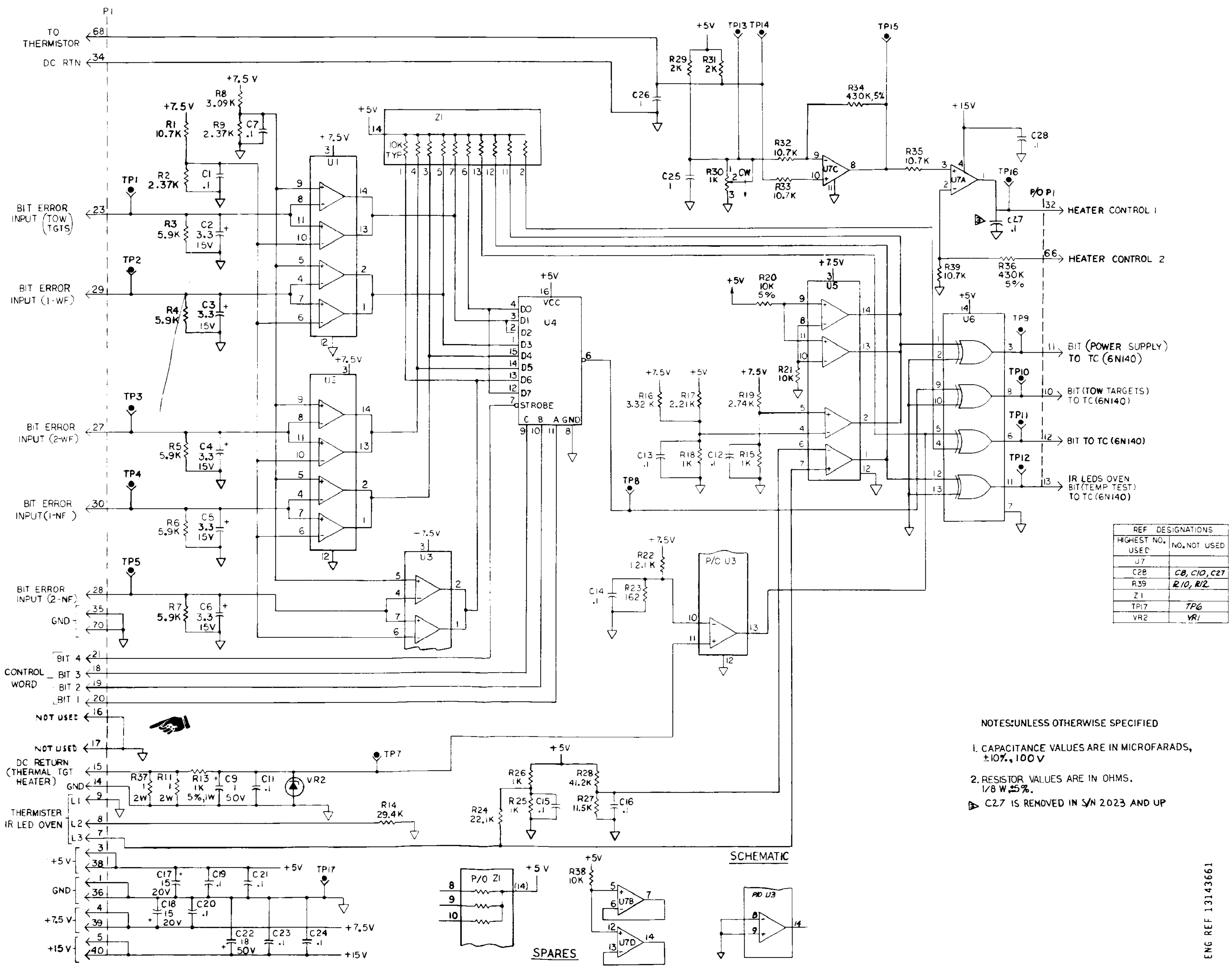


Figure H-27. BIT Monitor Card A3 Schematic Diagram

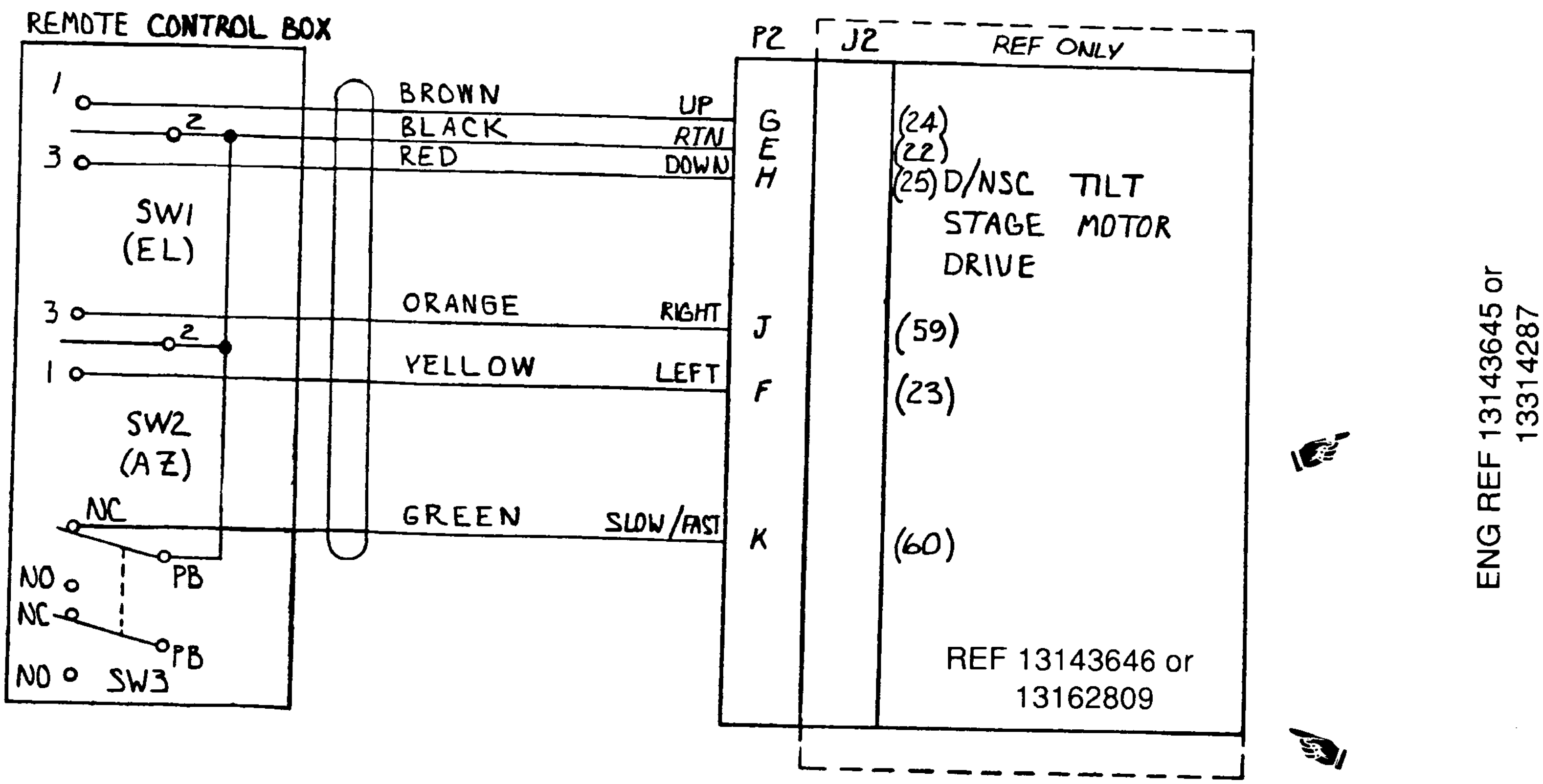
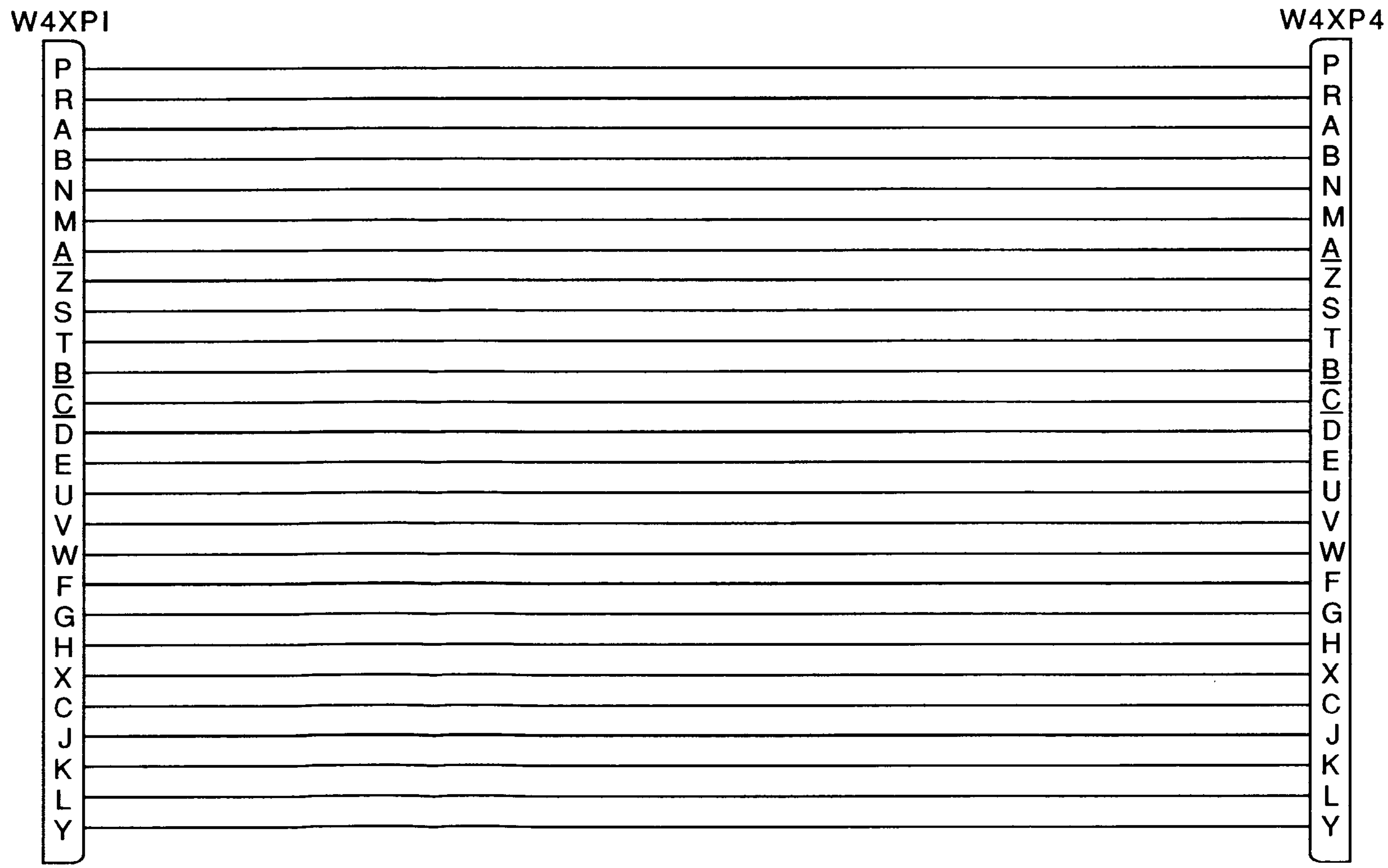


Figure H-28. Remote Position Control Schematic Diagram

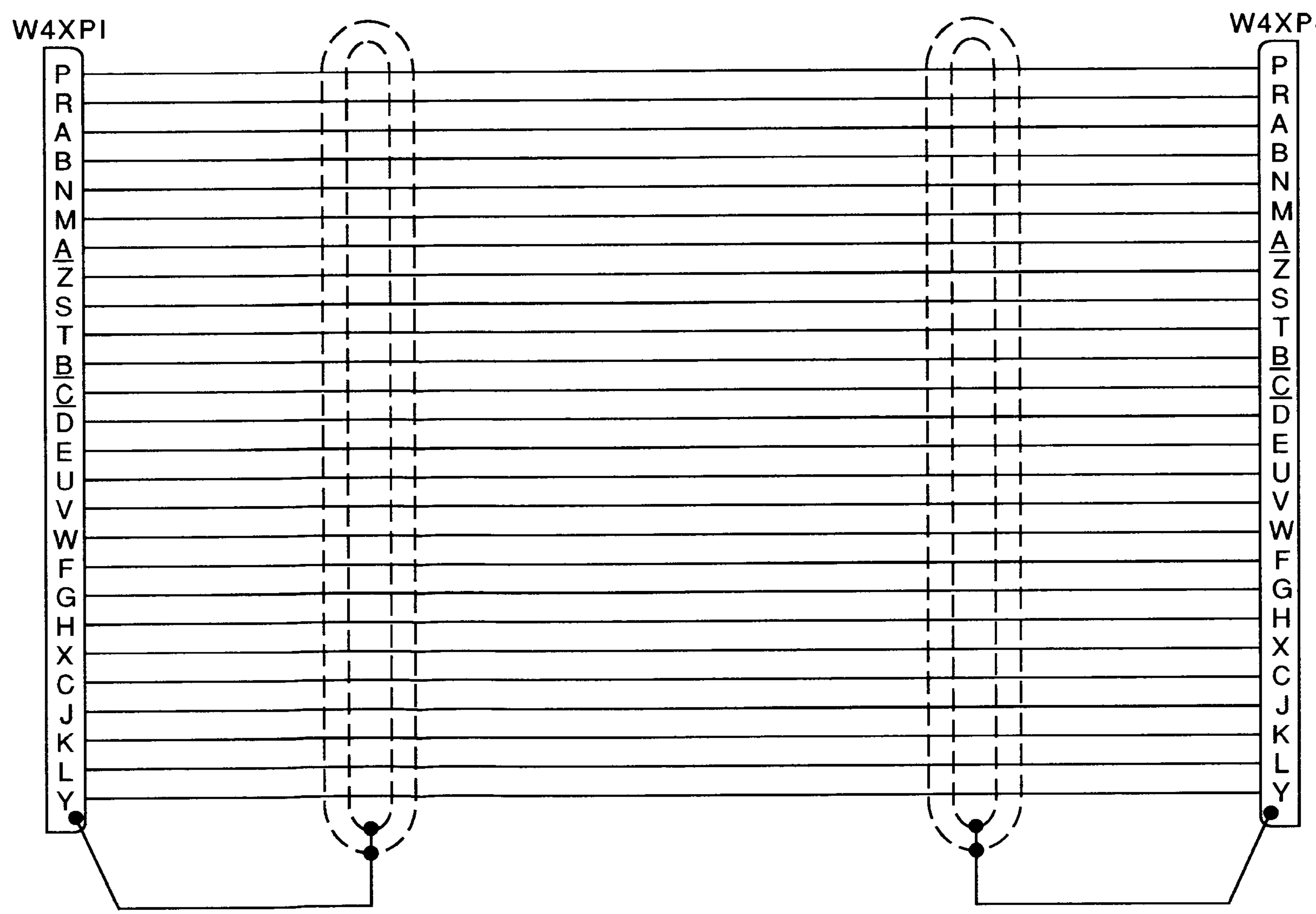


ENG REF 13143574

NOTES: UNLESS OTHERWISE SPECIFIED
UNDERLINING INDICATES LOWER CASE LETTERS

WIRING SCHEMATIC

Figure H-29. D/NSC Cable W4 Schematic Diagram
(Sheet 1 of 2)

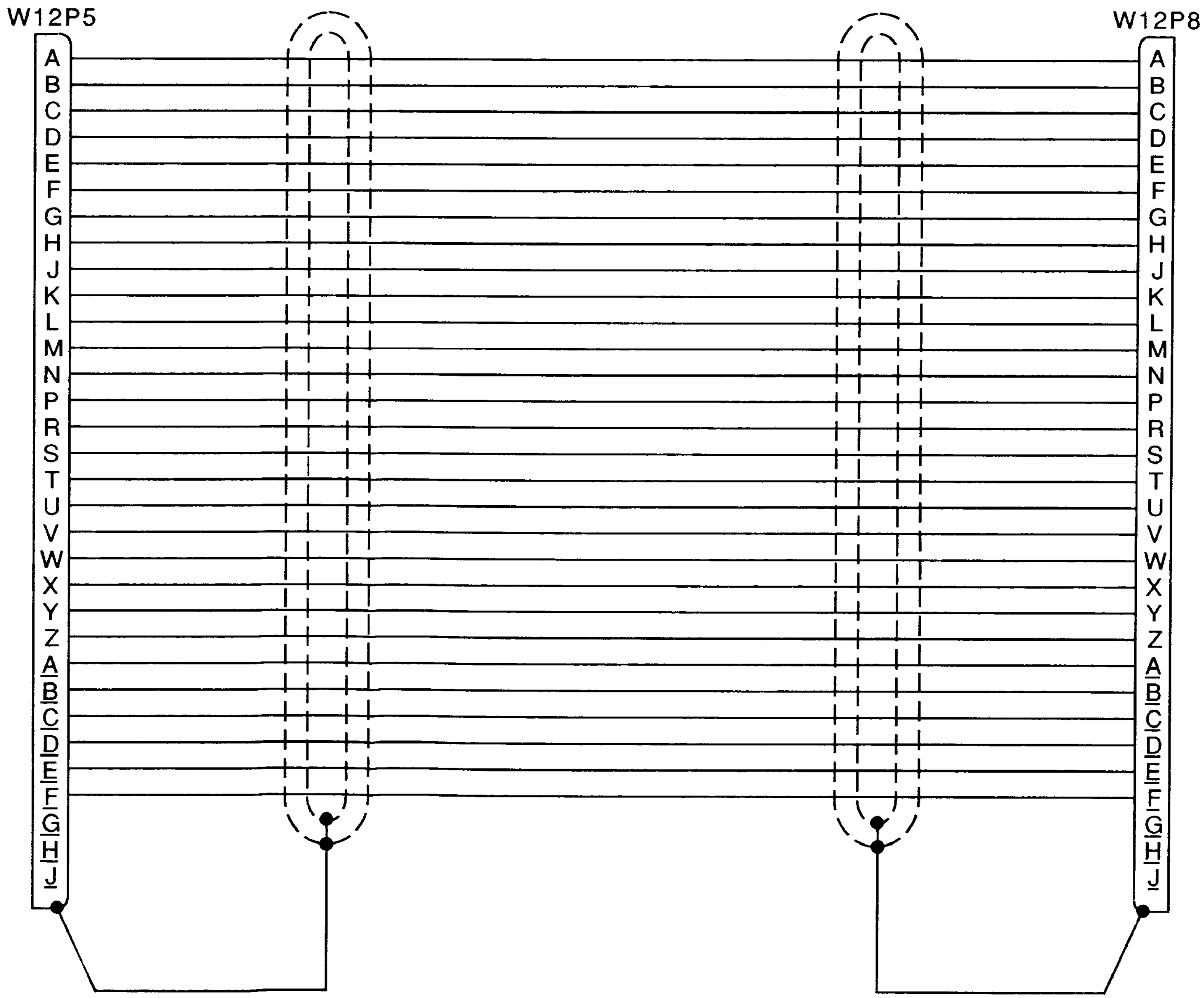


ENG REF 13280639

NOTES: UNLESS OTHERWISE SPECIFIED
UNDERLINING INDICATES LOWER CASE LETTERS

WIRING SCHEMATIC

Figure H-29. D/NSC Cable W4 Schematic Diagram
(Sheet 2 of 2)

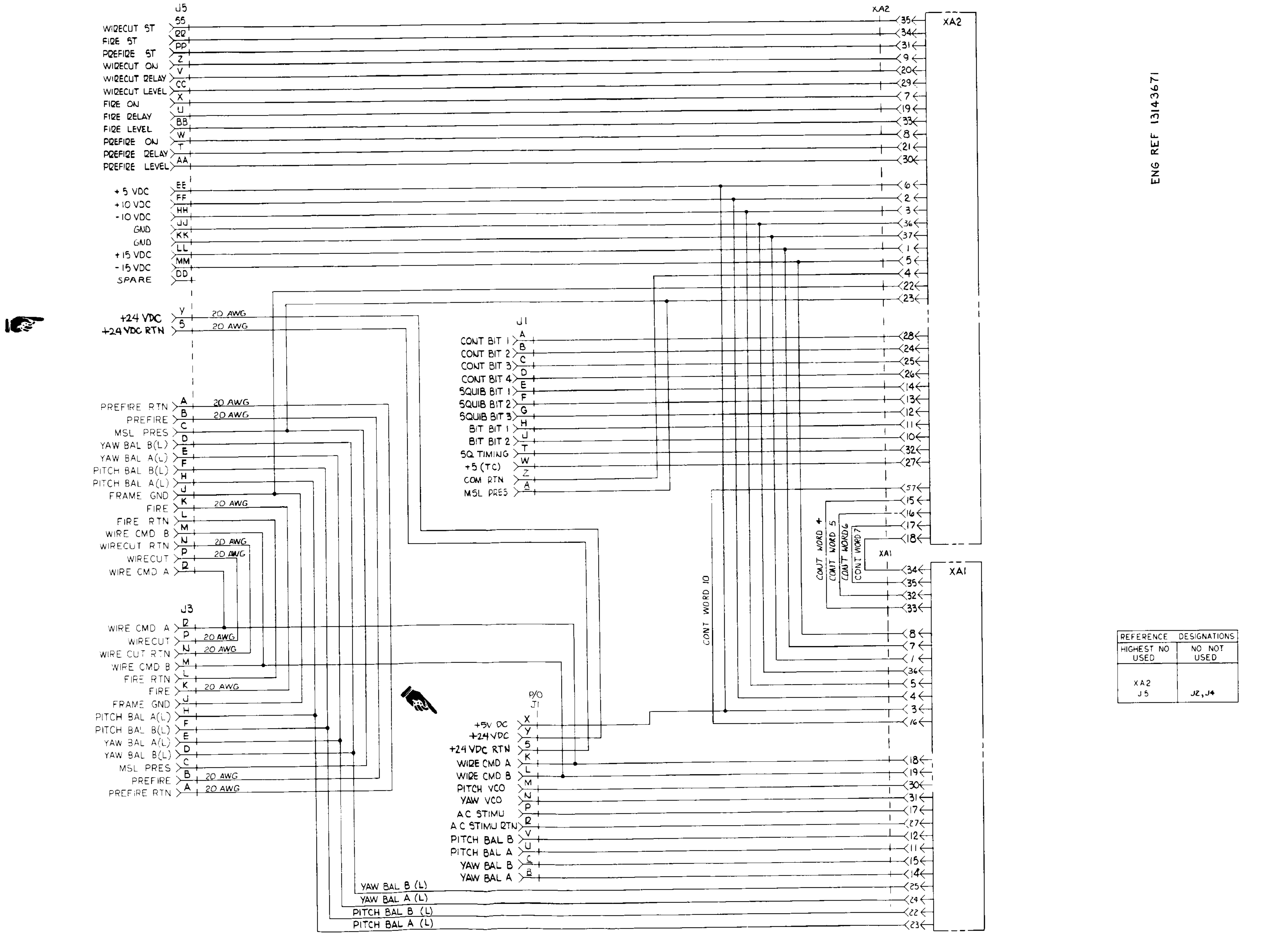


ENG REF 13162747

NOTES: UNLESS OTHERWISE SPECIFIED
UNDERLINING INDICATES LOWER CASE LETTERS

WIRING SCHEMATIC

Figure H-29.1. D/NSC Cable W12 Schematic Diagram



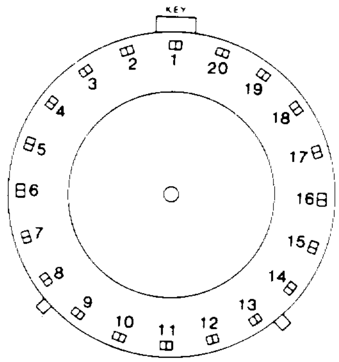
REFERENCE	DESIGNATIONS
HIGHEST NO USED	NO NOT USED
XA2 J5	J2, J4

2. ALL WIRES ARE 22 AWG

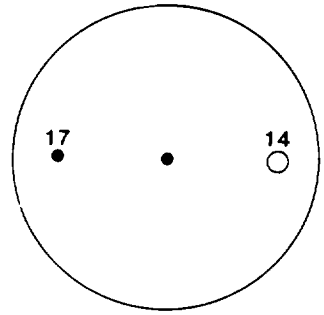
1. UNDERLINING OF A LETTER E.G. A INDICATES LOWERCASE

NOTES-UNLESS OTHERWISE SPECIFIED

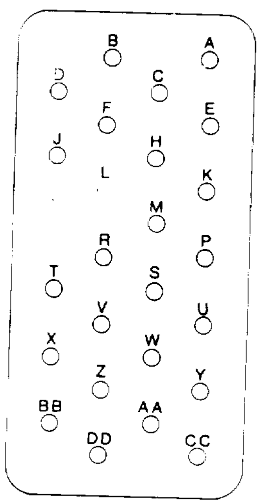
Figure H-30. Missile Simulator Assembly Schematic Diagram



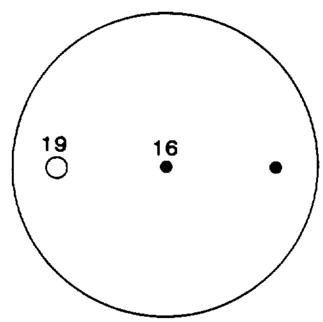
J2



MISSILE CASE
TERMINAL-1
(MC1)



P2



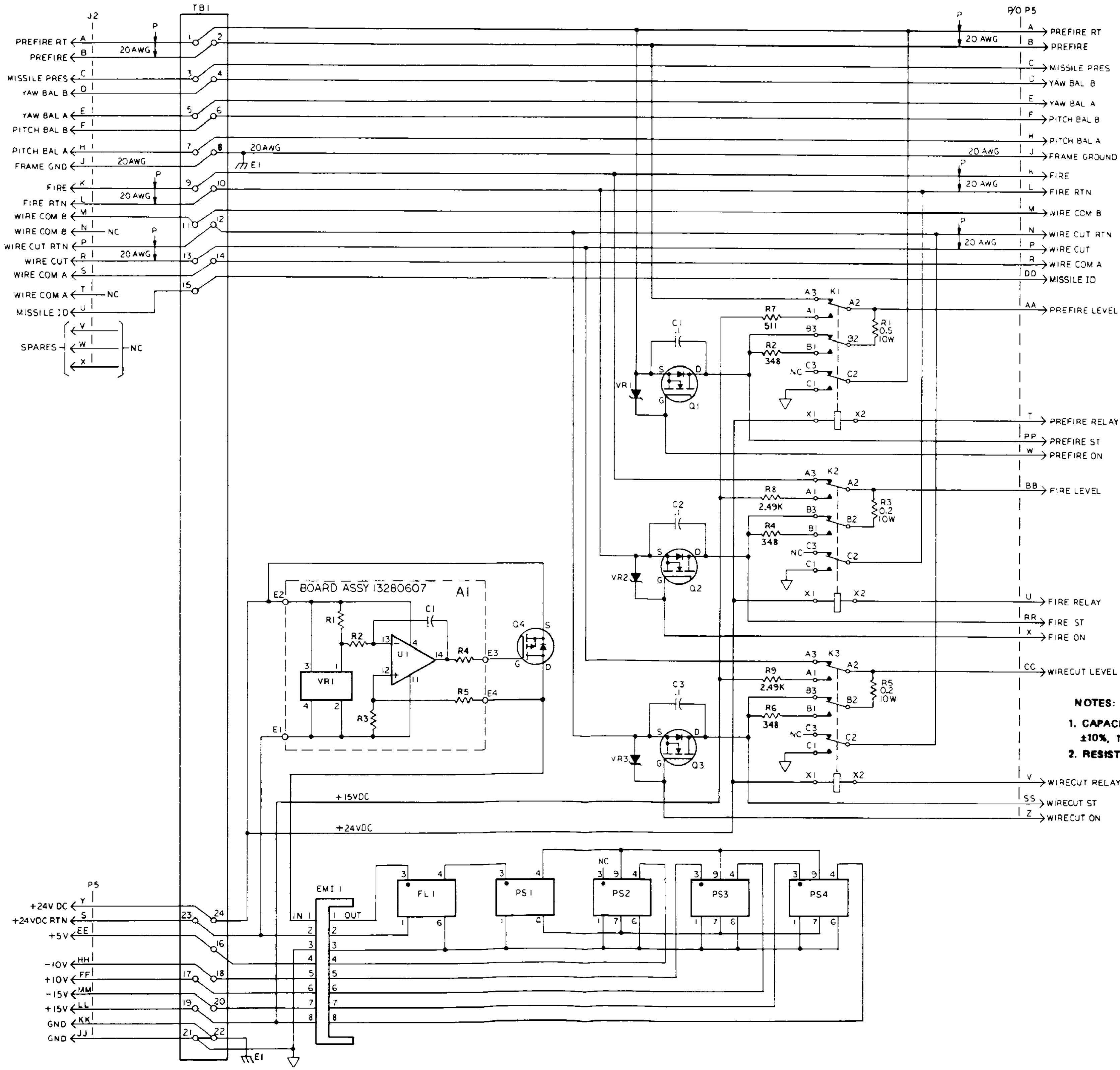
MISSILE CASE
TERMINAL-2
(MC2)

POINT-TO-POINT LIST FOR PLUG P2 ; UMBILICAL CONNECTOR J2 ;
AND MISSILE CASE TERMINALS

FROM	TO	FROM	TO	FROM	TO
P2-A	J2-2	P2-J	MC(GND-E1	MC1-14	J2-14
P2-B	J2-3	P2-K	J2-12	MC1-14	J2-15
P2-C	J2-4	P2-L	J2-13	MC1-17	J2-17
P2-D	J2-7	P2-M	MC1-14	MC2-16	J2-16
P2-E	J2-8	P2-P	MC2-16	MC2-16	J2-18
P2-F	J2-9	P2-R	MC1-17	MC2-19	J2-19
P2-H	J2-10	P2-S	MC2-19	MC2-19	J2-20
P2-J	J2-11				

Figure H-30.1. Missile Simulator Case Modification/Umbilical Harness Assembly Point-to-point Wiring List

ENG REF 13280612

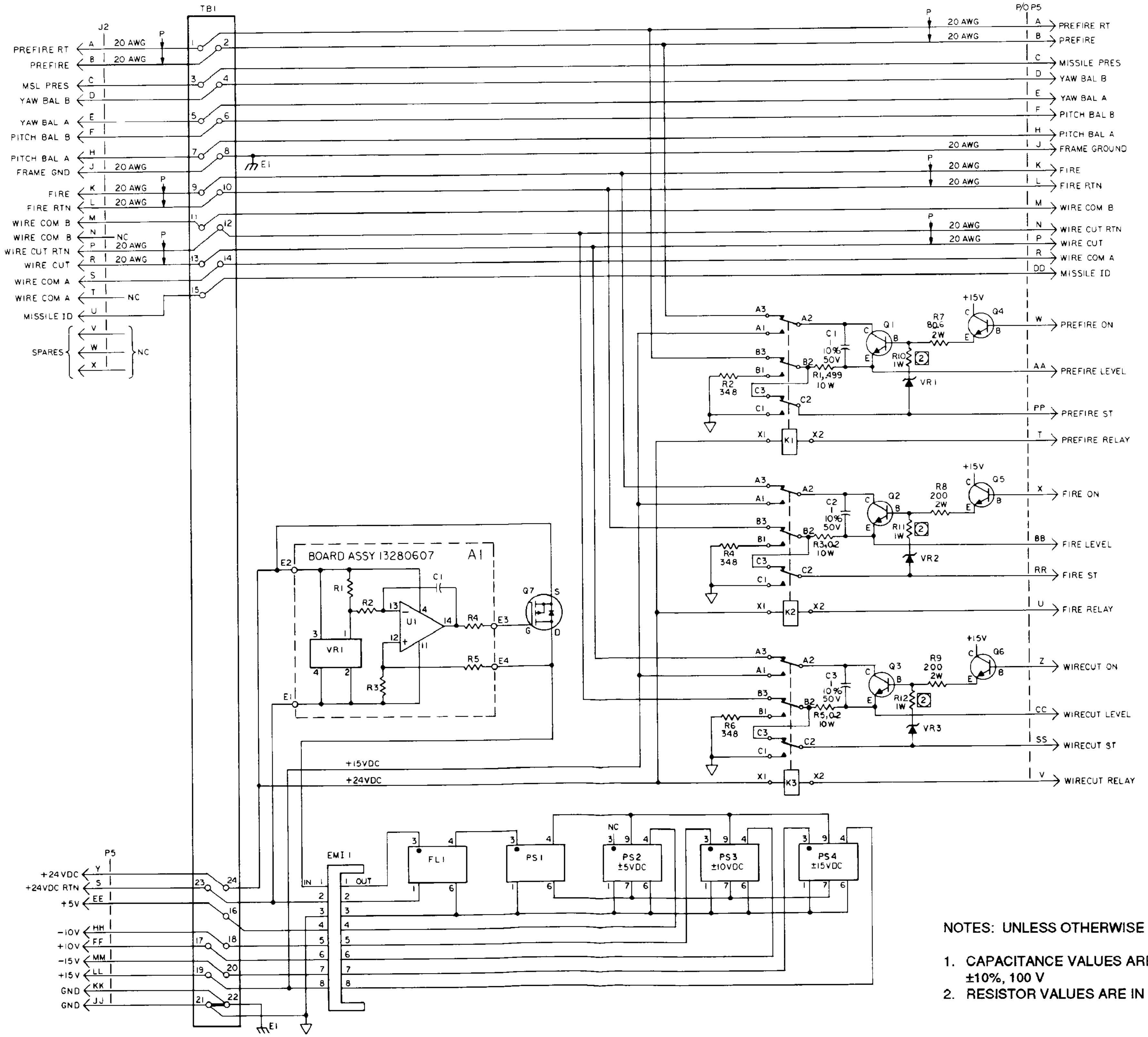


NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROFARADS ±10%, 100 V
2. RESISTOR VALUES ARE IN OHMS

REFERENCE DESIGNATION	
HIGHEST NO. USED	NO. NOT USED
C3	
R9	
Q4	
TB1	
K3	
FL1	
EMI 1	
PS4	
P5	P1, P2, P3 & P4
VR3	
J2	J1

Figure H-31. DC/DC Power Supply Schematic Diagram
(Sheet 1 of 2)



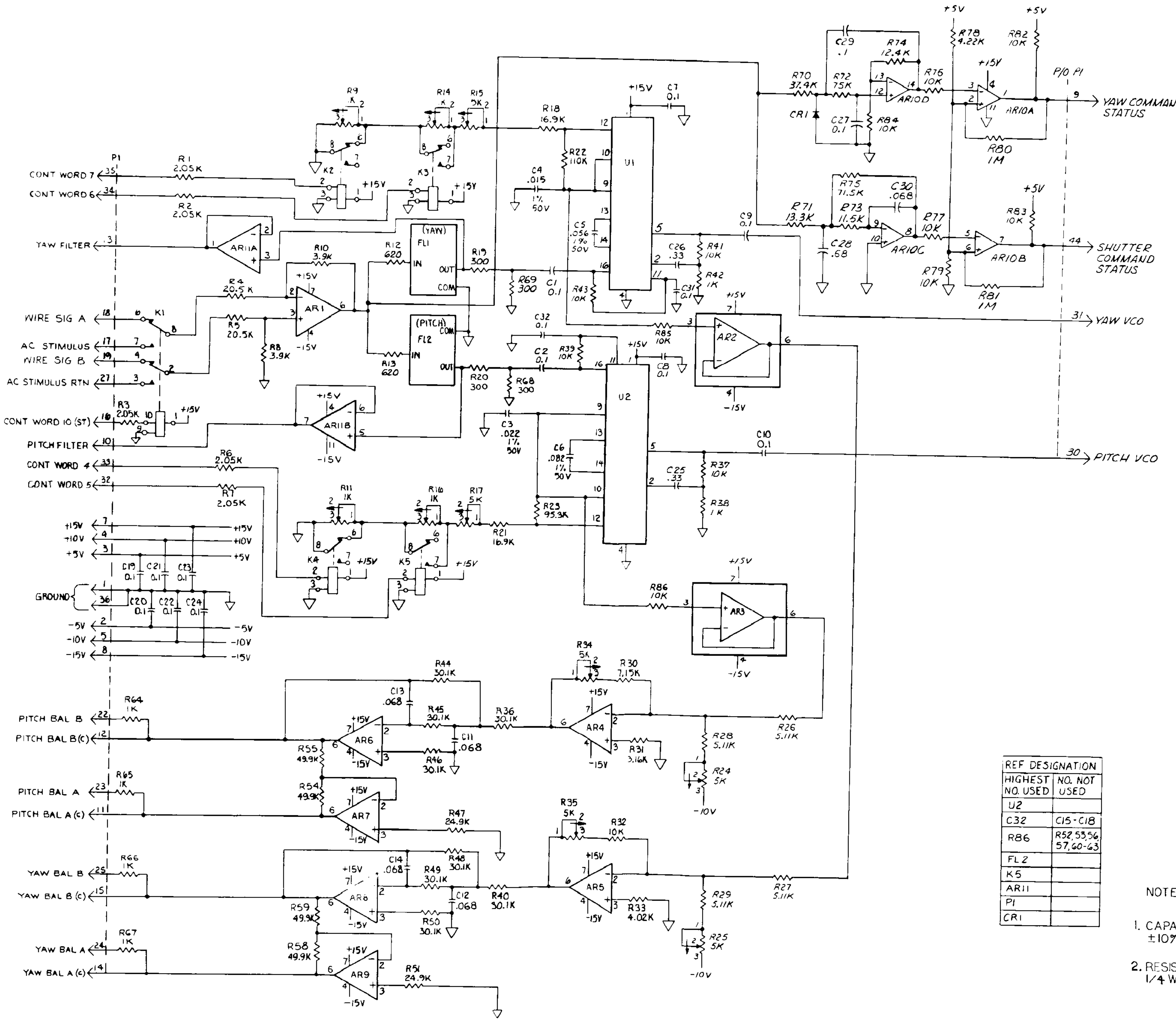
NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROFARADS ±10%, 100 V
2. RESISTOR VALUES ARE IN OHMS

ENG REF 13250581

Figure H-31. DC/DC Power Supply Schematic Diagram
(Sheet 2 of 2)

ENG REF 13163018



REF DESIGNATION	
HIGHEST NO. USED	NO. NOT USED
U2	
C32	C15-C18
R86	R52,53,56, 57,60-63
FL2	
K5	
AR11	
P1	
CR1	

NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROFARADS, ±10%, 100V
2. RESISTOR VALUES ARE IN OHMS. 1/4 W, ±1%.

Figure H-32. Timing and Demodulation Card A1 Schematic Diagram

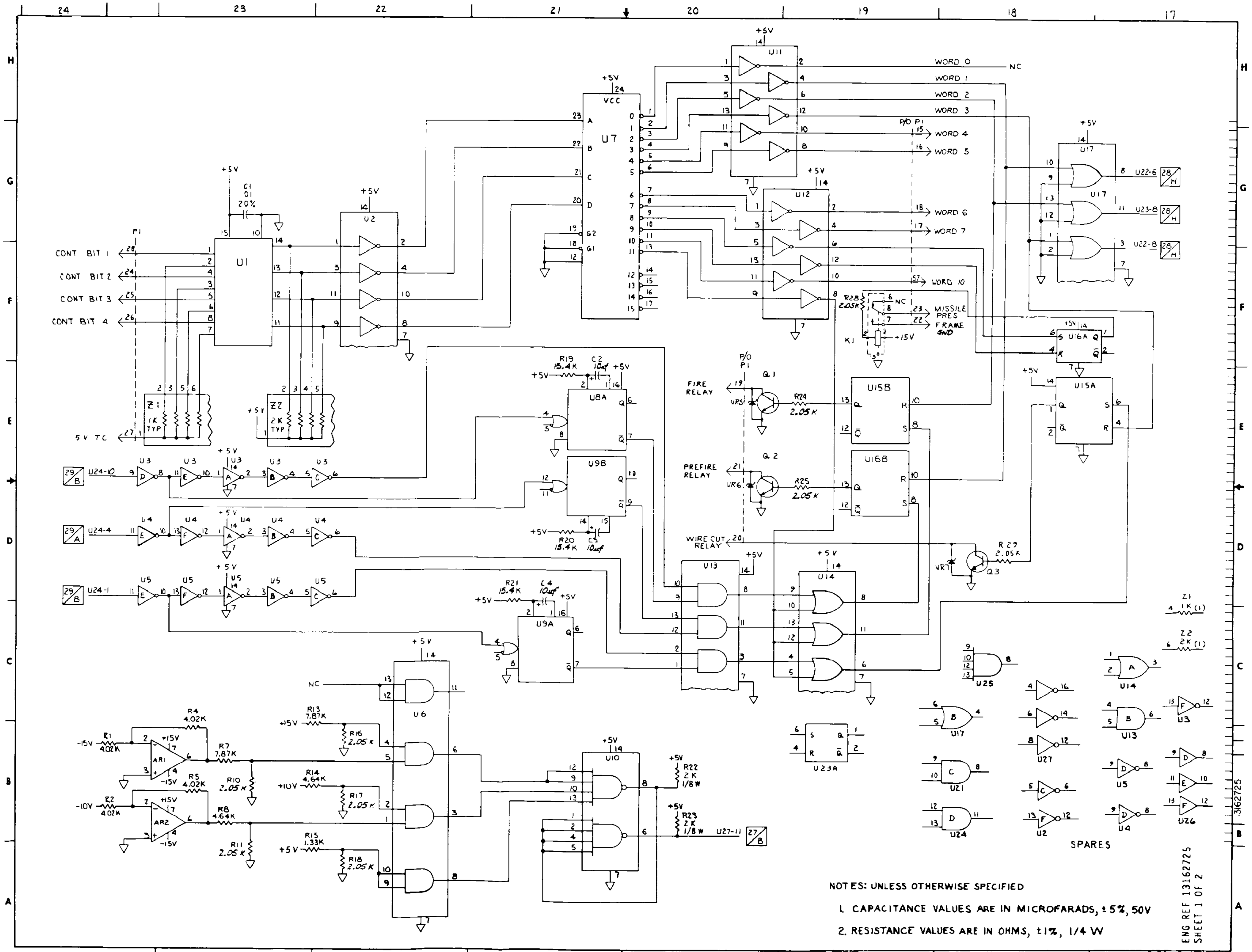


Figure H-33. BIT and Squib Card A2 Schematic Diagram (Sheet 1 of 4)

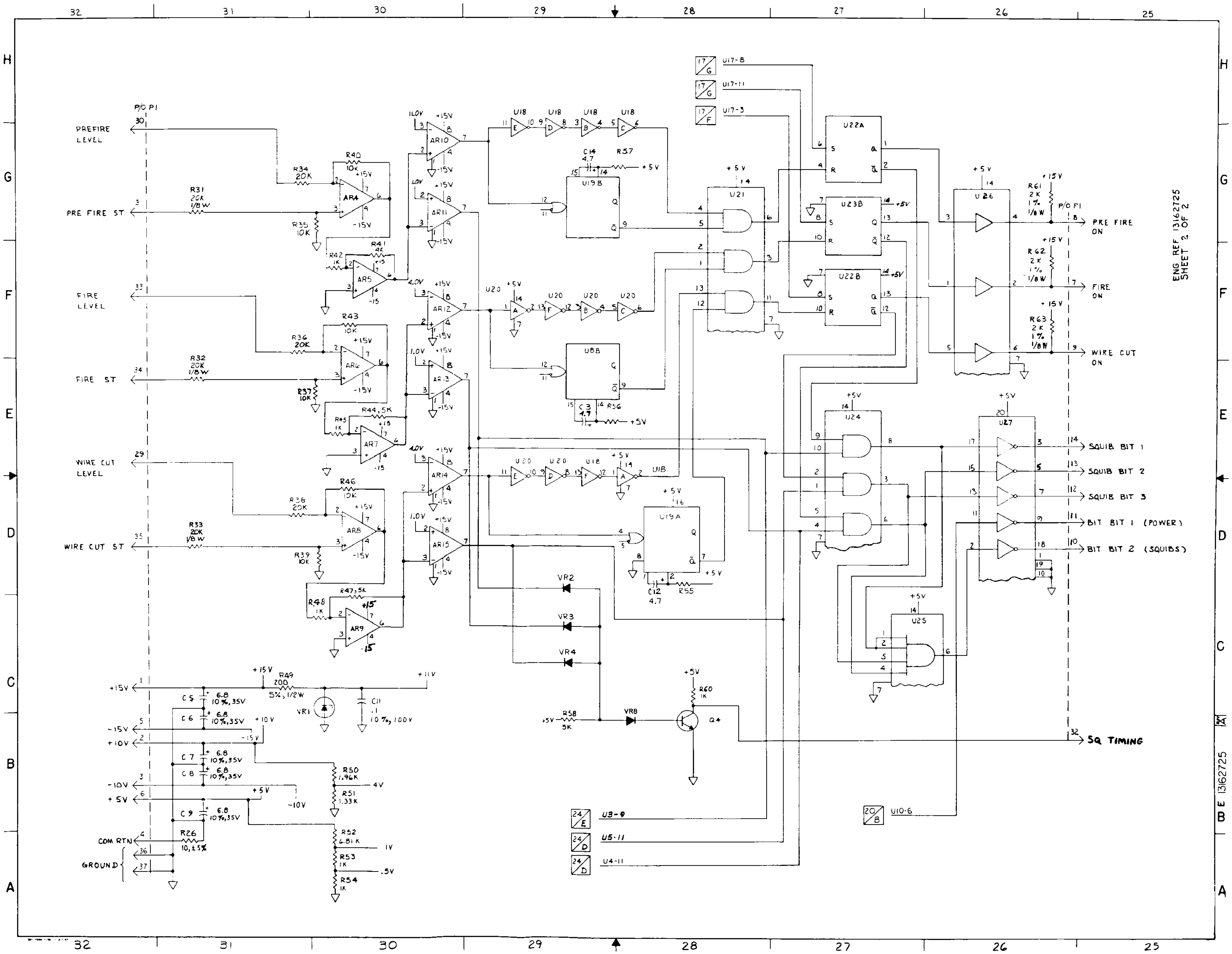


Figure H-33. BIT and Squib Card A2 Schematic Diagram
(Sheet 2 of 4)

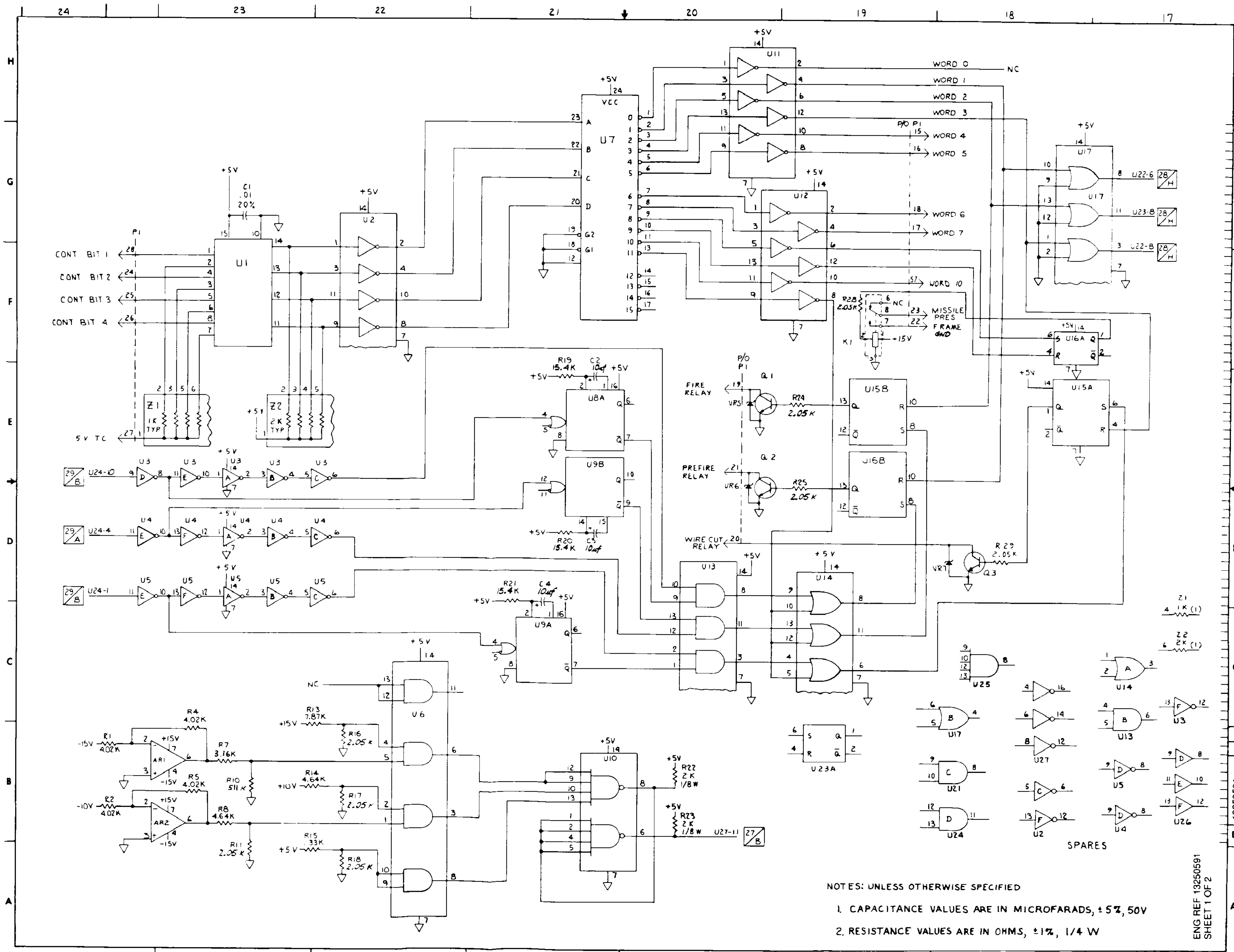


Figure H-33. BIT and Squib Card A2 Schematic Diagram (Sheet 3 of 4)

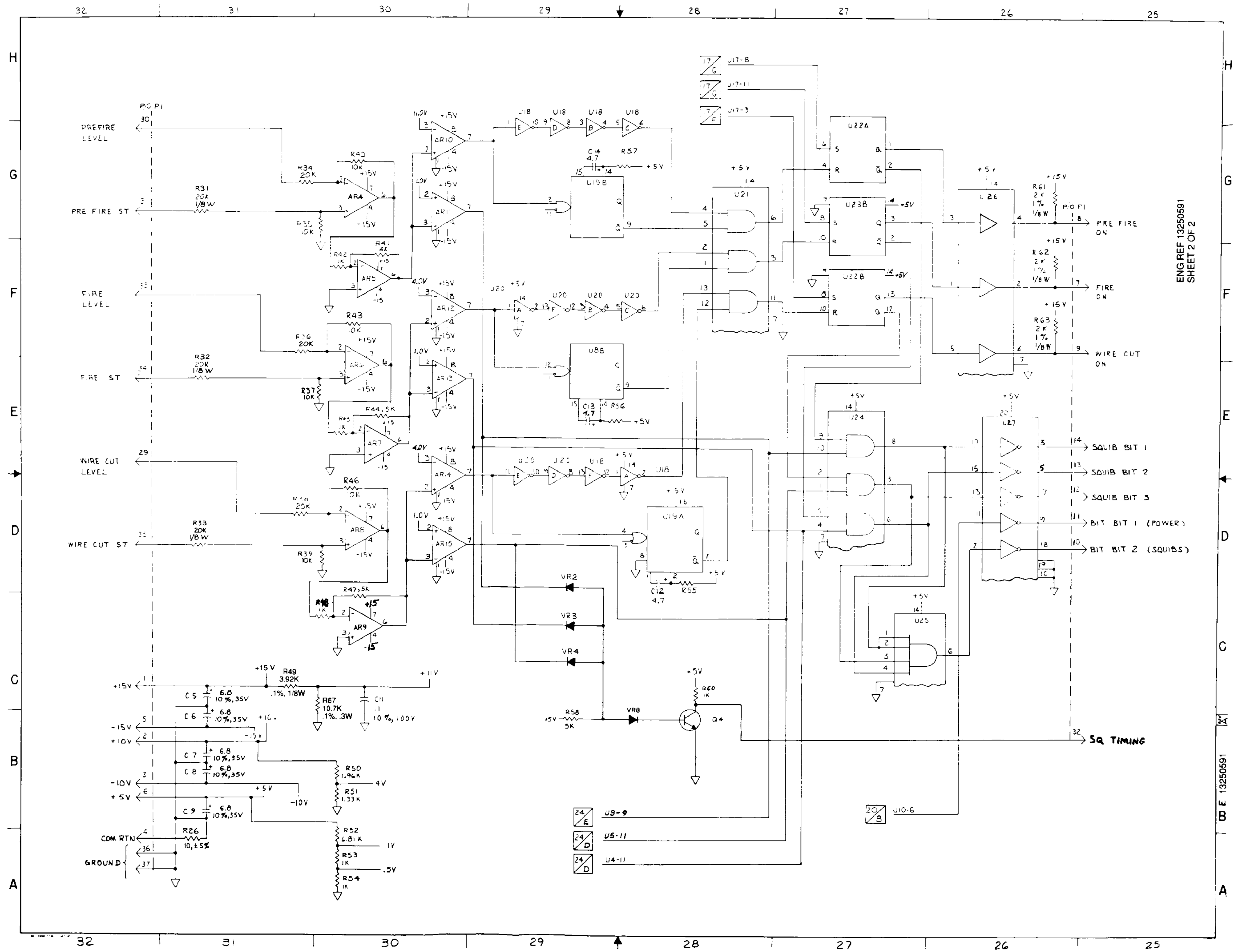


Figure H-33. BIT and Squib Card A2 Schematic Diagram
(Sheet 4 of 4)

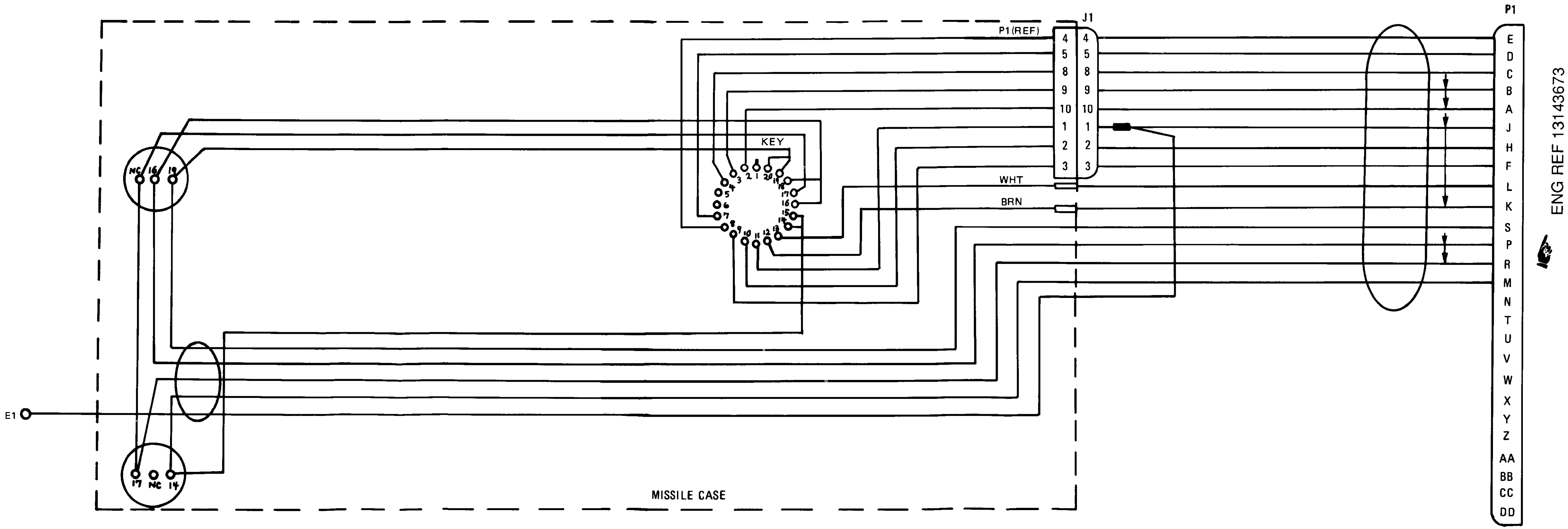
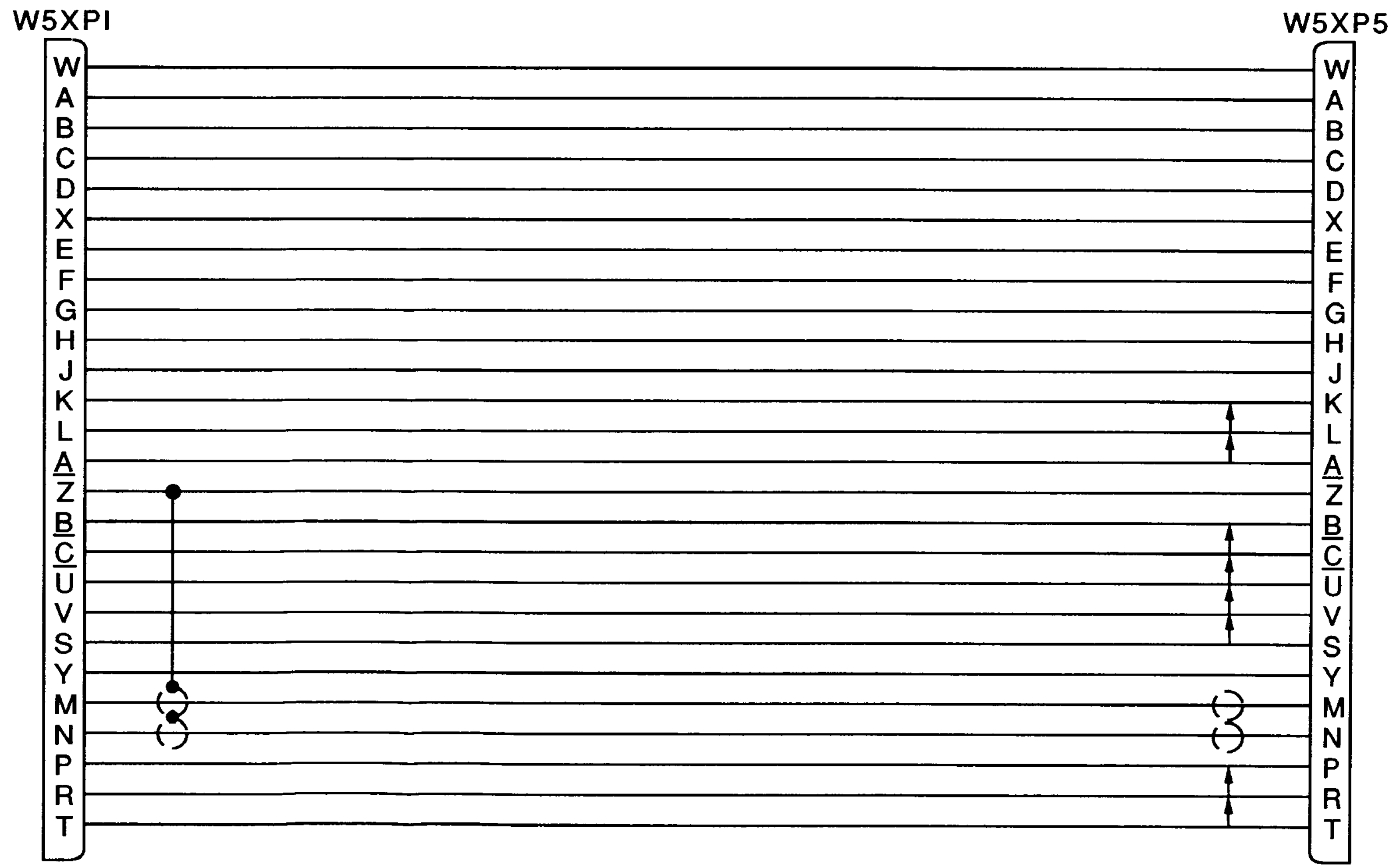


Figure H-33.1. Case Modification Schematic Diagram

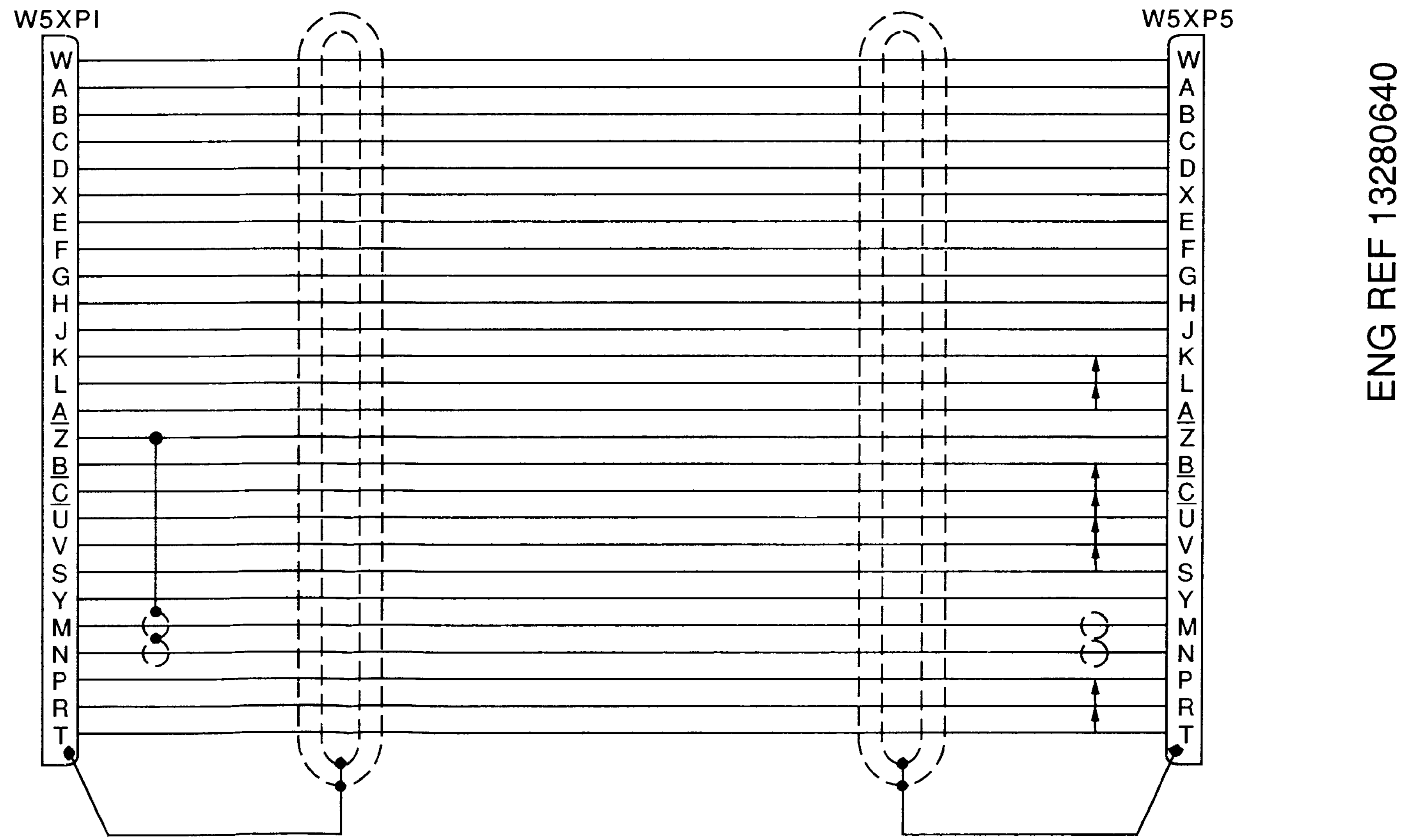


ENG REF 13143575

NOTES: UNLESS OTHERWISE SPECIFIED
UNDERLINING INDICATES LOWER CASE LETTERS

WIRING SCHEMATIC

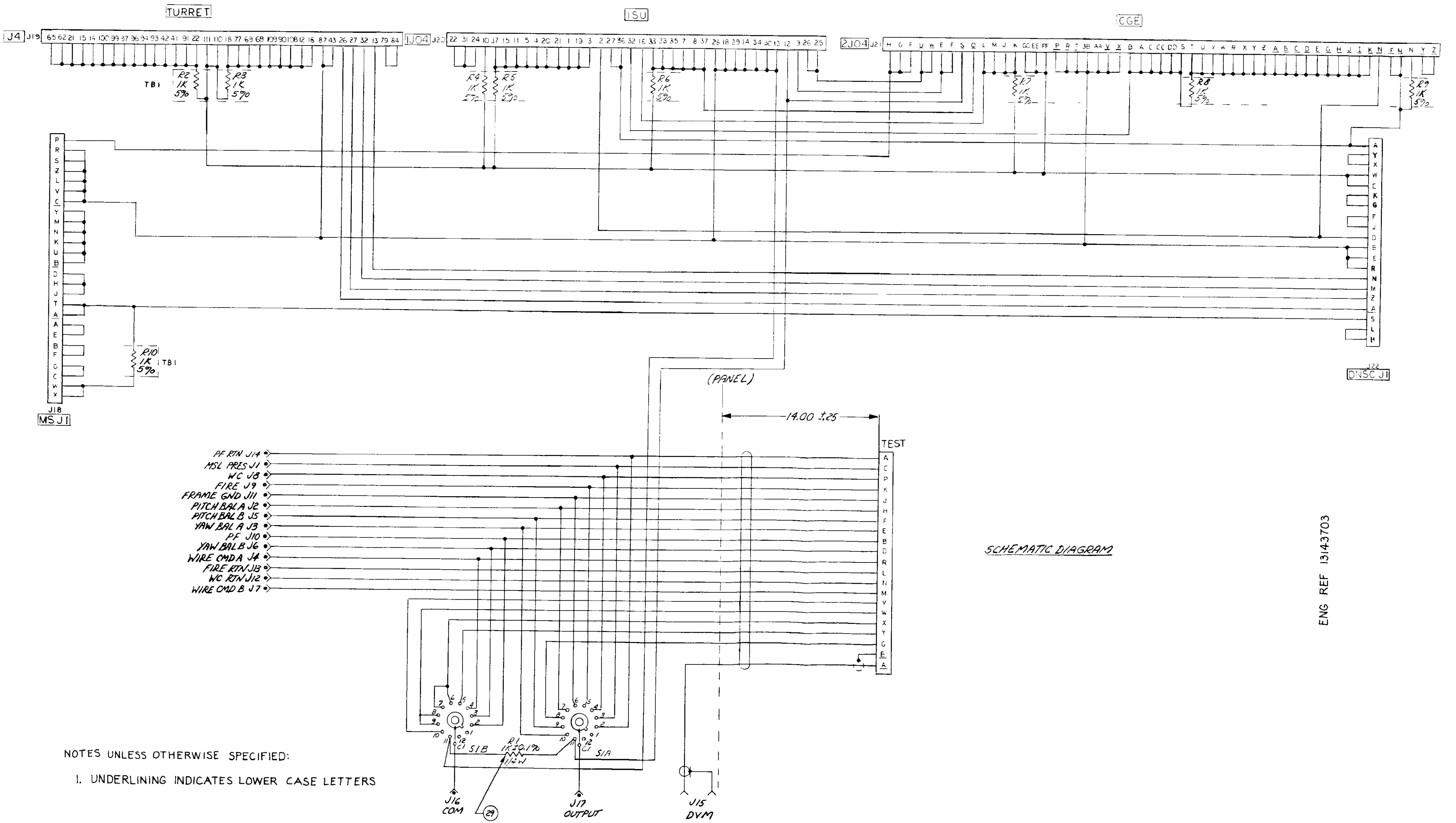
Figure H-34. MS Cable W5 Schematic Diagram
(Sheet 1 of 2)



NOTES: UNLESS OTHERWISE SPECIFIED
UNDERLINING INDICATES LOWER CASE LETTERS

WIRING SCHEMATIC

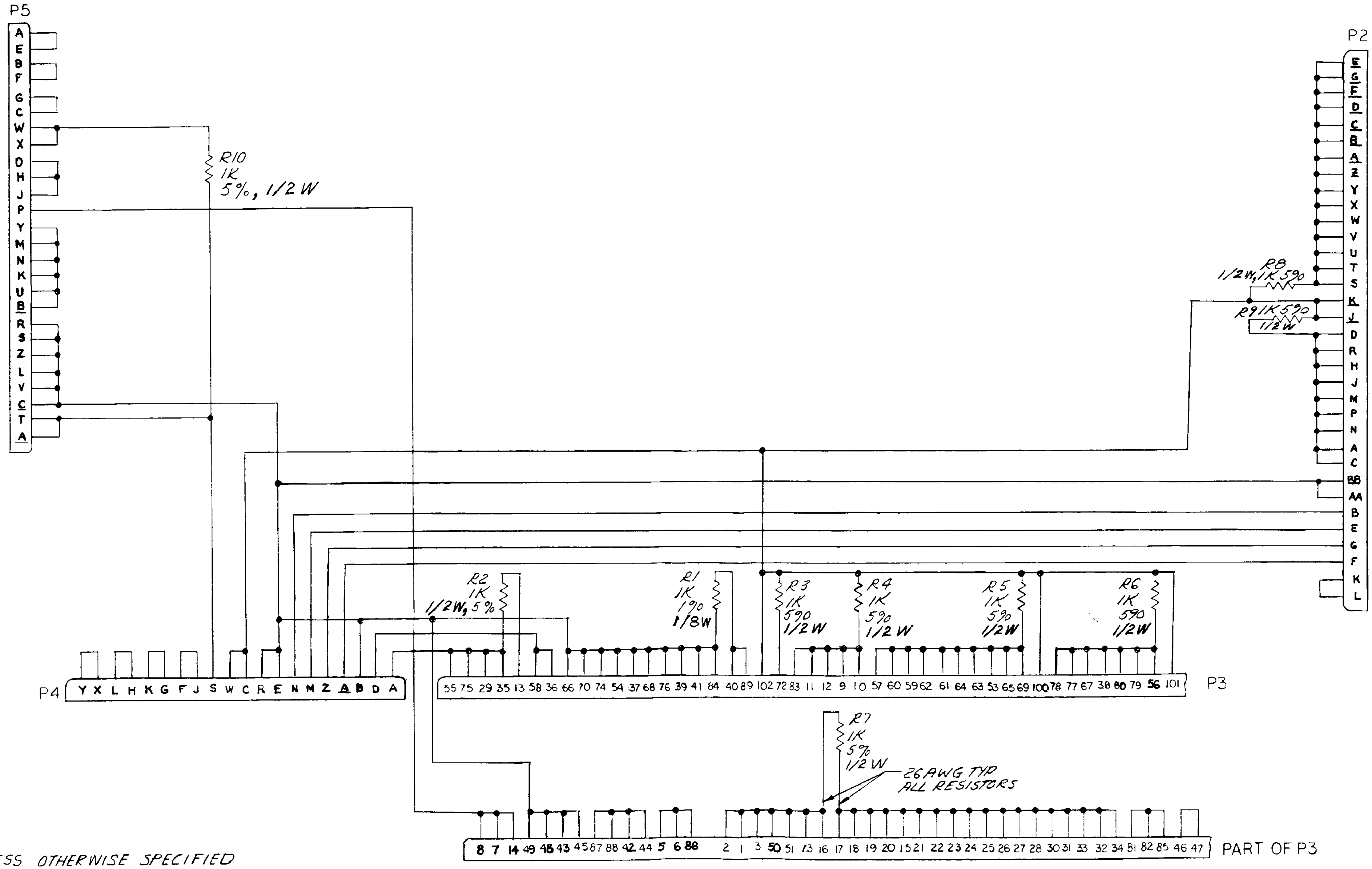
Figure H-34. MS Cable W5 Schematic Diagram
(Sheet 2 of 2)



NOTES UNLESS OTHERWISE SPECIFIED:

1. UNDERLINING INDICATES LOWER CASE LETTERS

Figure H-35. ABOB Front Panel Assembly Schematic Diagram



ENG REF 13143577

NOTES: UNLESS OTHERWISE SPECIFIED
UNDERLINING INDICATES LOWER CASE LETTERS

Figure H-36. Self Test Cable W7 Schematic Diagram

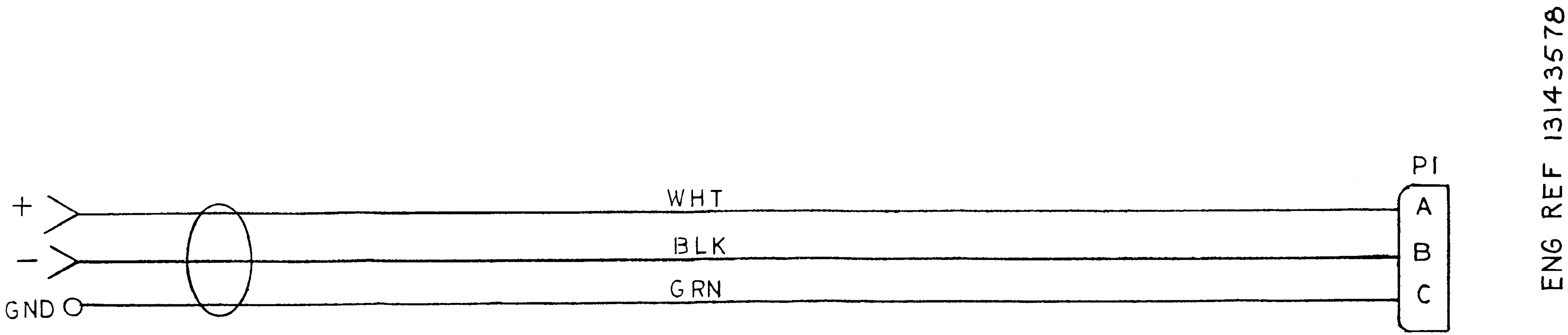


Figure H-37. TC Auxiliary Power Cable W8 Schematic Diagram

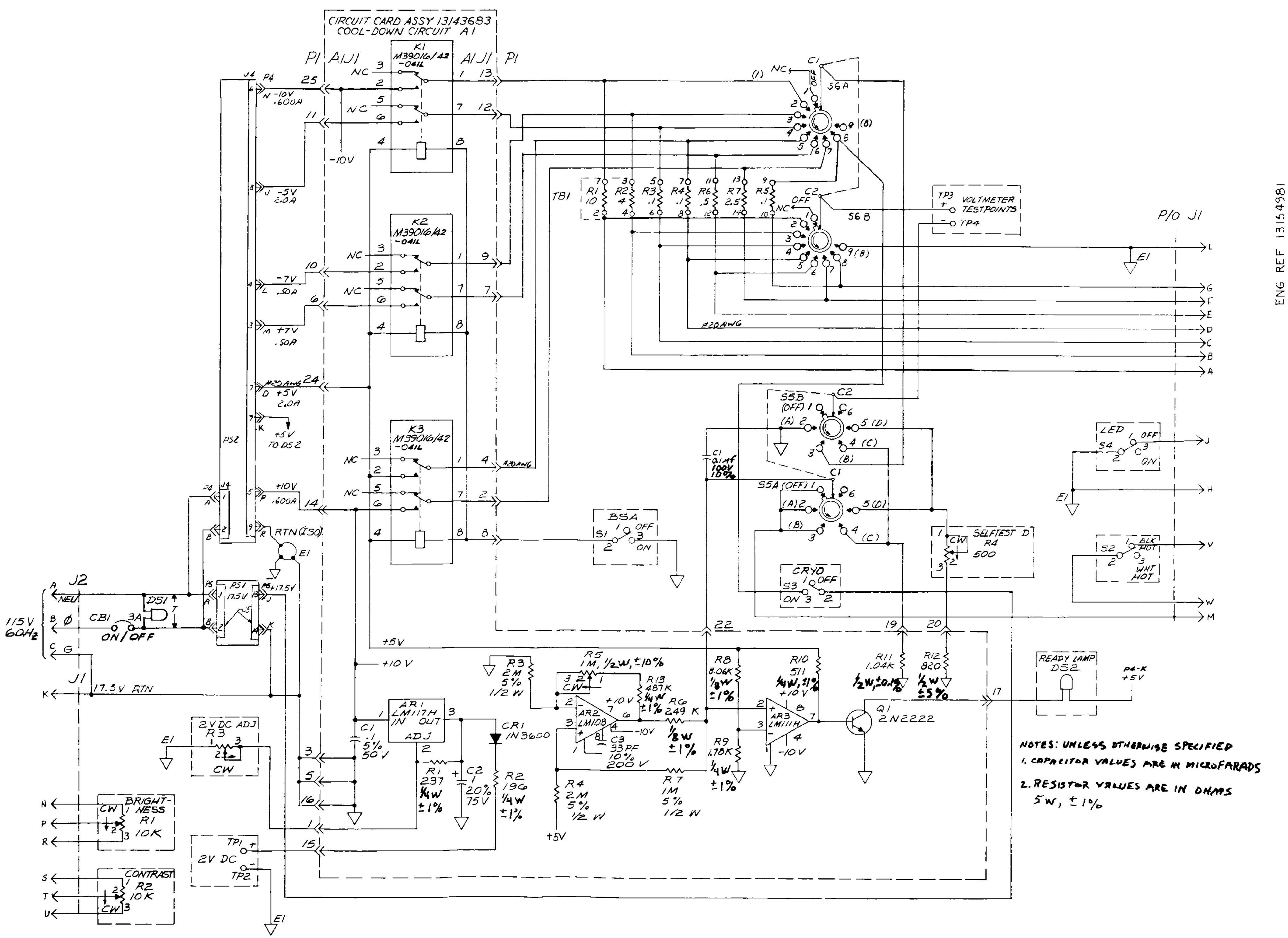


Figure H-38. BSAC Front Panel Assembly Schematic Diagram

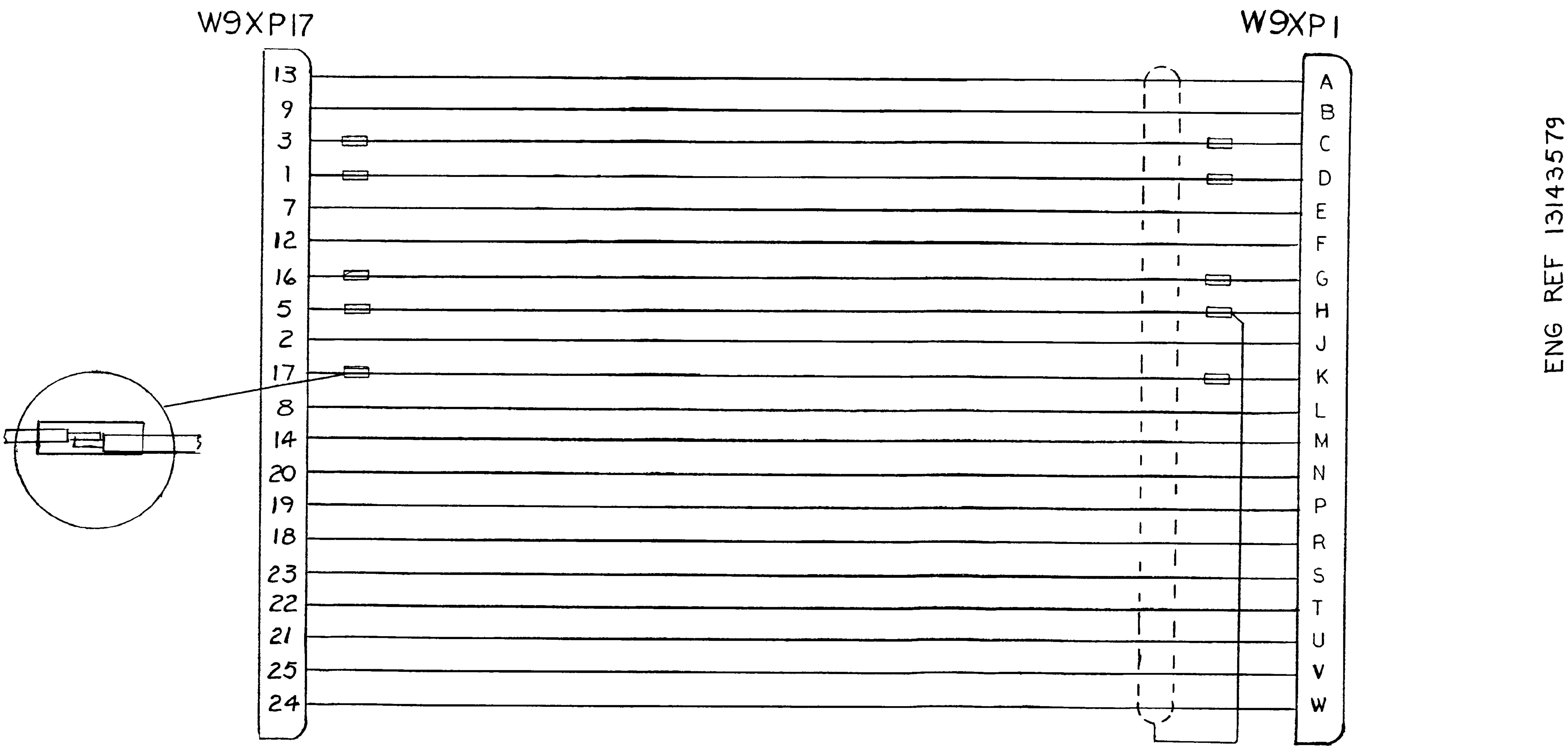


Figure H-39. BSA Cable W9 Schematic Diagram

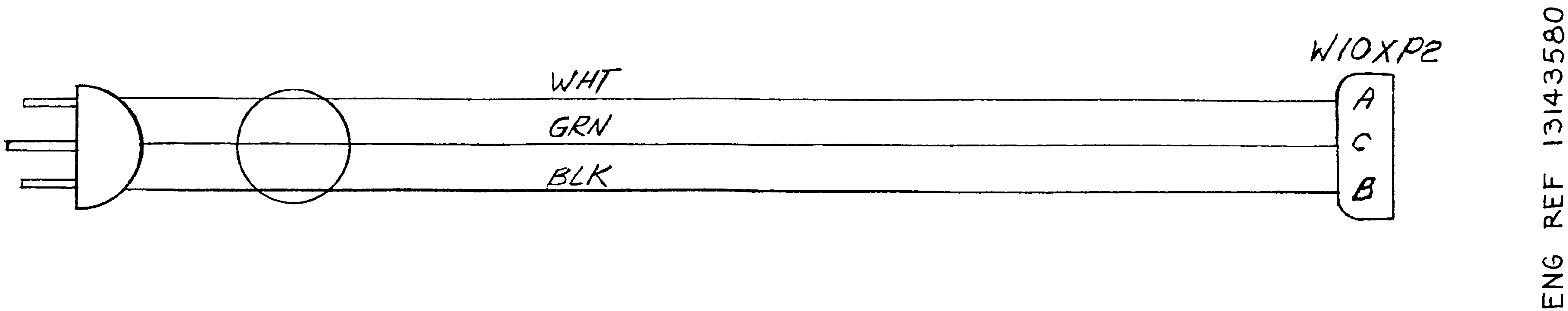


Figure H-40. Power Cable W10 Schematic Diagram

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R

Subject	Paragraph, Figure, Table Number

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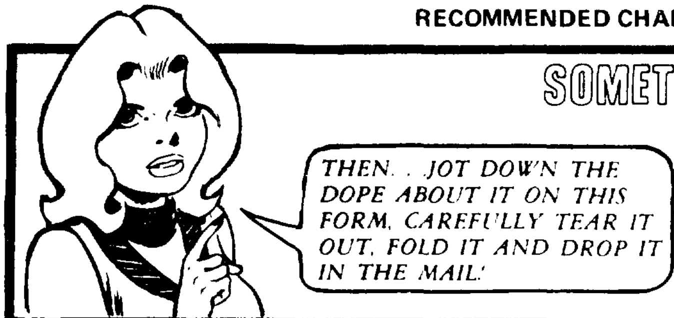

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DATE SENT

14 January 1979

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-1430-550-34-1	7 Sep 72	Unit of Radar Set AN/MPQ-50 Tested at the HFC

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	
9-19		9-5		"B" Ready Relay K11 is shown with two #9 contacts. That contact which is wired to pin 8 of relay K16 should be changed to contact #10.
21-2	step 1C		21-2	Reads: Multimeter B indicates 600 K ohms to 9000 K ohms. Change to read: Multimeter B indicates 600 K ohms minimum. Reason: Circuit being checked could measure infinity. Multimeter can read above 9000 K ohms and still be correct.

SAMPLE

NOTE TO THE READER:

Your comments will go directly to the writer responsible for this manual, and he will prepare the reply that is returned to you. To help him in his evaluation of your recommendations, please explain the reason for each of your recommendations, unless the reason is obvious.

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THE METRIC SYSTEM AND EQUIVALENTS

NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'EIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

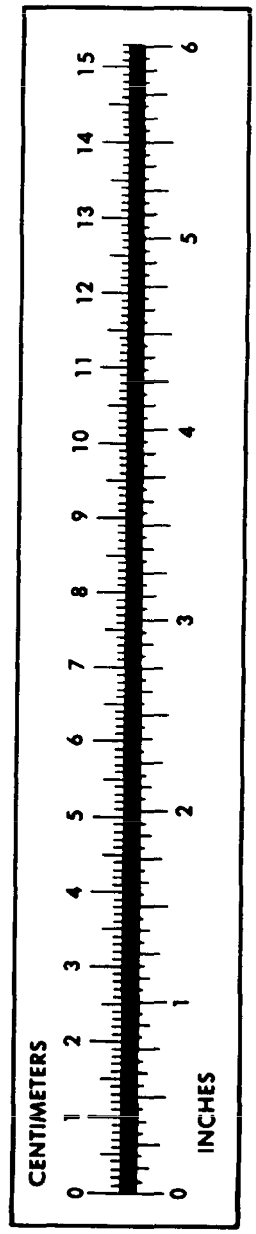
1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F



APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
'ers	Gallons	0.264
.ms	Ounces	0.035
.ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
'ometers per Liter	Miles per Gallon	2.354
›meters per Hour	Miles per Hour	0.621

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