TM 11-5895-217-35

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD AND DEPOT MAINTENANCE MANUAL

TRANSPONDER SET AN/APX-44

This copy is a reprint which includes current pages from Changes 1 through 3 and 5 through 7.

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1960

AGO 10004A

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 125-volt and the 300-volt plate and power supply circuits, or on the 150-volt bias supply circuit.

DON'T TAKE CHANCES

EXTREMELY DANGEROUS VOLTAGES (600-volt dc and 1,200-volt dc) EXIST IN RADAR RECEIVER-TRANSMITTER RT-494/APX-44

CAUTION!

Do not make resistance measurements on the transistorized circuits of Radar Receiver-Transmitter RT-494/APX-44.

(See paragraph 72 before making resistance measurements on these circuits.)

CHANGE No. 7

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *2 May 1968*

DS, GS, and Depot Maintenance Manual Including Repair Parts List
TRANSPONDER SETS AN/APX-44 AND AN/APX-44B

TM 11-5895-217-35, 27 July 1960, is changed as follows: The manual now also applies to:

Nomenclature	*Order No.*	*Serial No.*
Transponder Set AN/APX-44B	FR28-043-P6-22095 (E)	501 through 999
	FR28-043-P6-22795 (E)	1 through 1042

Note. The parenthetical references to a previous change (example: "page 3 of C 3") indicates pertinent material was published in that change.

After the paragraph heading, add "(for Equipments Without SLS Capability)" in the following places:

Page 76, paragraph 55.
Page 77, paragraph 56.
Page 81, paragraph 57.
Page 100, paragraph 64.

Page 2, chapter 1, below the title, note (page 1 of C 5). Add after the second sentence: For AN/APX-44 modified by modification work orders MWO 11-5895-217-30/3 and for AN/APX-44B procured on Order FR 28-043-P6-22095 (E), serial numbers 1 through 500 modified by modification work orders MWO 11-5895-217-30/3, Order FR 28-043-P6-22095 (E), serial numbers 501 through 999, and Order FR 28-043-P6-27795 (E), serial numbers 1 through 1042, the AN/APX-44B contains a sidelobe-suppression (SLS) circuit; the video amplified card has been replaced by a VIDEO AMPLIFIER/SLS card. All illustrations and text pertaining to the video amplifier card do not apply to the VIDEO AMPLIFIER/SLS card.

Page 11, paragraph 16 (page 2 of C 2). Add after subparagraph *e:*

f. Transponder sets that contain sidelobe-suppression (SLS) circuitry reply to three-pulse, SLS-type interrogations. The additional pulse is a control pulse that is inserted in a fixed position after the first pulse of a mode-determining, two-pulse interrogation to permit more positive control of transponder responses when operating in close proximity to the radar ground station. The three-pulse SLS system reduces ground station antenna sidelobe triggering of undesirable transponder replies.

Page 12, paragraph *18b.* Make the following changes.

Add after subparagraph *b* (5):

(6) Sidelobe-suppression control pulse-risetime 0.2 µsec or less, decay time 0.4 µsec or less, width 0.7 to 1.2 µsec, with separation of 2 µsec ± 0.15 for all interrogation modes.

After subparagraph *c,* add new subparagraph *d.*

d. The three-pulse, sidelobe-suppression type interrogation system uses an added pulse, designated P2, for transponder control. A radar ground station transmits this pulse at a fixed separation from the first interrogation pulse but at an amplitude considerably lower than that of the interrogation first pulse (P1) and last pulse (P3). Sidelobe control pulse P2 is transmitted omnidirectionally around the ground station with an amplitude that exceeds that of my sidelobe being radiated by the radar antenna and is able to initiate transponder set control before the radar antenna sidelobes can cause erratic replies.

Page15, section II, below the title, add:

Note. All references to interrogation pulse pairs are applicable to equipments with SLS capability unless otherwise specified. The SLS control pulse may be present in the receiver and video output during three-pulse SLS interrogations, but is not pertinent to the discussion unless specifically mentioned.

Page 18, paragraph *25e.* Make the following changes:

After subparagraph *e,* add:

e. 1. Refer to figure 8.2, *receiver-transmitter with SLS, block diagram,* for the following discussion. Spike suppressor V303 eliminates pulses of 0.3 µsec or less in width and decreases the width of each interrogation pulse by 0.3 µsec to eliminate most of the received noise pulses. Sidelobe blocking oscillator V301 receives interrogation pulses from V303 and is adjusted to produce output pulses that are approximately 0.6 µsec in width while maintaining the original interrogation pulse separation. The reshaped interrogation pulses from V301 are applied to all three decoders (V351, V352 and V353). When one of the decoders receives a correct code and mode, main gate multivibrator V404 is triggered. Passage of the SLS control pulse (P2) to the video amplifier/SLS card input is possible only when pulse P2 has an amplitude sufficient to overcome IF suppressors CR204 through CR207 *(d* above). Pulse P2 must have an amplitude that exceeds the 10-dbm threshold of the IF suppressor circuit at the 2.0-µsec separation point to be fed to spike suppressor V303 for triggering of V301. Decoders V351, V352, and V353 will reject the P2 pulse if there is a lack of pulse-pair coincidence. Pulses P1 and P2 from V301 are combined and made additive when properly spaced. This action produces a single pulse of sufficient amplitude to trigger sidelobe multivibrator V302. The 35-µsec output pulse produced by V302 is used to blank V301, suppressing P3, and to prevent decoding of pulse P3. It is also rectified by automatic overload control (AOC) rectifier CR308 to reduce if amplifier (V202, V203 and V204) sensitivity when the preset prf has been exceeded.

Page 19, paragraph *25f.* After subparagraph (3), add:

(3.1) For equipments with SLS, the negative main gate pulse from V404 is amplified by main gate amplifier V454A and is applied to suppressor cathode follower and inverter amplifier V304 (fig. 8.2). The output of V304 cuts off sidelobe blocking oscillator V301 for the duration of the main gate and prevents interrogation of the transponder during the cutoff period. Amplifier V304 also supplies the main gate suppression pulse to SUPPR jack J106 and to main gate AOC rectifier CR305, where the gate is rectified and is applied as bias to IF amplifiers V202, V203, and V204 when the preset prf rate is exceeded. This governs receiver sensitivity by the interrogation repetition rate, and prevents the excessive transmitter duty cycle that would result if the transponder set replied to all interrogations.

Page 29, paragraph *27f* (6). Add the following note after subparagraph (6).

Note. SLS control pulse P2 falls at the 2.0- sec interval and is blocked in the if. suppressor circuit unless pulse P2 has sufficient amplitude to exceed the 10-dbm threshold of the IF suppressor. A 9-dbm *gray area* exists for passage of P2 due to IF suppressor circuit and interrogation signal characteristics. Pulse P2 must pass the IF suppressor whenever P2 is equal to or greater in amplitude than pulse P1.

Page 31, paragraph 28, heading. Add after the heading: (Without SLS).

After figure 18, add:

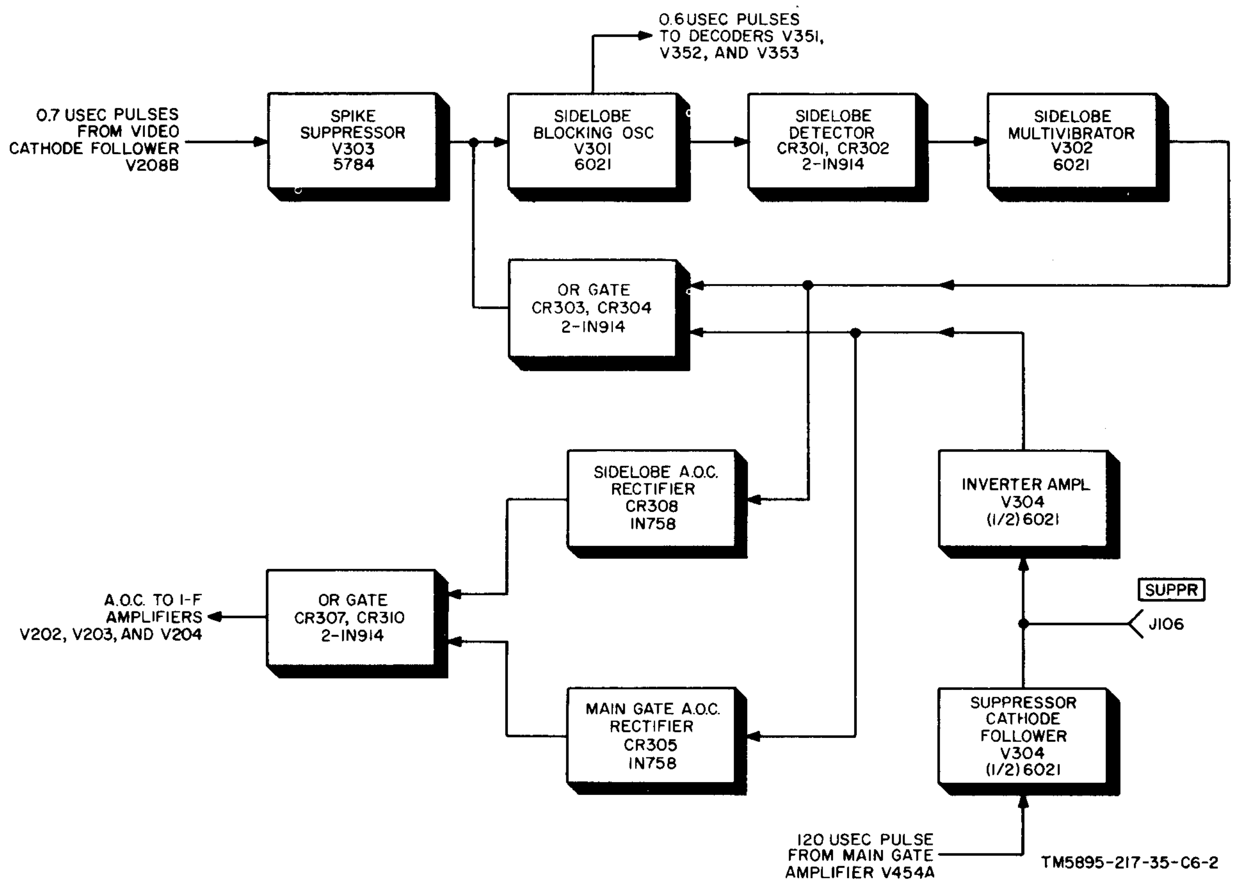


Figure 18.1. Video amplifier/SLS card, block diagram.

Page 32. After figure 19, add figure 19.1.

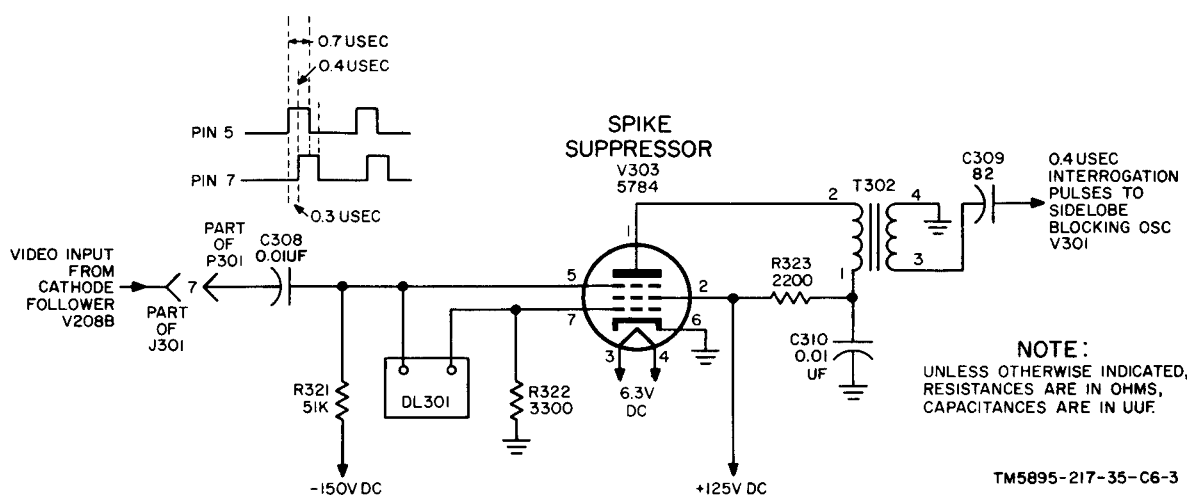


Figure 19.1. Spike suppressor (SLS), partial schematic diagram.

After figure 20, add figure 20.1.

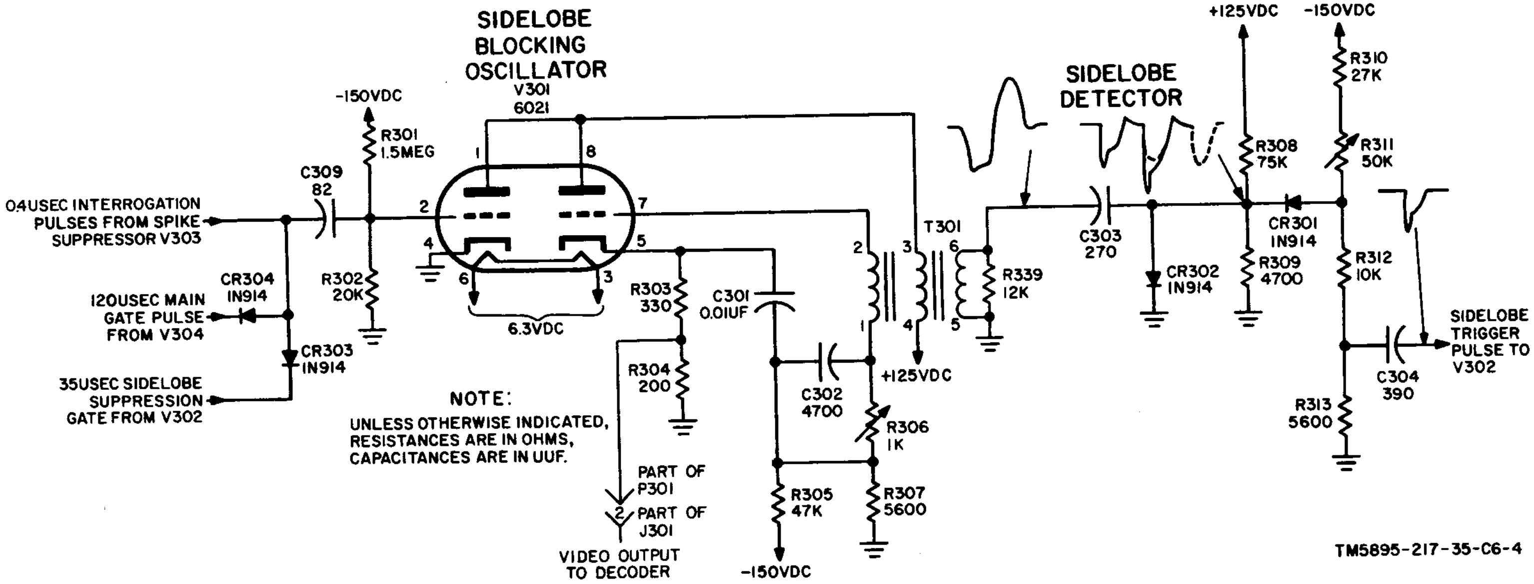


Figure 20.1. Sidelobe blocking oscillator and detector (SLS), partial schematic diagram.

Page 33. Make the following changes:
Afte figure 21, add figure 21.1.

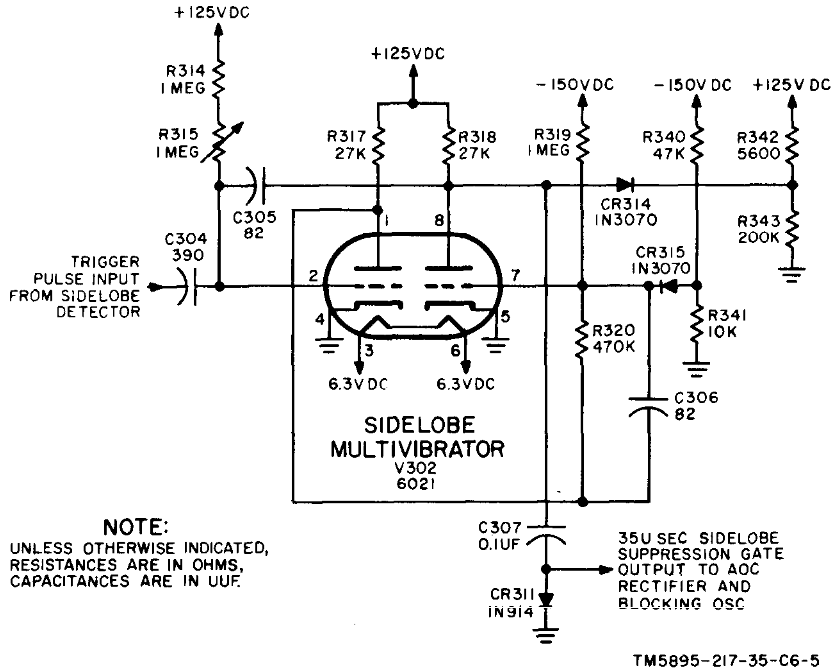


Figure 21.1. Sidelobe multivibrator (SLS), partial schematic diagram.

Add after paragraph 28:

28.1. Video Amplifier Card (With SLS) (fig. 18.1)

a. General. The input interrogations to the video amplifier/SLS card are positive in polarity and 0.7 µsec wide. Spike suppressor V303 eliminates all received pulses that are 0.3 µsec wide or less. The output of V303 consists of positive pulses approximately 0.4 µsec wide that are fed to blocking oscillator V301. Two additional inputs are fed to V301; a sidelobe-suppression gate pulse, which blanks V301 and prevents pulse P3 from reaching the decoders and a main gate suppression pulse, which blanks V301 and prevents additional interrogations from overloading the transmitter. The sidelobe blocking oscillator generates 0.6-µsec pulses, which are fed to the decoders and to sidelobe detector CR301 and CR302. An additive memory network in the detector combines pulses P1 and P2 to form a single pulse with sufficient amplitude to trigger sidelobe multivibrator V302. The output of V302 is the sidelobe-suppression gate pulse coupled through one-half of OR gate CR303 and CR304 to the input of V301. Main gate input is fed from the suppressor cathode- follower section of V304 to the front panel SUPPR jack (J106) and to the other half of V304 where the main gate suppression pulse is inverted and fed through the other half of OR gate CR303 and CR304 to V301. The sidelobe-suppression gate from V302 is fed to sidelobe AOC rectifier CR308. The main gate suppression pulse output of V304 is fed to main gate AOC rectifier CR305. The output of the sidelobe and main gate AOC rectifiers are fed to OR gate CR307 and CR310. The dc OR gate output is used to control IF amplifiers V202, V203, and V204 sensitivity and to prevent overload of the transponder set transmitter.

b. Spike Suppressor (fig. 19.1). The positive video input pulses at pin No. 7 of card connector P301 are coupled through capacitor C308 and developed across resistor R321. These pulses are applied simultaneously to the suppressor grid of spike suppressor V303 and 0.3-µsec delay line DL301. The output of DL301, occurring 0.3 µsec after the input, is applied across resistor R322 to the control grid of V303. Both grids are biased to cutoff by voltage from the -150-volt dc distribution bus (para 42) input at pin No. 10 of card connector P301. Tube V303 is able to conduct only when the suppressor grid and control grid are both driven positive by pulses simultaneously. Noise pulses of 0.3 µsec or less at the suppressor grid will not be in coincidence with the same pulses at the control grid due to DL301. Without coincidence, V303 will not conduct the 0.3-µsec noise pulses into the output. Plate voltage for V303 is supplied from the +125-volt dc distribution bus (para *41e*) through the primary of transformer T302, isolation filter resistor R323, and capacitor C310. The secondary of transformer T302 feeds 0.4 µsec positive interrogation pulses through capacitor C309 to the input of sidelobe blocking oscillator V301.

c. Sidelobe Blocking Oscillator (fig. 20.1). The input section of sidelobe blocking oscillator V301 acts as a trigger amplifier, which has contol grid pin 2 biased to cutoff by voltage divider R301 and R302 from the -150-volt dc distribution bus (para 42). Positive interrogation pulses fed through capacitor C309 from V303 cause the input section of V301 to conduct plate current, through winding 3-4 of transformer T301, supplied from the +125-vo[illegible] distribution bus (para *41e*). Pulse current [illegible] winding 3-4 of T301 induces a positive pulse in winding 1-2 of T301, which is applied to control grid pin 7 of V301, The control grid pin of V301 is fixed biased through resistor R306 and winding 1-2 of T301 by a voltage divider consisting of resistors R305 and R307. A positive pulse at grid pin 7 further increases the pulse current in winding 3-4 of T301 due to the common plate connection of V301, which in turn causes V301 to become saturated. Capacitor C301 eliminates degeneration caused by cathode resistors R303 and R304. During the positive swing of V302, capacitor C302 is charged at a rate determined by the setting of resistor R306. After the trigger pulse reaches maximum amplitude, the rate of plate current change begins to diminish, and the voltage of T301 winding 1-2 reduces. When the charge voltage of capacitor C302 equals the voltage across T301 winding 1-2, they cancel due to polarity opposition. The static fixed bias then cuts off control pin 7 of V301 and the magnetic field of transformer T301 begins to collapse, reversing T301 winding 1-2 voltage. This reversal drives control grid pin 7 of V301 further into cutoff, sharpening the trailing edge of the generated pulse. The positive pulses taken from the junction of cathode resistors R303 and R304 are adjusted to a width of 0.6 µsec by resistor R306 and are fed to decoders V351, V352, and V353 through pin 2 of card connector P301. A third winding (5-6) on transformer T301 is swamped by resistor R339 to prevent ringing and this winding supplies blocking oscillator pulses through capacitor C303 to the sidelobe detector circuit. Sidelobe-suppression gate pulses *(e* below) from V302 are fed to the trigger input of V301 through diode CR303 to cut off V301 immediately after the receipt of an SLS control pulse (P2). The negative sidelobe-suppression gate pulse cuts off V301 to prevent interrogation pulses P3 from reaching decoders V351, V352, and V353 and thus controls transponder set replies in accordance with control pulse P2. Negative main gate pulses *(f* below) from V304 are fed to the trigger input of V301 through diode CR304 to cut off V301 after one proper interrogation is received. Diodes CR303 and CR304 form an OR gate which permits either gate to cut off the trigger section of blocking oscillator V301.

d. Sidelobe Detector (fig. 20.1). Sidelobe detector diode CR302, in conjunction with capacitor C303 and resistor R309, forms a memory circuit for the sidelobe blocking oscillator (V301) pulses triggered by interrogation pulse P1. Diode CR302 is forward biased by voltage divider resistors R308 and R309 and the +125-volt dc distribution bus (para *41e*). During the time that V301 is cutoff (no pulse output), capacitor C303 is discharged to ground due to low resistance of CR302. When V301 is triggered by P1 only, the output negative swing of T301 winding 5-6 cuts off CR302 and the negative pulse portion of the output is developed across R309. As the voltage across winding 5-6 goes through the reference level in the positive direction, CR302 again conducts and effectively grounds one side of capacitor C303. Capacitor C303 then charges to the positive peak voltage across T301 winding 5-6 developed by the positive pulse portion of V301 output. As the positive pulse begins to go negative toward the reference level, diode CR302 again cuts off and capacitor C303 discharges developing the second negative pulse across R309. The separation time between the first negative pulse and the second negative pulse (P1 memory pulse) is the sum of the blocking oscillator output pulse widths (negative and positive swings), and the rc time constant of C303 and R309 determines aperture (memory pulse width), which results in a P1 memory pulse position of approximately 2.0 µsec. Triggering of blocking oscillator V301 by a P2 SLS pulse at 2.0 µsec results in an overlap of the blocking oscillator negative output pulse and the P1 memory pulse; the P2 memory pulse is of no importance to circuit operation. The P2 pulse and the P1 memory pulse are additive and result in a single pulse approximately double the amplitude of either of the two pulses developed by P1 alone. Diode CR301 is biased to cutoff by a voltage developed across voltage divider resistors R310, R311, R312, and R313 connected between ground and a -150-volt dc distribution bus (para 42). The amount of negative bias is adjusted by control R311 to prevent CR301 from conducting on a P1 pulse only. However, when a P2 pulse is added to the P1 memory pulse, the resultant amplitude is enough to cause CR301 to conduct the P2 pulse to R312 and R313. Capacitor C304 couples the P2 pulse to the input of sidelobe multivibrator V302.

e. Sidelobe Multivibrator (fig. 21.1). Grid pin 2 of tube V302 is biased positive by resistors R314 and R315 connected to the +125-volt dc distribution bus to cause plate current saturation. Identical plate load resistors R317 and R318 are used for both sections of tube V302, and grid pin 7 is negative biased with voltage divider resistors R319 and R320 connected from the -150-volt dc distribution bus to plate pin 1. Capacitors C305 and C306 are feedback coupling capacitors. When a negative sidelobe detector trigger pulse is coupled through capacitor C304 to grid pin 2, pin 1 plate current is driven to cutoff; this action drives grid pin 7 positive. Grid pin 7 going positive, increases pin 8 plate current and the negative plate voltage swing is coupled back through C305 to hold grid pin 2 at cutoff. The sidelobe detector trigger pulse has collapsed by this time, pin 1 plate current is cut off, and pin 8 plate current has reached saturation. The multivibrator pulse width is determined by the discharge rates of capacitors C305 and C306 and the setting of R315. Adjustment is made for a pulse width of 35 µsec and the negative sidelobe gate pulse is taken from plate pin 8. Capacitor C307 is the coupling capacitor for input through OR gate diode CR303 to blank V301 for sidelobe suppression (*d* above). Diode CR314 clips any positive peaks occurring on the gate pulse and aids in decreasing pulse delay time which shortens reinitiation time after sidelobe suppression. Diode CR314 has its cathode biased positive by voltage supplied from the +125-volt dc distribution bus through voltage divider resistors R342 and R343, and limits the positive swing of plate pin 8. Diode CR315 has its anode biased negative by voltage supplied from the -150-volt dc distribution bus through voltage divider resistors R340 and R341, and limits the negative swing of grid pin 7 to decrease reinitiation time after sidelobe suppression. This action steepens the leading and trailing edges of the sidelobe gate pulse obtained from multivibrator V302.

f. Inverter Amplifier and Suppressor Cathode Follower (fig. 22.1). Main gate blanking pulses are fed to pin 9 of card connector P301 through capacitor C313 to control grid pin 2 of suppressor cathode follower V304A. The control grid is fixed biased from the -150-volt dc distribution bus through voltage divider resistors R329 and R330. Plate voltage is supplied direct to pin 1 of V304A from the +125-volt dc distribution bus. A positive main gate suppression pulse is developed across V304A cathode resistor R331, and diode CR313 couples only the positive portion to card connector P301 pin 13 which connects to the front panel SUPPR jack J106. The main gate suppression pulse is developed across resistor R334 and coupled through capacitor C315 and resistor R333 to control grid pin 7 of inverter amplifier V304B. Grid bias is supplied from the -150-volt dc distribution bus through voltage divider resistors R335 and R336. Plate voltage for V304B is supplied from the +125-volt dc distribution bus through plate load resistor R332. The amplified negative output pulses from V304B are fed through coupling capacitor C314 to blocking oscillator V301 and to main gate A.O.C. rectifier diode CR305; diode CR312 removes any positive peaks from the negative main gate suppression pulse.

g. A.O.C. Rectifiers, Switches, and OR Gates (fig. 22.1). Negative main gate suppression pulses from V304B are rectified by CR305 and are fed to a filter network consisting of resistors R325 and R326 and capacitor C311. The discharge rate of capacitor C311 is governed by the adjustment of R326 and determines the counting rate of gate pulse input. If the main gate pulse recurrence response (prr) exceeds the preset value, the voltage developed across R326 and C311 will close Zener diode switch CR306 and pass the resultant dc bias voltage through OR gate diode CR307 to card connector P301 pin 12 to IF amplifiers V202, V203, and V204. Sidelobe A.O.C. rectifier CR308, switching diode CR309, and OR gate diode CR310 operate similarly with resistor R328 and capacitor C312 determining the sidelobe-suppression gate A.O.C. count or threshold for sensitivity reduction of IF amplifiers V202, V203 and V204.

Page 34. After figure 22, add figure 22.1.

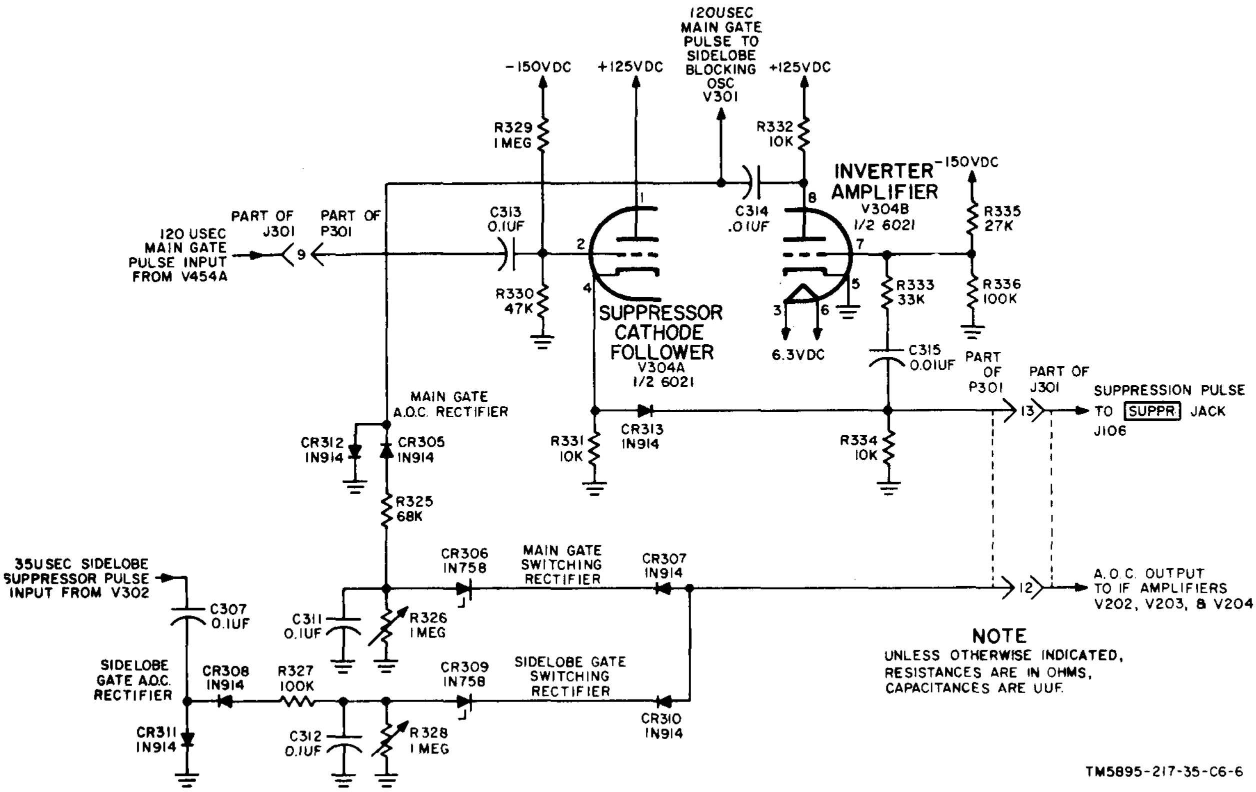


Figure 22.1. Inverter amplifier, suppressor cathode follower, and A.O.C. (SLS), partial schematic diagram.

Page 49, figure 37 (page 3 of C 5). Add the following note:

3. FOR THE RT-494B/APX-44, RESISTOR R454 HAS BEEN CHANGED FROM 33,000 OHMS TO 24,000 OHMS, RESISTOR R455 HAS BEEN CHANGED FROM 100,000 OHMS TO 22,000 OHMS, RESISTOR R456 HAS BEEN CHANGED FROM 1.5 MEGOHM TO 330,000 OHMS, AND CAPACITORS C451, C454, AND C455 HAVE BEEN CHANGED FROM 0.01 μF TO 0.0047 μF.

Page 60, paragraph 41 (para 41 of O 5), heading. Delete and substitute:

41. B+ Distribution (RT-494/APX Without SLS, fig. 49; RT-494B/APX-44 Without SLS, fig. 49.1; RT-494/APX-44 With SLS, fig. 49.2; RT-494B/APX44 With SLS, fig. 49.3)

Page 61, paragraph 42, heading. Delete "(fig. 50)" and substitute:

(For Equipments Without SLS, figure 50; For Equipments With SLS, figure 50.1).

Page 73, paragraph 53. Make the following changes:

Line 10 (page 6 of C 5). After "(fig. 8)", add: (SLS, fig. 8.2).

Line 12. After "Figure 54" add: (SLS, fig. 54.1) .

Paragraph *54b* (3) (page 6 of C 5). After "(figs. 54 and 55)," add: (SLS, 54.1).

Page 74. After figure 54, add figure 54.1.

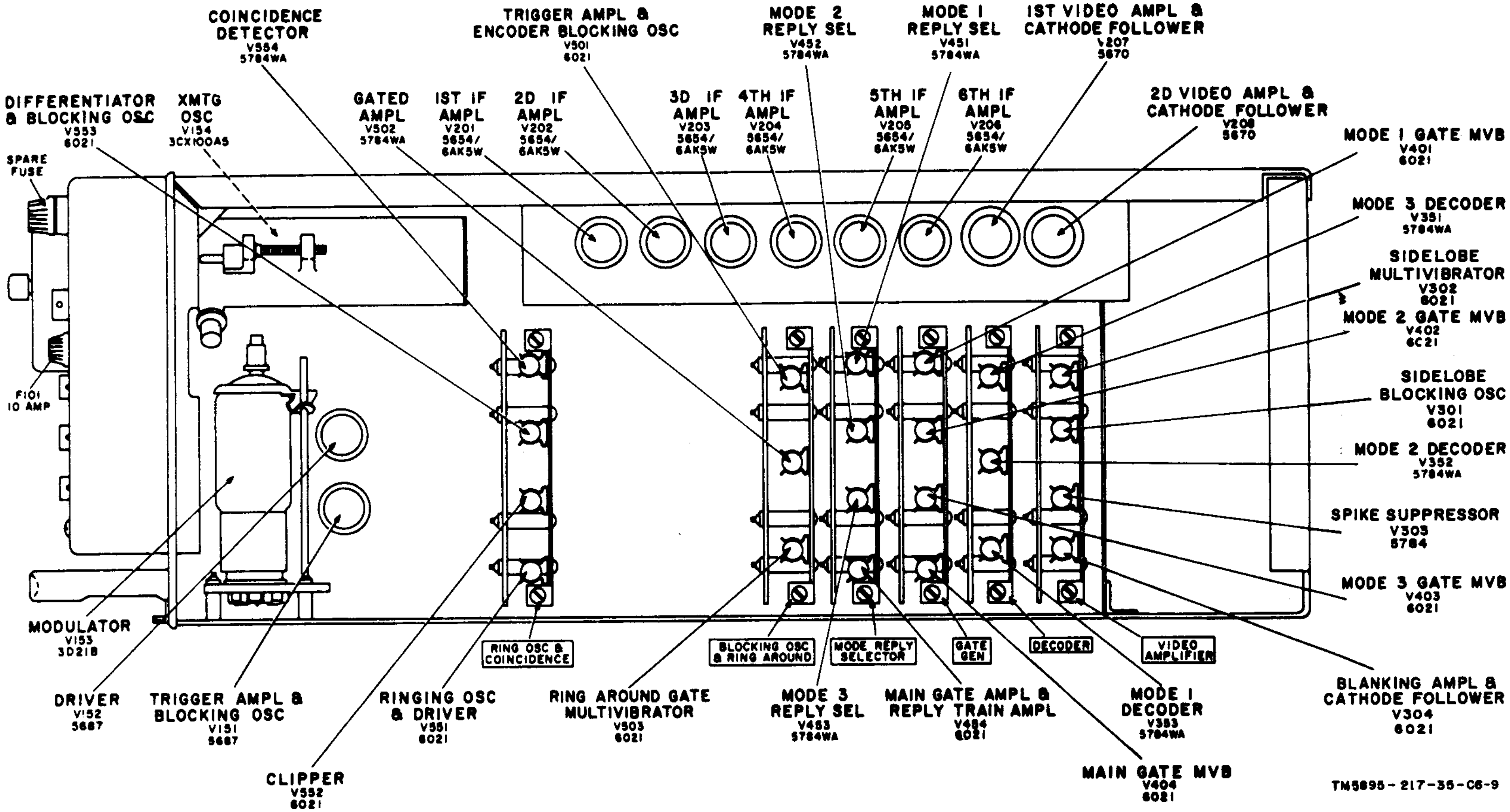


Figure 54.1. Receiver-transmitter right side view, tube, crystal and card locations (SLS).

Page 82, paragraph 58c. Add the following to the chart:

Subassembly	Test point location fig. No.	Schematic and waveform diagram fig. No.
VIDEO AMPLIFIER/SLS card	113.13	124.1

Page 90, paragraph *59b* (page 7 of C 5). Make the following changes:

Add after heading:

Note. Use steps 16 and 17 instead of steps 4 and 5 when troubleshooting equipments with SLS capability.

Chart. Add after step 15:

Step	Oscilloscope input	Waveform reference	Normal indication	Abnormal indication	Corrective measures
16	Green lead (pin 5) of V303 (fig. 76.1) .	A, figure 124.1 (xmtr off).	Positive interrogation pulses for each mode with correct waveshape and amplitude at V303 suppressor and control grid.	No pulses, either grid V303.	Check continuity between pin 7 of J391 (fig. 106) and pin 3 of P201 (fig. 105); repair wiring if open. Replace or troubleshoot (para 64.1) and repair video amplifier/ SLS card as required.
				No pulses at control grid of V303.	Replace or troubleshoot (para 64.1) and repair video amplifier/ SLS card as required.
17	Green lead (pin 5) of V303 (fig. 76.1).	C, figure 124.1 (xmtr off).	Upper trace shows pulses P1 and P2 and no P3. Lower trace shows pulses P1/P2 with P3 in sidelobe gate.	All three pulses on upper trace; no sidelobe gate on lower trace.	Replace or troubleshoot (para 64.1) and repair video amplifier/ SLS card as required.
				No pulses on either trace.	Replace or troubleshoot (para 64.1) and repair video amplifier/ SLS card as required.
				Pulse P1 and P3 normal on upper trace: no mail gate on lower trace.	Replace or troubleshoot (para 64.1) and repair video amplifier/ SLS card as required. Proceed to steps 6, 7, and 8, to check main gate multivibrator and amplifier. Check for continuity between pin 9 of J301 and pin 12 of J451 (fig. 106). Repair wiring if open.

Page 94, figure 71 (page 7 of C 5), notes. Make the following changes:

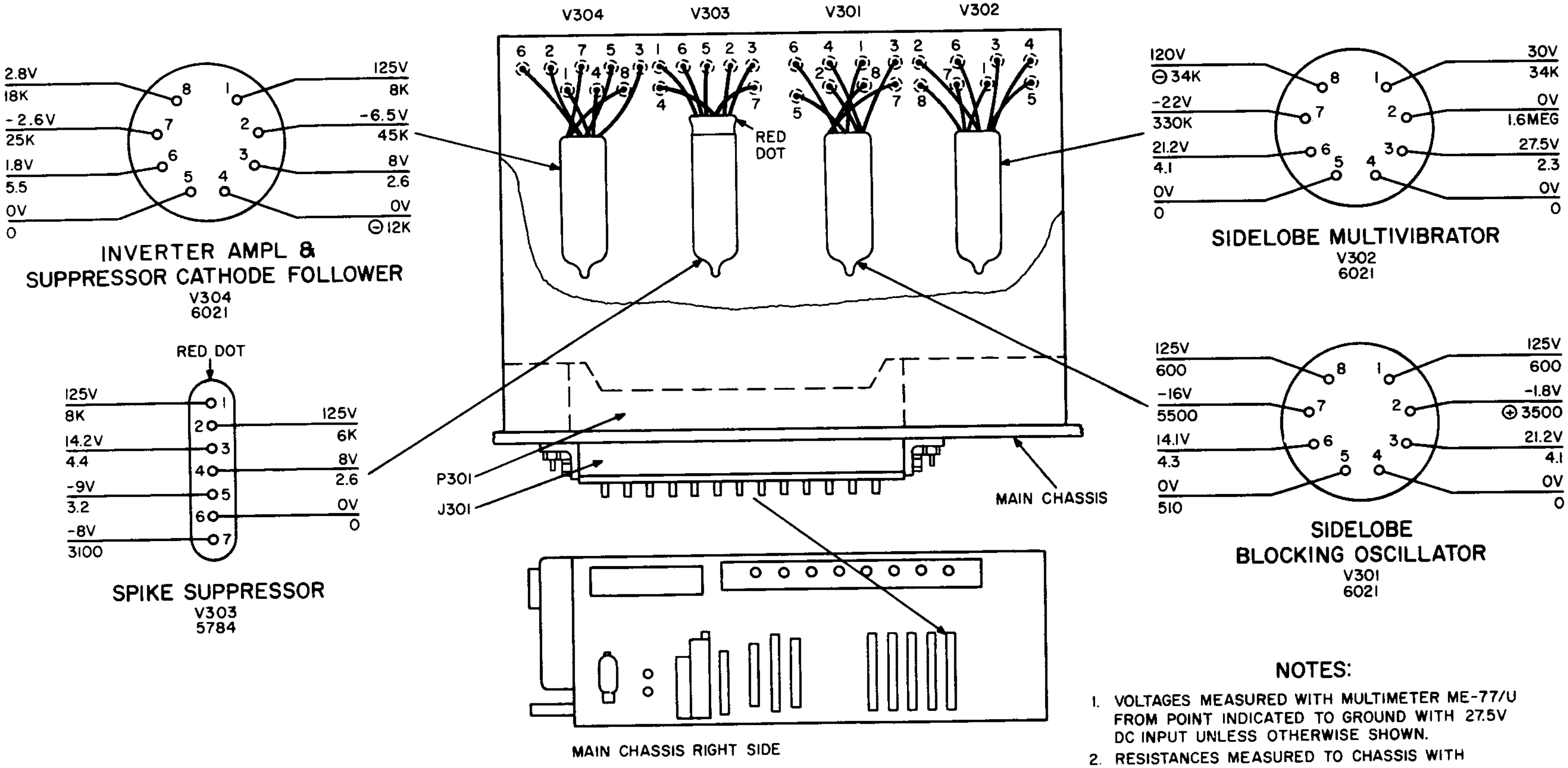
Note 4. Add the following:

FOR THE RT-494/APX-44 ONLY, RESISTANCE IS 450 K WITH MODE 2 CONTROL OFF AND 0 OHM WITH MODE 2 CONTROL ON.

Note 5. Add the following:

FOR THE RT-494B/APX-44 ONLY, RESISTANCE IS 330 K WITH MODE 2 CONTROL OFF AND 22 K WITH MODE 2 CONTROL ON.

Page 99. After figure 75, add figure 75.1.



NOTES:

1. VOLTAGES MEASURED WITH MULTIMETER ME-77/U FROM POINT INDICATED TO GROUND WITH 27.5V DC INPUT UNLESS OTHERWISE SHOWN.
2. RESISTANCES MEASURED TO CHASSIS WITH MULTIMETER ME-77/U.
3. VOLTAGE READINGS ABOVE LINE, RESISTANCES BELOW LINE.
4. NUMERALS AT TUBE CONNECTION POINTS ARE TUBE BASE NUMBERS FOR REFERENCE ONLY.

TM5895-217-35-C6-12

Figure 75.1. Video amplifier/SLS card, tube voltage and resistance diagram.

Page 100. Add after paragraph 64:

64.1. Video Amplifier/SLS Card Troubleshooting

a. General. The chart (*c* below) lists trouble and corrective maintenance procedures for the video amplifier/SLS card. All measurements are made with receiver-transmitter completely assembled unless otherwise specified. Use the bench test setup shown in figure 113.11. Refer to the partial schematic diagrams (fig. 19.1 through 22.1), complete schematic diagram (fig. 124.1), and parts location printed wiring diagram (fig. 76.1) for circuit connections. After trouble has been isolated, replace the defective part by following the procedures in paragraph 76.

b. Video Amplifier/SLS Voltage and Resistance Measurements. Tube voltage and resistance measurements shown in figure 75.1 are taken with no signal input to the transponder set. Card receptacle voltage and resistance measurements (fig. 71) are also useful for isolating troubles.

c. Video Amplifier/SLS Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	No output to decoder card ----	Open filament circuit- - - - -- - - -	Check filament circuit continuity.
		Defective stage in video amplifier/SLS card.	Check waveforms A, B, and C (fig. 124.1) at test points (fig. 76.1). Refer to items 2 through 6 below.
2	No wave forms present at either test point A.	No video input from IF suppressor subchassis.	Troubleshoot IF suppressor subchassis. (para 63).
			Check wiring that connects pin 3 of P201 to pin 7 of J301 (fig. 122).
3	No SLS P2 pulse present at either test point A.	Suppressor circuit in IF suppressor subchassis defective.	Troubleshoot suppressor circuit in IF suppressor subchassis (para 63) for 10 dbm threshold at 2.0 µsec from P1.
4	No channel 2 waveform present at test point A.	Defective delay line DL301 ____	Replace DL301 (fig. 76.1).
5	No waveforms present at test point B.	Defective spike suppressor stage	Remove and check V303 (fig. 54.1 and 76.1); replace if defective.
			Make voltage and resistance check of V303 stage (fig. 75.1).
6	No waveforms present at test point C.	Defective sidelobe blocking oscillator stage.	Remove and check V301 (fig. 54.1 and 76.1); replace if defective.
			Make voltage and resistance check of V301 stage (fig. 75.1).
7	No waveform present at test point D with normal P1/P2 pulses at test point C.	Defective sidelobe detector circuit.	Check diodes CR301 and CR303 (fig. 76.1). Check adjustment of R311 (para 90.3).
8	No waveforms present at test point E.	Defective sidelobe multivibrator stage.	Remove and check V302 (fig. 54.1 and 76.1); replace if defective.
			Make voltage and resistance check of V302 stage (fig. 75.1).
9	No SLS gate wave form present at test point B with normal waveform at test point E.	SLS OR gate inoperative ------	Check diodes CR303 and CR311 (fig. 76.1).

c. Video Amplifier/SLS Troubleshooting Chart. - (Continued)

Item	Indication	Probable trouble	Procedure
10	No waveform present at test point F.	No main gate input to video amplifier/SLS from V454 in mode reply selector card.	"Check for main gate output at mode reply selector card (para 68). Check wiring that connects pin 9 of J301 to pin 12 of P451 (fig. 122).
		Defective inverter amplifier and suppressor cathode follower stage.	Remove and check V304 (fig. 54.1 and 76.1); replace if defective. Make voltage and resistance check of V304 stage (fig. 75.1).
11	No main gate waveform present at test point B with normal waveform at test point F.	Main gate OR gate inoperative	Check diodes CR304 and CR312 (fig. 76.1) .
12	SLS A.O.C. inoperative with normal waveforms at test point B.	SLS A.O.C. rectifier, switch or gate defective.	Check diodes CR308, CR309, and CR310. Check adjustment of R328 (pars 90.5).
13	with normal spurious reply pulse blanking normal; waveforms at test point B normal.	Main gate A.O.C. rectifier, switch, or gate defective.	Check diodes CR305, CR306, and CR307. Check adjustment of R326 (para 90.6).

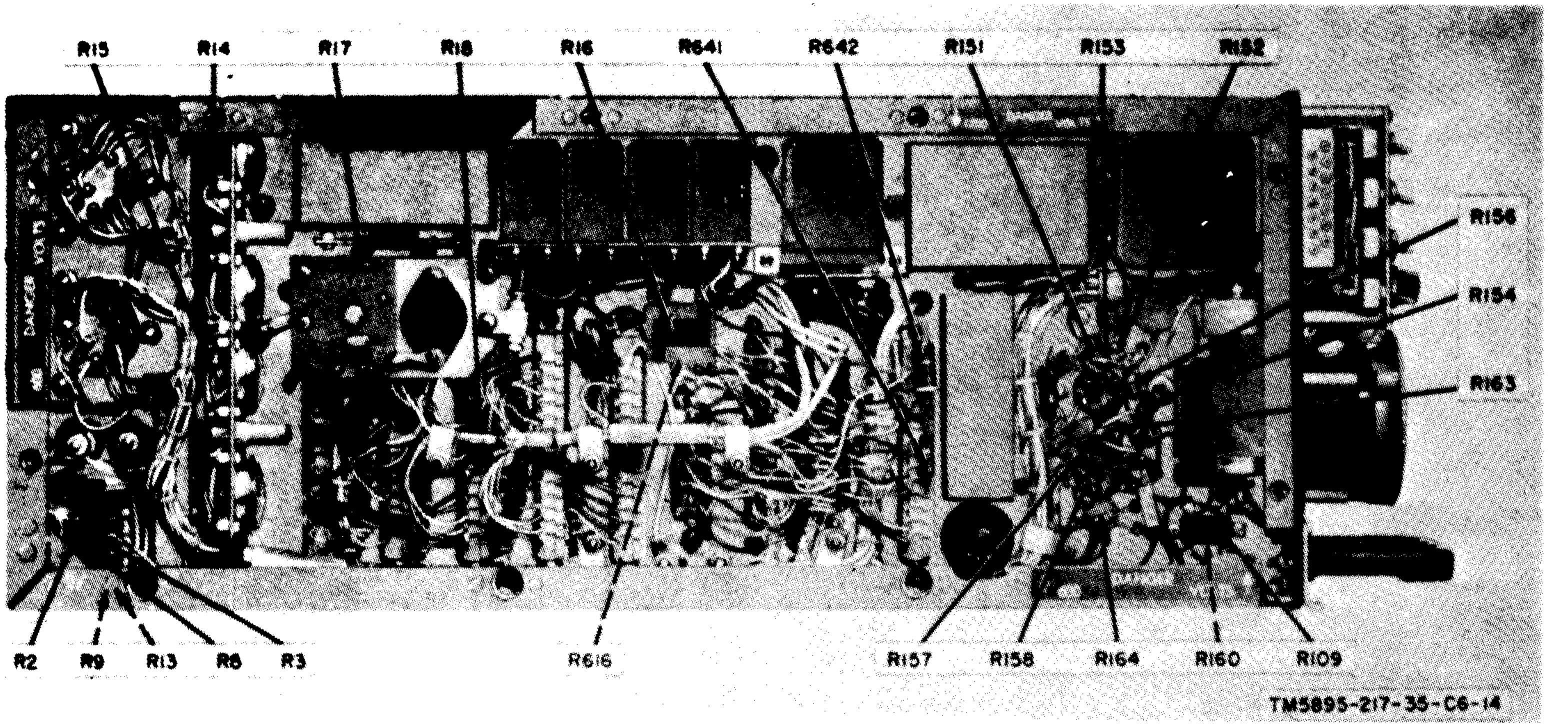


Figure 107.2 Receiver-transmitter left side view, resistor location (with power supply transient suppressor board WPN 127789-2).

Page 108, figure 83, notes (page 7 of C 5). Add the following to note 5:

FOR THE RT-494B/APX-44 ONLY, PIN 5 RESISTANCE IS 20 K.

Page 129 (page 15 of C 5). After figure 107.1, add figure 107.2:

Page 139. Make the following changes:

Add section *II.I* and figures 113.7 through 113.13 after section II.

Section II.I. VIDEO AMPLIFIER/SLS CARD ADJUSTMENTS

88.1. Test Facilities Required

The following equipments or suitable equivalents will be required for performing the VIDEO AMPLIFIER/SLS (SLS) card adjustments.

a. Test Equipment.

Equipment	Federal stock No.	Qty reqd	Applicable literature	Common name
Test Set, Radar AN/UPM-135--	----------------	1		Test set
Multimeter ME-26B/U	6625-646-9406	1	TM 11-6626-200-12	Vtvm
Oscilloscope AN/USM-140 ______	----------------------	1	TM 11-6626-535-15	Oscilloscope
Test Set, Transponder AN/APM-123(V)1.	----------------	1	TM 11-6626-667-12	Transponder

b. Additional Equipment.

(1) A 27.5-volt (± 0.25), dc power supply with 7.5-ampere output (Power Supply PP-1104A/G, or equivalent) is required to provide an input voltage for the transponder set.

(2) A wire harness is required to connect the receiver-transmitter to Control, Transponder Set C-2614/APX-44 and to the de power supply. The wire harness may be fabricated by using the connectors and electrical wire shown in figure 3.

(3) A test panel with provision for adjustment of the VIDEO AMPLIFIER/SLS card is required to replace the receiver-transmitter right-hand side panel to enable behind-the-panel adjustments to the receiver-transmitter with a panel in place. The test panel is fabricated in accordance with the instructions in paragraph 88.2.

(4) A jeweler's screwdriver set (FSN 5120-288-8739) is required for adjustments of R328 (SIDELOBE A.O.C.) and R326 (MAIN GATE A.O.C.).

(5) A 25-watt, 50-db attenuator (A8401S, Engleman Microwave Company or equivalent).

88.2. Test Panel Fabrication With Provision For SLS Adjustment

Fabricate the test panel in accordance with the dimensions shown on figures 113.7, 113.8, and 113.9, the test panel markings, A.O.C. TEST VOLTS pin jack detail, and DET WAVEFORM pin jack detail shown on figure 113.10, and the procedures given in a through *p* below.

a. Use a sheet of soft aluminum (type 6061-T6, or equivalent), 0.050 inch thick, 7 7/8 inches wide, and 19 9/16 inches long to fabricate the test panel.

Note. As an alternate, a discarded receiver-transmitter right-hand side panel may be used for the test panel or a test panel previously fabricated from instructions in paragraph 100 (page 2 of C 3) and modified in accordance with the instructions in *c, e, h, j, m, n,* and *p* below.

b. Bend the sheet of aluminum 3/8 inch from the bottom edge along the 19 9/16 -inch dimension.

Note. The bend provides a ledge which inserts into fasteners on the inside bottom of the receiver-transmitter.

c. Drill out all the holes and cut out the rectangular hole in accordance with the dimensions shown on figure 113.7.

d. Install a turnlock stud fastener (Camloc No. 555-6) with a stud retaining washer (Camloc No. 553-1) into each of the seven 3/16-inch mounting holes.

e. Set and secure the drilled-out test panel in place on the receiver-transmitter. Check the alignment of the test panel holes with the receiver-transmitter controls and test points (SLS card installed). The location of the controls and test points for each individual receiver-transmitter may be slightly different. If necessary, mark the area around the holes that require additional cutting away, remove the test panel, and use a round file to cut away the marked area.

f. Place a plastic tubing insert that has a lip on one end (fig. 137 (page 6 of C 3)) into each of the four 13/32-inch holes. When installed, the plastic insert should fit snugly into the hole, and the lip should be exposed on the outside of the test panel. Secure the plastic insert with glue.

Note. The plastic inserts prevent the oscilloscope test probe from shorting to the test panel.

g. Fabricate eight 15/16-inch diameter disks and two 1 1/4-inch disks from a sheet of aluminum, 0.050 inch thick.

h. Fabricate two door runners and one sliding door from instructions on figure 113.8.

i. Install the disks with rivets so that the disks are capable of swinging away from the holes they cover, in at least one direction, without interfering with the adjacent disk. Use a 1/64-inch spacer between the test panel and each disk that covers a. 13/32-inch hole. (The disks must be raised from the test panel to clear the lip of the plastic insert.) One each 1 1/4-inch disk spans the COINCIDENCE and RING OSC hole.

j. Install the two door runners with rivets and install the sliding door in accordance with instructions on figure 113.9.

k. Cut a piece of clear plastic tubing 7/16 inch inside diameter and 3 5/8 inches long (fig. 137 (page 6 of C 3)).

Note. The plastic tubing is used as a screwdriver guide when variable resistor R154 requires adjustment. The plastic tubing is inserted through the BLOCK OSC hole and fits snugly over the locknut of variable resistor R154. When not in use, the plastic tubing mounts on a metal strip directly below the BLOCK OSC hole.

l. Fabricate a rigid metal strip 1/16 inch thick, 7/16 inch wide, and 2 7/8 inches long. Mount the metal strip with a 1/4-inch spacer, bolt, and nut to the test panel directly under the BLOCK OSC hole. Insert the 1/4-inch spacer between the metal strip and test panel to enable the plastic tubing (*k* above) to slide over the metal strip.

m. Install an insulated pin jack with ground lug in place into the 1/4-inch A.O.C. TEST VOLTS hole on the test panel (fig. 113.10).

Note. Remove paint from test panel area that makes contact with the ground lug.

n. Install an insulated pin jack into the 1/4-inch DET WAVEFORM hole on the test panel.

o. Solder one end of a 9-inch long, flexible, insulated wire (#20) to the lug on the A.O.C. TEST VOLTS pin jack. Solder the other end of the wire to a connector that mates with the A.O.C. test pin on the IF amplifier subchassis.

p. Solder one end of a 9-inch long, flexible, insulated wire (#20) to the lug on the DET WAVEFORM pin jack. Solder the other end of the wire to a connector that mates with the DET test pin on the IF amplifier subchassis.

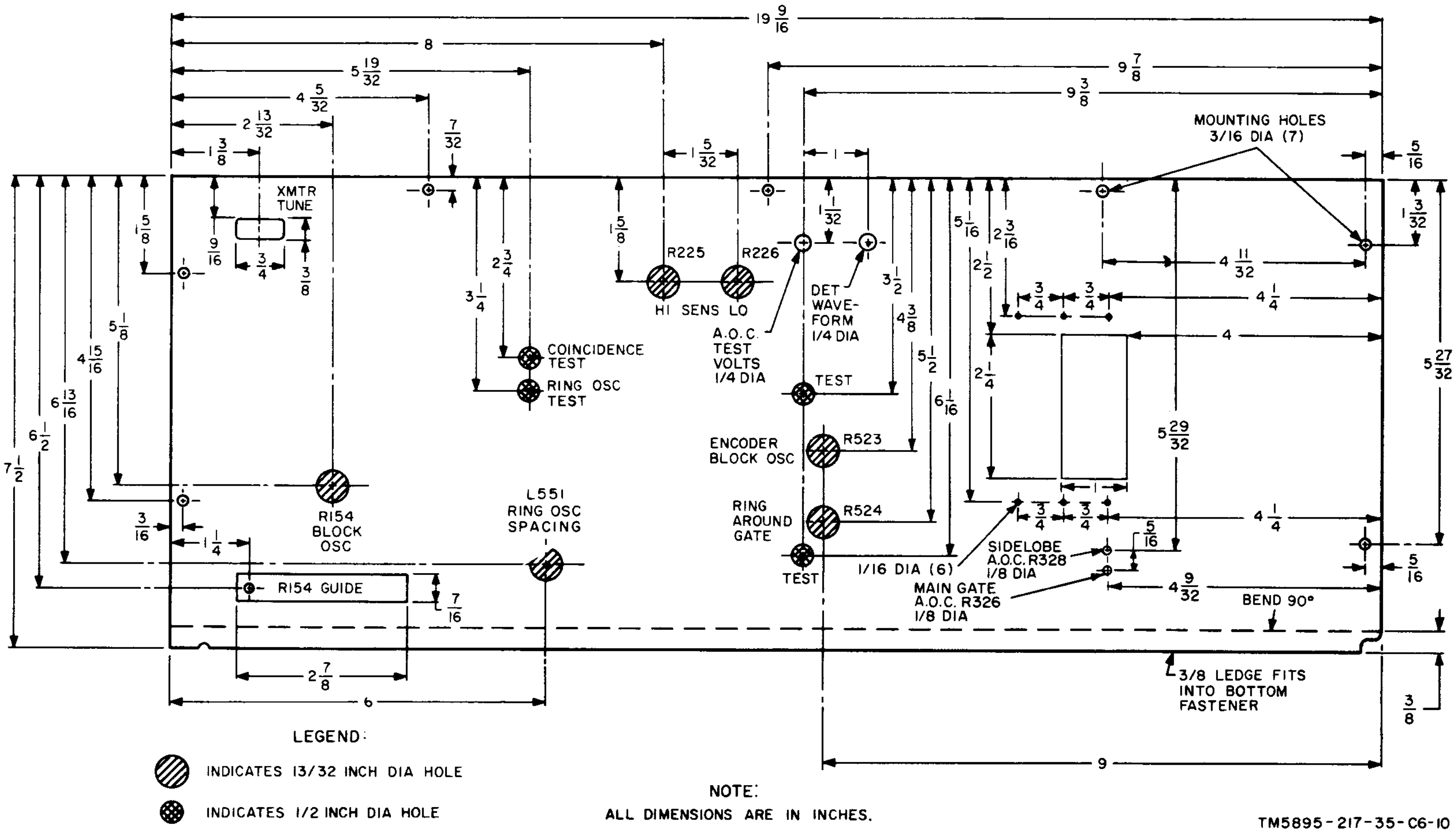
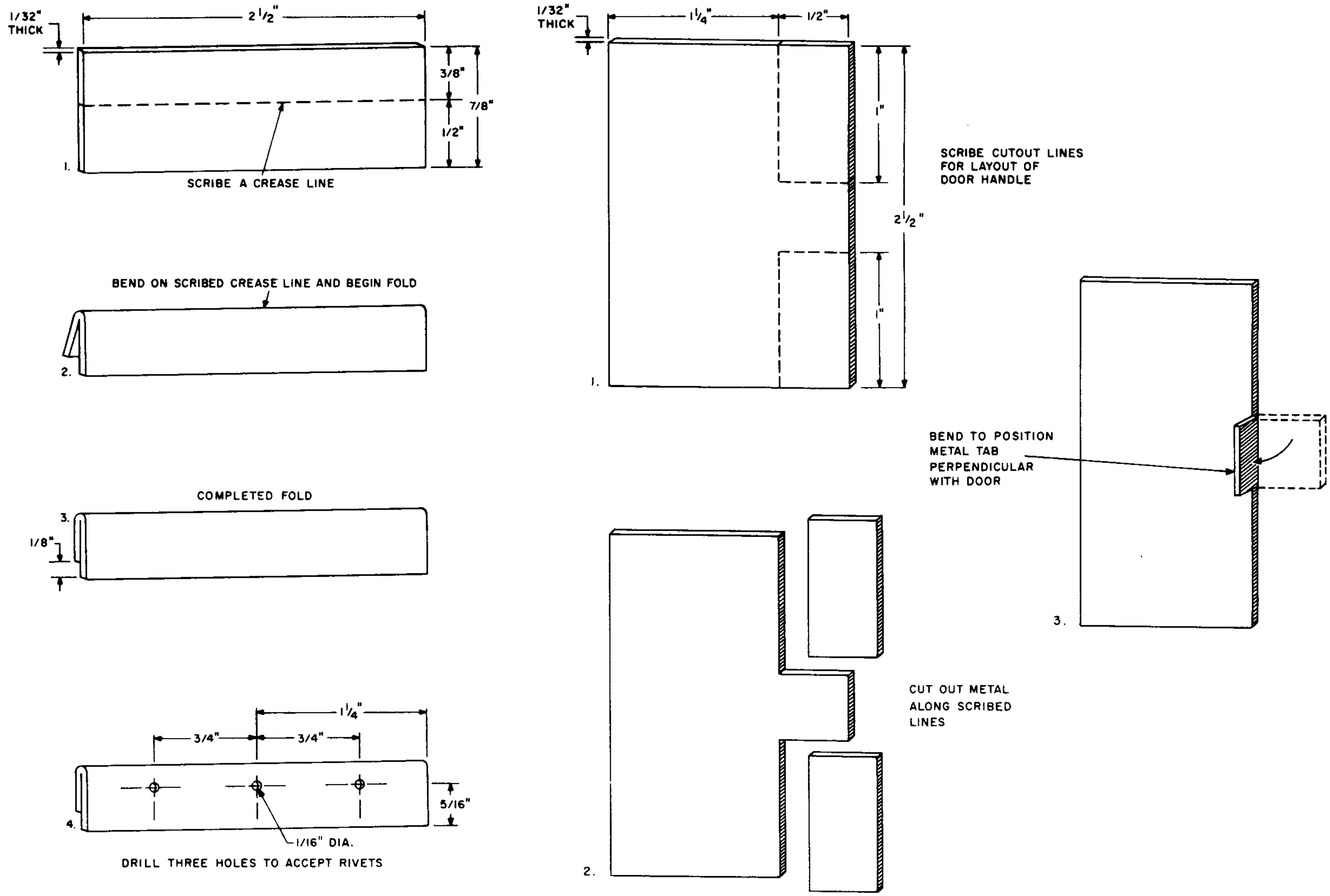


Figure 113.7. Receiver-transmitter SLS test panel dimensions.



A. DOOR RUNNER CONSTRUCTION (2 EA. REQUIRED)

B. SLIDING DOOR CONSTRUCTION

Figure 113.8. SLS test panel door runner and sliding door, construction diagram.

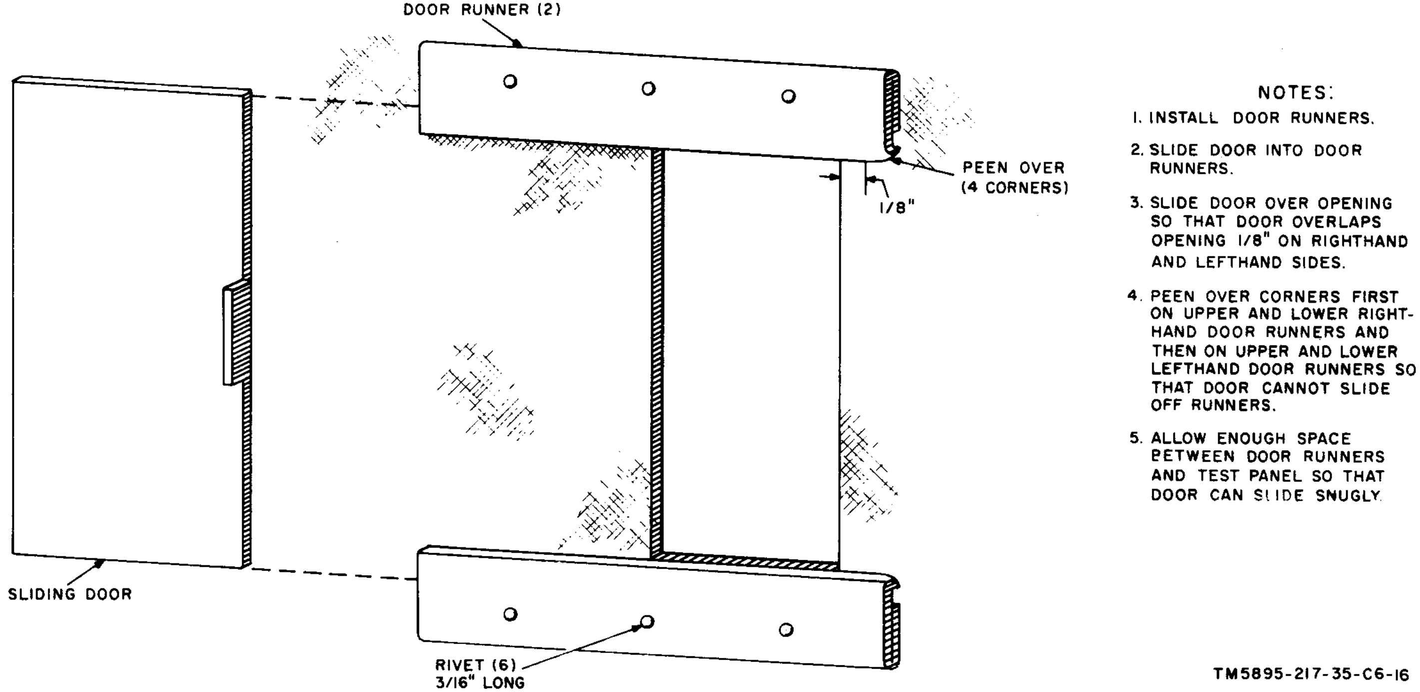


Figure 113.9. SLS test panel door runner and sliding door, installation diagram.

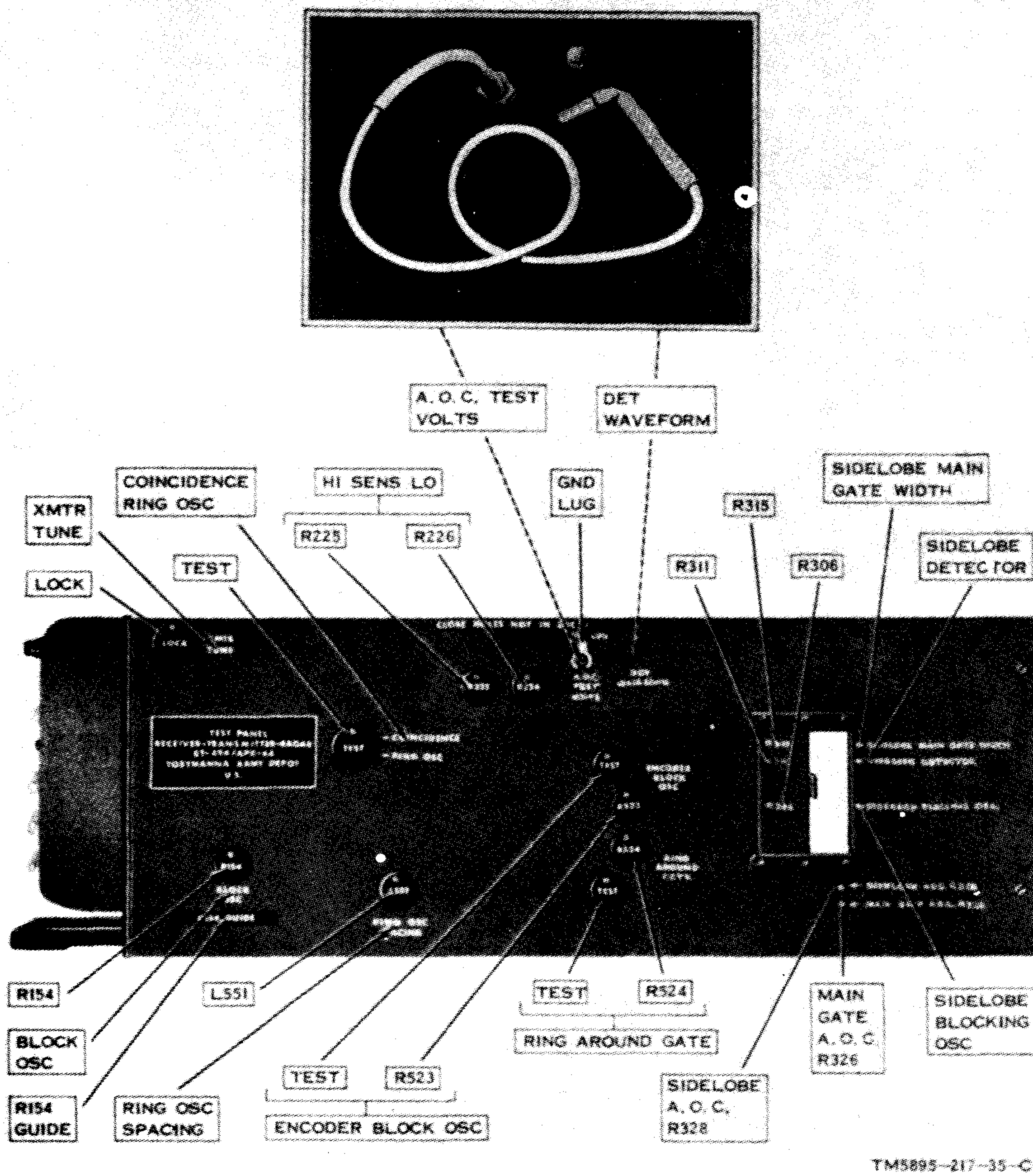


Figure 113.10. Receiver-transmitter with SLS test panel in place.

88.3. General Adjustment Requirements

a. Each procedure *must* be performed in the sequence outlined in (1) through (11) below. Do not vary the sequence because the validity of each adjustment or test procedure depends upon the completion of an immediate preceding procedure.

(1) Preliminary procedures (para 88.4).
(2) Preliminary panel control settings (para 88.5).
(3) Adjustment of signal generator frequency (para 88.6).
(4) High receiver sensitivity and main gate A.O.C. adjustment (para 88.7).
(5) Sidelobe blocking oscillator adjustment (para 88.8).
(6) Preliminary sidelobe detector adjustment (para 88.9).
(7) Sidelobe multivibrator adjustment (para 88.10).
(8) Sidelobe-suppression minimum range adjustment (para 88.11).
(9) Sidelobe-suppression maximum range test (para 88.12).
(1o) Preliminary sidelobe A.O.C. control adjustment test (para 88.13).
(11) Operational check (para 88.14).

b. Do not make any tests on the receiver-transmitter unless the test panel is in place because the test results will not be valid. Test panel openings must be closed with their covers when an adjustment is not being made through the opening. Do not remove the left-hand panel.

c. Minimum warmup time for the receiver-transmitter *must* be at least 45 minutes. This warmup time must be observed so that the internal temperature of the receiver-transmitter can stabilize to the same temperature condition as that of an equipment in normal operating use. A stabilized temperature condition can only be achieved with the test panel in place and all test panel openings and sliding door closed. If the receiver-transmitter temperature is not stabilized, the different temperature levels will cause a changing A.O.C. voltage that will invalidate the A.O.C. and receiver sensitivity adjustments (para 88.7) and cause the receiver-transmitter to perform erratically and poorly in tactical operation.

88.4. Preliminary Procedures

a. Construct a wire harness (fig. 3) for use in interconnecting the receiver-transmitter to Control, Transponder Set C-2714/APX-44, and to the dc power supply.

b. Construct a test panel with provision for adjustment of the SLS card (para 88.2) for use in replacing the right-hand panel on the receiver-transmitter to enable behind-the-panel adjustments to the receiver--transmitter with a panel in place.

c. Remove the receiver-transmitter right-hand panel. Connect the alligator clip attached to the flexible lead from the A.O.C. TEST VOLTS pin on the test panel to the A.O.C. test pin on the receiver-transmitter IF amplifier subchassis. Connect the alligator clip attached to the flexible lead from the DET WAVEFORM pin on the test panel, to the DET pin on the receiver-transmitter IF amplifier subchassis. Position and secure the test panel in place on the receiver-transmitter.

Note. Do not make any tests on the receiver-transmitter without the test panel in place.

d. Connect the equipment as shown in figure 113.11.

e. Ground the case of Simulator, Coder SM-500/UPM-135, receiver-transmitter, and Oscilloscope AN/USM-81 (oscilloscope) with a copper wire (#22 AWG). Make sure wire makes contact with bare metal on each unit.

88.5. Preliminary Panel Control Settings

With the equipment connected as shown in figure 113.11, make the preliminary panel control settings outlined in a through n below. Perform each control setting in the indicated sequence.

a. DC Power Supply. Adjust output voltage of dc power supply to 27.5 volts.

b. Control Unit.

(1) Set master control to STBY.

(2) Set function contralto MOD.
(3) Set MODE 2 ON-OFF switch to ON.
(4) Set MODE 3 ON-OFF switch to ON.
(5) Set MODE 1 code control to 00.
(6) Set MODE 3 code control to 00.
(7) Set AUDIO ON-OFF switch to OFF.
(8) Set I/P switch to OFF.

c. Receiver-Transmitter. Set all mode 2 toggle switches to OFF.

d. All Equipment. Energize equipment. Allow 30 minutes for all equipment to warm up.

e. Signal Generator (Part of SM-500/UPM- Set signal generator to 1,030 mc as follows:

(1) Set CAL-CONTROL unit METER SELECT switch to CAL.
(2) Adjust CAL-CONTROL unit CAL ADJ control for a full-scale meter indication.
(3) Set CAL-CONTROL unit METER SELECT switch to WM.
(4) Turn CAL-CONTROL unit WM SENS control fully cw.
(5) Set WAVEMETER INPUT switch to SIG GEN.
(6) Set WAVEMETER FREQUENCY control to a dial setting equivalent to 1,030 mc in accordance with appropriate WAVEMETER CALIBRATION CURVE in Book of Calibration Charts provided with AN/UPM-135.
(7) Vary SG FREQUENCY control for a dip on CAL-CONTROL unit meter.
(8) Turn CAL-CONTROL unit WM SENS control ccw and, at same time, vary SG FREQUENCY control until dip on meter occurs within range of meter scale.
(9) Set SG FREQUENCY control for a maximum dip on CAL-CONTROL unit meter.
(10) This completes the *preliminary* frequency adjustment.

f. Test Set, Radar AN/UPM-135.

(1) Terminate LP IN Jack on SM-500/UPM-135 with a 50-ohm only termination plug.

Note. Some AN/UPM-135 termination plugs are 50 ohms and others are 75 ohms. Check the resistance of the termination plug with an ohmmeter to make sure that the resistance is 50 ohms.

(2) Set SYNC SELECT control to INT on XTAL MARK & SYNC unit.
(3) Set PRF control to approximately 6 on XTAL MARK & SYNC unit.
(4) Make following control setting on INTERROGATION CODER unit:
  (a) MODE SELECT switch to 1.
  (b) SUB-PULSE counter control to 0.
  (c) Function switch to MOD-INT.
  (d) CODE WIDTH control approximately two-thirds cw.
  (e) VIDEO select switch to CODE.
  (f) ISLS select switch to OUT.
  (g) Subpulse select switch to OUT.
  (h) ISLS level control fully ccw.
  (i) ISLS WIDTH control approximately two-thirds cw.
(5) Set SM-500/UPM-135 ATTENUATION control fully ccw (minimum attenuation).
(6) Set CAL-CONTROL unit TRIGGER switch to INT.
(7) Set CAL-CONTROL unit METER SELECT switch to 5,000 and VIDEO OUT control to SIG MON.
(8) Set DISPLAY unit VOLTS/IN switch to 5 and 75 ohms IN-OUT switch to OUT.

g. Oscilloscope AN/USM-81.

(1) Make following control settings on preamplifier:
  (a) MODE switch to A ONLY.
  (b) DC-AC slide switch to DC (on CHANNEL A).
  (c) Black VOLTS/CM switch to .5 (on CHANNEL A).
(2) Make following MAIN SWEEP control settings:
  (a) Black MULTIPLIER switch to 1.
  (b) Black TIME/CM switch to 1.
  (c) Red 5X MAGNIFIER switch to OFF.
  (d) Black TRIGGER SLOPE switch to any position.

(e) Red TRIGGERING MODE switch to AC FAST.

(f) Red STABILITY control fully cw.

(g) Black TRIGGERING LEVEL control fully cw.

(3) Make following DELAY SWEEP control setting:

(a) Black TIME/CM OR DELAY switch to 10 MICRO SEC.

(b) Red LENGTH control fully cw.

(c) DELAY-TIME MULTIPLIER control to read 4 in window.

(d) Black TRIGGERING LEVEL control fully cw.

(e) Red STABILITY control fully cw.

(4) Make following HORIZONTAL DISPLAY control settings:

(a) Mode selector switch to DELAYING SWEEP.

(b) SLOPE toggle switch to +.

(c) ATTEN toggle switch to X 1.

h. Connect CAL-CONTROL unit VIDEO OUT jack to CHANNEL A input jack on oscilloscope; use type CG-530F/U coaxial cable.

i. Connect XTAL MARK & SYNC unit O TRIGGERS jack to TRIGGER OR EXT. SWEEP IN jack on oscilloscope; use type CG-530F/U coaxial cable.

j. On oscilloscope, slowly rotate red DELAYING SWEEP STABILITY control ccw until proper pulse stabilization is obtained.

k. Adjust oscilloscope INTENSITY control to discern brightened portion of horizontal trace.

l. Adjust oscilloscope DELAY-TIME MULTIPLIER control to position brightened portion of horizontal trace over dual pulse mode 1 interrogation.

m. Set oscilloscope HORIZONTAL DISPLAY mode selector switch to MAIN SWEEP DELAY.

n. Adjust controls as necessary to obtain an optimum display.

88.6. Adjustment of Signal Generator Frequency

Note. The calibration charts supplied with the AN/UPM-135 have been prepared to enable the signal generator unit to be aligned accurately to within ±0.7 mc. The crystal-controlled signal of the ISLS pulse generator (part of INTERROGATION CODER unit) is accurate to within ±0.2 mc of 1,030 mc. It is, therefore, possible to further align the signal generator frequency output by zero-beating it against the fixed ISLS signal, thereby obtaining a three pulse frequency accuracy of 1,030 ±0.2 mc. Proceed as follows:

a. Set ISLS select switch to 2 µsec, on INTERROGATION CODER unit, function switch to INT, and MODE SELECT switch to either 1, 2, or 3A.

b. Turn XTAL MARK & SYNC unit PRF control fully clockwise.

c. Adjust INTERROGATION CODER unit CODE WIDTH control for a P1, P3 pulse width of 0.8 µsec at half-amplitude points as viewed on oscilloscope.

d. Set INTERROGATION CODER unit ISLS level control to 0 and adjust ISLS WIDTH control and screwdriver adjust CAL control so that middle ISLS pulse is equal in width and amplitude to the two interrogation pulses.

e. Set INTERROGATION CODER ISLS PULSE switch to CHECK.

f. Set the oscilloscope MAIN SWEEP: TIME/CM control to 0.1 µsec and MULT control to 2 for a view of first pulse (P1) approximately 4 centimeters wide.

g. Place oscilloscope hood over screen and slowly rotate SG FREQUENCY crank on SM-500/UPM-135 signal generator unit to either side of position previously set in preliminary signal generator frequency adjustment (para 88.5), and notice a beat indication on top of displayed pulse. Observe that fill-in traces change from vertical to horizontal and back to vertical. Set SG FREQUENCY crank for best horizontal fill-in. This fill-in indicates a zero beat (same frequency) between crystal-controlled P2 signal generated in INTERROGATION CODER unit and variable P1, P3 signals generated in SM-500 135 signal generator unit.

Note. The adjustment performed in g above is critical; therefore, it requires absolute certainty before continuing on.

h. Return PRF control on XTAL MARK & SYNC unit to approximately 6.

i. Set CAL-CONTROL unit METER SELECT switch to 500, and adjust XTAL MARK & SYNC unit PRF control for a reading of 500 on CAL-CONTROL unit meter.

j. Disconnect video cable from VIDEO OUT jack on CAL-CONTROL unit and connect jumper cable CG-530/U (10 inches) between VIDEO OUT jack on CAL- CONTROL unit and VIDEO jack on DISPLAY unit. On MAIN SWEEP, set TIME/CM control to 1 and MULTIMETER switch to 1.

k. This completes the final signal generator frequency adjustment.

88.7. High Receiver Sensitivity and Main Gate A.O.C. Adjustment

Notes:

1. Warm up the receiver-transmitter for at least 30 minutes, so that the internal temperature of the receiver-transmitter can stabilize to the same temperature condition as that of an equipment in normal operating use. A stabilized temperature condition can only be achieved with the test panel in place and all test panel openings and sliding door closed. If the receiver-transmitter temperature is not stabilized, the different temperature levels will cause a changing A.O.C. voltage that will invalidate the A.O.C. and receiver sensitivity adjustments and cause the receiver-transmitter to perform erratically and poorly in tactical operation.
2. Do not make any tests on the receiver-transmitter unless the test panel is in place, because the test results will not be valid. Test panel openings must be closed with their covers when an adjustment is not being made through the opening. Do not remove the left-hand panel.

a. With equipment connected as before, connect oscilloscope probe between oscilloscope CHALLEL B connector and DET WAVEFORM test jack on test panel.

b. Make following control settings on oscilloscope:

(1) MODE switch to B ONLY.
(2) Black VOLTS/CM switch to .1 (CHANNEL B).
(3) Red VARIABLE control cw to CALIBRATED (CHANNEL B).
(4) DC-AC slide switch to DC (CHANNEL B).
(5) Red POLARITY switch to NORMAL (CHANNEL B).

c. Set INTERROGATION CODER ISLS select switch to OUT.

d. Set WAVEMETER INPUT switch to OFF on panel of AN/UPM-135.

e. Set INTERROGATION CODER MODE SELECT switch to 1.

f. Set signal generator unit ATTENUATION control fully counterclockwise. Set C-2714/APX-44 control unit master control to NORMAL.

Note. Receiver-transmitter should now be firing a reply to each interrogation from the signal generator unit.

g. Set CAL-CONTROL unit TRIGGER switch to DEMOD and observe that the same reading is obtained on the CAL-CONTROL meter as in paragraph 88.6.

h. Set XTAL MARK & SYNC DELAY and TRIGGER DELAY controls to 0; set RANGE control on SWEEP & INTEN MARK unit to 20-200 and turn SWEEP SPEED control to position display.

i. Adjust DISPLAY unit HOR control for proper presentation of a two-pulse mode 1 reply.

Notes:

1. If indications specified in *g* and *i* above are not stable (meter flickers or pulses arc-over) or not displayed at all, check to see that equipment is properly connected and preliminary panel control settings have been properly made as outlined in paragraph 88.5.
2. If connections and control settings did not require correction and a stable display resulted, proceed to *j* below.
3. If connections and control settings did require correction, or if unstable condition still exists after correction, SIDELOBE DETECTOR contol R311 may be excessively maladjusted. Turn adjustment screw of R311 (fig. 113.13) clockwise until indications specified in *g* and *i* above are fully displayed and then continue turning adjustment screw clockwise for 5 revolutions. (Final adjustment of SIDELOBE DETECTOR control R311 will be performed later during sidelobe-suppression minimum range adjustment.)

j. Set oscilloscope MAIN SWEEP TIME/CM knob to 1 MICROSEC.

Note. The mode 1 interrogation pulses should be displayed.

k. Adjust signal generator unit ATTENUATION control clockwise until CAL-CONTROL unit meter oscillates at 250 position (50 percent triggering point). At same time, arc-over should occur across base-line of *transmitted pulses* displayed on DISPLAY unit scope. Note setting of ATTENUATION control.

l. Turn ATTENUATION control ccw 30 db from setting noted in *k* above.

Note. Peak amplitude of *interrogation pulses* displayed on oscilloscope should be 2.5 volts ±0.5. Adjust CHANNEL B VOLTS/CM black knob, as required, for an adequate display of pulses.

m. Set vtvm selector control to measure a negative voltage. Momentarily short vtvm common lead to DC lead and adjust ZERO ADJ control for an indication of 0 volt.

n. Connect vtvm DC lead to A.O.C. TEST pin jack on test panel. Connect vtvm common lead to ground lug on test panel.

o. Turn signal generator unit ATTENUATION control cw until arc-over occurs across base of transmitted reply pulses as indicated on the DISPLAY unit scope. Indication on vtvm should decrease at same time. Turn ATTENUATION control ccw until arc-over across the *transmitted* reply pulses fully disappears.

p. Adjust MAIN GATE A.O.C. control R326 (fig. 113.13) through test panel opening for an indication of approximately 0.6 volt as observed on vtvm.

Note. Set vtvm RANGE control to 1V to obtain a more accurate indication.

q. Slowly adjust signal generator unit ATTENUATION control clockwise until CAL-CONTROL unit meter oscillates at 250 position (50 percent triggering point).

r. Note ATTENTUATION control setting and add this figure to the fixed attenuation specified on DEMODULATOR ATTENUATION CONSTANTS chart for SG IN to HP IN under *1030* MC column in Book of Calibration Charts provided with the AN/UPM-135. Cable loss must be added to this vale. The CG-409E/U (5 feet 2 1/8 inches) cable has a loss of approximately 1.25 db. The fixed attenuation value will vary for each individual N/UPM-135. The total attenuation to achieve the 50-percent triggering point should be between 80 and 86 db (that is, input voltage between -80 and -86 db per volt).

Note. If total attenuation is not at least 80 db, adjustment of HI SENS control R225 may be necessary and then, in turn, alignment of IF amplifier may also be necessary. (Refer to TM 11-5895-217-35 for adjustment and alignment procedures.)

s. Repeat procedures given in *q* and r above with MODE SELECT switch on INTERROGATION CODER unit set to 2 and then to 3/A.

t. Set INTERROGATION CODER unit MODE SELECT switch to 1.

u. Turn signal generator unit ATTENUATION control fully ccw (minimum attenuation, maximum signal).

v. Set CAL-CONTROL unit METER SELECT switch to 5000.

w. Set vtvm RANGE control to 10V.

x. Observe reply pulses on DISPLAY unit scope and slowly turn XTAL MARK & SYNC unit PRF control cw until arc-over first occurs across baseline of reply pulses. At this point, CAL-CONTROL unit meter should indicate not more than 1,000. Slowly turn PRF control further cw through its range. Arc-over across pulses should increase in intensity and meter indication should not be more than 1,000. If meter indicates more than 1,000, troubleshoot main gate A.O.C. circuit.

y. Turn XTAL MARK & SYNC unit PRF control ccw for an indication of 500 on CAL-CONTROL unit meter.

z. Set CAL-CONTROL unit METER SELECT switch to 500.

aa. Set vtvm RANGE control to 1V.

ab. Set C-2714/APX-44 master control to STBY.

88.8. Sidelobe Blocking Oscillator Adjustment

Notes:

1. The high receiver sensitivity and main gate A.O.C. adjustment (para 88.7) must be performed before proceeding with the following procedure.

2. Connections and last setting of controls as performed in the high *receiver* sensitivity and main gate A.O.C. adjustment remain the same unless indicated otherwise.

a. Set ATTENUATION control fully counterclockwise on signal generator unit (maximum attenuation).

b. Capacity couple alligator tip of probe to green lead (pin 5) of V301 (fig. 113.13) by grasping green lead with teeth of alligator tip through sliding door in test panel.

c. Adjust SIDELOBE BLOCKING OSC control R306 so that width of first interrogation plus is 0.6 µsec at half-amplitude point.

Notes:

1. Peak amplitude will depend upon amount of capacity coupling between probe and green lead (pin 5) of V301.
2. After adjustment, make sure that when R306 adjustment screw is turned at least 2 revolutions cw from its adjusted position and then at least 2 revolutions ccw from its adjusted position, no abrupt change in pulse width will occur (to insure stability in tactical operation). The point at which an abrupt change occurs is the functional limit of R306.

d. Remove probe from green lead and close sliding door on test panel.

88.9. Preliminary Sidelobe Detector Adjustment

Notes:

1. The sidelobe blocking oscillator adjustment (para 88.8) must be performed before proceeding with the following procedure.
2. Connections and last setting of conrols as performed in the sidelobe blocking oscillator adjustment remain the same unless indicated otherwise.

a. Set up oscilloscope for CHANNEL B operation and, using probe, monitor DET WAVEFORM test point on test panel.

b. Set INTERROGATION CODER unit ISLS select switch to 2 µsec, and rotate ISLS level control clockwise to 0 to observe presence of a P2 pulse.

c. Open sliding door on test panel, remove probe from DET WAVEFORM test point and capacity couple alligator tip of probe to red lead (pin 2) of V302 by grasping red lead with teeth of alligator tip, to observe trigger pulse input to sidelobe multivibrator V302.

d. A negative trigger waveform should appear on oscilloscope.

Note. Peak amplitude will depend upon amount of capacity coupling between probe and red lead (pin 2) of V302.

e. Adjust INTERROGATION CODER unit ISLS level control counterclockwise to -9DB mark and observe disappearance of trigger waveform on oscilloscope.

f. If the desired conditions in *d* and *e* above are not present, SIDELOBE DETECTOR control R311 may be maladjusted.

g. To correctly adjust R311, position INTERROGATION CODE ISLS level control to -9DB and adjust SIDELOBE DETECTOR control R311 until the negative-going pulse at pin 2 V302 just disappears.

h. Readjust INTERROGATION CODER ISLS level control to 0 and observe presence of negative-going pulse at pin 2 of V302.

Note. The procedures in *g* and *h* above may have to be repeated several times until desired ISLS operation is observed.

88.10. Sidelobe Multivibrator Adjustment

Notes :

1. The preliminary sidelobe detector adjustment (para 88.9) must be performed before proceeding with the following procedure.
2. Connections and last setting of controls as performed in preliminary sidelobe detector adjustment remain the same unless indicated otherwise.

a. Set ISLS level control to 0 on INTERROGATION CODER.

b. Capacity couple alligator tip of probe to gray lead (pin 8) of V302 by grasping gray lead with teeth of alligator tip, to observe firing of sidelobe multivibrator V302.

c. Set oscilloscope MAIN SWEEP MULTIPLIER to 5 and TIME/CM to 1 µsec.

d. Adjust SIDELOBE MAIN GATE WIDTH control R315 to obtain a sidelobe gate pulse width from 30 to 35 µsec at half-amplitude point.

e. Remove alligator tip of probe from gray lead (pin 8) of V302 and close sliding door on test panel.

88.11. Sidelobe-Suppression Minimum Range Adjustment

Note. The sidelobe multivibrator adjustment (para 88.10) must be performed before proceeding with the following procedure.

a. With equipment connected as before, connect test probe between oscilloscope and DET WAVEFORM jack on test panel (to monitor the spacing of the mode interrogations). Set MAIN SWEEP TIME/CM to 1.

Notes:

1. The test probe *must* be used for connection between the oscilloscope and the DET WAVEFORM jack on the test panel. A direct cable connection between the oscilloscope and the DE T jack on the test panel will load down the circuit feeding the DET jack and cause an undesirable change in spacing between the interrogation pulses at the input of the video amplifier/SLS card.
2. The output from the receiver-transmitter RCVR OUT jack *must not* be used for measurement of the mode interrogation pulse spacing. Use only the DET WAVEFORM jack on the test panel. The mode interrogation pulse spacing at the RCVR OUT jack is different from that at the DET WAVEFORM jack and different from that of the SM-500/UPM-135 signal generator unit. Because of the different outputs at the RCVR OUT jack and the signal generator unit, only the similar outputs of the DET WAVEFORM jack and signal generator unit can be used for adjustment of the video amplifier/SLS card.

b. Set INTERROGATION CODER unit ISLS select switch to OUT (no P2 pulse output) .

c. Set control unit master control to NORMAL.

d. Set signal generator ATTENUATION control fully ccw (for minimum attenuation and maximum P1 and P3 pulse output).

e. With INTERROGATION CODER unit MODE SELECT switch alternately set to 1, 2, and 3/A, receiver-transmitter should fire fully as indicated on the oscilloscope.

Note. Full firing is indicated by no random arc-over across the baseline of the transmitted reply pulses from the receiver-transmitter and no downward flicker (coincidental with the arc-over) on the CAL-CONTROL meter from its 500 prf position.

f. Set the INTERROGATION CODER unit MODE SELECT switch to 1.

g. Adjust oscilloscope controls, as required, for optimum presentation of mode 1 interrogation pulses.

h. Check to see that leading edge of first mode 1 interrogation pulse is displaced 3.0 used from leading edge of second mode 1 interrogation pulse at half-amplitude point.

i. Set INTERROGATION CODER unit ISLS select switch to 2 µsec and adjust ISLS level control to 0.

j. Capacity couple alligator tip of probe to gray lead (pin 8) of V302 (fig. 113.13) by grasping gray lead with teeth of alligator tip through sliding door opening on test panel.

Notes:

1. Receiver-transmitter should not fire a reply at all, as indicated by disappearance of transmitted reply pulses (normally observed on DISPLAY unit scope when receiver-transmiter fires a reply).
2. The CAL-CONTROL unit meter should indicate 0 with no upward flicker (full suppression of transmitted reply).
3. The sidelobe suppression gate pulse, monitored from gray lead (pin 8) of V302. should fire fully with no arc-over.

k. Turn INTERROGATION CODER ISLS level control to -9DB and observe that the sidelobe suppression pulse ceases to fire on oscilloscope.

l. The CAL-CONTROL unit meter should indicate 500 with no downward flicker (full firing of transmitted reply).

m. Repeat the instructions in *h* through *l* [illegible] with MODE SELECT switch set to 2 and then to 3/A on INTERROGATION CODER unit to determine that for a nominal 2.0-[illegible] P2 pulse spacing (leading edge of P1 [illegible] and leading edge of P2 pulse at half-amplitude point) proper ISLS action occurs (full transmission when P2 is less than P1/P3 by 9 db and full suppression, no transmission, when P2 equals P1/P3).

n. Return INTERROGATION CODER unit MODE SELECT switch to 1 and ISLS level control to 0.

o. Monitor DET WAVEFORM test point on test panel with oscilloscope probe.

p. Set INTERROGATION CODER unit subpulse select switch to P2 and adjust SUB-

PULSE counter control to set spacing between leading edge of P1 pulse and leading edge of P2 pulse to 1.85 µsec at half-amplitude point, and then to 2.15 µsec. At 1.85 µsec and 2.15 µsec settings, with MODE SELECT switch alternately set to 1, 2, and 3/A, receiver-transmitter should not fire at all (transmitted reply fully suppressed), as indicated on DISPLAY unit scope.

Note. If performance standards given above are met, SIDELOBE DETECTOR control R311 need not be adjusted. If performance standards are not met, adjust SIDELOBE DETECTOR control R311 as required.

q. On INTERROGATION CODER unit, set SUB-PULSE counter control to 0, subpulse select switch to OUT, and ISLS select switch to OUT (no P2 pulse).

r. Check to make sure that receiver-transmitter does not fire on a single pulse interrogation by momentarily setting INTERROGATION CODER unit MODE SELECT switch to SGL. Reset MODE SELECT switch to 1.

s. If the transmitter fires on a single pulse, SIDELOBE DETECTOR control R311 must be readjusted and the procedures in a through r above must be repeated.

88.12. Sidelobe-Suppression Maximum Range Test

Notes:

1. The sidelobe-suppression minimum range adjustment (para 88.11) must be performed before proceeding with the following procedure.
2. Connections and last setting of controls as performed in the sidelobe-suppression minimum range adjustment remain the same unless otherwise indicated.

a. Set control unit master control to NORMAL.

b. Turn signal generator unit ATTENUATION control cw until 50-percent triggering is noted on CAL-CONTROL unit meter.

c. Turn signal generator unit ATTENUATION control 10 db ccw from 50-percent triggering point set in *b* above.

d. Adjust oscilloscope VOLTS/CM control to adequately display P1 and P3 mode 1 interrogation pulses.

e. On INTERROGATION CODER unit, set ISLS select switch to 2 µsec and ISLS level control to 0 (amplitude of P2 pulse is same as that of P1 and P3 pulses).

f. Set INTERROGATION CODER unit MODE SELECT switch alternately to 1, 2, and 3/A. Receiver-transmitter should not fire a reply at all, as indicated by disappearance of transmitted reply pulses (normally observed on DISPLAY unit scope when receiver-transmitter fires a reply). The CAL-CONTROL unit meter should indicate 0 prf with no upward flicker.

g. Adjust ISLS level control ccw (decrease P2 to -9DB); the transmitted reply pulses should appear and fire fully, without any arcover (as observed on DISPLAY unit scope) and CAL-CONTROL unit meter indicates 500 prf without downward flicker.

h. Set MODE SELECT alternately to 1, 2, and 3A on INTERROGATION CODER unit. Receiver-transmitter should fire fully in all modes.

i. Adjust INTERROGATION CODER unit ISLS level control clockwise to 0 (P2 equal to P1/P3).

j. On INTERROGATION CODER unit, set subpulse select switch to P2 and adjust SUB-PULSE counter control to set spacing between leading edge of P1 pulse and leading edge of P2 pulse to 1.85 µsec at half-amplitude point, and then to 2.15 µsec. At both these spacings, with MODE SELECT switch alternately set to 1, 2, and 3/A, transmitted reply should remain fully suppressed as indicated on DISPLAY unit scope and 0 prf indication on CAL-CONTROL unit meter.

k. Return ISLS select switch and subpulse select switch to OUT, and SUB-PULSE counter control to 0.

88.13. Preliminary Sidelobe A.O.C. Control Adjustment

Notes:

1. The sidelobe-suppression maximum range test (para 88.12) must be performed before proceeding with the following procedure.
2. Connections and setting of controls as performed in the preceding procedures remain the same unless indicated.

3. The sidelobe A.O.C. control adjustment approximately determines the correct adjustment of SIDELOBE A.O.C. control R328. Final adjustment of R328 is a depot function: however, the adjustment of R328 in the procedure below will be sufficiently accurate.

a. Set INTERROGATION CODER unit MODE SELECT switch to 1.

b. Set master control switch on control unit to NORMAL.

c. Adjust oscilloscope controls to display mode 1 P1 and P2 interrogation pulses from DET WAVEFORM test jack on test panel.

d. Set subpulse select switch to P3 on the INTERROGATION CODER.

e. On INTERROGATION CODER unit, adjust SUB-PULSE counter control ccw until leading edge of P1 interrogation pulse is spaced exactly 2.0 μsec from leading edge of second interrogation pulse, at their half-amplitude points, on oscilloscope.

Note. In *e* above, the second interrogation pulse is used as the P2 pulse, with a P3 pulse not present.

f. The vtvm indication should decrease to 0 or slightly below 0 (as determined by temporarily removing test lead probe from A.O.C. TEST VOLTS jack on test panel, to determine meter movement).

g. Connect RCVR OUT jack on receiver-transmitter to oscilloscope CHANNEL A jack, using CG-530F/U video cable.

h. Set CAL-CONTROL unit TRIGGER switch to INT.

i. Set CAL-CONTROL unit METER SELECT switch to 5000 PRF.

j. Slowly turn PRF control cw on XTAL MARK & SYNC unit until meter on CAL-CONTROL unit indicates maximum (approximately 4,500 PRF). The interrogation pulses, on CHANNEL A display, should increase in intensity but not in amplitude. When CAL-CONTROL meter indicates approximately 4,500 pps, the amplitude of interrogation pulses should be at the verge of decreasing.

k. If requirements in *j* above are met, SIDELOBE A.O.C. control R328 need not be adjusted. If requirements are not met, adjust R328 accordingly. (Be careful not to adjust MAIN GATE A.O.C. control R326 by mistake.)

l. Set control unit master control to STBY.

m. Disconnect all test equipment, remove receiver-transmitter test panel, and reinstall right-hand panel.

n. On receiver-transmitter, clean area on top of front cover over mode 2 switches and stamp "TEST MOD APPLIED."

88.14. Operational Check

Use Test Set, Transponder AN/APM-123 (V) 1 and the procedures outlined below to check the sidelobe-suppression (SLS) capability and the overall performance of the receiver-transmitter.

a. AN/APM-123 (V) 1 Self-Test. Perform the procedures in (1) through (8) below to see that the AN/APM-123 (V) 1 is functioning normally.

(1) Connect the equipment as shown in figure 113.12.

(2) Adjust the output voltage of Power Supply PP-1104A/G to 27.5 volts dc.

(3) Set the C-2714/APX-44 controls and switches as follows:

Control or switch	Position
Master control	STBY
Function control	MOD
MODE 2 ON-OFF switch	ON
MODE 3 ON-OFF switch	ON
MODE 1 code control	00
MODE 3 code control	00
AUDIO ON-OFF switch	OFF
I/P switch	OFF

(4) Allow the equipment to warm up for approximately 10 minutes.

(5) Set the AN/APM-123 (V) 1 controls and switches as follows:

Control or switch	Position
Power switch	115 VAC
FUNCTION switch	SELF TEST
MODE switch	1
CODE AB-CD controls	0000
SIDE LOBE SUPPRESSION (ISLS) SWITCH	OFF
PRESS TO TEST switch	LOCK

(6) After an approximate 2 minute warmup period, the white ACCEPT indicator on AN/APM-123(V) 1 should light.

(7) Rotate the AN/APM-123 (V) 1 MODE switch to 2 and then 3/A and note that ACCEPT indicator remains lighted.

(8) If the indications in (6) and (7) above are not obtained. the AN/APM-123 (V) 1 is defective and must be replaced with one that passes the self-test check.

b. Receiver-Transmitter Test Procedure.

(1) With the equipment connected and controls set as in *a* above, reset the AN/APM-123(V) 1 MODE switch to 1 and the FUNCTION switch to SYSTEM. Note that the red REJECT indicator lights,

(2) Set the C-2714/APX-44 master control to NORMAL and note that the AN/APM-123 (V) 1 ACCEPT indicator lights.

(3) Adjust the AN/APM-123 (V) 1 CODE AB-CD controls to 1000 and note that the REJECT indicator lights.

(4) Return the CODE AB-CD controls to 0000.

(5) Repeat the instructions in (2), (3), and (4) above with the AN/APM-123(V) 1 MODE switch first set to 2 and then to 3/A.

(6) Turn off the C-2714/APX-44 and the receiver-transmitter. Do not disconnect the equipment.

(7) Remove the right side cover of the receiver-transmitter by loosening the quarter-turn fasteners and locate the video amplifier card (Wilcox part No. 116670-2) by referring to figure 54, TM 11-5895-217-35.

(8) Loosen the holddown screws at each end of the card and remove the card.

(9) Obtain a video amplifier/SLS card (Wilcox part No. 117858-2) and insure that it is in good condition.

(10) Align the connector of the card with the receiver-transmitter receptacle and carefully push the card into place.

Caution: Be careful when installing the video amplifier/SLS card to avoid damage to connectors, pins, and printed circuit.

(11) Tighten each holddown screw securely. Do not overtighten.

(12) Reinstall the right side cover of the receiver-transmitter.

(13) Reset the C-2714/APX-44 master control to STBY, AN/APM-123 (V) 1 MODE switch to 1, and FUNCTION switch to SYSTEM. Note that the REJECT indicator lights.

(14) Repeat the instructions in (2) through (5) above. Reset AN/APM-123 (V) 1 MODE switch to 1.

(15) Set the AN/APM-123 (V) 1 SIDE LOBE SUPPRESSION (ISLS) switch to ON and note that the REJECT indicator lights.

(16) Return the SIDE LOBE SUPPRESSION (ISLS) switch to OFF and note that ACCEPT indicator lights.

(17) Repeat the instructions in (2), (3), and (4) above with the AN/APM-123 (V) 1 MODE switch first set to 2 and then to 3/A.

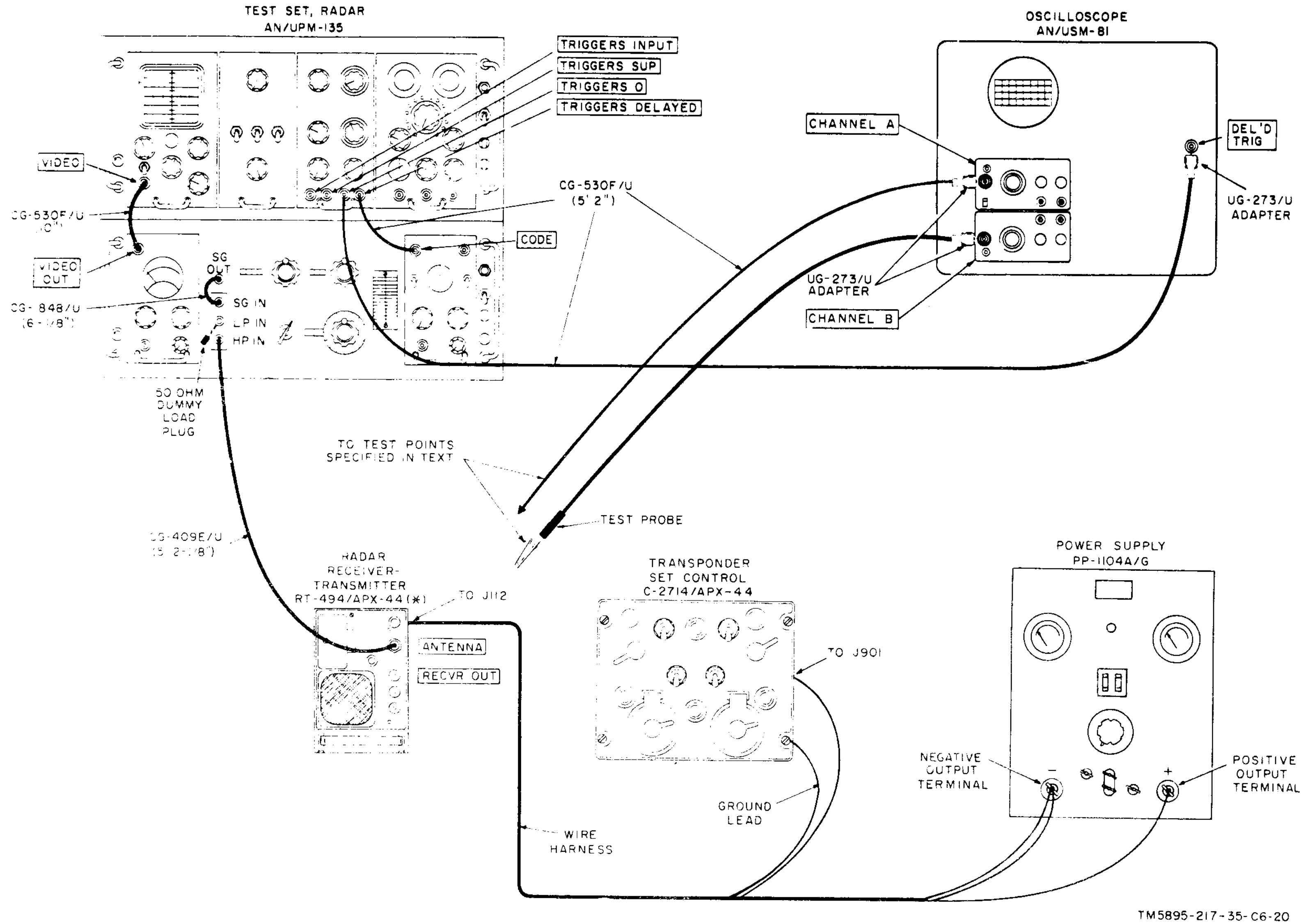


Figure 113.11. Connections for SLS adjustment and testing.

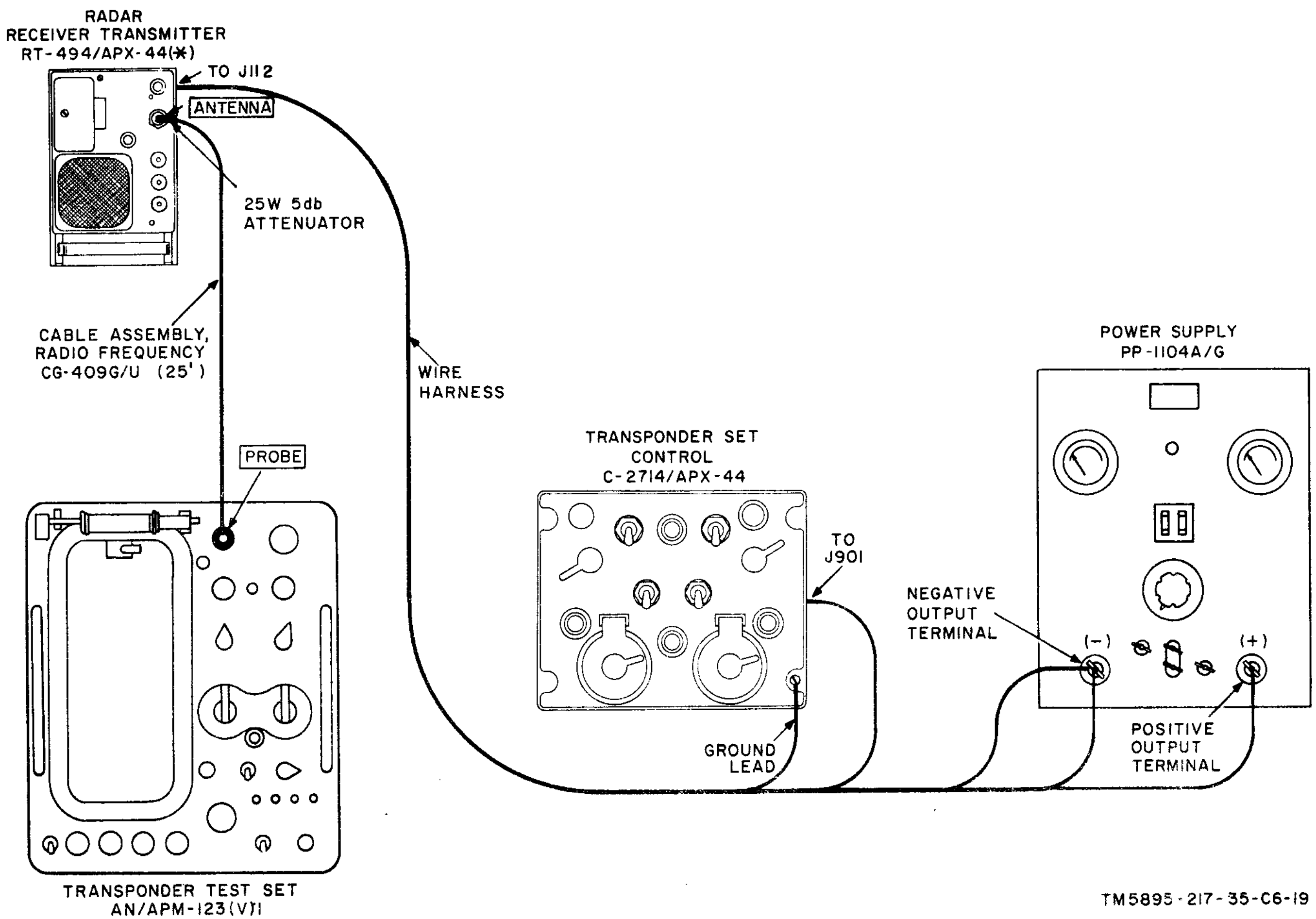


Figure 113.12. Connections for AN/APM–123(V)1 self-test.

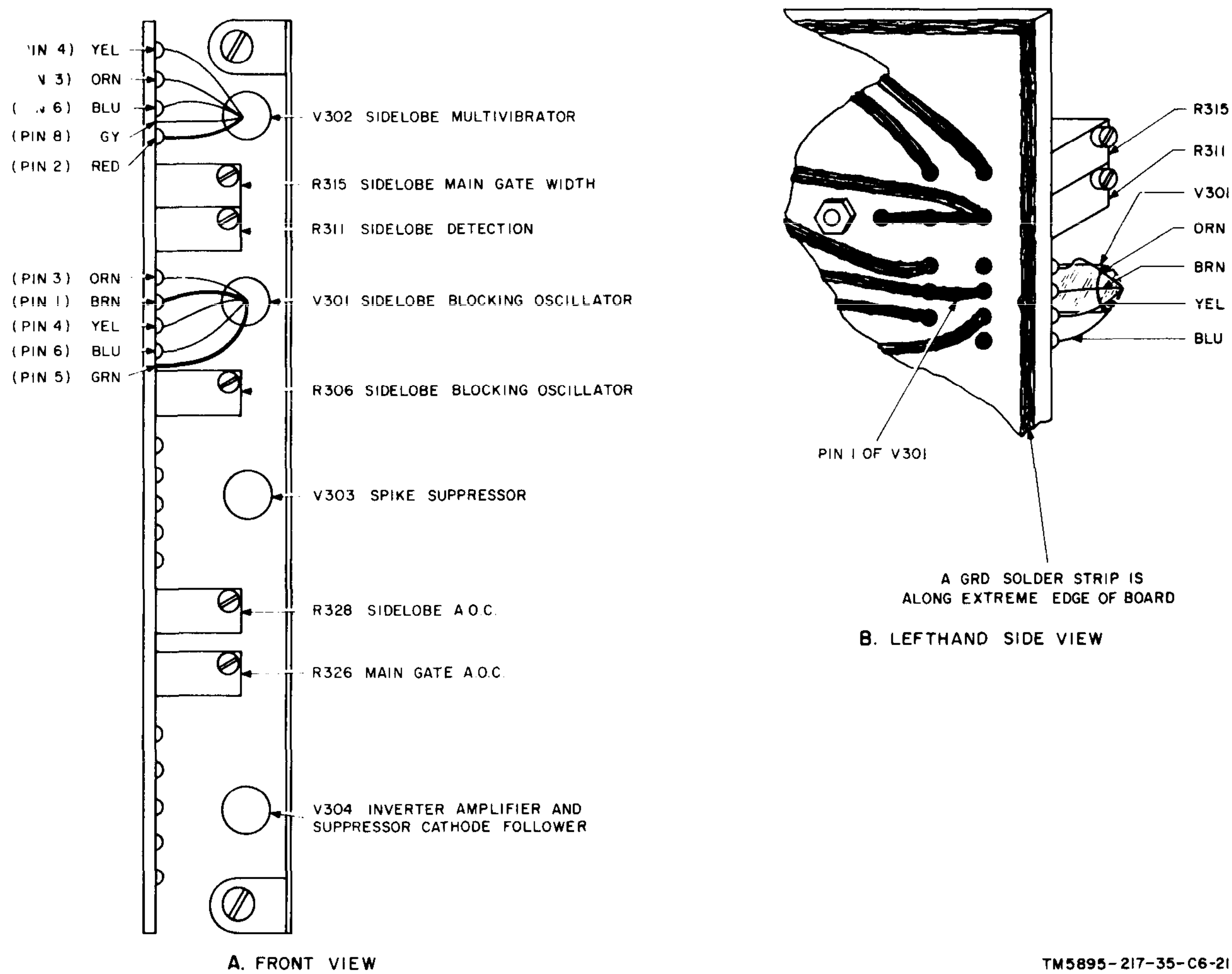


Figure 113.13. Test and adjustment points for the VIDEO AMPLIFIER/SLS card, physical location diagram.

Page 141, paragraph 95.6 (page 7 of C 1), chart, *Step No. 6, Performance standard* column. Make the following changes:

a. Delete "1 or 2 ohms" and substitute: 15 to 75 ohms.

c. Delete "600 ohms" and substitute: 80 to 200 ohms.

e. Add the following note:

Note. Reverse the ohmmeter leads if a resistante between 1,000 and 5,000 ohms is indicated when the I/P switch is set to MIC.

Figure 8 (foldout section). After figure 8. add figure 8.2.

Figure 8.2. Receiver-transmitter with SLS, block diagram.

(Located in back of change)

Figure 49 (foldout section). After figure 49.1, add figures 49.2 and 49.3.

Figure 49.2. B+ distribution for RT-494/APX-44 with SLS, simplified schematic diagram.

(Located in back of change)

Figure 49.3 B+ distribution for RT-494B/APX-44 with SLS, simplified schematic diagram.

(Located in back of change)

Figure 50 (foldout section). Make the following changes:

Caption, add: *(without SLS).*

After figure 50, add figure 50.1.

Figure 50.1 Bias distribution for SLS equipment, simplified schematic diagram.

(Located in back of change)

Figure 76 (foldout section). After figure 76, add figure 76.1.

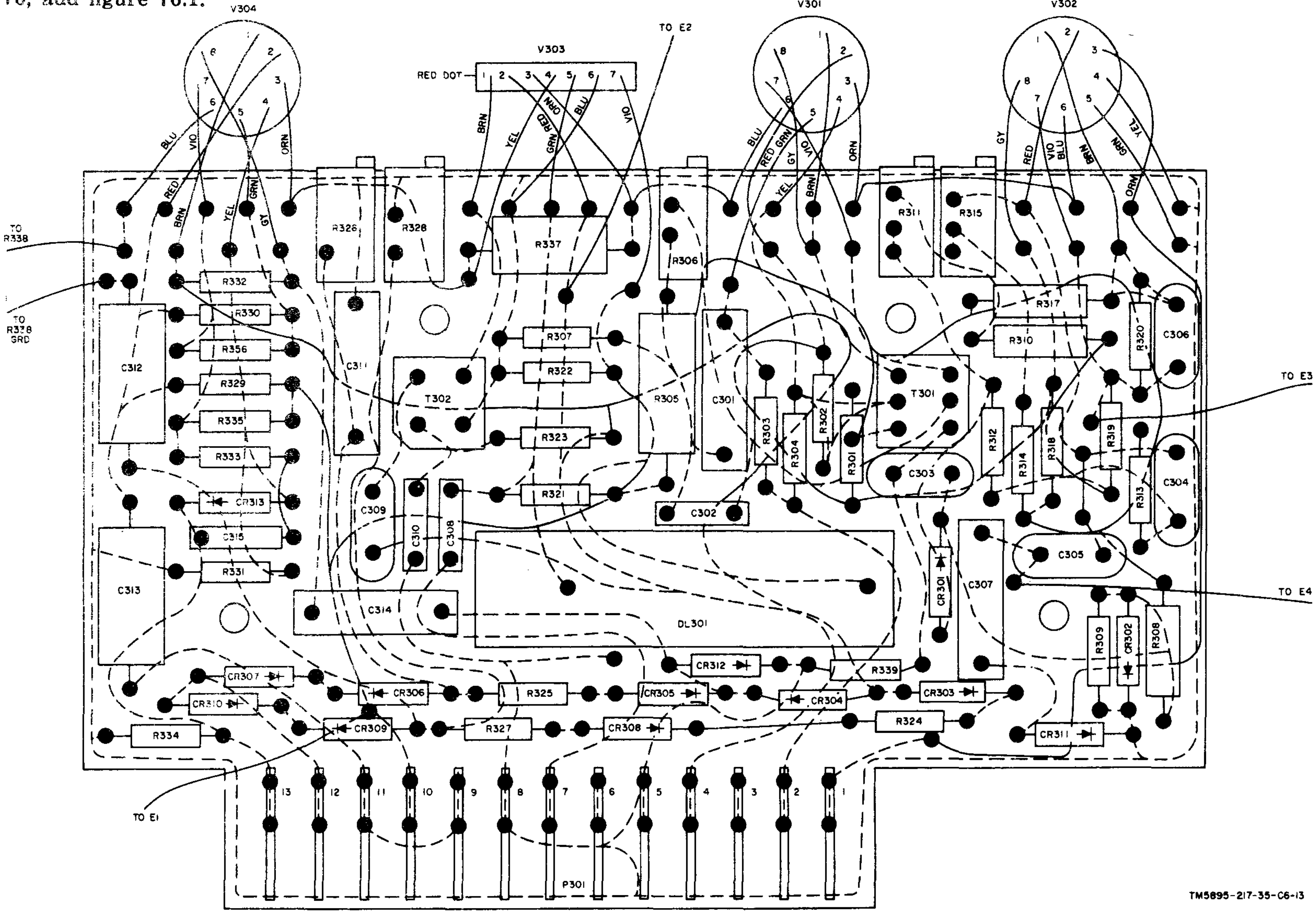


Figure 76.1 Video amplifier/SLS card, parts location and printed circuit wiring diagram.

Figure 119-P1, notes (foldout section). Add the following:

7. FOR THOSE EQUIPMENTS MODIFIED BY MWO 11-5895-217-30/4, TWO RED LEADS CONNECTED TO PIN 3 OF J401 HAS BEEN REMOVED AND CONNECTED TO PIN 10 OF J401, A 4 UF CAPACITOR (14) HAS BEEN CONNECTED BETWEEN A GROUND LUG AND PIN 3 OF J401, AND A 560 OHM RESISTOR (R18) HAS BEEN CONNECTED BETWEEN PIN 3 AND PIN 10 OF J401.

Figure 119.1-1 (page 18 of C 5 (foldout section)). Add the following:

NOTE:

FOR THOSE EQUIPMENTS MODIFIED BY MWO 11-5895-217-30/4, TWO RED LEADS CONNECTED TO PIN 3 OF J401 HAS BEEN REMOVED AND CONNECTED TO PIN 10 OF J401, A 4 UF CAPACITOR (C14) HAS BEEN CONNECTED BETWEEN A GROUND LUG AND PIN 3 OF J401, AND A 560 OHM RESISTOR (R18) HAS BEEN CONNECTED BETWEEN PIN 3 AND PIN 10 OF J401.

Figure 123, notes (foldout section). Add the following:

6. FOR THE AN/APX-44B, THE VALUE OF RESISTOR R234 HAS BEEN CHANGED FROM 1,200 OHMS TO 1,000 OHMS, THE VALUE OF RESISTOR R235 HAS BEEN CHANGED FROM 68 OHMS TO 200 OHMS, AND THE VIDEO OUT TEST POINT HAS BEEN CONNECTED TO THE JUNCTION OF RESISTORS R234 AND R235.

Figure 124 (foldout section). After figure 124, add figure 124.1.

Figure. 124.1 Video amplifier/SLS card, schematic and wave form diagram.

(Located in back of change)

Figure 128 (page 18, C 5), notes (foldout section). Add:

7. FOR THE RT-494B/APX-44, RESISTOR R454 HAS BEEN CHANGED FROM 33,000 OHMS TO 24,000 OHMS, RESISTOR R455 HAS BEEN CHANGED FROM 100,000 OHMS TO 22,000 OHMS, RESISTOR R456 HAS BEEN CHANGED FROM 1.5 MEGOHM T0 330,000 OHMS, AND CAPACITORS C451, C454, AND C455 HAVE BEEN CHANGED FROM 0.01 UF TO .0047 UFD.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army.
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

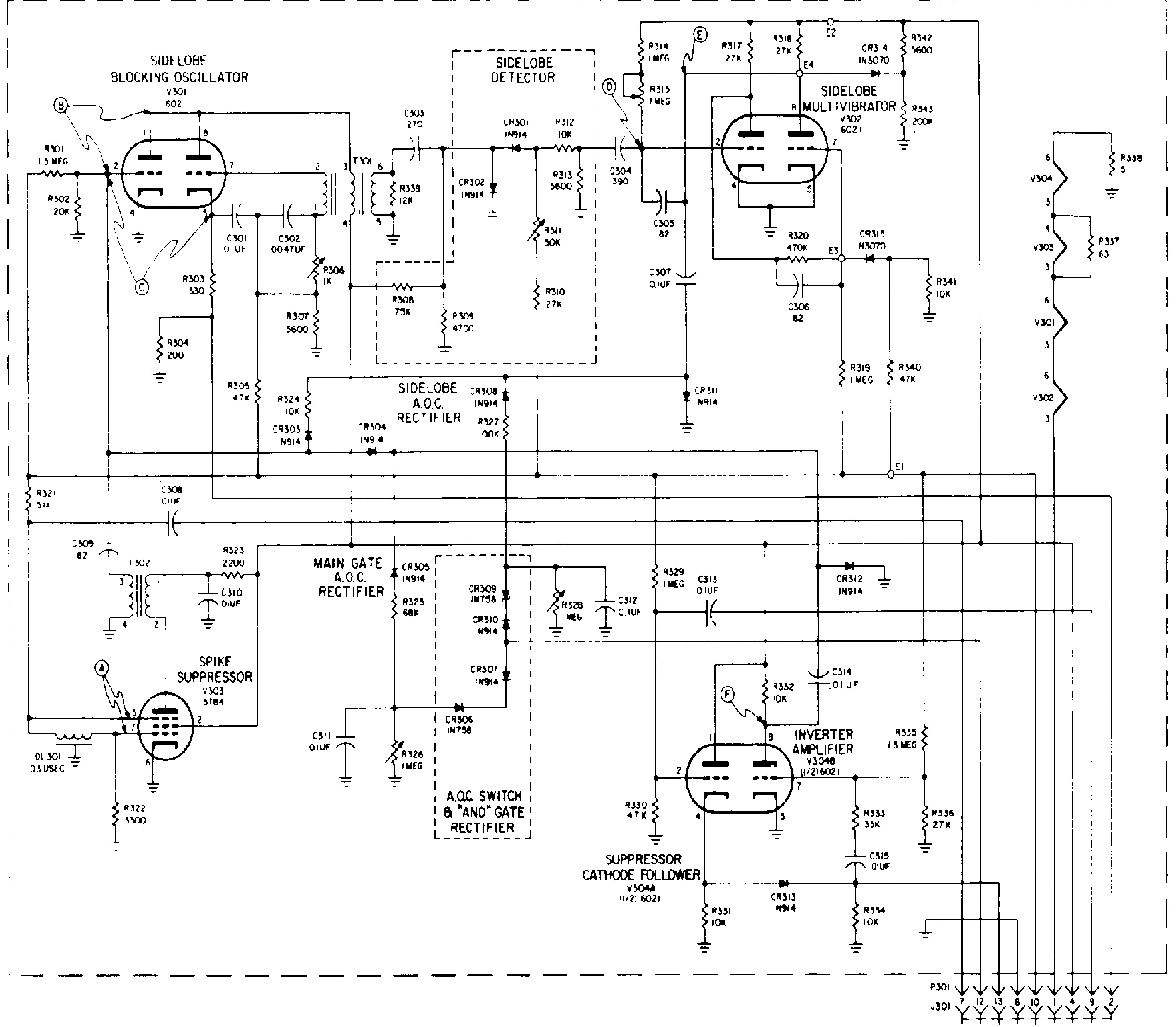
Distribution:
To be distributed in accordance with DA Form 12-36 requirements for direct and general support maintenance literature for the OV-1A; OV-1B; OV-1C U-1A, U-6A, U-8D, RU-8D, U-8F, U-10A, CH-21B; CH-21C, CH-34A, CH-34C, CH-37A, CH-37B, CH-47A, UH-1A; UH-1B; UH-1D, UH-19C and UH-19D aircraft.

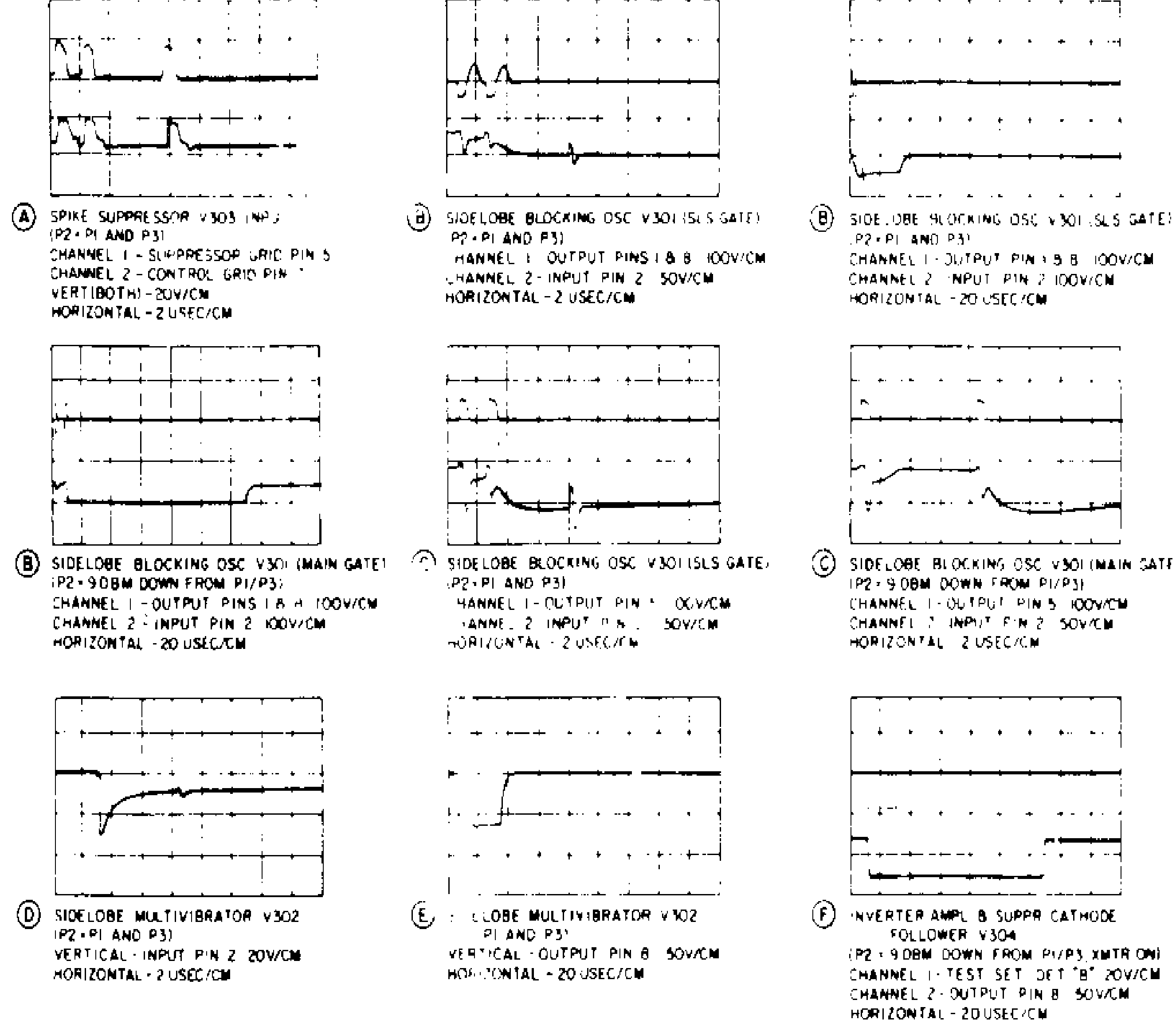
Figure 8.2. Receiver-transmitter with SLS, block diagram.

Figure 49.2 B+ distribution for RT 494 APX-44 with SLS simplified schematic diagram

Figure 49.3. B+ distribution for RT-494B/APX-44 with SLS, simplified schematic diagram.

Figure 50.1. Bias distribution for SLS equipment, simplified schematic diagram.





NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS. CAPACITANCES ARE IN MICROMICROFARADS.
2. WAVEFORM TAKEN BETWEEN POINT(S) INDICATED AND CHASSIS UNLESS OTHERWISE SHOWN.
3. WAVEFORMS TAKEN WITH -40 DBM SIGNAL INPUT TO ANTENNA, 500 PRR AND A MODE 3 INTERROGATION, XMTR OFF UNLESS OTHERWISE STATED.
4. DENOTES ZENER TYPE DIODE RECTIFIER

TM5895-217-35-C6

Figure 124.1. Video amplifier/SLS card, schematic and waveform diagram.

Figure 124.1

CHANGE No. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *23 October 1967*

DS, GS, and Depot Maintenance Manual (Including Repair Part List) TRANSPONDER SETS AN/APX-44 AND AN/APX-44B

TM 11-5895-217-25, 27 July 1960, is changed as follows:

The title of the manual is changed as shown above.

Note. The parenthetical reference to previous changes (example: "page 1 of C2") indicate that pertinent material was published in that change.

Page 2, paragraph 1, (as changed by C4, 21 Jan 1966). Make the following changes: Subparagraph *b,* line 2. Delete TM 11-5895-217-12P and TM 11-5895-217-35P. Subparagraph *c.* Delete and substitute:

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

Paragraph 2. Delete and substitute:

2. Index of Publications

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

Page 147, paragraph 113 (as changed by C4, 21 Jan 1966).

Subparagraph *e,* last sentence. Delete the last sentence and substitute: At any position of the MODE 1 code control, the transmitted reply should consist of 4 trains (8 framing pulses) and the F2 framing pulse in the 4th train should fire fully.

Subparagraph *h.* Delete the *Note* in its entirety.

Subparagraph *o*(1), line 1. Delete 500-uuf and substitute: 560-uuf.

Paragraph 114 (page 16 of C 3).

Subparagraph *a.* Delete subparagraph *a* and substitute:

a. Connect the equipment as shown in figure 134, except for cable CG-530B/U (10"). Connect cable CG-530B/U to the TRIGGERS DELAYED connector on the TS-1253/UP XTAL MARK & SYNC unit.

Subparagraph *c.* Delete the last sentence.

Subparagraph *d.* Add subparagraphs *e* and *f* after subparagraph *d.*

e. Remove cable CG-530B/U from the TRIGGERS DELAYED connector on the TS-1253/UP XTAL MARK & SYNC unit and connect cable CG-530B/U to the TRIGGERS 0 connector on the TS-1253/UP XTAL MARK & SYNC unit.

f. For each interrogation specified in C, E, H, I, M, and S, figure 139, check to see that no arc-cover appears across the base of any pulse in the transmitter reply.

Page 148, appendix (as changed by C4, 21 Jan 1966). Designate the existing appendix as appendix I. Delete TM 11-5895-217-12P, TM 11-5895-217-35P, and TB SIG 363 in their entirety. (Page 7 of C2). "TM 11-5895-217-12". Change the title of the manual to: Operator and Organizational Maintenance Manual: Transponder Set AN/APX-44 and AN/APX-44B Including Repair Parts List.

Delete appendix II (added by C4, 21 Jan 1966) and substitute appendix II.

*This change supersedes C4, 21 January 1966, 27 July 1960.

APPENDIX II

DS, GS, AND DEPOT REPAIR PARTS

Section I. INTRODUCTION

1. General

This appendix contains a list of repair parts, section II, required for the performance of maintenance at direct support, general support, and depot categories, for Transponder Sets AN/APX-44 and AN/APX-44B.

2. Explanation of Columns

The following is an explanation of the columns in section II.

a. Source, Maintenance, and Recoverability Codes, Column 1.

(1) *Source code, column 1a.* The selection status and source for the listed item is shown in the column. Source codes and their explanations are as follows:

Code	Explanation
P	Applies to repair parts which are stocked in or supplied from GSA/DSA, or Army supply system, and authorized for use at indicated maintenance categories.
M	Applies to repair parts which are not procured or stocked but are to be manufactured at indicated maintenance categories.
A	Applies to assemblies which are not procured or stocked as such but are made up of two or more units, each of which carry individual stock numbers and descriptions and are procured and stocked and can be assembled by units at indicated maintenance categories.
AF	Applies to repair parts requiring manufacture, assembly, or test at a category higher than that authorized to replace the part.
X1	Applies to repair parts which are not procured or stocked, the requirement for which will be supplied by use of next higher assembly or component.
X2	Applies to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain such parts through cannibalization. If they are not obtainable through cannibalization, such repair parts will be requisitioned with supporting justification through normal supply channels.
G	Applies to major assemblies that are procured with PEMA funds for initial issue only to be used as exchange assemblies at DSU and GSU level. These assemblies will not be stocked above DSU and GSU level or returned to depot supply level.

(2) *Maintenance code, column 1b.* The lowest category of maintenance authorized to install the listed item is indicated in this column.

Code	Explanation
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

(3) *Recoverability code, column 1c.* The information in this column indicates whether unserviceable items should be returned for recovery or salvage. Recoverability code and its explanation is as follows:

Note. When no code is indicated in the recoverability column, the part will be considered expendable.

Code	Explanation
R	Applies to repair parts and assemblies which are economically repairable at DSU and GSU activities and normally are furnished by supply on an exchange basis.

b. Federal Stock Number, Column 2. The Federal stock number for the item is indicated in this column.

c. Description, Column 3. The model designator, sequence number, Federal item name, a five-digit manufacturer's code, an indenture code, and a part number are included in this column. The designator (*) indicates the different models of the end equipment. For subsequent appearances of the same item, the manufacturer's code and a part number are omitted. The words "same as" followed by the sequence number assigned to the item when it first appeared in the list will follow the item name, e.g. "RESISTOR, FIXED, COMPOSITION: SAME AS A298." The indenture codes indicate the end item, the assemblies, and the component parts. Identical codes are parts of the preceding higher code. An asterisk (*) indicates attaching hardware.

d. Unit of Issue, Column 4. The unit used as a basis of issue (e.g. ea, pr, ft, yd, etc) is noted in this column.

e. Quantity Incorporated in Unit Pack, Column 5. The actual quantity contained in the unit pack in is indicated in this column.

f. Quantity Incorporated in Unit, Column 6. The quantity of repair parts in an assembly is indicated in this column.

g. Maintenance Allowances, Column 7.

(1) The allowance columns are divided into subcolumns. The total quantity of items authorized for the number of equipments supported is indicated in each subcolumn opposite the first appearance of each item. Subsequent appearances of the same item will have no entry in the allowance columns but will have a reference, in the description column, to the first appearance of the item. Items authorized for use as required but not for initial stockage are identified with an asterick (*) in the allowance column.

(2) The quantitative allowances for DS/GS categories of maintenance will represent initial stockage for a 30-day period for the number of equipments supported.

h. One-Year Allowances Per 100 Equipments/Contingency Planning Purposes, Column 8. Opposite the first appearance of each item, the total quantity required for distribution and contingency planning purposes is indicated. The range of items indicates total quantities of all authorized items required to provide for adequate support of 100 equipments for one year.

i. Depot Maintenance Allowance Per 100 Equipments, Column 9. This column indicates the total quantity of each item authorized depot maintenance for 100 equipments. Subsequent appearances of the same item will have no entry in this column, but will have a reference in the description column to the first appearance of the item.

j. Illustration, Column 10.

(1) *Figure number, column 10a.* Not used.

(2) *Item or symbol number, column 10b.* The callout number used to reference the item in the illustration is indicated in this column.

3. Location of Repair Parts

a. When the Federal stock number is unknown, follow the procedures given in (1) through (4) below.

(1) Locate the appropriate appendix of the repair parts list.

(2) If the item or symbol number is available, locate the item by scrutiny of column 10*b* of the repair parts list.

(3) If the item, symbol, and figure number are not known, check the description column (col 3) in the repair parts list to locate the part.

(4) Locate the applicable illustration in this manual and note the item number. Use the repair parts listing and locate the item number as noted on the illustration.

b. When the Federal stock number is known, use the repair parts listing to find the repair part and the item number.

4. Federal Supply Codes

This paragraph lists the Federal supply code and the associated manufacturer's name.

Code Number	Manufacturer's Name
00779	Amp, Inc.
01002	General Electric Co., Capacitor Dept.
01009	Alden Products Co.
01341	Microphase Corp.
03038	Long-Lok Corp.
04009	Arrow-Hart and Hegeman Electric Co.
04673	Dakota Engineering, Inc.

Code Number	Manufacturer's Name
04713	Motorola, Inc. Semiconductor Products Division
06776	Robinson Nugent, Inc.
07388	Torotel, Inc.
08289	The Blinn Delbert Co., Inc.
09922	Burndy Corp.
10643	Solid State Electric Co. of Texas
12014	Chicago Rivet and Machine Co.
13934	Midwec Corp.
14101	Sprague Electric Co.
14655	Cornell-Dubilier Electric Corp.
28959	Hoffman Electronics Corp.
37942	P.R. Mallory and Co., Inc.
56289	Sprague Electric Co.
59730	The Thomas and Betts Co.
65597	Wilcox Electric Co., Inc.
71279	Cambridge Thermionic Corp.
71286	Camloc Fastener Corp.
71468	ITT Cannon Electric, Inc.
72259	Nytronics, Inc.
72928	Gudeman Co.
72962	Elastic Stop Nut Corp. of America
73535	Butcher and Hart Mfg. Co.
73949	Guardian Electric Mfg. Co.
74868	Amphenol Corp., Amphenol R. F. Division
74921	The Iten Fibre Co.
75042	I.R.C., Inc.
75915	Littlefuse, Inc.
76005	Lord Mfg. Co., Division of Lord Corp.
76530	Cinch-Monadnock, Division of United-Carr, Inc.
76854	Oak Mfg. Co.
78189	Shakeproof, Division of Illinois Tool Works, Inc.
79136	Waldes Kohinoor, Inc.
79251	Wenco Mfg. Co.
79497	Western Rubber Co.
80067	Armed Services Electro Standards Agency
80152	Condenser Products, Div. of New Haven Clock and Match Co.
80813	Dimco Gray Co.
81312	Winchester Electronics Division, Litton Industries, Inc.
81349	Military Specifications
81350	Joint Army-Navy Specifications
82121	Electro Switch Corp.
82376	Astron Corp.
82389	Switchcraft, Inc.
82577	Hughes Aircraft Co.
82877	Rotron Mfg. Co., Inc.
83298	The Bendix Corp., Red Bank Division
83330	Herman H. Smith, Inc.
83385	Central Screw Co.
84171	Arco Electronics, Inc.
84411	TRW Capacitor Division
85143	Davis Electric Co.
87034	Marco-Oak Industries, A Division of Oak-Electro/Netics Corp.
88236	Bomac, Division of Varian Associates
90484	ITT Wire and Cable Division
91146	ITT Cannon Electric, Inc., Salem Division
91506	Augat, Inc.
91662	Elco Corp.
91984	Maida Development Co.
93929	G-V Controls, Inc.
94154	Tung-Sol Electric, Inc.
94222	South Chester Corp.
94271	Western Instruments, Inc., Weston-Archbald
94310	Tru-Ohm Products, Memcor Components Division
95712	Dage Electric Co., Inc.
96906	Military Standards
97722	P.C.A. Electronics, Inc.
97983	Litton Systems, Inc., Westrex Communications Division
98291	Sealectro Corp.
99109	Columbia Technical Corp.
99378	Atlee Corp.
99699	Filtors, Inc., Division of The Deutsch Co., Electronics Components Division
99942	Hoffman Electronics Corp., Semiconductor Division

Section II. REPAIR PARTS, DS, GS, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
AF	F	R	5895-686-7772							A	A001 TRANSPONDER SET AN/APX-44: 65597; 97485-100 (This item is nonexpendable)	ea	1	1										
AF	F	R	5895-926-2509							A	A001A1 TRANSPONDER SET AN/APX-44B: 65597; 97485-301 (This item is nonexpendable) Note: Model column 1 refers to AN/APX-44; Model column 2 refers to AN/APX-44B (Serial Nos. 1 thru 500 on Contract DA28-043-AMC-01947); Model column 3 refers to AN/APX-44B (Serial Nos. 501 and subsequent on Contract DA28-043-AMC-01947)	ea	1	1										
P	F		5915-947-3159		*	*				B	A001B FILTER, LOW PASS: 01341; 66D13764	ea	1	1	*	*	*	*	*	*	4	7		
P	F		5915-858-8373		*	*				B	A001C FILTER, RADAR INTERFERENCE: 14101; 14S399	ea	1	1	*	*	*	*	*	*	4	7		
G	O	R	5895-677-1982		*	*				B	A002 MOUNTING MT-2100/APX-44: 65597; 88358-100; (Note: Used on Fixed Wing Aircraft no longer procured)	ea	1	1										
G	O	R	5895-944-9271		*	*				B	A002A MOUNTING MT-2100B/APX-44: 65597; 88358-300; (Note: Shall be used on either Fixed or Rotary Wing Aircraft)	ea	1	1										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
M	H				*	*				C	A003 PANEL, RACK MTG: 65597; 87914-1	ea	1	1										
X2	F				*	*				*	A005 SCREW, MACHINE: 96906; MS51957-45	ea	1	8										
X2	F				*	*				*	A007 NUT, SELF-LOCK: 72962; 68NM-82	ea	10	8										
P	F		5340-817-0763	*						C	A008D MOUNT, RESILIENT: 76005; J-5572-3; (Replace with A008A)	ea	1	4	*	*	*	*	*	*	5	8		
P	F		5895-912-4743		*	*				C	A008A MOUNT, RESILIENT: 76005; J-5572-340	ea	1	4	*	*	*	*	*	*	5	8		
M	H				*	*				C	A009 STRAP, BONDING: 65597; 81753-1	ea	1	4										
X2	F				*	*				*	A010 SCREW, MACHINE: 96906; MS51957-45	ea	10	4										
X2	F				*	*				*	A011 WASHER, LOCK: 96906; MS35338-80	ea	10	4										
X2	F				*	*				*	A012 WASHER, LOCK: 96906; MS35333-72	ea	100	4										
X2	F		5820-920-2831		*	*				C	A013 HOLD DOWN, FRONT: 65597; 60538	ea	1	2										
X2	H			*	*	*				*	A014 SCREW, MACHINE: 96906; MS51957-14	ea	100	4										
X2	F		5310-281-9845		*	*				*	A015 NUT, SELF LOCK: 72962; 68NM-40	ea	100	4										
X2	F				*	*				D	A016 LEAF, BUTT HINGE: 65597; 60537	ea	1	1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY. PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10)(A) ILLUSTRATIONS FIGURE NUMBER	(10)(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	F				*	*				D	A017 PIN, HOLLOW: 72962; 52-022-094-0500	ea	50	1										
X2	F				*	*				D	A018 FERRULE, FLOAT: 65597; 77556	ea	1	1										
X2	F				*	*				D	A018A STUD, HOLDDOWN: 65597; 102166	ea	1	1										
X2	F				*	*				D	A018B FERRULE, KNURL: 65597; 77361	ea	1	1										
X2	F				*	*				C	A019 INJECTOR SUBASSEMBLY: 65597; 116750-1	ea	1	1										
X2	F				*	*				*	A020 SCREW, SELF LOCK: 03038; LL-22-G-82-P-8	ea	100	2										
X2	F				*	*				*	A021 NUT, SELF LOCK: 72962; 68NTE-048	ea	100	1										
X2	F				*	*				D	A022 BLOCK, MOUNTING: 65597; 77583-1	ea	1	1										
X2	F				*	*				D	A023 PIN, STRAIGHT: 65597; 71464	ea	1	2										
X2	F				*	*				D	A024 NUT, SELF LOCK: 72962; 68NTM-02	ea	100	2										
X2	F				*	*				D	A025 WASHER, FLAT: 65597; 276198-1	ea	100	3										
X2	F				*	*				D	A026 BLOCK, CLAMP: 65597; 77474	ea	1	1										
X2	F				*	*				D	A027 SPACER, SLEEVE: 65597; 70910	ea	1	1										

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	O		5355-656-1627		*	*				D	A028 KNOB: 65597; 60602	ea	1	1	*	*	*	*	*	*	5	7		
X2	F				*	*				D	A029 PIN, HOLLOW: 72962; 52-022-094-0750	ea	50	1										
X2	F				*	*				D	A030 SCREW, INJECTOR: 65597; 102775	ea	100	1										
X2	F				*	*				C	A035 PIN, STRAIGHT: 65597; 74226	ea	1	2										
X2	F		5310-281-9845		*	*				*	A036 NUT, SELF LOCK: SAME AS A015	ea		2										
X2	F				*	*				C	A037 HOLDDOWN, REAR: 65597; 116387	ea	1	1										
X2	F				*	*				D	A038 RING, RETAINING: 79136; 5133-18-MD	ea	20	1										
X2	F				*	*				D	A039 PIN: 65597; 77374	ea	1	1										
X2	F		5895-685-5542		*	*				D	A040 SPRING: 65597; 61136	ea	1	1										
X2	F				*	*				D	A041 BUSHING, MACHINE: 65597; 100849	ea	1	1										
X2	F				*	*				D	A042 WASHER, LOCK: 65597; 276187	ea	100	1										
X2	F				*	*				D	A043 HOUSING: 65597; 77454	ea	1	1										
M	H				*	*				C	A044 BRACKET, CONNECTOR: 65597; 92016-1	ea	1	1										
X2	F				*	*				*	A045 SCREW, MACHINE: 96906; MS51957-28	ea	100	2										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	F				*	*				*	A045A SCREW, MACHINE: 96906; MS51957-44	ea	100	2										
X2	F				*	*				*	A045B SCREW, MACHINE: 96906; MS24693C25	ea	100	2										
X2	F		5310-208-4006		*	*				*	A046 NUT, SELF LOCK: 72962; 68NM-62	ea	100	2										
X2	F				*	*				*	A046A NUT, SELF LOCK: SAME AS A007	ea		2										
X2	F		5310-728-2434		*	*				*	A046B NUT, SELF LOCK: 72962; 68NM107-62	ea	100	2										
M	D			*						C	A047D PLATE, IDENTIFICATION: 65597; 67494-1	ea	1	1										
M	D				*	*				C	A047A PLATE, IDENTIFICATION: 65597; 267472-1	ea	1	1										
X2	F				*	*				*	A048 SCREW, MACHINE: 96906; MS24693C2	ea	100	2										
M	H				*	*				C	A049 RACK, EQUIPMENT: 65597; 88357-1	ea	1	1										
G	O	R	5895-686-7626		*	*				B	A050A ANTENNA AT-884/APX-44: 65597; 97482-300	ea	1	1										
M	H				*	*				C	A051 BRACKET, ANTENNA MOUNTING: 65597; 92007-1	ea	1	1										
P	F		5895-677-9234		*	*				C	A052 GASKET: 65597; 65471-1	ea	1	1	*	*	2	*	*	2	8	20		
M	D			*						C	A053D PLATE, IDENTIFICATION: 65597; 67495-1	ea	1	1										

Title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
M	D			*	*	*				C	A053A PLATE, IDENTIFICATION: 65597; 267473-1	ea	1	1										
X2	H			*	*	*				*	A054 SCREW, MACHINE: 96906; MS24693C33	ea	100	10										
X2	H		5310-728-2434	*	*	*				*	A055 NUT, SELF LOCK: SAME AS A046B	ea		10										
X2	H			*	*	*				C	A056 SHELL, ELECTRICAL CONNECTOR: 65597; 77462	ea	1	1										
X2	H			*	*	*				C	A057 SPACER, INSULATED: 65597; 70989	ea	1	1										
P	H		5895-683-5743	*	*	*				C	A058 CONTACT, ELECTRICAL: 65597; 47922	ea	1	1				*	*	*	4	4		
X2	H			*	*	*				*	A059 SETSCREW: 96906; MS51963-9	ea	100	1										
X2	H			*	*	*				C	A060 SCREW, MACHINE: 96906; MS35275-228	ea	100	2										
X2	H			*	*	*				C	A060A WASHER, LOCK: 96906; MS15795-805	ea	100	2										
X2	H			*	*	*				C	A061 PLATE, COVER: 65597; 47925	ea	1	1										
X1	H				*	*				C	A063 ANTENNA ELEMENT: 65597; 47928	ea	1	1										
X1	H				*	*				C	A064 CASTING, ANTENNA: 65597; 47927-1	ea	1	1										
G	O	R	5895-681-9868	*	*	*				B	A065A CONTROL, TRANSPONDER C-2714/APX-44: 65597; 97468-300	ea	1	1										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(B) MAINT. CD	(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
M	D				*	*				C	A066 COVER, PANEL: 65597; 89451-2	ea	1	1										
X2	F				*	*				*	A067 SCREW, SELF LOCK: 03038; LL22G40S6	ea	100	2										
X2	F			*	*	*				*	A06701 SCREW, MACHINE: SAME AS A045B	ea		6										
X2	F			*	*	*				*	A068 SCREW, MACHINE: 96906; MS51957-27	ea	100	6										
X2	F			*	*	*				*	A069 WASHER, LOCK: 96906; MS35333-71	ea	100	6										
M	D			*	*	*				C	A070 COVER, PANEL: 65597; 87873-2	ea	1	1										
X2	H			*	*	*				C	A07001 PLATE, WASHER: 65597; 276232-1	ea	1	2										
X2	F			*	*	*				*	A071 SCREW, MACHINE: 96906; MS35275-229	ea	100	3										
X2	F		5310-208-4006		*	*				*	A07101 NUT, SELF LOCK: SAME AS A046	ea		2										
M	D			*	*	*				C	A072A PLATE, IDENTIFICATION: 65597; 267471-1	ea	1	1										
X2	F			*	*	*				*	A073 SCREW, MACHINE: 96906; MS51957-13	ea	100	2										
X2	H		5310-072-5883	*	*	*				*	A074 NUT, SELF LOCK: 72962; 68-1660-40	ea	100	2										
M	H			*	*	*				C	A075 BRACKET, REL, MOUNTING: 65597; 92089-2	ea	1	1										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A076 SCREW, MACHINE: 96906; MS51957-15	ea	100	1										
X2	H			*	*	*				*	A077 SCREW, MACHINE: 96906; MS35275-215	ea	100	1										
X2	H			*	*	*				*	A07701 SCREW, MACHINE: 96906; MS24693C4	ea	100	2										
X2	H			*	*	*				*	A078 WASHER, LOCK: 96906; MS35333-70	ea	100	2										
P	F		5945-687-1174	*	*	*				C	A079 RELAY, ARMATURE: 85143; CD4013	ea	1	5	*	2	2	*	2	2	12	15		K901
X2	H		5940-682-2477	*	*	*				*	A080 TERMINAL LUG: 78189; 2104-04-00	ea	500	1										
X2	H			*	*	*				*	A081 WASHER, LOCK: 96906; MS35338-78	ea	100	1										
X2	H		5310-281-9845	*	*	*				*	A082 NUT, SELF LOCK: SAME AS A015	ea		3										
M	H			*	*	*				C	A083 BRACKET, ANGLE: SAME AS A075	ea		1										
X2	H			*	*	*				*	A084 SCREW, MACHINE: SAME AS A076	ea		2										
X2	H			*	*	*				*	A08401 SCREW, MACHINE: SAME AS A07701	ea		2										
X2	H			*	*	*				*	A085 WASHER, LOCK: SAME AS A078	ea		2										
P	H		5945-681-9817	*	*	*				C	A086 RELAY, THERMAL: 93929; GT2895	ea	1	1				*	2	2	12	8		K902
X2	F			*	*	*				*	A087 SCREW, MACHINE: SAME AS A076	ea		2										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10)(A) ILLUSTRATIONS FIGURE NUMBER	(10)(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	F		5940-682-2477	*	*	*				*	A088 TERMINAL, LUG: SAME AS A080	ea		1										
X2	F			*	*	*				*	A089 WASHER, LOCK: SAME AS A081	ea		1										
X2	F		5310-281-9845	*	*	*				*	A090 NUT, SELF LOCK: SAME AS A015	ea		2										
M	H			*	*	*				C	A091A WIRING HARNESS, BRANCH: 65597; 432902-1	ea	1	1										
P	F		5935-683-5654	*	*	*				D	A092 CONNECTOR, RECEPTACLE: 09922; PT07A-18-32P	ea	1	1	*	*	*	*	*	*	5	14		J901
X2	H			*	*	*				D	A093 TERMINAL, LUG: 00779; 323986	ea	500	8										
P	O		5355-656-1626	*	*	*				C	A094 KNOB: 65597; 77560-1	ea	1	2	*	2	2	*	2	2	13	14		
X1	F			*	*	*				*	A095 SETSCREW: 96906; MS51963-33	ea	100	4										
P	O		5355-682-6828		*	*				C	A096 KNOB: 65597; 77566-1	ea	1	2	*	2	2	*	2	2	19	14		
X1	F				*	*				*	A097 PIN, HOLLOW: 72962; 79-012-062-0437	ea	100	2										
X1	F				*	*				*	A098 SETSCREW: 96906; MS51963-20	ea	100	2										
M	D			*	*	*				C	A099A COVER, DIAL: 65597; 89626-2	ea	1	1										
M	D			*	*	*				C	A099B COVER, DIAL: 65597; 89627-2	ea	1	1										
M	D			*	*	*				C	A100 POST, DIAL: 65597; 77531-1	ea	1	2										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A101 SCREW, MACHINE: 83385; 301207SS	ea	100	2										
P	H		5355-706-5596	*	*	*				C	A102 DIAL, CONTROL: 65597; 77563-2	ea	1	2				*	2	2	19	10		
P	H		5355-706-5597	*	*	*				C	A103 DIAL, CONTROL: 65597; 77558-2	ea	1	2				*	2	2	19	10		
X1	H			*	*	*				*	A104 SETSCREW: 96906; MS51963-40	ea	100	6										
P	H		6240-725-6530	*	*	*				C	A105 COVER, LAMP: 87034; 80050-2	ea	1	4				*	*	*	16	16		
P	F		6210-725-6531	*	*	*				C	A106 LENS, INDICATOR LITE: 87034; 10850M-4	ea	1	1	*	*	2	*	*	2	5	8		
P	F		6240-155-7836	*	*	*				C	A107 LAMP, INCANDESCENT: 96906; MS25237-327	ea	1	5	*	2	2	*	2	2	12	25		DS901 thru DS905
X2	H			*	*	*				C	A108 NUT, PLAIN, KNURLED: 82389; T-1070-1	ea	100	4										
P	H		5895-907-4738	*	*	*				C	A109 PANEL, FRONT: 65597; 87874-1	ea	1	1				*	*	*	5	1		
P	H		5930-716-4598	*	*	*				C	A110 PUSH BUTTON: 65597; 77564-1	ea	1	1				*	*	2	8	2		
P	H		5895-687-5270	*	*	*				C	A111 SPRING, HELICAL: 65597; 61172-1	ea	1	1				*	*	*	5	8		
X1	H			*	*	*				*	A112 RING, RETAINING: SAME AS A038	ea		1										
P	F		6210-322-2632	*	*	*				C	A113D LIGHT, INDICATOR: 87034; VM911M-4-A	ea	1	1	*	2	2	*	2	2	18	37		XDS905

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	F		6220-284-0289	*	*	*				C	A113A LIGHT, INDICATOR: 96906; MS25041-4	ea	1	1	*	2	2	*	2	2	12	12		XDS905
P	H		5930-655-1514	*	*	*				C	A114 SWITCH, TOGGLE: 96906; MS35058-22	ea	1	3				*	*	2	18	15		S905, S906, S908
P	H		5930-655-1523	*	*	*				C	A115 SWITCH, TOGGLE: 96906; MS35058-31	ea	1	1				*	*	2	8	15		S907
X2	F			*	*	*				*	A116 NUT, PLAIN, ROUND: 65597; 100875-1	ea	100	4										
P	H		5960-686-7247	*	*	*				C	A117 SEMICONDUCTOR DEVICE, DIODE: 81349; 1N540	ea	1	17				2	2	3	71	175		CR901
X2	H			*	*	*				C	A118 TERMINAL, LUG: 59730; A85	ea	500	1										
X2	H			*	*	*				C	A119 LEAD, ELECTRICAL: 65597; 27184-1	ea	1	1										
X2	H			*	*	*				D	A120 TERMINAL, LUG: SAME AS A093	ea		2										
P	H		6220-299-6656		*	*				C	A121 LAMPHOLDER: 96906; MS25010A11A	ea	1	4				*	*	2	8	15		XDS901 thru XDS904
X2	H			*	*	*				C	A123 TERMINAL, STUD: 81312; 753-10T5-0A	ea	1	1										
X2	F			*	*	*				*	A124 SCREW, MACHINE: SAME AS A048	ea		1										
X2	F			*	*	*				*	A125 WASHER, LOCK: SAME AS A081	ea		1										
P	H		5930-682-0421	*	*	*				C	A126 SWITCH, ROTARY: 82121; MA-12-2-2-5	ea	1	1				*	*	2	8	15	52	S904

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5930-687-0547	*	*	*				C	A127 SWITCH, ROTARY: 82121; MA-12-2-3-3	ea	1	1				*	*	2	8	15	52	S903
X2	H			*	*	*				*	A128 NUT, PLAIN, HEX: 83385; 10002ZCPSCH	ea	100	2										
P	H		5930-701-2897	*	*	*				C	A129M SWITCH ASSEMBLY: 76854; 193984-F2	ea	1	1				*	*	2	8	15	52	S902
P	H		5930-701-2898		*	*				C	A130M SWITCH ASSEMBLY: 76854; 193983-F2	ea	1	1				*	*	2	8	15	52	S901
M	H			*	*	*				C	A131 PANEL, MOUNTING: 65597; 87872-2	ea	1	1										
X1	H				*	*				D	A132 PANEL, BLANK: 65597; 87872-1	ea	1	1										
X1	H				*	*				D	A134 STUD, FASTENER: 81349; 60695-1	ea	1	4										
AF	F	R	5895-701-2198		*	*				B	A135A RECEIVER-TRANSMITTER, RADAR RT-494B/APX-44: 65597; 97449-300	ea	1	1										
X1	H				*	*				C	A136 COVER PANEL: 65597; 87897-2	ea	1	1										
X2	H				*	*				D	A137 COVER, PANEL: 65597; 87897-1	ea	1	1										
X2	H				*	*				D	A138 STUD ASSEMBLY: 71286; 2700-3	ea	1	3										
X1	H				*	*				D	A139 STUD, TURNLOCK: 71286; 5S5-6	ea	1	7										
X2	H				*	*				D	A140 WASHER, RETAIN: 71286; 5S3-1	ea	100	7										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	F				*	*				C	A141 COVER PANEL: 65597; 87889-2	ea	1	1										
X2	F				*	*				D	A142 COVER, PANEL: 65597; 87889-1	ea	1	1										
X2	F				*	*				D	A143 STUD, TURNLOCK: SAME AS A139	ea		7										
X2	F				*	*				D	A144 WASHER, RETAINING: SAME AS A140	ea		7										
X2	F				*	*				C	A145 EXTRACTOR, CARD: 65597; 81752-1	ea	1	1										
X2	F				*	*				C	A146 SPRING: 65597; 61176-1	ea	1	2										
X2	F			*	*	*				*	A147M SCREW, MACHINE: SAME AS A014	ea		2										
X2	H			*	*	*				*	A148 WASHER, LOCK: SAME AS A078	ea		2										
X2	H		5310-281-9845		*	*				*	A149 NUT, SELF LOCK: SAME AS A015	ea		2										
M	D				*	*				C	A150 COVER, PANEL: 65597; 116731-1	ea	1	1										
X2	H				*	*				D	A151 COVER, PANEL: 65597; 89453-3	ea	1	1										
X2	H				*	*				E	A152 COVER, PANEL: 65597; 89453-2	ea	1	1										
X2	H				*	*				E	A153 SPACER, CAPTIVE SCREW: 65597; 270016-1	ea	1	2										

Title printed across the heading: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H		5310-297-9070		*	*				E	A154 NUT, SELF LOCK: 72962; 68NC2-40	ea	100	1										
X2	H				*	*				E	A155 COVER, PANEL: 65597; 89452-1	ea	1	1										
X2	H				*	*				E	A156 HINGE, BUTT: 65597; 60681-1	ea	1	1										
X2	H				*	*				*	A157 RIVET, TUBULAR: 12014; R3309-9/64	ea	50	6										
P	F		5935-258-1767	*						E	A158 CAP, ELECTRICAL: 81349; CW-123A/U	ea	1	3	*	*	*	*	*	*	5	6		
X2	H				*	*				*	A159 RIVET, TUBULAR: 96906; MS16535-113	ea	50	3										
X2	H				*	*				D	A160 WIRE, FABRIC: 65597; 63028-1	ea	1	1										
M	D				*	*				D	A161 FRAME, AIR: 65597; 88354-1	ea	1	1										
X2	H				*	*				*	A162 SCREW, MACHINE: SAME ^S A014	ea		4										
X2	H				*	*				*	A163 WASHER, LOCK: SAME AS A078	ea		4										
X2	H		5310-072-5883		*	*				*	A164 NUT, SELF LOCK: 72962; 68-1660-40	ea		4										
P	H		5920-686-0302	*	*	*				D	A165 FUSEHOLDER: 75915; 340201	ea	1	2				*	*	2	16	22		
P	F		5920-577-6778		*	*				E	A166 CAP, ELECTRICAL: 75915; 342012-SA2	ea	1	2	*	2	2	*	2	2	33	18		

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	F		5920-280-5002	*	*	*				D	A167 FUSE, CARTRIDGE: 81349; F03A250V10A	ea	1	1	*	2	2	*	2	2	33	50		
X2	F				*	*				D	A168 SCREW, MACHINE: 96906; MS51957-18	ea	100	2										
X2	F				*	*				D	A169 WASHER, FLAT: 96906; MS15795-803	ea	100	2										
X2	F				*	*				D	A170 WASHER, LOCK: SAME AS A081	ea		2										
X2	F				*	*				D	A171A WASHER, NONMETAL: 94222; 58-46-0-63	ea	100	2										
X2	F				*	*				D	A172 THUMBSCREW: 65597; 302611-1	ea	100	1										
X2	F			*	*	*				D	A173 INSULATOR, WASHER: 65597; 76102	ea	100	1										
X2	F				*	*				D	A174 WASHER, NONMETAL: SAME AS A171A	ea		1										
P	H	R	5895-705-2823	*	*					C	A175D RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116670-2	ea	1	1										
P	H	R	5895-926-7240			*				C	A175A SIDE LOBE SUPPRESSION MODIFICATION KIT: 65597; 068258-0001	ea	1	1				*	*	*	4	1		
P	H	R	5895-997-6208			*				C	A175B SIDE LOBE SUPPRESSION SUBASSEMBLY: 65597; 117858-2	ea	1	1				*	*	*	4	1		
X2	H					*				D	A176A BRACKET, BOARD MOUNTING: 65597; 92617-3	ea	1	1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	F		5905-686-3338			*				D	A177 RESISTOR, WIREWOUND: 94310; X-9212	ea	1	4	*	2	2	*	2	2	40	44		R338
X2	H			*	*	*				*	A178 SPACER, SLEEVE: 65597; 270020-2	ea	1	4										
X2	F			*	*	*				*	A180 SCREW, MACHINE: 96906; MS51957-17	ea	100	2										
X2	F			*	*	*				*	A181 SCREW, MACHINE: 96906; MS51957-21	ea	100	4										
X2	F		5940-682-2477	*	*	*				*	A182 TERMINAL, LUG: SAME AS A080	ea		1										
X2	F		5330-785-2129	*	*	*				*	A183 WASHER, NONMETAL: 65597; 76102	ea	100	8										
X2	F		5310-072-5883	*	*	*				*	A184M NUT, SELF LOCK: SAME AS A074	ea		6										
X2	F			*	*	*				E	A185A BRACKET, BOARD MOUNTING: 65597; 92617-2	ea	1	1										
X2	F			*	*	*				E	A186 CLAMP, ELECTRIC: 99378; 100-200-16-5	ea	1	4										
X2	F			*	*	*				*	A187 RIVET TUBULAR: 96906; MS16535-51	ea	50	12										
X2	F		5305-991-6964	*	*	*				D	A188 SCREW, SHOULDER: 65597; 302610-1	ea	1	2										
X2	F			*	*	*				*	A189 WASHER, FLAT: SAME AS A169	ea		6										
X2	F		5340-598-4306	*	*	*				*	A190 RING, RETAINING: 79136; 5103-18-MD	ea	10	12										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. C D	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
A	F	R				*				D	A190A GATE RECOV SUBASSEMBLY: 65597; 117891-0001	ea	1	1										
X2	F					*				*	A190B SCREW, MACHINE: 96906; MS51957-3	ea	100	2										
X2	F					*				*	A190C WASHER, LOCK: 96906; MS35337-77	ea	100	2										
P	H		5905-683-2238			*				E	A190D RESISTOR, COMPOSITION: 81349; RC07GF103J	ea	1	6				2	2	2	33	49		R341
P	H		5905-691-0195			*				E	A190E RESISTOR, COMPOSITION: 81349; RC07GF562J	ea	1	1				*	2	2	40	21		R342
P	H		5905-681-8821			*				E	A190F RESISTOR, COMPOSITION: 81349; RC07GF473J	ea	1	1				*	*	2	8	7		R343
P	H		5905-299-2013			*				E	A190G RESISTOR, COMPOSITION: 81349; RC32GF473J	ea	1	1				*	2	2	19	14		R340
P	H		5961-854-8470			*				E	A190H SEMICONDUCTOR DEVICE, DIODE: 81349; 1N3070	ea	1	2				*	*	2	16	14		CR314, CR315
X1	H					*				E	A190I PRINTED CIRCUIT BOARD: 65597; 285026-3	ea	1	1										
A	H	R		*	*					D	A191 REC-TRANS SUB: 65597; 116670-1	ea	1	1										
A	H	R				*				D	A191A SIDE LOBE SUPRESSION SUBASSEMBLY: 65597; 117858-1	ea	1	1										
P	H		5910-823-1068		*	*				E	A192 CAPACITOR, CERAMIC: 81349; CK62AW472M	ea	1	2				*	*	2	8	7		C303
P	H		5910-838-9421	*	*	*				E	A193 CAPACITOR, CERAMIC: 81349; CK60AW102M	ea	1	129				5	5	10	300	500		C305

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	(7) DS (B) 21–50	(7) DS (C) 51–100	(7) GS (A) 1–20	(7) GS (B) 21–50	(7) GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5910-822-5683	*	*	*				E	A194 CAPACITOR, CERAMIC: 81349; CK63AW103M	ea	1	27				*	2	2	80	135		C301, C304, C306
P	H		5910-946-1947			*				E	A195D CAPACITOR, MICA: 81349; CM15C470K03	ea	1	1				*	*	2	4	4		C302
P	H		5910-688-2565		*	*				E	A196 CAPACITOR, ELECTROLYTIC: 01002; 29F461G34	ea	1	2				*	*	2	4	4		C307
P	H		5910-437-0376			*				E	A196A CAPACITOR, PLST: 13934; E3FR1042B	ea	1	4				*	2	2	20	28		C301, C307, C311, C314
P	H		5910-937-0377			*				E	A196B CAPACITOR, PLST: 13934; E3FR4721B	ea	1	1				*	*	2	8	7		C302
P	H		5910-937-0378			*				E	A196C CAPACITOR, PLST: 13934; E3FR1032B	ea	1	3				*	2	2	18	21		C308, C310, C315
P	H		5910-937-0530			*				E	A196D CAPACITOR, PLST: 56289; 192P10402	ea	1	2				*	2	2	13	14		C312, C313
P	H		5910-060-1189			*				E	A196E CAPACITOR, MICA: 81349; CM05F271J03	ea	1	1				*	*	2	12	7		C303
P	H		5910-081-8526			*				E	A196F CAPACITOR, MICA: 81349; CM05F391J03	ea	1	1				*	*	2	8	7		C304
P	H		5910-781-6497			*				E	A196G CAPACITOR, MICA: 81349; CM05E820J03	ea	1	3				*	2	2	18	21		C305, C306, C309
P	H		5905-192-3988	*	*					E	A197D RESISTOR, COMPOSITION: 81349; RC20GF563K	ea	1	1				*	*	2	8	7		R301
P	H		5905-195-6502	*	*					E	A198 RESISTOR, COMPOSITION: 81349; RC20GF332K	ea	1	2				*	2	2	18	11		R302
P	H		5905-195-6451	*	*					E	A199 RESISTOR, COMPOSITION: 81349; RC20GF472K	ea	1	2				*	2	2	13	14		R303

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-171-2004	*	*	*				E	A200 RESISTOR, COMPOSITION: 81349; RC20GF223K	ea	1	4				*	*	2	8	7		R312
P	H		5905-171-1985	*	*					E	A201 RESISTOR, COMPOSITION: 81349; RC20GF822K	ea	1	4				*	*	2	8	7		R304
P	H		5905-245-0023	*	*					E	A202 RESISTOR, COMPOSITION: 81349; RC20GF682K	ea	1	3				*	2	2	10	12		R305
P	H		5905-185-6920	*	*					E	A203 RESISTOR, COMPOSITION: 81349; RC20GF155K	ea	1	2				*	2	2	18	15		R314
P	H		5905-192-3982	*	*	*				E	A204 RESISTOR, COMPOSITION: 81349; RC20GF105K	ea	1	3				*	2	2	13	24		R316
P	H		5905-185-8518	*	*					E	A205 RESISTOR, COMPOSITION: 81349; RC20GF103K	ea	1	4				*	2	2	18	21		R306, R309
P	H		5905-192-3987	*	*					E	A206 RESISTOR, COMPOSITION: 81349; RC20GF104K	ea	1	4				*	2	2	18	21		R308, R311, R313, R315
P	F		5905-686-3344			*				E	A207 RESISTOR, WIREWOUND: 81349; RW59V630	ea	1	6	2	2	3	2	2	2	30	66		R337
P	H		5905-279-1884	*	*					E	A208 RESISTOR, COMPOSITION: 81349; RC20GF335K	ea	1	1				*	*	2	8	7		R307
P	H		5905-192-0662	*	*					E	A209 RESISTOR, COMPOSITION: 81349; RC20GF184K	ea	1	2				*	2	2	18	11		R317
P	H		5905-279-1877	*	*					E	A210 RESISTOR, COMPOSITION: 81349; RC20GF242J	ea	1	1				*	*	2	8	7		R310
P	H		5905-686-3355	*	*					E	A211 RESISTOR, VARIABLE: 81349; RV6LAXSA255B	ea	1	1				*	*	2	8	7		R318
P	H		5905-800-3481			*				E	A211A RESISTOR, COMPOSITION: 81349; RC07GF155J	ea	1	2				*	2	2	13	14		R301, R335

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-686-3368			*				E	A211B RESISTOR, COMPOSITION: 81349; RC07GF203J	ea	1	1				*	*	2	8	7		R302
P	H		5905-691-0195			*				E	A211C RESISTOR, COMPOSITION: SAME AS A190E	ea		2				*	2	2	18	21		R307, R313
P	H		5905-686-9998			*				E	A211D RESISTOR, COMPOSITION: 81349; RC07GF472J	ea	1	1				*	*	2	8	7		R309
P	H		5905-683-2238			*				E	A211E RESISTOR, COMPOSITION: SAME AS A190D	ea		5										R312, R324, R331, R332, R334
P	H		5905-681-8817			*				E	A211G RESISTOR, COMPOSITION: 81349; RC07GF105J	ea	1	3				*	2	2	18	21		R314, R319, R329
P	H		5905-686-3838			*				E	A211H RESISTOR, COMPOSITION: 81349; RC07GF273J	ea	1	1				*	*	2	8	7		R318
P	H		5905-681-8957			*				E	A211I RESISTOR, COMPOSITION: 81349; RC07GF474J	ea	1	4				*	2	2	22	28		R320
P	H		5905-682-4103			*				E	A211J RESISTOR, COMPOSITION: 81349; RC07GF513J	ea	1	1				*	*	2	8	7		R321
P	H		5905-681-9969			*				E	A211K RESISTOR, COMPOSITION: 81349; RC07GF332J	ea	1	1				*	*	2	8	7		R322
P	H		5905-723-5251			*				E	A211L RESISTOR, COMPOSITION: 81349; RC07GF222J	ea	1	1				*	*	2	8	7		R323
P	H		5905-686-3129			*				E	A211M RESISTOR, COMPOSITION: 81349; RC07GF683J	ea	1	3				*	2	2	18	21		R327, R330, R336
P	H		5905-681-8853			*				E	A211N RESISTOR, COMPOSITION: 81349; RC07GF683J	ea	1	1				*	*	2	8	7		R325
P	H		5905-686-3903			*				E	A211N1 RESISTOR, COMPOSITION: 81349; RC07GF333J	ea	1	1				*	*	2	8	7		R333

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-686-3369			*				E	A2110 RESISTOR, COMPOSITION: 81349; RC07GF331J	ea	1	1				*	*	2	8	7		R303
P	H		5905-683-2239			*				E	A211P RESISTOR, COMPOSITION: 81349; RC07GF201J	ea	1	1				*	*	2	8	7		R304
P	H		5905-726-4413			*				E	A211Q RESISTOR, COMPOSITION: 81349; RC07GF123J	ea	1	1				*	*	2	8	7		R339
P	H		5905-800-3478			*				E	A211R RESISTOR, COMPOSITION: 81349; RC20GF753J	ea	1	1				*	*	2	8	7		R308
P	H		5905-379-3499			*				E	A211S RESISTOR, COMPOSITION: 81349; RC20GF273J	ea	1	10				2	2	2	46	70		R310, R317
P	H		5905-299-2013			*				E	A211T RESISTOR, COMPOSITION: SAME AS A190G	ea	1	1										R305
P	H		5905-937-0268			*				E	A211U RESISTOR, VARIABLE: 94271; 370-74H102	ea	1	1				*	*	2	8	7		R306
P	H		5905-937-0267			*				E	A211V RESISTOR, VARIABLE: 94271; 370-74H503	ea	1	1				*	*	2	8	7		R311
P	H		5905-937-0266			*				E	A211W RESISTOR, VARIABLE: 94271; 388-74HS105	ea	1	3				*	2	2	18	21		R315, R326, R328
P	H		5895-710-5713			*				E	A21101 DIAL, SCALE: 65597; 37513-1	ea	1	1				*	2	2	13	15		
X2	H			*	*	*				*	A212 WASHER, LOCK: 65597; 276220-1CPSCH	ea	100	1										
X2	H			*	*	*				*	A213 WASHER, LOCK: 96906; MS35335-61	ea	100	1										
P	H		5895-686-7623		*	*				E	A214 DELAY LINE: 99109; CTC 2928	ea	1	1				*	*	*	4	2		TL301

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5950-937-0782			*				E	A214A TRANSFORMER, PULSE: 65597; 40187-1	ea	1	1				*	*	*	5	7		T301
P	H		5950-937-0781			*				E	A214B TRANSFORMER, PULSE: 65597; 40160-1	ea	1	1				*	*	*	5	7		T302
P	H		5960-682-2587	*	*					E	A215 SEMICONDUCTOR DEVICE, DIODE: 82577; HD6556	ea	1	50				3	7	13	157	434		CR301, CR302
P	H		5961-842-9864	*	*	*				E	A215A SEMICONDUCTOR DEVICE, DIODE: 81349; 1N914	ea	1	62				3	7	13	157	434		CR301 thru CR305, CR307, CR308, CR310 thru CR313
P	H		5960-683-4180	*	*					E	A216D SEMICONDUCTOR DEVICE, DIODE: 28959; 1N1314	ea	1	2				*	*	*	4	4		CR303
P	H		5961-847-5242	*	*					E	A216AD SEMICONDUCTOR DEVICE, DIODE: 81349; 1N962B	ea	1	1				*	*	*	5	7		CR303
P	H		5961-894-0684			*				E	A216B SEMICONDUCTOR DEVICE, DIODE: 81349; 1N758A	ea	1	2				*	*	2	10	14		CR306, CR309
P	F		5960-808-2258			*				E	A217 ELECTRON TUBE: 81349; JAN5784WB	ea	1	9	5	13	25	2	4	6	297	900		V303
P	F		5960-261-8679			*				E	A218 ELECTRON TUBE: 81349; JAN6021	ea	1	6	10	25	47	3	6	12	540	1300		V301, V302, V304
P	F		5960-685-9145	*	*	*				E	A219 SHIELD, TUBE: 99378; 109-501-8	ea	1	8	2	3	5	2	2	2	59	48		
X1	H			*	*					E	A220 PRINTED CIRCUIT BOARD: 65597; 87806-2	ea	1	1										TB301
X1	H				*	*				E	A220A PRINTED CIRCUIT BOARD: 65597; 285001-2	ea	1	1										TB301
X2	F				*	*				E	A220B LABEL: 65597; 304908-0001	ea	1	1										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B(continued)													
A.	F	R	5895-705-2824	*	*	*				C	A221 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116671-2	ea	1	1										
X2	H			*	*	*				D	A222 BRACKET, BOARD MOUNTING: 65597; 116725-2	ea	1	1										
P	H		5905-686-3345	*	*	*				D	A223 RESISTOR WIREWOUND: 94310; X-9211	ea	1	1				*	*	2	8	11		R366
X2	H			*	*	*				*	A224 SPACER, SLEEVE: SAME AS A178	ea		3										
X2	H			*	*	*				*	A225 SPACER, SLEEVE: 65597; 270020-1	ea		1										
X2	H			*	*	*				*	A226 SCREW, MACHINE: SAME AS A180	ea		1										
X2	H			*	*	*				*	A227 SCREW, MACHINE: SAME AS A181	ea		4										
X2	H		5940-682-2477	*	*	*				*	A228 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H		5330-785-2129	*	*	*				*	A229 INSULATOR, WASHER: SAME AS A173	ea		8										
X2	H		5310-072-5883	*	*	*				*	A230 NUT, SELF LOCK: SAME AS A074	ea		5										
X2	H			*	*	*				E	A231 BRACKET, BOARD MOUNTING: 65597; 91965-2	ea	1	1										
X2	H			*	*	*				E	A232 CLAMP, ELECTRICAL: SAME AS A186	ea		3										
X2	H			*	*	*				*	A233 RIVET, TUBULAR: SAME AS A187	ea		9										

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H		5305-991-6964	*	*	*				D	A234 SCREW, SHOULDER: SAME AS A188	ea		2										
X2	H			*	*	*				*	A235A WASHER, FLAT: SAME AS A169	ea		6										
X2	F		5340-598-4306	*	*	*				*	A236 RING, RETAINING: SAME AS A190	ea		2										
A	H	R		*	*	*				D	A237 DECODER, PULSE: 65597; 116671-1	ea	1	1										
P	H		5910-822-5683	*	*	*				E	A238 CAPACITOR, CERAMIC: SAME AS A194T	ea		2										C351, C357
P	H		5910-838-9421	*	*					E	A239 CAPACITOR, CERAMIC: SAME AS A193D	ea		9										C352 thru C356, C358 thru C261
P	H		5961-842-9864	*	*	*				E	A240 SEMICONDUCTOR DEVICE: SAME AS A215AM	ea		8										CR351 thru CR358
P	H		5905-195-6817	*	*	*				E	A241 RESISTOR, COMPOSITION: 81349; RC20GF102K	ea	1	1				*	*	2	8	5		R351
P	H		5905-171-2009	*	*	*				E	A242 RESISTOR, COMPOSITION: 81349; RC20GF222K	ea	1	2				*	2	2	13	10		R358
P	H		5905-192-9260	*	*	*				E	A243 RESISTOR, COMPOSITION: 81349; RC20GF154K	ea	1	5				2	2	3	40	40		R353, R356, R359
P	H		5905-295-3410	*	*	*				E	A244 RESISTOR, COMPOSITION: 81349; RC20GF473K	ea	1	7				2	2	3	40	40		R354, R357, R361, R362, R368, R370
P	H		5905-185-8518	*	*	*				E	A246 RESISTOR, COMPOSITION: SAME AS A205D	ea		1										R360
P	H		5905-279-2516	*	*	*				E	A247 RESISTOR, COMPOSITION: 81349; RC20GF514J	ea	1	1				*	*	2	8	5		R363

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-171-2003	*	*	*				E	A248 RESISTOR, COMPOSITION: 81349; RC20GF204J	ea	1	4				*	2	2	20	24		R364, R369, R365, R367
P	H		5905-254-7087	*	*	*				E	A250 RESISTOR, COMPOSITION: 81349; RC20GF683K	ea	1	4				2	2	3	40	54		R371, R372, R373
P	H		5905-245-0023	*	*					E	A251 RESISTOR, COMPOSITION: SAME AS A202D	ea		1										R352
P	H		5905-195-6502	*	*	*				E	A252 RESISTOR, COMPOSITION: SAME AS A198D	ea		1										R355
P	F		5960-808-2258	*	*	*				E	A253 ELECTRON TUBE: SAME AS A217	ea		3										V351, V352, V353
P	F		5960-685-9145	*	*	*				E	A254 SHIELD, TUBE: SAME AS A219	ea		3										
X1	H			*	*	*				E	A255 PRINTED CIRCUIT BOARD: 65597; 87807-2	ea	1	1										TB351
A	H	R	5895-705-2826	*	*					C	A256D RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116672-4	ea	1	1										
A	H	R	5895-752-6171	*	*	*				C	A25601 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116672-4	ea	1	1										
X2	H			*	*	*				D	A257 BRACKET, BOARD MOUNTING: 65597; 116725-3	ea	1	1										
P	H		5905-686-3338	*	*	*				D	A258 RESISTOR, WIREWOUND: SAME AS A177	ea		1										R425
X2	H			*	*	*				*	A259 SPACER, SLEEVE: SAME AS A178	ea		3										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10)(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A260 SPACER, SLEEVE: SAME AS A225	ea		1										
X2	H			*	*	*				*	A261 SCREW, MACHINE: SAME AS A180	ea		1										
X2	H			*	*	*				*	A262 SCREW, MACHINE: SAME AS A181	ea		4										
X2	H		5940-682-2477	*	*	*				*	A263 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H		5330-785-2129	*	*	*				*	A264 INSULATOR, WASHER: SAME AS A173	ea		8										
X2	H		5310-072-5883	*	*	*				*	A265 NUT, SELF LOCK: SAME AS A074	ea		5										
X2	H			*	*	*				E	A266 BRACKET, BOARD MOUNTING: 65597; 91965-3	ea	1	1										
X2	H			*	*	*				E	A267 CLAMP, ELECTRICAL: SAME AS A186	ea		4										
X2	H			*	*	*				*	A268 RIVET, TUBULAR: SAME AS A187	ea		12										
X2	H		5305-991-6964	*	*	*				*	A269 SCREW, SHOULDER: SAME AS A188	ea		2										
X2	H			*	*	*				*	A270 WASHER, FLAT: SAME AS A169	ea		6										
X2	F		5340-598-4306	*	*	*				*	A271 RING, RETAINING: SAME AS A190	ea		2										
A	H	R		*	*	*				D	A272 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116672-1	ea	1	1										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5910-804-2391	*	*	*				E	A273 CAPACITOR, MICA: 81349; CM15D221J03	ea	1	4				*	2	2	22	20		C402. C405, C408
A	H	R		*	*	*				D	A27201 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116672-3	ea	1	1										
P	H		5910-636-2150	*						E	A274 CAPACITOR, MICA: 14655; 22R	ea	1	3				*	2	2	18	15		C403, C406, C409
P	H		5910-883-6083		*	*				E	A27401 CAPACITOR, MICA: 81349; CM15C680GP3	ea	1	3				*	2	2	18	15		C403, C406, C409
P	H		5910-804-2374	*	*	*				E	A275 CAPACITOR, MICA: 81349; CM15D361G03	ea	1	3				*	2	2	18	15		C401, C404, C407
P	H		5910-822-5683	*	*	*				E	A276 CAPACITOR, CERAMIC: SAME AS A094D	ea		1										C411
P	H		5910-838-9421	*	*	*				E	A277 CAPACITOR, CERAMIC: SAME AS A193D	ea		1										C410
P	H		5910-963-5632		*	*				E	A278A CAPACITOR, MICA: 14655; 1AD3S3	ea	1	1				*	*	2	8	5		C412
P	H		5905-681-8957	*	*	*				E	A279 RESISTOR, COMPOSITION: SAME AS A211I	ea		3										R405, R411, R417
P	H		5905-195-6806	*	*	*				E	A280 RESISTOR, COMPOSITION: 81349; RC20GF102J	ea	1	6				2	2	3	33	30		R402, R408, R414
P	H		5905-279-2668	*	*	*				E	A281 RESISTOR, COMPOSITION: 81349; RC20GF135J	ea	1	2				*	2	2	13	10		R400
P	H		5905-279-1868	*	*	*				E	A282 RESISTOR, COMPOSITION: 81349; RC20GF115J	ea	1	1				*	*	2	8	5		R401
P	H		5905-279-3499	*	*	*				E	A283 RESISTOR, COMPOSITION: SAME AS A211S	ea		6										R403, R404, R409, R410, R415, R416

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-686-3360	*	*	*				E	A285 RESISTOR, COMPOSITION: 81349; RC07GF135J	ea	1	2				*	2	2	13	10		R412, R418
P	H		5905-686-3359	*	*	*				E	A286 RESISTOR, COMPOSITION: 81349; RC07GF115J	ea	1	2				*	2	2	13	10		R407, R413
P	H		5905-686-3358	*	*	*				E	A287 RESISTOR, COMPOSITION: 81349; RC07GF393J	ea	1	1				*	*	2	8	5		R423
P	H		5905-686-3131	*	*	*				E	A288 RESISTOR, COMPOSITION: 81349; RC07GF334J	ea	1	1				*	*	2	8	5		R424
P	H		5905-686-3356	*	*	*				E	A289 RESISTOR, COMPOSITION: 81349; RC20GF823J	ea	1	1				*	*	2	8	5		R426
P	H		5905-190-8887	*	*	*				E	A290 RESISTOR, COMPOSITION: 81349; RC20GF202J	ea	1	1				*	*	2	8	5		R422
P	H		5905-279-3504	*	*	*				E	A291 RESISTOR, COMPOSITION: 81349; RC20GF472J	ea	1	3				*	*	2	8	15		R421
P	H		5905-683-2238	*	*	*				E	A292 RESISTOR, COMPOSITION: SAME AS A190P	ea		1										R419
P	H		5905-683-2246	*	*	*				E	A293 RESISTOR, COMPOSITION: 81349; RC07GF473J	ea	1	1				*	*	2	8	5		R420
P	F		5960-261-8679	*	*	*				E	A294 ELECTRON TUBE: SAME AS A218	ea		4										V401 thru V404
P	F		5960-685-9145	*	*	*				E	A295 SHIELD, TUBE: SAME AS A219	ea		4										
X1	H				*	*				E	A296 PRINTED CIRCUIT BOARD: 65597; 87808-2	ea	1	1										TB401
P	H	R	5895-705-2831	*	*	*				C	A297 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116673-2	ea	1	1				*	*	*	3	2		

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
M	D		5905-686-3338	*	*	*				D	A298 RESISTOR, WIREWOUND: SAME AS A177	ea		1										R469
X2	H			*	*	*				*	A300 SPACER, SLEEVE: SAME AS A178	ea		3										
X2	H			*	*	*				*	A301 SPACER, SLEEVE: SAME AS A225	ea		1										
X2	H			*	*	*				*	A302 SCREW, MACHINE: SAME AS A180	ea		1										
X2	H			*	*	*				*	A303 SCREW, MACHINE: SAME AS A181	ea		4										
X2	H		5940-682-2477	*	*	*				*	A304 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H			*	*	*				*	A305 INSULATOR, WASHER: SAME AS A173	ea		5										
X2	H		5310-072-5883	*	*	*				*	A306 NUT, SELF-LOCK: SAME AS A074	ea		5										
X2	H			*	*	*				E	A307 BRACKET, BOARD MOUNTING: 65597; 91965-4	ea	1	1										
X2	F			*	*	*				E	A308 CLAMP, ELECTRICAL: SAME AS A186	ea		4										
X2	H			*	*	*				*	A309 RIVET, TUBULAR: SAME AS A187	ea		12										
X2	H		5305-991-6964	*	*	*				D	A310 SCREW, SHOULDER: SAME AS A188	ea		2										
X2	H			*	*	*				*	A311 WASHER, FLAT: SAME AS A169	ea		6										

(1) SOURCE CD (A)	(1) MAINT. CD (B)	(1) REC. CODE (C)	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	F		5340-598-4306	*	*	*				*	A312 RING, RETAINING: SAME AS A190	ea		2										
A	H	R		*	*	*				D	A313 RECEIVER-TRANSMITTER SUBASSEMBLY:	ea	1	1										
P	H		5910-838-9421	*	*	*				E	A314 CAPACITOR, CERAMIC: SAME AS A193D	ea		3										C453, C456, C458
P	H		5910-822-5683	*	*	*				E	A315 CAPACITOR, CERAMIC: SAME AS A194D	ea		4										C451, C452, C454, C455
P	H		5910-688-2565		*	*				E	A316 CAPACITOR, ELECTROLYTIC: SAME AS A196D	ea		1										C457
P	H		5905-185-8518	*	*	*				E	A317 RESISTOR, COMPOSITION: SAME AS A205	ea		4										R462, R465, R466, R467
P	H		5905-249-4248	*	*	*				E	A318 RESISTOR, COMPOSITION: 81349; RC20GF333K	ea	1	1				*	*	2	8	7		R454
P	H		5905-254-7087	*	*	*				E	A319 RESISTOR, COMPOSITION: SAME AS A250	ea		3										R453, R458, R461
P	H		5905-192-3987	*	*	*				E	A320 RESISTOR, COMPOSITION: SAME AS A206	ea		3										R451, R455, R459
P	H		5905-192-3982		*	*				E	A320A RESISTOR, COMPOSITION: SAME AS A204D	ea		1										R468
P	H		5905-192-9260	*	*	*				E	A321 RESISTOR, COMPOSITION: SAME AS A243	ea		1										R457
P	H		5905-192-9260	*						E	A322D RESISTOR, COMPOSITION: 81349; RC20GF134J	ea	1	1				*	*	2	8	6		R463
P	H		5905-249-3661		*	*				E	A32201 RESISTOR, COMPOSITION: 81349; RC20GF683J	ea	1	2				*	2	2	18	15		R463

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-185-6920	*	*	*				E	A323 RESISTOR, COMPOSITION: SAME AS A203	ea	1	3										R452, R456, R460
P	H		5905-686-3344	*	*	*				E	A324 RESISTOR, WIREWOUND: SAME AS A207	ea		3										R470, R471, R472
P	H		5905-279-3500	*						E	A325 RESISTOR, COMPOSITION: 81349; RC20GF183J	ea	1	2				*	2	2	13	10		R464
P	H		5961-842-9864	*	*	*				E	A326 SEMICONDUCTOR DEVICE, DIODE: SAME AS A215A	ea		1										CR451
P	F		5960-808-2258	*	*	*				E	A327 ELECTRON TUBE: SAME AS A217	ea		3										V451. V452. V453
P	F		5960-261-8679	*	*	*				E	A328 ELECTRON TUBE: SAME AS A218	ea		1										V454
P	F		5960-685-9145	*	*	*				E	A329 SHIELD, TUBE: SAME AS A219	ea		4										
X1	H			*						E	A330 PRINTED CIRCUIT BOARD: 65597; 87809-2	ea	1	1										TB451
A	H	R		*						C	A331D RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116674-2	ea	1	1										
A	H	R			*	*				C	A33101 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116674-4	ea	1	1										
X2	H			*	*	*				D	A332 BRACKET, BOARD MOUNTING: 65597; 116725-5	ea	1	1										
P	H		5905-686-3339	*	*	*				D	A333 RESISTOR, WIREWOUND: 94310; X-9210	ea	1	1				*	*	2	8	5		R519

Table header: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10)(A) FIGURE NUMBER	(10)(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A334 SPACER, SLEEVE: SAME AS A178	ea		3										
X2	H			*	*	*				*	A335 SPACER, SLEEVE: SAME AS A225	ea		1										
X2	H			*	*	*				*	A336 SCREW MACHINF: SAME AS A180	ea		1										
X2	H			*	*	*				*	A337 SCREW MACHINE: SAME AS A181	ea		4										
X2	H		5940-682-2477	*	*	*				*	A338 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H		5330-785-2129	*	*	*				*	A339 INSULATOR, WASHER: SAME AS A173	ea		8										
X2	H		5310-072-5883	*	*	*				*	A340 NUT, SELF LOCK: SAME AS A074	ea		5										
X2	H			*	*	*				E	A341 BRACKET, BOARD MOUNTING: 65597; 91965-5	ea	1	1										
X2	H			*	*	*				E	A342 CLAMP, ELECTRICAL: SAME AS A186	ea		3										
X2	H			*	*	*				*	A343 RIVET, TUBULAR: SAME AS A187	ea		9										
X2	H		5305-991-6964	*	*	*				D	A344 SCREW, SHOULDER: SAME AS A188	ea		2										
X2	H			*	*	*				*	A345 WASHER, FLAT: SAME AS A169	ea		6										
X2	F		5340-598-4306	*	*	*				*	A346 RING, RETAINING: SAME AS A190	ea		2										

(1) SOURCE CD (A)	(1) MAINT. CD (B)	(1) REC. CODE (C)	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION		(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1-20	DS (B) 21-50	DS (C) 51-100	GS (A) 1-20	GS (B) 21-50	GS (C) 51-100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)														
A	F	R		*	*					D	A347	RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116674-3	ea	1	1										
A	H	R			*	*				D	A34701	RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116674-3	ea	1	1										
P	H		5910-823-1068		*	*				E	A348	CAPACITOR, CERAMIC: SAME AS A192	ea	1	1										C513
P	H		5910-682-3255	*						E	A349D	CAPACITOR, ELECTROLYTIC: 81349; CL34BQOR5MPI	ea	1	1				*	*	2	8	7		C503
P	H		5910-688-2565		*	*				E	A34901	CAPACITOR, ELECTROLYTIC: SAME AS A196	ea		1										C503
P	H		5910-822-5683	*	*	*				E	A350	CAPACITOR, CERAMIC: SAME AS A194	ea		1										C504
P	H		5910-838-9421	*	*	*				E	A351	CAPACITOR, CERAMIC: SAME AS A193	ea		6										C501, C502, C512, C506, C507, C508
P	H		5910-847-1627	*	*	*				E	A353	CAPACITOR, MICA: 81349; CM15C151G03	ea		1				*	*	2	8	5		C509
P	H		5910-850-7991	*	*	*				E	A354	CAPACITOR, MICA: 81349; CM15C151G03	ea	1	2				*	2	2	13	10		C510
P	H		5910-727-7084	*	*	*				E	A355	CAPACITOR, MICA: 81349; CM15D271J03	ea	1	1				*	*	2	8	5		C511
P	H		5961-842-9864	*	*	*				E	A356	SEMICONDUCTOR DEVICE, DIODE: SAME AS A215A	ea		2										CR501, CR502
P	H		5905-254-7087	*	*	*				E	A357	RESISTOR, COMPOSITION: SAME AS A250	ea	1	2										R501, R507

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-192-9260	*	*	*				E	A358 RESISTOR, COMPOSITION: SAME AS A243	ea		1										R502
P	H		5905-195-6502	*	*	*				E	A359 RESISTOR, COMPOSITION: SAME AS A198	ea		1										R503
P	H		5905-192-0649	*						E	A360 RESISTOR, COMPOSITION: 81349; RC20GF203J	ea	1	1				*	*	2	8	5		R505
P	H		5905-195-6453		*	*				E	A36001 RESISTOR, COMPOSITION: 81349; RC20GF562J	ea	1	3				*	2	2	18	15		R505
P	H		5905-295-3409	*						E	A361D RESISTOR, COMPOSITION: 81349; RC20GF224K	ea	1	1				*	*	2	8	5		R506
P	H		5905-254-9201		*	*				E	A36101 RESISTOR, COMPOSITION: 81349; RC20GF473J	ea	1	1				*	*	2	8	5		R506
P	H		5905-221-5860	*	*	*				E	A362 RESISTOR, COMPOSITION: 81349; RC20GF334K	ea	1	1				*	*	2	8	5		R508
P	H		5905-185-6920	*						E	A363 RESISTOR, COMPOSITION: SAME AS A203	ea		1										R509
P	H		5905-195-6761		*	*				E	A36301 RESISTOR, COMPOSITION: 81349; RC20GF104J	ea	1	1				*	*	6	8	5		R509
P	H		5905-295-3410	*						E	A364 RESISTOR, COMPOSITION: SAME AS A244	ea		1										R510
P	H		5905-279-3506		*	*				E	A36401 RESISTOR, COMPOSITION: 81349; RC20GF332J	ea	1	1				*	*	2	8	5		R510
P	H		5905-682-4054	*	*	*				E	A365 RESISTOR, FILM: 75042; MDA-587K-1%	ea	1	1				*	*	2	8	5		R511
P	H		5905-682-4056		*	*				E	A366 RESISTOR, FILM: 75042; MDA-943K-1%	ea	1	1				*	*	2	8	5		R512

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H			*						E	A36601D RESISTOR, FILM: 75042; MDA-1.05M-1%	ea	1	1				*	*	2	8	5		R512
P	H		5905-682-4053		*	*				E	A367 RESISTOR, FILM: 75042; MDA-1.56M-1%	ea	1	1				*	*	2	8	5		R513
P	H		5905-279-1751	*	*	*				E	A368 RESISTOR, COMPOSITION: 81349; RC20GF302J	ea	1	1				*	*	2	8	5		R514
P	H		5905-279-3499	*	*	*				E	A369 RESISTOR, COMPOSITION: SAME AS A211S	ea		2										R515, R516
P	H		5905-279-2668	*	*	*				E	A370 RESISTOR, COMPOSITION: SAME AS A281	ea		1										R517
P	H		5905-279-2515	*	*	*				E	A371 RESISTOR, COMPOSITION: 81349; RC20GF474J	ea	1	1				*	*	2	8	5		R518
P	H		5905-686-3344	*	*	*				E	A372 RESISTOR, WIREWOUND: SAME AS A207	ea		1										R520
P	H		5905-279-3511	*	*	*				E	A373 RESISTOR, COMPOSITION: 81349; RC20GF511J	ea	1	2				*	2	2	18	15		R521
P	H		5905-195-6451	*	*	*				E	A374 RESISTOR, COMPOSITION: SAME AS A199	ea		1										R522
P	H		5905-682-4245		*	*				E	A37401 RESISTOR, VARIABLE: 81349; RV6LAXSA504B	ea	1	1				*	*	2	8	7		R524
P	H		5905-682-1153	*	*	*				E	A375 RESISTOR, VARIABLE: 81349; RV6LAXSA501B	ea	1	3				*	2	2	13	14		R523
P	H		5895-710-5713	*	*	*				E	A37501 DIAL, SCALE: SAME AS A21101	ea		2										
X2	H			*	*	*				*	A376 WASHER, LOCK: SAME AS A212	ea		2										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A377 WASHER, LOCK: SAME AS A213	ea		2										
P	H		5905-686-6661	*	*	*				E	A378 TRANSFORMER, PULSE: 97722; PM101-1.0	ea	1	1				*	*	*	5	6		T501
P	H		5950-686-6662	*	*	*				E	A379 TRANSFORMER, PULSE: 97722; PM101-2.0	ea	1	1				*	*	*	5	7		T502
P	F		5960-261-8679	*	*	*				E	A380 ELECTRON TUBE: SAME AS A218	ea		2										V501, V503
P	F		5960-808-2258	*	*	*				E	A381 ELECTRON, TUBE: SAME AS A217	ea		1										V502
P	F		5960-685-9145	*	*	*				E	A382 SHIELD, TUBE: SAME AS A219	ea		3										
X1	H			*	*	*				E	A383 PRINTED CIRCUIT BOARD: 65597; 87810-2	ea	1	1										
P	F	R	5895-705-2825	*	*	*				C	A384 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116675-2	ea	1	1	*	*	*	*	*	*	3	4		
X2	H			*	*	*				D	A385 BRACKET BOARD MOUNTING: 65597; 116725-6	ea	1	1										
P	H		5905-686-3338	*	*	*				D	A386 RESISTOR, WIREWOUND: SAME AS A177	ea		1										R569
X2	H			*	*	*				*	A387 SPACER, SLEEVE: SAME AS A178	ea		3										
X2	H			*	*	*				*	A388 SPACER, SLEEVE: SAME AS A225	ea		1										
X2	H			*	*	*				*	A389 SCREW, MACHINE: SAME AS A180	ea		1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	(7) DS (B) 21–50	(7) DS (C) 51–100	(7) GS (A) 1–20	(7) GS (B) 21–50	(7) GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/AFX-44, -44B (continued)													
X2	H			*	*	*				*	A390 SCREW, MACHINE: SAME AS A181	ea		4										
X2	H		5940-682-2477	*	*	*				*	A391 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H		5330-785-2129	*	*	*				*	A392 INSULATOR, WASHER: SAME AS A173	ea		8										
X2	H		5310-072-5883		*	*				*	A393 NUT, SELF LOCK: SAME AS A074	ea		5										
M	H			*	*	*				E	A394 BRACKET, BOARD MOUNTING: 65597; 91965-6	ea	1	1										
X2	H			*	*	*				E	A395 CLAMP, ELECTRICAL: SAME AS A186	ea		4										
X2	H			*	*	*				*	A396 RIVET, TUBULAR: SAME AS A187	ea		12										
X2	H		5305-991-6964	*	*	*				D	A397 SCREW, SHOULDER: SAME AS A188	ea		2										
X2	H			*	*	*				*	A398 WASHER, FLAT: SAME AS A169	ea		6										
X2	F		5340-598-4306	*	*	*				*	A399 RING, RETAINING: SAME AS A190	ea		2										
A	H	R		*	*	*				D	A400 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116675-1	ea	1	1										
P	H		5910-838-9421	*	*	*				E	A401 CAPACITOR, CERAMIC: SAME AS A193	ea		1										C557
P	H		5910-822-5683		*	*				E	A402 CAPACITOR, CERAMIC: SAME AS A194	ea		5										C551, C552, C554, C558, C559

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5910-688 2565	*	*	*				E	A404 CAPACITOR, ELECTROLYTIC: SAME AS A196	ea		1										C556
P	H		5910-804-2386	*	*	*				E	A405 CAPACITOR, MICA: 81349; CM15C560J03	ea	1	1				*	*	2	8	7		C555
P	H		5910-804-2391	*	*	*				E	A406 CAPACITOR, MICA: SAME AS A273	ea		1										C553
P	H		5961-847-5242	*	*	*				E	A407 SEMICONDUCTOR DEVICE, DIODE: SAME AS A216AD	ea		1										CR551
P	H		5961-842-9864	*	*	*				E	A408 SEMICONDUCTOR, DEVICE, DIODE: SAME AS A215A	ea		1										CR552
P	H		5950-686-6674		*	*				E	A409 TRANSFORMER, RADIOFREQ-UENCY: 65597; 38862-1	ea	1	1				*	*	*	5	7		L551
X2	H			*	*	*				*	A410 WASHER, LOCK: 96906; MS35333-74	ea	100	1										
X2	H			*	*	*				*	A411 WASHER, LOCK: SAME AS A212	ea		1										
X2	H			*	*	*				*	A412 NUT, PLAIN, HEX: 83385; 100035SS	ea	100	1										
P	H		5950-686-6678	*	*	*				E	A413 COIL, RADIOFREQUENCY: 65597; 38853-1	ea	1	1				*	*	*	5	5		L552
P	H		5905-195-6453		*	*				E	A414 RESISTOR, COMPOSITION: SAME AS A36001	ea		2										R561, R564
P	H		5905-185-8516	*	*	*				E	A415 RESISTOR, COMPOSITION: SAME AS A205	ea		1										R560
P	H		5905-190-8880		*	*				E	A415A RESISTOR, COMPOSITION: 81349; RC20GF122J	ea	1	1				*	*	2	8	7		R565

(1) (A) SOURCE CD	(B) MAINT. CD	(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-192-9260	*	*	*				E	A416 RESISTOR, COMPOSITION: SAME AS A243	ea		2										R566, R567
P	H		5905-192-0662	*	*	*				E	A417 RESISTOR, COMPOSITION: SAME AS A209	ea		1										R563
P	H		5905-279-3503	*	*	*				E	A418 RESISTOR, COMPOSITION: 81349; RC20GF682J	ea	1	2				*	2	2	13	10		R552, R556
P	H		5905-279-1876	*	*	*				E	A419 RESISTOR, COMPOSITION: 81349; RC20GF222J	ea	1	1				*	*	2	8	5		R562
P	H		5905-279-1882	*	*	*				E	A420 RESISTOR, COMPOSITION: 81349; RC20GF275K	ea	1	1				*	*	2	8	5		R559
P	H		5905-185-6944	*	*	*				E	A421 RESISTOR, COMPOSITION: 81349; RC20GF394K	ea	1	1				*	*	2	8	5		R558
P	H		5905-192-0649	*	*	*				E	A422 RESISTOR, COMPOSITION: SAME AS A360	ea		1										R557
P	H		5905-171-2009	*	*	*				E	A42201 RESISTOR, COMPOSITION: SAME AS A242	ea		1										R573
P	H		5905-171-1985	*	*	*				E	A423 RESISTOR, COMPOSITION: SAME ASA201	ea		1										R555
P	H		5905-249-3661	*	*	*				E	A424 RESISTOR, COMPOSITION: SAME AS A32201	ea		1										R551
P	H		5905-190-8879	*	*	*				E	A425 RESISTOR, COMPOSITION: 81349; RC20GF183K	ea	1	3				*	2	2	18	15		R554
P	H		5905-299-1965	*	*	*				E	A426 RESISTOR, COMPOSITION: 81349; RC20GF301J	ea	1	3				*	2	2	13	10		R568
P	H		5905-295-3410	*	*	*				E	A427 RESISTOR, COMPOSITION: SAME AS A244	ea		1										R571

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-686-3344	*	*	*				E	A428 RESISTOR, WIREWOUND: SAME AS A207	ea		1										
P	H		5905-683-5899	*	*	*				E	A429 RESISTOR, FILM: 75042; MDC-2400-1%	ea	1	1				*	*	2	8	5		R553
P	H		5905-254-7087	*	*	*				E	A430 RESISTOR, COMPOSITION: SAME AS A250	ea		1										R572
P	H		5950-686-6642	*	*	*				E	A431 TRANSFORMER, PULSE: 97722; PM101-0.5	ea	1	1				*	*	*	5	5		T551
P	F		5960-261-8679	*	*	*				E	A432 ELECTRON TUBE: SAME AS A218	ea		3										V551, V552, V553
P	F		5960-808-2258	*	*	*				E	A433 ELECTRON TUBE: SAME AS A217	ea		1										V554
P	F		5960-685-9145		*	*				E	A434 SHIELD, TUBE: SAME AS A219	ea		4										
X1	H			*	*	*				E	A435 PRINTED CIRCUIT BOARD: 65597; 87811-2	ea	1	1										TB551
A	H	R	5895-705-2829	*	*	*				C	A436 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116676-1	ea	1	1										
P	H		5910-838-9421	*	*	*				D	A437 CAPACITOR, CERAMIC: SAME AS A193	ea		20										C621 thru C640
P	H		5905-249-3661	*	*	*				D	A438 RESISTOR, COMPOSITION: 81349; RC07GF683K	ea	1	33				2	6	11	130	165		R621, R623, R625, R627, R629, R631, R633, R635, R637, R639
P	H		5905-682-1101	*	*	*				D	A442 RESISTOR, COMPOSITION: 81349; RC07GF224K	ea	1	10				2	6	11	124	160		R622, R624, R626, R628, R630, R632, R634, R636, R638, R640

(1) (A) SOURCE CD	(B) MAINT. CD	(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-683-2241	*	*	*				D	A445A RESISTOR, COMPOSITION: 81349; RC07GF512J	ea	1	1				*	*	2	8	5		R641
P	H		5961-842-9864	*	*	*				D	A446 SEMICONDUCTOR DEVICE, DIODE: SAME AS A215A	ea		9										CR621 thru CR629
P	H		5961-087-6047	*	*	*				D	A446A SEMICONDUCTOR DEVICE, DIODE: 81349; 1N645	ea	1	3				*	2	2	13	21		CR630
X1	H			*	*	*				D	A447 PRINTED CIRCUIT BOARD: 65597; 87812-2	ea	1	1										TB621
P	F	R	5895-705-2827	*	*	*				C	A448 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116677-1	ea	1	1	*	*	*	*	*	*	3	4		
P	H		5910-838-9421	*	*	*				D	A449 CAPACITOR, CERAMIC: SAME AS A193	ea		27										C651 thru C677
P	H		5905-249-3661	*	*	*				D	A450 RESISTOR, COMPOSITION: SAME AS A438	ea		14										R651, R652, R654, R656, R658, R660, R662, R664, R666, R668, R670, R672, R674, R676
P	H		5905-682-1101		*	*				D	A455 RESISTOR, COMPOSITION: SAME AS A442	ea		13										R653, R655, R657, R659, R661, R663, R665, R667 R669, R671, R673, R675, R677
P	H		5961-842-9864	*	*	*				D	A460 SEMICONDUCTOR DEVICE, DIODE: SAME AS A215A	ea		14										CR651 thru CR664
X1	H			*	*	*				D	A461 PRINTED CIRCUIT BOARD 65597; 87813-2	ea	1	1										TB651
A	F	R	5896-705-2828		*	*				D	A462 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116678-1	ea	1	1	*	*	*	*	*	*	4	3		

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5910-838-9421	*	*	*				D	A463 CAPACITOR, CERAMIC: SAME AS A193	ea		18										
P	H		5905-249-3661	*	*	*				L	A464 RESISTOR, COMPOSITION: SAME AS A438	ea		9										R681, R683, R685, R687, R689, R691, R693, R695
P	H		5905-682-1101	*	*	*				D	A467 RESISTOR, COMPOSITION: SAME AS A442	ea		9										R682, R684, R686, R688, R690, R692, R694, R696, R698
P	H		5961-842-9864	*	*	*				D	A470 SEMICONDUCTOR DEVICE, DIODE: SAME AS A215A	ea		9										CR681, CR683, CR684, CR687, CR688, CR691, CR692, CR691, CR692, CR695, CR696
X1	H			*	*	*				D	A473 PRINTED CIRCUIT BOARD: 65597; 87814-2	ea	1	1										TB681
M	D			*	*	*				C	A474 TUBE, MOUNTING BOARD SUBASSEMBLY: 65597; 116732-1	ea	1	1										
X2	H			*	*	*				C	A475 RETAINER, TUBE: 97983; 3T	ea	1	1										
X2	H			*	*	*				C	A47501 RETAINER, TUBE: 65597; 94488-1	ea	1	1										
X2	H			*	*	*				*	A476 SPACER, SLEEVE: 65597; 270029 1	ea	1	3										
X2	H			*	*	*				*	A47601 SPACER: 65597; 270060-1	ea	1	1										
X2	H			*	*	*				*	A47602 STUD, PLAIN: 65597; 102180-1	ea	1	1										
X2	H				*	*				*	A477 SCREW, MACHINE: SAME AS A048	ea		1										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A478 SCREW, MACHINE: 96906; MS24693C9	ea	100	3										
X2	H				*	*				*	A479 WASHER, FLAT: SAME AS A169	ea		3										
X2	H			*	*	*				*	A480 WASHER, FLAT: 96906; MS15795-807	ea	100	1										
X2	H		5330-784-9183	*	*	*				*	A481 INSULATOR, WASHER: 65597; 76029 FT	ea	100	3										
X2	H			*	*	*				*	A48101 INSULATOR, WASHER: 74921; 76031 FT	ea	100	1										
X2	H		5310-281-9845	*	*	*				*	A482 NUT, SELF LOCK: SAME AS A015	ea		3										
X2	H			*	*	*				*	A48201 NUT, PLAIN, HEX: 96906; MS35649-84	ea	100	1										
P	H		5935-686-9364	*	*	*				D	A483 SOCKET, TUBE: 91662; 612PH-1/8	ea	1	1				*	*	2	5	6		YV153
X2	H			*	*	*				D	A484 TERMINAL, STUD: 71279; 1457-4	ea	500	5										
X1	H			*	*	*				D	A485 PRINTED CIRCUIT BOARD: 65597; 87884-1	ea	1	1										
P	H		5905-279-1922	*	*	*				C	A486 RESISTOR, COMPOSITION: 81349; RC42GF271K	ea	1	1				*	*	2	8	5		R161
P	F		5960-808-6935	*	*	*				C	A487 ELECTRON TUBE: 94154; 3D21WA or 3D21WB	ea	1	1	3	9	16	2	2	4	182	100		V153
P	F		5960-685-9147	*						C	A488 SHIELD, TUBE: 81349; R0967	ea	1	2	*	2	2	*	2	2	13	36		

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44 -44B (continued)													
P	F		5960-686-8087		*	*				C	A488A SHIELD, TUBE: 96906; MS24233-5	ea	1	2	*	2	2	*	2	2	13	36		
P	F		5960-537-3960	*	*	*				C	A489 ELECTRON TUBE: 81349; JAN-5687WA	ea	1	2	3	9	16	2	2	4	182	200		V151, V152
P	F		5960-937-1403	*	*	*				C	A489A SHIELD, TUBE: 65597; 089898-0001	ea	1	1	*	*	*	*	*	*	5	12		
P	H		5895-686-7624	*	*	*				C	A490 CAVITY, TUNED: 65597; 116744-1	ea	1	1				*	*	*	5	5		Z151
X2	H			*						*	A491 SPACER: 65597; 270036-1	ea	1	1										
X2	H			*	*	*				*	A492 SCREW, MACHINE: 96906; MS51957-29	ea	100	4										
X2	H			*	*	*				D	A493 SHIELD, FRONT: 65597; 89256-2	ea	1	1										
X2	H			*	*	*				D	A494 SPACER, PLATE: 65597; 270004-2	ea	1	1										
X2	H			*						D	A495 SPACER, CONTACT: 65597; 87793-2	ea	1	1										
X2	H			*	*	*				D	A496 INSULATOR, CAP: 65597; 28133-1	ea	1	4										
X2	H			*	*	*				D	A497 INSULATOR, BUSHING: 65597; 28134-1	ea	1	4										
X2	H		5940-682-2477	*	*	*				*	A498 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H			*	*	*				*	A499 SCREW, MACHINE: 96906; MS51957-12	ea	100	1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A500 SCREW, MACHINE: 83385; 103517SS	ea	100	4										
X2	H		5330-785-2129	*	*	*				*	A501 INSULATOR, WASHER: SAME AS A173	ea		4										
X2	H			*	*	*				*	A502 WASHER, FLAT: SAME AS A169	ea		1										
X2	H			*	*	*				*	A503 WASHER, LOCK: SAME AS A081	ea		5										
X2	H			*	*	*				D	A504 FLANGE, CAVITY: 65597; 77577-1	ea	1	1										
X2	H			*	*	*				*	A505 SCREW, MACHINE: 83385; 103685SS	ea	100	4										
X2	H			*	*	*				*	A506 WASHER, FLAT: SAME AS A081	ea		4										
X2	H			*	*	*				D	A507 BLOCK, TUNING: 65597; 77538-2	ea	1	1										
X2	H			*	*	*				D	A508 SCREW, TUNING: 65597 77539-1	ea	1	1										
X2	F				*	*				*	A509 RING, RETAINING: SAME AS A038	ea		1										
X2	H			*	*	*				D	A510 BLACK, RETAINING: 65597; 77433	ea	1	1										
X2	H		5895-687-5775	*	*	*				D	A511 SPRING, HELICAL: 65597; 61171-1	ea	1	1										
X2	H			*	*	*				*	A512 SCREW, MACHINE: SAME AS A014	ea		1										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				D	A513 INSULATOR, DISK: 65597; 70866-2	ea	1	1										
X2	H			*	*	*				D	A514 RECPT, CATHODE: 65597; 77541-2	ea	1	1										
X2	H				*	*				D	A515 INSULATOR, BUSHING: 65597; 28140-1	ea	1	3										
X2	H			*	*	*				D	A516 INSULATOR, DISK: 65597; 28142-1	ea	1	1										
X2	H		5340-682-1603	*	*	*				*	A517 RING, RETAINING: 79136; 5133-12-MD	ea	20	1										
X2	H			*	*	*				D	A518 CONTACT, HEATER: 65597; 116738-1	ea	1	1										
X2	H			*	*	*				D	A519 INSULATOR, BUSHING: 65597; 28141-1	ea	1	1										
X2	H			*	*	*				D	A520 BELL, GRID: 65597; 77540-2	ea	1	1										
X2	H		5940-682-2477	*	*	*				*	A521 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H			*	*	*				*	A522 SCREW, MACHINE: SAME AS A073	ea		3										
X2	H			*	*	*				*	A523 SCREW, MACHINE: SAME AS A014	ea		3										
X2	H			*	*	*				*	A524 WASHER, FLAT: SAME AS A169	ea		3										
X2	H			*	*	*				*	A525 WASHER, LOCK: SAME AS A081	ea		6										

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10)(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				D	A526 CAVITY, TRANS: 65597; 116745-1	ea	1	1										
P	F		5960-581-9119	*						C	A527D ELECTRON TUBE: 81349; JAN-3CX100A5	ea	1	1	2	4	8	2	2	2	100	100		V154
P	F		5960-815-0813		*	*				C	A527A ELECTRON TUBE: 81349; JAN-7289	ea	1	1	2	4	8	2	2	2	100	100		V154
P	H		5905-279-4312	*	*	*				C	A528 RESISTOR, COMPOSITION: 81349; RC42GF220K	ea	1	1				*	*	2	8	5		R162
A	H	R	5895-705-2832	*						C	A529 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116683-1	ea	1	1										
A	H	R			*	*				C	A529A RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116683-2	ea	1	1										
X2	H			*	*	*				*	A530 SCREW, MACHINE: 96906; MS51957-31	ea	100	2										
X2	H			*	*	*				*	A531 WASHER, LOCK: 96906; MS35338-79	ea	100	2										
X2	H			*	*	*				*	A532 WASHER, NONMETAL: SAME AS A171A	ea		2										
X2	H			*	*	*				D	A533 COVER, PANEL: 65597; 89448-3	ea	1	1										
X2	H			*	*	*				E	A534 COVER, PANEL: 65597; 89448-1	ea	1	1										
X2	H			*	*	*				E	A535 TERMINAL, STUD: 79251; A-24F4-1068	ea	500	6										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1-20	DS (B) 21-50	DS (C) 51-100	GS (A) 1-20	GS (B) 21-50	GS (C) 51-100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A536 RIVET, TUBULAR: 96906; MS16535-52	ea	50	6										
X2	H			*	*	*				*	A537 WASHER, LOCK: SAME AS A078	ea		6										
X2	H		5310-281-9845	*	*	*				*	A538 NUT, SELF LOCK: SAME AS A015	ea		6										
X2	H			*	*	*				D	A539 BLOCK. MOUNTING: 65597; 77562-1	ea	1	2										
X2	H			*	*	*				*	A540 SCREW, MACHINE: SAME AS A073	ea		4										
X2	H			*	*	*				*	A541 WASHER, LOCK: SAME AS A081	ea		4										
P	F		5960-685-9148	*						D	A542 SHIELD, TUBE: 81347; R0761	ea	1	6	*	2	2	*	2	2	22	60		
P	F		5960-686-8119		*	*				D	A542A SHIELD, TUBE: 96906; MS24233-1	ea	1	6	*	2	2	*	2	2	22	60		
P	F		5960-685-9146	*						D	A543 SHIELD, TUBE: 81349; R0966	ea	1	2	*	*	2	*	*	2	10	20		
P	F		5960-800-0736		*	*				D	A543A SHIELD, TUBE: 96906; MS24233-4	ea	1	2	*	*	2	*	*	2	10	20		
P	F		5960-262-1357	*	*	*				D	A544 ELECTRON TUBE: 81349; JAN-5654	ea	1	6	9	22	42	2	5	11	487	600		V201 thru V206
P	F		5960-188-6584	*	*	*				D	A545 ELECTRON TUBE: 81349; JAN-5670	ea	1	2	2	6	11	2	2	3	130	200		V207, V208
P	H		5935-232-3758	*	*	*				D	A546 SOCKET, TUBE: 81349; TS102C01	ea	1	6				*	2	2	22	42		XV201 thru XV206

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H		5940-159-1252	*	*	*				*	A547 TERMINAL, LUG: 78189; 2522-04-00	ea	500	12										
X2	H			*	*	*				*	A548 SCREW,MACHINE: SAME AS A014	ea		12										
X2	H			*	*	*				*	A549 WASHER, LOCK: SAME AS A078	ea		12										
X2	H			*	*	*				*	A550 WASHER, LOCK: SAME AS A081	ea		12										
X2	H		5310-072-5883	*	*	*				*	A551 NUT, SELF LOCK: SAME AS A074	ea		12										
P	H		5935-222-9828	*	*	*				D	A552 SOCKET, TUBE: 81350; TS103C01	ea	1	2				*	2	2	13	21		XV207. XV208
X2	H		5940-159-1252	*	*	*				*	A553 TERMINAL, LUG: SAME AS A547	ea		5										
X2	H			*	*	*				*	A554 SCREW, MACHINE: SAME AS A014	ea		4										
X2	H			*	*	*				*	A555 WASHER, LOCK: SAME AS A078	ea		4										
X2	H			*	*	*				*	A556 WASHER, LOCK: SAME AS A081	ea		4										
X2	H		5310-072-5883	*	*	*				*	A557 NUT, SELF LOCK: SAME AS A074	ea		4										
P	H		5905-686-3353	*	*	*				D	A558 RESISTOR, VARIABLE: 81349; RV6LAXSA502B	ea	1	1				*	*	2	8	7		R225
P	H		5905-686-3354	*	*	*				D	A559 RESISTOR, VARIABLE: 81349; RV6LAXSA103B	ea	1	1				*	*	2	8	7		R226

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(B) MAINT. CD	(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A560 WASHER, LOCK: SAME AS A212	ea		2										
P	F		5935-686-9359	*	*	*				D	A561 CONNECTOR, RECEPTACLE: 95712; 8001-1	ea	1	1	*	*	*	*	*	*	8	13		J201
X2	F		5310-764-0277	*	*	*				*	A562 WASHER, LOCK: 65597; 276178NPPHBR	ea	100	1										
P	F		5935-686-9362	*	*	*				D	A563 JACK, TELEPHONE: 82389; 7J-1034	ea	1	1	*	*	*	*	*	*	8	4		J202
X2	H			*	*	*				*	A564 WASHER, LOCK: SAME AS A212	ea		1										
P	F		5935-583-8443	*	*	*				D	A565 CONNECTOR, RECEPTACLE: 91146; DE-9P(A101)	ea	1	1	*	*	*	*	*	*	5	13		J203
X2	H			*	*	*				*	A566 LOCKING DEVICE: 71468; D20418-2	ea	1	2										
X2	H		5940-159-1252	*	*	*				*	A567 TERMINAL, LUG: SAME AS A547	ea		2										
X2	H			*	*	*				*	A568 WASHER, LOCK: SAME AS A078	ea		2										
P	H		5910-617-4042	*	*	*				D	A569 CAPACITOR, PAPER: 81349; CP11A3KE104K3	ea	1	1				*	*	2	8	9		C232
X2	H			*	*	*				*	A570 WASHER, LOCK: 96906; MS35338-83	ea	100	1										
P	H		5950-686-6669	*	*	*				D	A571 TRANSFORMER, INTERMEDIATE FREQUENCY: 65597; 38793	ea	1	3				*	2	2	13	18		T203, T205, T207
P	H		5950-686-6667	*	*	*				D	A572 TRANSFORMER, INTERMEDIATE FREQUENCY: 65597; 38794	ea	1	3				*	2	2	13	18		T202, T204, T206

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5950-686-6668	*	*	*				D	A573 TRANSFORMER, INTERMEDIATE, FREQUENCY: 65597; 38795	ea	1	1				*	*	*	5	6		T201
X2	H			*	*	*				*	A574 WASHER, LOCK: 96906; MS35338-81	ea	100	7										
P	H		5910-838-9421	*	*	*				D	A575 CAPACITOR, CERAMIC: SAME AS A193	ea		41										C201 thru C216, C220 C221, C223. C224, C225, C229, C230, C233 thru C250
P	H		5910-822-5683	*	*	*				D	A579 CAPACITOR, CERAMIC: SAME AS A194	ea		7										C251 thru C257
P	H		5910-192-2245	*	*	*				D	A580 CAPACITOR, CERAMIC: 81349; CC20CJ030D	ea	1	2				*	2	2	13	14		C217, C227
P	H		5910-690-9491	*	*	*				D	A580A CAPACITOR, CERAMIC: 81349; CC21CH120J	ea	1	1				*	*	2	8	7		C222
P	H		5910-556-9420	*	*	*				D	A581 CAPACITOR, CERAMIC: 81350; CC20CH240J	ea	1	2				*	2	2	13	14		C218, C226
P	H		5910-683-3002	*	*	*				D	A582 CAPACITOR, CERAMIC: 81349; CC20SH390J	ea	1	1				*	*	2	8	7		C219
P	H		5910-543-0822	*	*	*				D	A583 CAPACITOR, CERAMIC: 81349; CC20CH050D	ea	1	2				*	2	2	13	14		C228
P	H		5910-850-7991	*	*	*				D	A584 CAPACITOR, MICA: SAME AS A354	ea		1										C231
P	H		5950-686-9945	*	*	*				D	A585 COIL, RADIOFREQUENCY: 65597; 38799	ea	1	4				*	2	2	16	20		L201, L203, L205, L212
P	H		5950-686-9944	*	*	*				D	A586 COIL, RADIOFREQUENCY: 65597; 38800	ea	1	14				2	2	3	46	70		L202, L204, L206, L207, L209 L211, L213, L220

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1-20	DS (B) 21-50	DS (C) 51-100	GS (A) 1-20	GS (B) 21-50	GS (C) 51-100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5950-686-6679	*	*	*				D	A589 COIL, RADIOFREQUENCY: 65597; 38854-1	ea	1	2				*	*	2	10	10		L208, L210
P	H		5905-185-8518	*	*	*				D	A590 RESISTOR, COMPOSITION: SAME AS A205	ea		1										R201
P	H		5905-279-1756	*	*	*				D	A591 RESISTOR, COMPOSITION: 81349; RC20GF151K	ea	1	4				*	2	2	20	24		R202 R205, R208, R211
P	H		5905-681-6462		*	*				D	A591A RESISTOR, COMPOSITION: 81349; RC07GF102J	ea	1	1				*	*	2	8	6		R249
P	H		5905-171-2004		*	*				D	A592 RESISTOR, COMPOSITION: SAME AS A200	ea		3										R203, R207, R209
P	H		5905-279-3504	*	*	*				D	A593 RESISTOR, COMPOSITION: SAME AS A291	ea		2										R212, R223
P	H		5905-256-0410	*	*	*				D	A594 RESISTOR, COMPOSITION: 81349; RC20GF181K	ea	1	6				2	2	3	30	36		R204 R206, R210, R213, R216, R222
P	H		5905-192-3972	*	*	*				D	A596 RESISTOR, COMPOSITION: 81349; RC20GF391K	ea	1	1				*	*	2	8	6		R214
P	H		5905-549-7435		*	*				D	A59601 RESISTOR, COMPOSITION: 81349; RC20GF226K	ea	1	1				*	*	2	8	6		R242
P	H		5905-192-4408	*	*	*				D	A597 RESISTOR, COMPOSITION: 81349; RC20GF562K	ea	1	2				*	2	2	13	12		R215, R221
P	H		5905-195-6806	*	*	*				D	A598 RESISTOR, COMPOSITION: SAME AS A280	ea		3										R217, R224 R234
P	H		5905-279-1757	*	*	*				D	A599 RESISTOR, COMPOSITION: 81349; RC20GF152J	ea	1	2				*	2	2	13	12		R218, R219
P	H		5905-171-2005	*	*	*				D	A600 RESISTOR, COMPOSITION: 81349; RC20GF471K	ea	1	1				*	*	2	8	7		R220

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-171-1985	*	*	*				D	A601 RESISTOR, COMPOSITION: SAME AS A201	ea		2										R227 R232
P	H		5905-195-6449	*	*	*				D	A602 RESISTOR, COMPOSITION: 81349; RC42GF472K	ea	1	1				*	*	2	8	7		R229
P	H		5905-190-8883	*	*	*				D	A60201 RESISTOR, COMPOSITION: 81349; RC20GF100K	ea	1	6				2	2	3	40	56		R243 thru R248
P	H		5905-279-3500	*	*	*				D	A603 RESISTOR, COMPOSITION: SAME AS A325	ea		1										R230
P	H		5905-192-3982	*	*	*				D	A604 RESISTOR, COMPOSITION: SAME AS A204	ea		1										R231
P	H		5905-256-0409	*	*	*				D	A605 RESISTOR, COMPOSITION: 81349; RC20GF221K	ea	1	3				*	2	2	13	24		R233
P	H		5905-195-5571	*						D	A606 RESISTOR, COMPOSITION: 81349; RC20GF680J	ea	1	1				*	*	2	8	7		R235
P	H		5905-279-2674		*	*				D	A606A RESISTOR, COMPOSITION: 81349; RC20GF201J	ea	1	1				*	*	2	8	7		R235
P	H		5905-171-2000	*	*	*				D	A607 RESISTOR, COMPOSITION: 81349; RC20GF684J	ea	1	1				*	*	2	8	7		R236
P	H		5905-686-3341	*	*	*				D	A608 RESISTOR, WIREWOUND: 81349; RW59V150	ea	1	1				*	*	2	8	7		R237
P	H		5905-686-3306	*	*	*				D	A609 RESISTOR, WIREWOUND: 81349; RW59V350	ea	1	2				*	2	2	13	14		R238, R239
P	H		5905-702-9532	*	*	*				D	A610 RESISTOR, WIREWOUND: 81349; RW59V8R0	ea	1	1				*	*	2	8	7		R240
P	H		5905-299-1965	*	*	*				D	A611 RESISTOR, COMPOSITION: SAME AS A426	ea		1										R228

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. C D	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-190-8880	*						D	A612 RESISTOR, COMPOSITION: 81349; RC20GF122K	ea	1	1				*	*	2	8	7		R234
P	H		5905-279-2515	*	*	*				D	A613 RESISTOR, COMPOSITION: 81349; RC20GF474K	ea	1	1				*	*	2	8	7		R241
P	H		5960-842-3525	*	*	*				D	A614 SEMICONDUCTOR DEVICE, DIODE: 82577; 1N198A	ea	1	3				*	*	2	10	14		CR209
P	H		5960-552-9852		*	*				D	A61401 SEMICONDUCTOR DEVICE, DIODE: 81349; 1N251	ea	1	4				*	2	2	10	14		CR201 thru CR204
P	H		5961-842-9864	*	*	*				D	A61402 SEMICONDUCTOR DEVICE, DIODE: SAME AS A215A	ea		8										CR209 CR201 thru CR207
P	H		5940-578-1084	*	*	*				D	A616 TERMINAL, FEED: 98291; FT-1000-SL	ea	1	4				*	2	2	18	21		
X2	H		5940-812-9686		*	*				D	A617 TERMINAL, STUD: 98291; ST-1000-SL	ea	1	16										
X1	H			*	*	*				D	A618 CHASSIS, ELECTRICAL EQUIPMENT: 65597; 80807-1	ea	1	1										
A	H	R		*	*	*				C	A619 RECEIVER BOARD SUBASSEMBLY: 65597; 116735-1	ea	1	1										
X2	H			*	*	*				*	A620 SCREW, MACHINE: SAME AS A076	ea		3										
X2	H				*	*				*	A621 WASHER, FLAT: SAME AS A169	ea		3										
P	H		5960-686-7247	*	*	*				D	A622 SEMICONDUCTOR DEVICE, DIODE: SAME AS A117	ea		16										CR1 thru CR16

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				D	A623 TERMINAL BOARD: 65597; 87890-2	ea	1	1										
X2	H			*	*	*				E	A624 TERMINAL STUD: 71279; 1548-2	ea	100	28										
X2	H			*	*	*				E	A625 TERMINAL BOARD: 65597; 87890-1	ea	1	1										
X2	H			*	*	*				C	A626 BRACKET, CAP MOUNTING: 65597; 91982-2	ea	1	1										
X2	H			*	*	*				*	A627 SCREW, MACHINE: SAME AS A076	ea		4										
X2	H			*	*	*				*	A628 WASHER, LOCK: SAME AS A078	ea		4										
X2	H		5310-281-9845	*	*	*				*	A629 NUT, SELF LOCK: SAME AS A015	ea		4										
P	H		5910-686-6640	*						C	A630 CAPACITOR, PAPER: 82376; MDL-8303	ea	1	1				*	*	2	8	8		C3
P	H		5910-948-3162		*	*				C	A630A CAPACITOR, PAPER: 72928; 17889	ea	1	1				*	*	2	8	8		C3
P	H		5910-682-3148	*						C	A631 CAPACITOR, PAPER: 82376; MDL-8304	ea	1	1				*	*	2	8	8		C4
P	H		5910-948-3135		*	*				C	A631A CAPACITOR, PAPER: 72928; 17890	ea	1	1				*	*	2	8	8		C4
X2	H			*	*	*				*	A632 SCREW, MACHINE: SAME AS A068	ea		4										
M	H			*						C	A633 BRACKET, ANGLE: 65597; 91985-1	ea	1	1										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
M	D				*	*				C	A633A BRACKET ANGLE: 65597; 92583-2	ea	1	1										
X2	H			*	*	*				*	A634 SCREW, MACHINE: SAME AS A07701	ea		2										
X2	H		5940-682-2477	*	*	*				*	A634A TERMINAL, LUG: SAME AS A080	ea		3										
X2	H			*	*	*				*	A634B WASHER, LOCK: SAME AS A081	ea		2										
X2	H		5310-281-9845	*	*	*				*	A635 NUT, SELF LOCK: SAME AS A015	ea		2										
X2	H			*	*	*				D	A635A CLIP, SPRING TENSION: 91506; 6001-10CC	ea	1	2										
X2	H			*	*	*				*	A635B RIVET, TUBULAR: 12014; R3715-1/8CPS	ea	50	4										
M	D			*	*	*				D	A635C BRACKET, ANGLE: 65597; 92583-1	ea	1	1										
X2	H			*	*	*				C	A636 RETAINER, CAP: 10643; KAPKL1PNC-NYLON	ea	1	2										
P	H		5910-082-4790	*	*	*				C	A637 CAPACITOR, ELECTROLYTIC: 81349; CL64CJ600MP3	ea	1	2				*	2	2	12	14		C1, C2
X2	H			*	*	*				*	A638 SCREW, MACHINE: SAME AS A7701	ea		2										
X2	H		5310-281-9845	*	*	*				*	A639 NUT, SELF LOCK: SAME AS A015	ea		2										
P	H		5910-947-8631	*	*	*				C	A639A CAPACITOR, PAPER: 81349; CP12A3KB105K3	ea	1	1				*	*	2	8	8		C13

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A639B SCREW, MACHINE: SAME AS A068	ea		1										
X2	H		5310-208-4006	*	*	*				*	A639C NUT, SELF LOCK: SAME AS A046	ea		1										
X2	H		5940-812-9686	*	*	*				C	A639D TERMINAL, STUD: SAME AS A617	ea		1										
X2	H			*	*	*				C	A63901 LEAD, ELECTRICAL: 65597; 27190-1	ea	1	1										
X2	H		5940-682-2477	*	*	*				C	A63902 TERMINAL, LUG: SAME AS A080	ea		2										
X2	H			*	*	*				*	A462 WASHER, LOCK: SAME AS A081	ea		1										
X2	H		5310-281-9845	*	*	*				*	A643 NUT, SELF LOCK: SAME AS A015	ea		1										
P	H		5950-686-6665	*	*	*				C	A644 REACTOR: 07388; 1148	ea	1	1				*	*	*	5	3		L1
X2	H			*	*	*				*	A645 SCREW, MACHINE: SAME AS A005	ea		1										
X2	H			*	*	*				*	A646 WASHER, LOCK: SAME AS A011	ea		1										
X2	H			*	*	*				C	A647 BRACKET, CAP MOUNTING: 65597; 91978-3	ea	1	1										
X2	H			*	*	*				*	A648 SCREW, MACHINE: SAME AS A014	ea		1										
X2	H			*	*	*				*	A649 SCREW, MACHINE: SAME AS A076	ea		1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A651 WASHER, LOCK: SAME AS A081	ea		2										
X2	H			*	*	*				*	A652 WASHER, LOCK: SAME AS A078	ea		1										
P	H		5910-688-2564	*	*	*				C	A653 CAPACITOR, PLAS: 80152; ASC2M05E	ea	1	1				*	*	2	8	8		C8
X2	H			*	*	*				C	A654 BRACKET, CAP MOUNTING: 65597; 92009-1	ea	1	2										
X2	H		5310-728-2434	*	*	*				*	A655 NUT, SELF LOCK: SAME AS A046B	ea		2										
X2	H		5940-828-6984	*	*	*				*	A656 TERMINAL, LUG: 78189; 2104-08-00	ea	500	2										
X2	H			*	*	*				*	A657 WASHER, FLAT: SAME AS A060A	ea		2										
X2	H			*	*	*				*	A658 WASHER, LOCK: SAME AS A011	ea		2										
X2	H			*	*	*				*	A659 SPACER: 65597; 270024-2	ea	1	2										
X2	H			*	*	*				*	A660 SCREW, MACHINE: SAME AS A014	ea		2										
X2	H			*	*	*				*	A661 WASHER, LOCK: SAME AS A081	ea		2										
M	D			*	*	*				C	A662 BRACKET, TRANS: 65597; 91980-2	ea	1	1										
M	D			*	*	*				C	A663 BRACKET COVER MOUNTING: 65597; 91981-2	ea	1	1										
X2	H			*	*	*				D	A664 RECEPTACLE FASTENER: 71286; 5R2-1	ea	1	13										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A665 RIVET, SOLID: 96906; MS20426AD3-3	ea	50	2										
M	H			*	*	*				D	A666 BRACKET, ANGLE: 65597; 91981-1	ea	1	1										
X2	H			*	*	*				*	A667 SCREW, MACHINE: SAME AS A073	ea		3										
X2	H			*	*	*				*	A668 SCREW, MACHINE: 96906; MS51957-16	ea	100	3										
X2	H		5940-682-2477	*	*	*				*	A669 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H			*	*	*				*	A670 WASHER, LOCK: SAME AS A081	ea		3										
X2	H			*	*	*				*	A671 WASHER, LOCK: SAME AS A078	ea		3										
P	H		5950-705-9087	*	*	*				C	A672 TRANSFORMER, SATURABLE: 07388; 1146	ea	1	1				*	*	*	5	6		T1
P	H		5950-705-9088	*	*	*				C	A673 TRANSFORMER, SATURABLE: 07388; 1147	ea	1	1				*	*	*	5	6		T2
X2	H		5340-802-4706	*	*	*				*	A673A CLAMP, LOOP; 09922; HP5N	ea	1	1										
X2	H			*	*	*				*	A673B WASHER, FLAT: SAME AS A060A	ea		1										
X2	H		5310-208-4006	*	*	*				*	A674 NUT, SELF LOCK: SAME AS A046	ea		6										
M	D			*	*	*				C	A675 BRACKET, SUPPORT: 65597; 91983-1	ea	1	1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A676 SCREW, MACHINE: SAME AS A07701	ea		2										
X2	H			*	*	*				*	A677 SCREW, MACHINE: SAME AS A076	ea		2										
X2	H		5940-682-2477	*	*	*				*	A678 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H			*	*	*				*	A679 WASHER, LOCK: SAME AS A078	ea		2										
X2	H		5310-281-9845	*	*	*				*	A680 NUT, SELF LOCK: SAME AS A015	ea		4										
X2	H			*	*	*				C	A68001 RETAINER, CAP: 10643; NB-NYLON	ea	1	1										
P	H		5910-082-4786		*	*				C	A68002 CAPACITOR, ELECTROLYTIC: 81349; CL64CJ250MPS	ea	1	1				*	*	2	8	8		C9
X2	H			*	*	*				*	A68003 TERMINAL, STUD: 81312; 750-14T5-0A	ea	1	1										
X2	H		5940-682-2477	*	*	*				*	A68004 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H			*	*	*				*	A68005 SCREW, MACHINE: 96906; MS24693C3	ea	100	8										
X2	H			*	*	*				*	A68005A SCREW, MACHINE: SAME AS A048	ea		1										
X2	H			*	*	*				*	A68006 SCREW, MACHINE: SAME AS A014	ea		1										
X2	H			*	*	*				*	A68007 WASHER, LOCK: SAME AS A081	ea		2										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(B) MAINT. C D	(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1—20	DS (B) 21—50	DS (C) 51—100	GS (A) 1—20	GS (B) 21—50	GS (C) 51—100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H		5310-072-5883	*	*	*				*	A68008 NUT, SELF LOCK: SAME AS A074	ea		2										
M	D			*	*	*				C	A681 BRACKET, COVER MOUNTING: 65597; 91984-2	ea	1	1										
X2	H			*	*	*				*	A682 SCREW, MACHINE: SAME AS A076	ea		2										
X2	H			*	*	*				*	A683 SCREW, MACHINE: SAME AS A07701	ea		1										
X2	H			*	*	*				*	A684 WASHER, LOCK: SAME AS A078	ea		2										
X2	H			*	*	*				D	A685 RECEPTACLE, FAST: SAME AS A664	ea		2										
X2	H			*	*	*				*	A686 RIVET, SOLID: SAME AS A665	ea		4										
P	H		5905-043-2588	*	*	*				C	A688 RESISTOR, WIREWOUND: 94310; X-9636	ea	1	4				*	*	2	8	44		R2, R3. R8, R9
P	H		5905-686-3340	*						C	A689 RESISTOR, WIREWOUND: 94310; X9413	ea	1	1				*	*	2	8	11		R13
P	H		5905-686-3340	*	*	*				C	A689A RESISTOR, WIREWOUND: 94310; X-9357	ea	1	1				*	*	2	8	11		R13
X2	H			*	*	*				*	A690 SCREW, MACHINE: 96906; MS24693C14	ea	100	2										
X2	H		5310-072-5883	*	*	*				*	A691 NUT, SELF LOCK: SAME AS A074	ea		2										
X2	H			*	*	*				C	A692 SUPPORT, CARD: 65597; 77575-1	ea	1	1										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A693 SCREW, MACHINE: SAME AS A68005	ea		2										
P	H		5910-752-4336	*	*	*				C	A69301 CAPACITOR, CERAMIC: 56289; 36C151	ea	1	1				*	*	2	8	8		C12
A	H	R		*	*	*				C	A694 REC BOARD SUBASSEMBLY: 65597; 116737-1	ea	1	1										
X2	H			*	*	*				C	A695 INSULATOR, PLATE: 65597; 28138-1	ea	1	1										
X2	H			*	*	*				*	A696 SCREW, MACHINE: SAME AS A076	ea		2										
X2	H			*	*	*				*	A697 WASHER, LOCK: SAME AS A078	ea		2										
P	H		5960-686-7247	*	*	*				D	A698 SEMICONDUCTOR DEVICE, DIODE: SAME AS A117	ea		4										CR17 thru CR20
X2	H			*	*	*				D	A699 TERMINAL BOARD: 65597; 87894-3	ea	1	1										
X2	H			*	*	*				E	A700 TERMINAL, STUD: SAME AS A624	ea		5										
X2	H			*	*	*				E	A701 NUT, SELF LOCK: 72962; 68NC3-40	ea	100	2										
X2	H			*	*	*				E	A702 BOARD, RECT MOUNTING: 65597; 87894-1	ea	1	1										
A	H	R		*	*	*				C	A703 REC BOARD SUBASSEMBLY: 65597; 116737-2	ea	1	1										
X2	H			*	*	*				C	A704 INSULATOR, PLATE: SAME AS A695	ea		1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10)(A) ILLUSTRATIONS FIGURE NUMBER	(10)(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A705 SCREW, MACHINE: SAME AS A07701	ea		2										
P	H		5960-686-7247	*	*	*				D	A706 SEMICONDUCTOR DEVICE, DIODE: SAME AS A117	ea		4										CR21 thru CR24
X2	H			*	*	*				D	A707 TERMINAL BOARD: 65597; 87894-4	ea	1	1										
X2	H			*	*	*				E	A708 TERMINAL, STUD: SAME AS A624	ea		5										
X2	H			*	*	*				E	A709 NUT, SELF LOCK: SAME AS A701	ea		2										
M	D				*	*				E	A710 BOARD, RECT MOUNTING: 65597; 87894-2	ea	1	1										
M	D			*	*	*				C	A711 DOOR, ACCESS: 65597; 83349-2	ea	1	1										
X2	H			*	*	*				*	A712 SCREW, MACHINE: 96906; MS51957-4	ea	100	3										
X2	H			*	*	*				*	A713 WASHER, LOCK: 96906; MS35333-69	ea	100	3										
X2	H			*	*	*				*	A714 NUT, SELF LOCK: 72962; 68NM-26	ea	100	3										
X2	H			*	*	*				D	A715 HINGE, BUTT: SAME AS A156	ea		1										
X2	H			*	*	*				*	A716 RIVET, TUBULAR: 96906; MS16535-53	ea	50	3										
X2	H			*	*	*				D	A717 LATCH GUIDE, SNAP FASTENER: 80813; 1G-2	ea	1	1										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				D	A718 LATCH, SNAP FASTENER: 80813; 1L	ea	1	1										
X2	H			*	*	*				D	A719 WASHER, SPRING TENSION: 80813; 1W	ea	100	1										
X2	H			*	*	*				*	A720 RIVET, TUBULAR: 80813; 1R-125	ea	50	1										
X2	H			*	*	*				D	A721 PANEL, ACCESS DOOR: 65597; 83349-1	ea	1	1										
X2	H			*	*	*				C	A722 BRACKET, FASTENER: 65597; 92010-2	ea	1	1										
X2	H			*	*	*				*	A723 SCREW, MACHINE: SAME AS A014	ea		2										
X2	H			*	*	*				*	A724 WASHER, LOCK: SAME AS A078	ea		2										
X2	H		5310-072-5883	*	*	*				*	A725 NUT, SELF LOCK: SAME AS A074	ea		2										
X2	H			*	*	*				D	A726 STUD, SNAP FASTENER: 80813; 60694-1	ea	1	1										
X2	H			*	*	*				D	A727 BRACKET, FASTENER: 65597; 92010-1	ea	1	1										
X2	H			*	*	*				C	A728 SPRING, HOLD DOWN: 65597; 61175-1	ea	1	1										
X2	H			*	*	*				*	A729 SCREW, MACHINE: SAME AS A014	ea		2										
X2	H			*	*	*				*	A730 WASHER, LOCK: SAME AS A078	ea		2										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H		5310-281-9845	*	*	*				*	A731 NUT, SELF LOCK: SAME AS A015	ea		2										
P	H		5895-701-8305	*	*	*				C	A732 DELAY LINE: 99109; CTC2925	ea	1	1				*	*	*	5	3		L351
X2	H			*	*	*				C	A733 HANDLE, BOW: 65597; 60689-1	ea	1	1										
X2	H			*	*	*				*	A734 SCREW, MACHINE: SAME AS A073	ea		2										
X2	H			*	*	*				*	A735 WASHER, LOCK: SAME AS A081	ea		2										
X2	H			*	*	*				C	A736 PLATE, CORN RET: 65597; 87876-1	ea	1	1										
X2	H			*	*	*				*	A737 SCREW, MACHINE: SAME AS A014	ea		4										
X2	H			*	*	*				*	A738 WASHER, LOCK: SAME AS A081	ea		4										
P	H		5935-843-9008	*	*	*				C	A739 CONNECTOR, RECEPTACLE: 96906; UG1094A/U	ea	1	3				*	2	2	18	42		J104, J105, J106
X2	H		5940-329-5754	*	*	*				*	A740 TERMINAL, LUG: 37942; A131023-1	ea	500	1										
X2	H		5310-764-0277	*						*	A741 WASHER, LOCK: SAME AS A562	ea		3										
X2	H			*	*	*				C	A742 HANDLE, BOW: 65597; 60679-2	ea	1	1										
X2	H			*	*	*				C	A743 HOOK, HOLD DOWN: 65597; 90864-2	ea	1	2										

(1) (A) SOURCE CD	(B) MAINT. CD	(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1-20	DS (B) 21-50	DS (C) 51-100	GS (A) 1-20	GS (B) 21-50	GS (C) 51-100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A744 SCREW, MACHINE: 96906; MS51957-30	ea	100	2										
X2	H			*	*	*				*	A745 SCREW, MACHINE: SAME AS A492	ea		2										
X2	H			*	*	*				*	A746 WASHER, LOCK: SAME AS A531	ea		2										
X2	H		5310-208-4006	*	*	*				*	A747 NUT, SELF LOCK: SAME AS A046	ea		2										
M	D			*	*	*				C	A748 PLATE, EXTRACT: 65597; 87882-1	ea	1	1										
M	D			*						C	A749 PLATE, IDENTIFICATION: 65597; 67493-1	ea	1	1										
M	D				*	*				C	A749A PLATE, IDENTIFICATION: 65597; 267470-1	ea	1	1										
X2	H			*	*	*				*	A750 SCREW, MACHINE: SAME AS A530	ea		3										
X2	H			*	*	*				*	A751 WASHER, LOCK: SAME AS A069	ea		3										
X2	H		5310-208-4006	*	*	*				*	A752 NUT, SELF LOCK: SAME AS A046	ea		3										
X2	H			*	*	*				*	A753 SCREW, MACHINE: SAME AS A180	ea		1										
X2	H			*	*	*				*	A754 WASHER, LOCK: SAME AS A078	ea		1										
X2	H		5310-281-9845	*	*	*				*	A755 NUT, SELF LOCK: SAME AS A015	ea		1										

The table's title is REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE.

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10)(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
A	H	R		*	*	*				C	A756 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116730-1	ea	1	1										
X2	H			*	*	*				*	A757 SCREW, MACHINE: SAME AS A014	ea		4										
X2	H			*	*	*				*	A758 WASHER, LOCK: SAME AS A081	ea		4										
P	H		5930-822-1117	*	*	*				D	A759 SWITCH, TOGGLE: 04009; TSA-17	ea	1	12				2	2	3	40	150		S101 thru S112
X2	H			*						*	A760 WASHER, LOCK: SAME AS A212	ea		12										
P	H		5920-686-0302	*	*	*				D	A761 FUSEHOLDER: SAME AS A165	ea		1										XF101
P	H		5920-577-6778	*	*	*				E	A762 CAP, ELECTRICAL: SAME AS A166	ea		1										
P	O		5920-280-5002	*	*	*				D	A763 FUSE, CARTRIDGE: SAME AS A167	ea		1										F101
X2	H			*	*	*				D	A764 PLATE, SW MOUNTING: 65597; 8787-1	ea	1	1										
X2	H			*	*	*				C	A765 BRACKET, TERMINAL: 65597; 92023-1	ea	1	1										TB101
X2	H			*	*	*				C	A766 TERMINAL, FEED: 98291; FFSM-1-TUR	ea	1	14										
X2	H			*	*	*				*	A767 SCREW, MACHINE: SAME AS A076	ea		2										
X2	H		5310-281-9845	*	*	*				*	A768 NUT, SELF LOCK: SAME AS A015	ea		2										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY. PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		4140-802-7443	*						C	A769 FAN, VANEAXIAL: 82877; AXIMAX 2 SERIES	ea	1	1				*	*	*	5	6		B1
P	H		4140-802-7443	*	*	*				C	A769A FAN, VANEAXIAL: 82877; AXIMAX 2 SERIES YS-A022440	ea	1	1				*	*	*	5	6		B1
X2	H			*						C	A770 VENTURI: 65597; 77565-1	ea	1	1										
X2	H			*	*	*				*	A771 SCREW, MACHINE: 96906; MS51957-32	ea	100	3										
X2	H			*	*	*				*	A772 WASHER, LOCK: SAME AS A531	ea		3										
P	H		5910-894-2373	*	*	*				C	A773 CAPACITOR, PAPER: 81349; CP08A1KE224K3	ea	1	1				*	*	2	8	8		C11
X2	H		5325-275-7506	*	*	*				C	A774 GROMMET, PLASTIC: 76530; 295202-8C	ea	1	1										
X2	H			*	*	*				C	A775 SPACER: 65597; 270023-1	ea	1	3										
X2	H			*	*	*				*	A776 SCREW, MACHINE: 96906; MS24693C26	ea	100	1										
X2	H			*	*	*				*	A777 SCREW, MACHINE: SAME AS A045	ea		2										
X2	H			*	*	*				*	A778 WASHER, LOCK: SAME AS A531	ea		3										
M	D			*	*	*				C	A779 PANEL, COVER: 65597; 87888-2	ea	1	1										
X2	H			*	*	*				D	A780 RECEPTACLE, FASTENER: SAME AS A664	ea		10										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A781 RIVET, SOLID: SAME AS A665	ea		20										
X2	H			*	*	*				D	A782 GUSSET: 65597; 91990	ea	1	1										
X2	H			*	*	*				*	A783 RIVET, SOLID: 96906; MS20426AD4-5	ea	50	4										
P	F		5895-897-5167	*	*	*				C	A783A GASKET: 65597; 65560-1	ea	1	1				*	*	*	10	20		
M	D			*	*	*				C	A784 PANEL, FRONT: 65597; 87877-2	ea	1	1										
X2	H			*	*	*				C	A785 SPACER: 65597; 270024-1	ea	1	11										
X2	H			*	*	*				C	A785A SHIELD, WIRE: 65597; 089895-0001	ea	1	1										
X2	H			*	*	*				*	A786 SCREW, MACHINE: SAME AS A014	ea		4										
X2	H			*	*	*				*	A787 SCREW, MACHINE: SAME AS A076	ea		11										
X2	H			*	*	*				*	A788 WASHER, LOCK: SAME AS A078	ea		11										
X2	H			*	*	*				*	A789 WASHER, LOCK: SAME AS A081	ea		15										
P	H		5340-937-9065	*	*	*				D	A790 CLIP: 91506; 6012-5A	ea	1	1				*	*	*	10	6		
X2	H			*	*	*				*	A791 RIVET, TUBULAR: 96906; MS16535-112	ea	50	2										
X2	H			*	*	*				D	A792 SPACER: 65597; 270022-1	ea	1	1										
M	D			*	*	*				D	A793 PANEL: 65597; 87877-1	ea	1	1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
M	D			*	*	*				C	A794 COVER, PANEL: 65597; 87893-2	ea	1	1										
X2	H			*	*	*				*	A795 SPACER, SLEEVE: 65597; 270053-1	ea	1	1										
X2	H			*	*	*				*	A796 SCREW, MACHINE: SAME AS A776	ea		2										
X2	H			*	*	*				*	A797 SCREW, MACHINE: SAME AS A07;01	ea		5										
X2	H			*	*	*				*	A798 SCREW, MACHINE: SAME AS A076	ea		3										
X2	H			*	*	*				*	A799 WASHER, LOCK: SAME AS A081	ea		1										
X2	H			*	*	*				*	A800 WASHER, LOCK: SAME AS A078	ea		3										
X2	H		5310-728-2434	*	*	*				*	A801 NUT, SELF LOCK: SAME AS A046B	ea		2										
X2	H		5310-281-9845	*	*	*				*	A802 NUT, SELF LOCK: SAME AS A015	ea		7										
X2	H			*	*	*				C	A803 SPACER: 65597; 270026-1	ea	1	4										
X2	H			*	*	*				C	A804 SPRING, TENSION: 65597; 61173-1	ea	1	2										
X2	H			*	*	*				*	A805 SCREW, MACHINE: 96906; MS24693C28	ea	100	4										
X2	H		5310-728-2434	*	*	*				*	A806 NUT, SELF LOCK: SAME AS A046B	ea		4										
X2	H			*	*	*				D	A807 RECEPTACLE, FASTENER: SAME AS A664	ea		1										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A808 RIVET, SOLID: SAME AS A665	ea		2										
X2	H			*	*	*				D	A809 GUSSET: SAME AS A782	ea		1										
X2	H			*	*	*				*	A810 RIVET, SOLID: SAME AS A783	ea		4										
X2	H			*	*	*				D	A811 CLIP, SPRING TENSION: 65597; 94450-1	ea	1	3										
X2	H			*	*	*				*	A812 RIVET, SOLID: 96906; MS20426AD4-4	ea	50	6										
P	H		5325-171-4365	*	*	*				D	A813 RECEPTACLE, FASTENER: 71286; 212-12N	ea	1	3				*	2	2	13	20		
X2	H				*	*				*	A814 RIVET, SOLID: 96906; MS20426AD3-5	ea	50	6										
M	D			*	*					D	A815 COVER, PANEL: 65597; 87893-1	ea	1	1										
A	H	R		*						C	A816 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116740-1	ea	1	1										
A	H	R			*	*				C	A816A RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116740-2	ea	1	1										
X2	H			*	*	*				*	A817 SCREW, MACHINE: SAME AS A076	ea		7										
X2	H			*	*	*				*	A818 SCREW, MACHINE: SAME AS A014	ea		2										
X2	H				*	*				*	A818A SCREW, MACHINE: SAME AS A048	ea		2										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A819 WASHER, LOCK: SAME AS A078	ea		5										
X2	H		5310-281-9845	*	*	*				*	A820 NUT, SELF LOCK: SAME AS A015	ea		7										
A	H	R		*	*	*				D	A822 CONVERTER, FREQUENCY: 65597; 116751-2	ea	1	1										
X2	H			*	*	*				*	A823 SCREW, MACHINE: SAME AS A045	ea		2										
X2	H			*	*	*				*	A824 WASHER, FLAT: SAME AS A060A	ea		2										
X2	H			*	*					*	A825 WASHER, LOCK: SAME AS A531	ea		2										
X2	H			*	*	*				E	A827 PLATE, EL SH: 65597; 89478-1	ea	1	1										
X2	H			*	*	*				*	A829 SCREW, MACHINE: SAME AS A499	ea		2										
X2	H			*	*	*				*	A831 WASHER, LOCK: SAME AS A081	ea		2										
X2	H			*	*	*				E	A833 PLATE, ELEC SH: 65597; 89477-2	ea	1	1										
X2	H			*	*	*				*	A835 SCREW, MACHINE: SAME AS A499	ea		4										
X2	H			*	*	*				*	A836 WASHER, LOCK: SAME AS A081	ea		4										
P	F		5960-686-8087	*	*	*				E	A837 SHIELD, TUBE: SAME AS A488A	ea		1										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	F		5960-262-0167	*	*	*				E	A838 ELECTRON TUBE: 81349; JAN-12AT7WA	ea	1	1	2	3	5	2	2	2	53	100		V101
X2	H		5955-892-3368	*						E	A839 CRYSTAL, QUARTZ: 65597; 247276-1	ea	1	1										Y101
P	F		5955-892-3368	*	*	*				E	A839A CRYSTAL, QUARTZ: 81349; CR54A/U	ea	1	1	*	*	*	*	*	*	4	4		Y101
P	H		5935-222-9828	*	*	*				E	A840 SOCKET, TUBE: SAME AS A552	ea		1										XV101
X2	H			*	*	*				*	A841 SCREW,MACHINE: 96906; MS51957-11	ea	100	2										
X2	H			*	*	*				*	A842 WASHER, LOCK: SAME AS A081	ea		2										
P	H		5935-581-6941	*	*	*				E	A843 SOCKET, CRYSTAL: 81349; TS0205C01	ea	1	1				*	*	*	4	4		XY101
X2	H				*	*				E	A844 RETAINER, CRYSTAL: 65597; 94428	ea	1	1										
X2	H			*	*	*				*	A845 SCREW, MACHINE: SAME AS A180	ea		1										
X2	H		5330-785-2129	*	*	*				*	A846 INSULATOR, WASHER: SAME AS A173	ea		1										
X2	H		5310-072-5883	*	*	*				*	A847 NUT, SELF LOCK: SAME AS A074	ea		1										
P	H		5910-688-2692	*						E	A848 CAPACITOR, CERAMIC: 91984; 287C	ea	1	3				*	2	2	18	21		C104, C105, C109
P	H		5910-930-2730		*	*				E	A848A CAPACITOR, CERAMIC: 91984; 287N1	ea	1	3				*	2	2	18	21		C104, C105, C109

Table heading: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A849 WASHER, LOCK: 73535; 76307SS	ea	100	3										
X2	H			*	*	*				E	A850 TERMINAL, STUD: 65597; 30563-2	ea	500	4										
X2	H			*	*	*				E	A850A WASHER, LOCK: SAME AS A081	ea		4										
X2	H		5940-270-2657	*	*	*				E	A851 TERMINAL, FEED: 98291; FT-SM-1	ea	1	1										
X2	H		5940-814-4781	*	*	*				E	A852 TERMINAL, STUD: 98291; ST-SM-1	ea	1	2										
X2	H			*	*	*				E	A853 TERMINAL, FEED: 98291; FT-1000	ea	1	3										
A	F	R	5995-686-4852	*	*	*				E	A854 CABLE ASSEMBLY, RADIOFREQUENCY: 65597; 432502-1	ea	1	1										
X2	H			*	*	*				*	A855 WASHER, LOCK: SAME AS A570	ea		1										
X2	H			*	*	*				*	A855A WASHER, LOCK: 65597; 276191NPPHBR	ea	100	1										
P	H		5940-552-4878	*	*	*				F	A856 FERRULE, RF: 80067; MX-1684/U	ea	1	1				*	*	2	8	10		
P	H		5935-686-9356	*	*	*				F	A857 CONNECTOR, PLUG: 95712; 8037-1	ea	1	1				*	*	2	8	13		
P	H		6145-823-2544	*	*	*				F	A858 CABLE, RADIOFREQUENCY: 90484; 13026 REV. 1	ea	ROLL	6				*	*	*	5	12		
P	H		5950-686-6673	*	*	*				E	A865 COIL, RADIOFREQUENCY: 65597; 38789	ea	1	1				*	*	*	5	6		L101

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5950-686-6680	*	*	*				E	A866 COIL, RADIOFREQUENCY: 65597; 38790	ea	1	1				*	*	*	5	6		L102
X2	H			*	*	*				*	A867 WASHER, LOCK: SAME AS A574	ea		2										
P	H		5935-686-3564	*	*	*				E	A868 BRACKET, DIODE MOUNTING: 65597; 92020-1	ea	1	1				*	*	2	4	6		
X2	H			*	*	*				*	A869 SCREW, MACHINE: SAME AS A014	ea		1										
X2	H		5310-072-5883	*	*	*				*	A870 NUT, SELF LOCK: SAME AS A074	ea		1										
X2	H			*						E	A871 SEMI CONDUCTOR DEVICE, DIODE: 88236; 1N416D	ea	1	1										CR102
P	H		5960-615-5550	*	*	*				E	A87101 SEMICONDUCTOR DEVICE, DIODE: 81349; 1N21WE	ea	1	1				*	*	*	4	7		CR102
P	H		5895-705-2819	*						E	A872 COUPLER, CAVITY: 65597; 116696-1	ea	1	2				*	*	*	5	10		
P	H		5895-937-1987		*	*				E	A872A COUPLER, CAVITY: 65597; 116790-1	ea	1	1				*	*	*	4	6		
X2	H			*	*	*				*	A873 SCREW, MACHINE: SAME AS A499	ea		6										
X2	H		5940-159-1252	*						*	A874 TERMINAL, LUG: SAME AS A547	ea		1										
X2	H			*						*	A875 WASHER, FLAT: SAME AS A169	ea		5										
X2	H				*	*				*	A876 WASHER, LOCK: SAME AS A069	ea		1										

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A877 WASHER, LOCK: SAME AS A081	ea		6										
P	F		5935-686-9358		*	*				E	A878 CONNECTOR, RECEPTACLE: 65597; 229503-1	ea	1	1				*	*	2	8	8		J102
X2	H				*	*				*	A879 SCREW, MACHINE: 83385; 103412SS	ea	100	4										
X2	H			*	*	*				*	A880 WASHER, LOCK: 73535; 76314SS	ea	100	4										
X2	H			*	*	*				E	A881 COIL, ADJUSTABLE TUNING: 65597; 65535-1	ea	1	2										
X2	H			*	*	*				E	A882 COIL, ADJUSTABLE TUNING: 65597; 65536-1	ea	1	1										
X2	H			*	*	*				*	A883 WASHER, LOCK: SAME AS A849	ea		3										
X2	H				*	*				*	A884 NUT, PLAIN, HEX: 83385; 100057SS	ea	100	3										
P	H		5910-838-9421		*	*				E	A885 CAPACITOR, CERAMIC: SAME AS A193	ea		2										C101, C103
P	H		5910-577-3209	*	*	*				E	A886 CAPACITOR, CERAMIC: 81350; CC20SH200J	ea	1	2				*	2	2	13	12		C102, C106
P	H		5910-853-6495	*	*	*				E	A887 CAPACITOR, CERAMIC: 81349; CC20SH300J	ea	1	1				*	*	2	8	7		C107
P	H		5910-195-5157	*	*	*				E	A888 CAPACITOR, CERAMIC: 81350; CC20CH100C	ea	1	1				*	*	2	8	8		C108
P	H		5910-543-0822	*	*	*				E	A888A CAPACITOR, CERAMIC: SAME AS A583	ea		1										C110

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5905-195-6502	*	*	*				E	A889 RESISTOR, COMPOSITION: SAME AS A198	ea		1										R101
P	H		5905-256-0409	*	*	*				E	A890 RESISTOR, COMPOSITION: SAME AS A605	ea		1										R102
P	H		5905-245-0023	*	*	*				E	A891 RESISTOR, COMPOSITION: SAME AS A202	ea		1										R103
P	H		5905-190-8879	*	*	*				E	A892 RESISTOR, COMPOSITION: SAME AS A425	ea		1										R104
P	H		5905-195-6748	*	*	*				E	A893 RESISTOR, COMPOSITION: 81349; RC42GF332K	ea	1	1				*	*	2	8	8		R105
P	H		5905-249-3661	*	*	*				E	A894 RESISTOR, COMPOSITION: SAME AS A32201	ea		1										R106
P	H		5905-192-3982	*	*	*				E	A895 RESISTOR, COMPOSITION: SAME AS A204	ea		1										R107
P	H		5905-192-9260	*	*	*				E	A896 RESISTOR, COMPOSITION: SAME AS A243	ea		1										R108
P	H		5960-842-3525	*	*	*				E	A897 SEMICONDUCTOR DEVICE, DIODE: SAME AS A614	ea		1										CR101
P	H		5895-705-2820	*	*	*				E	A899 CAVITY, CONVERT:65597; 116751-1	ea	1	1				*	*	*	4	4		
X2	H			*	*	*				*	A900 SCREW, MACHINE: SAME AS A073	ea		3										
X2	H			*	*	*				*	A901 WASHER, LOCK: SAME AS A081	ea		3										
A	H	R		*	*	*				D	A902 RECEIVER-TRANSMITTER SUBASSEMBLY: 65597; 116741-1	ea	1	1										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44. -44B (continued)													
X2	H			*	*	*				*	A903 SCREW, MACHINE: SAME AS A076	ea		4										
X2	H		5310-281-9845	*	*	*				*	A904 NUT, SELF LOCK: SAME AS A015	ea		4										
P	H		5961-923-3332	*	*	*				E	A905 TRANSISTOR: 81349; 2N174A	ea	1	4				*	2	2	16	12		Q1 thru Q4
X2	H			*	*	*				*	A906 TERMINAL, LUG: 78189; 2103-10-00	ea	500	4										
X2	H			*	*	*				*	A907 WASHER, LOCK: SAME AS A574	ea		4										
X2	H			*	*	*				*	A908 NUT, SELF LOCK: SAME AS A024	ea		4										
P	H		5945-685-9143	*	*	*				E	A909 RELAY, ARMATURE: 99699; S88A3H3A-1	ea	1	2				*	2	2	13	18		K6, K7
X2	H			*	*	*				*	A910 SCREW, MACHINE: SAME AS A190B	ea		4										
X2	H		5310-622-1724	*	*	*				*	A911 NUT, SELF LOCK: 72962; 68-1660-26	ea	100	4										
P	H		5905-299-2023	*	*	*				E	A912 RESISTOR, COMPOSITION: 81349; RC32GF183J	ea	1	1				*	*	2	8	8		R14
P	H		5905-101-7800	*	*	*				E	A913 RESISTOR, COMPOSITION: 81349; RC32GF150K	ea	1	4				*	2	2	22	28		R1, R4, R7, R10
P	H		5905-171-2007	*	*	*				E	A914 RESISTOR, COMPOSITION: 81349; RC42GF433J	ea	1	1				*	*	2	13	8		R15
X2	H		5940-812-9686	*	*	*				E	A915 TERMINAL, STUD: SAME AS A617	ea		12										

(1) SOURCE CD (A)	MAINT. CD (B)	REC. CODE (C)	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
M	D			*	*	*				E	A916 CHASSIS, ELECTRICAL EQUIPMENT: 65597; 91979-2	ea	1	1										
X2	H			*	*	*				D	A917 GROMMET, RUBBER: 83330; 91113G	ea	1	1										
X2	H			*	*	*				D	A918 SPACER, SLEEVE: SAME AS A225	ea		1										
X2	H			*	*	*				D	A919 CLAMP, CABLE: 04673; 2C1-25-(9)	ea	1	1										
X2	H			*	*	*				*	A920 SCREW, MACHINE: 83385; 103684SS	ea	100	1										
X2	H			*	*	*				*	A921 NUT, SELF LOCK: 72962; 68NM-38	ea	100	1										
X2	H			*	*	*				D	A922 KEEPER, CABLE: 04673; 2C1-25A-(9)	ea	1	1										
M	H			*						D	A923 BRACKET, DL MOUNTING: 65597; 92006-1	ea	1	1										
M	H				*	*				D	A923A BRACKET, DL MOUNTING: 65597; 92584-2	ea	1	1										
X2	H			*	*	*				D	A924 BUMPER: 65597; 65475-1	ea	1	2										
X2	H			*	*	*				*	A925 SCREW, MACHINE: SAME AS A014	ea		2										
X2	H			*	*	*				*	A925A SCREW, MACHINE: SAME AS A649	ea		2										
X2	H		5310-281-9845	*	*	*				*	A925B NUT, SELF LOCK: SAME AS A015	ea		2										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(B) MAINT. CD	(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*						*	A926 WASHER, LOCK: SAME AS A081	ea		2										
X2	H			*	*	*				D	A927 BLOCK, MOUNT, DL: 65597; 77581-1	ea	1	2										
X2	H			*						*	A927A TRANSMITTER SUPPORT SUBDIVISION: 65597; 117789-1	ea	1	1										
A	H	R			*	*				D	A927A1 TRANSMITTER SUPPORT SUBASSEMBLY: 65597; 117789-2	ea	1	1										
P	H		5910-615-5518	*	*	*				D	A927B CAPACITOR, ELECTROLYTIC: 81349; CL24BQ040SP3	ea	1	1				*	*	2	5	10		C14
X1	H		5340-598-0383	*	*	*				*	A927C CLAMP, LOOP: 09922; HP4N	ea	1	1										
X2	H		5940-682-2477	*	*	*				*	A927D TERMINAL, LUG: SAME AS A080	ea		1										
X2	H			*						*	A928 SCREW, MACHINE: SAME AS A649	ea		2										
X2	H			*	*	*				*	A929 SCREW, MACHINE: SAME AS A014	ea		3										
X2	H			*	*	*				*	A929A SCREW, MACHINE: SAME AS A076	ea		1										
X2	H			*	*	*				*	A929B WASHER, FLAT: 96906; MS15795-804	ea	100	1										
X2	H			*						*	A930 WASHER, LOCK: SAME AS A081	ea		2										
X2	H			*	*	*				*	A930A WASHER, FLAT: SAME AS A169	ea		2										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5961-904-7700	*						E	A930B TRANSISTOR: 81349; 2N2904	ea	1	1				*	*	2	8	7		Q6
P	H		5961-937-1409		*	*				E	A930B1 TRANSISTOR: 04713; 2N4236	ea	1	1				*	*	*	15	13		Q[illegible]
P	H		5961-954-2159	*						E	A930C TRANSISTOR: 81349; 2N1165	ea	1	1				*	*	2	8	7		Q5
P	H		5961-917-1636		*	*				E	A930C1 TRANSISTOR: 04713; 2N3790	ea	1	1				*	*	*	15	13		Q5
X2	H			*						E	A930D PL, HEAT SINK: 65597; 284919-1	ea	1	1										
X2	H			*	*	*				E	A930E INSULATOR, PLATE: 08289; DM105	ea	1	1										
X2	H			*	*	*				*	A930F SCREW, MACHINE: SAME AS A180	ea		2										
X2	H			*	*	*				*	A930G TERMINAL, LUG: 78189; 2101-04-00	ea	500	1										
X2	H		5970-818-3486	*	*	*				*	A930H INSULATOR, BUSH: 83298; 2106300	ea	1	2										
X2	H			*	*	*				*	A930I WASHER, FLAT: SAME AS A169	ea		2										
X2	H		5310-072-5883	*	*	*				*	A930J NUT, SELF LOCK: SAME AS AS A074	ea		2										
P	H		5905-279-3511	*	*	*				E	A930K RESISTOR, COMPOSITION: SAME AS A373	ea		1										R17
P	H		5905-577-7435	*						E	A930L RESISTOR, WIREWOUND: 81349; RW59V561	ea	1	1				*	*	2	8	7		R16

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5960-087-6047	*	*	*				E	A930M SEMICONDUCTOR, DIODE: SAME AS A446A	ea		2										CR25, CR27
P	H		5961-852-5170	*	*	*				E	A930N SEMICONDUCTOR DEVICE, DIODE: 81349; 1N3032B	ea	1	1				*	*	*	10	10		CR26
P	H		5961-942-2738	*	*	*				E	A9300 SOCKET, SEMICONDUCTOR DEVICE: 06776; NS503-19	ea	1	1				*	*	*	10	10		XQ6
X1	H			*	*	*				E	A930P PRINTED CIRCUIT BOARD: 65597; 284915-3	ea	1	1										
X1	H			*	*	*				E	A930P1 PRINTED CIRCUIT BOARD: 65597; 284915-5	ea	1	1										
X2	H		5940-500-5644	*	*	*				F	A930Q TERMINAL, LUG: 71279; 2043-2	ea	500	5										
X2	H			*	*	*				D	A931 BRACKET, REL MT: 65597; 91991-1	ea	1	1										
X2	H			*	*	*				*	A932 SCREW, MACHINE: SAME AS A014	ea		3										
P	F		5945-687-1174	*	*	*				D	A933 RELAY, ARMATURE: SAME AS A079	ea		4										K1 thru K4
X2	H		5310-072-5883	*	*	*				*	A934 NUT, SELF LOCK: SAME AS A074	ea		12										
M	D			*						D	A935 BRACKET, RELAY MOUNTING: 65597; 91987-1	ea	1	1										
X2	H			*	*	*				*	A936 SCREW, MACHINE: SAME AS A014	ea		2										
P	H		5945-685-9144	*	*	*				D	A937 RELAY, ARMATURE: 73949; 595-PHI-235 DUAL, A-(D55X)W/AN330, 4 CAN	ea	1	1				*	*	*	5	9		K5

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H		5310-208-4006	*	*	*				*	A938 NUT, SELF LOCK: SAME AS A046	ea		3										
P	H		5910-686-6639	*	*	*				D	A939 CAPACITOR, PAPER: 84411; WX-2	ea	1	1				*	*	2	8	8		C7
X2	H			*	*	*				*	A940 SCREW, MACHINE: SAME AS A068	ea		2										
X2	H		5940-156-7344		*	*				*	A94001 TERMINAL, LUG: 78189; 2104-06-00	ea	500	1										
X2	H				*	*				*	A94002 WASHER, LOCK: SAME AS A531	ea		1										
P	H		5910-686-6615	*						D	A941 CAPACITOR, PAPER: 82376; MDL8305	ea	1	1				*	*	2	8	8		C5
P	H		5910-930-2731		*	*				D	A941A CAPACITOR, PAPER: 72928; 17891	ea	1	1				*	*	2	8	8		C5
X2	H			*	*	*				*	A942 SCREW, MACHINE: SAME AS A068	ea		2										
P	H		5910-686-6646	*	*	*				D	A943 CAPACITOR, PLASTIC: 80152; ASG254-2ME	ea	1	1				*	*	2	8	8		C6
P	H		5910-705-9196	*	*	*				D	A944 CAP, ELECTRICAL: 65597; 28139-1	ea	1	1				*	*	*	5	9		
M	H			*	*	*				D	A945 BRACKET, CAP MOUNTING: 65597; 92019-1	ea	1	1										
X2	H		5940-828-6984	*	*	*				*	A946 TERMINAL, LUG: SAME AS A656	ea		2										
X2	H			*	*	*				*	A947 WASHER, LOCK: SAME AS A012	ea		1										

Repair parts for direct support, general support, and depot maintenance

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A948 WASHER, FLAT: SAME AS A480	ea		3										
X2	H			*	*	*				*	A949 WASHER, LOCK: SAME AS A011	ea		2										
X2	H			*	*	*				*	A950 NUT, PLAIN, HEX: SAME AS A48201	ea		2										
X2	H		5310-281-9845	*	*	*				*	A951 NUT, SELF LOCK: SAME AS A015	ea		1										
X2	H			*	*	*				D	A952 BRACKET, CAP MOUNT: 65597; 92017-1	ea	1	1										
X2	H			*	*	*				*	A953 SCREW, MACHINE: SAME AS A048	ea		2										
X2	H			*	*	*				D	A954 BAFFLE: 65597; 81746-2	ea	1	1										
X2	H		5310-281-9845	*	*	*				E	A954A NUT, SELF LOCK: SAME AS A015	ea		1										
X2	H			*	*	*				E	A955 TERMINAL, STUD: SAME AS A535	ea		2										
X2	H			*	*	*				*	A956 RIVET, TUBULAR: SAME AS A536	ea		2										
X2	H			*	*	*				E	A957 BAFFLE: 65597; 81746-1	ea	1	1										
P	H		5905-682-1153	*	*	*				D	A958 RESISTOR, VARIABLE: SAME AS A375	ea		1										R154
X2	H			*	*	*				*	A959 WASHER, LOCK: SAME AS A212	ea		1										
P	H		5960-685-9142	*						D	A960 SEMICONDUCTOR DEVICE, DIODE: 99942; 1N1363RA	ea	1	1				*	*	2	8	7		CR151

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5961-985-1930		*	*				D	A960A SEMICONDUCTOR DEVICE, DIODE: 81349; 1N2990RB	ea	1	1				*	*	*	5	7		CR151
P	H		5960-687-1155	*						D	A961 SEMICONDUCTOR DEVICE, DIODE: 99942; 1N1369R	ea	1	1				*	*	2	8	7		CR152
P	H		5961-080-4694		*	*				D	A961A SEMICONDUCTOR DEVICE, DIODE: 81349; 1N2999RB	ea	1	1				*	*	*	5	7		CR152
X2	H			*	*	*				*	A962 WASHER, LOCK: 96906; MS35333-73	ea	100	2										
X2	H			*	*	*				*	A963 WASHER, LOCK: SAME AS A574	ea		2										
X2	H			*	*	*				*	A964 NUT, SELF LOCK: SAME AS A024	ea		2										
P	H		5935-160-1365	*	*	*				D	A965 SOCKET, TUBE: 81349; TS103P01	ea	1	2				*	*	*	5	6		XV151, XV152
X2	H			*						*	A966 SCREW, MACHINE: SAME AS A540	ea		2										
X2	H			*	*	*				*	A967 SCREW, MACHINE: SAME AS A014	ea		4										
X2	H			*	*	*				*	A96701 TERMINAL, STUD: SAME AS A123	ea		2										
X2	H		5940-159-1252	*	*	*				*	A96702 TERMINAL, LUG: SAME AS A547	ea		3										
X2	H		5940-682-2477	*	*	*				*	A968 TERMINAL, LUG: SAME AS A080	ea		2										
X2	H			*	*	*				*	A969 WASHER, LOCK: SAME AS A081	ea		5										

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	(3) MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A969 WASHER, LOCK: SAME AS A081	ea		5										
X2	H			*	*	*				*	A969A WASHER, LOCK: SAME AS A078	ea		2										
X2	H		5310-072-5883	*	*	*				*	A970 NUT, SELF LOCK: SAME AS A074	ea		2										
P	H		5910-682-3149	*						D	A971D CAPACITOR, MICA: 84171; DM-20-562±2%	ea	1	1				*	*	2	8	7		C151
P	H		5910-771-9090		*	*				D	A971A CAPACITOR, MICA: 81349; CM07F562G03	ea	1	1				*	*	2	8	8		C151
P	H		5910-822-5683		*	*				D	A972 CAPACITOR, CERAMIC: SAME AS A194	ea		4										C152, C153, C155, C157
P	H		5905-190-8879	*						D	A973 RESISTOR, COMPOSITION: SAME AS A425	ea		1										R151
P	H		5910-686-7757		*	*				D	A97301 CAPACITOR, CERAMIC: 56289; 41C92	ea	1	3				*	2	2	18	24		C154, C156, C158
P	H		5905-192-3987	*	*	*				D	A974 RESISTOR, COMPOSITION: SAME AS A206	ea		1										R152, R153, R155
P	H		5905-195-5514	*	*	*				D	A975 RESISTOR, COMPOSITION: 81349; RC20GF152K	ea	1	1				*	*	2	8	8		R163
P	H		5905-190-8883	*	*	*				D	A976 RESISTOR, COMPOSITION: SAME AS A60201	ea		2										R157, R158
P	H		5905-185-6575	*	*	*				D	A977 RESISTOR, COMPOSITION: 81349; RC20GF392K	ea	1	1				*	*	2	8	8		R164
P	H		5905-279-3517	*	*	*				D	A978 RESISTOR, COMPOSITION: 81349; RC20GF510J	ea	1	1				*	*	2	8	8		R156

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5950-836-2494	*	*	*				D	A97801 COIL, RADIOFREQUENCY: 72259; RFC-M-1000	ea	1	2				*	*	2	10	10		L151, L152
P	H		5950-686-6660	*	*	*				D	A979 TRANSFORMER, PULSE: 97722; MPT111-0.4	ea	1	1				*	*	*	5	6		T151
P	H		5950-686-6659	*	*	*				D	A980 TRANSFORMER, PULSE: MPT101-1.0	ea	1	1				*	*	*	5	6		T152
P	H		5905-686-3346	*	*	*				D	A981 RESISTOR, WIREWOUND: 94310; X-9208	ea	1	1				*	*	*	8	8		R109
P	H		5905-686-3305	*	*	*				D	A982 RESISTOR, WIREWOUND: 94310; X-9209	ea	1	1				*	*	2	8	8		R160
X2	H			*	*	*				*	A983 SCREW, MACHINE: 96906; MS51957-19	ea	100	2										
X2	H		5940-682-2477	*	*	*				*	A98301 TERMINAL, LUG: SAME AS A080	ea		1										
X2	H			*	*	*				*	A98302 WASHER, LOCK: SAME AS A078	ea		1										
P	H		5935-688-3969	*	*	*				D	A984 CONNECTOR, RECEPTACLE: 91662; 00-5002-013-103-003	ea	1	1				*	*	*	5	12		J301
P	H		5935-686-3459	*	*	*				D	A985 CONNECTOR, RECEPTACLE: 91662; 00-5002-017-103-003(7)	ea	1	1				*	*	*	5	10		J351
P	H		5935-686-3458	*	*	*				D	A986 CONNECTOR, RECEPTACLE: 91662; 00-5002-015-103-003(4)	ea	1	1				*	*	*	5	10		J401
P	H		5935-686-3457	*	*	*				D	A987 CONNECTOR, RECEPTACLE: 91662; 00-5002-015-103-003(13)	ea	1	1				*	*	*	5	10		J451

Table title: REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(B) MAINT. CD	(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5935-686-3456	*	*	*				D	A988 CONNECTOR, RECEPTACLE: 91662; 00-5002-015-103-003(11)	ea	1	1				*	*	*	5	10		J501
P	H		5935-686-3460	*	*	*				D	A989 CONNECTOR, RECEPTACLE: 91662; 00-5002-014-103-003(5)	ea	1	1				*	*	*	5	10		J551
X2	H			*	*	*				*	A990 SCREW, MACHINE: SAME AS A076	ea		3										
X2	H			*	*	*				*	A991 SCREW, MACHINE: SAME AS A073	ea		6										
X2	H			*	*	*				*	A992 SCREW, MACHINE: SAME AS A014	ea		3										
X2	H		5940-682-2477	*	*	*				*	A993 TERMINAL, LUG: SAME AS A080	ea		9										
X2	H			*	*	*				*	A994 WASHER, LOCK: SAME AS A081	ea		6										
X2	H			*	*	*				*	A994A WASHER, LOCK: SAME AS A078	ea		6										
X2	H		5310-072-5883	*	*	*				*	A995 NUT, SELF LOCK: SAME AS A074	ea		12										
P	H		5905-299-2052	*	*	*				D	A995A RESISTOR, COMPOSITION: 81349; RC32GF561J	ea	1	1				*	*	2	8	8		R18
P	H		5905-299-2044	*	*	*				D	A996 RESISTOR, COMPOSITION: 81349; RC32GF222K	ea	1	1				*	*	*	8	8		R641
P	H		5905-185-8507	*	*	*				D	A997 RESISTOR, COMPOSITION: 81349; RC42GF912J	ea	1	1				*	*	2	8	8		R642
P	H		5935-686-9383	*	*	*				D	A998D CONNECTOR, RECEPTACLE: 91662; 7001-29-5-1-1-11	ea	1	1				*	*	*	5	4		J621

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
P	H		5935-947-8288	*	*	*				D	A99801 CONNECTOR, RECEPTACLE: 91662; 00-7001-029-163-001(11)	ea	1	1				*	*	*	5	10		J621
P	H		5935-686-9361	*						D	A999 CONNECTOR, RECEPTACLE: 91662; 7001-35-5-1-1-19	ea	1	1				*	*	*	5	10		J651
P	H		5935-832-5243	*	*	*				D	A99901 CONNECTOR, RECEPTACLE: 91662; 00-7001-035-163-001(19)	ea	1	1				*	*	*	5	10		J651
P	H		5935-686-9360	*						D	A1000D CONNECTOR, RECEPTACLE: 91662; 7001-23-5-1-1	ea	1	1				*	*	*	5	10		J681
P	H		5935-947-8343		*	*				D	A100001 CONNECTOR, RECEPTACLE: 91662; 00-7001-023-163-001	ea	1	1				*	*	*	5	10		J681
X2	H		5310-281-9845		*	*				*	A1002 NUT, SELF LOCK: SAME AS A015	ea		6										
P	H		5905-926-8469	*	*	*				D	A1002A RESISTOR, WIREWOUND: 81349; RE70G82R5	ea	1	1				*	*	2	8	8		R16
X2	H			*	*	*				*	A1002B SCREW, MACHINE: SAME AS A014	ea		2										
P	H		5895-705-2821	*	*	*				D	A1003M DELAY LINE: 97722; EP4622	ea	1	1				*	*	*	4	4		DL601
M	D			*	*	*				D	A1003A BRACKET, RES MOUNTING: 65597; 92634-0003	ea	1	1										
X2	H		5940-156-7344	*	*	*				*	A1004M TERMINAL, LUG: SAME AS A94001	ea		4										
X2	H			*	*	*				*	A1005 WASHER, LOCK: SAME AS A531	ea		3										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H		5310-208-4006	*	*	*				*	A1006 NUT, SELF LOCK: SAME AS A046	ea		4										
P	H		5905-279-3511	*	*	*				D	A1007 RESISTOR, COMPOSITION: SAME AS A373	ea		1										R616
X2	H			*	*	*				D	A1008 SUPPORT, CARD: 65597; 81747-1	ea	1	1										
X2	H			*	*	*				*	A1009 SCREW, MACHINE: SAME AS A048	ea	100	2										
X2	H		5940-682-2477	*	*	*				D	A1010 TERMINAL, LUG: SAME AS A080	ea		2										
X2	H			*	*	*				*	A1012 WASHER, LOCK: SAME AS A081	ea		2										
X2	H		5310-281-9845	*	*	*				*	A1013 NUT, SELF LOCK: SAME AS A015	ea		2										
P	H		5905-251-7757	*	*	*				B	A1014 RESISTOR, COMPOSITION: 81349; RC20GF270K	ea	1	1				*	*	2	8	8		R159
P	H		5950-682-3142	*	*	*				D	A1015 TRANSFORMER, PULSE: 97722; 102-A-WIL	ea	1	1				*	*	*	5	6		T153
X2	H			*	*	*				D	A1016 STRAP, RETAINING: 65597; 92018-1	ea	1	1										
X2	H			*	*	*				*	A1017 SCREW, MACHINE: SAME AS A014	ea		2										
X2	H			*	*	*				D	A1018 CLIP, ELECTRIC: 01009; 90BC	ea	1	1										
M	H			*	*	*				D	A1019 WIRING HARNESS: 65597; 432501-1	ea	1	1										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A1020 SPACER, SLEEVE: 65597; 270020-3	ea	1	3										
X2	H		5340-543-3931	*	*	*				*	A1021 CLAMP, LOOP: 09922; HP3N	ea	1	3										
X2	H			*	*	*				*	A1022 SCREW, MACHINE: 96906; MS24693C11	ea	100	3										
X2	H			*	*	*				*	A1023 WASHER, FLAT: SAME AS A929B	ea		6										
X2	H		5310-281-9845	*	*	*				*	A1024 NUT, SELF LOCK: SAME AS A015	ea		3										
X2	H			*	*	*				D	A1025 DUPLEXER: 65597; 116739-1	ea	1	1										
X2	H			*	*	*				*	A1026 SCREW, MACHINE: SAME AS A014	ea		2										
M	H			*	*	*				E	A1027 BRACKET, ANGLE: 65597; 91995-1	ea	1	1										
X2	H			*	*	*				*	A1028 SCREW, MACHINE: SAME AS A073	ea		2										
X2	H			*	*	*				*	A1029 WASHER, LOCK: SAME AS A081	ea		2										
P	H		5935-710-9328	*	*	*				E	A1030 CONNECTOR, TEE: 74868; 28600(10100 MODIFIED)	ea	1	1				*	*	*	5	12		J107
P	H		5935-729-8036	*	*	*				E	A1031 CONNECTOR, RECEPTACLE: 96906; UG-704A/U	ea	1	1				*	*	*	5	10		J101
X2	H			*	*	*				E	A1032 PLATE, CONNECTOR MOUNTING: 65597; 87875-1	ea	1	1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1)(A) SOURCE CD	(1)(B) MAINT. CD	(1)(C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10)(A) ILLUSTRATIONS FIGURE NUMBER	(10)(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				E	A103201 SHIELD, CONNECTOR: 65597; 89500-1	ea	1	1										
X2	H			*	*	*				*	A1033 WASHER, LOCK: 65597; 27221CPSCH	ea	100	1										
P	H		5935-686-9357	*	*	*				E	A1034 CONNECTOR, PLUG: 95712; 8036-1	ea	1	2				*	*	2	10	24		P102, P103
X2	H			*	*	*				E	A1035 GROMMET, RUBBER: 96906; MS35489-4	ea	1	1										
P	H		6145-823-2544	*	*	*				E	A1036 CABLE, RADIOFREQUENCY: SAME AS A858	ft		27										
M	D			*	*	*				D	A1037 WIRING HARNESS: 65597; 432500-1	ea	1	1										
M	H			*	*	*				D	A1037A WIRING HARNESS: 65597; 432903-1	ea	1	1										
X2	H		5340-598-0496	*	*	*				*	A1038 CLAMP, LOOP: 09922; HP8N	ea	1	2										
X2	H		5340-200-2691	*	*	*				*	A1039 CLAMP, LOOP: 09922; HP6N	ea	1	2										
X2	H			*	*	*				*	A1040 SPACER, SLEEVE: 65597; 270029-2	ea	1	3										
X2	H			*	*	*				*	A1041 SCREW, MACHINE: 96906; MS24693C8	ea	1	1										
X2	H			*	*	*				*	A1042 SCREW, MACHINE: SAME AS A983	ea		2										
X2	H			*	*	*				*	A1043 SCREW, MACHINE: SAME AS A668	ea		1										

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1–20	DS (B) 21–50	DS (C) 51–100	GS (A) 1–20	GS (B) 21–50	GS (C) 51–100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(10) (B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H			*	*	*				*	A1044 WASHER, FLAT: SAME AS A169	ea		2										
X2	H			*	*	*				*	A1045 WASHER, FLAT: SAME AS A060A	ea		5										
X2	H		5310-281-9845	*	*	*				*	A1046 NUT, SELF LOCK: SAME AS A015	ea		4										
X2	H			*	*	*				*	A1047 SCREW, MACHINE: SAME AS A014	ea		2										
X2	H		6310-072-5883	*	*	*				*	A1048 NUT, SELF LOCK: SAME AS A074	ea		2										
P	H		5935-686-9382	*	*	*				E	A1049 CONNECTOR, RECEPTACLE: 65597; 30496-1	ea	1	1				*	*	*	5	10		J112
P	H		5935-578-3661	*	*	*				E	A1050 CONNECTOR, RECEPTACLE: 91146; DE-9S(A101)	ea	1	2				*	*	*	5	10		P201, J352
X2	H			*	*	*				E	A1051 SHIELD, ELECTRICAL CONNECTOR: 65597; 29467-1	ea	1	1										
X2	H			*	*	*				E	A1052 CLAMP, CONNECTOR: 65597; 94456-1	ea	1	2										
X2	H			*	*	*				*	A1053 SCREW, MACHINE: 96906; MS35275-214	ea	100	2										
X2	H		5310-072-5883	*	*	*				*	A1054 NUT, SELF LOCK: SAME AS A074	ea		2										
X1	H			*	*	*				*	A1055 CONNECTOR, LOCK: 71468; D20419	ea	1	2										
X2	H		5325-275-5897	*	*	*				E	A1056 GROMMET, RUBBER: 79497; G1065	ea	1	1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

(1) (A) SOURCE CD	(1) (B) MAINT. CD	(1) (C) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	IND CD	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UN PK	(6) QTY INC IN UNIT	(7) 30 DAY MAINT. ALW. DS (A) 1-20	DS (B) 21-50	DS (C) 51-100	GS (A) 1-20	GS (B) 21-50	GS (C) 51-100	(8) 1 YR. ALW. PER 100 EQUIP. CNTGCY PL.	(9) DEPOT MAINT. ALW. PER 100 EQUIP.	(10) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
											AN/APX-44, -44B (continued)													
X2	H		5325-687-5607	*	*	*				D	A1057 GROMMET, PLASTIC:76530; 295202-4A	ea	1	3										
P	H		5940-578-1084	*	*	*				D	A1058 TERMINAL, FEED: SAME AS A616	ea		4										
X2	H		5940-812-9686	*	*	*				D	A1059 TERMINAL, STUD: SAME AS A617	ea		8										
M	D			*	*	*				D	A1060 CHASSIS, ELECTRICAL EQUIPMENT: 65597; 80813-2	ea	1	1										

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-36 (Unclas) requirements for Direct and General Support maintenance, OV-1A, OV-1B, OV-1C, U-1A, U-6A, U-8D, RU-8D, U-8F, U-10A, CH-21B, CH-21C, CH-34A, CH-34C, CH-37A, CH-37B, CH-47A, UH-1A, UH-1B, UH-1D, UH-19C and UH-19D aircraft.

CHANGE No. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *16 February 1967*

DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists

TRANSPONDER SETS AN/APX–44 AND AN/APX–44B

TM 11-5895-217-35, 27 July 1960, is changed as follows:

The manual is changed as indicated so that it also applies to—

Nomenclature	*Order No.*	*Serial No.*
Transponder Set AN/APX–44B	FR 28043–P6–22095	1 through 500

Title is changed as shown above.

Note. The parenthetical reference to previous changes (example: "page 3 of C 3") indicate pertinent material was published in that Change.

Page 2. Make the following changes:

Chapter 1, below the title, add:

Note. Transponder Set AN/APX–44B is similar to Transponder Set AN/APX–44 except that Receiver-Transmitter, Radar RT–494B/APX–44B contains a transient suppressor circuit, minor circuit changes have been made, and the AN/APX–44B is provided with an external interference filter 14S399 (FSN 5915–858–8373) and a low pass filter 66D13764 (FSN 5915–947–3159). The filters are supplied only with Transponder Set AN/APX–44B on Order No. FR 28–043–P6–22095(E). Information in this manual applies to both sets unless otherwise specified.

Paragraph 1*c* (page 1 of C 4). Delete subparagraph *c* and substitute:

c. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting discrepancies and recommendations for improving this equipment publication. The form will be completed by the individual using the manual and forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL–MR–NMP–AD, Fort Monmouth, N.J., 07703.

Page 16, paragraph 24*d*. Add after the second sentence:

(For the AN/APX–44B, power relay K5 applies input power to the high- and low-voltage power supplies through a transient suppressor circuit to prevent undesirable noise spikes from entering the receiver-transmitter from the 27.5-volt dc input source.)

Paragraph 25, line 2. After "figure 8", add:

(for Receiver-Transmitter RT–494B/-APX–44B, refer to figure 8.1)

Page 17, figure 7. Add figure 7.1 after figure 7.

Page 20, paragraph 25*l*. After last sentence, add: For the AN/APX–44B, power relay K5 applies input power to the high-and-low-voltage power supplies through a transient suppressor circuit to prevent undesirable noise spikes from entering the receiver-transmitter from the 27.5-volt dc input source (fig. 8.1).

Page 23, figure 11. Add the following note to figure 11:

NOTE:
FOR THE RT–494B/APX–44B, SUPPRESSOR DIODES CR205, CR206, AND CR207 ARE TYPE IN914.

Page 24, paragraph 27. Make the following changes:

Subparagraph *b*, line 1. After "(fig. 12)" add: *(for the RT–494B/APX–44B, fig. 12.1.)*.

Line 15. After "C202", add: (for the RT–494B/APX–44B, the decoupling filter consists of R204 and C252).

Line 23. After "R243", add: (for the RT–494B/APX–44B, the screen grid of V201 is bypassed to ground by capacitor C202).

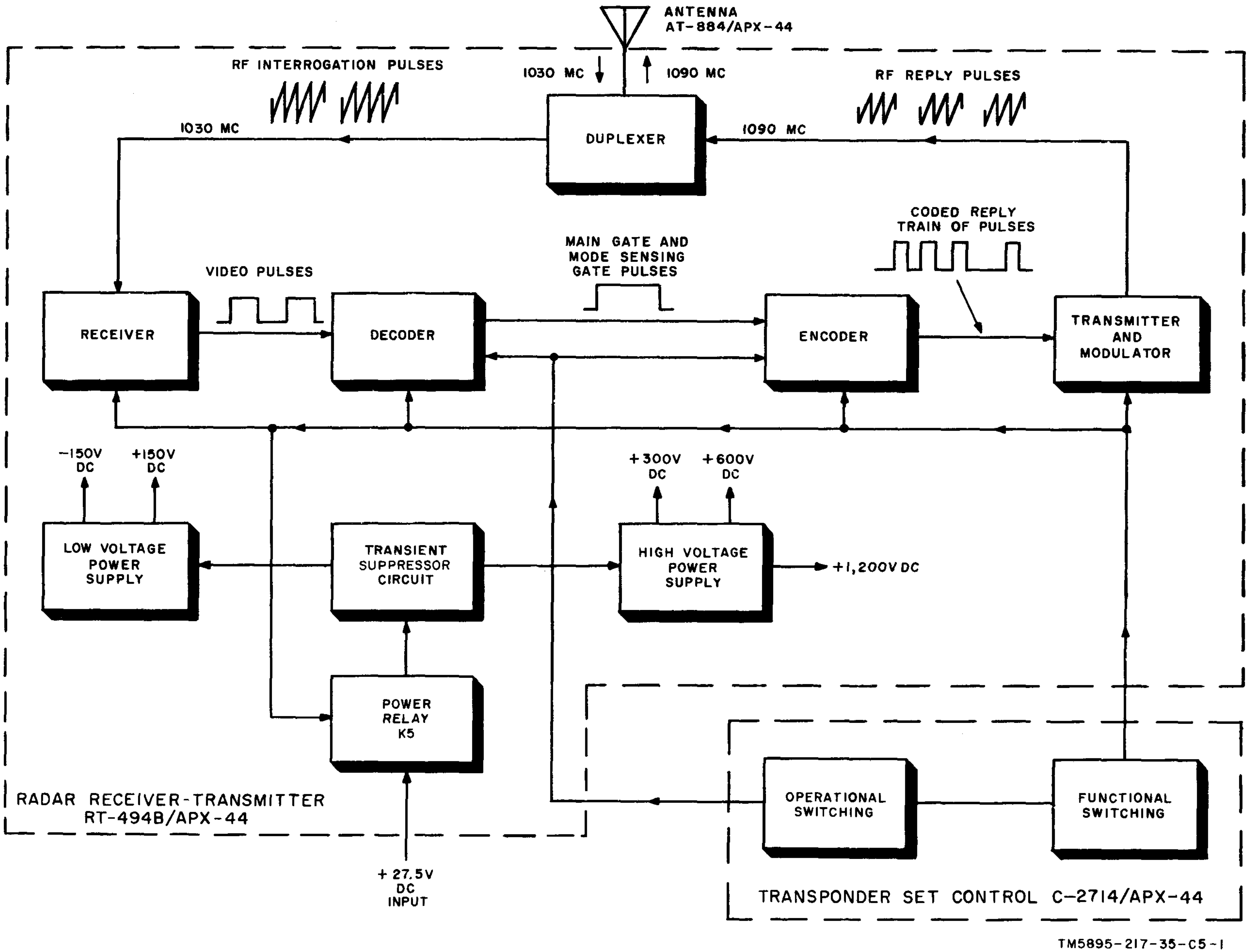


Fig. 7.1. Transponder Set AN/APX-44B, block diagram.

Line 45. After "C207", add: (for the RT–494B/APX–44B, the decoupling filter consists of R206 and C253).

Line 47. After "R244", add: (for the RT–494B/APX–44B, the screen grid of V202 is bypassed to ground by capacitor C207).

Subparagraph *c*, line 1. After "(fig. 13)", add: (for the RT–494B/APX–44B, refer to fig. 13.1.).

Line 10. After "C211", add: (for the RT–494B/APX–44B, the decoupling filter consists of R210 and C254).

Line 14. After "R245", add: (for the RT–494B/APX–44B, the decoupling filter is bypassed to ground by capacitor C211).

Page 25. After figure 12, add figure 12.1.

After figure 13, add figure 13.1.

Page 26, paragraph 27*c*. Make the following changes:

Line 18. After "C215", add: (for the RT–494B/APX–44B, the decoupling filter consists of R213 and C255).

Last line. After "R246", add: (for the RT–494B/APX–44B, the screen grid of V204 is bypassed to ground by capacitor C215).

Page 30, figure 16 (page 2 of C 2). Add the following note 4 after note 3.

4. FOR THE RT–494B/APX–44B, DIODES CR205, CR206 AND CR207 ARE TYPE 1N914.

Add the following note 3 after note 2,

3. FOR THE RT–494B/APX–44B, THE VIDEO OUT TEST POINT IS CONNECTED AT THE JUNCTION OF RESISTORS R234 AND R235.

Figure 17. Make the following changes:

For R234, change "1,200", to 1,000 ohms.

For R235, change "68", to 200 ohms.

Page 31, figure 18. Add the following note:

NOTE:

FOR THE RT–494B/APX–44B, DIODES CR301 AND CR302 ARE TYPE 1N914 AND DIODE CR303 IS TYPE 1N982B.

Page 34, figure 22. Add note 3 after note 2:

3. FOR THE RT–494B/APX–44B, DIODES CR301 AND CR302 ARE TYPE 1N914 AND DIODE CR303 IS TYPE 1N982B.

Page 35, figure 23. Add the following note:

NOTE:

FOR THE RT–494B/APX–44B, ALL DIODES ARE TYPE 1N914.

Page 37, figure 25. Change the word "NOTE" to NOTES. Number the existing note "1", and add the following:

2. FOR THE RT–494B/APX–44B, DIODES CR351 THROUGH CR358 ARE TYPE 1N914.

Page 42. figure 29. Add the following note:

NOTE:

FOR THE RT–494B/APX–44B, DIODE CR501 IS TYPE 1N914.

Page 43, figure 30. Change the word "NOTE" to NOTES. Number the existing note "1", and add the following:

2. FOR THE RT–494B/APX–44B, DIODES CR501 AND CR502 ARE TYPE 1N914.

Page 44, figure 32. Change the word "NOTE" to NOTES. Number the existing note "1", and add the following:

2. FOR THE RT–494B/APX–44B, DIODE CR502 IS TYPE 1N914.

Page 49, figure 37. Change the word "NOTE" to NOTES. Number the existing note "1", and add:

2. FOR THE RT–494B/APX–44B, RESISTOR R455 HAS BEEN CHANGED FROM 100,000 OHMS TO 22,000 OHMS, AND RESISTOR R456 HAS BEEN CHANGED FROM 1.5 MEGOHMS TO 330,000 OHMS.

Page 50, figure 38. Add note 3 after note 2:

3. FOR THE RT–494B/APX–44B, DIODE CR451 IS TYPE 1N914.

Figure 39. Change the word "NOTE" to NOTES. Number the existing note "1", and add the following:

2. FOR THE RT–494B/APX–44B, RESISTOR R468 IS 1.0 MEGOHM.

Page 53, figure 43. Add note 4 after note 3:

4. FOR THE RT–494B/APX–44B, DIODE CR552 IS TYPE 1N914 AND RESISTOR R565 IS 12,000 OHMS.

Page 56, figure 45. Add note 3 after note 2:

3. FOR THE RT–494B/APX–44B, DIODE CR151 IS TYPE 1N2990RB AND DIODE CR152 IS TYPE 1N2999RB.

Page 57, paragraph 39, heading. After "(fig. 47)", add: (for the RT–494B/APX–44, refer to fig. 47.1.).

Page 58, paragraph 39. Make the following changes:

Subparagraph *b*, line 16. After "power relay K5", add: (for the RT–494B/APX–44B, input power from K5 is applied through transient suppressor circuit Q5 and Q6 to a filter consisting of C13, L1, C1, and C2 (fig. 47.1.).

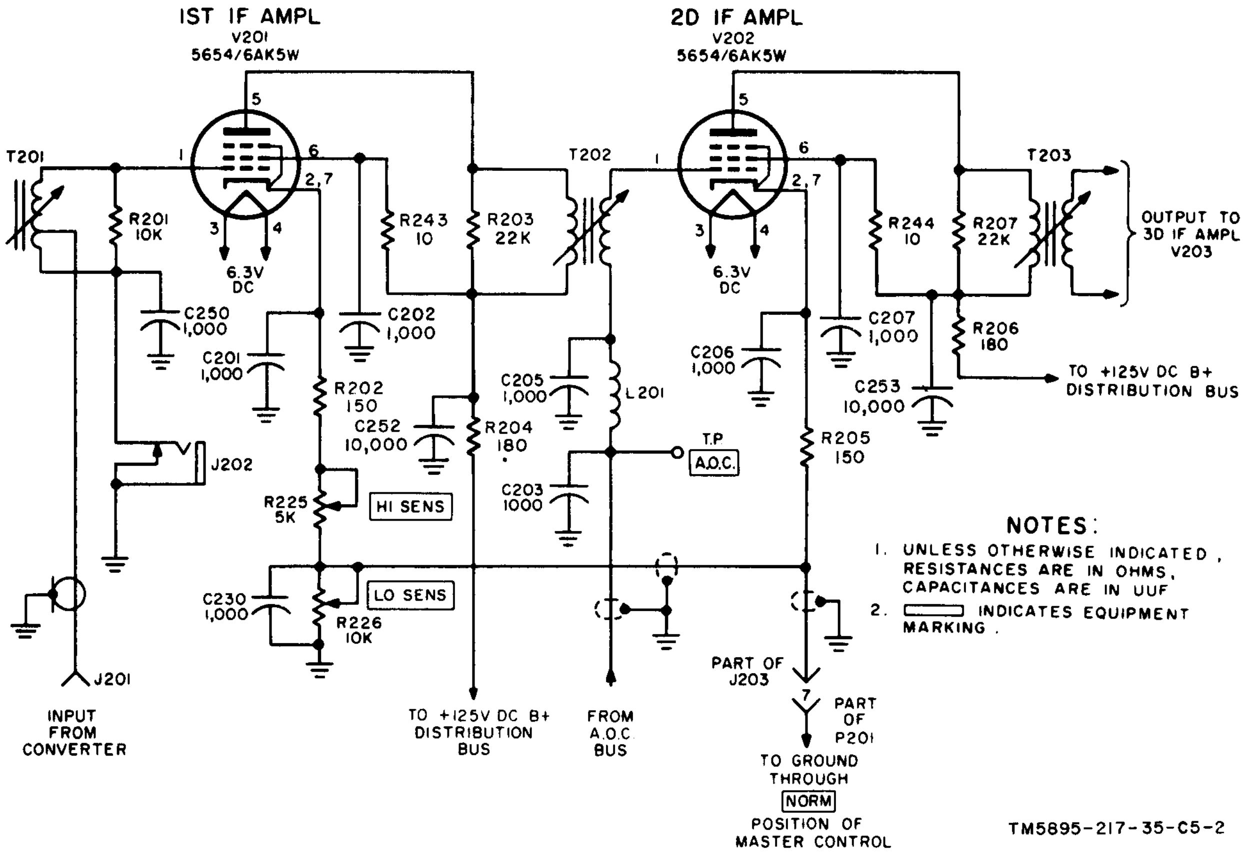


Figure 12.1. RT-494B/APX-44B, first and second IF amplifiers, partial schematic diagram.

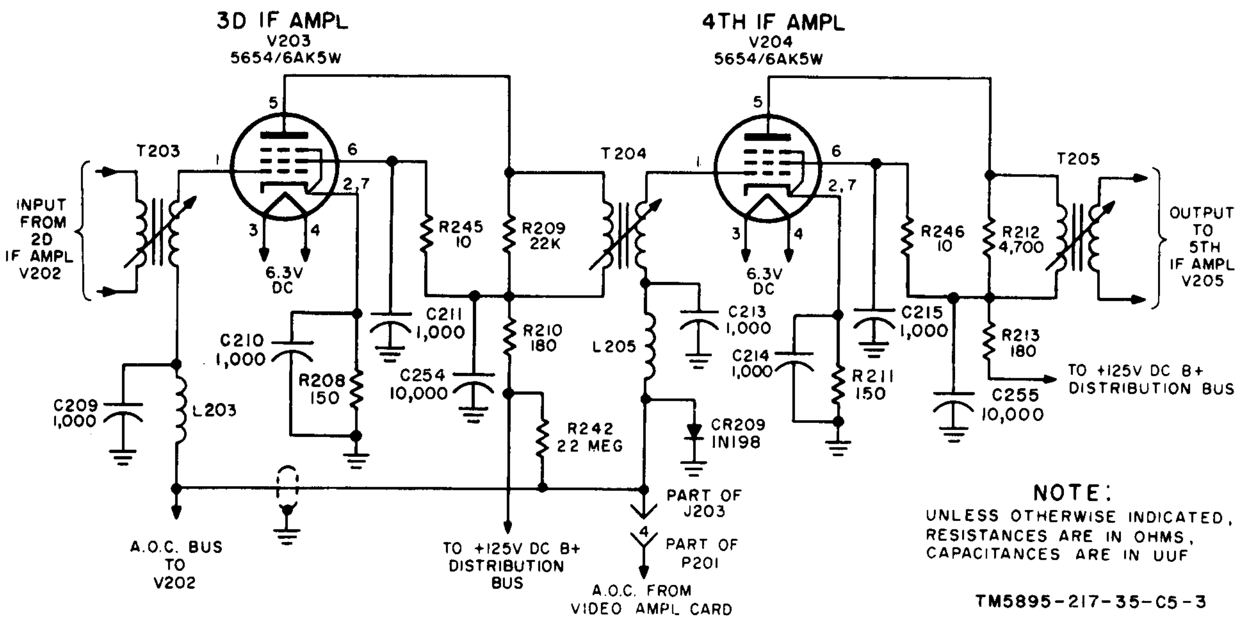


Figure 13.1. RT-494B/APX-44B, third and fourth IF amplifiers, partial schematic diagram.

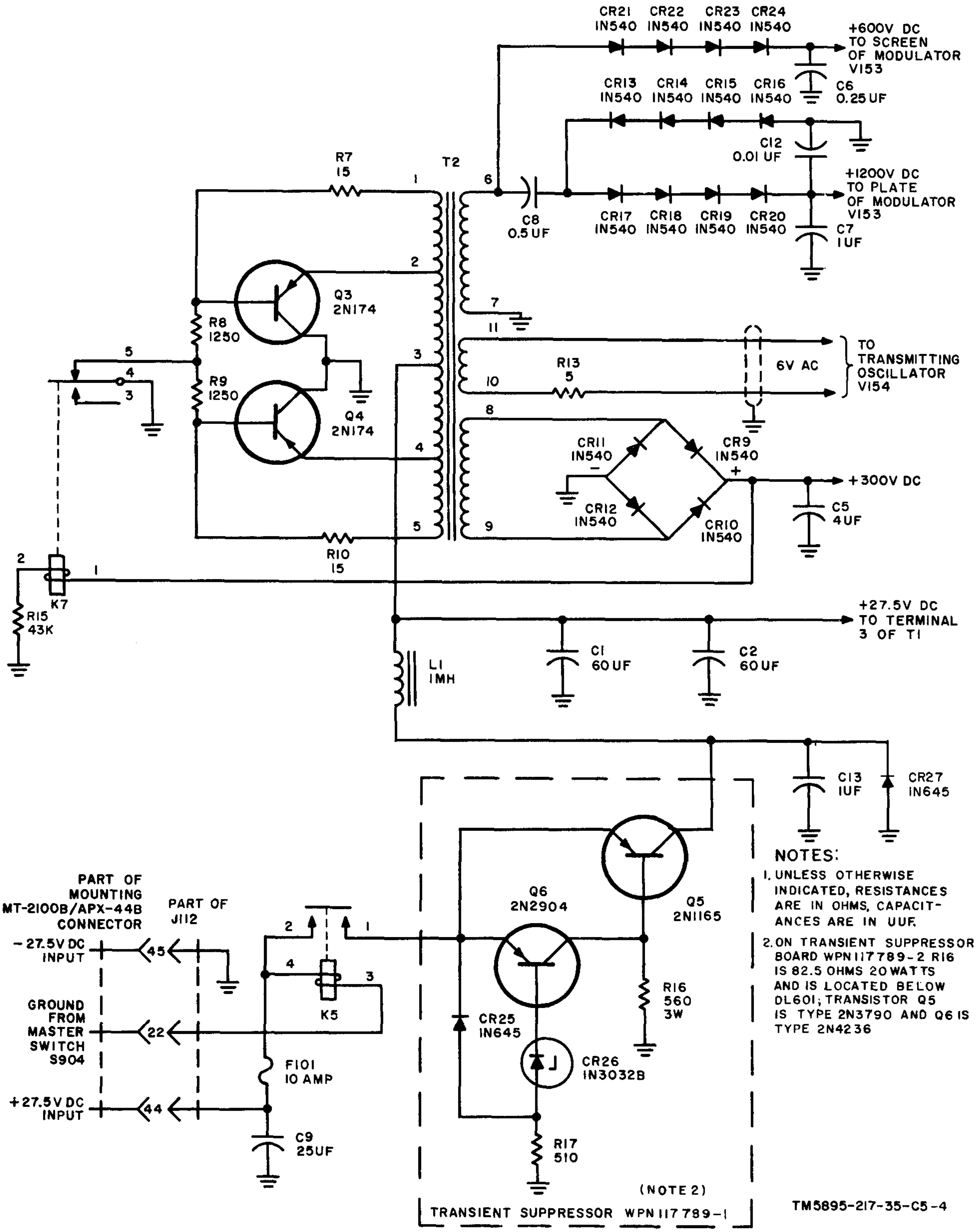


Figure 47.1. RT-494B/APX-44B high-voltage power supply, partial schematic diagram.

Add after subparagraph *b:*

b.1. Transient Suppressor (fig. 47.1). For the RT–494B/APX–44B, input voltage is applied through relay K5 and simultaneously to transistors Q5 and Q6. Transistor Q5 is saturated under normal input power conditions, and Q6 is held cut off by Zener diode CR26. If a voltage transient appears at the input, back biasing on CR26 exceeds its breakdown level and Q6 conducts. Conduction of Q6 reduces the forward bias applied to the emitter-base junction of Q5, causing Q5 to conduct less or to be cut off. This action protects the receiver-transmitter from transients which could cause component damage. Capacitor C13, inductor L1, capacitor C1, and capacitor C2 comprise a filter circuit.

Page 59. After figure 47, add figure 47.1.

Page 60, paragraph 41, heading. After "(fig. 49)", add:

(Refer to fig. 49.1 for the RT–494B/APX–44B.).

Page 62, paragraph 43. Make the following changes:

Heading. After "(fig. 51)", add: (for the RT–494B/APX–44B, refer to fig. 51.1.).

Subparagraph *b*(2). Add after subparagraph: (For those equipments modified by MWO 11–5895–217–35/1 and procured on Order FR–28–043–P6–22905(E), the connection is not used for the pilot lamp.).

Subparagraph *b*(5). Add after subparagraph: (for the RT–494B/APX–44B, primary power is applied through transient suppressor Q5 and Q6 and filter C13, L1, C1, and C2 to the primary center taps of transformers T1 and T2 (fig. 51.1).

Page 63, paragraph 44. Add "(For those equipments modified by MWO 11–5895–217–35/1 and procured on Order FR 28–043–P6–22905(E), pilot lamp E901 has been changed to pilot lamp DS905.)" in the following places:

Subparagraph *a*, at the end of first sentence.

Subparagraph *a*(6), at end of first sentence.

Page 64, figure 52. Add the following note:

NOTE:
FOR THOSE EQUIPMENTS MODIFIED BY MWO 11-5895-217-35/1 AND PROCURED ON ORDER FR 28-043-P6-22905(E), PILOT LAMP E901 HAS BEEN CHANGED TO PILOT LAMP DS905.

Page 73. Make the following changes:

Paragraph 53, line 10. After "(fig. 8)," add: (Refer to fig. 8.1 for the RT–494B/APX–44B.).

Paragraph 54*b*(4). Delete subparagraph (4) and substitute:

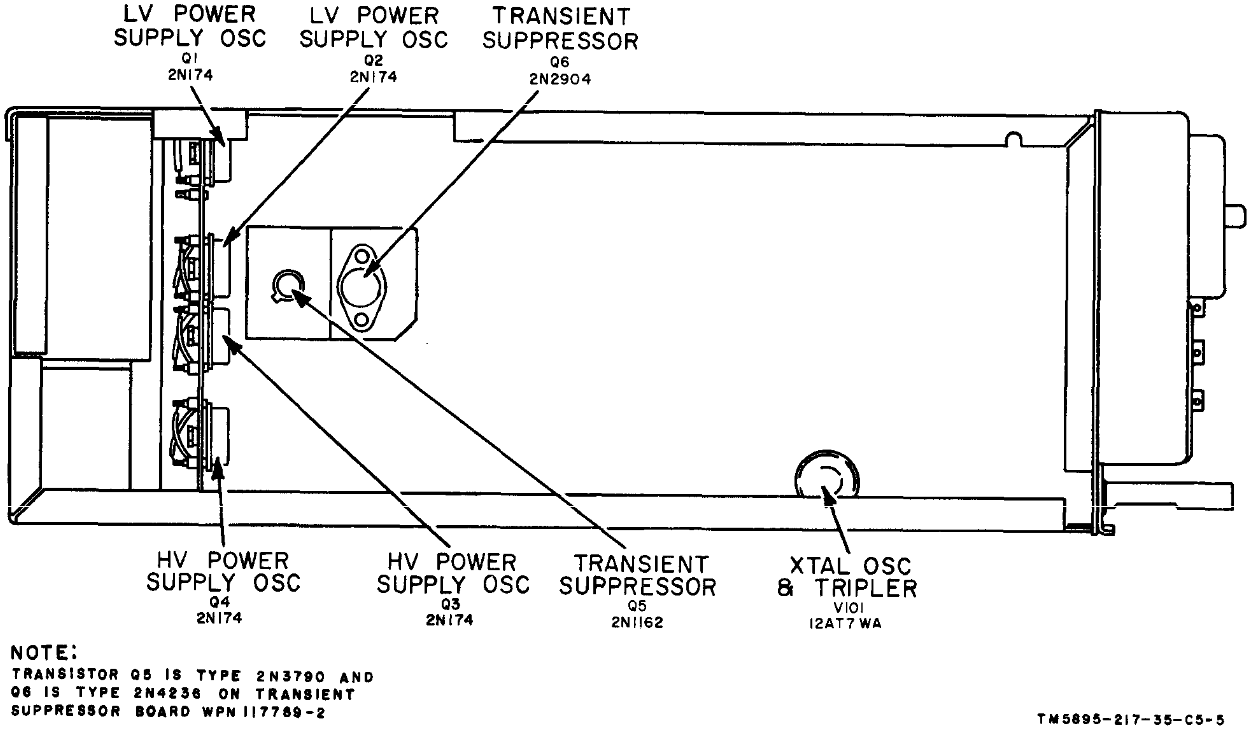


Figure 55.1. RT–494B/APX–44B, receiver-transmitter, left side view, tube and transistor locations.

(4) For the RT-494/APX-44, remove transistors Q1 through Q4 (fig. 55). For the RT-494B/APX-44B, remove transistors Q1 through Q6 (fig. 55.1).

Page 75. After figure 55, add figure 55.1.

Page 76, paragraph 54*d*, chart, *isolating procedures* column. After the first sentence, add: (for the RT-494B/APX-44B, check capacitors C1, C2, and C13 (fig. 105.1) and transistors Q5 and Q6 (fig. 106.1).).

Page 90, paragraph 59*b*, chart, *corrective measures* column. After the fourth sentence, add: For the RT-494B/APX-44B, check transistors Q1 through Q6 (fig. 55.1).

Page 94, figure 71. Add note 9 after note 8:

9. FOR THE RT-494B/APX-44B, SERIAL NUMBERS 1, 4, 5, 20, 27, 28, 31, AND HIGHER, THE RESISTANCE WILL BE 8,000 OHMS FOR PIN 3 OF J401. PIN 10 OF J401 WILL HAVE A VOLTAGE OF 130 VOLTS AND A RESISTANCE OF 7,000 OHMS.

Page 108, figure 83. After note 6, add note 7:

7. FOR THE RT-494B/APX-44B, THE RESISTANCE VALUE FOR V452, PIN 5, WILL BE LOWER.

Page 110, figure 85. Add note 5 after note 4:

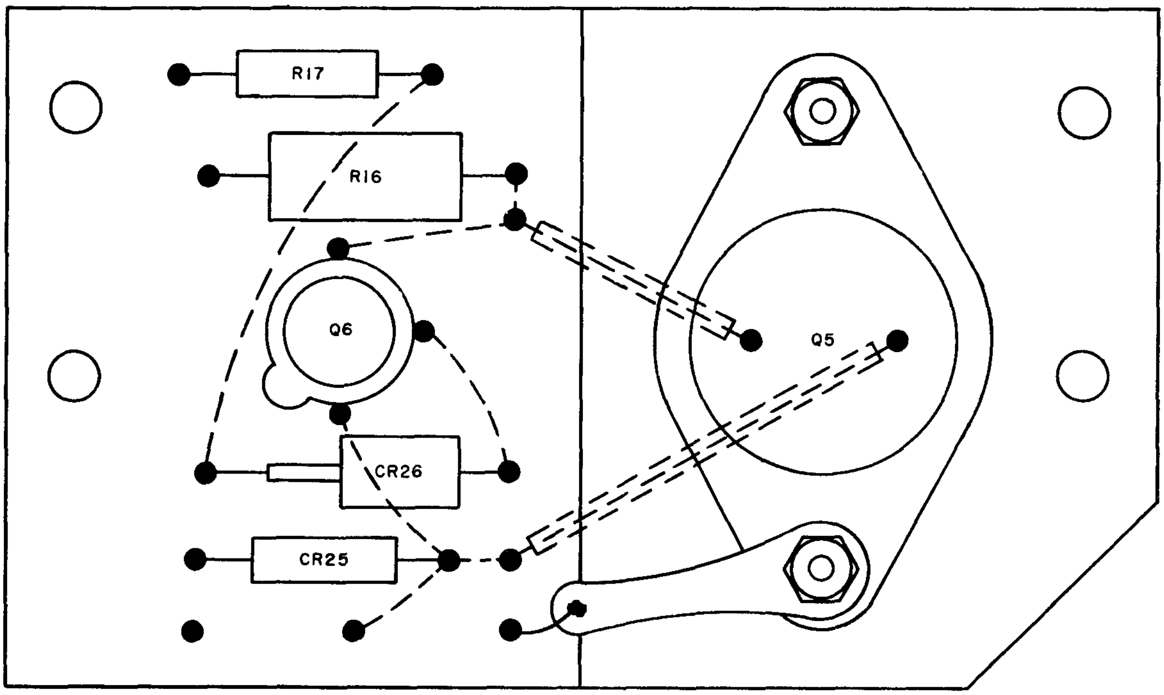
5. FOR THE RT-494B/APX-44B, SERIAL NUMBERS 31, 36, 44, 46, 52, 53, 57, AND HIGHER, VOLTAGE ON PIN 5 OF V554 WILL BE -11 VOLTS AND RESISTANCE WILL BE 12,000 OHMS.

After figure 85, add figure 89.1.

Page 114. After figure 90, add figure 90.1.

Page 115, paragraph 72. Make the following changes:

Subparagraph *b*(1). Add after subparagraph: (Voltage and resistance measurements for the RT-494B/APX-44B low- and high-voltage power supplies and transient suppressor circuit are shown in figure 90.1.).



NOTES:

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. —— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
3. – – – DENOTES PRINTED CIRCUIT ON BACK OF BOARD.
4. R16 IS OMITTED ON TRANSIENT SUPPRESSOR BOARD WPN 117789-2.

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Figure 89.1. RT-494B/APX-44B, transient suppressor circuit board, parts location and wiring diagram.

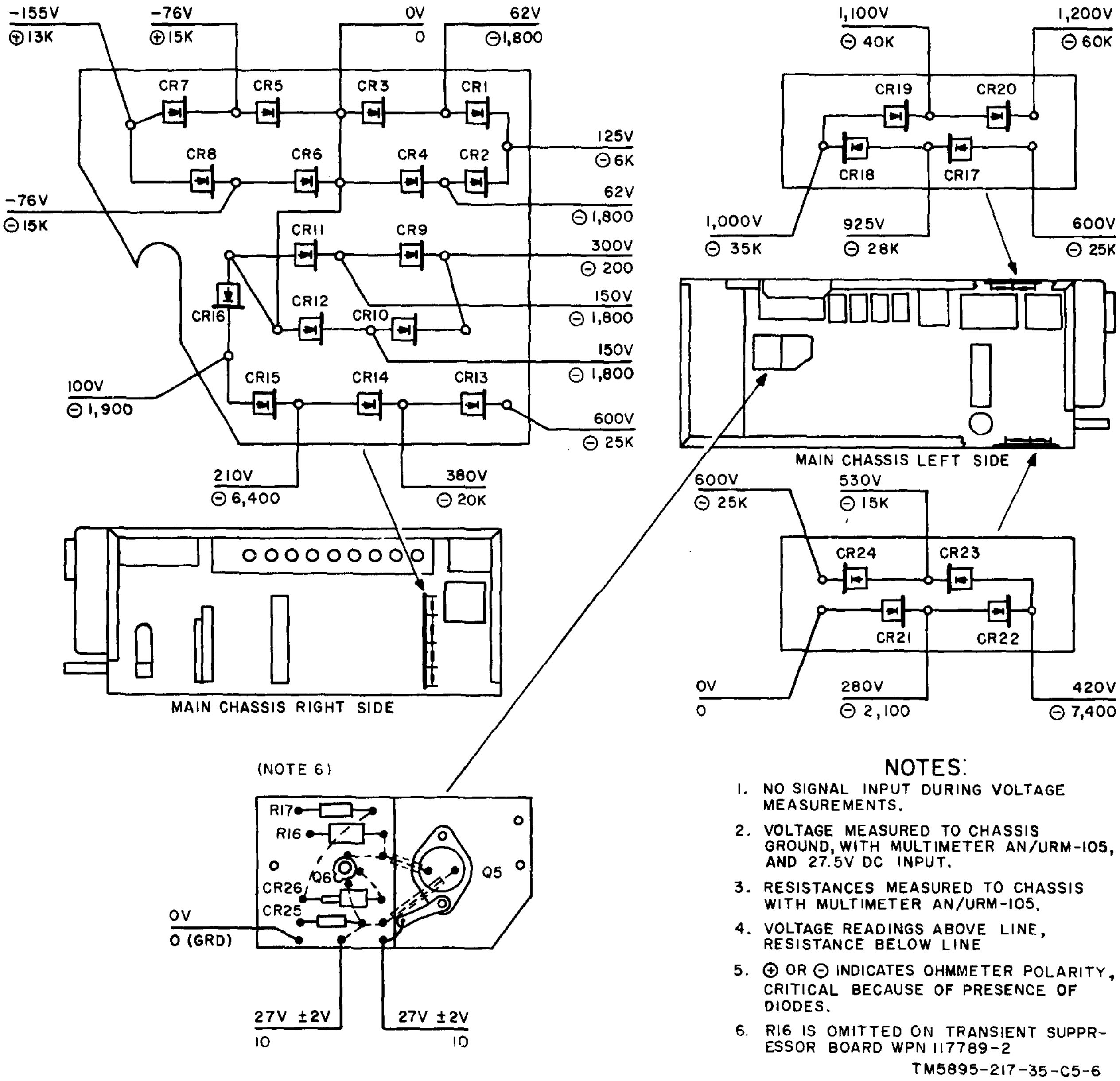

Figure 90.1. RT-494B/APX-44B, power supply and rectifier boards, voltage and resistance diagram.

Subparagraph *e*, chart. Add to item 1:

Item	Indication	Probable trouble	Procedure
		Filter capacitors C1, C2, and/or C13 shorted. Components within the transient suppressor circuit defective.	Replace C1, C2, and/or C13 (fig. 105.1). Check transient suppressor circuit (fig. 55.1, 90.1, and 106.1).

Page 118, paragraph 73*d*, chart. Add after last item of chart:

Diode type	Forward resistance (max)	Resistance ratio (min)	Back current (max)
1N914	0.5 kilohm	20 to 1	Not readable.
1N645	0.1 kilohm	30 to 1	Not readable.

Page 123, paragraph 78, below heading. Delete "(figs. 100-103)" and substitute: (fig. 100 through 103.1).

Page 124. After figure 100, add figure 100.1.

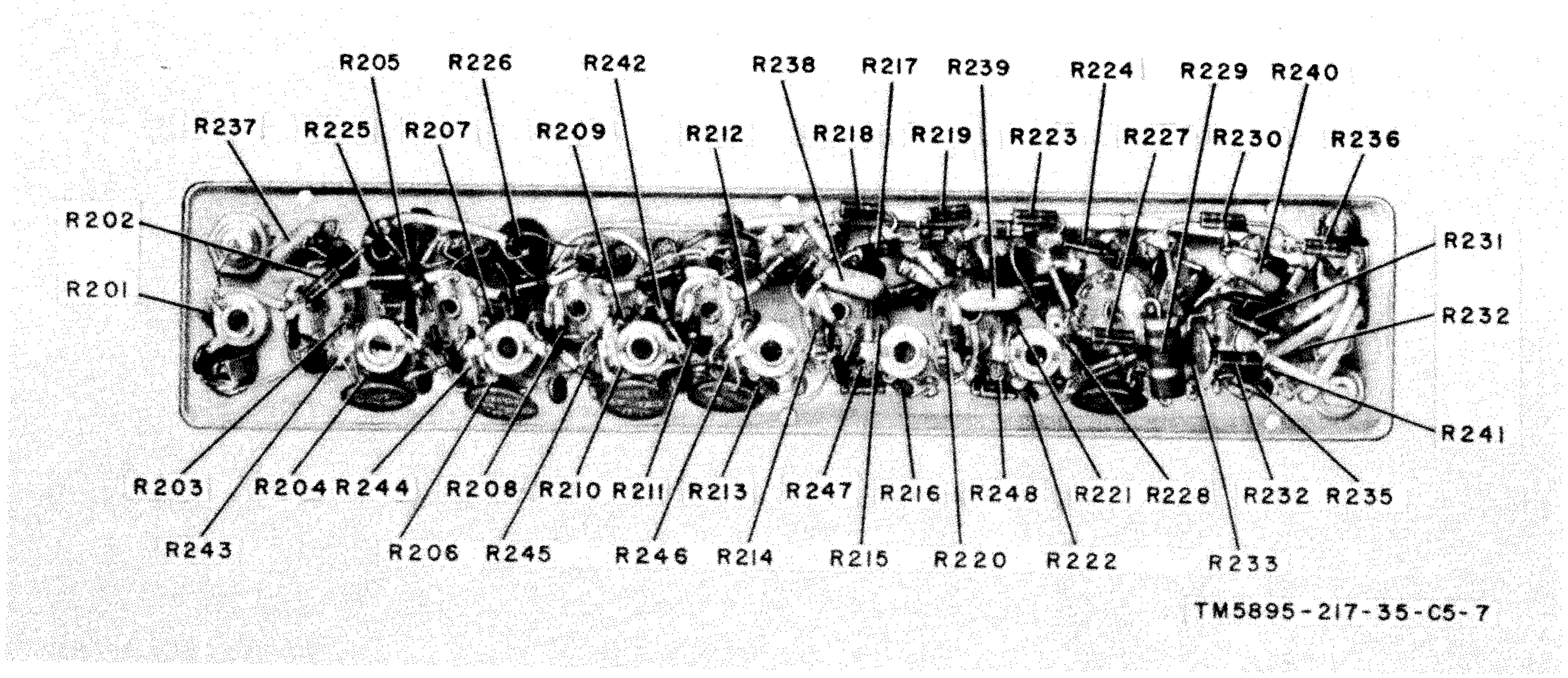

Figure 100.1. RT-494B/APX-44B, IF suppressor subchassis, bottom view, resistor location.

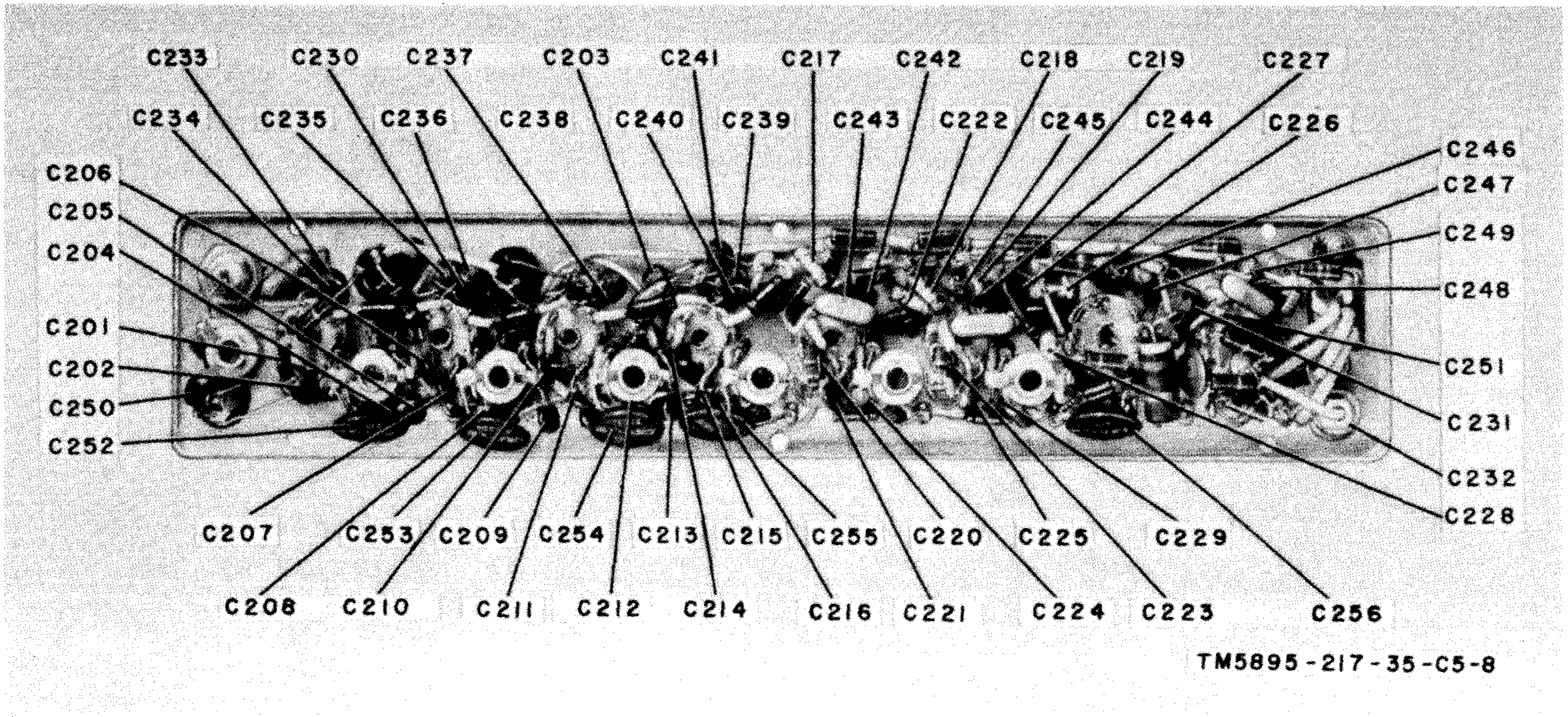

Figure 101.1. RT-494B/APX-44B, IF suppressor subchassis, bottom view, capacitor location.

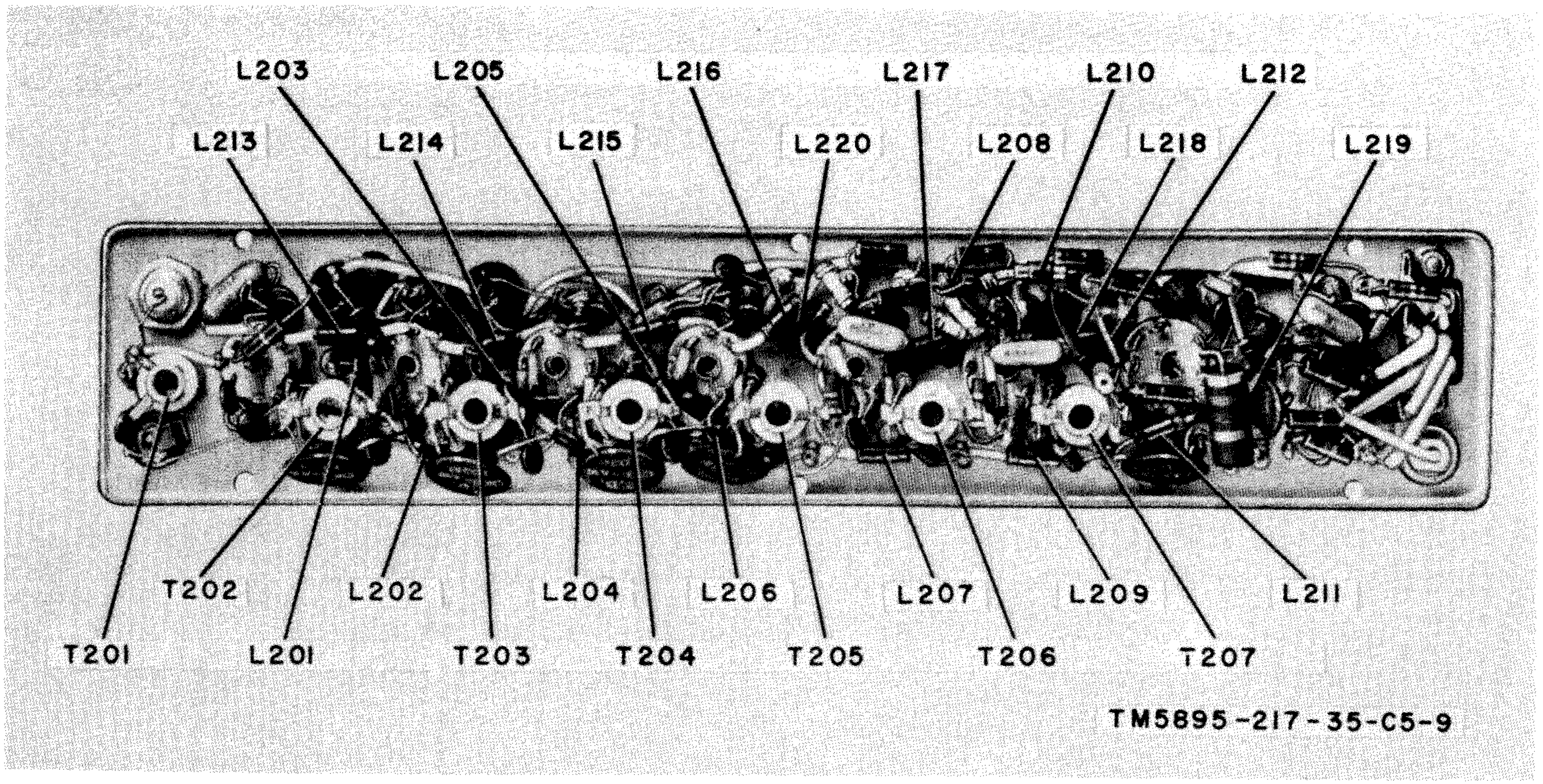

Figure 102.1. RT-494B/APX-44B, IF suppressor subchassis, bottom view, coil and transformer location.

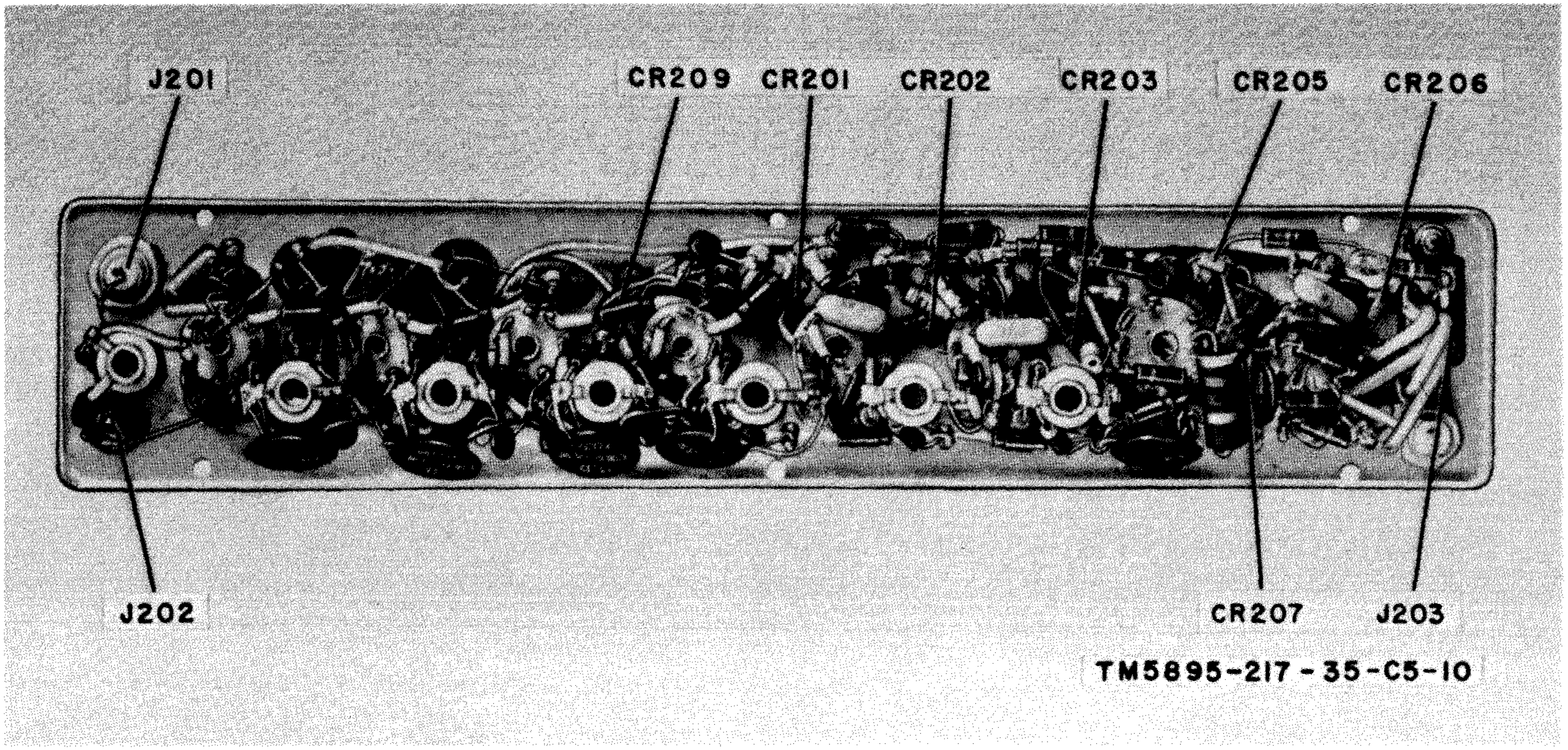

Figure 103.1. RT-494B/APX-44B, IF suppressor subchassis, bottom view, diode and connector location.

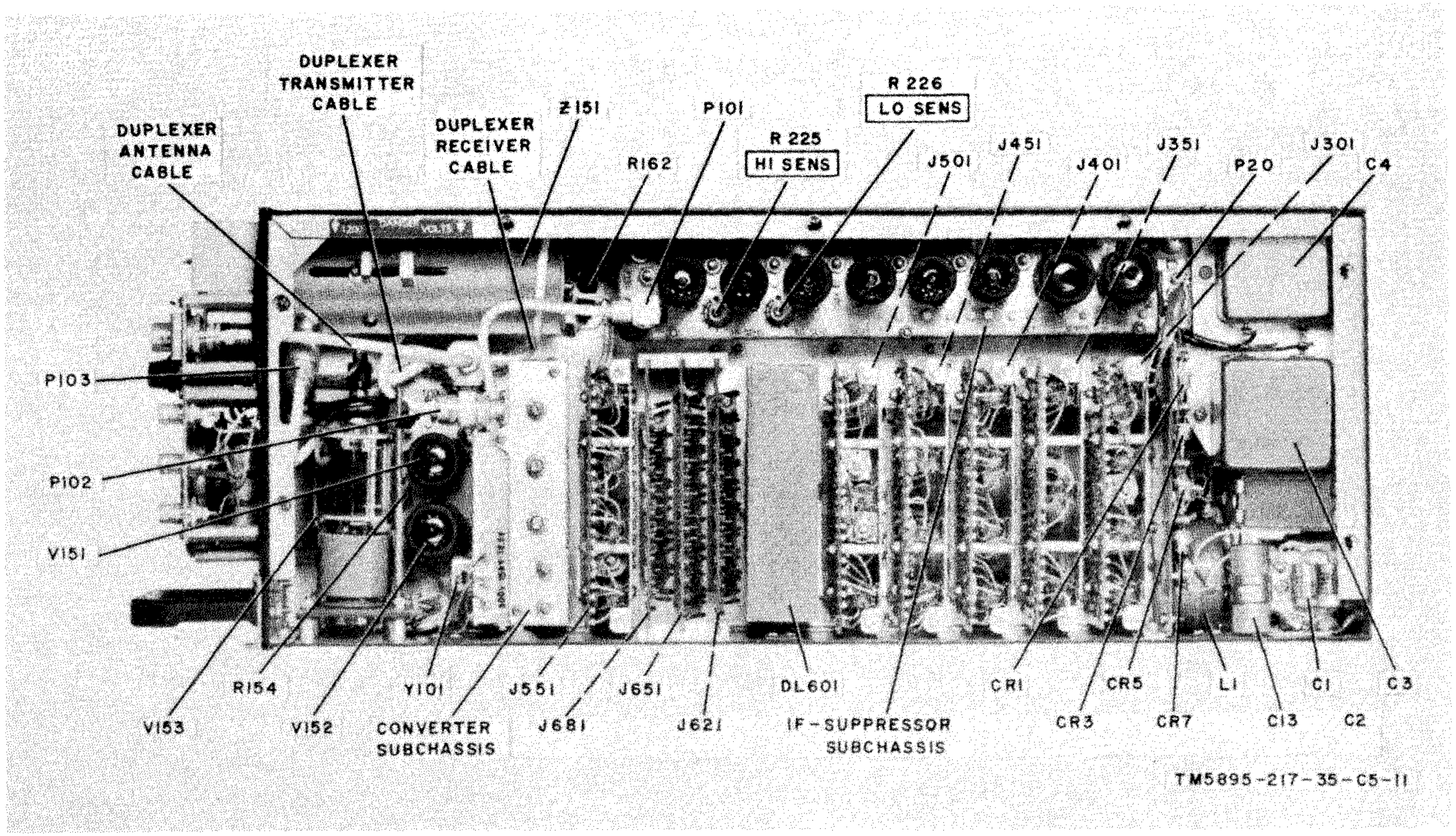

Figure 105.1. RT-494B/APX-44B, receiver-transmitter, right side view, parts location.

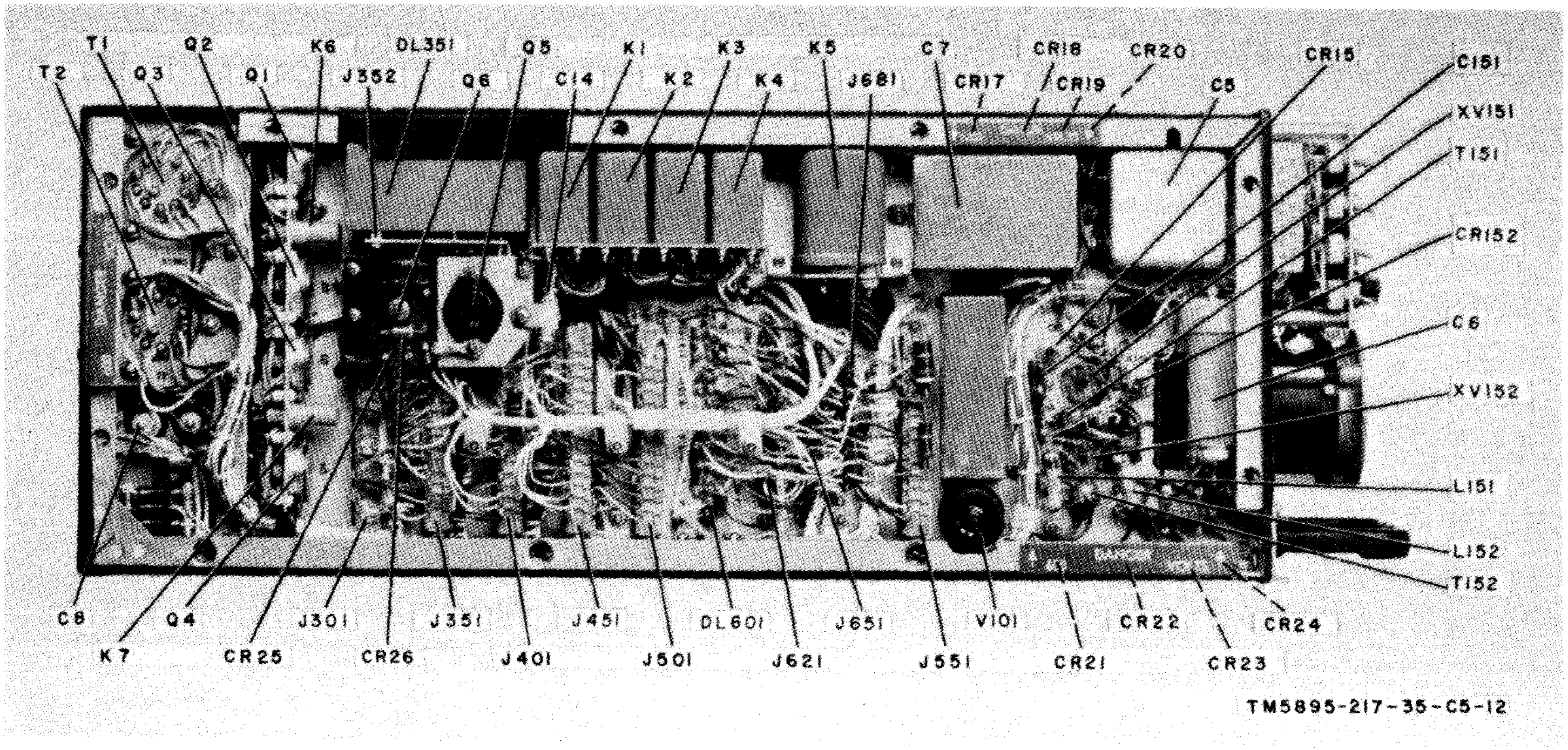

Figure 106.1. RT-494B/APX-44B. receiver-transmitter, left side view, parts location.

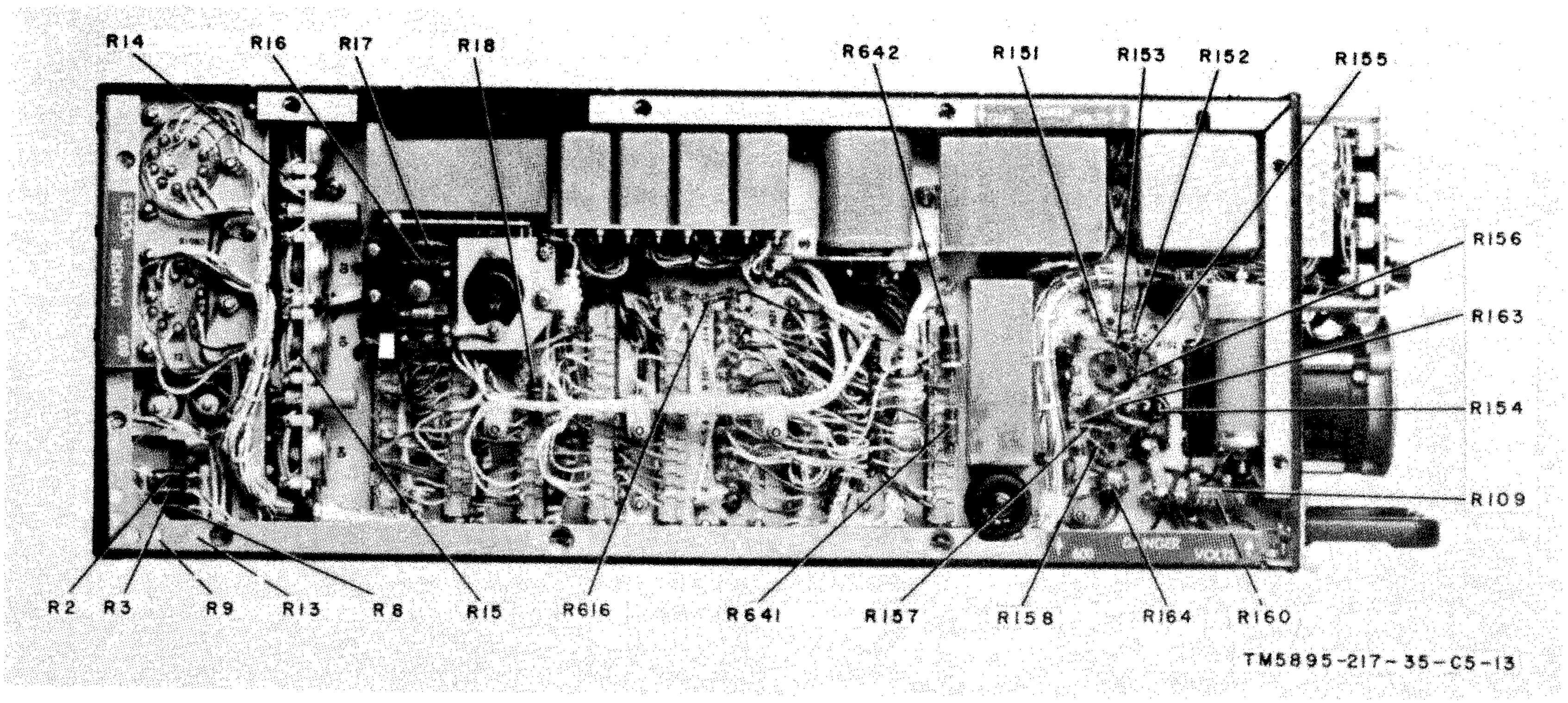

Figure 107.1. RT-494B/APX-44B, receiver-transmitter, left side view, parts location.

Page 131, paragraph 81. After subparagraph *f*, add new subparagraph *g*.

g. RT-494B/APX-44B Transient Suppressor Board Subassembly Removal and Replacement (D, fig. 109.1).

(1) This subassembly is located on the left-hand side at the rear of the receiver-transmitter (fig. 106.1).

(2) Tag and unsolder the three leads from the three terminals on the bottom of the transient suppressor board below diode CR25 (fig. 89.1).

(3) Remove the three Phillips-head screws from the transient suppressor board, and remove the transient suppressor board from the receiver-transmitter.

(4) To replace the transient suppressor board, set the transient suppressor in place and secure with three Phillips-head screws.

(5) Solder the three leads to their proper terminals on the bottom of the transient suppressor board below diode CR25.

Page 132. After figure 109, add figure 109.1.

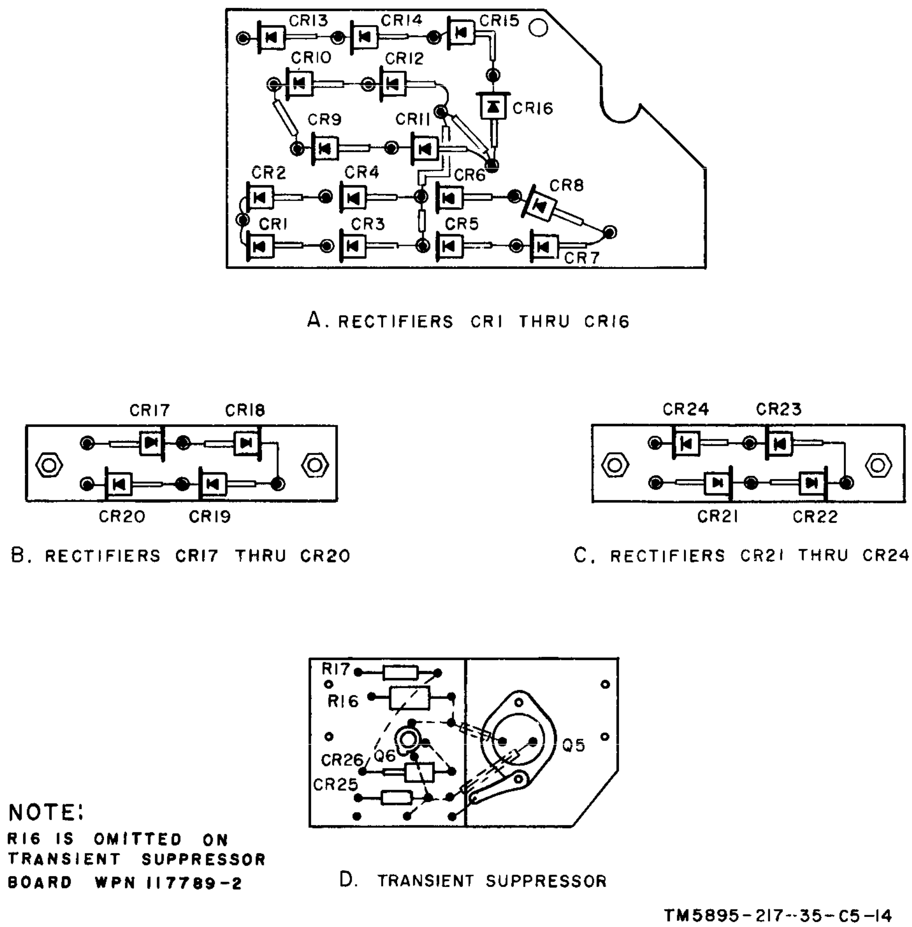

Figure 109.1. RT-494B/APX-44B, power supply rectifier boards and transient suppressor board subassemblies.

Figure 8 (C 2) (fold-out). After figure 8, add figure 8.1.

Figure 8.1. RT–494B/APX–44B, receiver-transmitter, block diagram.

Figure 33 (fold-out). Make the following changes.

Switch S901B. Delete the connection from terminal 8 to the connection between terminals 3 and 12.

Change switch S901 terminal numbers as follows:

Switch section S901A front.

Delete terminal No. 5 and substitute terminal No. 2.

Switch section S901A rear.

Delete terminal No. 1 and substitute terminal No. 10.

Delete terminal No. 2 and substitute terminal No. 11.

Delete terminal No. 3 and substitute terminal No. 12.

Delete terminal No. 4 and substitute terminal No. 1.

Delete terminal No. 8 and substitute terminal No. 5.

Delete terminal No. 12 and substitute terminal No. 9.

Switch section S901B rear.

Delete terminal No. 1 and substitute terminal No. 10.

Delete terminal No. 2 and substitute terminal No. 11.

Delete terminal No. 3 and substitute terminal No. 12.

Delete terminal No. 4 and substitute terminal No. 1.

Delete terminal No. 8 and substitute terminal No. 5.

Delete terminal No. 12 and substitute terminal No. 9.

After note 2, add the following notes:

3. FOR THE RT–494B/APX–44B, DIODES CR621 THROUGH CR629 ARE TYPE 1N914.
4. FOR THE RT–494B/APX–44B, DIODE CR630 IS TYPE 1N914 EXCEPT FOR TRANSPONDER SETS BEARING SERIAL NUMBERS 5, 20, 32, 33, 39, 47, 51, 56, AND UP WHERE CR630 IS A TYPE 1N645.
5. FOR THE RT–494B/APX–44B, SERIAL NUMBERS 31, 36, 44, 46, 52, 53, 57, AND UP, R641 (5,100 OHMS) HAS BEEN CONNECTED BETWEEN CAPACITOR C640 AND PIN 4 OF P621.

Figure 34 (fold-out). After note 2, add the following note:

3. FOR THE RT–494B/APX–44B, DIODES CR651 THROUGH CR664 ARE TYPE 1N914.

Figure 35 (fold-out). Make the following changes:

Change switch S902 terminal numbers as follows:

Switch section S902A front.

Delete terminal No. 5 and substitute terminal No. 2.

Switch section S902A rear.

Delete terminal No. 1 and substitute terminal No. 10.

Delete terminal No. 2 and substitute terminal No. 11.

Delete terminal No. 3 and substitute terminal No. 12.

Delete terminal No. 4 and substitute terminal No. 1.

Delete terminal No. 8 and substitute terminal No. 5.

Delete terminal No. 12 and substitute terminal No. 9.

Switch section S902B rear.

Delete terminal No. 1 and substitute terminal No. 10.

Delete terminal No. 2 and substitute terminal No. 11.

Delete terminal No. 3 and substitute terminal No. 12.

Delete terminal No. 4 and substitute terminal No. 1.

Delete terminal No. 8 and substitute terminal No. 5.

Delete terminal No. 12 and substitute terminal No. 9.

After note 3, add:

4. FOR THE RT–494B/APX–44B, DIODES CR681 THROUGH CR696 ARE TYPE 1N914.

Figure 49 (fold-out). After figure 49, add figure 49.1.

Figure 49.1. RT–494B/APX–44B, B+ distribution, simplified schematic diagram.

(Located in back of change)

Figure 50 (fold-out). After note 3, add:

4. FOR THE RT–494B/APX–44B, DIODES CR205, CR206, CR207, CR354, CR355, AND CR356 ARE TYPE 1N914, DIODE CR151 IS TYPE 1N2990RB, AND DIODE CR152 IS TYPE 1N2999RB.

5. FOR THE RT-494B/APX-44B, SERIAL NUMBERS 31, 36, 44, 46, 52, 53, 57 AND UP, RESISTOR R565 HAS BEEN CHANGED FROM 10,000 OHMS TO 12,000 OHMS.
6. FOR THE RT-494B/APX-44B, RESISTOR R455 HAS BEEN CHANGED FROM 100,000 OHMS TO 22,000 OHMS, AND RESISTOR R456 HAS BEEN CHANGED FROM 1.5 MEGOHMS TO 330,000 OHMS.

Figure 51 (fold-out). After figure 51, add figure 51.1.

Figure 51.1. RT–494B/APX–44B, primary power distribution, simplified schematic diagram.

(Located in back of change)

Figure 53 (fold-out). After note 5, add:

6. FOR THE RT-494B/APX-44B, DIODES CR354, CR355, CR356, CR626, CR627, CR629, CR661, CR664, CR695, AND CR696 ARE TYPE 1N914.
7. FOR THE RT-494B/APX-44B, DIODE CR630 IS TYPE 1N914 EXCEPT THAT FOR SERIAL NUMBERS 5, 20, 32, 33, 39, 47, 51, 56, AND HIGHER, DIODE CR630 IS TYPE 1N645.
8. FOR THE RT-494B/APX-44B, SERIAL NUMBERS 31, 36, 44, 46, 52, 53, 57, AND HIGHER, RESISTOR R641 (5,100 OHMS) HAS BEEN CONNECTED BETWEEN CAPACITOR C640 AND PIN 4 OF P621.
9. FOR THE RT-494B/APX-44B, RESISTOR R455 HAS BEEN CHANGED FROM 100,000 OHMS TO 22,000 OHMS, AND RESISTOR R456 HAS BEEN CHANGED FROM 1.5 MEGOHMS TO 330,000 OHMS.

Figure 87 (fold-out). Add figure 87.1 after figure 87.

Figure 87.1. RT–494B/APX–44B, mode one reply code switching card, parts location and printed wiring diagram.

(Located in back of change)

Figure 118 (fold-out). Add figure 118.1 after figure 118.

Figure 118.1. RT–494B/APX–44B, IF suppressor subchassis, wiring diagram.

(Located in back of change)

Figure 119 (119–P1) (fold-out). Add figure 119.1 1 after figure 119–P1.

Figure 119.1 1 . RT–494B/APX–44B, receiver-transmitter wiring diagram (part 1 of 3).

(Located in back of change)

Figure 119 (119-P2) (fold-out). Add figure 119.1 2 after figure 119–P2.

Figure 119.1 2 . RT–494B/APX–44B, receiver-transmitter wiring diagram (part 2 of 3).

(Located in back of change)

Figure 119 (119–P3) (fold-out). Add figure 119.1 3 after 119–P3.

Figure 119.1 3 . RT–494B/APX–44B, receiver-transmitter wiring diagram (part 3 of 3).

(Located in back of change)

Figure 120 (fold-out). Delete figure 120 and substitute new figure 120.

Figure 120. Control unit wiring diagram.

(Located in back of change)

Figure 121 (fold-out). Delete figure 121 and substitute new figure 121.

Figure 121. Control unit schematic diagram.

(Located in back of change)

Figure 122–P2 (fold-out). After figure 122–P2, add figure 122.1.

Figure 122.1. RT–494B/APX–44B, receiver-transmitter, schematic and waveform diagram.

(Located in back of change)

Figure 123 (fold-out). After figure 123, add figure 123.1.

Figure 123.1. RT–494B/APX–44B, IF suppressor subchassis, schematic and waveform diagram.

(Located in back of change)

Figure 124 (fold-out). Add note 5 after note 4:

5. FOR THE RT-494B/APX-44B, DIODES CR301 AND CR302 ARE TYPE 1N914. DIODE CR303 IS TYPE 1N982B.

Figure 125 (fold-out). Add note 4 after note 3:

4. FOR THE RT-494B/APX-44B, DIODES CR351 THROUGH CR358 ARE TYPE 1N914.

Figure 127 (fold-out). Add note 4 after note 3:

4. FOR THE RT-494B/APX-44B, DIODES CR501 AND CR502 ARE TYPE 1N914.

Figure 128 (fold-out). After note 4, add the following notes:

5. FOR THE RT-494B/APX-44B, DIODE CR451 IS TYPE 1N914, AND RESISTOR R468 HAS BEEN CHANGED FROM 68,000 OHMS TO 1.0 MEGOHM.
6. FOR THE RT-494B/APX-44B, RESISTOR R455 HAS BEEN CHANGED FROM 100,000 OHMS TO 22,000 OHMS, AND RESISTOR R456 HAS BEEN CHANGED FROM 1.5 MEGOHMS TO 330,000 OHMS.

Figure 129 (C2) (fold-out). Add the following notes after note 3:

4. FOR THE RT-494B/APX-44B, DIODE CR552 IS TYPE 1N914.
5. FOR THE RT-494B/APX-44B, SERIAL NUMBERS 31, 36, 44, 46, 52, 53, 57, AND HIGHER, RESISTOR R565 HAS BEEN CHANGED FROM 10,000 OHMS TO 12,000 OHMS.

Figure 130 (fold-out). Change the word "NOTE" to NOTES. Number the existing note "1", and add the following notes:

2. FOR THE RT-494B/APX-44B, DIODES CR621 THROUGH CR629 ARE TYPE 1N914.
3. FOR THE RT-494B/APX-44B, DIODE CR630 IS TYPE 1N914, EXCEPT THAT FOR SERIAL NUMBERS 5, 20, 32, 33, 39, 47, 51, 56, AND HIGHER, CR630 IS TYPE 1N645.
4. FOR THE RT-494B/APX-44B, SERIAL NUMBERS 31, 6, 44, 46, 52, 53, 57, AND HIGHER, RESISTOR R641 (5,100 OHMS) HAS BEEN CONNECTED BETWEEN CAPACITOR C640 AND PIN 4 OF P621.

Figure 131 (fold-out). Change the word "NOTE" to NOTES. Number the existing note "1", and add the following:

2. FOR THE RT-494B/APX-44B, DIODES CR651 THROUGH CR664 ARE TYPE 1N914.

Figure 132 (fold-out). Change the word "NOTE" to NOTES. Number the existing note "1", and add the following note:

2. FOR THE RT-494B/APX-44B, DIODES CR681 THROUGH CR696 ARE TYPE 1N914.

Figure 133 (fold-out). After figure 133, add figure 133.1.

Figure 133.1. Transponder Set AN/APX-44B, typical aircraft installation wiring diagram.

(Located in back of change)

BY ORDER OF THE SECRETARY OF THE ARMY:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

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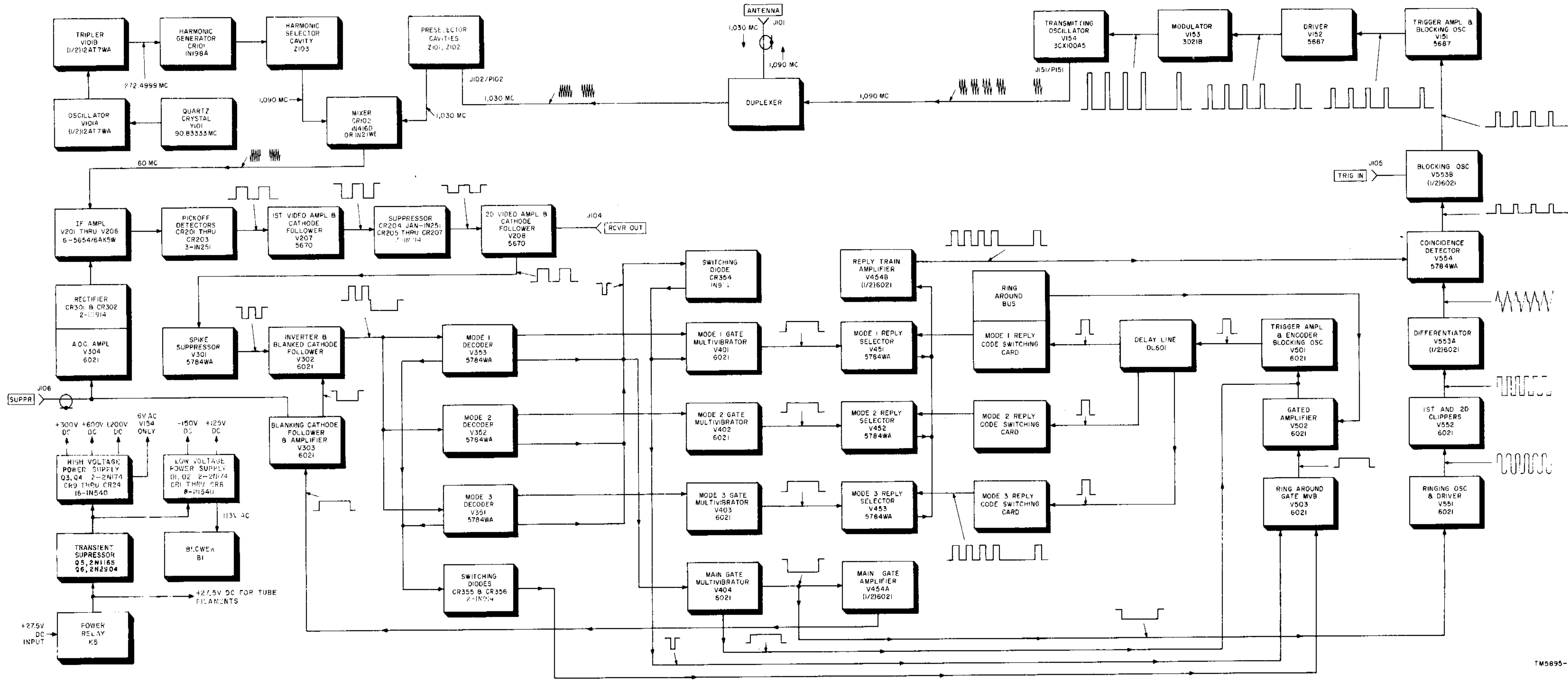


Figure 8.1

TM5895-217-35-C5-13

RT-494B/APX-44B, receiver-transmitter, block diagram.

Figure 49.1. *RT-494B/APX-44B, B+ distribution, simplified schematic diagram.*

TM5895-217-35-C5-16

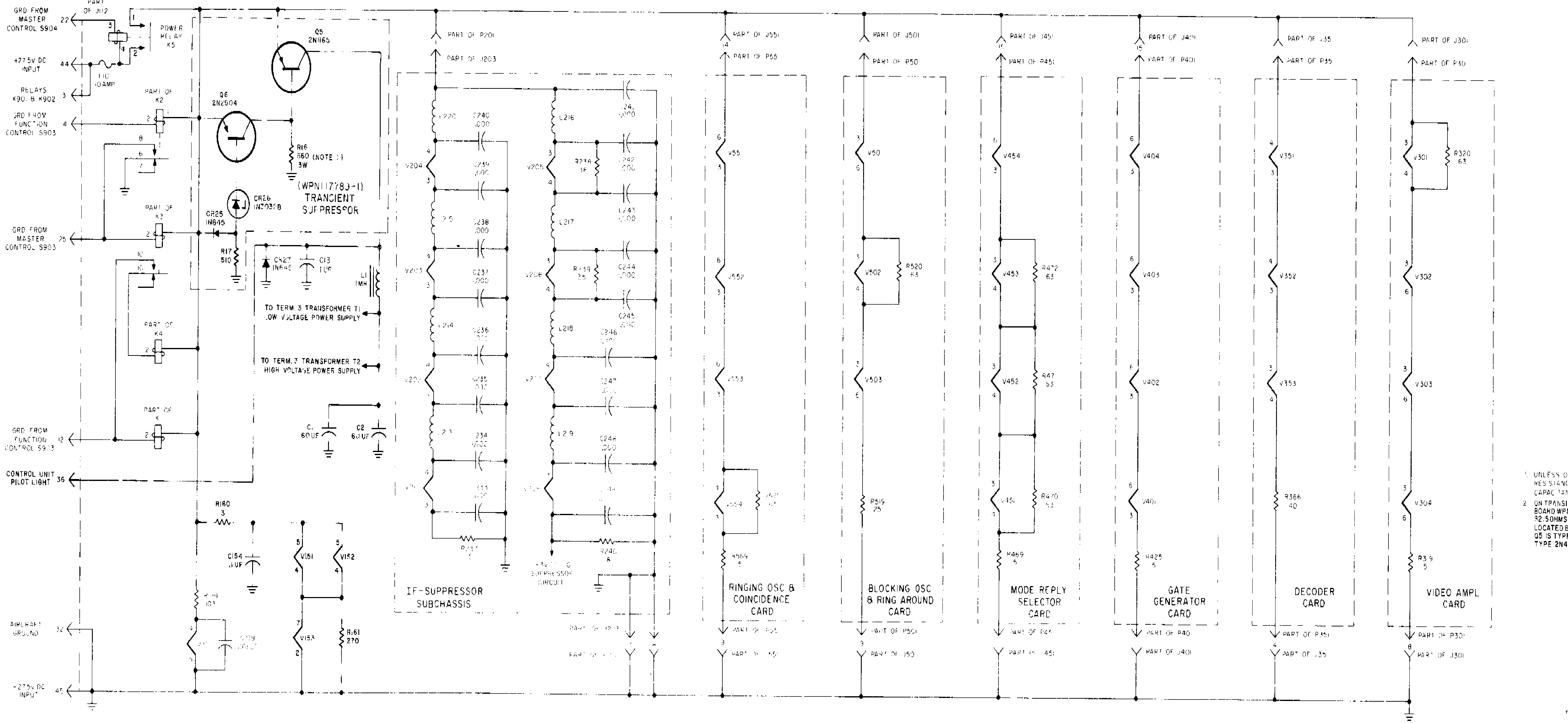
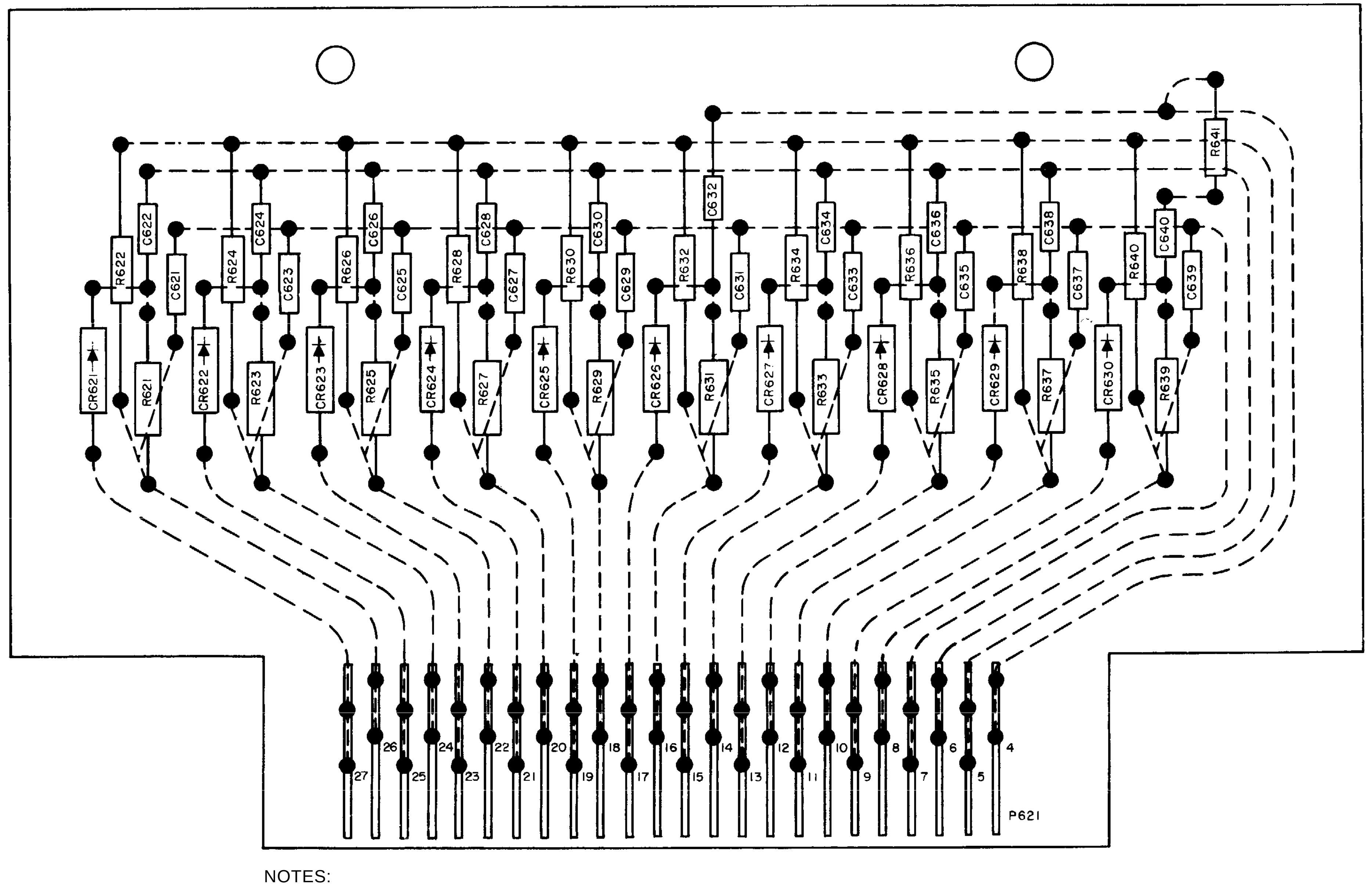


Figure 51.1. RT-494B/APX-44B, primary power distribution, simplified schematic diagram.

TM5895-217-35-C5-17



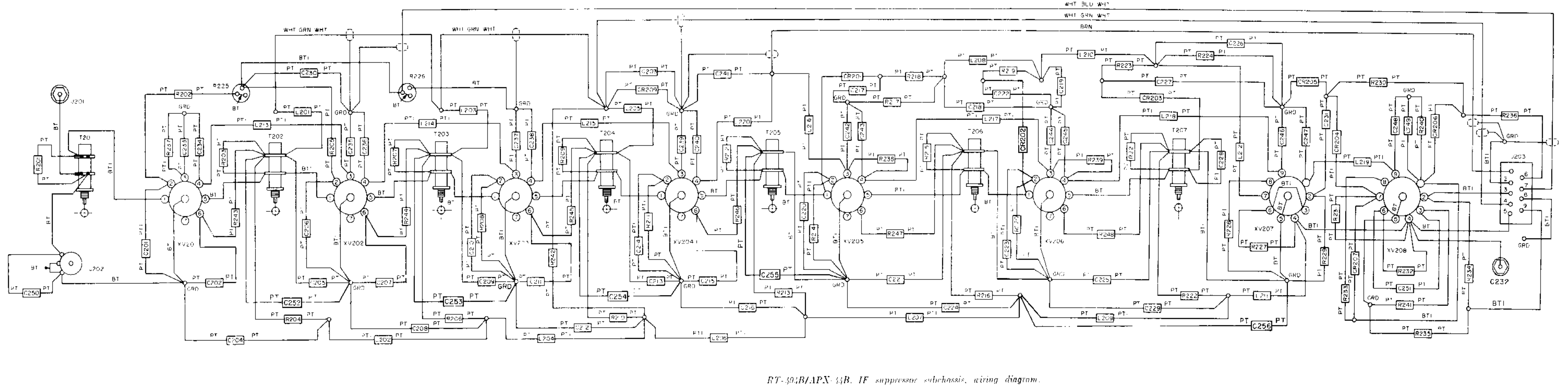
NOTES:
1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. ——— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
3. – – – DENOTES PRINTED CIRCUIT ON BACK OF BOARD.

Figure 87.1.

TM5895-217-35-C5-18

2 4

RT-494B/APX-44B, mode one reply code switching card, parts location and printed wiring diagram.



NOTES:

1. BT DENOTES BARE TINNED COPPER WIRE
2. BTI DENOTES BARE TINNED COPPER WIRE WITH INSULATED SLEEVING
3. PT DENOTES PIGTAIL LEAD
4. PTI DENOTES PIGTAIL LEAD WITH INSULATED SLEEVING
5. ( ) DENOTES SHIELDED CONNECTION

Figure 118.1. RT-494B/APX-44B, IF suppressor subchassis, wiring diagram.

TM5895-217-35-C5-20

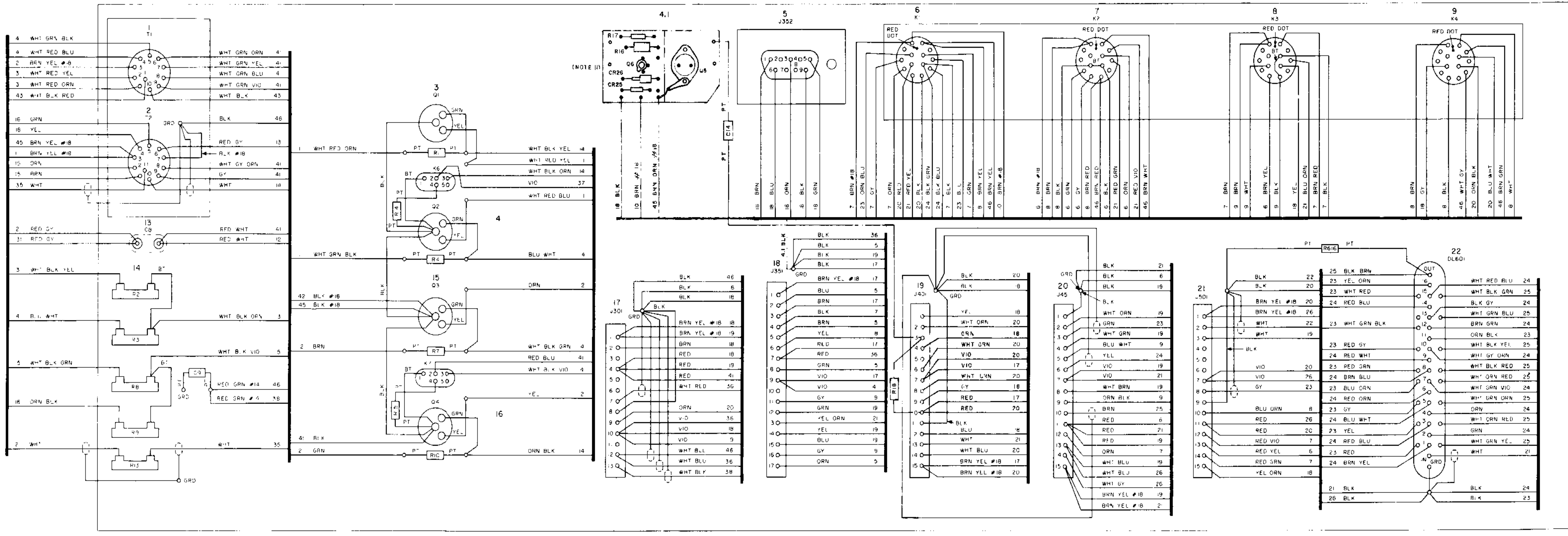


Figure 115.1 1.

RT-494B/APX-44B, receiver-transmitter wiring diagram (part 1 of 3).

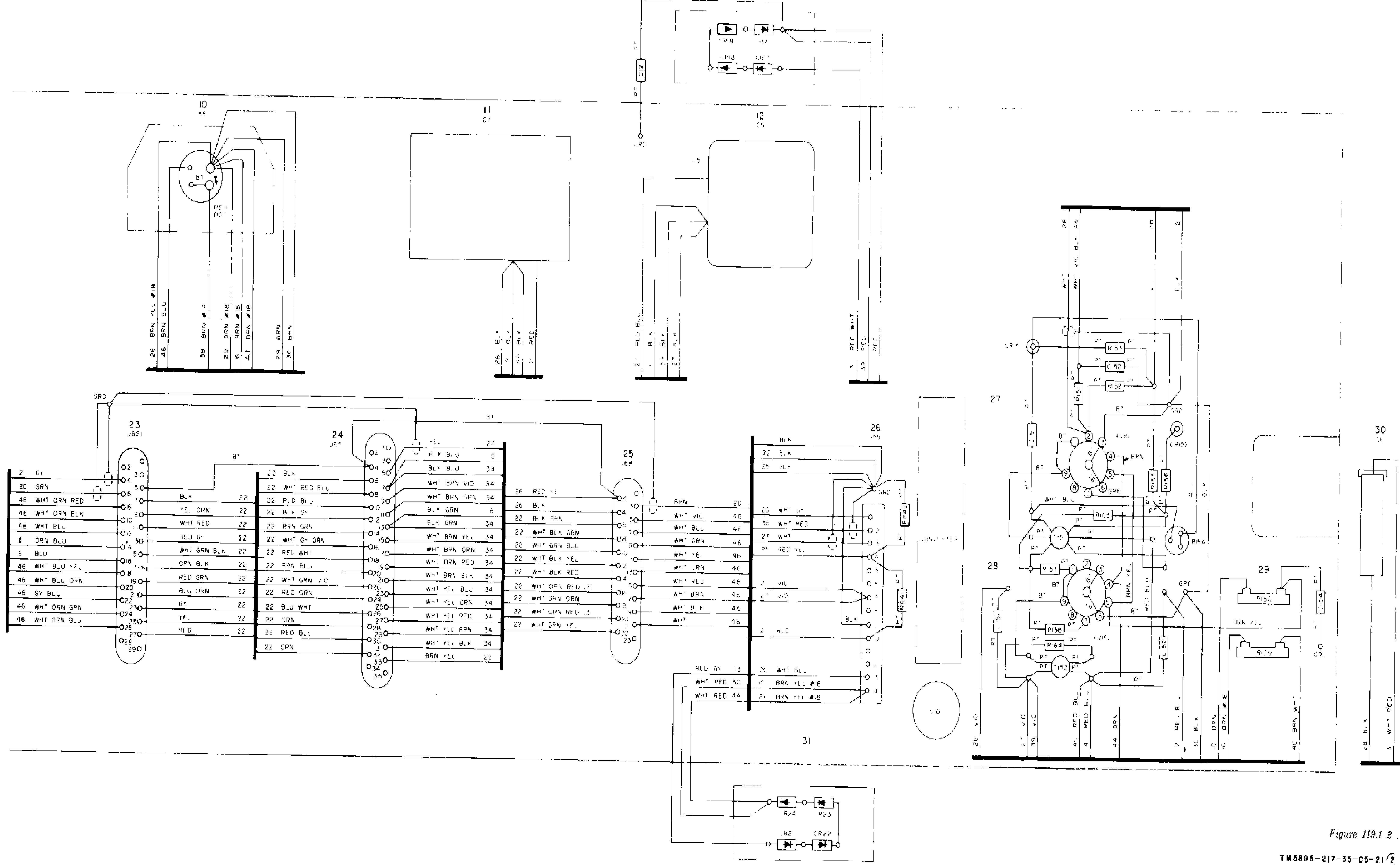
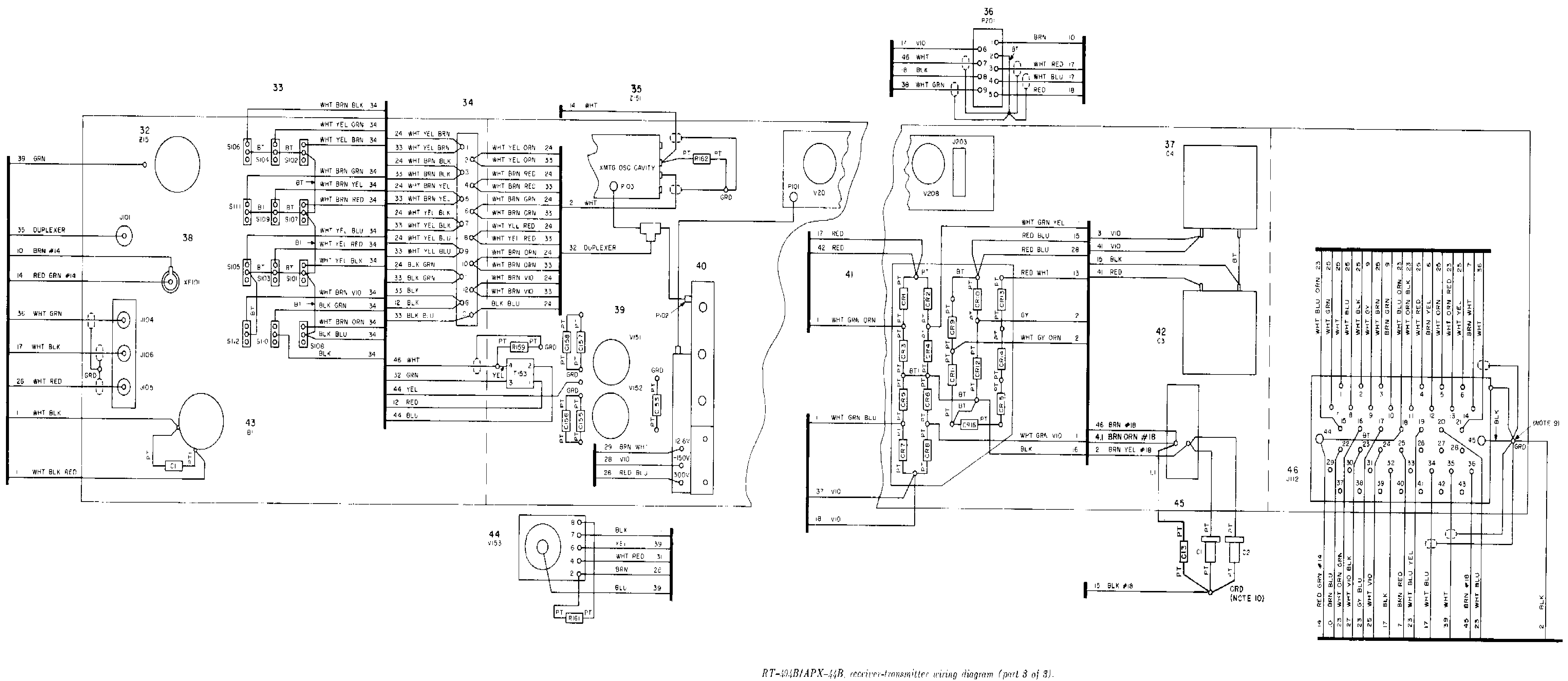


Figure 119.1 2

TM5895-217-35-C5-21(2)

RT-494B/APX-44B, receiver-transmitter wiring diagram (part 2 of 3).



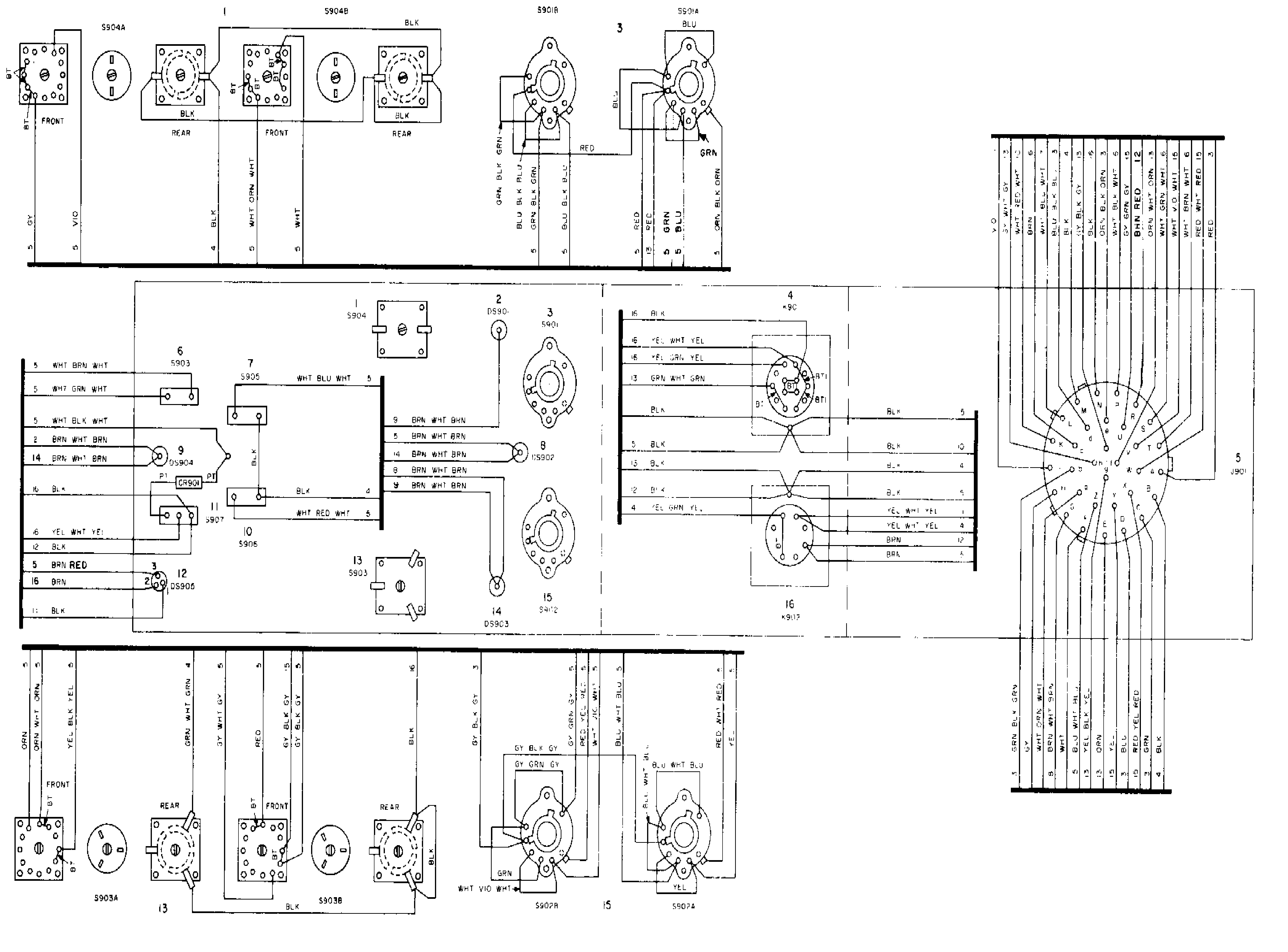
NOTES:

1. THE SMALL NUMBER ON EACH WIRE, ADJACENT TO THE BASE LINE, IS THE NUMBER OF THE STATION TO WHICH THE WIRE RUNS.
2. UNLESS OTHERWISE INDICATED ALL WIRES ARE #22 AWG.
3. BT DENOTES BARE TINNED COPPER WIRE.
4. BTI DENOTES BARE TINNED COPPER WIRE WITH INSULATED SLEEVING
5. PT DENOTES PIGTAIL LEAD.
6. PTI DENOTES PIGTAIL LEAD WITH INSULATED SLEEVING
7. (shielded lead symbol) DENOTES SHIELDED LEAD
8. STATION NUMBERS 1 THRU 9 AND 13 THRU 22 APPEAR ON SHEET 1. STATION NUMBERS 10 THRU 12 AND 23 THRU 31 APPEAR ON SHEET 2
9. THE BREAK IN THE CHASSIS OMITS RECEPTACLES J301, J351, J401, J451, J501, J551, J621, J651, J681 AND DELAY LINE DL601
10. COMMON CHASSIS GROUND
11. **R'6 IS LOCATED AT STATION 22 WHEN TRANSIENT SUPPRESSOR BOARD WPN 117769 IS USED**

RT-494B/APX-44B, receiver-transmitter wiring diagram (part 3 of 3).

Figure 119.1 3.

TM5895-217-35-CC-21(3)



NOTES

1. THE SMALL NUMBER ON EACH WIRE, ADJACENT TO THE BASE LINE, IS THE NUMBER OF THE STATION TO WHICH THE WIRE RUNS
2. UNLESS OTHERWISE INDICATED ALL WIRES ARE #22 AWG
3. BT DENOTES BARE TINNED COPPER WIRE
4. BTI DENOTES BARE TINNED COPPER WIRE WITH INSULATED SLEEVING
5. PT DENOTES PIGTAIL LEAD
6. A SECTIONS OF SWITCHES ARE SECTIONS NEAREST CONTROL KNOB AND VIEWED FROM CONTROL UNIT REAR. BROKEN LINES INDICATE CONTACTS ON FRONT SIDE OF WAFER OR SECTION

Figure 120

TM5895-217-35-C5-24

Control unit wiring diagram.

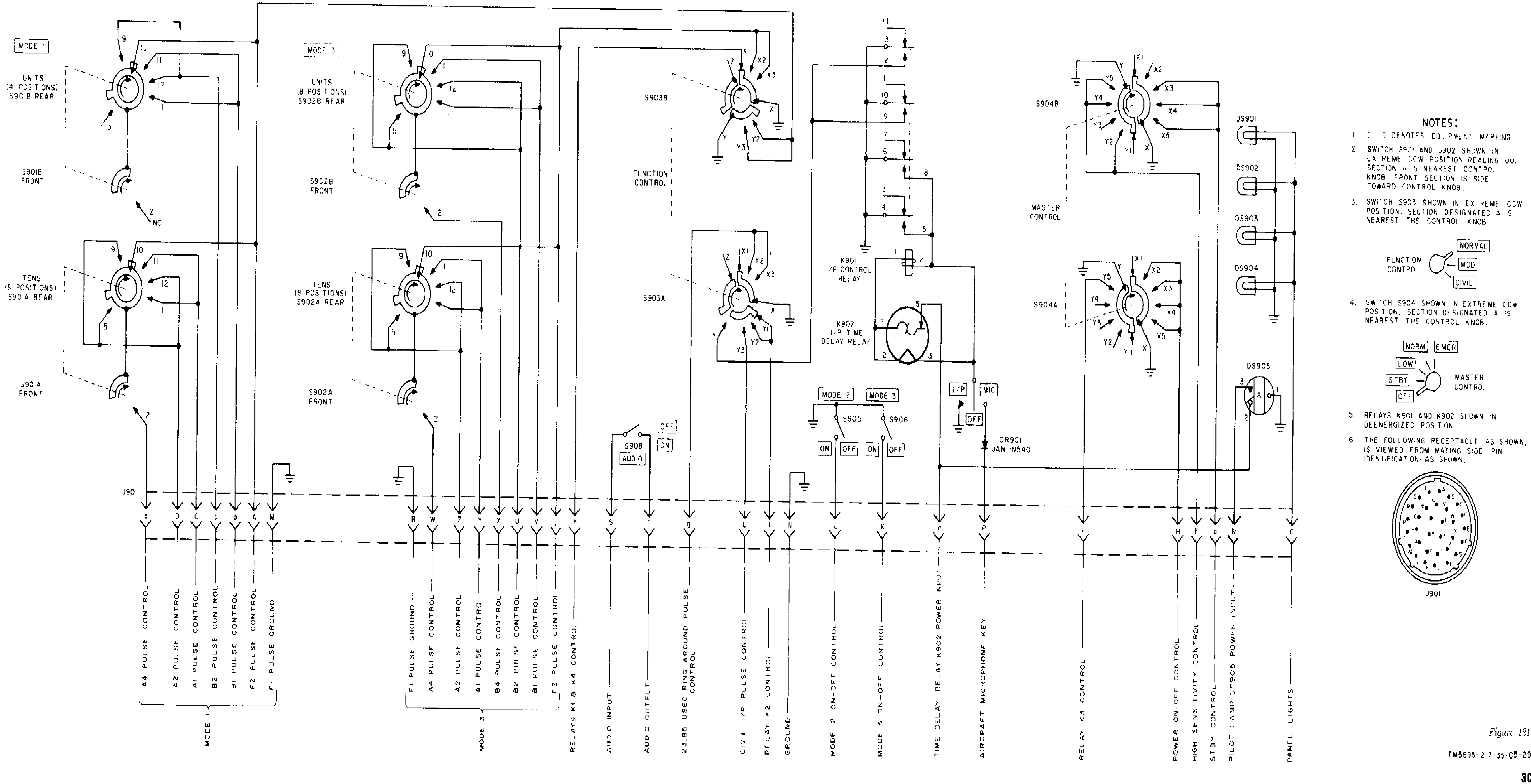


Figure 131

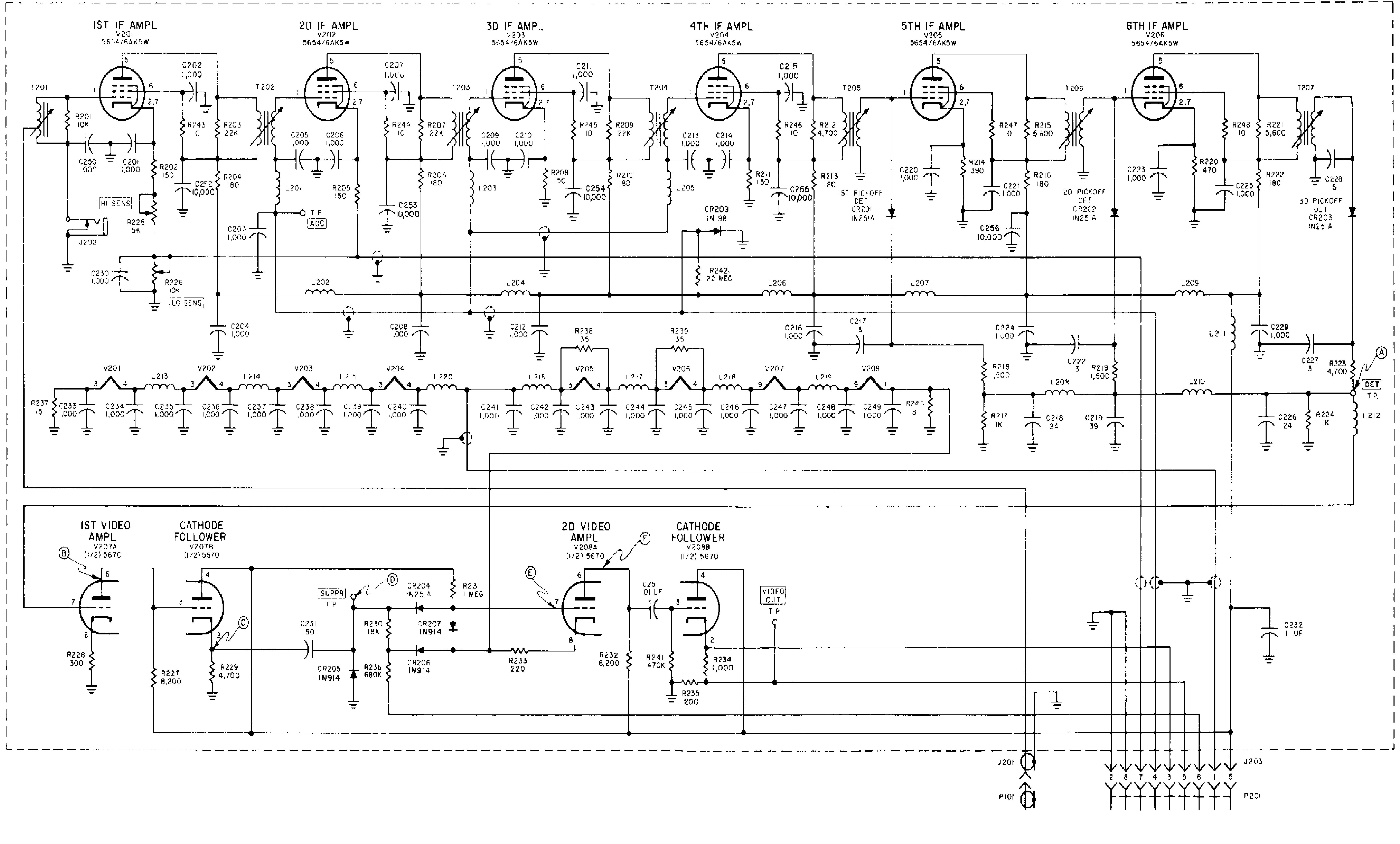
TM5895-2-7 35-CD-29

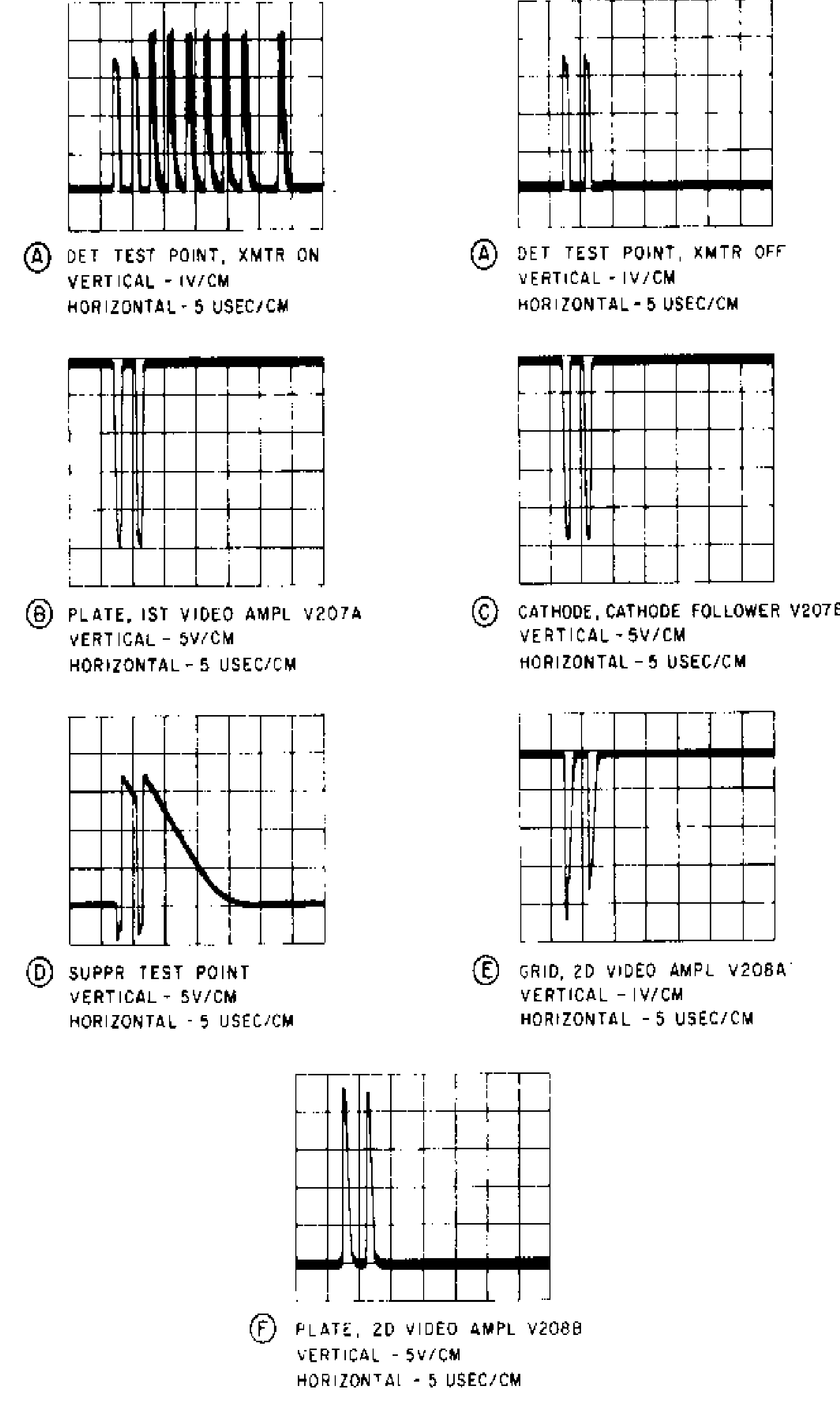
Control unit schematic diagram.

RT-494B/APX-44B, receiver-transmitter, schematic and waveform diagram.

Figure 122.1.

TM5895-217-35-C5-25





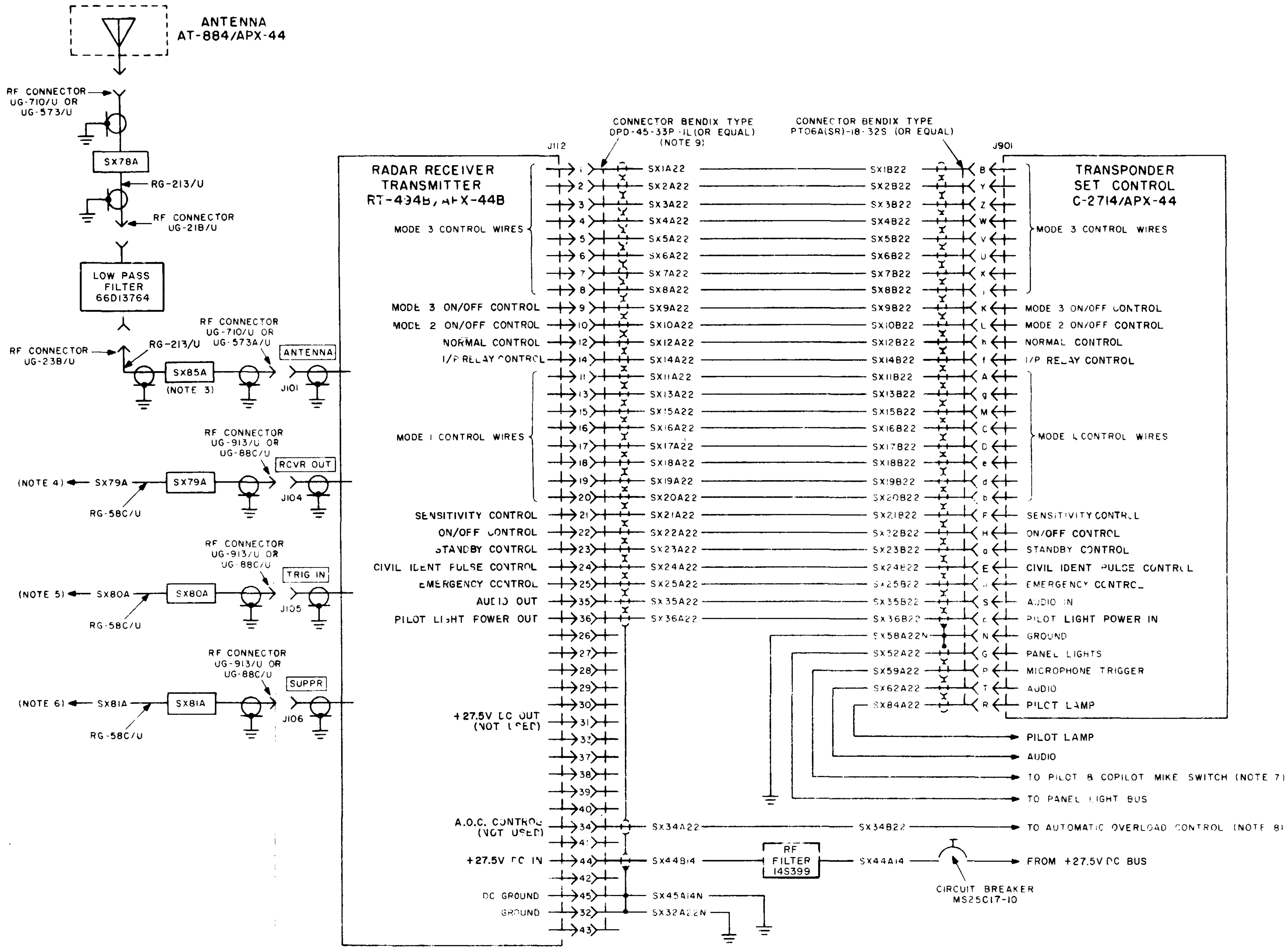
NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. ○→ WAVEFORM TAKEN BETWEEN POINT INDICATED AND CHASSIS UNLESS OTHERWISE SHOWN.
3. WAVEFORMS TAKEN WITH 0 DBM SIGNAL INPUT TO ANTENNA, 1,000 PRR AND A MODE I INTERROGATION, XMTR OFF UNLESS OTHERWISE STATED.
4. ▭ DENOTES EQUIPMENT MARKING.
5. ON RT-494B/APX-44, SERIAL NO. 1 THROUGH 500, ORDER NO. FR28-043-P6-22095(E) ONLY, DIODES CR201 THROUGH CR204 ARE IN251A. ALL OTHERS ARE IN914

Figure 183.1.

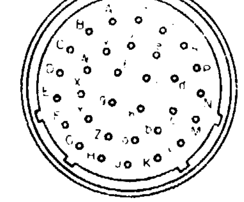
TM5895-217-35-C5-27

RT-494B/APX-44B, IF suppressor subchassis, schematic and waveform diagram.



NOTES:

1. INSTALLATION SHALL BE IN ACCORDANCE WITH SPECIFICATION MIL-W-5088.
2. BLOCK OF NUMBERS ASSIGNED SX-1 THRU SX-99. HIGHEST NUMBER USED SX-85.
3. COAXIAL CABLES SHALL BE IDENTIFIED BY METALLIC BANDS, SLEEVES, OR OTHER SUITABLE MARKINGS, ATTACHED (1) INCH FROM EACH CABLE PLUG AND MARKED EXACTLY AS INDICATED AT THE RESPECTIVE SYMBOLS. THE CHARACTERS SHALL BE LEGIBLE AND OF A PERMANENT NATURE.
4. PROVIDED TO FACILITATE USE OF THIS PORTION OF TRANSPONDER WITH OTHER TYPES OF RELATED EQUIPMENT WITHIN AIRCRAFT WIRING DETAILS DEPENDENT UPON NATURE AND CIRCUITRY OF EXTERNAL EQUIPMENT. CABLES NOT SUPPLIED BY MANUFACTURER.
5. PROVIDED FOR PULSE INPUT FROM PRECISION APPROACH RADAR RECEIVER. INSTALL CABLE WHEN REQUIRED. A .001 UF CAPACITY MUST BE INSERTED IN THE LINE, AT CONNECTION TO P.A.R. RECEIVER ADJUST P.A.R. TO PRODUCE POSITIVE PULSE OF 30 VOLTS.
6. PROVIDED FOR INPUT OF SUPPRESSION PULSE SOURCE OF ADJACENT EQUIPMENT WHICH INTERFERES WITH TRANSPONDER AND PREVENTS TRUE TRANSPONDER REPLIES (SUCH AS ADJACENT RADAR). ADJUST SUPPRESSION OUTPUT OF INTERFERING EQUIPMENT TO PRODUCE POSITIVE PULSE OF 25 VOLTS. MAY ALSO BE USED TO FEED SUPPRESSION PULSE (+25V) TO ADJACENT EQUIPMENT, WHILE TRANSPONDER IS TRANSMITTING, TO PREVENT TRANSPONDER INTERFERENCE WITH SUCH EQUIPMENT. INSTALL LEAD ONLY WHEN REQUIRED.
7. CONNECT THRU PILOT AND COPILOT MICROPHONE SWITCH TO GROUND.
8. PROVIDED TO FACILITATE USE OF TRANSPONDER WITH OTHER TYPES OF EQUIPMENT WITHIN AIRCRAFT WIRING DETAILS DEPENDENT UPON NATURE AND CIRCUITY OF EXTERNAL EQUIPMENT. INSTALL LEAD ONLY WHEN REQUIRED.
9. CONNECTOR TO BE SECURELY MOUNTED ON MOUNTING MT-2100B/APX-44B.
10. MATING CONNECTOR PLUG IS BENDIX PART NO. PT06A(SR)-18-32S AND SHOWN BELOW AS VIEWED FROM MATING SIDE.



11. MATING CONNECTOR IS CANNON ELECTRIC PART NO. DPD-45-33S IL TO BE INSTALLED ON MOUNTING MT-2100B/APX-44B AND VIEWED FROM MATING SIDE AS SHOWN BELOW.

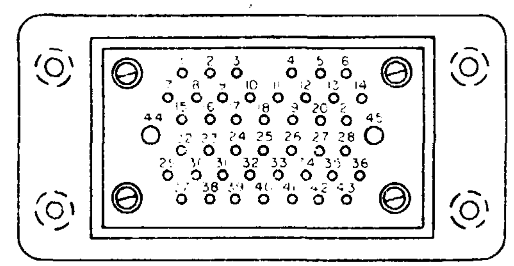


Figure 133.1.

TM5895-217-35-C5-28

Transponder Set AN/APX-44B, typical aircraft installation wiring diagram.

CHANGE No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *21 May 1965*

Field and Depot Maintenance Manual

TRANSPONDER SET AN/APX-44

TM 11-5895-217-35, 27 July 1960, is changed as follows:

Page 142. Delete chapter 5 and substitute:

CHAPTER 5

DEPOT INSPECTION STANDARDS

96. Applicability of Depot Inspection Standards

Transponder Set AN/APX-44 must be tested thoroughly after rebuild or repair to insure that it meets adequate performance standards when returned to stock for reissue. Use the tests described in this chapter to measure the performance of the repaired test set. It is mandatory that equipment to be reissued, or returned to stock for reissue, meet all of the performance standards given in this chapter.

97. Applicable References

a. Repair Standards. Applicable procedures of the Army depot performing this test and its general standards for repaired electronic equipment, form a part of the requirements for testing this equipment.

b. Technical Publications. The following technical publications are applicable to this equipment:

Equipment and subject	Publication
Operator and Organizational Maintenance Manual, Transponder Set AN/APX-44.	TM 11-5895-217-12
Operator and Organizational Maintenance Repair Parts and Special Tools List, Transponder Set AN/APX-44.	TM 11-5895-217-12P
Field and Depot Maintenance Repair Parts and Special Tools List, Transponder Set AN/APX-44.	TM 11-5895-217-35P

c. Modification Work Orders. Perform all applicable Modification Work Orders pertaining to this equipment before making the test specified. DA PaM 310-4 lists all available MWO's.

98. Test Facilities Required

The following equipments, or suitable equivalents, will be used in determining compliance with this specific standard.

a. Test Equipment.

Equipment	Federal stock No.	Qty reqd	Applicable literature
Test Set, Radar AN/UPM-98	6625-580-3771	1	TM 11-6625-403-14
Oscilloscope AN/USM-140A	6625-987-6603	1	TM 11-6625-535-15
Multimeter ME-26B/U	6625-646-9409	1	TM 11-6625-200-12

b. Additional Equipment.

(1) A 27.5-volt (±0.25), dc power supply with 7.5-ampere output (Power Supply PP-1104A/G or equivalent) is required to provide an input voltage for the transponder set.

(2) A wire harness is required to connect Receiver-Transmitter, Radar RT-494/APX-44 to Control, Transponder Set C-2714/APX-44, and to the dc power supply. The wire harness may be fabricated by using the connectors and electrical wire shown in fig. 3.

(3) A test panel is required to replace the RT-494/APX-44 right-hand side panel to enable behind-the-panel adjustments to the RT-494/APX-44 with a panel in place. The test panel is fabricated in accordance with the instructions in paragraph 100.

(4) A 4-inch diameter magnifying glass (Bausch and Lomb Cat. No. 81-33-24 or equivalent) is required for accurate observation of pulse spacing on the AN/UPM-98 DISPLAY unit scope. The magnifying glass fits exactly into the viewing end of the hood on the scope.

(5) A stopwatch is required to time the duration of the I/P pulse when performing the coincidence test.

(6) A headset (Headset HS-33 or equivalent) is required for the reply audio monitoring test.

99. General Test Requirements

Most of the tests will be performed under the conditions given below and as illustrated in fig. 134. Testing will be simplified if connections (*d* and *e* below) and preliminary panel control settings (para 101) are made initially, and modifications are made as required for the individual tests.

a. Construct a wire harness (fig. 3) for use in interconnecting receiver-transmitter, radar RT-494/APX-44 to control, Transponder Set C-2714/APX-44, and to the dc power supply.

b. Construct a test panel (para 100) for use in replacing the right-hand side panel on the RT-494/APX-44 to enable behind-the-panel adjustments to the receiver-transmitter with a panel in place.

c. Remove the RT-494/APX-44 right-hand side panel. Mate the female connector, attached to the flexible lead from the A.O.C. TEST VOLTS pin on the test panel (fig. 135), with the A.O.C. test pin on the RT-494/APX-44 IF amplifier subchassis. Position and secure the test panel in place on the RT-494/APX-44.

Note. Do not make any tests on the RT-494/APX-44 without the test panel in place, because the test results will not be valid. Test panel openings must be close with their covers when an adjustment is not being made through the opening. Do not remove the left-hand side panel.

d. Connect receiver-transmitter, Radar RT-494/APX-44; Control, Transponder Set C-2742/APX-44; Test Set, Radar AN/UPM-98; and Oscilloscope AN/USM-140A as shown in fig. 134.

e. Ground the case of the AN/UPM-98, RT-494/APX-44, and AN/USM-140A with a copper wire (#22 AWG). Make sure that the wire makes contact with bare metal on each unit.

100. Test Panel Fabrication

Fabricate the test panel in accordance with the dimensions shown on fig. 136, the test panel markings and A.O.C. TEST VOLTS pin jack detail shown on fig. 135, and the procedures given in *a* through *k* below.

a. Use a sheet of soft aluminum type 6061-T6 or equivalent, .050 inch thick, 7⅞ inches wide and 19⁹⁄₁₆ inches long to fabricate the test panel.

Note. As an alternate, a discarded RT-494/APX-44 right-hand side panel may be used for the test panel.

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820-168-1

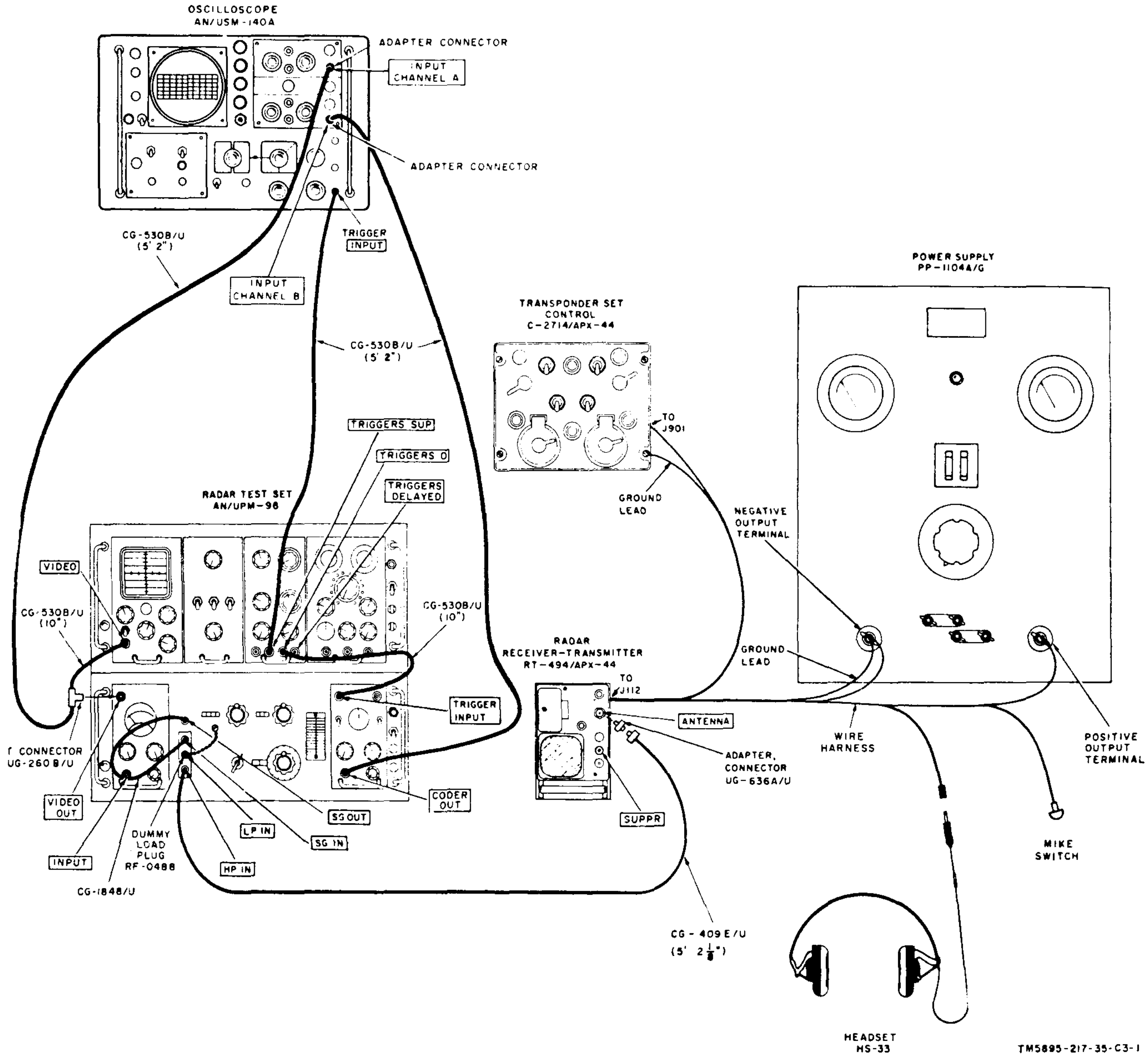


Figure 134. Connections for final testing.

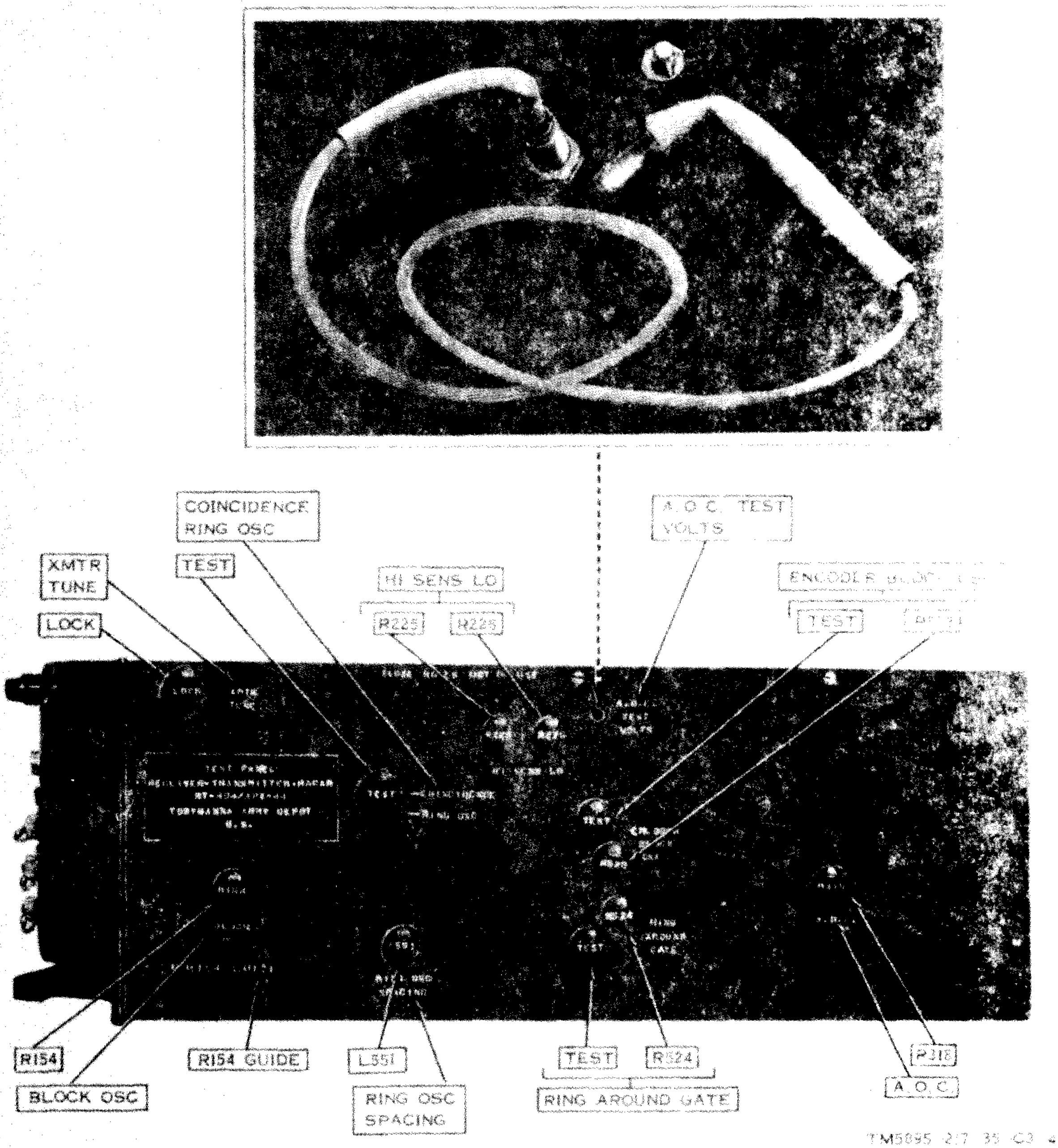


Figure 135. Receiver-Transmitter, Radar RT-494/APX-44, test panel in place.

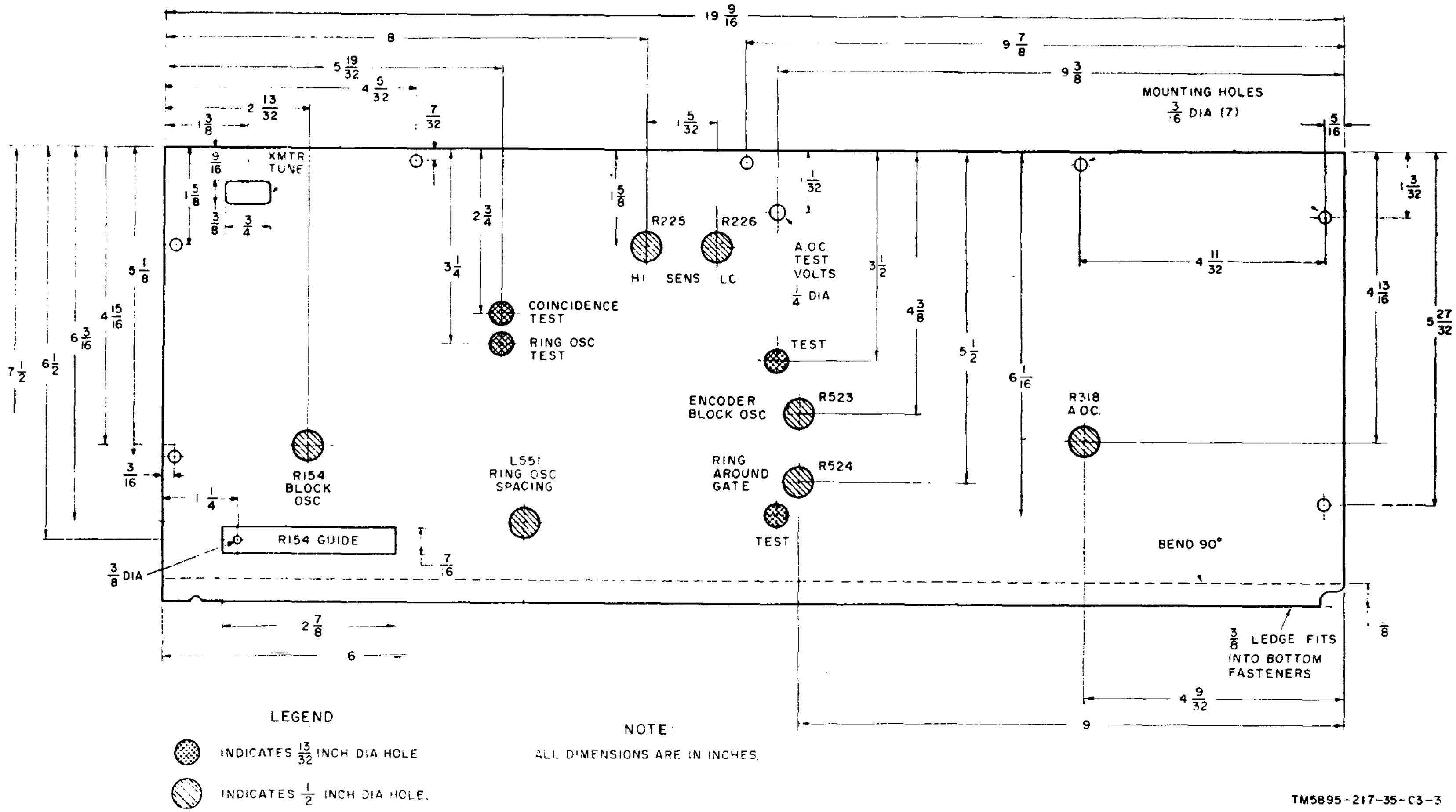


Figure 136. Receiver-Transmitter, Radar RT-494/APX-44, test panel dimensions.

b. Bend the sheet of aluminum ⅜-inch from the bottom edge along the 19⁹⁄₁₆-inch dimension.

Note. The bend provides a ledge which inserts into fasteners on the inside bottom of the receiver-transmitter.

c. Drill out all the holes in accordance with the dimensions shown on fig. 136.

d. Install a turnlock stud fastener (Camloc No. 555-6) with a stud retaining washer (Camloc No. 553-1) into each of the seven ³⁄₁₆-inch mounting holes.

e. Set and secure the drilled out test panel in place on the receiver-transmitter. Check the alignment of the test panel holes with the RT-494/APX-44 controls and test points. The location of the controls and test points for each individual RT-494/APX-44 may be slightly different. If necessary, mark the area around the holes that require additional cutting away, remove the test panel, and use a round file to cut away the marked area.

f. Place a plastic tubing insert having a lip on one end (fig. 137) into each of the four ¹³⁄₃₂-inch holes. When installed, the plastic insert should fit snugly into the hole, and the lip should be exposed on the outside of the test panel.

Note. The plastic inserts prevent the oscilloscope test probe from shorting to the test panel.

g. Fabricate nine ¹⁵⁄₁₆-inch diameter disks and two 1¼-inch disks from a sheet of soft aluminum 0.050 inch thick.

h. Install the disks with rivets so that the disks are capable of swinging away from the holes they cover, in at least one direction, without interfering with the adjacent disk. Use a ¹⁄₆₄-inch spacer between the test panel and each disk that covers a ¹³⁄₃₂-inch hole. (The disks must be raised from the test panel to clear the lip of the plastic insert.) One each 1¼-inch disk covers the XMTR TUNE hole, and the other 1¼-inch disk spans the COINCIDENCE and RING OSC holes.

i. Cut a piece of clear plastic tubing ⁷⁄₁₆ inch inside diameter and 3⅝ inches long.

Note. The plastic tubing is used as a screwdriver guide when variable resistor R154 requires adjustment. The plastic tubing is inserted through the BLOCK OSC hole and fits snugly over the locknut of variable resistor R154. When not in use, the plastic tubing mounts on a metal strip directly below the BLOCK OSC hole.

j. Fabricate a rigid metal strip ¹⁄₁₆ inch thick, ⁷⁄₁₆ inch wide, and 2⅞ inches long. Mount the metal strip with a ¼-inch spacer, bolt, and nut to the test panel directly under the BLOCK OSC hole. Insert the ¼-inch spacer between the metal strip and test panel to enable the plastic tubing (*i* above) to slide over the metal strip.

k. Install an insulated pin jack into the ¼-inch A.O.C. TEST VOLTS hole on the test panel. Solder one end of a 9-inch long, flexible insulated wire (#20) to the lug on the pin jack. Solder the other end of the wire to a connector which mates with the A.O.C. test pin on the IF amplifier subchassis.

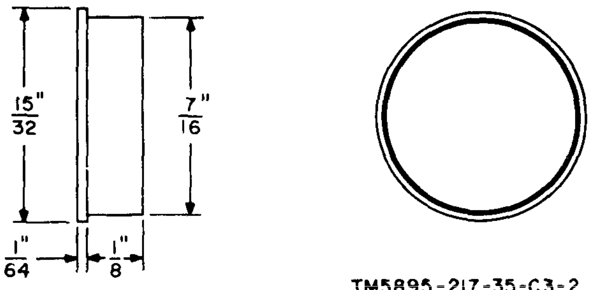


Figure 137. Plastic tubing insert, dimensions.

101. Preliminary Panel Control Settings

Connect the equipment as shown in fig. 134. Make the preliminary panel control settings outlined in *a* through *s* below. Perform each control setting in sequence. Do not vary the sequence. Modifications are made as required for the individual test (para 102-114). No setting or adjustment is required for controls not mentioned.

a. Dc Power Supply. Adjust the output voltage of the dc power supply to 27.5 volts.

b. Control Unit.

(1) Set the master control to NORM.
(2) Set the function control to MOD.
(3) Set the MODE 2 ON-OFF switch to ON.
(4) Set the MODE 3 ON-OFF switch to ON.
(5) Set the MODE 1 code control to 00.
(6) Set the MODE 3 code control to 00.
(7) Set the AUDIO ON-OFF switch to OFF.
(8) Set the I/P switch to OFF.

c. Receiver-Transmitter. Set all the mode 2 toggle switches to OFF.

d. Oscilloscope AN/USM-140A. Set the POWER ON-OFF switch to ON.

e. Test Set, Radar AN/UPM-98.

(1) Set the TS-1253/UP POWER ON-OFF switch to ON.

(2) Set the SM-197/UPM-98 POWER ON-OFF switch to ON.

(3) Allow approximately 30 minutes for all equipment to warm up.

f. SM-197/UPM-98 MARK X CODER Unit. Set the FUNCTION switch to INT.

g. TS-1253/UP XTAL MARK & SYNC Unit.

(1) Set the SYNC SELECT switch to 1.45.

(2) Set the PRF control to midscale.

Note. The PRF control will be adjusted as described in n(6) and (10) below.

h. SM-197/UPM-98 Signal Generator Unit. Set the signal generator unit of the SM-197/UPM-98 to 1,030 mc as follows:

(1) Set the WAVEMETER FREQUENCY control to a dial setting equivalent to 1,030 mc in accordance with the appropriate WAVEMETER CALIBRATION CURVE in the Book of Calibration Charts provided with the AN/UPM-98.

(2) Set the WAVEMETER INPUT switch to SIG GEN.

(3) Set the METER SELECT switch to WM on the CAL-CONTROL unit.

(4) Turn the WM SENS control fully cw on the CAL-CONTROL unit.

(5) Vary the SG FREQUENCY control for a dip on the CAL-CONTROL unit meter.

(6) Turn the WM SENS control ccw on the CAL-CONTROL unit and, at the same time, vary the SG FREQUENCY control until the dip on the meter occurs within the range of the meter scale.

(7) Set the SG FREQUENCY control for a maximum dip on the meter.

i. SM-197/UPM-98 CAL-CONTROL Unit. Calibrate the meter as follows:

(1) Set the METER SELECT switch to CAL.

(2) Adjust the CAL ADJ control for a meter indication of 500.

(3) Set the METER SELECT switch to 500 PRF.

j. SM-197/UPM-98 Signal Generator Unit. Set the ATTENUATION control fully ccw.

k. TS-1253/UP XTAL MARK & SYNC Unit. Set the SUP control to midrange.

l. SM-197/UPM-98 MARK X CODER Unit.

(1) Set the PULSE POS control to 0.

(2) Set the MODE SELECT control to M-1.

m. SM-197/UPM-98 CAL-CONTROL Unit. Set the VIDEO OUT control to POWER.

n. Test Set, Radar AN/UPM-98. Perform the procedures given in (1) through (11) below to provide a prf of 500 and a pulse width of 1 usec.

(1) Set the TRIGGER switch to DEMOD on the SM-197/UPM-98 CAL-CONTROL unit.

(2) Set the METER SELECT switch to 500 PRF on the SM-197/UPM-98 CAL-CONTROL unit.

(3) Set the FUNCTION switch to INT on the SM-197/UPM-98 MARK X CODER unit.

(4) Set the SYNC SELECT switch to INT 1.45 on the TS-1253/UP XTAL MARK & SYNC unit.

(5) Set the CODER LEVEL control to midposition on the SM-197/UPM-98 MARK X CODER unit.

(6) Adjust the PRF control on the TS-1253/UP XTAL MARK & SYNC unit for a reading of 500 on the SM-197/UPM-98 CAL-CONTROL unit meter.

Note. With the TRIGGER switch set to DEMOD on the SM-197/UPM-98 CAL-CONTROL unit ((1) above), a reading of 500 on the meter indicates that the transponder set is replying at approximately 500 prf (identical with the interrogating prf).

(7) Set the FUNCTION switch to (+) VIDEO on the SM-197/UPM-98 MARK X CODER unit.

Note. The meter on the SM-197/UPM-98 CAL-CONTROL unit will not indicate.

(8) Use the channel B input on Oscilloscope AN/USM-140A to monitor the video prf from the CODER OUT connector on the SM-197/UPM-98 MARK X CODER unit.

(9) Set Oscilloscope AN/USM-140A for a sweeptime of 2 milliseconds per centimeter.

(10) Adjust the PRF control on the TS-1253/UP XTAL MARK & SYNC unit for a 500-prf display on Oscilloscope AN/USM-140A. A pulse will occur coincidental with each vertical graticule.

(11) Set Oscilloscope AN/USM-140A for a sweeptime of 1 usec per centimeter.

(12) Adjust the PULSE WIDTH control on the SM-197/UPM-98 MARK X CODER unit for an interrogating pulse width of 1 usec, measured at 50 percent peak amplitude, as observed on Oscilloscope AN/USM-140A.

Note. Two square-wave interrogating pulses should be displayed.

(13) Set the FUNCTION switch to INT on the SM-197/UPM-98 MARK X CODER unit.

Notes:

1. The meter should indicate *approximately* 500 on the TS-1253/UP CAL-CONTROL unit.
2. The control settings outlined in *o* through *s* below will provide a normal display of the transmitted pulses.

o. TS-1253/UP DISPLAY Unit.

(1) Set the HOR and VERT controls to midrange.

(2) Set the VOLTS/IN switch to 5.

(3) Set the VIDEO SENS control to fully cw.

(4) Set the 75 Ω IN-OUT switch to OUT.

p. TS-1253/UP XTAL MARK & SYNC Unit.

(1) Set the SWEEP DELAY RANGE control to 1-11.

(2) Set the SWEEP DELAY FINE control fully ccw.

(3) Set the TRIGGER DELAY RANGE control to 1-11.

(4) Set the TRIGGER DELAY FINE control fully ccw.

(5) Turn the XTAL MARK LEVEL control cw until the 1.45-usec markers appear below the point where the level of the baseline changes on the scope of the TS-1253/UP DISPLAY unit.

q. TS-1253/UP SWEEP & INTEN MARK Unit.

(1) Set the SWEEP SPEED RANGE control to 20-200.

(2) Set the INTENSITY MARKS RANGE control to OFF.

(3) Set the SWEEP SPEED ADJUST control on the TS-1253/UP SWEEP & INTEN MARK unit and the HOR control on the TS-1253/UP DISPLAY unit to position the two pulses from the transponder set on the scope of the TS-1253/UP DISPLAY unit.

r. TS-1253/UP DISPLAY Unit. Adjust the INTEN, FOCUS, and ASTIG controls for optimum scope presentation.

s. Oscilloscope AN/USM-140A. Adjust the controls for optimum presentation of the transmitted reply pulses.

102. Pilot Light Test

a. Connect the equipment as shown in figure 134.

b. Set the control unit master control to OFF.

c. Turn the pilot light test button fully ccw.

d. Press the control unit pilot test button. The pilot light should light.

e. Set the control unit master control to NORM. The pilot light should light with or without pressing the pilot light test button.

103. High Receiver Sensitivity and Automatic Overload (A.O.C.) Tests

a. Connect the equipment as shown in figure 134.

b. Make sure that the preliminary panel control settings have been made as outlined in paragraph 101.

c. Turn the ATTENUATION control cw on the SM-197/UPM-98 signal generator unit until arc-over begins to occur across the baseline of the two transmitted pulses as viewed on the

TS-1253/UP DISPLAY unit scope and Oscilloscope AN/USM-140A. In addition, observe that the prf indication on the SM-197/UPM-98 CAL-CONTROL unit meter begins to decrease to a value less than 500.

d. Set the SM-197/UPM-98 ATTENUATION control to a point where the intensity of the arc-over is equal to that of the trailing edges of the two transmitted pulses.

Note. When the intensity of the arc-over is equal to that of the trailing edges of the two transmitted pulses, the SM-197/UPM-98 CAL-CONTROL unit meter needle will oscillate at the 250 position. This will be referred to as the 50 percent triggering point.

e. Note the indication on the ATTENUATION dial of the SM-197/UPM-98 signal generator unit and *add this figure to the fixed attenuation* specified on the DEMODULATOR ATTENUATION CONSTANTS chart for SG IN to HP IN under the *1030 MC* column in the Book of Calibration Charts provided with the AN/UPM-98. The fixed attenuation value will vary for each individual AN/UPM-98. The *total* attenuation to achieve the 50 percent triggering point should be between 72 and 76.

Note. The total attenuation corresponds to a sensitivity figure of decibels below 1 volt. (For example, an attenuation figure of 72.5 corresponds to a sensitivity figure of 72.5 decibels below 1 volt.)

f. Repeat the procedures given in *c, d,* and *e* above with the MODE SELECT control on the SM-197/UPM-98 MARK X CODER unit set first to M-2 and then to M-3.

g. Set the MODE SELECT control to M-1 on the SM-197/UPM-98 MARK X CODER unit.

h. Turn the SM-197/UPM-98 ATTENUATION control *ccw* from the 50 percent triggering point noted in *e* above until the previously observed arc-over (*d* above) appears in the pulse area not more than once per second. In addition, an occasional downward flicker should be observed on the SM-197/UPM-98 CAL-CONTROL unit meter coincidental with arc-over. This is referred to as the 100 percent threshold triggering point and should occur 3 decibels ±0.3 from the 50 percent triggering point noted in *e* above.

i. Measure the negative dc voltage between the A.O.C. test pin on the test panel and chassis ground with the VTVM. The value should be between —0.7 and —1.2 volts.

Note. The value of —0.7 and —1.2 volts applies only with the MODE SELECT control set to M-1 on the SM-197/UPM-98 MARK X CODER unit and the master control set to NORM, function control set to MOD, MODE 1 code control set to 00 on the control unit, and the PRF control on the TS-1253/UP XTAL MARK & SYNC unit set to obtain 500 pps. If it is necessary to adjust variable resistor R318 to achieve the 100 percent threshold triggering point at 3 db from the 50 percent triggering point, receiver sensitivity may be affected, and the high receiver sensitivity test (*c–e* above) must be repeated.

j. Turn the SM-197/UPM-98 ATTENUATION control completely ccw.

k. Set the METER SELECT switch to 5000 on the SM-197/UPM-98 CAL-CONTROL unit.

l. Observe the TS-1253/UP DISPLAY unit scope and slowly turn the PRF control cw on the TS-1253/UP XTAL MARK & SYNC unit until arc-over first occurs across the baseline of the transmitted reply pulses. At this point, the meter on the SM-197/UPM-98 CAL-CONTROL unit should indicate less than 700. Slowly turn the PRF control further cw through its range. The arc-over should increase in intensity, and the average indication on the meter should not be more than 700.

104. Receiver Bandwidth Test

Note. Perform the high receiver sensitivity and automatic overload control (A.O.C.) test given in paragraph 103 immediatley before proceeding with the receiver bandwidth test. Preliminary control settings and connections for the receiver bandwidth test are identical with those for the high receiver sensitivity and automatic overload control (A.O.C.) test.

a. Set the SM-197/UPM-98 signal generator unit ATTENUATION control *ccw* +3 decibels from the 50 percent triggering point (para. 103*d*).

b. Turn the SM-197/UPM-98 signal generator unit SG FREQUENCY control cw until the 50 percent triggering point again occurs.

Note. When the intensity of the arc-over is equal to that of the trailing edges of the two transmitted pulses, the SM-197/UPM-98 CAL-CONTROL unit meter needle will oscillate at the 250 position. This is referred to as the 50 percent triggering point.

c. Set the METER SELECT switch to WM on the SM-197/UPM-98 CAL-CONTROL unit.

d. Vary the WAVEMETER FREQUENCY control on the SM-197/UPM-98 signal generator unit for a dip on the meter of the SM-197/UPM-98 CAL-CONTROL unit.

e. Turn the WM SENS control ccw on the SM-197/UPM-98 CAL-CONTROL unit and, at the same time, vary the SM-197/UPM-98 WAVEMETER FREQUENCY control until the dip on the meter occurs within the range of the meter scale.

f. Set the SM-197/UPM-98 WAVEMETER FREQUENCY control for a maximum dip on the meter.

g. Interpolate the SM-197/UPM-98 WAVEMETER FREQUENCY dial setting in accordance with the appropriate WAVEMETER CALIBRATION CURVE in the Book of Calibration Charts provided with the AN/UPM-98. Note the interpolated frequency; this is the 50 percent triggering point for the high reference frequency.

h. Set the METER SELECT switch to 500 PRF on the CAL-CONTROL unit.

i. Slowly turn the SM-197/UPM-98 signal generator unit SG FREQUENCY control *ccw* until the transmitted reply pulses again fire fully (no arc-over). Continue turning the SG FREQUENCY control further ccw until the 50 percent triggering point is again reached.

j. Set the METER SELECT switch to WM on the SM-197/UPM-98 CAL-CONTROL unit and determine the SM-197/UPM-98 signal generator frequency as outlined in *d* through *g* above. Note the interpolated frequency; this is the 50 percent triggering point for the low reference frequency. Subtract the low reference frequency from the high reference frequency noted in *g* above. The resultant difference is the bandwidth at +3 decibels from the 50 percent triggering point and should be between 6 and 8 mc.

k. Determine the center frequency by adding one-half of the bandwidth to the low reference frequency noted in *j* above. The center frequency should be 1,030 mc ±1.

l. Set the METER SELECT switch to 500 PRF on the SM-197/UPM-98 CAL-CONTROL unit.

m. Determine the receiver bandwidth at +20 decibels from the 50 percent triggering point by performing the procedures given in *a* through *j* above, with +20 decibels substituted for the +3-decibel figure. The resultant difference obtained in *j* above will be the bandwidth at +20 decibels from the 50 percent triggering point and should not be greater than 15 mc.

105. Low Receiver Sensitivity Test

***Caution:* The low receiver sensitivity test must be performed in as short a time as possible to prevent possible damage to the AN/UPM-98 LP input circuit.**

a. Connect the equipment as shown in figure 134 except for the following connections:

(1) Remove cable CG-409E/U (5′ 2⅛″) from the HP IN connector and connect the cable to the LP IN connector on the SM-197/UPM-98.

(2) Terminate the HP IN connector with Dummy Load Plug RF-0488.

Note. Dummy Load Plug RF-0488 is attached to the SM-197/UPM-98 front panel with a link chain.

b. Make sure that the preliminary panel control settings have been made as outlined in paragraph 101, except set the control unit master control to LOW.

c. Turn the ATTENUATION control cw on the SM-197/UPM-98 signal generator unit until arc-over occurs across the baseline of the two transmitted pulses as viewed on the TS-1253/UP DISPLAY unit scope and Oscilloscope AN/USM-140A. In addition, observe that the prf indication on the SM-197/UPM-98 CAL-CONTROL unit meter begins to decrease to a value less than 500.

d. Set the SM-197/UPM-98 ATTENUATION control to a point where the intensity of the arc-over is equal to that of the leading edges of the two transmitted pulses.

Note. When the intensity of the arc-over is equal to that of the leading edges of the two transmitted pulses, the SM-197/UPM-98 CAL-CONTROL unit meter needle will oscillate at the 250 position. This will be referred to as the 50 percent triggering point.

e. Note the indication on the ATTENUATION dial of the SM-197/UPM-98 signal generator unit and *add this figure to the fixed attenuation* specified on the DEMODULATOR ATTENUATION CONSTANTS chart for "SG IN" to "LP IN" under the *1030 MC* column in the

Book of Calibration Charts provided with the AN/UPM-98. The fixed attenuation value will vary for each individual AN/UPM-98. The *total* attenuation to achieve the 50 percent triggering point should be 30 decibels ±5 below the total attenuation obtained in paragraph 103*e* when measuring high receiver sensitivity (MODE SELECT control set to M-1 on the SM-197/UPM-98 MARK X CODER unit, and FUNCTION switch to MOD and MODE 1 code control set to 00 on the control unit).

106. Main Gate Characteristic Test

a. Connect the equipment as shown in figure 134 except for cable CG-530B/U (5′ 2″). Remove cable CG-530B/U (5′ 2″) from the CODER OUT connector on the MARK X CODER unit and connect the cable to the SUPPR connector on the receiver-transmitter.

b. Make sure that the preliminary panel control settings have been made as outlined in paragraph 101, except for the following:

(1) Set the MODE SELECT control to M-2 on the SM-197/UPM-98 MARK X CODER.

(2) Set the control unit MODE 2 switch to OFF.

Note. MODE 2 switch is set to OFF to prevent the receiver-transmitter from transmitting a reply. The reply would appear as pips upon the main gate pulse.

c. Observe the main gate pulse on Oscilloscope AN/USM-140A. The main gate pulse should be a minimum of 100 usec wide at the 50 percent amplitude points of leading and trailing edges. The peak amplitude of the main gate pulse should be between 20 and 70 volts. The rise-time voltage should not be less than 10 volts per usec measured at any point between the 10 percent and 90 percent peak amplitude points. The falltime voltage should not be less than 10 volts per usec measured at any point between a point starting at 4 usec from the 10 percent amplitude point and terminating at the 10 percent amplitude point.

107. Transmitter Frequency Test

a. Connect the equipment as shown in figure 134.

b. Make sure that the preliminary panel control settings have been made as outlined in paragraph 101, except for the following:

(1) Set the WAVEMETER INPUT switch to DEMOD on the SM-197/UPM-98 signal generator.

(2) Set the METER SELECT switch to WM on the SM-197/UPM-98 CAL-CONTROL unit.

c. Vary the WAVEMETER FREQUENCY control on the SM-197/UPM-98 signal generator unit for a dip on the meter of the SM-197/UPM-98 CAL-CONTROL unit.

d. Turn the WM SENS control ccw on the SM-197/UPM-98 CAL-CONTROL unit and, at the same time, vary the SM-197/UPM-98 WAVEMETER FREQUENCY control until the dip on the meter occurs within the range of the meter scale.

e. Set the SM-197/UPM-98 WAVEMETER FREQUENCY control for a maximum dip on the meter.

f. Interpolate the SM-197/UPM-98 WAVEMETER FREQUENCY dial setting in accordance with the appropriate WAVEMETER CALIBRATION CURVE in the Book of Calibration Charts provided with the AN/UPM-98. The frequency must be 1,090 mc ±1.

108. Transmitter Peak Power Output Test

a. Connect the equipment as shown in figure 134.

b. Make sure that the preliminary panel control settings have been made as outlined in paragraph 101.

Note. Make sure that the TRIGGER switch is set to DEMOD on the SM-197/UPM-98 CAL-CONTROL unit.

c. Set the control unit MODE 1 code control to 03.

d. Set the MODE SELECT control to M-1 on the SM-197/UPM-98 MARK X CODER unit.

e. Perform the procedure given in *q* below.

f. Set the No. 4 and 5 (code 0300) mode 2 toggle switches on the receiver-transmitter to ON.

g. Set the MODE SELECT control to M-2 on the SM-197/UPM-98 MARK X CODER unit.

h. Perform the procedure given in *q* below.

i. Set the control unit MODE 3 code control to 03.

j. Set the MODE SELECT control to M-3 on the SM-197/UPM-98 MARK X CODER unit.

k. Perform the procedure given in *q* below.

l. Set the control unit master control to EMER.

m. Set the MODE SELECT control to M-1 on the SM-197/UPM-98 MARK X CODER unit.

n. Perform the procedure given in *q* below.

o. Set the MODE SELECT control to M-3 on the SM-197/UPM-98 MARK X CODER unit.

p. Perform the procedure given in *q* below.

q. Measure the peak amplitude of the transmitted reply pulses in volts by using the graticule on the scope of the TS-1253/UP DISPLAY unit or Oscilloscope AN/USM-140A. Convert the peak volts to decibels above 1 watt by referring to the HP IN DEMODULATOR CALIBRATION CURVE in the Book of Calibration Charts provided with the AN/UPM-98. The decibels above 1 watt should be between 24 and 30.

Note. Use an average value of peak amplitude for conversion to decibels above 1 watt because the amplitude of the pulses in a single reply may vary slightly. The peak amplitude of any of the pulses in a single reply should not differ by more than 10 percent.

109. Reply Audio Monitoring Test

a. Connect the equipment as shown in figure 134. Connect the headset to the wire harness.

b. Make sure that the preliminary panel control settings have been made as outlined in paragraph 101, except set the control unit AUDIO ON-OFF switch to ON.

c. Monitor the transmitted reply with the headset. A steady tone should be heard.

Note. The frequency of the tone is the same as that of the interrogating pulse rate frequency. The tone is *sidetone* from the modulator section of the receiver-transmitter.

110. Special Transmitter Reply and Pulse Width Tests

a. Connect the equipment as shown in figure 134 except for cable CG-530B/U (5′ 2″). Remove cable CG-530B/U (5′ 2″) from the channel B connector on Oscilloscope AN/USM-140A and connect the cable to the TRIG IN connector on the receiver-transmitter.

b. Make sure that the preliminary panel control settings have been made as outlined in paragraph 101, except for the following:

(1) Set the VIDEO OUT control to SHAPE on the SM-197/UPM-98 CAL-CONTROL unit.

(2) Set the MODE SELECT control to SGL on the SM-197/UPM-98 MARK X CODER unit.

(3) Set the FUNCTION switch to (+) VIDEO on the SM-197/UPM-98 MARK X CODER unit.

c. Turn the CODER LEVEL control fully ccw and then slowly cw on the SM-197/UPM-98 MARK X CODER unit until the transmitted reply appears on Oscilloscope AN/USM-140A. The transmitted reply should be a single pulse between 0.4 and 0.5 usec wide measured at 50 percent from peak amplitude.

Note. Be careful not to turn the CODER LEVEL control to a point where the pulse width of the transmitted pulse suddenly increases, as this indicates overloading of circuits in the receiver-transmitter and results in a test that is not valid.

111. Decoder Test

a. Connect the equipment as shown in figure 134.

b. Make sure that the preliminary panel control settings have been made as outlined in para- 101.

Note. The SM-197/UPM-98 signal generator unit ATTENUATION control *must* be set fully ccw.

c. Observe Oscilloscope AN/USM-140A or TS-1253/UP DISPLAY unit scope and turn the PULSE POS control cw from the 0 setting on the SM-197/UPM-98 MARK X CODER unit until the intensity of the arc-over is equal to that of the trailing edges of the two transmitted pulses; the SM-197/UPM-98 CAL-CONTROL unit meter will waver back and forth about 250. This point is the 50 percent triggering point, and the PULSE POS control should indicate less than —1.0.

Note. If the PULSE POS control should set exactly on —1.0 (or very near —1.0) when the 50 percent triggering point occurs, set the FUNCTION switch to VIDEO on the SM–197/UPM–98 MARK X CODER unit and use Oscilloscope AN/USM–140A, channel B, to actually measure the altered spacing between interrogation pulses.

d. Turn the PULSE POS control ccw from the 0 setting until the intensity of the arc-over is equal to that of the trailing edges of the two transmitted pulses; the SM–197/UPM–98 CAL-CONTROL unit meter will waver back and forth about 250. This point is the 50 percent triggering point and the PULSE POS control should indicate less than +1.0.

Note. If the PULSE POS control should set exactly on +1.0 (or very near +1.0) when the 50 percent triggering point occurs, set the FUNCTION switch to VIDEO on the SM–197/UPM–98 MARK X CODER unit and use Oscilloscope AN/USM–140A, channel B, to actually measure the altered spacing between interrogation pulses.

e. Repeat the procedure given in *c* and *d* above with the SM–197/UPM–98 MARK X CODER unit MODE SELECT control set first to M–2 and then to M–3.

112. Transmitted Reply Pulse Separation Test

Note. The transmitted reply pulse separation test may be performed in mode 1, 2, or 3.

a. Connect the equipment as shown in figure 134 except for cable CG–530B/U (10″). Remove cable CG–530/U(10″) from the TRIGGERS 0 connector and connect the cable to the TRIGGERS DELAYED connector (TS–1253/UP XTAL MARK & SYNC unit).

b. Make sure that the preliminary panel control settings have been made as outlined in paragraph 101, except for the following.

(1) Set the SWEEP DELAY FINE control to 10 on the TS–1253/UP XTAL MARK & SYNC unit.

(2) Set the SYNC SELECT switch to INT 1.00 on the TS–1253/UP XTAL MARK & SYNC unit.

(3) Set the INTENSITY MARKS RANGE control to .1 on the TS–1253/UP SWEEP & INTEN MARK unit.

(4) Set the SWEEP SPEED RANGE control to 1–30 on the TS–1253/UP SWEEP & INTEN MARK unit.

c. Adjust the HOR control on the TS–1253/UP DISPLAY unit and the SWEEP SPEED ADJUST control on the TS–1253/UP SWEEP & INTEN MARK unit until the first framing pulse (F1) of the transmitted reply and the 1.00— and .1-usec markers are spread at a maximum.

Note. After adjustment, only the F1 pulse will be visible.

d. Adjust the INTEN, FOCUS, and ASTIG controls of the TS–1253/UP DISPLAY unit, XTAL MARK LEVEL control on the TS–1253/UP XTAL MARK & SYNC unit, and the INTENSITY MARKS LEVEL control on the TS–1253/UP SWEEP & INTEN MARK unit for optimum clarity of the F1 pulse and markers.

e. Adjust the TRIGGER DELAY FINE control cw on the TS–1253/UP XTAL MARK & SYNC unit until the *leading edge* of the F1 pulse coincides with the *end* of the closest 1.00-usec xtal marker (the 1.00-usec xtal marker appears as a sine wave when spread, and spans a distance of approximately .3 usec).

f. Turn the HOR control fully ccw on the TS–1253/UP DISPLAY unit and slowly turn the SWEEP SPEED ADJUST control cw on the TS–1253/UP SWEEP & INTEN MARK unit until the second framing pulse (F2) appears from the right-hand side of the DISPLAY unit scope.

g. Vary the HOR control on the TS–1253/UP DISPLAY unit and count the quantity of 1.00-usec spaces between the leading edges of the two framing pulses. Note the quantity of 1.00-usec spaces. The quantity should be 20 plus a fraction. (This signifies that the total separation is greater than 20 usec.) Determine the total separation within a 10th of a usec by performing the procedure given in *h* through *l* below.

h. Turn the HOR control on the TS–1253/UP DISPLAY unit until the second framing pulse (F2) is positioned at the extreme right-hand side of the DISPLAY unit scope.

Note. At this time, and in the procedures given in *i* through *l* below, only the F2 pulse is visible.

i. Set the SWEEP DELAY RANGE control to 11–21 on the TS–1253/UP XTAL MARK &

SYNC unit. This moves the second framing pulse to the left on the DISPLAY unit scope.

j. Turn the HOR control cw on the TS-1253/UP DISPLAY unit until the second framing pulse (F2) is positioned at the extreme right-hand side of the DISPLAY scope, and then set the SWEEP DELAY RANGE control to 21-31 on the TS-1253/UP XTAL MARK & SYNC unit. This again moves the second framing pulse to the left.

k. Vary the SWEEP SPEED ADJUST control on the TS-1253/UP SWEEP & INTEN MARK unit and the HOR control on the TS-1253/UP DISPLAY unit for optimum spread of the second framing pulse.

l. Use the magnifying glass (if necessary) and count the quantity of .1-usec spaces between the *end* of the 20th 1.00-usec marker and the leading edge of the F2 pulse. (The leading edge of the F2 pulse should be at the right of the 20th 1.00-usec marker.) Add this quantity to 20 usec. The sum represents the total separation between the F1 and F2 framing pulses of the transmitted reply to within a 10th of a usec and should be 20.3 usec ±.2.

Note. It is not necessary to measure transmitted reply separation to within a 10th of a usec for any of the other replies, because the transponder set circuit design is such that when the requirements given in *c* through *l* above are fulfilled, separations are *invariably* within tolerance for all the other replies.

113. Emergency Replies Stability and I/P Tests

a. Connect the equipment as shown in figure 134, except for the following:

(1) Remove cable CG-530B/U (5′ 2″) from the channel B input connector of Oscilloscope AN/USM-140A.

(2) Connect the oscilloscope probe to the channel B input connector of Oscilloscope AN/USM-140A.

b. Make sure that the preliminary panel control settings have been made as outlined in paragraph 101, except set the control unit master control switch to EMER.

c. Adjust the HOR control to the TS-1253/UP DISPLAY unit scope, SWEEP ADJUST control on the TS-1253/UP SWEEP & INTEN MARK unit and, if necessary, the SWEEP DELAY RANGE switch on the TS-1253/UP XTAL MARK & SYNC unit for optimum presentation of the reply.

d. Observe that the transmitted reply on the scope of the TS-1253/UP DISPLAY unit is a four-train reply (G, fig. 139).

Note. The transmitted reply illustrated in G, figure 139, and the observation in *e* below may be affected by an improper setting of ring around gate multivibrator adjust control R524. If necessary, adjust R524 in accordance with the instructions outlined in paragraph 94.

e. Rotate the control unit MODE 1 code control throughout its range and, at the same time, observe the transmitted reply on Oscilloscope AN/USM-140A or scope of the TS-1253/UP DISPLAY unit. The transmitted reply should not change and all of the pulses should continue to fire.

f. Set the control unit MODE 1 code control to 00.

g. Remove cable CG-530B/U (10″) from the TRIGGERS O connector on the TS-1253/UP XTAL MARK & SYNC unit and connect the cable to the TRIGGERS DELAYED connector on the TS-1253/UP XTAL MARK & SYNC unit.

h. Set the TRIGGER DELAY FINE CONTROL on the TS-1253/UP XTAL MARK & SYNC unit so that the leading edge of the start pulse of the transmitted reply coincides with the nearest 1.45-usec marker.

Note. To achieve the requirement given in *h* above, it may be necessary to adjust ENCODER BLOCKING OSC control R523 and/or adjust RINGING OSC SPACING control L551. If adjustment is necessary, turn ENCODER BLOCKING OSC control R523 cw to increase the width of the encoded pulses monitored at the COINCIDENCE test pin by Oscilloscope AN/USM-140A, and/or adjust RINGING OSC SPACING control L551 (usually ccw) to reduce the separation between transmitted reply pulses (monitored by TS-1253/UP DISPLAY unit scope). However, when adjusting L551, observe extreme caution not to exceed the 20.3 —0.2-usec separation requirement specified in the transmitted reply pulse separation test (para 112).

i. Check to see that the quantity of 1.45-usec spaces between the pulses of the transmitted reply are identical with the quantity of 1.45-usec spaces illustrated in G, figure 139.

j. Remove cable CG-530B/U (10″) from the TRIGGERS DELAYED connector on the TS-

1253/UP XTAL MARK & SYNC unit and connect the cable to the TRIGGERS O connector on the TS-1253/UP XTAL MARK & SYNC unit.

k. Set the MODE SELECT control to M-3 on the SM-197/UPM-98 MARK X CODER unit and perform the procedures given in *c* through *i* above except, in *e* above, set the MODE 3 ON-OFF switch to ON and rotate the MODE 3 code control on the control unit.

Note. Set the MODE 3 ON-OFF switch to OFF and set the MODE 3 control to 00 after performing the procedure given in *e* above.

l. Set the control unit function control to CIVIL.

m. Use the stopwatch to note the duration time of the I/P pulse. If it is necessary to repeat the I/P duration test, allow approximately 1 minute before repeating the test. Because of an inherent thermal circuit reaction, the I/P pulse duration time will be reduced if the 1-minute waiting period is not observed; this will result in an I/P test that is not valid. Proceed as follows:

(1) Observe the scope on the TS-1253/UP DISPLAY unit and simultaneously press the control unit I/P-OFF-MIC switch to I/P and actuate the stopwatch. An I/P pulse should appear after the last F2 pulse in the fourth pulse train identical with that illustrated in H, figure 139.

(2) Note the duration time of the I/P pulse. The duration time should be 32 seconds ±10. No arc-over should occur across the base of the I/P pulse.

(3) Remove cable CG-530B/U (10") from the TRIGGERS O connector on the TS-1253/UP XTAL MARK & SYNC unit and connect the cable to the TRIGGERS DELAYED connector on the TS-1253/UP XTAL MARK & SYNC unit. The leading edge of the I/P pulse should be three 1.45-usec *spaces* after the leading edge of the last framing (F2) pulse in the fourth pulse train. Reconnect cable CG-530B/U (10") to the TRIGGERS O connector.

Note. If the fourth train pulses fire fully but arc-over occurs across the I/P pulse or no I/P pulse occurs, the mode 3 gate multivibrator pulse width is excessively shorter than the required 120 usec. The mode 3 gate multivibrator output may be monitored on the gate generator card (brown lead from pin 1 of V403). The pulse width of the mode 3 gate multivibrator may be increased by connecting a 20-uuf, 300-VWV mica capacitor (FSN 5910-649-3187 or equivalent) in parallel with capacitor C408 in the mode 3 gate multivibrator circuit on the gate generator card.

n. Connect the probe of Oscilloscope AN-USM-140A to monitor the encoded pulse train output available at the COINCIDENCE test pin, on the ringing oscillator and coincidence card of the receiver-transmitter, through the opening on the receiver-transmitter test panel.

Note. The COINCIDENCE test pin in the uppermost pin on the card and is connected to a violet lead.

o. Observe that the top-riding ringing oscillator pips coincide with the framing pulses (fig. 138). The ringing oscillator pip on top of the last framing (F2) pulse in the fourth train should not coincide with the falltime area of the last framing (F2) pulse. This condition signifies stable coincidence between the framing pulses and ringing oscillator pulses and insures reliable transmitted emergency replies.

Note. To achieve the requirement in *o* above, it may be necessary to perform the procedure given in (1) or (2) below or both.

(1) Connect a 500-uuf, 500-VWV mica capacitor (FSN 5910-865-3538 or equivalent) between terminal 16 (23.85-usec terminal) of delay line DL601 and ground. The 500-uuf capacitor provides a 0.2-usec increase in delay time and causes the encoded pulses to shift sufficiently to the right of the ringing oscillator pulses.

(2) Turn ENCODER BLOCKING OSC control R523 cw to increase the width of the encoded pulses monitored at the COINCIDENCE test pin by Oscilloscope AN/USM-140A and/or adjust RINGING OSC SPACING control L551 (usually ccw) to reduce the separation between transmitted reply pulses (monitored by TS-1253/UP DISPLAY unit scope). However, when adjusting L551, observe extreme caution not to exceed the 20.3 —0.2-usec separation requirement specified in the transmitted reply pulse separation test (para. 112).

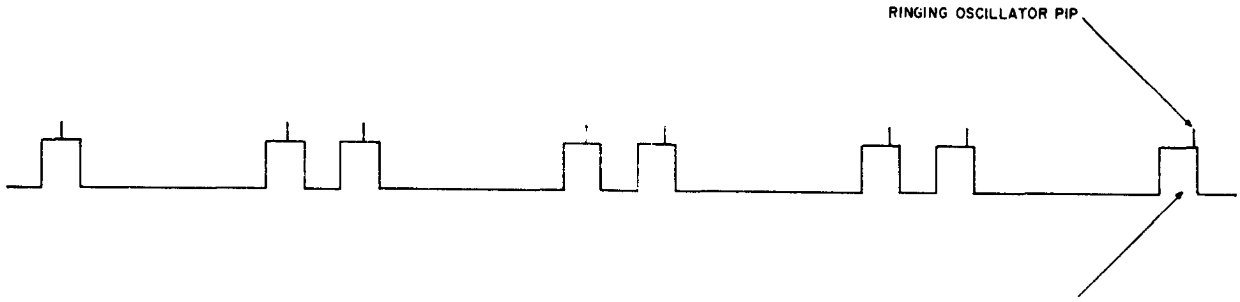


Figure 138. Encoded pulse train output from COINCIDENCE test pin.

p. Set the MODE SELECT control to M-1 on the SM-197/UPM-98 MARK X CODER unit.

q. Perform the procedure given in *o* above.

r. Set the MODE SELECT control to M-3 on the SM-197/UPM-98 MARK X CODER unit.

s. Set the control unit MODE 3 code control to 77.

t. Observe that the transmitted reply on the scope of the TS-1253/UP DISPLAY unit is in accordance with I, figure 139. No arc-over should occur across the base of any of the pulses in the reply, and the quantity of 1.45-usec spaces between the pulses should be as indicated in I, figure 139.

114. Transmitted Replies Test

a. Connect the equipment as shown in figure 134, except for cable CG-530B/U (10″).

(1) To perform the interrogations specified in C, E, H, I, M, and S, figure 139, connect cable CG-530B/U (10″) to the TRIGGERS O connector on the TS-1253/UP XTAL MARK & SYNC unit.

(2) To perform the interrogations specified in A, B, D, F, G, J, K, L, N, O, P, Q, and R, figure 139, remove cable CG-530B/U (10″) from the TRIGGERS O connector on the TS-1253/UP XTAL MARK & SYNC unit and connect the cable to the TRIGGERS DELAYED connector on the TS-1253/UP XTAL MARK & SYNC unit.

b. Perform the procedures given in *c* and *d* below in addition to the instructions specified for each interrogation on figure 139. Set the front panel controls of the equipment in accordance with the instructions on figure 139 for each interrogation.

c. Observe that the transmitted replies on the scope of the TS-1253/UP DISPLAY unit are identical with those illustrated on figure 139 for each interrogation. The quantity of 1.45-usec spaces appearing between the leading edges of the pulses, as observed on the scope of the TS-1253/UP DISPLAY unit, should be identical with the quantity of 1.45-usec spaces indicated for the applicable pulses illustrated on figure 139. No extraneous pulses should be displayed for any of the transmitted replies. In addition, for each interrogation specified in C, E, H, I, M, and S, figure 139, check to see that no arc-over appears across the base of any pulse in the transmitted reply.

Notes:

1. For optimum presentation of the transmitted replies on the scope of the TS-1253/UP DISPLAY unit, adjust the HOR control on the TS-1253/UP DISPLAY unit, SWEEP SPEED ADJUST control on the TS-1253/UP SWEEP & INTEN MARK unit and, if necessary, the SWEEP DELAY RANGE control on the TS-1253/UP XTAL MARK & SYNC unit.

2. To count the 1.45-usec spaces between the transmitted reply pulses on the scope of the TS-1253/UP DISPLAY unit, set the TRIGGER DELAY FINE control on the TS-1253/UP XTAL MARK & SYNC unit so that the leading edge of the start pulse of the transmitted reply coincides with the nearest 1.45-usec marker.

3. Each time the MODE SELECT control setting on the SM-197/UPM-98 MARK X CODER unit is changed in accordance with the instructions on figure 139, the TRIGGER DELAY FINE control on the TS-1253/UP XTAL MARK & SYNC unit must be adjusted.

4. The transmitted replies illustrated in C, E, I, G, and M, figure 139, may be affected by an improper setting of ring around gate multivibrator adjust control R524. If necessary, adjust R524 in accordance with the instructions outlined in paragraph 94.

d. Note the peak amplitude of the pulses in each transmitted reply. The peak amplitude of the pulses in each transmitted reply should not differ by more than 10 percent.

Figure 139. Transmitted replies test.
(Located in back of manual)

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-36 requirements for Field Maintenance Instructions for CH-21C, CH-34A, CH-34C, CH-37B, CH-47A, CV-2A, CV-2B, CV-7A, OV-1A, OV-1B, OV-1C, U-1A, U-6A, U-8D, U-8F, RU-8D, UH-1A, UH-1B, UH-1D, UH-19C, UH-19D aircraft.

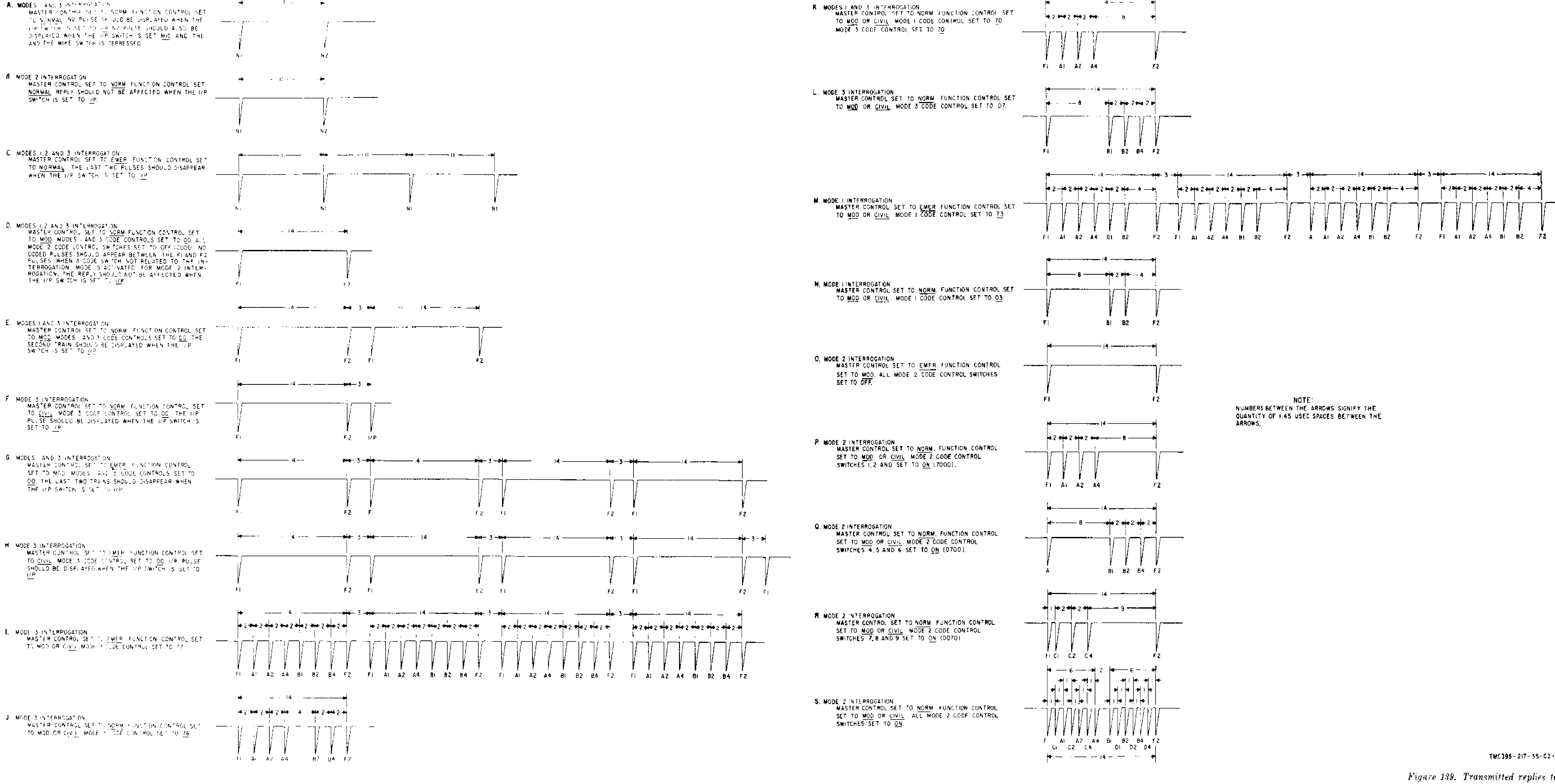


Figure 139. Transmitted replies test

Field and Depot Maintenance Manual
TRANSPONDER SET AN/APX-44

CHANGE No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C. *14, October 1964*

TM 11-5895-217-35, 27 July 1960, is changed as follows:

Note. The parenthetical reference to a previous change (example: page 8 of C 1) indicates that pertinent material was published in that change.

Page 2, chapter 1. Change the title to INTERNAL PREVENTIVE MAINTENANCE INSTRUCTIONS.

Section I. Delete section I and substitute:

Section I. INTRODUCTION

1. Scope of Manual

a. This manual contains instructions for field and depot maintenance for Transponder Set AN/APX-44. It includes instructions for internal preventive maintenance, troubleshooting, aligning, testing, calibrating, and repairing or replacing specified maintenance parts. It also lists tools, materials, and test equipment required for field and depot maintenance. Detailed functioning of the circuits of the AN/APX-44 are covered in chapter 2.

b. The complete manual for the AN/APX-44 includes TM 11-5895-217-12, TM 11-5895-217-12P, and TM 11-5895-217-35P.

c. The direct reporting, by the individual user, of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvements. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-MR-MP-P, Fort Monmouth, N. J. 07703. One information copy will be furnished to the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc).

Note. For applicable forms and records, see paragraph 3, TM 11-5895-217-12.

2. Index of Publications

Refer to the latest issue of DA PAM 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 4, 6, 7, 8, and 9), supply bulletins, lubrication orders, and modification work orders available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

3. Differences in Models

Minor changes were made during the production of Receiver-Transmitter RT-494/APX-44 to improve equipment stability. These changes are as follows:

a. Mixer CR102 in serial numbers 1 through 850 is a 1N416D diode (FSN 5960-681-9825) and in serial numbers 851 through 3700 is a 1N21WE diode (FSN 5960-615-5550).

b. Resistor R463 in serial numbers 1 through 257 is a 130K-ohm resistor (FSN 5905-221-8800) and in serial numbers 258 through 3700 is a 68K-ohm resistor (FSN 5905-249-3661).

c. Capacitors C403, C406, and C409 in serial numbers 1 through 450 are 15-$\mu\mu$f capacitors (FSN 5910-636-2150) and in serial numbers 451 through 3700 are 68-$\mu\mu$f capacitors (FSN 5910-668-0071).

d. Resistor R512 in serial numbers 1 through 300 is a 1.05-megohm resistor (FSN 5905-729-7499) and in serial numbers 301 through 3700 is a 0.943-megohm resistor. Variable resistor R524, 500K ohms (FSN 5905-682-4245) is added in serial numbers 301 through 3700. These changes were made by replacement of the blocking oscillator and ring around card (FSN 5895-705-2830) with a redesigned card (FSN 5895-752-5464).

Delete section II.

Page 5. Change Section III to Section II.

Paragraph 7. Delete subparagraph *a* and substitute:

a. Internal preventive maintenance supplements the preventive maintenance procedures outlined in TM 11-5895-217-12, and should be performed when the equipment is received from, or being returned to, the using organization. The purpose of internal preventive maintenance is to eliminate conditions which may cause malfunctions or breakdowns in the equipment.

Paragraph 8. Delete subparagraph *a* and substitute:

a. Remove the cover plates of the receiver-transmitter and the wraparound top and side cover of the control unit.

Page 11, paragraph 16. Delegate subparagraph *b.*

Page 13, paragraph 20*a,* line 8. Change made to mode.

Page 30, figure 16. Delete figure 16 and substitute the new figure 16:

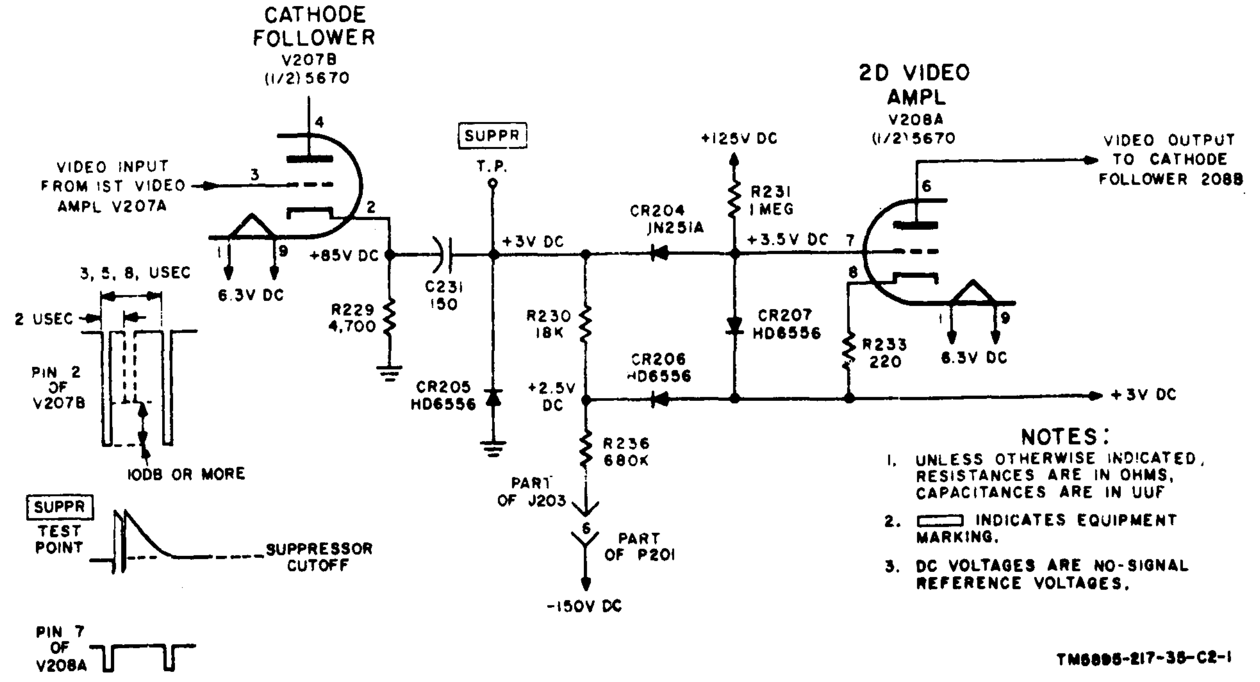


Figure 16. Suppressor, simplified schematic diagram.

Page 45, paragraph 32*c*. Make the following changes:

Subparagraph (2), fifth sentence. Change 2, 3, and 6 to 2, 3, 6, and 7.

Sixth sentence. Change pin C to pin e.

Subparagraph (3). Delete the last two sentences and substitute:

Contacts 3 and 12 close switching diode CR628 in dial positions number 2 and 3 respectively and provide the 14.5-μsec delayed pulse (B2, fig. 5). Contact 8 would do the same for dial position number 7 except that the mechanical stop of switch S901B will not allow the switch to rotate beyond dial position number 3.

Page 46, paragraph 33*c*. Make the following changes:

Subparagraph (1), line 4. Change S903 to S905.

Subparagraph (2). Delete the fourth sentence and substitute:

The output of the diode CR655 is developed across resistor R658 and coupled to bus 2 through capacitor C659.

Subparagraph (3), line 5. Change (B, fig. 5) to (B1, fig. 5).

Page 47, paragraph 34*c*(3), line 7. Change S902A to S902B.

Page 63, paragraph 45*b* line 3. Change relay K4 to relay K5.

Page 65, paragraph 46. Delete subparagraph *d* and substitute:

d. NORMAL-EMER Functions. During normal-emergency operation, normal relay K1 is energized by the ground connection through contact X1 of switch S903B, emer/mod relay K3 is energized by the ground connection through contact Y5 of switch S904A, and emer/normal relay K4 is energized by the ground connection through contact X1 of switch S903B and closed contacts 9 and 10 of energized emer/mod relay K3. A ground connection is also completed through contacts 10–11 of deenergized I/P relay K2 and contact 4–5 of energized normal relay K1 to switching diode CR626 in the mode 1 reply code switching card. This ground connection allows switching diode CR626 to pass the 15.05-μsec delayed pulse to the suppressor grid of gated amplifier V502. Contacts 9–10 of energized normal relay K1 connect +125 volts dc to resistor R512 (the 57-μsec time-constant circuit) in the blocking oscillator and ring around card. The +125-volt dc applied to resistor R512 causes ring around gate multivibrator V503 to generate the 57-μsec ring around gate pulse. The cutoff control grid bias on gated amplifier V502 is reduced from —150 volts to approximately —25 volts by the ground connection through contacts 4–5 of energized emer/mod relay K3. The 57-μsec ring around gate pulse, applied to the control grid of gated amplifier V502 (para 31*d*), allows gated amplifier V502 to amplify pulses applied to its suppressor grid for a period of 57 μsec after the start of the main gate. The 15.05-μsec delayed pulse applied to the suppressor grid of gated amplifier V502 is amplified and triggers encoder blocking oscillator V501B (fig. 30) through trigger amplifier V501A (para. 31*b*). Encoder blocking oscillator V501B generates a pulse (approximately 16 μsec after the initial pulse) which is applied to delay line DL601. The pulse is delayed 15.05 μsec and applied through switching diode CR626 to the suppressor grid of gated amplifier V502 where it is amplified and used to trigger encoder blocking oscillator V501B; therefore, the delay pulse cycle is repeated. This ring around gate continues as long as the 57 μsec gate is present on the control grid of gated amplifier V502. The 57-μsec gate is present on the control grid of gated amplifier V502. The 57-μsec ring around gate allows three ring around pulses to be generated which, in addition to the initial pulse, provides the four pulses for the normal-emergency reply. The decoder card mode 1 input is enabled by a ground connection from contacts 6–8 of energized emer/mod relay K3, and the all modes input is enabled by a ground connection from contacts 9–10 of energized emer/mod relay K4. The AN/APX–44 can reply to any interrogation; however, contacts 3–4 and 6–7 of energized emer/mod relay K4 are open, disabling the mode 2 and mode 3 reply selectors. For normal-emergency operation, the AN/APX–44 provides a mode 1 emergency reply consisting of four pulses spaced at approximately 16-μsec intervals for any interrogation.

Page 86, figure 64. Interchange the callouts for R523 and R524.

Page 141, paragraph 95.7*c* (page 11 of C 1). Make the following changes:

Test equipment control settings column, step 1, SM–197/UPM–98, line 2. Change SF to SG.

Step 2. Add at the end of the sentence: except place C–2714/APX–44 master control in STBY.

Step 4, SM–197/UPM–98. After METER SELECT: 500, add WM SENS: fully cw.

Equipment under test control settings column, step 1. Delete reference to C–2714/APX–44 and substitute N/A.

Test procedure column, step 3. Delete *f* and substitute:

f. On the C–2714/APX–44, position MODE 3 switch to OFF and master control to LOW.

***Caution*: Be sure that MARK X CODER, MODE SELECT switch is positioned to M–3 and MODE 3 switches on C–2714/APX–44 are in OFF positions.**

Performance standard column, step 4. Delete *e* and substitute:

e. The ATTENUATION indication should be 39 or less.

Figure 113.4 (page 14 of C 1). Delete figure 113.4 and substitute the new figure 113.4:

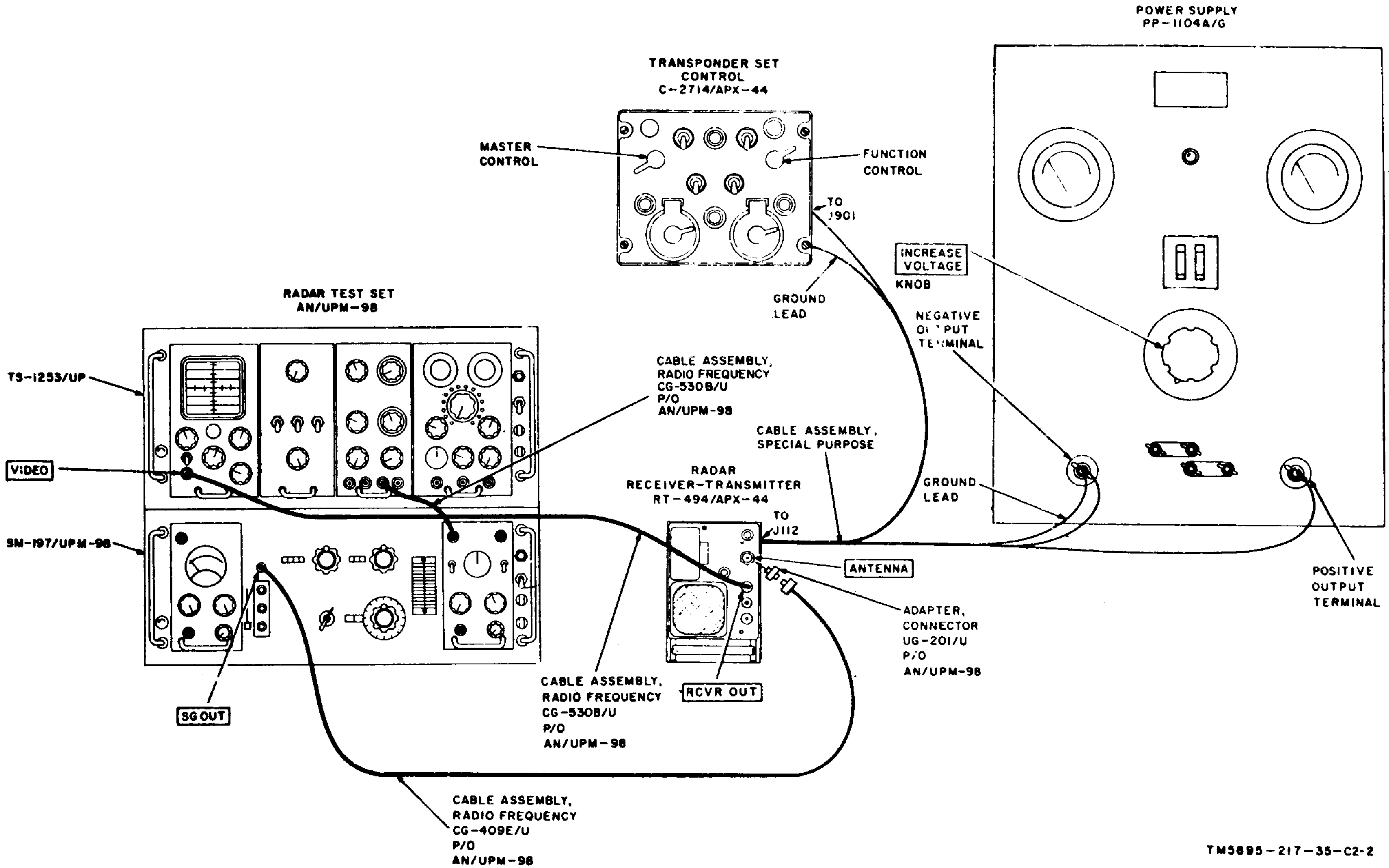


Figure 113.4. Receiver bandwidth and center frequency test setup.

Paragraph 95.8*c* (page 15 of C 1). Make the following changes:

Test procedure column, item *h*. Delete *h*, and substitute:

h. On the SM–197/UPM–98 adjust, the ATTENUATION control so that the pulse amplitude is decreased by one-half inch. Note the ATTENUATION control setting.

After *h*, add:

h.1 On the SM–197/UPM–98, reduce the ATTENUATION control setting by 3 db.

Item i. Change same as noted in *g* above to same as given in *h* above.

Item k. Change same as in *g* above to same as given in *h* above.

Item n. Delete 072.0 and substitute: the same as given in *h* above.

Item p. Delete of 032.0 and substitute: the same as given in *h* above.

Item q. Change noted in *g* above to given in *h* above.

Performance standard column, item *i*. Delete *i* and substitute:

i. Pulse amplitude decreases and becomes the same as given in *h* above.

Paragraph 95.9 (page 19 of C 1). Make the following changes:

Subparagraph *a*(6). After (p/o AN/UPM–98), add (length 5 feet 2½ inches).

Subparagraph *c*, chart:

Test equipment control settings column, step 1. Change WM SENS: Fully ccw to WM SENS: Fully cw.

Test procedure column, step 1*e*. Delete *e* and substitute:

e. On the CAL-CONTROL unit, adjust the WM SENS control fully cw and on the SM–197/UPM–98, set the WAVEMETER INPUT switch to DEMOD.

Step 2c. After inches add: and convert to volts.

Note. Add at the end of the note: When converting from db to power, add 0.85 db for cable attenuation.

Paragraph 95.10*c* (page 23 of C 1). Make the following changes:

Test equipment control settings column. Add Function control: NORMAL in the following places:

Step 2, after MODE 2 switch: ON.

Step 4, after Master control: EMER.

Step 5, after Master control: NORMAL.

Test procedure column, step 1*d*, line 3. Change HP to LP.

Step 2e. Add: On C–2714/APX–44, set function control to MOD.

Performance standard column, step 3*g*. Change 1 and 2 11.6 to 1 and 2 2.9; change 3 and 4 2.9 to: 3 and 4 11.6.

Paragraph 95.11 (page 28 of C 1), subparagraph *b*(3)(*c*). Make the following changes:

Line 4. Change Between 47 and 52, inclusive to Will be 39 or less.

Note. Change 5 dbm to 50 dbm.

Page 144, paragraph 108*a*, line 4. Change ±0.5 to ±0.05.

Figure 8. Delete figure 8 and substitute the new figure 8.

Figure 129. Delete figure 129 and substitute the new figure 129.

Page 148, appendix. Delete the appendix and substitute.

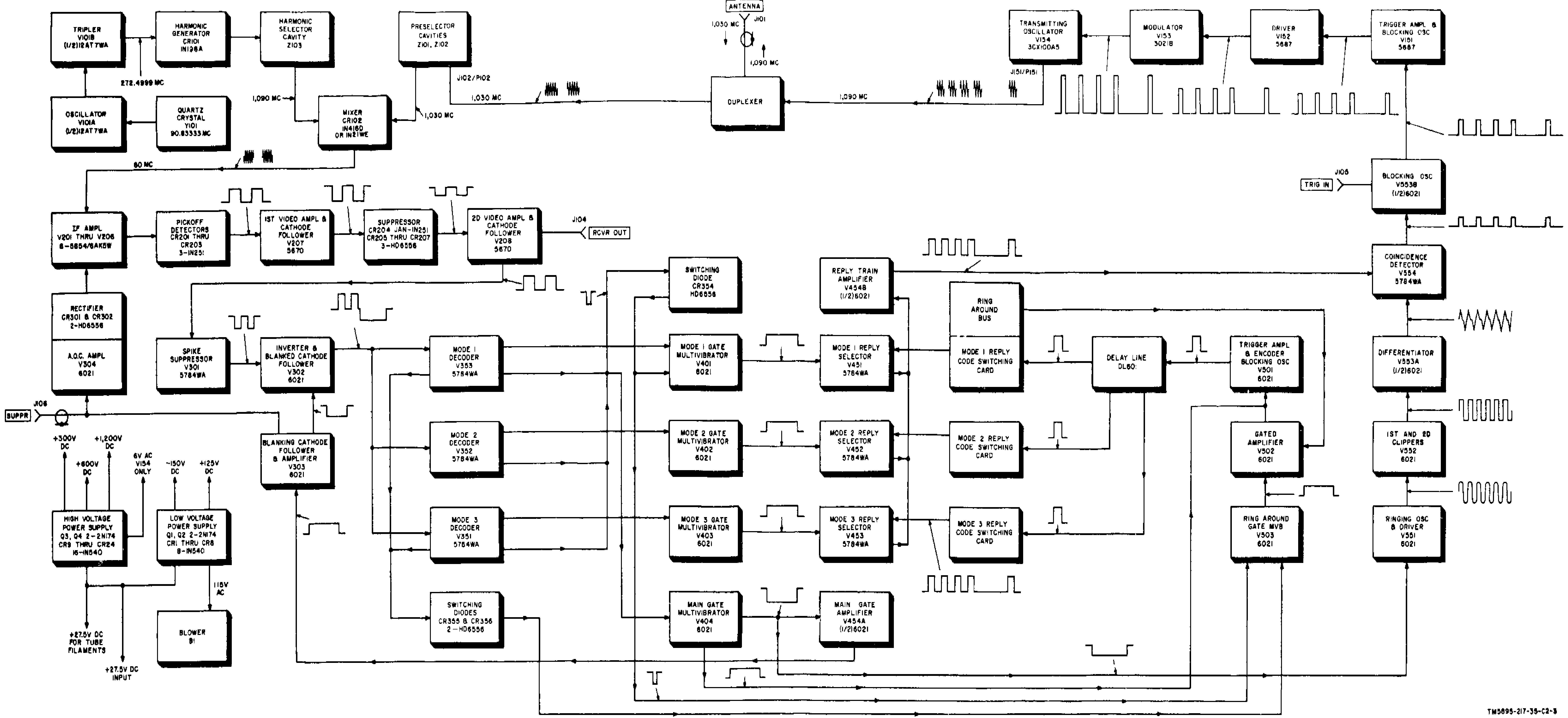
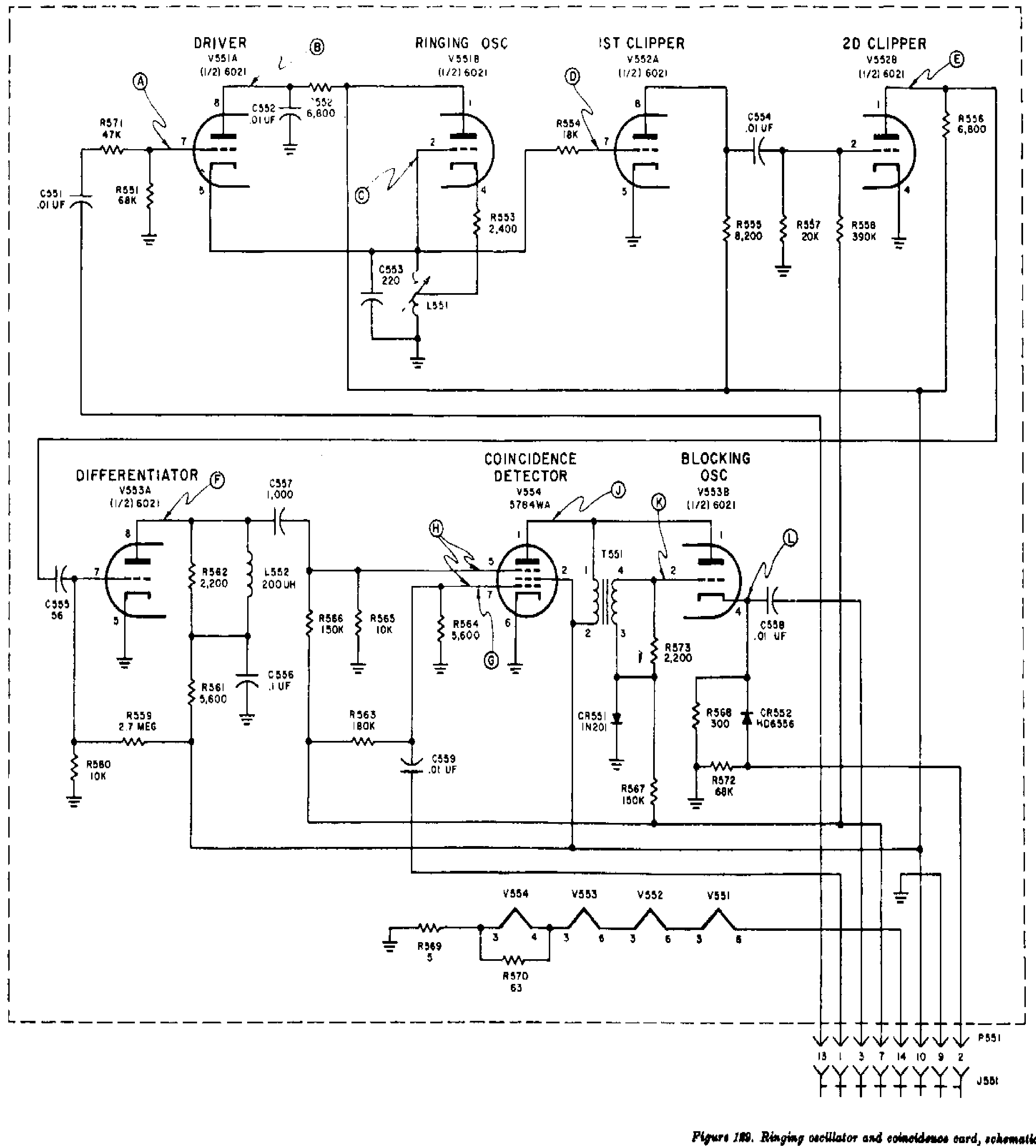
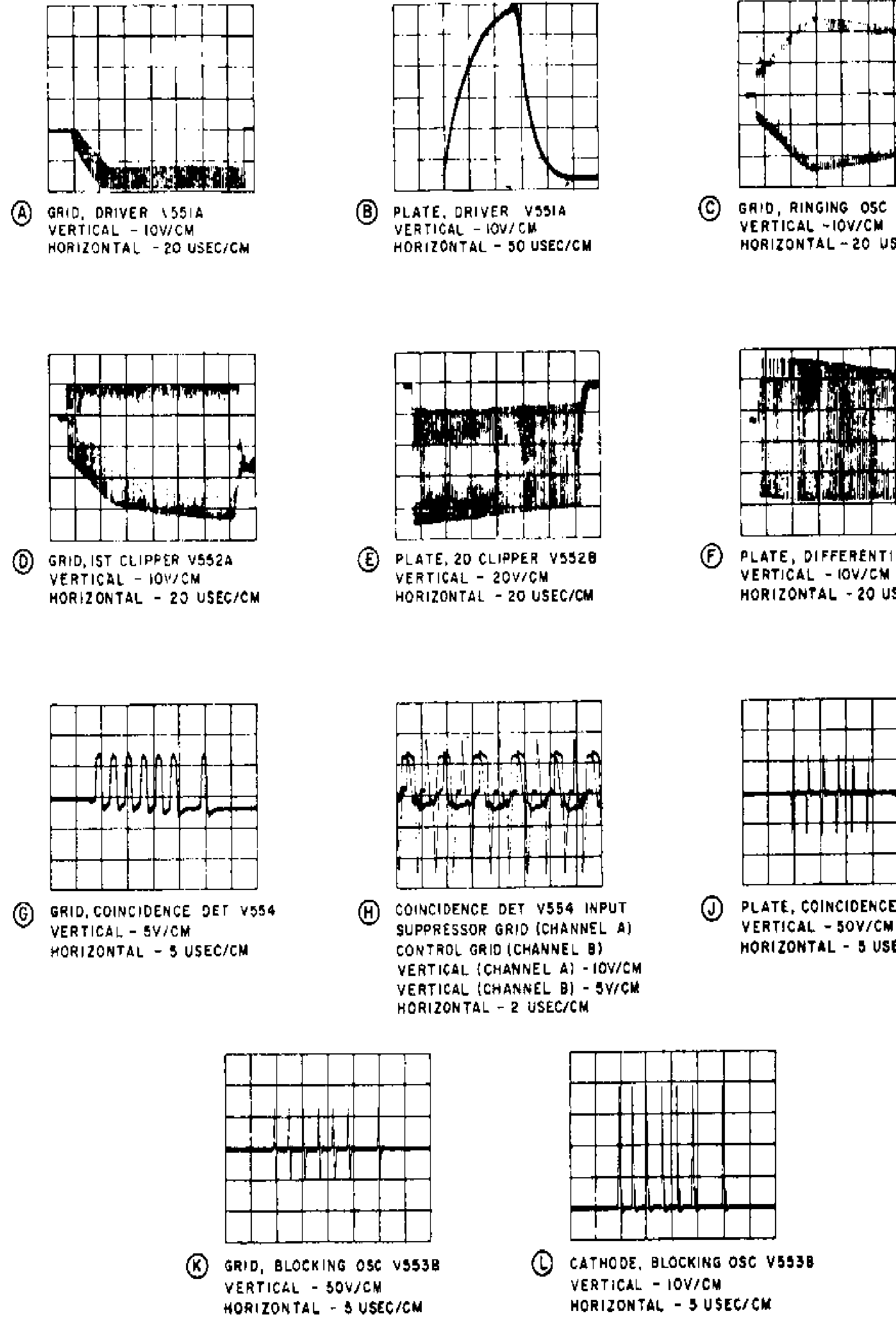


Figure 8. Receiver-transmitter, block diagram.

Figure 8





NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. WAVEFORM TAKEN BETWEEN POINT INDICATED AND CHASSIS UNLESS OTHERWISE SHOWN.
3. WAVEFORMS TAKEN WITH 0 DBM SIGNAL INPUT TO ANTENNA, 1,000 PRR AND A MODE 1 INTERROGATION. XMTR OFF UNLESS OTHERWISE STATED.

TM5895-217-35-C2-4

Figure 189. Ringing oscillator and coincidence card, schematic and waveform diagram.

802-089-2

APPENDIX

REFERENCES

Following is a list of applicable references which are available to the field and depot maintenance repairman of Transponder Set AN/APX-44:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals, (types 4, 6, 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TM 11-1175	Radar Test Set AN/UPM-6A and Radar Test Set AN/UPM-6B.
TM 11-1242	Crystal Rectifier Test Sets TS-268/U, TS-268A/U, TS-268B/U, TS-268C/U, TS-268D/U, and TS-268E/U.
TM 11-5126	Power Supplies PP-1104A/G and PP-1104B/G.
TM 11-5511	Electronic Multimeter TS-505/U.
TM 11-5895-217-12	Operator and Organizational Maintenance Manual: Transponder Set AN/APX-44.
TM 11-5895-217-12P	Operator and Organizational Maintenance Repair Parts and Special Tool Lists: Transponder Set AN/APX-44.
TM 11-5895-217-35P	Field and Depot Maintenance Repair Parts and Special Tool Lists: Transponder Set AN/APX-44.
TM 11-6625-203-12	Operator and Organizational Maintenance: Multimeter AN/URM-105, Including Multimeter ME-77/U.
TM 11-6625-219-12	Operator's and Organizational Maintenance Manual: Oscilloscope AN/USM-81.
TM 11-6625-274-12	Operator's and Organizational Maintenance Manual: Test Sets, Electron Tube TV-7/U, TV—7A/U, TV-7B/U, and TV-7D/U.
TM 11-6625-316-12	Operator and Organizational Maintenance Manual: Test Sets, Electron Tube TV-2/U, TV-2A/U, TV-2B/U, and TV-2C/U.
TM 11-6625-368-10	Operator's Manual: Pulse Generator Sets AN/UPM-15 and AN/UPM-15A.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-31 requirements for field (direct support) maintenance instructions for all fixed wing and all rotor wing aircraft.

TECHNICAL MANUAL

Field and Depot Maintenance Manual

TRANSPONDER SET AN/APX-44

TM 11-5895-217-35
CHANGES No. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *27 September 1962*

TM 11-5895-217-35, 27 July 1960, is changed as follows:

Page 8, figure 3. Make the following changes: Upper left, second line. Change "DPD-45-33P-1L" to: DPD-45-33S-1. Pin R of connector PT06A-(SR)-18-32S. Make a connection between pin R and pin G. Pin R of receptacle J901. To the right of the arrow, add: PRESS-TO-TEST 28 VDC.

Page 57, paragraph 38*a*, first line. Change "horizontally" to: vertically.

Page 78, figure 56. Change the caption to: *Installation of N and C connectors on coaxial cable.*

Page 79, figure 57. Change the caption to: *Installation of BNC connectors on coaxial cable.*

Page 141. Add chapter 4.1 after chapter 4:

CHAPTER 4.1 (Added)
FOURTH ECHELON TESTING PROCEDURES

95.1. General

a. Testing procedures are prepared for use by Signal field maintenance shops and Signal service organizations responsible for fourth echelon maintenance to determine the acceptability of repaired signal equipment. These procedures set forth specific requirements that repaired signal equipment *must* meet before it is returned to the using organization. The testing procedures may also be used as a guide for testing equipment repaired at third echelon if the proper tools and test equipment are available. A summary of the performance standards is given in paragraph 95.11.

b. Each test depends on the preceding one for certain operating procedures and, where applicable, for test equipment calibrations. Comply with the instructions preceding the body of each chart before proceeding to the chart. Perform each test in sequence. Do not vary the sequence. For each step, perform all the actions required in the *Test equipment control settings* and *Equipment under test control settings* columns; then perform each specific test procedure and verify it against its performance standard.

95.2. Test Equipment and Other Equipment Required

a. General. All test equipment and other equipment required to perform the testing procedures given in this chapter are listed in the following charts. These equipments are authorized under tables of allowances or table of organization and equipment, or they are repair part items for the AN/APX-44 authorized for stockage at fourth echelon maintenance.

b. Equipment Authorization. Authorizations for the required test equipment and other equipment are found in the following publications:

TA 11-17	Signal Field Maintenance Shops.
TA 11-100 (11-17)	Allowances of Signal Corps Expendable Supplies for Signal Field Maintenance Shops.
TA 11-101 (11-158)	Allowances of Signal Corps Expendable Supplies for Signal Depot Company.
TOE 11-158D	Signal Depot Company.

c. Test Equipment.

Nomenclature	Federal stock No.	Technical manual
Radar Test Set AN/UPM-98.	6625-580-3771	TM 11-6625-403-14
Multimeter TS-352(*)/U.[a]	6625-242-5023	TM 11-5527
Oscilloscope AN/USM-81.	6625-701-4038	TM 11-6625-219-12
Transponder Set Control C-2714/APX-44 (p/o AN/APX-44).	6240-155-7836	TM 11-5895-217-12

[a] Multimeter TS-352(*)/U indicates TS-352/U, TS-352A/U, or TS-352B/U.

d. Other Equipment.

Nomenclature	Federal stock No.	Technical manual
Power Supply PP-1104A/G.	6130-542-6385	TM 11-5126
Connector, Bendix type PT06A(SR)-18-32S.	5935-777-1423	
Connector, Cannon type DPD-45-33S-1.	5935-201-8219	
Special purpose cable assembly[a].		
Cable Assembly, Radio Frequency CG-409E/U[b].	--------------	TM 11-6625-403-14
Cable Assembly, Radio Frequency CG-530B/U [b] (two).	--------------	TM 11-6625-403-14
Cable Assembly, Radio Frequency CG-1848/U[b].	--------------	TM 11-6625-403-14
Adapter, Connector UG-201/U [b] (two).	--------------	TM 11-6625-403-14
Wire, electrical (14 AWG)[c].	6145-160-5144	
Wire, electrical (22 AWG)[d].	6145-643-0907	

[a] Refer to paragraph 95.3 for fabrication instructions.
[b] Part of Radar Test Set AN/UPM-98.
[c] Used to fabricate special purpose cable assembly. Approximately 25 feet will be required. (Exact length will depend upon particular test setup.)
[d] Used to fabricate special purpose cable assembly. Approximately 300 feet will be required. (Exact length will depend upon particular test setup.)

95.3. Fabrication of Special Purpose Cable Assembly

(fig. 113.1)

A special purpose cable assembly is required to connect Radar Receiver-Transmitter RT-494/APX-44 to Transponder Set Control C-2714/APX-44 and to Power Supply PP-1104A/G. This cable assembly is fabricated by using the connectors and electrical wire listed in paragraph 95.2*d*. The length of this cable is not critical (in the average setup, the length may be from 8 to 10 feet) and will depend upon the particular shop bench setup used to carry out the tests on the RT-494/APX-44. Fabricate the cable in accordance with the instructions in figure 113.1.

95.4. Modification Work Order

The performance standards listed in the test for the C-2714/APX-44 (par. 95.6) assume that the modification work order listed below has been performed. A listing of current modification work orders will be found in DA Pamphlet 310-4.

MWO No.	Date	Priority	Echelon	Location of MWO marking	Remarks
MWO 11-5895-217-35/1	3 April 1961	Urgent	3	Adjacent to nameplate	None.

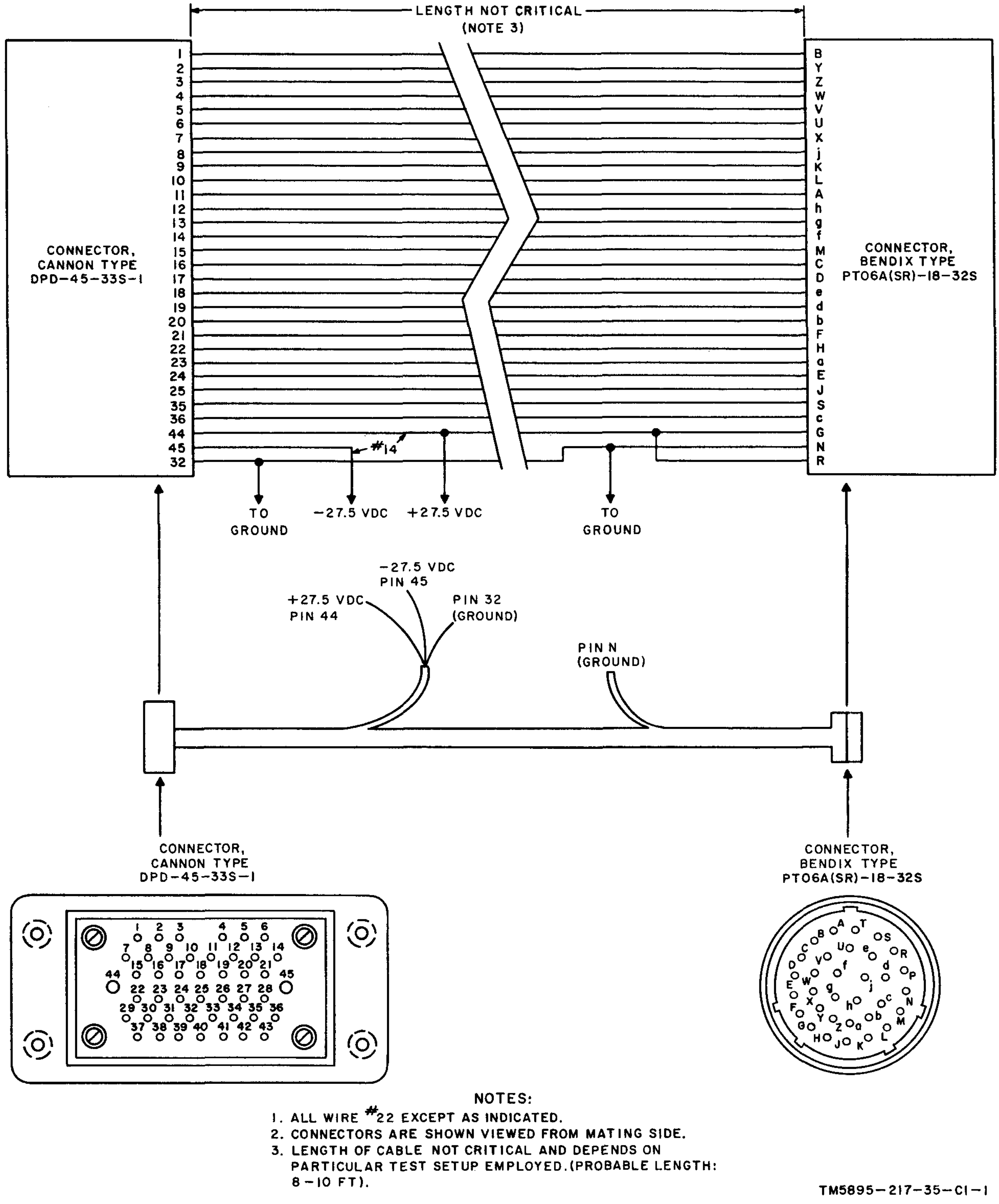


Figure 113.1. Special purpose cable assembly, fabrication details. (Added)

95.5. Physical Test and Inspection

a. Test Equipment and Materials. None.

b. Test Connections and Conditions. None.

c. Procedure.

Step No.	Test equipment control settings	Equipment under test control settings	Test procedure	Performance standard
1		*RT-494/APX-44* N/A *C-2714/APX-44* Controls may be in any position.	*a.* Inspect the front panel of RT-494/APX-44 and C-2714/APX-44. Check for loose, missing, or damaged screws; protective covers; and other hardware. Also check connectors for bent or damaged pins and threads. *b.* Remove RT-494/APX-44 and C-2714/APX-44 chassis from their protective covers and inspect each chassis for cleanliness, signs of excessive wear or damage, and loose or missing components or hardware. *c.* Inspect the protective cover of RT-494/APX-44 and C-2714/APX-44 for damage, missing parts, and condition of paint. *Note.* Touchup painting is recommended instead of refinishing. Do not paint screwheads, receptacles, or plated fasteners; do not polish screwheads with abrasives.	*a.* All screws, covers, connectors, and other hardware should be in place, properly installed, and show no sign of damage or excessive wear. Panel lettering should be legible. *b.* Chassis should be clean. No. signs of excessive wear, damage or loose or missing components should be evident. *c.* No damage or missing parts should be evident. External surfaces intended to be painted should not show bare metal.

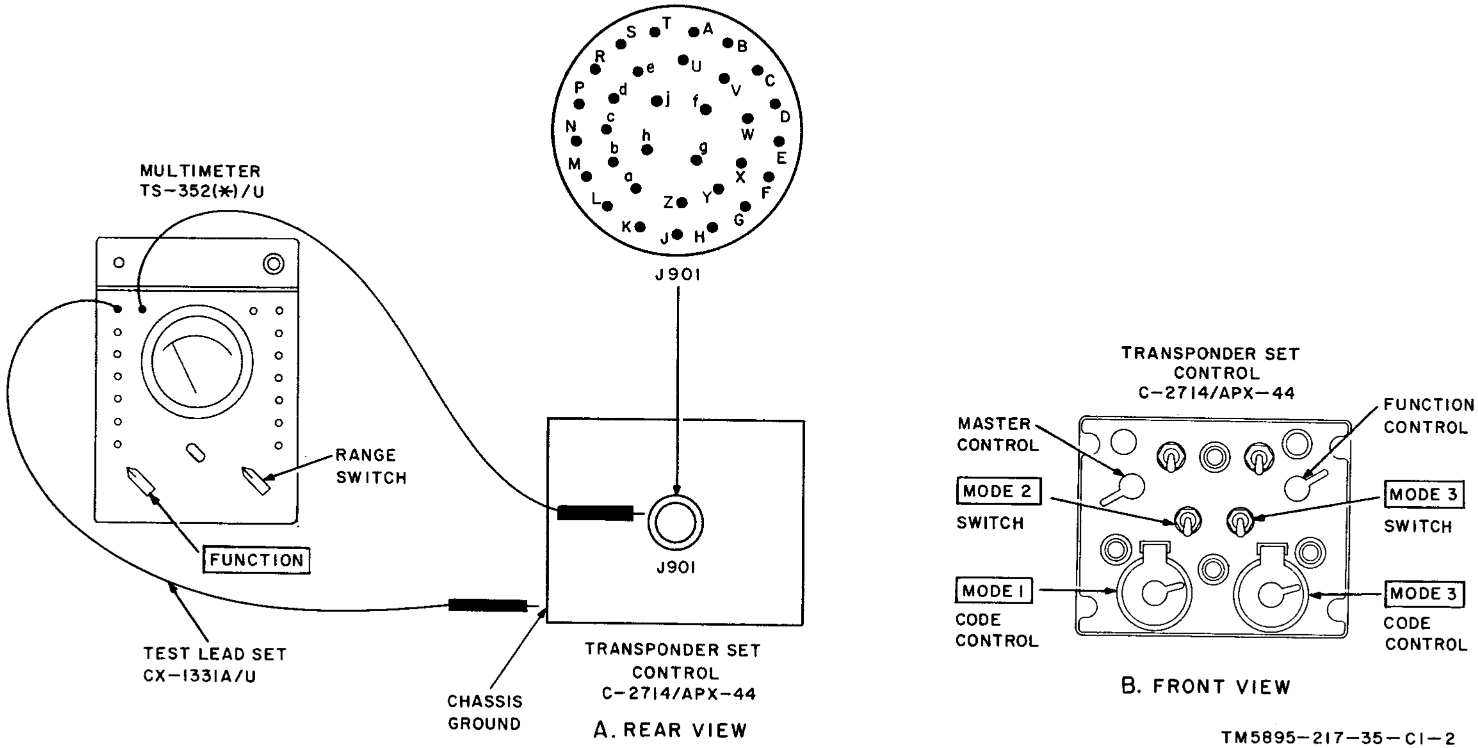


Figure 113.2. Transponder Set Control C-2714/APX-44, continuity test. (Added)

95.6. Continuity Test of Transponder Set Control C-2714/APX-44

a. Test Equipment and Materials. Multimeter TS-352(*)/U.

b. Test Connections and Conditions (fig. 113.2).

(1) When making the continuity checks on the C-2714/APX-44, set the range switch of the TS-352(*)/U to RX1 position when the meter indication should be a short circuit and on RX10000 when the meter indication should be an open circuit.

(2) The continuity test of C-2714/APX-44 only checks out the switches and the wiring associated with these switches. It does not check out the two relays (K901 and K902) that are within the control unit.

c. Procedure.

Step No.	Test equipment control settings	Equipment under test control settings	Test procedure	Performance standard
1	*TS-352(*)/U* FUNCTION: OHMS Range switch: RX1 (for shorts RX-10000 (for opens).	*C-2714/APX-44* Master control switch: OFF. All other controls may be in any position.	*a.* Connect one of the test leads of TS-352(*)/U to the case (or chassis) and the other to pins F, H, a, J, and N of receptacle J901 in succession and note the meter indication after each connection. *Note.* The test lead to the case (or chassis) is the ground terminal and must be connected to the C-2714/APX-44 at a point where bare metal is exposed, such as the panel screws or the outside of receptacle J901. Do not connect the ground test lead to any painted portion of the C-2714/APX-44.	*a.* The meter should indicate an open circuit when test lead is on pins F, H, a, and J. On pin N, the meter should indicate a short circuit (continuity).
			b. On the C-2714/APX-44, position the master control switch to STBY and repeat *a* above, except for pin N. *Note.* Pin N of receptacle J901 is connected directly to chassis ground and meter indications should be independent of any control settings.	*b.* The meter should indicate a short circuit when test lead is on pins F, and H. On pins a and J, the meter should indicate an open circuit.
			c. On the C-2714/APX-44, position the master control switch to LOW and repeat *a* above.	*c.* The meter should indicate an open circuit when test lead is on pins F and J. On pins H and a, the meter should indicate a short circuit.
			d. On the C-2714/APX-44, position the master control switch to NORM and repeat *b* above.	*d.* The meter should indicate a short circuit when test lead is on pins F, H, and a. On pin J, the meter should indicate an open circuit.
			e. On the C-2714/APX-44, position the master control switch to EMER and repeat *b* above.	*e.* The meter should indicate a short circuit when test lead is on pins F, H, a, and J.
2	Same as in step 1	*C-2714/APX-44* Function control: NORMAL. All other controls may be in any position.	*a.* Connect one of the test leads of TS-352(*)/U to the case (or chassis) and the other to pins j, A, h, g, f, and E of connector J901 in succession and note the meter indication after each connection.	*a.* The meter should indicate an open circuit when test lead is on pins f, j, A, g, and E. On pin h, the meter should indicate a short circuit.
			b. On the C-2714/APX-44, position the function control switch to MOD and repeat *a* above.	*b.* The meter should indicate a short circuit when test lead is on pins j, A, and g. On pins h, f, and E, the meter should indicate an open circuit.
			c. On the C-2714/APX-44, position the function control switch to CIVIL and repeat *a* above, excluding the note.	*c.* The meter should indicate a short circuit when test lead is on pins j, A, and g. On pins h, f, and E, the meter should indicate an open circuit.
3	Same as step 1	*C-2714/APX-44* Function control: MOD MODE 2 switch: OFF. MODE 3 switch: OFF. MODE 1 code control: 00. All other controls may be in any position.	*a.* Connect one of the test leads of TS-352(*)/U to the case (or chassis) and the other to pins A, g, M, C, D, e, d, and b of receptacle J901 in succession and note the meter indication after each connection.	*a.* The meter should indicate a short circuit when test lead is on pins A, g, and M. On pins C, D, e, d, and b, the meter should indicate an open circuit.
			b. On the C-2714/APX-44, position the MODE 1 code control to 10 and repeat *a* above, except for pin M.	*b.* The meter should indicate a short circuit when test lead is on pins A, g, and C. On pins D, e, d, and b, the meter should indicate an open circuit.
			c. On the C-2714/APX-44, position the MODE 1 code control to 20 and repeat *b* above.	*c.* The meter should indicate a short circuit when test lead is on pins A, g, and D. On pins C, e, d, and b, the meter should indicate an open circuit.
			d. On the C-2714/APX-44, position the MODE 1 code control to 30 and repeat *b* above.	*d.* The meter should indicate a short circuit when test lead is on pins A, g, C, and D. On pins e, d, and b, the meter should indicate an open circuit.
			e. On the C-2714/APX-44, position the MODE 1 code control to 40 and repeat *b* above.	*e.* The meter should indicate a short circuit when test lead is on pins A, g, and e. On pins C, D, d, and b, the meter should indicate an open circuit.
			f. On the C-2714/APX-44, position the MODE 1 code control to 50 and repeat *b* above. *Note.* Pin M of receptacle J901 is connected directly to chassis ground and meter indications should be independent of any control settings.	*f.* The meter should indicate a short circuit when test lead is on pins A, g, C, and e. On pins D, d, and b, the meter should indicate an open circuit.
			g. On the C-2714/APX-44, position the MODE 1 code control to 60 and repeat *b* above.	*g.* The meter should indicate a short circuit when test lead is on pins A, g, D, and e. On pins C, d, and b, the meter should indicate an open circuit.
			h. On the C-2714/APX-44, position the MODE 1 code control to 70 and repeat *b* above.	*h.* The meter should indicate a short circuit when test lead is on pins A, g, C, D, and e. On pins d and b, the meter should indicate an open circuit.
			i. On the C-2714/APX-44, position the MODE 1 code control to 01 and repeat *b* above.	*i.* The meter should indicate a short circuit when test lead is on pins A, g, and d. On pins C, D, e, and b, the meter should indicate an open circuit.
			j. On the C-2714/APX-44, position the MODE 1 code control to 02 and repeat *b* above.	*j.* The meter should indicate a short circuit when test lead is on pins A, g, and b. On pins C, D, e, and d, the meter should indicate an open circuit.
			k. On the C-2714/APX-44, position the MODE 1 code control to 03 and repeat *b* above.	*k.* The meter should indicate a short circuit when test lead is on pins A, g, d, and b. On pins C, D, and e, the meter should indicate an open circuit.
			l. Connect one of the test leads of TS-352(*)/U to the case and the other to pins L and K in succession and note the meter indication.	*l.* The meter should indicate an open circuit.
4	Same as step 1	*C-2714/APX-44* Function control: MOD. MODE 3 switch: ON. MODE 3 code control: 00. All other controls may be in any position.	*a.* Connect one of the test leads of TS-352(*)/U to the case (or chassis) and the other to pins B, Y, Z, W, V, U, X, and j of receptacle J901 in succession and note the meter indication after each connection.	*a.* The meter should indicate a short circuit when test lead is on pins B and j. On pins Y, Z, W, V, U, and X, the meter should indicate an open circuit.
			b. On the C-2714/APX-44, position the MODE 3 code control to 10 and repeat *a* above, except for pin B. *Note.* Pin B of receptacle J901 is connected directly to chassis ground and meter indications should be independent of any control settings.	*b.* The meter should indicate a short circuit when test lead is on pins Y and j. On pins Z, W, V, U, and X, the meter should indicate an open circuit.
			c. On the C-2714/APX-44, position the MODE 3 code control to 20 and repeat *b* above.	*c.* The meter should indicate a short circuit when test lead is on pins Z and j. On pins Y, W, V, U, and X, meter should indicate an open circuit.
			d. On the C-2714/APX-44, position the MODE 3 code control to 30 and repeat *b* above.	*d.* The meter should indicate a short circuit when test lead is on pins Y, Z, and j. On pins W, V, U, and X, the meter should indicate an open circuit.
			e. On the C-2714/APX-44, position the MODE 3 code control to 40 and repeat *b* above.	*e.* The meter should indicate a short circuit when test lead is on pins W and j. On pins Y, Z, V, U, and X, the meter should indicate an open circuit.
			f. On the C-2714/APX-44, position the MODE 3 code control to 50 and repeat *b* above.	*f.* The meter should indicate a short circuit when test lead is on pins Y, W, and j. On pins Z, V, U, and X, the meter should indicate an open circuit.
			g. On the C-2714/APX-44, position the MODE 3 code control to 60 and repeat *a* above.	*g.* The meter should indicate a short circuit when test lead is on pins Z, W, and j. On pins Y, V, U, and X, the meter should indicate an open circuit.
			h. On the C-2714/APX-44, position the MODE 3 code control to 70 and repeat *b* above.	*h.* The meter should indicate a short circuit when test lead is on pins Y, Z, W, and j. On pins V, U, and X, the meter should indicate an open circuit.
			i. Connect one of the test leads of TS-352(*)/U to the case and the other to pin K and note the meter indication.	*i.* The meter should indicate a short circuit.
5	Same as step 1	*C-2714/APX-44* Function control: MOD. MODE 3 switch: ON. MODE 3 code control: 01. All other controls may be in any position.	*a.* Connect one of the test leads of TS-352(*)/U to the case (or chassis) and the other to pins Y, Z, W, V, U, X, and j of receptacle J901 in succession and note the meter indication after each connection.	*a.* The meter should indicate a short circuit when test lead is on pins V and j. On pins Y, Z, W, U, and X, the meter should indicate an open circuit.
			b. On the C-2714/APX-44, position the MODE 3 code control to 02 and repeat *a* above.	*b.* The meter should indicate a short circuit when test lead is on pins U and j. On pins Y, Z, W, V, and X, the meter should indicate an open circuit.
			c. On the C-2714/APX-44, position the MODE 3 code control to 03 and repeat *a* above.	*c.* The meter should indicate a short circuit when test lead is on pins V, U, and j. On pins Y, Z, W, and X, the meter should indicate an open circuit.
			d. On the C-2714/APX-44, position the MODE 3 code control to 04 and repeat *a* above.	*d.* The meter should indicate a short circuit when test lead is on pins X and j. On pins Y, Z, W, V, and U, the meter should indicate an open circuit.
			e. On the C-2714/APX-44, position the MODE 3 code control to 05 and repeat *a* above.	*e.* The meter should indicate a short circuit when test lead is on pins V, X, and j. On pins Y, Z, W, and U, the meter should indicate an open circuit.
			f. On the C-2714/APX-44, position the MODE 3 code control to 06 and repeat *a* above.	*f.* The meter should indicate a short circuit when test lead is on pins U, X, and j. On pins Y, Z, W, and V, the meter should indicate an open circuit.
			g. On the C-2714/APX-44, position the MODE 3 code control to 07 and repeat *a* above.	*g.* The meter should indicate a short circuit when test lead is on pins V, U, X, and j. On pins Y, Z, and W, the meter should indicate an open circuit.
			h. Connect one of the test leads of TS-352(*)/U to pin S and the other to pin T of receptacle J901 and note the meter indication.	*h.* The meter should indicate an open circuit.
			i. On the C-2714/APX-44, place the AUDIO switch to ON and again note the meter indication with test leads on pins T and S.	*i.* The meter should indicate a short circuit.
6	Same as step 1	*C-2714/APX-44* Controls may be in any position.	*a.* Connect one of the test leads of TS-352(*)/U to the case and the other to pin G of receptacle J901 and note the meter indication.	*a.* The meter should indicate a resistance of about ~~1 or 2 ohms.~~
			b Move the test lead from pin G to pin R and note the meter indication.	*b.* The meter should indicate an open circuit.
			c. With the test leads connected as in *b* above, press the test button on the C-2714/APX-44 and note the meter indication.	*c.* The meter should indicate a resistance of about ~~6 ohms.~~
			d. Move the test lead from pin R to pin P and note the meter indication.	*d.* The meter should indicate an open circuit.
			e. With the test leads connected as in *d* above, place the I/P switch first to I/P and then to MIC positions and note the meter indications.	*e.* The meter should indicate an open circuit, and the position of I/P switch should have no effect on the meter indication.

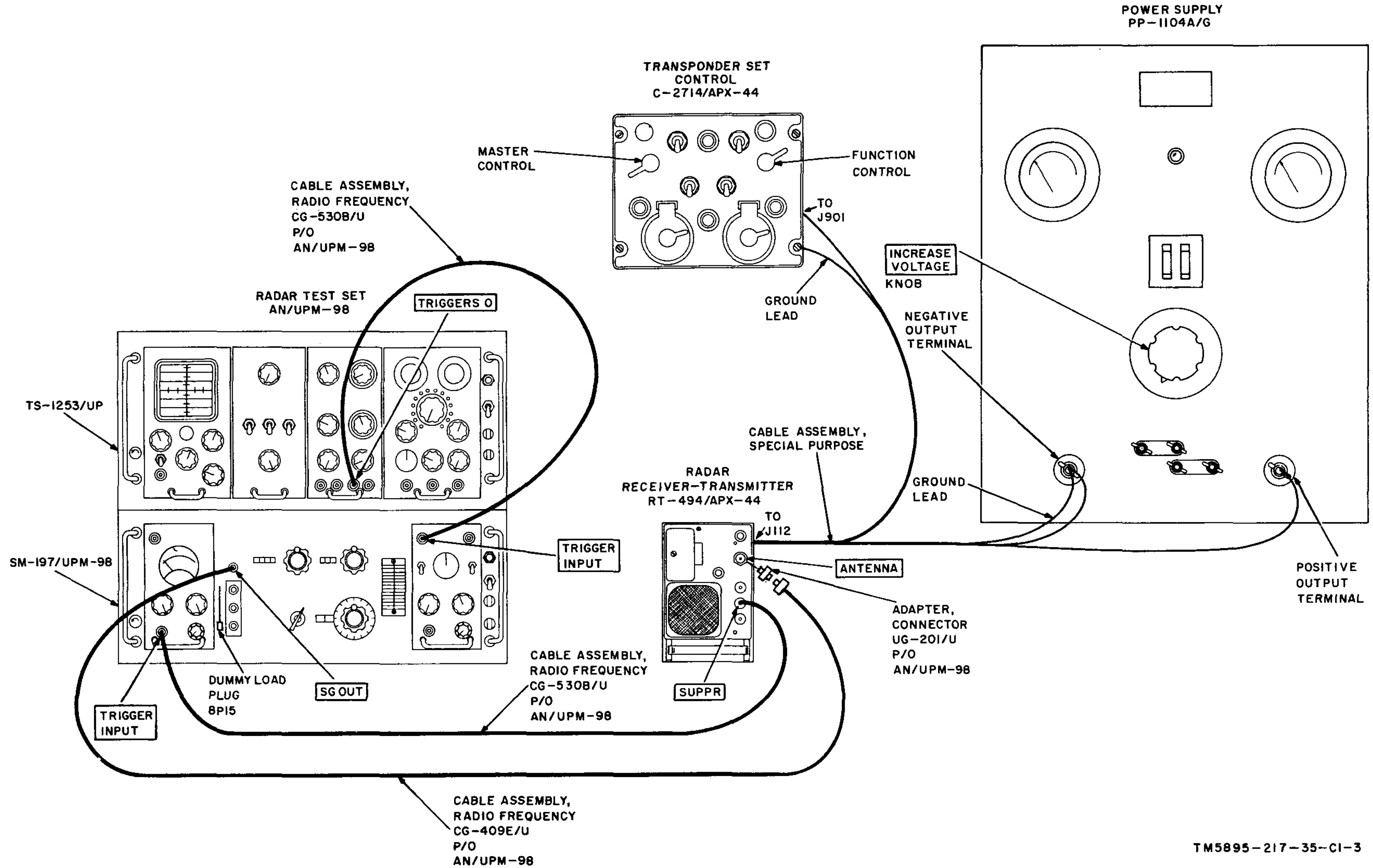


Figure 113.3. Receiver sensitivity, image response, and pilot light, tests hookup. (Added)

95.7. Receiver Sensitivity, Image Response, and Pilot Light Tests

a. Test Equipment and Materials.

(1) Radar Test Set AN/UPM–98.
(2) Power Supply PP–1104A/G.
(3) Transponder Set Control C–2714/APX–44.
(4) Special purpose cable assembly (par. 95.3).
(5) Cable Assembly, Radio Frequency CG–530B/U (p/o AN/UPM–98) (two).
(6) Cable Assembly, Radio Frequency CG–409E/U (p/o AN/UPM–98).
(7) Adapter, Connector UG–201/U (p/o AN/UPM–98).

b. Test Connections and Conditions.

***Caution:* To prevent damage to the RT–494/APX–44, adjust the output voltage of the PP–1104A/G to 27.5 volts *before* power from the PP–1104A/G is applied to the RT–494/APX–44.**

(1) Apply 115-volt 60-cps power to the PP–1104A/G (TM 11–5126) and adjust INCREASE VOLTAGE knob until the dc voltmeter on the PP–1104A/G panel indicates 27.5 volts.
(2) With the PP–1104A/G turned off, interconnect the C–2714/APX–44, PP–1104A/G, and RT–494/APX–44 as shown in figure 113.3.
(3) With a copper wire (22 AWG), ground the case of the AN/UPM–98 to the RT–494/APX–44 (not shown in figure 113.3). Be sure that the wire makes contact with bare metal on each unit.

***Caution:* To prevent damaging the screen of the cathode-ray tube of the DISPLAY unit of the TS–1253/UP, turn the INTEN control on the DISPLAY unit fully counter-clockwise *before* applying power to the AN/UPM–98.**

(4) Turn INTEN control on the DISPLAY unit of the TS–1253/UP fully ccw. Apply 115-volt 60-cps power to the AN/UPM–98 and let it warm up for at least 30 minutes before proceeding with the tests. (The TS–1253/UP and SM–197/UPM–98 are turned on by placing the POWER ON-OFF switch on each unit to ON.)

c. Procedure.

Step No.	Test equipment control settings	Equipment under test control settings	Test procedure	Performance standard
1	*TS–1253/UP* DISPLAY unit: INTEN: Fully ccw. FOCUS: Center. HOR: Center. VERT: Center. 75Ω IN-OUT: OUT. VOLTS/IN: 20. VIDEO SENS: CAL. SCALE: Fully ccw. ASTIG: Center. SWEEP & INTEN MARK unit: SWEEP SPEED RANGE: 1–30. SWEEP SPEED ADJUST: Center. MARKER TRIGGER: NORMAL. INTENSITY MARKS RANGE: OFF. INTENSITY MARKS LEVEL: Fully ccw. XTAL MARK & SYNC unit: SWEEP DELAY RANGE: 0. SWEEP DELAY COARSE: Fully ccw. SWEEP DELAY FINE: Fully ccw. SYNC SELECT: INT. XTAL MARK LEVEL: Fully ccw. PRF: Center. SUP: Fully ccw. SIF CODER: CODE: 0000. FUNCTION: N. SUB PULSE SELECT: OFF. LEVEL: LO. SUB PULSE POS: 0. PULSE WIDTH: .45. AMPLITUDE: Fully ccw. *SM–197/UPM–98* ATTENUATION: 20. SF FREQUENCY: Fully ccw. WAVEMETER INPUT: DEMOD. WAVEMETER FREQUENCY: Fully ccw. CAL-CONTROL unit: METER SELECT: WM. WM SENS: Fully clockwise. VIDEO OUT: 50. CAL ADJ (FULL SCALE): Fully ccw. TRIGGER: INT. MARK X CODER: PULSE POS: 0. MODE SELECT: M–1. FUNCTION: INT. PULSE WIDTH: Center. CODER LEVEL: Fully ccw. TRIGGER INPUT 75Ω: OUT. MOD INPUT 75Ω: OUT. *C–2714/APX–44* Master control: NORM. Function control: NORMAL. MODE 2 switch: OFF. MODE 3 switch: OFF. MODE 1 code control: 00. MODE 3 code control: 00. AUDIO: OFF. I/P switch: OFF. *PP–1104A/G* Circuit breaker lever: ON. INCREASE VOLTAGE KNOB: Set to produce an output voltage of 27.5 volts.	*C–2714/APX–44* MASTER control: NORM. All other controls in any position.	*a.* Observe the pilot light on the C–2714/APX–44 front panel *b.* Position the master control to LOW, STBY, and EMER, in turn, and observe the pilot light for each position of the master control. *c.* Position the master control to NORM	*a.* The pilot light should glow. *b.* The pilot light should glow for each position of master control. *c.* None.
2	Controls remain as last indicated in step 1.	N/A	*a.* Connect cable CG–530B/U between TRIGGERS 0 on the XTAL MARK & SYNC unit and TRIGGER INPUT on the MARK X CODER. *b.* Set the signal generator portion of the SM–197/UPM–98 to 1,030 mc as follows: (1) Adjust the WAVEMETER FREQUENCY control to 1,030 mc. (Refer to the curves in the Book of Calibration Charts provided with the AN/UPM–98 to determine the exact setting of the WAVEMETER FREQUENCY control for 1,030 mc.) (2) Position the WAVEMETER INPUT switch to SIG GEN and adjust the SG FREQUENCY control until the meter needle on the CAL-CONTROL unit indicates a maximum dip to the left. *Note.* To determine the exact point at which maximum needle deflection to the left takes place, it may be necessary to turn WM SENS control ccw some. *c.* Connect cable CG–409/U between the SG OUT connector on the SM–197/UPM–98 and the ANTENNA connector on the RT–494/APX–44. *d.* On the CAL-CONTROL unit, position the METER SELECT control to 500 PRF. *e.* On the XTAL MARK & SYNC unit, adjust the PRF control for an indication of 400 on the CAL-CONTROL unit meter. *f.* Connect cable CG–530B/U between the SUPPR connector on the RT–494/APX–44 and the TRIGGER INPUT control on the CAL-CONTROL unit. *g.* On the CAL-CONTROL unit, position the TRIGGER control to EXT. *h.* On the SM–197/UPM–98, turn the ATTENUATION control cw until the meter on the CAL-CONTROL unit indicates 200. Note the ATTENUATION indication.	*a.* None. *b.* None. *c.* None. *d.* None. *e.* None. *f.* None. *g.* None. *h.* The ATTENUATION indication should be between 84 and 89, inclusive.
3	Controls remain as last indicated in step 1, except: *SM–197/UPM–98* MARK X CODER: MODE SELECT: M–2. CAL-CONTROL unit: TRIGGER: INT. *C–2714/APX–44* MODE 2 switch: ON.	N/A	*a.* Repeat 2*e*, *g*, and *h* *b.* On the MARK X CODER, position the MODE SELECT to M–3. *c.* On the C–2714/APX–44, position the MODE 2 switch to OFF and the MODE 3 switch to ON. *d.* On the SM–197/UPM–98, position the ATTENUATION control for an indication of 20 and the TRIGGER control on the CAL-CONTROL unit to INT. *e.* Repeat 2*e*, *g*, and *h* *f.* On the C–2714/APX–44, position the master control to LOW *g.* On the SM–197/UPM–98, adjust the ATTENUATION control for an indication of 200 on the CAL-CONTROL unit meter. Note the ATTENUATION indication.	*a.* Same as in 2*e*, *g*, and *h*. *b.* None. *c.* None. *d.* None. *e.* Same as in 2*e*, *g*, and *h*. *f.* None. *g.* The ATTENUATION indication should be between 55 and 59, inclusive.
4	Controls remain as last indicated in step 3 except: *SM–197/UPM–98* ATTENUATION: 20. CAL-CONTROL unit: TRIGGER: INT. METER SELECT: 500. *C–2714/APX–44* Master Control: normal.	N/A	*a.* On the XTAL MARK & SYNC unit, adjust the PRF control for an indication of 400 on the CAL-CONTROL unit meter. *b.* On the SM–197/UPM–98, set the ATTENUATION control for an indication of 072.0 on the CAL-CONTROL unit, set the METER SELECT control to WM. *c.* Set the signal generator portion of the SM–197/UPM–98 to 1,150 mc as follows: (1) Adjust the WAVEMETER FREQUENCY control to 1,150 mc. (Refer to the curves in the Book of Calibration Charts provided with the AN/UPM–98 to determine the exact setting of the WAVEMETER FREQUENCY control for 1,150 mc.) (2) Adjust the SG FREQUENCY control until the meter needle on the CAL-CONTROL unit indicates a maximum dip to the left. *Note.* To determine the exact point at which maximum needle deflection to the left takes place, it may be necessary to turn WM SENS control ccw some. *d.* On the CAL-CONTROL unit, position the TRIGGER control to EXT and the METER SELECT control to 500. *e.* On the SM–197/UPM–98, turn the ATTENUATION control ccw until the meter on the CAL-CONTROL unit indicates 200. Adjust the SG FREQUENCY control slowly for a maximum meter indication on the CAL-CONTROL unit, and readjust the ATTENUATION control for an indication of 200 on the CAL-CONTROL unit meter. Note the ATTENUATION indication. *f.* Turn the equipment off	*a.* None. *b.* None. *c.* None. *d.* None. *e.* The ATTENUATION indication should be between 47 and 52, inclusive. *f.* None.

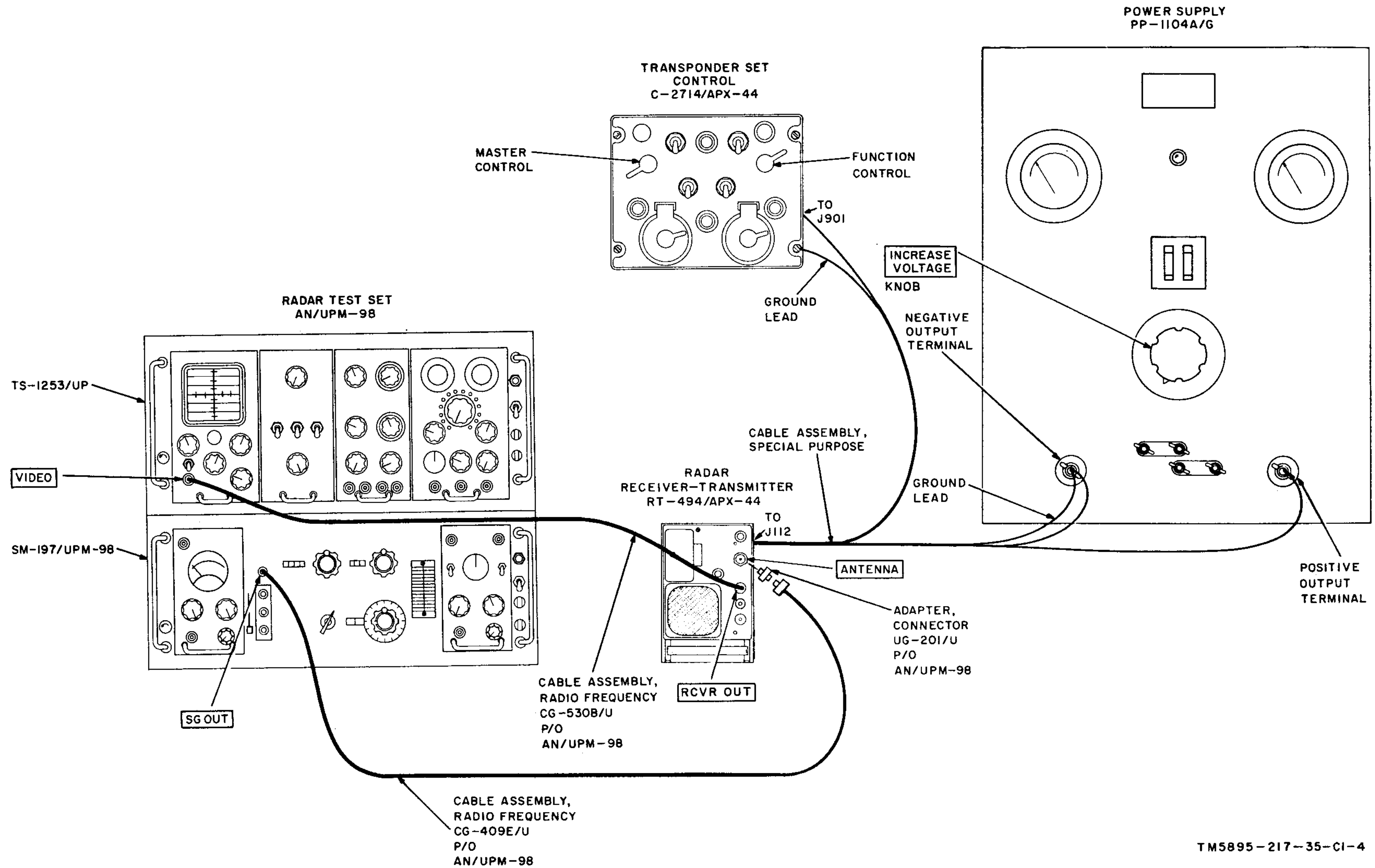


Figure 113.4. Receiver bandwidth and center frequency test hookup. (Added)

95.8. Receiver Bandwidth and Center Frequency Tests

a. Test Equipment and Materials.

(1) Radar Test Set AN/UPM-98.
(2) Power Supply PP-1104A/G.
(3) Transponder Set Control C-2714/APX-44.
(4) Special purpose cable assembly (par. 95.3).
(5) Cable Assembly, Radio Frequency CG-530B/U (p/o AN/UPM-98).
(6) Cable Assembly, Radio Frequency CG-409E/U (p/o AN/UPM-98).
(7) Adapter, Connector UG-201/U (p/o AN/UPM-98).

b. Test Connections and Conditions.

Caution: **To prevent damage to the RT-494/APX-44, adjust the output voltage of the PP-1104A/G to 27.5 volts *before* power from the PP-1104A/G is applied to the RT-494/APX-44.**

(1) Apply 115-volt 60-cps power to the PP-1104A/G (TM 11-5126) and adjust INCREASE VOLTAGE knob until the dc voltmeter on the PP-1104A/G panel indicates 27.5 volts.
(2) Interconnect the C-2714/APX-44, PP-1104A/G, and RT-494/APX-44 as shown in figure 113.4.
(3) With a copper wire (#22 AWG), ground the case of the AN/UPM-98 to the RT-494/APX-44 (not shown in figure 113.4). Be sure that the wire makes contact with bare metal on each unit.

Caution: **To prevent damaging the screen of the cathode-ray tube of the DISPLAY unit of the TS-1253/UP, turn INTEN control on the DISPLAY unit fully counterclockwise *before* applying power to the AN/UPM-98.**

(4) Turn INTEN control on the DISPLAY unit of the TS-1253/UP fully counterclockwise. Apply 115-volt 60-cps power to the AN/UPM-98 and let it warm up for at least 30 minutes before proceeding with the test. (The TS-1253/UP and SM-197/UPM-98 are turned on by placing the POWER ON-OFF switch on each unit to ON.)

c. Procedure.

Step No.	Test equipment control settings	Equipment under test control settings	Test procedure	Performance standard
	TS-1253/UP DISPLAY unit: INTEN: Fully ccw. FOCUS: Center. HOR: Center. VERT: Center. 75ΩMIN-OUT: OUT. VOLTS/IN: Position that gives best display on scope. VIDEO SENS: CAL. SCALE: Fully ccw. ASTIG: Center. SWEEP & INTEN MARK unit: SWEEP SPEED RANGE: 1-30 SWEEP SPEED ADJUST: Center. MARKER TRIGGER: NORMAL. INTENSITY MARKS RANGE: OFF. INTENSITY MARKS LEVEL: Fully ccw. XTAL MARK & SYNC unit: SWEEP DELAY RANGE: O. SWEEP DELAY COARSE: Fully ccw. SWEEP DELAY FINE: Fully ccw. TRIGGER DELAY RANGE: O. TRIGGER DELAY COARSE: Fully ccw. TRIGGER DELAY FINE: Fully ccw. SYNC SELECT: INT. XTAL MARK LEVEL: Fully ccw. PRF: Center. SUP: Fully ccw. SIF CODER: CODE: 0000. FUNCTION: N. SUB PULSE SELECT: OFF. SUB PULSE POS: O. LEVEL: LO. PULSE WIDTH: .45. AMPLITUDE: Fully ccw. *SM-197/UPM-98* ATTENUATION: 072.0. SG FREQUENCY: Fully ccw. WAVEMETER INPUT: DEMOD. WAVEMETER FREQUENCY: Fully ccw. CAL-CONTROL unit: METER SELECT: WM. WM SENS: Fully cw. VIDEO OUT: 50. CAL ADJ (FULL SCALE): Fully ccw. TRIGGER: INT. MARK X CODER: PULSE POS: O. MODE SELECT: M-3. FUNCTION: INT. PULSE WIDTH: Center. CODER LEVEL: Center. TRIGGER INPUT 75: OUT. MOD INPUT 75: OUT. *C-2714/APX-44* Master Control: NORM. Function control: NORMAL. MODE 2 switch: OFF. MODE 3 switch: OFF. MODE 1 code control: OO. MODE 3 code control: OO. AUDIO: OFF. I/P switch: OFF. *PP-1104A/G* Circuit breaker lever: ON. INCREASE VOLTAGE knob: Set to produce an output voltage of 27.5 volts.	N/A	*a.* After the 30-minute warmup period, check the PP-1104A/G output voltage. Readjust INCREASE VOLTAGE knob on the PP-1104A/G if necessary to give 27.5-volt output.	*a.* Dc voltmeter on PP-1104A/G should indicate 27.5 volts.
			b. Set the signal generator portion of the SM-197/UPM-98 to the frequency of the receiver as follows: (1) Adjust the WAVEMETER FREQUENCY control to 1,030 mc. (Refer to the cruves in the Book of Calibration Charts provided with the AN/UPM-98 to determine the exact setting of the WAVEMETER FREQUENCY control for 1,030 mc.) (2) Position the WAVEMETER INPUT switch to SIG GEN and adjust the SG FREQUENCY control until the meter needle on the CAL-CONTROL unit indicates a maximum dip to the left. *Note.* To determine the exact point at which maximum needle deflection to the left takes place, it may be necessary to turn WM SENS control ccw some.	*b.* None.
			c. Connect cable CG-409E/U between the SG OUT connector on the SM-197/UPM-98 and the ANTENNA connector on the RT-494/APX-44.	*c.* None.
			d. Connect cable CG-530B/U between the RCVR OUT connector on the RT-494/APX-44 and the VIDEO connector on the DISPLAY unit. Adjust the controls on the DISPLAY unit for best image (pulse) presentation.	*d.* Receiver output pulse should appear on scope of DISPLAY unit.
			e. On the SM-197/UPM-98, adjust the SG FREQUENCY control for a maximum pulse amplitude indication on the DISPLAY unit scope.	*e.* Pulse amplitude on DISPLAY unit becomes maximum.
			f. On the SM-197/UPM-98, slowly adjust the WAVEMETER FREQUENCY control for a needle dip on the CAL-CONTROL unit meter. Refer to the Book of Calibration Charts and determine the frequency which corresponds to the WAVEMETER FREQUENCY control setting.	*f.* The frequency determined should be 1,030 mc ±1.
			g. On the DISPLAY unit, adjust the VOLTS/IN control for some convenient pulse amplitude on the scope. Note this pulse amplitude.	*g.* None.
			h. On the SM-197/UPM-98, adjust the ATTENUATION control so that the ATENUATION indication is 069.0.	*h.* Pulse amplitude noted in *g* above decreases.
			i. On the SM-197/UPM-98, turn the SG FREQUENCY control slowly clockwise until the pulse amplitude is the same as noted in *g* above.	*i.* Pulse amplitude increases and becomes the same as in *g* above.
			j. On the SM-197/UPM-98, slowly adjust the WAVEMETER FREQUENCY control for a needle dip on the CAL-CONTROL unit meter. Refer to the Book of Calibration Charts and determine the frequency which corresponds to this WAVEMETER FREQUENCY control setting. Note this frequency.	*j.* None.
			k. On the SM-197/UPM-98, turn the SG FREQUENCY control ccw slowly until the pulse amplitude on the DISPLAY unit scope is again the same as in *g* above.	*k.* None.
			l. On the SM-197/UPM-98, slowly adjust the WAVEMETER FREQUENCY control for a needle dip on the CAL-CONTROL unit meter. Refer to the Book of Calibration Charts and determine the frequency which corresponds to the WAVEMETER FREQUENCY control setting. Note this frequency.	*l.* None.
			m. Calculate the difference between the frequencies noted in *j* and *l* above.	*m.* The difference should be between 6 and 8 mc, inclusive.
			n. On the SM-197/UPM-98, adjust the ATTENUATION control so that the ATTENUATION again indicates 072.0.	*n.* None.
			o. On the SM-197/UPM-98, adjust the SG FREQUENCY control for a maximum pulse amplitude indication on the DISPLAY unit scope. Note this pulse amplitude. *Note.* If it is desired, adjust the VOLTS/IN control on the DISPLAY unit to set the pulse amplitude to some convenient value on the scope.	*o.* None.
			p. On the SM-197/UPM-98, set the ATTENUATION control for an indication of 032.0.	*p.* Pulse amplitude noted in *o* above increases.
			q. On the SM-197/UPM-98 rotate the SG FREQUENCY control cw slowly until the pulse amplitude on the DISPLAY unit scope is the same as noted in g above.	*q.* None.
			r. On the SM-197/UPM-98, slowly adjust the WAVEMETER FREQUENCY control for a needle dip on the CAL-CONTROL unit meter. Refer to the Book of Calibration Charts and determine the frequency which corresponds to this WAVEMETER FREQUENCY control setting. Note this frequency.	*r.* None.
			s. On the SM-197/UPM-98, rotate the SG FREQUENCY control ccw until the pulse amplitude on the DISPLAY unit scope is again the same as noted in *q* above.	*s.* None.
			t. On the SM-197/UPM-98, slowly adjust the WAVEMETER FREQUENCY control for a needle dip on the CAL-CONTROL unit meter. Refer to the Book of Calibration Charts and determine the frequency which corresponds to this WAVEMETER FREQUENCY control setting. Note this frequency.	*t.* None.
			u. Calculate the difference between the frequencies noted in *r* and *t* above.	*u.* The difference should be not more than 29 mc.
			v. Turn the equipment off	*v.* None.

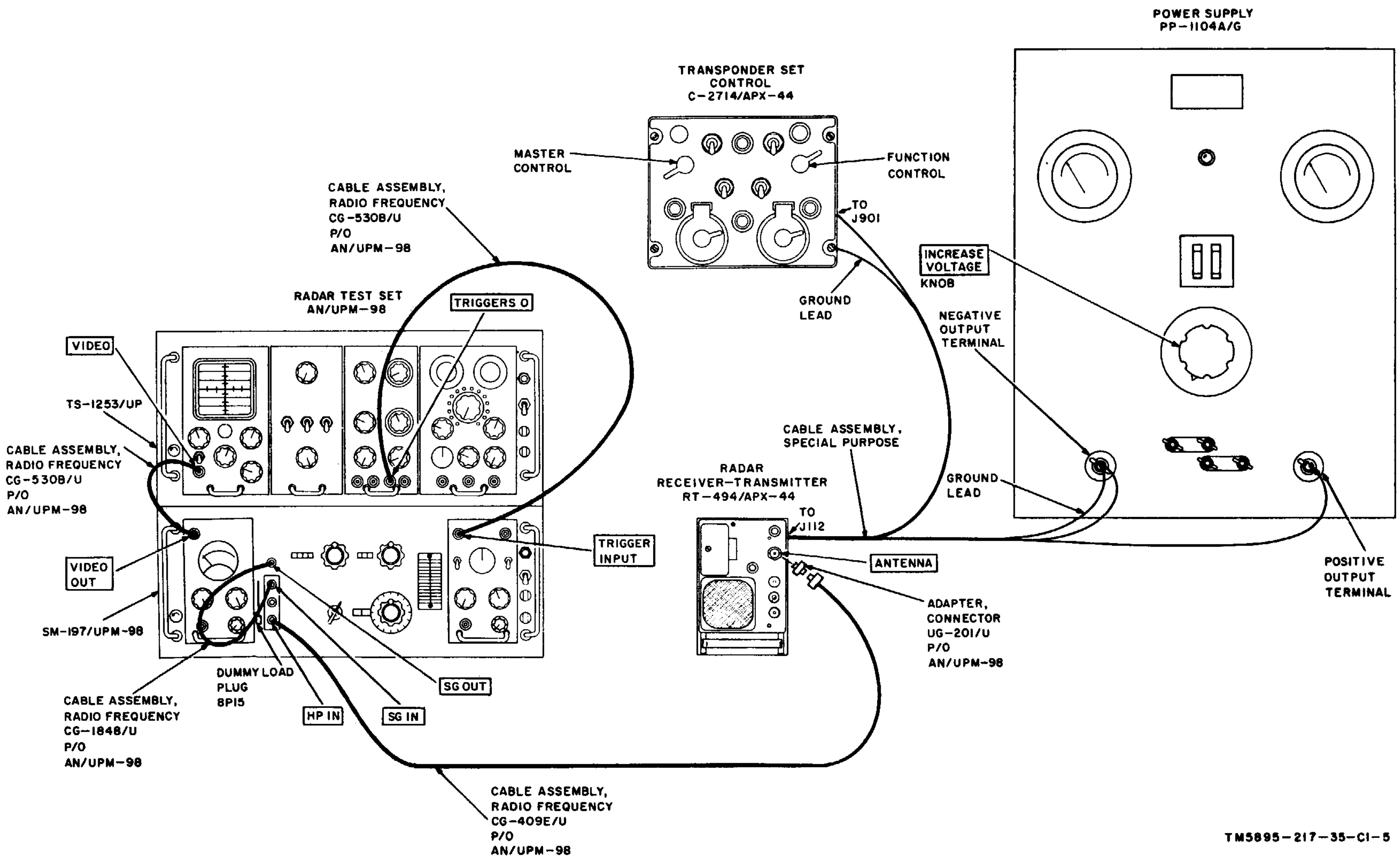


Figure 113.5. Transmitter frequency and power test hookup. (Added)

95.9. Transmitter Frequency and Power Tests

a. *Test Equipment and Materials.*

(1) Radar Test Set AN/UPM–98.
(2) Power Supply PP–1104A/G.
(3) Transponder Set Control C–2714/APX–44.
(4) Special purpose cable assembly (par. 95.3).
(5) Cable Assembly, Radio Frequency CG–530B/U (p/o AN/UPM–98) (two).
(6) Cable Assembly, Radio Frequency CG–409E/U (p/o AN/UPM–98).
(7) Cable Assembly, Radio Frequency CG–1848/U (p/o AN/UPM–98).
(8) Adapter, Connector UG–201/U (p/o AN/UPM–98).

b. *Test Connections and Conditions.*

***Caution:* To prevent damage to the RT–494/APX–44, adjust the output voltage of the PP–1104A/G to 27.5 volts *before* power from the PP–1104A/G is applied to the RT–494/APX–44.**

(1) Apply 115-volt 60-cps power to the PP–1104A/G (TM 11–5126) and adjust INCREASE VOLTAGE knob until the dc voltmeter on the PP–1104A/G panel indicates 27.5 volts.
(2) Interconnect the C–2714/APX–44, PP–1104A/G, and RT–494/APX–44 as shown in figure 113.5.
(3) With a copper wire (#22 AWG), ground the case of the AN/UPM–98 to the RT–494/APX–44 (not shown in figure 113.5). Be sure that the wire makes contact with bare metal on each unit.
(4) Make the other connections shown in figure 113.5 when directed in the procedures.

***Caution:* To prevent damaging the screen of the cathode-ray tube of the DISPLAY unit of the TS–1253/UP, turn the INTEN control on the DISPLAY unit fully counterclockwise *before* applying power to the AN/UPM–98.**

(5) Turn INTEN control on the DISPLAY unit of the TS–1253/UP fully counterclockwise. Apply 115-volt 60-cps power to the AN/UPM–98 and let it warm up for at least 30 minutes before proceeding with the tests. (The TS–1253/UP and SM–197/UPM–98 are turned on by placing the POWER ON-OFF switch on each unit to ON.)

c. *Procedure.*

Step No.	Test equipment control settings	Equipment under test control settings	Test procedure	Performance standard
1	*TS–1253/UP* DISPLAY unit: INTEN: Fully ccw. FOCUS: Center. HOR: Center. VERT: Center. 75Ω IN-OUT: OUT. VOLTS/IN: 20. VIDEO SENS: CAL. SCALE: Fully ccw. ASTIG: Center. SWEEP & INTEN MARK unit: SWEEP SPEED RANGE: 1–30. SWEEP SPEED ADJUST: Center. MARKER TRIGGER: NORMAL. INTENSITY MARKS RANGE: OFF. INTENSITY MARKS LEVEL: Fully ccw. XTAL MARK & SYNC unit: SWEEP DELAY RANGE: 0. SWEEP DELAY COARSE: Fully ccw. SWEEP DELAY FINE: Fully ccw. SYNC SELECT: INT. XTAL MARK LEVEL: Fully ccw. PRF: Center. SUP: Fully ccw. SIF CODER: CODE: 0000. FUNCTION: N. SUB PULSE SELECT: OFF. LEVEL: LO. SUB PULSE POS: 0. PULSE WIDTH: .45. AMPLITUDE: Fully ccw. *SM–197/UPM–98* ATTENUATION: 20. SG FREQUENCY: Fully ccw. WAVEMETER INPUT: DEMOD. WAVEMETER FREQUENCY: Fully ccw. CAL-CONTROL unit: METER SELECT: WM. WM SENS: Fully ccw. VIDEO OUT: 50. CAL ADJ (FULL SCALE): Fully ccw. TRIGGER: DEMOD. MARK X CODER: PULSE POS: O. MODE SELECT: M–1. FUNCTION: INT. PULSE WIDTH: Center. CODER LEVEL: Fully ccw. TRIGGER INPUT 75: OUT. MOD INPUT 75: OUT. *C–2714/APX–44* Master control: NORM. Function control: NORMAL. MODE 2 switch: OFF. MODE 3 switch: OFF. MODE 1 code control: 00. MODE 3 code control: 00. AUDIO: OFF. I/P switch: OFF. *PP–1104A/G* Circuit breaker lever: ON. INCREASE VOLTAGE knob: Set to produce an output voltage of 27.5 volts.	N/A	*a.* After the 30-minute warmup period, check the PP–1104A/G output voltage. Readjust INCREASE VOLTAGE knob on the PP–1104A/G if necessary to give 27.5-volt output. *b.* Connect cable CG–530B/U between TRIGGER 0 connector on the XTAL MARK & SYNC unit and the TRIGGER INPUT connector on the MARK X CODER. *c.* Set the signal generator portion of the SM–197/UPM–98 to 1,030 mc as follows: (1) Adjust the WAVEMETER FREQUENCY control to 1,030 mc. (Refer to the curves in the Book of Calibration Charts provided with the AN/UPM–98 to determine the exact setting of the WAVEMETER FREQUENCY control for 1.030 mc.) (2) Position the WAVEMETER INPUT switch to SIG GEN and adjust the SG FREQUENCY control until the meter needle on the CAL-CONTROL unit indicates a maximum dip to the left. *Note.* To determine the exact point at which maximum needle deflection to the left takes place, it may be necessary to turn the WM SENS control ccw some. *d.* Connect cable CG–1848/U between the SG OUT connector and the SG IN connector on the SM–197/UPM–98. Connect cable CG–409E/U between the HP IN connector or the SM–197/UPM–98 and the ANTENNA connector on the RT–494/APX–44. To the LP IN connector on the SM–197/UPM–98, connect dummy load plug 8P15 (fig. 113.5). *e.* On the CAL-CONTROL unit, adjust the WM SENS control for a maximum meter deflection. *f.* On the SN–197/UPM–98, slowly adjust the WAVEMETER FREQUENCY control for a maximum needle dip on the CAL-CONTROL unit meter. Refer to the Book of Calibration Charts and determine the frequency which corresponds to this WAVEMETER FREQUENCY control setting. *Note.* To determine the exact point at which maximum needle deflection to the left takes place (the dip), it may be necessary to turn the WM SENS control ccw some.	*a.* Dc voltmeter on PP–1104A/G panel should indicate 27.5 volts. *b.* None. *c.* None. *d.* None. *e.* None. *f.* The frequency should be between 1,089 and 1,091 mc, inclusive.
2	Controls remain as last indicated in step 1, except: *SM–197/UPM–98* CAL-CONTROL unit: VIDEO OUT: POWER.	N/A	*a.* Connect cable CG–530B/U between the VIDEO OUT connector on the CAL-CONTROL unit and the VIDEO connector on the DISPLAY unit. *b.* On the DISPLAY unit, turn the VIDEO SENS control to the maximum cw position and set the VOLTS/IN control to that position which most nearly gives a full-scale deflection to the pulses on the scope screen. *c.* Measure the amplitude of the pulse on the scope screen in inches. Refer to the Book of Calibration Charts and determine the power which this amplitude represents. *Note.* In the Book of Calibration Charts, there are two curves from which the power corresponding to the amplitude of the pulse is determined. The curve used depends on which of the connections HP IN or LP IN, is used. In this case, be sure to use the curve which relates to the HP IN connections. *d.* Turn the equipment off	*a.* None. *b.* None. *c.* The power output should be between 251 and 1,000 watts, inclusive. *d.* None.

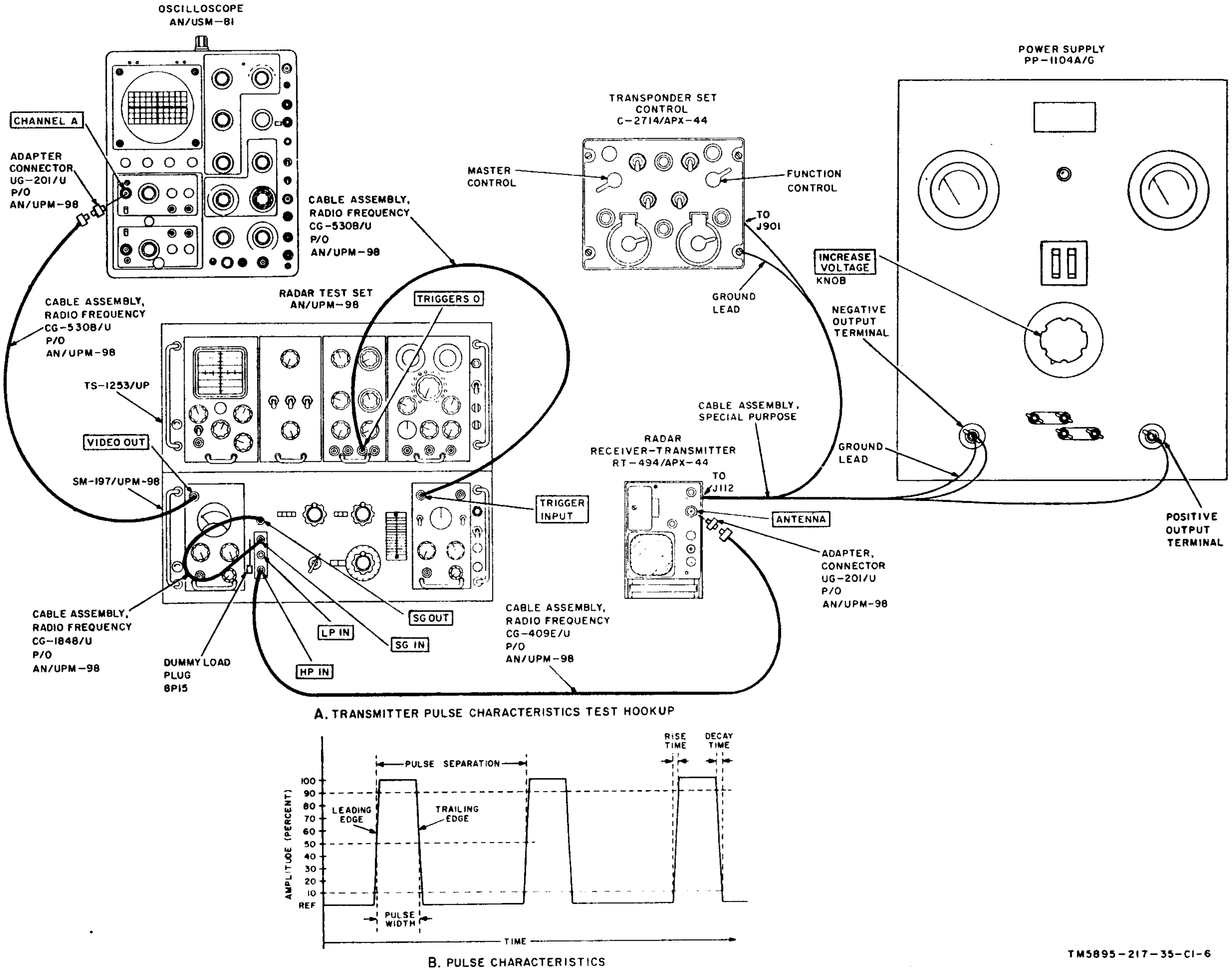


Figure 113.6. Transmitter pulse characteristics test hookup and pulse characteristics. (Added)

95.10. Transmitter Pulse Characteristics Test

a. *Test Equipment and Materials.*

(1) Radar Test Set AN/UPM-98.
(2) Supply PP-1104A/G.
(3) Transponder Set Control C-2714/APX-44.
(4) Special purpose cable assembly (par. 95.3).
(5) Oscilloscope AN/USM-81.
(6) Cable Assembly, Radio Frequency CG-530B/U (p/o AN/UPM-98) (two).
(7) Cable Assembly, Radio Frequency CG-409E/U (p/o AN/UPM-98).
(8) Cable Assembly, Radio Frequency CG-1848/U (p/o AN/UPM-98).
(9) Adapter, Connector CG-201/U (p/o AN/UPM-98) (two).
(10) Dummy load plug 8P15 (p/o SM-197/UPM-98).

b. *Test Connections and Conditions.*

Caution: **To prevent damage to the RT-494/APX-44, adjust the output voltage of the PP-1104A/G to 27.5 volts *before* power from the PP-1104A/G is applied to the RT-494/APX-44.**

(1) Apply 115-volt, 60-cps power to the PP-1104A/G (TM 11-5126) and adjust INCREASE VOLTAGE knob until the dc voltmeter on the PP-1104A/G panel indicates 27.5 volts.
(2) Interconnect the AN/USM-81, AN/UPM-98, C-2714/APX-44, RT-409/APX-44 and PP-1104A/G as shown in A, figure 113.6.
(3) Make the other connections shown in figure 113.6 when directed in the procedures.
(4) With a copper wire (#22 AWG), ground the case of the AN/USM-81 to the case of the AN/UPM-98, and the case of the AN/UPM-98 to the RT-494/APX-44 (not shown in figure 113.6). Be sure that the wire makes contact with bare metal on each unit.

Caution: **To prevent damaging the screen of the cathode-ray tube of the DISPLAY unit of the TS-1253/UP or of the AN/USM-81, turn the INTEN control on the DISPLAY unit and the INTENSITY control on the AN/USM-81 are both fully counterclockwise *before* applying power to either the DISPLAY unit or the AN/USM-81.**

(5) Turn INTEN control on the DISPLAY unit and the INTENSITY control on the AN/USM-81 both counterclockwise. Apply 115 volts, 60 cps to the AN/UPM-98 and the AN/USM-81 and let them warm up for at least 30 minutes before proceeding with the test. (The TS-1253/UP and SM-197/UPM-98 are turned on by placing the POWER ON-OFF switch on each unit to ON. The AN/USM-81 is turned on by placing the POWER switch to ON.)

c. *Procedure.*

Step No.	Test equipment control settings	Equipment under test control settings	Test procedure	Performance standard
1	*TS-1253/UP* DISPLAY unit: INTEN: Fully ccw. FOCUS: Center. HOR: Center. VERT: Center. 75ΩIN-OUT: OUT. VOLTS/IN: 20. VIDEO SENS: CAL. SCALE: Fully ccw. ASTIG: Center. SWEEP & INTEN MARK unit: SWEEP SPEED RANGE: 1-30. SWEEP SPEED ADJUST: Center. MARKER TRIGGER: NORMAL. INTENSITY MARKS RANGE: OFF. INTENSITY MARKS LEVEL: Fully ccw. XTAL MARK & SYNC unit: SWEEP DELAY RANGE: 0. SWEEP DELAY COARSE: Fully ccw. SWEEP DELAY FINE: Fully ccw. TRIGGER DELAY RANGE: O. TRIGGER DELAY COARSE: Fully ccw. TRIGGER DELAY FINE: Full ccw. SYNC SELECT :INT. XTAL MARK LEVEL: Fully ccw. PRF: Center. SUP: Fully ccw. SIF CODER: CODE: 0000. FUNCTION: N. SUB PULSE SELECT: OFF. SUB PULSE POS: 0. LEVEL: LO. PULSE WIDTH: 45.. AMPLITUDE: Fully ccw. *SM-197/UPM-98* ATTENUATION: Fully ccw. SG FREQUENCY: Fully ccw. WAVEMETER INPUT: DEMOD. WAVEMETER FREQUENCY: Fully ccw. CAL-CONTROL UNIT: METER SELECT: CAL. WM SENS: Fully ccw. VIDEO OUT: 50. CAL ADJ (FULL SCALE): Fully ccw. TRIGGER: DEMOD. MARK X CODER: PULSE POS: 0 MODE SELECT: M-1. PULSE WIDTH: Center. CODER LEVEL: Fully ccw. TRIGGER INPUT 75: OUT. MODE INPUT 75: OUT. *C-2714/APX-44* Master control: NORM. Function control: NORMAL. MODE 2 switch: OFF. MODE 3 switch: OFF. MODE 1 code control: 11. MODE 3 code control: 00. AUDIO: OFF. I/P switch: OFF. *AN/USM-81* INTENSITY: Fully ccw. FOCUS: Center. ASTIGMATISM: Center. HORIZONTAL DISPLAY: MAIN SWEEP NORMAL. MAIN SWEEP controls: TRIGGERING LEVEL: Fully ccw. STABILITY: PRESENT. TRIGGER SLOPE: INT. TRIGGERING MODE: AUTOMATIC. TIME/CM: .1. 5 X MAGNIFIER: OFF. MULTIPLIER: 2. DELAYING SWEEP controls: TRIGGERING LEVEL: Center. STABILITY OR EXT SWEEP ATTEN: Fully ccw. HORIZONTAL POSITION: Center. SQUARE WAVE CALIBRATOR: 5. Calibrator range switch: VOLTS. MODE: A ONLY. *PP-1104A/G* Circuit breaker lever: ON. INCREASE VOLTAGE knob: Set to produce an output voltage of 27.5 volts.	N/A	a. After the 30-minute warmup period, check the PP-1104A/G output voltage. Readjust INCREASE VOLTAGE knob on the PP-1104A/G if necessary to give 27.5-volt output. b. Connect cable CG-530B/U between TRIGGER 0 connector on the XTAL MARK & SYNC unit and the TRIGGER INPUT connector on the MARK X CODER. c. Set the signal generator portion of the SM-197/UPM-98 to 1,030 mc as follows: (1) Adjust the WAVEMETER FREQUENCY control to 1,030 mc. (Refer to the curves in the Book of Calibration Charts provided with the AN/UPM-98 to determine the exact setting of the wavemeter FREQUENCY control for 1,030 mc.) (2) Position the WAVEMETER INPUT switch to SIG GEN and adjust the SG FREQUENCY control until the meter needle on the CAL-CONTROL unit indicates a maximum dip to the left. *Note.* To determine the exact point at which maximum needle deflection to the left takes place, it may be necessary to turn the WM SENS control ccw some. d. Connect cable CG-1848/U between the SG OUT connector and the SG IN connector on the SM-197/UPM-98. Connect cable CG-409E/U between the HP IN connector on the SM-197 SG-197/UPM-98 and the ANTENNA connector on the RT-494/APX-44. To the HP IN connector on the SM-197/UPM-98, connect dummy load plug 8P15 (A, fig. 113.6). e. Connect cable CG-530B/U between the VIDEO OUT connector on the SM-197/UPM-98 and the CHANNEL A connector on the AN/USM-81. f. After adjusting the controls on the AN/USM-81 for best image presentation, measure the pulse width as follows: (1) Set the TRIGGER SLOPE selector switch to +INT position. (2) Set the MULTIPLER selector switch to 2 and keep the image intensity low to obtain the sharpest possible trace. (3) Measure the distance in centimeters between the half-amplitude points of the pulse (B, fig. 113.6). (If desired, the VERTICAL POSITION control may be used to bring the pulse into coincidence with the horizontal axis of the scope screen for ease in reading fractions of a centimeter.) *Note.* The screen of the scope is covered by a scaled plastic plate. Each square is 1 cm square, and each cm along the vertical and horizontal axis is subdivided into 0.2 cm. (4) To calculate the pulse width, multiply the distance in cm by the setting of the TIME/CM selector switch, and this product by the MULTIPLIER selector switch setting. *Example:* Distance between half-amplitude points = 2 cm. TIME/CM selector switch setting = 0.1 μsec. MULTIPLIER selector switch setting = 2. Pulse width = $2 \times 0.1 \times 2 = 0.4$ μsec. g. On the C-2714/APX-44, position the function control to MOD and the MODE 1 code control to 00. h. Position the TIME/CM selector switch on the AN/USM-81 to 10 and observe the pulses on the AN/USM-81 scope. i. Position the TIME/CM selector switch on the AN/USM-81 to .1. After adjusting the controls of the AN/USM-81 for best image presentation, measure the pulse width of the first pulse as in *f* above. j. Position the TIME/CM selector switch to 10. Determine the separation between the two pulses by measuring the distance between the half-amplitude point of the leading edge of the first pulse (left-hand side) and the half-amplitude point of the leading edge of the second pulse (B, fig. 113.6). Calculate the separation (*f*(4) above). k. On the C-2714/APX-44, position the MODE 1 code control to 03. l. Position the TIME/CM selector switch on the AN/USM-81 to 10 and observe the pulses on the AN/USM-81 scope screen. m. Measure the pulse wdith of the first pulse as in *i* above. n. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separation between pulses 1 and 2, 2 and 3, and 3 and 4. o. On the C-2714/APX-44, position the MODE 1 code control to 70. p. Measure the pulse width of the first pulse as in *i* above. q. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separations between the pulses. r. On the C-2714/APX-44, position the MODE 1 code control to 73. s. Measure the pulse width of the first pulse as in *i* above. t. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separations between the pulses.	a. Dc voltmeter on PP-1104A/G panel should indicate 27.5 volts. b. None. c. None. d. None. e. None. f. A single pulse, 0.35 to 0.55 microsecond wide at the half-amplitude points, should be displayed on the scope screen. *Note.* Pulse width at the half-amplitude point is synonymous with the pulse width at the 50 percent amplitude point illustrated in B, figure 113.6. g. None. h. There should be two pulses displayed on the AN/USM-81 scope. i. Pulse width should be 0.35 to 0.55 μsec between the half-amplitude points. j. The pulse separation should be 20.3 μsec. k. None. l. There should be four pulses displayed on the AN/USM-81 scope screen. m. Same as in *i* above. n. Pulse separation should be as follows: *Pulses* — *Separation (μsec)* 1 and 2 — 11.6 2 and 3 — 2.9 3 and 4 — 5.8 o. There should be five pulses displayed on the AN/USM-81 scope. p. Same as in *i* above. q. Pulse separation should be as follows: *Pulses* — *Separation (μsec)* 1 and 2 — 2.9 2 and 3 — 2.9 3 and 4 — 2.9 4 and 5 — 11.6 r. There should be seven pulses displayed on the AN/USM-81 scope. s. Same as in *i* above. t. Pulse separations should be as follows: *Pulses* — *Separation (μsec)* 1 and 2 — 2.9 2 and 3 — 2.9 3 and 4 — 2.9 4 and 5 — 2.9 5 and 6 — 2.9 6 and 7 — 5.8
2 C 2	Controls remain as last indicated in step 1, except: *SM-197/UPM-98* MARK X CODER: MODE SELECT: M-2. *C-2714/APX-44* MODE 2 switch: ON.	On the TR-494/APX-44, unscrew the door fastener, open the hinged door which covers the mode 2 code switches and set all 12 switches to OFF. *Note.* The 12 mode 2 code switches are arranged in four horizontal rows, with three switches in each row. They are numbered 1 through 12 from left to right and from top to bottom.	a. Observe the pulses on the AN/USM-81 scope screen. b. Measure the pulse width of the first pulse as in step 1, *i*. c. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separation between the two pulses. d. On the RT-494/APX-44, position mode 2 code switches 1, 2, and 3 to ON. Observe the pulses on the AN/USM-81 scope screen. e. Measure the pulse width of the first pulse as in step 1 *i*. f. Reset the TIME/CM selector switch on the AN/USM 81 to 10 and measure the pulse separations between the pulses. g. On the RT-494/APX-44, position mode 2 code switches 1, 2, and 3 to OFF, and switches 4, 5, and 6 to ON. Observe the pulses on the AN/USM-81 scope screen. h. Measure the pulse width of the first pulse as in step *1*, *i*. i. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separations between the pulses. j. On the RT-494/APX-44, position mode 2 code switches 4, 5, and 6 to OFF, and switches 7, 8, and 9 to ON. Observe the pulses on the AN/USM-81 scope screen. k. Measure the pulse width of the first pulse as in step 1, *i*. l. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separations between the pulses. m. On the RT-494/APX-44, position mode 2 code switches, 7, 8, and 9 to OFF, and switches 10, 11, and 12 to ON. Observe the pulses on the AN/USM-81 scope screen. n. Measure the pulse width of the first pulse as in step 1, *i*. o. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separations between the pulses. p. On the RT-494/APX-44, position all mode 2 code switches to ON and observe the pulses on the AN/USM-81 scope screen. q. Measure the pulse width of the first pulse as in step 1, *i*. r. Reset the TIME/CM selector switch on the AN/USM-81 to to 10 and measure the pulse separations between the pulses. s. On the RT-494/APX-44, position all mode 2 code switches to OFF, close the hinged door, and tighten the door fastener.	a. There should be two pulses displayed on the AN/USM-81 scope screen. b. Same as in step 1, i. c. The pulse separation should be between 14.36 and 17.54 μsec. d. There should be five pulses displayed on the AN/USM-81 scope screen. e. Same as in step 1, *i*. f. Pulse separations should be the same as in step 1, *q*. g. There should be five pulses displayed in the AN/USM-81 scope screen. h. Same as in step 1, *i*. i. Pulse separations should be as follows: *Pulses* — *Separation (μsec)* 1 and 2 — 11.6 2 and 3 — 2.9 3 and 4 — 2.9 4 and 5 — 2.9 j. There should be five pulses displayed on the AN/USM-81 scope screen. k. Same as in step 1, *i*. l. Pulse separations should be as follows: *Pulses* — *Separation (μsec)* 1 and 2 — 1.45 2 and 3 — 2.9 3 and 4 — 2.9 4 and 5 — 13.05 m. There should be five pulses displayed on the AN/USM-81 scope screen. n. Same as in step 1, *i*. o. Pulse separations should be as follows: *Pulses* — *Separation (μsec)* 1 and 2 — 13.05 2 and 3 — 2.9 3 and 4 — 2.9 4 and 5 — 1.45 p. There should be 14 pulses displayed on the AN/USM-81 scope screen. q. Same as in step 1, *i*. r. Pulse separations should be as follows: *Pulse* — *Separation (μsec)* Between all adjacent pulses, except 7 and 8 — 1.45 7 and 8 — 2.9 s. None.
3	Controls remain as last indicated in step 2, except: *SM-197/UPM-98* MARK X CODER: MODE SELECT: M-3. *C-2714/APX-44* MODE 2 switch: OFF. MODE 3 switch: ON.	N/A	a. Measures the pulse width as in step 1, *i*. b. On the C-2714/APX-44, position the MODE 3 code control to 07 and observe the pulse on the AN/USM-81 scope screen. c. Measure the pulse width of the first pulse as in step 1, *i*. d. Reset the TIME/CM selector switch to the AN/USM-81 to 10 and measure the pulse separations between the pulses. e. On the C-2714/APX-44, position the MODE 3 code control to 70 and observe the pulses on the AN/USM-81 scope screen. f. Measure the pulse width of the first pulse as in step 1, *i*. g. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separations between the pulses. h. On the C-2714/APX-44, position the MODE 3 code control to 77 and observe the pulses on the AN/USM-81 scope screen. i. Measure the pulse width of the first pulse as in step 1, *i*. j. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separation between the pulses.	a. Same as in *i* above. b. There should be five pulses displayed on the AN/USM-81 screen. c. Same as in step 1, *i*. d. Pulse separations should be as follows: *Pulses* — *Separation (μsec)* 1 and 2 — 11.6 2 and 3 — 2.9 3 and 4 — 2.9 4 and 5 — 2.9 e. There should be five pulses displayed on the AN/USM-81 scope screen. f. Same as in step 1, *i*. g. Pulse separations should be as follows: *Pulses* — *Separation (μsec)* 1 and 2 — 11.6 2 and 3 — 2.9 3 and 4 — 2.9 4 and 5 — 2.9 h. There should be eight pulses displayed on the AN/USM-81 scope screen i. Same as in step 1, *i*. j. Pulse separations should be 2.9 μsec between all pulses.
4 C 2	Controls remain as last indicated in step 3, except: *SM-197/UPM-98* MARK X CODER: MODE SELECT: M-1. *C-2714/APX-44* MODE 3 switch: OFF. Master control: EMER.	N/A	a. Observe the pulses on the AN/USM-81 scope screen. b. Measure the pulse width of the first pulse as in step 1, *i*. c. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separations between the pulses. d. On the SM-197/UPM-98, position the MODE SELECT control on the MARK X CODER to M-2. e. On the C-2714/APX-44, position the MODE 2 switch to ON and observe the pulses on the AN/USM-81 scope screen. f. Measure the pulse width of the first pulse as in step 1,*i*. g. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separations between the pulses. h. On the SM-197/UPM-98, position the MODE SELECT control on the MARK X CODER to M-3. i. On the C-2714/APX-44, position the MODE 2 switch to OFF and the MODE 3 switch to ON, and observe the pulses on the AN/USM-81 scope screen. j. Measure the pulse width of the first pulse as in step 1, *i*. k. Reset the TIME/CM selector switch on the AN/USM-81 to 10 and measure the pulse separations between the pulses.	a. There should be four pulses displayed on the AN/USM-81 scope screen. b. Same as in step 1, *i*. c. Pulse separations between pulses should be equal and fall between 13.5 and 18.5 μsec. d. None. e. Same as in *a* above, except that the pulses should be slightly displaced to the right. f. Same as in step 1, *i*. g. Same as in *c* above. h. None. i. Same as in *a* above, except that the pulses should be displaced to the right slightly more than in *e* above. j. Same as in step 1, *i*. k. Same as in *c* above.
5 C 2	Controls remain as last indicated in step 4, except: *SM-196/UPM-98* MARK X CODER: MODE SELECT: M-1. *C-2714/APX-44* MODE 3 switch: OFF. Master control: NORMAL.	N/A	a. On the C-2714/APX-44, momentarily position the I/P switch to the I/P position and observe the pulses on the AN/USM-81 scope screen. b. On the SM-197/UPM-98, position the MODE SELECT control on the MARK X CODER to M-2. c. On the C-2714/APX-44, position the MODE 2 switch to ON, momentarily position the I/P switch to the I/P position, and observe the pulses on the AN/USM-81 scope screen. d. On the SM-197/UPM-98, position the MODE SELECT control on the MARK X CODER to M-3. e. On the C-2714/APX-44, position the MODE 2 switch to OFF and the MODE 3 switch to ON. Momentarily position the I/P switch to the I/P position and observe the pulses on the AN/USM-81 scope screen. f. Turn off the power to the AN/USM-81, the AN/UPM-98, and the PP-1104A/G, and disconnect the equipment.	a. There should be two pulses displayed on the AN/USM-81 scope screen, lasting from 15 to 50 seconds. b. None. c. Same as in *a* above, except that the pulses should be slightly displaced to the right. d. None. e. Same as in *a* above, except that the pulses should be displaced to the right slightly more than in *c* above. f. None.

95.11. Summary of Performance Standards

Personnel may find it convenient to arrange a list of the tests in a manner similar to that shown below.

a. Transponder Set Control C-2714/APX-44 Continuity Test.

C-2714/APX-44 control settings	Ohmmeter indications between case of C-2714/APX-44 and receptacle J901 pins	
	Pin	Indication
Master control: OFF (All other controls in any position.)	F	Open circuit
	H	Open circuit
	a	Open circuit
	J	Open circuit
	N (chassis ground)	Short circuit
Master control: STBY	F	Short circuit
	H	Short circuit
	a	Open circuit
	J	Open circuit
Master control: LOW	F	Open circuit
	H	Short circuit
	a	Short circuit
	J	Open circuit
Master control: NORM	F	Short circuit
	H	Short circuit
	a	Short circuit
	J	Open circuit
Master control: EMER	F	Short circuit
	H	Short circuit
	a	Short circuit
	J	Short circuit
Function control: NORMAL	j	Open circuit
	A	Open circuit
	h	Short circuit
	g	Open circuit
	E	Open circuit
	f	Open circuit
Function control: MOD	j	Short circuit
	A	Short circuit
	h	Open circuit
	g	Short circuit
	f	Open circuit
	E	Open circuit
Function control: CIVIL	j	Short circuit
	A	Short circuit
	h	Open circuit
	g	Short circuit
	f	Open circuit
	E	Open circuit

a. Transponder Set Control C-2714/APX-44 Continuity Test—Continued.

C-2714/APX-44 control settings	Ohmmeter indications between case of C-2714/APX-44 and receptacle J901 pins	
	Pin	Indication
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 00	A	Short circuit
	g	Short circuit
	M (chassis ground)	Short circuit
	C	Open circuit
	D	Open circuit
	e	Open circuit
	d	Open circuit
	b	Open circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 10	A	Short circuit
	g	Short circuit
	C	Short circuit
	D	Open circuit
	e	Open circuit
	d	Open circuit
	b	Open circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 20	A	Short circuit
	g	Short circuit
	C	Open circuit
	D	Short circuit
	e	Open circuit
	d	Open circuit
	b	Open circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 30	A	Short circuit
	g	Short circuit
	C	Short circuit
	D	Short circuit
	e	Open circuit
	d	Open circuit
	b	Open circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 40	A	Short circuit
	g	Short circuit
	C	Open circuit
	D	Open circuit
	e	Short circuit
	d	Open circuit
	b	Open circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 50	A	Short circuit
	g	Short circuit
	C	Short circuit
	D	Open circuit
	e	Short circuit
	d	Open circuit
	b	Open circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 60	A	Short circuit
	g	Short circuit
	C	Open circuit
	D	Short circuit
	e	Short circuit

a. Transponder Set Control C–2714/APX–44 Continuity Test—Continued.

C–2714/APX–44 control settings	Ohmmeter indications between case of C–2714/APX–44 and receptacle J901 pins	
	Pin	Indication
	d	Open circuit
	b	Open circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 70	A	Short circuit
	g	Short circuit
	C	Short circuit
	D	Short circuit
	e	Short circuit
	d	Open circuit
	b	Open circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 01	A	Short circuit
	g	Short circuit
	C	Open circuit
	D	Open circuit
	e	Open circuit
	d	Short circuit
	b	Open circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 02	A	Short circuit
	g	Short circuit
	C	Open circuit
	D	Open circuit
	e	Open circuit
	d	Open circuit
	b	Short circuit
Function control: MOD MODE 2 switch: OFF MODE 3 switch: OFF MODE 1 code control: 03	A	Short circuit
	g	Short circuit
	C	Open circuit
	D	Open circuit
	e	Open circuit
	d	Short circuit
	b	Short circuit
	L	Open circuit
	K	Open circuit
Function control: MOD MODE 3 switch: ON MODE 3 code control: 00	B (chassis ground)	Short circuit
	Y	Open circuit
	Z	Open circuit
	W	Open circuit
	V	Open circuit
	U	Open circuit
	X	Open circuit
	j	Short circuit
Function control: MOD MODE 3 switch: ON MODE 3 code control: 10	Y	Short circuit
	Z	Open circuit
	W	Open circuit
	V	Open circuit
	U	Open circuit
	X	Open circuit
	j	Short circuit
Function control: MOD MODE 3 switch: ON MODE 3 code control: 20	Y	Open circuit
	Z	Short circuit
	W	Open circuit
	V	Open circuit
	U	Open circuit
	X	Open circuit
	j	Short circuit
Function control: MOD MODE 3 switch: ON MODE 3 code control: 30	Y	Short circuit
	Z	Short circuit
	W	Open circuit
	V	Open circuit
	U	Open circuit
	X	Open circuit
	j	Short circuit
Function control: MOD MODE 3 switch: ON MODE 3 code control: 40	Y	Open circuit
	Z	Open circuit
	W	Short circuit
	V	Open circuit
	U	Open circuit
	X	Open circuit
	j	Short circuit
Function control: MOD MODE 3 switch: ON MODE 3 code control: 50	Y	Short circuit
	Z	Open circuit
	W	Short circuit
	V	Open circuit
	U	Open circuit
	X	Open circuit
	j	Short circuit
Function control: MOD MODE 3 switch: ON MODE 3 code control: 60	Y	Open circuit
	Z	Short circuit
	W	Short circuit
	V	Open circuit
	U	Open circuit
	X	Open circuit
	j	Short circuit
Function control: MOD MODE 3 switch: ON MODE 3 code control: 70	Y	Short circuit
	Z	Short circuit
	W	Short circuit
	V	Open circuit
	U	Open circuit
	X	Open circuit
	j	Short circuit
	K	Short circuit
Function control: MOD MODE 2 switch: ON MODE 3 code control: 01	Y	Open circuit
	Z	Open circuit
	W	Open circuit
	V	Short circuit
	U	Open circuit
	X	Open circuit

a. Transponder Set Control C–2714/APX–44 Continuity Test—Continued.

a. Transponder Set Control C–2714/APX–44 Continuity Test—Continued.

C–2714/APX–44 control settings	Ohmmeter indications between case of C–2714/APX–44 and receptacle J901 pins	
	Pin	Indication
	j	Short circuit
Function control: MOD MODE 2 switch: ON MODE 3 code control: 02	Y	Open circuit
	Z	Open circuit
	W	Open circuit
	V	Open circuit
	U	Short circuit
	X	Open circuit
	j	Short circuit
Function control: MOD MODE 2 switch: ON MODE 3 code control: 03	Y	Open circuit
	Z	Open circuit
	W	Open circuit
	V	Short circuit
	U	Short circuit
	X	Open circuit
	j	Short circuit
Function control: MOD MODE 2 switch: ON MODE 3 code control: 04	Y	Open circuit
	Z	Open circuit
	W	Open circuit
	V	Open circuit
	U	Open circuit
	X	Short circuit
	j	Short circuit
Function control: MOD MODE 2 switch: ON MODE 3 code control: 05	Y	Open circuit
	Z	Open sircuit
	W	Open circuit
	V	Short circuit
	U	Open circuit
	x	Short circuit
	j	Short circuit
Function control: MOD MODE 2 switch: ON MODE 3 code control: 06	Y	Open circuit
	Z	Open circuit
	W	Open circuit
	V	Open circuit
	U	Short circuit
	X	Short circuit
	j	Short circuit
Function control: MOD MODE 2 switch: ON MODE 3 code control: 07	Y	Open circuit
	Z	Open circuit
	W	Open circuit
	V	Short circuit
	U	Short circuit
	X	Short circuit
	j	Short circuit
AUDIO switch: OFF	(Ohmmeter indication with test leads between pins S and T.)	Open circuit

a. Transponder Set Control C–2714/APX–44 Continuity Test—Continued.

C–2714/APX–44 control settings	Ohmmeter indications between case of C–2714/APX–44 and receptacle J901 pins	
	Pin	Indication
AUDIO switch: ON	(Ohmmeter indication with test leads between pins S and T.)	Short circuit
Controls may be in any position.	G	About 1 or 2 ohms.
	R	Open circuit
	R (with test button pushed in).	About 6 ohms
	P	Open circuit
	P (with I/P switch in I/P or MIC position).	Open circuit

b. RT–494/APX–44 Tests.

(1) *Receiver sensitivity, NORM.*

(*a*) Signal generator portion of SM–197/UPM–98 set at ---- 1,030 mc.

(*b*) On CAL-CONTROL unit, METER SELECT set at --- 500 PRF.

(*c*) On XTAL MARK & SYNC unit, PRF control adjusted for a CAL-CONTROL unit meter indication of --------- 400.

(*d*) ATTENUATION indication on SM–197/UPM–98 when meter on CAL-CONTROL unit indicates 200 ---------- Between 84 and 89, inclusive.

Note. Receiver sensitivity (NORM) may also be stated as −72 to −76 dbm at 50% transmitter triggering.

(2) *Receiver sensitivity, LOW.*

(*a*) Conditions are the same as (*a*), (*b*), and (*c*) above.

(*b*) ATTENUATION indication on SM–197/UPM–98 when meter on CAL-CONTROL unit indicates 200 ---------- Between 55 and 59, inclusive.

Note. Receiver sensitivity (LOW) may also be stated as −42 to −46 dbm at 50% transmitter triggering.

(3) *Image response.*

(a) Signal generator portion of SM–197/UPM–98 set at ---- 1,150 mc.

(b) On XTAL MARK & SYNC unit, PRF control adjusted for a CAL-CONTROL unit meter indication of --------- 400.

(c) ATTENUATION indication on SM–197/UPM–98 when meter on CAL-CONTROL unit indicates 200 --------- Between 47 and 52, inclusive.

Note. Image response may also be stated at 5 dbm below normal sensitivity.

(4) *Receiver center frequency.* 1,030 mc ±1.

(5) *Receiver bandwidth.*

(a) Between 6 and 8 mc, inclusive, at 3-db points.

(b) Not more than 29 mc at 40-db points.

(6) *Transmitter frequency.* 1,090 mc ±1.

(7) *Transmitter power.* Between 251 and 1,000 watts, inclusive.

Note. Power output of the transmitter may also be stated as being 27 db ±3 above 1 watt.

(8) *Transmitter pulse characteristics.*

(a) All pulse widths 0.45 μsec ±0.1.

(b) Pulse characteristics of codes are as follows:

C–2714/APX–44 control settings	Pulse characteristics	
Function control: MOD Master control: NORM MODE 1 code control: 00	Two pulses, 20.3-μsec separation.	
Function control: MOD Master control: NORM MODE 1 code control: 03	*Pulses (4)* 1 and 2 2 and 3 3 and 4	*Separation (μsec)* 11.6 2.9 5.8
Function control: MOD Master control: NORM MODE 1 code control: 70	*Pulses (5)* First four [a] 4 and 5	*Separation (μsec)* 2.9 11.6
Function control: MOD Master control: MORN MODE 1 code control: 73	*Pulses (7)* First six 6 and 7	*Separation (μsec)* 2.9 5.8
Function control: MOD Master control: NORM MODE 2 switch: ON *Note.* On the RT–494/APX–44, all 12 mode 2 code switches set to OFF.	Two pulses, 14.36- to 17.54-μsec separation.	
Function control: MOD Master control: NORM MODE 2 switch: ON *Note.* On the RT–494/APX–44, mode 2 code switches 1, 2, and 3 set to ON; all others set to OFF.	*Pulses (5)* First four [a] 4 and 5	*Separation (μsec)* 2.9 5.8
Function control: MOD Master control: NORM MODE 2 switch: ON *Note.* On the RT–494/APX–44, mode 2 code switches 4, 5, and 6 set to ON; all others set to OFF.	*Pulses (5)* 1 and 2 All others	*Separation (μsec)* 11.6 2.9
Function control: MOD Master control: NORM MODE 2 switch: ON *Note.* On the RT–494/APX–44, mode 2 code switches 7, 8, and 9 set to ON; all others set to OFF.	*Pulses (5)* 1 and 2 2 and 3 3 and 4 4 and 5	*Separation (μsec)* 1.45 2.9 2.9 13.05
Function control: MOD Master control: NORM MODE 2 switch: ON *Note.* On the RT–494/APX–44, mode 2 code switches 10, 11, and 12 set to ON; all others set to OFF.	*Pulses (5)* 1 and 2 2 and 3 3 and 4 4 and 5	*Separation (μsec)* 13.05 2.9 2.9 1.45
Function control: MOD Master control: NORM MODE 2 switch: ON *Note.* On the RT–494/APX–44, all mode 2 code switches set to ON.	*Pulses (14)* All pulses except 7 and 8 7 and 8	*Separation (μsec)* 1.45 2.9
Function control: MOD Master control: NORM MODE 3 switch: ON MODE 3 code control: 07	*Pulses (5)* 1 and 2 All others	*Separation (μsec)* 11.6 2.9
Function control: MOD Master control: NORM MODE 3 switch: ON MODE 3 code control: 70	*Pulses (5)* First four [a] 4 and 5	*Separation (μsec)* 2.9 11.6
Function control: MOD Master control: NORM MODE 3 switch: ON MODE 3 code control: 77	Eight pulses, with 2.9-μsec separation between all pulses.	
Function control: MOD Master control: EMER	Four pulses, with equal separations between pulses and falling between 13.5 and 18.5 μsec.	
Function control: MOD Master control: EMER MODE 2 switch: ON	Four pulses, with equal separations between pulses and falling between 13.5 and 18.5 μsec.	

See footnote at end of table.

C–2714/APX–44 control settings	Pulse characteristics
Function control: MOD Master control: EMER MODE 3 switch: ON	Four pulses, with equal separations between pulses and falling between 13.5 and 18.5 μsec.
Function control: MOD Master control: NORM I/P switch: I/P	Two pulses, lasting from 15 to 50 μsec.
Function control: MOD Master control: NORM MODE 2 switch: ON I/P switch: I/P	Two pulses, lasting from 15 to 50 μsec.
Function control: MOD Master control: NORM MODE 3 switch: ON I/P switch: I/P	Two pulses, lasting from 15 to 50 μsec.

[a] *First four* means that the separations between pulses 1 and 2, 2 and 3, and 3 and 4 are the same and equal to 2.9 μsec.

Page 148. Add the following to the appendix:

MWO 11–5895–217–35/1 — Modification of Transponder Set Control C–2714/APX–44, Part of Transponder Set AN/APX–44, to Correct Deficiency in Pilot Light Circuit.

TM 11–5527 — Multimeters TS–352/U, TS–352-A/U, and TS–352B/U.

TM 11–6625 219–12 — Operator's and Organizational Maintenance Manual Oscilloscope AN/USM–81.

TM 11–6625–403–14 — Operator, Organizational, and Field Maintenance Manual: Radar Test Set AN/UPM–98.

Page 160, figure 120 (fold-out). Make the following changes: Station 5, J901, pin R. From pin R, run a line vertically to the air-line above connector J901. Write along the line: BRN WHT 12. Station 16, K902. Change "12 BLK" to: 11 BLK. Station 14, DS903. Change "12 BRN WHT BRN" to: 9 BRN WHT. Station 9, DS904. Change "12 BRN WHT BRN" to: 14 BRN WHT. Station 12, DS905. Make the following changes: Change "16 BRN" to: 5 BRN WHT. Change "9 BRN WHT BRN" to: 16 BRN. Delete "14 BRN WHT BRN". Number the terminals of DS905, starting with the top terminal and proceeding clockwise: 3, 1, and 2.

Figure 121 (fold-out). Make the following changes: Switch S903A. Extend the stationary "Y" contact (arrow) so that it touches the rotary portion of the switch. Label the I/P-MIC–OFF switch: S907. DS905, terminal 2: Delete the horizontal line from terminal 2 that connects to pin G of connector J901. Extend the vertical line (about one-half inch) from terminal 2, bend it to the left 90°, and connect it to the horizontal line that connects to pin c of receptacle J901. Terminal 3. Extend the vertical line to receptacle J901 and terminate the line in an arrow (adjacent to pin a of receptacle J901). Label this pin: R. Pin R, receptacle J901. Draw the female portion of pin R similar to the other pins and label it: 27.5 VDC BUS.

Figure 133 (fold-out). Change "CONNECTOR BENDIX TYPE DPD–45–33P–1L" to: CONNECTOR CANNON TYPE DPD–45–33S–1L.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12–31 requirements for field maintenance instructions for all fixed and rotor wing aircraft.

TECHNICAL MANUAL
No. 11-5895-217-35

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *27 July 1960*

FIELD AND DEPOT MAINTENANCE MANUAL

TRANSPONDER SET AN/APX-44

*This manual supersedes TM 11-5895-217-35, 27 May 1960.

CHAPTER 1
PREVENTIVE MAINTENANCE INSTRUCTIONS

Section I. EXTERNAL PREVENTIVE MAINTENANCE

1. Scope

a. This manual covers field and depot maintenance for Transponder Set AN/APX-44. It includes instructions appropriate to third echelon for preventive maintenance; to third and fourth echelons for troubleshooting, repair or replacement of specified parts, alinement, calibration, and test; and to fifth echelon for rebuilding and test. It also lists tools, materials, and test equipment for third, fourth, and fifth echelon maintenance. Detailed functions of the transponder set are covered in chapter 2.

b. The complete technical manual for the transponder set includes TM 11-5895-217-12, TM 11-5895-217-12P, and TM 11-5895-217-35P.

c. For applicable forms and records, refer to paragraph 2 of TM 11-5895-217-12.

d. Forward comments concerning this manual to the Commanding Officer, U. S. Army Signal Materiel Support Agency, Fort Monmouth, N. J.

2. Periodic Checks

Periodic maintenance procedures and the intervals for performing these procedures are listed in the following table:

Time interval	Procedure
Daily	External inspection and service (par. 3).
200 hours	Internal inspection, service, and periodic pullout bench check (par. 9).
200 hours	Operational check (in aircraft) with test equipment (pars. 10-15).

3. External Maintenance

Preventive maintenance is performed to keep equipment in proper working condition, and to prevent or reduce breakdowns and service interruptions. Check the following conditions to prevent breakdowns, wear, breakage, corrosion, dirt, fraying, looseness, overheating, or other indications of abnormal or improper condition. Before proceeding, correct any deficiencies located. For detailed preventive maintenance procedures, see TM 11-5895-217-12.

Section II. REMOVAL AND REPLACEMENT

4. General

Internal preventive maintenance of the transponder set requires the removal of its components from the aircraft, and the removal of their cases or covers.

5. Removal

a. Receiver-Transmitter. To remove the receiver-transmitter, proceed as follows:

(1) Disconnect all cables from the front panel connectors. The main interconnecting cable is automatically disconnetted when the receiver-transmitter is withdrawn from its mounting.

(2) Loosen the two knurled nuts of the holddown clamps on the mounting by turning them counterclockwise. (Refer to TM 11-5895-217-12 for mounting illustration.)

(3) Turn the knob of the injector-ejector mechanism counterclockwise several turns. When the receiver-transmitter has been brought out far enough to disengage the holddown pins, lift the receiver-transmitter front end slightly

to clear the front panel lip from the injector-ejector groove. Withdraw the receiver-transmitter from its mounting.

(4) Remove the detachable sideplates by turning the sideplate fasteners on either plate counterclockwise.

b. Control Unit. The control unit normally is mounted on the aircraft instrument panel. To remove the control unit, proceed as follows:

(1) Disconnect the main interconnecting cable at the rear of the control unit housing.

Note. In some installations, it may be necessary to remove the control unit before the main interconnecting cable can be disconnected.

(2) Depress and turn each of the four fasteners on the front panel a quarter of a turn counterclockwise. Withdraw the control unit from the panel.

(3) Remove the wraparound top and side cover by removing the six screws in the rear, two at the top, and three at each side.

c. Mounting. This is a shock-absorbent mounting for the receiver-transmitter. It is secured to the equipment shelf or to the deck by machine screws. To remove the mounting, proceed as follows:

(1) Remove the receiver-transmitter from the mounting (*a* above).

(2) Remove the machine screws in each resilient mount.

(3) Remove the connector assembly at the rear of the mounting.

(4) Remove the mounting.

d. Antenna. The antenna mounts through a cutout in the aircraft skin. To remove the antenna, proceed as follows:

(1) From inside the aircraft, disconnect the antenna cable from the antenna.

(2) Remove the six machine screws that hold the antenna in place. (Hold the antenna while removing these screws.)

(3) Withdraw the antenna.

e. Fuses. One 10-ampere fuse protects the transponder set from overload. It is located in a fuseholder on the receiver-transmitter front panel, and it can be removed from outside the case, A spare fuse is carried in a similar holder above the in-service fuseholder. To remove these fuses, depress the holder cap and turn it counterclockwise.

f. Cables. The two basic cables are required to connect the components of the transponder set. Figure 1 illustrates the cording between the units and the location of the receptacles. Refer to the applicable aircraft technical manual for removal of these cables.

6. Replacement

After maintenance, testing, or repair of the components of the transponder set, replace the units as follows:

a. Antenna.

(1) Before replacing the antenna, check the grounding gasket. This gasket is part of the antenna and consists of a wire mesh imbedded in a flexible gasket material. The mesh should be clean and bright, and the gasket should be free of holes, cracks, and tears.

(2) Place the antenna in position through the aircraft skin cutout, and replace the six machine screws.

(3) Reconnect the antenna cable to the antenna receptacle.

b. Mounting.

(1) Replace the rear connector of the mounting.

(2) Set the mounting in place on the equipment shelf and line up the holes for the mounting screws.

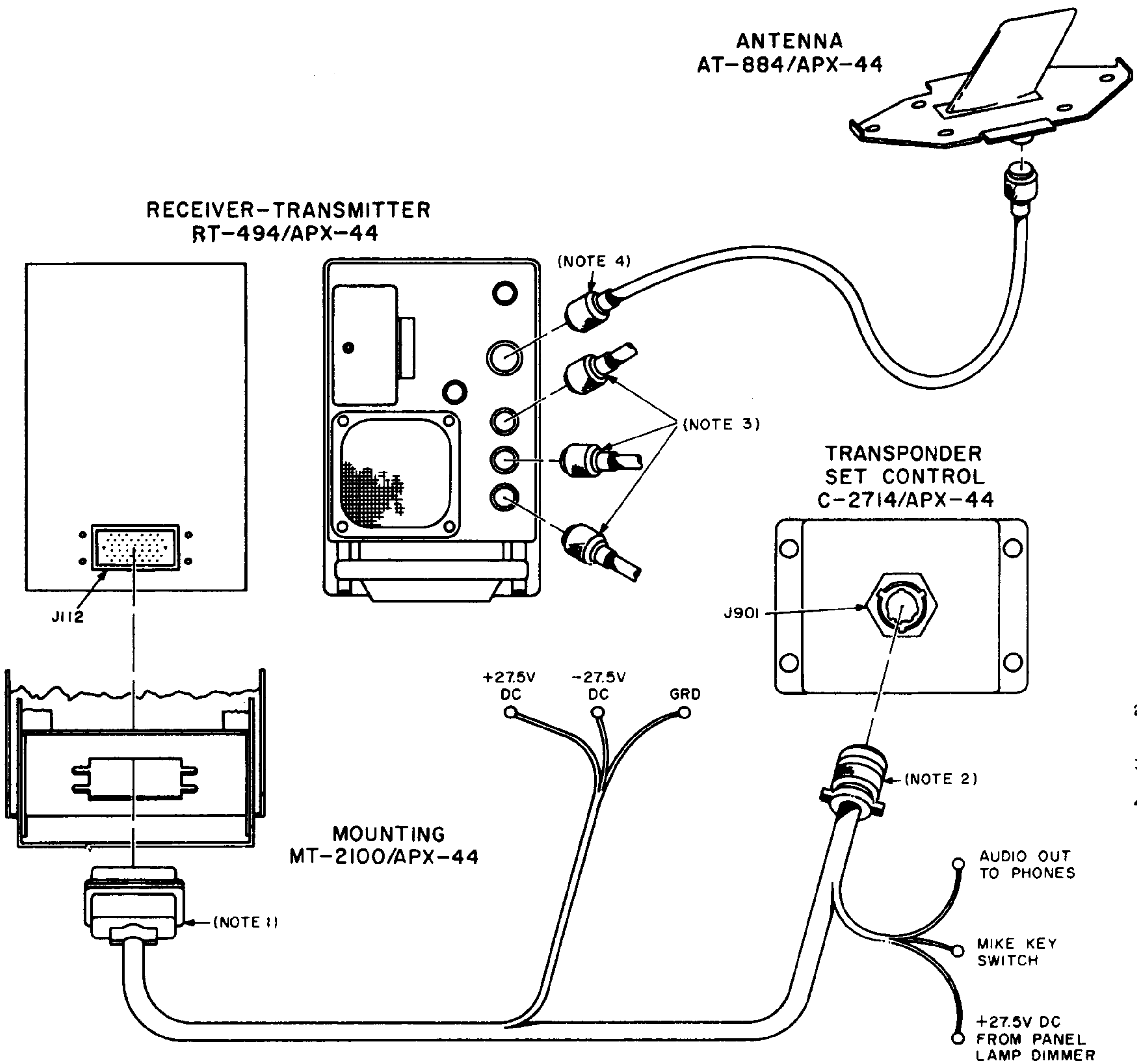
(3) Replace the mounting screws.

c. Control Unit.

(1) Attach the main interconnecting cable to receptacle J901 (fig. 1) at the rear of the control unit; be sure that the twist-lock ring is fully engaged.

Note. In some installations, the control unit may have to be mounted before attaching this interconnecting cable.

(2) Set the control unit in place in the instrument panel opening, and depress and turn each of the four fasteners a quarter of a turn clockwise.



NOTES:

1. USE CANNON PLUG TYPE DPD-45-33S-IL AND SHIELD TYPE DPD-33-11612.
2. USE ONE OF THE FOLLOWING BENDIX PLUG TYPES: PT06A(SR)-18-32S, PT06A-18-32S PT06P-18-32S OR PT06W-18-32S.
3. USE ONE OF THE FOLLOWING TYPE BNC CONNECTORS: UG-88C/U OR UG-913/U.
4. USE ONE OF THE FOLLOWING TYPE C CONNECTORS: UG-573A/U OR UG-710A/U.

TM5895-217-35-1

Figure 1. Transponder set and required cables.

d. Receiver-Transmitter.

(1) Place the receiver-transmitter between the siderails of the mounting.

(2) Slide the receiver-transmitter to the rear until the holddown pins on the rear of the mounting engage the guide holes at the rear of the receiver-transmitter case.

(3) Before the mounting and the case connectors engage, raise the front of the receiver-transmitter case slightly and match the lip of the case with the groove of the injector-ejector mechanism.

(4) Lower the case front, with the lip and groove engaged. Turn the injector-ejector knob clockwise until the receiver-transmitter case is fully seated.

(5) Lock the unit in place by engaging and tightening the holddown clamps and by turning the knurled nuts clockwise.

Section III. INTERNAL PREVENTIVE MAINTENANCE

***Warning:* Dangerous voltages are present inside the receiver-transmitter when power is applied. Be sure that the power is off before attempting any internal preventive maintenance work. Observe safety precautions when making tests or measurements with power applied.**

7. General

a. The purpose of preventive maintenance is to locate and correct deficiencies before they lead to malfunction or breakdown. Check for signs of abnormal operation and condition, and take corrective maintenance action immediately to prevent breakdown or damage.

b. Internal maintenance of the transponder set is carried out at the test bench. The subassemblies of the receiver-transmitter are to remain in their proper positions; only the cover plates are to be removed.

8. Internal Maintenance Procedures

***Caution:* The tube filaments in this transponder are connected in series-parallel. To avoid possible damage to tubes, be sure that the power is *off* before removing or inserting the tubes.**

a. Remove the receiver-transmitter (par. *5a)* and the control unit (par. *5b)* from the aircraft, and remove the sideplates of the receivetransmitter and the wraparound top and side cover of the control unit.

b. Follow the procedures listed in the following chart:

Item	Procedure
1	Check internal components for signs of overheating, breakage, corrosion, damage, deterioration, and vibration.
2	Check internal connectors for tightness, cracks, chips, and for good wiring connections.
3	See that printed circuit cards are securely in place.
4	Carefully dust interior with cloth or brush, or blow out dust with dry compressed air at not more than 15 pounds pressure.
5	Clean the blower opening.
6	Connect 28 vdc power to pin No. 44 and ground pin No. 22 of J112 (fig. 1).
7	Observe blower operation for quietness and speed, and tube filaments for lighting, *Note.* An open filament, in most cases, will cause all or several of the tubes in a subassembly to remain unlighted.
8	Disconnect 28-vdc power.

9. Pullout Check

This check is performed with the receiver-transmitter and the control unit removed from the aircraft and connected to the test equipment bench test).

a. Test Equipment Required. The test equipment required for the pullout check of the transponder set is listed below, with applicable reference literature and assigned common names.

Nomenclature	Reference	Common name
Test Set, Radar AN/UPM-6B.	TM 11-1175	IFF simulator.
Oscilloscope AN/USM-81.	TM 11-6625-219-12	Oscilloscope.
Coder-Decoder Group AN/UPA-39.		Coder-decoder.
Power Supply PP-1104A/G or equivalent.	TM 11-5126	28-volt supply.
Headset HS-33 or equivalent.		Headset.

b. Additional Equipment. Additional equipment required for pullout check and their assigned common names are listed below.

Equipment	Common name
UG-565A/U Adapter (1)	Antenna adapter.
UG-201/U Adapter (2)	Oscilloscope adapter.
Video cable, 10 ft RG-62/U coaxial cable with two UG-88/U connectors.	Video cable.
Interconnecting cable for connecting receiver-transmitter to control unit (*c* below).	Bench test cable.

c. Bench Test Setup. The cording, the test equipment connections, and the bench test cable connections shown in figure 2 illustrate the setup used to perform the pullout check. Do not connect the oscilloscope and the coder-decoder until actually required because they load the IFF simulator. Fabricate the bench test cable as shown in figure 3. Allow sufficient cable length ot provide working space and accessibility to the units. Fabricate the video cable by installing a UG-88/W connector (fig. 57) on each end of a 10-foot length of RG-62/U coaxial cable.

Note. Cables W401, W701, W702, and W703, and adapters E702 and E703 are eupplied with the IFF simulator. Cables W901, W902, and W903 are supplied with the coder-decoder. When setting up the equipment for bench test, isolate the coaxial cables as much as possible to prevent stray pickup.

d. Pullout Check Procedures. Complete the following procedures in conducting a pullout check:

(1) Set up the equipment for bench test (*c* above).

(2) Follow the transponder testing procedures described in TM 11-1175 to set up the IFF simulator, and check the specifications listed below. If the correct specifications are not obtained, refer to chapter 3 for corrective maintenance procedures.

Note. All specifications are taken with 27.5 volts ±0.25 direct current (dc) input measured at fuse F101.

Test	Specification
Receiver sensitivity (triggering or decoding level).	-72 to -76 dbm
Receiver bandwidth: -------	6 to 8 mc at 3 db down points.
Receiver center frequency--	1,030 mc ±1.0
Receiver LOW sensitivity ___	-43 dbm ±5
Transmitter power output__	27 db ±3 db above 1 watt
Transmitter frequency _____	1,090 mc ±1

(3) Connect Oscilloscope AN/USM-81 and Coder-Decoder Group AN/UPA-39 as shown in figure 2, and set the oscilloscope controls as follows:

Oscilloscope control	Position
MAIN SWEEP:	
TRIGGERING LEVEL	Full clockwise.
STABILITY	Full clockwise.
TRIGGER SLOPE	EXT
TRIGGERING MODE	AC SLOW.
TIME/CM	10 MICRO SEC.
MULTIPLIER	1
HORIZONTAL DISPLAY	MAIN SWEEP DELAYED.
DELAYING SWEEP:	
TIME/CM or DELAY TIME	2 MICRO SEC.
DELAY-TIME MULTIPLIER 1-10	0
TRIGGERING LEVEL	0
STABILITY OR EXT. SWEEP ATTEN.	Set for stable waveform.
Preamplifier:	
MODE	CHOPPED.
CHANNEL A	2 VOLTS/CM AC.
CHANNEL B	0.2 VOLTS/CM AC.

(4) Check the codes listed in (5) below; use the coder-decoder to speed identification of pulse positions by matching the A, B, C, and D switches with codes selected on the control unit. Compare the transponder set (CHANNEL A) and the coder-decoder (CHANNEL B) codes presented on the oscilloscope. Set the coder-decoder controls as follows:

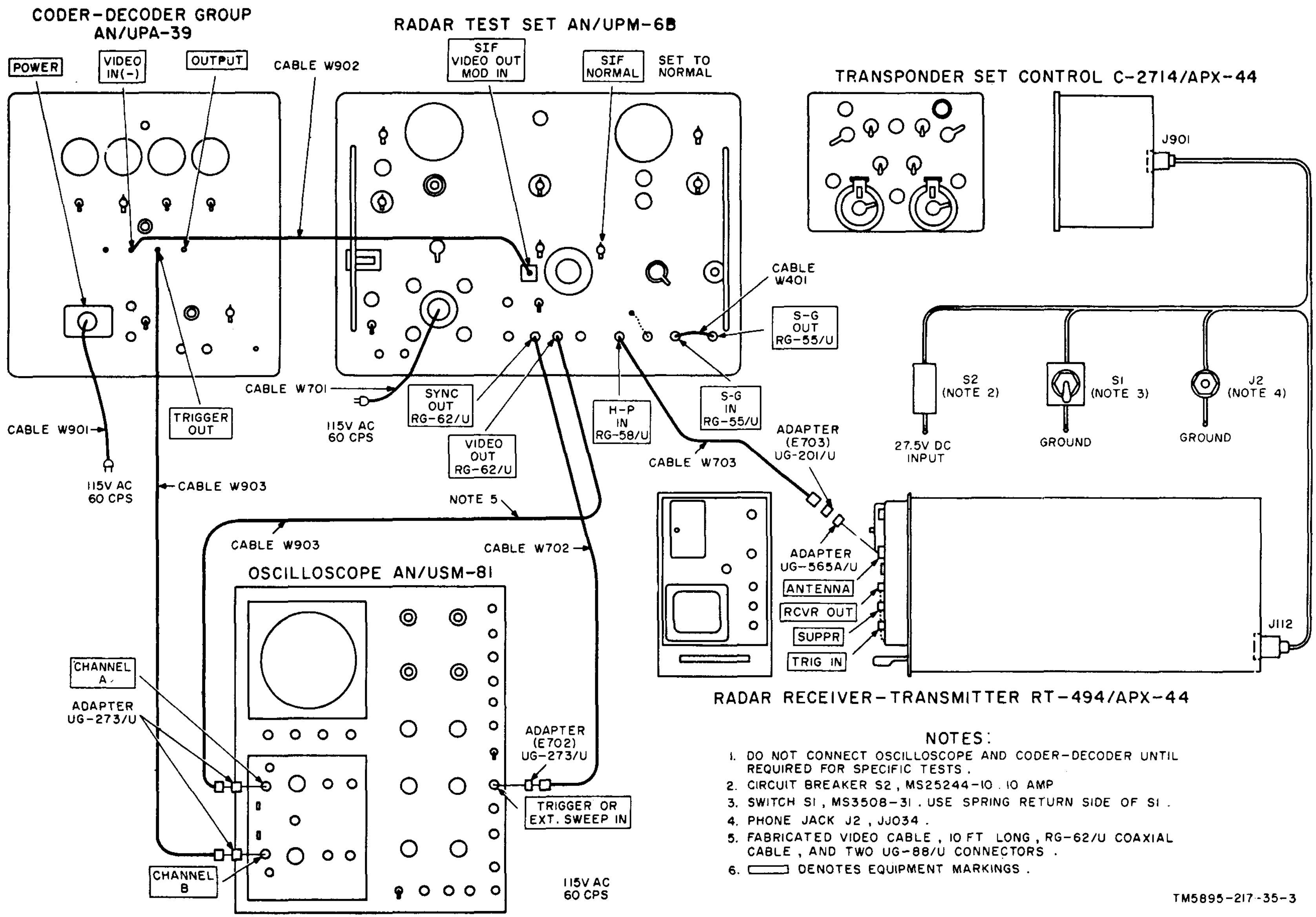
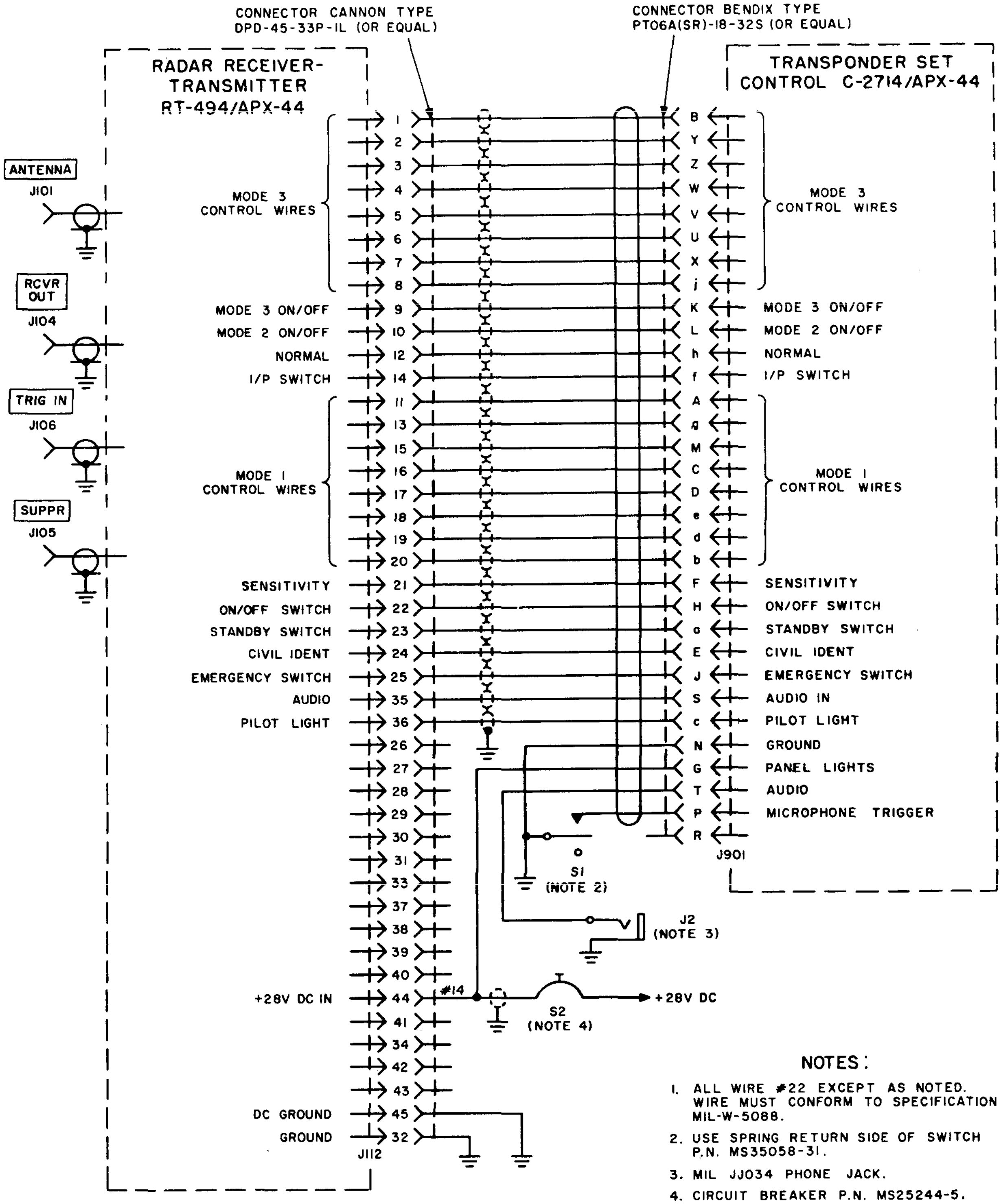


Figure 2. Pullout check bench test setup.



NOTES:

1. ALL WIRE #22 EXCEPT AS NOTED. WIRE MUST CONFORM TO SPECIFICATION MIL-W-5088.
2. USE SPRING RETURN SIDE OF SWITCH P.N. MS35058-31.
3. MIL JJ034 PHONE JACK.
4. CIRCUIT BREAKER P.N. MS25244-5.

TM5895-217-35-2

Figure 3. Transponder set interconnection diagram (for fabrication of bench test cable).

Coder-decoder control	Position
SYNC switch	EXTERNAL
CODE-DECODE switch	DECODE
OUTPUT switch	20 v
CODER INT SYNC switch	OFF
I/P-NORMAL-EMERGENCY switch	NORMAL

(5) Refer to section I of chapter 2 for additional details of codes, if necessary. The code column below refers to types or categories of operation (TM 11-5895-217-12), and the reply column refers to reply train pulse output (fig. 5) as observed on the oscilloscope. When operating with the control unit function control in NORMAL position, the coder-decoder will not produce a comparison code.)

Code	Reply
NORMAL:	
Mode 1	1 pulse (A, fig. 5)
Mode 2	2 pulses, 15.95 usec ±0.1 separation (B, fig. 5)
Mode 3	1 pulse (C, fig. 5)
MOD or CIVIL:	
Mode 1	Code train 00 to 73 (D through, G, fig. 5)
Mode 2	Code train 0000 to 7777 (H through L, fig. 5)
Mode 3	Code train 00 to 77 (M through O, fig. 5)
NOMAL-I/P:	
Mode 1	2 pulses, 16 usec ±2.5 separation (P, fig. 5) for 30 sec +20 -15
Mode 2	2 pulses, 16 usec ±2.5 separation (Q, fig. 5) for 30 sec +20 -15
Mode 3	2 pulses, 16 usec ±2.5 separation (R, fig. 5) for 30 sec +20 -15
MOD-I/P:	
Mode 1	2 code trains spaced 4.35 usec ±0.1 (V, fig. 5) for 30 sec +20 -15
Mode 2	1 code train for 30 usec +20 -15 (X, fig. 5)
Mode 3	2 code trains spaced .435 usec ±0.1 (Z, fig. 5) for 30 sec +20 -15
CIVIL-I/P :	
Mode 3	1 code train plus 1 pulse 4.35 usec ±0.1 after last framing pulse (BB, fig. 5)
NORMAL-EMER:	
Mode 1	4 pulses, 16 usec ±2.5 separation (S, fig. 5)
Mode 2	4 pulses, 16 usec ±2.5 separation (T, fig. 5)
Mode 3	4 pulses, 16 usec ±2.5 separation (U, fig. 5)
MOD or CIVIL-EMER:	
Mode 1	4 code trains spaced 4.35 usec ±0.1 (W, fig. 5)
Mode 2	1 code train (Y, fig. 5)
Mode 3	4 code trains spaced 4.35 usec ±0.1 (AA, fig. 5)

(6) Check the transponder set output pulse characteristics as follows: disconnect the coder-decoder and the video signal from CHANNEL A of the oscilloscope. Connect the 10 to 1 oscilloscope probe to CHANNEL A and to any of the three screws in the nylon-insulated end of the transmitting oscillator cavity (cathode V154). Adjust the oscilloscope to view one pulse only at 0.2 usec per centimeter calibration.

(a) Pulse width (50 percent amplitude points) 0.45 microseconds (usec) ±0.1.

(b) Rise time (10 to 90 percent points) less than 0.1 usec.

(c) Decay time (90 to 10 percent points) less than 0.2 usec.

(d) Amplitude jitter, less than 5 percent.

(7) Insert the headset in test jack J2 (fig. 3) and listen for noise when the transponder set is not being interrogated. No noise should be heard. Note the fan operation and the general operating conditions.

10. General

Functional checks will be made after the transponder set is installed in the aircraft, and will be performed every 200 hours. The purpose of the check is to insure that the transponder set functions properly in the aircraft after it has been serviced and is known to be operating properly on the bench.

11. Power Requirements

a. A dc power source capable of maintaining 27.5 volts at the full load current drawn by all equipment in the aircraft will be required. Use aircraft ground servicing unit, multipurpose, type MA-1 or equivalent.

b. A 115-volt, 60 cycles per second (cps) source of at least 500 watts will be required for test equipment in the aircraft.

12. Test Equipment Required for Functional Check

The following table lists the test equipment for functional checks on the transponder set, with applicable reference literature and assigned common names.

Nomenclature	Reference	Common name
Test Set, Radar AN/UPM-6B.	TM 11-1175	IFF simulator
Coder-Decoder Group AN/UPA-39.		Coder-decoder
Transponder probe antenna.		Test hat

13. Functional Check Test Setup

a. The IFF simulator is connected to the test hat and the antenna, as specified in TM 11-1175, to measure the overall performance. Use the applicable cable connections shown in figure 2.

b. The coder-decoder is used to check all MOD codes. Connect cable W902 from the IFF simulator SIF VIDEO OUT MOD IN receptacle to the coder-decoder VIDEO IN(-) receptacle.

14. Functional Check Procedures

a. *Reply Pulse Characteristic Check*. Follow the bench tests given in paragraph *9d* (2) take into account the 20 decibel (db) attenuation factor of the test hat.

b. *Reply Coding Check*. Check the codes as instructed in paragraph *9d* (4) to make sure that the aircraft installation wiring is correct NORMAL codes can be observed by measuring the video with the PEAK VOLTAGE meter on the IFF simulator in the same manner as emergency and identification of position code observations. Identification of position (IP) will produce a higher meter reading than single reply trains, and emergency trains a still greater increase.

c. *Interference Check*. Operate the transponder set, while using one of the aircraft headsets to monitor the audio output. Turn on the other aircraft electronic equipment to make sure that these equipments do not trigger the transponder set when the IFF simulator attenuator is set to -120 decibels referred to 1 volt (dbv). No sound should be audible in the aircraft headset and no output indicated on the PEAK VOLTAGE meter. Interrogate the transponder set on several modes and codes to determine that other equipments are not affected. Sound should be present in the aircraft headset used to monitor the transponder set output, but not in communication or navigation equipments.

15. Functional Check Conclusion

a. Any malfunctions observed during the above tests usually indicates a defective antenna, coaxial cables, control unit to receiver-transmitter wiring, or dc supply voltage, and must be corrected before using the aircraft The units may be bench-checked specifically for a particular fault (par. 9, or ch. 3). Difficulties with other equipments in the aircraft may indicate transponder set troubles or other equip. ment troubles, but they usually indicate a defective installation.

b. When satisfactory operation is obtained, disconnect and remove all test equipment. Reconnect any leads that were disconnected during the above tests.

CHAPTER 2

THEORY

Section I. SYSTEM APPLICATION

16. General

a. The transponder set provides transponder functions to receive, decode, and reply to the following characteristics interrogations:

(1) Interrogations of Mark X Identification, Friend or Foe (IFF) System.

(2) Interrogations of Mark X IFF System, supplemented by Selective Identification Feature (SIF).

(3) Interrogations of the civil secondary ground radar system.

b. TM 11-5895-217-12 includes a functional diagram that shows the transponder set being interrogated by a ground-based IFF system.

c. Interrogation signals, consisting of pairs of pulses with their spacing governed by the interrogation mode, are transmitted to the transponder set by the challenging ground station. The transponder set decodes the interrogation signal pulses and transmits a coded reply to the interrogating station. Replies from the transponder set permit positive identification of nationality and of position, if desired.

d. Coded transponder replies are formed in five operational categories or types. These operational categories are:

(1) NORMAL operation.

(2) Modified (MOD) operation (also referred to as SIF).

(3) CIVIL operation.

(4) Identification of position (I/P).

(5) Emergency (EMER) operation.

e. The working range of the transponder set (limited to line of sight, except for the slight bending effect peculiar to ultra-high frequency (uhf) transmission) depends primarily on the height of the aircraft.

17. Pulse Techniques

a. General. The pulses under discussion in this manual have certain detailed characterics (fig. 4). The terms affiliated with these characteristics are defined in the following paragraphs.

b. Pulse Amplitude. Pulse amplitudes are measured in average, peak, or peak-to-peak values. Average values are determined by noting the individual amplitudes at specific time intervals, and then averaging these values. Peak values are measured from the 0-volt base line to the greatest positive or negative portion of the pulse. Peak-to-peak values represent amplitude between the maximum positive and negative portions of a pulse.

c. Pulse Width. Pulse widths are measured at the 50 percent amplitude points of leading and trailing edges of a pulse. The time distance between these points is the pulse width, and is usually expressed in microseconds. The leading edge of the pulse is the left-hand edge as viewed on an oscilloscope that produces a display by left-to-right beam movement.

d. Pulse Rise Time. Pulse rise time is the time required for the pulse amplitude to rise from the 10 percent amplitude point to the 90 percent point on the leading edge of the pulse. It is usually expressed in tenths of a usec.

e. Pulse Decay Time. Pulse decay time is the time required for the trailing edge amplitude to fall from the 90 percent amplitude point to the 10 percent point. It is usually expressed in tenths of a usec.

f. Pulse Separation. Pulse separation, sometimes called pulse spacing or pulse interval, is the time distance between the corresponding points on two pulses. It is usually expressed in microseconds or parts thereof.

18. Interrogations

a. Three independent interrogation modes are presently in use by military operations: mode 1, mode 2, and mode 3. All three modes

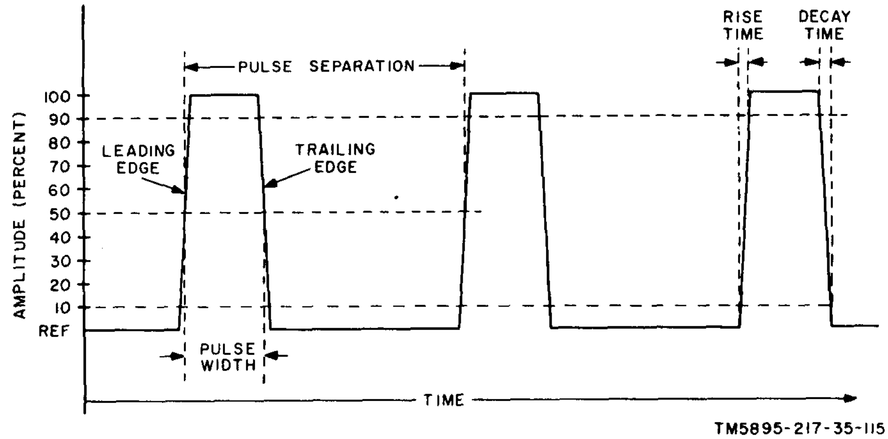


Figure 4. Pulse characteristics.

consist of two identical pulses; the difference between each of these modes is established by pulse separation. The interrogation pulses have specific characteristics which permit the transponder set to distinguish between interrogations and other pulse groups that may be received from radars or jamming devices. Transmitted interrogation pulses consist of bursts of a radiofrequency (RF) carrier similar to continuous wave (cw) code transmissions used in communication systems.

b. Characteristics of interrogation pulses are as follows:

(1) Carrier frequency-1,010 to 1,030 megacycles (mc).
(2) Rise time-0.2 usec or less.
(3) Decay time-0.4 usec or less.
(4) Width-0.7 to 1.2 usec.
(5) Separation-mode 1; 3 usec (IFF mode). Mode 2; 5 usec (personal identification mode). Mode 3; 8 usec (flight leader identification mode).

Note. Pulse characteristics apply to the demodulated RF interrogation pulses as observed on an oscilloscope.

c. The interrogation rate or repetition rate is determined by the pulse repetition frequency (prf) of the radar set associated with the ground-based IFF system, and may vary between 500 and 2,000 interrogations per second. Interrogations which do not have the characteristics given in *b* above will be rejected by the transponder set, and no reply will be transmitted.

19. Transmitted Replies

a. Transmitted replies consist of bursts of RF signal (pulses) which have been arranged with specific characteristics in time and position. The type of reply is determined by the interrogation mode and the operator code control selection. Specialized replies are available to the operator for identification of the position (I/P) and the emergency (EMER) operations as required by tactical situations. Mode 1 provides 32 code combinations; mode 2 provides 4,096 code combinations; and mode 3 provides 64 code combinations.

b. The characteristics of the pulses which make up the reply codes are as follows:

(1) Carrier frequency-1,090 to 1,110 mc.
(2) Rise time-0.1 usec or less.
(3) Decay time-0.2 usec or less.
(4) Width-0.451 usec ±0.1.
(5) Amplitude variation-10 percent or less.

Note. Pulse characteristics apply to the demodulated RF reply pulses as observed on an oscilloscope.

c. The combination and separation of pulses, with the characteristics listed in *b* above, form predetermined coded reply trains which are received by the ground-based IFF system. The ground equipment uses a *go-no-go* decoder system to make sure that the received coded reply train is according to tactical orders.

20. Reply Coding by Category

a. General. Several typical reply codes are shown in figure 5. These sample replies indicate pulse position and pulse identification with respect to the interrogation mode and the selected and assigned reply codes. The reply codes in A through O represent typical replies obtained with the master control in the NORM (or LOW) position. These replies include the basic single reply trains for each interrogation made with different operational categories and selected codes. The reply codes in P through BB are the repeated replies obtained in I/P or EMER. The following paragraphs discuss the pulses and their identification by operational category (par. *16d*). The technician must thoroughly understand the composition of a coded reply train before attempting maintenance procedures.

b. NORMAL Reply Codes. In a conventional Mark X IFF system, the transponder set is challenged by a pulse pair that has one of three spacings between pulses: three usec, five usec, or eight usec, representing modes 1, 2, and 3, respectively. The transponder set, operating in the NORMAL category (function control at NORMAL), replies with a code of one (modes 1, 3), two (mode 2), or four (emergency) pulses. In A, B, C (fig. 5), the initial reply pulse shifts to the right because the zero time base used throughout figure 5 is obtained from the second pulse of an interrogation pulse pair of mode 1. Reply pulse characteristics are specified in paragraph *19b*.

c. MOD (SIF) Reply Codes. As in the case of NORMAL operation, the Mark X IFF challenges to SIF-equipped transponder sets consist of a pulse pair with three-, five-, or eight-usec spacing, depending on the interrogation mode. The transponder set reply is a coded pulse train with a number of selectable codes for each reply mode. The makeup of this pulse train, in general terms, is as follows:

(1) Two framing pulses, spaced 20.3 usec ±0.05, are always present in SIF replies for any interrogation mode or reply code selection (D, fig. 5).

(2) From 1 to 12 pulses, between these two framing pulses, are present for coded identification. These pulses are divided into two groups, each containing up to six pulses. Spacing between these two groups is fixed at 2.9 usec. Spacing between pulses within either group is 1.45 usec or 2.9 usec, depending on code selection and reply mode. The 1.45 usec spacing is involved only in mode 2 replies (J, L, fig. 5).

d. CIVIL Reply Codes. CIVIL interrogations, also consisting of a pulse pair with 3-, 5-, or 8-usec spacing, depending on the mode, provide the necessary overlap between CIVIL and IFF systems for compatibility. Replies in CIVIL function setting are identical with those in MOD function setting, except for the CIVIL I/P reply. This reply coding is illustrated in BB, figure 5.

e. Identification of Position Reply Codes. In all cases, if the ip coding is inserted, the ip reply code is displayed for 30 seconds + 20-15 when continuously interrogated. With the function switch set to NORMAL, ip replies consist of two pulses. This is a sustained display of two reply pulses for each interrogation, not a repetition of pulses. In the MOD-I/P function setting, mode 1 and mode 3, replies consist of two selected reply trains (the original train and one repetition) with a spacing between the two reply trains of 4.35 usec ±0.1. Mode 2 ip replies are not changed for this function, but remain the same as the standard reply. CIVIL-I/P replies (BB, fig. 5) include the selected reply train, with one pulse added, 4.35 usec ±0.1, after the last framing pulse. This reply train is not repeated but will be present for each interrogation received. Repeated replies in MOD, modes 1 and 3 only, produce two complete reply trains for each interrogation. All ip functions are sustained for 30 seconds + 20 -15 by the time delay switch to provide sufficient time for performing tactical duties.

f. Emergency (EMER) Reply Codes. With the EMER control setting and the NORMAL function selection, the reply consists of four pulses, 16 usec ±2.6 apart, in any of the three modes (S, T, U, fig. 5). In the MOD or CIVIL function, the EMER reply to mode 1 and mode 3 interrogations will be the selected reply code, displayed four times for each interrogation (W, AA, fig. 5). The mode 2 reply is the MOD or CIVIL function will be the normal mode 2 reply (Y, fig. 5).

21. Reply Coding by Assigned Code Number

a. Assigned Code Number. For tactical purposes, IFF code assignments are changed from time to time. These codes consist of 2- or 4-digit numbers which indicate the correct settings of code controls or switches. The transponder set converts this, code to a coded pulse train. For modes 1 and 3, the assigned code numbers are 2-digit numbers. For mode 2, the assigned code number is a 4-digit number.

b. Code Group Letter. The pulse train for SIF consists of two framing pulses and up to 12 information pulses for mode 2, or up to six information pulses for modes 1 and 3. The 12 information pulses (mode 2) are divided into four groups of three pulses, and each group of three pulses is identified by a code group letter. The code group letters are A, B, C, and D. These code group letters always apply to the same three pulses, and, in combination with the pulse position number (*c* below), permanently identify each of the information pulses (fig. 5). The digits of the assigned code number *(a* above) indicate the code group to be used and the pulse coding within that group. In a 4-digit number, the first digit (thousands) designates the A group coding; the second digit (hundreds), the B group coding; the third digit (tens), the C group coding; and the fourth digit (units), the D group coding. In the 2-digit assigned code number (modes 1 and 3), only the A and B groups are used to represent tens and units, respectively.

c. Pulse Position Number. Positive identification of pulses within a group is accomplished by assigning a number to each pulse in a group. The numbers used are 1, 2, and 4, and they are assigned to the pulses of each group in sequence. Hence, there is an A1, A2, and A4, a B1, B2, and B4, and so on.

(1) These numbers were used because their various sums give the maximum number of combinations, without repetition, for three numbers. By using various combinations of these numbers any digit from zero to seven can be obtained.

(2) The code number for each group is a digit from zero to seven. This code number is set up in the code switching system to provide pulse position numbers whose sum is equal to the desired code number for that code group. The following example will clarify this:

Code number 5610

Code letter	Code number	Pulses in reply code
A	5	Pulses A1 and A4 (1 + 4 = 5)
B	6	Pulses B2 and B4 (2 + 4 = 6)
C	1	Pulse C1 = 1
D	0	No pulses = 0

(3) The foregoing example shows the setup for mode 2 reply coding. Mode 1 and mode 3 codes are readable directly from their code controls. However, the combination of pulses in modes 1 and 3 is made up in the same way, using only two digits.

22. Mode 2 Switching Arrangement

Switches for setting up the mode 2 replay code are located on the receiver-transmitter front panel (fig. 6). They are enclosed by a small door on the front-cover left side.

a. The 12 mode 2 code switches are arranged in four horizontal rows with three switches in each row. They are numbered from left to right and from top to bottom, with numerals 1 through 12.

b. The four rows correspond to the four pulse groups (A, B, C, and D), and the three switches in each row correspond to the pulse position numbers (1, 2, and 4) within the pulse group. This explanation is simplified in the following chart.

Switch No.	Pulse group	Pulse position No.
1	A	1
2	A	2
3	A	4
4	B	1
5	B	2
6	B	4
7	C	1
8	C	2
9	C	4
10	D	1
11	D	2
12	D	4

c. Mode 2 code assignment is given by a 4-digit number. The digits represent pulse group letters and the digit numeral represents the sum of the pulse position numbers.

Example: Code number 5610 would require switches No. 1, 3, 5, 6, and 7 to be at ON, with all others at OFF. The left-hand digit of the code number being 5 calls for the A group pulses in positions No. 1 and 4, because only these two position numbers have a sum total of 5. Switch No. 1 controls pulse A1; switch No. 3, pulse A4; switch No. 5, pulse B2; switch No. 6, pulse B4; and switch No. 7, pulse C1. No D group pulses are required in code 5610.

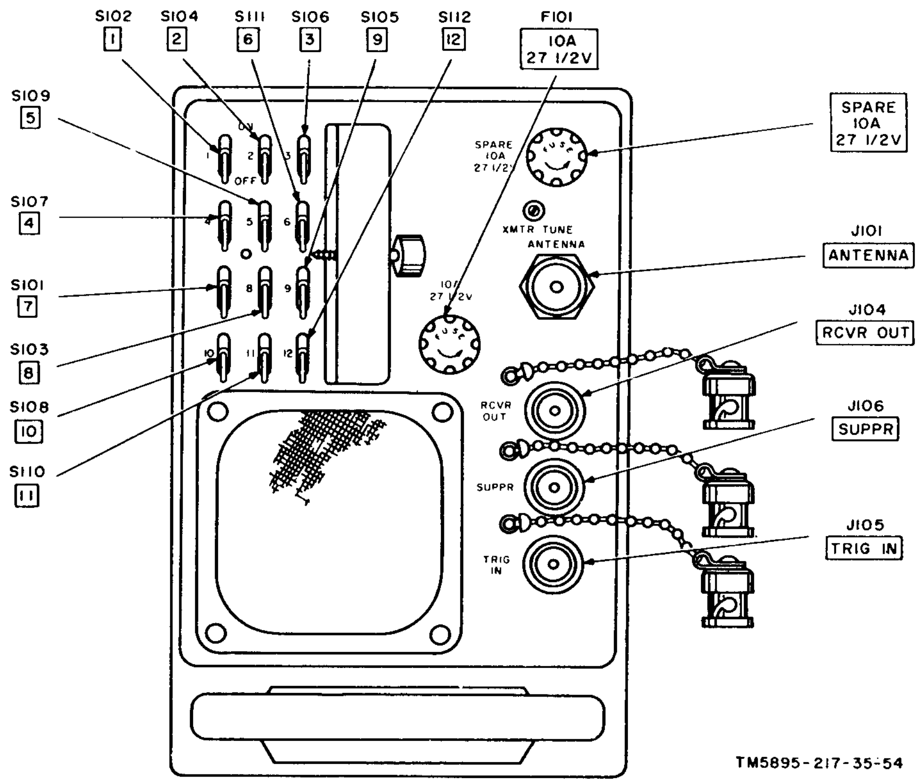


Figure 6. Receiver-transmitter, front panel.

Section II. GENERAL THEORY OF TRANSPONDER SET

23. Interrogation Signal Paths (fig. 7)

a. The transponder set receives all interrogations through Antenna AT-884/APX44. The antenna receives and transmits horizontally polarized signals in all directions. The received signal frequency is 1,030 mc. Interrogations received by the antenna are fed through the duplexer to the receiver section of Radar Receiver-Transmiter RT-494/APX-44. The duplexer allows the transponder set to receive and transmit with the same antenna, without using mechanical switching parts. This reduces losses in signal power and changeover time. The receiver is a superheterodyne type having broadband characteristics to accommodate RF pulses without distortion. Its sensitivity is controlled by the NORM and LOW positions of the master control in the Transponder Set Control C-2714/APX-44, and also by automatically sensing the interrogation rate. The video pulses from the receiver have had all undesirable pulses eliminated, such as pulses of unequal amplitude, too narrow in width, or spaced less than 2 usec after the first pulse. The video pulses from the receiver consist of a pulse pair for each interrogation; the time between the pulses of a pair will be either 3, 5, or 8 usec, depending on the interrogation mode.

b. The video from the receiver, in the form of interrogation pulse pairs, is applied to the decoder which performs the following functions:

(1) Determines whether a proper interrogation has been received.

(2) Determines the received signal's interrogation mode.

(3) Generates mode-sensing gate pulses that enable the mode sensitivity encoder circuits to accept a selected reply train of pulses.

(4) Generates main gate pulses to blank out all interrogations for a period of 120 microseconds after a received pulse pair (which allows time to complete a reply and avoids multiple replies), and to synchronize encoder reply train construction.

24. Reply Signal Path (fig. 7)

a. When a main gate pulse is received, the encoder is triggered and starts building up a train of pulses. The operational switching circuits of the control unit select the desired reply codes that will be assembled within the encoder. Whenever an interrogation is received, the encoder assembles a mode 1, 2, and 3 reply train. The mode-sensing gate pulse from the decoder causes the encoder to pass a correct reply train, according to the interrogation mode. Functional controls in the control unit determine whether the encoder shall produce a coded reply for normal, modified (SIF), or civil IFF system, and whether the reply is to be a normal (NORM), identification of position (I/P), or emergency (EMER) tactical reply. When all control unit switches are at ON, the decoder mode-sensing gate pulse permits only the reply determined by the interrogation mode to be passed to the modulator-transmitter stages, although a code is developed for replies in all three modes.

b. The coded reply train received by the modulator-transmitter section is amplified considerably through the modulator portion. This amplification is necessary to provide high amplitude pulses for the transmitter. These pulses actually supply plate power to the transmitting oscillator. Thus, whenever a pulse occurs, the transmitter generates an RF carrier for the duration of the pulse. The standby (STBY) position on the control unit function switch prevents the encoder from triggering the modulator-transmitter when it is not desirable to reply to an interrogation for tactical reasons.

c. The RF reply pulses from the transmitter are applied to the duplexer. The duplexer prevents these pulses from entering the receiver, and passes them to the antenna. The antenna radiates the RF reply pulses in a horizontally polarized, omnidirectional pattern. The peak power output of these pulses is approximately 500 watts.

d. Transponder Set Control C-2714/APX-44 is divided into two basic sections, functional and operational switching. Functional switching applies power to the tube filaments, operates power relay K5 which applies input power to the high- and low-voltage power supplies, and supplies power for relay operation, mode, and category (NORMAL, MOD, CIVIL, I/P, or EMER) circuits. Operational switching presets and controls the reply codes according to the tactical requirements, by operating applicable circuits in the decoder and encoder.

25. Block Diagram Analysis of Receiver-Transmitter

Radar Receiver-Transmitter RT-494/APX-44 signal paths are shown in figure 8. and are discussed in *a* through *k* below. Circuit details of each card, subchassis, and stage are included in paragraphs 26 through 46.

a. ANTENNA receptacle J101 connects to the duplexer in the receiver-transmitter. The duplexer allows transmitting and receiving with a common antenna system. Duplexer coaxial cable sections are resonant for signal rejection and nonresonant for signal transmission. The coaxial cable sections of the duplexer are arranged so that the receiver cable section is an open circuit at the transmitter frequency, and the transmitter cable section is an open circuit at the receiver frequencies.

b. RF interrogation pulses at a carrier frequency of 1,030 mc are fed through two preselector cavities (Z101 and Z102) to mixer diode CR102. Oscillator V101A, using quartz crystal Y101, generates a signal of 90.83333 mc which is applied to tripler V101B. The output of tripler V101B at 272.4999 mc. is fed to harmonic

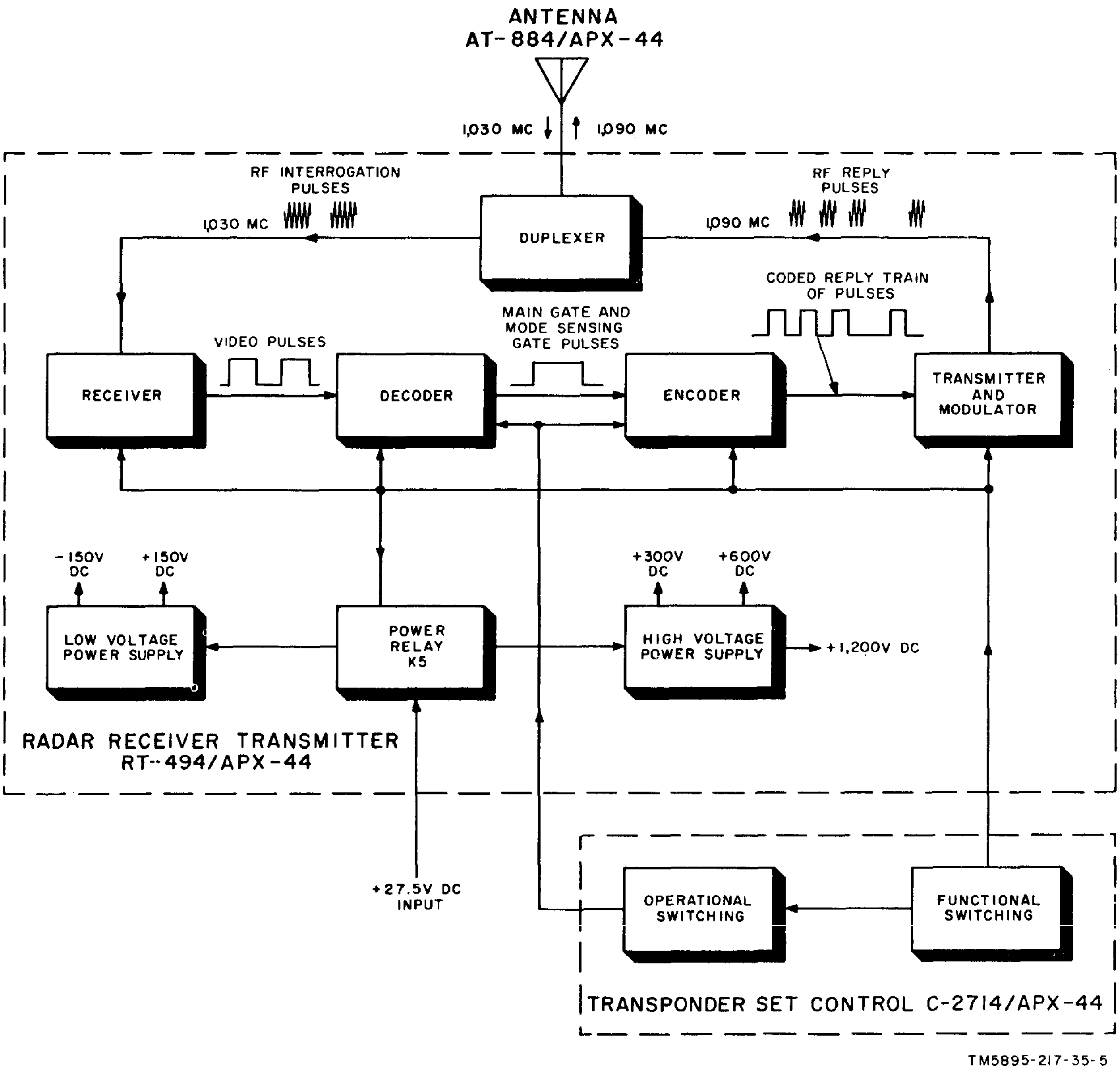


Figure 7. Transponder set, block diagram.

generator CR101 which produces many harmonics in its output. Harmonic selector cavity Z103 selects the fourth harmonic (1,090-mc) and applies that frequency to mixer CR102. The mixer beats the 1,090-mc signal with the received 1,030-mc interrogation pulses. The output of mixer CR102, consisting of 60 mc (difference frequency), is connected to the intermediate frequency (IF) amplifiers.

Note. The preselector mixer cavity consists of two preselector cavities (Z101 and Z102) and one harmonic selector cavity (Z103).

c. Six stagger-tuned IF amplifier stages (V201 through V206) amplify the 60-mc output of mixer CR102. During low signal input conditions, these amplifiers operate as conventional amplifiers with pickoff detector CR203 acting as the second detector. As signal strength increases, IF amplifiers V204, V205, and V206 begin limiting, and pickoff detectors CR201 and CR202 begin to operate. This detection system provides a linear video output variation from the IF detector circuit as the signal input level to the receiver is varied logarithmically. This is required to assist the suppressor (*d* below) to eliminate received pulses of unequal amplitude. Automatic Overload Control (A.O.C.) from the A.O.C. amplifier and rectifier is applied to IF amplifiers V202, V203, and V204. This controls the receiver sensitivity according to the interrogation rate instead of the signal strength. When interrogations from several ground stations are received, resulting in a high interrogation rate, the receiver sensitivity is decreased so that the transponder set will reply to strong signals only.

d. First video amplifier and cathode follower V207 provide video pulse amplification and match impedance to the input of the suppressor circuit (diodes CR204 through CR207). The amplitude of the two pulses of a given interrogation pulse pair will be almost equal. Stray pulses or additional interrogations from other sources will usually differ in amplitude from the given interrogation pulse pair. This difference in amplitude is used in the suppressor to eliminate random transponder triggering. The amplitude of the first pulse establishes the operating of reference level of the suppressor. The suppressor eliminates any pulses following the first pulse by 2 microseconds or less, or having an amplitude of 10 db or more below that of the first pulse. The suppressor also maintains the input to second video amplifier and cathode follower V208 at a constant level. The second video amplifier and cathode follower amplifies the video pulses and lowers the circuit impedance to match the input to V301. The positive pulses from V208 are amplified and applied to the front-panel RCVR OUT receptacle J104 and spike suppressor V301.

e. Spike suppressor V301 eliminates pulses of 0.3 usec or less in width and decreases the width of each interrogation pulse by 0.3 usec. This eliminates most of the received noise pulses. Inverter and blanked cathode follower V302 receives interrogation pulses from the spike suppressor output and a main gate pulse from blanking cathode follower and amplifier V303. The interrogation pulses from V302 are applied to all three decoders (V351, V352, and V353). When one of the decoders receives its correct code and mode, main gate multivibrator V404 is triggered.

f. Each decoder (V351, V352, and V353) identifies and passes only its assigned interrogation mode pulse pair. All decoder outputs are single pulses, 0.4 usec in width, and are used to trigger circuits that begin the assembly of a reply train.

(1) The negative pulse output of each mode decoder triggers its respective mode gate multivibrator (V401, V402, and V403). The gate pulse from a mode gate multivibrator is applied to the corresponding mode reply selector (V451, V452, and V453,) allowing it to operate. Because only one interrogation is fed to the decoders, only one decoder will pass a pulse to its mode gate multivibrator; therefore, only one mode reply selector will form a reply train.

(2) Main gate multivibrator V404, the main synchronization generator, receives a decoder output pulse from any mode through a common decoder output connection. This common decoder output is also applied to the mode 1 gate multivibrator V401 and the ring around gate multivibrator V503 when the switching diode CR354 is closed. When operating in the NORMAL category, either I/P or EMER, diode CR354 is closed and mode 2 and 3 reply selectors (V452 and V453) are disabled. This develops a mode 1 normal reply for a mode 1, 2, or 3 interrogation.

(3) The negative main gate pulse from V404 is amplified by main gate amplifier V454A, and applied to blanking cathode follower and amplifier V303. The output of V303 cuts off the blanked cathode follower portion of V302. This prevents any interrogation that is less than 120 usec after the first pair from triggering the transponder set. The blanking gate from V303 is also applied to the automatic overload control A.O.C. amplifier V304 and the SUPPR jack J106. The blanking gate is amplified and rectified by the A.O.C. system. The A.O.C. output bias controls the receiver sensitivity by changing the bias on IF amplifiers V202, V203, and V204. This bias voltage is

governed by the interrogation repetition rate, and prevents the excessive transmitter duty cycle that would result if the transponder set replied to all interrogations. The negative main gate from V404 is also applied to the ringing oscillator and driver V551, which generates a ringing oscillator output for each decoded interrogation.

(4) A positive main gate pulse from V404 is applied to the trigger amplifier and encoder blocking oscillator V501. Tube V501 supplies a 1-usec pulse to delay line DL601. This 1-usec pulse appears as numerous accurately timed pulses available at the output taps on DL601. Each mode reply code switching card selects the desired pulses from the delay line according to its code selection and assembles them as a train of pulses.

(5) During MOD and CIVIL emergency, and MOD identification of position operations, switching diodes CR355 and CR356 are closed, causing mode 1 decoder V353 and mode 3 decoder V351 to trigger ring around gate multivibrator V503. Because mode 2 interrogations do not require repeated replies, ring around gate multivibrator V503 is not used to repeat the basic reply train.

g. The three identical mode reply selectors (V451, V452, and V453) accer' `e reply code train assembled by their respective reply code switching cards. The one reply code passed to reply train amplifier V454B is determined by interrogation mode and the mode gate generators. If a mode 3 interrogation is received and no special reply is required, the positive mode 3 gate from V403 will allow reply selector V453 to pass the selected mode 3 reply code train. The negative pulse train output from any of the reply selectors is amplified in reply train amplifier V454B, and fed as positive pulses to coincidence detector V554.

h. A negative main gate pulse excites ringing oscillator V551 and allows it to oscillate at approximately 690 kilocycles (kc) providing accurate 1-cycle periods of 1.45 usec. This signal provides accurate timing of reply train pulse separation. First and second clippers V552 clip both positive and negative peaks to obtain symmetrical square waves that have a constant amplitude during the entire main gate pulse period. Differentiator V553A, a video peaking amplifier, drives coincidence detector V554. Each of the reply code train pulses from reply train amplifier V454B allows coincidence detector V554 to pass one ringing oscillator positive half cycle. Output pulses of V554 are accurately spaced because of the ringing oscillator accuracy, and coded by the pulses of the mode reply code switching cards. The output from V554 triggers blocking oscillator V553B.

i. The output of blocking oscillator V553B is applied to trigger amplifier and blocking oscillator V151. The two blocking oscillators (V553B and V151) provide pulses with a very fast rise and decay time, and constant amplitude. Driver V152 amplifies the reply train pulses from V151 to provide sufficient drive for modulator V153. The high positive pulses from V153 are applied to transmitting oscillator V154. These high amplitude pulses (approximately 2,000 volts) provide plate voltage for oscillator V154, allowing V154 to oscillate whenever a pulse occurs. Transmitting oscillator V154 oscillates for periods of approximately 0.45 usec, at a frequency of 1,090 mc. The separation between periods of oscillation is determined by the selected reply code train. The output RF reply train is connected through the duplexer to antenna receptacle J101 for application to the antenna.

j. Ring around gate multivibrator V503 provides the repeat characteristics required for emergency and identification of position replies. Tube V503 is triggered by either an all-mode decoder pulse from switching diode CR354, or a mode 1 or 3 decoder pulse from switching diodes CR355 and CR356. In the civil category, all three switching diodes are open, and ring around gate multivibrator V503 does not operate. In MOD (SIF) emergency and identification of position functions, diode CR354 is open and diodes VR355 and CR356 are closed. This allows ring around gate multivibrator V503 to operate for modes 1 and 3 but not for mode 2 interrogations. The width of the ring around gate multivibrator pulses is adjusted according to the reply train repeat time requirements. Ring around gate pulse widths are as follows:

37 usec for MOD-I/P modes 1 and 3, 57 usec for NORMAL emergency, and 87-usec in MOD emergency modes 1 and 3. The positive ring around gate pulse is applied to gated amplifier V502.

k. The selected ring around gate pulse allows gated amplifier V502 to amplify pulses from the ring around bus in mode 1 reply code switching card. In the normal categories (except identification of position), a 15.05-usec pulse is applied to tube V502. In the modified and civil categories, a 23.85-usec pulse is applied to V502. These pulses appear to be approximately 0.9 usec short to produce the required spacing between repeated reply trains; this shortage is made up in the input delay of delay line DL601 and miscellaneous circuit delays. Each time a ring around pulse from the mode 1 code switching card ring around bus is received, and a ring around gate (from V503) is present, gated amplifier V502 will trigger encoder blocking oscillator V501 and excite delay line DL601.

l. All power for the receiver-transmitter is obtained from the 27.5-volt dc source. Two transistorized power supplies change 27.5 volts dc to obtain the voltages required throughout the receiver-transmitter. The low-voltage power supply, consisting of transistor Q1 and Q2 with silicon diodes CR1 through CR8, supplies the following voltages: +125 volts dc, for most of the tube plate circuits; -150 volts dc, for bias requirements; and 115 volts ac to operate blower B1. The high-voltage power supply, consisting of transistors Q3 and Q4 with silicon diodes CR9 through CR24, produces +300, +600, and +1,200 volts dc for modulator-transmitter requirements, and 6 volts ac for the transmitting oscillator V154 filament.

Section III. RECEIVER-DECODER THEORY

26. Converter Subchassis

a. General (fig. 9). The converter subchassis changes the 1,010- to 1,030-mc interrogation pulses to an IF of 60 mc. It consists of the preselector mixer cavity unit (including three tuned cavities), two diodes, one tube, and associated circuit components. Crystal oscillator V101A generates a signal of predetermined frequency between 89.16 and 90.83 mc. Tripler V101B selects the third harmonic of the crystal oscillator output (between 267.5 mc and 272.49 mc) and applies it to harmonic generator CR101. Harmonic generator CR101 passes the tripler output and many harmonics to harmonic selector cavity Z103. Cavity Z103 is tunable from 1,070 to 1,090 mc. It selects the fourth harmonic of the tripler output frequency and applies it to mixer CR102. The received RF interrogation pulses picked up by the antenna are applied to the duplexer. The duplexer passes the received pulses to preselector cavity Z101, and prevents signals from the transmitter section from entering the receiver. The output of Z101 is applied to Z102. Both preselector cavities Z101 and Z102 are tuned to the received signal frequency within the range of 1,010 and 1,030 mc. The output from Z102 is applied to mixer CR102. Mixer CR102 heterodynes the two signals and passes the difference frequency to the IF suppressor subchassis. The IF output from the converter subchassis consists of 60-mc interrogation pulses.

b. Preselector (fig. 10). The received RF interrogation pulses from the duplexer connected to jack J102 are loop-coupled into preselector cavity Z101. Both cavities Z101 and Z102 are tuned to the received signal frequency 1,030 mc. The signals pass from Z101 to Z102 through the slot in the wall between the two cavities. The output from Z102 is loop-coupled from the cavity, and applied through coupling capacitor C108 to mixer CR102.

c. Crystal Oscillator (fig. 10). Crystal oscillator V101A uses a Pierce oscillator circuit, with crystal Y101 operated above dc ground (plate voltage across the crystal). Plate voltage is supplied from the +300-volt dc distribution bus (par. *41d)* through two decoupling filters (R105, C104 and R104, C103) through plate-load resistor R103 and plate inductor L101. Inductor L101 is tuned to the crystal frequency of 90.83333 mc. Capacitor C102 reduces the amplitude of the feedback to the proper level. Resistor R101 and capacitor C101 develop grid leak bias when the oscillations cause the grid to draw current, and R102 prevents parasitic oscillations. Filament voltage is supplied directly from the +27.5-volt dc source through filament-dropping resistor R109 and bypassed with C109.

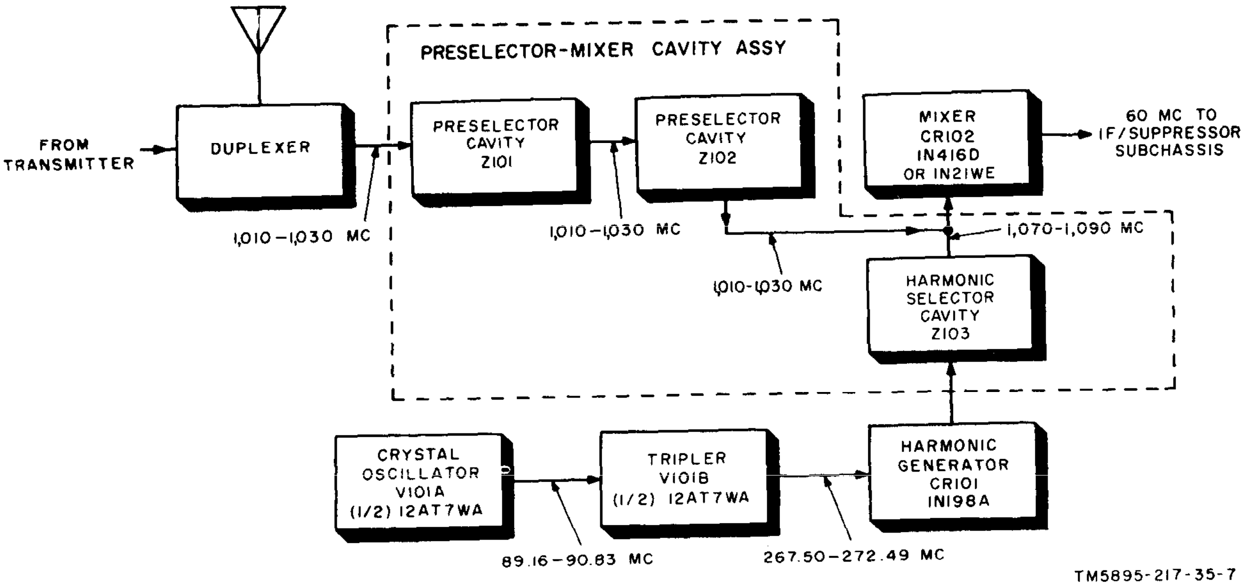


Figure 9. Converter subchassis, block diagram.

d. Tripler (fig. 10). Theoutputfrom V101A is coupled through C106 to the grid of tripler V101B. Tripler V101B is maintained near cut-off with bias obtained from the -150-volt dc bus (par. 42) and a voltage divider network consisting of dropping resistor R107 and grid resistor R106. This bias causes nonlinear operation of V101B which generates harmonics, aiding frequency multiplication. Capacitor C105 prevents feedback into the -150-volt dc bus. Plate voltage is obtained from the +300-volt dc bus (par. *41c)* through decoupling filter R104 and C104 and the plate inductor L102. Inductor L102 is tuned to the oscillator's third harmonic at approximately 272.49 mc. The output from V101B is coupled through C107 and developed across R108, the input resistor, for the harmonic generator.

e. Harmonic Generator and Selector (fig. 10). The tripler output is applied to the cathode of harmonic generator CR101. Because a diode is a nonlinear device, it is capable of developing many harmonics of any signal applied to it. The output of CR101 is loop-coupled into the harmonic selector cavity Z103. This output consists of the output frequency of V101B with many of its harmonics. Harmonic selector cavity Z103 is. tuned to the fourth harmonic of the tripler output frequency. This harmonic frequency at approximately 1,090 mc is loop-coupled out of the harmonic selector and applied directly to mixer CR102.

f. Mixer (fig. 10). The 1,090-mc signal from harmonic selector Z103 and the 1,030-mc RF interrogation pulses from preselector cavity Z102 are both applied to the cathode of crystal mixer CR102. These two signals are heterodyned at the mixer, The signals present at the output of the mixer include the two fundamental frequencies, their sum, their difference, and several harmonics. Capacitor C110 bypasses all of the unwanted frequencies and allows only the 60-mc difference frequency to pass. This output, consisting of 60-mc RF interrogation pulses, is connected to the IF suppressor subchassis through a coaxial cable and plug P101.

27. IF Suppressor Subchassis (fig. 11)

a. General. The 60-mc interrogation pulses from mixer CR102 are amplified by six stagger-tuned, transformer-coupled IF amplifiers (V201 through V206) operating as conventional amplifiers on low input signal levels. During low input signal conditions, third pickoff detector CR203 operates as the detector, converting the 60-mc pulses to video pulses. As the input signal level increases, sixth IF amplifier V206 begins to act as a limiter and infinite impedance detec-

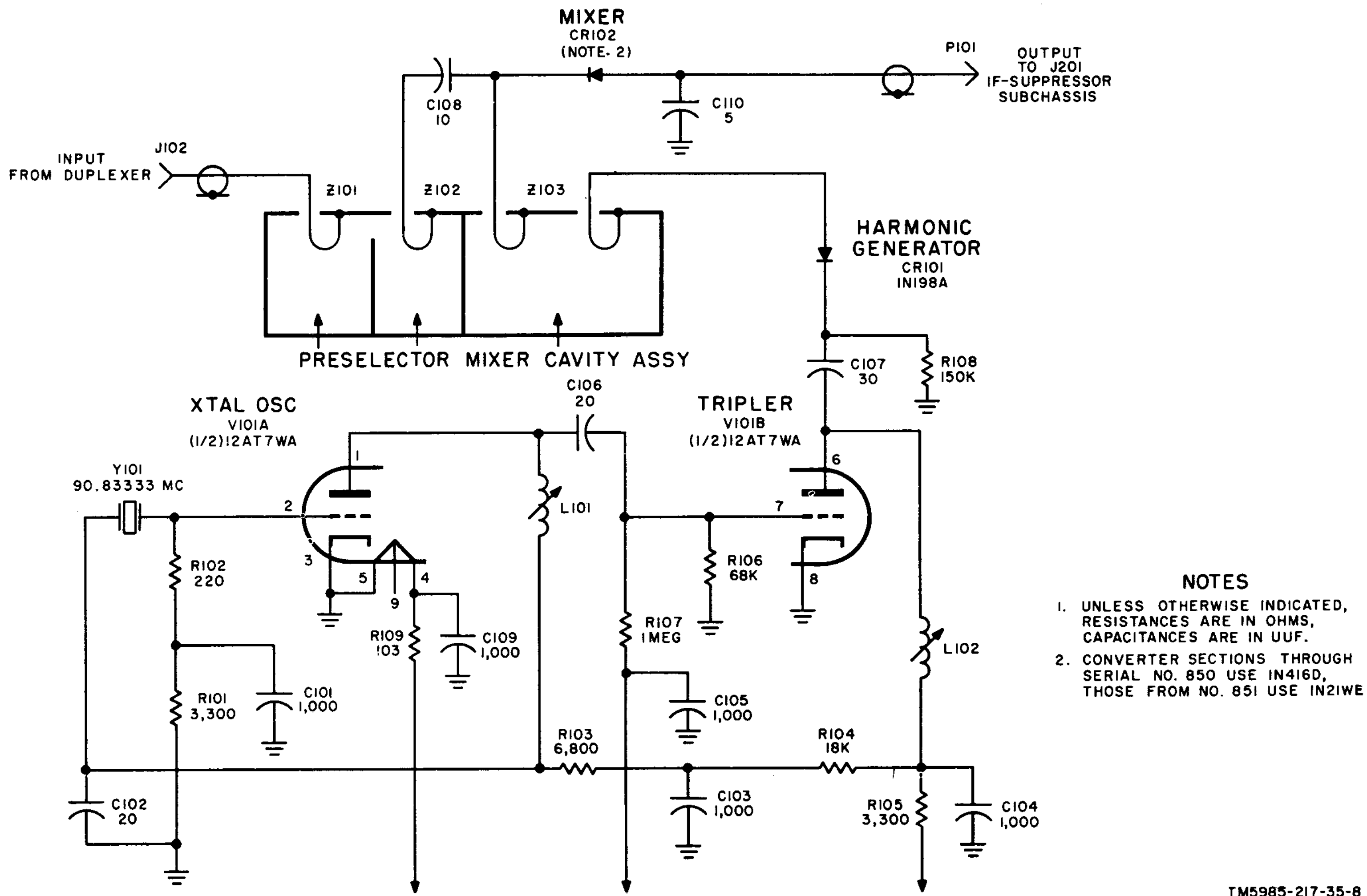


Figure 10. Converter subchassis, schematic diagram.

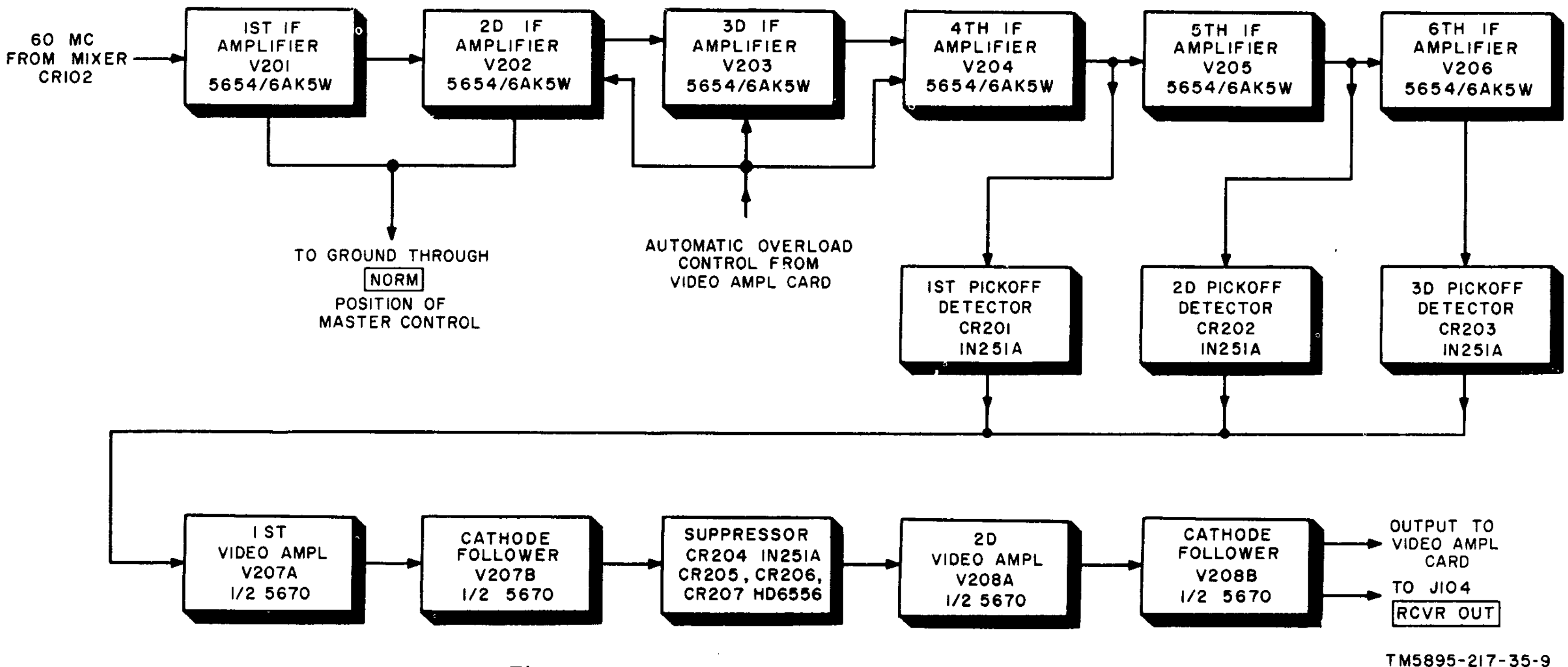


Figure 11. IF suppressor subchassis, block diagram.

tor in conjunction with second pickoff detector CR202. Further signal increase causes fifth IF amplifier V205 and CR201 to react in the same manner as that of the sixth IF stage. Circuit constants are such that as a diode approaches saturation, the amplifier preceding that diode begins to limit, and detection with the preceding diode occurs. All three pickoff detectors feed video pulses to a common video output. The three pickoff diode outputs are in phase and are applied to first video amplifier V207A as positive pulses. IF amplifier V204 limits on extremely strong signals to keep the video pulse input to tube V207A within operating limits. High or low sensitivity (selected by the master control on the control unit) is applied to the first and second IF stages, while automatic overload control (A.O.C.) is applied to the second, third, and fourth stages. A.O.C. consists of a negative bias obtained by amplifying and rectifying the main gate multivibrator pulses. This bias prevents excessive transmitter duty cycle when more than one interrogating station is received. First video amplifier and cathode follower V207 amplifies and lowers circuit impedance to match the input to suppressor CR204 through CR207. The suppressor removes any pulse occurring less than 2 microseconds after the first pulse, or having an amplitude of 10-db or more, lower than the first pulse. All other pulses with less than 10-db amplitude difference are applied to second video amplifier V208A where they are amplified and passed to cathode follower V208B for impedance matching. Video pulse output is fed to front panel RCVR OUT jack J104 and the video amplifier card.

b. First and Second IF Amplifiers (fig. 12). The 60-mc input from jack J201 is applied to the tap on transformer T201. Transformer T201 provides the proper impedance match between the coaxial cable and the first IF tube input. Transformer T201 is tuned to approximately 60 mc as determined by the best overall frequency response. Jack J202, in series with T201 ground return, permits measurement of mixer CR102 current, and capacitor C250 filters RF from the meter. Resistor R201 shunts T201 to broaden its frequency response. First IF amplifier V201 obtains plate voltage from the +125-volt dc distribution bus (par. *41e)* through the decoupling filter, consisting of R204 and C202, and the primary of transformer T202 shunted by resistor R203. Resistor R203 broadens the transformer frequency response. Transformer T202, tuned to approximately 63 mc, couples the output of V201 to the grid of second IF amplifier V202. Screen grid voltage is taken from the plate-decoupling filter and applied through isolation resistor R243. Resistor R202 and HI SENS control R225, bypassed by C201, provide cathode bias for first IF amplifier V201. Resistor R205, bypassed by C206, provides cathode bias for second IF amplifier V202. LO SENS control R226, bypassed by C230, provides additional bias for both V201 and V202. Variable resistors R225 and R226 are adjusted to provide the desired receiver sensitivity for the LOW and NORM positions of the master control on the control unit. Pin No. 7 of J203 is grounded in the NORM position; therefore only R225 is effective and must be adjusted first; R226 is then adjusted for proper LOW sensitivity. In addition to the cathode bias, A.O.C. bias is applied to grid of tube V202 through filter network L201, C203, and C205. At low signal levels, the A.O.C. bias voltage is slightly positive, partially reducing the effect of the cathode bias. Plate voltage for V202 is supplied from the +125-volt dc distribution bus (par. *41e)* through the decoupling filter, consisting of R206 and C207, and the primary of transformer T203 shunted by resistor R207. Isolating resistor R244 connects screen grid voltage from the decoupling filter.

c. Third and Fourth IF Amplifiers (fig. 13). Transformer T203, tuned to approximately 57 mc, couples the input to third IF amplifier V203. Bias is provided by cathode resistor R208 and bypass capacitor C210. A.O.C. bias is applied to the grid through inductor L203, bypassed by capacitor C209. Plate voltage is supplied by the +125-volt dc distribution bus (par. *41e)* through the decoupling filter consisting of R210 and C211, and the primary of transformer T204 shunted by resistor R209. Resistor R209 broadens the transformer frequency response. Screen grid voltage is applied from the decoupling filter through isolation resistor R245. Transformer T204, tuned to approximately 63 mc, couples the signal output to the grid of fourth IF amplifier V204. Bias for V204 is obtained from cathode resistor R211 and bypass

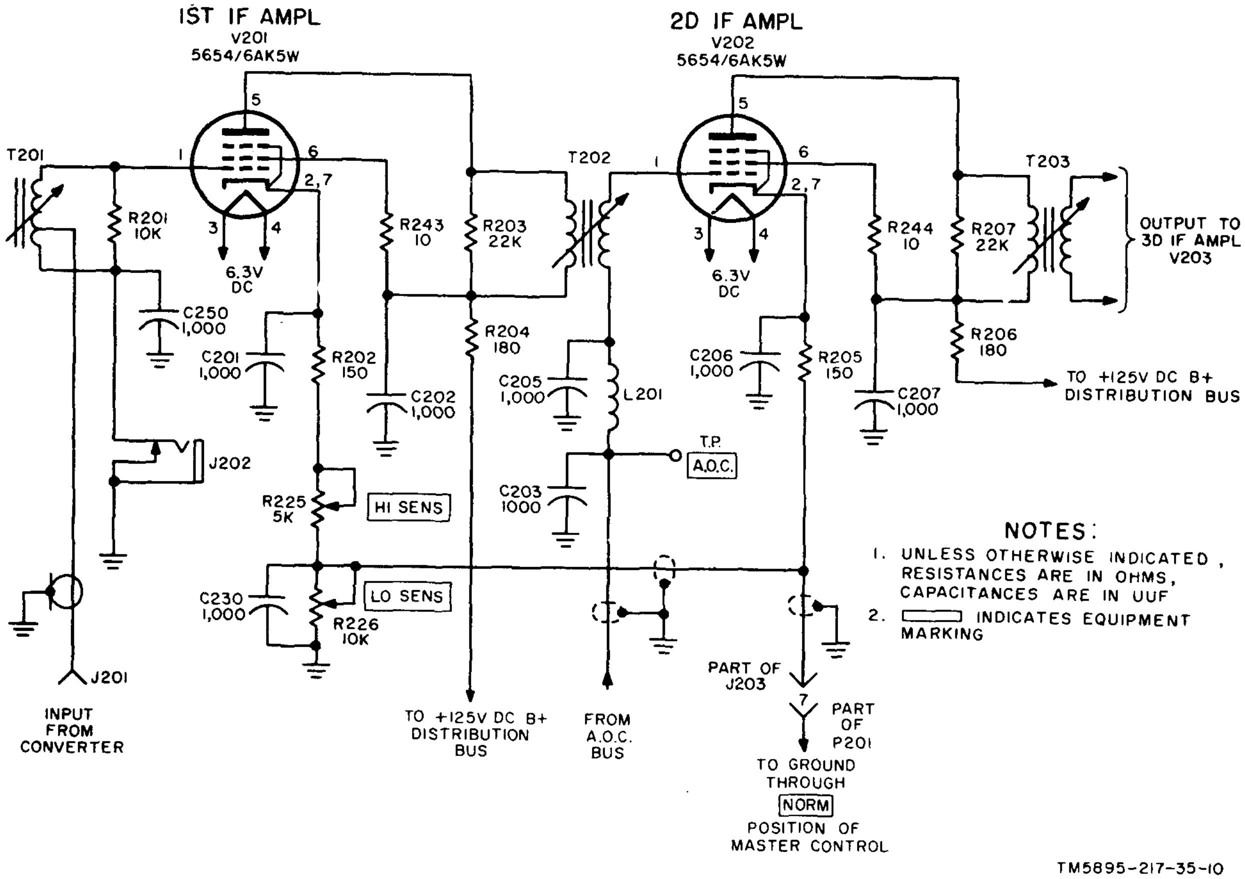


Figure 12. First and second IF amplifiers, partial schematic diagram.

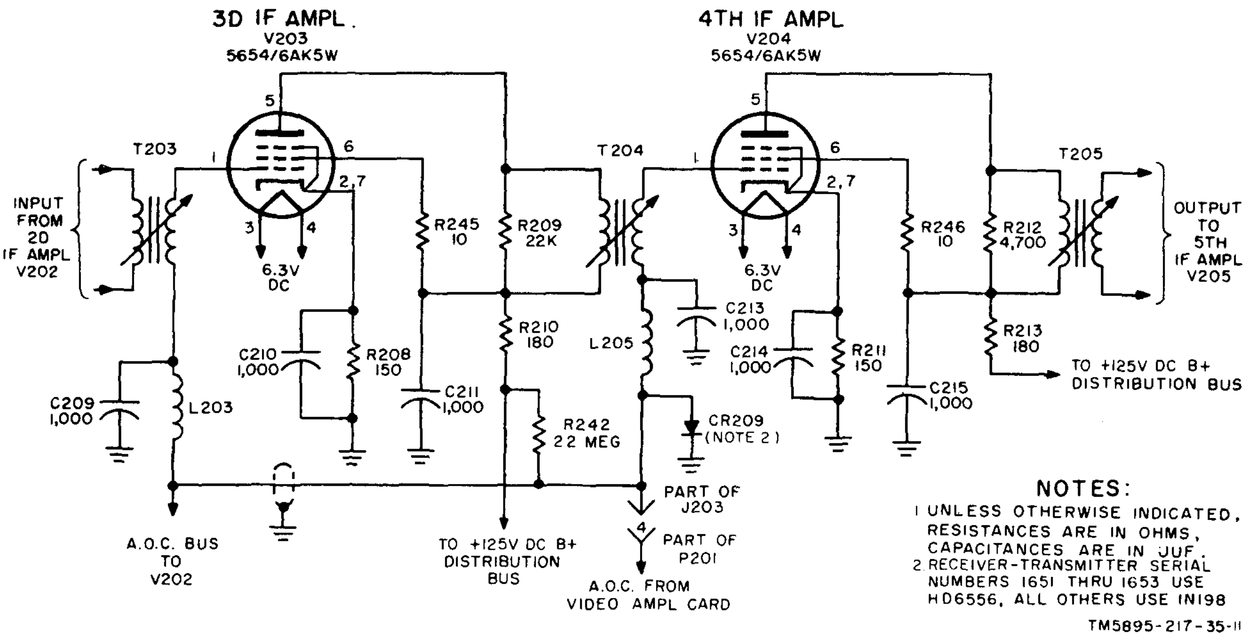


Figure 13. Third and fourth IF amplifiers, partial schematic diagram.

capacitor C214. A.O.C. bias is applied to the grid through inductor L205, bypassed by capacitor C213. Resistor R242 and diode CR209 provide the positive grid bias on the A.O.C. bus. Current flow from ground through CR209 and R242 to +125 volts dc, places the diode anode and A.O.C. bus at approximately +0.5 volt dc, if no negative input voltage is applied to pin No. 4 of receptacle J203. The negative A.O.C. voltage from the video amplifier card reduces the receiver sensitivity. This voltage is the result of sensing the interrogation rate, using the main gate pulses. The purpose of the A.O.C. bias is to reduce the rate of transponder replies to a level that will not damage the transmitter. Plate voltage for tube V204 is obtained from the +125-volt dc distribution bus (par. *41e)* through decoupling filter R213 and C215, and the primary of transformer T205, shunted by resistor R212 which broadens transformer frequency response. Screen grid voltage is supplied from the decoupling filter through isolating resistor R246.

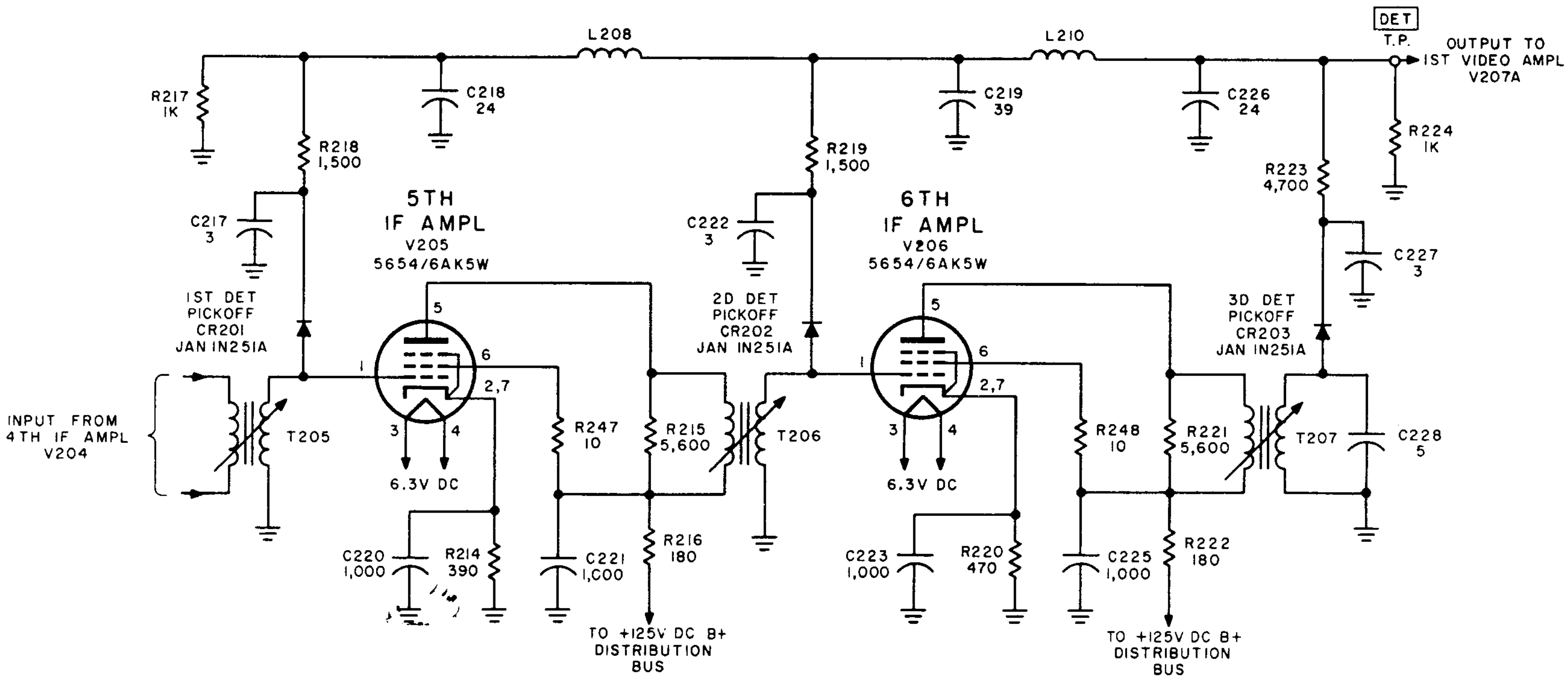
d. Fifth and Sixth IF Amplifiers (fig. 14). Transformer T205, tuned to approximately 57 mc, couples the signal from V204 to fifth IF amplifier V205. The fifth and sixth IF amplifiers perform several functions directly related to signal strength. In addition to normal IF amplification of weak signals, limiter action and detection takes place in both tubes on strong signals. The detector pickoff diodes (CR201, CR202, and CR203) couple the video pulses to a common output.

(1) The input signal is coupled through transformer T205 to the grid of fifth IF amplifier V205. At low signal levels, it is amplified and coupled through transformer T206, tuned to approximately 63 mc, to the grid of sixth IF amplifier V206. Higher-than-usual cathode bias is developed across resistor R214 and capacitor C220 for tube V205, and across R220 and C223 for tube V206. Resistors R215 and R221 shunt their respective transformers, to broaden transformer frequency response. Plate and screen grid voltages are supplied from the +125-volt dc distribution bus (par. *41e)* through decoupling filter R216, C221 (V205), and R222, C225 (V206). Isolating resistors R247 and R248 connect screen grid voltage to their respective stages.

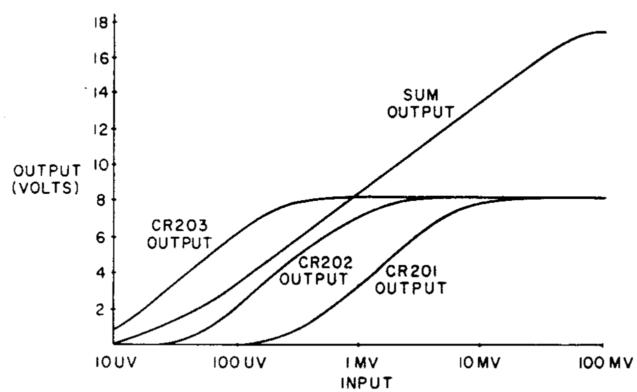
(2) As the input signal strength increases, sixth IF amplifier V206 begins to clip the negative signal peaks because of its high cathode bias. This clipping of the negative peaks causes V206 to operate as an infinite impedance detector. As the input signal level continues to increase, V205 begins negative peak clipping (detection) and tube V206 begins limiting due to saturation on the positive signal peaks. Tube V205 will begin positive peak clipping or limiting with a further signal increase, and when the input to the receiver is approximately 25 millivolts, IF amplifier V204 *(c* above) begins limiting. However, because tube V204 has normal bias it does not serve as a detector.

(3) Third detector pickoff diode CR203 operates as a conventional second detector, rectifying the 60-mc RF pulses from transformer T207 to obtain the video pulses. Capacitor C228 adds sufficient capacity; this enables T207 to tune to approximately 57 mc. The first and second detector pickoff diodes CR201 and CR202 aid the infinite impedance detector action of the fifth and sixth IF stages respectively, by coupling the positive pulses from the grid circuits. Capacitors C217, C222, and C227 filter the RF component from the outputs of CR201, CR202, and CR203, respectively. Resistors 218, R219, and R223 isolate each of the diodes from the common output. Inductors L208 and L210, with capacitors C218, C219, and C226, form a small delay line (or phase shift network). This line is terminated at each end by resistors R217 and R224 to match the line impedance correctly. The small amount of phase shift provided by the line compensates for the slight phase shift through each stage.

(4) Successive detection (B, fig. 14) results by addition of the individual di-



A FIFTH & SIXTH IF STAGES.



B. IDEAL SUCCESSIVE DETECTOR CURVE

NOTES:

1 UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF

2 [box] INDICATES EQUIPMENT MARKINGS.

TM5895-217-35-12

Figure 14. Fifth and sixth IF amplifiers, partial schematic diagram.

ode output curves to form an output to tube V207A, which increases at a linear rate with a logarithmic increase in receiver signal input. The video pulse output (positive pulses) at the DET test point is the sum of the individual outputs of diodes CR201, CR202, and CR203 and is very nearly linear until the receiver reaches saturation. Bias levels of the fourth, fifth, and sixth IF stages are set to cause saturation limiting at one of these stages when the pickoff diode following it has reached maximum output. This action prevents overloading a pickoff diode, causing nonlinearity in the resultant sum output. The linear output characteristic of the IF, stages is necessary so that amplitude differences between interrogation pulses and unwanted pulses may be compared in the suppressor (*f* below). Therefore, a desired interrogation pulse pair (normally having equal amplitudes) may be selected by the suppressor, and all other pulses or pulse pairs are rejected.

e. First Video Amplifier and Cathode Follower (fig. 15). Video pulses are coupled through inductor L212 to the grid of first video amplifier V207A. Inductor L212 blocks any stray RF from the video amplifier input. Degenerative cathode feedback developed across unbypassed resistor R228 helps to maintain good pulse response of the amplifier. Resistor R227 is the amplifier plate load, and plate voltage is received from the +125-volt dc distribution bus (par. *41e*). Pulse output from amplifier V207A is coupled directly to the grid of cathode follower V207B. A large cathode bias resistor, R229, provides the correct bias for V208B, compensating for the high positive grid voltage caused by direct coupling, The plate of V207B is directly connected to the +125-volt dc bus. The video pulse output of V207B is coupled from the cathode through capacitor C231 to the suppressor.

f. Suppressor (fig. 16). First video cathode follower V207B applies negative pulses developed across resistor R229 to capacitor C231. Because of the rapid rise and decay time of these pulses (0.2 to 0.4 usec), C231 appears as a short circuit during the pulse rise and decay time, Another important factor in the theory of operation of the suppressor circuit is the resistance capacitance (rc) time constant of the discharge and charge circuits. These time constants directly affect the instantaneous voltages at various circuit points in the suppressor, and have a direct relationship to the signal pulses applied to the suppressor.

(1) Under static or no-signal conditions, voltages are established at specific circuit points by the +125-volt dc distribution bus (par. *41e),* the -150-volt dc distribution bus (par. 42), and the +3 volts dc obtained across resistor R240 in series with part of the

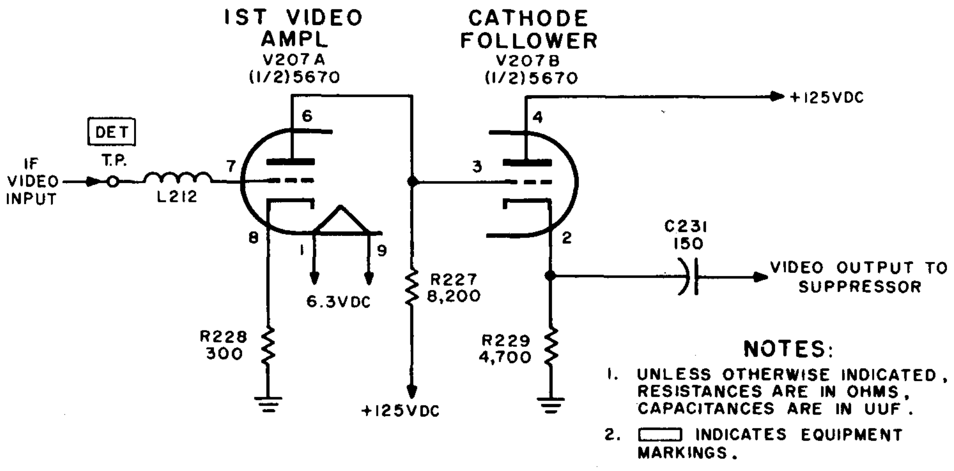


Figure 15. First video amplifier and cathode follower, partial schematic diagram.

IF suppressor subchassis filament string (par. 43). Diodes CR204 through CR207 operate as electronic switches in the suppressor circuit; diodes CR205, CR206, and CR207 are closed whenever their anodes are a minimum of 0.5 volts positive with respect to their cathodes, while diode CR204 requires a minimum of approximately 0.25 volts to close. Diodes CR204, CR206, and CR207 are closed or conducting under static conditions, and diode CR205 is open.

Note. Voltages in the following paragraphs are as measured between the point noted and chassis ground, unless otherwise specified.

(2) Under static conditions, capacitor C231 has a net potential across it of approximately 82 volts, and is charged to this value. The first interrogation pulse fed to tube V207B decreases the cathode voltage. This negative change, coupled through capacitor C231, drives the SUPPR test point negative. When the test point reaches -0.5 volt, diode CR205 closes and capacitor C231 discharges to the amplitude of the input pulse. Throughout the duration of the pulse the SUPPR test point is maintained at -0.5 volt by CR205. If the cathode voltage of tube V207B is reduced to +61 volts and the SUPPR test point voltage is maintained at -0.5 volt, the net potential across capacitor C231 will be 61.5 volts (a difference of 24.5 volts from static net potential). The discharge path for C231 through diode CR205 and resistor R229 gives the circuit a time constant of approximately 0.6 usec. This time constant, nearly the pulse width of the normal interrogation pulse, permits capacitor C231 to discharge the full amplitude of the input pulse (24 volts).

(3) During the negative excursion of the input pulse, the SUPPR test point is only permitted to drop to the -0.5-volt level by diode CR205. Diode CR204 will be closed during this time, and the voltage at the grid of tube V208A will drop to approximately -0.25 volts, thus opening diode CR207. A negative pulse (limited to a little under 4 volts in amplitude) is applied to the grid of tube V208A.

(4) When the input pulse is no longer present at the cathode of V207B, capacitor C231 begins to charge through resistors R236 and R230 and tube V207B. The voltage at the SUPPR test point becomes approximately 21 volts (the pulse amplitude less the static 3-volt potential at the test point). This positive voltage will open diodes CR204, CR205, and CR206. The absence of a negative pulse will allow diode CR207 to close, causing the grid of V208A to return to the static reference level of +3.5 volts. Thus, signal input to tube V208A will resemble the first interrogation pulse except for a reduction in amplitude.

(5) If a second pulse does not closely follow the first input pulse (15 usec or less), the charge current of capacitor C231 will cause the SUPPR test point voltage to decay to the static level. The initial part of this voltage decay is quite linear, and this is the principal portion used for pulse suppression (2 usec after the first pulse is received). After approximately 15 usec, the test point voltage reduces to the static level of +3 volts, and diodes CR204 and CR206 will close, returning the suppressor circuit to its static condition.

(6) If a second pulse is received during the 15-usec decay time, it must have an amplitude greater than the voltage present on the SUPPR test point to be coupled through CR203 to the grid of V208A. The decay voltage is high enough for the first 2 usec to block any pulse that may occur. After 2 usec, a second pulse must have an amplitude within 10 db (3.16 volts) of the first pulse, or it will not pass on to the grid of V208A. The interrogation pulses are spaced 3, 5, or 8 usec, and are of a constant amplitude; therefore any proper interrogation pulse pair will be passed by the suppressor.

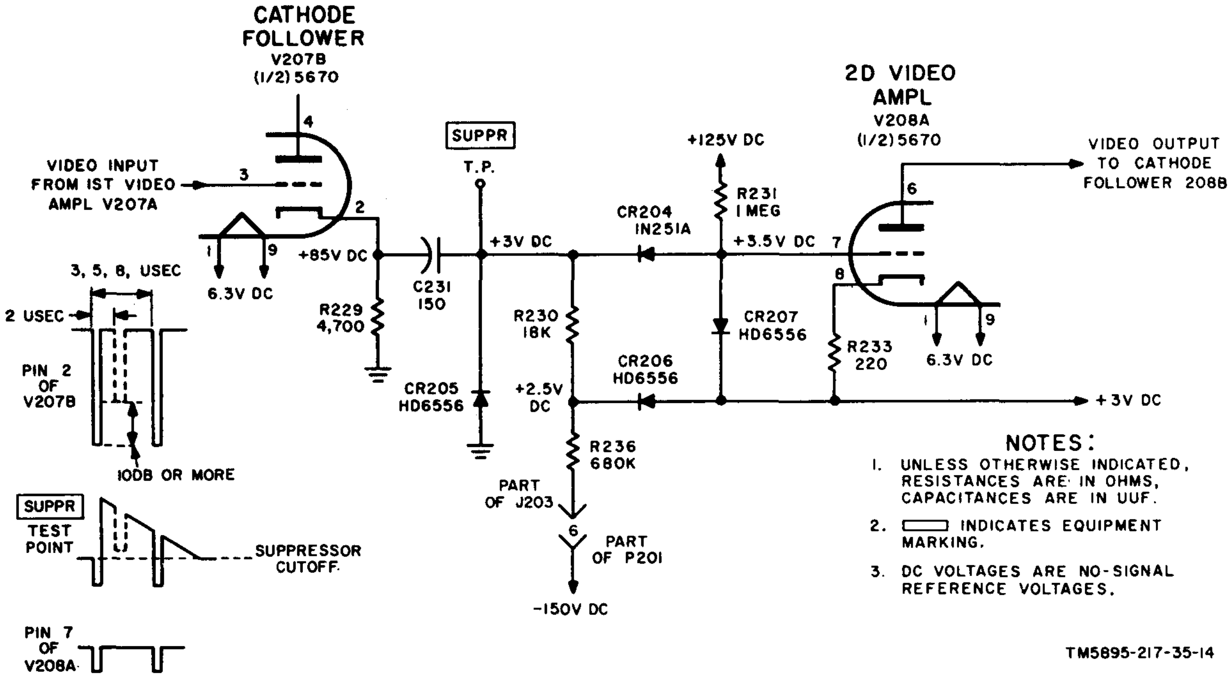


Figure 16. Suppressor, simplified schematic diagram.

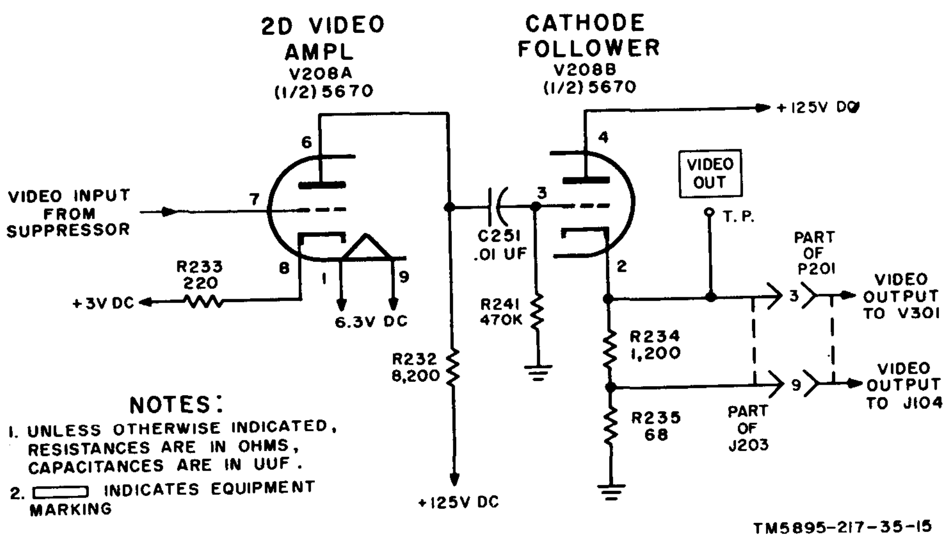


Figure 17. Second video amplifier and cathode follower, partial schematic diagram.

g. Second Video Amplifier and Cathode Follower (fig. 17). Negative video pulses from the suppressor are applied to the grid of second video amplifier V208A. Cathode self-bias for V208A is provided by resistor R233, and plate voltage is supplied from the +125-volt dc bus (par. *41e)* through plate load resistor R232. Positive pulses from V208A are coupled through capacitor C251 to the grid of cathode follower V208B. Resistor R241 provides a grid return for V208B, and the plate is directly connected to the +125-volt dc distribution bus (par. *41e).* Two cathode resistors (R234 and R235) supply operating bias and two output voltage and impedance levels. The two video outputs at pins No. 3 and 9 of receptacle J203 are connected to the video amplifier card and front panel RCVR OUT jack J104, respectively.

28. Video Amplifier Card (fig. 18)

a. General. The input interrogation pulses to the video amplifier card are positive in polarity and 0.7 usec in width. Spike suppressor V301 eliminates all received pulses having a width of 0.3 usec or less; these pulses are usually noise pulses. The output of V301 consists of negative pulses approximately 0.4 usec in width. Inverter tube V302A amplifies and inverts the negative pulses from tube V301 and applies them to blanked cathode follower V302B. Positive 0.4 usec pulses from V302B are applied to decoders V351, V352, and V353 on the decoder card for interrogation mode determination. After a pulse pair is passed to the decoders, a positive main gate pulse (approximately 120 usec) is received by blanking cathode follower V303A. The blanking cathode follower applies the positive main gate to SUPPR jack J106 and blanking amplifier V303B. Blanking amplifier V303B amplifies and inverts this gate pulse, and applies it to blanked cathode follower V302B. These negative pulses cut off tube V302B, preventing spurious video pulses from passing to the decoder card. Main gate pulses are also coupled from blanking cathode follower V303A to A.O.C. amplifier V304 where they are amplified and applied to the A.O.C. rectifier. The A.O.C. rectifier, consisting of CR301 through CR303, provides negative bias for IF amplifiers V202, V203, and V204. The A.O.C. circuit prevents exceeding the permissible transmitter duty cycle when many interrogations are received.

b. Spike Suppressor and Inverter (fig. *19).* The input positive video pulses at pin No. 7 of card connector P301 are coupled through capacitor C301 and developed across resistor R301. These pulses are applied simultaneously to the suppressor grid of spike suppressor V301 and 0.3-usec delay line DL301. The output of DL301 occurring 0.3 usec after the input, is applied across resistor R302 to the control grid of tube V301. Both grids are biased to cutoff by voltages from the -150-volt dc distribution bus (par. 42) input at pin No. 10 of card connector P301. Tube V301 is able to conduct only when suppressor grid and control grid are both driven positive by pulses. The input pulses to the spike suppressor are of a fixed amplitude, and, because of the 0.3-usec delay of the pulses applied to the control grid, pulses of 0.3 usec or less duration will not overlap and allow V301 to conduct. Plate voltage for V301 is supplied from the +125-volt dc distribution bus (par. *41e)* through plate-load resistor R303. Capacitor C302 couples the negative video pulses from V301 and applies them across grid resistor R304 of inverter V302A. Inverter V302A is unbiased to permit a full negative pulse signal swing without clipping. Plate voltage for tube V302A is supplied from the +125-volt dc distribution bus (par. *41e)* through

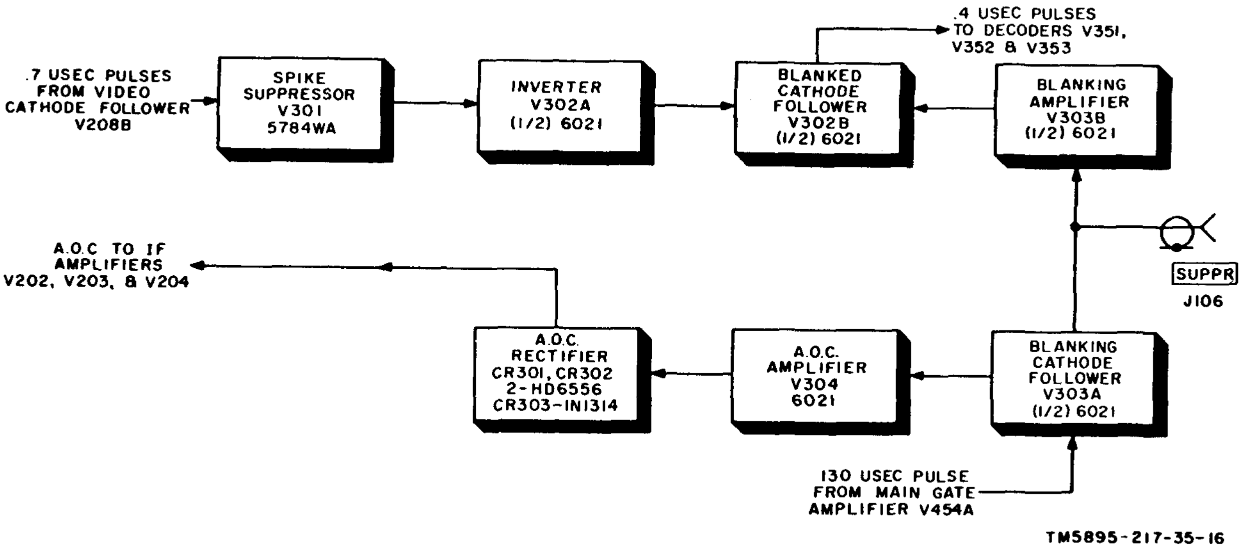


Figure 18. Video amplifier cord, block diagram.

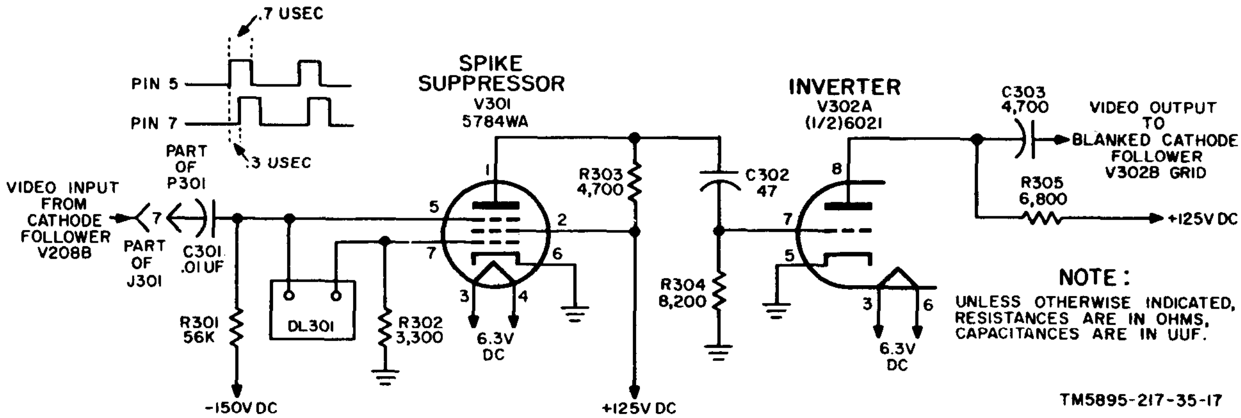


Figure 19. Spike suppressor and inverter, partial schematic diagram.

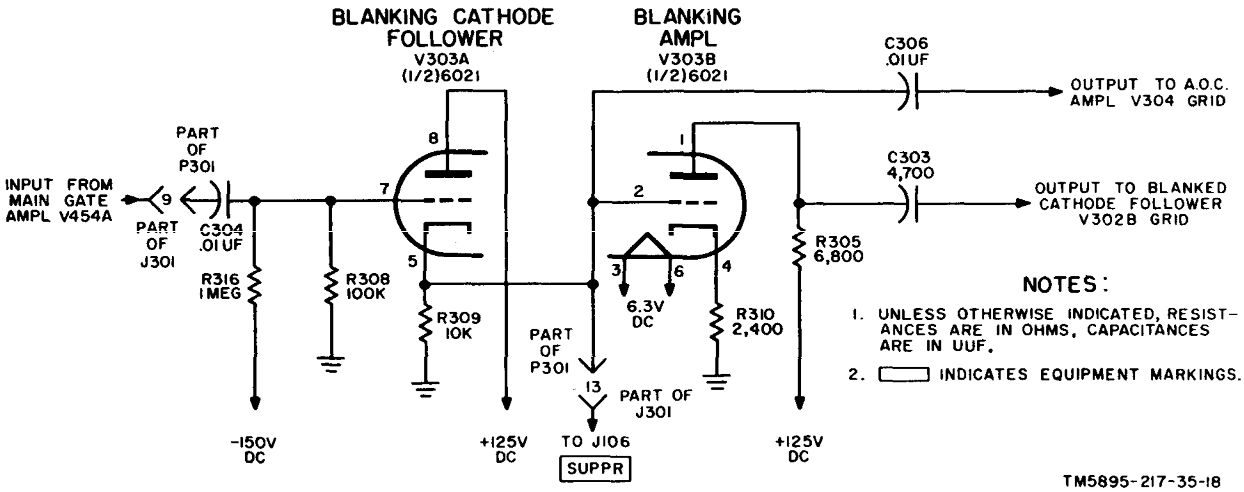


Figure 20. Blanking cathode follower and blanking amplifier, schematic diagram.

plate-load resistor R305, and video output is coupled through capacitor C303 to blanked cathode follower V302B. Interrogation pulses are now only 0.4-usec wide and pulse separation is increased by 0.3 usec, which remains within decoder tolerances.

c. *Blanking Cathode Follower and Blanking Amplifier* (fig. 20). A positive main gate pulse, approximately 120 usec in width, is applied to pin No. 9 of card connector P301 after a correct interrogation pulse pair has been received. This main gate pulse is coupled through capacitor C304 across grid resistor R308 to the grid of blanking cathode follower V303A. Tube V303A is negatively biased by the -150-volt dc distribution bus (par. 42) through resistor R316 to allow full swing of the positive pulse without clipping. The low impedance output signal developed across cathode resistor R309 is coupled directly to blanking amplifier V303B and front-panel SUPPR jack J106. Another output is coupled through capacitor C306 to the grid of A.O.C. amplifier V304 (*e* below). Tube V303B amplifies the main gate pulse and applies it as a negative gate through capacitor C303 to the grid of blanked cathode follower V302B (par. *28d*). Plate voltage for tube V303B is supplied from the +125-volt dc distribution bus (par. *41e*) through plate-load resistor R305. Self-bias is obtained from cathode resistor R310.

d. *Blanked Cathode Follower* (fig. 21). Two inputs are coupled through capacitor C303 to blanked cathode follower V302B grid: a positive video pulse pair from inverter V302A, and

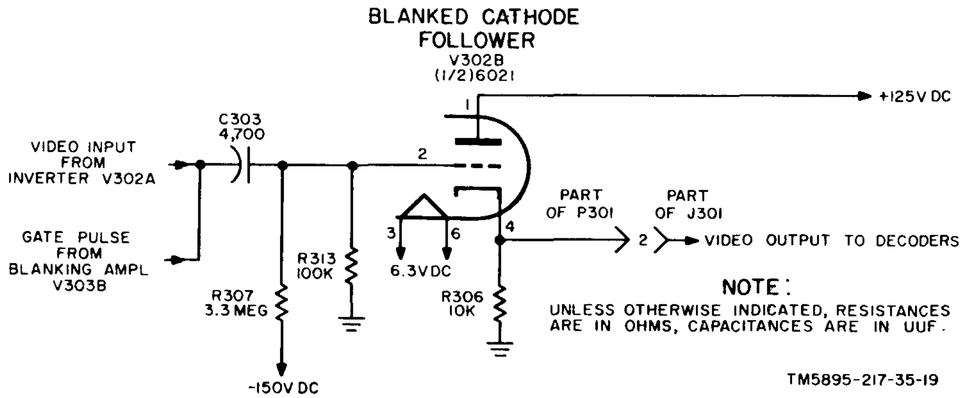


Figure 21. Blanked cathode follower, partial schematic diagram.

a negative main gate pulse from blanking amplifier V303B. Tube V303B is operated very close to cutoff because of cathode resistor R306 and the fixed bias obtained from voltage divider network R307 and R313 connected between the -150-volt distribution bus (par. 42) and ground. The plate is directly connected to the +125-volt dc distribution bus (par. *41e*). The first interrogation pulse pair passes through V303B, is decoded in the decoder card (par. 29), and triggers the main gate multivibrator. The output of the main gate multivibrator is used to cut off tube V303B, preventing interrogations from triggering the transponder for approximately 120 usec after the pulse pair is passed.

e. A.O.C. Amplifier and Rectifier (fig. 22). The two sections of A.O.C. amplifier V304 are connected in parallel The positive main gate pulse is coupled through capacitor C306 and grid-limiting resistor R311 to both grids. Bias from the -150-volt dc distribution bus (par. 42) is applied to both grids by voltage-divider resistors R314 and R315, to permit large signal swings without clipping. Negative output pulses developed across plate-load resistor R312 of V304 are coupled through capacitor C305 to a voltage-doubler rectifier consisting of diodes CR301 and CR302. Resistors R317 and R318 provide the load for the voltage-doubler rectifier. The voltage across variable resistor R318 charges capacitor C307 during each main gate. Zener diode CR303 has a breakdown (Zener) voltage from 9 to 12 volts. When the average charge potential across capacitor C307, governed by the main gate pulse repetition rate and resistor R318 setting, reaches this voltage, diode CR303 conducts. When diode CR303 conducts, a negative voltage is applied to IF amplifiers V202, V203, and V204 (par. *27b* and *c*), reducing the receiver sensitivity. When the frequency of the main gate pulse increases, capacitor C307 has less time to discharge between main gate pulses; this increases the average voltage across capacitor C307. The main gate pulse amplitude and duration are constant; therefore the only two factors affecting capacitor C307 voltage are the repetition rate and the adjustment of resistor R318.

29. Decoder Card
(fig. 23)

a. General. Interrogation pulse pairs are applied directly and through delay line DL351 to three decoders V351, V352, V353. Delay line DL351 has three delayed outputs corresponding in time to the pulse separations of the three interrogation modes used in the Mark X IFF System. This delay enables tube V353 to pass only mode 1 interrogations; tube V352, mode 2; and tube V351, mode 3. The decoder card has several outputs; three direct outputs, allowing each decoder to trigger its mode gate multivibrator; a direct connected all-mode output that triggers the main gate multivibrator; an all-mode output controlled by switching diode CR354 that triggers mode 1 gate multivibrator and the ring around gate multivibrator for NORMAL-EMER or NORMAL-l/P replies and modes 1 and 3 outputs controlled by switching diodes CR355 and CR356, to trigger the ring around gate multivibrator for MOD-EMER, MOD-I/P, or CIVIL-EMER replies.

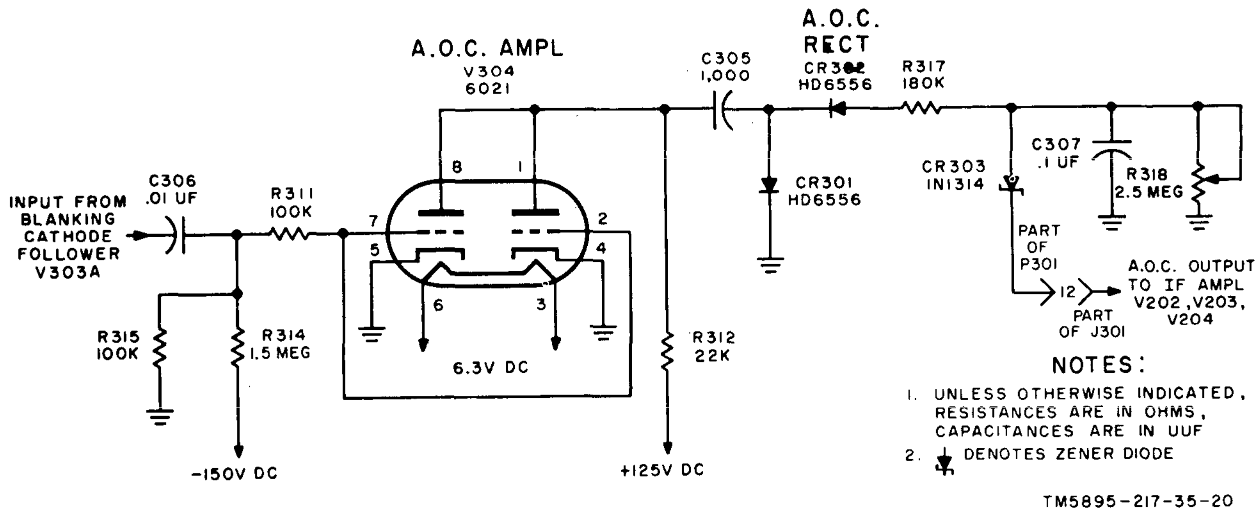


Figure 22. A.O.C. amplifier and rectifier, partial schematic diagram.

All of the above decoder outputs are single negative pulses 0.4 usec in width.

b. Modes 1, 2, and 3 Decoders (fig. 24). The decoders consist of three identical coincidence amplifier stages. The interrogation mode is determined by comparing the second pulse of an incoming pulse pair, at pin 3 of receptacle J351 and card connector P351, with the first pulse delayed 3, 5, or 8 usec. Each of the three tubes (V351, V352, and V353) has its control grids and suppressor grids biased beyond cutoff by -150-volt dc distribution bus (par. 42), through dropping resistor R363. Plate voltage for the three tubes is supplied from the +125-volt dc distribution bus (par. *41e)* through plate load resistors R352, R355, and R358. The small difference in plate load resistances adjusts the amplification of the decoders to compensate for slight signal losses in the delay line. Ground return for the grids is provided by resistors R353, R356, and R359; resistor R351 and capacitor C351 in series match the termination impedance of delay line DL351. A received interrogation pulse pair, coupled through capacitor C357, is fed simultaneously to the suppressor grids of all three decoders, and to delay line DL351 input. Pin 17 of card connector P351 applies the first pulse to the control grid of tube V353 3 usec after it appeared on the suppressor grids. Pin 8 of card connector P351 applies the first pulse to the control grid of tube V352 5 usec after it appeared on the suppressor grids, and pin 2 of card connector P351 applies the first pulse to the control grid of tube V351 8 usec after it appeared on the suppressor grids. A mode 1 interrogation consists of two pulses with a separation of 3 usec; under these conditions, the only tube that will amplify is V353 (Mode 1 decoder) because the 3-usec delay of delay line DL351 has applied the first pulse to the control grid at the same time the second pulse is applied to the suppressor grids. The modes 2 and 3 decoders operate in the same manner to identify the modes 2 and 3 interrogations spaced 5 and 8 usec, respectively. When a decoder operates, the single pulse appearing across its plate load resistor is coupled to the decoder output distribution network *(c* below). Therefore, each decoder can conduct and produce a single output pulse if the second pulse on the suppressor grid coincides with the first pulse after it has been delayed. Capacitors C354, C353, and C352 couple modes 1, 2, and 3 trigger pulses, respectively, to the output distribution network.

c. Recoder Output Distribution (fig. 25). The outputs from the mode decoders consist of 0.4 usec negative pulses occurring at the same time the second interrogation pulse of a pulse pair was received at the decoder card. The mode 1 trigger pulse coupled through capacitor C354 across resistor R361, will trigger mode 1 gate multivibrator V401 in the gate generator card (par. 30). Diode CR358 prevents this negative pulse from feeding back into other circuitry. A mode 2 trigger pulse coupled through C353 across resistor R357 will trigger mode 2 gate

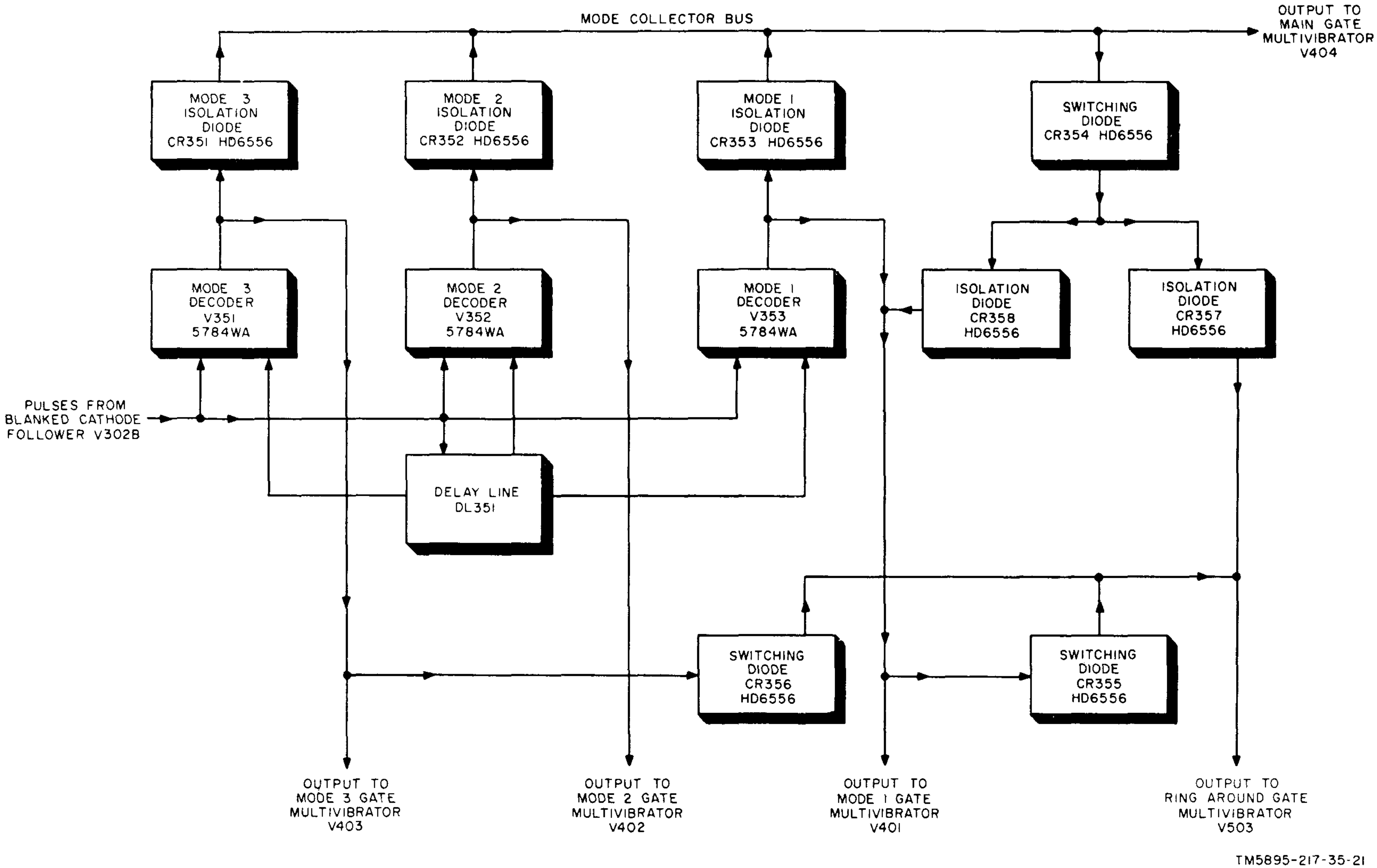


Figure 23. Decoder card, block diagram.

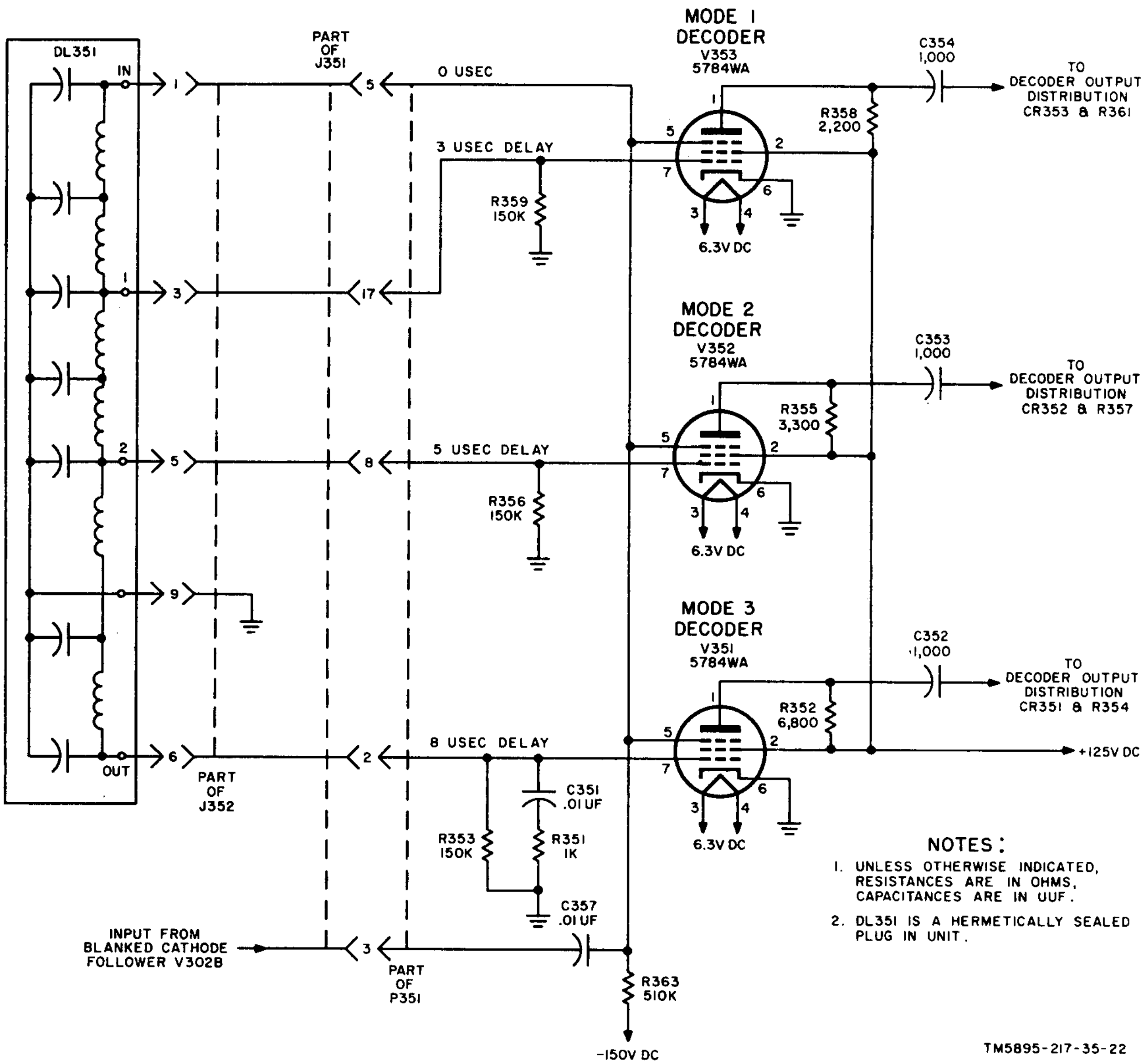


Figure 24. Modes 1, 2, and 3 decoders, partial schematic diagram.

multivibrator, and a mode 3 trigger pulse coupled through C351 across R354 will trigger mode 3 gate multivibrator V403. Diodes CR351, CR352, and CR353 couple their respective mode outputs to main gate multivibrator V404. Each of these diodes prevent the other two mode trigger pulses from entering its output circuit. Resistor R360 terminates the main gate multivibrator common trigger pulse line. Diodes CR354, CR355, and CR356 perform switching functions, and are cut off by a negative bias from the -150-volt dc distribution bus (par. 42). Diode CR354 sets up ring around gate multivibrator V503 with decoder output pulses for EMER and I/P categories of NORMAL function, and diodes CR355 and CR356 provide ring around decoder pulses for MOD-EMER, MOD-I/P or CIVIL-I/P categories.

(1) Diode CR354 receives its cutoff bias from voltage divider resistors R364 and R365 bypassed by C356 and through R362. This bias is removed whenever emergency-normal relay K4 (par. 43) energizes connecting pin 16 of card connector P351 to ground. Relay K4 will energize if the control unit

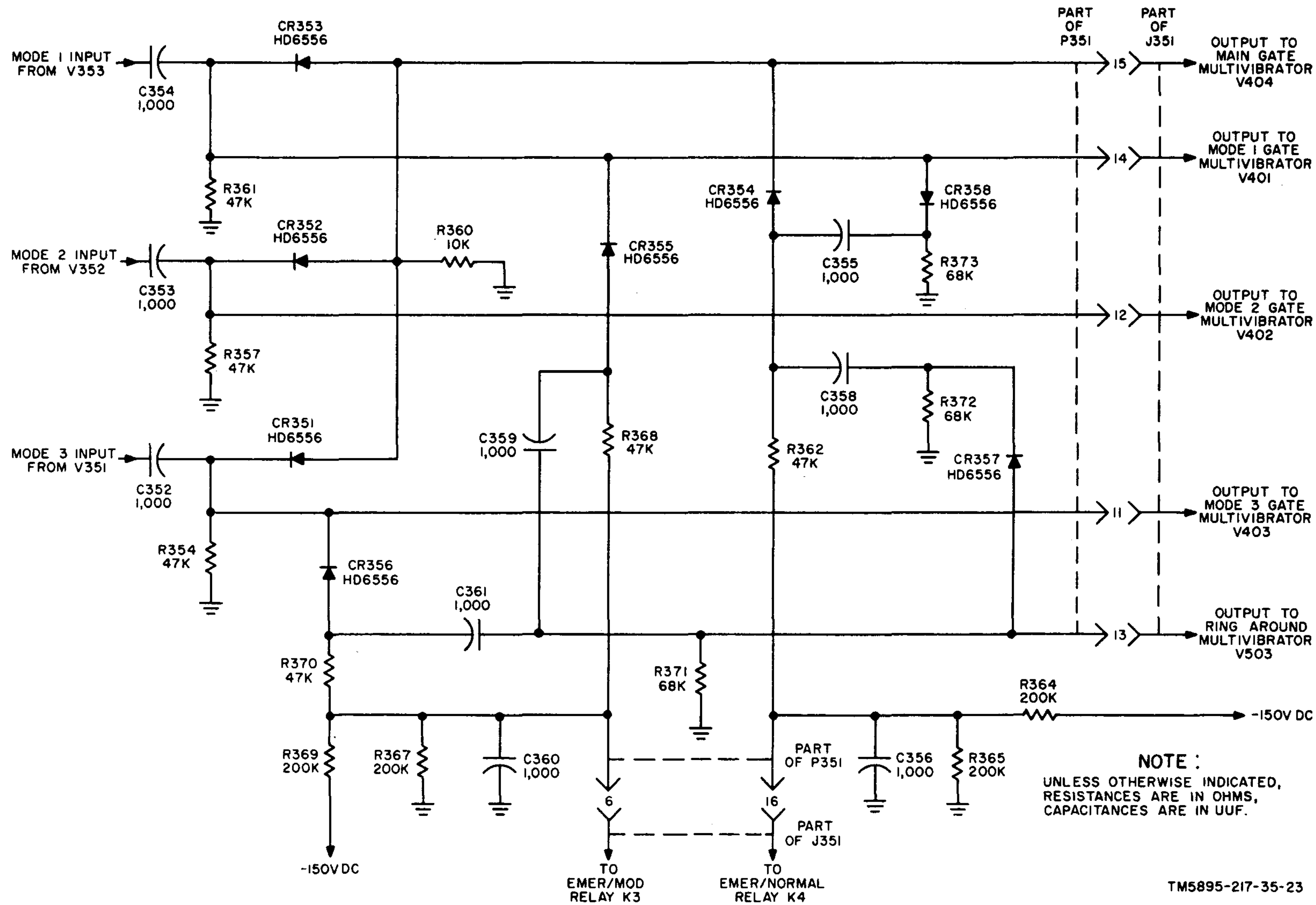


Figure 25. Decoder output distribution, simplified schematic diagram.

function control is set to NORMAL and either I/P or EMER operation is used. Under these conditions, an interrogation in any mode will trigger ring around gate multivibrator V503 in the blocking oscillator and ring around card (par. 31). The all-mode pulse is coupled through CR354 and C358 and developed across resistor R372. Diode CR357 passes the trigger pulse to pin 13 of card connector P351 but prevents multivibrator V503 output from feeding back through the decoder output distribution circuits. Capacitor C355 couples all-mode trigger pulses across resistor R373 and the output of CR358 triggers mode 1 gate multivibrator V401 (par. *30b*).

(2) The cutoff bias for diodes CR355 and CR356 is supplied by voltage divider resistors R367 and R369, bypassed by capacitor C360. Pin 6 of card connector P351 is grounded by emergency modified relay K3 (par. *46g)* whenever the control unit master switch is set to EMER or; whenever the control unit is set to I/P and the function control is set to MOD. Resistor R370 is the load resistor for CR356 and mode 3 trigger pulses; and R368 the load for CR355 and the mode 1 trigger pulses. Capacitors C359 and C361 couple the Modes 1 and 3 pulses across load resistor R371. These pulses are applied to ring around gate multivibrator V503 in the blocking oscillator and ring around card (par. *31c*).

(3) The decoder output distribution circuit supplies the necessary trigger pulses to the ring around gate multivibrator for the repetitive characteristics of I/P and EMER replies. Mode 2 interrogations are answered with repeated replies in NORMAL function only.

30. Gate Generator Card (fig. 26)

a. General. Modes 1, 2, and 3 gate multivibrators V401, V402, and V403 have identical circuits that produce three independent 120-usec mode gate pulses according to the interrogation mode. Each of the three multivibrators, when triggered by a 0.4-usec negative pulse from the appropriate mode decoder, supplies its gate to the appropriate mode reply selector. Mode 1 gate multivibrator V401 is also triggered in EMER and I/P (except CIVIL) functions by a combined mode pulse. Each mode gate multivibrator output is applied to its respective mode reply selector in the mode reply selector card (par. 35) allowing the selector to assembly the desired reply train. Main gate multivibrator V404 is triggered by a 0.4-usec negative pulse from any of the mode decoders, and supplies the following output gates:

(1) A negative gate applied through the main gate amplifier to the video amplifier card (par. 28), for video blanking and A.O.C.

(2) A negative pulse to the ringing oscillator and coincidence card (par. 36) that allows ringing oscillator V551 to operate.

(3) A positive gate to the blocking oscillator and ring around card (par. 31) that triggers and allows encoder blocking oscillator V501 to operate.

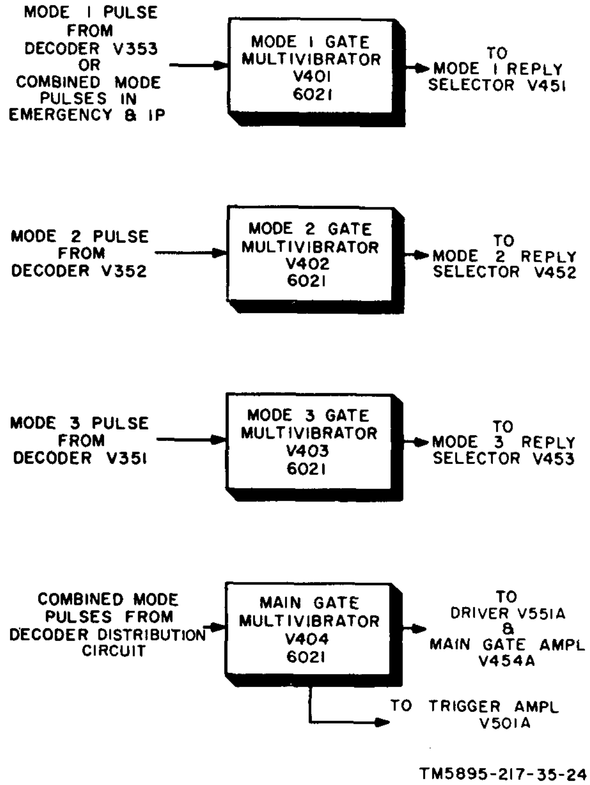


Figure 26. Gate generator card, block diagram.

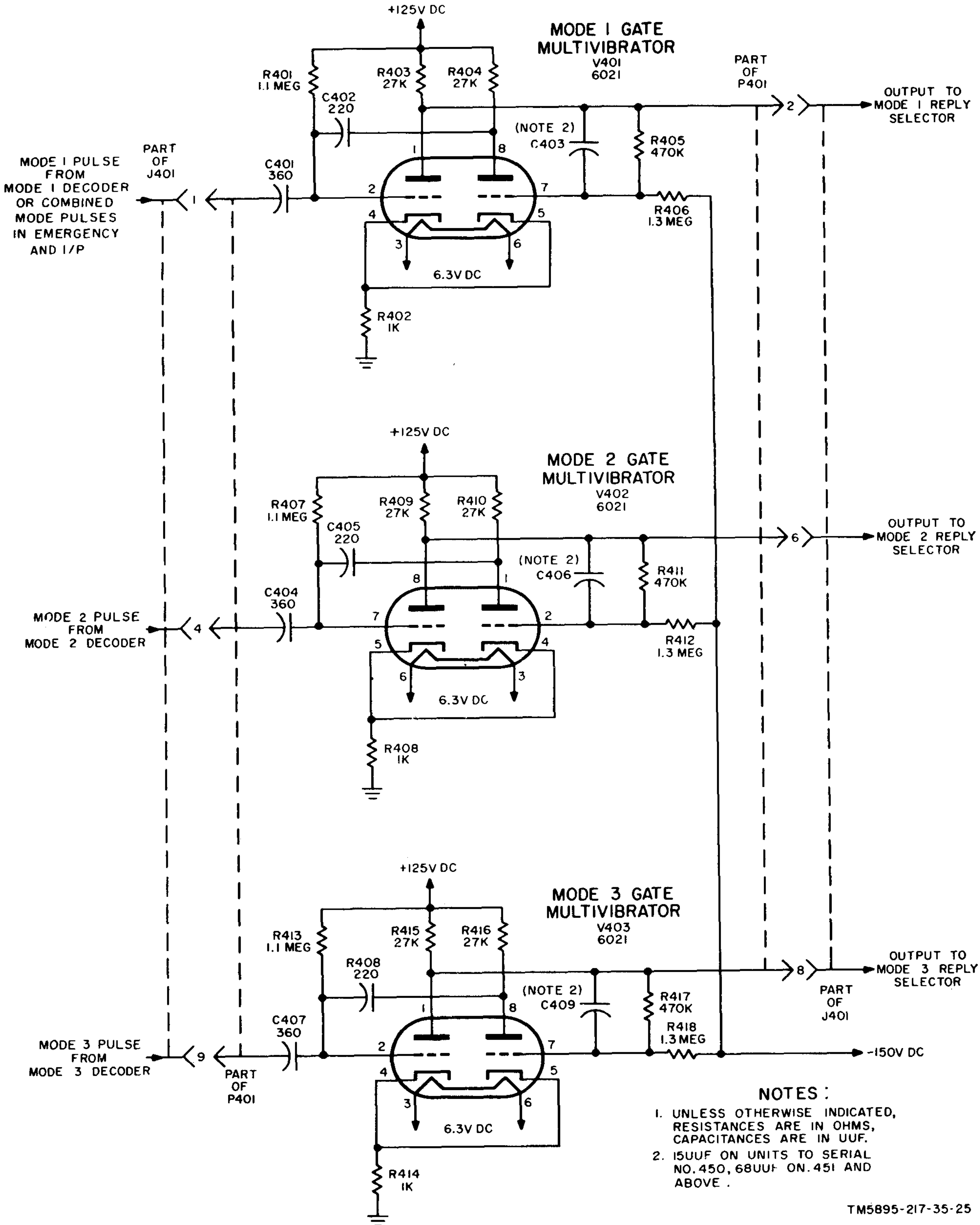


Figure 27. Modes 1, 2, and 3 gate multivibrators, schematic diagram.

b. Mode 1 Gate Multivibrator (fig. 27). Grid pin 2 of tube V401 is positive biased by resistor R401 connected to the +125-volt dc distribution bus (par. *41e)* to cause plate current saturation. Identical plate load resistors R403 and R404 are used for both sections of tube V401, and grid pin 7 is negative biased with voltage divider resistors R405 and R406 connected from the -150-volt dc distribution bus (par. 42) to ground. Resistor R402 is a common cathode-biasing resistor to control operating bias when tube V401 oscillates. Capacitors C402 and C403 are feedback coupling capacitors. When a negative decoder pulse is coupled through C401 to grid pin 2, pin 1 plate current is driven to cutoff; this drives grid pin 7 positive through C403. Grid pin 7 going positive increases pin 8 plate current and the negative going plate voltage is coupled back to hold grid pin 2 at cutoff. The decoder input pulse has collapsed by this time and pin 1 plate current is cutoff and pin 8 plate current has reached saturation. The length of time this condition exists (determined by the charge and discharge rates of capacitors C402 and C403) sets the width of the gate pulse. When this static condition is reached, capacitors C402 and C403 reverse and drive the tube sections back to the static starting voltages present before the decoder trigger pulse arrived. A positive mode gate pulse is coupled from plate pin 1 directly to the mode 1 reply selector tube V451 (par. *35b)* through pin 2 of card connector P401.

c. Modes 2 and 3 Gate Multivibrators (fig. 27). The circuits for modes 2 and 3 gate multivibrators are similar to mode 1 gate multivibrator *(b* above). Pin 7 of V402 and pin 2 of V403 grids are positive biased by resistors R407 and R413 connected to the +125-volt dc distribution bus (par. *41e),* causing plate current saturation of this section. The other section of each of these multivibrators is cutoff by negative bias from the -150-volt distribution bus (par. 42) through two separate voltage dividers. Resistors R412 and R411 apply the cutoff bias to the grid pin 2 of V402, and resistors R418 and R417 apply cutoff bias to the grid pin 7 of V403. Resistors R408 and R414 are the common cathode resistors for the two multivibrators. Identical plate load resistors are also used; resistors R409 and R410 for V402, and R415 and R416 for V403. The cross-connected feedback between the two triode sections of each multivibrator is provided by capacitors

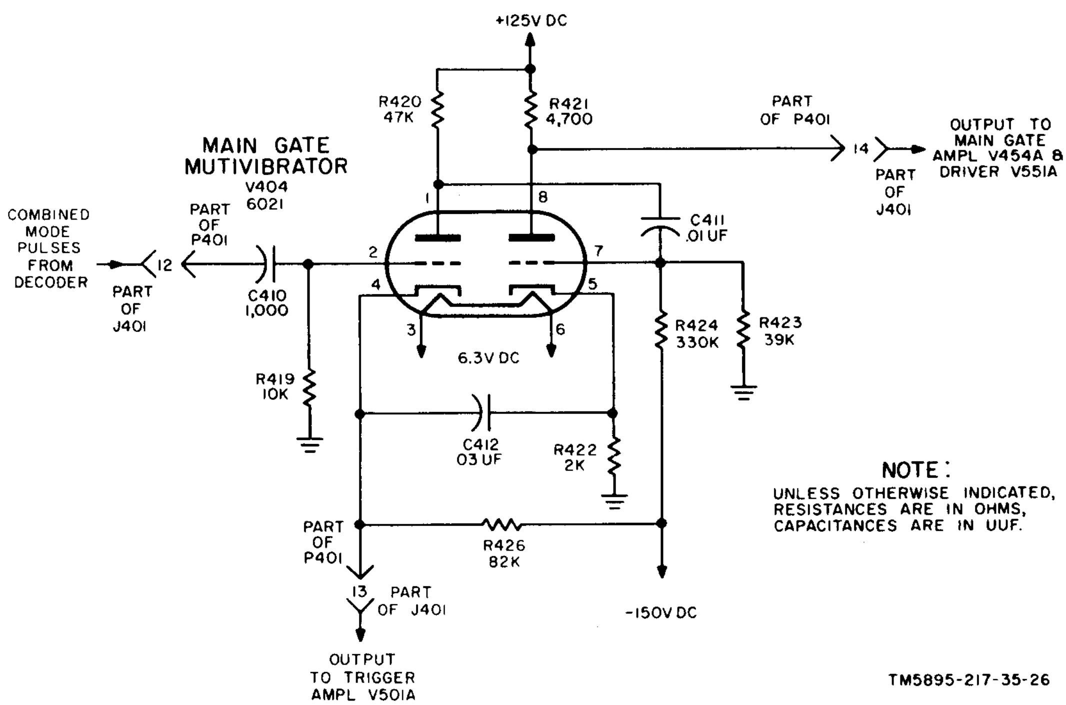


Figure 28. Main gate multivibrator, partial schematic diagram.

C406, C405, C408, and C409. The trigger input to V402 from the mode 2 decoder is connected to pin 4 of card connector P401 and is coupled to grid pin 7 through capacitor C404. The trigger input from mode 3 decoder connected to pin 9 of card connector P401 is coupled through capacitor C407 to the grid pin 2 of V403. The output gates from these decoders, connected to pins 6 and 8 of card connector P401, are applied to their respective reply selector.

d. Main Gate Multivibrator (fig. 28). Although main gate multivibrator V404 operation is similar to multivibrators V401, V402, and V403, its circuit is altered to better accommodate its multiple outputs. The pin 2 grid section is biased to plate saturation by the application of a high negative cathode bias through resistor R426 from the -150-volt dc distribution bus (par. 42). The grid is returned to ground through resistor R419. Plate pin 1 has R420 as plate load resistor and plate pin 8, R421; both obtain plate voltage from the +125-volt dc distribution bus (par. *41e*). Grid pin 7 is biased to cutoff by voltage divider resistors R423 and R424 from the -150-volt dc distribution bus (par. 42). Capacitors C411 and C412 are feedback coupling capacitors, and cathode resistor R422 at pin 5 provides additional operating bias. A negative trigger pulse from the decoder, coupled through C410, drives pin 2 grid negative causing pin 1 plate voltage to increase. The positive voltage change is coupled by capacitor C411 to grid pin 7, driving pin 8 plate toward saturation. This increased plate current causes cathode pin 5 to become more positive. The positive increase at pin 5 is coupled through capacitor C412 to cathode pin 4, driving plate pin 1 to cutoff. Circuit time constants hold tube saturation. for approximately 120 usec before it can return to the static condition. Positive main gate pulses are taken from cathode pin 4 to operate trigger amplifier V501A in the blocking oscillator and ring around card (par. 31). Negative pulses are taken from plate pin 8 to operate ringing oscillator driver V551A in the ringing oscillator and coincidence card (par. 36), and to be amplified by main gate amplifier V454A in the mode reply selector (par. *35d)* for video blanking and A.O.C.

Section IV. ENCODER-TRANSMITTER THEORY

31. Blocking Oscillator and Ring Around Card (fig. 29)

a. General. The blocking oscillator and ring around card supplies one or more excitation pulses to delay line DL601, from which all coded reply trains are formed. Isolating diode CR501 couples and differentiates the main gate pulse from main gate multivibrator V404 to the input of trigger amplifier V501A. The output of tube V501A triggers encoder blocking oscillator V501B, which supplies a 1-usec positive pulse to delay line DL601. During EMER and I/P operations, the reply train must be repeated although only one interrogation pulse pair was received. To initiate this repeat, an all-mode trigger pulse is supplied to ring around gate multivibrator V503 which generates a gate pulse of either 37, 57, or 87 usec in width. The 37-usec ring around gate pulse is used in MOD-I/P (par. *46f)* only, the 57-usec gate in NORMAL-I/P and NORMAL-EMER (par. *46c* and *d),* and the 87-usec in the MOD-EMER and CIVIL-EMER (par. *46g* and *j)* conditions. These ring around gate pulses allow gated amplifier V502 to amplify ring around trigger pulses obtained from the ring around bus in the mode 1 reply code switching card (par. 32). The output pulses of tube V502 are applied to trigger amplifier V501A to start encoder blocking oscillator V501B. Only three ring around pulses (from the mode 1 bus) occur during the ring around gate. Actually, the first reply train is triggered by the original interrogation and only three more reply trains are needed to complete MOD-EMER operation.

b. Trigger Amplifier and Encoder Blocking Oscillator (fig. 30). Trigger amplifier V501A is biased to cutoff by voltage divider resistors R502 and R503, connected to the -150-volt dc distribution bus (par. 42). Its plate is connected in parallel with the plate of encoder blocking oscillator tube V501B to a common plate load consisting of the primary of transformer T501 paralleled by resistor R522. Plate voltage is supplied by the +125-volt dc distribution bus (par. *41e).* The positive pulses from main gate multivibrator V404 (par. *30d)* at pin

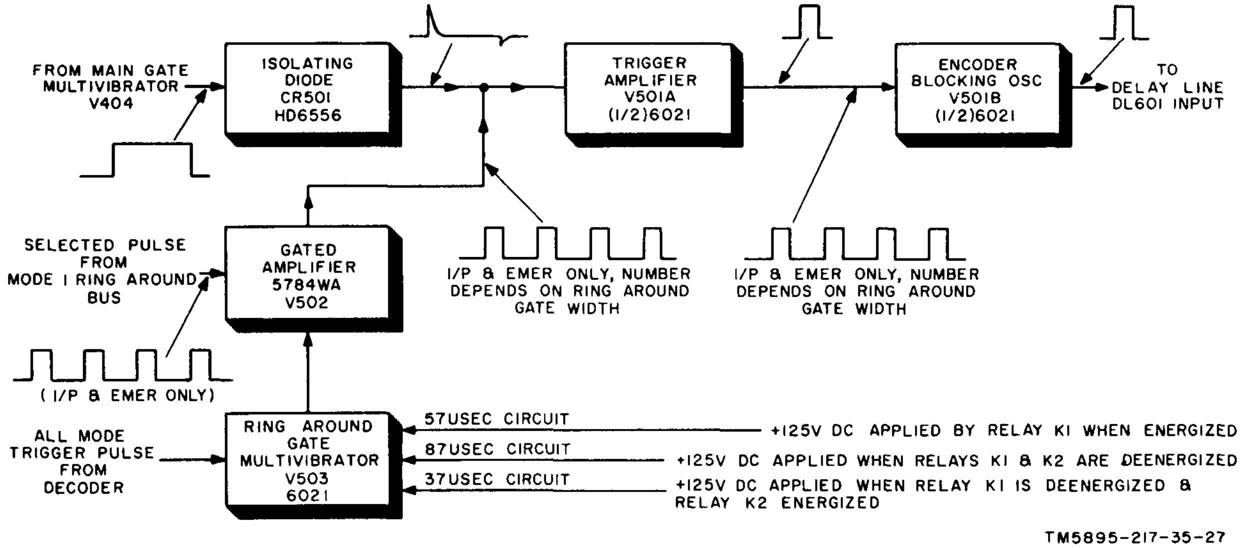


Figure 29. Blocking oscillator and ring around card, block diagram.

3 of card connector P501 are coupled through isolating diode CR501 to resistor R501. Diode CR501 prevents trigger amplifier input pulses from returning to main gate multivibrator V404, and assists coupling capacitor in differentiating the main gate pulse. Isolating diode CR501 allows coupling capacitor C501 to charge rapidly to the positive main gate pulse amplitude. Trigger pulses for repetitive reply construction during EMER and I/P operations are obtained from gated amplifier V502 through transformer T502 and coupling capacitor C502. Diode CR502 clips the negative pulse peaks from the output of transformer T502 secondary. Fixed bias for encoder blocking oscillator V501B is supplied by voltage divider resistors R505 and R506 connected to the -150-volt dc distribution bus (par. 42), and self-bias is provided by cathode resistor R521. Capacitor C503 eliminates degeneration caused by cathode resistor R521. A positive trigger pulse, fed to tube V501A input, causes plate current to increase through the primary of transformer T501. A positive voltage induced in the secondary is applied to the grid of tube V501B. The encoder blocking oscillator grid is quickly driven positive and draws current, charging capacitor C513. The rate and amount of charge of capacitor C513 are determined by the setting of resistor R523. After the trigger pulse reaches maximum amplitude, the rate of plate current change begins to diminish, and the secondary voltage of transformer T501 reduces. When the charge voltage of capacitor C513 equals the secondary voltage of transformer T501, they cancel because of opposite polarities. The static fixed bias then cuts off tube V501B and the magnetic field of transformer T501 begins to callapse, reversing the secondary voltage polarity. This reversal drives tube V501B further into the cutoff region, sharpening the trailing edge of the generated pulse. Ringing oscillations are eliminated in the encoder blocking oscillator by the slow discharge of capacitor C513, keeping the grid below cutoff. Desirable trigger pulses through trigger amplifier V501A have sufficient amplitude to overcome this additional bias when required. The encoder blocking oscillator output, taken from the cathode of tube V501B, is a pulse of approximately 1 usec in width as determined by the setting of resistor R523. This pulse is applied to delay line DL601.

c. Ring Around Gate Multivibrator (fig. 31). Multivibrator tube V503 is a conventional monostable multivibrator capable of providing an output gate with one of three different pulse widths. Resistors R515 and R516 are plate loads, and capacitors C510 and C511 are feedback coupling capacitors. A voltage divider consisting of resistors R517 and R518, in series with R515 between the +125-volt and -150-volt dc distribution buses, supplies negative bias to grid pin 7. Grid pin 2 is positive biased to saturate plate (pin 1) current. The value of this

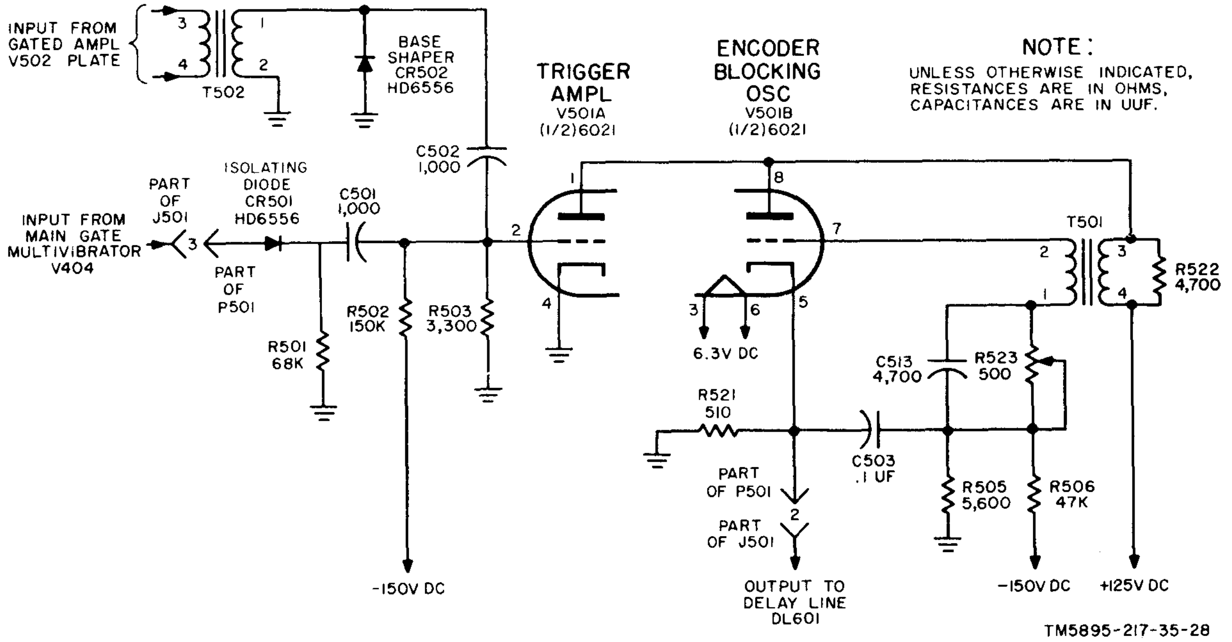


Figure 30. Trigger amplifier and encoder blocking oscillator, partial schematic diagram.

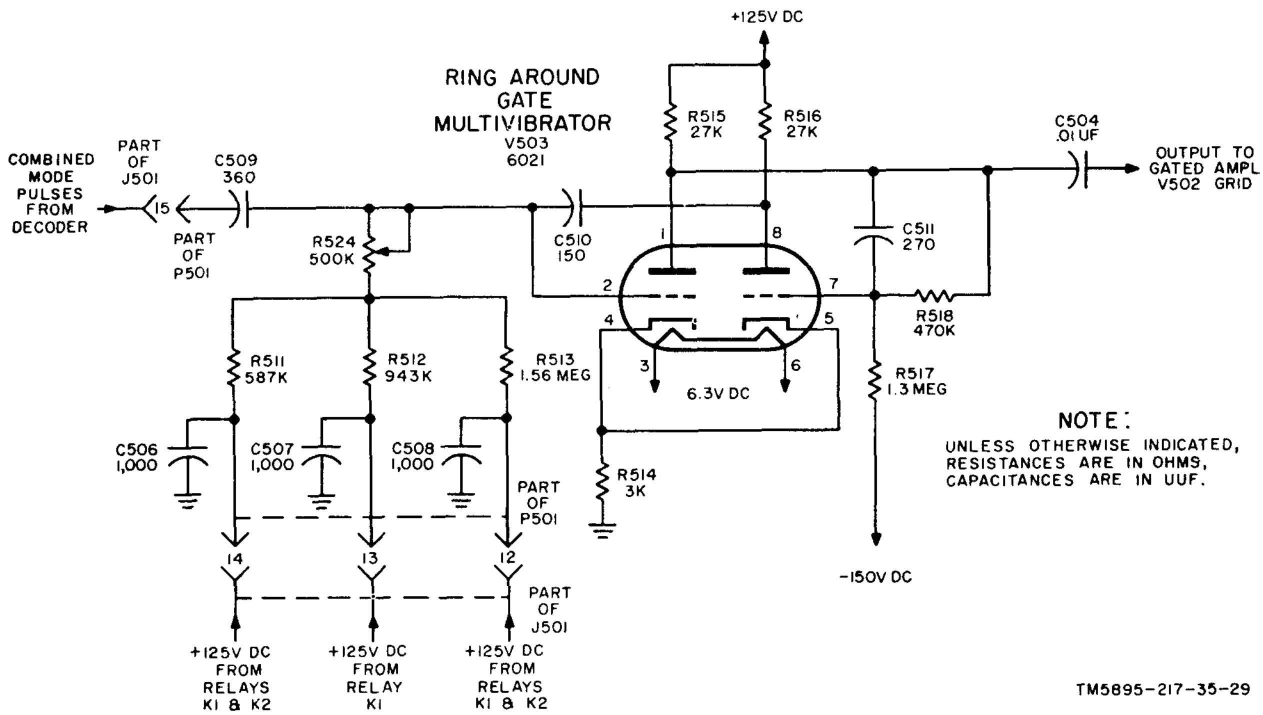


Figure 31. Ring around gate multivibrator, schematic diagram.

positive grid voltage is determined by resistor R524 and whether the +125-volts dc is supplied through resistor R511, R512; or R513. Capacitors C506, C507, and C508 prevent pulses from entering the +125-volt dc distribution bus (par. *41e*). Common cathode resistor R514 sets the overall operating bias to the optimum condition. A negative trigger pulse from the decoder card (par. 29) is coupled through capacitor C509 to grid pin 2 to cutoff plate (pin 1) current. The increasing plate voltage at pin 1 is coupled through capacitor C511 to grid pin 7, saturating pin. 8 plate current. The decreasing voltage at the plate, pin 8, is coupled through capacitor C510 to drive the grid, pin 2, into cutoff. During this cutoff period, capacitor C510 must discharge through one of the selected resistors (R511, R512, or R513) before grid pin 2 returns to the high positive static bias condition. The length of time grid pin 2 is cut off determines the ring around gate multivibrator output pulse width. The positive gate pulses are coupled through capacitor C504 to gated amplifier V502. Resistor R511 provides 37 usec pulses; R512, 57 usec pulses; and R513, 87 usec pulses.

d. Gated Amplifier (fig. 32). Gated amplifier V502 requires two positive pulse inputs before plate current will flow, developing an output across the secondary of transformer T502. Suppressor grid cutoff bias is supplied by voltage divider resistors R509, R510, and control grid cutoff bias is -150-volts dc unless modified-emergency relay K3 is energized. Energizing K3 grounds pin 10 of card connector P501 and drops the control grid bias to approximately -25 volts through voltage divider resistors R507 and R508. Capacitor C512 bypasses signals from the modified-emergency relay circuit when K3 is not energized. If relay K3 is energized the positive 37-, 57-, or 87-usec ring around gate multivibrator pulses coupled through capacitor C504 bring the control grid out of cutoff. During the time of this gate, positive pulses applied to the suppressor grid will appear in the plate circuit. These positive pulses are obtained from the ring around bus in the mode 1 reply code switching card (par. 32) through pin 8 of card connector P501 and coupling capacitor C505. Positive trigger pulses taken from the secondary of transformer T502 are coupled through capacitor C502 to trigger amplifier V501A. Base shaper CR502 clips the negative peak swing of the ouput pulses.

32. Mode 1 Reply Code Switching (fig. 33)

a. General. Mode 1 I/P and EMER replies (consisting of repeated replies) are described in paragraph 46. The formation of single replies or reply trains for each category are listed below. In MOD or CIVIL, the reply train consists of the first and last framing pulses with up to six information pulses selected by the MODE 1

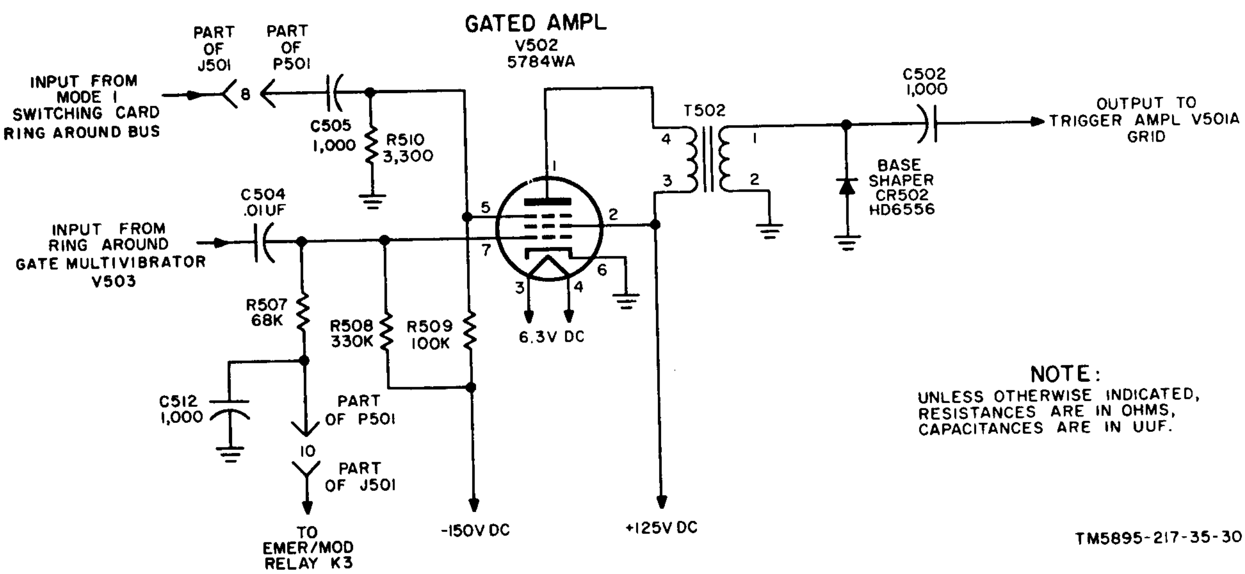


Figure 32. Gated amplifier, partial schematic diagram.

code control. The MODE 1 code control consists of two concentric selector switches S901A and S901B. NORMAL replies consist of individual pulses only.

b. Mode 1 Normal Replies. Mode 1 NORMAL replies, a single pulse (A, fig. 5), are provided by the direct ground from pin M of receptacle J901, pin 15 of J112, and pin 26 of card connector P621. This ground removes the +60-volt dc cutoff bias applied to diode CR621 through resistors R621 and R622. The O-usec pulse from terminal 1 of delay line DL601 is developed across resistor R621 and coupled to Mode 1 reply selector V451 bus 1 by capacitor C622. Although relay K1 is closed when switch S903 is in the NORMAL position (par. *46b),* the 15.05-usec pulse fed to gated amplifier V502 by diode CR627 and capacitor C634 is not effective because gated amplifier V502 is cut off. Function control S903 removes the ground connection from MODE 1 control S901, eliminating code control pulse selection.

c. Mode 1 MOD or Mode 1 CIVIL Replies.

(1) *Framing pulses.* MODE 1 code control, selector switches S901A and B are activated by the ground supplied to their number one arm contacts from function control S903 (set to MOD or CIVIL). This ground, through pin A of receptacle J901 and pin 10 of card connector P621, closes switching diode CR629 and applies the 20.3-usec pulse from terminal 15 of DL601 to bus 1 through capacitor C638 as the last framing pulse. The first framing pulse is supplied by the closing of switching diode CR621 through the ground from pin M of receptacle J901 (as in *b* above), selecting the 0-usec pulse to bus 1. The two framing pulses will always be present for modified or civil replies regardless of MODE 1 code control S901 position, and are the only pulses present in a reply when S901 is in the 00 position.

(2) *Group A (tens) pulses.* The group A (tens) pulses are selected through seven positions of switch S901A. The 2.9-usec delayed pulse (A1 pulse, fig. 5) is produced when contact 2 or 4 of switch S901A rear supplies the ground connection through pin C of J901 and pin 24 of card connector P621 to close switching diode CR622. Contact 2 or 4 is closed in the 1, 3, 5, and 7 dial number positions. Pulses are developed across resistor R623 and coupled to bus 1 by capacitor C624. Contacts 3, 8, and 12 of S901A rear supply a ground through pin D of J901 and pin 22 of J621, at dial numbers 2, 3, and 6 closing switch diode CR623 to produce the 5.8-usec pulse (A2 pulse, fig. 5) which is coupled through capacitor C626. The remaining group A pulse (A4 pulse, fig. 5) is an 8.7-usec delayed pulse produced by the ground from contact 5 on switch S901A front through pin C of J901 and pin 20 of P621. This ground is present in the 4, 5, 6, and 7 dial number positions. This ground closes switching diode CR624 and develops the pulse across resistor R627 and through capacitor C628 to bus 1.

(3) *Group B (units) pulses.* The group B (units) switching section of MODE 1 code control is limited to three positions as the available assigned code numbers (par. *21a)* are limited. Contacts 2 and 4 of switch S901B rear apply the ground which closes switching diode CR625 in the 1 and 3 dial number positions only. The 11.6-usec pulses (B1) are developed across resistor R629 and coupled to bus 1 through capacitor C630. Contact 3 of switch S901B rear closes switching diode CR628, and although contacts 8 and 12 would do the same, the switch cannot rotate far enough to accomplish this. Thus, the 14.5-usec delayed pulse (B2 pulse, fig. 5) is used only in the dial number 2 position.

33. Mode 2 Reply Code Switching
(fig. 34)

a. General. Mode 2 coded reply trains, available only in MOD or CIVIL functions and when MODE 2 switch S905 is set to ON, are controlled by 12 toggle switches (S101 through S112) on the receiver-transmitter front panel (fig. 6).

b. MODE 2 NORMAL Replies. Mode 2 NORMAL replies consist of two pulses, spaced 15.95

usec (B, fig. 5). Diode CR651 is permanently set up to conduct O-usec pulses from delay line DL601, developing its output pulse across resistor R651 and coupling it to bus 2 through capacitor C651. With switch S903 on NORMAL, relay K1 is energized. Contacts 6/8 of relay K1 apply a ground to resistors R670 and R671, removing the +60-volt dc bias applied to diode CR661. Diode CR661 then passes the 15.95-usec delayed pulse from delay line DL601, developing an output across resistor R670, which is coupled through capacitor C671 to bus 2. Only these two pulses can be selected in NORMAL function, because the 12 toggle switches are deactivated by contact 7 of relay K1.

c. Mode 2 MOD or Mode 2 CIVIL Replies.

(1) *Framing pulses.* Diode CR651 is permanently set to conduct O-usec pulse from delay line DL601 when MODE 2 switch S903 is ON. This pulse output is developed across resistor R651 and coupled to bus 2 through capacitor C651. When function control S903 is set to MOD or CIVIL, relay K1 is deenergized, and its contacts 6-7 gronnd resistors R676 or R677. This ground removes the +60-volt dc bias from diode CR664, permitting it to conduct the 20.3-usec delayed pulse from delay line DL 601. Output of diode CR664 is developed across resistor R676 and coupled to bus 2 through capacitor C677.

(2) *Group A (thousands) pulses.* Group A (thousands) pulses are selected by switches S102, S104, and S106 (front panel numbers 1, 2, and 3). The 2.9-usec pulse (A1 pulse, fig. 5) is produced when switch S102 is closed, closing switching diode CR653, the output of which is developed across resistor R654 and coupled to the output through capacitor C655. The 5.8-usec pulse (A2, fig. 5) is produced when switch S104 is closed, closing switching diode CR655. The output of diode CR655 is developed across resistor R656 and coupled to bus 2 through capacitor C657. The 8.7-usec delayed pulse (A4, fig. 5) is produced when switch S106 is closed, closing switching diode CR657. The output of diode CR657 is developed across resistor R662 and coupled to bus 2 through capacitor C663.

(3) *Group B (hundreds) pulses.* Group B (hundreds) pulses are selected by switches S107, S109, and S111 (front panel numbers 4, 5, and 6). The 11.6-usec delayed pulse (B, fig. 5) is produced when switch S107 is closed, closing switching diode CR658. The output of diode CR658 is developed across resistor R664 and coupled to bus 2 through capacitor C665. The 14.5 -usec delayed pulse (B2, fig, 5) is produced when switch S109 is closed, closing switching diode CR660. The output of diode CR660 is developed across resistor R668 and coupled to bus 2 through capacitor C669. The 17.4-usec delayed pulse (B4, fig. 5) is produced when switch S111 is closed, closing switching diode CR662. The output of diode CR662 is developed across resistor R672 and coupled to bus 2 through capacitor C673.

(4) *Group C (tens) pulses.* Group C pulses (tens) are selected by switches S101, S103, and S105 (front panel numbers 7, 8, and 9). The 1.45-usec delayed pulse (C1, fig. 5) is produced when switch S101 is closed, closing switching diode CR652. The output of diode CR652 is developed across resistor R652 and coupled to bus 2 through capacitor C653. The 4.35-usec delayed pulse (C2, fig. 4) is produced when switch S103 is closed, closing switching diode CR654. The output of diode CR654 is developed across resistor R656 and coupled to bus 2 through capacitor C657. The 7.25-usec delayed pulse (C4, fig. 5) is produced when switch S105 is closed, closing switching diode CR656. The output of diode CR656 is developed across resistor R660 and coupled to bus 2 through capacitor C661.

(5) *Group D (units) pulses.* Group D (units) are selected by switches S108, S110, and S112 (front panel numbers 10, 11, and 12). The 13.05-usec delayed

pulse (D1, fig. 5) is produced when switch S108 is closed, closing switching diode CR659. The output of diode CR659 is developed across resistor R666 and coupled to bus 2 through capacitor C667. The 15.95-usec delayed pulse (D2, fig. 5) is produced when switch S110 is closed, closing switching diode CR661. The output of diode CR661 is developed across resistor R670 and coupled to bus 2 through capacitor C671. The 18.85-usec delayed pulse (D4, fig. 5) is produced when switch S112 is closed, closing switching diode CR663. The output of diode CR663 is developed across resistor R674 and coupled to bus 2 through capacitor C675.

34. Mode 3 Reply Code Switching (fig. 35)

a. General. Only NORMAL, MOD, or CIVIL mode 3 replies are discussed below, because I/P and EMER selections are discussed in paragraph 46. The MODE 3 code control consists of two concentric selector switches S902A and S902B.

b. Mode 3 NORMAL Replies. Mode 3 NORMAL replies consists of a single pulse (C, fig. 5) which is passed by switching diode CR681. Diode CR681 is permanently set up to conduct the O-usec pulse, by a ground through pin B of receptacle J901. The output of diode CR681 is developed across resistor R681 and coupled to bus 3 through capacitor C682.

c. Mode 3 MOD and Mode 3 CIVIL Replies.

(1) *Framing pulses.* MODE 3 code control selector switches S902A and B are activated by grounding both number one arm contacts. This ground is supplied by function control S903, when set to MOD or CIVIL. This ground is also applied through pin j of receptacle J901, to close switching diode CR695 which supplies a 20.3-usec delayed pulse to bus 3, through capacitor C696. This 20.3-usec delayed pulse is the second framing pulse. The first framing pulse is supplied by switching diode CR681 (*b* above). The two framing pulses are fixed parts of the mode 3 MOD or mode 3 CIVIL replies, regardless of code control S901 settings.

(2) *Group A (tens) pulses.* Group A pulses (tens) are selected through seven positions of switch S902A. These selections are independent of settings of switch S902B. The 2.9-usec delayed pulse (A1, fig. 5) is produced in dial positions 1, 3, 5, and 7 when contact 2 or 4 of switch S902A rear provides the ground connection to close switching diode CR683. These output pulses are developed across resistor R683 and coupled to bus 3 through capacitor C684. The 5.8-usec delayed pulse (A2, fig. 5) is produced when contact 3, 8, or 12 of switch S902A rear provides the ground connection to close switching diode CR684 (in the 2, 3, 6, and 7 dial positions). The output of diode CR684 is developed across resistor R685 and coupled to bus 3 through capacitor C686. The 8.7-usec delayed pulse (A4, fig. 5) is produced when contact 5 on switch S902A front provides the ground connection (in the 4, 5, 6, and 7 dial positions) to close switching diode CR687. The output of diode CR687 is developed across resistor R687 and coupled to bus 3 through capacitor C688.

(3) *Group B (units) pulses.* Group B pulses (units) are selected through seven positions of switch S902B (independent of switch S902A settings). The 11.6-usec delayed pulse (B1, fig. 5) is produced when contact 2 or 4 of switch S902A rear provides the ground connection to close switching diode CR688 (in the 1, 3, 5, and 7 dial positions). Output of diode CR688 is developed across resistor R689 and coupled to bus 3 through capacitor C690. The 14.5-usec delayed pulse (B2, fig. 5) is produced when contact 3, 8, or 12 of switch S902B rear provides the ground connection to close switching diode CR691 (in the 2, 3, 6, and 7 dial positions). Output of diode CR691 is developed across resistor R691 and coupled to bus 3

through capacitor C692. The 17.4-usec delayed pulse (B4, fig. 5) is produced when contact 5 of switch S902B front provides the ground connection to close switching diode CR692 (in the 4, 5, 6, and 7 dial positions). The output of diode CR692 is developed across resistor R693 and coupled to bus 3 through capacitor C694.

35. Mode Reply Selector Card

(fig. 36)

a. General. The three mode reply selectors (V451, V452, and V453) are identical stages and their individual identifications are determined by the characteristics of their input signals. Each selector receives a gate pulse from its respective mode gate multivibrator (par. 30) and the series of pulses selected by the reply code switching circuits (pars. 32, 33, and 34). Each mode reply selector tube has a common bus connection from its corresponding mode reply switching card which carries the code pulses selected from delay line DL601. For a given interrogation, only one gate will be applied to a reply selector, as determined by the interrogation mode. All three mode reply trains from the modes 1, 2, and 3 reply switching cards are applied to the respective reply selectors. The reply selector that receives a gate will apply its coded reply train to the common reply selector connection. The selected pulses on the common connection are applied to base shaper diode CR451. Diode CR451 removes any positive excursions or irregularities before the pulse train is amplified in reply train amplifier V454B and fed to coincidence detector V554 (par. *36e).* This selected reply train is the basic group which eventually results in the transponder transmitted reply. Main gate amplifier V454A amplifies the output of main gate multivibrator V404 (par. *30d)* for application as positive pulses to blanking cathode follower V303A (par. *28c)* in the video amplifier card.

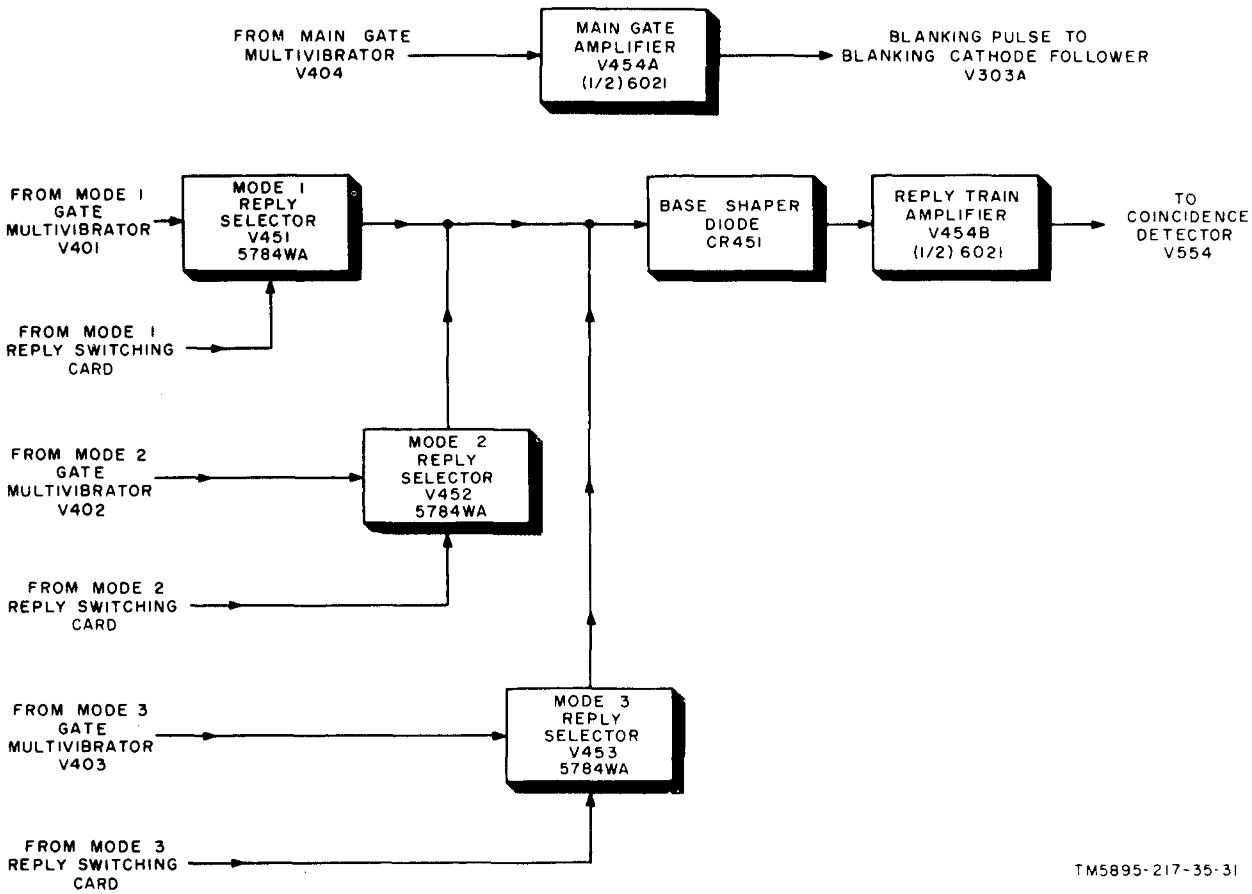


Figure 36. Mode reply selector card, block diagram.

b. Modes 1, 2, and 3 Reply Selectors (fig. 37). Mode reply selectors V451, V452, and V453 operate identically when the MODE 2 and MODE 3 control unit switches are ON. Suppressor grid bias is supplied from the -150-volt dc distribution bus (par. 42) through resistors R451-R452, R455-R456, and R459-R460, and control grid bias is taken from a common bus established by resistors R454 and R457 through respective resistors R453, R458, and R461. Capacitors C453 and C456 prevent stray pickup from entering the suppressor grid circuit, and capacitor C452 bypasses any signals on the control grid bias bus. Resistor R462 is a common plate load for all three tubes, and plate voltage is obtained from the +125-volt dc distribution bus (par. *41e*). Each mode gate pulse, coupled by capacitor C451, C454, or C455 to the control grid, overcomes the fixed bias and allows the reply code pulses applied to the suppressor grid to be amplified by the appropriate mode reply selector. The mode gate pulse switches on the correct mode reply selector for approximately 120 usec to pass the selected code reply train for that mode. The common outputs are coupled through capacitor C457 to base shaper diode

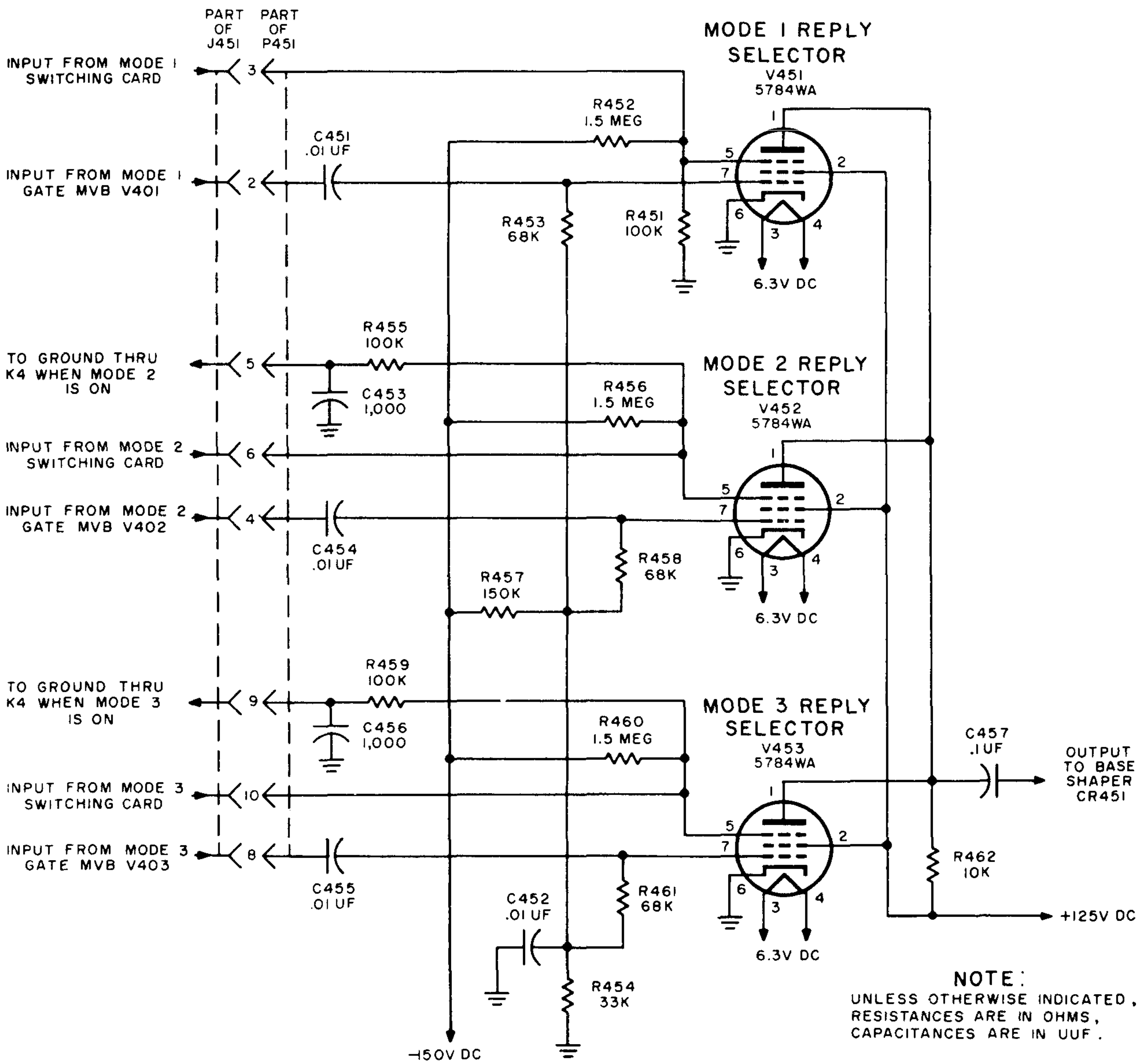


Figure 37. Modes 1, 2, and 3 reply selectors, partial schematic diagram.

CR451. When mode 2 and mode 3 replies are not required, the control unit removes the ground from pins 5 and 9 of card connector P451, and tubes V452 and V453 are maintained at cutoff by -150-volt bias on their control grids.

c. Reply Train Amplifier (fig. 38). The negative reply train pulses are coupled through capacitor C457 to the cathode of base shaper CR451. The cathode of CR451 is maintained approximately 15 volts positive by the voltage divider consisting of resistors R463 and R464. The negative reply train pulses must first overcome this voltage before diode CR454 can apply them across resistor R465 to the grid of reply train amplifier V454B. This removes any irregularities appearing at the reference level of the pulse train. Tube V454B amplifies the pulses and develops them across plate load resistor R466. The positive pulse reply train from tube V454B is applied to coincidence detector V554 through pin 14 of card connector P451.

d. Main Gate Amplifier (fig. 39). Main gate amplifier V454A is zero-biased to permit large negative pulse swings without clipping. The input to tube V454A, from main gate multivibrator V404 (par. *30d),* is coupled through capacitor C458 to the grid circuit. Resistor R468 is the grid resistor. The positive main gate output pulses developed across plate load resistor R467 are applied through pin 12 of card connector P451 to blanking cathode follower V303A (par. *28c)* in the video amplifier card.

36. Ringing Oscillator and Coincidence Card

(fig. 40)

a. General. A negative main gate pulse is applied through driver V551A to excite the ringing oscillator V551B. During the approximate 120-usec period of this main gate pulse, the ringing oscillator produces slightly damped sine waves with a one-cycle period of 1.45 usec (approximately 690 kc). The sine wave is squared by first and second clippers V552A and V552B and differentiated by tube V553A. The output of differentiator V553A, consisting of a

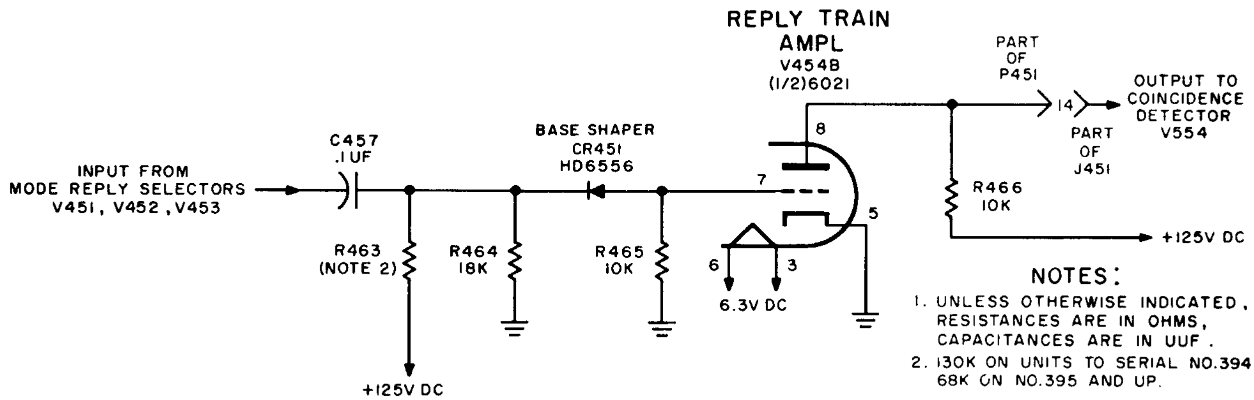


Figure 38. Reply train amplifier, partial schematic diagram.

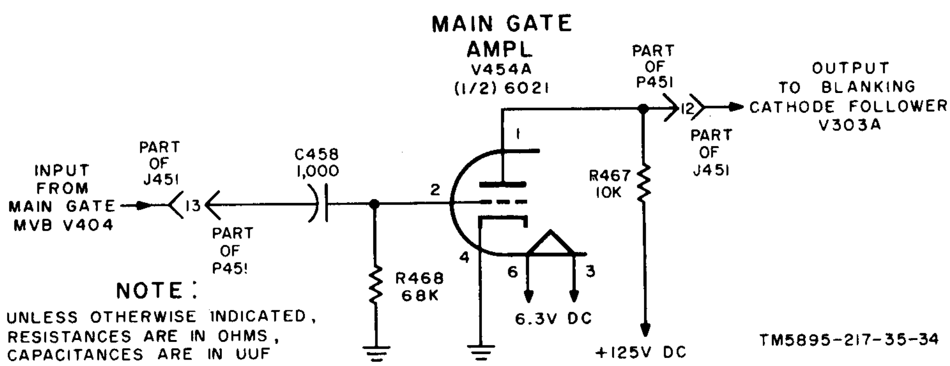


Figure 39. Main gate amplifier, partial schematic diagram.

series of accurately timed (1.45 usec) pulses, is fed to coincidence detector V554 together with the selected reply code train (pedestal) from reply train amplifier V454B (par. *35c).* Each pedestal pulse individually enables tube V554 to pass an individual pulse from the differentiator. The resulting reply train of pulses triggers blocking oscillator V553B once for each pulse received. The output of blocking oscillator V553B, consisting of an accurately timed reply train, is applied to trigger amplifier V151A in the modulator-transmitter section of the receiver-transmitter (par. *37b).* The ringing oscillator and coincidence card provides the required pulse spacing accuracy.

b. Driver and Ringing Oscillator (fig. 41). Negative main gate pulses are coupled through capacitor C551 and are applied across voltage divider resistors R551 and R571 to the grid of driver tube V551A. Tube V551A is zero-biased under static conditions and will accept the full amplitude swing of the main gate pulse. The plate of tube V551A is maintained at ac ground by capacitor C552; plate voltage is supplied through resistor R552. Ringing oscillator V551B is a Hartley-type oscillator and direct cathode coupling is used between it and the driver. Inductor L551 and capacitor C553 form the parallel-resonant circuit with L551 adjustable. Tube V551B bias is obtained from cathode resistor R553. The cathode is connected to ground through a tap on inductor L551 to provide feedback to sustain oscillations. Oscillator plate voltage is supplied directly from the +125-volt dc bus, and the output signal is taken from the parallel-resonant circuit. The negative gate pulse from the cathode or V551A is applied across inductor L551, and ringing oscillator V551B is shock-excited into oscillation. Inductor L551 is adjusted to produce a one-cycle period of 1.45 usec (approximately 690 kc). This oscillator is, and must be, stable as its output provides accurate pulse timing for the transmitted reply trains.

c. First and Second Clippers (fig. 42). The 690-kc ringing oscillator output is direct coupled through resistor R554 to first clipper V552A. Positive peak clipping takes place in the grid circuit of tube V552A because of grid current flow through resistor R554 on positive peaks. The output of V552A, developed across plate load resistor R555, is coupled through capacitor C554 to the grid of second clipper V552B. Tube V552B clips the positive peaks fed to its grid by plate saturation. Resistor R556 is small and will not accommodate the full signal swing present on the grid. Because of negative bias provided by resistors R557 and R558, negative grid peaks drive tube V552B into cutoff. The output of second clipper V552B, developed across plate load resistor R556 is coupled through capacitor C555 to the grid of differentiator V553A.

d. Differentiator (fig. 43). The 690-kc square wave from the plate circuit of second clipper V552B is coupled through capacitor C555 to the grid of differentiator V553A. The coupling circuit, consisting of capacitor C555 and re-

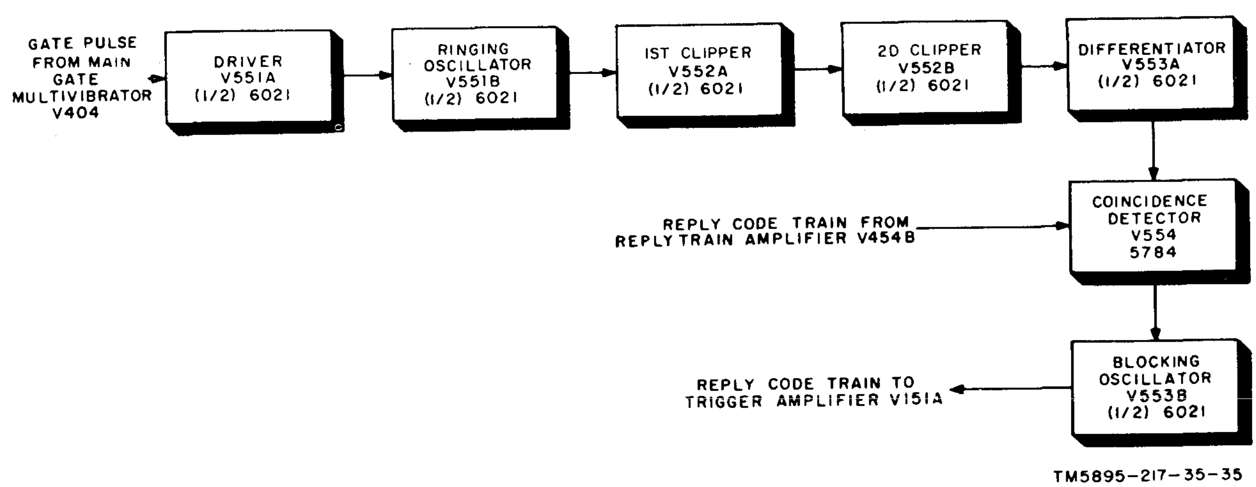


Figure 40. Ringing oscillator and coincidence card, block diagram.

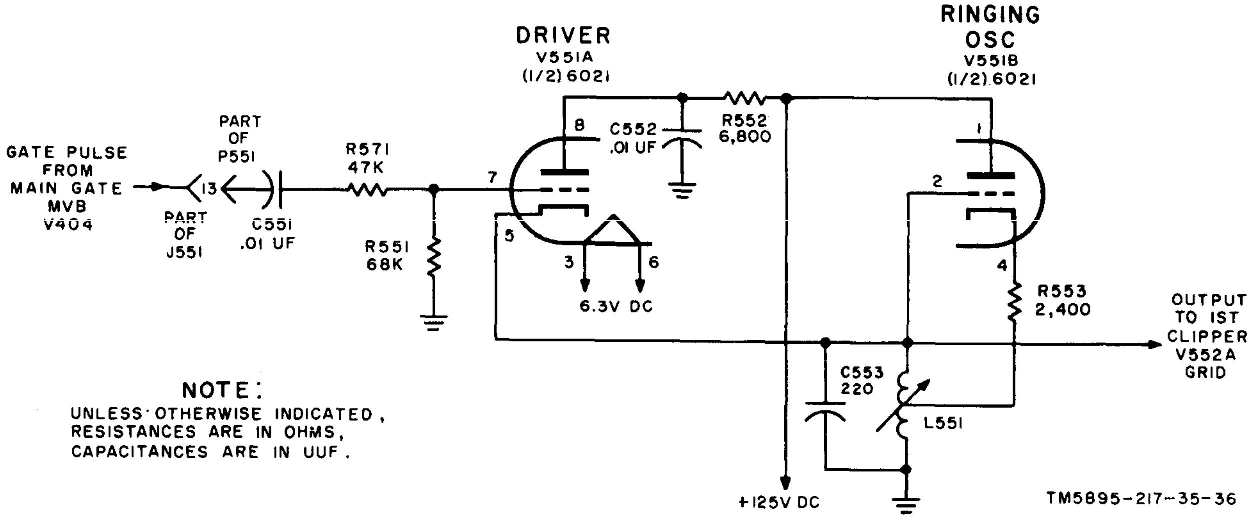


Figure 41. Driver and ringing oscillator, partial schematic d'agram.

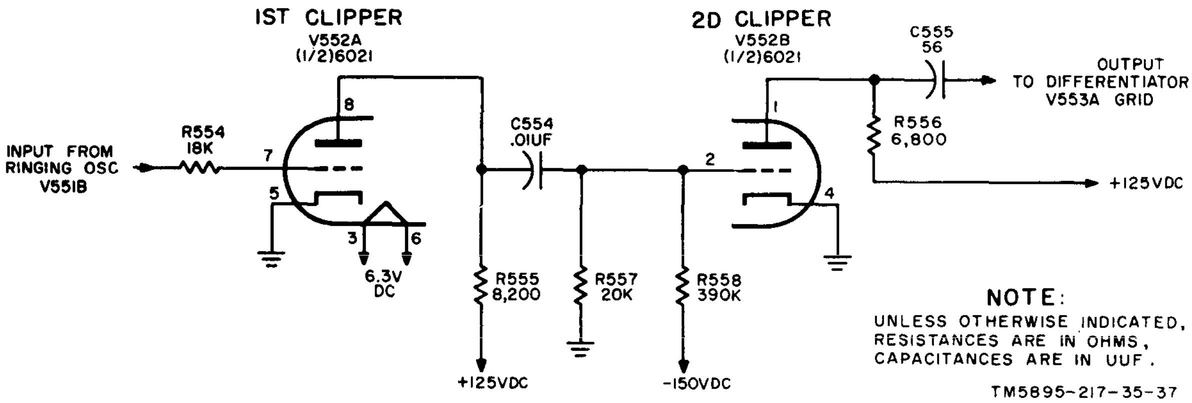
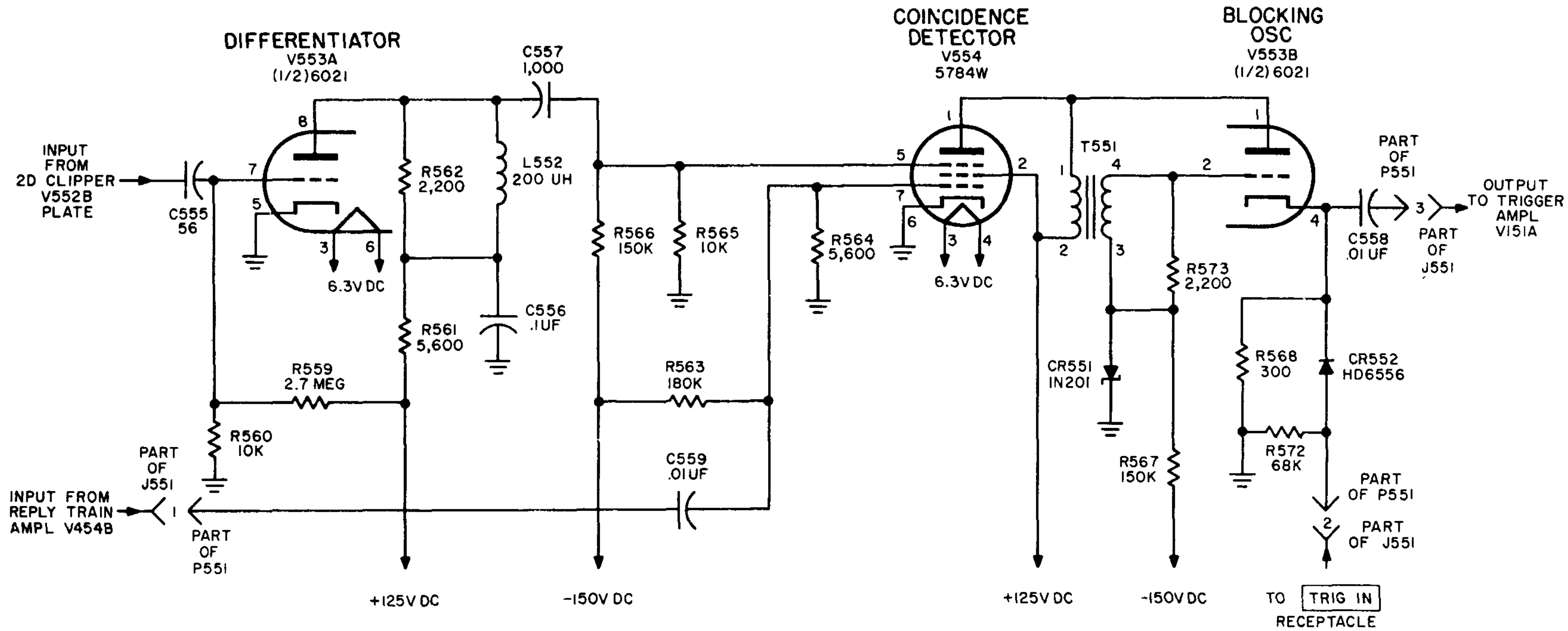


Figure 42. First and second clippers, partial schematic diagram.

sistor R560, has a short time constant (approximately 0.056 usec). This short time constant differentiates the square wave, applying positive and negative pulses (representing the leading and trailing edges of the 690-kc square wave) to the grid of V553A. Type V553A is positive biased to saturation by the voltage divider network consisting of resistors R559 and R560. The positive pulses are not amplified, but the full amplitude of the negative pulses are amplified by tube V553A developing positive pulses at its plate circuit. The plate circuit has coil L552 in parallel with plate load resistor R562. This improves the high-frequency response and peaks the pulses, giving them a short rise and decay time and good amplitude. Plate voltage for V553A is supplied from the +125-volt dc source (par. *41e)* through a decoupling filter consisting of resistor R561 and capacitor C556.

e. Coincidence Detector (fig. 43). The output of differentiator V553A, consisting of accurately timed (1.45 usec) positive pulses, is coupled through capacitor C557 to the suppressor grid of coincidence detector V554. The pulse reply train from reply train amplifier V454B at pin 1 of card connector P551 is coupled through capacitor C559 to the control grid of V554. The suppressor grid of the coincidence detector is biased to cutoff by voltage divider resistors R565 and R566, and the control grid is biased to cutoff by voltage divider resistors R563 and R564 connected to the -150-volt dc source (par. 42). The presence or absence of pulses in the



NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. ⯆ DENOTES ZENER DIODE.
3. ▭ INDICATES EQUIPMENT MARKING.

TM5895-217-35-38

Figure 43. Differentiator, coincidence detector, and blocking oscillator, partial schematic diagram.

output is determined by the positive pulses in the pulse train, which acts as the gating signal for the coincidence detector. The timing accuracy is determined by the pulses from the differentiator. The output of tube V554 starts operation of blocking oscillator V553B.

f. Blocking Oscillator (fig. 43). The plate of tube V554 is connected in parallel with the plate of blocking oscillator V553B through the primary of blocking oscillator transformer T551 to + 125-volt dc source (par. *41e*). When positive pulses are present on both grids of tube V554 (*e* above), plate current flows through the primary of transformer T551. This current induces a positive voltage at terminal 4. The grid of tube V553B was cutoff by a negative bias from the voltage divider consisting of resistor R567 and Zener diode CR551. The positive induced voltage at terminal 4 of transformer T551 starts the flow of blocking oscillator V553B plate current. This additional current through the primary of T551 increases the induced positive voltage applied to the grid, driving tube V553B into saturation. Once tube V553B is at saturation, the current through T551 primary stops increasing. At this time, the magnetic field in the transformer starts to collapse, driving the grid into cutoff. Blocking oscillator V553B is a fully driven oscillator and its pulse output characteristics are determined by transformer T551 shunted by resistor R573. Only positive pulses are coupled through capacitor C558 from cathode resistor R568, because the grid of tube V553B is driven to cutoff during negative portions of the grid pulses. Positive output pulses are prevented from developing across resistor R572 by diode CR552, but external positive pulses applied through front panel TRIG IN jack J105 will pass to provide external triggering of transmitting blocking oscillator V151B (par. *37b*).

37. Theory of Modulator-Transmitter

(fig. 44)

a. General. The pulse reply train from blocking oscillator V553B (par. *36f*) in the ringing oscillator and coincidence card is applied to trigger amplifier V151A. If the ground connection from control unit switch S904 is present, trigger amplifier V151A amplifies reply train of pulses and applies them as triggers to blocking oscillator V151B. Blocking oscillator V151B generates pulses with proper rise time, delay time, and pulse width as required for the transmitted replies. Properly shaped pulses from V151B are supplied to driver V152. The driver amplifies the pulses and applies them to the modulator. The modulator produces pulses of sufficient amplitude to excite the transmitting oscillator. The pulses from the modulator are coupled through pulse transformer T153 to

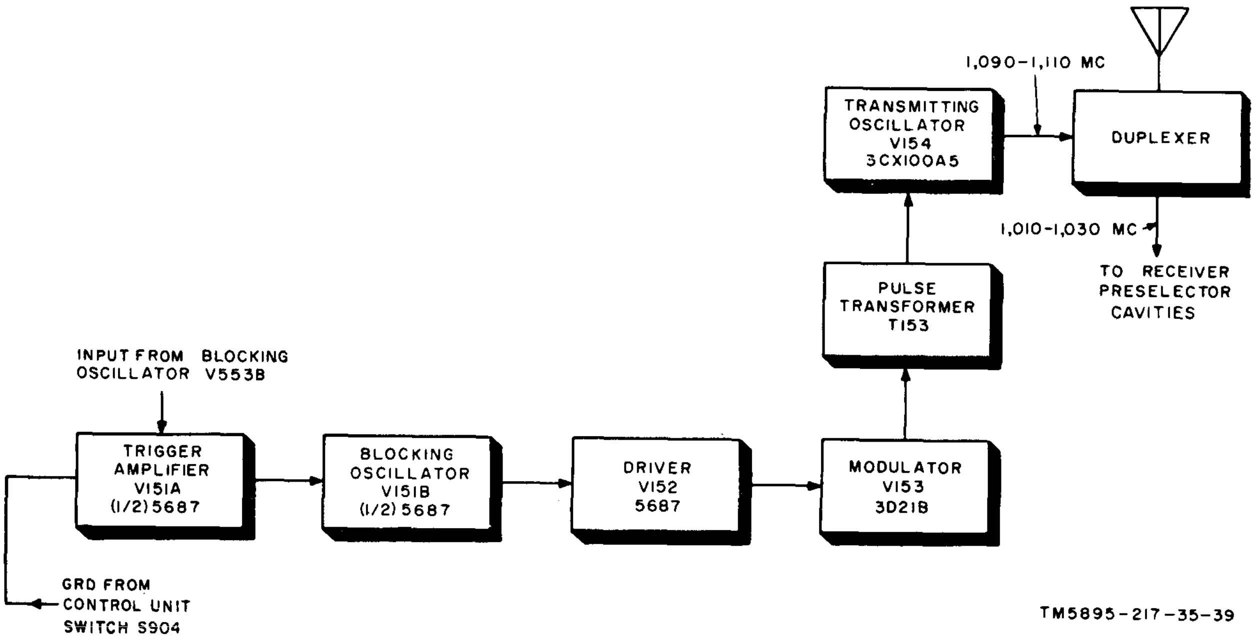


Figure 44. Modulator-transmitter, block diagram.

transmitting oscillator V154. The transmitting oscillator generates a burst of RF energy for each pulse received. The output of the transmitting oscillator, consisting of 1,090 to 1,110 mc RF pulses representing the coded pulse reply train, is applied through the duplexer to the antenna.

b. Trigger Amplifier and Blocking Oscillator V151 (fig. 45). Both sections of trigger amplifier and blocking oscillator V151 are biased to cutoff by the -150-volt dc distribution bus (par. 42) through decoupling filter consisting of coil L151 with capacitors C153, C155, and C156. Trigger amplifier grid pin 2 receives bias from voltage divider resistors R151 and R152. When master control switch S904 on the control unit is in STBY, resistor R151 is not grounded, and the full -150-volts is applied to trigger amplifier grid pin 2. This high bias prevents transmitter triggering during standby periods. Capacitor C152 bypasses the lead to the master control switch. Blocking oscillator grid pin 7 is biased by resistor R153 and Zener diode CR151. Zener diode CR151 maintains a constant bias voltage of approximately -30 volts dc. A positive pulse applied to the trigger amplifier grid causes plate current to flow through the primary of blocking oscillator transformer T151, and a positive voltage induced in the secondary at terminal 2 is applied to the blocking oscillator grid pin 7. This positive voltage causes the blocking oscillator plate current to flow through the primary of transformer T151, increasing the induced voltage applied to the blocking oscillator grid. The blocking oscillator grid rise time is nearly the same as the rise time of the trigger pulse, so that the grid draws current almost immediately. This grid current flow charges capacitor C151, with the charge rate determined by the setting of variable resistor R154. (The time constant of C151 and R154 determines the width of the blocking oscillator output pulse.) The blocking oscillator saturates as the trigger pulse approaches maximum amplitude, reducing the rate of plate current increase in the primary of transformer T151. This reduces the transformer secondary voltage applied to the blocking oscillator grid. When negative voltage across capacitor C151 equals the positive voltage across the transformer secondary, the two voltages cancel, and the blocking oscillator grid returns to cutoff. Plate current cutoff causes collapse of the magnetic field of transformer T151, driving the blocking oscillator grid beyond cutoff. Capacitor C151 discharges slowly to return grid bias to the static level slowly, preventing the blocking oscillator from being triggered by spurious oscillations in its own grid circuit. During this return to static bias, spurious oscillation amplitudes are too low to swing the oscillator grid positive, but closely spaced pulses of a reply train have sufficient amplitude to overcome the small additional bias developed by capacitor C151. Blocking oscillator output pulses are taken from secondary number two of transformer T151. Plate voltage for the trigger amplifier and blocking oscillator is taken from the +300-volt dc distribution bus (par. *41d)* through decoupling filter L152 and C157, and through the primary of transformer T151.

c. Driver V152 (fig. 45). Blocking oscillator output pulses are amplified by driver tube V152 for application to modulator V153. Positive pulses from transformer T151 are applied to both parallel driver grids, which are biased beyond cutoff. This bias of approximately -50-volts is taken from the -150-volt dc circuit through a voltage divider consisting of resistors R155 and R156 with Zener diode CR152. Zener diode CR152 maintains this voltage at a constant value. When positive pulse voltage overcomes the bias, the driver conducts, amplifying the input pulse. Resistors R157 and R158 prevent parasitic oscillations in driver tube V152. Resistor R163 shunts the secondary of transformer T151 to prevent ringing. Output of the driver is coupled to the modulator through transformer T152. Plate voltage for the driver is taken from the +300-volt dc distribution bus (par. *41d)* through decoupling filter L152, C157, and C158, and the primary of transformer T152. Pin 3 of transformer T152 secondary is connected to the -150-volt decoupling filter. This provides negative bias for the grid of modulator V153 *(d* below).

d. Modulator V153 (fig. 46). Driver output pulses are amplified by modulator V153 to provide high amplitude positive pulses for the plate of transmitting oscillator V154. Positive pulse voltages from T152 overcome the -150-volt bias on the modulator grid *(c* above). This

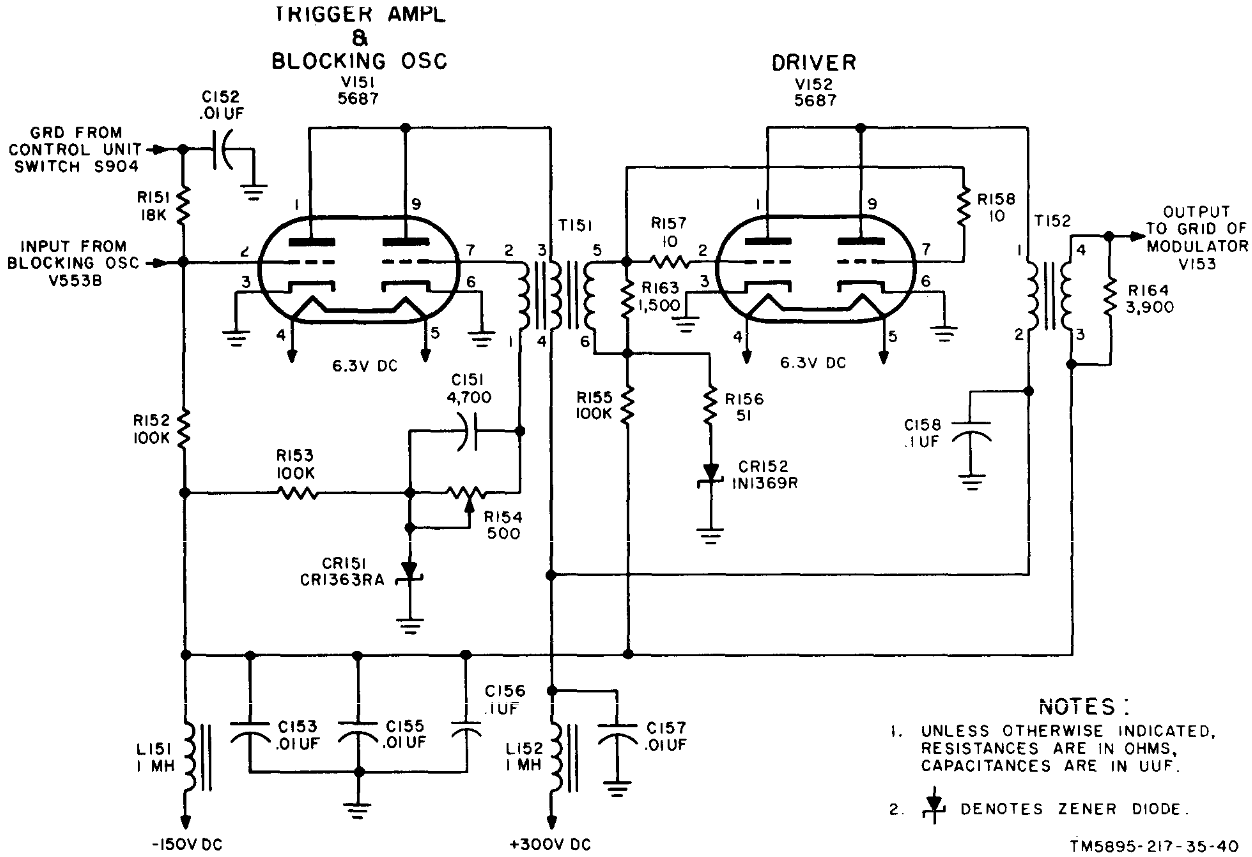


Figure 45. Trigger amplifier, blocking oscillator, and driver, partial schematic diagram.

bias is well beyond cutoff valve. Positive pulses applied to the grid from the secondary of T152 cause tube V153 to conduct. The pulsed plate current of tube V153 through the primary of pulse transformer T153 develops pulses of approximately 2,000-volt amplitude across the secondary. These pulses are applied to the transmitting oscillator as plate voltage. Plate voltage for the modulator is obtained from the +1,200-volt dc distribution (par. *41b)* and screen voltage is obtained from the +600-volt dc distribution (par. *41c).*

e. Transmitting Oscillator V154 (fig. 46). Transmitting oscillator V154 generates RF energy which is coded in bursts, according to the reply train fed to the modulator. The oscillator is a *lighthouse* tube, operating in a folded, full wavelength cavity at 1,090 to 1,110 mc. A sliding inductive shunt permits tuning the cavity. Cathode resistor R162 provides the minimum bias for oscillator V154. Plate voltage is the 2,000-volt pulses from the modulator and pulse transformer *(c* above). These pulses *excite* the transmitting oscillator. The RF output from the cavity is picked up by the adjustable capacitive probe and applied through jack J151 to the coaxial line of the duplexer. Resistor R159 provides a ground return for the secondary of pulse transformer T153, and develops the audio monitor output.

f. Duplexer. The duplexer (fig. 116), antenna tr switching component part, is made up of three lengths of coaxial cable joined together at a tee connection. Two line sections are critical in length (receiver and transmitter); the third (antenna) is not. The line section between the tee and ANTENNA receptacle J101 is nonresonant; therefore, its length is not critical. A full wavelength line at 1,030 mc (receiver frequency) is used between the tee and transmitting oscillator V154. Because this end is terminated by probe coupling in the oscillator cavity, the received interrogation signal looks into an open circuit at the tee. Seven quarter-

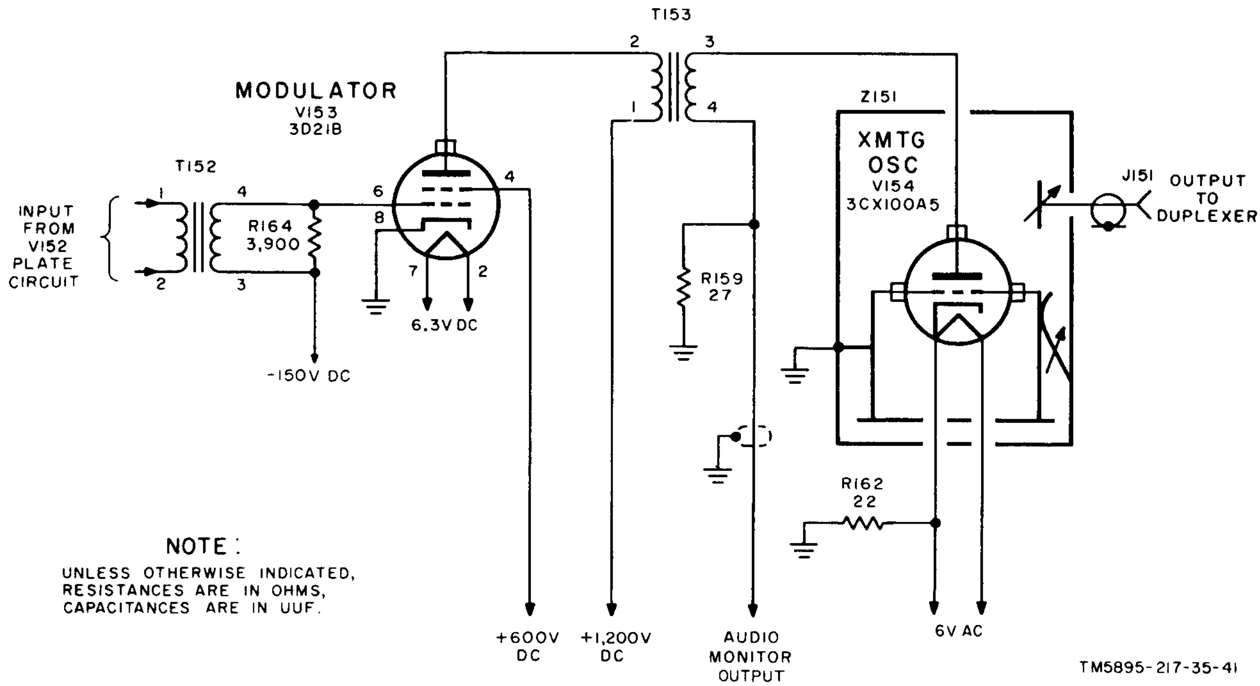


Figure 46. Modulator and transmitting oscillator, partial schematic diagram.

wavelengths of line, at 1,090 mc (transmitter frequency) are used between the tee and converter input connector J102-P102. The receiver line is terminated in a grounded loop and therefore presents an open circuit to transmitter signal at the tee. Each line is nonresonant to its correct signal.

38. Antenna Theory

a. Antenna AT-884/APX-44 is a horizontally polarized, omnidirectional antenna in the form of a small metal blade (fig. 5, TM 11-5895-217-12). Its frequency range is 900 to 1,220 megacycles with a low-voltage standing wave ratio. The antenna is fed from a coaxial cable transmission line single 50-ohm coaxial connector. The single antenna and transmission line conducts both received interrogations and transmitted replies.

b. The antenna is a half-wave grounded type fed from close to one end. The half wavelength is measured along the blade edge from one mounting flange to the opposite flange. In actual practice, the blade junction is insulated and sealed from the mounting flange with one end of the blade grounded internally. The coaxial connector feed is connected at a point away from the grounded end along the blade that best matches the 50-ohm coaxial transmission line.

c. The antenna is omnidirectional by being folded back at the ends and having a comparatively large metal surface. The large metal surface also provides the required broadband characteristics. The voltage standing wave ratio varies from approximately 1.31:1 to 1.27:1 over the receiver-transmitter frequency range. The aircraft metallic surfaces forms the ground plane against which the antenna radiates. The antenna requires no adjustments or servicing at any time.

Section V. POWER SUPPLY AND CONTROL CIRCUITS THEORY

39. Theory of High-Voltage Power Supply
(fig. 47)

a. General. Aircraft primary power at +27.5 volts dc is converted to +1,200, +600, and +300 volts dc by the high-voltage power supply. This supply also furnishes 6 volts ac for transmitting oscillator V154 filament. This filament voltage is obtained from secondary winding terminals 10 and 11 of transformer T2, and through resistor R13. The high-voltage power supply consists of power transistors Q3 and Q4; transformer T2; 16 silicon diode rectifiers, CR9 through CR24; associated filter, decoupling, control, and protective circuits.

b. Primary Circuit. Power transistors Q3 and Q4 operate as a push-pull, 400-cps square-wave oscillator, to provide a changing primary current in the transformer. Transformer T2 primary contains the equivalent of four windings, two are used for voltage transformation and two provide feedback. The input power, +27.5 volts dc, is applied from pin 44 of connector J112, through fuse F101 to contacts 2 and 4 of power relay K5. Capacitor C9 bypasses any signals present on the +27.5-volt aircraft power source. When the control unit master control S904 is turned to STBY, LOW, NORM, or EMER, a ground connection is supplied through pin 22 of connector J112 to pin 2 of power relay K5. This causes K5 to energize, applying the input power through the filter consisting of coil L1 and capacitors C1 and C2 to the center tap of transformer T2. This positive voltage is applied through the primary winding of T2 to the emitters of transistors Q3 and Q4 (terminals 2 and 4), The feedback windings (terminals 1 and 5) connect the +27.5 volts on the primary and the regenerative feedback to the bases of each transistor. When power is applied, two voltage divider networks, resistors R7 and R8 and resistors R9 and R10, are connected to ground through contacts of relay K7. These networks provide forward bias for transistors Q3 and Q4 to insure starting current. Because of tolerance variations in transformer T2 primary, transistors, and resistors, the two transistor circuits are unbalanced enough so that one transistor will begin to conduct heavily through its half of the primary. Conduction builds up rapidly, aided by the feedback, until transformer core saturation is reached. When saturation is reached, the primary field begins to collapse, the first transistor is cut off by its feedback winding polarity reversal, and the second transistor begins conduction. Its current flows in the opposite direction through the other half of transformer T2 primary to build up and produce the opposite polarity half-cycle of required primary square wave. Thus, each transistor operates as a switch alternately closing and opening to produce current variations in the primary and permit a current to be induced in the secondary. When the oscillations begin, the +300-volt section causes current to flow through relay K7 and resistor R15. Relay K7 energizes, removing the ground connection from the starting forward bias circuit. The transistors continue to oscillate with the normal operating bias.

c. Positive 300-Volt Dc Section. One secondary (terminals 8 and 9) of transformer T2 furnishes its induced voltage to a bridge rectifier circuit consisting of diodes CR9, CR10, CR11, and CR12. Output of this bridge rectifier is +300 volts dc, which is filtered by capacitor C5 and fed to the +300-volt dc distribution circuit (par. *41d).*

d. Positive 600-Volt Dc Section. The second secondary (terminals 6 and 7) of transformer T2 furnishes its induced voltage to diodes CR21, CR22, CR23, and CR24 for rectification. These four diodes are series-connected (to provide the required peak inverse voltage rating) in a half-wave rectifier circuit. Output of this rectifier, +600 volts dc, is filtered by capacitor C6 and fed to the +600-volt dc distribution circuit (par. *41c).*

e. Positive 1,200-Volt Dc Section. Output of the +600-volt dc section secondary of T2 *(d* above) is also fed to a voltage doubler rectifier circuit consisting of diodes CR13 through CR20 and capacitor C8. On one half-cycle, capacitor C8 charges to peak voltage through diodes CR13 through CR16. On the next half-cycle, the charge voltage on C8 adds to the peak voltage of the transformer secondary, charging filter capacitors C7 and C12 through rectifiers CR18 through CR20. The 1,200-volt dc output of this rectifier is applied to the +1,200-volt dc distribution circuit (par. *41b).*

40. Theory of Low-Voltage Power Supply (fig. 48)

a. General. Aircraft primary power, at 27.5 volt dc, is converted to +125- and -150-volt dc by the low-voltage power supply. This supply also furnishes 115-volt ac for operation of blower B1. Blower B1 obtains 115 volts ac at approximately 400 cps from secondary winding (terminals 10 and 11) of transformer T1. This

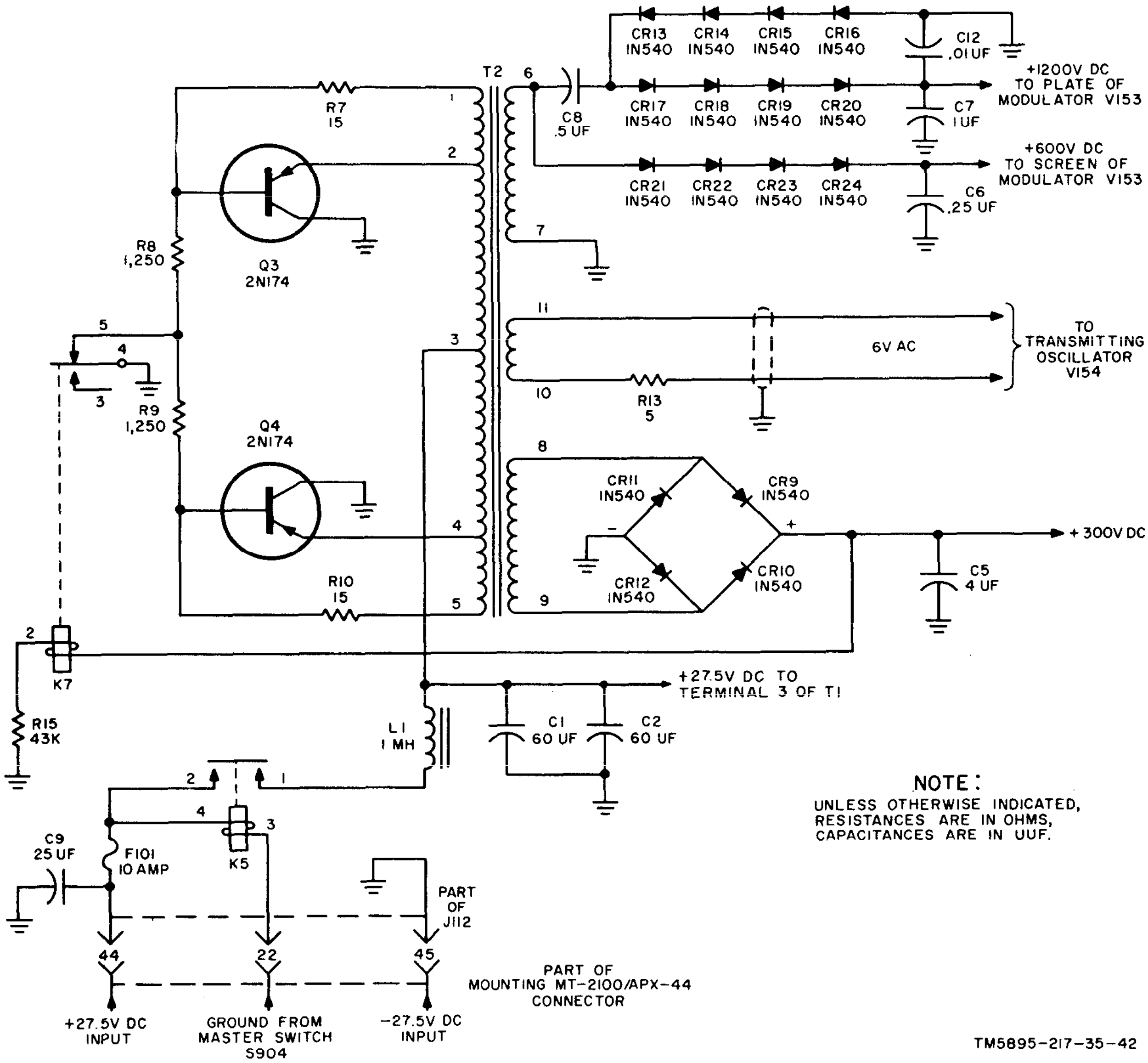


Figure 47. High-voltage power supply, partial schematic diagram.

voltage is applied directly to the first field winding (terminals 1 and 4) and through phase-shift capacitor C11 to the second field winding (terminals 1 and 5). The blower is mounted on the front of the receiver-transmitter. The low-voltage supply consists of power transistors Q1 and Q2; transformer T1; eight silicon diode rectifiers, CR1 through CR8; associated filter, decoupling control, and protective circuits.

b. Primary Circuit. Operation of the low-voltage power supply primary circuit is similar to the high-voltage supply (par. *39b*). Power transistors Q1 and Q2 oscillate to provide the changing primary current through transformer T1. The input +27.5 volts is supplied through the same filter that applied power to terminal 3 of transformer T2. Starting forward bias is provided by voltage divider resistors R1-R2, and R3-R4 for transistors Q1 and Q2, respectively. Relay K6, when deenergized, supplied the ground connection for the starting forward bias circuits. Relay K6 is energized by current from the -150-volt rectifier *(d* below) through its coil and resistor R14.

c. Positive 125-Volt Dc Section. One secondary winding (terminals 6 and 7) of transformer

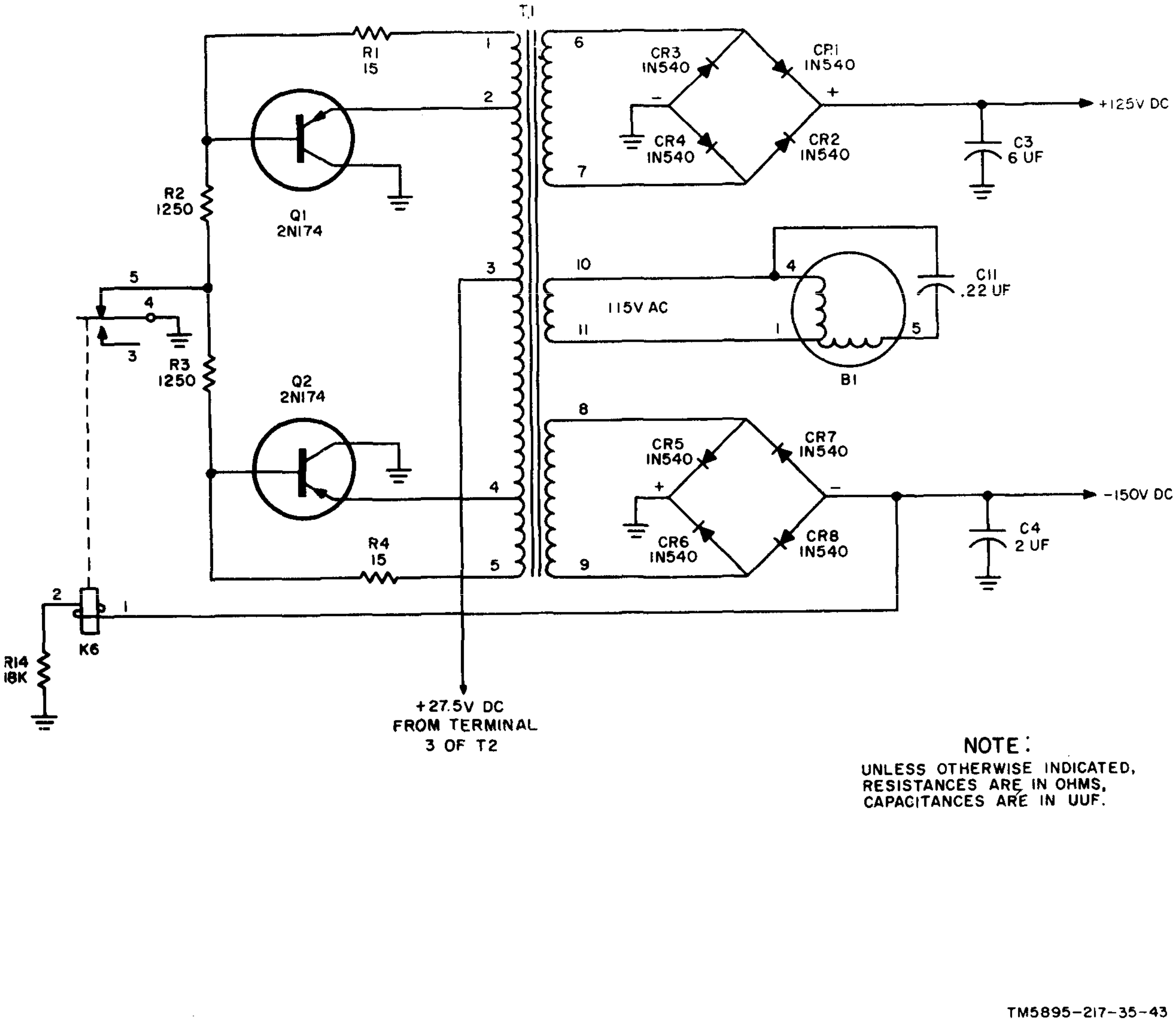


Figure 48. Low-voltage power supply, partial schematic diagram.

T1 provides voltage to a bridge rectifier, diodes CR1, CR2, CR3, and CR4. The output of this rectifier is +125 volts dc, filtered by capacitor C3, and fed to the +125-volt dc distribution circuit (par. *41e).*

d. Negative 150-Volt Dc Section. A second secondary winding (terminals 8 and 9) of transformer T1 provides voltage to a bridge rectifier, diodes CR5, CR6, CR7, and CR8. The output of this rectifier is -150-volts dc, filtered by capacitor C4, and fed to the -150-volt dc distribution circuit (par. 42).

41. B+ Distribution
(fig. 49)

a. General. Four B+ distribution circuits carry B+ power throughout the receiver-transmitter. These circuits are supplied with voltages from the high-voltage power supply (par. 39) the low-voltage power supply (par. 40). The B+ distribution circuits are: +1,200 volts, +600 volts, +300 volts, and +125 volts.

b. Positive 1,200-Volt Distribution Circuit. The +1,200-volt distribution circuit only supplies plate voltage to modulator V153 (par. *37d)* .

c. Positive 600-Volt Distribution Circuit. The +600-volt distribution only supplies screen grid voltage to modulator V153.

d. Positive 300-Volt Distribution Circuit. The +300-volt dc is connected through the filter consisting of choke L152 and capacitors C157 and C158 to the plate circuits of driver V152 and trigger amplifier and blocking oscillator V151 (par. 37). This distribution circuit also applies plate voltage, decoupled by resistors R103, R104, and R105 and capacitors C103 and C104, to the crystal oscillator and tripler V101 in the converter subchassis (par. 26).

e. Positive 125-Volt Distribution Circuit. This distribution circuit supplies plate and screen voltage to most of the tubes in the receiver-transmitter. The +125-volt dc is distributed as follows:

(1) To the IF compressor subchassis (par. 27) through pin 5 of connector J203. Within the IF suppressor subchassis, the voltage is applied directly to the plate circuits of first video amplifier and cathode follower V207 and second video amplifier and cathode follower V208. The voltage is also applied to a distribution bus for the six IF amplifiers V201 through V206. This bus consists of a series of filters that successively decouple and apply plate and screen voltage to each individual IF amplifier. These decoupling filters consist of RF chokes L202, L204, L206, L207, L209, and L211 with capacitors C204, C208, C202, C206, C224, and C229 for IF amplifiers V201 through V206, respectively.

(2) To voltage divider network consisting of resistors R641 and R642 which supplies +60-volt dc bias for the diodes in the reply code switching cards (par. 32-34).

(3) To trigger amplifier and encoder blocking oscillator plate circuits, gated amplifier V502 plate and screen circuits, and ring around gate multivibrator V503 plate circuits through pin 11 of blocking oscillator and ring around card (par. 31) connector P501.

(4) To one of three time constant circuits for ring around gate multivibrator V503 (par. *31c)* through contacts of relays K1 and K2.

(5) Through pin 4 of video amplifier card (par. 28) connector P301 to the plate and screen circuit of spike suppressor V301, and the plate circuits of blanked cathode and inverter V302, blanking amplifier and cathode follower V302, and A.O.C. amplifier V304.

(6) Through pin 10 of ringing oscillator and coincidence card (par. 36) connector P551 to the plate circuits of ringing oscillator and driver V551, first and second clippers V552, differentiator and blocking oscillator V553, and the plate and screen grid circuits of coincidence detector V554.

(7) Through pin 7 of decoder card (par. 29) connector P351 to the plate and screen grid circuits of the modes 1, 2, and 3 decoders V351, 352, and V353, respectively.

(8) Through pin 11 of mode reply selector card (par. 35) connector P451 to the plate and screen grid circuits of the modes 1, 2, and 3 reply selectors V451, 452, and V453, and to the plate circuits of main gate and reply train amplifier V454.

(9) Through pin 3 of gate generator card (par. 30) connector P401 to the plate circuits of modes 1, 2, and 3 and main gate multivibrators V401, V402, V403, and V404.

42. Bias Distribution
(fig. 50)

The bias distribution circuit supplies -150-volts dc obtained from the low-voltage power supply (par. *41d)* to may stages throughout the receiver-transmitter. This bias voltage is distributed as follows:

a. Through a filter consisting of choke L151 with capacitors C153, C155, and C156 to the grid circuits of modulator V153, driver V152, trigger amplifier and blocking oscillator V151, and tripler V101.

b. Through pin 6 of IF suppressor subchassis (par. 27) connector J203, to the suppressor circuit (grid circuit of second video amplifier V208A).

c. Through pin 10 of video amplifier card (par. 28) connector P301 to the control and suppressor grid circuits of spike suppressor V301 and to the grid circuits of blanked cathode follower V302B, blanking cathode follower V303A, and A. O. C. amplifier V304.

d. Through pin 9 of decoder card (par. 29) connector P351, to the control and suppressor grid circuits of modes 1, 2, and 3 decoders V351, V352, and V353.

e. Through pin 7 of ringing oscillator and coincidence card (par. 36) connector P551, to the control and suppressor grid circuits of coincidence detector V554, and to the grid circuits of clipper V552B and blocking oscillator 553B.

f. Through pin 7 of mode relay selector card (par. 35) connector P451 to the control and suppressor grid circuits of modes 1, 2, and 3 relay selectors V451, V452, and V453.

g. Through pin 7 of gate generator card (par. 30) connector P401 to the grid circuits of modes 1, 2, 3, and main gate multivibrators V401, V402, V403, and V404.

43. Primary Power Distribution (fig. 51)

a. General. Primary power for transponder set operation is obtained from the 27.5-volt dc aircraft power source through the interconnecting cable or aircraft wiring to pin 44 of receiver-transmitter connector J112. It is fused against overload by fuse F101 and applied to one coil lead and one contact of power relay K5. Master control switch S904 supplies the ground connection to the other coil lead, energizing relay K5.

b. Primary Power Circuits. Relay K5 applies the 27.5-volt dc power to all the primary power circuits. The primary power is distributed as follows:

(1) To the control relays K1 through K4.

(2) Through pin 36 of receiver-transmitter connector J112, and the interconnecting cable (or aircraft wiring) to the control unit pilot lamp.

(3) Through filament dropping resistor R160, bypassed by capacitor C109, to the filament of converter oscillator V101.

(4) Through filament dropping resistor R160, bypassed by capacitor C154, to a series-parallel circuit consisting of the filaments of trigger amplifier and blocking oscillator V151, driver V152, and modulator V153, with current distribution resistor R161.

(5) Through a filter, consisting of choke L1 and capacitor C1 and C2, to the primaries of low-voltage transformer T1 and high-voltage transformer T2.

(6) Through connector P201--J203, pin 1, to two series filament circuits in the IF suppressor subchassis. The first circuit consists of dropping resistor R237, the filaments of tubes V201 through V204, and series decoupling coils L213, L214, L215, and L220 with bypass capacitors C233 through C240. The second circuit consists of dropping resistor R240, the filament of tubes V205 through V208, and series decoupling coils L216 through L219 with bypass capacitors C241 through C249.

(7) Through pin 14 of card connector J551-P551 to the ringing oscillator and coincidence card series filament circuit, consisting of tubes V551 through V554, dropping resistor R569, and current distribution resistor R570.

(8) Through pin 1 of card connector J501-P501 to the blocking oscillator and ring around card series filament circuit, consisting of the filaments of tubes V501, V502, and V503 with dropping resistor R519 and current distribution resistor R520.

(9) Through pin 15 of card connector J451-P451 to the mode reply selector series filament circuit consisting of the filaments of tubes V451 through V454 with series resistor R469 and current distribution resistors R470, R471, and R472.

(10) Through pin 15 of card connector J401-P401 to the gate generator card series filament circuit consisting of the filament of tubes V401 through V404 with dropping resistor R425.

(11) Through pin 1 of card connector J351-P351 to the decoder card series filament circuit consisting of the filaments of tubes V351, V352, and V353 with dropping resistor R366.

(12) Through pin 1 of card connector J301-P301 to the video amplifier card series filament circuit consisting of the filaments of tubes V301 through V304

with dropping resistor R319 and current distribution resistor R320.

44. Control Circuits Block Diagram (fig. 52)

All in-flight operation of the transponder set is controlled by the control unit. Its basic operation is divided into two groups, functional and operational controls.

a. Functional Controls. The functional controls include master control S904, function control S903, I/P switch S907 (including relays K901 and K902), AUDIO switch S908, MODE 2 switch S905, MODE 3 switch S906, and pilot lamp E901.

(1) Master control S904 operates receiver-transmitter power relay to apply primary power to the transponder set (par. 43), selects either low or normal receiver if sensitivity, and operates receiver-transmitter relay K3 for emergency (EMER) replies.

(2) Function control S903 operates receiver-transmitter relays K1 through K4 to detemine the reply category, and supplies the ground connection for enabling the MODE 1 MODE 3 code controls to select their reply trains for selective identification feature replies (MOD or CIVIL).

(3) I/P switch S907 provides two means of energizing I/P relay K901 either directly at the control unit or from the aircraft microphone (mike) switch circuits. When relay K901 is energized, it operates through the function control ((2) above) to provide the repeated replies required for position identification. I/P time-delay relay K902 keeps relay K901 energized for approximately 30 seconds after it has been energized.

(4) AUDIO switch S908 applies audio (relay pulses) to the aircraft audio system to provide the pilot with a means of monitoring the transmitted replies.

(5) MODE 2 and 3 switches S905 and S906 enable or disable their reply code switching cards.

(6) Pilot lamp E901 (a press-to-test indicator lamp) indicates when the transponder set is turned on.

b. Operational Controls. The operational controls consist of the MODE 1 (S901) and MODE 3 (S902) code controls. When these controls are enabled by the function control *(a(2)* above), they control the switching diodes in the mode 1 and mode 3 reply code switching cards to determine the composition of their respective coded reply trains.

45. Master Control Circuits (fig. 53)

a. STBY Position. Contact X2 of switch S904A applies a ground to the coil of power relay K5 which energizes and applies +27.5 volts dc throughout the transponder set (par. 43). All circuits are activated after warmup except trigger amplifier and blocking oscillator tube V151 (par. *37b),* which has the full -150-volt dc bias applied to grid pin 2. Contact Y2 of switch S904B sets the receiver to high sensitivity by shorting resistor R226 to ground, but the reply train of pulses fed to tube V151 cannot pass because of the high cutoff bias.

b. LOW Position. Rotating switch S904 to the LOW position permits contact X3 of section A to hold relay K4 energized. Contact Y3 of section B, having no connection, places the receiver on LOW sensitivity by adding resistor R226 to the cathode circuits of first and second IF amplifiers V201 and V202. Contact X3 of section B ground one end of resistor R151 to reduce the cutoff bias on V151. This allows V151 to amplify the reply pulses that are to be transmitted.

c. NORM Position. Switch S904 in the NORM position selects high receiver sensitivity by grounding resistor R226 through contact Y4 of switch section B. Contact X4 of section B maintains normal operating bias on tube V151 and contact X4 of section A holds relay K5 energized.

d. EMER Position. Depressing the barrier button on the control unit and setting master control S904 to EMER position, close emergency-modified relay K3 and emergency-normal relay K4 if normal codes are in use. Contact

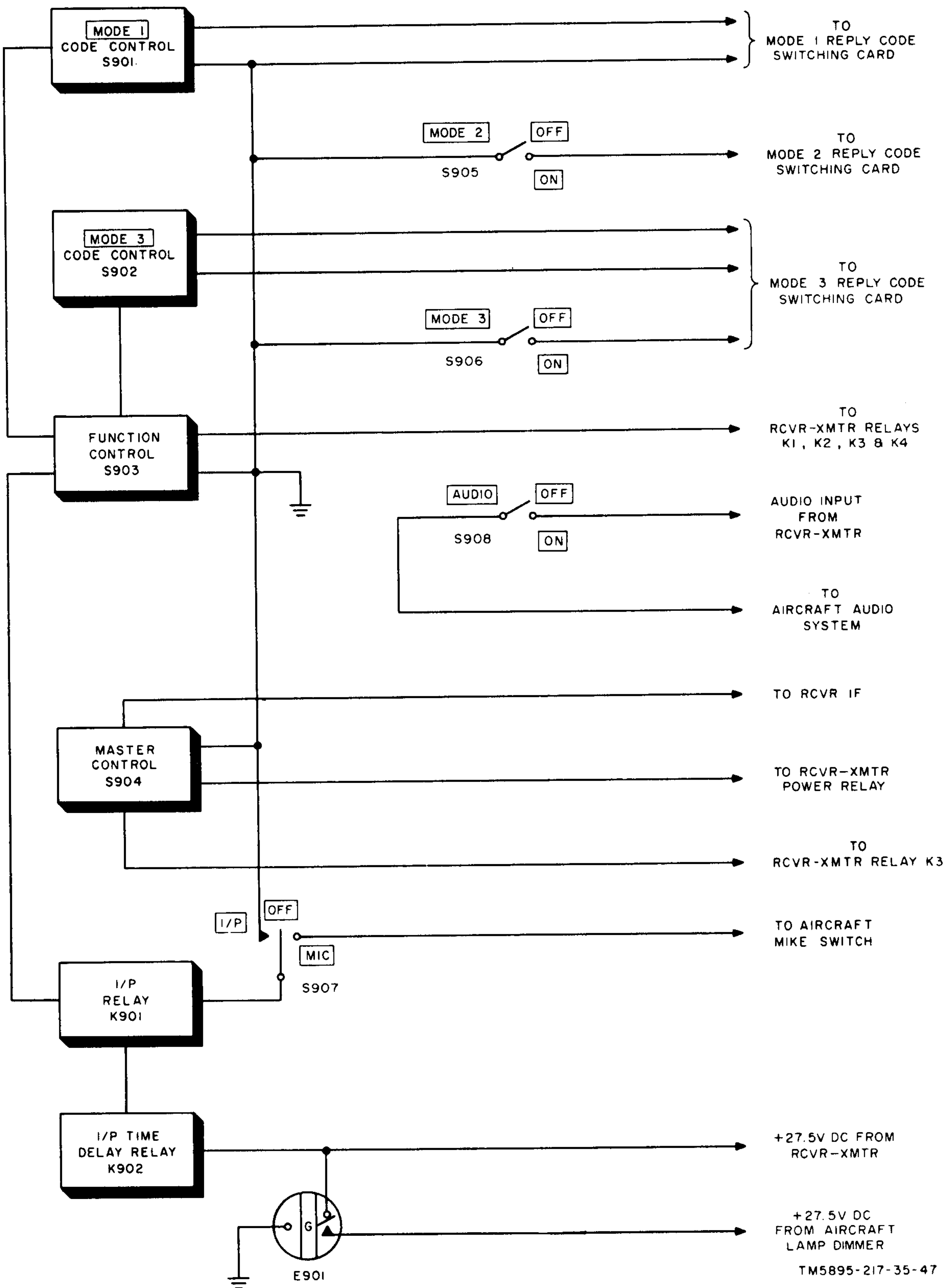


Figure 52. Control circuits block diagram.

Y5 of section A supplies this ground to relay K3. Contact X5 of section A holds relay K5 energized; contacts X5 and Y5 of section B maintain normal operating bias on tube V151 and high receiver sensitivity, respectively. The operation of relays K3 and K4 is discussed in paragraph *46d* and *g*.

46. Function Control Circuits (fig. 53)

a. General. The following discussion applies only to the circuitry which prepares the receiver-transmitter for operation in a particular category. Actual code formations are covered in paragraphs 32, 33, and 34.

b. NORMAL Functions. When function control S903 is set to NORMAL position, contact X1 of S903B closes normal relay K1. The closing of relay K1 is a preparatory step for mode 1 and mode 3 emergency and identification of position operation. The MODE 1 and MODE 3 code controls are disabled as no ground is applied to contacts X2 or X3 and Y2 or Y3 of S903B. Therefore, no reply code is obtained; mode 1 and 3 replies consist of only the O-usec pulse (present in all replies). Mode 2 replies require a second pulse spaced 15.95 usec after the O-usec pulse. This pulse is provided by contacts 6 and 8 of relay K1. These contacts remove the +60-volt dc bias applied to switching diode CR661 in the mode 2 reply code switching card, allowing the 15.95-usec pulse from delay line DL601 to be developed across resistor R670. Capacitor C671 couples this pulse to mode 2 reply selector V452.

c. NORMAL-I/P Functions. Switches S903 and S904 remain as in *b* above for I/P operation, and switch S907 is set to one of two positions. If I/P is selected (spring return side), a ground is supplied to the coil of I/P control relay K901 and to the heater of the time-delay relay K902. When relay K901 energizes, holding contacts 4-5 and 6-8 close. Relay K901 will remain energized until time-delay relay K902 contacts 5-7 open (approximately 30 seconds) removing the +27.5 volts dc. Contacts 9-10 and 12-13 apply a ground connection through arm Y of switch S903A and contact Y1 to energize I/P relay K2. The second pulse needed for all NORMAL-I/P replies is supplied by contacts 9-10 of relay K2 and 12-13 of relay K1. These contacts provide the ground connection to close switching diode CR627 which applies the 15.95-usec pulse to mode 1 reply selector V451 bus. Contacts 6-8 of relay K2 energize modified-emergency relay K3. When K3 is energized, its contacts 9-10 will energize emergency-normal relay K4. Mode 1 reply selector V451 will produce the two pulses for all modes of interrogation because all-mode decoder output switching diode CR354 has been closed by contacts 9-10 of relay K4. The ring around circuitry has been activated during this time, but gated amplifier V502 could not conduct because of the lack of a suppressor grid 15.05-usec pulse. (The ground connection from contacts 9-10 of K2 was removed from contacts 4-5 of relay K1 when relay K2 energized).

d. NORMA L-EMER Functions. During NORMAL-EMER operation, relay K1, K3, and K4 are energized to provide repeated reply train operation. Contacts 9-10 of relay K3, energized by contact 4-5 of S904A, energizes K4 are energized to provide repeated reply K2 close switching diode CR626, which supplies the 15.05-usec pulse to gated amplifier V502 suppressor grid. Contacts 9-10 of relay K1 supply +125-volts dc to resistor R512, causing ring around gate multivibrator to produce a 57-usec gate pulse. This gate pulse activates gated amplifier V502 because its bias has been returned to normal by relay K3 contacts 4-5 grounding resistor R507. Thus, after the first decorder interrogation pulse, the 15.05-usec pulse will trigger the encoder blocking oscillator and produce another pulse spaced 16 microseconds after the first. This process is repeated until the fourth pulse has been produced. All-mode decoder switching diode CR354 (closed by contacts 9-10 of relay K4) permits all three decoder outputs to trigger the ring around circuitry.

e. MOD Functions. The last framing pulse (fig. 5) required for all reply trains in MOD categories is continuously supplied to its respective mode reply selector as follows: mode 1, by contact Y2 of switch S903B and switching diode CR629; mode 2, by contacts 6-7 of de-energized relay K1 and switching diode CR664; and mode 3, by contact X2 of switch S903B and switching diode CR695. Although ring around gate pulses and gated amplifier pulses are being generated, gated amplifier V502 is held inoperative by open contacts 4-5 of relay K3. The zero time or first framing pulse is always present, MODE 1 and MODE 3 code controls and mode 2 and 3 reply selector V452 are enabled by contacts X2 and Y2 of S903B.

f. MOD-I/P Functions. Relay K2 is energized for 30 seconds the same as in c above by contact Y2 of switch S903A, and relay K3 is energized by closed contacts 6-8 of relay K2. Ring around gate multivibrator V503 develops a 37-usec gate as determined by the application of +125 volts dc to resistor R511 through closed contacts 10-11 of relay K1 and 4-5 of relay K2. Normal bias is established for the control grid of gated amplifier V502 by closed contacts 4-5 of relay K3. Contact X2 of switch S903A will close 23.85-usec switching diode CR630, which supplies the ring around suppressor grid pulse to tube V502. The 23.85-usec ring around pulse plus circuit delays cause the first framing pulse of the second reply train to appear 4.35 usec after the last framing pulse of the first reply train (fig. 5). Mode 2 interrogations will not produce a ring around gate pulse because only modes 1 and 3 decoder outputs are available to trigger the ring around gate multivibrator V503. This change in because contacts 6-8 of energized relay K3 have closed diodes CR355 and CR356 only. (Relay K4 is not energized because switch S904B contact X1 is open in MOD position).

g. MOD-EMER Functions. Setting switch S904 to the EMER position energizes relay K3 (relays K1, K2, and K4 are deenergized); contacts 4-5 provide normal bias for gated amplifier V502; and contacts 6-8 close switching diodes CR355 and CR356 to permit mode 1 and mode 3 interrogations to trigger ring around gate multivibrator V503. Mode 2 interrogations do not require repeated reply trains in EMER operation. The only significant change from MOD-I/P operation in f above is that relay K2 is not energized, contacts 10-11 of relay K1 and 3-4 of relay K2 now supply +125-volts dc to resistor R513. Ring around gate multivibrator V503 produces an 87-usec gate for gated amplifier V502. This allows enough time for four complete reply trains spaced 4.35 usec apart (fig. 5).

h. CIVIL Functions. Setting function control S903 to the CIVIL position makes no significant change from MOD position discussed in *e* above.

i. CIVIL-I/P Functions. Setting function control S903 to the CIVIL position for I/P categories does not energize relay K2, but applies the ground from contact Y3 of section A directly to close 24.65-usec switching diode CR696 in mode 3 reply code switching card. Because only a mode 3 interrogation will activate mode 3 reply selector V453, the single pulse spaced 4.35 usec after the last framing pulse will be added to the reply train in mode 3. Modes 1 and 2 will produce the normal single reply train in CIVIL-I/P.

j. CIVIL-EMER Functions. In CIVIL-EMER categories, relay K3 is energized by contact Y3 of switch S904A and operation is identical with MOD-EMER operation *(g* above).

CHAPTER 3

TROUBLESHOOTING

Section I. GENERAL TROUBLESHOOTING TECHNIQUES

Warning: Dangerous voltages exist in Radar Receiver-Transmitter RT-494/APX-44. Take adequate precautions against electrical shock during troubleshooting. Remove power input prior to making physical contact with parts in the receiver-transmitter.

47. General Instructions

The troubleshooting procedures in this manual are provided for the levels of maintenance shown in the maintenance allocation chart, TM 11-5895-217-12. Systematic troubleshooting procedure includes operation and organizational maintenance instructions contained in TM 11-5895-217-12, preventive maintenance procedures in chapter 1, and the sectionalizing, localizing, and isolating techniques in paragraphs to follow. Section II provides interunit troubleshooting procedures (including Antenna AT-884/APX-44. and transponder Set Control C-2714/APX-44), and sections III and IV describe intraunit (within unit) localizing and isolating procedures for Radar Receiver-Transmitter RT-494/APX-44.

48. Organization of Troubleshooting Procedures

a. General. The first step in servicing a defective transponder set is to sectionalize the fault. Sectionalizing the fault means tracing it to a major component or subassembly. The second step is to localize the fault to a stage within the major component or subassembly. The third step, isolation, is sometimes accomplished by visual inspection for burned-out transformers, resistors, and arcing, but usually requires voltage and resistance measurements for completely isolating the defective part. For intermittents and part value changes, part substitution is recommended.

b. Sectionalization. The transponder set consists of the following three major components: the receiver-transmitter, the control unit, and the antenna. Sectionalizing the faults in this equipment first requires determining which major component is defective.

(1) Troubles within the control unit or the receiver-transmitter must be sectionalized to the subassembly or the circuit section.

(2) The antenna has no subassemblies.

(3) The control unit has two sections: functional control circuits and operational control circuits.

(4) The receiver-transmitter has the following removable subassemblies:

- *(a)* Converter subchassis.
- *(b)* IF suppressor subchassis.
- *(c)* Video amplifier card.
- *(d)* Decoder card.
- *(e)* Gate generator card.
- *(f)* Mode reply selector card.
- *(g)* Blocking oscillator and ring around card.
- *(h)* Ringing oscillator and coincidence card.
- *(i)* Modulator-transmitter.
- *(j)* Power supplies.

(5) Tracing a fault to a major component is usually accomplished by the functional check (par. 14) or interunit troubleshooting (sec. II).

(6) A visual inspection will sometimes reveal the causes of trouble without testing the circuits or taking measurements. Broken wires, bent or damaged connector pins, loose electrical connections, and burned or damaged parts can be located by a visual inspection (par. 8 and TM 11-5895-217-12).

c. Localization. With the trouble traced to a major component or subassembly, the next step is to determine which stage of the component or subassembly is defective. The following tests will prove helpful in localizing the trouble:

(1) B+ and bias short-circuit check (par. 54).

(2) Signal tracing (par. *58a).*

(3) Voltage and resistance measurements (par. *58d* and *e).*

(4) Troubleshooting charts (pars. 59, and 62 through 72).

(5) Intermittent troubles should not be overlooked as a possible source of difficulty. Intermittents are generally either short- or open-circuit troubles that do not appear until the equipment has run for some time or is subjected to vibration. Intermitted troubles sometime may be made to appear by tapping or jarring the unit or by applying heat to a suspected component.

d. Isolation. When trouble has been localized to a stage, the following techniques will isolate the faulty part:

(1) Take voltage and resistance measurements at the tube sockets and compare the readings obtained with the values shown in the diagrams provided in this manual.

(2) If the voltages are abnormal and the resistances are normal, check the tubes with the tube tester or by substitution.

(3) Examine the printed circuits, if applicable, with a magnifying glass and a strong light for hairline cracks and evidence of dielectric breakdown.

(4) Check the waveforms surrounding the defective stage for indications which point directly to the faulty part.

49. Test Equipment, Materials, and Tools Required

a. Test Equipment. The following chart lists the test equipment required for troubleshooting Transponder Set AN/APX-44, including the appropriate technical manuals and the assigned common names. The characteristics of commerical test equipment required are listed in *d* below.

Test equipment	Reference	Common name
Uhf Signal Generator, Hewlett-Packard Model 612A or equivalent.		Uhf signal generator
Generator, Electronic Marker AN/USM-108.[a]		Marker generator
Power Bridge, Polytechnic Research and Development Inc. (PRD) type 650B or equivalent.[b]		Power bridge
Bolometer, PDR Type 631-D or equivalent.[b]		Bolometer
Bolometer Mount PRD Type 628-A or equivalent.[b]		Bolometer mount
Coaxial Tuner PRD type 327 or equivalent.		Coaxial tuner
Detector, PRD Type 612A or equivalent.		Detector
Attenuator, PRD Type 756A-10 or equivalent.		Attenuator
Coaxial Directional Coupler, Narda Microwave Corp. Type 3002-20 or equivalent.		Directional coupler
Wavemeter FXR Co. Inc. Model N410A.		Wavemeter
Slotted Line, Hewlett-Packard model 805A or equivalent.		Slotted line
Standing Wave Indicator, Hewlett-Packard model 415B or equivalent.		Standing wavemeter
Oscilloscope AN/USM-81.	TM 11-6625-219-12	Oscilloscope
Pulse Generator Set AN/UPM-15.	TM 11-1177	Pulse generator
Test Set, Electron Tube TV-2/U.	TM 11-2661	Tube tester (5th echelon)
Test Set, Electron Tube TV-7/U.	TM 11-5080	Tube tester
Multimeter AN/URM-105.	TM 11-6625-203-12	Multimeter
Electronic Multimeter TS-505/U.	TM 11-5511	Vacuum tube voltmeter (vtvm).
Crystal Rectifier Test Set TS-268/U.	TM 11-1242	Diode tester
Test Set, Transistor TS-1100/U.		Transistor tester
Test Set, Radar AN/UPM-98		Test set
Power Supply PP-1104A/G or equivalent.	TM 11-5126	28-volt supply

[a] Use Time-Mark Generator, Tektronix Inc. Type 180A or equivalent until AN/USM-108 is available.
[b] May be replaced by Bridge, Summation AN/USM-68 if available.

b. Materials. Following is a list of materials required for troubleshooting the transponder set.

Description	Common name
UG-710A/U Coaxial Connector (2 rqr).	C connectors.
UG-273/U Adapters (5 rqr) ------	BNC to UHF adapters.
UG-201/U Adapters	BNC to N adapters.
Interconnect cable for connecting the control unit to the receiver-transmitter (fig. 3).	Bench test cable.
Rotary coaxial switches (3) (Danbury Knudsen, Inc. type CS400 or equivalent.	Bench test switches (S4, S5, and S6).
60 feet RG-62/U Coaxial Cable----	Video cables.
10 feet RG-8/U Coaxial Cable _____	Rf cable.
10 feet RG-58/U Coaxial Cable----	Rf cable.
21 feet RG-21/U Coaxial Cable----	Lossy line.
UG-57B/U Coupling Adapter --------	Coupling adapter.
UG-274/U Tee Adapter (1 required).	Tee adapter.
UG-88/U Coaxial Connectors (26 rqr).	BNC connecters.
UG-21/U Coaxial Connectors (6 rqr).	N connectors.
Metal box 2 x 2 x 2 inches	
100-ohm, 1-watt carbon resistor	

c. Tools. All of the tools required for troubleshooting and maintenance of the transponder set are included in Tool Equipment TE-113.

d. Test Equipment Characteristics.

(1) *Uhf signal generator, model 612A.* This standard uhf signal generator has a frequency range from 450 to 1,230 mc. The output variable is from 0 to -127 dbm.

(2) *Marker generator, type* 180A. This marker generator produces pulse markers with spacings from 1 usec to 1 second. The markers are used to provide one common triggering source for all equipments and timing measurements.

(3) *Power bridge, type 650B.* The power bridge measures the output of the transponder set when coupled to bolometer 631-D/628-A and coaxial tuner 327 up to 100 milliwatts average power. The frequency range of the entire power output measuring setup is 1,000 to 10,000 mc.

(4) *Detector, type 612A.* The detector is double tuned, with a frequency range from 500 to 10,000 mc. Its voltage standing wave ratio is less than 1.5:1 for all frequencies when terminated in a 50-ohm nominal line impedance.

(5) *Directional coupler, type 3002-20.* This is a broadband coaxial directional coupler with maximum (max) voltage standing wave ratio of 1.15:1 over a frequency range from 950 to 2,000 mc. The forward power rating is 2,000 watts, the reverse power rating is 20 watts, and the peak power rating is 10 kilowatts. Coupling directivity is 20 db ±1.

(6) *Wavemeter, model N410A.* The wavemeter is continuously tunable from 1,000 to 4,000 mc ±2 percent coaxial type for measuring the transmitter frequency.

(7) *Attenuator, type 756A-10.* This is a coaxial attenuator with fixed attenuation of 10 db. It has two N-type connectors, a male on one end and a female on the other.

(8) *Slotted line, model 805.* This is an adjustable slotted 50-ohm coaxial line for measuring the voltage standing wave ratio on the coaxial antenna cables; that transmits RF signals within the frequency range of 500 to 4,000 mc.

(9) *Standing wave indicator, model 415B.* This indicator operates with the slotted line ((8) above) to provide a direct meter indication of voltage standing wave ratio.

Section II. INTERUNIT TROUBLESHOOTING

50. Troubleshooting Procedure

Interunit troubleshooting consists of third echelon (in-aircraft) troubleshooting only. These procedures are based on anticipated pilot or periodic check reports, and will assist the maintenance personnel to determine which of the major units is defective. Because of the control circuit complexity, control unit troubleshooting is combined and completed in interunit procedures, and receiver-transmitter troubleshooting is contained in sections III and IV. Repair references for the antenna are eliminated in paragraph 51 as it is not a repairable unit. The interunit troubleshooting chart (par. 51) and the control unit continuity chart (par. 52) involve continuity measurements with Multimeter ME-77/U (part of Multimeter AN/URM-105) in most cases. Use the X1 OHMS scale for continuity checks and the X10K OHMS scale for short tests. Interconnecting cable continuity and short test are made at mounting receptacle J112 with the receiver-transmitter removed. A ground should be applied to each wire as indicated by the switch position and X in the box of the charts in paragraph 52. When short-circuit checks are made, the switches must be rotated to a blank-box position or the control unit connector must be disconnected from receptacle J901.

51. Interunit Troubleshooting Chart

The chart below lists potential troubles in the Indication column. Pilot reports may indicate only part of the trouble as they may not have had cause to use other functions of the transponder set. Before proceeding with this chart, perform the periodic functional check (par. 14) to insure that the extent of the trouble is known.

Item	Indication	Probable trouble	Procedure
1	Transponder set will not energize--	No power input ------------------	Check aircraft power source.
		Fuse blown ----------------------	Replace fuse F101.
		Defective interconnect cable -------	Check continuity at pin 22 of mounting receptacle J112 (figs. 105 and 133).
		Defective master control S904-------	Check control continuity in STBY LOW, NORM, and EMER (par. *52a*).
		Defective receiver-transmitter -----	Replace receiver-transmitter.
2	Improper master control----------	Defective interconnect cable --------	Check for continuity and shorts, mounting receptacle J112 pins 21, 22, 23, 25, and 32 (figs. 105 and 133).
		Defective master control S904-----	Check master control continuity (par. *52a*).
		Defective receiver-transmitter -----	Replace receiver-transmitter.
3	Improper function control--------	Defective interconnect cable --------	Check for continuity and shorts, mounting receptacle J112 pins 8, 9, 10, 11, 12, and 13 (figs. 105 and 133).
		Defective function control S903----	Check function control continuity (par. *52b*).
		Defective receiver-transmitter -----	Replace receiver-transmitter.
4	Improper I/P operation ----------	Defective interconnect cable -------	Check for continuity or shorts, mounting receptacle J112 pins 14, 24, and 36 (figs. 105 and 133).
		Defective control unit ------------	Check continuity of function control S903A, segment Y (par. *52b*).
			Check relays K901 and K902 (fig. 94).

Item	Indication	Probable trouble	Procedure
			Check switch S907 and pin P of receptacle J901 (fig. 121).
		Defective receiver-transmitter----	Replace receiver-transmiter.
5	MODE 1 and MODE 3 code controls inoperative.	Defective control unit ------------	Check continuity of common ground supplied to code controls by function control (fig. 121).
6	MODE 1 codes incorrect --------------	Defective interconnect, cable ------	Check for continuity or shorts, mounting receptacle J112 pins 11, 15, 16, 17, 18, 19, 20, and 32 (par. *52c* and figs. 105 and 133).
		Defective MODE 1 code control S901.	Check continuity of control (par. *52c*).
		Defective receiver-transmitter----------	Replace receiver-transmitter.
7	MODE 2 codes incorrect ----------	Defective receiver-transmitter----------	Replace receiver-transmitter.
8	MODE 3 codes incorrect -----------	Defective interconnect cable ----------	Check for continuity and shorts, mounting receptacle pins No. 1 through 8 (par. *52c* and figs. 105 and 133).
		Defective MODE 3 code control S902.	Check continuity of control (par. *52d*).
		Defective receiver-transmitter---------	Replace receiver-transmitter.
9	Transponder set weak and/or intermittent, all operations.	Defective antenna to receiver-transmitter coaxial cable.	Inspect for mechanical damage to cable and connectors. Check for continuity and shorts in cable.
		Defective antenna ------------------------	Bench test receiver-transmitter (par. 9), then functional check with test hat (par. 14), compare sensitivity and decoding. If low, replace Antenna AT-884/APX-44.
		Low aircraft bus voltage ---------------	Adjust aircraft bus voltage to 27.5 volts dc.
		Defective receiver-transmitter---------	Replace receiver-transmitter.
10	No audio output ----------------------	Defective interconnect cable --------	Check for continuity and short, mounting receptacle J112 pin 35 (figs. 105 and 133).
		Defective control unit ----------------	Check AUDIO switch S908, receptacle J901 pins S and T, for continuity with switch at ON (fig. 121).
		Defective aircraft audio distribution system.	Troubleshoot aircraft audio distribution systems.
		Defective receiver-transmitter---------	Replace receiver-transmitter.
11	Transponder set causes interference in other equipment or equipments.	Defective interconnect cable ----------	Inspect installation for broken or damaged wire shields and/or grounds. Refer to the applicable aircraft technical manual.
		Defective receiver-transmitter---------	Replace receiver-transmitter.
		Defective primary power input filter to transponder set (if used).	Replace filter. (See aircraft installation diagram.)
		Defective installation or equipment in which interference occurs.	Replace or troubleshoot applicable equipment or equipments.

52. Control Unit Continuity

The charts in a through *d* below are subdivided by controls as follows: master control S904, function control S903, MODE 1 code control S901, and MODE 3 code control S902. The remaining switches and lamp are not shown because of their simplicity; refer to figures 120 and 121 for wiring details of all switches. Figures 33, 35, and 53 will also be of assistance in correlating chart information for troubleshooting. All continuity measurements are taken with Multimeter AN/URM-105 set to X1 OHMS scale, and are from pin indicated to chassis ground.

a. Master Control S904 *Continuity Chart.*

Mounting receptacle P112, pin	Control unit receptacle J901, pin	Master control S904 setting				
		OFF	STBY	LOW	NORM	EMER
21	F		X		X	X
22	H		X	X	X	X
23	a			X	X	X
25	J					X
32	N	X	X	X	X	X

Note. X denotes continuity; blank space denotes an open circuit.

b. Function Control S903 Continuity Chart.

Mounting receptacle P112, pin	Control unit receptacle J901, pin	Function control S903 setting		
		NORMAL	MOD	CIVIL
8	j		X	X
11	A		X	X
12	h	X		
13	g		X	X
14	f	X (K901 closed)	X (K901 closed)	
24	E			X (K901 closed)

Note. X denotes continuity; blank space denotes an open circuit.

c. MODE 1 Code Control S901 Continuity Chart (Note 2).

Mounting receptacle P112, pin	Control unit receptacle J901, pin	MODE 1 code control S901 setting											
		Tens (S901A)								Units (S901B)			
		0	1	2	3	4	5	6	7	0	1	2	3
11	A	x	x	x	x	x	x	x	x	x	x	x	x
13	g	x	x	x	x	x	x	x	x	x	x	x	x
15	M	x	x	x	x	x	x	x	x	x	x	x	x
16	C		x		x		x		x				
17	D			x	x			x	x				
18	e					x	x	x	x				
19	d										x		x
20	b											x	x
32	N	x	x	x	x	x	x	x	x	x	x	x	x

Notes:
1. X denotes continuity, blank space denotes an open circuit.
2. All continuities are measured with function control in MOD or CIVIL except pins 15 (M) and 32 (N), which are continuous grounds.

d. MODE 3 Code Control S902 Continuity Chart (Note 2).

Mounting receptacle P112, pin	Control unit receptacle J901, pin	MODE 3 code control S902 setting															
		Tens (S902A)								Units (S902B)							
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
1	B	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	Y		X		X		X		X								
3	Z			X	X			X	X								
4	W					X	X	X	X								
5	V										X		X		X		X
6	U											X	X			X	X
7	X													X	X	X	X
8	j	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes:

1. X denotes continuity; blank space denotes an open circuit.

2. All continuities are measured with function control in MOD or CIVIL except pin No. 1(B), which is a continuous ground.

Section III. RADAR RECEIVER-TRANSMITTER RT-494/APX-44 TROUBLESHOOTING

53. Receiver-Transmitter Troubleshooting Procedure

The procedures given in this section will assist third echelon maintenance personnel in localizing troubles within the receiver-transmitter. The data is coordinated with information obtained in section II and/or results of periodic checks performed in chapter 1. Because of the numerous internal signal paths, signal tracing is the best method of troubleshooting to determine the full extent of the troubles. The block diagram (fig. 8) should be used as a guide to signal distribution and trouble localization. Figures 54 and 55 provide tube and card location information necessary for locating major sections of the receiver-transmitter. Figure 6 (front panel) shows fuse and switch location.

54. Checking Primary Power, B+, and Bias Circuits

a. When to Check. When any of the following conditions apply, check for short or open circuits and clear the trouble before applying the power.

(1) When the receiver-transmitter is being serviced apart from the other components of the transponder set and the nature of the abnormal symptoms is not known.

(2) When abnormal symptoms reported from the pullout and functional checks in chapter 1 indicate possible power circuit troubles.

(3) When interunit troubleshooting procedures in paragraph 51 indicate possible power supply troubles.

b. Conditions for Tests. To prepare for the short-circuit tests, perform the following steps:

(1) Make sure that the receiver-transmitter is not connected to the control unit or the test equipment.

(2) Remove both side covers from the receiver-transmitter.

(3) Remove all plug-in components (tubes, printed circuit cards) (figs. 54 and 55).

(4) Remove transistors Q1 through Q4 (fig. 55).

c. Procedure. Perform the resistance measurements indicated in the chart (*d* below) to check the power distribution circuits. If abnormal readings are obtained, make the additional checks outlined. When the defective part is found, repair the trouble before applying power to the receiver-transmitter.

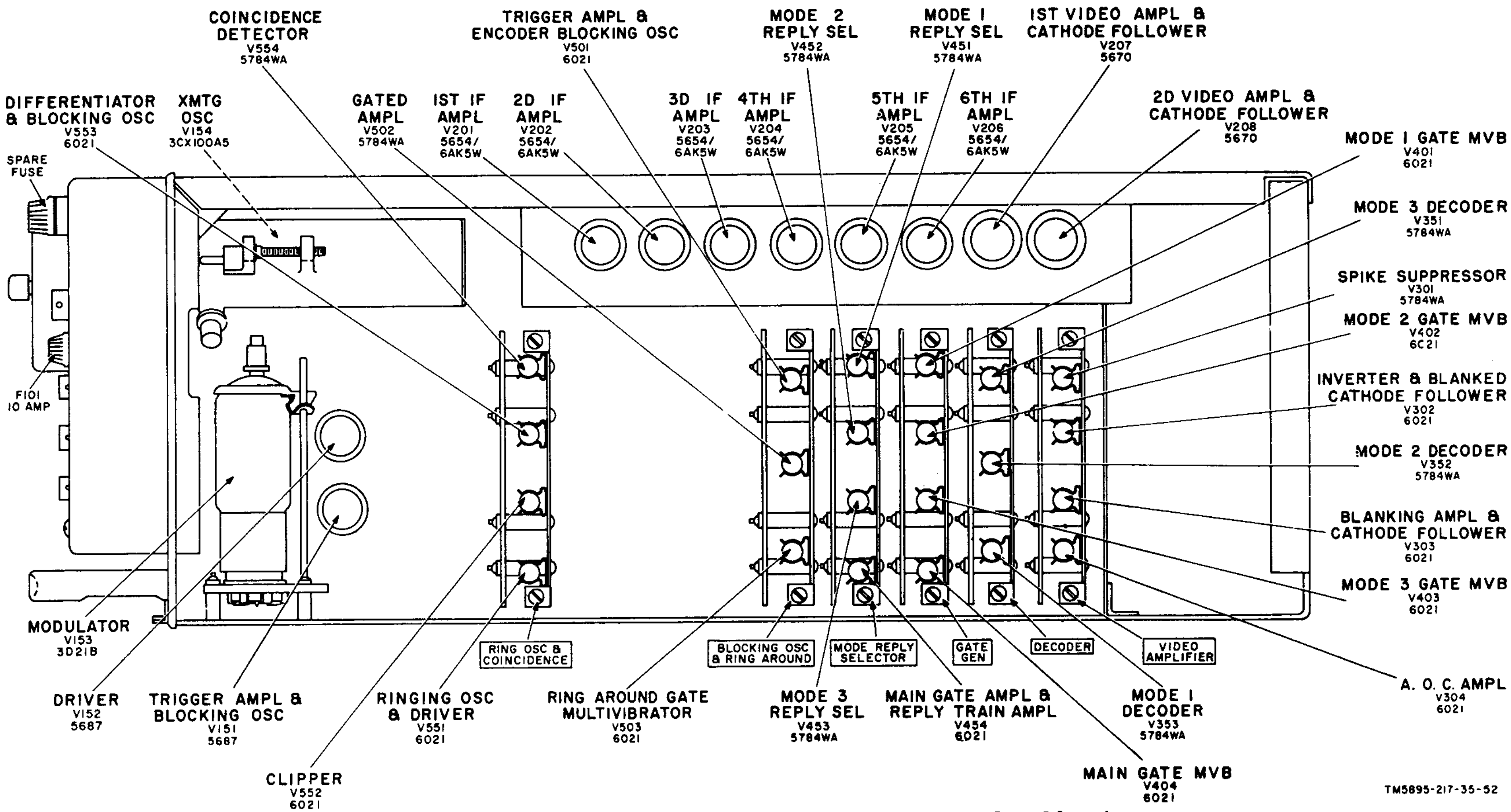


Figure 54. Receiver-transmitter right side view, tube, crystal, and card locations.

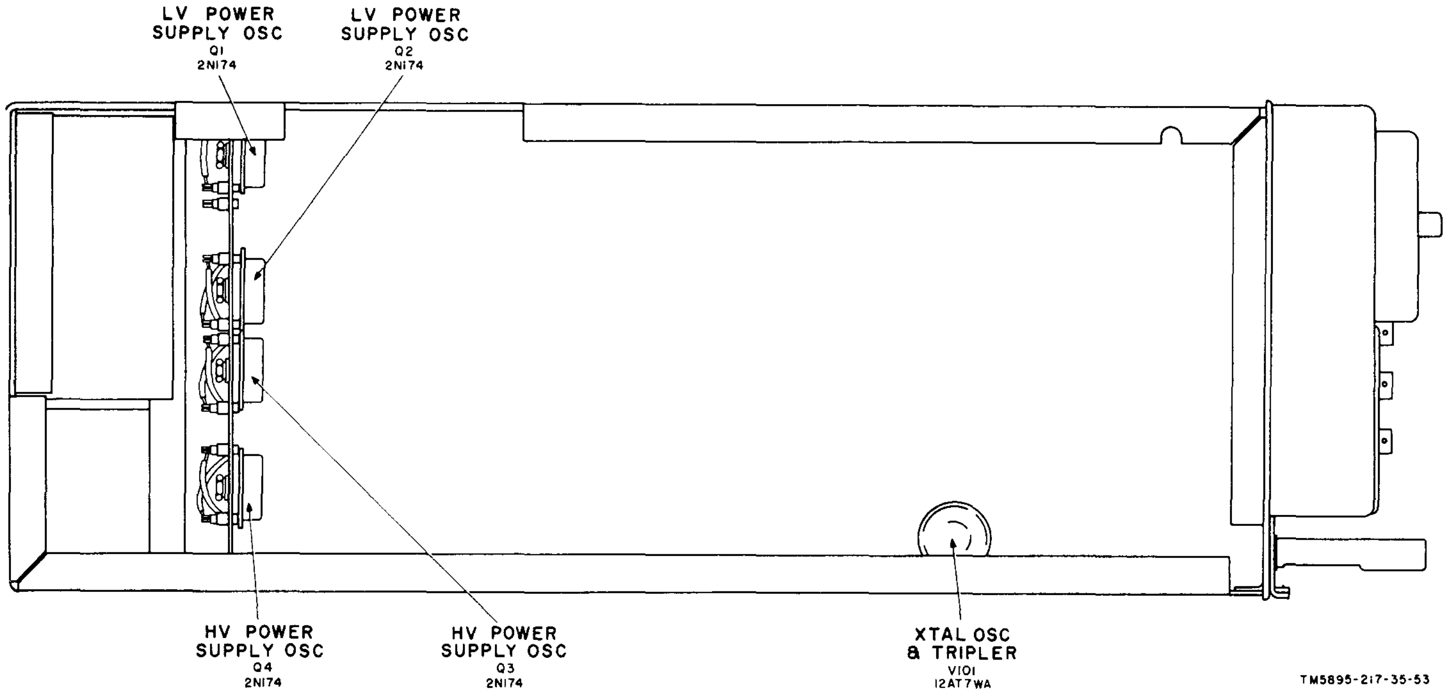


Figure 55. Receiver-transmitter left side view, tube and transistor locations.

d. Power Circuit Checks.

Point of measurement	Normal indication	Isolating procedure
Junction of L1 and C1 and C2 (fig 105).	Approximately 300 ohms resistance.	If the resistance is less than 100 ohms, check capacitors C1, C2 (fig. 105), and C154. If the resistance is approximately 100 ohms, check C109 (fig. 98).
Positive lead of meter to the junction of CR1 and CR2 (fig. 109), negative lead to ground.	Approximately 10K ohms.	If the resistance is zero, check capacitor C3 (fig. 105). If the resistance is low, check for a shorted rectifier CR1, CR2, CR3, or CR4 (figs. 105 and 109). If the resistance is high, check for an open rectifier CR1, CR2, CR3, or CR4.
Negative lead of multimeter to pin 1 of K7 (fig. 106), positive lead to ground.	approximately 80K ohms.	If the resistance is low, check for a shorted capacitor C5 (fig. 106), C157, or C158. If the resistance is low, but at least 3K ohms, check for a shorted capacitor C102, C103 (fig. 99), C104 (fig. 98) or rectifier CR9, CR10, CR11, CR12 (fig. 109). If the resistance is high, check for an open relay K7 coil, resistor R15 (fig. 107) or coil L152 (fig. 106). Check for an open resistor R103, R104 (fig. 99), R105 (fig. 98), or rectifier CR9 through CR12.
Negative lead of multimeter to the top of capacitor C6 (fig. 106), positive lead to ground.	Infinite resistance.	Check for a shorted capacitor C6 or shorted rectifiers CR21 through CR24 (figs. 106 and 109).
Negative lead of multimeter to V153 plate cap lead (fig. 105), positive lead to ground.	Infinite resistance.	Check for a shorted capacitor C7 (fig. 106) or C12.
Positive lead of multimeter to the bottom lead of CR7 (fig. 105), negative lead to ground.	80K ohms resistance.	Check for a shorted capacitor C4 (fig. 105), C105 (fig. 98), C153, C155, or C156.

55. Test Setup

The test setup in paragraph 9 may be used for third echelon or preliminary receiver-transmitter troubleshooting, but the equipment listed in paragraph 49 will be necessary for most of the fourth and fifth echelon troubleshooting procedures. Figure 58 illustrates the test equipment connections. Cable fabrication information is included below.

a. Cables. The bench test cable is required to interconnect the control unit and the receiver-transmitter. (See par. 9 for fabrication.) Fabricate the coaxial cables with the connectors listed in the chart below. Refer to figures 56 and 57 for connector installation procedures.

Cable No. (fig. 58)	Cable type	Length	Connectors	Adapters
1	RG-62/U	6 ft	2 UG-88/U	1 UG-273/U.
2	RG-62/U	6 ft	2 UG-88/U	1 UG-273/U.
3	RG-62/U	6 ft	2 UG-88/U	None.
4	RG-62/U	6 ft	2 UG-88/U	1 UG-273/U.
5	RG-62/U	6 ft	2 UG-88/U	None.

Cable No. (fig. 58)	Cable type	Length	Connectors	Adapters
6	RG-62/U	6 ft	2 UG-88/U	1 UG-273/U.
7	RG-62/U	6 ft	2 UG-88/U	1 UG-273/U.
8	RG-62/U	6 ft	2 UG-88/U	None.
9	RG-62/U	6 ft	2 UG-88/U	(*b.* below).
10	RG-8/U	6 ft	2 UG-21B/U	None.
11	RG-62/U	6 ft	2 UG-88/U	None.
12	RG-58/U	6 ft	2 UG-88/U	1 UG-201/U.
13	RG-58/U	2 ft	2 UG-88/U	1 UG-201/U.
14	RG-58/U	2 ft	2 UG-88/U	1 UG-29/U.
15	RG-8/U	3 ft	1 UG-21B/U	1 UG-201/U.
			1 UG-710A/U	None.
Lossy line	RG-21/U	21 ft	1 UG21B/U	None.
			1 UG-710A/U	

b. Detector Load. A small metal box, 2 by 2 by 2 inches, is used to house a 100-ohm, l-watt carbon resistor for terminating coaxial detector type 612A. Drill a 1/4-inch hole, centered, in opposite sides of the box. Strip the insulation from cable No. 9 (about 1 inch) approximately 5 inches from one end. (Leave enough shield braid to permit attachment to the box.) Insert the modified portion through the box and fasten the shields to the box (solder preferred). Attach the 100-ohm resistor from the center conductor of the coaxial cable to the shield or box, and then install the UG–88/U connectors on both ends of the cable.

c. Test Setup Connections. Connect all cables as shown in figure 58, including switches S4, S5, and S6. Mount the switches in a box or on a panel and placard the positions as shown; also placard the reference designations. The probe cables, included with Oscilloscope AN/USM–81, will be used to measure waveforms at the test points after preliminary checks are made.

56. Test Equipment Calibration

After fabrication, several portions of the test setup (fig. 58) must be calibrated to determine the loss or time delay present. All test equipment should be checked for calibration. Follow the procedures given in the manuals provided with the test equipment.

a. Pulse Generator, Pulse Separation Adjustment. Unless otherwise specified, the pulse generator shall be operated with internal triggering. Where extreme accuracy is desired, the marker generator is used to trigger the pulse generator. The procedures listed below shall be used to calibrate output pulse characteristics for accurate interrogation (triggering) of the receiver-transmitter.

(1) Disconnect cables No. 4 and No. 6 (fig. 58) from switch S6, and reconnect cable No. 6 to UG–274/U at pulse generator OUTPUT. Disconnect cable No. 7 from oscilloscope CHANNEL B and reconnect cable No. 4 to CHANNEL B input. Turn on the pulse generator, the marker generator, and the oscilloscope.

(2) The test equipment control settings listed in the charts below are critical settings; those not listed shall be adjusted as required to obtain usable indications. Do not change the pulse generator settings during troubleshooting and final testing unless instructed to do so in tests.

Oscilloscope control	Position
HORIZONTAL DISPLAY	MAIN SWEEP DELAYED.
MAIN SWEEP TIME/ CM	1 MICRO SEC
MODE	ALTERNAT E

Marker generator control	Position
TRIGGER RATE control	1 KC
MARKER control	1 USEC

Pulse generator control	Position
SYNC selector knob	EXT GOING +
SYNC switch	LEAD
DELAY switch	SHORT
PULSE NO. 2 switch	IN
WIDTH switch	NAR
RISE TIME dial	1 usec
POLARITY switch	POS
PULSE RATE dial	1 kc
COARSE ATTN knob	250 OHMS

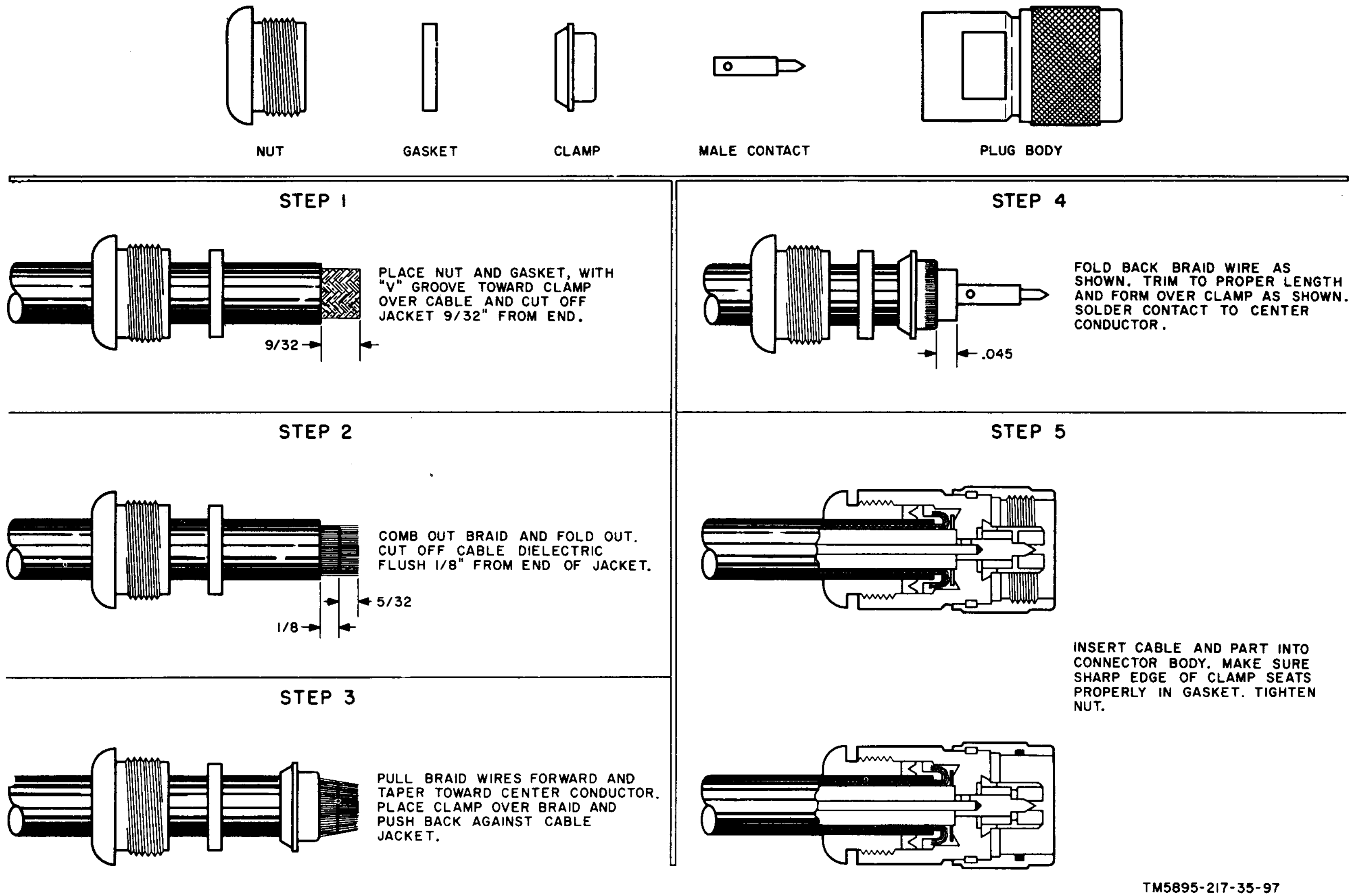


Figure 56. Installation of BNC connectors on coaxial cable.

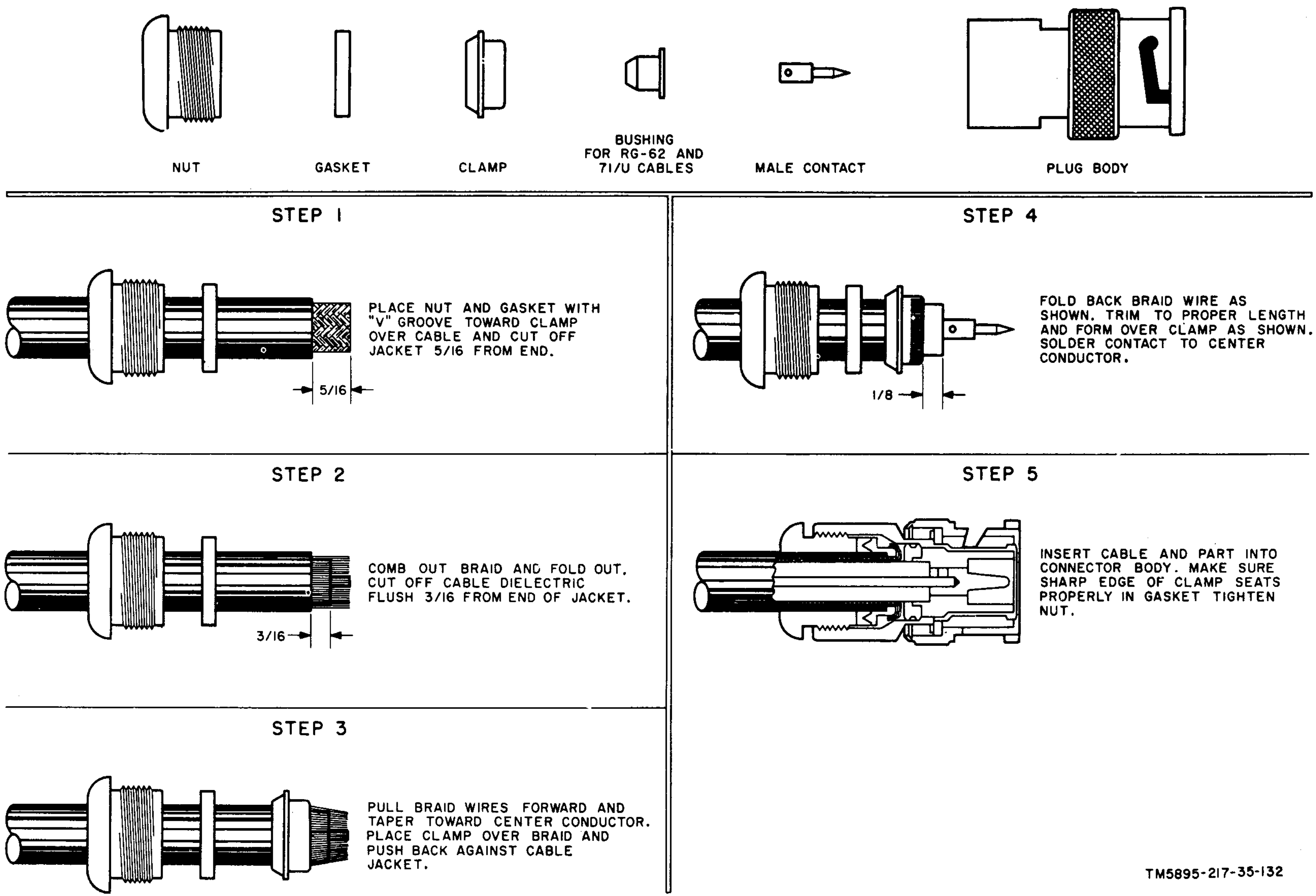


Figure 57. Installation of N and C connectors on coaxial cable.

(3) Accurately mark the pulse generator SEPARATION dial for 3-, 5-, and 8-usec pulse separations as compared to marker generator.

(4) Check the oscilloscope horizontal time calibration to be sure that it is accurate.

b. Uhf Signal Generator Delay. The following procedures are necessary to determine the amount of uhf signal generator delay to the pulse output from the pulse generator.

(1) Disconnect cable No. 6 at switch S6 (fig. 58), and reconnect it to Tee Adapter UG-274/U on the pulse generator. Disconnect cable No. 10 from the uhf signal generator and cable No. 14 from switch S5; then reconnect cable No. 14 to uhf signal generator OUTPUT receptacle.

(2) Operate the oscilloscope, the pulse generator, the uhf signal generator, and the marker generator as instructed in a above (1 USEC markers not required).

(3) Calibrate the uhf signal generator at 1,030 mc as described in its instruction manual, and then adjust for 50 percent external modulation from the pulse generator. Use the 0 dbm setting.

(4) When stable CHANNEL A and CHANNEL B traces have been established on the oscilloscope, measure the difference in time between the leading edges of the second pulse on each trace. This delay is the uhf signal generator delay and should be re-recorded on the front panel for future use.

c. Power Output Circuit Losses. The test setup of figure 58 introduces power losses between the receiver-transmitter and the power bridge.

***Caution:* Power bridge controls must always be set to their correct positions according to the bolometer in use, to prevent damage to the bolometer. Do not apply rf power to the bolometer when the power bridge is not connected and turned on. Keep test setup switch S5 in the DET position when not measuring output power or when the power bridge is turned off.**

(1) To prevent overload of the attenuator, substitute the lossy line for the coaxial attenuator (fig. 58) when code selections involve testing with more than four pulses in a reply train. The coaxial attenuator is to be used for receiver-sensitivity measurements only.

(2) Set test setup switch S5 (fig. 58) to the PWR position; switches S4 and S6 may be in any position. Set the pcwer bridge controls as follows:

Power bridge control	Position
BOLOMETER RESISTANCE	200 ohms.
POWER RANGE	100 milliwatts.
TEMPERATURE COEFFICIENT	+
BIAS CURRENT	11-40
BOL. RES. (chassis rear)	FIXED.
POWER switch	ON.

(3) Zero-set the power bridge; follow the procedures given in its instruction manual. (The power bridge should be turned on throughout the following tests.)

(4) Connect the slotted line to the attenuator in place of cable No. 15. Connect the other end of the slotted line to the uhf signal generator OUTPUT. Interconnect the slotted line and the standing wave meter.

(5) Set the uhf signal generator frequency to 1,090-mc, 0-dbm output, and 1,000-cps modulation. Locate the points of minimum voltage standing wave ratio and 1.5 to 1 by tuning both sections of the coaxial tuner. Mark these two points for future use in final testing. Lock the coaxial tuner in the minimum voltage standing wave ratio position. Restore the original cable connections shown in figure 58.

(6) Turn on the receiver-transmitter and the pulse generator; set the control unit master control to NORM, and the function control to NORMAL. Interrogate the receiver-transmitter on 1,030 mc with a mode 1 signal (3-usec separation) and 0-dbm at-

tenuator setting. Measure the average power output in milliwatts with power bridge and record (wavemeter tuned to 1,000 mc).

(7) Disconnect the bolometer from the coaxial tuner and connect the bolometer to the directional coupler in place of cable No. 13. Measure the average power output in milliwatts with the power bridge.

(8) Subtract the reading obtained in (7) above from the reading obtained in (6) above; the difference is the power output circuit loss. Record this figure for future use.

57. Test Setup Operation

The test setup has four basic control configurations which are used throughout chapters 3, 4, and 5. These four configurations will provide equipment operation for most of the sectionalizing and localizing procedures.

Caution: **To prevent overload of the attenuator, substitute the lossy line in place of the attenuator (fig. 58) when code selections involve testing with more than four pulses in a reply train. Use the coaxial attenuator for receiver-sensitivity measurements only.**

a. Test Equipment. The oscilloscope and the marker generator are adjusted according to the time elements required for the test. The power bridge settings are given in paragraph 56c and the POWER RANGE control is set to the scale required for substantial readings. The uhf signal generator and pulse generator settings are most commonly used are given below.

(1) Calibrate the uhf signal generator and record its dial settings for 1,030 mc; use a high quality frequency standard, the wavemeter, or the internal crystal oscillator. Set the remaining controls as follows:

Uhf signal generator control	Position
Modulation control ______	EXT. MOD
PULSE control _________	+
MOD. LEVEL control ___	Adjust to obtain a 50 percent reading on the PERCENT MODULATION meter.

(2) Calibrate the pulse generator as instructed in paragraph 56. Set the controls as given below for tests; the SEPARATION, FINE ATTN, and DELAY (variable) controls are set according to test requirements. The PULSE RATE dial is normally set to .5 kc, but when high accuracy time measurements are made with marker generator, use 1 kc and set the SYNC selector knob to EXT GOING +.

Pulse generator control	Position
SYNC switch _________	LEAD
SYNC selector knob _____	INT B (except for high accuracy measurements as above).
PULSE NO. 2 switch ___	IN
WIDTH control _______	1 usec
RISE TIME control ___	.1 usec
COARSE ATTN_______	MULTIPLIER 1, OHMS 250

b. Configuration No. 1. This configuration of the test setup switches will permit measurement of receiver-transmitter sensitivity, bandwidth, frequency, suppression characteristics, power output and decoder troubleshooting, and test requirements. Connect the oscilloscope probe to CHANNEL B for troubleshooting waveform checks.

Test setup switch	Position
S4	SUPER
S5	PWR
S6	MARK

c. Configuration No. 2. Use this test setup configuration for receiver-transmitter delay, range jitter, pulse reply, special reply pulse, code number assignment, interrogation rate, and random triggering rate tests. Connect the oscilloscope probe in CHANNEL A or CHANNEL B for troubleshooting waveform checks.

Test setup switch	Position
S4	MARK
S5	DET
S6	DET

d. Configuration No. 3. This configuration provides a quick sectionalizing check and overall performance measurement. The oscilloscope may be used with its probe connected to either channel for signal tracing.

Test setup switch	Position
S4	SUPER
S5	PWR
S6	VIDEO

e. Configuration No. 4. Use this configuration in general operation where comparisons are desired between oscilloscope probe measurements and selected signals.

Test setup switch	Position
S4	DET
S5	DET
S6	VIDEO

58. Localizing Troubleshooting Methods

a. Signal Tracing. Signal tracing is a method by which the signal path is followed through an equipment. It includes following the received signals, the signals initiated within the equipment because of the received signals, and the resulting final output. In the receiver-transmitter, most of the signal tracing requires waveform analysis on an oscilloscope (b below). Each step of the troubleshooting chart in paragraph 59 lists references to applicable test points and waveforms. The following paragraphs will assist maintenance personnel in duplicating the conditions for obtaining the proper waveforms.

b. Oscilloscope Procedures. Oscilloscope AN/USM-81 is used for observing the waveforms. Refer to TM 11-6625-219-12 for the operation of the oscilloscope. Use the probe furnished with the oscilloscope to check the test points. The probe in CHANNEL B, with test setup switch S6 in the MARK position, permits comparison of the waveforms to selected markers from the marker generator. Adjustment of horizontal sweep speeds depends on the pulse width, the number of pulses, and the type of waveform to be observed. The pulse generator DELAY and oscilloscope DELAY-TIME MULTIPLIER controls are used to position the displays for proper timing measurements. Be sure to consider the attenuation factors and the time delays of the probes and coaxial cables used.

c. Waveforms. The normal waveforms that should be observed are illustrated with the schematic diagram of each subassembly. These waveforms are designated by letters and descriptions, and the letters are keyed to circuit points on the schematic diagram to indicate the point at which the waveform was taken. The test equipment connections in figures 2 and 58 provide several suitable setups for observing the waveforms. Under each waveform is the oscilloscope horizontal sweep time and the vertical voltage calibration required for obtaining the waveform. The width, rise, decay, and separation times, and the amplitude are indicated directly by the waveforms themselves. Because amplitude is not as important as time and waveshape, waveforms, for successive stages, that involve only amplitude changes, have been omitted in this manual. Any corrections or repairs made to correct time and waveshape discrepancies will normally correct small amplitude deficiencies. Where double-trace waveforms are shown, the required calibrations for each channel are also indicated. Thorough knowledge of the use of the oscilloscope is necessary to obtain the maximum information from waveforms shown in figures 122 through 129. Figures 59 through 69 illustrate the physical location of waveform measurement points for each subassembly. The letters on the test point location illustrations are consistent with the waveform letter designations on the applicable subassembly schematic diagram. Refer to the following chart for coordinating the test point location diagrams to the appropriate schematic diagram.

Subassembly	Test point location Fig. No.	Schematic and waveform diagram Fig. No.
IF-suppressor subchassis____	59	123
Video amplifier card________	60	124
Decoder card ___________	61 and 62	125
Gate generator card _________	63	126

Subassembly	Test point location Fig. No.	Schematic and waveform diagram Fig. No.
Blocking oscillator and ring around card.	64	127
Mode reply selector card	65	128
Ringing oscillator and coincidence card.	66	129
Modulator section	67 and 68	122
Power supplies	69	122

d. Voltage Measurements. Unless otherwise specified, all voltage measurements are taken with Multimeter AN/URM-105. Refer to TM 11-6625-203-12 for the operation of the multimeter. With the equipment operating and no signal input to ANTENNA receptacle J101, measure the voltages at the points indicated on the voltage and resistance diagram of the appropriate subassembly, and compare with the values shown. Be sure to set the multimeter to the proper scale before connecting the leads to the circuit. When measuring high voltages, turn off the transponder set, make the scale setting, connect the test leads, and then turn on the equipment to prevent personal shock or shorts that could damage the equipment.

***Caution:* Momentarily shorting B+ and bias leads or connections to ground will usually damage one or more of the power supply transistors.**

e. Resistance Measurements. Resistance measurements are made with the multimeter when the transponder set is turned off. It should be observed in the voltage and resistance diagrams that certain resistance values are prefixed by a ⊕ or ⊖ sign. These resistances are measured in circuits containing diodes and require the proper meter polarity connections to obtain the same results. This polarization does not necessarily mean that the red or positive lead is used for positive voltage readings. Multimeter AN/URM-105 has the negative terminal of its internal battery connected to the red lead during resistance measurements; therefore its black lead would be connected to the test point when a ⊕ sign is indicated, and its red lead would be connected to the test point when a ⊖ sign is indicated.

59. Receiver-Transmitter Trouble Localization

a. General. The chart (*b* below) includes a complete procedure for localizing troubles within the receiver-transmitter. This chart may be used by third echelon personnel for troubleshooting, because it includes a systematic procedure for tracing troubles to a defective subassembly (subchassis or printed circuit card) or plug-in component. Third echelon maintenance personnel will replace these components. Figure 70 illustrates the use of the card removal tool fastened inside the right side cover. The chart may also be used by fourth and fifth echelon maintenance personnel to localize the trouble. The references throughout this chart indicate the proper isolating or additional troubleshooting procedures to locate the defective part. The chart is based on signal tracing, using the oscilloscope to check waveforms at key circuit test points (par. 58c). If this chart is used for third echelon maintenance, the equipment may be set up according to the procedures in paragraph 9c. Disconnect the coder-decoder and check the waveforms; use the oscilloscope probe connected to the oscilloscope CHANNEL B input, If this chart is used for fourth or fifth echelon maintenance, set up the equipment according to the procedures in paragraph 55, calibrate the test equipment as indicated in paragraph 56, and follow the test equipment operation procedures in paragraph 57.

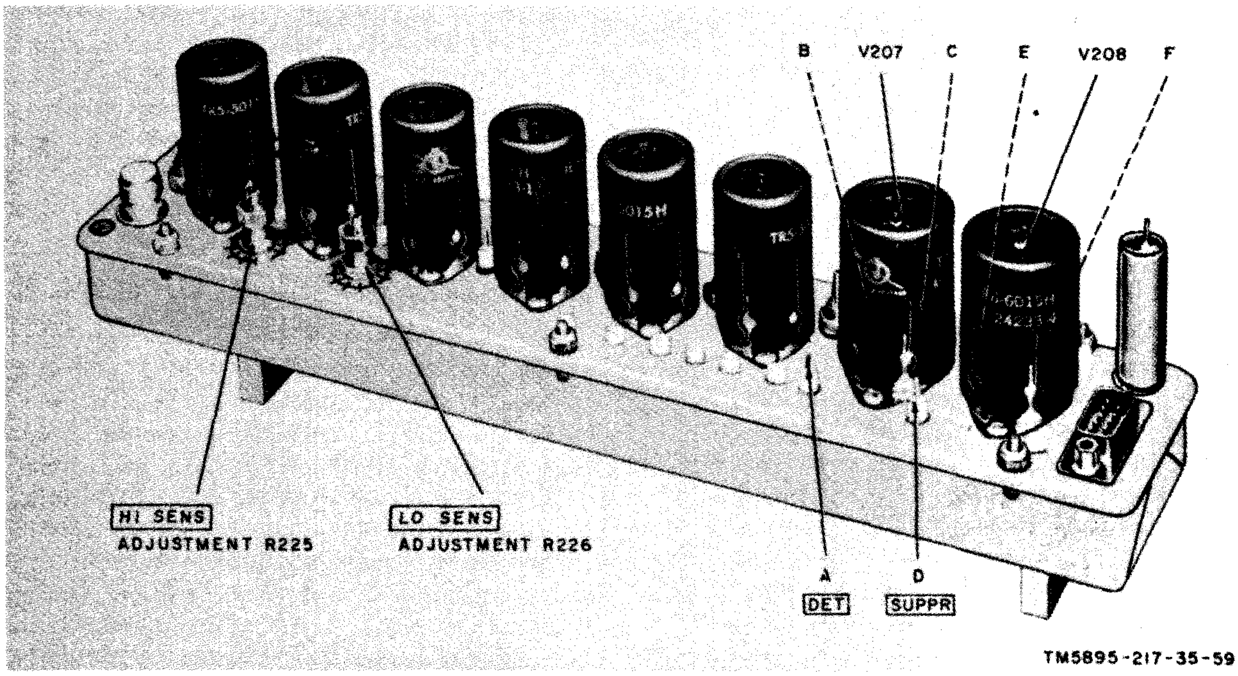


Figure 59. IF-suppressor subchassis, test point locations.

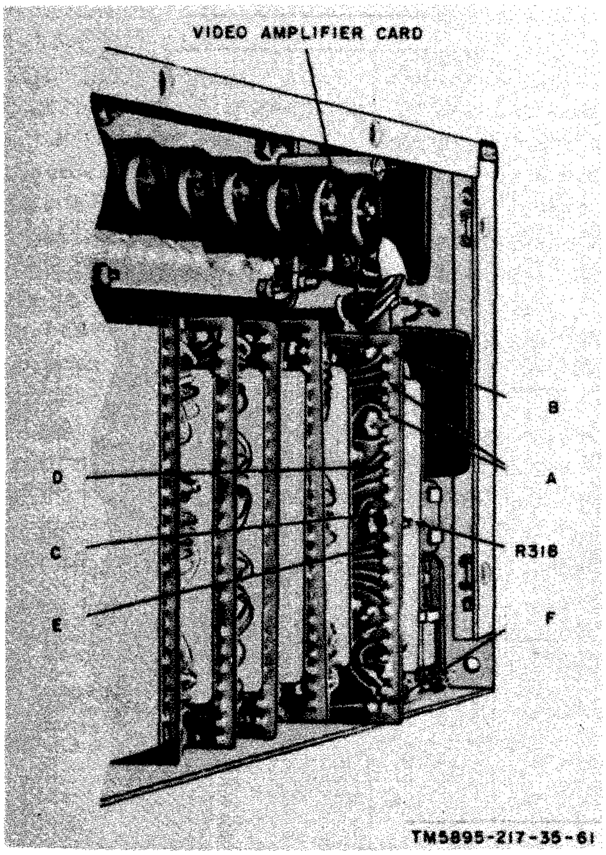


Figure 60. Video amplifier card, A. O. C. control and test points location.

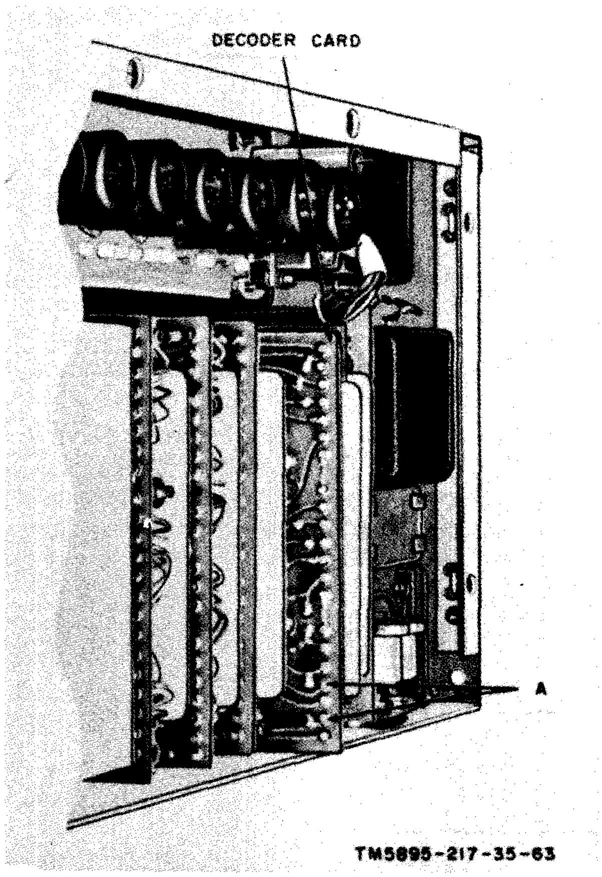


Figure 61. Decoder card, test point location.

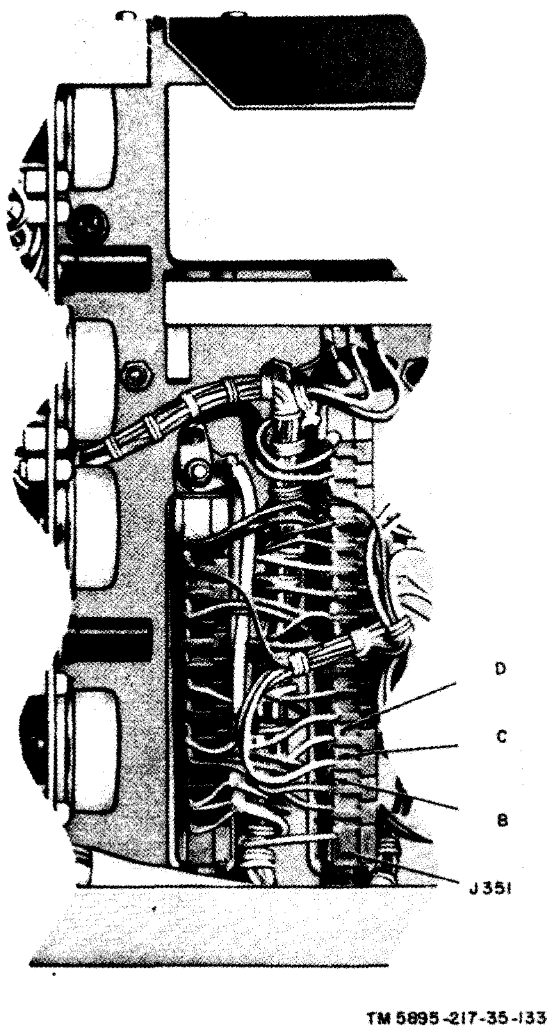


Figure 62. Decoder card receptacle, test points location.

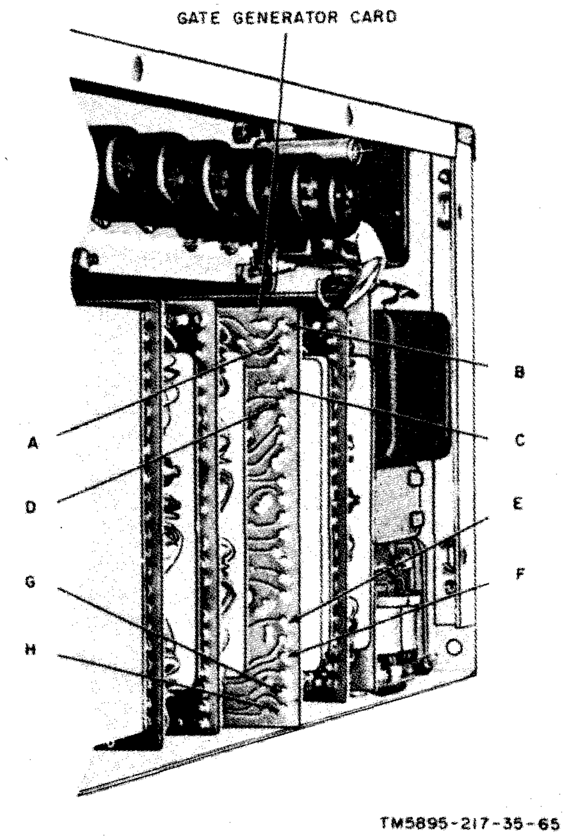


Figure 63. Gate generator card, test points location.

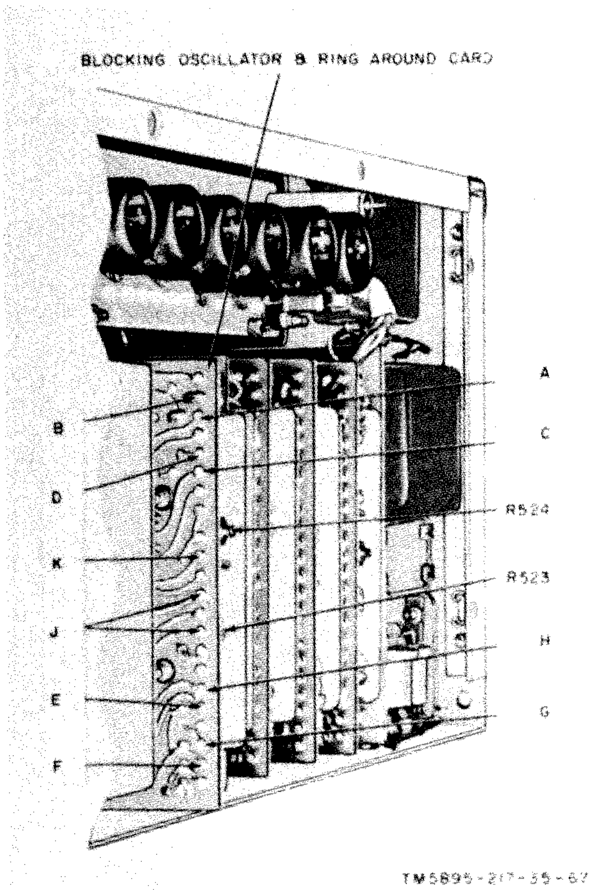


Figure 64. Blocking oscillator and ring around card, test points and adjustments location.

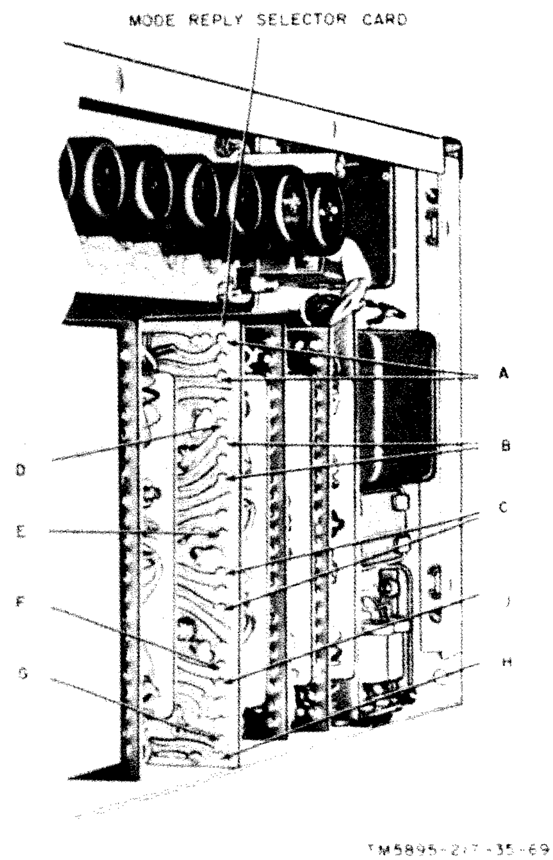


Figure 65. Mode reply selector card, test points location.

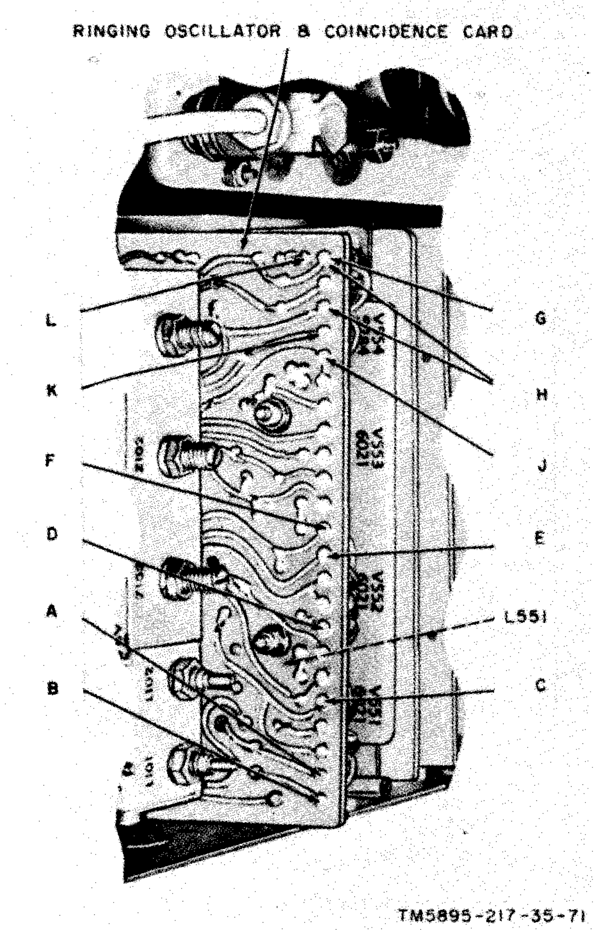


Figure 66. Ringing oscillator and coincidence card, adjustment and test points location.

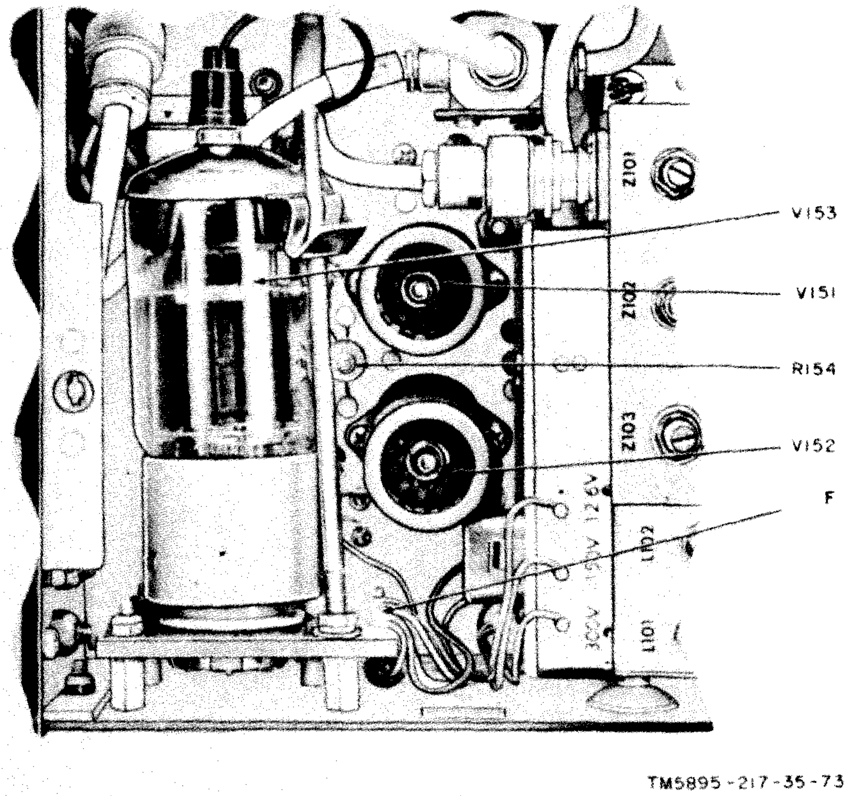


Figure 67. Trigger amplifier-blocking oscillator, driver, and modulator tubes, blocking oscillator adjustment, and modulator grid test point location.

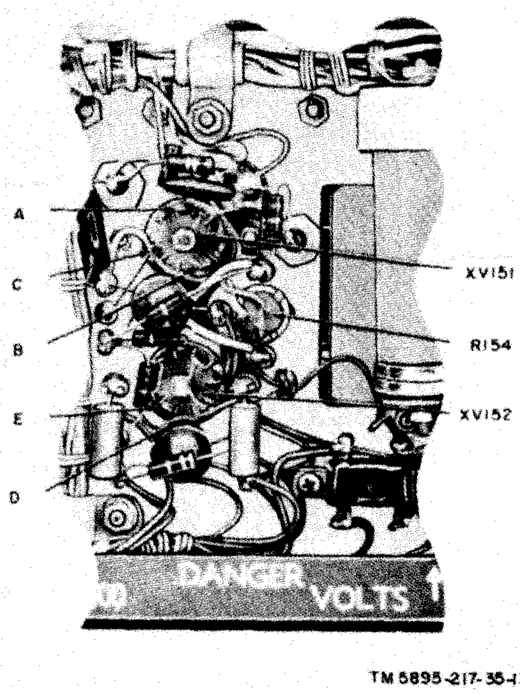


Figure 68. Trigger amplifier, blocking oscillator, and drive tube socket test point location.

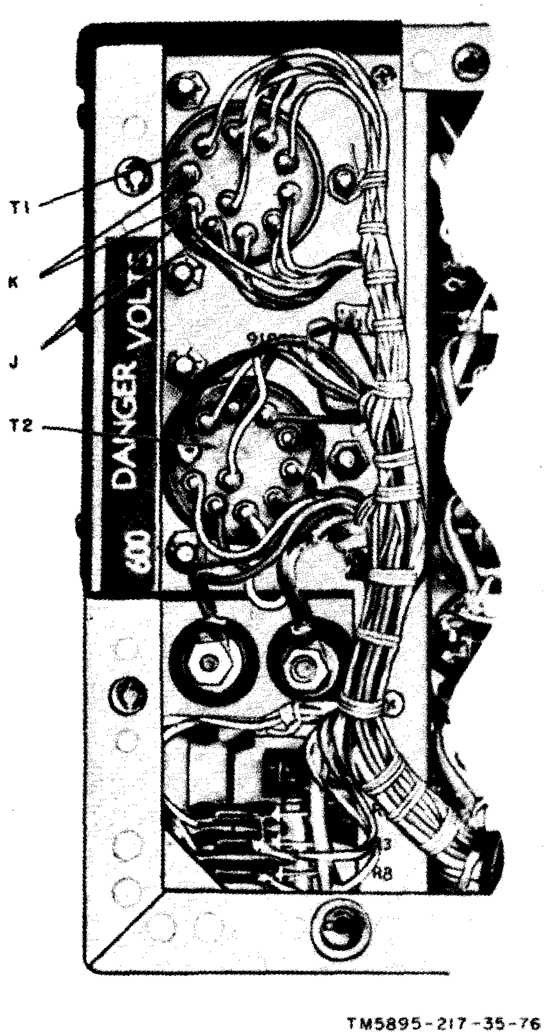


Figure 69. Power supply transformers T1 and T2, test points location.

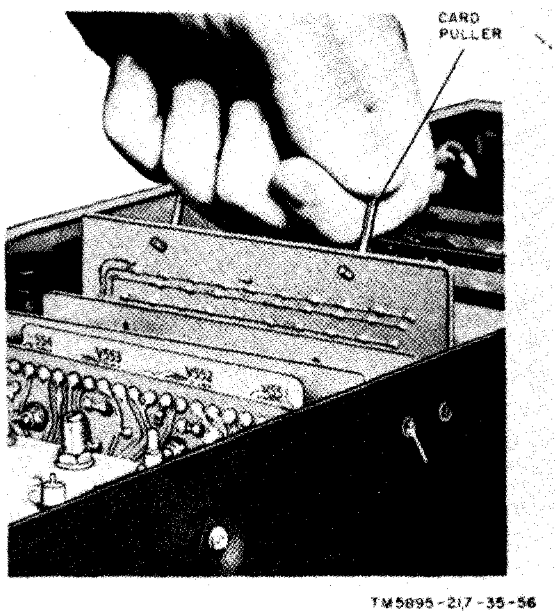


Figure 70. Typical card removal, using card puller.

b. Receiver-Transmitter Troubleshooting Chart.

Step	Oscilloscope input	Waveform reference	Normal indication	Abnormal indication	Corrective measures
1	Test points J and K, figure 69.	J and K, part 2, figure 122.	Both power supplies and tube filaments energized.	Power supplies and tube filaments not energized.	Check for blown fuse F101 (fig. 6). Check continuity of power relay K5 (figs. 93 and 106). Replace if defective.
				Filaments energized but power supplies inoperative.	Check transistors Q1 through Q4 (fig. 55). Follow the procedures in paragraph 72*d;* replace all defective transistors (par. 81*f*). Check continuity of relays K6 and K7 (figs. 93 and 106); replace if defective. Troubleshoot power supplies (par. 72) and repair as required (par. 81).
2	DET test point (A, figure 59).	A, figure 123 (xmtr on and off).	Interrogation pulses for each mode and spurious reply pulses according to code with xmtr on. No spurious reply pulses with xmtr off.	Weak or no interrogation pulses.	Check tubes V101 (fig. 55) and V201 through V206 (fig. 54). Replace all defective tubes. Troubleshoot converter subchassis (par. 62) and repair as required (par. 77). Troubleshoot IF-amplifier stages of IF-suppressor subchassis (par. 63) and repair as required (par. 78). Check alignment of converter (par. 87) and IF-amplifier stages (par. 86).
3	VIDEO OUT test point F, figure 59.	A, figure 124 (xmtr off).	Same waveform as shown for V301 suppressor grid.	No pulse present or amplitude and waveshape incorrect.	Check tubes V207 and V208 (fig. 54); replace defective tubes. Troubleshoot first and second video amplifiers and cathode followers on IF-suppressor subchassis (par. 63); repair as required (par. 78).
4	Test point A, figure 60.	A, figure 124 (xmtr off).	Positive interrogation pulses for each mode with correct waveshape and amplitude at V301 suppressor grid and control grid.	No pulses, either grid V301__	Check for continuity between pin 7 of J301 (fig. 106) and pin 3 of P201 (fig. 105); repair wiring if open. Replace, or troubleshoot (par. 64) and repair video amplifier card as required.
				No pulses at control grid V301.	Replace or troubleshoot (par. 64) and repair video amplifier card as required.
5	Test point D, figure 60.	D, figure 124 (xmtr on).	Interrogation pulses in all modes with blanking pulse greatly attenuating spurious reply pulses.	Interrogation pulses normal but spurious reply pulses not blanked. No gate pulse at SUPER receptacle J106 on front panel.	Proceed to steps 6, 7, and 8, to check main gate multivibrator. Check for continuity between pin 9 of J301 and pin 12 of J451 (fig. 106). Repair wiring if open.

					Replace or troubleshoot (par. 64) and repair video amplifier card as required.
				Interrogation pulses low or absent all modes.	Replace or troubleshoot video amplifier card.
6	Test point C, figure 62.	C, figure 125 (xmtr on).	Single pulse, all interrogation modes.	No pulse in any interrogation mode.	Check for continuity between pin 3 of J351 and pin 2 of J301 (fig. 106); repair wiring if open.
					Replace or troubleshoot (par. 65) and repair decoder card as required.
				No decoder pulse in one interrogation mode.	Replace delay line DL351 (fig. 106).
					Replace decoder card, or troubleshoot (par. 65) for a defective mode decoder.
7	Test point H, figure 63.	H, figure 126 (xmtr on).	Gate pulse approximately 120 used wide.	No gate pulse	Check for continuity between pin 12 of J401 (fig. 106) and pin 15 of J351; repair wiring if open.
					Replace gate generator card, or troubleshoot main gate multivibrator stage in gate generator card (par. 66).
				Gate pulse waveshape and amplitude incorrect.	Replace or troubleshoot gate generator card.
8	Test point J, figure 65.	J, figure 128	Main gate pulse approximateiy 120 used wide.	No gate pulse	Replace mode reply selector card or troubleshoot main gate amplifier stage on mode reply selector card (par. 68).
9	A, B, C, figure 65	Channel B waveforms of A, B, C, figure 128.	Appropriate mode gate pulse according to interrogation mode.	No gate pulse, one or more modes.	Replace decoder card, or troubleshoot output distribution circuit on decoder card (par. 65).
					Replace gate generator card or troubleshoot the defective mode gate multivibrator on the gate generator card (par. 66).
10	H, figure 65	H, figure 128	Reply train pedestals according to selected code and interrogation mode.	No pedestals, any mode or code.	Replace mode reply selector card, or troubleshoot reply train amplifier on mode reply selector card (par. 68).
					Proceed to step 11 and check encoder blocking oscillator.
				No pedestals, one mode and code only.	Replace mode reply selector card, or troubleshoot the inoperative mode reply selector stage on the mode reply selector card (par. 68).
					Replace the reply code switching card for the inoperative mode, or troubleshoot the reply code switching card (par. 70).
					Recheck for output from the mode gate multivibrator (step 9).

Step	Oscilloscope input	Waveform reference	Normal indication	Abnormal indication	Corrective measures
11	Test point D, figure 64.	D, figure 127	Pulses approximately 1 usec in width to drive delay line DL601.	No pulses any interrogation mode or operational category.	Replace blocking oscillator and ring around card, or troubleshoot trigger amplifier and encoder blocking oscillator stage on the blocking oscillator and ring around card (par. 67). Recheck step 7 to make sure that main gate pulses are available for trigger amplifier.
				Pulses in all but special operational categories (I/P and EMER).	Replace blocking oscillator and ring around card, or troubleshoot ring around gate multivibrator and gated amplifier stages on blocking oscillator and ring around card (par. 67). Replace mode 1 reply code switching card, or check ring around bus in the mode 1 reply code switching card (par. 70).
				Pulses are normal, but no reply pedestals were present during step 10 above.	Replace delay line DL601 (fig. 105). Perform resistance check (fig. 92) to determine that the delay line is defective.
12	Test point A, figure 68.	A, part 2, figure 122	Reply train of pulses according to interrogation mode and selected code.	No pulses, any mode or code	Replace ringing oscillator and coincidence card, or troubleshoot ringing oscillator and coincidence card (par. 69).
13	Test point F, figure 67.	F, part 2, figure 122	Same as step 12.	No pulses or weak pulses	Check tubes V151 and V152 and replace defective tubes. Troubleshoot trigger amplifier, blocking oscillator, and driver stages (par. 71).
14	Cathode of V154, top of resistor R162 (fig. 105).	G, part 2, figure 122	Same as step 12.	Same as step 13	Check tube V153 and replace if defective. Check tube V154 and replace (par. 79*d*) if defective. Troubleshoot modulator and transmitting oscillator stages (par. 71).
15	VIDEO OUT receptacle of IFF simulator (when using fig. 2 test setup), or output of detector (when using fig. 58 test setup).	G, part 2, figure 122	Same as step 12.	Same as step 13	Check duplexer (fig. 116). Check transmitting oscillator tube V154. Troubleshoot transmitting oscillator cavity and circuits (par. 71).

Section IV. RECEIVER TRANSMITTER TROUBLE ISOLATION

60. Isolation Procedures

Data in the following paragraphs coordinate the information in sections II and III to assist fourth and fifth echelon maintenance personnel in isolating a fault to a particular part. The charts in this section cover a card, a subchassis, or an operating section of the receiver-transmitter. Each paragraph also contains additional troubleshooting information in the form of transformer and inductor resistances, voltage and resistance data, and references to parts location and printed wiring illustrations. Reference is also made to test point location diagrams and schematic diagrams for each card or subchassis. The card receptacle voltage and resistance diagrams (figs. 71 and 72) will also aid in troubleshooting the printed circuit cards.

61. Test Equipment Required

All the test equipment referred to in the following charts are listed in paragraph 49. The troubleshooting bench test setup (fig. 58) is to be used for equipment operation. Follow the procedures in paragraphs 55 through 57 for applying the proper input signals to the receiver-transmitter. Waveforms and voltages must be taken with all subassemblies installed.

Caution: **To prevent overload of the attenuator, substitute the lossy line (par. 55a) in place of the attenuator (fig. 58) whenever code selections consist of more than four pulses in a reply train. The attenuator is to be used for receiver-sensitivity measurements only.**

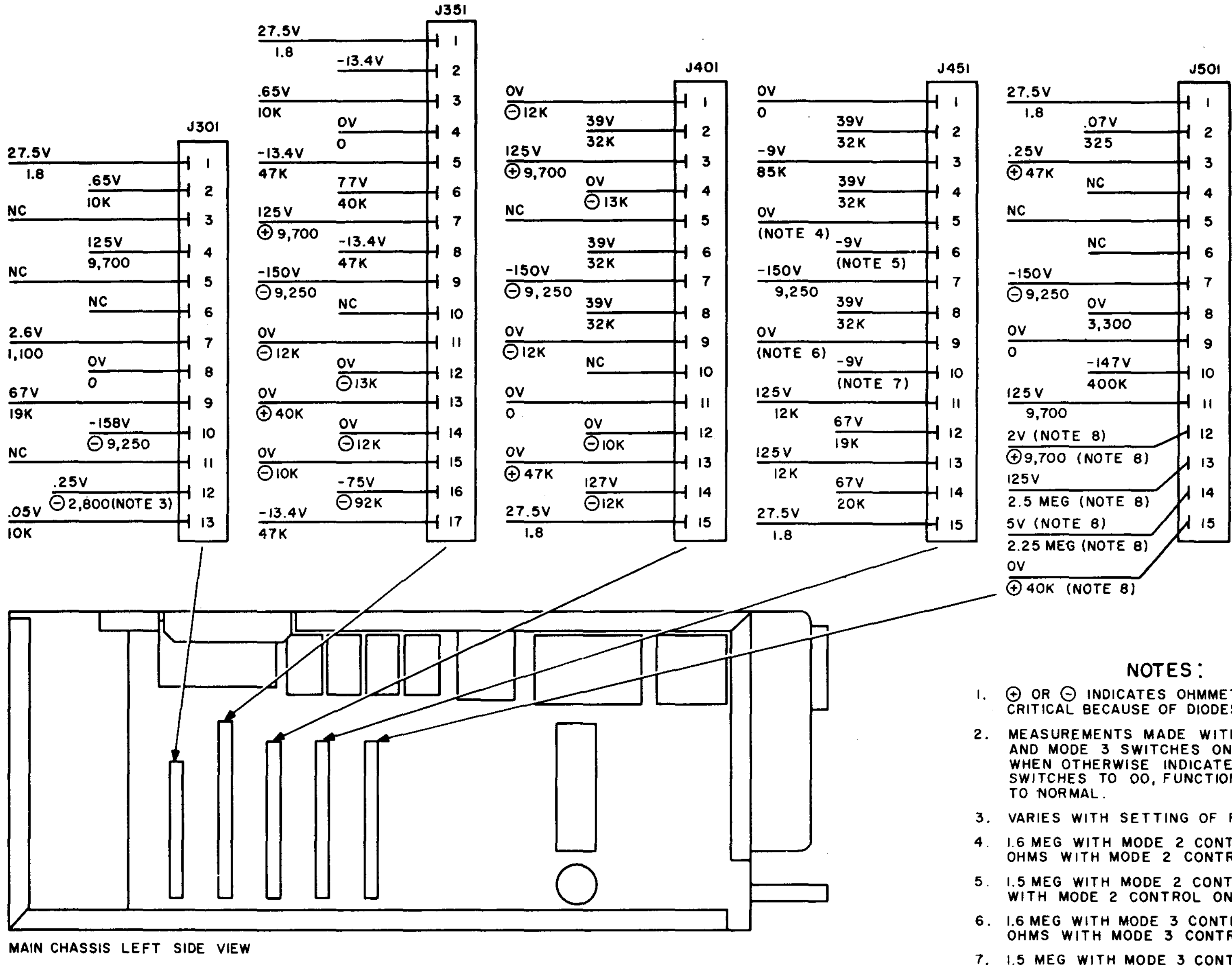
62. Converter Subchassis Troubleshooting

a. General. The chart (*c* below) contains information which aids converter trouble isolation. After completion of the checks and any repairs, realine the converter (par. 87). Refer to schematic (figs. 10 and 122) and wiring diagrams (fig. 117) for circuit connections, After the trouble is isolated, refer to paragraph 77 for the repair procedures.

b. Converter Voltage and Resistance Measurements. Voltage and resistance measurements shown in figure 73 for tube V101 are taken with Electronic Multimeter TS-505/U and tube socket adapter. Make sure all cover plates are in place on the converter subchassis and no signal is applied to the input when measurements are taken. Keep vtvm leads as short as possible to avoid introducing stray signals and reactance to the oscillator circuit.

c. Converter Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	Signals will not pass through converter.	Local oscillator section inoperative.	Check tube V101 (fig. 55); replace if defective.
			Make voltage and resistance measurements or tube V101 (fig. 73).
			Substitute crystal Y101 (figs. 98 and 105).
			Check alinement of oscillator and frequency multipliers (par. 87).
			Check diode CR101 (fig. 98); replace if defective.
		Mixer inoperative	Check diode CR102 (fig. 98); replace if defective.
			Check capacitors C108 and C110; replace if defective.
			Check alinement of preselector and harmonic selector cavities (par. 87).
2	Receiver weak, if.-suppressor sensitivity normal.	Crystal Y101 off-frequency	Check frequency or substitute crystal (par. 87b).
		Converter misalined	Realine converter (par. 87).



NOTES:

1. ⊕ OR ⊖ INDICATES OHMMETER POLARITY, CRITICAL BECAUSE OF DIODES IN CIRCUIT.
2. MEASUREMENTS MADE WITH MODE 2 AND MODE 3 SWITCHES ON, EXCEPT WHEN OTHERWISE INDICATED. ALL CODE SWITCHES TO 00, FUNCTION CONTROL TO NORMAL.
3. VARIES WITH SETTING OF R318.
4. 1.6 MEG WITH MODE 2 CONTROL OFF, 0 OHMS WITH MODE 2 CONTROL ON.
5. 1.5 MEG WITH MODE 2 CONTROL OFF, 85K WITH MODE 2 CONTROL ON.
6. 1.6 MEG WITH MODE 3 CONTROL OFF, 0 OHMS WITH MODE 3 CONTROL ON.
7. 1.5 MEG WITH MODE 3 CONTROL OFF, 85K WITH MODE 3 CONTROL ON.
8. DEPENDS ON SETTING OF R524.

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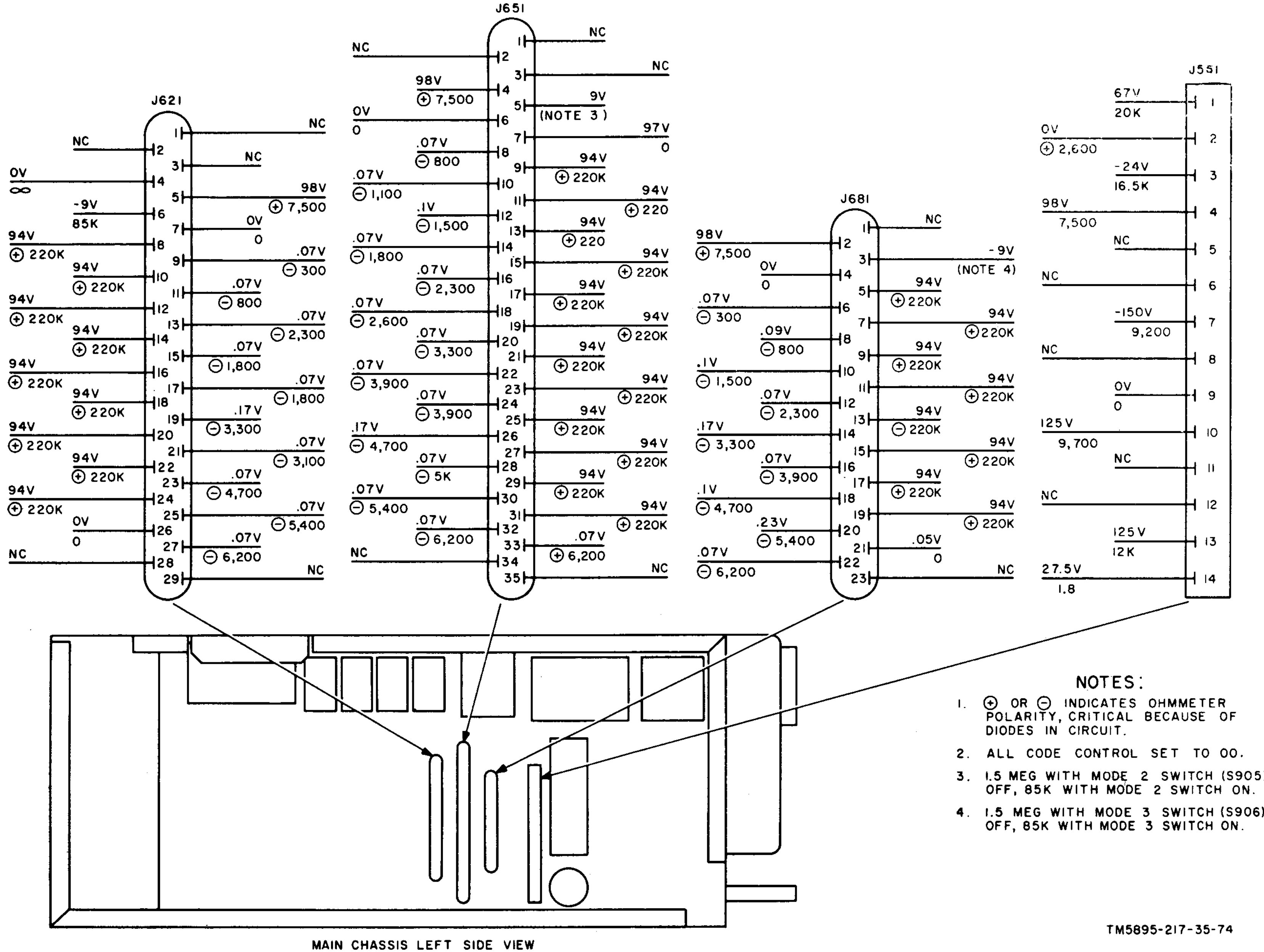
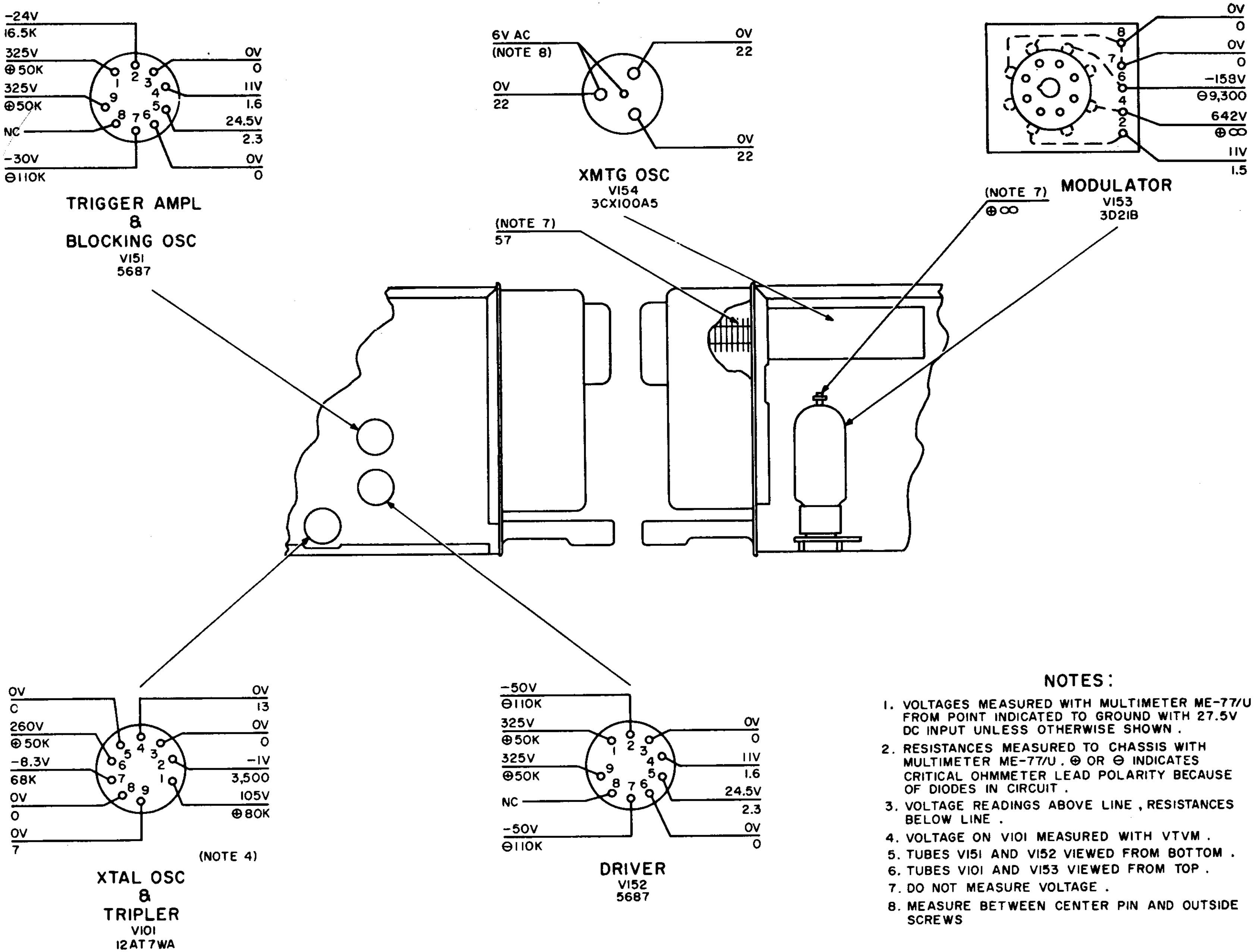
Figure 71. Video amplifier, decoder, gate generator, mode reply selector, and blocking oscillator and ring around card receptacles, voltage resistance diagram.



NOTES:

1. ⊕ OR ⊖ INDICATES OHMMETER POLARITY, CRITICAL BECAUSE OF DIODES IN CIRCUIT.
2. ALL CODE CONTROL SET TO 00.
3. 1.5 MEG WITH MODE 2 SWITCH (S905) OFF, 85K WITH MODE 2 SWITCH ON.
4. 1.5 MEG WITH MODE 3 SWITCH (S906) OFF, 85K WITH MODE 3 SWITCH ON.

Figure 72. Modes 1, 2, and 3 reply code switching and ringing oscillator-coincidence card receptacles, voltage and resistance diagram.



NOTES:

1. VOLTAGES MEASURED WITH MULTIMETER ME-77/U FROM POINT INDICATED TO GROUND WITH 27.5V DC INPUT UNLESS OTHERWISE SHOWN.
2. RESISTANCES MEASURED TO CHASSIS WITH MULTIMETER ME-77/U. ⊕ OR ⊖ INDICATES CRITICAL OHMMETER LEAD POLARITY BECAUSE OF DIODES IN CIRCUIT.
3. VOLTAGE READINGS ABOVE LINE, RESISTANCES BELOW LINE.
4. VOLTAGE ON V101 MEASURED WITH VTVM.
5. TUBES V151 AND V152 VIEWED FROM BOTTOM.
6. TUBES V101 AND V153 VIEWED FROM TOP.
7. DO NOT MEASURE VOLTAGE.
8. MEASURE BETWEEN CENTER PIN AND OUTSIDE SCREWS

Figure 73. Converter and modulator-tra~~smitter, tube-socket voltage and resistance diagram.

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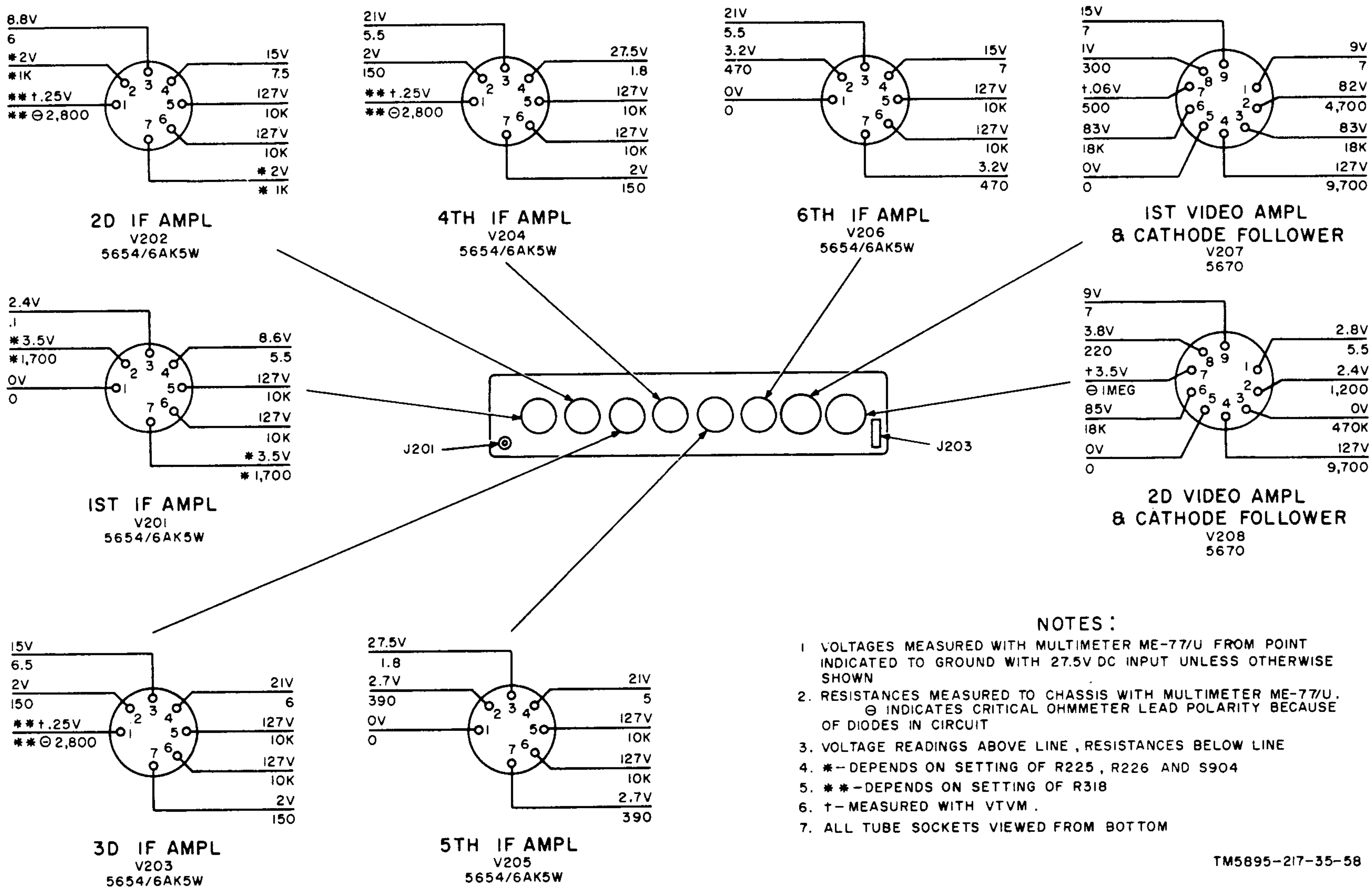


Figure 74. IF-suppressor subchassis, tube socket, voltage and resistance diagram.

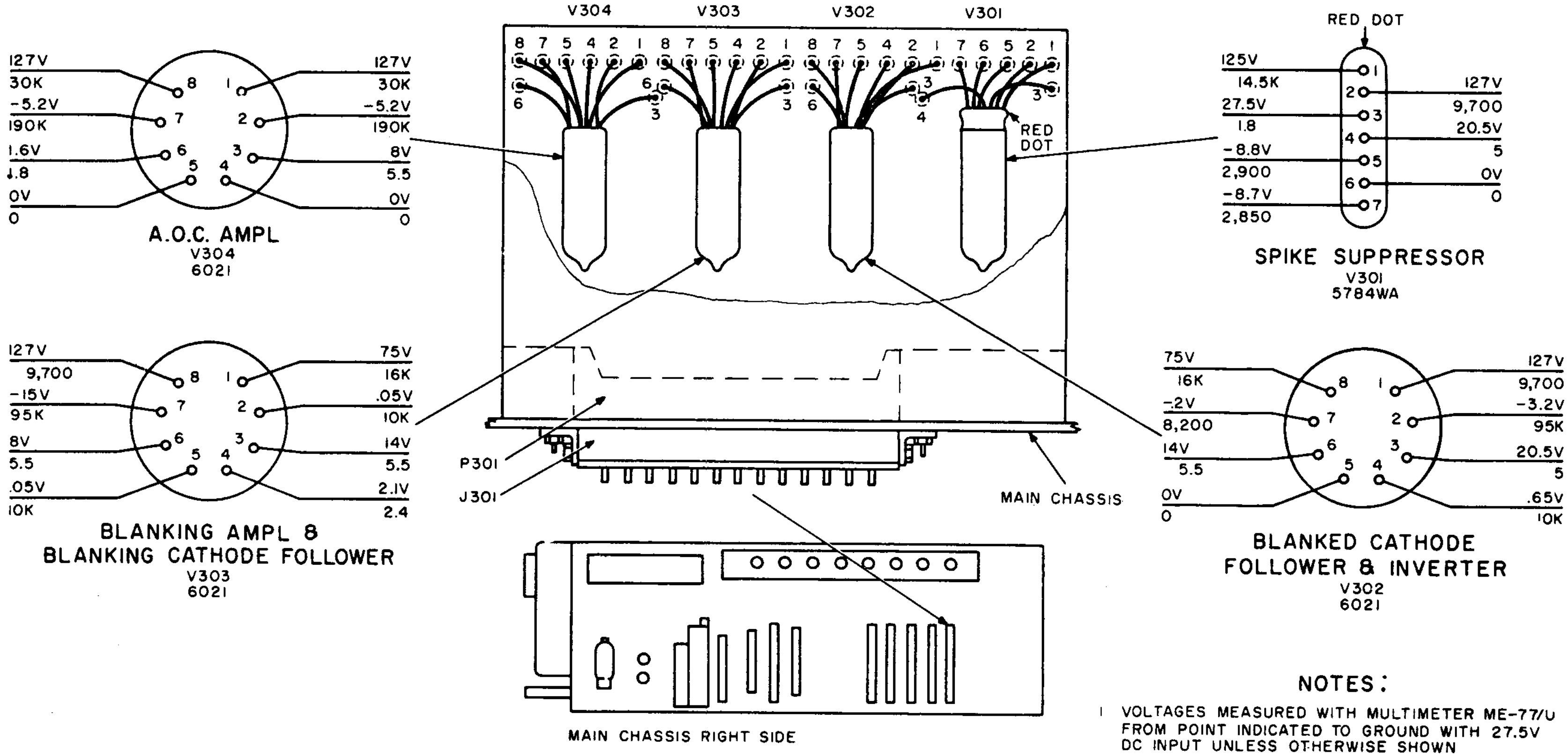
63. IF-Suppressor Subchassis Troubleshooting

a. General. The chart (*c* below) will permit maintenance personnel to isolate IF-suppressor subchassis troubles and perform corrective maintenance. Refer to paragraph 86 for detailed alinement instructions when it is determined that all circuit parts are in serviceable condition. Refer to the partial schematic diagrams (figs. 12-17), overall schematic diagram (fig. 123), and wiring diagram (fig. 118) for circuit connections. After the trouble is isolated, refer to paragraph 78 for repair procedures.

b. IF-Suppressor Voltage and Resistance Measurements. Voltage and resistance measurements on the IF-suppressor subchassis are made with the bottom cover removed or with tube adapters. The subchassis may be reconnected and rotated to provide access to tube socket pins after removal. Voltages and resistances are shown in figure 74.

c. If-Suppressor Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	No output at DET test point, or output weak and distorted.	Defective if. stage ---------------	Check tubes V201 through V206 (fig. 54) replace all defective tubes. Make voltage and resistance measurements of V201 through V206 stages (fig. 74). Check if. alinement (par. 86).
		Defective A.O.C. circuit ---------	Check diode CR209 (fig. 103). Follow the diode testing procedures in paragraph 73d. Make voltage and resistance checks (fig. 74) of V202, V203, and V204 control grid (pin 1) circuits. Troubleshoot A.O.C. section of video amplifier card (par. 64).
2	Strong signals distorted at DET test point (fig. 59).	Defective successive detector circuits.	Check tubes V204 through V206 (fig. 54); replace all defective tubes. Check pickoff diodes CR201, CR202, and CR203 (fig. 103). Follow the procedures in paragraph 73d. Make voltage and resistance checks of V204, V205, and V206 stages (fig. 74).
		[mproperly alined if. stages ------	Realign if. stages (par. S6).
8	No waveform (D, fig. 123) present at SUPPR test point (fig. 59).	Defective first video amplifier and cathode follower V207.	Check tube V207 (fig. 54); replace if defective. Check diode CR205 (fig. 103) following the procedures in paragraph 73d. Check for waveforms (B and C, fig. 123) at test points (B and C, fig. 59) . Make voltage and resistance checks of V207 stage (fig. 74).
4	No waveform (F, fig. 123) present at VIDEO OUT test point.	Defective suppressor circuit ----------	Check for waveform (E, fig. 123) at test point (E, fig. 59). If no waveform is present, check diodes CR204, CR206, and CR207 (fig. 103). Refer to paragraph 73d.
		Defective second video amplifier and cathode follower.	Check tube V208 (fig. 54); replace if defective. Make voltage and resistance checks of V208 stages (fig. 74).



NOTES:

1. VOLTAGES MEASURED WITH MULTIMETER ME-77/U FROM POINT INDICATED TO GROUND WITH 27.5V DC INPUT UNLESS OTHERWISE SHOWN
2. RESISTANCES MEASURED TO CHASSIS WITH MULTIMETER ME-77/U.
3. VOLTAGE READINGS ABOVE LINE, RESISTANCES BELOW LINE
4. NUMERALS AT TUBE CONNECTION POINTS ARE TUBE BASE NUMBERS FOR REFERENCE ONLY

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Figure 75. Video amplifier card tube voltage and resistance diagram.

64. Video Amplifier Card Troubleshooting

a. General. The chart (c below) lists troubles and corrective maintenance procedures for the video amplifier card. The waveform test points in figure 60 correspond to the waveforms and waveform data in figure 124. All measurements are made with receiver-transmitter completely assembled unless otherwise specified. Use the bench test setup shown in figure 58. Refer to partial schematic diagrams (figs. 19-22), complete schematic diagram (fig. 124), and parts location printed wiring diagram (fig. 76) for circuit connections. After the trouble has been isolated, replace the defective part by following the procedures in paragraph 76.

b. Video Amplifier Voltage and Resistance Measurements. Tube voltage and resistance measurements shown in figure 75 are taken with no signal input to the transponder set. Card receptacle voltage and resistance measurements (fig. 71) are also useful for isolating troubles.

c. Video Amplifier Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	No output to decoder card ----------	Open filament circuit ------------	Check filament circuit continuity.
		Defective stage in video amplifier card.	Check waveforms A, B, C, and D (fig. 124) at test points (fig. 60). Refer to items 2 through 6.
2	No waveforms present at either test point A.	No video input from IF-suppressor subchassis.	Troubleshoot IF-suppressor subchassis (par. 63).
			Check the wiring that connects pin 3 of P201 to pin 7 of J301 (fig. 122).
3	No channel B waveform present at test point A.	Defective delay line DL301 --------	Replace DL301 (fig. 76).
4	No waveform present at test point B.	Defective spike suppressor stage------	Remove and check V301 (figs. 54 and 76); replace if defective.
			Make voltage and resistance check of V301 stage (fig. 75).
5	No waveform present at test point C.	Defective inverter stage ---------	Remove and check V302 (figs. 54 and 76); replace if defective.
			Make voltage and resistance check of V302 stages (fig. 75).
6	No waveform present at test point D.	Defective blanked cathode follower stage.	Remove and check V302 (figs. 54 and 76); replace if defective.
			Make voltage and resistance check of V302 stages (fig. 75).
7	No blanking of spurious reply pulses or A.O.C. operation.	Defective blanking amplifier and cathode follower stage.	Remove and check V303 (figs. 54 and 76); replace if defective.
			Make voltage and resistance check of V303 stages (fig. 75).
8	No A.O.C. operation, video blanking is normal.	Defective A.O.C. amplifier or rectifier.	Check waveform F (fig. 124) at the test point (fig. 60). If no waveform is present, refer to item 9; if waveform is present, refer to item 10.
9	A.O.C. inoperative, no waveform is present at test point F.	Defective A.O.C. amplifier stage---	Remove and check V304 (figs. 54 and 76); replace if defective.
			Make voltage and resistance check of V304 stage (fig. 75).
10	A.O.C. inoperative, normal waveform is present at test point F.	Defective A.O.C. rectifier or control circuit.	Check diodes CR301 and CR302 (fig. 76) by following the procedures in paragraph *73d*.
			Replace Zener diode CR303.
		A.O.C. control out of adjustment-	Perform A.O.C. adjustment (par. 90).

65. Decorder Card Troubleshooting

a. General. Troubleshooting the decoder card requires operation of the control unit in the five categories and using all three interrogation modes. The single pulse output of the decoder distribution circuit (par. 29c) is the main trigger pulse for developing the reply code. Troubleshooting items listed in the chart *(e* below) are guides for trouble isolation. Refer to the schematic diagrams (figs. 24, 25, and 125) and parts location printed wiring diagram (fig. 78) for circuit connections. After the trouble has been isolated, replace the defective part (par. 76).

b. Decoder Voltage and Resistance Measurements. Voltage and resistance measurements are given in figure 77. A, figure 94 identifies tube lead connections on the card edge. Use the multimeter to make card receptacle voltage and resistance measurements (fig. 71) for additional circuit checks. Be sure diodes are isolated from the circuit when checks are made with the multimeter or Crystal Rectifier Test Set TS-268/U.

c. Decoder Waveforms. Decoder card waveforms, taken at the test points (figs. 61 and 62), are coordinated with the waveforms on the schematic diagram (fig. 125). Refer to paragraph 58 for the procedures on taking waveforms.

d. Decoder Delay Line Resistances. The chart below contains the out-of-circuit dc resistance of delay line DL351 (fig. 106).

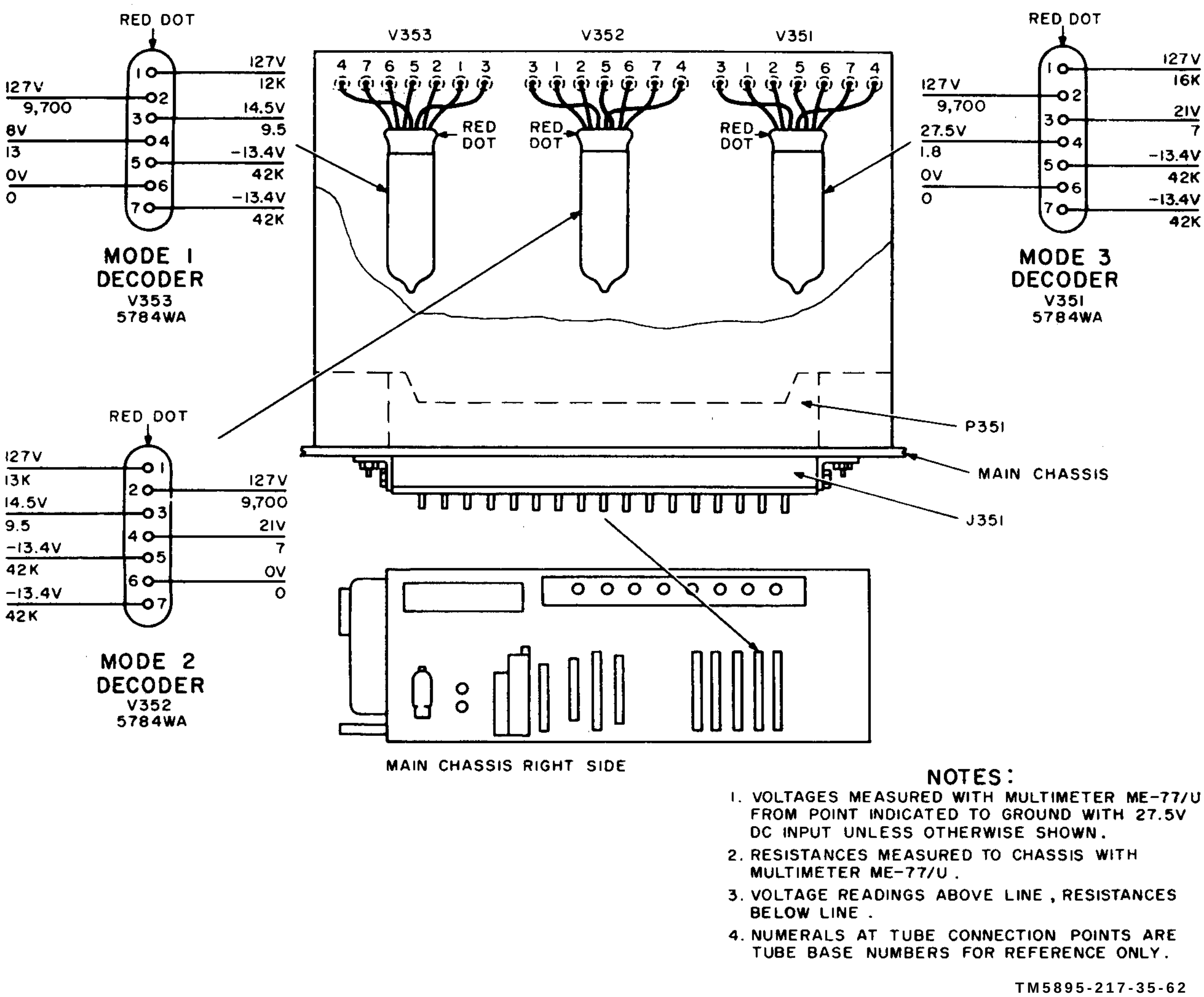
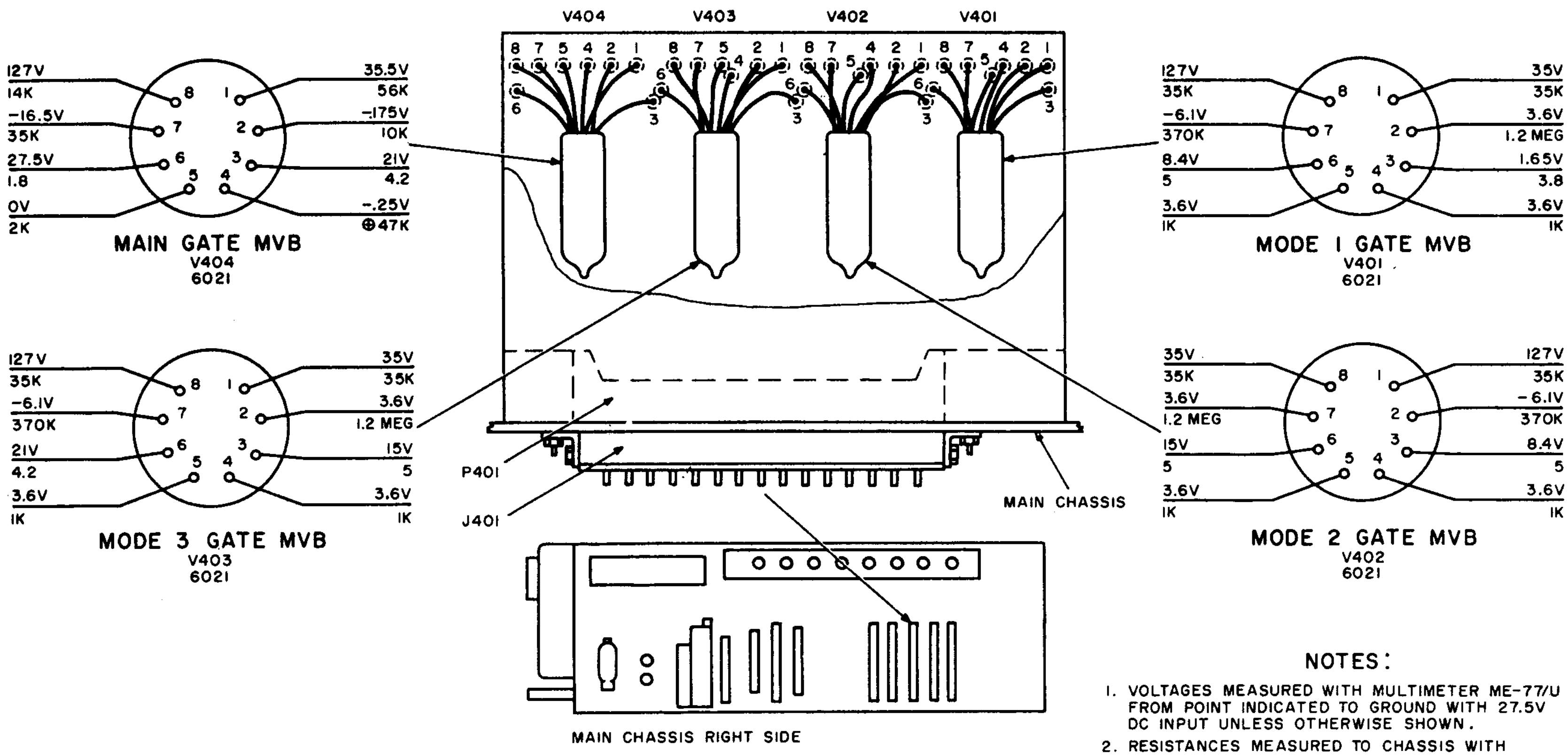


Figure 77. Decoder card, tube voltage and resistance diagram.

Delay line terminals	Resistance (ohms)	Delay line terminals	Resistance (ohms)
1 to 2	NC	1 to 6	2,500
1 to 3	1,300	1 to 7	NC
1 to 4	NC	1 to 8	NC
1 to 5	2,000	1 to 9	NC

e. Decoder Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	No decoder output, all modes	Open filament circuit	Check continuity of resistor R366 and the filaments of tubes V351, V352, and V353; replace defective resistor or tube.
		No B+ or bias voltage	Check voltage and resistances at card receptacle J35 (fig. 71).
		No signal input from video amplifier card.	Check for video waveform (A, fig. 125) at pin 3 of receptacle J351. If no waveform is present, troubleshoot video amplifier card (par. 64) or check continuity between pin 3 of J351 and pin 2 of J301 (fig. 106).
		Defective input circuit	Check resistance of delay line DL351 (*d* above).
2	No decoder ouput from one mode, in all operational categories.	Input to the decoder is out of coincidence.	Check waveforms (A, fig. 125) at the appropriate decoder control and suppressor grids for coincidence. If the second pulse at the suppressor grid does not coincide with the first pulse at the control grid, replace delay line DL351 (fig. 106).
		Defective mode decoder stage	Remove and check the suspected tube (figs. 54 and 78); replace the tube if defective. Make voltage and resistance check of inoperable tube circuit (fig. 77).
3	Decoder outputs to all mode gate multivibrators are normal, but main gate multivibrator is not triggered in one or all modes.	Defective decoder output distribution circuit.	Check diodes CR351, CR352, and CR353 (fig. 78). Refer to paragraph 73d.
4	Decoding is normal for all but repeated replies (I/P and EMER).	Inoperative switching diodes	Check diodes CR354, CR355, and CR356 (fig. 78). Refer to paragraph 73d.
5	Decoding is normal for all but modulated-emergency replies.	Inoperative switching diodes	Check diodes CR355 and CR356 (par. 73d). Check relay K3 (fig. 106) for operation or continuity (fig. 93).



NOTES:

1. VOLTAGES MEASURED WITH MULTIMETER ME-77/U FROM POINT INDICATED TO GROUND WITH 27.5V DC INPUT UNLESS OTHERWISE SHOWN.
2. RESISTANCES MEASURED TO CHASSIS WITH MULTIMETER ME-77/U. ⊕ OR ⊖ INDICATES CRITICAL OHMMETER LEAD POLARITY BECAUSE OF DIODES IN CIRCUIT
3. VOLTAGE READINGS ABOVE LINE, RESISTANCES BELOW LINE
4. NUMERALS AT TUBE CONNECTION POINTS ARE TUBE BASE NUMBERS FOR REFERENCE ONLY.

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Figure 79. Gate generator card, tube voltage and resistance diagram.

66. Gate Generator Card Troubleshooting

a. General. Gate generator card troubleshooting procedures are listed in the chart (*d* below). Because this card is composed of four almost identical multivibrators, troubles are combined. Faults applicable to one multivibrator can occur to the other three. Refer to the partial schematic diagrams (figs. 27 and 28), complete schematic diagram (fig. 126), and parts location printed wiring diagram (fig. 80) for circuit connections. When the trouble has been isolated, refer to paragraph 76 for the repair procedures.

b. Gate Generator Voltage and Resistance Measurements. Voltages and resistances for tube lead connection points are shown in figure 79. B, figure 94 identifies tube connections. The card receptacle voltage and resistance measurements (fig. 71) will also assist in isolating troubles.

c. Gate Generator Waveforms. The waveform test points shown in figure 63 correspond to the waveforms and waveform data in figure 126. In cases of unusual troubles, use the waveforms as a continuity measurement or for signal tracing. Be alert for spurious signals which may cause erratic operation. Refer to paragraph 58 for waveform procedures.

d. Gate Generator Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	No main gate pulses	Main gate multivibrator not triggered.	Check for main gate trigger (C, fig. 125) at pin 15 of J351 (fig. 105). If no trigger is present, troubleshoot decoder card. If trigger is present, check for continuity between pin 15 of J351 and pin 12 of J401 (fig. 105).
		Inoperative main gate multivibrator stage.	Remove and check tube V404 (fig. 54); replace the tube if defective. Make voltage and resistance check of V404 stage (fig. 79).
2	No main gate pulses to video amplifier card only.	Inoperative main gate amplifier	Troubleshoot main gate amplifier in mode reply selector card (par. 68).
3	No mode 1, 2, or 3 gate pulse	Applicable mode gate multivibrator is not triggered.	When interrogating in the appropriate mode, check for mode trigger (B, fig. 125) at pin 14 (mode 1), pin 12 (mode 2), or pin 11 (mode 3) of J351. If the trigger is not present, troubleshoot the decoder card (par. 65). If the trigger is present, check continuity between the mode checkpoint used and pin 1 (mode 1), pin 4 (mode 2), or pin 9 (mode 3) of J401 (fig. 126).
		Applicable mode gate multivibrator is inoperative.	Remove and check tube V401, V402, or V403 (fig. 54); replace the tube if defective. Make voltage and resistance check of the inoperative multivibrator (fig. 79).

67. Blocking Oscillator and Ring Around Card Troubleshooting

a. General. Troubleshooting procedures for the blocking oscillator and ring around card are included in the chart (*e* below). Be sure to observe the waveshape and pulse width of all waveforms. Check the waveforms in all operational categories to determine extent of fault. Refer to the partial schematic diagrams (figs. 30-32), complete schematic diagram (fig. 127), and the parts location-printed wiring diagram (fig. 82) for circuit connections. When the trouble has been isolated, replace the defective part (par. 76).

b. Blocking Oscillator and Ring Around Voltage and Resistance Measurements. Voltage and resistance measurements are shown in figure 81. Figure 94 will aid in locating tube connections. Refer to figure 71 for card receptacle voltage and resistance measurements.

c. Blocking Oscillator and Ring Around Waveforms. Waveforms shown in figure 127 are present at the points illustrated in figure 64. Complete data are given in figure 127 for duplicating the waveform conditions. These waveforms may also be used for signal tracing in the card. Refer to paragraph 58 for waveform procedures.

d. Blocking Oscillator and Ring Around Transformer Data. Resistance measurements for transformers T501 and T502 are given in the chart below. These measurements are out-Of-circuit resistances measured with Multimeter AN/URM-105.

Transformer	Terminal	Resistance (ohms)
T501	1 to 2	7.5
	3 to 4	8.25
T502	1 to 2	12
	3 to 4	13

e. Blocking Oscillator and Ring Around Card Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	No output trigger pulses to delay line.	Open filament circuit on blocking oscillator and ring around card.	Check filament continuity through tubes V501, V502, V503, and resistor R519 (fig. 82). Replace tubes with open filament or R519 if open.
		Inoperative stage on blocking oscillator and ring around card.	Check waveforms A, B, C, and D (fig. 127) at test points A, B, C, and D (fig. 64), then proceed to the applicable item (2-4) for the isolating procedure.
2	No waveform at test point A	No input from main gate multivibrator.	Check for main gate at pin 13 of J401 (fig. 106). If no gate is present, troubleshoot gate generator card (par. 66). If gate is present, check continuity between pin 13 of J401 and pin 3 of J501; check diode CR501 and capacitor C501 (fig. 82).
		Inoperative ring around gate multivibrator.	Remove and check tube V503 (fig. 54); replace the tube if defective.
		Pulse train input to gated amplifier missing.	Check for the 1-usec pulse at pin 4 of J621 (fig. 106). If the pulse is missing, troubleshoot mode 1 code switching card (par. 70); check resistance of delay line DL601 (fig. 92). If the pulse is present, check continuity between pin 4 of J621 and pin 8 of J501; check capacitor C505.

Item	Indication	Probable trouble	Procedure
		lated amplifier inoperative _ _ _ _ _	Remove and check tube V502 (fig. 54); replace tube if defective. Make a voltage and resistance check of V501 circuit (fig. 81).
3	No waveform present at test point B.	Defective trigger amplifier stage _ _	Remove and check tube V501 (fig. 54); replace the tube if defective. Make a voltage and resistance check of V501A, leads 1, 2, and 4, (fig. 81).
4	No waveform present at test point C or D.	Defective blocking oscillator stage_	Check tube V501. Make a voltage and resistance check of V501B, pins 5, 7, and 8 (fig. 81). Check continuity of the primary and secondary windings of transformer T501.
5	No repeated I/P and EMER replies.	No trigger input to ring around gate multivibrator.	Check for trigger pulse waveform (D, fig. 125) at pin 13 of J351 (fig. 106). If no trigger is present, troubleshoot decoder card (par. 65). If trigger is present, check continuity between pin 13 of J351 and pin 15 of J501. Check capacitor C509 (fig. 82).
6	Reply trains repeated incorrect number of times in one category.	Ring around gate multivibrator pulse width incorrect.	Check resistance values of R511, R512, and R513 (fig. 82) with card removed. Check capacitors C509 and C510 with card removed. Check operation and continuity of relays K1 and K2 (fig. 93).
7	All reply trains incorrectly repeated in I/P and EMER categories.	R524 not correctly adjusted _ _ _ _ _ _	Refer to paragraph 94 for adjustment procedure.

68. Mode Reply Selector Card Troubleshooting

a. General. Troubleshooting data in the chart (*d* below) isolates troubles by stage to the part. Be sure that correct inputs to this card are available as coincidence-type circuits will not function unless timing is reasonably accurate. Refer to the partial schematic diagram (fig. 37), the card schematic diagram (fig. 128), and the parts location and printed wiring diagram (fig. 84) for the mode reply selector circuits. When the trouble has been isolated, replace the defective part (par. 76).

b. Mode Reply Selector Card Voltage and Resistance Measurements. Voltage and resistance measurements are given in figure 83. Use figure 94 to identify tube leads and figures 49, 50, 51, and 71 for further assistance in voltage distribution problems.

c. Mode Reply Selector Card Waveforms. Waveforms shown in figure 128 are present at points shown in figure 65. Data given with each waveform indicate characteristics and test conditions. Refer to paragraph 58 for waveform procedures.

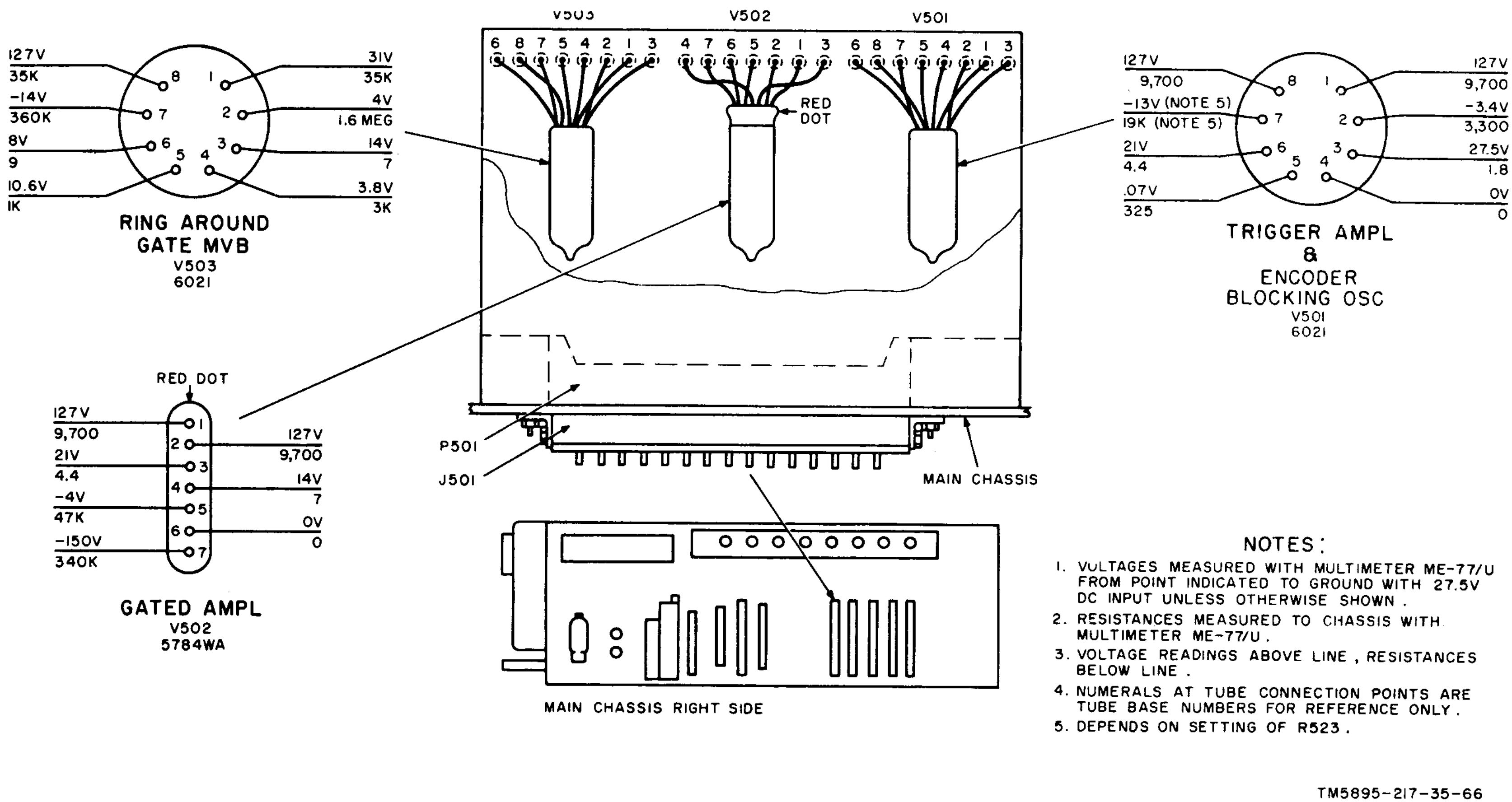
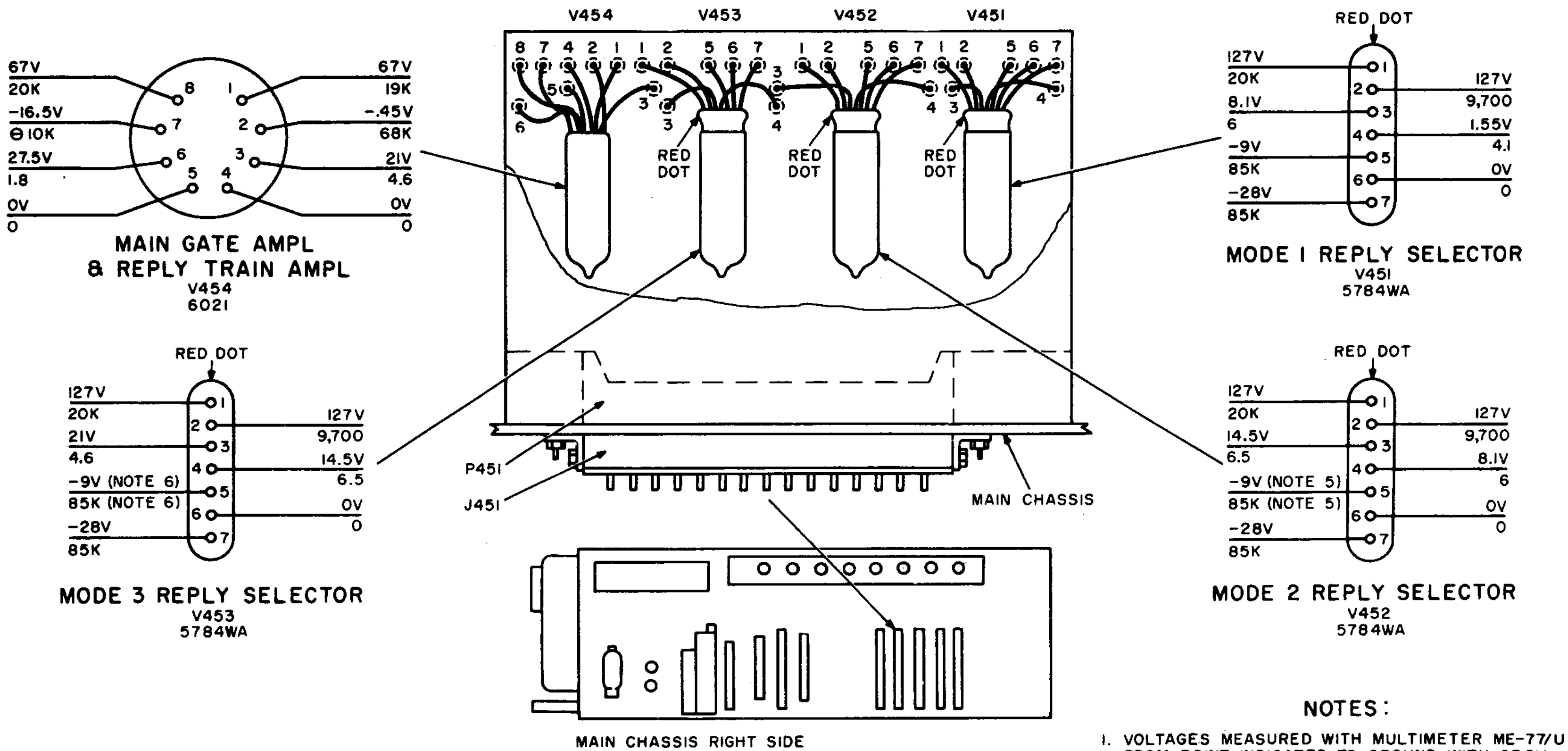


Figure 81. Blocking oscillator and ring around card, tube voltage and resistance diagram.



NOTES:

1. VOLTAGES MEASURED WITH MULTIMETER ME-77/U FROM POINT INDICATED TO GROUND WITH 27.5V DC INPUT UNLESS OTHERWISE SHOWN.
2. RESISTANCES MEASURED TO CHASSIS WITH MULTIMETER ME-77/U. ⊕ OR ⊖ INDICATES CRITICAL OHMMETER LEAD POLARITY BECAUSE OF DIODES IN CIRCUIT.
3. VOLTAGE READINGS ABOVE LINE, RESISTANCES BELOW LINE.
4. NUMERALS AT TUBE CONNECTION POINTS ARE TUBE BASE NUMBERS FOR REFERENCE ONLY.
5. READING TAKEN WITH MODE 2 SWITCH 'ON'
6. READING TAKEN WITH MODE 3 SWITCH 'ON'

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Figure 83. Mode reply selector card, tube voltage and resistance diagram.

d. Mode Reply Selector Card Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	All mode reply selectors inoperative	Open filament circuit---- --------	Check continuity V451 through V454 filaments and resistors R469 through R472 (fig. 84). Replace tubes with open filaments or open resistors.
		No input power to mode reply selector card.	Check power distribution circuits (figs. 49-51).
		Reply train amplifier inoperative--	Remove and check V454 (fig. 54); replace tube if defective. Check diode CR451 (fig. 84); follow the procedures in paragraph 73d. Make voltage and resistance check of V454 (fig. 83).
2	Individual mode reply selector stage inoperative.	One or both inputs to affected reply selector stage are missing.	Check applicable waveform A, B, or C (fig. 128) at test point (fig. 65). If the control grid gate is missing, check mode gate circuit or troubleshoot gate generator card (par. 66). If the suppressor grid pulses are missing, check the applicable reply code switching card (par. 70).
		Defective mode reply selector stage	Remove and check the inoperative stages tube V451, V452, or V453, (fig. 54); replace defective tubes. Make voltage and resistance check of the inoperative stage (fig. 83). Check operation and continuity of relay K4 (figs. 106 and 93).
3	No main gate pulses to video amplifier card.	Defective normal/emergency relay_ Inoperative main gate amplifier_ _ _	Remove and check tube V454 (fig. 54); replace tube if defective. Make voltage and resistance check of V454 stage (fig. 83). Check for main gate pulse input from main gate multivibrator. If missing, troubleshoot gate generator card (par. 66), or check the circuit between the gate generator and mode reply selector cards.

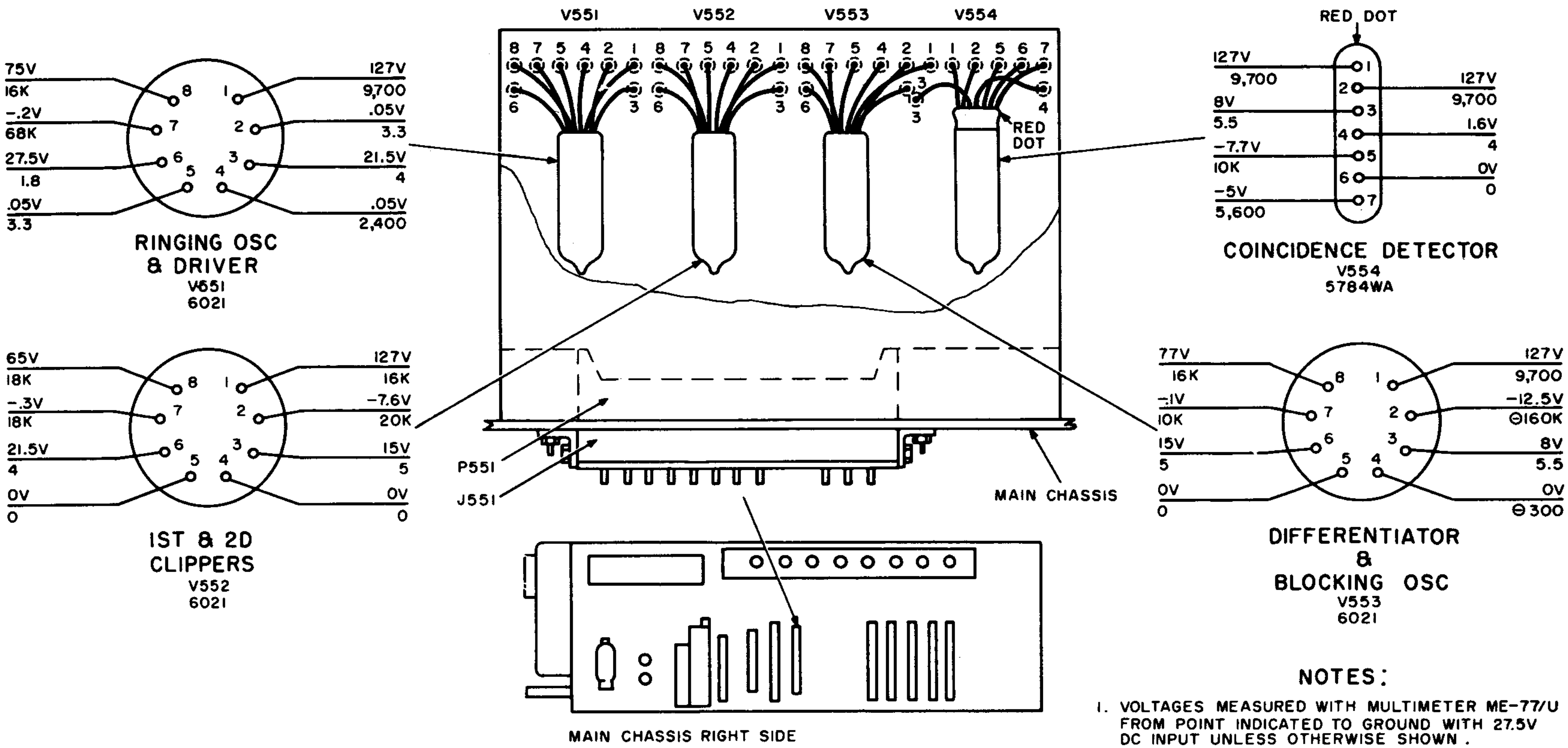
69. Ringing Oscillator and Coincidence Card Troubleshooting

a. General. Consult the chart (*d* below) for appropriate trouble and use procedure to isolate the faulty part. The ringing oscillator and coincidence card circuits in partial schematic diagrams (figs. 41-43), card schematic diagram (fig. 129), and parts location and printed wiring diagram (fig. 86) are useful for isolating troubles. When the trouble is isolated, replace the defective part (par. 76).

b. Ringing Oscillator and Coincidence Card Voltage and Resistance Measurements.

(1) Tube voltage and resistance measurements are given in figure 85. Card receptacle voltage and resistance measurements are included in figure 72. Use the vtvm for ringing oscillator voltage measurements.

(2) Out-of-circuit dc resistances for transformer T551 in the following chart are measured with Multimeter AN/URM-105.



NOTES:

1. VOLTAGES MEASURED WITH MULTIMETER ME-77/U FROM POINT INDICATED TO GROUND WITH 27.5V DC INPUT UNLESS OTHERWISE SHOWN.
2. RESISTANCES MEASURED TO CHASSIS WITH MULTIMETER ME-77/U.
3. VOLTAGE READINGS ABOVE LINE, RESISTANCES BELOW LINE.
4. NUMERALS AT TUBE CONNECTION POINTS ARE TUBE BASE NUMBERS FOR REFERENCE ONLY.

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Figure 85. Ringing oscillator and coincidence card, tube voltage and resistance diagram.

Transformer T551 terminal	Resistance (ohms)
1 to 2	3.7
3 to 4	1 meg

c. Ringing Oscillator and Coincidence Card Waveforms. Waveforms referenced in the chart (*d* below) are taken at test points shown in figure 66 and are coordinated with waveforms shown in figure 129. Refer to paragraph 58 for waveform procedures.

d. Ringing Oscillator and Coincidence Card Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	No reply train output from card	Open filament circuit	Check continuity through the filaments of V551 through V554 and resistor R569. Replace defective tube or resistor.
		Input power missing	Check B+, bias, or filament power distribution circuit (figs. 49-51).
		Inoperative stage on ringing oscillator and coincidence card.	Check waveforms A through L (fig. 129) at the test points (fig. 66), then proceed to the applicable item (2–13).
2	No waveform at test point A	No main gate input to driver	Check for waveform A at pin 14 of J401. If waveform is not present, troubleshoot main gate multivibrator on gate generator card (par. 66). If waveform is present, check continuity between pin 14 of J401 and pin 13 of J551 (fig. 106); check capacitor C551 (fig. 86).
3	No waveform at test point B	Inoperative drive stage	Remove and check tube V551 (fig. 54); replace the tube if defective. Make a voltage and resistance check at leads 5, 7, and 8 of tube V551 (fig. 85).
4	No waveform at test point C	Inoperative ringing oscillator stage	Remove and check tube V551; replace the tube if defective. Make a voltage and resistance check at leads 1, 2, and 4 of tube V551 (fig. 85).
5	No waveform at test point D	No input to first clipper stage	Replace resistor R554 (fig. 86).
6	No waveform at test point E	Inoperative first or second clipper stage.	Remove and check tube V552 (fig. 54); replace the tube if defective. Make a voltage and resistance check of V552 stages (fig. 85).
7	No waveform at test point F	Inoperative differentiator stage	Remove and check tube V553 (fig. 54); replace the tube if defective. Make a voltage and resistance check at leads 5, 7, and 8 of tube V553 (fig. 85).
8	No waveform at test point G	No mode reply code input to V554	Check for pulse reply code at pin 14 of J451 (fig. 106). If no pulses are present, troubleshoot mode reply selector card (par. 68). If pulses are present, check for continuity between pin 14 of J451 and pin 1 of J551 (fig: 106); check capacitor C559 (fig. 86)

Item	Indication	Probable trouble	Procedure
9	No waveform H at suppressor grid of V554.	Defective coupling circuit	Replace capacitor C557 (fig. 86).
10	Control grid and suppressor grid waveform (H, fig. 129) positive pulses not in coincidence.	Incorrect ringing oscillator frequency.	Adjust inductor L551 (par. 92). Check capacitor C553 and inductor L551 (fig. 86).
		Defective delay line	Replace DL601 (fig. 105).
11	No waveform at test point J	Inoperative coin coincidence detector stage.	Check coincidence of input pulses (item 10). Remove and check tube V554 (fig. 54); replace tube if defective. Make a voltage and resistance check of V554 stage (fig. 85).
12	No waveform at test point K	No input to blocking oscillator	Replace transformer T551 (fig. 86).
13	No waveform at test point J	Defective blocking oscillator stage	Remove and check tube V553 (fig. 54); replace tube if defective. Make a voltage and resistance check at leads 1, 2, and 4 of V553 (fig. 85).

70. Mode Reply Code Switching Card Troubleshooting

Troubleshooting mode reply code switching cards is limited to checking diodes (par. 73d) and resistances. In-circuit resistances, are shown in figure 72. Observe multimeter *battery polarity* for all resistance measurements to correctly simulate values given. Multimeter AN/URM-105 has the positive battery terminal connected to the black (negative) test lead. Cards may be removed for further isolation and checking values obtained from schematic diagrams (figs. 130–132). Figures 87, 88, and 89 illustrate parts location and printed wiring circuits on the three code switching cards.

71. Modulator-Transmitter Troubleshooting

a. General Modulator-transmitter troubleshooting procedures are indicated in the chart (*d* below).

***Warning:* High voltages are present in this circuit. Take adequate precautions to prevent electrical shock.**

***Caution:* To prevent overload of attenuator, substitute the lossy line (par. 55a) in place of the attenuator (fig. 58) when code selections involve testing with more than four pulses in a reply train. The attenuator is to be used for receiver sensitivity measurements only.**

b. Modulator-Transmitter Voltage and Resistance Measurements.

(1) Voltage and resistance measurements are provided in figure 73.

(2) Out-of-circuit dc resistance data for transformers T151, T152, and T153 are given in the chart below.

Transformer	Terminal	Resistance (ohms)
T151	1 to 2	2.75
	3 to 4	2.6
	5 to 6	3.25
T152	1 to 2	8.5
	3 to 4	9
T153	1 to 2	3.7
	3 to 4	1 meg

c. Modulator-Transmitter Waveforms. Waveforms A through F of figure 122 are present at points shown in figures 67 and 68. Check pulse characteristics during signal tracing to detect distortion and pulse width changes caused by circuit faults.

d. Modulator-Transmitter Troubleshooting Chart.

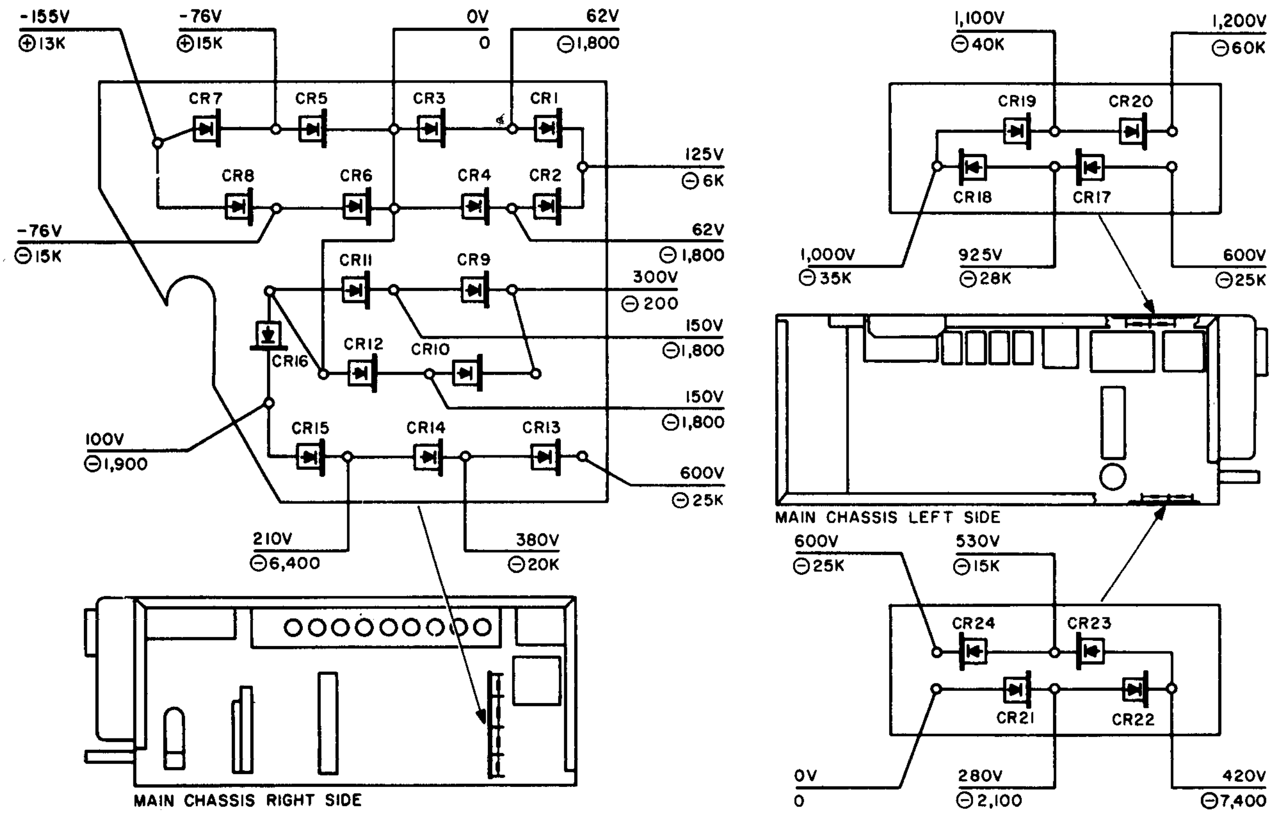
Item	Indication	Probable trouble	Procedure
1	No transmitted reply trains, any code or category.	Standby circuit inoperative	Resistor R151 (fig. 7) open. Check voltage distribution (figs. 49-51).
		No input to trigger amplifier and blocking ocsillator.	Check for reply train at grid pin 2 of tube V151 (A, fig. 122). Recheck ringing oscillator and coincidence card (par. 69).
		Defective stage	Signal trace with waveforms C, D, E, and cathode of V154 (figs. 67, 68, and 122).
2	Defect modulator-transmitter stage.	Trigger amplifier and blocking oscillator inoperative.	Check voltage and resistance of tube V151 (fig. 73). Test or substitute tube V151 (fig. 54 or 105). Check diode CR151 (par. 73d).
		Driver stage inoperative	Check voltage and resistance of tube V152 (fig. 73). Test or substitute tube V152 (figs. 54 or 105). Check diode CR152 (par. 73d).
		Modulator stage inoperative	Check voltage and resistance of tube V153 (fig. 73). ***Caution:* Do not check plate voltage of tube V153.** Test or substitute tube V153 (fig. 54 or 105).
		Transmitting oscillator inoperative	Check voltage and resistance at cathode of V154 (fig. 73). Substitute tube V154 (fig. 54). Replace oscillator cavity (par. 79). Check duplexer (fig. 116) for continuity and shorts.
3	Pulses of reply train incorrect characteristics.	Trigger amplifier and blocking oscillator defective.	Check voltage and resistance of tube V151 (fig. 73). Check or substitute transformer T151 (fig. 106). Adjust resistor R154 (par. 93).
		Ringing oscillator and coincidence card defective.	Recheck card (par. 69).
4	Short range to transmitted replies.	Transmitter off frequency	Realign transmitting oscillator cavity (par. 88).
		Lower power output	Check or replace transformer T153 (fig. 106). Substitute tube V154 (figs. 54 and 105). Check resistor R162 (fig. 105). Check or replace duplexer (fig. 116).

72. Power Supply Troubleshooting

a. General. The chart (*e* below) contains information to aid power supply trouble isolation.

b. Power Supply Voltage and Resistance Measurements.

(1) Voltage and resistance measurements for the low- and high-voltage power



NOTES:

1. NO SIGNAL INPUT DURING VOLTAGE MEASUREMENTS.
2. VOLTAGE MEASURED TO CHASSIS GROUND, WITH MULTIMETER AN/URM-105, AND 27.5V DC INPUT.
3. RESISTANCES MEASURED TO CHASSIS WITH MULTIMETER AN/URM-105.
4. VOLTAGE READINGS ABOVE LINE, RESISTANCE BELOW LINE.
5. ⊕ OR ⊖ INDICATES OHMMETER POLARITY, CRITICAL BECAUSE OF PRESENCE OF DIODES.

TM5895-217-35-75

Figure 90. Power supply, rectifier boards, voltage and resistance diagram.

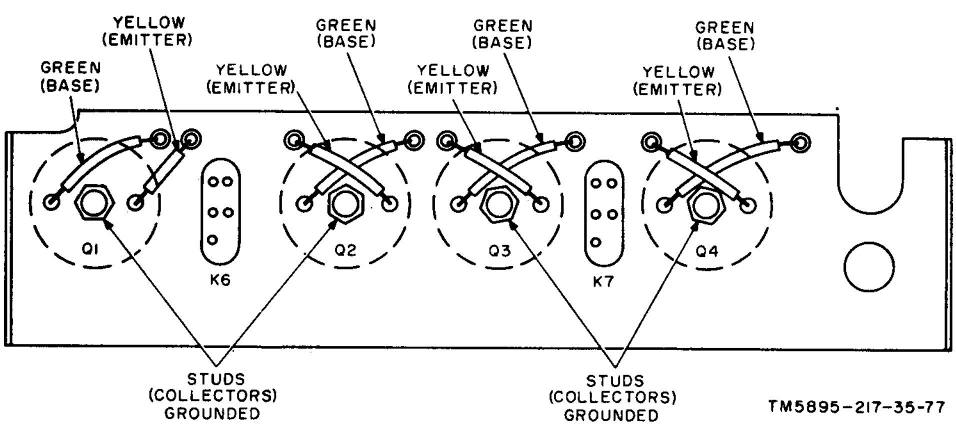


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Figure 91. Transistor lead identification.

supplies are shown in figure 90. These measurements are made with Multimeter AN/URM-105.

(2) Additional out-of-circuit resistances for inductors L151 and L152, blower B1, and transformers T1 and T2 are given in the following chart. These resistances are measured with Multimeter AN/URM-105.

Part	Location (fig. No.)	Terminals	Resistance (ohms)
B1	108	1 to 4	125
		1 to 5	135
L151	106		15
L152	106		15
T1	106	1 to 2	less than 1
		1 to 3	less than 1
		1 to 4	less than 1
		1 to 5	less than 1
		6 to 7	3.75
		8 to 9	4.6
		10 to 11	3.5
T2	106	1 to 2	less than 1
		1 to 3	less than 1
		1 to 4	less than 1
		1 to 5	less than 1
		6 to 7	55
		8 to 9	20
		10 to 11	less than 1

c. Power Supply Waveforms. Power supply test point locations for troubleshooting are shown in figure 69 and the waveforms are shown in figure 122. Refer to paragraph 58 for waveform procedures.

d. Transistor Troubleshooting. Waveforms and voltage-resistance measurements will usually isolate defective transistors. Use Transistor Test Set TS-1100/U to test the transistors. Figure 91 indicates lead color codes for identification purposes.

e. Power Supply Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	No power supply output (+1,200 vdc, +600 vdc, +300 vdc, +125 vdc, -150 vdc, 6 vac or 115 vac) and tubes do not light.	Fuse F101 open	Check fuse F101 (fig. 6).
		Relay K5 defective	Check relay K5 (figs. 93 and 106).
		Inductor L1 open	Check continuity through L1 (fig. 105).
2	No output from high-voltage supply (+1,200 vdc, +600 vdc, +300 vdc, and 6 vac to tube V154 missing).	Transformer T2 primary open	Check resistance of transformer T2 (*b* above).
		Transistor Q3 or Q4 defective	Check (*d* above) or replace transistor Q3 or Q4 (figs. 55 and 106).
		Resistor R8 or R9 open	Check resistance of R8 or R9 (fig. 107).
		Relay K7 contacts stuck in open position.	Check relay K7 (figs. 93 and 106).
3	No output from low-voltage supply (+125 vdc, —150 vdc, and 115 vac to B1 missing).	Transformer T1 primary defective.	Check resistance of transformer T1 (*b* above).
		Transistor Q1 or Q2 defective	Check (*d* above) or replace transistor Q1 or Q2 (figs. 55 and 106).
		Resistor R2 or R3 open	Check resistance of R2 or R3 (fig. 107).
		Relay K6 contacts stuck in open position.	Check relay K6 (figs. 93 and 106).
4	No +1,200 or +600 vdc output	Transformer T2 high-voltage secondary defective.	Check resistance of transformer T2 terminals 6 and 7 (*b* above).
5	No +1,200 vdc output	Rectifier string CR13 through CR2C defective.	Check rectifiers CR13 through CR20 (par. 73d).
		Capacitor C8 defective	Check capacitor C8 (fig. 106).
		Capacitor C7 defective	Check capacitor C7 (fig. 106).
6	No +600 vdc output	Defective rectifier in string CR21 through CR24.	Check rectifiers CR21 through CR24 (par. 73d).
		Capacitor C6 defective	Check capacitor C6 (fig. 106).

Item	Indication	Probable trouble	Procedure
7	No +300 vdc output	Transformer T2 defective	Check transformer T2 terminals 8 and 9 (b above).
		Defective rectifier in bridge CR9 to CR12.	Check rectifiers CR9 to CR12 (par. 73d).
		Capacitor C5 defective	Check capacitor C5 (fig. 106).
8	No 6 vac output (tube V154 does not light).	Resistor R13 defective	Check resistor R13 (fig. 107).
		Transformer T2 defective	Check transformer T2, terminals 10 and 11 (b above).
9	No +125 vdc output	Transformer T1 defective	Check transformer T1, terminals 6 and 7 (b above).
		Defective rectifier in bridge CR1 through CR4.	Check rectifiers CR1 thorugh CR4 (par. 73d).
		Capacitor C3 defective	Check capacitor C3 (fig. 105).
10	No -150 vdc output	Transformer T1 defective	Check transformer T1, terminals 8 and 9 (b above).
		Defective rectifier in bridge CR5 through CR8.	Check rectifiers CR5 through CR8 (par. 73d).
		Capacitor C4 defective	Check capacitor C4 (fig. 105).
11	No 115 vac output. (Blower B1 does not operate.)	Transformer T1 defective	Check transformer T1, terminals 10 and 11 (b above).

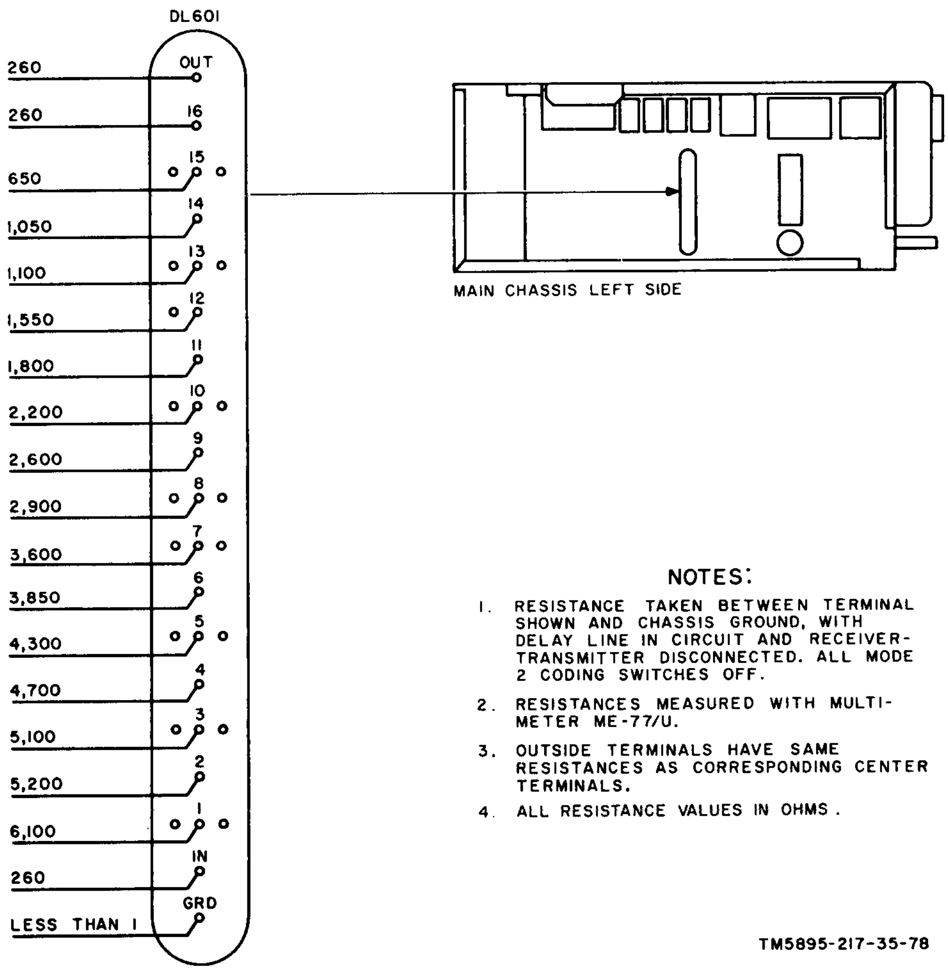


Figure 92. Delay line resistance diagram.

73. Additional Troubleshooting Data

a. Delay Line DL601 Resistance Measurements. Resistance measurements shown in figure 92 are taken with Multimeter AN/URM-105.

b. Relay Measurements. Figure 93 contains relay continuity and coil resistance data for relays K1 through K7, K901, and K902. To check energized contact continuity, disconnect the relay coil terminals from chassis wiring and apply 27.5 volts dc to the applicable terminals. Resistances and continuity are measured with Multimeter AN/URM-105.

c. Subminiature Tube Connections. Figure 94 illustrates colors of insulated tubing used on the subminiature tubes, and also shows the arrangement of element leads. Further identification assistance may be obtained from the appropriate card parts location and printed wiring diagram.

d. Diode Rectifier Data. The color code identification system used for diodes in the receiver-transmitter is shown in figure 95. There are two test sets that can be used for testing diode rectifiers, Crystal Rectifier Test Set TS-268/U or Multimeter AN/URM-105. Either of these test sets will give a relative indication of diode condition. If the trouble indicates that a diode is defective, replace the diode. Zener-type diodes must be replaced when suspected of causing faults. The chart below lists resistance, resistance ratio, and back current values for use with either test set. Measure forward and back resistances on either test set; back currents are measurable on diode tester only. Forward resistances listed are maximum resistance permissible, and back resistances are determined by resistance ratio and the measured forward resistance. In some instances, the back resistance will exceed the maximum

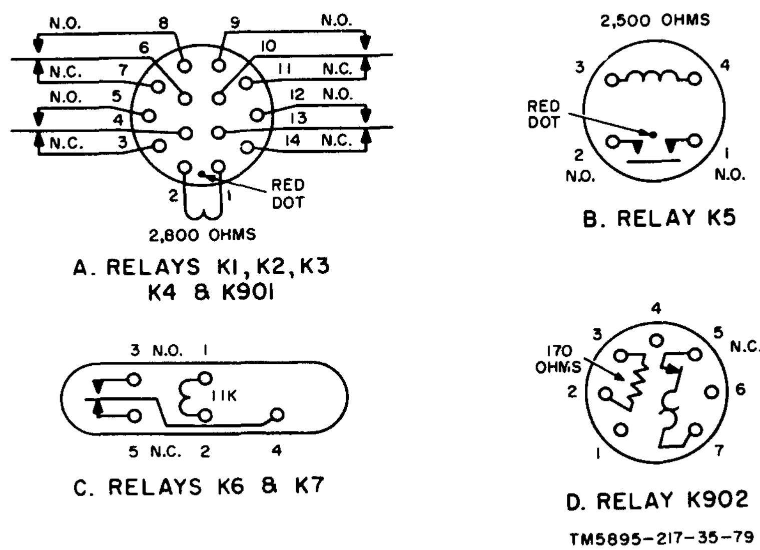


Figure 93. Relay continuity and resistance data.

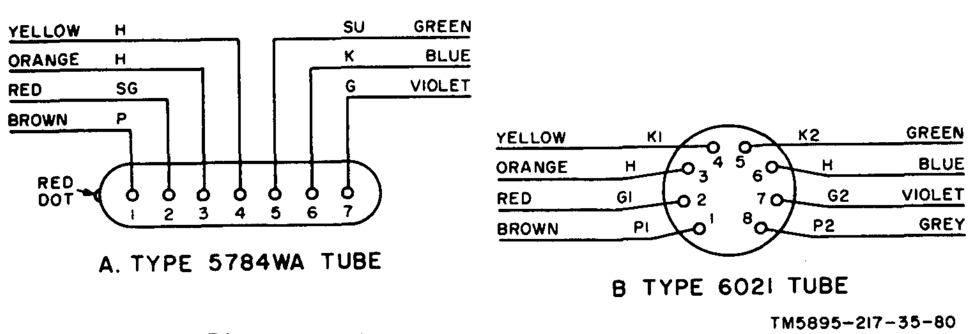
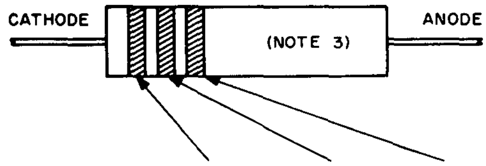


Figure 94. Subminiature tube connection diagrams.



COLOR	1ST BAND	2D BAND	3D BAND
BROWN	1	1	1
RED	2	2	2
ORANGE	3	3	3
YELLOW	4	4	4
GREEN	5	5	5
BLUE	6	6	6
VIOLET	7	7	7
GRAY	8	8	8
WHITE	9	9	9
BLACK	0	0	0

NOTES:

1. DIODES NOT COLOR-CODED HAVE IDENTIFICATION AND DIODE SYMBOL STAMPED ON BODY. DIODE SYMBOL IDENTIFIES CATHODE AND ANODE ENDS.
2. PREFIX "IN" IS ASSUMED IN COLOR-CODING STANDARD TYPE DIODES, COLOR BANDS SHOW ONLY SUFFIX.
3. MANUFACTURER'S SYMBOL-LETTER, IF USED, APPEARS HERE. "HD-6" PREFIX OF SPECIAL-TYPE DIODE USED IN THIS UNIT IS INDICATED BY WHITE "H".

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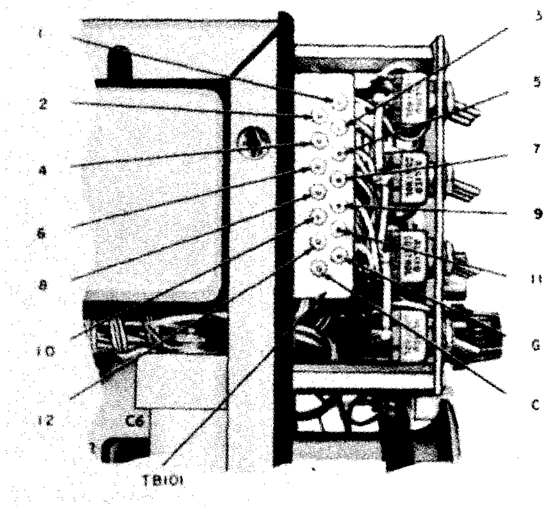
Figure 95. Diode rectifier color code identification.

resistance possible on the test instrument, but if its forward resistance is within limits, the diode is usually serviceable.

Diode type	Forward resistance (max)	Resistance ratio (min)	Back current (max)
1N21(WE)	0.5 kilohm	10 to 1	0.125 ma
1N198A	0.5 kilohm	20 to 1	0.02 ma
1N251	1.5 kilohm	15 to 1	Not readable
HD6556	1 kilohm	15 to 1	Not readable
1N540	1 kilohm	15 to 1	Not readable



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Figur 96. Mode 2 switch test points.

e. Mode 2 Switch. Test Points. Terminal board TB101 (fig. 96) is on the right side of the receiver-transmitter behind the front cover. This terminal board contains 14 test points for checking the mode 2 toggle switch circuits. Test points 1 through 12 are for switches 1 through 12. When one of these switches is turned on, continuity may. be measured between the switch test point and the common (C) test point. The C test point is connected to ground (test point G) for modified or civil replies through contacts of relay K1.

CHAPTER 4

REPAIR AND ALINEMENT INSTRUCTIONS

Section I. REPAIRS

74. General

a. Common repair procedures generally will be applicable in making transponder repairs. However, some special precautions must be observed, and special procedures employed, when dealing with printed circuits, crystal diodes, and transistors.

b. Make a thorough visual inspection of the transponder set component to be repaired. Determine if work is to be done near crystal diodes, transistors, or printed circuits and what physical approach to the repair is necessary.

c. Before removing a subassembly, or part, always tag the leads to be disconnected so that proper reconnection may be made.

75. Soldering

a. While general soldering techniques will be applicable to the common types of circuitry in the transponder, some modification of these techniques is necessary.

b. Special rules for guidance in soldering on this equipment are:

(1) Do not use a soldering gun because its temperature is not controlled. Heat is destructive to printed circuits, crystal diodes, and transistors. Using an uncontrolled heat source *on or* near these parts can damage them. (The gun also sets up strong magnetic fields which may damage crystal diodes or transistors.)

(2) To limit the heat, use a 40- to 50-watt soldering iron.

(3) When soldering near crystal diodes, transistors, and printed circuits, keep the body of the soldering iron away from these parts.

c. Soldering on printed circuits, crystal diodes, and transistors require special care. Follow these rules when making soldered connections on printed circuits, crystal diodes, and transistors.

(1) Use a 40- to 50-watt soldering iron.

(2) Use only rosin-core solder.

(3) Solder quickly, applying heat only long enough to make a proper joint. (Excessive heat will cause blistering or peeling of printed circuits, and may damage crystal diodes or transistors.)

(4) When soldering crystal diodes or transistor leads, use a *heat sink* to prevent heat conduction along the lead into the diode or transistor. To dissipate the heat, hold the lead with a long-nosed pliers between the soldering point and the diode or transistor body.

(5) Two methods for removing parts from printed circuit boards are recommended.

Note. Before removing parts from printed circuit boards, it may be necessary to disassemble the card (par. 76).

(a) Where lead lengths are sufficient, melt the joint, push the lead through the board, and clip off the flattened lead end. The lead may then be removed from the board.

***Caution:* Do not attempt to pull the flattened end through the board, as this will enlarge the mounting hole. Be careful to avoid putting pressure on the circuit board when using diagonal cutters in close quarters; pressure may fracture the board.**

(b) Where lead lengths are insufficient, or when insulating tubing prevents pushing the lead through the board,

clip the leads between the part and the board. Melt the joint and push the lead stubs out with a scribe.

(6) To install a new part, push the lead through the proper mounting hole, and clip it to the correct length. Flatten the end with pliers so that the lead contacts the foil, and solder the joint in accordance with instructions in (1) through (4) above. Where solder has filled the mounting hole, it may be reopened by melting the joint and pushing a steel scribe through the hole.

76. Printed Circuit Card Repairs
(fig. 97)

***Caution:* Most of the cards have crystal diodes mounted on their printed circuit boards. Both crystal diodes and printed circuit boards are easily damaged by heat. Be extremely careful when handling or replacing parts on the printed circuit boards.**

a. Disassembly.

(1) Two captive holddown screws, one at each end of the card, hold the printed circuit cards in their receptacles.

(2) Loosen these screws until they disengage the captive chassis nuts. Firmly grasp the card and pull straight up. Do not twist or tilt.

***Caution:* Avoid handling or damaging the printed wiring on the exposed surface of the fiber circuit board.**

(3) Do not disassemble the card unless absolutely necessary. Four screws through the metal shield plate of each card hold the shield plate and printed circuit board together.

(4) A fifth screw mounts the filament resistor on the metal shield plate. When disassembling the card, this screw must be removed first.

(5) After removing the four assembly screws, the shield plate can be removed from the printed circuit board.

(6) The three switching cards do not have shield plates or holddown screws. They are held in place by the receptacle tension and the white plastic guides on the chassis at each end of the card receptacle.

(7) Switching cards may be removed by using the card puller furnished (fig. 70). This puller is clip-mounted inside the right side panel. Use this puller for removing switching cards to avoid handling exposed parts of the card.

(8) The two hooked ends of the puller engage in matching holes at the top of the switching cards to form a *handle* for card removal.

***Caution:* Do not twist or tilt cards during removal because this may damage base pins or separators.**

b. Repair Procedures. General repair procedures discussed in paragraphs 74 and 75 will serve for card repairs, except as noted below.

(1) The blocking oscillator and ring around card contains two variable resistors one of which (R524) is mounted on the shield plate. Be careful when opening this card to avoid breaking the leads.

(2) The printed circuit board is not repairable. Replace the complete printed circuit boards that are broken or have damaged conductor foils.

(3) To replace the subminiature tubes used on the cards:

(a) Clip the tube leads close to the printed circuit board.

(b) Hold the tube shield in place inside the tube clips, to prevent it from sliding out with the tube.

(c) Withdraw the tube from the clips and the shield.

(d) Replacement tubes. are inserted into the shield and pushed into place, while holding the shield to prevent it from being pushed out of the clips. Be sure to orient tube base correctly before insertion.

(e) Resolder the tube leads.

(4) To replace the tube shields, disassemble the card. Slide the old shield out of the tube clip; pry open the tube clip jaws with a pair of long-nosed

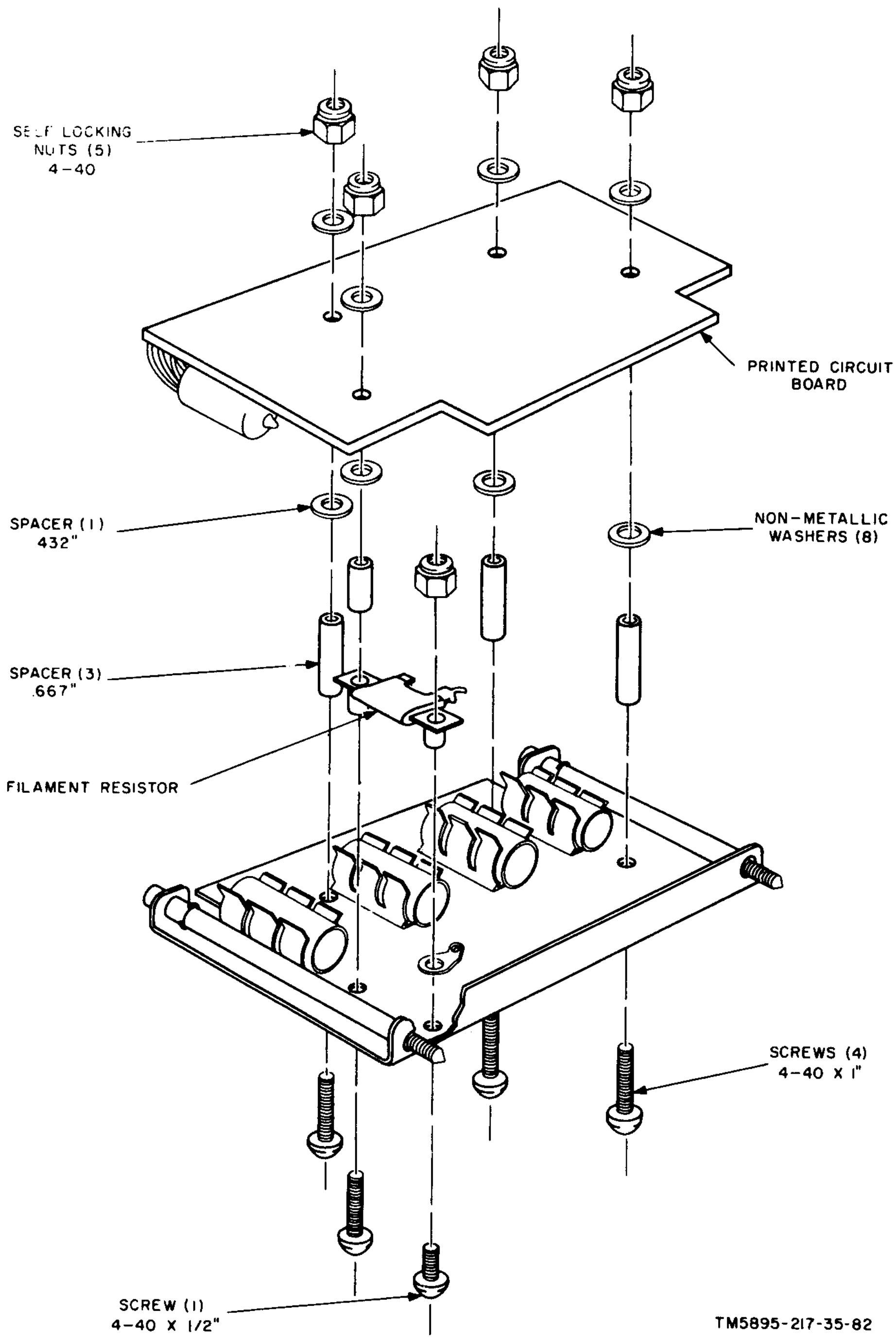


Figure 97. Typical card disassembly, exploded view.

pliers, and slide the replacement shield in place between the clip *fingers.*

(5) Retaining rings for holddown screws fit into the groove near the screwhead. Press the open jaws of the retaining ring into this groove.

(6) Techniques for replacing electrical parts are covered in paragraph 75c. To replace most parts, it will be necessary to disassemble the card.

(7) Printed circuit boards are coated with Dow-Corning 991 sealing and insulating compound after assembly. This compound burns away when soldering heat is applied. Immediately after the repairs are completed, apply a light coating of this or an equivalent compound on the exposed connections.

77. Converter Repairs

(figs. 98 and 99)

a. Removal.

(1) Three mounting screws secure the converter subchassis to the main chassis. Two are located on the left side of the receiver-transmitter and one is on the bottom of the receiver-transmitter case.

(2) Disconnect the duplexer cable from converter jack J102. Disconnect the converter output cable from IF-suppressor jack J201. Unsolder the three wire leads from the converter.

(3) Remove the three mounting screws and lift out the converter subchassis from the right side of the receiver-transmitter.

b. Disassembly and Reassembly.

(1) Two cover plates inclose the converter circuitry. The larger is held by four small screws at the corners. The smaller, an L-shaped strip, covers the tube socket and is held by two screws.

(2) Remove both cover plates for converter repairs.

(3) The converter cavities are not repairable except for replacement of the antenna cable receptacle and the three cavity couplers.

(a) The antenna cable receptacle, with the antenna coupler on its underside, is installed in preselector cavity Z101 by four small screws. It must be set in the mounting hole with its coupling loop parallel with the tuning slug and with the grounded end of this loop toward the threaded end of Z101 tuning slug.

(b) Preselector cavity Z102 contains one coupling plate, held in place by two screws. To replace this coupler, remove mixer diode CR102. Unsolder the lead from the coupler feedthrough insulator. Remove the screw and nut that fastens CR102 holder in place. Remove the coupler mounting screws. Hold the mixer diode clip out of the way while lifting out the coupler. Replace the coupler with the loop parallel with the tuning slug, and with the coupler feedthrough insulator toward the ground tie-point of capacitor C110. Reconnect the lead from the mixer diode clip to the coupler feedthrough insulator, and replace the screws.

(c) Harmonic generator cavity Z103 contains two couplers. Both are set with the feedthrough insulators toward the side in which the tuning slugs are located. The harmonic generator diode (CR101) is connected to the coupler nearest this side.

Caution: **See paragraph 75 before unsoldering CR101.**

(d) Replace both cover plates after the converter repairs are completed.

c. Replacement.

(1) Place the converter subchassis in the main chassis from the right side of the receiver-transmitter. Replace the three mounting screws.

(2) Connect the converter output cable to IF-suppressor jack J201. Connect the duplexer cable to converter jack J102. Resolder the three wire leads to the converter.

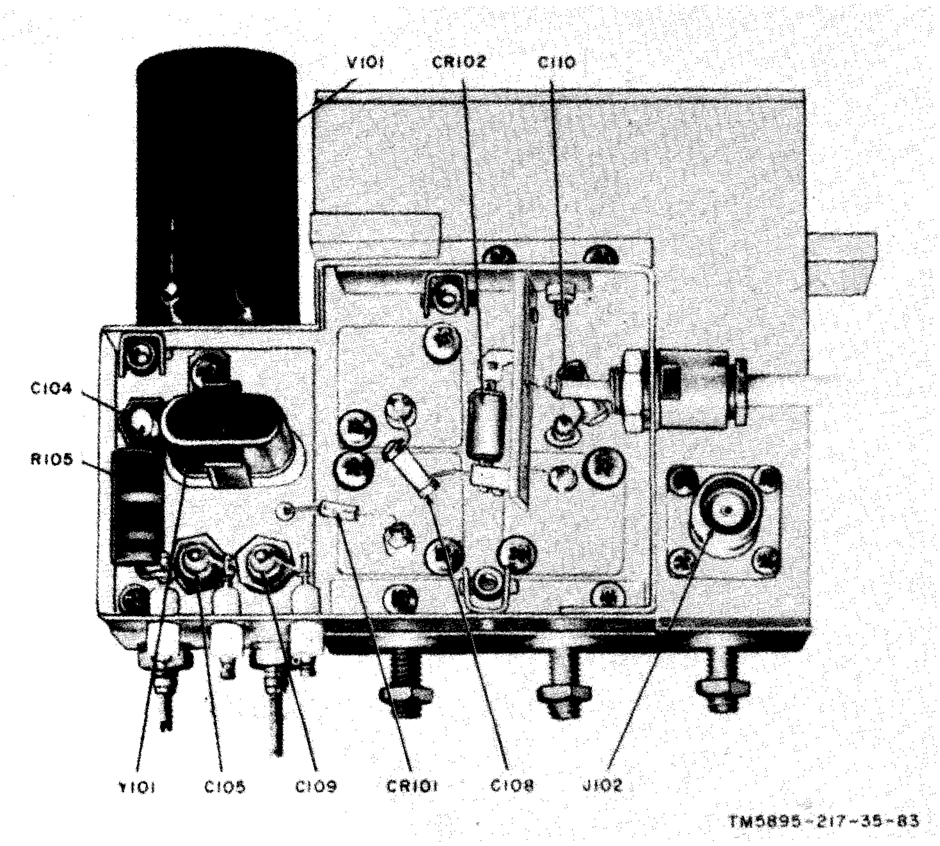


Figure 98. converter, interior view, crystal side, parts location.

78. IF Suppressor Subchassis Repairs
(figs. 100-103)

a. The IF suppressor subchassis is secured to the main chassis by two captive screws. They are located near the top of the left side of the receiver-transmitter housing, and pass through the main chassis into lugs on the subchassis bottom cover.

b. The power cable connector is held down by two screws.

c. The bottom cover is held in place by six nuts. Removal of the nuts will free the bottom cover.

d. No special repair techniques are required for the IF-suppressor subchassis.

e. In compact circuits using miniature components, special care is required because of the confined work space and the fact that parts must be protected from heat.

***Caution:* Give special attention to the instructions in paragraph 75, because there are crystal diodes in this subchassis.**

79. Transmitter Cavity Repairs
(fig. 104)

a. Tube Replacement.

(1) Tube V154, a type 3CX100AS, is housed inside the transmitting cavity, with its cooling fins outside the open end of the cavity. It is held in place by a spring-fitting sleeve inside the cavity.

(2) To replace tube V154, remove the receiver-transmitter front cover, which is held in place by two captive screws.

(3) Grasp the tub-cooling fins firmly and pull the tube *straight* out. It may be started with a twist, and a twisting motion may help to withdraw the tube. Do not jerk or pull the tube from side to side, because this may break the tube.

b. Cavity Removal.

(1) The cavity is flange-mounted through

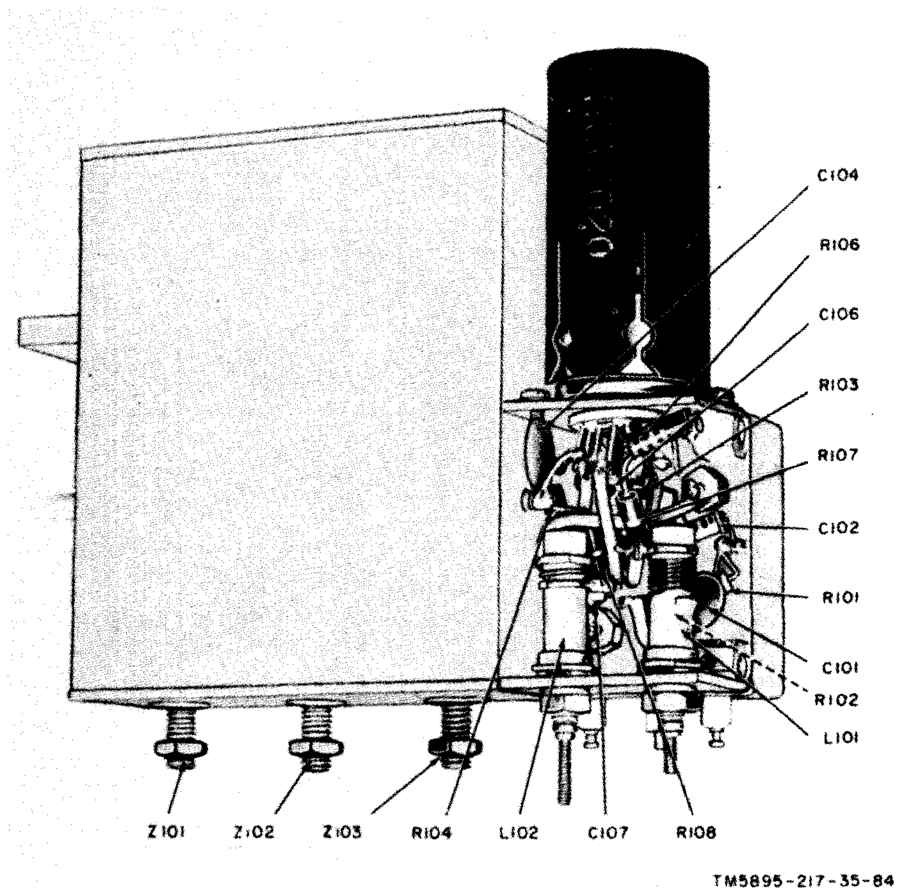


Figure 99. Converter, interior view, tube side, parts location.

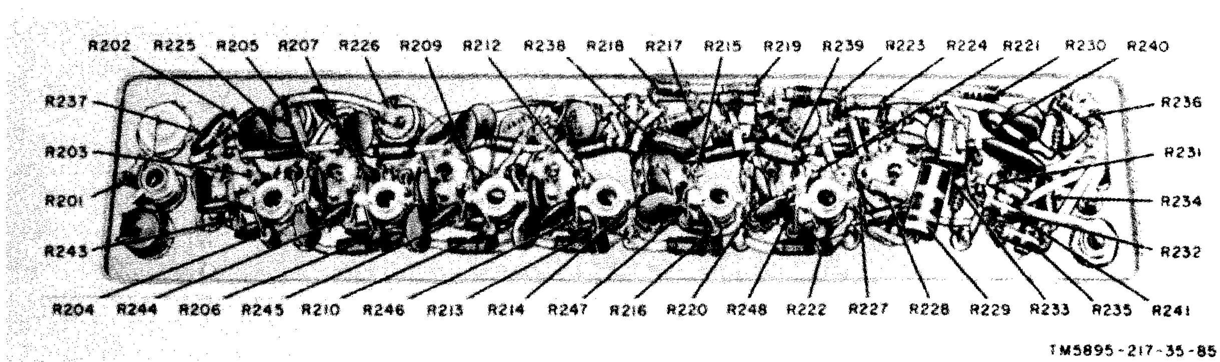


Figure 100. IF suppressor subchassis, bottom view, resistor location.

the receiver-transmitter front panel by four screws.

(2) Remove tube V154 from the cavity before removing the cavity.

(3) Disconnect the cavity output cable, the two leads to the cavity terminal plate, and the lead to the cavity flange.

(4) Remove the mounting screws and withdraw the cavity through the front-panel cutout.

c. Repairs.

(1) The transmitter cavity is not repairable.

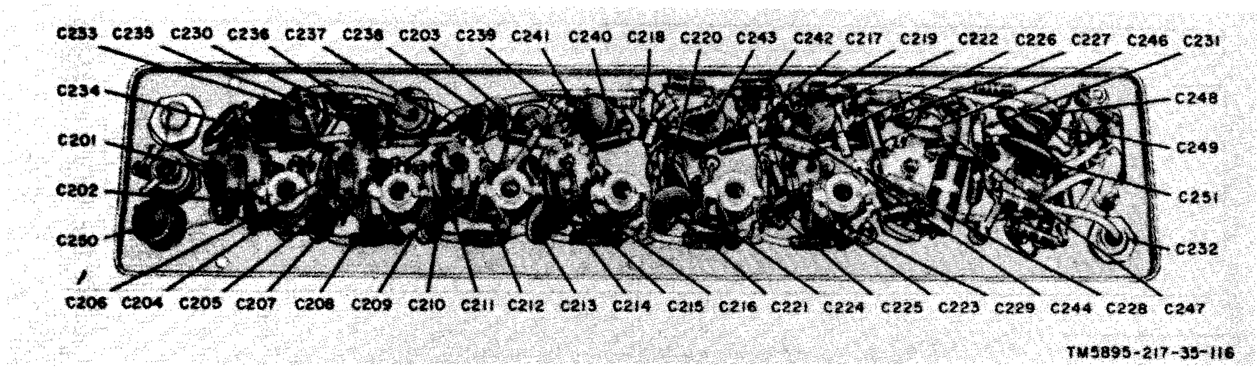


Figure 101. IF suppressor subchassis, bottom view, capacitor location.

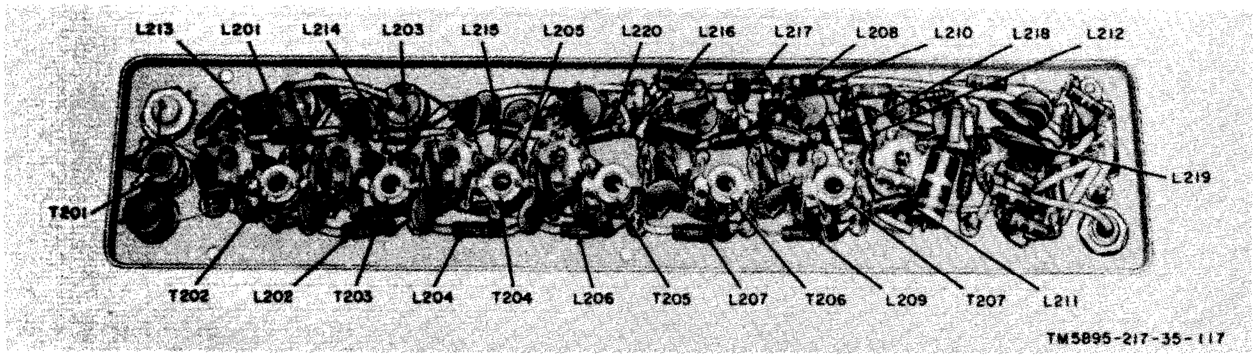


Figure 102. IF suppressor *subchassis, bottom view, coil and transformer locations.*

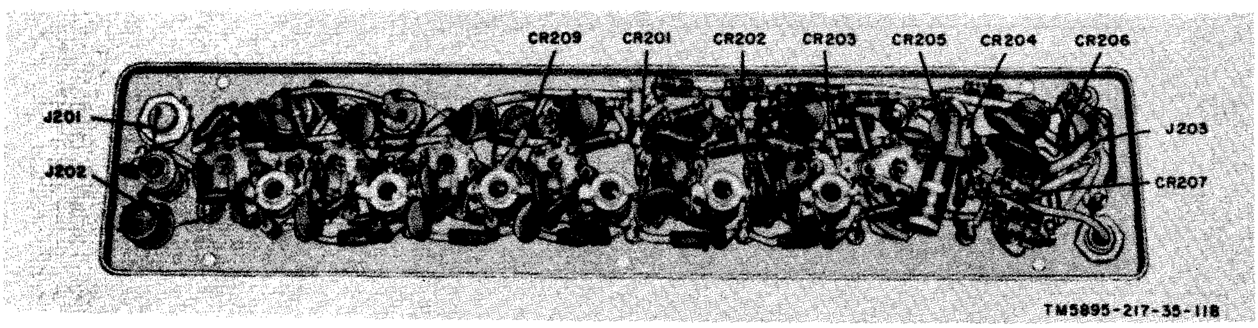


Figure 103. IF suppressor subchassis, bottom view, crystal and connector locations.

(2) Two minor items in the cavity assembly are replaceable. These are the contact spring and the retaining ring on the tuning screw.

(3) The retaining ring is a split-washer type and is replaced by pressing it into the tuning screw groove.

(4) The contact spring is secured to the movable end of the tuning screw assembly by a single screw.

d. Cavity Replacement.

(1) Slide the cavity in position through the front panel cutout and replace the mounting screws.

(2) Reconnect the cavity output cable, the two leads to the cavity terminal plate, and the lead to the cavity flange.

80. Modulator Section Repairs
(figs. 105-108)

a. The modulator section consists of trigger

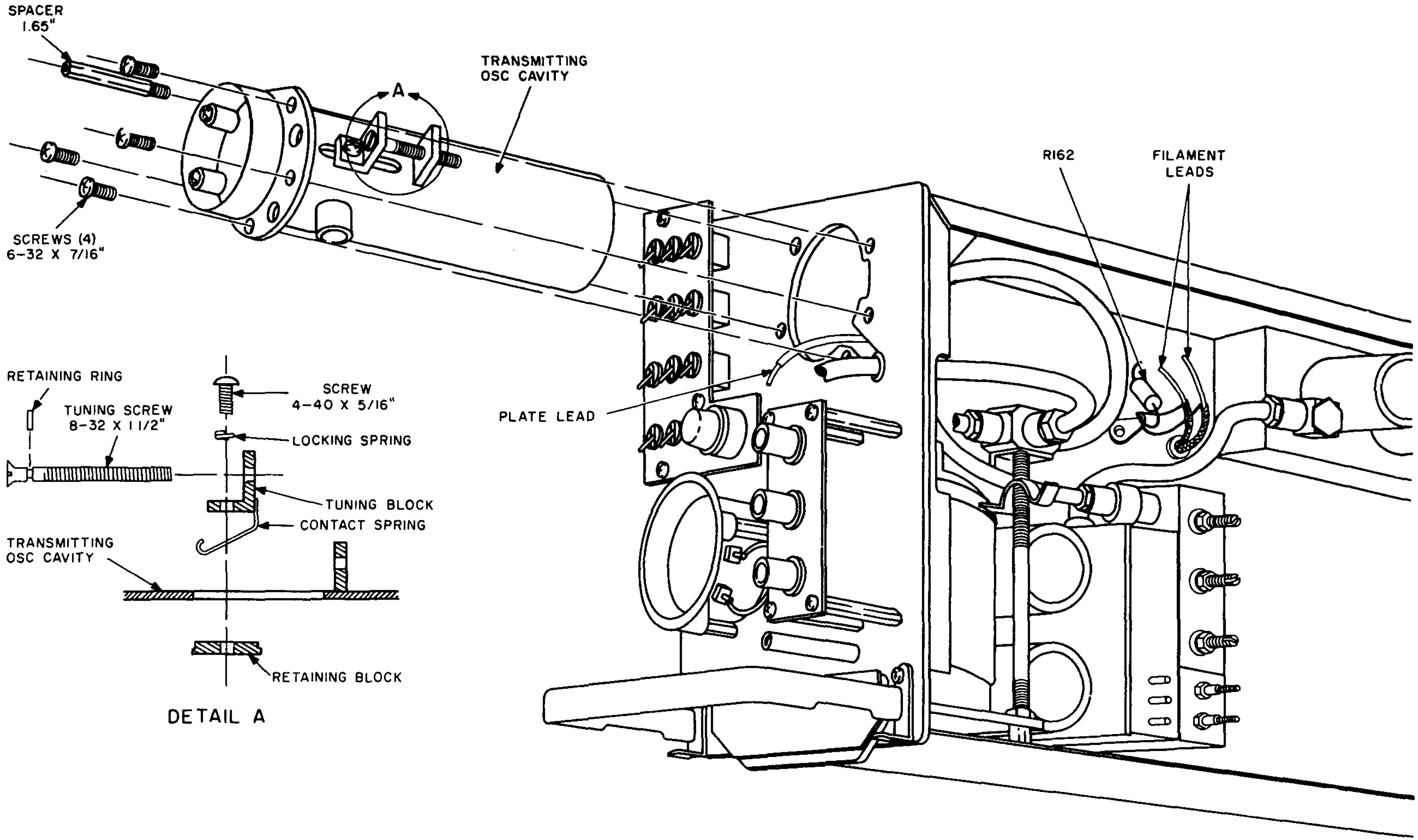


Figure 104. Transmitter cavity, exploded view.

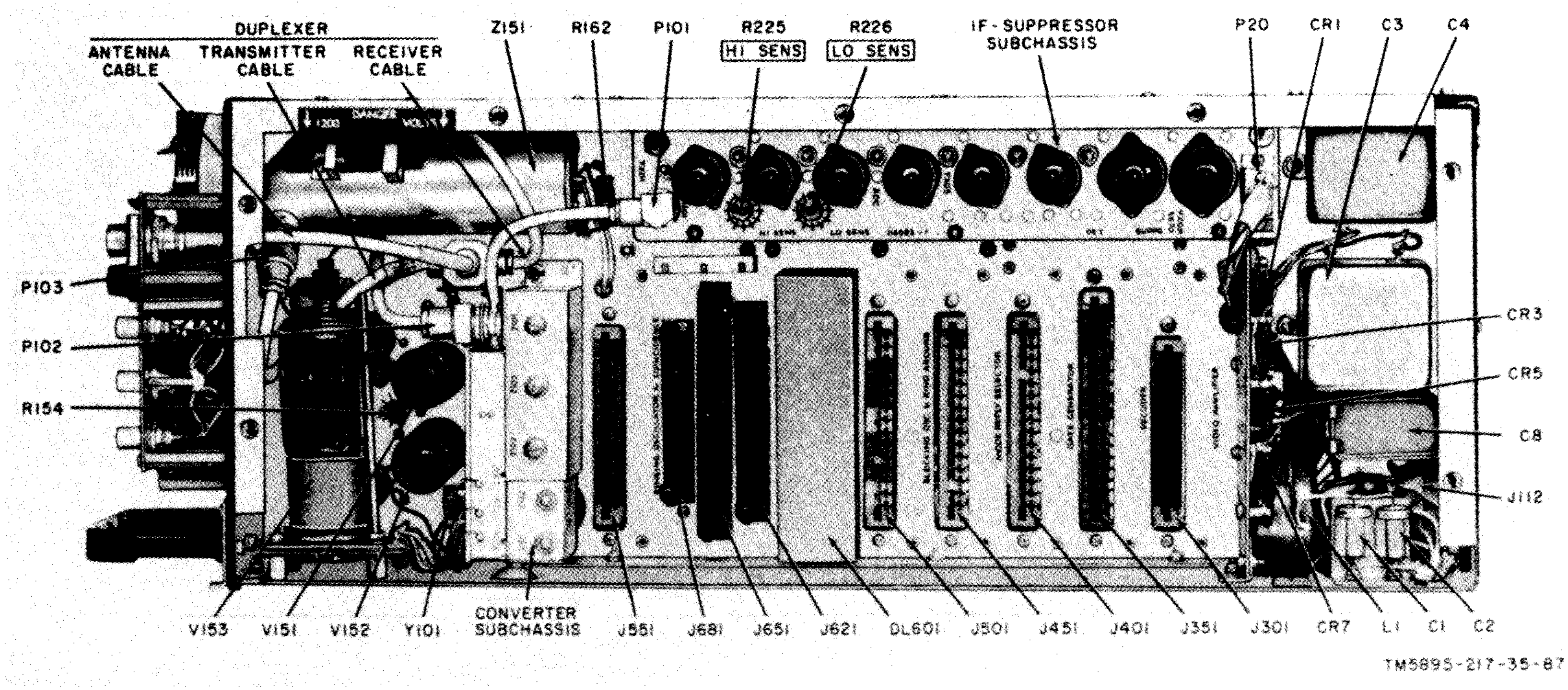


Figure 105. Receiver-transmitter, right side view, parts location.

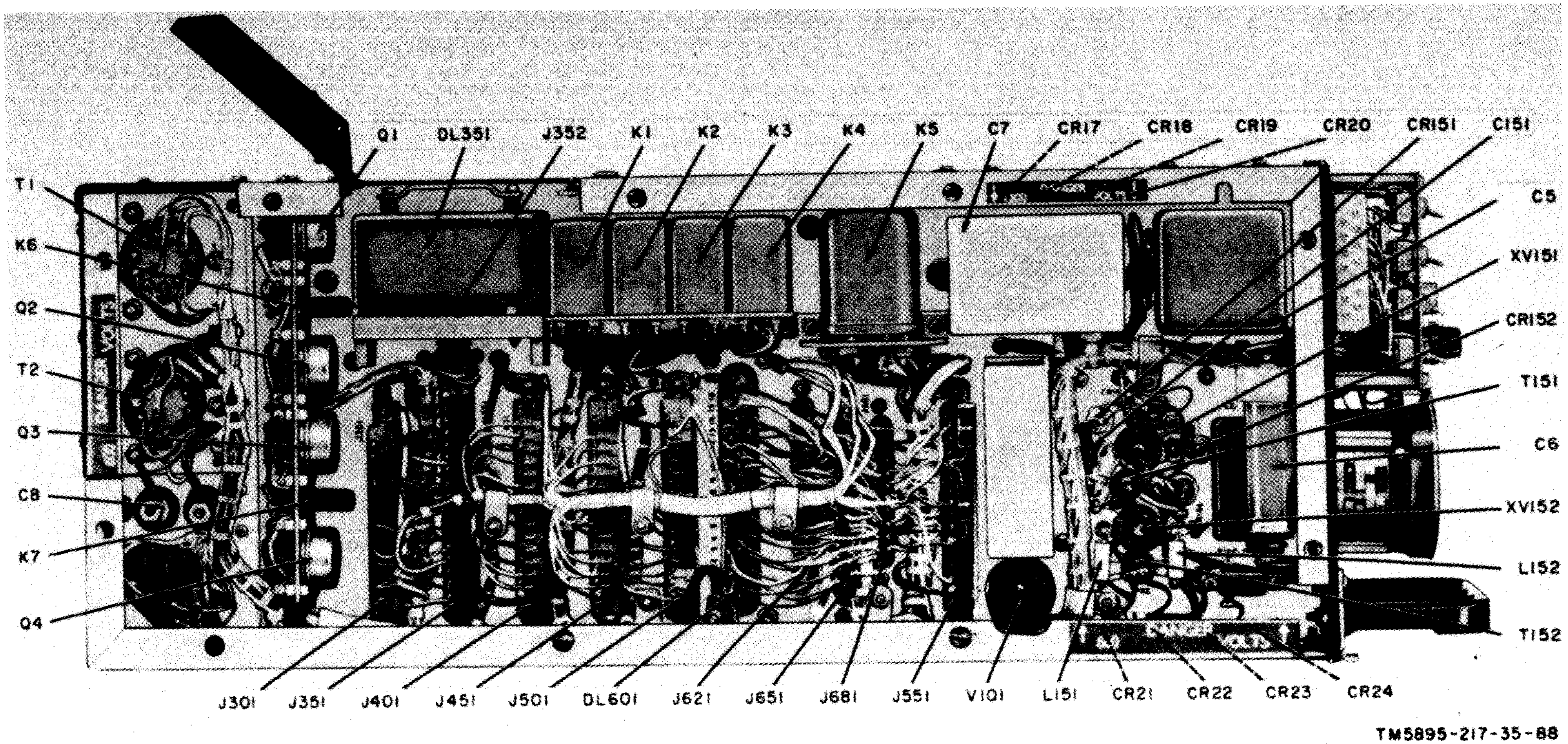


Figure 106. Receiver-transmitter, left side view, parts location.

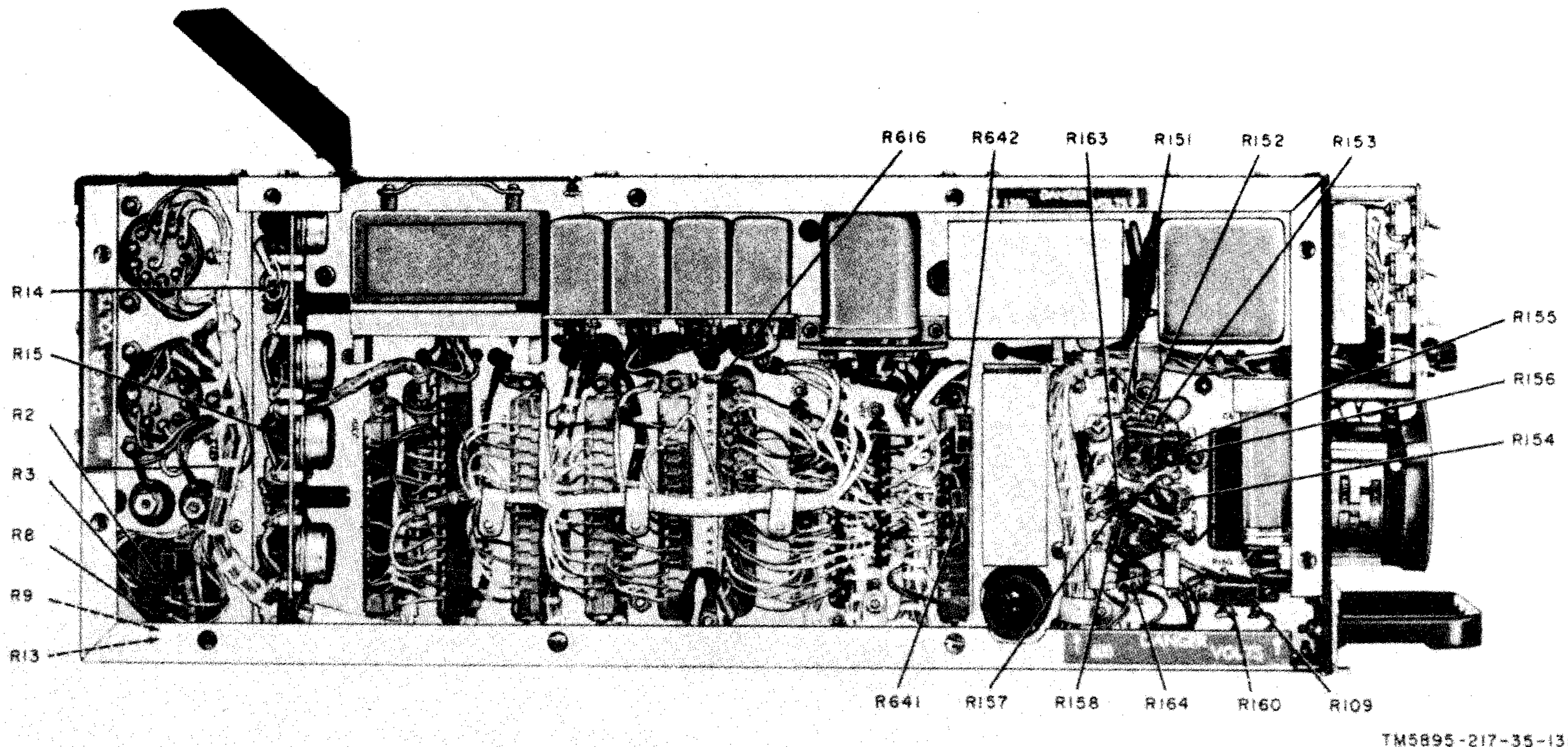


Figure 107. Receiver-transmitter, left side view, resistor location.

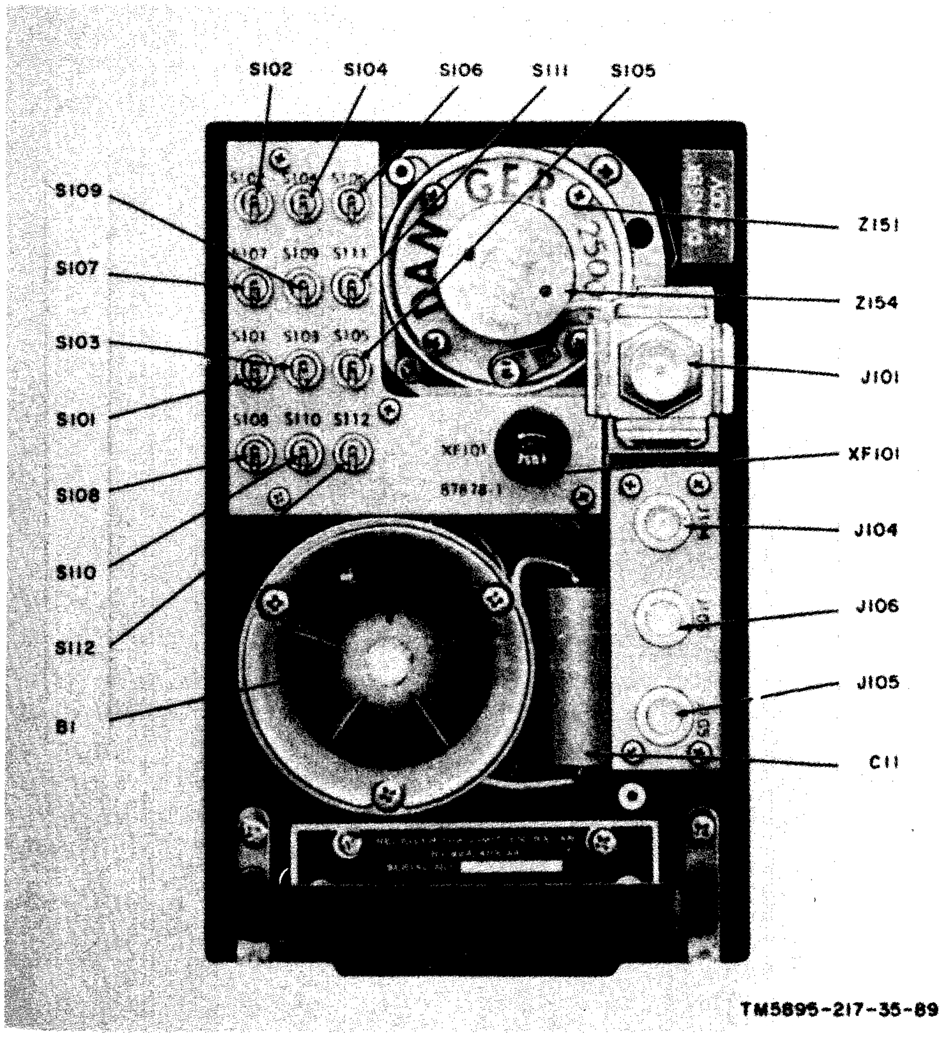


Figure 108. Receiver-transmitter, front view, front panel removed, parts location.

amplifier-blocking oscillator V151, driver V152, and modulator V153 (fig. 105). The associated circuit parts for these stages are also illustrated in figures 106, 107, and 108.

b. The modulator tube socket is part of a small printed circuit board. Do not attempt to repair this board.

c. No special repair procedures are required.

81. Power Supply Repairs
(fig. 109).

The power supply contains five subassemblies: the transformer subassembly, the capacitor subassembly (C3 and C4), the rectifier subassembly, the 600-volt rectifier board. subassembly, and the 1,200-volt rectifier board subassembly.

a. Transformer Subassembly, Removal and Replacement. The transformer bracket is mounted at the rear of the receiver-transmitter case by six screws, three outside the case and three inside, accessible from the left side. Twenty wires connect to transformers T1 and T2.

(1) Disconnect and tag the wires.

(2) Remove the six mounting screws and withdraw the transformer subassembly from the left side of the receiver-transmitter case.

To replace the transformer subassembly, set the subassembly in place from the left side of the receiver-transmitter. Replace the six mounting screws.

(4) Reconnect the 20 tagged wires to transformers T1 and T2.

b. Capacitor *C3 and C4 Subassembly Removal and Replacement* (fig. 105).

(1) The mounting bracket for this subassembly is secured to the receiver-transmitter case with four screws, all outside the case.

(2) Disconnect the four capacitor leads.

(3) Remove the four mounting screws and withdraw the subassembly from the right side.

(4) To replace the capacitor subassembly, set the subassembly in place from the right side of the receiver-transmitter. Replace the four mounting screws.

(5) Reconnect the four capacitor leads.

c. Rectifier Board Subassembly Removal and Replacement (A, fig. 109).

(1) The rectifier board subassembly is mounted on a bracket near the rear of the receiver-transmitter case on the right side. It is secured to this bracket by three screws.

(2) Remove the five rearmost subassembly cards to make room for a screwdriver for removing the mounting screws.

(3) If repairs can be made without disconnecting leads to the rectifiers, do not disconnect these leads.

(4) Remove the three mounting screws and take out the rectifier subassembly.

(5) To replace the rectifier board subassembly, set the subassembly in place and replace the three mounting screws.

d. 600-Volt Rectifier Board Subassembly Removal and Replacement (B, fig. 109).

(1) This subassembly is located on the left side of the receiver-transmitter case at the bottom and front. It is held in place by two screws.

(2) Disconnect the three leads to the rectifier board subassembly.

(3) Remove the mounting screws and lift out the rectifier board. Remove the insulating sheet under the rectifier board.

(4) To replace the rectifier board subassembly, set the rectifier board in place with the insulating sheet under it. Replace the mounting screws.

(5) Reconnect the three leads to the rectifier board.

e. 1,200-Volt Rectifier Board Subassembly Removal and Replacement (C, fig. 109).

(1) This subassembly is located on the left side of the receiver-transmitter case at the top and front. It is concealed by capacitor C7, which must be removed to give access to the rectifier board subassembly.

(2) Two screws hold capacitor C7 in place and must be removed to free the capacitor. The leads to C7 are long enough to avoid the need for disconnecting them.

(3) With C7 laid back out of the way, disconnect the three leads to the rectifier board.

(4) Remove the two mounting screws and lift out the rectifier board. Remove the insulating sheet under the rectifier board.

(5) To replace the rectifier board subassembly, set the rectifier board in place with the insulating sheet under it. Replace the two mounting screws.

(6) Reconnect the three leads to the rectifier board.

(7) Reinstall capacitor C7 with the two holding screws.

f. Transistors. Transistors are removed individually. They are held in place by a single stud and nut. Each transistor has two leads to be disconnected before removal (fig. 91).

82. Receiver-Transmitter Connector

a. The receiver-transmitter connector is located on the rear panel, near the bottom. It is inaccessible on all four sides because of the presence of other parts, and can be reached only by removing the bottom-rear half-wraparound cover.

b. The connector can be reached by removing the bottom-rear half-wraparound cover, formed from a single piece of sheet metal.

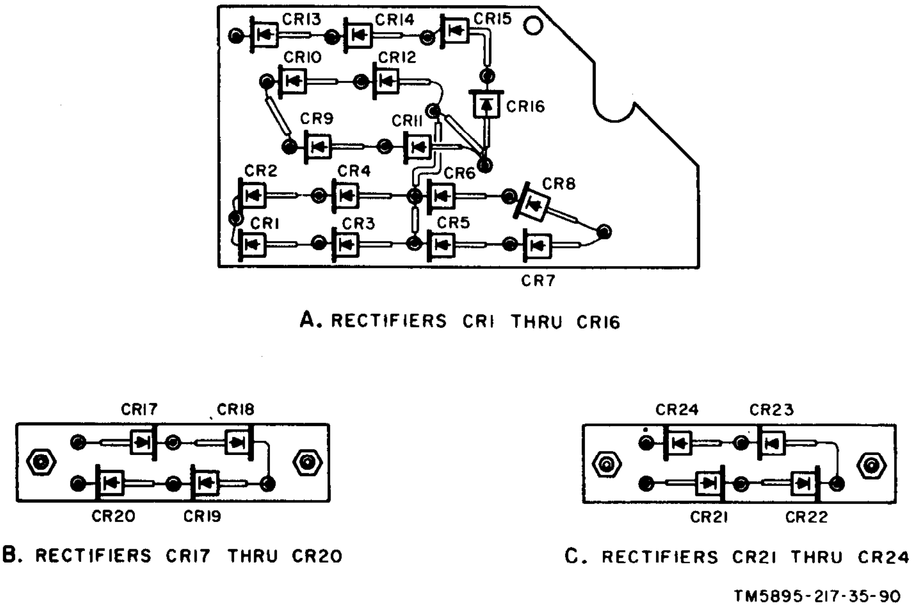


Figure 109. Power supply rectifier board subassemblies.

c. All screws in the bottom must be removed, except the two that hold the white plastic guide for the switching cards.

(1) Begin by removing modulator tube V153 (fig. 105).

(2) Remove the four screws that hold the modulator tube base.

(3) Remove the remaining screws in the bottom cover, except the switching card guide screws. Some of the screws are engaged in captive nuts, while the nuts engaging the others are free. Be sure to take out all free nuts and washers to prevent the possibility of shorts after reassembly.

d. With the screws removed from the bottom and rear, as indicated, the cover can be lifted off. The connector will be detached from the rear cover, and will be exposed when the rear cover is removed. The large capacitor just above the connector may be removed, if necessary.

83. Control Unit Repairs

a. The control unit (fig. 4, TM 11-5895-217-12) is housed in a wraparound cover that closes the top and sides. To remove this cover, remove the six roundhead screws around the edges of the rear panel; remove the two flathead screws on the front edge of the top, and the three flathead screws on each side.

b. To remove either of the two relay mounting brackets, remove the four screws: two on the rear panel and two on the bottom plate. In the case of K901, one of the rear-panel screws is locked by a wire seal (to the mounting nut on J901) which must be clipped to remove this screw.

c. To remove receptacle J901, cut the safety wire on the large nut, and loosen the receptacle nut. Take out the screws in both relay brackets, and remove the receptacle nut and receptacle. Push back the insulated tubing and carefully unsolder the wires. After installation of the replacement receptacle, tighten the nut and safety-wire with #20 brass wire.

d. No special repair procedures are required.

Caution: **The control unit contains one crystal diode. Be careful when soldering near this diode because it is easily damaged by heat.**

84. Antenna Repair

(fig. 5, TM 11-5895-217-12)

Replacement of the antenna cable receptacle center contact is the only repair permitted on on the antenna. To replace this contact, proceed as follows:

a. Remove the receptacle outer shell.

b. Pull out the dielectric (insulator) bushing.

c. Unscrew the center contact pin and replace it with a serviceable contact pin.

d. Replace the dielectric bushing.

e. Replace the outer shell.

Section II. ALINEMENT

85. Test Equipment Required for Alinement

a. Test Equipment. The test equipment listed below is used for both IF and converter alinement. The assigned common name and technical manual are also listed in the chart. The transmitter alinement requires the same test equipment listed in paragraph 49.

Nomenclature	Technical manual	Common name
Oscilloscope AN/USM-81.	TM 11-6625-219-12.	Oscilloscope.
Sweep Signal Generator, Boonton, Radio Corp. Type 240A.		Sweep generator.
Power Supply PP-1104A/G or equivalent.	TM 11-5126	28-volt power source.

b. Additional Equipment Required. Additional equipment required for alinement is listed below with the assigned common name.

Description	Common name
Interconnect cable, control unit to receiver-transmitter.	Bench test cable (par. 9).
115-volt, 60-cps power source.	Ac power source.
Coaxial cable, 4 ft RG-62/U with a UG-88/U connector at one end and clips at the other end.	Cable No. 16.
Coaxial cable, 4 ft RG-62/U with uhf connector at one end only.	Cable No. 17.
Coaxial cable, 4 ft RG-62/U with uhf connector at one end, UG-88/U connector at other end.	Cable No. 18.
Coaxial cable, 6 ft RG-58/U with UG-88/U connectors at one end and Dage Corp. type CBSN 3478-1 connector at other end.	Cable No. 19.
Coaxial cable, 6 ft RG-58/U with UG88/U connectors at both ends.	Cable No. 20.
One each UG-201/U adapter.	BNC to N adapter.

Description	Common name
One each UG-565A/U adapter.	N to C adapter.
Microammeter, 0-50 ua shunted by 120 ohms and filtered by 1,000 uuf (fig. 110).	Converter crystal current indicator.
Plug, Switchcraft Corp. type 750 or equivalent.	Crystal current plug.

c. Sweep Generator Characteristics. The Boonton Radio Corp. type 240A sweep generator covers the frequency range from 4.5 to 120 mc in five bands. The RF output is continuously variable from 1 to 300,000 microvolt, and the sweep rate is variable from 20 to 70 cps with sweep widths to ±15 mc each side of the center frequency. Crystal markers available at 2.5, 0.5, and 0.1 mc, and variable pip markers (two) are amplitude-adjustable and position-adjustable. Provisions are made for internal calibration of the rf signal output against the crystal oscillator.

d. Converter Crystal Current Indicator. The 0-50 microammeter (fig. 110) used to aline the converter subchassis is fabricated as follows: use a 2-foot piece of shielded wire to connect the shield to the shell and the center wire to the tip of the Switchcraft Corp. type 750 or equivalent plug. Place the 120-ohm resistor and the 1,000-micromicrofarads (µµf) capacitor across the meter terminals, and connect the shield to the positive meter terminal. Connect the center wire to the negative meter terminal. Do not insert this meter setup until instructed to do so by alinement instructions.

e. Test Setup. Fabricate the coaxial cables with the connectors listed in paragraph *85b.* Use figures 56 and 57 for coaxial connector installation data.

86. IF Alinement

a. Connect the equipment as shown in figure 110. Do not connect cable No. 20 because it

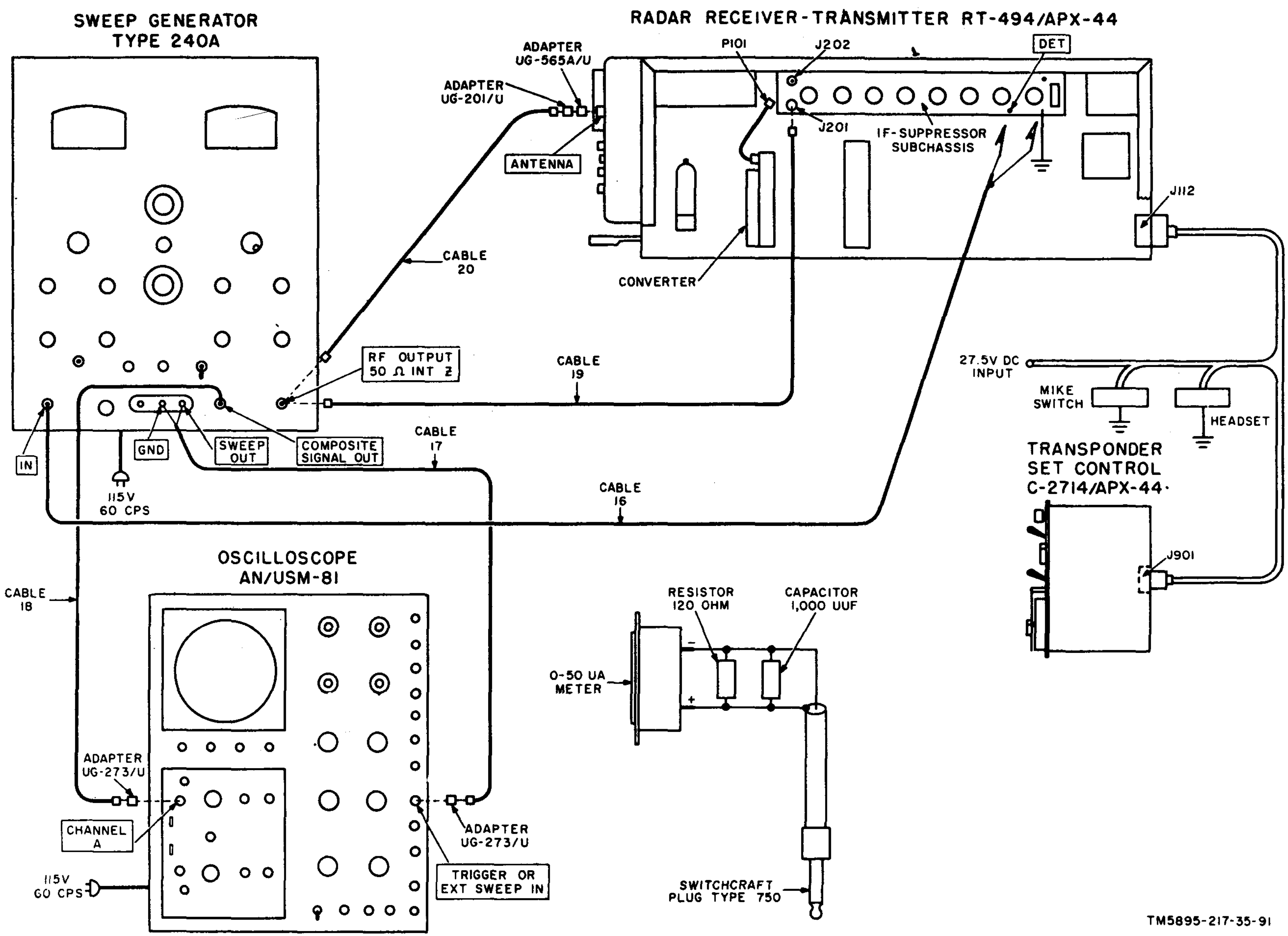


Figure 110. Alinement bench test setup.

is not used in the IF alinement. Turn on all the test equipment and set the control unit master control to the STBY position.

Caution: **Do not move the master control to any other position when the sweep generator is in use. Adjust HI SENS control R225 on the IF suppressor subchassis (fig. 110) to its maximum clockwise position, and calibrate the sweep generator at 60 mc; use its internal crystal calibrator by following the procedures in its instruction manual.**

b. Set the oscilloscope controls as follows:

Oscilloscope controls	Setting
HORIZONTAL DISPLAY	EXT SWEEP
5X MAGNIFIER	ON
STABILITY OR EXT. SWEEP ATTEN.	As required for full scale trace.
ATTEN	X 10
MODE	A ONLY

c. Set the sweep generator controls as follows:

Sweep generator controls	Setting
FREQ RANGE MC	35–75
SWEEP RATE	60
CW-SWEEP	SWEEP
AM	OFF
SWEEP SELECTOR	INT
CRYSTAL MARKER	OFF
PIP MARKER AMPLITUDE	Full counterclockwise.
RF LEVEL FULL SCALE switch	100 UV
TEST SIGNAL AMPLITUDE	Set to midrange

d. When a stable waveform has been established, proceed as follows:

(1) Set the sweep generator CRYSTAL MARKER control to 2.5 mc and adjust the sweep generator CRYSTAL MARKER AMPLITUDE control to produce visible markers.

(2) Adjust the sweep generator sweep WIDTH control so that the waveform (B, fig. 111) covers approximately three-fourths of the oscilloscope scale, and adjust the oscilloscope CHANNEL A VOLTS/CM for near full scale display. (Keep the VARIABLE control set to CALIBRATED.)

(3) Increase the sweep generator PIP MARKER AMPLITUDE control until markers are visible, and set the sweep generator PIP MARKER POSITION control No. 1 to the 2.5 mc marker which corresponds to the 60-mc center-frequency.

(4) Set the sweep generator CRYSTAL MARKER control to the .5 mc position; set pip marker No. 1 to 57 mc and pip marker No. 2 to 63 mc (each is six 0.5 mc markers from 60 mc).

(5) Set the sweep generator CRYSTAL MARKER control to OFF.

Note. Do not make any adjustments to the sweep generator SWEEP WIDTH, SWEEP RATE, or CENTER FREQ controls after calibrating the pip markers.

e. When calibration has been completed, check the waveform against that shown in B, figure 111. If the waveform and markers agree, no IF alinement is necessary. If alinement is required, proceed as follows:

(1) Aline IF transformers T202, T204, and T206 at 63 mc, and T203, T205, and T207 at 57 mc (A, fig. 111). This is accomplished by observing the pip markers and the corresponding waveform humps, and adjusting each transformer so that a maximum hump amplitude is obtained at each pip marker. Thus, when alinement is completed, the maximum hump amplitude points are 6 mc apart and equal in amplitude. Differences in amplitude greater than 10 percent indicate a defective stage or stages.

(2) Set the sweep generator output to 100 microvolt and measure the output at the DET test point with the oscilloscope. Peak voltage shall be 1.25 volts ±0.25 as measured on the oscilloscope, and the bandwidth shall not be greater than 8 mc at the 3-db points.

Note. Transformer T201 is normally not adjusted during IF alinement because it is used to correct the final overall converter IF waveform.

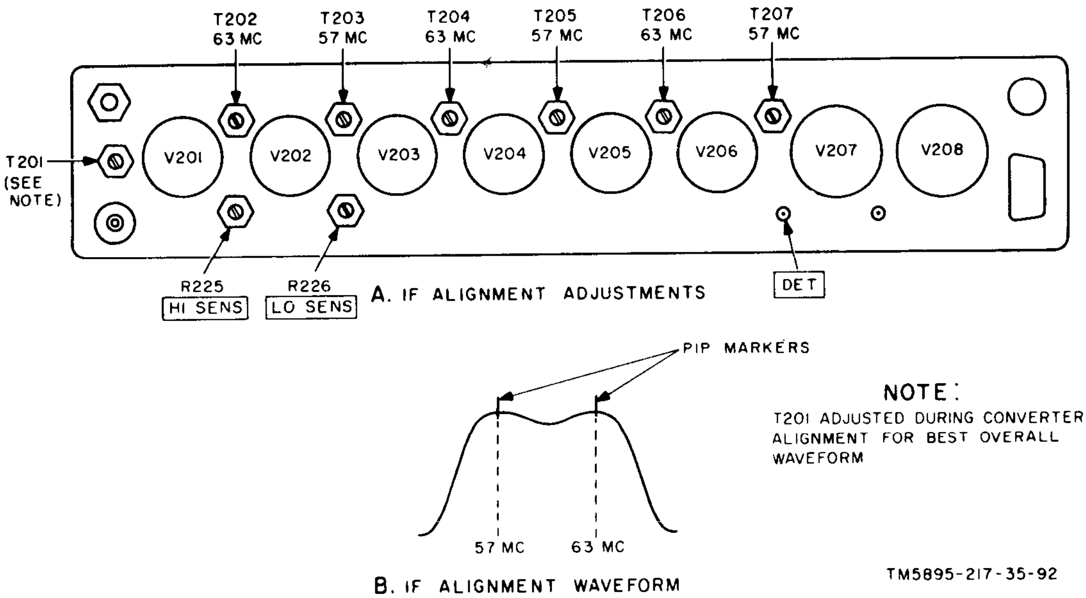


Figure 111. IF alinement controls and waveforms.

87. Converter Alinement

a. Converter alinement is performed with cables connected as shown in figure 110; except that cable No. 19 is not used. The converter crystal current indicator is inserted into receptacle J202 only during oscillator and harmonic generator alinement. A harmonic output of the sweep generator is used for preselector cavity (Z101 and Z102) alinement.

b. Check crystal Y101 frequency to make sure that it is correct for the assigned receiver input frequency.

$$\text{Crystal frequency (mc)} = \frac{\text{Receiver frequency (mc)} + 60 \text{ mc}}{12}$$

Turn on the transponder set and allow 10 minutes warmup time for stabilization. Tune inductors L101, L102, and cavity Z103 for maximum converter crystal current. Meter readings between one-quarter and one half. scale are within operating limits. If the crystal frequency must be checked because of off-frequency operation, use a standard frequency counter having a 0.001 percent accuracy.

c. Converter preselectors Z101 and Z102 are alined by the use of the tenth harmonic of the sweep generator output.

(1) Set the sweep generator dial to 102.5 mc and calibrate by zero-beating with the 2.5 mc-crystal marker.

(2) When the 102.5-mc frequency has been accurately located, set the sweep generator CRYSTAL MARKER control to .5 mc and again note the 102.5-mc zero beat.

(3) Move the center frequency dial to 103-mc zero beat which is the first 0.5-mc beat above 102.5 mc. If a frequency counter is available for frequency measurement use it to check the 103-mc sweep generator center frequency. (Type N410A Wavemeter and type 612A Detector may also be used to check the frequency.)

d. Alinement controls for the converter preselector are shown in A, figure 112. Because harmonic operation is used, multiply all crystal markers by 10; therefore, 2.5-mc markers will represent 25 mc on the oscilloscope display.

(1) Set the pip markers at 1,027 and 1,033 mc and check Z101 and Z102 to determine at which frequency each has been set. No fixed rule has been adopted as to frequency assignment for these adjustments or for T201 in the IF suppressor subchassis because they are adjusted for the best overall receiver frequency response curve.

(2) Adjust Z101 and Z102 and check the

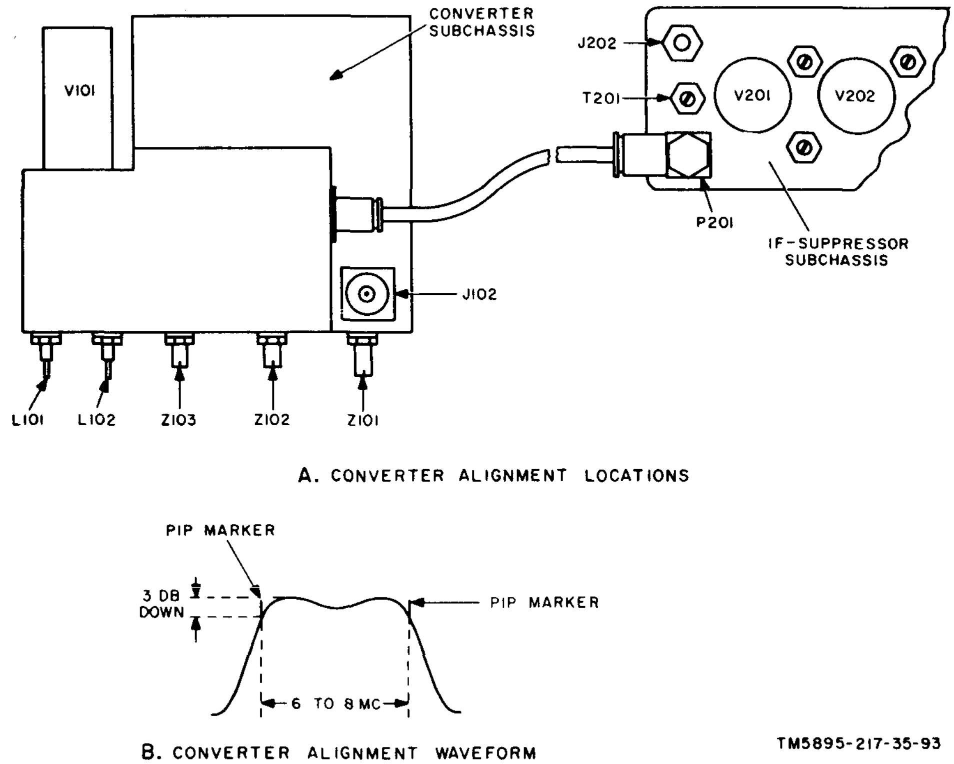


Figure 112. Converter alinement controls and waveforms.

pattern for symmetry as shown in B, figure 112. If one hump is appreciably higher than the other, readjust Z101and Z102 to opposite frequencies for possible improvement. The setting that provides the best balance between the two peaks should be the final setting.

(3) Adjust IF transformer T201 to place the dip between peaks as near the center frequency as possible.

(4) Tighten each adjustment locknut while holding its adjustment screw.

88. Transmitting Oscillator Alinement

a. Use the test setup of figure 58 and paragraph 55 for transmitting oscillator alinement. Follow the test setup calibration procedures in paragraph 56. Be sure that the coaxial tuner is properly tuned during the alinement. Set the test setup switches as follows: S4 to SUPPR, S5 to PWR, and S6 to VIDEO; and interrogate the receiver-transmitter with a mode 1 interrogation. Set the control unit as follows: MODE 1 code control to position 73, function control to MOD, and master control to NORM.

b. When the equipment has warmed up (approximately 10 minutes), tune the wavemeter until a dip is seen in the power bridge indication. The frequency shall be 1,090 mc ±1. If the frequency is not correct, aline the cavity as follows:

(1) Loosen the tuning adjustment lock screw (fig. 113) one-half turn and adjust the cavity tuning adjustment in small increments, while checking the frequency with the wavemeter. Moving the tuning slide toward the front of the receiver-transmitter raises the cavity resonant frequency.

***Caution:* Do not loosen the tuning adjustment lock screw too far at any time because the retaining block (fig. 104) will fall inside the cavity and will require disassembly of the cavity.**

(2) Continue tuning until the proper frequency is obtained.

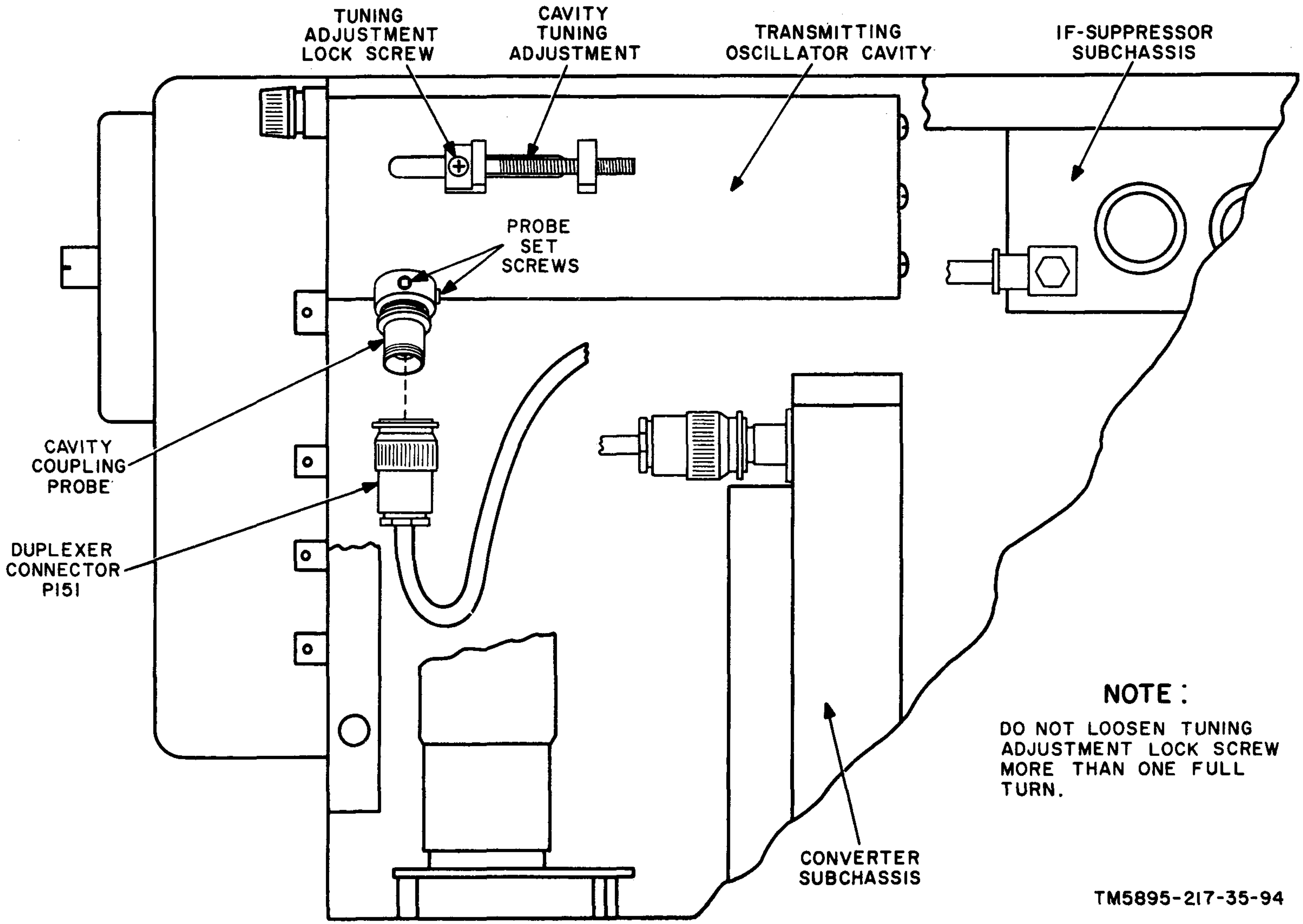


Figure 113. Transmitting oscillator, location of alinement controls.

(3) Tighten the tuning adjustment lock screw and recheck the frequency.

c. After the frequency has been set, check the transmitter power output as instructed in paragraph 104. To adjust peak power output, the activity coupling probe (fig. 113) must be adjusted.

(1) Turn off the receiver-transmitter.

(2) Disconnect coaxial connector P151, and loosen the probe setscrews.

(3) Screw the probe in to increase or out to decrease the power.

(4) Tighten the setscrews, reconnect P151, and recheck the power output.

(5) Repeat this adjustment as required to obtain 500-watt peak power output.

Note. Be sure that the wavemeter is detuned to 1,000 mc and that the coaxial tuner is correctly tuned when measuring output power.

Section III. ADJUSTMENTS

89. Test Equipment Required for Adjustments

The test equipment and materials used for troubleshooting (par. 49) are also required for making the receiver-transmitter adjustments. Follow the test setup procedures in paragraph 55; calibrate the test equipment by Wing the procedures in paragraph 56.

90. A. O. C. Adjustment

Unless otherwise specified by military maintenance procedures, A.O.C. control R318 (fig. 60) will be adjusted to begin regulation at interrogation rates above 500 cps.

a. Set the control unit master control to NORM, and the function control to NORMAL, and interrogate the receiver-transmitter on mode 1.

b. Set test setup switch S4 to SUPPR, S5 to PWR, and S6 to VIDEO, and turn on all test equipment.

c. Set the pulse generator PULSE RATE control set to .5 kc (500-cps interrogation rate).

d. Rotate control R318 to the full counterclockwise position.

e. Adjust the uhf signal generator output for 50 percent transmitter triggering. This is determined by observing the main gate pulse on the oscilloscope, with the oscilloscope horizontal sweep speed at the interrogation rate. When the intensity of the horizontal trace and the intensity of the main gate pulse are equal, the transmitter is triggered by 50 percent of the interrogations.

f. Increase the uhf signal generator output 3 dmb; this should produce a full triggering display on CHANNEL B of the oscilloscope. (Full triggering is the condition where no horizontal trace appears in the pulse area.)

g. Set A. O. C. control R318 to produce 100 percent firing (the point at which a horizontal trace appears in the pulse area occasionally, but not more than once per second). This procedure remains the same for all interrogation rates at which regulation is desired.

h. Turn off all equipment when the adjustment is completed.

91. Encoder Blocking Oscillator Adjustment

Encoder blocking oscillator control R523 (fig. 64) is adjusted to obtain the l-µsec output pulses that are applied to delay line DL601.

a. Disconnect cable No. 7 (fig. 58) and connect the probe cable to CHANNEL B of the oscilloscope.

b. Connect this probe to test point D (fig. 64) and set switch S5 to PWR and S6 to MARK.

c. Set the control unit master switch to NORM and the function control to NORMAL.

d. Turn on all test equipment. Adjust the oscilloscope to obtain waveform amplitude and calibration of D, figure 127. Compare the width of these waveforms with the 1-usec markers from the marker generator.

e. Adjust the pulse width to 1 usec ±0.1 with control R523 (fig. 64) in blocking oscillator and ring around card.

f. When the adjustment is completed, turn off all test equipment and reconnect cable No. 7 to CHANNEL B of the oscilloscope.

92. Ringing Oscillator Adjustment

The ringing oscillator is adjusted to provide the accurate 1.45-usec spacing for the reply pulses.

a. Disconnect cable No. 7 (fig. 58) from the oscilloscope CHANNEL B, and connect the oscilloscope probe to CHANNEL B. Connect the probe to test point H of figure 66 (suppressor grid of tuber V554).

b. Set test setup switch S5 to PWR and S6 to MARK, and turn on all test equipment.

c. Set the control unit master control to NORM and the function control to NORMAL

d. Adjust the oscilloscope horizontal sweep to .1 usec, DELAYING SWEEP; and the pulse generator to obtain a mode 1 interrogation (3-usec pulse spacing).

e. Adjust the amplitudes and positions of the two traces on the oscilloscope for easy comparison.

f. Check and adjust the ringing oscillator as follows:

(1) Rotate the oscilloscope DELAY-TIME MULTIPLIER control to move the waveforms to the right until the first complete cycle of the ringing oscillator is visible.

(2) Aline the 50 percent amplitude point of the leading edge on a positive going peak of the ringing oscillator output with a vertical line on the scale, and record the oscilloscope DELAY-TIME MULTIPLIER dial reading. *The scale vertical line chosen for this step will be used as the reference line for all steps to follow.*

(3) Continue rotating the oscilloscope DELAY-TIME MULTIPLIER control to bring the leading edge 50 percent amplitude point of the closest 1-usec marker pulse to the reference line. Record the oscilloscope DELAY-TIME MULTIPLIER dial reading.

(4) Slowly rotate the oscilloscope DELAY-TIME MULTIPLIER control to move waveforms to the left, and count 60 complete ringing oscillator cycles as the 50 percent leading edge points pass the reference line. Record the oscilloscope DELAY-TIME MULTIPLIER reading.

(5) Return to the reference point ((3) above) and count eighty-seven 1-usec marker pulses at the reference line. Record the oscilloscope DELAY-TIME MULTIPLIER dial reading.

(6) Adjust inductor L551 (fig. 66) until the difference in oscilloscope DELAY-TIME MULTIPLIER dial readings for the ringing oscillator in (2) and (4) above equals the difference in oscilloscope DELAY-TIME MULTIPLIER dial readings for the marker pulses in (3) and (5) above. When this occurs, 60 complete ringing oscillator cycles will be enclosed by 87 marker pulses. The period of one complete ringing oscillator cycle must be 1.45 usec ±0.05. When this occurs, the adjustment is completed.

g. Turn off all equipment and reconnect cable No. 7 to CHANNEL B of the oscilloscope.

93. Blocking Oscillator Adjustment

The blocking oscillator is adjusted to obtain the 0.45usec pulse width for the transmitted pulses.

a. Connect the receiver-transmitter and the test equipment as shown in figure 58 with switch S4 in the DET position, S5 in the DET position, and S6 in the MARK position.

b. Set all 12 mode 2 selector switches to ON, and set the control unit as follows: mode 2 switch to ON, master control to NORM, and function control to MOD.

c. Turn on all test equipment, select 1-usec markers from the marker generator, and interrogate the receiver-transmitter with mode 2 (5-usec spaced pulses). A full mode 2 reply train should appear on CHANNEL B track with horizontal sweep set for 5 usec/cm.

d. Set the horizontal sweep controls for 0.1 usec/cm (MAIN SWEEP DELAYED) and adjust control R154 (fig. 67) for a pulse width of 0.45 usec ±0.1.

e. Rotate the oscilloscope DELAY-TIME MULTIPLIER control to view each pulse of the replay train; none of the pulses must exceed the limits of 0.35 to 0.55-usec pulse width. Adjust control R154 to place all pulses in the reply train within the limits.

94. Ring Around Gate Multivibrator Adjustment

a. With the equipment setup as in figure 58, disconnect cable No. 7 from the oscilloscope and connect the probe cable to CHANNEL B input. Connect the probe to test point H (fig. 64) and turn on all test equipment. Set test setup switch S5 to PWR and S6 to MARK.

b. Following are the procedures for checking each of the three ring around gate multivibrator pulse widths.

(1) Set the control unit master control to EMER and the function control to NORMAL; measure the width of the pulse on the oscilloscope channel B trace with a mode 1 (3-usec spaced pulses) interrogation. The pulse should be approximately 57 usec wide.

(2) With the control unit master control in EMER, the function control in the MOD position, a mode 1 interrogation, and MODE 1 code control set to 73, measure the pulse width on the oscilloscope channel B trace. The pulse should be approximately 87 usec.

(3) Set the control unit master control to NORM and the function control to MOD. Interrogate the receiver-transmitter on mode 1 with the MODE 1 code control set to 73. Measure the pulse width on the oscilloscope channel B trace after the control unit I/P switch has been operated. The pulse should be approximately 37 usec wide.

(4) Adjust control R524 (fig. 64) to the point at which the three pulse widths (37, 57, and 87 usec) are as close to correct as possible.

95. Receiver Sensitivity Adjustment

With the equipment set up as in figure 58, turn on all test equipment and use the test setup configuration of paragraph 57a and *c.* Measure receiver sensitivity at the transmitter 50 percent triggering point as follows:

a. Set the uhf signal generator to 1,030 mc and interrogate with 3-usec pulse separation. Set the control unit master control to NORM. Adjust the uhf signal generator output for 50 percent transmitter triggering. This can be determined by observing the main gate pulse on the oscilloscope. With the oscilloscope horizontal sweep triggered at the interrogation rate; the intensity of the horizontal trace, and the main gate pulse are equal when 50 percent triggering occurs.

b. If the receiver-transmitter signal input is less than -76 dbm (36 microvolts), at the ANTENNA receptacle, adjust R225 (fig. 59) to produce 50 percent triggering with a signal input of -74 dbm (43 microvolts).

c. Place the control unit master control in the LOW position, increase the signal input 30 dbm, and adjust R226 (fig. 59) for 50 percent triggering.

CHAPTER 5
FINAL TESTING

96. Purpose of Final Testing

The tests outlined in this chapter provide a systematic procedure for measuring the performance capability of a repaired equipment. Equipment that meets the tolerances specified in these tests will furnish satisfactory operation, equivalent to that of new equipment. The control unit may be tested when used with the receiver-transmitter, or by performing the control unit continuity checks in paragraph 52. There are no tests for the antenna.

97. Test Equipment Required for Final Testing

The same test equipment that was used for troubleshooting (par. 49) is required for final testing. Refer to the appropriate technical or instruction manual for the operating instructions of each test equipment item. Use the test setup pin figure 58 for all tests in this chapter. The instructions given with each test provide the best method for the test under consideration. To provide a complete check, perform the tests in the order of the following paragraphs. Prior to each test, check and adjust the input power at fuse F101 to exactly 27.5 volts dc.

98. Receiver Sensitivity Test

The receiver sensitivity tests (triggering level) determine the minimum input signal required to provide 50 percent triggering of the transmitter. This is determined by observing the main gate pulse on the oscilloscope with the oscilloscope horizontal sweep speed at the interrogation rate. When the intensities of the main gate pulse trace and baseline trace (interrogations that do not trigger the main gate multivibrator) are equal, the transmitter is producing reply trains for one-half of the received interrogations. Use the test setup operating procedures described in paragraph 57a and *d*.

Caution: **Be sure that the power bridge is connected and operating properly (par. 57c), and that the code controls are set for minimum pulses in the reply train before turning on the receiver-transmitter.**

a. Adjust the uhf signal generator output frequency to 1,030 mc. Set the control unit master control to NORM.

b. Adjust the signal generator output level until 50 percent triggering is observed on the oscilloscope.

c. Adjust the pulse generator pulse separation for Mode 1 (3 usec), mode 2 (5 usec), and mode 3 (8 usec) interrogation, and note the signal input required for 50 percent triggering on each mode. This is the receiver sensitivity.

d. The receiver sensitivity must be -72 to -76 dbm (58 to 36 microvolt) for all three interrogation modes. Record the sensitivity values obtained for use in other parts of the final test.

99. Receiver Bandwidth Test

The following procedure (*a* through *c* below) is used to measure the receiver bandwidth between the 3-db and the 40-db points. The bandwidth shall be 6 to 8 mc between the two 3-db points, and not greater than 29 mc between the two 40-db points. Use the test setup configuration described in paragraph 57a and *c*.

a. Set the uhf signal generator output level to the required sensitivity value (par. 98d).

b. Increase the signal output 3 db, and rotate the uhf signal generator frequency dial above and below 1,030 mc to locate the new 50 percent transmitter triggering points. The difference between these two frequencies is the bandwidth at 3 db.

c. Increase the signal output 40 db above the value obtained in paragraph 98, and again determine the upper and lower 50 percent transmitter triggering points. The difference between these two frequencies is the bandwidth at 40 db.

100. Receiver Center-Frequency Test

The receiver center-frequency may be computed from the half-power (3 db) frequencies determined in paragraph 99. The center-frequency is the frequency midway between the two frequencies at the half-power points, and will be 1,030 mc ±1.

101. Sensitivity Level Selection Test

Determine the receiver sensitivity (par. 98) with the control unit master control in the NORM position. Set the master control to the LOW position and recheck the receiver, sensitivity. The LOW sensitivity will be 30 dbm less than the NORM sensitivity.

102. Receiver Image Response Test

Using the test and sensitivity value obtained in paragraph 98, set the uhf signal generator to 1,150 mc and increase the signal output to establish 50 percent triggering. Rock the uhf signal generator frequency dial to find a maximum signal point and again adjust the attenuator for 50 percent triggering. The sensitivity will be at least 50 dbm below the sensitivity obtained in paragraph 98.

103. Main Gate Characteristic Test

Main gate pulse characteristics will be as follows: the pulse width 120 usec + 30 -20, the peak amplitude not less than 20 volts or greater than 70 volts, the rise time equal to or greater than 10 volts per usec, and the decay time equal to or greater than 10 volts per usec. Use the test setup configuration described in paragraph 57a and *b*.

a. Use a 3-usec pulse separation (mode 1) interrogation, and trigger the pulse generator at 1 kc with the marker generator. Set the uhf signal generator attenuator to apply -69 dbm signal input to the ANTENNA receptacle of the receiver-transmitter.

b. Observe and measure the pulse waveform on CHANNEL B of the oscilloscope with its sweep speed set at the 20 usec/cm rate. Use the marker generator outputs as required for accurate timing of the waveform.

104. Transmitter Power Output Test

Caution: **To prevent overload of the attenuator, substitute the lossy line (par. 55a) in place of the attenuator (fig. 58) when code selections involve testing with more than four pulses in a reply train. Use the attenuator for receiver-sensitivity measurements only.**

Compute the transmitter output peak power from the power bridge average power reading by the following formula:

$$P_k = \frac{P_{av} \times 10}{W \times N \times PRR}$$

P_k = Peak power in watts.

P_{av} = Power bridge reading plus test setup calibrated loss in watts.

W = Average pulse width in seconds.

N = Number of pulses in reply train (4 used in test).

PRR = Pulse repetition rate, or PULSE RATE of pulse generator (500 used in test).

The peak power output shall not be less than 251 watts or greater than 1,000 watts with the minimum voltage standing wave ratio. The peak power must not be less than 158.5 watts with a voltage standing wave radio of 1.5:1 (3.5 db) .

a. Use the test setup configuration described in paragraph *57a* and *b*. Be sure that the power bridge is operating, connected, and properly adjusted before turning the transponder set on.

b. Adjust the pulse generator to provide 50 percent modulation of the uhf signal generator 1,030 mc output. Adjust the pulse generator for 3 usec separation (mode 1) pulses at a PULSE RATE .5 KC.

c. Increase the uhf signal generator attenuator to 0 DBM and set the control unit as follows: the master control to NORM, the function control to MOD, and the MODE 1 code Control at the .03 position. Compute the peak power; use the average power reading from the power bridge. Record the average power and peak power.

d. Repeat the procedure given in c above with the control unit set for EMER and NORM/IP and with 5 and 8 usec (mode 2 and 3) pulse, separations. The peak power output shall not vary more than 10 percent from the value obtained in c above.

e. Increase the PULSE RATE from 0.5 to

2.0 kc. The average power reading on the power bridge shall not be more than 1 db below that obtained in c above.

f. Increase the PULSE RATE from 2.0 to 3.5 kc. The average power reading on the power bridge will not be more than 3 db below that obtained in c above.

g. Set the coaxial tuner to 1.5:1 voltage standing wave ratio points calibrated in paragraph 56, and the PULSE RATE to .5 KC. Measure the average power and compute the peak power output.

105. Transmitter Frequency Test

With the equipment operating as instructed in paragraph *104a, b, c,* and *d,* tune the wavemeter for a minimum indication on the power bridge. The frequency read on the wavemeter dial shall be 1,090 mc ±1.

***Caution:* To prevent overload of the attenuator, substitute the lossy line (par. *55a)* in place of the attenuator (fig. 58) when code selections involve testing with more than four pulses in a reply train. The attenuator is to be used for receiver-sensitivity measurements only.**

106. Receiver-Transmitter Range Jitter Test

Operate the equipment as instructed in paragraph *57a* and *b* for the range jitter test. Observe the horizontal movement (jitter) of successive reply trains on oscilloscope channel B trace. Range jitter shall not exceed 0.2 usec. Use approximately -30-dbm signal input at the receiver-transmitter ANTENNA receptacle and several interrogation modes and reply code trains.

107. Receiver-Transmitter Delay Test

Receiver-transmitter delay time shall not exceed 3 usec ±0.3 when interrogating pulses are 3, 5, or 8 usec ±0.2 at signal inputs 6 to 50 dbm above normal triggering level (par. 98).

***Caution:* To prevent overload of the attenuator, substitute the lossy line in place of the attenuator (fig. 58) when code selections involve testing with more than four pulses in a reply train, The attenuator is to be used for receiver-sensitivity measurements only.**

a. Determine the uhf signal generator delay if it is not known (par. 56). Disconnect cable No. 6 from test setup switch S6 (fig. 58) and reconnect it to the UG-274/U tee adapter on the pulse generator OUTPUT receptacle.

b. With the equipment operating as instructed in paragraph *57a* and *b,* measure and record the time between the leading edge of the second pulse on the channel A trace and the leading edge of the first reply train pulse on the channel B trace.

c. Compute the receiver-transmitter delay by subtracting the uhf signal generator delay from the time obtained in *b* above.

108. Receiver-Transmitter Pulse Reply Test

Each coded reply train from the receiver-transmitter must have the characteristics listed in *a* below. Consult chapter 2 for the explanation of code number assignments if necessary. Examine each pulse and the spacing between pulses of a maximum pulse reply train in several operational categories. Check each of the possible codes for the correct number assignment and the position of its pulses. Refer to figure 5 for pulse positions.

***Caution:* To prevent overload of attenuator, substitute the lossy line (par. *55a)* in place of the attenuator (fig. 58) when code selections involve testing with more than four pulses in a reply train. The attenuator is to be used for receiver-sensitivity measurements only.**

a. The pulse characteristics are listed below; spacings between pulses and reply trains are as follows: mode 1 or 3 interrogation, pulse separation 2.9 usec ±0.5; mode 2, 1.45 usec ±.05; the spacing between repeated reply trains is 4.35 usec ±.1. I/P replies are displayed for 30 seconds +20 -15.

Pulse characteristic	Value
Width	0.45 usec ±.1.
Rise time	0.1 usec or less.
Decay time	0.2 usec or less.
Amplitude variation	10 percent or less.
Spike amplitude	Not greater than 40 percent of the average pulse amplitude.
Amplitude jitter	5 percent or less.

b. Check the function control NORMAL reply codes as listed below; use the test setup configuration (par. *57a* and *c*). Except for pulse separation, all pulses are to have characteristics described in a above.

Master control position	Interrogation mode	Fig. 5 pulse train	Pulse separation
NORM	1	A	None
NORM	2	B	15.95 usec ±.1
NORM	3	C	None
EMER	1, 2, 3	S, T, U	16 usec ±2.5
NORM-I/P	1, 2, 3	P, Q, R	16 usec ±2.5

c. Check the function control MOD reply codes as listed below; use the test setup configuration (par. *57a* and *c*). All pulses have characteristics and separations described in a above.

Master control position	Interrogation mode	Fig. 5 pulse train	Code control used	Code number assignment
NORM	1	D through G	MODE 1	00 through 73
NORM	2	H through L	Front panel switches	0000 through 7777
NORM	3	M, N, and O	MODE 3	00 through 77
EMER	1	W	MODE 1	73
EMER	2	Y	Front panel switches	7777
EMER	3	AA	MODE 3	77
NORM-I/P	1	Two G	MODE 1	73
NORM-I/P	2	X	Front panel switches	7777
NORM-I/P	3	Z	MODE 3	77

d. Check the function control CIVIL reply codes (identical with the MOD position except for I/P replies). The CIVIL-I/P replies listed below have pulse characteristics and separations listed in a above. Use test setup configuration (par. *57a* and c). For each check, place the I/P switch to the I/P position.

Master control position	Interrogation mode	Fig. 5 reply train	Code control used	Code number assignment
NORM	1	G	MODE 1	73
NORM	2	L	Front panel switches	7777
NORM	3	BB	MODE 3	77

109. Single Interrogation Pulse Test

The receiver-transmitter will not transmit a reply for single-pulse interrogations having a pulse width from 0.5 to 10 usec at pulse repetition rates from 0.05 to 10 kc.

a. With the test setup configuration (par. *57a* and c), interrogate the receiver-transmitter normally to check its response, and adjust the oscilloscope.

b. Set pulse generator PULSE NO. 2 switch to OUT and vary the pulse width and the PULSE RATE controls through their ranges.

c. No transmitted replies should be present in the NORMAL, MOD, or CIVIL positions of the function control.

110. Second Interrogation Pulse Width Test

The width of the second pulse of a mode 1 interrogation shall not be narrower than the first pulse by more than 0.2 usec.

a. Use the test setup configuration (par. *57a* and d), and set the control unit master control to NORM and the function control to NORMAL.

b. Disconnect cable No. 8 (fig. 58) from the receiver-transmitter SUPPR receptacle and reconnect cable No. 8 to the UG-274/U tee adapter on the pulse generator.

c. Turn on all equipment and adjust the signal level input to the receiver-transmitter to -74 dbm. Measure the width of the second pulse on the oscilloscope channel A trace, and determine the shrinkage as compared to the second pulse on the oscilloscope channel B trace. (The oscilloscope may be calibrated by momentarily setting test setup switch S6 to the MARK position.)

111. Special Transmitter Reply Pulse Test

When the transmitter is triggered at the receiver-transmitter TRIG IN receptacle by a 1-usec pulse at a 1-kc pulse repetition rate, the transmitted reply shall be a single pulse of not less than 0.4 usec in width.

a. Disconnect cable No. 3 (fig. 58) from the uhf signal generator and reconnect it to the TRIG IN receptacle of the receiver-transmitter. Use the test setup configuration (par. *57a* and *c)*.

b. Turn on all equipment, except the uhf signal gnerator. Set the pulse generator PULSE NO. 2 switch to its OUT position, and adjust the PULSE RATE dial to 1 kc (pulse width 1 usec).

c. Increase the pulse generator FINE ATTN output until a transmitted pulse is present on oscilloscope channel B trace. Measure the pulse width against the marker generator calibration on the oscilloscope channel A trace.

112. Decoder Test

a. *Mode 1*. The receiver-transmitter shall not respond to a mode 1 interrogation when the interrogation pulse separation is equal to or less than 2 usec, or equal to or greater than 4 usec.

(1) Set the control unit master control to NORM, and the function control to MOD (MODE 2 and 3 switches at OFF) Disconnect cable No. 5 (fig. 58) from switch S6 and connect it to switch S4 in place of cable No. 9.

(2) Check the receiver sensitivity (triggering level) in accordance with paragraph 98. Increase the signal input to the receiver-transmitter by 40 db.

(3) Set the test setup switches to the configuration described in paragraph *57b*, and decrease the interrogation pulse separation until 50 percent firing is obtained.

(4) Set test setup switch S4 to DET (shows interrogating pulses) and measure the pulse separation of lower limit.

(5) Return switch S4 to SUPPR and increase the interrogation pulse separation until the 50 percent triggering point is reached.

(6) Set switch S4 to DET and measure the upper interrogation pulse separation limit.

b. *Mode 2*. The receiver-transmitter shall not respond to a mode 2 interrogation when the interrogation pulse separation is equal to or less than 4 usec, or when equal to or greater than 6 usec. Follow the procedures in a(1) through (6) above with the control unit mode 2 switch at ON and MODE 3 switch at OFF. Determine the upper and lower mode 2 decoder 50 percent triggering points.

c. *Mode 3*. The receiver shall not respond to a mode 3 interrogation when the interrogation pulse separation is equal to or less than 7 usec, or equal to or greater than 9 usec. Follow the procedures in *a* (1) through (6) above with the control unit MODE 2 switch at OFF and the MODE 3 switch at ON. Determine the upper and lower mode 3 decoder 50 percent triggering points.

d. *Modes 2 and 3*. With the control unit MODE 2 and 3 switches at ON, the receiver-transmitter will not respond to interrogations with pulse separations equal to or less than 2 usec, between 6 and 7 usec, and equal to or greater than 9 usec.

(1) Use the test setup configuration described in paragraph *57a* and *e*, and operate the transponder set in all three positions of the function control.

(2) Adjust the receiver-transmitter signal input to 40 db more than normal triggering level obtained in paragraph 98.

(3) Starting with pulse generator SEPARATION control at minimum, slowly increase the separation to 10 usec while observing the 50 percent triggering points.

113. Interrogation Rate Test

Interrogation rates of 0.75 and 1 kc will reduce receiver sensitivity by more than 30 db when measured at the 100 percent triggering point. (The point at which an occasional horizontal sweep occurs on the oscilloscope is not to exceed one trace per second.)

***Caution:* To prevent overload of the attenuator, substitute the lossy line (par. *55a)* in place of the attenuator (fig. 58) when code selections involve testing with more than four pulses in a reply train. The attenuator is to be used for receiver-sensitivity measurements only.**

a. Use the test setup configuration described in paragraph *57a* and *e*, and the control unit as follows: the master control to NORM, and the function control to MOD.

b. Properly interrogate the receiver-transmitter at pulse repetition rates of 0.40 to 0.45 kc and determine and record the 100 percent triggering level.

c. Increase the interrogation rate to 0.75 kc and measure and record the signal input required for 100 percent triggering.

d. Increase the interrogation rate to 1 kc and measure and record the signal input required for 100 percent triggering.

e. The difference between the value in *b* and c, and the value in *b* and *d* above is the amount of A.O.C. threshold for the increased interrogation rates.

114. Random Triggering Rate Test

With the test setup configuration described in paragraph *57a* and *d*, and the uhf signal generator attenuator set to -125 dbm, the random triggering rate shall not exceed an average of 5 replies (any type) over an interval of 30 seconds. (Test with several operational categories set up on the control unit.)

APPENDIX

REFERENCES

Following is a list of references applicable and available to the field and depot maintenance repairman of Transponder Set AN/APX-44.

TM 11-1175	Instruction Book for Radar Test Set AN/UPM-6A and Radar Test Set AN/UPM-6B.
TM 11-1177	Pulse Generator Set AN/UPM-15.
TM 11-1242	Crystal Rectifier Test Sets TS-268/U, TS-268A/U, TS-268B/U, TS-268C/U, TS-268D/U, and TS-268E/U.
TM 11-2661	Electron Tube Test Sets TV-2/U, TV-2A/U, and TV-2B/U.
TM 11-5083	Electron Tube Test Sets TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U.
TM 11-5126	Power Supply PP-1104A/G.
TM 11-5511	Electronic Multimeter TS-505/U.
TM 11-5895-217-12	Operation and Organizational Maintenance: Transponder Set AN/APX-44.
TM 11-5895-217-12P	Operator and organizational Maintenance Repair parts and Special Tools List, Transponder Set AN/APX-44.
TM 11-5895-217-35P	Field and Depot Maintenance Repair Parts and Special Tools List, Transponder Set AN/APX-44.
TM 11-6625-203-12	Operation and organizational Maintenance: Multimeter AN/URM-105, including Multimeter ME-77/U.
TM 11-6625-219-12	Operator's and organizational Maintenance Manual: Oscilloscope AN/USM-81.

GLOSSARY

Section I. ABBREVIATIONS

ac-----------------alternating current
A.O.C.---------automatic overload control
amp-------------ampere
AWG------------ American wire gage
CIVIL------------civilian
cm---------------centimeter
cps--------------- cycles per second
cw--------------------continuous wave
db-----------------decibel
dbm--------------decibels (referred to 1 milliwatt)
dbv---------------decibels (referred to 1 volt)
dc----------------------direct current
DET--------------Detector
IF---------------------intermediate frequency
IFF-------------------Identification Friend or Foe
I/P or i/p---------- identification of position
kc-----------kilocycles
mc-----------------memegacycles
MOD---------------Modified (see SIF)
N-----------------number of pulses (as used in the power output formula)
Pav-------------average power
par---------------pulse repetition rate
Pk-----------------peakak power
RF--------------------radio frequency
SIF---------------selective Identification Feature (MOD)
STAY---------------standby
SUPER-------------suppressor, suppression
TRIG-------------trigger
usec----------------microsecond
uhf ----------- ultrahigh frequency
v------------volt
vhf----------------very-high frequency
vtvm-------------vacuum tube voltmeter
W------------------width, pulse (as used in the power output formula)

Section II. DEFINITIONS OF UNUSUAL TERMS

Assigned code number. The two or four digit number used to identify a pulse reply train construction.

Automatic Overload Control (A.O.C.) Circuit which prevents excessive duty cycle of transmitter.

Civil reply. Reply trains triggered by civilian ground radar interrogations.

Coincidence. The condition in which two signals must arrive simultaneously at a stage to pass through the stage.

Decay time. The time required for the voltage to decrease from 90 to 10 percent of peak amplitude on the trailing edge of a pulse.

Decoder. A circuit which responds to a particular interrogation mode and rejects all others.

Differentiator. A short time-constant circuit which peaks the input waveform to improve symmetry.

Duplexer. A device, without tubes or moving parts, which performs transmit-receive switching of a common antenna.

Emergency reply. A reply train which retains the selected code configuration, but which may be repeated to signify unusual circumstances.

Encoder. A circuit which generates or forms a coded reply in a transponder, also called coder.

Fifty percent triggering. The point of sensitivity at which the transmitter responds with complete replies to one-half the interrogations received.

Full triggering. The condition in which a transponder returns the complete reply train for each interrogation received.

Identification of position. A reply train which retains the selected code configuration, but is repeated or has a pulse added to permit accurate radar identification of a specific aircraft.

Interrogation. The double-pulse signal received by the aircraft transponder from the ground-based interrogator-responder.

Jitter. A momentary pulse separation variation, expressed in microseconds, or a momentary amplitude variation expressed in percent of peak amplitude.

Main gate pulse. The main synchronization pulse used throughout the receiver-transmitter.

Mode. The identification of interrogation signals; determined by separation between two pulses of an interrogation.

Mode gate pulse. The pulse used to select the correct encoder circuit as determined by interrogation mode.

Modified reply. The series of reply trains which differ from previously available replies by virtue of multiple code selection (part of Selective Identification Feature).

Normal reply. The reply which is fixed in configuration and depends only on interrogation mode.

One hundred percent triggering. The point of sensitivity at which the transmitter responds with complete replies to virtually all interrogations received. Mistriggering must not occur more than once per second.

Pulse amplitude. The maximum voltage amplitude of a pulse or an rf pulse envelope, excluding spike.

Pulse group. The group of pulses that form part of a complete reply train, groups A, B, C, and D. A group consists of the pulses that comprise one digit of the assigned code number.

Pulse position number. The numerical value of a specific pulse within a pulse group.

Pulse repetition rate. The rate or frequency at which interrogations are repeated.

Pulse separation. The time interval between adjacent pulses.

Pulse width. The time interval between the 50 percent amplitude points on the leading and trailing edges of the pulse (also called duration).

Reply train. The complete group of selected pulses, including the first and last framing pulses, in a transmitted reply.

Ringing oscillator. A sine wave oscillator stage which provides accurate timing intervals.

Rise time. The time required for the voltage to increase from 10 to 90 percent of peak amplitude on the leading edge of the pulse.

Selective Identification Feature. The additional selected reply train codes available to assist in identifying specific aircraft in large groups.

Spike. A narrow pulse, usually less than 0.5 usec in width, appearing separately or on top of a normal pulse.

Spurious reply pulses. Pulses of the reply train which appear in the receiver sections because of internal coupling from the transmitter-modulator.

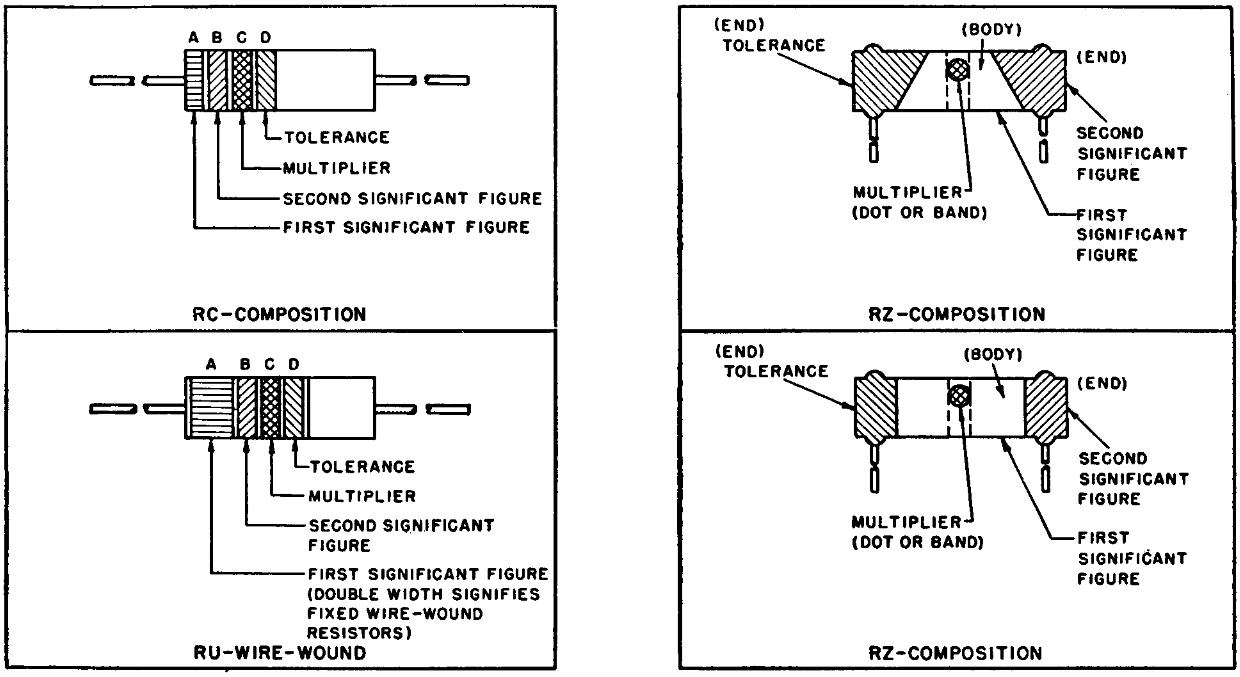
Suppression pulse. A pulse which may be injected into receiver to delay response of transponder to interrogations.

Trigger pulse. A pulse which, when inserted, will cause transmitter to transmit a pulse of 0.4 usec or greater in width. Also may refer to pulses used within transponder to start a stage which is nonoperating.

Zener diode. A crystal rectifier which exhibits normal characteristics until reverse voltage exceeds predetermined levels. It then conducts back current to maintain a nearly constant voltage across it.

RESISTOR COLOR CODE MARKING
(MIL-STD RESISTORS)

AXIAL-LEAD RESISTORS (INSULATED) — RADIAL-LEAD RESISTORS (UNINSULATED)



RESISTOR COLOR CODE

BAND A OR BODY*		BAND B OR END*		BAND C OR DOT OR BAND*		BAND D OR END*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1	BODY	± 20
BROWN	1	BROWN	1	BROWN	10	SILVER	± 10
RED	2	RED	2	RED	100	GOLD	± 5
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000		
GREEN	5	GREEN	5	GREEN	100,000		
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	GOLD	0.1		
WHITE	9	WHITE	9	SILVER	0.01		

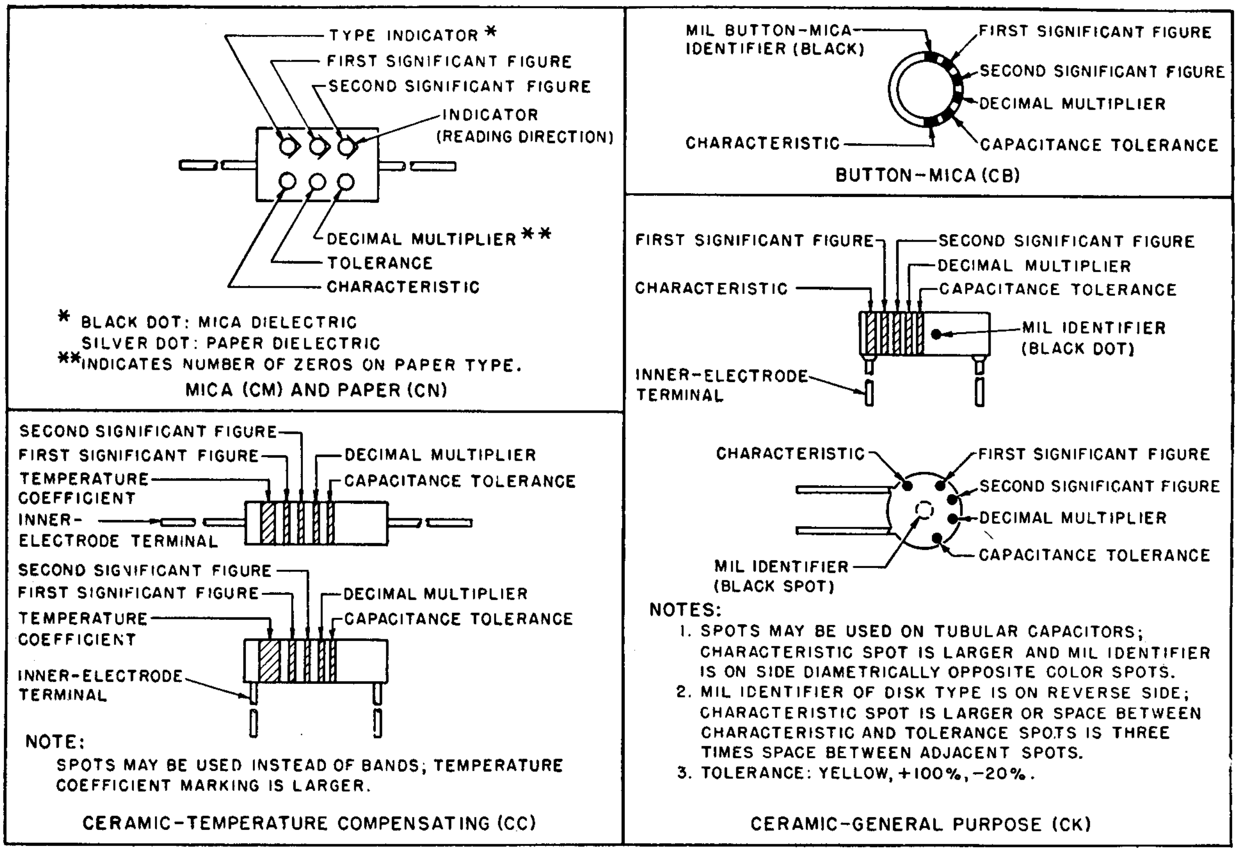
*FOR WIRE-WOUND-TYPE RESISTORS, BAND A SHALL BE DOUBLE-WIDTH. WHEN BODY COLOR IS THE SAME AS THE DOT (OR BAND) OR END COLOR, THE COLORS ARE DIFFERENTIATED BY SHADE, GLOSS, OR OTHER MEANS.

EXAMPLES (BAND MARKING):
10 OHMS ±20 PERCENT: BROWN BAND A; BLACK BAND B; BLACK BAND C; NO BAND D.
4.7 OHMS ±5 PERCENT: YELLOW BAND A; PURPLE BAND B; GOLD BAND C; GOLD BAND D.

EXAMPLES (BODY MARKING):
10 OHMS ±20 PERCENT: BROWN BODY; BLACK END; BLACK DOT OR BAND; BODY COLOR ON TOLERANCE END.
3,000 OHMS ±10 PERCENT: ORANGE BODY; BLACK END; RED DOT.

Figure 114. Resist or color code.

CAPACITOR COLOR CODE MARKING
(MIL-STD CAPACITORS)



CAPACITOR COLOR CODE

COLOR	SIG FIG.	MULTIPLIER		CHARACTERISTIC[1]				TOLERANCE [2]					TEMPERATURE COEFFICIENT (UUF/UF/°C)
		DECIMAL	NUMBER OF ZEROS	CM	CN	CB	CK	CM	CN	CB	CC OVER 10UUF	CC 10UUF OR LESS	CC
BLACK	0	1	NONE		A			20	20	20	20	2	ZERO
BROWN	1	10	1	B	E	B	W				1		−30
RED	2	100	2	C	H		X	2		2	2		−80
ORANGE	3	1,000	3	D	J	D			30				−150
YELLOW	4	10,000	4	E	P								−220
GREEN	5		5	F	R						5	0.5	−330
BLUE	6		6		S								−470
PURPLE (VIOLET)	7		7		T	W							−750
GRAY	8		8			X						0.25	+30
WHITE	9		9								10	1	−330(±500)
GOLD		0.1						5		5			+100
SILVER		0.01						10	10	10			

1. LETTERS ARE IN TYPE DESIGNATIONS GIVEN IN MIL-C SPECIFICATIONS.
2. IN PERCENT, EXCEPT IN UUF FOR CC-TYPE CAPACITORS OF 10 UUF OR LESS.
3. INTENDED FOR USE IN CIRCUITS NOT REQUIRING COMPENSATION.

STD-C1

Figure 115. Capacitor color code.

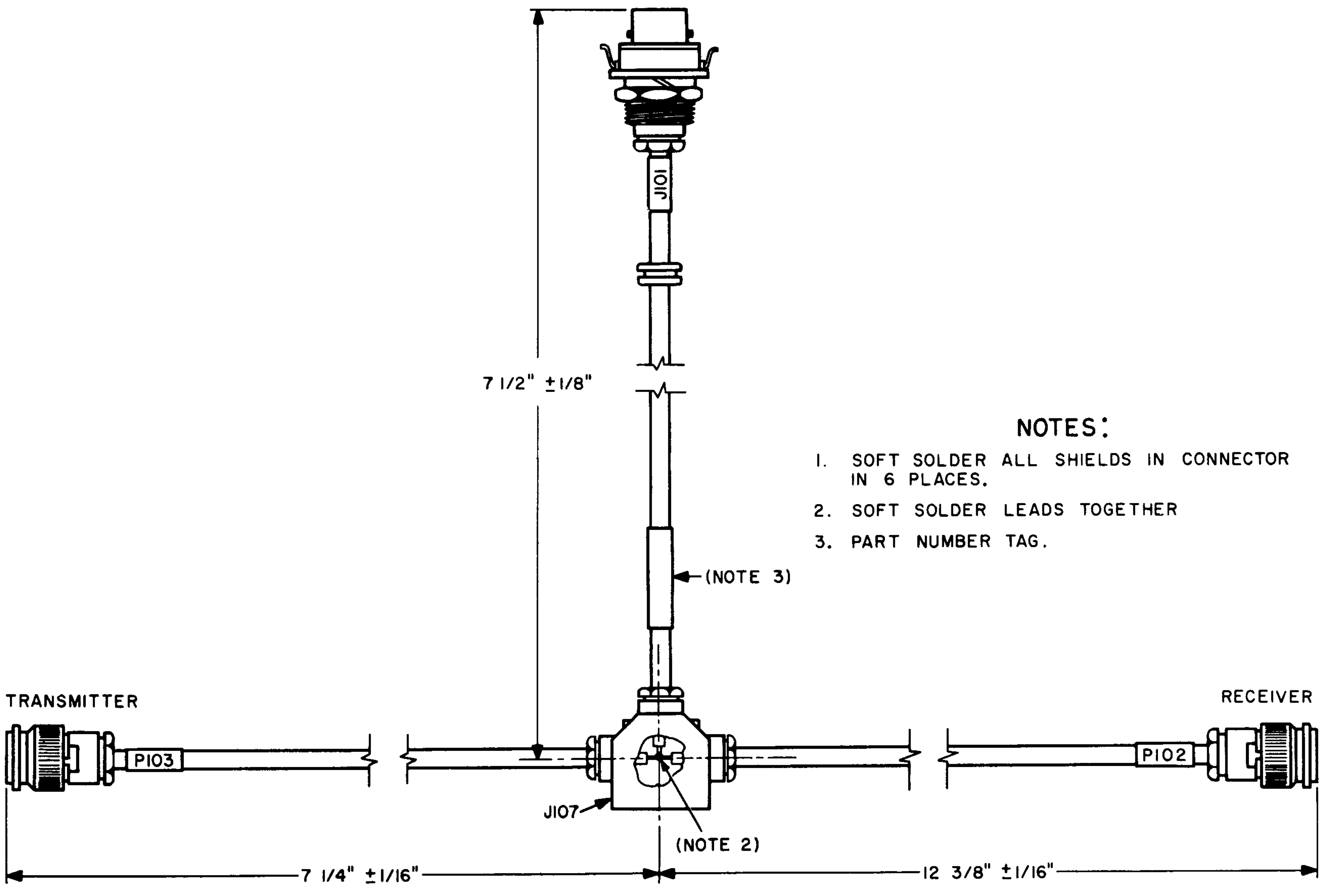
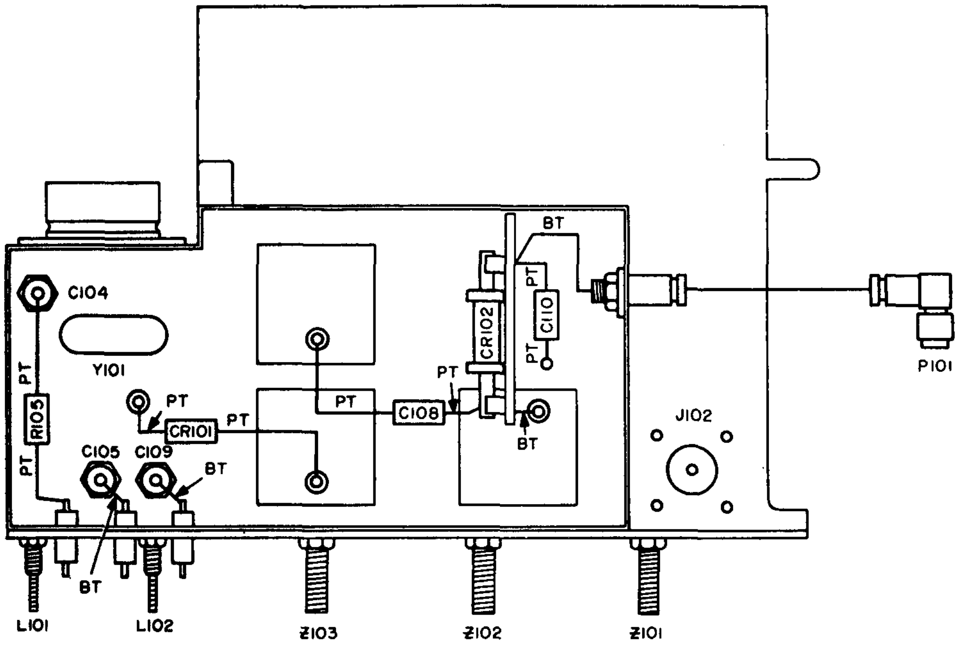
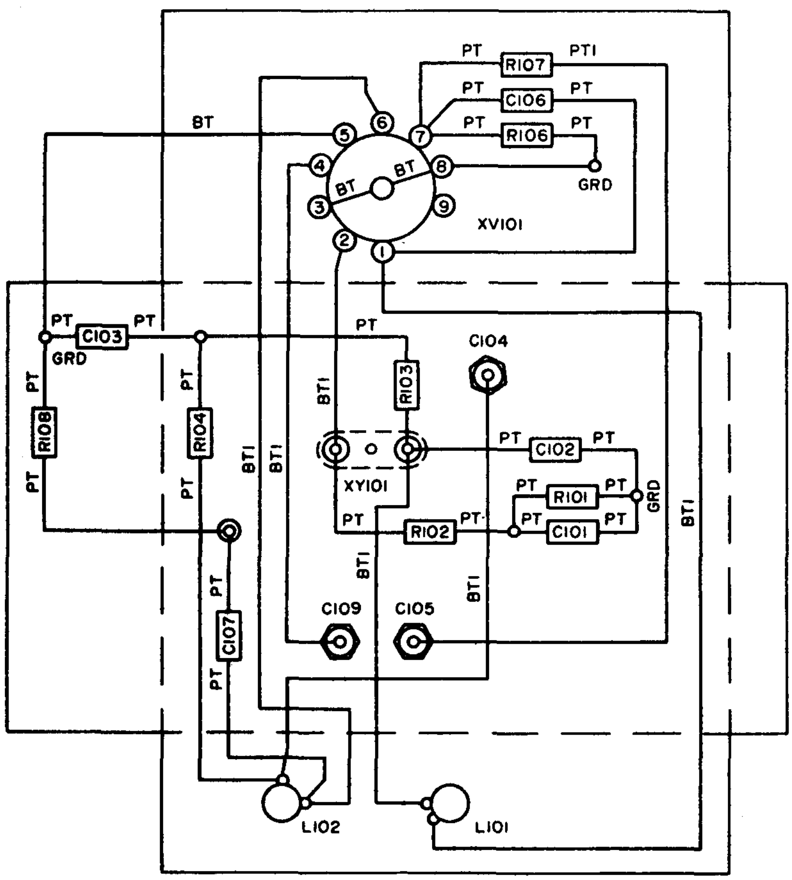


Figure 116. Duplexer dimensions.



A. CRYSTAL SIDE



B. OSCILLATOR SIDE

NOTES:

1. BT DENOTES BARE TINNED COPPER WIRE.
2. BT1 DENOTES BARE TINNER COPPER WIRE WITH INSULATED SLEEVING
3. PT DENOTES PIGTAIL LEAD
4. PT1 DENOTES PIGTAIL LEAD WITH INSULATED SLEEVING

TM5895-217-35-99

Figure 117. Converter subchassis, wiring diagram.

INDEX

By Order of *Wilber M. Brucker,* Secretary of the Army:

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Chief of Staff.

Official:

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USMA (2)
USASCS (900)
Units org under fol TOE:
11-155 (2)
11-500 (AA-EE) (2)
11-587 (2)

NG: State AG (3) ; units-same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

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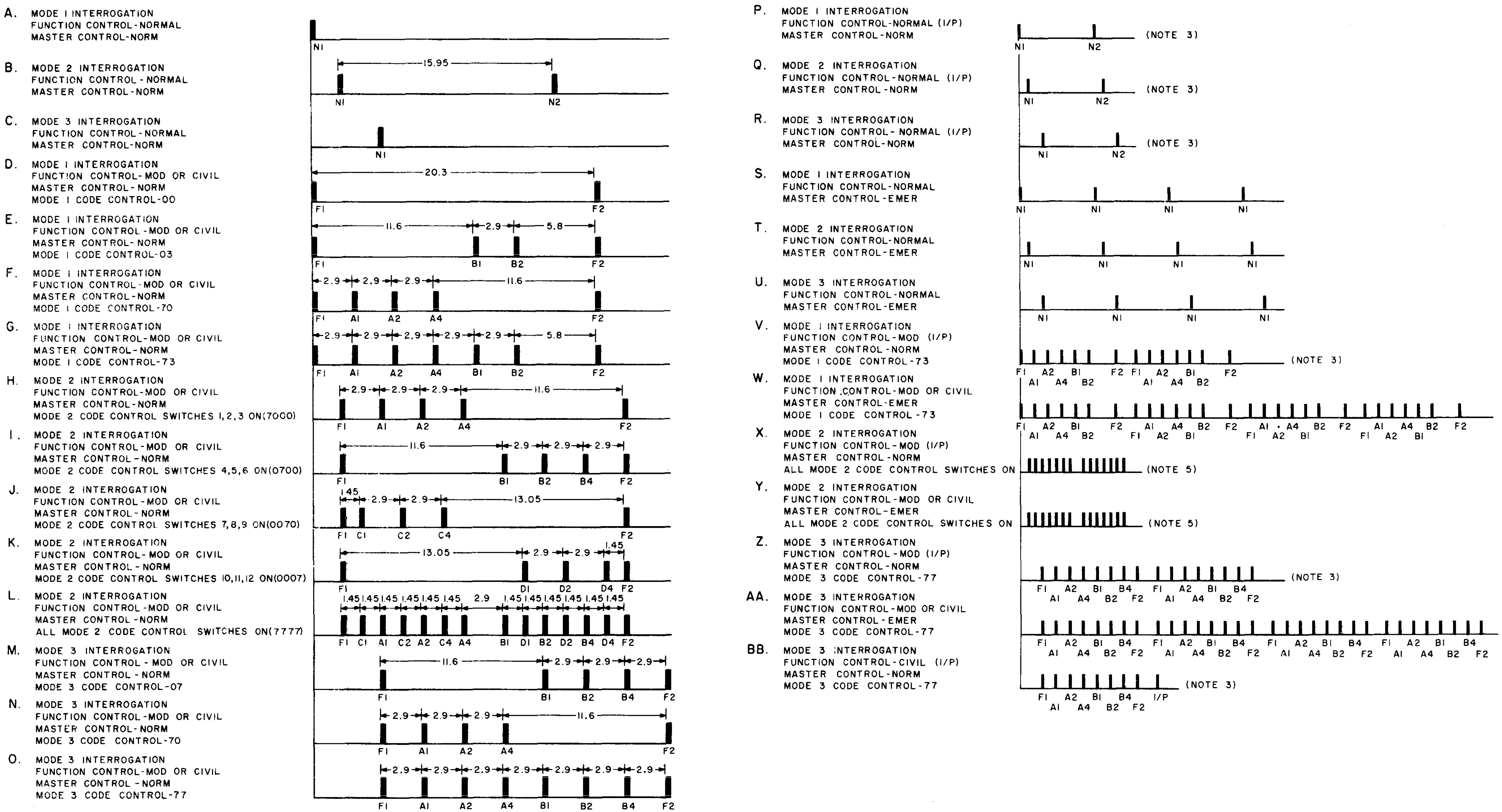


Figure 5. Typical coded reply pulse trains.

NOTES:

1. ALL TIMES IN USEC.
2. ALL REPLIES SHOWN ARE BASED ON SINGLE INTERROGATION.
3. I/P REPLIES DISPLAYED FOR 30 -15 +20 SEC, IF CONTINUOUSLY INTERROGATED
4. SCALE FOR REPLY TRAINS P THROUGH BB IS HALF THAT OF REPLY TRAINS A THROUGH O.
5. PULSES CALLED OUT IN REPLY

TM5895-217-35-4

Figure 5

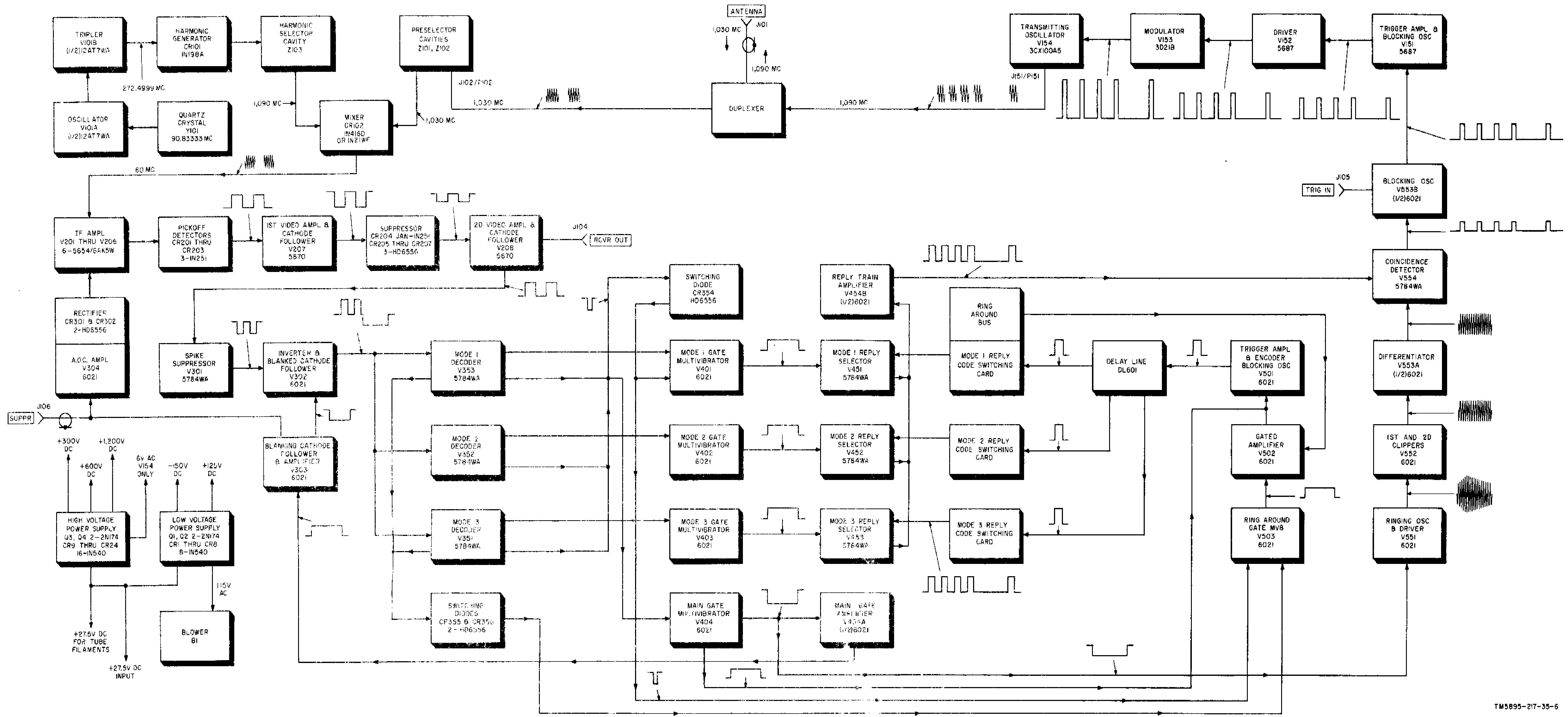


Figure 8. Receiver-transmitter, block diagram.

Figure 8

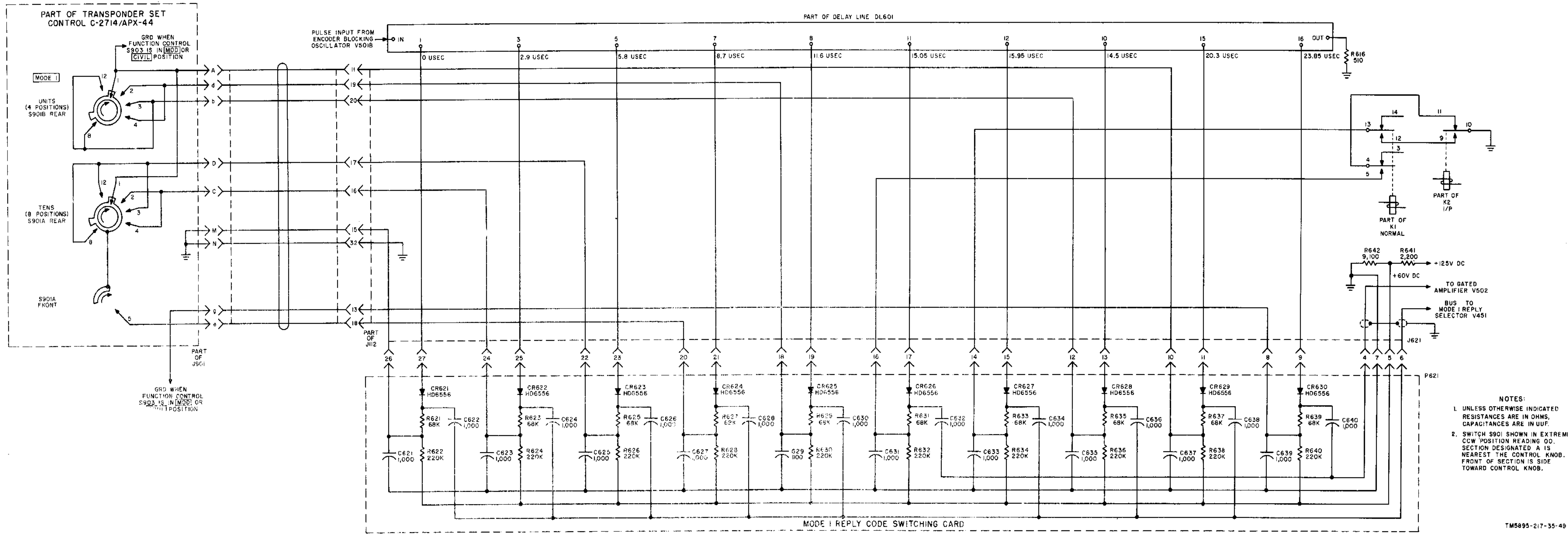


Figure 33. Mode one reply switching circuits, simplified schematic diagram.

Figure 33

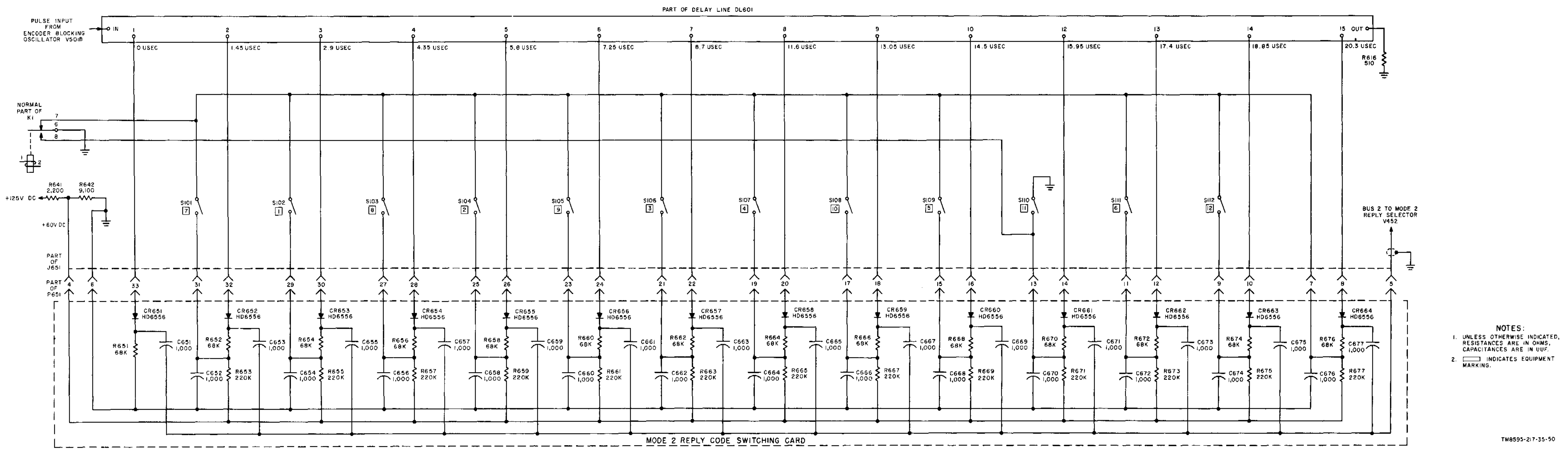


Figure 34. Mode two reply switching circuits, simplified schematic diagram.

Figure 34

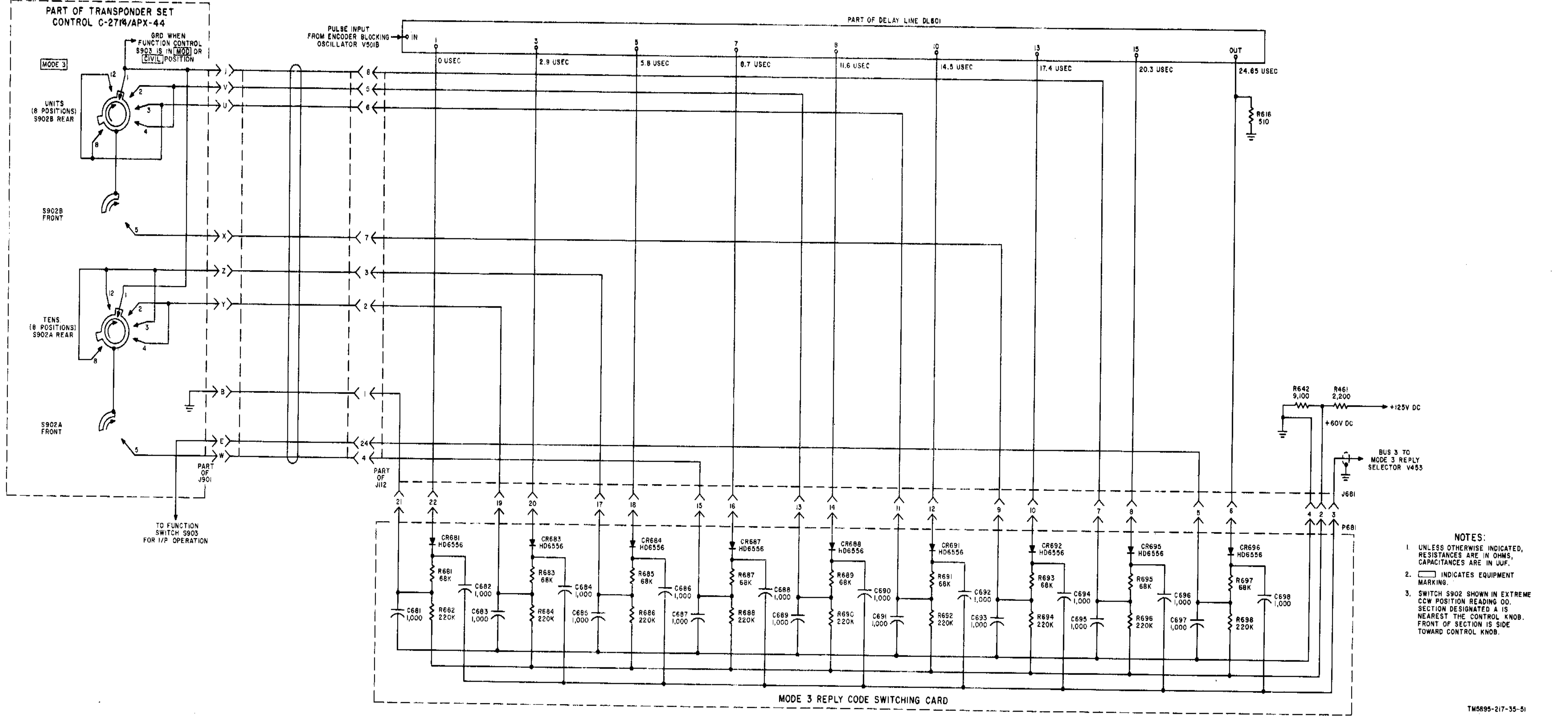


Figure 35. Mode three reply switching circuits, simplified schematic diagram.

Figure 35

Figure 49. B+ distribution, simplified schematic diagram.

Figure 49

Figure 50. Bias distribution circuit, simplified schematic diagram.

Figure 50

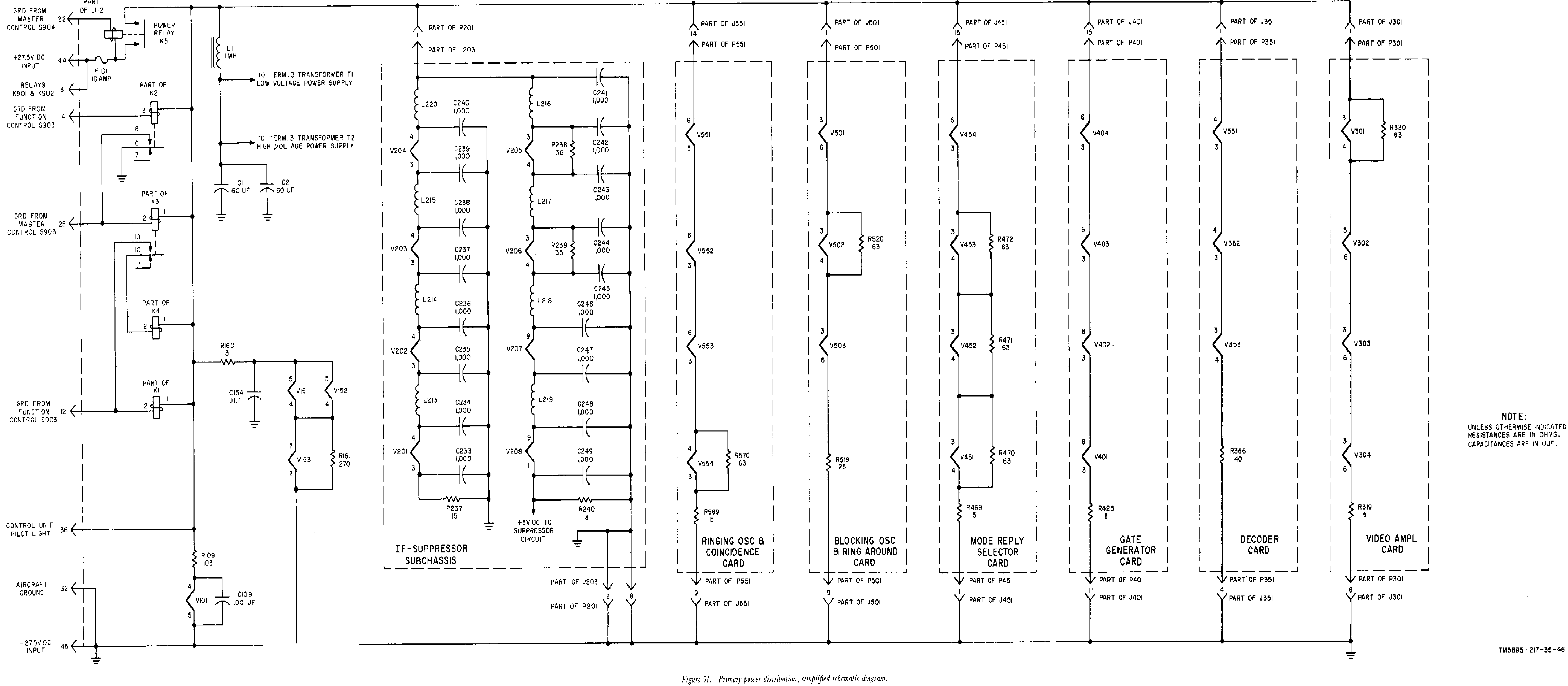
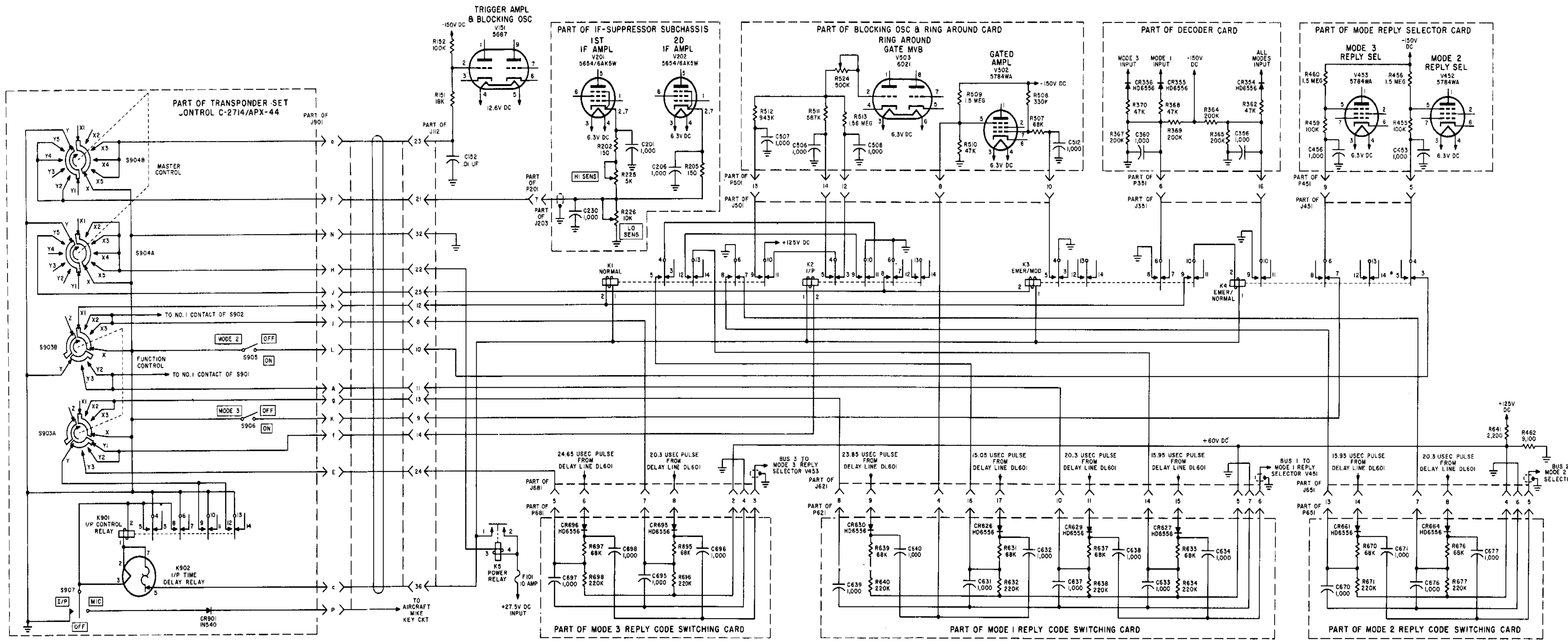


Figure 51. Primary power distribution, simplified schematic diagram.

Figure 51



NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. [ ] INDICATES EQUIPMENT MARKINGS.
3. ALL RELAYS SHOWN IN DE-ENERGIZED POSITION.
4. SWITCH S903 SHOWN IN EXTREME CCW POSITION. SECTION DESIGNATED A IS NEAREST THE CONTROL KNOB.

5. SWITCH S904 SHOWN IN EXTREME CCW POSITION. SECTION DESIGNATED A IS NEAREST THE CONTROL KNOB.

TM5895-2...

Figure 53. Functional control circuits, simplified schematic diagram.

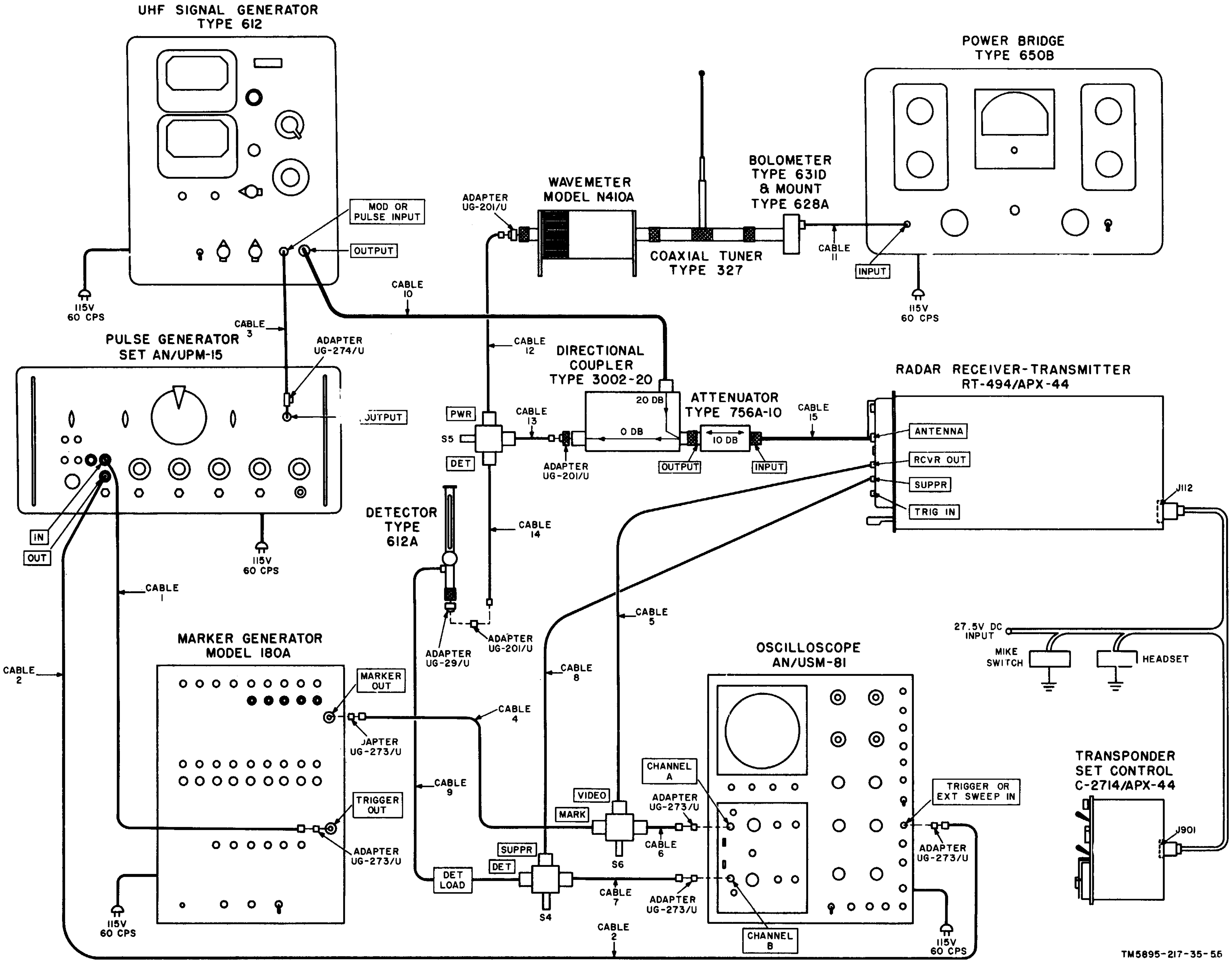
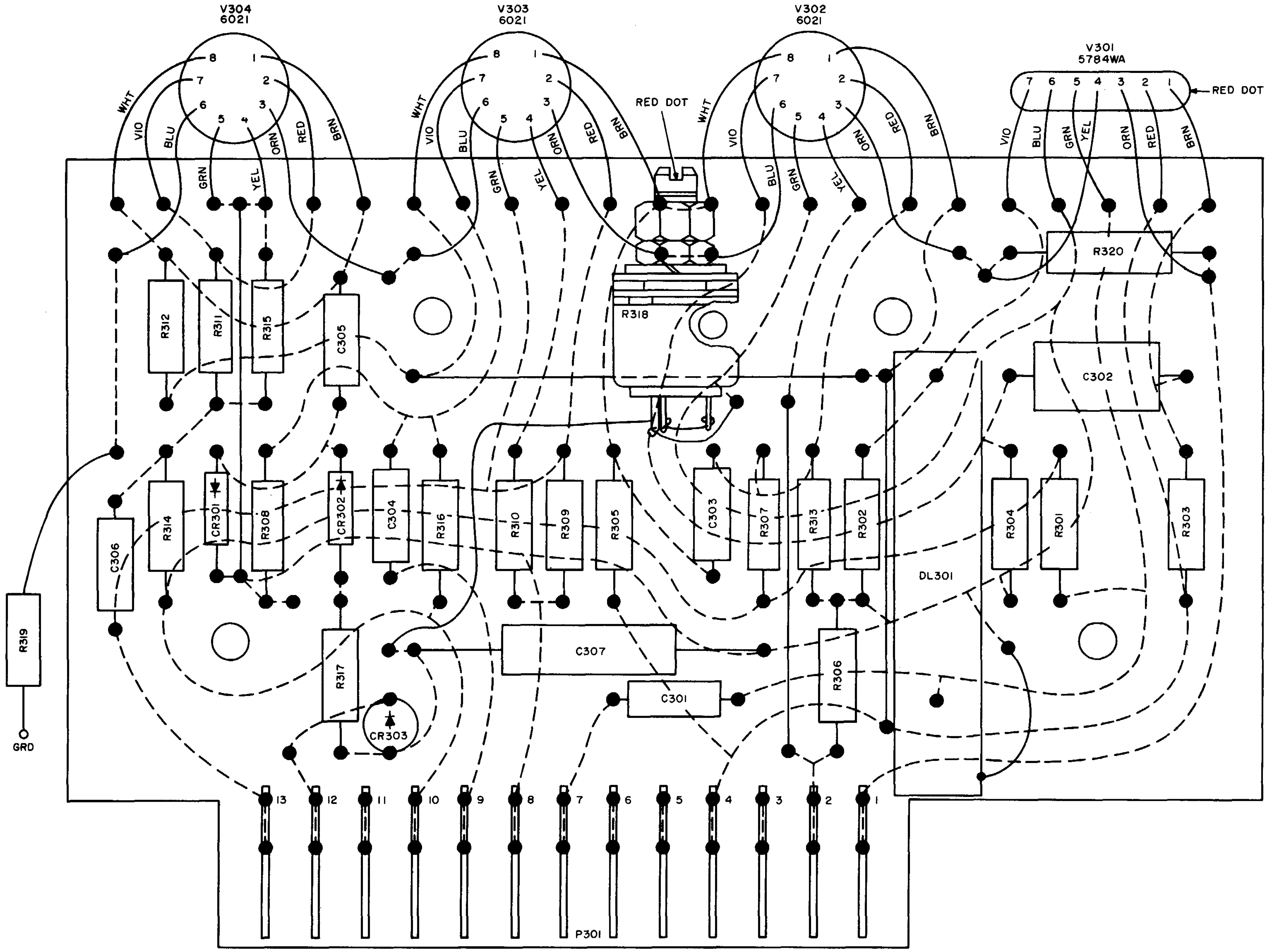


Figure 58. Troubleshooting bench test setup.

Figure 58



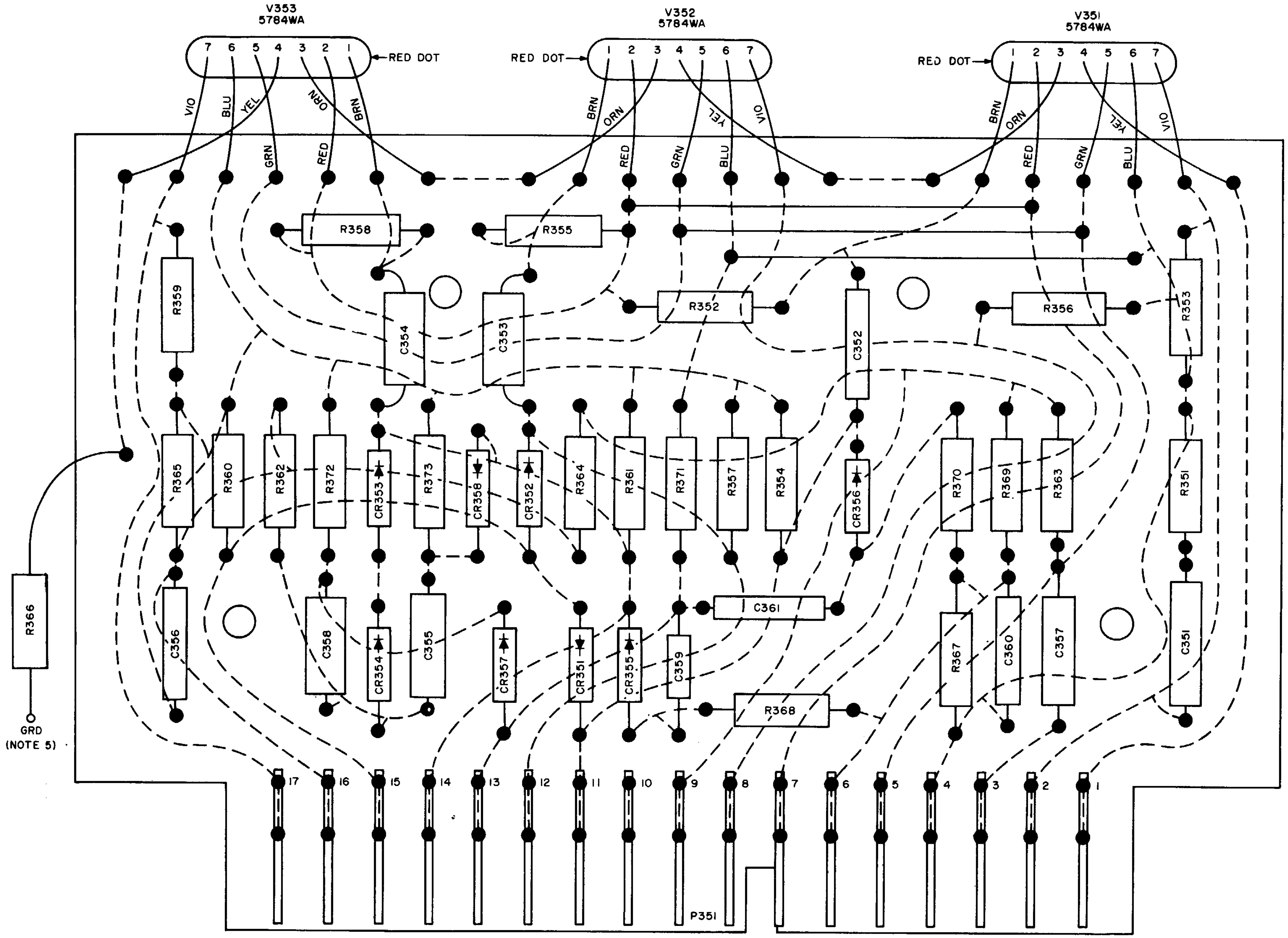
NOTES

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. VACUUM TUBE HOLD DOWN CLIPS NOT SHOWN.
3. —— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
4. — — DENOTES PRINTED CIRCUIT ON BACK OF BOARD.
5. RESISTOR R319 MOUNTED AND GROUNDED TO METAL FRAME.

TM5895-217-35-101

Figure 76. Video amplifier card, parts location and printed wiring diagram.

Figure 76



NOTES:

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. VACUUM TUBE HOLD DOWN CLIPS NOT SHOWN.
3. ——— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
4. — — DENOTES PRINTED CIRCUIT ON BACK OF BOARD.
5. RESISTOR R366 MOUNTED AND GROUNDED TO METAL FRAME.

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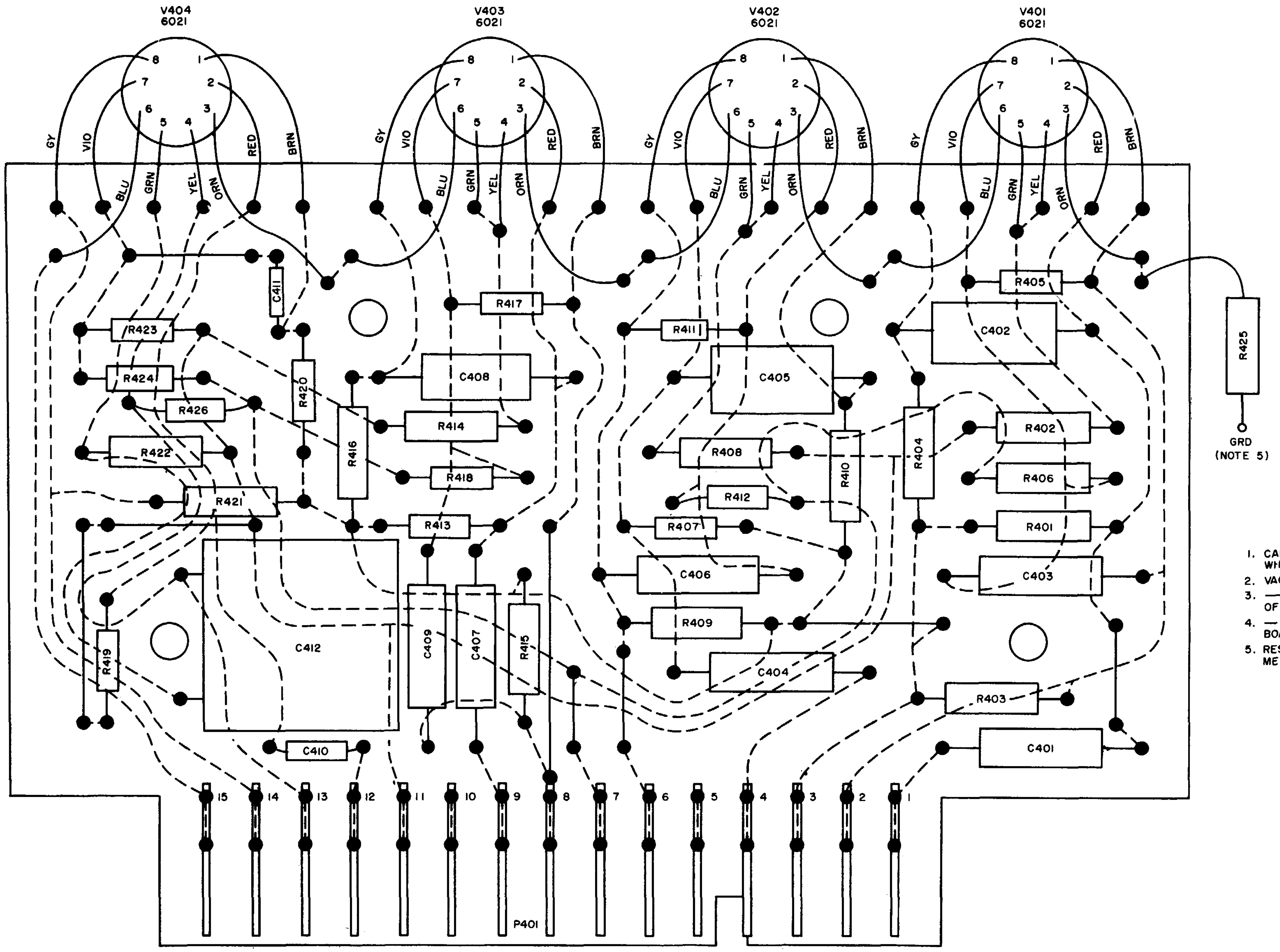
Figure 78. Decoder card, parts location and printed wiring diagram.

Figure 78



NOTES

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. VACUUM TUBE HOLD DOWN CLIPS NOT SHOWN.
3. ——— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
4. — — — DENOTES PRINTED CIRCUIT ON BACK OF BOARD.
5. RESISTOR R425 MOUNTED AND GROUNDED TO METAL FRAME.

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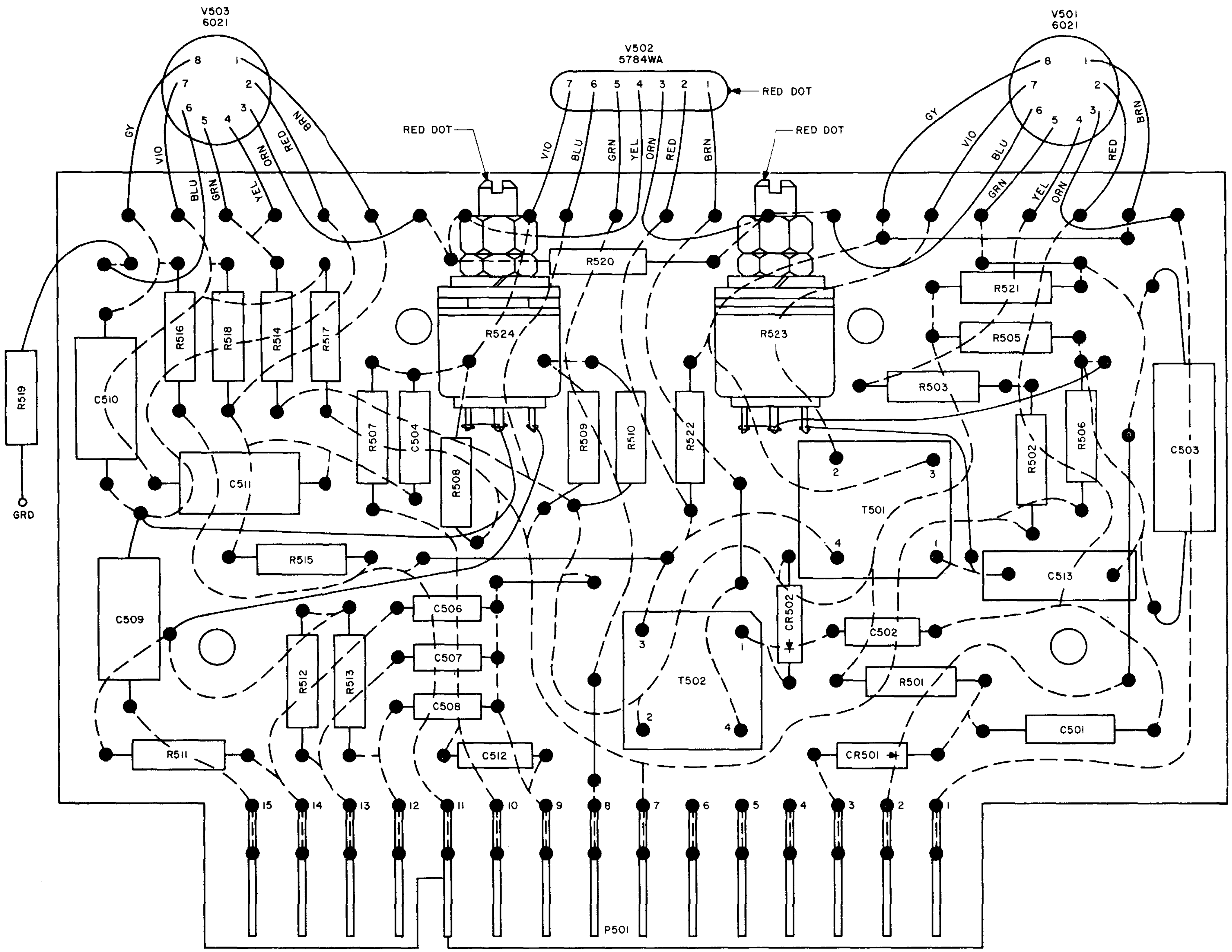
Figure 80. Gate generator card, parts location and printed wiring diagram.

Figure 80



NOTES:

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. VACUUM TUBE HOLD DOWN CLIPS NOT SHOWN.
3. ——— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
4. — — — DENOTES PRINTED CIRCUIT ON BACK OF BOARD.
5. RESISTOR R524 MOUNTED TO METAL FRAME, R523 MOUNTED TO PRINTED CIRCUIT BOARD.

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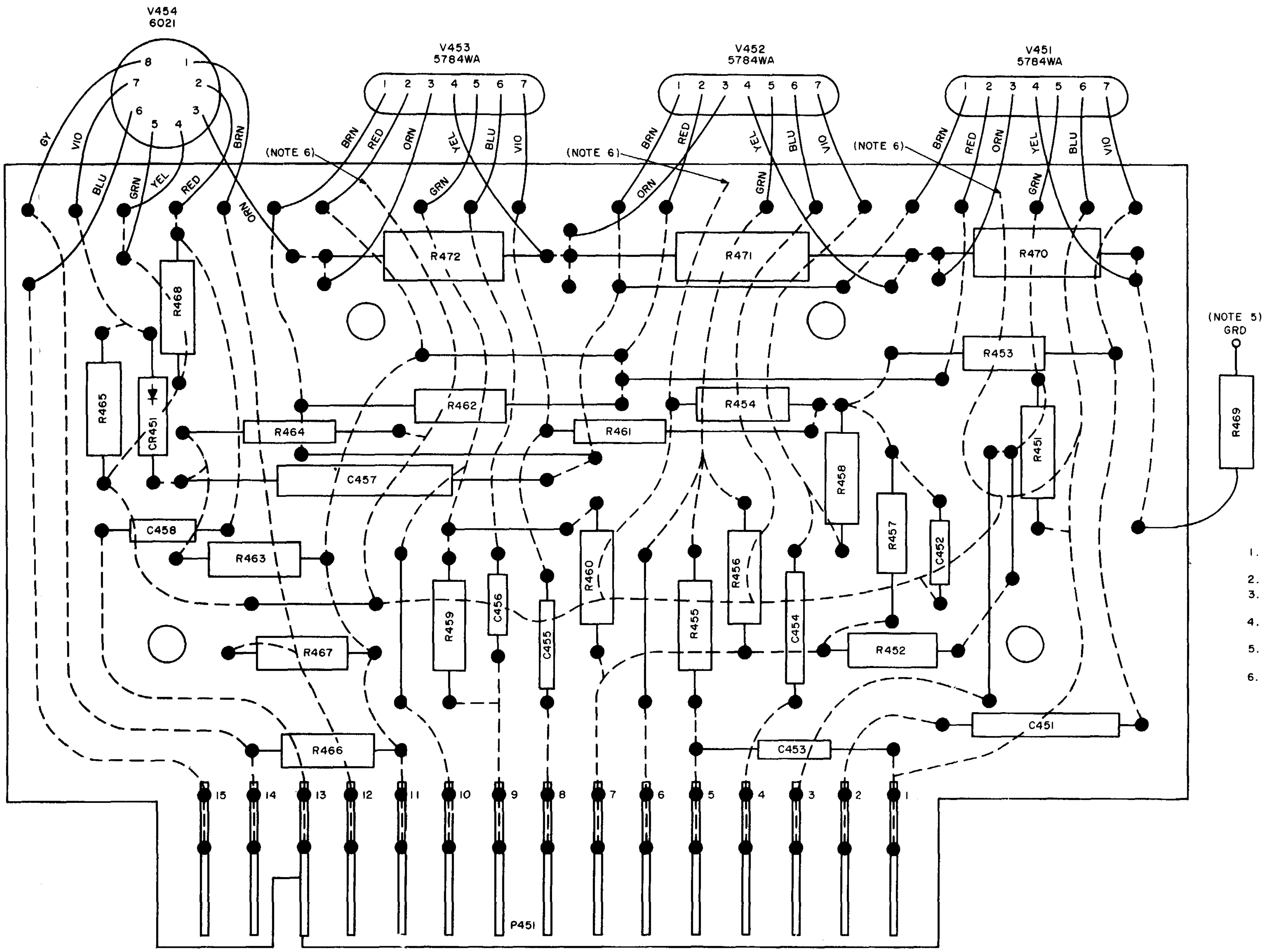
Figure 82. Blocking oscillator and ring around card, parts location and printed wiring diagram.

Figure 82



NOTES:

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. VACUUM TUBE HOLD DOWN CLIPS NOT SHOWN.
3. ——— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
4. — — — DENOTES PRINTED CIRCUIT ON BACK OF BOARD.
5. RESISTOR R469 MOUNTED AND GROUNDED TO METAL FRAME.
6. PRINTED LEAD DEAD ENDS AT THIS POINT.

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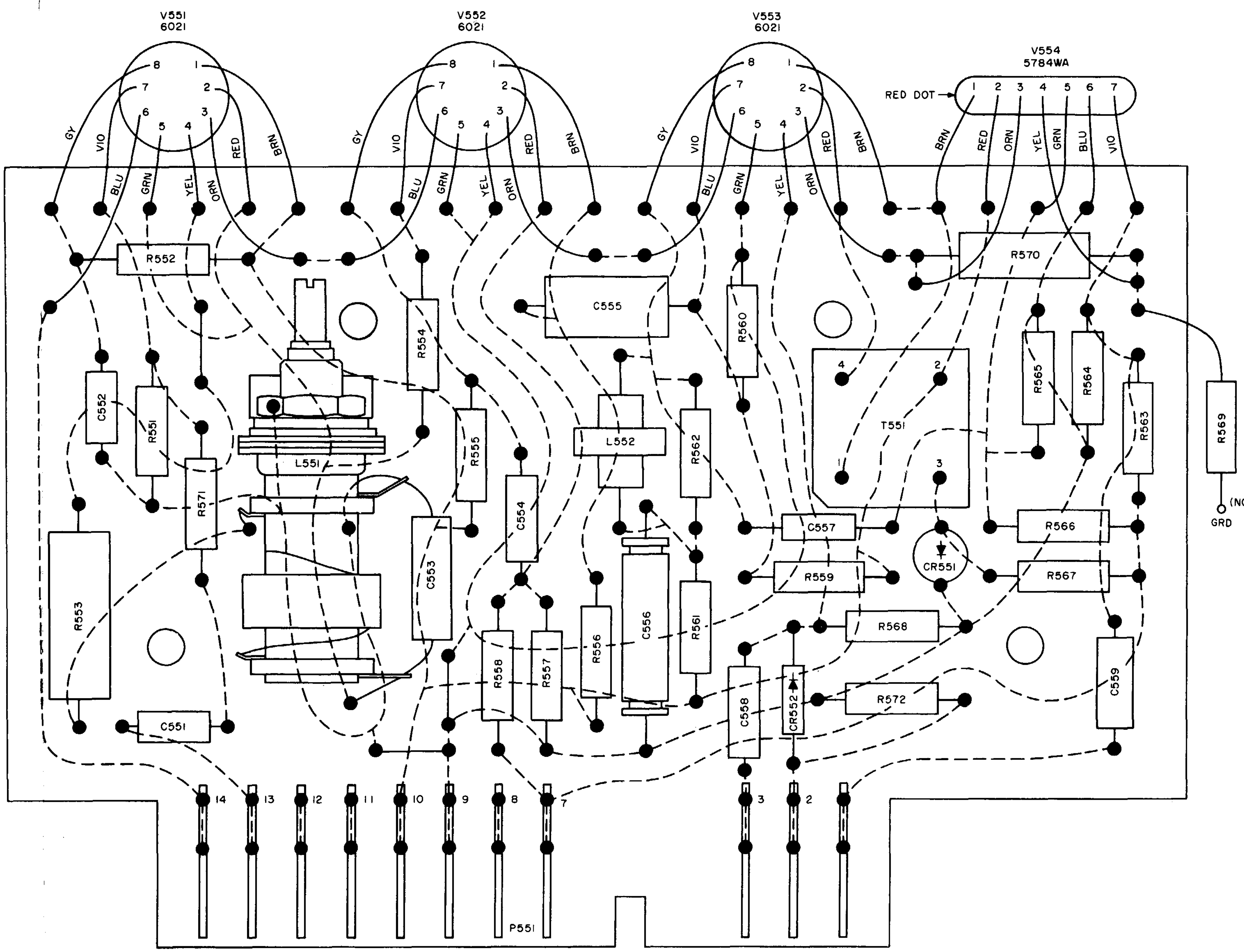
Figure 84. Mode reply selector card, parts location and printed wiring diagram.

Figure 84



NOTES:

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. VACUUM TUBE HOLD DOWN CLIPS NOT SHOWN.
3. ——— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
4. — — DENOTES PRINTED CIRCUIT ON BACK OF BOARD.
5. RESISTOR R569 MOUNTED AND GROUNDED TO METAL FRAME

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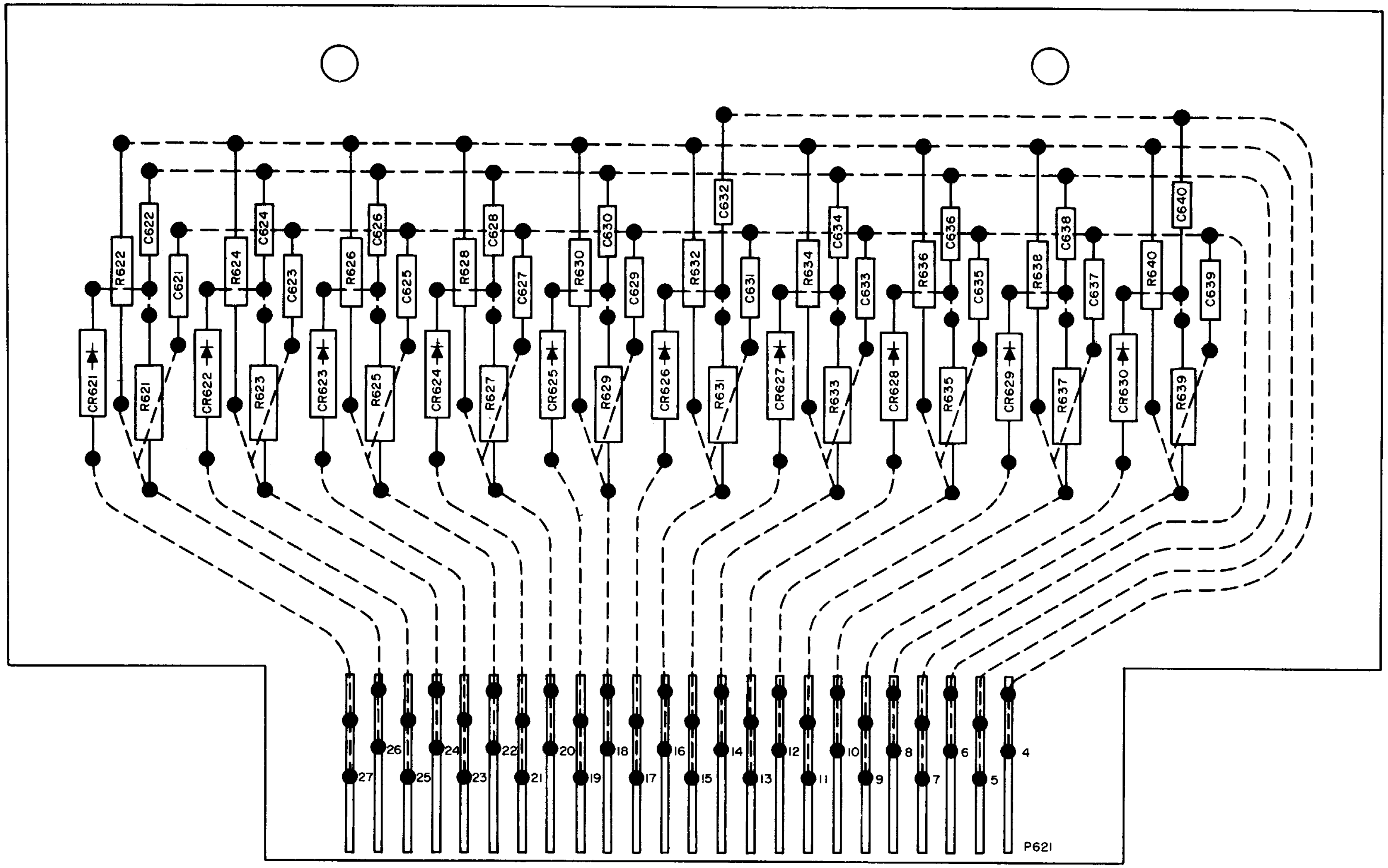
Figure 86. Ringing oscillator and coincidence card, parts location and printed wiring diagram.

Figure 86



NOTES:

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. ——— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
3. — — DENOTES PRINTED CIRCUIT ON BACK OF BOARD.

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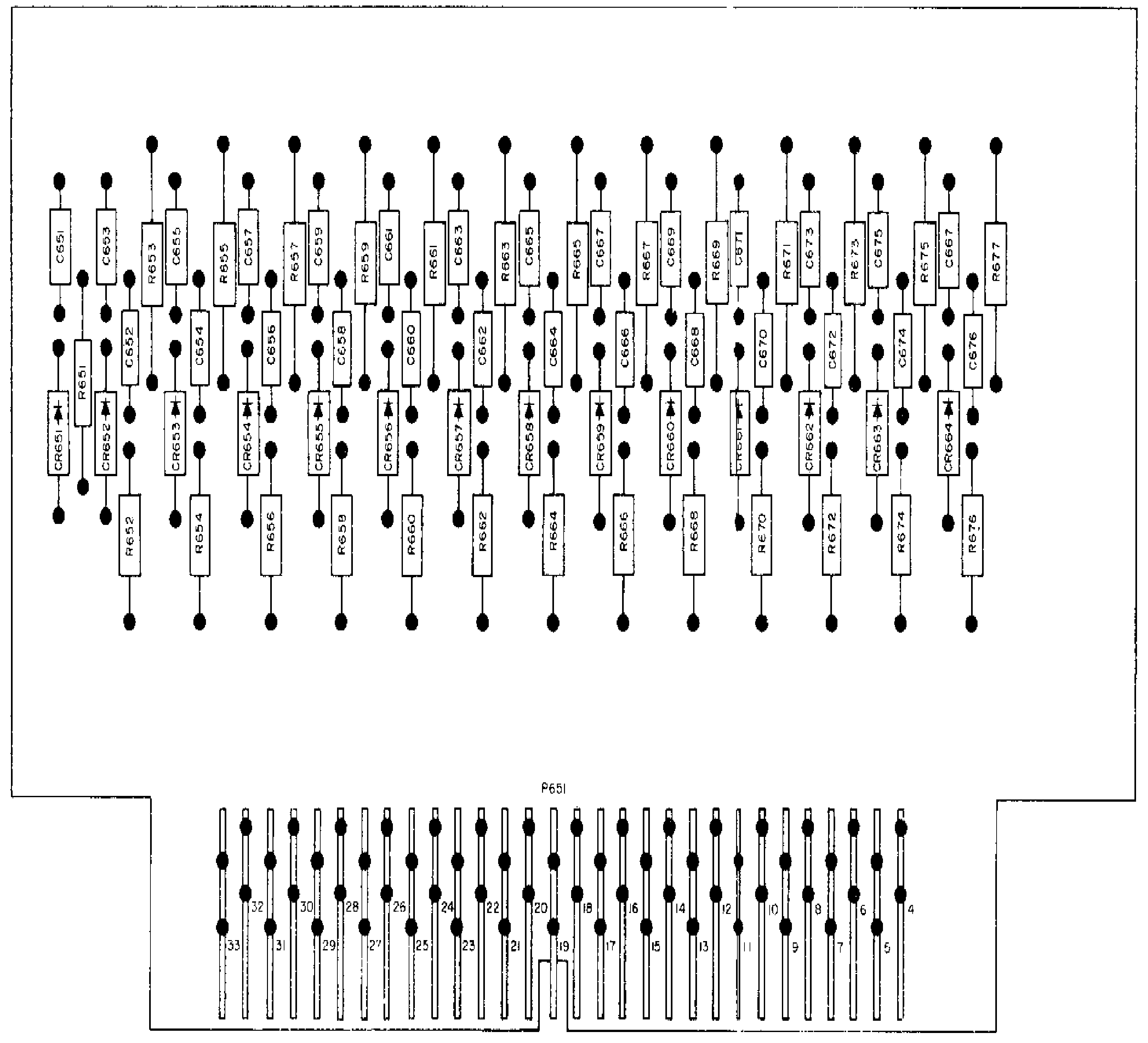
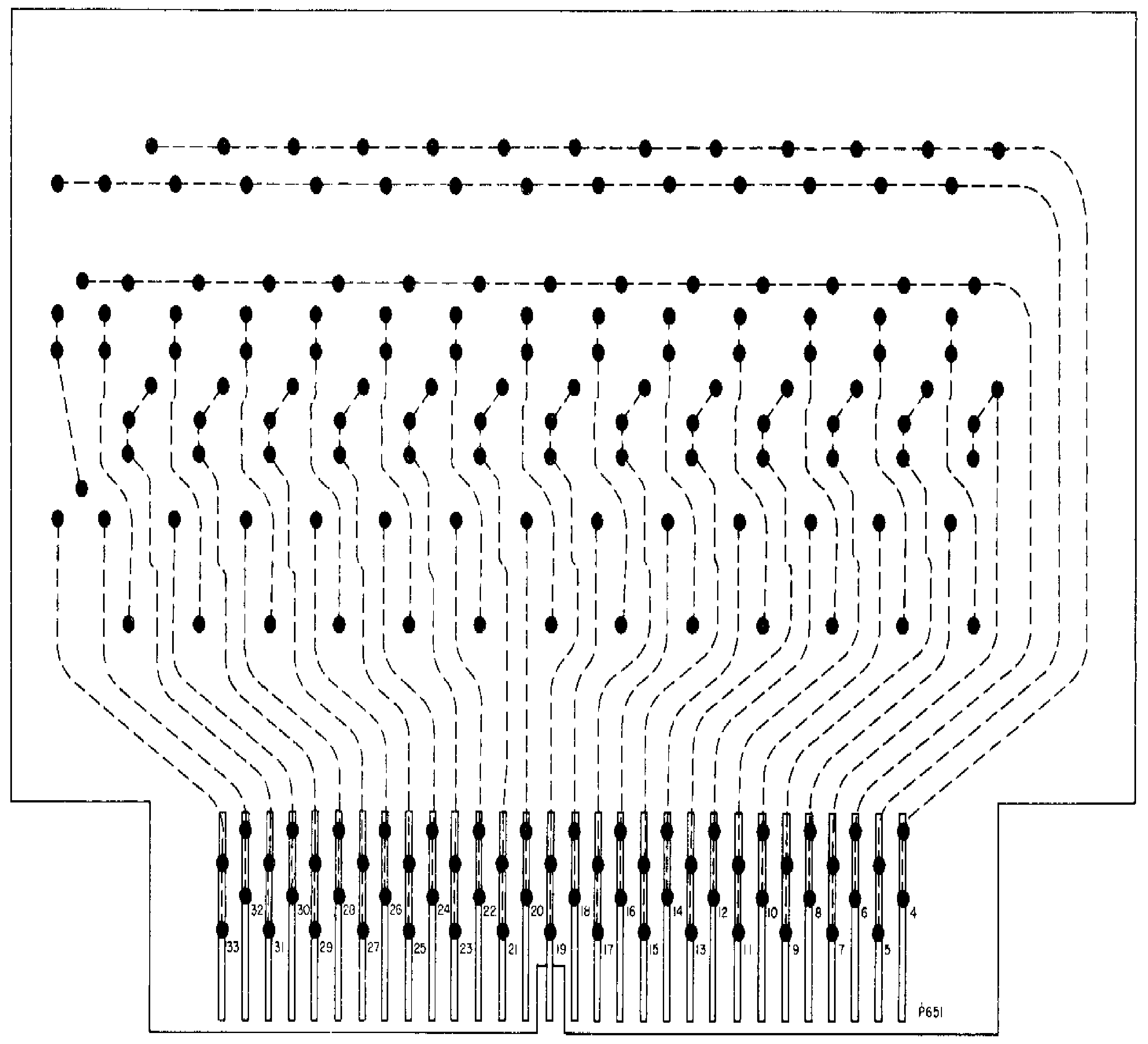
Figure 87. Mode one reply code switching card, parts location and printed wiring diagram.

Figure 87



A. MODE 2 REPLY CODE SWITCHING CARD PARTS LOCATIOI .



B. MODE 2 REPLY CODE SWITCHING CARD PRINTED CIRCUIT WIRING .

NOTES:

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. ——— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
3. — — DENOTES PRINTED CIRCUIT ON BACK OF BOARD.

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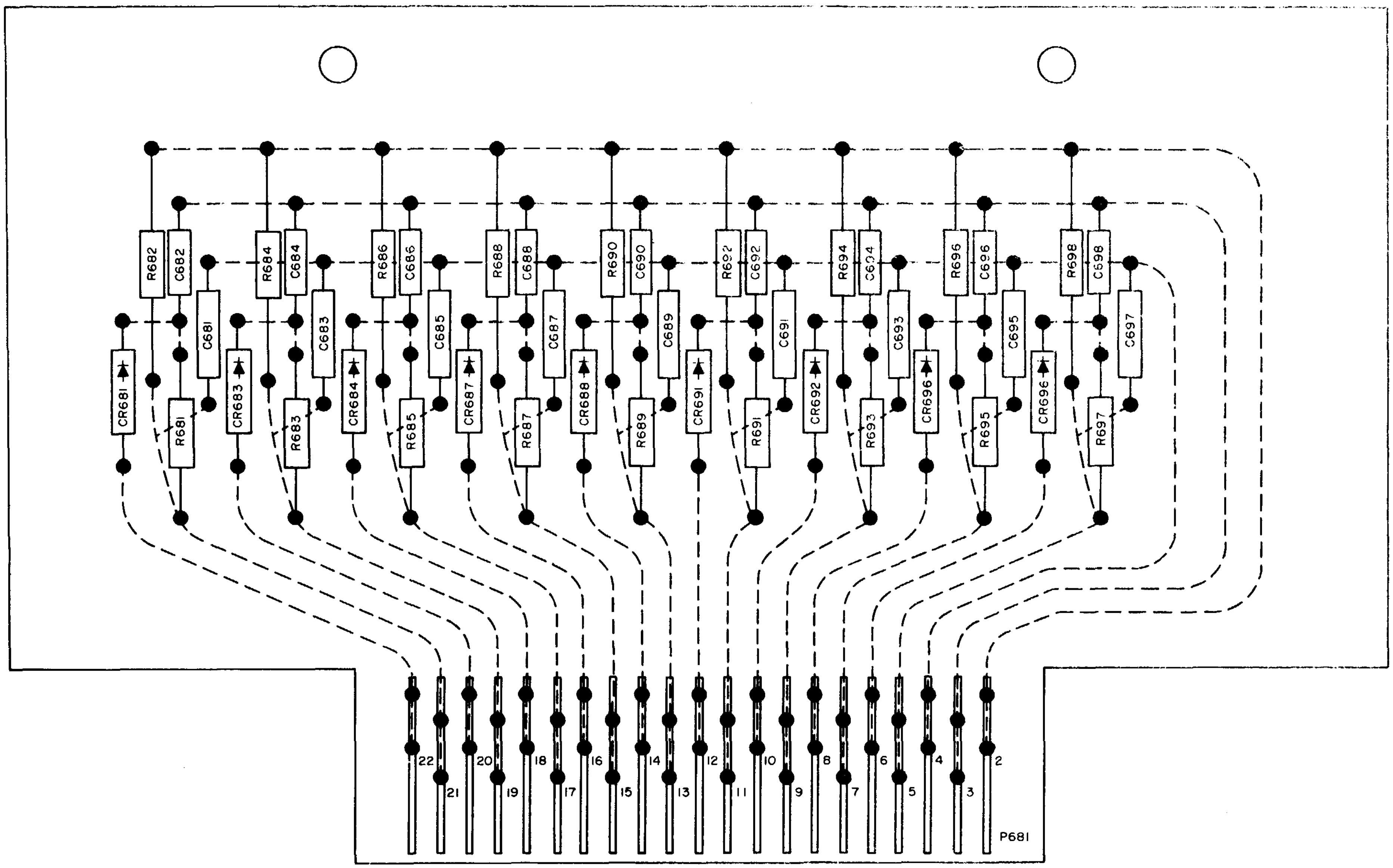
Figure 88. Mode two reply code switching card, parts location and printed wiring diagram.



NOTES:

1. CARD VIEWED FROM FRONT. FRONT IS SIDE ON WHICH PARTS ARE MOUNTED.
2. ——— DENOTES PARTS AND PIGTAILS ON FRONT OF BOARD.
3. — — DENOTES PRINTED CIRCUIT ON BACK OF BOARD

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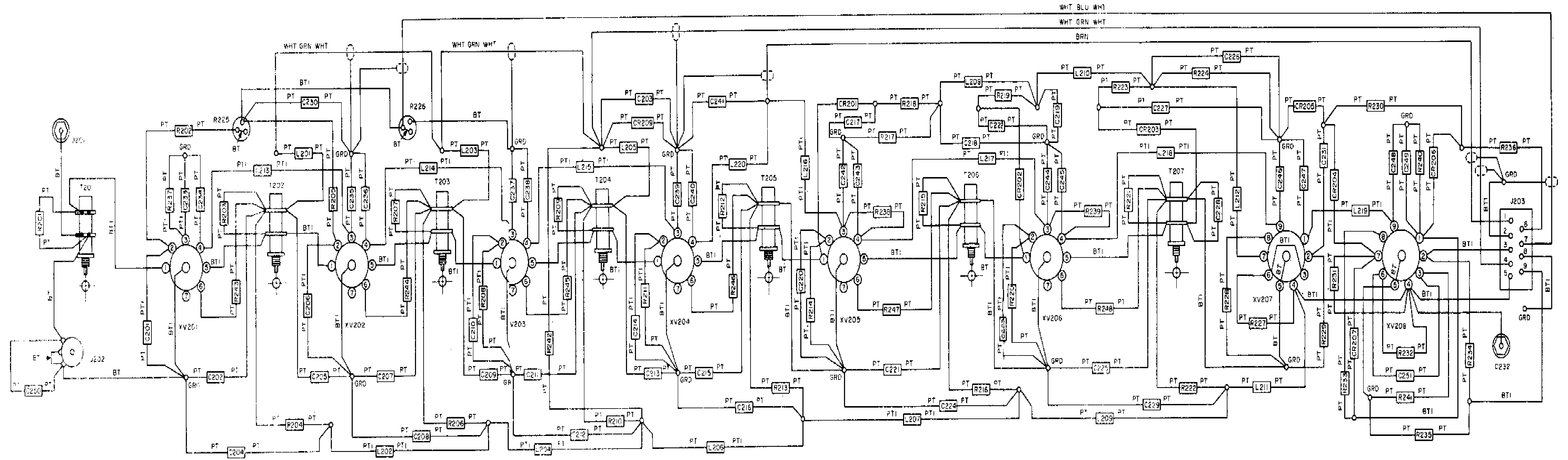
Figure 89. Mode three reply code switching card, parts location and printed wiring diagram.

Figure 89



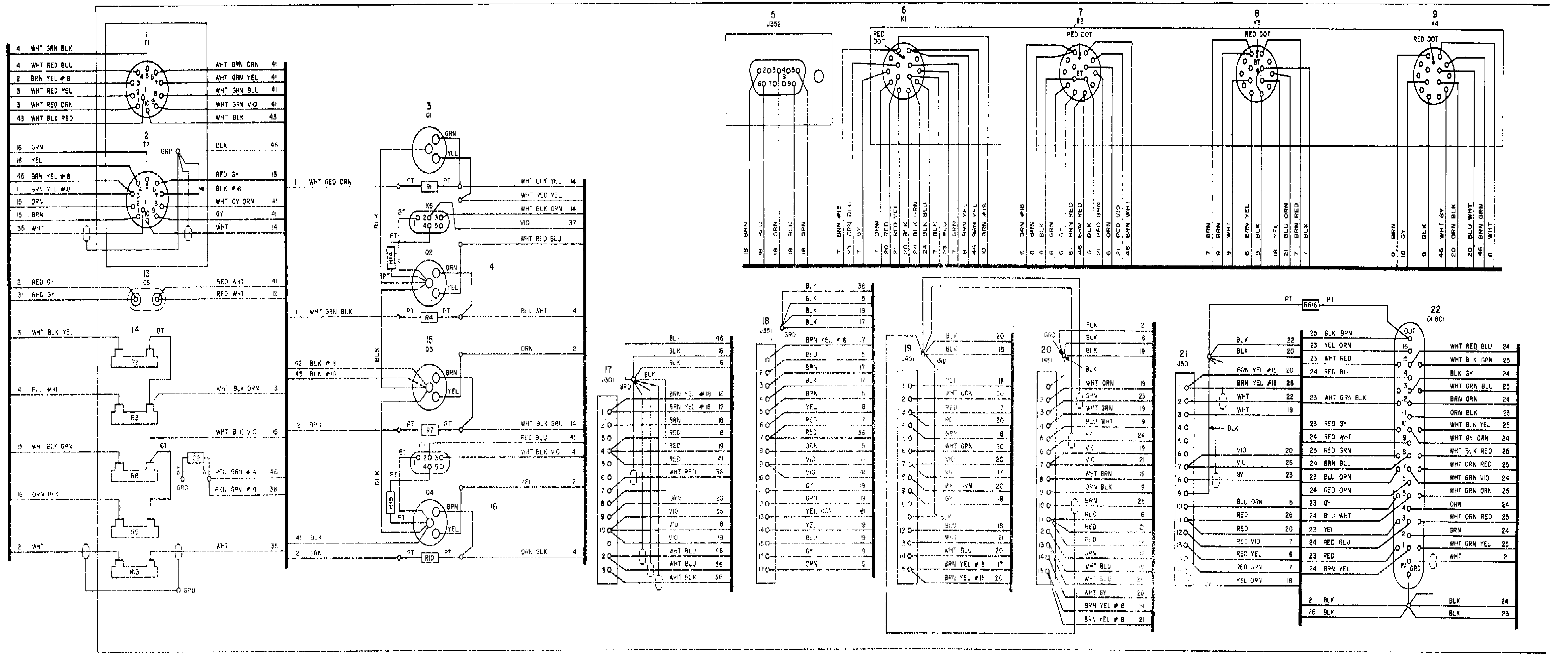
NOTES:

1. BT DENOTES BARE TINNED COPPER WIRE
2. BTI DENOTES BARE TINNED COPPER WIRE WITH INSULATED SLEEVING
3. PT DENOTES PIGTAIL LEAD
4. PTI DENOTES PIGTAIL LEAD WITH INSULATED SLEEVING
5. ⌐ DENOTES SHIELDED CONNECTION.

TM5895-217-35-100

Figure 118. IF suppressor subchassis, wiring diagram

Figure 118



NOTES:

1 THE SMALL NUMBER ON EACH WIRE, ADJACENT TO THE BASE LINE, IS THE NUMBER OF THE STATION TO WHICH THE WIRE RUNS.

2. UNLESS OTHERWISE INDICATED ALL WIRES ARE #22 AWG.

3. BT DENOTES BARE TINNED COPPER WIRE.

4. PT DENOTES PIGTAIL LEAD.

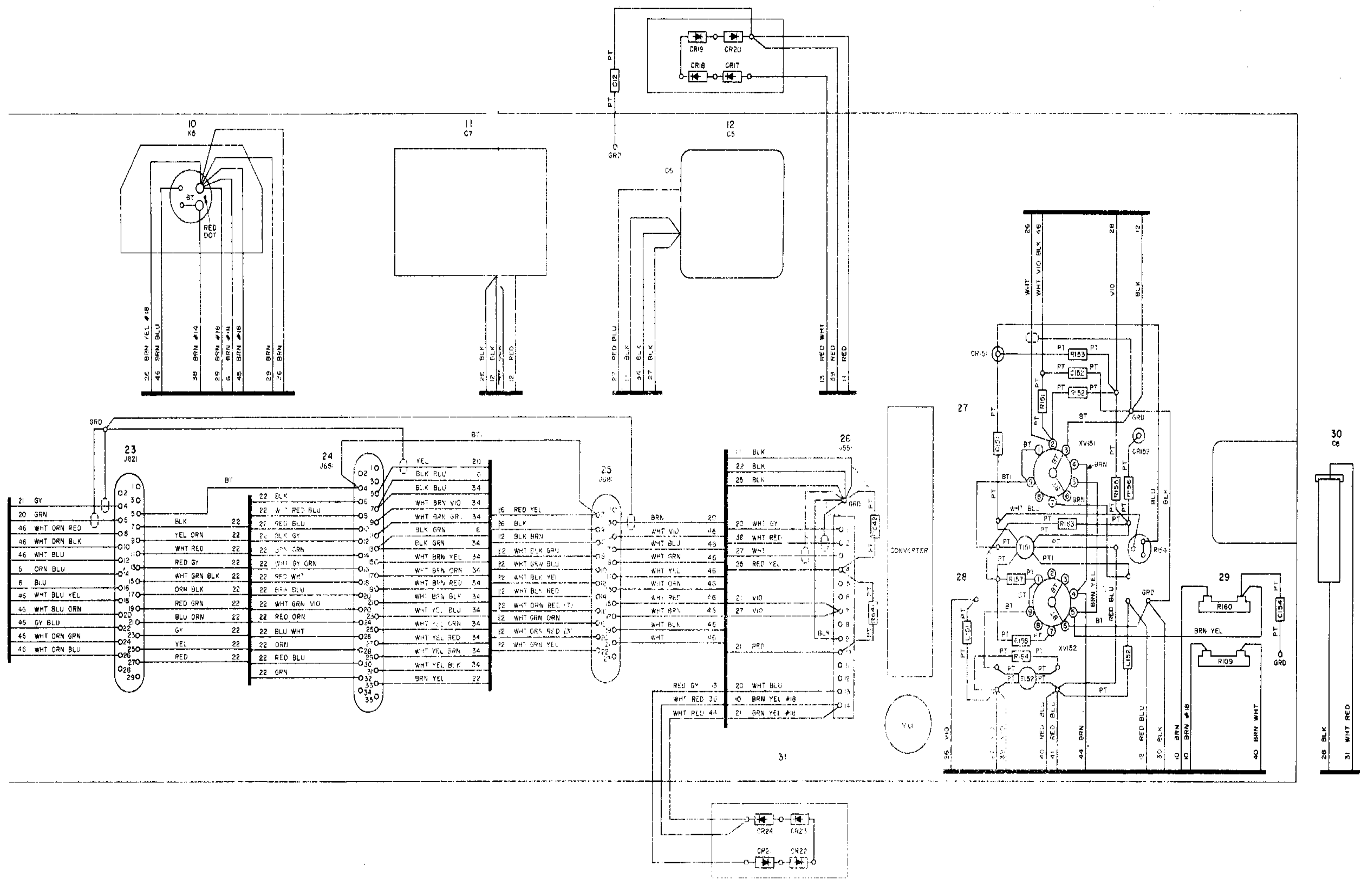
5. ( )— DENOTES SHIELDED CONNECTION.

6 STATION NUMBERS 10 THRU 12 AND 23 THRU 31 APPEAR ON SHEET 2 STATION NUMBERS 32 THRU 46 APPEAR ON SHEET 3.

TM5895-217-35-110①

Figure 119. Receiver-transmitter wiring diagram (pt 1 of 3).

Figure 119-P1



NOTES:

1. THE SMALL NUMBER ON EACH WIRE, ADJACENT TO THE BASE LINE, IS THE NUMBER OF THE STATION TO WHICH THE WIRE RUNS.
2. UNLESS OTHERWISE INDICATED ALL WIRES ARE #22 AWG.
3. BT DENOTES BARE TINNED COPPER WIRE.
4. BTI DENOTES BARE TINNED COPPER WIRE WITH INSULATED SLEEVING.
5. PT DENOTES PIGTAIL LEAD.
6. PTI DENOTES PIGTAIL LEAD WITH INSULATED SLEEVING.
7. ( )— DENOTES SHIELDED LEAD
8. STATION NUMBERS 1 THRU 9 AND 13 THRU 22 APPEAR ON SHEET 1 STATION NUMBERS 32 THRU 46 APPEAR ON SHEET 3.

TM5895-217-35-110②

Figure 119-P2

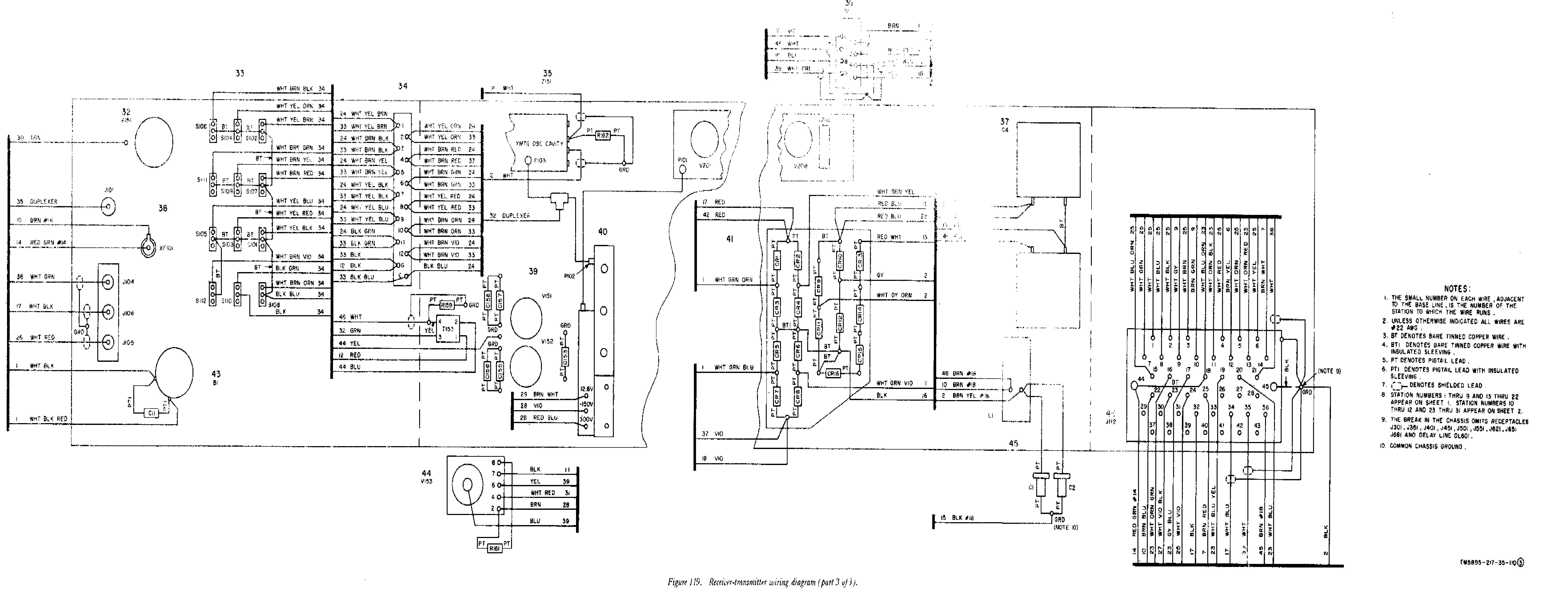
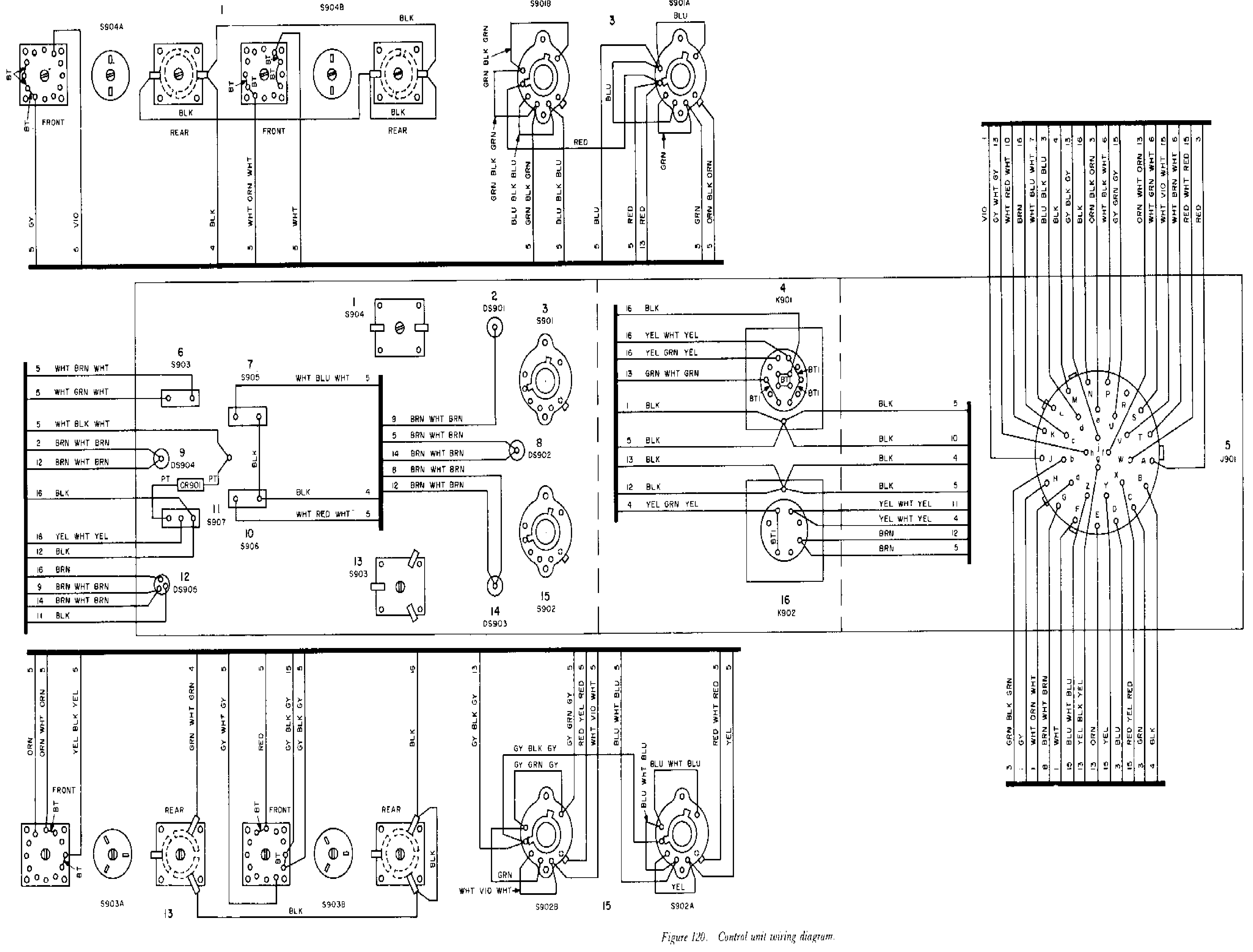


Figure 119. Receiver-transmitter wiring diagram (part 3 of 3).

Figure 119-P3



NOTES

1. THE SMALL NUMBER ON EACH WIRE, ADJACENT TO THE BASE LINE, IS THE NUMBER OF THE STATION TO WHICH THE WIRE RUNS.
2. UNLESS OTHERWISE INDICATED ALL WIRES ARE #22 AWG.
3. BT DENOTES BARE TINNED COPPER WIRE.
4. BTI DENOTES BARE TINNED COPPER WIRE WITH INSULATED SLEEVING.
5. PT DENOTES PIGTAIL LEAD.
6. 'A' SECTIONS OF SWITCHES ARE SECTIONS NEAREST CONTROL KNOB AND VIEWED FROM CONTROL UNIT REAR. BROKEN LINES INDICATE CONTACTS ON FRONT SIDE OF WAFER OR SECTION.

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Figure 120. Control unit wiring diagram.

Figure 120

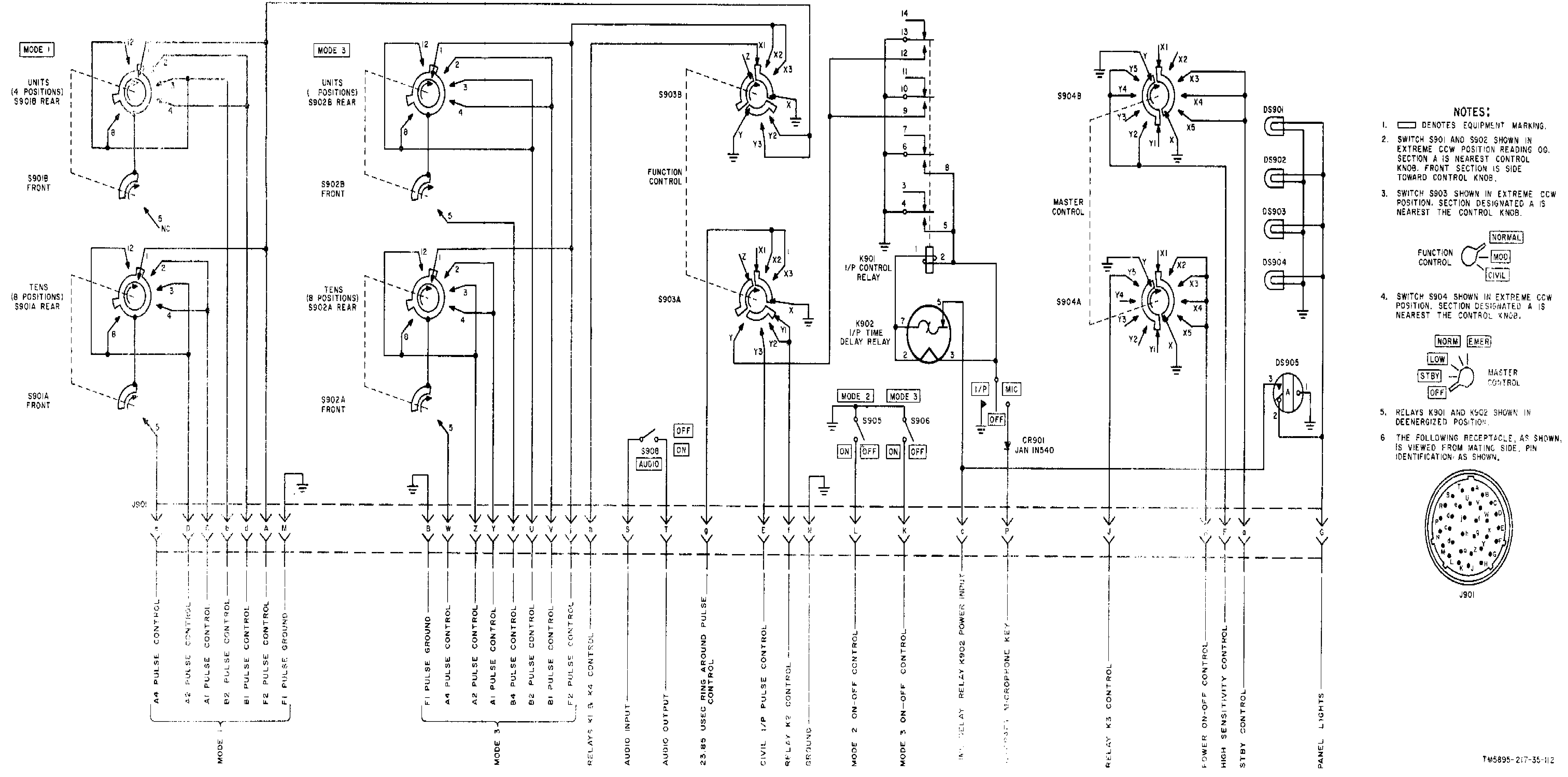
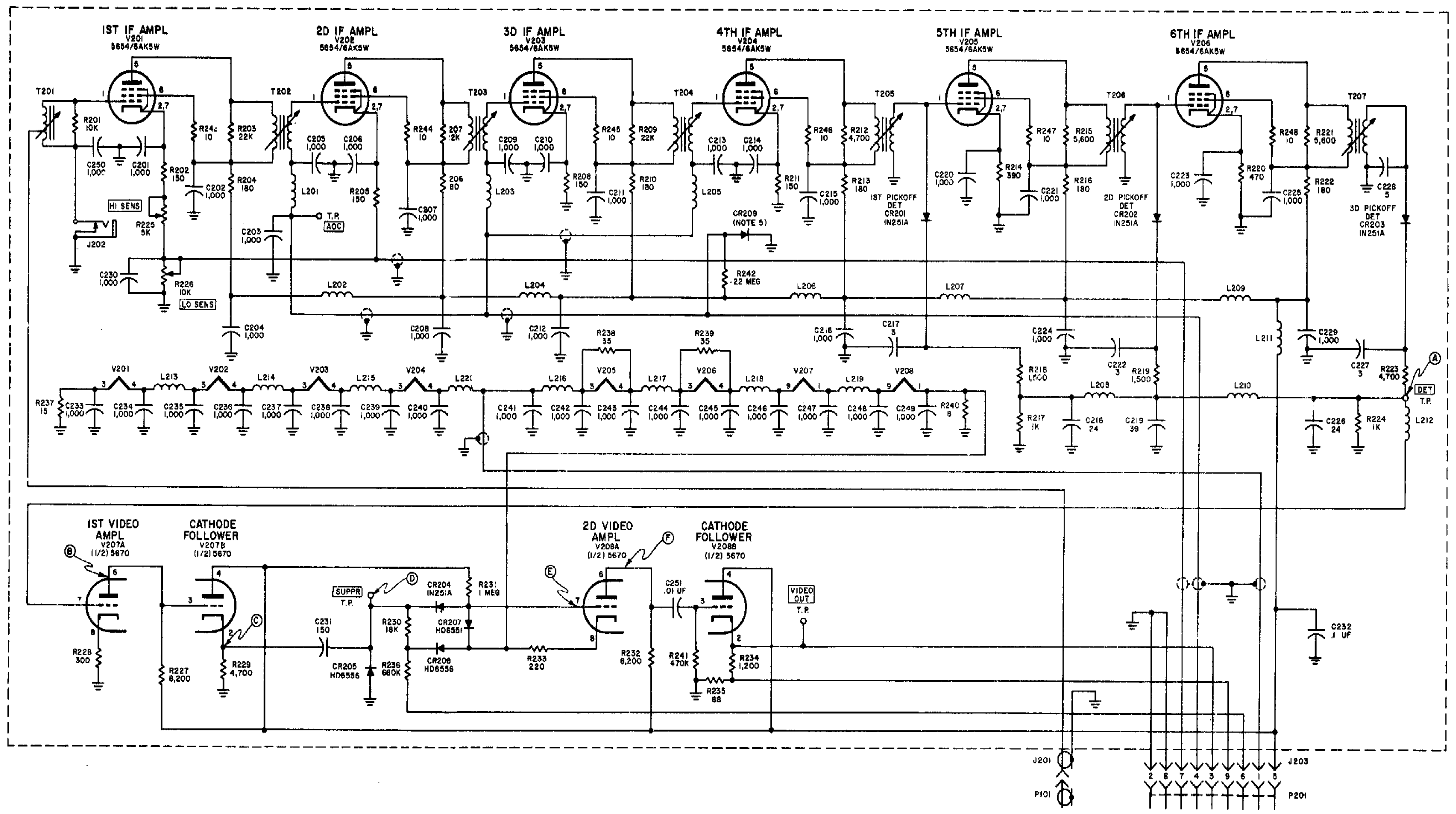


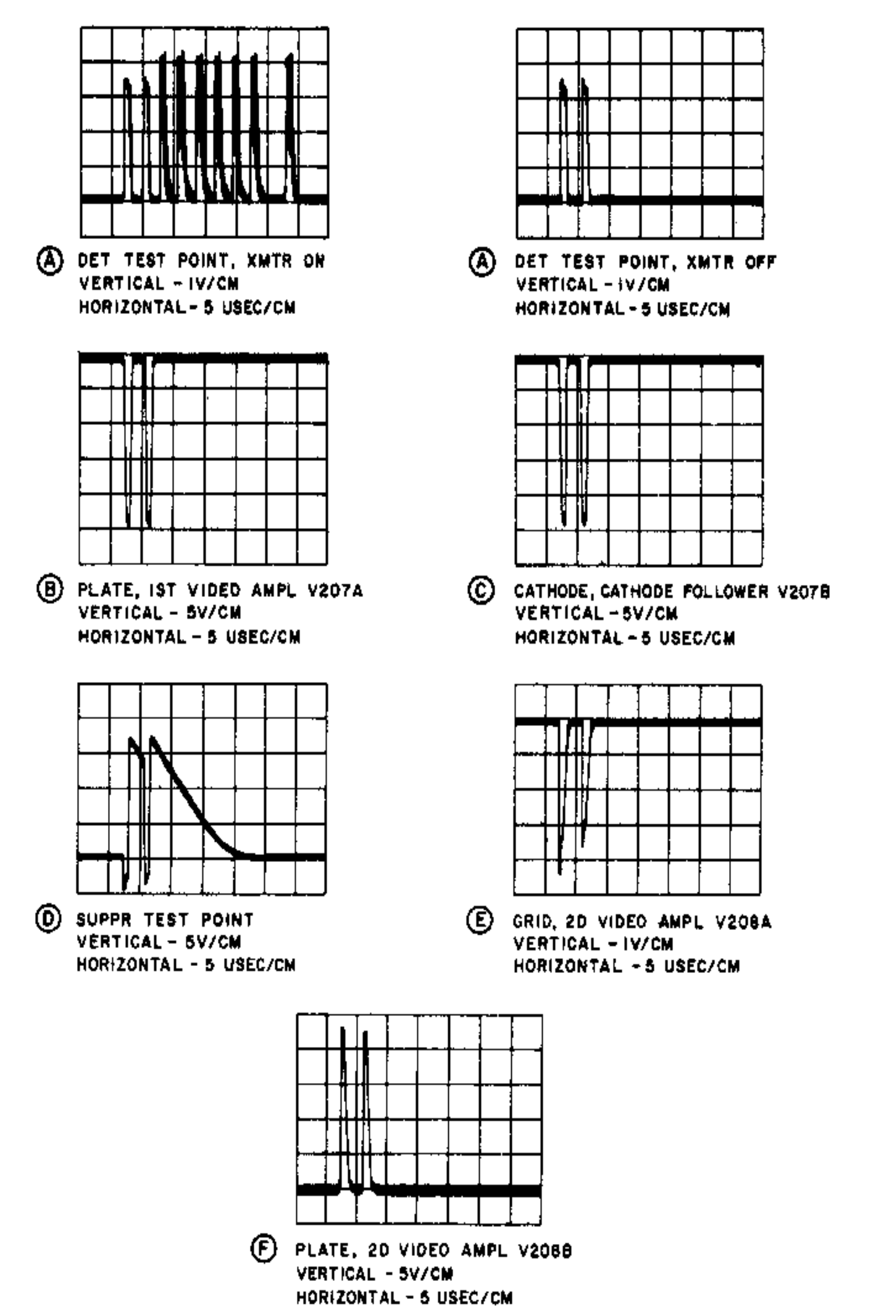
Figure 121. Control unit schematic diagram.

Figure 121

Figure 122-P1

Figure 122. Receiver-transmitter, schematic and waveform diagram (part 2 of 2).





NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. ○⌁ WAVEFORM TAKEN BETWEEN POINT INDICATED AND CHASSIS UNLESS OTHERWISE SHOWN.
3. WAVEFORMS TAKEN WITH 0 DBM SIGNAL INPUT TO ANTENNA, 1,000 PRR AND A MODE 1 INTERROGATION. XMTR OFF UNLESS OTHERWISE STATED.
4. ▭ DENOTES EQUIPMENT MARKING.
5. RECEIVER-TRANSMITTER SERIAL NUMBERS 1651 THROUGH 1653 USE HD6556, ALL OTHERS USE 1N198.

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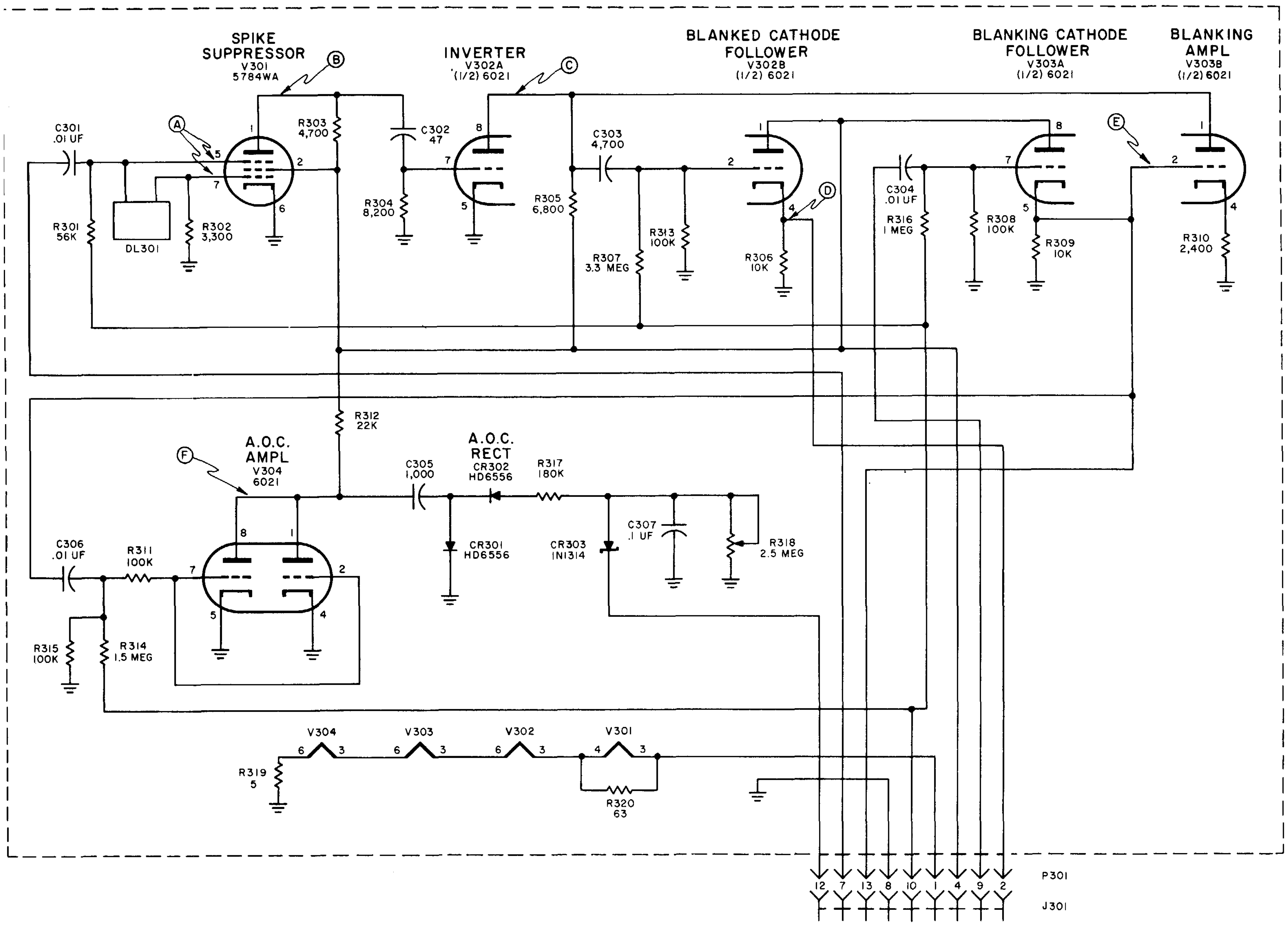
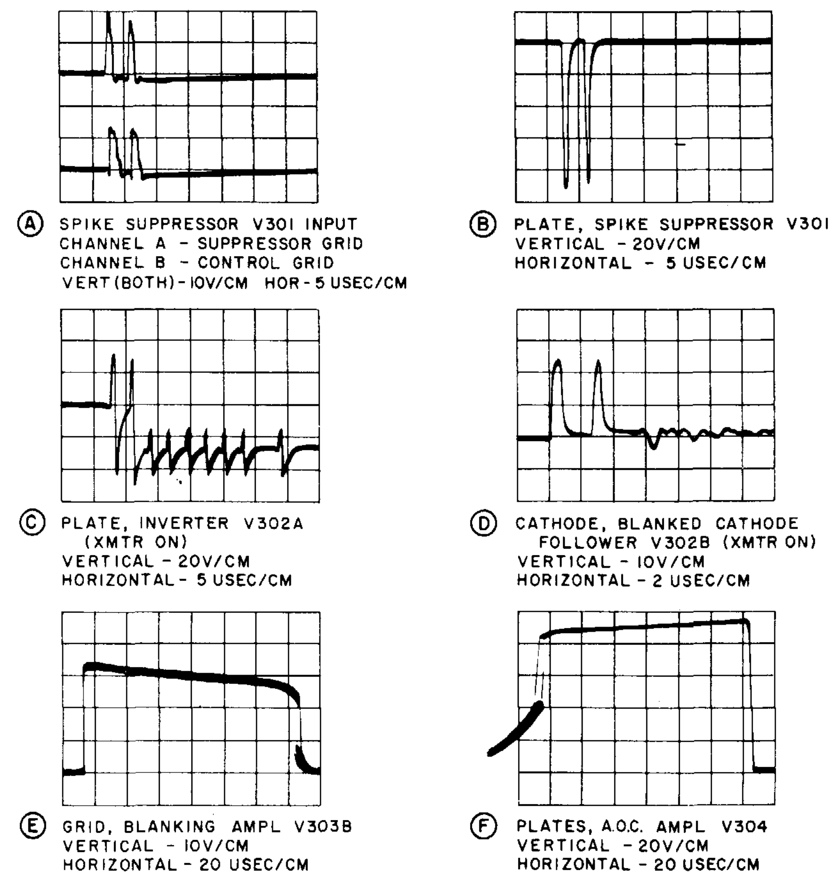
Figure 123. If. suppressor subchassis, schematic and waveform diagram.

Figure 123





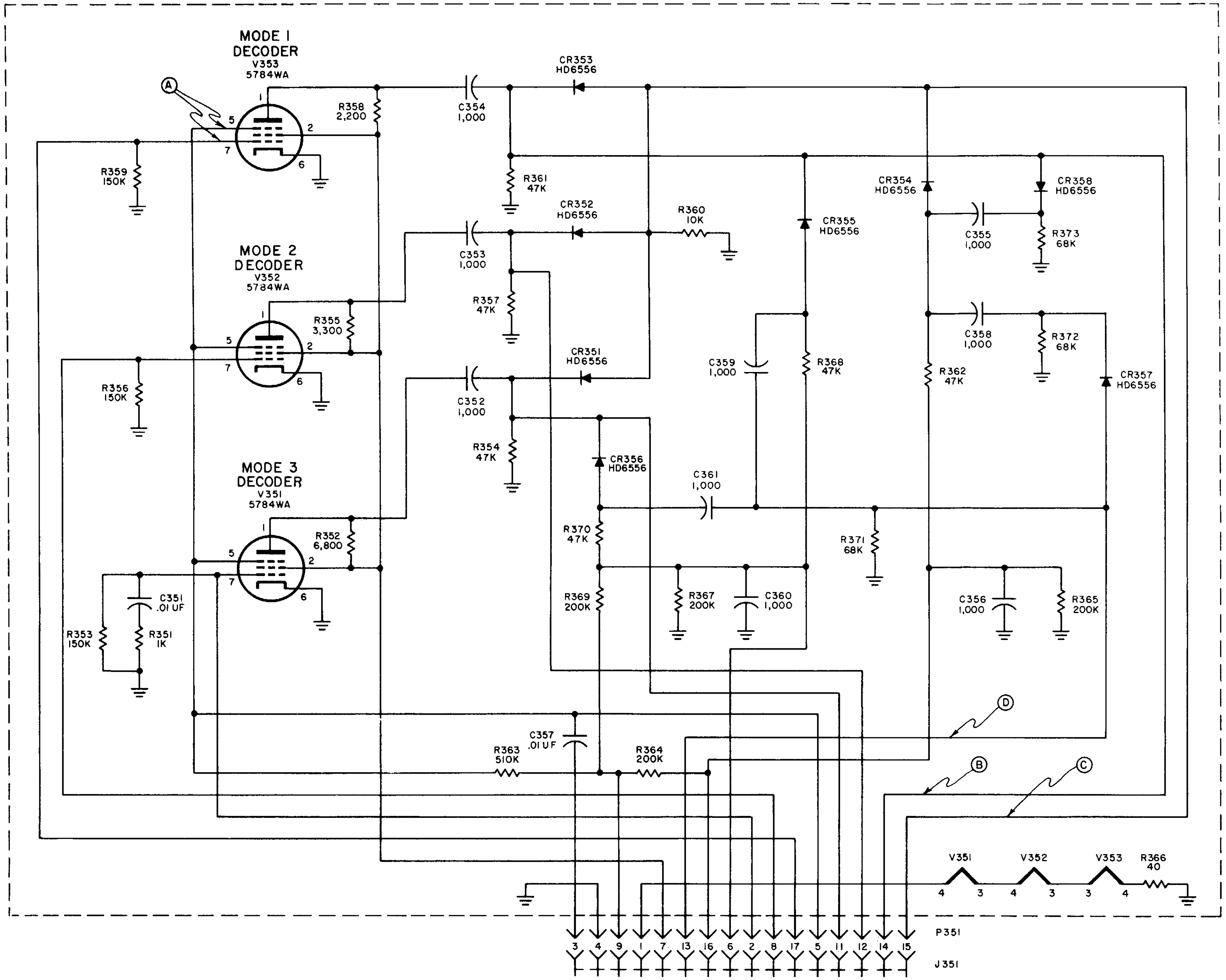
NOTES:

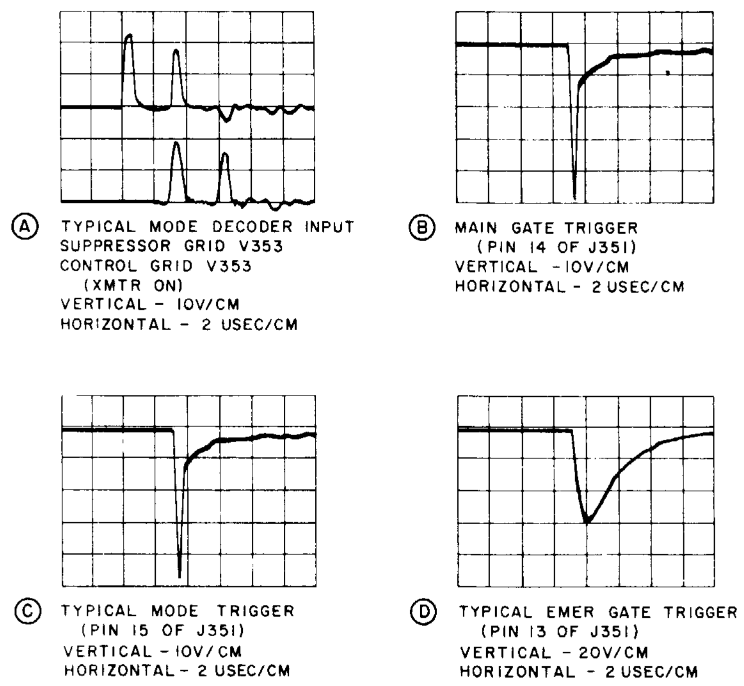
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. (waveform symbol) WAVEFORM TAKEN BETWEEN POINT INDICATED AND CHASSIS UNLESS OTHERWISE SHOWN.
3. WAVEFORMS TAKEN WITH 0 DBM SIGNAL INPUT TO ANTENNA, 1,000 PRR AND A MODE 1 INTERROGATION. XMTR OFF UNLESS OTHERWISE STATED.
4. (zener diode symbol) DENOTES ZENER TYPE DIODE RECTIFIER.

TM5895-217-35-122

Figure 124. Video amplifier card, schematic and waveform diagram.

Figure 124





NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. WAVEFORM TAKEN BETWEEN POINT INDICATED AND CHASSIS UNLESS OTHERWISE SHOWN.
3. WAVEFORMS TAKEN WITH 0 DBM SIGNAL INPUT TO ANTENNA, 1,000 PRR AND A MODE 1 INTERROGATION. XMTR OFF UNLESS OTHERWISE STATED.

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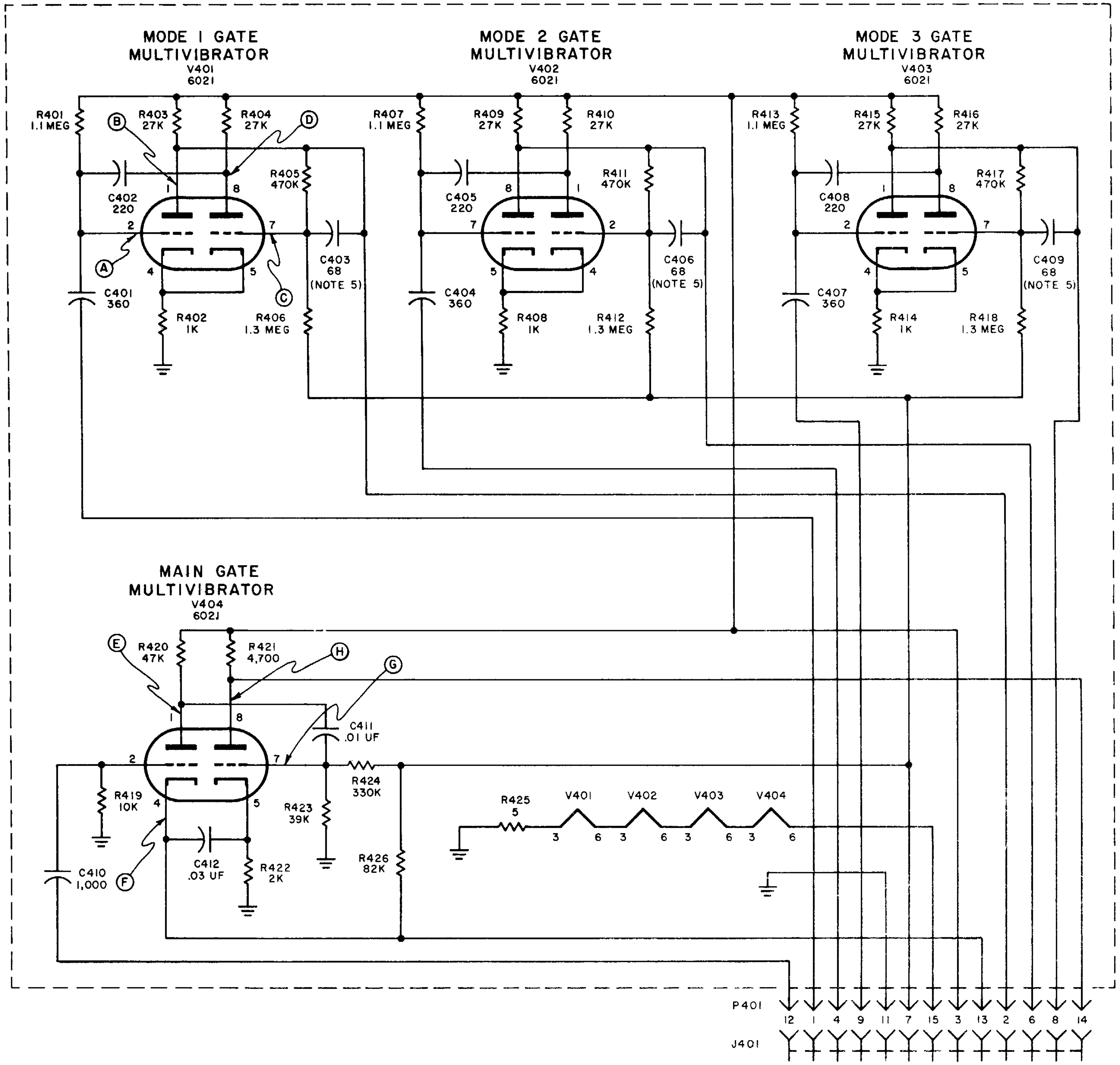
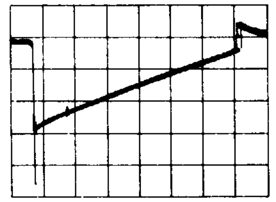
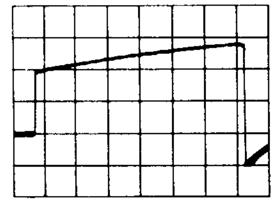
Figure 125. Decoder card, schematic and waveform diagram.

Figure 125

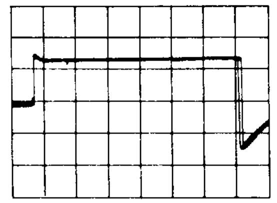




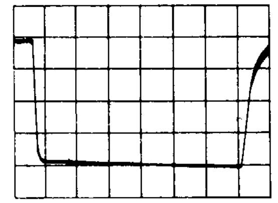
(A) GRID, MODE 1 GATE MVB V401A
VERTICAL - 10V/CM
HORIZONTAL - 20 USEC/CM



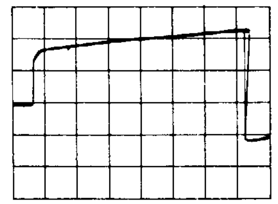
(B) PLATE, MODE 1 GATE MVB V401A
VERTICAL - 20V/CM
HORIZONTAL - 20 USEC/CM



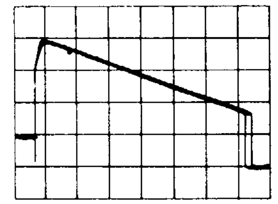
(C) GRID, MODE 1 GATE MVB V401B
VERTICAL - 10V/CM
HORIZONTAL - 20 USEC/CM



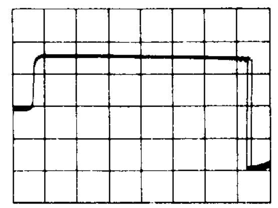
(D) PLATE, MODE 1 GATE MVB V401B
VERTICAL - 20V/CM
HORIZONTAL - 20 USEC/CM



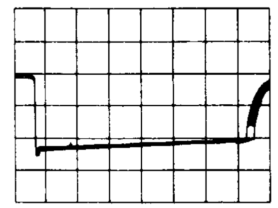
(E) PLATE, MAIN GATE MVB V404A
VERTICAL - 20V/CM
HORIZONTAL - 20 USEC/CM



(F) CATHODE, MAIN GATE MVB V404A
VERTICAL - 5V/CM
HORIZONTAL - 20 USEC/CM



(G) GRID, MAIN GATE MVB V404B
VERTICAL - 20V/CM
HORIZONTAL - 20 USEC/CM



(H) PLATE, MAIN GATE MVB V404B
VERTICAL - 20V/CM
HORIZONTAL - 20 USEC/CM

NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. ○⁓➝ WAVEFORM TAKEN BETWEEN POINT INDICATED AND CHASSIS UNLESS OTHERWISE SHOWN.
3. WAVEFORMS TAKEN WITH 0 DBM SIGNAL INPUT TO ANTENNA, 1,000 PRR AND A MODE 1 INTERROGATION. XMTR OFF UNLESS OTHERWISE STATED.
4. A CAPACITOR VALUE OF 15 UUF IS USED IN RADAR RECEIVER-TRANSMITTER RT-494/APX-44 WITH SERIAL NUMBERS 1 THROUGH 450 ON ORDER NO. 3746-PP-59. THE INDICATED VALUE OF 68 UUF MUST ALWAYS BE USED IF CAPACITOR REPLACEMENT BECOMES NECESSARY.

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Figure 126. Gate generator card, schematic and waveform diagram.

Figure 126

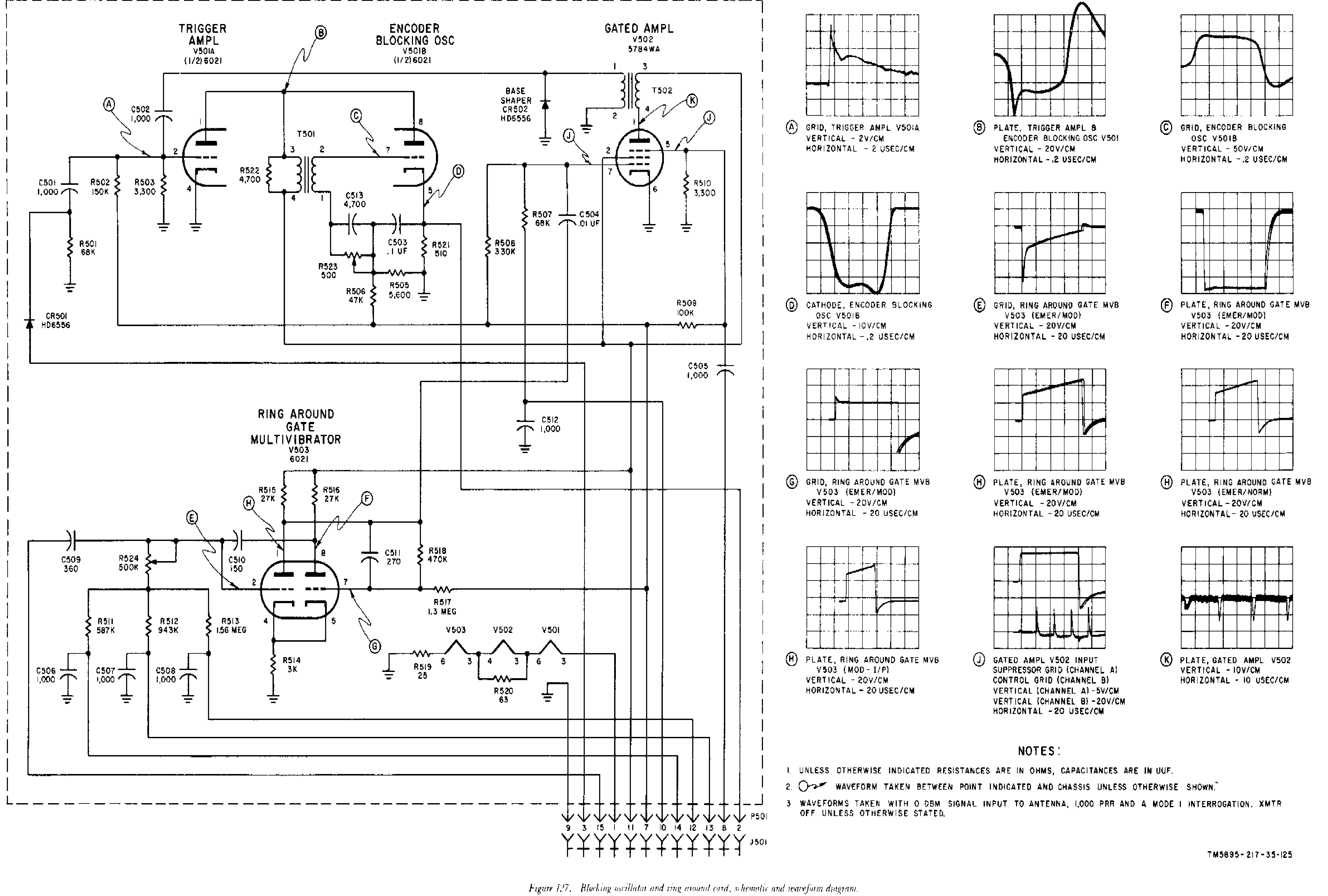
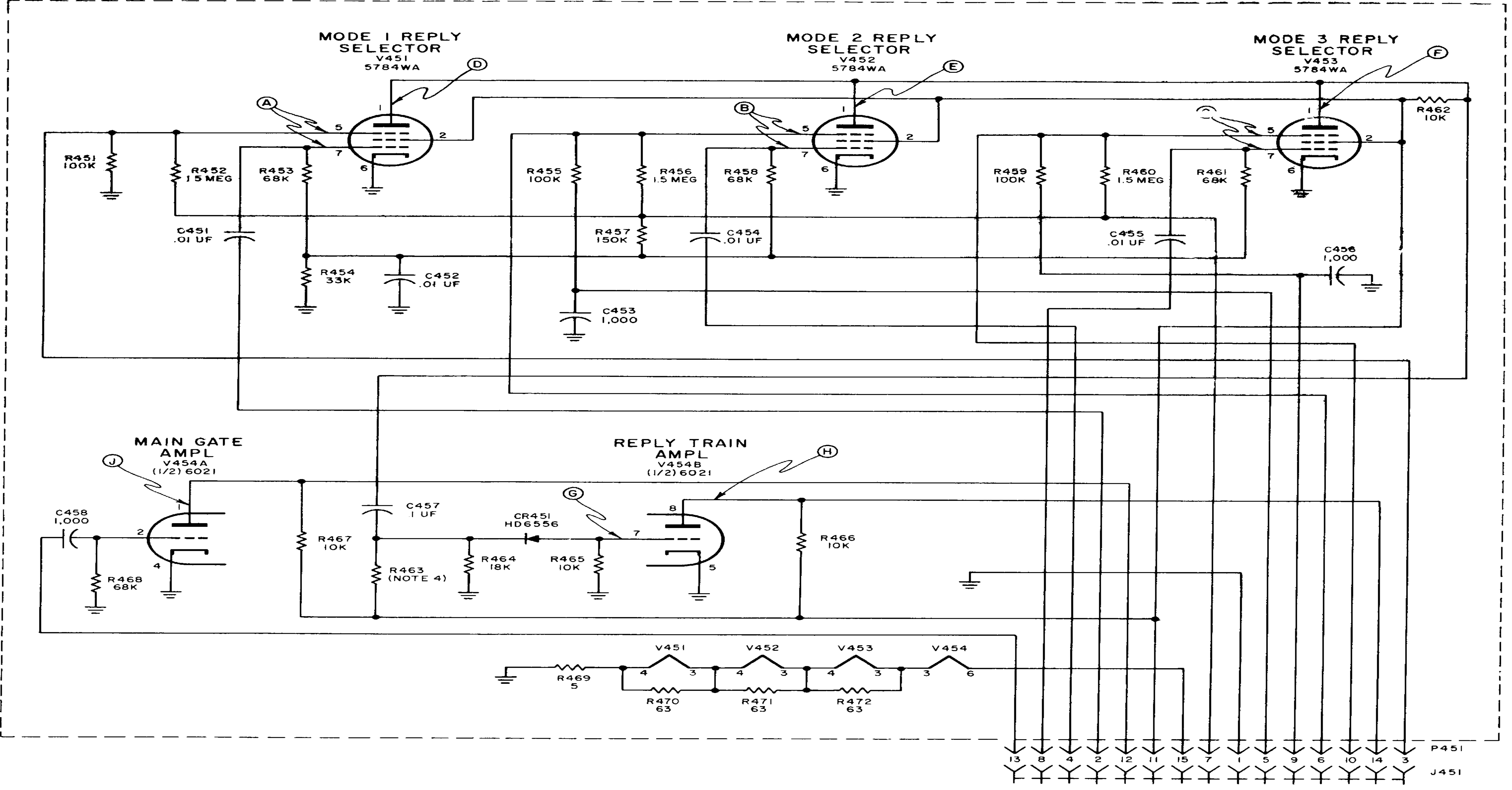
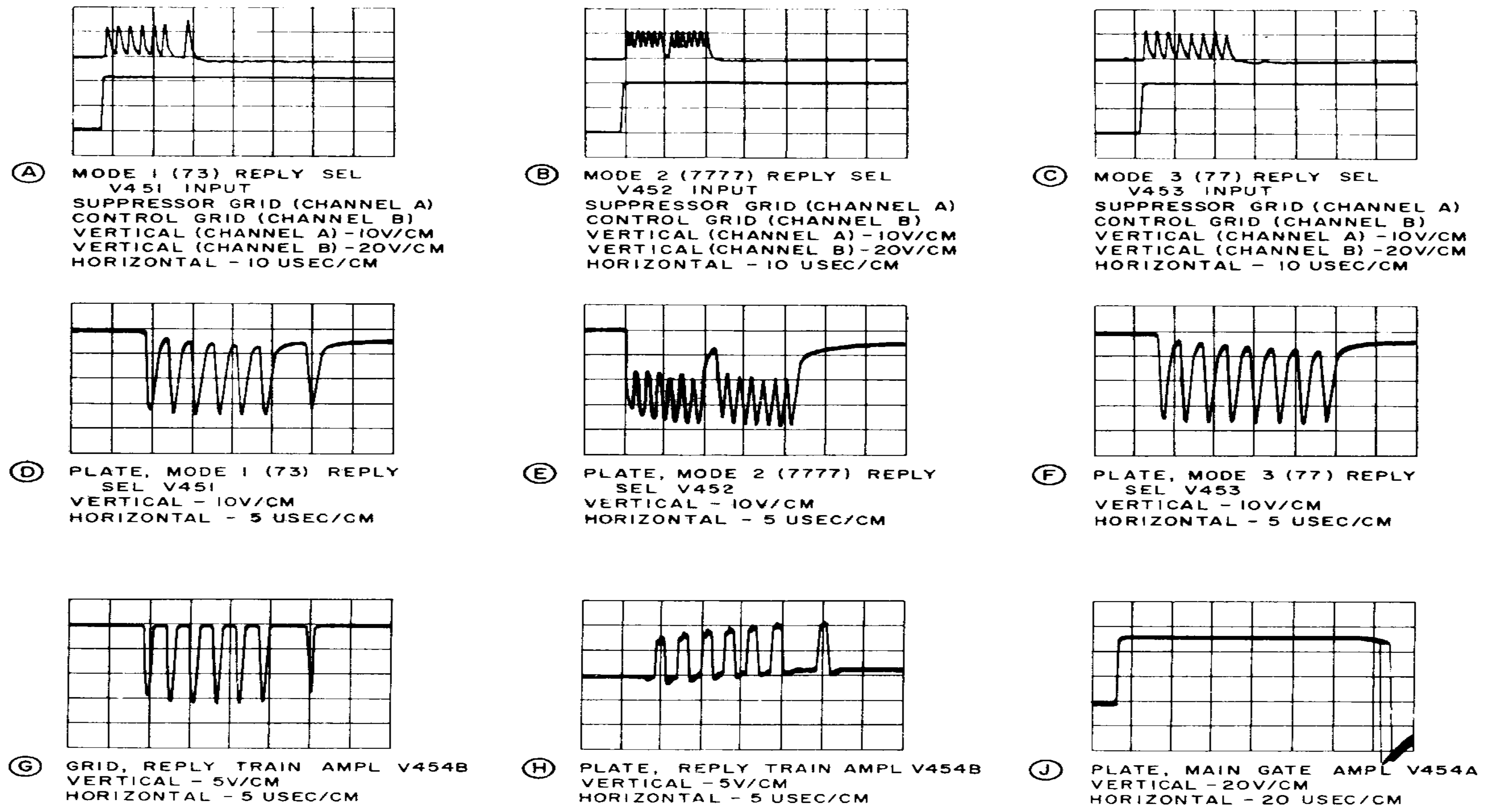


Figure 127. Blocking oscillator and ring around card, schematic and waveform diagram.

Figure 127





NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. WAVEFORM TAKEN BETWEEN POINT INDICATED AND CHASSIS UNLESS OTHERWISE SHOWN.
3. WAVEFORMS TAKEN WITH O DBM SIGNAL INPUT TO ANTENNA, 1,000 PRF AND A MODE I INTERROGATION. XMTR OFF UNLESS OTHERWISE STATED.
4. (130K IN RECEIVER-TRANSMITTERS UP TO SERIAL NUMBER 394) 68K IN NUMBER 395 AND HIGHER.

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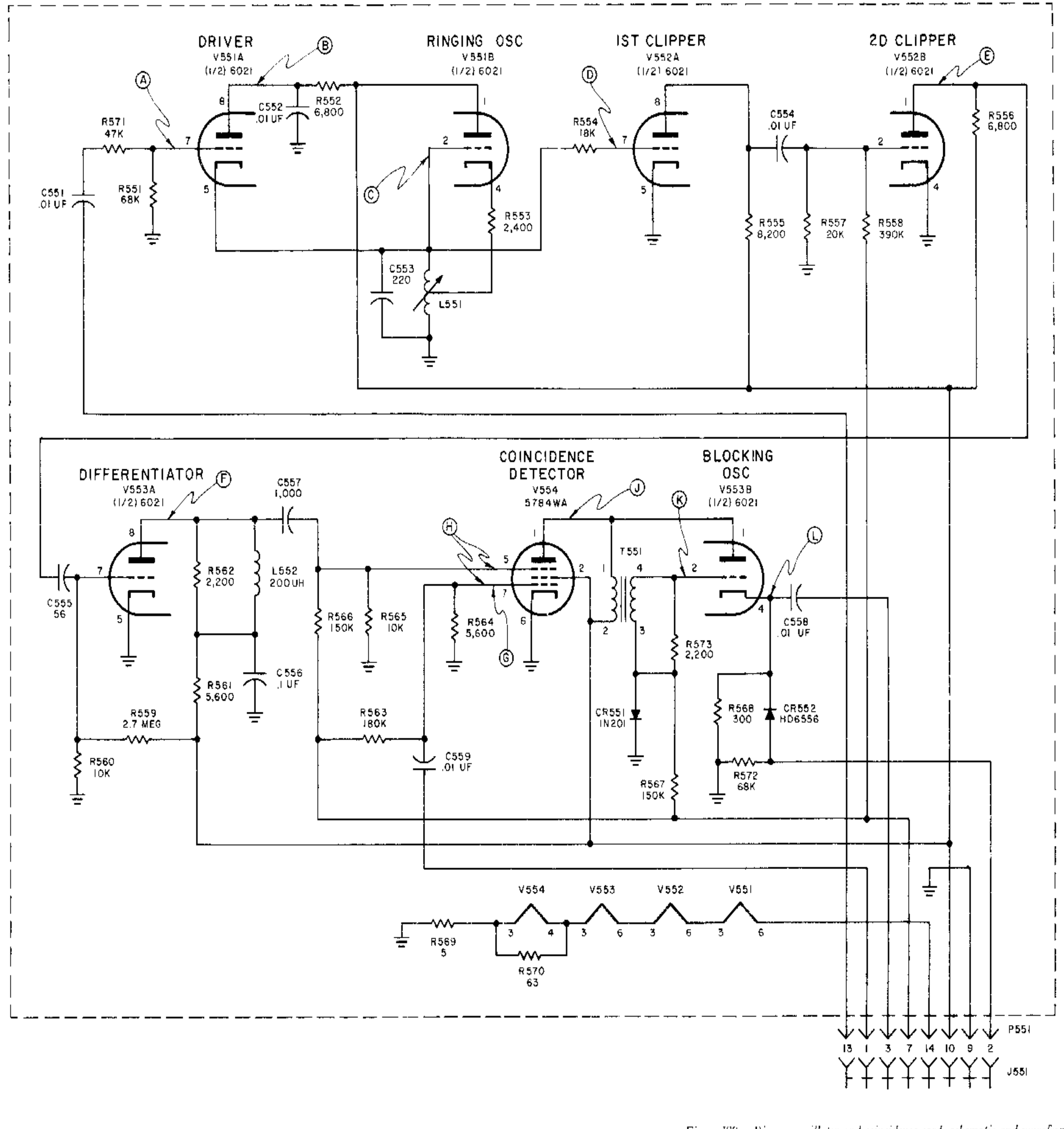
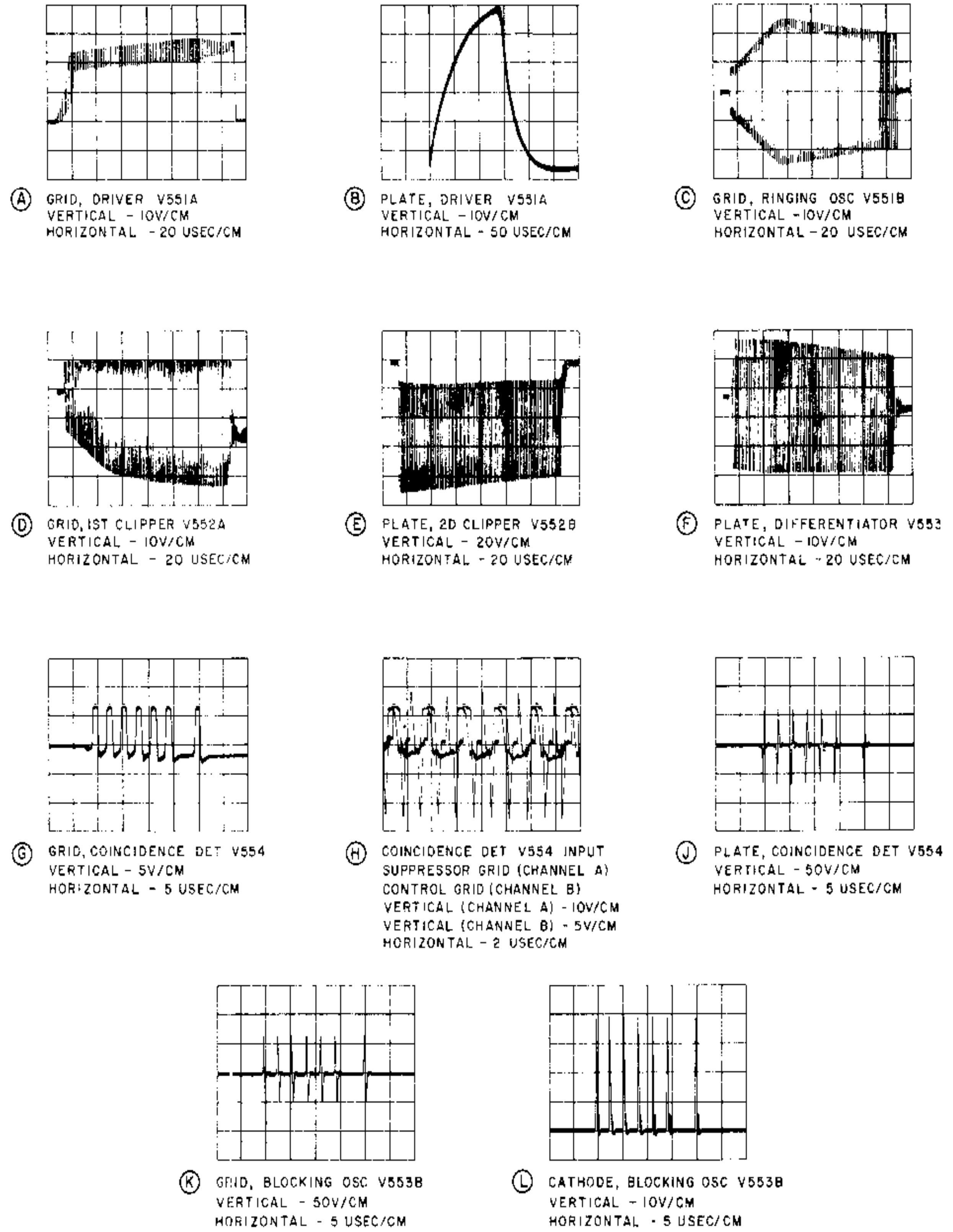
Figure 128. Mode reply selector card, schematic and waveform diagram.

Figure 128





NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. ○⌁ WAVEFORM TAKEN BETWEEN POINT INDICATED AND CHASSIS UNLESS OTHERWISE SHOWN.
3. WAVEFORMS TAKEN WITH 0 DBM SIGNAL INPUT TO ANTENNA, 1,000 PRR AND A MODE I INTERROGATION. XMTR OFF UNLESS OTHERWISE STATED.

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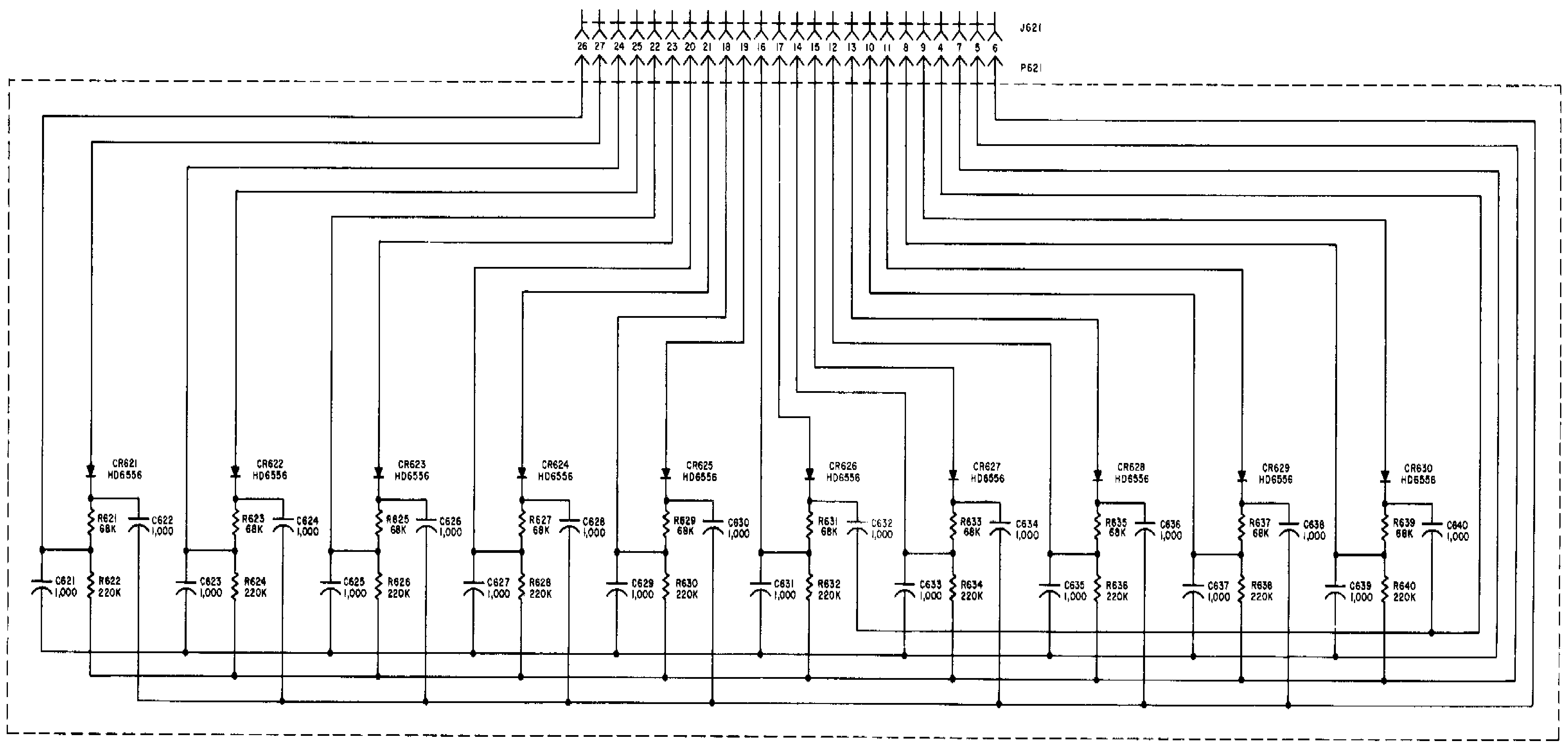
Figure 129. Ringing oscillator and coincidence card, schematic and waveform diagram.

Figure 129



NOTE:

UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.

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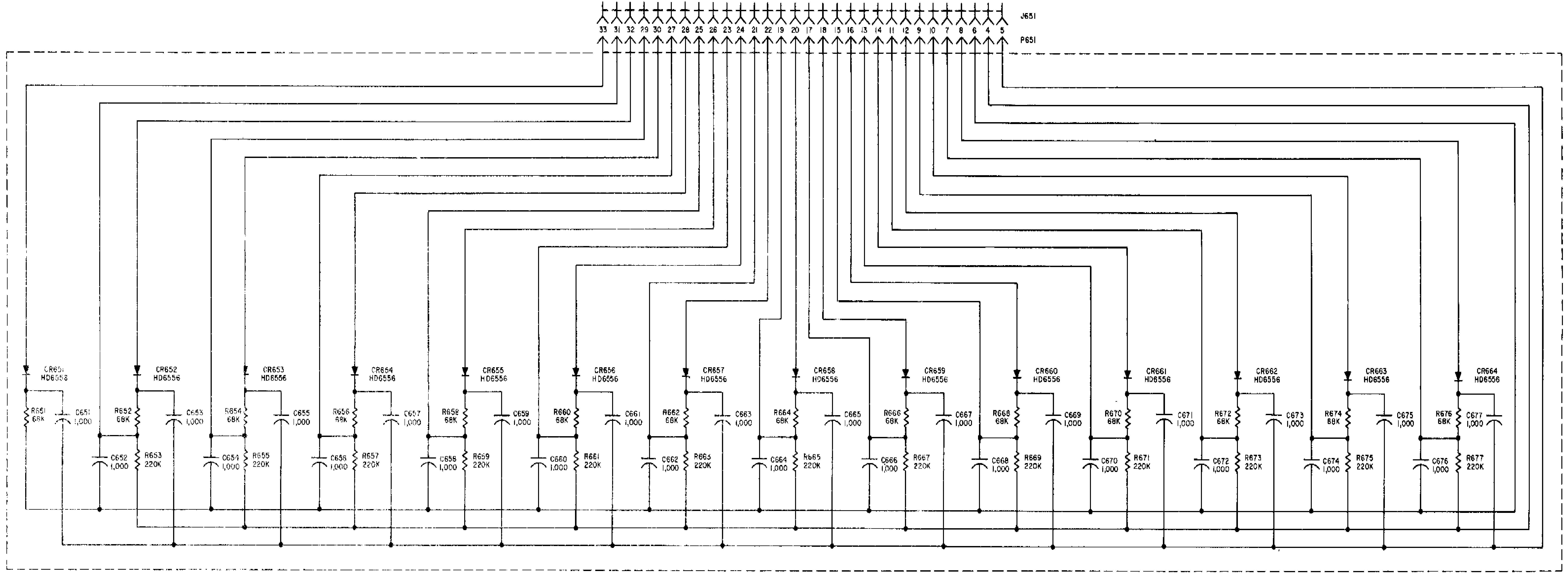
Figure 130. Mode one reply code switching card, schematic diagram.

Figure 130



NOTE:

UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.

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Figure 131. Mode two reply code switching card, schematic diagram.

Figure 131

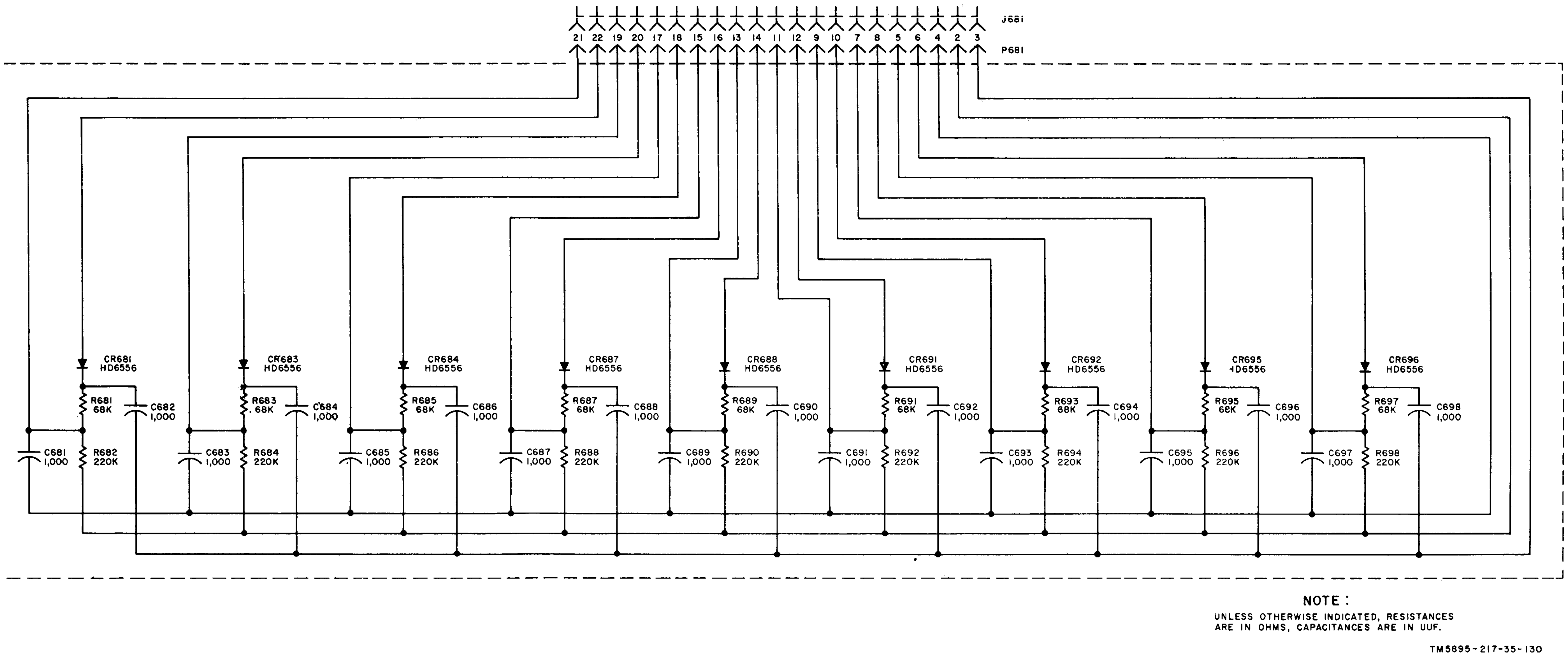
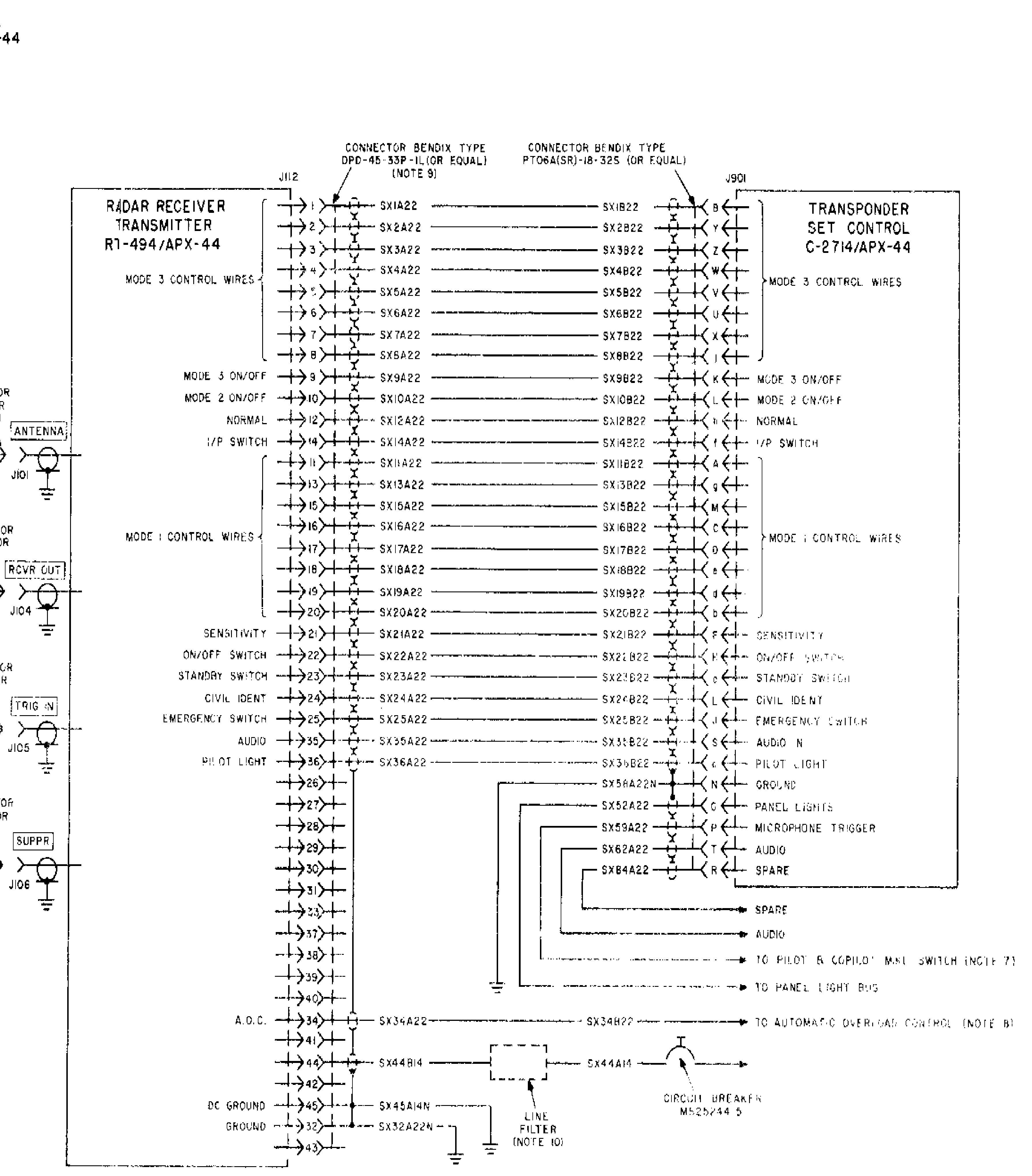


Figure 132. Mode three reply code switching card, schematic diagram.

Figure 132



NOTES:

1. INSTALLATION SHALL BE IN ACCORDANCE WITH SPECIFICATION MIL-W-5088.

2. BLOCK OF NUMBERS ASSIGNED SX-1 THRU SX-99. HIGHEST NUMBER USED SX-85.

3. COAXIAL CABLES SHALL BE IDENTIFIED BY METALLIC BANDS, SLEEVES, OR OTHER SUITABLE MARKINGS, ATTACHED (1) INCH FROM EACH CABLE PLUG AND MARKED EXACTLY AS INDICATED AT THE RESPECTIVE SYMBOLS —▭— THE CHARACTERS SHALL BE LEGIBLE AND OF A PERMANENT NATURE.

4. PROVIDED TO FACILITATE USE OF THIS PORTION OF TRANSPONDER WITH OTHER TYPES OF RELATED EQUIPMENT WITHIN AIRCRAFT WIRING DETAILS DEPENDENT UPON NATURE AND CIRCUITRY OF EXTERNAL EQUIPMENT. CABLES NOT SUPPLIED BY MANUFACTURER.

5. PROVIDED FOR PULSE INPUT FROM PRECISION APPROACH RADAR RECEIVER, INSTALL CABLE WHEN REQUIRED. A .001 UF CAPACITY MUST BE INSERTED IN THE LINE, AT CONNECTION TO P.A.R. RECEIVER. ADJUST P.A.R. TO PRODUCE POSITIVE PULSE OF 30 VOLTS.

6. PROVIDED FOR INPUT OF SUPPRESSION PULSE SOURCE OF ADJACENT EQUIPMENT WHICH INTERFERES WITH TRANSPONDER AND PREVENTS TRUE TRANSPONDER REPLIES (SUCH AS ADJACENT RADAR), ADJUST SUPPRESSION OUTPUT OF INTERFERING EQUIPMENT TO PRODUCE POSITIVE PULSE OF 25 VOLTS. MAY ALSO BE USED TO FEED SUPPRESSION PULSE (+25V) TO ADJACENT EQUIPMENT, WHILE TRANSPONDER IS TRANSMITTING, TO PREVENT TRANSPONDER INTERFERENCE WITH SUCH EQUIPMENT. [illegible]

7. [illegible] AND COPILOT MICROPHONE SWITCH TO GROUND.

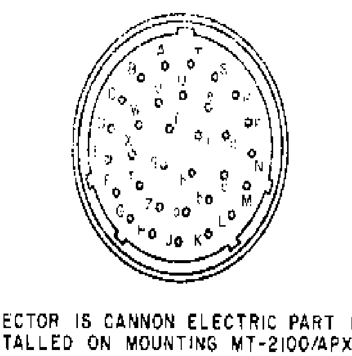
8. PROVIDED TO FACILITATE USE OF TRANSPONDER WITH OTHER TYPES OF EQUIPMENT WITHIN AIRCRAFT WIRING DETAILS DEPENDENT UPON NATURE AND CIRCUITY OF EXTERNAL EQUIPMENT. INSTALL LEAD ONLY WHEN REQUIRED.

9. [illegible] TO BE SECURELY MOUNTED ON MOUNTING MT-2100/APX-44.

10. OPTIONAL ITEM, TO BE USED ONLY WHEN NECESSARY TO REDUCE CONDUCTED RADIATION. SPRAGUE NO. 145399 OR EQUIVALENT. REFER TO SPECIFICATION SCS 58, PARAGRAPH 6.1.2.

11. OPTIONAL ITEM, TO BE USED ONLY WHEN NECESSARY TO REDUCE HARMONIC RADIATION, TELONICS NO. TLP-1115-5N OR EQUIVALENT. REFER TO SPECIFICATION SCS-56, PARAGRAPH 6.1.1.

12. [illegible] BENDIX PART NO. [illegible]-18-32S [illegible] VIEWED FROM MATING SIDE.



13. MATING CONNECTOR IS CANNON ELECTRIC PART NO. DPD-45-33S-IL TO BE INSTALLED ON MOUNTING MT-2100/APX-44 AND VIEWED FROM MATING SIDE AS SHOWN BELOW.

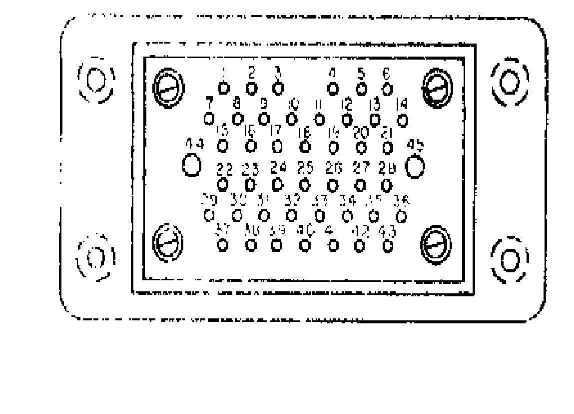


Figure 133. Transponder set AN/APX-44, typical aircraft installation wiring diagram.

Figure 133