

**TECHNICAL MANUAL**

**OPERATOR AND ORGANIZATIONAL  
MAINTENANCE MANUAL  
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS)  
INTERROGATOR SET  
AN/TPX-41**

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

## **WARNING**

### **DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT**

Be careful when working on the 117-volt ac circuits and the 300-volt dc circuit.

### **DON'T TAKE CHANCES!**

### **EXTREMELY DANGEROUS VOLTAGES EXIST IN RECEIVER-TRANSMITTER, RADAR RT-264D/UPX-6**

Voltages as high as 3,500 volts dc are present in this unit.

### **TOXIC FUMES RESULT FROM BURNED SELENIUM RECTIFIERS**

Failure of selenium rectifiers in KY-97C/TPX and RT-264D/UPX-6 can result in liberation of poisonous fumes and deposit of poisonous selenium compounds. If a rectifier burns out or arcs over, the odor is strong. Provide adequate ventilation immediately. Avoid inhaling fumes and do not handle damaged rectifier until it has cooled.

TECHNICAL MANUAL

No. 11-5895-479-12

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 12 August 1971**Operator's and Organizational Maintenance Manual  
(Including Repair Parts and Special Tools Lists)  
INTERROGATOR SET AN/TPX41**

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## CHAPTER 1. INTRODUCTION

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### Section I. GENERAL

#### 1-1. Scope

a. *General.* This manual contains operator and organizational maintenance instructions for Interrogator Set AN/TPX-41 (fig. 1-1). Coverage includes installation, operating, troubleshooting, cleaning, lubricating, and maintenance instructions required by operators and organizational maintenance personnel.

b. *Basic Issue Items List and Maintenance Allocation Chart.* The basic issue items list (BIIL) is not applicable. The maintenance allocation chart (MAC) appears in appendix C.

#### 1-2. Indexes of Publications

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

b. *DA Pam 310-7.* Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO'S) pertaining to the equipment.

#### 1-3. Forms and Records

a. *Reports of Maintenance and Unsatisfactory Equipment.* Maintenance forms, records, and reports

which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750 (Army).

b. *Report of Packaging and Handling Deficiencies.* Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58 and DSAR 4145.8.

c. *Discrepancy in Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38 and DSAR 4500.15.

#### 1-3.1. Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to Publications and Blank Forms, and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-Q Fort Monmouth, NJ 07703.

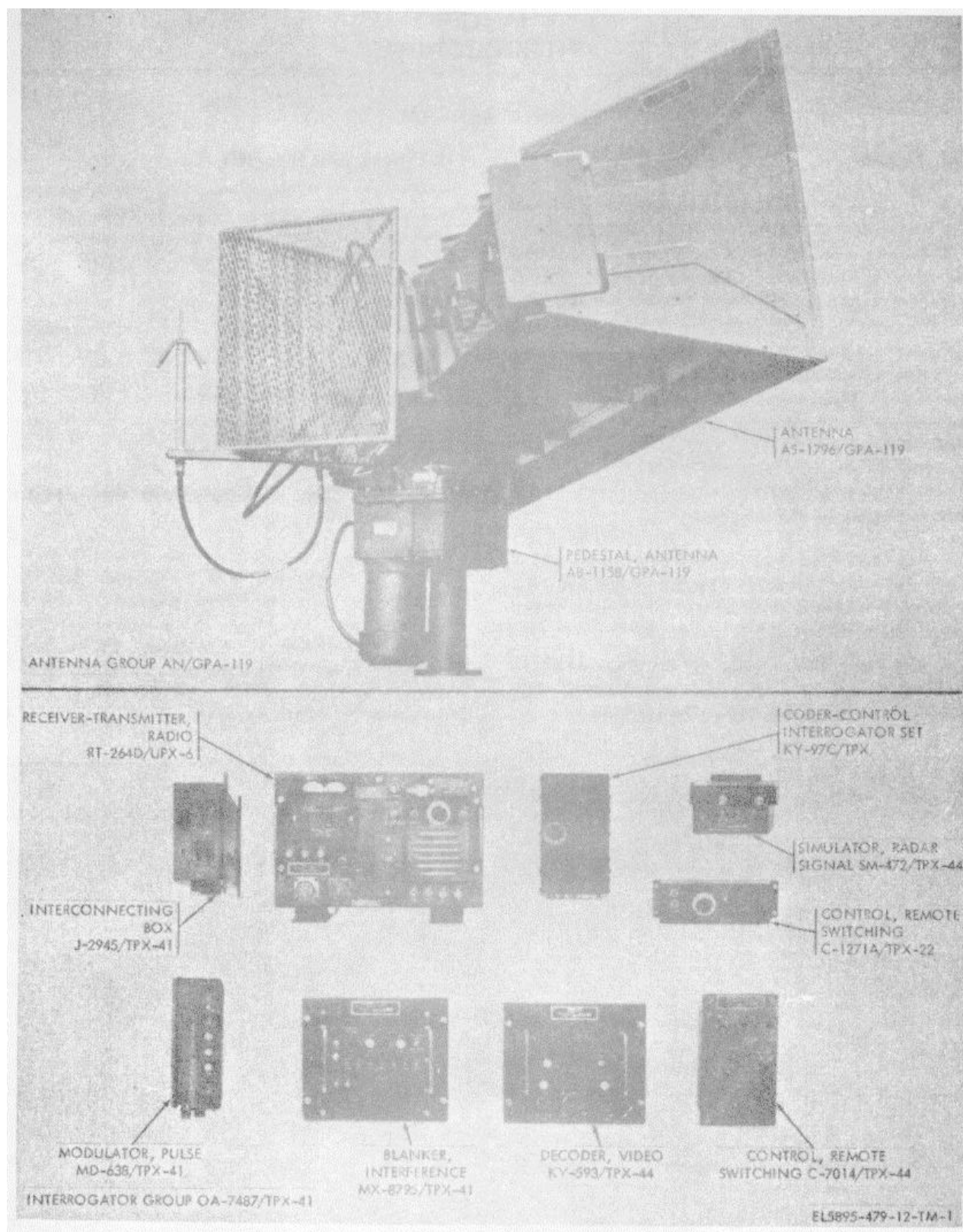


Figure 1-1. Interrogator Set AN/TPX-41.

## Section II. DESCRIPTION AND DATA

### 1-4. Purpose and Use

Interrogator Set AN/TPX-41 is designed for operation with Radar Set AN/FPN-40 to provide high resolution aircraft identification information. Both the AN/TPX-41 and AN/FPN-40 are part of Radar System AN/FSQ-84, which functions as an air traffic control center. When properly installed and operating, the AN/TPX-41 operates as a complete aircraft identification system with both iff (identification friend or foe) and sif (selective identification features) capabilities. The iff capability allows an operator to distinguish between friendly and unfriendly aircraft, while the sif capability permits selective identification of specific friendly aircraft.

### 1-5. System Application

*a. General.* Aircraft identification capabilities of the AN/TPX-41 are directly applicable to the ground station function of the aircraft traffic control system. The following paragraph describes system application of the AN/TPX-41. See figure 1-2.

*b. Application.* During surveillance operation, antenna synchro data from the AN/FPN-40 and the AN/TPX-41 is applied to separate synchronizing circuits in Control Indicator Group OA-2664/FPN-40. This synchro data is translated into antenna position information and displayed on the face of a crt in the form of two separate sweeps, one representing radar antenna position, the other representing iff antenna position. Radar video resulting from aircraft detection is applied to the crt in synchronization with the radar sweep. This results in the presentation of a small blip on the face of the crt which indicates aircraft range and azimuth. Aircraft identification is initiated by the transmission of a coded interrogation signal from the AN/TPX-41. The interrogation code is selected at Control, Remote Switching C-1271A/TPX-22 which is mounted on Control Indicator Group OA-2664/FPN-40. Control, Remote Switching C-1271A/TPX-22 provides code select switching for coding and transmitting circuits in Interrogator Group OA-7487/TPX-41. The coded, high-power interrogation signal, produced in Interrogator Group OA-7487/TPX-41 is applied to Antenna Group AN/GPA-119 for directional beam transmission to airborne transponders. On receipt of the interrogation

signal, the aircraft transponder transmits a predesignated reply code for reception by Antenna Group AN/GPA-119 of the AN/TPX-41. Control, Remote Switching C-7014/TPX-44, which is mounted on Control Indicator Group OA-2664/FPN-40, provides decode select switching to set decoding circuits in Interrogator Group OA-7487/TPX-41. If the aircraft reply code matches this decode setting, the reply is decoded, amplified and applied to Control Indicator Group OA-2664A/FPN-40 as iff/sif decoded video. The decoded video is applied to the crt in synchronization with the iff sweep, which results in an iff presentation on the crt face. This presentation appears directly adjacent to the aircraft radar return, indicating that the aircraft is identified. If no reply is seen from a properly challenged aircraft, the aircraft is reported as unidentified in accordance with local operations procedures.

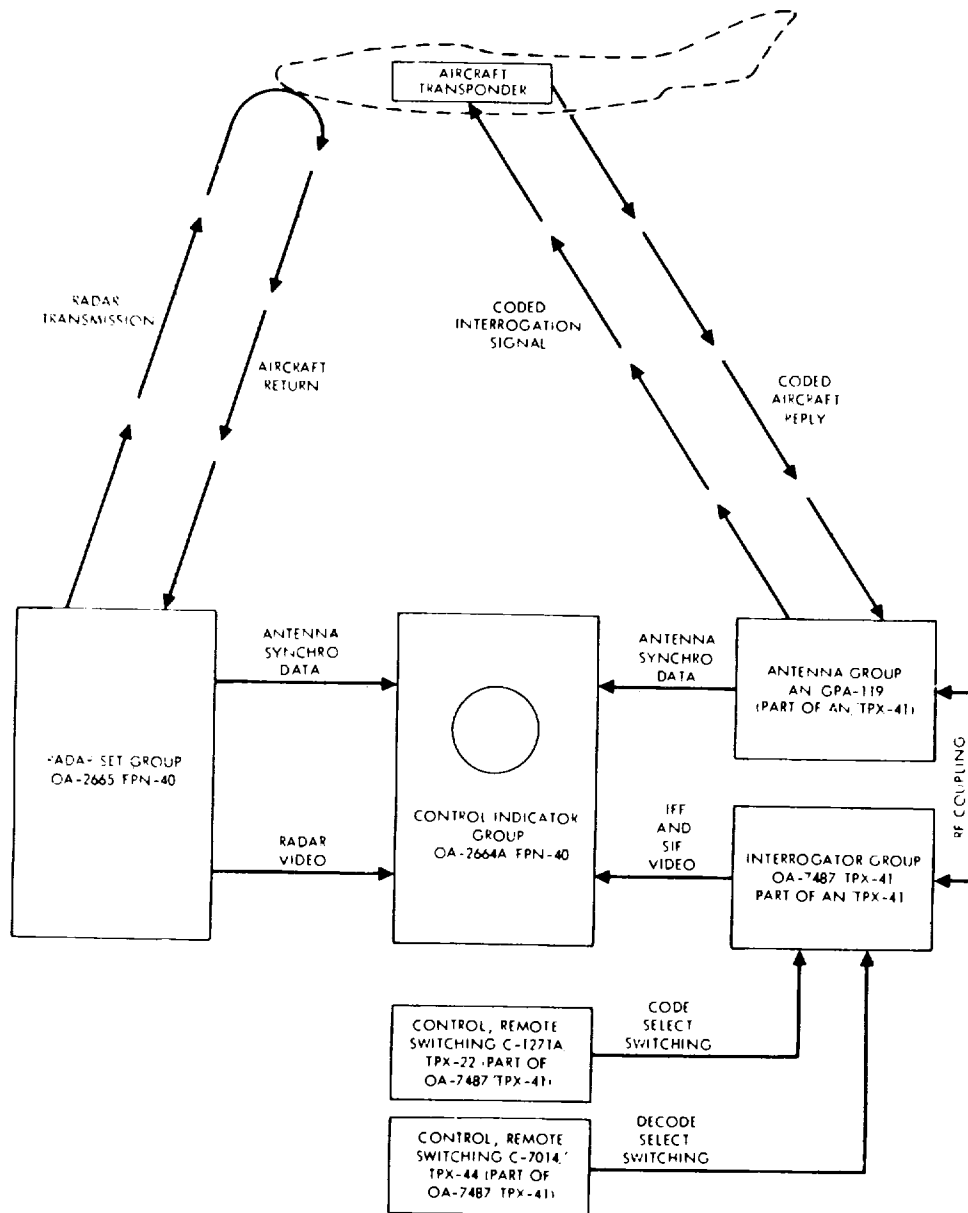
### 1-6. Technical Characteristics

#### *a. General.*

Range .....	200 mi (321.8 km) in this configuration
Challenge modes .....	3
Power requirements:	
Current .....	12 amp max
.....	6 amp nom
Voltage .....	117v $\pm$ 10%
Line frequency .....	50/60 Hz, single-phase

#### *b. Transmitting System.*

Frequency range:	
Capability .....	990 to 1040 MHz
Pretuned .....	1010 to 1030 MHz
Oscillator .....	Crystal-controlled
Type of modulation....	Pulse
Output pulse:	
Duration .....	0.7 to 1.2 $\mu$ sec
Risetime .....	0.2 $\pm$ 0.1 $\mu$ sec
Decay time .....	0.4 $\pm$ 0.2 $\mu$ sec
Rf power output .....	1.5 kw
Output impedance .....	52 ohms



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Figure 1-2. Interrogator Set AN/TPX-41 system application diagram.



**c. Receiving System.**

Frequency Range:	
Capability .....	1080 to 1130 MHz
Pretuned .....	1090 to 1110 MHz
Oscillator .....	Crystal-controlled
Receiver type .....	Superheterodyne
Sensitivity .....	76 db below 1v
Bandwidth:	
Broad .....	8 to 11 MHz
Narrow .....	5 MHz
Intermediate .....	60 MHz
frequency	
RF input impedance .....	52 ohms
Video output .....	75 ohms
impedance	
Video output power .....	0.2w (approx)

**d. Coding System.**

Input impedance .....	75 or 510 ohms
Input pulse width .....	0.3 to 15 $\mu$ sec
Input pulse amplitude .....	+5 to +50v (measured across 75 ohms)
Output trigger voltage .....	+55v (measured across 75 ohms)
Pulse risetime .....	0.1 to 0.5 $\mu$ sec
Self-trigger prf .....	200 pulse-pairs per second
System trigger prf .....	375, 300, 250 pulse-pair per sec.
Trigger delay:	
Out .....	9.5 $\mu$ sec
In .....	12.5 $\pm 0.5$ to 34 $\pm 2$ $\mu$ sec
Modes of interrogation .....	3
Mode 1:	
Number of pulses .....	2
Pulse width .....	0.3 $\mu$ sec (nom)
Pulse spacing .....	3 $\pm 0.2$ $\mu$ sec
Mode 2:	
Number of pulses .....	2
Pulse width .....	0.3 $\mu$ sec (nom)
Pulse spacing .....	5 $\pm 0.2$ $\mu$ sec
Mode 3:	
Number of pulses .....	2
Pulse width .....	0.3 $\mu$ sec (nom)
Pulse spacing .....	8 $\pm 0.2$ $\mu$ sec

**e. Decoding System.**

Video input:	
Pulse type .....	Coded pulse trains
Pulse polarity .....	Positive
Individual pulse .....	5v max; 2v min
amplitude	
Noise .....	0 to 1v rms
Sensitivity .....	2v amplitude (nom)
Overall duration of .....	24.65 $\pm 0.1$ $\mu$ sec
pulse train	
Individual pulse .....	0.45 $\pm 0.1$ $\mu$ sec
width	
Pulse risetime .....	Less than 0.2 $\mu$ sec
Pulse decay time .....	Less than 0.4 $\mu$ sec
Pulse spacing in .....	1.45 $\pm 0.5$ $\mu$ sec
single train	
Interleaved pulse .....	2 nom
trains	
Pulse spacing in .....	0.5 $\mu$ sec min (from trailing edge of one pulse to leading edge of following pulse)
interleaved pulse .....	
trains .....	

Input impedance .....	75 ohms
Video output:	
Pulse type .....	One positive pulse for each correctly coded pulse train Input; two positive pulses for each correctly coded pulse train with identification of position pulse; four positive pulses for each correctly coded emergency signal
Pulse amplitude .....	3v min
Pulse width .....	1.0 $\pm 0.25$ $\mu$ sec
Pulse risetime .....	0.2 $\mu$ sec max
Output impedance .....	75 ohms
Modes of decoding .....	3
Number of codes .....	32 (mode 1); 4096 (modes 2 and 3)
Beacon assist .....	Pulse width increased to 10.0 $\mu$ sec
video output	

**f. Simulating System.**

Trigger input:	
System test .....	Pulse pair (5 $\pm 0.2$ $\mu$ sec inter-pulse spacing)
Receiver test .....	Single pulse
Pulse width .....	0.3 $\mu$ sec (nom)
Input pulse voltage .....	30v min (coding system output)
Input repetition .....	System prf
frequency	
Input impedance .....	1500 ohms min
Trigger delay .....	(range)
Minimum .....	Not more than 120 $\mu$ sec
Maximum .....	Not less than 240 $\mu$ sec
RF output:	
System test .....	Code 7777 rf pulse train
Receiver test .....	Single rf pulse
Oscillator .....	Crystal-controlled
Output frequency .....	1.090 $\pm 3$ MHz
Output pulse:	
Duration .....	0.45 $\mu$ sec (nom)
Spacing .....	1.45 $\pm 0.05$ $\mu$ sec (leading edge to leading edge)
Output impedance .....	50 ohms (nom)

**g. Antenna System.**

Electrical Sum Pattern (1030 MHz):	
Polarization .....	Vertical
Impedance .....	50 ohms input nom
VSWR .....	1.7 max
Gain .....	19 db min
Azimuth beam- .....	8 deg max
width (3 db)	
Side-lobe-level .....	23 db max
Elevation beam- .....	45 deg max
width (3 db)	
Electrical Difference Pattern (1030 MHz) including backfill radiation requirements):	
Polarization .....	Vertical
Impedance .....	50 ohms nom input
VSWR .....	1.7 max

Elevation beam width (3 db) (when referenced from peak of difference lobe)	45 deg max
Null depth at bore-sight with respect to sum pattern main lobe)	25 db min
Difference coverage over sum pattern off boresight except at the null interface region	4 db min

#### *h. ISLS System.*

Input trigger	Pulse-pairs from coding system
Rf input	Output of transmitting system
Modulation pulse output (P2 MOD)	+150v peak min, 0.95 $\pm$ 0.25 $\mu$ sec duration; occurs 2.0 $\pm$ 0.1 $\mu$ sec after first transmitted pulse
Control pulse output	+60 v peak min, 1.45 $\pm$ 0.25 $\mu$ sec duration; terminates 3.0 $\pm$ 0.1 $\mu$ sec after first transmitted pulse; diplexed with rf pulses from transmitting system
RF switch (part of Antenna AS-1796/GPA-119)	
Input	Control pulse diplexed with transmitted rf pulses from MD-638/TPX-41
Output	Rf pulses

#### *i. Defruiting and Timing System.*

Video input.

Pulse type	Pulse train
Pulse polarity	Positive
Individual pulse amplitude	5v (nom)
Sensitivity (for standardized output)	1.5v (peak)
Individual pulse width	0.45 $\pm$ 0.05 $\mu$ sec
Pulse risetime	Less than 0.2 $\mu$ sec
Input impedance	75 ohms
Video output:	
Pulse type	Pulse train
Pulse polarity	Positive
Individual pulse amplitude	3.5v (min)
Pulse width	0.3 to 0.6 $\mu$ sec
Pulse risetime	0.1 $\mu$ sec (max)
Pulse delay	4000, 333.3, 2666.6 $\pm$ 1.0 $\mu$ sec

#### Trigger outputs:

Iff Display Trigger	
Risetime	Less than 0.1 $\mu$ sec
Prf	375, 300, 250 pps
Pulse width	0.4 $\mu$ sec
Amplitude	3.5v
Polarity	Positive
Iff Trigger	
Amplitude	12v
Pulse width	0.5 $\mu$ sec
Prf	375, 300, 250 pps
Risetime	Less than 0.1 $\mu$ sec
Falltime	Less than 0.1 $\mu$ sec
Type signal	Pulse
Polarity	Positive
Delay	Adjustable from 70 to 120 $\mu$ sec

#### 1500 Hz Radar

Sync	
Amplitude	20v peak-to-peak (nom)
Type signal	Sine wave
Polarity	Ac

## 1-7. Items Comprising an Operable Equipment

NSN	Qty	Nomenclature	Dimensions (in.)			Weight (lbs)
			Height	Depth	Width	
5895-00-406-1603		Interrogator Set-AN/TPX-41				
		Consisting of:				
5985-00-909-5350	1	Antenna AS-1796/GPA-119	24	42	119	130
5985-00-413-4415	1	Pedestal, Antenna AB-1158/GPA-119	20-3/4	11-3/8	13-3/4	76
	1	Interrogator Group OA-7487/TPX-41				
5895-00-402-5301	1	Blanker, Interference MX-8795/TPX-41	9-1/4	17-1/8	10-1/2	18
	1	Coder-Control, Interrogator Set KY-97C/TPX	9-1/8	4-7/8	5-1/4	16
	1	Control, Remote Switching C-1271A/TPX-22	3	3	9-3/8	2
	1	Control, Remote Switching C-7014/TPX-44	9-3/4	3-3/4	5-1/2	16
5840-00-944-1203	1	Decoder, Video KY-593/TPX-44	9-1/4	17-1/8	10-1/2	14
5895-00-491-3496	1	Interconnecting Box J-2945/TPX-41	9-3/16	18	3-1/2	12
	1	Modulator, Pulse MD-638/TPX-41	9-1/2	18-1/4	3-7/16	25
5895-00-378-4911	1	Receiver-Transmitter, Radio RT-264D/UPX-6	11	21	15	77
		Consisting of:				
		Wrench Socket Head Screw:				
		Bristol #4 Shortarm				
5120-00-223-6995	1	Wrench Socket Head Screw:				
		Bristol #8 Shortarm				
6625-00-906-3344	1	Simulator, Radar Signal SM-472/TPX-44	4-1/8	4-1/2	6-1/8	4
5995-00-243-3616	1	Cable Assembly, Power Electrical				
		CX-12557/G 8 ft				
5995-00-243-3617	1	Cable Assembly, Power, Electrical				
		CX-12558/G 6 ft				
5995-00-243-3618	1	Cable Assembly, Power, Electrical				
		CX-12559/G 6 ft				
5995-00-470-4333	3	Cable Assembly, Radio Frequency				
		CG-3663/U 7 ft				
5995-00-470-4335	3	Cable Assembly, Radio Frequency				
		CG-3663/U 8 ft				
5995-00-470-4340	1	Cable Assembly, Radio Frequency				
		CG-3665/U 7 ft				
5120-00-223-6995	1	Wrench, Socket Head: Bristol #8 Shortarm				

Change 3 1-6.1

## 1-8. Description of Equipment

*a. Overall Description.* Interrogator Set AN-TPX-41 consists of two major operating assemblies: Interrogator Group OA-7487/TPX-41 and Antenna Group AN/GPA-119. The major components contained in each of these assemblies are illustrated in figure 1-3. Control, Remote Switching C-1271A/TPX-22 and Control, Remote Switching C-7014/TPX-44 are functional parts of Interrogator Group OA-7487/TPX-41 but are physically attached to the side of Control Indicator Group OA-2664A/FPN-40. Decoder, Video KY-593/TPX-44, which is also part of Interrogator Group OA-7487/TPX-41, is mounted in a dust cover and located near Control Indicator Group OA-2664A/FPN-44 at the radar indicator site. All other components of Interrogator Group OA-7487/TPX-41 are housed in an S-70/G shelter at the radar receiver-transmitter site. The components which comprise Antenna Group AN/GPA-119 are mounted on top of the S-70/G shelter that houses the components of Interrogator Group OA-7487/TPX-41. A description of each major component comprising the AN/TPX-41 is contained in the following paragraphs.

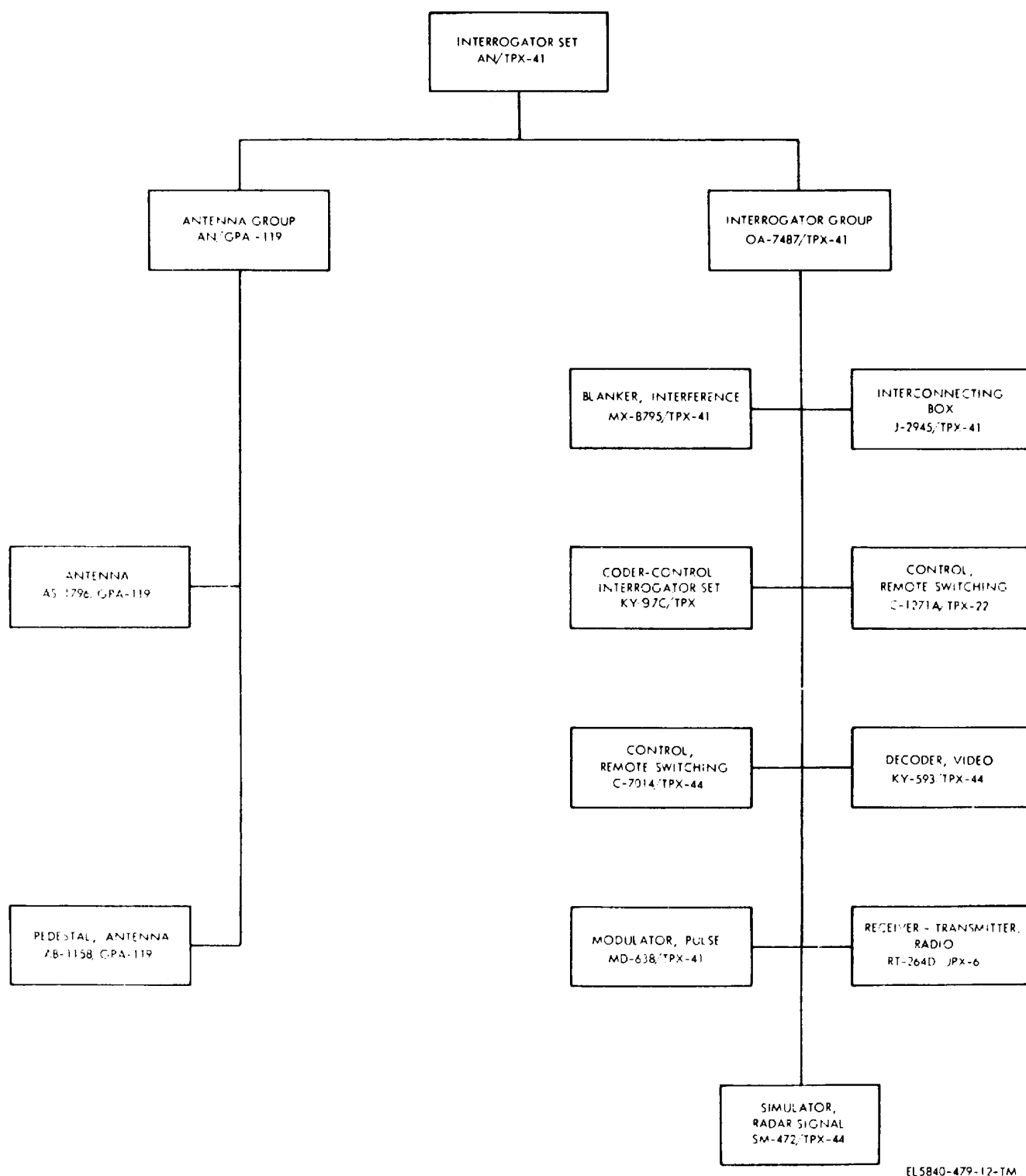
*b. Blanker, Interference MX-8795/TPX-41* (fig. 1-1). Blanker, Interference MX-8795/TPX-41 performs the basic functions of the timing and defruiting systems. The MX-8795/TPX-41 is an open panel-chassis assembly. Most of the circuitry for the MX-8795/TPX-41 is on three pullout circuit cards mounted inside the chassis. Six external connectors, two power supplies, and a three-in-one delay line are mounted on the rear section of the chassis. All operating controls and indicators, eight test points, and two power supply adjustments are located on the front panel. Four captive thumbscrews on the front panel secure the MX-8795/TPX-41 in its mounting position.

*c. Coder-Control, Interrogator Set KY-97C/TPX* (fig. 1-1). Coder-Control, Interrogator Set KY-97C/TPX performs the basic functions of the coding system and provides switching to permit remote code selection at Control, Remote Switching C-1271A/TPX-22. Coder-Control, Interrogator Set KY-97C/TPX is a simple lightweight box structure with removable side panels. A vertical interior chassis provides mounting surfaces for electronic circuitry and special adjustments which control iff presentations on the indicator of the associated radar. All operating controls and indicators are mounted on the front panel. All connectors are mounted on the rear panel. The front panel can be removed and reversed, if necessary, for special installation.

*d. Control, Remote Switching C-1271A/TPX-22* (fig. 1-1). Control, Remote Switching C-1271A/TPX-22 provides switching and control to accomplish coding functions of Coder-Control, Interrogator Set KY-97C/TPX from a remote position. Control, Remote Switching C-1271A/TPX-22 is a simple box structure with remote controls, indicators, and switches located on the front panel. One cable with attached connector and a hard mounted connector are located on the rear panel for interconnection with the KY-97C/TPX.

*e. Receiver-Transmitter, Radio RT-264D/UPX-6* (fig. 1-1). Receiver-Transmitter, Radio RT-264D/UPX-6 contains the circuitry required for the transmission and reception of coded interrogation signals. The RT-264D/UPX-6 consists of a pulse-modulated, 1.5-kw, direct crystal-controlled transmitter that can be varied in frequency from 990 to 1040 MHz, and direct crystal-controlled receiver capable of receiving pulse-modulated signals over a frequency range from 1080 to 1130 MHz. During operation, the unit is duplexed to a common receiving and transmitting antenna. The RT-264D/UPX-6 consists of a lightweight, panel-chassis unit which slides into a rigid, sheetmetal protective dust cover. The panel-chassis unit is secured to the dust cover by four captive screws on the front panel. Five spare fuses and two bristol wrenches (no. 4 and no. 8) are mounted on the top of this chassis. An interlock switch, mounted on the rear of the RT-264D/UPX-6 chassis, cuts off power to the unit when the chassis is removed from its dust cover. Dual-purpose shock mounts are installed on the dust-cover for mounting the RT-264D/UPX-6. The front panel is sealed with a gasket and the air intake is louvered. Nine external cable connectors, controls and indicators, fuses, a power attenuator, and dummy load unit are mounted on the front panel. Provisions for mounting Simulator, Radar Signal SM-472/TPX-44 are provided on the front panel. When the SM-472/TPX-44 is in place, the frequency adjustment shafts and operating crystals are covered.

*f. Modulator, Pulse MD-638/TPX-41* (fig. 1-1). Modulator, Pulse MD-638/TPX-41 provides a third pulse for transmission with the coded interrogation signal from the RT-264D/UPX-6. The addition of this pulse provides interrogation-path, side-lobe suppression (isls) which reduces the effects of false position information when an aircraft is interrogated in the antenna side lobes. The MD-638/TPX-41 consists of a cast aluminum case



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Figure 1-3. Interrogator Set AN/TPX-41, assemblies block diagram

with a removable perforated dust cover, which encloses a removable subassembly, power supply, and diplexer. The front panel of the removable subassembly is used as a mount for controls, indicators, switches, and testpoints of the MD-638/TPX-41. Two press-to-lock fasteners secure this subassembly. Six cable connectors are located on the bottom of the MD-638/TPX-41. Six holes in front and rear case flanges permit mounting of this unit.

*g. Decoder, Video KY-593/TPX-44* (fig. 1-1). Decoder, Video KY-593/TPX-44 performs the basic decoding functions of the system. The KY-593/TPX-44 is an open panel-chassis assembly. Four pullout subassemblies and a pullout delay line are mounted inside the chassis. The external connectors, power switch, fuse, and indicator lamp are mounted on the front panel. Four captive thumbscrews on the front panel secure the KY-593/TPX-44 in its mounting position.

*h. Control, Remote Switching C-7014/TPX-44* (fig. 1-1). Control, Remote Switching C-7014/TPX-44 provides switching and control to set the decoding circuits in the KY-593/TPX-44 from a remote position. The C-7014/TPX-44 is a simple lightweight box structure. Four captive thumbscrews on the front panel secure the C-7014/TPX-44 in its mounting position. All operating controls and indicators are on the front panel. An external cable connector is mounted on the bottom of the assembly.

*i. Simulator, Radar Signal SM-472/TPX-44* (fig. 1-1). Simulator, Radar Signal SM-472/TPX-44 provides test signals for evaluation of the coding, receiving, and decoding systems. The SM-472/TPX-44 consists of a single assembly installed on the front panel of the RT-264D/UPX-6. Because of its small size and light weight, it may remain permanently installed and connected for routine testing without interfering with normal operation of the AN/TPX-41. The main chassis components are mounted on three circuit card subassemblies and a removable 60-MHz modulator assembly. The rear cover is a one-piece, U-shape wraparound shell. On the rear and about halfway up the sides of the main chassis are two metal ears that contain captive thumbscrews. The two captive thumbscrews are used to secure the SM-472/TPX-44 to its mounting bracket. The top of the chassis contains all operating controls and two cable connectors. Two fixed cable assemblies extend from the bottom panel. A removable cover on the bottom and rear contains holes for ventilation during operation.

*j. Interconnecting Box J-2945/TPX-41* (fig. 1-1). Interconnecting Box J-2945/TPX-41 provides interconnection, switching, and distribution of input

power to the major components of the AN/TPX-41. The J-2945/TPX-41 consists of an aluminum box with a removable side panel. The front panel contains a double-pole circuit breaker and two toggle switches. Three cable connectors and a grommated access hole for primary power cables are located on the bottom of the J-2945/TPX-41.

*k. Antenna AS-1796/GPA-119* (fig. 1-1). Antenna AS-1796/GPA-119 provides directional propagation of transmitted interrogation signals from the AN/TPX-41. The AS-1796/GPA-119 consists of a waveguide shunt slot radiator, an aluminum reflector, a radome, a cast aluminum mount, and a waterproof electronic component box with a removable rear panel. Mounted on the rear of the AS-1796/GPA-119 is a backfill dipole antenna and an aluminum mesh backfill reflector.

*l. Pedestal, Antenna AB-1158/GPA-119* (fig. 1-1). Pedestal, Antenna AB-1158/GPA-119 supports and rotates Antenna AS-1796/GPA-119 and provides coupling for transmitted and received iff signals. AB-1158/GPA-119 contains a drive motor with gearing, a synchro, and a dc-conducting rotary joint. The base and frame of the AB-1158/GPA-119 are cast aluminum, all exposed hardware is stainless steel, and all gaskets are specially processed compressed asbestos. The lubricant used in the AB-1158/GPA-119 is a special wide-temperature-range silicon oil.

## 1-9. Description of Minor Components

*a. Transit Cases.* Cases used for storage or transport of the components of the AN/TPX-41 are described in the following paragraphs.

(1) *Receiver-Transmitter Case CY-1324/UPX-6.* The CY-1324/UPX-6 is a watertight case which houses Receiver-Transmitter, Radio RT-764D/UPX-6 during storage or transit. The case is made of metal and plywood, and has removable front and rear covers.

(2) *Electrical Standardized Components Case CY-951/TPX.* The CY-951/TPX is a watertight case with a removable top cover. The interior of the case is divided to provide separate storage for Coder-Control, Interrogator Set KY-97C/TPX and technical manuals or running spares. After installation of the KY-97C/TPX, the entire case may be used for storage of manuals and spares.

*b. Interrogator Group OA-7487/TPX-41, Cables and Connectors.* Cables and connectors used to interconnect components of Interrogator Group OA-7487/TPX-41 are described in the following paragraphs.

(1) *Cable Assembly, Power, Electrical, CX-2478/U (18 ft) (W737).* Power cable W737 is an 18-foot, 3-inch length of 2-conductor cold weather cable with a straight female connector (type AN3106A-14S-9S) on one end and two solder lugs on the other. It is used to connect ac power from the J-2945/TPX-41 to Coder-Control KY-97C/TPX.

(2) *Cable Assembly, Power, Electrical, CX-2403/U (20 ft) (W738).* Power cable W738 is a 20-foot, 3-inch length of 2-conductor cold weather cable with a right-angle female connector (type AN3108B-14S-9S) on one end and two terminal lugs on the other. It is used to connect ac power from the J-2945/TPX-41 to Receiver-Transmitter RT-264D/UPX-6.

(3) *Cable Assembly, Power, Electrical CX-11121/U (10 ft) (W8801).* Power Cable W8801 is a 10-foot, 7-conductor, rubber-insulated cable (CO-10HOE10/160704) with a right-angle male connector (97-3108A24-6P) on one end (with adapters) and a straight female connector (MS3106A24-20S) on the other end. This cable is used to electrically connect KY-97C/TPX to RT-264D/UPX-6.

(4) *Cable Assembly, Radio Frequency CG-3144/U (4 ft 8 in) (W8802).* Rf Cable W8802 is a 4-foot, 8-inch, vinyl-covered, coaxial-type cable (RG-59B/U) with a male connector (MS35170-260D) on each end. This cable is used to connect one receptacle of the T-connector on KY-97C/TPX to the input connector of SM-472/TPX-44.

(5) *Cable Assembly, Radio Frequency CG-409G/U (2 ft) (W8803).* Rf Cable W8803 is a 2-foot, vinyl-covered, coaxial-type cable (RG-58C/U) with a male connector (MS35168-88E) on each end. This cable is used to connect the output connector on SM-472/TPX-44 to the RF PROBE 20 DB MID BAND ATTEN connector on the front panel of RT-264D/UPX-6.

(6) *Cable Assembly, Radio Frequency CG-3144/U (10 ft) (W9002).* Rf Cable W9002 is a 10-foot, vinyl-covered, coaxial-type cable (RG-59B/U) with a male connector (MS35170-260D) on each end. This cable is used to connect one receptacle of the T-connector on KY-97C/TPX to MD-638/TPX-41.

(7) *Cable Assembly, Power, Electrical CX-11119/U (5 ft) (W9005).* Power Cable W9005 is a 5-foot, 2-conductor, rubber-insulated cable (CO-03MOE2/160342) with a straight female connector (MS3106A16S-4S) on one end and two terminal lugs (Amp Inc, pn 31885) on the other end. This cable is used to connect primary power from J-2945/TPX-41 to MD-638/TPX-41.

(8) *Cable Assembly, Power, Electrical CX-12557/G (8 ft) (W9801).* Cable assembly W9801 is an 8-foot, 9-conductor cable with a straight female connector (MS3106F18-1SX) on one end, and a straight female connector (MS3106F28-1S) on the other end. The cable is used to connect power from the J-2945/TPX-41 to Demultiplexer TP-992/G (refer to paragraph 1-10d) at the iff receiver-transmitter site.

(9) *Cable Assembly, Power, Electrical CX-12558/G (6 ft) (W9802).* Cable assembly W9802 is a 6-foot, 5-conductor cable with a straight male connector (MS3106-F22-23P) on one end, and a straight female connector (MS3106F16S-8S) on the other end. This cable is used to connect power from the J-2945/TPX-41 to the MX-8795/TPX-41.

(10) *Cable Assembly, Radio Frequency CG-3663/U (8 ft) (W9803).* Cable assembly W9803 is an 8-foot coaxial-type rf cable (RG59B/U) with a straight male connector (M39012/16-0002) on each end. This cable is used to connect raw iff video from the RT-264D/UPX-6 to the MX-8795/TPX-41.

(11) *Cable Assembly, Radio Frequency CG-3663/U (7 ft) (W9804).* Cable assembly W9804 is a 7-foot coaxial-type rf (RG59B/U) cable with a straight male connector (M39012/16-0002) on each end. This cable is used to connect the iff pretrigger from the MX-8795/TPX-41 to the KY-97C/TPX.

(12) *Cable Assembly, Radio Frequency, CG-3663/U (7 ft) (W9805).* Cable assembly W9805 is a 7-foot coaxial-type rf (RG59B/U) cable with a straight male connector (M39012/16-0002) on each end. This cable is used to connect iff video from the MX-8795/TPX-41 to Demultiplexer TD-992/G (refer to paragraph 1-10d).

(13) *Cable Assembly, Radio Frequency CG-3663/U (7 ft) (W9806)*. Cable assembly W9806 is a 7-foot, coaxial-type rf cable (RG59 B/U) with a straight male connector (M39012/16-0002) on each end. This cable is used to connect an iff display trigger from the MX-8795/TPX-41 to Demultiplexer TD-992/G (refer to paragraph 1-10d).

(14) *Cable Assembly, Power, Electrical CX-12559/U (6 ft) (W9807)*. Cable assembly W9807 is a 6-foot, 10-conductor cable with a straight male connector (MS3106F18-1P) on one end, and a straight female connector (MS3106F18-1S) on the other end. This cable is used to connect coding control signals to the KY-97C/TPX from Demultiplexer TD-992/G (refer to paragraph 1-10d).

(15) *Cable Assembly, Radio Frequency CG-3663/U (8 ft) (W9808)*. Cable assembly W9808 is a 8-foot, coaxial-type, rf cable (RG59B/U) with a straight male connector (M39012/16-0002) on each end. This cable is used to connect the coded interrogation pulse pair from the RT-264D/UPX-6 to the MD-638/TPX-41.

(16) *Cable Assembly, Radio Frequency CG-3663/U (8 ft) (W9809)*. Cable assembly W9809 is a 8-foot, coaxial-type, rf cable (RG59B/U) with a straight male connector (M39012/16-0002) on each end. This cable is used to connect a pulse from the MD-638/TPX-41 to the modulator of the RT-264D/UPX-6.

(17) *Cable Assembly, Radio Frequency CG-3665/U (7 ft) (W9810)*. Cable assembly W9810 is a 7-foot, coaxial-type, rf cable with a right-angle male connector (19518) on one end, and a straight male connector (M39012/01-0005) on the other end. This cable is used to connect an rf signal from the RT-264D/UPX-6 to the MD-638/TPX-41.

c. *Antenna Group AN/GPA-119, Cables and Connectors*. Cables and connectors used to interconnect components of Antenna Group AN/GPA-119 are described in the following paragraphs.

(1) *Cable Assembly, Radio Frequency CG-2338/U (4 ft 6½ in) (W100-1 and W1001-2)*. Cable assemblies W1001-1 and W1001-2 are 4-foot, 6½-inch vinyl-covered, coaxial-type cables (RG-214/U) with a straight female connector (UG-1185A/U) on one end and a right-angle male connector (UG-594A/U) on the other end. These cables are of critical electrical length and are used to connect the iff antenna to the hybrid coupler. CG-2338/U (4 ft 6½ in.) must be replaced in matched pairs.

(2) *Cable Assembly, W1003*. Cable assembly W1003 is a vinyl-covered, coaxial-type cable (RG-214/U) with a right-angle male connector (UG-594A/U) on one end, and a straight female connector (UG-1185A/U) on the other end. This cable is used to connect the directional coupler to the dipole antenna.

(3) *Cable Assembly, Radio Frequency CG-2293/U (3 ft) (W1004)*. Cable assembly W1004 is a vinyl-covered, coaxial-type cable (RG-214/U) with a right-angle male connector (UG-594A/U) on each end. This cable is used to connect the rf switch to the hybrid coupler.

(4) *Cable Assembly, Radio Frequency CG-2338/U (2 ft) (W1005)*. Cable assembly W1005 is a vinyl-covered, coaxial-type cable (RG-214/U) with a straight female connector (UG-1185A/U) on each end. This cable is used to connect the hybrid coupler to the directional coupler.

(5) *Cable Assembly, Radio Frequency CG-2338/U (3 ft) (W1006)*. Cable assembly W1006 is a vinyl-covered, coaxial-type cable (RG-214/U) with a straight female connector (UG-1185A/U) on each end. This cable is used to connect the rf switch to the directional coupler.

(6) *Cable Assembly, W20001*. Cable assembly W20001 is a 2-foot 1-inch, vinyl-covered, coaxial-type cable (RG-214/U) with a straight connector (M39012/01-0005) on one end, and a straight connector (39012/02-0002) on the other end. This cable is used to couple rf signals to and from the rotary joint in the antenna pedestal.

(7) *Cable Assembly, W21001*. Cable assembly W21001 is a 1-foot 8-inch, coaxial-type cable with a straight female connector (UG1185A/U) on one end, and a straight male connector (M39012/02-0002) on the other end. This cable provides rf coupling between Antenna AS-1796/GPA-119 and the rotary joint on Pedestal, Antenna AB-1158/GPA-119.

## 1-10. Additional Equipment Required

a. *Radar Set AN/FPN-40*. The AN/FPN-40 operates in conjunction with the AN/TPX-41 and provides an indicator system for mixed presentation of iff information and accompanying radar returns.



b. *Video Amplifier AM-1578/FPN-33.* The AM-1578/FPN-33 provides line amplification and separation of iff video, radar video, and trigger signals from the AN/TPX-41 and the AN/FPN-40. The combined video and trigger signals are separated and then amplified in the AM-1578/FPN-33 to eliminate the effects of line losses and distortion which results from transmission over extended cable lengths. After amplification, the signals are distributed to the appropriate components of the AN/TPX-41 and AN/FPN-40.

c. *Multiplexer TD-991/G.* The TD-991/G accepts and transmits iff and radar control data from components of the AN/TPX-41 and the AN/FPN-40 which are located at the indicator site. This data is transmitted over a minimum number of conductors to Demultiplexer TD-992/G at the receiver-transmitter site. Multiplexer TD-991/G also receives incoming radar and iff video and triggers for processing and distribution to the appropriate indicator site components.

d. *Demultiplexer TD-992/G.* The TD-992/G accepts, separates, and distributes incoming iff and radar control data for application to the appropriate components at the receiver-transmitter site. Demultiplexer TD-992/G also combines iff and radar video for transmission to the indicator site.

e. *S-70/G Shelter.* The S-70/G shelter provides all-weather protection for the components of Interrogator Group OA-7487 which are located at the receiver-transmitter site.

f. *Shelter Cabling.* The cables within the S-70/G shelter are furnished as part of Radar System AN/FSQ-84 and are normally preinstalled in the shelter. These cables provide the necessary interconnections between the equipment located in the S-70/G shelter and other components of Radar System AN/FSQ-84. Shelter cables that connect directly to components of the AN/TPX-41 include cable assembly W9208, cable assembly W9209, and cable assembly W9210. Shelter cabling is described in paragraphs (1) through (10) below. Instructions for connecting cable assemblies W9208, W9209 and W9210 are given in paragraphs 2-8b (21) through (23). For instructions covering the connection of those shelter cables that do not connect to components of the AN/TPX-41, refer to TM-11-5840-345-20.

(1) *Cable Assembly, W9201.* Cable

assembly W9201 is a 48-conductor cable with a straight male connector (MS3102R36-10P) on one end and a straight female connector (MS3106F36-10S) on the other end. The cable is connected between Demultiplexer TD-992/G and external cable W.

(2) *Cable Assembly, W9202.* Cable assembly W9202 is a 48-conductor cable with a straight male connector (MS3102R36-10PX) on one end and a straight female connector (MS3106F36-10SY) on the other end. The cable is connected between Demultiplexer TD-992/G and external cable W9401.

(3) *Cable Assembly, W9203.* Cable assembly W9203 is a coaxial-type cable (RG59B/U) with a straight female connector (19516) on one end and a straight male connector (MS39012/16-0002) on the other end. The cable is connected between Demultiplexer TD-992/G and external cable W9402.

(4) *Cable Assembly, W9204.* Cable assembly W9204 is a coaxial-type cable (RG59B/U) with a straight female connector (19517) on one end and a straight male connector (MS39015/16-0002) on the other end. The cable is connected between Demultiplexer TD-992/G and external cable W94

(5) *Cable Assembly, W9205.* Cable assembly W9205 is a coaxial-type cable (RG59B/U) with a straight female connector (19516) on one end and a straight male connector (MS39012/16-0002) on the other end. The cable is connected between Demultiplexer TD-992/G and external cable W9403.

(6) *Cable Assembly, W9206.* Cable assembly W9206 is a coaxial-type cable (RG59B/U) with a straight female connector (19516) on one end and a straight male connector (MS39012/16-0002) on the other end. The cable is connected between Demultiplexer TD-992/G and external cable W9404.

(7) *Cable Assembly, W9207.* Cable assembly W9207 is a 14-conductor cable with a straight female connector (MS3102R22-19S) on one end and a straight male connector (MS3106F22-19P) on the other end. The cable is connected between Demultiplexer TD-992/G and external cable W9406.

(8) *Cable Assembly, W9208.* Cable assembly W9208 is a coaxial-type cable (RG59B/U) with a straight female connector (8514) on one end and a

straight male connector (M39012/16-0002) on the other end. The cable is connected between Blanker, Interference MX-8795/TPX-41 and external cable W9405.

(9) *Cable Assembly, W9209.* Cable assembly W9209 is a coaxial-type cable (RG214/U) with a straight female connector (M39012/03-0002) on one end and a straight male connector (UG1213/U) on the other end. The cable is connected between Modulator, Pulse MD-638/TPX-41 and external cable W9407.

(10) *Cable Assembly, W9210.* Cable assembly W9210 is a 3-conductor cable with a straight female connector (MS3106F22-9S) on one end and 3 terminal lugs on the other end. The 3 terminal lugs connect to terminals on terminal board TB1002 in the shelter power junction box and the female connector connects to Interconnecting Box J-2945/TPX-41.

*g. Indicator Site Cabling.* The cables at the indicator site that are used to connect components of the AN/TPX-41 to other components of Radar System AN/FSQ-84 are furnished as part of the landing control central. Indicator site cables that connect directly to components of the AN/TPX-41 include cable assemblies W9602, W9603, W9605, W9608 and W9609. Instructions covering installation of these cables are given in paragraphs 2-8*b* (24) through (28). For instructions covering installation of those indicator site cables that do not connect directly to components of the AN/TPX-41, refer to TM 11-5840-345-20. Indicator site cables are described in paragraphs (1) through (9) below.

(1) *Cable Assembly, Special Purpose, Electrical CX-12560/G (30 ft) (W9601).* Cable assembly W9601 is a 30-foot, 48-conductor cable with a female connector (MS3106F36-10SW) on one end and a female connector (MS3106F36-10S) on the other end. The cable is connected between Multiplexer TD-991/G and Control Indicator Group OA-2264/FPN-40.

(2) *Cable Assembly, Power, Electrical CX-12561/G (30 ft) (W9602).* Cable assembly W9602 is a 30-foot, 26-conductor, sleeved cable, with individual shielding for each wire. A right angle female connector (MS3108R-28-12S) is on one end and a straight male connector (MS3106E-28-12P) is on the other end. The cable is connected between the C-7014/TPX-44 and the KY-593/TPX-44.

(3) *Cable Assembly, Power, Electrical CX-12562/G (30 ft) (W9603).* Cable assembly W9603 is a 30-foot, 10-conductor, sleeved cable with a right angle female connector (MS53108R18-1S) on one end, and a straight male connector (MS3106F18-1P) on the other end. This cable is connected between the C1271A/TPX-22 and Multiplexer TD-991/G.

(4) *Cable Assembly, Power, Electrical CX-12563/G (30 ft) (W9604).* Cable assembly W9604 is a 30-foot, 8-conductor, sleeved cable with a straight female connector (10-107618-8S) on one end and a straight male connector (MS3106F22-23P) on the other end. The cable is connected between Multiplexer TD-991/G and Control-Indicator Group OA-2264/FPN-40.

(5) *Cable Assembly, Power, Electrical CX-12564/G (30 ft) (W9605).* Cable assembly W9605 is a 30-foot, 3-conductor, sleeved cable with a straight male connector (MS3106-F14S-7P) on one end, and a right-angle female connector (MS3108R14S-7S) on the other end. The cable is connected between the C-1271A/TPX-22 and the KY-593/TPX-44.

(6) *Cable Assembly, Radio Frequency CG-3664/U (30 ft) (W9606).* Cable assembly W9606 is a 30-foot, coaxial-type cable (RG59B/U) with a straight male connector (M39012/15-0001) on one end and a straight male connector (M39012/16-0002) on the other end. The cable is connected between Multiplexer TD-991/G and Control Indicator Group OA-2264/FPN-40.

(7) *Cable Assembly, Radio Frequency CG-3664/U (10 ft) (W9607).* Cable assembly W9607 is a 10-foot, coaxial-type cable (RG59B/U) with a straight male connector (M39012/15-0001), on one end and a straight male connector (M39012/16-0002) on the other end. The cable is connected between Multiplexer TD-991/G and Video Amplifier AM-1578/FPN-33.

(8) *Cable Assembly, Radio Frequency CG-3664/U (10 ft) (W9608).* Cable assembly W9608 is a 10-foot, coaxial-type cable (RG59B/U) with a straight male connector (M39012/15-0001) on one end and a straight male connector (M39012/16-0002) on the other end. The cable is used to connect iff video from the AM-1578/FPN-33 to the KY-593/TPX-44.

(9) *Cable Assembly, Radio Frequency CG-3664/U (30 ft) (W9609)*. Cable assembly W9609 is a 30-foot, coaxial-type cable (RG59B/U) with a straight male connector (M39012/15-0001) on one end, and a straight male connector (M39012/16-0002) on the other end. The cable is used to connect iff decoded video from the KY-593/TPX-44 direct to the OA-2664/FPN-40.

*h. External Cabling.* Cables that provide external interconnection of the indicator site, S-70/G shelter (receiver-transmitter site), Antenna Group AN/GPA-119, Receiver-Transmitter Group OA-2667/FPN-40, and associated power distribution equipment are furnished as part of Radar System AN/FSQ-84. External cables that connect directly to components of the AN/TPX-41 include cable assemblies W9406 and W9407. Instructions covering installation of these cables are given in paragraphs 2-11a and b. For instructions covering installation of those cables that do not connect directly to components of the AN/TPX-41, refer to TM 11-5840-345-20. External cables are described in paragraphs (1) through (9) below.

(1) *Cable Assembly, Special Purpose Electrical CX-12565/G (50 ft) (W9401)*. Cable assembly W9401 is a 50-foot, 48-conductor cable with a straight male connector (G0886) on one end and a straight male connector (G0886X) on the other end. The cable is connected between Receiver-Transmitter Group OA-2667/FPN-40 and shelter cable W9202.

(2) *Cable Assembly, Radio Frequency CG-3666/U (50 ft) (W9402)*. Cable assembly W9402 is a 50-foot, coaxial-type cable (RG216/U) with a straight male connector (M39012/01-0005) on one end and a straight male connector (M39012/06-0002) on the other end. The cable is connected between Receiver-Transmitter Group OA-2667/FPN-40 and shelter cable W9203.

(3) *Cable Assembly, Radio Frequency CG-3667/U (50 ft) (W9403)*. Cable assembly W9403 is a 50-foot, coaxial-type cable (RG216/U) with a straight male connector (M39012/01-0005) on each end. The cable is connected between Receiver-Transmitter Group OA-2667/FPN-40 and shelter cable W9205.

(4) *Cable Assembly, Radio Frequency CG-3666/U (50 ft) (W9404)*. Cable assembly W9404 is a 50-foot, coaxial-type cable (RG216/U) with a straight male connector (M39012/01-0005) on one end and a straight male connector (M39012/06-0002) on the other end. The cable is connected between Receiver-Transmitter Group OA-2667/FPN-40 and shelter cable W9206.

(5) *Cable Assembly, Radio Frequency CG-3667/U (50 ft) (W9405)*. Cable assembly W9405 is a 50-foot, coaxial-type cable (RG216/U) with a straight male connector (M39012/01-0005) on each end. The cable is connected between Receiver-Transmitter Group OA-2667/FPN-40 and shelter cable W9208.

(6) *Cable Assembly, W9406*. Cable assembly W9406 is a 14-conductor cable with a right-angle female connector (MS3108R22-19S) on one end and a straight male connector (MS3106F22-19P) on the other end. The cable connects between Antenna Group AN/GPA-119 and shelter cable W9207.

(7) *Cable Assembly, W9407*. Cable assembly W9407 is a coaxial-type cable (RG214/U) with a straight male connector (M39012/01-0005) on each end. The cable is connected between Antenna Group AN/GPA-119 and shelter cable W9209.

(8) *Cable Assembly, Power Electrical CX-12566/G (50 ft) (W9408)*. Cable assembly W9408 is a 50-foot, 2-conductor cable with a straight female connector (G0930S) on one end and a straight male connector (G0930P) on the other end. The cable connects between the shelter power junction box and the external power interconnecting box.

(9) *Cable Assembly, Power Electrical CX-12567/G (10 ft) (W9409)*. Cable assembly W9409 is a 10-foot, 4-conductor cable with a straight female connector (G0935S) on one end and a straight male connector (G0935P) on the other end. The cable is connected between Receiver-Transmitter Group OA-2667/FPN-40 and the external power interconnecting box.

### 1-11. Differences in Equipment

a. When the AN, TPX-41 is deployed for training in the Air Traffic Control Radar Beacon System (ATCRBS) located within CONUS, and within some overseas areas where it has been determined that the level of the interrogator set power is a contributing cause of interference in the ATCRBS, the AN/TPX-41 rf power output is reduced 12 db from 1.5 kw minimum to 94 watts minimum. Power reduction is accomplished by the insertion of POWER ATTENUATOR AND DUMMY LOAD (Z501) (fig. 3-8) between ANTENNA jack J212 on the RT-264D/UPX-6 (receiver-transmitter) and connector P212 on cable assembly W9810 that otherwise connects directly to J212 (fig. 2-10 (1)). Additionally the insertion of the attenuator reduces the strength of the signal applied to the receiver. To compensate for the reduced received signal, GTC shorting link 0-109 is inserted between J11 and J112 (fig. 5-2).

b. When not in use, power attenuator Z501 is connected to dummy load Z502, and the combination power attenuator and dummy load is attached to the front panel of the receiver-transmitter at the upper right corner (fig. 3-8). When not in use, GTC shorting link 0-109 is stored at the upper left corner of the top of the receiver transmitter (top view, fig. 5-2).

c. When the power attenuator is in use, the attenuator connector(J501) fits inside the receiver-transmitter front well; when in storage, it is connected to ANTENNA jack J212, and the attenuator connector

(J502) that otherwise mates with the dummy load is attached to cable assembly W9810. The dummy load is left dangling at the end of the chain that attaches it to the attenuator.

d. When the GTC shorting link is inserted between J111 and J112, the switches and adjustments listed below have no effect on the output of the GTC and gate circuits, and the receiver sensitivity.

- (1) GTC switches (3) (fig. 3-3, 3-4, and 3-8)
- (2) LONG GATE DURATION control R125 (fig. 2-14).
- (3) SHORT GATE DURATION control R160.
- (4) LONG GTC DURATION control R158.
- (5) SHORT GTC DURATION control R157.
- (6) LONG GTC AMPLITUDE control R155.
- (7) SHORT GTC AMPLITUDE control R144.

## CHAPTER 2 INSTALLATION

### Section I. SERVICE UPON RECEIPT OF EQUIPMENT

#### 2-1. Unpacking

*a. Packaging Data.* When packed for shipment, the components of the AN/TPX-41 are packed in water-resistant corrugated fiberboard cartons with all seams and joints sealed with water-resistant, pressure-sensitive tape. The components of the AN/TPX-41 are further

protected by being packed in wooden boxes. A typical shipping box and its contents are shown in figure 2-1. Boxes, box numbers, and contents of boxes, based on original shipment for use with Radar System AN/FSQ-84 are listed in the following chart.

<b>Box No.</b>	<b>Dimensions (in.)</b>	<b>Volume (cu ft)</b>	<b>Unit weight (lb)</b>	<b>Contents of box</b>
1 of 5	25 x 16 x 16	3.7	65	Interconnecting Box J-2945/TPX-41 Control, Remote switching C-1271A/TPX-22 Coder-Control Interrogator Set Ky-97C/TPX Receiver-Transmitter, Radio RT-264D/UPX-6 Modulator, Pulse MD-638/TPX-41
2 of 5	28 x 26 x 19	8	148	Control, Remote Switching C-7014/TPX-44 Simulator, Radar Signal SM-472/TPX-44 Decoder, Video KY-593/TPX-44
3 of 5	25 x 26 x 26	11	179	Blanker, Interference MX-8795/TPX-41 Interrogator Group OA-7487/TPX-41, interconnecting cables (para 1-9b)
4 of 5	30 x 18 x 19	6.1	170	Pedestal, Antenna AB-1158/GPA-119
5 of 5	148 x 32 x 30	83	405	Antenna AS-1796/GPA-119 Cable Assembly W20001

*b. Removing Contents.* Remove components of the AN/TPX-41 from their respective boxes as follows:

#### NOTE

**Unpack equipment in a clean, dust-free area. Do not throw or drop tools into unpacked boxes.**

(1) Cut and fold back steel straps just below box cover.

(2) Remove nails from top, side, and end panels with nailpuller and remove top, side, and end panels.

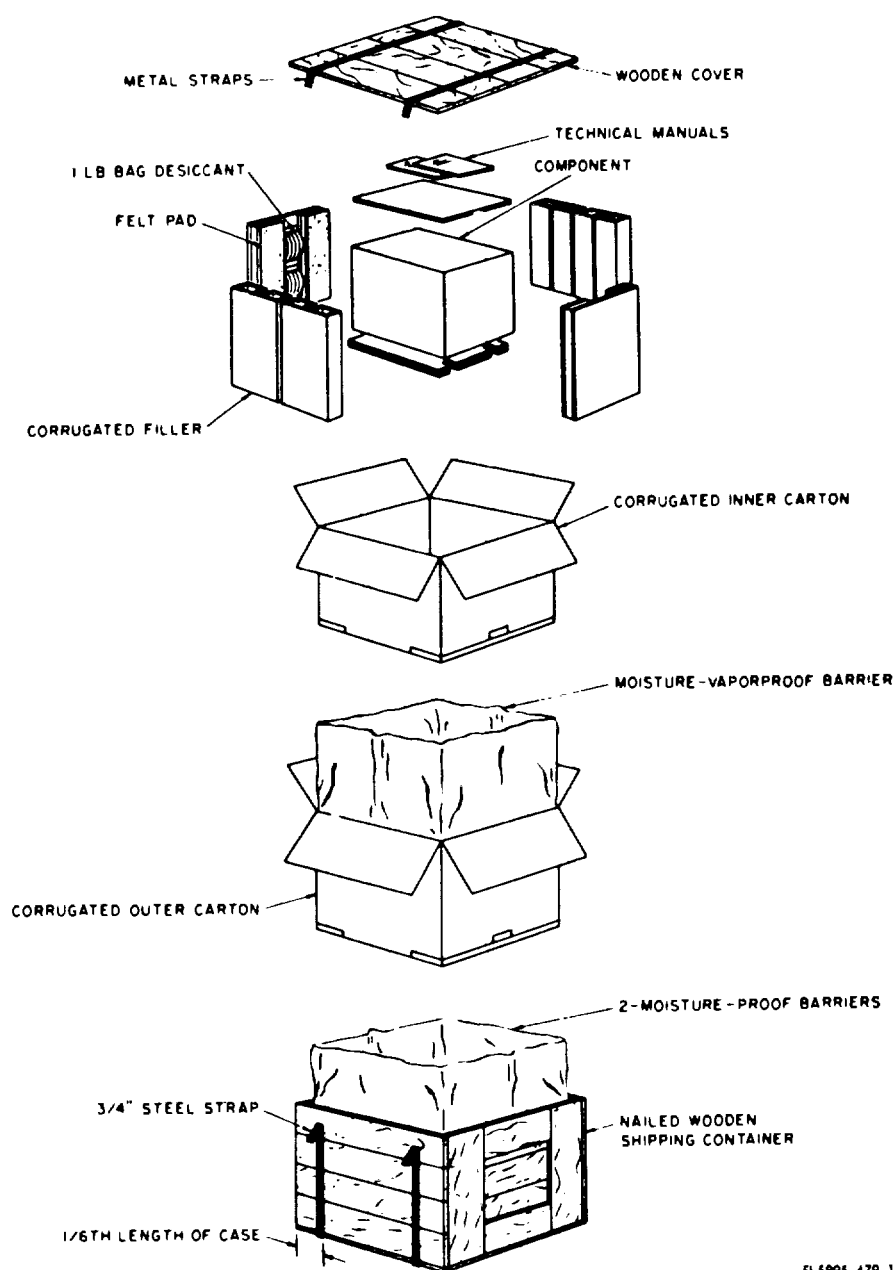
(3) Remove corrugated fiberboard container and cut through edges of container.

(4) Remove contents.

#### 2-2. Checking Unpacked Equipment

The procedures contained in this paragraph should be performed prior to installation of the AN/TPX-41.

*a. General.* After unpacking, the components of the AN/TPX-41 should be checked against the packing list for completeness. If no packing list accompanies the equipment, check the equipment against the basic issue items list in appendix B and the packaging data (para 2-1a). Report all discrepancies in accordance with TM 38-750. Report any evidence of equipment damage on DD Form 6 per paragraph 1-3b. If the equipment has been used or reconditioned, determine whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Check that the literature has been corrected to reflect the MWO. Procedures for



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Figure 2-1. Interrogator Set AN/TPX-41, unpacking diagram (typical).

checking each major component of the AN/TPX-41 are contained in the following paragraphs.

**NOTE**

**Shortage of minor part that does not affect proper functioning of the equipment should not prevent use of the equipment.**

**NOTE**

**Current MWO's applicable to the equipment are listed in DA Pam 310-7.**

*b. Receiver-Transmitter, Radio RT-264D/UPX-6.* Make the following checks on the front panel and main chassis of Receiver-Transmitter, Radio RT-264D/UPX-6.

**NOTE**

**On the initial shipment of this equipment, the RT-264D/UPX-6 CAUTION nameplate is packaged in the equipment accessories crate. Remove this nameplate from the packing crate and secure it to the front panel of the RT-264D/UPX-6; use the mounting screws provided with each nameplate.**

(1) Check that proper fuses are installed in three fuse holders on left side of front panel. Location, rating, and function of all fuses are given in paragraph 2-12c.

(2) Hold SM-472/TPX-44 (fig. 2-2) with one hand to prevent from falling, and turn knurled captive thumbscrews that attach it to front panel of RT-264D/UPX-6 ccw until SM-472/TPX-44 can be removed from mounting adapter plate.

(3) Detach SM-472/TPX-44 from mounting adapter plate, inspect for any damage incurred during transit, and set aside.

(4) Remove (turn ccw) 2 screws that hold adapter plate to front panel of RT-264D/UPX-6. Set mounting adapter plate aside; be careful not to loosen mounting screws.

(5) Make sure that correct operating crystals are installed in RT-264D/UPX-6 (para 2-14b). If wrong crystals are inserted, follow procedures given in paragraph 2-14b.

(6) Make sure that TRANSMITTER

FREQUENCY dial and RECEIVER FREQUENCY dial are set to correct operating frequency according to instructions given in paragraph 2-14b.

(7) Reinstall simulator mounting adapter plate, and install mounting screws. Do not replace SM-472/TPX-44 until checks in (8) and (9) below are completed.

(8) Check that pins of cable connectors on front panel have not been bent or otherwise damaged during transit.

(9) Remove shield covers from POWER and CHALLENGE indicators, and check that indicator lamps are installed properly.

**NOTE**

**The indicator lamps on the RT-264D/UPX-6 and KY-97C/TPX have dimmer adjustments that regulate light brilliance to conform with security regulations. The dimmer is closed completely when the adjustment is set at the extreme cw position. Before starting the equipment, rotate the dimmer adjustments on all lamps to the extreme ccw position to observe the operation of the component units. If this is not done, a fault may be incorrectly indicated in the equipment while actually the dimmer has only been turned to the extreme dim (cw) position.**

(10) Remove RT-264DIUPX-6 dust cover to make following checks on main chassis of unit. To remove dust cover, release 5 captive screws on front panel and pull chassis forward by handles. When reinstalling chassis in dust cover, be sure captive screws on front panel are attached securely. Interlock switch S102 (fig. 2-3), located at rear of unit, is used to cut off all ac power to equipment (except at convenience outlet J101) when dust cover is either partly or completely removed from chassis.

(11) Inspect tubes on unit main chassis (fig. 2-4), and check that all tube shields are firmly mounted on tubes. (To remove tube shield, press down slightly and turn shield ccw.)

(12) Check that GTC shorting link 0-109 (fig. 2-14) is stored as shown and not inserted in connectors J111 and J112.

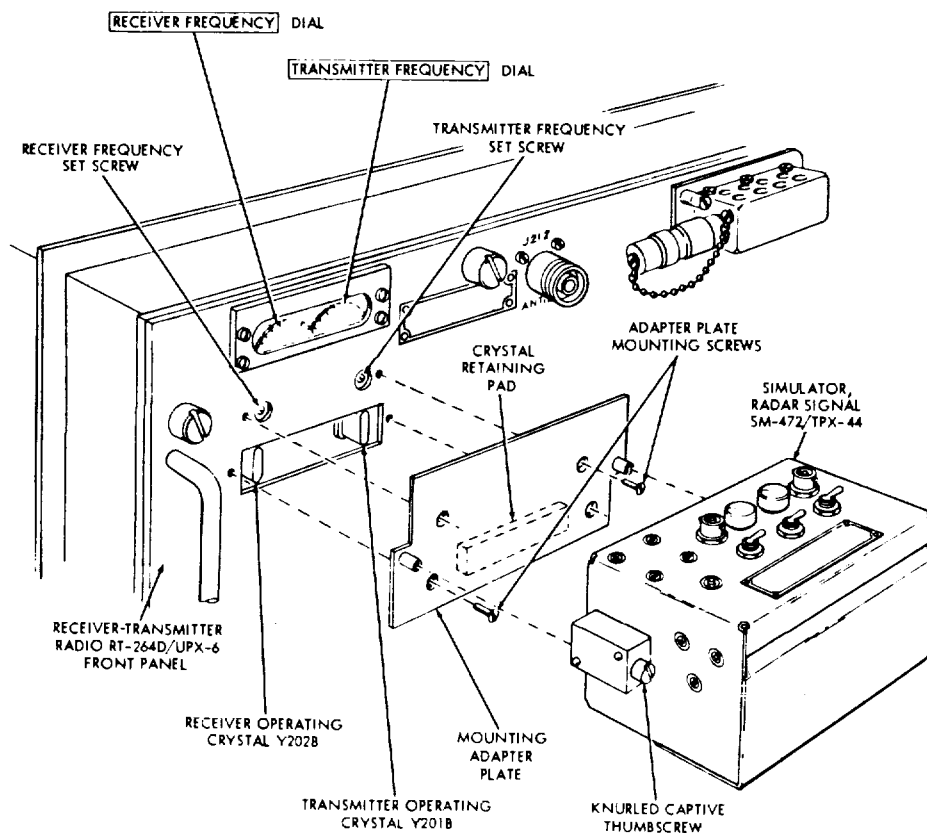


Figure 2-2. Receiver-Transmitter, Radio RT 264D/UPX-6, operating crystals location.



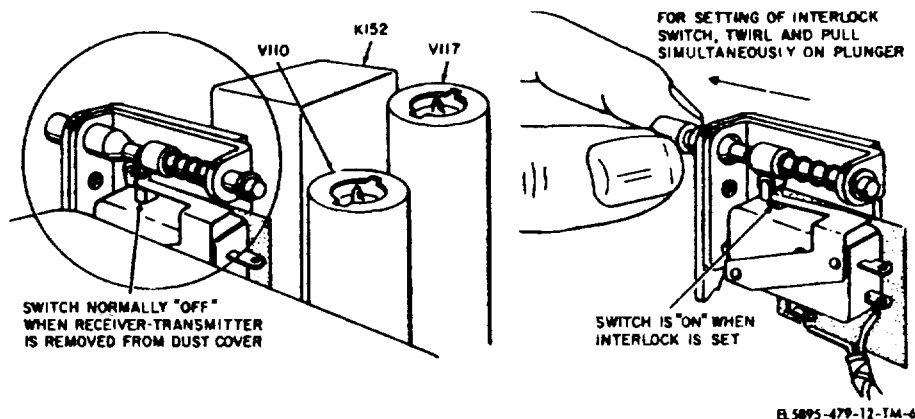


Figure 2-3. Receiver-Transmitter, Radio RT-264D/UPX-6, interlock location.

(13) Ensure that GTC internal-external link 0-108 (fig. 2-14) is set to internal position as described in paragraph 2-14c.

(14) Check that plate cap on high-voltage rectifier tube V101 is in place and has not been damaged.

(15) Inspect all coaxial cable connections between subassemblies and main chassis, particularly connection between P107 and J207 on left side of rf subassembly (fig. 2-4).

(16) Inspect fuses F104 and F105 on underside of chassis (fig. 2-5).

(17) Check that terminal leads to plate and filament transformers on underside of chassis are connected properly for available power supply as described in paragraph 2-14a.

c. *Coder-Control Interrogator Set KY-97C/TPX.* Make the following checks on the KY-97C/TPX.

(1) Inspect fuse F401 on front panel and ensure that spare fuse is installed in spare fuse holder on rear panel.

(2) Remove shield covers of RT POWER, CHALLENGE, and POWER indicators, and check that indicator lamps are installed properly. Rotate dimmer adjustments to extreme ccw position.

(3) Check that pins of all cable connectors on rear panel have not been bent or otherwise damaged during transit.

(4) Remove holding screws that secure louvered side panel of KY-97C/TPX, and inspect tubes mounted on inner vertical chassis (fig. 2-6). Check that tube shields are mounted firmly on all tubes.

(5) Be sure that power lead to plate and filament transformer on inner chassis is connected properly for available power supply as described in paragraph 2-16a.

(6) Check setting of impedance-matching link 0-401 (fig. 2-7). Link 0-401 is provided to match input impedance of Coder-Control KY-97C/TPX with output impedance of Blanker, Interference MX-8795/TPX-41 and is located on left side of KY-97C/TPX. Normal system operation is with link in place, to provide for 75ohm impedance. Link position should be checked when fault develops that indicates an improper input to KY-97C/TPX.

(7) Replace left-side panel, remount unit, and reinstall right-side panel.

d. *Simulator, Radar Signal SM-472/TPX-44.* Make the inner chassis checks on the SM-472/TPX-44 as follows:

(1) Remove 8-32 fillister-head screws that secure cover of SM-472/TPX-44, and lift off cover.

(2) Ensure that removable 60-MHz modulator assembly is installed properly.

(3) Align holes in top, rear, and bottom panels of SM-472/TPX-44 with holes in wraparound cover and secure panels with fillister-head screws.

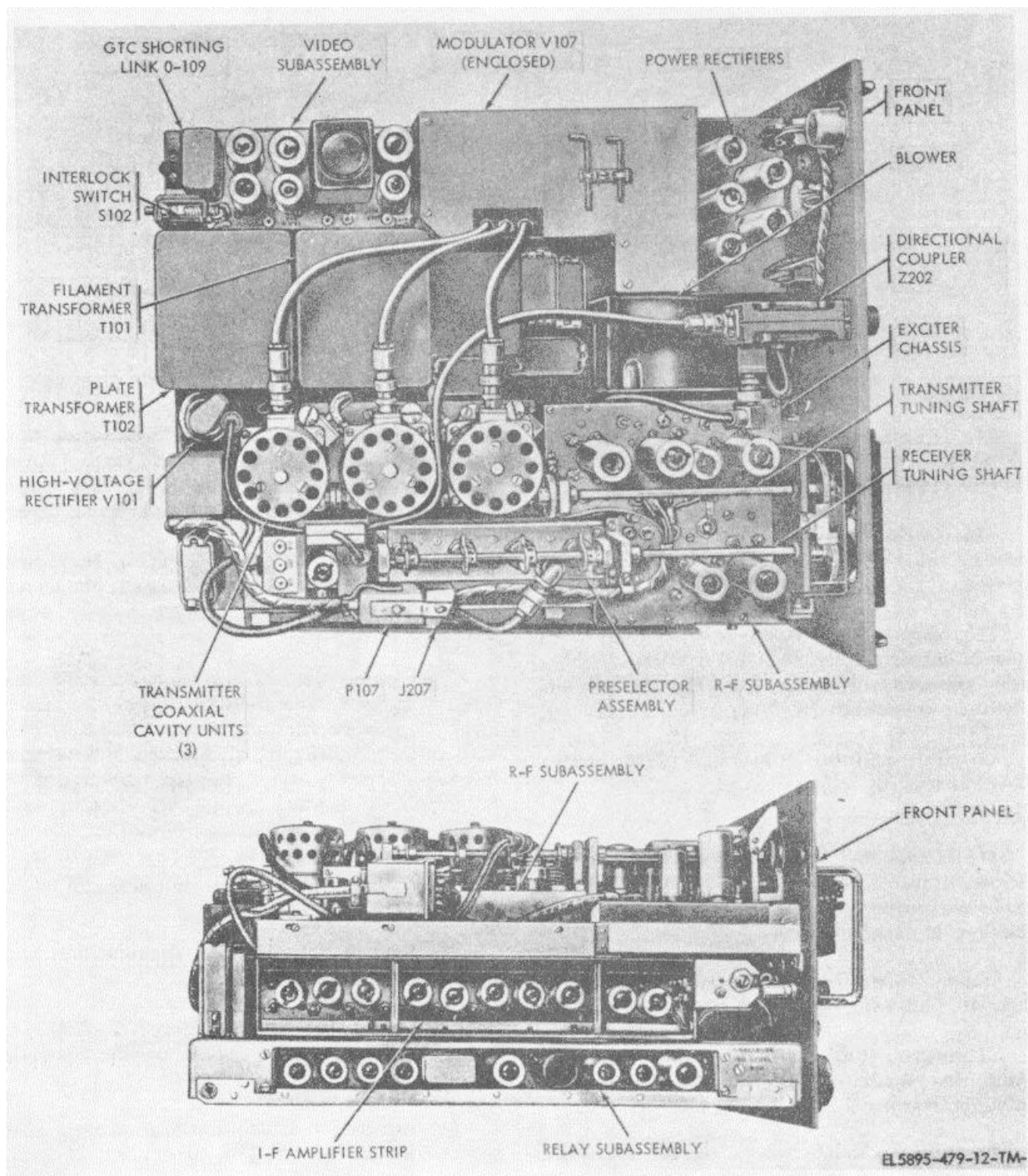


Figure 2-4. Receiver-Transmitter, Radio RT-264D/UPX-6, internal component location.

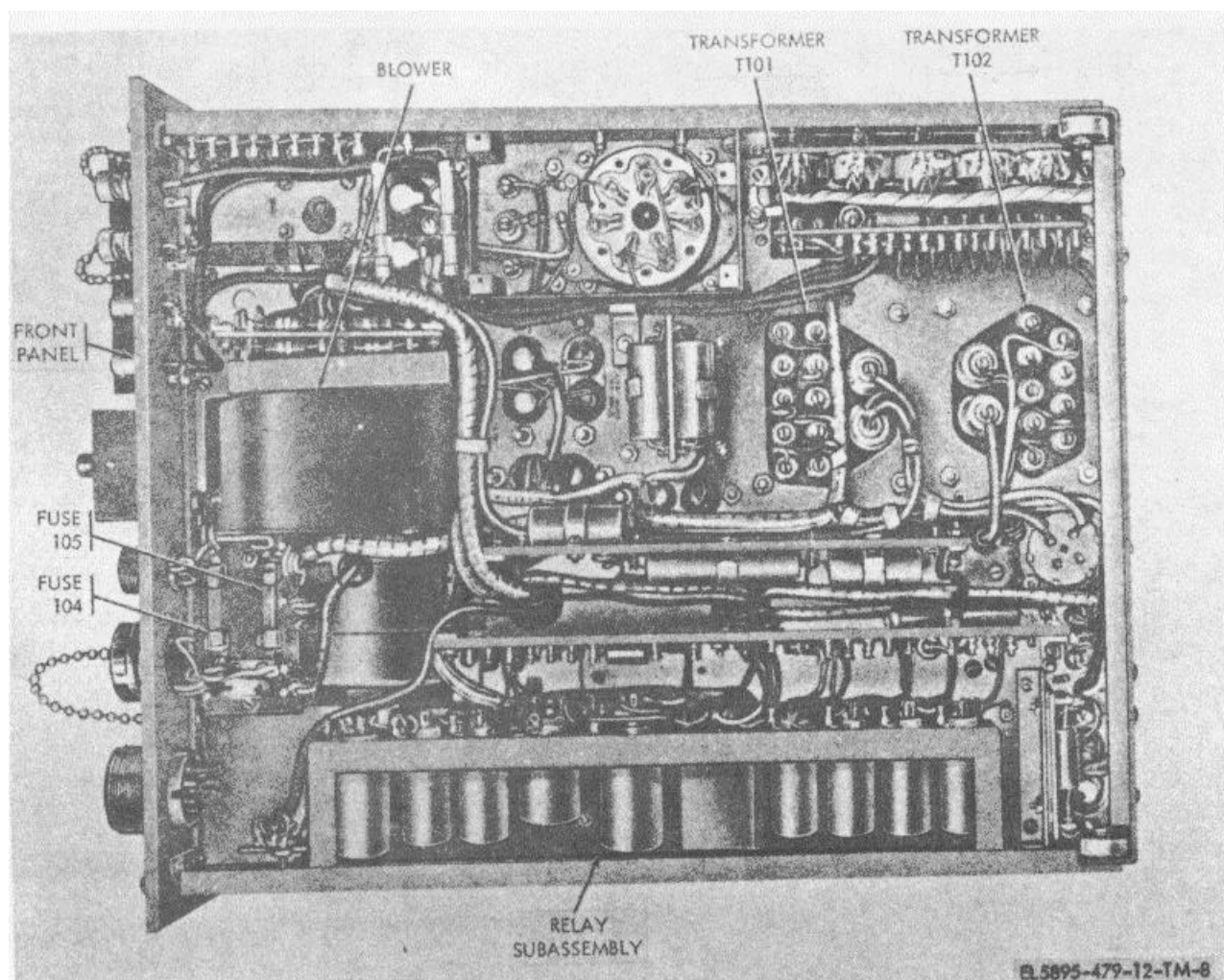


Figure 2-5. Receiver-Transmitter, Radio RT-264D/UPX-6, fuse location.

(4) Reinstall SM-472/TPX-44 on RT-264D/UPX-6; use mounting adapter plate with captive thumbscrews.

e. *Decoder, Video KY-593/TPX-44.* Make the following checks on front panel and chassis of KY-593/TPX-44 (fig. 3-6):

(1) Check 117 VAC 1.0 AMP power fuse F201 for proper rating.

(2) Remove power indicator lamp lens and check that indicator lamp is seated properly.

(3) Check that four circuit card subassemblies front (fig. 2-16) are properly seated and secured with snap-lock fasteners.

(4) Make sure DLYD-UNDLYD switch on

position.

(5) Check that delay line near right side is seated properly.

(6) Inspect parts and chassis for damage incurred during transit.

f. *Blanker, Interference MX-8795/TPX-41.* Make the following front panel and chassis checks on the MX-8795/TPX-41:

(1) Check 117 VAC 1/2 AMP power fuse for proper rating.

(2) Check 117 VAC 1 AMP DL HTR fuse for proper rating.

(3) Remove power indicator lamp lens and check that indicator lamp is seated properly.

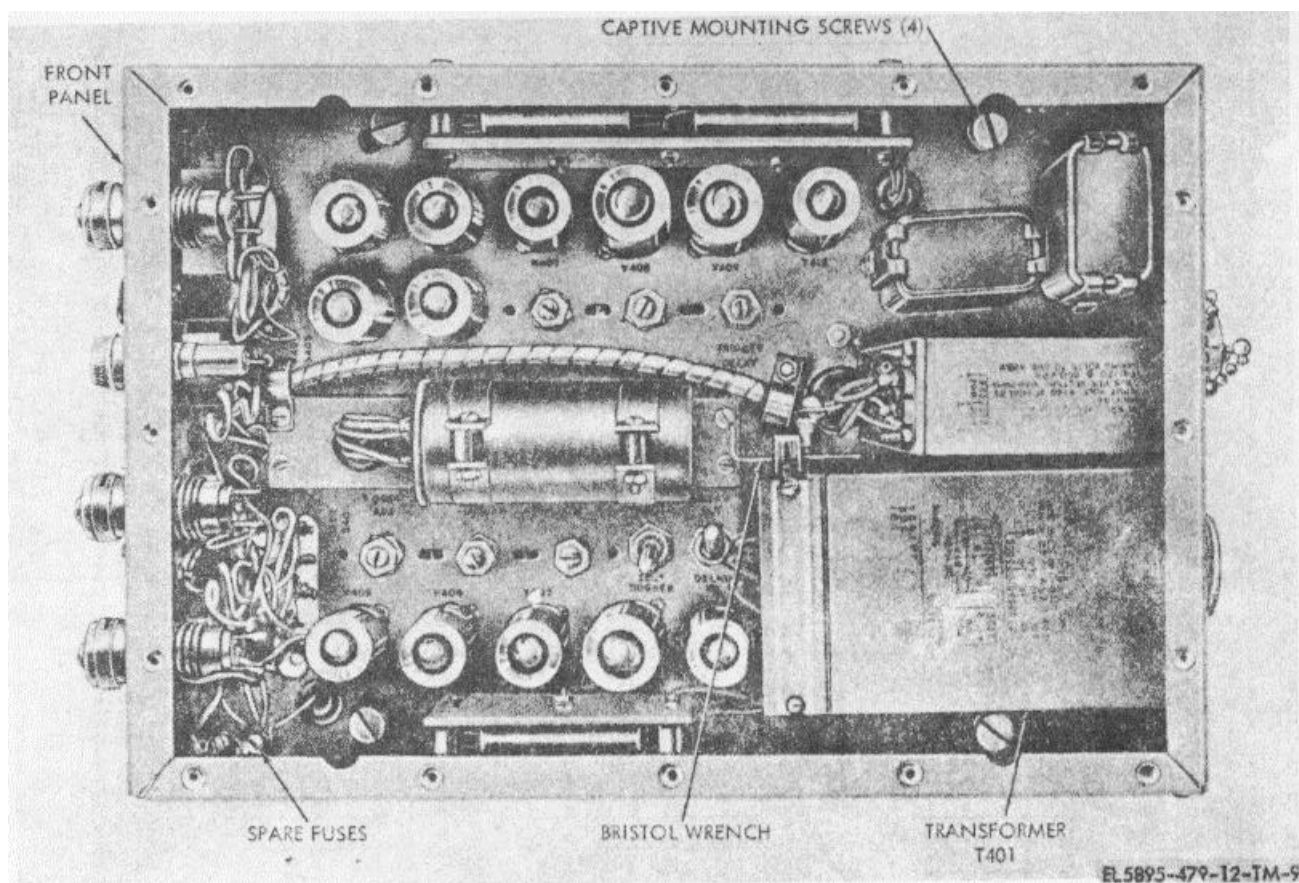


Figure 2-6. Coder-Control KY-97C/TPX, internal component location.

(4) Check that switches have not been damaged during transit.

(5) Make sure pins of all connectors have not been bent or otherwise damaged during transit.

(5.1) Check that DL 1 is secured to chassis.

(6) Check that three circuit card subassemblies at front (fig. 2-17) are properly seated and secured with snap-lock fasteners.

(7) Inspect parts and chassis for damage incurred during transit.

*g. Modulator, Pulse MD-638/TPX-41.* Make the following checks on the MD-638/TPX-41:

(1) Check that fuses of proper rating (para 2-12c) are installed.

(2) Remove indicator lamp lens and check indicator lamp for proper seating.

(3) Check switches and controls for any damage incurred during transit.

(4) Inspect connectors on bottom of chassis for bent pins or damage.

*h. Control, Remote Switching C-7014/TPX-44.* Make the following checks on the C-7014/TPX-44 (fig. 3-5):

(1) Remove indicator lamp lenses and check indicator lamps for proper seating.

(2) Check switches and chassis for damage incurred during transit.

*i. Control Remote Switching C-1271A/TPX-22.* Make the following checks on the C-1271A/TPX-22 (fig. 3-4):

(1) Remove RT POWER and CHALLENGE indicators shield covers and check that indicator lamps are installed properly. Rotate dimmer adjustments to extreme ccw position.

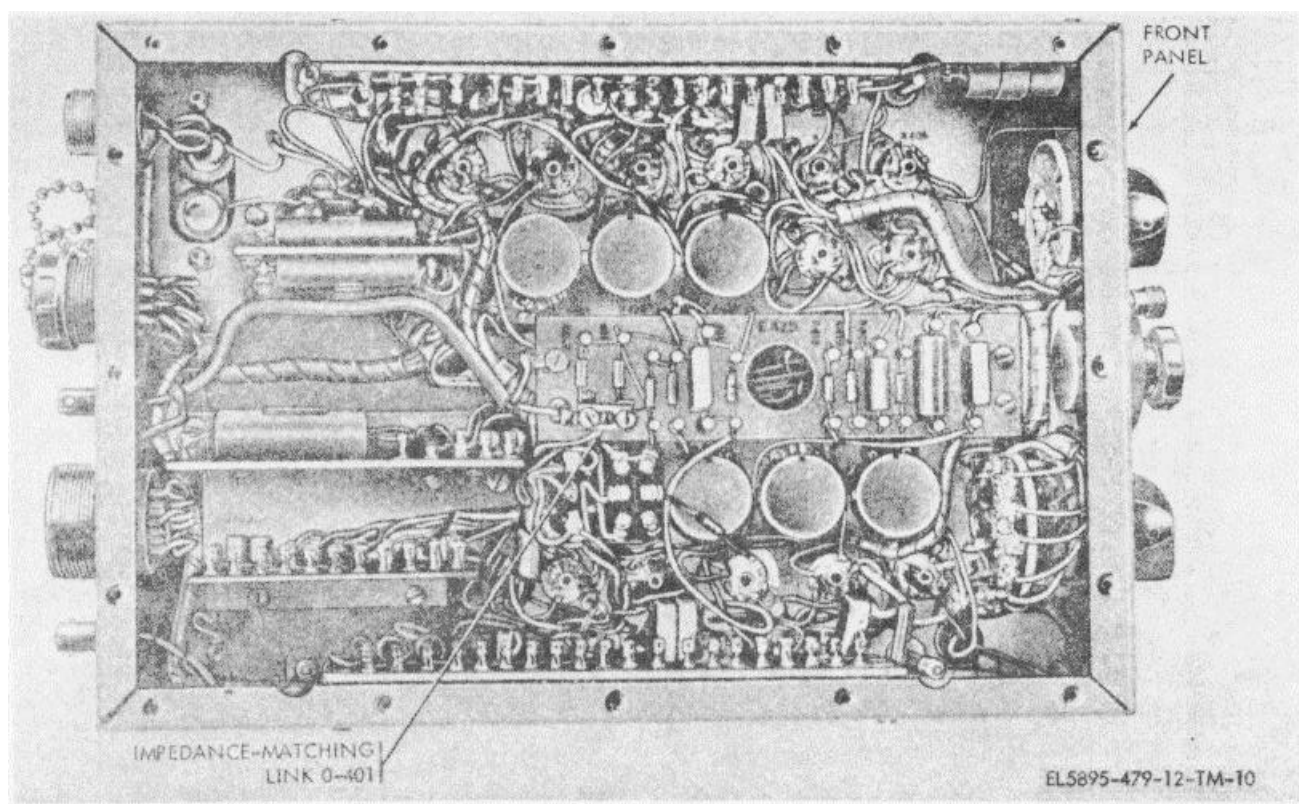


Figure 2-7. Coder-Control KY-97C/TPX, impedance-matching link location.

(2) Check that pins of cable connectors mounted on box bottom have not been bent or otherwise damaged during transit.

(3) Check operating controls on front panel for ease of operation.

### 2-3. Siting

a. *Equipment Location* (fig. 2-8). The components of the AN/TPX-41 shall be located as follows:

(1) Remote switching controls C-1271A/TPX-22 and C-7014/TPX-44 shall be located at indicator site and mounted on side of Control Indicator Group OA-2664/FPN-40 with a special purpose mounting bracket.

(2) Decoder, Video KY-593/TPX-44 shall be located at indicator site and separated from Control Indicator Group OA-2664/FPN-40 by no more than 30 feet.

(3) Interconnecting Box J-2945/TPX-41, Coder-Control Interrogator Set KY-97C/TPX, Blanker, Interference MX-8795/TPX-41, Receiver-Transmitter, Radio RT-264D/UPX-6, Modulator, Pulse MD-638/TPX-

41, and Simulator, Radar Signal SM-472/TPX-44 shall be rack mounted and housed in S-70/G shelter designated as the receiver-transmitter site. Shelter shall be located no more than 10,000 feet (dependent on cable lengths) from indicator site and within 50 cable feet of Receiver-Transmitter Group OA-2664A/FPN-40.

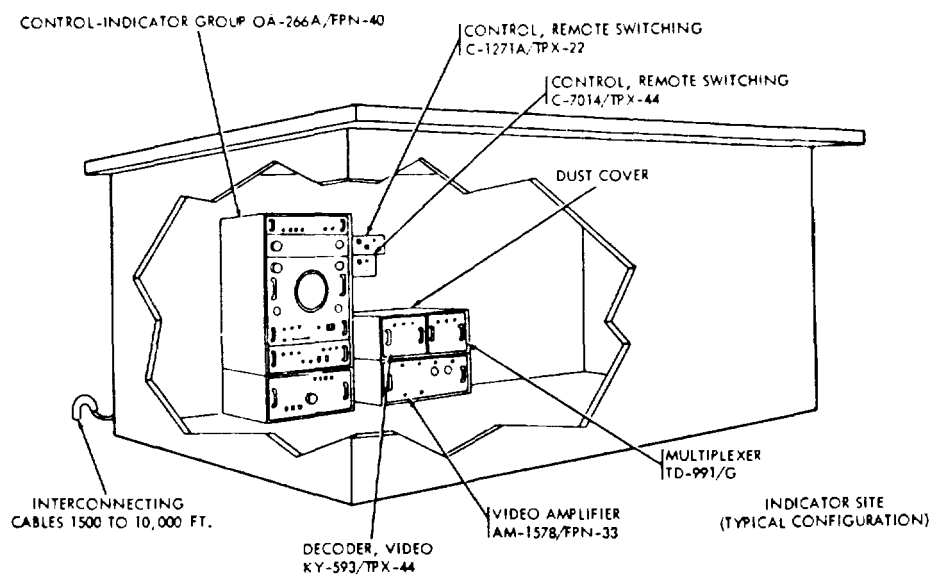
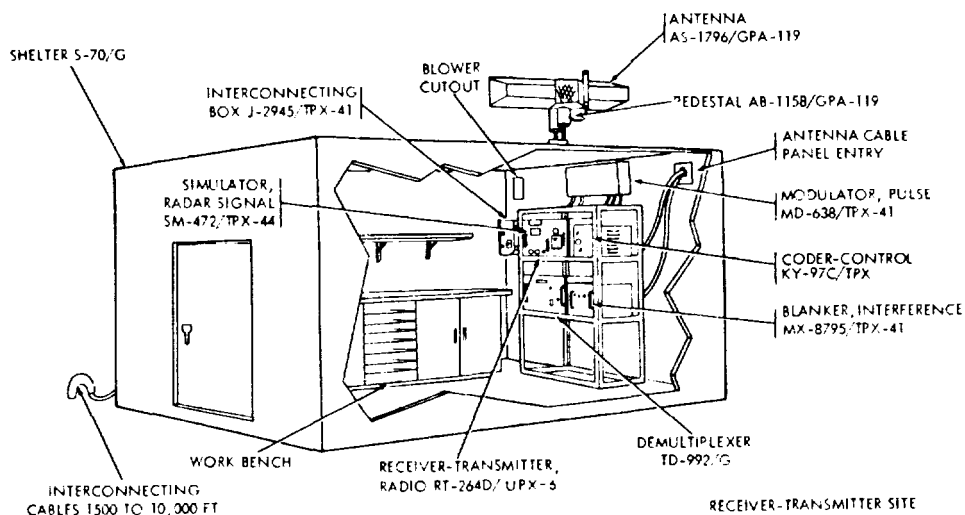
(4) Antenna Group AN/GPA-119, consisting of Antenna AS-1796/GPA-119 and Pedestal, Antenna AB-1158/GPA-119 shall be mounted on top of S-70/G shelter.

b. *Equipment Positioning*. The following paragraphs give general instructions for positioning components of the AN/TPX-41.

(1) Provide level area suitable to size and weight of components being installed.

(2) Ensure that sufficient clearance exists between moving parts of antenna group and other cables, aerals, etc.

(3) Allow enough space to remove components from dust covers or mountings for repair and maintenance.



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Figure 2-8. Interrogator Set AN/TPX-41, siting diagram.



(4) Locate equipment so that adequate ventilation and enough light are provided for day and night operation. Position front panels of all components so that all controls are easily accessible and panel designations and indicators may be easily read by operating personnel.

#### 2-4. S-70/G Shelter Requirements

The S-70/G shelter (para 1-10e) is a rigid, all-weather, transportable shelter which houses the receiver-transmitter site components of the AN/TPX-41. The shelter is modified to accommodate power inputs and cable routing for the components contained in the shelter. For information regarding shelter fabrication, dimensions, and installation of equipment within the shelter, refer to TM 11-5840-345-20.

#### 2-5. Tools, Test Equipment and Material Required for Installation

The following chart lists tools, test equipment, and material required for installation of the AN/TPX-41.

<i>Tool or device</i>	<i>Application</i>	<i>Location</i>
Cross-recessed screwdriver	Remote switching control installation	
Nut driver	Remote switching control installation	
Nut driver	Remote switching control installation	

### Section II. INSTALLATION INSTRUCTIONS

#### 2-6. General

This Section contains instructions for installing and checking the AN/TPX-41 prior to the application of power. Two men are required to accomplish installation, with the additional assistance of three men required during installation of Antenna Group AN/GPA-119. Receiver-transmitter site components of Interrogator Group OA-7487/TPX-41 are normally preinstalled in an equipment rack which is located in the S-70/G shelter described in paragraph 1-10e. Installation instructions for these components apply only if a specific component is shipped separately or found to be damaged upon receipt, requiring replacement. Receiver-transmitter site components of Interrogator Group OA-7487/TPX-41 consist of the following:

Receiver-Transmitter, Radio RT-264D/UPX-6  
 Simulator, Radar Signal SM-472/TPX-44  
 Coder-Control, Interrogator Set KY-97C/TPX  
 Blanker Interference MX-8795/TPX-41  
 Modulator Pulse MD-638/TPX-41  
 Interconnecting Box J-2945/TPX-41

#### 2-7. Interrogator Group OA-7487/TPX-41 Installation Instructions

Instructions for installing components of Interrogator Group OA-7487/TPX-41 are contained in the following paragraphs (fig. 2-9).

*a. Installation of Remote Control Box Mounting Bracket and Adapter.* Prior to the installation of Remote Switching Controls C-1271A/TPX-22 and C-7014/TPX-44, a bracket and adapter must be installed on the side of Cabinet, Electrical Equipment CY-2094/FPN-33. Install the bracket and adapter as follows (see fig. 2-9):

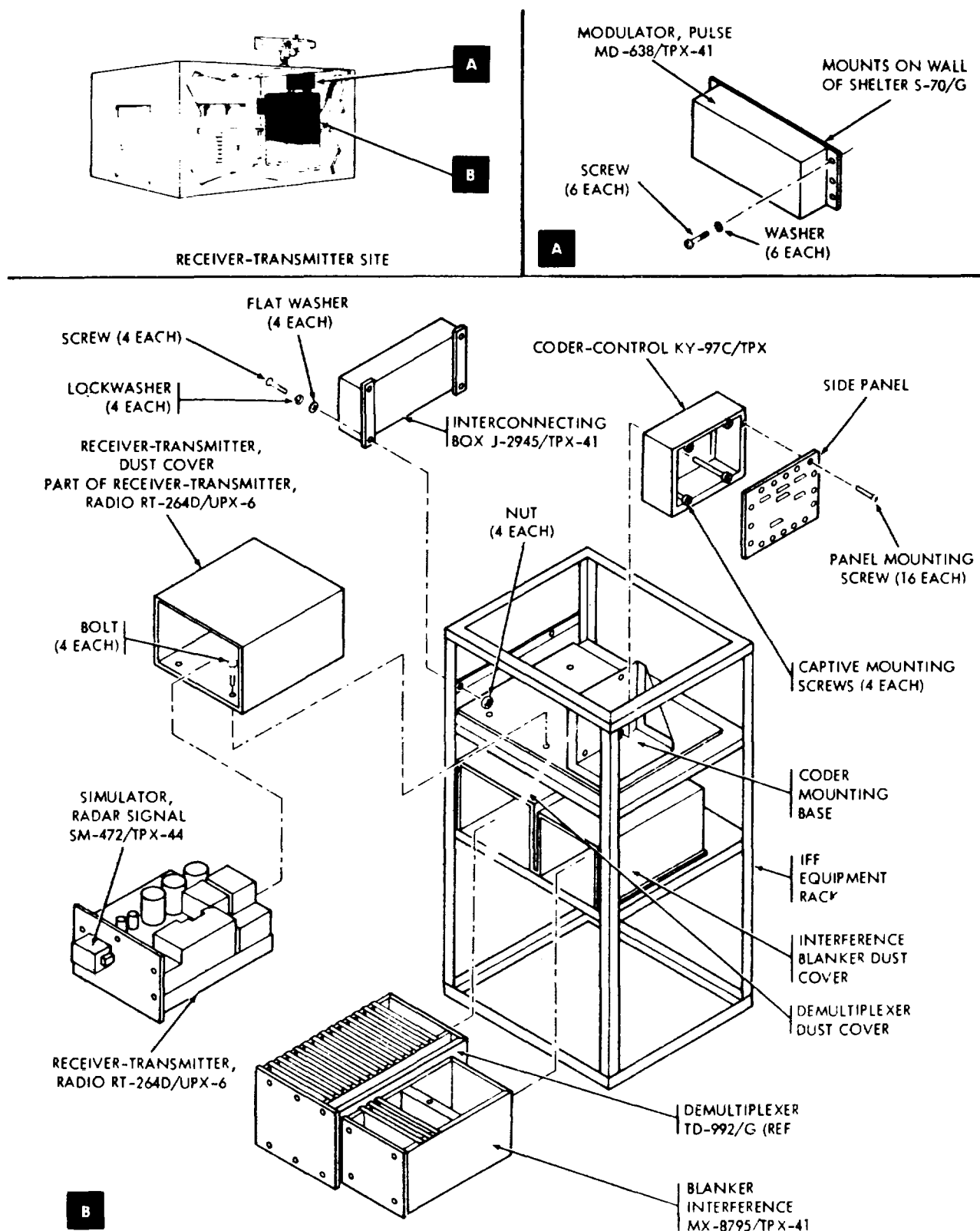
(1) Mount adapter on bracket assembly by installing 4 screws and 4 flat washers from far side of bracket assembly. Secure by installing 4 attaching flat washers, lockwashers, and nuts.

(2) Mount bracket assembly and adapter on side of Cabinet, Electrical Equipment CY-2094/FPN-33 as shown in figure 2-9, using 4 screws, flat washers, and lockwashers.

*b. Control, Remote Switching C-1271A/TPX-22 (fig. 2-9).* Install Control, Remote Switching C-1271A/TPX-22 as follows:

(1) Position C-1271A/TPX-22 so that connecting cables extend through bracket assembly and all front panel information is right-side up.

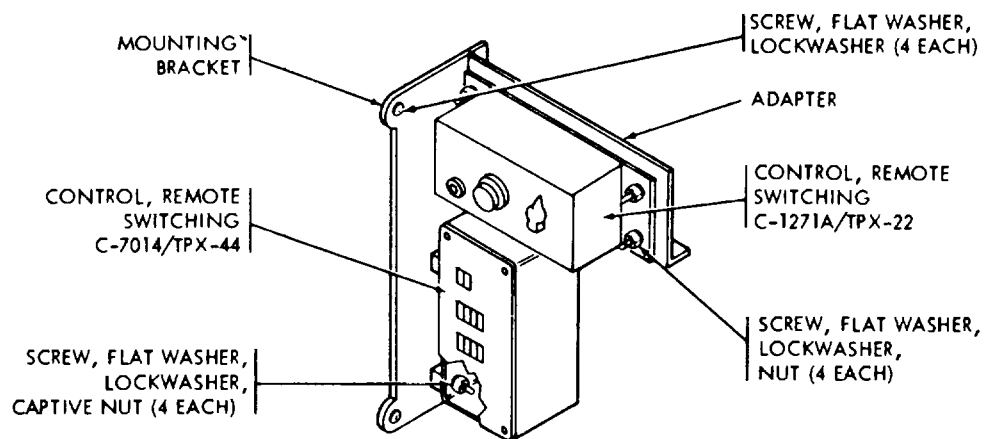
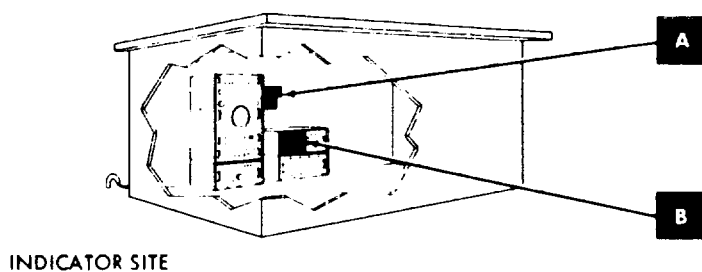
(2) Secure C-1271A/TPX-22 to bracket assembly with 4 attaching screws, flat washers, lockwashers and nuts.



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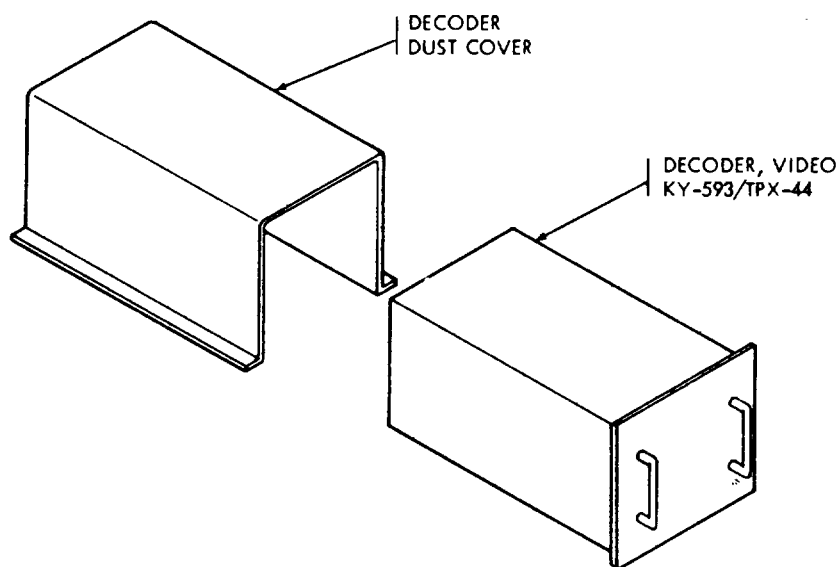
Figure 2-9(1). Interrogator Group OA-7487/TPX-41, installation diagram (sheet 1 of 2)





**A** (ROTATED 90°)

(TYPICAL)



**B**

(TYPICAL)

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Figure 2-9(2). Interrogator Group OA-7487/TPX-41, installation diagram (sheet 2 of 2)

c. *Control, Remote Switching C-7014/TPX-44 (fig. 2-9).* Install Control, Remote Switching C-7014/TPX-44 as follows:

(1) Position Control, Remote Switching C-7014/TPX-44 in adapter with connector P40301 facing down.

(2) Secure C-7014/TPX-44 to adapter by screwing in 4 captive screws located on C-7014/TPX-44 front panel.

d. *Decoder, Video KY-593/TPX-44 (fig. 2-9).* Install Decoder, Video KY-593rTPX-44 as follows:

(1) Position KY-593/TPX-44 in decoder dust cover.

(2) Slide KY-593/TPX-44 into dust cover and secure with 4 captive screws located on KY-593/TPX-44 front panel.

e. *Receiver-Transmitter, Radio RT-264D/UPX-6 (fig. 2-9).* Install the RT-264D/UPX-6 as follows:

(1) Position RT-264D/UPX-6 dust cover on left side of upper shelf in iff equipment rack so that holes in dust cover are aligned with mounting holes in shelf.

(2) Secure RT-264D/UPX-6 dust cover to rack with 4 mounting bolts.

(3) Slide RT-264D/UPX-6 into dust cover and secure with 5 captive screws located on front panel.

f. *Simulator, Radar Signal SM-4 72/TPX-44 (fig. 2-2).* Install the SM-472/TPX-44 as follows:

(1) Remove SM-472/TPX-44 from adapter plate by unscrewing 2 captive knurled thumbscrews.

(2) Secure adapter plate to RT-264D/UPX-6 front panel with four screws, flat washers, and lockwashers.

(3) Reinstall SM-472/TPX-44 on adapter plate by screwing in 2 captive knurled thumbscrews.

g. *Coder-Control Interrogator Set KY-97C/TPX*

(fig. 2-9). Mount the KY-97C/TPX in coder mounting base as follows:

(1) Remove right-side panel and locate 4 captive mounting screws accessible from right side of inner vertical chassis.

(2) Turn 4 mounting screws until they extend through holes in left-side panel.

(3) Position KY-97C/TPX in coder mounting base and align 4 mounting screws with 4 mounting holes on mounting base.

(4) Tighten 4 mounting screws until KY-97C/TPX is secured firmly to mounting base.

(5) Reinstall right-side panel.

h. *Blanker, Interference MX-8795/TPX-41 (fig. 2-9).* Install the MX-8795/TPX-41 as follows:

(1) Position MX-8795/TPX-41 in right-hand dust cover located on lower shelf of iff equipment rack.

(2) Slide MX-8795/TPX-41 into dust cover and secure with 4 captive thumbscrews located on front panel of MX-8795/TPX-41.

i. *Modulator Pulse, MD-638/TPX-41 (fig. 2-9).* Install the MD-638/TPX-41 as follows:

(1) Position MD-638/TPX-41 on rear wall of S-70/G Shelter so that mounting holes align with pre-drilled holes in shelter wall.

(2) Secure MD-638/TPX-41 with 6 screws, washers and nuts.

j. *Interconnecting Box. J-2945/TPX-41 (fig. 2-9)* Install the J-2945/TPX-41 as follows:

(1) Position J-2945/TPX-41 on left-side of iff equipment rack with holes in mounting flange aligned with mounting holes provided on rack.

(2) Secure J-2945/TPX-41 to the rack with 4 screws, washers and hex nuts.

## 2-8. Interrogator Group OA-7487/TPX-41 Cabling Instructions

Functions of connectors on components of Interrogator Group OA-7487/TPX-41 are described in paragraph *a* below. Instructions for connecting cables to these connectors are given in paragraph *b* below (fig. 2-10).

a. *Connector Function Charts.* Before proceeding with cabling instructions (*b* below), study the functions of the cable connectors of the equipment as indicated in (1) through (9) below. Ac power is supplied

to most components of AN/TPX-41 through J-2945/TPX-41 which is connected to the external primary power source.

(1) *Receiver-Transmitter, Radio RT-264D/UPX-6 connector functions.* The external terminations of all cable connections to RT-264D/UPX-6 are located on the front panel. The functions of these connectors are given in the chart below. Panel markings are indicated by capital letters.

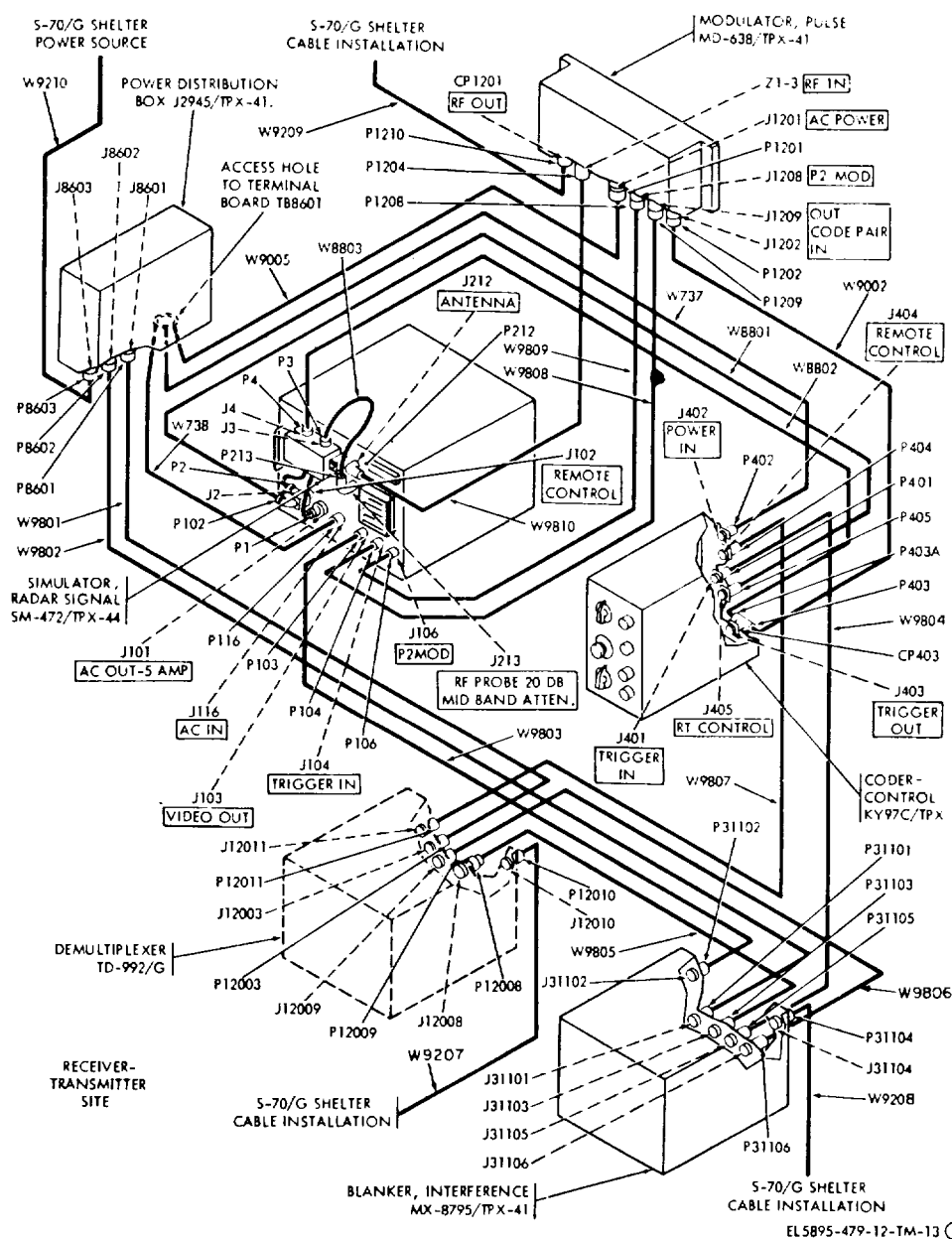
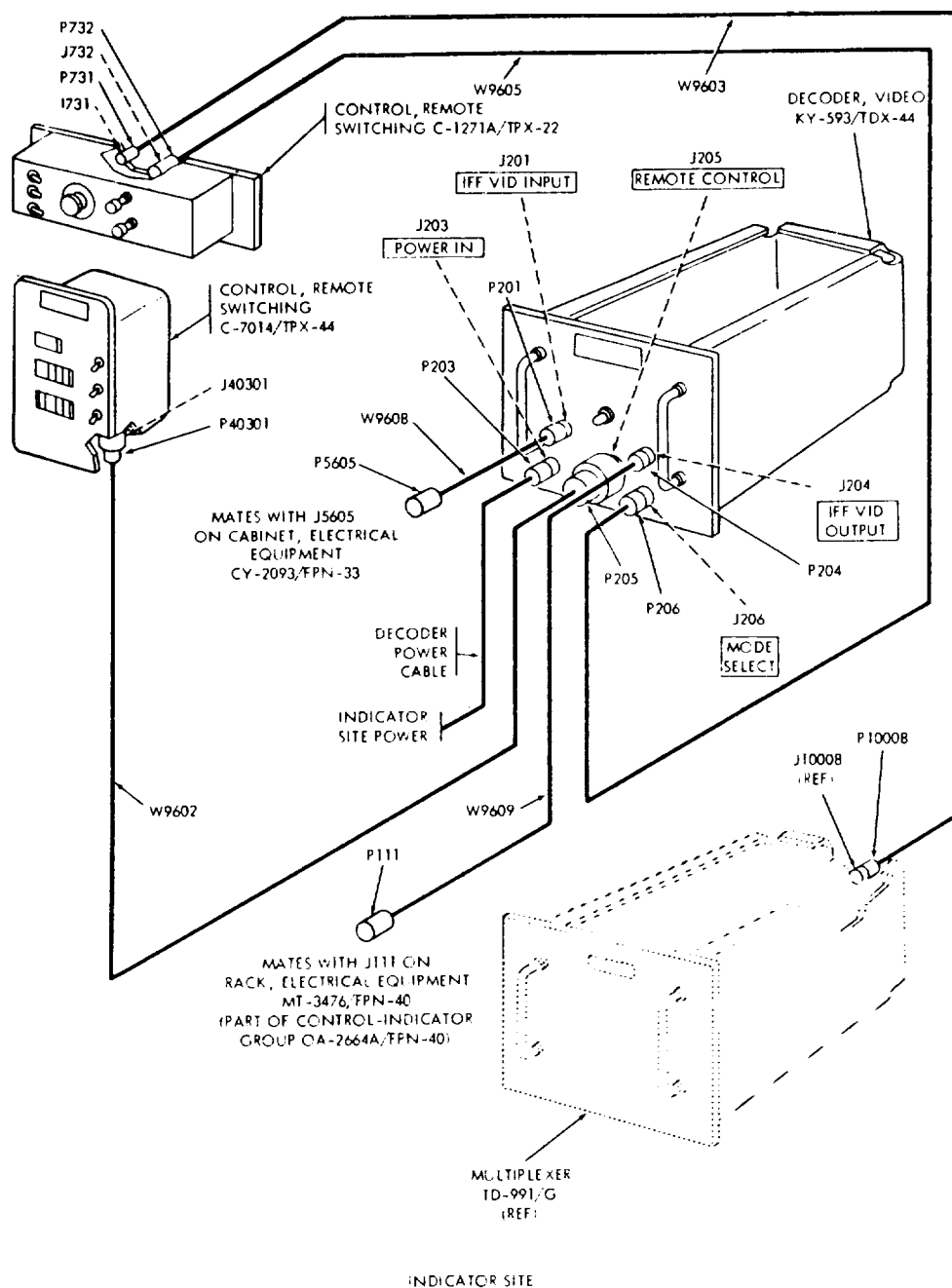


Figure 2-10(1). Interrogator Group OA-748 7/TPX-41, cabling diagram (sheet 1 of 2)



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Figure 2-10(2). Interrogator Group OA-7847/TPX-41, cabling diagram (sheet 2 of 2)

<i>Item</i>	<i>Connector</i>	<i>Function</i>
1	POWER IN (J116)	Input connector for ac power
2	TRIGGER IN (J104)	Input connector for paired trigger pulses from KY-97C/TPX via MD-638/TPX-41.
3	ANTENNA (J212)	Connects to AN/GPA-119 via MD-6381TPX-41, providing for transmitter output and receiver input at same jack.
4	REMOTE CONTROL (J102)	Connector for controlling operation of RT-264D/UPX-6 from front panel of KY-97C/TPX or from C-1271A/TPX-22.
5	VIDEO OUT (J103)	Output receptacle for connection of coded iff replay signals to MX-8795/TPX-41
6	AC OUT (J101)	Provides ac power for operation of Simulator, Recognition Signal SM-472/TPX-44.
7	TRIGGER OUT (J105)	Auxiliary output connector for trigger pulses developed from coded pulses connected to TRIGGER IN jack.
8	P2 MOD (J106)	Input connector for third pulse (P2) needed for isls operation generated in MD-638/TPX-41.
9	RF PROBE 20 DB MID BAND ATTEN (J213)	Provided for test purposes to measure transmitter power and to introduce rf test signals to receiver. Output of SM-472/TPX-44 is connected to this connector.

(2) *Coder-Control, Interrogator Set KY-97C/TPX connector functions.* The external terminations of all cable connections to KY-97C/TPX are located on the rear panel. The functions of these

connectors are given in the chart below. All connections are considered essential for normal operation of the equipment.

<i>Item</i>	<i>Connector</i>	<i>Function</i>
1	POWER IN (J402)	Input connector for ac power.
2	TRIGGER IN (J401)	Input connector for synchronization triggers connected from MX-8795/TPX-41.
3	TRIGGER OUT (J403)	Output trigger for paired trigger pulses connected to RT-264D/UPX-6 through MD-638/TPX-41.
4	REMOTE CONTROL (J404)	Receptacle for operation of AN/TPX-41 from C-1271A/TPX-22.
5	RT CONTROL (J405)	Receptacle for control of RT-264D/UPX-6 from front panel of KY-97C/TPX.

(3) *Decoder, Video KY-593/TPX-44 connector functions.* The external terminations of all cable connections to KY-593/TPX-44 are located on the front panel. The functions of these connectors are given

in the chart below. Items 1 through 5 are essential for normal operation of the equipment. Item 6 is for use with auxiliary equipment and is not used with AN/TPX-41.

<i>Item</i>	<i>Connector</i>	<i>Function</i>
1	VIDEO INPUT (J201)	Input receptacle for coded iff reply signals from MX-8795/TPX-41.
2	VIDEO OUTPUT (J204)	Output receptacle for connection of decoded iff reply signals to associated radar set.
3	POWER IN (J203)	Input receptacle for ac power.
4	MODE SELECTOR (J206)	Receptacle for mode interlock between KY-97C/TPX and KY-593/TPX-44.
5	MASTER CONTROL (J205)	Receptacle used when controlling operation of KY-593/TPX-44 from C-7014/TPX-44.
6	REMOTE CODE (J207)	Receptacle enables control of KY-593/TPX-44 through use of auxiliary remote switching control.

(4) *Interconnecting Box J-2945/TPX-41 connector functions.* The external terminations of cable connections to J-2945/TPX-41 are located on the bottom of the metal box enclosure. External access to a

terminal board for power cables is provided through a grommated access. The functions of these connectors are given in the chart below.

<i>Item</i>	<i>Connector</i>	<i>Function</i>
1	J8601	Output receptacle for connection of ac antenna power and control voltages to Multiplexer TD-991/G.
2	J8602	Output receptacle for connection of ac power and control voltage to MX-8795/TPX-41.
3	J8603	Input receptacle for ac power from external primary power source.
4	TB8601	Output terminal board for distribution of ac power to receiver-transmitter site components of AN/TPX-41.

(5) *Modulator, Pulse MD-638/TPX-41 connector functions.* The external terminations of all cable connections to MD-638/TPX-41 are located on the

bottom of the enclosure. The functions of these connectors are given in the chart below:

<i>Item</i>	<i>Connector</i>	<i>Function</i>
1	AC POWER (J1201)	Input receptacle for ac power.
2	CODED PAIR IN (J1202)	Input receptacle for connection of paired trigger pulses from KY-97C/TPX.
3	P2 MOD (J1208)	Output receptacle for connection of P2 mod pulse to RT-264D/UPX-6.
4	CODED OUT (J1209)	Output receptacle for connection of paired trigger pulses to RT-264D/UPX-6.
5	RF IN (Z1-3)	Input receptacle for connection of pulsed rf from RT-264D/UPX-6.
6	RF OUT (CP1201)	Output receptacle for connection of pulsed rf diplexed with control pulses and dc bias through rotary joint in AB-1158/GPA-119.

(6) *Simulator, Radar Signal SM1-472/TPX-44 connector functions.* External terminations of cable connections to SM-472/TPX-44 are located on the front

panel and on the ends of cables permanently attached to this component. The functions of these connectors are given in the chart below.

<i>Item</i>	<i>Connector</i>	<i>Function</i>
1	P1	Input receptacle for ac power.
2	P2	Input receptacle for connection of control voltages from KY-97C/TPX via an adapter on RT-264D/UPX-6.
3	RF OUT (J3)	Output receptacle for connection of simulated iff reply signal to RT-264D/UPX-6
4	TRIGGER IN (J4)	Input receptacle for connection of pulse pair triggers from KY-97C/TPX

(7) *Blanker, MX-8795/TPX-41 connector functions.*

<i>Item</i>	<i>Connector</i>	<i>Function</i>
1	POWER IN (J31101)	Input receptacle for ac power from J-2945/TPX-41
2	VIDEO INPUT (J31102)	Input receptacle for raw iff video from RT-264D/UPX-6.
3	IFF VIDEO (J31103)	Output receptacle for connection of processed iff video to KY-593/TPX-44 via remoting equipment
4	1500 CPS (J31104)	Output receptacle for radar synchronizing signal
5	IFF TRIGGER OUT (J31105)	Output receptacle for connection of iff triggers to KY-97C/TPX.
6	Display Trigger (J31106)	Output receptacle for connection of iff triggers to indicator of associated radar.

(8) *Control, Remote Switching C-1271A/TPX-22 connector functions.* The two external terminations of cable connections to C-1271A/TPX-22 are located on the rear of the enclosure. One is

mounted on the rear panel and the other is on the end of a permanently attached cable. The functions of these connectors are given in the chart below.

<i>Item</i>	<i>Connector</i>	<i>Function</i>
1	J731	Connects to KY-97C/TPX to provide remote control of AN/TPX-41 functions when LOCAL-REMOTE switch on KY-97C/TPX is placed to REMIOTE.
2	J732	Connects to KY-593/TPX-44 to provide remote mode switching interlock.

(9) *Control, Remote Switching C-7014/TPX-44 connector functions.*

<i>Item</i>	<i>Connector</i>	<i>Function</i>
1	J40301	Connects to KY-593/TPX-44 to provide decoding control functions.

b. *Cabling Instructions.* Connect cables to components of Interrogator Group OA-7487/TPX-41 as follows:

(1) *Cable Assembly, Radio Frequency CG-3663/U (8 ft) (W9803).* Install male connector P103 to VIDEO OUT receptacle J103 on RT-264D/UPX-6. Install male connector P31102 to VIDEO INPUT receptacle J31102 on MX-8795/TPX-41.

(2) *Cable Assembly, Power, Electrical CX-11121/U (10 ft) (W8801).* Install right-angle male connector P102 to REMOTE CONTROL receptacle J102 on RT-264D/UPX-6. Install female connector P405 to RT CONTROL receptacle J405 on KY-97C/TPX.

(3) *Tee Adapter CP403.* Install tee adapter CP403 on TRIGGER OUT receptacle J403 on KY-97C/TPX.

(4) *Cable Assembly, Radio Frequency CG-3144/U (4 ft 8 in) (W8802).* Install male connector P4 to TRIGGER IN receptacle J4 on SM-472/TPX-44. Install male connector P403A to one side of tee adapter CP403 (installed in (3) above).

(5) *Cable Assembly, Radio Frequency CG-3142/U (2 ft) (W8803).* Install male connector P3 to RF OUT receptacle J3 on SM-472/TPX-44. Install male connector P213 to RF PROBE 20 DB MID BAND ATTEN receptacle J213 on RT-264D/UPX-6.

(6) *Simulator, Recognition Signal SM-472/TPX-44, Cables W1 and W2.* Install connector P2 of cable W2 to J2 receptacle located on adapter P102 on RT-264D/UPX-6. Install connector P1 of cable W1 to AC OUT receptacle J101 on RT-264D/UPX-6.

(7) *Cable Assembly, Special Purpose, Electrical CX-12557/G (8 ft) (W9801)*. Install male connector P12003 to power in receptacle J12003 on demultiplexer TD-992/G. Install female connector P8601 to receptacle J8601 on J-2945/TPX-41.

(8) *Cable Assembly, Radio Frequency CG-3144/U (10 ft) (W9002)*. Install male connector P403 to either side of tee adapter CP403 that does not have connector installed. Install male connector P1202 to CODED PAIR IN receptacle J1202 on MD-638/TPX-41.

#### NOTE

**Several of the following cables to be installed will terminate with lugs connected to terminals on terminal board TB8601 located in J-2945/TPX-41. Remove side panel of J-2945/TPX-41 and locate TB8601, the unused cable clamp, and a grommet in the bottom of chassis. All connections to TB8601 are routed through the grommet and held in place by the cable clamp.**

(9) *Cable Assembly, Power, Electrical CX-11119/U (5 ft) (W9005)*. Install female connector P1201 to AC POWER receptacle J1201 on MD-638/TPX-41. Connect black wire 101 to terminal 5 and white wire 75 to terminal 7 of terminal board TB8601 in J-2945/TPX-41. Refer to note under (8) above.

(10) *Cable Assembly, Radio Frequency CG-3663/U (8 ft) (W9809)*. Install male connector P104 to TRIGGER IN receptacle J104 on RT-264D/UPX-6. Install male connector P1209 to CODED PAIR OUT receptacle J1209 on MD-638/TPX-41.

(11) *Cable Assembly, Radio Frequency CG-3663/U (8 ft) (W9808)*. Install male connector P106 to P2 MOD receptacle J106 on RT-264D/UPX-6. Install male connector P1208 to P2 MOD receptacle J1208 on MD-638/TPX-41.

(12) *Cable Assembly, Radio Frequency CG-3665/U (7 ft) (W9810)*. Install right-angle male connector P212 to ANTENNA receptacle J212 on RT-264D/UPX-6. Install female connector P1204 to RF IN receptacle Z1-3 on MD-638/TPX-41.

(13) *Cable Assembly, Special Purpose, Electrical CX-12559/G (6 ft) (W9807)*. Install male

connector P404 to REMOTE CONTROL receptacle J404 on KY-97C/TPX. Install female connector P12011 to receptacle J12011 on the Demultiplexer TD-992/G.

(14) *Cable Assembly, Power, Electrical CX-2478/U (18 ft) (W737)*. Install female connector P402 to POWER IN receptacle J402 on KY-97C/TPX. Connect 2 unidentified wires to terminals 5 and 7 of TB8601 in J-2945/TPX-41. Refer to note under (8) above.

(15) *Cable Assembly, Power, Electrical CX-2403/U (20 ft) (W738)*. Install right-angle female connector P116 to AC IN receptacle J116 on RT-264D/UPX-6. Connect 2 unidentified wires to terminals 5 and 7 of TB8601 in J-2945/TPX-41. Refer to note under (8) above.

(16) *Cable Assembly, Special Purpose, Electrical CX-12558/G (6 ft) (W9802)*. Install right-angle female connector P31101 to POWER IN receptacle J31101 on MX-8795/TPX-41. Connect male connector P8602 to receptacle J8602 on J-2945/TPX-41.

(17) *Interconnecting Box J-2945/TPX-41*. Open unused cable clamp in J-2945/TPX-41. Route all wires connected to terminal board TB8601 through cable clamp and fasten clamp around outer jacket of all 3 cables. Reinstall side panel on J-2945/TPX-41.

(18) *Cable Assembly, Radio Frequency CG-3663/U (7 ft) (W9804)*. Connect male connector P31105 to receptacle J31105 IFF PRETRIGGER on MX-8795/TPX-41. Connect male connector P401 to receptacle J401 TRIGGER IN on KY-97C/TPX.

(19) *Cable Assembly, Radio Frequency CG-3663/U (7 ft) (W9805)*. Connect male connector P31103 to receptacle J31103 VIDEO OUT on MX-8795/TPX-41. Connect male connector P12008 to receptacle J12008 on Demultiplexer TD-992/G.

(20) *Cable Assembly, Radio Frequency CG-3663/U (7 ft) (W9806)*. Connect male connector P31106 to receptacle J31106 display trigger on MX-8795/TPX-41. Connect male connector P12009 to receptacle J12009 on Demultiplexer TD-992/G.



(21) *Cable W9208.* Cable W9208 is normally mounted in S-70/G shelter. Connect male connector P31104 to receptacle J31104 1500 CPS on Blanker, Interference MX-8795/TPX-41.

(22) *Cable W9209.* Cable W9209 is normally mounted in S-70/G shelter on antenna cable entry panel. Connect male connector P1210 to receptacle CP1201 RF OUT on Modulator, Pulse MD-638/TPX-41.

(23) *Cable W9210.* Cable W9210 is normally mounted in S-70/G shelter. Connect female connector P8603 to male connector J8603 on Interconnecting Box J-2945/TPX-41.

(24) *Cable Assembly, Special Purpose, Electrical CX-12562/G (30 ft) (W9603).* Connect straight male connector P731 to receptacle J731 on C-1271A/TPX-22. Connect right-angle female connector P10008 to receptacle J10008 on Multiplexer TD-991/G.

(25) *Cable Assembly, Radio Frequency, CG-3664/U (10 ft) (W9608).* Connect male connector P201 to receptacle J201 VIDEO INPUT on KY-593/TPX-44. Connect male connector P5605 to receptacle J5605 on Video Amplifier AM-1578/FPN-33.

(26) *Cable Assembly, Radio Frequency, CG-3664/U (30 ft) (W9609).* Connect male connector P204 to receptacle J204 VIDEO OUTPUT on KY-593/TPX-44. Connect male connector P111 to receptacle J111 on Electrical Equipment Cabinet CY-2094/FPN-33.

(27) *Cable Assembly, Special Purpose, Electrical CG-12564/G (30 ft) (W9605).* Install right-angle male connector P206 to MODE SELECT receptacle J206 on KY-593/TPX-44. Install female connector P732 to receptacle J732 on C-1271A/TPX-22.

(28) *Cable Assembly, Special Purpose, Electrical CG-12561/G (30 ft) (W9602).* Install right-angle male connector P205 to REMOTE CONTROL receptacle J205 on KY-593/TPX-44. Install female connector P40301 to receptacle J40301 on C-7014/TPX-44.

(29) *Decoder power cable.* Install connector P203 to POWER INPUT receptacle J203 on KY-593/TPX-44. Plug other end of cable into 1IL7-vac outlet.

## 2-9. Antenna Group AN/GPA-119 Installation Instructions

Instructions for installing components of the Antenna Group AN/GPA-119 are contained in the following paragraphs (fig. 2-11).

### NOTE

**Insure that the correct type and amount of lubricant is present in Pedestal, Antenna AB-1158/GPA-119 (para 5-7).**

*a. Pedestal, Antenna AB-1158/GPA-119 (fig. 2-11).* Install Pedestal, Antenna AB-1158/GPA-119 as follows:

(1) Position AB-1158/GPA-119 on antenna mounting fixture located on top of S-70/G shelter.

(2) Ensure that AB-1158/GPA-119 is centered in mounting fixture and position two halves of clamping ring as shown in figure 2-11.

(3) Secure each half of the clamping ring with 3 bolts and washers by tightening bolts alternately, a little at a time, ensuring that AB-1158/GPA-119 does not shift position.

(4) Install right-angle adapter CP21001 on rotary joint (E20001) receptacle located on top of AB-1158/GPA-119.

*b. Antenna AS-1796/GPA-119 (fig. 2-11).* Install the AS-1796/GPA-119 as follows:

(1) Position AS-1796/GPA-119 on top of AB-1158/GPA-119 so that holes in mounting flange are aligned with mounting holes in AB-1158/GPA-119.

(2) Secure AS-1796/GPA-119 by installing 4 screws, flat washers and lockwashers.

*c. Backfill Antenna Assembly.* To install the backfill antenna assembly, secure assembly to rear of AS-1796/GPA-119 with hardware provided.

## 2-10. Antenna Group AN/GPA-119 Cabling Instructions

Functions of connectors on components of Antenna Group AN/GPA-119 are described in paragraph *a* below. Instructions for connecting cables to these connectors are given in paragraph *b* below (fig. 2-12).

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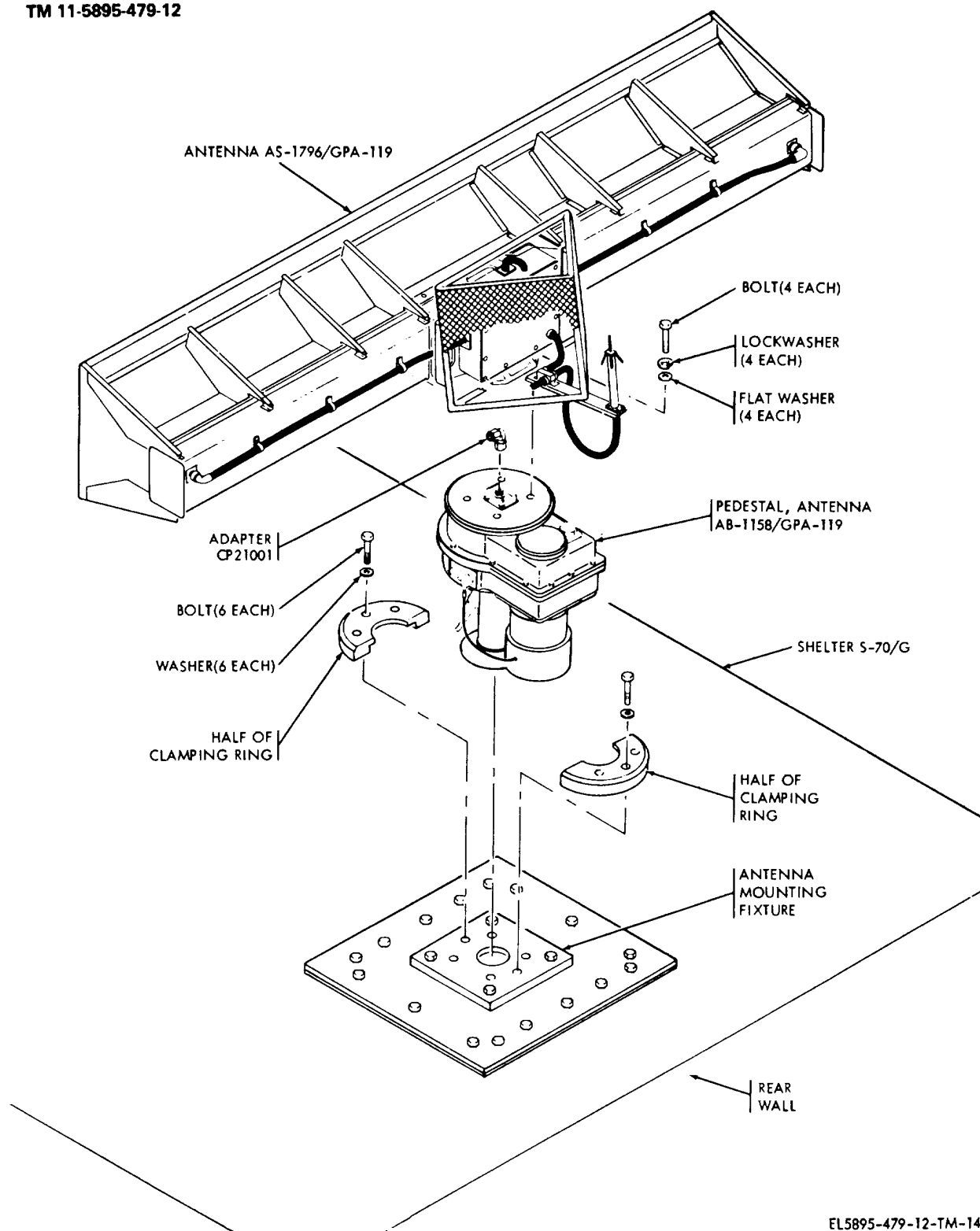
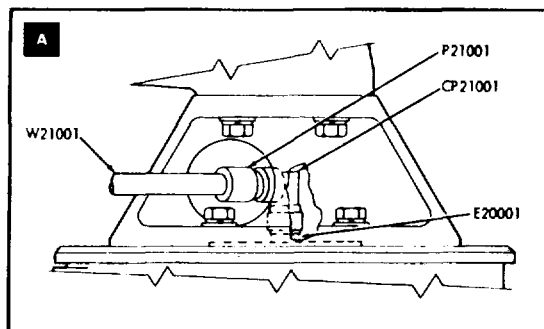
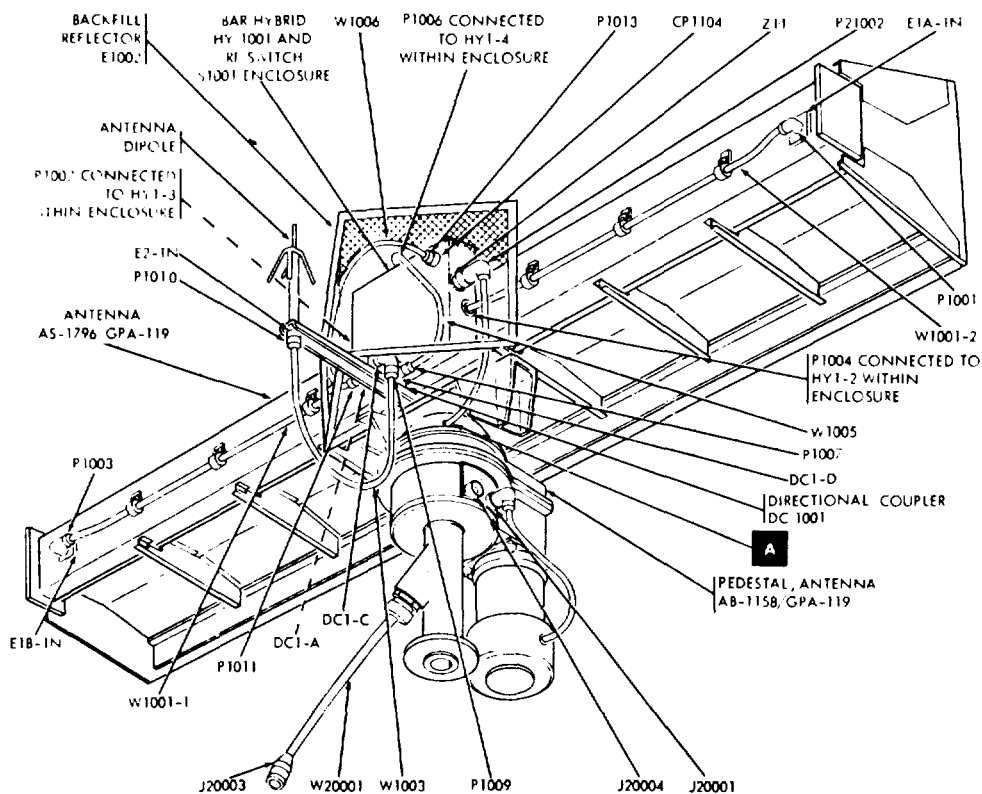


Figure 2-11. Antenna Group AN/GPA-119, installation diagram.



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Figure 2-12. Antenna Group AN/GPA-119, cabling diagram.

a. *Connector Function Charts.* Before proceeding with cabling instructions (*b* below), study the functions of the cable connectors of the equipment as indicated in (1) and (2) below.

(1) *Antenna AS-1796/GPA-119 connector functions.* Connector Z1-1 is the input connector for transmitted rf diplexed with control pulses and dc bias from the rotary joint in AB-1158/GPA-119. Z1-1 also functions as the output connector for received iff reply signals which are delivered through the rotary joint.

(2) *Pedestal, Antenna AB-1158/GPA-119 external connector functions.* There are four external connectors on AB-1158/GPA-119: one located on top for connecting to Antenna AS-1796/GPA-119 and three on the bottom to provide connections to Interrogator Group OA-7A87/TPX-41 and the antenna drive motor. The functions of these connectors are given in the chart below.

Item	Connector	Function
1	CP21001	Output receptacle for connection of rf and control pulses and dc bias to AS-1796/GPA-119. Input receptacle for received iff reply signals from AS-1796/GPA-119 for delivery through rotary joint.
2	J20001	Output receptacle for connection of antenna drive voltage to antenna drive motor B20002.
3	J20003	Input receptacle for connection of diplexed rf and control pulses and dc bias from MD-638/TPX-41 to rotary joint. Output receptacle for connection of iff reply signals to MD-638/TPX-41.
4	J20004	Input receptacle for connection of antenna drive motor voltage. Output receptacle for connection of antenna synchro data.

b. *Cabling Instructions.* Connect cables to components of Antenna Group AN/GPA-119 as follows:

(1) *Cable Assembly, Radio Frequency CG-2338/U (4 ft 6 1/2 in) (W1001-1).* Right-angle male connector P1003 is normally factory installed on EIB-IN receptacle of iff antenna. Female connector P1002 is normally factory installed on no. 2 receptacle of hybrid coupler.

(2) *Cable Assembly, Radio Frequency CG-2338/U (4 ft 6 1/2 in) (W1001-2).* Right-angle male connector P1001 is normally factory installed on E1A-IN receptacle of iff antenna. Female connector P1004 is normally factory installed on receptacle of hybrid coupler.

(3) *Cable Assembly, Radio Frequency CG-2293/U (3 ft) (W1004).* Right-angle male connector P1005 is normally factory installed on no. 1 receptacle of hybrid coupler. Right-angle male connector P1012 is normally factory installed on FL1101 receptacle of rf switch.

(4) *Cable Assembly, Radio Frequency CG-2338/U (4 ft) (W1003).* Install female connector P1010 to E2-IN receptacle on dipole. Install right-angle male connector P1009 to C receptacle on directional coupler.

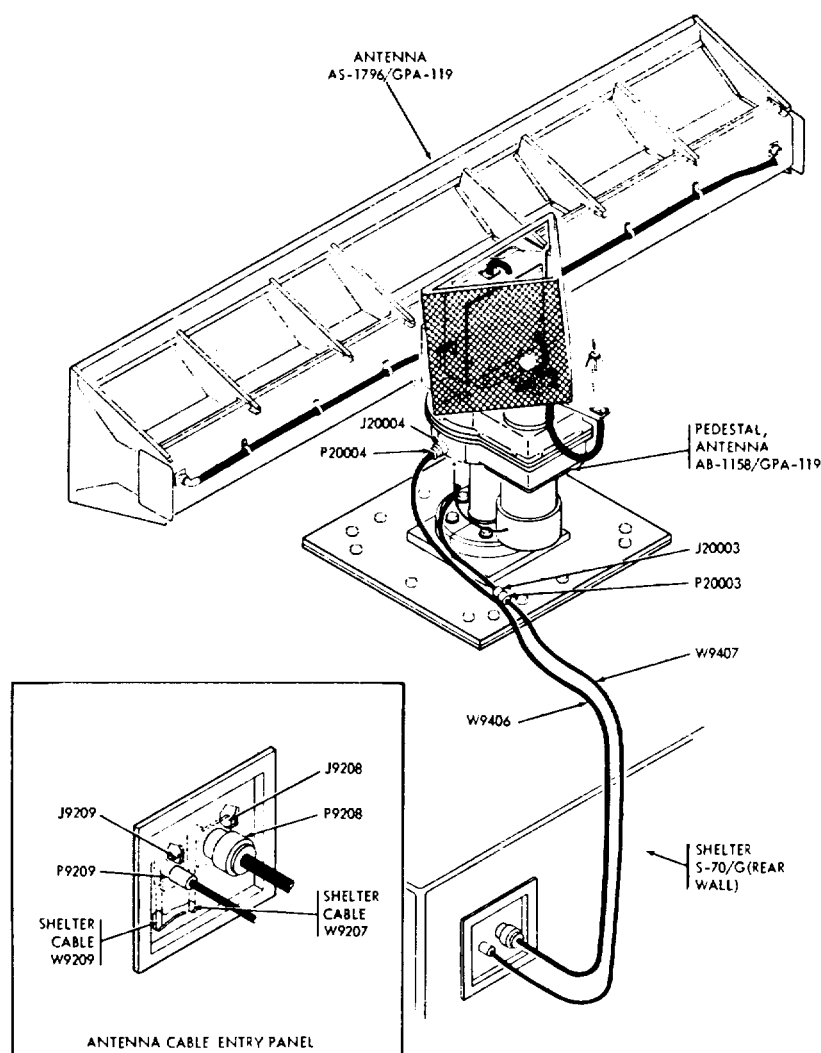
(5) *Cable Assembly, Radio Frequency CG-2338/U (2 ft) (W1005).* Install female connector P1007 to D receptacle on directional coupler. Female connector P1006 is normally factory installed on HY1-4 receptacle of hybrid coupler.

(6) *Cable Assembly, Radio Frequency CG-2338/U (3 ft) (W1006).* Install female connector P1013 to CP1104 receptacle on rf switch. Install female connector P1011 to A receptacle on directional coupler.

(7) *Cable Assembly, Radio Frequency CG-/U (W21001).* Connect female connector P21002 to Z1-1 receptacle on rf switch assembly. Connect female connector P21001 to CP21001 adapter on top of AB-1158/GPA-119.

## 2-11. Interconnection

Interconnection between Antenna Group AN/GPA-119 and Interrogator Group OA-7487/TPX-41 requires the attachment of external cables W9406 and W9407. Instructions for installing these cables are given in paragraphs a and b below (fig. 2-13).



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Figure 2-13. Interrogator Set AN/TPX-41, interconnecting diagram.

a. **Cable W9406.** Connect male connector P9208 to receptacle J9208 located on antenna cable entry panel on rear wall of S-70/G Shelter. Connect right-angle female connector P20004 to receptacle J20004 on Pedestal, Antenna AB-1158/GPA-119.

b. **Cable W9407.** Connect male connector P9209 to connector J9209 located on antenna cable entry panel on rear wall of S-70/G Shelter. Connect male connector P20003 to connector J20003 on Pedestal, Antenna AB-1158/GPA-119.

## 2-12. Checking the Installation

This paragraph contains procedures for checking the AN/TPX-41 on completion of installation. Perform these checks prior to the application of power to ensure

operational readiness of the equipment.

a. **Cable Checks.** Cables of the AN/TPX-41 must be securely connected to the proper receptacles and should be free of sharp bends and material damage. The cables should also be routed in a manner to avoid contact with grease or oil. Check each cable to ensure these requirements are met, using the cabling checklists in *b* below.

b. **Cabling Checklists.** The following charts provide a means of checking cables and their respective points of connections at components of the AN/TPX-41.

## (1) Interrogator Group OA-7487/TPX-41, cabling checklist.

Cable No.	Nomenclature	Connects	
		From	To
W737	Cable Assembly, Power, Electrical CX-2478/U (18 ft)	J-2945/TPX-41, TB8601, terminals 5 and 7	KY-97C/TPX, POWER IN J402
W738	Cable Assembly, Power, Electrical CX-2403/U (20 ft)	J-2945/TPX-41, TB8601, terminals 5 and 7	RT-264D/UPX-6, AC IN J116
W8801	Cable Assembly, Power, Electrical CX-11212/U (10 ft)	KY-97/TPX, RT CONTROL J405	RT-264D/UPX-6, REMOTE CON- TROL J102
W8802	Cable Assembly, Radio Frequency CG-3144/U (4 ft 8 in)	KY-97C/TPX, TRIGGER OUT J403A	SM-472/TPX-44, TRIGGER IN J4
W8803	Cable Assembly, Radio Frequency CG-3142/U (2 ft)	SM-472/TPX-44, RF OUT J3	RT-264D/UPX-6, RF PROBE 20 DB MID BAND ATTEN J213
W9002	Cable Assembly, Radio Frequency CG-3144/U (10 ft)	KY-97C/TPX, TRIGGER OUT J403B	MD-638/TPX-41, CODED PAIR IN J1202
W9005	Cable Assembly, Power, Electrical CX-11119/U (5 ft)	MD-638/TPX-41, AC POWER J1201	J-2945/TPX-41, TB8601 terminals 5 and 7
W9208	Cable Assembly, W9208	MX-8795/TPX-41, 1500 CPS J31104	External Cable W9405, P9207
W9209	Cable Assembly, W9209	MD-638/TPX-41, RF OUT CP1201	External Cable W9407, P9209
W9210	Cable Assembly, W9210	Shelter Power Junction Box	J-2945/TPX-41, J8603
W9602	Cable Assembly, Power, Electrical CX-12561/G (30 ft)	C-7014/TPX-44, J40301	KY-593/TPX-44, REMOTE CON- TROL J205
W9603	Cable Assembly, Power, Electrical CX-12562/G (30 ft)	C-1271A/TPX-22, J731	Multiplexer TD-991/G J10008
W9605	Cable Assembly, Power, Electrical CX-12564/G (30 ft)	C-1271A/TPX-22, J732	KY-593/TPX-44, MODE SELECT J206
W9608	Cable Assembly, Radio Frequency CG-3664/U (10 ft)	AM-1578/FPN-33, J5605	KY-593/TPX-44, IFF VID INPUT J201
W9609	Cable Assembly, Radio Frequency CG-3664/U (30 ft)	KY-593/TPX-44, IFF VID OUT- PUT J204	CY-2094/FPN-33, IFF VIDEO IN J111
W9801	Cable Assembly, Power, Electrical, CX-12557/G (8 ft)	J-2945/TPX-41, J8601	Demultiplexer TD-992/G J12003
W9802	Cable Assembly, Power, Electrical, CG-12558/G (6 ft)	J-2945/TPX-41, J8602	MX-8795/TPX-41, POWER IN J31101
W9803	Cable Assembly, Radio Frequency CG-3663/U (8 ft)	RT-264D/UPX-6, VIDEO OUT J103	MX-8795/TPX-41, VIDEO INPUT J31102
W9804	Cable Assembly, Radio Frequency CG-3663/U (7 ft)	MX-8795/TPX-41, IFF PRE- TRIGGER J31105	KY-97C/TPX, TRIGGER IN J401
W9805	Cable Assembly, Radio Frequency CG-3663/U (7 ft)	MX-8795/TPX-41, IFF VIDEO OUT J31103	Demultiplexer TD-992/G J12008
W9806	Cable Assembly, Radio Frequency CG-3663/U (7 ft)	MX-8795/TPX-41, DISPLAY TRIG- GER J31106	Demultiplexer TD-992/G J12009
W9807	Cable Assembly, Power, Electrical CX-12559/G (6 ft)	Demultiplexer TD-992/G, J12011	KY-97C/TPX, REMOTE CON- TROL J404
W9808	Cable Assembly, Radio Frequency CG-3663/U (8 ft)	MD-638/TPX-41, CODED PAIR OUT J1209	RT-264D/UPX-6 TRIGGER IN J104
W9809	Cable Assembly, Radio Frequency CG-3663/U (8 ft)	MD-638/TPX-41, P2 MOD J1208	RT-264D/UPX-6, P2 MOD J106
W9810	Cable Assembly, Radio Frequency CG-3665/U (7 ft)	RT-264D/UPX-6, ANTENNA J212	MD-638/TPX-41, RF IN, Z1201-3

## (2) Antenna Group AN/GPA-119, cabling checklist.

Cable No.	Nomenclature	Connects	
		From	To
W1001-1	Cable Assembly, Radio Frequency, CG-2338/U (4 ft 6½ in)	E1B-IN on antenna array E1001-A	HY1-3 on bar hybrid HY1001
W1001-2	Cable Assembly, Radio Frequency, CB-2338/U (4 ft 6½ in)	E1A-IN on antenna array E1001-B	HY1-2 on bar hybrid HY1001
W1003	Cable Assembly, Radio Frequency, CG-2338/U (4 ft)	E2-IN on backfill dipole antenna (part of backfill reflector E1002)	DC1C on directional coupler DC1001
W1004	Cable Assembly, Radio Frequency, CG-2293/U (3 ft)	AT1001 (A UG-27C/U (CP1001) connect other end of AT1001 to ARM 1 on bar hybrid HY1001 within bar hybrid and rf switch enclosure)	FL1101 on RF switch S1001
W1005	Cable Assembly, Radio Frequency, CG-2338/U (2 ft)	DC1-D on directional coupler DC1001	HY1-4 on bar hybrid HY1001
W1006	Cable Assembly, Radio Frequency, CG-2338/U (3 ft)	CP1104 on rf switch S1001	DC1-A on directional coupler DC1001
W21001	Cable Assembly, W21001	Pedestal, Antenna AB-1158/GPA-119, CP21001	Antenna, AS-1796/GPA-119 Z1-1
W9406	Cable Assembly, W9406	Shelter cable W9207, J9208	AB-1158/GPA-119, J20004
W9407	Cable Assembly, W9407	Shelter cable W9209, J9209	AB-1158/GPA-119, J20003

c. Fuse Checks. The AN/TPX-41 is shipped with all the fuses installed. Check that a fuse of the proper value and rating is installed in each fuse-

holder. The following chart lists all the fuses used in the AN/TPX-41 and provides their value and rating and their location by component and circuit.

Ref Symbol	Fuse Rating		Location	
	Volts	Amp	Component	Circuit
F1	250	1/4	SM-472/TPX-44	Ac power input
F101	125	1-1/2	RT-264D/UPX-6	Plate
F102	250	3/8	RT-264D/UPX-6	Relay Supply
F103	250	3	RT-264D/UPX-6	Power
F104	250	5	RT-264D/UPX-6	Convenience outlet
F105	250	5	RT-264D/UPX-6	Convenience outlet
F201	250	1-1/2	KY-593/TPX-44	Ac power input
F401	250	3/4	KY-97C/TPX	Ac power input
F1301	250	1/2 SB	MD-638/TPX-41	Ac power input
F1302	250	1/8	MD-638/TPX-41	+250v
F1303	250	1/2	MD-638/TPX-41	-30v
F31101	250	1/2	MX-8795/TPX-41	Ac power input
F31102	250	1	MX-8795/TPX-41	Delay line heater

### Section III. INITIAL ADJUSTMENT OF EQUIPMENT

#### 2-13. Overall Initial Checks

This paragraph covers initial checks that must be performed on the AN/TPX-41 after installation and prior to routine operation of the equipment. Initial adjustments on the individual major components are described in paragraphs 2-14 through 2-19. The remaining checks, listed in a through g below, must be performed on newly installed equipment to ascertain that installation is complete and accurate and that no damage to the equipment or danger to personnel will result when the power is applied.

a. Check air filter on front panel of Receiver-Transmitter, Radio RT-264D/UPX-6. Remove any dirt accumulation. Air intake filter removal, cleaning, and replacement procedures are provided in paragraph 4-6b.

b. Check that all fuses are installed in fuse-holders and are of proper rating, as instructed in paragraph 2-12b.

c. Check all components for loose control knobs, and tighten, if necessary. Also make certain that lamp dimmer adjustments are rotated fully ccw for maximum light brilliance.

d. Check that all components are attached securely to mountings.

e. Make certain that equipment cabling has

been checked as instructed in paragraph 2-12a.

f. Ensure that primary power source is properly grounded. Suitable ground connections between individual components of AN/TPX-41 are accomplished through interconnecting cables.

g. Check operating line voltage from primary power source and ensure that proper input power connections have been made on RT-264D/UPX-6 per paragraph 2-14a.

#### 2-14. Receiver-Transmitter, Radio RT-264D/UPX-6, Initial Adjustments

Instructions for performing initial adjustment of the RT-264D/UPX-6 are contained in the following paragraphs.

a. *Power Supply Adjustment.* The RT-264D/UPX-6 operates from a 60-Hz single-phase power source of 105, 117, or 125 volts ( $\pm 10$  percent). Tie unit is factory-wired for a 117-volt ac power source. To adjust the RT-264D/UPX-6 for a line voltage of 105 or 125 volts, change the power leads to the terminals of the plate and filament transformers. To do this, remove the RT-264D/UPX-6 dust cover, and locate transformers T101 and T102 on the underside of the chassis (fig. 2-5). Change the power leads to the transformers by following the instructions in the following chart.

<i>Transformer</i>	<i>105-volt supply</i>	<i>125-volt supply</i>
T101	Disconnect wire from terminal No. 3 and connect to terminal No. 2	Disconnect wire from terminal No. 3 and connect to terminal No. 1.
T102	Disconnect wire from terminal No. 3 and connect to terminal No. 2	Disconnect wire from terminal No. 3 and connect to terminal No. 1.



*b. Operating Frequency Adjustment.* The receiver and transmitter sections of the RT-264D/UPX-6 are tuned by operating crystals which plug directly into the equipment through the front panel, and by manual screwdriver adjustments adjacent to the crystals (fig. 2-2). The transmitter covers an overall tuning range from 990 to 1040 MHz and may be tuned by crystal substitution and front panel controls adjustment for any frequency of the 20-MHz channel for which the equipment has been aligned. The transmitter is factory-aligned for 1020-MHz operation and can be tuned by appropriate crystal (Y201B) replacement and front panel controls adjustment for any frequency between 1010 and 1030 MHz. Outside this range, complete transmitter exciter circuits realignment is required. The receiver covers an overall tuning range from 1080 to 1130 MHz and may be tuned by crystal substitution and front panel controls adjustment for any frequency within the 20-MHz channel for which the equipment has been aligned. The receiver is factory-aligned for 1100-MHz operation and can be tuned by appropriate crystal (Y202B) replacement and front panel adjustment for any frequency between 1090 and 1110 MHz. Outside of this channel, a complete realignment of all tuned receiver circuits is required. Two sets of crystals are normally provided with the equipment. The operating frequency is obtained from the crystal frequencies by a process of frequency multiplication. The two crystals for the transmitter are 37.77778 MHz for an operating frequency of 1020 MHz and 38.14815 MHz for an operating frequency of 1030 MHz. The two crystals for the receiver are 42.96296 MHz for an operating frequency of 1100 MHz and 42.59259 MHz for an operating frequency of 1090 MHz. Check the operating frequency for your location and if the RT-264D/UPX-6 is not aligned for those frequencies, proceed with the instructions in (1) through (7) below.

**NOTE**

**Simulator, Radar Signal SM-472/TPX-44 operating frequency is preset to 1090 MHz; therefore, the 1090 MHz crystal (42.59259 MHz) should be used in the receiving system. When the RT-264D/UPX-6 is operating in an air traffic control beacon system, the normal operating frequencies are 1030 MHz for transmitting and 1090 MHz for receiving.**

(1) Remove SM-472/TPX-44 and mounting adapter plate from front of RT-264D/UPX-6 as outlined in paragraph 2-2b(2) through (4).

(2) Carefully pull out transmitter frequency

and receiver frequency crystals. Be careful not to bend or break pins on crystals.

(3) Align pins of new transmitter crystal with holes in transmitter operating crystal holder and gently push crystal into holder until crystal is seated firmly.

(4) Rotate transmitter frequency setscrew with screwdriver until TRANSMITTER FREQUENCY dial indicates desired frequency.

(5) Align pins on new receiver crystal with holes in receiver operating crystal holder and gently push crystal into holder until crystal is seated securely.

(6) Rotate receiver frequency setscrew with screwdriver until RECEIVER FREQUENCY dial indicates desired frequency.

(7) Replace SM-472/TPX-44 and mounting adapter plate on front of RT-264D/UPX-6.

*c. GTC External-Internal Link 0-108 Adjustment* (fig. 2-14). GTC external-internal link 0-108 is set in the INT position for normal operation. Procedures for setting the link are given below.

(1) Remove 6 screws that hold cover plate on right-rear side of RT-264D/UPX-6 and remove cover plate. Check position of link 0-108. If link is set incorrectly, perform procedures given in (2), (3), and (4) below.

(2) Loosen 3 locknuts, and slide link connector until it links posts marked INT and GTC.

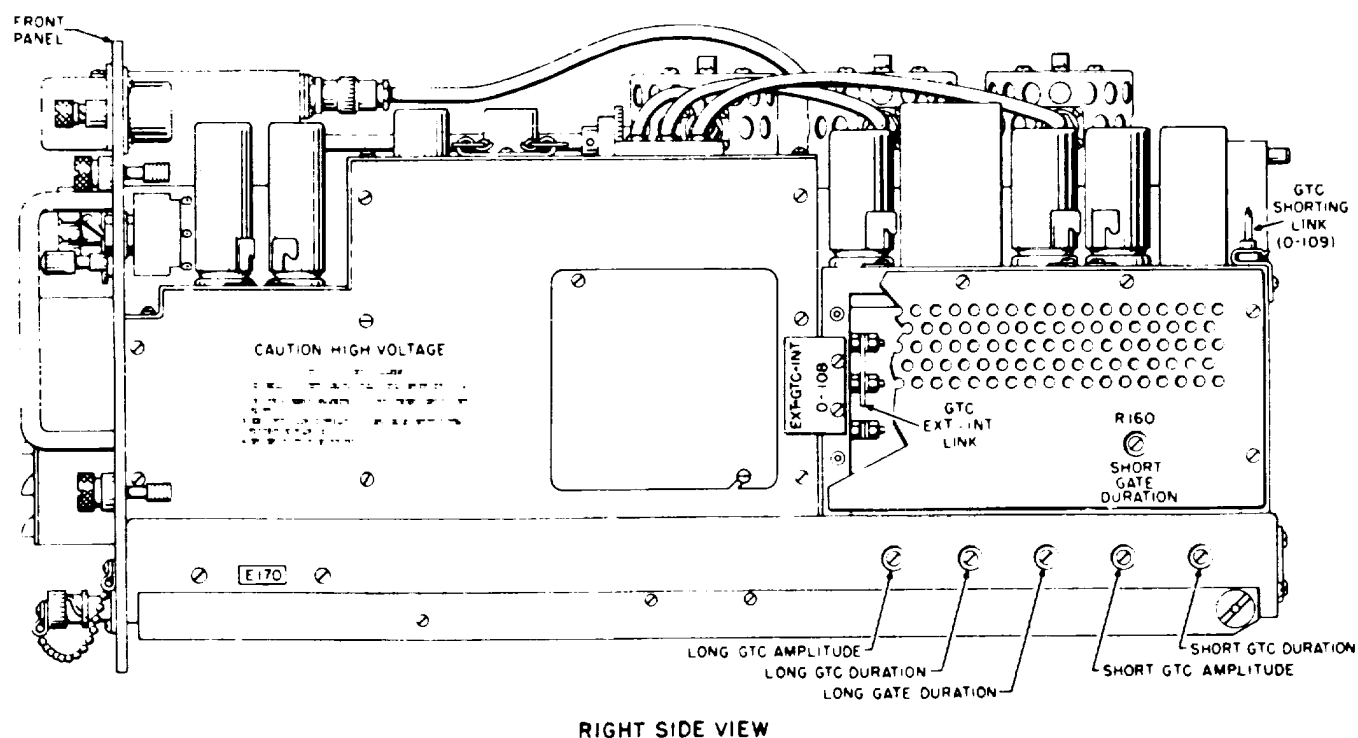
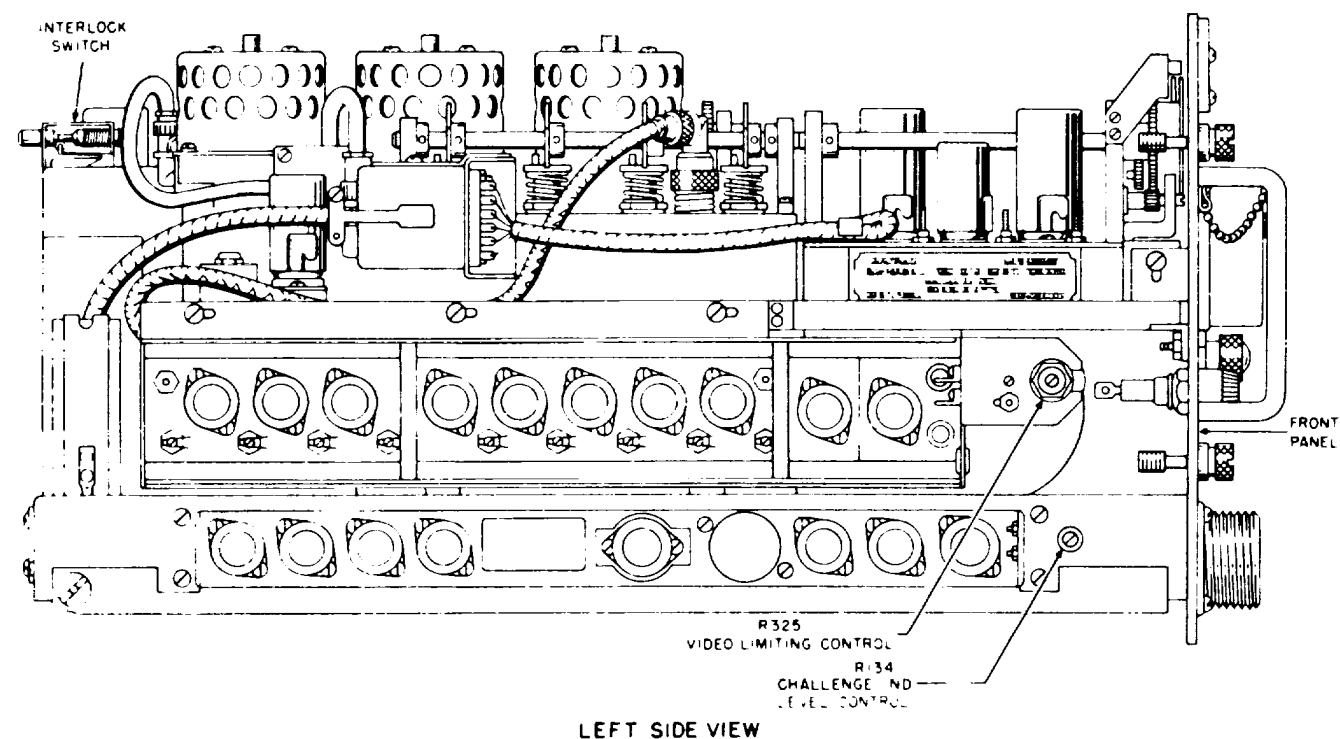
(3) Tighten locknuts to prevent slipping or vibration of connecting link.

(4) Align holes in cover plate with 6 holes on chassis and secure cover plate with 6 screws removed in step (1), above.

**NOTE**

**The preliminary control settings (para 3-4) and the starting procedure (para 3-5) must be completed prior to performing the following adjustments.**

*d. LONG GATE DURATION Control and SHORT GATE DURATION Control Adjustment* (fig. 2-14). Instructions for adjusting LONG



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Figure 2-14. Receiver Transmitter, Radio RT-264D/UPX-6, initial adjustments

GATE DURATION and SHORT GATE DURATION controls are contained in steps (1) through (10) below. Before proceeding with adjustments ensure that GTC links 0-108 and 0-109 are correctly positioned as instructed in paragraph 2-26(12) and (13) and subparagraph c above.

(1) Remove RT-264D/UPX-6 main chassis from dust cover by releasing knurled captive thumbscrews on front panel and pulling chassis out by handles.

(2) Set interlock switch S102 (fig. 2-3) to provide ac power to receiver-transmitter.

(3) On Control, Remote Switching C-1271A/TPX-22, place GTC switch to LONG.

(4) On associated radar set, place RANGE switch to 200 MILES.

(5) On C-7014/TPX-44, place OPERATE TEST switch to TEST.

(6) On C-1271A/TPX-22, loosen dial lock and rotate RECEIVER GAIN control to position 10 (maximum gain). Tighten dial lock.

(7) On KY-97C/TPX, place CHALLENGE switch to ON.

(8) On RT-264D/UPX-6, adjust LONG GATE DURATION control R125 until iff receiver noise extends to end of sweep on radar ppi.

(9) On C-1271A/TPX-22, place GTC switch to SHORT, and on RT-264D/UPX-6, adjust SHORT GATE DURATION control R160 until iff receiver noise extends to end of sweep on radar ppi.

(10) On KY-97C/TPX, place CHALLENGE switch to OFF.

e. *RECEIVER GAIN Control Adjustment.* The RECEIVER GAIN control on the C-1271A/TPX-22 is used to adjust the level of output signal from receiving system of RT-264D/UPX-6. This signal is applied to a threshold limiter in Blanker, Interference MX-8795/TPX-41 that eliminates much of the noise; therefore, high receiver gain in the RT-264D/UPX-6 may not be desirable because of the resultant noise level increase. On the C-1271A/TPX-22, adjust the RECEIVER GAIN control as follows:

(1) Rotate dial lock ccw until RECEIVER GAIN control can be rotated freely.

(2) With OPERATE-TEST switch on C-

7014/TPX-44 placed to TEST, depress PUSH TO CHAL switch and observe associated radar set ppi display.

#### NOTE

The green CHALLENGE indicator lamps on the C-1271A/TPX-22 and RT-269D/UPX-6 should light when the PUSH TO CHAL switch is depressed, indicating acceptable transmitter operation.

(3) Adjust RECEIVER GAIN control approximately three dial positions cw from point at which iff receiver noise begins to appear. When iff replies are seen, adjust RECEIVER GAIN control cw or ccw for best definition of replies at greatest range. A small amount of iff receiver noise should be displayed.

#### NOTE

The iff video control at the associated radar control-indicator may require adjustment for best results.

(4) Relock RECEIVER GAIN control and note control setting.

f. *Video Limiting Control Adjustment.* Video limiting control R225, located on the left side of RT-264D/UPX-6 chassis (fig. 2-14), is adjusted to ensure that output amplitude (video) of the receiving system is correct for input to the defruiting system in the MX-8795/TPX-41. This control is normally preset for proper operation, but should be checked by higher category maintenance personnel if iff replies are weak or jittery or are not seen.

### 2-15. Simulator, Radar Signal SM-472/TPX-44, Initial Adjustments

The SM-472/TPX-44 is shipped with all adjustments preset for proper operation. The operating rf output is preset to 1090 MHz and is determined by the crystal frequency of a crystal-controlled oscillator. Procedures for the OUTPUT LEVEL control adjustment and the DELAY control adjustment are provided in a and b below.

#### NOTE

The preliminary control settings (para 3-4) and the starting procedure (para 3-5) must be completed prior to performing the following adjustments.

a. **OUTPUT LEVEL Control Adjustment.** The OUTPUT LEVEL control (fig. 3-9) is used to adjust the output signal strength of the SM-472/TPX to a level suitable for detection by the iff receiving system. At the extreme ccw position, the signal strength may be too low for proper reception, and the simulated reply signal will not be seen on the ppi display of the associated radar set. Follow the procedure below:

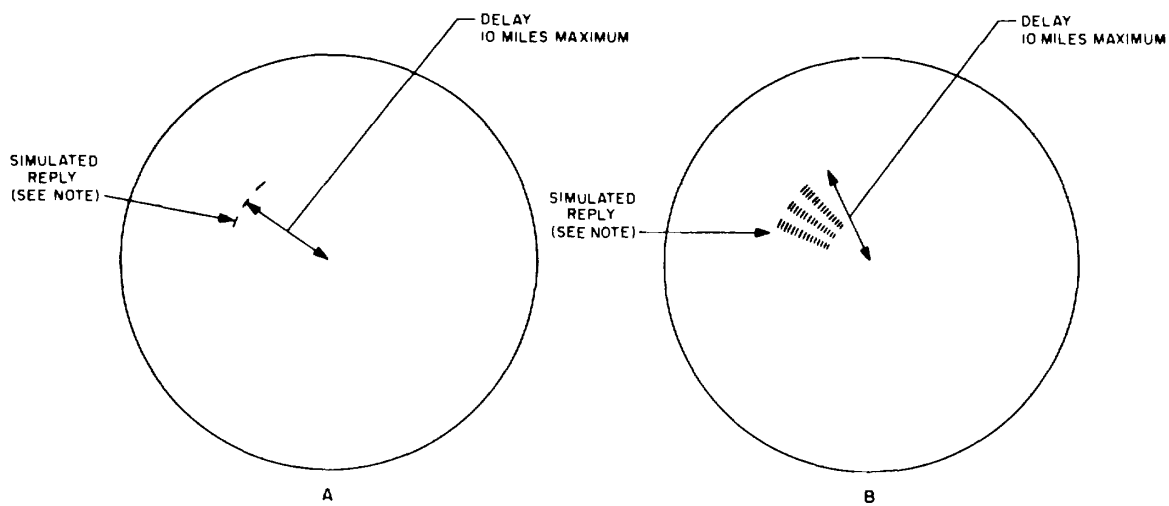
- (1) On SM-472/TPX-44, rotate OUTPUT LEVEL control fully cw.
- (2) On C-1271A/TPX-22, place CHOP switch to ON.
- (3) Depress PUSH TO CHAL switch and

observe simulated iff reply signal on associated radar set ppi display (fig. 2-15).

(4) On SM-472/TPX-44, slowly rotate OUTPUT LEVEL control ccw to point at which simulated reply signal does not appear on associated radar set ppi display.

(5) Rotate OUTPUT LEVEL control cw to point at which simulated reply signal reappears. Note this position.

(6) Reset OUTPUT LEVEL control to point midway between position noted in (5) above and extreme cw position.



CONDITIONS

- CONTROL, REMOTE SWITCHING  
C-1179A/TPX-19;
1. MODE SELECTOR 2
  2. CHOP SWITCH: ON
  3. PUSH TO CHALL SWITCH: DEPRESSED
  4. GTC SWITCH: SHORT

SIMULATOR, RADAR

SIGNAL SM-472/TPX-44

1. B+ ON SWITCH: REMOTE
2. TRIG IN SWITCH: MODE 2
3. DELAY CONTROL MAXIMUM COUNTER-CLOCKWISE

CONDITIONS

1. SAME AS FOR CONDITIONS IN A, EXCEPT THAT CONTROL, REMOTE SWITCHING C-7014/TPX-44 TEST-OPERATE SWITCH IS SET TO TEST

ASSOCIATED RADAR SET;

1. PPI SET FOR SHORT RANGE VIEWING (20 MILES)

CONTROL, REMOTE SWITCHING

C-7014/TPX-44

1. MODE 2 CODE SWITCH SET TO 7777
2. TEST-OPERATE SWITCH: OPERATE

NOTE:

**SIMULATED REPLY WILL APPEAR AS AN ARC OR COMPLETE CIRCLE AROUND PPI, DEPENDING ON LENGTH OF TIME THAT PUSH TO CHALLENGE SWITCH REMAINS DEPRESSED.**

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Figure 2-15. Simulated iff reply signals, typical ppi presentations.

(7) Leave OUTPUT LEVEL control in position determined in (6) above. If further adjustment cw is required to obtain simulated reply, decrease in sensitivity of receiving system in RT-264D/UPX-6 or decrease in output from SM-472/TPX is indicated. Notify higher category repairman.

#### NOTE

Use a grease pencil or any suitable marker and mark the knob setting on the panel beside the OUTPUT LEVEL control. This mark serves as a quick reference to the operator for resetting controls on the SM-472/TPX-44 and an indication of iff receiving system performance. If either the RT-264D/UPX-6 or SM-472/TPX-44 is realigned, the mark may be erased and a new reference level established.

*b. DELAY Control Adjustment.* The DELAY control (fig. 3-9) is used to adjust the position of the simulated iff reply signal from approximately 10 to 20 nautical miles (18.5 to 37 km). The control should be adjusted to place the simulated reply on the associated radar set ppi display at a point where it will be recognized readily by the operator. Proceed as follows:

(1) On C-1271A/TPX-22, depress PUSH TO CHAL switch and observe simulated iff reply signal on associated radar set ppi display. CHOP switch on C-1271A/TPX-22 must be placed to ON.

(2) On SM-472/TPX-44, rotate DELAY control in both directions and observe extreme positions of iff reply signal on associated radar set ppi display with respect to control setting (A, fig. 2-15).

(3) On C-7014/TPX-44, place OPERATE-TEST switch to TEST. Simulated iff reply should appear on associated radar set ppi display as train of 15 pulses (B, fig. 2-15).

(4) On SM-472/TPX-44, adjust DELAY control until 15 pulses of simulated iff reply are visible within range being displayed on associated radar set ppi display.

(5) On C-7014/TPX-44, place OPERATE-TEST switch to OPERATE. Observe single-pulse simulated iff reply signal on associated radar set ppi display.

(6) On SM-472/TPX-44, adjust DELAY control until simulated iff reply is readily observed on associated radar set ppi display for both positions of OPERATE-TEST switch. Return OPERATE-TEST switch to OPERATE.

(7) Note setting of DELAY control and leave control at this position for normal operation.

### 2-16. Coder-Control Interrogator Set KY-97C/TPX, Initial Adjustments

Instructions for performing initial adjustment of the KY-97C/TPX are contained in the following paragraphs (fig. 2-16).

*a. Power Supply Adjustment.* The KY-97C/TPX operates from a single-phase, power source of either 50/60 or 400 Hz, at a line voltage of 105, 117, or 125 volts ( $\pm 10$  percent). The unit is factory-wired for the 117-volt, 60-Hz ac power. To adjust the unit for a line voltage supply of 105 or 125 volts, remove the louvered side panel of the unit, and locate transformer T401 (fig. 2-16); then follow instructions in the following chart.

Transformer	105-volt supply	125-volt supply
T401	Disconnect wire from terminal No. 3 and connect to terminal No. 2.	Disconnect wire from terminal No. 3 and connect to terminal No. 4.

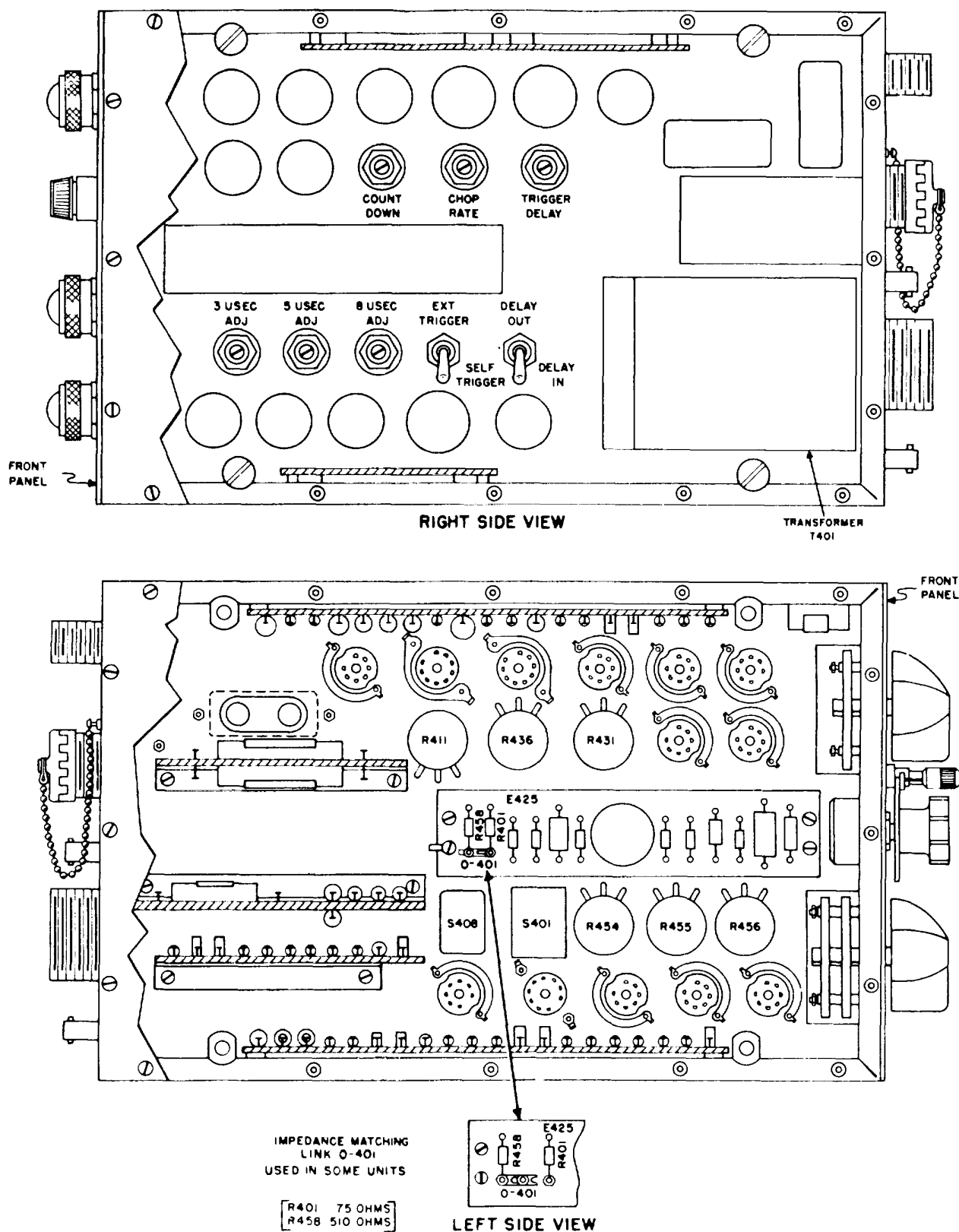
*b. Impedance Matching Link 0-401 Adjustment.* The impedance matching link 0-401 is provided to match the input impedance of the KY-97C/TPX with the output impedance of the MX-8795/TPX-41. Set the impedance matching link to the 75-ohm position as follows.

(1) Remove left-side panel of KY-97C/TPX by removing 16 attaching screws.

(2) Locate impedance matching link 0-401 (fig. 2-16) and loosen 2 attaching hex nuts.

(3) Slide impedance matching link 0-401 toward front panel of KY-97C/TPX until R4-1 mounting post is encountered.

(4) Secure impedance matching link 0-401 in position by tightening 2 hex nuts.



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Figure 2-16. Coder Control KY-97C/TPX, initial adjustments.

(5) Reinstall left-side panel of KY-97C/TPX.

c. *COUNT DOWN Adjustment.* The COUNT DOWN adjustment, which is set for unity count down (375, 300, or 250 pulse pairs per second) and the three output pulse spacing (mode) adjustments are normally preset when shipped, and are adjusted only by higher category maintenance personnel.

#### NOTE

The preliminary control settings (para 3-4) and the starting procedure (para 3-5) must be completed prior to performing the following adjustments.

d. *CHOP RATE Control Adjustment.* Adjust the CHOP RATE control (fig. 5-3) as follows:

(1) Remove louvered right-side panel of KY-976/TPX and loosen locknut on CHOP RATE control. (In some equipments, panel need not be removed since an access hole is provided.)

(2) Depress PUSH TO CHAL switch and rotate CHOP RATE control with screwdriver until iff reply signals have desired appearance (fig. 3-10). Tighten locknut.

(3) Replace louvered right-side panel on KY-97C/TPX.

### 2-17. Decoder, Video KY-593/TPX-44, Power Supply Adjustment

The KY-593/TPX-44 has one power supply control that may require slight adjustment following installation. This adjustment is the +12V ADJ control (fig. 2-17), which is as follows:

a. On J-2945/TPX-41, place IFF POWER circuit breaker to ON and on KY-593/TPX-44, place POWER switch to ON.

b. Release 4 captive thumbscrews that secure panel-chassis to its dust cover, and partially withdraw KY-593/TPX-44.

c. Using Multimeter AN/USM-223 (para 5-2b), monitor 12-volt output between +12V testpoint TP2 and PWR SUP COM testpoint TP1.

d. Adjust +12V ADJ control (R35) to obtain 12-volt indication on AN/USM-223.

e. Remove AN/USM-223 and reinstall KY-

593/TPX-44 in its dust cover.

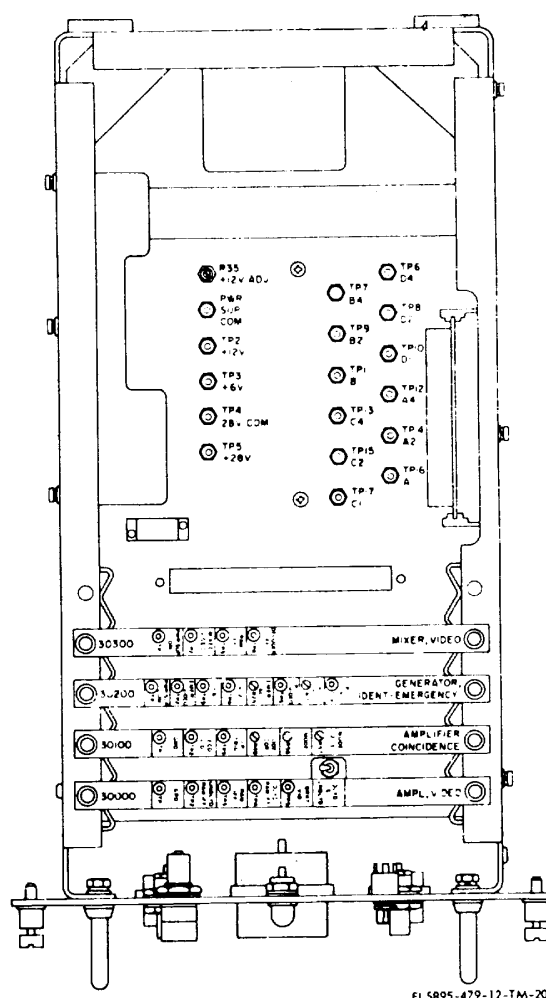


Figure 2-17. Decoder, Video KY-593/TPX-44. initial adjustments.

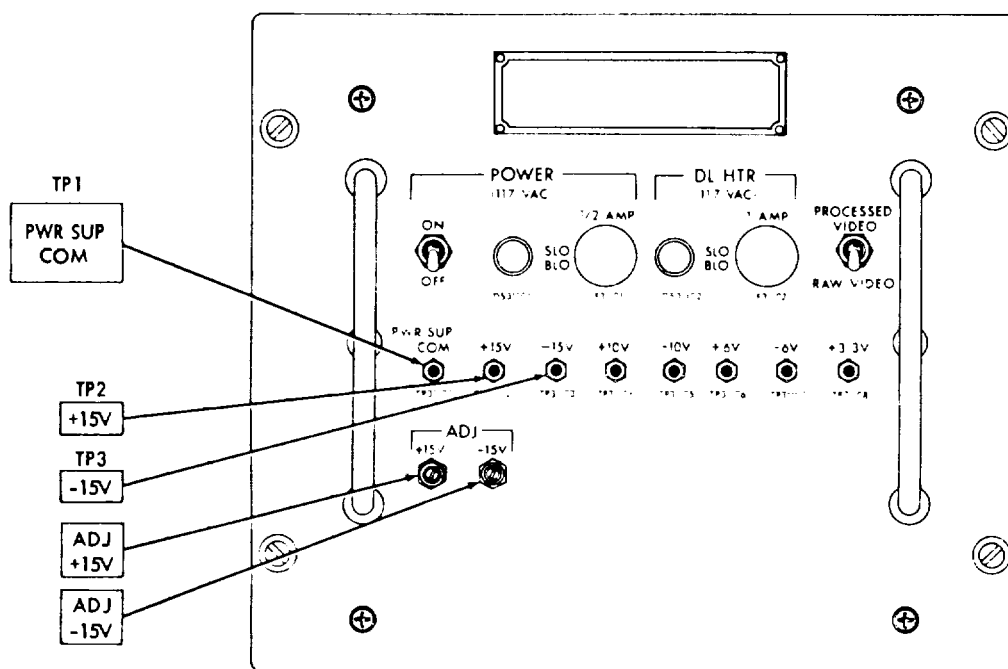
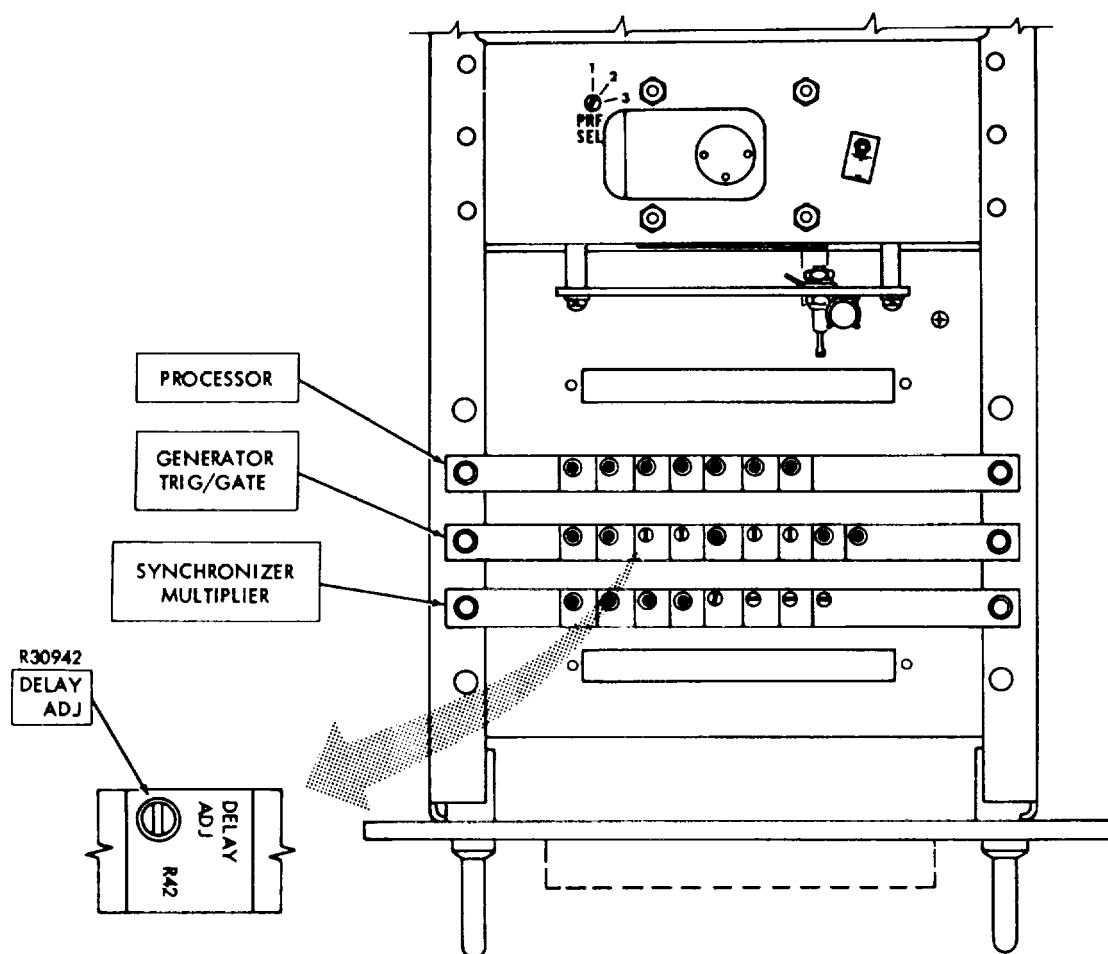
### 2-18. Blanker, Interference MX-8795/TPX-41, Initial Adjustments

Instructions for performing initial adjustment of the MX-8795/TPX-41 are contained in the following paragraphs (fig. 2-18).

a. *Power Supply Adjustments.* Adjust the +15V ADJ and -15V ADJ in the MX-8795/TPX-41 power supply as follows:

(1) On J-2945/TPX-41, place IFF POWER circuit breaker to ON and on MX-8795/TPX-41, place POWER switch to ON.

(2) Set AN/USM-223 to indicate volts.



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Figure 2-18. Blanker, Interference MX-8795/TPX-41, initial adjustments.



(3) Using AN/USM-223, monitor +15-volt output between +15V testpoint TP2 and PWR SUP COM testpoint TP1.

(4) Adjust +15V ADJ control R1 to obtain 15-volt indication on AN/USM-223.

(5) Using AN/USM-223, monitor -15 volt output between -15V testpoint TP6 and PWR SUP COM testpoint TP1.

(6) Adjust -15V ADJ control R2 to obtain 15-volt indication on AN/USM-223.

(7) Disconnect the AN/USM-223.

*a.1 Prf Select Switch Setting.* The setting of PRF SEL switch S3 (fig. 2-18) on the MX-8795/TPX-41 chassis must be determined by local command authority to prevent interference between operating interrogator sets. This setting and related adjustments are to be made by higher category of maintenance.

#### NOTE

**The following procedure (DELAY ADJ) should be performed after antenna orientation (para 2-19) and completion of the preliminary control settings (para 3-4) and the starting procedure (para 3-5).**

*b. DELAY ADJ Control Adjustment.* Adjust the DELAY ADJ control on the trigger/gate generator subassembly of the MX-8795/TPX-41 as follows:

(1) Observe associated radar set for proper operation.

(2) On associated radar Control-Indicator OA-2664/FPN-40, place -

(a) SCAN MODE switch S1102 to SEARCH.

(b) SCAN control switch S1107 to ON.

(c) RANGE switch S1101 to 20 miles.

(3) On Control-Indicator DA-2664/FPN-40, locate normal radar signal with associated decoded IFF reply. This reply should be separated from all other replies by a distance which will allow uninterrupted visual contact as shown for MODE 1 NORMAL REPLY in figure 3-10.

(4) On Control-Indicator OA-2664/FPN-40, continue to visually track located reply until RANGE switch S1101 can be set to 5 miles.

(5) On Control-Indicator OA-2664A/FPN-40, set RANGE SWITCH S1101 to 5 miles.

(6) Release 4 captive thumbscrews on front panel of MX-8796/TPX-41 and slide chassis forward to expose DELAY ADJ R30942 (fig. 2-18).

(7) On Blanker, Interference MX-8795/TPX, adjust DELAY ADJ R30942 until IFF reply is centered just behind associated radar signal. (See NORMAL REPLY for MODE 1 in figure 3-10.)

(8) Replace Blanker, Interference MX-8795/TPX-41, in its dust cover.

**Change 1 2-36.1**

## 2-19. Antenna Group AN/GPA-119, Orientation

Instructions for orienting Antenna Group AN/GPA-119 are given in paragraphs *a* and *b* below.

### NOTE

**Orientation and synchro alignment of radar Antenna Group OA-2666/FPN-40 must be accomplished prior to orientation of iff Antenna Group AN/GPA-119.**

*a. Antenna Positioning.* Prior to any electrical alignment in the iff antenna synchro system, the iff and radar antennas must be positioned to point in the same direction. This may be accomplished easily by establishing an azimuth reference point and physically positioning both antennas to point directly at this reference point. Instructions for establishing an azimuth reference point and positioning the radar and iff antennas are given in steps (1) through (13) below.

(1) On SB-116/FPN-40, place SCAN ON-OFF switch to OFF.

(2) ON J-2945/TPX-41, place SCAN ON-OFF switch to OFF.

(3) Mount boresite telescope on radar azimuth Antenna AS-1079/FPN-40.

### NOTE

**For the purposes of the following steps, an azimuth reference point may be an easily identifiable, fixed geographical feature of the surrounding area that is located at least 1 mile from the radar antenna.**

(4) Site through boresite telescope and physically rotate radar azimuth Antenna AS-1079/FPN-40 until suitable azimuth reference point is encountered.

(5) Carefully position radar azimuth Antenna AS-1079/FPN-40 so that vertical crosshair of boresite telescope bisects azimuth reference point.

(6) Taking care not to move antenna, remove boresite telescope from radar azimuth Antenna AS-1079/FPN-40.

(7) Install boresight telescope on telescope mount located on side of Pedestal, Antenna AB-

1158/GPA-119 support casting.

(8) Loosen 6 screws that secure Pedestal, Antenna AB-1158/GPA-119 to mounting fixture just enough so that pedestal may be rotated.

(9) Site through boresight telescope and position Pedestal, Antenna AB-1158/GPA-119 so that telescope vertical crosshair bisects azimuth reference point established in (5) above.

(10) Tighten 6 pedestal mounting screws (loosened in (8) above) and site through boresight telescope to verify that Pedestal, Antenna AB-1158/GPA-119 has not shifted position.

(11) Remove boresight telescope from Pedestal, Antenna AB-1158/GPA-119.

(12) At top of Pedestal, Antenna AB-1158/GPA-119, locate two reference marks: one on rotating section of pedestal and the other on stationary section of pedestal adjacent to rotating section.

(13) Position iff Antenna AS-1796/GPA-119 so marks identified in (12) above are aligned.

### NOTE

**Take care to prevent movement of the iff and radar antennas.**

*b. Iff Sweep Orientation.* Perform following steps (1) through (11) below to orient the iff sweep.

(1) On SN-386/FPN-40, place IFF ON-OFF switch to ON and RANGE NAUTICAL MILES switch to SEARCH 200.

(2) Inside SN-386/FPN-40 on chassis deck just behind RANGE NAUTICAL MILES switch, adjust VERT IFF ADJ and HORIZ IFF ADJ controls to center origin of 200-mile iff sweep.

(3) Place RANGE NAUTICAL MILES switch to SEARCH 5. Inside SN-386/FPN-40, adjust VERT IFF OFF CENTERING and HORIZ IFF OFF CENTERING controls to center origin of 5-mile sweep.

(4) Repeat steps (2) and (3) until sweep origins remain centered when RANGE NAUTICAL MILES switch is placed alternately to 5- and 200-mile positions.

(5) Establish communications between indicator and Antenna Group AN/GPA-119, and have one man remain at indicator to observe sweep presentations.

(6) At Pedestal, Antenna AB-1158/GPA-119, remove cover from synchro B20001 and manually rotate synchro until iff sweep is superimposed on radar sweep at indicator. Reinstall cover on synchro B20001.

(7) On SB-1116/FPN-40, place SCAN ON-OFF switch to ON.

(8) On J-2945/TPX-41, place SCAN ON-OFF switch to ON and ensure SCAN switch is placed to OPERATE.

(9) At radar indicator, select responding

aircraft target that is moving directly inbound or outbound in relation to site.

(10) Iff response (arc) should be centered directly behind radar return as shown in figure 3-10.

(11) When iff response is not centered on radar return, readjust iff synchro to attain requirements of step (10).

## **2-20. Installation Performance Checks**

The SM-472/TPX-41 and the replies received from airborne transponders may be used to check the performance of Interrogator Set AN/TPX-41. Perform sequences 6, 7, and 8 in the daily preventive maintenance checks and services chart (para 4-5a).

## CHAPTER 3. OPERATING INSTRUCTIONS

### Section I. OPERATORS CONTROLS AND INDICATORS

#### 3-1. Damage From Improper Settings

Observe the following precautions when making settings on the AN/TPX-41 to avoid damage to the equipment or injury to personnel.

a. Do not place SCAN ON-OFF switch on the J-2945/TPX-41 to ON until iff antenna area has been checked for obstructions and personnel.

b. Do not depress the PUSH TO CHAL switch on the C-1271A/TPX-22 when maintenance personnel are working on the RT-264D/UPX-6.

c. Place the IFF POWER ON-OFF switch on the J-2945/TPX-41 to OFF in the event of primary power fluctuations.

d. Haphazard operation or improper settings of the controls and misinterpretation of the indicator functions on the equipment can impair effective operation. To interrogate properly and to analyze the video pulse-train formations that the equipment is capable of decoding, the equipment *must* be set up correctly. Refer to the charts in paragraphs 3-2a through i below to determine the function of each control on the AN/TPX-41.

#### 3-2. Controls and Indicators

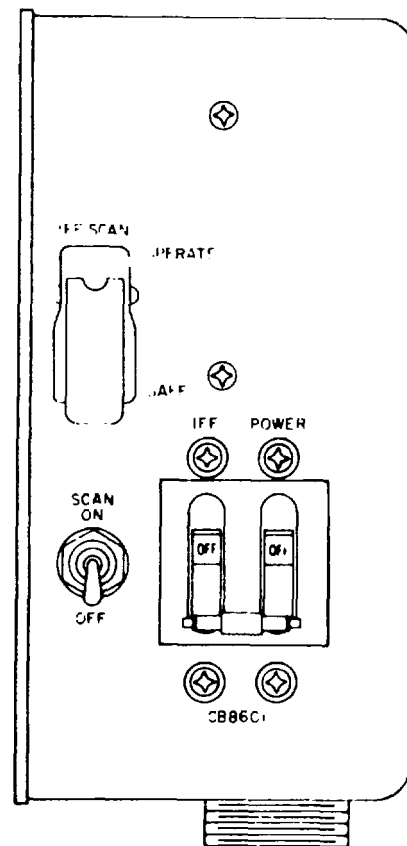
Operating controls and indicators for each major component of the AN/TPX-41 are listed in paragraphs a through i below by control name and function.

a. *Interconnecting Box J-2945/TPX-41, Controls and Indicators* (fig. 3-1).

<b>Control or indicator</b>	<b>Function</b>
IFF POWER circuit breaker	Applies ac input power to components of AN/TPX-41.
SCAN switch	Applies ac drive power to
<b>Control or indicator</b>	<b>Function</b>

IFF SCAN switch

Antenna Group AN/GPA-119 for antenna rotation. Used to remove ac drive power to Antenna Group AN/GPA-119 when placed to SAFE position. When placed to OPERATE position, permits application of ac drive power to antenna drive motor.

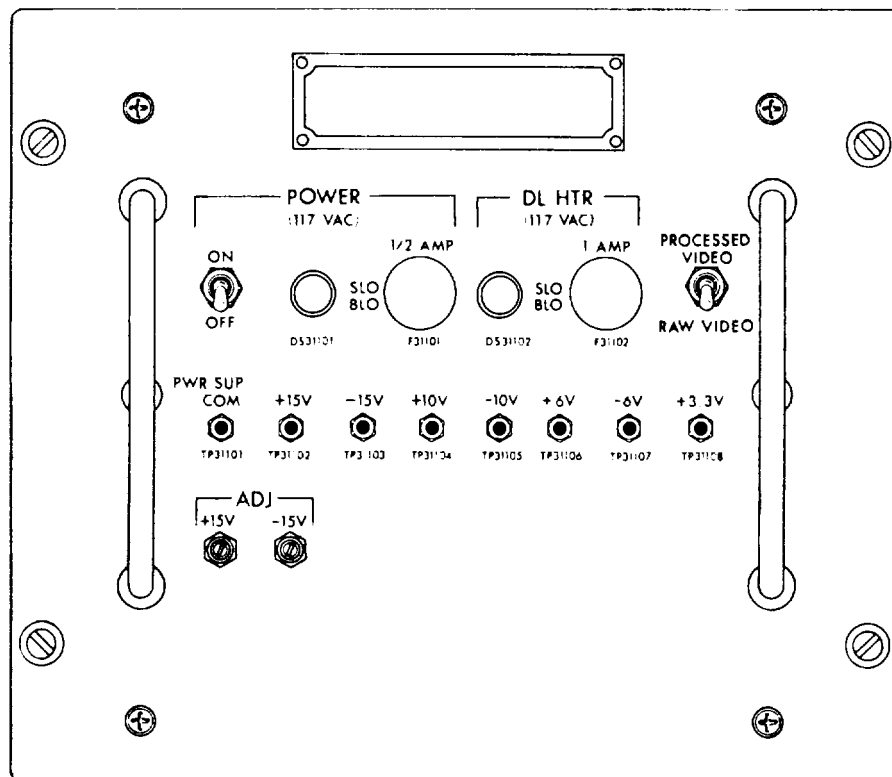


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Figure 3-1. Interconnecting Box J-2945/TPX-41, controls and indicators.

b. *Blanker, Interference MX-8795/TPX-41, Controls and Indicators.* (fig. 3-2).

<i>Control or indicator</i>	<i>Function</i>
POWER switch.....	Connects MX-8795/TPX-41 to 117v ac power when placed to ON.
POWER indicator lamp (green).	Lights when ac power is applied to MX-8795/TPX-41.
PROCESSED VIDEO-RAW VIDEO switch.	Selects video output of processing circuits in MX-8795/TPX-41 when placed to PROCESSED VIDEO position. Selects raw video input (bypasses MX-8795/TPX-41 video processing circuits) when placed to RAW VIDEO position.
PRF SEL switch.....	Selects operating prf of AN/TPX-41 by determining trigger output rate of MX-8795/TPX-41. When set to position 1, a 375 pps prf is established. When set to position 2, a 300 pps prf is established. When set to position 3, a 250 pps prf is established.
DL HTR indicator lamp	Lights when ac power is applied to delay line heater.



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Figure 3-2. *Blanker, Interference MX-8795/TPX-42, controls and indicators.*

c. *Coder-Control Interrogator Set KY-97C/TPX, Controls and Indicators.* (fig. 3-3).

<i>Control or indicator</i>	<i>Function</i>
POWER switch.....	Connects ac power to coder-control unit when placed to ON position.
CHOP switch .....	Connects chopping circuit when placed to ON position that interrupts delivery of trigger pulses to transmitter. This action will change appearance of IFF reply signal on radar scope as shown in figure 3-10.
CHALLENGE switch.....	Initiates operation of interrogator set when placed to ON position. This action causes coder-control unit to begin delivering paired triggers to receiver-transmitter, which activate transmitter and receiver systems for transmission and reception of IFF signals.
GTC switch .....	Provides LONG and SHORT gtc conditions. When placed to LONG position, false responses due to antenna side- and back-lobing effects are minimized. When placed to SHORT position, maximum receiver sensitivity is obtained.

**3-2.1/(3-2.2 blank)**

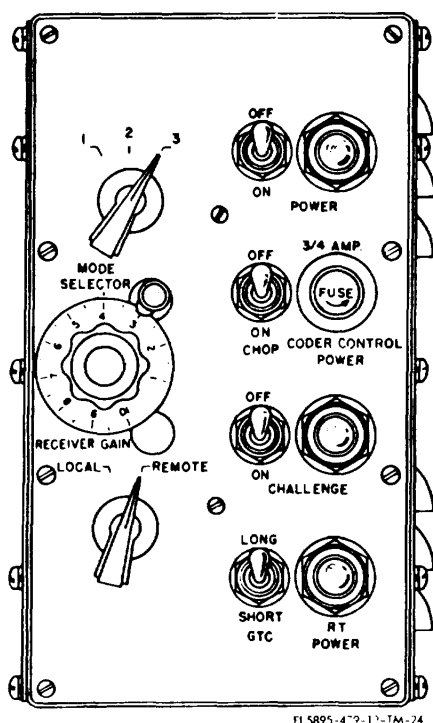


Figure 3-3. Coder-Control KY-97C/TPX Control and Indicators.

Control or indicator	Function
GTC switch	Provides LONG and SHORT gtc conditions. When placed to LONG position, false responses due to antenna side- and back-lobing effects are minimized. When placed to SHORT position, maximum receiver sensitivity is obtained.
CHOP switch	Connects chopping circuit when placed to ON position that interrupts delivery of trigger pulses to transmitter section of RT-264D/UPX-6. This action will change appearance of iff reply signal on radar scope as shown in figure 3-10.
PUSH TO CHAL switch	Initiates operation of AN/TPX-41 when depressed. This action causes KY-97C/TPX to begin delivering paired triggers to RT-264D/UPX-6, which activates transmitter and receiver systems for transmission and reception of iff signals.
RECEIVER GAIN control	Controls gain of RT-264D/UPX-6.
RT POWER indicator (amber)	Indicator lamp lights (after 60-sec delay) when POWER switch on RT-264D/UPX-6 is placed to ON.
CHALLENGE indicator (green)	When PUSH TO CHAL switch is depressed, indicator lamp lights when output power of RT-264D/UPX-6 is normal. Light extinguishes when output power is below normal.
MODE SELECTOR switch	Three-position switch used to select mode of operation of RT-264D/UPX-6 and desired MODE CODE switch on C-7014/TPX-44.

*e. Control, Remote Switching, C-7014/TPX-44, Controls and Indicators. (fig. 3-5).*

Control or indicator	Function
MODE 1 thumbswitch (selects 2 digits)	Used to code setting for mode 1 operation (can be used to select 32 codes from 00 to 73, utilizing digits 0 through 7; right-hand thumbswitch is blocked from going past 3).

Control or indicator	Function
LOCAL-REMOTE switch	When placed to LOCAL position, permits operation of interrogator set from front panel of coder-control unit. When placed to REMOTE position, permits operation of interrogator set from remote control box.
MODE SELECTOR switch	Three-position switch for selection of mode 1 (IFF), mode 2 (PI), and mode 3 (FLI) interrogation modes.
RECEIVER GAIN control	Controls gain of receiver system in receiver-transmitter.
POWER indicator lamp	Lights when ac power is connected to coder-control unit.
CHALLENGE indicator lamp (green)	Lights when transmitter power output level is normal. Light extinguishes when power output falls below normal.
RT POWER indicator lamp (amber)	Lights (after 60-sec time delay) when receiver-transmitter POWER switch is placed to ON position.

*d. Control, Remote Switching C-1271A/TPX-22, Controls and Indicator. (fig. 3-4).*

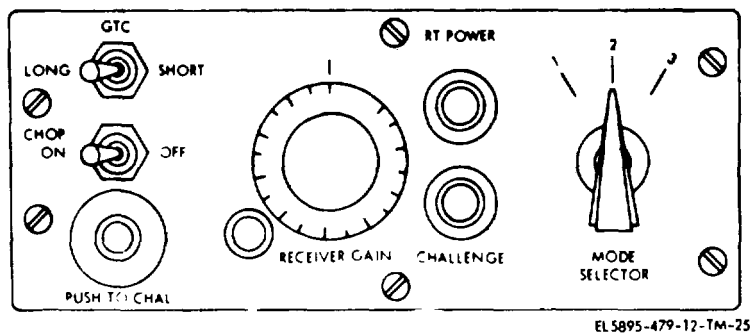
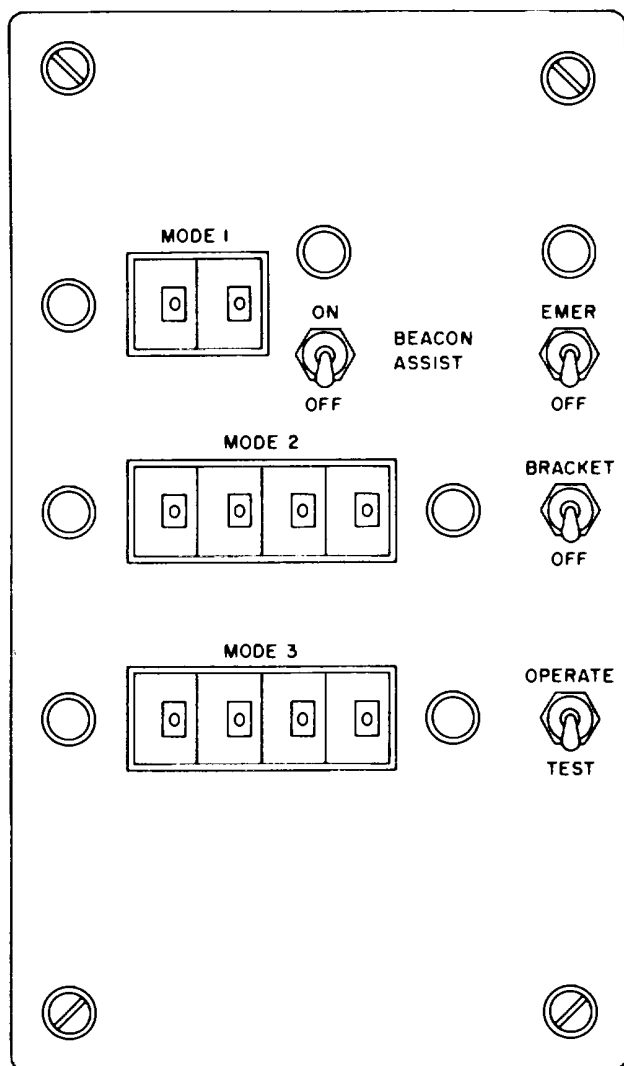


Figure 3-4. Control, Remote Switching C-1271A/TPX-22, controls and indicators.





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Figure 3-5. Control, Remote Switching, C-7014/TPX-44, controls and indicators.

Control or indicator	Function
MODE 3 thumbswitch (selects 4 digits)	Used to select code setting for mode 3 operation (can be used to select 4096 codes from 0000 to 7777, utilizing digits 0 through 7).
MODE 3 indicator lamp (green), left of MODE 3 switch.	Lights when mode 3 has been selected by C-1271A/TPX-22.
BEACON ASSIST switch	When placed to ON position, a properly coded iff reply is displayed as 10-ysec pulse instead of normal 1-rsec pulse.
BEACON ASSIST indicator lamp (blue)	Lights when BEACON ASSIST switch is placed to ON position.
EMER-OFF switch	When placed to EMER position, iff reply will appear as string of four pulses, but <i>only</i> when aircraft transponder has been set to reply with an emergency signal.
EMER indicator lamp (red)	Lights when EMER-OFF switch is placed to EMER position.
BRACKET-OFF switch	When placed to BRACKET position, permits KY-593/TPX-44 to produce an output video signal from aircraft transponders that are on correct mode but transmitting any code; if BEACON ASSIST is placed to ON, properly coded replies will be 10 psec wide and all others will be 1 Asec wide.
BRACKET indicator lamp (green)	Lights when BRACKET-OFF switch is placed to BRACKET position.
OPERATE-TEST switch	When placed to TEST position, iff reply (coded video pulses) bypasses decoding circuits and is displayed as raw iff video. When placed to OPERATE position, iff reply is applied to decoding circuits.
OPERATE-TEST indicator lamp (green)	Lights when switch is placed to OPERATE position.

f. Decoder, Video KY-593/TPX-44, Controls and Indicators. (fig. 3-6).

Control or indicator	Function
POWER switch	Used to connect or disconnect ac power to KY-593/TPX-44.
POWER indicator lamp (red)	Lights when POWER switch is placed on ON.

Control or indicator	Function
MODE 1 indicator lamp (green), left of MODE 1 switch	Lights when mode 1 has been selected by MODE SELECTOR switch on Control, Remote Switching C-1271A/TPX-22.
MODE 2 thumbswitch (selects 4 digits)	Used to select code setting for mode 2 operation (can be used to select 4096 codes from 0000 to 7777, utilizing digits 0 through 7).
MODE 2 indicator lamp (green), left of MODE 2 switch.	Lights when mode 2 has been selected by C-1271A/TPX-22.

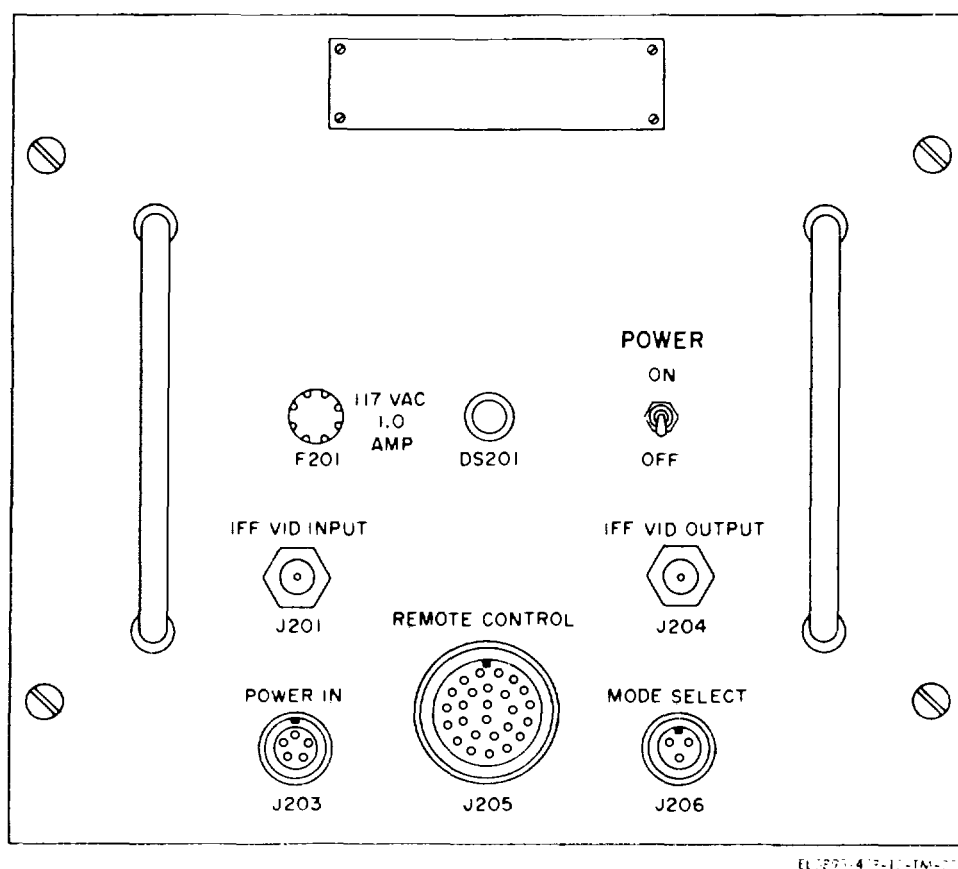


Figure 3-6. Decoder, Video KY-593/TPX-44, controls and indicators.

g. Modulator, Pulse MD-638/TPX-41, Controls and Indicators. (fig. 3-7).

h. Receiver-Transmitter RT-264D/UPX-6, Controls and Indicators. (fig. 3-8).

Control or indicator	Function
P2 DELAY ADJ control <sup>1</sup>	Used to adjust delay time between P1 pulse generated in KY-97C/TPX and P2 pulse generated in MD-638/TPX-41.
CP DELAY ADJ control <sup>1</sup>	Used to adjust position of control pulse generated in MD-638/TPX 41 to bracket P2 pulse.
SLS switch	Provides isls capabilities when placed to ON.
BIAS ON indicator lamp (red)	Lights when required dc bias is connected to Antenna AS-7796/GPA-119.
POWER switch	Used to connect or disconnect ac power to MD-638/TPX-41.

Control or indicator	Function
POWER switch	Connects RT-264D/UPX-6 to ac power supply when placed to the ON position.
POWER indicator lamp (red)	Lights (after a 60-sec time delay) when POWER switch is placed to the ON position.
CHALLENGE indicator lamp (green)	Lights when transmitter output power level is normal and PUSH TO CHAL switch on C-1271A/TPX-22 is depressed. Light extinguishes when output level falls below normal.
FREQUENCY CONTROL CRYSTALS AND SPARES	Housing for transmitter and receiver operating crystals. Cover plate contains two alternate frequency crystals.
RECEIVER-TRANSMITTER FREQUENCY ADJUSTMENT	Screwdriver adjustments for changing transmitter and receiver frequencies.

<sup>1</sup>These controls are not to be adjusted by the operator. They are for use of higher category maintenance personnel in performing isls system alignments.

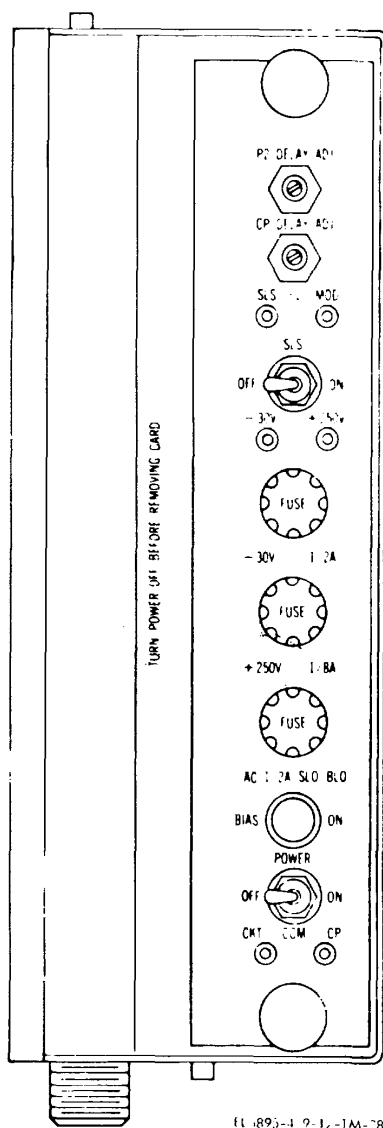


Figure 3-7. Modulator, Pulse MD-638/TPX-41, controls and indicators.

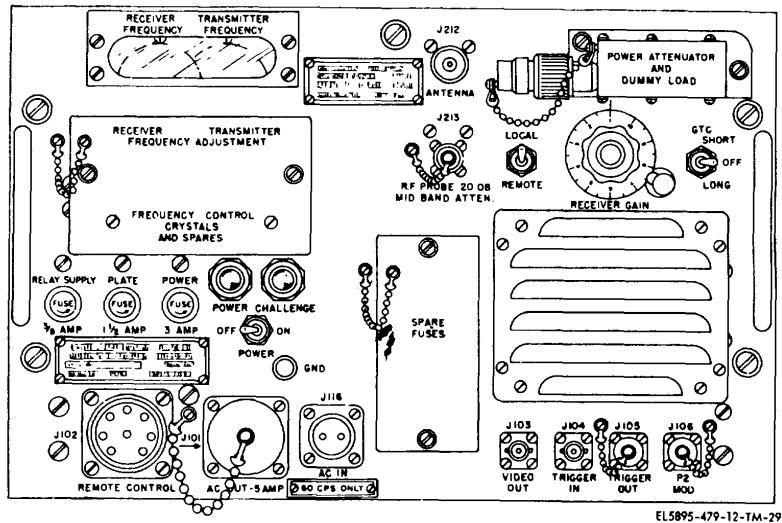
Control or indicator	Function
RECEIVER GAIN control	Used to control gain of receiver system (LOCAL-REMOTE switch placed to LOCAL position).
GTC switch	Provides LONG and SHORT gtc conditions (LOCAL-REMOTE switch placed to LOCAL) for observing iff reply signals. When placed to LONG position, false responses due to antenna side- and back-lobing effects are minimized. When placed to SHORT position, maximum receiver sensitivity is obtained. Gtc selection is cut off when placed to OFF position.

i. Simulator, Radar Signal SM-472/TPX-44, Controls and Indicators. (fig. 3-9).

Control or indicator	Function
POWER switch	Connects the SM-472/TPX-44 to ac power when placed to ON. Disconnects ac power when placed to OFF.
TRIG IN switch	Used to select one of two types of input; when placed to MODE 2 positions, SM-472/TPX-44 can only be triggered by mode 2 output (pulse pair) from KY-97C/TPX. When placed to PULSE position, SM-472/TPX-44 can be triggered by any suitable singular trigger pulse delivered to TRIGGER IN connector J4 on SM-472/TPX-44.
B+ ON switch	Provides two methods of controlling application of B+ power to SM-472/TPX-44 circuits; when placed to LOCAL position, B+ power is applied direct to SM-472/TPX-44. Used to apply B+ power to SM-472/TPX-44 when placed to REMOTE position, and CHOP switch on either KY-796/TPX or C-1271A/TPX-22 is placed to ON, as selected by LOCAL-REMOTE switch on KY-97C/TPX.

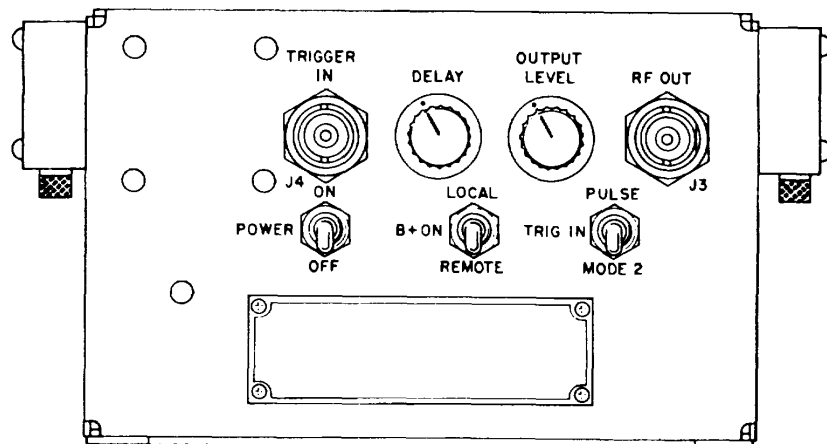
Control or indicator	Function
RECEIVER FREQUENCY and TRANSMITTER FREQUENCY dials	Direct-reading dials that indicate frequency settings made by manual controls
LOCAL-REMOTE switch	When placed to LOCAL position, permits operation of RECEIVER GAIN control and GTC selector switch from front panel of receiver transmitter. When placed to REMOTE position, permits remote operation of controls from front panel of Coder-Control KY-97C/TPX.

Control or indicator	Function	Control or indicator	Function
OUTPUT LEVEL control	Used to adjust rf output signal strength to level suitable for RT-264D/UPX-6.		
DELAY control	Used to adjust SM-472/TPX-44 output signal delay from approxi-		mately 120 to 240 usec with reference to input triggers. (Roughly the equivalent of 10 to 20 mil (18.5 to 37 km) on range scale of associated radar ppi.)



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Figure 3-8. Receiver-Transmitter, Radio RT-264D/UPX-6, controls and indicators.



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Figure 3-9. Simulator, Radar Signal SM-472/TPX-44, controls and indicators.

## Section II. OPERATION UNDER USUAL CONDITIONS

### 3-3. General

This section contains instructions for operating the AN/TPX-41. Coverage includes preliminary control settings, starting procedure, equipment operation, and stopping procedure. Prior to operating the AN/TPX-41, verify proper operation of the associated radar equipment. This will eliminate the possibility of mistaking a radar equipment problem for an iff equipment malfunction.

### 3-4. Preliminary Control Settings

Before proceeding with the starting procedure, paragraph 3-4, place controls and switches to the positions indicated in the following chart.

<i>Component</i>	<i>Control</i>	<i>Position</i>
J-2945/TPX-41	IFF POWER circuit breaker	OFF
J-2945/TPX-41	SCAN switch	OFF
KY-593/TPX-44	POWER switch	OFF
MD-638/TPX-41	POWER switch	OFF
MD-638/TPX-41	SLS switch	ON
RT-264D/UPX-6	POWER switch	OFF
RT-264D/UPX-6	RECEIVER GAIN control	10
RT-264D/UPX-6	GTC switch	SHORT
RT-264D/UPX-6	LOCAL-REMOTE switch	REMOTE
MX-8795/TPX-41	POWER switch	OFF
MX-8795/TPX-41	PROCESSED VIDEO	RAW
RAW VIDEO	switch	VIDEO
SM-472/TPX-44	POWER switch	OFF
SM-4721TPX-44	B+ ON <b>switch</b>	REMOTE
SM472/TPX-44	TRIG IN switch	MODE 2
SM-472/TPX-44	OUTPUT LEVEL control	Fully cw
SM-472/TPX-44	DELAY control	1/4 turn cw
KY-97C/TPX	POWER switch	OFF
KY-97C/TPX	RECEIVER GAIN control	10
KY-97C/TPX	GTC switch	SHORT
KY-97CITPX	CHOP switch	OFF
KY-97CITPX	MODE SELECTOR switch	2
KY-97CITPX	LOCAL-REMOTE switch	REMOTE
KY-97C/TPX	CHALLENGE switch	OFF
C-1271APTPX-22	RECEIVER GAIN control	10
C-1271A/TPX-22	GTC switch	SHORT
C-1271APTPX-22	CHOP switch	OFF
C-1271APTPX-22	MODE SELECTOR switch	2
C-7014/TPX-44	Mode 2 switch	7777
C-7014/TPX-44	BEACON ASSIST	OFF
C-7014/TPX-44	EMER-OFF	OFF
C-7014/TPX-44	BRACKET-OFF	OFF
C-7014/TPX-44	OPERATE-TEST	OPERATE

### 3-5. Starting Procedure

#### NOTE

**If an abnormal result is obtained during the starting procedure, refer to the operators troubleshooting chart (para 4-8). Refer to the preliminary control settings (para 3-4) before performing starting procedures outlined in a through k below.**

a. Insure that associated radar set is turned on and is operating normally.

b. On Interconnecting Box J-2945/TPX-41, place IFF POWER circuit breaker to ON and place IFF SCAN switch to OPERATE.

c. On J-2945/TPX-41, place SCAN switch to ON and observe that AS-1796/GPA-119 rotates.

d. On Modulator, Pulse MD-638/TPX-41, place POWER switch to ON and observe that red BIAS ON indicator lamp lights.

e. On Receiver-Transmitter, Radio RT-264D/UPX-6, place POWER switch to ON and observe following:

(1) Blower operates.

(2) After approximately 60 seconds, red POWER indicator lamp lights.

f. On Coder-Control, KY-97C/TPX, place POWER switch to ON and observe that red POWER indicator lamp lights.

g. On Decoder, Video KY-593/TPX-44, place POWER switch to ON and observe that red POWER indicator lamp lights.

h. On the Control, Remote Switching C-1271A/TPX-22, verify that amber RT POWER indicator lamp is lighted.

*i.* On Control, Remote Switching C-7014/TPX-44 observe that green MODE 2 indicator lamp and green OPERATE-TEST indicator lamp are lighted.

*j.* On Simulator, Radar Signal SM-472/TPX-44, place POWER switch to ON.

*k.* On Blanker, Interference MX-8795/TPX-41, place POWER switch to ON and observe that red POWER indicator lamp lights.

### 3-6. Preoperational Checks and Adjustments

Prior to operating the AN/TPX-41, verify that the following checks and adjustments have been performed on the various components of the AN/TPX-41.

*a. Receiver-Transmitter, Radio RT-264D/UPX-6.*

- (1) Power supply adjustment (para 2-14a).
- (2) Operating frequency adjustment (para 2-14b).

(3) GTC external-internal link 0-108 adjustment (para 2-14c).

(4) LONG GATE DURATION control and SHORT GATE DURATION control adjustment (para 2-14d).

(5) RECEIVER GAIN control adjustment (para 2-14e).

(6) Video limiting control adjustment (para 2-14f).

*b. Simulator, Radar Signal SM-472/TPX-44.*

- (1) OUTPUT LEVEL control adjustment (para 2-15a).
- (2) DELAY control adjustment (para 2-15b)

*c. Coder-Control KY-97C/TPX.*

- (1) Power supply adjustment (para 2-16a).
- (2) Impedance matching link 0-401 adjustment (para 2-16b).
- (3) COUNT DOWN adjustment (para 2-16c)

(4) CHOP RATE control adjustment (para 2-16d).

*d. Decoder, Video KY-593/TPX-44.*

- (1) Power supply adjustment (para 2-17).

*e. Blanker, Interference MX-8795/TPX-41.*

- (1) Power supply adjustments (para 2-18a)

(1.1) Prf select switch setting (para 2-18a)

(2) DELAY ADJ control adjustment (para 2-18b).

*f. Antenna Group AN/GPA-119.*

- (1) Antenna positioning (para 2-19a).

(2) Iff sweep orientation (para 2-19b).

### 3-7. Equipment Operation

Interrogation of aircraft located by the associated radar set is discussed in a below. Additional operating information is contained in b through i below.

*a. Interrogation.*

(1) Before interrogation, make certain the proper code combinations have been set on the mode switches (located on Control, Remote Switching C-7014/TPX-44) in accordance with local command. Each mode switch has direct reading numerals. The code combination is properly selected when the appropriate numerals are indicated on the switch. Mode 1 has only a 2 number combination and 32 codes between 00 and 73 can be selected. Modes 2 and 3 have a 4-number combination and each can select 4,096 codes between 0000 and 7777.

(2) Normal interrogation of aircraft is accomplished at the C-1271A/TPX-22 and C-7014/TPX-44, which are mounted on the side of Control Indicator Group OA-2664A/FPN-40. The AN/TPX-41 transmits interrogation signals when the PUSH TO CHAL, switch on the C-1271A/TPX-22 is depressed or the CHALLENGE switch on Coder-Control KY-97C/TPX is placed to ON. The CHALLENGE switch on KY-97C/TPX activates the iff transmitting system continuously if left in the ON position. Coding of the transmitted signal is selected by the MODE SELECTOR switch on the C-1271A/TPX-22 (LOCAL-REMOTE switch on the KY-97C/TPX in REMOTE position).

Decoding of the iff reply signal is selected by the applicable mode switch on the C-7014/TPX-44. The MODE SELECTOR switch on the C-1271A/TPX-22 is interconnected with the three mode switches (mode interlock) on the C-7014/TPX-44 and determines which one of the mode switches (applicable green indicator lamp lights) will establish the operating code of the decoder group, consisting of the C-7014/TPX-44 and KY-593/TPX-44.

(3) Operation from the KY-97C/TPX (for testing and troubleshooting purposes) is possible if the LOCAL-REMOTE switch on the KY-97C/TPX is placed to LOCAL. The MODE SELECTOR switch on the KY-97C/TPX, however, is not interconnected with the mode switches on the C-7014/TPX-44; therefore, proper interrogation from the KY-97C/TPX is only possible when the MODE SELECTOR switches on the C-1271A/TPX-22 and the KY-97C/TPX have the same settings.

(4) When the application of the AN/TPX-41 is the identification of friendly aircraft, the operator should use the PUSH TO CHAL switch sparingly to decrease the possibility of the enemy picking up and analyzing the rf signals from the airborne transponders and interrogator sets. When an unknown target or echo appears on the associated radar ppi display, the PUSH TO CHAL switch should be depressed only long enough for Antenna AS-1796/GPA-119 to sweep one revolution. The PUSH TO CHAL switch should be released when the area of the target has been scanned. If the target return is from a friendly aircraft, an iff response should be seen trailing the radar target as seen on the ppi display. If no iff reply is seen, the target should be challenged in the other two modes, and the applicable equipment operating features discussed below should be used before it is considered to be unidentified or hostile. Another reason for using the PUSH TO CHAL switch sparingly is to prevent the excessive interrogation of the airborne transponder that is caused by interrogation from several ground stations being received, resulting in possible loss of an iff reply signal. When the equipment is used in an air traffic control situation for the selection and identification of particular aircraft under the control of the operator (primary equipment application), or to enhance the coverage of the search system of the associated radar set, the challenge signals may be transmitted continuously if authorized by local command. In this case, transmission of challenge signals should be discontinued when the equipment is not actively used.

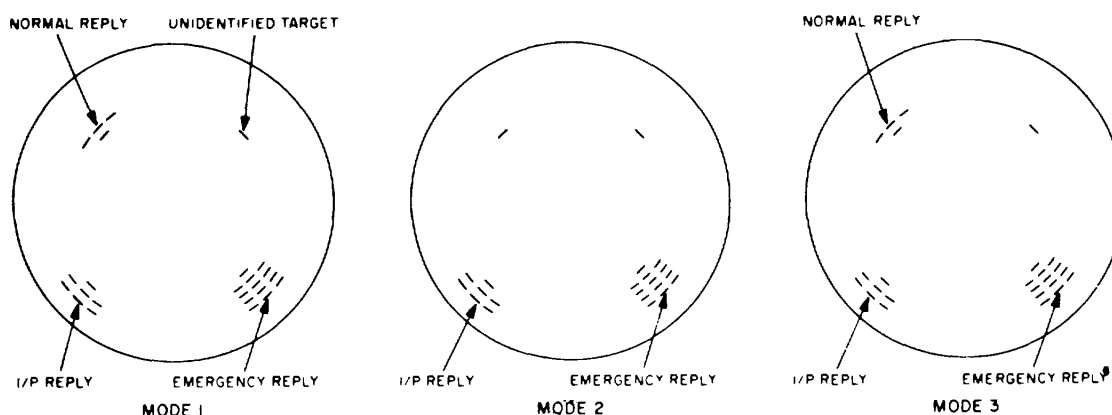
*b. Scope Presentation.* In normal operation, Decoder, Video KY-593/TPX-44 will generate a single video output pulse for each correctly coded video pulse train supplied to its input. This will produce a single reply arc adjacent to the radar target (at same azimuth angle, but a slightly greater range) on the associated radar set ppi display. Mixed presentation of iff and radar video is limited to the maximum range of the AN/FPN-40, which is 40 miles (74 km). Iff video can be displayed to a maximum of 200 miles (370.4 km) which is the maximum range of the AN/TPX-41. To enable specific targets located by radar to be identified as friendly or unidentified, and to permit more detailed information on the aircraft, the airborne transponder may be set to reply to any of the three interrogator challenge modes. The airborne transponder normally replies with a single coded pulse train to interrogation in any of the three modes. When the airborne transponder is switched to reply to a radio communication request for further identification in a special identification-of-position (I/P) mode that is intended for use when replies from more than one aircraft appear on the ground radar ppi, it replies with two consecutive coded pulse trains for each MODE 1 interrogation. When MODE 2 or MODE 3 is in use, the reply from the airborne transponder may be one coded pulse train with one additional I/P pulse. With either type of I/P transmission, two reply arcs will be displayed adjacent to the radar target on the associated radar set ppi display. In emergency operation, the newer airborne transponders reply with a coded pulse train and three pairs of bracket pulses. On MODE 1 and MODE 2, the coded train will be of the code in use. On MODE 3 the code will be 7700; therefore, the MODE 3 switch on the C-7014/TPX-44 must be set to code 7700 for emergency operation. For emergency operation, the EMER-OFF switch on the C-7014/TPX-44 also must be placed to EMER (red EMER indicator lamp lighted). Some older airborne transponders, however, transmit an emergency signal, consisting of four code trains, that does not require utilization of the special emergency circuitry designed into this equipment. In every case, the emergency reply produces four consecutive reply arcs on the associated radar set ppi display. Decoder, Video KY-593/TPX-44 is designed to accept two interleaved coded pulse trains and still provide normal operation. Interleaved coded pulse trains are those in which the pulses of one coded pulse train are received in the intervals between the pulses of another coded pulse train. Interleaving of coded pulse trains is commonly caused by replies from airborne transponders displayed in range along the azimuth. A

single video output pulse will be generated for each of these interleaved coded pulse train as long as spacing from the trailing edge of one pulse to the leading edge of the following pulse is not less than 0.05  $\mu$ sec. The typical replies which can be displayed in the different modes are shown in figure 3-10.

c. *Processed Video-Raw Video Switch.* When an airborne transponder is being interrogated by more than one interrogator set within a given control area, the transponder will replay to each interrogation. The receiver of each interrogator set will receive all replies regardless of which system interrogated the transponder. If all the replies are displayed on the indicator, false targets will momentarily appear (replies created by other interrogated sets will be nonsynchronous) and could cause confusion, especially in high density traffic areas. The processing circuits in Blanker, Interference MX-8795/TPX-41 eliminate the nonsynchronous replies, and therefore, they are not displayed. Placing the PROCESSED VIDEO-RAW VIDEO switch on the MX-8795/TPX-41 to PROCESSED VIDEO routes the video from the RT-264D/UPX-6 through the processing circuits. In the RAW VIDEO position, the video bypasses these circuits.

d. *Receiver Gain.* In the preoperational check the RECEIVER GAIN control is adjusted for proper operation, and readjustment should not be required.

e. *CHOP Switch.* When the CHOP switch on the C-1271A/TPX-22 is placed to ON (LOCAL-REMOTE switch on the KY-97C/TPX placed to REMOTE position), a chopping circuit in the KY-97C/TPX is activated and periodically interrupts the train of trigger pulses delivered to the transmitting system. This action will interrupt the transmitted challenge signals, which in turn will interrupt the reply signals from the transponder. The iff reply on the ppi will appear as a clearly defined series of dashes (forming an arc) that appear slightly later in range than the associated radar signal. When the CHOP switch is placed to OFF, the iff reply will have the same brilliance, focus, and relative position, but will appear as a solid unbroken arc. The chopped iff reply may be easier to distinguish from radar echoes than the solid unbroken iff replies. When the POWER switch on the SM-472/TPX-44 is placed to ON (B+ ON switch placed to REMOTE), a simulated iff reply may also be seen. The POWER switch on the SM-472/TPX-44 is normally placed to OFF, except



CONDITIONS:

RADAR RANGE SELECTOR 40 MLES

MODE SELECTOR AS INDICATED

CHOP SWITCH: ON

GTC SWITCH: SHORT

TRIGGER DELAY: DELAY OUT

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Figure 3-10. Effects of transponder replies on the ppi presentation.

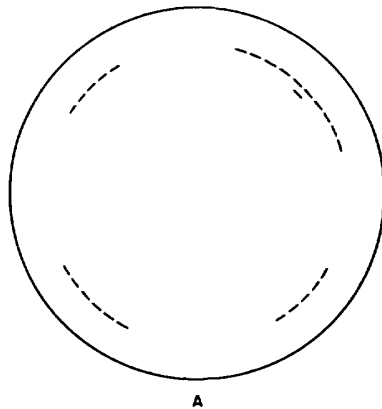


when the SM-472/TPX-44 is used for testing purposes. Simulated reply displays are shown in figure 2-15.

*f. GTC Switch.* When the GTC switch on the C1271/TPX-22 is placed to SHORT (LOCAL-REMOTE switch on the KY-97C/TPX in REMOTE position), the receiver will have relatively high gain for iff replies from airborne transponders of nearby friendly aircraft. When the GTC switch is placed to LONG, the receiver will have relatively lower gain for nearby aircraft. For normal operation, place the GTC switch to SHORT. The LONG position of the GTC switch reduces false responses from nearby aircraft due to iff antenna side and back lobes. The effect on the display caused by side and back lobes is shown in A, figure 3-11. The upper right-hand sector of the scope shows a normal response (track) from the main lobe; that is, Antenna AS-1796/GPA-119 is facing the aircraft. The short solid line shows the associated radar set response; the chopped line indicates the iff reply. When the AS-1796/GPA-119 rotates through 90 degrees, the side lobe is directed at the aircraft and a reply is received. To reduce the effect of side- or back-lobe responses on the associated radar set ppi, place the GTC switch to LONG.

*g. SLS Switch.* When the airborne transponder being interrogated is equipped for side-lobe suppression (sls), back-lobing and side-lobing effects described in *f.* above will be further reduced or eliminated entirely by placing the SLS switch (on the MD-638/TPX-41) to ON. Since operation of the SLS switch has no effect on airborne transponders not equipped for sls, it is normally left in the ON position. The effect on display when sls is used, is shown in B, figure 3-11.

*h. Bracket-Off Switch.* When the BRACKET-OFF switch on the C-7014/TPX-44 is placed to BRACKET, replies from all aircraft transponders responding to the iff challenge signal will be displayed on the ppi display of the associated radar set, regardless of the transponder code settings. The transponders, however, must be set to the correct mode. This permits the operator to determine whether an aircraft transponder is replying to the iff challenge, regardless of the code. An improperly coded reply could be caused by an incorrect switch setting or malfunction. If the BEACON ASSIST switch (*i* below) is placed to ON, replies from properly coded airborne transponders will appear longer than those from improperly coded transponders (fig. 3-12).



CONDITIONS:

RADAR RANGE SELECTOR: 5 MILES

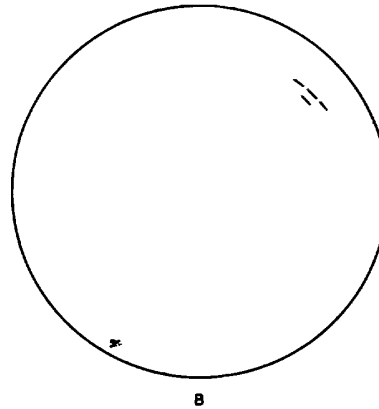
MODE SELECTOR MODE I

CHOP SWITCH: ON

GTC SWITCH: SHORT

TRIGGER DELAY: DELAY OUT

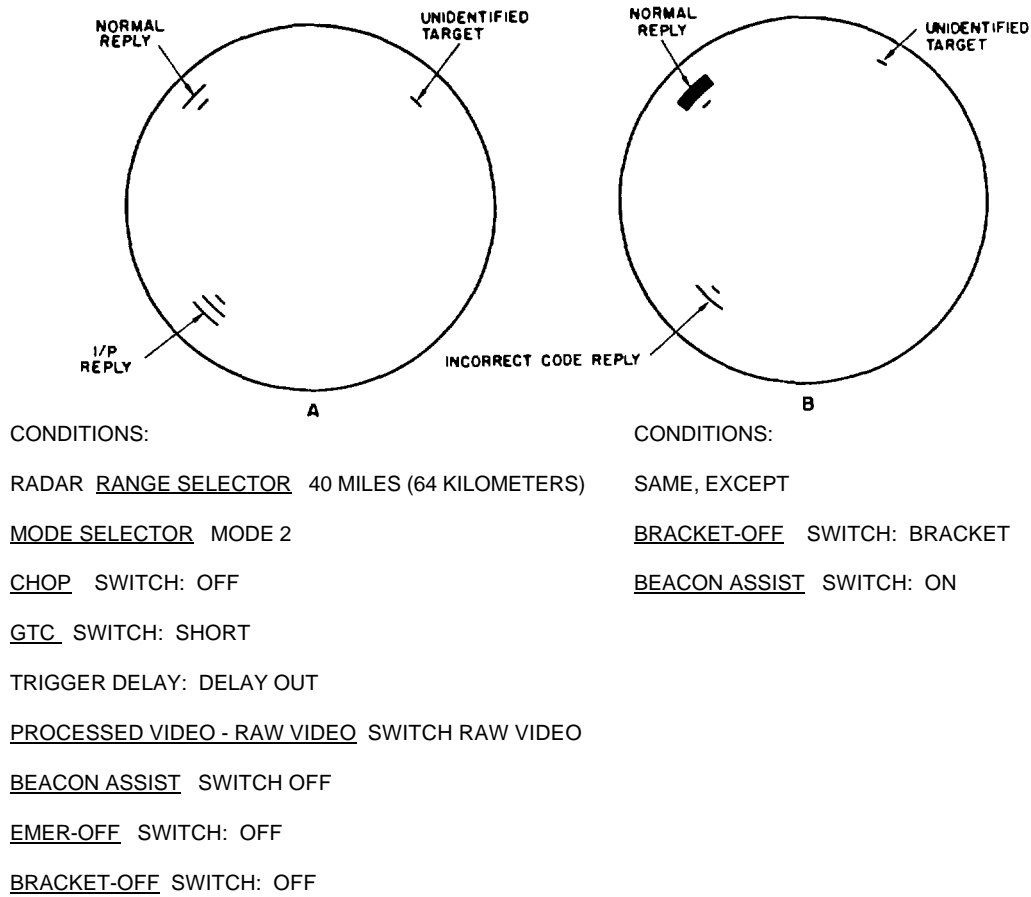
SLS SWITCH: OFF



CONDITIONS:

SAME, EXCEPT SLS SWITCH: ON

Figure 3-11. Effects of back-lobing and side-lobing on the ppi presentation.



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Figure 3-12. Effects of beacon assist and brackets on the ppi presentation.

i. **Beacon Assist Switch.** When the BEACON ASSIST switch on the C-7014/TPX-44 is placed to ON, correctly coded iff replies are stretched so that a larger pulse, which can be recognized easily, appears on the ppi. This type of operation is useful at long ranges, especially when the iff reply is not accompanied by a radar return, because the normal narrow iff pulse might not be seen easily on ppi.

### 3-8. Stopping Procedure

To place the AN/TPX-41 in an OFF condition, perform the following procedure.

a. On Blanker, Interference MX-8795/TPX-41, place POWER switch to OFF.

b. On Simulator, Radar Signal SM-472/TPX-44, place POWER switch to OFF.

c. On Decoder, Video KY-593/TPX-44, place POWER switch to OFF.

d. On Coder-Control KY-97C/TPX place POWER switch to OFF.

e. On Receiver-Transmitter, Radio RT-264D/UPX-6, place POWER switch to OFF.

f. On Modulator, Pulse MD-638/TPX-41, place POWER switch to OFF.

g. On J-2945/TPX-41, place SCAN switch to OFF and POWER switch to OFF. Verify that antenna rotation stops.

**Section III. OPERATION UNDER UNUSUAL CONDITIONS****3-9. Low Temperature Conditions**

When the IFF antenna group is exposed to subzero temperatures and climatic conditions associated with cold weather, frequently inspect Antenna AS-1796/GPA-119 and Pedestal, Antenna AB-1158/GPA-119 and remove any accumulation of ice and snow. Be extremely careful not to damage the antenna radome and exposed cabling when cleaning the equipment of ice and snow.

**3-10. Tropical and Desert Conditions**

Under conditions of extreme heat, humidity, and dust and dirt accumulation, frequently remove the moisture, dust, dirt, and other foreign matter that may coat the equipment. Under windy conditions in desert climates, do not expose the interior of the equipment to the blowing dust and dirt unless absolutely necessary.

**3-11. High Wind Conditions**

The AN/TPX-41 will operate during high winds which do not exceed a maximum velocity of 60 knots (69 mph). In winds exceeding 60 knots, place the SCAN ON-OFF switch on the J-2945/TPX-41 to OFF. This will allow the IFF antenna to vane with the wind and position itself to provide minimum wind resistance.

**3-12. Synchronous Interference**

Synchronous interference may occur when two or more interrogator sets with overlapping coverage are operating at the same PRF. This interference cannot be removed by the defruiting action of the MX-8795/TPX-41. If this condition is suspected, notify higher category of maintenance so that it may be determined whether resetting of the PRF SEL switch on the MX-8795/TPX-41 is necessary.

**Change 1 3-15**

## CHAPTER 4. OPERATORS MAINTENANCE INSTRUCTIONS

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### Section I. SCOPE, TOOLS AND EQUIPMENT

#### 4-1. Scope of Maintenance

The maintenance duties assigned to the operator of the AN/TPX-41 are listed below with a reference to the paragraphs covering the specific maintenance function.

- a. Daily preventive maintenance checks and services (para 4-5a).
- b. Weekly preventive maintenance checks and services (para 4-5b).
- c. Cleaning procedures (para 4-6).
- d. Troubleshooting procedures (para 4-7).
- e. Operator's adjustments (para 4-9).
- f. Repair and replacement procedures (para 4-10)

#### 4-2. Tools, Test Equipment, and Materials Required

a. *Tools and Test Equipment Required.* The maintenance procedures contained in this chapter do not require the use of any special tools or test equipment by operator personnel.

b. *Materials Required.* Materials required by operator personnel are listed below.

- (1) Clean, lint-free dust cloths.
- (2) Medium camel hair brush.
- (3) Cleaning compound (Federal Stock No. 7930-395-9542).
- (4) Oil, lubricating, general purpose (LO) FSN 9150-252-6174).

## Section II. OPERATOR'S PREVENTIVE MAINTENANCE

### 4-3. General

Operator's preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable. The preventive maintenance checks and services charts (para 4-5) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and the normal conditions; the Reference column lists the illustrations, paragraphs, or manuals and contain detailed troubleshooting, repair or replacement procedures. If the defect cannot be remedied by the operator, higher category maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

### 4-4. Preventive Maintenance Service and Inspection Periods

Preventive maintenance service and inspection of Interrogator Set AN/TPX-41 are required on a daily and weekly basis.

a. Paragraph 4-5a specifies maintenance services and inspections that must be accomplished daily and under special conditions listed below.

(1) When the equipment is initially installed.

(2) When the equipment is reinstalled after removal for any reason.

(3) At least once each week if the equipment is maintained in standby conditions.

b. Paragraph 4-5b specifies maintenance services and inspections that must be performed once each week. If the equipment is maintained in a standby condition, the daily (para 4-5a) and weekly (para 4-5b) services and inspections should be accomplished at the same time.

### 4-5. Operator's Preventive Maintenance Checks and Services Charts

a. *Daily Preventive Maintenance Checks and Services Chart.*

<u>Interval and Sequence No.</u>		<i>Item to be inspected</i>	<i>Procedure</i>	<i>Para reference</i>
<i>Before</i>	<i>Operation During</i>			
1		Completeness	Inspect AN/TPX-41 and verify that equipment is complete.	2-2
2		Exterior surfaces	a. Clean all major operating components of Interrogator Set AN/TPX-41. b. Inspect paint surfaces for bare spots, rust, and corrosion.	4-6
3		Cables and connectors	a. Check all exposed AN/TPX-41 interconnecting cables and connectors for cracks and breaks. b. Check that cable connectors are clean, intact, and not loose fitting.	2-12a 2-12a
4		Indicator window	a. Ensure that indicator window on RT-264D/UPX-6 is clean and free of cracks and chips. b. Check all indicator lenses for damage.	4-10b
5		Knobs, dials, and switches	Check all knobs, dials, and switches, and verify that movement is smooth and free of binding.	

<u>Interval and Sequence No.</u>		<u>Operation</u>		<u>Item to be inspected</u>	<u>Procedure</u>	<u>Para reference</u>
<u>Before</u>	<u>During</u>	<u>After</u>				
6				AN/TPX-41 operation	Check overall operations of AN/TPX-41 as follows	
					a. Make preliminary control settings as described in para 3-4.	4-8
					b. Perform starting procedures as described in para 3-5 and verify that correct indications occur after each setting.	
	7			Simulated interrogation	On C-1271A/TPX-22, set CHOP switch to ON, depress PUSH TO CHAL switch and verify occurrence of following:	
					a. CHALLENGE indicators on RT-264D/UPX-6 and C1271A/TPX-22 light.	4-8
					b. Simulated iff reply signals appear on associated radar set ppi display.	
	8			Mode switching	a. On C-1271A/TPX-22, set MODE SELECTOR switch to 1 and verify that MODE 1 indicator lights on C-7014/TPX-44.	4-8
					b. On C-1271A/TPX-22, set MODE SELECTOR to 2 and verify that MODE 2 indicator lights on C-7014/TPX-44.	4-8
					c. On the C-1271A/TPX-22, set MODE SELECTOR to 3 and verify that MODE 3 indicator lights on C-7014/TPX-44.	4-8
		9		Antenna Group AN/GPA-1 19	Check antenna group for loose hardware and fittings.	

*b. Weekly Preventive Maintenance Checks and Services Chart.*

<u>Interval and Sequence No.</u>		<u>Operation</u>		<u>Item to be inspected</u>	<u>Procedure</u>	<u>Para reference</u>
<u>Before</u>	<u>During</u>	<u>After</u>				
1				Air filter	Check air filter on Receiver-Transmitter, Radar RT-264D/ITPX-41 for excessive dirt. If necessary, clean or replace.	4-6b
2				Mountings	Tighten loose nuts or bolts. Replace missing hardware as required.	
3				Antenna AS-1796/GPA-119 and Pedestal, Antenna AB-1158/GPA-119	Inspect AS-1796/GPA-119 and AB-1158/GPA-119 for physical damage. While antenna is rotating, listen for unusual noise, indicating equipment malfunction.	

#### 4-6. Cleaning Procedures

Inspect all operating components of AN/TPX-41 for cleanliness. The exterior surfaces should be clean and free of dust, dirt, grease, and fungus.

a. *Exterior Surfaces.* Clean the external surfaces of the AN/TPX-41 as follows:

(1) Remove dust and loose dirt with clean soft cloth.

**Cleaning compound (Federal Stock No. 7930-395-9542) is flammable and its fumes are toxic. Provide adequate ventilation. Do not use near an open flame.**

(2) Remove grease, fungus, and ground-in dirt from cases; use cloth dampened (not wet) with cleaning compound.

**WARNING**

(3) Remove dust or dirt from plugs and jacks with brush.

(4) Clean front panels, indicators, and control knobs; use soft, clean cloth. If dirt is difficult to remove, dampen cloth with water; mild soap may be used for more effective cleaning.

*b. Air Filter.*

(1) Remove louver, with air filter attached, from right-hand side of front panel of Receiver-Transmitter, Radio RT-264D/UPX-6 by removing 4 screws.

(2) Detach air filter from louver by removing 1 screws.

(3) Clean air filter by moving back and forth in solution of dish washing compound and water.

(4) Allow air filter to dry.

(5) Saturate air filter with Oil, Lubricating, Aircraft and Instruments (OAI). Permit excess oil to drain off before installing air filter in louver.

(6) Position air filter in louver so that direction of airflow, as indicated by arrows on edge of air filter, is correct; secure air filter to louver with 4 screws.

(7) Position louver, with air filter attached, on front panel of RT-264DIUPX-6 and secure with 4 screws.

**CAUTION**

**If the air filter element is the fiberglass type, rap the air filter element against a hard flat surface to remove the dust. Use a vacuum cleaner if one is available. If necessary, replace the fiberglass air filter.**

**Section III. OPERATOR'S TROUBLESHOOTING**

**4-7. General Troubleshooting Information**

This section contains troubleshooting information to aid operators in the localization and correction of equipment malfunctions. The operator's troubleshooting chart contained in paragraph 4-8 is based primarily on trouble symptoms that may be observed while making the during operation checks in the operator's preventive maintenance checks and services table. Symptoms of troubles that may occur during normal operation are also included. References in the checks and corrective action column are paragraphs giving details on corrective actions. If a trouble cannot be corrected by the indicated corrective action, higher category maintenance is required. When an equipment malfunction occurs, perform the general troubleshooting checks listed in a

through *d* below before referring to the operator's troubleshooting chart. This may eliminate extensive troubleshooting for an obvious problem.

*a.* Check for incorrect settings of switches and controls.

*b.* Check for loose cable connections and improperly mated connectors.

*c.* Check for loose fuseholder caps.

*d.* Check for improper seating of front panel on RT-264D/UPX-6.

## 4-8. Operator's Troubleshooting Chart

<i>Item no.</i>	<i>Trouble symptom</i>	<i>Probable trouble</i>	<i>Checks and corrective actions</i>
1	Antenna AS-1796/GPA-119 does not rotate when IFF POWER and SCAN switches on J-2945/TPX-41 are placed to ON.	Connectors P9208 and P20004 on cable W9406 are loose.	<b>WARNING:</b> Place SCAN switch on J-2946/TPX-41 to OFF before performing any checks in the antenna area. Tighten connections at P9208 and P20004.
2	BIAS ON indicator lamp on MD-63 8/TPX-41 does not light when MD-638/TPX-41 POWER switch is placed to ON.	BIAS ON indicator lamp is defective. Front panel fuses are blown. Connector P1201 is loose. Cable W9005 is disconnected from terminals 5 and 7, terminal board TB8601 in J-2945/TPX-41.	Replace indicator lamp.  Replace blown fuses. Tighten connector P1201. Connect cable W9005 per paragraph 2-8b(9).
3	Green POWER indicator lamp on MX-8795/TPX-41 does not light when MX-8795/TPX-41 POWER switch is placed to ON.	Indicator lamp is defective. Front panel AC POWER fuse is blown. Connector P31101 on back of MX-8795/TPX is loose. Connector P8602 on J-2945/TPX is loose.	Replace indicator lamp. Replace fuse.  Tighten connector P31101.  Tighten connector P8602.
4	POWER indicator lamp on RT-264D/UPX-6 does not light after 60-sec time delay when RT-264D/UPX-6 POWER switch is placed ON.	POWER indicator lamp is defective. POWER 3 AMP fuse on front panel is blown. RELAY SUPPLY 3/8 AMP fuse on front panel is blown. Connector P116 is loose.	Replace indicator lamp.  Replace fuse.  Replace fuse.  Tighten connector P116.
5	Amber RT POWER indicator lamp on KY-97C/TPX does not light after 60-sec time delay when the RT-264D/UPX-6 POWER switch is placed to ON.	RT POWER indicator lamp is defective. Connector P405 on back of KY-97C/TPX is loose. Connector P102 on front of RT-264D/UPX-6 is loose.	Replace indicator lamp.  Tighten connector P405.  Tighten connector P102.
6	Blower in RT-264D/UPX-6 does not operate when RT-264D/UPX-6 POWER indicator lamp is lighted.	Blower fuse is blown.  Blower motor is defective.	  Higher category maintenance is required. Higher category maintenance is required.
7	Red POWER indicator lamp on KY-97C/TPX does not light when KY-97C/TPX POWER switch is placed to ON.	POWER indicator lamp is defective. 3/4 AMP POWER fuse on front panel is blown. Connector P402 on front panel is loose.	Replace power indicator lamp.  Replace fuse.  Tighten connector P402.
8	POWER indicator lamp on KY-593/TPX-44 does not light when KY-593/TPX-44 POWER switch is placed ON.	POWER indicator lamp is defective. Front panel fuse is defective. Connector P203 is loose.	Replace indicator lamp.  Replace fuse. Tighten connector P203.
9	Amber RT POWER indicator lamp on C-1271A/TPX-22 does not light when KY-97C/TPX LOCAL-RE-MOTE switch is placed to RE-MOTE.	RT POWER indicator lamp on C-1271A/TPX-22 is defective. Connector P404 on back of KY-97C/TPX is loose. Connector P731 on back of C-1271A/TPX-22 is loose. <i>Note:</i> The SM-472/TPX-44 POWER ON-OFF must be placed to ON to properly analyze the following troubles.	Replace indicator lamp.  Tighten connector P404.  Tighten connector P731.



<i>Item no.</i>	<i>Trouble symptom</i>	<i>Probable trouble</i>	<i>Checks and corrective actions</i>
10	When CHOP switch is placed to on and PUSH TO CHAL switch on C-1271A/TPX-22 is depressed, simulated iff reply appears on radar ppi, but CHALLENGE indicator lamp on RT-264D/UPX-6 does not light.	CHALLENGE indicator lamp is defective.	Replace indicator lamp.
11	When PUSH TO CHAL switch on C-1271A/TPX-44 is depressed, simulated iff reply appears on radar ppi but challenge indicator lamp on C-1271A/TPX-22 does not light.	CHALLENGE indicator lamp is defective.	Replace indicator lamp.
12	When PUSH TO CHAL switch on C-1271A/TPX-22 is depressed, no simulated iff replies appear on radar ppi and CHALLENGE indicator lamps on RT-264D/UPX-6 and C-1271A/TPX-22 does not light.	Connector P401 on back of KY-97C/TPX is loose. Connector P31105 on back of MX-8795/TPX-41 is loose.	Tighten connector P401. Tighten connector P31105.
13	When PUSH TO CHAL switch on C-1271A/TPX-22 is depressed, simulated iff replies appear on radar ppi but CHALLENGE indicator lamps on RT-264D/UPX-6 and C-1271A/TPX-22 do not light.	Connector P403 on back of KY-97C/TPX is loose. Connector P1202 on MD-638/TPX-41 is loose. Connector P104 on front of RT-264D/UPX-6 is loose. Connector P1209 on MD-638/TPX-41 is loose. Transmitting system malfunction.	Tighten connector P403. Tighten connector P1202. Tighten connector P104. Tighten connector P1209. Refer to paragraph 4-9a.
14	When PUSH TO CHAL switch on C-1271A/TPX-22 is depressed, CHALLENGE indicator lamps on RT-264D/UPX-6 and C-1271A/TPX-22 light but no simulated iff replies appear on radar ppi.	Connector P1 on SM-472/TPX-44 is loose. Connector P2 on SM-472/TPX-44 is loose. Connector P3 on SM-472/TPX-44 is loose. Connector P4 on SM-472/TPX-44 is loose. Connector P403A on back of KY-97C/TPX is loose. Connector P213 on front of RT-264D/UPX-6 is loose. Connector P206 on front of KY-593/TPX-44 is loose. Connector P732 on C-1271A/TPX-22 is loose. Connector P205 on front of KY-593/TPX-44 is loose. Connector P40301 on C-70141 TPX-44 is loose. Connector P103 on front of RT-264D/UPX-6 is loose. Connector P31102 on back of MX-8795/TPX-41 is loose. Connector P201 on front of KY-593/TPX-44 is loose. Connector P31103 on back of MX-8795/TPX-41 is loose. Connector P204 on front of KY-593/TPX-44 is loose.	Tighten connector P1. Tighten connector P2. Tighten connector P3. Tighten connector P4. Tighten connector P403A. Tighten connector P213. Tighten connector P206. Tighten connector P732. Tighten connector P205. Tighten connector P40301. Tighten connector P103. Tighten connector P31102. Tighten connector P201. Tighten connector P31103. Tighten connector P204.

<i>Item no.</i>	<i>Trouble symptom</i>	<i>Probable trouble</i>	<i>Checks and corrective actions</i>
15	After checking all probable troubles for item 14, OPERATE-TEST switch on C-7014/TPX-44 is placed to TEST and simulated iff replies still do not appear on radar ppi.	MODE SELECTOR switch on C-1271A/TPX-22 is not properly set to MODE 2. Mode 2 thumbswitches on C-7014/TPX-44 are not properly set to 7777.	Place MODE SELECTOR switch to MODE 2.  Set MODE 2 thumbswitches to 7777.
16	After checking probable troubles listed for item 15, simulated iff replies still do not appear on radar ppi.	Receiving system malfunction. Decoding system malfunction. Coding system malfunction. Simulating system malfunction.	Refer to paragraph 4-9b. Refer to paragraph 4-9c. Refer to paragraph 4-9d. Refer to higher category maintenance
17	With SM-472/TPX-44 B+ ON switch placed to LOCAL and PUSH TO CHAL switch on C-1271A/TPX-22 depressed, CHALLENGE indicator lamps on C-1271A/TPX-22, and RT-264D/UPX-6 light but no simulated iff replies appear on radar ppi.	Receiving system malfunction. Decoding system malfunction. Coding system malfunction. Simulating system malfunction.	Refer to paragraph 4-9b. Refer to paragraph 4-9c. Refer to paragraph 4-9d. Refer to higher category maintenance.
18	With SM-472/TPX-44 TRIG IN switch placed to PULSE and PUSH TO CHAL switch on C-1271A/TPX-22 depressed, CHALLENGE indicator lamps on C-1271A/TPX-22 and RT-264D/UPX-6 light but simulated iff replies do not appear on radar ppi.	Receiving system malfunction. Decoding system malfunction. Simulating system malfunction.	Refer to paragraph 4-9b. Refer to paragraph 4-9c. Refer to higher category maintenance.
19	With C-7014/TPX-44 OPERATE-TEST switch placed to TEST and PUSH TO CHAL switch on the C-1271A/TPX-22 depressed, CHALLENGE indicator lamps on C-1271A/TPX-22 and RT-264D/UPX-6 light but simulated iff replies do not appear on radar ppi.	Receiving system malfunction. Decoding system malfunction. Coding system malfunction. Simulating system malfunction.	Refer to paragraph 4-9b. Refer to paragraph 4-9c. Refer to paragraph 4-9d. Refer to higher category maintenance.
20	With KY-97C/TPX LOCAL-REMOTE switch placed to LOCAL and PUSH TO CHAL switch on C-1271A/TPX-22 depressed, CHALLENGE indicator lamps on KY-97C/TPX and C-1271A/TPX-22 do not light.	CHALLENGE indicator lamp on the KY-97C/TPX is defective.	Replace indicator lamp.

#### 4-9. Operator's Adjustments

The following paragraphs contain instructions for verifying proper adjustment and response of the operator's controls. These instructions are given on a system basis and when used with the operator's troubleshooting chart, will aid in localizing equipment malfunctions to a specific system.

##### *a. Transmitting System.*

(1) Set all controls and switches for operation (para 3-4 and 3-5).

(2) On Control, Remote Switching C-1271A/TPX-22, depress PUSH TO CHAL switch, or on Coder-Control KY-97C/TPX, place CHALLENGE switch to ON. CHALLENGE indicators on Receiver-Transmitter, Radar RT-264D/UPX-6 and Control, Remote Switching C-1271A/TPX-22

should light to indicate that output power is normal (transmitter output satisfies predetermined minimum power output requirements). If CHALLENGE indicator lamps are good but do not light, refer to higher category maintenance.

#### NOTE

**The CHALLENGE switch on the KY-97C/TPX will activate the iff transmitting system continuously if left in the ON position; therefore, place CHALLENGE switch to OFF whenever the test indicates the use of this switch is completed.**

#### *b. Receiving System*

(1) Set all controls and switches for operation (para 3-3 and 3-4).

(2) On Control, Remote Switching C-7014/TPX-44, place OPERATE-TEST switch to TEST.

(3) On C-1271A/TPX-22, note setting of RECEIVER GAIN control and unlock. Rotate RECEIVER GAIN control cw, then ccw, while observing associated radar indicator. This action should cause a change in intensity of radar ppi sweep, indicating that iff receiving system is capable of amplifying iff signals. Return RECEIVER GAIN control to preset position and tighten control lock.

(4) On C-7014/TPX-44, place OPERATE-TEST switch to OPERATE; and on C-1271A/TPX-22, place the CHOP switch to ON and depress PUSH TO CHAL switch. Observe associated radar indicator. A chopped simulated iff signal reply should be seen with RECEIVER GAIN control set at approximately midposition if outputs of Simulator, Radar Signal SM-472/TPX-44 and Decoder, Video KY-593/TPX-44 are normal. If simulated iff signal reply is seen only when RECEIVER GAIN control is at or near maximum cw position, receiver gain may be below normal. Higher category maintenance is required.

#### *c. Decoding System.*

(1) Set all controls and switches for operation (para 3-3 and 3-4).

(2) On C-1271A/TPX-22, place the CHOP switch to ON and depress PUSH TO CHAL switch. Observe chopped simulator iff signal reply on associated radar indicator.

(3) On C-7014/TPX-44, reset MODE 2 switch to any combination except 7777. On C-1271A/TPX-22, depress PUSH TO CHAL switch. No simulated reply should be seen on associated radar indicator. Simulated reply should reappear when MODE 2 switch on C-7014/TPX-44 is reset to code 7777.

(4) On C-1271A/TPX-22, place MODE SELECTOR switch to 3; on SM-472/TPX-44, place TRIG IN switch to PULSE; and on C-7014/TPX-44, place MODE 3 switch to code 7777. On C-1271A/TPX-22, depress PUSH TO CHAL switch. A chopped simulated iff reply should be seen on associated radar indicator.

(5) On C-7014/TPX-44, reset MODE 3 switch to any combination, except 7777; on C-1271A/TPX-22, depress PUSH TO CHAL switch again. No simulated reply should be seen.

#### NOTE

**The results obtained from the instructions in (3), (4), and (5) above indicate that the decoding system is functioning and decoding code 7777 (test code), the output of the simulating system.**

(6) If chopped simulated iff signal is not seen, rotate MODE 2 switch on C-7014/TPX-44 to 7777, and place OPERATE-TEST switch to TEST. On C-1271A/TPX-22, depress PUSH TO CHAL switch, and observe associated radar indicator. If pulse train is seen, normal reply circuitry in decoding system is faulty and higher category maintenance is required. Return OPERATE-TEST switch to OPERATE.

(7) The check of the identification-of-position (I/P), bracket and beacon assist video circuits in the decoding system as detailed in (a) through (c), below, may be made using the response from an airborne transponder in reply to radio communication directions.

#### NOTE

**A check of the emergency video circuits activated by the C-7014/TPX-44 EMER-OFF switch (indicator display of four evenly spaced reply arcs adjacent to the radar return) may be made only when the aircraft has proper clearance to transmit an emergency reply.**

(a) Direct aircraft to transmit I/P reply pulse (required mode and identical code selected at both aircraft and interrogator set). Observe that decoded iff reply, in response to challenge signal, consists of two arcs adjacent to radar return on associated radar indicator. Advise aircraft to switch off I/P reply.

(b) On C-7014/TPX-44, place BRACKET-OFF switch to BRACKET. Observe that decoded iff reply, in response to challenge signal, from aircraft replying in interrogated mode is seen on associated radar indicator regardless of code selected on applicable MODE switch on C-7014/TPX-44.

(c) On C-7014/TPX-44, place BEACON ASSIST switch to ON. Observe that decoded iff replies from aircraft replying in same mode and code selected on C-1271A/TPX-22 and C-7014/TPX-44 are stretched and appear larger on associated radar ppi display. Any replies in an improper code ((2) above) are not stretched. Return BRACKET-OFF and BEACON ASSIST switches to OFF.

#### NOTE

**A check of this decoding system function may also be made utilizing the simulator.**

#### *d. Coding System.*

(1) Set all controls and switches for operation (para 3-3 and 3-4).

(2) On C-1271A/TPX-22, place CHOP switch to ON and depress PUSH TO CHAL switch. Observe associated radar indicator. Chopped simulated iff signal should be seen, and CHALLENGE indicators should light.

(3) If CHALLENGE indicators light, but chopped simulated iff signal is not seen, place TRIG IN switch on SM-472/TPX-44 to PULSE; on C-1271A/TPX-22, depress PUSH TO CHAL switch. If simulated iff signal reply is seen and CHALLENGE indicators light, fault is in coding system and higher category maintenance is required.

(4) If CHALLENGE indicators light, but simulated iff reply signal is not seen on associated radar indicator, fault may be in simulating system. Higher category maintenance is required.

#### *e. Isls System.*

(1) Set all controls and switches for operation (para 3-3 and 3-4).

#### NOTE

**This procedure requires that the airborne transponder replies from a nearby aircraft (within approximately 5-mile (9.3 km) range) be observed on the associated radar indicator. The airborne transponder must be equipped for isls operation.**

(2) On Modulator, Pulse MD-638/TPX-41, place SLS switch to OFF; on C-1271A/TPX-22, depress PUSF: TO CHAL switch. Observe iff return without side-lobe suppression on associated radar indicator.

(3) On MD-638/TPX-41, place SLS switch to ON; on C-1271A/TPX-22, depress PUSH TO CHAL switch. Observe that iff return with side-lobe suppression on associated radar indicator is narrower arc, and that any ring around to side- and back-lobe response is suppressed (fig. 3-11). If pulse does not become narrower, fault is in isls system. Higher category maintenance is required.

#### *f. Defruiting System.*

#### NOTE

**To successfully perform the following procedure, the AN/TPX-41 must be operating at a different prf than other interrogator sets. Results of this procedure will be seen better if nonsynchronous replies due to interrogation from other iff ground stations are visible on the associated radar ppi display. Such replies commonly known as wildcatting may be seen when the IF GAIN AZ control on the radar indicator is temporarily rotated fully ccw, and PROCESSED VIDEO-RAW VIDEO switch on Blanker, Interference MX-8795/TPX-41 is placed to RAW VIDEO. Observe that these nonsynchronous signals are removed when the PROCESSED VIDEO-RAW VIDEO switch on the MX-8795/TPX-41 is placed to PROCESSED VIDEO.**

(1) Set all controls and switches for operation (para 3-3 and 3-4), except place OPERATE-TEST switch on C-7014/TPX-44 to TEST.

(2) On Blanker, Interference MX-8795/TPX-41, place PROCESSED VIDEO-RAW VIDEO switch to PROCESSED VIDEO.

(3) On C-7014/TPX-44, depress PUSH TO CHAL switch.

(4) On C-1271A/TPX-22, unlock and rotate RECEIVER GAIN control until background noise on associated radar indicator is just visible. Tighten control lock.

(5) On MX-8795/TPX-41, place PROCESSED VIDEO-RAW VIDEO switch to RAW VIDEO. Observe increase in noise level on associated radar indicator. If no change is observed, fault is in defruiting system. Higher category maintenance is required.

#### 4-10. Operator's Repair and ment Replacement

*a. Replacement of Front Panel Fuses.* Front panel fuses in the AN/TPX-41 are listed by rating and circuit location in paragraph 2-12c. Replace blown fuses as follows:

##### CAUTION

**Fuses used in this equipment are of various ratings. Make sure the proper rated fuse is used in replacement of a defective fuse. Equipment may be damaged if the set is overfused.**

(1) Push fuseholder cover in and twist ccw to unlock.

(2) Pull out cover; fuse will come with it.

(3) Remove fuse and replace with new fuse.

(4) Reinstall fuseholder cover with new fuse inserted.

*b. Replacement of Indicator Lamps.* Indicator lamps are located on the front panels of the components as described in paragraph 3-2. If found to be defective, replace as follows:

(1) Unscrew glass jewel to expose defective lamp.

(2) Press in on lamp and then rotate ccw to unlock.

(3) Pull out defective lamp and replace with new lamp.

(4) Push new lamp in and then rotate cw to lock.

(5) Screw glass jewel back into place.

##### NOTE

**Leave the jewel lamp cover adjusted fully ccw to allow light to shine through the jewel when the lamp lights.**

## CHAPTER 5. ORGANIZATIONAL MAINTENANCE

### Section I. GENERAL

#### 5-1. Scope of Organizational Maintenance

The organizational maintenance duties to be performed on the AN/TPX41 are listed below with a reference to the paragraphs covering the specific maintenance function.

- a. Monthly preventive maintenance checks and services (para 5-4a).
- b. Quarterly preventive maintenance checks and services (para 5-4b).
- c. Lubrication (para 5-6).
- d. Touchup painting (para 5-7).
- e. Troubleshooting procedures (para 5-9).
- f. Adjustment procedures (para 5-12).
- g. Component removal procedures (para 5-15).
- h. Component installation procedure (para 5-16).

maintenance are contained in tool kit, Electronic Equipment TK-101/G.

b. *Test Equipment.* The only test equipment required is Multimeter AN/UJSM-223.

c. *Materials.* Materials required for organizational maintenance are listed below.

- (1) Cleaning compound (NSN 7930-00-395-9542).
- (2) Orangestick (NSN 5120-004084036).
- (3) Cheesecloth, bleached, lint-free (NSN 8305-00-267-3015).
- (4) Cleaning cloth.
- (5) Fine sandpaper (NSN 5350-00-235-0124).
- (6) Crocus cloth (NSN 5350-00-192-5052).
- (7) Grease, aircraft and instrument, gear and actuator screw (specification MIL-G-23827A)

#### 5-2. Tools, Test Equipment and Materials Required

- a. *Tools.* All tools required for organizational

### Section II. PREVENTIVE MAINTENANCE

#### 5-3. General

a. Preventive maintenance is the systematic care, servicing, and inspection of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all categories of maintenance concerned with the equipment and includes inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of the AN/TPX-41 at the organizational category are made at quarterly intervals unless otherwise directed by the commanding officer.

b. Maintenance forms and records shall be used and maintained as specified in TM 38750.

a. *Monthly Checks and Service Periods.* Monthly maintenance checks and services of the AN/rPX41 are not regularly required unless directed by the commanding officer. If operations are conducted under unusually severe environmental conditions, more frequent preventive maintenance such as cleaning and inspection for signs of deterioration may be deemed necessary. In that case, the procedures outlined in the quarterly maintenance checks and services chart (para 5-5) may be performed monthly.

b. *Quarterly Checks and Service Periods.* Quarterly preventive maintenance checks and services of the AN/TPX-41 are required. All deficiencies or shortcomings shall be recorded in accordance with the requirements of TM 38750. Perform all the checks and services listed in the quarterly maintenance checks and services chart (para 5-5) in the sequence listed.

#### 5-4. Organizational Preventive Maintenance Checks and Service Periods

## 5-5. Quarterly Preventive Maintenance Checks and Services Chart

<i>Sequence No.</i>	<i>Item to be inspected</i>	<i>Procedure</i>	<i>References</i>
1	Completeness	See that equipment is complete	Para 1-7
*2	Exterior surfaces	a. Clean all mayor operating components b. Clean and touch up paint that shows hare spots, rust, and corrosion.	a. Para 4-6a b. Para 5-7
3	Intercabling and connectors	Check all interconnecting cables and connectors for cracks and breaks. Replace cables that have cracks or broken connectors; minor insulation cuts and abrasions may be repaired with electrical insulation tape.	Para 2-12a
4	Mountings	See that all bolts, nuts, and washers are present and properly tightened. Check for cracked bent, or broken brackets. Check for proper mounting of all components.	
*5	Indicator window and indicator lenses.	Check to see that indicator window on Receiver-Transmitter, Radar RT-264D/UPX-6 is free of dirt and not broken. Check all indicator lenses for damage.	
*6	Air filter	Check air filter on front panel of RT-264D/UPX; for excessive dirt. If necessary, clean or replace.	Para 4-6b
*7	Iff antenna and antenna pedestal	Inspect Antenna AS-1796,GPA-119 and Pedestal Antenna AB-1158/GPA-119 for rust and corrosion and physical damage. During check of equipment operation (sequence 14) inspect AB-1158/GPA-119 drive assembly for unusual noise. Lubricate AB-1158/GPA-119 drive assembly in accordance with instructions in paragraph 5-6.	Para 5-6

**Change 3 5-2**

Sequence No.	Item to be inspected	Procedure	References
8	Interior surfaces	Tighten switches, terminal blocks, mountings, transformers, chokes, relays, and potentiometers. Clean interior and cases, and check adequacy of moistureproofing and fungusproofing treatment.	
9	Interior electrical items	Check interior electrical items for evidence of overheating, leaks, bulges, corrosion, and cracks. <i>WARNING:</i> Failure of selenium compounds produces highly toxic fumes. If a rectifier burns out or arcs over, the odor is strong. Provide adequate ventilation immediately. Avoid inhaling fumes and do not handle damaged rectifier until it has cooled.	
10	Pluckout items	Check that all pluckout items (interior and exterior) are properly seated.	
11	Fuses	Check that installed fuses are of indicated value.	Para 2-12c
12	Modifications	Check DA Pam 310-7 to determine whether new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	TM 38-750 and DA Pam 310-7
13	Knobs, dials, and switches	While making operating checks (sequence 14), observe that mechanical action of each knob, dial, and switch is smooth and free of external or internal binding.	
14	AN/TPX-41 Operation	Check overall operation of the AN/TPX-41 as follows: a. Make preliminary control setting as described in paragraph 3-4. b. Perform starting procedures as described in paragraph 3-5 and verify that correct indications occur after each setting.	Para 5-10 Para 5-10
15	Simulated Interrogation	On C-1271A/TPX-22 place CHOP switch to ON, depress PUSH TO CHAL switch and verify occurrence of following: a. CHALLENGE indicators on RT-264D/UPX-6 and C-1271A/TPX-22 light. b. Simulated iff reply signals appear on associated radar set ppi display.	Para 5-10 Para 5-10
16	Mode switching	a. On C-1271A/TPX-22, place MODE SELECTOR to 1 and verify that MODE 1 indicator lights on C-7014/TPX-41. b. On C-1271A/TPX-22, place MODE SELECTOR to 2 and verify that MODE 2 indicator lights on C-7014/TPX-44. c. On C-1271A/TPX-22, place MODE SELECTOR to 3 and verify that MODE 3 indicator lights on C-7014/TPX-44.	Para 5-10 Para 5-10 Para 5-10
17	Publications	Check that all publications are complete, serviceable, and current.	DA Pam 310-4
18	Spare parts	Check all spare parts (operator and organizational) for general condition and proper storage. There should be no evidence of overstock, and all shortages must be on valid requisition.	

\*To be accomplished at frequent intervals during storms and other Periods of extreme climatic conditions (para 3-9).



## 5-6. Lubrication

The only component of the AN/TPX-41 requiring lubrication is the Pedestal, Antenna AB-1158/GPA-119. The AB-1158/GPA-119 shall be lubricated at the maximum time intervals indicated below except for extreme weather conditions which may warrant more frequent lubrication.

*a. Main Drive Gear Lubrication.* The main drive gears shall be inspected quarterly (sequence 7, para 5-5) but should require lubrication only every 6 months (2,500 hours) under normal operating conditions. Remove the access plug shown in A, figure 5-1, and apply a light coating of grease, aircraft and instrument, gear and actuator screw (specification MIL-G-23827A) to the main drive gears. Reinstall the access plug and tighten.

*b. Synchro Drive Gear Lubrication.* The synchro drive gears shall be inspected quarterly (sequence 7, para 5-5) but should require lubrication only once a year (5,000 hours) under normal operating conditions. Remove the access plug shown in B, figure 5-1, and apply a thin film of grease, aircraft and instrument, gear and actuator screw (specification MIL-G-23827A) to the synchro drive gears. Reinstall the access plug and tighten.

## 5-7. Touchup Painting Instructions

Exterior painted surfaces of the AN/TPX-41 should be touched up as indicated in paragraph 5-5 to reduce corrosion and prevent degradation of the equipment. To perform touchup painting, remove rust and corrosion from metal surfaces by lightly sanding with fine sandpaper. Refer to applicable cleaning and refinishing practices specified in TB SIG 364.

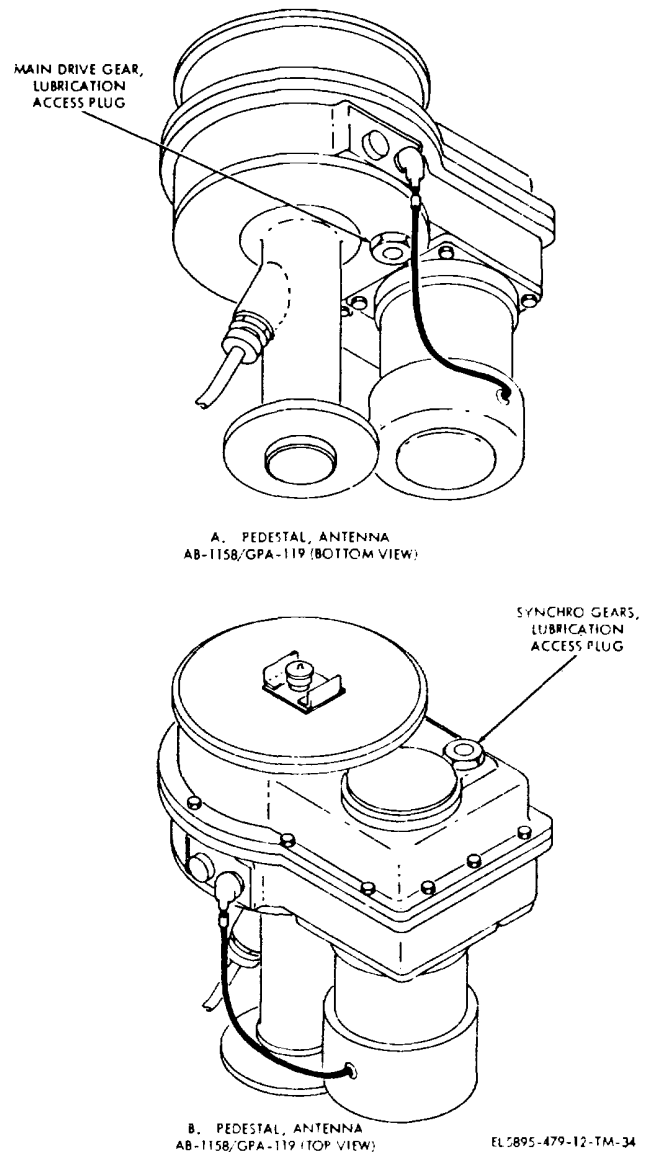


Figure 5-1. Pedestal, Antenna AB-1158/GPA-119, lubrication diagram.

### Section III. ORGANIZATIONAL TROUBLESHOOTING

#### 5-8. General Troubleshooting Information

This section contains pertinent troubleshooting information to aid organizational maintenance personnel in the localization and correction of equipment malfunctions. Troubleshooting, which may be performed by organizational maintenance, is limited by designated maintenance responsibility and authorized tools, test equipment, and repair parts. The following troubleshooting techniques should be followed to insure fast, systematic location and correction of equipment troubles.

*a. Visual Inspection and Routine Checks.* In many instances, an obvious trouble can be detected quickly by a simple visual inspection. When an equipment malfunction occurs, and a particular unit is suspected of causing the trouble, conduct a visual inspection taking particular care to identify the following:

- (1) Worn, broken, or disconnected cords or plugs.
- (2) Burned-out fuses.
- (3) Loose seating of tubes and other pluckout components.
- (4) Defective tubes.
- (5) Defective crystals.

*b. System Sectionalization.* If a visual inspection is not practical or fails to reveal a trouble, the most efficient means of locating the trouble is by system sectionalization. To accomplish system sectionalization, obtain information regarding the trouble symptom from the equipment operator and attempt to isolate the trouble to a specific system or major component. Refer to the troubleshooting block diagram (FO-1) and accompanying discussion (para 5-9) for information regarding component relationships and functions. The operational checks in the operator's preventive maintenance checks and services chart may be used as an equipment performance checklist to identify abnormal indications. These abnormal indications

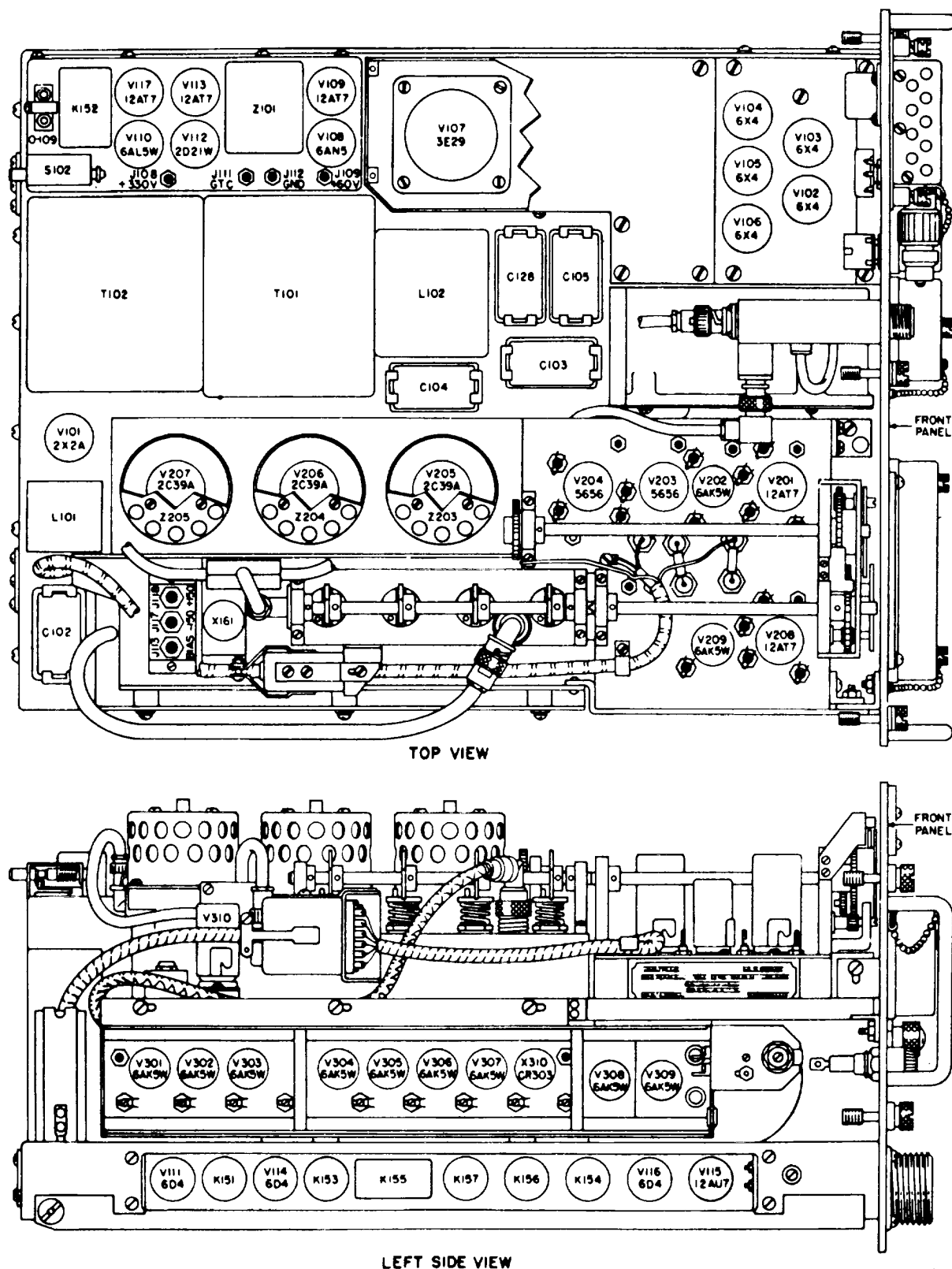
appear in the organizational troubleshooting chart (para 5-10) as trouble symptoms listed with the probable trouble, checks, and corrective measures. For corrective measures requiring tube replacement refer to figure 5-2, Receiver-Transmitter, Radio RT-264D/UPX-6, tube location diagram, or figure 5-3, Coder-Control KY-97C/TPX, tube location diagram, as applicable.

*c. Referral to Higher Category of Maintenance.* If a trouble is located and cannot be corrected by minor repairs or adjustments within the scope or capabilities of organizational repairmen, higher category of maintenance personnel should be notified immediately. If the equipment is turned in for repair, not on the repair tag how the equipment performed and what corrective measures were taken.

#### 5-9. Troubleshooting Block Diagram Discussion

The following discussion establishes the basic functions and relationships of components in the AN/TPX-41. The discussion is keyed to the troubleshooting block diagram (FO-1) and should aid organizational maintenance personnel in locating equipment malfunctions.

*a. Timing System.* The timing system is essentially comprised of trigger generating circuits and a recirculating trigger loop in the MX-8795/TPX-41. The trigger generating circuits are contained on the trigger/gate generator chassis series No. 30900 which is a circuit card assembly. The recirculating trigger loop is provided through circuitry in processor chassis series No. 30800, which is also a circuit card assembly, PRF SEL switch S3 and delay line DL1. An astable multivibrator in the trigger/gate generator initiates the first pulse period by developing a trigger which is applied to the processor as the IFF circulating pretrigger. The pretrigger is amplified in the processor and applied to delay line DL1, where it is delayed for 4000, 3333.3, or 2666.6  $\mu$ sec (one pulse period) and fed back to the processor. The delayed pretrigger is amplified in the processor and coupled to a coincidence circuit to produce a circulating pulse output from the processor. This circulating pulse is fed to the trigger/gate generator to trigger the



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Figure 5-2. Receiver-Transmitter, Radio, RT-264D/UPX-6, tube location diagram.

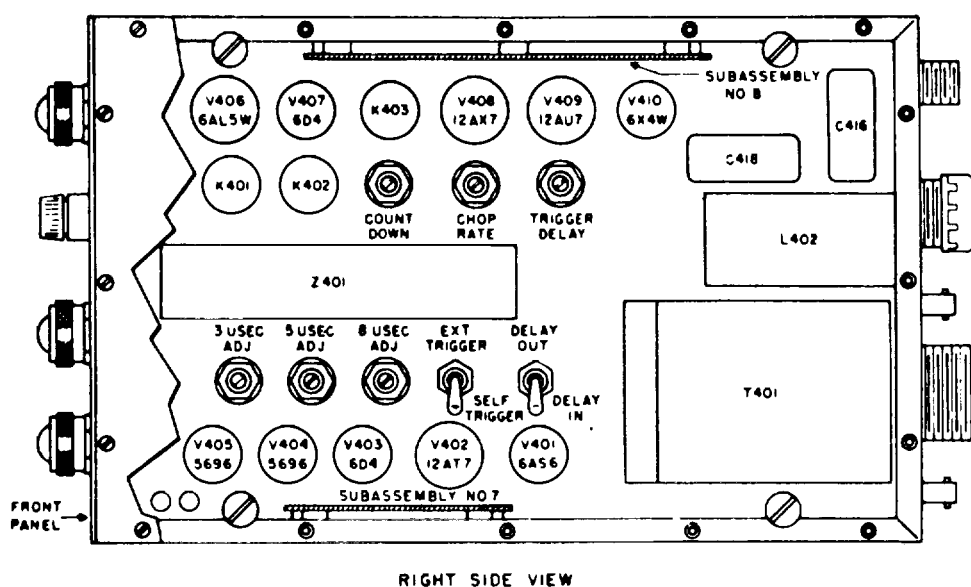


Figure 5-3. Coder-Control KY-97C/TPX, tube location diagram.

astable multivibrator and initiate the next iff circulating pretrigger. This method of triggering the astable multivibrator with the circulating pulse ensures that each pulse period will be equal to the delay time of the delay line for each cycle. In addition to producing an iff circulating pretrigger, the processor produces a delayed trigger for each pulse period. The iff circulating pretrigger and delayed trigger outputs from the processor are applied to synchronizer multiplier chassis no. 31000 which is also a circuit card assembly. The delayed trigger is shaped and amplified in the synchronizer multiplier and routed out of the MX-8795/TPX-41 to trigger the KY-97C/TPX. On receipt of the iff circulating pretrigger, the synchronizer multiplier produces a 1500-Hz sine wave which is in synchronization with the delayed trigger. The 1500-Hz signal is amplified in the synchronizer multiplier and routed out of the MX-8795/TPX-41 to establish a time reference for the synchronizer of the associated radar. An iff display trigger taken directly from the iff circulating pretrigger output of the trigger/gate generator is also routed out of the MX-8795/TPX-41. This display trigger is used to synchronize the iff sweep on the ppi of the associated radar. The trigger/gate generator also generates gates which are used in the processor circuits for defruiting purposes.

*b. Coding System.* The coding system circuits are contained in Coder-Control KY-97C/TPX (chassis series no. 400). Also, a duplicate set of coding system operating controls is located on the front panel of

Control, Remote Switching C-1271A/TPX-22. The primary purpose of the KY-97C/TPX is to produce the coded pulse pairs for the three different modes of operation. The KY-97C/TPX contains countdown circuits, delay circuits, the mode spacing and output pulser circuits, and chop rate circuits. These circuits are discussed in paragraphs *c*, *d*, and *e*, below. The trigger countdown and delay features are not used in this application with the AN/TPX-41. Establishment of the pulse repetition rate and the necessary delay for the triggers applied to the associated radar set are performed in the MX-8795/TPX-41.

*c. Countdown and Delay Circuits.* The action of these circuits as used in the AN/TPX-41 during normal operation is discussed in (1), (2), and (3) below. Additional features of these circuits are discussed in (4) and (5) below.

(1) Incoming pulses are amplified by countdown gate and trigger amplifier V401, and then are fed into delay multivibrator V402. When DELAY IN-DELAY OUT switch S408 is placed to the DELAY OUT position, V402A amplifies the pulses received from V401 (V402B is inoperative), and the iff reply signal on the associated radar ppi appears at a fixed interval and later in range than the radar signal. When used with the AN/TPX-41, switch S408 is placed to the DELAY OUT position and the separation between the radar target and

the iff reply is controlled by the setting of the DLYD ADJ control on the trigger/gate generator in the MX-8795/TPX-41.

(2) When EXT TRIGGER-SELF TRIGGER switch S401 is placed to the EXT TRIGGER position, delay line driver V403 fires each time a positive pulse is received from V402. A small fixed delay exists between the application of the input pulse to V402A and the output pulse from V403. Positive pulses are capacity coupled from the cathode of V403 to the mode spacing circuit. Countdown clipper V406 receives negative pulses from the plate of V403. (Switch S401 is placed to the EXT TRIGGER position when used with the AN/TPX-4 1.)

(3) Countdown clipper V406 conducts each time it receives a negative pulse from V403. The current through V406 is used to charge a capacitor, which then discharges through COUNT DOWN control R431. The exponential negative voltage across the capacitor is applied to the suppressor grid of countdown gate and trigger amplifier V401; this negative voltage is used to cut off V401 to limit the intervals during which V401 can function. This action results in pulses appearing at the output of the countdown and delay circuit which have comparatively low pulse repetition rate (actual rate is determined by setting of R431), although the pulse repetition rate of the incoming radar trigger pulses may be much higher. In this application, R431 is adjusted for unity countdown, resulting in an output of approximately 1250, 300, or 375 pulse pairs per second.

(4) When S408 is placed to the DELAY IN position, delay multivibrator V402 operates as a one-shot multivibrator. Pulses appearing across the output of this stage will lag incoming pulses at a variable interval, the exact value being dependent on the setting of TRIGGER DELAY control R411. The separation between the iff reply signal and the associated radar signal on the ppi thus can be varied as required.

(5) Delay line driver V403 will function as a relaxation oscillator when switch S401 is placed to the SELF TRIGGER position. Driver V403 then furnishes pulses to the mode spacing circuit at a pulse repetition rate of approximately 200 pps.

*d. Mode Spacing and Output Pulser Circuits.* The mode spacing circuit consists of pulse delay network Z401 and mode change relays K101 and K402.

This circuit generates a pair of pulses for each trigger pulse introduced from the countdown and delay circuit. The spacing between the pulses of each pair (3, 5, or 8 psec, constituting mode 1, mode 2, and mode 3, respectively) is regulated by the position of the contacts of relays K401 and K402.

(1) Each incoming trigger pulse from the countdown and delay circuit is delayed 8.5 psec by pulse delay network Z401 before connection to second output pulser V404. Another pulse is taken from the intermediate point on Z401 that is 3, 5, or 8 psec ahead (in time) of the pulse delivered to V404. The pulse from the intermediate point (tap) on Z401 is delivered to first output pulser V405 through K402 or K401 and K402.

(2) The output pulser circuit consists of first output pulser V405 and second output pulser V404. The pulses at the input of V404 and V405 are combined into a single pulse-pair output, available at TRIGGER OUT connector J403 when the CHALLENGE switch is placed to ON. A pulse-pair that carries the interpulse spacing of 3, 5, or 8 psec is generated; thus interpulse spacing constitutes the three available challenge modes. The selection of interpulse spacing is governed by MODE SELECTOR switch S403, which is used to energize the coils of mode change relays K401 and K402.

*e. Chop Rate Circuit.* The chop rate circuit consists of relaxation oscillator V407 and regenerative shaper V108. This is an auxiliary circuit that functions to interrupt the output of the KY-97C/TPX so pulse pairs are delivered to the RT-264D/UPX-6 only 40 percent of the time (when CHOP switch S405 is placed to ON). Single pulses are delivered during the remaining 60-percent interval. Since airborne transponders reply only to challenge signals comprised of pulse pairs, the action of this circuit reduces the number of reply signals from an airborne transponder, and the iff visual reply appears on the associated radar ppi as a series of dashes. When the chop rate circuit is not in operation (CHOP switch S405 placed to OFF), the reply signals appear as solid unbroken arcs.

(1) When CHOP switch S405 is placed to ON, chopping relay K403 is energized. With K403 energized, relaxation oscillator V 107 begins generating sawtooth waves, to trigger regenerative shaper V408, connected as a trigger circuit. When triggered, V.108 furnishes negative square waves which are used to chop (key) second output pulser V404.

Second output pulser V404 is cut off during the intervals it has the negative portion of the square wave applied to its suppressor grid. The output of the pulser circuit is then interrupted.

(2) When CHOP switch S405 is placed to OFF, V408 provides zero potential to the shield grid of V404 at all times, and the output pulser circuit is not chopped.

*f. Isls System.* The isls system consists of the circuits in Modulator, Pulse MD-638/TPX-41 (chassis series no. 1200) and Antenna AS-1796/GPA-119 (chassis series no. 1000). The rf switch circuits of the isls system in the AS-1796/GPA-119 are discussed as part of the antenna system. The circuits in the MD-638/TPX-41 are described in paragraphs *g* through *j* below.

*g. Delay Generator (Chassis Series No. 1300).* The delay generator produces a linear ramp, which generates a delayed pulse for insertion between the input coded pulses. The input to the delay generator is the pair of positive pulses generated in the coder. The delay generator accepts these positive pulses and produces a linear ramp at its output. This ramp voltage is applied to the P2 pulse generator.

*h. P2 Pulse Generator (Chassis Series No. 1300).* The P2 pulse generator develops the third pulse required to transmit the difference pattern that performs the isls action. The positive-going linear ramp from the delay generator comprises the input to the P2 pulse generator. At a specific point in time along this ramp (determined by the setting of P2 DELAY ADJ control), the P2 pulse generator produces the P2 pulse. The width of this pulse is determined by the setting of the P2 PULSE WIDTH control. The P2 pulse is routed out of the MD-638/TPX-41 and applied to the modulator in the transmitter section of the RT-264D/UPX-6.

*i. Control Pulse Generator (Chassis Series No. 1300).* The control pulse generator is identical to the P2 pulse generator, except that in some cases no adjustment of the pulse width is provided. In these cases fixed circuit values are chosen to provide a control pulse width of approximately 2  $\mu$ sec. The control pulse starts just before the beginning of the P2 pulse and ends just after the P2 pulse terminates. The control pulse changes the bias on the rf switch in the AS-1796/GPA-119 and causes the difference pattern to be transmitted during the P2 pulse time.

*j. Interlock Circuit (Chassis Series No. 1300) and Diplexer (Chassis Series No. 1200).* The interlock

circuit, consisting of transistors Q1313, Q1314, and Q1315 and interlock relay K1301, provides protection of microwave switch S1001 in the AS-1796/GPA-119. A dc bias must be applied to the switching diodes in S1001 during rf transmission or serious damage to the microwave switch will result. If the bias current to S1001 is interrupted for any reason, the forward bias for the transistors of the interlock circuit is removed and interlock relay K1301 is deenergized. This action removes the coded pair from the input of the MD-638/TPX-41, and no rf pulses are sent to the rf switch. A train of rf pulses from the RT-264D/UPX-6 (including the P2 pulse), the dc bias, and the control pulse are combined in the diplexer and routed to the AS-1796/GPA-119 through the AB-1158/GPA-119 rotary joint.

*k. Transmitting System.* The coded pair and P2 pulses from the MD-638/TPX-41 are applied to the modulator circuit in the RT-264D/UPX-6. These pulses modulate the rf circuits in the transmitter. The rf pulses are then sent back to the MD-638/TPX-41, where they are mixed with the bias and control pulse in the diplexer. This signal is then sent to the AS-1796/GPA-119 for transmission. The transmitting system is explained in paragraphs *l* through *r*. The duplexer and directional coupler (para *p* and *q*), although discussed here, are common to both the transmitting and receiving systems.'

*l. Modulator Circuit.* The modulator circuit consists of trigger input amplifier and blocking oscillator V109, modulator driver V108, and modulator V107. This circuit modulates the continuous rf signal originating in the transmitter crystal oscillator and provides the necessary power for rf transmission.

(1) During operation, incoming trigger pulses from the MD-638/TPX-41 are amplified by trigger input amplifier V109B. These amplified pulses trigger blocking oscillator V109A, which generates 1  $\mu$ sec pulses.

(2) Modulator driver V108 amplifies the positive pulses from the blocking oscillator stage and capacitively couples them to the grid of modulator tube V107.

(3) The modulator (V107) circuits develops 500-volt, 2100-volt, and 3500-volt positive pulses. The 2100-volt pulses are used to excite tripler

cavity tube V205 and first amplifier tube V206. The 500-volt pulses excite tripler tube V203 and buffer amplifier tube V204 in the exciter circuits. The 3500-volt pulses excite final amplifier cavity tube V207. The 500-, 2100-, and 3500-volt pulses occur simultaneously and are of 1 psec duration as governed by the action of the blocking oscillator.

*m. Exciter Circuit.* The exciter circuit provides rf pulses of controlled frequency and of considerable power to the coaxial cavity circuits.

(1) Crystal-controlled oscillator V201A supplies a continuous rf signal; the third harmonic of this signal is amplified in first tripler V2013 and further amplified in first buffer amplifier V202.

(2) In tripler V203, the third harmonic of the amplified signal (that is, the ninth harmonic of the crystal frequency) is again amplified and passed on; however, the plates of this stage are pulse modulated by voltage pulses from the modulator circuit. The resultant output consists of rf pulses, 1 psec in width, which are applied to buffer amplifier V204.

(3) In addition to having a pulsed input signal, buffer amplifier V204 is also plate modulated. The amplified output of V204 is used to feed the first of a series of three cavity units in the final stages of the transmitting system.

*n. Coaxial Cavity Circuits.* Three coaxial cavity units are used in the output stages of the transmitter. First transmitter cavity V205 functions as a harmonic generator (tripler); the second and third cavities (first amplifier V206 and final amplifier V207) amplify the rf signal to the required output level of 1500 watts minimum. Each coaxial cavity uses a type 2C39A triode tube (or 2C41) which differs in its mechanical construction from conventional vacuum tube design. The coaxial cavities consist of sections of coaxial transmission line, which are tuned to the operating frequency by the process of changing their values of lumped capacitance.

*o. Challenge Indicator Circuit.* The challenge indicator circuit consists of challenge indicator amplifier V115B, level detector V116, and relay actuator V115A. This circuit monitors the transmitter power output. Challenge indicator relay K154, which applies power to the front panel CHALLENGE indicator lamp, remains energized as long as the transmitter pulses satisfy the predetermined minimum power output requirement of

1500 watts. If the output drops 6 db below this level, K154 deenergizes and the indicator lamp extinguishes.

*p. Duplexer Assembly.* Duplexer assembly Z201 provides an efficient method of coupling the receiver and transmitter to a common antenna. High-powered transmitter pulses will appear at the AS-1796/GPA-119 without disturbing the receiver circuits. Similarly, received signals are coupled efficiently to the receiving system without being dissipated across the output circuit of the transmitting system. In operation, the duplexer is equivalent to a radio-frequency switch.

*q. Directional Coupler.* Directional coupler Z202 permits sampling of the transmitting system output delivered to the AS-1796/GPA-119. Transmitted and received signals are coupled along a transmission line in Z202 with almost no signal loss. Two probes, which are part of Z202, provide coupling to the transmission line with approximately 20 db of signal attenuation. One of the rf probes is connected to R.F. PROBE 20 DB MID BAND ATTEN. connector J213 and is used to couple the simulated rf reply signal from Simulator, Radar Signal SM-472/TPX-44 to the transmission line. The other probe couples a small amount of transmitting system signal to a monitor detector, and the resultant/demodulated pulses are introduced into the challenge indication circuit to monitor the transmitting system power output.

*r. Power Attenuator and Dummy Load.* The POWER ATTENUATOR (Z501) AND DUMMY LOAD (Z502), mounted on the front panel of RT-264D/UPX-6, permit operation of the equipment while tests or adjustments are being made without causing unnecessary interference by radiation of transmitting system signals. The dummy load can be installed on ANTENNA connector J212, serving as a replacement for AS-1796/GPA-119. If the RT-264D/UPX-6 is used with an antenna system other than the AR-1796/GPA-119, the power attenuator may be used in series with the antenna to reduce rf signal strength and thereby reduce the side-lobing effect caused by an iff antenna system that does not have sls capabilities.

*s. Antenna System.* The antenna system consists of Antenna AS-1796/GPA-119 and Pedestal, Antenna AB-1158/GPA-119. The components of the AS-1796/GPA-119 are described in paragraphs *t* through *v*, below. Components of the AB-1158/GPA-119 are described in paragraphs *w* through *y*, below.

*t. Antenna AS-1796/GPA-119.* Iff antenna E1001 is a vertically polarized, longitudinal shunt-slot array. It is constructed of a section of waveguide approximately 10 feet long which is divided in the center to form two radiating elements. When the two elements are excited in phase, a radiation pattern equivalent to a normal directional antenna is produced. This pattern is called the sum pattern and is the normal (no isls) pattern. When the two elements are excited 180 degrees out of phase with respect to each other, a pattern is produced which is characterized by a deep null along the centerline of propagation. This pattern is called the difference pattern and is developed during isls operation. Hybrid coupler HY1001 determines the phase in which the two elements are excited. Energy entering HY1001 through arm no. 1 (referred to as the sum port) will excite the two elements in phase; energy entering HY1001 through arm no. 4 (referred to as the difference port) will excite the elements 180 degrees out of phase.

*u. Rf Switch S1001.* The rf switch changes the input of hybrid coupler HY1001 to either the sum or difference port in accordance with a pulsed signal. This signal, called the control pulse, is generated in Modulator, Pulse MD-638/TPX-41. The control pulse is synchronized with the transmitter rf output and appears between the coded pulse pair. In isls operation, a second pulse (P2), also generated in MD-638/TPX-41, is applied to RT-264D/UPX-6 and appears as an rf output pulse during the time the control pulse is present. The rf and control pulses are combined in the MD-638/TPX-41 and are separated in the rf switch by diplexer ZI101. The control pulse is connected to microwave switch S1101 through the pulse-shaping network R1101, R1102, Co101, R1103, and C1102. During the time the control pulse is present, S1101 routes the P2 rf pulse to the difference port of HY1001. When the control pulse is not present, S1101 is held in the sum condition by a dc bias from MD-638/TPX-41. Filters FL1101 and FL1102 provide protection to S1101 from nearby high-powered radars.

*v. Backfill Radiator E1002.* Directional coupler DC1001 is inserted in the difference pattern line between microwave switch S1101 and hybrid coupler HY1001. DC1001 feeds a portion of the transmitted difference signal (P2 pulse), attenuated approximately 6 db, to the backfill radiator E1002. The backfill radiator provides a difference pattern in the rear hemisphere of iff antenna E1001 to cover the reflections from energy radiated in the sum pattern from E1001.

*w. Rotary Joint E20001.* Rotary joint E20001 located in the AB-1158/GPA-119, provides a method of

transferring rf energy and control data from a stationary cable during rotation of the AS-1796/GPA-119. This rotary joint is different from the usual rotary joint in that dc electrical continuity is provided between the stationary section and the rotating section. The dc continuity is required to transfer the dc bias to the rotating rf switch.

*x. Drive Motor B20002 and Gear Train.* The main shaft of the AB-1158/GPA-119 is rotated through a reduction drive assembly by ac drive motor B20002. The drive motor is also coupled to a control synchro transmitter through a gear train. The gear train consists of spur gears, which hold backlash to a minimum.

*y. Synchro Control Transmitter B20001.* The rotor of synchro transmitter B20001 is excited by single-phase, 117-volt, ac power. The stator voltage is transmitted to the indicator synchro system of the associated radar set and causes the ppi displays to rotate synchronously with the AS-1796/GPA-119.

*z. Receiving System.* Iff reply signals, returned by an airborne transponder in response to the interrogation signals, comprise the input to the receiving system. These signals, consisting of rf pulses at the receiver frequency, are delivered from the AS-1796/GPA-119 to the ANTENNA connector on the front panel of the RT-264D/UPX-6. They pass through the directional coupler and duplexer assemblies (previously discussed in paragraphs *p* and *q* above, on the transmitting system) and are routed to the receiver preselector assembly. The receiving system processes the rf pulses and produces the coded raw video signals at its output. Paragraphs *aa* through *ad* provide a discussion of the receiving system.

*aa. Preselector Assembly.* The preselector assembly is an adjustable rf bandpass filter consisting of four units assembled in one integral subassembly. The first three units can be tuned to pass incoming signals within the frequency range of 1080 to 1130 MHz. The fourth unit functions as the final tuned circuit of the oscillator-multiplier circuit. The output from the third unit (1080 to 1130 MHz) and the output from the fourth unit (1140 to 1190 MHz) are connected to a silicon diode mixer inserted inside a coaxial connector located between the third and fourth units. The mixer rf signals that occur at the output of the diode mixer include the



desired intermediate frequency of 60 MHz. The four cavity units of the preselector assembly are adjusted from the front panel of the RT-264D/UPX-6 for any frequency within the 20-MHz range to which the receiver has previously been aligned. Desired signals pass through the first three units with little attenuation and signals other than those of the desired frequency are attenuated greatly. Attenuated signals also include those of image frequency that occur 60 MHz above the output frequency of the oscillator-multiplier circuit, within the range of 1200 to 1250 MHz.

*ab. Oscillator-Multiplier Circuit.* The oscillator-multiplier circuit provides a signal 60 MHz above the received (airborne) transponder signal. The oscillator-multiplier signal and the received signal are combined to produce the required IF of 60 MHz at the output of mixer crystal CR202. The required oscillator-multiplier frequency (1140 to 1190 MHz) is produced by generating an RF signal in crystal-controlled oscillator V208A and multiplying it 27 times by using a series of triplers. The crystal frequencies that control V208A are calculated by the formula -

$$\text{crystal frequency (MHz)} = \frac{\text{receiver operating frequency (MHz)} + 60 \text{ (MHz)}}{27}$$

and range from 42.22222 MHz to 44.07407 MHz. The output of the mixer is sent to the IF amplifier circuit.

*ac. IF Amplifier Circuit.* The 60-MHz IF amplifier circuit consists of seven stagger-tuned stages of amplification, a video detector stage, and two stages of video amplification.

(1) Signals received from mixer crystal CR202 are amplified by the seven-stage IF amplifier (V301 through V307) and are detected in the video detector (CR303 or V310). The detected signal is amplified further in the two-stage video amplifier (V308 and V309) and is applied to the VIDEO OUT connector on the RT-264D/UPX-6 front panel.

(2) The normal bandwidth of approximately 9.5 MHz (broadband) can be reduced to approximately 4 MHz (narrow band) by replacement of the crystal diode video detector (CR303) with a dual-diode, vacuum tube video detector (V310).

(3) Receiver sensitivity is manually controlled, from Coder-Control KY-97C/TPX or from Control, Remote Switching C-1271A/TPX-22, by

operation of the RECEIVER GAIN control. The control sets the level of negative voltage (bias) applied to the control grids of the first and third IF amplifiers. After setting the RECEIVER GAIN control, sensitivity of the RT-264D/UPX-6 is controlled automatically by application of a variable negative voltage (bias) to the control grids of the second and fourth IF amplifiers. This variable bias adjusts the gain to the optimum value required for reception from distant or nearby targets and is called gain time control (gtc). A fixed bias is applied to the fifth, sixth, and seventh IF amplifiers.

*ad. Gtc and Gate Circuit.* The gtc and gate circuit places a negative bias on the grids of the second and fourth IF amplifiers sufficient to hold them at cutoff until the initiating trigger pulse is received. This bias is then replaced during the reception period (gate interval) by gtc bias (a negative voltage that changes with respect to time). The need for the variable bias system is caused by reply signals from distant aircraft being much weaker than those signals that originate from nearby aircraft. Thus, the gtc circuit varies the receiver gain so that distant signals can be amplified enough to be used for identification without overloading the receiving system in the RT-264D/UPX-6 with strong signals from relatively close aircraft.

*ae. Defruiting System.* The defruiting system is contained in Blanker, Interference MX-8795/TPX-41 (chassis series No. 31100). Defruiting as applied to this system is the process by which spurious, nonsynchronous signals are removed from the video pulse train while retaining the desired signals. Defruiting of the video takes place in the processor subassembly (chassis series No. 30800) of the MX-8795/TPX-41. A delay line (DL31101) external from the processor subassembly and the gates from the trigger/gate generator subassembly (chassis series No. 30900) are also used. Defruiting is initiated when IFF video from the receiving system is applied to the processor in the MX-8795/TPX-41. An IFF input enable gate is produced in the trigger/gate generator and applied to the processor simultaneously with the IFF video. The IFF input enable gate and the IFF video are applied to coincidence AND circuitry in the processor to produce an input to delay line DL1. This input consists of a video pulse train and a circulating pulse, all of which are the same amplitude. After a delay of 2666.6, 3333.3, or 4000  $\mu$ sec, the video pulse train and the circulating pulse are fed back to the processor for application to a second AND circuit. An IFF output enable gate, produced in the trigger/gate generator, and undelayed IFF video provide the

second and third inputs to this AND circuit. Coincidence of all three inputs are essential for an output from the AND circuit; therefore, any nonsynchronous pulses appearing on the delayed or undelayed iff video pulse trains will not produce an output. This results in a single iff video pulse train which consists of only those pulses which are synchronous from one pulse period to the next. This iff video pulse train is routed out of the MX-8795/TPX-41 and applied to the KY-593/TPX-44 for decoding.

*af. Decoding System.* The decoding system is contained in Decoder, Video KY-593/TPX-44 (chassis series No. 200) and Control, Remote Switching C-7014/TPX-44 (chassis series no. 40300). The KY-593/TPX-44 accepts the processed coded video train from the MX-8795/TPX-41 and determines whether the coded signal is correct for the selected mode. If the code is correct, the KY-593/TPX-44 will generate a single pulse which is sent to the associated radar set for display on the ppi. The KY-593/TPX-44 contains four circuit card subassemblies, a delay line, and a diode matrix. The circuit card subassemblies are the video amplifier (chassis series No. 30000), coincidence amplifier (chassis series No. 30100), ident-emergency generator (chassis series No. 30200), and video mixer (chassis series No. 30300). The signals frequently pass in and out of the subassemblies; therefore, the discussions in paragraphs *ag* through *ao* is by function rather than by subassembly.

*ag. Pulse Train Amplifying and Shaping Circuits.* The pulse train amplifying and shaping circuits, contained on the video amplifier (chassis series no. 30000) comprise the input stages of the decoding system. The positive coded pulse trains from the defruiting system are applied to the video amplifier, where they are shaped and amplified to assure proper processing of the pulses throughout the decoding system. The output pulse trains from the video amplifier are applied to code selecting and pulse train analyzing circuits.

*ah. Code Selecting and Pulse Train Analyzing Circuits.* The code selecting and pulse train analyzing circuits comprise the intermediate stages of the decoding system. These circuits establish code settings for all modes of operation and transform the time-sequential code train of positive video pulses received from the pulse train amplifying and shaping circuits to a time-coincident series of pulses. When the time interval of all the pulses in the video code train is established, it

is possible to produce an output only when the correct pulse combination is received. When each pulse of the video code train is delayed exactly the same time as it is spaced ahead of the final bracket pulse, all pulses appear at the same time in the diode matrix. If the pulse spacing corresponds to the selected code, outputs from the matrix are further processed in the coincidence amplifier and video mixer subassemblies, causing a single pulse to be produced at the output of the KY-593/TPX-44. The principal components in Control, Remote Switching C-7014/TPX-44, used to establish the correct code, are switches S40301, S40302, and S40303 and relays K40301 through K40306. The principal components in the KY-593/TPX-4-1 used to examine the pulse train, are delay line DL201 and diode matrix CR205 through CR234 on the main chassis.

*ai. Delay Line DL1.* Delay line DL1 is a lumped constant delay line which consists of 17 sections. Taps are provided for input and output signals. These taps on DL1 connect to the pulse train amplifying and shaping circuits and the diode matrix. Each section of DL1 provides a delay of  $1.45 \pm 0.5 \mu\text{sec}$ . This delay is equal to the spacing between all pulses, except pulses A4 and B1 of a coded pulse train input of 14 pulses. To compensate for signal attenuation, a tap near the center of DL1 delivers pulses in the pulse train (X1 video) to a secondary amplifying and shaping network which consists of inverter amplifier Q3 and amplifier Q4 at the video amplifier subassembly. These pulses are reintroduced into DL1 as X2 video after amplification. When the first bracket (PF1) pulse in a code train has reached the termination of DL1, the remaining pulses will be deployed along the line until each pulse is positioned at the tap associated with its position in the code train. At this instant, time coincidence of all pulses in the code train occurs at the taps on DL1. Correct code coincidence requires that all selected pulses be present at their respective outputs from DL1 at the same time. This indicates that there can be no correct code signal until both brackets (PF1 and PF2), along with the code pulses, are present at their respective matrix inputs. PF1 and PF2 are reference pulses that are always present in a transponder response. No decoded signal can result without these bracket pulses. The KY-593/TPX-44 will produce a display signal for any transponder answering a challenge from the associated interrogator set, and since all coded signals contain bracket pulses PF1 and PF2, the bracket function (para *an*) can produce a signal using only these two pulses.

*aj. Diode Matrix CR5 through CR34.* The diode matrix that connects to the terminals of DL1 will determine whether the code is correct. Through the diode matrix, a pulse from each tap on DL1 is either switched to a coincident line (code correct) or a kill line (code incorrect). If the selected code requires a pulse at a given tap, it will go to the coincident line. If the selected code requires no pulse at a selected tap and a pulse is present, it will proceed to a kill line and prevent the generation of a display pulse. When the C-7014/TPX-44 provides sound for the matrix, pulses will be delivered to the coincident line. When ground is removed, all pulses produced will be delivered to the kill line. The resultant outputs of the diode matrix are applied to the coincidence amplifier, chassis series No. 30100, which forms part of the reply generating circuits.

*ak. Reply Generating Circuits.* The reply generating circuits are primarily located on the coincidence amplifier, chassis series No. 30100, and the video mixer, chassis series No. 30300. The coincidence amplifier amplifies the outputs of the diode matrix and uses time coincidence circuitry to produce outputs in response to the various types of iff replies. The video mixer provides mixing, amplification, and shaping to produce decoded video representing the specific type of replies.

*al. Identification-of-Position Video.* When decoded replies from more than one aircraft appear on the indicator of the associated radar set, the operator can request by radio that the pilot key the airborne transponder to transmit an I/P reply. For mode 1, the I/P reply consists of two normal code trains transmitted one after the other. The code trains are then processed normally through the KY-593/TPX-44 and displayed on the associated ppi as two iff replies 24.65  $\mu$ sec apart. The I/P replies on modes 2 and 3 differ in that the replies have one pulse added to the code train. This extra I/P pulse is placed 4.35  $\mu$ sec after the second bracket pulse of the normal code train. The normal code train is processed by the KY-593/TPX-44 in the normal manner and becomes the first pulse of the I/P reply. The second pulse is acted upon by circuitry of the video amplifier, coincidence amplifier, ident-emergency generator, and video mixer to produce the second pulse required for an I/P presentation on the indicator of the associated radar set.

*am. Emergency Reply Circuits.* The emergency and bracket video circuits of Decoder, Video KY-593/TPX-44 are closely interrelated. The KY-593/TPX-44 provides four video pulses for display at the

associated radar set indicator for each airborne transponder transmitting an emergency signal and utilizing the preselected code in use. The first requirement for an emergency display is that the airborne transponder must transmit an emergency signal. In modes 1 and 2 in the newer airborne transmitters, the emergency transmission is one pulse train of the code in use followed by three pairs of bracket pulses. In mode 3 operation, the transmission is one pulse train containing code 7700 followed by three pairs of bracket pulses. The second requirement is that the C-7014/TPX-44 EMER-OFF switch S40304 must be placed to EMER. Some older airborne transponders transmit an emergency signal which consists of four code trains. These four code trains will produce four decoded outputs, and the emergency circuitry of the KY-593/TPX-44 will not be utilized. During emergency operation, the airborne transponder sends an emergency reply which consists of a normal code train followed by three sets of bracket pulses. When this reply is decoded, the emergency display consists of four pulses spaced 24.65  $\mu$ sec apart. These four video pulses are provided for display on the associated radar ppi by the KY-593/TPX-44. The first video pulse is produced by decoding the code pulse train through the normal video decoding circuits. The second video pulse is produced by the identification-of-position (I/P) circuits. The third and fourth video pulses are produced by circuits of the ident-emergency generator, chassis series No. 30200.

*an. Bracket Circuits.* Bracket operation is an auxiliary function of the decoding system that permits the operator to determine whether an aircraft transponder is replying to the iff challenge, regardless of the code. The reply must be in the same mode as the challenge. The bracket circuits use only bracket pulses PF1 and PF2 to produce bracket video. In bracket operation, all aircraft transponders responding to the challenge will be displayed at the indicator regardless of their code settings. Bracket pulses PF1 and PF2 are present in all codes. When the BRACKET-OFF switch on the C-7014/TPX-44 is placed to BRACKET, circuitry within the video amplifier is allowed to produce an output in response to all iff replies containing properly spaced bracket pulses. This output is applied to the video mixer where a 1- $\mu$ sec pulse is produced for presentation on the indicator of the associated radar set.

*ao. Beacon Assist Circuit.* At longer ranges, the 1- $\mu$ sec iff pulses on the ppi indicator may be weak

and difficult to identify, especially when not accompanied by a radar return. The beacon assist function provides a means of stretching the video pulse so that a wider pulse is displayed and will be easily recognized. Also, the beacon assist function provides a distinctive appearance to properly coded replies when operating with the bracket decode function. When the BEACON ASSIST switch on the C-7014/TPX-44 is placed to ON, a 10- $\mu$ sec multivibrator in the video mixer is enabled. When enabled this multivibrator produces a 10- $\mu$ sec output pulse in response to properly decoded iff replies. When used with the bracket function, the bracket video has no effect on the 10-psec multivibrator circuit. This results in a ppi presentation that displays a narrow 1-usec arc for all aircraft responding in the correct mode, and a wide 10- $\mu$ sec arc for aircraft responding in the specific selected code.

*ap. Simulating System.* The simulating system is contained in Simulator, Radar Signal SM-472/TPX-44. A 60-MHz modulator subassembly (chassis series No. 40400) is contained within the SM-472/TPX-44. The appearance of a simulated reply on the associated radar set ppi display depends on a correct (mode 2) code output from the coding system, proper operation of the receiving system, processing of the synchronous simulated reply by the defruiting system, and normal operation of the decoding system. No check is made by the SM-472/TPX-44 of emergency reply or I/P circuits contained in the decoding system. The SM-472/TPX-44 produces a 15-pulse rf wave train corresponding to code 7777, plus one pulse. The extra pulse occurs in the x-time slot (center) in the wave train and has no effect upon the decoding system operation. The rf wave train is applied to the RT-264D/UPX-6.

*aq. Normal Operation.* During normal operation, the TRIG IN switch on the SM-472/TPX-44 is placed to the MODE 2 position. If improper operation of the coding system is suspected, placing the TRIG IN switch to PULSE, will cause a single pulse trigger to be used. The single pulse trigger available at IFF PRE-TRIG connector on Blanker, Interference MX-8795/TPX-41 may be used during the test condition. The function of the SM-472/TPX-44 when TRIG IN switch is placed to MODE 2 for normal operation is described in (1) through (12) below.

(1) The trigger input signal at the TRIGGER IN connector on the SM-472/TPX-44 must be a correctly spaced, mode 2, coded pulse-pair signal before an output can be obtained from the coincidence gate (part of integrated circuit Z2 and Z3). The pulse

inhibit multivibrator (integrated circuit Z1) prevents the second pulse of the coded pulse-pair from retriggering the coincidence gate. The second pulse of the coded pulse pair signal will arrive during an approximate 20-psec period in which the pulse inhibit multivibrator is in the gated state produced by the first pulse of the coded pulse-pair. During this time, the pulse inhibit multivibrator is not sensitive to additional input trigger pulses. The leading edge of the positive gate produced at the output of the pulse inhibit multivibrator triggers the 5-psec multivibrator (part of integrated circuit Z2, switch Q3, and constant-current generator Q4 on the main chassis), and a negative gate is produced.

(2) The negative gate produced at the output of the 5- $\mu$ sec multivibrator is differentiated and the resultant positive pulse corresponding to the trailing edge of the 5- $\mu$ sec gate pulse is applied to the coincidence gate (part of integrated circuit Z2 and Z3).

(3) The coded pulse-pair signal present at the TRIGGER IN connector is coupled to the coincidence gate. The first pulse has no effect, but with a properly spaced, mode 2 code input pulse, the second pulse will arrive at the coincidence gate the same time as the positive pulse corresponding to the trailing edge of the 5- $\mu$ sec gate from the 5- $\mu$ sec multivibrator. At this time, a positive pulse of 1- $\mu$ sec duration will be developed at the output of the coincidence gate, which is connected to the delay multivibrator (integrated circuit Z4, switch Q5, and constant-current generator Q6).

(4) A positive pulse input causes the delay multivibrator to produce a negative output trigger pulse. The position in time of this negative output trigger pulse may be adjusted by the DELAY control between approximately 120 and 240  $\mu$ sec: i.e., adjustment of the range at which the simulated reply will appear on the associated radar set ppi display.

(5) The position in time of the negative output pulse from the delay multivibrator is adjusted by the DELAY control until the output of the 20.3- $\mu$ sec gate multivibrator (integrated circuits Z5, switch Q11, constant-current generator Q12, and emitter-follower Q13) is an adjusted positive gate of 20.3  $\mu$ sec nominal duration. The adjusted positive gate previously positioned by the DELAY control selects the time period during

which the 690-kHz oscillator (consisting of switch Q7 and oscillator Q8) will produce exactly 15 pulses (half-cycles) spaced 1.45  $\mu$ sec apart.

(6) The 690-kHz oscillator is a modified Colpitts oscillator, the operating period of which is limited by the 20.3-psec gate multivibrator ((5) above). The sinusoidal output of the 690-kHz oscillator is connected to emitter-follower Q9, which is biased to permit only the positive half-cycles of the 15-cycle pulse train to pass.

(7) The positive rectified output of emitter-follower Q9 is coupled to inverter Q15, shaper Q14, and driver Q10. During this time, the positive rectified signal is amplified and shaped, resulting in an output from driver Q10 of a coded pulse train of 15 precisely shaped negative pulses.

(8) The negative coded pulse train from driver Q10 is coupled to inverter Q40402 (located on the 60-MHz modulator subassembly). The amplitude of the positive coded pulse train from inverter Q40402 may be adjusted by the OUTPUT LEVEL control on the SM-472/TPX-44 before connection to the diode switch (consisting of switches CR40401 and CR40402, located on the 60-MHz modulator subassembly).

(9) The 60-MHz oscillator (located on the 60-MHz modulator subassembly) is a crystal-controlled, modified Colpitts oscillator using a crystal cut for 60.5556 MHz. The 60.5556-MHz output of the 60-MHz oscillator is coupled to the diode switch.

(10) The diode switch functions as a gate that permits the 60.5556-MHz pulse wave train output signal to pass only during that time in which the 15-pulse code train is present. The amplitude of the pulse wave train is adjusted by the OUTPUT LEVEL control ((8) above).

(11) RF amplifier Q40403 (located on the 60-MHz modulator subassembly) amplifies the 60.5556-MHz rf pulses the amount required to drive the 18-times multiplier (Z6).

(12) The 18-times multiplier consists of a high-pass filter network and step recovery diode, driving a matching section containing tuned lines cut to the eighteenth harmonic of 60.5556-MHz and an impedance-matching output circuit. The output of the step recovery diode is a rectified 60.5556-MHz signal (including many harmonics), which is connected to the

matching section. The rectified 60.5556-MHz output, including harmonics, causes the tuned lines in the matching section to resonate at  $18 \times 60.5556$ -MHz, or 1090-MHz. The resultant 1090-MHz rf pulse train output is connected to the RF OUT connector for application to the receiving system in the RT-264D/UPX-6.

*ar. Single Input Pulse Operation.* When improper operation of the coding system is suspected, the SM-472/TPX-44 may be placed in single input pulse operation by placing the TRIG IN switch to the PULSE position. The operating point of the coincidence gate (part of integrated circuit Z2 and Z3) is changed to permit a single pulse (such as that available at the IFF PRE-TRIG connector on the MX-8795/TPX-41) to be coupled through the coincidence gate. The positive gate output of the coincidence gate triggers the delay multivibrator (integrated circuit Z4, switch Q5, and constant-current generator Q6), producing a negative output pulse.

*as. Component Power Supplies.* The primary source of ac power for the AN/TPX-41 is a 3-phase power generator that is part of the associated landing control central. This generator supplies 117-volt, single-phase, ac power at a frequency of 60 Hz to the power supplies of the AN/TPX-41 components. The following paragraphs (1) through (6) discuss the operation of these power supplies.

(1) *Receiver-Transmitter, Radio RT-264D/UPX-6, power supply.* In normal operation, filament and relay voltages are available immediately after the equipment is connected to the primary power supply (POWER switch placed to ON). Power transformer T101 contains the necessary windings to produce 60 volts dc from bridge rectifier CR101 for most of the relay coils; additional secondary windings furnish 2.5 and 6.3 volts ac for the filaments and heaters of all tubes in the RT-264D/UPX-6. The power control circuit consists of a time-delay relay circuit that permits the filaments of all tubes to heat up to operating temperatures before plate voltage is applied, and an overload circuit that protects the equipment from faults which may cause excessive current in the +3500-volt supply. When a high-voltage current overload occurs in the equipment, the operation of these circuits will either clear the overload by temporarily cutting off power to the plate transformer, or will interrupt plate power completely if the overload is not cleared within a prescribed number of interruptions.

Two similar full-wave rectifiers and filters are provided to furnish +150 and -150 volts, and two additional half-wave rectifiers with associated filters supply +330 and +3500 volts. In operation, a 60-second time delay (regulated by action of the power control circuit) occurs between the instant the POWER switch is placed to ON and the time when plate voltages are available.

(2) *Simulator, Radar Signal SM-472/TPX-44, power supply.* The simulator power supply consists of a full-wave bridge rectifier with two series regulators. One supplies +12 volts bias for transistor circuitry; the other supplies +3 volts bias for the integrated circuit modules.

(3) *Coder-Control KY-97C/TPX, power supply.* The coding system power supply circuit furnishes all plate, filament, bias, and relay voltages required by the coding system. The +160 volt plate supply consists of a full-wave rectifier, using a type 6X4W double-diode tube, and a two-section choke input filter. The -150 volt bias supply consists of a full-wave rectifier, using four selenium rectifiers, and a three-section resistance-capacitance (rc) filter. The relay supply includes a grid-controlled, full-wave rectifier, using a 12AU7 double-triode tube, and a single capacitor for filtering. The no-load voltage (all relays deenergized) is +100 volts; the full-load voltage (two relays energized) is +70 volts.

(4) *Decoder, Video KY-593/TPX-44 power supply.* The power supply for the KY-593/TPX-44 consists of a regulated power supply module and a diode full-wave rectifier. The module produces a regulated +12 volt output which is connected to regulators Q201 and Q202. The output of these regulators is a regulated +6 volts. The full-wave rectifier receives its output from power transformer T201 and produces a +28 volt output.

(5) *Modulator, Pulse MD-638/TPX-41 power supply.* This power supply develops the +250 and -30 volts necessary for operation of the MD-638/TPX-41. These voltages are developed by individual supplies consisting of a diode full-wave rectifier, a filter circuit, and Zener diode shunt regulator. Individual fusing is provided by F1303 and F1302.

(6) *Blanker, Interference MX-8795/TPX-41 power supply.* The MX-8795/TPX-41 power supply consists of two identical regulated power supply modules mounted on the main chassis. The output of one module is wired to provide a positive voltage and the other is wired to provide negative voltage. The positive voltage output is +15 volts and is sent to three Zener diodes that provide +10, +6, and +3.3 volt outputs. The negative voltage output is -15 volts and is sent to two Zener diodes to provide -10 and -6 volt outputs.

#### NOTE

The regulated power modules used in the KY-593/TPX-44 and the MX-8795/TPX-41 have a current limiting feature which protects the module from overloads. If a short or overload condition exists, the voltage will drop and the current will be limited to a safe value. When the overload is removed, the power supply operation will return to normal automatically.

### 5-10. Organizational Troubleshooting Chart

Item No.	Trouble symptom	Probable trouble; checks; and corrective measures
1	RT-264D/UPX-6 POWER indicator lamp fails to light and blower does not operate after POWER switch is placed to ON and 60-sec time delay elapses.	Check power cable for proper mating at POWER IN connector J116. Check POWER fuse F103 (3 ampere) on front panel. Check interlock switch S102 for proper action when chassis is secure in dust cover. Check for proper mating of plug P107 with jack J207 on left side of rf subassembly. Remove P116 from J116 and check for 117 vac between pins A and B of P116; use multimeter AN/USM-223.
2	RT-264D/UPX-6 POWER indicator lamp lights but blower does not operate after POWER switch is placed to ON and 60-sec time delay elapses.	Check thermostat S101 located under main chassis next to fuses F104 and F105. Remove bolding screws and cover plate at front right-side of inner chassis and check wiring to blower motor.
3	RT-264D/UPX-6 blower operates but POWER indicator lamp does not light after POWER switch is placed to ON and 60-second time delay elapses.	Check for defective indicator lamp and replace, if necessary.

<i>Item No.</i>	<i>Trouble symptom</i>	<i>Probable trouble; checks; and corrective measures</i>
4	KY-96C/TPX RT POWER indicator lamp fails to light after RT-264D/UPX-6 POWER switch is placed to ON and 60-second time delay elapses.	Check that- LOCAL-REMOTE switch on KY-97C/TPX is placed to LOCAL position. Check RT POWER indicator lamp. Check interconnecting cable W8801.
5	RT POWER indicator lamp on the C-1271A/TPX-22 fails to light when KY-97C/TPX LOCAL-REMOTE switch is placed to REMOTE.	Check RT POWER indicator lamp on C-1271A/TPX-22 and check connections at connector P404 at rear of KY-97C/TPX and connector P731 on C-1271A/TPX-22.
6	Red POWER indicator lamp on KY-97C/TPX fails to light when POWER switch is placed to ON.	Check power cable for proper mating at POWER IN connector J402 on KY-97C/TPX. Check POWER indicator lamp on front panel. Check 3/4 AMP POWER fuse on front panel.
7	Red POWER indicator lamp on KY-593/TPX-44 fails to light when POWER switch is placed to ON.	Check 117 VAC 1.0 AMP fuse on front panel. Check power cable for proper mating at POWER IN connector J203.
8	Red BIAS ON indicator lamp on MD-638/TPX-41 fails to light when POWER switch is placed to ON.	Check BIAS ON indicator lamp. Check three fuses on front panel. Check power cable for proper mating at J1201. Use AN/USM-223 to check voltages at -30V and +250V testpoints on front panel with respect to CKT COM testpoint. Remove P1210 on rf cable from CP1201 (RF OUT). Use AN/USM-223 to measure between 70 and 1000 ohms from center conductor to outer conductor. If abnormal, trouble is indicated in AS-1796/GPA-119 or in rf cabling to antenna; higher category maintenance is required.
9	Green POWER indicator lamp on MX-8795/TPX-41 fails to light when POWER switch is placed to ON.	Check 117 VAC 1/2 AMP SLO BLO fuse on front panel. Check POWER indicator lamp on front panel. Check power cable W9802 for proper mating at AC POWER connector J31101.
10	With LOCAL-REMOTE switch on KY-97C/TPX placed to LOCAL and CHALLENGE switch placed to ON, CHALLENGE indicator lamp on KY-97C/TPX lights but CHALLENGE indicator lamp on RT-264D/UPX-6 does not light.	Check CHALLENGE indicator lamp on RT-264D/UPX-6.
11	With LOCAL-REMOTE switch on KY-97C/TPX placed to LOCAL and CHALLENGE switch placed to ON, CHALLENGE indicator lamp on RT-264D/UPX-6 lights but CHALLENGE indicator lamp on KY-97C/TPX does not light.	Check CHALLENGE indicator lamp on KY-97C/TPX. Check connectors J102 and J405 for proper mating. <b>Note. Place LOCAL-REMOTE switch on KY-97C/TPX to REMOTE after making checks for item 11.</b>
12	When CHOP switch is placed to ON and PUSH TO CHAL switch on C-1271A/TPX-22 is depressed, simulated iff replies appear on radar ppi but CHALLENGE indicator lamps on RT-264D/UPX-6 and C-1271A/TPX-22 do not light.	Check cables W9002 and W9808 for proper mating. Check PLATE (1-1/2 AMP) and REPLY SUPPLY (3/8 AMP) fuses on the RT-264D/UPX-6. Check tubes V101, V107 through V109, V115, and V116. Also check transmitter operating crystal by substitution.
13	When CHOP switch is placed to ON and PUSH TO CHAL switch on C-1271A/TPX-22 is depressed. CHALLENGE indicator lamps on RT-264D/UPX-6 and C-1271A/TPX-22 do not light and no simulated iff replies appear on radar ppi.	a. Check tee connector CP403 for proper mating at TRIGGER OUT connector J403. Check cable W9804 for proper mating at TRIGGER IN connector J401. Remove power temporarily and check seating of each circuit card assembly in MX-8795/TPX-41. b. On SM-472/TPX-44, place TRIG IN switch to PULSE. (1) If simulated reply is now seen, check tubes V404 and V405 in KY-97C/TPX. (2) If simulated reply is not seen, check power supply tubes V102 through V106, V110, V111, and V114 in RT-264D/UPX-6.

<i>Item No.</i>	<i>Trouble symptom</i>	<i>Probable trouble; checks; and corrective measures</i>
		<p>c. Inside KY-97C/TPX, place EXT TRIGGER-SELF TRIGGER switch to SELF TRIGGER.</p> <p>(1) If CHALLENGE indicators light and simulated iff reply is seen, replace tubes V401 and V402 in KY-97C/TPX.</p> <p>(2) If CHALLENGE indicators do not light and simulated reply is not seen, replace tubes V403, V406, V409 and V410 in KY-97C/TPX.</p>
14	When CHOP switch is placed to ON and PUSH TO CHAL switch on C-1271A/TPX-22 is depressed, CHALLENGE indicator lamps on. RT-264D/UPX-6 and C-1271A/TPX-22 light but no simulated iff replies appear on radar ppi.	<p>a. Check cable W9803 for proper mating to VIDEO OUT connector J103 and IFF VIDEO IN connector J31102. Also check cables W9805 and W9608.</p> <p>b. On KY-593/TPX-44, place OPERATE-TEST switch to TEST.</p> <p>(1) If undecoded simulated reply is seen, remove power temporarily and check seating of each of four circuit card subassemblies in KY-593/TPX-44, and processor subassembly in MX-8795/TPX-41.</p> <p>(2) If simulated iff reply is not seen, unlock and vary RECEIVER GAIN control on C-1271A/TPX-22. Noise generated by RT-264D/UPX-6 should vary intensity of ppi sweep.</p> <p>(3) If ppi sweep intensity does not change, check tubes V301 through V309, detector CR303 (or V310), tubes V110, V112, V113, and V117 in RT-264D/UPX-6.</p> <p>(4) If ppi sweep intensity varies with setting of RECEIVER GAIN control on C-1271A/TPX-22, check tubes V208 and V209 in RT-264D/UPX-6. Check receiver operating crystal by substitution (replace with a good crystal of same operating frequency).</p>
15	CHALLENGE indicator lamps on RT-264D/UPX-6 and C-1271A/PPX-22 light and iff replies from known operating transponders can be obtained but simulated iff replies do not appear on radar ppi when SM-472/TPX-44 is switched into operation.	Check following cables for proper mating at respective connectors: SM-472/TPX-44 cables to J101 (AC OUT) and J2 (on P102), W8802 to CP403 on J403 (TRIGGER OUT) and J4 (TRIGGER IN), W8803 to J3 (RF OUT) and J213 (RF PROBE). Check fuses F104 and F105 on RT-264D/UPX-6. Remove power from SM-472/TPX-44 and check seating of 60-MHz modulator subassembly.
16	CHALLENGE indicator lamps on RT-264D/UPX-6 and C-1271A/TPX-22 light and simulated iff replies can be obtained, but iff replies from known operating transponders cannot be obtained.	Check all coaxial cables and connectors in AS-1796/GPA-119 for proper mating at correct connectors. Check that all mode code controls are properly set.
17	Effects of side- and/or back-lobing are not eliminated by isls when interrogating aircraft is known to have isls capability.	Check that SLS switch on MD-638/TPX-41 is placed to ON. Check cable W9809 for proper mating at connectors J106 and J1208.
18	During interrogation, iff replies do not appear slightly behind and at same azimuth as associated radar return.	Refer to higher category maintenance.



## 5-11. Supplementary Troubleshooting Information

The following procedures (para *a* through *c* below) supplement the organizational troubleshooting chart, paragraph 5-10. These procedures should be used as a means of checking and correcting equipment malfunctions discovered during trouble-shooting procedures as outlined in the organizational troubleshooting chart.

### CAUTION 1

**Do not rock or rotate the top of a miniature tube when removing it from its socket; pull it straight out. Rocking or rotation of the tube causes the pins to bend and may break the weld where the pins enter the glass. A high resistance or intermittent solder joint may also develop.**

### CAUTION 2

**Tubes V205, V206, and V207 in the rf subassembly located in Receiver-Transmitter, Radio RT-264D/UPX-6 are enclosed in tuned cavities. Special precautions must be taken when replacing these tubes. If replacement of tubes V201 through V209 is necessary, the associated stages of the RT-264D/UPX-6 must be retuned. Replacement of these tubes must be done by higher maintenance category repairman.**

### NOTE

**Do not use nonpreferred-type tubes in place of preferred types. For example, do not use a 6AK5 (nonpreferred) to replace a 5654/6AK5W (preferred), or do not use a 6AL5 (nonpreferred) to replace a 5726/6AL5 (preferred). In the rf sub-assembly located in the RT-264D/UPX-6, replace 2C39A type tubes with 2C41 type tubes.**

*a. Tube Checking, Using the Single-Tube Substitution Method.*

(1) Substitute a new tube for one of the suspected original tubes. If the equipment continues to be inoperative, replace the new tube with the original. Similarly, check each original tube suspected, one at a time, until the defective tube is located and the equipment becomes operative. Discard the last original

tube removed from the equipment. **DO NOT LEAVE A NEW TUBE IN A SOCKET IF THE EQUIPMENT OPERATES SATISFACTORILY WITH THE ORIGINAL TUBE.**

(2) If this method of tube substitution does not correct the trouble, try the method described in *b* below.

*b. Tube Checking, Using the Multitube Substitution Method.* Occasionally, two or more tubes are defective at the same time in an equipment. In such cases, new tubes must be installed one at a time until the equipment becomes operative. Proceed as follows:

(1) Remove one of the suspected original tubes. Install a new tube. If the equipment is still inoperative, leave the new tube in place and remove the next suspected original tube. Install another new tube. Mark the original tubes with the socket number from which they were removed. Continue this procedure until the equipment becomes operative. The last original tube removed is defective and should be discarded.

(2) To determine whether another original tube is defective, return one of them to its original socket. If there is no noticeable difference in performance, leave the original tube in the equipment. In the same way, return the remaining original tubes to their sockets, one at a time. If equipment failure occurs, or performance is unsatisfactory, discard the last original tube installed. **DO NOT LEAVE A NEW TUBE IN A SOCKET IF THE EQUIPMENT OPERATES SATISFACTORILY WITH THE ORIGINAL TUBE.**

### NOTE

**If none of the procedures outlined above restore the equipment to normal operation, return the original tubes to their sockets before forwarding the defective item of equipment to a higher category of maintenance for repair.**

*c. Rf Cable Check.* Check rf cables for shorts or opens as follows:

(1) Set AN/USM-223 controls to read ohms.

(2) Disconnect both ends of rf cable to be checked.

(3) Touch one AN/USM-223 probe to connector shell at one end of cable and touch other probe to connector shell at opposite end of cable. AN/USM-223 should indicate 0 ohms.

(4) Touch one AN/USM-223 probe to center pin at one end of cable and touch other probe to center pin at opposite end of cable. AN/USM-223

should indicate 0 ohms.

(5) Touch one AN/USM-223 probe to connector shell at either end of cable and touch other probe to center pin at same end of cable. AN/USM-223 should indicate infinity.

(6) If requirements of steps (3), (4), and (5) above are satisfied, cable is good. Reconnect rf cable.

## Section IV. ADJUSTMENTS, REPAIRS, AND REPLACEMENT

### 5-12. Organizational Maintenance Adjustments

Following paragraphs *a* through *f* below provide references to paragraphs containing adjustment procedures for components of the AN/TPX-41.

*a. Receiver-Transmitter, Radio RT-264D/UPX-6 Adjustments.* Adjustment procedures for the RT-264D/UPX-6 that can be performed by organizational maintenance are contained in paragraph 2-14.

*b. Simulator, Radar Signal SM-472/TPX-44 Adjustments.* Adjustment procedures for the SM-472/TPX-44 that can be performed by organizational maintenance are contained in paragraph 2-15.

*c. Coder-Control KY-97C/TPX Adjustments.* Adjustment procedures for the SM-472/TPX-44 that can be performed by organizational maintenance are contained in paragraph 2-16.

*d. Decoder, Video KY-593/TPX-44 Adjustments.* Adjustment procedures for the KY-593/TPX-44 that can be performed by organizational maintenance are contained in paragraph 2-17.

*e. Blanker, Interference MX-8795/TPX-41 Adjustments.* Adjustment procedures for the MX-8795/TPX-41 that can be performed by organizational maintenance are contained in paragraph 2-18.

*f. Antenna Group AN/GPA-119 Adjustments.* Adjustment procedures for the AN/GPA-119 that can be performed by organizational maintenance are contained in paragraph 2-19.

### Internal Fuse Replacement

Instructions for replacement of front panel fuses in the RT-264D/UPX-6 are contained in paragraph 4-10a. To replace fuses F104 and F105 on the underside of the main chassis (fig. 2-5), follow the procedure in *a* through *f* below.

#### CAUTION

**Turn off all power and remove all cables from the front panel to permit withdrawal of the RT-264D/UPX-6 chassis from its dust cover.**

*a.* Remove dust cover by releasing 4 captive screws on front panel and pulling chassis forward by its handles until chassis is completely removed from dust cover. Locate two fuses on underside of chassis (fig. 2-5).

*b.* Pull defective fuse straight out of holder. Be careful not to disturb internal wiring.

*c.* Align ends of replacement fuse above fuse-holder clips and carefully press fuse into holder. Be careful not to disturb internal wiring.

*d.* Grasp chassis handles and push chassis back into dust cover.

*e.* Secure chassis to dust cover with 4 captive screws.

*f.* Reinstall cables, if previously removed, and restore power.

### 5-13. Receiver-Transmitter, Radio RT-264D/UPX-6

#### 5-14. Replacement of Crystal Diode Assembly CR303 in Receiver-Transmitter Radar RT-264D/UPX-6

Replace crystal diode assembly CR303 (fig. 5-2) as follows:

- a. Release (turn ccw) 4 captive thumb-screws on front panel of RT-264D/UPX-6 and withdraw inner chassis a few inches to reach tube socket X310 on left side.
- b. Release tube shield over crystal diode assembly CR303 by pushing in on shield and turning. Pull off tube shield.
- c. Gently pull defective crystal diode assembly CR303 straight out of tube socket.
- d. Make sure pins on good crystal diode assembly CR303 are straight. Align pins of crystal diode assembly CR303 with holes in tube socket X310.
- e. Gently push assembly straight into tube socket. Be careful not to bend pins on crystal diode assembly.
- f. Place tube shield over assembly, push in on shield, turn, and release when shield locks into place.
- g. Push RT-264D/UPX-6 chassis back into case and secure with 4 captive thumbscrews.

#### 5-15. Component Removal Procedures

Procedures for removing major components of the AN/TPX-41 are contained in paragraphs *a* through *i* below. Before removing any of these components, turn off all power.

#### 5-15. Component Removal Procedures

a. *Receiver-Transmitter, Radar RT-264D/UPX-6, Removal.* Remove the RT-264D/UPX-6 (and attached Simulator, Radar Signal SM-472/TPX-44) as follows:

- (1) Remove all external cables.
  - (2) Release 5 captive screws on front panel.
  - (3) Pull chassis forward by handles until chassis is clear of dust cover.
- b. *Blanker, Interference MX-8795/TPX-41, Removal.* Remove the MX-8795/TPX-41, as follows:

- (1) Remove all external cables.

(2) Release 4 captive thumbscrews on front panel.

(3) Slide chassis forward by handles until chassis is clear of dust cover.

c. *Decoder, Video KY-593/TPX-44, Removal.* Remove the KY-593/TPX-44 as follows:

- (1) Remove all external cables.
- (2) Release 4 captive thumbscrews on front panel.
- (3) Slide chassis forward by handles until chassis clears dust cover.

d. *Modulator, Pulse MD-638/TPX-41, Removal.* Remove the MD-638/TPX-41 as follows:

- (1) Remove all external cables.
- (2) Remove 8 attaching screws, nuts, and washers that secure MD-638/TPX-41 to wall of S-70/G Shelter.
- (3) Remove the MD-638/TPX-41 from shelter wall.

e. *Coder-Control KY-97C/TPX, Removal.* Remove the KY-97C/TPX as follows:

- (1) Remove all external cables.
- (2) Remove 16 attaching screws that secure right-side panel of KY-97C/TPX.
- (3) Remove right-side panel.
- (4) Locate and loosen 4 captive thumbscrews in KY-97C/TPX.
- (5) Remove KY-97C/TPX from mounting base in iff equipment rack.

f. *Control, Remote Switching C-7014/TPX-44, Removal.* Remove the C-7014/TPX-44 as follows:

- (1) Remove all external cables.
- (2) Release 4 captive thumbscrews on front panel.
- (3) Remove C-7014/TPX-44 from mounting bracket located on side of Cabinet, Electrical Equipment CY-2094/FPN-33.

*g. Control, Remote Switching C-1271A/TPX-22, Removal.* Remove the C-1271A/TPX-22 as follows:

- (1) Remove all external cables.
- (2) Remove 4 attaching screws, nuts, lockwashers, and fiat washers that secure C-1271A/TPX-22 to mounting bracket.
- (3) Remove C-1271A/TPX-22 from mounting bracket located on side of Cabinet, Electrical Equipment CY-2094/FPN-33.

*h. Antenna AS-1796/GPA-119, Removal.* Remove the AS-1796/GPA-119 as follows:

- (1) Disconnect cable W21001.
- (2) Disconnect adapter CP21001 at connector E20001.
- (3) Release 4 screws, flat washers and lockwashers that secure AS-1796/GPA-119 to AB-1158/GPA-119.
- (4) Lift AS-1796/GPA-119 from AB-1158/GPA-119.

*i. Pedestal, Antenna AB.1158/GPA-119, Removal.* Remove the AB-1158/GPA-119 as follows:

(1) Disconnect cables W9406 and W9407 from connectors J20003 and 20004 respectively on AB-1158/GPA-119.

(2) Remove attaching screws that secure pedestal clamping ring.

(3) Remove clamping ring,

(4) Lift AB-1158/GPA-119 from mounting fixture.

## 5-16. Component Installation Procedures

Following paragraphs *a* through *c* provide references to paragraphs containing installation procedures for the major components of the AN/TPX-41.

*a. Interrogator Group OA-7487/TPX-41, Installation.* Installation instructions for components of the Interrogator Group OA-7487/TPX-41 are contained in paragraphs 2-7*a* through *k*. Connect cables to the individual components as shown in figure 2-10.

*b. Antenna Group AN/GPA-119, Installation.* Installation instructions for components of the Antenna Group AN/GPA-119 are contained in paragraph 2-8*a* through *b*. Connect cables to the individual components as shown in figure 2-10.

## CHAPTER 6

SHIPMENT, LIMITED STORAGE, AND DEMOLITION  
TO PREVENT ENEMY USE

## Section I. SHIPMENT AND ADMINISTRATIVE STORAGE

**6-1. General**

This section contains instructions covering disassembly and repacking of the AN/TPX-41 for shipment or limited storage. Since the AN/TPX-41 is designed specifically for operation with the Radar System AN/FSQ-84, it is very likely that shipment of the entire AN/TPX-41 will occur only during relocation of the radar system. The S-70/G shelter (part of Radar System AN/FSQ-84) has provisions to accommodate shipment of the AN/TPX-41 with the radar system. The general instructions given in paragraph 6-2 below cover preparation of the AN/TPX-41 for shipment with Radar System AN/FSQ-84. For information regarding equipment positioning and tie-down within the S-70/G shelter, refer to TM 11-5840-345-20. General instructions covering repackaging of the equipment when it is to be shipped independent of the radar system or stored for a limited time are given in paragraph 6-3 below.

**6-2. Preparation for Shipment with Radar System AN/FSQ-84**

Only limited disassembly of Interrogator Set AN/TPX-41 is required for shipment with Radar System AN/FSQ-84. Refer to the instructions given in a through j below for disassembly and packaging of the components to be removed.

- a. Perform AN/TPX-41 stopping procedure (para 3-8).
- b. Remove Decoder, Video KY-593/TPX-44 per paragraph 5-15c.
- c. Remove Control, Remote Switching C-7014/TPX-44 per paragraph 5-15f.

d. Remove Control, Remote Switching C-1271A/TPX-22 per paragraph 5-15g.

e. Pack items removed in *b*, *c* and *d* above in original shipping containers (para 2-1a) and store in S-70/G shelter.

f. Disconnect Cable W9406 from connector J20004 on Pedestal, Antenna AB-1158/GPA-119 and connector J9208 on shelter cable W9207. Wind cable W9406 onto reel provided.

g. Disconnect W9407 from connector J2003 on Pedestal, Antenna AB-1158/GPA-119 and connector J9209 on shelter cable W9208. Wind cable W9407 onto reel provided.

h. Remove Antenna AS-1796/GPA-119 per paragraph 5-15h.

i. Remove Pedestal, Antenna AB-1158/GPA-119 per paragraph 5-15i.

j. Clean items removed in *h* and *i* above as specified in paragraph 4-6a and store in S-70/G shelter as instructed in TM 11-5840-345-20.

**6-3. Repackaging for Shipment or Limited Storage**

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored. For long distance shipping or indefinite storage, the equipment should be packaged in accordance with the original packaging as far as possible with available materials. Refer to listing of preservation, packaging, and packing materials contained in SB 38-100.

## Section II. DEMOLITION TO PREVENT ENEMY USE

### 6-4. Authority for Demolition

Demolition of the equipment will be accomplished only upon order of the commander. Use the destruction procedures outlined in paragraph 6-5 to prevent further use of the equipment.

### 6-5. Methods of Destruction

Any of the methods of destruction given below may be used in most instances when destruction of equipment is undertaken. The tactical situation also will determine how the destruction order will be carried out. However, in most cases, it is essential to demolish completely some portions of the equipment rather than to destroy partially all the equipment units (para 6-6).

*a. Smash.* Smash all tubes, coils, panels, and mechanical linkage.

*b. Cut.* Cut all cables, cords, and wiring (where possible).

#### **WARNING 1**

**The use of small arms fire to destroy the equipment should be avoided. Such fire exposes personnel to danger of ricochets.**

#### **WARNING 2**

**Explosives should be used only on direct order of the officer in charge, under the supervision of personnel thoroughly trained to handle them, and only when extreme urgency demands their use.**

*c. Burn.* Burn all technical manuals, cables, cords, and chassis.

*d. Bend.* Bend indicator panels, subassembly chassis, and main chassis.

*e. Explode.* If time is limited, place small charges of TNT in each component, spill gasoline or fuel

oil under the unit, and ignite.

*f. Disposal.* Scatter or bury parts in foxholes, slit trenches, or other holes, or throw them into streams, swamps, or other bodies of water.

### 6-6. Destruction Priority

*a. Destruction Plan.* If a destruction plan is not provided by higher authority, one should be prepared by the using organization. Personnel should be assigned to specific destruction tasks, so that minimum time will be required if destruction of Interrogator Set AN/TPX-41 becomes necessary. All concerned personnel in the using organization should be familiar with all aspects of the entire destruction plan. The plan must be complete and easily carried out in the field and must provide for destruction as thorough as available time, equipment, and personnel will permit under various circumstances. Because the time required for total destruction may not always be available, the destruction plan must establish priorities, so that essential parts of the equipment will be destroyed in order of their importance. Systematic destruction of some important units of equipments of a given type will prevent the enemy from learning the important features of the equipment and also will insure against the assembly of a complete equipment by the enemy through cannibalization or combination of partially destroyed equipment. Adequate destruction of some units of the equipment should always be accomplished in preference to partial destruction of all the units when lack of time or materials prevent complete destruction of the equipment. The methods of destruction (para 6-5) will also depend on the time allowed for the destruction to be carried out.

*b. Sequence of Destruction.* When a destruction command is given by the commander, destroy the equipment in the following sequence:

(1) All technical manuals and associated literature.

(2) Antenna AS-1796/GPA-119.

(3) Receiver-Transmitter, Radar RT-264D/UPX-6.

(4) Simulator, Radar Signal SM-472/TPX-44.

(5) Decoder, Video KY-593/TPX-44 and control, Remote Switching C-7014/TPX-44.

(6) Coder-Control KY-97C/TPX.

(7) Blanker, Interference MX-8795/TPX-41.

(8) Modulator, Pulse MD-638/TPX-41.

(9) All remaining parts.

#### **6-7. Reporting Destruction**

Report Destruction of the equipment through appropriate command channels.

## APPENDIX A REFERENCES

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The following publications contain information applicable to the operation and organizational maintenance of Interrogator Set AN/TPX-41.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders
DA Pam 310-7	Modification Work Orders
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment used by the Army
TB 746-10	Field Instructions for Painting and Preserving Electronics Command Equipment
TM 11-5840-293-12	Operator and Organizational Maintenance Manual, Radar Set, AN/FPN-40 with Iff Capability)
TM 11-6625-366-15	Operator and Organizational Maintenance Manual, Multimeter TS-3528/U
TM 38-750	The Army Maintenance Management System (TAMMS)



## APPENDIX C.

### MAINTENANCE ALLOCATION

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#### Section I. INTRODUCTION

##### 1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

##### 2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

a. INSPECT. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

b. TEST. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc. This is accomplished with external test equipment and does not include operation of the equipment and operator type tests using internal meters or indicating devices.

c. SERVICE. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

d. ADJUST. To rectify to the extent necessary to bring into proper operating range.

e. ALIGN. To adjust two or more components or assemblies of an electrical or mechanical system so that their functions are properly synchronized. This does not include setting the frequency control knob of radio receivers or transmitters to the desired frequency.

f. CALIBRATE. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

g. INSTALL. To set up for use in an operational environment such as an encampment, site, or vehicle.

h. REPLACE. To replace unserviceable items with serviceable like item.

i. REPAIR. To restore an item to serviceable condition through correction of a specific failure of unserviceable condition. This function includes, but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. OVERHAUL. Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

k. REBUILD. The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

l. SYMBOLS. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

### 3. Explanation of Format

a. Column 1, group number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, functional group. Column 2 lists the noun names of components , assemblies, subassemblies and modules on which maintenance is authorized.

c. Column 3, maintenance functions. Column 3 lists the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

<u>Code</u>	<u>Maintenance Category</u>
C	Operator/Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

d. Column 4, tools and test equipment. Column 4 specifies, by code, those tools and -test equipment required to perform the designated function. The numbers appearing in this column refer to specific tools and test equipment which are identified in Table I.

e. Column 5, Remarks. Self-explanatory.

### 4. Explanation of Format of Table I, Tool and Test Equipment Requirements

The column in Table I, Tool and Test Equipment Requirements are as follows:

a. Tools and Equipment. The numbers in this column coincide with the numbers used in the tools and equipment column of the applicable tool for the maintenance function.

- b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.
- c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.
- d. Federal Stock Number. This column lists the Federal stock number of the specific tool or test equipment.
- e. Tool Number. Not used.

		SECTION II. MAINTENANCE ALLOCATION CHART													
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	c MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS	
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD			
a	b												d	e	
	Interrogator Set AN/TPX-41	C	C  O   F       H		C  O				O		O				Visual Operational Test Operational Adjustment  Preventive Maint.          Component Replacement on cards may be accomplished at F and H level. Printed circuit repair will be accomplished at depot.





		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	c											TOOLS AND EQUIPMENT	REMARKS
		MAINTENANCE FUNCTIONS												
a	b	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	d	e
	Pedestal Antenna AB- (181503-1)	C	O  F  H  D	O	C	F		O	O	F  H	H	D	15,33 33 33 33 16,17,34 34 34  5,9,13,16,17, 18,23,32,34, 47 16,17,32,34 16,17,32,34 5,9,13,16,17, 18,23,32,34, 47	Visual Operational Adjustments     Replace Synchro's and Drive Motor       Depot Facilities



		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	c											TOOLS AND EQUIPMENT	REMARKS
		MAINTENANCE FUNCTIONS												
a	b	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	d	e
	Blanker, Interference MX (Defruiter 181530-1)	C	O  F  H   D	O				O	O	F			15,33 33 33 33 4,8,16,17,18, 19,34 31,34  4,7,8,11,14, 16 thru 20,30, 32,34,39 thru 44,46 16,18,32,34 2,4 thru 12, 14,16 thru 20, 24,28,30,32, 43,44,45 2,4 thru 12, 14,16 thru 20,22,24,26, 28 thru 32,35, 43,44,45 4,7,8,11,14, 16 thru 20,30, 32,34,39 thru 44,46	Visual   



		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
a	b												d	e
	Decoder, Video KY-593/TPX-44	C	O  F  H  D	O   										

		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
a	b												d	e
	Modulator, Pulse MD-638/TPX-41	C	O  F  H  D	O       D		H		O	O		F	H	15,33 33 33 33 16,17,18,19, 27,29,34,43, 46 31,34  7,14,16,17, 18,19,30,34, 43,46,71,72 18,28,32,34, 46 5,6,7,11,16, 17,18,28,30, 31,32,34,43 5,6,7,11,13, 16,17,18,19, 20,28,30,32, 34,43,46,49, 53,60,67,70, 71,72	Visual  

		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
a	b												d	e
	Control Remote Switching C-7014/TPX-44	C	O  F H  D	O				O	O	F	H	D	15,33 33 33 33 3,16,17,34 34 16,17,20,28 32,34,38 16,17,20,32, 34,38 16,17,20,28, 32,34,38	Visual          Depot Facilities
C-13														

		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
a	b												d	e
	Control, Remote Switching C-1271A/TPX-22	C	O  F H D	O				O	O	F	H	D	15,33 33 33 33 17,34 34 14,17,32,34 14,17,32,34 17,32,34	Visual          Depot Facilities







		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	c											TOOLS AND EQUIPMENT	REMARKS
		MAINTENANCE FUNCTIONS												
a	b	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	d	e
	Frequency Converter-Transmitter Sub Assy. MX-1376A/TPX-6	F	F  H  D	F				H	H	D	D	D	4,16,17,18, 34 34 4,5,16,17,18, 32,34 32,34 4,5,16,17,18, 32,34 32,34 32,34	Visual        Depot Facilities Depot Facilities

[illegible]

		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
a	b												d	e
	Directional Coupler CV-340/UPX-6	F	F  H  D	F				H	H	D		D	10,16,17,18, 34 34 10,16,17,18, 23,32,34 32,34 10,16,17,18, 23,32,34 32,34 32,34	Visual          Depot Facilities Depot Facilities Depot Facilities

		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	c											TOOLS AND EQUIPMENT	REMARKS
		MAINTENANCE FUNCTIONS												
a	b	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	d	e
	Cabinet Electrical Equipment CY-2094/FPN-33	C	O  F H  D	O				O	O	F  D	H	D	15,33 33 33 33 16,17,31,34 31,34 16,17,31,32, 34 16,17,32,34 16,17,31,32, 34	Visual         Depot Facilities Depot Facilities

		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
a	b												d	e
	Cable Assemblies Power, Electrical CX-2403/u 20 Ft 3 In. CX-2478/u 18 Ft 3 In.	C	O	O				O	O	F	H	D	15,33 33 15,33 15,33 34 16,17,32	Visual     Depot Facilities
	Cable Assembly, R. F. CC-3144/u 10 Ft.	C	O	O				O	O	F	H	D	15,33 33 15,33 15,33 34 16,17,32	Visual     Depot Facilities

		SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
a	b												d	e
	Box, Interconnecting J- (Power Distribution Box) (181557-1)	C	O F H D					O	F	F	H	D	15,33 33 34 34 34 17,32,34 32,34 17,32,34	Visual       Depot Facilities

TOOLS AND TEST EQUIPMENT REQUIREMENTS				19
TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
1	F	Antenna Assembly AT-197/GR	5985-219-7454	
2	F,H,D	Attenuator, Fixed CN-303/UPM	6625-633-9963	
3	F	Coder-Decoder Group AN/UPA-39	5840-548-7673	
4	F,H,D	Counter, Electronic Digital AN/USM-207	6625-911-6368	
5	H,D	Frequency Meter FR-146/U	6625-966-4183	
6	F,H,D	Generator, Electronic Marker AN/USM-108	6625-987-9564	
7	H,D	Generator, Pulse AN/PPM-1 (2 ea.)	6625-503-0661	
8	F,H,D	Generator Set, Pulse AN/UPM-15A (2 ea.)	6625-682-2581	
9	H,D	Generator, Signal AN/URM-64A	6625-570-5721	
10	F,H,D	Generator, Signal AN/USM-44A	6625-669-4031	
11	H,D	Generator, Signal SG-299/U	6625-808-5584	
12	F,H,D	Generator, Signal TS-452C/U	6625-828-6410	
13	H,D	Indicator, SWR AN/USM-37E	6625-197-6960	
14	H,D	Light Assy, Electrical MX-1292/PAQ	6625-378-5449	
15	0	Multimeter, AN/USM-223	6625-999-7465	
16	F,H,D	Multimeter, Electronic ME-26B/U	6625-360-2493	
17	F,H,D	Multimeter, TS-352B/U	6625-242-5023	
18	F,H,D	Oscilloscope, AN/USM-281A	6625-228-2201	

TOOLS AND TEST EQUIPMENT REQUIREMENTS				20
TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
19	F,H,D	Oscilloscope Subassy MX-2962/USM	6625-856-5064	
20	H,D	Power Supply PP-3135/U (2 ea.)	6625-635-7991	
21	D	Recorder Set, Radiation Pattern, RF AN/GPM-45	6625-752-8352	
22	H,D	Repair Kit, Printed Wiring Board MK-772( )/U	5999-757-7042	
23	H,D	Slotted Line Coaxial, IM-92/U	6625-356-0314	
24	H,D	Spectrum Analyzer AN/UPM-84	6625-557-8262	
25	D	Test Set, Electron Tube TV-2( )/U	6625-669-0263	
26	F,H,D	Test Set, Electron Tube TV-7( )/U	6625-820-0064	
27	F	Test Set, Radar AN/UPM-6B	6625-692-6565	
28	H,D	Test Set, Radar AN/UPM-98A	6625-580-3771	
29	F,H,D	Test Set, Transistor, TS-1836B	6625-168-0954	
30	H,D	Transformer, CN-16B/U	5950-235-2086	
31	F,H,D	Transformer, Power Isolation TF-112/F	5950-646-4451	
32	H,D	Tool Kit, Electronic Equipment TK-100/G	5180-605-0079	
33	O	Tool Kit, Electronic Equipment TK-101/G	5180-064-5178	
34	F,H,D	Tool Kit, Electronic Equipment TK-105/G	5180-610-8177	
35	F,H,D	Tube Socket Adaptor Kit MX-1258/U	6625-301-0815	
36	H,D	Test Fixture for SM-472/TPX-44 ITTG TF 125615	5840-G37-7685	



TOOLS AND TEST EQUIPMENT REQUIREMENTS				21
TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
37	H,D	Test Fixture for KY-593/TPX-44 ITTG TF-122949	5840-G37-7684	
38	H,D	Test Fixture for C-7014/TPX-44 ITTG TF.118647	5840-G37-7683	
39	H,D	Test Fixture for Defruiter ITTG TF 181530	Commercial	
40	H,D	Test Fixture for Processor Card ITTG TF 125600	Commercial	
41	H,D	Test Fixture for Trig/Gate Gen. ITTG TF 125601	Commercial	
42	H,D	Test Fixture for Sync/Multiplier ITTG TF 170114	Commercial	
43	F,H,D	Voltmeter, Electronic, AC ME-30/U	6625-669-0742	
44	H,D	Voltmeter, Differential ME-202/U	6625-050-8686	
45	F,H,D	Wattmeter, AN/URM-98	6625-566-4990	
46	F,H,D	Dummy Load, Electrical, DA-232/U (2 ea)	6625-889-3982	
47	H,D	Dummy Load, Electrical, DA-265/U	5895-069-8820	
48	D	Antenna Parabolic Reflector Scientific Atlanta Model 22-8 with Linear Feed Model 23-1.8	Commercial	
49	D	Attenuator, Coaxial Weinschel Model 50-10 (2 ea)	Commercial	

TOOLS AND TEST EQUIPMENT REQUIREMENTS				22
TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
50	D	Attenuator, Variable Polytechnic R&D Model 1110	Commercial	
51	D	Adapter, Coax to Waveguide Scientific Atlanta Model 11-0.9	Commercial	
52	D	Detector, Crystal Hewlett-Packard 420B (2 ea)	Commercial	
53	D	Detector Mount Polytechnic R&D Model 627AM W/Bolometer Element Model 631C	Commercial	
54	D	Detector, Video Sage Model 1021J	Commercial	
55	D	D.C. Block Sage Model 505 (2 ea)	Commercial	
56	H,D	Termination FXR - 35675-75 (2 ea)		
57	H,D	Adapter UG-606/U		
58	H,D	Attenuator, Weinshel 1-06N	Commercial	
59	D	Directional Coupler Narda 3042-10 (2 ea)	Commercial	
60	D	Filter, Low Pass Hewlett-Packard 360B (2 ea.)	Commercial	
61	D	Frequency Diplexer ITT Gilfillan 115327	Commercial	

TOOLS AND TEST EQUIPMENT REQUIREMENTS				23
TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
62	D	Positioner, Azimuth Over Elevation Scientific Atlanta 5303-1	Commercial	
63	D	Cables Scientific Atlanta 5051-12 (2 ea)	Commercial	
64	D	Positioner Control Scientific Atlanta 4112	Commercial	
65	D	Power Oscillator A. I. L 124C	Commercial	
66	D	Standard Gain Horn Scientific Atlanta 12-0.9	Commercial	
67	D	Sweep Generator Hewlett-Packard 691A	Commercial	
68	D	Coaxial Load Maury 303-2	Commercial	
69	D	Termination, CN-1127/U	5985-754-8813	
70	D	Power Supply (2 ea) Power Design 5015A	Commercial	
71	H,D	Test Fixture for Pulse Generator TF 112312 (ITTG Dwg 7663A, B, C, D)	5840-G37-7679	P/O MD-638/TPX 41
72	H,D	Test Fixture for Processor Pulse Gen. TF 119849 (ITTG Dwg 7664)	5840-G37-7680	P/O MD-638/ TPX-41

TOOLS AND TEST EQUIPMENT REQUIREMENTS				24
TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
73	D	Test Fixture TF 125603 for Video Amp in KY-593/TPX-44		
74	D	Test Fixture TF 125604 for Coincidence Amp in KY-593/TPX-44		
75	D	Test Fixture TF 125605 for Ident Emerg. Gen In KY-593/TPX-44		
76	D	Test Fixture TF 125606 for Video Mixer in KY-593/TPX-44		

## APPENDIX D. ORGANIZATIONAL MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LISTS

### Section I. INTRODUCTION

#### D-1. Scope

This appendix lists repair parts required for the performance of organizational maintenance of the AN/TPX-41.

#### NOTE

**No special tools, test, and support equipment are required.**

#### D-2. General

This Repair Parts List is divided into the following sections:

*a. Prescribed Load Allowance (PLA)- Section II.* A composite listing of the repair parts having quantitative allowances for initial stockage at the organizational level.

*b. Repair Parts - Section III.* A list of repair parts authorized for the performance of maintenance at the organizational level.

*c. Index - Federal Stock Number Cross Reference to Figure and Item or Reference Designation - Section IV.* A list of Federal stock numbers in ascending numerical sequence, cross-referenced to the illustration figure number and reference designation.

*d. Index - Reference Designation Cross Reference to Page Number - Section V.* A list of reference designations cross-referenced to page numbers.

#### D-3. Explanation of Columns

The following provides an explanation of columns in the tabular lists:

*a. Source, Maintenance, and Recoverability Codes (SMR), Column 1:*

(1) Source code indicates the selection

status and source for the listed item. Source codes are:

<b>Code</b>	<b>Explanation</b>
<i>P</i>	Repair parts which are stocked in or supplied from the GSA/DSA, or Army supply system and authorized for use at indicated maintenance categories.
<i>P2</i>	Repair parts which are procured and stocked for insurance purposes because the combat or military essentiality of the end item dictates that a minimum quantity be available in the supply system.
<i>P9</i>	Assigned to items which are NSA design controlled: unique repair parts, special tools, test, measuring and diagnostic equipment, which are stocked and supplied by the Army COMSEC logistic system, and which are not subject to the provisions of AR 380-41.
<i>P10</i>	Assigned to items which are NSA design controlled: special tools, test, measuring and diagnostic equipment for COMSEC support, which are accountable under the provisions of AR 380-41, and which are stocked and supplied by the Army COMSEC logistic system.
<i>M</i>	Repair parts which are not procured or stocked, but are to be manufactured in indicated maintenance levels.
<i>A</i>	Assemblies which are not procured or stocked as such, but are made up of two or more units. Such component units carry individual stock numbers and descriptions, are procured and stocked separately and can be assembled to form the required assembly at indicated maintenance categories.

depot for evaluation and analysis before final disposition.

<b>Code</b>	<b>Explanation</b>
X	Parts and assemblies which are not procured or stocked and the mortality of which normally is below that of the applicable end item or component. The failure of such part or assembly should result in retirement of the end item from the supply system.
X1	Repair parts which are not procured or stocked. The requirement for such items will be filled by use of the next higher assembly or component.
X2	Repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain same through cannibalization. Where such repair parts are not obtainable through cannibalization, requirements will be requisitioned, with accompanying justification, through normal supply channels.
G	Major assemblies that are procured with PEMA funds for initial issue only as exchange assemblies at DSU and GSU level. These assemblies will not be stocked above DS and GS level or returned to depot supply level.

(2) Maintenance code indicates the lowest category of maintenance authorized to install the listed item. The maintenance level codes are:

<b>Code</b>	<b>Explanation</b>
C	Operator/Crew
O	Organizational Maintenance

(3) Recoverability code indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are:

<b>Code</b>	<b>Explanation</b>
R	Repair parts and assemblies that are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.
S	Repair parts and assemblies which are economically repairable at DSU and GSU activities and which normally are furnished by supply on an exchange basis. When items are determined by a GSU to be uneconomically repairable, they will be evacuated to a

<b>Code</b>	<b>Explanation</b>
T	High dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts normally are repaired or overhauled at depot maintenance activities.
U	Repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, or high dollar value reusable casings or castings.

*b. Federal Stock Number, Column 2.* This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

*c. Description, Column 3.* This column indicates the Federal item name and any additional description of the item required. The index number has been included as part of the description to aid in the location of "same as" items. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parentheses.

*d. Unit of Measure (or Unit of Issue), Column 4.* A two character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

*e. Quantity Incorporated in Unit, Column 5.* This column indicates the quantity of the item used in the AN/TPX-41. A "V" appearing in this column in lieu of a quantity indicates that a definite quantity can not be indicated (e.g., shims, spacers, etc.). Subsequent appearances of the same item in the same assembly are indicated by the letters "REF".

*f. 15-Day Organizational Maintenance Allowance, Column 3 of Section II and Column 6 of Section III.*

(1) The allowance columns are divided into four subcolumns. Indicated in each subcolumn opposite the first appearance of each item is the total quantity of items authorized for the number of equipments supported. Subsequent appearances of the same item will have the letters "REF" in the allowance columns. Items authorized for use as required, but not for initial stockage, are identified with an asterisk in the allowance column.

(2) The quantitative allowances for organizational level of maintenance represents one initial prescribed load for a 15-day period for the number of equipments supported. Units and organizations authorized additional prescribed loads will multiply the number of prescribed loads authorized by the quantity of repair parts reflected in the density column applicable to the number of items supported to obtain the total quantity of repair parts authorized.

(3) Organizational units providing maintenance for more than 100 of these equipments shall determine the total quantity of parts required by converting the equipment quantity to a decimal factor by placing a decimal point before the next to last digit of the number to indicate hundredths, and multiplying the decimal factor by the parts quantity authorized in the 51-100 allowance column. Example, authorized allowance for 51-100 equipments is 40; for 150 equipments multiply 40 by 1.50 or 60 parts required.

(4) Subsequent changes to allowances will be limited as follows: No change in the range of items is authorized. If additional items are considered necessary, recommendation should be forwarded to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-M E-NMP-EM, Fort Monmouth, New Jersey 07703, for exception or revision to the allowance list. Revisions to the range of items authorized will be made by the USA ECOM National Maintenance Point based upon engineering experience, demand data, or TAERS information.

*g. Illustrations.* This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration in which the item is shown. Where a circled number appears below the figure number i.e., 2-10, this indicates a part illustration.

(2) *Item number or reference designation.* Indicates the reference designation used to identify the item in the illustration.

#### D-4. Special Information

Repair parts mortality is computed from failure rates derived from experience factors with the individual parts in a variety of equipments. Variations in the specific application and periods of use of electronics equipment, the fragility of electronic piece parts, plus intangible material and quality factors intrinsic to the manufacture of electronic parts, do not permit mortality to be based on hours of end item use. However, long periods of continuous user under adverse conditions are likely to

increase repair parts mortality.

#### D-5. Location of Repair Parts

a. This appendix contains two cross reference indexes (sec IV and V) to be used to locate a repair part when either the Federal stock number or reference designation is known. The first column in each index is prepared in numerical or alphanumeric sequence in ascending order.

b. When the Federal stock number is known, follow the procedures given in (1) and (2) below.

(1) Refer to the index of Federal stock numbers (sec IV) and locate the Federal stock number. The FSN is cross referenced to the applicable figure and reference designation.

(2) When the reference designation is determined, refer to the reference designation index (sec V). The reference designations are listed in alphanumeric ascending order and are cross-referenced to the page number on which they appear in the repair parts list (sec III). Refer to the page number noted in the index and locate the reference designation in the repair parts list (col. 7b). If the description column indicates that it is a "SAME AS" item, locate the first appearance of the item by the index number (sequence number) referenced.

c. When the reference designation is known, follow the procedures given in b(2) above.

d. When neither the FSN nor reference designation is known, identify the part in the illustration and follow directions given in c above or scrutinize column 3 of the repair parts list.

#### D-6. Federal Supply Codes for Manufactures

<i>Code</i>	<i>Explanation</i>
05828	General Instrument Corp.
08664	Bristol Company
71400	Bussmann Mfg.
71785	Cinch Mfg. Co.
72619	Dialight Corp.
75376	Kurzkasch, Inc.
77342	Amf Inc. Potter and Brumfield
80063	Army Electronics Command
80131	Electronic Industries Association
81349	Federal Specifications
96906	Military Standards

## SECTION II. PRESCRIBED LOAD ALLOWANCE

(1) FEDERAL STOCK NUMBER	(2) DESCRIPTION  USABLE ON CODE	(3) 15-DAY ORG. MAINT. ALLOWANCE			
		(a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100
	INTERROGATOR SET AN/TPX-41				
	CABLE ASSEMBLY, RADIO FREQUENCY CG-3663/U 8 FT				1
	CABLE ASSEMBLY, RADIO FREQUENCY CX-3663/U 7 FT				1
	BLANKER, INTERFERENCE MX-8795/TPX-41				
5920-199-9498	FUSE, CARTRIDGE: F02B250V1-2A (81349)	1	2	3	6
5920-284-9220	FUSE, CARTRIDGE: F02B250V1A (81349)		1	1	2
	LAMP, GLOW: MS25252C7A (96906)			1	1
	CODER CONTROL, INTERROGATOR SET KY-97C/TPX				
5920-284-9494	FUSE, CARTRIDGE: F02GR750A (81349)	2	2	3	6
5945-259-1198	RELAY, ARMATURE: SM1112-3 (77342)			1	1
5960-108-0263	ELECTRON TUBE: 6D4 (81349)	3	10	25	47
5960-166-7663	ELECTRON TUBE: 12AU7 (81349)	2	5	13	25
5960-188-6593	ELECTRON TUBE: 5696 (81349)	3	8	21	41
5960-262-0015	SHIELD, ELECTRON TUBE: TS102U01 (81349)			1	1
5960-262-0167	ELECTRON TUBE: 12AT7WA	3	8	20	38
5960-264-3004	SHIELD, ELECTRON TUBE: TS103U02; (81349)			1	1
5960-272-9094	SHIELD, ELECTRON TUBE: TS102U02 (81349)			1	1
5960-272-9182	ELECTRON TUBE: 6X4WA (81349)	7	25	59	114
5960-827-8782	ELECTRON TUBE: 12AX7WA (81349)	2	2	5	10
5960-879-5078	ELECTRON TUBE: 5726/6AL5W (81349)	2	5	12	22
5960-879-5079	ELECTRON TUBE: 6AS6W (80131)	2	3	9	16
6210-299-3893	LENS, INDICATOR LIGHT: 83B-11-2 (72619)				2
6240-155-8706	LAMP, INCANDESCENT: MS15571-2 (96906)	2	4	10	18
	CONTROL, REMOTE SWITCHING C-7014/TPX-44				
6210-023-7029	LENS, INDICATOR LIGHT: GREEN; LC12GT (81349)			1	1
6240-155-7836	LAMP, INCANDESCENT: MS25237-327 (96906)	2	3	9	16
	CONTROL, REMOTE SWITCHING C-1271A/TPX-22				
	NO PARTS AUTHORIZED FOR STOCKAGE				
	DECODER, VIDEO KY-593/TPX-44				
5920-280-8342	FUSE, CARTRIDGE: F02A250V1A (81349)	2	2	3	6



## SECTION II. PRESCRIBED LOAD ALLOWANCE (CONTINUED)

(1) FEDERAL STOCK NUMBER	(2) DESCRIPTION  USABLE ON CODE	(3) 15-DAY ORG. MAINT. ALLOWANCE			
		(a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100
6240-892-4420	LAMP, GLOW: MS25252NE2D (96906)  MODULATOR, PULSE MD-638/TPX-41	1	2	3	6
5920-280-8344	FUSE, CARTRIDGE: F02A250V1-2A (81349)	1	2	3	6
5920-296-0451	FUSE, CARTRIDGE: F02A250V1-8A (81349)  RECEIVER-TRANSMITTER, RADIO RT-264D/UPX-6	1	2	3	6
5305-646-6970	THUMBSCREW: SM-B-78403 (80063)				2
5340-301-4481	MOUNT, RESILIENT: 5220TY (81860)			2	2
5920-010-6652	FUSE, CARTRIDGE: F02G3R00A (81349)	2	2	3	6
5920-280-9328	FUSE, CARTRIDGE: F02D1R50B (81349)	2	2	3	6
5920-296-0679	FUSE, CARTRIDGE: MS90079-3 (96906)	2	2	6	11
5920-518-1790	FUSE, CARTRIDGE: F02GR375A (81349)	2	2	3	6
5935-258-1767	COVER, ELECTRICAL CONNECTOR: SM-B-397860 (80063)				2
5960-114-3834	ELECTRON TUBE: 3E29 (81349)	2	5	12	22
5960-114-4849	ELECTRON TUBE: 2X2A (81349)	2	2	4	8
5960-284-9285	ELECTRON TUBE: 5727/2D21W (81349)	2	4	11	20
5960-543-0219	ELECTRON TUBE: 6AN5WA (81349)  AMPLIFIER, INTERMEDIATE FREQUENCY AM-761A/TPX	2	5	12	22
5960-262-1357	ELECTRON TUBE: 5654/6AK5W (81349)	6	21	48	91
5960-644-5495	RETAINER, ELECTRICAL SHIELD: 1093A-P34-2 (71785)  FREQUENCY CONVERTER-TRANSMITTER SUBASSEMBLY MX- 1376A/UPX-6			2	2
5840-395-9020	SHIELD, ELECTRON TUBE: SM-B-78837 (80063)  SIMULATOR, RADAR SIGNAL AM-472/TPX-44  NO PARTS AUTHORIZED FOR STOCKAGE  POWER ATTENUATOR AND DUMMY LOAD  NO PARTS AUTHORIZED FOR STOCKAGE				2

## SECTION III. REPAIR PARTS FOR ORGANIZATIONAL MAINTENANCE (CONTINUED)

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION  Reference Number and FSCM	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6)				(7)	
					(a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100	(a) FIG NO	(b) ITEM NO
P-O-S		A001 INTERROGATOR SET AN/TPX-41 (This item is nonexpendable)								
P-O-S		A001A CABLE ASSEMBLY, RADIO FREQUENCY CG-3663/U 8FT	EA	3	*	*	*	1	2-10(1)	W9803,W9808, W9809
P-O-S		A001B CABLE ASSEMBLY, RADIO FREQUENCY CX-3663/U 7FT	EA	3	*	*	*	1	2-10(1)	W9804,W9805, W9806
P-O-S		A001C CABLE ASSEMBLY, RADIO FREQUENCY CX-3665/U 7FT	EA	1	*	*	*	*	2-10(1)	W9810
P-O-S		A001E CABLE ASSEMBLY, POWER, ELECTRICAL EX-12557/G 8FT	EA	1	*	*	*	*	2-10(1)	W9801
P-O-S		A001F CABLE ASSEMBLY, POWER, ELECTRICAL CX-12558/G 6FT	EA	1	*	*	*	*	2-10(1)	W9802
P-O-S		A001G CABLE ASSEMBLY, POWER, ELECTRICAL CX-12559/G 6FT	EA	1	*	*	*	*	2-10(1)	W9807
G-O-S		BLANKER, INTERFERENCE MX-8795/TPX-41								
		A002 BLANKER, INTERFERENCE MX-8795/TPX-41 (This item is nonexpendable)	EA	1					3-2	A31100
P-C	5920-199-9498	A003 FUSE, CARTRIDGE: F02B250V1-2A (81349)	EA	1	1	2	3	6	3-2	F31101
P-C	5920-284-9220	A004 FUSE, CARTRIDGE: F02B250V1A (81349)	EA	1	*	1	1	2	3-2	F31102
P-C		A005 LAMP, GLOW: MS25252C7A (96906)	EA	2	*	*	1	1	3-2	DS31101,DS31102
G-O-S	5895-903-0652	A006 CODER CONTROL, INTERROGATOR SET KY-97C/TPX CODER CONTROL, INTERROGATOR SET KY-97C/TPX (This item is nonexpendable)	EA	1					3-3	400
P-O	5935-500-5008	A007 CAP, ELECTRICAL: MS25043-180 (96906)	EA	1	*	*	*	*		MP406
P-O	5960-188-6593	A008 ELECTRON TUBE: 5696 (81349)	EA	2	3	8	21	41	5-3	V404,V405
P-O	5960-879-5079	A009 ELECTRON TUBE: 6AS6W (80131)	EA	1	2	3	9	16	5-3	V401
P-O	5960-108-0263	A010 ELECTRON TUBE: 6D4 (81349)	EA	2	3	10	25	47	5-3	V403,V407
P-O	5960-272-9182	A011 ELECTRON TUBE: 6X4WA (81349)	EA	1	7	25	59	114	5-3	V410
P-O	5960-262-0167	A012 ELECTRON TUBE: 12AT7WA (81349)	EA	2	3	8	20	38	5-3	V402
P-O	5960-166-7663	A013 ELECTRON TUBE: 12AU7 (81349)	EA	1	2	5	13	25	5-3	V409
P-O	5960-827-8782	A014 ELECTRON TUBE: 12AX7WA (81349)	EA	1	2	2	5	10	5-3	V408
P-O	5960-879-5078	A015 ELECTRON TUBE: 5726/6AL5W (81349)	EA	1	2	5	12	22	5-3	V406
P-O	5920-284-9494	A016 FUSE, CARTRIDGE: F02GR750A (81349)	EA	1	2	2	3	6		F401
P-O	5355-667-6840	A017 KNOB: SM-B-78233 (80063)	EA	2	*	*	*	*		MP405,MP407
P-O	6240-155-8706	A018 LAMP, INCANDESCENT: MS15571-2 (96906)	EA	3	2	4	10	18		DS416,DS417,DS418
P-O	6210-643-0683	A019 LENS, INDICATOR LIGHT: 83B-11-1 (72619)	EA	1	*	*	*	*		MP402
P-O	6210-299-3893	A020 LENS, INDICATOR LIGHT: 83B-11-2 (72619)	EA	1	*	*	*	2		MP403
P-O	6210-299-3892	A021 LENS, INDICATOR LIGHT: 83B-11-3 (72619)	EA	1	*	*	*	*		MP404
P-O	5945-259-1198	A022 RELAY, ARMATURE: SM1112-3 (77342)	EA	3	*	*	1	1		K401,K402,K403
P-O	5960-262-0015	A023 SHIELD, ELECTRON TUBE: TS102U01 (81349)	EA	4	*	*	1	1		E401,E404,E405,E406
P-O	5960-272-9094	A024 SHIELD, ELECTRON TUBE: TS102U02 (81349)	EA	5	*	*	1	1		E403,E407,E411 E412,E413
P-O	5960-729-8150	A025 SHIELD, ELECTRON TUBE: TS102U03 (81349)	EA	1	*	*	*	*		E410
P-O	5960-264-3004	A026 SHIELD, ELECTRON TUBE: TS103U02 (81349) CONTROL, REMOTE SWITCHING C-7014/TPX-44	EA	3	*	*	1	1		E402,E408,E409
G-O-S	5895-944-1319	A027 CONTROL, REMOTE SWITCHING C-7014/TPX-44 (This item is nonexpendable)	EA	1					3-5	A40300
P-C	6240-155-7836	A028 LAMP, INCANDESCENT: MS25237-327 (96906)	EA	7	2	3	9	16		DS40301 THRU DS40307
P-O	6210-023-7029	A029 LENS, INDICATOR LIGHT: GREEN: LC12GT (81349)	EA	5	*	*	1	1		MP40301
P-O	6210-023-7030	A030 LENS, INDICATOR LIGHT: RED: LC12RT (81349)	EA	1	*	*	*	*		MP40302
P-O	6210-926-6983	A031 LENS, INDICATOR LIGHT: BLUE: LC12BD (81349)	EA	1	*	*	*	*		MP40303

## SECTION III. REPAIR PARTS FOR ORGANIZATIONAL MAINTENANCE (CONTINUED)

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION  Reference Number and FSCM	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6)				(7)	
					(a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100	(a) FIG NO	(b) ITEM NO
G-O-R	5895-903-0650	A032 CONTROL, REMOTE SWITCHING, C1271A/TPX-22 (This item is nonexpendable)	EA	1					3-4	A700
P-O	5355-668-1548	A033 DIAL, CONTROL: SM-B-78302 (80063)	EA	1	*	*	*	*		1702
P-O	5355-667-6840	A034 KNOB: SAME AS A017	EA	1	REF	REF	REF	REF		1701
P-C	6240-155-8706	A035 LAMP, INCANDESCENT: SAME AS A018	EA	2	REF	REF	REF	REF		E731,E732
P-O	6210-299-3895	A036 LENS, INDICATOR LIGHT: SAME AS A020	EA	1	REF	REF	REF	REF		0706
P-O	6210-299-3892	A037 LENS, INDICATOR LIGHT: SAME AS A021	EA	1	REF	REF	REF	REF		0707
P-O	5120-223-6995	A038 SCREWDRIVER, OFFSET: 8 (08664)	EA	1	*	*	*	*		H725
G-O-R	5840-944-1203	A039 DECODER, VIDEO KY-593/TPX-44 (This item is nonexpendable)	EA	1					3-6	A200
P-C	5920-280-8342	A040 FUSE, CARTRIDGE: F02A250V1A (81349)	EA	1	2	2	3	6	3-6	F201
P-C	6240-892-4420	A041 LAMP, GLOW: MS25252NE2D (96906)	EA	1	1	2	3	6	3-6	DS201
G-O-R	5895-903-0649	A042 MODULATOR, PULSE MD-638/TPX-41 (This item is nonexpendable)	EA	1					3-7	A1200
P-C	5920-199-9498	A043 FUSE, CARTRIDGE: SAME AS A003	EA	1	REF	REF	REF	REF		F1301
P-C	5920-296-0451	A044 FUSE, CARTRIDGE: F02A250VA-8A (81349)	EA	1	1	2	3	6		F1302
P-C	5920-280-8344	A045 FUSE, CARTRIDGE: F02A250V1-2A (81349)	EA	1	1	2	3	6		F1303
P-C	6240-892-4420	A046 LAMP, GLOW: SAME AS A041	EA	1	REF	REF	REF	REF		DS1301
G-O-S	5895-378-4911	A047 RECEIVER-TRANSMITTER, RADIO RT-264D/UPX-6 (This item is nonexpendable)	EA	1					3-8	100
P-O	5920-503-1783	A048 CAP, ELECTRICAL: HKP-R (71400)	EA	3	*	*	*	*		
P-O	5935-258-1767	A049 COVER, ELECTRICAL CONNECTOR: SM-B-397860 (80063)	EA	3	*	*	*	2		H108,H109,H110
P-O	5935-189-4908	A050 COVER, ELECTRICAL CONNECTOR: MS25043-22 (96906)	EA	1	*	*	*	*		H107
P-O	5960-114-4849	A051 ELECTRON TUBE: 2X2A (81349)	EA	1	2	2	4	8	5-2	V101
P-O	5960-114-3834	A052 ELECTRON TUBE: 3E29 (81349)	EA	1	2	5	12	22	5-2	V107
P-O	5960-543-0219	A053 ELECTRON TUBE: 6AN5WA (81349)	EA	1	2	5	12	22	5-2	V108
P-O	5960-108-0263	A054 ELECTRON TUBE: SAME AS A010	EA	3	REF	REF	REF	REF	5-2	V111,V114,V116
P-O	5960-272-9182	A055 ELECTRON TUBE: SAME AS A011	EA	5	REF	REF	REF	REF	5-2	V102 THRU V106
P-O	5960-262-0167	A056 ELECTRON TUBE: SAME AS A012	EA	3	REF	REF	REF	REF	5-2	V109,V113,V117
P-O	5960-166-7663	A057 ELECTRON TUBE: SAME AS A013	EA	1	REF	REF	REF	REF	5-2	V115
P-O	5960-879-5078	A058 ELECTRON TUBE: SAME AS A015	EA	1	REF	REF	REF	REF	5-2	V110
P-O	5960-284-9285	A059 ELECTRON TUBE: 5727/2D21W (81349)	EA	1	2	4	11	20	5-2	V112
P-O	4130-174-0011	A060 FILTER, AIR CONDITIONING: SM-B-78478 (80063)	EA	1	*	*	*	*		MP112
P-C	5920-280-9328	A061 FUSE, CARTRIDGE: F02D1R50B (81349)	EA	1	2	2	3	6		F101
P-C	5920-518-1790	A062 FUSE, CARTRIDGE: F02GR375A (81349)	EA	1	2	2	3	6		F102
P-C	5920-010-6652	A063 FUSE, CARTRIDGE: F02G3R00A (81349)	EA	1	2	2	3	6		F103
P-C	5920-296-0679	A064 FUSE, CARTRIDGE: MS90079-3 (96906)	EA	2	2	2	6	11	2-5	F104,F105
P-C	6240-155-8706	A065 LAMP, INCANDESCENT: SAME AS A018	EA	2	REF	REF	REF	REF		E120,E121
P-O	6210-643-0683	A066 LENS, INDICATOR LIGHT: SAME AS A019	EA	1	REF	REF	REF	REF		MP111
P-O	6210-299-3893	A067 LENS, INDICATOR LIGHT: SAME AS A020	EA	2	REF	REF	REF	REF		MP110

## SECTION III. REPAIR PARTS FOR ORGANIZATIONAL MAINTENANCE (CONTINUED)

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION  Reference Number and FSCM		(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6)				(7)	
						(a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100	(a) FIG NO	(b) ITEM NO
P-O	5340-301-4481	A068	MOUNT, RESILIENT: 5220TY (81860)	EA	6	*	*	2	2		A112
P-O	5945-259-1198	A069	RELAY, ARMATURE: SAME AS A022	EA	3	REF	REF	REF	REF	5-2	K151,K153,K154
P-O	5945-636-5388	A070	RELAY, ARMATURE: SM-B-78491 (80063)	EA	1	*	*	*	*	5-2	K156
P-O	5945-642-5318	A071	RELAY, THERMAL: 115N060T (70563)	EA	1	*	*	*	*	5-2	K157
P-O	5960-273-2451	A072	RETAINER, ELECTRON TUBE: SM-C-209541-5 (80063)	EA	1	*	*	*	*		MP101
P-O	5960-378-3261	A073	RETAINER, ELECTRON TUBE: 5 (97983)	EA	1	*	*	*	*		MP102
P-O	5960-262-0015	A074	SHIELD, ELECTRON TUBE: SAME AS A023	EA	2	REF	REF	REF	REF		E110,E161
P-O	5960-272-9094	A075	SHIELD, ELECTRON TUBE: SAME AS A024	EA	8	REF	REF	REF	REF		E108,E111,E112, E114,E116,E151, E153,E154
P-O	5960-729-8150	A076	SHIELD, ELECTRON TUBE: SAME AS A025	EA	5	REF	REF	REF	REF		E102 THRU E106
P-O	5960-264-3004	A077	SHIELD, ELECTRON TUBE: SAME AS A026	EA	4	REF	REF	REF	REF		E109,E113,E115, E117
P-O	5960-284-4352	A078	SHIELD, ELECTRON TUBE: TS103U03 (81349)	EA	1	*	*	*	*		E157
P-O	5305-639-2752	A079	SCREW, MACHINE: SC-B-20578 (80063)	EA	4	*	*	*	*		H102
P-O	5305-646-6970	A080	THUMBSCREW: SM-B-78403 (80063)	EA	4	*	*	*	2		H104
P-O	5305-301-4631	A081	THUMBSCREW: SM-B-78487 (80063)	EA	2	*	*	*	*		H105
P-O	5305-531-1464	A082	THUMBSCREW: SM-B-78636 (80063)	EA	2	*	*	*	*		H103
G-O-S	5895-543-1566	A083	AMPLIFIER, INTERMEDIATE FREQUENCY AM-761A/TPX (This item is nonexpendable)	EA	1						
P-O	5960-262-1357	A084	ELECTRON TUBE: 5654/6AK5W (81349)	EA	9	6	21	48	91	5-2	V301 THRU V309
P-O	5960-879-5078	A085	ELECTRON TUBE: SAME AS A015	EA	1	REF	REF	REF	REF	5-2	V310
P-O	5960-644-5495	A086	RETAINER, ELECTRICAL SHIELD: 1093A-P34-2 (71785)	EA	10	*	*	2	2		A301 THRU A310
P-O	5961-372-3406	A087	SEMICONDUCTOR DEVICE, DIODE: SM-B-78931 (80063)	EA	1	*	*	*	*	5-2	CR303
P-O	5960-262-0015	A088	SHIELD, ELECTRON TUBE: SAME AS A023	EA	10	REF	REF	REF	REF		E301 THRU E310
G-O-S	5895-355-8516	A089	FREQUENCY CONVERTER-TRANSMITTER SUBASSEMBLY MX-1376A/UPX-6 (This item is nonexpendable)	EA	1						A200
P-O	5840-392-9112	A090	ADAPTER, CONNECTOR: SM-B-78772 (80063)	EA	1	*	*	*	*		E210
P-O	5955-667-3072	A091	CRYSTAL UNIT CR-23/U OR	EA	1	*	*	*	*		Y201B
P-O	5955-667-3071	A092	CRYSTAL UNIT CR-23/U	EA	1	*	*	*	*		Y201B
P-O	5955-889-4032	A093	CRYSTAL UNIT CR-52A/U OR	EA	1	*	*	*	*		Y202B
P-O	5955-709-4328	A094	CRYSTAL UNIT CR-52A/U	EA	1	*	*	*	*		Y202B
P-O	5840-395-9020	A095	SHIELD, ELECTRON TUBE: SM-B-78837 (80063)	EA	3	*	*	*	2		MP206,MP230,MP231
P-O	5960-262-0015	A096	SHIELD, ELECTRON TUBE: SAME AS A023	EA	2	REF	REF	REF	REF		E202,E209
P-O	5960-264-3004	A097	SHIELD, ELECTRON TUBE: SAME AS A026	EA	4	REF	REF	REF	REF		E201,E203,E204,E208
G-O-S	6625-906-3344	A098	SIMULATOR, RADAR SIGNAL SM-472/TPX-44 (This item is nonexpendable)	EA	1					3-9	A40500
P-O	5355-850-9799	A099	KNOB: MS91528-0N1B (96906) POWER ATTENUATOR AND DUMMY LOAD	EA	2	*	*	*	*		MP40515,MP40516
P-C	5905-322-4715	A100	POWER ATTENUATOR AND DUMMY LOAD	EA	1	*	*	*	*	3-8	
P-O	5895-699-0371	A101	CHAIN READ: A-3750-4-11 (05828)	EA	1	*	*	*	*		H505

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FEDERAL STOCK NUMBER	FIGURE NUMBER	ITEM NUMBER OF REF. DESIGNATION	FEDERAL STOCK NUMBER	FIGURE NUMBER	ITEM NUMBER OF REF. DESIGNATION
4130-174-0011		MP112	5955-709-4328		Y202B
5120-223-6995		H725	5955-889-4032		Y202B
5305-301-4631		H105	5960-108-0263	5-2	V111
5305-531-1464		H103	5960-108-0263	5-2	V114
5305-639-2752		H102	5960-108-0263	5-2	V116
5305-646-6970		H104	5960-108-0263	5-3	V403
5340-301-4481		A112	5360-108-0263	5-3	V407
5355-667-6840		MP405	5960-114-3834	5-2	V107
5355-667-6840		MP407	5960-114-4849	5-2	V101
5355-668-1548		I702	5960-166-7663	5-2	V115
5355-850-9799		MP40515	5960-166-7663	5-3	V409
5355-850-9799		MP40516	5960-188-6593	5-3	V404
5840-392-9112		E210	5960-188-6593	5-3	V405
5840-395-9020		MP206	5960-262-0015		E110
5840-395-9020		MP230	5960-262-0015		E161
5840-395-9020		MP231	5960-262-0015		E202
5840-944-1203	3-6	A200	5960-262-0015		E209
5895-355-8516		A200	5960-262-0015		E301
5895-378-4911	3-8	100	5960-262-0015		E302
5895-699-0371		H505	5960-262-0015		E303
5895-903-0649	3-7	A1200	5960-262-0015		E304
5895-903-0650	3-4	A700	5960-262-0015		E305
5895-903-0652	3-3	400	5960-262-0015		E306
5895-944-1319	3-5	A40300	5960-262-0015		E307
5920-010-6652		F103	5960-262-0015		E308
5920-199-9498		F1301	5960-262-0015		E309
5920-199-9498	3-2	F31101	5960-262-0015		E310
5920-280-8342	3-6	F201	5960-262-0015		E401
5920-280-8344		F1303	5960-262-0015		E404
5920-280-9328		F101	5960-262-0015		E405
5920-284-9220	3-2	F31102	5960-262-0015		E406
5920-284-9494		F401	5960-262-0167	5-2	V109
5920-296-0451		F1302	5960-262-0167	5-2	V113
5920-296-0679	2-5	F104	5960-262-0167	5-2	V117
5920-296-0679	2-5	F105	5960-262-0167	5-3	V402
5920-503-1783			5960-262-1357	5-2	V301
5920-518-1790		F102	5960-262-1357	5-2	V302
5935-189-4908		H107	5960-262-1357	5-2	V303
5935-258-1767		H108	5960-262-1357	5-2	V304
5935-258-1767		H109	5960-262-1357	5-2	V305
5935-258-1767		H110	5960-262-1357	5-2	V306
5935-500-5008		MP406	5960-262-1357	5-2	V307
5945-259-1198	5-2	K151	5960-262-1357	5-2	V308
5945-259-1198	5-2	K153	5960-262-1357	5-2	V309
5945-259-1198	5-2	K154	5960-264-3004		E109
5945-259-1198		K401	5960-264-3004		E113
5945-259-1198		K402	5960-264-3004		E115
5945-259-1198		K403	5960-264-3004		E117
5945-636-5388	5-2	K156	5960-264-3004		E201
5945-642-5318	5-2	K157	5960-264-3004		E203
5955-667-3071		Y201B	5960-264-3004		E204
5955-667-3072		Y201B	5960-264-3004		E208

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5960-264-3004		E402	6210-299-3892		0707
5960-264-3004		E408	6210-299-3893		MP110
5960-264-3004		E409	6210-299-3893		MP403
5960-272-9094		E108	6210-299-3893		0706
5960-272-9094		E111	6210-643-0683		MP111
5960-272-9094		E112	6210-643-0683		MP402
5960-272-9094		E114	6210-926-6983		MP40303
5960-272-9094		E116	6240-155-7836		DS40301
5960-272-9094		E151	6240-155-7836		DS40302
5960-272-9094		E153	6240-155-7836		DS40303
5960-272-9094		E154	6240-155-7836		DS40304
5960-272-9094		E403	6240-155-7836		DS40305
5960-272-9094		E407	6240-155-7836		DS40306
5960-272-9094		E411	6240-155-7836		DS40307
5960-272-9094		E412	6240-155-8706		DS416
5960-272-9094		E413	6240-155-8706		DS417
5960-272-9182	5-2	V102	6240-155-8706		DS418
5660-272-9182	5-2	V103	6240-155-8706		E120
5960-272-9182	5-2	V104	6240-155-8706		E121
5960-272-9182	5-2	V105	6240-155-8706		E731
5960-272-9182	5-2	V106	6240-155-8706		E732
5960-272-9182	5-3	V410	6240-892-4420	3-6	DS201
5960-273-2451		MP101	6240-892-4420		DS1301
5960-284-4352		E157	6625-906-3344	3-9	A40500
5960-284-9285	5-2	V112			
5960-378-3261		MP102			
5960-543-0219	5-2	V108			
5960-729-8150		E102			
5960-729-8150		E103			
5960-729-8150		E104			
5960-729-8150		E105			
5960-729-8150		E106			
5960-729-8150		E410			
5960-827-8782	5-3	V408			
5960-644-5495		A301			
5960-644-5495		A302			
5960-644-5495		A303			
5960-644-5495		A304			
5960-644-5495		A305			
5960-644-5495		A306			
5960-644-5495		A307			
5960-644-5495		A308			
5960-644-5495		A309			
5960-644-5495		A310			
5960-879-5078	5-2	V110			
5960-879-5078	5-2	V310			
5960-879-5078	5-3	V406			
5960-879-5079	5-3	V401			
6210-023-7029		MP40301			
5961-372-3406	5-2	CR303			
6210-023-7030		MP40302			
6210-299-3892		MP404			

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A302	D-9	E202	D-9	H725	D-8
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A304	D-9	E204	D-9	K151	D-9
A305	D-9	E208	D-9	K153	D-9
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A310	D-9	E303	D-9	K402	D-7
A700	D-8	E304	D-9	K403	D-7
A1200	D-8	E305	D-9	MP101	D-9
A31100	D-7	E306	D-9	MP102	D-9
A40300	D-7	E307	D-9	MP110	D-8
A40500	D-9	E308	D-9	MP111	D-8
CR303	D-9	E309	D-9	MP112	D-8
DS201	D-8	E310	D-9	MP206	D-9
DS416	D-7	E401	D-7	MP230	D-9
DS417	D-7	E402	D-7	MP231	D-9
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DS1301	D-8	E404	D-7	MP403	D-7
DS31101	D-7	E405	D-7	MP404	D-7
DS31102	D-7	E406	D-7	MP405	D-7
DS40301	D-7	E407	D-7	MP406	D-7
DS40302	D-7	E408	D-7	MP407	D-7
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E110	D-9	F201	D-8	V108	D-8
E111	D-9	F401	D-7	V109	D-8
E112	D-9	F1301	D-8	V110	D-8
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E114	D-9	F1303	D-8	V112	D-8
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V409	D-7				
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ARNG None  
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For explanation of abbreviations used, see AR 310-50.

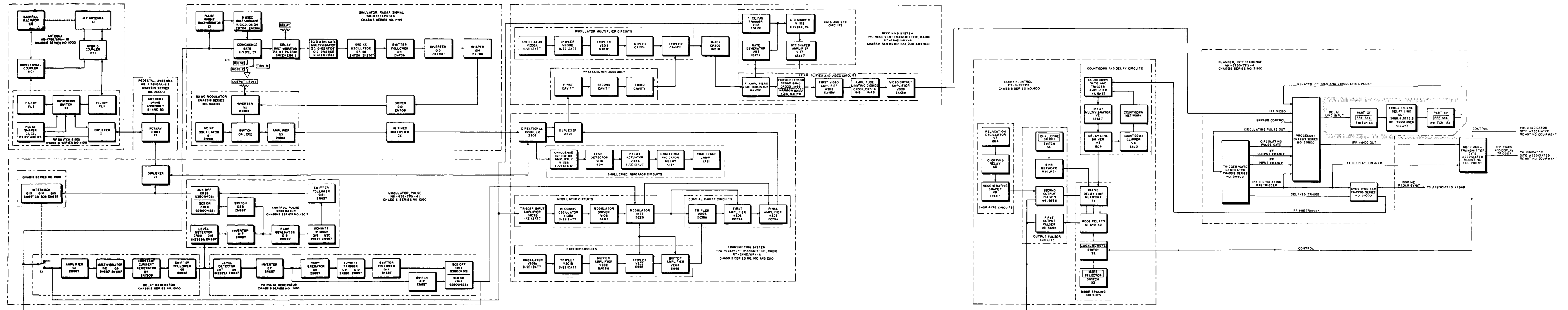


Figure FO-1(1). Interrogator Set AN/TPX-41 troubleshooting block diagram (sheet 1 of 2).

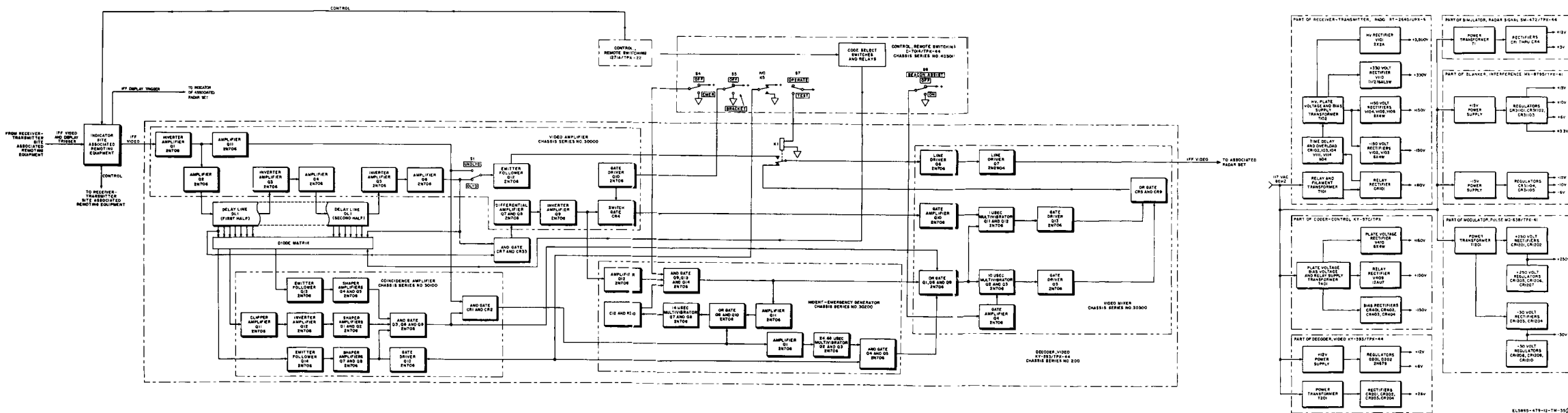


Figure FO-1(2). Interrogator Set AN/TPX-41 troubleshooting block diagram (sheet 2 of 2).

FO-1 (2) Interrogator Set AN/TPX-41 troubleshooting block diagram (sheet 2 of 2)

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