OPERATION AND MAINTENANCE
HOT STANDBY
DR 6/11-135A AND 135EC
TWT AMPLIFIER
REPLACEMENT PROCEDURES
RADIO TRANSMITTER

CONTENTS PAGE

This practice is reissued to add RF Switch Network Replacement information. The practice is used in binders 421-105-001, 421-105-001AC, 421-105-003AC, 421-105-090, 421-106-001, 421-106-001AC, 421-106-003AC, and 421-106-030.

This section is used to replace units in the radio transmitter. Any tests, adjustments, or operating requirements necessary after replacement are ***not*** provided in the replacement procedures. To determine if any action after replacement is required, return to the alarm-clearing procedure that called for the unit replacement. To replace the transmitter IF shelf, the transmitter waveguide assembly units, or the backplane pin connectors, refer to the Maintenance Support document.

Each procedure lists the recommended test equipment and accessories. Each piece of equipment is keyed with an item number (e.g., Item A1) that corresponds to an item number in Table A, B, or C under the "Test Equipment and Accessories" tab.

ADMONISHMENTS

Admonishments are strategically-placed reminders to assure safety of personnel *(DANGER),* to minimize service interruptions *(Caution),* and to prevent equipment damage *(Warning).* The technician should read and become familiar with the "Admonishments" section in the "Maintenance" tab.

SERVICE PROTECTION

Service protection is necessary before performing most procedures in this section. The preface information for each procedure contains the following:

Note: THIS IS AN IN-SERVICE PROCEDURE.

OR

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

The *Note* indicates that the procedure can be performed on a working radio transmitter without performing any service protection operations. The ***Caution*** indicates that manual service protection operations ***must*** be performed to avoid interrupting service. Generally, service on the regular channel under repair ***must*** be manually switched to standby to prevent service interruptions. If the standby channel is under repair, it ***must*** be manually locked out to prevent the regular channel from switching to it during the procedure.

If necessary, refer to the "Service Protection" tab and/or the "Operations" tab to perform or verify proper service protection.

Warning: To prevent ESD (electrostatic discharge) damage to a plug-in unit, ensure that all ESD precautions are followed when removing, replacing, handling, and storing circuit packs.

IF PREDISTORTER REPLACEMENT

This procedure is used to replace the IF PREDISTORTER unit.

No special tools are required to perform this procedure.

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

Warning: To prevent ESD damage to a plug-in unit, ensure that all ESD precautions are followed.

STEP	PROCEDURE
1	Verify that service is protected.
2	Obtain a replacement unit with the same unit code.
3	*Connect the ESD wrist strap to the ESD jack on the radio frame.*
4	Remove IF IN and IF OUT cable (each equipped with locking-type SMB connector) from unit faceplate.
5	On the unit to be removed, simultaneously release the latch catch and pull the lever forward. Pull the lever down until the unit is released from the backplane connector.
6	Hold the unit at the top and bottom; slide it out of the shelf. Place the unit in an ESD protective container.
7	On the left side of the replacement unit, set the slide switch to the same position (A or B) as the unit removed (Table A).
8	On the replacement unit, release the latch catch and pull the lever forward.
9	***Warning: Misalignment of the plug-in unit in the shelf guides will cause backplane connector damage.*** Carefully align the replacement unit in the top and bottom shelf guides.
10	Slide the replacement unit into the shelf until the bottom of the lever clears the front of the shelf.
11	Seat the plug-in by simultaneously pushing up on the lever and applying light pressure to the top of the unit. Ensure that the latch catch has engaged the lever.
12	Reconnect IF IN and IF OUT cable to unit faceplate.
13	This procedure is complete. Return to the instruction that referenced this procedure.

TABLE A

IF PREDISTORTER SWITCH SETTINGS

SWITCH POSITION	FREQUENCY CODE (NOTE)	
	6 GHZ	11 GHZ
A	J AJ K AK L AL M AM N AN P AP R AR S AS T	DE EA JD PB DF EB JE PC DG EC JF PD DH ED JG PE DJ EE JH PF DK EF JJ PG DL EG JK PH DM EH JL PJ EJ PK EK PL EL PM
B	AA B AB C AC D AD E AE F AF G AG H AH	DB JA DC JB DD JC

Note:

The frequency code is stamped on the latch plate of the TRANSMITTER UP-CONV & MWV GEN unit.

TRANSMITTER UP-CONVERTER AND MICROWAVE GENERATOR REPLACEMENT

This procedure is used to replace the TRANSMITTER UP-CONV & MWV GEN unit.

The following tools are required to perform this procedure:

1 - Combination wrench, 1/4" (Item C2)

1 - Torque wrench, SMA-type (Item C4)

1 - Screwdriver, 3" (Item C7).

For tool specifications and recommendations, see "Test Equipment and Accessories" under the "Tests and Adjustments" tab.

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

Warning: To prevent ESD damage to a plug-in unit, ensure that all ESD precautions are followed.

Warning: The SMA connectors should be properly torqued to prevent damage to the connectors. It is also recommended that both hands be used when removing/installing a semirigid cable.

STEP	PROCEDURE
1	Verify that service is protected.
2	Obtain a replacement TRANSMITTER UP-CONV & MWV GEN unit with the same code as the unit being replaced.
3	On the unit faceplate, disconnect the IF IN cable (equipped with locking-type SMB connector).
4	Remove the semirigid cable between the unit (RF OUT) and the transmitter amplifier assembly (RF FL IN).
5	*Connect the ESD wrist strap to the ESD jack on the radio frame.*
6	On the unit to be removed, simultaneously release the latch catch and pull the lever forward. Pull the lever down until the unit is released from the backplane connector.
7	Hold the unit at the top and bottom, and slide it out of the shelf. Place the unit in an ESD protective container.
8	If the replacement unit already has a microwave generator module installed, go to Step 9. If not, go to Step 13.
9	Check the unit code on the new microwave generator module. If the code is the same as the one being replaced, go to Step 17. If not, go to Step 10.

STEP	PROCEDURE
	MWV GEN Removal
10	Remove the power connector for the microwave generator module from plug P1 on the printed circuit board (Fig. 1 for 6 GHz or Fig. 2 for 11 GHz).
11	Remove the screws (two) holding the microwave generator module in place.
12	Disconnect the microwave generator module (RF OUT) from the semirigid cable (equipped with SMA connector) and set module aside. ***Note:*** Hold the connector on the cable with a 1/4" wrench to prevent twisting of the cable.
	MWV GEN Installation
13	Install the new microwave generator module without inserting the mounting screws.
14	Plug the power connector into P1 on the printed circuit board (Fig. 1 or 2).
15	Connect the semirigid cable to the microwave generator module (RF OUT). Torque the connector. ***Note:*** Hold the connector on the cable with a 1/4" wrench to prevent twisting of the cable.
16	Install the two mounting screws previously removed (Fig. 1 or 2).
	Plug-In Unit Installation
17	On the replacement unit, release the catch and pull the lever forward.
18	***Warning: Misalignment of the plug-in unit in the shelf guides will cause backplane connector damage.*** Carefully align the replacement unit in the top and bottom shelf guides.
19	Slide the replacement unit into the shelf until the bottom of the lever clears the front of the shelf.
20	Seat the plug-in by pushing up on the lever and simultaneously applying light pressure to the top of the unit. Ensure that the latch catch has engaged the lever.
21	Apply the correct latch label to the unit latch if a new microwave generator module was installed.
22	Reconnect IF IN cable to unit faceplate.
23	If applicable, refer to the trouble isolation instruction that referenced this procedure to see if additional testing is required.

STEP	PROCEDURE
24	Reconnect the semirigid cable between the unit (RF OUT) and transmitter amplifier assembly (RF FL IN). Torque both connectors.
25	This procedure is complete. Return to the instruction that referenced this procedure.

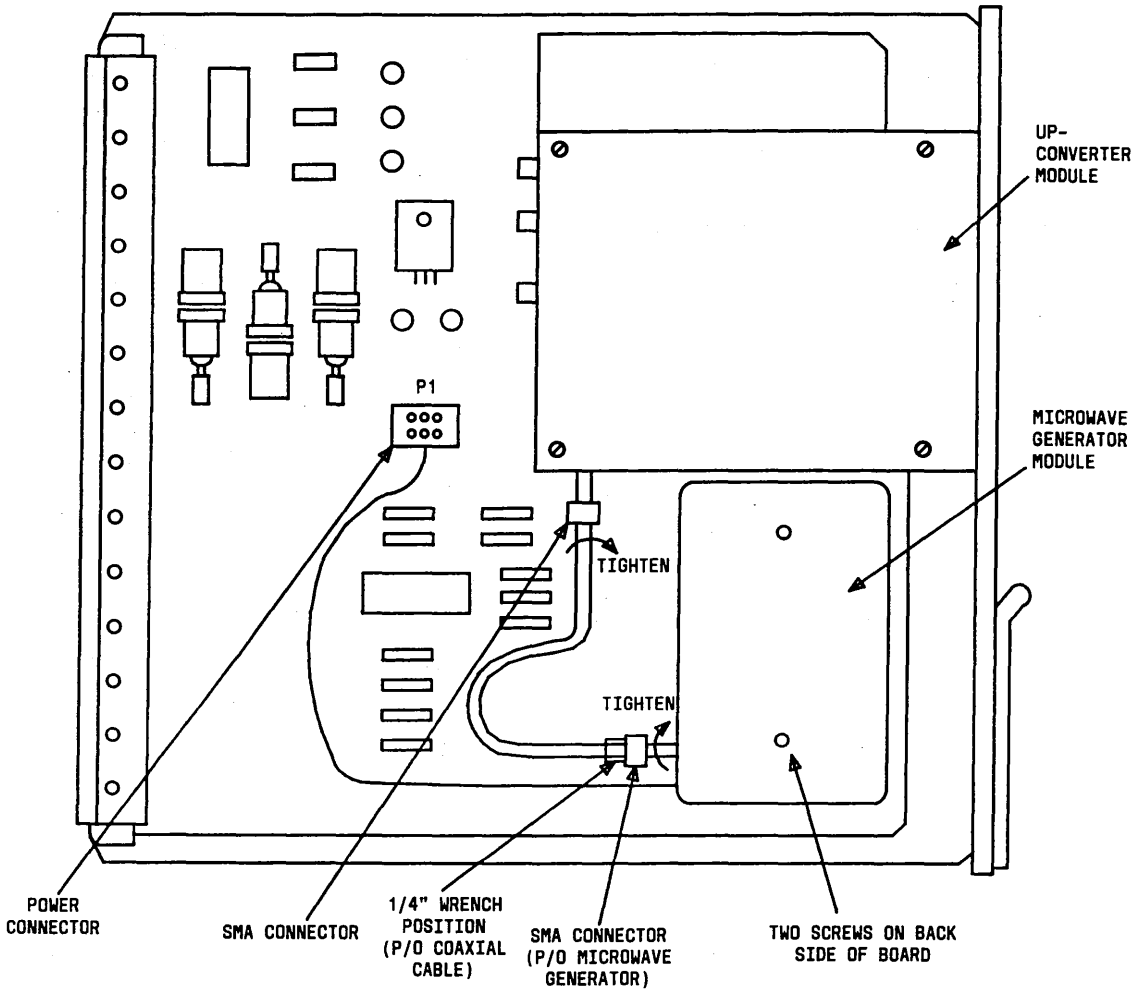

Fig. 1—Replacement of Transmitter Microwave Generator Module (6 GHz)

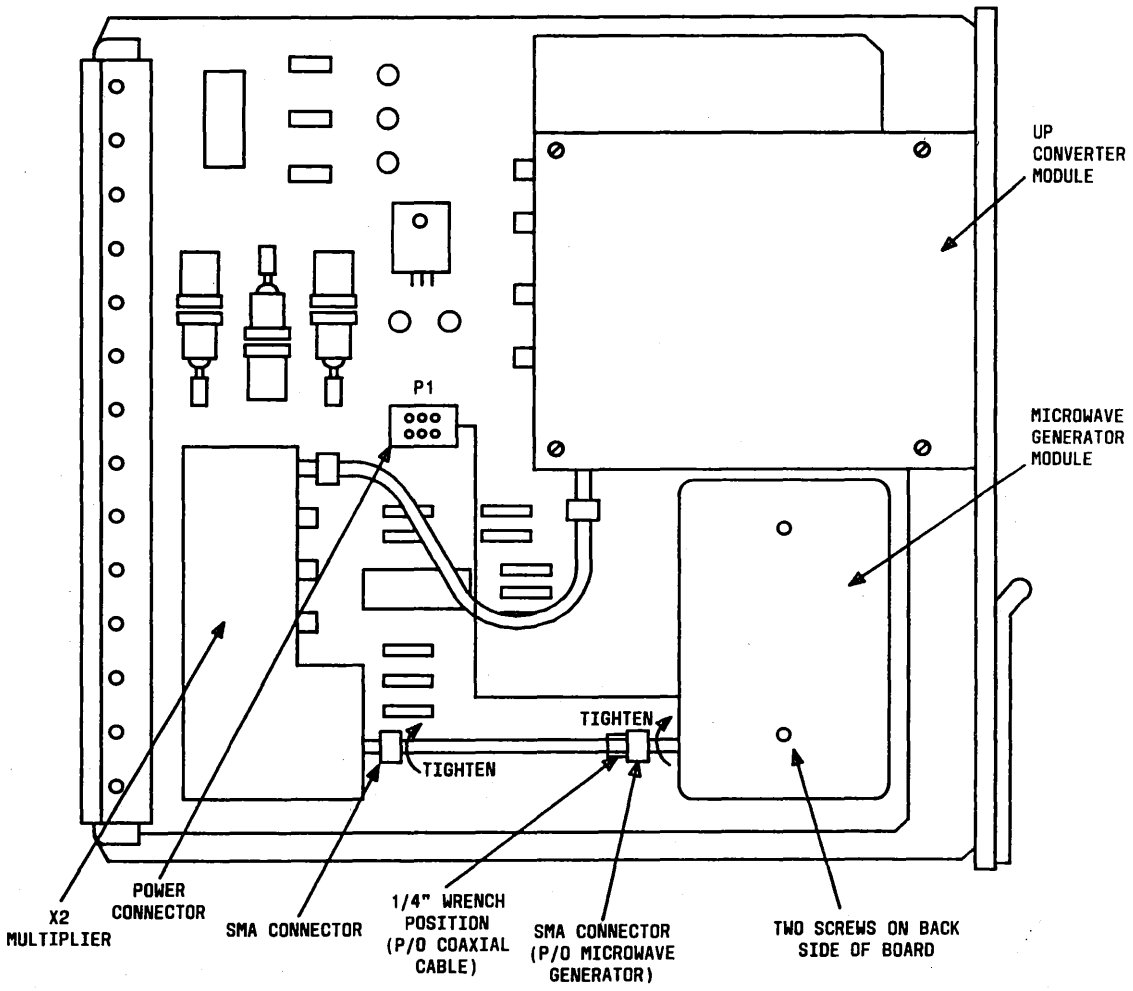

Fig. 2—Replacement of Transmitter Microwave Generator Module (11 GHz)

TRANSMITTER AMPLIFIER ASSEMBLY REPLACEMENT

This procedure is used to remove and reinstall the entire transmitter amplifier assembly.

The following tools are required to perform this procedure:

1 - Torque wrench, SMA-type (Item C4)

1 - Screwdriver, 4" (Item C8)

1 - Screwdriver, 10" (Item C11).

For recommendations and specifications of tools, see "Test Equipment and Accessories" under the "Tests and Adjustments" tab.

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

Warning: The SMA connectors should be properly torqued to prevent damage to the connectors. It is also recommended that both hands be used when removing/installing a semirigid cable.

STEP	PROCEDURE
	Removal
1	Verify that service is protected.
2	On the TWT control unit, operate the TRANS/STBY switch to the STBY position and then the ON/OFF switch to the OFF position.
3	Disengage the sliding lock mechanism, and remove the multipin power connector located on the lower right corner transmitter amplifier assembly.
4	Remove the semirigid cable between the ALC Network (RF OUT) and the transmitter switch.
5	Remove the semirigid cable between the transmitter amplifier assembly (RF FL IN) and the TRANSMITTER UP-CONV & MWV GEN unit (RF OUT).
6	Loosen the four captive screws holding the assembly to the framework, two at the top rear and two at the bottom front.
7	Using the handle on the top front of the assembly, lift upward and slide the entire assembly forward and free of the support bracket on the framework. Take the entire assembly to a proper work area.
	Note: If additional tests to isolate trouble are to be performed, return to the instruction that referenced this procedure. If a defective unit within the transmitter amplifier assembly is to be replaced, refer to the appropriate replacement procedure.

STEP	PROCEDURE
	Installation
8	Verify that all test equipment is removed and that units within the transmitter amplifier assembly are properly installed for normal operation.
9	***Caution: Before placing the assembly onto the support bracket, carefully inspect the assembly to be sure there are no wires sticking out that could be caught or pinched by the bracket. Observe the assembly as it is being slid into the support bracket to be sure that no wires catch or get pinched.*** Place the transmitter amplifier assembly on the framework support bracket, and slide the unit into the bay.
10	Secure the four captive mounting screws.
11	Reconnect the semirigid cable between the transmitter amplifier assembly (RF FL IN) and the TRANSMITTER UP-CONV & MWV GEN unit (RF OUT). Torque both connectors.
12	On the TWT power supply control unit, verify that the ON/OFF switch is in the OFF position and the TRANS/STBY switch is in the STBY position.
13	On the ALC Network, verify that the ALC ON/OFF switch is in the ALC OFF position.
14	Reconnect the multipin power connector to the transmitter amplifier assembly (plug P12), and engage the sliding lock mechanism.
15	If applicable, refer to the trouble isolation instruction that referenced the particular unit replacement procedure to see if additional testing is required.
16	Reconnect the semirigid cable between the transmitter switch and the ALC Network (RF OUT). Torque both connectors.
17	On the TWT power supply control unit, operate the ON/OFF switch to the ON position and the TRANS/STBY switch to the TRANS position.
18	On the ALC Network, set the ALC ON/OFF switch to ON.
19	This procedure is complete. Return to the instruction that referenced the replacement procedures.

TWT AMPLIFIER REPLACEMENT

This procedure is used for replacing the TWT AMPLIFIER unit. This procedure requires a thermal shim (should be equipped with a spare TWT) that is identified in the ED-8C531-10 drawing.

The following tools are required to perform this procedure:

1 - Torque wrench, SMA-type (Item C4)

1 - Torque wrench (for 6 GHz only), N-type (Item C12)

1 - Screwdriver, 3" (Item C7)

1 - Screwdriver, 4"(Item C8)

1 - Open-end wrench, 7-mm (Item C13).

For tool specifications and recommendations, see "Test Equipment and Accessories" under the "Tests and Adjustments" tab.

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

Warning: To prevent ESD damage, ensure that all ESD precautions are followed.

Warning: The SMA connectors should be properly torqued to prevent damage to the connectors. It is also recommended that both hands be used when removing/installing a semirigid cable.

STEP	PROCEDURE
	Preliminary
1	Verify that service is protected.
2	Obtain a replacement TWT AMPLIFIER unit.
3	Remove the transmitter amplifier assembly from the radio frame. Refer to the Transmitter Amplifier Assembly Replacement procedure (Removal).
	Removal
4	Remove the semirigid cable between the RF IN and RF FL OUT on front of the transmitter amplifier assembly.
5	Loosen the screw and release the holding tab on the lower front of the ALC Network.
6	Place the transmitter amplifier assembly on its side (TWT AMPLIFIER up), and remove the side plate (five screws) adjacent to the ALC Network.
7	Disconnect the semirigid cable from the TWT AMPLIFIER (RF OUT) jack.

STEP	PROCEDURE
8	Remove the outside screws (five) on the lower side plate. Carefully lift the plate with the attached filter assembly out and place aside.
9	Remove the multipin power connector on the bottom of the TWT power supply unit (requires screwdriver).
10	Remove the four screws on the backplate that hold the large heat sink and the TWT AMPLIFIER unit in place. Carefully lift the heat sink and TWT AMPLIFIER unit out of proper work area.
11	Remove the 7-mm metric slotted hex-head screws that secure the TWT AMPLIFIER unit to the large heat sink. Separate the TWT AMPLIFIER unit from the heat sink.
	Installation
	Note: Before installing the TWT AMPLIFIER unit, note the serial number. Once the TWT AMPLIFIER unit is installed and operating properly, update the RADIO DATA CARD with the new serial number.
12	Wipe clean the TWT AMPLIFIER unit and heat sink mating surfaces.
13	Support the TWT AMPLIFIER on blocks (RF ports down).
14	***Warning: The shim is delicate. Handle with care.***
	Carefully lay new thermal shim on TWT AMPLIFIER so top of shim is even with top of TWT AMPLIFIER.
15	Carefully position the heat sink on top of the shim using the two uncovered holes on the lower part of the amplifier for alignment. Insert and tighten these two screws.
16	Insert (punch through shim) and tighten the remaining screws.
17	Carefully place the heat sink and TWT AMPLIFIER unit into the transmitter amplifier assembly, and secure to the backplate with the four screws that were previously removed.
18	Reconnect the multipin power connector (from TWT AMPLIFIER) to the bottom of the TWT power supply unit. Tighten the screws finger tight, and then tighten 1/8 to 1/4 turn more with a screwdriver.
19	Install the side plate with the attached filter assembly, and secure with the five screws that were previously removed.
20	Align and connect the semirigid cable (from ALC Network) to the TWT AMPLIFIER (RF OUT) jack. Torque the connector.
21	Reinstall the side plate. Before tightening the side plate screws, observe that the ALC Network is properly aligned within each side plate slot.
22	Secure the ALC Network holding tab.

STEP	PROCEDURE
23	Reconnect the semirigid cable between the RF IN and RF FL OUT on front of the transmitter amplifier assembly. Torque both connectors.
24	This procedure is complete. Go to the Transmitter Amplifier Assembly Replacement procedure (Installation).

TWT POWER SUPPLY AND CONTROL UNIT REPLACEMENT

This procedure is used to replace the TWT power supply and control unit.

Note: The power supply and control unit are to be replaced as a single assembled unit. Do not attempt to troubleshoot the individual units.

The following tools are required to perform this procedure:

1 - Torque wrench, SMA-type (Item C4)

1 - Torque wrench (for 6 GHz only), N-type (Item C12)

1 - Screwdriver, 3" (Item C7)

1 - Screwdriver, 4" (Item C8)

- Compound, heat-conductive (Stock No. KS-21343, L1).

For tool specifications and recommendations, see "Test Equipment and Accessories" under the "Tests and Adjustments" tab.

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

Warning: To prevent ESD damage, ensure that all ESD precautions are followed.

Warning: The SMA connectors should be properly torqued to prevent damage to the connectors. It is also recommended that both hands be used when removing/installing a semirigid cable.

STEP	PROCEDURE
	Preliminary
1	Verify that service is protected.
2	Obtain a replacement TWT power supply unit and a control unit.
3	Verify that the power supply is properly strapped for the TWT AMPLIFIER unit that is to be powered. The left side cover shows the proper switch positions as well as how the power supply is presently strapped. The appropriate strap options are: 6 GHz: 5.9 to 6.425 GHz 38 dB option 11 GHz: 10.7 to 11.7 GHz 38 dB option.
4	If it is necessary to change the strapping, remove the left side cover of the power supply by unscrewing the two screws on the back of the unit and sliding the cover off. Position the switches as required, and mark the cover labels to show the present strapping option. Slide the cover in place and secure with the two screws on the back of the unit.

STEP	PROCEDURE
5	If not already done, assemble the replacement power supply assembly by attaching the control unit to the top of the power supply unit with the two spring clips that are provided.
6	Remove the transmitter amplifier assembly from the radio frame. Refer to the Transmitter Amplifier Assembly Replacement procedure (Removal).
	Removal
7	Place the transmitter amplifier assembly on its side (TWT power supply up), and remove the side plate (four screws) adjacent to the ALC Network.
8	Loosen the screw and release the holding tab on the lower front of the ALC Network.
9	Disconnect the semirigid cable from the TWT AMPLIFIER (RF OUT) jack, and carefully move the ALC Network away from the transmitter amplifier assembly.
10	Remove the lower side plate on the transmitter amplifier assembly.
11	Remove the multipin connector (requires screwdriver) on the top and bottom of the TWT power supply and control unit.
12	Remove the six slotted hex-head screws holding the power supply assembly to the front heat sink.
13	***Caution: This step may be difficult due to adhesion of the heat sink compound that is used during the assembly. USE EXTREME CARE.*** Carefully separate the power supply assembly from the heat sink.
	Installation
	Note: Before installing the TWT power supply and control unit assembly, note the serial number on each unit. When installed and operating properly, update the RADIO DATA CARD with the new serial numbers.
14	Coat the front of the replacement TWT power supply with heat sink compound. The compound layer should be ***only*** of sufficient thickness to fill all voids.
15	Attach the replacement power supply assembly to the heat sink, and secure with the six metric slotted hex-head screws previously removed. Wipe off any excess heat sink compound.
16	Reconnect the multipin connector on the top and bottom of the TWT power supply assembly. Finger tighten the screw locks; then use a screwdriver to tighten another 1/8 to 1/4 turn.
17	Install the lower side plate on the transmitter amplifier assembly.
18	Align and connect the semirigid cable (from ALC Network) to the TWT AMPLIFIER (RF OUT) jack. Torque the connector.

STEP	PROCEDURE
19	Reinstall the side plate. Before tightening the side plate screws, observe that the ALC Network is properly aligned within each side plate slot.
20	Secure the ALC Network holding tab.
21	This procedure is complete. Go to the Transmitter Amplifier Assembly Replacement procedure (Installation).

4388A/4389A ALC NETWORK REPLACEMENT

This procedure is used to replace the 4388A (11 GHz) or the 4389A (6 GHz) ALC Network.

The following tools are required to perform this procedure:

1 - Torque wrench, SMA-type (Item C4)

1 - Torque wrench (for 6 GHz only), N-type (Item C12)

1 - Screwdriver, 3" (Item C7).

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

Warning: To prevent ESD damage, ensure that all ESD precautions are followed.

Warning: The SMA connectors should be properly torqued to prevent damage to the connectors.

STEP	PROCEDURE
	Preliminary
1	Verify that service is protected.
2	Obtain a replacement ALC Network with the same code as the one being replaced.
3	Remove the transmitter amplifier assembly. Refer to the Transmitter Amplifier Assembly Replacement procedure (Removal).
	Removal
4	Loosen screw and release the holding tab located below the front of the ALC Network unit.
5	Position the transmitter amplifier assembly on its side (TWT AMPLIFIER up).
6	Remove the side plate covering the ALC Network.
7	Release the sliding lock mechanism, and disconnect the multipin cable connectors for the ALC Network.
8	Remove SMA connector on TWT AMPLIFIER (RF OUT), and carefully separate the ALC Network (with semirigid cable) from the transmitter amplifier assembly.
	Installation
9	On the replacement ALC Network, set the ALC ON/OFF switch to ALC OFF.
10	Remove the semirigid cable from the faulty ALC Network (RF IN), and attach (loosely) in the same manner to the replacement.

STEP	PROCEDURE
	Note: Before installing the replacement ALC Network, note the serial number. Once installed and operating properly, update the RADIO DATA CARD with the new serial number.
11	Install the ALC Network into the transmitter amplifier assembly, and align the semirigid cable to the TWT AMPLIFIER (RF OUT). Torque both connectors.
12	Reconnect the multipin cable connector for the ALC Network, and engage the sliding lock mechanism.
13	Install the side plate to the transmitter amplifier assembly. Before tightening the side plate screws, observe that the screws on each side of the ALC network are aligned within the slot on each side plate.
14	Slide the holding tab over the ALC Network and secure the screw.
15	This procedure is complete. Go to the Transmitter Amplifier Assembly Replacement procedure (Installation).

4411B/4411C ALC NETWORK REPLACEMENT

This procedure is used to replace the 4411B (6-GHz) or 4411C (11-GHz) ALC Network.

The following tools are required to perform this procedure:

1 - Torque wrench, SMA-type (Item C4)

1 - Torque wrench (for 6 GHz only), N-type (Item C12)

1 - Screwdriver, 3″ (Item C7).

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

Warning: To prevent ESD damage, ensure that all ESD precautions are followed.

Warning: The SMA connectors should be properly torqued to prevent damage to the connectors.

STEP	PROCEDURE
	Preliminary
1	Verify that service is protected.
2	Obtain a replacement ALC Network with the same code as the one being replaced.
3	On the ALC Network to be replaced, set the ALC ON/OFF switch to OFF.
4	On the TWT control unit, switch the TRANS/STBY switch to the STBY position. As an added precaution, it may be desirable to remove the IF signal to the transmitter.
	Removal
5	Remove the semirigid cable between the ALC Network RF OUT jack and the transmitter switch. ***Note:*** When removing a semirigid cable, it is advisable to loosen both connectors with a wrench and then use two hands to simultaneously remove both connectors.
6	Remove the semirigid cable between the ALC Network RF IN jack and the TWT amplifier RF OUT jack.
7	At the bottom center of the ALC Network, loosen screw and release the holding tab.
8	Slide the ALC Network forward and disconnect the cable connector from the back of the unit by releasing the sliding lock mechanism.
	Installation
9	On the replacement ALC Network, set the ALC ON/OFF switch to OFF.

STEP	PROCEDURE
10	Attach the cable connector to the rear of the replacement ALC Network, and engage the sliding lock mechanism.
11	Install the ALC Network into transmitter amplifier assembly.
12	Slide the ALC Network holding tab upwards and tighten screw.
13	Connect the semirigid cable between the ALC Network RF IN jack and the TWT amplifier RF OUT jack.
14	Connect the semirigid cable between the ALC Network RF OUT jack and the transmitter switch.
15	Update the ALC Network serial number on the DATA CARD unit. This procedure is complete.

TRANSMITTER ISOLATOR ADAPTER AND/OR FILTER REPLACEMENT

This procedure is used for replacing the isolator adapter and/or filter network in the transmitter amplifier assembly.

The following tools are required to perform this procedure:

1 - Combination wrench, 1/4" (Item C2)

1 - Torque wrench, SMA-type (Item C4)

1 - Screwdriver, 3" (Item C7).

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

Warning: The SMA connectors should be properly torqued to prevent damage to the connectors.

STEP	PROCEDURE
1	Obtain a replacement isolator adapter and/or filter with the same code as the one being replaced.
2	Remove the transmitter amplifier assembly. Refer to Transmitter Amplifier Assembly Replacement procedure (Removal).
3	Remove the semirigid cable between the RF FL OUT and RF IN on the front of the transmitter amplifier assembly.
4	Place the transmitter amplifier assembly on its side (TWT AMPLIFIER up).
5	Remove the five outside screws on the lower side plate.
6	Carefully remove the plate with attached filter assembly by lifting from the rear.
7	Change the defective component or entire filter assembly, and reinstall the assembly onto the supporting plate.
8	Reinstall the plate and filter assembly into the transmitter amplifier assembly. Secure the screws.
9	Reconnect the semirigid cable between the RF FL OUT and RF IN on front of the transmitter amplifier assembly. Torque both connectors.
10	This procedure is complete. Go to the Transmitter Amplifier Assembly Replacement procedure (Installation).

RF SWITCH AND SWITCH CONTROL NETWORK REPLACEMENT

This procedure is used to replace the RF Switch and/or the Switch Control Network. Before replacing, compare the installed unit with the new unit and verify that it is the correct replacement.

The following tools are required to perform this procedure:

1 - Cable assembly, 1-foot coaxial with SMA male connectors (Item B7)

1 - Torque wrench, SMA-type (Item C4)

1 - Screwdriver, 3" (Item C6)

1 - Screwdriver, 10" (Item C11).

Caution 1: Replacing the RF Switch will require a service outage. To shorten the duration of the outage, a procedure is included to bypass the RF Switch during replacement.

Caution 2: Normally, no special precautions are necessary to protect service when the Switch Control Network is replaced. However, if the RF Switch is in the standby position when the Switch Control Network is removed, a momentary service hit will occur because the switch will automatically revert to the regular position.

Warning: The SMA connectors should be properly torqued to prevent damage to the connectors. It is also recommended that both hands be used when removing/installing a semirigid cable.

STEP	PROCEDURE
	Switch Control Network Removal
1	Loosen the captive screw on the Switch Control Network, and pull the unit out of the holding bracket by its handle (Fig. 3 or 5).
2	If only the Switch Control Network is to be replaced, go to Step 31. If the RF Switch is to be replaced, set the Switch Control Network aside and go to Step 3.
	RF Switch Bypass
3	Determine the standby transmitter that is feeding the RF Switch. If the transmitter pair has a left-hand waveguide feed (Fig. 3 and 4), the transmitter is in position 2 or 4. If the transmitter pair has a right-hand waveguide feed (Fig. 5 and 6), the transmitter is in position 1 or 3.
4	On the standby transmitter, operate the TWT control unit TRANS/STBY switch to the STBY position.
5	Carefully remove the semirigid cable between the standby transmitter ALC Network (RF OUT) and the circulator on the RF Switch (Fig. 3 or 5).
6	Attach and torque one end of the 1-foot coaxial (bypass) cable to the standby transmitter ALC Network (RF OUT).

STEP	PROCEDURE
7	On the regular transmitter, operate the TWT control unit TRANS/STBY switch to the STBY position.
	Note: Both transmitters are now off the air, so there may be some alarms during the short period of time that it takes to perform the next three steps.
8	At the INPUT jack on the isolator adapter (Fig. 3 or 5), unscrew and carefully move the semirigid cable far enough out of the way so that a cable can be installed to the jack.
9	Connect the free end of the bypass cable to the INPUT jack on the isolator adapter. Torque the connection.
10	On the standby transmitter TWT control unit, operate the TRANS/STBY switch to the TRANS position. The system is now on the air.
	RF Switch Removal
	Caution: The termination assembly may still be hot to the touch and may require some time to cool down.
11	Carefully remove the semirigid cable between the regular transmitter ALC Network (RF OUT) and the isolator on the RF Switch.
12	Release the holding tabs and pull the power connector apart (Fig. 4 or 6).
13	Loosen, but do not remove, the screws that hold the RF Switch bracket in the bay. Slide the bracket to the left and carefully remove the entire assembly.
	RF Switch Preliminary Installation
14	On a workbench, or other suitable work surface, simultaneously loosen and remove the two SMA connectors that attach the termination assembly to the two circulators on the RF Switch.
15	Remove the RF Switch from the mounting bracket. Observe which holes in the bracket are being used to mount the RF Switch.
16	Install the replacement RF Switch onto the bracket using the same screws. Observe the following directions: 1. If 6-GHz, use the two mounting holes furthest from the front of the bracket. If 11-GHz, use the two holes closest to the front of the mounting bracket. 2. Install the RF Switch on the left side of the bracket (opposite the bend in the bracket). The termination assembly should face the Switch Control Network. See Fig. 3 (left-hand waveguide feed) or Fig. 5 (right-hand waveguide feed).
17	Remove the circulator and SMA adaptor combination from the A (NC) port on the RF Switch being replaced, and install it in the same orientation on the A (NC) port of the replacement RF switch. The middle port of the circulator should be perpendicular to the bracket and pointing to the right if it is a left-hand waveguide feed bay (Fig. 4) and

STEP	PROCEDURE

pointing to the left if it is a right-hand waveguide feed bay (Fig. 6). Torque the SMA connection.

18 Remove the semirigid cable from the C (COM) port on the RF Switch being replaced, and install it in the same orientation on the C (COM) port of the replacement RF switch. Do not tighten at this time.

RF Switch Installation

Note: There should be only one circulator installed at this time, and it should be on port A (NC) of the RF Switch.

19 Carefully install the bracket and switch assembly into the bay. Slide the bracket until the screws meet the back of the slots.

20 Reconnect the power connector between the RF Switch and the Switch Control Network. Verify that the locking tabs are properly engaged.

21 Reconnect the semirigid cable between the regular transmitter ALC Network (RF OUT) and the circulator on the RF Switch. Torque the connectors.

RF Switch Bypass Removal

22 On the standby transmitter TWT control unit, operate the TRANS/STBY switch to the STBY position.

Note: Both transmitters are now off the air; there may be some alarms during the short period of time that it takes to perform the next two steps.

23 Remove the bypass cable from the INPUT jack on the isolator adapter, and carefully install the semirigid cable from the C (COM) port of the RF Switch. Torque both connectors.

24 On the regular transmitter TWT control unit, operate the TRANS/STBY to the TRANS position. The station is now on the air.

RF Switch Final Connections

25 Install the second circulator SMA adapter combination to port B (NO) of the RF Switch. Tighten the SMA connector on the adapter finger tight.

26 Carefully connect the termination assembly to the two middle ports of the circulators. Torque the two SMA connectors where the two terminations join the circulators. Use a small screwdriver and verify that the screws that hold the shield onto the power terminations are tight.

27 Torque the SMA connector on the adapter that mates with port B (NO) on the RF Switch.

28 Connect the semirigid cable between the standby transmitter ALC Network (RF OUT) and the circulator on the RF Switch. Torque both connectors.

STEP	PROCEDURE
29	Tighten the screws that hold the RF Switch bracket in the bay, and verify the torque on all of the accessible SMA connectors around the RF Switch, circulators, and other connections that might have been affected by this procedure.
30	On the standby transmitter TWT control unit, operate the TRANS/STBY switch to the TRANS position. All alarms on the radio bay should now be extinguished.
	Switch Control Network Installation
31	Align the replacement, or original if unit not changed, Switch Control Network with the tracks on the holding bracket, and slide the circuit all the way in until it is properly seated.
32	Tighten the captive screw located on front of the Switch Control Network only until it is snug.
33	This procedure is complete. Return to the instruction that referenced this procedure.

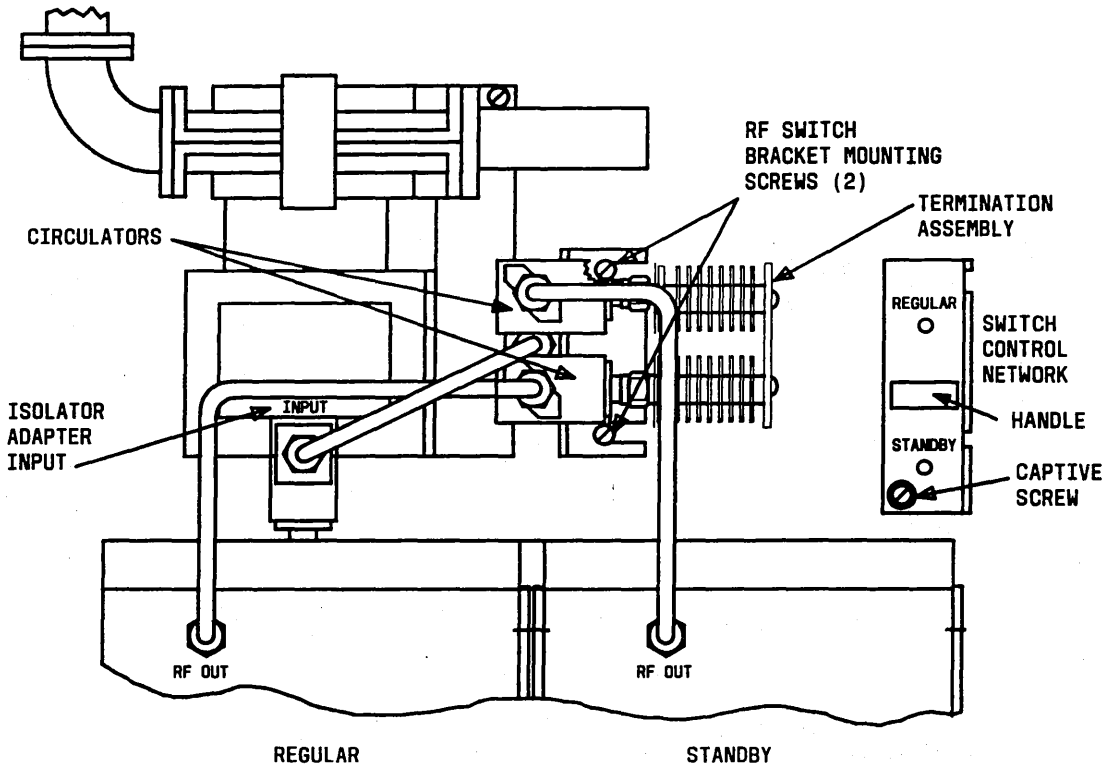

Fig. 3—Transmitter Waveguide Assembly With RF Switch and Switch Control Network—Left-Hand Waveguide Feed

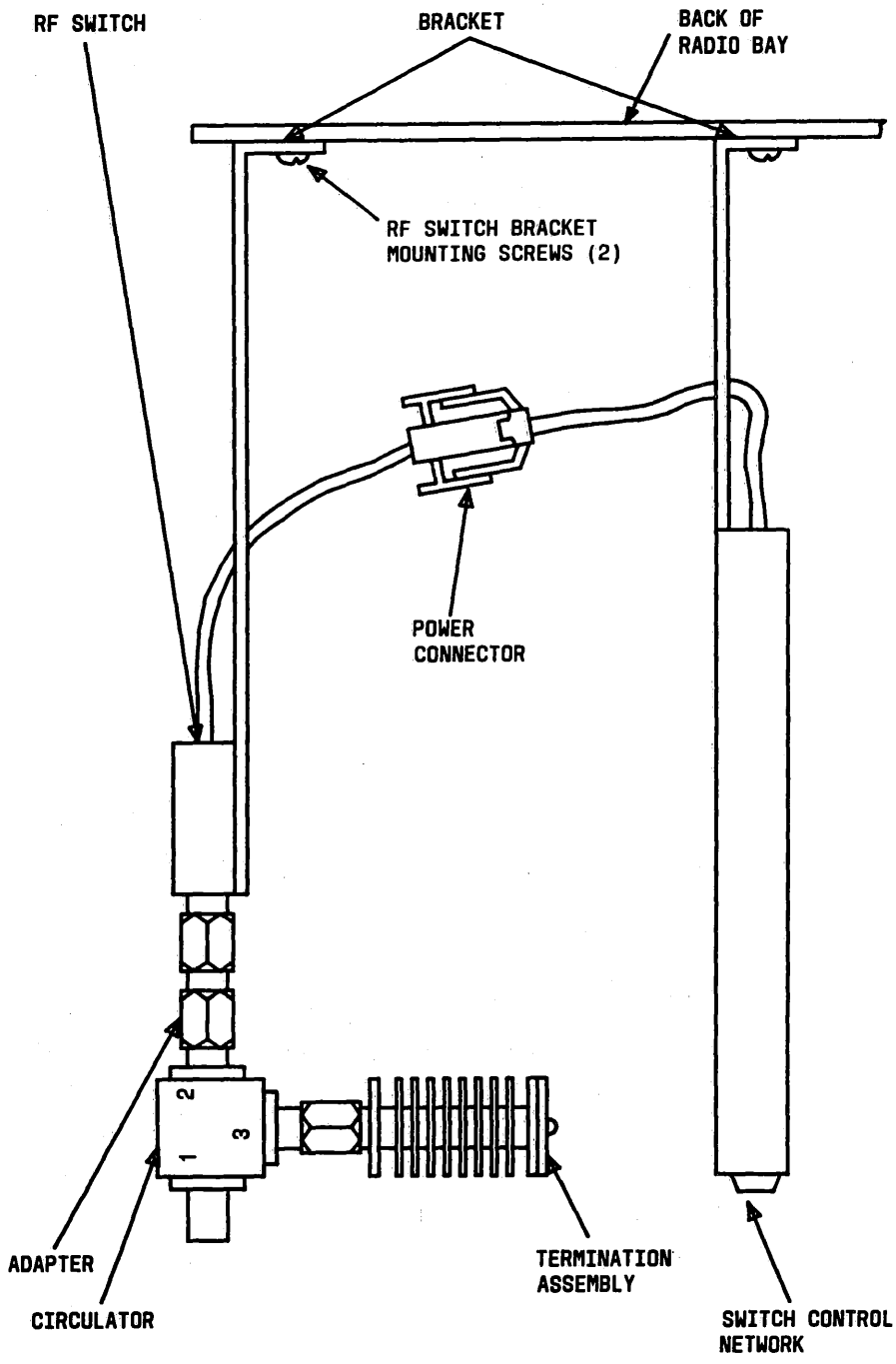

Fig. 4—Top View of Installed Transmitter Switch With RF Switch and Switch Control Network—Left-Hand Waveguide Feed

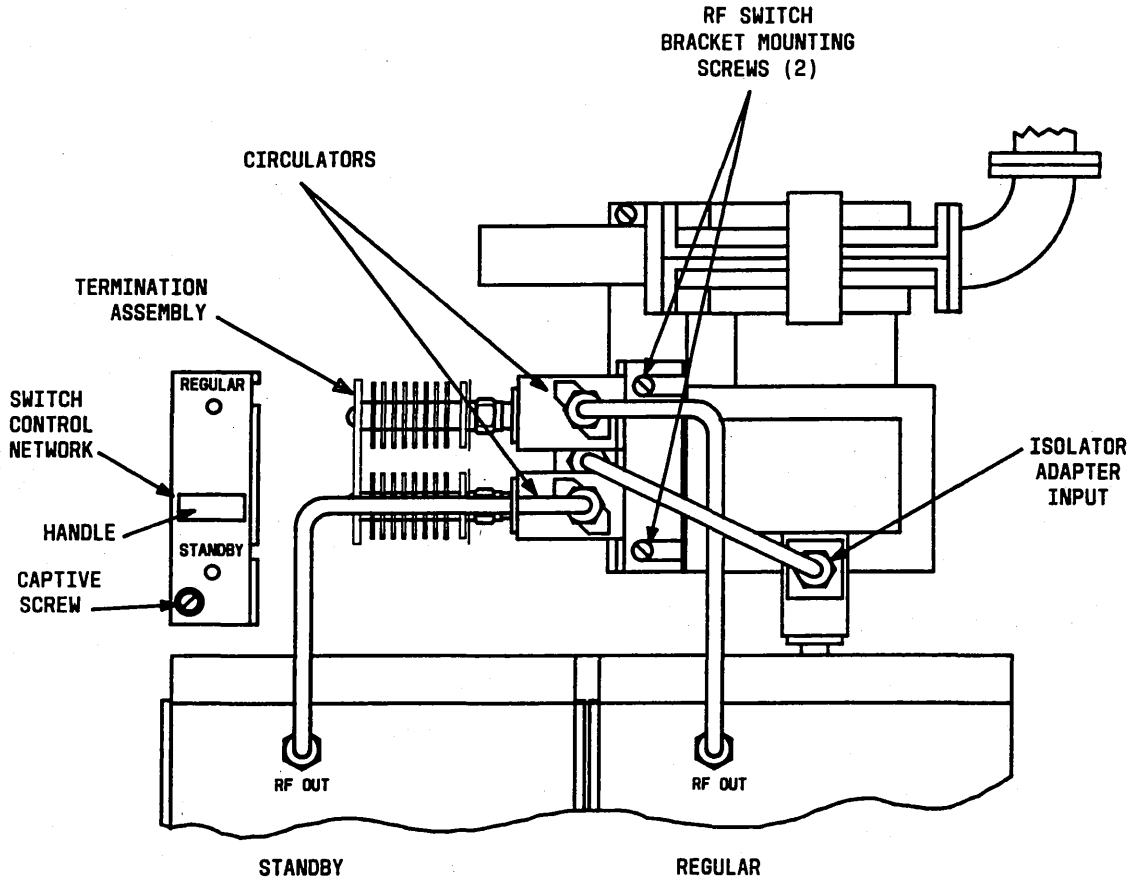

Fig. 5—Transmitter Waveguide Assembly With RF Switch and Switch Control Network—Right-Hand Waveguide Feed

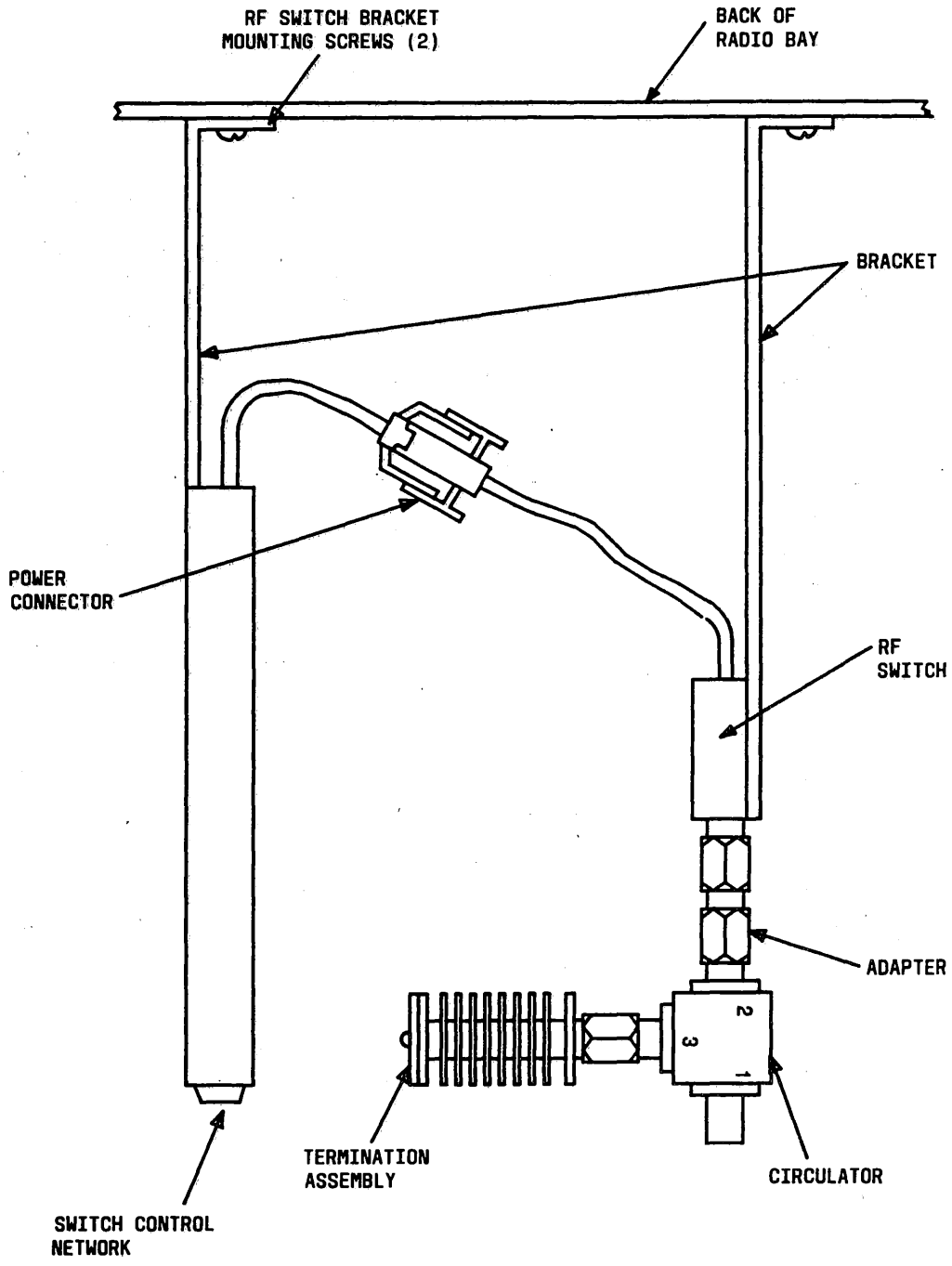

Fig. 6—Top View of Installed Transmitter Switch With RF Switch and Switch Control Network—Right-Hand Waveguide Feed

RF SWITCH NETWORK REPLACEMENT

This procedure is used to replace the RF Switch Network. Before replacing, compare the installed unit with the new unit and verify that it is the correct replacement.

The following tools are required to perform this procedure:

1 - Cable assembly, 1-foot coaxial with SMA male connectors (Item B7)

1 - Torque wrench, SMA-type (Item C4)

1 - Screwdriver, 3" (Item C6).

Caution: ***Replacing the RF Switch Network will require a service outage. To shorten the duration of the outage, a procedure is included to bypass the RF Switch Network during replacement.***

Warning: ***The SMA connectors should be properly torqued to prevent damage to the connectors. It is also recommended that both hands be used when removing/installing a semirigid cable.***

STEP	PROCEDURE
	RF Switch Network Bypass
1	Determine the standby transmitter that is feeding the RF Switch Network. If the transmitter pair has a left-hand waveguide feed (Fig. 7), the transmitter is in position 2 or 4. If the transmitter pair has a right-hand waveguide feed (Fig. 8), the transmitter is in position 1 or 3.
2	On the standby transmitter, operate the TWT control unit TRANS/STBY switch to the STBY position.
3	Carefully remove the semirigid cable between the standby transmitter ALC Network (RF OUT) and the the RF Switch Network (STBY RF IN).
4	Attach and torque one end of the 1-foot coaxial (bypass) cable to the standby transmitter ALC Network (RF OUT).
5	On the regular transmitter, operate the TWT control unit TRANS/STBY switch to the STBY position. ***Note:*** Both transmitters are now off the air; there may be some alarms during the short period of time that it takes to perform the next three steps.
6	Carefully remove the semirigid cable between the isolator adaptor (INPUT) and the RF Switch Network (RF OUT).
7	Connect the free end of the bypass cable to the INPUT jack on the isolator adapter. Torque the connection.

STEP	PROCEDURE
8	On the standby transmitter TWT control unit, operate the TRANS/STBY switch to the TRANS position. The system is now on the air.
	RF Switch Network Removal
	Caution: The termination assembly may still be hot and may require some time to cool down.
9	Carefully remove the semirigid cable between the regular transmitter ALC Network (RF OUT) and the RF Switch Network (REG RF IN).
10	Loosen the captive screw on the front of the RF Switch Network, and pull the unit forward and out of the mounting bracket.
	RF Switch Network Installation
11	Align the circuit board edges of the replacement RF Switch Network with the upper and lower tracks of the mounting bracket, and push the unit in until it is fully seated.
12	Tighten the captive screw on the front of the RF Switch Network.
13	Reconnect the semirigid cable between the regular transmitter ALC Network (RF OUT) and the RF Switch Network (REG RF IN).
	RF Switch Network Bypass Removal
14	On the standby transmitter TWT control unit, operate the TRANS/STBY switch to the STBY position.
	Note: Both transmitters are now off the air; there may be some alarms during the short period of time that it takes to perform the next two steps.
15	Disconnect the bypass cable from the INPUT jack on the isolator adapter, and carefully install the semirigid cable between the RF Switch Network (RF OUT) and the isolator adaptor (INPUT). Torque both connectors.
16	On the regular transmitter TWT control unit, operate the TRANS/STBY to the TRANS position. The station is now on the air.
	RF Switch Network Final Connections
17	Disconnect the bypass cable from the standby ALC Network (RF OUT).
18	Connect the semirigid cable between the standby ALC Network (RF OUT) and the RF Switch Network (STBY RF IN). Torque both connectors.
19	Verify the torque on all connectors.

STEP	PROCEDURE
20	On the standby transmitter TWT control unit, operate the TRANS/STBY switch to the TRANS position. All alarms on the radio bay should now be extinguished.
21	This procedure is complete. Return to the instruction that referenced this procedure.

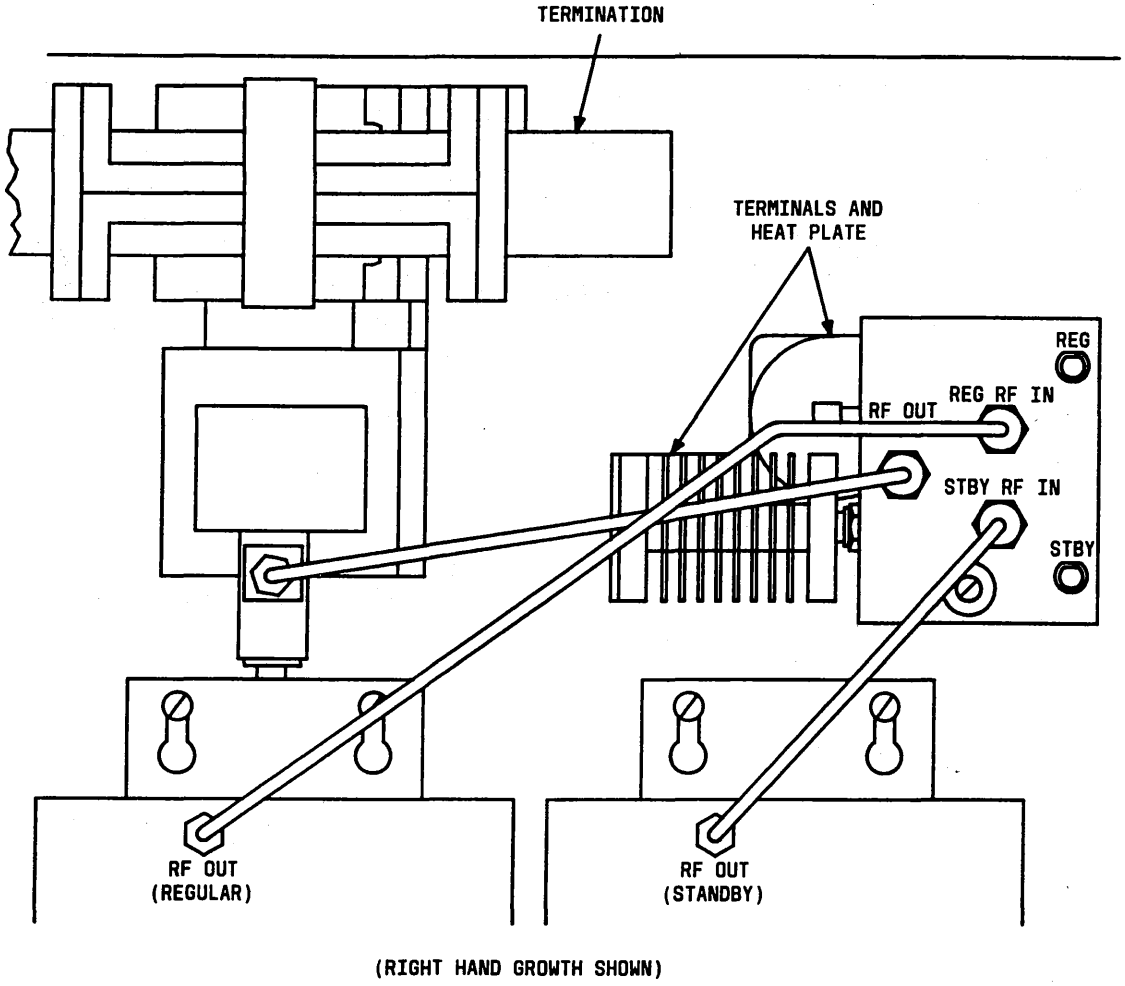

Fig. 7—Transmitter Waveguide Assembly With RF Switch Network—Left-Hand Waveguide Feed

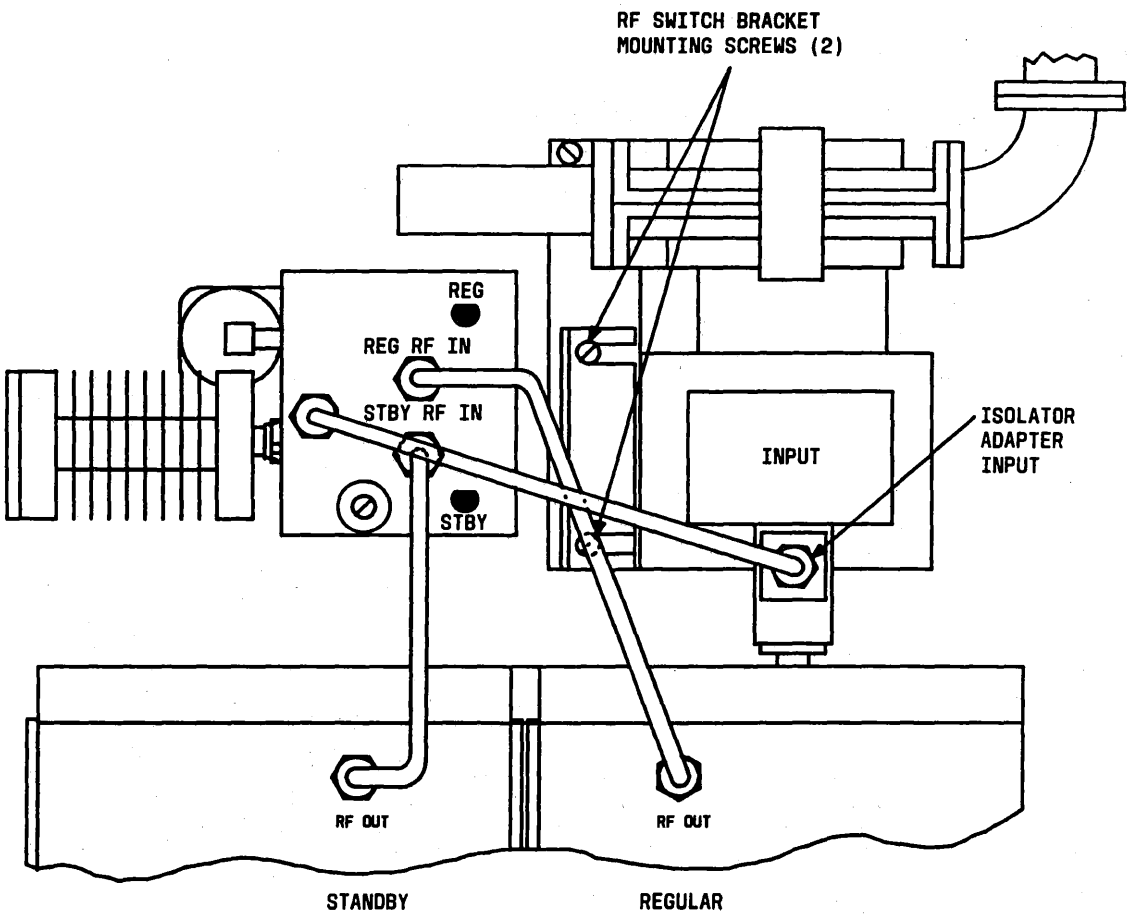

Fig. 8—Transmitter Waveguide Assembly With RF Switch Network—Right-Hand Waveguide Feed

TRANSMITTER POWER UNIT REPLACEMENT

This procedure is used to replace the TRMTR PWR unit.

No special tools are required to perform this procedure.

Caution: THIS PROCEDURE IS SERVICE-AFFECTING UNLESS THE PROPER MANUAL SWITCHING OPERATION HAS BEEN PERFORMED.

Warning: To prevent ESD damage, ensure that all ESD precautions are followed.

STEP	PROCEDURE
1	Verify that service is protected.
2	Obtain a replacement unit with the same unit code.
3	*Connect the ESD wrist strap to the ESD jack on the radio frame.*
4	On the unit faceplate, set the STBY/TRMTR ON pushbutton to the STBY (out) position.
5	On the unit to be removed, simultaneously release the latch catch and pull the lever forward. Pull the lever down until the unit is released from the backplane connector.
6	Hold the unit at the top and bottom, and slide it out of the shelf. Place the unit in an ESD protective container.
7	Verify that the STBY/TRMTR ON pushbutton on the replacement unit faceplate is in the STBY (out) position.
8	Release the latch catch on the replacement unit, and pull the lever forward.
9	***Warning: Misalignment of the plug-in unit in the shelf guides will cause backplane connector damage.*** Carefully align the replacement unit in the top and bottom shelf guides.
10	Slide the replacement unit into the shelf until the bottom of lever clears the front of the shelf.
11	Seat the plug-in unit by simultaneously applying light pressure to the top of the unit and pushing up on the lever. Ensure that the latch catch has engaged the lever.
12	Operate the STBY/TRMTR ON pushbutton on the unit faceplate to the TRMTR ON (in) position. ***Note:*** The green LED on the power unit should light.
13	This procedure is complete. Return to the instruction that referenced this procedure.

ALARM/ALARM AND METER UNIT REPLACEMENT

This procedure is used to replace the ALARM or ALARM AND METER unit.

Note: THIS IS AN IN-SERVICE PROCEDURE.

No special tools are required to perform this procedure.

Warning: To prevent ESD damage, ensure that all ESD precautions are followed.

STEP	PROCEDURE
1	Obtain a replacement unit with the same unit code.
2	***Connect the ESD wrist strap to ESD jack on the radio frame.***
3	Set the selector switch (if equipped) on the unit faceplate to the OFF position.
4	Simultaneously release the latch catch on the unit to be removed, and pull the lever forward. Pull the lever down until the unit is released from the backplane connector.
5	Hold the unit at the top and bottom, and slide it out of the shelf. Place the unit in an ESD protective container.
6	Verify that the two miniplugs on the replacement unit are in a vertical orientation. One miniplug is connected between J3 and J4, and the other one is between J5 and J6.
7	Set the selector switch (if equipped) on the replacement unit faceplate to the OFF position.
8	Release the catch on the replacement unit, and pull the lever forward.
9	***Warning: Misalignment of the unit in the shelf guides will cause backplane connector damage.*** Carefully align the replacement unit in the top and bottom shelf guides.
10	Slide the replacement unit into the shelf until the bottom of the lever clears the front of the shelf.
11	Seat the plug-in unit by simultaneously applying light pressure to the top of the unit and pushing up on the lever. Ensure that the latch catch has engaged the lever.
12	Rotate the selector switch (if equipped) on the unit faceplate to each position, and check meter readings against the RADIO DATA CARD plug-in unit.
13	This procedure is complete. Return to the instruction that referenced this procedure.

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