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DR 6/11-135A and 135EC 1×N Frequency Diversity Operation and Maintenance Radio Transmitter Trouble Isolation

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1 Introduction

Use this practice to isolate an equipment-alarm trouble to a specific unit in a radio transmitter or to clear any of the following problems discovered while doing transmitter test procedures.

- RF level
- IF level
- Slope and frequency response.

Because this practice applies to both types of radio transmitters (TWT and Solid State), all references pertain to both unless marked specifically for one or the other.

Figures 1 and 2 are Function and Level Diagrams which illustrate the functional relationships of the units within the transmitters and expected signal levels at measurement points. A comparison of measured levels with the nominal levels on these diagrams may be useful during trouble isolation.

1.1 Safety Labels

Safety labels are strategically placed symbols and messages that will alert you to potential risks. There are three types of safety labels.

DANGER:
DANGER *indicates the presence of a hazard that* ***will*** *cause death or severe personal injury if the hazard is not avoided.*

WARNING:
WARNING *indicates the presence of a hazard that* ***can*** *cause death or severe personal injury if the hazard is not avoided.*

CAUTION:
CAUTION *indicates the presence of a hazard that* ***will*** *or* ***can*** *cause minor personal injury or property damage if the hazard is not avoided.*

Within the **CAUTION** safety label, the term "property damage" refers also to possible service interruption or impairment.

Please refer to the Safety Labels heading in the **START HERE** tab for additional information about, and examples of, safety labels.

2 Equipment-Alarm Trouble Isolation

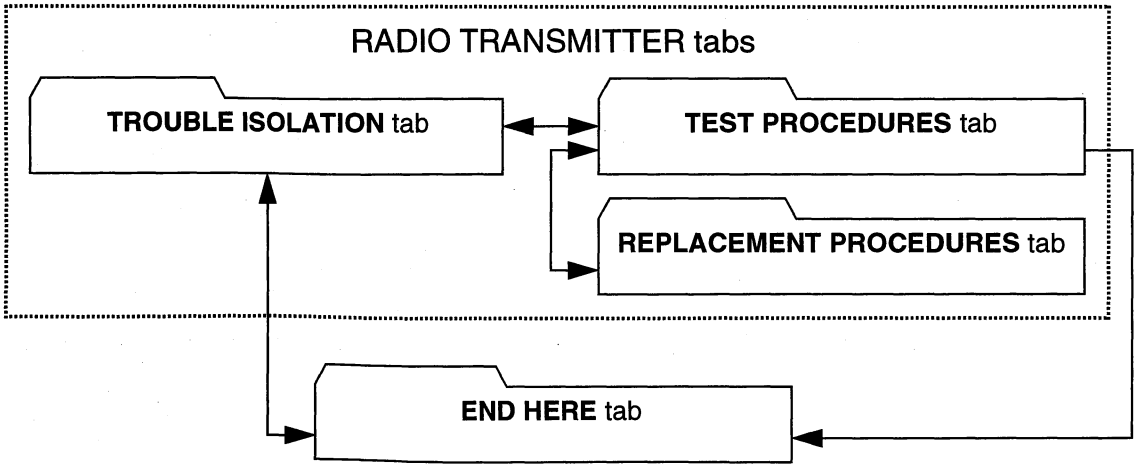
Trouble clearing for any radio transmitter alarm begins with Flowchart 1, Equipment-Alarm Trouble Isolation. All radio bay transmitter alarms, except a DC power unit failure alarm, are indicated on the ALARM AND METER unit, located in the transmitter shelf. A DC power unit failure will activate one or more of these transmitter alarms.

Two transmitter alarms are indicated on the ALARM AND METER unit; a TRMTR — GEN OVEN (microwave generator oven) alarm and a TRMTR — RF PWR (RF output power) alarm. Unless there is trouble in the alarm-reporting system, one or both of these alarms should be lighted whenever a radio transmitter alarm has been sent to the alarm center.

The trouble isolation portion of this section consists of flowcharts that guide you through a structured process of isolating and clearing a trouble and performing any required tests.

Flowchart 1 is the starting point for isolating and clearing equipment-alarm conditions in a radio transmitter. Alarm-clearing flowcharts are not specifically designed to clear multiple failures or take into account faulty spare units; if there is a multiple failure, the COM ALARM will still be lighted after you have cleared the first trouble. A flowchart will direct you to the beginning of the trouble isolation process to isolate and clear the second trouble.

As you go through the trouble isolation process, you will be interacting with the test procedures and the replacement procedures as shown below:



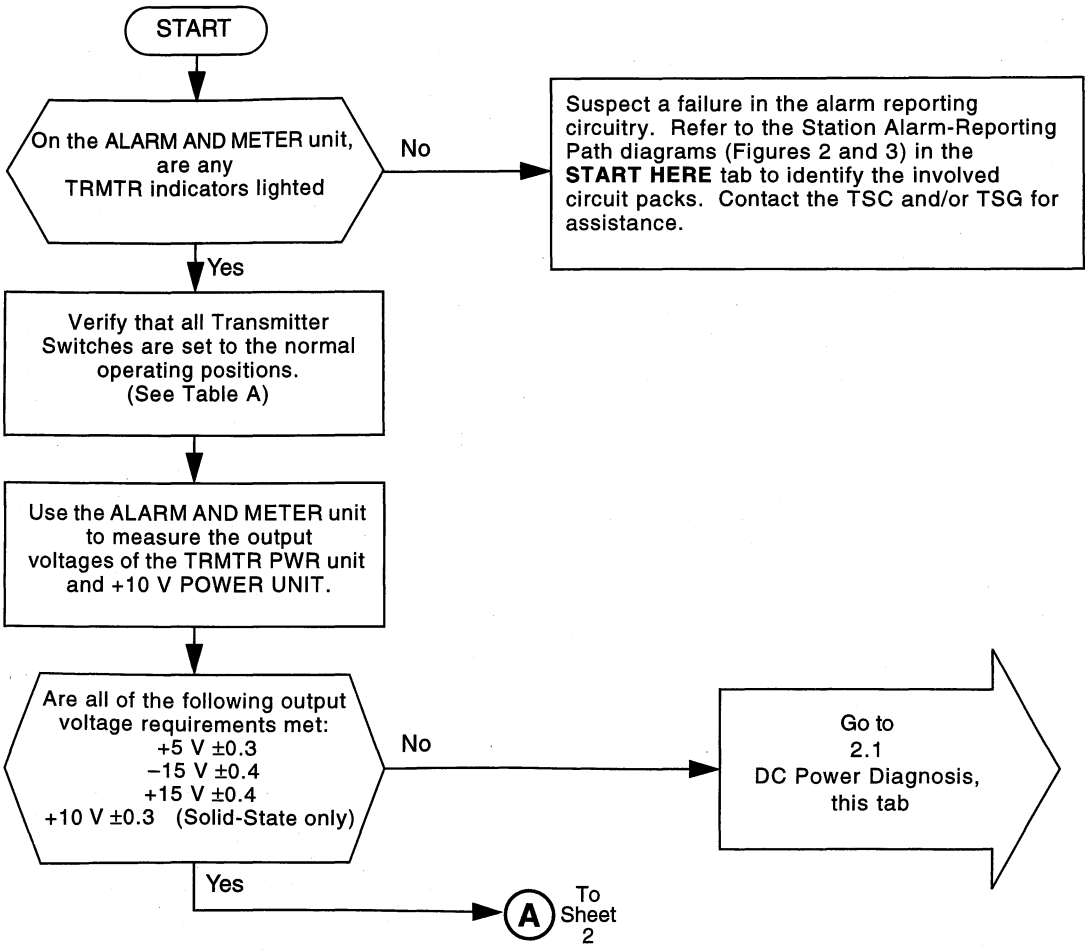
Because of critical operating levels in a radio transmitter, no transmitter unit can be replaced without one or more follow-up tests. Therefore, when you are directed by the trouble isolation flowcharts to replace a unit, go to Flowchart 3, Unit Replacement and Alignment, in the **TEST PROCEDURES** tab. Follow that flowchart to its completion to perform any required tests.

If the unit replacement and alignment flowchart ends with a transmitter alignment, you will be directed to the **END HERE** tab after you have satisfactorily completed the alignment. If the unit replacement and alignment flowchart does not end with a transmitter alignment, you will be directed to return to the trouble isolation flowchart.

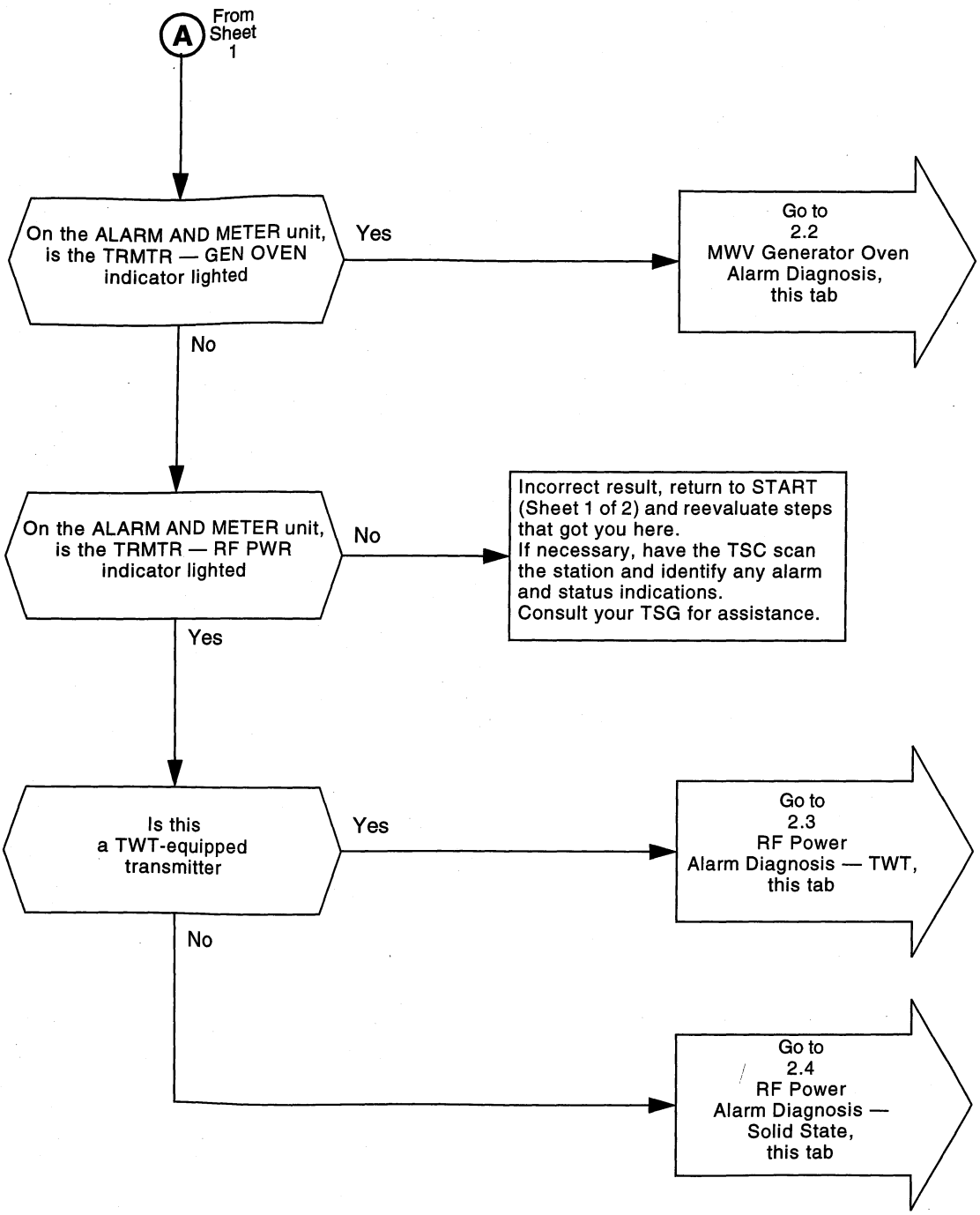
If you make an adjustment or equipment replacement that changes the signal level, you must perform a transmitter alignment before the transmitter can be placed in service.

Table A. Switch Positions for Normal Transmitter Operation

Transmitter Type	Unit	Switch	
		Designation	Position
Both (TWT & Solid State)	TRMTR PWR	TRMTR ON/STBY	TRMTR ON
TWT	ALC Network	ALC ON/OFF	ALC ON
	Power Supply and Control	ON/OFF	ON
		TRANS/STBY	TRANS
Solid State	328A Amplifier	ALC ON/OFF	ALC ON



Flowchart 1. Equipment-Alarm Trouble Isolation (Sheet 1 of 2)



Flowchart 1. Equipment-Alarm Trouble Isolation (Sheet 2 of 2)

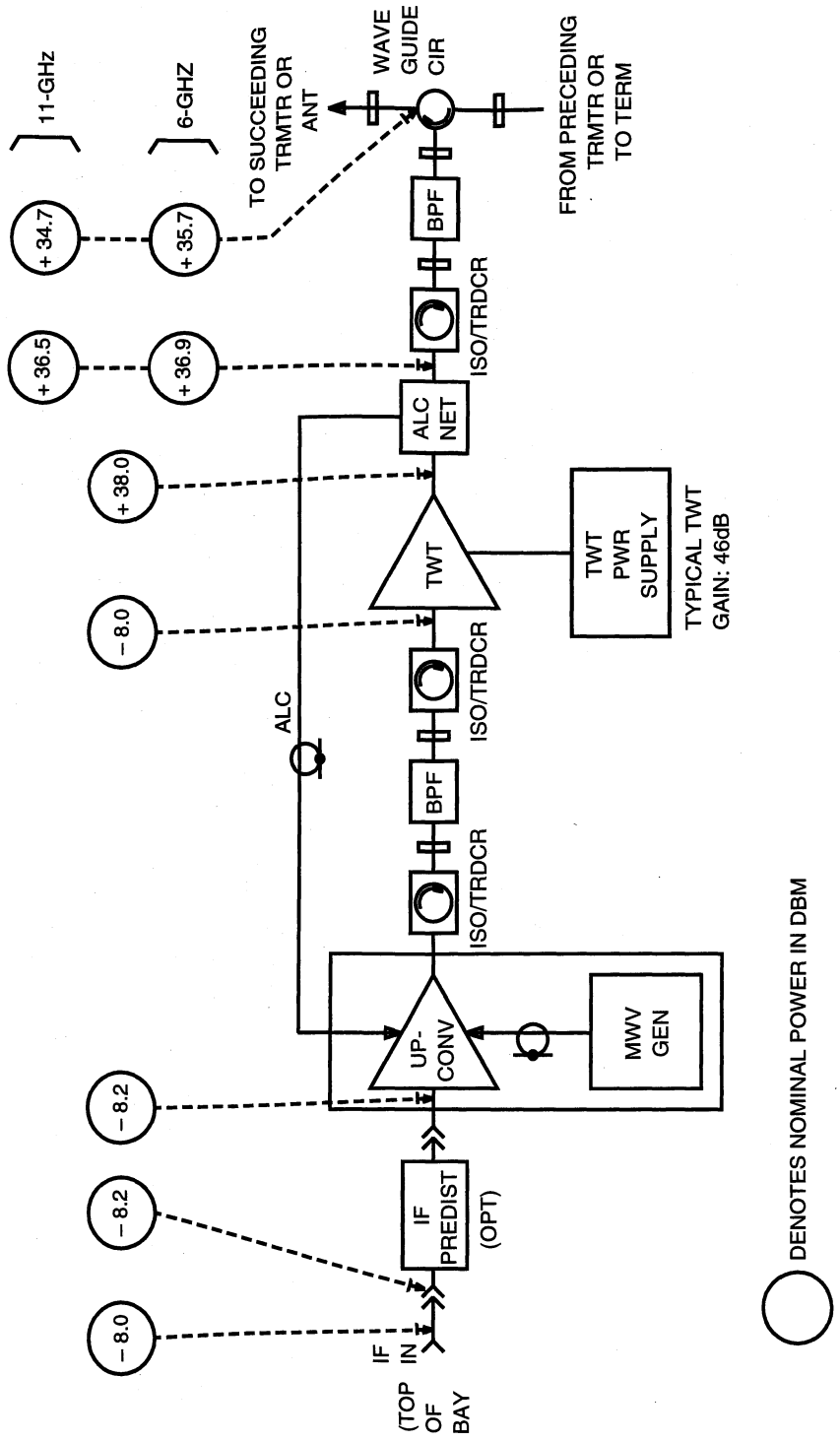


Figure 1. Function and Level Diagram—TWT

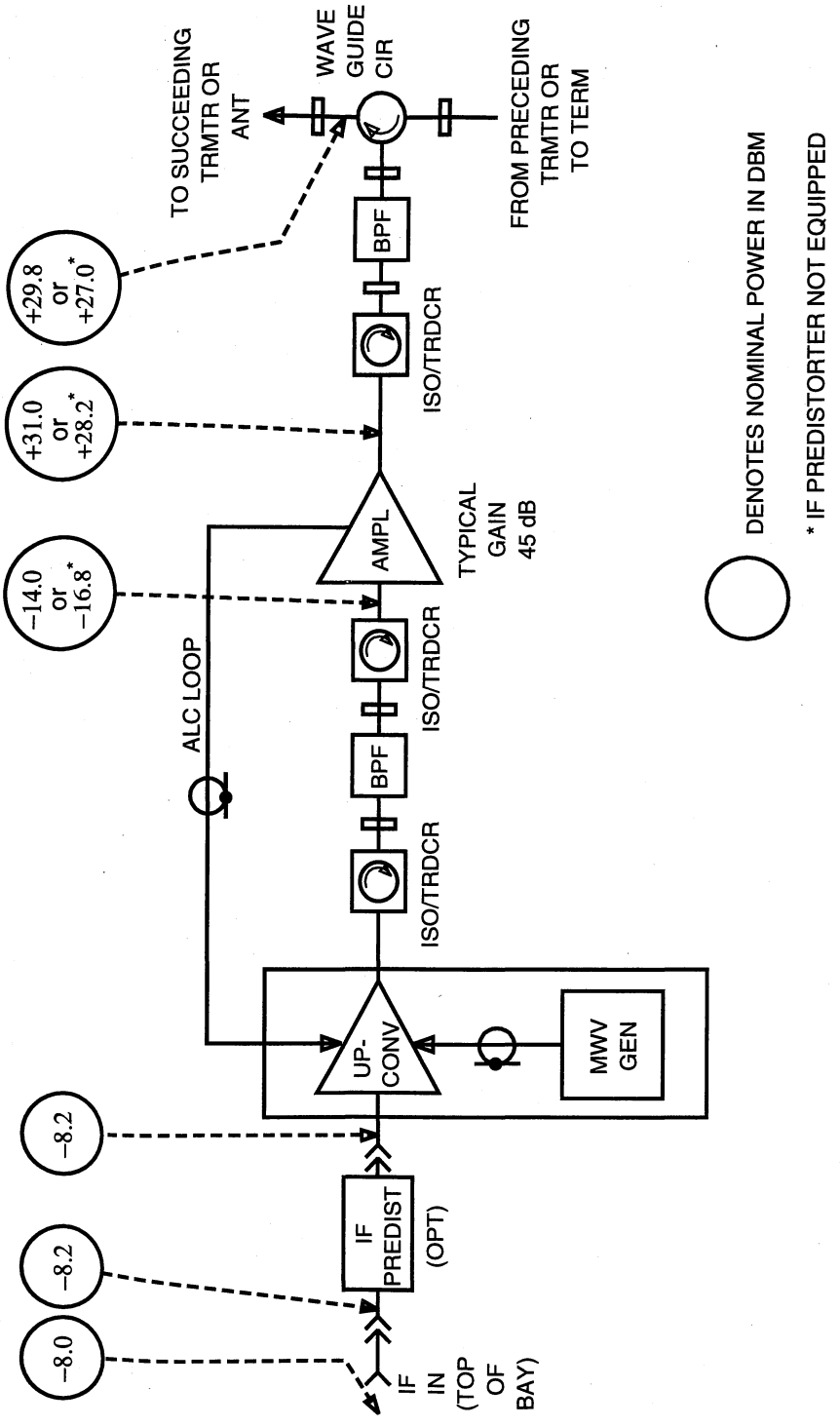


Figure 2. Function and Level Diagram—Solid State

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2.1 DC Power Diagnosis

Each vertical transmitter/receiver (T/R) pair in a radio bay (frame) is separately powered and fused by the –24 V/–48 V station power plant. In addition, each T/R pair is connected either by a single power-feed or by a double power-feed from the power plant. A single power-feed provides one input voltage supply to the top of the radio frame, and it provides power to both the transmitter and receiver. A double power-feed provides two separate input supplies; one for the transmitter and one for the receiver.

This practice applies to both types of transmitter, TWT and Solid-State (328A Ampl). Keep that in mind as you use the tables and diagrams. Many of the procedures are the same for both, but exceptions will be identified as they apply to a specific transmitter type, TWT or Solid-State.

Figures 3 and 4 are block diagrams of power distributions for each type of transmitter.

Basic low-voltage power for both types of transmitters is furnished by a 1474-type power unit (TRMTR PWR) mounted in the transmitter shelf.

Solid-State transmitters require +10 volts that is supplied by a 474 or 471-type power unit mounted to the left of the TRMTR PWR unit.

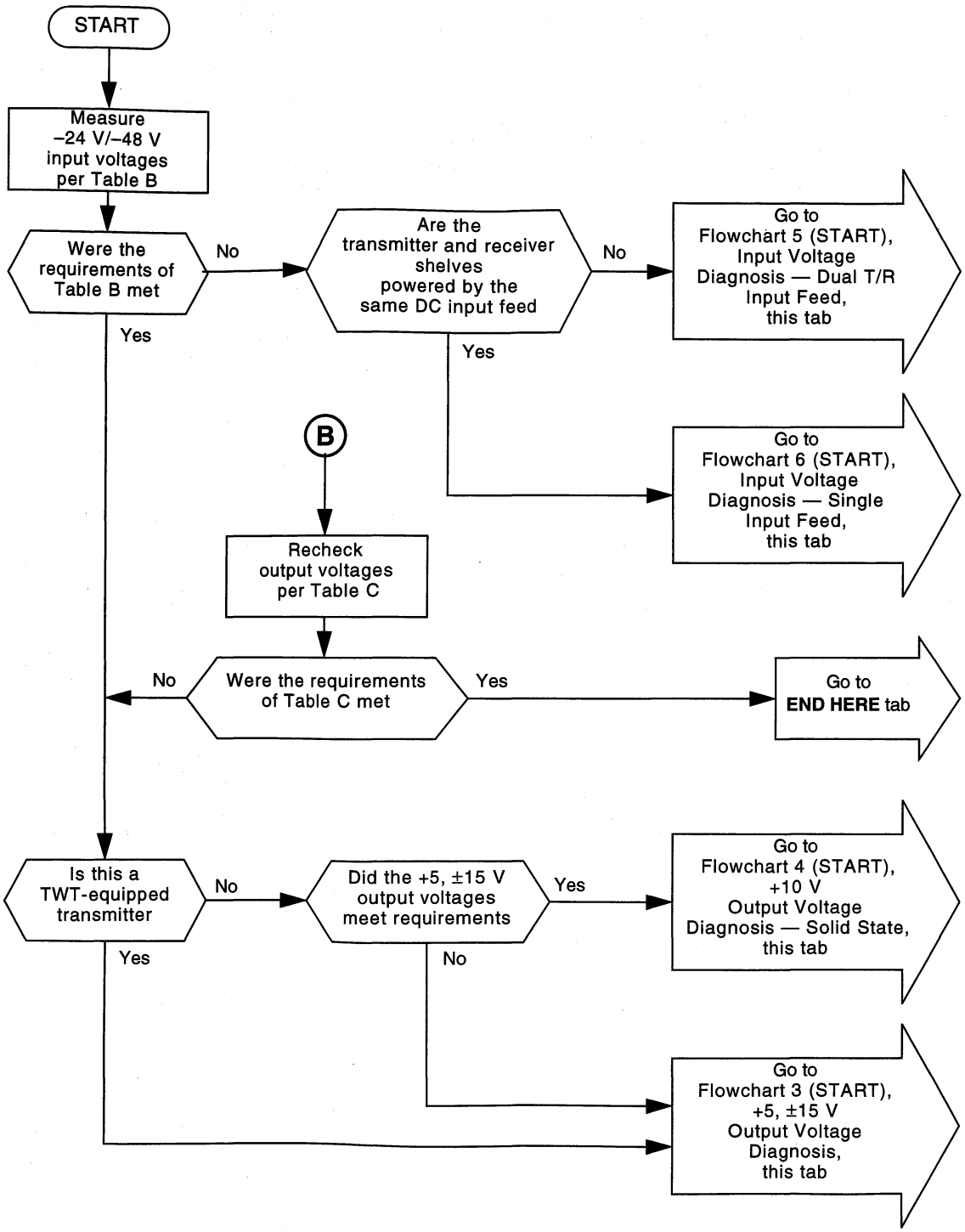
High-voltage requirements for the TWT Amplifier are provided by a power supply within the Amplifier Assembly.

Here are some trouble-isolation considerations:

a. Low-output voltage usually indicates a failed power unit. However, a faulty equipment unit may draw excessive power and pull the output voltage down or shut the power unit down.

b. A voltage transient may cause a power unit to shut down. That power unit can be reset by releasing, then re-latching, the latch catch.

Prerequisite: A power unit did not meet one or more output voltage requirements.



Flowchart 2. DC Power Diagnosis

Table B. DC Input Voltage Requirements

Battery Input Supply	Multimeter Test Connections			Requirement	Units Supplied
	Unit	Positive Test Lead	Common Test Lead		
–24 V	TRMTR PWR	–24V jack	GRD jack	–20.0 V to –28.5 V	TRMTR PWR MWV Generator TWT Power Supply POWER UNIT
	POWER UNIT (+10 V)	V IN – jack	V IN + jack		
–48 V	TRMTR PWR	–48V jack	GRD jack	–42.0 V to –60 V	
	POWER UNIT (+10 V)	V IN – jack	V IN + jack		

Table C. DC Output Voltage Requirements

ALARM AND METER Unit Switch Position	Multimeter Test Connections		Requirement	Units Supplied
	Positive Test Lead	Common Test Lead		
TRMTR +5V	+5V jack	GRD jack	+4.7 V to +5.3 V	Alarm and Meter IF Predistorter Up-Converter Solid-State Amplifier ALC Network
TRMTR –15V	–15V jack	GRD jack	–14.6 V to –15.4 V	
TRMTR +15V	+15V jack	GRD jack	+14.6 V to +15.4 V	Alarm and Meter IF Predistorter Up-Converter
TRMTR +10V (Solid State)	V 1 + jack	V 1 – jack	+9.7 V to +10.3 V	Solid-State Amplifier

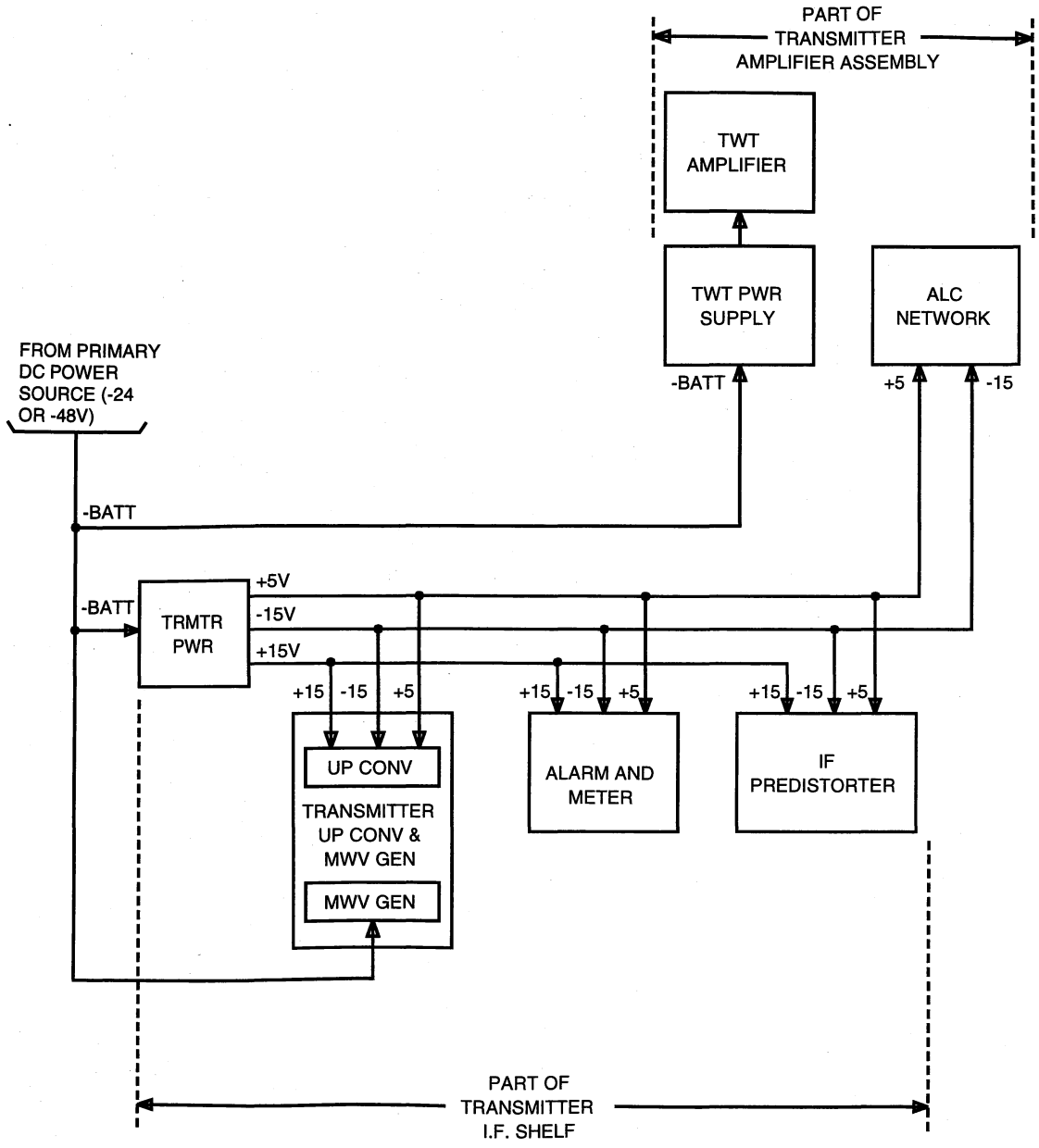


Figure 3. Power Distribution Diagram—TWT

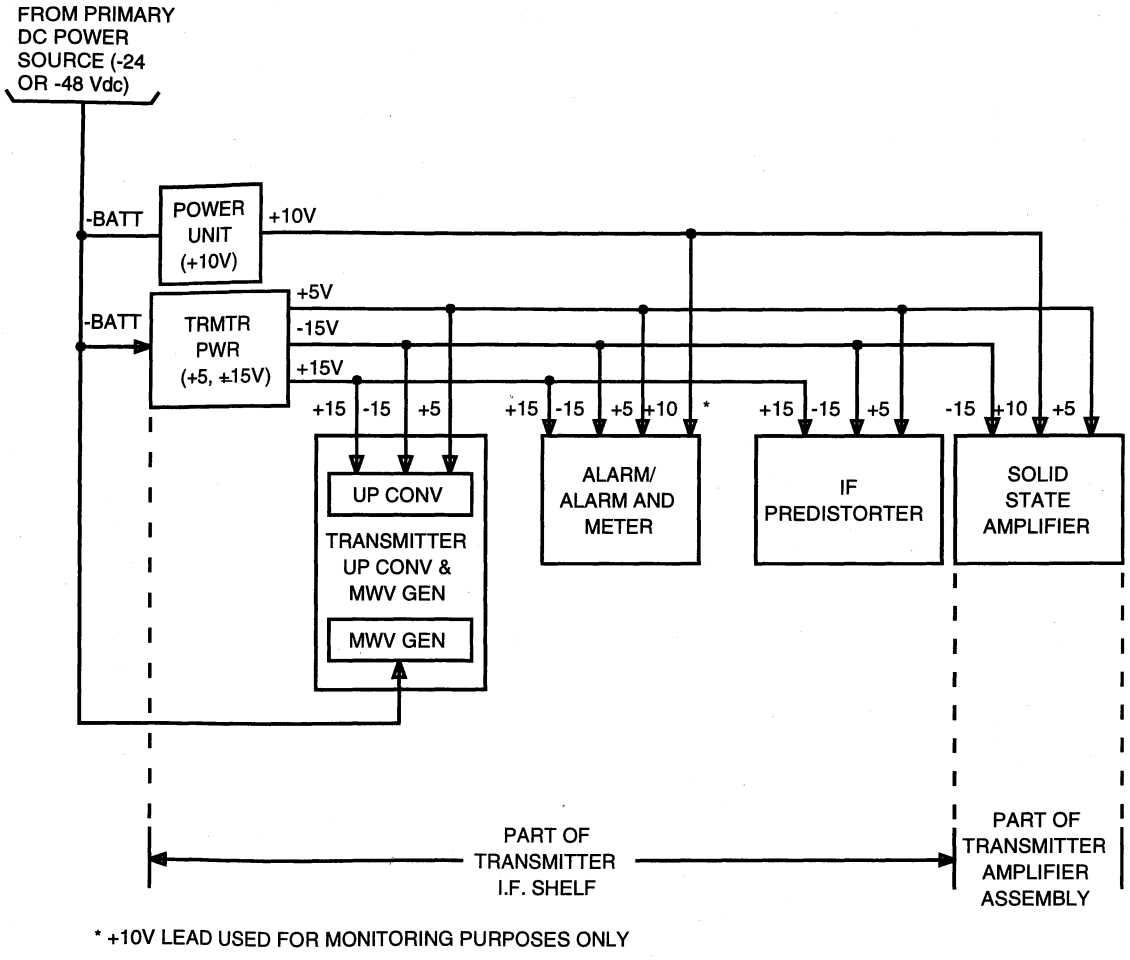
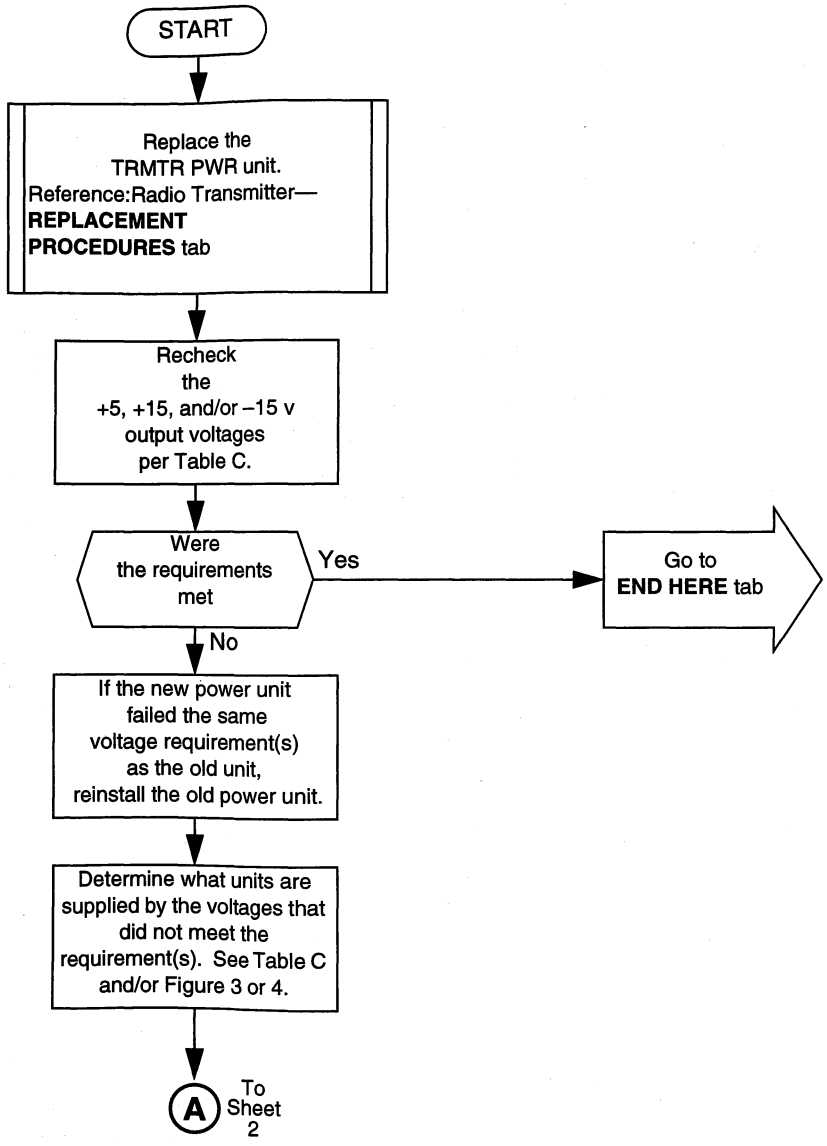


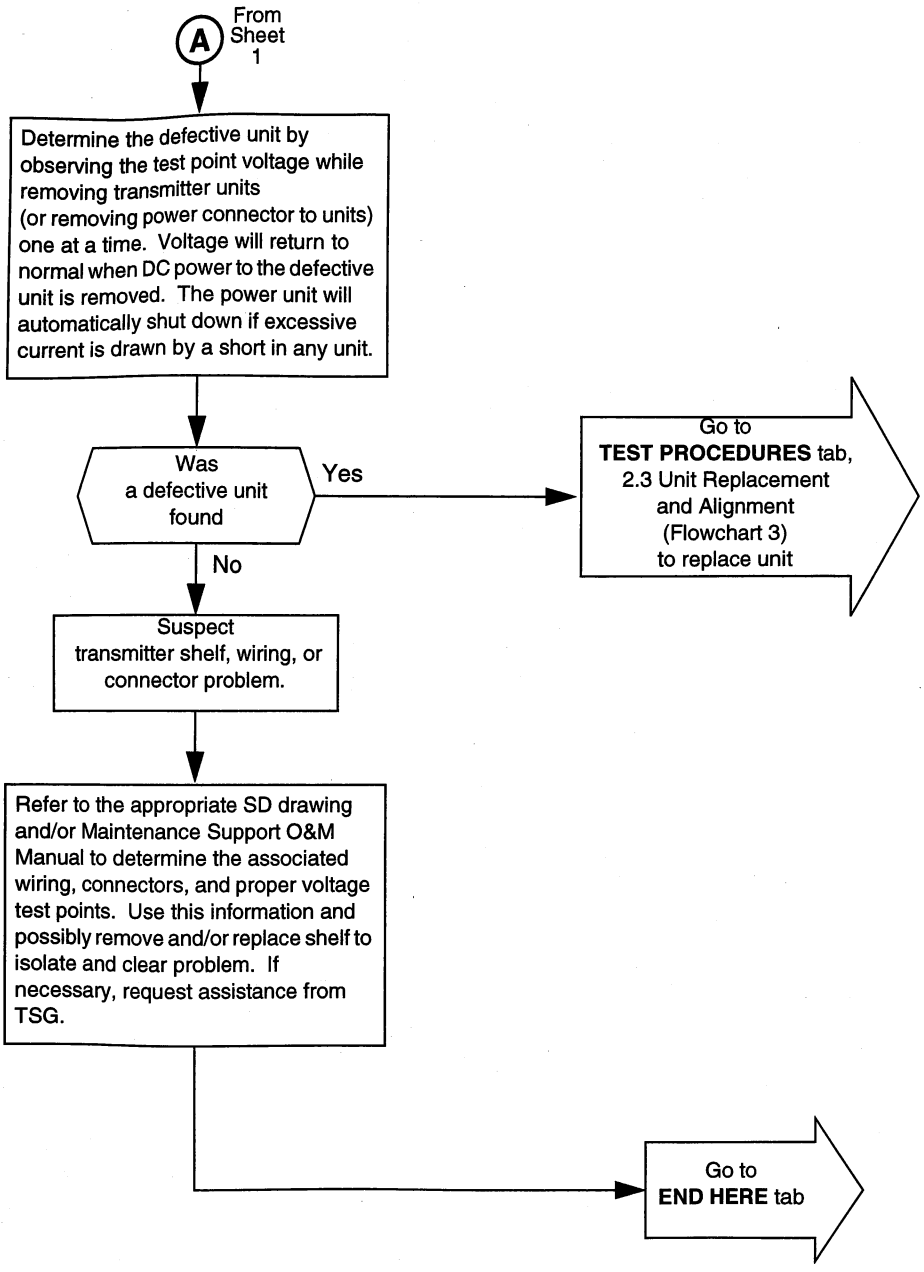
Figure 4. Power Distribution Diagram—Solid State

CAUTION:
This is an Out-of-Service procedure. Service will be interrupted or impaired unless you apply Service Protection measures.

Prerequisites: 1. The +5, +15 and/or –15 V output voltages of the TRMTR PWR unit did not meet requirement.
2. The –24 V or –48 V input voltage is within limits.



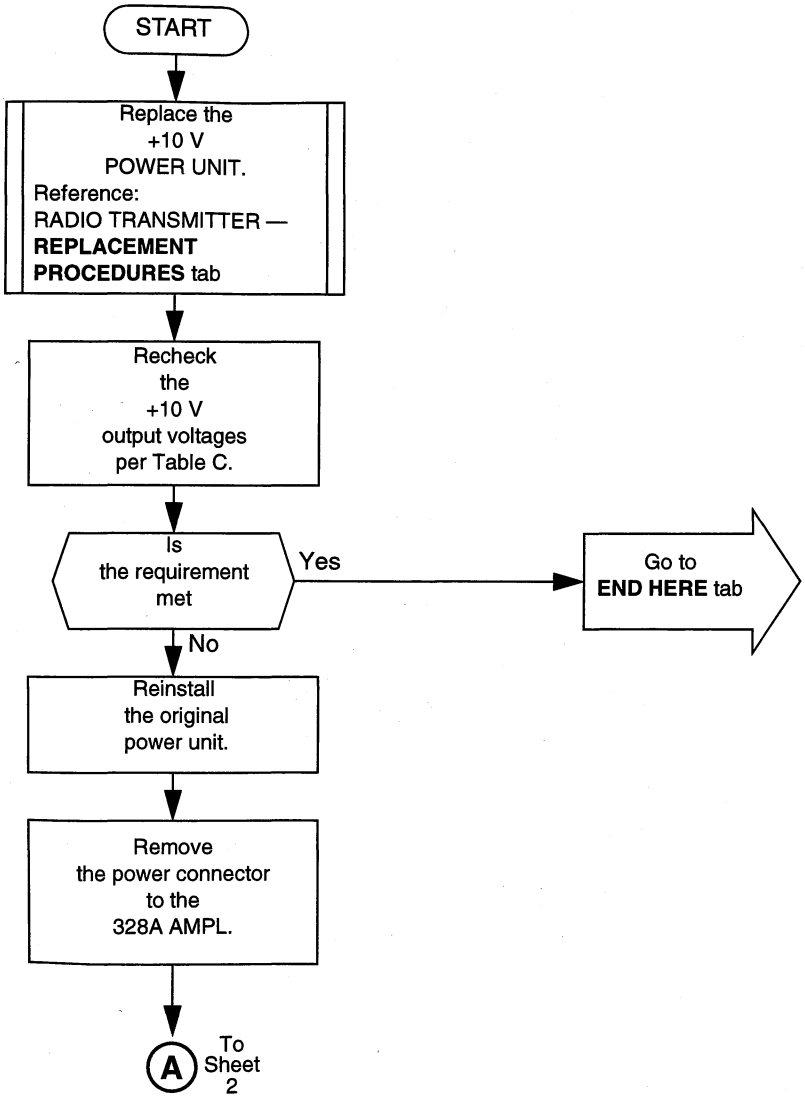
Flowchart 3. +5 /±15 V Output Voltage Diagnosis (Sheet 1 of 2)



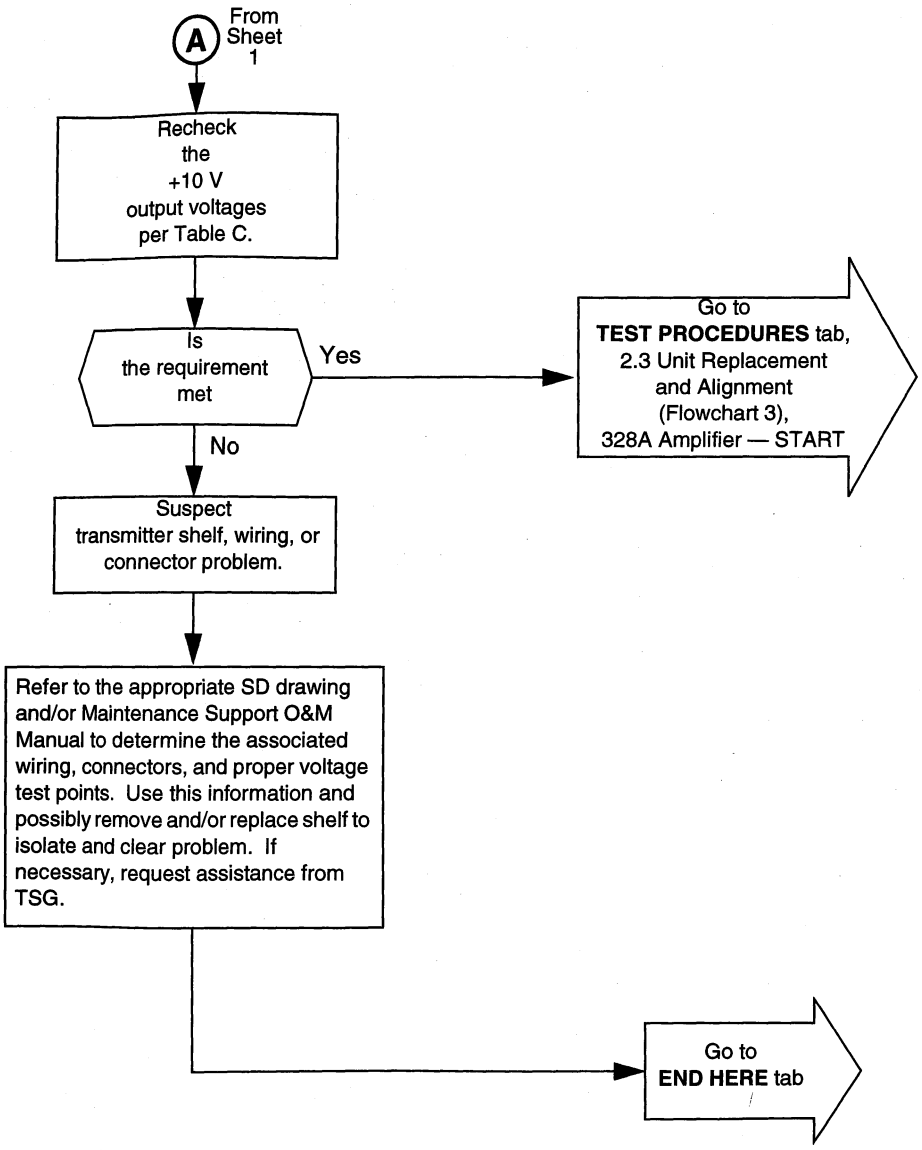
Flowchart 3. +5 /±15 V Output Voltage Diagnosis (Sheet 2 of 2)

CAUTION:
This is an Out-of-Service procedure. Service will be interrupted or impaired unless you apply Service Protection measures.

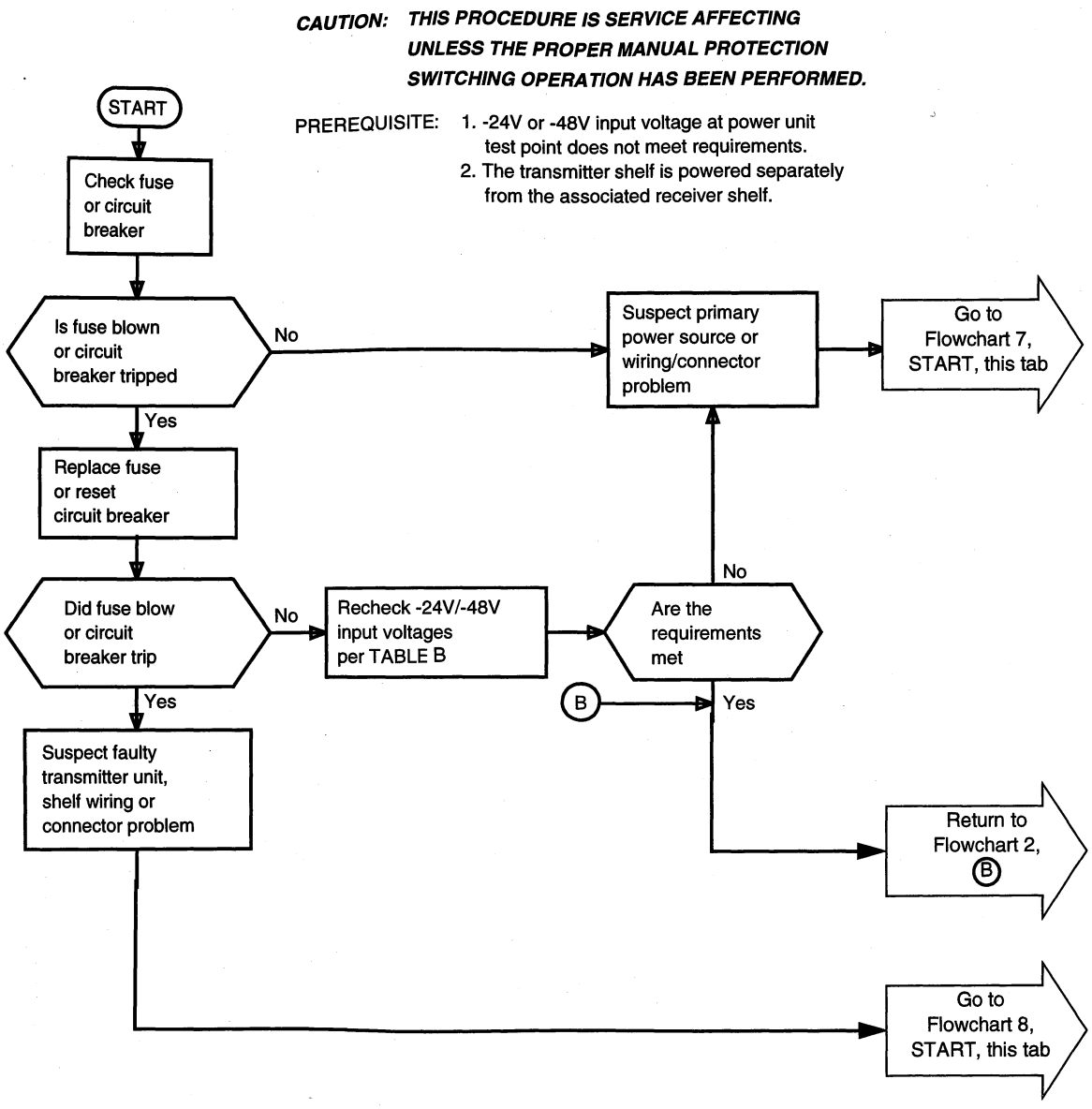
Prerequisites: 1. The +10 V output voltage of the +10 V POWER UNIT does not meet requirement.
2. The –24 V or –48 V input voltage is within limits.



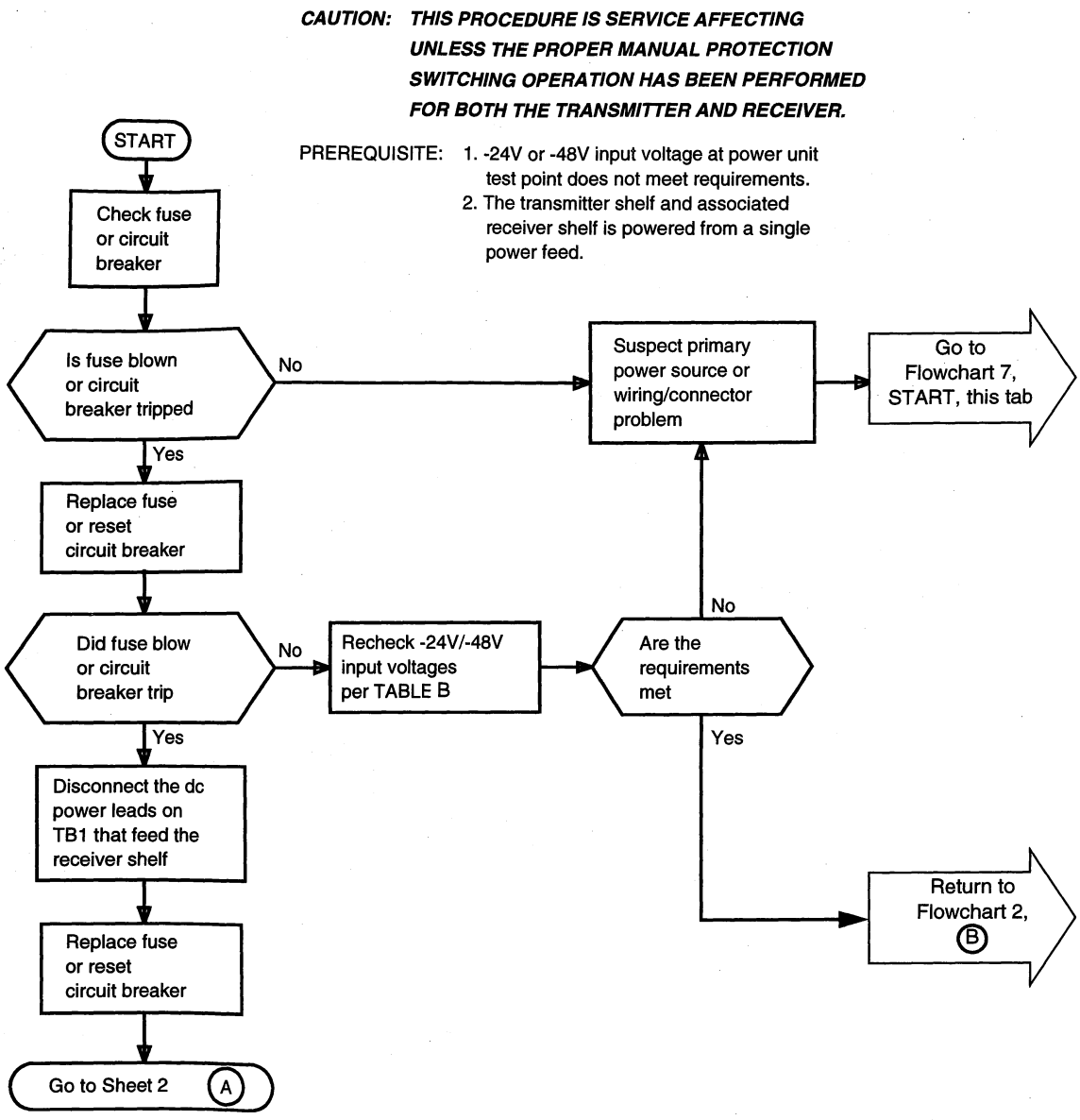
Flowchart 4. +10 V Output Voltage Diagnosis—Solid State (Sheet 1 of 2)



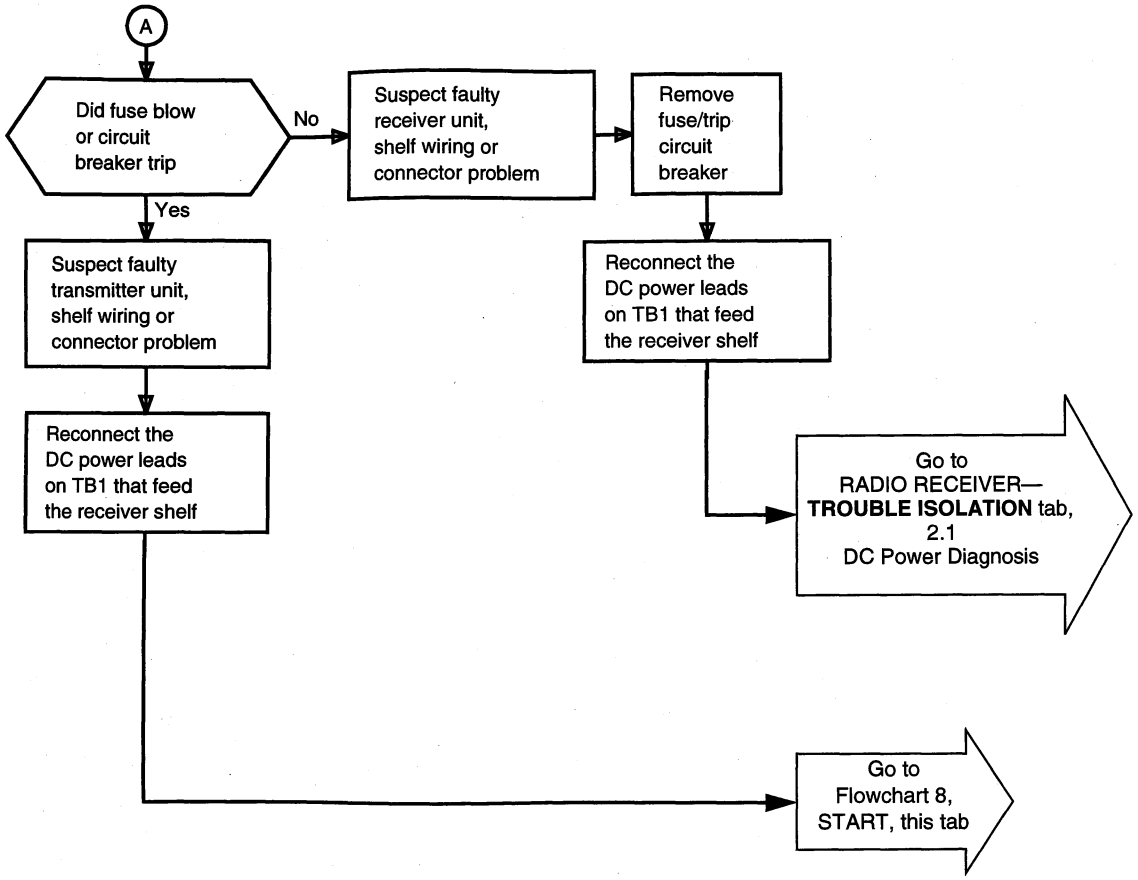
Flowchart 4. +10 V Output Voltage Diagnosis—Solid State (Sheet 2 of 2)



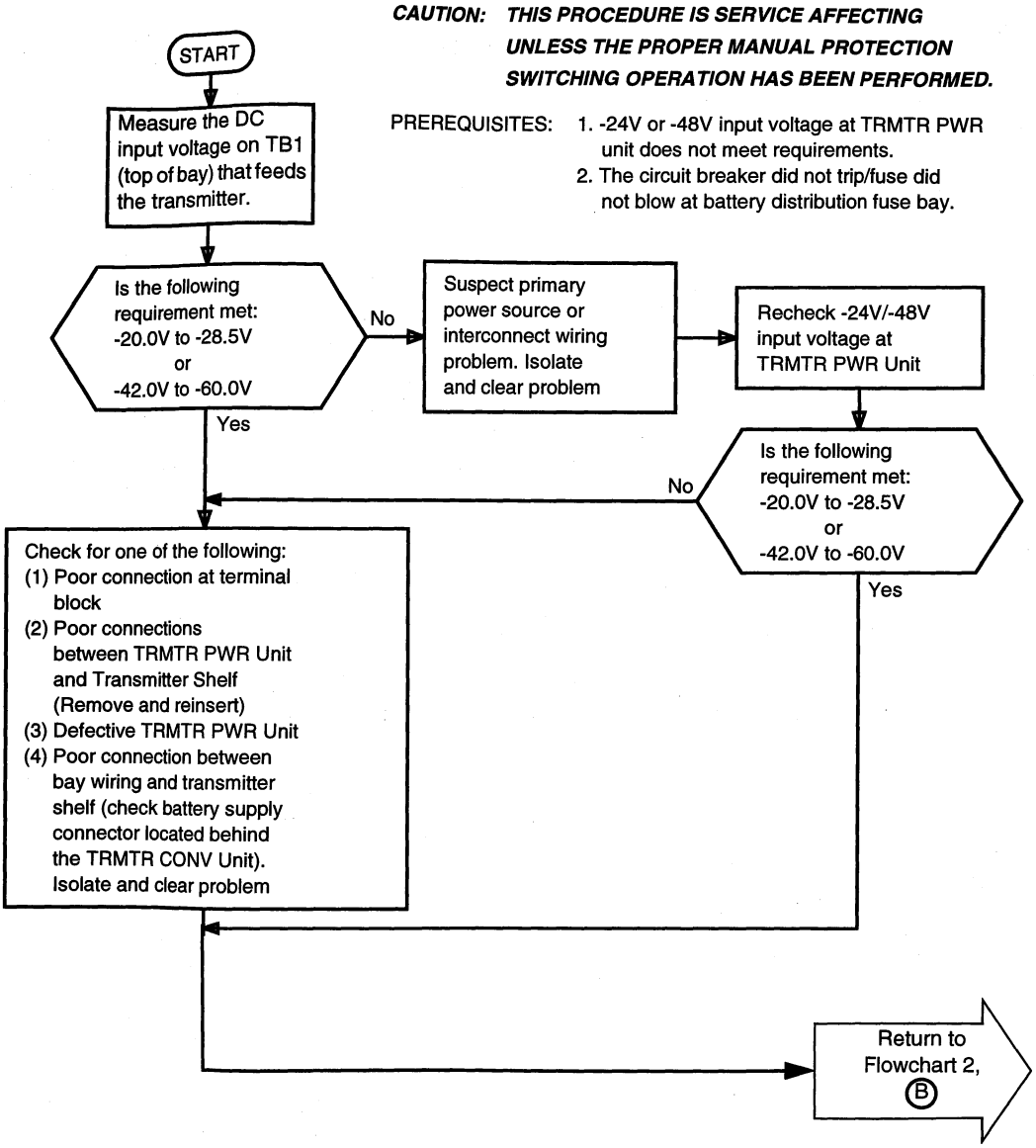
Flowchart 5. Input Voltage Diagnosis—Dual T/R Input Feed



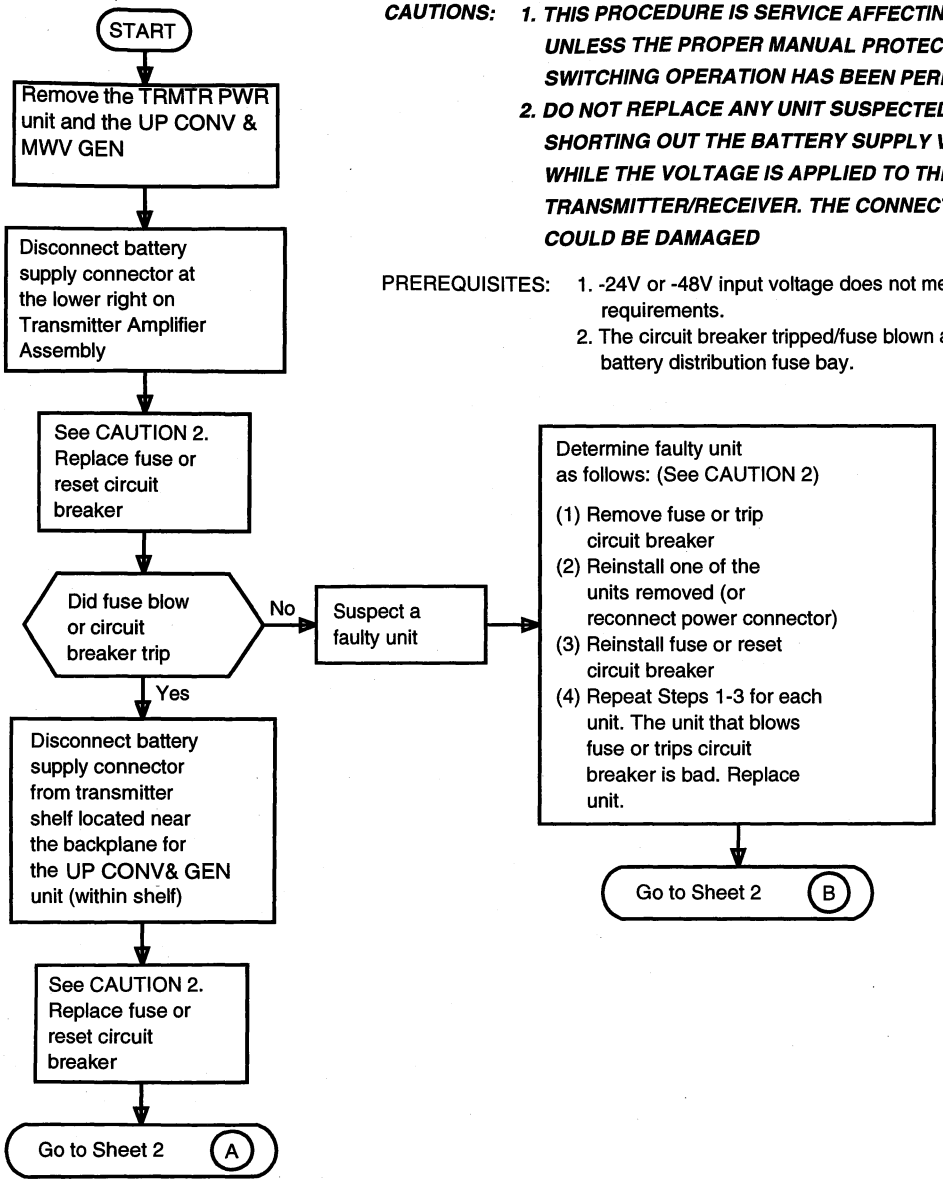
Flowchart 6. Input Voltage Diagnosis—Single T/R Input Feed (Sheet 1 of 2)



Flowchart 6. Input Voltage Diagnosis—Single T/R Input Feed (Sheet 2 of 2)



Flowchart 7. Input Voltage Diagnosis—Circuit Breaker Did Not Trip or Fuse Did Not Blow



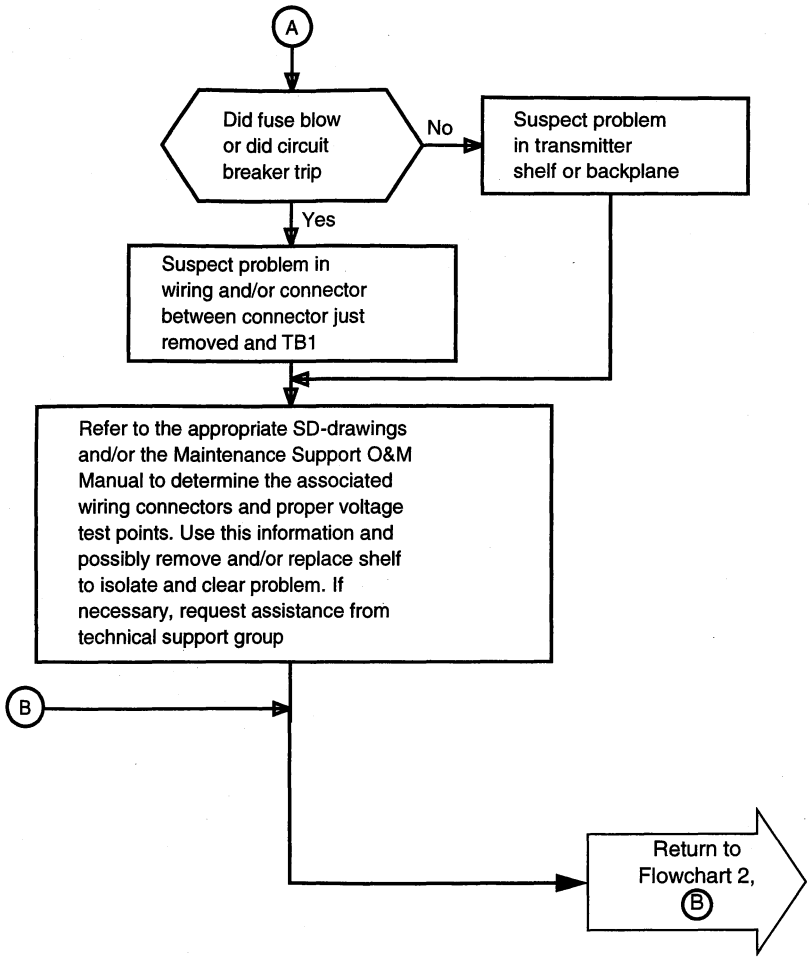
CAUTIONS:

1. ***THIS PROCEDURE IS SERVICE AFFECTING UNLESS THE PROPER MANUAL PROTECTION SWITCHING OPERATION HAS BEEN PERFORMED.***
2. ***DO NOT REPLACE ANY UNIT SUSPECTED OF SHORTING OUT THE BATTERY SUPPLY VOLTAGE WHILE THE VOLTAGE IS APPLIED TO THE TRANSMITTER/RECEIVER. THE CONNECTOR COULD BE DAMAGED***

PREREQUISITES:

1. -24V or -48V input voltage does not meet requirements.
2. The circuit breaker tripped/fuse blown at battery distribution fuse bay.

Flowchart 8. Input Voltage Diagnosis—Circuit Breaker Is Tripped or Fuse Is Blown (Sheet 1 of 2)



Flowchart 8. Input Voltage Diagnosis—Circuit Breaker Is Tripped or Fuse Is Blown (Sheet 2 of 2)

2.2 MWV Generator Oven Alarm Diagnosis

Flowchart 9 will guide you through the process of clearing a TRMTR — GEN OVEN alarm. The alarm occurs when the DC current to the oven in the microwave generator is outside specified limits.

Generally, the cause is a faulty MWV Generator, which is mounted inside the TRANSMITTER UP CONV & MWV GEN unit.

To replace the MWV Generator, you will be referred to a Unit Replacement and Alignment Flowchart in the RADIO TRANSMITTER—**TEST PROCEDURES** tab.

In that flowchart, you will perform these functions in this sequence:

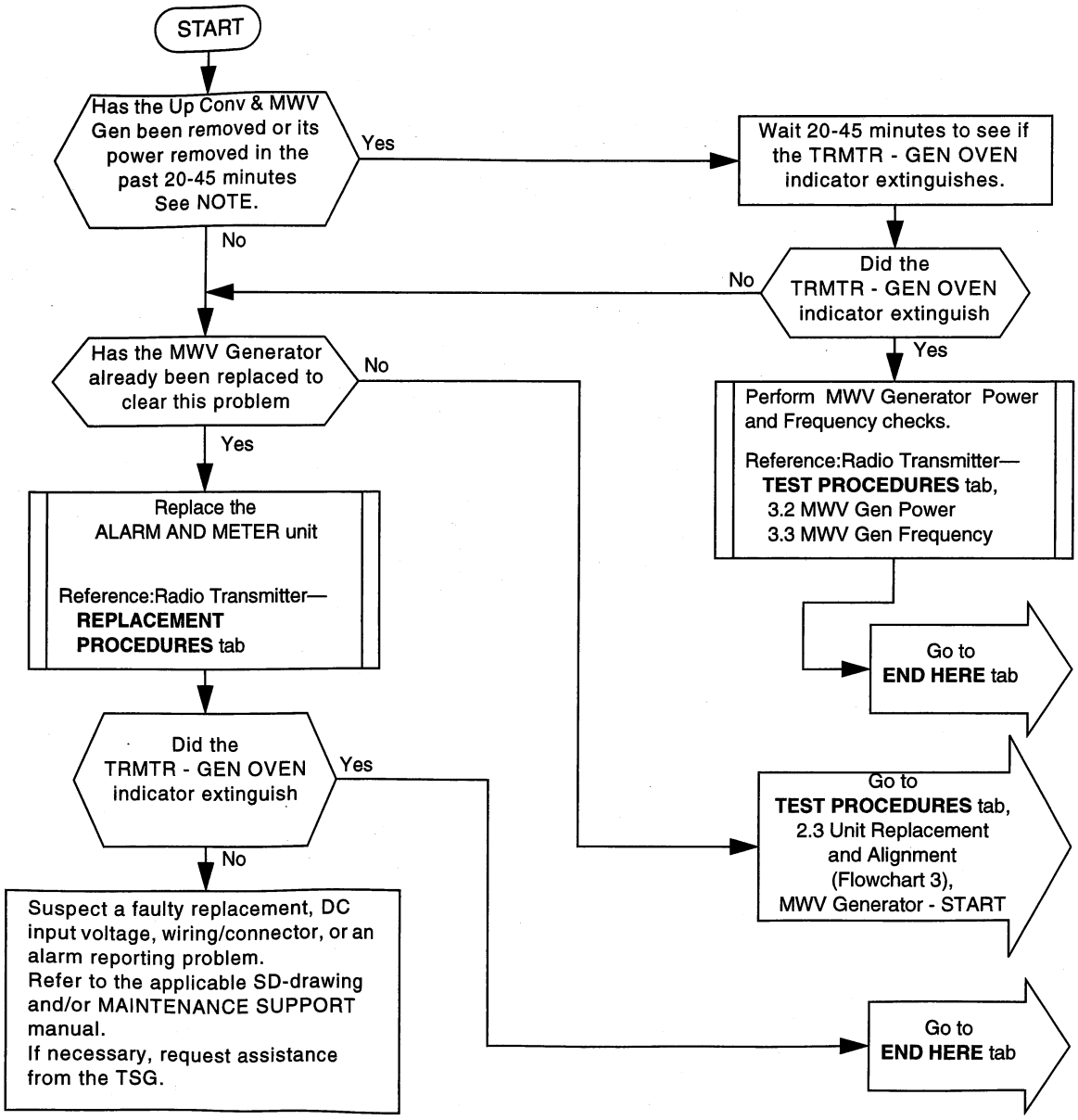
1. Replace the generator.
2. Wait for the GEN OVEN indicator to go off.
3. Perform the MWV Gen Power measurement.
4. Wait for warm-up.
5. Perform the MWV Gen Frequency measurement.

You will then return to Flowchart 9 in this tab.

CAUTION:
This is an Out-of-Service procedure. Service will be interrupted or impaired unless you apply Service Protection measures.

Prerequisite: TRMTR - GEN OVEN indicator is lighted on the ALARM AND METER unit.

NOTE:
The GEN OVEN indicator takes about 20 minutes to clear if the replacement is at room temperature and about 45 minutes if it is cold.



Flowchart 9. MWV Generator Oven Alarm Diagnosis

2.3 RF Power Alarm Diagnosis—TWT

Flowchart 10, RF Power Alarm Diagnosis, is the starting point for determining the source of a TRMTR — RF PWR alarm. From Flowchart 10, you will be sent to the **TEST PROCEDURES** tab.

General operating theory follows; you can proceed directly to Flowchart 10 and bypass the theory, if desired.

Transmitter RF Output Power Control and Monitoring

For satisfactory digital performance, the RF power level at the output of the TWT Amplifier must be held within a narrow operating range. A transmitter RF PWR alarm is activated whenever there is a high probability that the transmitter is operating outside this power range or is operating with poor performance. Several indicators of transmitter performance are used to trigger an RF PWR alarm. For effective trouble diagnosis, an understanding of these indicators and how they are activated is important.

The radio transmitter IF and RF gain stages are equipped with automatic level control (ALC) circuits. When all transmitter components are working normally, these ALC circuits act to hold the output power nearly constant by compensating for IF input level variations and gain variations in transmitter modules due to aging and environmental changes. The main transmitter ALC loop includes the up-converter and TWT Amplifier stages. The optional IF Predistorter, which, when used, precedes the up-converter and TWT Amplifier, has an internal ALC circuit that compensates for variations in input signal level to maintain a near constant output.

For the main ALC loop, an external ALC Network located at the output of the TWT Amplifier generates the loop control signal and performs the monitoring and RF PWR alarm functions.

Automatic Level Control Function

An RF detector circuit generates a voltage that is proportional to the RF output power. The voltage from the RF detector circuit is differentially compared with a reference voltage. After amplification, this difference, or error voltage (ALC V), is processed by additional driver shaping circuits to become the ALC loop control voltage. The control voltage (nominally –5 V) is used to control the gain of an IF amplifier in the IF section of the up-converter. When working properly, the ALC loop functions to hold the ALC V error voltage at essentially 0 volts. Since the reference voltage is adjusted on the basis of the desired RF output power, the ALC loop thus acts to hold the RF output power nearly constant by holding the ALC V error voltage close to 0 volts. The loop automatically adjusts the up-converter IF gain to compensate for changes in the IF input level to the up-converter, for gain changes in the internal RF stages of the up-converter, and for gain changes in the TWT Amplifier.

Transmitter RF Output Monitoring and Performance Indicators

For alarm purposes, the ALC V error voltage is monitored with the ALC Network. When this voltage is outside prescribed limits, the output power is outside of prescribed limits and a PWR OUT OF RANGE alarm is triggered on the face of the ALC Network.

The ALC Network is also equipped with an ON/OFF switch that, when off, disables the ALC loop by forcing the ALC loop control voltage to a fixed level at the input to the up-converter (midrange of variable gain stage of up-converter). When the switch is in the OFF position, an ALC OFF indicator lights. This switch position is used when a manual gain adjustment is made on the transmitter using the IF LEV adjustment on the up-converter.

For either a PWR OUT OF RANGE or ALC OFF condition, a common RF PWR alarm status signal is generated and sent to the ALARM AND METER unit. The RF PWR alarm will also be generated when the PREAL indicator on the Power Supply Control unit is activated. The PREAL indicator is activated when the TWT helix current is considered to be too high. A high helix current is an indicator of excessive beam defocusing within the TWT. The PREAL activates the transmitter RF PWR alarm to alert maintenance personnel that the performance of the transmitter may be degraded to the point that TWT Amplifier replacement is necessary.

Sources of a Transmitter RF PWR Alarm

The transmitter RF PWR alarm is normally caused by one of the following:

a. ALC switch on the ALC Network is operated to the OFF position (ALC OFF indicator lighted).

b. ON/OFF switch on the Power Supply Control unit is operated to the OFF position (AL indicator lighted).

c. TRANS/STBY switch on the Power Supply Control unit is operated to the STBY position (AL indicator lighted).

d. IF input level to the radio transmitter is high or low.

e. RF input level to the TWT Amplifier is high or low.

f. TWT is on preheat cycle (ON indicator on Power Supply Control unit not lighted).

g. TWT cathode current is too low (ON indicator on Power Supply Control unit not lighted).

h. TWT helix current is too high (PREAL indicator on Power Supply Control unit lighted).

i. TWT Power Supply is shut down (AL indicator on Power Supply Control unit lighted).

j. IF Predistorter, TRANSMITTER UP CONV & MWV GEN, TWT Amplifier, TWT Power Supply, or ALC Network has failed.

RF PWR Alarm-Reporting Problems Diagnosis

Whenever the RF PWR alarm is lighted on the radio ALARM AND METER unit, the ALC OFF and/or the PWR OUT OF RANGE indicator on the associated ALC Network or the PREAL indicator on the Power Supply Control unit should also be lighted. (See alarm-reporting information under the **START HERE** tab.) When an RF PWR alarm exists and the above indicators are not lighted, a failure in the alarm-reporting circuits within one or more of the above units or the ALARM AND METER unit is most likely the cause. A DC voltage or an interconnecting circuit path problem may also result in such a situation.

The best way to isolate the problem is to check the alarm status signals coming to the radio transmitter/receiver (T/R) centralized ALARM AND METER unit from the various alarm-reporting units mentioned above. This can be done by putting the ALARM AND METER unit into an extender plug-in unit. While in an extender, the access necessary to determine the state of the associated alarm input signals is possible.

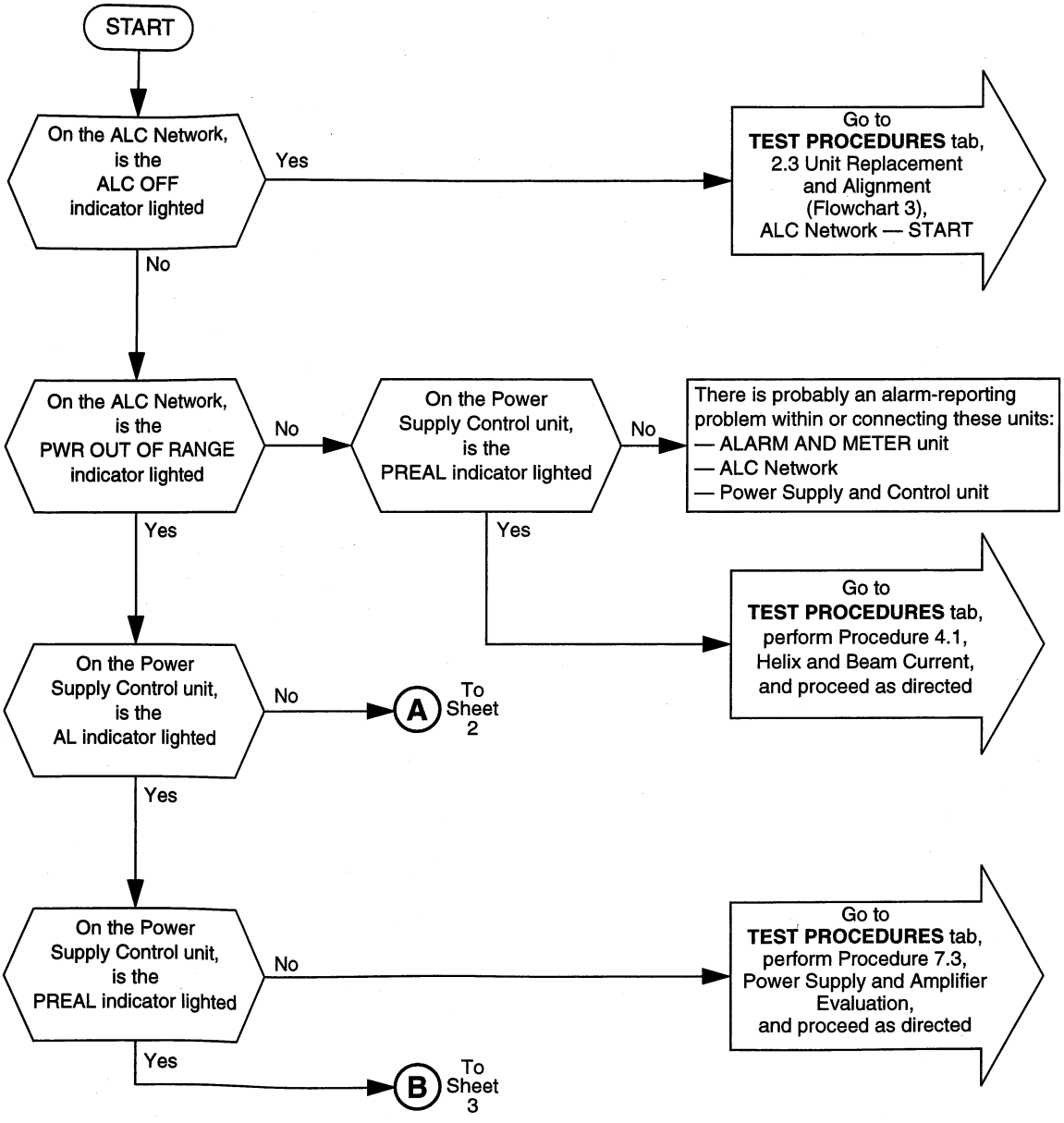
If the alarm status voltage at the ALARM AND METER unit agrees with the RF PWR alarm indicator on that unit, the ALARM AND METER unit is most likely operating properly. The discrepancy is most likely in the circuit reporting the false state or in the wiring path between it and the ALARM AND METER unit. If the status voltage at the input to the ALARM AND METER unit does not agree with the RF PWR indicator, then the alarm-reporting discrepancy is most likely due to a failure within the ALARM AND METER unit.

The Maintenance Support Operation and Maintenance (O&M) Manual and the applicable SD drawings provide the connection and input pin status information necessary for this evaluation.

Proceed to the **END HERE** tab when the alarm-reporting discrepancy problem is resolved.

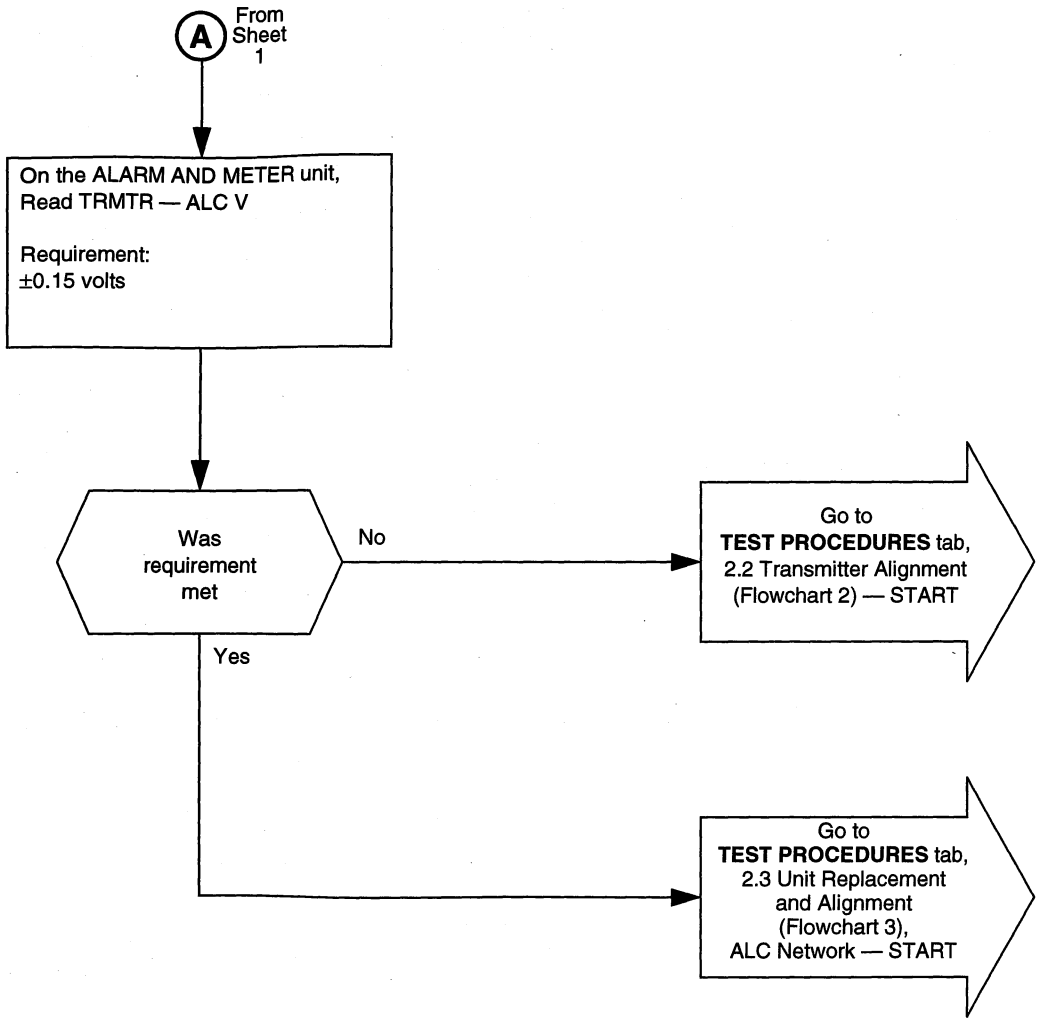
CAUTION:
This is an Out-of-Service procedure. Service will be interrupted or impaired unless you apply Service Protection measures.

Prerequisites: 1. TRMTR — RF PWR indicator is lighted on the ALARM AND METER unit.
2. All switches are in normal positions.



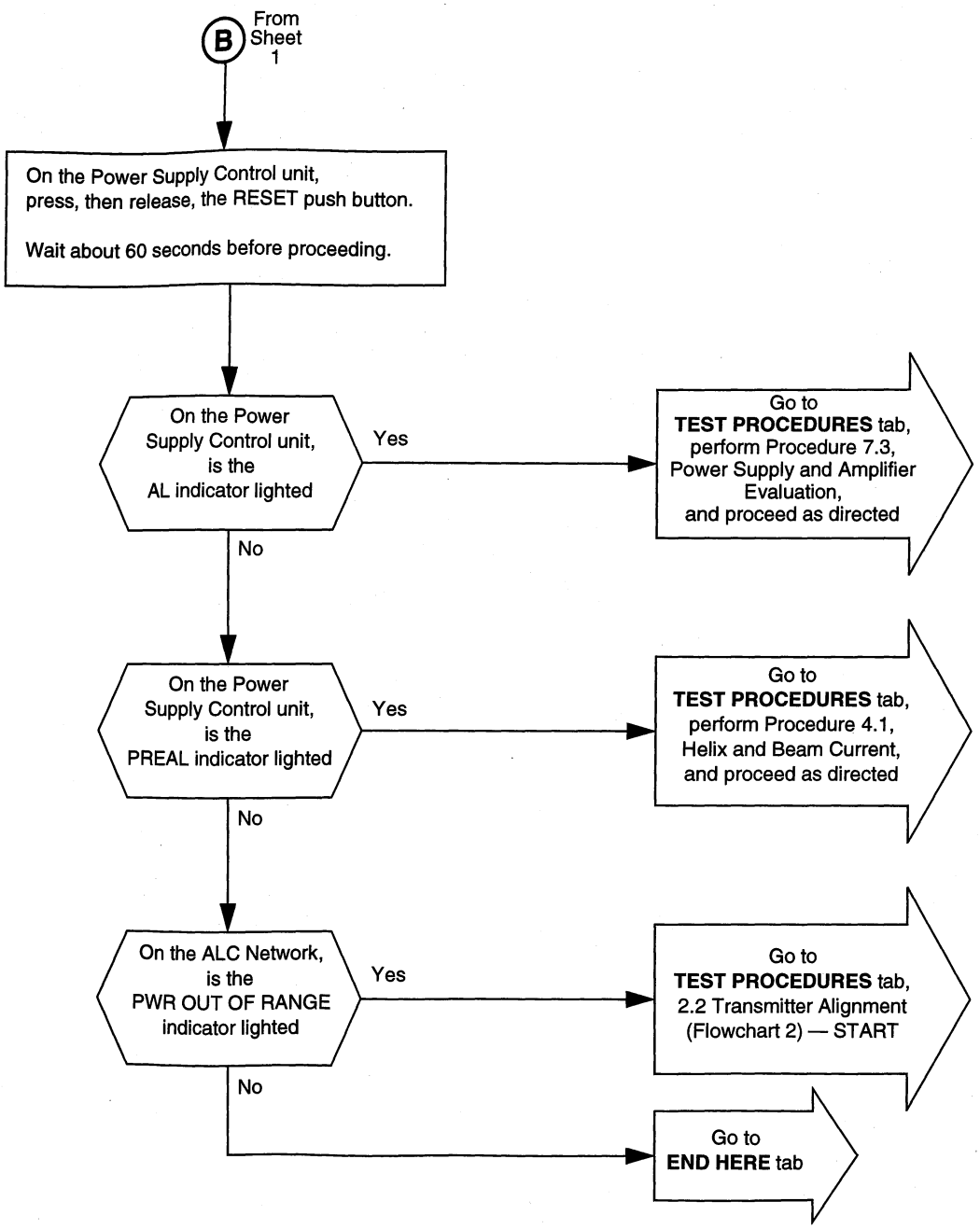
Flowchart 10. RF Power Alarm Diagnosis—TWT (Sheet 1 of 3)

Prerequisite: PWR OUT OF RANGE indicator lighted on the ALC Network.



Flowchart 10. RF Power Alarm Diagnosis—TWT (Sheet 2 of 3)

Prerequisites: 1. PWR OUT OF RANGE indicator lighted on the ALC Network.
2. PREAL and AL indicators lighted on the Power Supply Control unit.



Flowchart 10. RF Power Alarm Diagnosis—TWT (Sheet 3 of 3)

2.4 RF Power Alarm Diagnosis—Solid State

Flowchart 11, RF Power Alarm Diagnosis, is the starting point for determining the source of a TRMTR — RF PWR alarm. From Flowchart 11, you will be sent to the **TEST PROCEDURES** tab.

General operating theory follows; you can proceed directly to Flowchart 11 and bypass the theory, if desired.

Transmitter RF Output Power Control and Monitoring

For satisfactory digital performance, the RF power level at the output of the power amplifier must be held within a narrow operating range. A transmitter RF PWR alarm is activated whenever there is a high probability that the transmitter is operating outside this power range or is operating with poor performance. Several indicators of transmitter performance are used to trigger an RF PWR alarm. For effective trouble diagnosis, an understanding of these indicators and how they are activated is important.

The radio transmitter IF and RF gain stages are equipped with automatic level control (ALC) circuits. When all transmitter components are working normally, these ALC circuits act to hold the output power nearly constant by compensating for IF input level variations and gain variations in transmitter modules due to aging and environmental changes. The main transmitter ALC loop includes the up-converter and power amplifier stages. The optional IF Predistorter unit, which, when used, precedes the up-converter and power amplifier, has an internal ALC circuit that compensates for variations in input signal level to maintain a near constant output.

For the main ALC loop, an internal ALC circuit located at the output of the power amplifier generates the loop control signal and performs the monitoring and RF PWR alarm functions.

Automatic Level Control Function

An RF detector circuit generates a voltage that is proportional to the RF output power. The voltage from the RF detector circuit is differentially compared with a reference voltage. After amplification, this difference, or error voltage (ALC V), is processed by additional driver shaping circuits to become the ALC loop control voltage. The control voltage (nominally –5 V) is used to control the gain of an IF amplifier in the IF section of the up-converter unit. When working properly, the ALC loop functions to hold the ALC V error voltage at essentially 0 volts. Since the reference voltage is adjusted on the basis of the desired RF output power, the ALC loop thus acts to hold the RF output power nearly constant by holding the ALC V error voltage close to 0 volts. The loop automatically adjusts the up-converter IF gain to compensate for changes in the IF input level to the up-converter, for gain changes in the internal RF stages of the up-converter, and for gain changes in the power amplifier.

Transmitter RF Output Monitoring and Performance Indicators

For alarm purposes, the ALC V error voltage is monitored by circuits within the power amplifier. When this voltage is outside prescribed limits, the output power is outside of prescribed limits and a PWR OUT OF RANGE alarm is triggered on the face of the solid-state amplifier.

The solid-state amplifier is also equipped with an ON/OFF switch that, when off, disables the ALC loop by forcing the ALC loop control voltage to a fixed level at the input to the up-converter unit (midrange of variable gain stage of up-converter). When the switch is in the OFF position, an ALC OFF indicator lights. This switch position is used when a manual gain adjustment is made on the transmitter using the IF LEV adjustment on the up-converter.

For either a PWR OUT OF RANGE or ALC OFF condition, a common RF PWR alarm status signal is generated and sent to the centralized ALARM AND METER unit.

Sources of a Transmitter RF PWR Alarm

The transmitter RF PWR alarm is normally caused by one of the following:

a. ALC switch on the 328A Amplifier is operated to the OFF position (ALC OFF indicator lighted).

b. IF input level to the radio transmitter is high or low.

c. RF input level to the 328A Amplifier is high or low.

d. 328A Amplifier is shut down [power unit(s) turned off or defective].

e. IF Predistorter, TRANSMITTER UP CONV & MWV GEN, or 328A Amplifier is defective.

RF PWR Alarm-Reporting Problems Diagnosis

When the RF PWR alarm is lighted on the radio ALARM AND METER unit, the ALC OFF and/or the PWR OUT OF RANGE indicator on the associated solid-state amplifier should also be lighted. (See alarm-reporting information under the **START HERE** tab.) When an RF PWR alarm exists and the above indicators are not lighted, a failure in the alarm-reporting circuits within one or more of the above units or the ALARM AND METER unit is most likely the cause. A DC voltage or an interconnecting circuit path problem may also result in such a situation.

The best way to isolate the problem is to check the alarm status signals coming to the radio transmitter/receiver (T/R) centralized ALARM AND METER unit from the various alarm-reporting units mentioned above. This can be done by putting the ALARM AND METER unit into an extender plug-in unit. While in an extender, the access necessary to determine the state of the associated alarm input signals is possible.

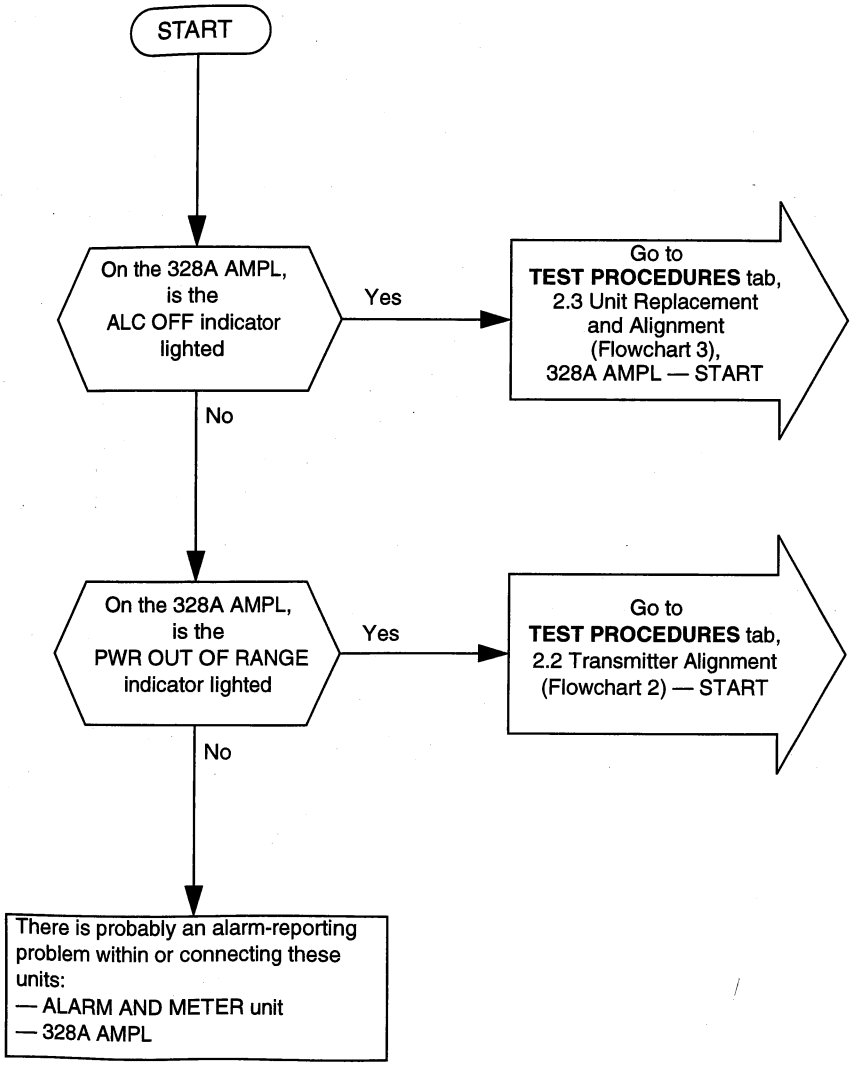
If the alarm status voltage at the ALARM AND METER unit agrees with the RF PWR alarm indicator on that unit, the ALARM AND METER unit is most likely operating properly. The discrepancy is most likely in the circuit reporting the false state or in the wiring path between it and the ALARM AND METER unit. If the status voltage at the input to the ALARM AND METER unit does not agree with the RF PWR indicator, then the alarm-reporting discrepancy is most likely due to a failure within the ALARM AND METER unit.

The Maintenance Support O&M Manual and the applicable SD drawings provide the connection and input pin status information necessary for this evaluation.

Proceed to the **END HERE** tab when the alarm-reporting discrepancy problem is resolved.

CAUTION:
This is an Out-of-Service procedure. Service will be interrupted or impaired unless you apply Service Protection measures.

Prerequisites: 1. TRMTR — RF PWR indicator is lighted on the ALARM AND METER unit.
2. All switches are in normal positions.



Flowchart 11. RF Power Alarm Diagnosis—Solid State

3 Additional Trouble Isolation

3.1 RF Level Problem (Transmitter)

WARNING:
RF radiation in excess of 1 milliwatt may cause bodily harm. Do not open any radio transmitter RF connection until the IF drive signal has been removed.

This procedure will assist you in locating a radio transmitter RF level problem when there is ***no alarm.***

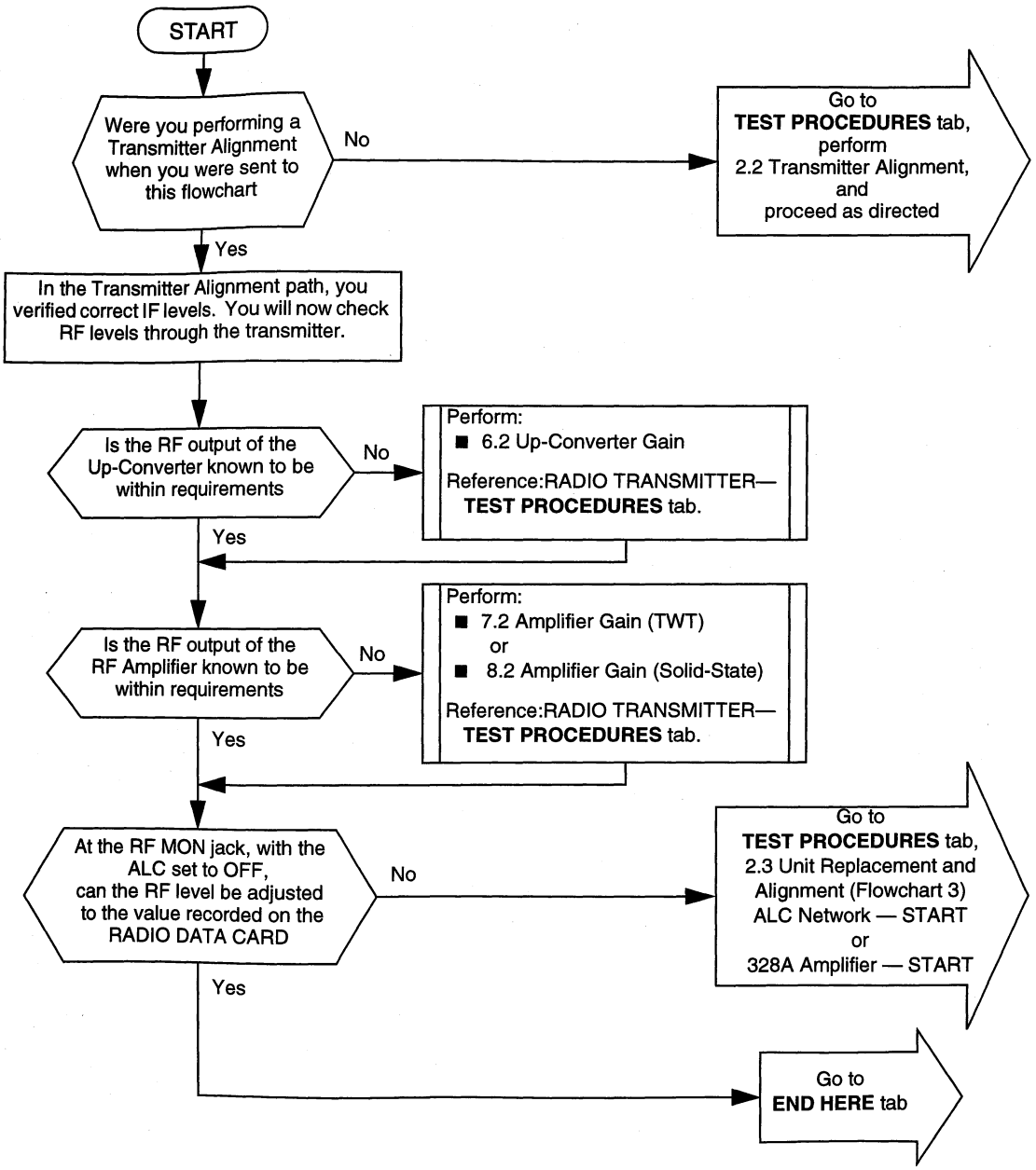
Flowchart 12, RF Level Problem, should be entered from the radio transmitter test procedures path.

Flowchart 12 may also be entered from the radio receiver trouble isolation path. In this case you will be sent to perform a transmitter alignment. You may then be referred back to this flowchart if the RF level problem still exists after checking IF levels and the MWV generator power and frequency.

If you are directed to repeat a test or procedure that you have already performed during this maintenance activity, and you already know the results of the test, you may go on to the next step. In other words, do not repeat tests if you already know the results.

CAUTION:
This is an Out-of-Service procedure. Verify that service is protected.

Prerequisite: The RF level measured at the RF OUT jack on the ALC Network (TWT) or 328A AMPL (Solid State) is not within its required range.



Flowchart 12. RF Level Problem

3.2 IF Level Problem

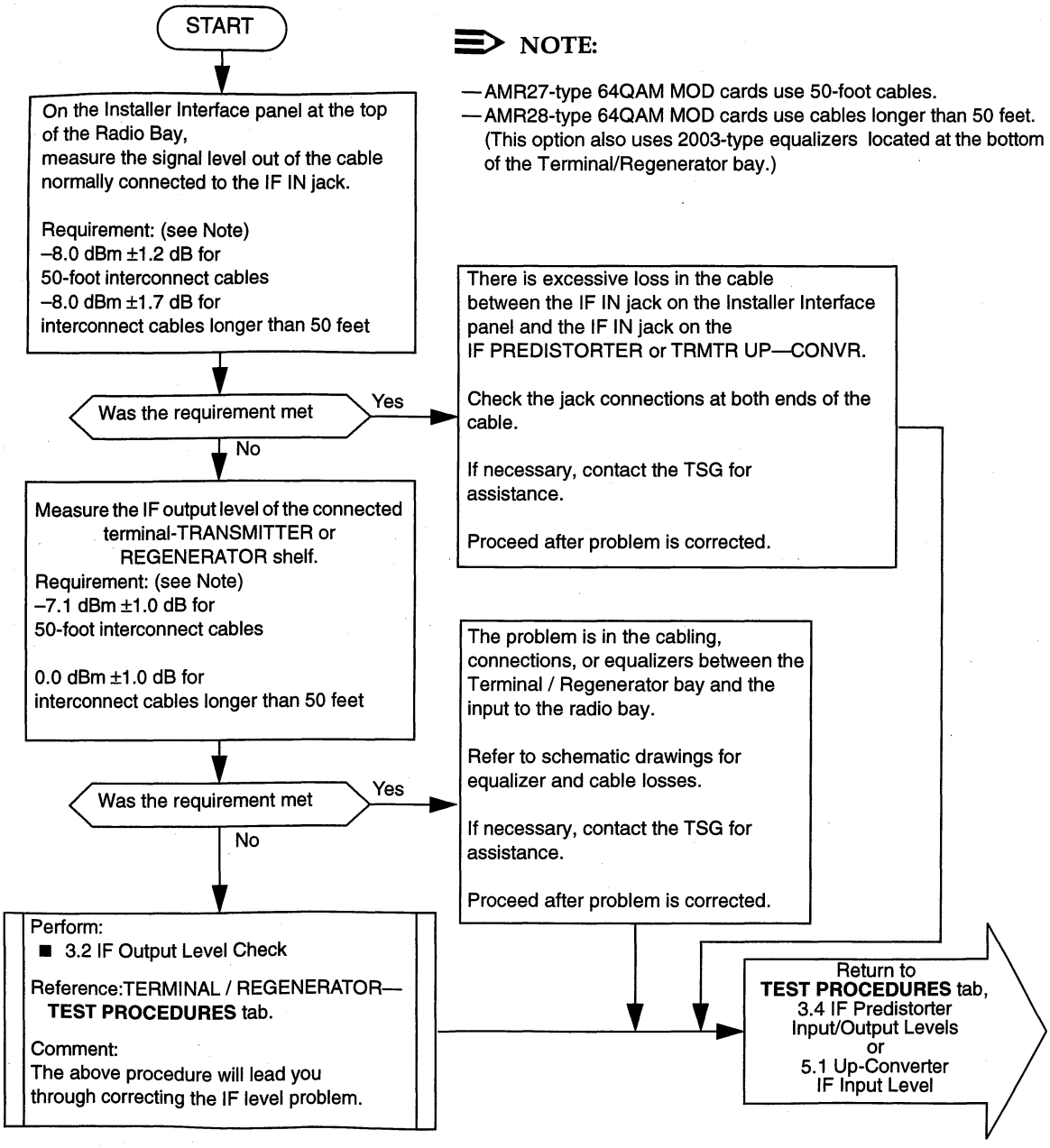
This procedure will assist you in locating an IF level problem.

Flowchart 13, IF Level Problem, is entered from the radio transmitter test procedures path.

If you are directed to repeat a test or procedure that you have already performed during this maintenance activity, and you already know the results of the test, you may go on to the next step. In other words, do not repeat tests if you already know the results.

CAUTION:
This is an Out-of-Service procedure. Verify that service is protected.

Prerequisite: The IF signal level at the input to the IF PREDISTORTER (if equipped) or TRANSMITTER UP CONV & MWV GEN is not within its required range.



Flowchart 13. IF Level Problem

3.3 Slope and Frequency Response Problem

WARNING:
RF radiation in excess of 1 milliwatt may cause bodily harm. Do not open any radio transmitter RF connection until the IF drive signal has been removed.

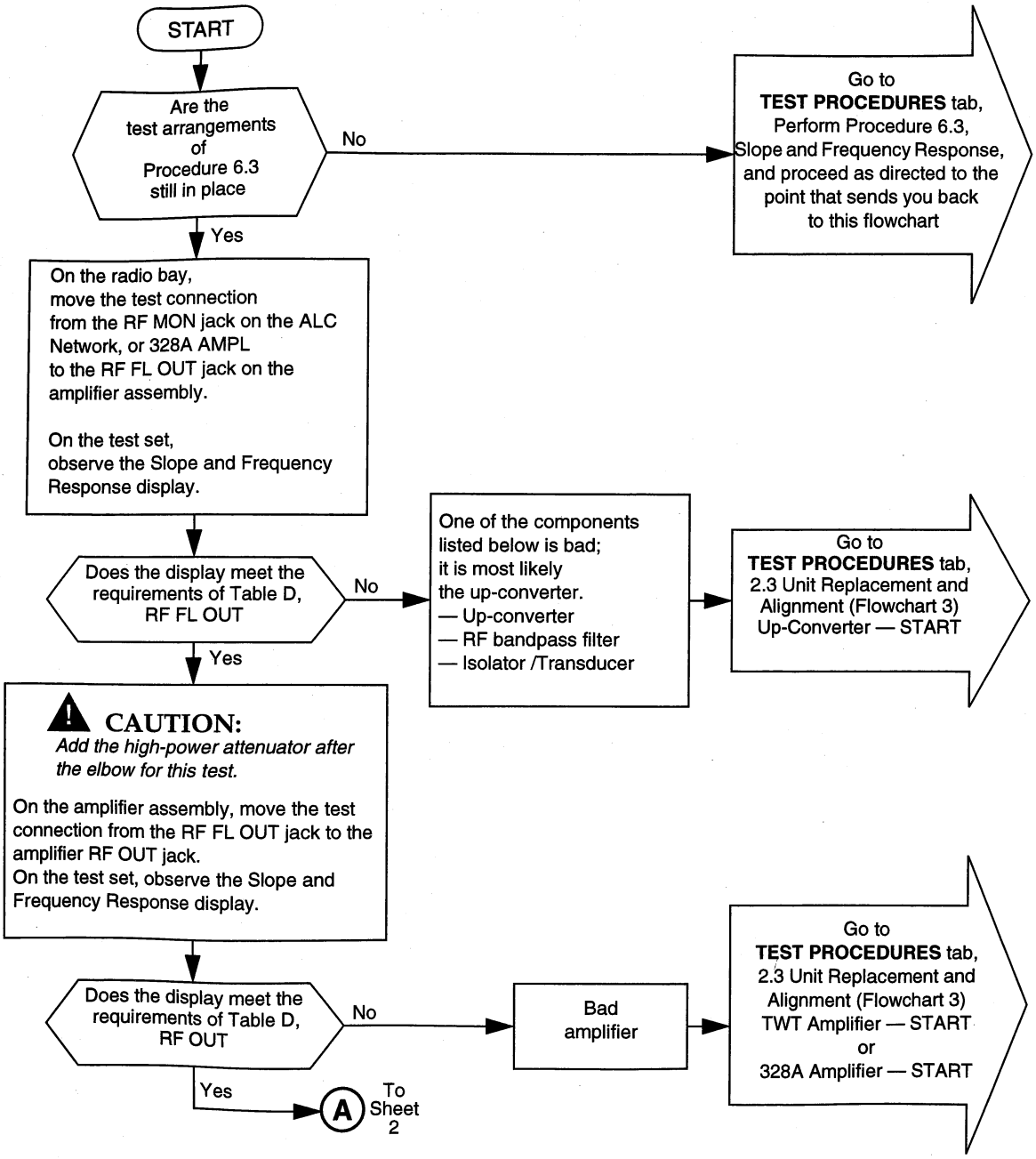
This procedure will assist you in locating a slope and frequency response problem when there is ***no alarm.***

Flowchart 14, Slope and Frequency Response Problem, is entered from the radio transmitter test procedures path.

If you are directed to repeat a test or procedure that you have already performed during this maintenance activity, and you already know the results of the test, you may go on to the next step. In other words, do not repeat tests if you already know the results.

CAUTION:
This is an Out-of-Service procedure. Verify that service is protected.

Prerequisite: The requirements of Procedure 6.3 Slope and Frequency Response (**TEST PROCEDURES** tab) were not met.

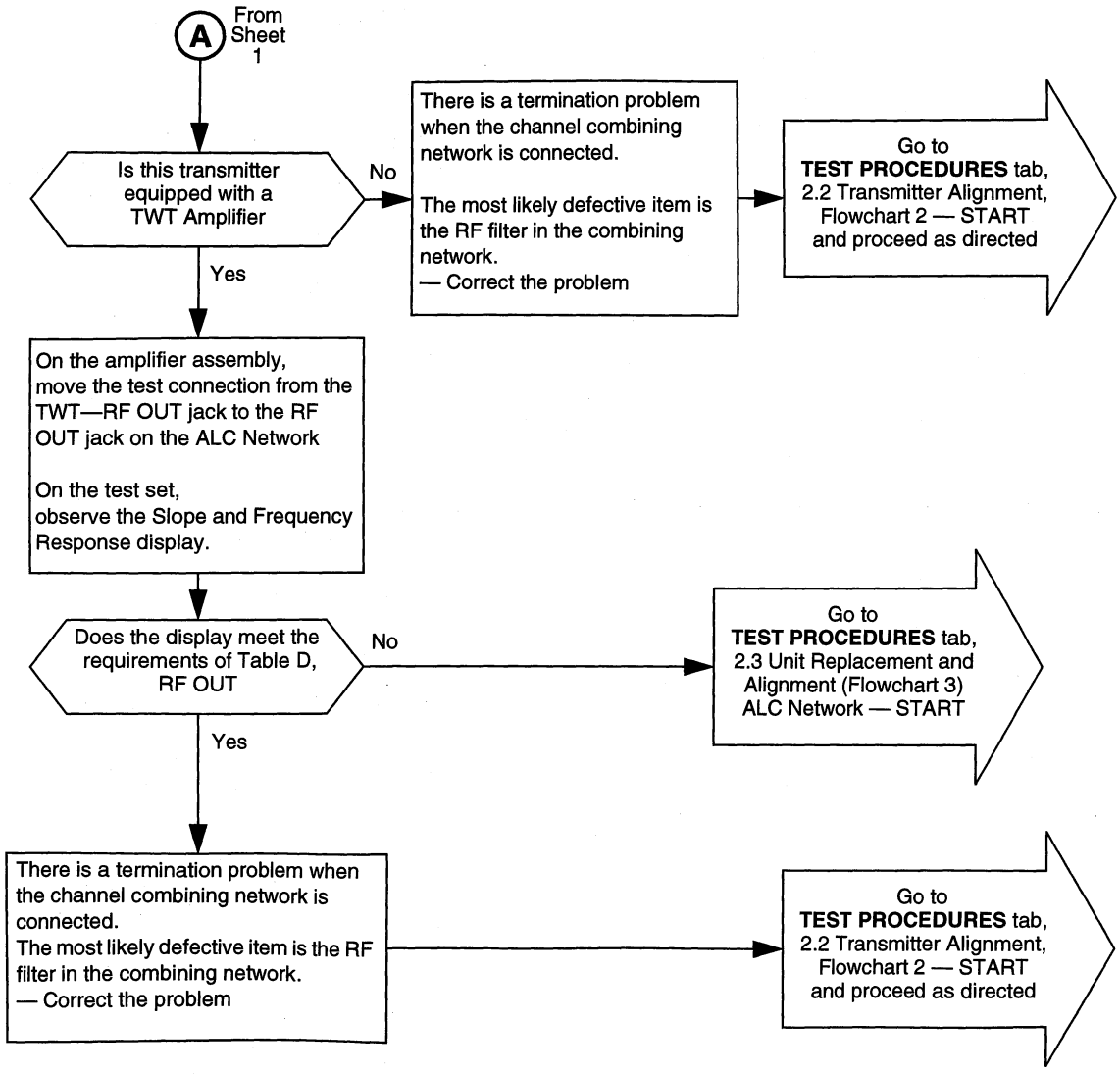


Flowchart 14. Slope and Frequency Response Problem (Sheet 1 of 2)

Table D. Slope and Response Requirements

Measurement Point	Slope Between 58 and 82 MHz *	Amplitude Variation From 58 to 82 MHz
RF FL OUT	± 0.6 dB	± 0.4 dB
RF OUT (amplifier)	± 0.1 dB	± 0.8 dB

* Maximum slope allowed with SLOPE ADJ control on TRANSMITTER UP CONV & MWV GEN adjusted for minimum slope.



Flowchart 14. Slope and Frequency Response Problem (Sheet 2 of 2)