

**OPERATION AND MAINTENANCE
HOT STANDBY
DR 6/11-135A AND 135EC
TWT AMPLIFIER
TRANSMITTER SUBROUTINES**

CONTENTS	PAGE
Logic Diagrams	
SR 1—Condition Transmitter for Repair Verification	3
SR 2—Isolating Manual Gain Problems to Before or After TRMTR CONV Unit	5
SR 2-1—Resolving Manual Gain Problems Before TRMTR CONV Unit	7
SR 2-2—Resolving Bay IF Input Level Problems	8
SR 3—Isolating Manual Gain Problems to Within or After TRMTR CONV Unit	9
SR 3-1—Resolving Suspected TRMTR CONV Unit Manual Gain Problem	11
SR 3-2—Resolving Suspected Filter/Cable Problem Between Up-Converter Output and Amplifier Input	13
SR 3-3—Adjustment Attempt to Resolve Suspected TWT Amplifier Low Gain Problem	14
SR 3-4—Resolving Suspected TWT Amplifier Power Supply Unit Manual Gain Problems	17
SR 3-5—Resolving Suspected ALC NETWORK Unit Manual Gain Problems	20
SR 3-6—Resolving Suspected Cable/Connector Problem Between Amplifier Output and ALC NETWORK Input	21
SR 4—Isolating Automatic Gain Problems	22
SR 4-1—Resolving Suspected TRMTR CONV Unit Automatic Gain Problem	24
SR 5—TRMTR CONV Unit Initial Check	26
SR 6—ALC NETWORK Unit Initial Check	29

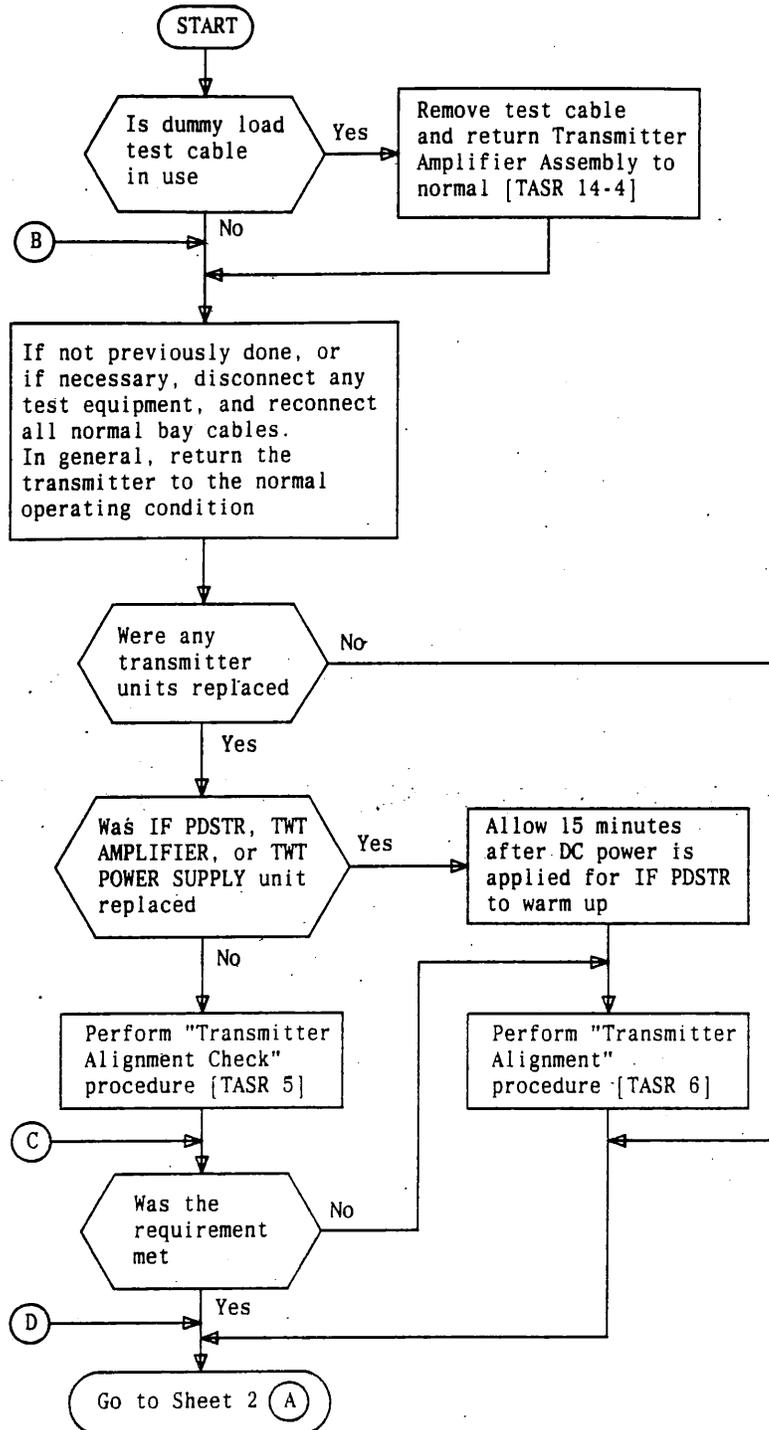
CONTENTS	PAGE
SR 7—TWT POWER SUPPLY Unit Initial Checks	30
SR 8—TWT Amplifier Unit Initial Checks	32
SR 9—Resolving Helix and/or Beam Current Out-of-Limits Problem	33
SR 10—Resolving DC Input Problems When Circuit Breaker Did Not Trip or Fuse Did Not Blow	34
SR 11—Resolving Transmitter Shelf DC Input Problems	35
SR 12—Resolving Receiver Shelf DC Input Problems	37

This section contains the subroutines (SR) referenced from the transmitter trouble-clearing main routines (MR), main subroutines (MSR), and transmitter test and adjustment subroutines (TASR).

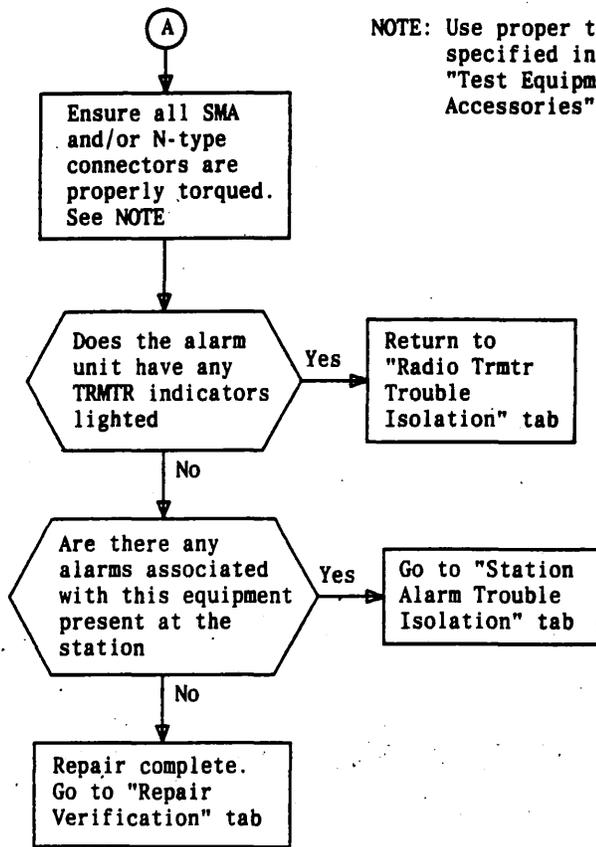
This practice is reissued to change subroutines SR 1, SR 2, SR 2-1, SR 3-5, SR 3-6, SR 4-1, SR 5, SR 6, SR 7, and SR 11. Also changed are the Instructions for the New TRMTR CONV Unit Passes Initial Check Requirements. The practice is used in binders 421-105-001, 421-105-001AC, 421-105-003AC, 421-105-090, 421-106-001, 421-106-001AC, 421-106-003AC, 421-106-030.

ISSUING ORGANIZATION

Published by the AT&T Documentation Management Organization.



SR 1—Condition Transmitter for Repair Verification (Sheet 1 of 2)

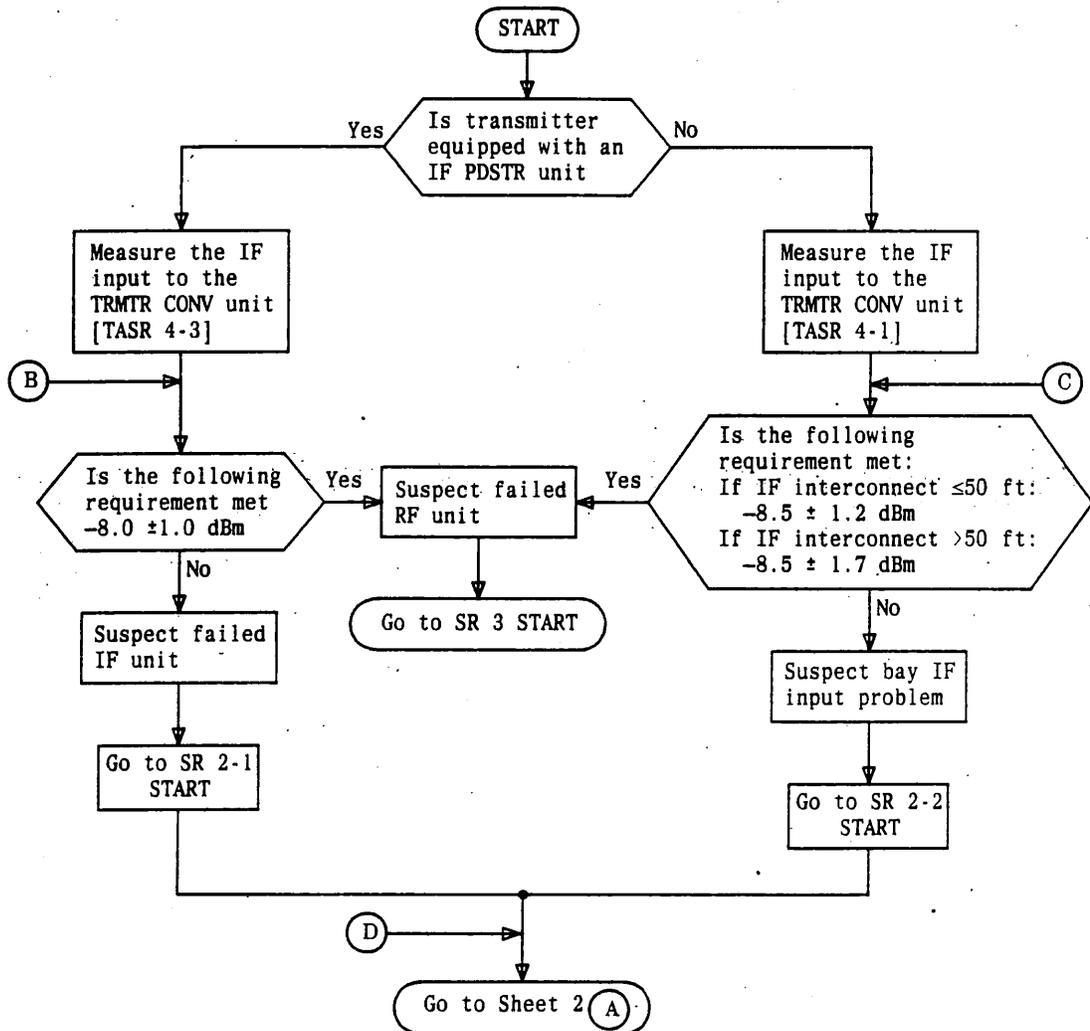


NOTE: Use proper torque wrench specified in Table C of "Test Equipment and Accessories" tab.

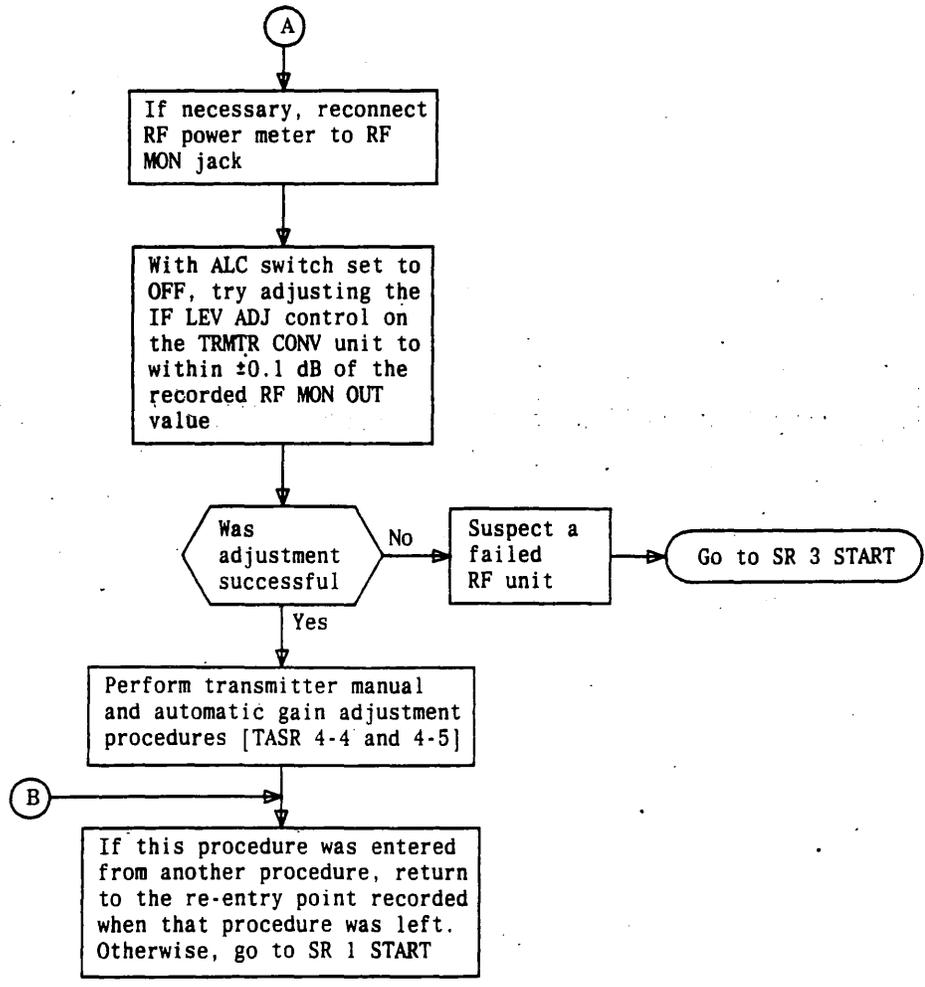
SR 1—Condition Transmitter for Repair Verification (Sheet 2 of 2)

CAUTION: THIS PROCEDURE IS SERVICE AFFECTING UNLESS THE PROPER MANUAL PROTECTION SWITCHING OPERATION HAS BEEN PERFORMED

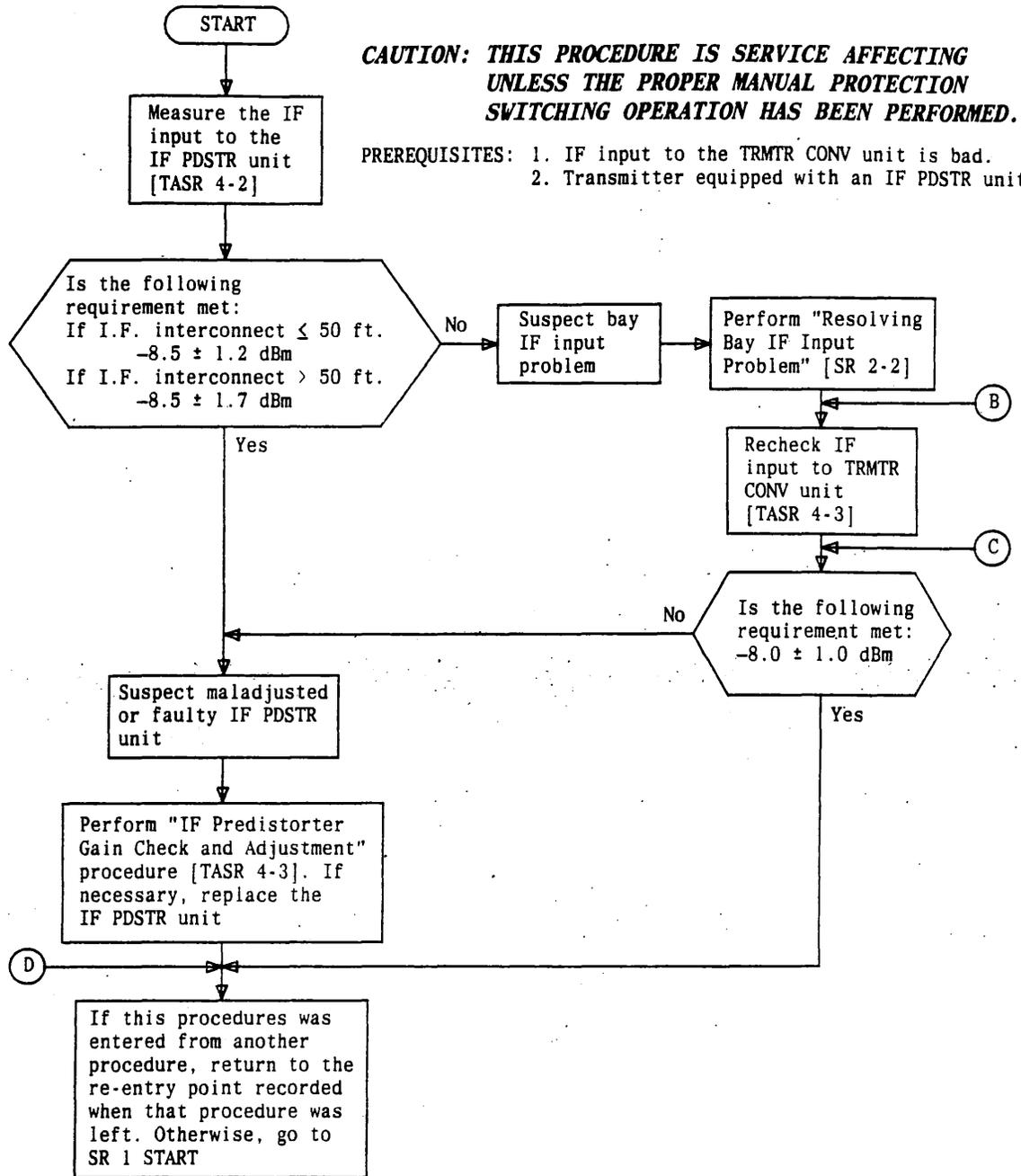
PREREQUISITE: 1. PWR OUT OF RANGE indicator lighted.
2. RF MON power not adjustable to DATA CARD value.



SR 2—Isolating Manual Gain Problems to Before or After TRMTR CONV Unit (Sheet 1 of 2)



SR 2—Isolating Manual Gain Problems to Before or After TRMTR CONV Unit (Sheet 2 of 2)



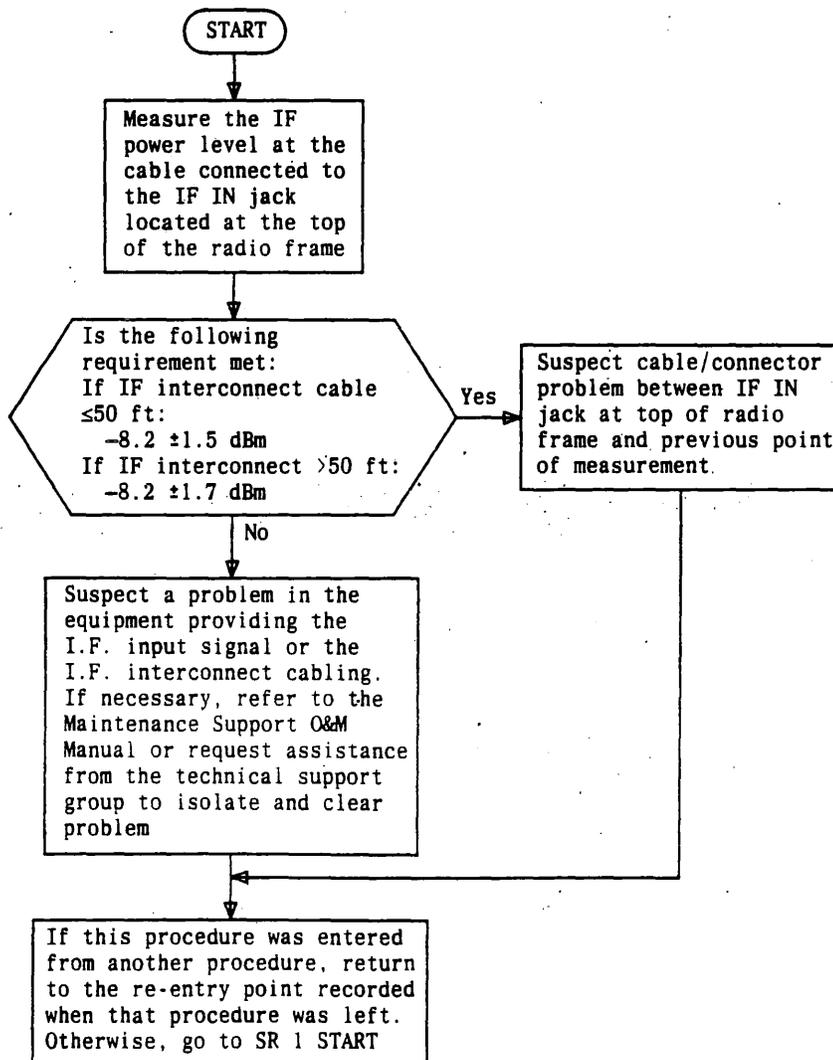
CAUTION: THIS PROCEDURE IS SERVICE AFFECTING UNLESS THE PROPER MANUAL PROTECTION SWITCHING OPERATION HAS BEEN PERFORMED.

PREREQUISITES: 1. IF input to the TRMTR CONV unit is bad.
2. Transmitter equipped with an IF PDSTR unit.

SR 2-1—Resolving Manual Gain Problems Before TRMTR CONV Unit

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

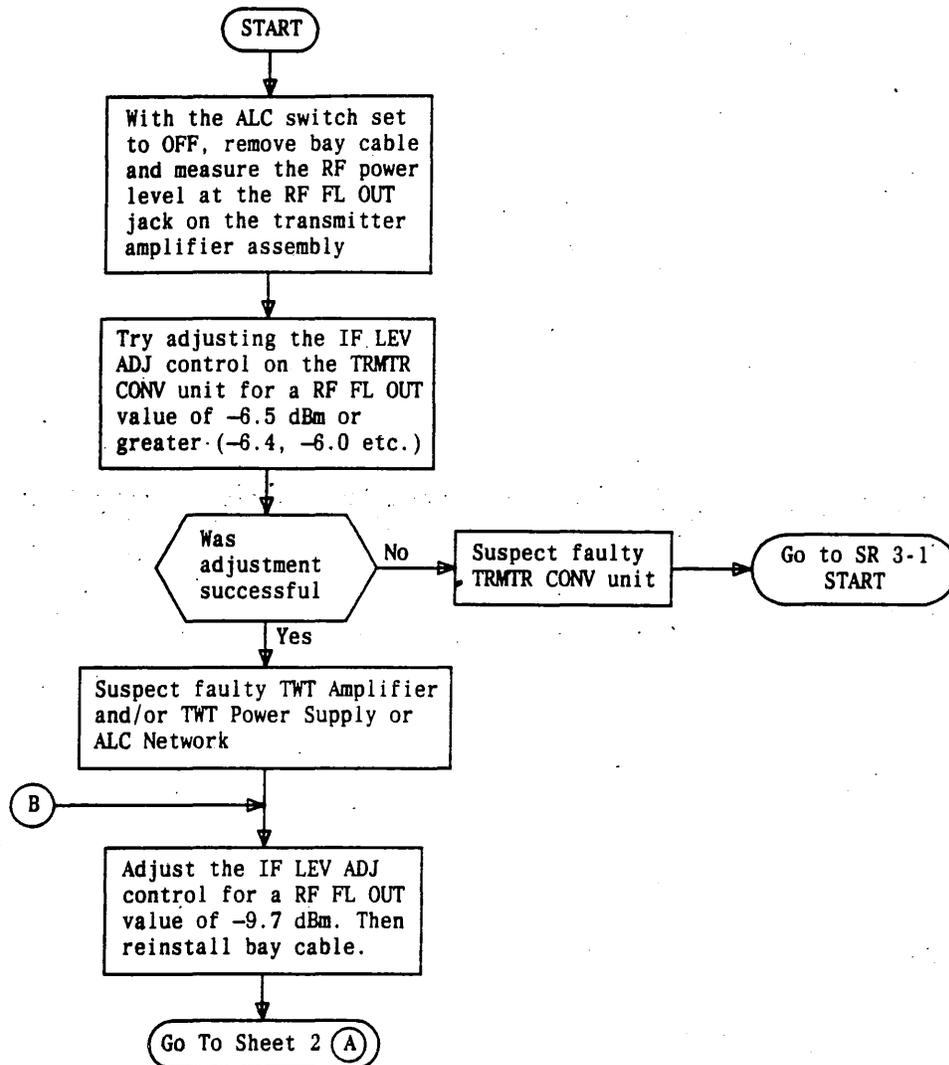
PREREQUISITE: I.F. input to the IF PDSTR unit is bad, or the I.F. input to the TRMTR CONV unit is bad when the I.F. PDSTR unit is not equipped.



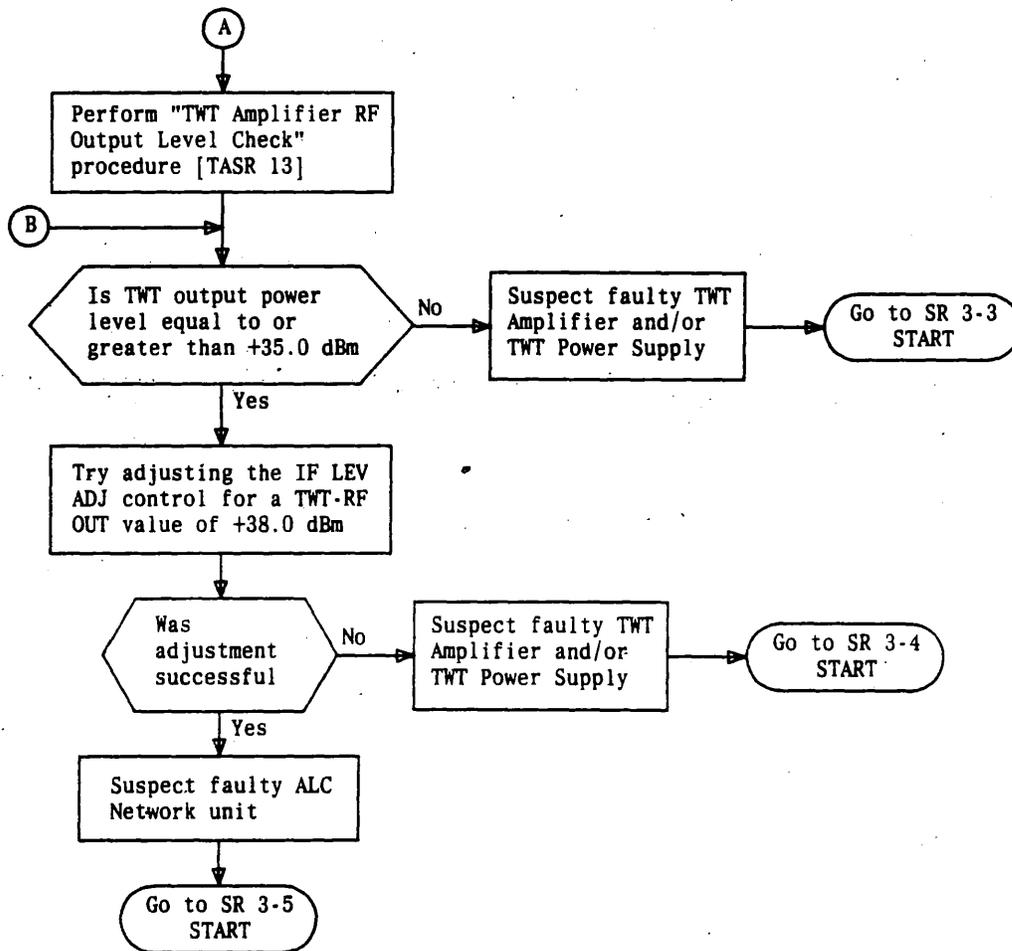
SR 2-2—Resolving Bay IF Input Level Problems

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

PREREQUISITE: I.F. input to up-converter is good but
R.F. output at RF MON jack is bad.



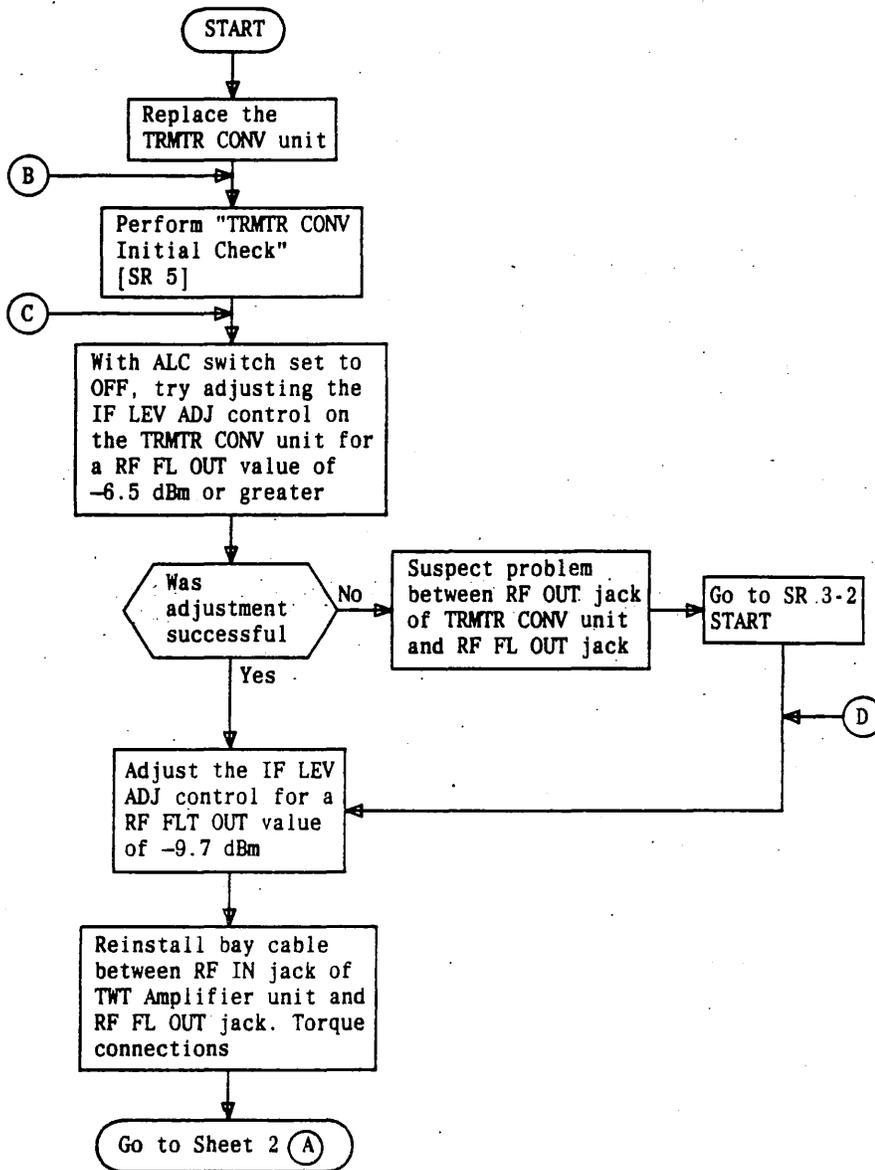
SR 3—Isolating Manual Gain Problems to Within or After TRMTR CONV Unit (Sheet 1 of 2)



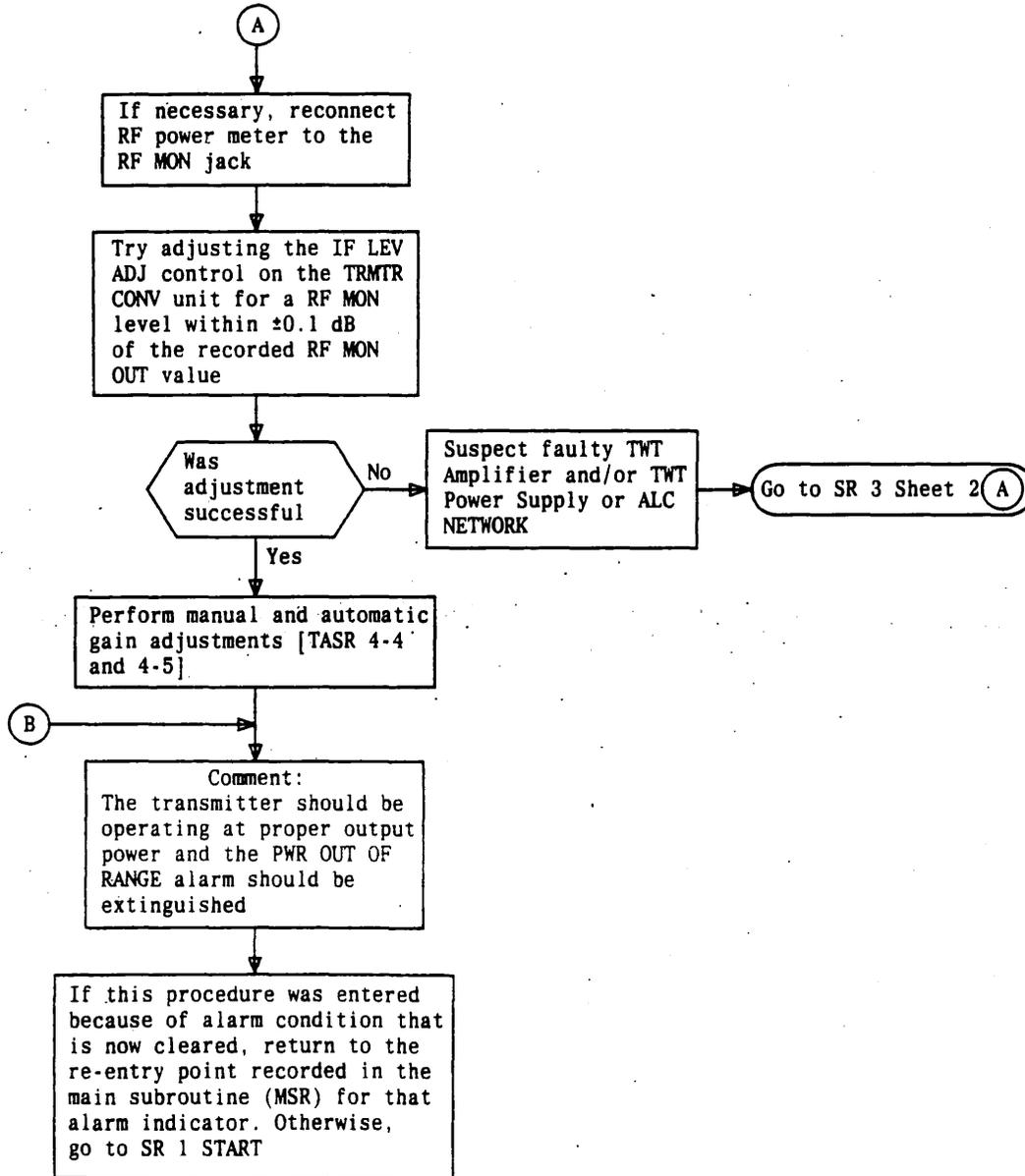
SR 3—Isolating Manual Gain Problems to Within or After TRMTR CONV Unit (Sheet 2 of 2)

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

PREREQUISITE: I.F. input to up-converter is good but low or no output level at input to TWT Amplifier (RF FL OUT jack)



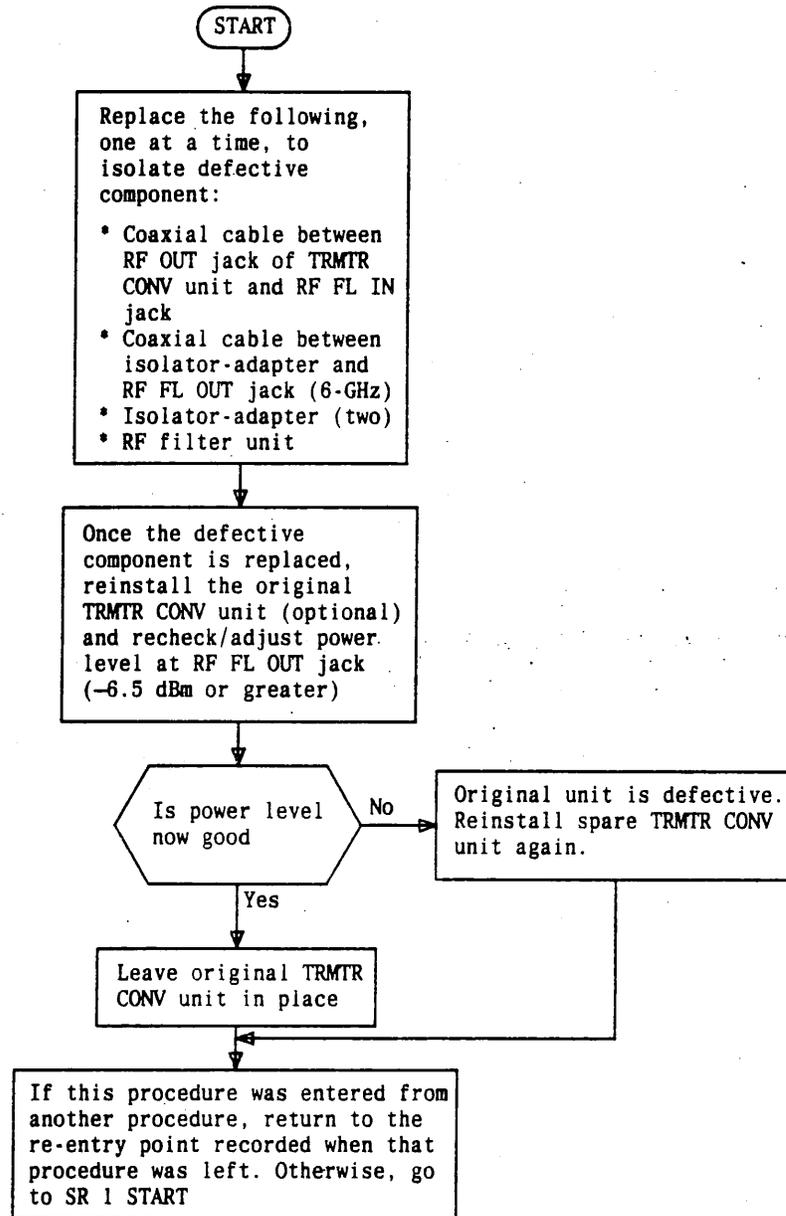
SR 3-1—Resolving Suspected TRMTR CONV Unit Manual Gain Problem (Sheet 1 of 2)



SR 3-1—Resolving Suspected TRMTR CONV Unit Manual Gain Problem (Sheet 2 of 2)

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

PREREQUISITE: Suspected problem between up-converter output and TWT Amplifier input

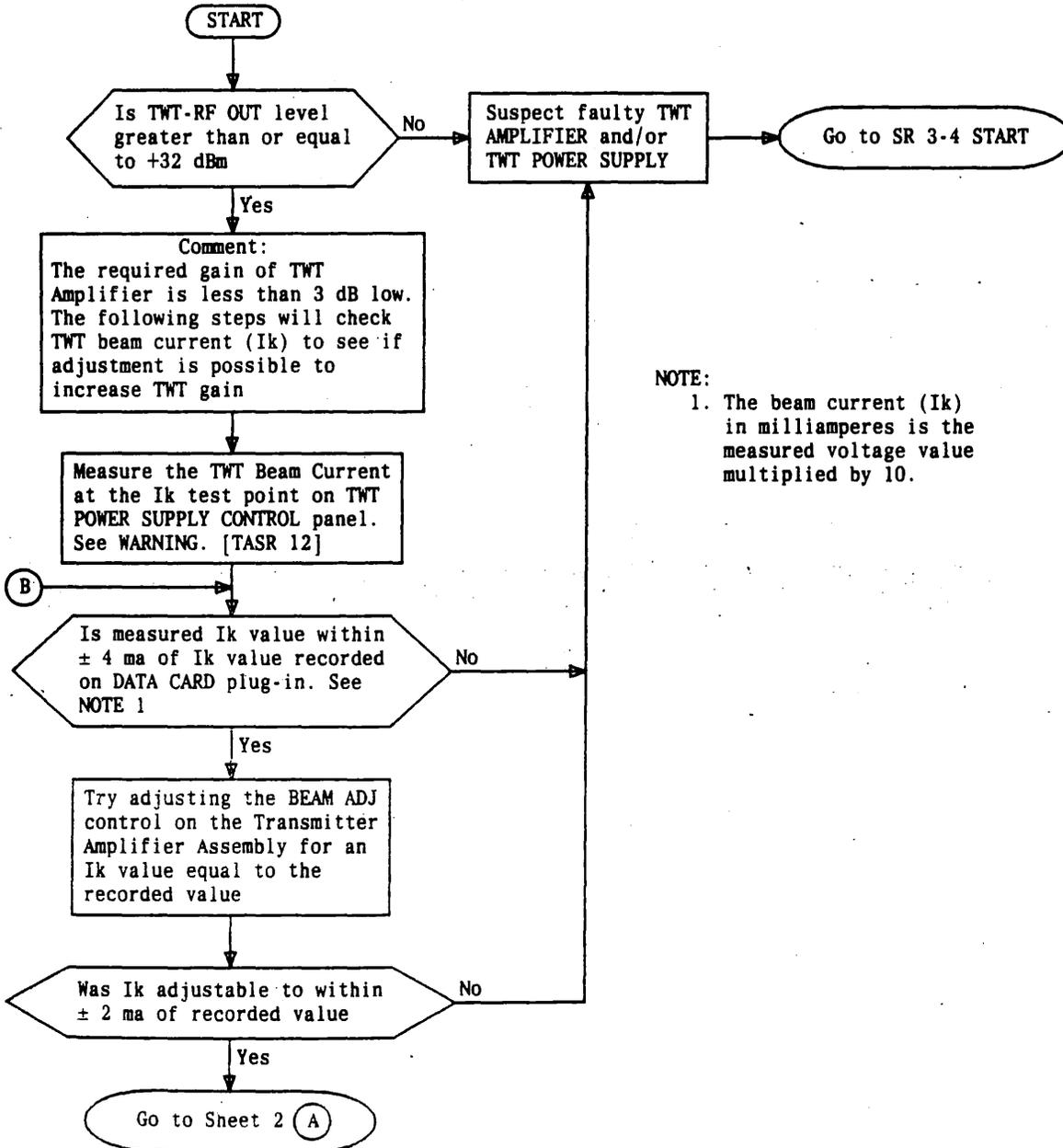


SR 3-2—Resolving Suspected Filter/Cable Problem Between Up-Converter Output and Amplifier Input

WARNING: TO PREVENT DAMAGE, DO NOT USE PROBES WITH METAL TIPS LONGER THAN ONE-HALF INCH WHEN MEASURING AT I_k and I_b TEST POINTS

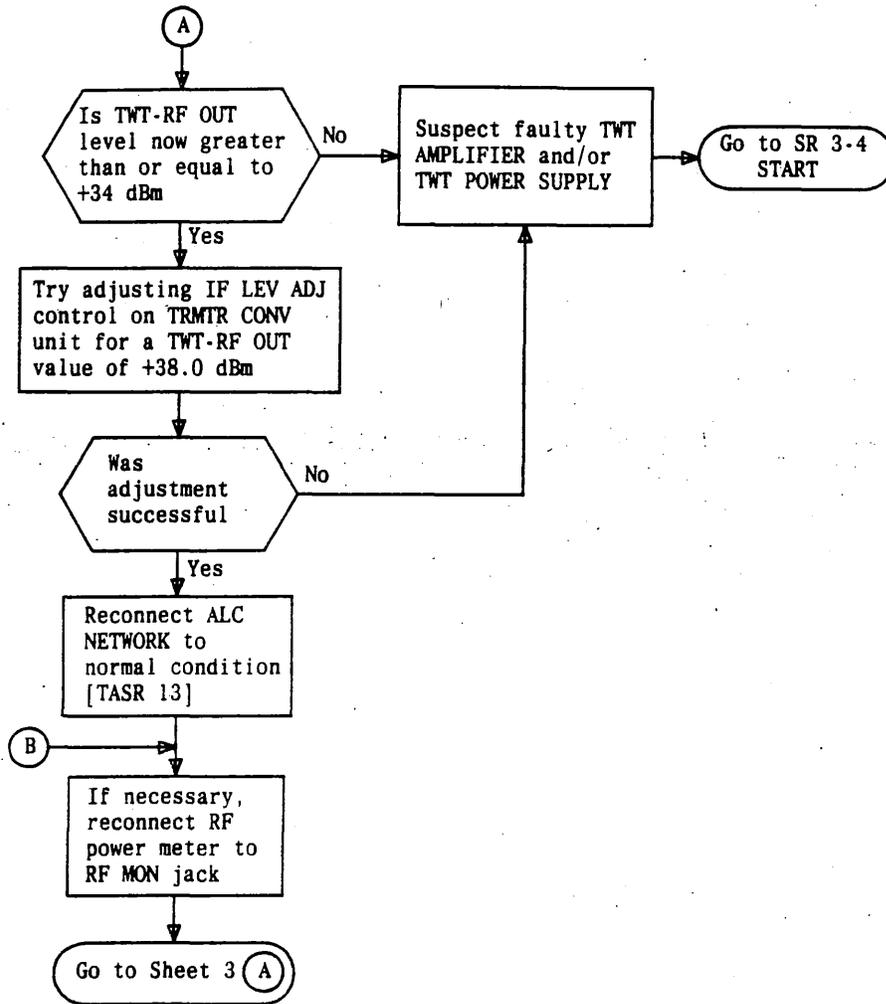
CAUTION: THIS PROCEDURE IS SERVICE AFFECTING UNLESS THE PROPER MANUAL PROTECTION SWITCHING OPERATION HAS BEEN PERFORMED.

PREREQUISITE: RF input to TWT Amplifier is good but minimum gain of TWT Amplifier is low

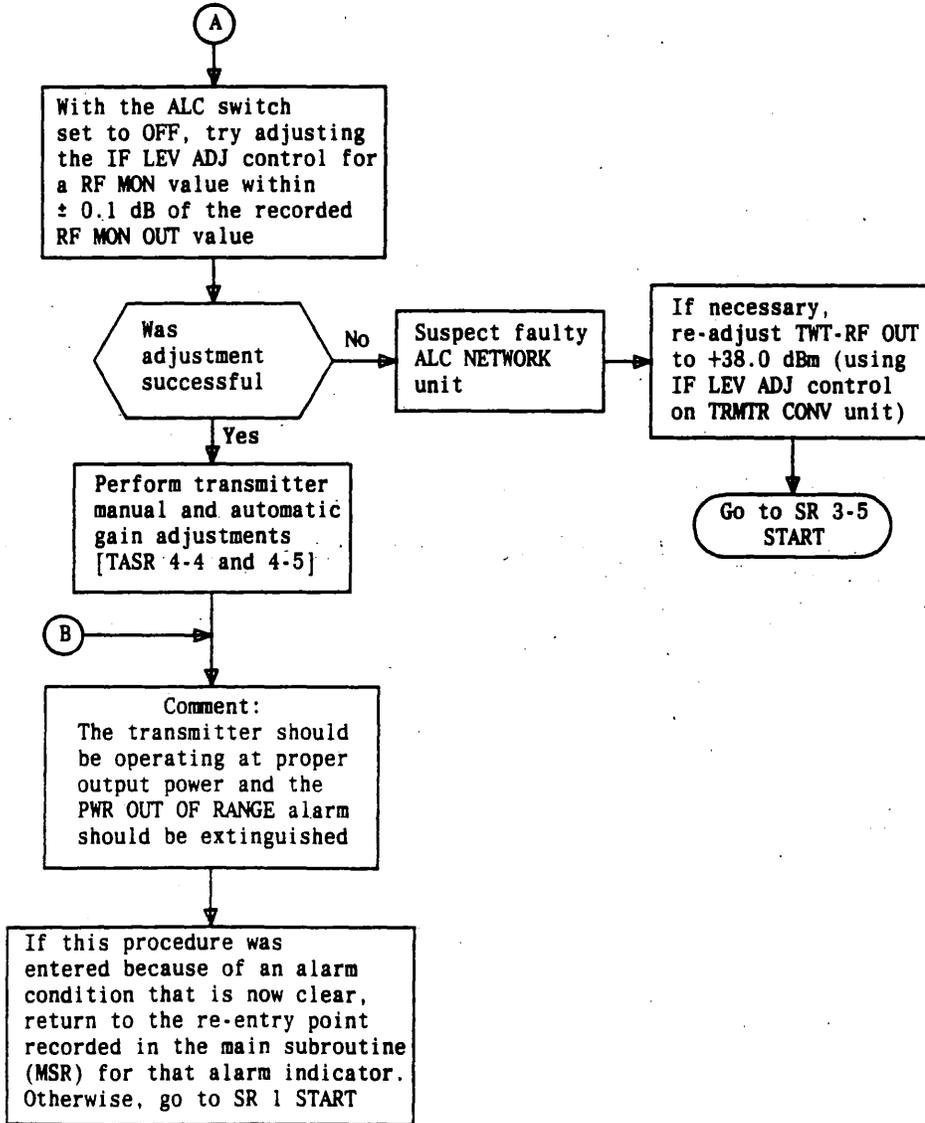


NOTE:
1. The beam current (I_k) in milliamperes is the measured voltage value multiplied by 10.

SR 3-3—Adjustment Attempt to Resolve Suspected TWT Amplifier Low Gain Problem (Sheet 1 of 3)



SR 3-3—Adjustment Attempt to Resolve Suspected TWT Amplifier Low Gain Problem (Sheet 2 of 3)



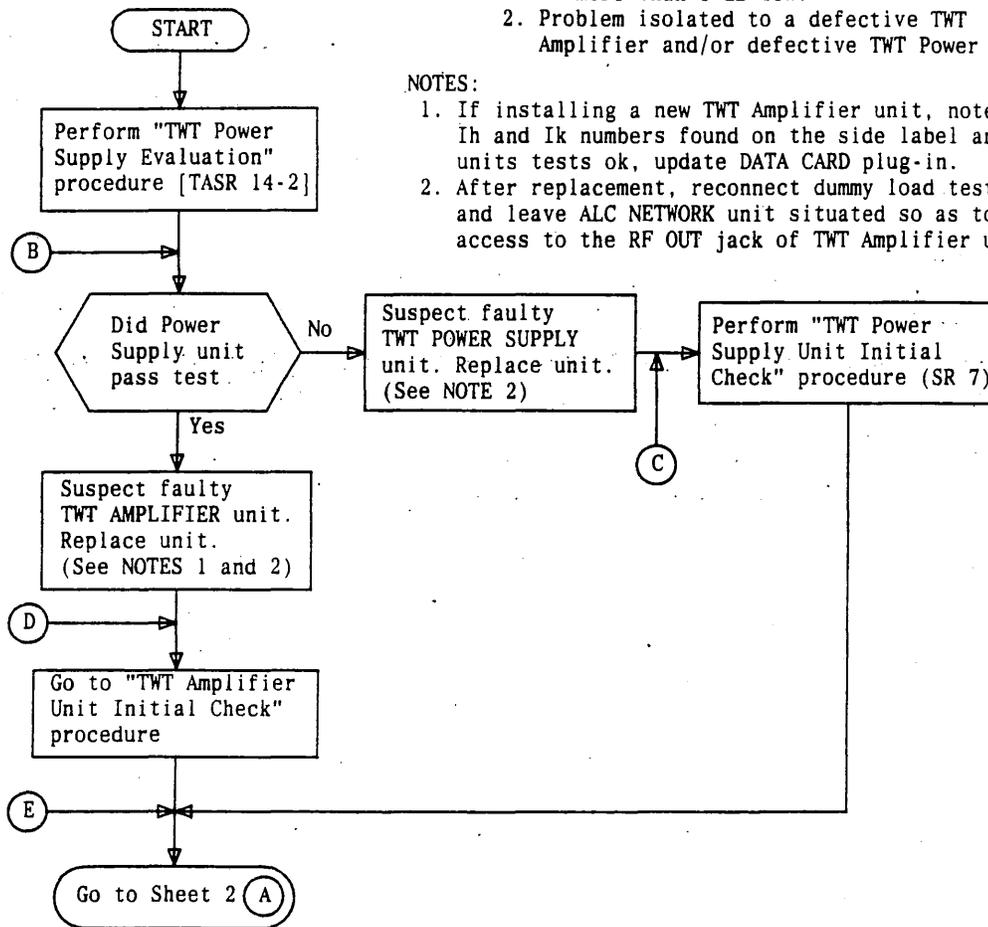
SR 3-3—Adjustment Attempt to Resolve Suspected TWT Amplifier Low Gain Problem (Sheet 3 of 3)

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

- PREREQUISITES: 1. RF input to TWT Amplifier is good but required minimum gain of TWT Amplifier is more than 3 dB low.
 2. Problem isolated to a defective TWT Amplifier and/or defective TWT Power Supply.

NOTES:

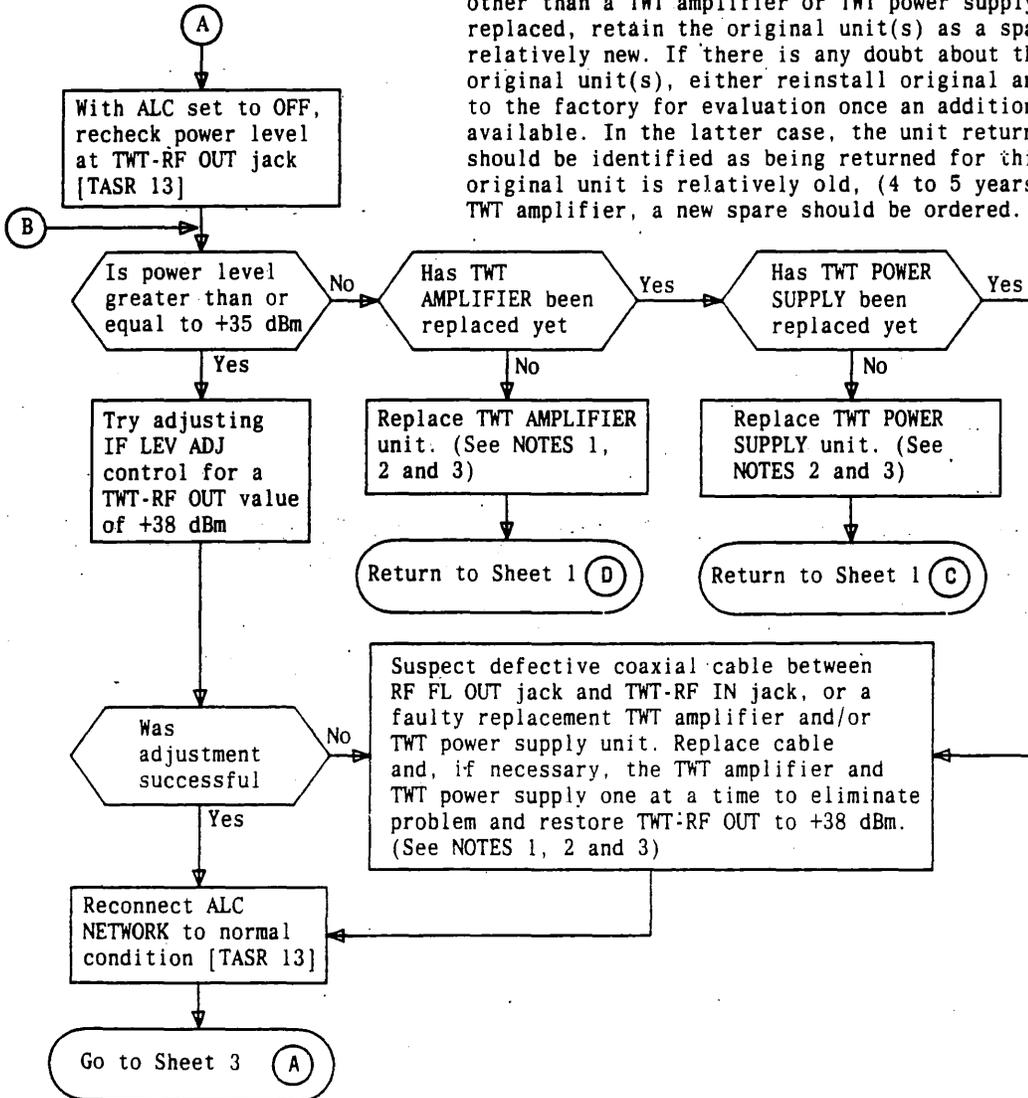
1. If installing a new TWT Amplifier unit, note the I_h and I_k numbers found on the side label and if units tests ok, update DATA CARD plug-in.
2. After replacement, reconnect dummy load test cable and leave ALC NETWORK unit situated so as to allow access to the RF OUT jack of TWT Amplifier unit.



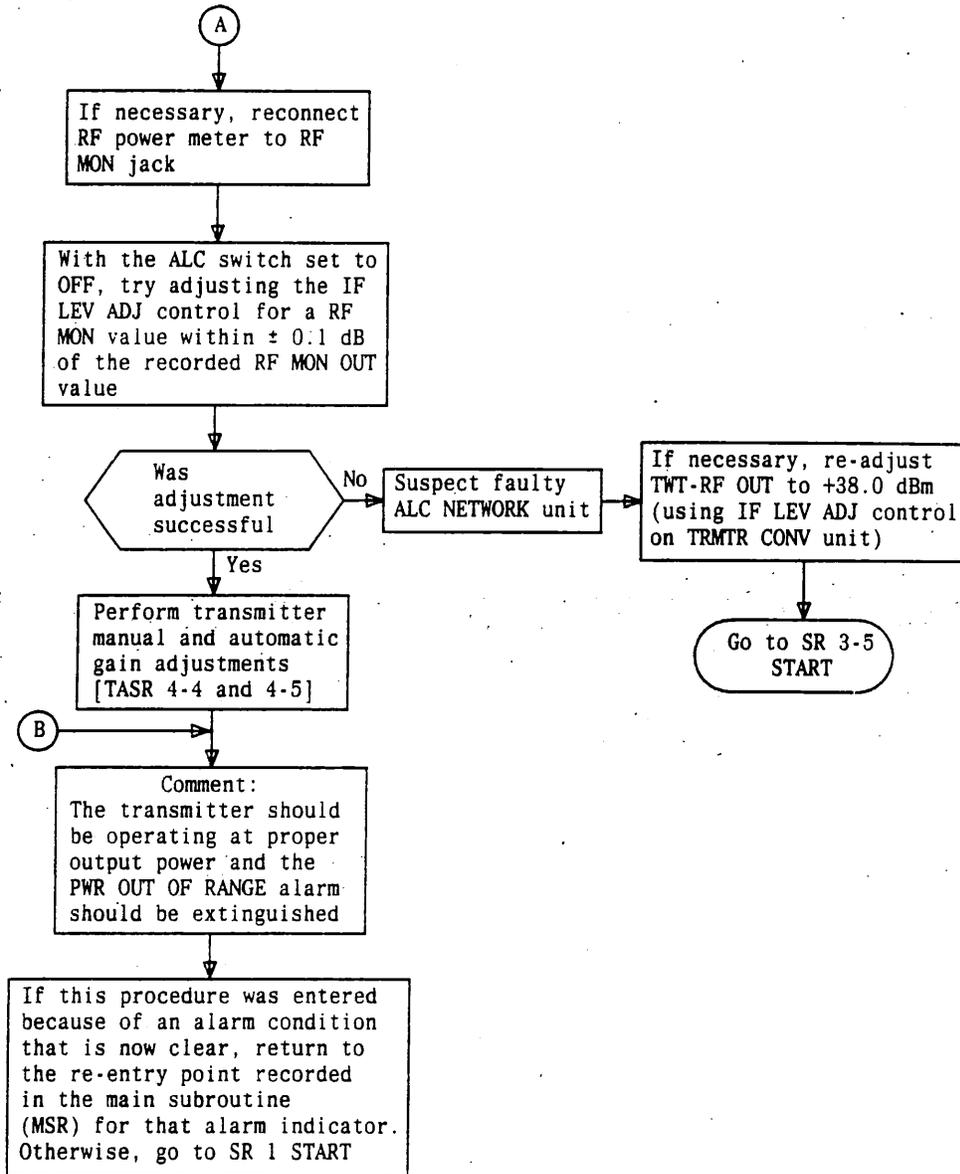
SR 3-4—Resolving Suspected TWT Amplifier Power Supply Unit Manual Gain Problems (Sheet 1 of 3)

NOTES:

1. If installing a new TWT Amplifier unit, note the I_h and I_k numbers found on the side label and if unit tests ok update DATA CARD plugin.
2. After replacement, reconnect dummy load test cable and leave ALC NETWORK unit situated so as to allow access to the RF OUT jack of TWT Amplifier unit.
3. If the ultimate source of the problem is found to be something other than a TWT amplifier or TWT power supply that has been replaced, retain the original unit(s) as a spare if it is relatively new. If there is any doubt about the quality of the original unit(s), either reinstall original and retest or return to the factory for evaluation once an additional spare is available. In the latter case, the unit returned to the factory should be identified as being returned for this purpose. If the original unit is relatively old, (4 to 5 years) especially the TWT amplifier, a new spare should be ordered.



SR 3-4—Resolving Suspected TWT Amplifier Power Supply Unit Manual Gain Problems (Sheet 2 of 3)

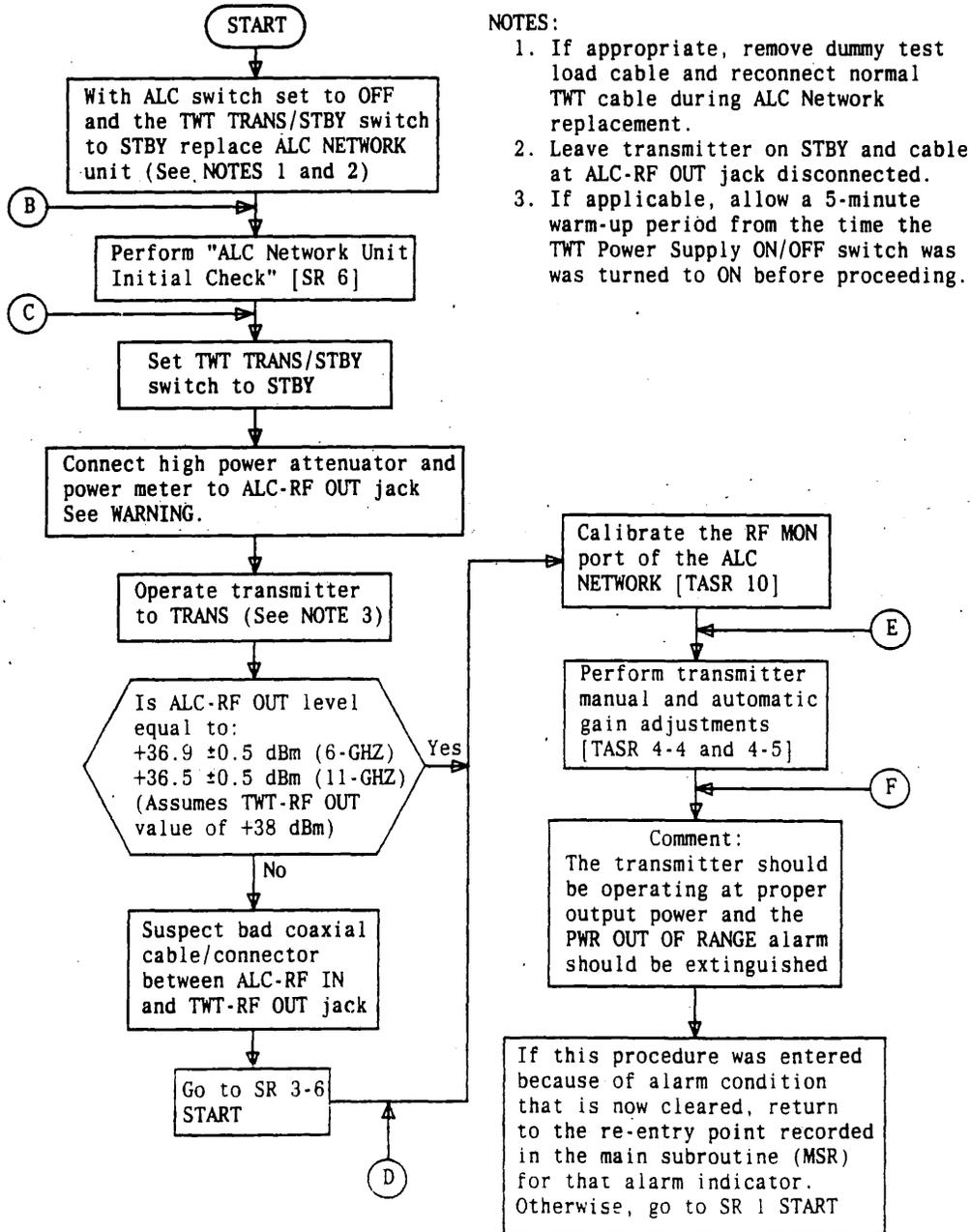


SR 3-4—Resolving Suspected TWT Amplifier Power Supply Unit Manual Gain Problems (Sheet 3 of 3)

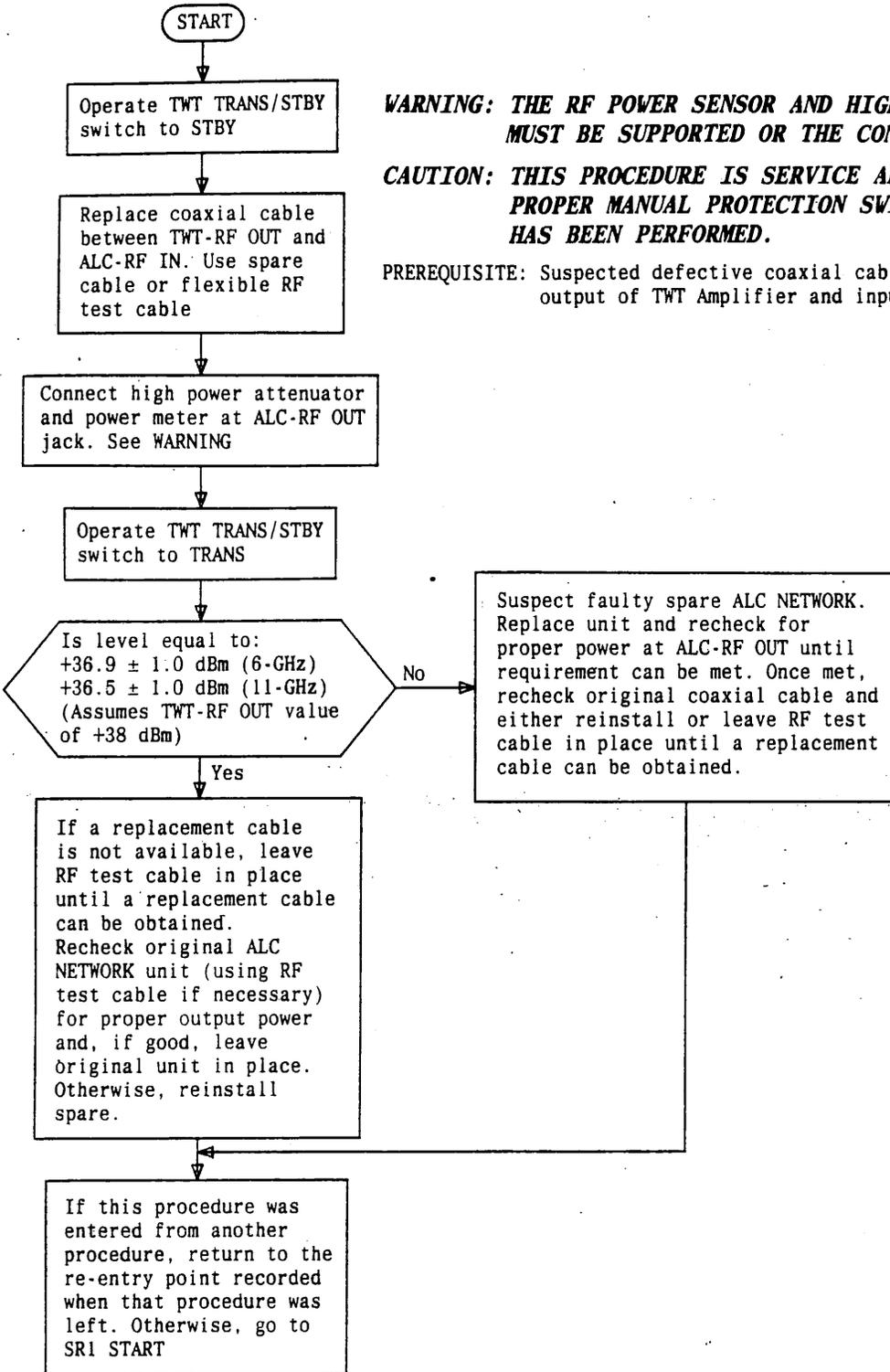
WARNING: THE RF POWER SENSOR AND HIGH POWER ATTENUATOR MUST BE SUPPORTED OR THE CONNECTOR MAY BE DAMAGED.

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

- PREREQUISITES:**
1. R.F. output of TWT Amplifier is good (+38 dBm) but low or no output level at ALC NETWORK unit RF MON/RF OUT jack
 2. Power problem isolated to a defective ALC NETWORK unit.



SR 3-5—Resolving Suspected ALC NETWORK Unit Manual Gain Problems



WARNING: THE RF POWER SENSOR AND HIGH POWER ATTENUATOR MUST BE SUPPORTED OR THE CONNECTOR MAY BE DAMAGED.

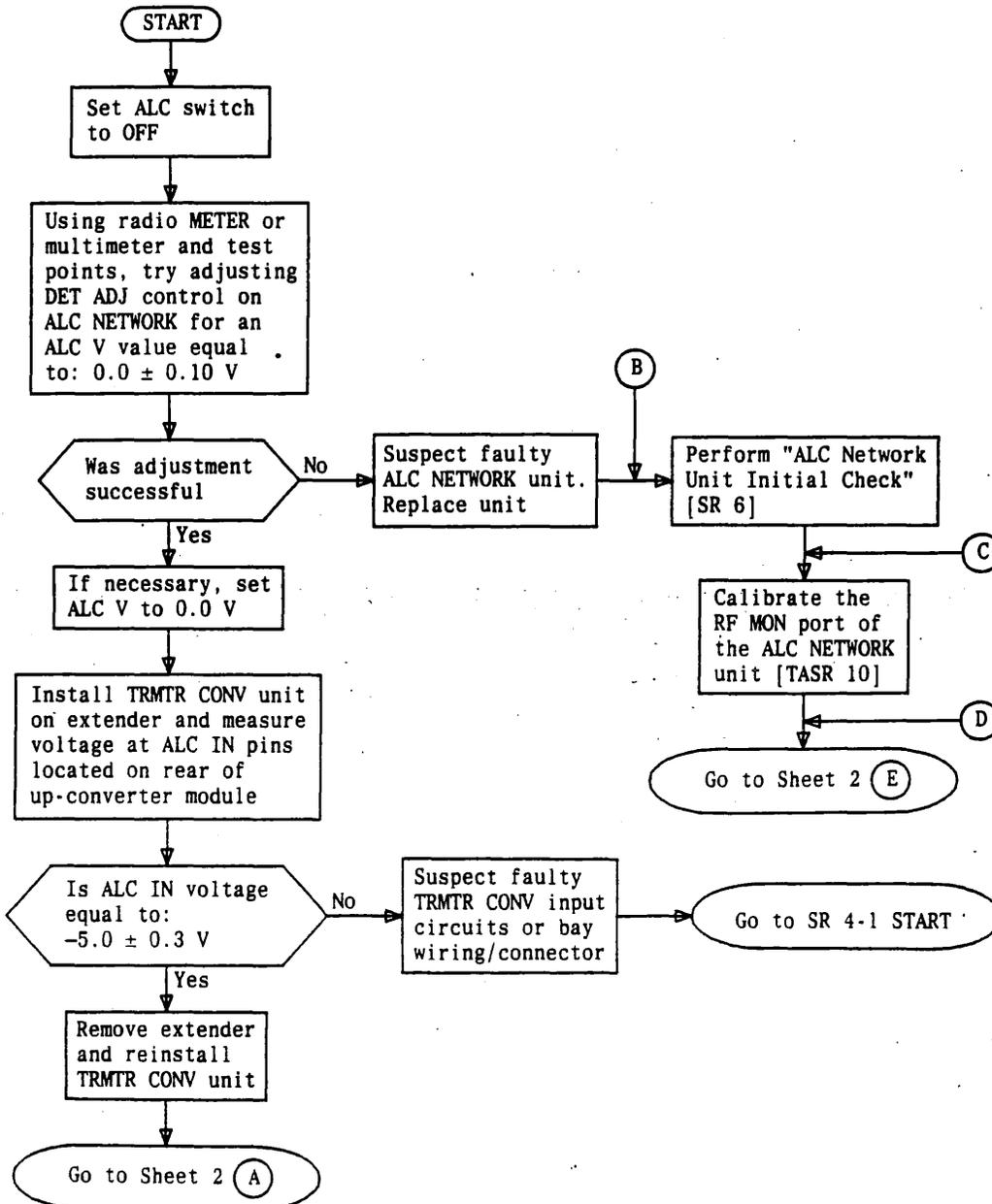
CAUTION: THIS PROCEDURE IS SERVICE AFFECTING UNLESS THE PROPER MANUAL PROTECTION SWITCHING OPERATION HAS BEEN PERFORMED.

PREREQUISITE: Suspected defective coaxial cable/connector between output of TWT Amplifier and input to ALC Network

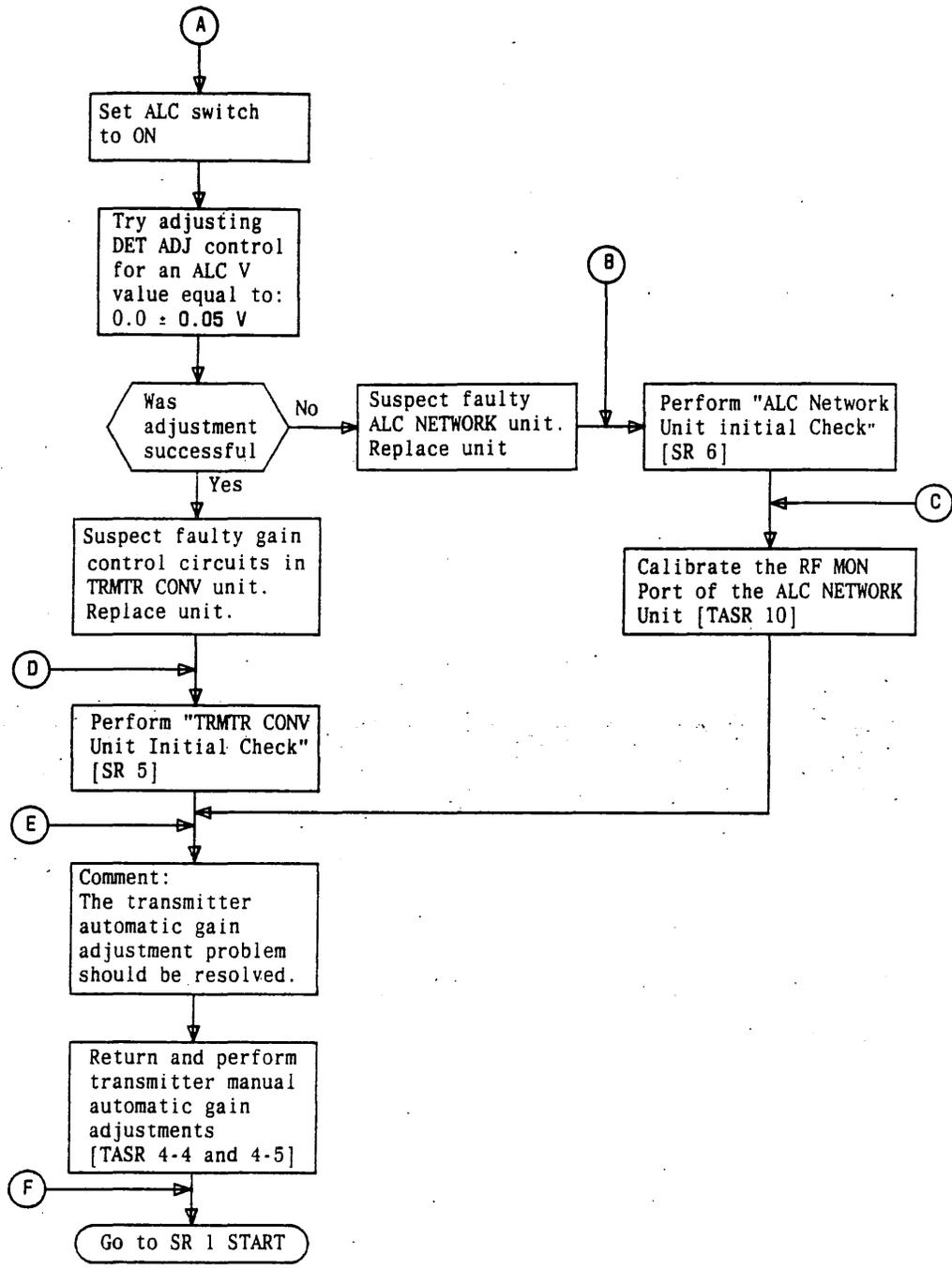
SR 3-6—Resolving Suspected Cable/Connector Problem Between Amplifier Output and ALC NETWORK Input

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

PREREQUISITE: Cannot adjust output level of transmitter in automatic mode (ALC switch set to ON) to within ± 0.1 dB of output level properly set with transmitter in manual mode (ALC switch set to OFF)



SR 4—Isolating Automatic Gain Problems (Sheet 1 of 2)

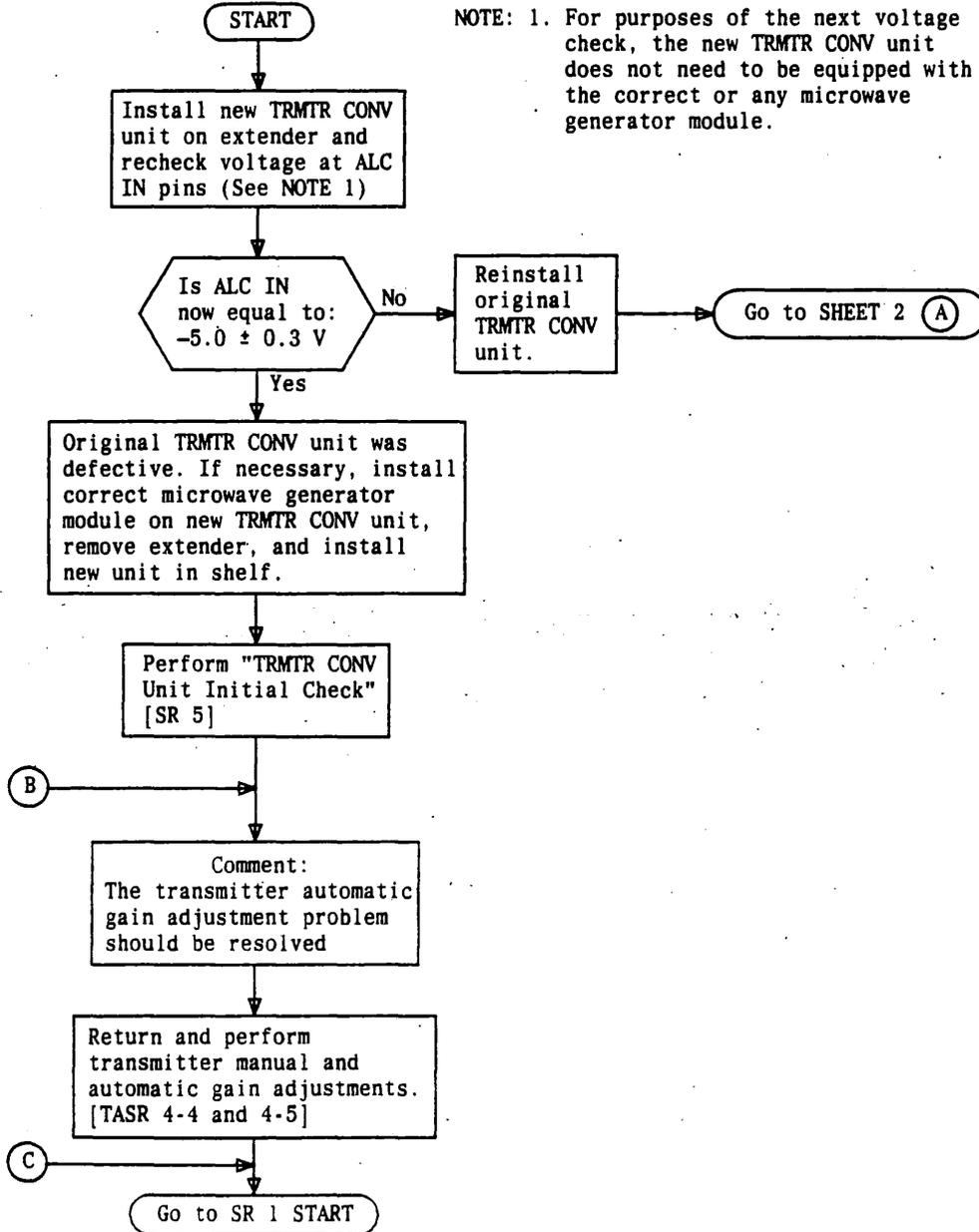


SR 4—Isolating Automatic Gain Problems (Sheet 2 of 2)

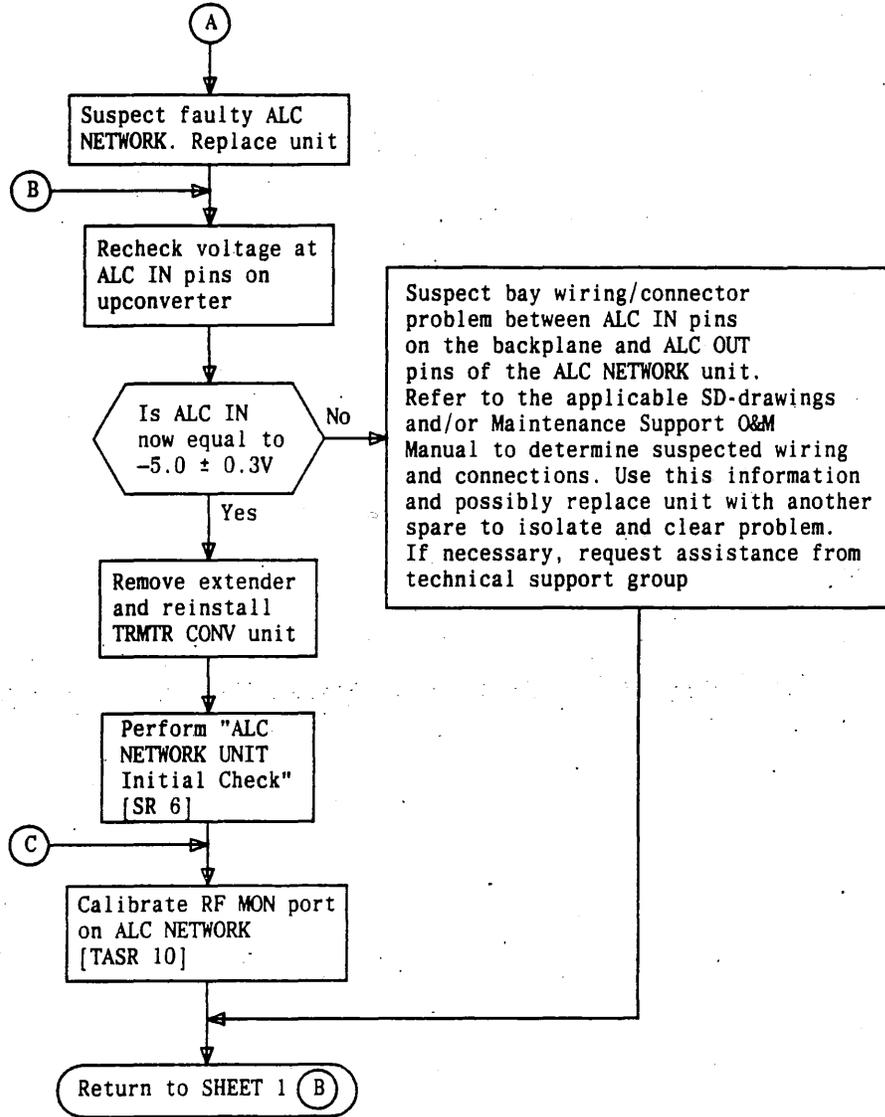
CAUTION: THIS PROCEDURE IS SERVICE AFFECTING UNLESS THE PROPER MANUAL PROTECTION SWITCHING OPERATION HAS BEEN PERFORMED.

PREREQUISITE: With ALC switch set to ALC OFF, the voltage measured at the ALC IN pins on the up-converter module is not within -5.0 ± 0.3 V

NOTE: 1. For purposes of the next voltage check, the new TRMTR CONV unit does not need to be equipped with the correct or any microwave generator module.



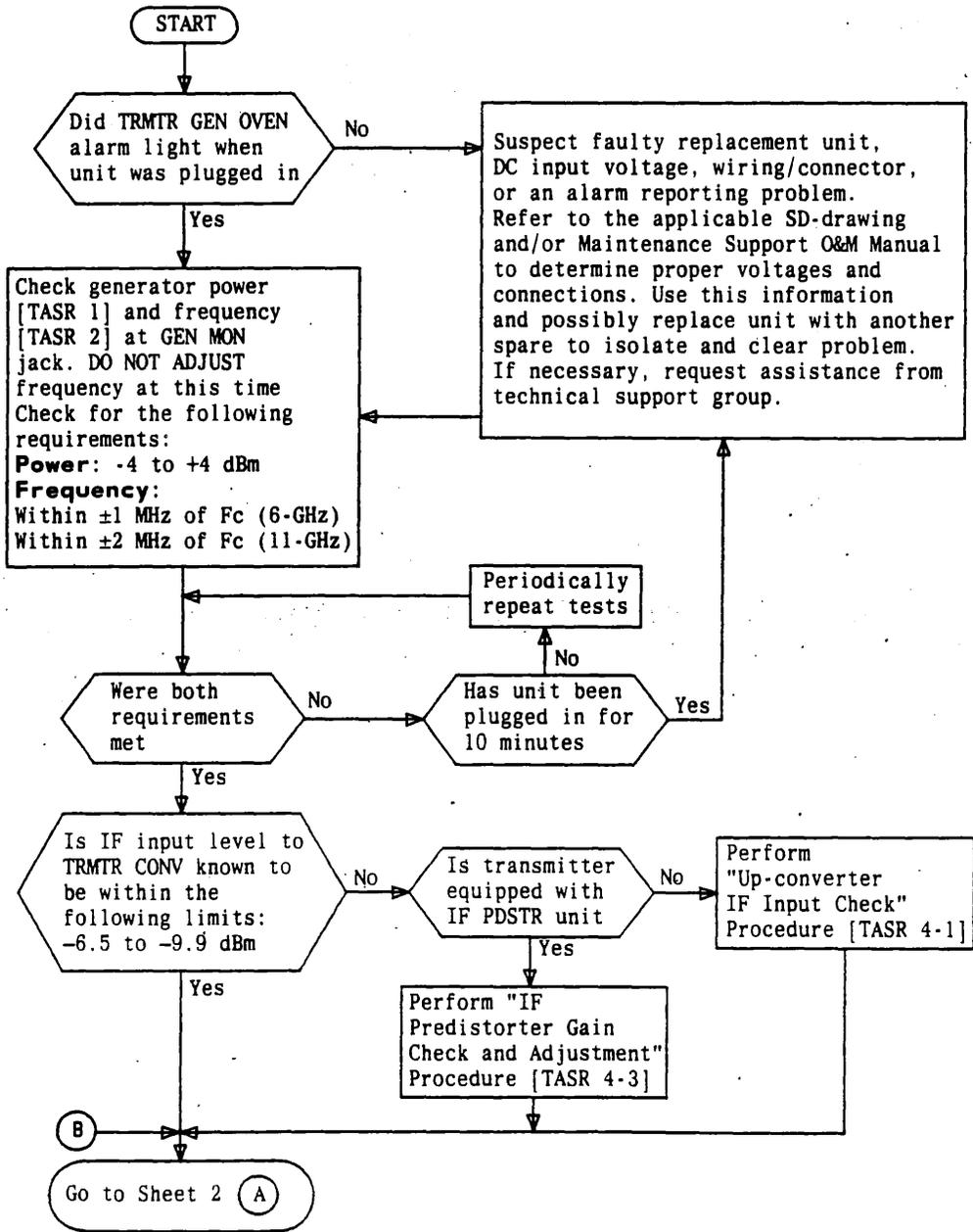
SR 4-1—Resolving Suspected TRMTR CONV Unit Automatic Gain Problem (Sheet 1 of 2)



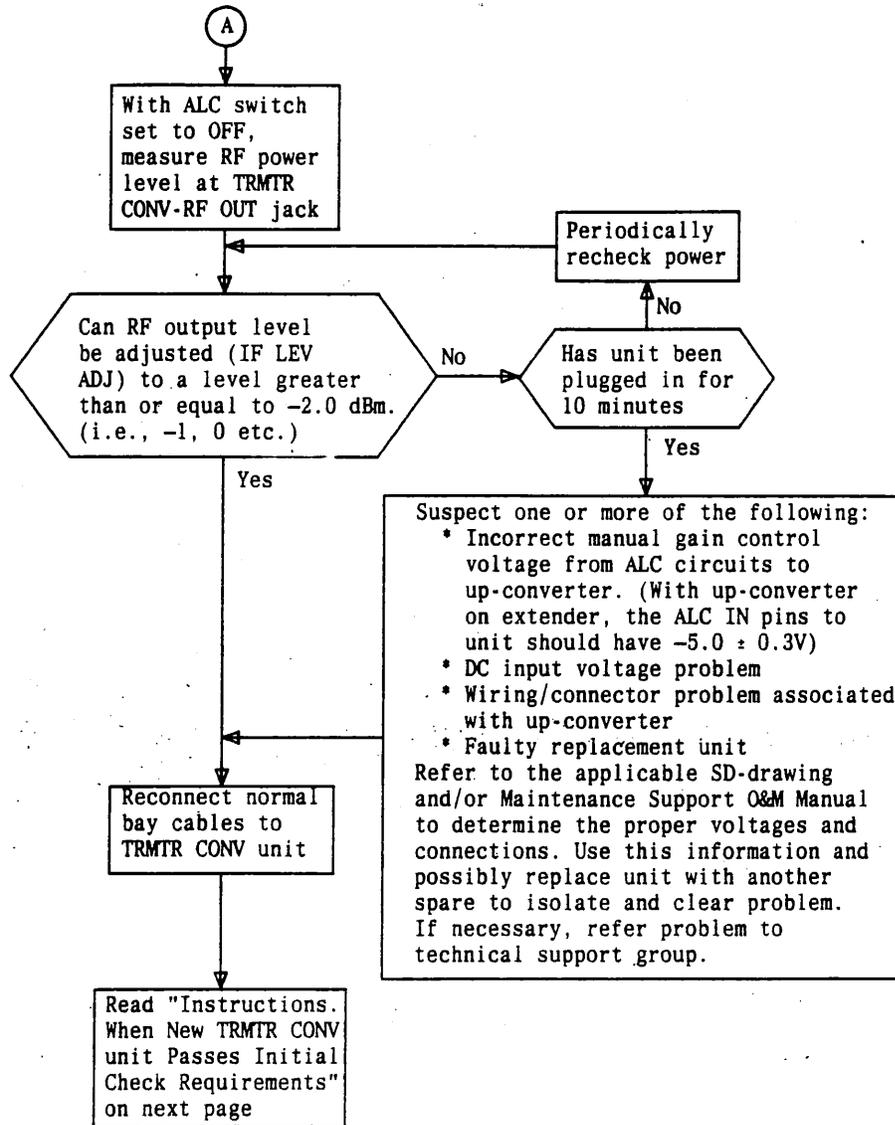
SR 4-1—Resolving Suspected TRMTR CONV Unit Automatic Gain Problem (Sheet 2 of 2)

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

PREREQUISITE: TRMTR CONV unit just installed.



SR 5—TRMTR CONV Unit Initial Check (Sheet 1 of 2)



SR 5—TRMTR CONV Unit Initial Check (Sheet 2 of 2)

INSTRUCTIONS

NEW TRMTR CONV UNIT PASSES INITIAL CHECK REQUIREMENTS

Procedure Was Referenced From Another Trouble Procedure

The status of the replaced unit at this point is usually adequate to continue most transmitter troubleshooting routines. This is especially true for those routines involving transmitter RF power or gain problems. Routines requiring temperature stabilization of the microwave generator oven of the TRMTR CONV unit (when the TRMTR GEN OVEN indicator is still lighted) should be delayed until the TRMTR GEN OVEN indicator goes off (see Final Generator Check). If this unit was replaced because of directions in another procedure, return to the instruction that called for the replacement (see *Note 1*). Generally, this will help to speed up troubleshooting transmitter alarms involving suspected TRMTR CONV problems (see Final Generator Check).

Note 1: Before returning to the referencing procedure, note the time that the TRMTR CONV unit was replaced and then periodically check the TRMTR GEN OVEN alarm indicator to ensure that it goes off within the normal time period (see *Note 2*). If the alarm indicator does not go off, dc voltage and/or wiring problems related to the TRMTR CONV unit may exist or the replacement unit is defective. Isolate and clear this problem before proceeding further with transmitter tests. Follow the instructions given in the Transmitter "GEN OVEN Alarm" tab.

Note 2: Normally, if the spare TRMTR CONV unit and microwave generator module were stored at room temperature, the TRMTR GEN OVEN indicator should go off within about 20 minutes. If the replacement units were stored in a cold environment, the time for the indicator to go off could be as long as 45 minutes.

Procedure Is Used Without Reference From Another Trouble Procedure

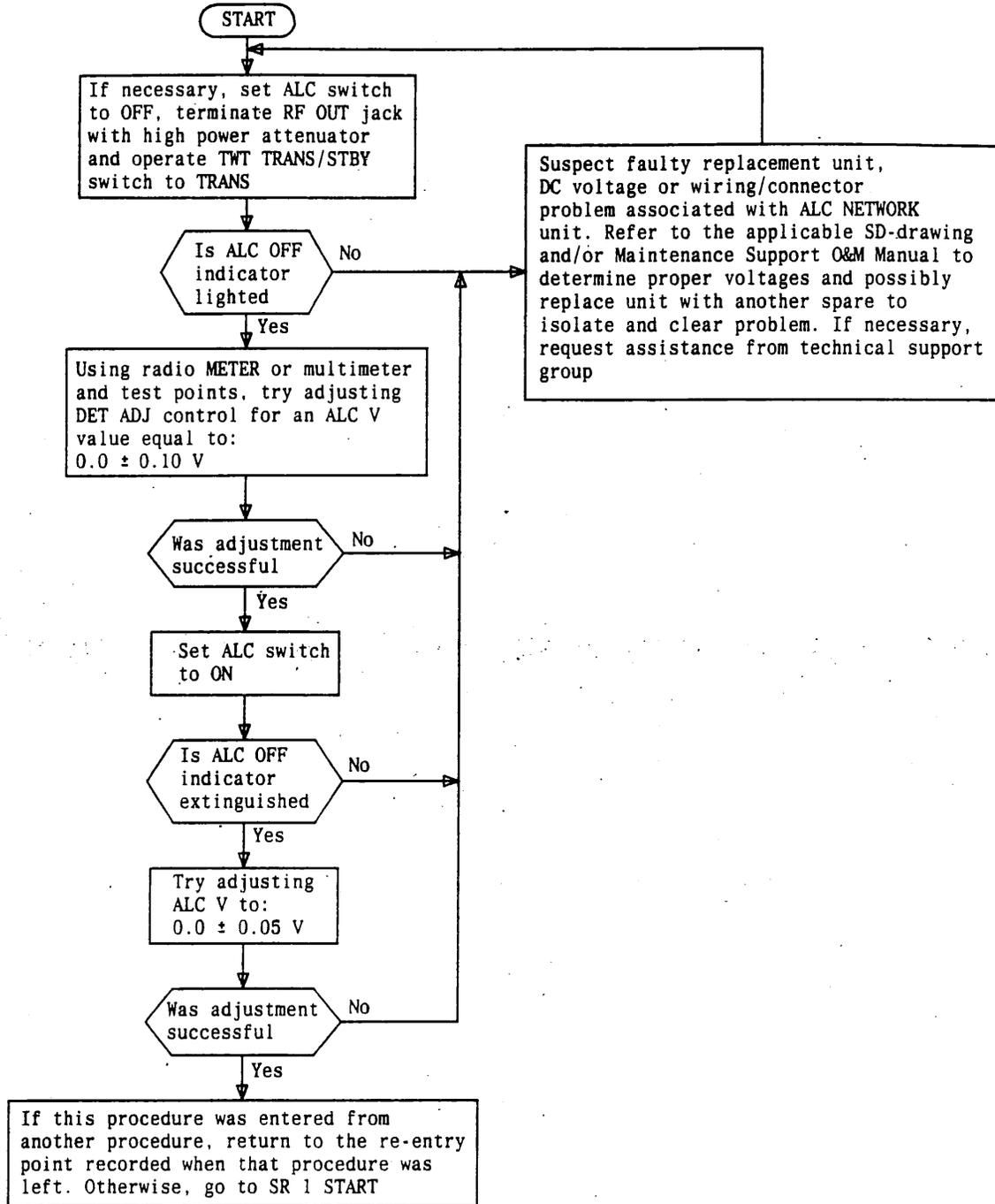
Wait for the TRMTR GEN OVEN alarm to clear before proceeding further (see *Notes 1 and 2*). At that point, or any time after, when the generator frequency is within ± 350 kHz of the center frequency for 6-GHz systems or ± 700 kHz for 11-GHz systems, make the transmitter manual and automatic gain adjustments. Perform the Transmitter Alignment Check (TASR 5) also. If adjustments are necessary to meet alignment requirements, do the final frequency check of the microwave generator (see Final Generator Check) before making the adjustments.

Final Generator Check

For either of the above cases, the frequency (TASR 2) and power (TASR 1) of the microwave generator in the TRMTR CONV should be checked and, if necessary, adjusted about 1 hour after the TRMTR GEN OVEN alarm indicator goes off. Do not try this sooner than 1 hour since, in general, the oscillator should stabilize at its proper frequency with little or no adjustment. Go to MR 1(B) in the Transmitter "GEN OVEN Alarm" tab when this procedure is used without being directed from another routine.

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

PREREQUISITE: ALC NETWORK unit just installed.

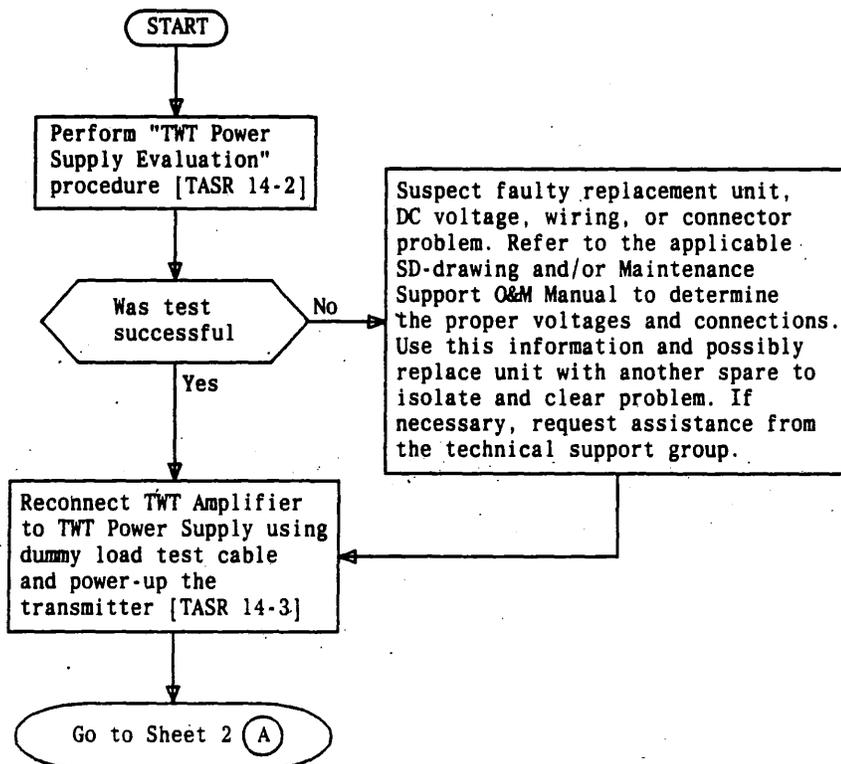


SR 6—ALC NETWORK Unit Initial Check

WARNING: TO PREVENT DAMAGE, DO NOT USE PROBES WITH METAL TIPS LONGER THAN ONE-HALF INCH WHEN MEASURING AT I_k AND I_b TEST POINTS

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

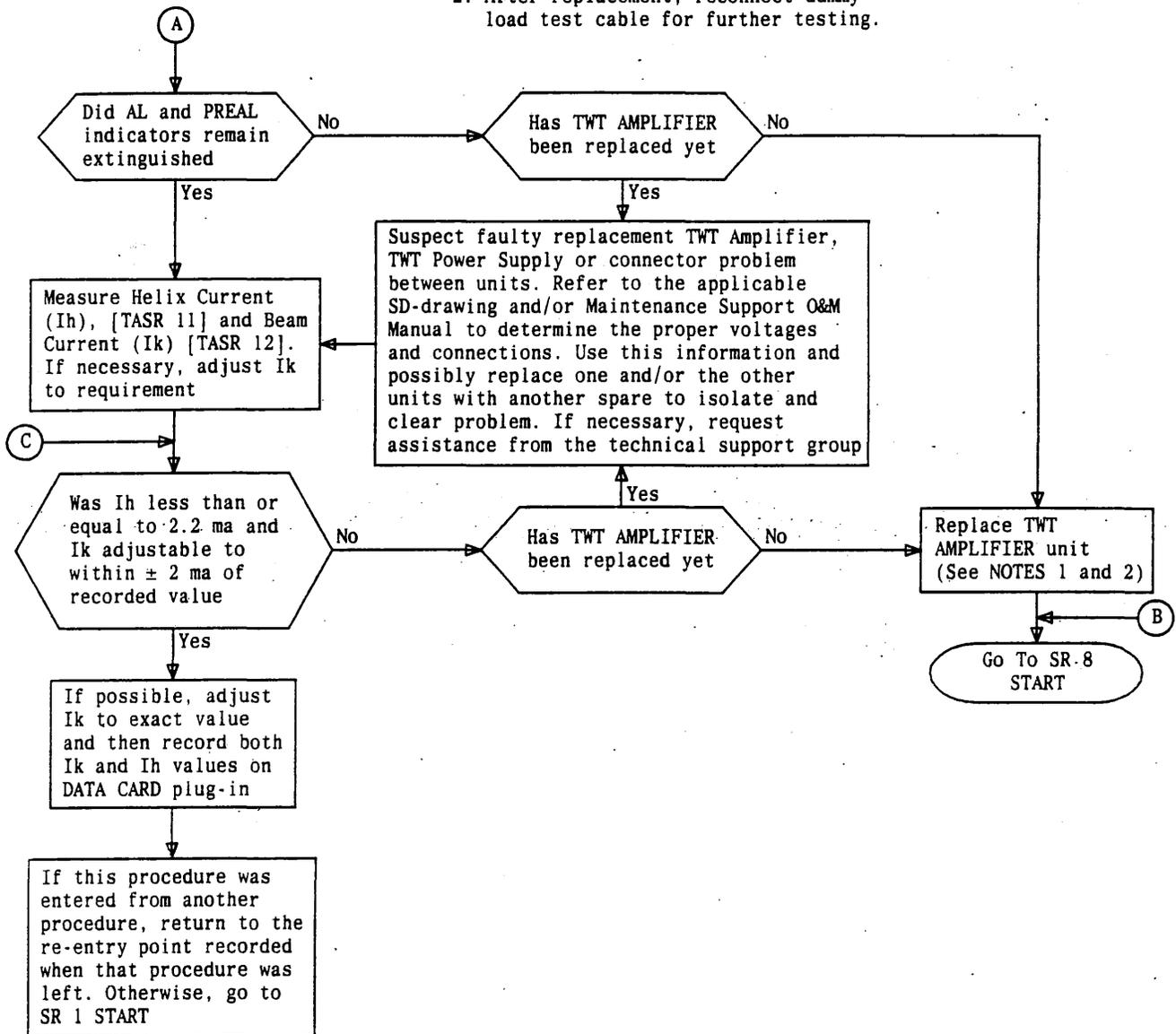
PREREQUISITE: New TWT POWER SUPPLY AND CONTROL unit just installed.



SR 7—TWT POWER SUPPLY Unit Initial Checks (Sheet 1 of 2)

NOTES:

1. Before installing new TWT Amplifier, note (for later use) the Beam Current (Ik) value recorded on the unit label.
2. After replacement, reconnect dummy load test cable for further testing.

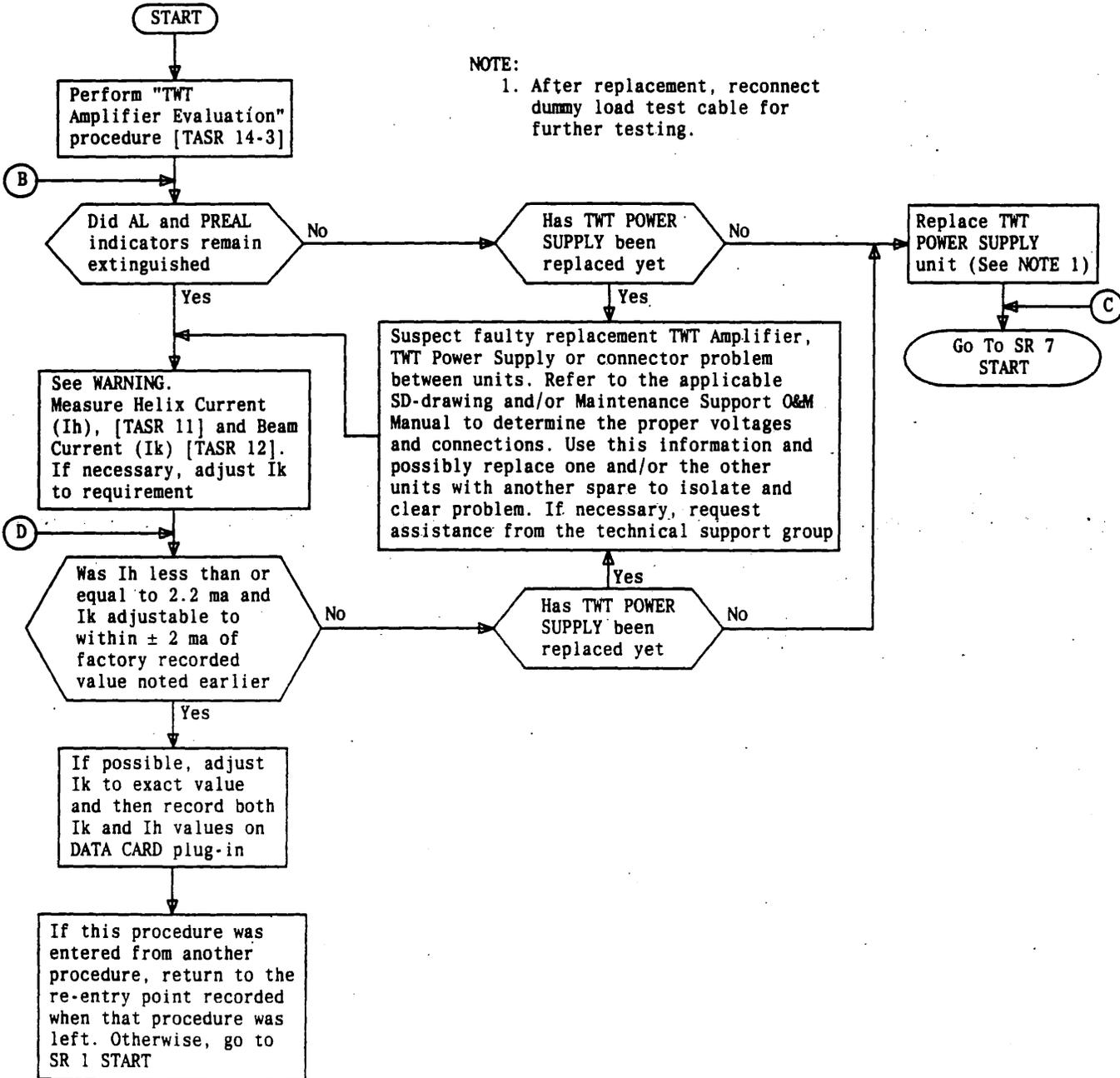


SR 7—TWT POWER SUPPLY Unit Initial Checks (Sheet 2 of 2)

WARNING: TO PREVENT DAMAGE, DO NOT USE PROBES WITH METAL TIPS LONGER THAN ONE-HALF INCH WHEN MEASURING AT I_k AND I_h TEST POINTS

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

PREREQUISITE: New TWT AMPLIFIER unit just installed.



SR 8—TWT Amplifier Unit Initial Checks

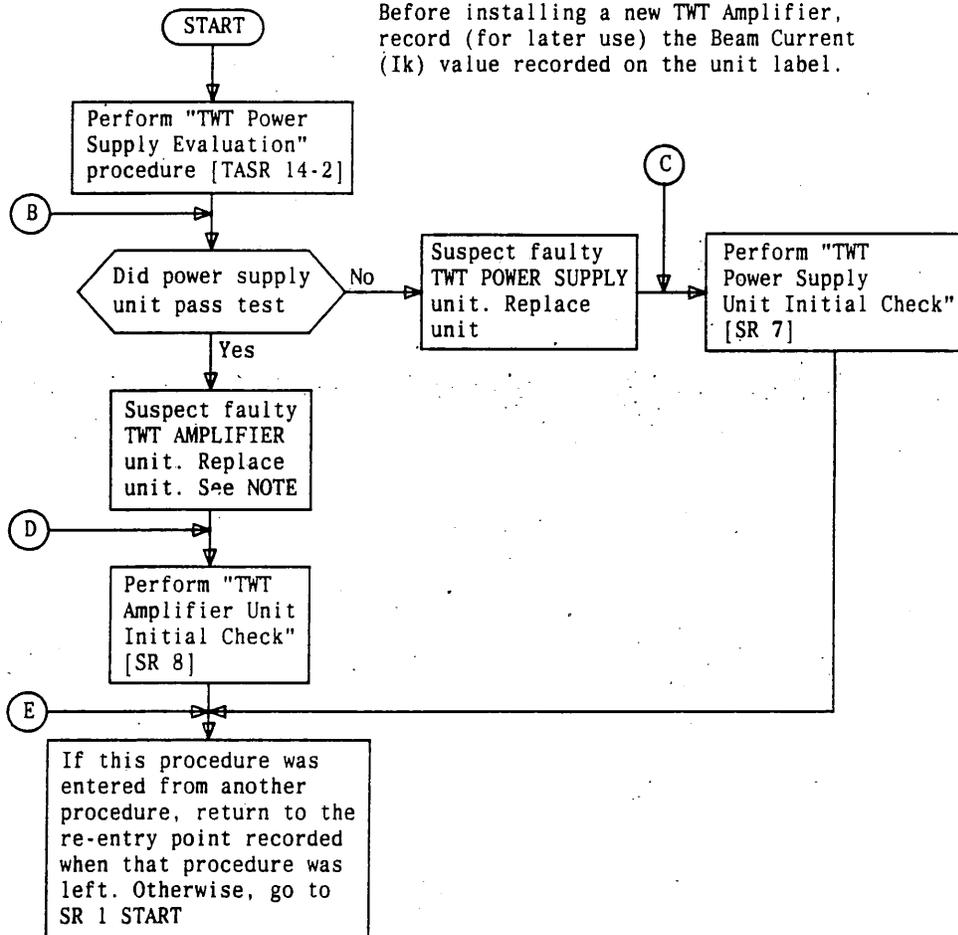
CAUTION: THIS PROCEDURE IS SERVICE AFFECTING UNLESS THE PROPER MANUAL PROTECTION SWITCHING OPERATION HAS BEEN PERFORMED.

PREREQUISITES:

1. The helix (Ih) and/or beam (Ik) current measurements do not meet requirements.
2. The transmitter may or may not be reporting any alarms.

NOTE:

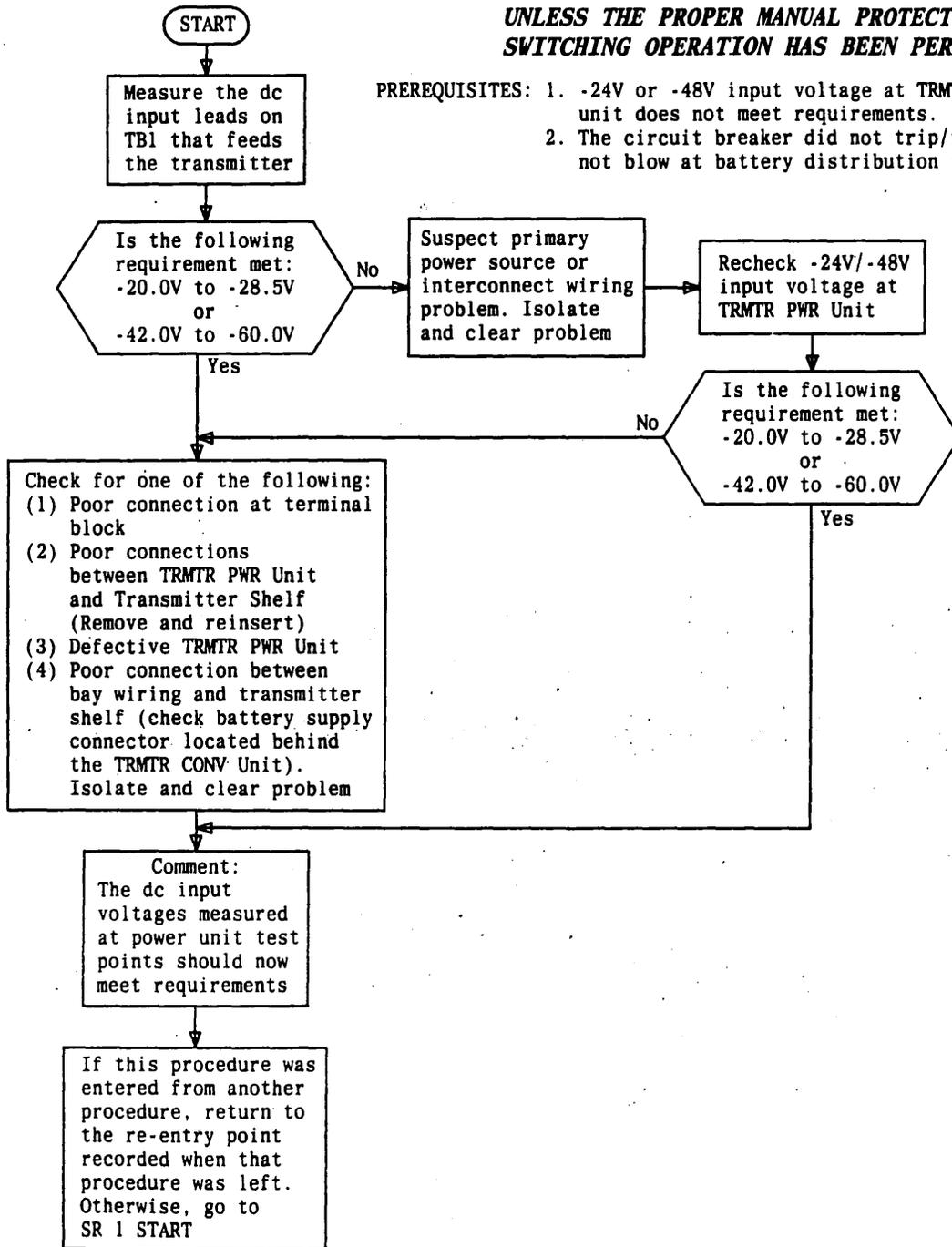
Before installing a new TWT Amplifier, record (for later use) the Beam Current (Ik) value recorded on the unit label.



SR 9—Resolving Helix and/or Beam Current Out-of-Limits Problem

**CAUTION: THIS PROCEDURE IS SERVICE AFFECTING
UNLESS THE PROPER MANUAL PROTECTION
SWITCHING OPERATION HAS BEEN PERFORMED.**

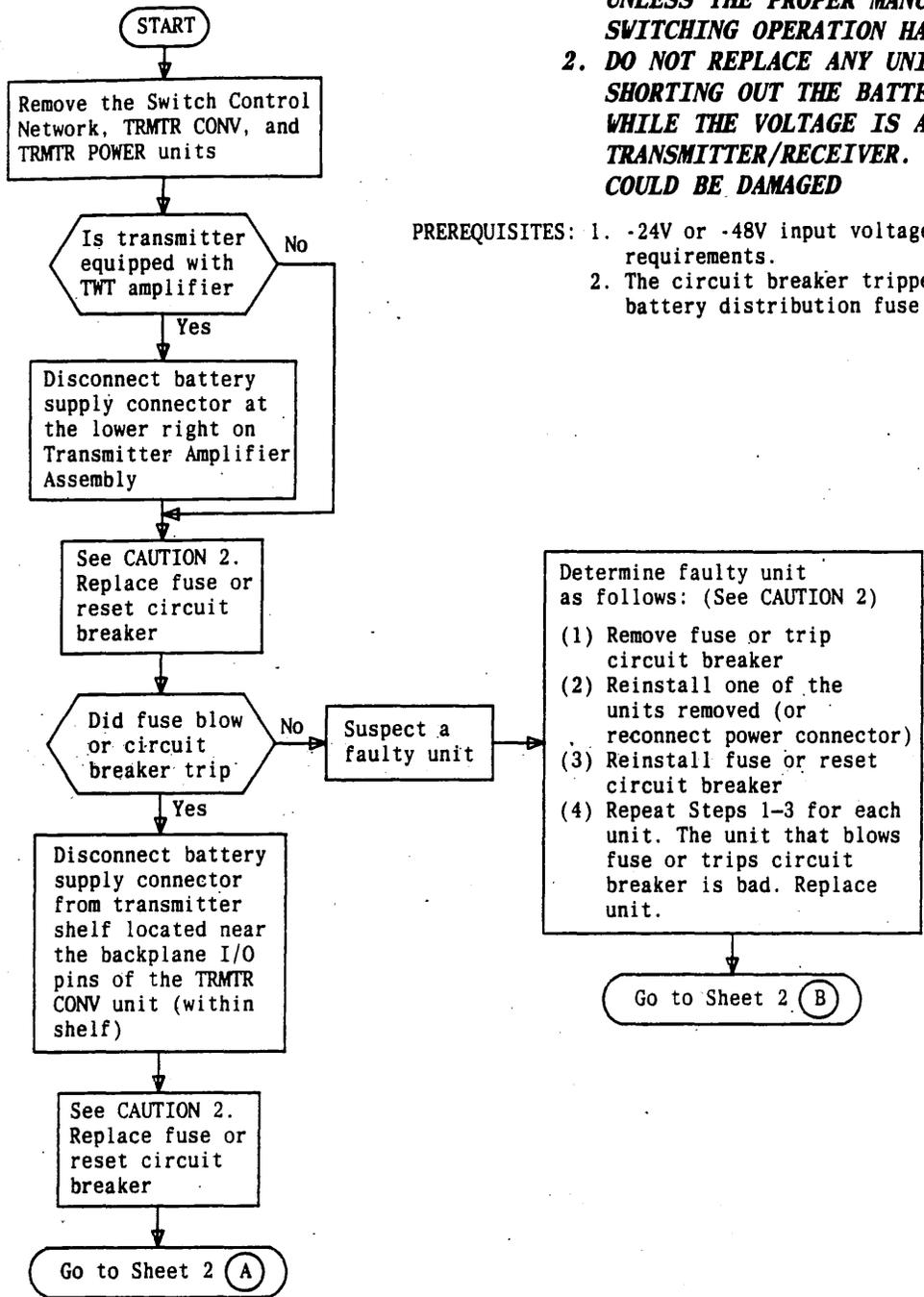
PREREQUISITES: 1. -24V or -48V input voltage at TRMTR PWR unit does not meet requirements.
2. The circuit breaker did not trip/fuse did not blow at battery distribution fuse bay.



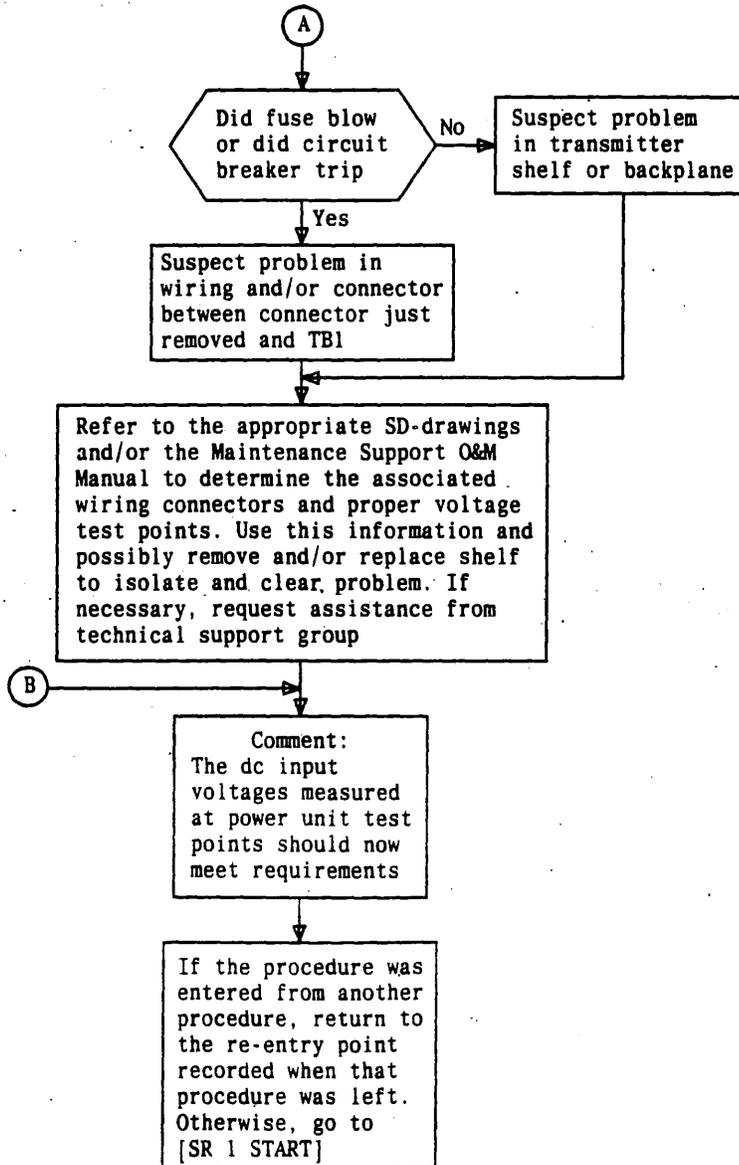
SR 10—Resolving DC Input Problems When Circuit Breaker Did Not Trip or Fuse Did Not Blow

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.



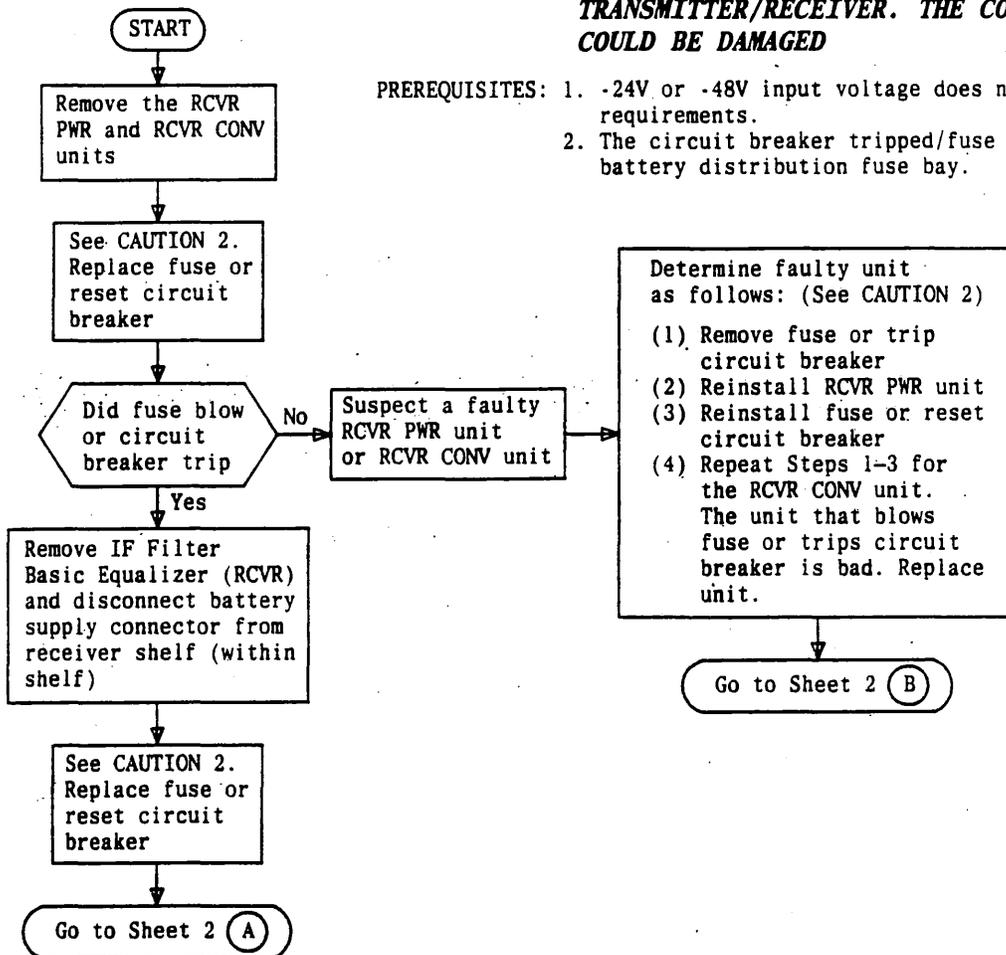
SR 11—Resolving Transmitter Shelf DC Input Problems (Sheet 1 of 2)



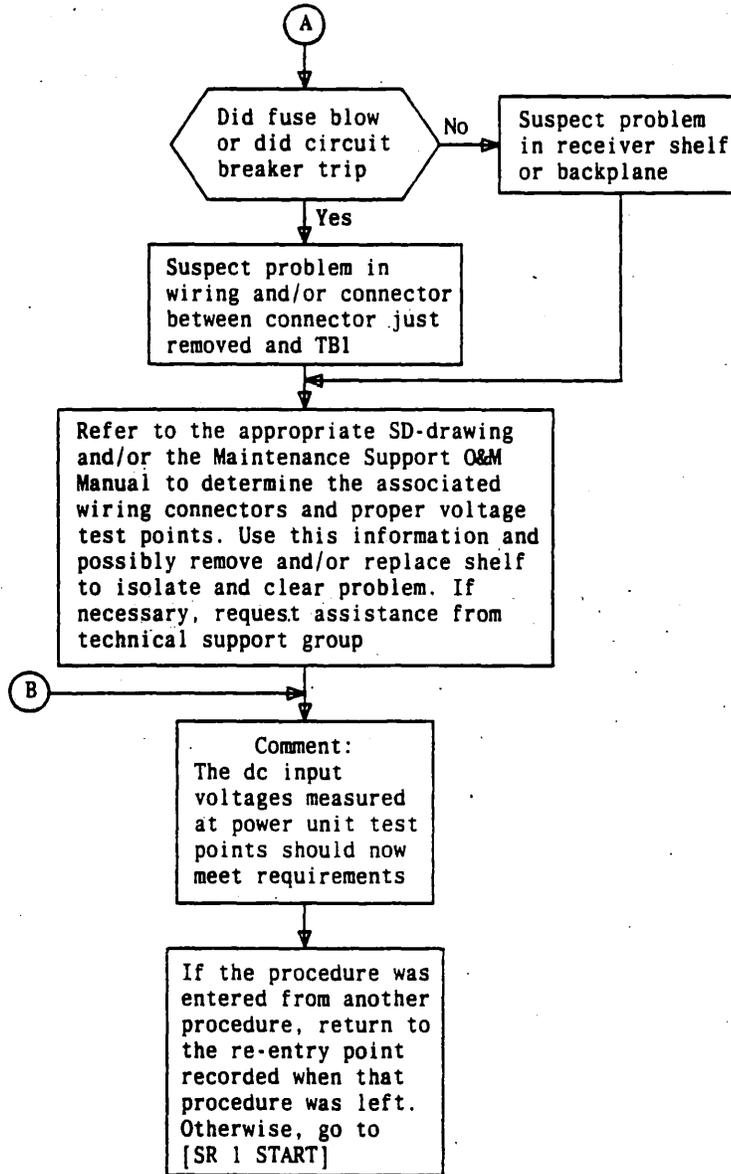
SR 11—Resolving Transmitter Shelf DC Input Problems (Sheet 2 of 2)

- 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.



SR 12—Resolving Receiver Shelf DC Input Problems (Sheet 1 of 2)



SR 12—Resolving Receiver Shelf DC Input Problems (Sheet 2 of 2)