

TL-1 MICROWAVE RADIO
RECEIVER TESTS
GENERAL

Receiver performance checks which can be made on a nondiversity system without interruption of service are as follows:

- (a) **Voltage:** Checks of battery, IF, and klystron supply voltages (−20 volts, −27.6 volts, −200 volts, and −400 volts)
- (b) **Current:** Checks of klystron cathode currents (CATH) and modulator crystal diode currents (CR1 and CR2)
- (c) IF amplifier input level (AGC)
- (d) IF frequency with respect to discriminator crossover (FREQ IF)
- (e) Magnetic amplifier operating point (AFC).

These checks are covered in Section 409-302-501 and provide an effective means of quickly locating trouble. Other performance checks which require interruption of service on a nondiversity system are described in Sections 409-306-501 through 409-306-505.

This section is reissued to add test information for TL-1 receivers that may now be equipped with either of the following:

- (a) The modulator-preamplifier unit (J99296AA-2, List 3) with the receiver IF and baseband unit (J99296G-2)
- (b) The modulator-preamplifier unit (J99296AA-2, List 3) with the IF amplifier unit (J99351E-1) and the FM receiver unit (J99351J-1).

Since this is a general revision, change arrows ordinarily used have been omitted.

This reissue does not affect the Equipment Test List.

The general test procedures are described in Chart 1. The procedures for removing and restoring service are described in Chart 2.

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APPARATUS:

- 1—J99262AA TL Test Set
 - 1—KS-14510 Volt-Ohm-Milliammeter
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CHART 1

GENERAL TEST PROCEDURES

Receiver checks and adjustments should be performed at the suggested test intervals outlined in Section 409-001-011.

STEP	PROCEDURE
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| 1 | Many of the tests and adjustments specified in Sections 409-306-501 through 409-306-505 require the interruption of service on a nondiversity system or the operation of the manual (MAN) switch on a diversity system. Refer to Chart 2 for the applicable procedures. |
| 2 | Spare IF and baseband units are used for replacement purposes as part of the testing technique. Therefore, the tests of Sections 409-306-501 through 409-306-505, applicable to an IF and baseband unit, should be performed periodically using the J99262AA TL test set to ensure that spare units are in good condition. |

Note: It is recommended that an adjustable power supply be set up in the control office capable of supplying 450 mA at 20.0 volts ± 1 percent to power the units and permit checking the condition of spares. A suggested arrangement for deriving the power from the control office battery is shown in Fig. 1.

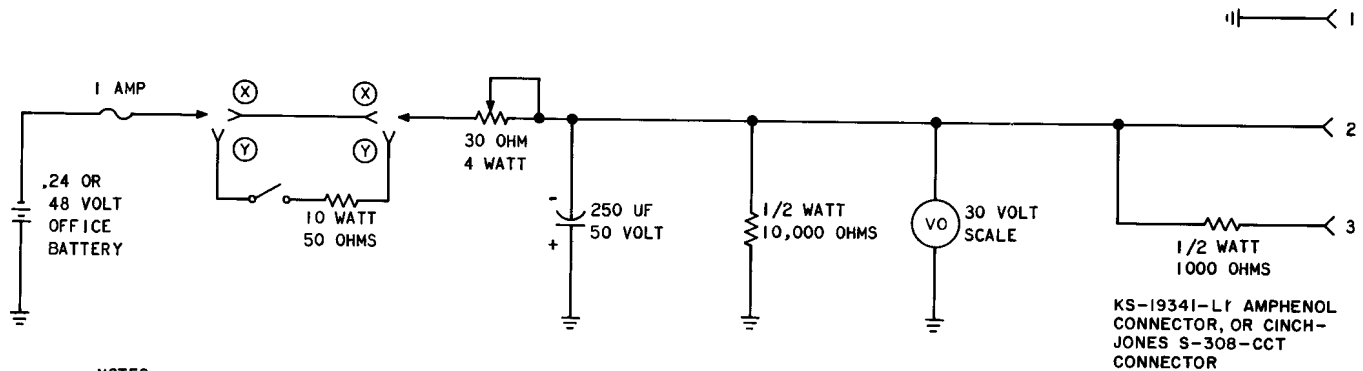
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|---|---|
| 3 | Because voltages applied to the klystron are higher than those normally encountered in the telephone plant, the general instructions on the maintenance and handling of electronic equipment involving hazardous voltages as contained in Section 010-110-001 should be <i>strictly</i> observed. |
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CHART 2

REMOVING AND RESTORING SERVICE PROCEDURES

This chart contains the recommended procedures for removing and restoring service on a TL-1 radio channel. The necessity for this action and the proper procedures to be followed must be positively established prior to any action that affects service.

CHART 2 (Cont)



NOTES:

1. USE (X) WIRING FOR A 24 VOLT OFFICE BATTERY.
2. USE (Y) WIRING, SWITCH AND 50-OHM 10-WATT RESISTOR FOR 48-VOLT OFFICE BATTERY. TO AVOID DAMAGE THE SWITCH SHOULD BE OPEN UNTIL THE IF AND BASEBAND UNIT HAS BEEN CONNECTED.

Fig. 1—Central Office Power Supply for TL-1 Receiver IF Testing—Schematic Diagram

STEP	PROCEDURE
Removing Service—Nondiversity System	
1	Once the necessity for removing service from a receiver on a nondiversity channel has been established and permission obtained, the alarm and control center need only be informed of the time and duration of the service interruption and then to proceed with the maintenance or test procedures.
Removing Service—Diversity System	
2	Secure the necessary permission and inform the alarm and control center of the time and duration of the receiver down time.
3	Check with the alarm and control center that no alarm conditions exist. If none exist, proceed directly to Step 5.
4	If an alarm does exist, measure the dc voltage on the PIL MON LEV (pilot-tone monitor level) jacks for each channel in turn with the VOM.
Note: The PIL MON LEV jacks for the regular channel are accessible on the diversity switch panel behind the duct cover.	
Requirement: The VOM indicates -5 to -10 volts.	

CHART 2 (Cont)

STEP	PROCEDURE
	<p>Note 1: If the requirement is met, the pilot tone is present; if the requirement is not met (−3 volts or less indicated on the VOM), the pilot tone is absent.</p> <p>Note 2: The diversity system alarm conditions are as follows:</p> <ul style="list-style-type: none">(a) Pilot tone present on both channels—no alarm(b) Pilot tone absent on both channels—no diversity alarm (but a major alarm due to total absence of pilot tone)(c) Pilot tone present on one channel; absent on the other—diversity alarm <p>Caution: <i>Do not proceed until the alarm condition is resolved.</i></p>
5	Determine the active channel by measuring with the VOM (use 3-Vdc scale) from the K4 jack to ground at the diversity switch panel.
	<p>Note: The presence of approximately −3 Vdc indicate that the diversity channel is active. Zero volt indicates that the regular channel is active.</p>
6	To determine that the transmission on the channel which will carry the service is stable and that no fading is apparent, set the selector switch to AGC. Then, reference to Fig. 2, 3, 4, or 5 will indicate the approximate received signal level based on the automatic gain control indication obtained for the channel being measured.
7	Once it is determined that the transmission conditions are suitable, operate the MAN switch from the AUTO position to the channel which is to remain active (REG or DIV).
8	If the transmitter is equipped with a J99302BF disconnect unit, proceed directly to Step 11.
9	Remove the patch cord at the BB IN jack on the transmitter baseband amplifier.
	<p>Note: Whenever the patch cord to a transmitter baseband amplifier BB IN jack is removed, a level rise of approximately 3.5 dB occurs on the adjacent channel of the diversity pair. To restore the signal to the proper level, perform Step 10.</p>
10	Attach the 75-ohm termination that is provided with the TL test set to the end of the patch cord after removal from the BB IN jack.
	<p>Note: The transmitter and receiver are now removed from service. The remaining steps apply only to systems that have transmitters equipped with a J99302BF disconnect unit.</p>
11	On the XMTR DISC ATTEN unit, operate rotary switch S1 to DISC.
12	Operate the ATTEN rotary switch counterclockwise to MAX.

CHART 2 (Cont)

STEP

PROCEDURE

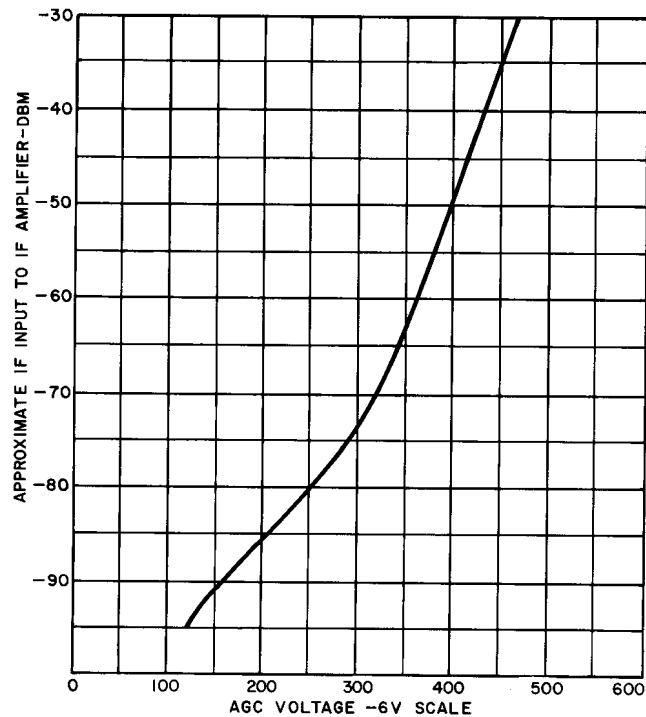


Fig. 2—Typical TL-1 Receiver AGC Characteristics

- 13 Remove the patch cord between XMTR DISC ATTEN jack J2 and the XMTR CONT jack BB IN.

Caution: Do not remove the connection to XMTR DISC ATTEN jack J1 since this will introduce hits on the system.

Restoring Service—Nondiversity System

- 14 When restoring service on a nondiversity system, be certain that all connections are made. Before restoring service, contact the alarm and control center for verification of service continuity and assurance that no alarms exist.

Restoring Service—Diversity System

- 15 When restoring service on a diversity system, be certain that all connections are in place and notify the alarm and control center that the units are being restored to service.

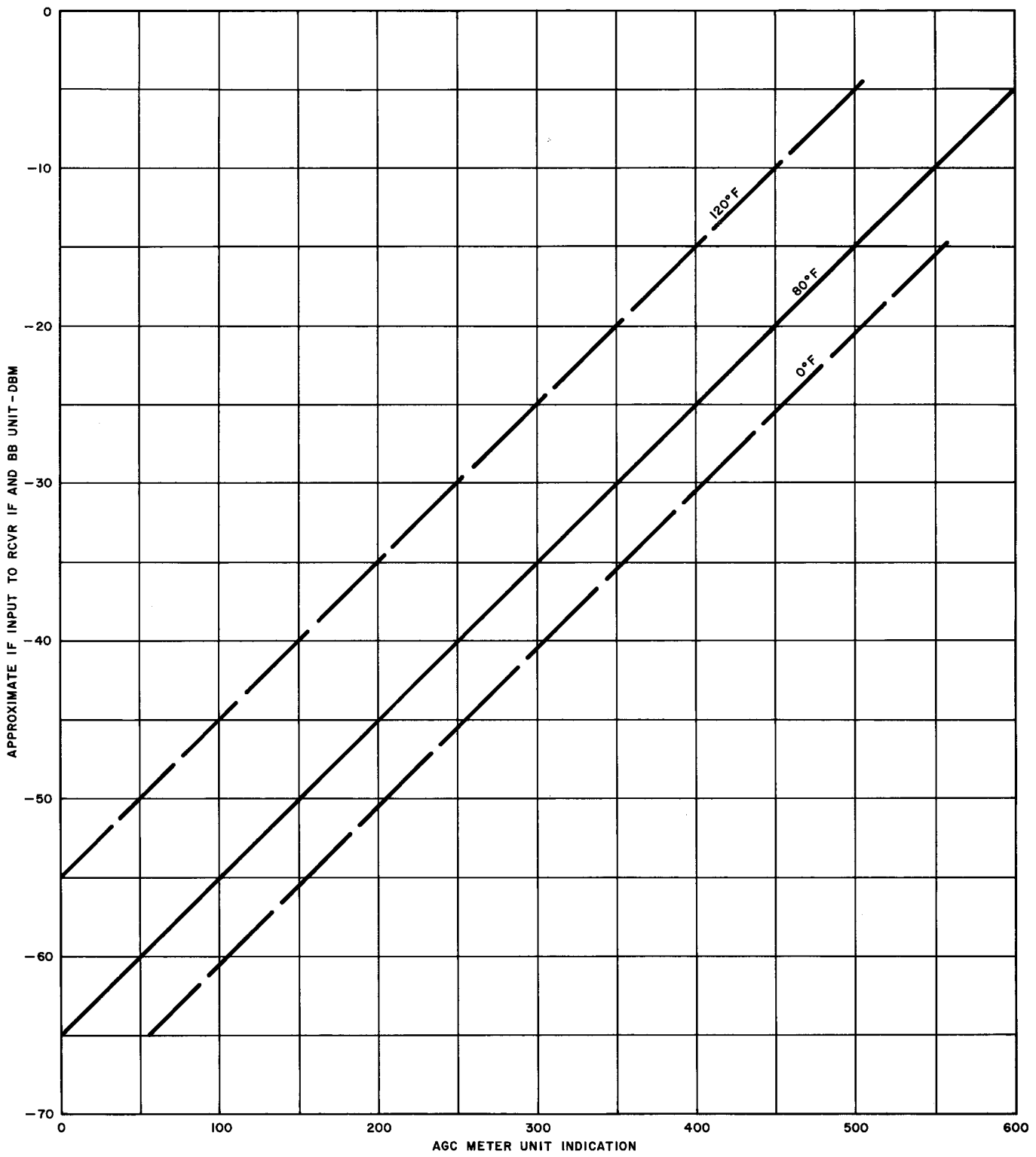


Fig. 3—Receiver AGC Characteristics—All J99296G-1 Units Prior to List 3, H Units

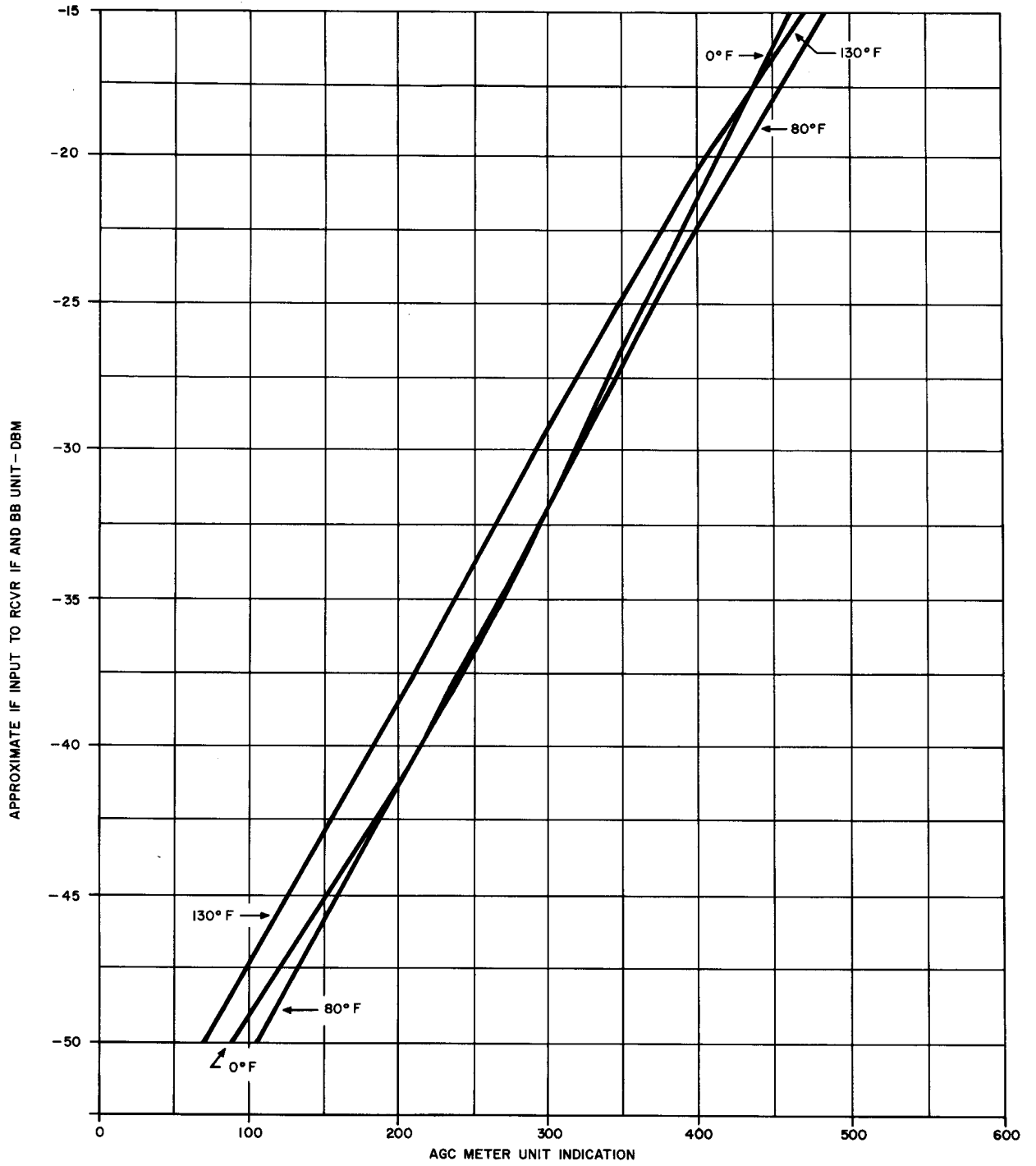


Fig. 4—Receiver AGC Characteristics—J99296G-1, List 3, H Units

CHART 2 (Cont)

STEP

PROCEDURE

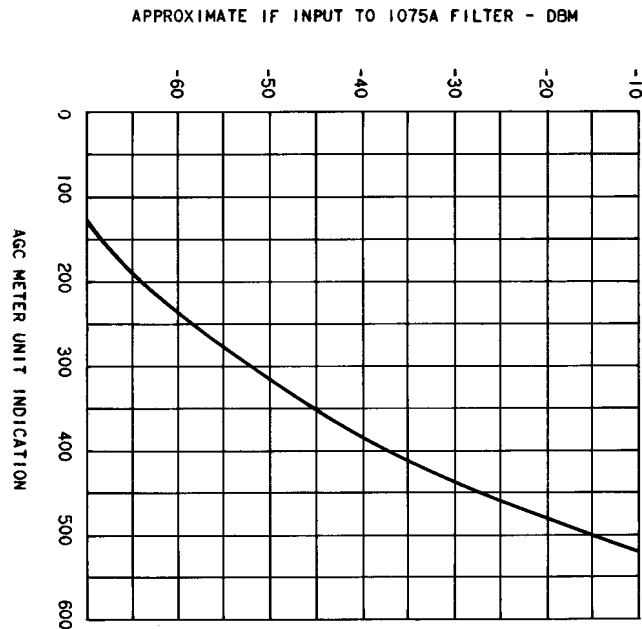


Fig. 5—Receiver AGC Characteristics—J99351E Unit

- 16 If the system has a transmitter that is equipped with a J99302BF disconnect unit, proceed directly to Step 22.
- 17 Detach the 75-ohm termination from the patch cord.
- 18 Reconnect the patch cord to the BB IN jack.
- 19 On the diversity switch panel, operate the MAN switch to the AUTO position.
- 20 On the radio bay, check that the waveguide switch is in the ON position.
- 21 Verify, with the alarm and control center, that service continuity is established and that no alarms exist.

Note: The transmitter and receiver are now restored to service. The remaining steps apply only to systems that have transmitters equipped with a J99302BF disconnect unit.

- 22 Reconnect the patch cord between XMTR DISC ATTEN jack J2 and XMTR CONT jack BB IN.

CHART 2 (Cont)

STEP	PROCEDURE
23	Operate the ATTEN rotary switch clockwise to the NORM position.
24	Operate rotary switch S1 to the NORM position.
25	On the diversity switch panel, operate the MAN switch to the AUTO position.
26	On the radio bay, check that the waveguide switch is in the ON position.
27	Verify with the alarm and control center that service continuity is established and that no alarms exist.
