TD-3 MICROWAVE RADIO
J68386G AND J68386H TRANSMITTER-RECEIVER BAYS
COMMON EQUIPMENT TESTS
PRELIMINARY CHECKS

This section provides the procedures for making preliminary checks on a J68386G or J68386H transmitter-receiver bay. These preliminary checks are made to establish the correct BO power and frequency to the receiver for the transmitter and to set the voltage of the −19 volt regulators.

The tests in this section may be performed using either the J68392A or the J68428A transmitter-receiver test set.

This section is issued to change the microwave generator frequency limits in Tables A, B, and C. The method for measuring the 40-MHz oscillator and shift modulator frequency, Fig. 5, has also been changed. This reissue does not affect the Equipment Test List.

CHART **PAGE**

Caution 1: These tests are performed on an out-of-service basis. Obtain a release from the designated control office; then remove the channel from service as directed by local practice.

Caution 2: On Hot Standby/Space Diversity equipped bays, consult Section 411-600-500 for forced switching procedures to remove service from BOTH the transmitter and receiver. Exercise extra caution during the tests since service will be present in some waveguide and IF cabling within this bay.

CHART 1

−19 VOLT REGULATOR CHECK

STEP	PROCEDURE
	Note 1: Repeater station radio bays use a common −19 volt regulator for both the transmitter and receiver sections. Main station radio bays utilize separate −19 volt regulator units for the transmitter and receiver sections; the location of the −19 volt regulators is shown in Fig. 1.
	Note 2: The adjustment procedure for the high-low voltage alarm of the J87279A −19 Volt Regulator is given in Section 411-502-502. If it is necessary to check or adjust the alarm at this time because of trouble in the bay or because it is specified by the ETL, refer to that section. The 92A and 92B power units (regulators) are not equipped with a high-low voltage alarm.
1	Operate the appropriate −19 volt control on the meter panel and observe the meter indication. (On a main station bay, the controls are designated −19V RCVR for the receiver regulator and −19V TRMTR for the transmitter regulator.)
	Requirement: 70 ±1
2	If the requirement is not met, adjust the ADJ VOLTS control on the regulator until the requirement is met. If unable to meet the requirement, replace the unit.

CHART 2

MICROWAVE GENERATOR FREQUENCY CHECK

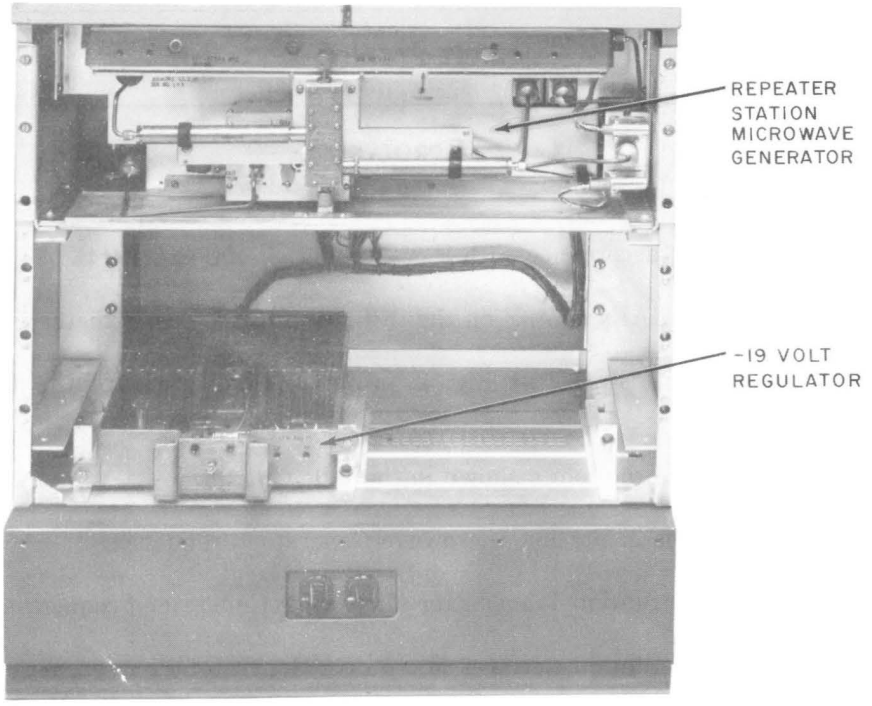
The following is a check of the frequency of the microwave generator. Repeater station bays use a single generator for both the transmitter and receiver. Main station bays provide separate generators for the transmitter and receiver. For location of the microwave generators, see Fig. 1.

Caution: Operating the microwave generator without the front cover of the bay may change the temperature of the generator and therefore its output frequency. Replace the cover as soon as the frequency check is completed.

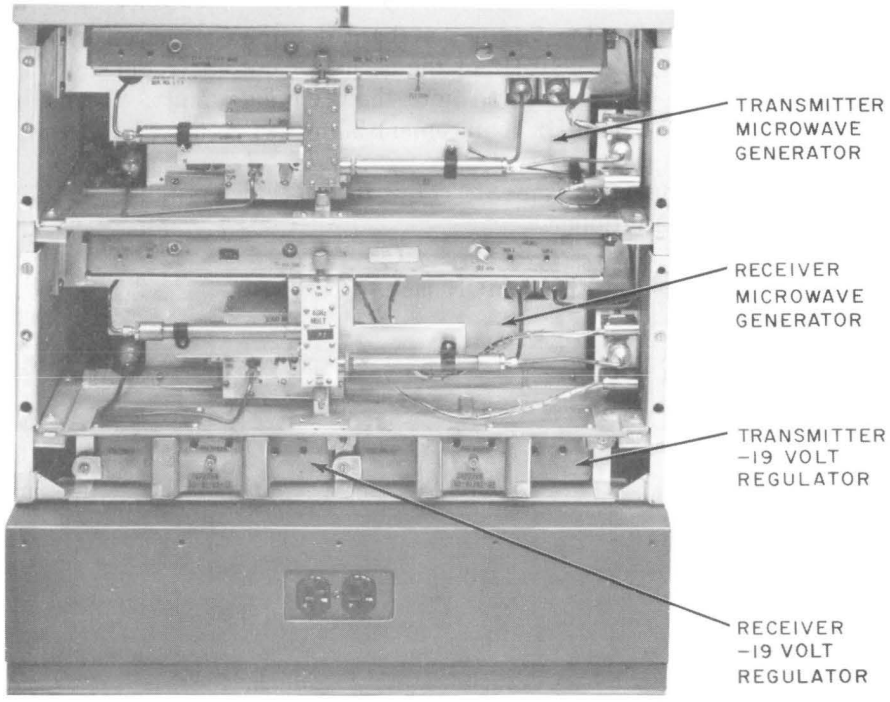
APPARATUS:

1—J68392A or J68428A Transmitter-Receiver Test Set

1—P-48Q352 Adjusting Tool



BASE OF REPEATER BAY



BASE OF MAIN STATION BAY

Fig. 1—Microwave Generator and —19V Regulator Locations

CHART 2 (Cont)

STEP	PROCEDURE
1	Prepare for testing in accordance with Fig. 2 or Fig. 3, option (Y).
2	Adjust the IF AMPL GAIN control on the test set until the power meter indicates 0 dBm.
3	Change connections to Fig. 2 or Fig. 3, option (Z) and measure the frequency on the counter. ***Requirement:*** Within the limits shown in the following: Table A—Repeater Station Microwave Generator Frequencies Table B—Main Station Transmitter Microwave Generator Frequencies Table C—Main Station Receiver Microwave Generator Frequencies. If the requirement is not met, adjust the FREQ ADJ control to bring the frequency to within 10 Hz of nominal. ***Note:*** The P-48Q352 adjusting tool has a slight detuning effect on the oscillator frequency. Adjust the control to within $\pm$10 Hz of the oscillator output frequency with the tool inserted in the control. Remove the tool and note the frequency shift. Readjust, taking the shift into account, so that the $\pm$10 Hz requirement is met when the tool is removed.
4	If unable to meet the requirement, refer to Section 411-502-504, J68387R Microwave Generator and 4-GHz Multiplier.
5	Disconnect the cable at the FREQ MON jack.

TABLE A

REPEATER STATION
MICROWAVE GENERATOR FREQUENCIES

RECEIVER		MICROWAVE GENERATOR LOW-FREQUENCY OSCILLATOR	
FREQUENCY (MHz)	CHANNEL	NOMINAL FREQUENCY (MHz)	LIMITS (MHz)
3730	1A	120.0000	119.999400–120.000600
3770	1B	118.7500	118.749400–118.750600
3810	2A	122.5000	122.499400–122.500600
3850	2B	121.2500	121.249400–121.250600
3890	3A	120.6250	120.624400–120.625600
3930	3B	119.3750	119.374400–119.375600
3970	4A	123.1250	123.124400–123.125600
4010	4B	121.8750	121.874400–121.875600
4050	5A	125.6250	125.624400–125.625600
4090	5B	124.3750	124.374400–124.375600
4130	6A	128.1250	128.124400–128.125600
4170	6B	126.8750	126.874400–126.875600
3710	7A	119.3750	119.374400–119.375600
3750	7B	118.1250	118.124400–118.125600
3790	8A	121.8750	121.874400–121.875600
3830	8B	120.6250	120.624400–120.625600
3870	9A	120.0000	119.999400–120.000600
3910	9B	118.7500	118.749400–118.750600
3950	10A	122.5000	122.499400–122.500600
3990	10B	121.2500	121.249400–121.250600
4039	11A	125.0000	124.999400–125.000600
4070	11B	123.7500	123.749400–123.750600
4110	12A	127.5000	127.499400–127.500600
4150	12B	126.2500	126.249400–126.250600

TABLE B

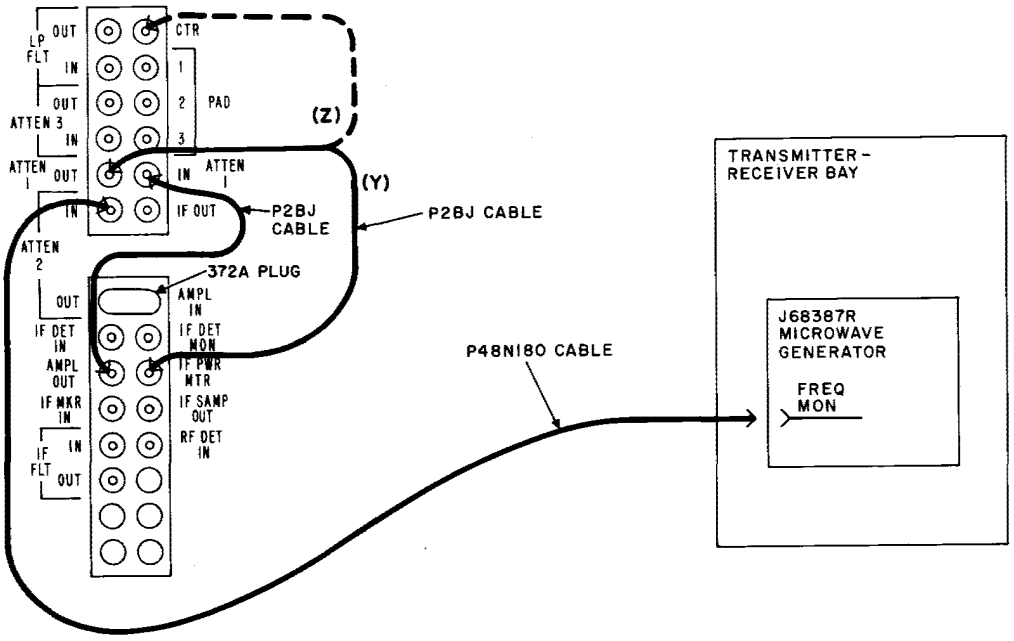
MAIN STATION
TRANSMITTER MICROWAVE GENERATOR FREQUENCIES

TRANSMITTER		GENERATOR OUTPUT (MHz)	MICROWAVE GENERATOR LOW-FREQUENCY OSCILLATOR	
FREQUENCY (MHz)	CHANNEL		FREQUENCY (MHz)	LIMITS (MHz)
3710	7A	3780	118.1250	118.124400–118.125600
3730	1A	3800	118.7500	118.749400–118.750600
3750	7B	3820	119.3750	119.374400–119.375600
3770	1B	3840	120.0000	119.999400–120.000600
3790	8A	3860	120.6250	120.624400–120.625600
3810	2A	3880	121.2500	121.249400–121.250600
3830	8B	3900	121.8750	121.874400–121.875600
3850	2B	3920	122.5000	122.499400–122.500600
3870	9A	3800	118.7500	118.749400–118.750600
3890	3A	3820	119.3750	119.374400–119.375600
3910	9B	3840	120.0000	119.999400–120.000600
3930	3B	3860	120.6250	120.624400–120.625600
3950	10A	3880	121.2500	121.249400–121.250600
3970	4A	3900	121.8750	121.874400–121.875600
3990	10B	3920	122.5000	122.499400–122.500600
4010	4B	3940	123.1250	123.124400–123.125600
4030	11A	3960	123.7500	123.749400–123.750600
4050	5A	3980	124.3750	124.374400–124.375600
4070	11B	4000	125.0000	124.999400–125.000600
4090	5B	4020	125.6250	125.624400–125.625600
4110	12A	4040	126.2500	126.249400–126.250600
4130	6A	4060	126.8750	126.874400–126.875600
4150	12B	4080	127.5000	127.499400–127.500600
4170	6B	4100	128.1250	128.124400–128.125600

TABLE C

MAIN STATION
RECEIVER MICROWAVE GENERATOR FREQUENCIES

RECEIVER		MICROWAVE GENERATOR LOW-FREQUENCY OSCILLATOR	
FREQUENCY (MHz)	CHANNEL	NOMINAL FREQUENCY (MHz)	LIMITS (MHz)
3730	1A	118.7500	118.749400–118.750600
3770	1B	120.0000	119.999400–120.000600
3810	2A	121.2500	121.249400–121.250600
3850	2B	122.5000	122.499400–122.500600
3890	3A	119.3750	119.374400–119.375600
3930	3B	120.6250	120.624400–120.625600
3970	4A	121.8750	121.874400–121.875600
4010	4B	123.1250	123.124400–123.125600
4050	5A	124.3750	124.374400–124.375600
4090	5B	125.6250	125.624400–125.625600
4130	6A	126.8750	126.874400–126.875600
4170	6B	128.1250	128.124400–128.125600
3710	7A	118.1250	118.124400–118.125600
3750	7B	119.3750	119.374400–119.375600
3790	8A	120.6250	120.624400–120.625600
3830	8B	121.8750	121.874400–121.875600
3870	9A	118.7500	118.749400–118.750600
3910	9B	120.0000	119.999400–120.000600
3950	10A	121.2500	121.249400–121.250600
3990	10B	122.5000	122.499400–122.500600
4030	11A	123.7500	123.749400–123.750600
4070	11B	125.0000	124.999400–125.000600
4110	12A	126.2500	126.249400–126.250600
4150	12B	127.5000	127.499400–127.500600



PREPARATION FOR TEST
(FIG. 2)

1. Connect power to the test set.
2. Observe the pilot lamp at the top right front of the test set. If the lamp is not lighted, operate the toggle switch to the opposite position and the lamp should be lighted.
3. Observe that no fuse alarm lamps are lighted.
4. Energize the counter and power meter.
5. Allow the equipment to warm up for at least 15 minutes.
6. On the power meter set the INPUT CHANNEL switch to IF, determine that no input is connected, then zero the power meter by placing the POWER RANGE DBM switch to −25 and adjusting the METER ZERO control for an indication of zero on the meter.
7. Set the POWER RANGE DBM switch to 0.
8. Set the FUNCTION switch on the counter to TEST, press the RESET button, and determine that the counter indicates 1 MHz ±1 count. Then set the FUNCTION switch to FREQUENCY.
9. Set the CTR switch to EXT. The test set is now ready for operation.
10. Set the AMPL GAIN control to the maximum counterclockwise position.
11. Set attenuators ATTEN 2 to 20 dB and ATTEN 1 to 5 dB.

Caution: Never apply more than +10 dBm to the power meter.

Fig. 2—Microwave Generator Frequency Check Using J68392A Test Set

PREPARATION FOR TEST
(FIG. 3)

1. Determine the control unit that applies. Test arrangement A shows connection for J68428A test sets using the C and D control panels. For test sets with the F control panel, refer to test arrangement B.

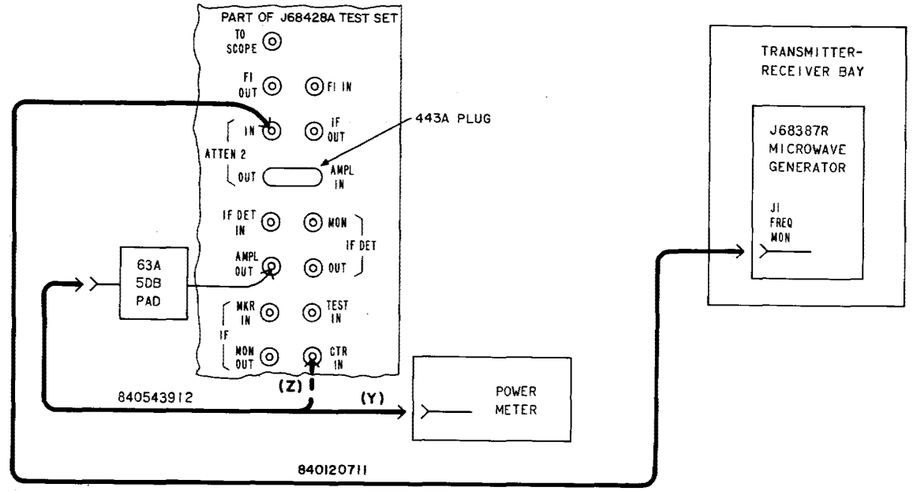
2. Operate the test set controls to the following positions.

UNIT	CONTROL	POSITION
Control Panel	ATTEN*	20 dB
	COUNTER INPUT	135 MHZ MAX
Counter	FUNCTION	135 MHZ MAX
	SAMPLE RATE	CCW but ON
	DISPLAY BLANKING	Depress the BLANKING DISPLAY pushbutton at the extreme right
Power Meter	MODE	ZERO
	INPUT	IF

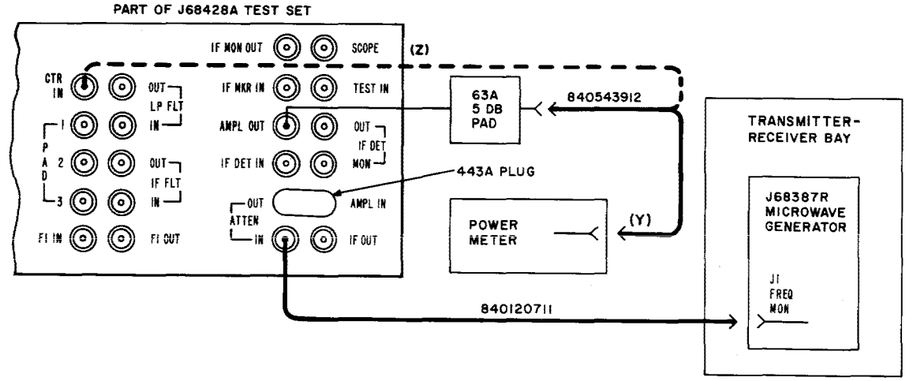
*On test sets equipped with J68428C and D control panels, use ATTEN 2.

3. Before connecting the IF cable to the power meter, zero the meter by adjusting the ZERO control for 000 indication on the digital display.

4. Set the MODE control to the POWER METER position.



A. USING J68428A TEST SET EQUIPPED WITH J68428 C AND D PANELS



B. USING J68428A TEST SET EQUIPPED WITH J68428 F PANEL

Fig. 3—Microwave Generator Frequency Check Using J68428A Test Set

CHART 3

MICROWAVE GENERATOR POWER CHECK

This chart checks the output power of the main station transmitter and receiver microwave generators and the output power of the repeater station bay microwave generator. If the output power cannot be adjusted to meet the requirements in this chart, check the microwave generator in accordance with Section 411-502-504. If still unable to meet the requirements in this chart after satisfying the microwave generator requirements in Section 411-502-504, check the 27A or 28A integrated circuit in accordance with Section 411-502-505.

APPARATUS:

1—P-48Q352 Adjusting Tool

STEP	PROCEDURE
	Note: If checking a main station bay, start with Step 4.
	Repeater Station Bay Microwave Generator
1	Select MWV GEN OUT control on the meter panel.
	Requirement: 70 $\pm$10
	If the requirement is met, proceed with Step 2.
	If the requirement is not met, proceed to Section 411-502-504 and realign the generator.
	After realignment, proceed with Step 2.
2	Adjust the LEV ADJ control in the 500-MHz generator circuit of the microwave generator until the meter indicates 70.
3	Read and record the MWV GEN 1, 2, and 3 and the MWV CUR MON meter indications on the meter panel.
	Requirement 1: The MWV GEN 3 meter indication must not exceed the meter indication stamped on the front of the 500-MHz generator.
	Requirement 2: The MWV CUR MON meter indication must not exceed 55.
	Main Station Transmitter Microwave Generator
4	Select blue MWV GEN OUT control on the meter panel.

CHART 3(Cont)

STEP	PROCEDURE

Requirement: 70 $\pm$10

If the requirement is met, proceed to Step 5.

If the requirement is not met, proceed to Section 411-502-504 and realign the generator.

After realignment, proceed with Step 5.

5 Adjust attenuator ATT 1 on the 28A integrated circuit until the meter indicates 70.

Note: The nut associated with the control for ATT 1 and ATT 2 should exert some drag when the control is being adjusted. When the nut is properly adjusted, it should be possible to adjust the control with the fingers of one hand while the nut remains stationary. It is not necessary to lock the nut after making the adjustment.

Caution: To maintain the correct power level and to prevent RF leakage, under no circumstance should the control be left in a loose condition.

Main Station Receiver Microwave Generator

6 Select red MWV GEN OUT control on the meter panel.

Requirement: 70 $\pm$10

If the requirement is met, proceed to Step 7.

If the requirement is not met, proceed to Section 411-502-504 and realign the generator.

After realignment, proceed to Step 7.

7 Adjust attenuator ATT 2 on the 28A integrated circuit until the meter indicates 70.

8 Read and record the MWV GEN 1, 2, and 3, and the MWV CUR MON meter indications on the meter panel.

Requirement 1: The MWV GEN 3 meter indication must not exceed the meter indication stamped on the front of the 500-MHz generator.

Requirement 2: The MWV CUR MON meter indication must not exceed 55.

CHART 4

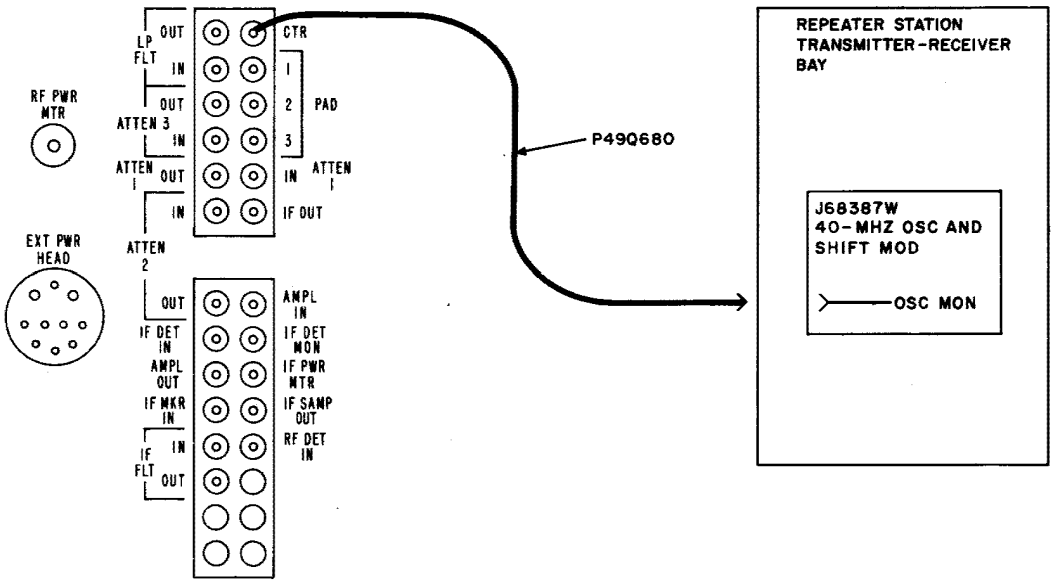
40-MHZ OSCILLATOR AND SHIFT MODULATOR CHECK

APPARATUS:

1—J68392A or J68428A Transmitter-Receiver Test Set

1—P-48Q352 Adjusting Tool

STEP	PROCEDURE
	Note 1: This chart applies only to a repeater station bay. Main station bays do not contain 40-MHz oscillators and shift modulators.
	Note 2: The checks in Charts 1 and 3 must be completed before proceeding with this chart.
1	Make the test connections shown in Fig. 4 or Fig. 5.
2	Observe the frequency indicated by the counter.
	Requirement: 40 MHz $\pm$400 Hz (limits: 39,999,600 to 40,000,400 Hz)
	If the requirement is not met, adjust the FREQ control for 40 MHz $\pm$50 Hz (limits: 39,999,950 to 40,000,050 Hz).
3	Remove the test cable from the OSC MON jack.
4	Select SHIFT MOD OUT control on the meter panel and read the panel meter.
	Requirement: 70 $\pm$2
	If the requirement is not met, adjust the PWR ADJ control on the 40-MHz oscillator until the requirement is met.
5	Select SHIFT OSC position control on the meter panel and record the meter indication.
6	Select SHIFT MOD BIAS position on the meter panel and record the meter indication.
7	If the requirements of Steps 2 and 4 cannot be met, check the 40-MHz oscillator and shift modulator in accordance with Section 411-502-503.



PREPARATION FOR TEST
(FIG. 4)

1. Set the CTR switch to the EXT position.

Fig. 4—40-MHz Oscillator and Shift Modulator Frequency Measurement Using J68392A Test Set

♦PREPARATION FOR TEST♦
(FIG. 5)

1. Determine the control unit that applies. Test arrangement A shows connections for J68428A test sets using the C and D control panels. For test sets with the F control panel, refer to test arrangement B.

2. Operate the test set controls to the following positions:

UNIT	CONTROL	SETTING
Control Panel	COUNTER INPUT	135 MHZ MAX
	ATTEN*	20 dB
Counter	FUNCTION	135 MHZ MAX
	SAMPLE RATE	Counterclockwise**
	DISPLAY BLANKING	Depress the BLANKING DISPLAY pushbutton at the extreme right
Power Meter	MODE	ZERO
	INPUT	IF

*On test sets equipped with J68428C and D control panels, use ATTEN 2.

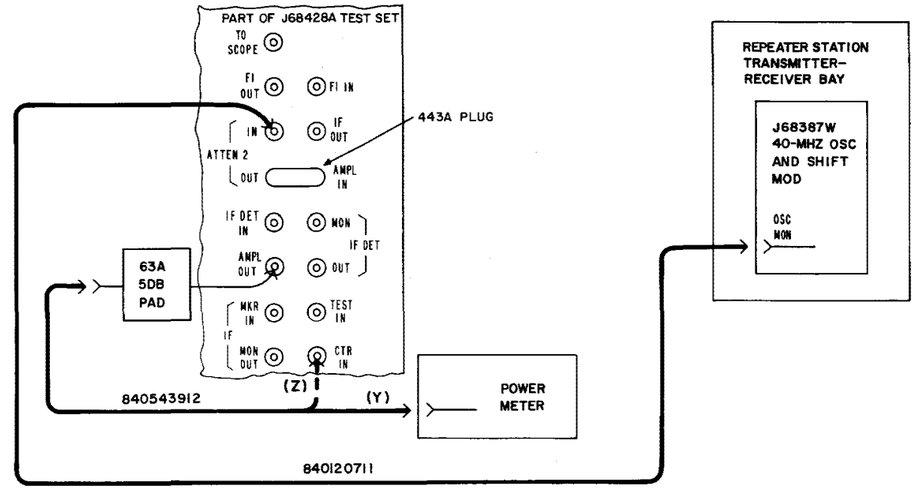
**On some units, the power switch is combined with the SAMPLE RATE control. Make sure the power is on.

3. Before connecting the IF cable to the power meter, zero the meter by adjusting the ZERO control for a 000 indication on the digital display.

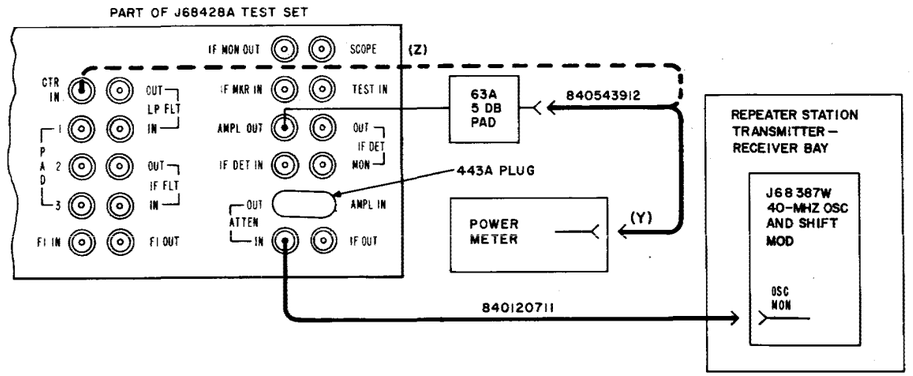
4. Set the MODE control on the power meter to the POWER METER position.

5. Connect option Y and adjust the IF AMPL GAIN control on the test set until the power meter indicates 0 dBm.

6. Change the test setup from option Y to option Z.



A. USING J68428A TEST SET EQUIPPED WITH J68428 C AND D PANELS



B. USING J68428A TEST SET EQUIPPED WITH J68428 F PANEL

Fig. 5—♦40-MHz Oscillator and Shift Modulator Frequency Measurement Using J68428A Test Set♦