TYPE O AND ON CARRIER TELEPHONE SYSTEMS

TERMINALS AND JUNCTIONS

GROUP UNIT LINEUP—TRANSMITTING

OSCILLATOR UNIT—GROUP AND 3700-HZ OSCILLATORS

The group carrier oscillator is an electron-coupled crystal oscillator. In O carrier terminals a different group carrier is fed to the group transmitting circuit and the group receiving circuit. In ON carrier terminals the same group carrier is fed to both group transmitting and group receiving circuits. At an ON1 Junction, the five channel groups are received from the open-wire side and modulated with the J98705H open wire (OW) group oscillators to the basic 4-channel band of 180 to 196 kHz. The second step of modulation, with the J98705J or W cable (CA) group oscillators, puts each group in its ON low-group allocation to transmit through the ON repeater to the cable. In receiving from the cable and ON repeater and in transmitting to the open wire, the steps of modulation are reversed.

This section is reissued to include requirements for 3-dB reduced level 3700-Hz signaling. Arrows and shaded areas indicate changes in this section. This reissue does not affect Equipment Test Lists.

Maladjusted or defective group oscillators may cause interchannel crosstalk, noise, and/or poor regulation of O and ON channel groups.

▶Reduction of the 3700-Hz signaling tone by 3 dB results in a 1- to 4-dB decrease in noise production in adjacent channels. This is accomplished by providing option ZZ covered on SD-95154-01 (not attached) which requires the insertion of a J98705H, List 17 resistor (7870 ohms) into the 3700-Hz oscillator circuit. New J98705H group oscillators, Lists 10 through 16 which are equipped with this option replace manufacture discontinued Lists 1 through 6 and L8 units, respectively.◀

The 3700-Hz tone used in signaling is generated in an oscillator located in the J98705H group oscillator unit. One oscillator is used to supply the 3700-Hz tone to one group of four channels. There are two adjustments on the oscillator. The 3700 OUT potentiometer (R2) on the face of the group oscillator unit controls the output level. The variable capacitor (C5) inside the unit at the bottom controls the frequency. See Fig. 1.

Maladjusted or defective 3700-Hz oscillators may cause signaling difficulties and/or adjacent channel interference which appears as noise and crosstalk.

The tests included in this section are:

A. Group Oscillator Output Level Test

B. Group Oscillator Output Frequency Test

C. 3700-Hz Oscillator Output Level Test

D. 3700-Hz Oscillator Output Waveform Test

E. 3700-Hz Oscillator Output Frequency Test

Tests A and B should be performed in order, and tests C, D, and E should be performed in order.

The purpose of this test is to measure and, if necessary, adjust the group and 3700-Hz oscillator output levels and frequencies.

APPARATUS:

1—Hewlett-Packard 400-Type Vacuum Tube Voltmeter (VTVM)

1—W2DW Cord

1—Frequency Counter HP5232A, 5532A, or equivalent

1—Oscilloscope

1—O and ON Unit Extender (J98705AY) or a P19A Cord

STEP	PROCEDURE
	A. Group Oscillator Output Level Test
1	Using a W2DW cord, connect the bottom VTVM post to ground and the top VTVM post to the CARR H, CARR L, or OUT jack of the group oscillator unit as required. See Table A.
2	Measure the carrier output level. ***Requirement:*** O Terminal: —5.0 to +5.0 dB ON Terminal: —10.0 to 0.0 dB ON1 Junction CA (Cable): —10.0 to 0.0 dB OW (Open Wire): —5.0 to +5.0 dB ***Note:*** A group output level test reading that is too high indicates that 45G varistors in the group transmitting unit or group receiving unit (or both, in the case of ON) have aged and must be replaced ▶with 460E diodes.◀
3	If the requirement in Step 2 is not met: (a) For O terminals and ON junctions (OW): Replace the group transmitting unit or group receiving unit, whichever is associated with the test reading, with a unit which is known to have good ▶460E diodes.◀ (b) For ON terminals and ON junctions (CA): Replace the group transmitter and group receiver units in succession (while observing the OUT jack test reading) with units known to contain good ▶460E diodes.◀

STEP	PROCEDURE
4	Remove the test connections.
	B. Group Oscillator Output Frequency Test
	Note: Test A must be performed before this test can be performed.
5	Connect the frequency counter to ground and to the CARR H, CARR L, or OUT jack of the group oscillators as required. See Table A. Be sure the counter ground jack is grounded.
6	Measure the carrier output frequency.
	Requirement: Frequency listed in Table A ±10 Hz.
7	If the requirement of Step 6 is not met, remove the channel group from service, replace the oscillator tube, and recheck the output level and frequency. If the requirement is still not met, adjust the frequency by performing Steps 8 through 11.
8	Remove the group oscillator unit and reconnect it using an O and ON unit extender (J98705AY) or a P19A cord.
9	Adjust the tuning capacitor to obtain the frequency specified in Table A. For CARR H, adjust C7; for CARR L, adjust C16; for group oscillator CA, adjust C2.
10	◗Return the unit to its normal position and recheck the frequency.
11	Remove the test connections and restore the channel group to service.◖
	C. 3700-Hz Oscillator Output Level Test
1	Using a W2DW cord, connect the bottom VTVM post to ground and the top VTVM post to the 3700 jack on the group oscillator unit.

Requirement:

	3-dB REDUCED LEVEL	OLD LEVEL
Lineup:	+0.8 dB	+3.8 dB
Maintenance:	0.0 to +1.5 dB	+3.0 to +4.5 dB

2	If the requirement of Step 1 is not met, check tubes in accordance with Section 362-110-503.
	Note: In cases where an ON terminal is connected directly or through an N line to an ON/K line, the requirement in Step 1 may not always be correct. In cases where the signaling output at the T jack (Section 362-115-502) requires the 3700-Hz readjustment, disregard the requirements in Step 1.
3	Adjust the 3700 OUT potentiometer, located on the face of the group oscillator unit, to meet the requirements of Step 1.
4	Remove the test connections.

STEP	PROCEDURE
	D. 3700-Hz Oscillator Output Waveform Test ***Note:*** Test C must be performed before this test can be performed.
5	Place all channels in the on-hook condition.
6	Connect the oscilloscope to ground on the terminal under test and to the 3700 jack on the group oscillator unit. Be sure the oscilloscope ground jack is grounded. ***Requirement:*** The peaks of the sine wave should be rounded with no evidence of flattening.
7	If the requirement of Step 6 is not met, replace the oscillator tube and, if necessary, the oscillator unit. If the requirement is still not met, check for a trouble condition in the terminal which would cause abnormal loading of the 3700-Hz oscillator output circuit. Repeat Tests C and D.
8	Remove the test connections.
	E. 3700-Hz Oscillator Output Frequency Test ***Note:*** Tests C and D must be performed before this test can be performed.
9	Connect the frequency counter to ground and to the 3700 jack on the group oscillator. Be sure the counter ground jack is grounded.
10	Measure the frequency. ***Requirement:*** Lineup: 3700 Hz Maintenance: 3680 to 3720 Hz
11	If the requirement of Step 10 is not met, remove the channel group from service, replace the oscillator tube, and repeat Tests C and D. If the requirement is still not met, adjust the frequency by performing Steps 12 through 15.
12	Remove the group oscillator unit and reconnect it using an O and ON unit extender (J98705AY) or a P19A cord.
13	Adjust capacitor C5 for 3700 Hz.
14	After adjusting capacitor C5, observe the degrees of open area between the stator and the rotor of the capacitor. ***Requirement:*** The open area should be 50 degrees or greater. ***Note:*** If the open area is less than 50 degrees, the unit should be returned to a service center.
15	Return the unit to its normal position and recheck the frequency.
16	Remove the test connections and restore the channel group to service.

TABLE A

ON TERMINAL	TYPE OSCILLATOR J98705H (SD-95154-01)	GROUP NUMBER	FREQ (KHZ) CARR L OSC JACK	FREQ (KHZ) CARR H OSC JACK
ON1	List 4 or 13	1	316	—
	List 5 or 14	2	296	—
	List 3 or 12	2	—	296
	List 3 or 12	3	276	—
	List 1 or 10	4	—	256
	List 1 or 10	5	236	—
ON2	List 5 or 14	1	—	312
	List 5 or 14	2	296	—
	List 3 or 12	2	—	296
	List 6 or 15	3	—	280
	List 6 or 15	4	264	—
	List 7, 8, or 16	5	—	248
	List 7, 8, or 16	6	232	—

O TERMINAL	TYPE OSCILLATOR J98705H (SD-95154-01)		FREQ (KHZ) CARR L OSC JACK	FREQ (KHZ) CARR H OSC JACK
OA	List 2 or 11		198	216
OB	List 1 or 10		236	256
OC	List 3 or 12		276	296
OD	List 4 or 13		316	336

ON JUNCTION (CABLE)	TYPE OSCILLATOR J98705J OR W (SD-95158-01)	GROUP NUMBER	FREQ (KHZ) OUT JACK
	List 6	1	316
	List 7	2	296
	List 3	3	276
	List 8	4	256
	List 9	5	236
	List 10	LCO	76

ON JUNCTION (OPEN WIRE)	TYPE OSCILLATOR J98705H (SD-95154-01)		FREQ (KHZ) CARR L OSC JACK	FREQ (KHZ) CARR H OSC JACK
OA	List 2 or 11		198	216
OB	List 1 or 10		236	256
OC	List 3 or 12		276	296
OD	List 4 or 13		316	336

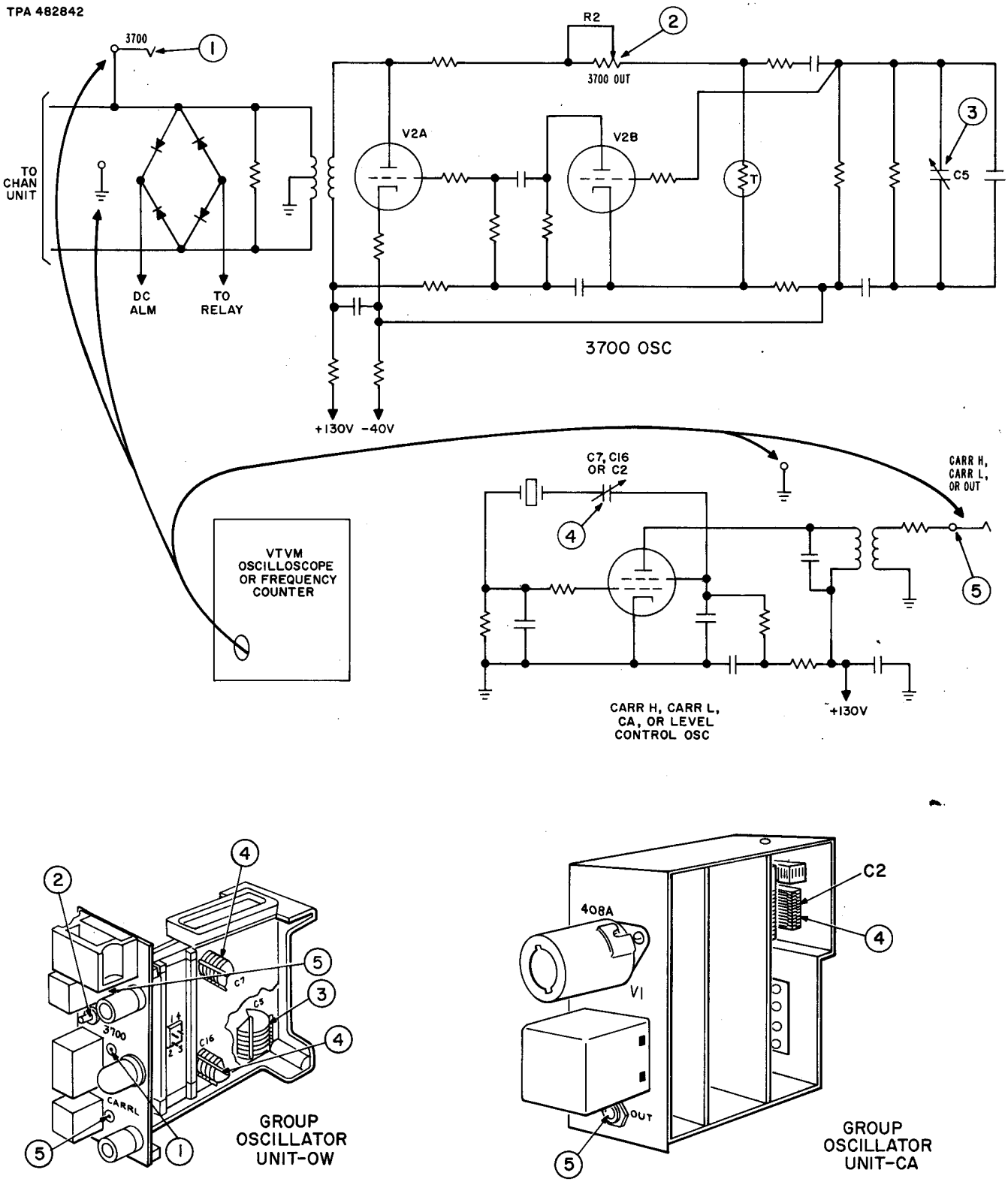

Fig. 1—Location of Test Points and Adjustors