

**P1 CARRIER TELEPHONE SYSTEM  
ADJUSTMENTS AND MAINTENANCE**

**REPEATERS**

**ADJUSTMENTS AND TESTS**

**LOW GROUP**

**1.00 INTRODUCTION**

**1.01** Since the tests and adjustments of the repeater may be performed at the pole location, binding post connections on the 386A apparatus case terminal block are given along with test points located on board E. The binding posts on the 386A apparatus case terminal block are shown in parentheses.

**1.02** Consult Table I for the tests and adjustments to be performed on the low group section of a specific repeater. All repeaters must first be tested as nonregulated repeaters (dummy regulator in positions H and C).

**2.00 TEST E—LOW GROUP GAIN (36 kc)**

**2.01** On the test set, turn the SEND switch to CARR.

**2.02** Turn the CARR OSC RANGE switch to 10-50 KC.

**2.03** Turn the REC switch to DET 600Ω. If power is furnished over the cable and the normal direction of transmission is used, turn the REC switch to DET HI-IMP; but if the reversed direction of transmission (REV) is used, turn the REC switch to DET 600Ω.

**TABLE I**

**LOW GROUP (LG) ADJUSTMENTS AND TESTS**

Option	Board C	Adjustments and Tests
Dummy Regulator (nonregulated)	800AF	E only
Total Power Regulator—LG	800AH	E and F
Pilot Regulator—LG	800AJ or AK	E and G
Pilot Oscillator—LG	800AL or AM	E and H

**Note:** (REV) indicates that the low group frequencies are transmitted from the central office.

**2.04** Connect send cord from SEND jack on the test set to test points HGT LINE; white to HGT LINE (14), black to yellow dot (13), and sleeve to yellow dot (13) on board E.

**2.05** Connect receive cord from REC jack on test set to test points LGT LINE; red to LGT LINE (12), black to yellow dot (13) on board E.

**2.06** Turn CARR OSC FREQ knob to 36 KC.

**2.07** Remove boards E and J. On board J remove the 8-db (29D) pad in the IN position and place a bare wire strap between screw terminals 4 and 6 (0-db pad value) if board J is equipped with a 337-type equalizer. If board J is not equipped with an equalizer (strap), replace the 24-db (29M) pad with an 8-db (29D) pad in the IN position. Reinsert boards J and E.

→ **2.08** Turn the DET SENS-db switch to 0 position and turn the ATTENUATOR switches to obtain a reading of approximately 0 on the DECIBEL meter. Adjust the CARR OSC OUTPUT potentiometer to obtain a reading of 0 on the DECIBEL meter.

**2.09** Turn the DET SENS-db switch to +20 position. Decrease the ATTENUATOR switch setting by 5 db. DECIBEL meter should read approximately -15.

**2.10** Decrease the ATTENUATOR by 1-db steps, observing that the DECIBEL meter reading decreases 1 db for each 1-db ATTENUATOR step. An increase of 0.5 db or less indicates amplifier overload. If a reading of -2.0 (+18 dbm) or higher is not obtained before overload occurs, replace the amplifier (800AB) board in position J and repeat the test.

**2.11** Turn DET SENS-db switch to the correct position:

Power Supply	Group Frequencies Transmitted from Central Office	DET SENS-db Position
Local	Low (REV) or High	0
Over the Cable	Low (REV)	+10
Over the Cable	High	0

**2.12** Operate CAL OSC key.

**2.13** Adjust CARR OSC OUTPUT potentiometer to obtain the following appropriate reading on the DECIBEL meter:

Power Supply	DET SENS-db Position	DECIBEL Meter Reading
Local or Power Over Cable	0	0 (0 dbm)
Power Over Cable (REV)	+10	-7 (+3 dbm)

**TABLE II**  
**TEST E—LOW GROUP GAIN REQUIREMENTS**  
**FREQUENCY 36 KC**

Equalizer	INPUT Pad for Gain Test	DET SENS-db Position	ATTENUATOR	DECIBEL Meter Reading
337A	8 (29G)	+10	8	-2.0 to +1.5
337B	8 (29G)	+10	8	-1.5 to +2.0
337C	8 (29G)	+10	8	-7.0 to -3.5
None	24 (29M)	+10	0	-2.0 to +1.5

- 2.14 Release CAL OSC key.
- 2.15 Turn DET SENS-db switch to +10 position.
- 2.16 Remove boards E and J. If board J is not equipped with an equalizer, replace the 8-db (29D) pad in the IN position with a 24-db (29M) pad. If board J is equipped with a 337-type equalizer, place an 8-db (29D) pad in the IN position. Reinsert boards J and E.
- 2.17 Change the ATTENUATOR setting to obtain the value given in Table II for the equalizer specified by the engineer for board J.
- 2.18 The required DECIBEL meter reading for 36 kc is given in Table II for the equalizer specified.
- 2.19 If the above requirements cannot be met, refer to Section 363-102-506.
- 2.20 If the repeater being tested is a nonregulated repeater, remove the send and receive cords from the repeater and prepare the repeater for connection to the line as covered in Section 363-102-504.
- 2.21 If the repeater being tested is a regulated repeater, do not remove the send and receive cords. Perform the additional adjustment indicated in Table I.

**3.00 TEST F—TOTAL POWER REGULATOR—LOW GROUP (36 kc)**

- 3.01 If board J is equipped with a 337C equalizer, remove boards E and J. Remove the 8-db (29D) pad from the IN position. Place a strap between screw terminals 4 and 6 on board J (0-db pad value). Reinsert boards J and E.
- 3.02 On the test set, turn CARR OSC FREQ knob to 36 KC.

- 3.03 Turn DET SENS-db switch to the correct position:

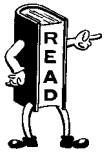
Power Supply	Group Frequencies Transmitted from Central Office	DET SENS-db Position
Local	Low (REV) or High	0
Over the Cable	Low (REV)	+10
Over the Cable	High	0

- 3.04 Operate CAL OSC key.
- 3.05 Adjust CARR OSC OUTPUT potentiometer to obtain the following appropriate reading on the DECIBEL meter:

Power Supply	DET SENS-db Position	DECIBEL Meter Reading
Local or Power Over Cable	0	0 (0 dbm)
Power Over Cable (REV)	+10	-7 (+3 dbm)

- 3.06 Release CAL OSC key.
- 3.07 Turn DET SENS-db switch to +10 position.
- 3.08 Change the ATTENUATOR switch setting to obtain a reading of  $0.0 \pm 0.5$  db ( $+10 \pm 0.5$  dbm) on the DECIBEL meter. Record the DECIBEL meter reading for use in 3.12 and 3.14.
- 3.09 Remove boards E and H (800AF dummy regulator) and insert a total power regulator board (800AH) in position H. Replace board E.

**3.10** On the KS-14510 meter, turn selector to DC VOLTS, 12 position.



*Caution: All voltage readings at the REG test point must be made with the selector in the DC VOLTS, 12 position.*

**3.11** Connect the KS-14510 meter to low group REG test point on board H; negative lead to REG (16), positive lead to yellow dot (13).

**3.12** Turn the ADJ OUT potentiometer on board H to obtain the same DECIBEL meter reading obtained in 3.08. If this requirement cannot be met, remove board H. If the screw terminals on board H are connected by a strap, remove the strap, reinsert board H, and repeat the test. If board H has no strap, use the procedures of Section 363-102-506 to locate the trouble.



*Caution: Allow at least 5 seconds for the regulator to stabilize after each adjustment.*

**3.13** The KS-14510 meter should read between the following:

Network Board	Volts dc
800AH, Series 1	4.0 and 6.5
800AH, Series 2	3.0 and 4.0

**Note:** The series number of the network board is shown on the bottom of the board.

Record this reading on the repeater information card located on the inside of the terminal block cover and on the front of the 803B connector cover. This voltage indicates the midpoint of the regulator range (for use in system line-up).

**3.14** Change the ATTENUATOR switch setting to add 5-db attenuation. DECIBEL meter reading should decrease but not more than 0.5 db

from the reading observed in 3.08 and 3.12. Record this reading for use in 3.16.

**3.15** The KS-14510 meter should read between the following:

Network Board	Volts dc
800AH, Series 1	1.5 and 3.5
800AH, Series 2	1.0 and 2.2

**3.16** Change the ATTENUATOR switch setting to remove 10-db attenuation. DECIBEL meter should increase but not more than 1.5 db above the reading observed in 3.14. This test verifies that the regulator is responding to variations over the required range of input power.

**3.17** The KS-14510 meter should read between the following:

Network Board	Volts dc
800AH, Series 1	8.0 and 13.0
800AH, Series 2	6.0 and 8.0

**3.18** If the above limits are not met, refer to Section 363-102-506.

**3.19** Remove the send and receive cords from the repeater. If no further tests are to be made, prepare the repeater for connection to the line as covered in Section 363-102-504.

**4.00 TEST G—PILOT REGULATOR—  
LOW GROUP (31.5 or 34.5 kc)**

**4.01** The low group pilot regulator will be used when the low group frequencies are used for the remote terminal to central office direction of transmission; this is the normal direction. The test set-to-repeater connections and the test set switch settings listed for Test E will apply to Test G regardless of which direction of transmission is used.

4.02 Remove boards E and J, remove the 8-db (29D) pad if present, and place a 24-db (29M) pad in the IN position. Reinsert boards J and E.

4.03 On the test set, turn CARR FREQ OSC knob to the appropriate frequency:

Arrangement	Frequency
	kc
Normal systems (800AK)	31.5
Staggered systems (800AJ)	34.5

4.04 Turn DET SENS-db switch to the 0 position.

4.05 Operate CAL OSC key.

4.06 Adjust CARR OSC OUTPUT potentiometer to obtain a reading of 0 on the DECIBEL meter.

4.07 Release CAL OSC key.

4.08 Turn the DET SENS-db switch to -10 position.

4.09 Change the ATTENUATOR switch setting to obtain a DECIBEL meter reading of  $-6.0 \pm 0.5$  db ( $-16 \pm 0.5$  dbm).

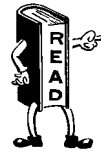
**Note:** Record the above reading for use in 4.15 and 4.17.

4.10 Remove boards E and H (800AF dummy regulator board) and insert the pilot regulator board (800AJ or AK) in position H. Replace board E.

4.11 Turn the DET SENS-db switch to obtain any reading on DECIBEL meter.

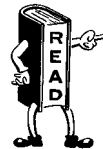
4.12 **Slowly** turn the CARR OSC FREQ knob until minimum power is read on DECIBEL meter. Readjust the DET SENS-db switch if

necessary. This sets the 7F test set frequency to the exact frequency of the pilot regulator filter.



*Caution: Allow at least 5 seconds for the regulator to stabilize after each adjustment of potentiometer or ATTENUATOR setting, or frequency.*

4.13 On KS-14510 meter, turn selector to DC VOLTS, 12 position.



*Caution: All voltage readings at the REG test point must be made with the selector in the DC VOLTS, 12 position.*

4.14 Connect the KS-14510 meter to low group REG test point on board H; negative lead to REG (16), positive lead to yellow dot (13).

4.15 On board H, adjust the ADJ OUT potentiometer to obtain the same DECIBEL meter reading obtained in 4.09 with DET SENS-db switch on -10 position.

4.16 The KS-14510 meter should read between the following:

Network Board	Volts dc
800AK, Series 1	4.0 and 6.5
800AK, Series 2 800AJ, Series 1	3.0 and 4.0

**Note:** The series number of the network board is shown on the bottom of the board.

Record this reading on the information card located on the inside of terminal block cover and on the front of the 803B connector cover. This voltage indicates the midpoint of the regulator range (for use in system line-up).

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**4.17** Change the ATTENUATOR switch setting to add 5-db attenuation. DECIBEL meter should decrease but not more than 0.5 db less power than the reading observed in 4.09 and 4.15. Record the DECIBEL meter reading for use in 4.19.

**4.18** The KS-14510 meter should read between the following:

Network Board	Volts dc
800AK, Series 1	1.5 and 3.5
800AK, Series 2 800AJ, Series 1	1.0 and 2.2

**4.19** Change the ATTENUATOR switch setting to remove 10-db attenuation. DECIBEL meter should increase but not more than 1.5 db above the reading observed in 4.17. This test verifies that the regulator is responding to variations over the required range of input power.

**4.20** The KS-14510 meter should read between the following:

Network Board	Volts dc
800AK, Series 1	8.0 and 13.0
800AK, Series 2 800AJ, Series 1	6.0 and 8.0

**4.21** If the above limits are not met, refer to Section 363-102-506.

**4.22** Remove the send and receive cords from the repeater. If no further tests are to be made, prepare the repeater for connection to the line as covered in Section 363-102-504.

**5.00 TEST H—PILOT OSCILLATOR—  
LOW GROUP (31.5 or 34.5 kc)**

**5.01** The low group pilot oscillator will be used when the low group frequencies are used for the remote terminal to central office direction of transmission; this is the normal direction. The test set-to-repeater connections and test set switch settings listed for Test E will apply to Test H regardless of which direction of transmission is used.

**5.02** Remove the send cord from the repeater.

**5.03** Place a 600-ohm resistor on the HGT LINE test points on board E (14-13).

**5.04** Remove dummy regulator board (800AF) from position H and insert the pilot oscillator board (800AL or AM) equipped with a 14-db (29G) pad in this position.

**5.05** On the test set, turn the DET SENS-db switch to -10 position.

**5.06** On board H, adjust the PILOT potentiometer to obtain a reading of -6.0 on the DECIBEL meter (-16 dbm).

**5.07** Remove the send and receive cords and the 600-ohm resistor from the repeater. If no further tests are to be made, prepare the repeater for connection to the line as covered in Section 363-102-504.