

TYPE N1. O AND ON CARRIER TELEPHONE SYSTEMS
OVER-ALL CHANNEL LINE-UP
SUMMARY CHARTS — LINE-UP AND MAINTENANCE
N1 CARRIER — MESSAGE CHANNEL UNIT (J98703F AND J98703FA)

This section is reissued to relax the E1-E2 maintenance requirements.

This section consists of an over-all diagram of the channel unit and charts giving the tests required for line-up and maintenance of the message channel unit. Charts I and II are provided for the standard testing arrangement; Charts III and IV are provided for locations where the Mobile Carrier Test Bay is used.

It will be necessary to refer to associated sections in this division of practices for the detailed procedures and for steps to be taken where requirements are not met. Familiarity with the sections covering the testing methods in detail is essential before this section is used.

NOTES:

1. For line-up, set the BRK and SIG potentiometers at midposition.
2. All testing equipment must be accurately calibrated.
3. Charts I and III are used for Original channels (silver label or no label on handle); Charts II and IV are used for Modified channels (blue label on handle).

APPARATUS:

- 1 — Hewlett-Packard, Model 400C or 400D Vacuum Tube Voltmeter
- 1 — KS-14510, L1 or L5 Volt-ohm-milliammeter, or equivalent (20,000 ohms per volt)
- 1 — 2B Signaling Test Set, or equivalent
- 1 — 3A Noise Measuring Set
- 1 — W2DW Cord (to connect the VTVM to test points)
- 1 — Transmission Measuring Set (Type 40B, or equivalent, 600 ohm)
- 1 — Channel Unit Test Stand (J98705M)
- 1 — P19A Cord (used with channel test stand)
- 2 — 1W13B Cords
- 2 — 364 Tools
- 2 — 365 Tools
- 1 — 262B Plug (600 ohms to terminate channel VF output)

LINE-UP AND MAINTENANCE TESTS FOR NI CARRIER MESSAGE CHANNELS (TYPE J98703F AND FA UNITS)

| TEST | PURPOSE OF TEST | TEST STAND REQ | MEAS. EQUIP. REQUIRED | | MEASURE TEST POINT TO GRD. OR BETWEEN TEST POINTS | REQUIRED VALUE | | ADJUST | TEST CONDITIONS AND REMARKS | | SECTION REFERENCE | |
|------|---------------------------|--------------------------|------------------------|------------------------|---|--|--|---------|--|---|-------------------|-------------|
| | | | TESTING END | DISTANT END | | TEST | READJUST | | | | | |
| | | | | | | | | | | | | |
| 1 | Channel Carrier Output | No | 400C or D | — | M2 | Recorded Value ±0.5 db | Recorded Value | MOD | FA unit maintenance only. For F units and initial line-up, see 362-025-501. | | 362-025-501 | |
| 2 | Channel Carrier Leak | No | 400C or D; 2B Sig. Set | — | M2 | —33 db or less | | — | F Units | Ground M1 Jack, OFF HOOK on M lead | | |
| | | | | | | At least 18 db below TEST 1 | | — | FA Units | | | |
| 3 | Compressor Gain | Yes | 400C or D | — | Term.6 of FL1 | At least +8.5 db | — | — | COMP pot. at max. output | | 362-025-502 | |
| | | | | | | — | +8.0 db | COMP | Send 1000~ at VF IN —16 dbm (4w); 0 dbm (2w) | | | |
| 4 | a | Received Channel Carrier | No | 400C or D | — | R1 | <i>Line-up:</i> —13.0 to 29.0 db <i>Maintenance:</i> Recorded Value ±5.0 db | | — | Line-up value for fully equipped terminals; see 362-030-501 for other conditions. | | 362-030-501 |
| | b | Channel Regulator | Yes | Volt-ohm-meter | — | R2 Jack to +130V Jack in Test Stand | 2.6 to 3.4 Volts | 3.0 V | REG | <i>Caution: Approx. 125 volts on R2 jack, insert test cord in R2 jack last.</i> | | |
| 5 | Demodulator Output | Yes | 400C or D | — | Term. 6 of FL42 (168B) | +11.0 to +14.0 db | — | — | | | 362-305-501 | |
| 6 | Expander Output | No | 400C or D | 1000~ Tone 2B Sig. Set | E1-E2 | +8.0 to +12.0 dbm | +10.0 db | EXP | <i>Testing End:</i> For line-up turn REC max. cw. 600-ohm termination in MOD IN (2w), DEMOD OUT (4w) | | | |
| 7 | Channel Regulation | a | Yes | 400C or D | 1000~ Tone 2B Sig. Set | Term.3 (center) REG pot. | Read and record value— Adj. to 5.0 db lower level | | REG | <i>Distant End:</i> Send 1000~ at 0 dbm (2w), —16 dbm (4w). OFF HOOK on M lead. | | 362-030-501 |
| | | E1-E2 | | | | +8.5 to +10.5 db | — | | | | | |
| | | Term.3 (center) REG pot. | | | | Value recorded above (Test 7a) | | REG | | | | |
| 8 | Channel Noise | No | 3A Noise Set | 2B Sig. Set | MOD IN (2W) DEMOD OUT (4W) | See Section 362-305-510 | | — | <i>Distant End:</i> OFF HOOK on M lead, term. chan. in 600 ohms. <i>Testing End:</i> Turn REC extreme clockwise. | | 362-305-510 | |
| 9 | Channel Net Loss | No | Transmission Meas. Set | 1000~ Tone 2B Sig. Set | MOD IN (2W) DEMOD OUT (4W) | 2 Wire | Design Value | REC | <i>Distant End:</i> OFF HOOK on M lead, send 1000~ 0 dbm (2w); —16 dbm (4w) <i>Testing End:</i> Set IDLE 2W channels to — 10 dbm. | | 362-305-512 | |
| | | | | | 4 Wire | +7.0 (+4.0) | | | | | | |
| 10 | Received Signal Level | Yes | 400C or D | 2B Sig. Set | S1 | —3.4 to +14.6 db | — | — | | | 362-305-515 | |
| 11 | Sig. Relay Current | Yes | Volt-ohm-meter | 2B Sig. Set | TP1 to TP2 (+ to TP1) | 14.0 to 16.0 Volts | 15.0 V | REL CUR | <i>Distant End:</i> ON HOOK on M lead. | | | |
| 12 | Sig. Receiver Sensitivity | Yes | 2B Sig. Set | 2B Sig. Set | E _G Jack of Test Stand | SIG. RELAY (K41) just operates as indicated by lamp on 2B Sig. Set | | SIG | <i>Testing End:</i> Strap S1 to TP3. Turn SIG pot. max. ccw, then cw slowly until L lamp on 2B Sig. Set. just lights. | | | |
| 13 | Per Cent Break | No | 2B Sig. Set | 2B Sig. Set | SIG L Jack of Patch Bay, or E _G Jack of Test Stand | 56 to 64% | 62% | BRK | <i>Distant End:</i> Adjust 2B Sig. Test Set to send 12 PPS at 58% break. | | | |
| 14 | Min. Length of Pulse | No | 2B Sig. Set | 2B Sig. Set | SIG L Jack of Patch Bay, or E _G Jack of Test Stand | Minimum 12% | — | — | <i>Distant End:</i> Send 12 PPS and adjust ADJ % BRK on 2B Sig. Set slowly from extreme counterclockwise until a deflection just appears on 2B Sig. Set at testing end. Read % break at distant end. | | | |

LINE-UP AND MAINTENANCE TESTS FOR N1 CARRIER MESSAGE CHANNELS (TYPE J98703F AND FA UNITS)

| TEST | PURPOSE OF TEST | | TEST STAND REQ | MEAS. EQUIP. REQUIRED | | MEASURE TEST POINT TO GRD. OR BETWEEN TEST POINTS | REQUIRED VALUE | | ADJUST | TEST CONDITIONS AND REMARKS | | SECTION REFERENCE | |
|------|---------------------------|------------------|----------------|------------------------|---------------------------|---|--|----------------|---------|---|----------------------------------|--|---|
| | | | | TESTING END | DISTANT END | | TEST | READJUST | | | | | |
| | | | | | | | | | | | | | |
| 1 | Channel Carrier Output | | No | 400C or D | — | M2 | Recorded Value ±0.5 db | Recorded Value | MOD | FA unit maintenance only. For F units and initial line-up see 362-025-501. | | 362-025-501 | |
| 2 | Channel Carrier Leak | | No | 400C or D; 2B Sig. Set | — | M2 | -33 db or less | | — | F Units | Ground TP7 OFF HOOK on M lead | | |
| | | | | | | | At least 18 db below TEST 1 | | — | FA Units | | | |
| 3 | a | Compressor Gain | No | 400C or D | — | F | At least +8.5 db | — | — | COMP pot. at max. output. | | Send 1000~ at VF IN -16 dbm (4W); 0 dbm (2W). | 362-025-502 |
| | | | | | | | +7.5 to +8.5 db | +8.0 db | COMP | | | | |
| | b | Compressor Noise | No | 400C or D | — | F | Max. -19.0 db | — | — | | | | |
| 4 | Received Channel Carrier | | No | 400C or D | — | Ri | -13.0 to -29.0 db | — | — | REG pot. set for maximum reading. | | 362-030-501 | |
| | | | | | | | -28.0 to -38.0 db | -33.0 db | REG | | | | |
| 5 | Demodulator Output | | Yes | 400C or D | — | Term. 6 of FL42 (168B) | +11.0 to +14.0 db | — | — | | | | |
| 6 | Expander Output | | No | 400C or D | 1000~ Tone 2B Sig. Set | E1-E2 | +8.5 to +11.5 dbm | +10.0 db | EXP | Testing End: For line-up turn REC max. cw. 600-ohm termination in MOD IN (2W), DEMOD OUT (4W.) | | 362-305-501 | |
| 7 | Channel Regulation | | Yes | 400C or D | 1000~ Tone 2B Sig. Set | R1 | — | -41.0 db | REG | Distant End: Send 1000~ at 0 dbm (2W), -16 dbm (4W). OFF HOOK on M lead. | | 362-030-501 | |
| | | | | | | E1-E2 | +9.0 to +10.5 db | — | — | | | | |
| | | | | | | R1 | — | -33.0 db | REG | | | | |
| 8 | Channel Noise | | No | 3A Noise Set | 2B Sig. Set | MOD IN (2W) DEMOM OUT (4W) | See Section 362-305-510 | | — | Distant End: OFF HOOK on M lead, term. chan. in 600 ohms. Testing End: Turn REC extreme clockwise. | | 362-305-510 | |
| 9 | Channel Net Loss | | No | Transmission Meas. Set | 1000~ Tone 2B Sig. Set | MOD IN (2W) DEMOM OUT (4W) | 2 Wire | Design Value | REC | Distant End: OFF HOOK on M lead, send 1000~ 0 dbm (2w), -16 dbm (4W). Testing End: Set IDLE 2W channels to -10 dbm. | | 362-305-512 | |
| | | | | | | | 4 Wire | +7.0 (+4.0) | | | | | |
| 10 | Received Signal Level | | Yes | 400C or D | 2B Sig. Set | S1 | -3.4 to +14.6 db | — | — | | | 362-305-515 | |
| 11 | Sig. Relay Current | | Yes | Volt-ohm-meter | 2B Sig. Set | TP1 to TP2 (+ to TP1) | 14.0 to 16.0 Volts | 15.0 V | REL CUR | Distant End: ON HOOK on M lead. | | | |
| 12 | Sig. Receiver Sensitivity | | Yes | 2B Sig. Set | 2B Sig. Set | E _G Jack of Test Stand | SIG. RELAY (K41) just operates as indicated by lamp on 2B Sig. Set | | SIG | | | | Testing End: Strap S1 to TP3. Turn SIG pot. max. ccw, then cw slowly until L lamp on 2B sig. set just lights. |
| 13 | Per Cent Break | | No | 2B Sig. Set | 2B Sig. Set | SIG L Jack of Patch Bay, or E _G Jack of Test Stand | 56 to 64% | 62% | BRK | Distant End: Adjust 2B Sig. Test Set to send 12 PPS at 58% break. | | | |
| 14 | Min. Length of Pulse | | No | 2B Sig. Set | 2B Sig. Set | SIG L Jack of Patch Bay, or E _G Jack of Test Stand | Minimum 12% | — | — | Distant End: Send 12 PPS and adjust ADJ % BRK on 2B Sig. Set slowly from extreme counterclockwise until a deflection just appears on 2B Sig. Set at testing end. Read % break at distant end. | | | |

CHART III — ORIGINAL UNITS
LINE-UP AND MAINTENANCE TESTS FOR NI CARRIER MESSAGE CHANNELS
 USING THE MOBILE CARRIER TEST BAY

| TEST | PURPOSE OF TEST | METER SWITCH | VF PATH SWITCH | | MEASURE TEST POINT TO GRD. OR BETWEEN TEST POINTS | REQUIRED VALUE | | ADJUST | TEST CONDITIONS AND REMARKS | | SECTION REFERENCE | |
|------|-----------------------------|--------------|---|----|---|---|---|---------|---|--|-------------------|---------------------------------------|
| | | | 2W | 4W | | TEST | READJUST | | | | | |
| 1 | Channel Carrier Output | 5 | * | | M2 | Recorded Value ±0.5 db | Recorded Value | MOD | FA unit maintenance only — For F unit, and initial line-up, see 362-025-501. | | 025-501 | |
| 2 | Channel Carrier Leak | 5 | * | | M2 | —33 db or less | — | — | F units | Ground M1 jack, OFF HOOK on M lead. | | |
| | | | | | | At least 18 db below TEST 1 | | — | FA units | | | |
| 3 | Compressor Gain | 5 | 1 | 5 | Term. 6 FL1 | At least +8.5 db | — | — | COMP pot. at max. output. | | 025-502 | |
| | | | | | | — | +8.0 db | COMP | | | | |
| 4 | a Received Channel Carrier | 5 | * | | R1 | <i>Line-up:</i> —13.0 to —29.0 db <i>Maintenance:</i> Recorded Value ±5.0 db | | — | Line-up value for fully equipped terminals, see 362-030-501 for other conditions, | | 030-501 | |
| | b Channel Regulator | 3 | * | | R2 | 2.6 to 3.4 Volts | 3.0 V | REG | <i>Caution: Approx. 125 volts on R2 jack</i> | | | |
| 5 | Demodulator Output | 5 | * | | Term. 6 FL42 | +11.0 to +14.0 db | — | — | <i>Distant End:</i> Send 1000~ at 0 dbm(2W) —16 dbm(4W) OFF HOOK on M lead | | 305-501 | |
| 6 | Expander Output | 6 | 3 | 5 | E1-E2 | +8.0 to +12.0 dbm | +10.0 dbm | EXP | | | | <i>Testing End:</i> REC pot. max. cw. |
| 7 | Channel Regulation | a | 5 | * | | Term. 3 REG (center) | Read and record value. Adj. to 5.0 db lower level | | REG | | | 030-501 |
| | | b | 6 | 3 | 5 | E1-E2 | +8.5 to +10.5 db | — | — | | | |
| | | c | 5 | * | | Term. 3 REG | Adj. to value recorded in 7a | | REG | | | |
| 8 | Channel Noise | | THIS TEST TO BE MADE ONLY AT VF PATCH BAY | | | | | | | | | 305-510 |
| 9 | Channel Net Loss ** | 7 | 2 | 6 | | 4 Wire | +7.0(+4.0) | REC | <i>Testing End:</i> Set IDLE 2W channels to —10 dbm | | 305-512 | |
| | | | | | | 2 Wire | Design Value | | | | | |
| 10 | Received Signal Level | 5 | * | | S1 | —6.9 to +11.1 db | — | — | (This value includes 3.5 db loss in Test Bay) | <i>Distant End:</i> ON HOOK on M lead | 305-515 | |
| 11 | Signal Relay Current | 4 | * | | TP1 to TP2 (+ to TP1) | 14.0 to 16.0 Volts | 15.0 V | REL CUR | | | | |
| 12 | Signal Receiver Sensitivity | | | | | SIG. RELAY (K41) just operates as indicated by lamp on 2B Sig. Set. | | SIG | <i>Testing End:</i> Strap S1 to TP3; Turn SIG pot. max. ccw, then cw until L lamp lights. | | | |
| 13 | Per Cent Break | | | | | 56 to 64% | 62% | BRK | <i>Distant End:</i> Send 12PPS at 58% break. | | | |
| 14 | Min. Length of Pulse | | — | | — | Minimum 12% | — | — | <i>Distant End:</i> Send 12PPS and adjust ADJ % BRK on 2B Sig. Set slowly from max. ccw until a deflection just appears on 2B Sig. Set at testing end. Read % break at distant end. | | | |

*VF PATH switch not used for these tests, can be left in any position except 2 or 6.

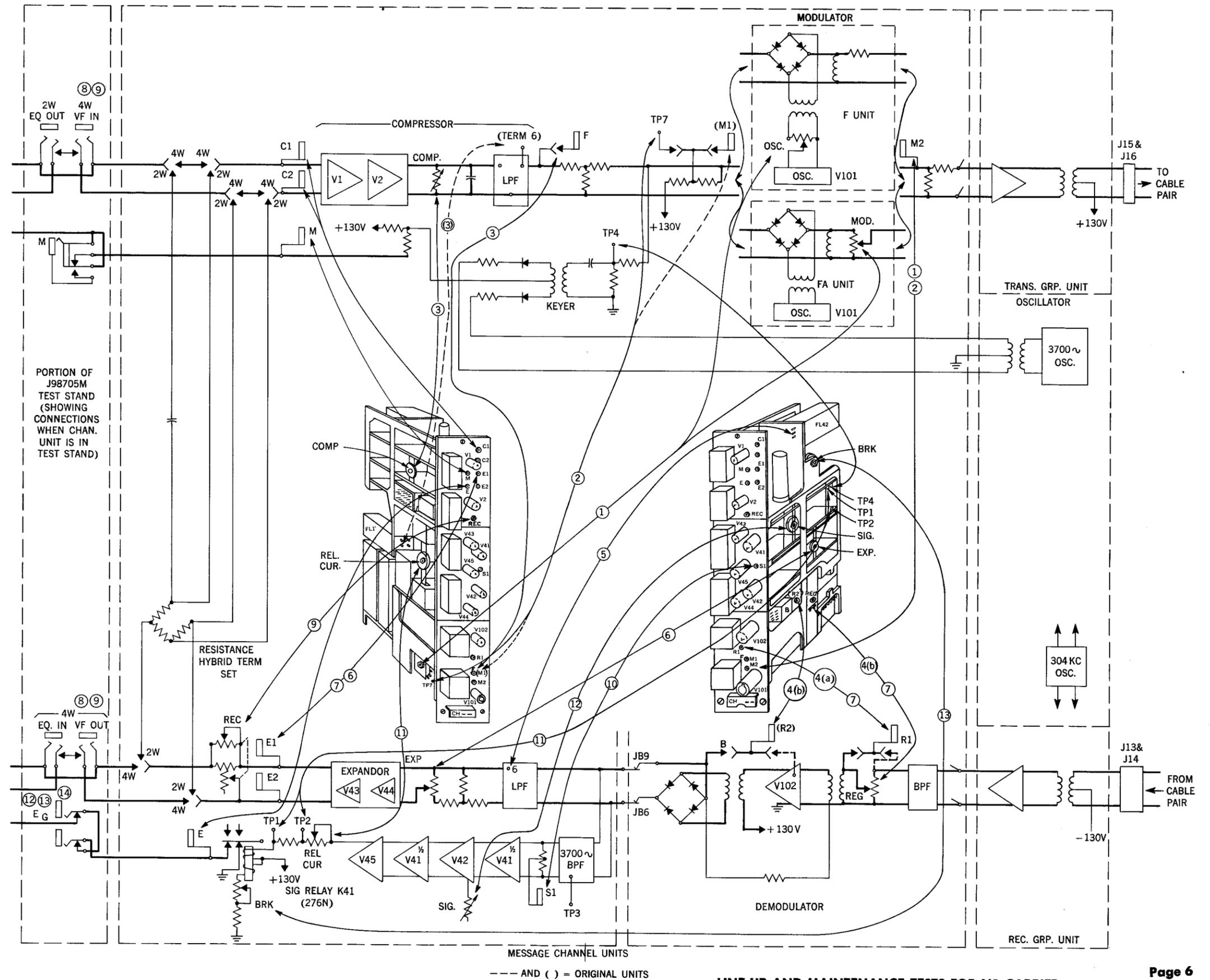
**Make final adjustment with a transmission measuring set at the VF Patch Bay.

CHART IV — MODIFIED UNITS
LINE-UP AND MAINTENANCE TESTS FOR N1 CARRIER MESSAGE CHANNELS
USING THE MOBILE CARRIER TEST BAY

| TEST | PURPOSE OF TEST | METER SWITCH | VF PATH SWITCH | | MEASURE TEST POINT TO GRD. OR BETWEEN TEST POINTS | REQUIRED VALUE | | ADJUST | TEST CONDITIONS AND REMARKS | SECTION REFERENCE 362- | |
|------|---------------------------|--|----------------|----|---|---|------------------|----------|--|---------------------------------------|---------|
| | | | 2W | 4W | | TEST | READJUST | | | | |
| 1 | Channel Carrier Output | 5 | * | | M2 | Recorded Value ±0.5 db | Recorded Value | MOD | FA unit maintenance only — for F units and initial line-up see 362-025-501 | 025-501 | |
| 2 | Channel Carrier Leak | 5 | * | | M2 | -33 db or less | | — | F Units | Ground TP7, OFF HOOK on M lead. | |
| | | | | | | At least 18 db below TEST 1 | | — | FA Units | | |
| 3 | Compressor Gain | 5 | 1 | 5 | F | At least +8.5 db | — | — | COMP pot. at max. output | | |
| | | | | | | +7.5 to +8.5 db | +8.0 db | COMP | | | |
| 4 | Received Channel Carrier | 5 | * | | R1 | -13.0 to -29.0 db | — | — | REG pot. set for maximum reading. | | |
| | | | | | | -28.0 to -38.0 db | -38.0 db | REG | | | |
| 5 | Demodulator Output | 5 | * | | Term. 6 FL42 | +11.0 to +14.0 db | — | — | <i>Distant End:</i> Send 1000~ at 0 dbm (2W) -16 dbm (4W). OFF HOOK on M lead. | | |
| 6 | Expander Output | 6 | 3 | 5 | E1-E2 | +8.5 to +11.5 dbm | +10.0 dbm | EXP | | <i>Testing End:</i> REC pot. max. cw. | 305-501 |
| 7 | Channel Regulation | a | 5 | * | | R1 | — | -41.0 db | | REG | 030-501 |
| | | b | 6 | 3 | 5 | E1-E2 | +9.0 to +10.5 db | — | | — | |
| | | c | 5 | * | | R1 | — | -33.0 db | REG | | |
| 8 | Channel Noise | THIS TEST TO BE MADE ONLY AT VF PATCH BAY | | | | | | | | | 305-510 |
| 9 | Channel Net Loss ** | 7 | 2 | 6 | | 4 Wire | +7.0(+4.0) | REC | <i>Testing End:</i> Set idle 2W channels to -10 dbm. | 305-512 | |
| | | | | | | 2 Wire | Design Value | | | | |
| 10 | Received Signal Level | 5 | * | | S1 | -6.9 to +11.1 db | — | — | (This value includes 3.5 db loss in TEST Bay.) | 305-515 | |
| 11 | Signal Relay Current | 4 | * | | TP1 to TP2 (+ to TP1) | 14.0 to 16.0 Volts | 15.0 V | REL CUR | <i>Distant End:</i> ON HOOK on M lead. | | |
| 12 | Sig. Receiver Sensitivity | | | | | SIG. RELAY just operates as indicated by lamp on 2B Sig. Set. | | SIG | <i>Testing End:</i> Strap S1 to TP3; turn SIG pot. max. cw, then cw until L lamp lights. | | |
| 13 | Per Cent Break | | | | | 56 to 64% | 62% | BRK | <i>Distant End:</i> Send 12 PPS at 58% break. | | |
| 14 | Min. Length of Pulse | | | | | Minimum 12% | — | — | <i>Distant End:</i> Send 12 PPS and adjust ADJ % BRK on 2B Sig. Set slowly from max.cw until a deflection just appears on 2B Sig. Set at testing end. Read % break at distant end. | | |

* VF PATH switch not used for these tests, can be left in any position except 2 or 6.

** Make final adjustment with a transmission measuring set at the VF Patch Bay.



PORTION OF J98705M TEST STAND (SHOWING CONNECTIONS WHEN CHAN. UNIT IS IN TEST STAND)

--- AND () = ORIGINAL UNITS

LINE-UP AND MAINTENANCE TESTS FOR N1 CARRIER MESSAGE CHANNEL UNITS (J98703F AND FA).