

Test Procedure: TEL171

The TEL171 is tested twice. As there are separate production orders for each subassembly and the finished product, each subassembly is tested as part of the subassembly production order. These subassemblies are then put in subassembly stock. Once all subassemblies have been tested, the production order for the TEL171 is started. Here, each required subassembly is pulled from stock and put on the test jig as a system. Proper operation and adjustment is verified. The system is then burned in for one day, then packaged and placed in finished goods stock.

Test Procedure: 0010-1211 Telemetry Transmitter

1. Do a physical inspection of the assembly. Verify that all chips are properly installed. Verify that all solder connections are good, and that the board shows high assembly quality.

2. Put the board on the test jig, ideally with the rest of a system also on the test jig.

3. Using the frequency counter, scope, and 10X probe, adjust R10 for 4.775 KHz on TP-4.1 Note that the test jig sample switch should be in the left position to provide a ground to the floating circuitry. We adjust for 4.775 KHz because the circuit tends to drift upwards as it warms up. It will ideally drift to 4.800 KHz. If necessary (especially if U6 is made by TI), R11 can be reduced to 6.8 K to reach the required frequency.

4. Connect the scope to output terminal 10 (white/black wire on test jig). Adjust R25 for 4 volts P-P.

5. With scope still connected as above, jumper TP-2 to TP-3. Adjust R13 for 1.270 KHz (+/- 5 Hz).

6. Remove above jumper. Jumper TP-2 to TP-4. Adjust R12 for 1.070 KHz (+/- 5 Hz).

7. Set the test jig polarity switch to the left. Verify that U7 (the UART) pins 38 and 39 have +5 volts on them. A jumper must be installed during assembly and is occasionally missed.

8. Set test jig polarity switch to left (+). Adjust sample pot full counter-clockwise (it is a multiturn pot). The local display should read 000. Slowly adjust the pot clockwise to run the display one digit at a time through 0009. Verify that each number in sequence can be accomplished. Increase the pot further running the "tens" digit through each possibility (000, 010, 020, 030. . . 090). Again, verify that each digit can be accomplished. Repeat for the hundreds digit. Finally, verify that the pot can be increased to a reading of +1999. Set the test jig sample pot for a display of approximately +1500. Verify that setting the polarity switch to the right gives the same indication (+/- 5 counts), but negative. Set the polarity switch in the center position. Verify that the display indicates between -1 and +1.

Make sure Terminal 8 (BRN) is making good contact.

*1508-1020
ALSO CHECK FOR A
CAP (102, 100 μ F) ON BACK
OF BOARD ACROSS PIN
V10-3 AND GND
(V10-2)*

9. After successfully completing the above tests, put a green sticker on the UART and put the board in stock.

Test Procedure: 0010-1221 Telemetry Receiver

1. Complete a visual inspection of the board, insuring that the assembly is of the highest quality.

CHECK FOR 10KΩ res.
ACROSS U06-12 and U06-14
ON BACK OF BOARD.

2. Put the board on the test jig, along with other working boards.

3. Connect the scope to terminal 2. Close switch 2, open switch 1. The 4 volt P-P FSK signal from the transmitter board should be visible. Open switch 1, close switch 2. A very small signal should be visible.

USE 10X ON SCOPE
1.2V/cm → (100μs - 1ms)

4. Close switch 4, open switch 3.

5. Using the scope, frequency counter and 10x probe, adjust R29 for 4.775 KHz on TP-2. If necessary, R28 can be reduced to 6.8K.

Terminal 2 is
different than TP-2

6. Connect the scope to U1-7. Set it for DC coupling and triggerring. Adjust R25 so that one bit time is 3.33 mS. The bit time should be the same for a high or low bit.

10X, 2V/cm, 1ms (THE FALLING EDGE
IS HARD TO SEE) Int. + or -

7. Run R19 through its range. At one end, it should be possible to make the display carrier light come on. After several tries, each of the display error lights should come on, verifying the operation of the parity and frame checking circuitry. In addition, whenever the display carrier lamp is on, the test jig LED should be out. Whenever the display carrier lamp is out, the test jig LED should be on. Set R19 to mid-range.

* FULLY CCW (R19) causes
DISPLAY TO BLANK OUT
** IF NECESSARY REMOVE
SIGNAL FROM TERMINALS
1+3.

8. Run the test jig sample pot and switch thru their range insuring proper operation of the display.

REMOTE DISPLAY SHOULD
NOT BLANK OUT WHEN RUNNING
THRU THEIR RANGE OR Something
wrong with TR.

9. After successfully completing the test, put a green dot on the UART and put the board in stock.

(PINS 38+39 jumper
on UART)

Test Procedure: 0010-1231 Telemetry Display

1. Insure that the board is assembled to the highest quality.

2. Plug in the test PROM. Insure that there is not a short between pins 9 and 10 of the test PROM once plugged in.

3. Wire the display into the test jig.

4. Using the sample pot and switch, run each digit through all possibilities, insuring that there are no missing codes, segments that do not light, or segments that do not go out, and that the polarity sign works properly.

5. Using the first 15 switches on the test jig, insure that the decimal point positioning circuitry works properly.

6. By reducing the sensitivity pot on the receiver board repeatedly, insure that each of the display error lights can be made to light. Restore the receiver sensitivity control to mid-position.

7. Attach the front panel to the display assembly. Insure that all required hardware is included.

8. Remove the test PROM from its socket. Install the ribbon cable and multicolor cable.

FREQUENCY COUNTER

4.775 KHz

9550

9560

2

@

1μs

5540

on scope

2390

2388

@

10μs

2386

on scope

Sometimes
Frequency Counter
is correct @ 1μs

* SWITCH TO
100μs → 10ms OR
110μs → 1μs
TO MAKE FREQ.
COUNTER COUNT
CORRECTLY.

9. Put a green dot on the board that has successfully completed the test. Put the board in stock.

Test Procedure: 0010-1281 Local Display

1. Insure that the assembly of the board is of high quality.
2. Connect the display to the test jig. Run the test jig sample pot and switch through the range, insuring that all digits and polarity are displayed properly.
3. Attach the board to the panel, connect the associated dip cable.
4. Attach a green dot to the 7211 driver chip of those boards that pass the test.

Test Procedure: 0000-1710 TEL171 Telemetry System

1. Run a set of boards through a one day burn in.
2. At conclusion of burn in, insure that the following tests are passed.
3. Check clock frequency on ^{TP1}transmitter and ^{TP2}receiver boards. They should be 4.800 KHz +/- 25 Hz.
4. Check the FSK frequencies on the transmitter board. They should be 1270 and 1070 Hz, +/- 10 Hz.
5. Check the transmitter board output level. It should be 4 volts P-P.
6. Insure that the bit timing on the receiver board is 3.3 mS per bit, +/- 0.3 mS.
7. Insure that both displays display all digits, polarity, and error signals properly.
8. Package the system as below:
9. The system goes in a 12x12x4 box.
10. Place one copy of each current product literature sheet EXCEPT distributor price list in the bottom of the box.
11. Put 2 copies of the TEL171 instruction book in the bottom of the box.
12. Put an envelope of 30 disconnect pin receptacles in the box.
13. Put an index sheet in the box.
14. Wrap each board in bubble sheet and place them in the box.
15. Seal the box, label the side (TEL171), and put it in finished good inventory.

4 JUMPER MEASURE
1270 TP 2 + TP3 } TP-10
1070 TP 2 + TP4 }
TP-10 (ADJ. R25)