EXHIBIT T – Tune-up Procedure

FCC ID CM676A90343-WMTS

1.0 PURPOSE

This Test Procedure describes the methodology to be used to install the crystals and tune up the Digital TM Transmitters, 90340, 90340-10, 90343-XX,and 90347-XX.

2.0 SCOPE

This Test Procedure applies to the testing of the Digital TM Transmitter, and should be used in conjunction with all applicable manufacturing procedures to test this assembly.

3.0 RESPONSIBILITY

It is the responsibility of the test technician to follow this procedure step by step and verify that the Unit Under Test conforms to the specification outlined here. It is the responsibility of the department manager to ensure that the test procedure is followed.

4.0 DEFINITION

UUT:	Unit Under Test
DMM:	Digital Multimeter. Also in some places the word DVM is used.
DVM:	Digital Voltmeter
P-P:	Peak to Peak
TFXXX:	Test Fixture Number XXX
or equivalent	equipment that is capable of performing all of the functions called for in the procedure with an accuracy that equals or exceeds the equipment specified

5.0 TEST EQUIPMENT REQUIRED

Digital Storage Scope, Tektronix 2211 or equivalent
Spectrum Analyzer :
Tektronix 2710 with options 01 (Phase Locked) and 02 (Digital Frequency Counter),
Tektronix 495P, Tektronix 497P, or equivalent.
Frequency Counter Racal-Dana Model 1992 or equivalent
Digital Multimeter (2)
10 MHz Frequency Standard, from the Loran C Receiver, Stanford Research Systems FS700
9V DC Power Supply
Power Supply Test Cable, TF546
Fixture, Lead Prep, TM XTL, 066-0578-00 (Modified TF566)
Tuning Tool Johanson 8762,Techni-Tool 88SC013, Voltronics TT200 or TT900 or equivalent
Test Procedure 064-1764-00, Reference Appendix A.
1st LO frequency Test Fixture TF426
Drawings 653-0005-00, 653-0095-00
BNC to BNC RG-58 Coax Cable
670-0787-10 PCBA, Interface, Source Box, 608-614MHz

6.0 SET UP

6.1 For transmitters with no shield 337-0225-XX only: Prepare the crystal according to Figure 6.2 or 6.3 as applicable. The crystal for the assigned channel frequency is installed in location X2. Install the prepared crystal and insulator 342-0100-00 (if the crystal is an HC35/U-1) on the UUT. Apply a bead of hot melt to the crystal per drawing 653-0005-00, Tx. Assy. Dgtl Tm.

6.2 For the 90343/90347 transmitters, follow instructions per drawing 653-0095-00Install shield and torque the mounting screws to 0.9 – 1.2 inch-lbs. This step is needed during test only if the crystal needs to be changed.

6.3 Set up the test equipment per Figure 6.1.

6.4 Turn 9V DC power to ON. Verify the current from the power supply is less than 8 mA for the 90340/90340-10/90347 transmitters and less then 13.5 mA for 90343 transmitters.

7.0 Transmitter ID Switches

7.1 Set the transmitter Chn Identification and TT (Tx Type) switches per Table 7.1 of Appendix A test procedure 064-1764-00 for 90343/90347. Set Tx type switches to 0000 for the TM receiver modules w/ sw v3.01.03 ONLY.

8.0 Set RF Signal Level

8.1 Set the spectrum analyzer to the assigned channel frequency with a span of 1 MHz/div, reference level at 0 dBm, with the video filter off, RF attenuation on auto (20 dB if auto is not available), and the resolution bandwidth on auto (100 KHz if auto is not available). See Appendix A of 064-1764-00 for a list of available frequencies.

8.2 Connect the BNC to BNC Cable from the 670-0787-10 to the Spectrum Analyzer.

8.3 Adjust C10 until the signal level is maximized.

8.4 Adjust C2 until the signal level is maximized. Then adjust C3 until the signal level is maximized.

* 8.5 Adjust C6 and C7 until the signal level is maximized. The signal level should be higher than –27.2dBm for 90343/90347 transmitters and higher than -20dBm for 90340/90340-10 transmitters

9.0 Set Assigned Center Frequency

9.1 Set the span to 2 KHz/div, reference level at 0 dBm, resolution bandwidth on 1 KHz, and the RF attenuation on auto (20 dB if auto is not available).

9.2 Do the following step only if the crystal is per spec 158-0075-00 (package style HC18/U or HC43/U-2 per Figure 9.1.

9.3 Increase the span to 5 KHz/div. Adjust C10 and verify that the output frequency is capable of being tuned 10 KHz or more above the assigned center frequency. Decrease the span to 2 KHz/div.

9.4 Adjust C10, R9 so that the two sideband peaks are symmetrical around the center frequency, see Figure 9.2.

9.5 Adjust R3 so the sideband peaks are ± 6 KHz from the center frequency.

9.6 Disconnect the coax cable from the Spectrum Analyzer and connect it to the frequency counter. Adjust R9 until the frequency is the assigned channel frequency ± 200 HZ. Test fixture TF426 must be used per Figure 6.1 for testing 90343/90347 only.

10.0 Setup of Tektronix 2710 Spectrum Analyzer (For example)

10.1 Set the instrument to factory default settings by pressing UTIL MENU / 1 / 1.

10.2 Make sure the stored settings protection is off by pressing UTIL MENU / 4. Item 5, Stored System Protect, should say OFF. If it says ON, press 5. In either case, then press UTIL MENU.

10.3 Check to see if anything is stored in settings 3-6 py pressing UTIL MENU / 1. If there is a title after items 3, 4, 5, or 6, erase them by pressing 3 / C / C, 4 / C / C, 5 / C / C, or 6 / C / C. Press UTIL MENU.

10.4 Configure setting 3 by pressing UTIL MENU / 2 / 0 / 116 / C / 1 / 30 / A / 2 / .5 / C / 7 / 1 / B / UTIL MENU. Store this setting by pressing UTIL MENU / 1 / 3 / B.

10.5 Configure setting 4 by pressing UTIL MENU / 2 / 0 / 232.5 / C / UTIL MENU. Store this setting by pressing UTIL MENU / 1 / 4 / B.

10.6 Configure setting 5 by pressing UTIL MENU / 2 / 0 / 465 / C / 1 / 0 / A / 2 / 1 / C / UTIL MENU. Store this setting by pressing UTIL MENU / 1 / 5 / B.

10.7 Configure setting 6 by pressing UTIL MENU / 2 / 2 / 2 / B / 4 / 1 / 3 / B / UTIL MENU / AUTO. Store this setting by pressing UTIL MENU / 1 / 6 / B.

END OF PROCEDURE

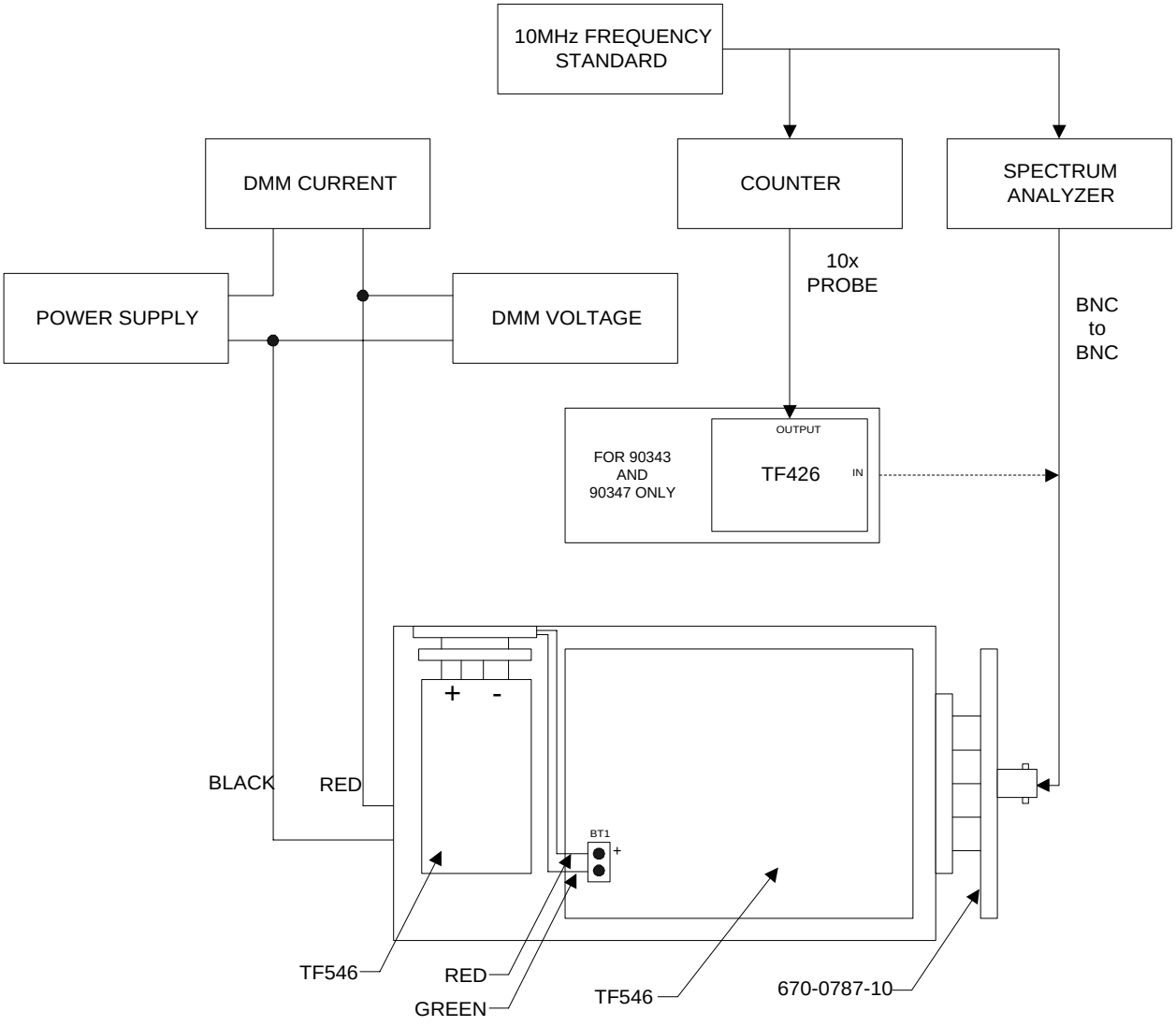
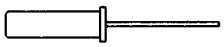

10MHz FREQUENCY STANDARD
DMM CURRENT
COUNTER
SPECTRUM ANALYZER
10x PROBE
BNC to BNC
POWER SUPPLY
DMM VOLTAGE
OUTPUT
FOR 90343 AND 90347 ONLY
TF426
IN
+
-
BLACK
RED
BT1
+
TF546
RED
GREEN
TF546
670-0787-10

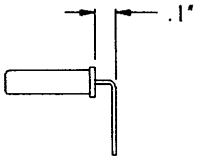
Figure 6.1

CRYSTAL LEAD PREPARATION FOR CASE STYLES HC18/U OR HC43/U-2

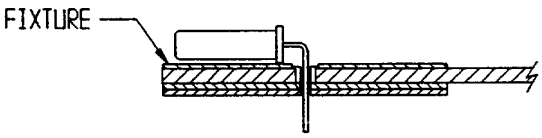
Cut the leads on the crystals to the approximate length shown (about 0.5 in).



Bend the leads 0.1 away from the case, away from the face which has the frequency stamp.



Insert the crystal on the fixture.



Cut the leads flush with the bottom of the fixture board.

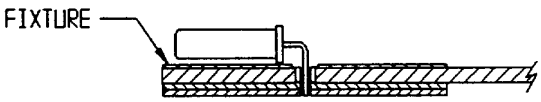


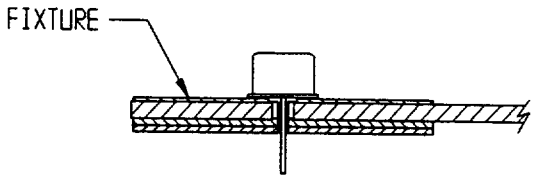
Figure 6.2

CRYSTAL LEAD PREPARATION FOR CASE STYLE HC35/U-1

Cut the third lead flush with the body of the crystal before installing the crystal on the PCB for 90340/90340-10 only.

BOTTOM VIEW

Insert the crystal on the fixture.



Cut the leads flush with the bottom of the fixture board.

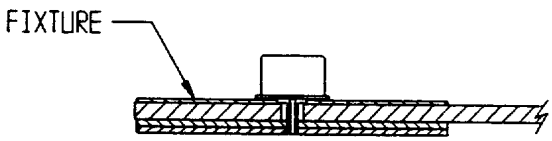


Figure 6.3

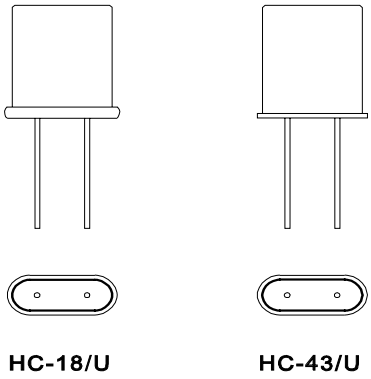


Figure 9.1

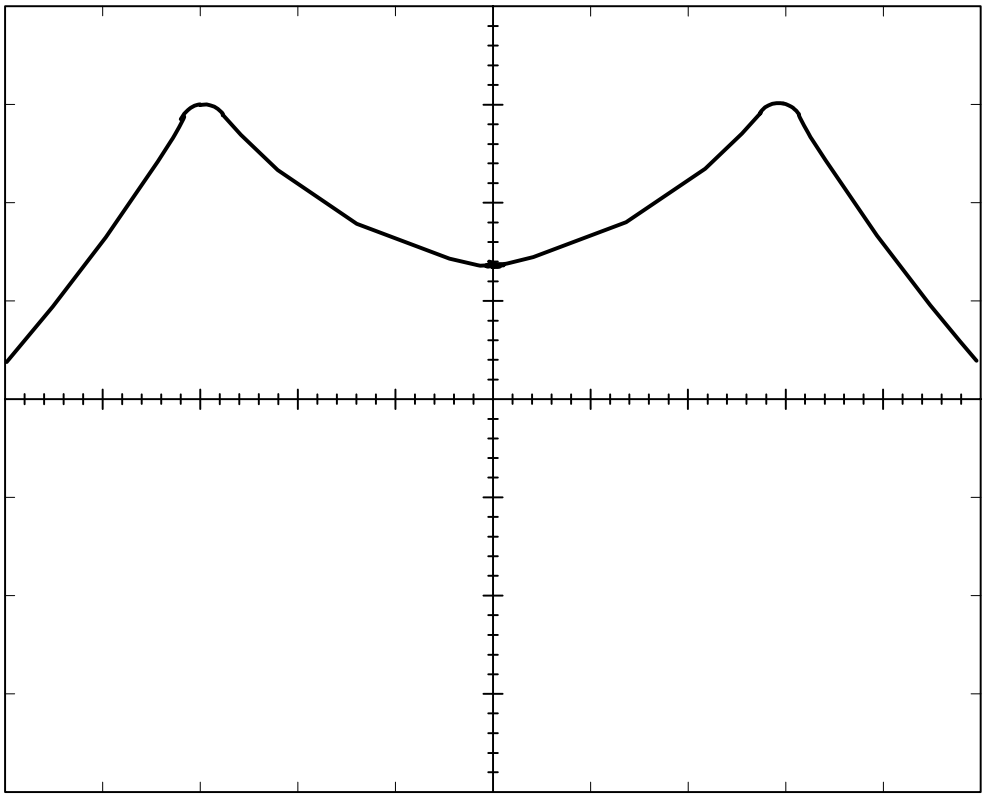


Figure 9.2