TECHNICAL MANUAL

CALIBRATION PROCEDURE

FOR

COMMUNICATIONS SERVICE MONITOR

FM/AM 1500

(IFR INC)

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COMMUNICATIONS SERVICE MONITOR

FM/AM 1500

(IFR INC)

1 CALIBRATION DESCRIPTION:

Table 1.

Test Instrument (TI) Characteristics	Performance Specifications	Test Method
Internal Time Base	Range: 10 MHz Accuracy: ±5 X 10^{-7}	Measured on Electronic Counter and adjusted for minimum offset
Receiver Sensitivity (Typical)	Range: 1 MHz to 999.9999 MHz Accuracy: 2 μV (-101 dBm) in FM 1	Measure with known signal level
Spectrum Analyzer		
Power Measurement	Range: -90 to -30 dBm Accuracy: ±2 dB	Compare with known signal levels
Dispersion	Range: 1 kHz to 10 MHz/div Accuracy: Operational	Measure with signals of known frequency
Freq Error Meter	Range: 10 kHz Accuracy: ±5% FS	Measure error from known frequency
Modulation Meter		
FM Analog Meter	Range: 100 kHz pk deviation Accuracy: ±5% FS	Apply known FM modulation levels
Digital FM Deviation Display	Range: 60 kHz pk deviation Accuracy: ±3% at these 2 points: 1) 2 kHz pk deviation at 6 kHz rate in FM 2; 2) 8 kHz pk deviation at 10 kHz rate in FM 3	Apply known FM modulation levels

Table 1. (Cont.)

Test Instrument (TI) Characteristics	Performance Specifications	Test Method
Modulation Meter *(Cont.)*		
Analog AM Meter	Range: 20, 60 and 200% Accuracy: ±(7% rdg + 5% FS)	Apply known % AM modulation levels
Digital AM Modulation Display	Range: 10 to 90% AM Accuracy: ±(5% rdg + 20 counts)	Apply known % AM modulation levels
RF Signal Generator		
Output Level	Range: -127 to 0 dBm Accuracy: ±2 dB, -80 to -10 dBm; ±2.5 dB, -127 to -80 dBm	Measure on tuned RF Measuring Receiver
Output Flatness	Range: 100 kHz to 999.9999 MHz Accuracy: ±4 dB at 0 dBm	Measured with Power Meter and Power Sensor
Duplex Generator		
Output Level at -40 dB DUPLEX/TRANS jack	Range: 40 dB below DUPLEX output Accuracy: ±3 dB (at DUPLEX levels of -80 to -10 dBm)	Measure relative amplitude of signal at -40 dB DUPLEX/TRANS connector against DUPLEX connector
Frequency Offset	Range: ±49.99 MHz Accuracy: Same as Time Base	Measure frequency offset with Measuring Receiver
Power Meter	Range: 0 to 15 W, 0 to 150 W Accuracy: ±(7% rdg + 3% FS)	Compare to known power levels
Oscilloscope		
Vertical	Range: 10 mV to 10 V/div Accuracy: ±10%	Measured with signal of known amplitude
Horizontal	Range: 10 μs to 10 ms/div Accuracy: ±20%	Measured with signal of known frequency

2 EQUIPMENT REQUIREMENTS:

	Noun	Minimum Use Specifications	Calibration Equipment	Sub-Item
2.1	SIGNAL GENERATOR	Range: 1 MHz to 1 GHz, -120 to +6 dBm Accuracy: Frequency <1 X 10^{-8}	Hewlett-Packard 8662A	As Available
2.2	SIGNAL GENERATOR	Range: 100 Hz to 100 kHz, 1 V rms Accuracy: Frequency <2.5% Amplitude N/A	Fluke 6011A/AJ	As Available
2.3	MEASURING RECEIVER	Range: 10 MHz to 1 GHz FM, AM, Attenuation Accuracy: Frequency <1 X 10^{-6}; FM ±(1% + 1 dgt); AM ±(1% + 1 dgt); Attenuation ±1 dB	Hewlett-Packard 8902A	As Available
2.4	POWER METER	Range: 0 dBm Accuracy: ±1.2%, Calibrated to ±2%	Hewlett-Packard 436A	As Available
2.5	POWER SENSOR	Range: 0 dBm, 100 kHz to 990 MHz Accuracy: ±2.5%, 100 kHz; ±2.4%, 200 to 300 kHz; ±2.1%, 300 kHz to 1 MHz; ±2.0%, 1 to 10 MHz; ±2.7%, 10 to 50 MHz; ±2.5%, 50 to 990 MHz	Hewlett-Packard 8482A	As Available
2.6	ELECTRONIC COUNTER	Range: 10 MHz Accuracy: Frequency <1 X 10^{-8}	Hewlett-Packard 5345A	As Available
2.7	RF POWER AMPLIFIER	Range: 10 to 400 MHz, 0 to 30 W Accuracy: N/A	M/A COM MPD SSPA 0240-22/6140	As Available

Noun	Minimum Use Specifications	Calibration Equipment	Sub-Item
2.8 POWER METER	Range: 0 to 10 mW Accuracy: ±1% FS	Hewlett-Packard 432B-HO5	As Available
2.9 HIGH POWER RF STANDARD	Range: 10 to 400 MHz Accuracy: AFPSL Charted	AFPSL 1852A	As Available
2.10 OSCILLOSCOPE CALIBRATOR	Range: 50 mV to 50 V p-p Accuracy: ±2.5%	Tektronix PG506	As Available
2.11 POWER SPLITTER	Range: 10 MHz to 1 GHz Accuracy: N/A	Weinschel 1870A	As Available
2.12 TERMINATION	Range: 50 Ω Accuracy: N/A	Tektronix 011-0049-01	As Available
2.13 STEP ATTENUATOR	Range: 50 dB Accuracy: N/A	Hewlett-Packard 8496B Opt 001	
2.14 RF POWER MEASUREMENT SET *	Range: 10 to 400 MHz, 0 to 150 W Accuracy: ±3.0% of rdg TAR: 3.33:1	Bird 4421A300	
2.15 HIGH POWER HIGH FREQUENCY RF AMPLIFIER SYSTEM *	Range: 10 to 400 MHz, 0 to 150 W Accuracy: N/A	PST Corp. BHED1719-1000/4006	

* Used during Power Meter alternate procedure only.

3 PRELIMINARY OPERATIONS:

3.1 Review and become familiar with the entire procedure before beginning the Calibration Process.

WARNING

Unless otherwise designated, and prior to beginning the Calibration Process, ensure that all test equipment voltage and/or current outputs are set to zero (0) or turned off, where applicable. Ensure that all equipment switches are set to the proper position before making connections or applying power. If not strictly observed, could result in injury to, or death of, personnel or long term health hazards.

WARNING

As long as external AC or DC power is applied a voltage potential exists on various points in the TI regardless of front panel switch setting. If not strictly observed, could result in injury to, or death of, personnel or long term health hazards.

3.2 Apply power to the TI and all other equipment and allow sufficient warm-up (TI requires 30 minute warm-up period).

3.3 Technicians unfamiliar with the TI may require the TI Operators Manual to supplement this procedure in performing the required keyboard entries.

3.4 Set TI PWR/OFF switch to OFF and mechanically zero both the TI MODULATION and FREQ ERROR meters.

3.5 Set TI PWR/OFF switch to PWR.

3.6 INTERNAL TIME BASE ADJUSTMENT:

3.6.1 Connect TI rear panel 10 MHz REF connector through the Termination to Electronic Counter Channel A input.

3.6.2 Adjust the TI front panel INT REF CAL adjustment for a 10 MHz indication on Electronic Counter (actual tolerance is 10 MHz ±5 Hz, but due to aging the TI Reference Oscillator should be returned to nominal each calibration cycle. Do not code this adjustment as a maintenance action).

3.6.3 Disconnect Electronic Counter from TI 10 MHz REF connector.

3.7 RECEIVER SENSITIVITY CHECK:

NOTE

The manufacturer gives this specification as typical. The TI sensitivity should be about -101 dBm in FM 1. Failure of the TI to meet this check does not require a limitation on the certification label, but if very poor may point to a possible maintenance problem.

3.7.1 Set TI controls as follows:

MODULATION	FM 1
GEN/REC	REC
LCD FREQUENCY	120.5000 MHz
FREQ ERROR	300 Hz
DISPLAY	METER
SQUELCH	CCW
TONE 1 FM/OFF/AM	OFF
TONE 2 FM/OFF/AM	OFF

3.7.2 Set Signal Generator (2.1) controls as follows:

FREQUENCY	120.5 MHz
AMPLITUDE	-50 dBm
FUNCTION	MOD OFF

3.7.3 Connect Signal Generator (2.1) RF OUTPUT through a 50 Ω coaxial cable to the TI ANTENNA input.

3.7.4 Note and record the frequency error displayed on the TI Digital Freq Error meter.

3.7.5 Decrease Signal Generator (2.1) output level until the TI Digital Freq Error indication changes 100 Hz from the value recorded in step 3.7.4 (ignore occasional fluctuations).

3.7.6 The Signal Generator (2.1) AMPLITUDE display should indicate about -101 dBm (2 μV into 50 Ω).

3.7.7 Disconnect the Signal Generator (2.1) from the TI.

4 CALIBRATION PROCESS:

NOTE

Unless otherwise specified, verify the results of each test and take corrective action whenever the test requirement is not met, before proceeding.

4.1 SPECTRUM ANALYZER CALIBRATION:

4.1.1 Connect equipment as shown in Figure 1.

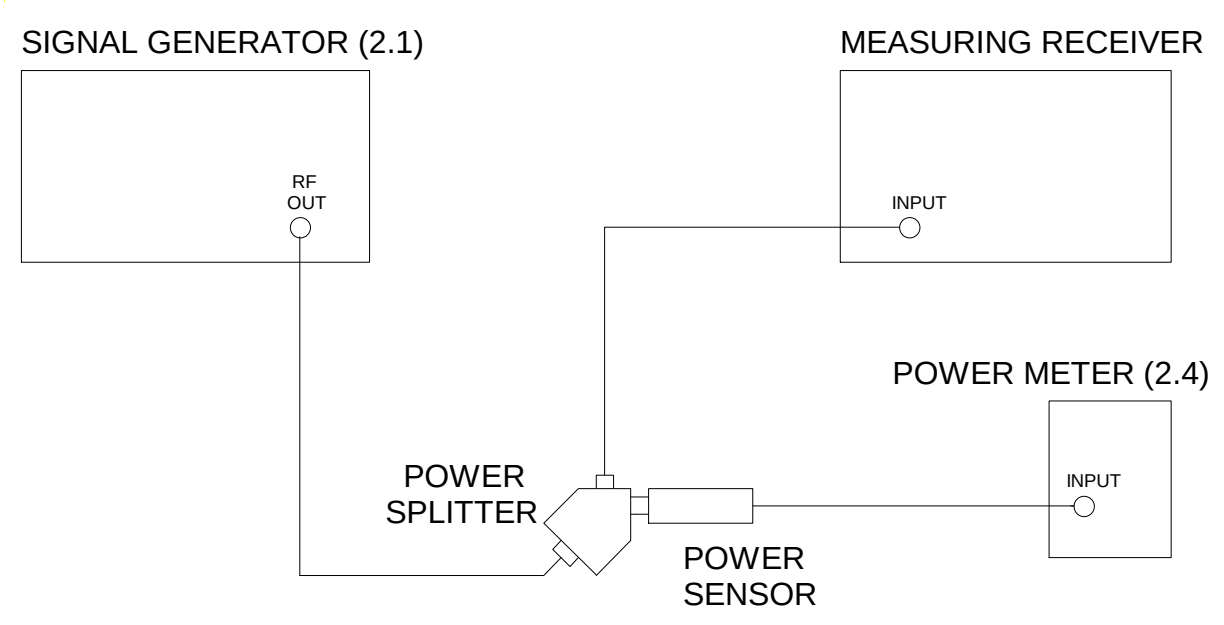

Figure 1.

4.1.2 Set Signal Generator (2.1) controls as follows:

FREQUENCY	120.5 MHz
AMPLITUDE	+6 dBm
FUNCTION	MOD OFF

4.1.3 Readjust Signal Generator (2.1) output until Power Meter (2.4) indicates closest value to 0 dBm (within ±0.1 dBm).

4.1.4 Perform an INSTR PRESET on the Measuring Receiver and then key in 120.5 MHz to enter the manual tuning mode.

4.1.5 Set Measuring Receiver MEASUREMENT FUNCTION to TUNED RF LEVEL, press LOG/LIN, select SET REF and ensure Measuring Receiver indicates 0.00 dB.

4.1.6 Decrease Signal Generator (2.1) output in 10 dB steps down to -90 dBm. Depress the Measuring Receiver CALIBRATE key when the RECAL annunciator illuminates.

4.1.7 Disconnect Power Sensor from test setup and connect TI ANTENNA input in its place.

4.1.8 Set TI controls as follows:

GEN/REC	REC
LCD FREQUENCY	120.5000 MHz
ANALY DISPR	20 kHz/DIV
DB/DIV	10 dB
DISPLAY	ANALY
ATTENUATOR	0 dB
FREQ ERROR	Any position except 10 kHz

4.1.9 Set Signal Generator (2.1) output level until the displayed signal on the TI CRT is on the -40 dB graticule. Press LOG/LIN, select SET REF on Measuring Receiver and ensure display indicates 0.00 dB.

4.1.10 Increase Signal Generator (2.1) output level until Measuring Receiver indicates +10.00 ±0.1 dB. Ensure signal displayed on TI CRT is at the -30 dB graticule ±2 dB.

4.1.11 Decrease Signal Generator (2.1) output level to obtain Measuring Receiver indications of -10.00, -20.00, -30.00 and -40.00 dB within ±0.1 dB.

4.1.12 Ensure signal is displayed on TI CRT at the -50, -60, -70 and -80 dB graticule lines respectively within ±2 dB.

4.1.13 Repeat step 4.1.9.

4.1.14 Set TI ATTENUATOR to 20 dB and increase Signal Generator (2.1) output level until signal displayed on TI CRT returns to the -40 dB graticule. Measuring Receiver must indicate 20 ±2 dB.

4.1.15 Set TI ATTENUATOR to 40 dB and increase Signal Generator (2.1) output level until signal displayed on TI CRT returns to the -40 dB graticule. Measuring Receiver must indicate 40 ±2 dB.

4.1.16 Disconnect test setup. Set Signal Generator (2.1) to 120.5 MHz at -50 dBm and connect directly to TI ANTENNA input. Set TI ATTENUATOR to 0 dB and ANALY DISP to 1 kHz/DIV.

4.1.17 Change Signal Generator (2.1) output frequency to 120.504 MHz and 120.496 MHz and ensure signal displayed on TI CRT moves about 4 divisions in each direction.

4.1.18 Set TI ANALY DISP control to settings of 2K, 10K, 20K, .1M, .2M, .5M, 1M, 2M, 5M and 10M. For each setting vary Signal Generator (2.1) frequency 4 times the ANALY DISP control setting in both a higher and a lower direction. Ensure signal displayed on TI CRT moves about 4 divisions in each direction.

4.1.19 Disconnect the test setup.

4.2 RF FREQUENCY ERROR CALIBRATION:

4.2.1 Set TI controls as follows:

DUPLEX/SIMPLEX	SIMPLEX
GEN/REC	REC
LCD FREQUENCY	120.5000 MHz
FREQ ERROR	30 Hz
DISPLAY	METER
MODULATION	FM 2
ANALY DISP	0.1 MHz

4.2.2 Set Signal Generator (2.1) to 120.5 MHz at -50 dBm. Connect Signal Generator (2.1) RF OUTPUT directly to TI ANTENNA input.

4.2.3 If necessary, adjust TI front panel INT REF CAL until TI Digital Frequency Error display indicates 00 Hz.

NOTE

If TI INT REF CAL is adjusted in step 4.2.3, it will be necessary to complete the Internal Time Base Adjustment in section 3.6 after completion of this portion of the calibration.

4.2.4 Increase the frequency of Signal Generator (2.1) by 28.5 Hz and ensure TI digital and analog frequency error meters both indicate +27 to +30 Hz.

4.2.5 Set Signal Generator (2.1) output frequency to 120.5 MHz.

4.2.6 Decrease the frequency of Signal Generator (2.1) by 28.5 Hz and ensure TI digital and analog frequency error meters both indicate -27 to -30 Hz.

4.2.7 Set Signal Generator (2.1) output frequency to 120.5 MHz.

4.2.8 Repeat steps 4.2.4 through 4.2.7 for each setting of the TI FREQ ERROR control shown in Table 2 substituting the appropriate applied values and limits from the table.

Table 2.

TI FREQ ERROR RANGE (Hz)	**SIGNAL GENERATOR (2.1) DELTA FREQ (Hz) (120.5 MHz ref)**	**TI FREQ ERROR METER LIMITS**	
		Analog	**Digital (Hz)**
30	+28.5 -28.5	+2.7 to +3.0 -2.7 to -3.0	+27 to +30 -27 to -30
100	+95 -95	+0.9 to +1.0 -0.9 to -1.0	+90 to +100 -90 to -100
300	+285 -285	+2.7 to +3.0 -2.7 to -3.0	+0.27 to +0.30 k -0.27 to -0.30 k
1 k	+950 -950	+0.9 to +1.0 -0.9 to -1.0	+0.90 to +1.00 k -0.90 to -1.00 k
3 k	+2.85 k -2.85 k	+2.7 to +3.0 -2.7 to -3.0	+2.7 to +3.0 k -2.7 to -3.0 k
10 k	+9.50 k -9.50 k	+0.9 to +1.0 -0.9 to -1.0	+9.0 to +10.0 k -9.0 to -10.0 k

4.2.9 Set the Signal Generator (2.1) output to minimum and disconnect from TI ANTENNA input.

4.3 <u>MODULATION METER CALIBRATION:</u>

4.3.1 Set TI controls as follows:

AVG PEAK/PEAK	AVG PEAK
DEV/PWR	6 kHz/%X10
MODULATION	FM 2
GEN/REC	REC
LCD FREQUENCY	850.0000 MHz
DISPLAY	METER

ATTENUATOR	0 DB
DEV/VERT	2 kHz/DIV

4.3.2 Connect equipment as shown in Figure 2 with Step Attenuator set to 50 dB.

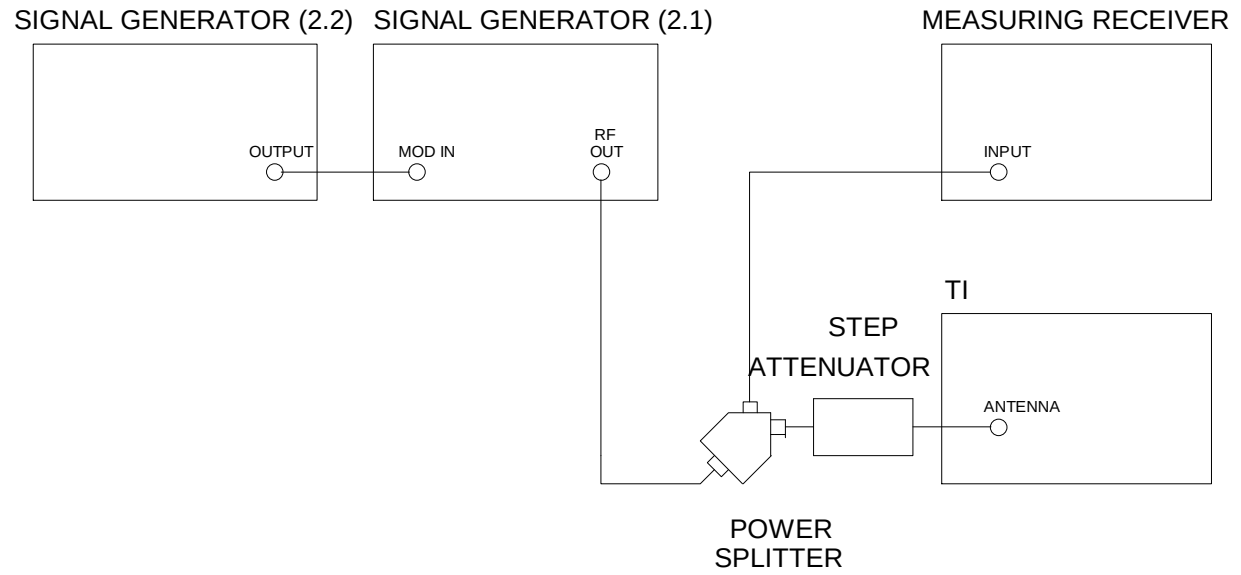

Figure 2.

4.3.3 Set Signal Generator (2.1) controls as follows:

FREQUENCY	850 MHz
AMPLITUDE	+6 dBm
FM	5 kHz
MOD	EXT AC

4.3.4 Set Measuring Receiver controls as follows:

MEASUREMENT FUNCTION	FM
DETECTOR	AVG
HP FILTER	300 Hz
LP FILTER	3 kHz

4.3.5 Set Signal Generator (2.2) for a 1 kHz output at 707 mV rms. Readjust output voltage to obtain an indication of 3.54 kHz on the Measuring Receiver.

4.3.6 TI Digital Deviation Display must indicate 4.85 to 5.15 kHz.

4.3.7 TI Deviation Monitor Meter must indicate 4.75 to 5.25 kHz.

4.3.8 Set TI DISPLAY to SCOPE. TI Oscilloscope display must indicate 5 ±0.5 div.

4.3.9 Set Signal Generator (2.1) FM deviation to 2 kHz. Set TI DEV/PWR to 2 kHz/%X10 and DEV/VERT to 0.5 kHz/DIV.

4.3.10 Set Measuring Receiver LP FILTER to 15 kHz. Set Signal Generator (2.2) frequency to 6 kHz and readjust output voltage to obtain an indication of 1.273 kHz on the Measuring Receiver.

4.3.11 TI Oscilloscope display must indicate 7.2 ±0.72 div.

4.3.12 Set TI DISPLAY to METER. TI Digital Deviation Meter must indicate 1.746 to 1.854 kHz.

4.3.13 Set TI controls as follows:

MODULATION	FM 3
DEV/PWR	20 kHz/%X10
DEV/VERT	5 kHz/DIV

4.3.14 Set Signal Generator (2.1) FM to 8 kHz deviation. Set Signal Generator (2.2) output frequency to 10 kHz and readjust output voltage to obtain an indication of 5.66 kHz on the Measuring Receiver.

4.3.15 TI Digital Deviation Display must indicate 7.76 to 8.24 kHz.

4.3.16 Set TI DISPLAY to SCOPE. TI Oscilloscope display must indicate 3.2 ±0.32 div.

4.3.17 Set TI controls as follows:

MODULATION	AM 1
DEV/PWR	2 kHz/%X10
DEV/VERT	Any kHz/DIV
DISPLAY	METER

4.3.18 Set Measuring Receiver controls as follows:

MEASUREMENT FUNCTION	AM
DETECTOR	+PEAK
HP FILTER	300 Hz
LP FILTER	3 kHz

4.3.19 Set Signal Generator (2.1) for 16% AM modulation. Set Signal Generator (2.2) FREQUENCY to 1 kHz and adjust AMPLITUDE as required to obtain an indication of 16.0% on the Measuring Receiver.

4.3.20 TI Monitor Meter must indicate 13.88 to 18.12% and TI Digital Display must indicate 13.2 to 18.8%.

4.3.21 Set TI DEV/PWR to 6 kHz/%X10.

4.3.22 Set Signal Generator (2.1) for 50% AM modulation. Adjust Signal Generator (2.2) AMPLITUDE as required to obtain an indication of 50% on the Measuring Receiver.

4.3.23 TI Monitor Meter must indicate 43.5 to 56.5% and TI Digital Display must indicate 45.5 to 54.5%.

4.3.24 Set TI DEV/PWR to 20 kHz/%X10.

4.3.25 TI Monitor Meter must indicate 36.5 to 63.5% and TI Digital Display must indicate 28 to 72%.

4.3.26 Set all outputs to minimum and disconnect the test setup.

4.4 GENERATOR OUTPUT CALIBRATION:

4.4.1 Set TI controls as follows:

RF LEVEL	0 dBm
DUPLEX/SIMPLEX	SIMPLEX
GEN/REC	GEN
LCD FREQUENCY	850.0000 MHz

4.4.2 Repeat steps 4.1.1 through 4.1.6 substituting 850 MHz for 120.5 MHz.

4.4.3 Disconnect the test setup and connect TI TRANS/-40dB DUPLEX connector through a 50 Ω coaxial cable to the Measuring Receiver INPUT 50 Ω connector.

4.4.4 Measuring Receiver must indicate 0 ±4 dB.

4.4.5 Set TI RF LEVEL control to each applied value listed in Table 3 and ensure Measuring Receiver indicates within the Limits shown.

Table 3.

Applied (dBm)	Limits (dBm)
0	-4 to +4
-10	-8 to -12
-20	-18 to -22

Table 3. (Cont.)

Applied (dBm)	Limits (dBm)
-30	-28 to -32
-40	-38 to -42
-50	-48 to -52
-60	-58 to -62
-70	-68 to -72
-80	-78 to -82
-90	-87.5 to -92.5
-100	-97.5 to -102.5
-110	-107.5 to -112.5
-120	-117.5 to -122.5

4.4.6 Disconnect test setup and connect Power Meter (2.4)/Power Sensor to TI TRANS/-40dB DUPLEX connector.

4.4.7 Set TI LCD FREQUENCY to .1000 MHz and RF LEVEL control to 0 dBm.

4.4.8 Power Meter (2.4) must indicate 0 dBm ±4 dB.

4.4.9 Set TI LCD FREQUENCY to frequencies of 10 MHz, 50 MHz, 100 to 900 MHz in 100 MHz steps and 990 MHz while repeating step 4.4.8.

4.4.10 Disconnect test setup.

4.5 DUPLEX OFFSET CALIBRATION:

4.5.1 Set TI controls as follows:

RF LEVEL	-10 dBm
DUPLEX/SIMPLEX	DUPLEX
GEN/REC	GEN
LCD FREQUENCY	800.0000 MHz
LCD OFFSET	00.00 MHz

4.5.2 Connect TI BNC DUPLEX OUTPUT connector through a 50 Ω coaxial cable to the Measuring Receiver INPUT 50 Ω connector.

4.5.3 Select INSTR PRESET and then TUNED RF LEVEL on the Measuring Receiver.

4.5.4 Depress the MHz key (or key in 800 MHz) to enter the manual tuning mode. Press LOG/LIN, select SET REF and ensure the Measuring Receiver indicates 0.00 dB.

4.5.5 Decrease TI RF LEVEL in 10 dB steps down to -60 dBm. Depress CALIBRATE when Measuring Receiver RECAL annunciator illuminates.

4.5.6 Return TI RF LEVEL to -10 dBm.

4.5.7 Disconnect Measuring Receiver from TI DUPLEX OUTPUT and reconnect to TI TRANS/-40dB DUPLEX connector. Terminate the BNC DUPLEX OUTPUT connector with the Termination.

4.5.8 Measuring Receiver must indicate -37 to -43 dB.

4.5.9 Disconnect the 50 Ω coaxial cable and the Measuring Receiver from the TI. Disconnect the Termination from the TI DUPLEX OUTPUT. Connect the TI DUPLEX OUTPUT to Measuring Receiver INPUT 50 Ω connector. Select INSTR PRESET on the Measuring Receiver and then key in 7.2 SPCL (100 Hz frequency resolution).

4.5.10 Depress TI keyboard OFFSET, 4, 9, 9, 9, ENTER and ensure Measuring Receiver indicates 849.9900 MHz ±1 count.

4.5.11 Depress TI keyboard OFFSET, -, 4, 9, 9, 9, ENTER and ensure Measuring Receiver indicates 750.0100 MHz ±1 count.

4.5.12 Disconnect Measuring Receiver from TI.

4.6 <u>POWER METER CALIBRATION:</u>

4.6.1 Set TI controls as follows:

DEV/PWR	15 W
AVG/PEAK	AVG
DISPLAY	METER
GEN/REC	REC

4.6.2 Connect equipment as shown in Figure 3.

4.6.3 On the Power Meter (2.8) set to 40 dB Coupler and CAL FACTOR/Vernier controls to the appropriate value.

4.6.4 On the RF Power Amplifier set the Filter Switching Unit BAND SELECT-MHz to 250-400 and POWER ADJUST controls fully CCW.

4.6.5 Set Signal Generator (2.1) for a 0 dBm output at 400 MHz. On the RF Power Amplifier set the Filter Switching Unit 100-400 MHz POWER ADJUST controls for an indication of 10.00 W on Power Meter (2.8).

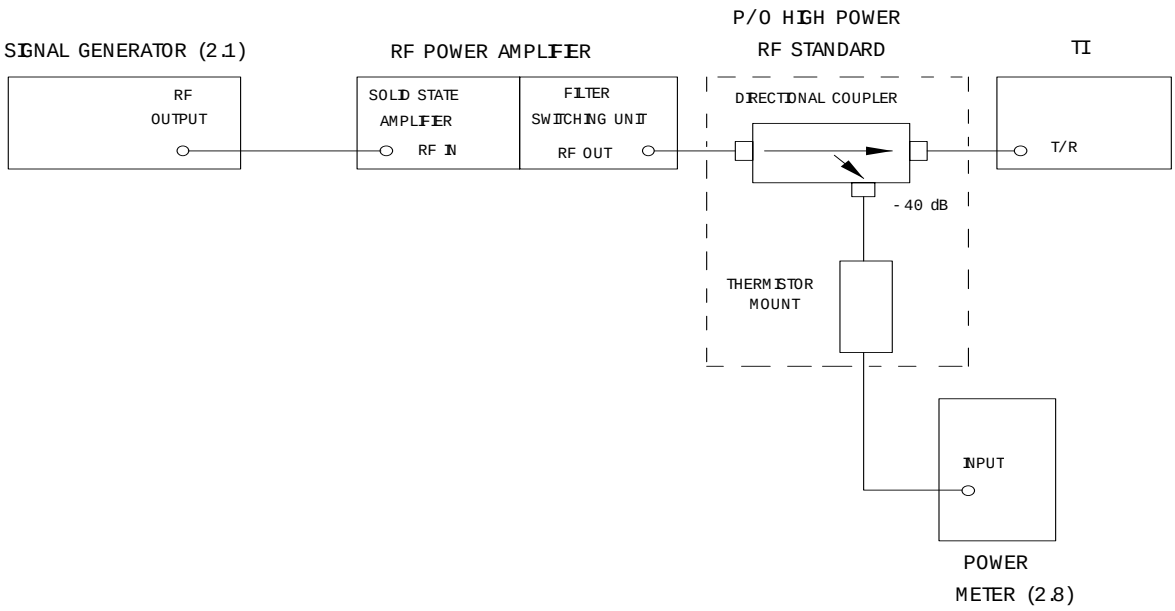

Figure 3.

4.6.6 TI digital and analog power meters must indicate 8.85 to 11.15 W.

4.6.7 Set TI DEV/PWR control to 150 W and increase the RF Power Amplifier Switching Unit 100-400 MHz POWER ADJUST controls for an indication of 30.0 W on the Power Meter.

4.6.8 TI digital and analog power meters must indicate 23.4 to 36.6 W.

4.6.9 Set Signal Generator (2.1) FUNCTION to AMPTD OFF and set RF Power Amplifier Switching Unit BAND SELECT-MHz to 100-160 with POWER ADJUST controls fully CCW.

4.6.10 Repeat steps 4.6.5 through 4.6.8 with Signal Generator (2.1) set to 100 MHz.

4.6.11 Set Signal Generator (2.1) FUNCTION to AMPTD OFF and set RF Power Amplifier Switching Unit BAND SELECT-MHz to 7.5 to 12 with POWER ADJUST controls fully CCW. On the RF Power Amplifier change RF connections to Solid State Amplifiers and Filter Switching Unit as necessary.

4.6.12 Repeat steps 4.6.5 through 4.6.8 with Signal Generator (2.1) set to 10 MHz.

4.6.13 Set Signal Generator (2.1) FUNCTION to AMPTD OFF and disconnect test setup.

4.6A <u>POWER METER CALIBRATION:</u> (Alternate Method)

4.6A.1 Connect equipment as shown in Figure 1A.

NOTE

Use the applicable Directional Power Sensor, as required, for the frequency being tested.

4.6A.2 Set the RF Power Meter, as required, to measure Watts.

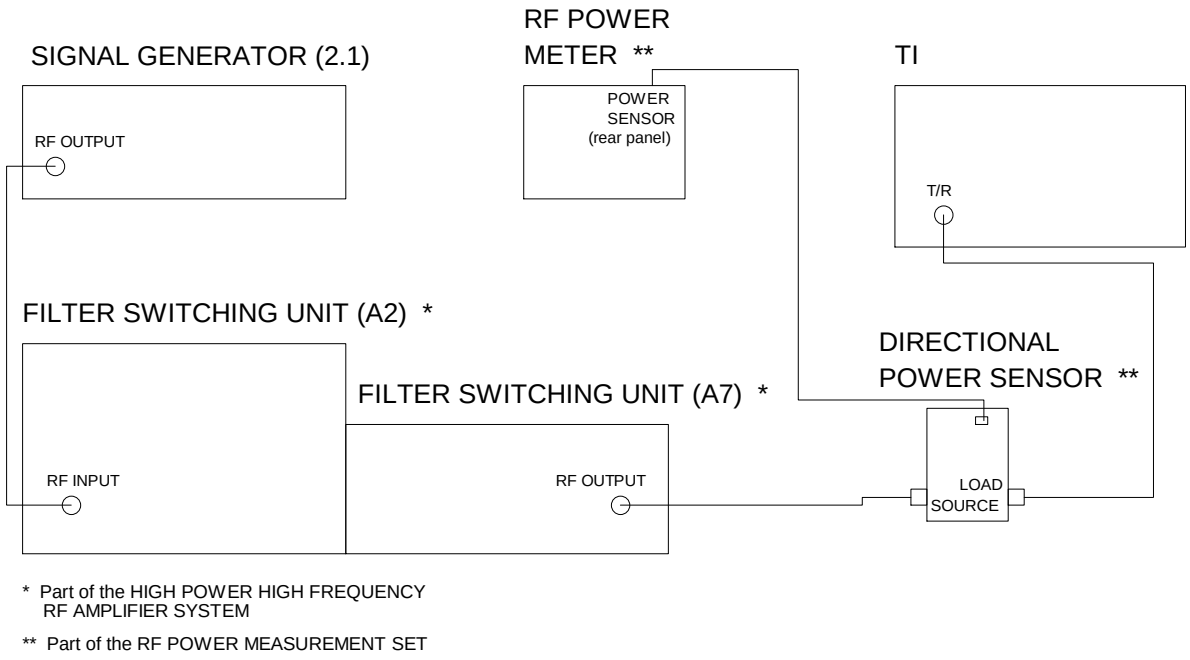

Figure 1A.

4.6A.3 On the Filter Switching Unit (A2), set the RF OUTPUT LEVEL CONTROL fully CCW and press the OPER/STBY key until the OPERATE lamp illuminates.

NOTE

Ensure the RF Power Meter FWD lamp is illuminated. If not, press the RF PWR key.

4.6A.4 Set TI controls as follows:

DEV/PWR	1st value listed in the Range column of Table 2A
AVG/PEAK	AVG
DISPLAY	METER
GEN/REC	REC

4.6A.5 On the Filter Switching Unit (A2), press the Band listed in the Band column of Table 2A.

4.6A.6 Set the Signal Generator, as required, to 0.0 dBm at the first frequency listed in the Frequency column of Table 2A.

4.6A.7 Set the Filter Switching Unit (A2) RF OUTPUT LEVEL CONTROL for a RF Power Meter indication of the first value listed in the Applied column of Table 2A.

NOTE

It may not be possible to set the Filter Switching Unit (A2) RF OUTPUT LEVEL CONTROL for an exact indication of the value listed in the Applied column of Table 2A. If it is not, set the RF OUTPUT LEVEL CONTROL as close as possible and calculate the limits from the RF Power Meter displayed value.

4.6A.8 The TI digital and analog power meters must indicate within the values listed in the Limits column of Table 2A.

4.6A.9 Set the Filter Switching Unit (A2) RF OUTPUT LEVEL CONTROL fully CCW.

4.6A.10 Repeat steps 4.6A.4 through 4.6A.9 for the remaining values listed in Table 2A. Use the applicable Directional Power Sensor, as required, for the frequency being tested.

Table 2A.

Range (W)	Band (MHz)	Frequency (MHz)	Applied (W)	Limits (W)
15	10 - 16	10.00	10.00	8.85 to 11.15
150	10 - 16	10.00	30.0	23.4 to 36.6
15	64 - 100	100.0	10.0	8.85 to 11.15
150	64 - 100	100.0	30.0	23.4 to 36.6
15	348 - 500	400.0	10.0	8.85 to 11.15
150	348 - 500	400.0	30.0	23.4 to 36.6

4.6A.11 Set all outputs to minimum or STBY. Disconnect the test setup.

4.7 OSCILLOSCOPE CALIBRATION:

4.7.1 Set TI controls as follows:

DEV/VERT	0.01 V/DIV
HORIZ	1 mS/DIV
DISPLAY	SCOPE
VERT VERNIER	CAL (fully CW)
HORIZ VERNIER	CAL (fully CW)

4.7.2 Connect Oscilloscope Calibrator AMPL OUTPUT through a 50 Ω coaxial cable to the TI SCOPE/SINAD INPUT.

4.7.3 Set Oscilloscope Calibrator AMPLITUDE control to 50 mV with the VARIABLE control IN. The TI Oscilloscope must indicate 5 ±0.5 div.

4.7.4 Repeat step 4.7.3 for TI DEV/VERT settings of 0.1, 1 and 10 V/DIV using Oscilloscope Calibrator AMPLITUDE settings of 0.5, 5 and 50 V respectively.

4.7.5 Disconnect 50 Ω coaxial cable from Oscilloscope Calibrator AMPL OUTPUT and connect to Signal Generator (2.2) through the Termination.

4.7.6 Set TI DEV/VERT to 1 V/DIV and HORIZ to 0.01 ms/DIV. Set Signal Generator (2.2) for a 1 VRMS output at 100 kHz.

4.7.7 Align the first sinewave peak with the first graticule line using TI HORIZ POSITION control and ensure the ninth sinewave peak falls between 6.4 and 9.6 div (one peak per div over 8 ±1.6 div).

4.7.8 Repeat step 4.7.7 for TI HORIZ settings of 0.1, 1 and 10 ms/DIV with Signal Generator (2.2) set to frequencies of 10 kHz, 1 kHz and 100 Hz respectively.

4.7.9 Set all OUTPUTS to OFF or ZERO and disconnect and secure all equipment.

CALIBRATION PERFORMANCE TABLE

Not Required