11758T/U/V Digital Radio Test System

Calibration Guide

For use with 11758B

Agilent Technologies

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Notice

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Agilent Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Notice

Hewlett-Packard to Agilent Technologies Transition

This documentation supports a product that previously shipped under the Hewlett-Packard company brand name. The brand name has now been changed to Agilent Technologies. The two products are functionally identical, only our name has changed. The document still includes references to Hewlett-Packard products, some of which have been transitioned to Agilent Technologies.

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General Safety Information

WARNING

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.This is a Safety Class I instrument (provided with a protective earthing ground, incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the instrument is likely to make the instrument dangerous. Intentional interruption is prohibited.

DO NOT operate the product in an explosive atmosphere or in the presence of flammable gasses or fumes.

DO NOT use repaired fuses or short-circuited fuseholders: For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type.

DO NOT perform procedures involving cover or shield removal unless you are qualified to do so: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers and shields are for use by service-trained personnel only.

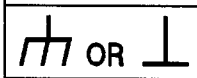
DO NOT service or adjust alone: Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, service personnel must not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a Agilent Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.

DO NOT substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to a Agilent Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.

Safety Symbols

The following symbols on the instrument and in the manual indicate precautions which must be taken to maintain safe operation of the instrument

	The Instruction Documentation Symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the supplied documentation.
	Indicates the field wiring terminal that must be connected to earth ground before operating the equipment - protects against electrical shock in case of fault.
	Frame or chassis ground terminal - typically connects to the equipment's metal frame.
	Alternating current (AC)
	Direct current (DC)
	Indicates hazardous voltages
WARNING 	Warning denotes a hazard. It calls attention to a procedure, which if not correctly performed or adhered to could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.
CAUTION 	Caution denotes a hazard. It calls attention to a procedure, which if not correctly performed or adhered to could result in damage to or destruction of the instrument. Do not proceed beyond a caution note until the indicated conditions are fully understood and met.
	The CE mark shows that the product complies with all relevant European Legal Directives.
ISM 1-A	This is a symbol of an Industrial, Scientific, and Medical Group 1 Class A product.
	The CSA mark is a registered trademark of the Canadian Standards Association, and indicates compliance to the standards laid out by them.
	The C-Tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework Regulations under the terms of the Radiocommunications Act of 1992.
	This symbol indicates the position of the operating switch for 'Off' mode. NOTE: To ensure instrument is isolated from mains, always rempve the appliance coupler (mains power cord) from the power source.
	This symbol indicates the position of the operating switch for 'On' mode.
	This symbol indicates the position of the operating switch for 'Stand-by' mode. Note, the instrument is NOT isolated from the mains when the switch is in this position. To isolate the instrument, the mains coupler (mains input cord) should be removed from the power supply.

Safety Considerations

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation

This product is a Safety Class I system (provided with a protective earth terminal).

Before Applying Power

Verify that the product is set to match the available line voltage and the correct fuses are installed.

Safety Earth Ground

An uninterruptable safety earth ground must be provided from the main power source to the product input wiring terminals, power cable, or supplied cable set.

WARNING

Any interruption of the protective (grounding) conductor (inside or outside the system) or disconnecting the protective earth terminal will cause a potential shock hazard the could result in personal industry.(Grounding one conductor of a two conductor outlet is not sufficient protection.) In addition, verify that a common ground exists between the unit under test and the system prior to energizing either unit.

Servicing instructions are for use by service-trained personnel only. To avoid dangerous electric shock, do not perform any servicing unless qualified to do so.

Adjustments described in the manual are performed with the power supplied to the system's instruments while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside the system's instruments might still be charged even if the system has been disconnected from its source of supply.

Anti-Static Work Station

Electrostatic discharge (ESD) can damage or destroy electronic components. Therefor, all work performed on assemblies consisting of electronic components should be done at a stati-safe workstation.

- Conductive table mat and wrist strap combination.
- Conductive floor mat and heel strap combination.

These methods may be used together or separately.

Reducing Damage Caused by ESD

Below are suggestions that may help reduce ESD damage that occur during testing and servicing instruments.

PC Board Assemblies and Electronic Components

Handle these items at a static-safe workstation.

Store or transport these items in static-shielding containers.

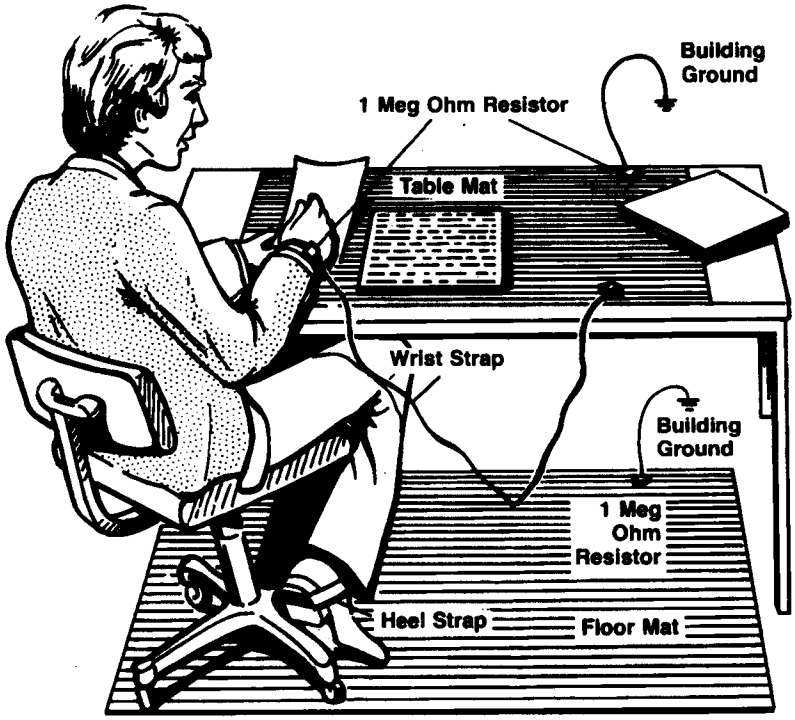
Test Equipment

Before connecting any coaxial cable to an instrument connector for the first time each day, momentarily ground the center and outer connector of the cable.

Personnel should be grounded with a resistor-isolated wrist strap before touching the center pin of any connector and before removing any assembly from the instrument.

Be sure that all instruments are properly earth-grounded to prevent buildup of static discharge.Figure 0-1. Static-Safe Workshop

Figure 1


Building Ground
1 Meg Ohm Resistor
Table Mat
Wrist Strap
Building Ground
1 Meg Ohm Resistor
Heel Strap
Floor Mat

Static-Safe Accessories

Table 1-1 is a list of static-safe accessories that may be obtained from any Agilent Technologies office by using the part numbers listed.

Table 1-1

Part Number	Description
9300-0797	3M™ static control mat .6m x 1.2m (2 x 4 ft.) 4.6m (15 ft.) ground wire wrist attachment cord
9300-0980	Wrist strap cord 1.5 m (5 ft.)
9300-0985	Wrist strap (large)
9300-0986	Wrist strap (small)
9300-1169	ESD heel strap (reusable 6 to 12 months)
9300-0793	Shoe ground strap (one-time use only)

More Static-Safe Accessories

The ESD accessories in Table 1-2 can be ordered from:

Agilent Technologies
Computer Supplies Operations
1320 Kifer Road
Sunnyvale, California 94086
Phone: (408) 738-8868

Table 1-2 More Static Safe Accessories

Part Number	Description
92175A	Black, hard-surface, static control mat 1.2m x 1.5m (4 ft. x 5 ft.)
92175B	Brown, soft-surface, static control mat 2.4m x 1.2m (8 ft. x 4 ft.)
92175T	Small, black, hard-surface, static control mat 1.2m x 0.9m (4 ft. x 3 ft.)
92175T	Tabletop static control mat 58 cm x 76 cm (23" x 30")
92176A	Anti-static carpet (natural color), 1.8m x 1.2m (6 ft. x 4 ft.)
92176C	Anti-static carpet (russet color), 1.8m x 1.2m (6 ft. x 4 ft.)
92176B	Anti-static carpet (natural color), 2.4m x 1.2m (8 ft. x 4 ft.)
92176D	Anti-static carpet (russet color), 2.4m x 1.2m (8 ft. x 4 ft.)

Contents

1 About this Book

This book contains performance tests and adjustments to assure the 11758A/B portion of your 11758T/U/V Digital Radio Test System is operating to the performance standards as specified in the specification table in the User's Guide.

Purpose

The purpose of this book is to provide methods to:

- Verify the instrument meets performance standards.
- Adjust the instrument to performance standards after repair.
- Perform periodic calibrations.

Documentation

11758U/V documentation consists of Operating information, Programming information, and Service information. Service information can be obtained when selecting Option 915. Any manual can be ordered from the Agilent Technologies Sales and Service Offices listed inside the rear cover of this manual.

NOTE

Field Operation 11758U/V documentation is modular. This allows you to choose, from the extensive documentation Agilent Technologies provides, the kind of information you wish to carry into the field. The recommended field operation documentation is:

- 11758U/V User's Guide
- Making Measurements With the Agilent Technologies 11757B Multipath Fading Simulator User's Guide
- "Local Reference" section from the Agilent Technologies 11757B Multipath Fading Simulator Operation and Programming Reference
- C/N vs BER DLP Measurement Personality User's Guide
- M-Curve DLP Measurement Personality User's Guide

Standard Information

Standard operating information is shipped with the instrument. Option 916 provides an additional set of operating information. You should have received the following documentation with your instrument:

- Agilent Technologies 11758U/V User's Guide
- Agilent Technologies 11758T/U Calibration Guide
- Making Measurements With the Agilent Technologies 11757B Multipath Fading Simulator User's Guide
- Agilent Technologies 11757B Installation and Calibration Guide

- Agilent Technologies 11757/8 Support Disk
- Agilent Technologies 11757B Multipath Fading Simulator Operation and Programming Reference
- Agilent Technologies 437B Operation Manual
- C/N vs BER DLP Measurement Personality User's Guide
- ROM Measurement Card
- M-Curve DLP Measurement Personality User's Guide
- Agilent Technologies 8590 Series Operation (For Agilent Technologies 8593E Spectrum Analyzer)
- Agilent Technologies 8591A/8593A Quick Reference Guide (For Agilent Technologies 8593E Spectrum Analyzer)
- Agilent Technologies 8590 Series Spectrum Analyzer Programming Manual (For Agilent Technologies 8593E Spectrum Analyzer)
- Agilent Technologies 85713A Digital Radio Measurements Personality Operating Guide
- Agilent Technologies 8593A E02 Supplement (For Agilent Technologies 8593E Spectrum Analyzer)
- Attention for DiRTS Note

Option 915 Orders

If you ordered an option 915, the following manuals were also sent.

Agilent Technologies 11758T/U Calibration Guide

Agilent Technologies 11758T/U Service Manual

Agilent Technologies 11758T/U CLIPS

Agilent Technologies 11757B Installation and Calibration Guide

Agilent Technologies 11757/8 Support Disk

Agilent Technologies 11757B Service Manual

Agilent Technologies 11757B CLIPS

Agilent Technologies 437B Service Manual

Agilent Technologies 8593A Service Manual (For Agilent Technologies 8593E Spectrum Analyzer)

Agilent Technologies 8593A Component Level Information (For Agilent Technologies 8593E Spectrum Analyzer)

Agilent Technologies 8593A E02 Supplement 08593-90017 (For Agilent Technologies 8593E Spectrum Analyze08593-90033)

What is in these manuals

Agilent Technologies 11758U Operating Manual Contains system operating information for the entire Agilent Technologies 11758U Digital Radio Test System.

Agilent Technologies 11758T/U Calibration Guide Contains system performance tests and adjustments.

Agilent Technologies 11757B Installation and Calibration Guide contains information about conducting automated performance tests and adjustments using the Agilent Technologies 11757B Support Disk.

Agilent Technologies 11757B Support Disk An HP-Basic program to perform automated performance tests and adjustments over GPIB.

Making Measurements with the Agilent Technologies 11757B explains how to make signature measurements with the Multipath Fading Simulator part of the Agilent Technologies 11758T/U (the signature capability does not exist with option 001 orders).

C/N DEP Manual describes how to use a DLP (Down Loadable Program) to make Carrier to Noise versus Bit Error Rate measurements.

M-Curve DLP Manual describes how to use a DLP (Down Loadable Program) to display M-Curve measurement results on the spectrum analyzer display.

Agilent Technologies 8590 Series Operation contains general operating information about the spectrum analyzer.

Agilent Technologies 8591A/8593A Quick Reference is a quick reference to the spectrum analyzer.

Agilent Technologies 8590 Series Programming Manual contains GPIB programming information for the spectrum analyzer.

Agilent Technologies 8593A E02 Supplement contains operating, verification, and service information about the spectrum analyzer that is specific to the E02 option.

Attention for DiRTS Note contains information about the accessories shipped with the spectrum analyzer.

Agilent Technologies 11757B Service Manual contains service information for the Multipath Fading simulator part of the Agilent Technologies 11758U.

Agilent Technologies 11757B CLIPS contains schematics, material lists, and component location diagrams for the Multipath Fading simulator part of the Agilent Technologies 11758U.

Agilent Technologies 437B Service Manual contains service information for the Power Meter part of the Agilent Technologies 11758U.

Agilent Technologies 8593A Service Manual contains service information for the Spectrum Analyzer part of the Agilent Technologies 11758U.

Agilent Technologies 8593A CLIPS contains schematics, material lists, and component location diagrams for the Spectrum Analyzer part of the Agilent Technologies 11758U.

Agilent Technologies 11757B Operating Manual contains installation, verification, operating, and programming information about the Multipath Fading Simulator part of the Agilent Technologies 11758U.

Agilent Technologies 437B Operating Manual contains operating and programming information about the Power Meter part of the Agilent Technologies 11758U.

Verification

If you are simply verifying the instrument meets performance standards, follow the procedures described in Chapter 2 , "Performance Tests,".

After Repair

If this instrument has been repaired, refer to Table 1-2 on page 8 to see which adjustment or calibration is necessary.

Calibration Cycle

This instrument requires periodic verification of performance to ensure that it is operating within specified tolerances. The performance tests described in this section should be performed once each year. Under conditions of heavy usage or severe operating environments, the tests should be more frequent. Adjustments that may be required are described in Chapter 3 , "Adjustments," in this manual.

Multipath Fading Simulator

The Multipath Fading Simulator documentation shipped with your 11758T/U makes reference to an internal printer. Your 11758T/U does not have this feature and you should therefore ignore these references.

If you wish to display the results of a measurement made with the Multipath Fading Simulator you can either use an external ThinkJet Printer or the M-Curve DLP.

Power Meter

The method of entering the calibration factors for the power sensor sent with your 11758U is different from that described in the Agilent Technologies 437B manual. The correct method is described in the Agilent Technologies 11758T manual.

In summary, the power sensor sent with the 11758U does not use the power meter's Sensor Type or Cal Factors function. The cal data that is printed directly on the sensor is entered using the Offsets feature of the power meter.

If you purchase any other HP/Agilent 437B compatible sensors from Agilent Technologies, the calibration data for those sensors should be entered into the Power Meter as described in the *Agilent Technologies 437B manual.*

Safety Considerations

The following warning contains information that must be followed for your personal safety and to avoid damage to the equipment being used. lit addition, important safety information precedes any step where a hazard may be present.

WARNING **Some procedures described in this book are performed with power applied to the instrument and with protective covers removed. These procedures should be performed only by service-trained personnel who are aware of the hazards involved (for example, fire and electrical shock). When the maintenance procedure can be performed without power, the power should be removed.**

For additional safety information, refer to the Safety Considerations page found at the beginning of this manual.

Equipment Required

A full listing of all recommended test equipment used in this manual can be found in the following table Table 1-1. If substitutions must be made for the models recommended in the adjustment procedures, the test equipment must meet the critical specifications listed in Table 1-1.

Table 1-1 Recommended Test Equipment

Instrument Type	Critical Specifications	Suggested model
Adaptor	75Ω, BNC (f) to N (f)	1250-1534
Attenuator, Min Loss	75Ω to 50Ω	HP/Agilent 11852B
Digital Voltmeter	Range 0 to 20 Vdc	HP/Agilent 3456A
Leveling Head	Part of 11758T/U System (no substitute)	11758-60002
Leveling Head Cable	Part of 11758T/U System (no substitute)	11758-60021
Local Oscillator	Frequency: 3.5-6.5 GHz Output Power: > +4 dBm Harmonic/Sub Harmonic: < -20 dBc	HP/Agilent 8671B
Microwave Amplifier	Frequency: 3.5-6-5 GHz Power: > +13 dBm Gain: > 9 dBm Harmonic/Sub Harmonic < -20 dBc	HP/Agilent 11975A
Power Meter	Range: 1mW Transfer accuracy (input to output): 0.2%	HP/Agilent 432A
Power Meter		HP/Agilent 436A
Power Meter		HP/Agilent 437B
Power Sensor	Compatible with HP/Agilent 437B Range: -20 to +10dBm Frequency: 10 MHz to 18 GHz	HP/Agilent 8481A
Power Sensor	Compatible with HP/Agilent 437B Range: -20 to +10 dBm Frequency: 10 MHz to 18 GHz Impedence: 75Ω	HP/Agilent 8483A
Range Calibrator	No substitute	HP/Agilent 11683A
Spectrum Analyzer	Frequency: 0 - 22 GHz	HP/Agilent 8566B
Thermistor Mount	Compatible with HP/Agilent 432A SWR: 1.05 at 50 MHzAccuracy: ±0.5% at 50 MHz	HP/Agilent 478A H75[a] HP/Agilent 478A H76[a]

a. standard lab calibration at 50 MHz (traceable to NIST)

Post-Repair Adjustments/Calibrations

Table 1-2 lists the adjustments related to the repair or replacement of any assembly.

Table 1-2 Post-Repair Adjustments

Repaired Assembly	Adjustments
Power Meter Display	None
Power Meter Keyboard	None
Power Meter Central Processing Unit	All power meter performance tests All Power Meter Adjustments
Power Meter A4 Analog Assemblies	All power meter performance tests. All Power Meter Adjustments (Includes Ref Oscillator)
Power Meter 50 MHz Oscillator (Part offset Analog Assembly)	All power meter performance Reference tests.
3 Tone Source Assembly	All 3 Tone Source performance testa All3 Source adjustments
Any RF Source Assembly	All RF Source performance tests. All RF adjustments
Power Supply	None
Distribution Board Assembly	None
Any Multipath Fading Simulator Assembly	All calibration and performance tests as given in the Agilent Technologies 11757B Installation/ Calibration Guide

2 Performance Tests

The performance tests given in this section are designed to verify 11758T/U/V published specifications. All tests can be performed without access to the interior of the instrument. During any performance test, all shields and connecting hardware must be in place. Perform the tests in the order given.

Test Procedures

It is assumed that the person performing the following tests understands how to operate the specified test equipment. It is also assumed that the technician will select the proper power sensor, cables, adapters, and probes required for test setups illustrated in this section.

NOTE

If the performance tests are to be considered valid, the following conditions must be met:

- The 11758T/U/V must have one-half hour warm-up for all specifications.
- The line voltage for all instruments must be 115 or 230 Vac±10%; and the line frequency must be 50 to 60 Hz.
- The ambient temperature must be 0° to 55°C.

Performance Test Record

Results of the performance tests may be tabulated in Table 2-1, "Performance Test Record," on page 2-27. The Performance Test Record lists all of the performance test specifications and the acceptable limits for each specification. If performance test results are recorded during an incoming inspection of the instrument, they can be used for comparison during periodic maintenance or troubleshooting procedures. The test results may also prove useful in verifying proper adjustments after repairs are made.

Power Meter

The following performance tests are essentially the same as those provided in the HP/Agilent 437B Operating Manual with the exception that references to the Power Supply have been eliminated.

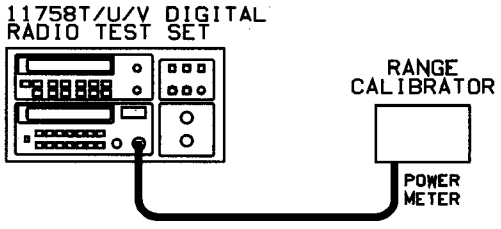
If the power meter does not meet performance specifications, attempt to adjust it using the adjustments in this guide. If the power meter will not adjust to specification refer to the 11758T/U/V Service Manual for disassembly, then to the HP/Agilent 437B Service Manual for troubleshooting information.

Zero Set Test

Electrical Characteristics	**Performance Limits**	**Conditions**
Accuracy: Zero set (Digital settability of zero)	±0.5% full scale	Most sensitive range. Decrease percentage by factor of 10 for each higher range ±1 count.

After the power meter is initially zeroed, the change in the digital readout is monitored as the power meter is stepped through its ranges. This test also checks drift and noise since drift, noise, and zero carryover readings cannot be separated.

Figure 2-1 Zero Carryover Test Setup



Equipment

Range Calibrator.....HP/Agilent 11683A

Power Sensor Cable.....HP/Agilent 11730A

Procedure

1. Press the power meter's LINE switch to ON.
2. Press **PRESET/LOCAL**.
3. Press **ENTER**.
4. Press **dBm/W** for a meter reading in watts.
5. Set the range calibrator as follows:

   RANGE.....3 μW

   FUNCTION.....STANDBY

   LINE.....ON
6. Press the power meter's **ZERO** key. Wait approximately 15 seconds for the `ZEROING****` display to disappear. Verify that the display reads `0.00` ±06 μW.
7. Press **SET RANGE.**
8. Press [▲]or [▼] until the display reads `RNG 1 -20dB`. Press **ENTER.**
9. Verify that the power meter's reading is within the limits shown in the table below. Record the reading.
10. Repeat steps 6 through 8 by entering RNG 2, RNG 3, RNG 4, and RNG 5.

Power Range	Min	Actual Results	Max
1	–0.05μW		0.5μW
2	–0.1μW		0.1μW
3	–0.00μW1		0.001mW
4	–0.01μW		0.01mW
5	–0.1μW		0.1mW

Instrument Accuracy Test

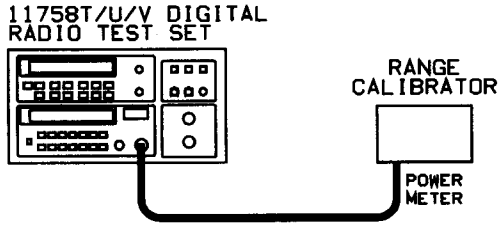
Electrical Characteristics	Performance Limits	Conditions
Accuracy: Instrumentation, includes sensor linearity.[a]	±0.5% or ±0.02 dB	Within same calibration range

a. When operating in ranges 4 or 5 add the corresponding sensor power linearity percentage.

Description

The power meter is initially calibrated on the 1 mW range. The readout is then monitored as the range calibrator is switched to provide reference inputs corresponding to each of the power meter operating ranges.

Figure 2-2 **Instrument Accuracy Test Setup**



f2_2

Equipment

Range Calibrator.....HP/Agilent 11683A

Power Sensor Cable.....HP/Agilent 11730A

Procedure

1. Connect the equipment as shown in Figure 2-2.
2. Press the power meter's LINE switch to ON.
3. Press **PRESET/LOCAL** then **ENTER**.
4. Press **dBm/W** for a meter reading in watts.

5. Set the range calibrator as follows:

   FUNCTION.....STANDBY

   POLARITY.....NORMAL

   RANGE.....3 μW

   LINE.....ON

NOTE When switching the range calibrator to STANDBY, allow enough time for the range calibrator to settle to its zero value before attempting to zero the power meter. This settling would appear on the power meter display as downward drift. When the drift has reached minimum, (typically less than 60 seconds), the range calibrator is settled.

6. Press the power meter's **ZERO** key. Wait approximately 15 seconds for the `ZEROING:*****` display to disappear. Verify that the display reads `0.00` ±0-05 μW.
7. Set the range calibrator's FUNCTION switch to CALIBRATE.
8. Set the range calibrator's RANGE switch to 1 μW.
9. Press the power meter's **CAL** key (**SHIFT, ZERO**)
10. If necessary, use [▲], [▼], [▶] or [◀] until REF CF 100% is displayed.
11. Press **ENTER**. The display will read `CAL***` for a few seconds.
12. Press the **CAL FREQ** (**SHIFT, FREQ**) key. If necessary, use arrows to modify the display to read `CALFAC 100%`.
13. Press the **ENTER** key.
14. Verify that the power meter display reads `1.000` ±0.001 mW.
15. Set the range calibrator's RANGE switch to the positions shown in the following table. For each setting, verify that the power meter's reading is within the limits shown.

Range Calibrator Setting	Min	Actual Results	Max
3 μW	3.10μW		3.23 μW
10 μW	9.90μW		10.10 μW
30 μW	31.4μW1		31.8 μW
100μW	99.5μW		100.5 mW
300 μW	0.314 mW		0.318 mW
1 mW	0.995 mW		1.005 mW
3 mW	31.4 mW		3.18 mW
10 mW	9.95 mW		10.5 mW
30 mW	31.4mW		31.8 mW

Range Calibrator Setting	Min	Actual Results	Max
100 mW	99.5 mW		100.5 mW

NOTE

It is not necessary to check instrument accuracy in dBm. The power meter uses the same internal circuitry to measure power and mathematically converts watts to dBm.

The Range Calibrator output level is adjustable in 5 dB increments. Thus, the 3 μW, 30 μW, 300 μW, 3 mW, and 30 mW legends on the RANGE switch are approximations. The true outputs for these settings are 3.16 μW, 31.6 μW, 316 μW, 3.16 mW, and 31.6 mW

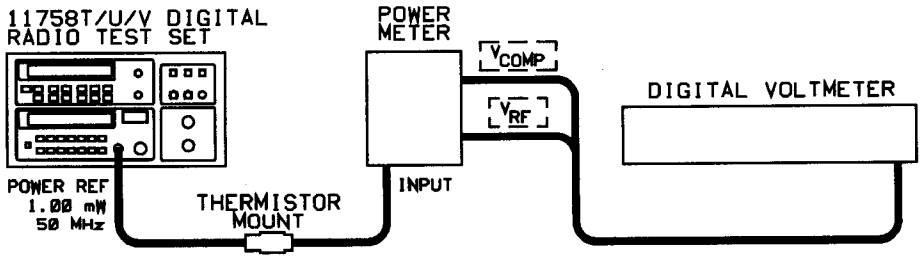
Power Reference Level Test

The power reference oscillator output is factory adjusted to 1 mW ±0.7%. To achieve this accuracy, Agilent Technologies employs a special measurement system accurate to 0.5%(traceable to the National Bureau of Standards and allows for a transfer error of ±0.2% in making the adjustment. If an equivalent measurement system is employed for verification, the power reference oscillator output can be verified to 1 mW ±1.9% (±1.2% accuracy plus ±0.5% verification system error plus ±0.2% transfer error=1.9% maximum error).

The power reference oscillator can be set to ±0.7% using the same equipment and following the adjustment procedure. To ensure maximum accuracy in verifying the power reference oscillator output, the following procedure provides step by step instructions for using specified Agilent Technologies test instruments of known capability. If equivalent test instruments are used, signal acquisition criteria may vary and reference should be made to the manufacturer's guidelines for operating the instruments.

Electrical Characteristics	**Performance Limits**	**Characteristics**
Power reference	1.0 mW	Internal 50 MHz oscillator factory set to ±0.7% traceable to National Bureau of Standards.
Power reference	±1.2%	Worst case.
Accuracy	±0.9%	RSS for one year.

Figure 2-3 Power Reference Level Test Setup



Equipment

Test Power Meter.....HP/Agilent 432A

Thermistor Mount.....HP/Agilent 478A Option H75 or H76

Digital Voltmeter (DVM).....HP/Agilent 3456A

Procedure

1. Set the DVM to measure resistance. Connect the DVM between the V_{rf} connector on the rear panel of the test power meter, and pin 1 on the thermistor mount end of the test power meter interconnect cable.
2. Round off the DVM indication to two decimal places and record this value as the internal bridge resistance (R) of the test power meter (approximately 200 Ω).

   R_____

3. Connect the test power meter to the power meter as shown in Figure 2-3.
4. Press the power meter's **LINE** switch to ON.
5. Press **PRESET/LOCAL** then ENTER.

NOTE Wait thirty minutes for the test power meter thermistor mount to stabilize before proceeding to the next step.

6. Set the test power meter RANGE switch to Coarse Zero. Adjust the front panel Course Zero control to obtain a zero meter indication.
7. Fine zero the test power meter on the most sensitive range, then set the RANGE switch to 1 mW.

NOTE Ensure that the DVM input leads are isolated from chassis ground when performing the next step.

8. Set the DVM to measure microvolts. Connect the positive and negative input leads, respectively, to the V_{comp} and V_{rf} connectors on

the rear panel of the test power meter.

9. Observe the reading on the DVM. If less than 400 microvolts, proceed to the next step. If 400 microvolts or greater, press and hold the test power meter Fine Zero switch and adjust the Coarse Zero control so that the DVM indicates 200 microvolts or less. Release the Fine Zero switch and proceed to the next step.

10. Round the DVM reading to the nearest microvolt. Record this reading as V_o.

V_o_____

11. On the power meter under test, press **PWR REF** (**SHIFT** ▶) to turn the power reference oscillator on.

12. Observe the reading on the DVM. Record the reading as V_1.

V_1_____

13. Disconnect the DVM negative input lead from the V_{rf} connector on the test power meter. Reconnect it to the test power meter chassis ground.

14. Observe the DVM reading. Record the reading as V_{comp}.

V_{comp}_____

15. Calculate the power reference oscillator output level (Prf) from the following formula:

$$Prf = \frac{2Vcomp(V_1 - V_0) + V_0^2 - V_1^2}{4R(Calibrationfactor)}$$

Where:

Prf = power reference oscillator output level

V_{comp} = previously recorded value

V_1 = previously recorded value

V_o = previously recorded value

R = previously recorded value

Calibration Factor = value for thermistor mount at 50 MHz (traceable to the National Bureau of Standards).

16. Verify that Prf is within the limits shown in the following table Record the reading

Min	Actual	Max
0.988 mW		1.012 mW

3 Tone Source Performance Tests

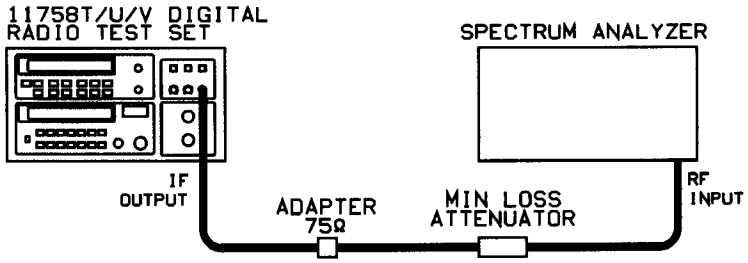
11758A/B 3 Tone Source frequency ranges, output level and distortion tests are measured. These tests may be performed manually or automatically.

If the 3 Tone Source fails the following performance tests, attempt adjustments in this manual. If attempts to adjust the 3 Tone Source fail, refer to the 11758T/U Service Guide for troubleshooting and repair.

3 Tone Source Adjustment Range

Each tone output from the 3 Tone Source is shifted in Frequency frequency using the 11758A/B's FREQUENCY knob. The amount of frequency shift is verified to be greater than 2.5 MHz This test is also valid for instruments containing the 137 MHz, 140 MHz, and 145 MHz tones. Simply change the settings on the spectrum analyzer and substitute 137 MHz for 67 MHz in the procedure.

Figure 2-4 Tone Source Frequency Range Test Setup



Equipment

Spectrum Analyzer.....HP/Agilent 8566B or equivalent

75Q BNC(f) to N(f) Adapter.....1250-1534

Minimum Loss Attenuator 75 Ω to 50 Ω... HP/Agilent 11852B

NOTE The HP/Agilent 8593A supplied with the 1758T/U system is acceptable for use in this measurement, provided that it has been calibrated within the recommended cycle.

Electrical Characteristics	Performance Limits	Conditions
3 Tone Source Frequency Adjust Range	± 2.5 MHz Minimum	

Procedure

1. Turn on the 11758T/U/V. Toggle the 3 Tone Source buttons until they are all lit.
2. Center the 11758T/U/V OFFSET FREQUENCY knob and TOTAL POWER OUT knob.
3. Connect the equipment as shown in Figure 2-4.
4. Place the Spectrum Analyzer MARKER on the 67 MHz (or 137 MHz) tone, and read the MARKER's frequency.
5. .Turn the 11758A/B's FREQUENCY knob fully clockwise. All three tones should increase in frequency.
6. Move the MARKER to the new location of the 67 MHz tone, and verify that the change in frequency is greater than 2.5 MHz.
7. Turn the FREQUENCY knob fully counterclockwise.
8. All three tones should decrease in frequency.
9. Again, move the MARKER to the new location of the 67 MHz tone. Verify that the change in frequency, from the value measured in step 2, is greater than 2.5 MHz.
10. Repeat steps 2 through 5 for both the 70 and 75 MHz tones (or 140 and 145 MHz tones).
11. Record your results:

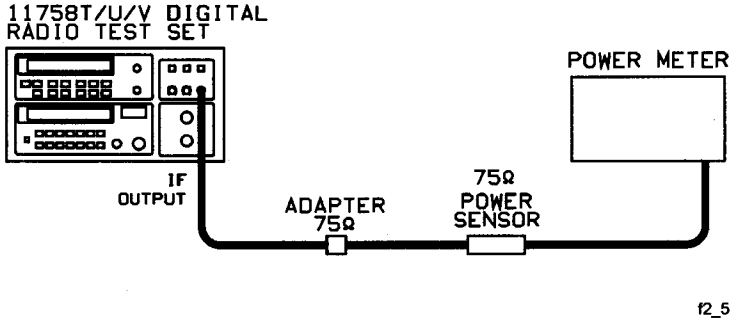
Center Frequency	Maximum Adjustments	Minimum Adjustments
67 MHz	_____MHz	_____MHz
70 MHz	_____MHz	_____MHz
75 MHz	_____MHz	_____MHz

Center Frequency	Maximum Adjustments	Minimum Adjustments
137 MHz	_____MHz	_____MHz
140 MHz	_____MHz	_____MHz
145 MHz	_____MHz	_____MHz

3 Tone Source Output Level Test

Using a Power Meter, the output power level of the 11758A/B 3 Tone Source is checked for each single tone output as well as for the sum of all three tones.

Figure 2-5 3 Tone Source Output Level Test Setup



Equipment

Power Meter.....HP/Agilent 437B or equivalent

75ΩAdapter, BNC(f) to N(f).....1250-1534

Power Sensor, 75Ω.....HP/Agilent 8483A

Electrical Characteristics	Performance Limits	Conditions
3 Tone Source Frequency Output Level	> –7 dBm	Per Tone
	> –2 dBm	All 3 tones

Procedure

1. Connect the equipment as shown in Figure 2-5.
2. Set the power meter in to following condition:
   a. **PRESET**
   b. Mode = dBm
   c. Cal Factor = As required
3. Set the 11758A/B to the following conditions:
   a. 67 MHz (or 137 MHz) Tone ON (annunciator will light)
   b. 70 MHz (or 140 MHz) Tone OFF (annunciator will be off)
   c. 75 MHz (or 145 MHz) Tone OFF (annunciator will be off)
   d. Frequency = CP (turn frequency knob to CF)

e. TOTAL POWER OUT (Rotate fully clockwise)

4. Read the power level of the 67 MHz tone from the power meter display. Record below:

   a. 67 MHz Tone Maximum Output Power:_____dBm

   b. 137 MHz Tone Maximum Output Power: _____dBm

5. Turn OFF the 67 MHz tone. Turn ON the 70 MHz

6. Read the power level of the 70 MHz tone from the power meter display. Record below:

   a. 70 MHz Tone Maximum Output Power: _____dBm

   b. 140 MHz Tone Maximum Output Power: _____dBm

7. Turn OFF the 70 MHz tone. Turn ON the 75 MHz tone.

8. Read the power level of the 75 MHz tone from the Power Meter display. Record below

   a. 75 MHz Tone Maximum Output Power:_____dBm

   b. 145 MHz Tone Maximum Output Power:_____dBm

9. Turn all three tones on. All three annunciators should be lit.

10. Read the power level of the three tones from the Power Meter display. Record below:

    a. 67,70,75 MHz Tone Maximum Output Power:_____dBm

    b. 137,140,145 MHz Tone Maximum Output Power:_____dBm

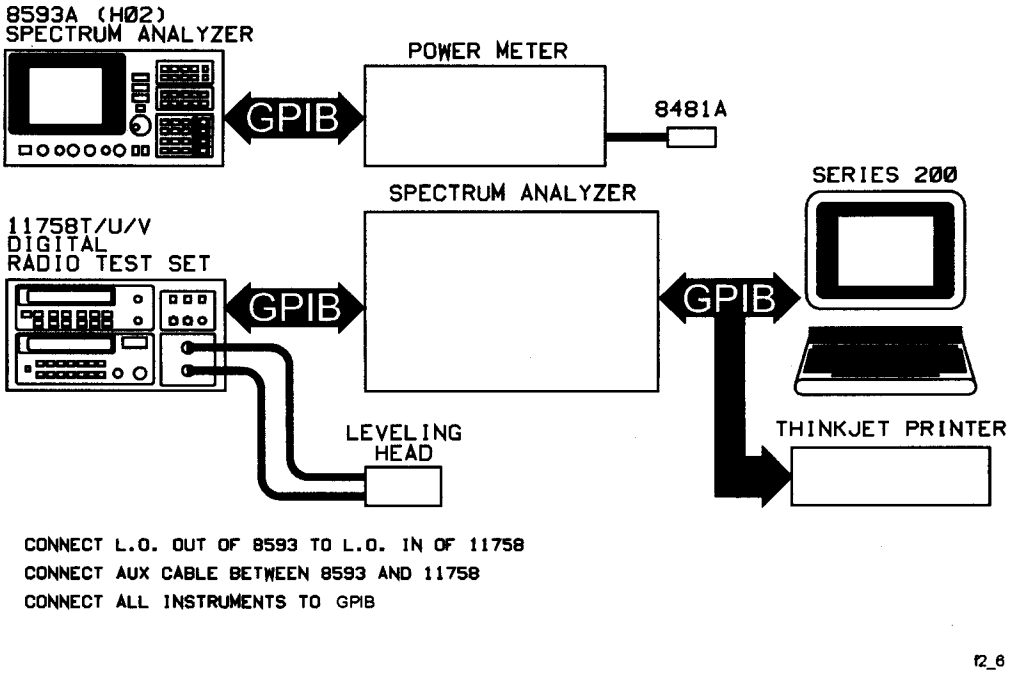
3 Tone Source Auto Performance Test

11758A/B 3 Tone Source frequency ranges, output level and distortion tests are measured. These tests may be performed manually or automatically.

Procedure

1. Insert HP/Agilent 11758A/B Support Disc.
2. Load "Test_11758".
3. Press **RUN.**
4. Enter Time and Date.
5. Enter serial number.
6. Enter comments.
7. Enter RFS Option.
8. Connect Equipment as shown in figure 2-6:

Figure 2-6 Tone Source and RF Source Auto Test Setup



9. Choose Test-05 from the main menu. This will run Test_06, Test_07 and Test_08.
10. Follow directions displayed on the computer screen.
11. When the testing is done, the main menu will be displayed and the test results will print.
12. Examine test results.
13. 3 Tone Source is working if all tests pass.
14. If any failures occur select Test_09, this will run an automatic calibration.
15. Follow directions on the computer screen.
16. When Test_09 is completed, rerun Test-05, if any failures occur, refer to the Adjustment Procedure Section to correct problem.
17. 3 Tone Source is working if all tests pass.

RF Source Performance Tests

1758A/B RF Source output level range, spurious signals, harmonics and sub harmonics are measured. These tests may be performed manually or automatically.

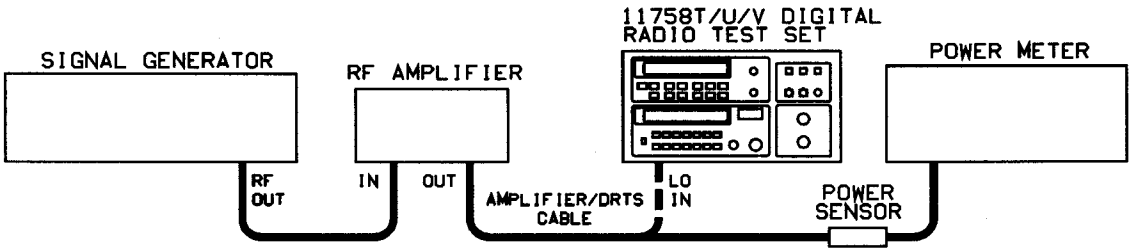
Preparation

If the 11758A/B fails these performance tests, attempt adjustments in this manual. If adjustments fail, refer to the 11758T/U Service Manual for troubleshooting and repair.

The setup described here is applicable to both the standard and Opt 011 11758A.

A Signal Generator and amplifier are used to provide the signal that the Digital Radio Test Set (DRTS) would expect from its companion instrument, the HP/Agilent 8593A Spectrum Analyzer.

Figure 2-7 RF Source Performance Tests Preparation



f2_7

Equipment

Power Meter.....HP/Agilent 437B or equivalent.

Power Sensor.....HP/Agilent 8481A.

Source.....HP/Agilent 8671B

RF Amplifier.....HP/Agilent 11975A

Spectrum Analyzer.....HP/Agilent 8566B

Leveling Head.....part number 11758-60002

Leveling Head Cable.....part number 11758-60021

Amplifier/DRTS Cable.....part number 8120-4948

Setup Process

1. Set up the equipment as shown in Figure 2-7, with the power sensor connected to the end of the Amplifier/DRTS cable.

2. Set the LO Output of the RF Source and Amplifier to +13 dBm. To do this:

   a. Set the Amplifier ALC to OFF.

   b. Set the Signal Generator to 4 GHz.

   c. Adjust the Signal Generator Power Level Output so that +13 dBm is observed on the power meter.

   d. Disconnect the Power Sensor and connect the Amplifier/DRTS cable to the LO INPUT on the 11758A/B rear panel.

3. Set the 11758A/B for direct control of the internal DACs. Press:

   SHIFT

   PRESET/LOCAL

   [▲] until **SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 09** is displayed

   ENTER

   [▲] until **VALUE 0001** is displayed

   Press **ENTER**

   The 11758A/B is now configured to control the RF Source from the Multipath Fading Simulator (MFS) front panel.

4. Set the 11758A/B to select the low band (3.5 to 6.5 GHz) Press:

   SHIFT

   PRESET/LOCAL

   [▲] until **SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 12** is displayed

   ENTER

   [▼] until **VALUE 0001** is displayed

   ENTER

   SHIFT

   PRESET/LOCAL

   [▲] until **SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 13** is displayed

ENTER

[▲] until **VALUE 0000** is displayed

ENTER

5. Set the to ON. Press:

SHIFT

PRESET/LOCAL

[▲] until **SERVICE** appears on the display.

ENTER

[▲] or [▼] until **I-BUS NUM 14** is displayed

ENTER

[▲] until **VALUE 0001** is displayed

Press **ENTER**

The RF Source is now ON. The front panel LED next to the RF Source connector should be lit.

RF Source Output Power Level Test

Electrical Characteristics	Performance Limits	Conditions
Frequency Range	3.7 to 6.5 GHz 10.7 to 11.7 GHz	Standard Test Set Option 011
Maximum Output Power Level Minimum Output Power Level	> +5 dBm < -15 dBm	

Description

The output power level of the 11758A/B is measured at the leveling head with a power meter.

Equipment

Power Meter.....HP/Agilent 437B or equivalent.

Power Sensor.....HP/Agilent 8481A.

Source.....HP/Agilent 8671B

RF Amplifier.....HP/Agilent 11975A

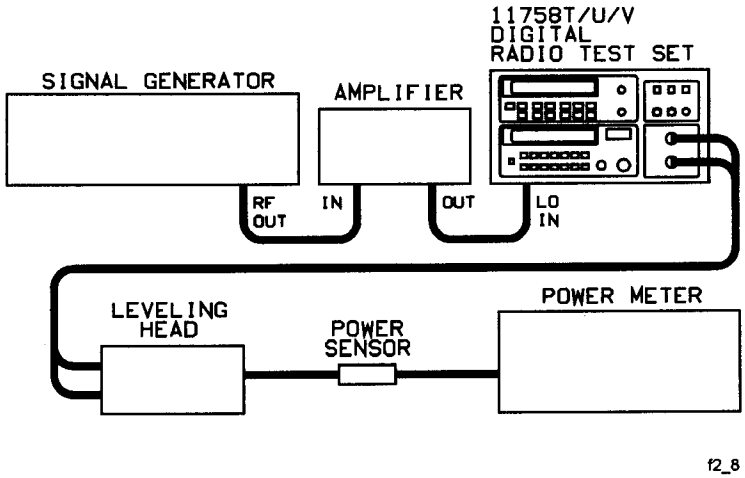
Spectrum Analyzer.....HP/Agilent 8566B

Leveling Head.....part number 11758-60002

Leveling Head Cable.....part number 11758-60021

Amplifier/DRTS Cable.....part number 8120-4948

Figure 2-8 RF Source Power Level Test Setup



Procedure

1. Set up equipment as shown in Figure 2-8.
2. Set the 11758A/B DAC value to 1023 (+5 dBM).

   SHIFT

   PRESET/LOCAL

   [▲] until **SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 11** is displayed

   ENTER

   [▲] until **VALUE 1023** is displayed
3. Measure the power level and record. At 4 GHz the measurement should be > +5 dBm.

   +5 dBm RF Power Test: _____dBm
4. Set the 11758A/B DAC value to 0000 (-15 dBM).

   Press [▲] or [▼] until **VALUE 0000** is displayed
5. Measure the power level and record. At 4 GHz the measurement should be <-15 dBm

   -15 dBm RF Power Test_____dBm

NOTE

These values are not specified. The factory adjusts the RF Source at -5 dBm (DAC setting 512). The formula for setting any value front 0 to 1023 is:

$$Value(DAC) = \frac{Power(dBm) + 16.5}{23}(1023)$$

Option 011 (only)

6. Set the frequency of the signal generator to 11 GHz.
7. Set the 11758A/B to select high band (10.7 to 11 GHz).

   SHIFT

   PRESET/LOCAL

   [▲] until **SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 12** is displayed

   ENTER

   [▲] until **VALUE 0000** is displayed

   ENTER

   SHIFT

   PRESET/LOCAL

   [▲] until **SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 13** is displayed

   ENTER

   [▲] until **VALUE 0001** is displayed

   ENTER

8. Repeat steps 2 through 5 and record the High Band power levels:

   +5 dBm RF Power Test (11 GHz)_____dBm

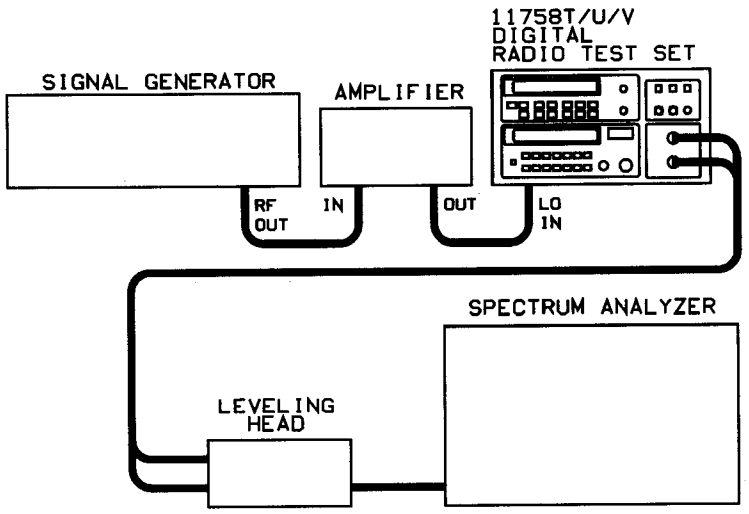
   -15 dBm RF Power Test (11 GHz)_____dBm

RF Source Spurious Signals, Harmonics and Sub Harmonics

Tests Spurious Signals, Harmonics and Sub Harmonics are tested with a spectrum analyzer over the frequency range of 3.5 to 6.5 GHz. For 11758A/B Option 011 continue the procedure for the frequency range of 10.7 to 11.7 GHz.

Electrical Characteristics	Performance Limits	Conditions
Frequency Range	3.5 to 6.5 GHz 10.7 to 11.7 GHz	Standard Test Set Option 011
Spurious Signals	< -64 dBc	3.5 to 6.5 GHz, > 30 kHz from CW signal
Option 011	<-64+2OLog(2) dBc	10.7 to 11.7 GHz
Harmonics and Sub-harmonics	< -40 dBc	

Figure 2-9 RF Source Spurious, Harmonics, and Sub Harmonics Setup



f2_9

Equipment

Source..... HP/Agilent 8671B

RF Amplifier.....HP/Agilent 11975A.

Spectrum Analyzer.....HP/Agilent 8566B

Leveling Head.....part number 11758-60002

Leveling Head Cable.....part number 11758-60021

Cable.....part number 8120-4948

Procedure

1. Set up the equipment as shown in Figure 2-9.
2. Set the Signal Generator frequency to 3.5 GHz.
3. Set the 11758A/B to select the low band (3.5 to 6.5 GHz). Press:

   SHIFT

   PRESET/LOCAL

   [▲] until **SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 12** is displayed

   ENTER

   [▼] until **VALUE 0001** is displayed

   ENTER

   SHIFT

   PRESET/LOCAL

   [▲] until **SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 13** is displayed

   ENTER

   [▲] until **VALUE 0000** is displayed

   ENTER

4. Set the 11758A/B DAC value to 958 +5 dBm).

   SHIFT

   PRESET/LOCAL

   [▲] until **SERVICE** appears on the display.

   [▲] or [▼] until **I-BUS NUM 11** is displayed

   ENTER

   [▲] until **VALUE 0958** is displayed

Spurious Signals Level Test

1. Set the signal generator to 3.5 GHz.
2. Set the Spectrum Analyzer to the following:
   a. **PRESET**
   b. **REFERENCE LEVEL**

c. **SPAN** to 0.5 MHz

d. **RES BW** to 3 kHz

e. **VBW** to 100 kHz

f. **CENTER FREQUENCY** to 3.5 GHz

3. Take a reference at 3.5 GHz. PK SEARCH, MKR REF LVL. This will place the peak at 3.5 GHz signal at the top tragically.
4. Place the marker on the greatest spurious signal that appears between the center of frequency and ±140 kHz away from the fundamental. This Spurious signal should be < -64 dBc from the top graticule line. Record the reading below.
5. Repeat steps 5 through 8 for 4.5, 5.5, and 6.5 GHz.

3.5 GHz Spurious Level:_____< -64 dBc

4.5 GHz Spurious Level:_____< -64 dBc

5.5 GHz Spurious Level:_____< -64 dBc

6.5 GHz Spurious Level:_____< -64 dBc

Harmonic Level Test

1. Set the Signal Generator to 3.5 GHz.
2. Set the Spectrum Analyzer to the following:

   a. **START FREQ** to 2 GHz

   b. **STOP FREQ** to 22 GHz

   c. **REFERENCE LEVEL** to +10 dBm

   d. **SPAN** to 500 KHz

   e. **VBW** to 300 Hz

   f. **RES BW** to 10 kHz

   g. **CENTER FREQ** to 3.5 GHz

   h. **CF STEP SIZE** to 200 MHz

3. Obtain a reference at 3.5 GHz. (Press **PK SEARCH, MKR REF LVL**).
4. Set Spectrum Analyzer **CENTER FREQ** to 7.0 GHz. The second harmonic of the 3.5 GHz signal should be visible.
5. If possible, set the signal generator to increase in frequency in 100 MHz steps.
6. As you increase the frequency of the signal generator to 6.5 GHz by 100 MHz steps, increase the frequency on the Spectrum Analyzer by 200 MHz steps.

NOTE This will allow you to monitor the second harmonic level on the spectrum analyzer display. For example, at a fundamental signal of 3.5 GHz on the signal generator you will monitor the 7.0 GHz second harmonic on the spectrum analyzer; at 3.6 GHz you will monitor 7.2 Ghz at 3.7 GHz you will monitor 7.4 GHz; and so on until you reach a fundamental of 6.5 GHz.

All second harmonics should be < –40 dBc. Record the greatest harmonic frequency, its fundamental frequency and the level in dBc of the harmonic.

Greatest Harmonic: _____GHz

Fundamental: _____GHz

Level: _____< -40 dBc

Sub-Harmonics

1. Return the signal generator frequency to 3.5 GHz.
2. Set the Spectrum Analyzer to the following:
   a. **0 - 2.5 GHz**
   b. **CENTER FREQ** to 3.5 GHz.
   c. **REFERENCE LEVEL** to +10 dBm
   d. **SPAN** to 500 kHz.
   e. **VBW** to 300 kHz.
   f. **RES BW** to 10 kHz.
   g. **CF STEP SIZE** to 50 MHz.
3. Obtain a reference at 3.5 GHz. (Press PK **SEARCH, MKR REF LVL**
4. Set Spectrum Analyzer **CENTER FREQ** to 1.75 GHz. (Second subharmonics of the fundamental signals may not be visible.)
5. If possible, set the signal generator to increase in frequency in 100 MHz steps.
6. As you increase the frequency of the signal generator to 6.5 GHz by 100 MHz steps, increase the frequency on the Spectrum Analyzer by 50 MHz steps.

NOTE This will allow you to monitor the second subharmonic level on the spectrum analyzer display. For example, at a fundamental signal of 3.5 GHz on the signal generator you will monitor the 1.75 GHz subharmonic on the spectrum analyzer; at 3.6 GHz you will monitor 1.8 Ghz; at 3.7 GHz you will monitor 1.85 GHz; and so on until you reach a fundamental of 6.5 GHz.

All subharmonics should be <-40 dBc. Record the greatest harmonic frequency, its fundamental frequency and the level in dBc of the harmonic.

Greatest Subharmonic: _____GHz

Fundamental: _____GHz

Level: _____< -40 dBc

Option 011(only)

1. Set the signal generator frequency to 10.7 GHz.
2. Set the 11758A/B to select high band (10.7 to 11.7 GHz).
   a. **SHIFT**
   b. **PRESET/LOCAL**
   c. [▲] until **11 SERVICE** appears on the display.
   d. **ENTER**
   e. [▲] or [▼] until **I-BUS NUM 12** is displayed
   f. **ENTER**
   g. [▲] until **VALUE 0000** is displayed
   h. **ENTER**
   i. **SHIFT**
   j. **PRESET/LOCAL**
   k. [▲] until **SERVICE** appears on the display.
   l. **ENTER**
   m. [▲] or [▼] until **I-BUS NUM 13** is displayed
   n. **ENTER**
   o. [▲] until **VALUE 0001** is displayed
   p. **ENTER**
3. Conduct the spurious signals, harmonic and sub-harmonic tests for 10.7 to 11.7 GHz in the same manner as described for 3.475 to 6.475 GHz, above.

10.7 GHz Spurious Level_____< -64

11.7 GHz Spurious Level_____< -64

Greatest Harmonic: _____GHz

Fundamental: _____GHz

Level: _____< -40 dBc

Greatest Subharmonic: _____GHz

Fundamental: _____GHz

Level: _____< -40 dBc

RF Source Auto Performance Test

11758A/B RF Source output level range, spurious signals, harmonics and sub harmonics are measured.These tests may be performed manually or automatically.

Procedure

1. Insert 11758A/B Support Disc.
2. Load "Test-11758".
3. Press **RUN**.
4. Enter Time and Date.
5. Enter serial number.
6. Enter comments.
7. Enter RFS Option.
8. Connect Equipment as shown in figure 2-10:

Figure 2-10 Tone Source and RF Source Auto Test Setup

9. Choose Test-01 from the main menu. This will run Test-02, Test-03, and Test-04.
10. Follow directions displayed on the computer screen.
11. When the testing is done, the main menu will be displayed and the test results will print.
12. Examine test results, if any failures occur, refer to the Adjustment Procedure Section to run calibration.
13. RF Source is working if all tests pass

Table 2-1 Performance Test Record

Agilent Technologies
Model 11758A/B
Digital Radio test Set
Serial Number

Tested by_____
Temperature/Humidity_____
Date_____

Test	Minimum Result	Actual Result	Maximum Result
Power Meter Zero Carryover			
Power Meter Range			
1	–0.05 µW		0.05 µW
2	–0.1 µW		0.1µW
3	–0.001 mW		0.001mW
4	–0.01 mW		0.01 mW
5	–0.1mW		0.1 mW
Power Meter Accuracy			
3	3.10 µW		3.23 µW
10	9.90 µW		10.10 µW
30	31.4 µW		31.8 µW
100	99.5 µW		100.5 µW
300	0.314 mW		0.318 mW
1 mW	0.995mW		1.005 mW
3 mW	3.14mW		3.18 mW
10 mW	9.95mW		10.5 mW
30 mW	31.4 mW		31.8 mW
100 mW	99.5 mW		100.5 mW
Power Meter Power Reference			
Prf	0.988 mW		1.012 mW

Multipath Fader Performance Tests using DLP & 8753

The Multipath Fader performance tests and adjustments are contained in the 11757B Installation and Calibration Guide 11757-90030.

Procedure

1. Follow the instructions for loading the Modes on page 2-10 of the Operating Manual (11758-90034, steps 1 thru 16).
2. Press **Mode Loader**
3. 10 **Enter**
4. Proceed when the Please Wait.... message disappears.
5. Press **Fader Cal**
6. Follow the directions on the computer screen.
7. Tests require approximately 45 min (STD & Opt 140) 90 min (Opt 140).
8. Rerun Multipath Fading Simulator Check (11758-90022).

NOTE This Performance Test is not as accurate as the one found in the Installation and Calibration Guide (11757-90030)

Test	Mimimum Result	Actual Result	Mazimum Result
3 Tone Source Freq Adj Range			
Center Frequency			
67 MHz	-2.5 MHz		+2.5 MHz
70 MHz	-2.5 MHz		+2.5 MHz
75 MHz	-2.5 MHz		+2.5 MHz
137 MHz	-2.5 MHz		+2.5 MHz
140 MHz	-2.5 MHz		+2.5 MHz
145 MHz	-2.5 MHz		+2.5 MHz
3 Tone Source Output Level Test			
67, 70, 75 MHz Single Tone ON Test	-7.1 dBm <		
3 Tones ON Test	-2.1 dBm <		
137 140 145 MHz Single Tone ON Test	-7.1 dBm <		
3 Tones ON Test	-2.1 dBm <		
RF Source Output Power Level Test			
+5 dBm RF Power Test (4 GHz)	+5 dBm <		
-15 dBm RF Power Test (4 GHz)	-15 dBm <		
+5 dBm RF Power Test (11 GHz)	+5 dBm <		
-15 dBm RF Power Test (11 GHz)	-15 dBm <		
RF Source Spurious Level Test			
3.475 GHz Spurious Level:	-64 dBc >		
4.5 GHz Spurious Level:	-64 dBc >		
5.5 GHz Spurious Level:	-64 dBc >		
6.475 GHz Spurious Level:	64 dBc >		
Option 011			
10.7 GHz Spurious Level:	64 dBc >		
11.7 GHz Spurious Level:	-64 dBc >		
RF Source Harmonies			
Greatest Harmonic (3.475 - 6.475 GHz):			
Fundamental:			
Level:	-40 dBc >		
Greatest Harmonic (10.7 - 11.7 GHz):			
Fundamental:			
Level:	40 dBc >		
Multipath Fading Simulator	Pass		

3 Adjustments

This chapter contains the adjustment procedures for the 11758A/B and 11758B Digital Radio Test Sets. Adjustments are not required on any fixed periodic basis. Performance tests should be completed after any repairs that may have altered the characteristics of the instrument. The test results will make it possible to determine whether or not adjustments are required.

Safety Considerations

This section contains a warning that must be followed for your protection and to avoid damage to the equipment being used.

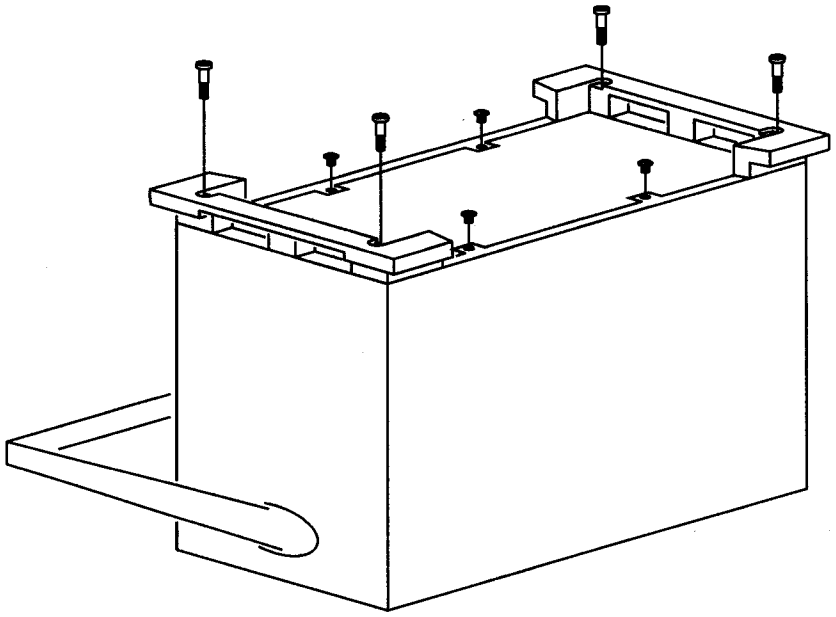
WARNING Adjustments described in this section are performed with power applied to the instrument and with the protective cover removed. Adjustments should be performed only by trained personnel who are aware of the hazards involved. When the adjustment procedure can be performed without power, the power should be removed.

HP/Agilent 437B Adjustments

This section contains adjustments that ensure proper performance of the Power Meter. Allow 30 minutes for the Power Meter to warm up, and then remove the 11758T/U/V cover, for access to the test and adjustment points.

To determine which performance tests and adjustments to perform after a repair, refer to Table 1-2 Post-Repair Adjustments.

Figure 3-1 **11758U Cover Removal**



f3_1

Equipment Required

Most of the adjustment procedures include a list of recommended test equipment. The test equipment is also identified on the test setup diagrams.

If substitutions must be made, the equipment used must meet the critical specification in Table 1-1.

NOTE Make adjustments only in the order specified.

Power Meter 220 Hz Frequency Adjustment

The 220 Hz is adjusted for maximum Power Meter readout.

Figure 3-2 **220 MHz Adjustment Setup**

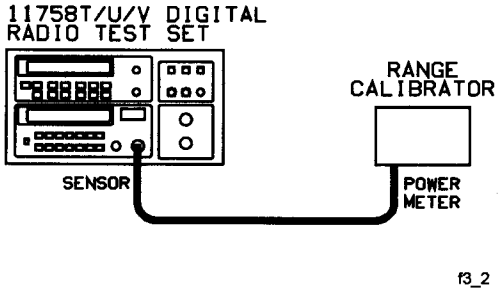
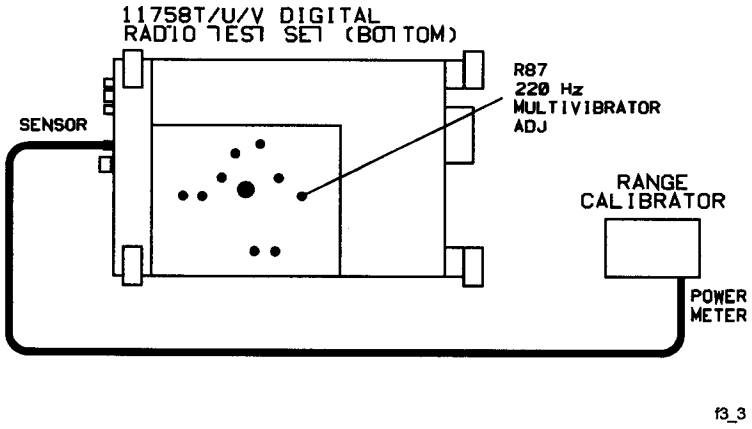


Figure 3-3 **220 MHz Adjustment Location(s)**



Equipment:

Range Calibrator.....HP/Agilent 11683A

Procedure

1. Turn on both the Power Meter and the range calibrator. Set the range calibrator controls as follows:

   LINE.....ON

   RANGE.....1 mW

   FUNCTION.....STANDBY

   POLARITY.....NORMAL

2. Connect the range calibrator to the Power Meter as shown in Figure 3-2.
3. Press the **PRESET/LOCAL** key, then the **ENTER** key.
4. Press the **ZERO** key on the Power Meter, and allow time (5 to 15 seconds) for the Power Meter zeroing routine to finish.
5. Set the range calibrator's **FUNCTION** switch to **CALIBRATE**.

6. Press the Power Meter's **CAL**, (**SHIFT ZERO**) key.
7. Using [▲], [▼], [▲], or [▼], modify the REF CF to read 100.0%.
8. Press the **ENTER** key.
9. Adjust A4R87 (FREQ) for the maximum front panel reading.

Range 4 and 5 Shaper Adjust

Range 4 and 5 Shaper circuits are adjusted for proper gain.

Figure 3-4 **Range 4 and 5 Shaper Adjustment Setup**

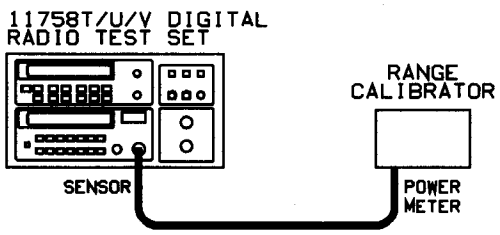
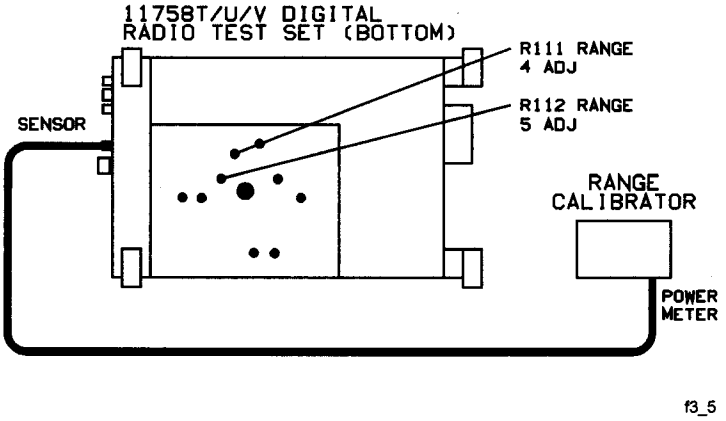


Figure 3-5 **Range 4 and 5 Shaper Adjustment Locations**



Equipment

Range Calibrator.....HP/Agilent 11683A

Procedure

1. Connect range calibrator to the Power Meter as shown in Figure 3-4.

2. Set the range calibrator controls as follows:

   LINE.....ON

   RANGE.....1 mW

   FUNCTION.....STANDBY

   POLARITY.....NORMAL

3. Press the Power Meter's **LINE** switch to ON.
4. Press the **PRESET/LOCAL** key, then the **ENTER** key.
5. Press the **ZERO** key, and allow time (5-15 seconds) for the zeroing routine to finish.
6. Set the range calibrator's **FUNCTION** switch to **CALIBRATE**.
7. Press the Power Meter's **CAL**, (**SHIFT ZERO**) key.
8. Using [▲], [▼], [▶] or [◀], modify the REF CF to read 100.0%.
9. Press the **ENTER** key.
10. Set the range calibrator's **RANGE** to 10 mW.
11. Adjust R111 (RNG 4 SHP) for a reading of 10.00 ±0.01 mW on the Power Meter display.
12. Set the range calibrator's **RANGE** to 100 mW.
13. Adjust R112 (RNG 5 SHP) for a reading of 100.0 ±0.1 mW on the Power Meter display.
14. Repeat steps 10 through 13 to check that interaction between steps has not caused a shift in settings.

Power Meter 50 MHz Ref Frequency Adjust

Variable inductor L5 is adjusted to set the power reference oscillator output frequency to 50.0 MHz ± 0.5 MHz.

Figure 3-6 **50 MHz Ref Frequency Adjustment Setup**

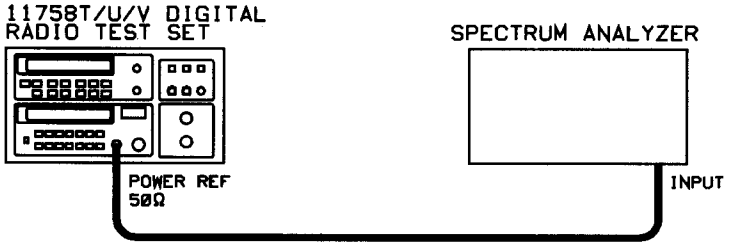
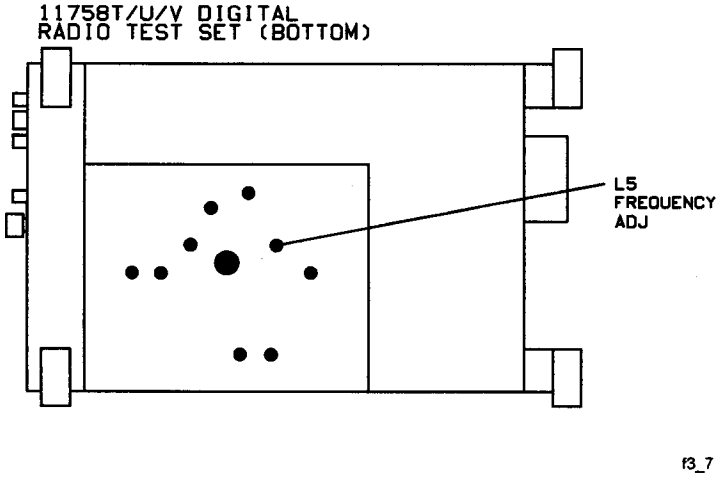


Figure 3-7 **50 MHz Ref Frequency Adjustment Locations**



Equipment

Spectrum Analyzer.....HP/Agilent 8566B

Procedure

NOTE Adjustment of the Power Reference Oscillator frequency may also affect the output level of the oscillator. Thus, after the frequency is adjusted to 50.0 ±0.5 MHz, the output level should be checked as described in the Power Meter Performance Tests in this manual.

1. Connect the equipment as shown in Figure 3-6.
2. Set up the spectrum analyzer to measure frequency.
3. Set the Power Meter **LINE** switch to ON.
4. Press the **PRESET/LOCAL** key, then the **ENTER** key.
5. Press the **PWR REF** (**SHIFT** ▶) key.
6. Observe the indication on the spectrum analyzer. If it is 50.0 ±0.5 MHz, no adjustment of the power reference oscillator frequency is necessary. If it is not within these limits, adjust the power reference oscillator frequency as described in steps 6 and 7.
7. Remove the 11758T/U cover.
8. Adjust L5 (FREQ) to obtain a 50.00 ±0.5 MHz indication on the spectrum analyzer.

50 MHz Reference Oscillator Power Adjustment

The power reference oscillator is factory-adjusted to 1.0 mW ±0.7% using a special measurement system accurate to 0.5% traceable to the National Bureau of Standards and allowing for a 0.2% transfer error. To

ensure maximum accuracy in readjusting the power reference oscillator, the following procedure provides step-by-step instructions for using specified Agilent Technologies instruments of known capability. If equivalent instruments are used, signal acquisition criteria may vary and reference should be made to the manufacturer's guidelines for operating the equipment.

NOTE The 11758T/U may be returned to the nearest Agilent Technologies office to have the power reference oscillator checked and/or adjusted.

Figure 3-8 50 MHz Ref Level Adjustment Setup

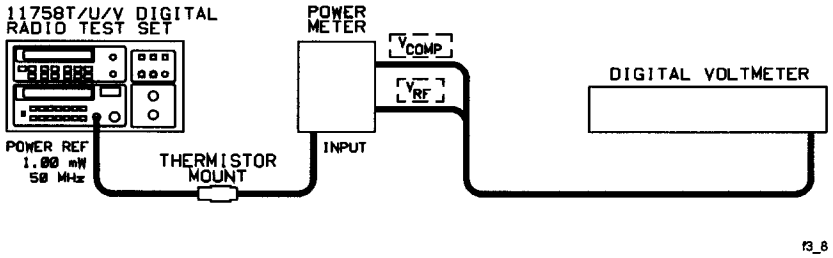
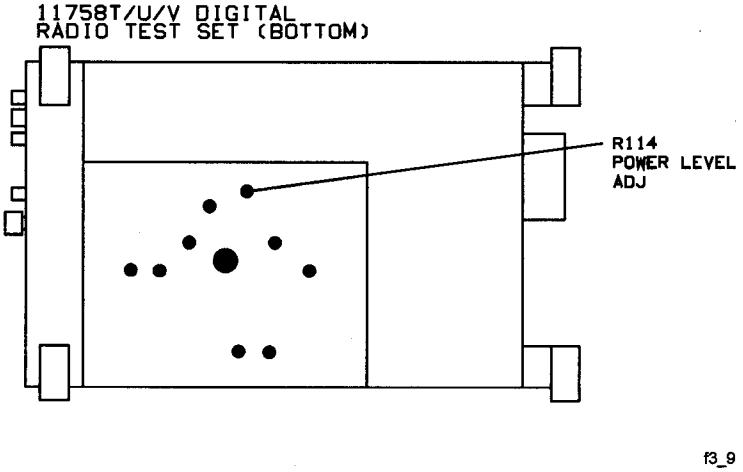


Figure 3-9 50 MHz Ref Level Adjustment Locations



Equipment

Test Power Meter.....HP/Agilent 432A

Thermistor Mount.....HP/Agilent 478A-H75

Digital Voltmeter (DVM).....HP/Agilent 3456A

Procedure

1. Set up the DVM to measure resistance. Connect the DVM between the V_{rf} connector on the rear panel of the test power meter and pin 1 on the thermistor mount end of the test power meter interconnect

cable.

2. Round off the DVM indication to two decimal places and record this value as the internal bridge resistance (R) of the test power meter (approximately 200 Ω).

   R (Internal Bridge Resistance)

   _____

3. Connect the test power meter to the Power Meter as shown in Figure 3-8.
4. Set the Power Meter **LINE** switch to ON. Ensure that the **PWR REF** is off. Wait thirty minutes for the test power meter thermistor mount to stabilize before proceeding to the next step.
5. Set the test power meter range switch to coarse zero and adjust the front panel coarse zero control to obtain a zero meter indication.
6. Fine zero the test power meter on the most sensitive range, then set the power meter range switch to 1 mW.

NOTE Ensure that the DVM input leads are isolated from chassis ground when performing the next step.

7. Set up the DVM to measure microvolts.
8. Connect the positive and negative input leads, respectively, to the V_{comp} and V_{rf} connectors on the rear panel of the test power meter.
9. Observe the indication on the DVM. If less than 400 microvolts, proceed with the next step. If 400 microvolts or greater, press and hold the test power meter fine zero switch and adjust the coarse zero control so that the DVM indicates 200 Microvolts or less. Then release the fine zero switch and proceed to the next step.
10. Round off the DVM indication to the nearest microvolt and record this value as V_0.

    V_0_____

11. Disconnect the DVM negative input lead from the V_{rf} connector on the test power meter and reconnect it to chassis ground.
12. Press the **PWR REF** (**SHIFT**, ▶) key to turn the reference oscillator on.
13. Record the indication observed on the DVM as V_{comp}.

    V_{comp}_____

14. Disconnect the DVM negative input lead fro chassis ground and reconnect it to the V_{rf} co on the rear panel of the test power meter. T is now set up to measure V_1, which represent power reference oscillator output level.

15. Calculate the value of V_1, equal to 1 mW from the following equation:

$$V_1 = V_{COMP} + V_0 - \sqrt{(V_{COMP})^2 - (10^{-3})(4R)(EffectiveeEfficiency)}$$

Where:

V_0 = previously recorded value

V_{comp} = previously recorded value

10^{-3} = 1 milliwatt

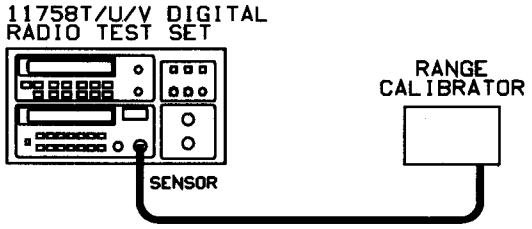
R = previously recorded value

16. Remove the 11758T/U cover and adjust R114 (LEVEL) until the DVM indicates the calculated value of VI.

Power Meter Analog Meter Adjustment

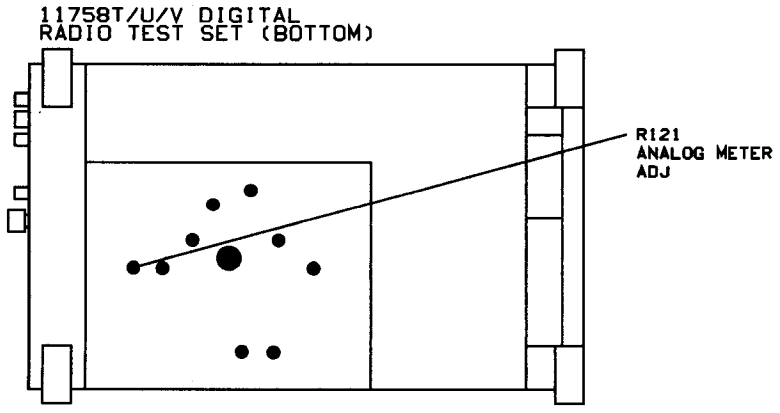
Manual adjustment.

Figure 3-10 Analog Meter Adjustment Locations



f3_10

Figure 3-11 Analog meter Adjustment Locations



f3_11

Equipment

Range Calibrator ..... HP/Agilent 11683A

Procedure

1. Set up the equipment as shown in Figure 3-10.
2. Set the range calibrator **FUNCTION** switch to CALIBRATE. Set the RANGE dial to 1 mW.
3. While observing the 11758A/B front panel, adjust R121 (as shown in Figure 3-11) so that the analog meter needle is positioned between the two right farthest lines

3 Tone Source Adjustments

Figure 3-12 Remove 6 Screws for Adjustment Access

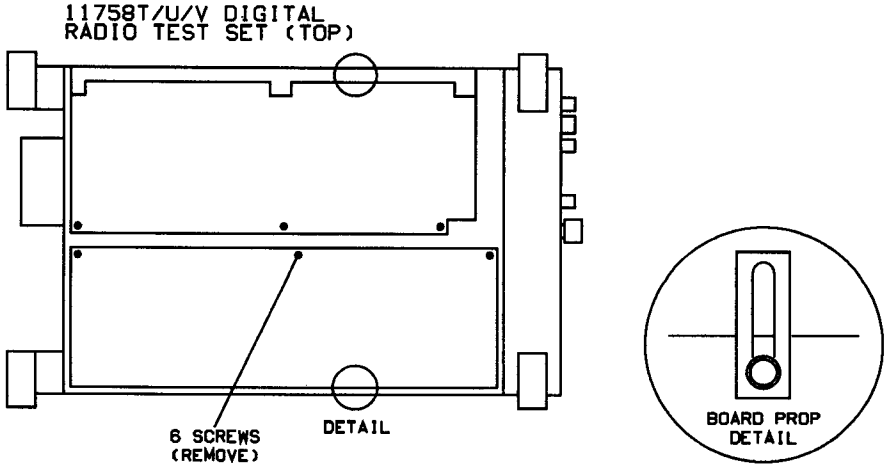


Figure 3-12 shows the 6 screws that must be removed to place the DRTS into the adjustment access position. To use the board prop, place the board upright on its hinge, loosen the board prop screw, move the prop to its highest position, then tighten the board prop screw.

OFFSET FREQUENCY Knob Zero Adjustment

A Voltmeter is used to align the DRTS off'set frequency knob pointer to zero.Figure 3-13. OFFSET FREQUENCY Knob Midrange Adjustment Setup

Figure 3-13 OFFSET FREQUENCY Knob Midrange Adjustment Locations

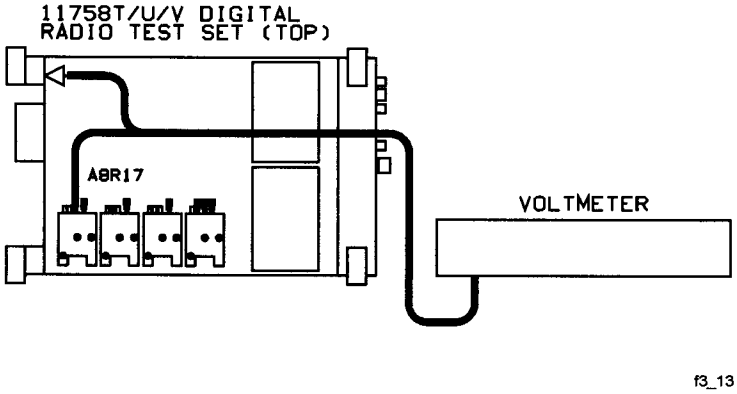
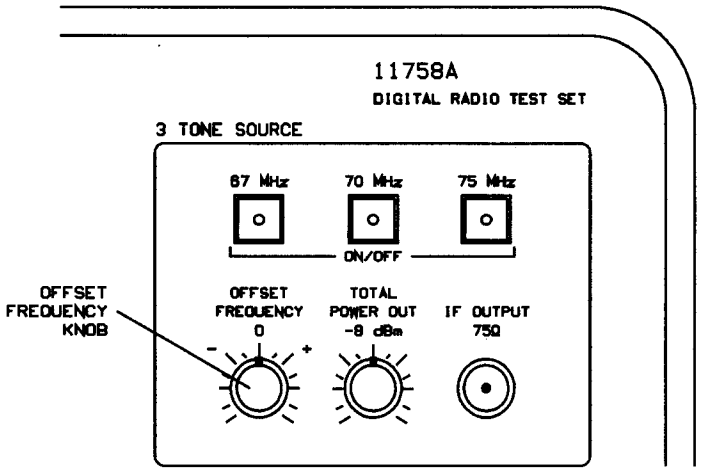


Figure 3-14 OFFSET FREQUENCY Knob Midrange Adjustment Setup



Equipment

Voltmeter..... HP/Agilent 3456A

Hex Driver.....0.5 mm

Procedure

1. Attach the voltmeter to A8R17, as shown in Figure 3-13. Proceeding from the rear of the instrument to the front, A8R17 is the third component visibly protruding from the metal shield.
2. Rotate the OFFSET FREQUENCY tuning knob until the pointer is on the center (zero) line.
3. If the voltmeter reads 6V ±.1 Vdc no adjustment is needed.
4. If the voltmeter reading is less than 5.9 Vdc or greater than 6.1 Vdc remove the OFFSET FREQUENCY knob by removing the insert hex nuts and pulling the knob away from the tuning shaft.
5. Turn the metal tuning shaft pin with your fingers until the voltmeter reads 6V ±.1 Vdc.
6. Carefully slide the OFFSET FREQUENCY knob back onto the tuning shaft so that the pointer is on the center (zero) line.
7. If you slide the OFFSET FREQUENCY knob onto the tuning shaft too far, it could scratch the front panel. The base of the knob should be about 1 to 2 mm from the front panel.

NOTE If you slide the OFFSET FREQUENCY knob onto the tuning shaft too far, it could scratch the front panel. The base of the knob should be about 1 to 2 mm from the front panel.

8. Make sure voltmeter reading remained unchanged and the OFFSET FREQUENCY knob pointer is still on the zero line, re-adjust if necessary, then tighten the hex nuts.

Tone Frequency Adjustments

A spectrum analyzer is used to adjust the 67 MHz, 70 MHz, and 75 MHz or the 137 MHz, 140 MHz, and 145 MHz tones.

Figure 3-15 **3 Tone Source Frequency Adjustment Locations**

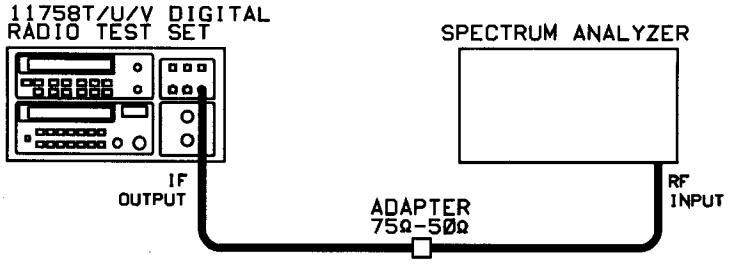
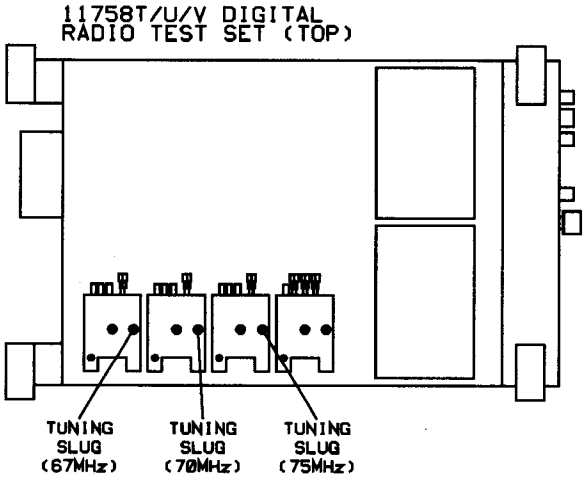


Figure 3-16 **3 Tone Source Frequency Adjustment Locations**



Equipment

Spectrum Analyzer..... HP/Agilent 8566A

75 Ω BNC to TypeN Adaptor.....1250-1534

50 Ω to 75 Ω Minimum Loss Pad.....HP/Agilent 11852A

Procedure

1. Set up the equipment as shown in Figure 3-15.
2. On the Spectrum Analyzer press:

   PRESET

   Center Frequency = 67 MHz (or 137 MHz)

   Frequency Span = 2 MHz
3. On the DRTS front panel, turn on all three tones. The annunciator lights should all be ON.
4. Refer to Figure 3-16 to find the 67 MHz (or 137 MHz) oscillator tuning slug.
5. Adjust the 67 MHz (or 137 MHz) tuning slug until the 67 MHz (or 137 MHz) signal is centered in the Spectrum Analyzer display within ± 50 KHz.
6. Set the Spectrum Analyzer center frequency to 70 MHz (or 140 MHz).
7. Refer to Figure 3-16 to find the 70 MHz (or 140 MHz) oscillator tuning slug.
8. Adjust the 70 MHz (or 140 MHz) tuning slug until the 70 MHz (or 140 MHz) signal is centered in the Spectrum Analyzer display within ± 50 KHz.
9. Set the Spectrum Analyzer center frequency to 75 MHz (or 145 MHz).
10. Refer to Figure 3-16 to find the 75 MHz (or 145 MHz) oscillator tuning slug.
11. Adjust the 75 MHz (or 145 MHz) tuning slug until the 75 MHz (or 145 MHz) signal is centered in the Spectrum Analyzer display within ± 50 KHz.

3 Tone Source Leveling Loop Adjustment

CAUTION

The 3 Tone Source leveling loop is adjusted by adjusting A8R37 to -11V for standard (37,40 and 45 MHz) units and to -3V for Option 143 (137, 140 and 145 MHz) units.

Turn OFF the 11758A before removing shield cover to access TP6. A hole is provided in the shield cover in some units, making it unnecessary to remove the cover to access TP6.

Figure 3-17 **3 Tone Source Leveling Loop Adjustment Setup**

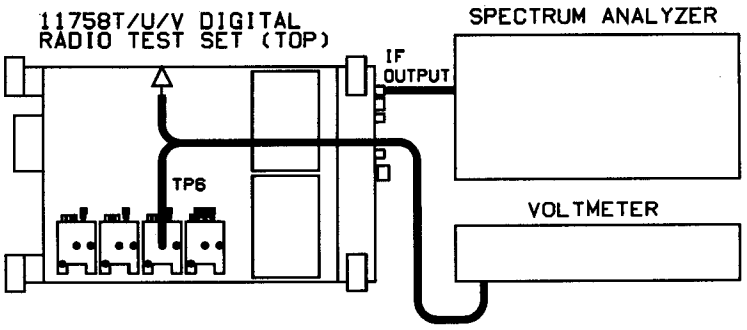
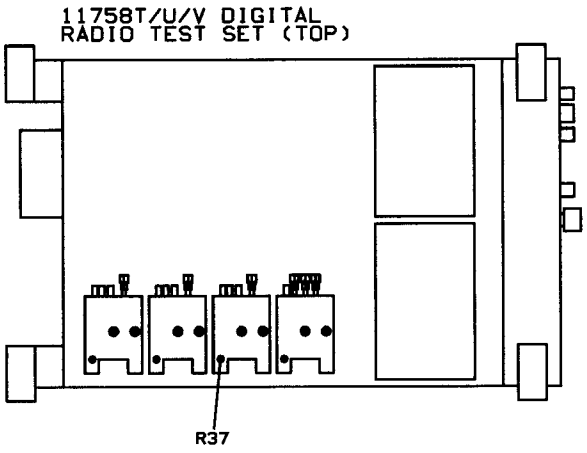


Figure 3-18 **3 Tone Source Leveling Loop Adjustment Locations**



Equipment

Spectrum Analyzer.....HP/Agilent 8566B

50 Ω to 75 Ω Adapter.....HP/Agilent 11852B

Voltmeter.....HP/Agilent 3456A

Procedure

1. Setup the test equipment as shown in Figure 3-17. Attach voltmeter to TP 6.
2. Turn ON the 75 MHz (or 145 MHz) tone. Turn OFF the 67 MHz (or 137 MHz) and 70 MHz (or 140 MHz) tone. The annunciator lights for the 67 MHz (or 137 MHz) and 70 MHz (or 140 MHz) tones should be OFF.
3. Set the center frequency of the spectrum analyzer to 72.5 MHz (or 142.5 Mhz).

4. Adjust OFFSET FREQUENCY knob until the 72.5 MHz (or 142.5 MHz) signal is centered in spectrum analyzer display.
5. Adjust the R37 pot for -11V.
6. Option 143 For option 143 adjust R37 to -3V.
7. Set the OFFSET FREQUENCY knob pointer to zero.

CAUTION Turn OFF the 11758A/B prior to replacing shield cover

3 Tone Source TOTAL POWER OUT Adjustment

The 3 Tone Source TOTAL POWER OUT is adjusted at each frequency while reading the power output of IF OUT on a power meter.

Figure 3-19 **3 Tone Source TOTAL POWER OUT Adjustment Setup**

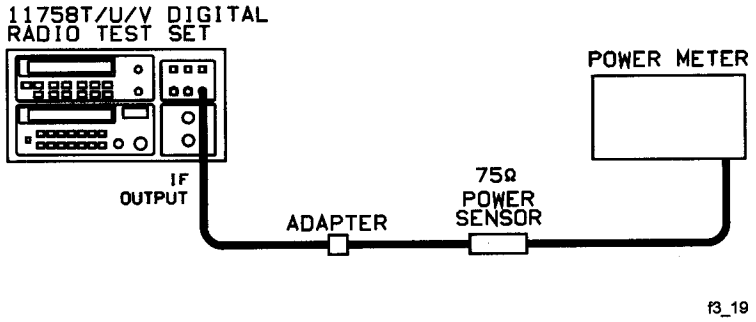
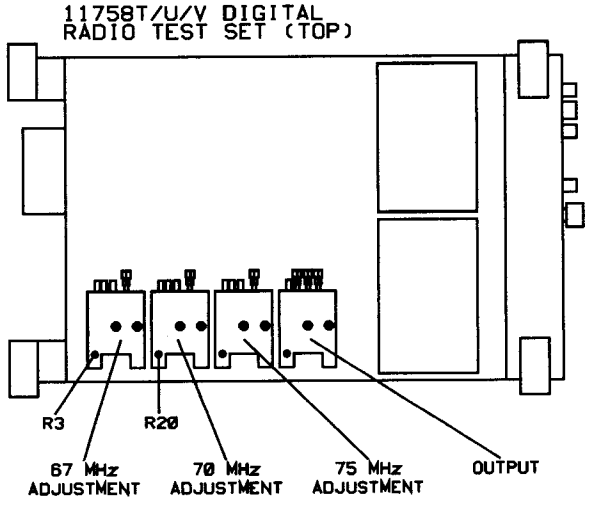


Figure 3-20 **3 Tone Source TOTAL POWER OUT Adjustment Locations**



Equipment

Spectrum Analyzer.....HP/Agilent 8566A

75 Ω BNC to Type N Adapter.....1250-1534

Power Meter.....HP/Agilent 437B

Power Sensor..... HP/Agilent 8483A

Procedure

1. Set up the equipment as shown in Figure 3-19.
2. Set the power meter to dBm mode.
3. Turn ON the 75 MHz (or 145 MHz) tone only. The 67 MHz (or 137 MHz) and 70 MHz (or 140 MHz) annunciators should be OFF.
4. Use the TOTAL POWER OUT knob to get -18.5 dBm on the power meter display.
5. If the knob pointer is at the -8 dBm indication, no adjustment is necessary. If the pointer is not at the -8 dBm indication, remove the hex screws on the knob, align the pointer with the -8 dBm indication while maintaining a - 18.5 dBm power meter reading, then re-tighten the hex screws.
6. Turn OFF the 75 MHz (or 145 MHz) tone. Turn ON the 70 MHz (or 140 MHz) tone only. The 67 MHz (or 137 MHz) and 75 MHz (or 145 MHz) annunciators should be OFF.
7. Set the power meter to dB *reference* mode.
8. Refer to Figure 3-20 for the adjustment locations. Adjust R20 to 0 dB ±0.2 dB.
9. Turn OFF the 70 MHz (or 140 MHz) tone. Turn ON the 67 MHz (or 137 MHz) tone only The 75 MHz (or 145 MHz) and 70 MHz (or 140 MHz) annunciators should be OFF.
10. Refer to Figure 3-20 for the adjustment locations. Adjust R3 to 0 dB ±0.2 dB.

RF Source Adjustments

11758A/B RF Source output level range, spurious signals, harmonics and sub harmonics are adjusted.

Preparation

The setup described here is applicable to both the standard and Opt 011 11758A.

A Signal Generator and amplifier are used as a substitute for the Digital Radio Test Set HP/Agilent 8593A Spectrum Analyzer. Automatic leveling is provided solely by the 11758A/B ALC assembly.

Figure 3-21 RF Source Adjustment Tests Preparation

Equipment

Power Meter..... HP/Agilent 437B or equivalent

Power Sensor.....HP/Agilent 8481A

Source..... HP/Agilent 8671B

RF Amplifier..... HP/Agilent 11975A.

Spectrum Analyzer.....HP/Agilent 8566B

Leveling Head.....part number 11758-60002

Leveling Head Cable.....part number 11758-60021

Amplifier/DRTS Cable.....part number 8120-4948

Setup Procedure

1. Set up the equipment as shown in Figure 3-21, with the power sensor connected to the end of the Amplifier/DRTS cable.
2. Set the LO Output of the RF Source and Amplifier to +13 dBm. To do this:
   a. Set the Amplifier ALC to OFF.
   b. Set the Signal Generator to 4 GHz.

c. Adjust the Signal Generator Power Level Output so that +13 dBm is observed on the power meter.

d. Disconnect the Power Sensor and connect the Amplifier/DRTS cable to the LO INPUT on the 11758A/B rear panel.

3. Set the 11758A/B for direct control of the internal DACs. Press:

   SHIFT

   PRESET/LOCAL

   [▲] until **11 SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 09** is displayed

   ENTER

   [▲] until **VALUE 0001** is displayed

   The 11758A/B is now configured to control the RF Source from the Multipath Fading Simulator (MFS) front panel.

4. Set the 11758A/B to select the low band (3.75 to 6.475 GHz) Press:

   SHIFT

   PRESET/LOCAL

   [▲] until **11 SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **Value 0001** is displayed.

   ENTER

   [▼] until **VALUE 0001** is displayed.

   ENTER

   SHIFT

   PRESET/LOCAL

   [▲] until **11 SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 13** is displayed

   ENTER

   [▲] until **VALUE 0000** is displayed.

   ENTER

5. Set the RF Source to ON. Press:

   SHIFT

   PRESET/LOCAL

   [▲] until **11 SERVICE** appears on the display.

   ENTER

   [▲] or [▼] until **I-BUS NUM 14** is displayed

   ENTER

   [▼] until **VALUE 0000** is displayed.

   ENTER

The RF Source is now ON. The front panel LED next to the RF Source connector should be lit.

RF Source Bandwidth and Output Power Level Adjustment

The bandwidth is set by adjusting variable resistors R36, R37, and R38. The output power level of the 11758A/B RF Source is measured at the leveling head with a power meter. The output level is set by adjusting variable resistor R35 to read -5 dBm.

Equipment

Power Meter.....HP/Agilent 437B or equivalent.

Power Sensor.....HP/Agilent 8481A.

Source.....HP/Agilent 8671B

RF Amplifier.....HP/Agilent 11975A

Spectrum Analyzer.....HP/Agilent 8566B

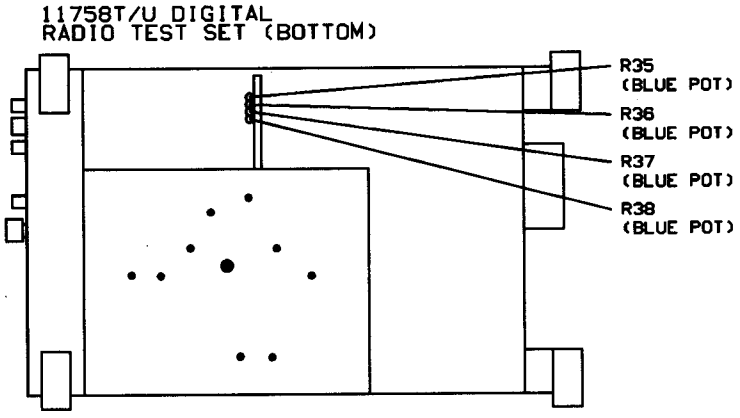
Leveling Head.....part number 11758-60002

Leveling Head Cable.....part number 11758-60021

Amplifier/DRTS Cable.....part number 8120-4948

Figure 3-22 **RF Source Power Level Adjustment Locations**

Figure 3-23 **RF Source Power Level Adjustment Locations Procedure**



Procedure

1. Coarse Tune Bandwidth Potentiometers
2. Refer to Figure 3-23 Set R38 fully clockwise.
3. Set R37 fully counter clockwise then back 15 turns clockwise.

Power Level Adjustment -5 dBm

4. Set up equipment as shown in Figure 3-22.
5. Set the 1758A/B DAC value to 0512 (-5 dBM).

   SHIFT

   PRESET/LOCAL

   [▲] until **11 SERVICE** appears on the display.

   ENTER

[▲] or [▼] until **I-BUS NUM 11** is displayed

ENTER

[▲] until **VALUE 0512** is displayed

6. Measure the power level. Refer to Figure 3-23 and adjust R35 Level Control until -5 ±.01 dBm appears on the power meter display.

NOTE The factory adjusts the RF Source at -5 dBm (DAC setting 512). The formula for setting any value from 0 to 1023 is:

$$Value(DAC) = \frac{Power(dBm) + 16.5}{23}(1023)$$

Spurious Signals Level Adjustment

1. Set the 11758A/B DAC value to 0958 (+5 dBM).

SHIFT

PRESET/LOCAL

[▲] until **11 SERVICE** appears on the display.

ENTER

[▲] or [▼] until **I-BUS NUM 11** is displayed

ENTER

[▲] until **VALUE 0512** is displayed

Figure 3-24 RF Source Spurious Adjustment Setup

2. Set up equipment as shown in Figure 3-24.
3. Set the signal generator to 6.475 GHz.
4. Set the Spectrum Analyzer to the following:

PRESET

REFERENCE LEVEL to + 10 dBm.

SPAN to 0.5 MHz

RES BW to 3 kHz.

VBW to 100 Hz

CENTER FREQUENCY to 6.475 GHz

5. Take a reference at 6.5 GHz **PK SEARCH, MKR REF LVL**. This will place the peak of the 6.475 GHz signal at the top graticule.
6. Place the marker on the greatest spurious signal that appears between the center frequency and ±30 kHz away from the fundamental. Adjust R36 until the spurious signal is < -64 dBc from the top graticule.
7. Place the marker on the greatest spurious signal that appears between ±30 kHz and ±140Hz away from the fundamental. Adjust R37 until the spurious signal is < -64 dBc from the top graticule.

Option 011

1. Set the 11758A/B DAC value to 0958 (+5 dBM).
2. Set up equipment as shown in Figure 3-24.

SHIFT

PRESET/LOCAL

[▲] until **11 SERVICE** appears on the display.

ENTER

[▲] or [▼] until **I-BUS NUM 11** is displayed

ENTER

[▲] until **VALUE 0958** is displayed

3. Set the signal generator frequency to 11.7 GHz.
4. Set the 11758A/B to select high band (10.7 to GHz).

SHIFT

PRESET/LOCAL

[▲] until **11 SERVICE** appears on the display.

ENTER

[▲] or [▼] until **I-BUS NUM 12** is displayed

ENTER

[▲] until **VALUE 0000** is displayed.

ENTER

SHIFT

PRESET/LOCAL

[▲] until **VALUE 0001** is displayed.

ENTER

[▲] until **11 SERVICE** appears on the display.

ENTER

[▲] or [▼] until **I-BUS NUM 13** is displayed

ENTER

[▲] until **VALUE 0001** is displayed.

ENTER

5. Set the Spectrum Analyzer to the following:

   PRESET

   REFERENCE LEVEL to + 10 dBm.

   SPAN to 0.5 MHz

   RES BW to 3 kHz.

   VBW to 100 Hz

   CENTER FREQUENCY to 6.475 GHz

6. Take a reference at 11.7 GHz **PK SEARCH, MKR REF LVL**. This will place the peak of the 11.7 GHz signal at the top graticule.
7. Place the marker on the greatest spurious signal that appears between the center frequency and ±30 kHz away from the fundamental. Adjust R36 until the spurious signal is < -64 dBc from the top graticule.
8. Place the marker on the greatest spurious signal that appears between ±30 kHz and ±140 kHz away from the fundamental. Adjust R37 until the spurious signal is < -64 dBc from the top graticule.

Multi-Path Fading Simulator Adjustments

The Multipath Fader performance tests and adjustments are contained in the Agilent Technologies 11757B Installation and Calibration Guide 11757-90030 that came with your 11757-60053 Installation Calibration Kit.