

OPERATING AND SERVICE MANUAL

MODIFICATIONS

MODEL 478A OPTION H75
THERMISTOR MOUNT

USE THIS MODIFICATION WITH
OPERATING AND SERVICE MANUAL
PART NO. 00478-90021
PRINTED JUNE 1991

MANUAL MODIFICATION
HP PART NO. 00478-90033
PRINTED IN THE USA
OCTOBER 1994
REV A DECEMBER 1994
REV B October 1995

DESCRIPTION

The 478A Option H75 Coaxial Thermistor Mount is similar to the standard 478A except it is designed for use with the 432 Power Meter to measure microwave power from 1 μ W to 10 mW over the frequency range of 1 MHz to 1 GHz. This is accomplished by the design of the RF input connector (00478-62004) and thermistor assembly (00478-62005), which utilize a 0.1 μ F cap for C1 and C2. Additionally the 478A-H75 has been test for SWR of ≤ 1.05 at 50 MHz

SPECIFICATIONS

Modify the HP 478A Thermistor Mount TABLE 1 SPECIFICATIONS on page 2 of the Operating and Service Manual (HP PART NO. 00478-90021) following.

ELECTRICAL SPECIFICATION

| PARAMETER | SPECIFICATION | CONDITIONS |
|---|---|---|
| FREQUENCY RANGE | 1 Mhz to 1 GHz | |
| IMPEDANCE | 50 ohms | |
| MAX RETURN LOSS/SWR (* except at 50 MHz) | 15.5 dB / ≤ 1.4 26.4 dB / ≤ 1.1 32.0 dB / ≤ 1.05 20.8 dB / ≤ 1.2 | 1 MHz to 5 MHz *5 MHz to 100 MHz 50 MHz 100 MHz to 1 GHz |
| OPERATING RESISTANCE | 200 ohms \pm 1% | |
| POWER RANGE | 1 μ W to mW | CAN NOT USE 431 PWR MTR |
| MAX PEAK PWR | 200 W | |
| MAX AVERAGE PWR | 30 mW | |
| MAX ENERGY per PULSE | 10 w / u second 5 w / u second | pulse rep rate \geq 1 KHz pulse rep rate $<$ 1 KHz |
| RF Connector | Type N, male | |
| Bridge Connector | Mates with cable supplied with 432 type Power Meters | |

All other specifications in TABLE 1. SPECIFICATIONS apply to the 478A-H75 except were use with the HP 431 power meter is referenced.
 Note the HP 478A-H75 can not be used with HP 431 power meters.

MOUNT CALIBRATION

| PARAMETER | SPECIFICATION | CONDITIONS |
|----------------------|-------------------------|----------------|
| EFFECTIVE EFFICIENCY | > 95% (typically > 98%) | 5 MHz to 1 GHz |
| CALIBRATION FACTOR | > 95% (typically *) | 5 MHz to 1 GHz |

OPERATION

Refer to the 478A Operating and Service Manual (HP PART NO. 00478-90021). Operation of the 478A Option H75 is the same as the standard 478A with the following exceptions.

All references to the 431 power meters are to be ignored. The 431 type power meters cannot be used with the 478A Option H75. In general, only those power meters employing bridges that transmit dc signals to and from the mount (432 type) are suitable for use with the 478A Option H75. Thus, paragraphs 16, 26 through 30, 43, 44, 50, 52, and 53 in the Operating Note, as well as Figures 4 and 5 do not apply.

ZERO SET

It is not necessary to terminate the mount if disconnected from the RF source when zeroing. See page 3-9 in the 432A Operating and Service Manual for the proper zeroing procedure.

MOUNT CALIBRATION DATA

For the 478A Option H75, over the 5 MHz - 1000 MHz frequency range, the Calibration Factors are essentially the same (within 1%) as the Effective Efficiency. Both vary less than the measurement uncertainties that apply to any calibration data that could be provided, and typically remain between 98% and 100%. Thus, the CALIBRATION SWITCH on the 432A Power Meter may be set to 99% for most measurements made with the 478A Option H75 Thermistor Mounts. Below 5 MHz, Calibration Factor typically falls off as indicated in Figure A.

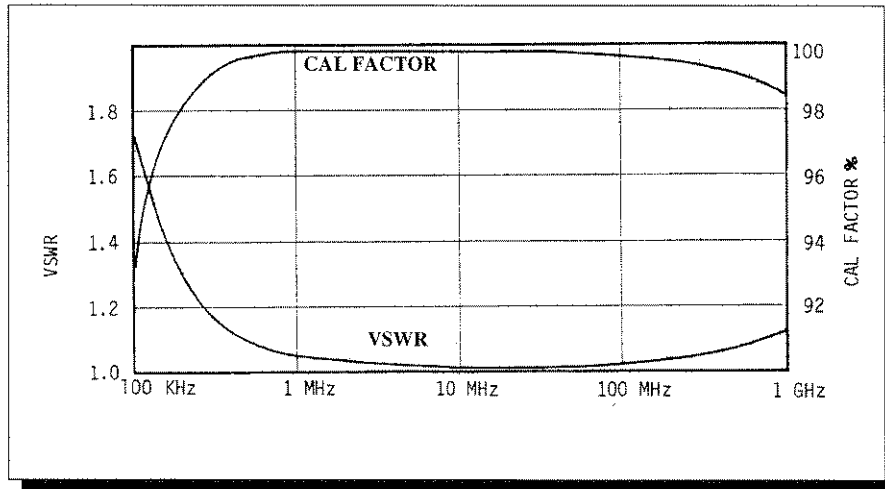


FIGURE A. Typical VSWR and Calibration Factor vs. Frequency for the 478A Option H75

OPERATING PRINCIPLES

Downward extension of the frequency range to 1 MHz of an HP Model 478A Thermistor Mount is accomplished in the Option H75 by changing the value of C1 and C2 to 0.1 μ F (see revised Figure 6 below). Utilization of these physically larger 0.1 μ F capacitors requires modified connector and thermistor assemblies. The part numbers assigned to these special assemblies are indicated in the Table 3 revisions and revised Figure 9 (next page).

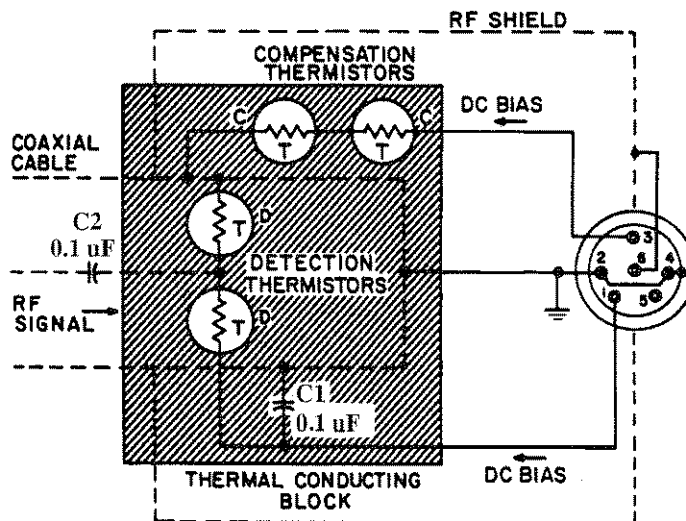


FIGURE 6 Schematic Diagram of HP Model 478A Option H75 Thermistor Mount when connected to a 432 Power Meter.

MAINTENANCE

Follow all precautions for the HP Model 478A Option H75, as with the standard HP Model 478A, as outlined in the Operating and Service Manual (00478-90021).

The standard 478A Thermistor Mounts THERMISTOR MATCH and REPAIR procedures generally apply to the 478A Option H75 except as follows.

REPLACEABLE PARTS

Make the following changes to the TABLE 3. REPLACEABLE PARTS in the standard HP Model 478A Operating and Service Manual (00478-90021). When ordering a replacement RF connector or Thermistor Assembly, refer to TABLE 3 and FIGURE 9 below.

| DELETED PART NO. (USED ON STD. 478) | NEW PART NO. (USED ON 478-H75) | QTY | DESCRIPTION |
|--|-----------------------------------|-----|-----------------------|
| 00478-60002 | 00478-62005 | 1 | Thermistor Assembly |
| 00478-60003 | 00478-62004 | 1 | RF Connector Assembly |

320.00 B/O

TABLE 3. REPLACEABLE PARTS MODIFICATION

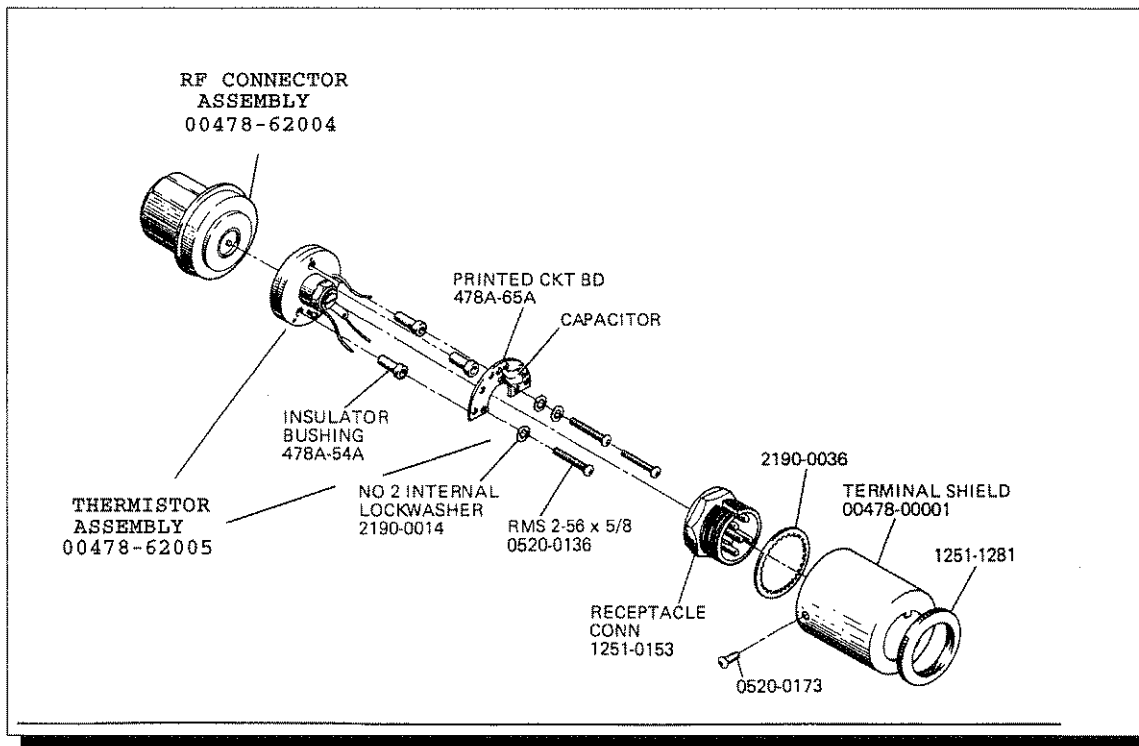


FIGURE 9. Model 478A Option H75 Thermistor Mount Assembly.

TESTING

Since the Model 478A Option H75 units are specified only up to 1000 MHz with Effective Efficiency and Calibration Factor varying very little over the operating Frequency range, the following checks (made with the 478A-H75 connected to an operating 432A), will generally ensure that the 478A-H75 is operating properly:

1. Check SWR / Return Loss from 1 MHz - 1 GHz using a swept frequency network analyzer equivalent. A fixed frequency check at 1 MHz only will ensure that blocking capacitor C2 is intact. Verify the following specifications:

| | | |
|---|-----------------------|-------------------|
| MAX RETURN LOSS/SWR (* except at 50 MHz) | 15.5 dB / ≤ 1.4 | 1 MHz to 5 MHz |
| | 26.4 dB / ≤ 1.1 | *5 MHz to 100 MHz |
| | 32.0 dB / ≤ 1.05 | 50 MHz |
| | 20.8 dB / ≤ 1.2 | 100 MHz to 1 GHz |

Figure A shows typical VSWR characteristics.

2. CAL FACTOR: With the 478A-H75 carefully zeroed and the 432A Range switch set to the 1 mW range, connect the 478A-H75 to a precision 1 mW / 50 MHz Power Reference as can be found on HP Models 435A/B or 436A Power Meters or the HP Model 435A-K05 Dual Power Reference. With CAL FACTOR switch set to 100%, the 432A should read between 0.95 and 1.02 mW (includes allowance for meter and Power Reference errors).



HP 478A OPTION H75

| | Frequency | % effective efficiency |
|---|-----------|------------------------|
| 1 | 1000 MHz | 99 |
| 2 | 800 MHz | 99 |
| 3 | 600 MHz | 99 |
| 4 | 400 MHz | 99 |
| 5 | 200 MHz | 99 |
| 6 | 1 MHz | 99 |