



Modifying the Keysight (Agilent/HP) 85105A for use with OML Millimeter Wave VNA Modules

Many of OML's customers have found the cost of a new Keysight 85105A-K10 a stumbling block to their acquisition of full "S" parameter capable millimeter wave vector analysis above 110 GHz. Many of these customers already owned the Keysight (HP) 85105A Millimeter-Wave Controller and asked if there was not some manner in which it could be adapted to working with the OML series of millimeter wave VNA modules (OMLMM). OML investigated several methods of adapting the 85105A to interfacing with the OMLMM and, as a result, has developed, is using and recommends the following approach. It will allow the use of any of the OMLMM between 33 and 325 GHz.

The Keysight 85105A provides DC bias voltage, RF and L.O. interfaces for the Keysight 85106A millimeter Wave Test Sets. Its front panel interfaces are R.F. and L.O. SMA compatible connectors and a special Sub D connector for DC bias and I.F. interconnections. The 85105A is set up to provide 11 to 20 GHz leveled amplification (R.F.) with switching between Port 1 and Port 2 for "S" parameter testing to the 85106A Millimeter Wave Test Set (Momadillo). It also provides 2 to 8 GHz leveled amplification (L.O.) simultaneously to Port 1 and Port 2.

The bias voltages and L.O. frequency range were found not to be appropriate for use with the OMLMM. The OMLMM requires +12 VDC and employs a higher L.O. frequency range (8 to 20 GHz), to reduce the multiple of the harmonic mixers in the OMLMM for lower conversion loss and higher dynamic range. OML was able to determine that the local oscillator amplifiers used in the 85105A were standard HP components that were designed to be capable of 2 to 20 GHz operation. It was further found that the leveling loops of these amplifiers were quite tolerant of operation up to 20 GHz. In fact, the only component the L.O. subsystem that limited the frequency range to 8 GHz was the L.O. input power divider that was used to drive the two L.O. amplifier chains.

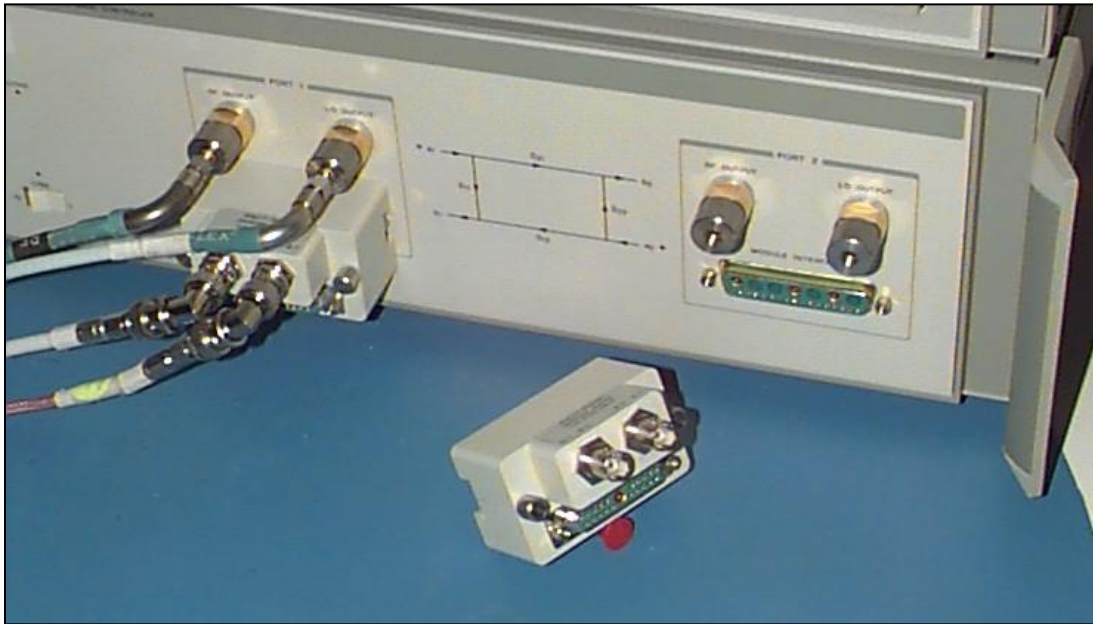


Figure 1 – 85105A Interface Adapter near front panel

Keysight designed a front panel adapter, the 85105A Interface Adapter, P/N 85105-60015 (see figure 1), to allow the use of the earlier 85104A Millimeter Wave Test Set with the 85105A. The 85104A Test Set utilized a group of discrete waveguide components and an 8355xA Millimeter Source Module (Armadillo) configured as a millimeter wave VNA test set. This Interface Adapter broke out the I.F. interfaces to BNCs (f) and brought the DC bias voltages out to another special Sub D connector.



Figure 2 – Narda power divider in the 2 to 18 GHz range

OML has engineered modifications to the 85105A which allow it to be used with both the Keysight products and with the OMLMM. One simple modification is necessary to the internals of the 85105A. The 2 to 8 GHz power divider must be replaced a unit capable of operation to 20 GHz. The Narda Model # 4456-2 (see figure 2) is a 2 to 18 GHz power divider that is widely available from used test equipment vendors for \$200 to \$300. It is still available new from Narda L3COM for less than \$700. It is a "drop-in" replacement for the 2 to 8 GHz Narda unit supplied in the 85105A (see figure 3) and has the same dimensions although the mounting hole pattern may need slight modification. It has been repeatedly tested by OML and found to have very little degradation between 18 and 20 GHz. Click here for [\(4x-xxxxxx_85105A\)](#) on replacing the 85105A L.O. splitter.

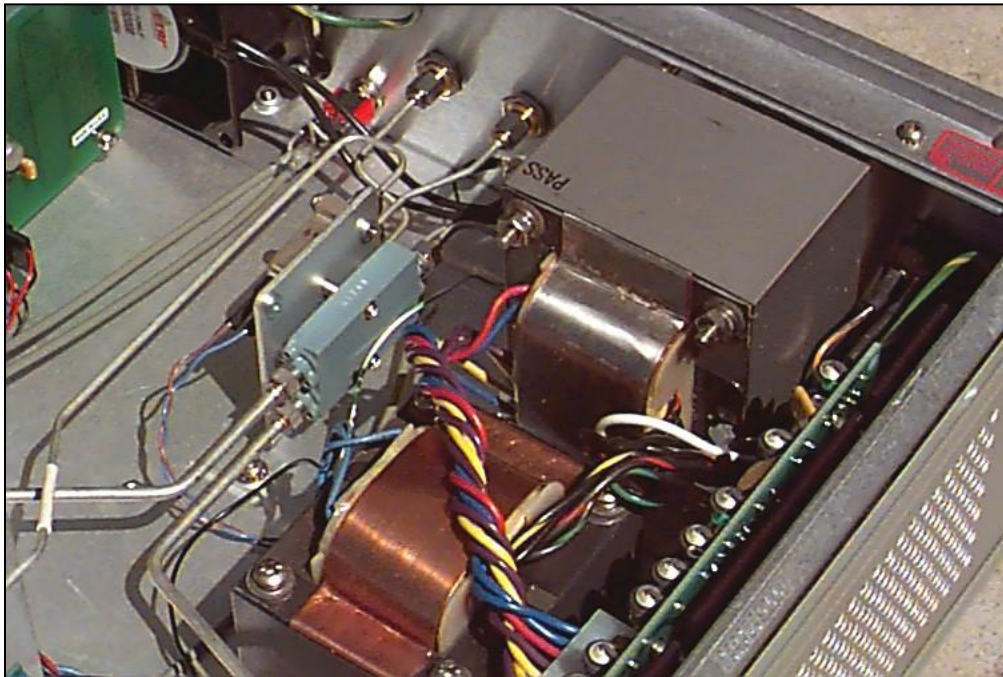


Figure 3 – Location and replacement of the power divider in the 85105A

The only external modification to the 85105A requires that the user obtain a pair of the Interface Adapters described above, which are available from Keysight for \$625 each at Tel. # 877 447 7278. Installation of these Interface Adapters onto the front panel of the 85105A is all that is needed to switch the 85105A into the OML mode. The 85105A is returned to the Keysight mode by removing the Interface Adapters. The user will have to adapt from the Interface Adapter I.F. BNC (f) to whatever cable connector he is using for his I.F. cables. The OMLMM I.F. output ports are SMA (f).

The internal layout of the 85105A discourages the installation of a 12 VDC power supply for the operation of the OMLMM. OML highly recommends that the user employ an outboard 12 VDC power supply capable supplying 4 amps to power the OMLMM. Two of the OML "T/R" modules or one "T/R" and one "T" module can be easily powered by a 4 amp supply. Utilize the power cables supplied by OML with the OMLMM for this purpose.