E5080B-21

Information Only Service Note

Supersedes:
None

E5080B ENA Series Vector Network Analyzer

Serial Numbers: ALL

E5080B 3.5mm/ 2.4mm/ 1.85mm Connector Care

Parts Required:

Calibrated Torque Wrench – Table 1-1
Connector Savers – Table 1-2

ADMINISTRATIVE INFORMATION

[[]] Calibration Required	PRODUCT LINE: WN
[X] Calibration NOT Required	AUTHOR: ls

ADDITIONAL INFORMATION:
This service note communicates the required procedures in mating and unmating the E5080B 3.5mm/ 2.4mm/ 1.85mm test port.

KEYSIGHT TECHNOLOGIES

Situation:
Making Good Connections

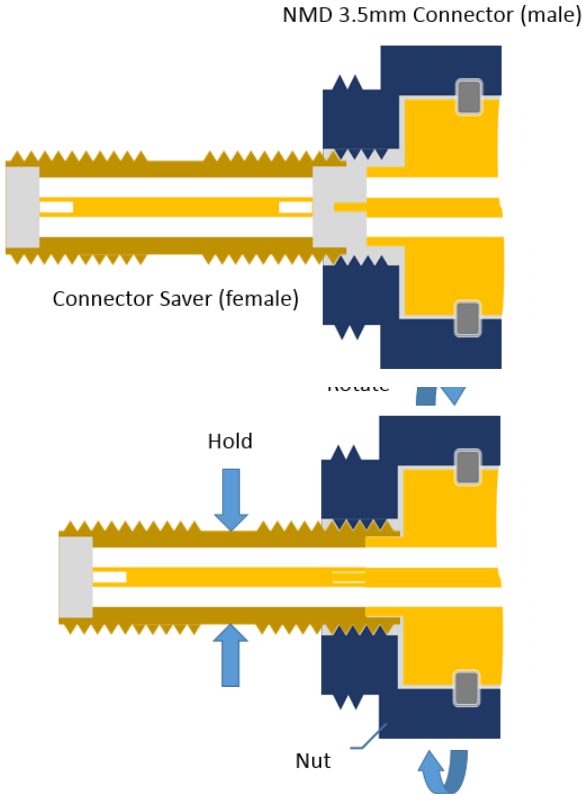
Good connections require a skilled operator. The most common cause of measurement error is bad connections. The following procedures illustrate how to make good connections of 3.5mm NMD connectors using f-f connector saver. Similar handling is applicable to 2.4mm/ 1.85mm NMD connectors.

Solution/Action:
Making a Connection (Applicable to 3.5mm, 2.4mm & 1.85mm NMD connector)

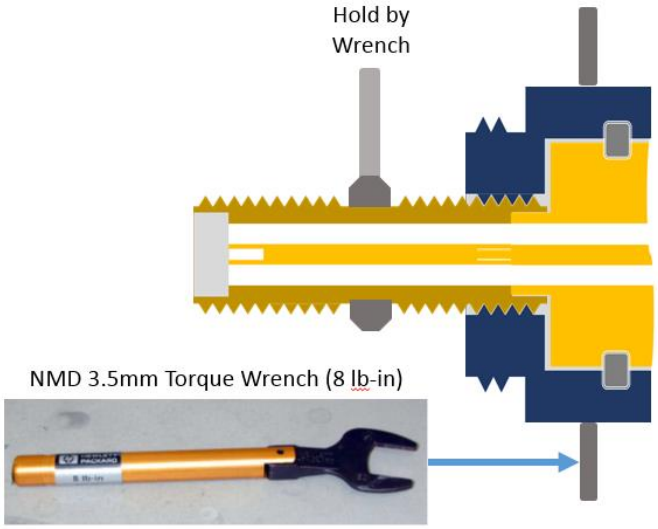
1. Wear a grounded wrist strap having a 1 MW series resistor to protect instrument from ESD damage.
2. Inspect, clean, and gauge connectors. All connectors must be undamaged, clean, and within mechanical specification.

3. [Connector saver to NMD Connector]
   Carefully align center axis of both devices. Push the connectors straight together so they can engage smoothly. The male center conductor pin must slip concentrically into the contact finger of the female connector.

4. CRITICAL: Rotate only the Connector Nut until finger-tight, being careful not to cross the threads. Damage to both connectors will occur if the male center pin is allowed to rotate in the female contact fingers.

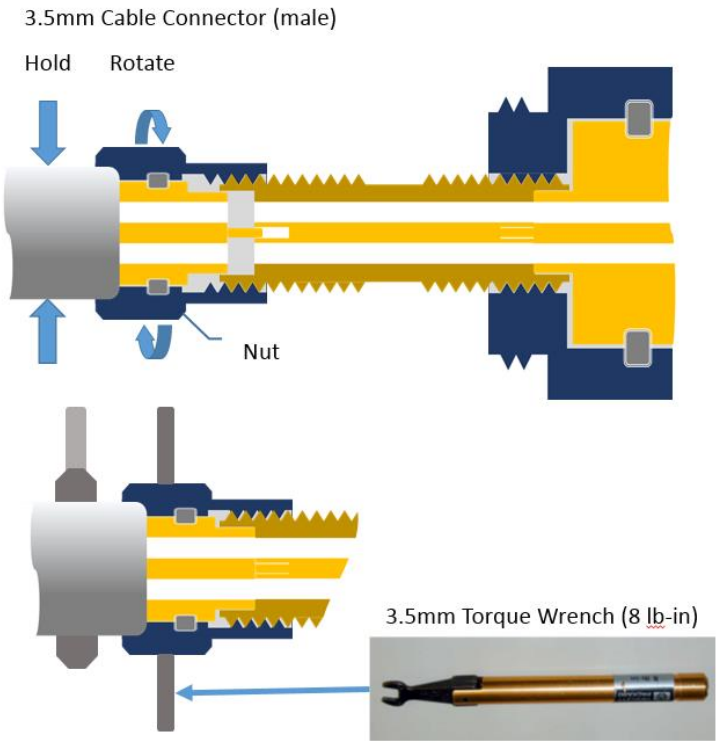


5. Use a torque wrench to make final connection. Tighten until the "break" point of the torque wrench is reached. Do not push beyond initial break point. Use additional wrench for holding Connector Saver, if needed, to prevent device body from turning.



6. [Cable Connector to Connector saver] Repeat processes 3 to 5 for connecting Cable connector to Connector Saver:

- ✓ Align center axis of both devices.
- ✓ Hold cable side and rotate Connector Nut until finger-tight.
- ✓ Using a torque wrench, tighten until the “break” point while holding cable side, if needed, with another wrench.



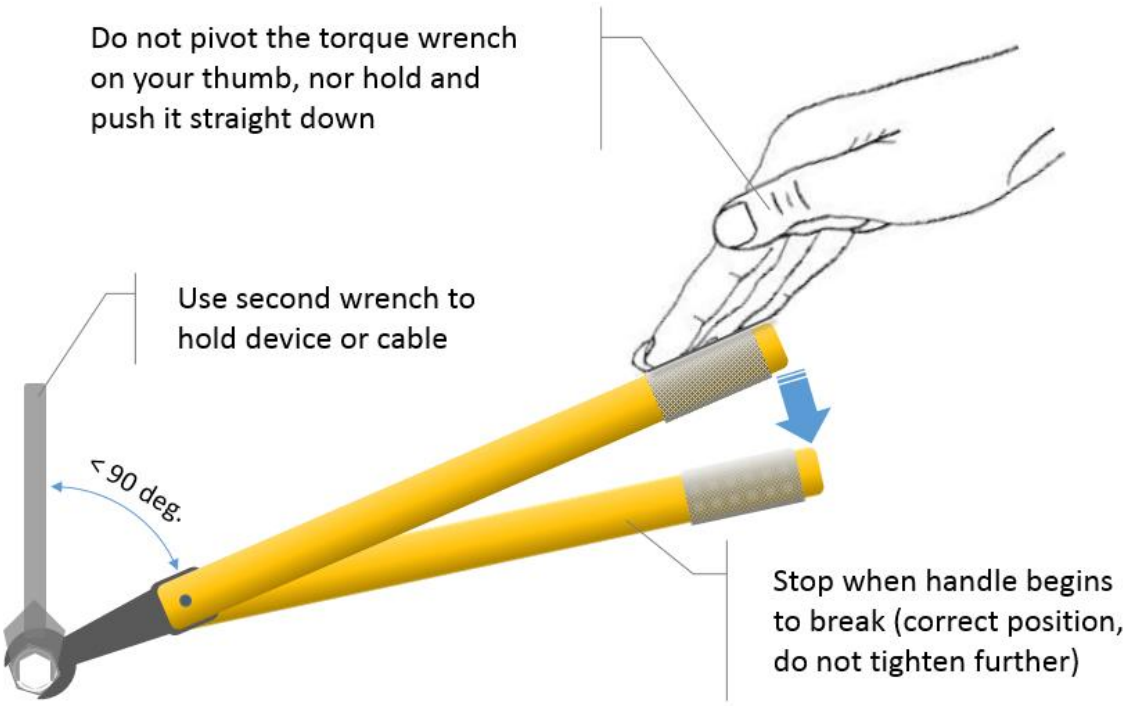
Separating a Connection

1. Support the devices to avoid any twisting, rocking or bending force on either connector.
2. Use an open-end wrench to prevent the device body from turning.
3. Use another open-end wrench to loosen the connector nut.
4. Complete the disconnection by hand, turning only the connector nut.
5. Pull the connectors straight apart.

Using a Torque Wrench

Proper torque on the connector improves measurement repeatability and extends connector life. The tightening torque on connectors has a significant effect on measurements at mm-wave frequencies. Repeatable measurements require consistent torque on all the connections in a setup. A torque wrench avoids damage due to over-tightening and helps connectors achieve their rated lifetimes.

1. Make sure torque wrench is set to the correct torque setting.
2. Position torque wrench, and a second wrench to hold the device or cable, within 90° of each other before applying force. Make sure to support the devices to avoid putting stress on the connectors.
3. Hold torque wrench lightly at the end of handle. Then apply force perpendicular to the torque wrench handle. Tighten until the "break" point of the torque wrench is reached. Do not push beyond initial break point.



Torque Settings

Table 1-1

Types	Torque Setting	Wrench Part Number
1.0 mm	4 in–lb (45 N–cm)	8710–2079
1.85 mm	8 in–lb (90 N-cm)	8710-1765
2.4 mm	8 in–lb (90 N-cm)	8710-1765
NMD 2.4 mm	8 in–lb (90 N-cm)	8710-1764
2.92 mm	8 in–lb (90 N-cm)	8710-1765
3.5 mm	8 in–lb (90 N-cm)	8710-1765
NMD 3.5 mm	8 in–lb (90 N-cm)	8710-1764
SMA	5 in–lb (56 N-cm)	8710-1582

Note: An SMA torque wrench is NOT structurally identical to a 3.5/ 2.4/ 1.85 mm torque wrench. They have similar shape but different coupling torque. (3.5/ 2.4/ 1.85mm: 8 in-lb, SMA: 5 in-lb, both widths across coupling nut wrench: 5/16")

- To connect an SMA male to a 3.5mm female connector, use an SMA torque wrench.
- To connect a 3.5mm male connector to a SMA female connector, use a 3.5mm torque wrench.

Table 1-2

Listed are the connector savers commonly available for E5080B NMD test port.
Refer to the RF and Microwave Test Accessories catalog for the comprehensive references of the entire connector savers family.

Types	Connector Saver	Description
3.5mm	85130D	NMD 3.5 mm to 3.5 mm adapter set. 85130D consists of 85130-60005 (Qty.1) and 85130-60006 (Qty.1)
	85130-60005	NMD 3.5mm Female - 3.5mm Female adapter
	85130-60006	NMD 3.5mm Female - 3.5mm Male adapter
	83059B	Coaxial Adapter, 3.5mm Female-Female
	83059C	Coaxial Adapter, 3.5mm Male-Female
2.4mm	85130G	NMD 2.4 mm to 2.4mm adapter set. 85130G consists of 85130-60015 (Qty.1) and 85130-60016 (Qty.1)
	85130-60015	NMD 2.4mm Female – 2.4mm Male adapter
	85130-60016	NMD 2.4mm Female – 2.4mm Female

		adapter
	11900B	Metrology-grade adapter, 2.4mm Female-Female.
	11900C	Metrology-grade adapter, 2.4mm Female-Male.
1.85mm	85130H	NMD 1.85mm to 1.85mm adapter set. Consists of 85058-60120 (Qty.1) and 85058-60121 (Qty.1)
	85058-60120	NMD 1.85mm Female – 1.85mm Male adapter
	85058-60121	NMD 1.85mm Female – 1.85mm Female adapter
	85058-60114	1.85mm Female-Female adapter
	85058-60115	1.85mm Female-Male adapter

Appendix
Additional References

VNA Connector Care
https://ena.support.keysight.com/e5080/manuals/webhelp/eng/index.htm#Tutorials/Connector_Care.htm

What Torque Wrenches and Open-Ended Wrenches Does Keysight Recommend for Connecting RF Connectors?
http://www.keysight.com/main/editorial.jspx?cc=MY&lc=eng&ckey=2516881&id=2516881

http://www.keysight.com/main/editorial.jspx?cc=MY&lc=eng&ckey=1000003678:epsg:faq&nid=-33186.897439&id=1000003678:epsg:faq

Millimeter Wave Connector Care
http://na.support.keysight.com/pna/connectorcare/Connector_Care.htm

RF and Microwave Test Accessories Catalog
http://literature.cdn.keysight.com/litweb/pdf/5992-0314EN.pdf?id=2600695

Connector Care Quick Reference

Do's	Don'ts
Handling and Storage: Keep connectors clean Protect connectors with plastic end caps Keep connector temperature same as analyzer	**Handling and Storage:** Do NOT touch mating-plane surface Do NOT set connectors contact-end down Do NOT store connectors loose in box or drawer
Visual Inspection: Inspect all connectors with magnifying glass carefully before every connection Look for metal debris, particles, scratches and dents	**Visual Inspection:** Do NOT use a damaged connector EVER!!! Do NOT use a connector with bent or broken center conductor or deformed threads
Connector Cleaning: Clean surfaces first with clean, dry compressed air Use lint-free swab or brush Use minimum amount of isopropyl alcohol Clean outer conductor mating surface and threads	**Connector Cleaning:** Do NOT use high pressure air (>60psi) Do NOT use any abrasives Do NOT allow alcohol into connector support beads Do NOT apply lateral force to center conductor
Gauging Connectors: Inspect and clean gage, gage master and DUT Use correct torque wrench Zero gage before use Use multiple measurements and keep record of readings	**Gauging Connectors:** Do NOT use an out-of-spec connector Do NOT hold connector gage by the dial
Making Connections: Align connectors first Rotate only the connector nut Use correct torque wrench	**Making Connections:** Do NOT apply bending force to connection Do NOT over tighten, twist or screw any connection Do NOT tighten past torque wrench "break" point Do NOT twist connector body to make connection Do NOT mate different connector types

Revision History:

Date	Service Note Revision	Author	Reason for Change
28-Mar-2022	E5080B-21	ls	As Published