

**Instruction Sheet**

# **RF and Microwave Connector Care**

**Inspection and Cleaning  
Protection from ESD  
Pin Depth Measurement  
Proper Connecting Methods  
Protection from Over-power and Over-voltage  
Connector Torque Settings and Tools**



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## Safety Symbols

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To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

## Symbols Used in Manuals

### Warning



Danger or Warning indicates a risk from a very hazardous condition or procedure that could result in light-to-severe injury or death, or loss related to equipment malfunction. Follow all safety precautions and procedures to minimize this risk.

### Caution



Caution indicates a risk from a hazardous condition or procedure that could result in injury or loss related to equipment malfunction. Follow all safety precautions and procedures to minimize this risk.

### Caution



Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching exposed, unpainted metal of the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

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## Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.



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# Chapter 1 — General Information

## 1-1 Introduction

This reference manual provides instructions for the use and care of RF and microwave connectors.

The recommendations in this document maximizes connector life with less equipment downtime due to connector-related failures.

The main topics of connector care are:

- Inspecting and cleaning
- Measuring pin depth
- Tightening and loosening connectors
- Torque specifications and tools

## 1-2 Connector Related Failures

Following are common causes of connector-related instrument failures and effects on measurement accuracy and repeatability.

- Connectors contaminated with material such as metal debris and dust particles will increase the risk of damaging connector.
- Connectors with improper pin protrusion can damage the mating connector.
- Connectors with improper pin recession can affect measurement accuracy.
- Worn or damaged threads can cause misalignment and damage mating connectors.
- Applying excessive torquing will cause excessive stress to connector interface.
- Under torquing impedes a proper measurement.
- Applying inadequate torque can affect measurement repeatability.
- A connector is a perfect conductor for electrostatic discharge (ESD). Excessive charge accumulation will damage expensive and sensitive electronic devices residing in the precision instrumentation.

---

## 1-3 Fundamentals of Connector Care

The rules listed below summarize the importance of each connector care topic.

**Handle With Care:** Proper care assures that microwave and RF connectors maintain high quality measurements.

**Inspect Before Use:** Careful inspection of RF connectors before use can prevent costly downtime and repairs.

**Keep Connectors Clean:** Avoid touching connector mating planes with bare hands. Regular cleaning maximizes reliable measurements.

**Measure Pin Depth:** Check the pin depth of a connector or a connector of unknown quality regularly to determine if it is out of tolerance. Excessive pin protrusion can damage a good connector. Excessive pin recession can degrade performance.

**Observe Input Power and Voltage Warnings:** Connector warning labels have information regarding what levels of signal power and DC voltage the connector and the circuitry attached to it can tolerate. Refer to [Section 1-4](#) for more information.

**Prevent ESD Damage:** Follow proper ESD handling procedures that conform to ANSI/ESD S20.20-2007. Always apply ESD-safe end caps to the connector when not in use.

**Connect Carefully:** When making connections, keep the connectors aligned and the center pins concentric to avoid center pin damage. Do not rotate the body of the component to tighten. Hold the connector body and rotate the coupling nut only.

**Never Force a Connection:** When making a connection, a mating resistance is an indication of misalignment, thread deformation, or connector incompatibility. Stop and troubleshoot the connection nonconformity before proceeding to reconnect.

**Torque Properly:** Rated and recommended torque specifications must be followed when making connection.

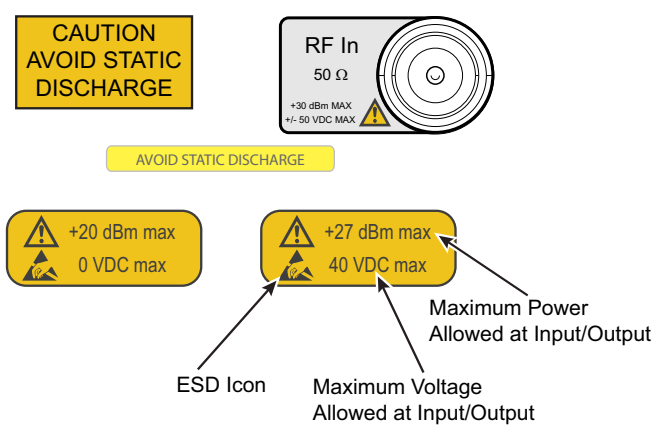
**Use the Proper Tools:** Never use pliers to tighten a connector. Start with finger tight and complete the connection with a torque wrench.

**Store Properly:** Store RF adapters and other components in a protective container.

## 1-4 Power and Voltage Limits

On Anritsu equipment, warning labels indicate the levels of signal strength that the connector and the circuitry attached to it can tolerate. An icon warning of ESD susceptibility is included where applicable. See [Figure 1-1](#) for example warnings.

- Check for warnings on the test instrument that you will be connecting to and ensure power and voltage limits will not be exceeded.
- Observe the power input ratings of each device and reduce power as needed to achieve safe operating conditions for each piece of test equipment and connector. Attach attenuation as needed to reduce power.
- Observe safe operating input voltage levels before injecting voltage into a voltage input connection.



**Figure 1-1.** Example Power, Voltage, and ESD Warning Labels

## 1-5 Electrostatic Discharge

ESD (Electrostatic Discharge) can damage the highly sensitive circuits in an instrument. Repair of damage found to be caused by ESD is not covered under Anritsu warranty.

### Personal ESD

A static charge can build up on your body. If you touch a connector on an instrument while you have a static charge built up, you can destroy circuitry within the instrument.

The ESD icon and it's description is shown below. The ESD warning icon can be found on equipment that is ESD sensitive.

#### Caution



Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching exposed, unpainted metal of the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

## Preventing Damage from Personal ESD

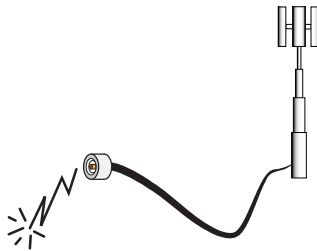
Your body carries a static charge. Before handling electronic devices, instrument and any of its connectors, make sure you are electrically grounded to remove any charge.

- Protect the instrument and test devices by wearing a grounded static-discharge wristband.
- You can discharge static potential by first ensuring the instrument is grounded, then touching the outer chassis of a the instrument before touching the RF connectors. Note that this works best on instruments that are connected to earth ground.
- Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

## Equipment-Generated ESD

ESD potential can build up on antenna towers, cables and equipment.

ESD from tower or other equipment cables can destroy instrument connectors and/or circuitry. This can occur as the device under test is being connected to the instrument's connectors. This is a leading cause of instrument damage by ESD.



**Figure 1-2.** Equipment-Generated ESD



# Chapter 2 — Inspecting and Cleaning

## 2-1 Introduction

Careful visual inspection of connectors with a magnification aid and lighting should be performed at least once per day before connecting.

## 2-2 Inspection

Using the following guidelines to inspect connectors regularly and replace any that are damaged.

### Magnification

Use a device with a magnification range of 2X to 10X.

Connector Type	Minimum Magnification for Inspection
7/16 DIN	
N	2X
7 mm	
SMA	
3.5 mm	
WSMA	
K (2.92 mm)	7X
V (1.85 mm)	7X
W (1.0 mm)	7X
0.8 mm	7X

**Figure 2-1.** Connector Inspection

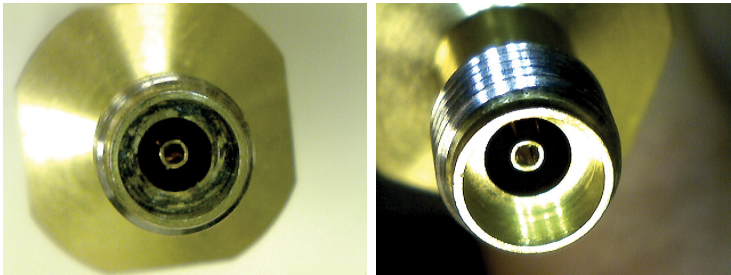
## Plating Inspection

**Caution**

Any connector found to have plating, outer conductor, or thread defects should be repaired (if possible) or discarded.

Inspect for plating defects such as:

- Deep scratches showing bare metal on the mating plane
- Bubbles and blisters in the plating



Uncleaned

Cleaned

**Figure 2-2.** Before and After Cleaning

**Note**

Connectors may lose some gloss over time through normal usage. Light scratches, marks, and other cosmetic imperfections found on the mating plane surfaces should not be considered cause for replacement.

Regular cleaning and proper connection techniques will minimize wear on the plating due to abrasion.

## Outer Conductor and Thread Inspection

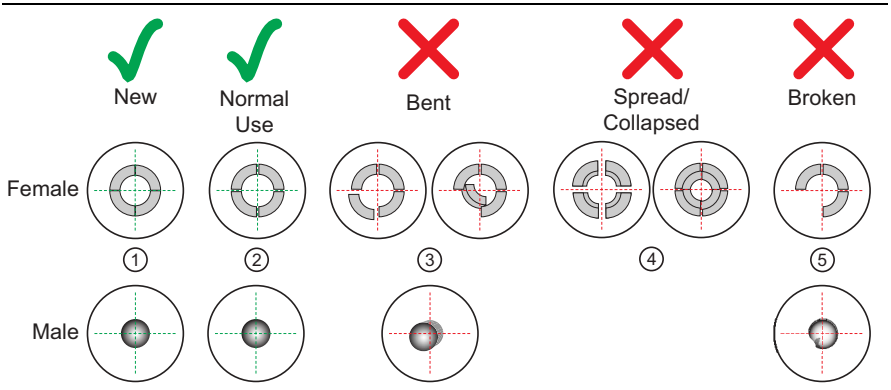
When connector threads are clean and free from defects, the coupling nuts should move freely. Inspect for defects such as:

- Dirt, dust, metal particles and oil
- Damaged threads (distorted, dented, or crushed)
- Deep scratches showing unplated metal
- Dents or raised edges on the mating plane



### Center Conductor Inspection

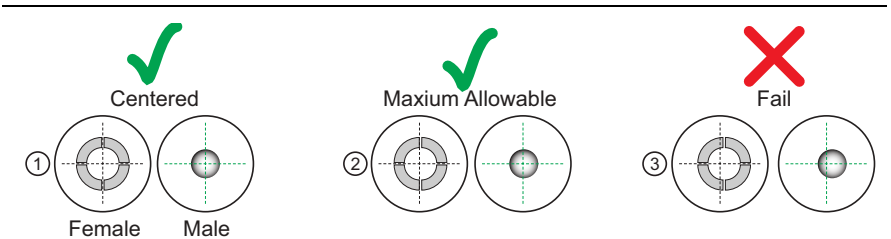
Inspect for bent, broken, or damaged center conductors:



Index	Description
1	New condition
2	Normal use – Slight gap
3	Bent pin section - Discard connector
4	Fingers spread or collapsed - Discard connector
5	Broken pin or pin section - Discard connector

**Figure 2-3.** Connector Damage States

Inspect for center pin concentricity:



Index	Description
1	Centered
2	Maximum allowable off-center
3	Fail - off center - Discard connector

**Figure 2-4.** Connector Concentricity

## 2-3 Cleaning

When the connector threads of the connectors are connected and disconnected, the threads and outer conductor mating interfaces can build up a layer of dirt, metal chips, and other foreign material. These contaminants can degrade electrical and mechanical performance. To prevent inaccurate measurements and reduced connector life, connector interfaces must be kept clean.

**Caution**

Use the correct sized cotton swabs that are made specifically for cleaning small areas, such as tapered tip mini cotton swabs. Oversized cotton swabs can put lateral pressure on the center pin and damage it.

### Required Cleaning Items

- Low-pressure dry, compressed air (oil free, solvent free), maximum pressure: 40 PSI
- Lint-free narrow-tipped cotton swabs
- Isopropyl alcohol (IPA): 90 %
- Microscope

**Caution**

Do not use compressed air on power sensors. Some power sensors have components internally located near the connector that can be damaged from excessive air pressure.

Do not use industrial solvents or water to clean the connector. Use 90 % Isopropyl Alcohol (IPA) only.

Do not spray alcohol directly onto connector surfaces.

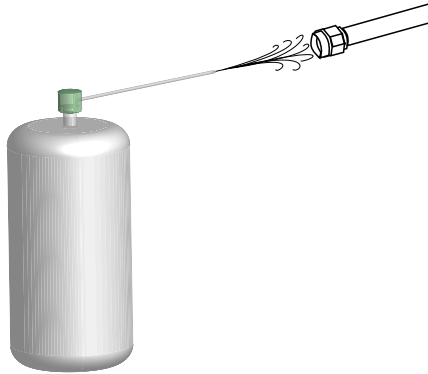
Do not saturate the swab with alcohol. Instead, lightly dampen it by touching the tip onto a bead of alcohol formed at the bottle tip as shown.

**Teflon Tuning Washers:****Note**

The center conductor on some RF and microwave components contains a small Teflon tuning washer located near the point of mating (interface). This washer compensates for minor impedance discontinuities at the interface. The washer's location is critical to the component's performance. Be careful not to disturb it with a cotton swab or compressed air and don't apply alcohol to it.

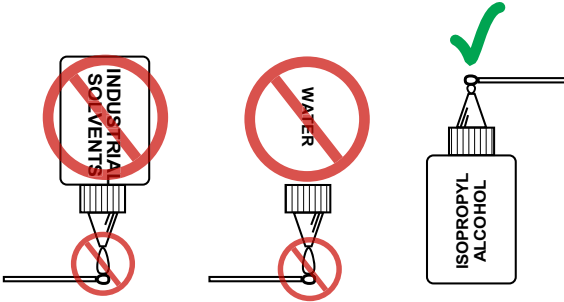
**Cleaning Procedure**

1. Remove loose particles on the mating surfaces, threads, and similar surfaces using low-pressure compressed air. Refer to [Figure 2-5](#). Avoid forcing dirt down into the connector by applying the forced air at a slight angle.



**Figure 2-5.** Low Pressure Compressed Air Cleaning

- Use only Isopropyl Alcohol for cleaning the connector parts. Clean the threads of the connector with a narrow-tipped lint-free cotton swab dampened with Isopropyl Alcohol.



**Figure 2-6.** Isopropyl Alcohol Only

**Caution**

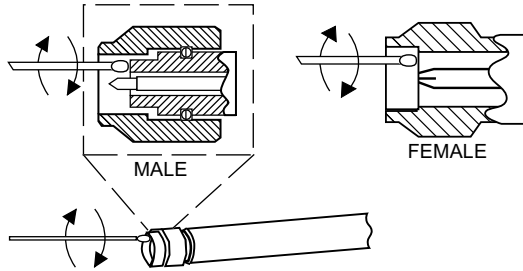
Do not insert cotton swabs at an angle. Doing so can damage the center pin.

Do not use a cotton swab that is too large. It can stress and damage the center pin.



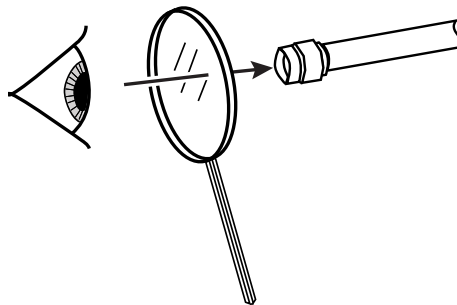
**Figure 2-7.** Avoid Angled or Large Swab

3. Clean the mating plane surfaces and connector threads by gently moving the cotton swab around the center pin. Do *not* touch the center pin.



**Figure 2-8.** Cleaning Connector with Cotton Swabs

4. After cleaning with swabs, use low-pressure compressed air to remove any remaining small particles and dry the connector surfaces.
5. With the aid of magnification and adequate lighting, inspect the connectors for damage and cleanliness.



**Figure 2-9.** Final Inspection

6. Hand tighten the connector until snug and then use a torque wrench to tighten to the specified torque.



# Chapter 3 — Measuring Pin Depth

## 3-1 Introduction

Incorrect pin depth of mating connectors is a common cause of incorrect measurement results and equipment failure in the field. All connectors being used should be checked a minimum of once per day before use.

### Pin Depth Defined

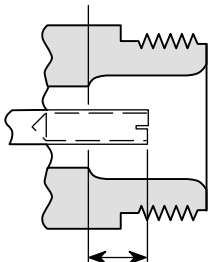
When an RF component is mated with a connector having a positive pin depth, damage will likely occur to the RF connectors.

Pin depth is measured from a connector reference plane to a defined point on the connector center pin (depending on the connector type). A typical example of pin depth dimensions for a male and female connector is shown in [Figure 3-1](#).

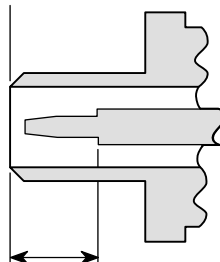
The mechanical gaging of coaxial connectors will detect and prevent the following problems:

**Out of Tolerance Positive Pin Depth:** Out of tolerance positive pin depth can result in buckling of the fingers of the female center conductor or damage to the internal structure of a device due to the axial forces generated.

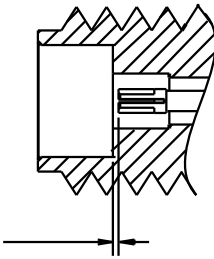
**Out of Tolerance Negative Pin Depth:** Out of tolerance negative pin depth can result in poor return loss, possibly unreliable connections, and even physical breakdown under peak power conditions.



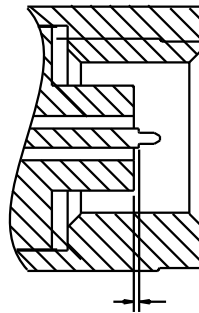
Type-N Female  
Pin Depth



Type-N Male  
Pin Depth



W1 Female  
Pin Depth



W1 Male  
Pin Depth

**Warning**

Pin depth that is too long can damage the mating connector. Some RF and microwave components may not have precision type connectors. Mating a precision connector to a non-precision connector can result in connector damage or degraded performance.



### 3-2 Recommended Equipment

Connector pin depth gauge kits are available as part of the Anritsu 365xX Series Calibration Kits. Refer to *Anritsu Precision RF & Microwave Components* catalog.

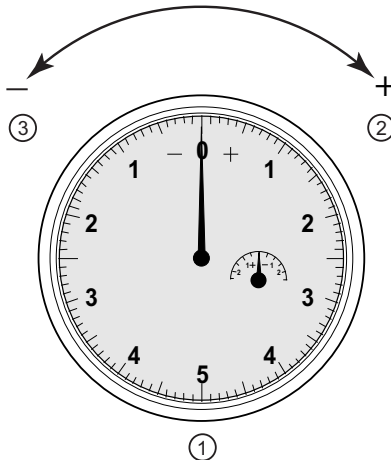
#### Pin Depth Gauge

Use an Anritsu Pin Depth Gauge or equivalent as shown in [Figure 3-1](#) to accurately measure pin depths.

The gauge coupling nut and adapters will vary depending on the connector type. A typical pin depth gauge kit consists of the following items, depending on the type of connector you are measuring.

- Pin Depth Gauge
- Reference Block for zeroing the gauge
- Adapters for connecting to a male or female connector

The smallest increment size measured with an Anritsu Pin Depth Gauge is 0.0001 mm.



Index	Description
1	Pin Depth Gauge with needle setting at zero.
2	Positive needle direction clockwise to right.
3	Negative needle direction counter-clockwise to left.

**Figure 3-1.** Pin Depth Gauge

## 3-3 Checking the Gauge

A pin depth gauge must be checked for cleanliness before each use. Follow the procedures in [Section 2-3](#) to inspect and clean the pin depth gauge.

## 3-4 N Connector Measurement

1. On the pin depth gauge, loosen the side lock knob.
2. Hold the reference block against the end of the gauge body and turn the gauge outer ring until the pointer rests on zero.
3. Tighten the side lock knob.
4. To measure female N connectors, screw the female adapter onto the end of the gauge body. To measure male N connectors, remove the female adapter.

## 3-5 GPC-7 Connector Measurement

1. Turn the gauge coupling nut until the threads are fully retracted.
2. Loosen the side lock knob.
3. Hold the reference block against the end of the gauge connector and turn the outer ring until the pointer rests on zero.
4. Tighten the side lock knob.
5. Remove the GPC-7 center conductor contact collet from the connector to be measured using the collet removal tool.
6. Attach the gauge to the connector and read the pin depth.
7. Remove the gauge and replace the center conductor collet.

### 3-6 K, 3.5 mm, and WSMA Connector Measurement

1. On the pin depth gauge, loosen the side lock knob.
2. Remove the female adapter from the gauge body coupling nut.
3. Hold the reference block against the end of the gauge body and turn the gauge outer ring until the pointer rests on zero.
4. Tighten the side lock knob.
5. To measure female connectors, unscrew the gauge coupling nut and slide it forward.
6. To measure male connectors, leave the gauge coupling attached to the gauge body. Screw the female adapter to the coupling nut.

### 3-7 V Connector Measurement

1. On the pin depth gauge, loosen the side lock knob.
2. Hold the reference block against the end of the gauge body and turn the gauge outer ring until the pointer rests on zero.
3. Tighten the side lock knob.
4. To measure V male connectors, screw the female adapter onto the gauge coupling nut.
5. To measure V female connectors, screw the male adapter onto the gauge coupling nut.

### 3-8 W1 and 0.8 mm Connector Measurement

A pin depth gauge for W1 (1mm) and 0.8 mm connectors is not available. If the pin depth of a W1 or 0.8 mm connector is a concern, please return the device to Anritsu for service. Contact Anritsu Service/Support at: <https://www.anritsu.com/en-US>

## 3-9 Tolerance/Gauge Settings

Refer to [Table 3-1](#). When measuring pin depth, if the connector measures out of tolerance in the (+) positive region of the gauge, the center pin is too long. *Mating under this condition can damage the mating connector.*

If the connector measures out of tolerance in the (–) negative region, the center pin is too short. This measurement result can result in a poor connection and consequent degradation in performance.

**Caution** The mating connectors of various RF and microwave components may not be precision types, therefore the center pins of these devices may not have the proper pin depth due to looser tolerances. The pin depth should be measured to ensure compatibility before attempting to mate it to a connector on Anritsu test equipment.

**Table 3-1.** Pin Depth Tolerances and Gauge Measurement Readings

Connector Type	Pin Depth (Inch)	Pin Depth (mm)
7/16 Male	+0.0579 to +0.0697	+1.4706 to +1.7703
7/16 Female	–0.0697 to –0.0815	–1.7703 to –2.0701
GPC-7	+0.0000 to –0.0030	+0.0000 to –0.0762
N Male	–0.2070 to –0.2100	–5.2578 to –5.3340
N Female	+0.2070 to +0.2040	+5.2578 to +5.1816
WSMA Male/Female (3.5 mm)	–0.0025 to –0.0035	–0.0635 to –0.0889
K Male/Female (2.92 mm)	–0.0005 to –0.0050	–0.0127 to –0.1270
V Male/Female (1.85 mm)	–0.0005 to –0.0030	–0.0127 to –0.0762
W1 Male/Female (1 mm)	–0.0005 to –0.0020	–0.0127 <sup>a</sup> to –0.0508
0.8 mm Male/Female	–0.0003 to –0.0020	–0.0762 <sup>b</sup> to –0.0508

a. Anritsu does not offer a pin depth gauge for the W1 connectors.

b. Anritsu does not offer a pin depth gauge for the 0.8 mm connectors.

# Chapter 4 — Tightening and Disconnecting Connectors

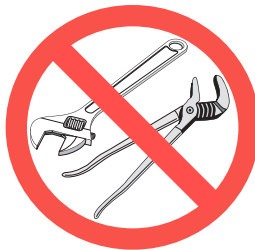
## 4-1 Introduction

This chapter provides tightening and disconnecting with proper torquing instructions for making a repeatable connection and avoiding damage to the connector.

## 4-2 Warnings

A connector must be correctly torqued to ensure an accurate RF measurement but not so tight as to damage the connector's center pin.

<b>Caution</b>	Never use pliers or adjustable wrenches to tighten connectors. Use the correct torque wrench with the correct setting to tighten the connector.
----------------	---



**Figure 4-1.** Do Not Use Pliers or Adjustable Wrenches

### 4-3 Pre-connection Steps

1. Before touching instrument connectors, make sure you have grounded yourself and eliminated all static charge by following proper ESD handling procedures that conform to ANSI/ESD S20.20-2007.
2. Verify the power and voltage levels of the test device you are connecting to.
3. Verify all the input limits of your test equipment.
4. Visually inspect the connectors for damage, cleanliness, and center pin concentricity as described in [Chapter 2](#).
5. The coupling nut should move freely. If necessary, clean the connectors.
6. Measure connector pin depth if the connector is new or of unknown condition. Refer to [Chapter 3](#) for details.

**Warning**

Some RF components may not have precision type connectors. Mating a precision connector with a non-precision type can result in connector damage or degraded performance. Ensure the connectors are compatible before proceeding. Refer to the section [“Connector Types and Cross-mating Compatibility”](#) on [page 4-9](#).

## 4-4 Initial Connection

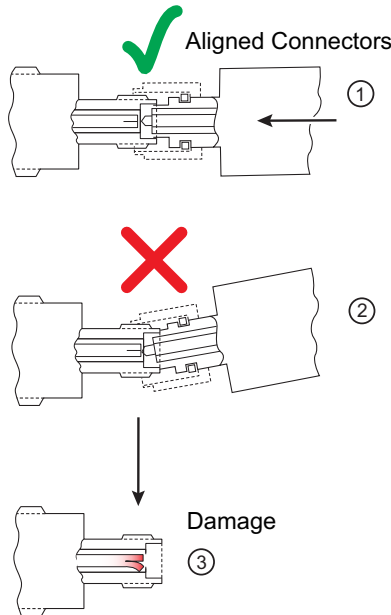
1. Carefully align the connectors as shown in [Figure 4-2](#).

Align the connectors center pins so they slip concentrically into the contact fingers of the female connector. You should never have to apply excessive force when making a connection.

2. Push the connectors straight together.

Do not twist while pushing them together. As the center conductors mate, there is usually a slight resistance.

**Warning** Having to apply excessive force to a connection is a reason to suspect the compatibility or quality of the connector and indicates a need to measure the pin depth.



Index	Description
1	Aligned connectors
2	Misalignment can cause pin damage
3	Damaged pin

**Figure 4-2.** Avoid Pin Damage Due to Misalignment

## 4-4 Initial Connection      Tightening and Disconnecting Connectors

3. Finger-tighten the connection first by turning the connector nut.

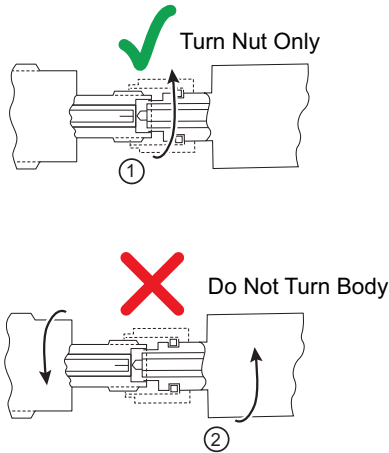
**Do not** turn the connector body.

**Do not** pre-tighten so much that there is no rotation of the nut when using the torque wrench.

4. Back off the connection by turning the connector nut counter clockwise 1/4 turn.

The final tightening is done using the appropriate torque wrench as described in [Section 4-5](#).

**Caution** Do not turn the connector body. Major damage to the center conductor and the outer conductor can occur if the connector body is twisted.



Index	Description
1	Turn nut only
2	Do not turn body

**Figure 4-3.** Tightening the Connector Nut



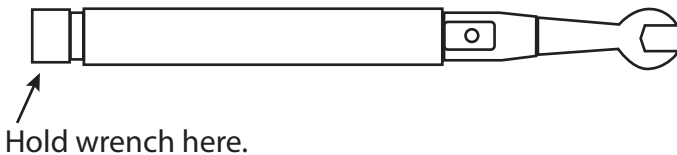
## 4-5 Torquing the Connection

Connectors must be properly torqued to their required specifications to assure an accurate RF measurement. Applying proper torque will improve connection repeatability, reproducibility, as well as maximize connector life.

**Caution** **Never** use pliers to tighten connectors. Use the correct torque wrench with the correct setting to tighten the connector. For Type N connectors, finger-tight will be sufficient.

1. Select a torque wrench of proper size and rating for the connector and an open end wrench. The open end wrench is used to prevent the body of the connector from turning. Refer to [Table 4-1](#) for torque specifications.
2. Place the two wrenches at an angle of less than 90° as shown in [Figure 4-5](#).
3. Hold the torque wrench at the end as shown below.

**Caution** Holding the torque wrench anywhere but at the end applies an unknown amount of torque and can damage contacts and/or connectors.

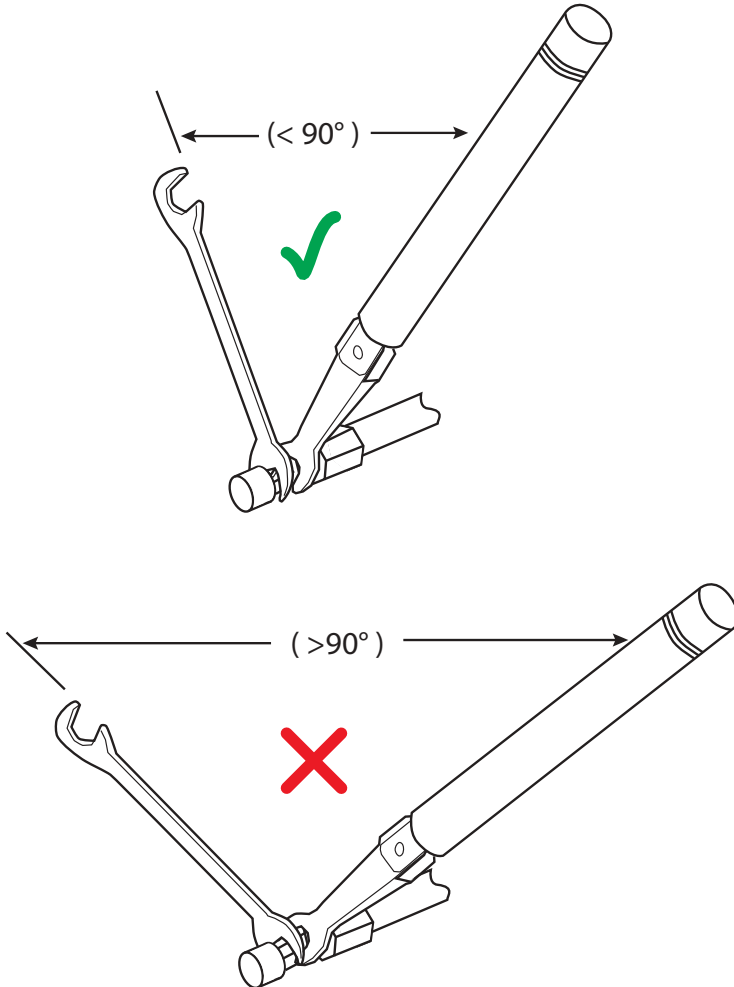


**Figure 4-4.** Correct Place to Hold Torque Wrench

4. Provide support for long, heavy pieces of equipment such as cables so there is no lateral pressure on the connection.
5. Hold the connector body while rotating and torquing *only* the connector nut when making connection.

**Caution**

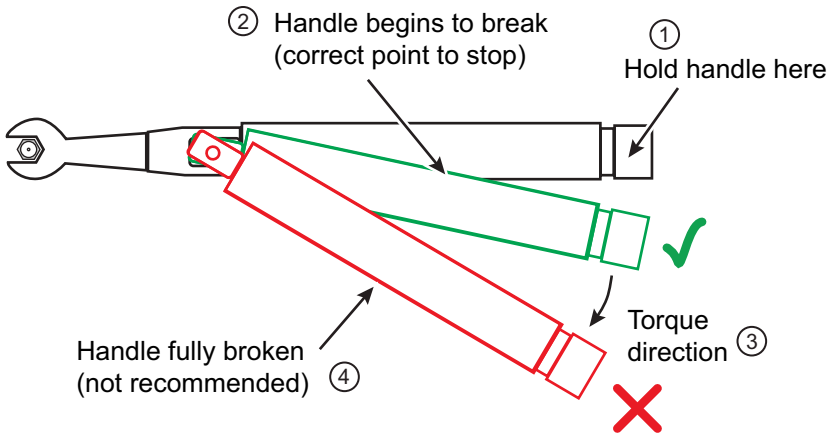
Using two wrenches with an angle greater than  $90^\circ$  causes the devices to lift up, which tends to misalign and stress the connectors. This becomes more of a problem when multiple devices are connected together.



**Figure 4-5.** Using Wrenches at Proper Angle

**Caution** Breaking the handle fully can cause the wrench to kick back which may loosen the connection.

6. Apply torque to the fitting until the handle begins to break as shown in [Figure 4-6](#).



Index	Description
1	Hold handle here
2	Handle begins to break - Stop torquing
3	Torque direction
4	Handle fully broken - Avoid torquing this far

**Figure 4-6.** Using a Torque Wrench

## Torque Specifications and Tools

Torque values are listed below for connectors used with Anritsu equipment. If you are not sure which connector types are available on your instrument, consult the instrument Technical Data Sheet available on the web at [www.anritsu.com](http://www.anritsu.com).

**Table 4-1.** Connector Torque Settings and Recommended Tools

Connector Type/ Size	Wrench Size	Torque Setting	Recommended Tools
7/16 DIN	32 mm 1 1/4 in	25 N·m 18.43 lbf·ft	01-513 Torque Wrench 01-510 Adjustable 10" End Wrench
	25.4 mm 1 in	25 N·m 18.43 lbf·ft	01-512 Torque Wrench 01-510 Adjustable 10" End Wrench
Type N (With Flats)	19 mm 3/4 in	1.35 N·m 12 lbf·in	01-200 3/4 in. Torque End Wrench
20 GHz Type N	19 mm 3/4 in	1.35 N·m 12 lbf·in	01-200 3/4 in. Torque End Wrench
Type N Twist-On	–	–	Twist-on connector version – no torque setting Align connectors, – twist on until finger tight. <i>Do not use a wrench or pliers to tighten.</i>
7 mm	19.2 mm 3/4 in	1.35 N·m 12 lbf·in	01-200 3/4 in. Torque End Wrench
SMA <sup>a b</sup>	8 mm 5/16 in	0.9 N·m 8 lbf·in	01-201 5/16 in. Torque End Wrench 01-204 5/16 in. 8 mm Open End Wrench
3.5 mm	8 mm 5/16 in	0.9 N·m 8 lbf·in	01-201 5/16 in. Torque End Wrench 01-204 5/16 in. or 8 mm Open End Wrench
WSMA <sup>c</sup>	8 mm 5/16 in	0.9 N·m 8 lbf·in	01-201 5/16 in. Torque End Wrench 01-204 5/16 in. or 8 mm Open End Wrench
K (2.92 mm)	8 mm 5/16 in	0.9 N·m 8 lbf·in	01-201 5/16 in. Torque End Wrench 01-204 5/16 in. 8 mm Open End Wrench
2.4 mm	8 mm 5/16 in	0.9 N·m 8 lbf·in	01-201 5/16" Torque End Wrench 01-204 5/16" 8 mm Open End Wrench
V (1.85 mm)	8 mm 5/16 in	0.9 N·m 8 lbf·in	01-201 5/16 in. Torque End Wrench 01-204 5/16 in. or 8 mm Open End Wrench
W (1 mm)	6 mm	0.45 N·m 4 lbf·in	01-504 6 mm Torque End Wrench 01-505 6 mm x 7 mm Combination Open End Wrench
0.8 mm	6 mm	0.45 N·m 4 lbf·in	01-524 0.8 mm - 6 mm Torque End Wrench 01-525 6 mm x 7 mm Open End Wrench

a. WSMA, 3.5 mm, 2.92 mm and K connectors are electrically compatible with SMA and have the same connector nut size (8 mm) and torque requirement. Refer to [Table 4-2](#) for connector compatibility information.

b. Although the 2.4 mm, 1.85 mm, and V connectors have the same connector nut size (8 mm) and torque requirement, they are not mechanically compatible with SMA. Refer to [Table 4-2](#) for connector compatibility information.

c. The WSMA connector is designed for best electrical performance when it is mated to an SMA connector.

### Connector Types and Cross-mating Compatibility

The following table lists RF connector characteristics and cross-mating compatibilities

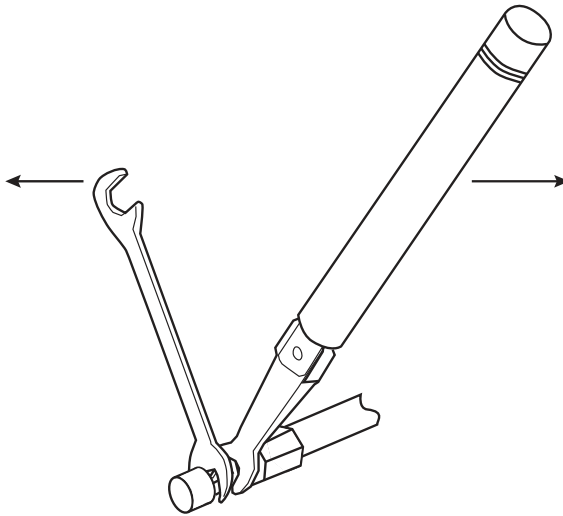
**Table 4-2.** RF Connector Characteristics

Connector Type/ Parameter	Upper Frequency Limit (GHz)	Mating Type	Cross mating Compatibility	Dielectric	Thread	Outer Conductor (mm)
7/16 DIN	7.5	M/F	7/16 DIN only	Air	M29 x 1.5	16
20 GHz Type N	20	M/F	Type N	Air	5/8-24	7
Type N	18	M/F	20 GHz Type N	Air	5/8-24	7
7 mm	18	Sexless	7 mm only	Air	0.6785-24	7
SMA	18	M/F	K, 3.5 mm, WSMA	Teflon	1/4-36	4.2
WSMA	26.5	M/F	K, 3.5 mm, SMA	Air	1/4-36	3.5
3.5 mm	26.5	M/F	K, SMA, WSMA	Air	1/4-36	3.5
K 2.92 mm	40	M/F	3.5 mm, SMA, WSMA	Air	1/4-36	2.92
2.4 mm	50	M/F	V	Air	M7 x 0.75	2.4
V 1.85 mm	67	M/F	2.4 mm	Air	M7 x 0.75	1.85
W1 1 mm	110	M/F	W (1 mm) only	Air	M4 x 0.7	1

## 4-6 Disconnecting

To properly separate an RF connection:

1. Use the same wrenches as shown in [Figure 4-7](#).
2. Use one to prevent the connector body from turning. Use the other to loosen the connector nut.
3. Complete the disconnection by hand, turning *only* the connector nut.
4. Pull the connectors straight apart without twisting or bending.



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**Figure 4-7.** Loosening Connectors



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