Operating Instructions

Connector Gage Kit

7mm Metrology Grade

Model A028D

A028-27C

Maury Microwave

Contents

General Information

Description

The Maury model A028D connector gage kit features a "thread-on" design which allows the gage to be conveniently mated with the device being measured for hands-free operation. The connector gage is initially set to zero using the model A028D2 master setting gage, allowing the subsequent measured results to be read directly from the dial indicator.

Two centering sleeves, model A028S5, are provided to facilitate the measurement of precision beadless airlines and two-port standards. The alignment pin, model A028S6, is supplied to aid in "flush-setting" the Maury metrology grade sliding load, model 2608C, and the model 2693A sliding mismatch. The "thread-on" design of the model A028D eliminates the difficulty in measuring vector network analyzer (VNA) test ports.

All machined parts are made from non-magnetic stainless steel to assure long life and good stability. Gaging surfaces are lapped to ensure a high degree of accuracy. A parts list is shown in **Table 1**.

ITEM	DESCRIPTION	MMC PART NUMBER	QUANTITY PER ASSEMBLY
1	Indicator Assembly	A028D1	1
2	Master Setting Gage	A028D2	1
3	Alignment Pin	A028S6	1
4	Pin Wrench	A028S5	2

Table 1. Parts List

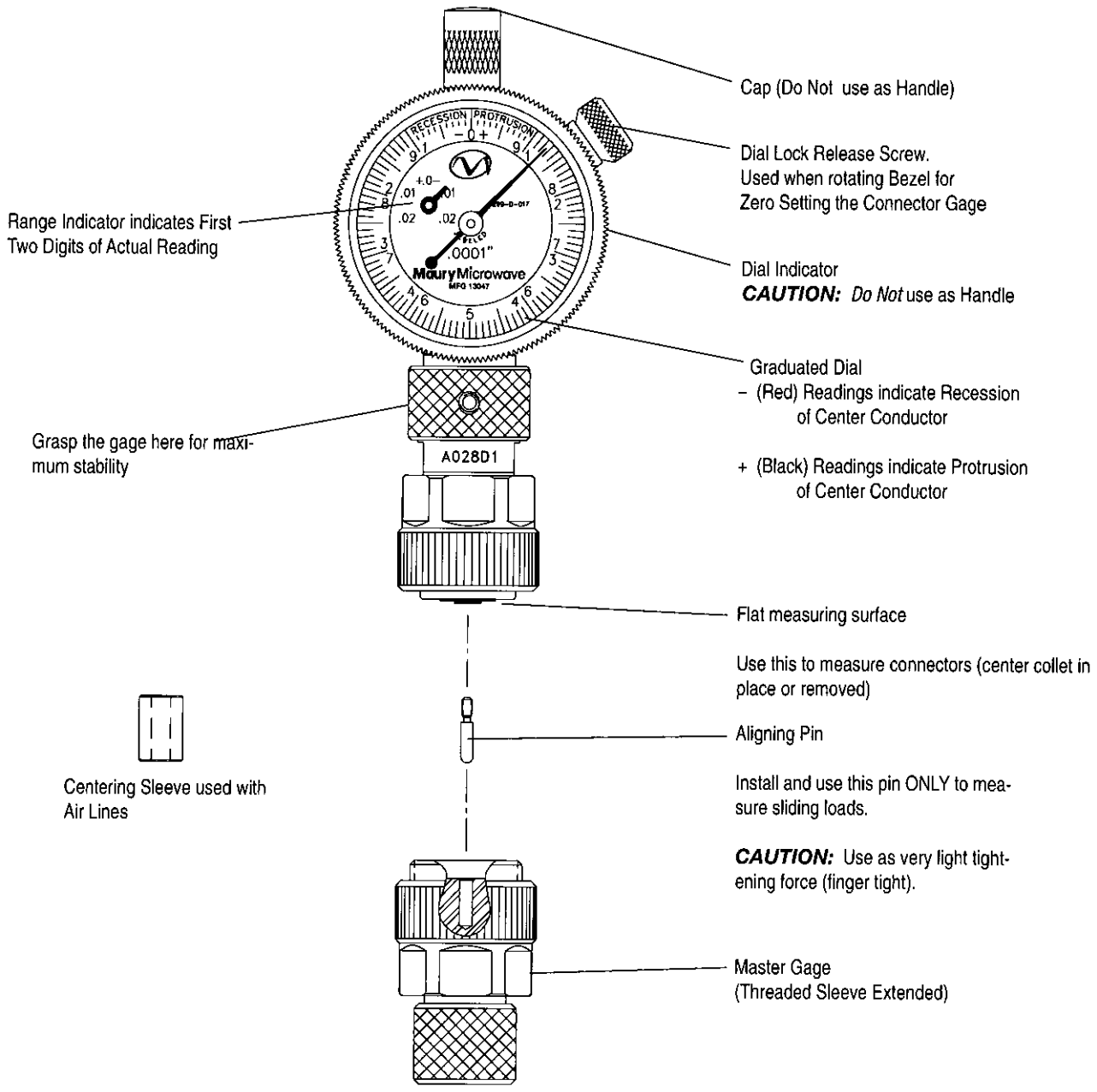


Figure 1. The A028D Connector Gage Kit

Specifications

The specifications listed in **Table 2** are the performance standards based on factory measurements traceable to the U.S.A. National Institute of Standards and Technology (NIST). To verify that your gage kit is performing to traceable specifications, periodically send the kit to Maury Microwave Corporation for calibration. The recommended calibration cycle is one year. The actual need may vary depending on usage.

Connector Gage Specifications

CHARACTERISTICS	LIMITS	COMMENTS
Gage Resolution	± 0.000020	1/5 Least dial graduation [1]
Gage Calibration Accuracy [6]	± 0.000150	1 Least dial graduation [2] plus 0.000050 measurement guardband
Gage Repeatability [4]	± 0.000020	1/5 Least dial graduation [2]
Master Accuracy	± 0.000050	0.00010 Range [3]
Total Uncertainty [5, 6]		
RSS	± 0.000161	Root sum of the squares.
Worst Case	± 0.000240	Add resolution, repeatability, gage and master accuracy limits.

Table 2

NOTES:

1. Per ASME B89.1.10M-2001, C5.1.2.
2. Per ASME B89.1.10M-2001, Table 2.
3. Per manufacturer's specification.
4. Operator skill has a great impact on repeatability. You can easily determine the repeatability of the connector gages by multiple engagements of the master gages following the procedure outlined under ***Zero Setting*** on page 4.
5. Performance standards are in compliance with ANSI/NCSL Z540-1, MIL-STD-45662A and ISO 10012-1.
6. Applies over the operating range for connector gaging a recession of 0.005" to a protrusion of 0.001" from master gage zero setting. Does not apply for measuring spring collet contact protrusion.

Operation

A connector assembly and master setting gage are shown in **Figure 1**. The gage assembly consists of a dial indicator graduated in 0.0001 inch increments with a precision adapter bushing kit that is attached to the indicator. An internal floating pin is used to measure the center conductor location. The master setting gage is used to set a zero reference.

CAUTION: *Do not loosen the set screws that hold the adapter bushing to the dial indicator. This will allow the bushing to move from the factory preset location and affect gaging action.*

Visual Inspection

Inspect all connectors carefully before each use. If a connector shows deep scratches, dents, uneven wear, or particles clinging to the mating plane surfaces, clean it and inspect again. Damaged connectors should be set aside for repair. Also, try to determine the cause of the damage before making further connections.

Cleaning

Use dry compressed air of a very low velocity first; then use a solvent such as isopropyl alcohol. Clean the contacting surfaces, alignment parts and threads using a lint free swab. Then reinspect the connector to make sure that no fibers have been left around the contact and mating surface.

Verifying Zero Setting

The gage assemblies are pre-set at the factory for zero setting. However, the user should verify the zero setting prior to each use.

Use master setting gage A028D2 to verify the zero setting.

Procedure: Refer to Figure 2

1. Visually inspect the mating surfaces of your connector gage and master setting gage.
2. Clean both mating surfaces using the cleaning procedure given above.
3. Extend the threaded sleeve of either the connector gage or the master setting gage. Ensure that one threaded sleeve is recessed and the mating part of the threaded sleeve is fully extended. Check this through light spinning of the knurled nuts.
4. Align the connector gage and master setting gage as shown in **Figure 2**. Then rotate the knurled nut, allowing it to engage with the threaded sleeve. Let the master setting gage bottom freely against your A028D1. Tighten by using an MMC 2698C2 torque wrench (12 inch pounds). The dial pointer should rotate clockwise and stop at zero after one or more revolutions. The small dial pointer should also read zero.

NOTE: *Avoid rotating parts at the same time torque action is done. Rotating parts against each other will yield faulty readings and could result in damage to the mating planes.*

5. If resetting zero is required, hold the dial indicator and master gage in one hand. Loosen the dial lock an rotate the bezel (outside of dial indicator) to the zero position indicated by the pointers on the indicator. Retighten the dial lock (see **Figure 2**).

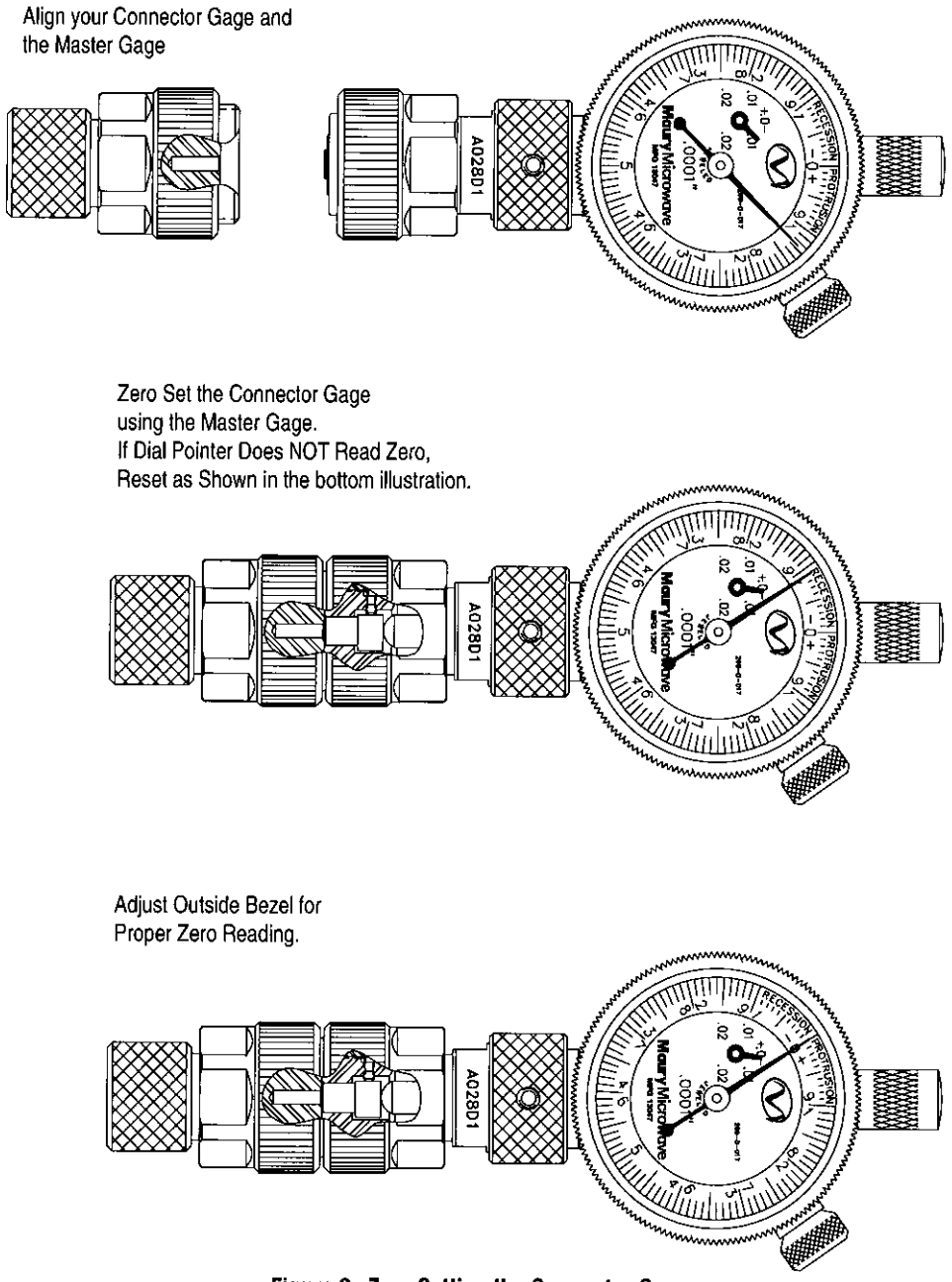


Figure 2. Zero Setting the Connector Gage

Alignment Pin

An aligning pin is supplied for checking 7mm connectors with the sleeve retracted and 7mm-M connectors (see **Figures 3** and **4**) in order to provide proper alignment. All three connector types can be checked with the aligning pin installed, however, it is not necessary to use the alignment pin on 7mm connectors with the sleeve extended or in the case of the 7mm-F version since the bushing then provides proper alignment.

Screw the aligning pin into the center pin of the gage assembly, then finger tighten only. Note that the alignment pin will fit into the center hole of the master gage.

Gaging 7mm Connectors

The following procedure applies primarily to standard 7mm connectors. It also applies in general to the other two version shown in **Figures 3** and **5**.

1. Using a collet extraction tool similar to the Maury 2697S5, remove the spring collet contact. Use care in this operation. Do not nick or scratch the end of the inner conductor or damage the contact itself.
2. Extend the coupling sleeve of the 7mm connector to be measured.

   NOTE: *When the alignment pin is used, the coupling sleeve is not extended, and the alignment pin is carefully inserted into the hole in the center of the A028D1.*

3. Align the connector and your A028D1. Then rotate the knurled nut allowing it to engage with the threaded sleeve, as in Figure 6. Let the connector bottom freely against your A028D1. Tighten with light finger pressure only, avoiding any rotation of the mating planes at the same time. Then using a torque wrench, torque connection to 12 in-lb.
4. The deviation from zero is read directly from the indicator main pointer. A minus (-) reading indicates the inner conductor is recessed or below the outer conductor mating plane. A plus (+) reading indicates the inner conductor is protruding past the outer conductor mating plane.
5. 7mm connectors and variations should meet the coplanar interface requirements depicted in **Figure 4**.
6. Reinsert collet after measurement of connector is complete.

CAUTION: *Protrusion of inner conductor can cause damage when a pair of connectors are mated.*

Gaging Sliding Loads

The critical mechanical specification in precision 7mm connectors is the recession (setback) of the center conductor relative to the outer conductor mating plane with the center conductor collet removed. No protrusion of the center conductor above the outer conductor mating plane is ever allowable. Sometimes a minimum recession is required.

Procedure: Refer to Figure 7

1. Visually and carefully inspect the mating surface of the connector on the sliding load to be gaged before making a connection.
2. Remove the centering pin from the sliding load center conductor.
3. Gently thread the aligning pin into the plunger of the A028D1.
4. Clean all mating surfaces.
5. Zero set the A028D1 using the master setting gage.
6. Loosen the center conductor locking mechanism in the rear of the sliding load.
7. Align the connector gage and the connector of the sliding load. Then carefully insert the aligning pin of the A028D1 into the sliding load center conductor.
8. Adjust the center conductor position so it is within the specified interface dimension for a 7mm precision connector. (See **Figure 4**). Tighten the center conductor locking mechanism.
9. Disengage the sliding load and the A028D1.
10. Reinsert the centering pin of your sliding load.

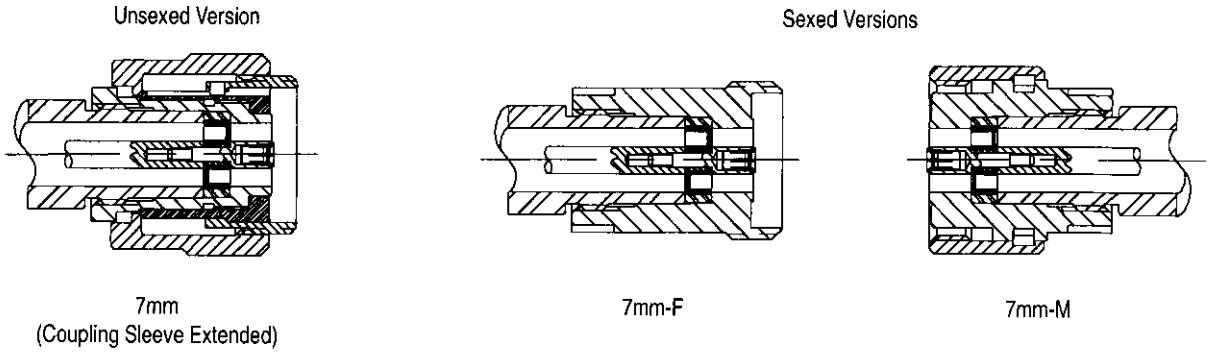


Figure 3. 7mm Connector and Sexed Variations

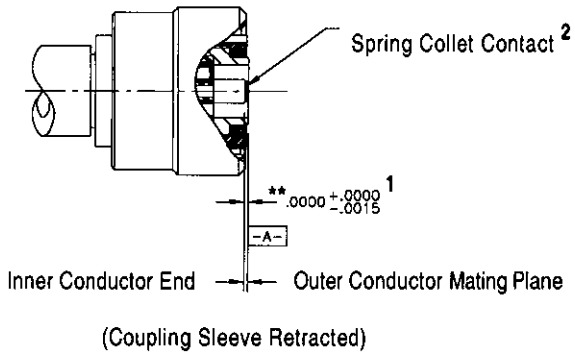


Figure 4. Coplanar Interface Requirements for 7mm Connector
****Tolerance shown is for 7mm GPC, the recommended 7mm LPC tolerance is +.000/-.0005**

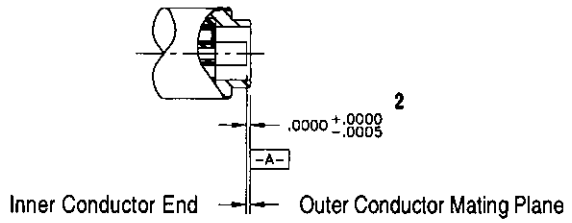


Figure 5. Air Line Assembly

NOTES

1 Minus tolerance indicates that the inner conductor is recessed or below plane [-A-]. This provides a direct reading based on the polarity of the dial indicator face.

2 The spring contact must be removed prior to gaging.

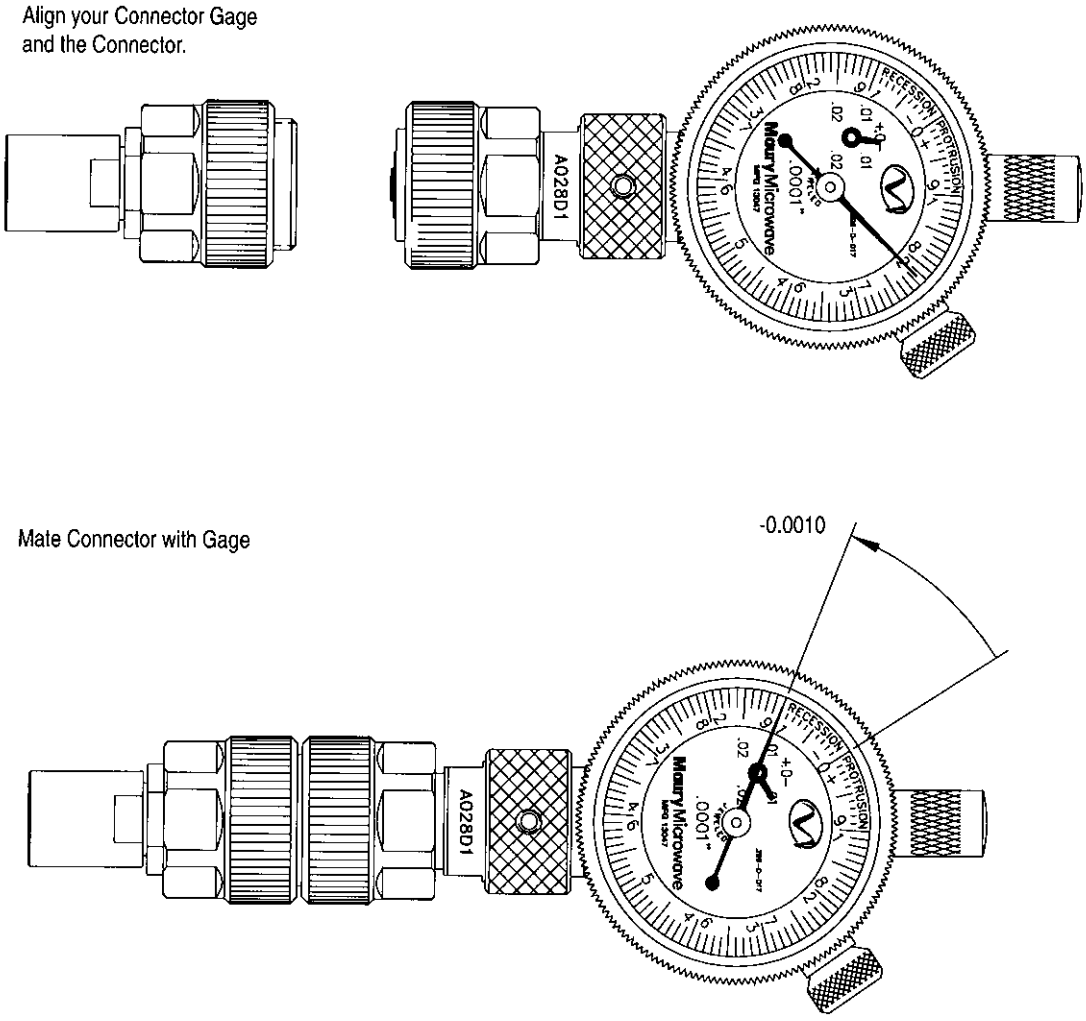
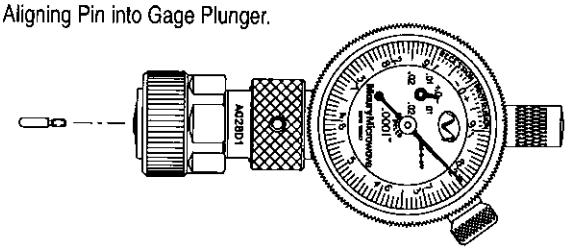
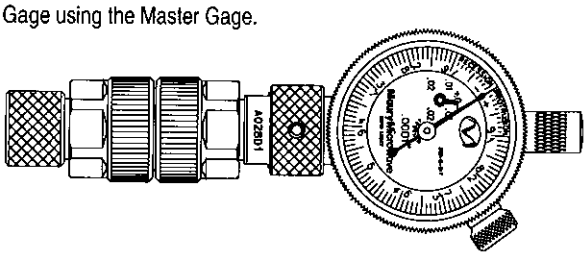


Figure 6. Gaging 7mm Connectors

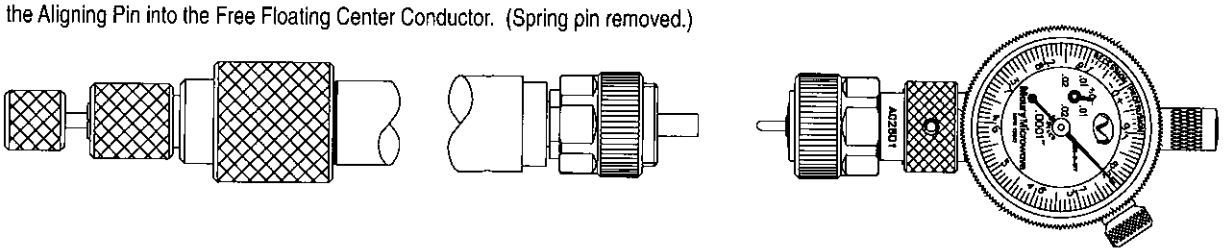
Thread Aligning Pin into Gage Plunger.



Zero Gage using the Master Gage.



Insert the Aligning Pin into the Free Floating Center Conductor. (Spring pin removed.)



Engage and Set for Proper Interface Dimensions.

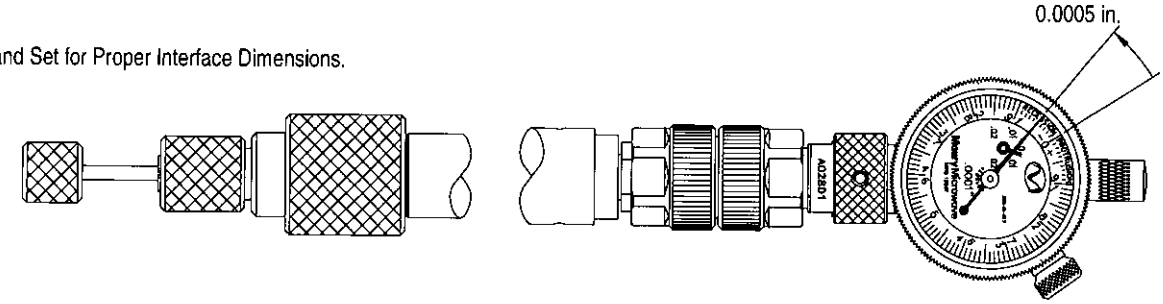


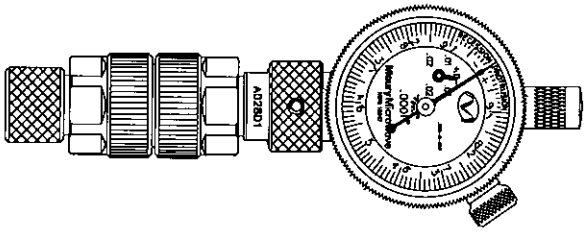
Figure 7. Gaging 7mm Precision Sliding Loads

Gaging Air Line Assemblies

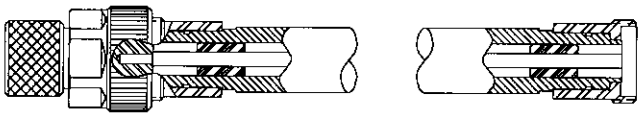
Procedure: Refer to Figure 8

1. Visually inspect the mating surface on the air line to be gaged before making a connection.
2. Remove the centering pins from both ends of the center conductor.
3. Clean all mating surfaces.
4. Zero set the A028D1 using the master setting gage.
5. Slip sleeve A028S5 over one end of the center conductor. Insert into the air line. (This helps avoid scratching the outer conductor while inserting the center conductor.)
6. Thread the master setting gage onto the air line end where the sleeve can be seen.
7. Insert the second sleeve into the open end of the air line.
8. Align the air line and A028D1. Gently make a connection. Using a torque wrench, torque to 12 in-lb. on both ends of the air line.

Zero Set the Connector Gage
Using the Master Gage.



Insert Centering Sleeves and Connect
Master Gage to Air Line or Two Port Standard



Engage Air Line and Connector Gage

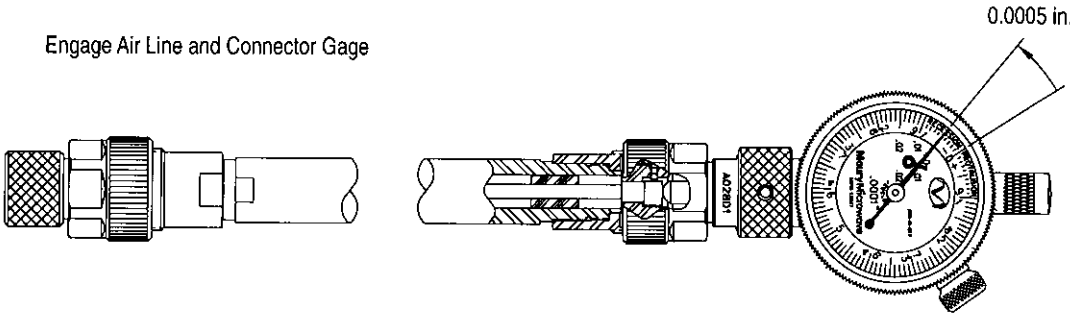


Figure 8. Gaging Beadless Precision Air Lines

Maintenance and Calibration

Maintenance

These connector gage kits are relatively maintenance free if the components are handled with the same care that is appropriate to all precision equipment. As with any precision component, proper care should be taken to assure clean mating surfaces, proper alignment, and proper torquing. Repair and calibration should be referred to our Customer Service Department.

Calibration

To verify that your calibration kit is performing to traceable specifications, periodically send the kit to Maury Microwave Corporation for calibration. The recommended calibration cycle is one year. The actual need may vary depending on usage.

Should additional information or service be required, address inquiries to:

Maury Microwave Corporation
Attention: Customer Service
2900 Inland Empire Boulevard
Ontario, California 91764-4804
USA

Phone: (909) 987-4715
Facsimile: (909) 987-1112
E-mail: maury@maurymw.com
Web site: http://www.maurymw.com

Please mention the model number and revision of the software and the date received in any correspondence.

Warranty

We warrant each instrument of our manufacture to be free from defects in material and workmanship. Our obligation under this warranty is limited to servicing or adjusting any instrument returned to our factory for that purpose, and to making good at our factory any part or parts thereof except fuses or batteries. This warranty period is limited to one year from date of shipment to the original purchaser, and to equipment which is returned to us with transportation charges prepaid and which, upon our examination, shall disclose to our satisfaction to have been defective. This warranty does not cover wear from normal usage nor subsequent damage after shipment.

We reserve the right to make changes in design at any time without incurring any obligation to install such changes on units previously sold by us.

This constitutes the only warranty extended by us, and is in lieu of any other obligations or liabilities on our part in connection with the sale of our equipment.

Appendix 1

Measuring Spring Collet Contact Protrusion

The Maury model A028D connector gage can also be used to measure the location of the spring collet contact per **Figure A1**.

To measure the 0.010 dimension, leave the spring collet in place and use the connector gage without the alignment pin. Use the following procedure.

1. Zero the dial indicator.
2. Extend the coupling sleeve of the 7mm connector completely. Connect the A028D1 to the connector and torque to 12 in-lb.
3. The protrusion of the collet can now be read directly from the indicator main pointer taking into account the small pointer. A reading of 0.010 is one complete revolution. Therefore, use extreme care when making the measurement. Practice a few times to make sure you are properly interpreting the indicator reading.

Another important test is to make sure the collet compresses below the inner conductor end. To accomplish this, compress the collet with your fingernail and visually inspect.

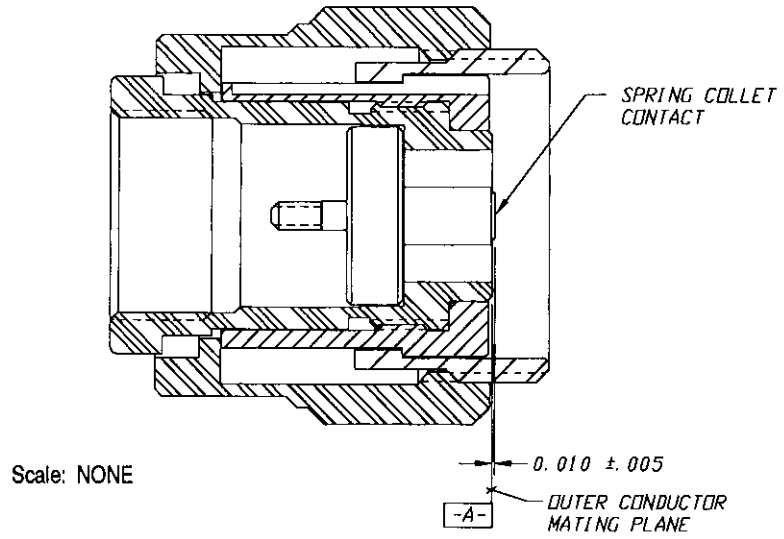


Figure A1