Maury Microwave

2.92/3.5mm
Connector Gage Kit
Metrology Grade
Model A034E

034-48 (Rev D) 07/20

User Guide

2.92/3.5mm
Connector Gage Kit

Model A034E

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Warranty

Maury Microwave hardware products are warranted against defects in materials and workmanship for a period of one year from date of shipment. During the warranty period, Maury Microwave will, at its option, either repair or replace products which prove to be defective.

Maury Microwave software products are warranted against defects in material and workmanship of the media on which the product is supplied for a period of ninety (90) days from date of shipment. Maury also warrants that the product shall operate substantially in accordance with published specifications during the same warranty period. During the warranty period, Maury Microwave will, at its option, either repair or replace products which prove to be defective. Maury does not warrant that the operation of the product shall be uninterrupted or error-free.

For warranty service or repair, all products must be returned to Maury Microwave and must be issued a return authorization number by Maury prior to shipment. Buyer shall prepay shipping charges to Maury. Obligation is limited to the original Buyer.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Buyer, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or wear resulting from normal use. No other warranty is expressed or implied. Maury Microwave specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

The remedies provided herein are the Buyer's sole and exclusive remedies. Maury Microwave shall not be liable for any direct, indirect, special, incidental, or consequential damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or any other financial loss) arising out of the Buyer's use of or inability to use the product, even if Maury or an authorized Maury dealer has been advised of the possibility of such damages.

Contents

General Information

Gage Kit Description

The Maury model A034E connector gage kit is designed to measure 2.92/3.5mm connectors with either female or male interfaces. For simplicity, the rest of this manual will refer to measuring in inches. The Maury A034E connector gage kit achieves excellent repeatability by maintaining tightly controlled tolerances on all machined parts. To achieve maximum accuracy, Maury recommends that an average of 3 measurements taken at different gage orientations be used to minimize random errors. See **Figure 1**.

The Maury model A034E1 measures female connectors and A034E2 measures male connectors these gage assemblies use a “thread-on” design that simulates actual mating conditions, allowing high accuracy measurements and hands-free operation. The connector gage assemblies are initially set to zero using master setting gages, A034E3 (female) or A034E4 (male), permitting measurements to be read directly on the indicator. Centering sleeves are provided for measuring beadless air lines and mismatch air lines. Flush setting sliding loads is easily accomplished using the A034E. The thread-on design of the A034E also allows more convenient and accurate measurements of network analyzer test ports.

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

Item	Description	Maury Part Number	Quantity Per Assy.	Notes
1	Indicator Assembly, Female	A034E1	1	—
2	Indicator Assembly, Male	A034E2	1	—
3	Master Gage, Female	A034E3	1	—
4	Master Gage, Male	A034E4	1	—
5	Sleeve Set (2), 2.92mm	A034S8	1	*
6	Sleeve Set (2), 3.5mm	A034S1	1	*

* The centering sleeves are shipped in small plastic containers

Table 1. Parts List

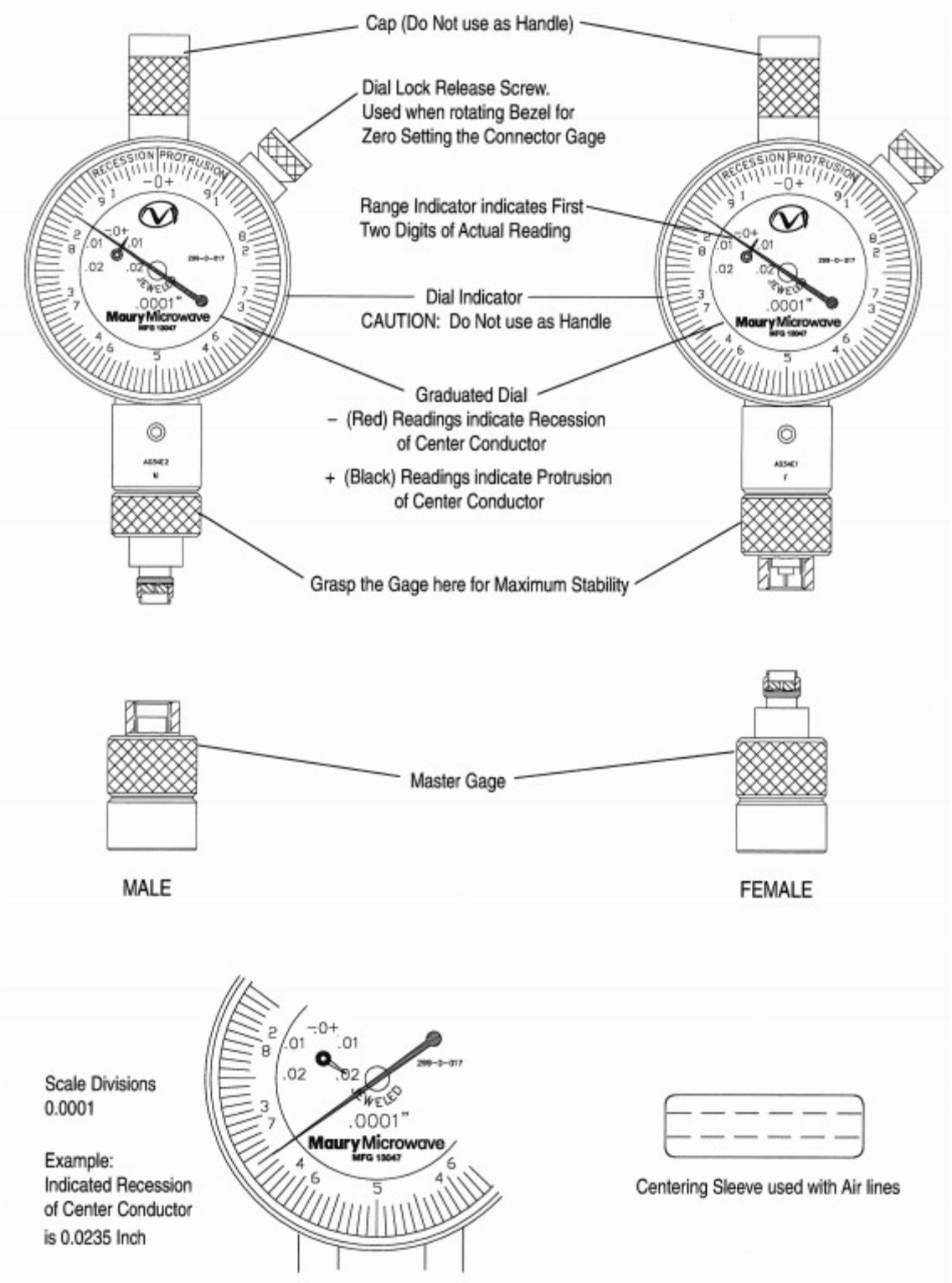

Figure 1. The A034E Connector Gage Kit

The specifications listed in Table 2 are the performance standards based on factory measurements traceable to 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 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 0.000250 measurement guardband
Gage Repeatability [4]	± 0.000020	1/5 Least dial graduation [2]
Master Accuracy	± 0.000025	0.00005 Range [3]
Total Uncertainty [5, 6]		
RSS	± 0.000155	Root sum of the squares.
Worst Case	± 0.000215	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 outlines under Zero Setting on Page 7.
5. Performance standard are in compliance with ANSI/NCSL Z540-1, MIL-STD-45662A and ISO 10012-1.
6. Applies over the operating range for connector gaging +0.006/-0.003" from master gage zero setting.

Operation

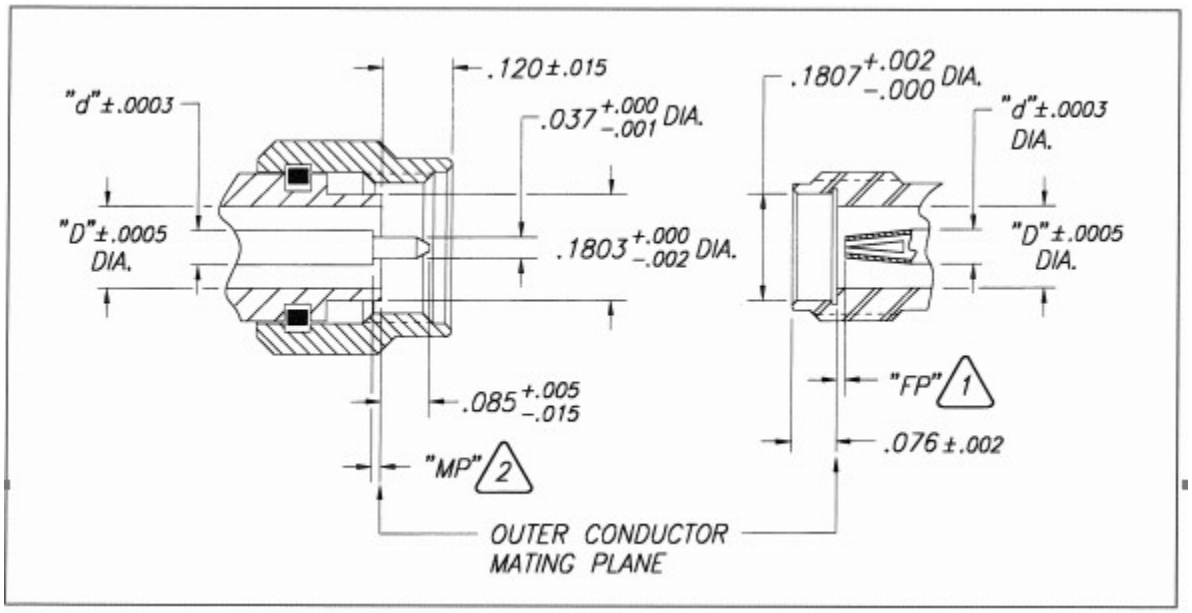

Figure 2. Critical Center Contact Location Dimensions for 2.92mm and 3.5mm Connectors

Connector Type	d	D	"FP" 3	"MP" 3	Comment
3.5mm	.0598	.1378	.000 +.003 -.000	.000 +.003 -.000	Rated to 34 GHz
2.92mm (K)	.0500	.1150	.000 +.003 -.000	.000 +.003 -.000	Rated to 40 GHz

Notes

1. Female contact pin location – use gage assembly marked “F”.
2. Male contact pin location – use gage assembly marked “M”.
3. Tighter tolerances can be used at user’s discretion.
4. In reference to the outline drawing above: Minus (-) tolerances indicate a protruding condition above the outer conductor mating plane. Plus (+) tolerances indicate a recessed condition below the outer conductor mating plane.
5. Other dimensions shown in this figure are shown since they affect the mating of the gage assemblies’ gaging mechanism (bushing and pin). Deviation from these dimensions may cause measurement errors or improper fit between the gaging mechanism and the connector being measured. Consult our Customer Service Department on measuring connectors with interface dimensions other than specified above.
6. When operating the gage: A minus (-) indicates a recessed condition below the outer conductor mating plane. A positive reading indicates a protruding condition above the outer conductor mating plane.
7. Operators are able to validate note 6 by doing the following: After zeroing the gage you will have a minus (-) reading when nothing is connected. As the pin travels towards the gage you will see the value on the gage begin to change in the positive direction.

Applications

Your A034E is an easy to use connector gage kit featuring a "thread-on" design for hands-free operation to determine the critical contact location of 3.5mm and 2.92mm connectors. These dimensions must be maintained in order to provide the required electrical performance and mechanical mating of the connectors. Destructive interference may result if either the female or male contact protrudes beyond the outer conductor mating planes. Conversely, an excessive gap of the center contacts when mated produces high reflections and impaired overall system performance. See **Figure 2**.

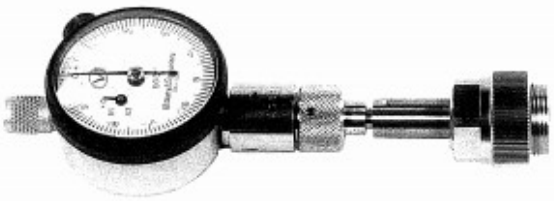

Figure 3

While primarily designed for metrology grade environment, the A034E can be used in production and for general laboratory testing of connector interfaces.

Figure 4

The A034E greatly simplifies setting the interface of sliding loads by freeing the user's hands to perform the necessary adjustments.

Figure 5

The A034E, along with the centering sleeves, is very useful for measuring the interface dimension of beadless 3.5mm and 2.92mm air lines.

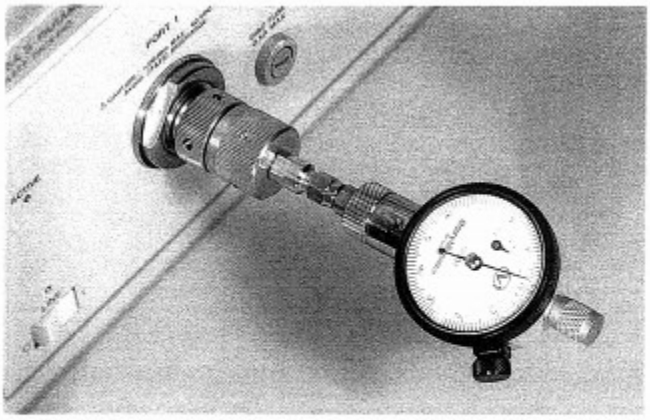

Figure 6

Figure 6 shows the A034E gaging a network analyzer test port connector.

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 at a very low velocity first; then a solvent such as isopropyl alcohol. Clean the contacting surfaces, alignment parts and threads using a lint free swab. Then re-inspect the connector to make sure that no fibers have been left around the contact and interface surfaces.

NOTE: To maintain cleanliness, always wear cotton gloves when performing any of the procedures described in this manual.

CAUTION: For optimum measurements and to prevent damage, always hold the connector gage on the knurled part of the bushing when connecting. Never rotate parts against each other since this could yield faulty readings or damage the mating surfaces.

Zero Setting

The critical mechanical specification in precision 2.92 and 3.5mm connectors is the recession (setback) of the center conductor relative to the outer conductor mating plane (Figure 2). No protrusion of the center conductor in from of the outer conductor mating plane is allowable.

The following procedure applies to both connector gages. For the female connector gage A034E1, use the A034E3 master setting gage and for the male connector gage A034E2, use the A034E4 master setting gage, respectively.

Procedure: Refer to Figure 7, 8 and 9

(Example for measuring female connector.)

1. Visually inspect the mating surfaces of your A034E1 connector gage and A034E3 master setting gage
2. Clean all mating surfaces of the master setting gage and connector gage using the recommended cleaning procedure above.
3. Align the connector gage and master setting gage carefully, then rotate the nut on the gage, allowing it to engage with the thread of your A034E3. Apply light finger pressure avoiding rotation of the mating planes. If you use a torque wrench, it should be rated at 8 inch-pounds. Maury model 8799A1 is recommended. Hold the corresponding part with the 5/16 open end wrench.
4. Loosen the dial indicator. Retighten the dial lock (Figures 1 and 9).
5. Gently loosen and disengage the connector gage and the master gage. You are now ready to measure.

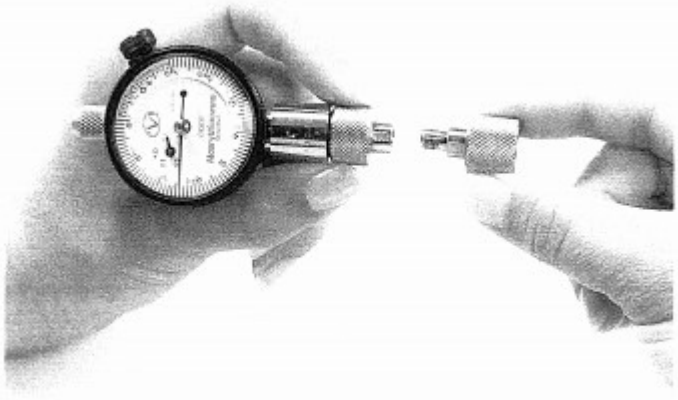

Figure 7. Zeroing the A034E1

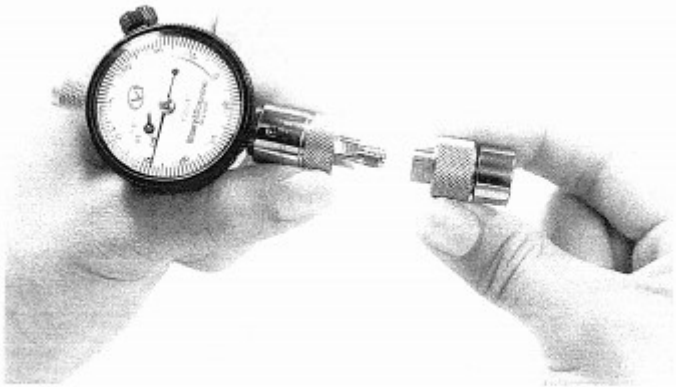

Figure 8. Zeroing the A034E2

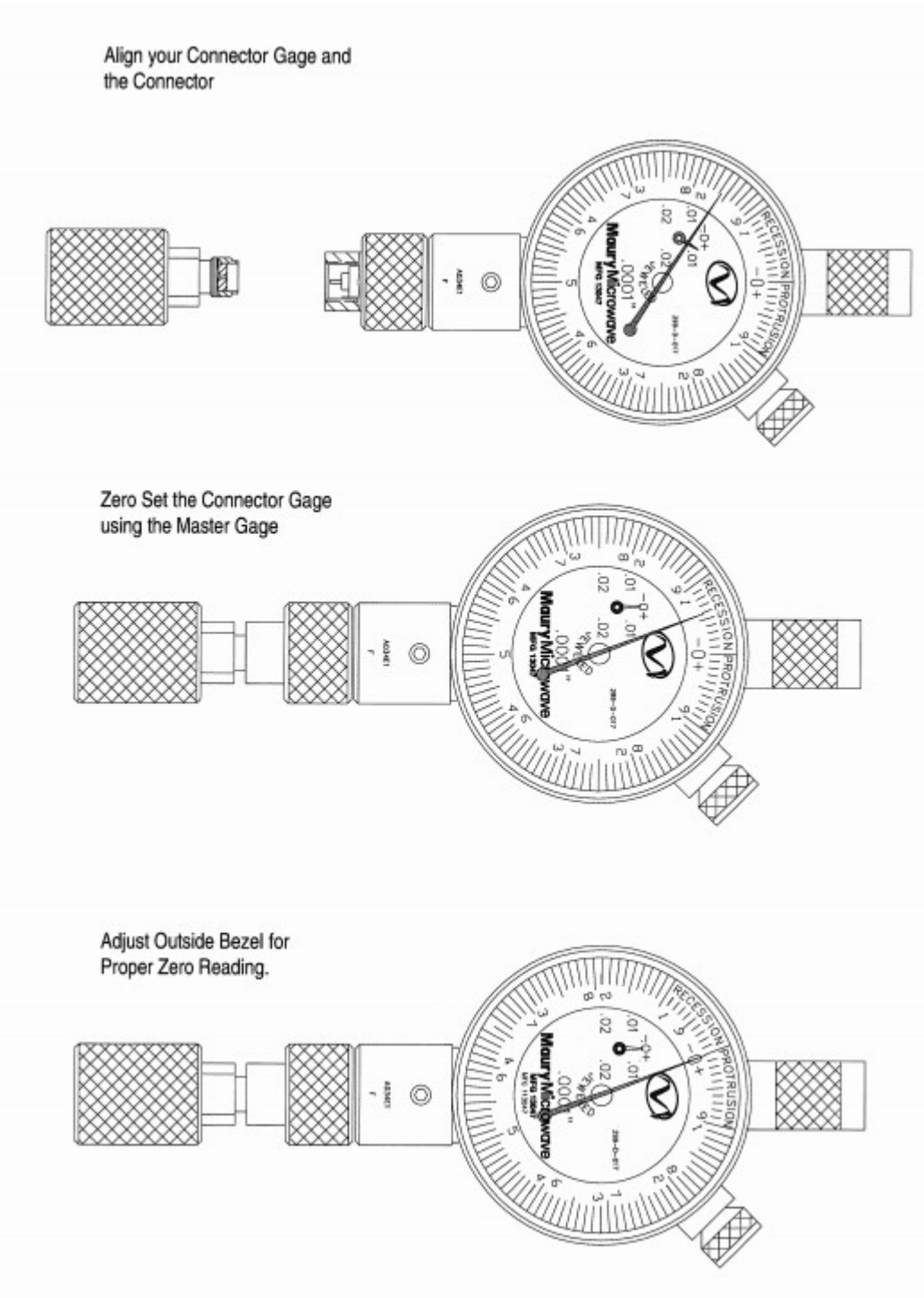

Figure 9. Zero Setting for 2.92mm and 3.5mm Female Connectors
(Applies Equally to the Male Connectors)

The critical mechanical specification in precision 2.92 and 3.5mm connectors is the recession (setback) of the center conductor relative to the outer conductor mating plane (Figure 2). No protrusion of the center conductor in from of the outer conductor mating plane is allowable.

The following procedure applies to both connector gages. For the female connector gage A034E1, use the A034E3 master setting gage and for the male connector gage A034E2, use the A034E4 master setting gage, respectively.

Procedure: Refer to Figure 10

(Example for measuring male connector.)

1. Visually inspect the mating surfaces of your A034E2 connector gage and A034E4 master setting gage
2. Clean all mating surfaces of the master setting gage and connector gage using the recommended cleaning procedure above.
3. Align the connector gage and master setting gage carefully, then rotate the nut on the gage, allowing it to engage with the thread of your A034E4. Apply light finger pressure avoiding rotation of the mating planes. If you use a torque wrench, it should be rated at 8 inch-pounds. Maury model 8799A1 is recommended. Hold the corresponding part with the 5/16 open end wrench.
4. Loosen the dial indicator. Retighten the dial lock.
5. Gently loosen and disengage the connector gage and the master gage. You are now ready to measure.

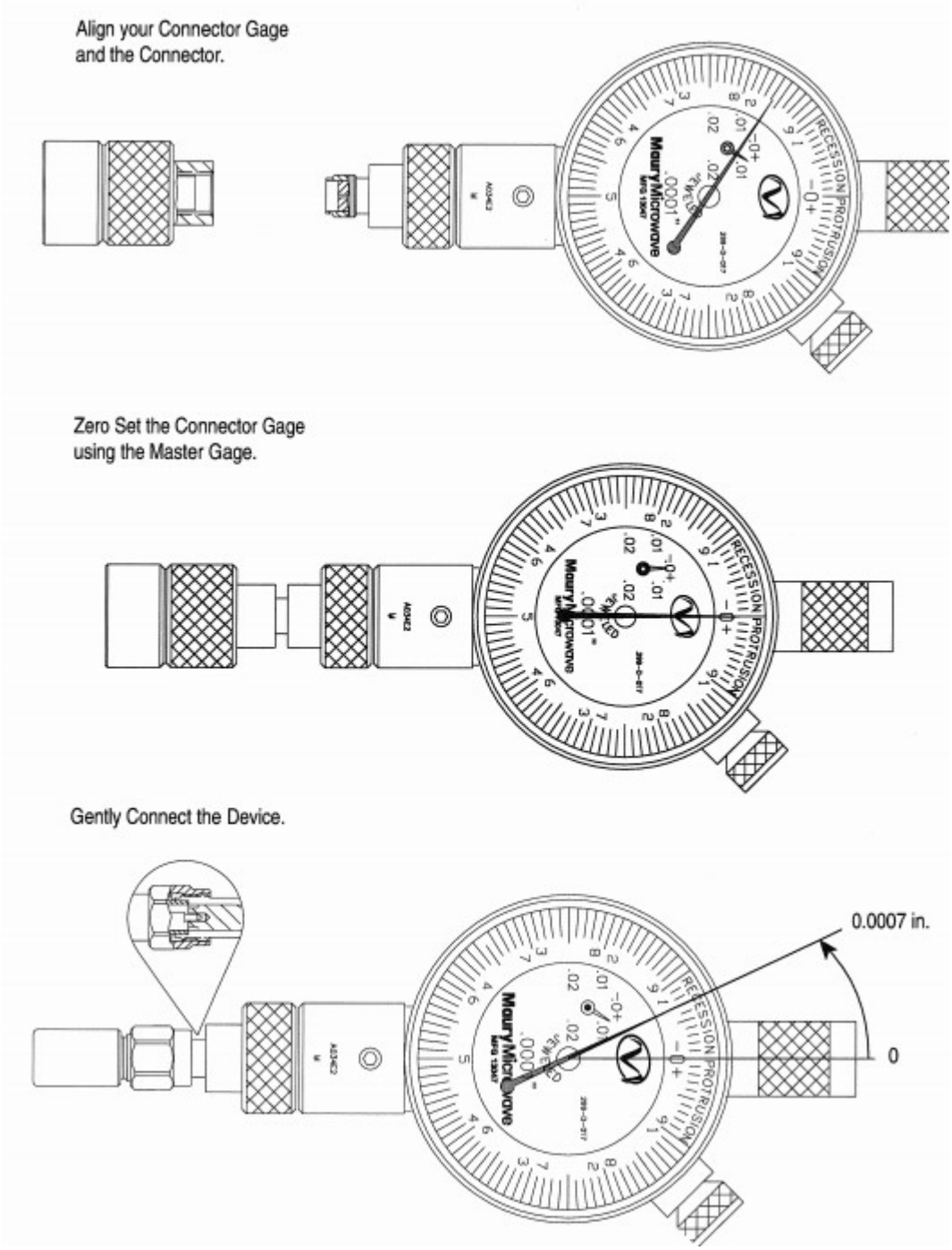

Figure 10. Zero Setting for 2.92mm and 3.5mm Male Connectors

Sliding Loads and Air Lines

Most sliding loads come equipped with a simple center conductor lock consisting of some form of clamping mechanism. The sliding load connector interface is usually set for a “zero gap” or “flush set” as described below.

NOTE: *Gaging the sliding load is not required for zero gap operation.*

For flush set operation, the sliding load center conductor is first set to the correct position using a connector gage. Then the center conductor is aligned axially and connected to the mating connector.

NOTE: *The nominal interface dimension is set using the A034E type connector gage.*

Gaging Sliding Loads

CAUTION: This section may not have complete information for your particular sliding load. Please consult the manual for your sliding load first.

The following procedure applies to both female and male sliding loads. For female sliding loads, use the A034E1 and A034E3 master gage. For male sliding loads, use the A034E2 and A034E4 respectively. For in-depth information on how to properly set the interface dimension, refer to the manual provided with your sliding load.

Procedure

Refer to **Figures 11**.

1. Visually inspect the mating surface of the connector to be gaged before making a connection.
2. Clean all mating surfaces: connector, master setting gage and connector gage.
3. Zero set your connector gage with the appropriate master gage.
4. Expose the center conductor of the sliding load to allow easy engagement of the gaging pin.
5. Make a gentle connection. Avoid rotation of the mating planes to prevent excessive wear. When using a torque wrench, make sure it is rated at 8 inch pounds. Allow the center conductor to gently push back during the mating process. Set the interface dimensions following the procedure outlined in the operating instructions of your sliding load.

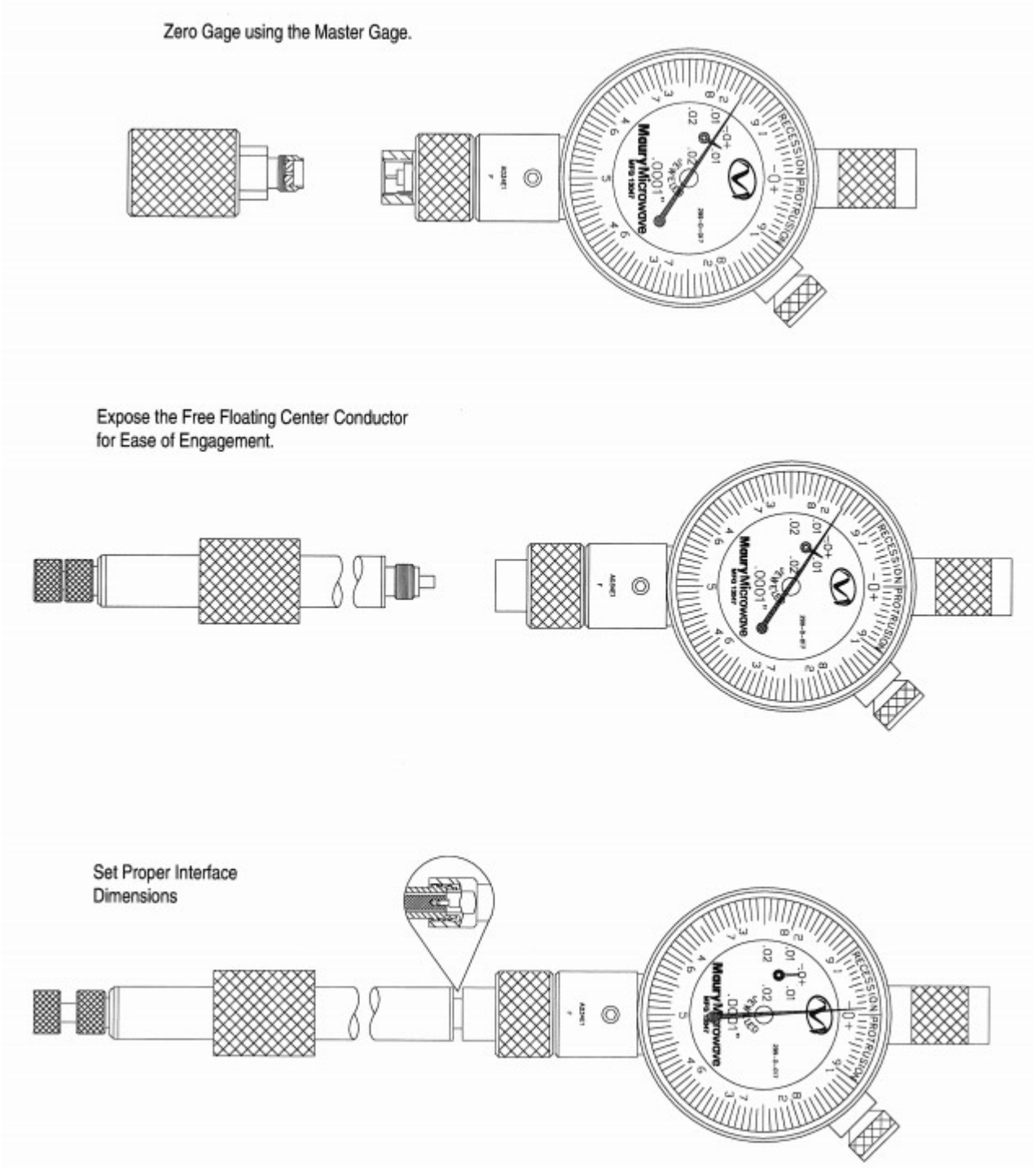

Figure 11. Gaging Precision Sliding Loads

Gaging 2.92 and 3.5mm Air Lines

NOTE: Use care when handling air line parts. Wear cotton gloves to prevent excessive thermal expansion.

When using a 2.92 or 3.5mm airline, a master gage is first connected to one end of and the corresponding A034E indicator gage is connected to the opposite end.

Procedure

See **Figure 12**

NOTE: Sleeve set is required for this measurement (see parts list **Table 1**).

1. Visually inspect the mating surfaces on the airline to be gaged before making a connection, and clean all mating surfaces.
2. Zero set the connector gage using the respective master setting gage.
3. Slip a centering sleeve on one end of the center conductor and insert into the air line. Avoid scratching the outer conductor while inserting the center conductor. Make sure that the sex of the outer and center conductors comply.
4. Connect the corresponding master setting gage onto the same end of the air line where the sleeve was inserted.
5. Insert the second sleeve into the open end of the air line.
6. Align the airline and your A034E; then carefully connect the connector gage. Tighten finger tight avoiding rotation of the mating surfaces against one another. When using a torque wrench, make sure it is rated at 8 inch pounds.

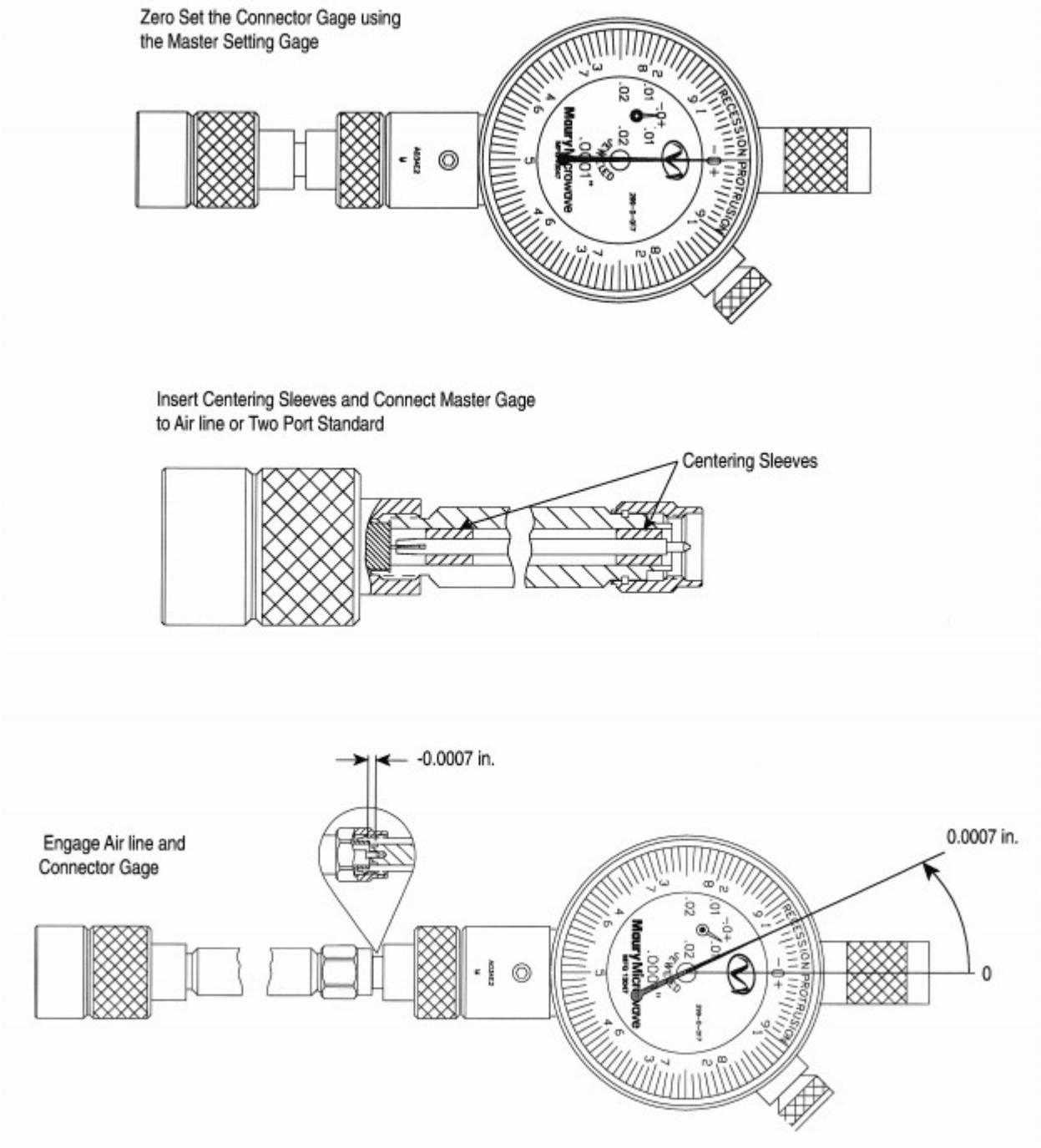

Figure 12. Gaging Beadless Precision 2.92mm and 3.5mm Airlines

Maintenance and Calibration

Maintenance

This connector gage kit is 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, correct alignment when mating, and proper torquing of connectors. To help maintain the integrity of the components in this kit, routine visual inspection and cleaning of mating surfaces is recommended. Failure to do so may result in degraded repeatability and accuracy, and may damage any mated devices. Refer to the *Operation* section of this User Guide for detailed instructions on visual inspection and cleaning.

Calibration

To maintain verification that a connector gage kit is performing to traceable specifications, we recommend that all kits be periodically returned to Maury Microwave for calibration. The typical calibration cycle is one year, although actual need may vary depending on usage.

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Appendix

Data Sheet Resources

2Y-051 – Connector Gages and Connector Gage Kits
http://maurymw.com/pdf/datasheets/2Y-051.pdf

2Y-050A – Torque Wrenches
http://maurymw.com/pdf/datasheets/2Y-050A.pdf

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