Maury Microwave

User Guide

SMP/GPO™ Connectors Connector Gage Kit

Model A042A

042-2 (Rev C) 3/14

User Guide

SMP/GPO™ Connector Gage Kit

Model A042A

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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.

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General Information

Description

The Maury model A042A connector gage kit is designed to measure the interface dimensions of SMP/GPO connectors. The female interface requires two measurements: the center contact, and dielectric location. The male interface requires only one measurement: the contact pin location. In addition, your A042A gage kit is equipped with a set of test pins used to distinguish between the four commonly used male connectors (full detent, limited detent, smooth bore, and catchers mitt). These four designations refer to the four types of outer conductor mating configurations used on the SMP male connectors. Holes are provided in the test pin handles to hold jack to jack adapters for ease of gaging.

NOTE: *For a full description of these connectors, see MIL-STD-348A; Notice 3; 322.2, 326.2, 326.3, 326.4. This kit is also designated to measure the interface dimensions of Gilbert Push-On connectors (GPO).*

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.

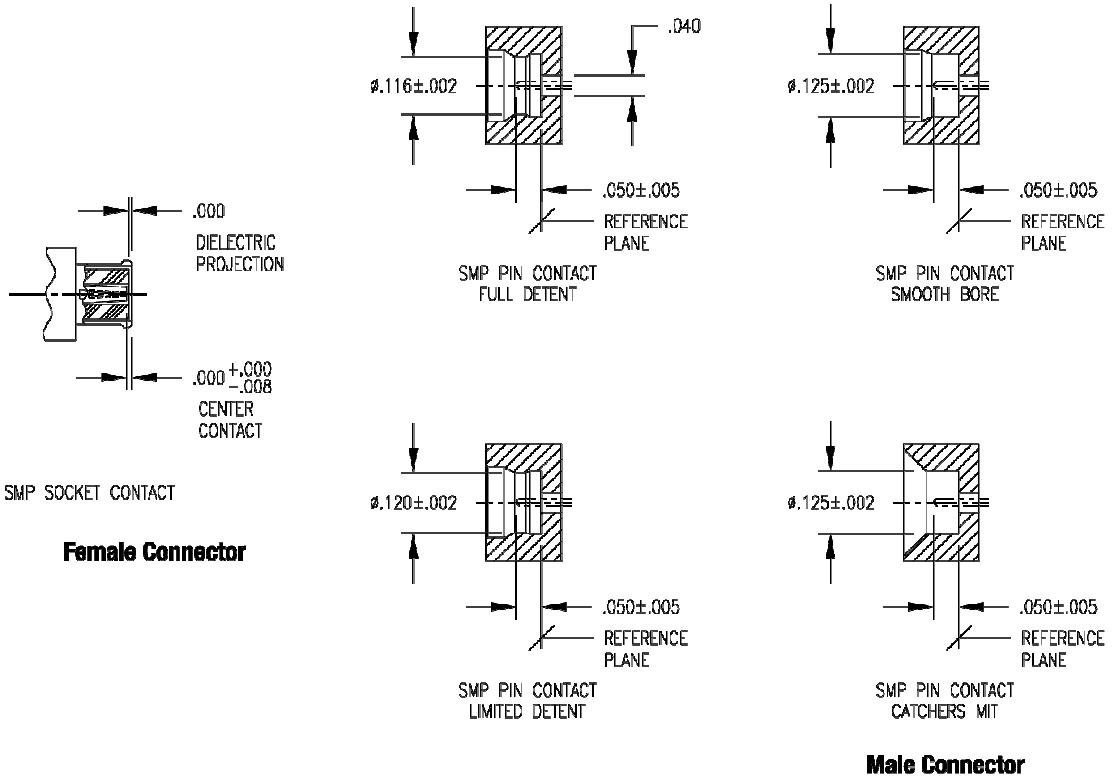

Figure 1. SMP/GPO connector interface

These gage kits provide a convenient and accurate means for checking the critical interface dimensions for SMP/GPO connectors (**Figure 1**). The gage assemblies themselves are basically dial indicator comparators and when zero set, will reflect the actual deviation from zero, which corresponds to deviation from the outer conductor mating plane.

Specifications

The following *Connector Gage Specifications* table provides the connector gage kit's performance standards, based on factory measurements traceable to the National Institute of Standards and Technology (NIST).

Table 1a. A042A3 (MP) Connector Gage Specifications

Characteristics	Limits	Comments
Gage Resolution	± 0.000100	1/5 Least dial graduation [1]
Gage Calibration Accuracy [6]	± 0.000750	1 Least dial graduation [2] plus 0.000250 measurement guardband
Gage Repeatability [4]	± 0.000100	1/5 Least dial graduation [2]
Master Accuracy	± 0.000250	0.0005 Range [3]
Total Uncertainty [5][6]		
RSS	± 0.000803	Root sum of the squares
Worst Case	± 0.001200	Add resolution, repeatability, gage and master accuracy limits

[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] Uncertainties apply over the operating range for connector gaging 0.015” recession to 0.005” protrusion from master gage zero setting.

Table 1b. A042A1 (FP) & A042A2 (FTD) Connector Gage Specifications

Characteristics	Limits	Comments
Gage Resolution	± 0.000100	1/5 Least dial graduation [1]
Gage Calibration Accuracy [6]	± 0.000750	1 Least dial graduation [2] plus 0.000250 measurement guardband
Gage Repeatability [4]	± 0.000100	1/5 Least dial graduation [2]
Master Accuracy	± 0.000100	0.0002 Range [3]
Total Uncertainty [5][6]		
RSS	± 0.000770	Root sum of the squares
Worst Case	± 0.001050	Add resolution, repeatability, gage and master accuracy limits

[7] Per ASME B89.1.10M-2001, C5.1.2.

[8] Per ASME B89.1.10M-2001, Table 2.

[9] Per manufacturer's specification.

[10] 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.

[11] Performance standards are in compliance with ANSI / NCSL Z540-1, MIL-STD-45662A and ISO 10012-1.

[12] Uncertainties apply over the operating range for connector gaging 0.015” recession to 0.005” protrusion from master gage zero setting.

Gage Kit Contents

1 ea	Gage Assembly, Female	A042A1 (FP)
1 ea	Gage Assembly, Female Dielectric	A042A2 (FTD)
1 ea	Gage Assembly, Male	A042A3 (MP)
1 ea	Master Gage	A042A4
1 ea	Instrument Case	042-17

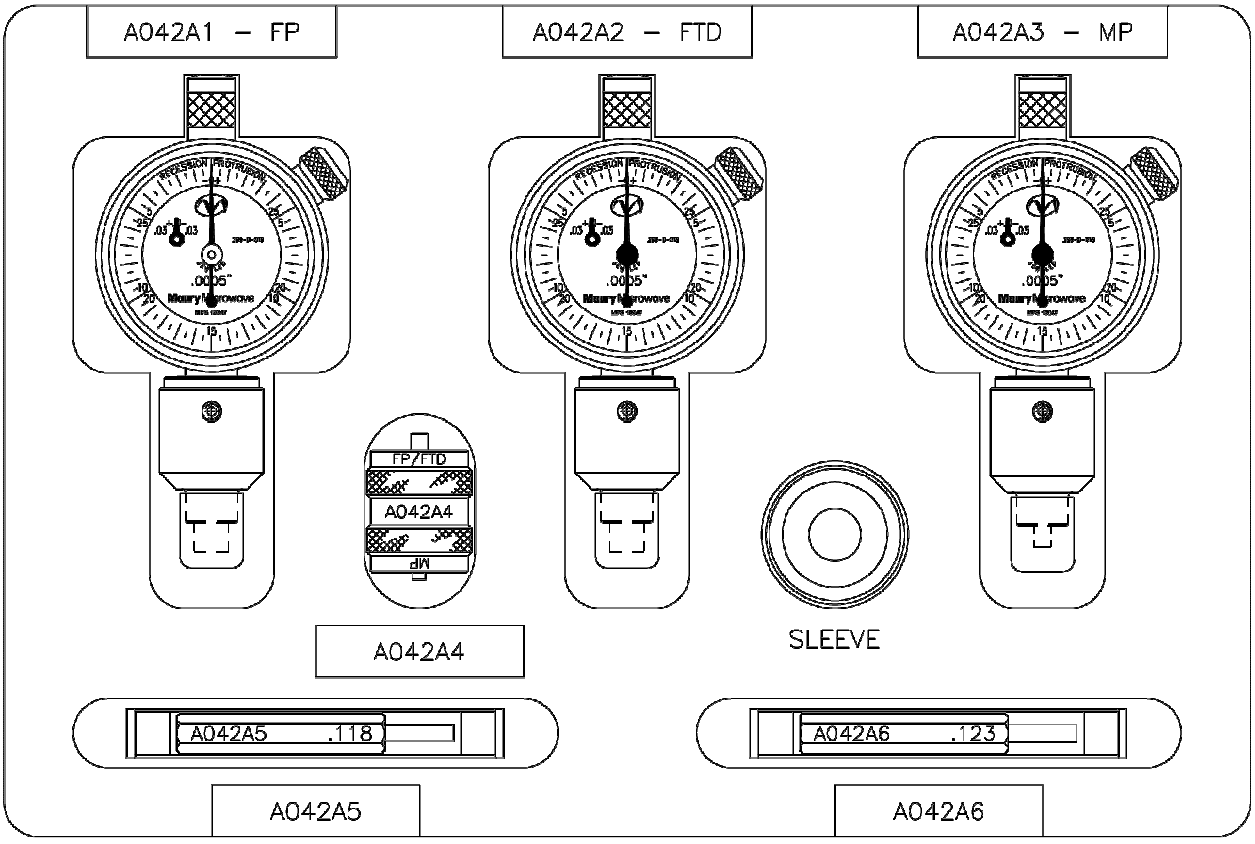

Figure 2. The A042A Connector Gage Kit

Operation

Introduction

A male and female gage assembly and master setting gage are shown in **Figure 2**. The male gage assembly is marked with an 'M' for measuring male connectors and the female is marked with an 'F'.

Each gage assembly consists of a dial indicator graduated in 0.0005 inch increments with a precision adapter bushing that is attached to the indicator via three hardened set screws. An internal floating pin is used to measure the center conductor location. The master setting gage is used to set a 0.055 inch offset for male gage assembly.

CAUTION: Do not loosen the set screws that hold the adapter bushing to the dial indicator since this will allow the bushing to move from the factory pre-set location and affect the gaging action.

Visual Inspection of Connectors

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. It is advised that the cause of the damage be determined before making further connections.

Cleaning Connectors

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

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.

The following procedure applies to connector gages of A042A1, A2 and A3. Use the master setting gage A042A4 to verify the zero setting. The master setting gage is marked 'FP/FTD' (female) and 'MP' (male) to correspond to the 'FP/FTD' and 'MP' marked on the indicator assemblies.

Procedure: Refer to Figures 3 & 4

1. Visually inspect the mating surfaces of your connector gage and 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 as shown in **Figure 3**. Then carefully engage the master gage with the dial indicator until the master gage seats securely. The dial hand should rotate clockwise and stop at zero after one or more revolutions. The range indicator (small inner dial) should read +0.0.
4. If resetting zero is required, engage the master gage using the alignment sleeve, then while holding the dial indicator and master gage in one hand, loosen the dial lock and rotate the Bezel (outside rim on indicator) to the zero position indicated by the hands on the indicator. Re-tighten the dial lock.

   NOTE: *Both pointers must point at zero.*

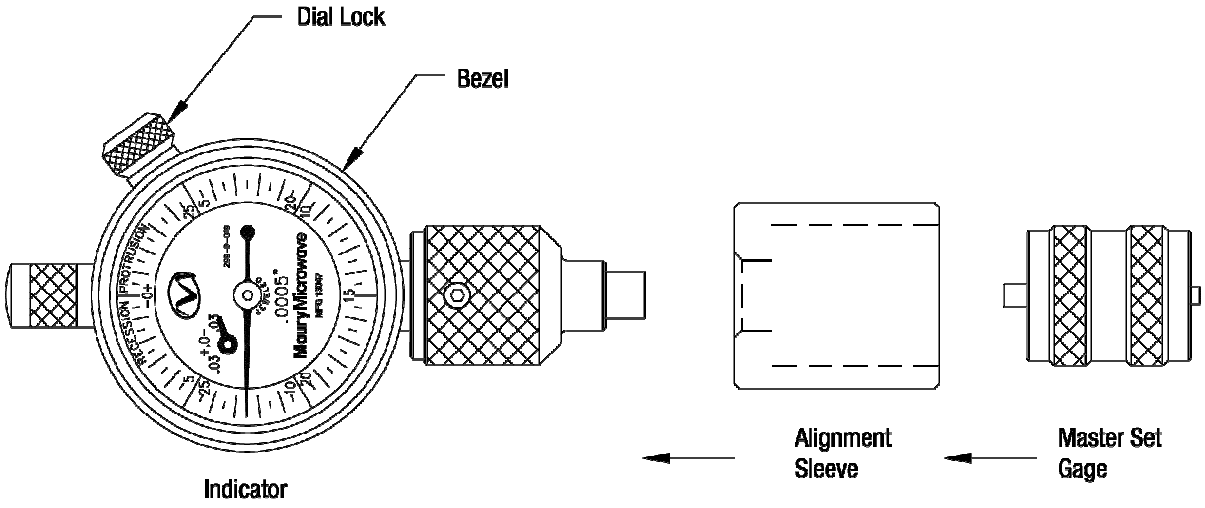

Figure 3.

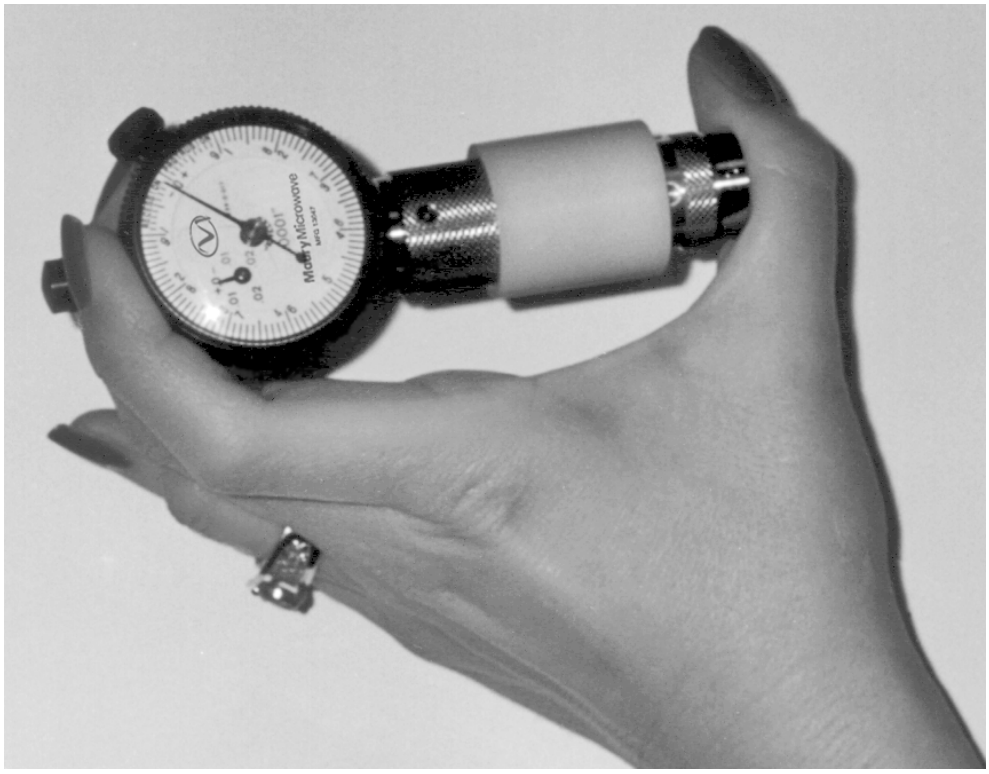

Figure 4.

Gaging SMP/GPO Connectors

The critical dimensions for the SMP connector interface are the contact pin on the male and female connectors, and the dielectric location on the female connector. Your A042A kit is designed to assure that these dimensions are within the specifications shown in **Figure 1**. Any out of spec. conditions can degrade electrical performance. Excessive protrusion of the contact pin can cause severe connector damage when mated.

The following procedure applies to all connector gages in your A042A kit. The example below is for measuring the female interface.

Example:

To measure the SMP female contact pin location, use indicator gage A042A1 and master gage A042A4. Refer to **Figure 2**.

Visually inspect the mating surface of the connector to be gaged before making a connection. For best results, clean all mating surfaces: connector, master setting gage and connector gage using the procedure under ***Cleaning*** on page 4.

1. Zero set your A042A1 using master setting gage A042A4 (see Verifying Zero Setting, page 4).
2. Align your A042A1 with the female (SMP) connector to be measured. Refer to **Figure 5**.
3. Engage the A042A1 until the connector's bottom and the dial indicator stops.
4. The outer dial should read 0.0 + .000/-.008. The small inner dial should indicate zero or slightly to the right of the zero (see CAUTION below).

NOTE 1: *When measuring the male connectors, the gage should read 0.0 + .000/-.010. (This master gage is set to 0.055 inches).*

NOTE 2: *Operator skill may impact measurement. Make multiple measurements until good repeatability is achieved.*

CAUTION: *The small inner dial is a safety indicator to assure that the outer dial is reading within the correct revolution (**Figure 5**). A grossly out of spec. connector could indicate in spec. using the outer dial only.*

Gaging the Dielectric

Follow steps 1-4 above, using indicator A042A2. The dielectric dimension should indicate 0.0 or slightly to the left of zero (this test is to check for no dielectric protrusion beyond the reference plane).

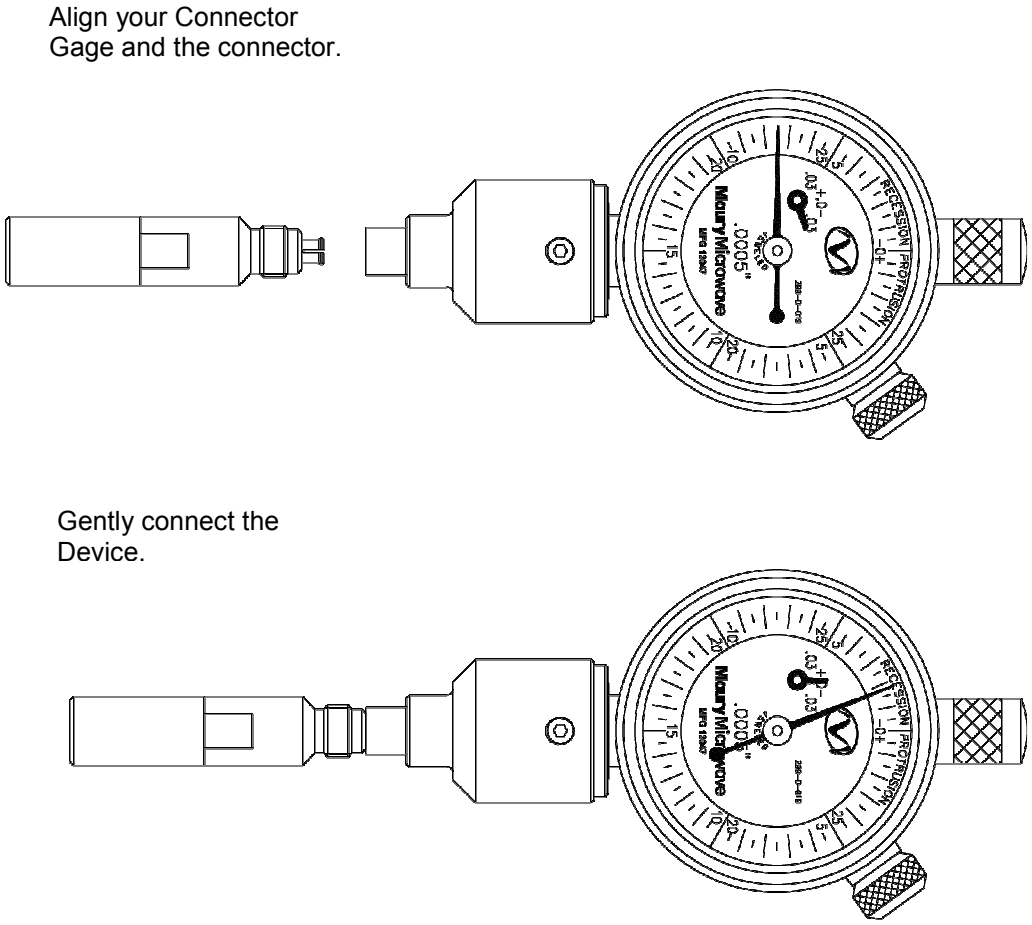

Figure 5. Gaging SMP Connectors

Using the A042A5 and A042A6 Test Pins (See Figure 2)

These pin gages are used to identify the type of SMP male connector you are using (see **Figure 1**). The four types (full detent, limited detent, smooth bore, and catchers mitt) are very similar in appearance. Using the test pins supplied in your A042A kit, you can distinguish between the four types by inserting them in the connector. Use the pins for GO/NO GO testing as follows:

1. Start with the A042A6 (.123 diameter pin). If this pin is a GO for the connector under test, you have a smooth bore or catchers mitt type.

2. If the A042A6 is a NO GO, you have a limited detent or full detent type. Use the A042A5 (.118 diameter pin) to distinguish between full and limited detent as shown in step 3.

3. Attempt to insert the A042A5 in the connector. If the pin is a GO, you have a limited detent connector. If the pin is a NO GO, you have a full detent connector. NOTE: The groove in the A042A5 and A042A6 pins must be just visible beyond the edge of the connector to ensure the gage pin has been inserted to the correct depth.

Gaging Jack to Jack Connectors

Holes are provided in the test pin handles (A042A5 and A042A6) to hold jack to jack adapters for ease of gaging (see **Figure 6**).

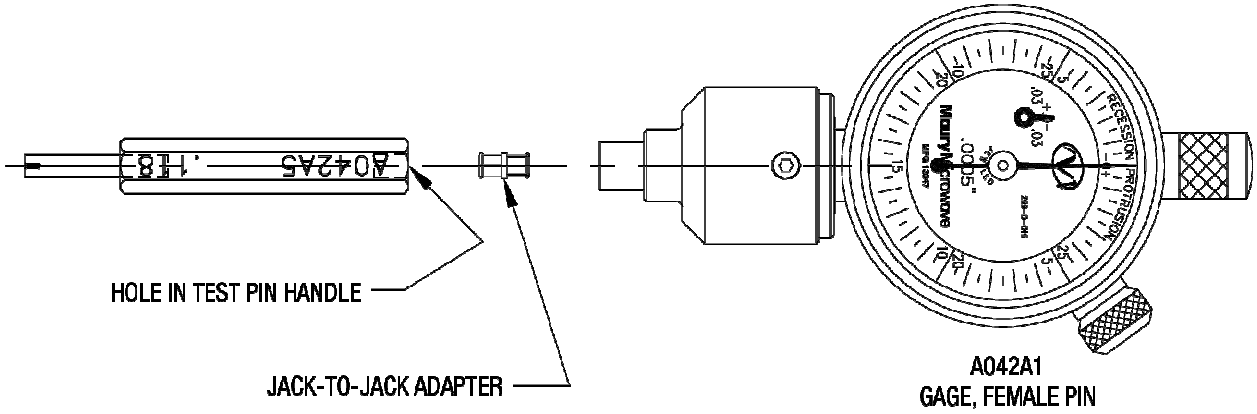

Figure 6. Gaging Jack to Jack Connectors

Appendix

Data Sheet Resources

2Y-031 – Precision SMP/GPO Connector Gage Kit
http://maurymw.com/pdf/datasheets/2Y-027.pdf

2Y-001 – Connector Gages and Connector Gage Kits
http://maurymw.com/pdf/datasheets/2Y-001.pdf

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