Maury Microwave

TNC/TNCA/BNC

Connector Gage Kit

Metrology Grade

Model A012G

012-101 (A) 10/24

User Guide

TNC/TNCA/BNC
Connector Gage Kit

Model A012G

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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.

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Contents

Gage Kit Description

The Maury model A012G connector gage kit is designed to measure the contact pin and dielectric location of all commonly used TNC/TNCA/BNC connectors. Generally, the TNC and BNC connectors are the same except the TNC is a screw on connector and the BNC is a bayonet type. Checking the interface dimensions requires three measurements for each connector to ensure the proper location of the contact pin and dielectric. These locations must be maintained within specifications for good electrical performance and to avoid connector damage when mated. **Figure 1** shows the interface dimensions measured with this A012G connector gage kit. **Table 1** gives the interface dimensions for the current industry standard TNC\TNCA and BNC connectors.

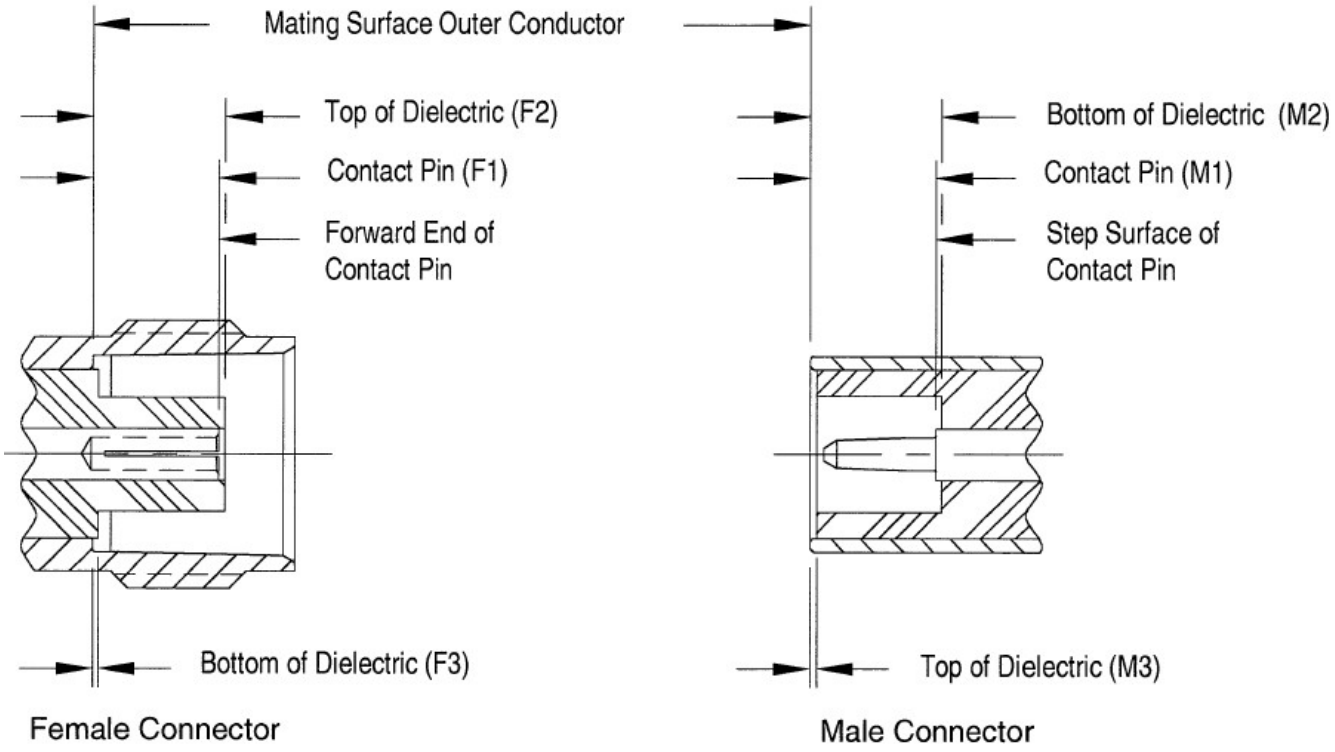

Figure 1. TNC Interface Dimensions

NOTE: *Several of today's TNC connectors are designed to operate up to 18 GHz. The 18 GHz connectors do not have a top dielectric dimension for the male connector.*

Specification	Female Connector			Male Connector		
	F1	F2	F3	M1	M2	M3
MIL-STD-348B (BNC) General	0.206 +0.000/-0.020	0.208 +0.000/-0.020	0.006 Max	0.210 +0.020/-0.000	0.208 +0.020/-0.000	0.006 Min
MIL-STD-348B (BNC) Test Connector	0.208 +0.000/-0.003	0.206 +0.000/-0.006	0.000 +0.008/-0.000	0.209 +0.003/-0.000	0.212 +0.006/-0.000	0.006 +0.006/-0.000
MIL-STD-348B (TNC) General	0.206 +0.000/-0.020	0.208 +0.000/-0.020	0.006 Max	0.210 +0.020/-0.000	0.208 +0.020/-0.000	0.006 Min
MIL-STD-348B (TNC) Test Connector	0.208 +0.000/-0.003	0.208 +0.000/-0.008	0.000 +0.006/-0.000	0.208 +0.003/-0.000	0.212 +0.006/-0.000	0.006 +0.006/-0.000
MIL-STD-348B (TNCA)	0.208 +0.000/-0.010	0.208 +0.000/-0.010	0.006 Max	0.208 Min	0.208 Min	N/A

Table 1. BNC, TNC and TNCA Interface Dimensions

NOTE: *Always check the manufacturer's specifications for the connector you are testing. The dimensions vary based on MIL-STD and IEC specificiations used.*

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	± 0.000100	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	± 0.000300	0.00060 Range [3]
Total Uncertainty [5, 6]		
RSS Worst Case	± 0.000820 ± 0.001250	Root sum of the squares. 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 6.
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 +0.003/-0.009" from master gage zero setting.

The Maury model A012G connector gage kit consists of the following components. Refer to **Figures 2 and 3.**

(1) & (2) Indicator assembly - Adapter bushing attached to dial indicator.
(3) Male bushing (marked BNC/TNC-M).
(4) Female bushing (marked BNC/TNC-F).
(5) Master setting gage (marked BNC/TNC-3).
(6) Pin (stepped down end), see **Figure 2**.
(7) Pin (straight), see **Figure 2**.
(8) Pin (straight with groove), see **Figure 2**.
(9) Pin (stepped down end with groove), see **Figure 2**.
(10) A wooden instrument case.
(11) Allen wrench (4-40).

NOTE: *Numbers in circles ◯ correspond to item numbers in replacement parts list.*

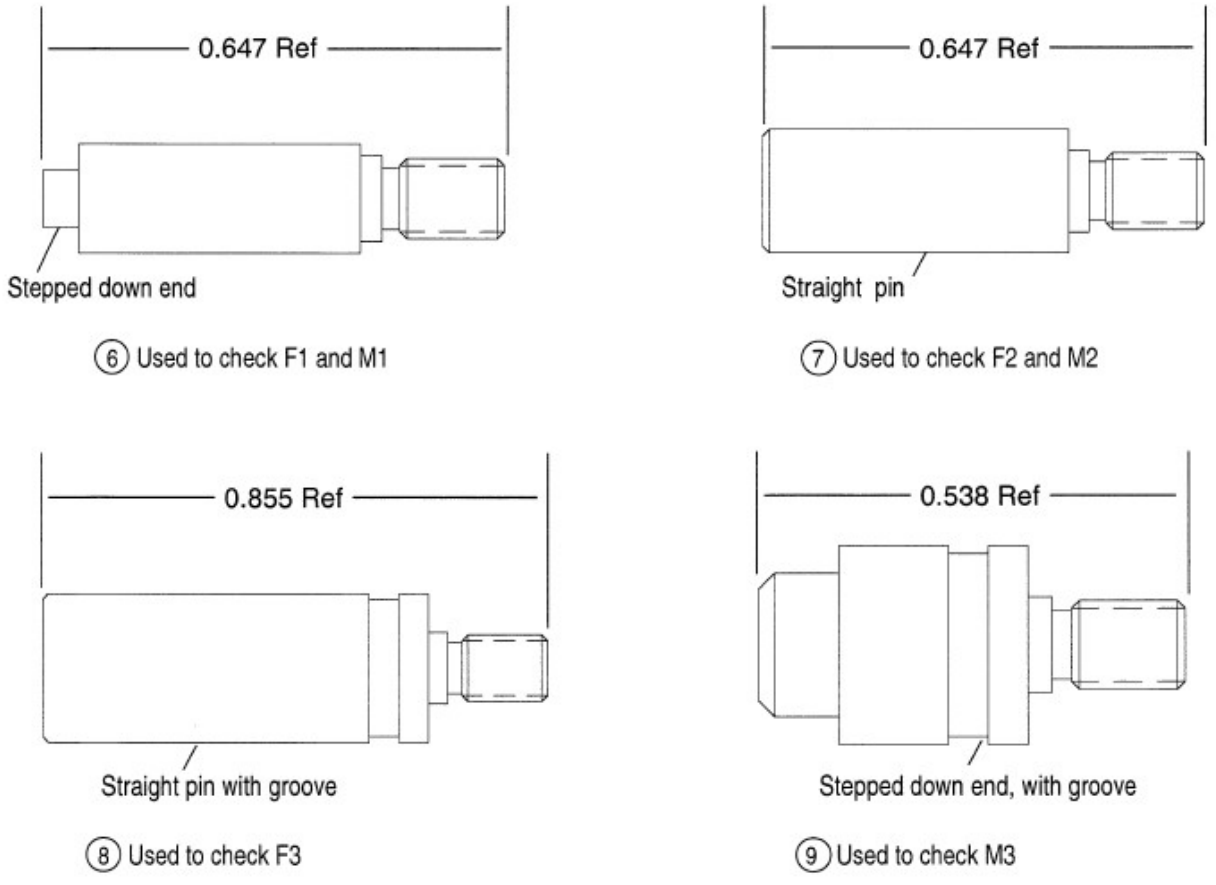

Figure 2. Pin Drawings for Visual Identification

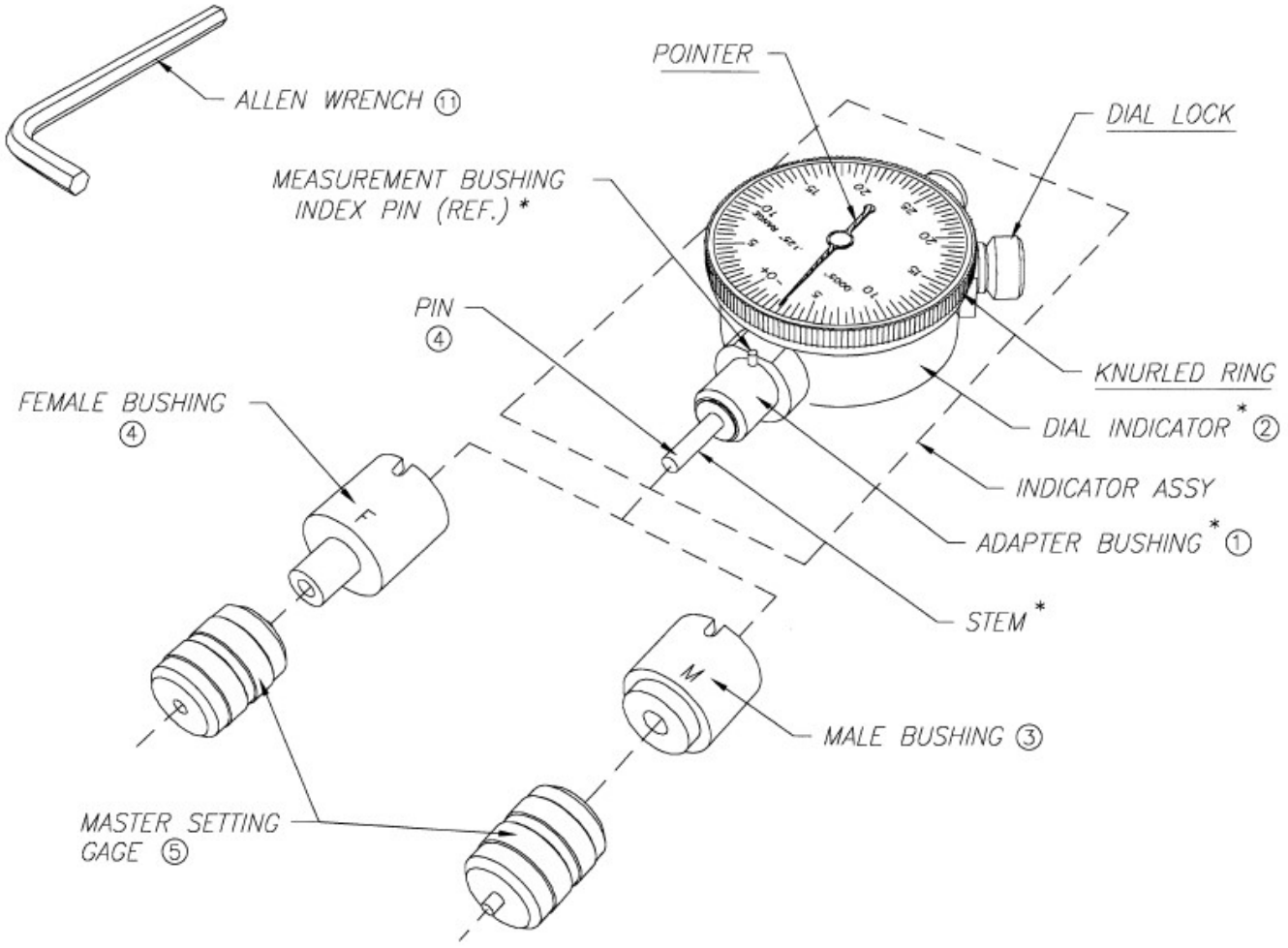

Figure 3.

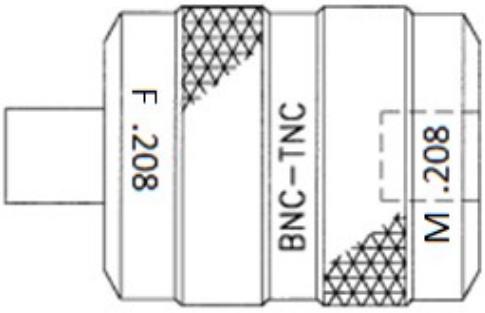

Figure 4. Master Setting Gage

Gaging TNC/BNC Connectors

Several examples are given below for gaging BNC/TNC connectors. Refer to **Figure 1** for the interface dimensions described. See **Figures 2** and **3** for descriptions of circled items.

1. Checking Female Contact Pin Location (F1) for BNC or TNC Connectors.

a. Screw pin⑥into stem of dial indicator; finger tight is adequate.
b. Attach the female bushing④to the indicator assembly and tighten set screws with the Allen wrench.
c. Engage master gage using the female side to the indicator-bushing assembly and rotate the knurled ring for a zero indication and lock. This sets the indicator to the nominal master gage dimension. The gage is now ready for measuring female connectors and is zeroed at 0.208.
d. To check a female pin location, engage the connector with the indicator bushing assembly, making sure that the mating surfaces are seated properly. The pointer of the dial indicator will then show the actual deviation from nominal, as set by the master gage, of the contact pin.

NOTE: *In order to arrive at the actual contact pin location, add or subtract the dial indicator reading from the nominal location as set by the master gage. (If the reading is to the left of zero you would use subtraction and to the right of zero you would add.)*

Referring to **Table 1**, if you are testing devices to be in compliance with "MIL-STD-348B BNC\TNC General", the indicator should be recessed (to the left of zero) by .002 at a minimum. If the dial indicator would be at .001, this would give you a value of .207 (.208 - .001) and the specification is .206 - .186.

2. Checking F2 Female Top Dielectric Interface.

a. Screw pin⑦into stem of dial indicator, finger tight is adequate.
b. Attach the female bushing④to the indicator assembly and tighten set screws with the Allen wrench.
c. Engage master gage using the female side to the indicator-bushing assembly and rotate the knurled ring for a zero indication and lock. This sets the indicator to the nominal master gage dimension. The gage is now ready for measuring female connectors and is zeroed at 0.208.
d. To check a female dielectric location, engage the connector with the indicator bushing assembly, making sure that the mating surfaces are seated properly. The pointer of the dial indicator will then show the actual deviation from nominal, as set by the master gage, of the contact pin.

NOTE: *In order to arrive at the actual dielectric location, add or subtract the dial indicator reading from the nominal location as set by the master gage. (If the reading is to the left of zero you would use subtraction and to the right of zero you would add.)*

3. Checking F3 Female Bottom Dielectric Interface.

a. Screw pin⑧into stem of dial indicator, finger tight is adequate.
b. Attach the female busing④to the indicator assembly and tighten set screws with the Allen wrench.
c. Engage master gage using the male side to the indicator-bushing assembly and rotate the knurled ring for a zero indication and lock. A flat surface, such as a surface plate can also be used to zero the indicator. The gage is now ready for measuring female connectors and is zeroed at 0.000.
d. To check a female dielectric location, engage the connector with the indicator bushing assembly, making sure that the mating surfaces are seated properly. The pointer of the dial indicator will then show the actual deviation from zero, as set by the master gage, of the contact pin.

NOTE: *Per **Table 1**, the female dielectric bottom dielectric should protrude in reference to the reference plane, so the readings on the dial indicator should be to the right of zero, any reading to the left of zero would below the reference plane.*

4. Checking Male Contact Pin Location (M1) for BNC or TNC Connectors.

a. Screw pin⑥into stem of dial indicator, finger tight is adequate.
b. Attach the male bushing③to the indicator assembly and tighten set screws with the Allen wrench.
c. Engage master gage using the male side to the indicator-bushing assembly and rotate the knurled ring for a zero indication and lock. This sets the indicator to the nominal master gage dimension. The gage is now ready for measuring male connectors and is zeroed at 0.208.

Note: *In order to arrive at the actual contact pin location, add or subtract the dial indicator reading from the nominal location as set by the master gage. (If the reading is to the left of zero you would use addition and to the right of zero you would subtract.)*

Similar to the female instructions, refer to **Table 1** for the specifications, if the nominal value is 0.209, the indicator must read a minimum of 0.001 to the left of zero to be compliant. (0.208 + .001 would give you a 0.209 result).

5. Checking M2 Male Bottom Dielectric Interface.

a. Screw pin⑦into stem of dial indicator, finger tight is adequate.
b. Attach the male bushing③to the indicator assembly and tighten set screws with the Allen wrench.
c. Engage master gage using the male side to the indicator-bushing assembly and rotate the knurled ring for a zero indication and lock. This sets the indicator to the nominal master gage dimension. The gage is now ready for measuring male connectors and is zeroed at 0.208.
d. To check a male dielectric location, engage the connector with the indicator bushing assembly, making sure that the mating surfaces are seated properly. The pointer of the dial indicator will then show the actual deviation from nominal, as set by the master gage, of the contact pin.

Note: *In order to arrive at the actual dielectric location, add or subtract the dial indicator reading from the nominal location as set by the master gage. (If the reading is to the left of zero you would use addition and to the right of zero you would subtract.)*

6. Checking M3 Male Bottom Dielectric interface.

a. Screw pin⑨into stem of dial indicator, finger tight is adequate.
b. Attach the male busing③to the indicator assembly and tighten set screws with the Allen wrench.
c. Engage master gage using the male side to the indicator-bushing assembly and rotate the knurled ring for a zero indication and lock. The gage is now ready for measuring male connectors and is zeroed at 0.000.
d. To check a male dielectric location, engage the connector with the indicator bushing assembly, making sure that the mating surfaces are seated properly. The pointer of the dial indicator will then show the actual deviation from zero, as set by the master gage, of the contact pin.

NOTE: *When reading the results from the dial indicator the sign should be reversed. Should you measure -0.002 which would be to the left of zero, the actual results is actually +0.002.*

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.

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.

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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