

PRODUCTION TEST PROCEDURE

302C-1 & 2

DIRECTIONAL RF WATTMETER

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Dated: May 23, 1957

Revised: July 3, 1957

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA

TM-927-2

1.0 SCOPE

These production test requirements apply to the Collins Directional RF Wattmeter, type 302C-1, part number 522 0649 00 and type 302C-2, part number 522 0653 00.

2.0 REFERENCE INFORMATION

2.1 Specifications:

Collins type 302C-1 & 2 equipment specification, part no. 568 0292 00.

2.2 Publications:

Collins type 302C-1 & 2 instruction book, part no.

2.3 Drawings:

302C-1 & 2 schematic diagram, part no. 542 0926 003.

302C-1 & 2 Final Coupler assembly drawing No. 542 4116 004

302C-1 & 2 connection diagram Figure number 1.

302C-1 Final assembly drawing No. 522 0649 00

302C-2 Final assembly drawing No. 522 0653 00

3.0 TEST EQUIPMENT REQUIRED

The following equipments or their equivalents are required to perform the specified tests.

3.1 Transmitter:

KWS-1: The transmitter must have low spurious and harmonic output and be capable of delivering at least 500 watts into a 51.5 ohm load. The spurious and harmonic output shall be at least 40 db below fundamental output. If the transmitter does not provide a sufficiently pure signal, then additional filtering must be provided between the transmitter and the coupler unit.

3.2 51.5 ohm r-f Load:

The 51.5 ohm r-f load shall be capable of dissipating 1000 watts r-f and provided with a means of measuring r-f power accurately to within $\pm 2\%$. The load shall be essentially non-reactive and be within $\pm 2\%$ of 51.5 ohms.

3.3 Decade Resistance Box:

The decade resistance box shall be accurate to at least 1% and have a maximum resistance of 10 k ohms.

3.4 Standard Meter:

A meter having a sensitivity of 200 micro-amps $\pm .5\%$ and a resistance of 1000 ohms $\pm .5\%$ shall be provided with a power scale as set forth on specification 458 0388 00. A selected meter of specification 458 0388 00 may be used as the standard.

4.0 TEST CONDITIONS

Unless otherwise specified, all tests shall be performed under the following conditions.

4.1 Ambient Temperature:

Normal factory ambient.

4.2 Ambient Humidity:

Normal factory ambient.

4.3 Ambient Atmospheric Pressure:

Normal factory ambient.

4.4 Shielding and Isolation Requirements:

No special overall shielding or isolation requirements are necessary.

4.5 Operational Duty Cycle:

No duty cycle is required. The 302C-1 and 302C-2 are designed for continuous duty under severe standing waves.

4.6 Warm-Up Period:

No special warm-up period is required for the 302C-1 and 302C-2. However, when a calorimeter type r-f load is used to measure power, sufficient time must be allowed for the load to completely stabilize before recording each power measurement.

5.0 PRELIMINARY TESTS

5.1 Equipment Interconnection:

The equipment should be connected as shown on schematic diagram 542 0926 003 and figure 1 using the decade resistance box in place of R3, R4, R5 or R6 and the standard meter in place of the equipment supplied meter.

6.0 INITIAL ADJUSTMENTS

6.1 Balance Adjustment:

With the equipment connected as described in Section 5.1 connect decade resistance box in place of R6 and set for zero resistance. (max. meter sensitivity) Replace the equipment supplied meter with the standard power meter connected to C10 (negative of meter grounded). Apply r-f power at 29.5 mc through coupler in normal direction (dc termination and to load). Adjust trimmer C2 for minimum meter indication. As a null is approached, increase r-f power until at least 500 watts, but not more than 1000 watts, is applied to coupler unit. At full power check C2 for balance. Remove r-f power and reverse coax connections to the coupler unit. Connect decade resistance box in place of R5 and set to zero resistance. Connect standard meter to C7. Apply r-f power and adjust trimmer C1 for minimum meter indication.

6.2 Coupler Unit Calibration:

With the coupler unit connected in the normal manner (dc termination end to load), connect decade resistance box in place of R5 and connect standard meter to C7. Apply 80 watts $\pm 2\%$ at 14.0 mc and adjust decade resistance box until meter reads 80 watts. Note resistance value and determine nearest standard value from chart on dwg. 542 4116 004. Solder in nearest standard meter to C8. Apply 500 watts $\pm 2\%$ at 14.0 mc and adjust decade resistance box until meter reads 500 watts. Note resistance value and select nearest standard value from chart on dwg. 542 4116 004. Reverse r-f coupler connections and repeat procedure for R6 (80 watt) and R4 (500 watt) connecting meter to C10 and C9 respectively.

7.0 TEST REQUIREMENTS

The following tests are to be performed on each coupler unit. Should any unit fail to meet either the frequency response or amplitude response change the offending diode and repeat paragraph 6.2. The tests should then be repeated.

7.1 Frequency Response of Forward Power:

With the coupler unit connected in the normal manner (load connected to dc termination end) and the standard meter connected to C7 apply 80 watts $\pm 2\%$ of r-f power at 3.5, 14.0 and 29.5 mc. Record the standard meter reading. Connect standard meter to C8 and repeat with 500 watts $\pm 2\%$ applied.

7.2 Frequency Response of Reflected Power:

Reverse r-f connections to coupler unit and repeat 7.1 connecting standard meter first to C10 using 20 watts and then to C9 using 500 watts.

7.3 Amplitude Response Forward:

With the source of r-f power set at 14.0 mc and the standard meter connected to C7, apply power at several levels such as 80 and 40 watts. Record standard meter readings. Connect meter to C8 and repeat using levels of 500 watts and 200 watts.

7.4 Amplitude Response Reflected:

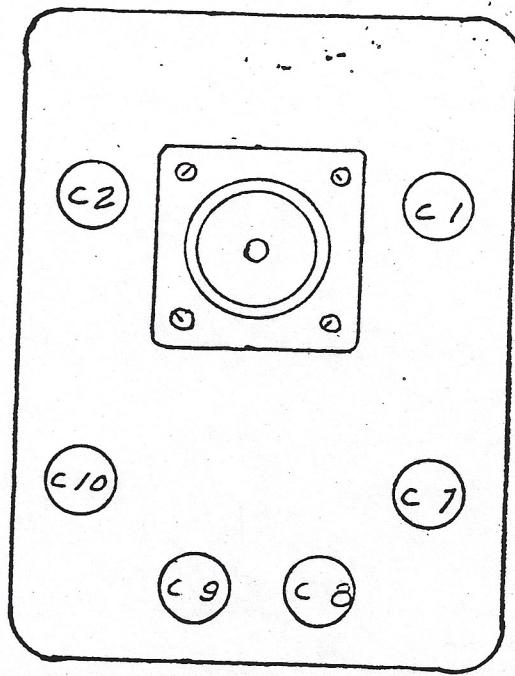
Reverse the RF coax connections to the coupler unit and repeat 7.3 connecting meter to C10 and C9 using levels of 40, 80, 200 and 500 respectively.

RESISTORS R3 and R4

<u>Part Number</u>	<u>Resistance in ohms</u>
705 7255 00	4750
705 7129 00	4870
705 7256 00	4990
705 7130 00	5110
705 7257 00	5230
705 7131 00	5360
705 7258 00	5490
705 7132 00	5620
705 7259 00	5760
705 7133 00	5900
705 7260 00	6040
705 7134 00	6190
705 7261 00	6340
705 7135 00	6490
705 7262 00	6650
705 7136 00	6810
705 7263 00	6980

RESISTORS R5 and R6

<u>Part Number</u>	<u>Resistance in Ohms</u>
705 7034 00	51.1
705 7048 00	100
705 7056 00	147
705 7062 00	196
705 7067 00	249
705 7071 00	301
705 7074 00	348
705 7077 00	402
705 7080 00	464
705 7082 00	511
705 7084 00	562
705 7086 00	619
705 7088 00	681
705 7090 00	750
705 7092 00	825
705 7094 00	909
705 7095 00	953
705 7096 00	1000



302C-1&2 Connection Diagram - Fig. No. 1