

302C-3 DIRECTIONAL WATTMETER

1.1 APPLICATION AND DESCRIPTION.

Figure 1 is a schematic diagram of 302C-3 Directional Wattmeter. The model 302C-3 measures up to 2 kilowatts of forward and 2 kilowatts of reflected power on 52-ohm transmission lines (RG-8/U, or equivalent). The instrument is accurate to within $\pm 10\%$ ($\pm 5\%$ nominal) over the 2- to 30-mc range. Power loss and mismatch introduced by the instrument are negligible.

2.1 INSTALLATION.

a. Mount the coupler unit adjacent to the transmission line, keeping the distance between the transmitter output and the input to the coupler unit to a minimum.

b. Cut the transmission line where it passes the coupler and install two type N male connectors at the break.

c. Place the indicator unit not more than five feet from the coupler. Solder the tinned cable leads to the proper terminals on the coupler.

d. Connect the transmission line from the antenna to the end of the coupler unit which has the d-c output terminals. Connect the line from the transmitter to the opposite end of the coupler unit.

e. The instrument is now ready for operation.

3.1 OPERATION.

The actual transmitter output power that can be handled safely is relative to the swr on the line. If the swr is

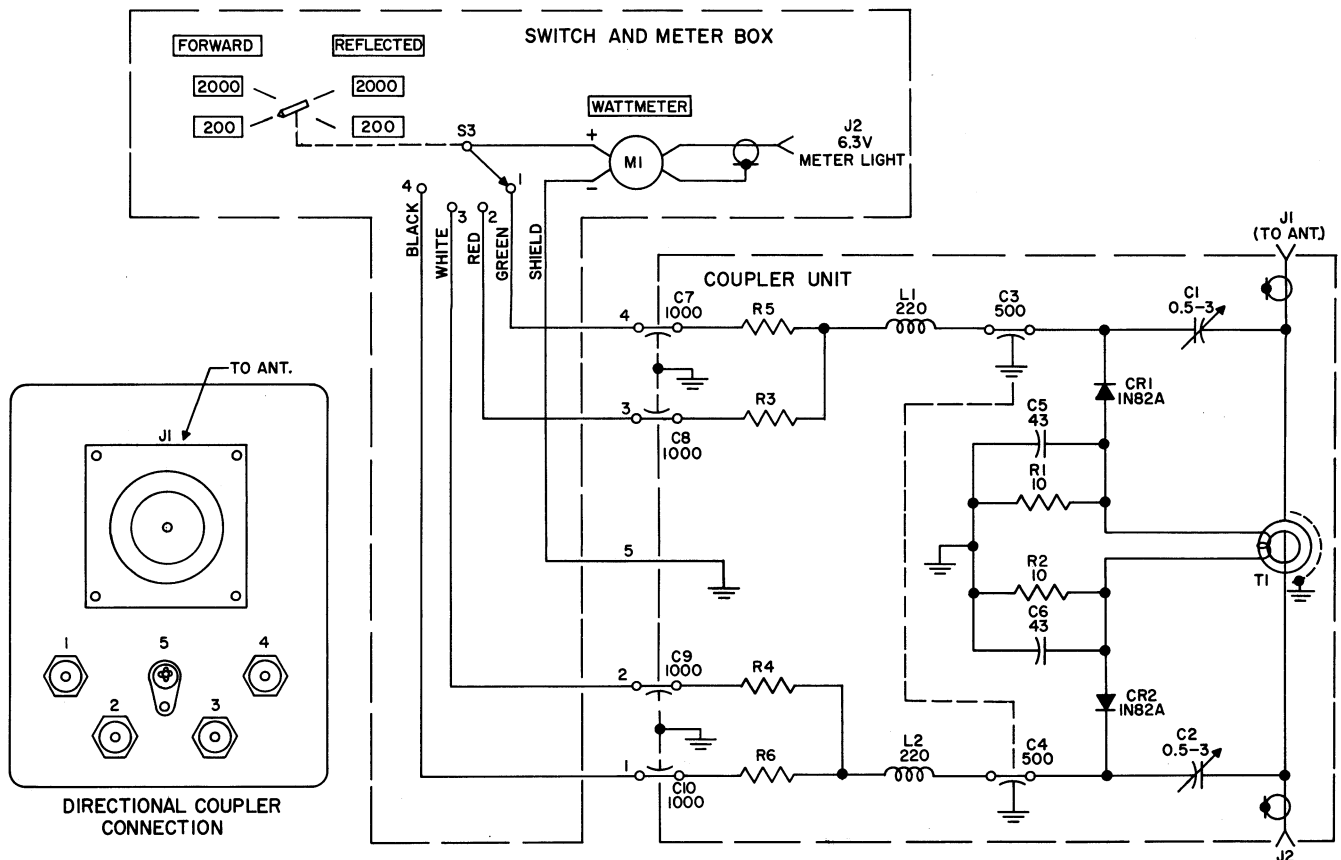
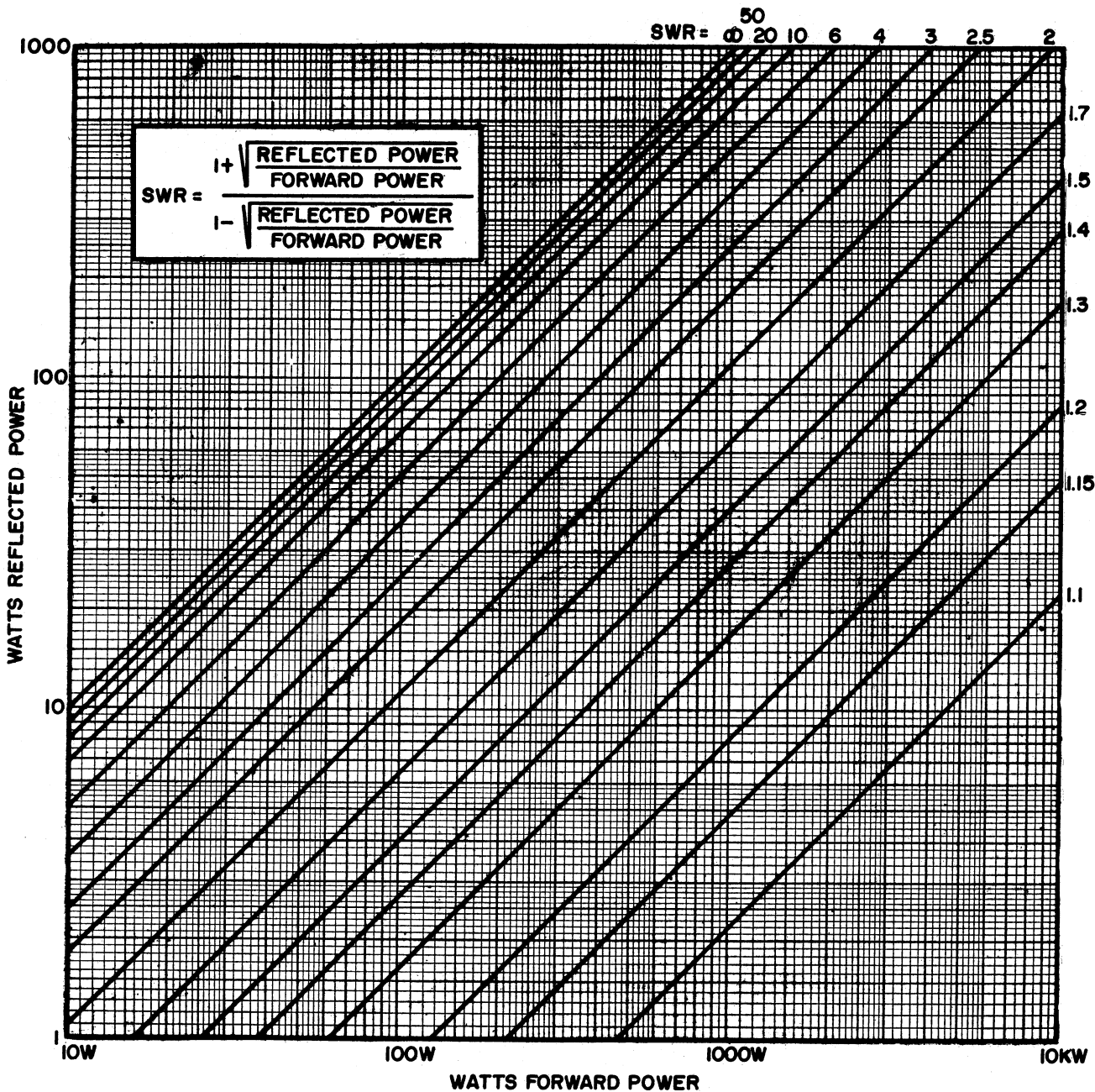


Figure 1. 302C-3 Directional Wattmeter, Schematic Diagram

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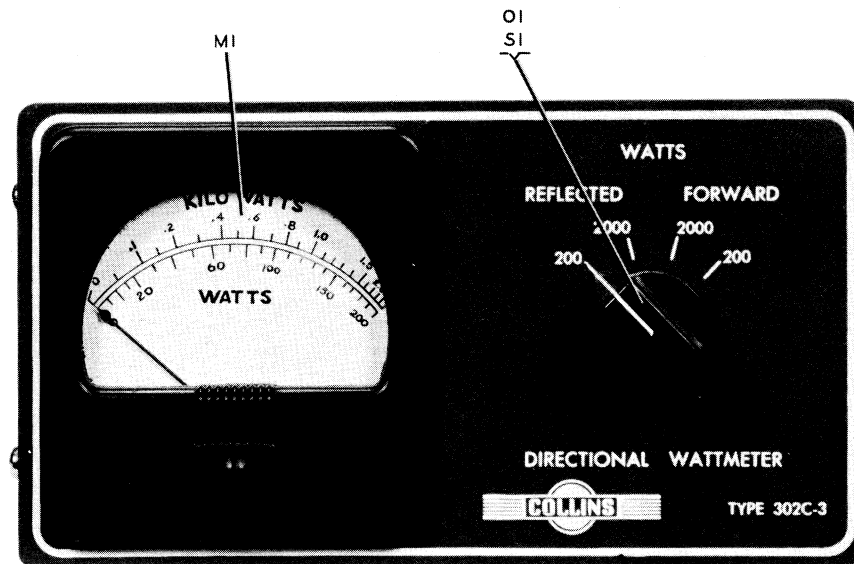
Figure 2. VSWR Chart

extremely high, as when the line is open or shorted, it is possible to obtain forward power greater than 2 kw with practically no power output from the transmitter. Therefore, to avoid damaging the instrument, the following operating procedure should be followed carefully.

a. Set the REFLECTED-FORWARD power switch to the FORWARD 2000 scale.

b. Turn on the transmitter and excite the transmission line (and the antenna or other load). Use AM or CW emission. The indicating meter should show a forward power indication.

c. If the forward power reading is below 200 watts, either switch to the FORWARD 200 scale or increase the power output of the transmitter until an indication of midscale or greater is obtained. If the forward power indication is greater than 2000 watts (off scale),



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Figure 3. Indicator Unit, Front View

reduce the power output of the transmitter until an on-scale indication is obtained. Record the indication.

d. Switch to the REFLECTED 2000 scale. Unless the antenna or load is perfectly matched (52 ohms resistive), the meter will indicate a reflected power. The reflected power indication will always be less than the forward power indication. If the indication is less than 200 watts, switch to the REFLECTED 200-watt scale. Record the indication. Figure 2 is a vswr chart. Use the recorded indications and figure 2 to determine vswr.

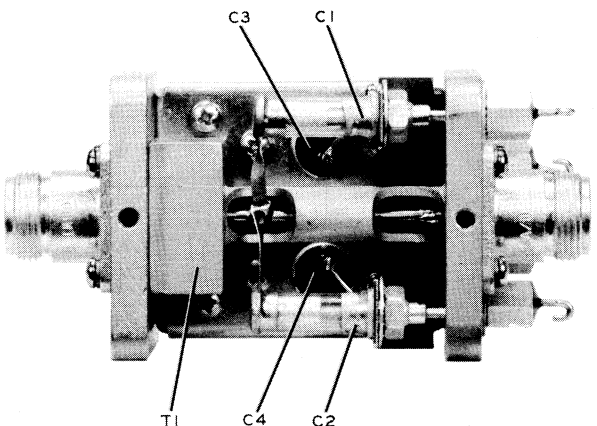
NOTE

If the reflected power indication is greater than the forward power indication, the coupler unit has been improperly installed. Either the coupler has been installed backwards (the input and output type N connectors attached to the wrong side of the line) or pairs of d-c meter leads to the indicator are reversed.

e. If the forward and reflected power readings are equal or nearly equal, the swr on the line is extremely high. This indicates a shorted, open, or poorly terminated line.

NOTE

The instrument will respond to submultiple and harmonic r-f output from the transmitter as



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Figure 4. Directional Coupler, Top View Showing Location of Parts

4.1 SPECIFICATIONS.

Frequency range 2 to 30 mc.

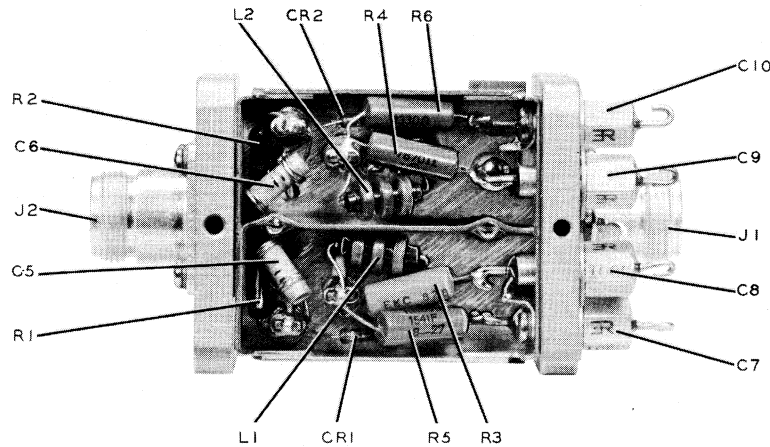
Maximum power handling capability 2000 watts forward power.

Impedance 52 ohms unbalanced.

Power loss through coupler Less than 0.1% or 2 watts with 2000 watts r-f output.

Wattmeter scales 200 watts forward.
2000 watts forward.
200 watts reflected.
2000 watts reflected.

Swr introduced by coupler Less than 1.05:1.



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Figure 5. Directional Coupler, Bottom View Showing Location of Parts

PARTS LIST

ITEM	DESCRIPTION	COLLINS PART NUMBER
	302C-3 DIRECTIONAL WATTMETER	522 1696 00
	<u>Directional Coupler</u>	543 8118 004
C1 & C2	CAPACITOR, VARIABLE, GLASS: 0.5 uuf min, 3.0 uuf max	922 0149 00
C3 & C4	CAPACITOR, MICA: 500 uuf ±20%, 500 vdcw	912 0667 00
C5 & C6	CAPACITOR, CERAMIC: 43 uuf ±1%, 500 vdcw	916 4675 00
C7 thru C10	CAPACITOR, CERAMIC: 1000 uuf +80% -20%, 500 vdcw	913 1292 00
C11 & C12	CAPACITOR, ELECTROLYTIC: 8 uf -20°C to +85°C temp range; 6 vdcw	183 1167 00
CR1 & CR2	DIODE: silicon, sealed; type 1N82A	353 2542 00
E1	CONDUCTOR, OUTER: brass, c/o tube, shield and plate; Collins Radio Company	542 4112 002
J1 & J2	CONNECTOR, RECEPTACLE, ELECTRICAL: 1 rd female contact, 50 ohms, straight shape; type UG-58A/U	357 9003 00
L1 & L2	COIL, R. F.: 220 uh, 0.02 amp	240 0037 00
R1 & R2	RESISTOR, FILM: 3,190 ohms ±1%, 1/2 w	705 2356 00
*R3 & R4	RESISTOR, FILM: 5,360 ohms ±1%, 1/4 w	705 7131 00
*R3 & R4	RESISTOR, FILM: 5,620 ohms ±1%, 1/4 w	705 7132 00
*R3 & R4	RESISTOR, FILM: 5,900 ohms ±1%, 1/4 w	705 7133 00
*R3 & R4	RESISTOR, FILM: 6,190 ohms ±1%, 1/4 w	705 7134 00
*R3 & R4	RESISTOR, FILM: 6,490 ohms ±1%, 1/4 w	705 7135 00
*R3 & R4	RESISTOR, FILM: 6,810 ohms ±1%, 1/4 w	705 7136 00
*R3 & R4	RESISTOR, FILM: 7,150 ohms ±1%, 1/4 w	705 7137 00
*R3 & R4	RESISTOR, FILM: 7,500 ohms ±1%, 1/4 w	705 7138 00
*R3 & R4	RESISTOR, FILM: 7,870 ohms ±1%, 1/4 w	705 7139 00
*R3 & R4	RESISTOR, FILM: 8,250 ohms ±1%, 1/4 w	705 7140 00
*R3 & R4	RESISTOR, FILM: 8,660 ohms ±1%, 1/4 w	705 7141 00
*R3 & R4	RESISTOR, FILM: 9,090 ohms ±1%, 1/4 w	705 7142 00
*R3 & R4	RESISTOR, FILM: 9,530 ohms ±1%, 1/4 w	705 7143 00
* Selected in manufacture. Replaced with identical part.		

ITEM	DESCRIPTION	COLLINS PART NUMBER
*R3 & R4	RESISTOR, FILM: 10,000 ohms ±1%, 1/4 w	705 7144 00
*R3 & R4	RESISTOR, FILM: 10,500 ohms ±1%, 1/4 w	705 7145 00
*R3 & R4	RESISTOR, FILM: 11,000 ohms ±1%, 1/4 w	705 7146 00
*R3 & R4	RESISTOR, FILM: 11,500 ohms ±1%, 1/4 w	705 7147 00
*R3 & R4	RESISTOR, FILM: 12,100 ohms ±1%, 1/4 w	705 7148 00
*R5 & R6	RESISTOR, FILM: 953 ohms ±1%, 1/4 w	705 7095 00
*R5 & R6	RESISTOR, FILM: 1000 ohms ±1%, 1/4 w	705 7096 00
*R5 & R6	RESISTOR, FILM: 1050 ohms ±1%, 1/4 w	705 7097 00
*R5 & R6	RESISTOR, FILM: 1100 ohms ±1%, 1/4 w	705 7098 00
*R5 & R6	RESISTOR, FILM: 1150 ohms ±1%, 1/4 w	705 7099 00
*R5 & R6	RESISTOR, FILM: 1210 ohms ±1%, 1/4 w	705 7100 00
*R5 & R6	RESISTOR, FILM: 1270 ohms ±1%, 1/4 w	705 7101 00
*R5 & R6	RESISTOR, FILM: 1330 ohms ±1%, 1/4 w	705 7102 00
*R5 & R6	RESISTOR, FILM: 1400 ohms ±1%, 1/4 w	705 7103 00
*R5 & R6	RESISTOR, FILM: 1470 ohms ±1%, 1/4 w	705 7104 00
*R5 & R6	RESISTOR, FILM: 1540 ohms ±1%, 1/4 w	705 7105 00
*R5 & R6	RESISTOR, FILM: 1620 ohms ±1%, 1/4 w	705 7106 00
*R5 & R6	RESISTOR, FILM: 1690 ohms ±1%, 1/4 w	705 7107 00
*R5 & R6	RESISTOR, FILM: 1780 ohms ±1%, 1/4 w	705 7108 00
*R5 & R6	RESISTOR, FILM: 1870 ohms ±1%, 1/4 w	705 7109 00
*R5 & R6	RESISTOR, FILM: 1960 ohms ±1%, 1/4 w	705 7110 00
*R5 & R6	RESISTOR, FILM: 2050 ohms ±1%, 1/4 w	705 7111 00
*R5 & R6	RESISTOR, FILM: 2150 ohms ±1%, 1/4 w	705 7112 00
*R5 & R6	RESISTOR, FILM: 2260 ohms ±1%, 1/4 w	705 7113 00
*R5 & R6	RESISTOR, FILM: 2370 ohms ±1%, 1/4 w	705 7114 00
*R5 & R6	RESISTOR, FILM: 2490 ohms ±1%, 1/4 w	705 7115 00
T1	COIL, RADIO FREQUENCY: 60 turns, toroidal wound, #30 AWG; Collins Radio Company	543 0916 002
	<u>Indicator Unit</u>	545 5920 004
M1	WATTMETER: panel type, dc circuit, 0-200 watt lower, 0-2 kilowatt upper scale, nonlinear	458 0566 00
O1	KNOB ASSEMBLY: c/o knob, pointer, push-on type, phenolic, 1-1/8 in. dia and leaf-type spring	543 8039 00
S1	SWITCH, ROTARY: 1 section, 2 circuit (2 pole) 4 position w/30° detent; 2 moving, 10 fixed contacts	259 1113 00