

DATE 7-1-64	TMC SPECIFICATION NO. S - 393		C
SHEET 1 OF 11			
BG/JR COMPILED	<i>gk</i> CHECKED	TITLE: SWR-3K SYSTEM TEST PROCEDURE	
APPROVED <i>[Signature]</i>			

DESCRIPTION

SWR-3K-RM :-contains a triple scale, dual pointer meter for indication of forward power, reflected power and VSWR; input connections for up to ten transmission line measurements; a ten position rotary switch for selecting the line to be measured; all assembled on a standard 19 inch relay rack panel with an optional cabinet, CAB-4. See sheet 9 for schematic diagram.

SWR-3K-PM :-Same meter movements and scales as the SWR-3K-RM above, but is a portable type with only one connector. See sheet 9 for schematic diagram.

CU-3K :-The Directional Coupler is essentially a balanced RF bridge network designed to measure forward and reflected power on the black and red scale respectively of either the PM or RM meters, or both. Also to indicate VSWR at the point where the two meter pointers intersect. The CU may be calibrated either for a 50 or 70 ohm load. See sheet 4 for cross section of R-201 and schematic of coupler.

JB111 :-junction box containing three four conductor connectors and a switch. Its purpose is to provide a rapid means of switching the two DC outputs from the Directional Coupler to either the PM or RM dual meter movements. See sheet 8 for schematic diagram.

The following test procedure is applicable to the units described above as a system or as individual units or combination of units. However, if the CU coupler is to be tested as an individual unit a PM or RM meter will be required. Likewise if a PM or RM meter is to be tested as individual units, a CU coupler will be required.

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SWR-3K SYSTEM

TEST EQUIPMENT REQUIRED

- . GPT-10K Transmitter
- . VTVM Hewlett Packard or equivalent
- . Simpson 260 ohmmeter or equivalent
- . CU-3K-50 or CU-3K-70
- . 50 or 70 ohm load capable of handling 3KW
- . Model 4715 Calibrated Directional Wattmeter
- . Directional Coupler Meter
- . SWR-3K-PM or RM

*A. JB111

1. Remove cover from the junction box and inspect wiring for loose connections, improper soldering and shorts.
2. With an ohmmeter and schematic diagram of JB111, check circuit continuity from each pin of J-303 to the corresponding pins on J-302 with the switch S-301 in REMOTE.
3. Place switch S-301 in LOCAL and repeat circuit continuity from pins of J-303 to corresponding pins of J-301.
4. Continuity, zero resistance, must conform to the JB111 schematic diagram on sheet 8.

B. SWR-3K-PM/SWR-3K-RM

- *1. Check the meter movement for proper positioning and zero adjusts for proper engagement. If necessary zero adjust the movements.
- *2. For RM only - Remove the front panel from the case and inspect wiring and mechanical operation of the eleven position switch, S-101.
3. Electrical and operational tests of either PM or RM meter units will be covered below in the procedure for RF alignment of the CU coupler.
4. For PM only - If a transmitter and/or an SWR-3K/CU are not available, test the SWR-3K/PM meter for correct movement using the Multimeter Test Fixture. With its variac powered from a constant voltage AC supply source, connect the SWR meter plug, J203 Pins A and B to the test jack. Turn Selector Switch to Position 1 and Range Switch to Position 3. Turn on power and adjust the variac until the Test Panel Meter reads 1.1 MA. The forward power or black pointer on the SWR meter must read full scale $\pm 2\%$. Repeat the foregoing with the J203 Pins C and D connected to the test jack, and without changing the variac setting, the reflected power or red pointer on the SWR meter must in turn read full scale $\pm 2\%$.

NOTE: Indicate completion and acceptance of portion (s) of this test preceeded by (*) by recording required observed value or by check (✓) mark as required on attached Test Data Sheet.

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C. CU-3K-50 or CU-3K-70

- *1. Remove the top cover of the CU coupler and carefully inspect for physical damage to components, wiring and ceramic standoffs. See that the 100W, 0.45 ohms resistor is properly seated.
- *2. The purpose of this test is to check the 1N252 diodes, 2.5 MH chokes and the 1000 PF capacitor that are mounted within the 0.45 ohm 100 Watt resistor. The coupler should be placed on the table with the "Transmitter" connector on the test leads left and "antenna" connector on right. Remove the top cover. With the ohmmeter perform the continuity checks listed on the table below. The designated check points are graphically and schematically shown on sheet #4. Where polarity is shown it must be observed. The resulting readings must be within the limits indicated.

OHMMETER AT TERMINALS	LIMITS OHMS
B and C	25 to 40
A and D	25 to 40
-C and +F	75 to 115
Reverse Test Leads	100K to ∞
-D and +E	75 to 115
Reverse Test Leads	100K to ∞
-A to +E or +F	25 to 40
-B to +E or +F	25 to 40
Reverse Test Leads.	
A to E or F	100K to ∞
B to E or F	100K to ∞
E to F	0.35 to 0.50

NOTE: Indicate completion and a portion of portion (s) of this test preceded by (*) by recording required observed value or by check (✓) mark as required on attached test Data Sheets.

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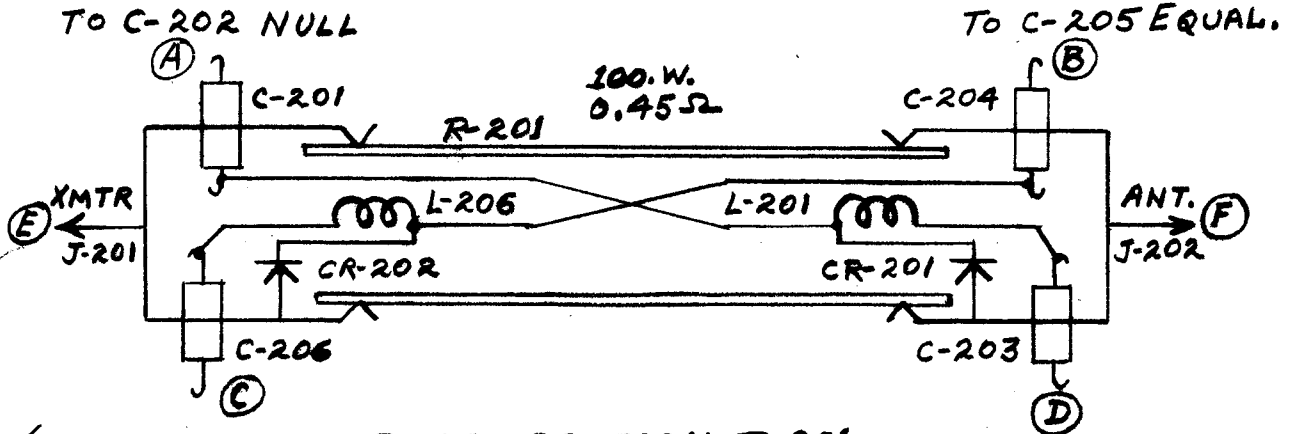
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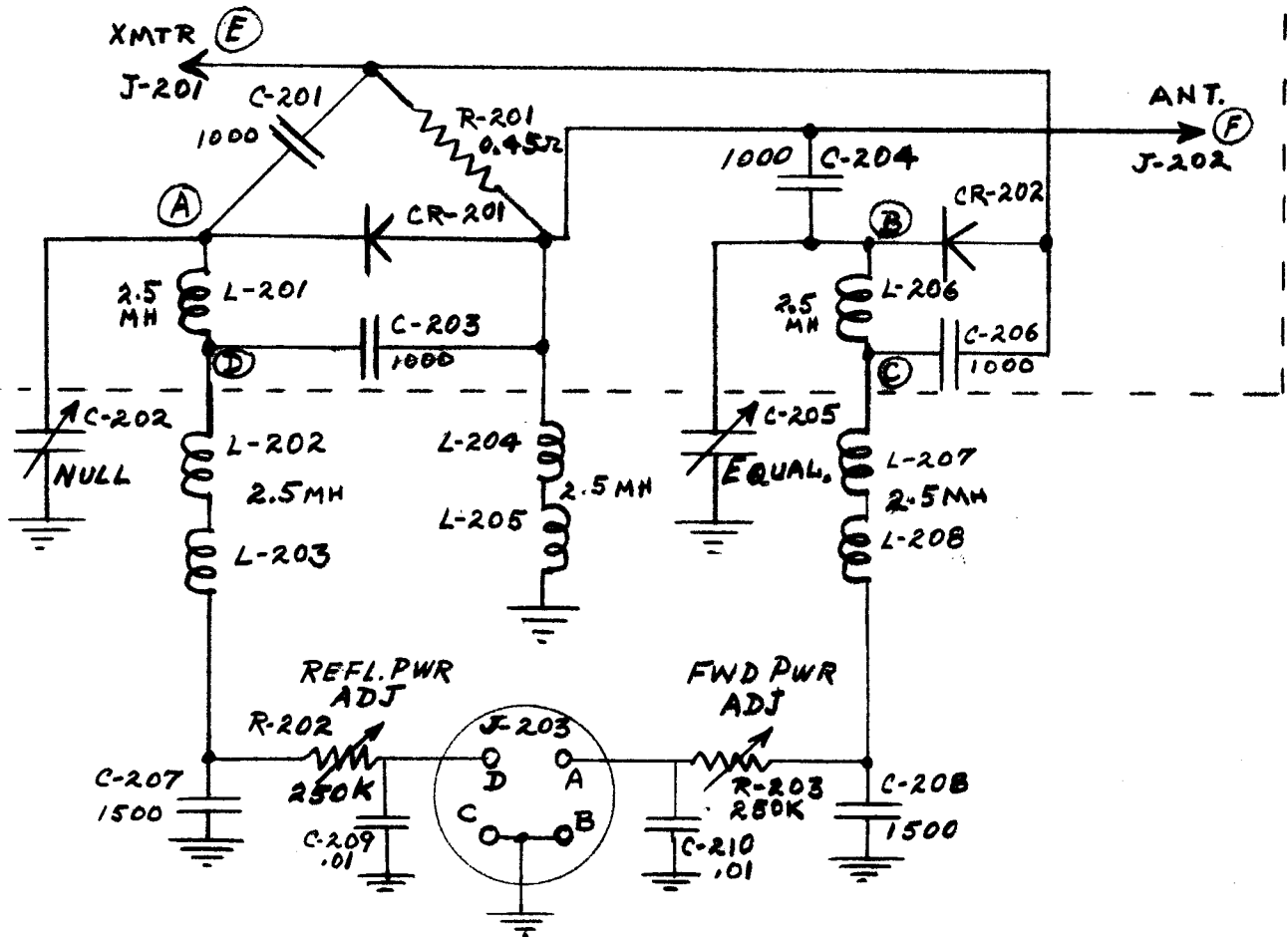
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CROSS SECTION R-201 ASSEMBLY



CU-3K SCHEMATIC

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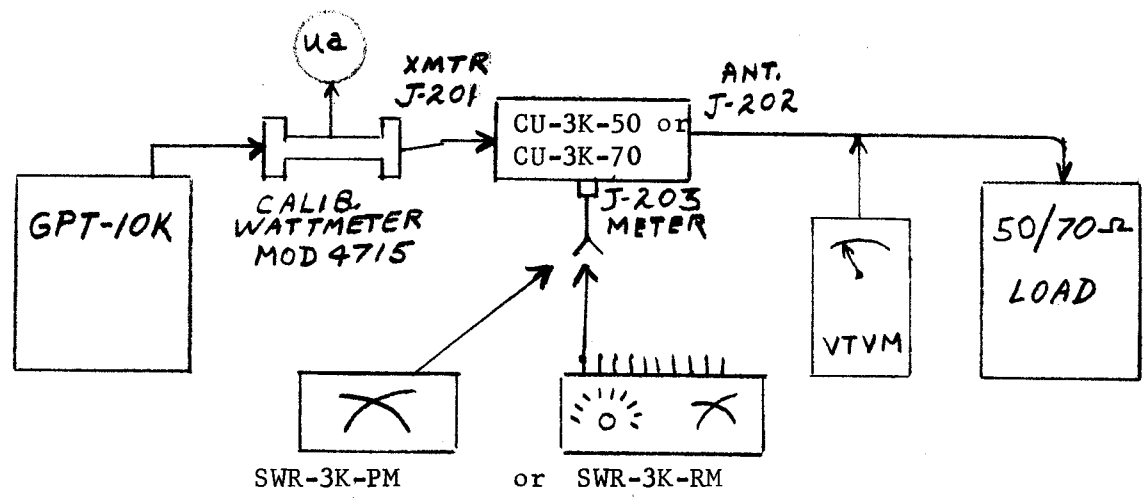
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D. RF Alignment, CU coupler and RM or PM meter Calibration

CAUTION: This test will require the use of RF output from a GPT-10K transmitter. During the tests do not exceed 3KW output and only use the reinserted carrier to drive the transmitter.

1. Connect the unit(s) to be tested to transmitter and load as shown in sketch below:



TEST CONNECTIONS

(SEE CK891 FOR MORE DETAILED WIRING INFORMATION)

2. Turn Reflect Power Adj, R202, and Forward Power Adj, R203, to maximum resistance-CCW.
3. Tune the transmitter to 10.0 MCS and carefully adjust for 3KW output on the calibrated Wattmeter (Model 4715) using only reinserted carrier for drive. Adjust Forward Power, R-203, to provide 1/2 to 3/4 deflection on forward power meter.

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- #4. Adjust NULL capacitor, C202, for minimum reading on reflected power scale.
- 5. Turn transmitter HV switch to "OFF". Reverse cable connections on transmitter connector, J201 and antenna connector, J202.
- 6. Turn transmitter HV switch to "ON" and carefully increase drive to 3KW output. Adjust Reflected Power, R-202, to provide $\frac{1}{2}$ to $\frac{3}{4}$ deflection on Reflected Power meter.
- #7. Adjust the EQUALIZER capacitor, C205, until forward power meter reads minimum. Turn transmitter HV "OFF".
- 8. Connect a RF VTVM across the 50 or 70 ohm load.
- 9. Adjust the transmitter output carefully until there is 388 volts across 50 ohm or 458 volts across 70 ohm load, the calibrated directional wattmeter should read 3KW \pm 5%.
- #10. Adjust R202, Reflected Power Adjustment until reflected power meter reads 3000 watts.
- #11. Carefully reduce transmitter drive until the VTVM indicates the following voltages across the appropriate load:

E across 50 ohm LOAD	E across 70 ohms LOAD	Reflected & Forward Power METER READING LIMITS
316V.	372V.	2000 \pm 5% F.S.
224V.	265V.	1000 \pm 5% F.S.

- 12. Turn transmitter HV switch to "OFF".
- 13. Restore the cable connections to J201 and J202 to their original position, as they were prior to reversal in Para "5" above.

NOTE: Indicate completion and acceptance of portion (s) of this test preceded by (*) by recording required observed value or by check (✓) mark as required on attached test Data Sheets.

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14. Turn transmitter HV switch "ON" and adjust transmitter drive carefully for 388 volts across 50 ohm, or 458 volts across 70 ohm load, as indicated on the RF VTVM. The calibrated directional wattmeter should read $3KW \pm 5\%$.
- *15. Adjust R203 Forward Power adjustment for 3000 watts on the forward power meter scale.
- *16. Repeat test "11" above for the Forward Power meter calibration, i.e., for 2000 and 1000 Watt readings. The same requirement applies as above for the Reflected power meter.
- *17. If the meter under test is an RM, in para "11" and "16" above for either the 2000 or 1000 W power level, the cable from J-203 on the CU coupler must be inserted in each of the ten jacks J-101 thru J-110 to insure that each on thru the appropriate position of S-101 selector switch provides the correct indication on the forward and reflected power indicators on the RM unit.

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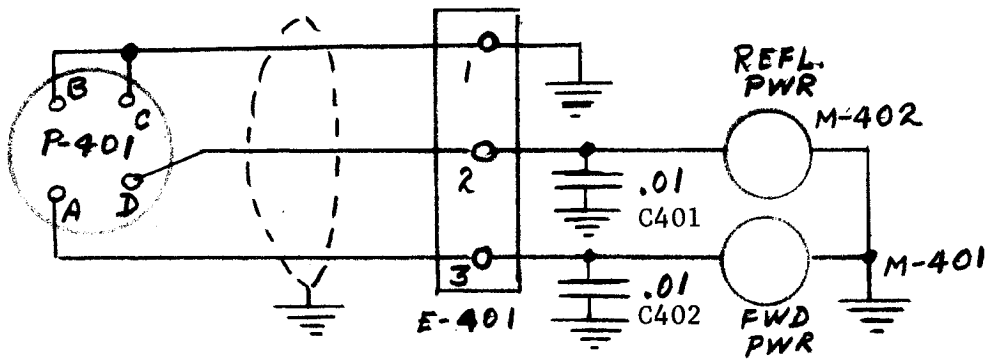
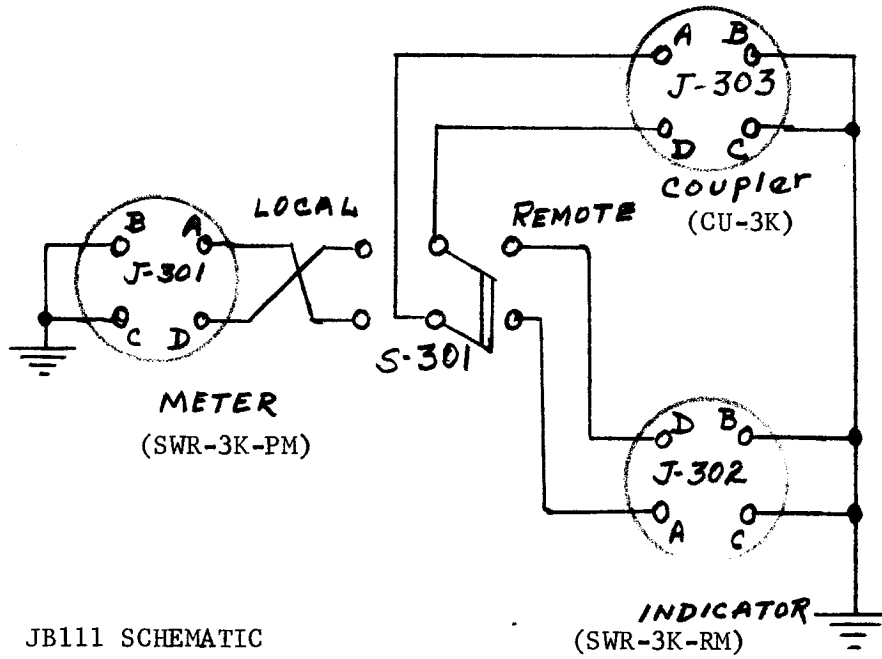
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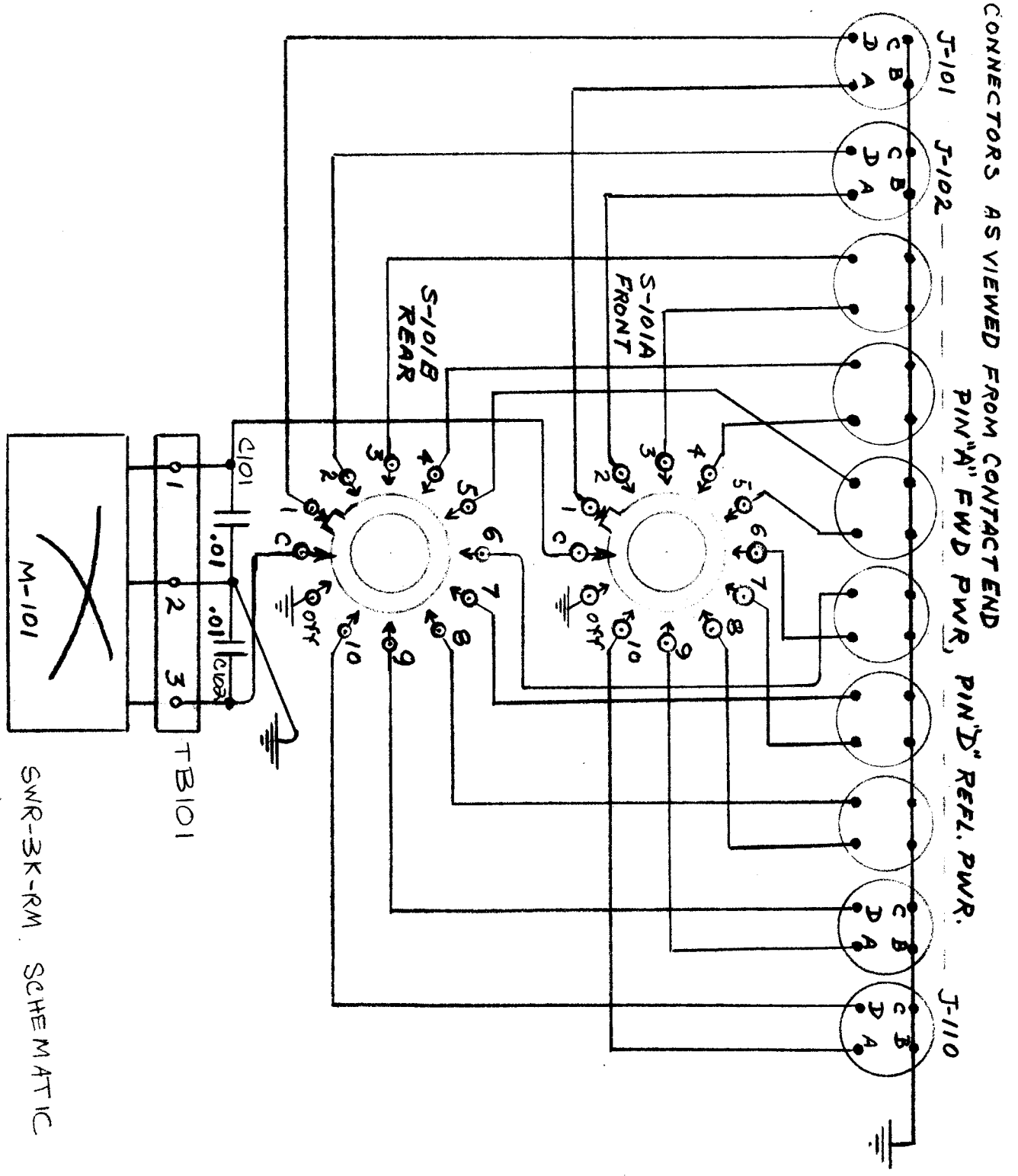
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**TEST DATA SHEET
SWR-3K
SYSTEM**

NOTE: If not a complete system, fill out only the appropriate sections below for the unit(s) tested.

1. (A-1 thru 4) JB: + 1000
 - a. Preliminary Inspection completed. No defects _____ ()
 - b. Circuit continuity checks completed _____ ()

2. (B & D) SWR-3K-FM OR FM
 - a. (B-1) Meter movements and zero adjust inspection completed _____ ()
 - b. (D-10 & D-15) Calibration of FORWARD and REFLECTED power indicators made at full scale, 3000W/10MCS with SWR-3000 CU coupler _____ ()
 - c. (B-2) FOR SWR-3K - RM ONLY-Electrical wiring and selector switch inspection completed. _____ ()
 - d. (D-17) FOR SWR-3K - RM ONLY-J-101 thru J-110 plug connectors checked out for each selector switch, S-101, position, for indication of both FORWARD and REFLECTED power meters. _____ ()
 - e. (D-11 & D-16) Forward and Reflected power meter calibration check made at 2000W and 1000W points in conjunction with CU-3K coupler for _____ + 5% of Full Scale.

E across		METER READINGS	
50 ohm load	70 ohm load	FORWARD	REFLECTED
388 V.	458 V.	_____ W.	_____ W.
316 V.	372 V.	_____ W.	_____ W.
224 V.	265 V.	_____ W.	_____ W.

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3. (C & D) CU-3K Coupler

- a. (C-1) Preliminary electrical inspection completed, no defects. _____ ()
- b. (C-2) Electrical check of R-201 Assembly completed, no defects. _____ ()
- c. (D-4 & D-7) Coupler NULLED and EQUALIZED at 10MCS/300W for _____ Ω (50 or 70)
- d. (D-10 & D-15) Coupler FORWARD and REFLECTED ADJ's set in connection with a PM meter at 10MCS for 3000 watt indication with _____ V.RF across the load in "C" above.

TESTED BY _____ MFG. #CU-3K _____

DATE _____ MFG. #SWR-3K-PM _____

APPROVED BY _____ MFG. #SWR-3K-RM _____

MFG. #JB111 _____

