

# MATCHMASTER

## MODELS 650 and 651

### DESCRIPTION

The B&W Matchmaster is a device consisting of a Dummy Load, a Direct Reading RF Watt Meter and a Standing Wave Ratio Indicator (SWR).

It is a useful and reliable equipment in the Ham Shack, Laboratory, Factory and Electronic Maintenance and Repair Shops. Two Models are available; Model 650 for 52 ohm and Model 651 for 73 ohm unbalanced coaxial line applications.

Circuitry, consisting of a non-reactive load, R.F. Bridge, Indicating Meter and necessary switches and variable controls, is housed in an attractive steel cabinet provided with ventilating louvers and finished in pleasing blue hammertone.

### APPLICATIONS

This versatile instrument may be used in any of the following applications:

1. Determine and measure SWR of Antenna Feed Lines.
2. Enables correct adjustment of antennas and Antenna Matching Networks.
3. Measure Power Output of Radio Transmitters.
4. Adjustment of Transmitters for Maximum Power Output.
5. Non-reactive dummy load for transmitter testing.

For powers in excess of 125 watts, a link may be used to feed the Matchmaster and the watt meter indication is useful for determining the proper tuning of all preceding and output stages of a transmitter. This is accomplished by using a length of coax cable of proper impedance with a link at one end and a coax fitting at the other end. This length of coax is attached to the "Input" terminal of the Matchmaster. With the Selector Switch

turned to the "PWR" position, the linked end of the coax line is loosely coupled to the tuned circuits of the transmitter. Proper adjustment of the tuned circuits will be indicated by maximum deflection of the meter under maximum loaded conditions effecting each stage under test.

The Matchmaster may also be used for observations of SWR conditions in a coax line between a Driver Amplifier and a Power Amplifier. It affords an excellent aid when adjustments are needed to correct inductive or capacitive link coupling reactance.

### MEASUREMENT OF POWER

When using the Matchmaster as an RF Power Meter, turn the Selector Switch to the "PWR" Position. Next, connect a length of coaxial cable of appropriate impedance between the output of the transmitter and the "Input" coax connector on the Matchmaster. Next, turn on the Transmitter and proceed to make all tuning and loading adjustments. The meter on the Matchmaster will now indicate the power output which is directly read on the portion of the scale calibrated for RF watts.

In test procedures with transmitters of less than 125 watts output, the Matchmaster may be used advantageously to obtain maximum output through the medium of optimum adjustment of bias and grid drive and proper setting of tuning and loading controls.

### STANDING WAVE RATIO MEASUREMENTS

The Standing Wave Ratio of a transmission line may be measured with the Matchmaster as follows:

1. Connect the output of the Transmitter

or driving stage through a suitable length of coax cable of appropriate impedance to the "Input" connector of the Matchmaster.

Connect the antenna feed line (coax type) to the "Output" connector of the Matchmaster.

Turn Selector Switch on Matchmaster to "PWR" Position.

Before turning on Transmitter, be sure that output will be at least 10 watts but, not greater than 100 watts.

Turn Transmitter on and load to suitable power meter value between 10-100 watts. Next, turn the Selector Switch to the "Adj." position and set the meter to read full scale by means of the meter "Adj." knob. This is the small knob located directly above the Selector Switch.

Turn Selector Switch on Matchmaster to "SWR" Position and read SWR value as indicated by meter.

An SWR greater than 2 to 1 can be considered as an excessive amount and customary steps for correction should be taken.

Adjustment of an antenna or an antenna matching network is accomplished by reducing the Standing Wave Ratio as indicated by the Matchmaster to as low a value as possible. An excellent source of information covering corrective measures for reducing SWR on transmission lines and antenna matching networks, is the 31st edition, 1954 issue of the ARRL Radio Amateur's Handbook, chapter 21, Pages 75 through 480.

The Matchmaster provides a fast visual

and easy method of correcting SWR on coaxial feed lines feeding beam type antennas.

In this process the Matchmaster can be located in the feed line near the point of feed on the driven element, within easy reading distance from the position where the feed line and element adjustments are made.

With the transmitter power turned on and power output adjusted for a suitable meter reading on the Matchmaster, the peak adjustments as required for the feed line and elements providing minimum SWR can be arrived at quickly by a glance at the Matchmaster without further disturbing the Transmitter.

When the adjustments have been completed and the SWR is reduced to a satisfactory low value, (less than 2 to 1), it can be assumed that the feed line system has an impedance value approximately equal to the Matchmaster. Thus, feeding the transmitter output power into the feed line system and the antenna, should have a minimum effect on the optimum adjustments previously made to the transmitter for maximum power output and best performance.

## CAUTION

As an R.F. Power Meter, the Matchmaster may be operated continuously with a power input up to 100 watts and intermittently up to 125 watts which is full scale on the meter.

It is not to be assumed that the Matchmaster can be permanently left connected in the transmission line for monitoring purposes after the process of SWR or

power measurements. When the instrument is used in this application, the internal non-reactive load of the Matchmaster is in partial shunt with the transmission line, allowing only a fraction of power to flow through. Hence, in order to permit full power to pass through the transmission line to the antenna or other device, the Matchmaster should be disconnected and the feed line attached directly to the output of the transmitter.

## MAINTENANCE INFORMATION

Should the Matchmaster fail to function in any attempt to use it, the first step is to remove the instrument from its case by removing the eight panel screws which fasten the panel to the cabinet. These are the eight Philips Head Screws located on the extreme outer edge of the panel. Do not loosen or remove any of the other screws located on the inside of the panel decorating trim stripe.

After the instrument has been removed

from the case, check the ballast lamp—Part #T-792—for continuity and make sure it is screwed tightly into its socket. If the lamp is open circuited, it should be replaced with an exact duplicate. Do not attempt to substitute one of unknown characteristics. **This is important.**

Repairs beyond this point will require replacement of certain components affecting the overall calibration of the instrument in which case, it should be returned to the factory for repairs, replacement of parts and adjustment against a laboratory standard.

## SPECIFICATIONS

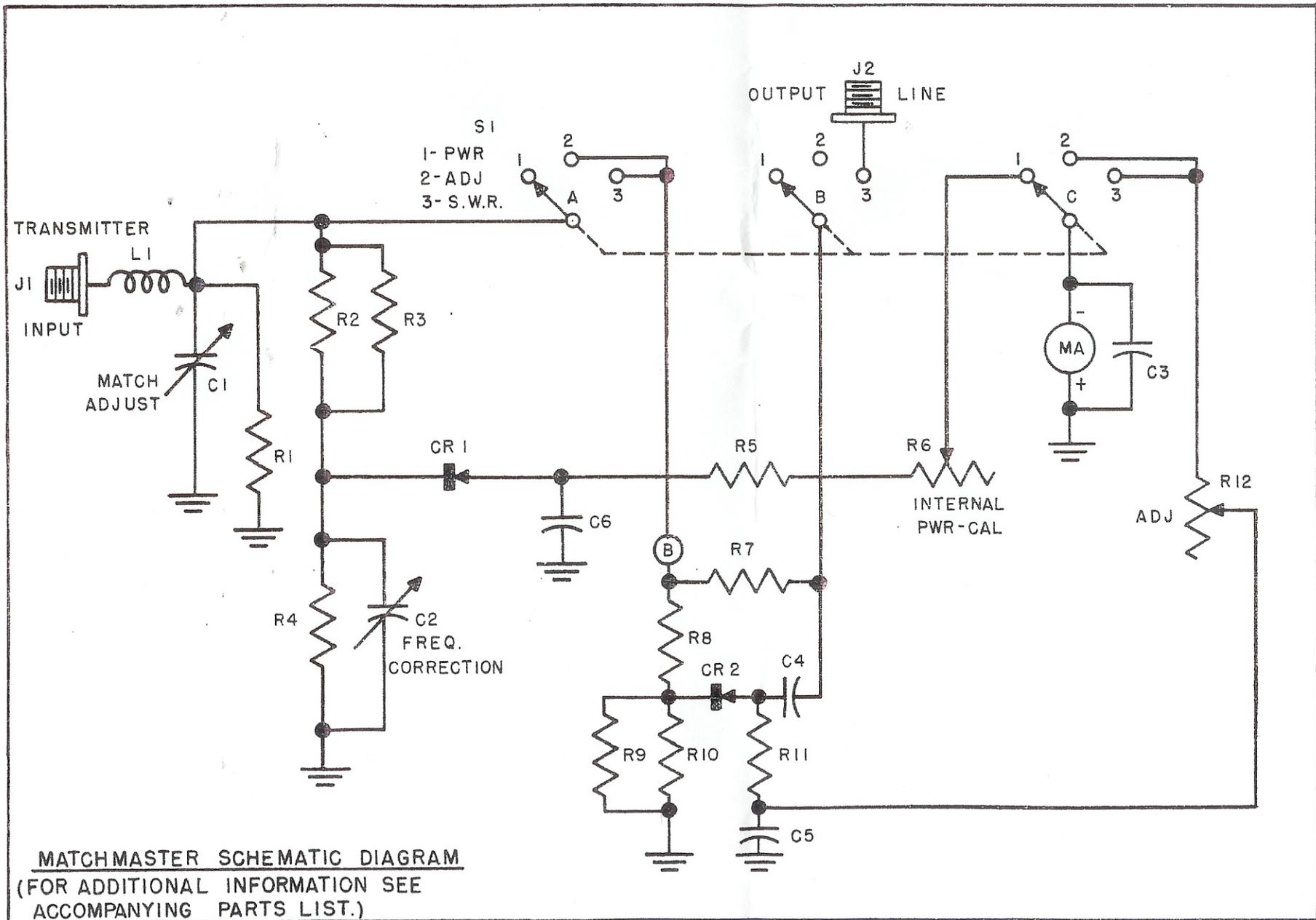
Dummy Load—SWR 1.2:1 or better over a frequency range from D.C. to 30MC.

RF Watt Meter—useful from 500KC to 30MC.

Power Rating—100 watts continuous—125 watts intermittent.

Model 650—52 ohms

Model 651—73 ohms



MODEL 650			PARTS LIST			MODEL 651		
SYMBOL NUMBER	B & W PART NO.	DESCRIPTION	SYMBOL NUMBER	B & W PART NO.	DESCRIPTION			
R1	R-98	RES., OHMITE, 52 OHM	R1	R-91	RES., OHMITE, 73 OHM			
R2, R3	R-97	RES., 8200 OHM, 10%, 2 WATT	R2, R3		SAME AS MODEL 650			
R4	R-96	RES., 470 OHM, 5%, 1/2 WATT	R4		SAME AS MODEL 650			
R5	R-63	RES., 5600 OHM, 10%, 1/2 WATT	R5		SAME AS MODEL 650			
R6	R-92	POT., WIRE WOUND, 7500 OHM	R6		SAME AS MODEL 650			
R7, R8, R10	R-99	RES., 51 OHM, 5%, 1/2 WATT	R7, R8, R10	R-94	RES., 75 OHM, 5%, 1/2 WATT			
R9, R11	R-100	RES., 1200 OHM, 5%, 1/2 WATT	R9, R11	R-95	RES., 1500 OHM, 5%, 1/2 WATT			
R12	R-93	POT., CARBON, 10,000 OHM	R12		SAME AS MODEL 650			
C1	T-15	CAP., 100MMF, A.P.C. TYPE	C1		SAME AS MODEL 650			
C2	T-314	CAP., 20MMF, A.P.C. TYPE	C2		SAME AS MODEL 650			
C3, C4, C5, C6	T-509	.001 DISC CERAMIC CAP.	C3, C4, C5, C6		SAME AS MODEL 650			
CR-1, CR-2	T-243	GERMANIUM RECTIFIER, 1N34	CR-1, CR-2		SAME AS MODEL 650			
L1		COIL - SPECIAL MINIDUCTOR	L1		COIL - SPECIAL MINIDUCTOR			
MA	T-789	METER, 0-1 MIL.	MA		SAME AS MODEL 650			
J1, J2	L-300	CO-AX CONNECTORS SO 239	J1, J2		SAME AS MODEL 650			
S1	T-790	SWITCH, CERAMIC ROTARY TYPE	S1		SAME AS MODEL 650			
B	T-792	BALLAST LAMP	B		SAME AS MODEL 650			

