

INSTRUCTIONS FOR
PORTABLE WHEATSTONE BRIDGE
MODEL 1071

1. DESCRIPTION

Completely self-contained, this portable Wheatstone Bridge combines laboratory accuracy with portability. It consists of a five dial Rheostat $9 \times (1000 + 100 + 10 + 1 + 0.1)$ ohms, a seven position Ratio Dial providing multipliers of .001, .01, .1, 1, 10, 100, and 1000, and a combination pointer and reflection (POINTERLITE) galvanometer. The bridge current is supplied by a 6 volt or 45 volt battery with current for the galvanometer lamp derived from two 1-1/2 volt flashlight cells connected in parallel. Binding posts, lever switches, and pushbutton keys to perform the functions described below, are conveniently located.

The range of the bridge is from 1 to 10 megohms, and the sensitive (.08 microampere per millimeter) galvanometer permits balancing to within 0.01% up to 250,000 ohms, within 0.1% up to 2.5 megohms and within 0.4% up to 10 megohms. Provisions for connecting an external battery or galvanometer may be made use of where additional sensitivity is required at the high end of the range.

2. GALVANOMETER ZERO ADJUSTMENTS

Place the instrument on a level support, reasonably free from mechanical vibration. Adjust the galvanometer pointer, if necessary, so that it coincides with zero on the scale by turning the knurled button on top of the galvanometer system. Operate the LAMP switch to the ON position (to the right). The index line on the indicating light spot can be aligned with zero by pressing on the glass scale and exerting lateral force in the desired direction.

3. RESISTANCE MEASUREMENTS

Connect the unknown resistor to the two binding posts marked X. Light the galvanometer lamp by operating the LAMP switch to the right. If the value of the X resistor is known approximately, set the ratio dial in accordance with the table below. Vary the rheostat dials until depressing and releasing the GB key causes no deflection of the galvanometer (or no more deflection than would be caused by moving the X.1 rheostat dial one step).

The GB key applies 6 volts to the bridge. For greater sensitivity above 10,000 ohms, depress the H key and lockdown by rotating clockwise. This applies 45 volts to the bridge through a protective resistor that prevents damage to low value resistors.

If the X resistor value is unknown operate LAMP switch to the left, which turns out the lamp and shunts the galvanometer with a low resistance. The galvanometer pointer will then indicate the direction of large bridge unbalances. Set the X1000 dial of rheostat on the 1 position and the ratio dial at .001. Press the GB key and observe the galvanometer deflection. Change the ratio dial to successively higher settings until the galvanometer deflection changes directions. Change back to the next lower ratio dial setting and complete the balance with the rheostat dials as described above with galvanometer lamp on as balance is approached. If the highest ratio value (1000) is reached without change of direction of galvanometer deflection, increase rheostat setting to the maximum to determine whether the unknown resistor is within the range of the bridge.

CAUTION: TO AVOID ERROR DUE TO SELF-HEATING OF UNKNOWN RESISTORS OF LOW RATING, DEPRESS AND RELEASE GB KEY INSTEAD OF HOLDING IT DOWN.

The value of the unknown resistor is the sum of the rheostat dial settings multiplied by the ratio dial setting.

<u>UNKNOWN RESISTANCE</u>		<u>RATIO SETTING</u>	<u>OPERATE</u>
Below -	10 ohms	.001	GB key
10 ohms to -	100 ohms	.01	
100 ohms to -	1,000 ohms	.1	
1,000 ohms to -	10,000 ohms	1.	GB key with H key locked down.
10,000 ohms to -	100,000 ohms	10.	
100,000 ohms to -	1,000,000 ohms	100.	
1,000,000 ohms to -	10,000,000 ohms	1000.	

4. TO USE RHEOSTAT ALONE

Connect to binding posts marked R. Make sure that the H key is open and do not depress the GB key. AVOID EXCESSIVE CURRENT. THE INDIVIDUAL RHEOSTAT RESISTORS HAVE A SHORT TIME RATING OF 0.5 WATT MAXIMUM, AND CAN WITHSTAND 0.25 WATTS CONTINUOUSLY WITHOUT DEVIATING FROM THEIR STATED ACCURACY.

5. TO USE EXTERNAL GALVANOMETER

Connect a suitable external galvanometer to the GA binding posts and operate the adjacent switch to the EXT position. The galvanometer, for most convenient use, should have an external critical damping resistance of approximately 1000 ohms.

6. TO USE EXTERNAL BATTERY

Connect a suitable battery to the BA binding posts and operate the adjacent switch to the EXT position. A protective resistance of 3000 ohms is in the external battery circuit, and an external battery in excess of 90 V must not be used except with additional protective resistance.

7. BATTERY INSTALLATION AND REPLACEMENT

Two D size flashlight cells are supplied for the galvanometer lamp, and a 6 volt and 45 volt battery are supplied for the bridge measuring circuit.

A. BATTERY INSTALLATION (Refer to Figure 1)

(Top View)

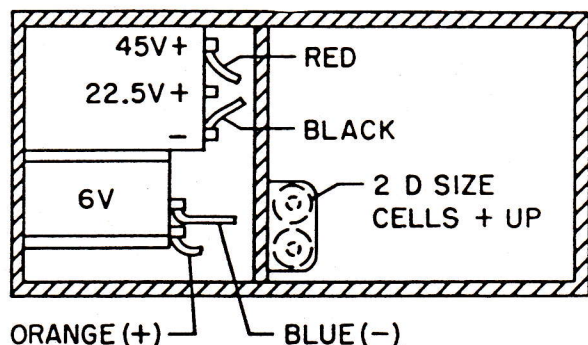


Figure 1. Installation and Connections

1. Remove three screws from the hinged rear door and open the door.
2. Connect and install the 6 and 45 volt batteries following the color coding and polarities shown. The D size cells are in parallel, insert as shown.
3. Close the hinged door and insert and tighten the three screws.

B. BATTERY REPLACEMENT

Replace the galvanometer lamp batteries when the indicating spot-of-light becomes too dim for convenient use. The bridge supply batteries must be replaced when there is a noticeable decrease in sensitivity. Refer to the parts list for proper replacement batteries. Battery replacement is made by following the preceeding battery installation instructions after battery removal.

8. TO REPLACE GALVANOMETER LAMP

The galvanometer lamp is accessible through the hinged door in the rear. A spare lamp is located in a fuse clip mounted to the galvanometer frame. The lamp is a Mazda 222 flashlight bulb. If desired, selected lamps (Part 726397-1) may be obtained from Rubicon Division of Electro-Nite Co. Remove the lamp socket from the end of the lens tube and replace the old lamp with the new. Replace the socket in the lens tube and with the LAMP switch closed, rotate the lamp socket until the best image is obtained. It may be necessary to bend the socket supporting wire to position the lamp for a good image.

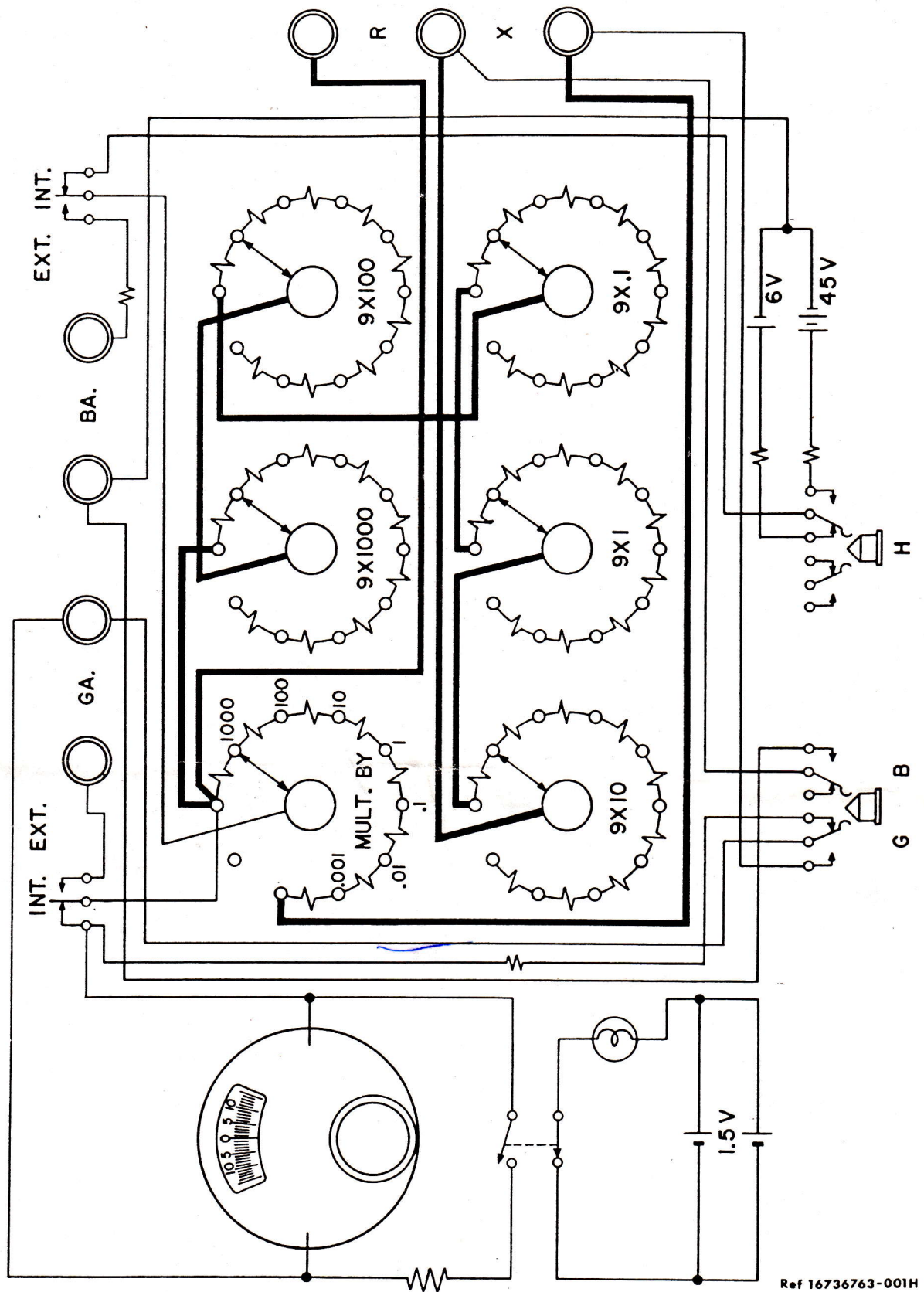


Figure 2. Schematic Diagram for Model 1071

REPLACEMENT PARTS FOR PORTABLE WHEATSTONE BRIDGE
MODEL 1071

It is recommended that the instrument be returned to the factory for replacement of parts not listed in the following table.

When ordering Replacement Parts, specify the Model and Serial Number of the instrument requiring parts, and the part number and description of the parts required.

Part Number	Qty.	Description
735045-1	2	Dry Cell, Standard Flashlight, Size "D".
735676-1	1	Battery, 6 volt, Burgess F4BP or equivalent.
735675-1	1	Battery, 45 volt, Burgess Z30NX or equivalent.
726667-3	1	Galvanometer System
726397-1	1	Galvanometer Lamp, Selected Mazda No. 222
726383-1	1	Glass Scale, Galvanometer
726432-1	4	Cap, Binding Post (GA & BA)
726438-1	3	Cap, Binding Post (R & X)
726192-2	6	Knob, Rheostat and Ratio Switches
726778-1	1	Switch, "INT. EXT"
726869-1	1	Switch, Galvanometer "LAMP"
726158-1	1	Key, "G B"
726158-3	1	Key, "H"