A microphone headset tester for pre-flight checking

Lewrey, N. A. C.

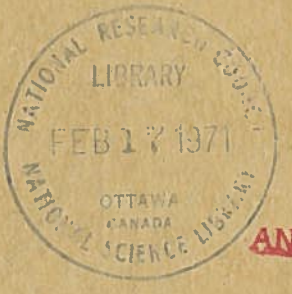
Report (National Research Council of Canada. Radio and Electrical Engineering Division : ERB); no. ERB-363, 1955-06

ERB-363

UNCLASSIFIED

NATIONAL RESEARCH COUNCIL OF CANADA

RADIO AND ELECTRICAL ENGINEERING DIVISION



A MICROPHONE HEADSET TESTER FOR PRE-FLIGHT CHECKING

N. A. C. LEWREY

OTTAWA

JUNE 1955

ABSTRACT

A microphone-headset tester constructed by #6 Repair Depot, RCAF, Trenton, Ont., was received for examination. It was evident that the unit, as designed, would serve satisfactorily for pre-flight checking by air crew, but it was felt that certain modifications were desirable. Circuit revisions were made to reduce the number of components, to increase reliability, to provide simpler operation, and to permit independent checks of the headset, the microphone, and any control switches on the microphone.

A MICROPHONE-HEADSET TESTER FOR PRE-FLIGHT CHECKING

- N.A.C. Lewrey -

1. A microphone-headset tester constructed by #6 R.D., RCAF, Trenton, Ont., was received for examination. It was evident that the unit as received would serve satisfactorily for pre-flight checking by air crew, but it was believed that certain changes would produce a more useful and reliable unit. An isolation transformer was added between the unit and the 110-volt A.C. line. This is considered a mandatory change.

2. In order to reduce the number of components required, and to give more straight-forward independent tests of headset, microphone, and push-to-talk control circuit switch, the original circuit (see Fig. 1) was revised as shown in Fig. 2. The new circuit is a cathode-coupled circuit utilizing the current through the tube as the microphone current. The purpose of the parallel resistor in the cathode circuit is to maintain tube operation when there is no microphone in the circuit. The following table shows the currents drawn by a typical tube with, and without the microphone in circuit, at various A.C. voltage inputs.

A.C. Voltage	Cathode Current (ma.) (microphone in)	Microphone Current (ma.)	Cathode Current (ma.) (microphone out)
100	36	28	20
110	40	34	22
120	45	39	24
125	49	42	26

When the microphone is out of the circuit the hum level in the headset can be used to provide an independent test of headset operation. The simplification of the rectifier filter circuit (omission of an input condenser) eliminated the necessity of using a hum signal input to the grid of the amplifier. Considerable hum level variation can be obtained if desired, by increasing, or decreasing the value of the filter condenser. Plugging in and switching on the microphones will increase the hum level, and the usual test procedure of whistling or blowing into the microphone can be used. Packed microphones, faulty conditions, etc, should become apparent immediately.

3. It may be noted that the method of test has been rearranged slightly from that of the original sample. If the pilot has no push-to-talk switch, he does not have to push any switches, while in the #6 R.D. test set he had to push switch SW 2. If the pilot has a push-to-talk switch, he operates it in the normal manner, thus energizing the microphone, and at the same time checking the control circuit switch by the pilot light. Other methods of carrying out this test are probably equally suitable, such as the

use of a neon light connected to the high-voltage termination of the power supply through a resistor to the tip contact of the microphone jack, or the use of a dropping resistor from the 110-volt output of the transformer in the same circuit.

4. A sample of this circuit has been fabricated in a flat form, possibly more suitable for wall mounting than the cubical form used by #6 R.D. A standard Hammond 4" x 8" x 2" chassis was used, together with Hammond transformers and other readily available components. The isolating transformer, a Hammond type-262F60 is too large to fit inside the 2-inch depth of the chassis and a special transformer or deeper chassis would be required to achieve complete inside mounting. The filament winding is most convenient for a check of the microphone control switch; therefore, instead of ripping off the filament winding available on the 262F60 transformer, a special ventilated wall-mounting back plate was fabricated, as shown in Fig. 3. A photograph of the complete unit is attached as Fig. 4, while Fig. 5 is an interior view.

5. It will be noted that this unit has been deliberately overdesigned in certain components, and that no parts that are likely to fail are located inside the chassis. The amplifier-rectifier tube, plug-in electrolytic filter condenser, fuse, and pilot indicator are all easily accessible outside the chassis. The filter resistor will probably outlast the tube or fuse, even if the condenser should short-circuit to ground. No on-off pilot bulb is used since the presence of hum in the independent headset test will indicate normal operation, and tube heater color will probably be visible.

6. It has been remarked, as for example, in the USAF Air Defense Command C and E Digest (April, 1955, p.32) that pre-flight tests can be made using a battery, a transformer, and two jacks. Such a system, of course, is satisfactory and one assembly has been set up for examination, if desired. It is, however, considerably less sensitive in checking loose or noisy connections than the amplifier described above. A T.C.A. Tester mentioned by #6 R.D. employs a similar circuit.

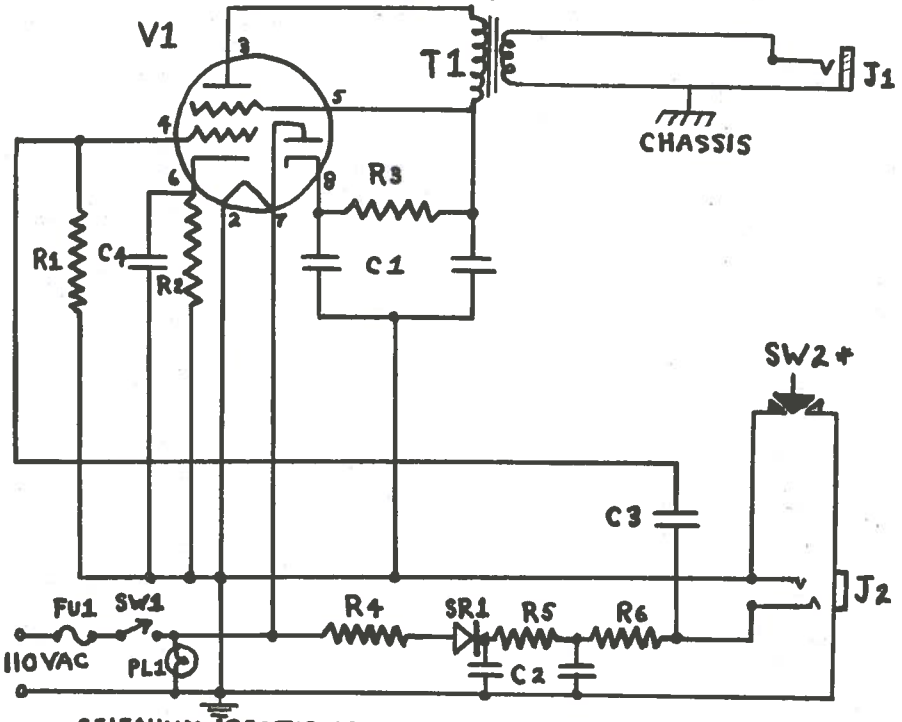
7. The tester, as described, is suitable for RCAF carbon button microphones. Tests of magnetic or dynamic microphones have not been considered. An isolating transformer or condenser in an external box, together with a resistor to lower the effective resistance in the cathode circuit and thus increase the gain of the amplifier tube, might provide a temporary expedient, but in all probability, more gain than that available from a single type-117N7 tube is necessary.

8. The sample unit as constructed by the National Research Council is available for loan or examination.

9. The retail cost of the components for this tester is estimated at 15 dollars, exclusive of the cover. Using the same costing process, the cost of the #6 R.D. unit is higher by perhaps 10 percent, exclusive of the box and its cover.

FIG. 1

AIRCREW PORTABLE HEADSET + MICROPHONE CHECKER



SR1-SELENIUM RECTIFIER
C1-C2-40-40MFD 150WV
C3-.01 MFD 600V
C4-10MFD 50V
R1-470K ½W
R2-100Ω 2W
R3-300Ω 1W
R4-47Ω ½W
R5-R6 750Ω 10W
J1-PHONE JACK
J2-MIC JACK
SW1-SPST
SW2-PUSH BUTTON
T1-HAMOND-139
V1-117N7GT
PL-117V 6WATT PILOTLIGHT

* SW2 used when checking headsets without a microphone or when microphones other than T-17 are used

No 6 Repair Depot
RCAF Station Trenton

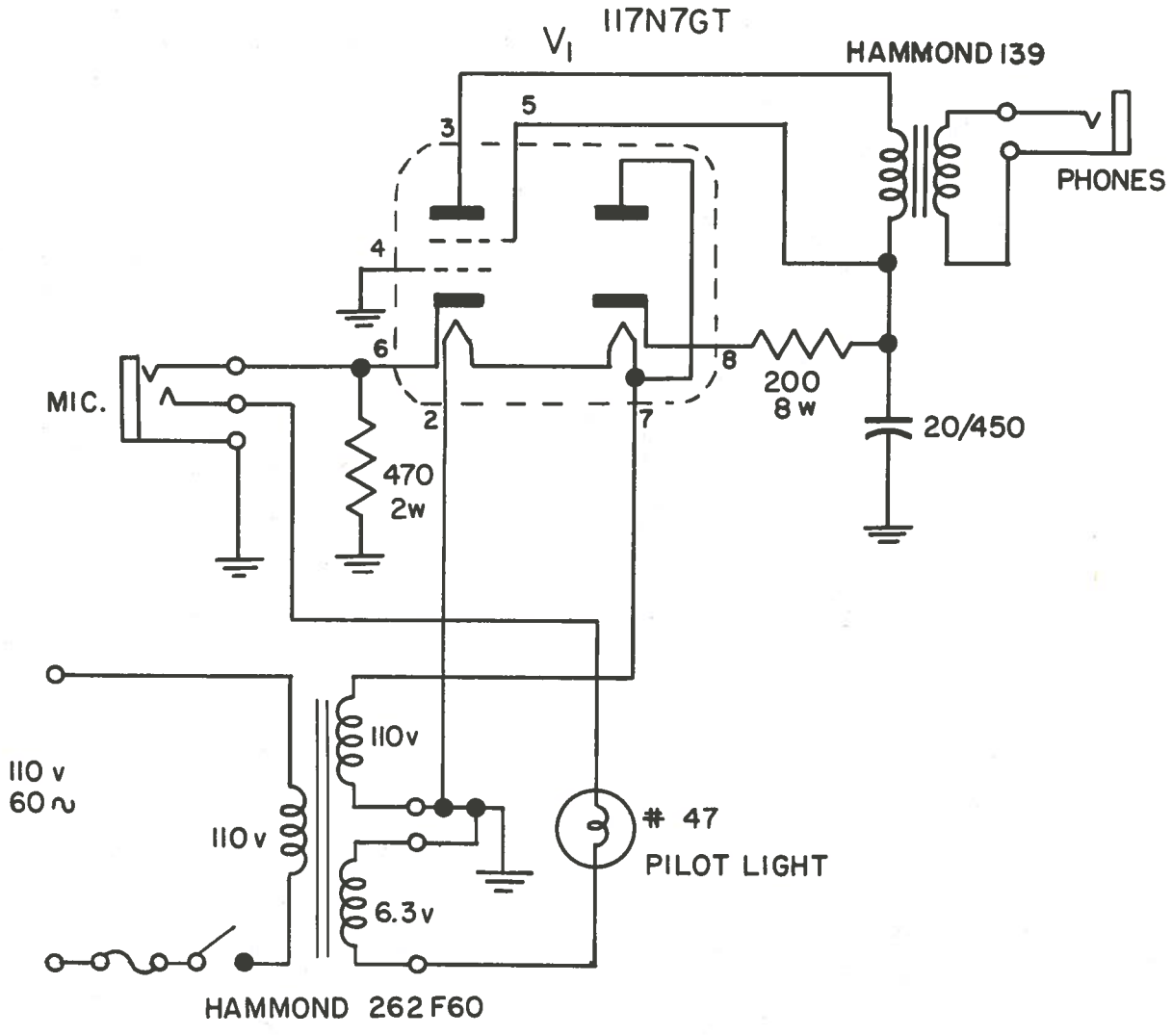


FIG. 2

MICROPHONE-HEADPHONE TEST SET

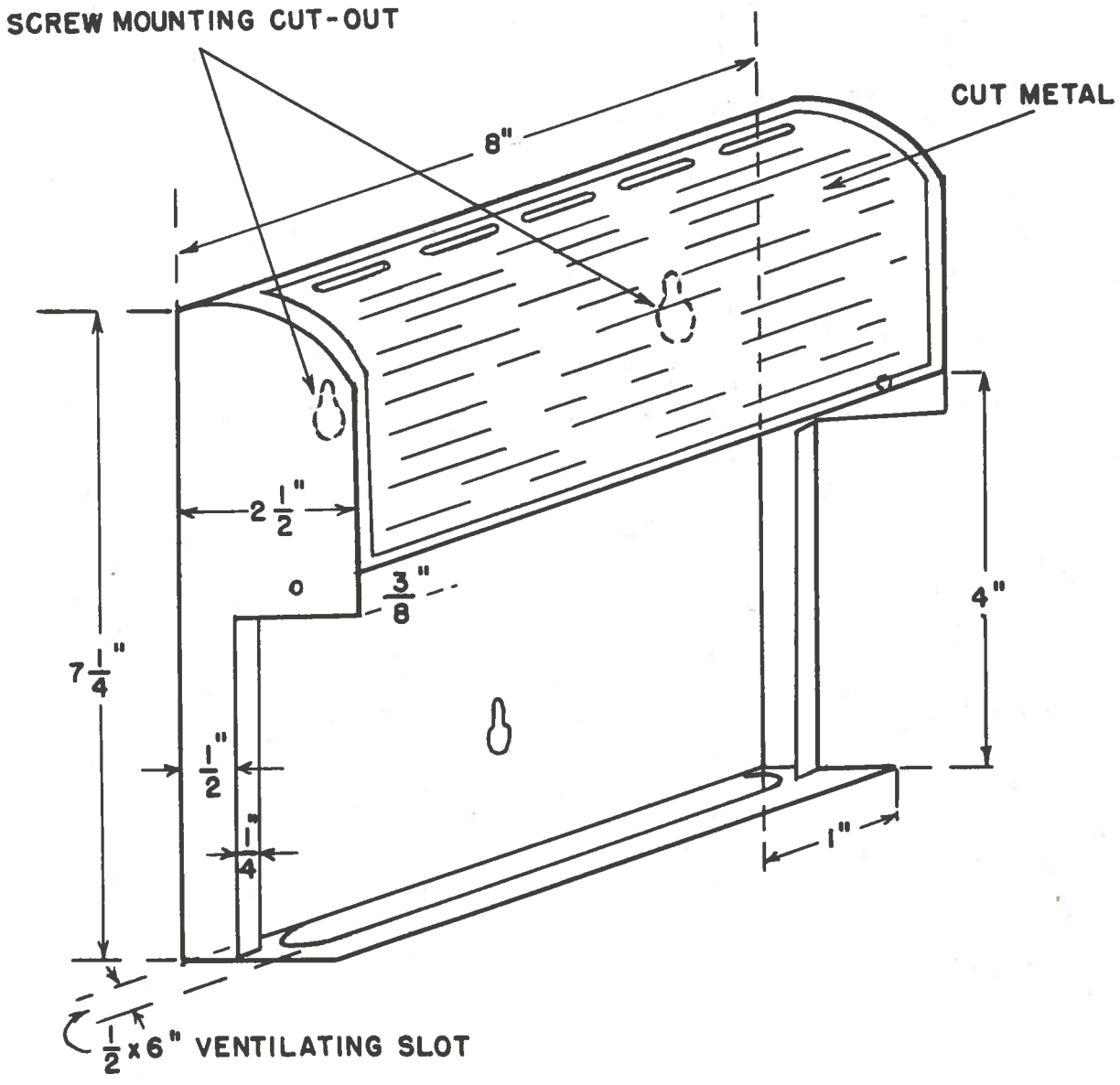


FIG. 3

MICROPHONE-HEADPHONE TEST SET MOUNTING PLATE

FIG. 4
MICROPHONE-HEADSET TESTER
FRONT VIEW

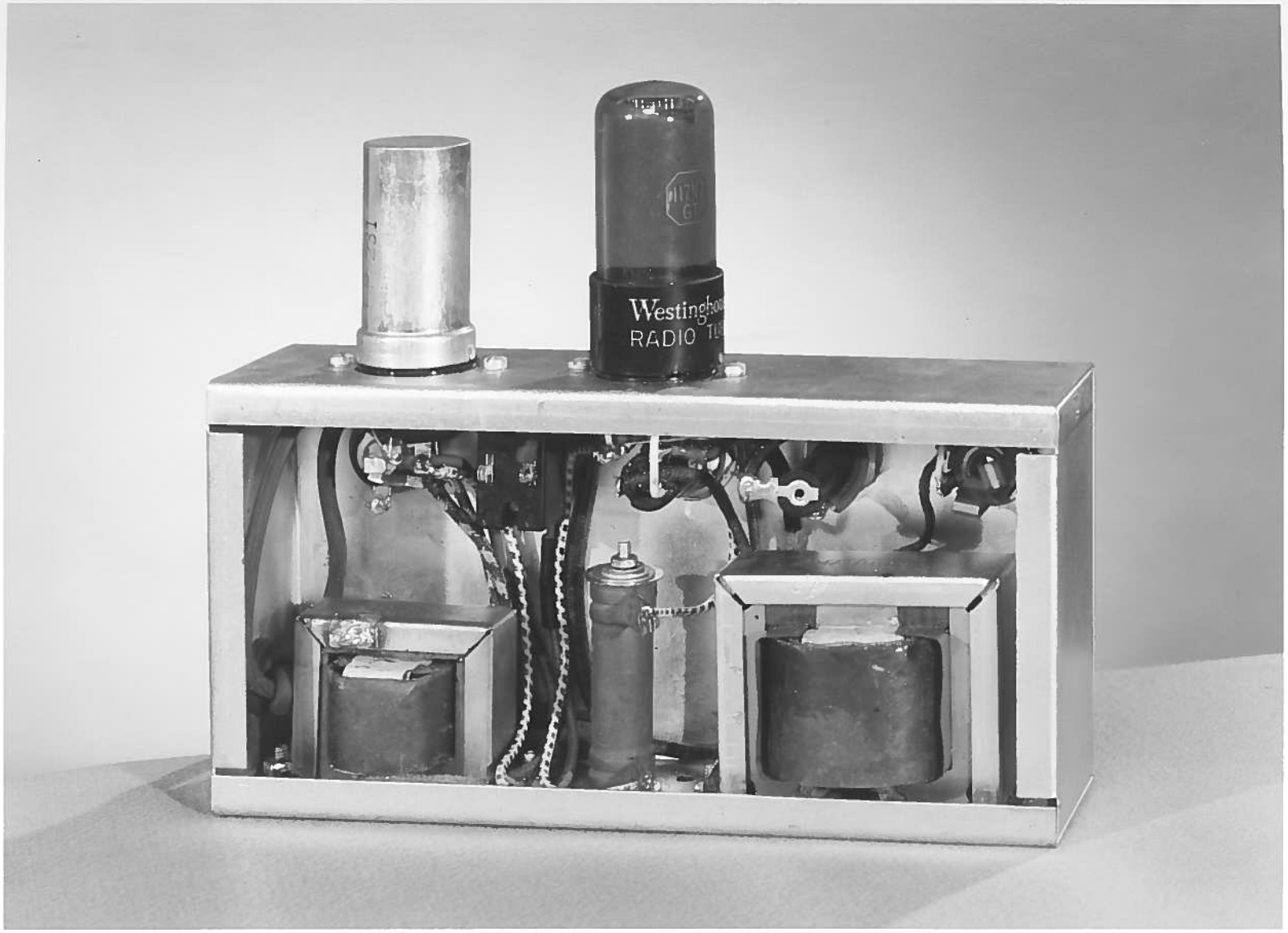


FIG. 5
MICROPHONE-HEADSET TESTER
INTERIOR VIEW