

## VARISTORS

### TRANSMISSION LOSS MEASUREMENTS

#### USING THE 12-DB PAD

#### 1. GENERAL

**1.01** This section describes a method of making transmission loss measurements on only those varistors whose permissible loss values are shown on the transmission test requirement tables for the circuits in which they are used, and where these tables specify the use of the 12-dB pad.

**1.02** This section is reissued to:

- Change reference to 400-type varistors to 400-type diodes
- Replace information on Page 2
- Update generally.

Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

**1.03** In the method outlined in this section, varistors are measured for maximum dB loss by applying 1000-Hz 1 mW testing power to the varistor through a 12-dB pad. The total loss, as measured with a transmission measuring set, minus the 12-dB loss for the pad is the loss of the varistor.

**Note 1:** The potential applied in this test is between 0.1 and 0.2 volts, which is insufficient for appraising a varistor's click-reducing properties. A resistance test of click-reducing varistors is covered in Section 032-170-501.

**Note 2:** A current flow test of 400-type diodes is covered in Section 032-160-701.

**1.04** The transmission test requirements for the varistors are shown on the circuit drawings.

**1.05** The procedures covered herein are based on the assumption that there is no shunt path, either ac or dc, in parallel with the varistor. Therefore, all parallel paths should be disconnected before proceeding with the test. Leads should be

unsoldered at the shunting apparatus and not at the varistor to prevent overheating the varistor. All leads disconnected for test purposes should be reconnected upon completion of the test.

**1.06** Since the transmission properties of varistors vary with temperature, it will be necessary to determine the ambient temperature at the varistor.

**1.07** The ambient temperature at the varistor is the temperature in the immediate area or at the surface of the varistor, *not* room temperature. It is assumed that many varistors will be tested while mounted in the associated apparatus. These varistors may be in the vicinity of electron tubes, electromagnetic apparatus, incandescent lamps, or any other apparatus that may cause the ambient temperature of the varistor to differ from room temperature. It is suggested that every effort be made to obtain a temperature reading that will best indicate the ambient temperature at the varistor.

**1.08** In those cases where the ambient temperature is between, or beyond, the values shown on the transmission test requirement tables, the permissible loss, at the measured temperature, can be determined by the following formula:

Let:

$T_n$  = Temperature on tables nearest to ambient temperature

$L_n$  = Loss on the tables associated with  $T_n$

$T_a$  = Ambient temperature as determined in Step 5

$L_a$  = Maximum allowable loss for varistor of the measured ambient temperature

**SECTION 032-171-501**

Then:

$$L_a = \frac{L_n \times T_a}{T_n}$$

**Example:** Assume the measured ambient temperature to be 102°F ( $T_a$ ), the nearest temperature listed is 100°F ( $T_n$ ), and the loss for 100°F is .7 dB ( $L_n$ ).

Then:

$$L_a = \frac{.7 \text{ dB} \times 102^\circ \text{ F}}{100^\circ \text{ F}}$$

$$L_a = .714 \text{ dB}$$

Therefore, the maximum allowable loss at 102°F is .714 dB.

**1.09** The apparatus listed in Part 2 and the method described in Part 3 are based on the use of a typical 1000-cycle testing power and a typical transmission measuring set. Other 600-ohm impedance transmission measuring equipment is available and, if used, the appropriate cords should be used in place of those listed and the method may be modified accordingly.

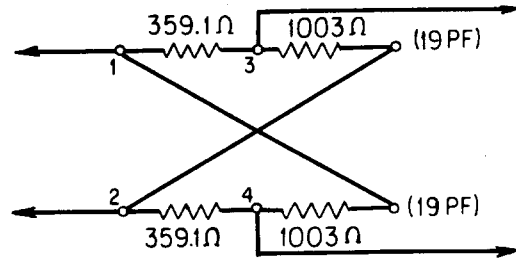
**1.10 Lettered Steps:** A letter a, b, c, etc, added to a step number in Part 3 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

**2. APPARATUS**

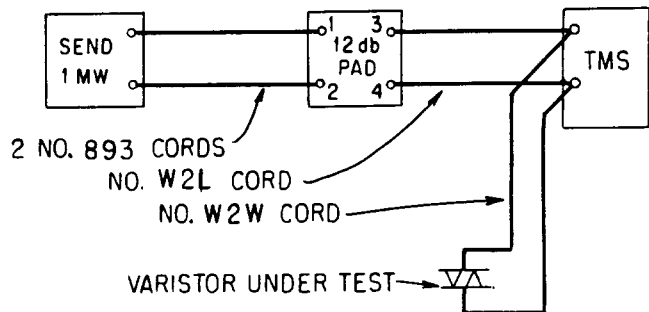
- 2.01** Thermometer KS-5499, or equivalent.
- 2.02** 12-type transmission measuring set or other with 600-ohm input impedance.
- 2.03** KS-5472 1000-cycle machine (MFR DISC) or other 600-ohm impedance source of 1000-cycle 1 mW testing power.
- 2.04** W2L cord, 5 feet long, equipped with one 309 plug and two 35 cord tips (2W11A cord).
- 2.05** W2W cord, 6 feet long, equipped with one 310 plug, one 360B tool, one 360C tool (2W17A cord), and two KS-6278 connecting clips.

**2.06** Two 893 cords, 3 feet long, equipped with two 360A tools (1W13A cord) and two KS-6278 connecting clips.

**2.07** One 12-dB pad (600-ohm characteristic resistance) constructed from two 19PF resistors as shown in Fig. 1 and 2.



**Fig. 1—Schematic of a 12-dB Pad**



**Fig. 2—Schematic of a Varistor Under Test**

STEP	ACTION	VERIFICATION
1	Locate the transmission test requirement tables on the schematic drawing for the circuit in which the varistor is used. (See 1.04.)  <i>Note:</i> Where the temperature listed in the tables is listed as either "Temperature" or "Room Temperature," it is to be understood that this means ambient temperature. (See 1.07.)	
2	Patch transmission measuring set to the 1000-cycle 1 mW testing power using the W2L cord.	
3	Calibrate the transmission measuring set in the approved manner.	
4a	If varistor has a shunt path connection as shown by the circuit drawing— Isolate varistor by disconnecting wiring at shunting apparatus. (See 1.05.)	
5	Determine the ambient temperature at the varistor. (See 1.07.)	
6	Remove the test clips from the testing power source, and connect them to the pad; connect the transmission measuring set to the varistor under test, and connect the pad to the testing power source as shown in Fig. 2.	
7	Observe the dB loss indicated by the transmission measuring set.	Difference between measured loss and 12 dB is loss of varistor at ambient temperature.
8	Remove all test connections.	
9	Determine the permissible loss from the transmission test requirement tables. (See 1.09.)	
10b	If the measured loss exceeds the permissible loss— Replace the varistor.	
11a	If varistor has a shunt path— Reconnect all wires removed prior to testing the varistor.	