




**MODEL DB62  
IN-LINE DEKABOX  
DECADE RESISTOR**

**Instruction Manual**

**Doc. No. 7275 Rev. A      July 1999**



### **1. REVIEW MANUAL:**

The  symbol on the instrument front panel denotes that the user should read the Instruction Manual before operating the instrument.

### **2. INSTALLATION CATEGORY:**

In accordance with EN61010-1, the Model DB62 is rated for Installation Category II.

### **3. ENVIRONMENTAL CONDITIONS:**

The DB62 is specified for operation at  $23^{\circ} \pm 1^{\circ}$  C. Refer to temperature and power coefficients listed in the instruction manual for operation outside these limits.

### **4. POTENTIAL HAZARDS:**

When in use, the front panel “GND” terminal should be connected to a suitable safety ground.

#### **WARNING**

The instrument does not protect against hazards created by equipment to which it is connected,

#### **WARNING**

Upon loss of the protective ground connection, all accessible parts (including knobs and controls that appear to be insulated) can render an electrical shock.

### **5. MISUSE OF INSTRUMENT:**

Misuse can result in unsafe operation and/or damage to the equipment. Do not use the instrument in any manner that is not specified in the Instruction Manual.



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## SECTION I INTRODUCTION

### PURPOSE OF EQUIPMENT

The in-line DEKABOX decade resistors are adjustable resistors that can be easily set to a resistance value for precision dc and audio frequency use.

### DESCRIPTION

The DB62 consists of a metal case, three binding posts, and six decade resistance switch assemblies. Figure 1-1 shows a panel arrangement and dimensions.

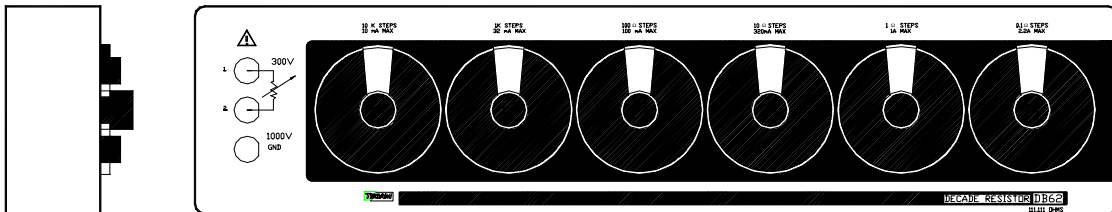


Figure 1-1 DEKABOX OUTLINE

### SPECIFICATIONS

INITIAL ACCURACY OF RESISTANCE CHANGE FROM ZERO SETTING	$\pm (0.01\% + 0.0005 \text{ ohm per decade})$ at 23° C
LONG-TERM STABILITY	$\pm (0.02\% + 0.001 \text{ ohm per decade})$ per year
ZERO RESISTANCE	Less than 15 mohms
RATING PER RESISTOR	See Table 1-1
TEMPERATURE COEFFICIENT	See Table 1-1
POWER COEFFICIENT	See Table 1-1
NUMBER OF DECADES	Six
BREAKDOWN VOLTAGE	See Table 1-1
WEIGHT	4 pounds net. 10 pounds packed for shipping
MAXIMUM CURRENT PER RESISTOR	See Table 1-1

**Table 1-1 RATINGS PER STEP FOR EACH DECADE**

RESIST- ANCE PER DECADE ( $\Omega$ )	RESIST- ANCE VALUE R ( $\Omega$ )	ACCURACY		COEFFICIENTS		MEASUREMENT DUTY MAXIMUM RATINGS		
		INITIAL (%)	LONG- TERM (%)	TEMPER- ATURE (ppm/ $^{\circ}$ C)	POWER (ppm/mW/ step)	POWER (mW/step)	CURRENT (mA)	PEAK VOLTAGE (V/step)
10 M	1 M	0.01	0.02	5	0.15	100	0.3	300
1 M	100 k	0.01	0.02	5	0.15	1000	3.2	300
100 k	10 k	0.01	0.02	5	0.15	1000	10	100
10 k	1 k	0.01	0.02	5	0.15	1000	32	32
1 k	100	0.01	0.02	5	0.15	1000	100	10
100	10	0.012	0.025	15	0.45	1000	320	3.2
10	1	0.03	0.07	20	0.6	1000	1000	1.0
1	0.1	0.2	0.5	60	3	500	2200	0.2
0.1	0.01	2	5	400	60	160	4000	0.04

**Table 1-2 RESISTANCE AND MINIMUM STEP RESISTANCE AVAILABLE**

TOTAL RESISTANCE	OHMS PER STEP
11,111.1 $\Omega$	0.01 $\Omega$
111,111 $\Omega$	0.1 $\Omega$
1,111,110 $\Omega$	1 $\Omega$
11,111,100 $\Omega$	10 $\Omega$



## SECTION II OPERATION

### OPERATING INSTRUCTIONS

Three binding posts are provided for connections on the panel of the DEKABOX. The GND binding post is connected to the metal case which forms a shield for the unit.

The resistance of the unit corresponds to the setting of the in-line dials. The resistance per step of each decade switch is marked above the dial.

Note that switch positions correspond to clock number positions of the bar knobs: 1 is at one o'clock, 2 is at two o'clock, and 10 is at ten o'clock. This feature allows an operator to set the resistance by feel without looking at the unit.

### THEORY OF OPERATION

The circuit consists of resistors switched in a series circuit. Figure 2-1 illustrates schematically the circuit of the Model DB62. Resistance values are related to the total resistance of the unit. These values are listed in Table 2-1.

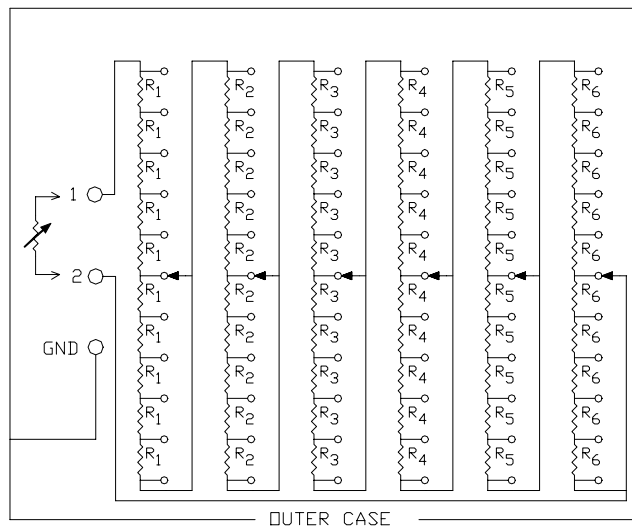


Figure 2-1 DEKABOX SCHEMATIC DIAGRAM

Table 2-1 RESISTANCE VALUES

TOTAL RESISTANCE	OHMS PER STEP	RESISTOR VALUES					
		R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	R <sub>5</sub>	R <sub>6</sub>
11,111.1 Ω	0.01 Ω	1 k	100 Ω	10 Ω	1 Ω	0.1 Ω	0.01 Ω
111,111 Ω	0.1 Ω	10 k	1 k	100 Ω	10 Ω	1 Ω	0.1 Ω
1,111,110 Ω	1 Ω	100 k	10 k	1 k	100 Ω	10 Ω	1 Ω
11,111,100 Ω	10 Ω	1 MEG	100 k	10 k	1 k	100 Ω	10 Ω



## SECTION III PREVENTIVE MAINTENANCE

The following procedures should be performed periodically (approximately once a year) to insure maximum accuracy and reliability from the Dekabox in-line decade resistors.

If the need for major repairs is apparent, it is recommended that the unit be sent to TEGAM for service. Although repair information and replacement parts are available, unauthorized repairs will invalidate the instrument warranty. If the instrument is more than one year old when returned to TEGAM, a reasonable charge may be expected for replacement of parts or complete reconditioning.

### VISUAL INSPECTION

Inspect the unit for dial orientation and damage to binding posts and binding post caps. Also check for dirt around the binding post insulators. Then remove the case as described below and inspect the unit for possible internal defects. These defects include such things as loose or broken connections, damaged or dirty switch contacts, and heat damaged resistors.

### REMOVING THE CASE

Prepare a soft, clean place to set the instrument. Be sure that no projections or pointed objects will be underneath the panel. See that there are no metal filings in the area.

Place the unit face down on the prepared surface. Loosen the screws on the back of the instrument and carefully slide the case off.

### CLEANING AND LUBRICATION

Clean the front panel with a soft, dry, lint-free cloth, being particularly careful to remove all dirt from around the binding post insulators. The only internal components that require cleaning and lubrication are the switch decks.

The switch decks are carefully lubricated at the time of manufacture and are protected from contamination by the instrument case. They should rarely, if ever, require maintenance. It is recommended that they be cleaned or lubricated only if it is determined that they are not making good electrical contact. If the switch decks are in need of cleaning or lubrications, proceed as follows:

- Apply solvent (Envirotech 1675-225 Dichlorofluoroethane Ethyl-S(-) 2-hydraypropionate carbon dioxide or equivalent) to the contact surfaces with a small brush or pipe cleaner.
- Wipe surfaces with clean, dry brush or dry with low pressure air.
- Apply a thin coating of lubricant (Oak #2008 or equivalent) to the contact surfaces with a hypodermic needle.
- Apply two drops of petroleum jelly to each of the switch bearings and detent mechanisms.
- Remove excess oil with a clean, dry cloth and remove all traces of lint with a soft brush.
- Avoid damaging binding posts with chemicals mentioned above. Clean binding posts with isopropyl alcohol if required.

### REPLACING THE CASE

Be sure that the interior of the case is completely clear of all foreign material.

Slip the case over the unit being careful not to touch any resistors with the cover. Replace the screws.

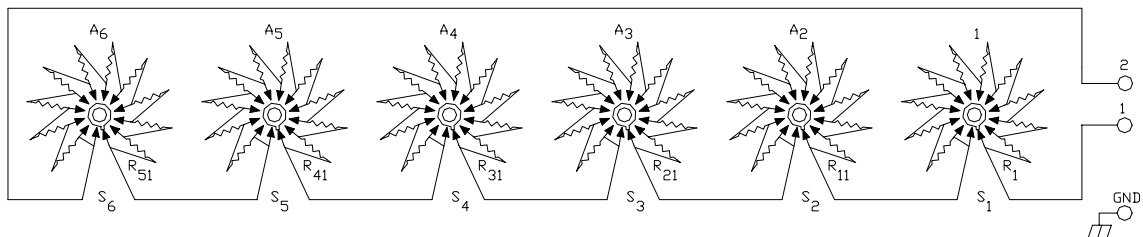


Figure 3-1 DB62 WIRING DIAGRAM



## SECTION IV CALIBRATION

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### ACCURACY

The accuracy of an in-line DEKABOX decade resistor should be verified as frequently as stability records indicate and prior to use in special test circuits where ambient temperature and/or dissipated power exceeds normal laboratory conditions.

### RECOMMENDED TEST EQUIPMENT

The DEKABOX should be calibrated with a Resistance Bridge that has an accuracy of 10 ppm, such as a recently calibrated TEGAM Model 242D Resistance Measuring System, or equivalent.

### CALIBRATION PROCEDURE

For maximum accuracy, the DEKABOX should be calibrated at 23°C with negligible power (e.g. 25 milliwatts) applied to its terminals. At any other ambient temperatures or input power greater than 100 milliwatts, temperature and power coefficients, unless accounted for, will adversely affect the calibration accuracy of the DEKABOX.

- a. Perform the preventive maintenance as described in Section III before calibrating the DEKABOX.
- b. Connect the DEKABOX to the Resistance Bridge.
- c. Measure the resistance with all DEKABOX dials set to zero. This zero resistance will be subtracted from all of the other resistance readings.
- d. Measure and record the resistance of the unit at the ten positions of each decade.
- e. Subtract the zero resistance (found in Step c above) from each reading.
- f. Record the ambient temperature and power applied to the terminals of the DEKABOX. Calculate and record the allowable changes in resistance value due to Temperature and Power Coefficients, whichever is predominant. Sometimes both effects are appreciable under given conditions.
- g. Verify that the DEKABOX has the desired accuracy or meets the specifications listed in Section I by subtracting the results in Step f from Step e.

### SERVICE AND REPAIR

In the event of an instrument malfunction, contact TEGAM. An apparent malfunction of an instrument or component may be corrected over the phone by contacting TEGAM. **DO NOT** send the instrument or component back to the factory without prior authorization. When it is necessary to return an item, state the symptoms or problems, catalog and type number of the instrument or component, serial number of the item, and date of original purchase. Also write the company name, your name, and phone number on an index card. Then attach the card to the instrument or component to be returned.



## Warranty

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TEGAM, Inc. warrants this product to be free from defects in material and workmanship for a period of one year from date of shipment. During the warranty period, we will at our option, either repair or replace any product that proves to be defective.

TEGAM, Inc. warrants the calibration of this product for a period of one year from date of shipment. During this period we will recalibrate any product that does not conform to the published accuracy specification.

To exercise the warranty, contact TEGAM, Inc., 10 TEGAM Way, Geneva, Ohio 44041, phone 440-466-6100, fax 440-466-6110, M-F, 8 a.m.-5 p.m. ET. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty, or at least 90 days, whichever is longer.

## Limitation of Warranty

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TEGAM, Inc. warranty does not apply to defects resulting from unauthorized modification or misuse of any product or part. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. TEGAM, Inc shall not be liable for any indirect, special or consequential damages.

## Statement of Calibration

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This instrument has been inspected and tested in accordance with specifications published by TEGAM, Inc.

The accuracy and calibration of this instrument are traceable to the National Institute of Standards and Technology through equipment that is calibrated at planned intervals by comparison to certified standards maintained in the Laboratories of TEGAM, Inc.

## How to Contact TEGAM

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