

## Y45BA Type Remote Set Point Adjuster

### Application

These set point adjusters vary the temperature setting of a thermistor network from a remote location. Use with Series A91 and T91 thermistor temperature sensors.

### General Description

The remote set point adjusters are precision wire wound potentiometers. The temperature set point is indicated on a graduated scale plate. The potentiometer is mounted on an attractive brushed aluminum switch plate for direct mounting to a standard 3 in. x 2 in. or 4 in. x 2 in. electrical box. Mounting screws are provided. **Note:** An electrical box is not included with the adjuster. The box must be provided by the installer when required.

Maximum ambient temperature is 150° F (65°C).

### Ordering Information

To order, specify Product Number only.

### Installation

#### Mounting

**⚠ CAUTION:** Disconnect power supply before wiring connections are made to prevent possible electrical shock or damage to equipment.

Install the set point adjuster at the location desired for accessibility of adjustment.

To mount, proceed as follows:

1. Install electrical box, if used.
2. Pull wiring from box or through hole in panel and make wiring connections to wire leads. (See Wiring).
3. Push excess wiring back into box.
4. Assemble the set point adjuster to the panel or electrical box.

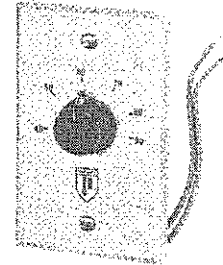


Fig. 1 -- Type Y45BA Remote Set Point Adjuster.

### Wiring

Make all wiring connections and check connections before applying power. Improper wiring may cause permanent damage.

Refer to job wiring diagrams or the diagrams in this bulletin for wiring connections.

Make all connections in accordance with local ordinances and national codes.

### Specifications

Product Number	Set Point Range	Potentiometer Calibration	Used With	
			Sensor	Controller and/or Controlled Device
Y45BA-1	40 to 90°F	855 ohms ± 5 ohms With knob set at 70°F (21°C), total resistance 1500 ohms	A91AAA-10, A91GAA-2, A91PAA-2, T91BAA-1	R93 (40 to 90°F models) w/ M80J or R23. Also direct control of M40E or M40F with A91 or T91
Y45BA-2	60 to 120°F	750 ohms ± 5 ohms With knob set at 90°F (32°C), total resistance 1500 ohms	A91AAA-11, A91GAA-1, A91PAA-1	R93 (60 to 120°F models) with M80J or R23
Y45BA-6	4 to 32°C	855 ohms ± 5 ohms With knob set at 70°F (21°C), total resistance 1500 ohms	A91AAA-10, A91GAA-2, A91PAA-2, T91BAA-1	R93 (15 to 50°F models) with M80J or R23
Y45BA-7	15 to 50°C	420 ohms ± 5 ohms With knob set at 30°F (-1.1°C), total resistance 1500 ohms	A91AAA-3, A91PAA-2, T91BAA-1	R93 (15 to 50°F models) with M80J or R23
Y45BA-10	15 to 50°F	420 ohms ± 5 ohms With knob set at 30°F (-1.1°C), total resistance 1500 ohms	A91AAA-3, A91PAA-2, T91BAA-1	R93 (15 to 50°F models) with M80J or R23
Y45BA-11	-10 to +10°C	420 ohms ± 5 ohms With knob set at 30°F (-1.1°C), total resistance 1500 ohms	A91AAA-3, A91PAA-2, T91BAA-1	R93 (15 to 50°F models) with M80J or R23

All splices are to be made utilizing approved solderless connectors or by soldering and then taping the connections. When using shielded wire, the shield must be spliced and taped.

Generally, shielded cable is not required on runs less than 50 ft. long. Low voltage control wiring should not be run in the same conduit as line voltage wiring or other conductors that supply highly inductive loads (contractors, coils, motors, generators, etc.). If the control wiring is over 50 ft. long, or must be run in a common conduit or near inductive loads, shielded cable is recommended. Use No. 22 gauge, Beldfoil 8761 or equivalent for runs up to 250 ft. From 250 ft. to 500 ft., use No. 18 gauge Beldfoil 8760 or equivalent.

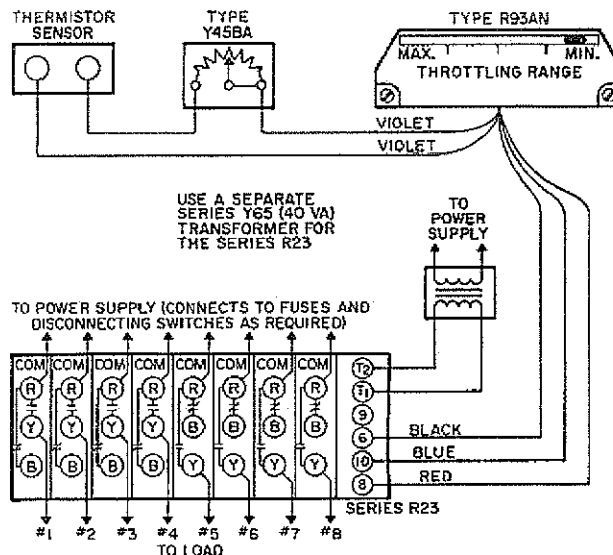
**Connect the shield only at the controlled device to terminal "10". Then using M40E or M40F, connect shield to terminal "B". Do not connect shield to any other point.**

### Recalibration

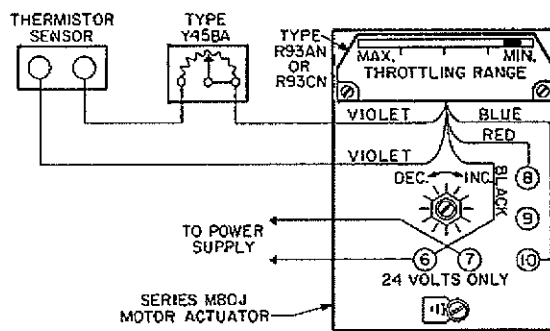
Set point adjusters are factory calibrated and should not require field calibration. If recalibration is required, proceed as follows:

1. Assure that the system is stable and under control by the controller.
2. Accurately measure the temperature at the sensing point.
3. Loosen the set screw in the Series Y45 knob and rotate the knob (do not disturb the set point) so pointer indicates the temperature being maintained.
4. Tighten the set screw to secure the knob at this position.

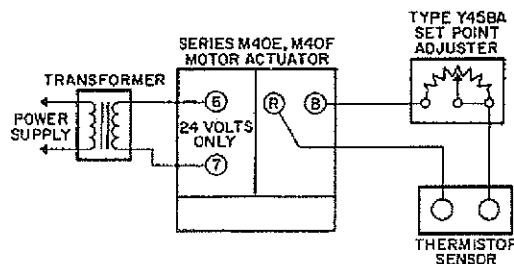
If a system has two set points in the sensor circuit, only one can be calibrated. Set the unused set point adjuster to its minimum setting where the knob stops (knob should be removed and adjuster marked "Controlling set point located ...").



**Fig. 2 — Single sensor sequencer system with remote set point adjustment and Type R93AN controller.**



**Fig. 3 — Motor actuator with remote set point adjustment and Series R93 motor mounted controller.**



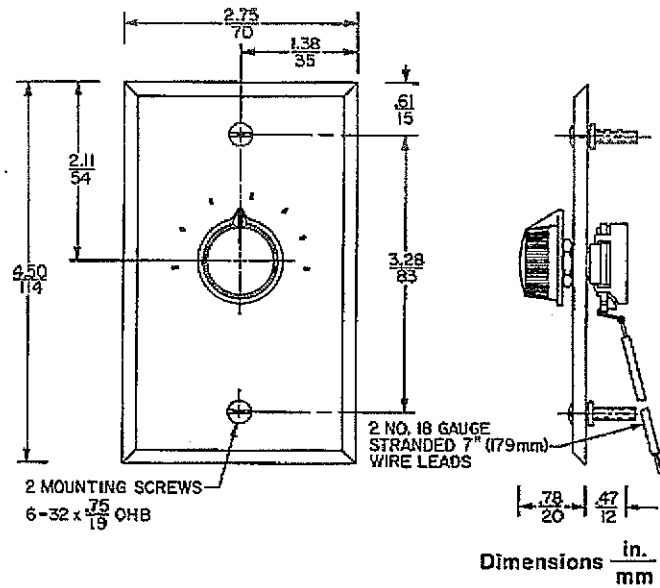
**Fig. 4 — Type Y45BA Set Point Adjuster used with a remote thermistor sensor to control a Series M40E or M40F motor actuator.**

### Checkout Procedure

Before leaving the installation, a complete operating cycle should be observed to see that all components are functioning properly (move set point to a higher set point to simulate a temperature decrease, controlled device should respond appropriately).

### Repairs and Replacement

Field repairs must not be made. Replacement set point adjusters may be obtained from nearest Penn Commercial Wholesaler. When ordering a replacement adjuster, specify Product Number stamped on the unit.



*Performance specifications appearing herein are nominal and are subject to accepted manufacturing tolerances and application variables.*



## A91 Series Thermistor Temperature Sensors For Duct, Immersion and Space Sensing

### Application

These thermistor sensors are used with Penn Series R93 electronic controllers to operate Series M80J motor actuators and/or Series R23 sequencers. They are also used with Series M40E and M40F motor actuators.

The sensors are designed for applications in the heating, ventilating and air conditioning industry. Immersion sensors must not be used in liquids injurious to the soft solder and copper metals in the immersion well.

### Operation

When the sensor is wired to the controller it becomes part of a voltage divider circuit, which includes the set point potentiometer. The voltage divider output is used to position the motor actuator or sequencer in proportion to the temperature deviation from the set point. If the temperature at the sensor changes, the resistance of the element changes. This change in the voltage divider is electronically amplified and causes the controlled device to be proportionally repositioned.

### Installation

Refer to instructions supplied with the equipment when available.



Fig. 3 -- Type A91PAA  
Duct Sensor less  
enclosure

### Locating

Locate sensors where they are exposed to the media being controlled and where they sense the average temperature of the air or liquid being controlled. Locate where temperature does not exceed 140°F (60°C) or fall below -40°F (-40°C).

Series A91 sensors are not position sensitive and can be mounted in any position.

### Duct Sensor with Enclosure Mounting

1. Select a mounting location in the duct where the probe will be in unrestricted air flow.
2. Cut a 1 in. diameter hole in the duct.
3. Remove the sensor cover.
4. Insert the sensing probe into the hole and mark the position for the sheet metal screws.
5. Punch or drill mounting screw holes.
6. Use sheet metal screws to secure sensor in place.
7. Make wiring connections. See "Wiring" and typical wiring diagrams in the controller literature.

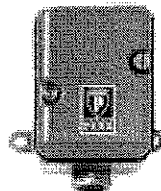


Fig. 4 -- Type A91NAA  
Space Sensor

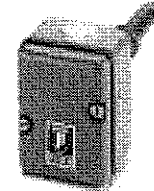


Fig. 1 -- Type A91AAA  
Immersion Sensor.

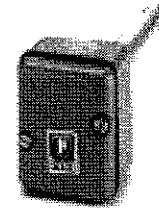


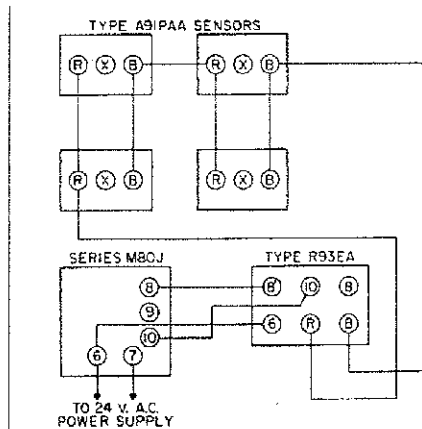
Fig. 2 -- Type A91GAA Duct  
Sensor with enclosure.

### Duct Sensor Less Enclosure Mounting

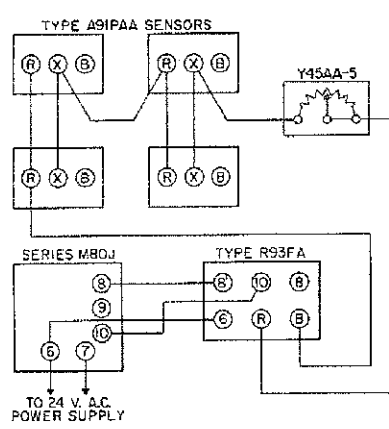
1. Select a mounting location directly in the air stream flow.
2. Mark the position for the mounting screw.
3. Punch or drill mounting screw hole.
4. Use sheet metal screw to secure sensor in place.
5. Make wiring connections. See "Wiring" and typical wiring diagrams in the controller literature.

### Immersion Sensor Mounting

1. Select the mounting location in the pipe line. Mount immersion sensors horizontally to prevent any drippage or condensation from collecting on the sensor. A 3/4 in. NPT opening is required.



**Fig. 5 — Averaging service with 4 Type A91PAA sensors with 40 to 90°F range wired in parallel with Series R93 controller and a Series M80J motor actuator.**



**Fig. 6 — Averaging service with 4 Type A91PAA sensors wired in parallel with Series R93 controller, potentiometer and a Series M80J motor actuator.**

2. Insert the sensing probe into the line and wrench tighten using the hex flats.
3. Remove the sensor cover.
4. Make wiring connections. See "Wiring" and typical wiring diagrams in the controller literature.

### Space Sensor Mounting

1. Select a mounting location where sunlight and radiant heat are at a minimum. The north wall of a building is usually a good place to mount the sensor.
2. Install conduit run, if required.
3. Secure in place with support lugs or by mounting directly on the 1/2 in. conduit used for wiring.
4. If four sensors are wired for averaging service, make wiring connections as shown in Figs. 5 and 6.

### Wiring

**CAUTION:** Disconnect power supply to motor actuator and/or sequencer before wiring connections are made to prevent possible electrical shock or damage to equipment.

All wiring to sensor is low voltage and should be in accordance with local regulations and the National Electrical Code.

Make connections to screw type terminals. Use copper conductors only.

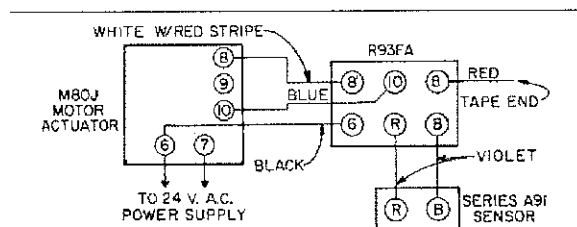
All applications must include a controller (such as a Series R93 or input circuits of a Series M40E or M40F), a sensor and a set point adjuster. All components must be matched, such as a 40 to 90°F controller with a 40 to 90°F sensor and a 40 to 90°F set point adjuster. One exception, the 15 to 50°F controllers and set points also use the 40 to 90°F sensors. If more than one set point is noted (such as one on the Series R93 and one on the Series Y45), remove one from the circuit by turning to the **minimum** temperature extreme of the dial. (Knob should be removed and adjuster marked "Controlling set point located . . .").

See controller literature or Figs. 7, 8, 9 and 10 for typical diagrams.

The 40 to 90°F (5 to 30°C) sensors are provided with 3 terminals "R", "X" and "B".

These can be used with a 350 ohm manual potentiometer to provide **limited** remote temperature adjustment at a point remote from the main set point adjuster. (See Fig. 6.)

Generally, shielded cable is not required on runs less than 50 ft. long. Low voltage control wiring should not be run in the same conduit as line voltage wiring or other conductors that supply highly inductive loads (contractors, coils, motors, generators, etc.). If the control wiring is over 50 ft. long, or must be run in a common conduit, or near inductive loads, the use of shielded cable is recommended. Use No. 22 gauge, Beldfoil 8761 or equivalent for runs up to 250 ft. From 250 ft. to 500 ft., use No. 18 gauge Beldfoil 8760 or equivalent. **Connect the shield only at the controlled device to terminal 10.** If an M40E or M40F is used, connect shield to terminal "B". Do not connect shield to any other point.



**Fig. 7 — Typical wiring diagram for a Series A91 sensor used with Series R93 controller and a Series M80J motor actuator as the final controlled device.**

**CAUTION:** Make all wiring connections and check connections before applying power. Improper wiring may cause permanent damage.

### Calibration

Calibrate the sensor circuit (set point and sensor) as follows:

1. Be sure system is in control (not full heat or full cool). Allow system to stabilize.
2. Measure medium temperature at the sensor.
3. Loosen set screw in set point knob, without disturbing balance of control, and turn knob to sensed temperature. Tighten set screw in knob.

### Checkout Procedure

After components are installed and wiring is complete, apply power to the equipment.

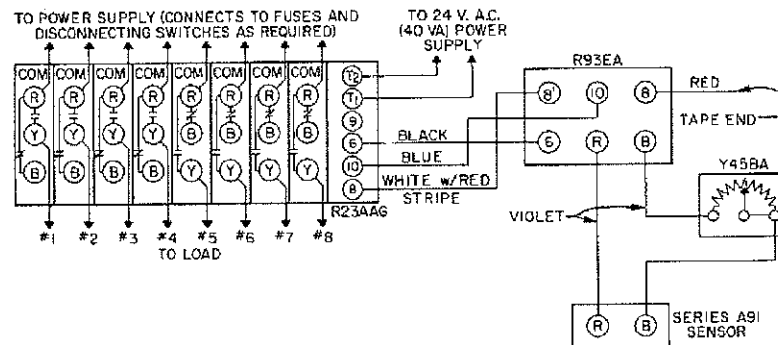
Before leaving the installation, a complete operating cycle should be observed to see that all components are functioning properly.

See the proper controller literature for the complete checkout procedure.

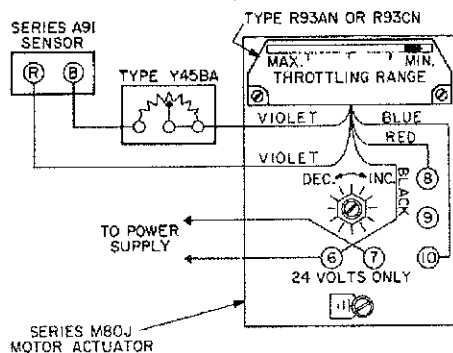
To check individual Series A91 sensors, disconnect one lead, measure resistance between the wires with an accurate ohmmeter and compare with curves for the temperature at the sensor. (See Figs. 11 and 12.)

### Repairs and Replacement

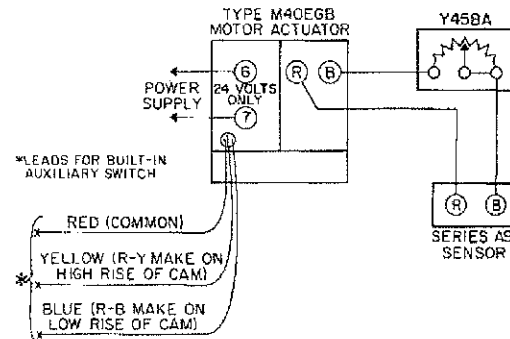
Field repairs must not be made. Replacement sensors may be obtained from the nearest Penn Commercial or Systems Wholesaler. When ordering a replacement sensor, specify Product Number shown on the sensor.



**Fig. 8 — Typical wiring diagram for a Series A91 sensor used with Series R93 controller and a Series R23 sequencer as the final controlled device.**



**Fig. 9 — Typical wiring diagram for a Series A91 sensor used with a Series R93 motor mount controller and a Series M80J motor actuator.**



**Fig. 10 — Typical wiring diagram for a Series M40E motor actuator with a Series A91 sensor.**

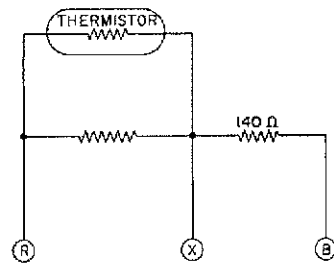
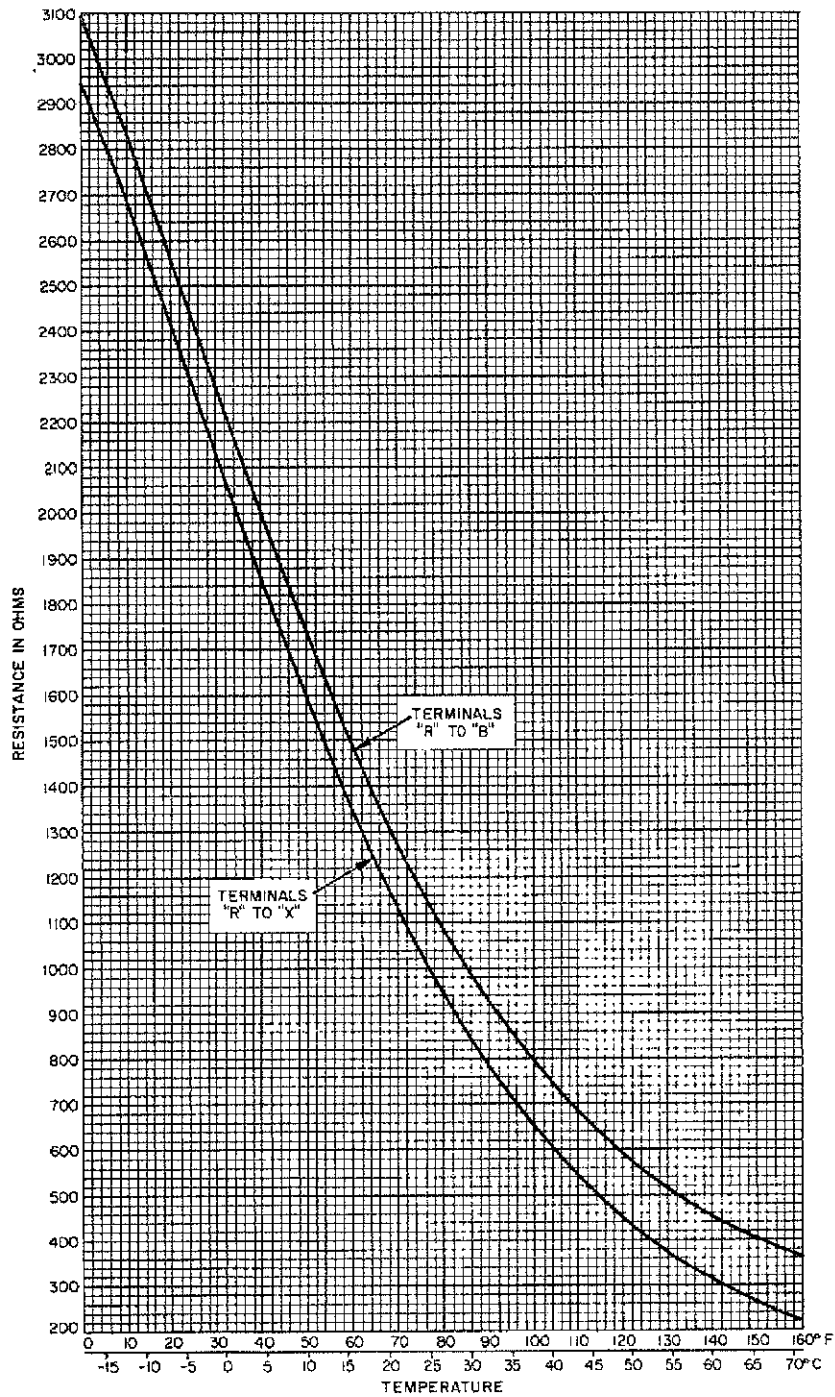


Fig. 11 — Temperature-Resistance Curve for 40 to 90°F (5 to 30°C) range and 15 to 50°F (-9 to 10°C) range.

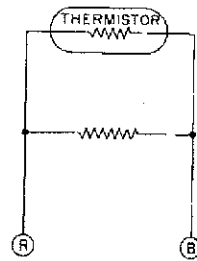
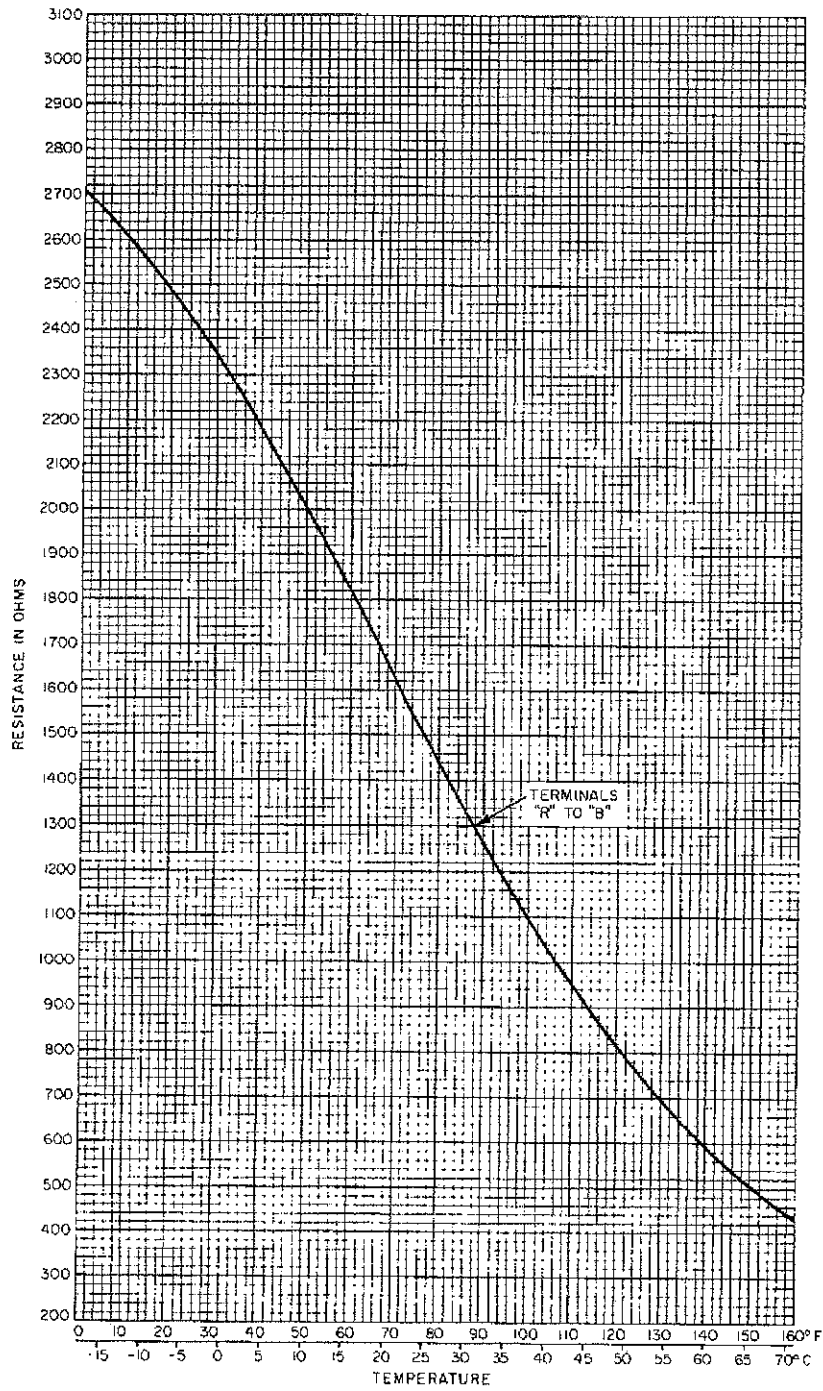


Fig. 12 — Temperature-Resistance Curve for 80 to 120°F (15 to 50°C) range.