

T-5800-1 and T-5800-2 Single Input Receiver-Controllers Installation and Calibration

The T-5800 Series Receiver-Controllers are designed for use with remote temperature, humidity, or pressure transmitters (connected to the controlled variable "CV" input) to provide precise control of pneumatic devices. The T-5800-1 is a single input proportional-only receiver-controller with field selectable local or remote set point. The T-5800-2 is also a single input receiver-controller with field selectable local or remote set point; however, this model provides proportional plus integral (PI) control. In addition, an automatic/manual integral control cutout feature is incorporated into the T-5800-2 design. This feature allows the system to start up using proportional-only control thus keeping the system from going out of control on startup, as is inherent to PI (automatic reset) controllers, when the system has been off for some time. Refer to Product Data T-5800 for instrument specifications and additional details.

Installation

The T-5800 Series Receiver-Controllers are designed for surface mounting; refer to Fig. 3 for space requirements and mounting details. All air line connections are made to the units through two snap-on input/output connectors which have barbed fittings for 1/4 in. O.D. polytubing. Both single input models are furnished with a clear cover, snap-on air connectors, a .007 in. orifice jumper, an additional set point dial sticker marked with 50 graduations, and a yellow remote indication set point dial sticker.

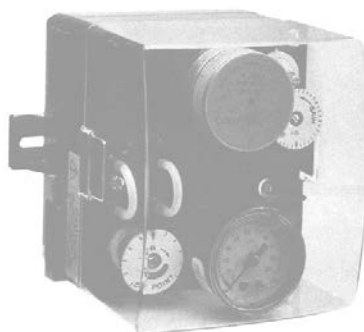


Fig. 1: T-5800-1 Single Input Proportional Receiver-Controller

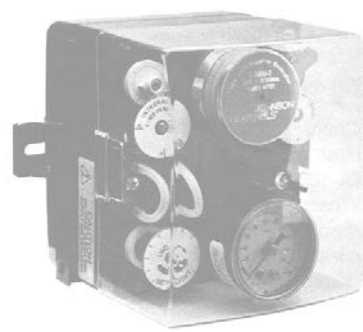


Fig. 2: T-5800-2 Single Input PI Receiver-Controller

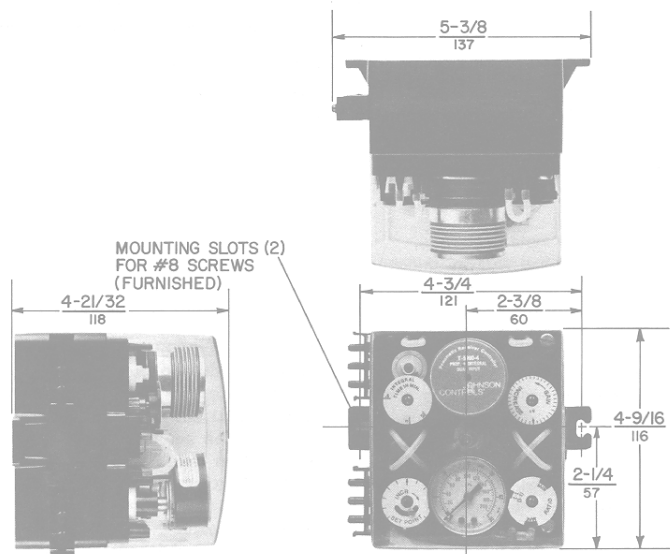


Fig. 3: T-5800 Series Dimensions in./mm and Mounting Details

Cover Removal

The cover can be removed by applying an inward pressure to one of the black tabs of the receiver-controller main body to unlatch it. The cover can also be removed by simply taking hold of the top and bottom sides of the cover and pulling outward.

Oil Indicating Supply Air Filter

Check the oil indicating supply air filter and replace as necessary (A-4000-137 ordered separately). When the filter is dirty, a pressure drop will occur. When filtering oil-contaminated air, the filter will change from white to red in color. If frequent changes are necessary, check the air supply system to determine the cause of dirty or oil-contaminated air.

Positioning the Action and Orifice Jumpers

The T-5800 must be programmed according to the system requirements. Both single input receiver-controllers are factory set in the direct acting mode and can be changed to reverse acting by interchanging the placement of the tube ends from one lower spigot to the other lower spigot (see Figs. 9 and 12).

Each single input T-5800 is furnished with a .007 in. orifice jumper and two yellow spigot caps (see Fig. 4). The orifice jumper provides a restricted source of supply to low volume non-relay type transmitters. For best results, it is recommended that this jumper be used when the low volume transmitter is located within 50 ft. (15m) of the receiver-controller. For all other applications, it is recommended that the spigots be capped and a source of supply be furnished at the transmitter. The non-functional master "M" spigot serves as a convenient storage location for the unused orifice

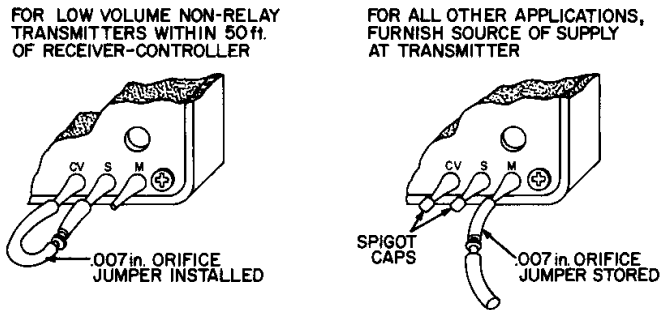


Fig. 4: Orifice Jumper Located on Lower Right Corner of T-5800

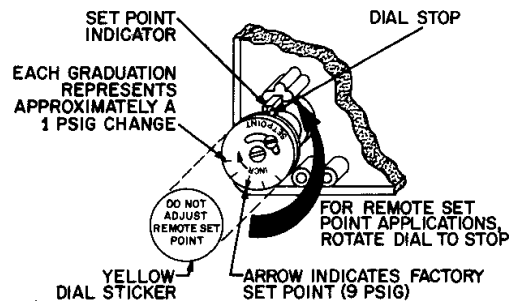


Fig. 5: Remote Set Point Mode

jumper when the caps are installed on the controlled variable "CV" and supply "S" spigots.

Set Point Selection - Local or Remote

Local: The arrow on the set point dial represents approximately a 9 PSIG (63 kPa) set point pressure. The dial sticker is designed so that the actual set point can be written directly on its surface using a common pencil. **Note: When local set point adjustment is used, the set point "SP" connection must be open to atmosphere.**

Remote: Rotate the set point dial fully counterclockwise until it hits its mechanical stop. Affix the yellow dial sticker to indicate remote set point adjustment mode (see Fig. 5).

Connect the tubing from the remote set point "SP" connection of the snap-on input/output connector. A low volume restricted source of supply air is automatically furnished; therefore, use 75% of the overall line length that is recommended for a .005 in. orifice.

FC and PRV Test Points

The FC and PRV test points and their associated adjustments are for **FACTORY USE ONLY**.

Supply Air Interruptions

Unlike the T-5800-1, the T-5800-2 has within its circuitry an automatic/manual integral control cutout feature which requires that the supply air remain on at all times.

Calibration

General Instructions

Calibration and readjustment of the T-5800 Receiver-Controller should only be done by a qualified Johnson Controls representative, equipped with the proper tools. An X-200-173 Calibration Kit (see Fig. 6, ordered separately) is available for making adjustments and pressure checks on the T-5800. This kit provides all of the necessary gages, regulators, and connectors for a more convenient and quicker calibration procedure.

An X-200-140 Hypodermic Needle Test Probe and appropriate gage (see Fig. 7, ordered separately) is also available for troubleshooting, for test point readings, or for final set point adjustments under actual job conditions. **Note: Figure 8 illustrates an alternative method of checking pressure readings on the T-5800 where use of a hypodermic needle test probe is prohibited.**

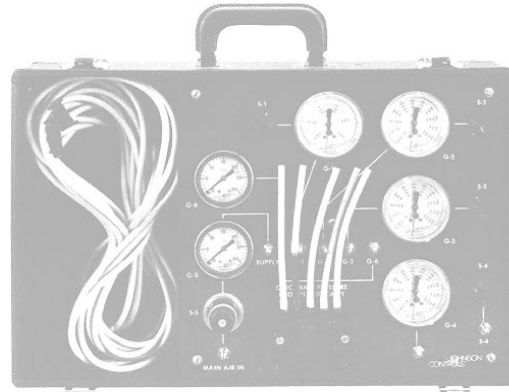


Fig. 6: X-200-173 Calibration Kit

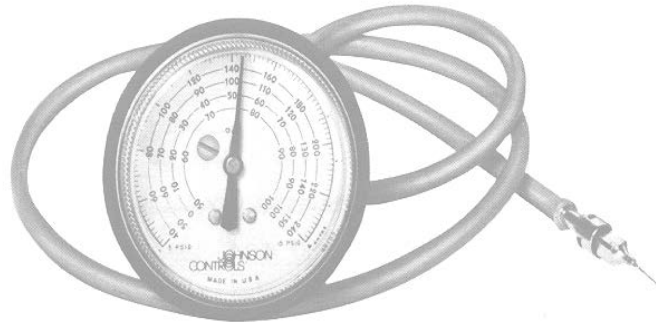


Fig. 7: X-200-140 Test Probe with Gage

Calibrating the T-5800-1 (See Fig. 9)

Set Point Adjustment

To make adjustments to the set point, proceed as follows:

1. Consult the system drawing to determine the required set point value. Convert this value to the pressure equivalent; see example highlighted in Fig. 10 (75°F on a 50 to 150°F range would be a set point of 6 PSIG).
2. Take a set point pressure reading using the appropriate method and gage, as illustrated in Fig. 8. Adjust the local set point dial or the remote adjuster (manual or automatic) until the pressure matches the value noted in Step 1. Remove the pressure reading device and reconnect the jumper (if applicable).

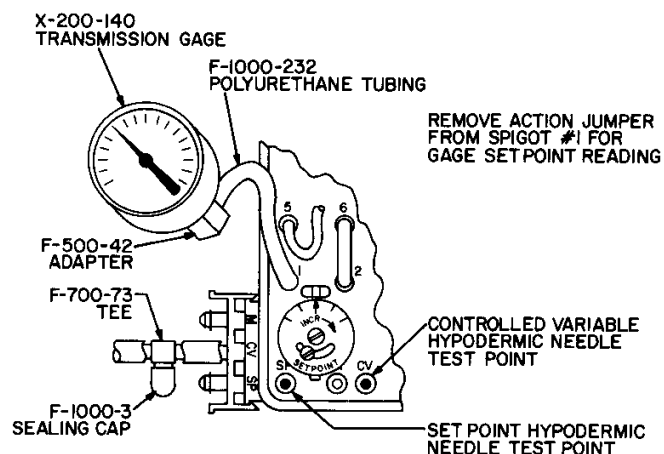


Fig. 8: Methods for Checking Pressure Readings

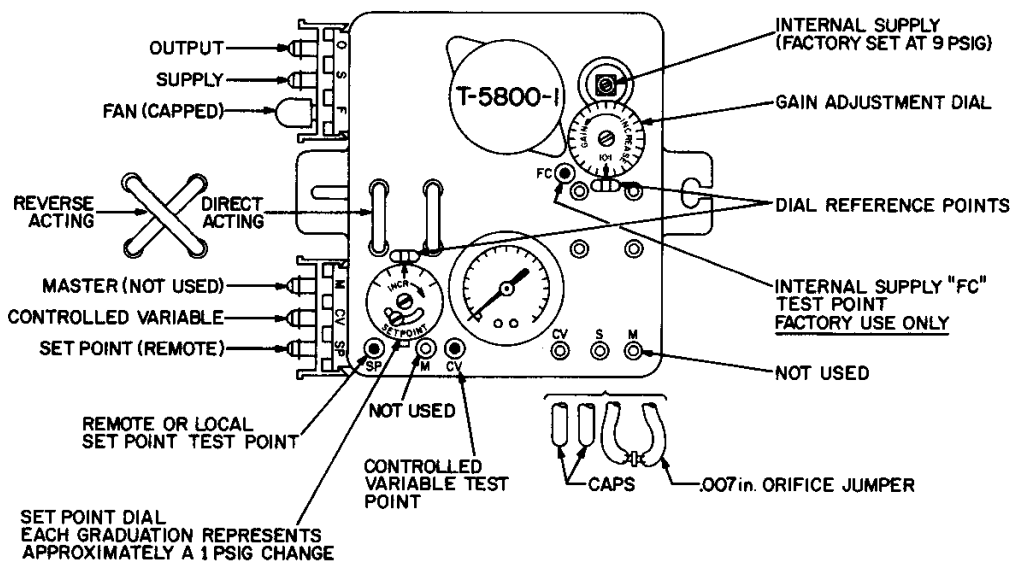
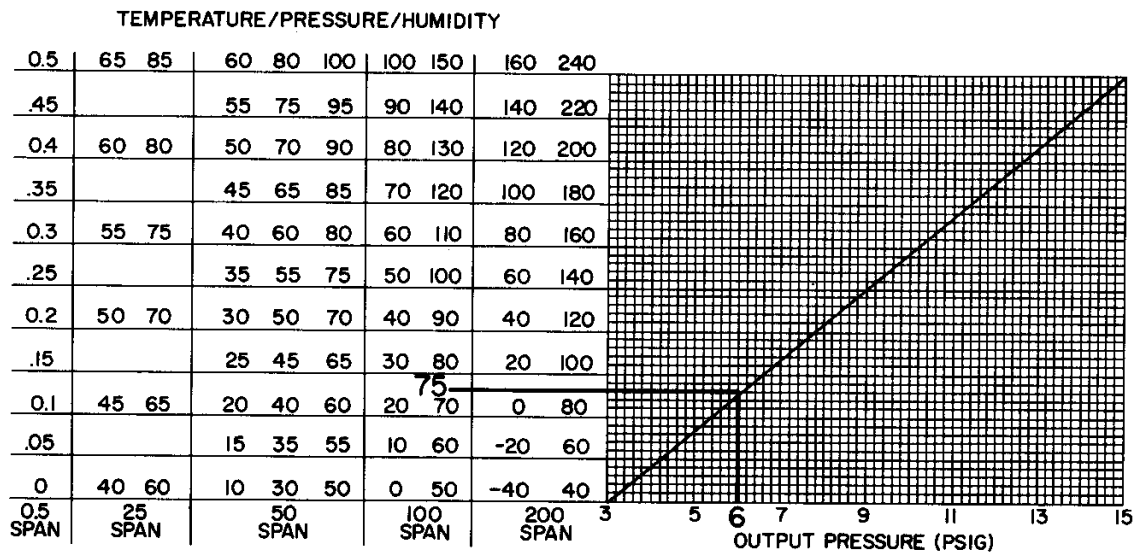


Fig. 9: T-5800-1 Adjustment Points



METRIC CONVERSION FACTORS

$$(^{\circ}\text{F} - 32) / 1.8 = ^{\circ}\text{C}$$

$$\text{PSIG} \times 7 = \text{kPa}$$

$$\text{in. WG} \times 249 = \text{Pa}$$

Fig. 10: Transmitter Span vs Output Pressure

3. Start up the system to be controlled. After a reasonable period of time, the receiver-controller should be in control within the throttling range of the controlled device.
4. Proceed to the Gain Adjustment section.

Gain Adjustment (See Fig. 11)

Adjusting the gain dial **will not** affect the controller set point; however, the **output pressure** may change when the gain dial is adjusted. Increasing the gain will narrow the throttling range (decrease offset), allowing the control point to be closer to the set point. Decreasing the gain will widen the throttling range, forcing the control point away from the set point.

Normally, having the gain arrow set at the pointer represents a reasonable gain adjustment which would provide stability. Increase the gain setting

by small increments until the system becomes unstable and begins to cycle. Decrease the gain setting slightly to remove the cycling effect. Doing so will provide maximum controllability with a minimum of offset.

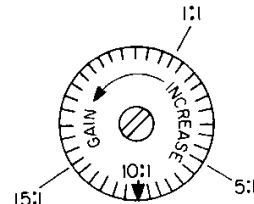


Fig. 11: T-5800-1 Gain Dial Reference Points

Calibrating the T-5800-2 (See Fig. 12)

When connecting the T-5800-2 Receiver-Controller to an operating system, the fan "F" connection should either have the "system in operation"

function signal (minimum of 12 PSIG) attached (example: fan on-off or water circulation pump on-off), or the connection must be capped.

Putting the P/PI jumper (see Fig. 13) off of its spigot causes the receiver-controller to operate as a proportional-only controller (no integral function). The jumper must be connected in order for the system to have normal proportional plus integral control.

The T-5800-2 has an automatic/manual integral control cutout feature when the fan "F" connection is used. This feature keeps the system from going out of control on startup (after it's been off for some time) by allowing the system to start up using proportional-only control. If it is determined that there is not a need for the cutout feature, cap the unused fan "F" connection. Doing so will allow

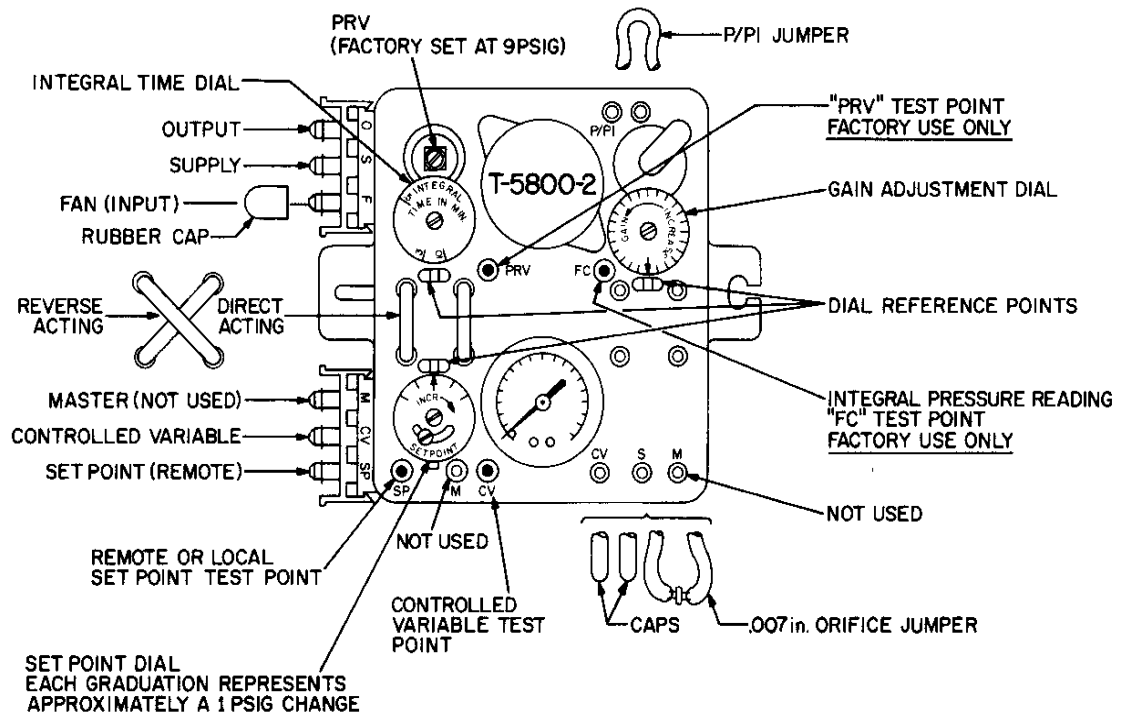


Fig. 12: T-5800-2 Adjustment Points

normal proportional plus integral control of the system at all times, provided that the P/PI jumper is connected.

Set Point Adjustment

To make adjustments to the set point, proceed as follows:

1. Pull the P/PI jumper off its spigot so that the receiver-controller will operate as a proportional-only controller (no integral function).
2. Consult the system drawing to determine the required set point value. Convert this value to the pressure equivalent; see example highlighted in Fig. 10 (75°F on a 50 to 150°F range would be a set point of 6 PSIG).
3. Take a set point pressure reading using the appropriate method and gage, as illustrated in Fig. 8. Adjust the local set point dial or the remote adjuster (manual or automatic) until the pressure matches the value noted in Step 2. Remove the pressure reading device and reconnect the jumper (if applicable).
4. Start up the system to be controlled. After a reasonable period of time, the receiver-controller should be in control (as a proportional-only controller) within the throttling range of the controlled device.
5. Proceed to the Gain Adjustment section.

Gain Adjustment (See Fig. 14)

Note: All gain adjustments must be made with the P/PI jumper still removed from the spigot.

Adjusting the gain dial **will not** affect the controller set point; however, the **output pressure** may change when the gain dial is adjusted. Increasing the gain will narrow the throttling range (decrease offset), allowing the

control point to be closer to the set point. Decreasing the gain will widen the throttling range, forcing the control point away from the set point.

Normally, having the gain arrow set at the pointer represents a reasonable gain adjustment which would provide stability. Increase the gain setting by small increments until the system becomes unstable and begins to cycle. Decrease the gain setting slightly to remove the cycling effect and mark this position on the dial. Rotate the dial fully clockwise until it hits its mechanical stop, then counterclockwise to the midpoint between the stop and the marked position. Doing so will provide a suitable gain to allow the introduction of the integral function.

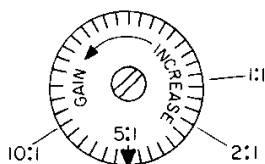


Fig. 14: T-5800-2 Gain Dial Reference Points

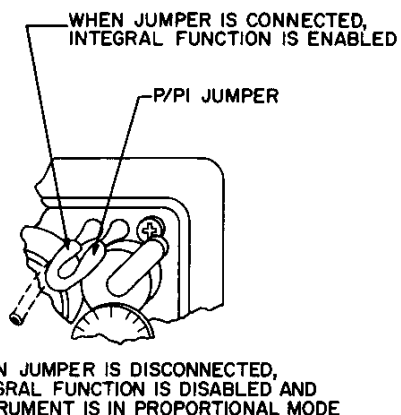


Fig. 13: P/PI Jumper Located on Upper Right Corner of T-5800-2

After the system stabilizes again, reconnect the P/PI jumper to return the integral function to the receiver-controller. After a reasonable period of time, the control point should stabilize at the set point value and no further adjustments will be required. If the control point does not stabilize at the set point value or if excessive cycling occurs, proceed to the Integral Time Adjustment section.

Integral Time Adjustment (See Figs. 14 & 15)

Adjusting the integral time dial will not affect the controller set point. If the system response toward the set point is too slow, **decrease** the integral time and/or **increase** the gain dial settings by small increments each. If cycling occurs, **increase** the integral time and/or **decrease** the gain dial settings by small increments each.

Mark the set point dial position. Upset the system by rotating the set point dial to force the controlled device to an open position. Wait a sufficient period of time to cause controlled variable deviation, then return the set point dial to its original position. If the system response is not as desired, adjust the

integral time and gain dials as prescribed above to obtain the desired system response.

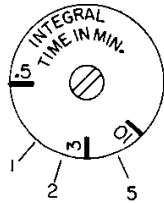


Fig. 15: T-5800-2 Integral Time Dial Reference Points

System Startup Response

The following procedure is for determining whether an additional time delay is required for proper system startup.

⚠ WARNING: Before stopping a system, be sure that a change in output pressure will not upset the system and cause damage.

A. Receiver-Controllers Using Fan "F" Connection

When the system becomes stable, stop the system and allow enough time to pass until the controlled variable

deviates from the set point. (Remember when the system is off, the receiver-controller returns to proportional-only control. This feature eliminates integral windup during off periods.) Restart the system and observe to see how well it comes into control. When the system is started and the fan signal is increased to maximum (20 PSIG), the proportional-only controller returns to proportional plus integral control to cause the control point to equal the set point. If the system response is not as desired, determine whether the cause is an incorrect time delay setting (see T-5800-100 Time Delay section) or an incorrect integral time setting (repeat Integral Time Adjustment procedure above).

B. Receiver-Controllers Having Fan "F" Connection Capped

When the system becomes stable, stop the system and disconnect the P/PI jumper. Allow enough time to pass until the controlled variable deviates from the set point. Restart the system,

reconnect the P/PI jumper, and observe to see how well the system comes into control. If the system response is not as desired, repeat the Integral Time Adjustment procedure above.

T-5800-100 Time Delay

After system startup, if the system response is too slow, the integral control function will act on the signal before the proportional control function settles out. To eliminate this problem a T-5800-100 Time Delay (ordered separately) must be added to the fan "F" connection (see Fig. 16). This device will delay the pressure increase to the fan "F" connection of the receiver-controller, allowing more time for the system to achieve proportional control (in control) before the integral control function is initiated.

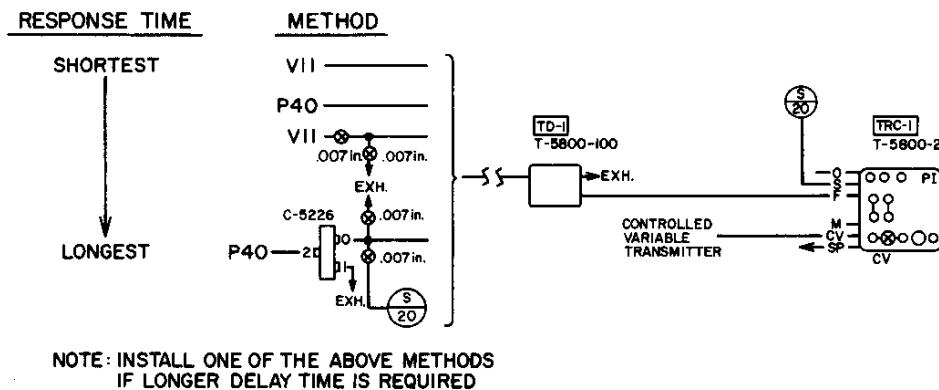


Fig. 16: T-5800-100 Time Delay Connected to Fan Input of T-5800-2

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Printed in U.S.A.