MOORE INDUSTRIES

ITX

Integrating Totalizer

USER'S MANUAL

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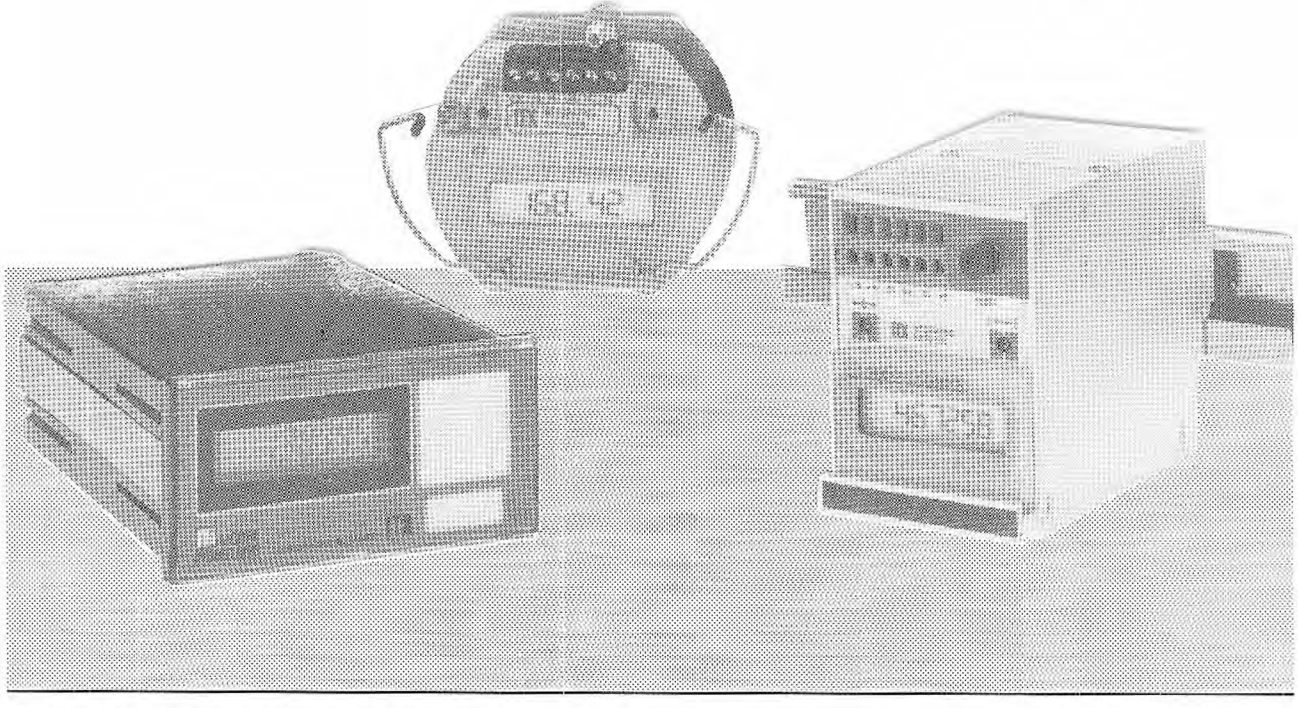

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Introduction

Moore Industries' Integrating Totalizer (ITX) is a loop-powered instrument that accepts current inputs and provides a digital readout in values that are linear with or the square root of the input. The ITX features jumper-selectable display ranges, mode selection, and battery backup, standard.

This manual contains descriptive, calibration, and installation information for the ITX and for the DIN-style Rate Indicator Module (IRX). The IRX is an accessory product that displays the rate at which the input is being applied to the DIN-style ITX. (The IRX is available for DIN-style ITX's ONLY, and is ordered as the RI Option.)

Notes and Cautions presented in this manual are provided to help the user avoid minor inconveniences (NOTE) and equipment damage (CAUTION) while calibrating or installing these instruments.

Description

The ITX is a 2-wire integrating totalizer that accepts 4-20 or 10-50 mA inputs and displays an accumulated count reading on its liquid crystal display (LCD). The input range and count rate are jumper-selectable features of the ITX.

The 8-digit LCD features a suppressed leading zero and is manually reset by a user-supplied external push button that is connected to the reset terminals of the ITX, or by the optional reset button (RS Option) mounted on the front of the unit.

An internal lithium battery provides backup power for the LCD to continue displaying its last reading for up to six months if loop-power is removed. While loop-power is applied, the battery is not used to power the LCD even when it's connected to the circuit. The values displayed on the LCD are a linear or a square root count of the current applied to the ITX. Linear and square root modes are jumper-selectable features.

Other standard control features include:

- Zero and span range jumper settings
- Zero and span adjustments
- LCD Battery backup in/out jumper setting

The ITX is available in three housing styles; hockey-puck (HP), 1/8-DIN panel-mount (P), and DIN-style. Each offers an LCD, LCD battery backup, jumper settings, and zero and span adjustments. However, each housing style is designed for a particular mounting application.

The molded HP housing is designed to mount inside explosion-proof enclosures. Spring clips attached to the unit apply pressure against the inside walls of an explosion-proof enclosure to hold the ITX in place. Since the ITX features an LCD, a glass top cover is required to view the display when mounted in an explosion-proof enclosure. HP units can be equipped with flange plates (FL Housing Option) for flat surface mounting or mounting on relay tracks.

The plastic P housing is designed for mounting on an instrument panel through a user-provided cut-out. The Installation Section of this manual has the dimensions for the panel cut-out for mounting the P-style unit.

The aluminum DIN-style housing is designed for mounting on standard DIN-style G-rails (DIN EN50035). Along with having the standard features described previously, DIN-style units offer a unique option which includes a rate counter (IRX) that is packaged in the same size DIN-style housing as the ITX. When the ITX is ordered with this option, it is equipped with a side-panel connector for the electrical connections to the IRX, and includes the IRX assembly.

The IRX displays a rate that represents the percentage of input signal being applied to the ITX. The IRX features a 3.5-digit LCD that displays readings in percent over the range of 00.0 to 100.0. It is a zero-based display that does not display negative values during normal operation. The type values displayed are jumper-selectable for linear or square root

modes, which must match the ITX setting. The IRX is powered by the ITX, so it requires no external power source. The IRX also has its own zero and span adjustments.

Tables 1 and 2 contain the operational and performance specifications for the ITX and IRX, respectively.

Table 1. ITX Operational and Performance Specifications

Charateristics	Specification
Input	Field selectable: **4-20 mA** (30 mA, max) **10-50 mA** (65 mA, max)
Output	The full-scale rate at which the LCD is to be incremented; jumper-selectable for any value between 6.25 and 51,200 counts-per-hour
Power	**Loop-powered:** 7-volt drop, standard; 6.3-volt drop with LV Option
Controls	**Zero:** Adjusts output to ±10% of span over all ranges **Span:** Adjusts to any span in selected output range **Count Dropout:** Adjusts count dropout between 1 and 20% of input span **Reset Button** (option): Resets LCD when pressed; standard units have reset terminals for connecting a remote reset button **Internal Jumpers:** For setting ranges, display mode, battery backup, and count dropout
Indicator*	**Type:** 8-digit LCD, 0.315" high black digits over reflective background **Format:** 8 active digits with leading zero suppression **Range:** 0 to 99,999,999 counts **Overflow:** Indicated by a black dot in top left corner of display **Backup:** 6-month lithium battery
Performance	**Accuracy:** For 1 to 100% of output span, ±0.1% of span in linear mode; ±0.2% of span in square root mode **Protection:** Reverse input polarity protection to 400 volts (not with LV Option) **Count Dropout:** Factory-set to 1% of input span, standard; field-adjustable from 1 to 20% (can be user-specified at time of ordering) **Switched Output:** 35 to 180 msec (less than 1/2 period) solid-state contact each time the display is incremented. Maximum external voltage that may be switched is 24 Vdc at 150 mA (FR Option)
Environmental Ratings	**Ambient Operating Temperature:** –18 to 70 °C (0 to 160 °F) **Temperature Affect:** ±0.018% of span/°C (±0.01%/°F) over ambient range
* LCD may non-destructively darken above 55 °C (131 °F); count is unaffected.	
NOTE: Refer to the Installation Section of this manual for outline mounting dimensions.	

Table 2. IRX Operational and Performance Specifications

Charateristics	Specification
Input	Direct from ITX
Output	3.5-digit LCD; display range of 00.0 to 100.0
Power	Direct from ITX
Controls	**Span:** Provides ±10% of span adjustability **Zero:** Provides ±10% of span adjustability **Internal Jumper:** for setting the display mode to match the ITX setting
Indicator*	**Type:** 3.5-digit LCD, 0.35" high black digits over reflective background **Format:** 3.5 active digits with minus (–) sign for negative values **Operating Range:** 00.0 to 100.0 **Overflow:** Negtive indications occur for signals below zero (–XX.X); for signals over 100.0, display reads 1XX.X (X is unspecified number)
Performance	**Accuracy:** For 0 to 100% (00.0 to 100.0), ±0.2% of span in linear mode; ±0.3% of span in square root mode
Environmental Ratings	**Ambient Operating Temperature:** –18 to 70 °C (0 to 158 °F) **Temperature Affect:** ±0.01% of span/°C over ambient range
* LCD may non-destructively darken above 55 °C (131 °F); count is unaffected.	
NOTE: Refer to the Installation Section of this manual for outline mounting dimensions.	

Options

The most popular factory-installed options available for the ITX include the following:

***CD Option** – Count Dropout.* The count dropout option allows you to specifiy a factory-setting between 1 and 20 percent of the input span, below which no counting occurs. This setting can be readjusted in the field. Units without this option are factory-adjusted to 1 percent, but the user can readjust it in the field.

***FR Option** –* Solid-state contact switch output that is incremented as the LCD is incremented.

***RF Option** – RFI/EMI.* The RFI immunity option shields the unit from the affects of radio frequency and electromechanical interference.

***RI Option** – IRX.* Provides a rate counter in a mating DIN-style housing (the IRX) to monitor the input of the ITX. For DIN-style ITX's only.

***RS Option** – Reset.* The reset option provides a push button on the front panel that is used to reset the display. Without this option, the reset terminals on the unit can be wired to an external push button for resetting the LCD.

***S Option** – Square Root.* The square root option configures the ITX for square root display operation. This feature is jumper-selectable and can be changed in the field. If not specified, units are configured for linear display mode at the factory.

For information on availability of other ITX options, contact Moore Industries or your local Sales Representative.

Serial Numbers. Moore Industries maintains a complete history on every unit we sell and service. This historical information is keyed to the unit's serial number. If historical data is required for a Moore Industries' product, the serial number of the unit must be given to a factory representative to retrieve this information.

The serial number for HP units will either be on a stainless steel tag attached to the front of the unit or on a label affixed to the side of the unit. The serial number for P-style units is printed on a label affixed to the top of the plastic housing. The serial number for DIN-style units is printed on a label affixed to the side of the unit.

Model Numbers. Model numbers identify the type of instrument, its functional characteristics, any options ordered, and the housing type of the unit. The model number is located in the same location as the serial number for each of the housing styles.

It is important to understand the composition of your ITX model number. The example below identifies the significance of each field of a Moore Industries' ITX model number.

Calibration

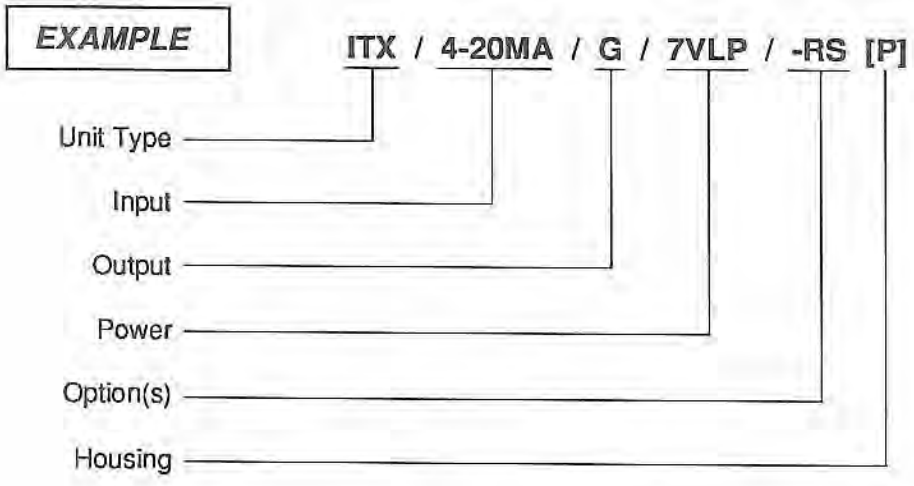
Every ITX and IRX is bench checked at the factory prior to shipment. However, should a unit need to be bench checked or calibrated at a later time, you should refer to the information contained in this section. We recommend that you bench check every unit before placing it into service, or when changing its application.

Calibration involves the controls and indicators of the ITX and IRX, and the use of calibration equipment to verify the desired operational settings. The use and location of the controls and indicators on the ITX and IRX are described in subsequent paragraphs.

Controls

The ITX controls consist of the following:

- Zero potentiometer
- Span potentiometer
- Count dropout potentiometer
- Input range jumper
- Display mode jumper



- Display range jumper
- Zero range jumpers
- Span range jumpers
- Battery backup jumper

The IRX controls consist of the following:

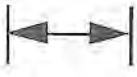
- Zero potentiometer
- Span potentiometer
- Display mode jumper

Adjustments. The Zero potentiometer is used to adjust the LCD to display a zero-percent reading for the desired zero-percent input. The Span potentiometer is used to adjust the LCD to display a 100-percent reading for the desired 100-percent input. The function of these adjustments is similar to that of other zero and span adjustments, except that you have the option of adjusting for a linear or square root display output.

The ITX has an 8-digit LCD. The IRX has a 3.5-digit LCD. Jumper settings are used to set the ITX display to a user-selectable display range. (Jumper settings are discussed in subsequent paragraphs.) The Zero and Span potentiometers are then used to adjust the display readings for both the ITX and IRX.

The Zero and Span potentiometers are accessible at the front panel of the HP- and DIN-style ITX's and the IRX. The HP-style unit has the words "ZERO" and "SPAN" embossed in the front panel to identify these potentiometers. DIN-style units have the following symbolic markings:


represents Zero


represents Span

The zero and span adjustments, as well as the optional count dropout adjustment, for the P-style ITX are behind the front lens cover, and are accessed through circular openings in PC2. These openings are accessed by simply popping the lens cover off with a slotted-head screwdriver or with your finger nails. The identifying markings for these potentiometers are written on PC1, but are not visible until the electronics are removed from the housing.

Count Dropout Adjustment. The Count Dropout potentiometer is an internal adjustment for the ITX. This adjustment allows you to set the count dropout sensitivity to any value between 1 and 20 percent of the input span.

Jumpers. All jumpers for the ITX and IRX are internal controls. The IRX has two jumper positions of which only one may be selected to match its display mode to that of the corresponding ITX.

Table 3 lists the jumper settings for the ITX and IRX. Jumpers described as ***installed*** are those that short the specified jumper pins together. Jumpers described as ***stored*** are those that are removed or placed on only one pin of the pin set. The following descriptions will help you decide which features to select for your application.

Input Range (J6). This single jumper configures the unit to safely accept a 4-20 or 10-50 mA input. Remove J6 for 4-20 mA or install it for 10-50 mA input.

ITX Display Mode (JP & JR). This jumper option allows you to configure the ITX to display a linear value or a square root value on the LCD. Install jumper JP and store jumper JR for linear mode. Install jumper JR and store jumper JP for square root mode. Only one jumper is used for this feature.

IRX Display Mode (JA & JB). This jumper option configures the IRX for linear or square root operation. The IRX displays a percentage of the input applied to the ITX, but to do so properly, this jumper must be set to match the ITX display mode setting. Only one jumper is used for this feature. If two jumper are present, intall only one and store the other by placing it on only one pin of the unused jumper location. See figure 10.

Table 3. ITX and IRX Jumper Settings

Feature		Selection	Jumper	Location
Input Range		4-20 mA	J6, stored	PC1
		10-50 mA	J6, installed	(All models)
ITX Display Mode*		Linear	JP, installed	PC1, DIN & P
		Square Root	JR, installed	PC2, HP
IRX Display Mode*		Linear	JA, installed	PC1
		Square Root	JB, installed	(All models)
Display Range*	A4	0 to 6.25 thru 12.5	JG, installed	PC1, P
(counts per hour)	A3	0 to 12.5 thru 25	JA, installed	PC2, DIN & HP
	A2	0 to 25 thru 50	JB, installed	
	A1	0 to 50 thru 100	JD, installed	
	A	0 to 100 thru 200	JC, installed	
	B	0 to 200 thru 400	JK, installed	
	C	0 to 400 thru 800	JH, installed	
	D	0 to 800 thru 1600	JJ, installed	
	E	0 to 1600 thru 3200	JL, installed	
	F	0 to 3200 thru 6400	JM, installed	
	G	0 to 6400 thru 12,800	JN, installed	
	H	0 to 12,800 thru 25,600	JF, installed	
	J	0 to 25,600 thru 51,200	JE, installed	
Zero Adjustment Range		Linear	J4, stored	PC1
		Square Root	J4, installed	(All models)
Span Adjustment Range*		70 to 77 ms	JV, installed	PC1, DIN & P
		77 to 95 ms	JW, installed	PC2, HP
		95 to 115 ms	JX, installed	
		115 to 135 ms	JY, installed	
		135 to 140 ms	JZ, installed	
Battery Backup		Out of circuit	J5, stored	PC1, HP
(for ITX LCD)		In circuit	J5, installed	PC2, P
				PC3, DIN
Count Dropout		Active	JU, stored	PC1, DIN & P
		Inhibited	JU, installed	(Not used in HP)

* Install only one jumper to set a selection for the feature indicated.

Display Range (JA–JN). This jumper provides a selection of various display ranges as listed in table 3. Only one jumper is used for this feature. Any spare jumpers must be stored or removed. This setting works in conjunction with the span adjustment.

Zero Adjustment Range (J4). This single jumper configures the ITX for the type zero-based operation desired. The zero adjustment range is based on the unit being configured for linear or square root mode. Store J4 for the linear mode and install it for the square root mode. This jumper must match the display mode setting.

Span Adjustment Range (JV–JZ). The span adjustment ranges are divided into five time periods (refer to table 3). These time periods represent the count intervals of the rate of the CAL output in milliseconds. The count interval is based on the display range and the actual full-scale counts/hour selected.

Table 4 contains a breakdown of the display ranges with their corresponding span adjustment range jumper. Only one jumper is used for this feature. Any spare jumpers must be stored or removed.

If the full-scale display output can not be achieved with a particular jumper setting, move the span jumper to the next jumper setting nearest the desired full-scale value. These ranges overlap, so it is possible that an adjacent jumper setting may be more appropriate for your application.

The "Scaling Factor" column in table 4 is used for count interval calculations discussed in the Calibration Setup subsection later in this section.

Battery Backup (J5). The LCD battery backup is a standard feature of the ITX. Units are shipped from the factory with the battery disconnected from the LCD circuit (J5 stored). To provide battery backup for the LCD, in case loop-power is lost once the unit is in service, you must install J5. With the battery out of the circuit, the LCD is powered by the loop. But, the unit will NOT retain the last reading when loop power is removed.

Table 4. Span Adjustment Range Jumper Settings

Display Range	Scaling Factor	Span Jumpers				
		JZ	JY	JX	JW	JV*
A4	4096	6.25-6.5	6.5-8	9-10	10.5-11.5	12-12.5
A3	2048	12.5-13	14-16	17-19	20-23	24-25
A2	1024	25-26	27-32	33-39	40-48	49-50
A1	512	51-52	53-64	67-79	78-96	97-100
A	256	101-104	105-128	129-159	160-192	193-200
B	128	201-208	209-256	266-319	320-384	385-400
C	64	401-416	417-513	514-639	640-768	769-800
D	32	801-833	834-1027	1028-1278	1279-1536	1537-1600
E	16	1601-1666	1667-2054	2055-2556	2557-3072	3073-3200
F	8	3201-3333	3334-4109	4110-5113	5114-6144	6145-6400
G	4	6401-6666	6667-8219	8220-10227	10228-12289	12289-12800
H	2	12801-13333	13334-16438	16439-20454	20455-24576	24577-25600
J	1	25601-26666	26667-32876	32877-40909	40910-49152	49153-51200

* JV is not used in panel-mount (P) housings. The absence of all span adjustment range jumpers in the P Housing produces the range listed here in the "JV" column based on the Display Range.

Count Dropout (JU). In the P- and DIN-style ITX's, there is a count dropout jumper that inhibits the count dropout function. For some testing and calibration techniques, the absence of the count dropout feature signal is useful. With JU installed, the count dropout is inhibited and the unit will continue counting throughout the entire input range.

NOTE

When some jumper settings are changed, especially the input range jumper, the ITX must be recalibrated to ensure reliable performance.

Figures 1 through 10 illustrate the disassembly and component locations for the HP, P, and DIN-style ITX's, and the IRX.

The ITX and IRX are packaged in the same size DIN-style housing. Removal of a side panel provides access to the electronics of these two modules. The electronics do not need to be removed from either of these packages to access the jumpers. The left-side panel must be removed to access the jumpers of the ITX, and the right-side panel removed for the IRX.

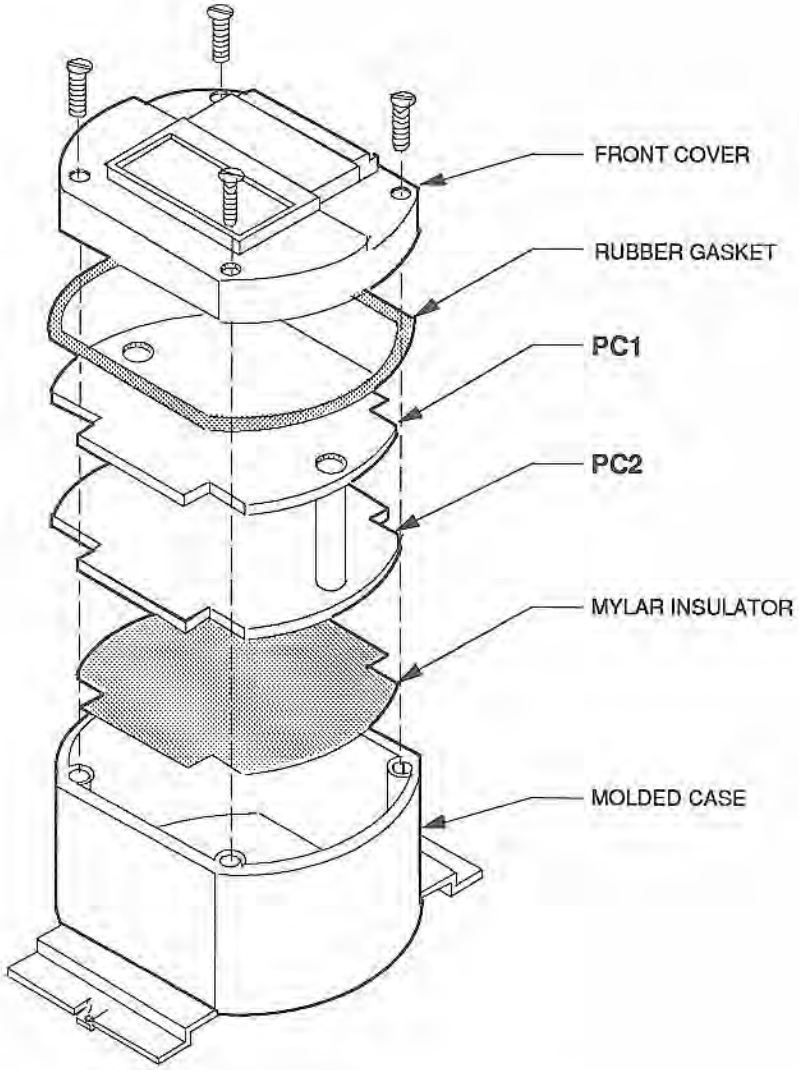


Figure 1. *HP Housing Disassembly*

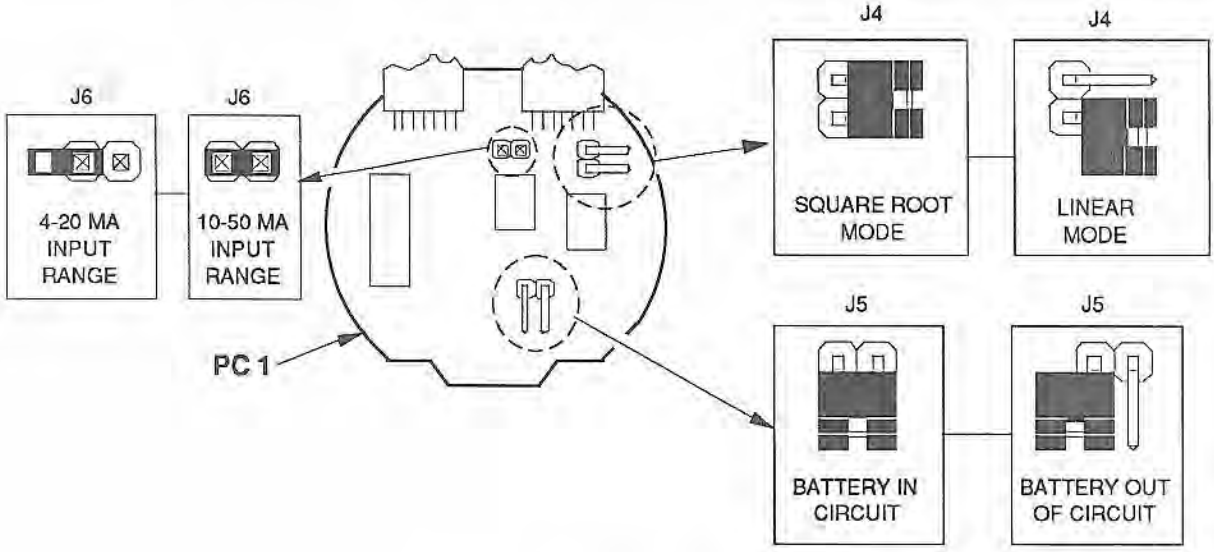


Figure 2. HP, PC1 Jumper Locations

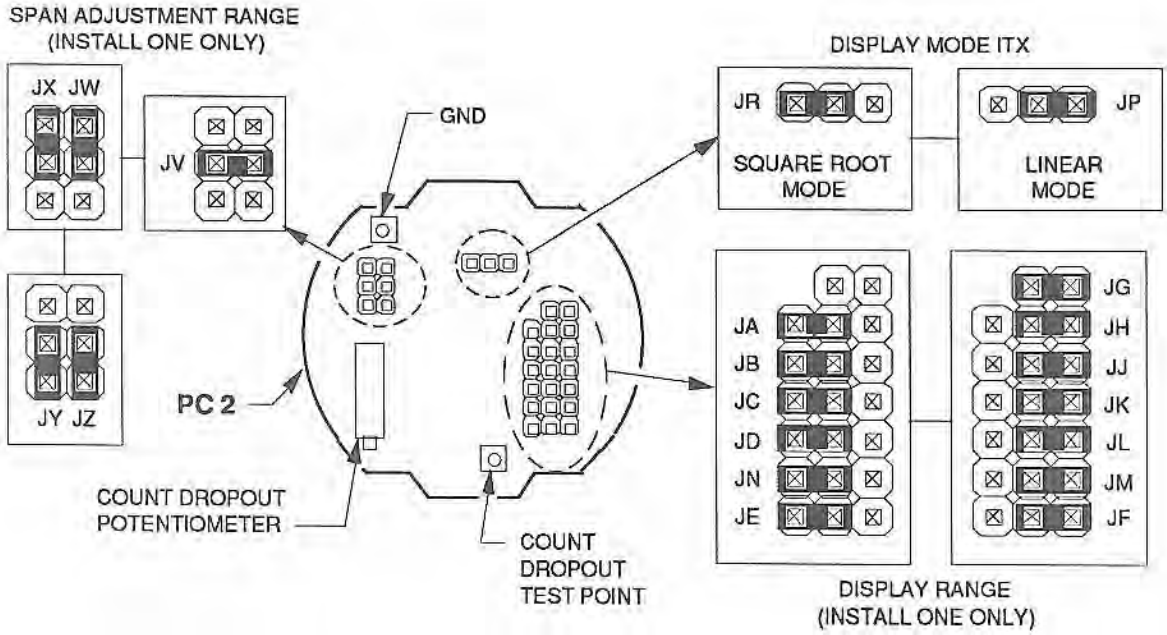


Figure 3. HP, PC2 Jumper Locations

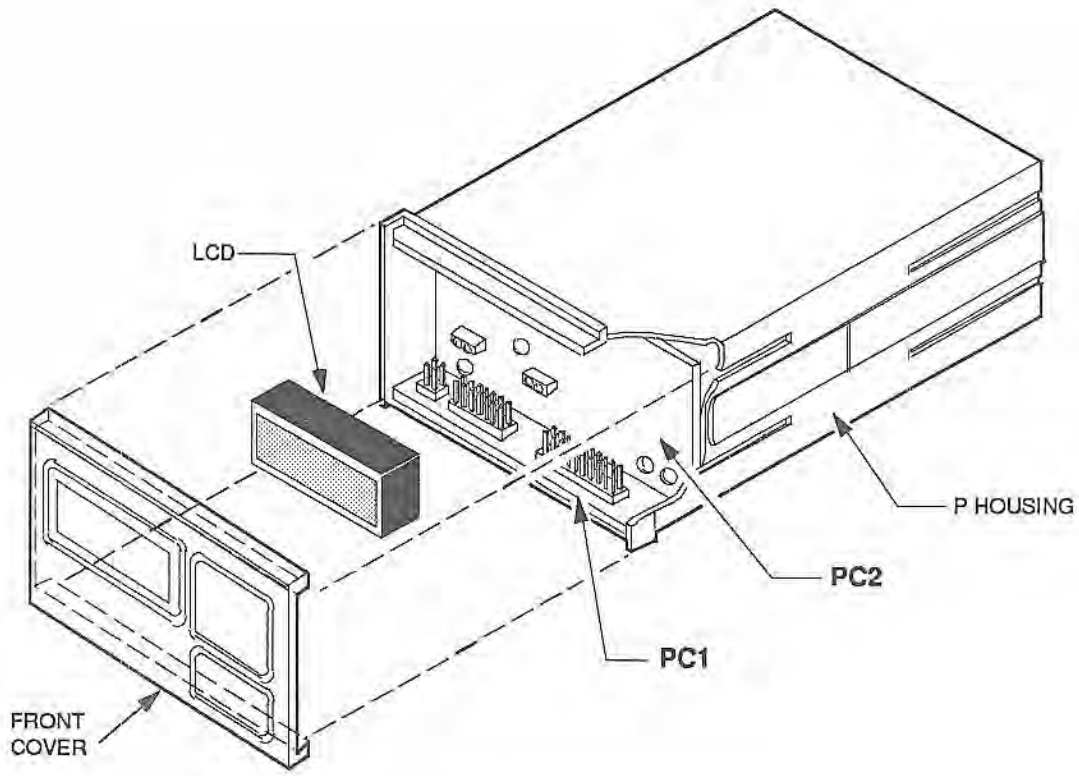


Figure 4. P-style Housing Front Access

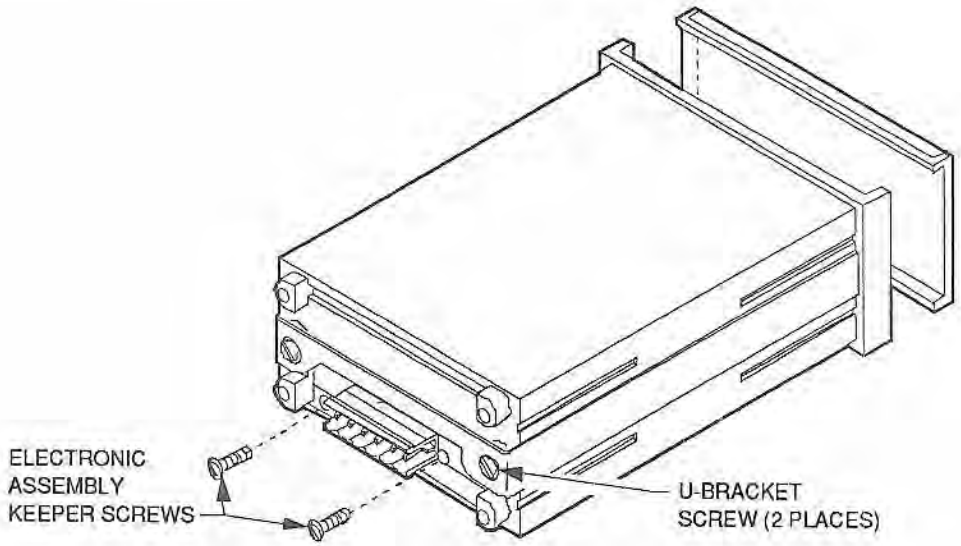


Figure 5. P-style Housing Disassembly

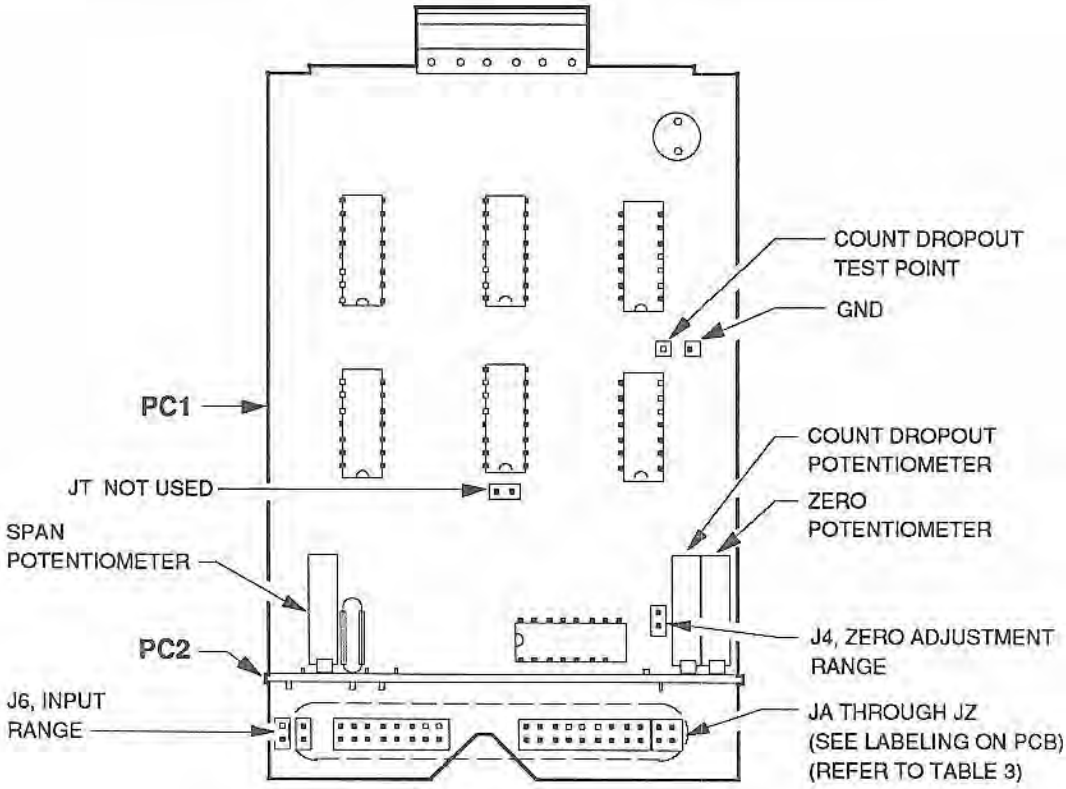


Figure 6. P-style Housing, PC1 Component Locations

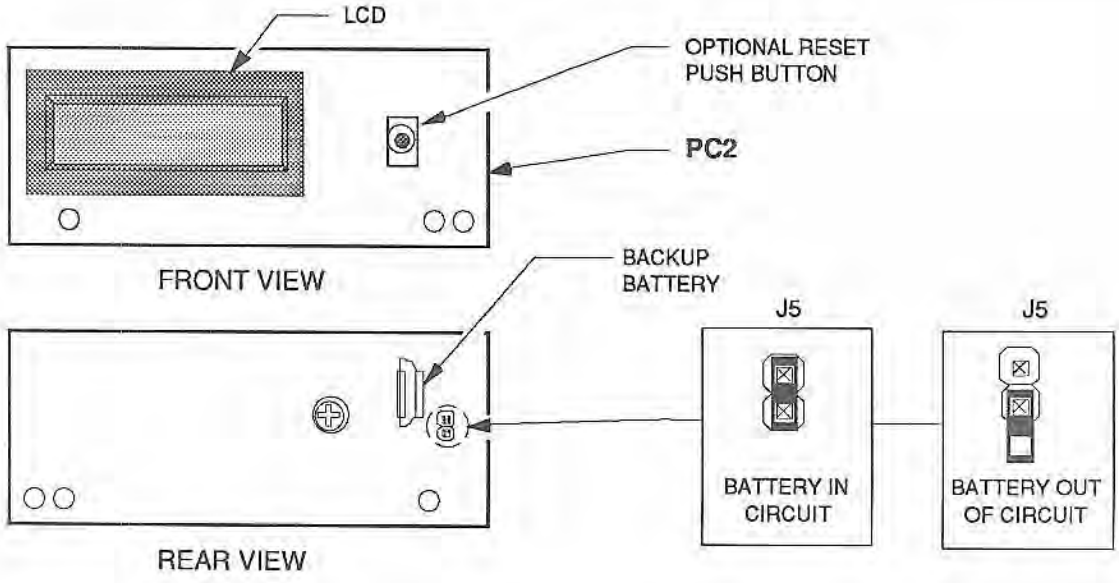


Figure 7. P-style Housing, PC2 Component Locations

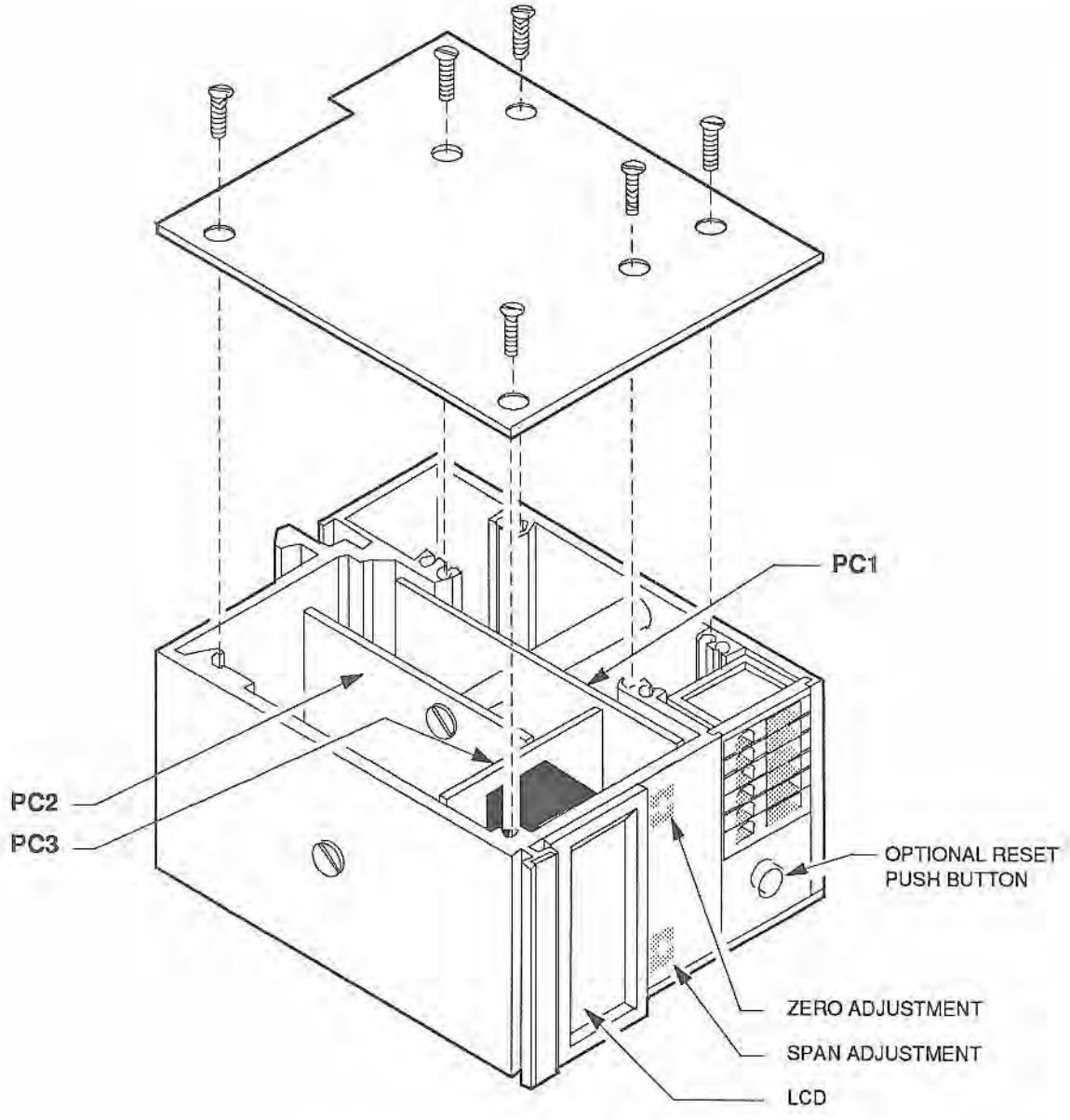


Figure 8. DIN-style Housing Disassembly

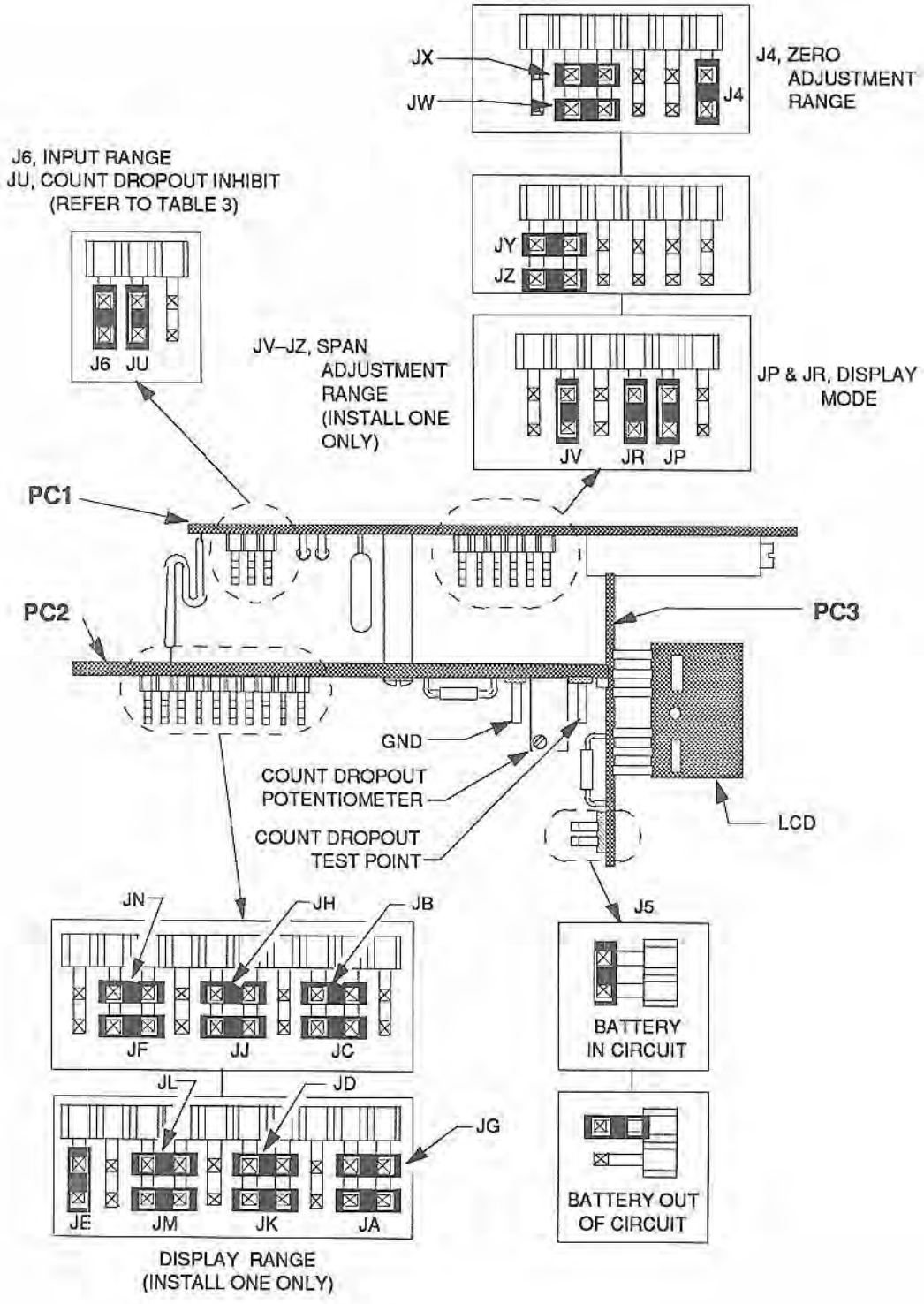


Figure 9. DIN-style Jumper Locations

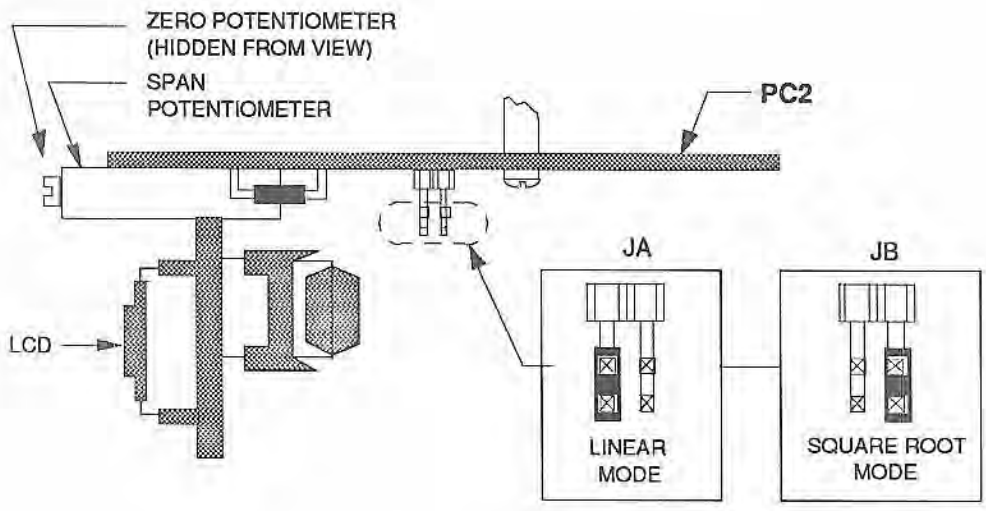


Figure 10. IRX Component Locations

Calibration Setup

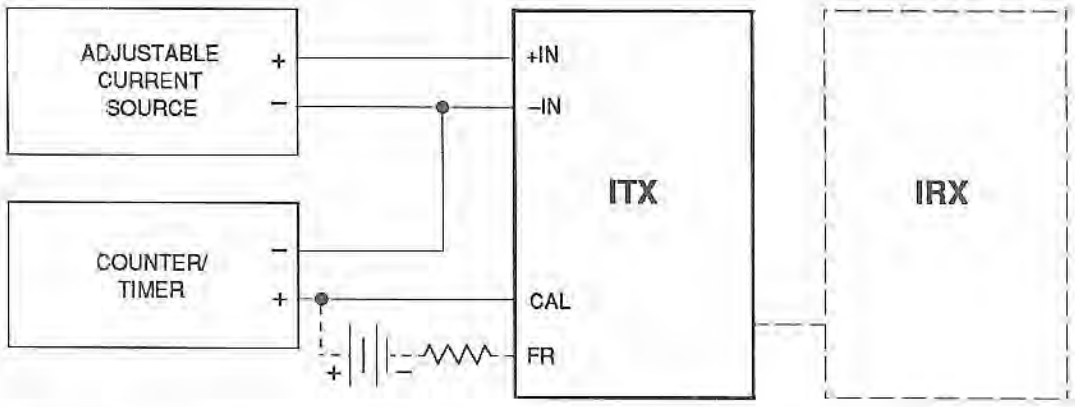
Calibrating the ITX and IRX involves the use of test equipment to simulate the appropriate input and to make adjustments to the unit(s) to achieve the required output.

Table 5 contains the equipment required to calibrate or bench check the ITX and IRX.

Figure 11 is the calibration hookup for the ITX. The setup shown here is also used if you wish to bench check the ITX or IRX. All electrical connections to the IRX are through the built-in connector that mates the two modules. However, the calibration equipment shown is still required to adjust the zero and span settings of the IRX.

Table 5. Calibration Equipment

Equipment	Characteristic
Adjustable Current Source	Accuracy of ±0.01% or better
DC Voltmeter (for CD Option)	Accuracy of ±0.5% or better
Counter/Timer	Accuracy of ±0.01% or better
Screwdriver (slotted)	Head width no wider than 2.54 mm (0.1 in)



NOTES: 1. Units equipped with a reset push button (RS Option) do not need an external push button to reset the LCD.
2. The FR option may be checked as shown with a power source no greater that 24 Vdc and a load resistor that limits current to 150 mA.

Figure 11. ITX/IRX Calibration Hookup

Calculating the CALibration Output. Before beginning the calibration of the ITX, the count intervals to be measured at the CAL terminals must be calculated. (The CAL terminals are used only for calibration.)

Count intervals are measured in milliseconds and are within the span adjustment ranges shown in table 3. By determining the full-scale count interval, various percentages of the full-scale output can be derived and used to verify output linearity. To find the count interval for the full-scale CAL output, use the following formula:

FORMULA A:

[(3600/K)/full-scale cph] x 1000 = full-scale count interval in milliseconds

- 3600 = number of seconds in an hour
- K = scaling factor (table 4)
- cph = counts per hour
- The scaling factor and cph pertain to a particular display range (table 4).

EXAMPLE #1: 1600 cph *(display range D)*

[(3600/32)/1600] x 1000 = 70.312 msec

- *In this example, scaling factor 32 and 1600 cph are for display range "D".*
- *The count interval derived with this formula will be used during calibration for the full-scale counter/timer reading.*

To calculate a percentage of a count interval that is representative of a particular percentage of input applied to the ITX, an additional formula is required. This calculation cannot be performed until the full-scale count interval (obtained with the previous formula) has been calculated. The percentage of the count interval must be obtainable to complete the calibration procedure. The formula is different for units configured for linear mode and square root mode operations. The two formulas are shown separately with examples.

FORMULA B:

To calculate a percentage of the count interval for units configured for the *linear mode*, use the following formula:

(100/% of input) x full-scale count interval = count interval representative of input percentage

***EXAMPLE #2: 70% input** (linear mode)*

(100/70%) x 70.312 = representative count interval at CAL terminal

(1/0.7) x 70.312 = 100.445 msec

The result of 100.445 msec is the count interval that exists for a 70 percent input to a linear unit that has been adjusted for a full-scale count interval of 70.312 msec.

FORMULA C:

For units configured for *square root* mode, use the following formula:

$\sqrt{100/\%}$ of input x full-scale count interval = count interval representative of input percentage

***EXAMPLE #3: 70% input** (square root mode)*

$\sqrt{100/70\%}$ x 70.312 = representative count interval at CAL terminal

1.195 x 70.312 msec = 84.022 msec

ITX Calibration Procedure

Before beginning the following calibration procedure, make all necessary jumper settings using tables 3 and 4 to configure the ITX (and IRX) as needed for your application.

1. Select full-scale counts per hour you wish to display on LCD for a full-scale current input.
2. Calculate full-scale count interval (for CAL output) using formula A in the Calibration Setup subsection.
3. Connect ITX and calibration equipment as shown in figure 11.
4. Set input source to desired 100-percent input value (20 or 50 mA).
5. Adjust Span potentiometer for count interval reading on counter/timer that matches value calculated in step 2.
6. For linear mode operation, use formula B in the Calibration Setup subsection to calculate a count interval for 10 percent input. Go to step 8.
7. For square root mode operation, use formula C in the Calibration Setup subsection to calculate a count interval for 1 percent input. Go to step 9.
8. For linear mode operation, apply 10-percent current input and adjust Zero potentiometer for count interval reading on counter/timer that matches value calculated in step 6. Go to step 10.
9. For square root mode operation, apply 1-percent current input and adjust Zero potentiometer for count interval reading on counter/timer that matches value calculated in step 7.
10. Alternately change current input between minimum and 100 percent to verify counter/timer readings remain stable. Readjust as necessary until stability is maintained.

NOTE

The FR Option can be checked by moving the counter/timer connection from the CAL terminal to the FR terminal and using a power source and load as shown in figure 11.

Making the Count Dropout Adjustment. This feature is factory-set to 1 percent of the input span if not otherwise specified at the time of ordering.

1. Turn Count Dropout potentiometer fully counterclockwise.
2. Connect a dc voltmeter between the Count Dropout test point (CDTP) and ground (GND). Positive lead to CDTP and negative to GND. Reading will be approximately –2.7 volts. (See figures 3, 6, and 9.)
3. Select count dropout level between 1 and 20 percent of input span. Adjust current source to desired level.
4. Monitor voltmeter and slowly turn Count Dropout potentiometer clockwise until CDTP reading is approximately +2 volts. ITX will stop incrementing.
5. Slowly turn Count Dropout potentiometer counterclockwise until CDTP reading returns to approximately –2.7 volts. ITX will begin incrementing. Leave setting where ITX just begins to count.

IRX Calibration Procedure

The IRX must be mated with the DIN-style ITX and setup for calibration as shown in figure 11 to perform the following procedure. The linear/square root jumper (figure 10) must be set to match the operating mode of the ITX.

1. Set input source to desired 100-percent input value.
2. Adjust Span potentiometer on IRX for an LCD reading of 100.0.
3. For linear mode operation, apply 10-percent current input to ITX and adjust IRX Zero potentiometer for an LCD reading of 10.0. Go to step 5.
4. For square root mode operation, apply 1-percent current input to ITX and adjust IRX Zero potentiometer for an LCD reading of 10.0.
5. Alternately change current input between minimum and 100 percent to verify LCD readings remain stable. Readjust as necessary until stability is obtained.

Installation

Installing the ITX consists of physically mounting the device and completing the necessary electrical connections. In most applications, it is easier to mount the ITX before completing the electrical connections.

Mounting

The ITX is available in three housing styles; each having its own unique mounting application. Regardless of the housing type, the ITX should always be mounted in an area free from dust, moisture, and corrosive elements. Also, environmental temperatures should be checked and kept to within operational specifications for the ITX to perform reliably.

Figure 12 is an outline dimension drawing of the HP-style housing with flange plates (FL Housing Option). The standard hockey-puck housing is equipped with spring clips on the front panel that are used to hold the unit inside explosion-proof enclosures; this is the mounting application the standard HP unit is designed for. The spring clips have no bearing on the overall size of the unit so they are not shown here to avoid cluttering the illustration. The FL housing is designed to mount on relay tracks or on a flat sturdy surface.

Figure 13 is an outline dimension drawing of the P-style housing. This thermoplastic housing is designed for mounting on an instrument panel through a user-provided cut-out. The panel cut-out dimensions are included with the illustration.

Figure 14 is an outline dimension drawing of the DIN-style housing. This aluminum package is designed for mounting on standard DIN-style G-rails (DIN EN50035). The IRX has the same physical size as the DIN-style ITX. Figure 15 shows a front view of the IRX with only its height and width listed. The depth is the same as that shown in the figure 14.

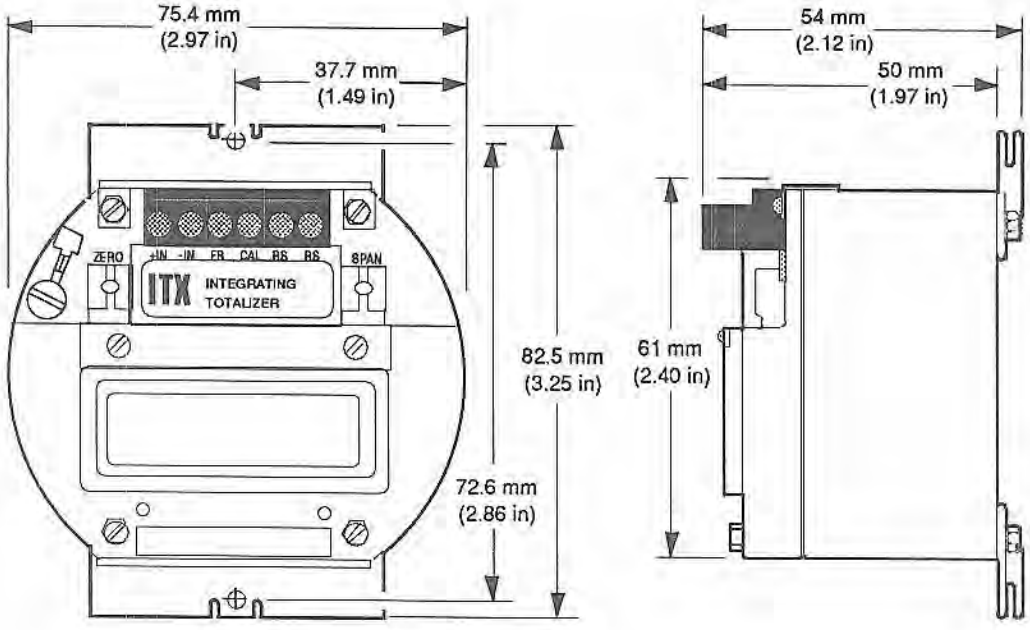
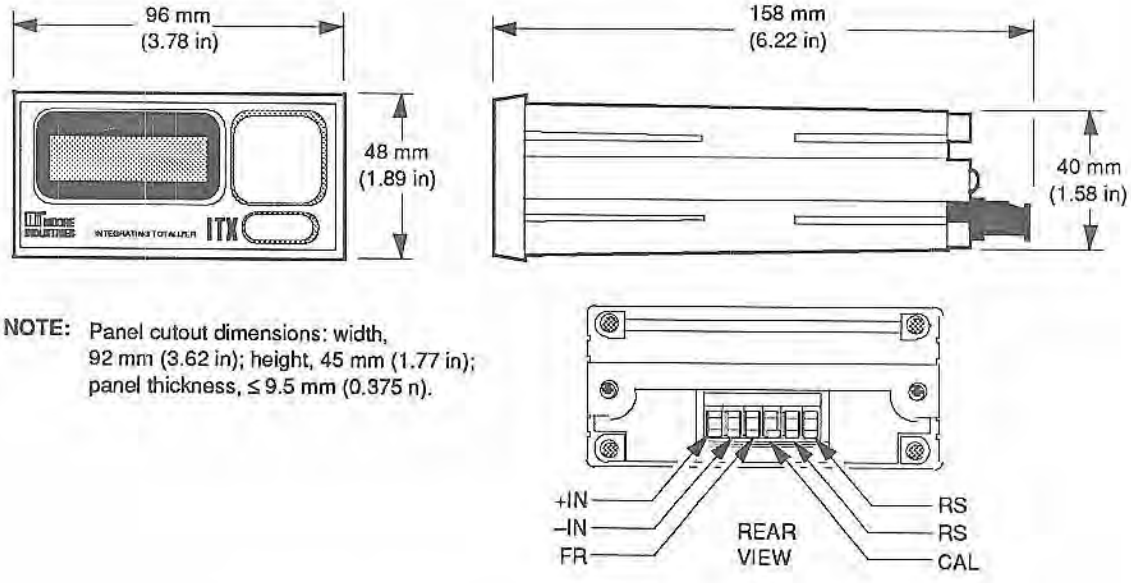
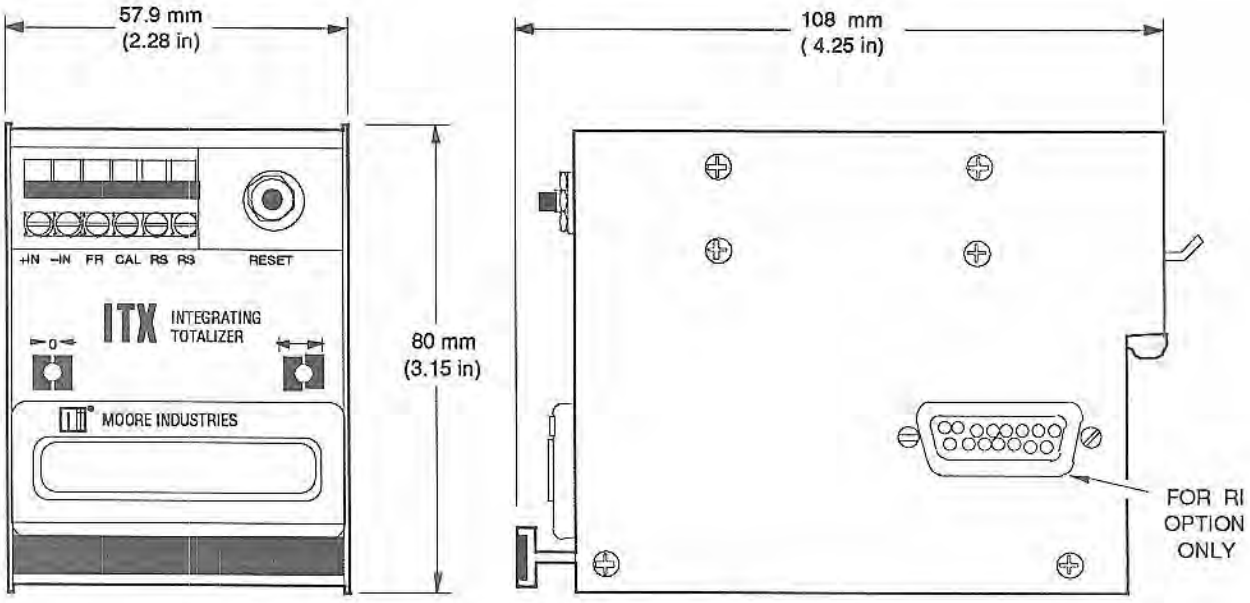


Figure 12. HP Housing Outline Dimensions



NOTE: Panel cutout dimensions: width, 92 mm (3.62 in); height, 45 mm (1.77 in); panel thickness, ≤ 9.5 mm (0.375 n).

Figure 13. P-style Housing Outline Dimension Drawing



NOTE: The IRX dimensions are the same as those for the ITX.

Figure 14. DIN-style Housing Outline Dimensions

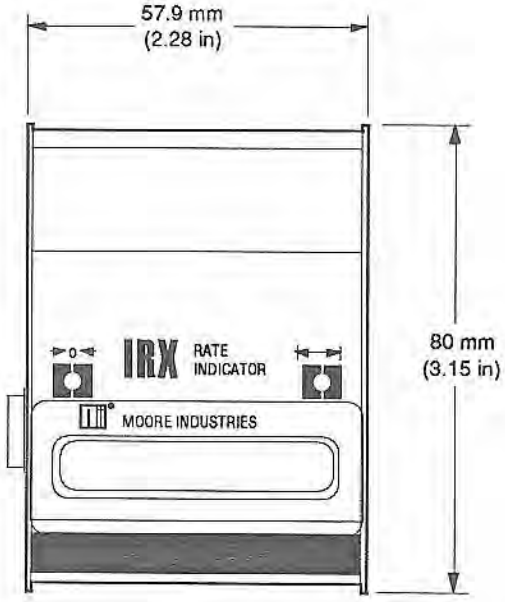


Figure 15. IRX Front View Outline Dimensions

Making the Electrical Connections

The electrical connections to the ITX (all housing styles) are made with compression screws. A small slotted-head screwdriver is required to complete the individual terminal connections. Wiring connections are made at the front panel of HP- and DIN-style units, but are made at the rear of PM-style units.

The terminals are labeled +IN, –IN, FR, CAL, RS, and RS on each unit. The +IN and –IN terminals are the loop input terminals. The FR terminal is active only if the FR Option is included in the unit. The FR terminal is used in conjunction with the –IN terminal to provide a solid-state contact closure for an external counter. The CAL terminal is used for calibration and provides count intervals related to the display range. The RS terminals are used to clear the LCD. These two terminals may have the factory-installed reset switch or may be used to connect a user-provided external reset switch.

The HP and DIN-style housings display the terminal designations immediately adjacent to each terminal. The P-style housing includes a label on its top surface that illustrates the terminal designations.

Figures 16 and 17 are typical installation hookup diagrams for a standard 2-wire installation, and an installation using transmitter excitation supplied by an external device and showing connections for the FR Option.

Operation

Once the ITX is calibrated and installed, it will operate unattended for extended periods of time. During normal operation, the unit may become warm to the touch. This is no cause for alarm and should not warrant further attention unless a malfunction is also encountered.

There are no error warning indicators on the ITX. The controls consist of the Zero and Span potentiometers and several jumper options. Once the ITX has been set up for the desired application, it will operate maintenance-free with a minimum of human intervention.

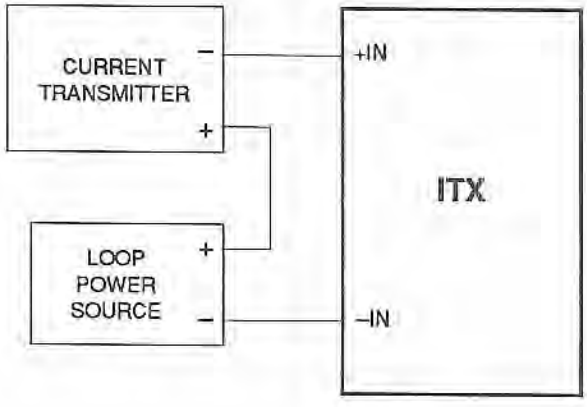


Figure 16. Typical Installation Hookup

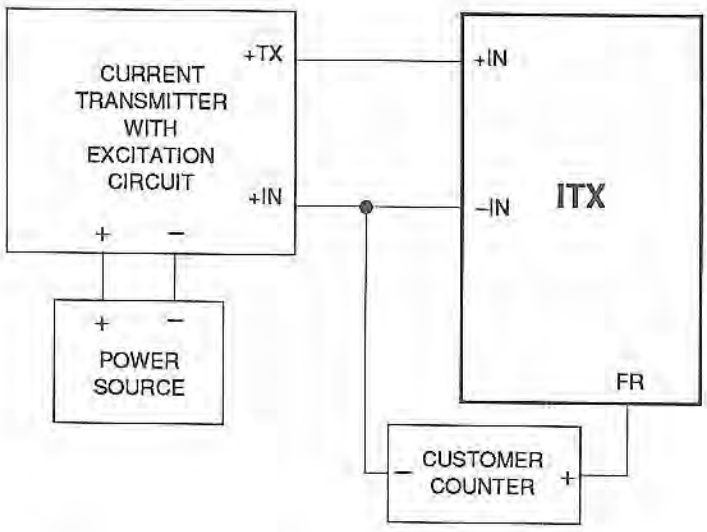


Figure 17. ITX Hookup with External Transmitter Excitation and FR Option

Maintenance

Maintenance of the ITX is limited to ensuring that the electrical terminals are clean and all connections are secure. You should also ensure that the ITX is operated in an area offering adequate ventilation or heat dissipation. We recommend you check the unit for cleanliness, wiring condition, and environmental effects at least once every six months.

For additional technical assistance, contact Moore Industries' Customer Service Department at 1-800-999-2900.

RETURN PROCEDURES

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

   Warranty Repair –
   If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

   Non-Warranty Repair –
   If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
   a) A note listing the symptoms that indicate the unit needs repair
   b) Complete shipping information for return of the equipment after repair
   c) The name and phone number of the person to contact if questions arise at the factory

3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.

4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

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