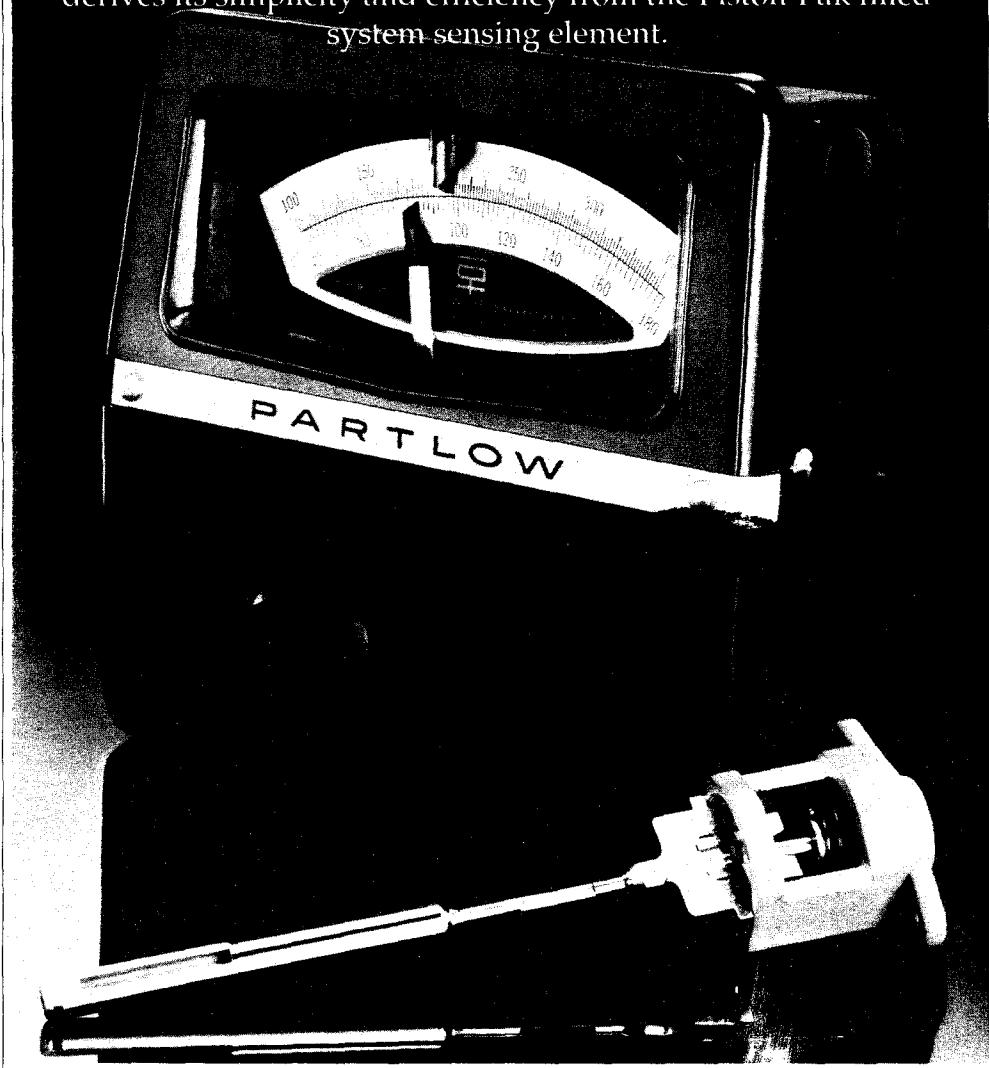


TWO SWITCH, DUAL SETPOINT INDICATING MECHANICAL TEMPERATURE CONTROLLER

The LFB73-73 is a two switch, dual setpoint, indicating temperature controller. The switches, which move with the setpointer, are adjustable over the entire scale range. It derives its simplicity and efficiency from the Piston-Pak filled system sensing element.



Form Number 3060
Published April 1990
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**SPECIFICATIONS
INSTALLATION
OPERATION**

LFB73-73

Partlow

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QUALITY INSTRUMENTATION DESIGNED & MANUFACTURED IN THE USA

Dynapar, Veeder Root, and Eagle Signal Brands:

Sales, Repair, and Application Support:

1675 Delany Rd.

Gurnee, IL. 60031

847-662-4150 Sales/Order Entry Fax

847-782-5277 Applications Support Fax

800-873-8731 Sales/Order Entry

800-234-8731 Applications Support

NorthStar Brand:

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847-782-5277 Applications Support Fax

800-873-8731 Sales/Order Entry

800-866-6659 Applications Support

Please disregard all phone numbers and addresses in this manual. The phone numbers and address on this page are the correct phone number and addresses to use for sales, repair, and application support.

LFB73-73 PRODUCT SPECIFICATIONS

Dimensions	8 5/8" x 8" x 4 9/32" D
Panel Mount Cutout	7 inches wide by 7 3/4 inches high;
Surface Mounting	Mounting brackets included
Switch Type	Two 3- wire single pole double throw.
Switch Sensitivities	Super Sensitive 1/2% of element range
Switch Differential between each separate switch	Maximum, full scale; minimum , 1. 5% of element range
Electrical Connection	Terminal block accessible through top cover hatch
Conduit Openings	1/2 inch NPS holes on each side of the case for 1/2 inch conduit fitting; drill guide hole spotted in the rear of the case showing optional rear opening location.
Electrical Rating	50VA, inductive; 500VA, non inductive; 250V maximum AC only.
Agency Approvals	UL and CSA Approved
Warranty	One year, details on the last page
Approx.Net Weight*	7 lbs
Approx. Ship. Weight*	10 lbs

* Weight may vary depending on element length.

Note:

It is strongly recommended that Partlow equipped applications incorporate a high or low limit protective device which will shut down the equipment at a preset temperature condition in order to preclude possible damage to property or product.

This document should accompany the instrument to its final installation in order to provide operational and service assistance to the end user.

LFB73-73 ORDER MATRIX



LFB73-73*
(Requires L-Type element plunger).

ACCESSORIES
0 None
1 201 Weather Resistant **

* Specify Dial Scale required.

** Requires an inverted dial scale. Check factory on availability.

PISTON PAK THERMAL SENSING ELEMENT

A Piston Pak Thermal Sensing Element must be specified for each LFB73-73. Use Partlow Form Number 3028 "Mechanical Instrumentation Product Cross Reference and Pricing Guide" to configure the matrix number for the sensing element.

INSTALLATION AND WIRING

LOCATION

The element head assembly is subject to ambient temperature limitations of -30°F to 125°F (-35°C to 52°C) for low temperature head assemblies, and 32°F to 150°F (0°C to 66°C) for high temperature head assemblies. These temperature limitations must be considered when determining the instrument location. It should be located in an area as free from vibration as possible.

MOUNTING

The instrument(s) are shipped to be surface mounted. Figure 1 illustrates hole placement for surface mount conditions. Note: Holes in brackets supplied are 9/32 clearance holes for 1/4" bolts. The three holes called out in the drawing may be any size that will accommodate the fastening required (ie: 9/32 for 1/4" thru-bolt with nut fastener) or #7 drill for 1/4" x NC tapped hole fastening or #3 drill for 1/4" x NF tapped hole fastener.

The instrument may also be flush mounted. This is accomplished by removing the three surface mounting angle brackets from the instrument. Figure 1A illustrates panel cut out dimensions. Cut the panel opening to 7" wide by 7 3/4" high. Drill 9/32 clearance holes in four locations if 1/4" thru-bolt with nut installation is desired. Should a tapped hole be more preferred, drill a #7 hole in four locations for a 1/4" x 20 NC or a #3 drill hole in four locations for a 1/4" x 28 NF. Note: All configurations require a flat head screw for proper cover installation. With the instrument in the upright position, insert it and the element into the panel opening and tilt it into place. Depending upon your panel size, it may be easier to make electrical connections before finally securing the instrument into the panel.

WIRING

Check applicable electrical codes, ordinances and regulations regarding use of conduit, etc. **If acceptable, make connections using short sections of flexible cable or conduit.** It is recommended that the rear conduit hole be used for panel mount installations. A drill guide hole is spotted in the back of the case to accommodate field drilling. Refer to the wiring diagram in Figure 2 (page 4) and proceed. Withdraw screws H (Figure 3, page 4) and remove the cover hatch. This will allow access to the wiring connection terminal block. The terminal block is labeled H1, C1, L1, H2, C2, and L2. The letters H, C and L represent the normally open, common and normally closed sides, respectively, of the switches. Note that when temperature is below switch setpoint a circuit is made between L and C terminals. Make wiring connection according to Figure 2 (page 4) and replace the top cover hatch.

Figure 1 - Surface Mount Dimensions

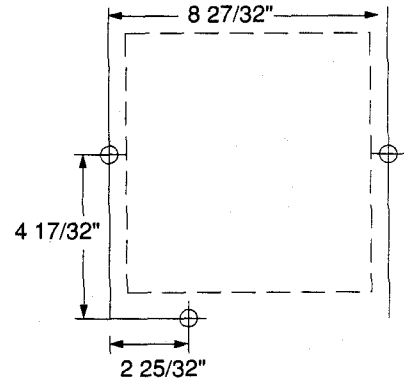
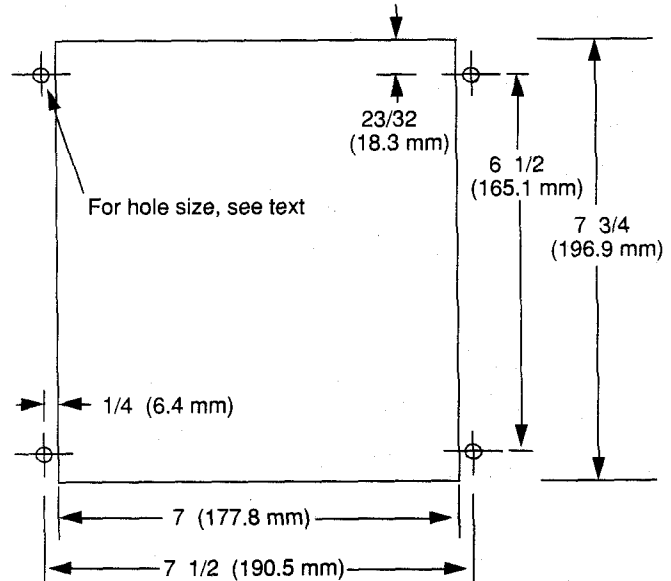


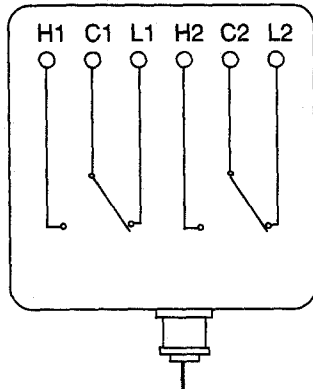
Figure 1A - Panel Cutout Illustration (in inches)



PLACING THE THERMAL SENSING ELEMENT

Locate the thermal sensing bulb in the most agitated part of the medium to be measured and completely immerse it. (When U and Y type bulbs are used, note separation coupling between bulb and capillary, be certain that the entire element is immersed in process). Do not bend capillary to less than 1/2 inch radius and never bend it too close to the element bulb or element head. Pencil type bulbs must never be bent as this will affect instrument accuracy. U and Y-type bulbs may be bent, but never to less than a two inch radius. Anchor the excess capillary securely to prevent vibration damage. If the bulb is to be subjected to corrosive or scouring conditions, it should be protected by a thermal well, separable socket or other protected material. These bulbs may be elevated up to 40 feet above the instrument without affecting calibration.

Figure 2 - Control Switch



STUFFING BOX INSTALLATION (IF APPLICABLE)

Overtightening of 21-T-105 stuffing boxes can damage the thermal element by restricting the capillary bore. To prevent damage, the stuffing box gland nut should be turned 1/2 to 3/4 of a revolution from a finger-tight position. This is equivalent to a torque of 130 to 180 inch-pounds for stainless steel.

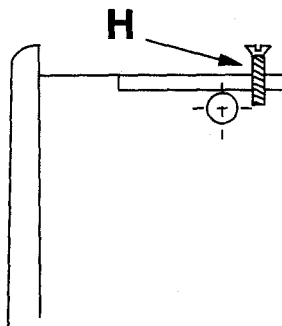
INSTRUMENT OPERATION

Prior to putting the instrument into service, check it against an accurate test thermometer. As with any precision instrument minor adjustments may be necessary after shipment and installation. If you are unfamiliar with how to perform this check refer to the CHECKING TEMPERATURE and RE-ZEROING section of this document.

Temperature setting of either switch is made by a two-position in-out knob located on the instrument cover. Two red set pointers permit each switch to be positioned independently at any two points on the temperature scale. Differential between settings can range from full scale to 1.5% of scale. Each setpoint, though independently adjustable, cannot be crossed over each other (ie, the left setpoint is always the lower temperature, the right setpoint is always the higher temperature).

Each switch is operated independently by the single black indicating pointer, which moves upscale and downscale in response to the expansion and contraction in the thermal element.

Figure 3 - Cover Hatch Removal



MAINTAINING YOUR LFB73-73

CHECKING TEMPERATURE

When checking and verifying your temperature be sure to use a test thermometer of known accuracy. Position the test thermometer sensing bulb or probe adjacent to the thermal sensing bulb from the LFB73-73. Position the red set pointers along the scale to the desired process settings. Wait for the temperature to stabilize, then compare the test thermometer reading with that of the LFB73-73. If the two readings do not agree, the LFB73-73 should be re-zeroed.

RE-ZEROING YOUR LFB73-73

Be sure that the process temperature is stable. Note the amount of temperature difference between the test thermometer reading and the black indicating pointer reading. Remove the instrument knob and cover. Note hex shaft J and set screws (Figure 4, page 5). Zeroing is accomplished by turning shaft J with the wrench provided. Lengthening shaft J (counterclockwise) raises the black indicating pointer reading; shortening shaft J (clockwise) lowers the reading.

Shut off the power to the instrument and turn set pointer (reinstall knob on setting shaft) to high end of scale; then turn shaft J accordingly and correct the reading of the black indicating pointer the same number of degrees as was found to be the error (difference) noted. Retighten screw S. Return set pointer to original setting and restore power to instrument. After temperature stabilization, black indicating pointer reading should agree with test thermometer reading. If necessary, repeat above procedure until properly zeroed. Replace cover and knob.

Note: Power shutdown described above prevents process temperature from building while adjustments are being made. If, however, the situation exists where power shutdown is not feasible, follow the same procedures but make shaft J adjustments as quickly as possible. In systems where temperature builds very rapidly, zeroing procedures may have to be repeated several times.

SWITCH REPLACEMENT

#73 Micro Switch (Pin Type) Replacement

Turn the power off to the instrument. Remove the cover and dial scale (see Exploded view on page 8). See page 7, figure 10 for more details. Remove the instrument scale (slide out at right side of control). Reinstall the setting knob and position the set pointers as needed for best access to the switch being replaced. Remove the two screws holding the switch in the switch arm. Take the switch out of the switch arm and remove the wires from the original switch and transfer them one at a time to the replacement switch. Re-install the new switch back into the holding arm and replace the mounting screws. Position the setpointers to the extreme left side of the instrument and reinstall the scale, cover and knob. Note the routing of the switch wires, be sure that they do not interfere with proper switch actuation. Be sure to check switch actuation and adjust screw A or E (see Figure 5) as needed for proper control switch actuation.

Note: Switch replacement may slightly alter the switch actuation point. After replacing either switch, switch settings should be checked and adjusted, if necessary (see Adjusting Switches).

SWITCH ADJUSTMENTS

Adjusting the right-hand switch (Switch 2) affects the actuation point of the left-hand switch (Switch 1). Always check the setting of the left switch after making adjustments to the right switch. When both switches are in need of adjustment, **always adjust the right switch first.**

When setting or adjusting switches, the indicating pointer must be moved up and down-scale several times to determine the proper switch actuation points. Using the process to move the indicating pointer is normally quite inconvenient and time consuming. It may be easier to move the indicating pointer manually with your finger. Adjusting switches should be accomplished with the power off, by listening for "clicking" of switch operation.

Right-Hand Switch (Switch 2)

The right-hand switch should actuate just as the black indicating pointer comes into alignment with the right set pointer. If actuation takes place before or after alignment is reached, correct by turning adjusting screw A. Switch actuation point is raised by turning screw A clockwise (facing screw) and lowered by turning screw A counterclockwise (see Figure 5).

Left-Hand Switch (Switch 1)

The left-hand switch should actuate when the black indicating pointer comes into alignment with left-hand set pointer. When the switch actuates below or above aligned position, it may be corrected by making adjustments to setting screw E. Turn screw E clockwise (facing screw head) to raise, and counterclockwise to lower switch actuation point (see Figure 5).

Figure 4 - Re-Zeroing

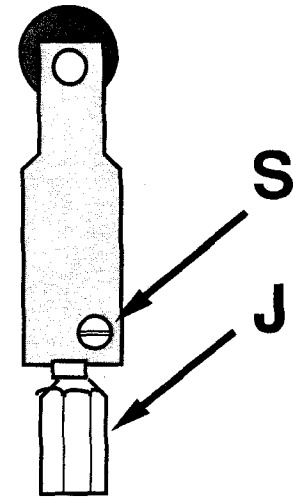
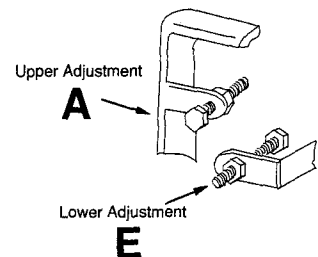


Figure 5 - Switch Adjustment



BRAKE TIGHTENING

With use, the setting shaft brake may require tightening. If the brake is too loose, over travel movement of the black indicating pointer will tend to drag the red set pointer upscale from its set position. To tighten the brake, turn the adjusting screw U (Figure 6) clockwise. Check screw U adjustment by positioning the red set pointer to a low scale setting; then, with thumb placed at the base of the black indicating pointer arm, simulate over-travel by moving the black pointer upscale through and beyond the red pointer setting and repeat several times. If the set pointer moves noticeably from its set position screw U is not tight enough. If over-tightened, the set pointer will stay in position, but the setting knob will be very difficult to turn. Brake adjustment screw U should be tightened so that the red pointer retains its set position when over-traveled by indicating pointer, and setting knob turns with relative ease.

Note: *There are two brake adjustments, one closest to the front of the instrument is the lower setpoint. The brake in the rear is for the higher setpoint.*

PISTON-PAK THERMAL SENSING ELEMENT IDENTIFICATION

An element designation number is stamped on the bottom of the element head. This is a coded description of the element specifications and should be used whenever a replacement element is ordered. The number appearing on the side of the element head (Figure 7) is the element age code, which may be required in establishing warranty.

ORDERING/SPECIFYING THE PISTON-PAK SENSING ELEMENT

The sensing element is ordered separately from the LFB73-73 and requires its own matrix number. To determine the correct sensing element configuration for your instruments and application see Partlow Form 3028 "Mechanical Instrumentation Products Cross Reference and Pricing Guide."

ELEMENT REPLACEMENT

To change a thermal sensing element start by removing screws D (Figure 8) and withdrawing the element from the instrument body. Then remove the element bulb from the medium. Install the new element and tighten screws D. Insert the new element bulb into the medium being measured. Note: After the element has been replaced check the temperature setting as re-zeroing may be necessary. If so see the CHECKING TEMPERATURE section.

Caution: *The inside mechanism(s), particularly the inside of the element housing, should never be oiled. However, if the instrument is subject to corrosion or gunking conditions, the mechanical linkage should be sprayed periodically with corrosion inhibiting CRC2-26, 3-36, or 5-56. Use only CRC2-26, 3-36, or 5-56 as other lubricants may cause build up and sticking of internal parts. CRC2-26 may be purchased from Partlow in a 15 oz. container (part #63600401). CRC5-56 may be purchased locally from any hardware or automotive store.*

Figure 6 - Brake Tightening

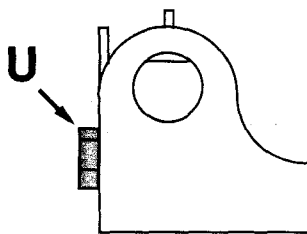


Figure 7 - Sensing Element ID

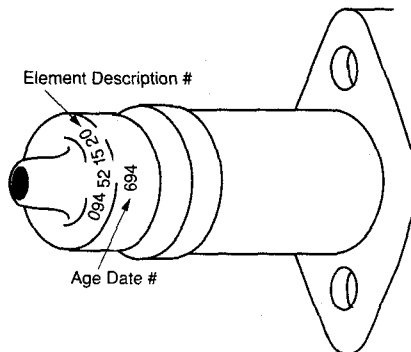
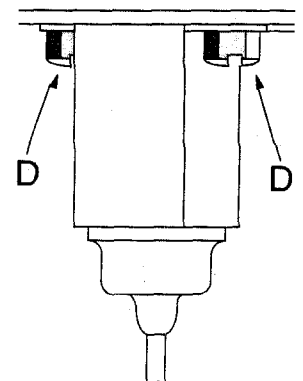


Figure 8 - Replacing Element



DIMENSIONAL DRAWING

Figure 9 - Dimensional Drawing

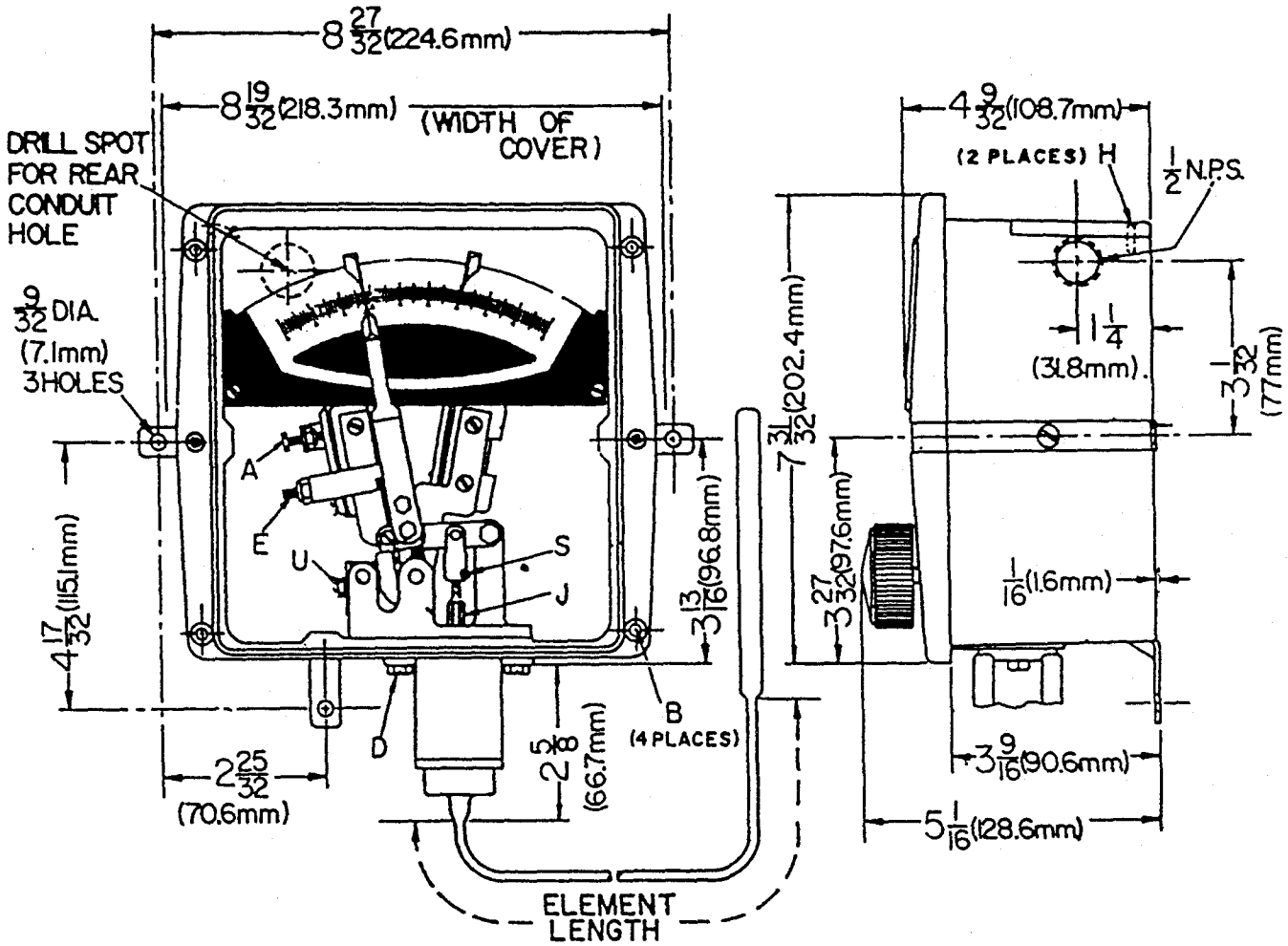
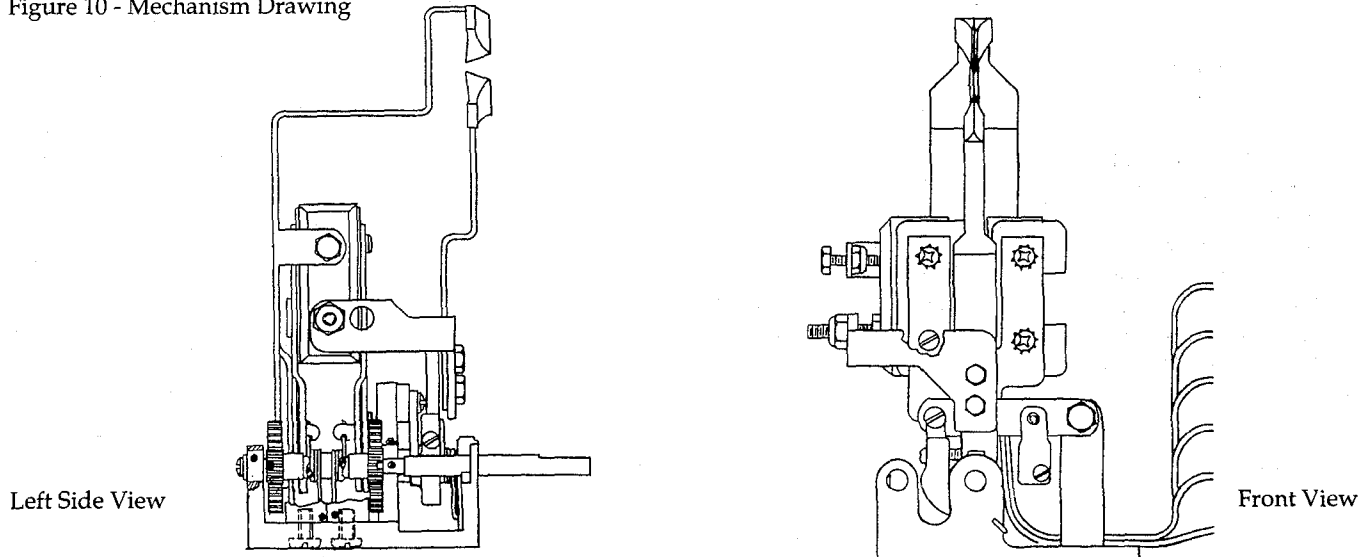


Figure 10 - Mechanism Drawing



Exploded Illustration and Parts List

1. Mechanism Assembly **10072013**
Includes: Switches #73 and #73, Wiring & Terminal Block With Mounting Screws, Push Rod.

2. Main Lever Assembly **64412001**
Includes: Main Lever with Push Rod Cap, Push Rod, Set Screw.

3. Micro Switches **64403018**
3B - #73 Micro Switch (std)
Includes terminal screws

Note: #73 replaces #7 switch.

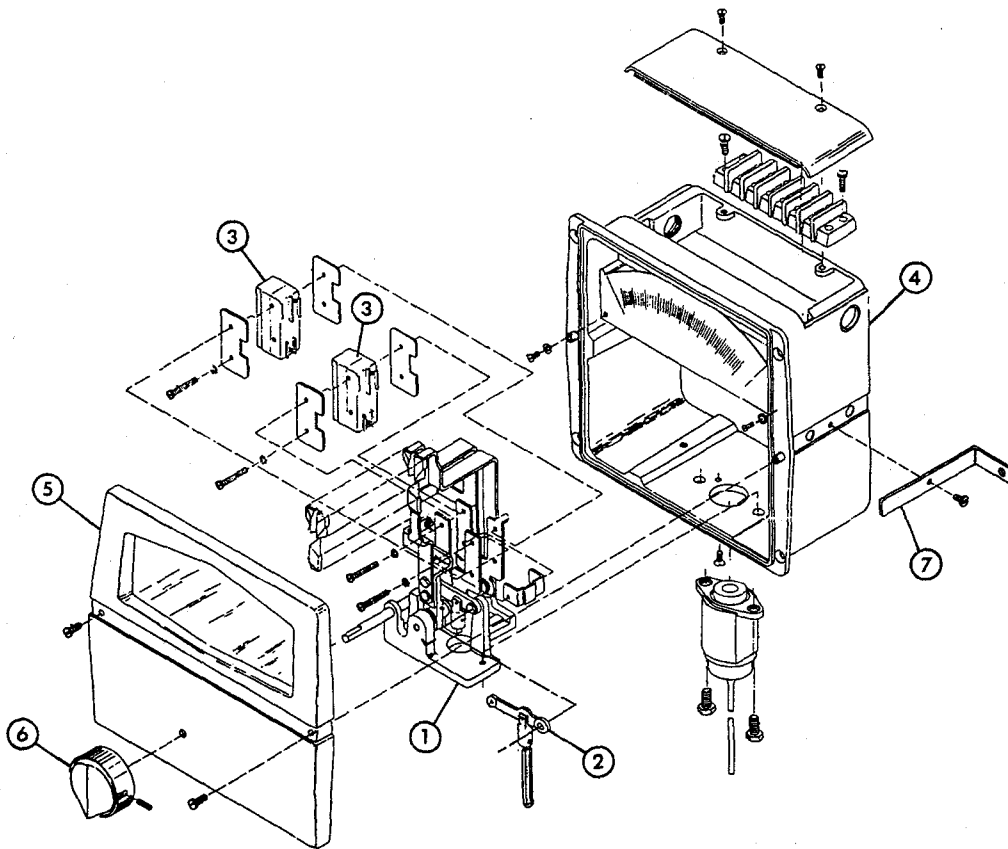
4. Case Assembly **64412101**
Includes: Top Plate With Screws, Terminal Block Barrier, Mounting Brackets With Screws

5. Cover Assembly **64412201**
Cover, Glass & Cover Screws

6. Knob Assembly **10041301**
Knob With Set Screw

7. Mounting Brackets (3 required) **64402003**
Brackets As Illustrated, sold separately

8. Standard Hardware Kit (not shown) **64412701**
Includes: Cover Screws, Switch Screws, Dial Screws, Terminal Block Mounting Screws, Mechanism Holding Screws, Mounting Bracket Screws, Push Rod Set Screw, Top Plate Screw, Ground Screw



Warranty

These products are sold by The Partlow Corporation ("Partlow") under the warranties set forth in the following paragraph. Such warranties are extended only with respect to a purchase of these products, as new merchandise, directly from Partlow or from a Partlow distributor, representative or reseller, and are extended only to the first buyer thereof who purchases them other than for the purpose of resale.

These products are warranted to be free from functional defects in materials and workmanship at the time the products leave the Partlow factory, and to conform at that same time to the specifications set forth in the relevant Partlow instrumentation sheet, sheets, manual or manuals for such products.

Partlow's sole and exclusive obligation and buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing, at Partlow's option free of charge, the products which are reported in writing to Partlow at its main office - The Partlow Corporation, 2 Campion Road, New Hartford, New York 13413 or FAX MAIL 1-315-797-0403 and which if so advised by Partlow, are returned with a statement of the observed deficiency to the designated facility during normal business hours, transportation charges prepaid and which upon examination by Partlow are found not to comply with the above warranties. PARTLOW SHALL NOT BE LIABLE FOR ANY INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES, SPECIAL DAMAGES, OR ANY OTHER DAMAGES, COSTS OR EXPENSES, EXCEPTING ONLY THE COST OR EXPENSE OF REPAIR OR REPLACEMENT AS ABOVE DESCRIBED.

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