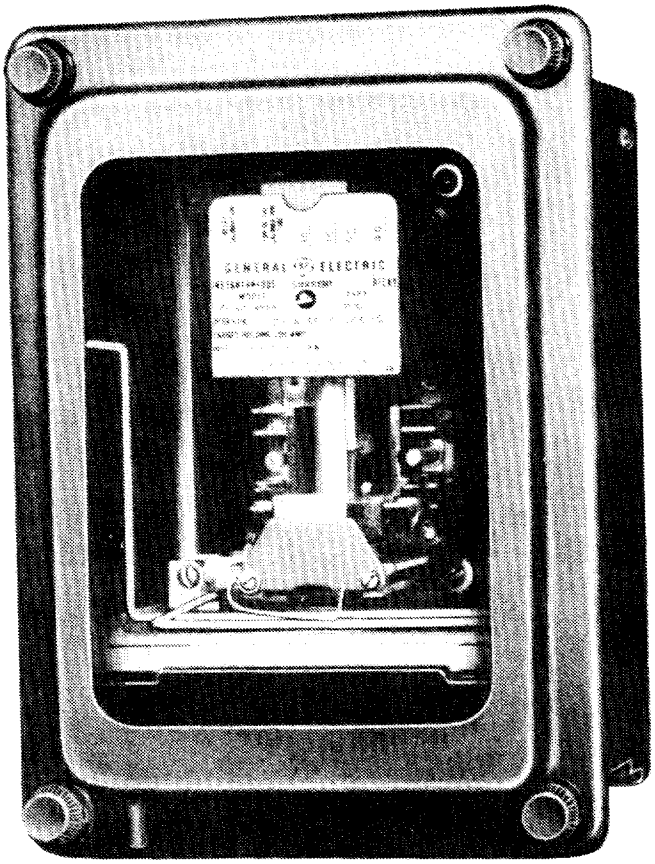
INSTRUCTIONS

INSTANTANEOUS OVERCURRENT RELAYS

Types

PJC11M
PJC11X
PJC11Z
PJC11AT
PJC11AV
PJC11AW
PJC12D
PJC12E
PJC12N
PJC12R
PJC12U
PJC13E
PJC13H
PJC13J
PJC14C
PJC14E



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INSTANTANEOUS OVERCURRENT RELAYS
TYPE PJC

APPLICATION

The Type PJC plunger relays are designed for general service. These relays are non-directional and instantaneous when in operation.

Type PJC relays are normally used for overcurrent protection of feeder circuits; they can also be used for various current control functions. When these relays are used in conjunction with thermal or time-overcurrent relays, they can be used to protect a motor against very high currents, since they will operate before the main relays respond. The AC relays are applicable where continuous operation in the pickup position is not required.

CHARACTERISTICS

Characteristic time-current curves are shown in Figure 1.

The pickup of current relays without taps (1.5, 3, 6, 12 amperes) is adjustable from 1/3 to 1-1/3 of the continuous rating up to and including the 12 ampere rating. The calibration ranges of the tapped coil (5, 10 amperes) and higher current untapped coil (25 amperes) relays are listed in Table II under **BURDENS.**

The contacts reset at approximately 90 to 95% of the pickup on AC circuits when using the contact arrangement of one normally-open contact and one normally-closed contact. For DC circuits, the dropout is 60 to 90% of the pickup current. These values are not adjustable; however, a slight change could be made by varying the contact pressures (refer to ADJUSTMENTS in the **INSTALLATION section**).

RATINGS

CONTACTS

The carrying rating of the contacts is 5 amperes continuously or 30 amperes for tripping. The interrupting ratings of the contacts are shown in Table I.

TABLE I

	DC				AC		
Volts	24	48	125	250	115	230	460
Amps	5	2	1	0.3	5	2	1

COILS

The ratings of the standard coils are listed listed below. These coils are suitable for DC and frequencies from 25 to 60 cycles.

Tapped:	5 and 10 amperes
Untapped:	1.5, 3, 6, 12 and 25 amperes

BURDENS

OPERATING COILS

TABLE II

Rated Amps.	Calibration Range	VA at 5 amps 60 Cycles	W at 5 amps 60 Cycles	W at 5 amps DC
1.5	0.5- 2	165	55	24
3	1 - 4	41	12.7	6
5	2 - 50	9.6	5.3	1.98
6	2 - 8	11.5	3.56	1.6
10	4 -100	2.65	0.8	0.43
12	4 - 16	2.65	0.8	0.43
25	10 - 40	0.4	0.125	0.08
25	20 - 80	0.1	0.03	0.056
25	40 -160	0.025	0.008	0.025

VA and W in the dropout position, with pickup current applied on the minimum pickup setting at 60 cycles, are approximately 1.7 and 0.6, respectively.

AUXILIARY COILS

The resistance of the 0.2 ampere and 1 ampere coils are 6.1 and 0.24 ohms, respectively.

RECEIVING, HANDLING AND STORAGE

These relays, when not included as part of a control panel, will be shipped in cartons designed to protect them against damage. Immediately upon receipt of a relay, examine it for any damage sustained in transit. If injury or damage resulting from rough handling is evident, file a damage claim at once with the transportation company and promptly notify the nearest General Electric Sales Office.

Reasonable care should be exercised in unpacking the relay in order that none of the parts are injured or the adjustments disturbed.

If the relays are not to be installed immediately, they should be stored in their original cartons in a place that is free from moisture, dust and metallic chips. Foreign matter collected on the outside of the case may find its way inside when the cover is removed, and cause trouble in the operation of the relay.

CONSTRUCTION

The Type PJC relays consist of one or more units mounted in a metal case. The units are of the plunger type and have an adjustable pickup current range. The moving contacts are fastened to a TEXTOLITE [R] contact barrier that is molded to the plunger rod. The armature assembly is positioned by a calibrating tube that is assembled to a magnet frame. These parts, together with a coil, pole piece, stationary contacts and a target, are assembled on a molded TEXTOLITE [R] base. In some units, there is an additional coil mounted on the magnet frame, which is part of a hinged-armature element. This coil performs an electrical holding function, keeping the plunger-rod assembly and the target in the operated (picked up) position until the holding coil is de-energized.

The types of relays summarized in Table III have any of a combination of the following features: one or more relay units; two or four contacts; with or without a mechanical or electrical target, and electrical holding; self or hand reset of contacts and coils; with or without taps.

TABLE III

Type	No. of Relay Units	Contacts Each Unit No.	Contacts Each Unit Code	Target M Mech E Elec. 0 None	Reset H Hand S Self	Coil Taps	Holding Coil	Size of Case	Outline & Panel Drilling Figs.	Int. Conn. Figs.
PJC11M	1	2	all	M	S	X	-	S1	13	2
PJC11X	3	2	all	M	S	X	-	M2	16	4
PJC11Z	3	2	all	M	S	-	-	M2	16	5
PJC11AT	3	2	11	M-0	S	-	-	M2	16	12
PJC11AV	1	2	all	M-0	S	-	-	S1	13	3
PJC11AW	2	2	all	M-0	S	-	-	S2	14	6
PJC12D	1	2	all	M	H	-	-	S1	13	3
PJC12E	1	2	all	M	H	X	-	S1	13	2
PJC12N	2	2	all	M	H	-	-	S2	14	6
PJC12R	3	2	all	M	H	-	-	M2	16	5
PJC12U	2	2	all	M	*S - H	-	-	S2	14	6
PJC13E	3	2	all	E	S	-	X	M1	15	7
PJC13H	2	2	all	E	S	-	X	S2	14	8
PJC13J	1	2	all	E	S	-	X	S1	13	9
PJC14C	1	4	all	M	S	-	-	S1	13	11
PJC14E	1	4	all	E	S	-	X	S2	14	10

* Left unit, self reset; Right unit, hand reset.

The Types PJC12D, 12E, 12N, 12R, and 12U have a hand contact reset feature. When the relay operates, a latch drops into place to hold the plunger up. When the relay is in the latched-up position, the normally-closed contacts will be open, but the normally-open contacts may, or may not, be closed. The relay is reset by pushing the reset button.

All targets are provided with external reset buttons, which also reset the contacts of hand-reset types of relays.

CASE

The case is suitable for either surface or semi-flush panel mounting, and an assortment of hardware is provided for either mounting. The cover attaches to the case and also carries the reset mechanism when one is required. Each cover screw has provision for a sealing wire.

The case has studs or screw connections at both ends, or at the bottom only, for the external connections. The electrical connections between the relay units and the case studs are made through spring-backed contact fingers mounted in stationary molded inner and outer blocks, between which nests a removable connecting plug that completes the circuits. The outer blocks, attached to the case, have the studs for the external connections, and the inner blocks have the terminals for the internal connections.

The relay mechanism is mounted in a steel framework called the cradle, and is a complete unit, with all leads being terminated at the inner block. This cradle is held firmly in the case by a latch at the top and the bottom and by a guide pin at the back of the case. The cases and cradles are so constructed that the relay cannot be inserted in the case upside down. The connecting plug, besides making the electrical connections between the respective blocks of the cradle and case, also locks the lower latch in place. The cover, which is fastened to the case by thumbscrews, holds the connecting plug in place.

To draw out the relay unit, the cover is first removed, then the plug drawn out; (Shorting bars are provided in the case to short the current transformer circuits.) the latches are then released, and relay unit can be easily drawn out. To replace the relay unit, the reverse order is followed.

A separate testing plug can be inserted in place of the connecting plug to test the relay in place on the panel, either from its own source of current and voltage, or from other sources. Or, the relay unit can be drawn out and replaced by another that has been tested in the laboratory.

INSTALLATION

LOCATION

The location should be clean and dry, free from dust and excessive vibration, and well lighted to facilitate inspection and testing.

MOUNTING

The relay should be mounted on a vertical surface. The outline and panel drilling diagrams for each model are referred to in Table III.

One of the mounting studs or screws should be permanently grounded by a conductor not less than #12 B&S gage copper wire or its equivalent.

CONNECTIONS

The internal connection diagrams for the various relays are referred to in Table III.

All relays, except those having three units, are provided with shorting bars on the individual contacts and operating coils. The shorting bars on the coils are required to prevent opening the secondary of the current transformer when the connection plug is withdrawn. The shorting bars on the contacts are arranged to be optional, and an internal connection lead is provided to make the extra connection. For example, Figure 2 for the Type PJC11M relay shows that one end of the connection lead on terminal 3 can be connected to terminal 1 (see dotted line). Then, if terminals 2 and 3 are used, the contacts will be shorted out when the plug is removed. When terminals 1 and 2 are used, the connection between terminals 1 and 3 should be removed.

ADJUSTMENTS

The relays have been adjusted at the factory; however, before they are put into operation, it is advisable to check each relay to be sure that the adjustments have not been disturbed. If they have, the following points should be observed in restoring them.

CONTACTS

The normal adjustment of contacts will give 3/64 inch wipe. This may be adjusted by bending the contact stops that are located between the stationary contact springs and the ribs on the molded base. The bend should be made about 1/4 inch from the front tip of the stop. A change in wipe on the normally-closed contacts affects the pickup for a given armature setting in the de-energized position. A decrease in wipe will increase the pickup, and an increase in wipe will decrease the pickup value. **The normal wipe should not be exceeded**, since this produces excessive creeping of the armature below the pickup value of the relay. Another undesirable effect is reduction of contact gap.

The contact pressure at the maximum pickup or dropout positions may be adjusted by bending the stationary-contact springs, near the part attached to the base. This adjustment may change the contact gap and contact wipe slightly. Adjustment of the contact stops within the normal range does not affect the contact pressure at the maximum pickup or dropout positions, because the contact springs are separated from the stops in these positions.

When there is one normally-open and one normally-closed contact, the initial tension should be adjusted for 15 grams, measured at the contact tip. If there are two normally-open or two normally-closed contacts, the initial tension must be reduced to 5 grams.

AUXILIARY HOLDING UNIT

The holding unit is normally adjusted to keep the plunger in the operated (picked up) position after the main coil has been de-energized. If adjustment is required, the pole piece should be set, while in the operated position, so that there us approximately 1/32 inch of gap between its end and the surface of the armature. The

slotted end of the pole piece is accessible through a hole in the top of the magnet frame. The locknut provided should be tightened after the proper setting has been obtained. The holding unit should operate at 80% of its nameplate rating. If a target is provided, it should operate and be in full view when the holding coil is energized.

OPERATION

In these types of relay, the moving contacts are operated directly by the plunger assembly. For models provided with an electrical target, the target has no mechanical relation with the plunger assembly; instead, it is lifted by the armature of the auxiliary element. All targets rise, when lifted, whether mechanical or electrical, from behind the target shield to a position where the target face is visible. The target is latched up in the exposed position until reset by hand.

The electrical holding of a target is provided by an auxiliary armature holding up the plunger assembly when the auxiliary coil is energized. This auxiliary coil is not intended to lift the plunger from the de-energized position.

Hand-reset contact action is made possible by passing the target wires through the two pins located at the bottom of the plunger rod. When the plunger armature is attracted upward, the target is lifted and is held by the target latch. The top target pin prevents the plunger rod from dropping until the latch is disturbed by the manual movement of the reset button on the relay cover.

SETTING

Any desired setting, within the calibrating ranges, may be obtained by turning the armature on the plunger rod. The armature is provided with an internal locking spring which requires no adjustments.

For relays with tapped coils, the pickup depends on the tap connection as well as the armature setting. The pickup values for all Type PJC relays are given on the nameplate. This is the value at which the relay will just pick up and close its "a" contacts if the armature is adjusted to the calibrating mark in the de-energized position.

PERIODIC CHECKS AND ROUTINE MAINTENANCE

In view of the vital role of protective relays in the operation of a power system, it is important that a periodic test program be followed. The interval between periodic checks will vary depending upon environment, type of relay and the user's experience with periodic testing. Until the user has accumulated enough experience to select the test interval best suited to his individual requirements, it is suggested that the points listed under ADJUSTMENTS in the **INSTALLATION** section be checked at least once every six months.

CONTACT CLEANING

For cleaning fine silver contacts, a flexible burnishing tool should be used. This consists of a flexible strip of metal with an etched-roughened surface, resembling in effect a superfine file. The polishing action is so delicate that no scratches are left, yet corroded material will be removed rapidly and thoroughly. The flexibility of the tool ensures the cleaning of the actual points of contact.

Fine silver contacts should not be cleaned with knives, files, or abrasive paper or cloth. Knives or files may leave scratches which increase arcing and deterioration of the contacts. Abrasive paper or cloth may leave minute particles of insulating abrasive material in the contacts and thus prevent closing.

The burnishing tool described above can be obtained from the factory.

RENEWAL PARTS

Sufficient quantities of renewal parts should be kept in stock for the prompt replacement of any that are worn, broken or damaged.

When ordering renewal parts, address the nearest Sales Office of the General Electric Company. Specify the name of the part wanted, quantity required, and complete nameplate data, including the serial number, of the relay.

Since the last edition, changes have been made in Figures 3 and 14.

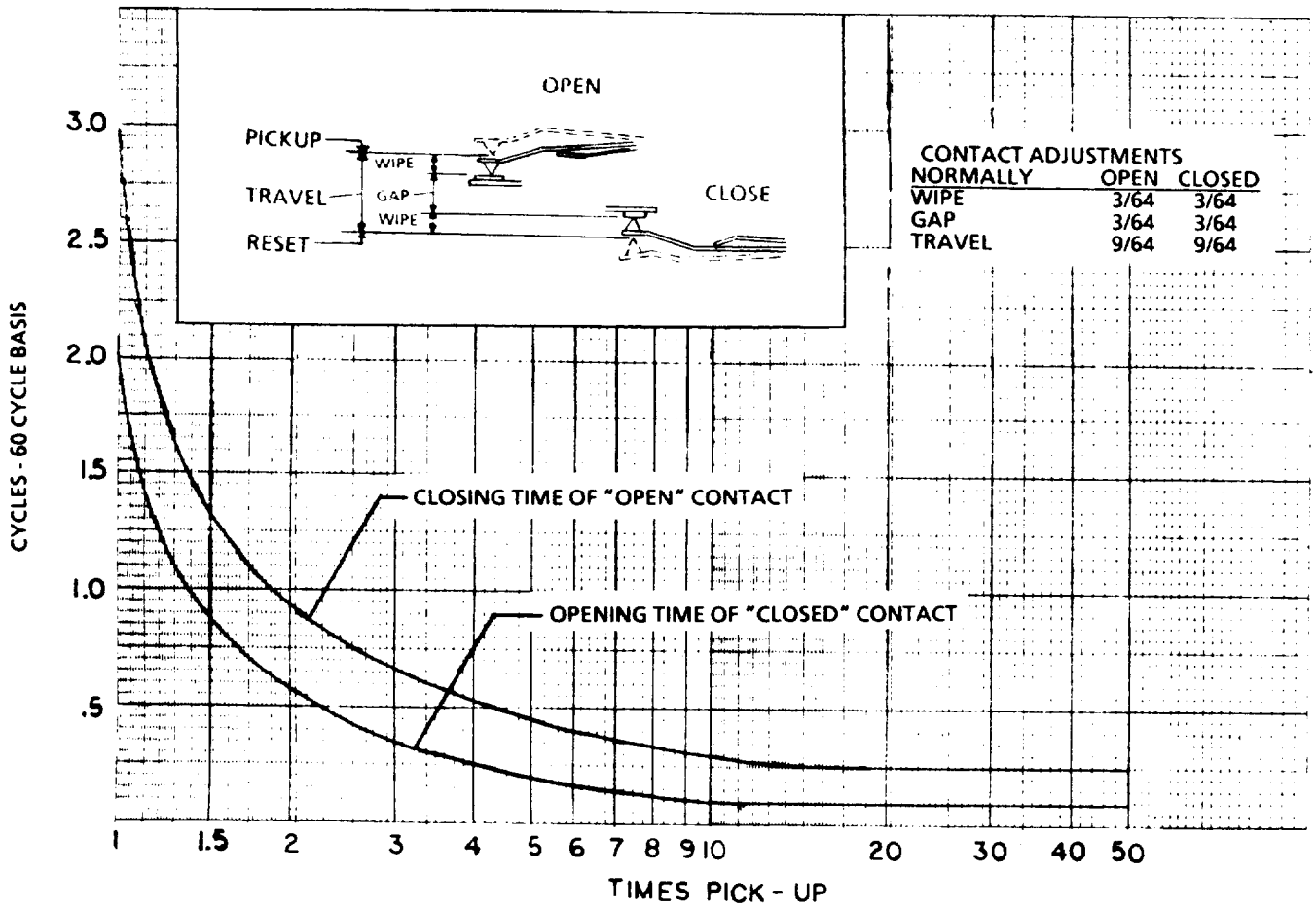

Figure 1 (0418A0711-1) Typical Time-Current Curves for the Contacts of Type PJC Relays

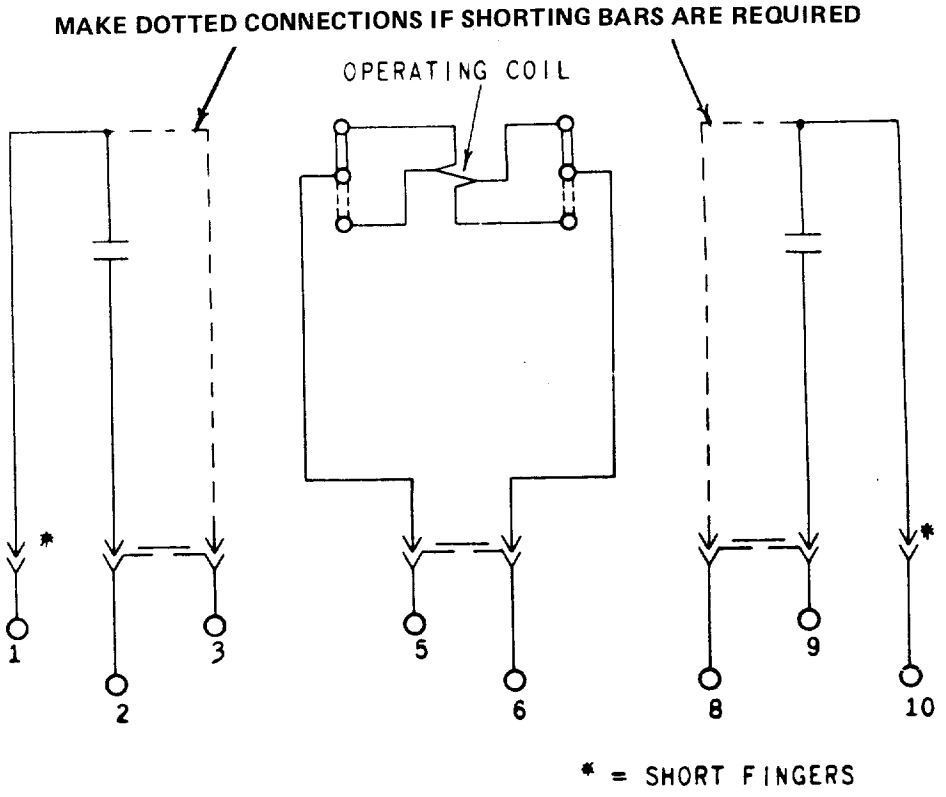

Figure 2 (K-6209009-3) Internal Connections
for Type PJC11M and PJC12E Relays (Front View)

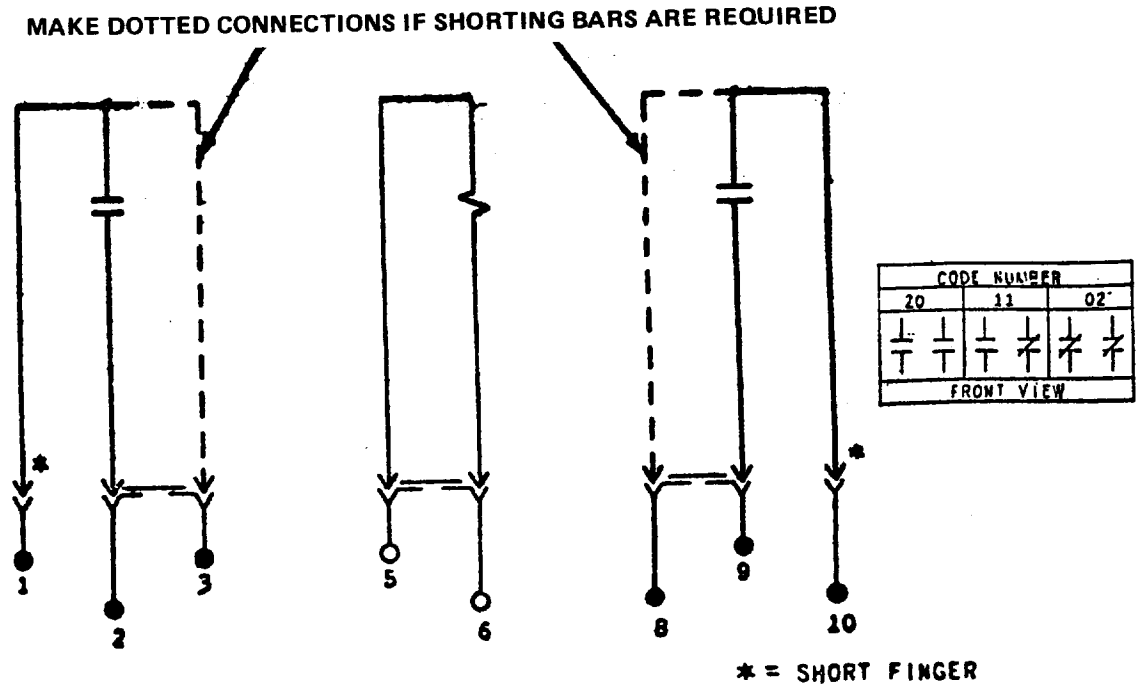

Figure 3 (K-6375600-4) Internal Connections
for Type PJC11AV and PJC12D Relays (Front View)

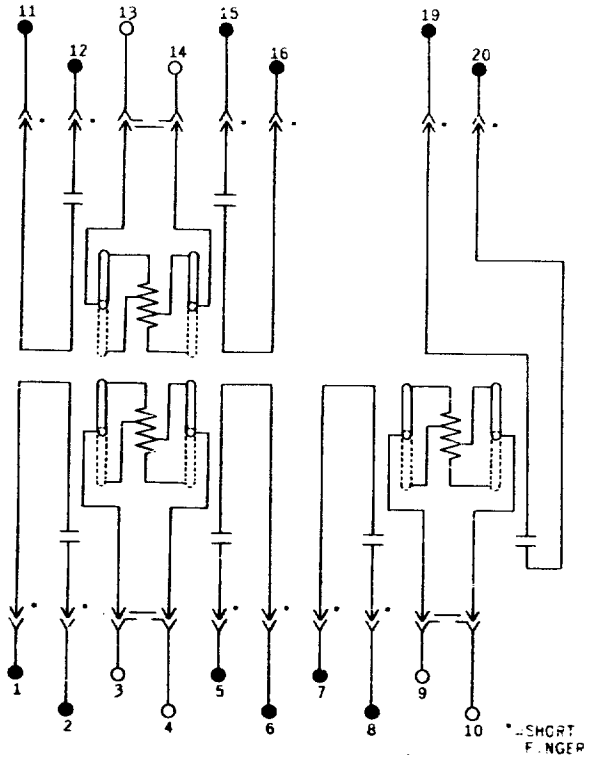

Figure 4 (K-6400236-1) Internal Connections for Type PJC11X Relay (Front View)

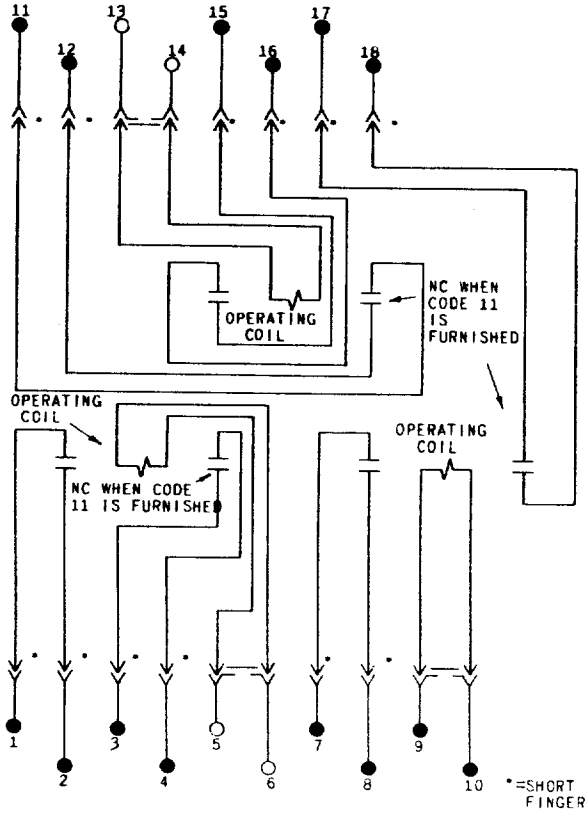

Figure 5 (K-6400331-3) Internal Connections for Type PJC11Z and PJC12R Relays (Front View)

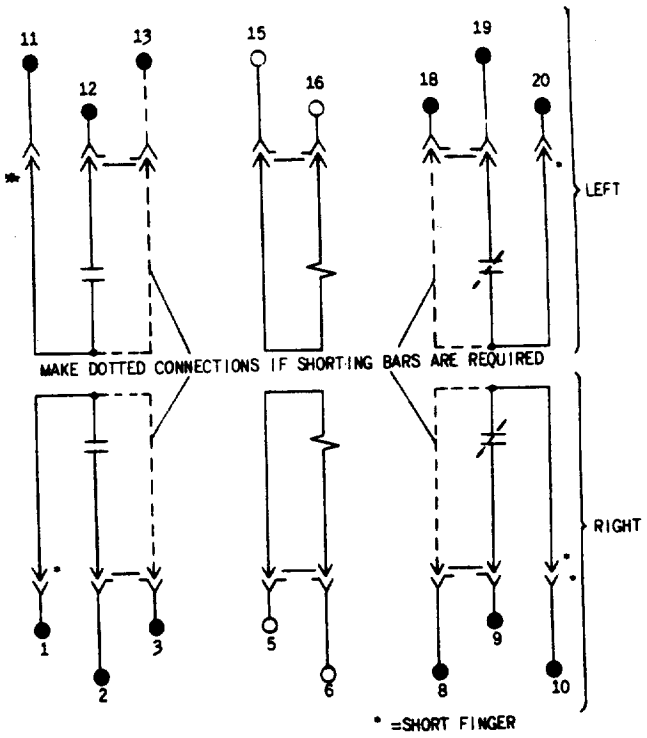

Figure 6 (K-6375604-8) Internal Connections for Type PJC11AW, PJC12N and PJC12U Relays (Front View)

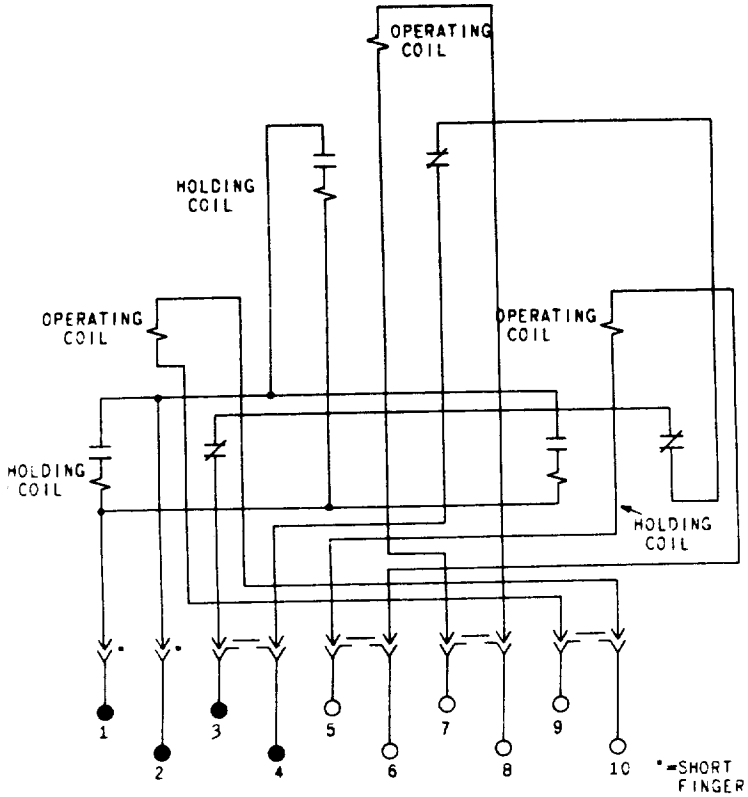

Figure 7 (K-6154906-2) Internal Connections for Type PJC13E Relay (Front View)

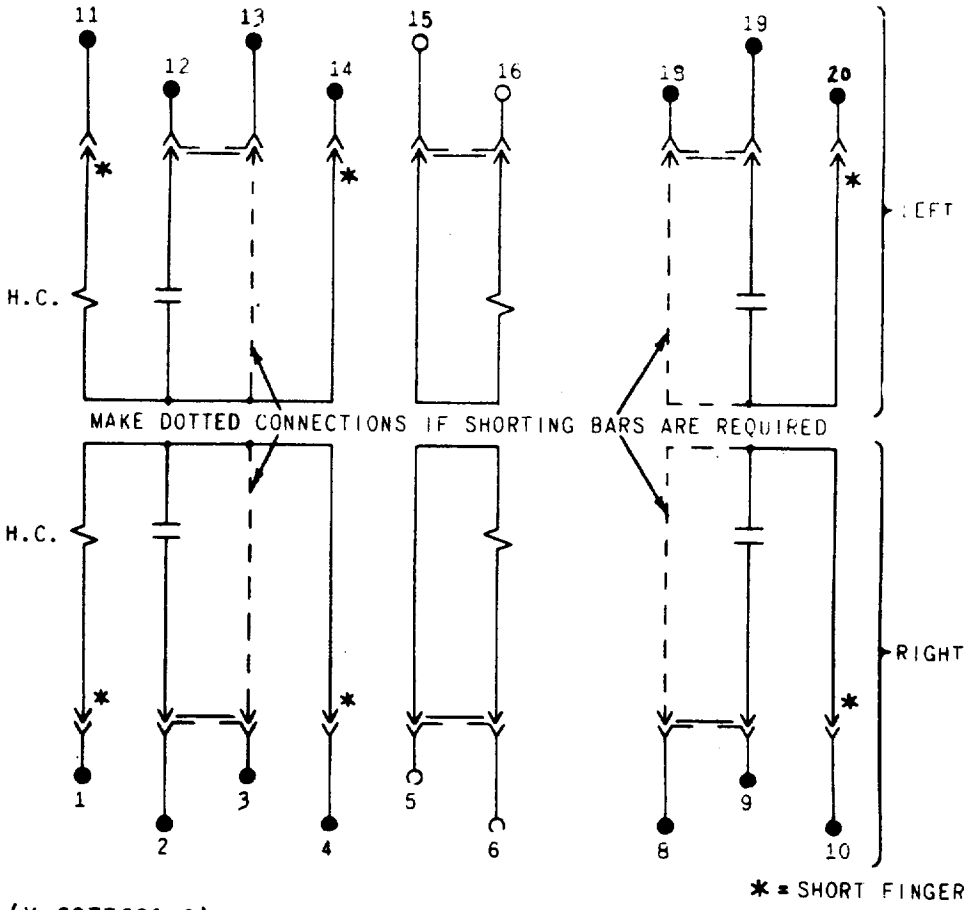

Figure 8 (K-6375601-3) Internal Connections for Type PJC13H Relay (Front View)

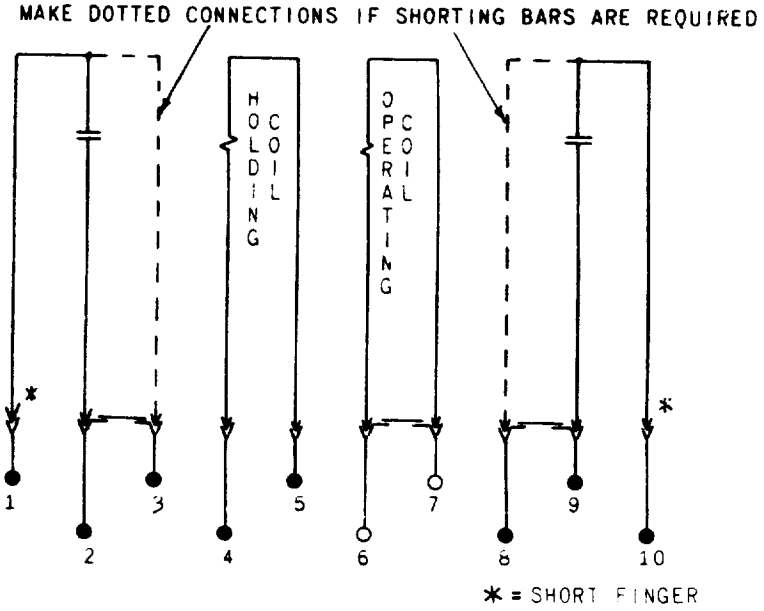

Figure 9 (K-6375829-2) Internal Connections for Type PJC13J Relay (Front View)

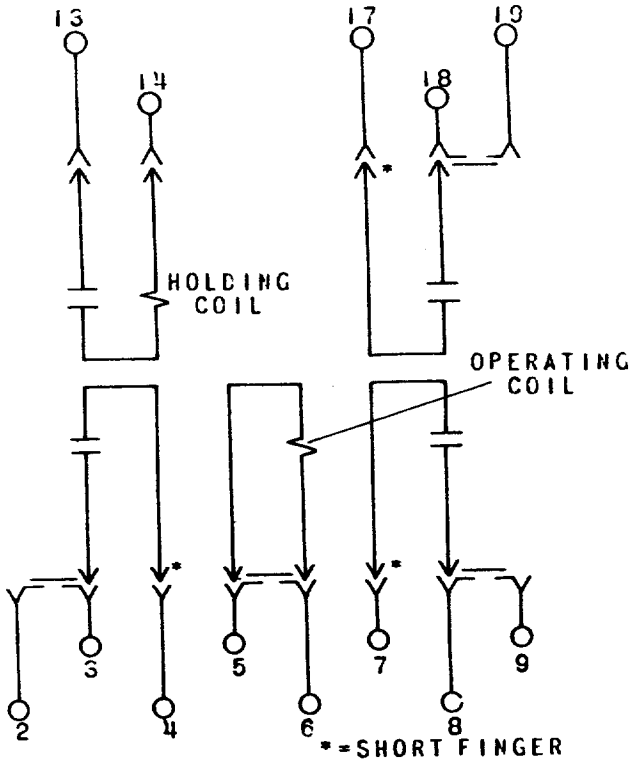

Figure 10 (K-6556533-1) Internal Connections for Type PJC14E Relay (Front View)

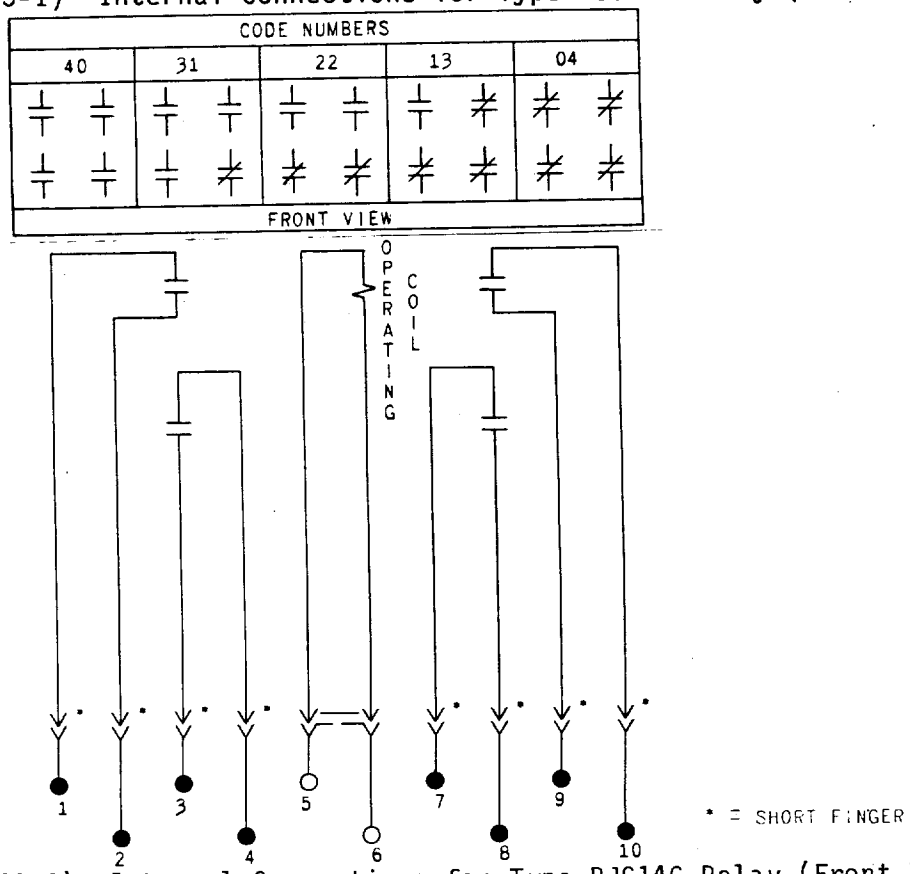

Figure 11 (K-6400542-2) Internal Connections for Type PJC14C Relay (Front View)

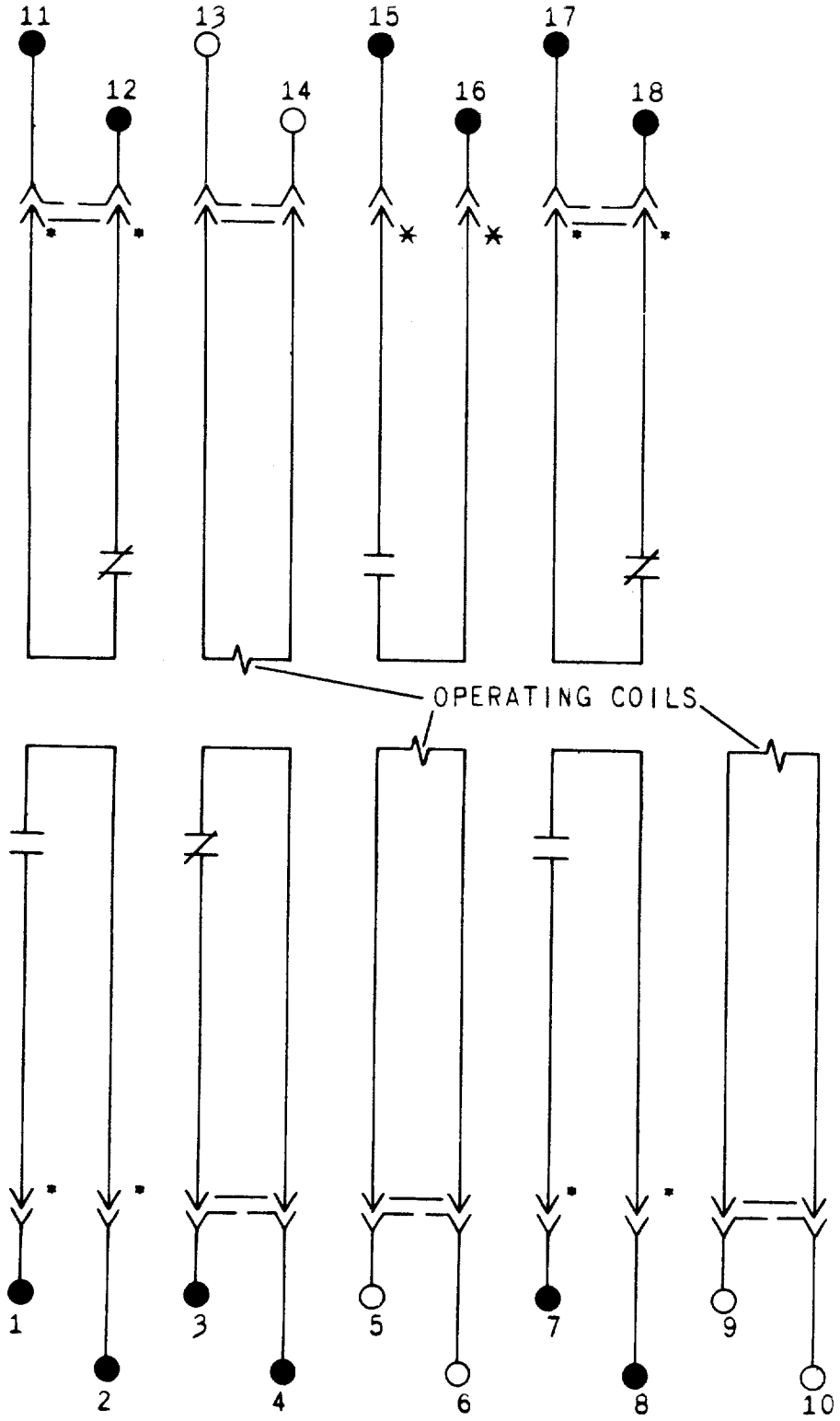

Figure 12 (K-6305854-2) Internal Connections for Type PJC11AT Relay

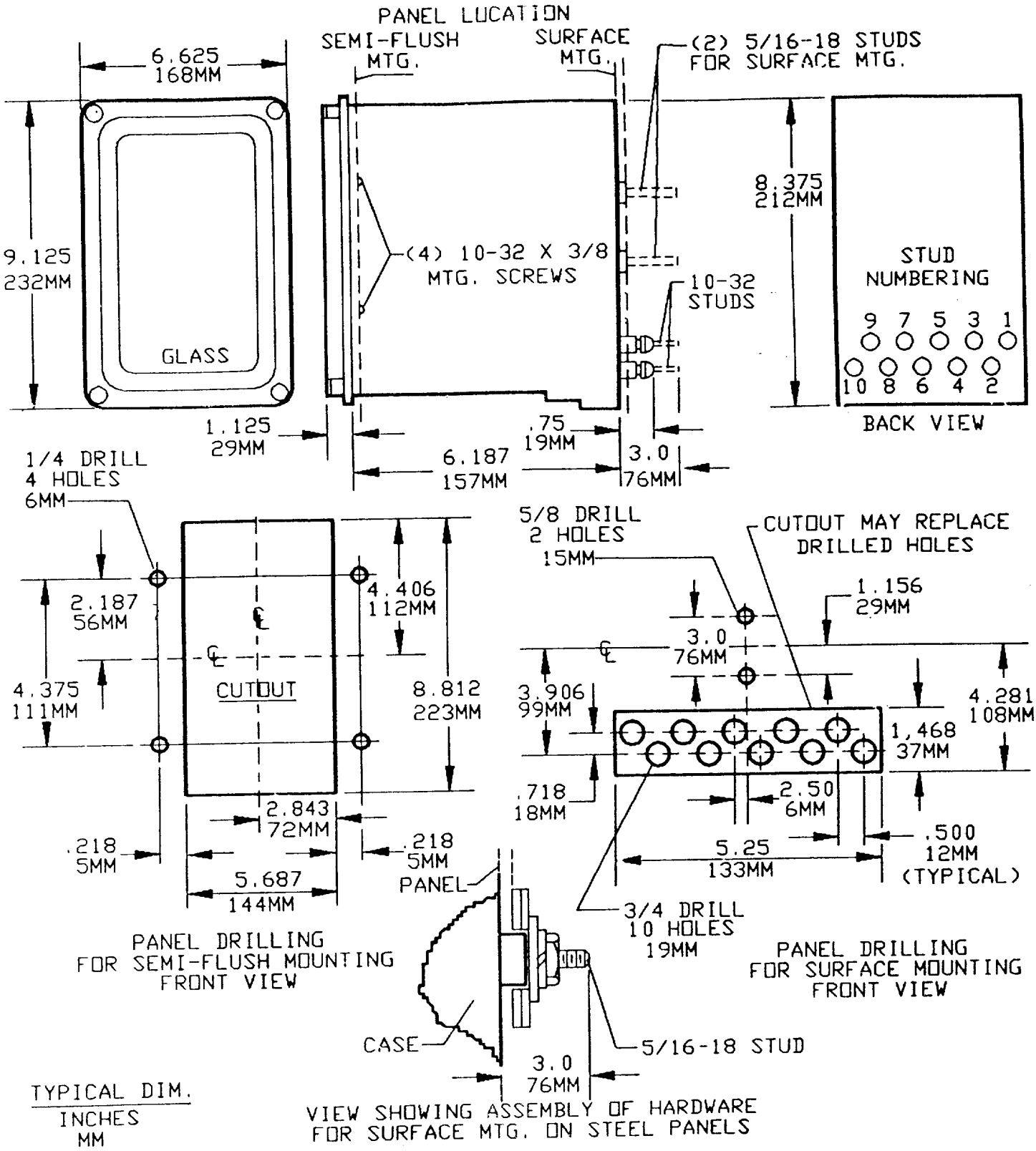

Figure 13 (K-6209271-8) Outline and Panel Drilling Dimensions for Size S1 Case

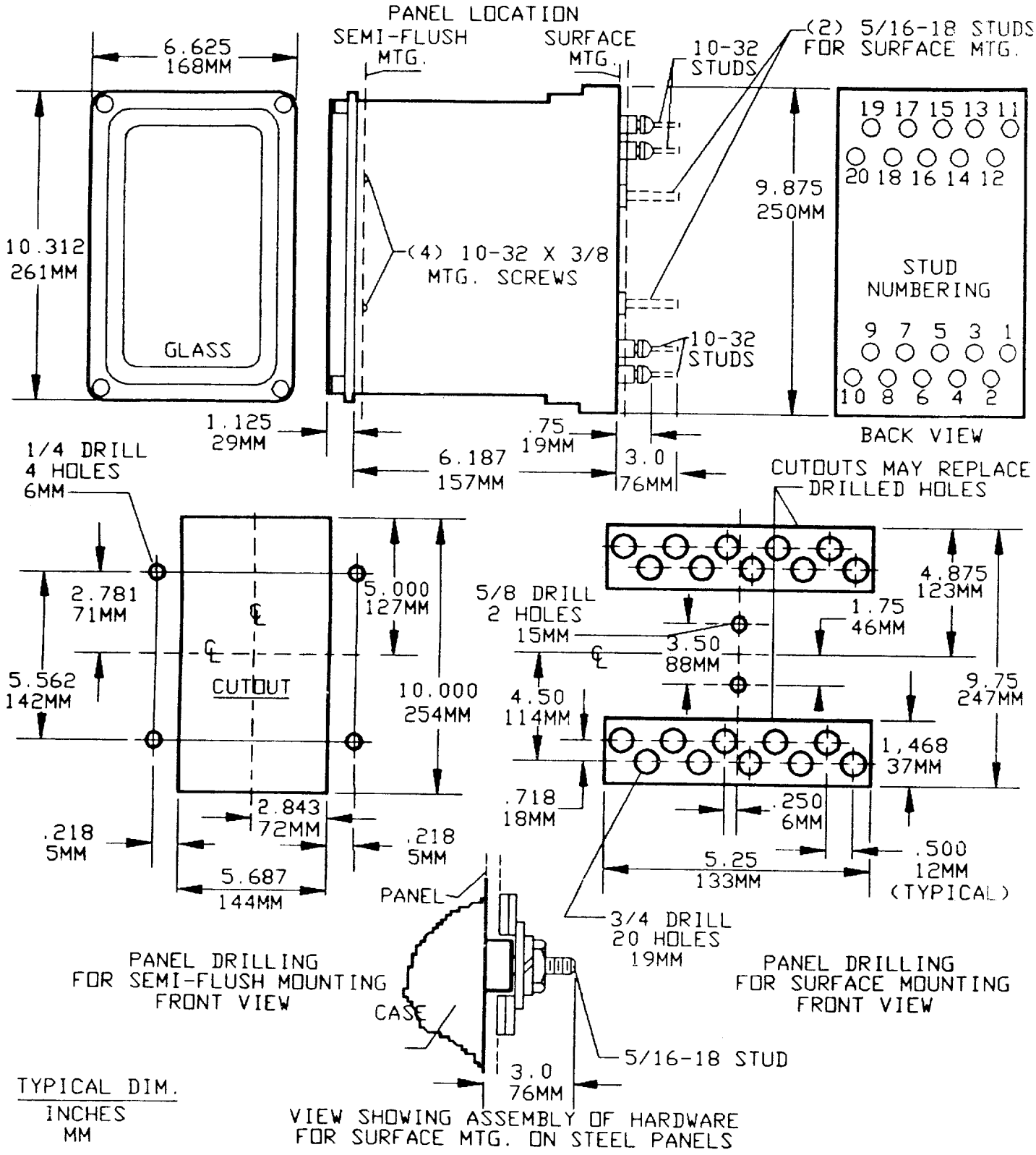

Figure 14 (K-6209272[7]) Outline and Panel Drilling Dimensions for Size S2 Case

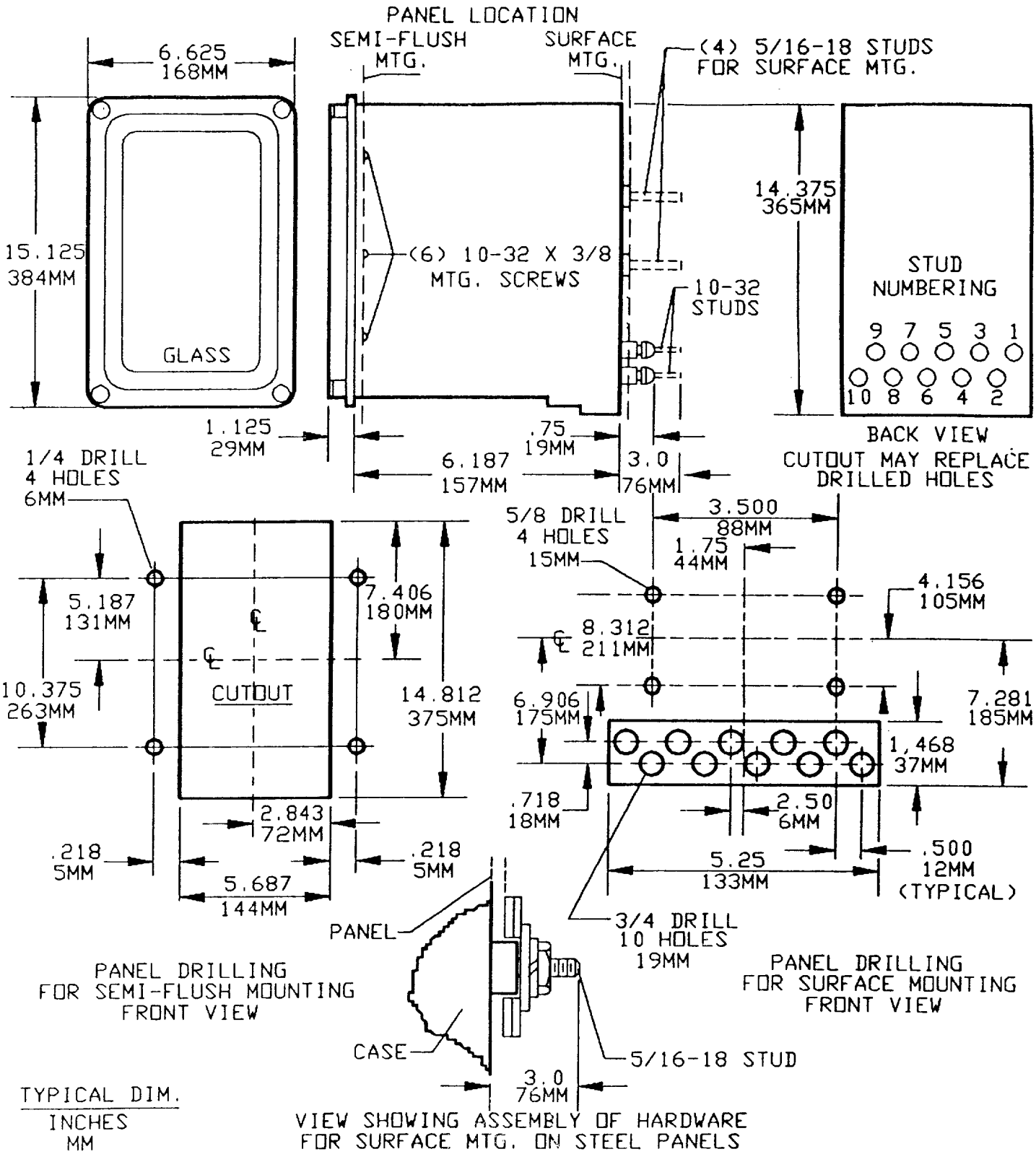

Figure 15 (K-6209273-5) Outline and Panel Drilling Dimensions for Size M1 Case

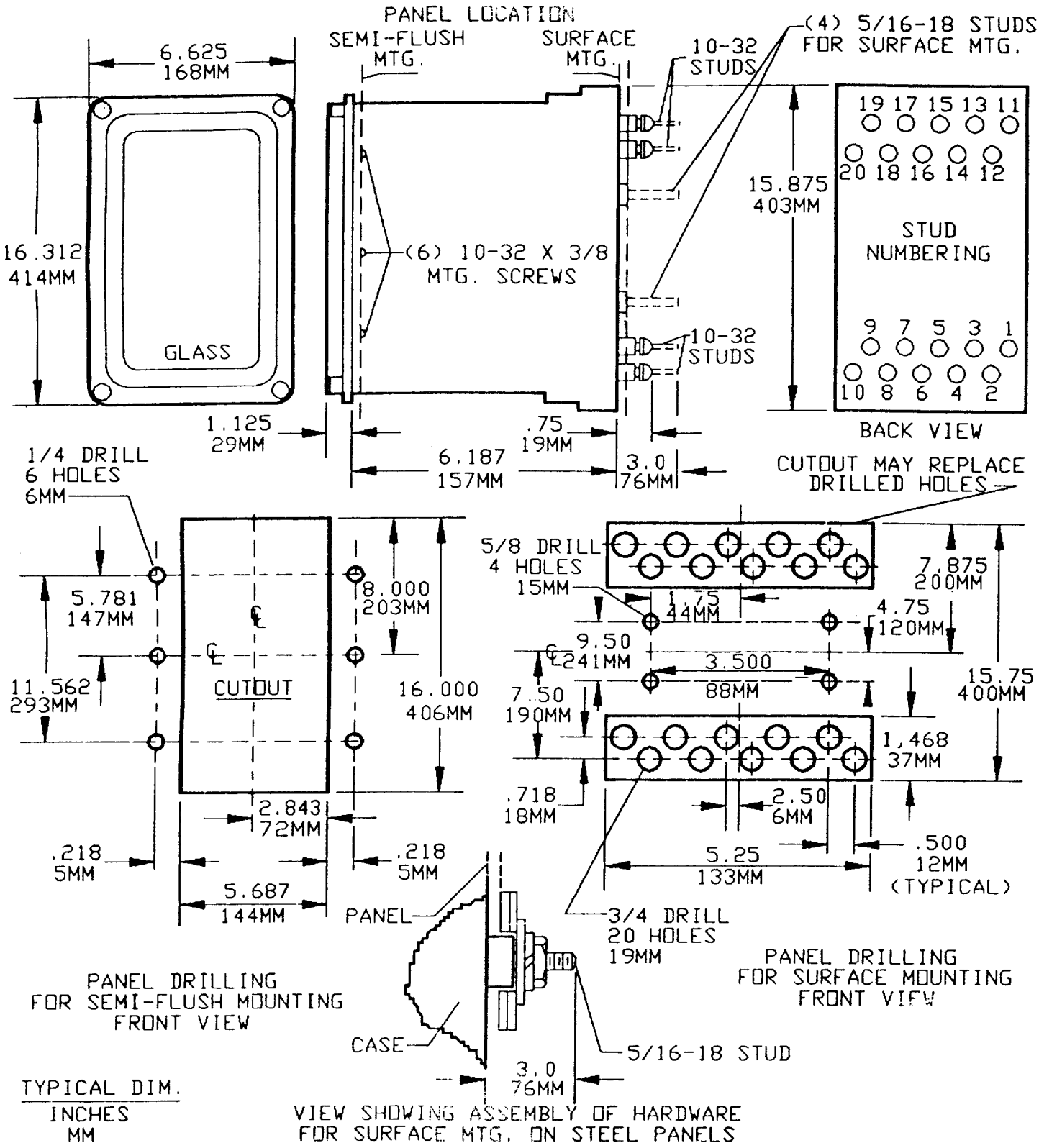

Figure 16 (K-6209274-6) Outline and Panel Drilling Dimensions for Size M2 Case

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