TYPE CH-3 THREE PHASE POWER DIRECTIONAL RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment. Make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly. Operate the relay to check the settings and electrical connections.

APPLICATION

The type CH-3 relay is a three phase induction type three element power directional relay.

This relay is used to obtain directional discrimination and is usually used for reverse power protection. For this application a timing relay is used in conjunction with the type CH-3 rday.

CONSTRUCTION AND OPERATION

The type CH-3 relay consists of three directional elements and two indicating contactor switches.

Directional Element

Each of these elements is an induction disc type element operating on current and voltage. Two of the elements are mounted on opposite sides of the lower rotating disc. The third element and a permanent magnet are mounted on opposite sides of the upper disc. The two discs are mounted on a common vertical shaft which is supported on the lower end by a steel ball- bearing riding between the concave sapphire jewel surfaces, and on the upper end by a stainless steel pin. The lower disc of the type CH-3 relay has a projecting stop on the right hand side which hits against a screw in the element frame to limit the disc travel. Two separate holes are provided for the stop screw.

The two lower poles of each element are energized by current and the upper poles by potential. The fluxes are produced by connecting two electrical quantities which cause rotation of the disc in a direction depending upon the phase angle between the current and voltage. As power reverses, the current in the elements reverse while the voltage remains fixed. Thus a directional torqus is obtained.

The moving contact consists of a rigid counter-weighted are fastened to an insulated section of the shaft between the two discs. A leaf spring is fastened to the shaft end of the arm with a silver contact attached to the free end of the leaf spring. When the moving contacts strike the stationary contacts, the spring deflects to provide the required contact follow. The electrical connection is made from the moving contact thru the arm and spiral spring. One end of the spring is fastened to the arm, and the other end to a slotted spring adjuster disc which in turn fastens to the element frams.

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RELAY DEPARTMENT NEWARK, N.J.

11/64

The stationary contact consists of two right angle brackets fastened to the element thru a Micarta insulated block. Contact screws project thru the outer end of the bracket. A stop on the right hand side of the lower disc provides a limited travel of the contacts.

Indicating Contactor Switch

The d-c indicating contactor switch is a small clapper type device. A magnetic armature, to which leaf-spring mounted contacts are attached, is attracted to the magnetic core upon energization of the switch. When the switch closes the moving contacts bridge two stationary contacts, completing the trip circuit. Also during this operation two fingers on the armature deflect a spring located on the front of the switch, which allows the operation indicator target to drop.

The front spring, in addition to holding the target, provides restraint for the armature and thus controls the pickup value of the switch.

CHARACTERISTICS

The type CH-3 is rated at 5 amperes, 70 volts, 60 cycles. The current coils have a continuous rating of 5 amperes and a one second rating of 140 amperes. The continuous rating of the voltage coil is 110% of the rated voltage.

The three phase minimum pick-up of the type CH-3 relay is 8 milliamperes at 70 volts or 1.6 amperes at one volt. The single phase pick-up currents are three times the three phase currents.

The relay has wattmeter characteristics and has its maximum torque when the current in the relay current coils and the voltage across the relay potential coil are in phase.

The relay has wattmeter characteristics and has its maximum torque at unity power factor, or as a var relay with maximum torque at current lagging 90°.

Trip Circuit

The relay contacts will safely close 30 amperes at 250 volts d-c and the seal-in contacts of the indicating contactor switches will safely carry this current long enough to trip a circuit breaker.

The indicating contactor switch has two taps that provide a pickup setting of 0.2- or 2 amperes. To change taps requires connecting the lead located in front of the tap block to desired setting by means of a screw connection.

Trip Circuit Constants

Contactor Switch _

0.2 ampere tap -- 6.5 ohms d-c resistance

2.0 ampere tap -- 0.15 ohms d-c resistance.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration, and heat. Mount the relay vertically be means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

ADJUSTMENTS AND MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory and should not be disturbed after receipt by the customer. If the adjustments have been changed, the relay taken apart for repairs, or if it is desired to check the adjustments at regular maintenance periods, the instructions below should be followed.

All contacts should be cleaned periodically. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and thus impairing the contact.

Adjust the top bearing screw so that very little play (.001 to .003 inch) can be detected by pressing up and down on the disc. This adjustment can best be made by turning down the top bearing screw until the discs fail to turn freely and then backing up a fraction of a turn. GREAT CARE MUST BE TAKEN IN MAKING THIS ADJUSTMENT SO AS NOT TO DAMAGE THE BEARINGS. Make sure the lock nut on the top bearing screw is tight.

Adjust the control spring so that the contact floats in the middle position. Pass 80 amperes thru the series coil of one of the operating elements with the potential coils short circuited and note whether the disc creeps in either direction. If the disc creeps, the current torque adjuster screw should be turned until the creepage ceases. This screw is located on the bottom edge of the electro-magnet iron and is available from the right hand side of the relay (front view). Repeat this check on all other elements.

Adjust the control spring so that the left hand relay contacts will just close with 1 volt and 1.6 amperes applied to all three elements. This can be done by connecting the three potential coils in parallel, and all three current coils in series and applying unit power factor current and voltage in the direction indicated by the polarity marks. Actually, if desired, the relay may be set for lower values of pick-up by reducing the spring bias. By inserting a screwdriver in the slotted disc on the spring adjuster and turning the disc, the amount of initial tension of the spiral spring can be varied such that the contact will either open or close as desired when the relay is de-energized.

Contact Setting. The relay is shipped with a contact separation of approximately 1/8 of an inch. The right hand stationary contact is set so that approximately .005 inches contact deflection occurs when the disc is against the stop on the right hand side of the electromagnet. The left hand stationary contact is then set as far to the left as possible with the limitation being that the moving contact must reset to the right hand stationary contact when the relay is energized with 70 volts and zero amperes.

Connect the three potential coils in parallel and all three current coils in series.. Energize the potential circuit with 35 volts and pass 20 amperes through the current circuit to open the left hand contact. Suddenly interrupt the current and see that the contacts do not close to the left.

Indicating Contactor Switch (CS) - Close the main relay contacts and pass sufficient d.c. current through the trip circuit to close the contacts of the ICS. This value of current should not be greater than the particular ICS tap setting being used. The indicator target should drop freely.

The contact gap should be approximately .047" between the bridging moving contact and the adjustable stationary contacts. The bridging moving contact should touch both stationary contacts simultaneously.

RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

The burden per phase of the type CH-3 relay is as follows:

Potential Circuit at 70 Volts.

Cycles	Volt Amperes	Watts	P.F. Angle
60	25.55	3.2	83°

Current Circuit at 5 Amperes

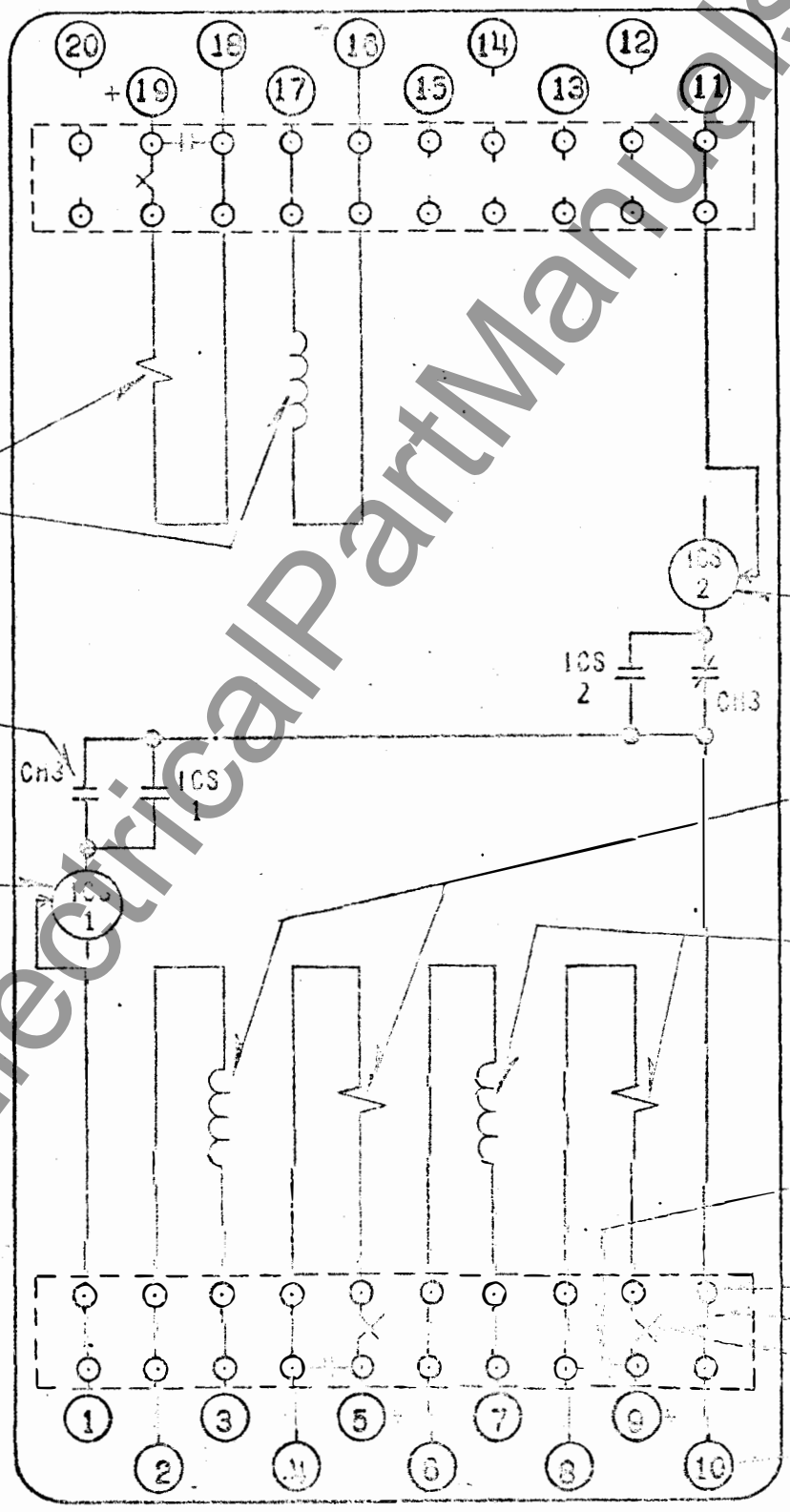
Cycles	Volt Amperes	Watts	P.F. Angle
60	2.2	1.1	60°

List of Figures

Fig. No.	Description	Dwg. No.
1	Internal Schematic	183A474
2	External Schematic of type CH-3 relay for Reverse Power Protection	290B490
3	Test Diagram for Type CH-3 Relay	184A688
4	Outline & Drilling Plan for Type CH-3 Relay (Type FT32 Case)	5707903

SUB.	DATES	D-	DFTM.	CHK.	APPD.

RELAY-TYPE CH-3 THREE PHASE POWER DIRECTIONAL
IN TYPE FT-32 CASE
INTERNAL SCHEMATIC



FRONT VIEW

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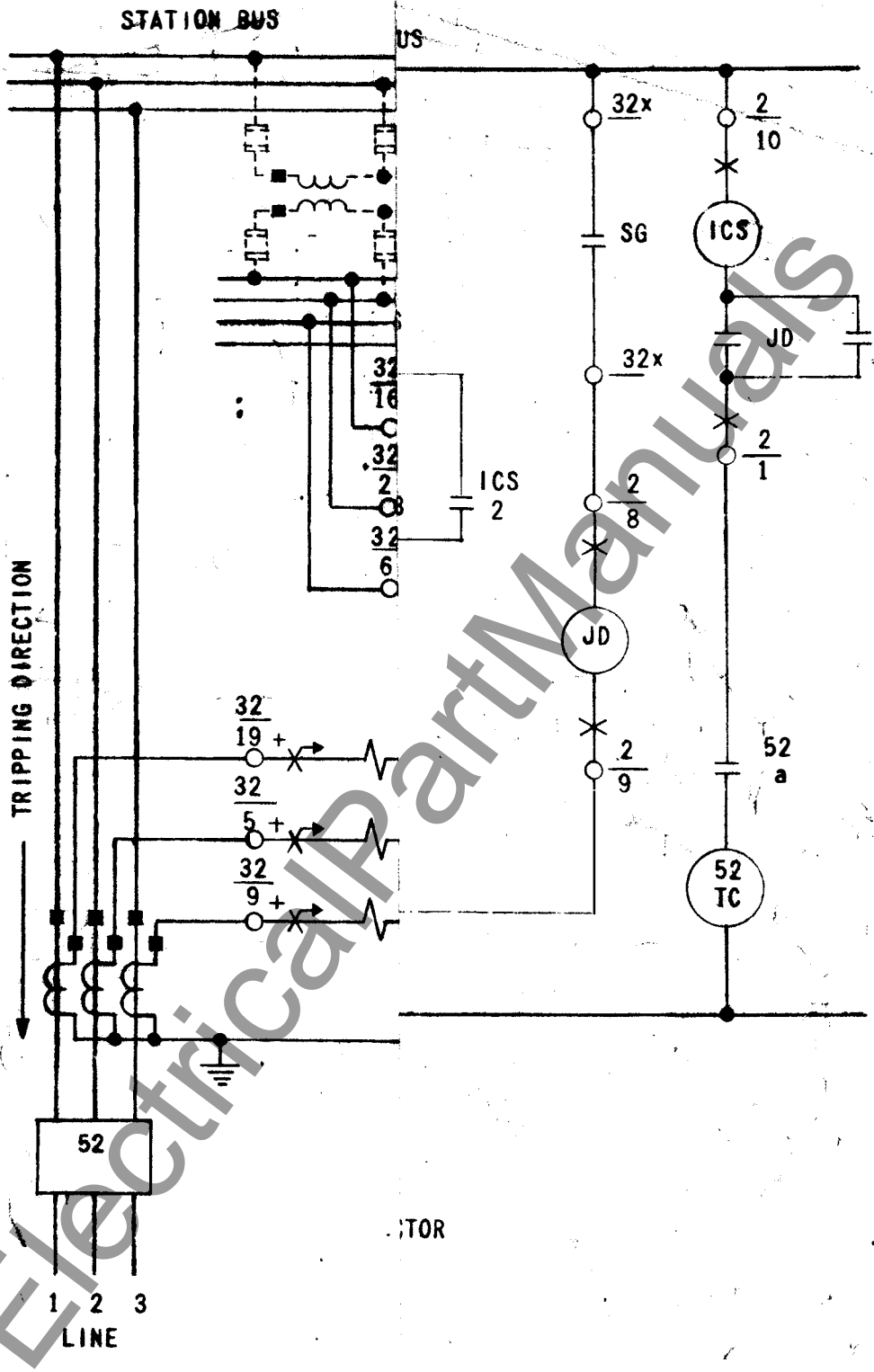

AL SCHEMATIC OF TYPE CH-3 RELAY FOR
E POWER PROTECTION

Comp [redacted] 290B490
Rev
Date 8/2/60

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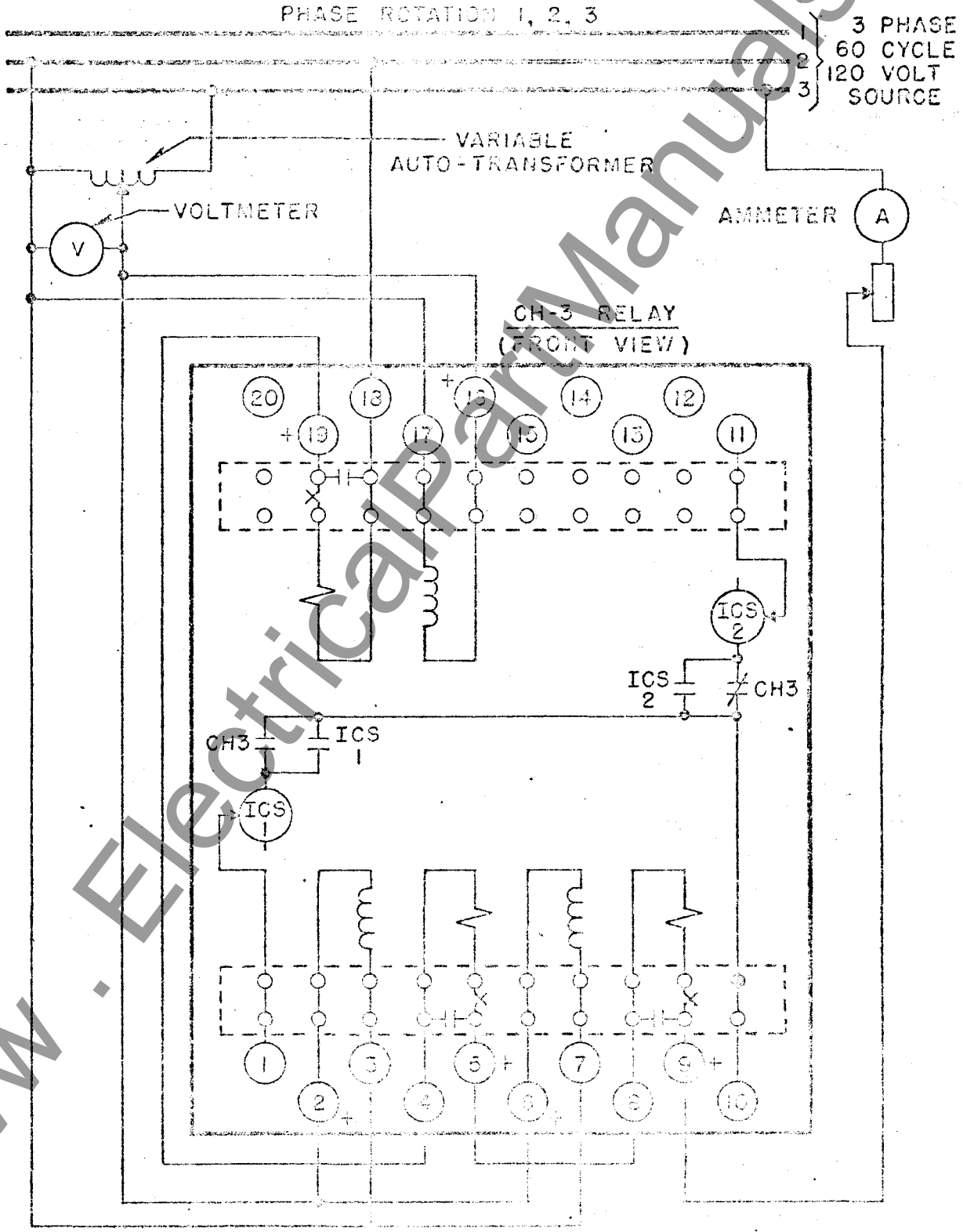
DWG. NO.		D-SPEC.	DRAFTSMAN	CHECKER	APPROVED	APPROVED
1	1 3		2-4-66	2-4-66	2-4-66	

DIMENSIONS IN INCHES

TEST CONNECTIONS FOR THE TYPE CH-3 THREE PHASE POWER DIRECTIONAL RELAY IN TYPE FT 32 CASE



DWG. NO. 5TD7903

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NE527 MAP-RETRACED (Supp. H.J.H. 2-8-67)

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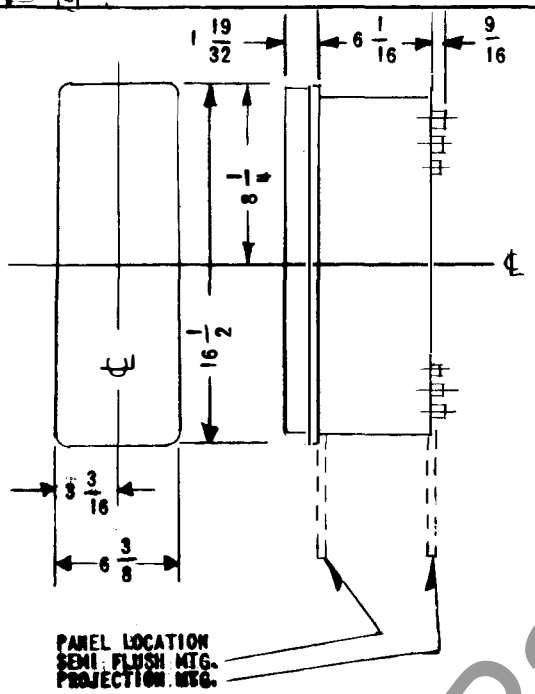
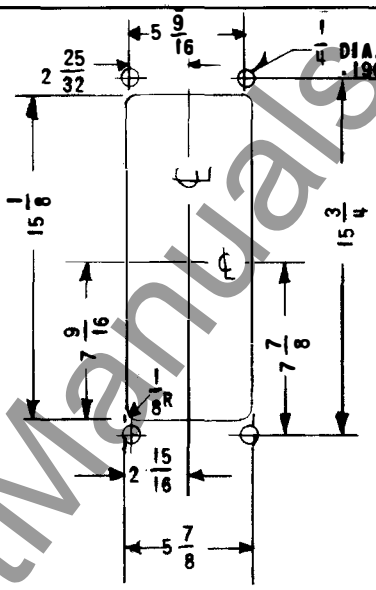
OUTLINE & DRILLING FOR RELAY CASE TYPE FT-32

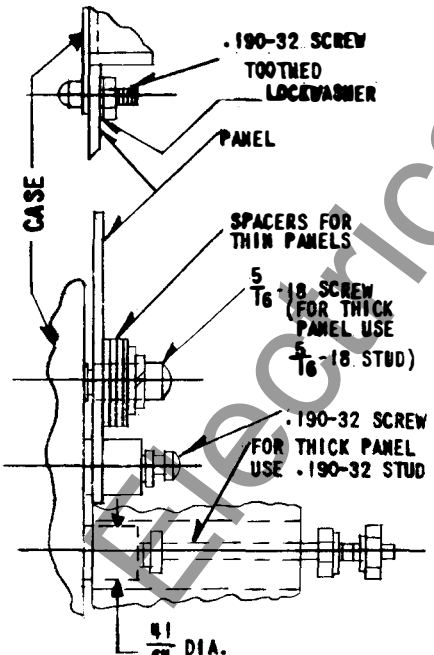
DIMENSIONS IN INCHES



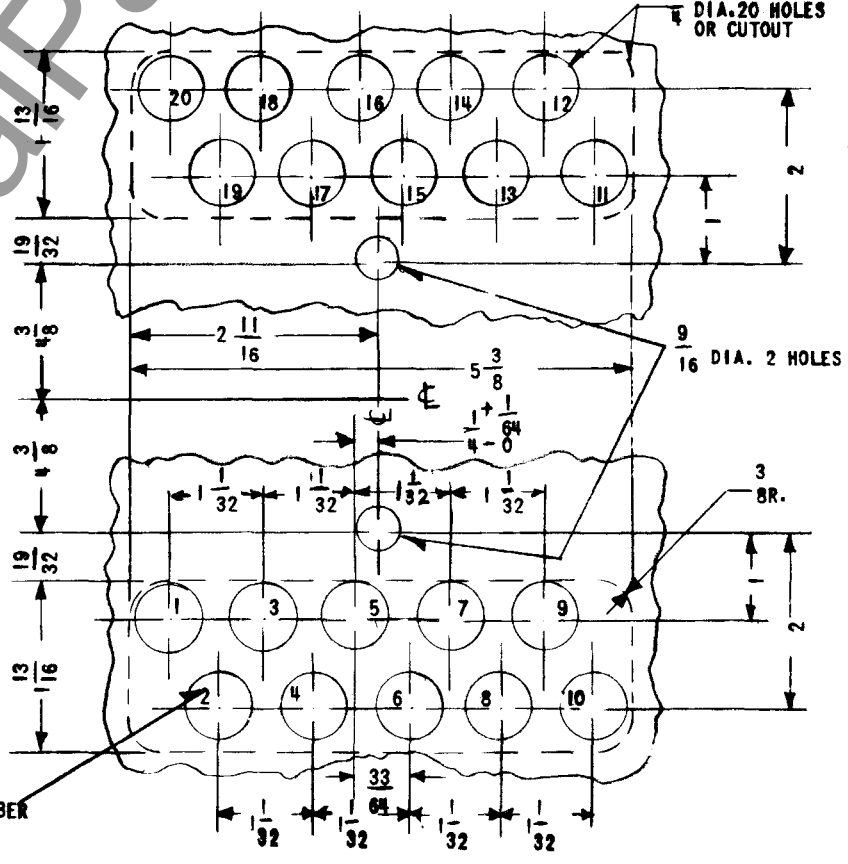
PANEL LOCATION
SEMI FLUSH MTG.
PROJECTION MTG.



PANEL CUTOUT & DRILLING
FOR SEMI FLUSH MTG.



TERMINAL AND MOUNTING DETAILS



TERMINAL NUMBER

PANEL DRILLING OR CUTOUT FOR PROJECTION MTG. (FRONT VIEW) 4100

Sub B

DWG. NO. 5TD7903

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