INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE JD TIMING 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, and operate the relay to check the settings and electrical connections.

APPLICATION

The type JD relay is a timing relay for general auxiliary service requiring up to 30 seconds maximum timing. It can be supplied for either a-c or d-c circuits. Two designs are available, a rack type having a slow reset, and a ratchet type with a quick reset.

CONSTRUCTION AND OPERATION

* The type JD relay consists of either a rack or ratchet timing unit and an indicating contactor switch when used. The construction and operation of these units are as follows:

Ratchet Timing Unit

A clapper type electromagnet is mounted in the lower rear of the unit. Its armature is hinged at the lower end while the upper end fastens to a leaf spring. The top of the leaf spring is attached to a horizontal rod. The other end of the rod is attached to a short horizontal arm assembled on a vertical shaft, which carries the moving contact arm and the ratchet gear. The pawls and ratchet are mounted on the top of a larger gear which meshes with a pinion on a shaft that carries a large disc. This disc rotates between the poles of a permanent magnet to provide damping.

When the relay coil is energized, the armature closes and deflects the leaf spring, which pushes on the horizontal rod to rotate the contact shaft. The rotation of this shaft causes the ratchet to rotate the disc between the damping magnets. When the coil is deenergized, the pawls release the ratchet and the contacts and armature reset instantaneously through the action of the springs and gravity. If time delay on deenergization of the relay is desired, the relay is supplied with the same ratchet and pawls assembled so that motion of the contact arm is transmitted to the damping disc only when the armature is returning to the deenergized position.

The stationary contact assembly consists of flat silver contacts attached to the free ends of two leaf springs. These springs are fastened one above the other to a moulded mounting block. A small set screw provides adjustment of the contact follow and adjust- so that both contacts will make simultaneously.

A similar set of contacts and supporting arms are bent around a moulded block fastened to the semi-circular time lever scale. These are known as the adjustable contacts since their position is adjustable around the time lever scale. The flexibility of the U-shape bend of the arm around the block provides the contact follow. The electrical connections are made through flexible leads.

The moving contacts are two small rounded silver contacts of the "dumbell" type, fastened on the end of an arm to provide front and back contacts. The other end of this arm is clamped to an insulated shaft which is rotated directly by the push rod and is connected through the ratchet and gear to the disc shaft. Depending upon the circuit arrangement, the contacts are either insulated or electrically connected through the moving arm and spiral spring. One end of the spiral spring is fastened to the contact arm and the other to a clamp on the moulded block.

Rack Timing Unit

The clapper type electromagnet construction is similar to that used in the ratchet type unit. It operates a horizontal rod that terminates in a rack. A guide tube holds the rod in position. The pinion is mounted on the main shaft below the damping disc. The moving contact assembly also is fastened to a contact arm on this shaft and is similar to the moving contact described above for the ratchet timing unit except that one end fastens to a slotted spring adjuster disc which in turn fastens to the moulded block mounted on the unit frame. The stationary contacts also are the same type as described above.

The movement of the electromagnet armature pushes the horizontal rod and rack forward to rotate the disc and contacts. When the relay coil is de-

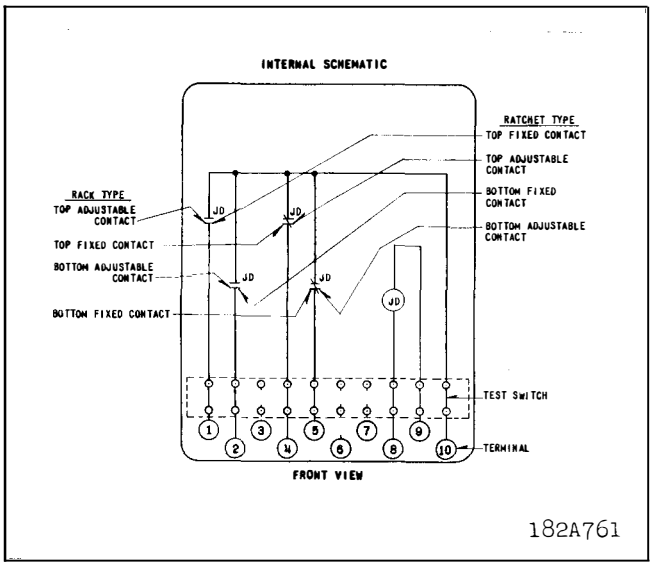


Fig. 1. Internal Schematic of the Rack or Ratchet Type JD Relay in the Type FT21 Case with Double Pole Double Throw Non-Independent Contacts

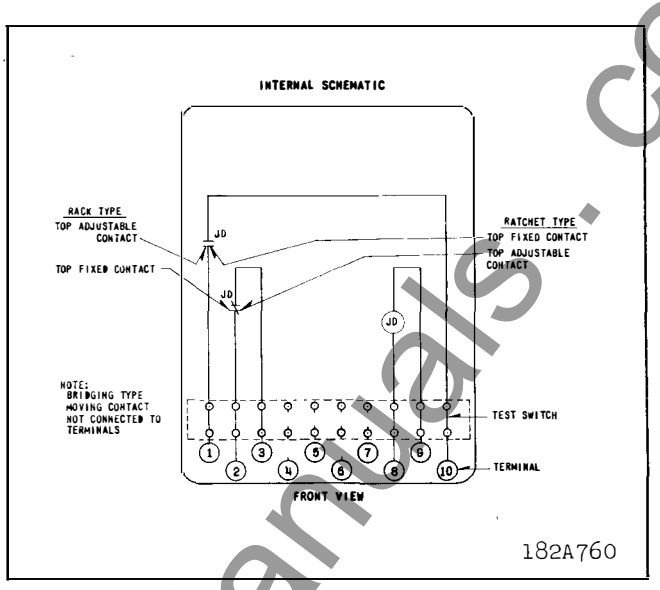


Fig. 2. Internal Schematic of the Rack or Ratchet Type JD Relay in the Type FT21 Case with Single Pole Double Throw Independent Contacts

energized, the armature resets to rotate the disc and contacts in the opposite direction. Thus there is time delay on either energizing or deenergizing the relay.

* Indicating Contactor Switch (ICS)

The indicating contactor switch is a small d-c operated 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 target is reset from the outside of the case by a push rod located at the bottom of the case.

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

CHARACTERISTICS AND SETTINGS

The ratchet type relay has a quick reset (less than 10 cycles for maximum contact travel), and is available in the following ranges: Its accuracy is within 10% at maximum time.

2 to 15 seconds
4 to 30 seconds

The rack type relay has a much slower reset characteristic but is more accurate (within 5% at maximum time) since there is no lost motion between ratchet and pawls. Its characteristics are as follows:

Range in Seconds	Reset Time In Seconds
0.25 to 4	0.50 to 5.0

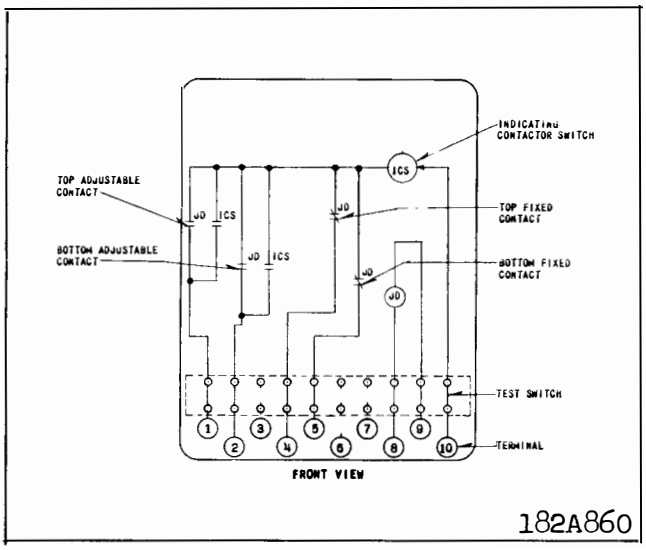
The coils for either type relay are available for 48, 125 or 250 volts d-c, or 115 or 230 volts a-c. The normal contact is double pole double throw as shown in Fig. 1. Independent type contacts as shown in Fig. 2 are also available.

A time lever scale marked in equal divisions permits the adjustment of the adjustable contacts, which fixes the deenergized position of the moving contacts. The scale division have no direct relation to the operating time but provide a convenient reference when the relay is being set for a particular time delay.

* Trip Circuit

The main contacts will safely close 30 amperes at 250 volts d-c and the seal-in contacts of the indicating contactor switch (when supplied) will safely carry this current long enough to trip a circuit breaker.

The indicating contactor switch (when supplied) 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 the



** Fig. 3. Internal Schematic of the Rack or Ratchet Type JD Relay in the Type FT21 Case with Double Pole Double Throw Non-Independent Contacts with Indicating Contactor Switch.*

desired setting by means of a screw connection.

Trip Circuit Constant

Indicating contactor switch (ICS) (When Supplied).

0.2 ampere tap	6.5 ohms d-c resistance
2.0 ampere tap	0.15 ohms d-c resistance

Indicating Contactor Switch (ICS) (When Supplied)

No setting is required on the ICS unit except the selection of the 0.2 or 2.0 ampere tap setting. This selection is made by connecting the lead located in front of the tap block to the desired setting by means of the connecting screw. When the relay energizes a 125 volt or 250 volt d.c. type WL relay switch, or equivalent, use the 0.2 ampere tap. For 48 volt d.c. applications set ICS in 2 ampere tap and use S#304C209G01 type WL relay or equivalent.

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 by 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.

Rack Timing Unit

If the rack assembly has been dismantled, the rack should be placed in mesh with the pinion so that when the L.H. adjustable contact lever is set at zero and the left-hand contacts are deflected 1/16", the front tooth of the rack will be opposite or slightly in front of (less than 1/8") the centerline of the disc shaft.

The relay is then adjusted for the required reset time (usually 5 seconds for full travel) by means of the damping magnet and the spiral spring adjuster. Moving the damping magnet toward the center of the disc reduces the time delay. The initial tension of the spiral spring can be varied by rotation of the slotted plate to which one end of the spring is fastened.

The operating time on the energized stroke is affected by the position of the two nuts at the rear of the push rod and by the shape of the leaf spring which engages these nuts at its slotted end. Bending of this spring above or below the end of the back-up spring may be necessary. The required timing may be obtainable by various combinations of adjustments and no definite procedure can be specified. However, the adjustments should be such that the armature will close positively at 70% of rated voltage.

In order that the timing may be consistent on repetitive operation, it is important that all moving parts be clean and free from burrs or similar sources of friction. The airgap above and below the damping disc should be inspected to see that there is clearance to the magnet and that there are no particles adhering to the magnet and touching the disc.

Ratchet Timing Unit

The spiral spring on the moving contact shaft of the ratchet-type JD relay is usually adjusted for 3/4 turn initial tension at the factory and is then soldered so that no further adjustment is possible. The position of the nuts on the rear of the push rod is adjusted so that with the armature closed and with the left-hand contacts closed and deflected approximately 1.16", the flat spring assembled on the armature barely

touches its hairpin-shaped stop. The pressure of the flat spring against its stop can be varied by opening or closing the angle of the inverted V bracket on which it is supported.

A spring wire mounted in a bar screwed to the right-hand side of the movement frame is deflected when the armature approaches the closed position, and serves to prevent sticking of the armature because of residual magnetism. This wire should be bent so as to obtain about 1/16" to 3/32" deflection of the wire when the armature is against the pole face.

The desired time for maximum contact travel is obtained at the factory by varying the strength and position of the damping magnet. After selection of the proper strength magnet, considerable variation in timing still can be obtained by varying the position of the magnet with respect to the center of the disc.

After other adjustments have been made the relay should be checked to see that the armature will close at 80%, or less, of rated voltage. There should be no difficulty in obtaining this pick-up if the relay is being adjusted for the usual time-ranges.

Contacts

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.

Indicating Contactor Switch (ICS)

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 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.

ENERGY REQUIREMENTS

The burdens of the coils are as follows:

Coil Rating	
48 volts d-c.	6 watts
125 volts d-c.	6.5 watts
250 volts d-c.	13 watts (with series resistor))
120 volts	60 cycles 25 v.a.
240 volts	60 cycles 25 v.a.

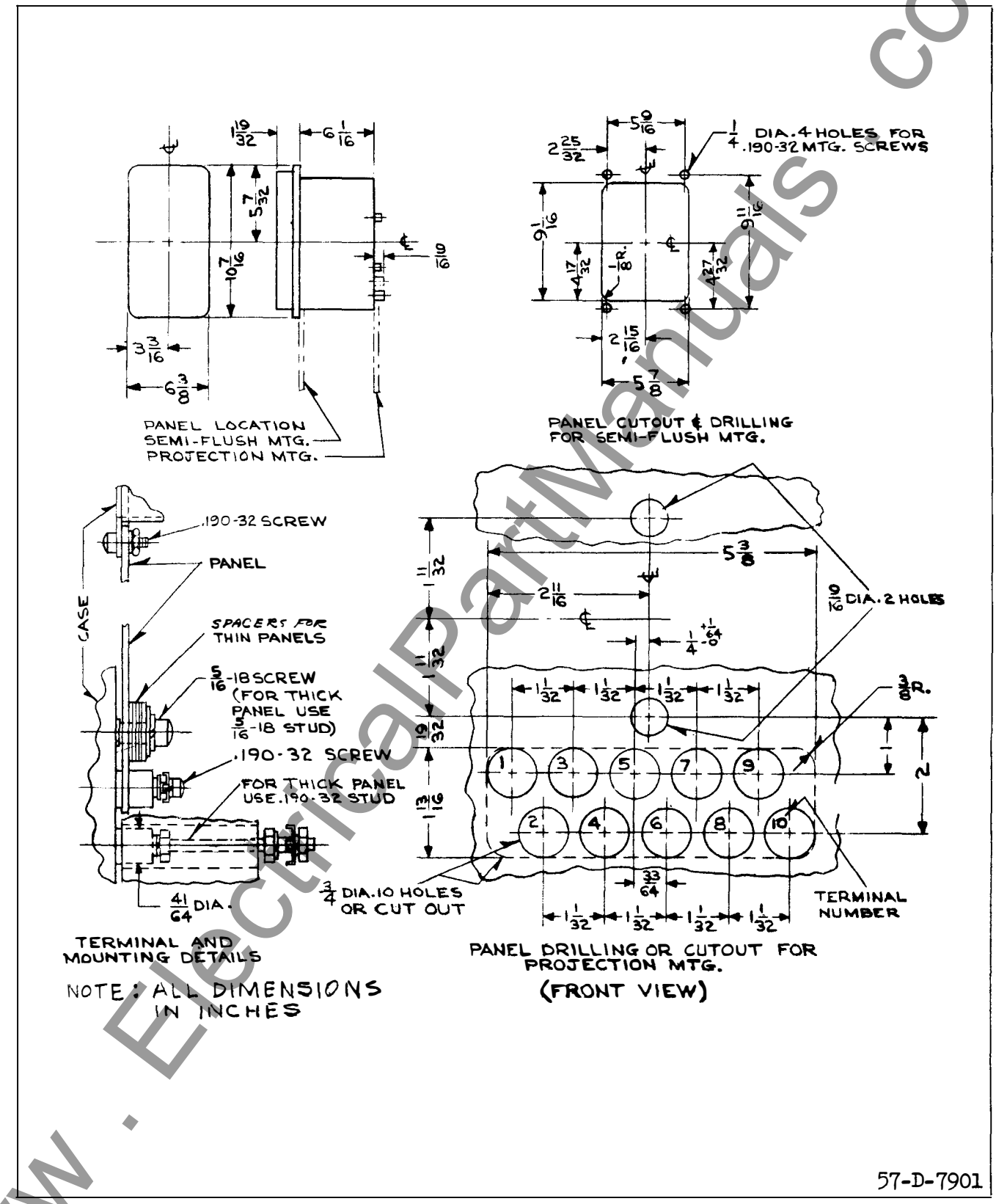


Fig. 4. Outline and Drilling Plan for the Type JD Relay in the Type FT21 Case

WESTINGHOUSE ELECTRIC CORPORATION

RELAY – INSTRUMENT DEPARTMENT **NEWARK, N. J.**

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