Instruction Leaflet

41-138.2C

Effective: May 1985

Supersedes IL 41-138.2B, Dated April 1965

Type KH-21
Direction Overcurrent Relay

CAUTION

Before putting relays into service, remove all blocking 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.

1.0 APPLICATION

The KH-21 relay is an under power relay using two high speed single phase directional elements in an FT-21 case. This is equivalent to two single phase elements for measuring power using these elements' contacts in series.

The relay utilities break contacts for an under power application. The contacts will be closed to trip in the absence of power flow. Thus, a small amount of real power (approximately .2% of 5 amps) must flow in the normal direction to hold the contacts open.

2.0 CONSTRUCTION

The type KH-21 consists of two cylinder directional overcurrent units (D).

2.1. DIRECTIONAL OVERCURRENT UNIT (D)

The directional overcurrent unit is a product induction cylinder type unit operating on the interaction between the polarizing circuit flux and the operating circuit flux.

Mechanically, the directional overcurrent unit is composed of four basic components: A die-case aluminum frame, and electromagnet, a moving element assembly, and a molded bridge.

The frame serves as the mounting structure for the magnetic core. The magnetic core which houses the lower pin bearing is secured to the frame by a locking nut. The bearing can be replaced, if necessary, without having to remove the magnetic core from the frame.

The electromagnet has two series-connected polarizing coils mounted diametrically opposite one another; two series-connected operating coils mounted diametrically opposite one another; and two locating pins. The locating pins are used to accurately position the lower bin bearing, which is threaded into the bridge. The electromagnet is secured to the frame by four mounting screws.

The moving element assembly consists of a spiral spring, contact carrying member, and an aluminum cylinder assembled to molded hub which holds the shaft. The shaft rides between the bottom pin bearing the upper pin bearing with the cylinder rotating in an air gap formed by the electromagnet and the magnet core.

The bridge is secured to the electromagnet and frame by two mounting screws. In addition to holding the upper pin bearing the bridge is used for mounting the adjustable stationary contact housing. The stationary contact housing is held in position by a spring-type clamp. The spring adjuster is located on the underside of the bridge and is attached to the moving contact arm by a spiral spring. The spring adjuster is also

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held in place by a spring type clamp.

With the contacts closed, the electrical connection is made through the stationary contact housing clamp, to the moving contact, through the spiral spring out to the spring adjuster clamp.

The dropout is changed by rotating the spring adjuster connected to the spiral spring.

NOTE: Refer to external schematic 763A026. During synchronizing the push-button contact must be held open until sufficient real power flows to prevent an immediate trip out.

3.0 CHARACTERISTICS

The KH-21 is an instantaneous directional overcurrent induction cylinder unit. It is designed for potential polarization and has its maximum torque when the current leads the voltage by approximately 30°. The shifting of the maximum torque angle is accomplished by means of an internally mounted phase shifter.

The upper and lower units are similar with a dropout of .020 amperes at rated voltage and at maximum torque.

3.1. CYLINDER UNIT CONTACTS

The moving contact assembly has been factory adjusted for low contact bounce performance and should not be changed.

The set screw in each stational contact has been shop adjusted for optimum follow and this adjustment should not be disturbed.

4.0 SETTINGS

No settings are required on the KH-21 relay.

5.0 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 will 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 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 information, refer to Instruction Leaflet. 41-076.

6.0 ADJUSTMENTS

The proper adjustments to insure correct operation of this relay have been made at the factory. Upon receipt of the relay, no customer adjustments, other than those covered under “SETTINGS”, should be required.

6.1. ACCEPTANCE CHECK

The following check is recommended to insure the relay is in proper working order:

Sensitivity – With rated voltage applied to either cylinder unit the contact should close at .020 amperes with the current leading 30×. The internal schematic should be consulted for the proper polarity.

7.0 MAINTENANCE

All relays should be inspected periodically and the operation should be checked at least once every year or at such other time intervals as may be dictated by experience to be suitable to the particular application.

All contacts should be periodically cleaned. A contact burnisher S#182836H01 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.

7.1. CALIBRATION

Use the following procedure for calibrating the relay if the relay has been taken apart for repairs or the adjustments have been disturbed. This procedure should not be used unless it is apparent that the relay is not in proper working order. (See “Acceptance Check”)

1) The upper pin bearing should be screwed down until there is approximately .025” clearance between it and the top of shaft bearing. The

upper pin bearing should then be securely locked in position with the lock nut. The lower bearing position is fixed and cannot be adjusted.

2) The contact gap adjustment for the directional overcurrent unit is made with the moving contact in the reset position, i.e., against the right side of the bridge. Advance the right hand stationary contact until the contacts make. Then advance the stationary contact an additional one-quarter turn.

The clamp holding the stationary contact housing need not be loosened for the adjustment since the clamp utilizes a spring-type action in holding the stationary contact in positions.

The sensitivity adjustment is made by varying the tension of the spiral spring attached to the moving element assembly. The spring is adjusted by placing a screwdriver or similar tool into one of the notches located on the periphery of the spring adjuster and rotating it. The spring adjuster is located on the underside of the bridge and is held in place by a spring type clamp that does not have to be loosened prior to making the necessary adjustments.

With rated voltage and minimum pickup current applied at the maximum torque angle (30° current leading) adjust the spring of the upper unit until the moving contact just makes with the right hand stationary contact.

Repeat the above for the lower unit.

7.2. ENERGY REQUIREMENTS

The burden of each potential circuit at 120 volts, 60 cycles is 3.5 volt-amperes at 60° power factor. The continuous rating of the potential circuit is 132 volts.

The burden of each current circuit at 5 amperes is 5.5 volt amperes at 47° power factor.

8.0 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 their own work. When ordering parts, always give the complete nameplate data.

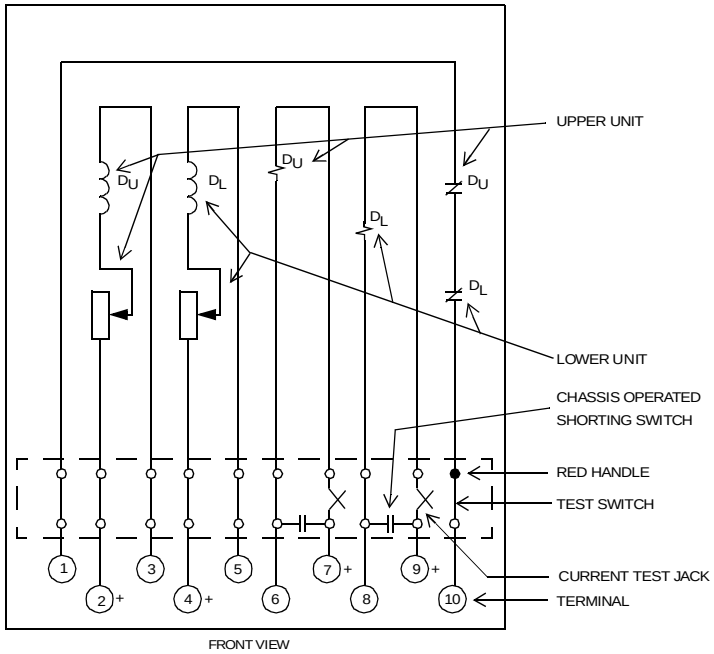

Figure 1. Internal Schematic

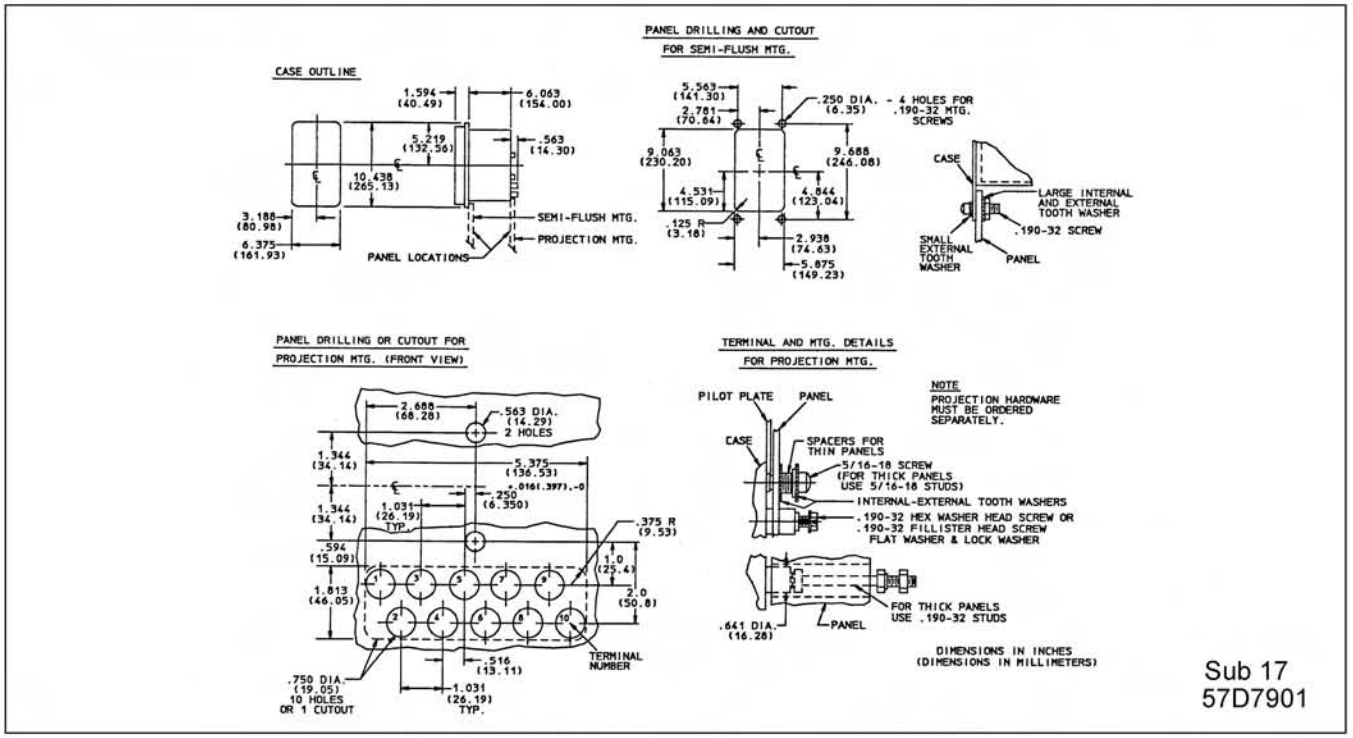

Figure 2. Outline and Drilling (Type FT-21 Case)

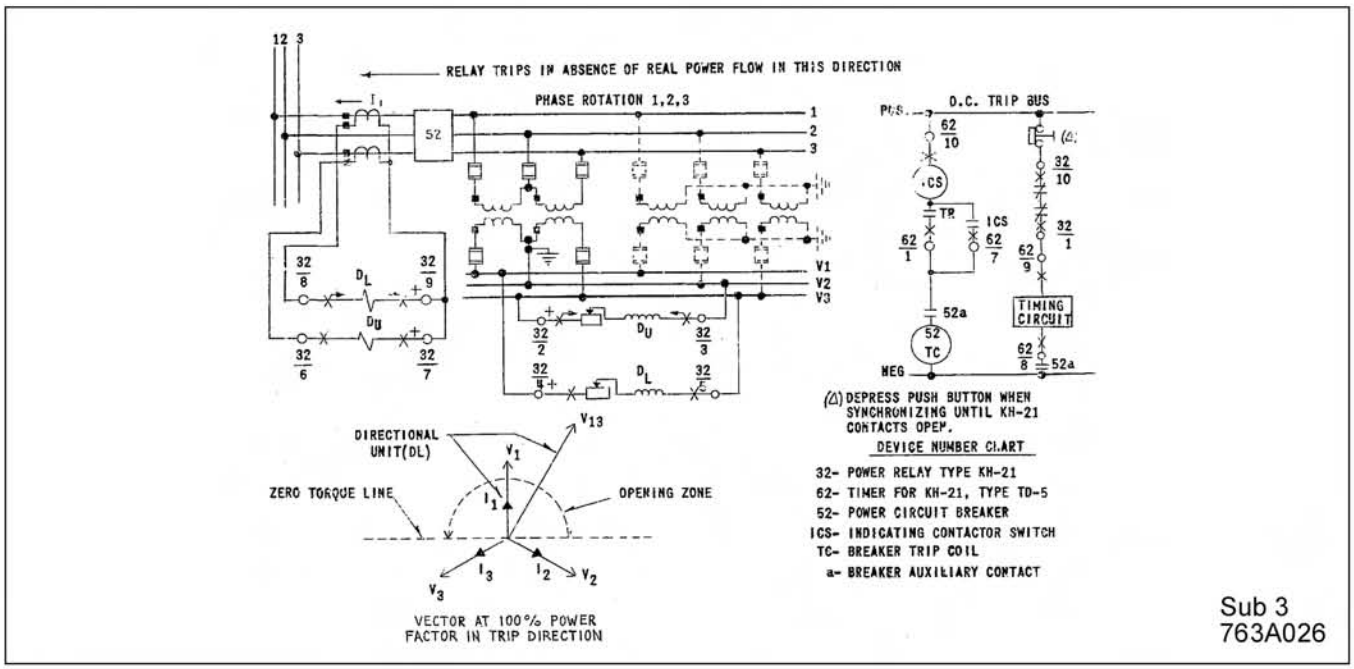

Figure 3. External Schematic

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