Westinghouse

TYPE RS AND RSN CARRIER CURRENT AUXILIARY RELAY

FOR TYPE GO CARRIER EQUIPMENT

INSTRUCTIONS

CAUTION

Before putting protective 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 RS relay is an auxiliary relay used in the carrier current relaying scheme to block or prevent instantaneous tripping for faults external to the line section to which it is applied and to permit instantaneous simultaneous tripping for internal faults. The relay is arranged to respond to indications of fault power and direction provided by the phase and ground relays, thereby controlling the transmission of the carrier signals. The response to ground faults is given preference over the response to phase faults.

The type RSN relay is identical to the type RS except that it includes additional blocking elements to prevent tripping due to out-of-step system conditions. These elements do not prevent or delay instantaneous fault tripping during out-of-step conditions except for three phase faults. Three phase faults occurring during out-of-step conditions can be cleared by tripping after a short time delay.

CONSTRUCTION AND OPERATION

The type RS or RSN relay consists of directional auxiliary, receiver, and alarm elements, contactor switches, and operation indicators connected as shown in Figures 1 and 2. In addition, the type RSN relay contains three voltage elements, a combination pendulum and time-delay drop-out relays which are the out-of-step elements. The construction and operation of the relay elements are described below. Complete details of the operation of this relay in the carrier current relaying scheme is described in I.L. 41-600B.

Directional Auxiliary Elements

These are two solenoid type contactor switches designated as CSP and CSG (Figures 1 and 2). The plunger of the contactor switch operates a spring leaf arm with a silver contact surface on one end and rigidly fixed to the frame on the other end. The stationary contact is also fastened to the frame and in the deenergized position the contacts are held closed by the leaf spring. When the coil is energized, the plunger travels upward breaking the contacts. The CSP switch is energized by the operation of the directional and second impedance element of the phase relays; and the CSG switch, by the operation of the directional and overcurrent elements of the ground relay. The back contacts of the two switches are connected in series, with the one side of the CSG contact connected externally to the cathode of the carrier current oscillator tube, and with the other side to the ground relay carrier starting contacts and to the CSP back contact. The other side of the CSP contact is connected to carrier starting contacts of the phase relays. These connections are such that on the occurrence of a fault within the range of the starting element of the ground or phase relays, the contacts of either starting element close to tie the oscillator cathode to negative and start carrier transmission. Ground preference is obtained by connecting the ground relay starting contacts nearer the cathode of the oscillator than the phase relay stopping contact, CSP. With this connection the ground relay completely supersedes the phase relays, as far as carrier control is concerned.

Receiver Element

The polarized relay consists of an armature and contacts mounted on a leaf spring supported symmetrically within a magnet frame. The armature rides in the front air gap of the frame with the contacts projecting outside. The poles of a permanent magnet clamp directly to each side of the frame. Two adjustable shunts are located across the rear air gaps. These change the reluctance of the magnetic path so as to force some of the flux thru the moving armature which is fastened to the frame midway between the two rear air gaps. Flux in the armature polarizes it and creates a magnetic bias, causing it to move towards either the left or the right, depending upon the adjustment.

Two stationary contact screws are mounted to the left (front view) of the moving contact assembly and adjusted for normally open contacts. These contacts are designated, RRP and RRG, and are connected in the phase and ground trip circuits respectively. One stationary contact screw is mounted to the right of the assembly and adjusted for normally closed contact. This contact is designated RRB and used in connection with the out-of-step protection features. These contacts are operated by two concentric coils, RRT and RRH, which are placed around the armature and within the magnetic frame. RRT is the operating coil and receives its energy from the local battery when either CSP or CSG is opened. RRH is the holding coil and receives its energy from the carrier current transmitted either from the local transmitter or the one at the other end of the section. These two coils are connected to oppose each other with the operating coil, RRT, operating to close the RRP and RRG contacts and trip; and the holding coil, RRH, to hold the RRP and RRG contacts open and block tripping. The restraining torque of the RRH coil is sufficient to overcome the operating torque of the RRT coil. Consequently, RRP and RRG contacts cannot close as long as RRH is energized.

Alarm Element

The alarm element is similar in con-

struction to the receiver element except that it is energized by a single coil and operates a single set of contacts. The coil is energized by the received carrier current to close the contacts and give an alarm. This element has a higher pick-up than that of the receiver element in order to obtain a direct check on the sensitivity of the tubes in the carrier current transmitter-receiver. The failure of the alarm relay to pick up when carrier is started indicates insufficient output from the transmitter-receivers.

Contactor Switches and Operation Indicator

The contactor switches, CS1 and CS2, are small solenoid auxiliary switches connected in series in the trip circuit. The plunger of the switch has a circular conducting disc mounted on its lower end, and as the plunger travels upward, the disc bridges three silver stationary contacts. The contacts of CS1 seal in the trip circuit holding both CS1 and CS2 in the operated position until the auxiliary switch on the breaker opens the trip circuit. The contacts of CS2 provide a means of energizing the trip circuit of two breakers simultaneously and from independent sources, if desired.

Two operation indicators show whether the fault was a phase fault or a ground fault by indicating which relays did the actual tripping, the phase relays thru RRP, or the ground relay thru RRG.

Out-of-Step Elements

The three voltage elements designated as A, B, C are contactor switches similar to those described above except that each is provided with a set of back or normally closed contacts as well as the normal make contacts. Their coils are energized thru contacts on the third impedance element of the corresponding phase relay from the trip voltage source. The back contacts of the voltage elements are connected in parallel and permit tripping through the terminals, 1 and 2, as long as any one of the back contacts is closed. The front contacts of the voltage elements are in series with the back contact on the receiver element, RRE, and the coil of the pendulum relay.

The pendulum relay is a telephone type relay with a horizontal spring arm extending between two contact points. A counterweight is fastened to the free end of the arm. The X2 relay is a telephone type relay with slow drop-out characteristics. A solenoid attracts an iron right-angle bracket which in turn operate a set of break and make contacts. Drop-out delay is obtained by the air gap adjustment between the solenoid core and the armature, and the copper slug on the core. X2 is energized by the pendulum relay contacts with its back contact in parallel with the back contacts of the voltage switches and connected in the phase trip circuit. When the pendulum relay is energized, its arm is pulled downward to close the lower contact. This energizes the X2 relay. After the pendulum relay is deenergized, the pendulum will oscillate for a short time alternately breaking and making both of its contacts. Consequently, the X2 relay will not drop out until after the pendulum oscillations have deenergized its coil. The complete operation of these elements during out-of-step are explained in connection with the operation of the carrier scheme. See I.L. 41-600B.

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 two mounting studs. Either of these studs may be utilized for grounding the metal base. The electrical connections may be made direct to the terminals by means of screws for steel panel mounting or to terminal studs furnished with the relay for ebony-asbestos or slate panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the studs and then turning the proper nut with a wrench.

The carrier relaying d-c schematic (supplied with all carrier orders) should be consulted for details of the external connections of these relays.

ADJUSTMENTS AND MAINTENANCE

The operating time of this relay may be affected by disturbing the flexible leads to the moving contacts. Care should be taken that they are not disturbed during maintenance.

All contacts should be periodically cleaned with a fine file. S#1002110 file 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.

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 or the relay taken apart for repairs, the following instructions should be followed in reassembling and setting it.

Directional Auxiliary Elements

The two contactor switches, CSP and CSG, have adjustable plunger travel. Adjust the two nuts on the bottom of the fixed shaft so that the plunger has 1/8" travel after the lower contacts make. The plunger should have 1/64" travel in the opposite direction after the upper contacts make. This is adjustable by screwing down the set screw on top of the switch until the upper contacts are just able to make as the plunger hits the upper stop. Then back off this screw 1/2 turn and lock in place.

Each contactor switch has a section of a tapped resistor in series with it, and will pick up positively when rated trip circuit voltage is applied across the coil and its section of the resistor. The resistance of the coil and resistors are:

	125 Volts	250 Volts
Coil	70 ohms	70 ohms
Tapped Resistor	600 ohms	1200 ohms
Carrier Resistor (Between Terminals 14 & 17)	1000 ohms	2000 ohms
Operating Coil Resistor ...	4000 ohms	8000 ohms

The minimum pick-up of the coil and its resistor is 40 volts for the 125 volt relays and 100 volts for the 250 volt relays.

Receiver Element

Back off contact screws so that they do not make contact. Screw magnetic shunts into the all-out position. The armature should remain against whichever side it is pushed with

this adjustment.

Contact Adjustment: Apply 125 volts d-c. to the 125 volt relay or 250 volts d-c. to the 250 volt relay from terminals 17 to 13 with positive on terminal 17. See figures 1 and 2. The CSP and CSG switch contacts should be blocked open. The armature should move to the left (front view). Adjust both left-hand contacts until they barely make a light circuit. A flickering light is permissible. Give both of the left-hand contact screws an additional 1/3 turn to secure the required 8 mil follow. Similarly, apply 125 or 250 volts d-c. to the operating coil and 10 to 20 milliamperes d-c. to the holding coil with the correct polarity. The armature should move to the right. Adjust the right-hand stationary contact until it barely makes a light circuit, then give the right-hand contact screw an additional 1/3 turn to secure the proper contact follow. Deenergize both coils and see that the back contact stays closed.

Calibration: Screw in the left-hand shunt so that the top air gap alone is shunted. This should increase the armature bias towards the right-hand back contact. Energize the operating coil with 125 or 250 volts d-c. and the holding coil with 4 milliamperes d-c. The right hand contact should remain closed. Screw in the right-hand shunt until the armature moves to the left. Tighten up both lock screws on both shunts and recheck the above adjustments. Increase the holding coil current to 6 ± .25 milliamperes d-c. and see that the armature closes the back contact with a snappy action.

Alarm Element (Normal Adjustment)

Contact Adjustment: Adjust the right-hand contact in the same manner as described above under the Receiver Element.

Calibration: Screw in the right-hand shunt until the top air gap alone is shunted. Apply 8 milliamperes d-c. to the coil with positive on terminal 20 and then screw in the left-hand shunt until the armature closes the right-hand contact. With this adjustment, the armature should move to the left with 4 to 6 milliamperes in the holding coil. Lock the shunts in position and recheck the calibration several times.

Alarm Element (Telemetering Adjustment)

Telemetering impulses over the carrier channel would normally impulse the alarm element and the alarm bell unless they are disconnected. To retain the alarm feature for communication signalling, a time delay circuit is used which requires reconnection and readjustment of the alarm element to have the opposite polarity and normally closed contacts. Where specified, this adjustment is made before shipment.

Contact Adjustment: With the element de-energized, screw the left-hand shunt all the way in, and back the right-hand shunt all the way out. This will increase the armature bias towards the right and move the armature in that direction. Back off the stationary contact screw and then screw it up until it barely makes a light circuit. Give the screw an additional one-third of a turn to secure the required 8 mil follow.

Calibration: Reverse the polarity of the coil by connecting positive on terminal 19 instead of terminal 20. This means that the contacts will be held open when the coil is energized. Back off the left-hand shunt slightly and screw in the right-hand shunt until the contact closes at 1 milliampere. The contacts should open at 6 milliamperes or less. This differential between pick-up and drop-out is decreased by closing more of the rear air gaps. This can be done by further screwing in both the right and left-hand shunts and rechecking the pick-up and drop-out values. This recheck is important, since any change of the shunts affects both calibration points. Lock the shunts in position and recheck the calibration several times.

CS-1 and CS-2 Contactor Switches

Adjust the stationary core of the switch for a clearance between the stationary core and the moving core of 1/64" when the switch is picked up. This can be done by turning the relay up-side-down and screwing up the core screw of the switch until the contacts just separate. Then back up the core screw approximately one turn and lock in place. This prevents the moving core from striking and sticking to the stationary core because of residual magnetism. Adjust the contact clearance for 3/32" by means of the two small nuts on either side of the Micarta disc. The switch should pick up at 2 amperes d-c. Test for sticking after 30 amperes d-c. is passed thru the coil.

Operation Indicators

Adjust the indicators to operate at one ampere d-c. gradually increased. Test for sticking after 30 amperes d-c. has been applied. Check the indicator and the contactor switches at 5 and 30 amperes d-c. to make sure that the indicator operates before its coil is shorted by the contactor switch.

Out-of-Step Blocking Elements for Type RSN Relay Only

Telephone Relay: Energize the telephone relay, X2, by applying 80 volts d-c. between terminals 16 and 17 with the pendulum relay armature held in the operated position. The telephone relay should operate positively, when the pendulum relay armature is held down to make the lower contact and should not operate when the armature is held up to make the top contact.

Pendulum Relay: To check the operation of the pendulum relay connect jumpers across the make contact on the voltage elements, A, B, and C, and apply 125 volts or 250 volts d-c. between terminals 16 and 17. (The voltage will depend upon the relay range). The pendulum relay armature should be pulled against the core screw and the X2 telephone relay should pick up. Remove the jumpers from the voltage switch contacts. The pendulum relay armature should oscillate and hold the X2 relay closed for approximately 3 seconds. This time may be varied slightly by adjusting the spacing of the two outer contacts.

Voltage Switches

Voltage switches, A, B, and C, should be adjusted so that there is a clearance of 1/64" between the plunger and the core with the plunger picked up. The switches should pick up at 25 volts d-c. and not stick closed after 90 volts d-c. is passed.

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.

Westinghouse Electric & Manufacturing Company
Newark Works, Newark, N. J.

PRINTED IN U.S.A.

7-42

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TYPE RS AND RSN CARRIER AUXILIARY RELAY

CATHODE KEYED CARRIER SETS

INSTRUCTIONS

41-603.4

CAUTION

Before putting protective 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 RS relay is an auxiliary relay used in the carrier relaying scheme to block or prevent instantaneous tripping for faults external to the line section to which it is applied and to permit instantaneous simultaneous tripping for internal faults. The relay is arranged to respond to indications of fault power and direction provided by the phase and ground relays, thereby controlling the transmission of the carrier signals. The response to ground faults may be given preference over the response to phase faults.

The type RSN relay is identical to the type RS except that it includes additional blocking elements to prevent tripping due to out-of-step system conditions. These elements do not prevent or delay instantaneous fault tripping during out-of-step conditions except for three phase faults. Three phase faults occurring during out-of-step conditions can be cleared by tripping after a short time delay.

CONSTRUCTION AND OPERATION

The type RS or RSN relay consists of directional auxiliary, receiver and alarm elements, contactor switches and operation indicators. In addition, the type RSN relay contains three voltage elements, a combination pendulum and time-delay drop-out relays which are the out-of-step elements. The construction and operation of the relay elements are described below. Complete details of the operation of this relay in the carrier relaying scheme is described in I.L. 41-600.5.

Directional Auxiliary Elements

These are two solenoid type contactor switches designated as CSP and CSG. The plunger of the contactor switch operates a spring leaf arm with a silver contact surface on one end and rigidly fixed to the frame on the other end. The stationary contact is also fastened to the frame and in the de-energized position the contacts are held closed by the leaf spring. When the coil is energized, the plunger travels upward breaking the contacts. The CSP switch is energized by the operation of the directional and second impedance element of the phase relays; and the CSG switch, by the operation of the directional and overcurrent elements of the ground relay. The back contacts of the two switches are connected in series, with the one side of the CSG contact connected externally to the cathode of the carrier oscillator tube, and with the other side to the ground relay carrier starting contacts and to the CSP back contact. The other side of the CSP contact is connected to carrier starting contacts of the phase relays. These connections are such that on the occurrence of a fault within the range of the starting element of the ground or phase relays, the contacts of either starting element close to tie the oscillator cathode to negative and start carrier transmission. Ground preference can be obtained by connecting the ground relay starting contacts nearer the cathode of the oscillator than the phase relay stopping contact, CSP. With this connection the ground relay completely supersedes the phase relays, as far as carrier control is concerned.

Receiver Element

The polarized relay consists of an armature and contacts mounted on a leaf spring supported symmetrically within a magnet frame. The armature rides in the front air gap of the frame with the contacts projecting outside. The poles of a permanent magnet clamp directly to each side of the frame. Two adjustable shunts are located across the rear air gaps, These change the reluctance of the magnetic path so as to force some of the flux thru the moving armature which is fastened to the frame midway between the two rear air gaps. Flux in the armature polarizes it and creates a magnetic bias, causing it to move towards either the left or the right, depending upon the adjustment.

Two stationary contact screws are mounted to the left (front view) of the moving contact assembly and adjusted for normally open contacts. These contacts are designated, RRP and RRG, and are connected in the phase and ground trip circuits respectively. One stationary contact screw is mounted to the right of the assembly and adjusted for normally closed contact. This contact is designated RRB and used in connection with the out-of-step protection features. These contacts are operated by two concentric coils, RRT and RRH, which are placed around the armature and within the magnetic frame. RRT is the operating coil and receives its energy from the local battery when either CSP or CSG is opened. RRH is the holding coil and receives its energy from the carrier transmitted either from the local transmitter or the one at the other end of the section. These two coils are connected to oppose each other with the operating coil, RRT, operating to close

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TYPE RS AND RSN CARRIER CURRENT AUXILIARY RELAY

FOR TYPE GO CARRIER EQUIPMENT

INSTRUCTIONS

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APPLICATION

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CONSTRUCTION AND OPERATION

The type RS or RSN relay consists of directional auxiliary, receiver, and alarm elements, contactor switches, and operation indicators connected as shown in Figures 1 and 2. In addition, the type RSN relay contains three voltage elements, a combination pendulum and time-delay drop-out relays which are the out-of-step elements. The construction and operation of the relay elements are described below. Complete details of the operation of this relay in the carrier current relaying scheme is described in I.L. 41-600B.

Directional Auxiliary Elements

These are two solenoid type contactor switches designated as CSP and CSG (Figures 1 and 2). The plunger of the contactor switch operates a spring leaf arm with a silver contact surface on one end and rigidly fixed to the frame on the other end. The stationary contact is also fastened to the frame and in the deenergized position the contacts are held closed by the leaf spring. When the coil is energized, the plunger travels upward breaking the contacts. The CSP switch is energized by the operation of the directional and second impedance element of the phase relays; and the CSG switch, by the operation of the directional and overcurrent elements of the ground relay. The back contacts of the two switches are connected in series, with the one side of the CSG contact connected externally to the cathode of the carrier current oscillator tube, and with the other side to the ground relay carrier starting contacts and to the CSP back contact. The other side of the CSP contact is connected to carrier starting contacts of the phase relays. These connections are such that on the occurrence of a fault within the range of the starting element of the ground or phase relays, the contacts of either starting element close to tie the oscillator cathode to negative and start carrier transmission. Ground preference is obtained by connecting the ground relay starting contacts nearer the cathode of the oscillator than the phase relay stopping contact, CSP. With this connection the ground relay completely supersedes the phase relays, as far as carrier control is concerned.

Receiver Element

The polarized relay consists of an armature and contacts mounted on a leaf spring supported symmetrically within a magnet frame. The armature rides in the front air gap of the frame with the contacts projecting outside. The poles of a permanent magnet clamp directly to each side of the frame. Two adjustable shunts are located across the rear air gaps. These change the reluctance of the magnetic path so as to force some of the flux thru the moving armature which is fastened to the frame midway between the two rear air gaps. Flux in the armature polarizes it and creates a magnetic bias, causing it to move towards either the left or the right, depending upon the adjustment.

Two stationary contact screws are mounted to the left (front view) of the moving contact assembly and adjusted for normally open contacts. These contacts are designated, RRP and RRG, and are connected in the phase and ground trip circuits respectively. One stationary contact screw is mounted to the right of the assembly and adjusted for normally closed contact. This contact is designated RRB and used in connection with the out-of-step protection features. These contacts are operated by two concentric coils, RRT and RRH, which are placed around the armature and within the magnetic frame. RRT is the operating coil and receives its energy from the local battery when either CSP or CSG is opened. RRH is the holding coil and receives its energy from the carrier current transmitted either from the local transmitter or the one at the other end of the section. These two coils are connected to oppose each other with the operating coil, RRT, operating to close the RRP and RRG contacts and trip; and the holding coil, RRH, to hold the RRP and RRG contacts open and block tripping. The restraining torque of the RRH coil is sufficient to overcome the operating torque of the RRT coil. Consequently, RRP and RRG contacts cannot close as long as RRH is energized.

Alarm Element

The alarm element is similar in con-

struction to the receiver element except that it is energized by a single coil and operates a single set of contacts. The coil is energized by the received carrier current to close the contacts and give an alarm. This element has a higher pick-up than that of the receiver element in order to obtain a direct check on the sensitivity of the tubes in the carrier current transmitter-receiver. The failure of the alarm relay to pick up when carrier is started indicates insufficient output from the transmitter-receivers.

Contactor Switches and Operation Indicator

The contactor switches, CS1 and CS2, are small solenoid auxiliary switches connected in series in the trip circuit. The plunger of the switch has a circular conducting disc mounted on its lower end, and as the plunger travels upward, the disc bridges three silver stationary contacts. The contacts of CS1 seal in the trip circuit holding both CS1 and CS2 in the operated position until the auxiliary switch on the breaker opens the trip circuit. The contacts of CS2 provide a means of energizing the trip circuit of two breakers simultaneously and from independent sources, if desired.

Two operation indicators show whether the fault was a phase fault or a ground fault by indicating which relays did the actual tripping, the phase relays thru RRP, or the ground relay thru RRG.

Out-of-Step Elements

The three voltage elements designated as A, B, C are contactor switches similar to those described above except that each is provided with a set of back or normally closed contacts as well as the normal make contacts. Their coils are energized thru contacts on the third impedance element of the corresponding phase relay from the trip voltage source. The back contacts of the voltage elements are connected in parallel and permit tripping through the terminals, 1 and 2, as long as any one of the back contacts is closed. The front contacts of the voltage elements are in series with the back contact on the receiver element, RRB, and the coil of the pendulum relay.

The pendulum relay is a telephone type relay with a horizontal spring arm extending between two contact points. A counterweight is fastened to the free end of the arm. The X2 relay is a telephone type relay with slow drop-out characteristics. A solenoid attracts an iron right-angle bracket which in turn operate a set of break and make contacts. Drop-out delay is obtained by the air gap adjustment between the solenoid core and the armature, and the copper slug on the core. X2 is energized by the pendulum relay contacts with its back contact in parallel with the back contacts of the voltage switches and connected in the phase trip circuit. When the pendulum relay is energized, its arm is pulled downward to close the lower contact. This energizes the X2 relay. After the pendulum relay is deenergized, the pendulum will oscillate for a short time alternately breaking and making both of its contacts. Consequently, the X2 relay will not drop out until after the pendulum oscillations have deenergized its coil. The complete operation of these elements during out-of-step are explained in connection with the operation of the carrier scheme. See I.L. 41-600B.

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 two mounting studs. Either of these studs may be utilized for grounding the metal base. The electrical connections may be made direct to the terminals by means of screws for steel panel mounting or to terminal studs furnished with the relay for ebony-asbestos or slate panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the studs and then turning the proper nut with a wrench.

The carrier relaying d-c schematic (supplied with all carrier orders) should be consulted for details of the external connections of these relays.

ADJUSTMENTS AND MAINTENANCE

The operating time of this relay may be affected by disturbing the flexible leads to the moving contacts. Care should be taken that they are not disturbed during maintenance.

All contacts should be periodically cleaned with a fine file. S#1002110 file 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.

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Each contactor switch has a section of a tapped resistor in series with it, and will pick up positively when rated trip circuit voltage is applied across the coil and its section of the resistor. The resistance of the coil and resistors are:

	125 Volts	250 Volts
Coil	70 ohms	70 ohms
Tapped Resistor	600 ohms	1200 ohms
Carrier Resistor (Between Terminals 14 & 17)	1000 ohms	2000 ohms
Operating Coil Resistor ...	4000 ohms	8000 ohms

The minimum pick-up of the coil and its resistor is 40 volts for the 125 volt relays and 100 volts for the 250 volt relays.

Receiver Element

Back off contact screws so that they do not make contact. Screw magnetic shunts into the all-out position. The armature should remain against whichever side it is pushed with

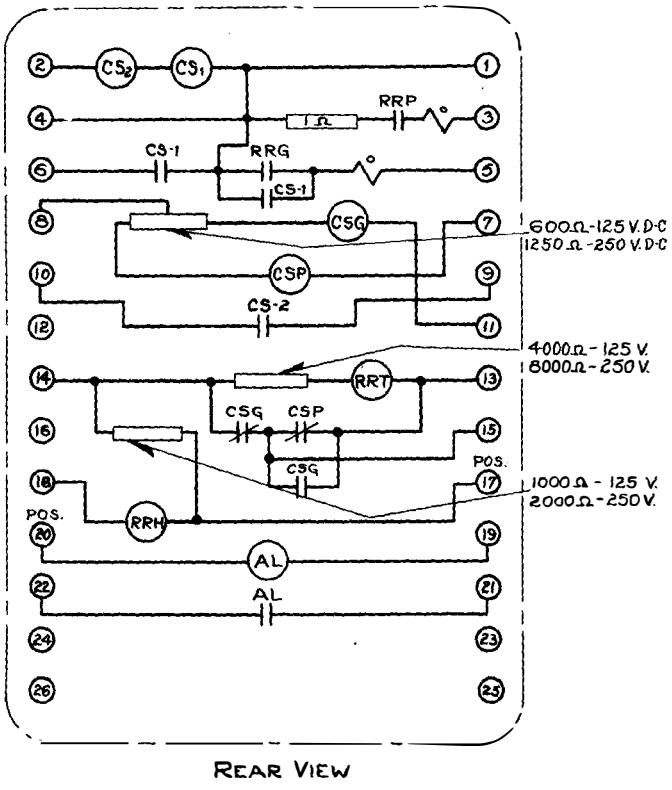

Figure 1
Internal Wiring Diagram of the Type RS Relay

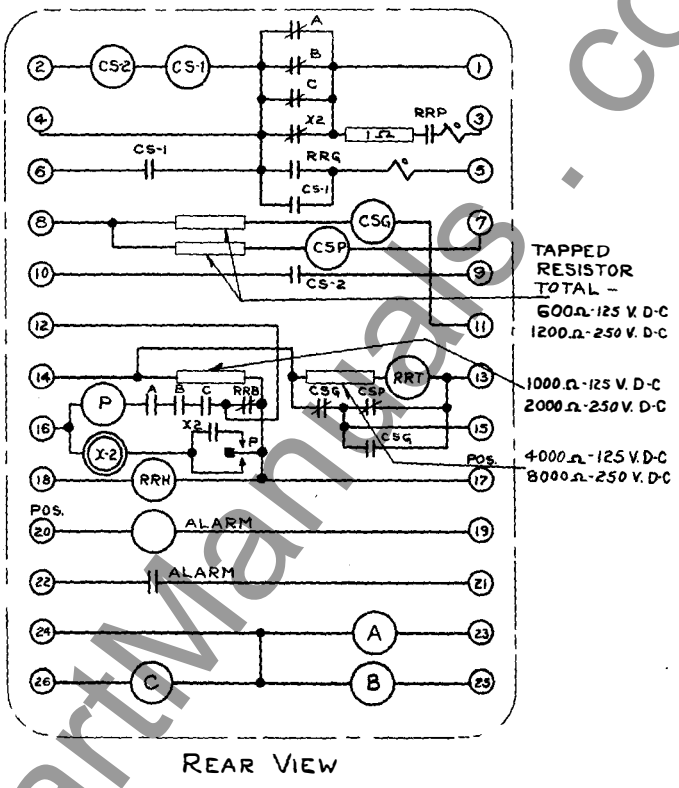

Figure 2
Internal Wiring Diagram of the Type RSN Relay