SERVICE MANUAL 4565

DC FLASHER VITAL RELAY
PF-256

Part Numbers

N322561-	001	002	
N322561-	801	802	803
N322561-	804	805	806

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SECTION I
GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides service information for the PF-256 plug-in D.C. Flasher Relay. The PF-256 Relay is a special relay which is used for flashing the lamps in signals, principally in Highway Crossing Signal Systems.

The design of the PF-256 Relay conforms to all applicable AAR specifications.

1.2 DESCRIPTION

1.2.1 General

The PF-256 D.C. Flasher Relays operate at a nominal 48, 65, or 75 cycles per minute to flash the lamps. The 48 cycle relay is employed to alternately light the lamps of grade crossing protection signals. The 65 cycle relay, as well as the 75 cycle relay, is employed to flash the lamps of wayside signals when such an aspect is required.

The relay is factory calibrated to operate across a wide environmental range. All moving parts are enclosed in a sturdy, transparent, dust and moisture resistant cover. All relays have indexing pins to insure that the relay is inserted in its proper mounting base. Relays lock securely into the plug-in position.

1.2.2 Coils

The PF-256 D.C. Flasher Relay has two coils each having a resistance value of 87.5 ohms.

1.2.3 Contacts

Contacts of the PF-256 relays are low voltage silver alloy to silver alloy normal and reverse. Contacts are rated at 5 amps., 30 volts dc, 175 volts ac.

1.3 SPECIFICATIONS

The following paragraphs provide the electrical and mechanical specifications of the flasher relays covered in this manual.

1.3.1 Electrical

Relay electrical specifications are tabulated below in part number order.

PART NO. N322561	CONTACTS	COIL RES. OHMS	START VOLTAGE	SYSTEM VOLTAGE	CYCLE PER MIN. (NON-ADJUSTABLE)
001; 801; 804	4NR	87.5/87.5	5	8 - 12	45 to 55
002; 802; 805	4NR	87.5/87.5	5	8 - 12	60 to 72
803; 806	4NR	87.5/87.5	6	8 - 12	69 to 81

Contacts - Low voltage silver alloy to silver alloy, normal and reverse.

Mounting Base - N384243 - Old style for above relays.
- N438689-001 - Improved style for above relays.

Note: Relays, N322561-804, -805 and -806 have the snubbing diodes mounted external to the relay case. X438970 must be ordered separately for new installations.

1.3.2 Mechanical

The following mechanical specifications are common to all PF-256 relays covered in this manual.

Dimensions:	Height: 7-1/6" (17.93 cm) Width: 4-15/16" (12.54 cm) Depth: 8-3/8" (21.2 cm)
Temperature:	-40°F (-40°C) to +185°F(85°C)
Indexing:	Refer to paragraph 2.3
Relay Weight:	13 7/16 lbs. (6.096 Kg)
Mounting Base Weight:	37 oz. (Old Style) 18 oz. (Improved Style)
Mounting Base Dimensions:	Height 7 15/16" (20.1 cm) Width 4 15/16" (12.54 cm) Depth 2-7/16" (6.19 cm) Old Style Base Depth 1-25/32" (4.52 cm) Improved Base

SECTION II
INSTALLATION

2.1 GENERAL

Relays plug directly into a mounting base which is secured to a rack. The only installation instructions required are for the mounting base and the Diode Board for those relays designed or modified for external snubbing diodes.

2.2 MOUNTING BASE

Secure the mounting base directly to the rack using the hardware furnished. All wiring terminates at the rear of the mounting base to solderless terminals (receptacle contact springs).

Mounting base details of the Old Style base and the Improved Base are shown in the Appendix.

2.3 RELAY INDEXING

Relays are factory equipped with indexing pins to prevent insertion of an incorrect relay into a mounting base. Each relay is accompanied by an indexing plate which is applied to the mounting base at the time of initial installation. A typical plug-in relay with indexing pins and base with corresponding indexing plate is shown in Figure 1.

The following data defines the indexing that has been established for relays covered by this manual.

a. The index code always consists of four figures (such as 0001, 0002, or 0101) and is used for both the relay and the indexing plate on the mounting base.

b. The index code for each relay can be determined from the relay part number and its suffix which is marked on the name plate attached to the front of the relay. The first two digits of the index code are the last two digits of the part number, and the second two digits of the index code are the last two digits of the suffix. The index number thus obtained should agree with the placement of the indexing pins in the numbered vertical rows on the back of the relay starting with the top pin and reading down.

c. The index code for each mounting base is determined by the placement of the holes in the numbered vertical rows of the large white nylon indexing plate which is affixed to the front of the mounting base. This indexing plate should not be removed from the mounting base unless it is damaged or the indexing is to be purposely changed to accommodate a relay of a different part number. Discard the indexing plate which comes in a bag tied to the handle of all new relays unless it is needed for replacement of damaged indexing plate or for application to a new mounting base).

WARNING

NEVER DRILL NEW HOLES IN A BASE INDEXING PLATE WHICH WILL PERMIT APPLICATION OF RELAYS WITH DIFFERENT PART NUMBERS OR CHANGE INDEXING PINS ON THE BACK OF A RELAY UNLESS IT IS BEING CONVERTED TO A NEW PART NUMBER. OTHERWISE, A HAZARD WILL BE CREATED WHICH MAY COMPROMISE SAFETY CIRCUIT FUNCTIONS.

2.4 RECEPTACLE CONTACT SPRINGS

2.4.1 Old Style Base Only

The mounting base will normally be equipped with the required quantity of J680165 solderless receptacle contact springs, and will accommodate one or two #14 or #16 wires. It can, however, be equipped with receptacle contact springs for one or two #10 or #12 wires (J680181), or for one or two #18 or #20 wires (J680179). Make certain which type of solderless receptacle contact springs accompany the mounting base before proceeding with their installation.

2.4.2 Improved One Piece Base Only

The one piece mounting base with hardware includes a full complement of receptacle contact springs (M451142-2702) to accommodate one or two #14-#16 wires, mounting fasteners, and tags. It can, however, be equipped with receptacle contact springs for one or two #10-#12 wires (M451142-2703), or for one or two #18-#20 (M451142-2701). Make certain which type of solderless receptacles contact springs accompany the mounting base before proceeding with their installation.

Each solderless receptacle contact spring should be inspected for physical damage and straightness before proceeding with installation.

The following is recommended when installing solderless receptacle contact springs:

a. Receptacle contact springs must be inserted into the base with the lock side down (Refer to Figure 2).

b. Make certain that the lanced tab is slightly compressed as the receptacle contact spring is inserted along the top of the cavity. The lanced tab could have been bent during handling, and therefore would not provide the required contact pressure after the relay is inserted. If the lanced tab does not touch, pull it up slightly using fingers or a suitable tool.

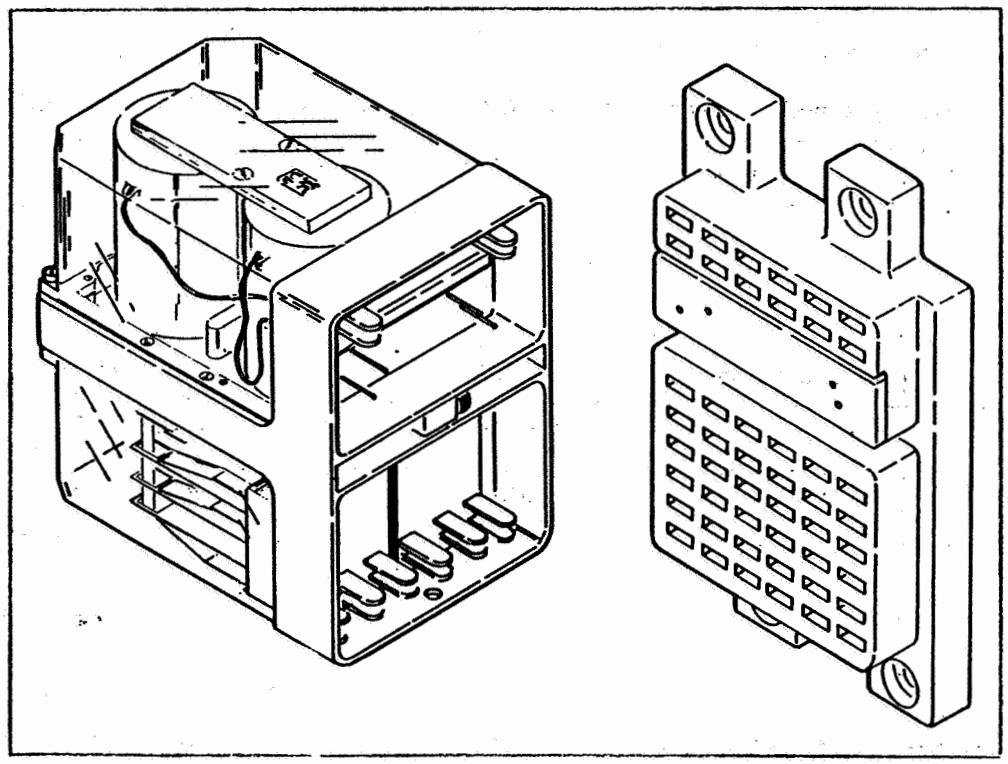


Figure 1. Typical Plug-In Relay and Mounting Base

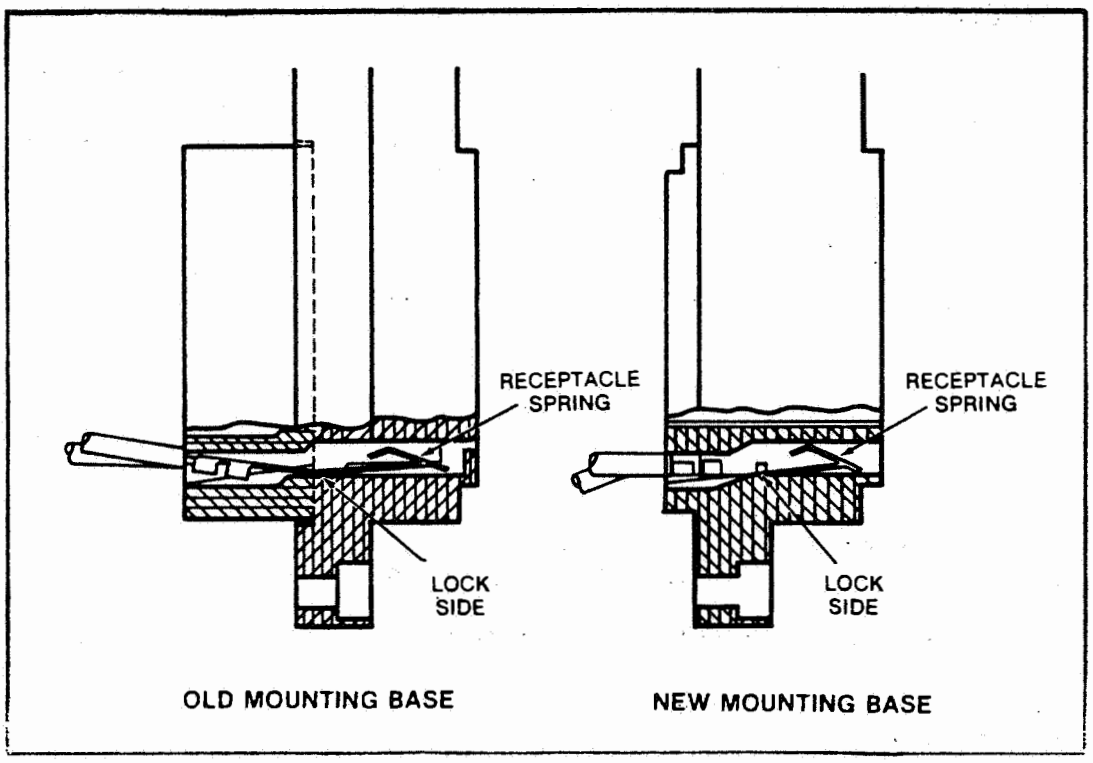


Figure 2. Receptacle Contact Spring Installed

2.4.3 Installing Wires in Receptacle Contact Springs

Use the following procedure to ensure a good electrical and mechanical connection between the conductor wire and the receptacle contact spring. The following table identifies the correct crimping tool to be used when installing wires in receptacle contact springs.

Crimping Tool	Wire Size	Old Style Receptacle Contact Spring	Improved Base Receptacle Contact Spring
J397138	#10/#12 AWG	J680181	M451142-2703
J397139	#14/#16 AWG	J680165 (Standard)	M451142-2702
J397188	#18/#20 AWG	J680179	M451142-2701

a. Strip 3/16 in. (0.187 in. or 0.47 cm.) of insulation from the end of the wire.

b. Place the receptacle contact spring into the jaws of the proper crimping tool. When using only one terminal, of any wire size, use the shortest terminal.

c. Partially close the crimping tool jaws against the receptacle contact spring to hold it in place. (Do not crush the receptacle contact spring barrel at this time.)

d. Insert the stripped end of wire all the way into the receptacle contact spring barrel. Squeeze the tool handles until crimping is completed and the jaws release. When using both terminals, it is more convenient to attach the first wire to the longest terminal.

e. Remove the crimped receptacle contact spring from the tool and inspect the connection. Make certain that the wire is flush with the crimped barrel and that there are no loose strands of wire.

2.5 DIODE BOARD INSTALLATION (See Figure 3)

NOTE

This Diode Board installation is only necessary for relays N322561-804; -805; -806 or relays that have been modified for external snubbing diodes.

a. Remove the relay from the mounting base.

b. Remove the upper left-hand (as viewed from rear) nut and washers from the mounting base.

c. Place the bracket of the Diode Board over the screw, install the lock washer and nut, then tighten.

d. Remove the receptacle contact spring from the +A (A1) position of the base. Crimp the red lead into the extra barrel and insert the spring into an unused contact space. Push the Faston connector onto the circuit board terminal marked +.

e. Crimp one of the white leads into the appropriate receptacle contact spring and insert the spring into the +A (A1) position of the base. Push the Faston connector onto the circuit board terminal marked 1.

f. Crimp the other white lead into a receptacle contact spring and insert the spring into the -B (F2) position of the base. Push the Faston connector onto the circuit board terminal marked 2.

g. Remove the receptacle contact spring from the -A (F1) position of the base. Crimp the black lead into the extra barrel and reinsert the spring into the -A (F1) position. Push the Faston connector onto the circuit board terminal marked -.

Note

If the external wiring was "daisy chained" and extra barrels are not available, wire splices acceptable to the signal department should be used to provide connections for the + and - terminals on the Diode Board

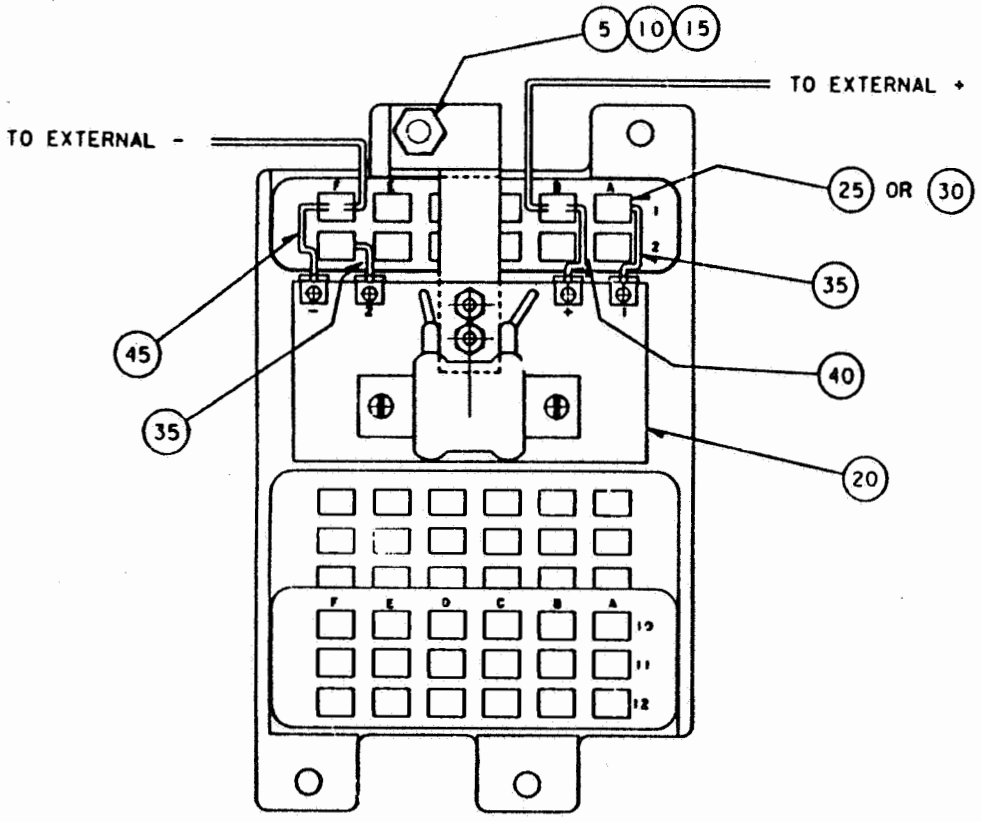


Figure 3. Diode Board Mounting/Wiring

2.6 RELAY INSERTION

Orient the relay to the mounting base with the name plate right side up; then plug the relay into the base. The relay should be pushed firmly against the mounting base while depressing the latch rod. After the relay is completely seated in the base, release the latch rod and pull on the handle to ensure that the relay has locked in place.

SECTION III
FIELD MAINTENANCE

3.1 INTRODUCTION

This section provides the necessary periodic preventive maintenance procedures which must be performed to ensure continuous, proper, and efficient operation of the PF-256 relays covered in this manual. Field maintenance covers periodic inspections and performance tests.

3.2 PERIODIC PERFORMANCE TEST

3.2.1 Cleaning

Before inspecting and testing the relay, if necessary use a soft cloth to clean the exterior to remove any dirt or dust that may have collected. A safe cleaning solution of alcohol and water or common laundry detergent may be used for removal of accumulated dirt, grease, etc.

3.2.2 Service Requirements

3.2.2.1 General

All flasher relays must be inspected and tested according to the following schedule:

N322561-001/-801/-804 (nominal 48 flash rate) after not more than 10 million operations or four years, whichever occurs first.

N322561-002/-802/-805 (nominal 65 flash rate) after not more than five million operations or four years, whichever occurs first.

N322561-803/-806 (nominal 75 flash rate) after not more than 2.5 million operations or four years, whichever occurs first.

The tests and inspections are to include: flash rate, starting voltage, on time, and visual inspection of contacts for damage or misalignment, corrosion or other contamination of parts, loose parts inside of the cover, broken seal, and cracked or broken cover.

Relays not passing the above stated tests and inspections must be replaced and not returned to service until the operating characteristics and conditions are in accordance with US&S specifications.

3.2.2.2 In-Service Test

It is recommended that flasher relays in service be removed from service for shop repairs when one or more of the following conditions occur: (Use as a reference the calibration values given in Table II.)

a. If the number of operations per minute per lamp falls below 36/min. for -001/-801/-804, 48/min. for -002/-802/-805 or 56/min. for -803/-806.

b. If the starting voltage at 68°F increases beyond 120% of specification maximum for a new relay.

c. If the "on time" of the lamps becomes objectionally unbalanced.

d. If the contacts are worn to such a degree that failure is imminent.

3.2.2.3 Test Procedures

Test the operating characteristics of the PF-256 relays as described in Section 4.6.1 in this manual.

3.3 REPAIR

3.3.1 Relays With External Diodes

If it is found that a flasher relay failure is due to defective diodes, a new diode board (N451657-0901) can be installed without removing the relay from service. To remove the diode board:

a. Disconnect the four faston terminals.

b. Remove the nut, washers and the board/bracket assembly from the upper left mounting bolt.

Install the new diode board, reconnect the wiring (see Figure 3) and install washers and nut.

Perform a Calibration and Timing check (Section 4.6) to verify satisfactory operation.

NOTE

Because of the 16 ohm current limiting resistor, the starting voltage will appear high. Measure the starting voltage at Point #1 on the board. The resistor provides current limiting should a diode short or a control contact bridge. Its presence should not cause any adverse effects at normal system voltages.

SECTION IV
SHOP MAINTENANCE

4.1 INTRODUCTION

This section provides the information necessary to perform shop level repairs of the flasher relays covered in this manual. In general, relays arriving at the shop for repair have been checked in the field and have been found to perform unacceptably or have been physically damaged.

4.2 CLEANING AND INSPECTION

Before inspecting the relay and initiating repairs, use a soft cloth to clean the exterior carefully to remove any dirt or dust that may have collected. A safe cleaning solution of alcohol and water may be used for removal of accumulated dirt, grease, etc.

Inspect the relay exterior for signs of physical damage, such as cracked or broken cover, cracked or damaged housing, and damaged and or missing contact block terminals and indexing pins. If severe damage is found, a careful inspection of the interior components should be made for obvious physical damage.

Remove the cover and clean the surface between the armature and the pole faces, especially the stop pin area, using a lint free cloth and alcohol.

Proceed with stop pin and relay contact cleaning, using the following recommended cleaning materials:

Recommended Cleaning Materials	Order Reference
Cleaning Tool	N378099
Extra sleeving for recovering three metal strips	J772330
#4/0 Metallographic paper sheet 9" x 14"	J035215
Burnishing tool	J397187
Distilled Water	

4.2.1 Armature Stop Pins Cleaning

The following instructions are for cleaning the armature stop pins. This procedure should be followed wherever a relay is shopped for failure to meet its calibration specifications during scheduled field inspection and tests.

a. Insert a clean Cleaning Tool* (N378099) between the stop pin and relay pole face. Using moderate pressure to hold the armature closed, pull the cleaning tool back and forth in a circular motion over the stop pin. Continue this process until it is apparent that no foreign substances are being transferred to the tool.

b. Repeat Step 'a' for the other stop pin.

* NOTE: In the event that the Cleaning Tool or sleeving is not available, substitute a strip of 67 pound, white, Springhill Vellum Bristol Paper (J793094).

4.2.2 Cleaning Relay Contacts

This section covers recommended methods for the preparation and cleaning of relay contacts.

After contacts have been dressed and/or after adjustments have been made to meet calibration requirements, the contacts should be cleaned in accordance with the procedure given in paragraph 4.2.2.1 and 4.2.2.2. Due to the unavailability of the Fluflon/Dacron sleeving (J772330) for the Cleaning Tool (N378099), an alternate contact cleaning procedure is presented in Paragraph 4.2.3.

CAUTION

The following is only mandatory for clear Lexan molded drivers. Deviations from this procedure may result in damage to equipment.

If it is desired to use an aerosol spray for cleaning relay contacts, only virgin Freon TF (available from Miller Stephenson Chemical Co. as MS-180 or MS-230 contact RE-NU FREON TF) is approved by U.S. & S for cleaning contacts with the driver attached to the contact springs.

4.2.2.1 General

a. Preliminary Information

The cleaning tool should be used to clean no more than 12 normal and 12 reverse silver contacts, after which they should be washed before re-use. The cleaning tool should be cleaned using a mild soap or detergent and water, rinsing thoroughly and allowing to dry.

b. New Sleeving

To apply new sleeving to the cleaning tool, heat seal one end by placing in a flame and pinching quickly with pliers. Stretch the sleeving over the cleaning tool and cut off excess material 1/8" beyond the end of the tool. Keeping the material stretched, heat seal the second end. Wash the tool before using if it does not appear to be perfectly clean.

4.2.2.2 Contact Cleaning Procedure

a. Apply distilled water (dispensed from a clean closed container) to a clean cleaning tool, and wash the active back contact tip members in one row of contacts while applying pressure by holding the armature. Wipe the contacts with at least six short strokes of the tool.

b. Apply more distilled water to the same tool and wash the active front contact tip members in the other row of contacts while applying pressure by holding the armature.

c. Immediately after the washing, the contacts should be wiped dry using a second clean, lint-free cleaning tool. This "dry wipe" removes or loosens any residue, such as dust, which was left from steps 'a' and 'b'. Wipe the contacts with at least six short strokes of the tool.

d. Immediately blow the contacts with filtered compressed air to remove any loose dust.

e. The washing and drying tools should then be washed before re-use.

f. If the contact resistance is still too high, burnish the contacts with metallographic paper cut in strips 1/2 inch wide and repeat steps 'a' to 'e' to remove the dust formed.

g. If the contacts are burned or pitted and the operation per step 'f' does not successfully reduce the contact resistance, burnish the contacts in the direction of slide with burnishing tool J397187. Follow with metallographic paper and repeat steps 'a' to 'd' to remove the dust formed.

4.2.3 Cleaning Relay Contacts (Alternate)

Recommended Cleaning Materials

Burnishing Tool, P.K. Neuses Co. No. 3-316	J397187
Burnishing Tool, P.K. Neuses Co. No. N318 (Heavy Duty)	J397187-001
Paper Strip, strips cut from 67 pound white Springhill Vellum Bristol Paper	J793094

Also recommended (commercially available)
Emery Paper, Wet or Dry, 600 Grit, cut in strips
Freon TF, Miller Stephenson MS180

NOTE

When using the paper strip, clean the back contacts first, then the front contacts last. Discard the paper strips when dirty.

4.2.3.1 Contacts That Are Severely Burned

a. Using a 600 grit emery paper strip folded with the grit side out so that both contacts can be burnished simultaneously, stroke the contacts in the direction of contact wipe.

b. Using the burnishing tool, stroke the contacts several times in the direction of contact wipe.

c. Place the paper strip between the open contacts, then close the contacts and withdraw the paper strip.

d. Repeat steps "c" several times if necessary.

e. Using the Freon TF spray, give the contacts a degreasing/wash.

f. Place the paper strip between the open contacts, then close the contacts and withdraw the paper strip.

g. Repeat steps "f" several times if necessary.

4.2.3.2 Contacts With Heavy Tarnish, Slightly Rough or Pitted

a. Perform the procedure in paragraph 4.2.3.1, Steps "b" to "g".

4.2.3.3 Contacts With Surface Film or Oxidation (Not Pitted)

a. Perform the procedure in paragraph 4.2.3.1, Steps "f" and "g"

4.3 CHECK-OUT PROCEDURE (Performance Test)

Perform calibration in accordance with paragraph 4.6.

4.4 REPAIRS AND REPLACEMENT

Since the contacts and armature bushings are the major wearing parts in this relay, in most cases the relay can be restored to proper operation by dressing (Paragraph 4.2.2.2) and readjusting (paragraph 4.5.3) the contacts, or repairing the armature.

4.4.1 Recommended Tools

Twist Drill - #42
Screw Driver - Torque Measuring

4.4.2 Disassembly

Dismantle the relay only to the degree necessary to complete repairs. Refer to the parts list appendix for part information and location of parts. In general, to dismantle the plug-in relay, proceed with the following sequence:

a. Remove relay cover seal.

b. Carefully remove plastic cover.

c. Remove/disassemble relay components as required.

NOTE

If only the contact block is to be removed, the Pole Piece assembly must be removed from the relay frame first because of interference from the armature counterweight.

d. Remove pole piece assembly.

e. Remove contacts/contact block as required.

CAUTION

MARK ONE SIDE OF THE ARMATURE BRACKET BEFORE REMOVAL TO ASSURE THAT IT IS NOT REVERSED DURING RE-INSTALLATION. OTHERWISE THE PARALLEL AIR GAPS WILL BE AFFECTED.

4.4.3 Reassembly

Reassembly is accomplished generally in the reverse order of disassembly. Do not overtighten or force parts when reassembling a relay. The following paragraphs provide additional instructions to be followed during reassembly of this relay.

Upon completion of reassembly, calibrate the relay as directed in paragraph 4.6.

4.4.4 General Parts Replacement

4.4.4.1 Replacing Contact Block

The contact block is a molded part with four silver-alloy normal (upper) - reverse (lower) contacts, and one silver-alloy normal-reverse control contact. As noted earlier, the pole piece assembly must be removed before the contact block can be removed because of interference from the armature weight.

If the contact block is to be replaced by another, remove the old block, then use a small punch to remove the small dowel pins. Attach the new block with the four screws. Run a #42 drill (0.0935 Dia.) thru the dowel pin holes into the epoxy contact block for a total depth of 9/16" + 1/32 - 0.

NOTE

Replacement contact blocks MUST be of the same general design.

Carefully install the dowel pins, tapping in until they are flush with the aluminum surface.

If it is necessary to install a used contact block from another relay, remove only one of the dowel pins from the aluminum frame. Carefully press the block on the remaining pin and fasten in place with the screws. One dowel pin will adequately hold the block in place. Install the contact block mounting screws and torque them to 10 $\pm$ 2 inch pounds.

Do not overtighten or force parts when reassembling a relay. Upon completion of reassembly, calibrate the relay as directed in paragraph 4.6.

4.4.4.2 Assembling the Armature and Bracket to the Pole Piece Assembly

Attach the armature, bracket and armature weight to the pole piece assembly prior to assembling it to the relay frame.

Lubricate pivots when relay is shopped. Install armature assembly with pivots adjusted per paragraph e below. Install armature assembly on the same relay with the armature bracket in the same position it was before removal.

Use special instrument oil, US&S Part No. J041099, for oiling trunnion pivots and bushings in the armature.

Use utmost care when using the oil. As the applicator rod is withdrawn, draw it slowly across the edge of the bottle opening to remove excess oil. Do not permit the rod to come in contact with any foreign material. If contamination is suspected, wipe the applicator thoroughly with a clean lintless cloth. Always close the bottle promptly with its own cap.

NOTE
STRICT ADHERENCE TO THE FOLLOWING OILING INSTRUCTIONS IS VERY IMPORTANT.

a. Examine the pivot pins and bushing holes in the armature to be sure that they are perfectly clean and free from dust.

b. Withdraw the applicator rod from the bottle so that only a single drop of oil remains on the rod.

c. Using the rod, thoroughly cover only the bearing area of the pivot pins and bushings. Since this is a non-spreading oil it must be placed directly on the surface to be lubricated. After applying the oil drop, again wipe the applicator rod carefully against the bottle opening to remove excess oil which may remain. Use the rod to distribute the oil over only the bearing area of the pivot pins and bushing holes. Any excess oil on the pivots must be removed by touching lightly with a clean lintless cloth. Care must be taken to prevent oil from covering the shoulder or the threaded area of the screws.

d. Protect the oiled parts from dust from the time of the oiling until the relay is sealed.

e. Position the pivot pins to center the armature. End play must not exceed 0.015" nor be less than 0.010". Side play between the pivots and the pivot bushings must be practically imperceptible and never exceed 0.004". Tighten the set screws securely against the pivots. Be sure that the armature is completely free on the pivots, and binding does not occur in any position. Set screws should be torqued to 15 to 18-inch pounds and then sealed with cement (US&S Part Number A041225 or some other suitable cement) mixed with powdered iron oxide for coloring.

4.5 ADJUSTMENTS

4.5.1 Armature Air Gap Adjustment

Set the armature as closely as possible to the parallel physical air gap specified below.

Relay Part No.	Air Gap (Nominal)
N322561-001; -801; -804	0.012"
N322561-002; -802; -803; -805; -806	0.018"

The physical air gap should not be less than the nominal value minus 0.002" at any point. It should not be possible to insert into the air gap, at any point, a spacer 0.002" thicker than the nominal air gap.

The Stop Pin should strike the pole face as nearly flat across its surface as possible. With one end of the armature held against its pole piece by pressure applied near the pivots, adjust the two set screws from the coil side of the assembly so that a 0.012" or 0.018" parallel air gap is obtained. With the other end of the armature held against its pole piece, determine that the air gap on that side is within limits. With the air gap so adjusted and all screws tight, determine that the armature is completely free on its pivots, has the correct end play, and has practically no vertical play between the pivots and the bushings. When this has been completed, seal all four set screws with cement (US&S Part Number A041225 or some other suitable cement) mixed with powdered iron oxide to color.

After the air gap has been set and checked, assemble the shunts to the pole pieces. Turn in the Nylok screws on the small shunt until the shoulder of the front screw head is even with the top of the small shunt. Turn in the rear screw until it is almost tight. On the larger shunt, turn in the Nylok screws until the front screw is just tight and the top of the rear screw is just below the surface of the shunt. This will allow the shunts to be adjusted away from the pole pieces under spring tension.

4.5.2 Operating Arm

The operating arm shall be inspected to make sure it is not warped and that there are no cracks or other evidence of defective molding, particularly at the contact engaging pins. There must be no flash which would come in contact with the heel springs or the operating arm clip. The epoxy coating should be uniform and not interfere with the action of the heel springs. Assemble the operating arm with the word "FRONT" facing the viewer. After assembly, the normal operating position of the operating arm shall be such that it does not touch the sides of any contact springs. The contact members may be adjusted slightly to the side if necessary to conform to this requirement. Working the armature by hand a few times will put the operating arm in its normal position. Should the bottom of the operating arm be off center more than 1/16", check to see if the

operating arm clip is touching flash on the operating arm or on the operating arm support, or if the operating arm wire itself is bent. Ascertain that the clip has proper pressure on the operating arm wire as evidenced by no forward or backward movement of the operating arm on the heel springs when the armature is operated and that there is no lost motion of the wire in the clip.

4.5.3 Contact Adjustments

4.5.3.1 General

The heavy brass contact members shall be checked to see that they are reasonably straight and that both ends are approximatey at right angles to the contact block. All adjustments of contacts shall be made by bending the heavy contact members with the bending tool applied between the rivets on the heel springs or against the contact block for the normal and reverse members. Because of the effect of the weight of the contact tips, all checks of contact adjustment shall be made with the relay in the normal upright position. If possible, adjust the contacts so that one of the tips on the bifurcated lamp contact springs hits flat with the other tip making at the same time or open not more than 0,003". Otherwise, both of the tips on the bifurcated springs must make on at least one point each with the opposite ends showing not over 0.003" light. This applies to the silver alloy to silver alloy lamp contacts and to the lower silver to silver tips of the control contact. The upper heel control contacts are spherical and both tips shall be within 0.010" of the same height from the main body of the spring. They shall touch the upper contact at the same time.

4.5.3.2 Heel Contact Springs

a. Lamp Contact Heels

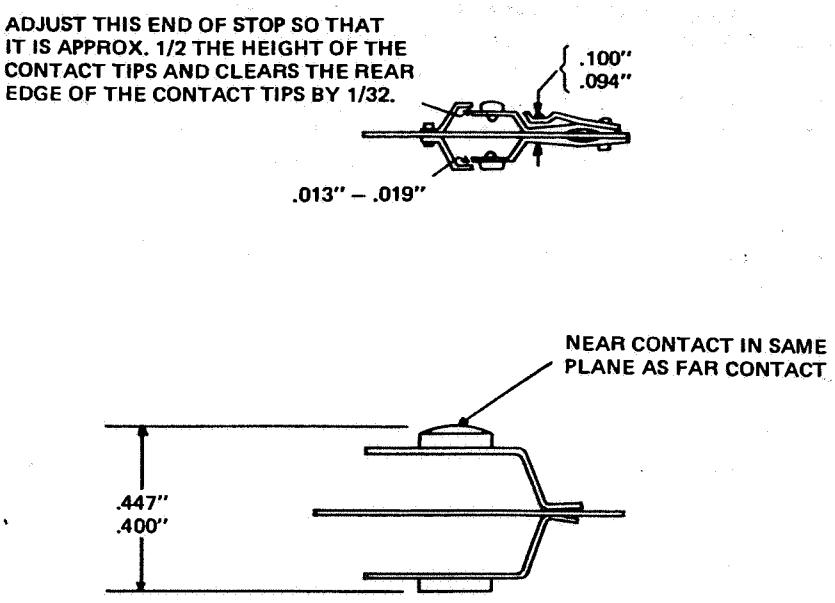
Before adjusting the heel springs it should be determined that dimensions of 0.094" - 0.100" exist as shown in Figure 4 for outside to outside across the flats of the depressions of the heel springs where the round pins of the operating arm rest. If they need adjusting, it must be done by bending the springs at the outer ends. After this adjustment, it must be determined that the springs are pressing against each other at the two points indicated in Figure 4 and that the free ends are aligned within 1/64 of an inch.

b. Control Contact Heel

Before adjusting these heel springs it should be determined that the dimensions exist as shown in Figure 4 and that the bifurcated parts have a slight trapped pressure against the main member.

4.5.3.3 Adjusting the Contact Springs

a. First adjust all contact stop springs closed with no trapped pressure.



A. Control Contact Heel

B. Lamp Contact Heel

Figure 4. Contact Heels

b. Using the nominal spacer, called for in Table I, Test 2, held firmly between the front stop pin and the pole face, adjust the upper (normal) lamp contact springs so that light is just barely visible between the contact tips. The armature can be held in the normal position electrically by placing a thin piece of paper between the normal control contact and its heel and energizing the relay. A 0.003" thinner spacer (Test 2A) should allow the contacts to close. Deenergize the relay and remove the spacer.

c. Remove the operating arm and hold it clear from all heel springs. Adjust the heel spring members so that they are just touching the upper (normal) lamp contacts with no trapped pressure.

d. Replace the operating arm and work the armature by hand a few times to get the operating arm into its normal operating position.

e. Replace the #2 Test spacer, energize the relay and readjust the upper (normal) lamp contact springs as before. Check that the #2A Test spacer allows the contacts to close.

f. Using the normal #3 Test spacer between the rear stop pin and the pole face, adjust the lower (reverse) lamp contact springs so that light is just barely visible between the contact tips. The armature can be held in the reverse position electrically by placing a thin piece of paper between the reverse control contact and its heel and energizig the relay. Check that the #3A spacer allows the contacts to close. Remove the spacer, deenergize the relay.

g. Again remove the operating arm and determine that the heel contacts have at least 0.075" opening at the reverse (lower) lamp contacts and that they are just open or just touching the normal (upper) lamp contacts with no trapped pressure.

h. Replace the operating arm and work the armature by hand a few times to get the operating arm into its normal operating position. When the armature is in the fully energized position, either normal or reverse, the opposite lamp contacts must have at least 0.110" opening.

i. Control Contacts

Caution: Bridged control contacts will cause a short circuit.

The method for adjusting the control contact springs is similar to that for the normal and reverse lamp springs. Tests 4, 4A, 5 and 7 from Table I are used. However, the thin paper insulator used between the control heel and normal or reverse contact to secure the stop pin spacer when the relay is energized to hold the armature in the proper position for contact adjustment should not be used, since the paper insulator will interfere with observing the contact openings. Instead, the armature may be held firmly in place by a wedge, or the heel control contact lead can be removed from the lower right terminal (viewed from front) of the upper connection block. The relay can then be energized and moved to the desired position where it will hold for adjustment.

j. The lower stop spring of the upper control contact shall be adjusted so that it is touching with 10 grams trapped pressure. The upper stop shall be adjusted to be just open when a 0.060" front stop pin spacer is used (Test 4A).

4.5 CALIBRATION AND TIMING

After the relays have been adjusted in accordance with the foregoing paragraphs, they shall be calibrated by means of the adjustable shunts to meet the requirements outlined in the tables.

The purpose of the small adjustable shunt on the right side of the relay (when viewing the relay from the front) is to balance the unequal "on time" due to the armature counterweight. The purpose of the larger adjustable shunt on the left side of the relay is to adjust the number of operations per minute. These shunts should not be disturbed if the frequency variation is less than ±2 flashes per minute nominal frequency measured at 10-volts, or the normal-reverse on-times are within 10% of each other.

4.6.1 Flash Rate Test

Test the operating characteristics of the PF-256 relay as detailed in the following paragraphs.

4.6.1.1 Recommended Test Equipment.

NOMENCLATURE	PART/MODEL/TYPE NO.
Power Supply, 0-40 Vdc	HP6205B
Digital Multimeter	HP3435A
SPST (single pole, single throw) Switch	
Counter	Redington Counter R9-3206
Stopwatch	Accurate within 0.1 sec.
On-Time Meter	PD-30 (Simpson TS-111)

4.6.1.2 Procedure

Connect the flasher relay test circuit, as shown in Figure 5, and proceed as follows:

a. Set dc power supply to appropriate D.C. voltage range.

b. Set M1 to appropriate DC voltage range.

c. Turn dc power supply on.

d. Slowly increase dc power supply output control setting. Relay should start operating when M1 indicates 5 volts maximum (6 volts for N322561-803; -806).

e. Increase power supply output until M1 indicates 8.0 volts.

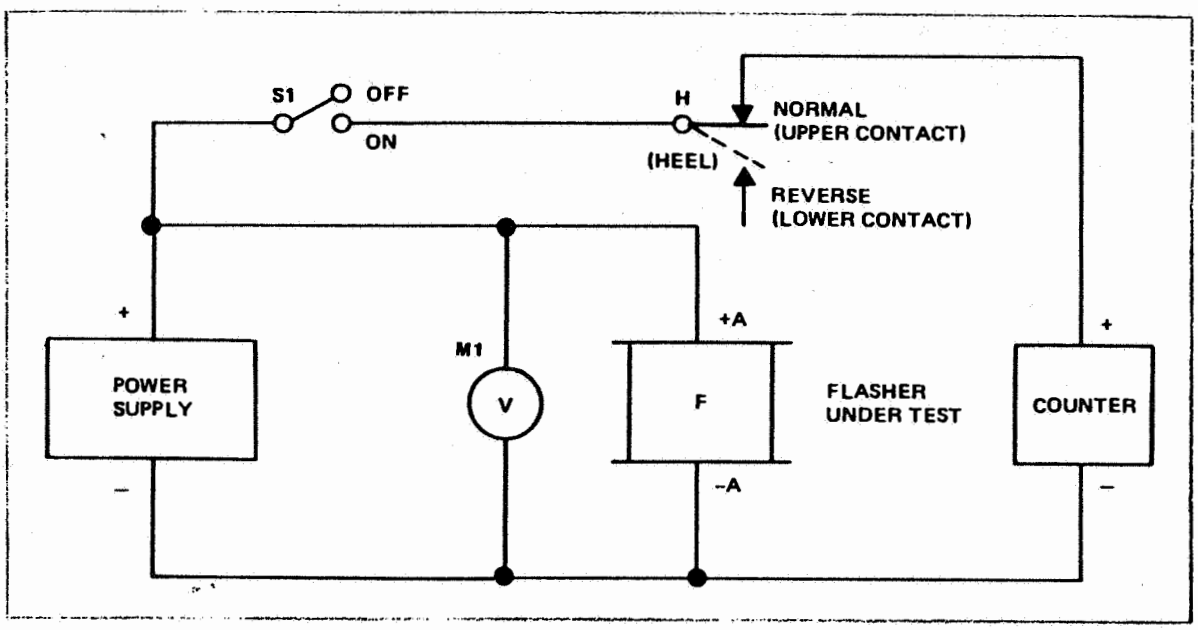


Figure 5. Flasher Relay Test Circuit

f. Set switch S1 to the ON position and simultaneously begin to time a period of three minutes.

g. At the end of precisely three minutes, set switch S1 to OFF, and note the reading at the counter.

h. Divide the counter reading by three. The resultant rate should be as specified in Table II.

i. Repeat steps e, f, and g with the DC power supply output control set for a reading of 10 volts on the M1. Divide the counter reading by three. The resulting rate should be as specified in Table II.

j. Repeat steps e, f, and g with the DC power supply output control set for a reading of 12 volts on the M1. Divide the counter reading by three. The resultant rate should be as specified in Table II.

k. With switch S1 set to OFF and the relay operating at 10 Volts, connect leads of on-time meter across heel and normal contacts, and then across heel and reverse contacts. Normal and reverse contact on-time readings should be within 10% of each other.

l. Test concluded. Disconnect relay from test circuit.

4.6.1.3 Adjustment Procedure

a. When adjustments are necessary, an off-set screwdriver is required. The shunts are held and adjusted by two screws (lower) from the contact side of the relay frame and one screw (upper) for locking and adjusting from

the coil side of the relay frame. The screws on the coil side determine the gap width. The upper and lower screws produce counter forces and any tightening of the upper screws must be accompanied by loosening of the lower screws.

b. Spacing is required only at the rear end of the large shunt and the front end of the small shunt. The large shunt adjusts frequency. Increasing the air gap of the large shunt increases frequency. The space range is between 0 and 0.10". Adjusting the air gap of the small shunt balances the unequal on-time due to the armature counterweight.

c. Connect an on-time meter (PD-30) across one of the heel and normal lamp contacts, and operate per paragraph 4.6.1.2 k. While the relay is operating on "Timing Test Volts" per Table II, note the on-time of the circuit. Repeat the same test on the reverse lamp contact of the same heel contact. Adjust the small shunt by means of the screw from the coil side of the pole piece assembly to obtain equal time on the two contacts within ±10%.

d. Adjust the large shunt by a similar screw to obtain the desired number of operations per minute per contact as listed in Table II. After all adjustments have been made, recheck the on-times of the normal and reverse contacts and also check the flash rate. Readjust if necessary.

e. Check the operations per minute per contact at the maximum and minumum test volts per Table II. Check that the upper stop on the control heel contact spring does not interfere with the upper control contact tip.

f. The starting voltage shall be checked by applying and slowly increasing the voltage until the relay begins to operate with the armature making complete cycles. Apply and interrupt this starting voltage to the relay a few times. This value shall not be higher than that listed in Table II for "Maximum Starting Volts".

4.7 CALIBRATION REQUIREMENTS

4.7.1 In-Service Test

Calibration requirements will be met when the relay adjustment values are the same as those given in Table I and II of this manual.

After any shop adjustments are made, check the calibration values (paragraph 4.6) and if they are not within the values given in Table I and II of this manual the relay should not be placed in service.

4.7.2 Contact Resistance

Resistance of front contacts should be measured with the armature in its full-stroke position, and resistance of back contacts should be measured with the armature fully released. Cleaned contact resistances should not exceed the following values.

Contacts	Ohms
Silver Alloy to Silver Alloy	0.03

4.8 MODIFICATIONS

4.8.1 Internal Fuse

NOTE

For Application and Wiring Diagram see Figure 6. All flasher production after June 10, 1978, will include item number 2, 5-ampere fuse, part number J710140. Repair package N438382 is an assembly with new block, fuse and diodes, preassembled for updating relays to present.

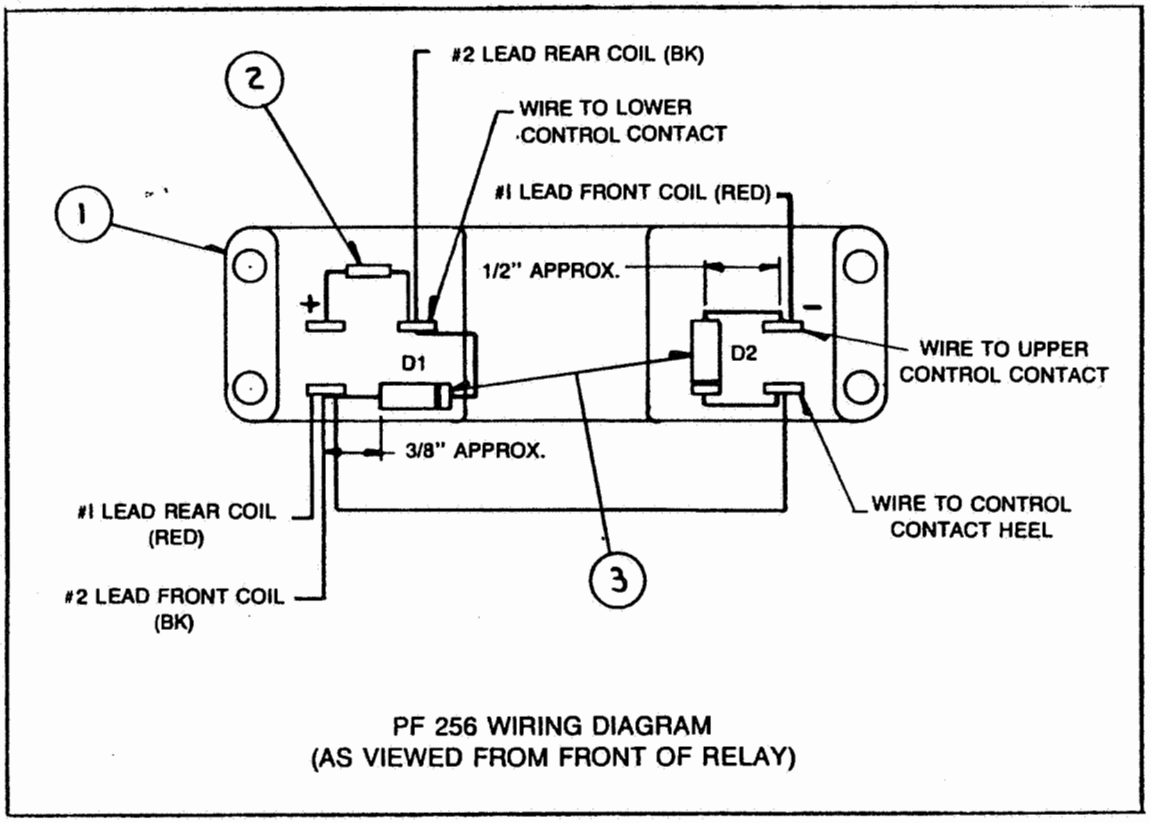


Figure 6. Application and Wiring Diagram

ITEM	DESCRIPTION	PART NUMBER
1	Contact Block	M385764
2	Fuse, Pico, 5A. 125V	J710140
3	Diode, 1N4007, 1A. 1000V	J723912

Repair package, N438382, contains block M385764, fuse and diodes, prewired for insertion into relay.

4.8.2 External Diodes

Existing flasher relays with internal diodes can be modified to use external diodes. Relays with Part Numbers N322561-001 (-801); -002 (802) and -803, can be converted to N322561-804; -805 and -806 respectively. This modification is extensive and should be performed in the relay shop.

NOTE

Rewiring of the relay should only be done whenever the circuit wiring is to be changed to accommodate the externally mounted diode board. Failure to mount the external board will result in rapid deterioration of the control contacts within the relay and no short circuit protection for external wiring.

Modification kit, X451131-3801 contains the necessary parts to modify one relay and one mounting base. Kit X451131-3802 contains the necessary parts to modify one relay only. This kit can be used to modify relays for spares for circuits that are wired to accommodate the externally mounted diode board.

4.8.2.1 Procedure

a. Remove the top cover of the relay.

b. Unsolder the wires from the terminals of the coil block.

c. Remove the coil terminal block.

d. Install the new coil terminal block (M385764-001).

e. Referring to Figure 7, rewire the block. (Figure 8 shows the overall circuit diagram.)

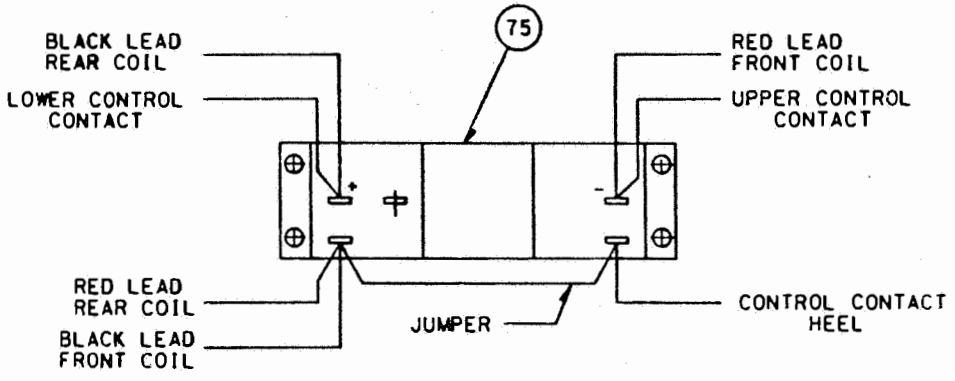


Figure 7. Revised Relay Wiring (Internal)

f. Ensure that the relay, base and diode board are wired as shown in Figure 8, then perform a calibration check (paragraph 4.6) to verify proper operation.

NOTE

Because of the 16 ohm current limiting resistor, the starting voltage will appear high. Measure the starting voltage at Point #1 on the board. The resistor provides current limiting should a diode short or a control contact bridge. Its presence should not cause any adverse effects.

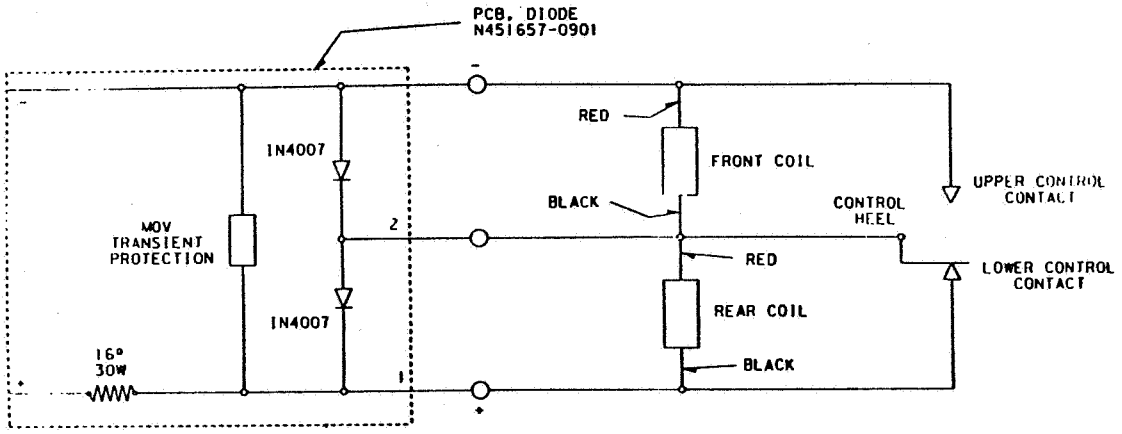


Figure 8. Overall Modified Circuit Diagram

4.8.2.2 Parts List (X451131-3801)
See Figures 3 and 7

Item No.	Description	Part No.
5	Screw, 1/4-20 x 1-1/4, Rd. Hd.	J052667
10	Lock Washer, 1/4-20, Stl.	J047775
15	Nut, 1/4-20, Hex.	J048002
20	Diode PCB	N451657-0901
25	Receptacle Spring	M451142-2701
30	Receptacle Spring	M451142-2702
35	Lead, White	N395668
40	Lead, Red	N397832-003
45	Lead, Black	N397832-002
50	Print, Drawing	P451131-0033
55	Index Plate	J776330
60	Name Plate	J631104
65	Wire, 2 Ply. #23 Galv. X 12	A043013
70	Seal, Lead	J079351
75	Terminal Block	M385764-001
80	Index Pin	J487090

NOTE: X451131-3802 is comprised of Items 50 through 80.

TABLE I. ADJUSTMENT AND CALIBRATION

Test No.		Nominal	Minimum	Maximum	Remarks
1	Armature Stroke		0.245"		Front Stop Pin Spacer for Checking Armature Stroke.
2	Normal (Upper) Lamp Contact Adjust.	0.090"	0.085"	0.095"	Front Stop Pin Spacer. Contact Just Open.
2A	Normal (Upper) Lamp Contact Adjust.	0.087"	0.082"	0.092"	Front Stop Pin Spacer. Contact Must Close.
3	Reverse (Lower) Lamp Contact Adjust.	0.060"	0.055"	0.065"	Rear Stop Pin Spacer. Contact Just Open.
3A	Reverse (Lower) Lamp Contact Adjust.	0.057"	0.052"	0.062"	Rear Stop Pin Spacer. Contact must Close.
4	Upper Control Contact Adjustment	0.058"	0.053"	0.063"	Rear Stop Pin Spacer. Contact Just Open. Armature must not stall or fail to follow through to the reverse position in one motion with "Minimum Operating Volts" applied to the relay coils.
4A	Upper Control Cont. Upper Stop Adjustment	0.060"			Front Stop Pin Spacer. Stop Just Open.
5	Lower Control Contact Adjustment	0.035"	0.030"	0.040"	Rear Stop Pin Spacer. Contact Just Open. Armature must not stall with "Minimum Operating Volts" applied to the relay coils. Control contacts must not bridge.
6	Normal (Upper) Lamp Contact Openings		0.075"		With Reverse Contacts Just Closed.
6A	Normal (Upper) Lamp Contact Openings		0.110"		Rear Stop Pin Touching.
6B	Reverse (Upper) Lamp Contact Openings		0.075"		Operating Arm Removed. (Heels Biased Up, just touching Normal Contact.)
7	Lower Control Contact Opening		0.020"		Operating Arm Removed. (Heel Biased Up, just touching Normal Contact.)
8	Maximum Starting Volts			Table II	Apply and increase voltage until armature cycles completely.
9	Timing Test Volts	Table II			
10	Operations Per Minute	Table II			
11	Parallel Air Gap -001 Suffix	0.012"	0.010"	0.013"	Check Air Gap with Armature held tightly to pole pieces by finger pressure applied midway between pivots and rear stop pin, also by pressure applied midway between pivots and front stop pin.
	-002 Suffix	0.018"	0.016"	0.019"	
	-801, -804 Suffix	0.012"	0.010"	0.013"	
	-802, -805 Suffix	0.018"	0.016"	0.019"	
	-803, -806 Suffix	0.018"	0.016"	0.019"	

TABLE II
CALIBRATION VALUES

NORMAL OPERATING RANGE				SHOP ADJUSTMENT							
						FREQUENCY IN FLASHES PER MINUTE PER LAMP					
Part No. N322561-	Relay Resis.	Normal Oper. Voltage	Flashes Per Min. Per Lamp	Min. Oper. Volt.	Max. Starting Volt.	Timing Test Volt.	Nom. Freq. ±2	Max. Volt.	Max. Freq.	Min. Volt.	Min. Freq.
001;801;804	87.5 87.5	8-12	45-55	7.2	5.0	10	48	12	55	8	45
002;802;805	87.5 87.5	8-12	60-72	7.2	5.0	10	65	12	72	8	60
803;806	87.5 87.5	8-12	69-81	8.0	6.0	10	75	12	81	8	69

SERVICE MANUAL 4565
Appendix A

Parts List

DC FLASHER VITAL RELAY PF-256

Part Numbers

N322561-	001	002	
N322561-	801	802	803
N322561-	804	805	806

THIS MANUAL SUPERSEDES SM-4565 DATED MARCH, 1984

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UNION SWITCH & SIGNAL INC.
5800 CORPORATE DRIVE, PITTSBURGH, PA 15237

PARTS LIST

A.1 PF-256 D.C. FLASHER RELAYS (See Figure A1)

Reference	Relay Part Number	No. Contacts	Flasher/Min
"A"	N322561-001	4N-4R	45-55
"B"	N322561-002	4N-4R	60-72
"C"	N322561-801	4N-4R	45-55
"D"	N322561-802	4N-4R	60-72
"E"	N322561-803	4N-4R	69-81
"F"	N322561-804	4N-4R	45-55
"G"	N322561-805	4N-4R	60-72
"H"	N322561-806	4N-4R	69-72

NOTE * Suffix numbers -001 and -801 are identical except for the use of Lexan Covers on the 801. This also applies to -002 and -802.

ITEM NO.	DESCRIPTION	PART NO.	USED ON RELAY REF.
1	Frame	M349197	All
2	Latch Rod	M349392	All
3	Latch Button	J770536	All
4	Nut	M395496	All
5	Latch	M321728	All
6	Dowel Pin	J048716	All
7	Spring	M321861	All
8	Armature Bracket	M385743	All
9	Pivot	M385744	All
10	Scr. #8-32 x 5/16" Hx. Soc. cup Pt.	J050731	All
11	Scr. #6-32 x 1/2" Fil. Nylok	J522139	All
12	Screw	M385766	All
13	Armature (0.012 Air Gap)	N385763	A,C,F
13	Armature (0.018 Air Gap)	N385763-001	B,D,E,G,H
14	Spring, Operating Arm	M349590	All
15	Nut Lock	M275388	All
16	Shunt	M385741	All
17	Shunt	M385745	All
18	Coil Spring	M194862	All
19*	Contact Block	N385747	All
20	Screw #8-32 x 7/8" Fil. Nylok	J522104	All
21	Armature Weight	R436445	All
22	Scr. #6-32 x 7/16" Hx. Soc, Cup Pt.	J050728	All
23	Operating Arm	M385765	All
24	Pole Piece & Core Assembly	R384242	All
25	Screw #8-32 x 3/4" Fil. Nyloc	J522141	All
26	Scr. #8-32 x 5/8" Flat Stl. T.Pl.	J052066	All
27	Scr. #6-32 x 1/2" Fil. Hd. Mach. Tin Plate	J052244	All

ITEM NO.	DESCRIPTION	PART NO.	USED ON RELAY REF.
28	Coil	N188858	All
29	Washer	M168824	All
30	Washer	M168826	All
31	Back Strap	M385740	All
33	Scr. #8-32 x 1/4" Flat Hd.	J521104	All
34	Block, Coil Contact	M385764	A-E
	Block, Coil Contact	M385764-001	F-H
35	Screw, #8-32 x 3/8", Flat Hd.	J052065	All
36	Shims	M437208	E
37	Parts Bag	N349711-6101	A,C
37	Parts Bag	N349711-6102	B,D
37	Parts Bag	N349711-6103	E
37	Parts Bag	N349711-6104	F
37	Parts Bag	N349711-6105	G
37	Parts Bag	N349711-6106	H
38	Coil Lock	M349652	All
40	Screw	M349622	All
41	Indexing Pin	J487090	All
42	Gasket	J047081	All
43	Screw #8-32 x 7/16" Fil. Stl. Tin Plate	J522042	All
44	Bottom Cover	J776307-0001	A,B,E
	Bottom Cover	J776598	C,D
45	Screw	J522042-001	All
46	Top Cover	J776597	All
47	Handle	J561111	All
48	Lock Washer #10 Int. Tooth Ph. Bz. N. Plate	J047710	All
49	Screw #10-32 x 3/8" Rd. Hd. Brass N. Plate	J051666	All
50	Vent Seal	J790257	All
51	Calibration Tag	S000192	All
53	Seal Wire	A043013	All
54	Seal	J079351	All
55	Name Plate	J631104	All
56	Screw #4-40 x 3/16" Rd. Stl. (F) Tin Plate	J525024	All
57	Screw #8-32 x 7/16" Rd. Hd. Stl. Mach. Tin Plate	J525106	All
58	Tag Form 108	S000108	All
59	Screw #8-32 x 7/8" Rd. Stl. Mach. Tin Plate	J052603	All
60	Lock Washer, #8 Shprf.	J047714	All
61	Diode, 1N4007	J723912	A-E
62	Fuse, 5 Amp. 125V	J710140	A-E

* NOTE: Item 19 is supplied as a one piece molded contact block and individual parts for older style are obsolete.

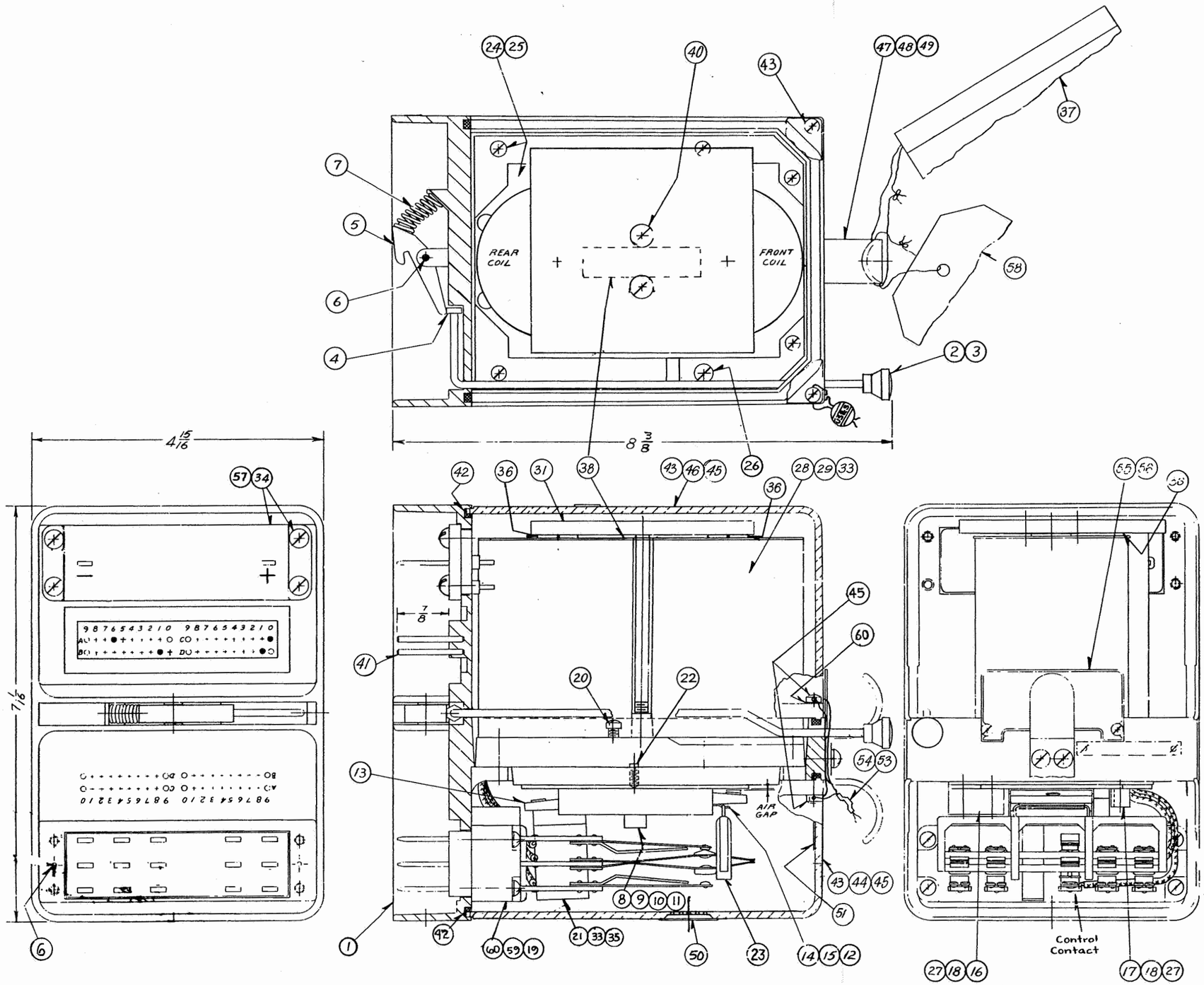

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Figure A-1. PF-256 Flasher Relay

A.2 OLD STYLE MOUNTING BASE - N384243
Refer to Figure A2.

Item No.	Description	Part No.
1	Base only	J776306
2	Coil Clamping Plate	J776318
3	Contact Clamping Plate	J776308
4	Screw, 6-32 x 5/8, Rd. Stl.	J525061
5	Strike	M321745
6	Nut	M267499
7	Tag	J075828
8	Screw, 4 x 3/16, Rd. Stl.	J052674
9	Indexing Plate (see Relay Parts Bag)	
10	Screw, 6-32 x 1-1/4 (see Relay Parts Bag)	J525099
11	Receptacle Contact Spring, Solderless, For #14 to #16 Wire	J680165
	Receptacle Contact Spring, Solderless, For #18 to #20 Wire	J680179
	Receptacle Contact Spring, Solderless, For #10 to #12 Wire	J680181

NOTE

When mounting base complete is ordered, a bag of parts is included that contains:

(2) Tags (Item 7)
(4) #4 x 3/16, Rd. Hd. Screws (Item 8)
*(4) 1/4-20 x 1-1/4 Rd. Hd. Screws - J052667
*(4) 1/4 Lock Washer, Stl. - J047775
*(4) 1/4 Plate Washer, Stl. - J047501
*(4) 1/4-20 Hex Nut, Stl. - J048002

and

(Required quantity) - Receptacle contact springs (J680165) for #14 to #16 wire. If other wire size is needed, request the proper part number as shown in Item 11 when ordering base complete (i.e. N349769, except using receptacle contact springs, solderless, J680181).

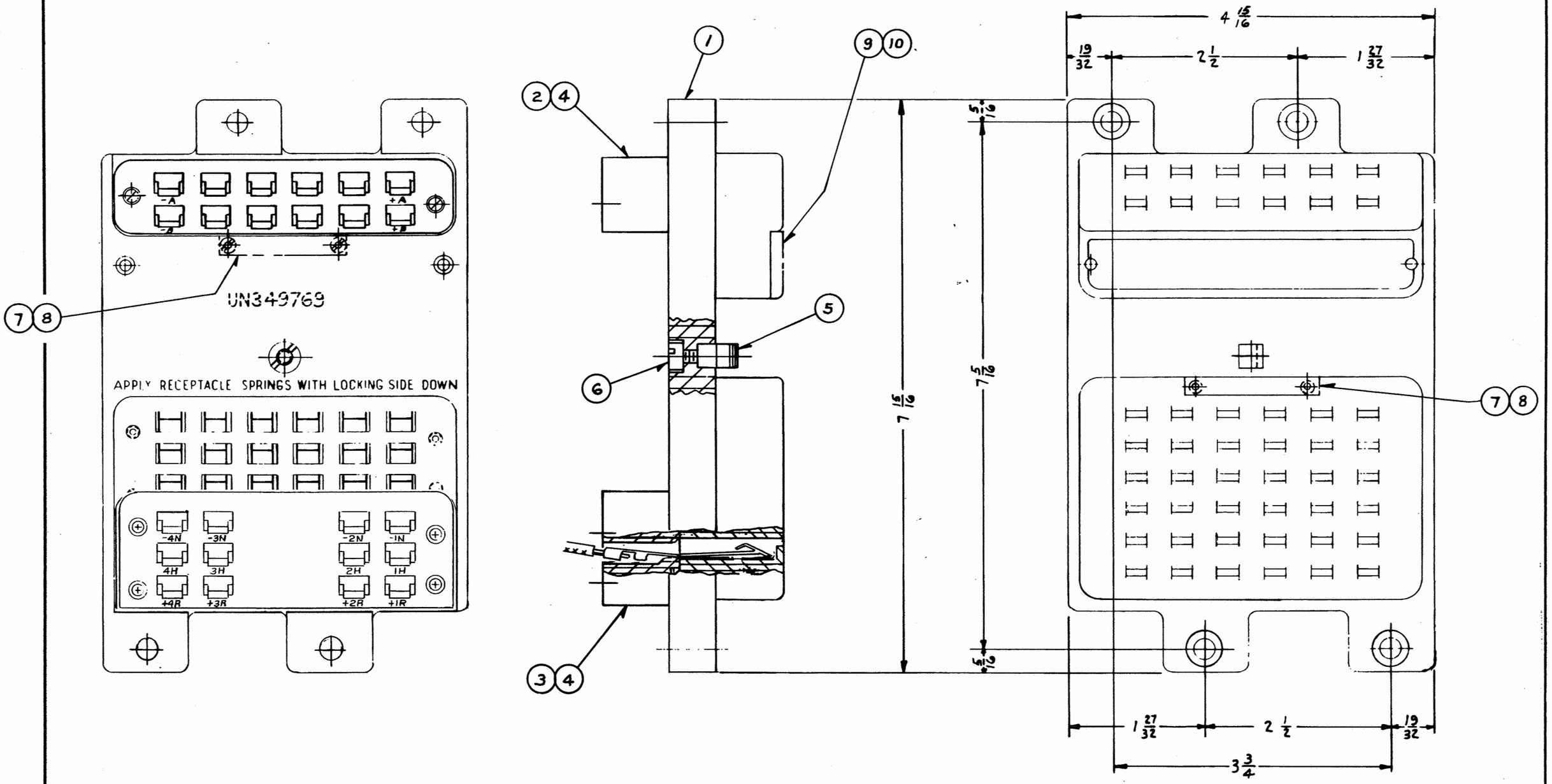
(*) These items are for attaching mounting base to the rack.

A.3 RELAY EXTERNAL DIODE KIT (X438970)

Item No.	Description	Part No.
5	Screw, 1/4-20 x 1-1/4, Rd. Hd.	J052667
10	Lockwasher, 1/4, Stl.	J047775
15	Nut, 1/4-20, Hex.	J048002
20	Diode PCB	N451657-0901
25	Receptacle Spring	M451142-2701
30	Receptacle Spring	M451142-2702
35	Lead, White	N395668
40	Lead, Red	N397832-003
45	Lead, Black	N397832-002
50	Print, Drawing	F451131-0038

A.3.1 Diode PCB (N451657-0901)

Item No.	Description	Part No.
5	Printed Circuit Board	J776617-0111
10	Diode, 1N4007	J723912
15	Varistor, 82V dc V82ZA12	J735528
20	Resistor, 16 ohm, 30W	J073844
25	Terminal, Faston, Male Tab	J731468
30	Mounting Bracket	M451563-6801
35	Pop Rivet	J490049
40	Screw, 6-32 x 3/4 Rd. Hd. Stl.	J525017
45	Lock Washer, #6	J047713
50	Nut, 6-32, Hex Stl.	J048148
55	Flat Washer, #6	J047996
60	Screw, 6-32 x 3/8, Rd. Hd. Stl.	J525031



D66339-1B Rev. 9

Figure A-2. Old Style Mounting Base for PF-256 Relays

A.4 IMPROVED MOUNTING BASE - N438689-001
Refer to Figure A3.

Item No.	Description	Part No.
1	Base only	J780054
2	Strike	J792848
3	Nut	J480280
4	Receptacle Contact Spring, Solderless, For #14 to #16 Wire	M451142-2702
4	Receptacle Contact Spring, Solderless, For #18 to #20 Wire	M451142-2701
4	Receptacle Contact Spring, Solderless, For #10 to #12 Wire	M451142-2703
5	Tag	J075951
6	Screw, 1/4-20 x 1-1/4, Rd. Hd.	J052667
7	Lock Washer, 1/4 Stl.	J047775
8	Plate Washer, 1/4 Stl.	J047501
9	Nut, 1/4-20, Hex. Stl.	J048002

NOTE

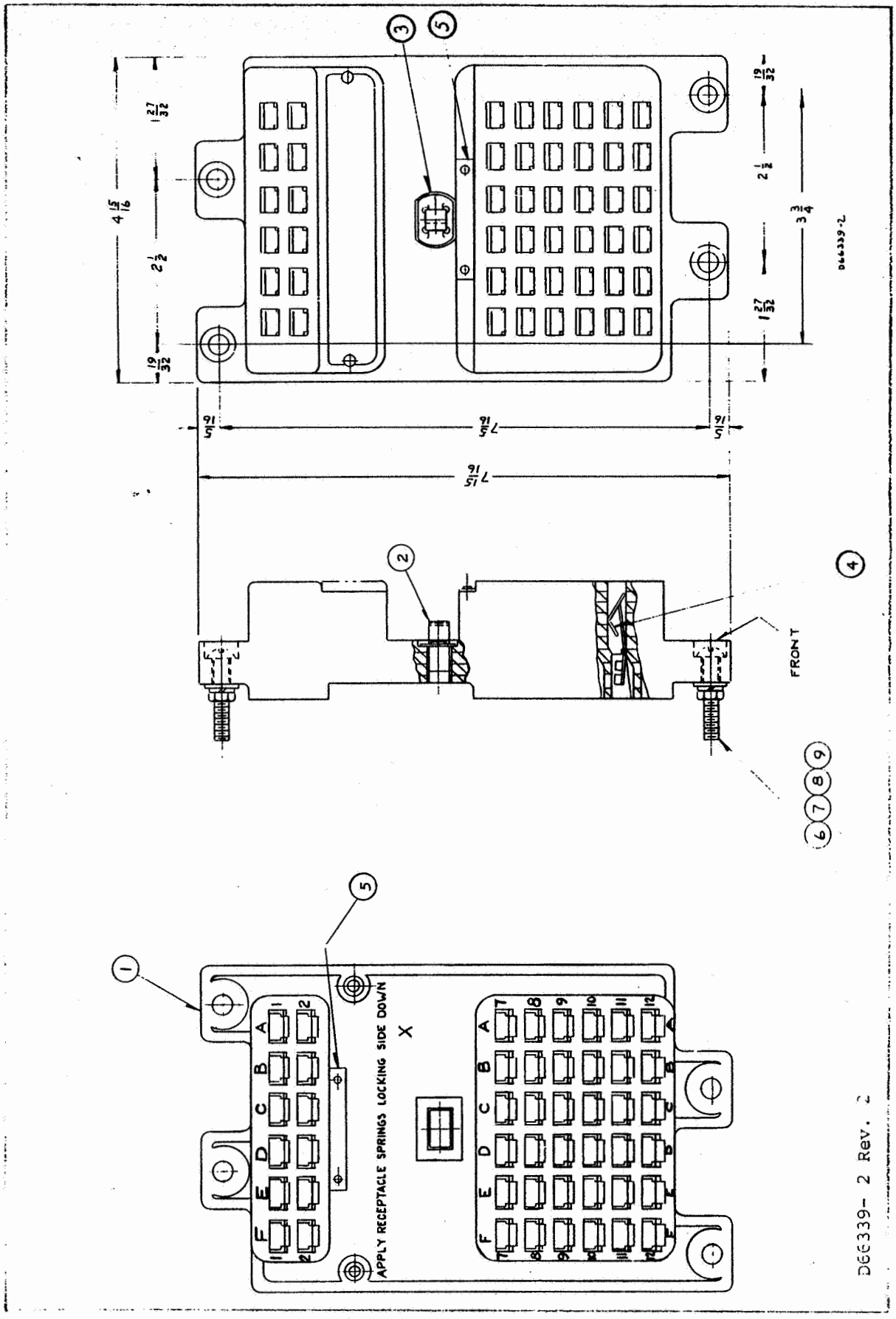
When mounting base complete is ordered, a bag of parts is included that contains:

(2) Tags (Item 5)
*(4) Screws (Item 6)
*(4) Lock Washers (Item 7)
*(4) Plate Washers (Item 8)
*(4) Nuts (Item 9)

and

(Required quantity) - Receptacle contact springs (M451142-2702) for #14 to #16 wire. If other wire size is needed, request the proper part number as shown in Item 4 when ordering base complete (i.e. N438689-001, except using receptacle contact springs, solderless, M451142-2703).

(*) These items are for attaching mounting base to the rack.



1965, p. A10

Figure A-3. Improved Mounting Base for PF-256 Relay