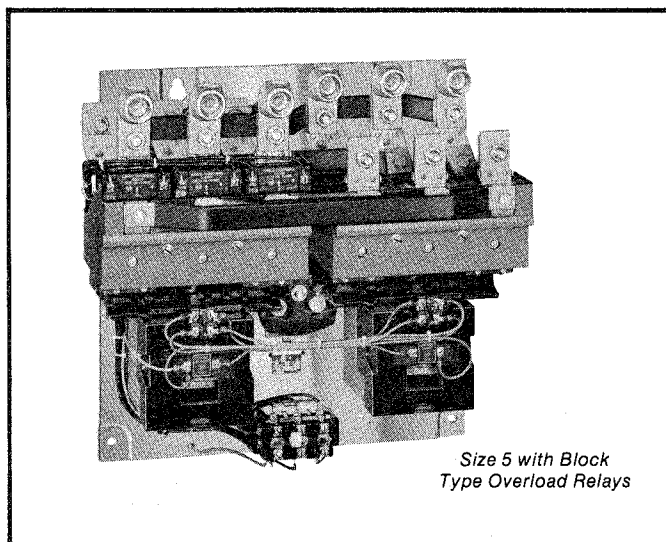




FULL VOLTAGE REVERSING STARTERS

Size 5 Series A Construction



OPERATION — These bulletin 505 starters are used for applications full voltage starting and reversing of polyphase squirrel cage motors and controlling the primary windings of slip-ring motors.

Bulletin 505 starters consist essentially of a "Forward" and a "Reverse" contactor mounted to a common base. These contactors are electrically and mechanically interlocked to guard against both contactors closing at the same time. A single block having three overload relays is provided on all enclosed starters. Open type starters are supplied with either a single block having three overload relays mounted below the contactors or two or three relays mounted at the side of the contactors.

Either 2 wire or 3 wire control devices may be used as control means.

ENGINEERING DATA —

3 PHASE • 600 VOLTS MAXIMUM • 60 Hz		
Continuous Ampere Rating ¹	Motor Volts	Maximum Horsepower Rating
270	200	75
	230	100
	460	200
	575	200

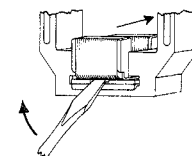
¹ Full load current must not exceed "Continuous Ampere Rating."

PREVENTIVE MAINTENANCE — For recommended preventive maintenance instructions refer to Publication GI-5.0 or the Handy Catalog.

REPAIRS — Starters can be disassembled as depicted in the illustrations on Page 2 of this Parts List. Additional consideration should be given to the following techniques.

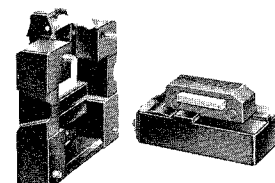
Removing Magnet Armature —

To remove the magnet armature from the movable contact support, insert screwdriver into slot as illustrated and lift screwdriver in the direction shown. At the same time push the magnet armature out. It may be necessary to wiggle the armature before it can be removed because of the pressure applied by the retainer spring.



Replacing Operating Coil —

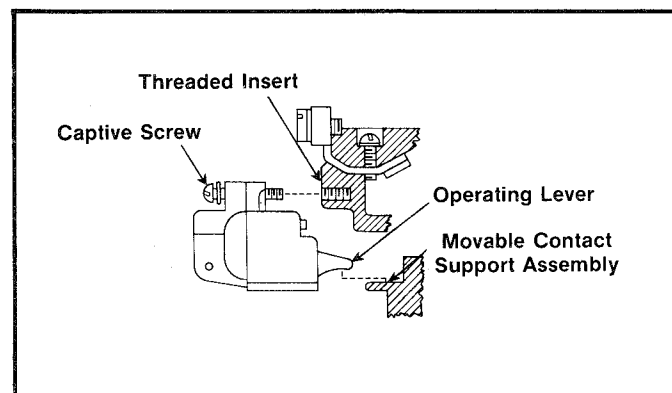
To replace the operating coil, first insert the magnet yoke into the operating coil as shown. After this has been done, insert both the operating coil and the magnet yoke as a unit into the coil cover. When replacing the coil cover into the switch unit, be sure the operating lever of the interlock contact rests on top of the movable contact support, and the yoke retainer is in place.

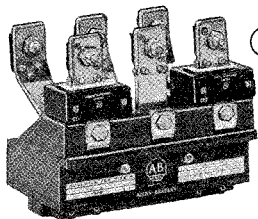


BULLETIN 1495 AUXILIARY CONTACTS — These auxiliary contacts are designed to operate on the upward motion of the movable contact support assembly. The auxiliary contacts are furnished with a captive screw. The captive screw is used to engage either of the four inserts imbedded in each of the contact block front covers. Refer to illustration below.

IMPORTANT — The auxiliary contact operating lever **must** rest on top of the movable contact support assembly.

- 1495-F1 (1 N.O. auxiliary contact)
- 1495-G5 (1 N.C. early break auxiliary contact)
- 1495-H0 (1 N.C. late break auxiliary contact)

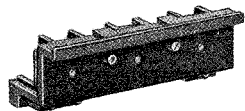




① **Stationary Contact Block Assembly**
(See Note)

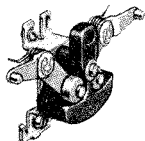


② **Contact Block Spacer**
(only)



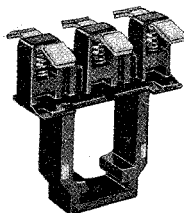
③ **Contact Block Cover**
(only)

⑬ **Mechanical Interlock Assembly**

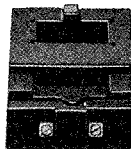


(See page 4
for instructions)

④ **Movable Contact Support Assembly**



Operating Coil
(includes spring)
(See Table Page 3)



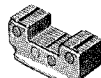
⑧ **Yoke Retainer**



⑥ **Yoke**



⑦ **Armature**



⑨ **Armature Retainer**

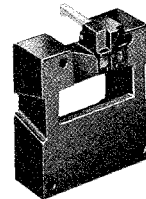


⑩ **Retainer Spring**



⑤ **Yoke and Armature Assembly**

⑪ **Coil Cover**



CONTACTS ⊕

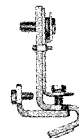


⑮ **Transformer Spring**
(See Note)



⑯ **Current Transformer**
(See Note)

⑬ **Front Stationary Contact Assembly**



⑭ **Rear Stationary Contact Assembly**



⑰ **Movable Contact**



⑱ **Movable Contact Spring**



505 Size 5 Series 'A' Construction

Item No.	Part Description	With Overload Relays		Without Overload Relays
		Left-Hand Contactor	Right-Hand Contactor	Both Contactors
		Part Number	Part Number	Part Number
1	Stationary Contact Block (less contacts, less spacer, less cover)	X-277415	X-277415	X-277415
2	Stationary Contact Block Spacer	F-20477	F-20477	F-20477
3	Stationary Contact Block Cover	X-232815	X-232815	X-232815
4	Movable Contact Support Assembly (less contacts and springs)	F-20798	F-20798	F-20798
5	Yoke and Armature Assembly (60-50Hz) (includes yoke/armature retainers and spring)	Z-31852	Z-31852	Z-31852
	Yoke and Armature Assembly (25Hz) (includes yoke/armature retainers and spring)	Z-31856	Z-31856	Z-31856
6	Yoke (60-50Hz)	Purchase complete yoke and armature assembly (item 5)	Purchase complete yoke and armature assembly (item 5)	Purchase complete yoke and armature assembly
	Yoke (25Hz)			
7	Armature (60-50-25Hz)			
8	Yoke Retainer	F-20478	F-20478	F-20478
9	Armature Retainer	F-20479	F-20479	F-20479
10	Retainer Spring	B-29481	B-29481	B-29481
11	Coil Cover – with Normally Closed Interlock Contact	Z-21144	Z-21144	Z-21144
	Coil Cover – with Normally Open Interlock Contact	Z21145	Z21145	Z21145
	Coil Cover – with Normally Open-Normally Closed Interlock Contact (comes as standard on the device)	Z-21146	Z-21146	Z-21146
	Coil Cover – without Interlock Contacts	Z-21147	Z-21147	Z-21147
12	Rear Stationary Contact Assembly	Order Single Pole Contact Set (qty 6 req'd per device)	Order Single Pole Contact Set (qty 6 req'd per device)	Order Single Pole Contact Set (qty 6 req'd per device)
13	Front Stationary Contact Assembly			
14	Movable Contact			
15	Movable Contact Spring			
12-15	Single Pole Contact Set (includes one[1] Front and Rear Stationary Contacts, Movable Contact and Movable Contact Spring)	Z-34043	Z-34042	Z-34042
16	Current Transformer Spring (qty 3 req'd)	B-31520	Not Used	Not Used
17	Current Transformer (300 to 5 amp ratio) (qty 3 req'd)	X-241563	Not Used	Not Used
18	Mechanical Interlock Assembly	Z-19134		Z-19134
	Lug	X-314129	X-314129	X-314129
	Lug Bolt	M-422	M-422	M-422
	Heater Element Screw	M-1552		Not Used

NOTE: Current transformers and transformer springs are not included on the stationary contact block assemblies or in any of the single pole contact sets. These parts must be ordered separately.

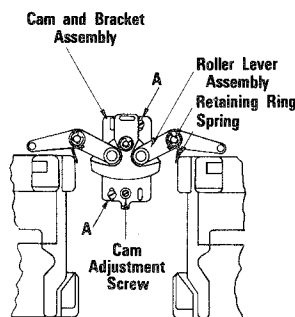
Overload Relay

Parts information on page 5

OPERATING COILS						
Volts	Hz	Coil Number	Coil Current		Volt-Amperes	
			Inrush	Sealed	Inrush	Sealed
120	60	CF236	16.3	.811	1950	98
110	50		16.2	.890	1785	98
110	60	CF232	17.7	.884	1950	98
95	50		17.8	.920	1695	88
110	25	CF607	8.5	.665	930	74
208	60	CF249	9.4	.468	1950	98
240	60	CF254	8.2	.406	1950	98
220	50		8.1	.445	1785	98
220	60	CF251	8.9	.442	1950	98
220	25	CF615	4.3	.333	930	74
480	60	CF273	4.1	.203	1950	98
440	50		4.1	.222	1785	98
440	60	CF271	4.5	.221	1950	98
380	50		4.5	.230	1695	88
440	25	CF621	2.1	.167	930	74
600	60	CF278	3.3	.162	1950	98
550	50		3.3	.178	1785	98
550	60	CF276	3.6	.177	1950	98
550	25	CF625	1.7	.133	930	74

REPLACING MECHANICAL INTERLOCK —

1. Remove both contact block front covers.
2. Remove both coil covers, coils and magnet yokes.
3. Remove both movable contact support assemblies.
4. Remove both roller lever retaining rings (see illustration).
5. Observe the assembly relationship between springs and roller levers, noting that there is a right hand and left hand assembly.
6. Remove roller levers and springs keeping them in their proper relationship to serve as a guide when assembling the new parts.
7. Remove nylon bushings.



8. Remove the cam and bracket assembly (see illustration), which is secured at the lower left and upper right by screws "A." Insert the replacement cam and bracket assembly, attaching loosely with screws "A" and associated washers.

9. Insert replacement nylon bushings.

10. Place springs on to roller levers.

IMPORTANT — Be sure the springs are in their proper positions before attempting to insert the roller lever assemblies.

11. Insert replacement roller lever assemblies and secure with provided nylon washers and retaining rings.

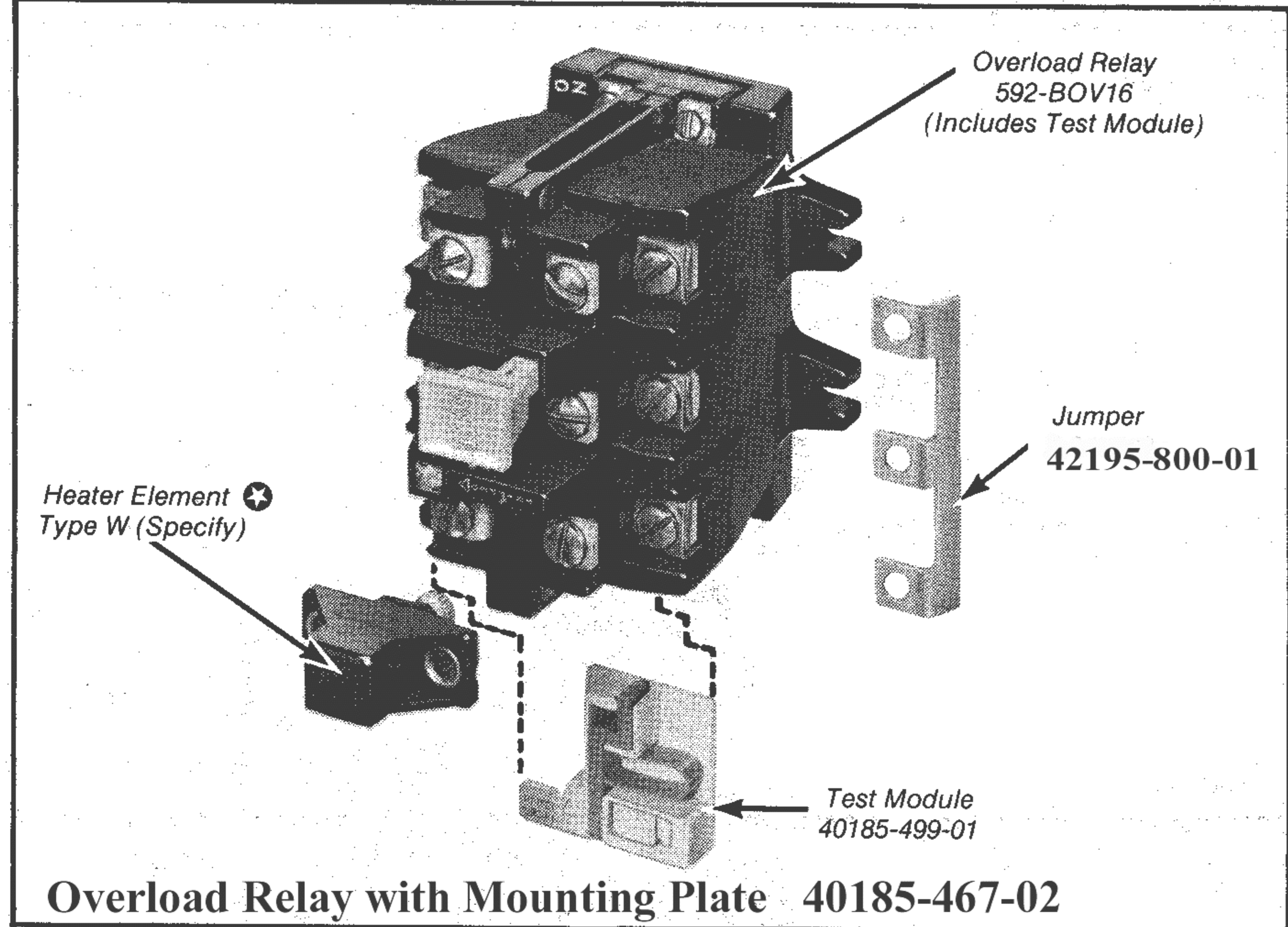
12. Replace both movable contact support assemblies, coils, magnet yokes and coil covers. Be sure all auxiliary contact and mechanical interlock operating levers rest **on top** of the movable contact support and the yoke retainer is in place. Incorrect position of these levers will cause improper operation and equipment damage.

13. Replace both contact block front covers.

ADJUSTING THE MECHANICAL INTERLOCK — With screws "A" loosened and the starter in the vertical position, hold the left hand contactor in the fully closed position by pressing upward on the bottom of the movable contact support. Turn the cam adjustment screw (see illustration) to a point where the right hand contactor has a very slight movement (1/64" to 1/32") when alternately pressed upward and released. Repeat this procedure holding the right hand contactor in the fully closed position and check the movement of the left hand contactor. Tighten screws "A" securely (30-35 inch-pounds of torque). Operate the starter manually a few times to check against binding of the interlock mechanism. If binding occurs, the adjustment may have to be loosened very slightly and rechecked.

ADJUSTMENT CHECK — As a final adjustment check, with power removed from the line terminals and with the motor disconnected from the starter, connect a flash light test lamp to the L1 terminal and L3 terminal. Operate the starter manually by pushing the movable contact support of both contactors up against the interlock at the same time. There should be no circuit through these contacts in any position of the movable contact supports, i.e., the test lamp should not light. If the starter fails to pass the test, refer back to "Adjusting the Mechanical Interlock."

NOTE — Parts indicated with ⚙ are recommended spare parts.



Overload Relay with Mounting Plate 40185-467-02

REQUIRED FASTENER TIGHTENING TORQUES —

Description	Torque In Inch-Pounds
Stationary Contact Block Mounting Bolts	450-500
Contact Block Cover Mounting Screw	40-60
Coil Cover Mounting Screw	25-30
Auxiliary Contact Mounting Screw	7-9
Lug Mounting Screw	300-500
Terminal Mounting Screw	175-250

OVERLOAD RELAY TEST MODULE—

The overload relay is equipped with a test module (Item 16), on the bottom that allows opening the normally closed overload contact for test purposes, without tripping the relay.

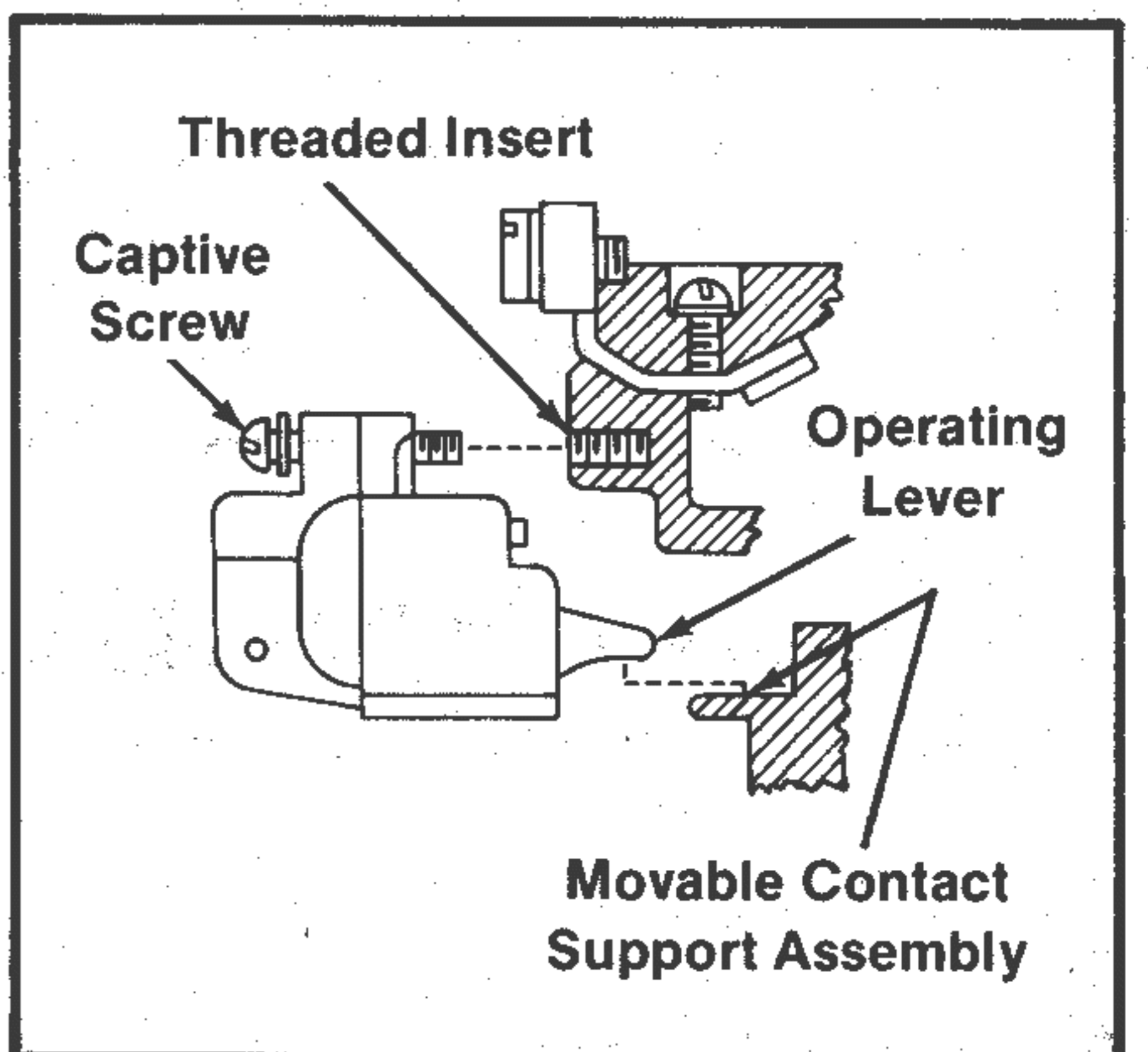
1. To remove insert an appropriate size screwdriver tip into the slot, provided on the test module, to the point where it "bottoms". Refer to Figure 2 on Page 4.
2. Slide the test module down and out.
3. Slide the replacement test module into place and press firmly until it locks in place.

BULLETIN 1495 AUXILIARY CONTACTS—

These auxiliary contacts are designed to operate on the upward motion of the movable contact support assembly. The auxiliary contacts are furnished with a captive screw. The captive screw is used to engage either of the four inserts imbedded in the contact block cover. Refer to illustration below.

IMPORTANT — The auxiliary contact operating lever **must** rest on top of the movable contact support assembly.

Refer to listing in the Industrial Control Catalog for replacement catalog numbers.



FRONT STATIONARY CONTACTS —

1. Remove lug from contact if not previously removed.
2. Remove current transformer retaining hardware and current transformer.
3. Remove bolt holding front contact support to the assembly.
4. Slide front stationary contact down and out.
5. Install replacement contact and reverse above procedure to replace contact support, current transformer and mounting hardware. **Note:** Arrow on current transformer must point "up" when installed.

REAR STATIONARY CONTACTS —

1. Remove lug from contact if not previously removed. Bolt is captive to the rear contact support.
2. Remove the bolt securing the contact support to the assembly and the bolt in the contact extending through the support.
3. Lift out the support from behind the contact. Rotate contact down and back and lift out through the slot.
4. Insert new rear stationary contact and reverse above procedure to secure contact in place.

REASSEMBLY — The reassembly process is basically the disassembly procedures in the reverse order.

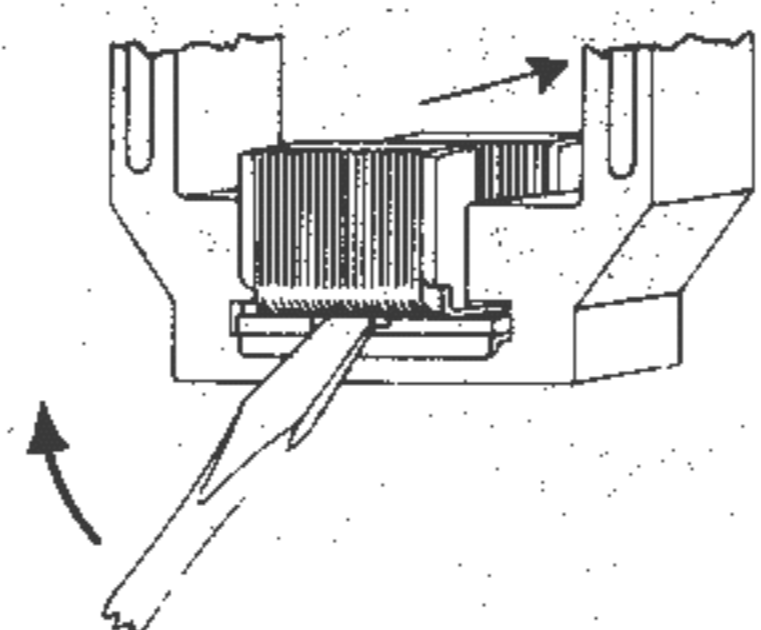
1. Insert the movable contact support assembly, armature, armature retainer and armature spring as a unit into the mounting plate heat sink.
2. Insert the yoke, including yoke retainer, into the operating coil. The

yoke is keyed and will fit only one way.

3. Insert the coil cover, operating coil and yoke as a unit into the movable contact support assembly. Be sure the operating lever of the interlock contact on the coil cover rests on top of the movable contact support. Tighten coil cover screws securely, refer to table for torque values.
4. Replace the contact block cover and tighten the screws securely. Refer to table for torque values.
5. Properly reconnect all wiring.

REMOVING MAGNET ARMATURE —

To remove the magnet armature from the movable contact support, insert screwdriver into slot as illustrated and lift screwdriver in the direction shown. At the same time push the magnet armature out. It may be necessary to wiggle the armature before it can be removed because of the pressure applied by the retainer spring.

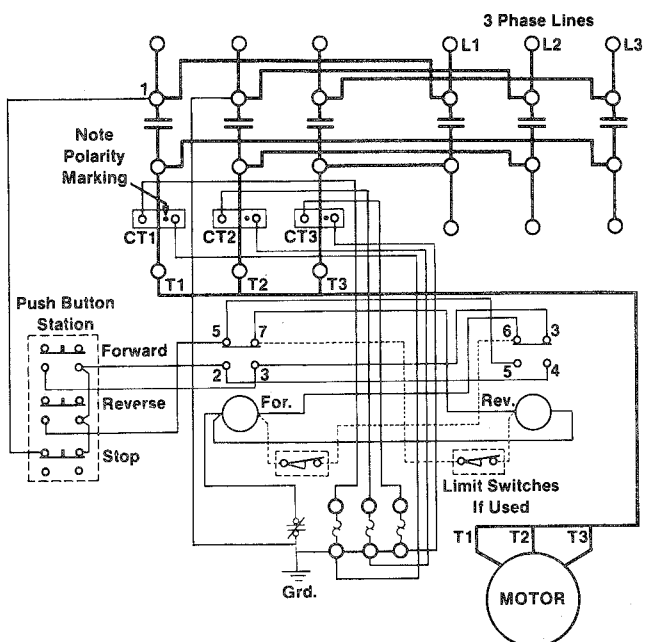


REPLACING OPERATING COIL —

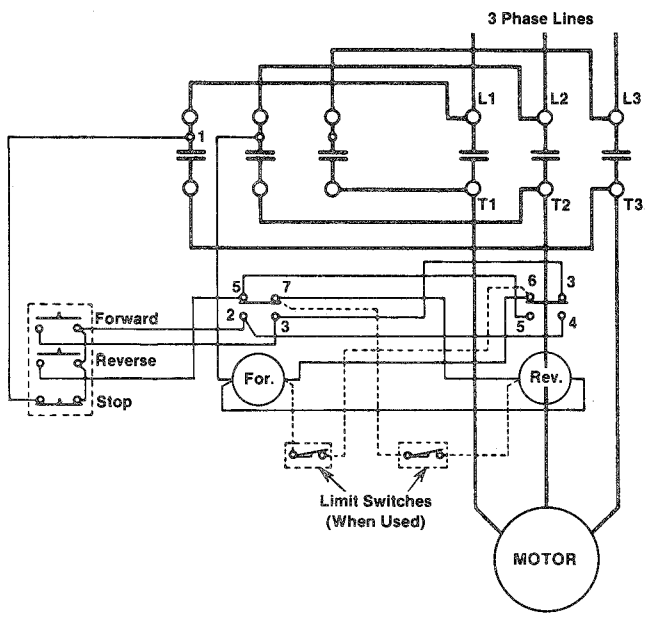
Insert new coil into coil cover with retaining spring side facing the interlock contact. Slide coil into cover until raised stops on the coil seat against the surface of the cover. Place yoke in the coil openings and slide yoke retainer into position through the yoke slot. When replacing this unit into the starter, be sure the operating lever of the interlock contact rests on top of the movable contact support.

TYPICAL WIRING DIAGRAMS — (See applicable codes and laws.)

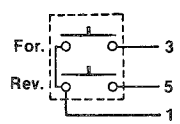
3 PHASE STARTERS, 3 WIRE CONTROL CONNECTIONS



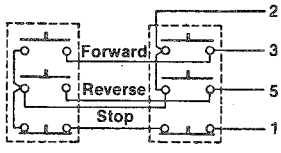
3 Pole Block Type Overload Relay



Without Overload Relays



2 Wire Control Connections



2 Station, 3 Wire Control Connections

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this document we use notes to make you aware of safety considerations:

ATTENTION

Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss



IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

Use only replacement parts and devices recommended by Rockwell Automation to maintain the integrity of the equipment. It is the user's responsibility to ensure that the renewal part number selected is properly matched to the model, series and revision level of the equipment being serviced.

ATTENTION

Servicing energized Industrial Control Equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Recommended practice is to disconnect and lockout control equipment from power sources, and release stored energy, if present.



Refer to **National Fire Protection Association Standard No. NFPA70E, Part 2 and (as applicable) OSHA rules for Control of Hazardous Energy Sources (Lockout/Tagout) and OSHA Electrical Safety Related Work Practices** for safety related work practices, including procedural requirements for lockout/tagout, and appropriate work practices, personnel qualifications and training requirements where it is not feasible to de-energize and lockout or tagout electric circuits and equipment before working on or near exposed circuit parts.

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