



# M AINTENANCE I NSTRUCTION

## TRACTION MOTOR FIELD SHUNTING CONTACTOR 8225437

### DESCRIPTION

Traction motor field shunting contactor (FS), part #8225437, Fig. 1, is a 4 pole contactor designed for 74 volt DC operation. The heavy duty bridging type main contacts are rated at 500 amperes. The 3 normally open and 1 normally closed auxiliary contacts are designed to carry 25 amperes inductive load.

Terminals for the auxiliary contacts and operating coil are located on the front of the mounting base for easy accessibility. The main power cable terminals are arranged for connections at the rear of the base. The contactor assembly is intended for panel mounting in a vertical position as shown in Fig. 1.

This new contactor replaces previously used traction motor field shunting contactors issued under part numbers 8200785, 8205701, and 8218878. These three contactors had a completely enclosed cast type cover.

The new contactor assembly is completely protected by a sheet metal cover to which an armature plate, main movable contacts and auxiliary interlock actuating plungers are mounted, see Fig. 2. There are two auxiliary enclosed interlock assemblies, one at each side, which are operated by the plunger attached to the armature plate. The main stationary contacts are mounted to the base, along with the operating coil and enclosed interlock assemblies. Each pair of main stationary contacts has a magnetic hold-in assembly mounted between them, see Fig. 2.

All adjustments for wear allowance and/or air gap are made by adding or

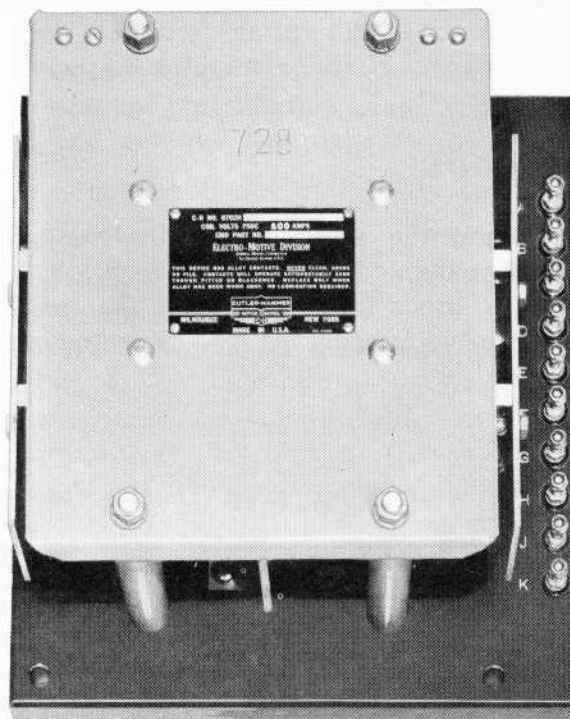


Fig. 1 - Field Shunting Contactor

removing shim washers of various thicknesses during manufacture. This means that the base assembly and the cover assembly are mated to each other during manufacture and should never be interchanged with those from other contactors. Should it ever become necessary to apply a new cover assembly or to interchange base and cover portions, all contacts, interlocks, magnet poles and actuating stems must be readjusted to conform to the specifications of a new contactor. Refer to the MAINTENANCE section of this instruction for procedure to be followed.

Referring to the specific locomotive wiring diagram it can be seen that the

motor shunting contactor (FS) functions to add a measured amount of external resistance in parallel with the traction motor fields during transition. This resistance improves the operating characteristics of the electrical transmission system and permits full horsepower to be utilized during the entire range of locomotive operation. FS contactors are actuated by the automatic transition circuitry and are physically located in the locomotive high voltage cabinet close to the external resistors mentioned above.

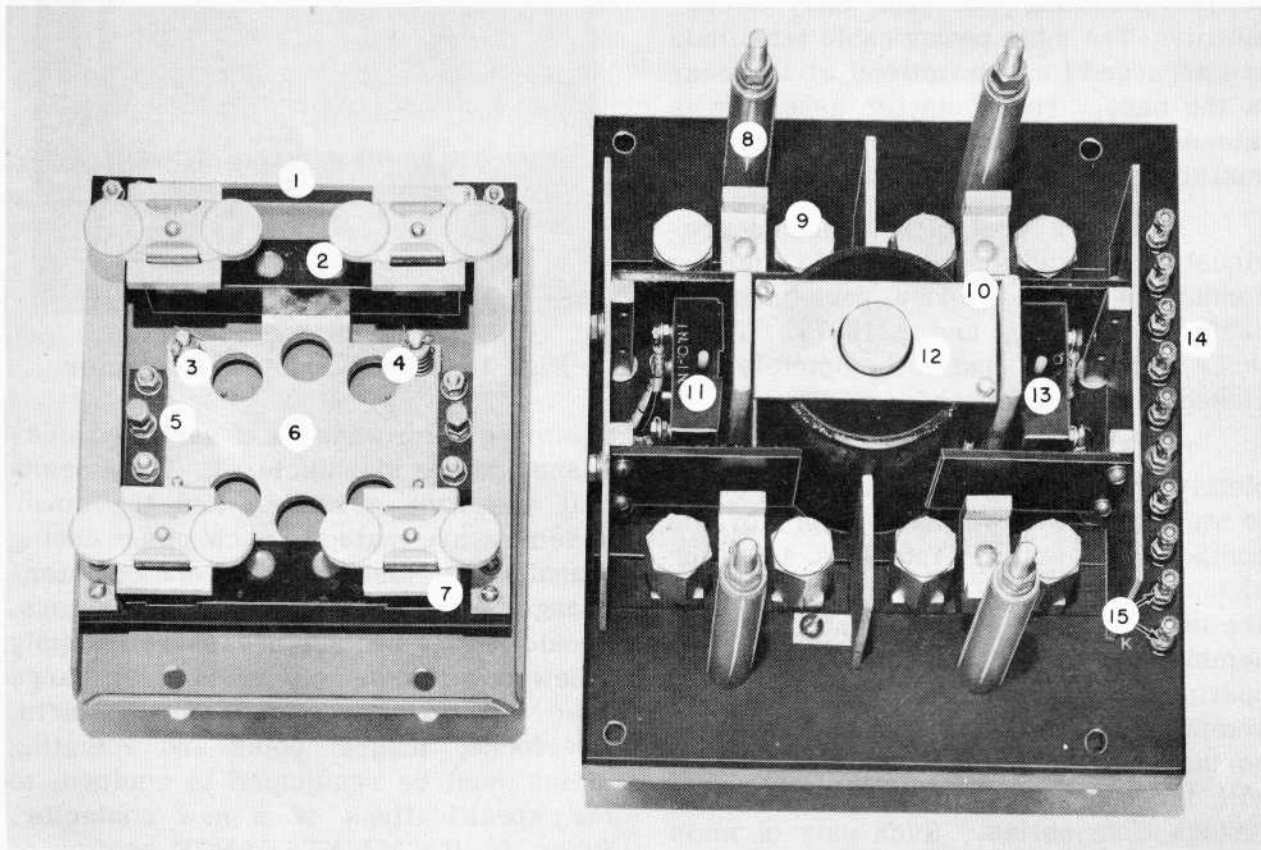
## OPERATION

When the single operating magnet coil is energized, the armature plate is caused to move inward, toward the magnet core, compressing the four recall

springs and closing the movable bridge contacts against their stationary contacts, Fig. 2.

The enclosed interlocks operate at the same time when the actuating stem moves, thus opening the NC contacts and closing the NO contacts.

The main movable contacts are each equipped with a square shaped soft iron collar, or magnet armature, which moves with the contact bridge to mate with a stationary magnet pole, Fig. 2. Each pair of main stationary contacts has a magnet pole mounted to the base in a position between the pair of contacts. These assemblies are known as magnetic hold-in devices. They are positioned in a manner which will establish a path for the magnetic field which



1. Sheet Metal Cover

2. Main Movable Contacts (4)

3. Recall Springs

6. Armature Plate

Fig. 2 - FS Contactor, Internal View of Cover and Base Assemblies

is induced when current flows through the main contacts. With this arrangement, a heavy current surge will induce a magnetic force which will tend to prevent a separation of the main contacts which might otherwise occur due to the momentary increase in magnetic flux density.

When the operating coil is de-energized, the armature plate will move away from the armature core under the influence of the recall springs. The main contacts will open and the auxiliary contacts will assume their normal positions.

## MAINTENANCE

Due to the rugged construction of this contactor and the close dimensional tolerances necessary to rebuild it to specifications, it is advisable to return the complete assembly (cover and base) to EMD for Rebuild and Return. Under no condition should the two assemblies be separated (cover and base assemblies) unless the base assembly is first matched to the cover assembly.

## INSPECTION

During periodic inspections of the locomotive or when faulty operation is suspected, the motor shunting contactor should be inspected as follows:

1. Remove any accumulation of dirt or dust with a brush or compressed air.
2. Check for free movement of all moving parts.
3. Check for clearance of all electrical parts.
4. Inspect security of mounting.
5. Check continuity of all soldered and bolted electrical connections.
6. Check for possible damage to insulation on leads.
7. Verify proper coil resistance.
8. Check alignment of contacts.

Any replacement of parts and/or adjustments should be made on a work bench. Remove both the cover and the base as these two parts of the assembly are mated and must be kept together.

## COIL REPLACEMENT - Fig. 2

1. Remove the four screws holding the sheet metal cover in place and remove the cover.
2. Remove the two screws holding the magnet coil holding plate in position and remove the plate.
3. Disconnect the coil leads and withdraw the coil.
4. Reassemble in reverse order.

## ARMATURE PLATE REPLACEMENT - Fig. 2

1. Remove the four hex-nuts holding the armature alignment straps in place.
2. Remove the four cotter-keys holding the armature return springs in place.
3. Withdraw the entire armature assembly.
4. The balance of the parts may be removed if necessary by carefully observing how they are assembled.

## CONTACT REPLACEMENT

This contactor is equipped with heavy duty silver alloy contacts which require very little attention or maintenance other than inspection. Under normal operating conditions they should provide satisfactory service over a long period of time.

Upon inspection the contacts may appear blackened, pitted or eroded, which is a natural condition and will not impair operation. They should not be dressed, filed or otherwise cleaned as this is unnecessary and will serve only to shorten their life. The contacts however should be replaced if they are worn to the point that base metal is exposed.

Replacement of contacts is easily accomplished. The movable contacts are removed by compressing them against the springs, tilting them while doing so. The stationary contacts can be removed by merely unscrewing them from their seats.

## ADJUSTMENTS

After any work or bench inspection has been done on these contactors, the following dimensions should be checked:

### 1. Magnetic Gap

The "Magnetic Gap" at point "A" on Fig. 3 between the armature plate and coil yoke should be  $.215''$  -  $.225''$  with the coil de-energized. This dimension can be checked with feeler gauges and is adjusted by adding or removing shim

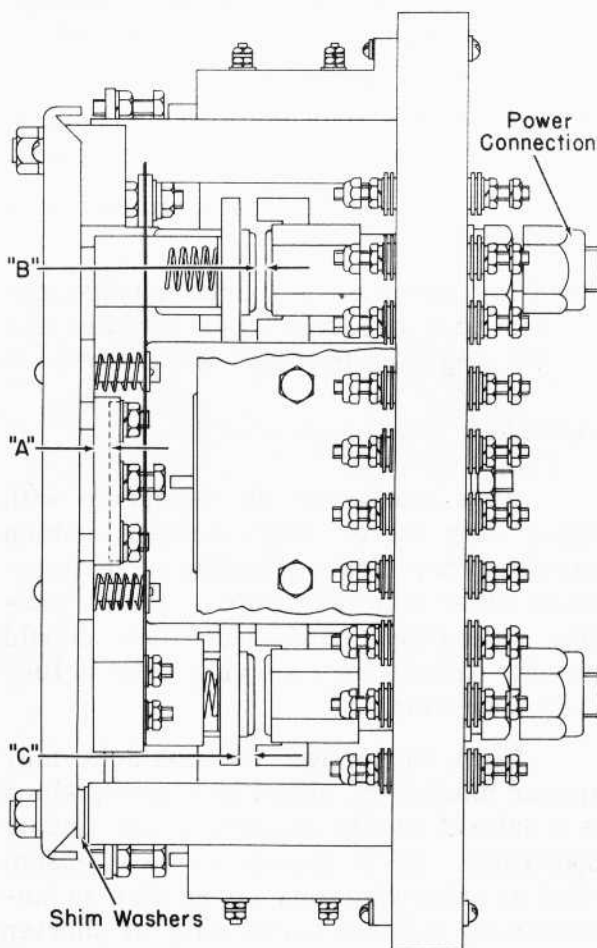


Fig. 3 - Air Gap Adjustment

washers at the top of the mounting posts. The armature plate should be held as close as possible to the plane of the top surfaces of the coil yoke.

### 2. Main Contact Air Gap

The main contact air gap at point "B" on Fig. 3 is to be  $1/8''$  -  $5/32''$ . This is obtained by adding or removing shims under the stationary contact assemblies.

The following shims are available for use in this application:

Part No.	Thickness
8222138	.004"
8219898	.008"
8219897	.032"

### 3. Main Contact Magnet Pole Air Gap

The main contact magnet pole air gap at point "C" on Fig. 3 is to be  $.104''$  -  $.115''$  when the main contacts are just touching. This dimension can be accurately checked with feeler gauges by following the below listed steps:

- Remove the movable contact bridge and magnetic armature from the movable contact assemblies. This is accomplished by depressing the main contact spring and tilting the contact bridge to clear the spring pocket.
- Position the contact bridges and magnetic armatures on their mating pair of stationary contacts.
- Check the air gap between the magnetic armature and magnet pole with feeler gauges. Add or remove part 8216230 -  $.011''$  or 8216231 -  $.031''$  shims between the magnet pole and base as required to bring the air gap within limits.
- Replace the movable contact bridges and magnetic armatures in their original positions in the movable contact assembly.

4. Interlocks

Adjust the hex-head screws on the interlock bar so that the "magnet gap" at point "A" on Fig. 3 is .045" - .062" when the lower (rear) NO contact of both electrical interlock assemblies just touch. This gives the proper amount of contact wipe for the three normally open interlocks when the coil is energized.

The "B" and "C" adjustment should not be required on contactors put into service directly after being factory assembled. They are listed here to point out the necessity for qualified maintenance and the extreme importance of keeping matched covers and base assemblies intact.

The interlocks should operate in proper sequence in respect to the main contacts. With the contactor adjusted within the above limits, the NO interlocks should close after the main contacts close and the NC interlocks should open before the main contacts close.

A rough check of the sequence may be made by a continuity test through the main and interlock contacts while moving the armature assembly in and out several times by hand. This may be done with the contactor on the bench in a horizontal position if more convenient. Slight discrepancies may be expected however, as the armature assembly will not be operating exactly as if energized electrically.

Sluggish operation of the contactor may result if the armature plate is allowed to rub on any of the recall spring guide shafts. The proper clearance between the armature assembly and these guide shafts may be obtained if necessary by removal of the recall springs and loosening the cap screws which attach the alignment straps to the cover. Then shift the armature assembly to provide clearance to all four guide shafts. Tighten the cap screws to secure the assembly in the relative position and replace the recall springs and cotter pins.

**MAINTENANCE DATA**

Contacts

Main Contacts - 4-NO - - - - - 500 Amperes  
 Auxiliary Contacts - 3-NO - 1-NC - - - - - 25 Amps. Inductive Ld.

Coil - - - - - 215 + 10% Ohms @ 20° C.

Operation @ 20° C.

Working - - - - - 74 Volts DC  
 Pickup - - - - - 48 Volts DC Max.  
 Dropout - - - - - 5 - 28 Volts DC

Hi-Pot - 60 Cycles AC

Coil to Ground - - - - - 600 Volts RMS  
 Coil to Contact - - - - - 600 Volts RMS  
 Main Contact to Ground - - - - - 2400 Volts RMS  
 Auxiliary Contact to Ground - - - - - 600 Volts RMS