GM Locomotive Group

M.I. 9681

MODERNIZATION RECOMMENDATION

INTERNAL LOAD REGULATOR (ILR) GOVERNOR UPGRADE

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PURPOSE:

To upgrade existing ILR governors for increased reliability and improved engine protection.

APPLICATION:

All 710 "G" and "GA" engines. EMD is offering all improvement features in new production and UTEX governors. Upgrade kits are also available for customer application.

REFERENCES:

Woodward Bulletin.....36053
Woodward Bulletin.....36703
Delta P Engine Protector.....M.I.260
Engine Maintenance Manual.....710G3/ G3A

GENERAL DISCUSSION/ BENEFITS

The improvement features, and the benefits that will result from the ILR governor upgrades, are as follows:

- New speed setting solenoid coils with windings made of bondable polyester coated wire, impregnated twice with high temperature epoxy. The solenoid plunger is hardened steel in all wear areas with copper coatings eliminated. *This change improves the reliability of the solenoids by preventing open circuits and/ or sticking plungers due to shock, vibration, and elevated temperature levels associated with the governor's normal operating environment.*

- An oil filled load regulator has been incorporated *to improve service reliability by dampening vibration and removing contaminates from the resistor.*

- A new plunger in the speed setting servo increases the engine deceleration time to 25 ±4 seconds. *This change eliminates engine shutdowns by the engine protector due to an imbalance between the air box pressure and water pump pressure. These shutdowns would typically occur when the throttle would be moved rapidly (wiped) from throttle notch 8 to idle. The longer deceleration time allows the air box pressure to properly equalize with the water pressure to eliminate false low water shutdown by the engine protector.*

NOTE

The ΔP engine protector function, described in "ENABLING "DELTA P" ENGINE PROTECTOR" on page 11, can be restored (re-connected) only after the governor has been upgraded with the new speed setting servo plunger.

GOVERNOR UPGRADE PROGRAM

The EMD governor upgrade program basically consists of two different kits which are being offered by the EMD Aftermarket Parts Department to modify the various ILR governors used on the applications previously described. One kit, P/ No. 40039027, can be used to convert governors originally provided on 16-cylinder engines. The other kit, P/ No. 40039026, is used to convert governors originally provided on 12-cylinder engines. Each kit contains all the components required to convert a ILR governor for the enhanced vibration and thermal characteristics - as is currently being provided on all new production ILR governors used on 710GA and 710GB engines.

The procedures necessary to incorporate all the enhancement features are provided in Woodward Governor Company manual #36053. (A copy of this manual is included with each kit). Also, customers may wish to refer to Woodward manual #36703 for additional comprehensive Service, Installation, and Operation instructions for these governors.

CAUTION

Installation of these kits requires extensive governor disassembly and assembly, which can only be accomplished by experienced technicians who are capable of rebuilding rail-type governors. No special tooling is required. However, following the rebuild, the governor must be completely tested and re-calibrated on a governor test stand.

Upon completion of the kit installation, and subsequent testing and re-calibration procedures, the designation on the governor nameplate must be changed to ensure that any future work on the unit will be done correctly for the new configuration. Re-mark the nameplate with the EMD UTEX part numbers provided in Table I following to assure that the governor is adequately identified.

Table 1. ILR GOVERNOR UPGRADE KIT APPLICATIONS		
KIT P/ No.	**Original Governor P/ No.**	**New UTEX Governor P/ No.**
40039027 (16-cyl. engines)	40003898	40038810
	40009579	40038811
	40010043	40035516
	40010967	40038813
	40021729	40038814
	40031051	40038815
	9582976	40038816
	9556128	40038823
	9572048	40038824
	9556128 (W.G.#8571-722)	40038825
40039026 (12-cyl. engines)	9582975	40038817
	40011853	40038818
	40011852	40038819
	40013612	40038820
	40017104	40038821
	40027558	40038822

GOVERNOR MODIFICATIONS

This modification procedure will change the resistor assembly from a "dry" resistor assembly to one which is submerged in oil. Parts in each kit for this conversion include a new side plate and side plate cover assembly, a new ceramic resistor assembly, a new contact beam assembly, and new wires (orange, gray and brown), Teflon tubing, and slotted terminals to run from the side plate to the receiver assembly.

IMPORTANT NOTICE

This modification submerges contacts containing Silver into the governor oil. Accordingly, the specification for the oil to be used in the governor must reflect that the oil now be of a non-Zinc Dithiophosphate (ZDP) type.

New preformed packings (O-rings), gaskets, and fittings are supplied as required for installation of the new side plate.

Two (2) different oil seal sets are supplied for the oil filter housing. Pick the seals that fit the filter and discard the unused seals.

Also, a new Oil Failure Diaphragm is included in the kit to replace the existing diaphragm which is often damaged during removal of the old side plate.

The modification kits also provide the parts necessary to convert the standard solenoid assemblies to "vibration resistant" assemblies. All five (5) coils on the receiver will be replaced. The replacement of the solenoid coils will require unsoldering the old coils and soldering in the new coils. Existing wiring on the receiver is to be reused.

In addition, the Speed Setting Pilot Valve Plunger will be replaced.

SPECIAL DISASSEMBLY NOTE

Extra care should be taken to be certain that the old Speed Setting Pilot Valve Plunger removed from the governor is kept separate from the parts supplied in the new kit. The new replacement parts are very similar in appearance and could be easily mistaken for the old parts. All O-rings and gaskets removed during disassembly can be discarded as they will be replaced with new seals from the kits during reassembly.

The governor must be disassembled to the stage shown in Figure 1. Figure 2 on page 6 shows an earlier stage with the side plate, resistor pack and associated parts removed. Figure 3 on page 6 shows a stage where the fuel limiter, receiver assembly, speed setting linkage, and the feedback linkage are also removed.

Disconnect the three wires from the terminal block on the receiver assembly before removal.

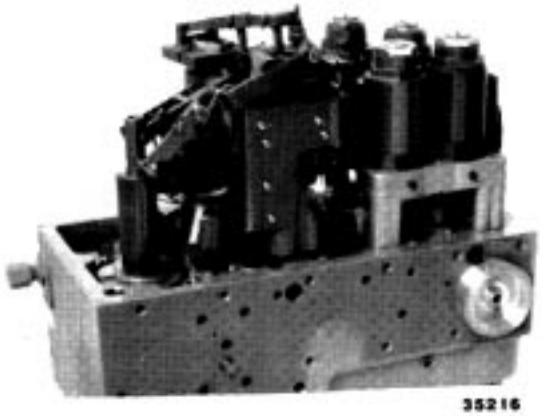

Figure 1. Side Plate Removed

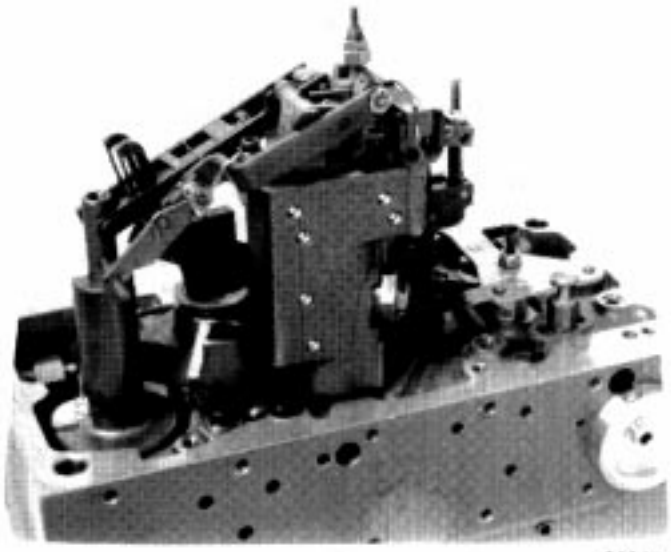

Figure 2. Side Plate and Receiver Removed

Figure 3. Governor Ready For Conversion

GOVERNOR CONVERSION

The following parts are included in each upgrade kit:

RECEIVER ASSEMBLY (See Figure 4 below and Figure 5 on Page 8)

COMPONENT	QTY.	APPLICATION
Vdc Coil Assembly	5	To replace existing coils.
.500" OD Plastic Washers	10	Used on bottom of solenoid terminals.
Teflon O AWG Ins.	10	Use to insulate coils while soldering.
Plunger Assembly	5	To replace existing plungers.
Plunger Stop Plugs	5	To replace existing plunger stops.
Insulating Paper	5	Replaces insulation in solenoid cases.

Note: Reuse the existing Solenoid Cases and Plunger Stop Lock Nuts. Remove the existing insulating paper from inside the cases and replace with new insulating paper.

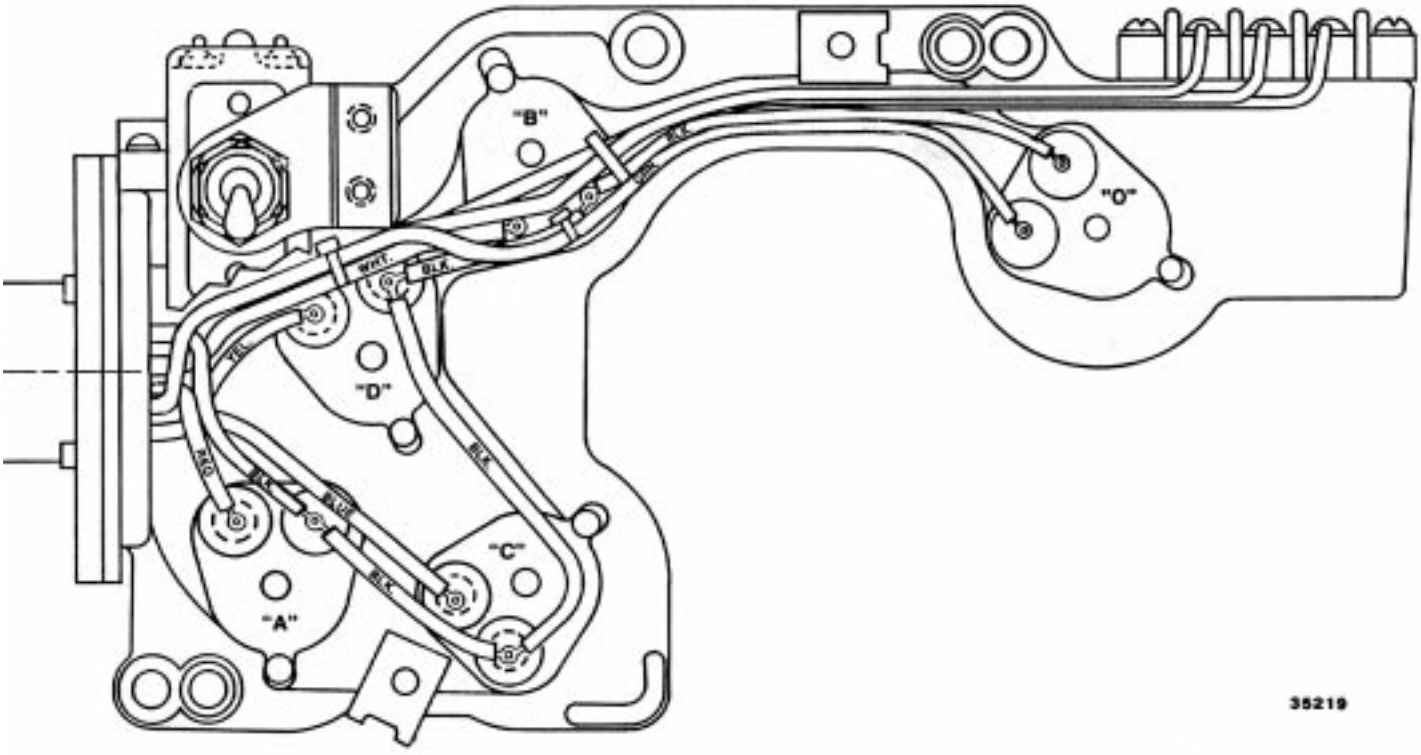

Figure 4. Underside of Receiver Assembly Showing Wire Colors

Figure 5. Receiver Assembly with New Coils Attached

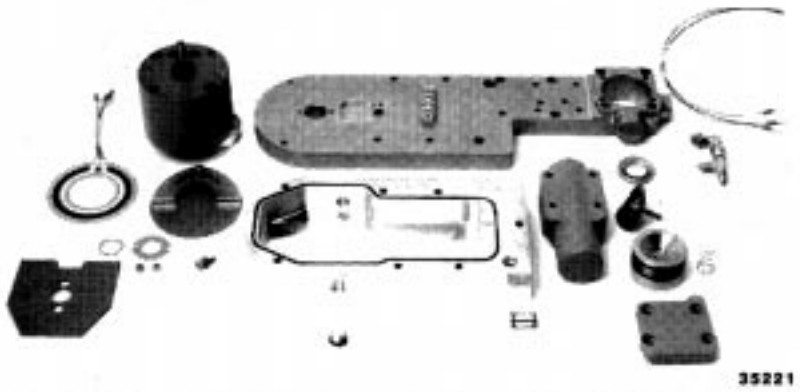

Figure 6. New Side Plate and Associated Parts

SIDE PLATE (See Figure 6 on Page 8 and Figure 7 on Page 10)

COMPONENT	Qty./ Unit	APPLICATION
Side Plate	1	Replaces existing side plate.
Side Plate Cover Ass'y.	1	Replaces existing side plate cover.
Contact Beam Spring Ass'y.	1	Replaces existing contact beam.
Resistor Ass'y.	1	Replaces existing resistor ass'y.
Wire Passage Sleeve	1	Fits in side plate cover.
.364" ID Preformed Packing	2	Use with wire passage sleeve.
7.237" ID Preformed Packing	1	Oil seal for side plate cover.
.562"-18 Plug	1	Use in side plate cover.
.468" ID Preformed Packing	1	Use with .562"-18 plug.
.487" ID Preformed Packing	2	Used between vane servo and side plate.
.859" ID Preformed Packing	1	Used between vane servo and side plate.
.250"-28 x 1.250" Screw	2	Short screws used to hold on new side cover.
.250"-28 x 2.250" Screw	5	Long screws used to hold on new side cover.
.250" Washer	7	Lock washers for new side cover screws.
Seal Support	1	Supports vane servo shaft in side plate.
Orange Wire	2 ft.	Replaces existing wire.
Gray Wire	2 ft.	Replaces existing wire.
Brown Wire	2 ft.	Replaces existing wire.
Teflon Tubing, 6 AWG	2 ft.	Use with new wires.
#6 Slotted Terminals	6	Use with new wires.
Elbow, Straight Thread	1	Threads into side plate.
.351" ID Preformed Packing	1	Used on elbow between elbow and side plate.
Swival Nut Tee	1	Connects to elbow.
Oil Failure Diaphragm	1	Replaces existing diaphragm.
1.734" ID O-Ring	2	Replaces O-rings on lube oil shutdown plug.
Side Panel Gasket	1	Use with new side plate.
Gasket for Oil Filter	1	Use with old style filter.
.301" ID Preformed Packing	1	Use with new style filter.
1.051" ID Preformed Packing	1	Use with new style filter.

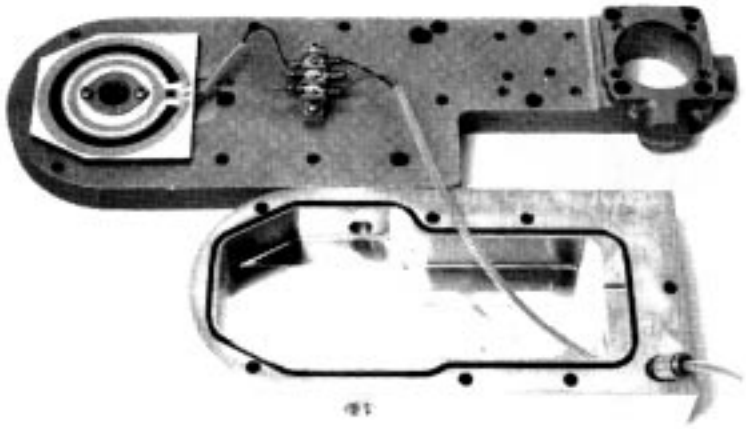

Figure 7. Side Plate and Side Plate Cover. Shows new wires in Teflon tube, installed thru passage sleeve.

Note: Use existing terminal block and wire hold down clamp from old side plate to new side plate. Use existing paper insulator between ceramic resistor assembly and side plate. Use existing wave washer, spacer, and screws to assemble resistor and vane servo.

MISCELLANEOUS PARTS (See Figure 8 below, and Figure 9 on Page 11)

COMPONENT	QTY.	APPLICATION
Speed Setting P V Plunger	1	Replace P V plunger.
Governor Cover Gasket	1	Replace if necessary.

Figure 8. New Speed Setting P V Plunger and Associated Parts. Associated parts to be removed to install new plunger.

Figure 9. New Speed P V Plunger

ENABLING "DELTA P" ENGINE PROTECTOR

Enabling the "delta P" engine protector provides the following advantages over the existing low water device:

- The ΔP protection is not affected by cooling system pressurization.
- The ΔP protection can detect exhaust gas in the cooling system since the gas causes pump cavitation.
- The ΔP protector protects against engine overheat, especially below throttle notch 6, and pump cavitation due to the water temperature approaching the boiling point.

To enable the engine protector to function as a "delta P" device, one (1) hose assembly must be added between the water pump inlet side of the protector and the left bank water pump inlet, as follows:

1. Remove the vent assembly, P/ No. 9575711, from the water pump inlet port of the engine protector.
2. Install flange O-ring, P/ No. 8342588, to the hose assembly, P/ No. 9320120, and secure to the engine protector using vent assembly screws removed in Step 1.
3. Remove 1/4" plug, P/ No. 103878, from the left hand water pump inlet housing.
4. Install hose connector, P/ No. 118750, into the water pump inlet housing, using a thread sealing compound. Connect the hose to the opposite end of the connector.
5. Check for leaks.

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