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MAINTENANCE MATTERS — Getting a hold on LINNIG Clutches

The last year has seen a lot of changes in the motor coach market — and most of them have been for the good. We have seen the introduction of the EPA-compliant engine exhaust system, which is good for the environment. Most of us have welcomed onboard security monitoring, backup cameras and GPS systems. While these systems are relatively transparent during normal operation, they have also precluded the need for additional procedures in our maintenance programs.

MCI researched extensively before changing from our longtime and familiar air-operated fan clutches to an electrically-operated clutch design. The introduction of the LINNIG brand fan clutch has brought many advantages, as well as a learning curve for the maintenance side of operations.

LINNIG clutches are designed for many miles of reliable, trouble-free operation. To maintain their robust and dependable design, there are 75,000- and 150,000-mile service intervals for the clutches.

The 75,000-mile service is basically a bearing replacement; however, LINNIG requires this service for its warranty to remain in effect. Some new tools will be required also. These tools should be available through your normal MCI sources, along with the service kits themselves.

The 150,000-mile service includes the 75,000-mile bearing service as well as service for the friction surfaces of the clutch assembly.

In addition, a "dampened" crankshaft pulley used on some CAT engine installations is supplied by LINNIG. This pulley also requires a 75,000-mile maintenance for the bearings.

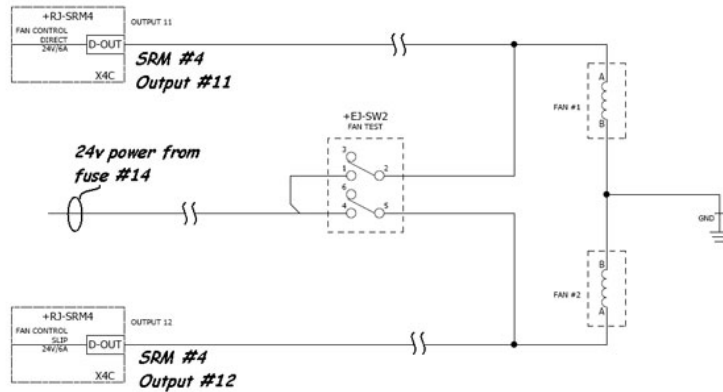
A supplement to your new service manuals will be arriving soon.

The E4500 and J4500 coaches, as well as on the Charge Air Cooler (CAC) side of the D-Series coaches, use a three-speed clutch assembly. These three speed functions are:

- **BRAKE** function, which almost stops (at 100 rpm) the CAC fan from turning during cold air temperatures, for quicker warmup of engine air.
- **FREEWHEEL**, in which the fan is turning at 1,200 rpm regardless of pulley speed.
- **ENGAGED**, where the clutch is locked up and turning at full pulley speed.

The two-speed clutch is only used on the radiator side of D-Series coaches. It operates in Freewheel or Engaged mode, as determined by the engine ECM.

The basic operation of these fan clutches is also simplified because they don't have air lines, solenoids and related control wiring. The new LINNIG clutches are now controlled through the multiplex system by inputs directly from the engine ECM. This provides the ease of diagnostics that is naturally associated with multiplexing.



(Part of the E/J Coach Schematic)

Instead of the engine ECM supplying power or ground directly to an air solenoid, the ECM now sends a simple input signal to the multiplex system. The electronic modules then supply the current directly to the appropriate fan coil(s).

- **BRAKE MODE:** Neither fan coil is energized. Fan rotation (@100 rpm) is due to bearing drag only.
- **CLUTCH MODE:** The fan "clutch" coil is energized (SRM #4, 12, see above) and the fan is

- **SLIP MODE:** the fan slip coil is energized (pin #12 as above) and the fan is pulled along by the magnetic field in the clutch coil, @1,200 rpm.
- **DIRECT MODE:** Both coils are now energized and the fan is in direct lockup condition, with the fans drive shaft at full pulley speed.

Whenever you are working on your coach, always consult your owner's and / or maintenance manual for full instructions and follow all safety precautions. If you have additional questions that are not addressed in your maintenance manual, consult your nearest [MCI service center](#) or call [MCI's technical call center](#).

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