fatigue resistant material. Assemblies made with the new tube material can be identified by the numerals 8620 on the saddle casting.

This change has reduced inlet tube breakage; however, there still are many of the old style tube assemblies in use on engines built before July, 1968. These old style tube assemblies are also located in spare parts stocks maintained by users of the engines.

EMD recommends that only inlet tube assemblies identified by the number 8620 be installed in 645 engines. Tube assemblies with or without the number 8620 may be used on 567 engines.

Whenever a used inlet tube assembly is to be installed on any 645 or 567 engine, the assembly should be magnaflux or dye-check inspected for cracks before installation.

INSTALLATION OF LINER WATER JUMPERS

Reprinted from October 31, 1967 Pointers.

It is important that cylinder liner water jumpers be correctly applied to prevent water leaks and possible jumper line breakage. Apply jumper lines as follows:

1. Check that the attaching surface on the liner is thoroughly clean. Coat seal 8305815 with grease or soap and place in groove end of jumper which attaches to liner.

2. Install two bolts 8226964 and lock washers through flange and into liner. Start these bolts approximately two threads deep.

3. Make sure water manifold is clean and install two saddle straps 8054536 on the 567 engine or 8347343 on the 645 engine around manifold. Apply four nuts 8032717 and tighten finger tight, allowing sufficient space between the saddle and manifold for the gasket.

4. Shape the manifold-to-jumper gasket 8142354 slightly to conform to the manifold and insert gasket between manifold and saddle. Tighten the saddle nuts to 15 ft-lbs.

5. Remove the two bolts and lockwashers from the liner. If the jumper line moves, it must be repositioned on the water manifold until it remains in position.

6. Torque the bolts at the jumper-to-liner flange to 30 ft-lbs.

ENGINE PRESSURE DETECTOR TUBING

This article supersedes Locomotive Pointers article dated October 17, 1973 covering the same subject. It reinstates water line 8425855, which was listed as discontinued in the previous article.

The air box and water line tubing to the combination low water and crankcase pressure detector has been changed from rigid cupro-nickel tubing to flexible hose assemblies on all combination detector applications except for water line 8425855 on "567" engine applications, which remains rigid cupro-nickel tubing.

ORDERING REFERENCE

	Discontinued Cupro-Nickel Tube Assys.	Current Flexible Hose Assys.	Price
Water Line	8412290 8419207	8477002	$5.44
Air Line	8337883 8340583	8491460	5.15
Flared Tube Connector		8040313	.12

Application of air line 8491460 requires replacement of elbow 8039169 on the engine end sheet or pipe tee with connector 8040313. The flexible hose does not require the 90° elbow.

POINTERS SUMMARY

The following Pointers articles were published during 1973. This list has been prepared to promote a review of the articles for information to reduce maintenance costs, improve operation, and extend service life of the equipment.

January 29, 1973 **Ver**

Turbo Spring Drive Gear Description And Torquing

EMD's Piping Color Coding

Change In Engine Pressure Detector Tubing

Applying Water Pump Roll Pin

Adjusting Pin-Type Slack Adjusters

February 26, 1973 **Ver**

Aligning AR10-D14 Generator Bearing

New HT-C Truck Hydraulic Shock Absorbers

Testing Engine Temperature Switch

Modified Pin-Type Slack Adjusters For SD Locomotives With Single Shoe Brakes

Flanged Soak Back System Piping

April 2, 1973 Ver

Checking Lube Oil Filter Pressure

Crankshaft Damping Device Usage Table

Proper Cylinder Liner Honing Procedures

New Throttle Response Panels

April 30, 1973 Ver

New Close Tolerance Valve Guide

Exhaust Stack Cleaning

May 7, 1973 Ver

Reworking Blade Connecting Rod

Advantages of Single Shoe Brake Rigging With Composition Shoes

Applying And Aligning Accessory Drive Housing

New Ground Relay Reset

June 11, 1973 Ver

Modifying Auxiliary Generator Bracket

Application Of Fan Guard Mounting Clips

Proper Maintenance Of Auxiliary Generator Drive Coupling

Improved Connecting Rod Saddle Area

July 16, 1973 Ver

Cooling System Pressure Caps

New Traction Motor Axle Cap Shim

Shimming Injector Control Shaft On Rebuilt Engines

New Switcher Load Regulator Rheostat Brush

August 13, 1973 Ver

Cylinder Head Identification And Application

New AR10 Bearing Housing

Improved Auxiliary Generator Drive Shaft Guard

Remote Controlled Engine Crankover Tool

September 17, 1973 Ver

Proper Rocker Arm Stud Nut Application

Improved Self Load Test Shunt Application

Airfoil Design Traction Motor Blower Wheels

New Main Bearing Cap Application Tool

Top Deck Head Frame Gasket

October 17, 1973 Ver

Idling Versus Shutting Engine Down

Reducing Fuel Consumption

Engine Auxiliary Drive Coupling Application

SD45 Shutter Control Air Piping

Carbon Build-Up On Spark Arrestor Manifolds

Engine Pressure Detector Flexible Tubing

November 19, 1973 Ver

Proper Positioning Of Controller Switches And Handles

Engine Connecting Rod Inspection

Inspection Type Arc Chute

Air Compressor Oil Pressure

Starting Motor Solenoid

December 10, 1973 Ver

Application Of Engine Air Filter Switches

Thermoplastic Tubing

Auxiliary Generator And Blower Assemblies

NOTE: Current Replacement Parts Price Book conditions apply to all prices.

Litho In U.S.A.

JANUARY 15, 1974

ELECTRO-MOTIVE

GENERAL MOTORS LOCOMOTIVES

Pointers

Division of General Motors Corporation, La Grange, Illinois

CONTENTS

LUBE OIL OXIDATION

Lubricating oil specifications for EMD engines are published in EMD Maintenance Instructions. These instructions include a chart that provides guidance for interpretation of lube oil sample analysis to determine if any abnormal conditions exist that may require corrective action.

Specific laboratory limits are provided for lube oil properties that permit evaluation of the engine and related components. However, specific limits are not provided for lube oil oxidation rate because this property varies with the type of lube oil being used. The degree of oxidation or deterioration of the lube oil is usually measured with any or all of the following properties: viscosity rise, total base number (reserve alkalinity), pH (acidic level), and resin content (pentane insolubles minus benzene insolubles; resins originate from oil or additive degradation). The degree of oxidation exhibited by two consecutive samples indicates the rate of oxidation during the elapsed time between samples.

If the rate of oxidation is abnormally rapid as compared to other engines in similar service, or as compared to previous performance, we recommend checking the following: Lube oil quality, fuel sulfur content, oil cooler efficiency, engine temperature controls, engine power output (governor and rack settings plus electrical controls that affect load control), engine condition (worn rings, cracked pistons, poor combustion), oil filtration, or oil pump suction leak.

Mechanical improvements that significantly decrease an engine's lube oil consumption can be responsible for lower pH and reserve alkalinity and higher viscosity than previously experienced because of the introduction of less make-up oil during the service interval. However, assumptions should not be made in this regard, but checks should be made to determine if detrimental conditions do exist that accelerate lube oil oxidation.

Lube oil that is badly oxidized should not be continued in service. Although the properties indicating excessive oxidation can vary with different lube oils, the values generally accepted as condemning limits are as follows:

Viscosity	1350 SSU @ 100° F (Maximum)
pH	5 (Minimum)
TBN	0.5 (Minimum)

Lube oil suppliers should be consulted for any exceptions to these values that may apply to their specific oil brand.

The oxidation rate being experienced and the frequency of obtaining oil samples should be correlated to determine at what degree of oxidation the oil should be changed so that it does not become badly oxidized before the next sampling. It should be recognized that the changes in viscosity and alkalinity are not uniform during the life of the lube oil and changes usually become less pronounced as the condemning limits are approached. Usually it is necessary to allow several units to actually reach the lube oil condemning limits before realistic drain limits can be determined.

REUSE OF WATER INLET TUBE ASSEMBLIES ON EMD 567 AND 645 ENGINES

Tubing material for water inlet tube assembly 8347340 (645 engines) and 8206804 (567 engines) was changed during July, 1968 to a more