

# Hanford Geophysical Logging Project

## Preventive Maintenance Procedure for the Spectral Gamma Logging System

September 2005



U.S. Department  
of Energy



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Spectral Gamma Logging System**

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Prepared for  
U.S. Department of Energy  
Office of Environmental Management  
Grand Junction, Colorado

Prepared by  
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Spectral Gamma Logging System**

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# 1.0 Introduction

The spectral gamma logging system (SGLS) consists of an Ortec high-purity germanium detector, multichannel analyzer, and a computer mounted on a Ford F-800 truck chassis. The unit incorporates additional equipment, including a hydraulic-hoist system, power supplies, a hydraulic boom, a liquid-nitrogen storage and dispensing system, and environmental control equipment. The SGLS will be used to monitor and characterize subsurface radiological waste. This system, which is capable of more than 2-kiloelectron-volt resolution of incident gamma photons, enables analysts to identify and determine the concentrations of any gamma-emitting radiological contaminant encountered.

This procedure outlines the preventive maintenance that should ensure the readiness and longevity of the SGLS support systems and specifies a method to track hardware maintenance and basic maintenance requirements.

This procedure is part of the vehicle and associated equipment maintenance records that will be kept in the logging truck in a three-ring binder; other sections of the binder will contain daily inspection logs. The Hanford Site Contractor (HSC) completes and maintains records. This procedure includes examples of these logs.

The Logging Engineer should refer to the vehicle maintenance logs and monthly/annual maintenance logs to determine when maintenance should be performed. The Logging Engineer is responsible for ensuring maintenance is current; however, the Project Coordinator must conduct regular reviews of maintenance records to ensure that truck maintenance is performed according to this plan.

Two factors in particular will promote the reliability of this logging unit: observation and cleanliness. All systems of the truck must be inspected frequently, and the systems must be kept clean. The Logging Engineer, as the unit's operator, is responsible for these tasks, but the Project Coordinator must also practice "management by walkdown" to note conditions of the systems.

Maintenance schedules presented in this procedure reflect manufacturers' recommendations. These recommendations assume a level of service more strenuous than currently planned. S.M. Stoller Corp., a contractor for the U.S. Department of Energy Grand Junction Office, may decide to modify the service intervals with no loss of reliability or longevity. The Project Manager must approve revisions to this procedure before implementation of the revision. Revisions may be made via a pen and ink change to this plan and in conjunction with a memo to the record and involved parties.

## **2.0 Vehicle Maintenance**

### **2.1 Specifications**

#### **2.1.1 Equipment**

The logging vehicle consists of an F-800 truck chassis equipped with an FD-1460 Ford diesel engine and Marmon-Herrington all-wheel-drive. Additional specifications are available in the Ford and Marmon-Herrington service manuals.

#### **2.1.2 Maintenance Materials**

- Engine oil: 15W-40, Service Rating SG, mineral- or synthetic-based.
- Gear lubricant: SAE 85W120 EP (mineral) or SAE 80W/90 (synthetic).
- Fan belts.
- Air filter, engine oil filter, fuel filter.

### **2.1 Preventive Maintenance Schedule**

#### **2.1.1 Daily**

- Check engine oil level, coolant level, power steering fluid level, windshield washer fluid level, and air filter restriction indicators.
- Drain fuel filter and water separators, if necessary.
- Inspect hoses, belts, and all other underhood equipment. Check for leaks.
- Inspect the underbody; look for loose hoses, wiring, fluid leaks, etc.
- Perform walk-around inspection to ensure that vehicle is ready to move.
- Check the liquid-nitrogen level.
- Determine whether any maintenance is due.
- Review the last driver's Vehicle Inspection Report. Ensure that any defects have been repaired.
- Make entry on Daily Inspection Log (see Figure 1).

### Daily Inspection Log

Truck No. \_\_\_\_\_

Month \_\_\_\_\_

Year \_\_\_\_\_

Date	Mileage	Engine Hours	Generator Hours	DOT Inspection	LN <sub>2</sub> level	Fuel Level	Signature	Comments on Back
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
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29								
30								
31								

*Figure 1. Daily Inspection Log*

## 2.2.2 Safety Check Before Moving Vehicle Onto Paved Roads

A Department of Transportation (DOT)-compliant pre-trip inspection will be performed and documented in addition to the daily inspection. The pre-trip inspection will include the following:

- Chock the wheels.
- Enter cab of truck.
  - Set parking brakes, put transmission in neutral, start engine, and monitor gauges.
  - Ensure that air-pressure warning buzzer is operating.
  - Check condition of accelerator, brake, and clutch pedal assemblies.
  - Switch on headlights and four-way flashers.
- Walk to front of truck.
  - Ensure that headlights, marker lights, and flashers are operating.
  - Listen for unusual noises.
  - Make sure license plate and hood latches are secure.
- Walk to right front of truck.
  - Check clearance and marker lights and reflectors.
  - Inspect exhaust system.
  - Check front tire pressure, inspect tire and rim.
  - Inspect hub, steering linkage, brake system, and suspension.
  - Check the fuel tank.
  - Inspect windshield wiper assembly.
  - Check the battery compartment, make sure batteries are secure and terminals are clean and tight.

- Walk to right rear of truck.
  - Check clearance and marker lights and reflectors.
  - Check tire pressure, inspect tire and rim.
  - Inspect hub, brake system, and suspension.
  - Check mudflaps.
- Walk to rear of truck.
  - Check stop, tail, and license lights.
  - Make sure license plate is secure.
  - Check liquid nitrogen system, make sure valves and dewar is securely mounted.
  - Make sure tarp and crane are secure.
- Walk to left rear of truck.
  - Check clearance and marker lights and reflectors.
  - Check tire pressure, inspect tire and rim.
  - Inspect hub, brake system, and suspension.
  - Check mudflaps.
- Walk to left front of truck.
  - Check clearance and marker lights and reflectors.
  - Check tire pressure, inspect tire and rim.
  - Inspect hub and steering linkage, brake system, and suspension.
  - Inspect windshield wiper assembly.

- Enter cab of truck.
  - Test horn.
  - Turn off hazard lights and test turn signals and stop lights. Have an assistant help determine whether outside lighting is functioning correctly.
  - Test high beams and check dash indicator.
  - Test dash lighting.
  - Test defrosters.
  - Test windshield wiper and washer.
  - Clean windshields, other glass, and mirrors if necessary.
  - Test backup alarm and backup lights.
  - Check adjustment of mirrors.
  - Check steering wheel for excess play.
  - Test the low-pressure warning buzzer, the spring brake application mechanism, air pressure buildup rate, air leakage rate, air compressor cut-in and cut-out pressures, parking brake, and service brake.
  - Check shipping papers.
- Make sure that the following Safety Equipment is in the truck:
  - 10 BC fire extinguishers, charged and with current inspection tag.
  - Reflective triangles.
  - Spare light bulbs.
  - Wheel chocks.
- Complete and document the inspection.
  - Initial the Daily Inspection Log (Figure 1), describe any work performed on the vehicle, date and sign the log.

- Complete the Driver's Vehicle Inspection Report (DVIR) (Figure 2). Leave one copy of the report on the clipboard on the passenger seat, and submit one copy along with the inspection form from the previous trip.
- Determine if the truck is due for scheduled maintenance.
- Fix any deficiencies or initiate a service request. Note any defects and submit a copy of the DVIR with the service request to Maintenance. If the vehicle is not roadworthy or safe to operate, the Logging Engineer should tag the steering wheel and notify management.

### **2.2.3 Weekly Maintenance**

- Grease all drive shaft zerck fittings.

### **2.2.4 Regular Maintenance**

The engine oil and filter should be changed every 800 hours, plus or minus 50 hours. During the 800-hour maintenance checkup, a Class B service should be performed, including chassis lubrication, fluid-level checks, a safety check, and a road test (Appendix F).

If synthetic engine oil is used, the oil will be sampled and changed after 200 hours of the first three uses of the product and analyzed for dirt, oxidation, and contamination. Analysis results will determine when the oil and/or the oil filter will be changed for subsequent oil changes. Sample intervals will be specified in a memo written by the Project Manager to the project record, with a copy of the memo placed in the maintenance manuals in the logging units.

In addition to the recommended service, ensure the automatic slack adjusters for the air brakes are inspected and adjusted annually and the air filter element is replaced as necessary, which may be more frequent than specified in the maintenance schedule. Replace the air filter when the air filter restriction indicator on the dash of the truck reads 25 inches. Additional service will be requested at appropriate intervals according to the maintenance schedules in Appendices A, B, and C.

The Ford Motor Company and Marmon-Herrington recommended maintenance schedules are in the owners' manuals. Appendices A and B of this procedure contain copies of these schedules. Refer to the manufacturers' manuals for schedule details. Ensure that the truck is serviced according to those schedules. Note any service work on the Daily Maintenance Log as the service is performed. In addition to the service intervals specified in Appendix B, Marmon-Herrington recommends the following:

- Initial Use (1,000 to 3,000 miles)
  - Change all lubricants in the drivetrain components.

- Annually, or every 10,000 miles
  - Change all lubricants in the drivetrain components.
  - Repack wheel bearings (more often if necessary).

# DRIVER'S VEHICLE INSPECTION REPORT

AS REQUIRED BY THE D.O.T. FEDERAL MOTOR CARRIER SAFETY REGULATIONS

CARRIER: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ A.M. \_\_\_\_\_ P.M.

CHECK ANY DEFECTIVE ITEM AND GIVE DETAILS UNDER "REMARKS"

**TRACTOR/ TRUCK NO.** \_\_\_\_\_ **ODOMETER READING** \_\_\_\_\_

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Air Compressor<br><input type="checkbox"/> Air Lines<br><input type="checkbox"/> Battery<br><input type="checkbox"/> Body<br><input type="checkbox"/> Brake Accessories<br><input type="checkbox"/> Brakes, Parking<br><input type="checkbox"/> Brakes, Service<br><input type="checkbox"/> Clutch<br><input type="checkbox"/> Coupling Devices<br><input type="checkbox"/> Defroster/Heater<br><input type="checkbox"/> Drive Line<br><input type="checkbox"/> Engine<br><input type="checkbox"/> Exhaust<br><input type="checkbox"/> Fifth Wheel<br><input type="checkbox"/> Frame and Assembly<br><input type="checkbox"/> Front Axle<br><input type="checkbox"/> Fuel Tanks<br><input type="checkbox"/> Generator | <input type="checkbox"/> Horn<br><input type="checkbox"/> Lights<br>Head - Stop<br>Tail - Dash<br>Turn Indicators<br><input type="checkbox"/> Mirrors<br><input type="checkbox"/> Muffler<br><input type="checkbox"/> Oil Pressure<br><input type="checkbox"/> Radiator<br><input type="checkbox"/> Rear End<br><input type="checkbox"/> Reflectors<br><input type="checkbox"/> Safety Equipment<br>Fire Extinguisher<br>Reflective Triangles<br>Flags - Flares - Fusees<br>Spare Bulbs & Fuses<br>Spare Seal Beam | <input type="checkbox"/> Suspension System<br><input type="checkbox"/> Starter<br><input type="checkbox"/> Steering<br><input type="checkbox"/> Tachograph<br><input type="checkbox"/> Tires<br><input type="checkbox"/> Tire Chains<br><input type="checkbox"/> Transmission<br><input type="checkbox"/> Wheels and Rims<br><input type="checkbox"/> Windows<br><input type="checkbox"/> Windshield Wipers<br><input type="checkbox"/> Other |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**TRAILER(S) NO. (S).** \_\_\_\_\_

- |                                                                                                                                                                                                              |                                                                                                                                                                                                 |                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Brake Connections<br><input type="checkbox"/> Brakes<br><input type="checkbox"/> Coupling Devices<br><input type="checkbox"/> Coupling (King) Pin<br><input type="checkbox"/> Doors | <input type="checkbox"/> Hitch<br><input type="checkbox"/> Landing Gear<br><input type="checkbox"/> Lights - All<br><input type="checkbox"/> Roof<br><input type="checkbox"/> Suspension System | <input type="checkbox"/> Tarpaulin<br><input type="checkbox"/> Tires<br><input type="checkbox"/> Wheels and Rims<br><input type="checkbox"/> Other |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**CONDITION OF THE ABOVE VEHICLE IS SATISFACTORY**

DRIVER'S SIGNATURE: \_\_\_\_\_

ABOVE DEFECTS CORRECTED

ABOVE DEFECTS NEED NOT BE CORRECTED FOR SAFE OPERATION OF VEHICLE

MECHANIC'S SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

DRIVER'S SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

**ORIGINAL**

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*Figure 2. Driver's Vehicle Inspection Report*

## 3.0 Hydraulic Maintenance

### 3.1 General

The hydraulic system provides the mechanical power for the drawworks, crane, and generator. Figure 3 presents a diagram of the hydraulic system.

The vehicle operator should avoid spraying water directly on the vents of the various gearboxes and remove accumulated dirt from around seals and breathers.

The hydraulic fluid and filter should be changed annually. This interval may be lengthened if fluid analysis indicates the fluid is in acceptable condition. A 10-micron filter is located near the hydraulic pumps beneath the truck.

Several possible fluids are used in the systems. The preferred fluid is Dextron Type III synthetic automatic transmission fluid. Dextron Type II automatic transmission fluid or equivalent, or Chevron Torque Fluid Type CPS226705 or equivalent is also acceptable. Different types of fluid must not be mixed. Use a Donaldson No. 163555 filter or equivalent.

#### 3.1.1 Monthly

- Check the fluid levels of all components.
- Check the area of the hydraulic components for leakage and loose hardware.
- Check hose connections, mounting bolts, and other fasteners for tightness.
- Inspect the chains.
- Clean (if necessary) and grease the level wind.
- Inspect all hydraulic hoses for weathering, chaffing, or other deterioration.
- Check the level of hydraulic fluid in the reservoir.
- Check the Ausco brake for leakage.

#### 3.1.2 Semiannually

- Change the lubricant in the Hub City gearboxes. This interval may be lengthened if analysis of the fluid indicates that the fluid remains in acceptable condition.

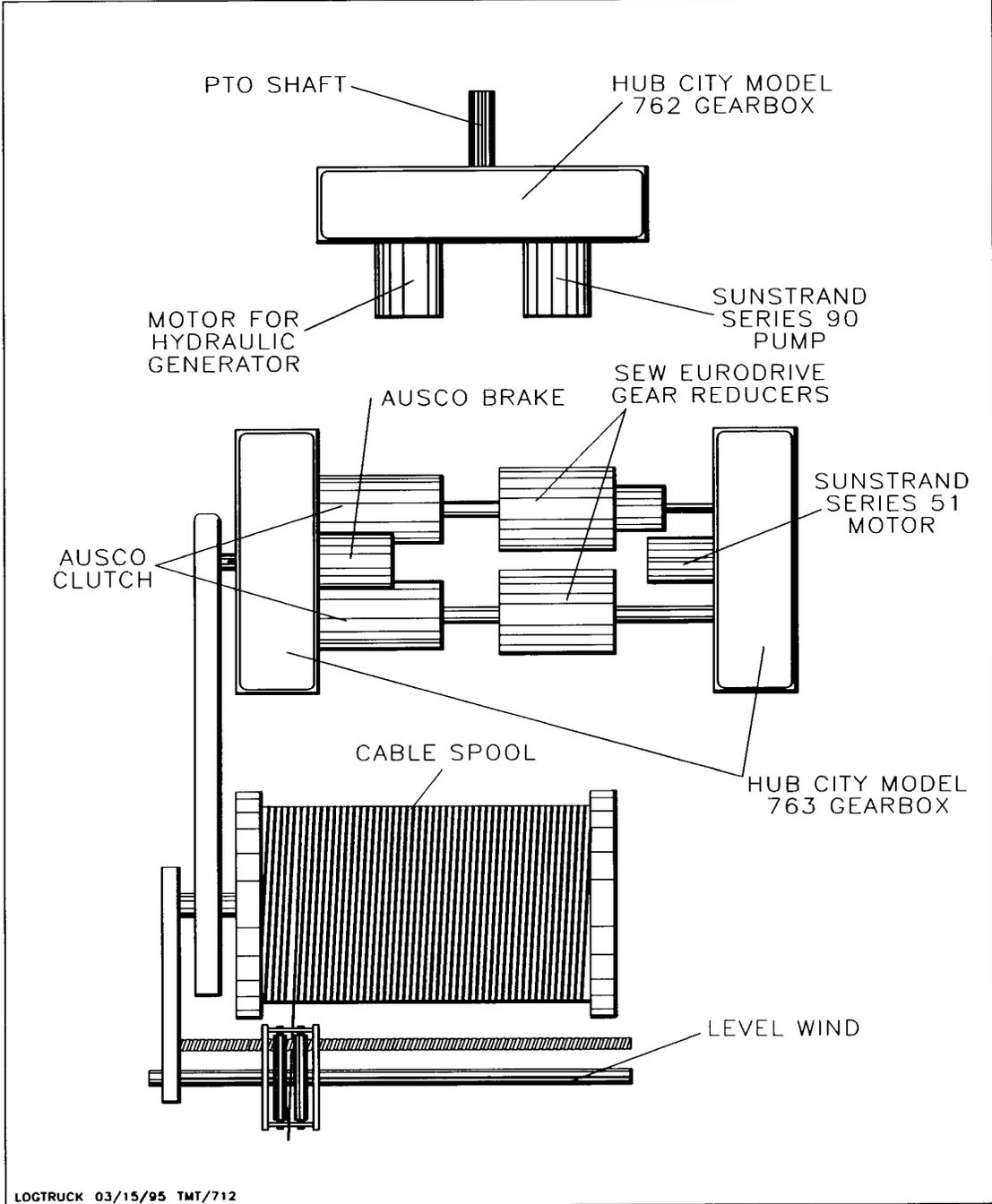


Figure 3. Hydraulic System

### **3.1.3 Annually**

- Change the lubricant in the SEW Eurodrive gear reduction cases and the Ausco clutches.

## **3.2 Sundstrand Series 90 Pump**

The Sundstrand series 90 pump provides hydraulic force to the drawworks and crane. The pump is mounted under the truck body at the end of the power takeoff (PTO) shaft. It does not require periodic maintenance other than monthly inspection. Inspect the pump mounting bolts, hose connections, and linkages.

## **3.3 Sundstrand Series 51 Motor**

The Sundstrand series 51 motor drives the drawworks. This unit is mounted on the top of the input side of the drawworks. It does not require periodic maintenance other than monthly inspection. Inspect the pump mounting bolts, hose connections, and linkages.

## **3.4 Hub City Gearboxes**

Two Model 763 gearboxes are on either side of the hoist drive. The gearboxes are grey triangular units in line with the drum flanges. A single Model 762 gearbox is located underneath the truck at the PTO shaft terminus.

- Check oil level. Use SAE 90 EP mineral or SAE 80W90 synthetic gear oil; do not mix mineral- and synthetic-based lubricants.

Model 762 gearbox: Remove 1/8-inch plug on the rear side of the housing.

- Model 763 gearbox: Input side—remove the 3/8-inch plug even with the upper shaft. Insert a dipstick, withdraw the dipstick, and compare the level with the position of the 1/8-inch plug located below and to the side of the 3/8-inch plug.
- Model 763 gearbox: Final drive (to chain sprocket)—maintain oil level at the 3/8-inch plug.

Check the oil levels when the engine oil is changed. If an oil leak is detected, check the oil level to ensure safe operation of the gearbox. Ensure the leak is repaired.

Change the oil after the initial 100 hours of operation, and flush the case using an approved lubricant.

### **3.5 SEW Eurodrive Reduction Gearboxes**

The SEW Eurodrive reduction gearboxes are two blue gear reducers mounted between the Hub City gearboxes. The two reducers provide different gear-reduction ratios to the cable drum. The forward unit, a 75.22:1 reducer, has one fill port, one drain port, and one inspection port. The rear reducer, providing a reduction ratio of 1515:1, has two drain ports, two fill ports, and two inspection ports. The inspection ports are located on two separate cases that do not connect internally.

Maintain the oil level at the shaft centerline. This level is above the fill port, but follows the manufacturer's recommendation for this low-speed application. Check the level when the engine oil is changed.

- Use Mobilegear 630 lubricant or SAE 80W90 synthetic gear lubricant—do not mix mineral- and synthetic-based lubricants.

### **3.6 Ausco Brake Model 37735**

The Ausco brake model 37735 is the cylindrical component mounted at the top position of the output side of the Hub City gearbox. Spring pressure applies the brake unless sufficient hydraulic pressure is present to release it. This component does not contain lubricant.

Check monthly for leakage around the pressure relief valve, and replace the O-ring if leakage occurs. Disassembly and cleaning will be necessary if hydraulic fluid leaks into the case.

### **3.7 Ausco Clutch Model 34910**

Two Ausco clutch model 34910 units are mounted at the output ends of the reducers, connecting the reducers to the final Hub City gearbox. Spring pressure holds these units in the release position unless sufficient hydraulic pressure is present to engage them.

A bleeder screw is located on the clutch.

- Fill housing to the height of the fill plug. The preferred fluid is Dextron Type III synthetic automatic transmission fluid. Dextron Type II automatic transmission fluid or equivalent, or Chevron Torque Fluid Type CPS226705 or equivalent is also acceptable. Different types of fluid must not be mixed.

## **4.0 Crane Maintenance**

### **4.1 General**

The manufacturer's recommendations for servicing the crane assume constant operation. Our operation differs because the crane typically will be deployed and stored just once each day. The maintenance intervals have, therefore, been changed from 800 hours to quarterly.

#### **4.1.1 Daily**

- Examine hoses and fittings for wear, damage, and leaks.
- Ensure that the crane is properly prepared before transport.

#### **4.1.2 Quarterly (every 800 hours)**

- Grease rotation bearings, hinge pins, and telescoping section guide blocks, using chassis lubricant.
- Check tightness of ring nuts, all other fasteners, and crane anchoring tie rods.
- Check guide pads for wear.
- Check welds and other structural elements.
- Clean entire assembly and relubricate.
- Check hoses and seals for signs of deterioration.

## 5.0 Hydraulic Generator Maintenance

### 5.1 General

The hydraulic generator includes a dedicated PTO-driven pump. The maintenance for this unit consists of periodic inspections and cleaning.

If the hydraulic fluid becomes discolored, burnt smelling, or abrasive to the touch, remove the generator from service immediately and diagnose and correct the problem.

Operate this unit with the compartment door open. The manufacturer warns that a louvered door may not provide adequate airflow for cooling.

Several possible fluids may be used in this system. The preferred fluid is Dextron Type III synthetic automatic transmission fluid. Dextron Type II automatic transmission fluid or equivalent is also acceptable. Different types of fluid must not be mixed.

#### 5.1.1 Daily

- Check oil level.
- Ensure that dirt or debris has not obstructed the cooling system.
- Inspect the line output cables and plugs.

#### 5.1.2 Monthly

- Inspect wiring; check for chaffing and loose connections.
- Inspect hydraulic components for wear and leaks, including pumps.
- Check cooling system fans with test button.
- Inspect the voltage regulator for corrosion and contamination.

#### 5.1.3 Annually

- Replace hydraulic fluid and filter (filter P/N Harrison HPP888-647-577). This interval may be lengthened if analysis of the fluid indicates that the fluid remains in acceptable condition.

#### **5.1.4 As Needed**

- Clean generators.

## 6.0 References

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**Appendix A**  
**Ford Motor Company Service Schedule**

**Appendix B**  
**Marmon-Herrington Service Schedule**

**Appendix C**  
**Greenspan, Inc., *Hydraulic Maintenance Manual***

**Appendix D**  
**Critical Spare Parts List**

## Spares Stored in Vehicle:

O-rings:	Probe top sub	235
	Bottom sub	233
	Cable head	029
	Autofill	013, 211
Fuses:	Bin	8 A slow blow
	Computer	MTH 6 ampere (A)
	Sensor Panel	3AG 5 A
		3AG 3 A
	Console	10 A slow blow
	Autofill (in J box)	3AG 10 A
	Remote (in console)	3AG 10 A
	Chassis	Circuitry protected by circuit breakers; no fuses are required.
Light bulbs:	Turn signal, taillight	1157
	Back up	1156
	Marker	194
	Headlight	H6054

Epoxy for cable heading

Cable head connector pins

Measuring wheel shackle

Fan Belt: Serpentine Belt, Motorcraft P/N JK8-726 (F3HZ 8620G)

A/C Belt: Motorcraft F3HZ 8620D

Hose clamps: various sizes

## Spares Stored in S.M. Stoller On-Site Laboratory:

Electronic Instruments:

ORTEC Model 4001C NIM bin

ORTEC Model 973 amplifier

ORTEC Model 918 dual port fan

Note: The units are equipped with two ORTEC Model 921 multichannel buffers.

Power supply/controller module for probe

Optical encoder

Hardware—rebuilt kits (gaskets, bearings, seals, etc.) for the following:\*

Ferrari crane

Sunstrand series 90 pump

Sunstrand series 51 motor

Hub City model 763 gearbox

SEW Eurodrive gear reducers  
Ausco clutch  
Ausco brake  
Logging cable: 600 feet  
Cable head assembly  
Autofill connector/stinger assembly

\* Parts for these items need not be stocked if parts and service are readily available from the manufacturer or local vendors. Manufacturer contact information is in Appendix C, Greenspan, Inc., *Hydraulic Maintenance Manual*.

Rate/strain cables

Connectors:	6 pin	PT06E10-6P and base PT06E10-6S and base
	10 pin	06A12-10S and base
Cable:	8 conductor shielded	

Engine throttle speed control cable

Hydraulic System oil filter: Donaldson No. 163555 filter or equivalent.

Hydraulic fluid: Dextron Type II ATF or Chevron Torque Fluid Type CPS226705 or equivalent, depending on which is installed.

Hydraulic generator oil filter: Harrison P/N HPP888-647-577 or equivalent

Microguard high-efficiency particulate air filter: (HEPA) P/N H-1212B (Airfilters, Inc., Houston, Texas, (713) 666-3648, or equivalent).

**Appendix E**  
**Class A Inspection and Service**

**Appendix F**  
**Class B Inspection and Service**