



HYDRAULIC POWER SYSTEMS, INC.



AUGER SYSTEMS

**MODEL 35VT
OPERATORS, MAINTENANCE
AND PARTS MANUAL**



TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
	TABLE OF CONTENTS	1-3
	REGISTRATION INFORMATION	4
1.0	GENERAL INFORMATION	5
1.1	Warranty	5
1.2	Model H - 35VT Assembly Instruction	6
1.3	Model H - 35VT Auger System	6
1.3.1	Auger Drive Unit	7
1.3.2	Diesel Hydraulic Power Unit	7
1.3.3	Hydraulic Hose Bundle	7
2.0	SAFETY INFORMATION	8
2.1	Important Safety Information	8
2.2	Standard Safety Procedures	9-10
3.0	INTRODUCTION	11
3.1	Specifications	11
3.2	General Overview	12
4.0	MAINTENANCE	13
4.1	Daily Maintenance	14
4.2	General Maintenance	15
4.2.1	Power Unit	15
4.2.2	Auger Unit	16
4.3	Maintenance Schedule	16
4.4	Torque Specifications	17
4.5	Fluids and Filters Specifications	18
4.5.1	Lubricants	18
4.5.2	Fuels	18
4.5.3	Coolants	18
4.5.4	Filters	19
4.6	Disassembly of Auger Unit	19
4.6.1	Disassembly of Auger Housing	19
4.6.2	Disconnect the Case Drain	19
4.6.3	Diagram of Auger Unit Exploded	20



TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
4.7	Disassembly of Planetary Subassembly	21
4.7.1	To Remove Disassembly of Planetary Subassembly	21
4.7.2	Disassemble Planet Hub Subassembly	22
4.7.3	Disassemble Bull Gear Housing	22-24
4.7.4	Disassemble Bull Gear Housing - Exploded View	23
5.0	Operation	25
5.1	Connecting the Hydraulic Hoses	25
5.1.1	Connecting the Hydraulic Hoses between the Power Pack and the Auger	25
5.2	Pre-Start of Auger Unit	25
5.2.1	Pre-Start.....	25
5.3	Starting Units	26
5.3.1	Auger and Power Unit	26
5.3.2.	Stopping Units	27
5.4	Setting System Flows and Pressures	27
5.4.1	Pressure Relief Setting.....	27
6.0	TROUBLE SHOOTING	28
6.1	Power Unit	28
6.1.1	Engine Will Not Start	28
6.1.2	Throttle Will Not Operate	28
6.2	Auger System	29
6.2.1	Loss of Operating Performance	29
6.2.2	Air Remote Box Does Not Function	30



TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
7.0	DIAGRAM OF PARTS	31
7.1	Auger	32
7.1.1	Bill Of Materials	32
7.1.2	Exploded View	33
7.2	Multi-Planematic Drive	34
7.2.1	Bill Of Materials	34
7.2.2	Exploded View	35
7.3	Hydraulic Valve	36
7.3.1	Bill Of Materials	36
7.3.2	Exploded View	39
7.4	Power Unit Replacement Parts	40
7.4.1	Bill Of Materials	40
7.4.2	Exploded View	41
7.5	Hydraulic Schematic Model H - 35VT	42
7.5.1	Bill Of Materials	42
7.5.2	Hydraulic Schematic	43
7.6	Air Schematic/Remote Control Engine	
	Throttle & Auger Control	44
7.6.1	Bill Of Materials	44
7.6.2	Air Schematic/Remote Control Box	45
8.0	Placards and Safety Signs	46-51
9.0	Hose Section	52
9.1.1	Power Pack Hoses	54
9.1.2	Motor Hoses	55



HYDRAULIC POWER SYSTEMS INC.

Release 01

Model H - 35VT Operators, Maintenance, and Parts Manual

Effective Date 08/98

REGISTRATION INFORMATION

EQUIPMENT NAME _____

POWER PACK MODEL # _____

POWER PACK SERIAL # _____

AUGER DRIVE MODEL # _____

PRIME MOVER _____

PRIME MOVER SERIAL # _____

CUSTOMER _____

DATE: _____



HYDRAULIC POWER SYSTEMS INC.

Model H - 35VT Operators, Maintenance, and Parts Manual

Release 01

Effective Date 08/98

SECTION 1- GENERAL INFORMATION

1.1 Warranty

HYDRAULIC POWER SYSTEMS, INC. hereby warrants that the is free from defects in material and workmanship attributable to **HYDRAULIC POWER SYSTEMS, INC.** under normal use and service for a period of ninety (90) days from date of delivery of such machine.

THE EXCLUSIVE REMEDY OF THE BUYER UNDER THIS WARRANTY is the repair or replacement, without charge, of any defective part or parts of this machine as long as buyer notifies **HYDRAULIC POWER SYSTEMS, INC.** by registered mail of such defect within seventy-five (75) days from the date of delivery of this machine.

Any part or parts claimed to be defective must be shipped to the **HYDRAULIC POWER SYSTEMS, INC.** factory at 1203 Ozark, North Kansas City, Missouri 64116, transportation prepaid. The **HYDRAULIC POWER SYSTEMS, INC.** acceptance of any part so shipped shall not be deemed an admission that the part is defective, and if **HYDRAULIC POWER SYSTEMS, INC.** finds that any part returned is not defective, such part shall be reshipped to the Buyer at Buyer's expense.

THE BUYER'S SOLE AND EXCLUSIVE REMEDY AGAINST **HYDRAULIC POWER SYSTEMS, INC.** UNDER THIS WARRANTY shall be for the REPAIR OR REPLACEMENT of defective parts as provided above. THE BUYER AGREES THAT NO OTHER REMEDY, INCLUDING, BUT NOT LIMITED TO, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSONS OR PROPERTY OR OTHER INCIDENTAL OR CONSEQUENTIAL LOSS SHALL BE AVAILABLE TO THE BUYER.

THE SOLE PURPOSE OF THE STIPULATED EXCLUSIVE REMEDY shall be to provide the Buyer with free repair or replacement of defective parts in the manner provided herein. This EXCLUSIVE REMEDY shall not be deemed to fail of its essential purpose so long as **HYDRAULIC POWER SYSTEMS, INC.** is willing and able to repair or replace defective parts in the prescribed manner.

THE BUYER SHALL NOT BE REQUIRED TO DELIVER A DEFECTIVE PART TO **HYDRAULIC POWER SYSTEMS, INC.** IF:

(1) The part was destroyed as a result of its defect in any part covered in the warranty,

AND

(2) **HYDRAULIC POWER SYSTEMS, INC.** is reasonably satisfied that the part was defective at the time of sale.

If both of these conditions are met, **HYDRAULIC POWER SYSTEMS, INC.** shall replace the part in the same manner provided herein as if the Buyer had delivered it to **HYDRAULIC POWER SYSTEMS INC.** at its factory.

THIS WARRANTY SHALL NOT APPLY to any machinery which has suffered abuse, misuse, neglect or accident or to any machinery which has been altered so as to affect its ability or reliability, (except where such alteration has been accomplished with the prior written consent of **HYDRAULIC POWER SYSTEMS, INC.**) or which has been repaired in any way by the Buyer without the prior written consent of **HYDRAULIC POWER SYSTEMS, INC.** or which has been negligently installed by the Buyer.

WARNING: THIS PRODUCT IS NOT TO BE USED IN ANY FASHION DIFFERENT FROM THAT WHICH BUYER HAS ADVISED SELLER SHALL BE ITS INTENDED USE. NO WARRANTY CONVEYED HEREIN SHALL APPLY TO A USE OTHER THAN THAT WHICH BUYER HAS INDICATED TO SELLER AT THE TIME OF PURCHASE.

SELLER DOES NOT WARRANT PRODUCTS MANUFACTURED BY OTHER MANUFACTURERS WHICH MAY BE USED IN THE ASSEMBLY OF THE TOTAL PRODUCT SOLD BY SELLER, BUYER'S SOLE REMEDY AS TO PRODUCTS MANUFACTURED BY OTHERS SHALL BE PURSUED WITH SUCH OTHER COMPONENT PRODUCT MANUFACTURERS.

THE BUYER EXPRESSLY UNDERSTANDS THAT **HYDRAULIC POWER SYSTEMS, INC.** HAS MADE NO EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, IMPLIED OR EXPRESSED WARRANTIES FOR MERCHANTABILITY OR FITNESS, OTHER THAN THE EXPRESSED WARRANTY SET FORTH ABOVE. THE SELLER, HEREBY, DISCLAIMS ALL OTHER EXPRESSED WARRANTIES, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER IMPLIED WARRANTIES.

Any oral statements made by any person about the machine described in the Agreement DO NOT CONSTITUTE WARRANTIES and are not part of this Agreement. The entire Agreement between the parties hereto is embodied in this writing. This writing constitutes the final expression of the parties' Agreement, and it is a COMPLETE AND EXCLUSIVE STATEMENT of the terms of that Agreement. All oral or written agreements between the parties made prior to the execution of this Agreement are hereby merged herein. This Agreement SHALL NOT BE MODIFIED OR ALTERED in any way other than by a writing, signed by the parties to this Agreement, their successors or authorized agents, and this Agreement SHALL NOT BE VARIED, SUPPLEMENTED, QUALIFIED, EXPLAINED, OR INTERPRETED BY ANY PRIOR COURSE OR DEALING BETWEEN THE PARTIES OR BY ANY USAGE OF TRADE.

HYDRAULIC POWER SYSTEMS, INC.
1203 Ozark
North Kansas City, Missouri 64116



SECTION 1- GENERAL INFORMATION

1.2 - Assembly Instructions

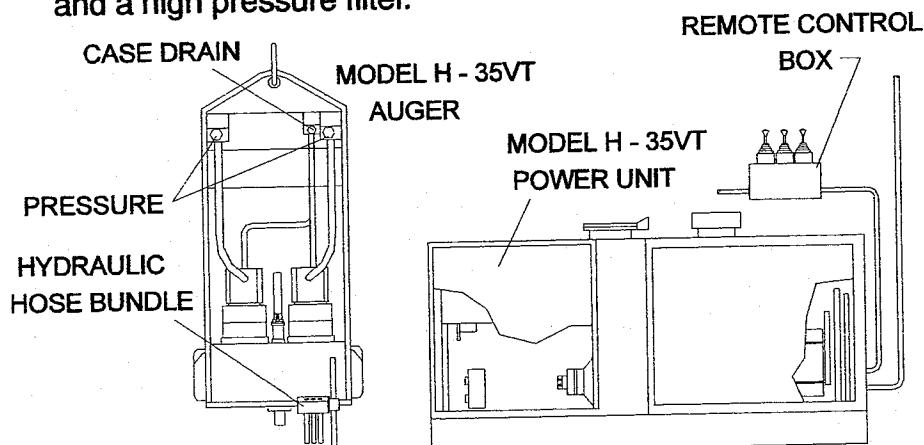
Assembly of the H.P.S.I. Model H - 35VT consists of locating the power unit and auger drive unit, making hose connections between the two units, and positioning the remote control box. The power unit is mounted on a steel tubing skid, so it can be located on the ground near the crane, or affixed to the crane. Position the auger unit in pile driving leads, or on a sufficient guide track to withstand the auger torque. Connect the 3/4" ID case drain hose between the power unit and the auger drive unit. This line should always be connected first to prevent accidental unit operation without proper motor drainage. Connect the two 1-1/4" ID main power hoses between the power unit and the auger unit. Locate the hydraulic control panel in a safe location accessible to the operator. Finally connect the 3/8" pilot line between the power unit and the auger drive unit.

1.3 - Model H - 35VT Auger System

The H.P.S.I. Model H - 35VT Auger is designed to drill with an output speed of 120 RPM at 10,000 ft. lb or 30 RPM at 33,000 ft. lb. The Model H - 35VT consists of an Auger Drive Unit, diesel driven Power Pack and Hose Bundle for interconnecting the two. The system is an open loop design which means that the oil is pumped from the reservoir tank to the system and returned to the tank.

1.3.1 - Auger Drive Unit

From the directional valve on the power pack, the oil is directed through a hose bundle, to the auger unit. The auger unit drive unit consists of a four planetary drive gearbox, four variable torque hydraulic motors, three manifolds (2 pressure and 1 case drain), and a high pressure filter.





SECTION 1- GENERAL INFORMATION - continued

1.3 - Model H - 35VT Auger with Power Unit

1.3.1 - Auger Drive Unit - continued:

Oil (in the forward direction of rotation) enters the high pressure, in-line filter and passes into one of the manifold blocks. From the manifold, oil is evenly distributed to the four hydraulic motors. The motors are arranged in a parallel circuit, and automatically split the oil flow evenly, because they are geared to a common output gear. Oil from the motors, is combined in the other manifold, and returned to the power unit.

1.3.2 - Diesel Hydraulic Power Unit

The H - 35VT Hydraulic Power unit is equipped with a Diesel Engine with a rated output of 335 H.P. at 2100 R.P.M. The power unit also includes a main hydraulic pump, and auxiliary hydraulic pump for controls, a reservoir, a directional control valve with pressure relief, an engine mounted oil cooler, a charge pressure filter, a return filter, and two flow dividers and a relief for the control circuit. All the components are mounted on a sturdy steel tubing skid. The main drive system oil passes from the reservoir, through a 4" suction strainer and 4" shut-off valve (for maintenance purposes only), into the gear pump. The gear pump has approximately 15% more volume capacity than the piston pump. The gear pump discharge port, to allow relieving excess fluid. Oil from the gear pump is directed through a 20 micron, in-line filter, and into the inlet of the main piston pump. From the discharge port pump, oil is directed to the inlet of the directional valve.

1.3.3 - Hydraulic Hose Bundle

There are two additional hoses between the power pack and the four motors. The 3/4" hose is used as a case drain line for the four motors. This prevents excessive pressure build-up in the motor cases and must always be connected when operating the auger. The 3/8" hose is used to direct pilot oil for varying the motor torque.

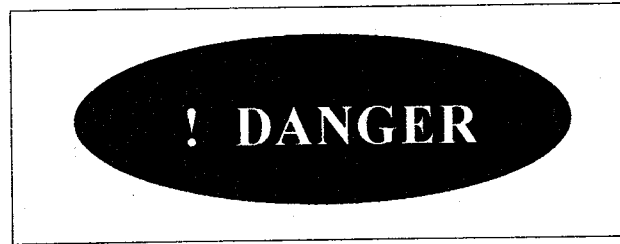
The final portion of the hydraulic circuitry involves the control system. Oil from the reservoir enter the auxiliary pump. Pilot oil is directed to the 3-spool remote control valve. The functions performed from the remote control include throttle control, forward and reverse of the auger, and motor displacement control to achieve the variable torque feature.



SECTION 2- SAFETY

2.1 Important Safety Information

Most accidents involving product operation, maintenance and repair are caused by a failure to observe basic safety rules and precautions. An accident can often be avoided by recognizing potentially hazardous situations before the situation occurs. A person must always be alert to potential hazards. This person should also have the necessary training, skills, and tools to perform these functions properly.



WARNING: IMPROPER OPERATION AND/OR MAINTENANCE OF THIS PRODUCT CAN BE EXTREMELY DANGEROUS AND COULD RESULT IN SERIOUS INJURY OR DEATH.

DO NOT OPERATE, MAINTENANCE, OR PERFORM ANY REPAIRS ON THIS PRODUCT UNTIL YOU HAVE READ AND UNDERSTOOD THE OPERATION, MAINTENANCE AND REPAIR INFORMATION IN THIS MANUAL.

SAFETY PRECAUTIONS AND WARNINGS ARE ALSO PROVIDED ON THE PRODUCT. IF THESE HAZARD WARNINGS ARE NOT HEEDDED, SERIOUS BODILY INJURY OR DEATH COULD OCCUR TO YOU OR OTHER PERSONS.

HYDRAULIC POWER SYSTEMS INC. cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are therefore not all inclusive. If a tool, procedure, work method or operating technique not specifically recommended by H.P.S.I. is used, you must first determine that it is in no way dangerous for you and others in the vicinity. Concern for the safety of the product should also be taken into consideration. You should ensure that the unit will not be damaged or made unsafe by the particular operation, maintenance, or repair procedures you choose.



SECTION 2- SAFETY - continued

2.1 Important Safety Information

The information, specifications, and illustrations in this publication are on the basis of information available at the time it was written. The specifications, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service given to the product. Obtain the complete and most current information before starting any job. H.P.S.I. dealers have the most current information available. For the name of the nearest **FACTORY AUTHORIZED REPRESENTATIVE** contact **HYDRAULIC POWER SYSTEMS INC.** at (816) 221-4774.

2.2 - Standard Safety Procedures



WARNING !!

NEVER START ENGINE WITH THE GOVERNOR LINKAGE DISCONNECTED.

INSTALL GUARDS OVER ALL EXPOSED ROTATING PARTS.

ALWAYS STOP ENGINE BEFORE ADJUSTING OR REPAIRING ENGINE HYDRAULIC POWER UNIT.

DO NOT WEAR LOOSE CLOTHING WHEN WORKING NEAR ENGINE.

ALWAYS WEAR PROTECTIVE GLASSES, CLOTHING, HEADGEAR, RESPIRATOR, ETC. WHEN CONDITIONS REQUIRE THEM.

NEVER INSPECT ENGINE COOLING SYSTEM WHILE UNIT IS RUNNING.

IF EQUIPPED WITH JACKET WATER COOLING SYSTEM, REMOVE COOLANT FILLER CAP SLOWLY TO RELIEVE PRESSURE THAT MAY HAVE BUILT UP DURING OPERATION. NEVER REMOVE CAP WHILE ENGINE IS HOT OR OPERATING. STEAM FROM COOLING SYSTEM COULD CAUSE SERIOUS INJURY.

EXTINGUISH ALL OPEN FLAMES INCLUDING CIGARETTES OR OTHER BURNING SUBSTANCES WHILE REFUELING UNIT AND WHEN SERVICING BATTERIES.



SECTION 2- SAFETY - continued

2.2 - Standard Safety Procedures - continued

EXTINGUISH ALL OPEN FLAMES INCLUDING CIGARETTES OR OTHER BURNING SUBSTANCES WHILE CHECKING BATTERY ELECTROLYTE LEVEL BECAUSE BATTERIES GIVE OFF FLAMMABLE FUMES.

ELECTROLYTE SOLUTION IS AN ACID. CONTACT WITH EXPOSED SKIN WILL CAUSE SERIOUS INJURY. ALWAYS WEAR PROTECTIVE GEAR WHEN REFILLING AND HANDLING ELECTROLYTE SOLUTION.

POWER UNIT MUST HAVE PROPER VENTILATION TO INSURE SAFE AND EFFICIENT OPERATION.

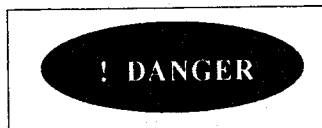
NEVER ATTEMPT REPAIRS YOU DO NOT UNDERSTAND. ALWAYS FOLLOW MANUAL INSTRUCTIONS.

ALWAYS REPAIR AND/OR REPLACE BROKEN OR DAMAGED PARTS BEFORE OPERATION. USE OF INCORRECT TOOLS IN OPERATION AND REPAIR SITUATIONS CAN FURTHER INCREASE RISKS TO MACHINERY AND OPERATORS.

REMOVE ALL TOOLS, ELECTRICAL CORDS, AND OTHER LOOSE ITEMS FROM THE POWER UNIT AND AUGER PRIOR TO USE.

DISPOSE OF WASTE OIL AND OTHER WASTE PRODUCTS SAFELY. ALWAYS WIPE UP SPILLED OIL, COOLANT, FUEL, ETC.

SAFELY DISPOSE OF CONTAMINATED RAGS AND CONTAINERS. NEVER LEAVE IN OR ON THE POWER UNIT CONTAINER. NEVER STORE FLAMMABLE LIQUIDS NEAR THE POWER UNIT OR AUGER.



INSULATE ALL ELECTRICAL CONNECTIONS AND DISCONNECTED WIRES.

DISCONNECT AND TAPE THE BATTERY GROUND LEAD BEFORE WORKING ON THE ENGINE TO PREVENT ACCIDENTAL IGNITION.



SECTION 3 - INTRODUCTION

3.1 - Specifications

H.P.S.I MODEL H - 35VT AUGER SYSTEM SPECIFICATIONS

AUGER

OUTPUT SPEED, R.P.M.....	30-120
AT OUTPUT SPEED 30 RPM TORQUE, FT/LB.....	33,000
AT OUTPUT SPEED 120 RPM TORQUE, FT/LB.....	10,000

DIMENSIONS

LENGTH, INCHES.....	34
WIDTH, INCHES.....	26
HEIGHT, INCHES.....	72

POWER PACK

ENGINE:

6 CYLINDER

335 HORSEPOWER, @RPM..... 2100

OPERATING SPEED, RPM..... 2100

ELECTRICAL SYSTEM, VOLT..... 24

HYDRAULIC SYSTEM:

PUMP FLOW, GAL PER MIN..... 85

MAXIMUM OPERATING PRESSURE, PSI..... 4700

RESERVOIR CAPACITY..... 165

FUEL TANK CAPACITY, GALLONS..... 95

DIMENSIONS

LENGTH, INCHES..... 144

WIDTH, INCHES..... 60

HEIGHT, INCHES..... 90

WEIGHT (WET), POUND..... 9,000

HOSE BUNDLE:

2 MAIN POWER HOSES (6 WIRE, HIGH PRESSURE), INCHES..... 1 1/4 I.D.

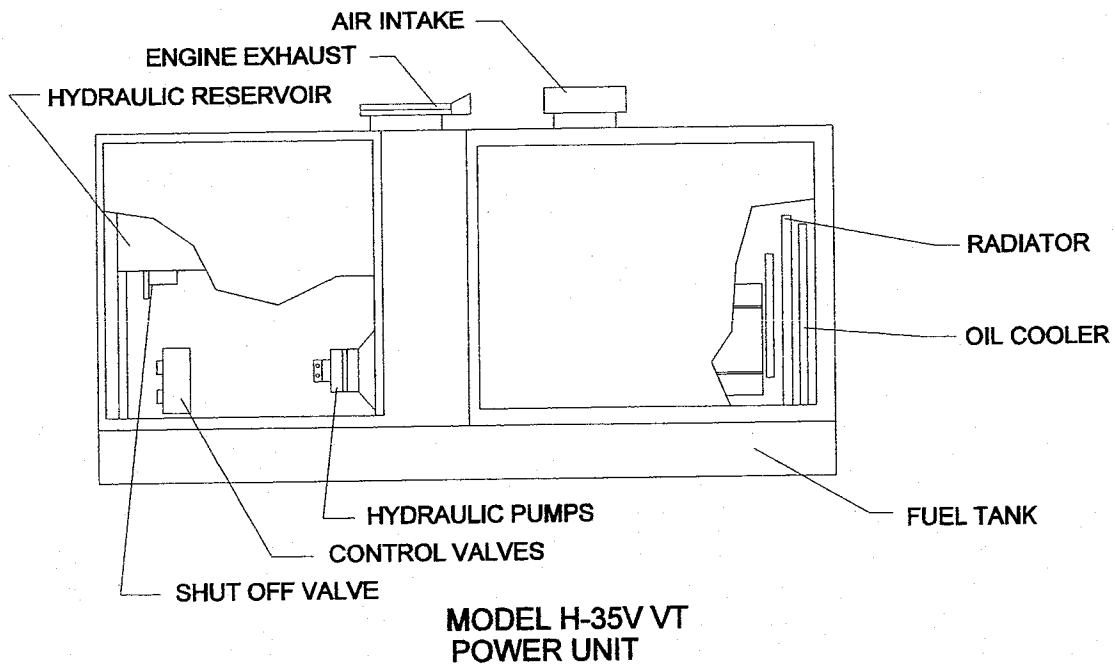
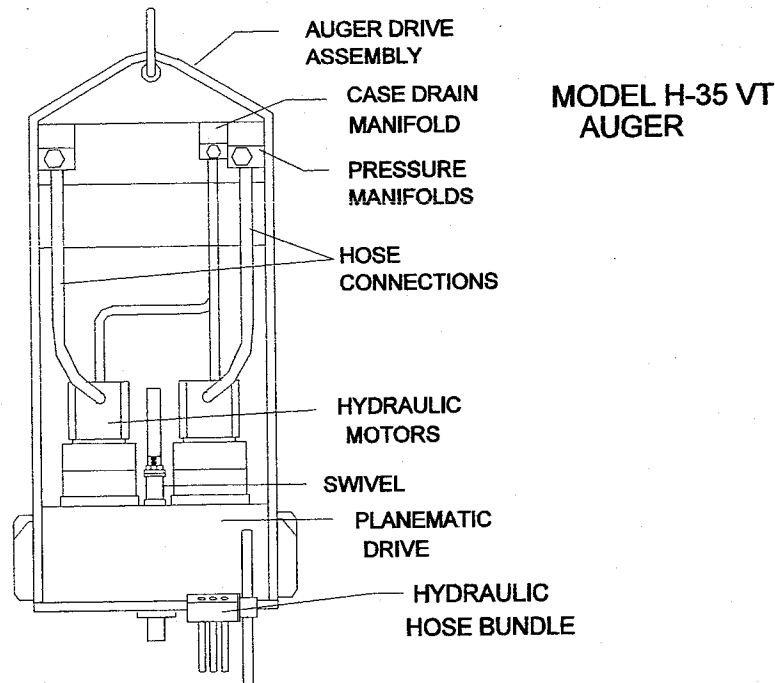
1 CASE DRAIN HOSES (1 WIRE, MEDIUM PRESSURE), INCHES..... 3/4 I.D.

1 PILOT HOSE (2 WIRE MEDIUM PRESSURE), INCHES..... 3/8



SECTION 3 - INTRODUCTION SECTION 2 - SAFETY - continued

3.2 - General Overview





HYDRAULIC POWER SYSTEMS INC.

Release 01

Model H - 35VT Operators, Maintenance, and Parts Manual

Effective Date 08/98

MAINTENANCE SECTION



SECTION 4 - MAINTENANCE



4.1 - Daily Maintenance

- 1) Make a "walk-around" inspection of the Power Unit and the Auger. Taking a few minutes to recognize and correct minor discrepancies can prevent major repairs at a later date. Refer to the Caterpillar Oil capacities and specifications located on the engine or in the manual for recommended oil types and capacities.
- 2) Check fuel tank level, and fill as required.
- 3) Check hydraulic reservoir level, and fill as required.
- 4) Check hydraulic lines for leaks, correct as required.
- 5) Make certain heat exchanger on the front of the engine is clean and free of debris.
- 6) Follow engine manufacturer's recommendations for engine pre-start procedures.
- 7) Start the engine as outlined in the engine manual. Make certain that the remote controls are in the neutral position. Let the engine idle for 15 minutes.
- 8) While engine is still at idle, operate the auger for 5 minutes to assure warm oil is in the auger drive.
- 9) Increase engine speed to High Idle.
- 10) Observe the indicators on the hydraulic system filters, if in the "red" continue checking as the system warms up. If indicators remain in the "red", service the filters before using the unit.
- 11) Visually check all hydraulic hoses and fittings for any visual signs of oil leaks and correct if necessary.



SECTION 4 - MAINTENANCE



4.1 - Daily Maintenance - continued:

12) Visually inspect all bolts, pins and fasteners used in mounting the sheet metal enclosure, radiator brackets, oil coolers, hydraulic valve, hydraulic reservoir and any other visible components.

13) Check all nuts, bolts and visible fasteners for any necessary or required maintenance. Replace any missing or faulty nuts, bolts, fasteners or component as necessary.

14) Operate the unit.

4.2 - General Maintenance



4.2.1 - Power Unit

1) Perform all engine manufacturer's maintenance requirements per the Operation and Maintenance Manual.

2) Hydraulic fluid should be changed every 500 operating hours.

3) Hydraulic strainer should be cleaned whenever fluid is changed. It is a reusable screen.

4) Hydraulic filter should be changed after five hours of operation, then every 500 operating hours (more frequent changing may be required, as indicated by the mechanical indicator.)

To change the "charge-pump" filter, remove the six cap screws on top of the filter housing, and remove the top and the double element. Replace with a new Parker element 924793. To change the high pressure filter on the auger drive, unscrew the filter bowl and remove the old element.



SECTION 4 - MAINTENANCE - continued

4.2 - General Maintenance - continued:

4.2.2 - Auger Unit

1) Check the fluid level in the planetary gear units (4) and the main gearbox, on the auger drive, daily. It should be 2/3 full. Fill with 90 wt. gear oil as required.

2) Lubricate the swivel and the upper seal retainer on the auger drive unit daily.

4.3 - Maintenance Schedule

ITEM	DAILY	WEEKLY	250 HOURS	500 HOURS
Engine Oil				
Engine Oil Filter				
Engine Air Filter				
Engine Coolant				
Diesel Fuel				
Hydraulic Oil				
Hydraulic Strainers				
Hydraulic Filters				
Hydraulic Reservoir				
Drain Air Tank				

ITEM	DAILY	WEEKLY	250 HOURS	500 HOURS
Planetary Gear				
Swivel				
Main Gearbox				
Auger Drive				
Hoses				



SECTION 4 - MAINTENANCE- continued

4.4 -Torque Specifications

1) Proper torque applied to all the fasteners and bolts on a Auger greatly reduces systematic problems and frequent repairs. It is therefore extremely important that the following chart be followed with as much precision as possible.

2) All torque specs are for lubricated threads. It is recommended that oil be used to lubricate threads on all fasteners to assure proper torque. **DO NOT USE "ANTI-SEIZE"**.

THE USE OF LOCTITE WILL ACHIEVE THE SAME LUBRICATION AS "LUBRICATED TORQUE VALVES".

3) Listed below are the major fasteners used in the assembly of the **H.P.S.I. MODEL H - 35VT AUGER**. For any information regarding the fasteners used on this product, please consult the factory.

SIZE	TYPE	REQUIRED TORQUE
3/8"	16 SOCKET-HEAD GRADE 8	59 FT./LBS.
1/2"	13 HEX-HEAD GRADE 8	107 FT./LBS.
1/2"	13 SOCKET-HEAD GRADE 8	144 FT./LBS.
5/8"	11 HEX-HEAD GRADE 8	212 FT./LBS.
3/4"	10 HEX-HEAD GRADE 8	376 FT./LBS.
3/4"	10 NUT GRADE 8	188 FT./LBS.
3/4"	10 SOCKET-HEAD GRADE 8	500 FT./LBS.
1"	8 HEX-HEAD GRADE 8	909 FT./LBS.
1"	8 SOCKET-HEAD GRADE 8	1044 FT./LBS.
1"	8 LOCK NUT	455 FT./LBS.
1 1/2"	6 HEX-HEAD GRADE 8	(*1)

*1 - The achievement of the proper torque value on this bolt might exceed the average capacity of an ordinary torque wrench. Use the "turn of the nut" method to tighten bolt properly.



SECTION 4 - MAINTENANCE- continued

4.5 - Fluids and Filters Specifications

4.5.1 - Lubricants



Power Unit Engine Oil - Refer to engine manufacturer's Operation and Maintenance Manual or engine manufacturers specs.

Power Pack Pump Drive Gear Oil - Conoco SAE 85W-140
Hydraulic Oil - Units are shipped with Chevron Clarity AW46, unless otherwise designated by customer. Check for oil type "E" or label located on the hydraulic tank.
Conventional hydraulic oils also acceptable but may not be EPA or coast guard approved for spillage.

Auger Gear Case Oil - Units are shipped with SAE 85W-140 Gear Oil.

***NOTE:** WHEN ADDING GEAR OILS IT IS ADVISABLE TO MAINTAIN THE SAME GEAR OILS RATHER THAN MIXING DIFFERENT TYPES OF OILS. SOME OILS, ALTHOUGH COMPATIBLE WITH THE DESIGN OF THIS MACHINE, MAY NOT BE COMPATIBLE WITH OTHER TYPES OF GEAR OIL.

4.5.2 - Fuels

Diesel Fuel - See engine manufacturer's Operation and Maintenance Manual or engine manufacturer's specifications.

4.5.3 - Coolants

Diesel Engine Radiator - See engine manufacturer's Operation and Maintenance Manual or engine manufacturer's specifications.