DELAFIELD CORPORATION
1520 Flower Avenue
Duarte, CA 91010
TEL: 626-303-0740
FAX: 626-359-7109

PACKING LIST

Shipping No. 351065

Special Instructions

☐ Cert. Enclosed ☐ Partial Ship ☒ Complete Ship

Goods Received in Good Condition

By: _____

Date: _____

SOLD TO:
CHELSIE LLC
P.O. BOX 29721
LAUGHLIN NV 89028
832-326-0587
BD

SHIP TO:
LeTOURNEAU TECHNOLOGIES INC.
6500 BRITTMOORE RD.
HOUSTON TX 77041

ATTN: LANA WILLIAMS BD

Sales Order	Ship Num	Cust No	Order Date	Tax	Promised	Sales Rep	Customer P. O. Number	Mark Shipment
140849	0000	CHE500	03/29/10	E	04/02/10	NOVA HOUSE	P993126-00	CHARLES BREAUX

Sales BR	F.O.B. Point	Ship Date	Shipped Via	Cartons	Weight	Waybill Number	Ins
AZ DU	OUR DOCK	04/08/10	TBD				N

Item	T	QUANTITY Order	B/O	Ship	Unit	Part Number/Revision	Description
001	S	1.00		1.00 BD	EA	N13350-B5D25AHNPT J P/N # SI-000390 BD COC Qty 1.00	HPU, S50, 480VAC, 50HP,UL ELEC Cust Part SI-000390 HPU N13350 S50 W/OPTIONAL WATER/HYD HEAT EXCHANGER AND HIGH PRESSURE FILTER 460/60 Hz W/STARTER. SET FOR HIGH TEMP 37 GPM/2500 PSI/40 HP* Bin STGFIN *** EMAIL INVOICE TO: *** Angelina_z@dftmail.net *** *****CERTIFICATION REQUIRED*** *********TAGS REQUIRED******* PACKING LIST TO NOTE: PO# P993126-00 ITEM 1 SI-000390 ATTACHED C OF C ATTACHED TS COMPLETE WITH SAME INFO. ATTACHED UPDATED MANUAL WITH LONG TERM STORAGE

Loc. Cntrl BD

INWING

RECEIVED
APR 12 2010
Per

CONDITIONAL SALES AGREEMENT: TITLE TO PRODUCTS REMAIN IN THE SELLER UNTIL INVOICE IS PAID. MATERIALS MAY NOT BE RETURNED WITHOUT SPECIFIC AUTHORIZATION FROM DELAFIELD CORPORATION. CLAIMS FOR SHORTAGES OR DEFECTIVE MATERIAL MUST BE MADE WITHIN 30 DAYS FROM RECEIPT OF GOODS. CERTIFICATE OF COMPLIANCE: MATERIALS AND/OR PARTS FURNISHED ON THIS ORDER HAVE BEEN MANUFACTURED IN ACCORDANCE WITH ALL APPLICABLE INSTRUCTIONS AND SPECIFICATIONS. PHYSICAL AND CHEMICAL DATA PERTAINING TO THIS ORDER MAY BE AVAILABLE FROM THE ORIGINAL MANUFACTURERS.

PACKED BY	DATE SHIPPED	# BOXES	TOTAL WEIGHT	SHIPPING/HANDLING CHARGES	INC. CHG. Y N
	4-8-10	1			OUT CHG. Y N

DELAFIELD CORPORATION

CERTIFICATE OF CONFORMANCE

1520 FLOWER AVE
DUARTE, CA 91010
PH:626-303-0740
FX:626-359-7109

10695 TREENA ST. SUITE #104
SAN DIEGO, CA 92131
PH:619-547-1150
FX:619-547-1160

CUSTOMER: **CHELSIE LLC**

PURCHASE ORDER NO.	SALES NO.	PAGE NO.
P993126-00	**0140849**	**1 OF 1**

ITEM	PART NUMBER	DESCRIPTION	DUE	U/M	QTY	ACCEPT	REJECT
001	N13350-B5D25AHNPT	HPU, S50, 480VAC, 50 HP	04/02/10	EA	1	1	0
	REV J	UL ELEC					
	S/N: DU10040022	**TEST REPORTS**					
		ARE ATTACHED					

IT IS HEREBY CERTIFIED THAT ALL ARTICLES ON THE ABOVE SHIPMENT AND IN THE QUANITIES AS CALLED FOR IN THE ABOVE PURCHASE ORDER NUMBER ARE IN CONFORMANCE WITH THE REQUIREMENTS, SPECIFICATIONS AND DRAWINGS APPLICABLE TO THAT ORDER.

INSPECTED BY: JOSE MARTINEZ
QUALITY CONTROL INSPECTOR

DATE: 04/08/2010

DELAFIELD CORPORATION

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INSPECTED BY: JOSE MARTINEZ
QUALITY CONTROL INSPECTOR

DATE: 04/08/2010

QC APPROVED
Inspected By
SIG QC 16
DATE 4/12/10

S/N DU10040022

EQUIPMENT

TEST PROCEDURE

FOR

HPU-S40/S50 HYDRAULIC POWER UNIT

APPROVALS		DATE
DRAWN	S.MUNOZ	4/7/07
CHECKED	JPSJ	2010.04.07 08:25:50 -07'00'
RESP ENG	JPSJ	2010.04.07 08:26:02 -07'00'
MFG ENG		
QUAL ENG		

DELAFIELD CORPORATION

Title: TEST PROCEDURE FOR HPU-S40/S50 HYDRAULIC POWER UNIT

Size	DWG	REV
A	TP13350	C

SCALE: NONE

This procedure defines the production of a single hydraulic power unit with one electric motor. Each unit is to be tested and inspected according to the following procedure. Unit preparation and setup shall be completed prior to starting this test.

Data sheet entries are required for each test step. Any discrepancy is cause for discontinuing the test until the discrepancy has been eliminated. In the event of a major discrepancy whose repair would affect items previously inspected or tested, the affected items shall also be retested after the discrepancy has been eliminated.

Reference Figure 1 (sheet 8) for the test loop.

1.0 VISUAL INSPECTION

1.1 Inspect the power unit to see that it has been assembled per applicable assembly drawing.

1.2 Check the orientation of Hand Pump and Return Filter check valves, such that it free flows per the appropriate hydraulic schematic.

1.3 Check electrical wiring for tight connections and proper circuitry per the appropriate electrical schematic.

2.0 UNIT PREPARATION

2.1 Connect test line as shown in Figure 1 (sheet 8). Flow control valve should open.

2.2 Fill Pump case with hydraulic oil (prime pump).

2.3 Ensure pump inlet valve is fully open.

2.4 Start motor and let it run for 20 seconds. At the end of this time period the pump should have cleared itself and the system of air and should have quieted down. If it does not, shut the unit down and locate the source of the noise and correct the problem.

Note: If quick starting is not obtained or excessive noise is heard from the pump, locate and correct the problem.

3.0 PRESSURE SETTINGS (see sheet 6 for specific values)

Note: All tests should be carried out with the oil temperature between 90-150° F unless otherwise noted.

3.1 With the system primed, and with the pump running, the flow meter should read at least the minimum flow specified on the data sheet.

3.2 (Note: This adjustment is for HPU's Equipped with overpressure relief valve.) With the pump off, turn System Overpressure Relief Valve all the way in. Close test loop valve, start pump, and increase pump output pressure to 3700 psi. Adjust System Overpressure Relief Valve to 3500 +/- 50 psi.

3.3 With pump running, adjust maximum pump output pressure to 3000 psi +100 psi / -0 psi.

4.0 HORSE POWER LIMITER SETTING

4.1 Run the pump. Open flow control valve and record the flow and pressure registered on the test loop gauges. Using an ampmeter, monitor motor current. Current should not exceed motor nameplate full load current.

4.2 Gradually close flow control valve while continually monitoring current for maximum amperage. Current should not exceed motor nameplate full load current in any of the three electrical phases. Record flow and current values for pressure as shown on data sheet.

5.0 TEMPERATURE SETTING

5.1 With the pump operating, fully open the flow control. Monitor fluid temperature and do not let it exceed 170° F. Take temperature switch bulb and place in a temperature bath that is below 160° F. Increase temperature of bath until motor shuts off. Motor should shut off when bath temperature reaches 165° +5°F / -0°F. Adjust switch as necessary to bring switch within limits.

5.2 When the temperature switch has shut the unit off, push the START button; the unit should start. Release the start button and the unit should shut down.

6.0 UNIT LEAKAGE

6.1 With flow control valve closed, run pump and check for external leakage.

6.2 Open flow control valve with pump still running and check for leakage.

7.0 OIL CLEANLINESS TEST

7.1 Test oil cleanliness per NAS 1638, Level 8 (ISO 17/14 – up to 1300 particles at 5 micrometer and up to 160 particles at 15 micrometers per milliliter).

8.0 REMOTE STOP/START TEST

8.1 Turn unit off using the remote start/stop, then turn the unit back on using remote switch.

9.0 PRESSURE GAUGE CHECK

9.1 Turn on Pump. Raise system pressure to 1500 psig.

9.2 Pressure gauge on HPU should match test gauge pressure within +/- 100 psig.

9.3 Raise pressure to 3000 psig.

9.4 Pressure gauge on HPU should match test gauge pressure within +/- 100 psig.

9.5 Shutdown Pump.

10.0 FLOAT SWITCH CHECK

10.1 Turn on pump. Drain fluid from reservoir while pump is running. Pump should shut off when fluid is within +/- 1" of the LOW position in the liquid level indicator window.

10.2 Push start button. Unit should run. Release the start button and the unit should shut down.

10.3 Shut unit down. Disconnect electrical power cord and the hydraulic lines. Replace filter with new element and drain reservoir fluid.

11.0 HEAT EXCHANGER AND THERMOSTATIC VALVE (if equipped)

11.1 Connect facility water to 1" NPT port located before the Thermostat Valve.

11.2 Confirm incoming water pressure is between 50 psi and 90 psi.

11.3 Place the Thermostat Valve probe in heated liquid bath.

11.4 Verify that the valve begins to open at 120 deg F +/- 5 deg F.

11.5 Valve should be fully open by 125 deg F (maximum). Record temperature.

11.6 Remove facility water lines and purge lines and heat exchanger of residual water. Record Temperature.

12.0 FINAL INSPECTION

12.1 Check to see that the reservoir is empty and clean.

12.2 Check to see that the labels and signs have been attached or applied per assembly drawing.

12.3 Install plugs on the pressure and return lines.

13.0 UNIT IS READY FOR SHIPMENT

DATA SHEET FOR HPU-S40 HYDRAULIC POWER UNIT

P/N N13350-65025AHNPT Date of test 4-8-10

DC 193

S/N DU10040022 Name of tester JF KELLEMS

STEP NO.	TEST	READING	REQUIREMENT
1.0	Visual Inspection		N13350 65025AHNPT -J
1.1	Assembly Inspection	✓	Per Assembly Dwg. No.
1.2	Valve Orientation	✓	Per Hydraulic Schematic: N/A
		✓	Pump Valve
1.3	Electrical Wiring	✓	Per Electric Schematic: N13527
2.0	Unit Preparation		
2.1	Test Gauge	✓	Installed
	Flow Control Valve	✓	Open
2.2	Pump Inlet Valve	✓	Open
2.3	System Priming Pump	✓	Normal Operating Noise
		✓	Quick Start-up
3.0	Pressure Setting		
3.1	Normal Flow	38.0 GPM	≥ 36 GPM
	Pressure	750 psi	≤ Specified operating pressure: 750 psi
3.2	System Overpressure Relief	3000 psi	~~3500~~ psi 3000
3.3	Pump Pressure Setting	2500 psi	~~3000~~ psi 2500
4.0	HP Limiter Setting		
4.1	Nominal Load Flow	30.0 GPM	19-24 GPM
		47.3 amps	≤ Motor nameplate Full Load Current: 57.8
		2175 psi	

4.2	Pressure vs Flow		GPM (minimum)
	2900 psi	N/A GPM	1 GPM
	2500 psi	21.5 GPM	20 GPM
	2000 psi	32.0 GPM	27 GPM
	1500 psi	37.5 GPM	34 GPM
	1000 psi	38.0 GPM	36 GPM
	500 psi	38.0 GPM	36 GPM
	Maximum Motor Current	47.3 amps	≤ Motor nameplate Full Load Current: 57.8
5.0	Temperature Setting		
5.1	Test Gauge Press. Setting	1800 psi	1800 psi ± 50 psi
	Temp. Shutoff	169 ° F	165° F + 5° F / -0° F
	Pump	✓	Off
5.2	Start Button		
	Push and Hold	✓	Motor Starts
	Release	✓	Motor Stops
6.0	Unit Leakage		
6.1	Hydraulic Leakage (closed)	✓	No Leakage
6.2	Hydraulic Leakage (open)	✓	No Leakage
7.0	Oil Cleanliness		
7.1	Varco Test Specification TS 00419	✓	Complete procedure
8.0	Remote Start/Stop		
8.1	Turn unit off using remote start/stop	✓	unit shuts off
8.2	Turn unit on using remote start/stop	✓	unit turns on
9.0	Pressure gauge		
9.1	System pressure to be 1500 psig	1500 psi	
9.2	HPU gauge reading	1500 psi	within +/- 100 psig
	within 100 psig	(Y) N	

DELAFIELD CORPORATION

SIZE	DWG	REV
A	TP13350	C

Title

TEST PROCEDURE FOR HPU-S40/S50 HYDRAULIC POWER UNIT

SCALE: NONE

9.3	System pressure to be ~~3000~~ 2500 psig	2500 psi	
9.4	HPU gauge reading	2500 psi	within +/- 100 psig
	within 100 psig	(Y) / N	
9.5	Shutdown HPU	(Y) / N	
10.0	Float switch		
10.1	Lower oil level	✓	oil at "Low" Level (± 1")
	Pump	✓	Off
10.2	Start Button		
	Push and Hold	✓	Motor Starts
	Release	✓	Motor Stops
10.3	Power Cord	✓	Disconnected
	Hydraulic Lines	✓	Disconnected
	Filter Element	✓	Replaced with new element
	Oil &Tank	✓	Drained and Clean
11.0	Heat Exchanger and Thermostat Valve		
11.1	Facility water connected	✓	connected
11.2	Water pressure between 50 and 90 psi	70	record pressure
11.3	Valve probe in heated bath	✓	confirm
11.4	Valve opens at 120 +/- 5 deg F	123°F	record temp
11.5	Valve fully open by 125 deg F	126°F	record temp
11.6	Purge water from lines and H.E.	✓	confirm

Title

TEST PROCEDURE FOR HPU-S40/S50 HYDRAULIC POWER UNIT

DELAFIELD CORPORATION

SIZE	DWG	REV
A	TP13350	C

SCALE: NONE

12.0 **Final Inspection**

12.1	Reservoir	✓	Empty
12.2	Labels and Signs	✓	Per Assembly Drawing
12.3	Pressure and Return Lines Plugged	✓	Installed

UNIT IS READY FOR SHIPMENT

OPERATION APPROVAL "F." KELLEMS DC 193 DET 3 QC

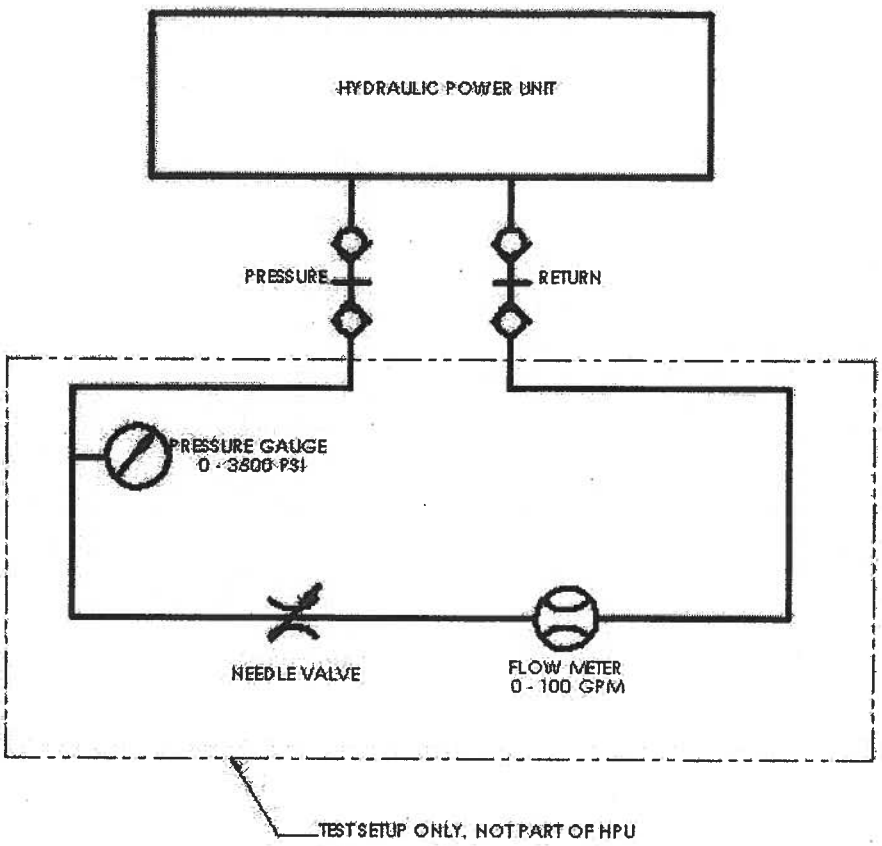
QUALITY CONTROL APPROVAL Jose Martinez

DATE 4-8-10

INSTRUMENT	ASSET #	CALIBRATION DATE
FLOW METER	DF.FM.08	2-24-11
TEMPERATURE GAUGE	DF.DTM.04	8-27-10
PRESSURE GAUGE	DF.PG.11	9-29-10
AMP METER	DF.DMM.03	6-12-10

```
Online log: 211
FCU 2110    V3.13
DELAFIELD CORP
   Start: 25.03.2010 13:30
    Averaging interval: 0  min
   Test volume   : 100 ml
Time          NAS  1638        Q
 h:m  02...05...15...25 >25   ml
 0:00  <02  <02  <04  <06   100
 0:00  <02  <02  <04  <06   101
 0:00  <02  <02  <04  <06   101
 0:00  <02  <02  <04  <06   101
 0:00  <02  <02  <04  <06   101
 0:00  <02  <02  <04  <06   102
 0:00  <02  <02  <04  <06   104
 0:00  <02  <02  <04  <06   100
```

FIGURE 1: HYDRAULIC POWER UNIT TEST SETUP



Title

TEST PROCEDURE FOR HPU-S40/S50 HYDRAULIC POWER UNIT

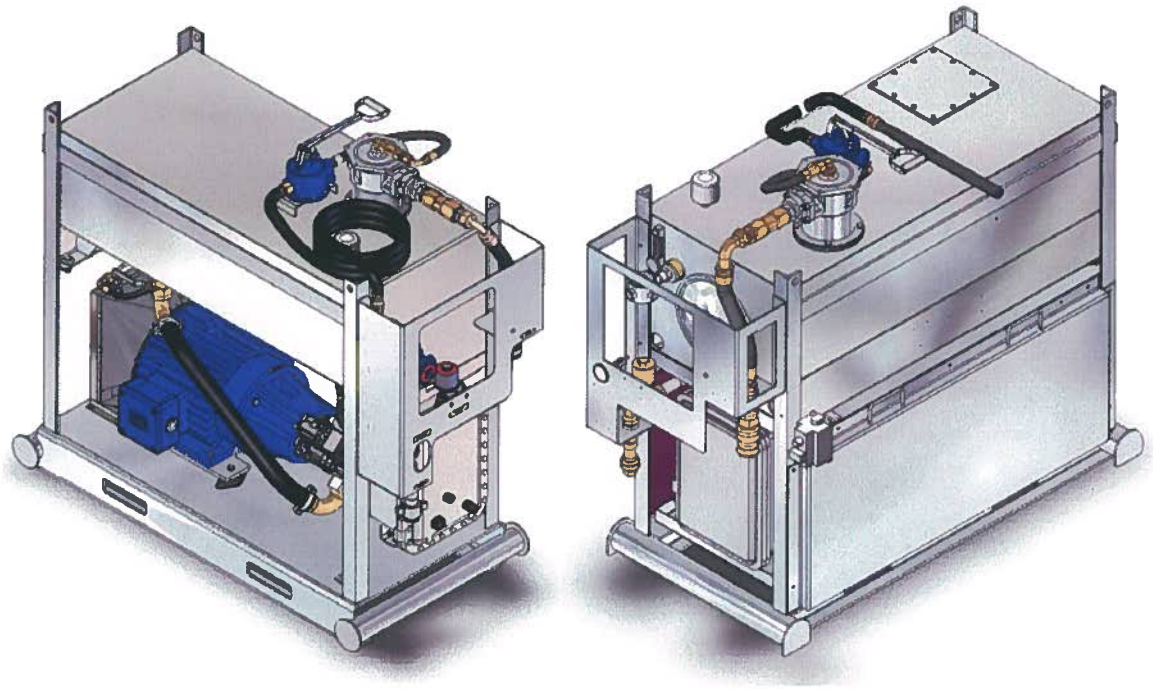
DELAFIELD CORPORATION

SIZE	DWG	REV
A	TP13350	C

SCALE: NONE

EQUIPMENT

HPU-S40/S50
Single Motor 40 or 50 Hp
HYDRAULIC POWER UNIT



SERVICE and MAINTENANCE MANUAL

SM13350 rev C

Contents

HPU-S40 SERVICE MANUAL

A) Introduction and General Information

****

-Caution-

To avoid injury to personnel or equipment,
all personnel installing, operating, repairing,
or maintaining this equipment should be trained
in rig safety and machine operation.
This includes any personnel in the vicinity of
this equipment or
any other hydraulically-operated equipment.

****

1) Safety Practices

- Isolate all energy sources before beginning any work on the Hydraulic Power Unit (HPU). Isolate and "lockout" all electrical, hydraulic, and tag all power and control stations. Notify personnel as required.

- Avoid performing any maintenance or repairs on the HPU while the HPU is in operation.

- Wear proper protective equipment during the installation, maintenance, inspection, or repair of this equipment.

- Before beginning work, familiarize yourself with electrical and hydraulic schematics, operational, maintenance, and safety procedures.

- Take precautions when bleeding down residual hydraulic pressure. Use bleed valves or equivalent techniques. Extreme care should be taken when servicing accumulators.

- Collect all residual hydraulic oil to prevent environmental contamination. Notify safety personnel of any oil spills.

2) General Maintenance Tips

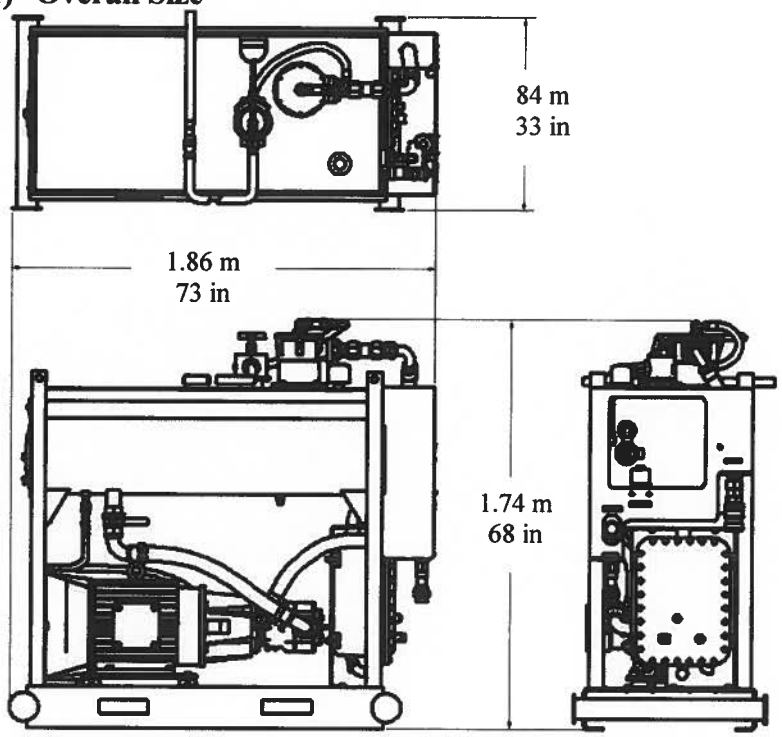
- When servicing components, verify component hoses and cables are clearly labeled to ensure correct re-installation.
- Replace failed, damaged, or lost components with Original Equipment Manufacturer (OEM) parts only.
- Replace or repair damaged parts as soon as possible to prevent further damage or hazards.
- Maintain equipments as recommended by the manufacturer and keep a maintenance log of all work performed.
- Only personnel fully trained in the maintenance and servicing of this equipment should perform any work.
- Keep in Stores a supply of all consumables and maintenance items. Restock before starting work.
- Clean-up any spilled fluids and dispose per standard rig procedures.
- Contact manufacturer if technical assistance is necessary. Don't guess.

3) Condition of HPU Driven Equipment

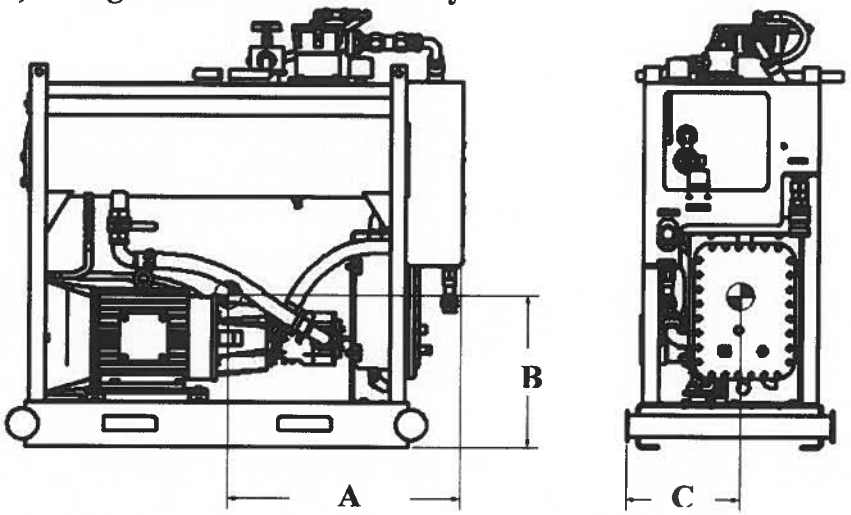
- All equipment connected to and powered by the HPU must be hydraulically clean, and in good working condition (no internal or external leaks). Confirm BEFORE connecting HPU to equipment.
- Hydraulic Relief Valves, Unloading Valves, and Over-pressure Valves on equipment connected to this HPU must be adjusted to pressures higher than the operating pressure of the HPU; otherwise overheating of HPU will result.
- Dirt, water, contamination, incorrect hydraulic fluid, and heat destroy hydraulic pumps. Failure to heed this warning will result in equipment breakdown.

B) Specifications

1) Overall Size



2) Weight and Center of Gravity



	A	B	C	WEIGHT (EST)
DRY	.97 m / 38 in	.64 m / 25 in	.40 m / 16 in	950 kg / 2100 lbs
WET	1.02 m / in 40 in	.81 mm / 32 in	.40 m / 16 in	1300 kg / 2900 lbs

3) Input Requirements

a) Electrical

- 40 Hp Motor – 440 - 480 VAC, 60 Hz, 3 Phase, 50 Ampere service minimum;
  380 - 420 VAC, 50 Hz, 3 Phase, 60 Ampere service minimum.

- 50 Hp Motor – 440 - 480 VAC, 60 Hz, 3 Phase, 60 Ampere service minimum.

Typical motor full load current values are listed below:

324 TC (small frame motor)

40hp	60Hz	460VAC	47.6 A
30hp	50Hz	380VAC	43.9 A

326TC (large frame motor)

50hp	60Hz	460VAC	57.8 A
40hp	50Hz	380VAC	58.5 A
40hp	60Hz	460VAC	47.9 A (high temp 55 deg C)

b) Hydraulic Oil

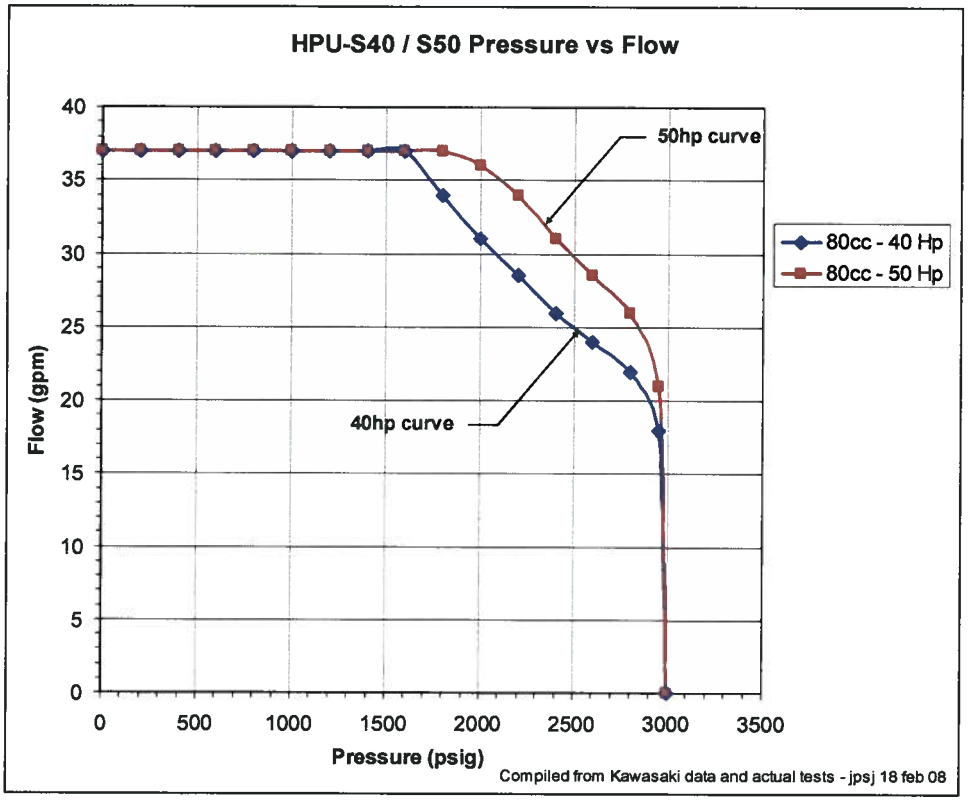
- Reservoir has a capacity of 100 gallons (380 liters) of petroleum based hydraulic oil. Oil should have anti-oxidants, anti-wear, and anti-foaming properties, and be suitable for the ambient operating temperatures. Note – More hydraulic oil will be needed to fill the equipment's piping and actuators.

- Mobil DTE 24 is the recommended hydraulic oil.

4) Output

a) Hydraulic

- Up to thirty-seven (37) gallons per minute (140 liters per minute). Maximum system pressure is 3000 psig (207 bar).

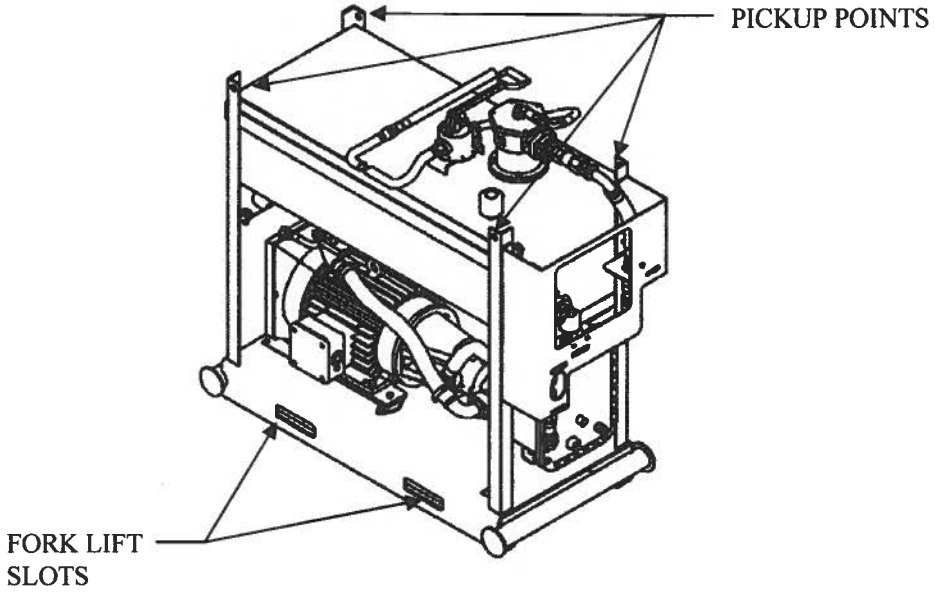


C)Installation

1) Moving the Hydraulic Power Unit

- The Hydraulic Power Unit (HPU) can be lifted by the four (4) lifting eyes permanently attached to the frame. HPU should only be lifted with a spreader beam that ensures vertical lifting at all four frame lifting eyes. Failure to use a spreader beam could result in damage to equipment and/or injury to personnel.

- HPU also has slots in Frame for lifting and moving utilizing a fork lift.



2) External Plumbing connections to Hydraulic Power Unit

- When routing plumbing, care should be taken to consider personnel access, servicing and maintenance, weight of piping, thermal expansion, environmental issues, system pressures, and rig motion.

- All piping connected to the HPU should be thoroughly cleaned to remove any contamination prior to connection to the HPU. Failure to do so could result in failure or damage to the unit. All piping should be pressure-tested prior to connection to the HPU.

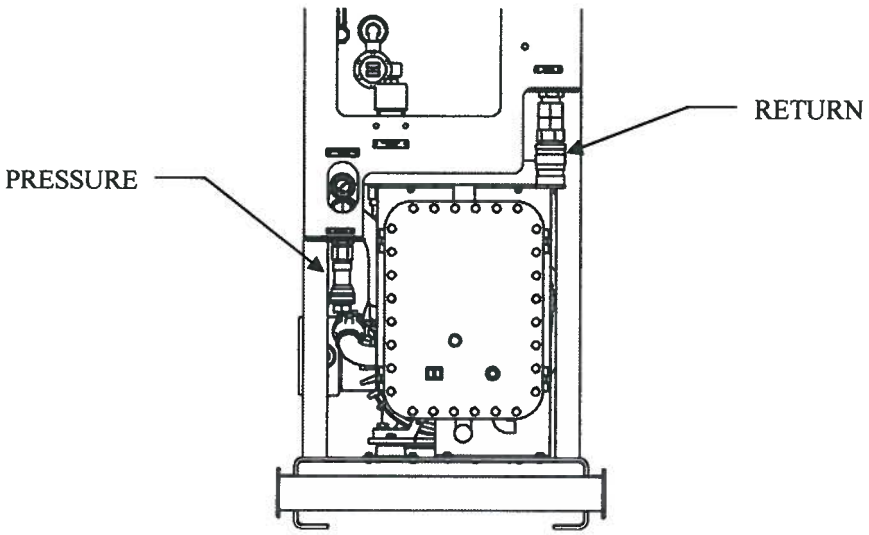
- All equipment intended to be connected to or powered by the HPU should be checked to insure that the hydraulic oil in the equipment is compatible with Mobil DTE 24 oil.

****

Warning
Residual oil in rig equipment
may contaminate, or may otherwise
be incompatible with the hydraulic oil
installed in the HPU.
Drain or perform tests on rig equipment oil,
before connection to the HPU

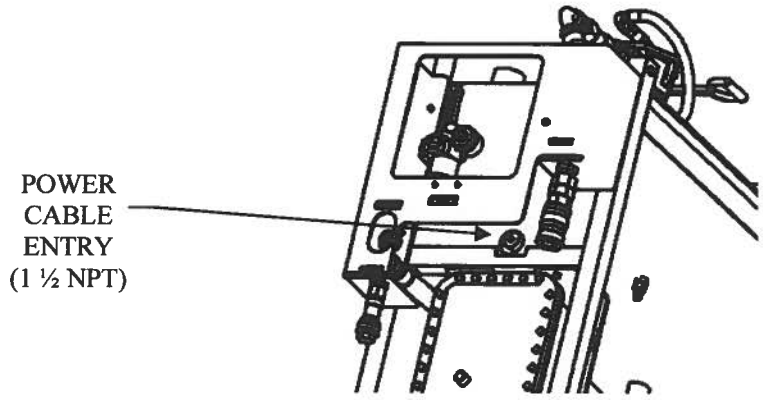
****

- Use only components rated equal to or greater than the pressures encountered.
  Maximum output pressure is 3000 psi (207 bar).
  Return connections should be rated for at least 150 psi (10 bar).



3) Electrical connections to Hydraulic Power Unit

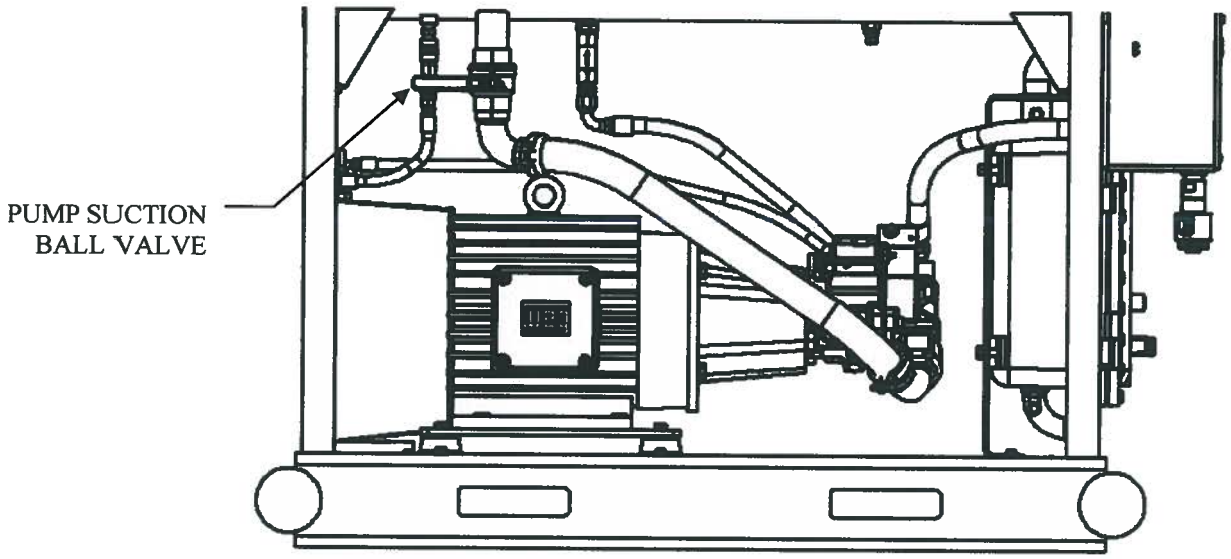
- Route electrical cables to meet the HPU as shown below.
- When routing cables, care should be taken to consider personnel access, servicing, maintenance, and rig motion.
- All cables should be installed with "drip loops" to reduce water ingress into the enclosures.
- Cable glands must have hazardous area certifications to meet the area requirements.
- Megger AC-Motor and Motor Leads for faults. Ensure Frame is grounded.
- Mount Motor Control Station near Driller's Console (workstation).



D)Commissioning and Startup

1) Pre-Startup Checkout Procedure

- Complete all Electrical and Hydraulic connections to the HPU.
- Remove and set aside the removable side sound panels (if equipped).
- Open suction ball valve (handle will be inline with body of valve).



- Check all cable glands insuring that they are tight and that cables are properly routed.
- Check for any loose bolts, clamps, or other hardware.
- If entire hydraulic system is to be commissioned, check to ensure all plumbing isolation valves are the proper position (open or closed, as required) and system is ready to be pressurized.

****

Caution –
Do not proceed until
the integrity and soundness
of the plumbing can be assured.

****

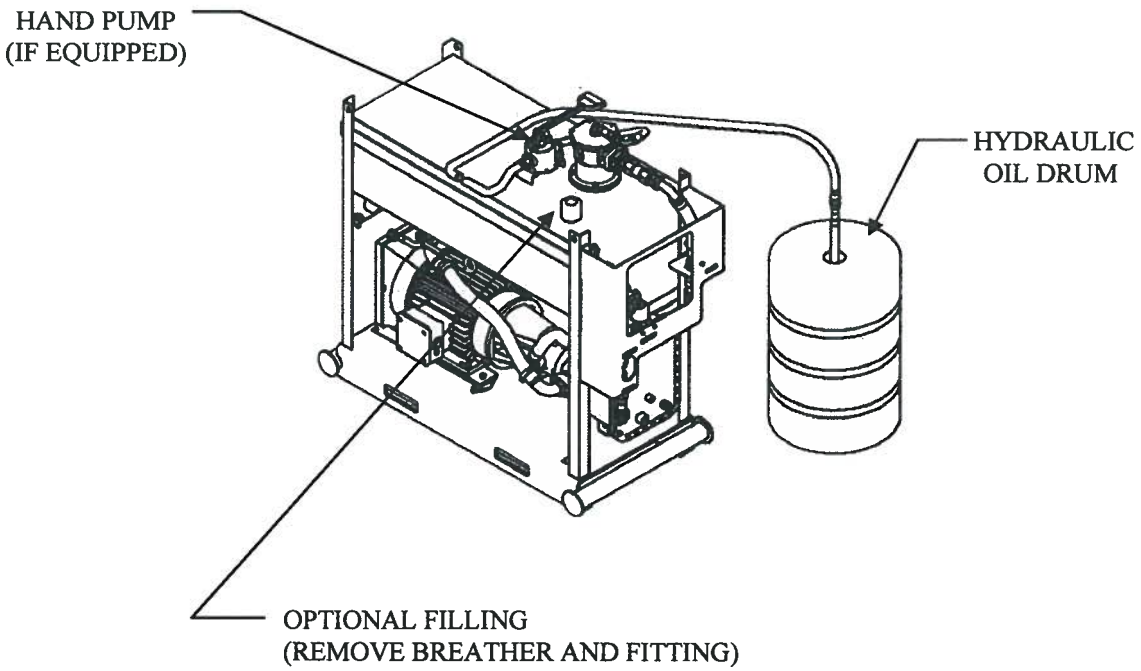
2) Commissioning and Startup

****
****WARNING****
******Severe Hazard******
Startup and operation of the HPU
may result in the unintentional motion of equipment.
Severe damage to equipment and / or
injury to personnel may result.
Hydraulically isolate any equipment
that may move or operate, *prior to commissioning*.
****WARNING****
****

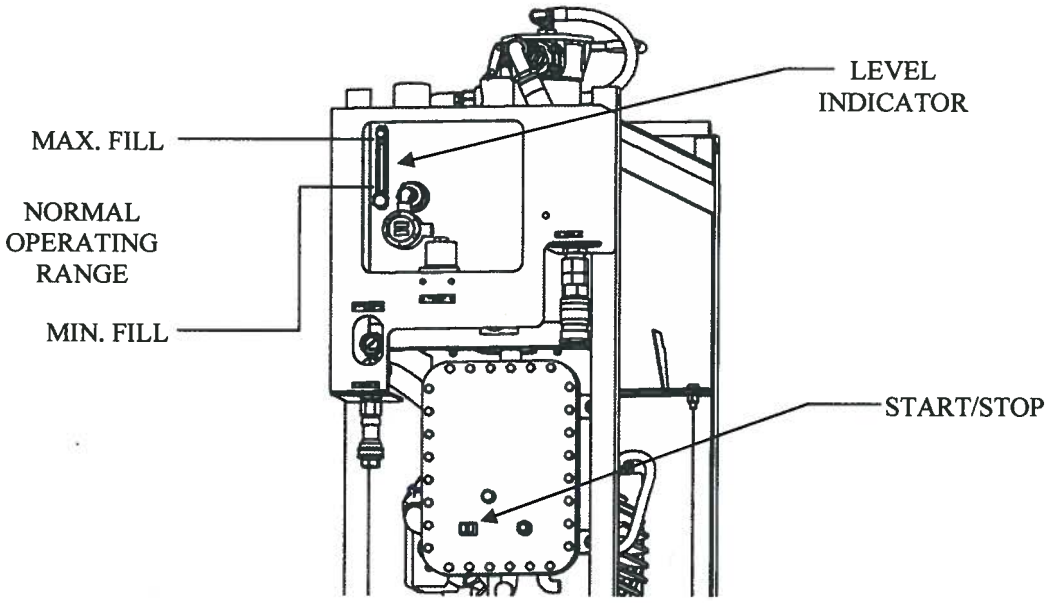
Filling Tank

- Prepare to fill Tank with at least 100 gallons (380 liters) of hydraulic oil. Hydraulic oil should be filled via the Hand Pump (if equipped) located on the top surface of the Tank.

- Remove all contamination from the Fill Hose and Tube.



- Fill with Hydraulic Oil until the "FULL" level is reached on the Level Indicator mounted on end of the Tank.



- After filling, remove hose from quick-disconnect fill port and keep hose close-by to add oil as needed. **Protect from contamination.**

Main Motor/Pump starting

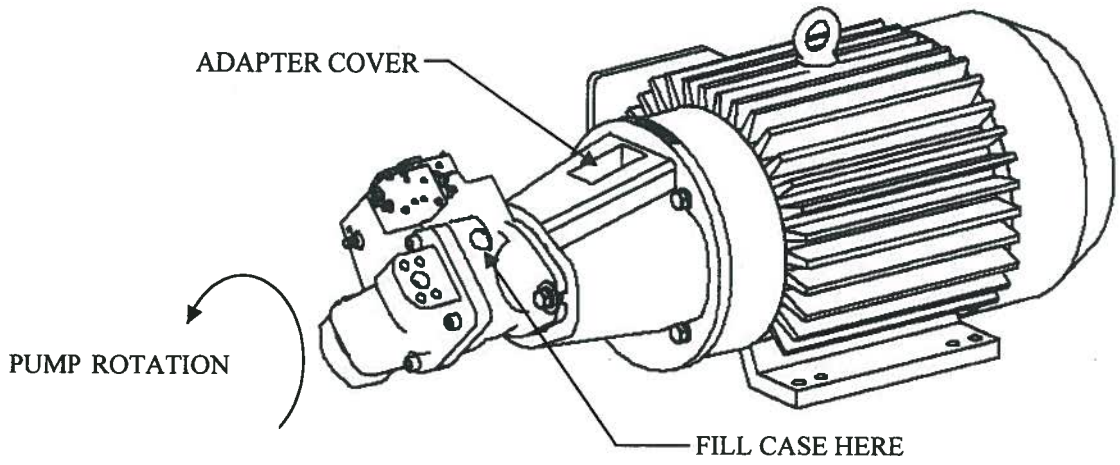
- Fill Pump case with Hydraulic oil. Fill via drain port on top of pump.

- Check Motor Rotation - Remove Motor/Pump Adapter Cover to allow visual access to Coupling. Make sure that Suction Ball Valve is open. Use the Start/Stop controls on the Motor Starter to rapidly jog motor power to check motor rotation. Motor should rotate **clockwise** when viewed from the motor fan end. If motor rotates in opposite direction, remove power, and reverse any <u>two</u> motor leads.

****

Caution –
Isolate power to motor before
attempting to reverse motor leads.

****



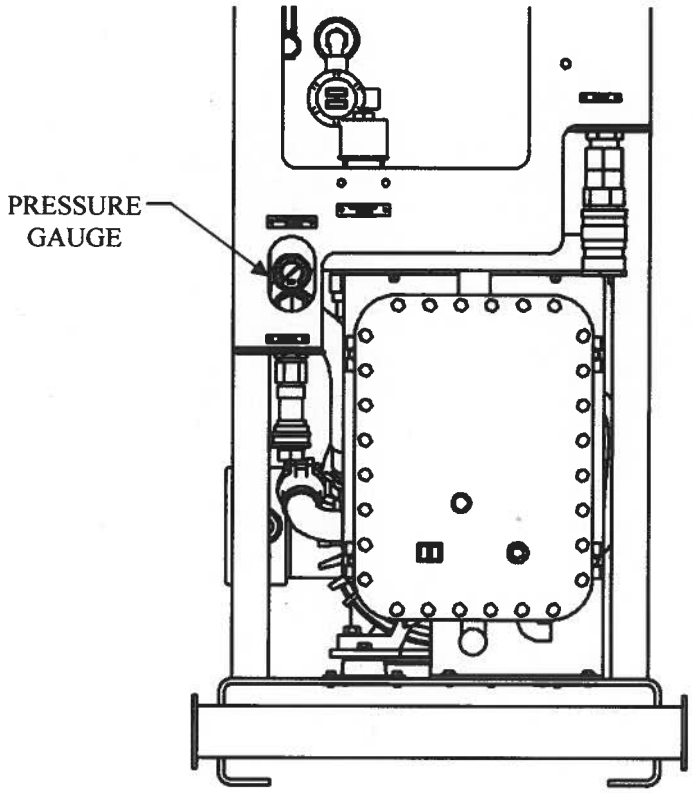
- Replace Motor Adapter Cover.

****
****WARNING****
******Severe Hazard******
Startup and operation of the HPU
may result in the unintentional motion of equipment.
Severe damage to equipment and / or
injury to personnel may result.
Hydraulically isolate any equipment
that may move or operate, *prior to commissioning*.
****WARNING****
****

- Start Motor. Monitor oil level in the Tank. Add hydraulic oil as needed to maintain proper oil level. If oil level falls below the minimum level, shutdown Motor until the proper level can be obtained. Restart Motor, as needed.

- Check for leaks in and around the pump. Shutdown pump if leaks are found. Tighten or repair connections as required.

- Monitor the Pressure Gauge. If the pressure does not reach operating pressure (3000 psi max) within 10 seconds, there may be a leak in the overall plumbing system or a valve open to allow the hydraulic oil to return directly to tank. The reason for the lack of pressure needs to be determined and corrected before commissioning continues.



- Monitor amperage to motor and confirm that it is within nameplate specifications for all loads.

- Replace removable Sound Panels (if equipped).

Motor Control Station checkout

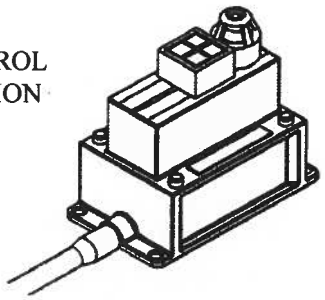
- Shutdown the motor on the HPU.

- Start and stop the motor on the HPU using the remote Control Station mounted at the Driller's Console. Green light will indicate that the motor is running.

- If motor does not operate properly, shutdown system, and isolate the problem.

- Important Note – If a low oil level or an over-temperature condition exists, the HPU-S40 control circuits are designed to allow the unit to continue to run as long as the START button on the Control Stations is depressed. This will allow any operation to be completed. Do not lock the START button on, as damage to the HPU will result.

CONTROL STATION



Auxiliary Equipment checkout

- Confirm proper operation of Over-Temperature Switch.
  Remove temperature probe from under Tank and test function of switch to insure that the contacts open at 165 +/- 5 deg F (73 +/- 3 deg C). Adjust as necessary.

- Confirm proper operation of Level Switch.
  Drain hydraulic oil from Tank to lower level of oil. Switch contact should open when oil level reaches Low level indicated at the sight gauge. Refill Tank to proper level.

Check Hydraulic Oil for contamination after Commissioning

After commissioning, contamination (moisture) can collect in the Tank. The hydraulic oil should be checked for water contamination and the Return Filters checked for particle contamination.

- Drain approximately 1 quart (1 liter) of hydraulic oil from the Tank. Inspect sample for evidence of water contamination. *See Section "Maintenance and Servicing, Hydraulic Tank" for location of Drain.*

- Replace Return Filter Element. *See Section "Maintenance and Servicing, Return Filters" for proper procedure.*

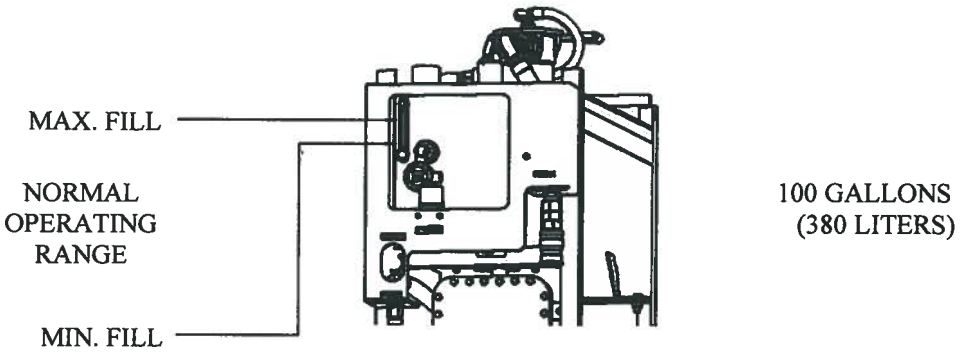
- Check Hydraulic Oil level. Re-fill as necessary. *See Section "Commissioning and Startup, Filling Tank" for proper procedure.*

E) Maintenance and Servicing

****
WARNING
****Severe Hazard****
Startup or shutdown of the HPU
may result in the unintentional motion of equipment.
Severe damage to equipment and / or
injury to personnel may result.
Hydraulically isolate any equipment
that may move or operate, *prior to startup or shutdown*.
WARNING
****

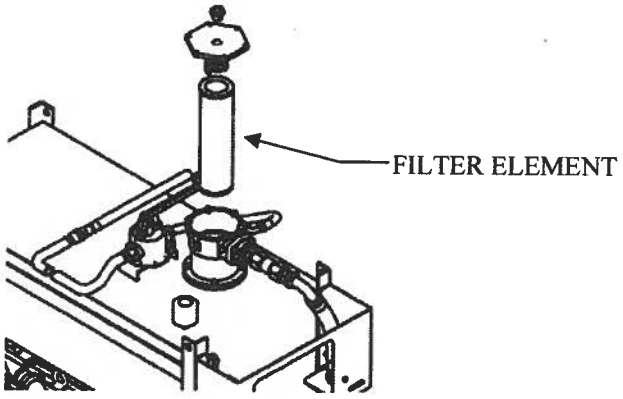
1) Hydraulic Oil Level

- Check oil level daily.
- Maintain the oil level in the normal operation range as shown on the Tank level indicator.
- Fill per Commissioning and Startup Procedures.
- Use only approved hydraulic oil (Mobil DTE 24 is recommended).



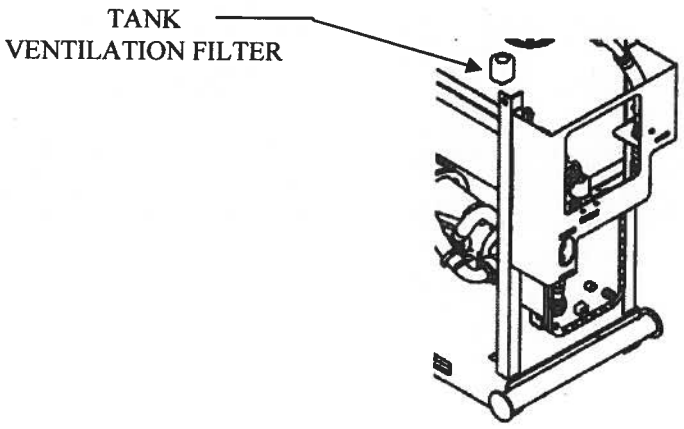
2) Return Filter

- Check Return Filter pressure gauge weekly (while unit is in use).
- Replace Filter every six months, regardless of Filter Gauge readings.
- If pressure gauge indicates excessive back pressure (in the red), the filter should be changed immediately.
- To change filter it is necessary to shutdown HPU:
  1) Remove Filter Housing Cover.
  2) Remove filter element from housing.
  3) Install new filter.
  4) Re-install Housing Cover and tighten cover bolts (10 lb-ft).
  5) Discard old filter elements (Do not reuse!).
  6) Cleanup spilled hydraulic oil.
  7) Check for leaks.
  8) Tag Housing with Element replacement date tag.



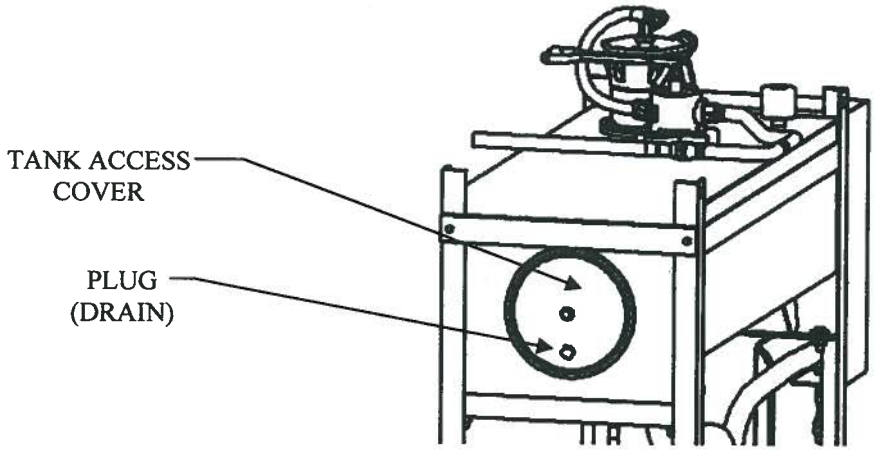
3) Tank Ventilation Filters

- Tank Ventilation Filter should be replaced every 6 months.
- Tank Ventilation Filter is located on top to the Tank
- Unscrew Filter and discard.
- Install new Filter.



4) Hydraulic Tank (Reservoir)

- Hydraulic Oil Tank should be cleaned every two (2) years.
  Note - It is recommended that this service take place with other major inspections/servicing.
- Shutdown and isolate HPU. Shut pump suction ball valve.
- Remove power to HPU.
- Drain Tank via plug in Tank access cover. Oil should be recycled, or discarded, per rig's standard procedures.



- Remove Tank Access Cover
- Ventilate Tank using fans to remove any residual gases or vapors.

****

-Caution-
Failure to ventilate Tank with fresh air can result in unsafe or unhealthy conditions. A second person should assist to insure safety of first person.

****

- Using clean hydraulic oil, the inside of the Tank should be wiped down with the residual oil forced to move towards the Tank Access Cover. All particles should be removed. The Tank should be visually inspected for corrosion or damage. All fittings should be checked for tightness. Suction strainers should be inspected and replaced as needed.
- Remove, disassemble and clean the Oil Level sight gauge.
- Inspect and replace the Tank Access Cover Gasket. Re-install Tank Access Cover. Torque Cover bolt to 15 lb-ft.
- Fill Tank with new Hydraulic Oil (Mobil DTE 24 is recommended) per Commissioning Procedure section.
- Open suction ball valve (handle will be inline with body of valve).
- Cleanup spilled hydraulic oil.
- Restart unit using procedure in *Commissioning and Startup* section.

5) Hydraulic Hoses and Fittings

- All HPU hoses and Fittings should be inspected every week for signs of leaks or possible failure (worn, abraded, or frayed hoses).
- Isolate and tighten, or replace all hoses immediately.

****

WARNING
Replacement Hoses and Fitting should be rated for the same pressure as the original parts.

****

- Cleanup spilled hydraulic oil.

6) Main Pump/Motor

- The Main Pump/Motor should be inspected every two (2) years.

Note - It is recommended that this service take place with other major inspections/servicing.

****

-WARNING-
Only qualified technicians should perform maintenance on rotating equipment. Lockout procedures should be followed before work begins.

****

- Remove Sound Panels (if equipped).
- Check Pump/Motor for unusual noise or vibration.
- Check for hydraulic leaks around the Pump seals.
- Megger Motor for internal faults.
- Shutdown unit and LOCKOUT.
- Check the condition of the Pump to Motor Coupling Spider. Replace as needed.
- Check rubber Isolation Mounts for wear or cracks. Replace as needed.
- Megger Motor Leads
- Restart unit, confirm direction of rotation.

- Check Motor amperes to insure it is within nameplate rating.

- Check amperes on all three leads. All lead amperes should be within 10% of each other.

7) Pressure and Horsepower Settings (these adjustments should be performed when ever the pump has been replaced)

- **Adjust System Relief Valve**

  a) Turn HPU off (both motors), and disconnect the Pressure and Return hoses from the HPU.

  NOTE – this should be done by disconnecting the Quick-Disconnects at the HPU. Do not remove the hoses from the quick-disconnects as this will allow the HPU to pump oil out of the hose.

  b) With Motor A off, turn System Relief Valve Adjusting Screw fully CCW (out).

  c) Turn Pump A Pressure Adjusting Screw fully CW (in).

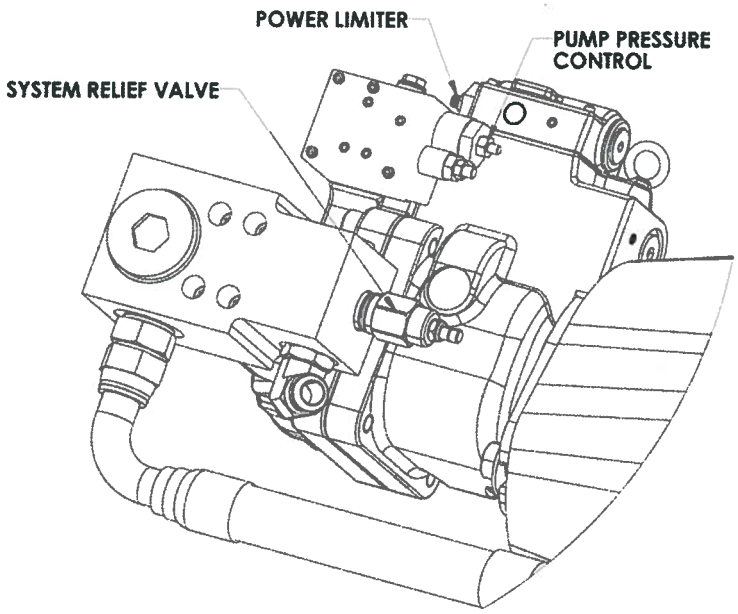
  d) Start motor and monitor system pressure on gauge while increasing the System Relief Valve setting (adjusting screw CW).

  e) When system pressure reaches 3500 psi ± 50 psi. (Set System Relief Valve 500 psi above Pump Pressure Setting)

  f) Secure System Relief Valve Adjusting Screw with locknut.

  g) Shutdown Motor A.

  h) Repeat steps a thru for Motor/Pump B.



- **Adjust Pump Pressure**

  a) With Motor A running, turn Pump Pressure Adjusting CCW (out) until system pressure reaches 3000 psi ± 50 psi max. (or as specified by others)

  b) Secure System Pressure Adjusting Screw with locknut.

  c) Shutdown motor A.

  d) Repeat sets a thru c for the second motor (as required).

- **Adjust Horsepower Limiter**

  a) Determine the motor supply voltage (volts) and frequency (Hz) (usually it is 460 VAC, 60 Hz; however, it may be 380 VAC, 50 Hz or 575 VAC, 60Hz).

  b) Once the supply voltage and frequency has been determined, look on the AC-Motor nameplate for the Full Load Current rating (amps) for the motor (motor amperage rating). Record this number. Typical values are listed below:

324 TC (small frame motor)			
40hp	60Hz	460VAC	47.6 A
30hp	50Hz	380VAC	43.9 A

326TC (large frame motor)

50hp	60Hz	460VAC	57.8 A
40hp	50Hz	380VAC	58.5 A
40hp	60Hz	460VAC	47.9 A (high temp 55 deg C)

c) Disconnect the Pressure and Return hoses from the Power Unit.

d) Install a test Flow Control Valve between the pressure and return quick-disconnects on the Power Unit.

Note - The valve and hoses should have a minimum of 1-inch ports, rated for a minimum of 3000 psi, and utilize a needle valve for precise control of flow.

e) Remove Motor A junction box cover, and place a clamp-on style ammeter on one of the motor power leads (maximum amp scale should be approximately 100 amps).

f) Make sure the test Flow Control Valve is fully open, and then start Motor A.

g) SLOWLY close the Flow Control Valve while monitoring the motor amperage on the ammeter. Record the maximum value reached on the ammeter.

Note – Maximum amps is usually reached around 1500 psi +/- 500 psi.

h) Compare the value obtained in step 'g' above to the motor nameplate value recorded in step 'b' above.

i) The Horsepower Limiter should be set to obtain a amperage value as close to the motor nameplate value as practical without going over. In other words, the value obtained in 'g' should be near, but always less than the value of 'b'.

j) Adjusting the Limiter Screw in increases amperage, out decreases the amperage.

k) Secure adjustment screw nut.

l) Shutdown HPU.

m) Repeat step a thru l for the second motor (as required).

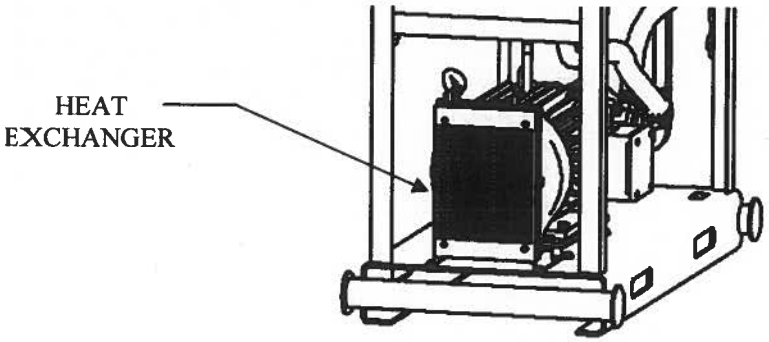
n) Remove test valve and reinstall hoses.

8) Frame

- Frame should be visually inspected for rust every six (6) months.
- Check welds.
- If rust is found, remove all rust to bare steel, and apply new zinc-based coating or other rust inhibitor.

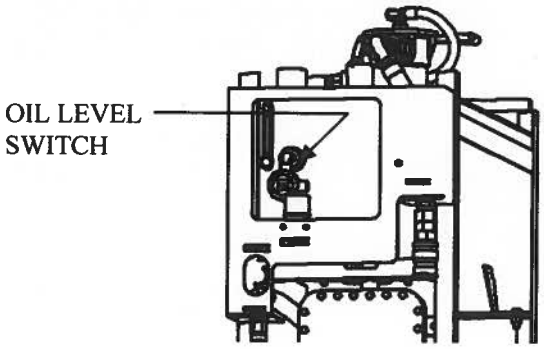
9) Air/Oil Heat Exchanger

- Inspect fins for a buildup of contamination or corrosion. Clean as necessary.



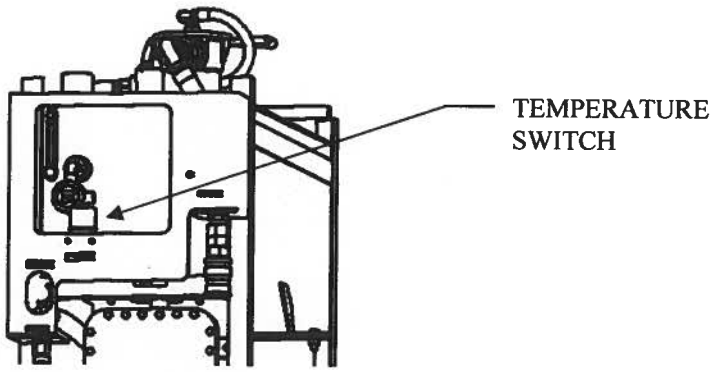
10) Oil Level Switch

- Oil Level Switch should be tested for proper operation every twelve (12) months.
- *See Commissioning and Startup, Auxiliary Equipment checkout* for procedure.



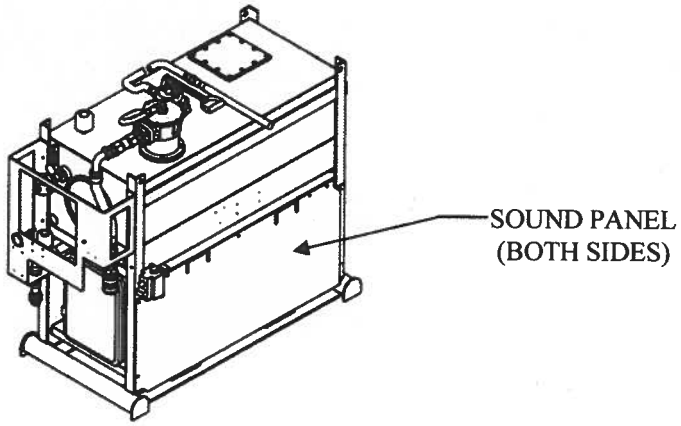
11) Temperature Switch

- Temperature Switch should be inspected every twelve (12) months.
- *See Commissioning and Startup, Auxiliary Equipment checkout* for procedure.



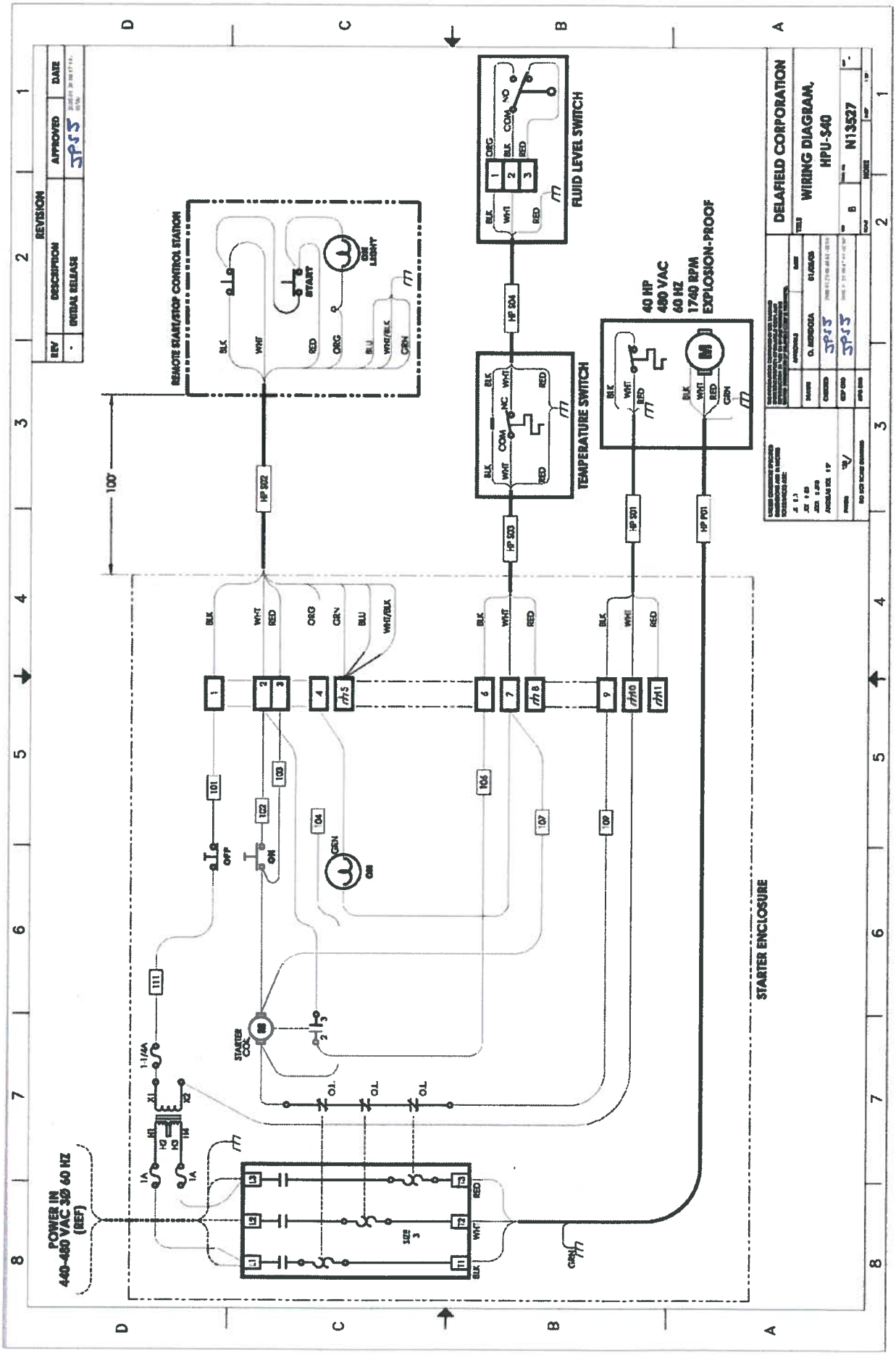
12) Sound Panels (if equipped)

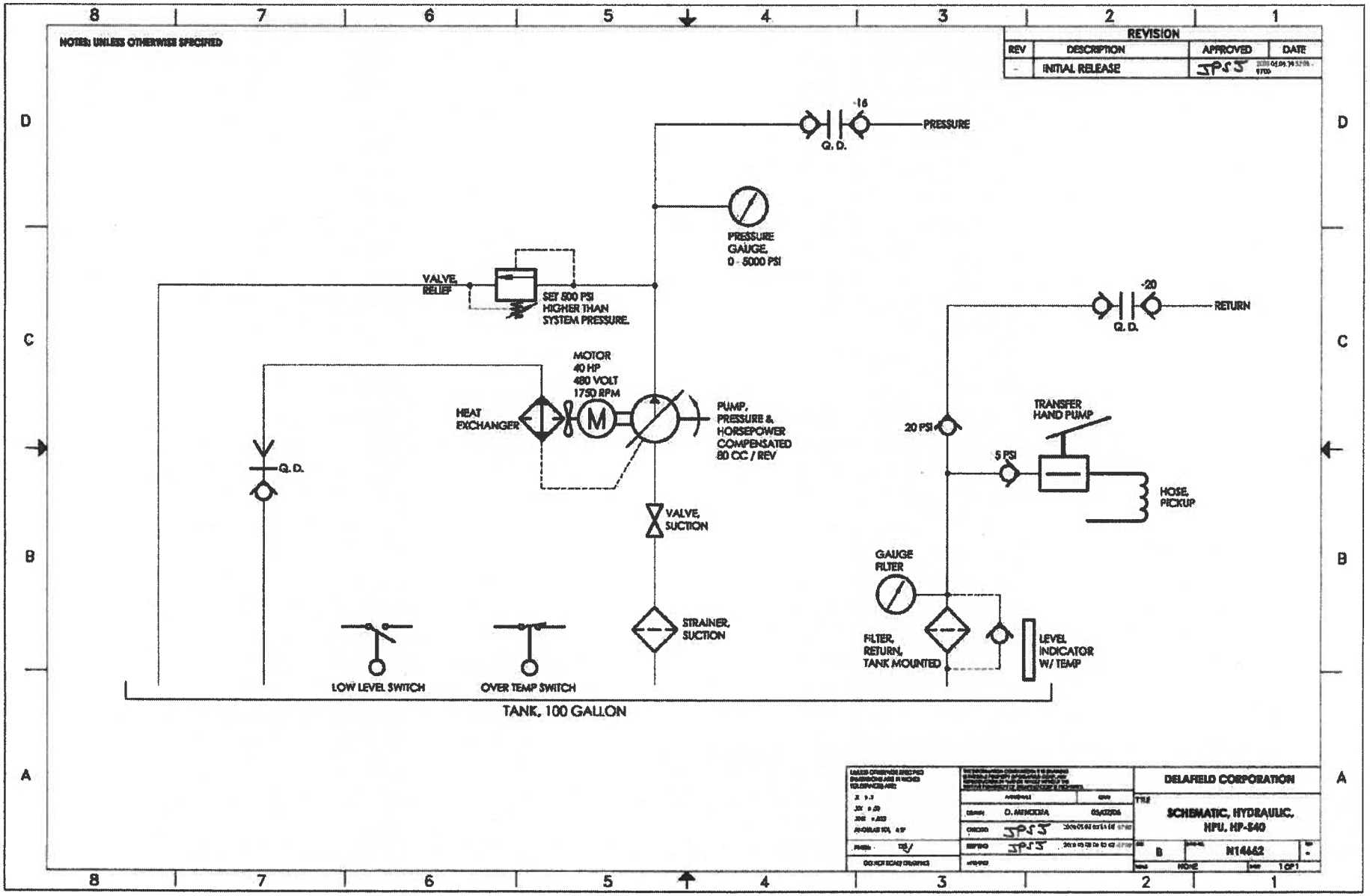
- Sound Panels should be visually inspected for rust every six (6) months.
- If rust is found, remove all rust to bare steel, and apply new zinc-based coating or other rust inhibitor.
- Inspect integrity of sound absorbing foam. If foam is missing or damaged replace.
- Replace any missing Panels.



13) General Service

- Every week the hydraulic oil level should be checked, and Return Filter cleanliness checked.
- Every month the hydraulic oil should be tested for contamination and depletion of additives.
- Every month, about one quart (1 liter) of oil should be drained from the bottom of the Tank and inspected for water contamination.
- Every month the Heat Exchanger should be cleaned.
- Every month, all the hardware on the HPU should be inspected and checked for tightness.
- Every year the Pressure Gauge, Temperature Switch, and Level Switch should be check for proper calibration.


DELAFIELD CORPORATION
WIRING DIAGRAM,
HPU-340
N13527
REVISION
REV
DESCRIPTION
APPROVED
DATE
INITIAL RELEASE
REMOTE START/STOP CONTROL STATION
START
ON LIGHT
FLUID LEVEL SWITCH
TEMPERATURE SWITCH
40 HP
460 VAC
60 HZ
1740 RPM
EXPLOSION-PROOF
STARTER ENCLOSURE
POWER IN
440-480 VAC 3Ø 60 HZ
(REF)
OFF
ON
STARTER COIL
O.L.
SIZE 3
100'
HP 902
HP 903
HP 904
HP 901
HP P01


NOTES: UNLESS OTHERWISE SPECIFIED
REVISION
REV
DESCRIPTION
APPROVED
DATE
INITIAL RELEASE
JPSS
-16
Q. D.
PRESSURE
PRESSURE GAUGE, 0 - 5000 PSI
VALVE, RELIEF
SET 500 PSI HIGHER THAN SYSTEM PRESSURE.
-20
Q. D.
RETURN
MOTOR 40 HP 480 VOLT 1750 RPM
HEAT EXCHANGER
PUMP, PRESSURE & HORSEPOWER COMPENSATED 80 CC / REV
Q. D.
20 PSI
TRANSFER HAND PUMP
5 PSI
HOSE, PICKUP
VALVE, SUCTION
GAUGE FILTER
STRAINER, SUCTION
FILTER, RETURN, TANK MOUNTED
LEVEL INDICATOR W/ TEMP
LOW LEVEL SWITCH
OVER TEMP SWITCH
TANK, 100 GALLON
DELAFIELD CORPORATION
SCHEMATIC, HYDRAULIC, HPU, HP-540
N14462
B
NONE
1 OF 1

HPU-S40/S50 Recommended Spare Parts				
Qty	**Part Number**	**Description**	**Domestic**	**International**
2	N15702-EL	Element, Filter, Return Line	X	
4	N15702-EL	Element, Filter, Return Line		X
2	FNQ-R-1	Fuse, 1 Amp	X	X
4	FNM-R-1-1/4	Fuse, 1-1/4 Amp	X	X
1	N13741	Pump, Hydraulic		X
1	685144-37264	Coupling, Pump		X
1	685144-12274	Spider, Coupling		X
1	H1RK06K06K-0432A	Hose, Pressure		X
1	25.500.5000PSI	Gauge, Pressure, 5000 psi	X	X
1	RDFA-LCN	Valve, Over-Pressure	X	X
2	SCU-1004	Breather, Tank	X	
3	SCU-1004	Breather, Tank		X
1	5RL-20	Gauge, Return Filter	X	X
1	D12204	Seal Kit, Return Filter	X	X
1	HC-LIPS-14	Seal, Access Cover	X	X
5	SR6S6/120V	Bulb, 'ON' Light, 120V	X	X
			Kit Part	**Number**
			N12500-RP1	**N12500-RP2**