Clock no/date

MANUAL SPECIFICATIONS

PART NUMBER: 2657668154

MANUAL DESCRIPTION: DM45/L TIER 2/3 TEST PROCEDURE

WARNING

Export of this manual to countries outside of the U.S. is subject to U.S. Export Administration Regulations.

Rig model _____, does it agree with "Manual Description" indicated above?

_____ If not, see supervisor.

Rev. No.	E/C Number	Revised By	Date		Signature	Date
007	7974-002	Quenton Dunn	03/07/07			
006	7974-001	Adam L	8/17/06			
005	7456-002	Woods	02/15/06			
004	6147-050	JEW	4/6/05			
003	5904-339	Larry	1/12/05	Drawn By:		
002	4947-001	Larry	6/12/03	Checked By:		
001	4996-001	Hamner	3/27/03	Approved By:		
000	3644-147	DOFFING	3/4/02			

Clock no/date
[1]

DM45/L

TEST PROCEDURE

Instructions for this test procedure:

1. This test procedure is a controlled document, do not make copies or remove pages. One copy of the latest revision of this procedure will be distributed by the Production Coordinator for each applicable rig.

2. Quality Control will maintain revisions to this procedure. Changes from the previous version will be indicated by a vertical bar in the left margin. A log of all revisions will be maintained by Quality Control.

3. Initial each blank as work is performed. If a test does not apply, write "N/A" in the signature blank.

4. Quality Control may audit this procedure during the functional and final audits. All items are subject to approval.

5. The test procedure should remain with the rig at all times. After completion, forward to the Production Coordinator. The Production Coordinator will log the rig serial number and forward the procedure to Product Support for final storage.

6. If a test or condition is incorrect or fails to reach given values, contact your supervisor or quality control inspector for proper corrective action.

7. For systems troubleshooting; refer to hydraulic, pneumatic, and electrical schematics in rig bill of material.

8. If nameplates or decals are not available during functional test, refer to part drawing for operational compliance.

[1]

Clock no/date

MANDATORY ELECTRICAL STANDARD PRACTICES

Review these practices regarding this rig for compliance, initial at the end.

1. Use Teflon tape, pipe sealant or gasket on all connections, whether NPT to NPT or into a box.
2. Always use insulated throat fittings, a bushing or insulated molding to protect wires from chaffing or cutting on edges or corners. Make sure no wires rest or are secured to an edge or corner.
3. Except for the inside of an operator's cab, all fittings, boxes and connections shall be rated or made to be dust-tight and weather resistant.
4. For AC electric rigs, do not rely on the conduit as a grounding means. Always provide a ground (green) wire to each load and ample ground wire size in each circuit, a grounding (bonding) jumper shall be installed in each box. Reference Article 250 in the 1999 National Electric Code (NEC).
5. Whenever possible, route wires without breaks in pull or junction boxes eliminate unnecessary connections to terminal strips and wire nuts.
6. Junction and control box interiors will be free from foreign material. All wiring will be neatly routed (for professional appearance) before the covers are secured for rig shipment.
7. Temperature gauge capillary tubing routing: near the engine, run capillary tubing inside ¾ inch Sealtite 2695333217. Route the Sealtite away from high heat sources, i.e., turbo charger and exhaust manifold. After installation, inject silicon compound 2656776792 in the end near the bulb to a depth of 2". Center the tubing inside the Sealtite until the compound sets. The Sealtite that holds the capillary tubing should be secured so the tubing and bulb are not subjected to any pull forces.
8. Prior to a rig being shipped, spray all exposed electrical connections with insulating varnish – 2657168916, to protect exposed connections when the machine is washed.
9. Prior to a rig being moved outside, insure that all electric device covers, box covers, conduit and cord grip fittings are properly secured to keep out water.
10. For AC electric rigs, Per 1999 NEC Article 350-18: Flexible metal conduit shall be secured by an approved means at intervals not exceeding 4.5 feet and within 12 inches of every box or fitting, where possible.
11. Insure that all conduit, cord and wires shall not be in contact with corners or knife-edges which can cause cutting or chaffing of the outer protective jacket. Secure away or protect against this type of condition.
12. A label, CPN 267093080 or standard material, indicating the wire number or option function if a wire number has not been established shall identify all wires. Where practical, use Grafoplast wire marking product. Use 3M material for wire pulls or where Grafoplast is not practical.
13. Use pipe sealant on all screws for screw-cover type boxes (Stonco), unilets (LB, T, etc.), and limit switches, this will protect threads from rusting.
14. For rotation tachometer signal wire in tower, use black high strength cable (2657522021) and a kellem type strain relief at each end; one near the power head and the other near the end of the hose at the hose tray. Make sure that at least 8" of extra cable is in the hose, for hose stretching.

_____ /_____

Clock no/date

PRE-START CHECKS

SERIAL NUMBERS

_____ /_____ 1. Rig model _____ Serial Number _____

_____ /_____ 2. Mainframe Weldment Serial Number _____

_____ /_____ 3. Tower Weldment Serial Number _____

_____ /_____ 4. I-R compressor _____ , if the gearset is changed from original, make sure proper gearset code is stamped in housing.

(The 5th digit of the compressor S/N is always "U")

_____ /_____ 5. Rotary head _____

_____ /_____ 6. Rotation motor(s) _____ _____

_____ /_____ 7. Jib hoist _____ motor _____

_____ /_____ 8. Receiver tank National Board number _____

_____ /_____ 9. Engine _____ Manufacturer _____

_____ /_____ 10. Main pumps: CS _____ DCS _____

_____ /_____ 11. Double pump _____

_____ /_____ 12. Pump gearbox _____

_____ /_____ 13. Cooler S/N _____ Manufacturer _____

_____ /_____ 14. Undercarriage CS _____DCS_____Manufacturer_____

_____ /_____ 15. Undercarriage motors CS _____ DCS _____

_____ /_____ 16. Water injection pump _____

_____ /_____ 17. Dust collector _____ motor _____

_____ /_____ 18. Jack cylinders: Drill end CS _____DCS _____Rear_____

_____ /_____ 19. Feed cylinders CS _____ DCS _____

_____ /_____ 20. Tower raising cylinders CS _____ DCS _____

_____ /_____ 21. DEI _____ Stratalogger box_____

_____ /_____ 22. Aquila display _____ DM1 box _____

_____ /_____ 23. Operator's cab _____

_____ /_____ 24. A/C Compressor Serial Number _____ Mfg _____

Clock no/date

RIG PRE-START OILS, LUBRICATION AND COOLANT

(See rig bill of material (BOM), or supervisor for proper fluid information)

_____ /_____ 1. Verify that all tower and main frame lubrication points have been lubed.

_____ /_____ 2. Verify that the Funk gearbox driveshaft has been lubed.

_____ /_____ 3. Verify that all main frame, tracks, and jack barrel points have been lubed.

_____ /_____ 4. Lubricate both tower pivot bushings and verify bushing locks are welded in place. Verify grease is getting to the shaft before raising the tower for the first time.

_____ /_____ 5. Fill radiator to base of fill cap with anti-freeze, allow anti-freeze to settle for 30 minutes. This time allows the fluid to move into the engine.

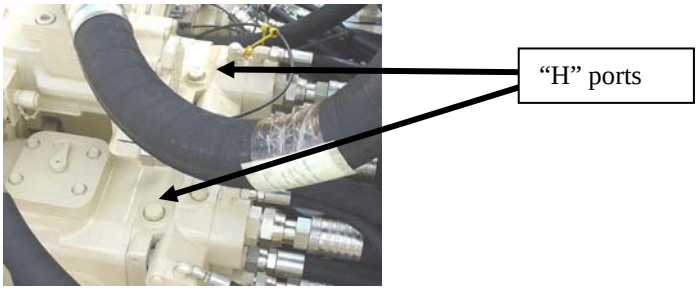
_____ /_____ 6. Verify the following fluid levels

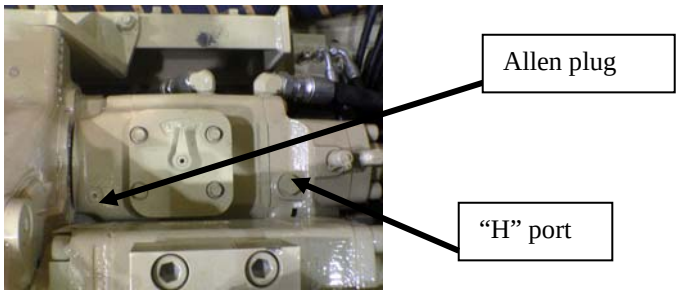
	Power pack engine oil
	Receiver tank to middle of sight glass.
	Jib hoist gear box
	Carousel gear box
	Track Final Drive (Cat), SAE 50W Oil.
	Track Final Drive (AC), 80W90 oil.
	Cat/Bean water injection pump (and oilers if applicable)
	Hydraulic tank ,ISO 32W
	Battery water level
	Fuel tank level
	Rotary head ,80/90W oil.
	Funk gear box oil. Fill and check at side plug or dipstick.

Clock no/date

_____ /_____ 7. Remove vent plug before filling hydraulic tank and to purge air from hydraulic system. Reinstall plug before cranking machine.

_____ /_____ 8. Verify CS and DCS pump cases have fluid, by looking into the "H" port, and rear Allen plug. Allow air to bleed out of these ports, until oil starts to flow out of ports. Check both main pumps to make sure there is no isolation plug inside the "H" port. Probe inside the ports with a long, clean, Allen wrench or rod. A long rod will reach about 8 inches into the pump if the isolation plugs are not installed. A long rod will stop about half way (4 inches) through the pump if the isolation plug is installed. If an isolation plug is found in either pump, remove and discard it.



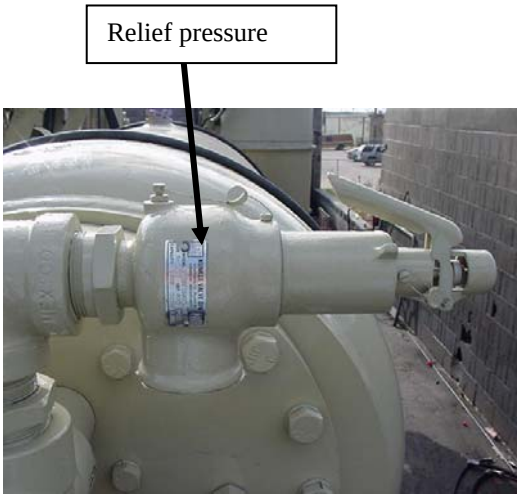


Clock no/date

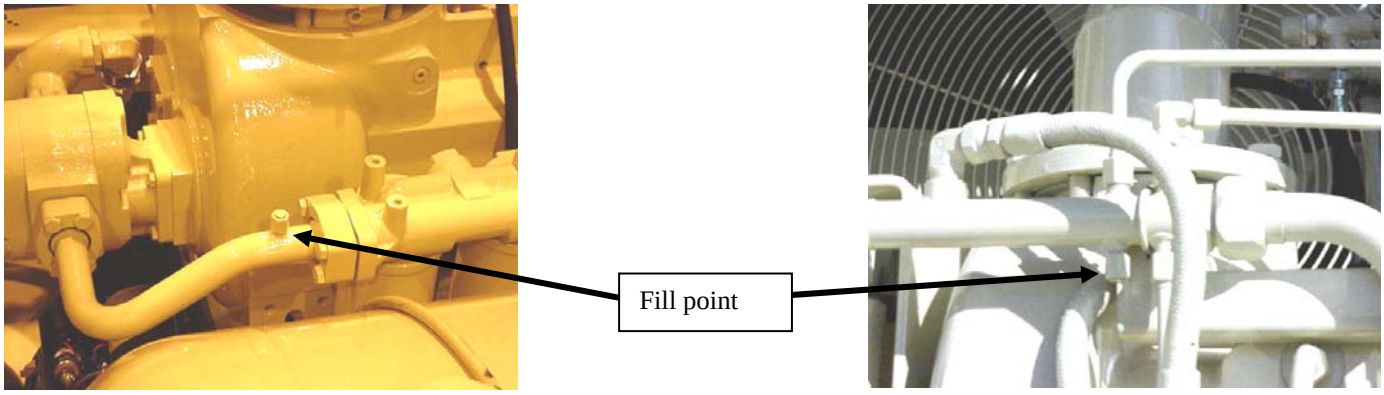
COMPRESSOR

_____ /_____ 1. Verify safety valve is stamped for the correct relief.

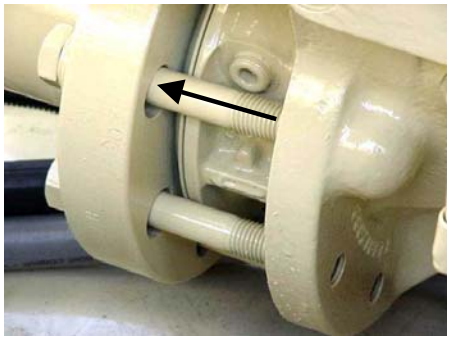
XL900	150 psi
XL1050	150 psi
XL1200	150 psi
XL1900	150 psi
226mm WW	150 psi
285mm	150 psi
HP900 – (HR2)	400 psi
HP1050 – (HR2.5)	400 psi
HP1250 – (HR2.5)	400 psi
HP1070	400 psi



_____ /_____ 2. HR2 and HR2.5, Remove the cap from the fitting in the large tube connecting the pump and filters. Inject 7 gallons of compressor oil into the manifold, this will prime the pump, fill the filters, and get oil into the compressor before starting. Reinstall the cap. Add 1-gallon of compressor oil through butterfly intake valve.



_____ /_____ 3. Verify the check valve in the compressor air discharge line is installed properly with the nameplate located at the top, therefore the hinge pivots from the top (free flow into tank).



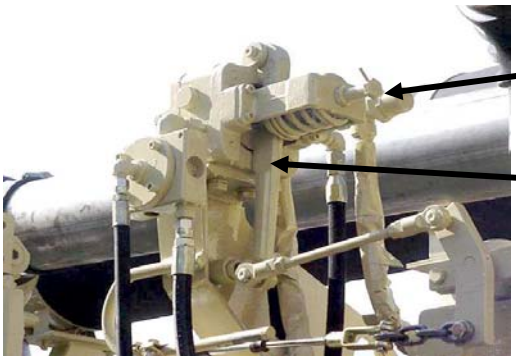
Clock no/date

_____ /_____ 4. Verify compressor discharge temperature Murphy gauge is working.

HR2 and HR2.5 Only

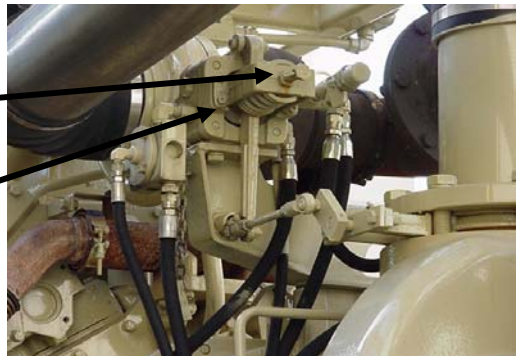
_____ /_____ 5. Remove butterfly end of the linkage between the UL88 and the butterfly valve. Insert a 5/8" key between the lever arm and the housing on the UL88. Close the butterfly valve completely and adjust the linkage arm until it pins back together with no force.

_____ /_____ 6. With the 5/8" key still in place, adjust the lever arm stop bolt until it touches the arm. Turn the bolt an additional 1/4 turn and tighten the jam nut. Remove 5/8" key.



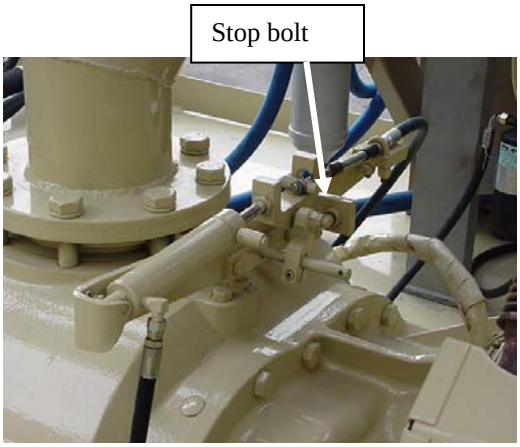
Closed stop bolt

5/8 Key insertion point



Clock no/date

XL Only

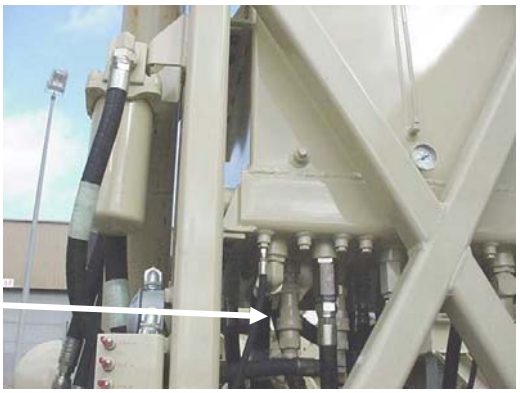


_____ /_____ 7. With the ON/OFF lever in the OFF position, adjust the linkage stop bolt until it just touches the linkage. Stroke the control cable several times, adjust the linkage stop bolt as needed to prevent the butterfly valve from sticking closed.

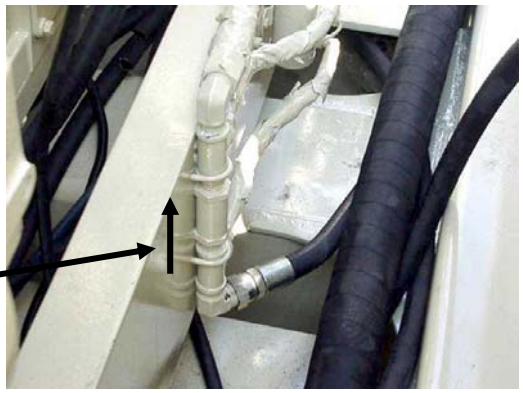
_____ /_____ 8. Shift the ON/OFF lever to the ON position. Manually extend the air cylinder and verify the control cable does not interfere with the cylinder travel.

MISCELLANEOUS

_____ /_____ 1. Verify that the hose from the case drain filter to hydraulic tank is connected at the quick disconnect.



_____ /_____ 2. Verify that the fuel line check valve is installed with the "top" stamping facing upwards. (Cat engine shown, Cummins check valve is on engine)



_____ /_____ 3. Check V-belts for being tight and not damaged (alternator and A/C).

Clock no/date

_____ /_____ 4. Verify rain cap is installed on engine exhaust, open to discharge gases away from tower and off rig.

_____ /_____ 5. Verify that all hump hose clamps on the compressor and engine air ducts are constant torque type, are tight, but no bulges or air gaps.

ENGINE START-UP

_____ /_____ 1. For Caterpillar engines only, use the Caterpillar "Electronic Technician" (ET) program, to program the engine. Refer to the charts in Appendix A for Tier 2 engine programming parameters and Appendix B for Tier 3 engine programming parameters.

_____ /_____ 2. Start the engine and verify that the readout on the diagnostic module is showing charge (positive value). If discharging (negative value), shut down unit and correct malfunction.

_____ /_____ 3. Record supercharge gauge pressure, no compressor load at maximum engine speed. _____(Must be 65 min. to 110 max. psi.)

Record engine speed at time of pressure reading _____

_____ /_____ 4. Verify fan turns clockwise when standing on fan side of the cooler.

_____ /_____ 5. Verify function of emergency stop.

_____ /_____ 6. Verify all engine gauges are functioning.

Tachometer/hour meter		Diagnostic Module	
Water temperature		Fuel Gauge	
Oil pressure			

_____ /_____ 7. Check for vibration in the Funk gearbox, realign drive line as required. Insure slip joint is not fully extended or retracted.

Clock no/date

_____ /_____ 8. Set and record engine speed: idle _____ maximum _____

Cummins Diesel: 1200 RPM (+0/-200) idle, no load
1800 RPM (± 50) max, no load

*Cat Diesel: 1200 RPM (± 50) idle, no load
1800 RPM (± 50) max, no load

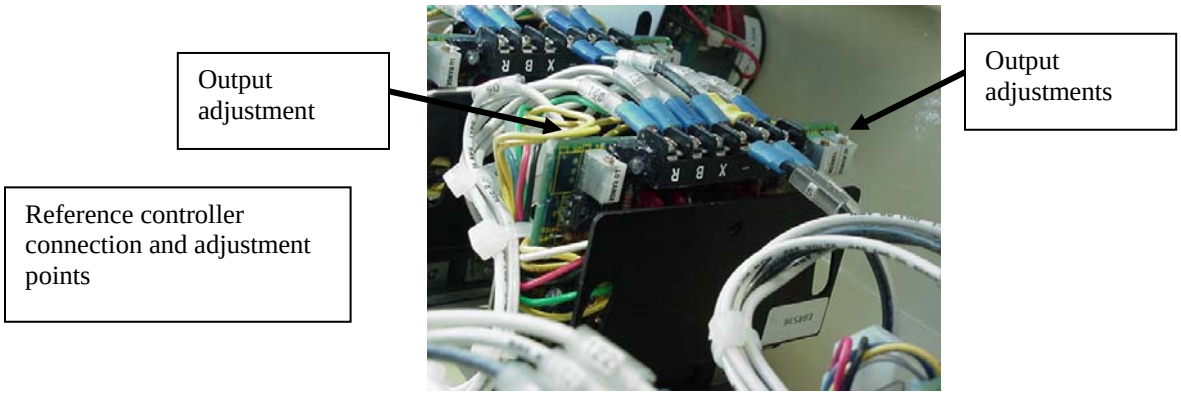
* Engine idle and max RPM to be set by Atlas Copco

JACKS (Rig must be in "drill" mode for the jack tests.)

_____ /_____ 1. Verify jack lever direction and jack direction matches nameplate.

_____ /_____ 2. Fully stroke all jack cylinders twice to purge air. Check for leaks, correct as required.

PRE-TEST CONTROLLER SETTINGS



Measured Current tolerance is plus 5 mA, minus 0 mA. Small LED indicators are illuminated when output is on and varies in intensity as output changes.

Main Pump Controller Settings - Propel Controls (If rig includes jack-up and/or propel interlock, make sure interlocks are in their propel position or are by-passed for the following test.)

Note: Make sure the key is in "ON" position, but engine is NOT running. Put the rig in "propel" mode. Remove the B wire from CS (right track) propel controller and connect an ammeter, 1 amp or less scale, between the controller "B" terminal and the open "B" wire (red lead to B and black lead to the open wire). If no current is measured, verify optional interlocks are operational.

_____ /_____ 1. Pull the CS controller handle slightly on stroke (till the micro switches just click). Adjust the threshold pot until the ammeter reads 60 milliamp (mA). If you do not get a current reading, check the wiring.

_____ /_____ 2. Pull the CS controller handle fully on stroke and set the max-out pot to 350 mA. Return handle to center, check current reading in opposite direction, return handle to center. Then reconnect the wire to the "B" terminal.

_____ /_____ 3. Repeat steps 1 through 4 for the DCS (left track) propel controller.

Clock no/date

Main Pump Controller Settings - Feed and Rotation (Drill) Controls

Note: Put the rig in the "drill" mode, engine off, key-switch on. If the machine is a HP machine turn the holdback controller knob to the half way position. The rotary head should be at the bottom in the tower.

_____ /_____ 1. Make sure the handle is in the center, off, position. Remove the B wire from the Feed controller and measure the resistance between the open "B" wire and the controller "A" terminal. Resistance should be 24 to 28 ohms, indicating that the controller is attached to the pump electric stroker coil. If not, check the wiring.

_____ /_____ 2. Connect an ammeter between the controller "B" terminal and the open "B" wire (red lead to B and black lead to the open wire).

_____ /_____ 3. Pull the Feed controller handle slightly on stroke (till the micro switches just click). Adjust the threshold pot until the ammeter reads 60 milliamp (mA).

_____ /_____ 4. Pull the Feed controller handle fully on stroke and set the HiRange pot to 350 mA.

_____ /_____ 5. Leave the controller handle fully stroked and hold down the button on top on the controller. Set the LoRange pot to 95 mA. Return handle to center. Check current reading in the opposite direction, return handle to center when finished. Reconnect the wire to the "B" terminal.

_____ /_____ 6. Repeat steps 1 through 6 for the Rotation controller.

Clock no/date

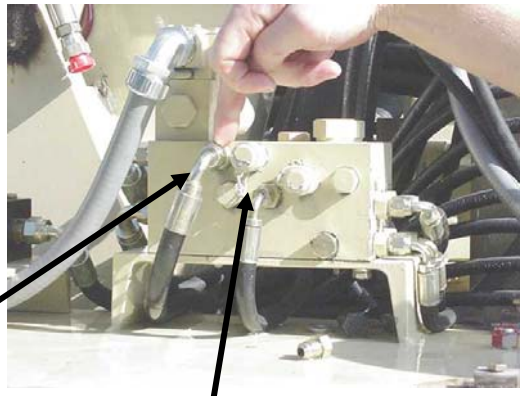
UNDERCARRIAGE

Drill/Propel valve pressure Settings

Inlet Pressure Setting

_____ /_____ 1. Connect a 600 psi gauge to the TST3 port on the Drill/Propel Control Valve to verify inlet pressure setting, put rig in “propel” mode, adjust to 500 psi, if required.

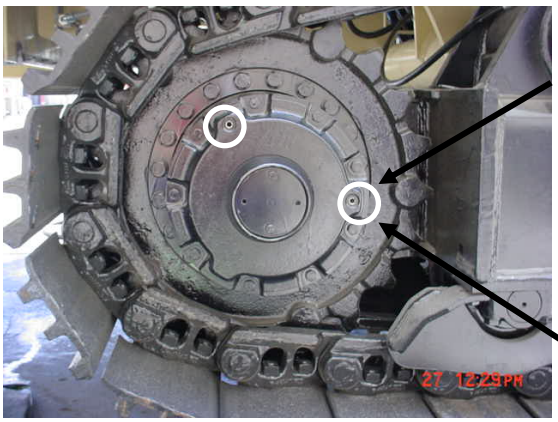
Record inlet pressure _____



Measurement or Test Device Information	
Device Type	0-600 Pressure gage
Device ID #	
Calibration Due Date	

Clock no/date

_____ /_____ 1. With rig on level ground, fill the final drive with oil to the bottom of the upper plug.



Check oil here and add, if needed.

Make sure final drive is orientated as indicated in photo. Typical all undercarriages.

Do not forget to replace plugs!

One plug at 3 O'clock position.

Final Drive oils:
CAT – SAE 50W
AC – 80W90 Gear oil

_____ /_____ 2. By-pass jack-up interlock, if required. Raise the rig on the jacks and rotate the tracks 4 or 5 revolutions to distribute the final drive oil. Repeat for reverse direction. Return controls to center "off" position, verify the tracks stop and do not creep. Return the tracks to level ground, recheck the final drive oil level, and re-fill as required.

_____ /_____ 3. Verify the main pump lever coincides with track movement and nameplate.

_____ /_____ 4. Tram the rig in the direction of the idler to release tension on the idler end of the undercarriage. Lay a straight edge on top of the grousers, long enough to reach between the first carrier roller and the idler. Measure and record the sag halfway between the carrier roller and idler.
Adjust idler tension for sag of 1 to 1.5 inches on CAT tracks.
Adjust idler tension for sag of 7/8 to 1.125 inches on AC tracks.

Record initial sag: DCS _____ CS _____

Record final sag: DCS _____ CS _____

_____ /_____ 5. Enable the jack-up interlock, if required. While in "drill" mode, raise the rig to get the tracks off the ground. Stroke both main pumps to maximum and verify that the tracks do not move, return controls to center "off" position.

_____ /_____ 6. With the tracks still off the ground, to test the jack-up interlock. Shift the drill/propel selector to "PROPEL". Stroke both propel controllers to forward, reverse, then return, and verify that both that both tracks do not move or creep.

TOWER CHECKS (Make sure pivot points are lubricated, upper and lower points of tower raising cylinders.)

_____ /_____ 1. With the tower elevated 45 – 60 degrees, open rod changer and run head the complete length of the tower to purge air from feed cylinders. Verify that the tower hoses do not bind.

_____ /_____ 2. With the rig leveled on the jacks and the power head at the top of the tower, raise the tower about 15 degrees and back to rest. Repeat for 30, 60 and 90 degrees. Verify lever and tower direction coincides with nameplate.

_____ /_____ 3. With the tower vertical, verify the Rotary head slides along the tower front chords smoothly. Verify that the main air hose does not bind. Adjust if required.

_____ /_____ 4. With all cylinders retracted, re-check the hydraulic oil tank and refill if needed.

_____ /_____ 5. Verify tower raising control by raising tower to 45-degree position and move control lever to neutral. Tower must not drift.

_____ /_____ 6. With the tower vertical and the head at the bottom, check the rotary head oil level. Fill to center of the sight gage if needed.

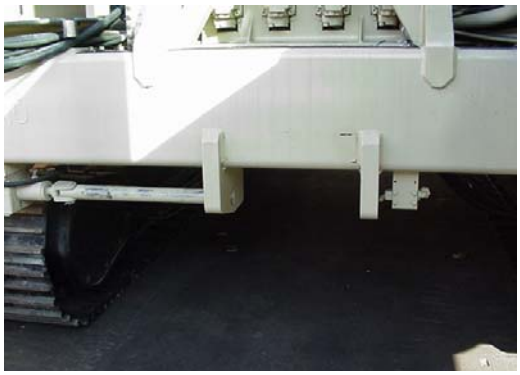
_____ /_____ 7. Verify that all rod cups rotate freely.

_____ /_____ 8. Verify that carousel rotate freely.

_____ /_____ 9. Verify that all-remaining tower controls on the console function in the proper direction as indicated on the nameplates.

Clock no/date

TOWER PINNING



_____/_____ 1. Verify the tower-locking pin slides into the clevis holes in the frame smoothly. The console indicator light should turn off when the pin is fully extended (engaged). Check pin engagement with tower.

_____ /_____ 2. Angle drill rigs only. Stamp the rig serial number on the angle pinning banana bar.

NIGHT LIGHTS

_____ /_____ 1. Verify all external lights are wired and functional with nameplates.

_____ /_____ 2. Verify cab light is wired and functional.

HEATER

_____ /_____ 1. Open engine water valves to heater and verify heater blows hot air.

_____ /_____ 2. Verify blower motor operates at all speeds.

_____ /_____ 3. Adjust the thermostat control and verify that the air temperature changes accordingly.

AIR CONDITIONER - By a qualified person, charge the A/C before the QC functional audit

Evacuating System Procedure

_____ /_____ 1. Hose up the system to the machine.

_____ /_____ 2. Pull a vacuum for 45 minutes.

_____ /_____ 3. Check the pressure to ensure that is has settled, note what pressure is.

_____ /_____ 4. Wait 15 minutes, and check to see if any pressure has bled off.

_____ /_____ 5. If pressure has dropped, there is a leak. The leak should be found and fixed before continuing onto evacuation.

Clock no/date

Charging Procedure

_____ /_____1. Check oil present in the compressor.

_____ /_____ 2. If required, add to the compressor 8-10 ounces of refrigerant oil (2657737934).

Record volume _____ for HG1000 compressor.
Record volume _____ for Sanden compressor.

_____ /_____ 3. Gauges and A/C system must still be in a vacuum from the evacuating system procedure

_____ /_____ 4. Attach charging hose to refrigerant bottle.

_____ /_____ 5. Purge air from charging hose.

_____ /_____ 6. Open shut-off valve at refrigerant bottle.

_____ /_____ 7. With machine off, open high side manifold valve.

_____ /_____ 8. After gauge pressures become slow to increase, close high side manifold valve.

_____ /_____ 9. Start engine and throttle to working rpm.

_____ /_____ 10. Adjust A/C controls for maximum cooling and engage compressor clutch.

_____ /_____ 11. Open low side manifold valve.

_____ /_____ 12. Charge to weight recommended by manufacturer.

_

Clock no/date

____ /_____ 13. Check system for cooling.

Measurement or Test Device Information	
RRefrigerant Type	R134A
Refrigerant Charge	

Adding Refrigerant

_____ /_____ 1. Record outside ambient temperature _____ 'F degrees.

_____ /_____ 2. Try to keep low side pressure between 5-35 psi and the high side pressure lower than 295 psi. Keep in mind that pressure readings are greatly affected by ambient temperatures. For example, a high side reading of 295 psi on a 75 degree day would not be good while a high side reading of 300 psi on a 115 degree day would be acceptable, assuming the A/C system was cooling good.

_____ /_____ 3. Monitor vent temperature with doors closed to cab. If adding refrigerant lowers vent temperature, keep adding refrigerant as long as high side pressure is acceptable. When vent temperature levels out or starts rising, stop adding refrigerant. A 20-degree difference between the vent temperature and the air intake temperature (Cab temperature at operator's chest level) is acceptable.

Record Cab temperature _____'F degrees.

_____ /_____ 4. Temperature at vent must be 25 to 30^{o} F or less below air intake temperature.

Record vent temperature _____ 'F degrees.

_____ /_____ 5. Verify that the blower works at all speeds.

_____ /_____ 6. Return line at compressor should be cool and possibly sweating.

_____ /_____ 7. Cab temperature should be comfortable.

Clock no/date

AC ELECTRICAL SYSTEM FUNCTION
Note: Refer to AC electrical system schematic.
120/240V-30kw Generator set must be running or external power provided.

WARNING: **TO PREVENT FIRE OR EXPLOSION:**
TURN OFF ELECTRIC HEATERS IN ENGINE, FUEL TANKS, HYDRAULIC RESERVOIR AND RECEIVER TANK BEFORE ADDING OIL.

Procedure: Verify that each heater is correct per B.O.M. and is wired to produce correct heat (power), based on schematic or heater nameplate. Should measured current readings not match expected results, ensure heater is wired correctly according to schematic then adjust heater settings to obtain expected heat (power) output.

Calculation: Based on voltage input, calculate the expected current and verify that the expected current and measured current are equal.

For single phase heaters: **Current (amps) = Power (watts) / Voltage (volts)**

Example: 5 amps = 1200 watts / 240 volts

* Heater Power value should be taken from heater nameplate or electrical schematic.

Clock no/date

_____ /_____ 1. Open 15Amp Low Hydraulic Oil Contactor Circuit Breaker. The Contactor should de-energized. Reset the Circuit Breaker, the Contactor should energized.

_____ /_____ 2. **Oil Reservoir Heater**. Use an ammeter to measure the current. It may be necessary to increase the thermostat temperature setting. Repeat this process for the each Oil Reservoir Heater. **Note:** Insure that oil covers heaters to prevent damage when running test.

*Heater Power _____ watts
Input Voltage _____ volts
Calculated current _____ amps
Measured current _____ amps

_____ /_____ 3. **Water Injection Tank Heater.** Use an ammeter to measure the current. It may be necessary to increase the thermostat temperature setting. Repeat this process for the each Water Injection Tank Heater. **Note:** Insure that water covers heaters to prevent damage when running test.

*Heater Power _____ watts
Input Voltage _____ volts
Calculated current _____ amps
Measured current _____ amps

_____ /_____ 4. **Engine Water Jacket Heater.** With the machine diesel engine not running use an ammeter to measure the current. **Note:** Insure that water covers heaters to prevent damage when running test.

*Heater Power _____ watts
Input Voltage _____ volts
Calculated current _____ amps
Measured current _____ amps

_____ /_____ 5. **Engine Fuel Tank Pad Heater.** With the machine diesel engine not running use an ammeter to measure the current. Repeat this process for the each Engine Fuel Tank Heater.

*Heater Power _____ watts
Input Voltage _____ volts
Calculated current _____ amps
Measured current _____ amps

_____ /_____ 6. **Engine Oil Pan Heater.** With the machine diesel engine not running use an ammeter to measure the current. **Note:** Insure that Engine Oil covers heaters to prevent damage when running test.

*Heater Power _____ watts
Input Voltage _____ volts
Calculated current _____ amps
Measured current _____ amps

Clock no/date

_____ /_____ 7. **Battery Pad Heater.** Use an ammeter to measure the current.

*Heater Power _____ watts
Input Voltage _____ volts
Calculated current _____ amps
Measured current _____ amps

_____ /_____ 8. **Receiver Tank Heater.** Use an ammeter to measure the current.

*Heater Power _____ watts
Input Voltage _____ volts
Calculated current _____ amps
Measured current _____ amps

_____ /_____ 9. **DHD Tank Heater.** Use an ammeter to measure the current.

*Heater Power _____ watts
Input Voltage _____ volts
Calculated current _____ amps
Measured current _____ amps

_____ /_____ 10. **Auxiliary Cab Heater.** Use an ammeter to measure the current.

*Heater Power _____ watts
Input Voltage _____ volts
Calculated current _____ amps
Measured current _____ amps

_____ /_____ 11. **Cab Convenience Receptacles.** Measure voltage with V.O.M. Check ground fault circuit breaker for proper operation.

Record voltage _____ volts

Clock no/date

CENTRALIZED LUBRICATION SYSTEM

_____ /_____ 1. If manual system, purge air from all grease lines, grease each lube point at the central lubrication manifold. Verify grease is supplied to each bearing point.

_____ /_____ 2. If automatic system, purge air from all grease lines, stroke the pump handle or turn the pump 'on' and verify grease is supplied to each lube point.

_____ / _____3. Verify that the indicator stem is visible when the injector piston is in the normal position.

Main frame lube:

a) All points at Jacks
b) Two points at Tower Raising Cylinders
c) Two points at Main Shaft
d) Two points at Oscillation Yoke Ends
e) Two points at Oscillation Yoke Pivot
f) Two points at Tower Support

Tower Lube Points:

a) Upper feed sprockets
b) Lower feed sheaves
c) Center and lower support for rod changer
d) Jib hoist
e) Jib hoist sheave
f) Upper and lower carousel pivot blocks.
g) Carousel swing cylinders
h) Tower raising cylinder pins
i) Index pivot bushing on upper carousel arm
j) Carousel lower arm

Clock no/date

TEST

In order to monitor air emissions at the test pad, the Texas Natural Resource Conservation Commission air permit number 24575 amendment 3, requires a record of engine running time while a rig is on the test pad.

S/N _____

MODEL_____

ENGINE HOURMETER READING WHEN RIG IS FIRST DRIVEN ON THE TEST PAD.

_____

_____ DATE

_____ TESTER INITIALS

ENGINE HOURMETER READING WHEN RIG IS READY TO LEAVE THE TEST PAD.

_____

_____ DATE

_____ TESTER INITIALS

FUNCTIONAL AUDIT FOR TOWER AND DRILL ROD

_____ /_____ 1. Tower **IS** to be removed; Quality must perform a functional audit before tower is removed.

_____ /_____ 2. Tower **IS NOT** to be removed for shipment.

_____ /_____ 3. Record the following data:

Test Rod Part Number	
Test Rod Length (Feet)	
Test Rod Size (Diameter of Rod - inches)	
Test Rod End Size and Type (Example - 4" - Beco)	
Test Rod QA stamp - number stamped on flat	

NOTE: IF THE TEST ROD DOES NOT HAVE A QA STAMP, THEN DO NOT USE THE DRILL ROD, AND CONTACT QUALITY.

Clock no/date

TEST

For all tests; when an instrument other than the panel gage is used, the following block must be filled out.

Measurement or Test Device Information	
Device Type	
Device ID #	
Calibration Due Date	

Device Type – Engineering or quality should enter a brief description of the type of gage required for the inspection or test. This should be part of the test book text prior to release.

Device ID # - The employee is to enter either the unique identification # put on the gage by I-R or the Serial # of the gage where no I-R identification # was issued. Any device, which has neither such identifier, should be considered suspect and a Quality department representative should be notified prior to using the gage for inspection or testing.

Calibration Due Date – The employee is to enter the Calibration Due Date indicated on the sticker or tag attached to the device. Any device without a due date identifier should be considered suspect and a Quality department representative should be notified prior to using the gage for inspection or testing.

NOTE: If test values are not obtainable or instructions unclear contact your Supervisor or Engineering.

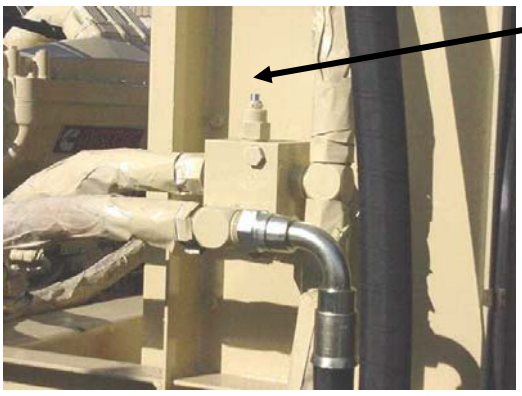
Clock no/date

COOLER RPM

_____ /_____ 1. Run rig to get hydraulic oil temperature to 110° F, minimum, see tank gauge. Then, set the cooler fan RPM as specified below. Tolerance on fan speeds is ±50 RPM.

Compressor	Cooler	Fan Speed (RPM)
XL 900	Side-By- Side Cooler	800
XL 1050	Side-By-side Cooler	1000
XL 1200	Side-By-Side Cooler	900
XL 1600	Side-By-Side Cooler	1100
XL 1900	Side-By-Side Cooler	1200
HP 900	Side-By-Side Cooler	1000
HP 1070	Side-By-Side Cooler	1100
HP 1250	Side-By-Side Cooler	1200
HP 1450	Side-By-Side Cooler	1200

Record Fan Speed _____(rpm)



Adjustment, screw-in (CW) to raise fan speed, out to lower, then lock jam-nut.

Measurement or Test Device Information	
Device Type	Stop watch
Device ID #	
Calibration Due Date	

JACK TEST

_____ /_____ 1. Raise the rig off the ground and record the distance between bottom of crosshead and bottom of slide:

CS_____ DCS _____ Rear _____

_____ /_____ 2. After 2 hours, re-check jack measurement and record distances. If more than 1/8" per hour drift is detected, replace fix the problem and retest.

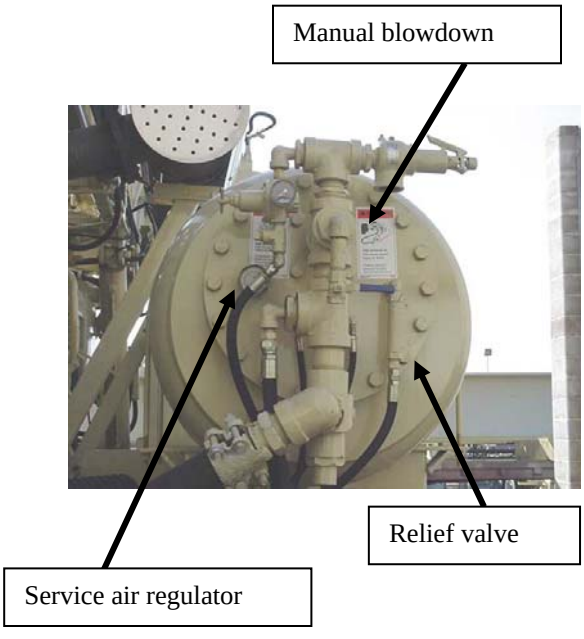
CS _____ DCS _____ Rear _____

_____ /_____ 3. Level the tower from side to side and front to rear using a long carpenters level. Adjust the bubble level on the console to center the bubble.

HR2/ HR2.5 COMPRESSOR

_____ /_____ 1. Close manual blowdown valve and throttle valve in the service air line. Turn the compressor ON/OFF valve, on the console, to OFF. These settings should remain the same for steps 2, 3, and 4.

_____ /_____ 2. Start engine and increase RPM to maximum. The UL88 valve should close the butterfly valve when the separator tank reaches minimum pressure. If the pressure is not within this range, stop engine, allow tank to blow down, and then remove the relief valve in the regulation line from the separator tank. Reject the valve or use pressure gauge and 1/4" (allen) hex wrench to re-set relief valve to 100 psi (+10, -0). Then, lock adjustment in place by peening the threads with a center punch to keep the jam-nut from moving. Replace the valve and reconnect the hose.



Clock no/date

_____ /_____ 3. With the UL88 arm fully extended, verify that the butterfly valve is near horizontal. A line is stamped on the end of the butterfly valve shaft indicates the position of the butterfly, verify that the line is near horizontal.

_____ /_____ 4. Start the engine and increase speed to maximum. The butterfly valve should close when the receiver pressure reaches 150 - 175psi.

Record receiver pressure at point when butterfly closes _____

_____ /_____ 5. Shut down the engine and watch the butterfly valve, it must open completely. If the butterfly sticks closed, tighten the lever arm stop bolt on the UL88. Re-check to verify butterfly opens without sticking.

_____ /_____ 6. Start engine and increase RPM to maximum. Wait for separator tank to build to minimum pressure (120-140 psi-HR2, 150-175 psi- HR2.5) and the butterfly valve to close. Check separator tank gauge for 5 minutes, the compressor must not continue to build air.

Record separator tank pressure after 5 minutes _____

Note: If steps 5 and 6 can not be reached simultaneously, verify the 3/32" orifice is drilled in the 50 psi relief mounted to the UL88. If orifice is in place, check butterfly for damage and replace if needed.

_____ /_____ 7. Verify that all compressor gauges are operating: Bit air pressure, interstage pressure, discharge temperature, and receiver pressure.

_____ /_____ 8. Remove discharge hose from REC/SEP tank and replace it with the test pad in-ground muffler hose. The airflow can now be blocked, verify that the receiver pressure will build to 345-355 psig (read pressure gauge on the console). Do not allow the pressure to exceed 360 psig. Adjust the spring tension on the UL88 if pressure is low.

_____ /_____ 9. Set the service air regulator on the receiver tank to 90 psi. Read pressure from the gage on the regulator.

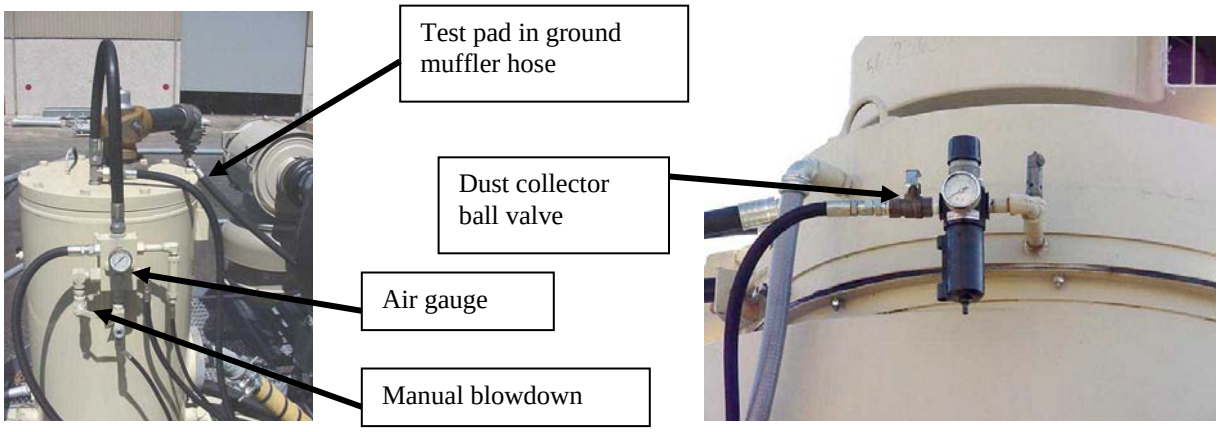
_____ /_____ 10. Open the throttle valve and switch the compressor to OFF. Shut down the engine and verify the automatic blowdown vents the receiver immediately.

Operating note: Do not shut down the engine with receiver pressure higher than minimum pressure valve setting. Can cause saturation of air cleaners.

Clock no/date

XL COMPRESSOR - This section for XL rigs with a 226-mm air end.

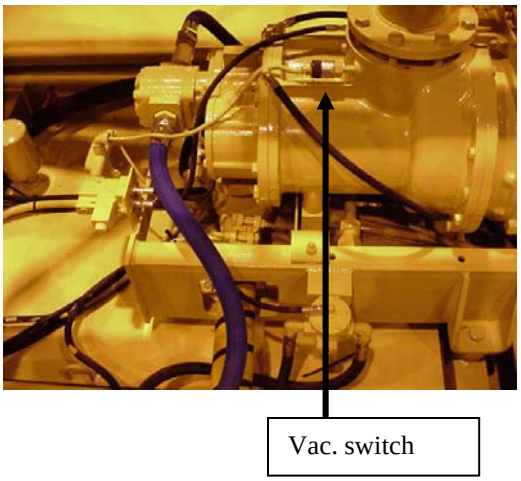
_____ /_____ 1. Make sure there is an air pressure gauge at the head of the receiver tank. Close the ball valve to the dust collector filter regulator.



_____ /_____ 2. Remove the plug on the inlet of the air end just below the butterfly valve and install a mercury manometer or vacuum gauge.

_____ /_____ 3. Stroke the compressor control cable several times. Verify that the butterfly shaft linkage is contacting the stop bolt when the lever is in the off position.

_____ /_____ 4. To set the adjustable vacuum switch on the compressor air inlet located just below the butterfly valve. Screw the adjustment knob all the way in (clockwise) and then back out 4 to 5 complete turns. This will cause the solenoid valve to open at approximately 15" Hg vacuum under the butterfly valve and allow air into the compressor.



_____ /_____ 5. Start the engine and set to maximum RPM. With the butterfly valve closed (lever off), check the vacuum under the butterfly valve, it must be less than 25" of mercury. If it is greater, adjust the stop bolt 1/2 turn to prevent the butterfly valve from closing all the way. Repeat as needed to obtain less than 25" of mercury.

Record vacuum reading _____

_____ /_____ 6. With the compressor control lever off, verify that a small amount of air is exhausting through the vent located under the receiver tank.

Clock no/date

_____ /_____ 7. Remove discharge hose from REC/SEP tank and replace it with the test pad in-ground muffler hose. The airflow can now be turned off with the ball valve connected to the in-ground muffler. Move the compressor control lever to the "on" position and allow pressure to build to 105-115 psig (read pressure gauge on the console). If the pressure does not build to this range, adjust the relief valve (cigar valve) in the air cylinder regulation line (do not allow the pressure to exceed 120 psi and blow the safety valve). Allow the air to blow out the hose for one minute

Record maximum pressure _____

_____ /_____ 8. Allow the compressor to run for 5 minutes with the airflow blocked. Verify that the receiver pressure does not build above 115 psi.

Record maximum pressure after 5 minutes _____

_____ /_____ 9. Unblock the airflow, with the compressor on, and allow the full flow of air to pass through the hose. Verify that no air is exhausting through the vent under the receiver tank.

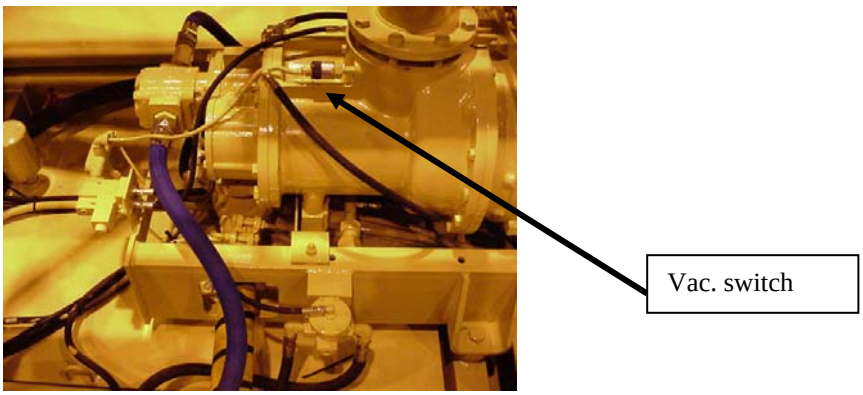
_____ /_____ 10. Allow the air to blow out into the muffler for one minute. Verify that no oil is present in the airflow, by shutting down rig, allow to blow down, remove test hose and inspect for oil.

XL COMPRESSOR - This section for XL rigs with a 285-mm air end. (XL 1200, 1600, 1900).

_____ /_____ 1. Make sure there is an air pressure gauge at the head of the receiver tank. Close the ball valve to the dust collector filter regulator. Close the manual blowdown valve.

_____ /_____ 2. Stroke the compressor control cable several times. Verify that the butterfly shaft linkage is contacting the stop bolt when the lever is in the off position.

_____ /_____ 3. To set the adjustable vacuum switch on the compressor air inlet located just below the butterfly valve. Screw the adjustment knob all the way in (clockwise) and then back out 4 to 5 complete turns. This will cause the solenoid valve to open at approximately 15" Hg vacuum under the butterfly valve and allow air into the compressor.



Clock no/date

_____ /_____ 4. Start the engine and set to maximum RPM. With the butterfly valve closed (lever off), check the vacuum under the butterfly valve, it must be less than 27" of mercury. If it is greater, adjust the stop bolt 1/2 turn to prevent the butterfly valve from closing all the way. Repeat as needed to obtain less than 27" of mercury.

Record vacuum reading _____

_____ /_____ 5. Remove discharge hose from REC/SEP tank and replace it with the test pad in-ground muffler hose. Start the engine and increase speed to maximum. Shift the compressor ON/OFF lever to ON. Allow the air to blow out the hose for one minute.

_____ /_____ 6. With air blowing out the hose, verify that the anti-rumble valve is shut and no air is passing out of the vent.

_____ /_____ 7. Restrict airflow and allow the pressure to build. The butterfly valve should close at 105-115 psi receiver pressure. If it is not in this range, check the reducing check valve set-point, then adjust or reject to get 100 psi (+10, -0). Repeat until the correct unloading pressure is reached.

Record maximum pressure _____

_____ /_____ 8. With the airflow blocked, the compressor ON, and the receiver pressure at maximum (butterfly closed by regulation system) record the vacuum reading at the vacuum gage in the anti-rumble circuit.

Record vacuum reading _____

_____ /_____ 9. Shift the compressor control to the off position. Verify that the anti-rumble valve opens and a small amount of air is exhausting through the vent. Record receiver pressure and vacuum reading in this condition. After test, reconnect rig discharge hose and verify that there is no oil in the air flow, by inspecting test hose for oil.

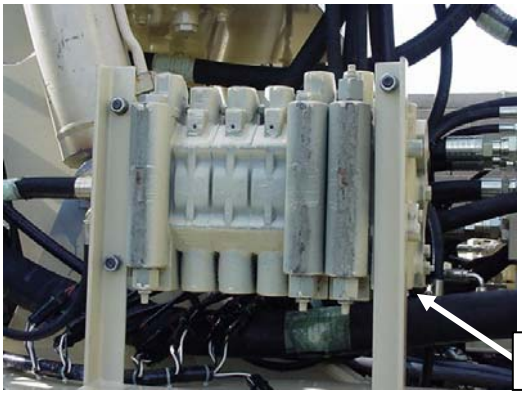
Receiver pressure _____ Vacuum reading _____

Clock no/date

HYDRAULIC PRESSURE SETTINGS AND TEST

Note: Make all adjustments in this section with engine at full speed and with the hydraulic oil temp at 120° F minimum. Tolerance on pressure settings is ± 50 psi.

6 Spool Pressure Settings_



_____ /_____ 1. To set the 6 spool main unloader at 3000 psi, stall any jack in the up direction by stroking the valve spool manually using a ‘1/2 inch wrench and adjust unloader.

Record unloader pressure _____

Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

_____ /_____ 2. To set the tower raise relief, cap off the C2 (raise) port of the tower raise section, spool #2, stroke the valve spool manually (1/2 inch wrench), and adjust relief to 2750 psi.

Record tower raise relief pressure _____

Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

Clock no/date

_____ /_____ 3. To set the tower retract relief, cap off the C1 (retract) port of the tower retract section, spool #2, stroke the valve spool manually (1/2 inch wrench), and adjust relief to 3000 psi.

Record tower retract relief pressure _____

Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

_____ /_____ 4. To set the water injection relief setting, cap off the C2 (water injection) port of spool #6, stroke the valve spool manually, and adjust relief to 1000 psi.

Record relief pressure _____

Measurement or Test Device Information	
Device Type	0-3000 Pressure gage
Device ID #	
Calibration Due Date	

_____ /_____ 5. To set the dust collector relief setting, cap off the C1 (dust collector) port of spool #6, stroke the valve spool manually, and adjust relief to 2750 psi.

Record relief pressure _____

Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

_____ /_____ 6. To set the Winch relief setting, disconnect the hoses and cap off the ports of spool #1, stroke the valve spool manually, and adjust relief to 2000 psi. Set both extend and retract reliefs.

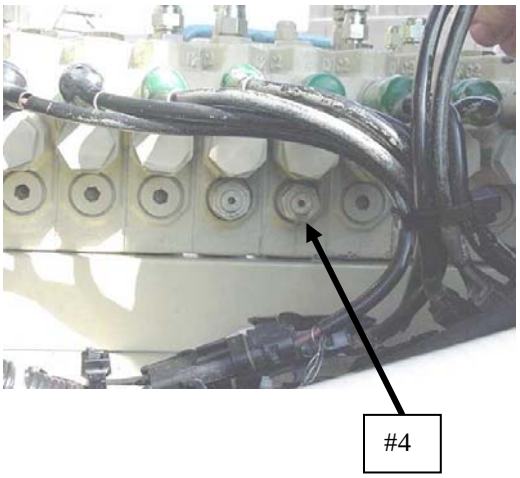
Record relief pressure _____

Measurement or Test Device Information	
Device Type	0-3000 Pressure gage
Device ID #	
Calibration Due Date	

Clock no/date

9 Spool Pressure Settings

_____ /_____7. Extend the tower pinning cylinder and set the tower pinning work port relief, spool #4 in the 9-spool valve, at 1200 psi.

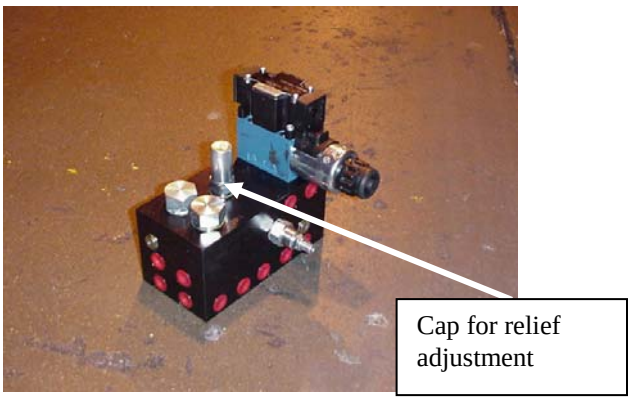


Record relief pressure _____

Measurement or Test Device Information	
Device Type	0-3000 Pressure gage
Device ID #	
Calibration Due Date	

Feed relief valve setting

_____ /_____ 9. Remove the cap for the relief located in the drill-propel valve. Stall the feed on the bottom stops and adjust the feed relief valve, if required, as listed below. Lock adjustment.



Record feed relief valve pressure

_____

Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

Drill-propel valve with internal feed relief setting

Note: This valve is pre-set at 3500 psi. For rigs with 35 foot towers check and verify this pressure setting. For rigs with 25/30 foot towers set the feed relief valve at 4000 - 4500 psi .

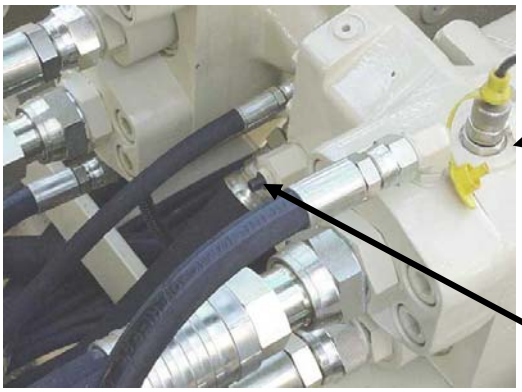
Clock no/date

Main Pump Pressure Settings

_____ /_____ 10. To set both main pump compensators at 4500 psi, install a 5000 psi gauge at the test fitting in the forward propel side of the pump. Stall forward propel, by removing the brake release hose and install plug at the "BR" port on the drill/propel selector valve. Make sure tracks are off the ground, rig is in "propel" mode. Move propel controller to full stroke, then read pressure and adjust as needed.

Record DCS main pump compensator pressure _ _____

Record CS main pump compensator pressure _____



Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

ROTARY HEAD MOTOR SETTINGS

_____ /_____ 11. Loosen all the swivel cap bolts on the rotary head ¼" (4 or 5 full turns) to prevent burning the packing. Also, loosen the wash pipe clamp and pull the swivel cap away from the swivel housing to remove any squeeze from the packing. Do not tighten until the drilling simulation test is complete.

Single Variable motor (7.25 Cu.In.) rotary Head

_____ /_____ 12. To set the pressure-reducing valve on the rotary head motor, install a 1000 psi gauge in the mini check fitting in the motor servo port. Stall the rotary head by engaging the breakout wrench, and adjust the pressure to 500 psi.

Record actual pressure _____

Measurement or Test Device Information	
Device Type	0-1000 Pressure gage
Device ID #	
Calibration Due Date	

Clock no/date

_____ /_____ 13. Back out the upper volume stop on the variable motor. Screw in the lower volume stop to reach a spindle speed of 200 RPM ± 10. Screw in the upper volume stop until it stops and lock into place.

Record actual spindle RPM obtained _____

Measurement or Test Device Information	
Device Type	Photo tach
Device ID #	
Calibration Due Date	

_____ /_____ 14. Back out the lower volume stop to reach a spindle speed of 140 RPM ± 10 and lock into place.

Record actual spindle RPM obtained _____

Measurement or Test Device Information	
Device Type	Photo tach
Device ID #	
Calibration Due Date	

Dual Fixed Motor (2 x 4F Cu.In.) Rotary Head

_____ /_____15. Record actual rotary head spindle speed with the engine at 2100 RPM and the main pump fully stroked.

Record actual spindle RPM obtained _____ (115 –125 RPM)

Measurement or Test Device Information	
Device Type	Photo tach
Device ID #	
Calibration Due Date	

Dual Variable/Fixed Motor (6V x 4F Cu.In.) Rotary Head

_____ /_____ 16. To set the pressure-reducing valve on the rotary head motor, install a 1000 psi gauge in the mini check fitting in the motor servo port. Stall the rotary head by engaging the breakout wrench, and adjust the pressure to 500 psi.

Record actual pressure _____

Measurement or Test Device Information	
Device Type	0-1000 Pressure gage
Device ID #	
Calibration Due Date	

Clock no/date

_____ /_____ 17. Back out the upper volume stop on the variable motor. Screw in the lower volume stop to reach a spindle speed of 160 RPM ± 10. Screw in the upper volume stop until it stops and lock into place.

Record actual spindle RPM obtained _____

Measurement or Test Device Information	
Device Type	Photo tach
Device ID #	
Calibration Due Date	

_____ /_____ 18. Back out the lower volume stop to reach a spindle speed of 130 RPM ± 10 and lock into place.

Record actual spindle RPM obtained _____

Measurement or Test Device Information	
Device Type	Photo tach
Device ID #	
Calibration Due Date	

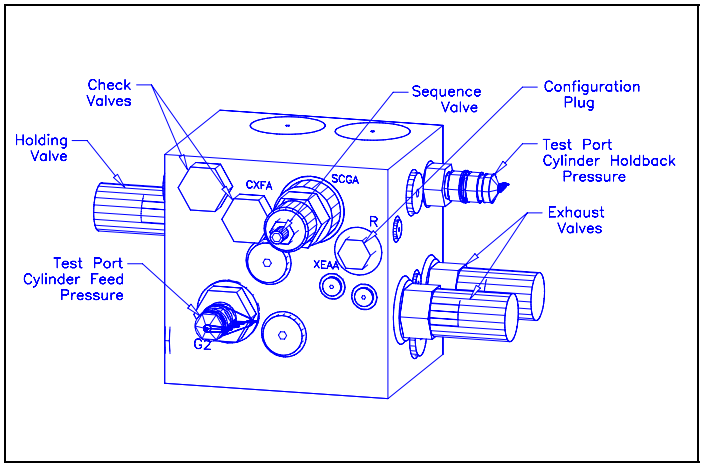
FEED SYSTEM CONTROL VALVE

Low Pressure Machines:

_____ /_____ 19. Install a test gauge in the cylinder feed pressure test port. With the rotary head moving slowly down the tower (2 to 10 feet/min), adjust the sequence valve until the test gauge reads 700 psi. Lock the adjustment in place.

High Pressure Machines:

_____ /_____ 20. Adjustment should not normally be required. Screw in as required on the sequence valve adjustment (1 turn at a time) only if the rotary head has a tendency to drift with the feed control lever in neutral.



ELECTRICAL CONTROLLER SETTINGS (Perform test with engine running at full speed)

Drill Feed Force Controller - (adjust with the head against lower stops)

_____ /_____1. To set the controller threshold, pull the feed direction controller down to maximum. Turn the feed force controller knob slightly away from "off" (till the micro switches just click) and adjust the threshold pot until the pulldown pressure is 200 - 400 psi.

Record minimum pulldown pressure _____

Measurement or Test Device Information	
Device Type	0-600 Pressure gage
Device ID #	
Calibration Due Date	

_____ /_____ 2. To adjust the controller maxout, turn the controller knob fully clockwise, then adjust the maxout pot until the pulldown pressure is obtained as stated below.

3500 psi max for rigs with 35-ft towers.
4000 to 4500 psi for rigs with 25/30-ft towers.

Record max pulldown pressure _____

Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

Holdback Controller – High Pressure option - (adjust with the head feeding down, pulldown controller fully clockwise)

_____ /_____3. To set the holdback controller threshold, turn the controller knob slightly away from "off" (until the micro switches just click) and adjust the threshold pot until the holdback pressure is 200 - 400 psi.

Record minimum holdback pressure _____

Measurement or Test Device Information	
Device Type	0-600 Pressure gage
Device ID #	
Calibration Due Date	

_____ /_____ 4. To adjust the holdback controller maxout, turn the controller knob fully clockwise, and then adjust the maxout pot until the holdback pressure is 3500 to 4000 psi.

Record max holdback pressure _____

Clock no/date

Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

Torque Limit Controller - Torque Limit Option - (adjust with the rotary head spindle stalled in the breakout fork)

_____ /_____5. To set the torque limit controller threshold, turn the controller knob slightly away from "off" (till the micro switches just click) and adjust the threshold pot until the torque limit pressure is 200 - 400 psi.

Record minimum torque limit pressure _____

Measurement or Test Device Information	
Device Type	0-600 Pressure gage
Device ID #	
Calibration Due Date	

_____ /_____ 6. To adjust the controller maxout, turn the controller knob fully clockwise, then adjust the maxout pot till the torque limit pressure is obtained as stated below.

Record max. torque limit pressure _____(4000 – 4500 psi)

Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

Jack Controllers

_____ /_____7. To set the jack controller threshold, open the control console and locate the threshold pots on all three-jack control cards. Pull, one at a time, each control slightly on stroke (till the micro switches just click) and set the threshold pot so the jack movement is barely noticeable.

_____ /_____8. Check jack speed for all jacks by operating each controller. If a jack is noticeably slower than the others, adjust the maxout pot for the controller to increase the jack speed. Jack controller mahout should not normally need adjustment.

Water Injection Controller

_____ /_____ 9. To adjust the water injection rotary controller threshold, turn the controller knob slightly away from "off" (till the micro switches just click) and adjust the threshold pot until the water injection motor shaft rotation is barely noticeable.

_____/ _____ 10. To adjust the controller maxout, turn the controller knob fully clockwise and adjust the maxout pot till the water injection motor starts decreasing in speed. Then turn the

maxout adjustment back up till the motor stops increasing in speed. Return knob to off, verify motor stops rotating.

Air Throttle Controller - HP Machines

_____ /_____ 11. To adjust the air throttle controller threshold, pull the controller slightly off neutral (until the micro switches just click) and adjust the threshold pot until movement of the throttle cylinder is barely noticeable.

_____ /_____ 12. To adjust the controller maxout, pull the controller fully on stroke and adjust the maxout pot to obtain 5 seconds ±1 second to move the throttle cylinder from the fully retracted to the fully extended position

. Record actual time: _____

Measurement or Test Device Information	
Device Type	Stopwatch
Device ID #	
Calibration Due Date	

Tower Raising Controller

_____ /_____ 13. To adjust the tower raising controller threshold, tower horizontal, push the controller slightly off neutral (till the micro switches just click) and adjust the threshold pot until movement of the tower raising cylinders is barely noticeable.

_____ /_____ 14. To check tower raising speed, fully stroke the controller handle. Tower raise speed should be close to 60 seconds, adjust the maxout pot to increase speed, if required.

Record actual time: _____

Measurement or Test Device Information	
Device Type	Stopwatch
Device ID #	
Calibration Due Date	

Chain Wrench Controller

_____ /_____ 15. To adjust the chain wrench controller threshold, push the controller slightly off neutral (till the micro switches just click) and adjust the threshold pot until movement of the chain wrench cylinder is barely noticeable

Clock no/date

. _____ /_____ 16. To adjust the controller maxout, fully stroke the controller handle and adjust the maxout pot to obtain 3 seconds ±1 second to move the chain wrench cylinder from the fully retracted to the fully extended position.

Record actual time: _____

Measurement or Test Device Information	
Device Type	Stopwatch
Device ID #	
Calibration Due Date	

Carousel Controllers

_____ /_____ 17. To adjust the carousel index controller threshold, pull the controller slightly off neutral (until the micro switches just click) and adjust the threshold pot until carousel index rotation is barely noticeable.

_____ /_____ 18. To adjust the controller maxout, fully stroke the controller handle and adjust the maxout pot to obtain 10 seconds ±2 seconds to rotate the carousel from stop to stop (either direction).

Record actual time: _____

Measurement or Test Device Information	
Device Type	Stopwatch
Device ID #	
Calibration Due Date	

___ /_____ 19. To adjust the carousel swing controller threshold, pull the controller slightly off neutral (until the micro switches just click) and adjust the threshold pot until carousel swing (either direction) is barely noticeable.

_____ /_____ 20. To adjust the controller maxout, fully stroke the controller handle and adjust the maxout pot to obtain 5 seconds ±1 second to swing the carousel in.

Record actual time: _____

Measurement or Test Device Information	
Device Type	Stopwatch
Device ID #	
Calibration Due Date	

Automatic Breakout Controller

_____ /_____ 21. To adjust the auto breakout controller threshold, pull the controller slightly off neutral (till the micro switches just click) and adjust the threshold pot until movement of the breakout fork is barely noticeable.

Clock no/date

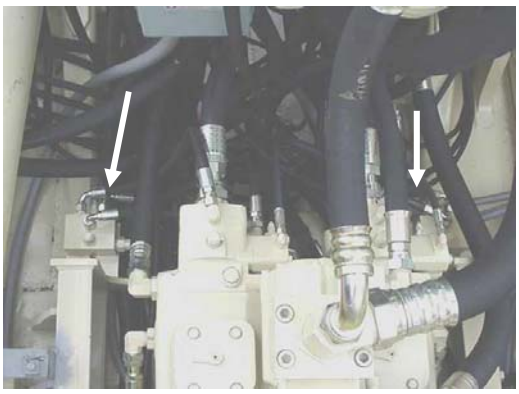
_____ /_____ 22. To adjust the controller maxout, fully stroke the controller handle and adjust the maxout pot to obtain 3 seconds ±1 second to move the breakout fork from the fully retracted to the fully extended position.

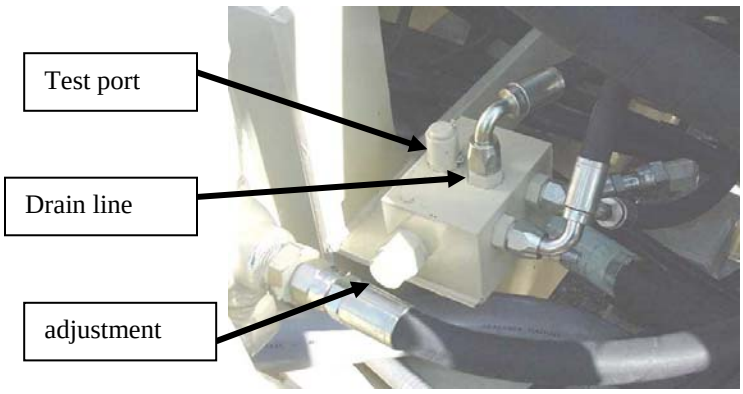
Record actual time: _____

Measurement or Test Device Information	
Device Type	Stopwatch
Device ID #	
Calibration Due Date	

Clock no/date

HOT OIL SHUTTLE (HOS) VALVES





_____ /_____ 1. Install a 500-psig gauge on test fitting on the CS hot oil shuttle valve. Install a low flow meter, 0 to 20 gpm, into the CS hot oil shuttle drain line.

_____ /_____ 2. Raise the tracks off the ground. Temporarily by-pass the jack-up interlock, if required. Set the engine at maximum RPM. Fully stroke the CS track in the direction that corresponds to the "A" port on the CS main pump. Set the hot oil shuttle relief at 150 ±10 psi.

Record HOS pressure setting _____

Measurement or Test Device Information	
Device Type	0-500 Pressure gage
Device ID #	
Calibration Due Date	

_____ /_____ 3. Verify the flow from the CS hot oil shuttle drain is 4 GPM minimum. If it is less than 4 GPM contact supervisor or QC.

Record flow _____

Measurement or Test Device Information	
Device Type	Flow meter
Device ID #	
Calibration Due Date	

_____ /_____ 4. Repeat steps 1, 2, and 3 for the DCS hot oil shuttle valve.

Record HOS pressure setting _____ Record flow _____

OVER PRESSURE CONTROL

_____ /_____ 1. Raise the rig on all jacks until the tracks are about one inch off the ground.

_____ /_____ 2. Stall maximum pulldown and rotation with the head at the bottom of the tower. Lift the CS jack off the ground and verify that the feed pressure drops below 500 psi, if not re-extend jack and contact supervisor.

Clock no/date

Record pressure with the CS jack up _____

_____ /_____ 3. Repeat step 2 using the DCS jack.

Record pressure with the DCS jack up _____

Measurement or Test Device Information	
Device Type	0-5000 Pressure gage
Device ID #	
Calibration Due Date	

UNDERCARRIAGE

_____ /_____ 1. Make sure the tracks are off the ground. Temporarily by-pass the jack-up interlock, if required. Shift the drill/propel selector to propel. Verify the tram alarm is functioning.

_____ /_____ 2. With the engine at full speed, stroke the main pumps to maximum and verify sprocket RPM for each track. Encircle the machine's undercarriage below for identification.

Forward: CS _____ RPM DCS _____ RPM

Reverse: CS _____ RPM DCS _____ RPM

DM45 Sprocket speed both directions: **24-28 RPM for CAT or 21-28 RPM for AC**

DML Sprocket speed both directions: **14-20 RPM for CAT or 12-18 RPM for AC**

Measurement or Test Device Information	
Device Type	Photo tach
Device ID #	
Calibration Due Date	

After test enable tram interlock circuits.

Clock no/date

ROTARY HEAD DECELERATION

_____ /_____ 1. Raise the rotary head (full speed) to the top of the tower and verify that the head slows down as it approaches the upper stops. Set the decel potentiometer inside the console so that the rotary head gently bumps the upper stops. Lock the pot adjustment in place.

ROD CHANGER/ROTARY HEAD ALIGNMENT

_____ /_____ 1. Align rotary head with the centralizer, shim the rotary head stops, and adjust the upper arm of the rod changer. Then verify the following steps.

_____ /_____ 2. With the tower horizontal, verify cable slack adjustment. It should be 1 ¾" to 1 7/8" from the center of the cable to the bottom of the main 5 x 3 tubing, at the center of the tower with the rotary head at the top stop.

_____ /_____ 3. With a rod on the rotary head, run the head to the top of the tower. Verify that the rod does not jump off the center when the head hits the upper stops.

_____ /_____ 4. Verify the alignment of the rotary head sub with the centralizer. If the feed chains were adjusted, re-verify step 2.

_____ /_____ 5. Verify that a rod can be loaded into a carousel cup without guiding the rod by hand. Also check for clearance between the bottom of the rod and the top of the cup. Verify that the alignment pointer is aligned.

_____ /_____ 6. Break the joint at the rotary head and move the head to the top of the tower. Load the rod in the carousel and swing the carousel out.

_____ /_____ 7. With the rod in the carousel, fully rotate the carousel and check for clearance between the top of the rod and the shield at the top of the carousel.

_____ /_____ 8. Position the rod under the spindle, verify the alignment of rod and rotary head spindle threads, then make the joint and remove the rod from the carousel.

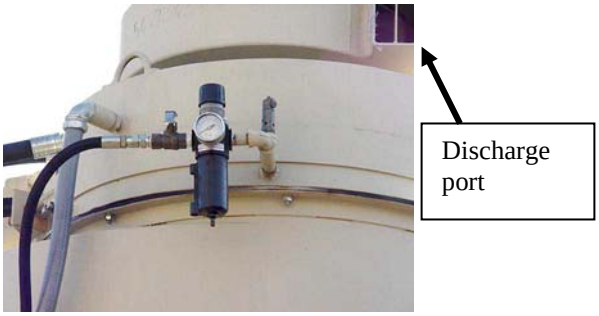
_____ /_____ 9. Repeat steps 5, 6, 7 and 8 for all remaining cups. If adjustments were made repeat steps 5, 6, 7 and 8 again.

DUST COLLECTOR

_____ /_____ 1. Set air regulator at 40-45 psi (maximum air to pulsation tank).

Record psi:

_____



Clock no/date

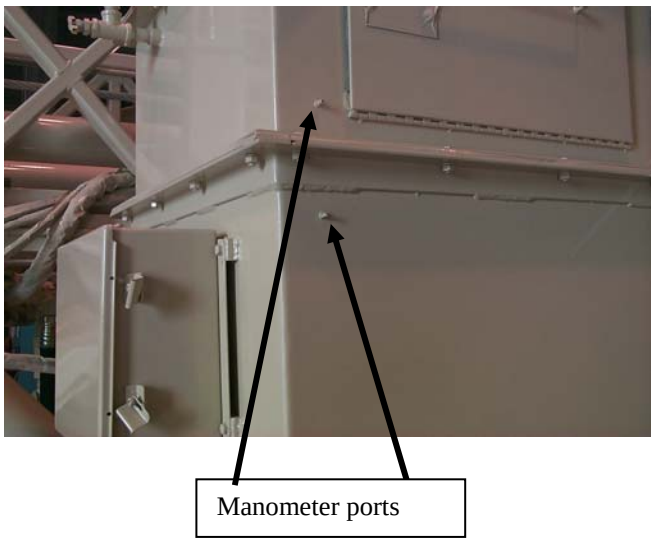
_____ /_____ 2. Listen for pulsing of filters (five to six second intervals). All filters should be cycled one at a time (pulse rate of approximately 13 per minute). As the supply air warms, the pulse rate will increase slightly. Watch for lights.

_____ /_____ 3. Check for proper rotation of motor, face discharge port of fan housing, motor should be rotating clockwise as viewed from the top of the blower looking down. Lower tower, actuate air ON/OFF valve by hand and check for suction.

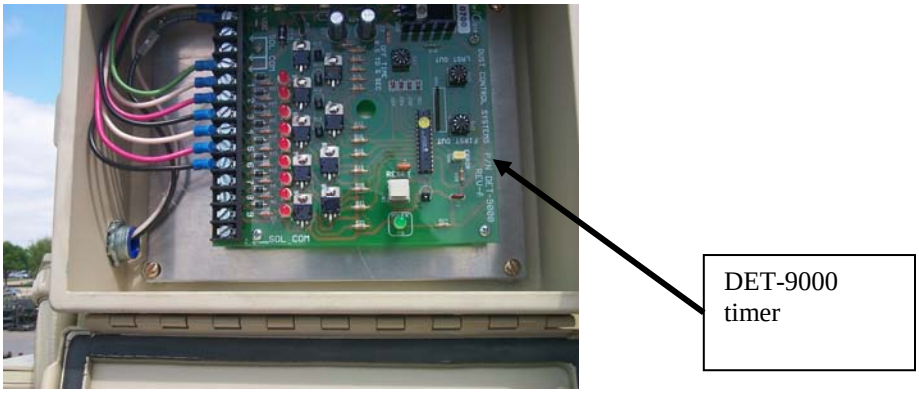
_____ /_____ 4. Remove the dribble curtain, if installed, from the drop chute, start the dust collector, and then block the drop chute with cardboard. Set the flow regulator to achieve a suction reading of 8" to 10" of water on a manometer.

Note: Manometer connections must be air tight, a loose connection will indicate a lower than actual suction.

Record Manometer suction _____



Clock no/date



ADJUSTMENT OF DET-9000 ELECTRIC TIMER FOR TIPTON DUST COLLECTORS:

NOTE: There are three switches on the DET-9000 that control the action of the timer. These switches are labeled "OFF TIME", "FIRST OUT" and "LAST OUT". A flat head screw driver can be used to set each switch to a digital value from 0 to 9 as listed below:

_____ /_____ 1. The "OFF TIME" switch controls the amount of time between pulses. A value of 0 represents 0.5 seconds. Each increment adds 0.5 seconds, with value 9 representing the maximum value of 5 seconds. Set the "OFF TIME" value at 9.

_____ /_____ 2. The "FIRST OUT" switch should be set to the station number of the first solenoid valve to be activated. A value of 0 is not allowed and will cause the yellow error lamp to blink on and off.

_____ /_____ 3. The "LAST OUT" switch should be set to the last station number to be activated. For example, if there are four filter elements in the dust collector and the first solenoid is connected to station 1, then the "LAST OUT" switch should be set to 4. 0 is not a valid setting.

_____ /_____ 4. If the power is on when any adjustments to the switches are made, then the reset button must be pushed before the adjustments take place.

WATER INJECTION (OPTION)

_____ /_____ 1. If the rig has a water tank, circulate water/anti-freeze from the tank, through the pump and out the spindle. If the rig has no tank, circulate water from a separate reservoir.

_____ /_____ 2. Restrict the spindle outlet so the air end is building near maximum pressure. Start the water injection pump and check for water from the spindle in this condition.

_____ /_____ 3. Verify that the flow can be regulated from zero to maximum using the regulator on the console with the air as in step 2.

_____ /_____ 4. Turn off water injection and verify the pump stops rotating.

_____ /_____ 5. Drain tank.

Clock no/date

LUBE INJECTION (OPTION) (7 Gallon and 60 Gallon systems)

_____ /_____ 1. Verify that the air supply from the receiver tank to the lubricator is directly from the receiver tank, not through the service air regulator.

_____ /_____ 2. Close the valve under the lubricator tank. Set the toggle switch on the timer to the up position (11 second pulse rate). Add clean DHD oil to the tank; fill the tank high enough to get the oil level above the pick-up tube in the bottom of the tank.

_____ /_____ 3. Remove the discharge hose from the flow switch to the air piping. Install a short hose and check-valve (2657371924 or equivalent) with free flow to atmosphere.

_____ /_____ 4. Start the rig and allow the receiver to build to minimum pressure. Start the lubricator with the toggle switch on the console (the valve under the tank should still be closed). Allow the pump to cycle about 10 times. Verify that the indicator light on the console does <u>not</u> illuminate (no oil flowing). If the light flashes, turn the socket head screw in the flow switch CCW until it stops.

_____ /_____ 5. Open the valve under the tank. Start the lubricator and allow the pump to prime. Verify that oil flows through the check-valve when the piston strokes. Verify that the indicator light on the console flashes when the pump moves oil. If it does not light, adjust the socket head screw in the flow switch CW until it does.

_____ /_____ 6. If the flow switch was adjusted in step 5, close the valve under the tank and allow the lubricator to pump until no oil passes through the check-valve. Verify that the indicator light does not illuminate when no oil is flowing.

_____ /_____ 7. Connect a 400 psi relief valve (2657359549) to the check-valve installed in step 3. Build the receiver pressure above 200 psi and maintain.

Record receiver pressure _____

_____ /_____ 8. Open the valve under the tank and then start the lubricator. Verify that oil pulses over the 400 psi relief at 11 second intervals and the light flashes. Measure the volume of oil for 20 cycles.

Record volume _____

_____ /_____ 9. Maintain the receiver pressure above 200 psi. Close the ball valve under the tank. Verify that the indicator light stops when the oil flow stops. If it does not stop flashing, adjust the socket head screw CCW until the light stops flashing. If adjustment was made repeat step 8.

_____ /_____ 10. Drain the tank after the QC functional audit and prior to paint.

_____ /_____ 11. Verify that the check valve between the discharge hose and the air pipe on the tower is installed correctly (free flow into the air pipe). Also, the check valve at the pump is installed correctly (free flow into hose).

Clock no/date

PIG OILER (Venturi Lube) – (OPTIONAL)

_____ /_____ 1. Add oil to the pig oiler. Partially block the spindle and allow air to blow through the spindle at near maximum pressure (above 250 psi).

_____ /_____ 2. Start the oiler and check for oil out of the spindle.

THREAD GREASER - (OPTIONAL)

_____ /_____ 1. Verify the piping is per print.

_____ /_____ 2. Set the regulator at 55 psig as stated on the assembly drawing.

Record pressure _____ psig.

_____ /_____ 3. Insert a short sub or drill pipe with the pin-end up into the table breakout wrench (sliding or flop down) for nozzle alignment.

_____ /_____ 4. Locate the nozzle to the middle of the pin-end of the sub or drill pipe.

_____ /_____ 5. Press and hold for 5 seconds the button on the console to activate the thread greaser.

_____ /_____ 6. Verify a round spray pattern of grease onto the pin-end.

_____ /_____ 7. Repeat step 5 for 15 times to confirm system performance.

ANGLE DRILL PACKAGE (OPTION)

_____ /_____ 1. With the drill pipe in the rotary head and through the centralizer bushing, adjust the rod support cylinder until the roller rests against the drill pipe. Lock cylinder in place.

_____ /_____ 2. Pin the tower in each angle position in the banana bar (use the banana bar stamped with the rig serial number on it). Verify that the pin slides completely into place without binding.

_____ /_____ 3. With the tower pinned in the 20^{o} or 30^{o} angle position, verify the alignment of the drill rod and centralizer bushing.

_____ /_____ 4. With the tower pinned in the 20^{o} or 30^{o} angle position, load and unload a rod into the carousel and break the joint at the rotary head. Verify that the rod aligns with the carousel cups.

_____ /_____ 5. With the tower pinned in the 20^{o} or 30^{o} angle position, pick up a rod from the carousel. Verify the alignment of the rod with the spindle sub threads.

Clock no/date

NO-BUMP ROD CHANGER

_____ /_____ 1. Open the carousel and move the rotary head to the bottom of the tower. Remove the arm from the micro switch that senses the carousel swing position. This will put feed down in the "no-bump" mode. With the feed down control in the feed down position, set the no-bump potentiometer in the control console so that the feed down gauge reads 1000 psi. Lock the pot adjustment in place.

_____ /_____ 2. Put the arm back on the carousel micro switch and adjust the switch so that it clicks on with the carousel fully open. Verify that full feed pressure is available when the carousel is fully open.

_____ /_____ 3. Raise the rotary head, close the carousel, and verify that the rotary head will feed down onto the carousel with no more than 1000 psi.

_____ /_____ 4. With head at top of tower, the rod changer should open and close.

_____ /_____ 5. With the rotary head spindle below the top of the carousel, the rod changer should open but not close.

ROD SUPPORT FUNCTION

_____ /_____ 1. With the rotary head at the top of the tower, the rod support cylinder should extend and retract.

_____ /_____ 2. Extend the rod support cylinder and then move the rotary head down away from the top of the tower. The rotary head should stop after moving a few feet away from the upper stops.

_____ /_____ 3. Without moving the rotary head, verify that the rod support cylinder will retract.

_____ /_____ 4. Without moving the rotary head, verify that the rod support cylinder will <u>not</u> extend.

JIB HOIST

_____ /_____ 1. Lift a 1000 - 1500 pound weight and verify operation of hoist and brake.

Record weight _____

_____ /_____ 2. Verify line speed by raising and lowering the 1300 pound load. Check with the engine at maximum RPM.

Time to raise the load 10 feet _____ (8-10 sec)

Time to lower the load 10 feet _____ (8-10 sec)

Clock no/date

COLD WEATHER PACKAGE (OPTION)

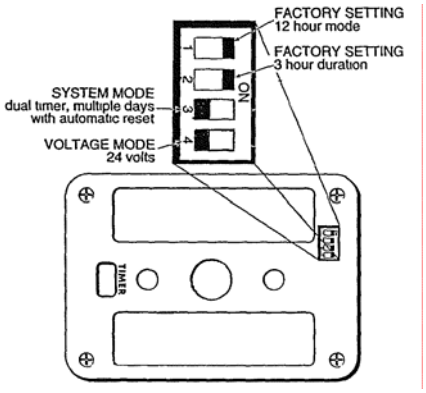
_____ / _____ 1. Push the ether injection switch and verify ether at the engine air intake manifold.

_____ / _____ 2. Start the diesel-fired engine pre-heater and circulate water through the engine. Verify plumbing of water hoses. See manufactures manual for further details.

_____ / _____ 3. If an AC electric heating package is installed, get an electrician to verify wiring complies with NEC code and energize circuits to test for proper operation and heat.

OPTIONAL - DIESEL ENGINE PREHEATER (PROHEAT)

_____ /_____ 1. Verify that the dip switches are set as shown in the figure below. (Note: If the dip switches are not correctly positioned then damage to the timer and heater will occur.)



_____ /_____ 2. Setting the Clock

Step 1: Press and hold “CLOCK”
Step 2: Use arrow buttons to set time
Step 3: Press “DAY” to advance the day
Step 4: Release “CLOCK”

Consult manufacture manual for further detailed information about programming.

_____ /_____ 3. First Time Startup

_____ /_____ 1. Inspect the entire installation for:

a) loose bolts,
b) loose hoses and hose clamps,
c) loose wires and wire connections,
d) kinked or pinched hoses or wires
e) battery connection for correct polarity, and
f) coolant supply and return location on the engine.

_____ /_____ 2. Verify the cooling system has been filled with coolant

Clock no/date

_____ /_____ 3. Start the deck engine and run it at fast idle for 5 to 10 minutes to purge air from the heater and coolant system. While the engine is running:

a) make sure the coolant is flowing freely,
b) inspect hoses and fittings for leaks,
c) check the coolant level in the radiator and add coolant as necessary.

4. Shut the engine "OFF".

_____ /_____ 5. Connect the power harness. The "ON" light on the PCM function display will light for one second and then go out.

_____ /_____ 6. Start the PROHEAT heater by pressing the "MANUAL" button on the timer. The red light should go on. Go to the heater and observe its operation.

Sequence of Events:

a) Coolant temperature must be less than 150° F.
b) "ON" light on PCM should be lit.
c) You should hear the coolant pump, blower, and compressor start. Looking through the inspection port you should see a spark and a flame.
d) The spark will stop after 60 seconds and the heater will continue to run.

(NOTE: If the indicator lamp on the timer flashes upon initial startup – **WAIT**. The heater will attempt a restart in 3 minutes. In some cases it takes longer for the fuel pump to prime the empty fuel lines during initial start. This is usually the case if the fuel lines are long (it may take a few restarts). If the light continues to flash after the restart, then there is a problem. You will need to refer to The Troubleshooting & Repair section of the Installation and Service manual.)

_____ /_____ 7. Once the heater is started it will continue to run until the coolant temperature reaches 185° F at the heater outlet, then it will shutoff.

Sequence of Events for Shutdown:

a) Fuel pump and compressor shut off.
b) The blower will run for 3 minutes on purge cycle the shut "OFF".
c) The water pump will continue to run.

8. The heater will restart when the coolant temperature falls below 150° F at the heater outlet, as long as the timer is left "ON".

_____ /_____ 9. Press the "MANUAL" switch on the timer to turn off the heater. The red light will go out and the heater will purge for 3 minutes.

_____ /_____ 10. Inspect the installation again for leaks.

_____ /_____ 11. Install the enclosure cover.

REMOTE PROPEL (OPTION)

_____ / _____ 1. Plug in remote propel control box and confirm the light on for operation.

_____ / _____ 2. Set controller to 60milliamps minimum threshold to 350 milliamps maximum

_____ / _____ 3. Propel the machine forward, reverse and spot-turn with the control box.

Clock no/date

_____ / _____ 4. Verify the machine will shut down with the emergency stop button on the remote propel box.

_____ / _____ 5. Unplug and store the remote control box with cord and accessories in the carrying case.

_____ / _____ 6. Deliver the packaged carrying case to the product's Supervisor for shipment with the machine.

ROTARY TABLE TACHOMETER (OPTION)

_____ / _____ 1. Verify that the rotary table tachometer on the console matches actual spindle speed within ± 4 RPM. Check with photo-tach or physical count.

Record Spindle speed _____

EMERGENCY SHUTDOWNS (OPTION)

_____ / _____ 1. Verify function of tower mounted emergency shutdown _____.

Verify function of ground level shutdowns; Button 1 _____Button 2_____

JACK-UP INTERLOCK WITH PROPEL CIRCUIT

_____ / _____ 1. Make sure all limit switches are installed and operational at each jack. In the "drill" mode, fully retract all jacks to activate switches. Go into "propel" mode and verify tracks are functional. Extend one jack, far enough to de-activate switch, propel should be disabled. Check all jacks in the same manner.

PIPE-IN-THE HOLE PROPEL INTERLOCK (OPTION)

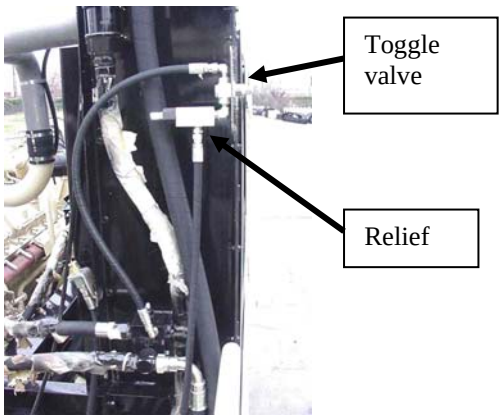
_____ / _____ 1. Put the rig in "propel" mode and the tracks off the ground, by-pass jack-up interlock, if required. Verify that the propel circuit is disabled, when the "sheave-cage " is below the switch. When the "sheave-cage" activates the switch, the propel circuit shall be operational.

2-SPEED FAN CONTROL (OPTION), see BOM for location drawing.

_____ /_____ 1. Shift mechanical toggle valve, located at cooler, to "low fan speed" position to activate low speed mode. Adjust relief, at this valve, to 300 RPM less than what is indicated in the "Cooler RPM" chart on page 16.

Record Low Fan Speed _____(rpm)

Measurement or Test Device Information	
Device Type	Photo tach
Device ID #	
Calibration Due Date	



Clock no/date

HEAT AND LEAK TEST

_____ /_____ 1. Steam oil from all hydraulic cylinder and valve bank areas.

_____ /_____ 2. With engine running at full speed, stall one of the 9 spool functions and run full speed no-load rotation until the hydraulic oil temperature reaches 120^{o} F minimum. Run rotary head up and down the tower 5 times. Check for hydraulic leaks on the rotary head motors, feed cylinders, valves and main pumps.

_____ /_____ 3. Stroke each function on the spool valves 5 times, maintain oil at 120^{o} F minimum. Check all cylinders, motors, and valves for leaks.

_____ /_____ 4. Heat oil to 130^{o} F. Check for leaks around fan motors and diverter valves. Continue with the drill simulating test while the oil is hot.

DRILLING SIMULATION

_____ /_____ 1. Verify that the tower is pinned. Remove discharge hose from REC/SEP tank and replace it with the test pad in-ground muffler hose, see photo page 19, item # 1. The airflow can now be blocked..

_____ /_____ 2. With engine at full speed, control airflow so the compressor is constantly building its highest pressure without the regulation system closing the butterfly valve.

_____ /_____ 3. Feed down against the lower stops and adjust the pulldown pressure to 3000 psi.

_____ /_____ 4. Run continuously under the above conditions for 2 hours and record the temperatures and pressures on the page 39.

_____ /_____ 5. At the end of the drilling simulation test, with rotation and feed still operating, check the dirt indicators on the main hydraulic filters. Change the elements only if the filters are bypassing, after rig has been shut-down and allowed to cool, see photo.

___ Check here if elements needed to be replaced

Clock no/date

_____ /_____ 6. Repeat step 5 for the hydraulic case drain filter.

___ Check here if the drain filter element needed to be changed

Condition indicators

_____ /_____ 7. Stroke the compressor butterfly control cable several times, adjust the linkage stop bolt as needed to prevent the butterfly valve from sticking closed.

___ Check here if the re-adjustment was required.

_____ /_____ 8. After the engine is off and pressure in receiver tank has dropped near zero, check the primary and secondary filter elements in the compressor air filter for oil contamination. Replace if required.

___ Check here if the filter element needed to be changed.

_____ /_____ 9. Apply electrical insulating varnish, 57168916, to all exposed electrical connections on the rig, this means connections that are exposed to the weather.

Clock no/date

Start time

End

TEMPERATURES	1/4 HOUR	1/2 HOUR	1 HOUR	1.5 HOURS	2 HOURS
Ambient					
Hydraulic tank					
Receiver tank					
Compressor discharge					
Funk gearbox					
CS main pump case drain					
DCS main pump case drain					
Double pump					
DCS rotation motor					
CS rotation motor					
Rotary head case					
Dust collector motor					
Engine oil					
Engine water					
PRESSURES	1/4 HOUR	1/2 HOUR	1 HOUR	1.5 HOURS	2 HOURS
Engine oil					
Compressor interstage					
Bit air pressure					
Rotation					
Feed					
Supercharge					
ENGINE RPM					

Clock no/date

BEFORE THE FUNCTIONAL AUDIT

Note: Use the chart on the last page to determine appropriate fluid levels and methods for checking them.

_____ /_____ 1. Add enough fuel for a 3 hour functional audit.

_____ /_____ 2. Check engine oil level. Adjust level if necessary.

_____ /_____ 3. Check engine antifreeze level and protection. Adjust level if necessary.

Record protection _____

_____ /_____ 4. Check battery water level and specific gravity (SG). Adjust water level if needed and charge batteries if SG is below 1.25.

_____ /_____ 5. Check hydraulic oil level. Adjust level if necessary.

_____ /_____ 6. Check compressor oil level. Adjust level if necessary.

_____ /_____ 7. Check rotary head oil level. Adjust level if necessary.

_____ /_____ 8. Check final drive oil level. Adjust level if necessary.

_____ /_____ 9. Check main hydraulic drive oil level. Adjust level if necessary.

_____ /_____ 10. Check that the water injection pump case and oilers are filled. Adjust level if necessary.

_____ /_____ 11. Check jib hoist gear box oil level. Adjust level if necessary.

_____ /_____ 12. Check carousel index gear box oil level. Adjust level if necessary.

_____ /_____ 13. Steam clean the complete rig before the functional audit.

_____ /_____ 14. Make sure all circuit jumpers and interlock by-pass devices have been removed and interlocks are fully functional.

Clock no/date

AFTER THE QC FUNCTIONAL AUDIT

_____ /_____ 1. Tighten the swivel cap and air pipe bolts on the rotary head that was loosened in the hydraulic test section, for the drill simulation tests.

_____ /_____ 2. Shift to propel and verify that the back-up alarm is functional.

_____ /_____ 3. Flush all oil and antifreeze from the main air line prior to paint.

Clock no/date

Fluid Level Specifications

Description	Method	Low	High
Engine oil level?	Engine not running for 10 minutes	Midpoint between low and high	Above high mark
Engine antifreeze level and protection?	Use antifreeze tester	Must be below -35°F	
Battery specific gravity	Hydrometer	1.24 temperature compensated	1.28 temperature compensated
Battery fluid level and posts tight?	Rig not running	Below ring (ring is visible)	Slots not visible
Hydraulic oil level?	All cylinders retracted	Below 5.5” from top of tank	Above 4.5” from top of tank
Compressor oil level?	Compressor running	Below midline of sight glass	Above 3/4 line of sight glass
Undercarriage final drive oil level?	Rig level, check plug in proper location	Oil not running out when plug removed	Above top of check plug
Hydraulic pump drive oil level?	Engine not running	Low mark on dipstick	High mark on dipstick
Water injection pump case and oilers filled?	Cat pump	Visible sight glass	Above sight glass
	Bean pump	Visible at plug	N/A
	Cat pump oilers	Should be completely full	
Rotary head oil level?	Spindle not running	Below midline of sight glass	Above 3/4 line of sight glass
Jib hoist gear box oil level?	Remove check plug	Visible at plug	Above plug
Carousel rotation gear box oil level?	Tower vertical, remove breather	Visible at breather	Above breather

APPENDIX A

Tier 2 Engine Programming Parameters*

Configuration Screen				
Description	Value	Value	Unit	TT
ECM Identification Parameters	***Original Value***	***Change Value***		
Equipment ID	**NOT PROGRAMMED**	**Rig Number Rig Model i.e. 6700 DM45**		**1**
Engine Serial Number	BFM00401	Do not change		1
ECM Serial Number	03520049FG	Do not change		
Personality Module Part Number	2153287-01	Do not change		
Software Group Release Date	JAN2002	Do not change		
Selected Engine Rating		Do not change		
Rating Number	3	Do not change		
Rated Power	XXX HP at 2100 RPM	Do not change		
Rated Peak Torque	XXXX lb-ft at 1400 RPM	Do not change		
Top Engine Speed Range	600 - 2310 RPM	Do not change		
Test Spec	0K2374	Do not change		
Top Engine Limit	**2310**	**1800**	**RPM**	**1**
Engine Accel. Rate	500	Do not change	RPM/s	0
Low Idle Speed	**700**	**1200**	**RPM**	**1**
PTO Mode	Ramp Up/Ramp Down	Do not change		0
High Idle Speed	**2310**	**1800**	**RPM**	**1**
Intermediate Engine Speed	1100	Do not change	RPM	0
Engine Power Trim	0	0	%	0
Engine Torque Limit	2027	Do not change	lb-ft	0
Customer Password #1	********	**INGERSOL**		
Customer Password #2	********	**GARLAND**		
		Use CAPITOL LETTERS for Password		
FLS	XX	Do not change		
FTS	XX	Do not change		
Fuel Air Ratio Control Adjust	0	Do not change		0
Air Shutoff	Disabled	Do not change		0
Maintenance Indicator Mode	Off	Do not change		
PM1 Interval	0	Do not change	Gal	
Last Tool to change Customer Parameter		Do not change		
Last Tool to change System Parameter	NEVER S	Do not change		
Total Tattletale	XX	Do not change		
Direct Fuel Ctrl	Off	Do not change		0
J1939 Throttle On	Off	Do not change		0
Throttle Enabled	**Off**	**On**		**1**
Aux Press Enable	Off	Do not change		0
Aux Temp Enable	Off	Do not change		0
Coolant Level On	**Off**	**On**		**1**
Ether Enable	**Off**	**On**		**1**

Clock no/date

Monitoring System Screen			
Description	State	Trip Point	Delay Time
Low Engine Oil Pressure			
Warn Operator(1)	On	None	2 Sec
Engine Derate(2)	**Off**	None	2 Sec
Engine Shutdown(3)	**On**	None	10 Sec
High Engine Coolant Temperature			
Warn Operator(1)	On	221 Deg F	4 Sec
Engine Derate(2)	**Off**	223 Deg F	4 Sec
Engine Shutdown(3)	**On**	225 Deg F	4 Sec
Engine Overspeed			
Warn Operator(1)	On	**1950 RPM**	1 Sec
Engine Shutdown(3)	On	**1950 RPM**	1 Sec
High Engine Inlet Air Temperature			
Warn Operator(1)	On	167.0 Deg F	4 Sec
Engine Derate(2)	On	174.2 Deg F	4 Sec
Low Coolant Level			
Warn Operator(1)	On	None	10 Sec
Engine Derate(2)	On	None	10 Sec
Engine Shutdown(3)	**On**	None	10 Sec
High Fuel Temperature			
Warn Operator(1)	On	176 Deg F	4 Sec
Engine Derate(2)	On	196 Deg F	3 Sec
Engine Shutdown(3)	Off	196 Deg F	3 Sec

Parameter Lockout Screen		
Parameter	Value	Value
	Original Value	***Change Value***
Engine Power Trim	Unlocked	Unlocked
Engine Torque Limit	Unlocked	Unlocked
High Idle Speed	**Unlocked**	**Locked**
Intermediate Engine Speed	Unlocked	Unlocked
Low Idle Speed	Unlocked	Unlocked
Monitoring System Configuration Access	Unlocked	Unlocked
Rating Number	Unlocked	Unlocked
Top Engine Limit	**Unlocked**	**Locked**

*** Highlighted items do not change from factory settings.**

APPENDIX B

Tier 3 Engine Programming Parameters*

Configuration Screen				
Description	**Value**	**Value**	**Unit**	**TT**
C15 IND (JRE00127)				
ECM Identification Parameters	**Original Value**	**Changed Value**		
Equipment ID	NOT PROGRAMMED	Rig Number Rig Model ie. DM30 7930		1
Engine Serial Number	JRE00127	JRE00127		0
ECM Serial Number	30046186JM	30046186JM		
Personality Module Part Number	2673419-01	2673419-01		
Software Group Release Date	JAN2005	JAN2005		
Selected Engine Rating				
Rating Number	1	1		0
Rated Power	540 HP at 2100 RPM	540 HP at 2100 RPM		
Rated Peak Torque	1820 lb-ft at 1400 RPM	1820 lb-ft at 1400 RPM		
Top Engine Speed Range	1800 - 2310 RPM	1800 - 2310 RPM		
Test Spec	0K5581	0K5581		
Top Engine Limit	2100	1800	RPM	1
Engine Accel. Rate	500	500	RPM/s	0
Low Idle Speed	700	1200	RPM	1
PTO Mode	Ramp Up/Ramp Down	Ramp Up/Ramp Down		0
High Idle Speed	2310	1800	RPM	1
Intermediate Engine Speed	1100	1100	RPM	0
Maximum Engine Torque Limit	2005	2005	lb-ft	0
Customer Password #1	********	drills		1
Customer Password #2	********	garland		1
FLS	21	LOWER CASE LETTERS FOR PASSWORD		
FTS	-26	-26		0
Ether Control	Disabled	Enabled		1
Air Shutoff	Disabled	Disabled		0
Maintenance Indicator Mode	Off	Off		
PM1 Interval	0	0	Gal	
Throttle Position Sensor	Not Installed	Installed		1
Coolant Level Sensor	Not Installed	Installed		1
Direct Fuel Control Mode	Data Invalid	Data Invalid		
Engine Retarder Enable Command	Disabled	Disabled		
Last Tool to change Customer Parameters				
Last Tool to change System Parameters	NEVER S	NEVER S		
Auxiliary Temperature Sensor Installation Status	Not Installed	Not Installed		
Auxiliary Pressure Sensor Installation Status	Not Installed	Not Installed		
Throttle Input Low Idle Duty Cycle Setpoint	10	10	%	0
Throttle Input High Idle Duty Cycle Setpoint	90	90	%	0
Engine Governor Primary Mode Configuration	Unavailable Parameter	Unavailable Parameter		
Total Tattletale	0	9		

Clock no/date

Monitoring System Screen			
Description	**State**	**Trip Point**	**Delay Time**
Low Engine Oil Pressure			
Warn Operator(1)	On	None	8 Sec
Engine Derate(2)	Off	None	4 Sec
Engine Shutdown(3)	On	None	4 Sec
High Engine Coolant Temperature			
Warn Operator(1)	On	230 Deg F	10 Sec
Engine Derate(2)	Off	232 Deg F	10 Sec
Engine Shutdown(3)	On	232 Deg F	10 Sec
Engine Overspeed			
Warn Operator(1)	On	1950 RPM	0 Sec
Engine Shutdown(3)	On	1950 RPM	0 Sec
High Engine Inlet Air Temperature			
Warn Operator(1)	On	167.0 Deg F	8 Sec
Engine Derate(2)	On	174.2 Deg F	8 Sec
Low Coolant Level			
Warn Operator(1)	On	None	10 Sec
Engine Derate(2)	Off	None	10 Sec
Engine Shutdown(3)	On	None	10 Sec
High Fuel Temperature			
Warn Operator(1)	On	194 Deg F	30 Sec
Engine Derate(2)	On	196 Deg F	10 Sec
Engine Shutdown(3)	Off	196 Deg F	10 Sec
High Fuel Pressure			
Warn Operator(1)	On	109.9 PSI	8 Sec
High Auxiliary Temperature			
Warn Operator(1)	On	221 Deg F	4 Sec
Engine Derate(2)	Off	223 Deg F	4 Sec
Engine Shutdown(3)	Off	225 Deg F	4 Sec
High Auxiliary Pressure			
Warn Operator(1)	On	218 PSI	4 Sec
Engine Derate(2)	Off	218 PSI	3 Sec
Engine Shutdown(3)	Off	218 PSI	3 Sec

Parameter Lockout Screen		
Description	**Mode**	**Mode**
	Original Value	Change Value
Engine Power Trim	Unlocked	Unlocked
High Idle Speed	Unlocked	Locked
Intermediate Engine Speed	Unlocked	Unlocked
Low Idle Speed	Unlocked	Unlocked
Maximum Engine Torque Limit	Unlocked	Unlocked
Rating Number	Unlocked	Unlocked
Top Engine Limit	Unlocked	Locked

*** Highlighted items do not change from factory settings.**

Clock no/date

TEST BOOK REVISIONS.

3/4/02 Release Testbook

3/27/03 Changed Maxout setting to 350 mA on pages 11 and 12 to eliminate potential for field problems with insufficient drive current to Denison pumps. Eliminated erroneous references to 300 mA on pages 23 and 24 because they don't apply to Apitech valves.

6/16/03 Added Air conditioning system testing, pages 15 thru 17. Updated hydraulic pressure settings section including measurement device information.

1/12/05 Added and revised the following test instructions: Ingersoll-Rand Company to Atlas Copco, pg1; deleted oscillation yoke, pg 4; deleted Radiator refill & corrosion inhibitor, pg 5: delete line item 6 & 7, pg 5; SAE 50W was ISO-VG220, pg 5; nameplate location for check valve, pg 7; line item 1,voltmeter was ammeter, pg 10; SAE 50W was ISO VG220, pg 13; with tower pinning, pg 15; added XL1600 fan speed, pg 22; line item 8 description, pg 24; line item 7, pg 26; 27" mercury, line items 4, 5 &6, pg 27; sprocket speeds, pg 41; ProHeat, pg 37-38; Thread greaser and Pig Oiler, pg 46.

4/6/05 Added AC electrical procedures, pp 17-19. Updated engine procedures, p 10. Added Appendices A and B. Replaced references to IR with AC. Cleaned up formatting a little.

02/15/06 Inserted table on page 17 titled "Measurement or Test Device Information" before subject line "Determine Refrigerant Weight Procedure"

03/07/07 Added mainframe, tower weldment and A/C compressor serial numbers to serial number list p.4, revised air conditioner procedures p. 16-18, added 'verify function of emergency stop' on p.10, added optional emergency stops p.52.