REEDRILL™

Part No. 420295

Operator & Maintenance Manual

650 Auger Drill

Reedrill
3501 S. FM Hwy. 1417, Denison, TX 75020 P.O. Box 998, Sherman, TX 75091-0998
Telephone 1-800-854-9030 Telefax 1-800-582-6570 within U.S.A.

Parts Ordering & Product Support

REEDRILL™
The equipment–and the people–you trust

Use only genuine Reedrill parts in the maintenance, rebuild, or repair, of Reedrill machines. Reedrill shall have no liability as to any unauthorized modification of machines or parts and shall have no obligation or liability as to any machines or parts which have been improperly handled, or which have not been operated, maintained, or repaired according to Reedrill's furnished manuals, or other written instructions, or which are operated with other than genuine Reedrill parts.

Your cooperation in furnishing as much information as possible will assist us in filling your orders correctly and in the shortest possible time.

1. IDENTIFICATION OF THE MACHINE

Always furnish the **Reedrill** Model Number and Serial Number when ordering parts. This information is found on the machine nameplate. Rock Drills have the serial number stamped on the cylinder.

2. PART NUMBER AND DESCRIPTION

In addition to the Serial Number, always give the part number and description of each part ordered. If there is any doubt as to the correct part number and description, furnish a dimensioned sketch or return the part to be replaced, transportation charges prepaid.

3. SHIPMENT

Unless otherwise instructed, all shipments will be made via motor freight collect or **UPS** prepaid and charged on our invoice. Shipments cannot be made on open account until your credit has been approved by our Accounting Department.

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Reedrill
P. O. Box 998
Sherman, TX. 75091-0998

SHIPPING ADDRESS
Reedrill
3501 S. FM Hwy 1417
Denison, TX. 75020

FOR PARTS ORDER ENTRY
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In North America Telephone 1-800-258-0009
or Telephone (903) 786-2981
Telefax (903) 786-6408

This safety alert symbol indicates important SAFETY MESSAGES in this manual. When you see this symbol, carefully read the message that follows and be alert to the possibility of personal injury or property damage.

WARNING

Before Starting Engine, Study Operator's Manual

- *** Practice All Safety Precautions**
- *** Make Pre-Operations Check**
- *** Learn Controls Before Operating**

It is your responsibility to understand and follow manufacturer's instructions on machine operation and service, and to observe pertinent safety precautions, laws, and regulations.

Drill Serial No. : _____

Date Drill Delivered : _____

Dealer : _____

Customer : _____

Model 650 Major Components

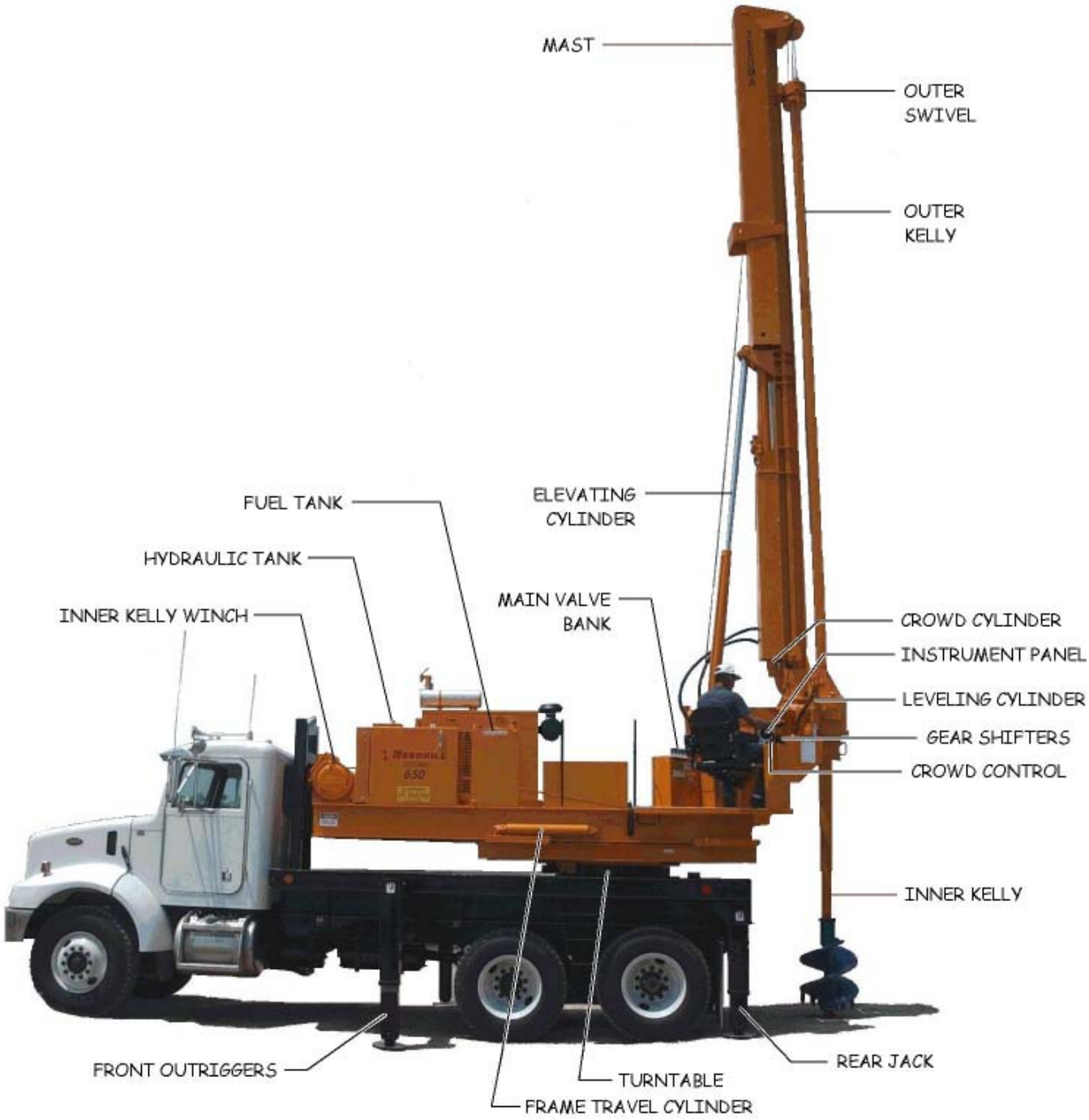

Fig. i-1 Model 650 Left Side

Model 650 Major Components

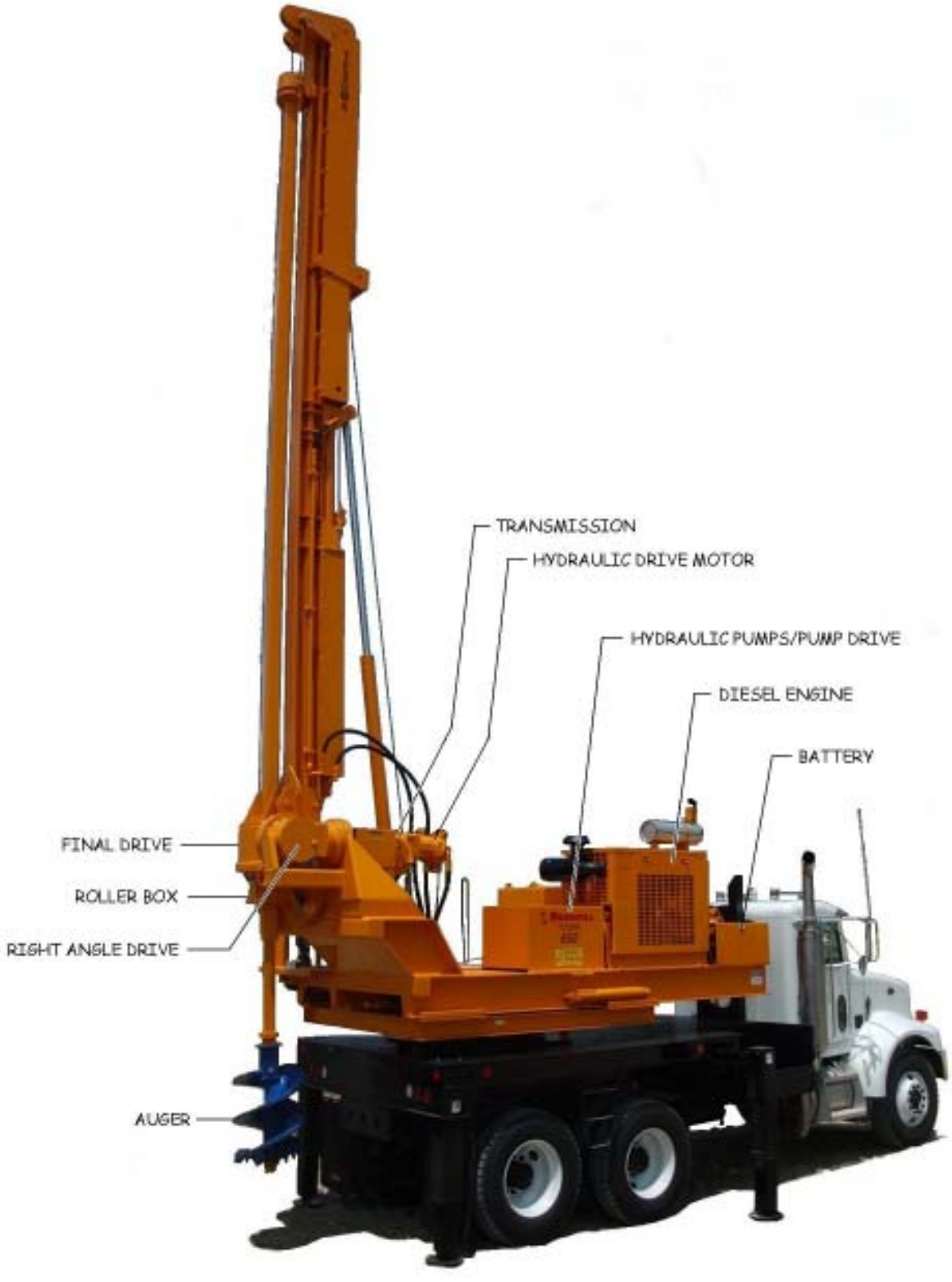

Fig. i-2 Model 650 Right Side

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Section 1

In this section and those that follow, the word:

DANGER means that severe injury or death will result from failure to follow instruction.
WARNING means that severe injury or death can result from failure to follow instruction.
CAUTION means that minor injury or property damage can result from failure to follow instructions.

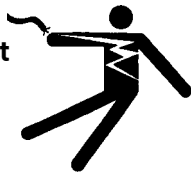
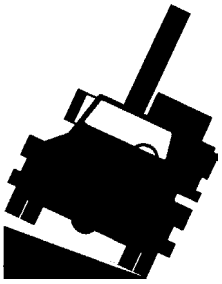
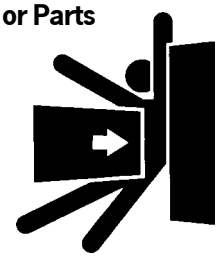
NOTE means that special attention should be given to the instruction.

Overview of Potential Hazards

The **Auger Drill** is a heavy moving machine with a mast capable of extending its reach vertically and horizontally. Like all moving objects and reach extending devices, there are **potential** hazards associated with its use. These hazards will be minimized if the machine is properly inspected and maintained. The operators should read this manual and have been trained to use the machine in an appropriate and safe manner. Should any questions arise concerning the maintenance or operation of the machine contact **Reedrill at 1-800-258-0009**.

In this section and those that follow, the word:

DANGER	**means that severe injury or death will result from failure to follow instruction.**
WARNING	**means that severe injury or death can result from failure to follow instruction.**
CAUTION	**means that minor injury or property damage can result from failure to follow instruction.**
NOTE	**means that special attention should be given to the instruction.**

POTENTIAL HAZARD	EFFECT	PREVENTION
Electrical Contact 	**DANGER:** Will cause Serious Injury or Death.	Maintain minimum clearance from high voltage power lines. Refer to "Minimum Clearance from High Voltage Lines" in this section. Do Not dig near underground power lines. Machine is NOT insulated
Contaminated Air 	**DANGER:** Will cause Serious Injury or Death.	Do Not run machine in an area without good ventilation.
Unit Overturn 	**WARNING:** Can Cause Serious Injury or Death.	Do Not travel on steep inclines or crosswise to grades. Do Not travel on soft or unstable ground or close to unsupported excavations. Do Not move machine with mast raised. Always extend jacks and outriggers on truck mounted machines before using auger. Always place auger on ground when lifting a load with service winch.
Moving Load or Parts 	**WARNING:** Can Cause Serious Injury or Death.	Do Not raise or lower mast until all people are clear of the area. Keep all personnel at least 15 ft. (4.6 m) from the Kelly Bar when it is operating. Do Not lubricate or service while machine is running.
High Pressure Air or Fluid 	**WARNING:** Can Cause Serious Injury or Death.	Relieve pressure on hydraulic and pneumatic systems before loosening hoses or connections.

Before Operation

- **Do** notify the owner of overhead or underground power lines before digging. Be sure to comply with all local regulations regarding safe operating distances from power lines.
- **Do** study this manual and fully understand the controls.
- **Do** be sure all safety guards are securely in place.
- **Do** be sure all nameplates and decals pertaining to safety, operation, and maintenance are in place and not damaged. Replace any damaged or missing nameplates or decals.
- **Do** wear safety helmet and glasses when operating or working on machine.
- **Do** be sure all personnel are clear of the machine and work area before starting the engine or operating the machine.
- **Do** maintain metal to metal contact between fuel tank and fuel nozzle when filling fuel tank. This will prevent static sparks and the possibility of fire and explosion.
- **Do** keep the area within 15 feet of the Kelly Bar clear of personnel.
- **Do** attach safety chain when using towbar.
- **Do Not** leave tools or other loose objects on the engine compartment or drive mechanisms. They can be thrown with a powerful force.
- **Do Not** operate machine with:
  - A hydraulic leak
  - Damaged hydraulic hoses or fittings
  - Broken or damaged electrical wiring
  - Damaged or missing guards and shields

Operation

- **Do maintain minimum clearance from high voltage wires (see chart in this section).** Check with power company and local regulations for specific guidelines and safety information.
- **Do** provide sufficient ventilation when running the engine in an enclosed area. Exhaust gases contain carbon monoxide, a deadly poison, which is colorless and odorless.
- **Do** keep work area clean and clear of mud, snow, ice, hand tools and other objects.
- **Do** engage brake systems before leaving the machine for any reason.
- **Do** check that the mast is vertical from side to side before lowering. Lower slowly to be sure mast will clear other parts of the machine and fit correctly in the mast rest.
- **Do Not** wear loose clothing or jewelry; keep clothing and hands clear of moving parts.
- **Do Not** travel on steep inclines, soft or unstable ground, or close to unsupported excavations.
- **Do Not** move machine if it is in a potentially unstable position.
- **Do Not** move the machine with the Feed Ram (mast) raised. Always lower the Feed Ram and raise the jacks before moving the machine.
- **Do Not** drill near a "bootleg" hole or any hole that may contain explosives.
- **Do Not** attempt to dig unless the jacks are firmly placed and set on a hard surface to eliminate the possibility of turning the truck and digger over.
- **Do Not** attempt to move the machine with a load suspended from the winch line. Always keep the Feed Ram vertical and the auger on the ground when lifting a load. Do not swing with a suspended load. Failure to heed this warning may cause serious damage and/or personnel injuries.

Clearances from High Voltage Lines	
Voltage	**Minimum Clearance**
up to 50 kv	10 ft. (3 m)
over 50 to 75 kv	11 ft. (3.4 m)
over 75 to 125 kv	13 ft. (4 m)
over 125 to 175 kv	15 ft. (4.6 m)
over 175 to 250 kv	17 ft. (5.2 m)
over 250 to 370 kv	21 ft. (6.4 m)
over 370 to 550 kv	27 ft. (8.2 m)
over 550 to 1000 kv	42 ft. (12.8 m)

Table 1-1 Minimum safe distances from high voltage lines.

After Operation

- **Do** be sure machine is on level ground and all controls are in the NEUTRAL or OFF position.
- **Do** let engine idle for 3 - 5 minutes before shutting off engine.
- **Do** be sure the jacks and outriggers (if equipped) are retracted before moving the truck.

Maintenance

- **Do** be sure machine and components are well supported before servicing or replacing parts.
- **Do** relieve pressure on hydraulic or pneumatic systems before loosening connections or parts.
- **Do** use only proper tools to make repairs or adjustments.
- **Do Not** service, or perform maintenance while machine is running.
- **Do Not** weld or grind near oil lines.
- **Do Not** smoke or use an open flame near batteries. Batteries can give off hydrogen which is a highly explosive gas.

Safety Instructions for Equipment Transfer

If all or part of the equipment is shipped to a new destination, always include a complete Operator's Manual or copy of the following topics from the Operator's Manual:

- Safety Section
- Pre-Start Checklist, engine start and shutdown procedures.
- Operating controls for auger drill and truck owners manual.

Section 2

Introduction

This manual contains detailed instructions, maintenance information, and technical data which the operator will need in order to properly operate the **Reedrill** Digger and to perform the various maintenance services that are required for keeping the equipment in good working condition at all times. Included herein are complete descriptions of each operating control and step-by-step instructions on how to start, operate, and stop the equipment, and recommended operator's maintenance procedures.

The maintenance procedures and service instructions in this manual are included as recommendations only and are based on normal equipment working conditions. Changes should be initiated by the user in order to compensate for other than normal conditions and to meet the working requirements of any specific job application.

By faithfully using this manual as a guide, and observing the instructions and recommendations, your **Reedrill** Digger will give you many years of dependable and efficient service at a minimum cost for operation.

Engine and Power Train

The diesel engine drives a variable displacement piston pump directly through a pump drive.

A variable displacement piston motor drives into a 4-speed transmission; power is then transmitted into the right angle and final drive assemblies.

Hydraulic System

The hydrostatic drive used in **650** digger is of the closed loop type. This system uses a variable displacement pump with an over-center capability, which provides forward, neutral and reverse. This capability of the pump gives an infinite range of auger speeds from 0 RPM to the maximum attainable at full torque in both forward and reverse.

Oil is furnished by a 110 gal. (417 L) tank to the variable displacement piston pump. The oil flow from the pump is controlled by self-centering valves. The oil is filtered through a filter in the return line to the tank and through a charge loop filter. This system is highly effective and will give long life with minimum maintenance, provided the system is kept clean.

Section 3

Engine Speed

John Deere Engine

Engine speed is electronically controlled. When low idle switch (item 1, fig. 3-1a) is OFF, engine is at low idle (1800 RPM). When low idle switch is ON, engine RPM can be increased using throttle switch (item 2, fig. 3-1a). High speed is 2200 RPM.

Cummins Engine

These engines have a manual throttle cable (item 2, fig. 3-1b). Pull out or turn counterclockwise to increase RPM. Push in or turn clockwise to decrease RPM.

Auger (Kelly) Bar Rotation

The forward/reverse pedal (item 5, fig. 3-1 and fig. 3-4) controls the direction and of rotation and speed of the auger (kelly) bar. The rotation speed can also be controlled by the rotation speed control valve to the right of the main valve bank. See fig. 3-4a.

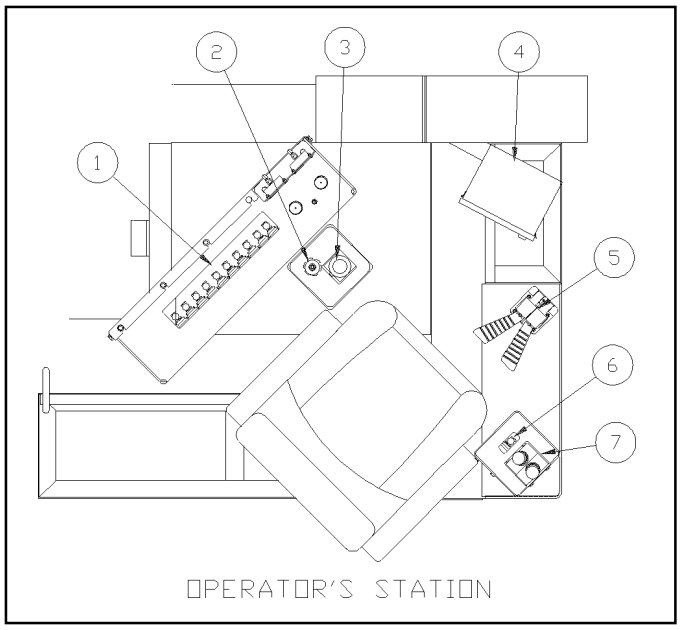


Fig. 3-1 650 Operator's Station
1. Main Control Valve Bank
2. Engine Throttle Control - Cummins Engine only
3. Inner Kelly and Swing Control Joystick
4. Instrument Panel Enclosure
5. Forward/Reverse Drill Rotation Pedal
6. Outer Kelly Crowd/Hoist/Float Control Lever
7. Gear Shift Levers - Low/High/2nd/3rd

Fig. 3-1a Instrument Panel - John Deere Engine
1. Low Idle off/on Switch
2. Throttle Switch

Fig. 3-1b Joystick and Cummins Engine Throttle
1. Inner Kelly/Swing Control Joystick
2. Throttle Control for Cummins Engine

Hydraulic Jacks

WARNING

DO NOT attempt to dig unless the jacks (truck mounted machines only) are firmly placed and set on a hard surface, and be sure the truck tires remain firmly on the ground to eliminate the possibility of turning the truck and digger over. Be sure the jacks and outriggers are retracted before moving the truck.
BE SURE all personnel are clear of the jacks and outriggers before operating.

All jacks are controlled by valves in the valve bank and are labeled as to their function. All jacks should be extended before raising the mast from its transporting (horizontal) position.

Each jack has its own individual control. Jacks are extended, thus raising the machine by pushing the appropriate lever away from the operator; by pulling the lever toward the operator, the jacks are retracted. Outriggers are extended by pushing the appropriate lever and are retracted by pulling the lever.

Track mounted machines do not use jacks.

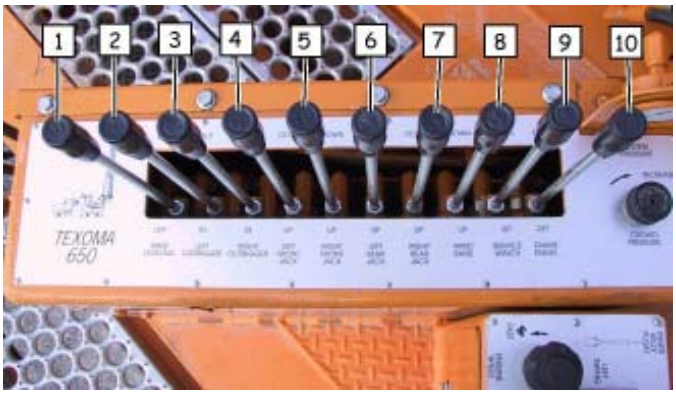


Fig. 3-2 Main Valve Bank
1. Mast Leveling - LEFT/RIGHT
2. Left Outrigger - IN/OUT
3. Right Outrigger - IN/OUT
4. Left Front Jack - UP/DOWN
5. Right Front Jack - UP/DOWN
6. Left Rear Jack - UP/DOWN
7. Right Rear Jack - UP/DOWN
8. Mast Raise - UP/DOWN
9. Service Winch - UP/DOWN
10. Frame Travel - RETRACT/EXTEND

Gear Selector

CAUTION:

DO NOT engage a gear range or change from one range to another with the auger bar rotating. Only move the selector lever with the auger bar stationary. Failure to do so will cause extensive damage to the driveline.

To provide the best auger speed for the digging conditions, a 4-speed gearbox is coupled to the right angle drive via a drive-coupler. The transmission is driven by a direct mounted variable displacement hydrostatic motor.

Gear Ratios and Auger Speed

Gear	Ratio	Auger RPM Range
Low	6.27 : 1	0 to 43
2nd	3.12 : 1	0 to 86
3rd	1.75 : 1	0 to 153
High	1 : 1	0 to 286

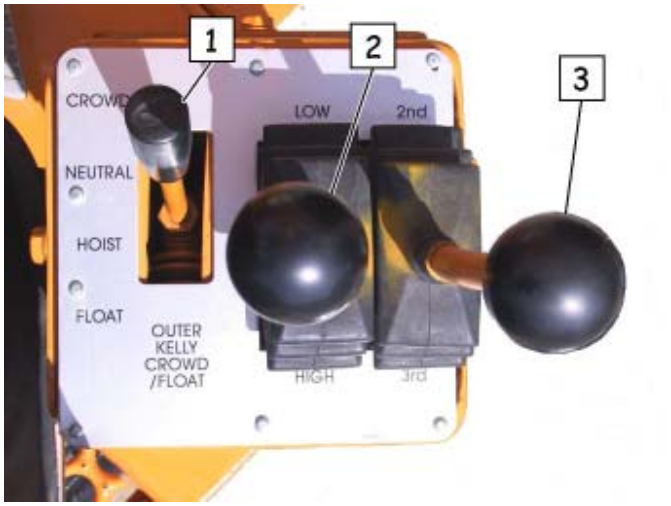


Fig. 3-3 Outer Kelly and Gear Selectors
1. Outer Kelly Hoist/Crowd/Float Control
2. Low/High Gear Selector
3. 2nd/3rd Gear Selector

Auger Rotation

After selecting the proper gear, auger rotation and speed is controlled by the kelly rotation foot pedal (fig. 3-4).

The rotation speed can be controlled in two ways:

1. Use the foot control valve (fig. 3-4). As the pedal is depressed the rotation speed increases.
2. Use the rotation speed control valve (item 3, fig. 3-4a). To activate the valve, turn the rotation control switch (item 2, fig. 3-4a) to ON. Turn the knob CLOCKWISE to INCREASE rotation speed. You can set the rotation speed and not have to keep your foot on the foot pedal. However, you can still use the foot pedal to INCREASE the rotation speed. When the rotation control switch is turned OFF, the rotation control valve is non-functional.

Drilling is done in the FORWARD (clockwise) rotation.

REVERSE rotation (counterclockwise) is typically used to reverse auger from a over-drill situation. This allows the operator to break away from the bottom of the hole.

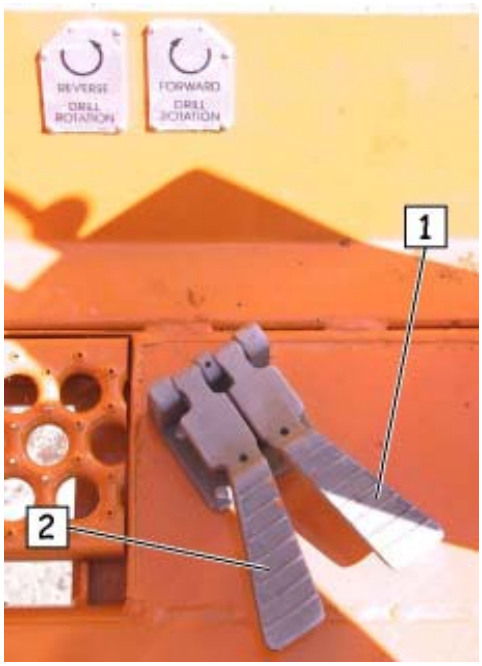


Fig. 3-4 Kelly Rotation Selector Foot Pedal
1. Forward Rotation (clockwise)
2. Reverse Rotation (counterclockwise)

Clearances from High Voltage Lines	
Voltage	**Minimum Clearance**
up to 50 kv	10 ft. (3 m)
over 50 to 75 kv	11 ft. (3.4 m)
over 75 to 125 kv	13 ft. (4 m)
over 125 to 175 kv	15 ft. (4.6 m)
over 175 to 250 kv	17 ft. (5.2 m)
over 250 to 370 kv	21 ft. (6.4 m)
over 370 to 550 kv	27 ft. (8.2 m)
over 550 to 1000 kv	42 ft. (12.8 m)

Table 3-1 Minimum safe distances from high voltage lines.

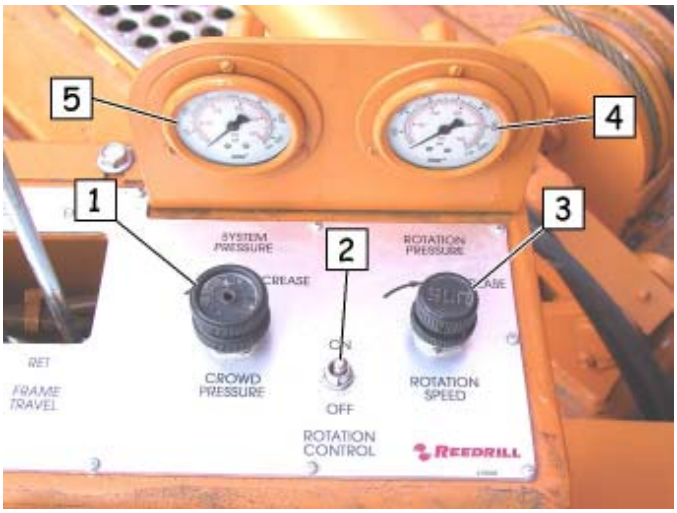


Fig. 3-4a Main Control Valve Console - Right Side
1. Crowd Pressure Control
2. Rotation Control Switch
3. Rotation Speed Control
4. Rotation Pressure Gauge
5. System Pressure Gauge

Mast Raising

DANGER

LOOK UP before raising mast.
DO NOT allow mast to come near electrical power lines. See Minimum Clearance Chart for Energized High Voltage lines. This machine is not insulated.

CAUTION:

When raising mast be sure to depress button on top of joystick so cable will spool off of inner kelly winch.
If machine has service winch mounted on frame, be sure to spool off cable as mast is being raised or damage to cable and or mast components will result

If machine has service winch mounted on frame:

3 functions must be performed at the same time:

1. Press button on top of joystick (fig. 3-5a) to let cable spool off of inner kelly winch.
2. Pull mast raise lever (item 8, fig. 3-5) to raise mast.
3. Push service winch lever (item 9, fig. 3-5) to spool off cable as mast raises.

If machine has service winch mounted on mast:

2 functions must be performed at the same time:

1. Press button on top of joystick (fig. 3-5a) to let cable spool off of inner kelly winch.
2. Pull mast raise lever (item 8, fig. 3-5) to raise mast.

NOTE

It is not necessary to spool off cable from service winch if it is mounted on the mast, as it raises with the mast.

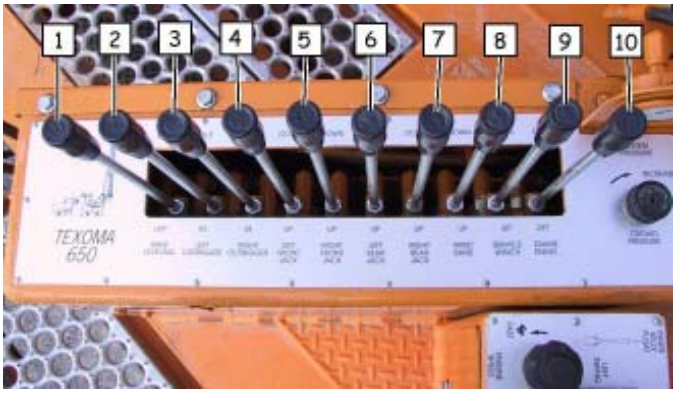


Fig. 3-5 Main Valve Bank

1. Mast Leveling - LEFT/RIGHT
2. Left Outrigger - IN/OUT
3. Right Outrigger - IN/OUT
4. Left Front Jack - UP/DOWN
5. Right Front Jack - UP/DOWN
6. Left Rear Jack - UP/DOWN
7. Right Rear Jack - UP/DOWN
8. Mast Raise - UP/DOWN
9. Service Winch - UP/DOWN
10. Frame Travel - RETRACT/EXTEND

Fig. 3-5a Joystick and Emergency Stop

1. Joystick - Functions as follows:
   - Move Right - Turntable Swings Right
   - Move Left - Turntable Swings Left
   - Push Forward - Lowers Inner Kelly
   - Pull Back - Raises Inner Kelly
   - Depress Top Button - Inner Kelly Winch Float position
2. Emergency Stop

Mast Lowering

CAUTION:

BEFORE LOWERING MAST be sure it is vertical from side-to-side with respect to the machine.
Retract frame all the way (towards truck cab) or mast will not contact mast rest.

If machine has service winch mounted on frame:

3 functions must be performed at the same time:

1. Push joystick (fig. 3-5a) forward wind cable onto inner kelly winch.
2. Push mast lever (item 8, fig. 3-5) to lower mast.
3. Pull service winch lever (item 9, fig. 3-5) to wind cable onto winch as mast is lowered.

If machine has service winch mounted on mast:

2 functions must be performed at the same time:

1. Push joystick (fig. 3-5a) forward wind cable onto inner kelly winch.
2. Push mast lever (item 8, fig. 3-5) to lower mast.

NOTE

It is not necessary to wind cable onto service winch if it is mounted on the mast, as it lowers with the mast.

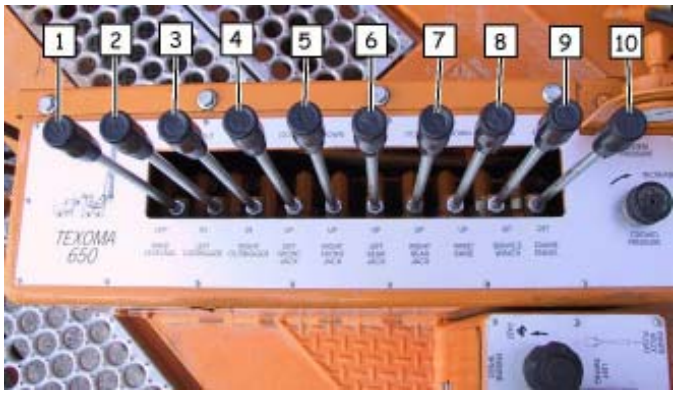


Fig. 3-5 Main Valve Bank

1. Mast Leveling - LEFT/RIGHT
2. Left Outrigger - IN/OUT
3. Right Outrigger - IN/OUT
4. Left Front Jack - UP/DOWN
5. Right Front Jack - UP/DOWN
6. Left Rear Jack - UP/DOWN
7. Right Rear Jack - UP/DOWN
8. Mast Raise - UP/DOWN
9. Service Winch - UP/DOWN
10. Frame Travel - RETRACT/EXTEND

Fig. 3-5a Joystick and Emergency Stop

1. Joystick - Functions as follows:
   - Move Right - Turntable Swings Right
   - Move Left - Turntable Swings Left
   - Push Forward - Lowers Inner Kelly
   - Pull Back - Raises Inner Kelly
   - Depress Top Button - Inner Kelly Winch Float position
2. Emergency Stop

Mast Leveling

Vertical Indicator

The digital readout (fig. 3-6) is connected to a sensor mounted on the mast.

There are 10 display lights in each axis:

Y+ (upper lights)

Y - (lower lights)

X+ (right hand lights)

X - (left hand lights)

Each light represents 0.6 degrees.

The lights remain ON if the mast is more than 6 degrees from plumb in any direction. The lights will go out successively as the mast approaches plumb in each direction.

Fig. 3-6 Instrument Panel - Cummins Engine
1. Vertical Indicator Digital Readout

Leveling - Front to Back

Use the mast raise lever (item 8, fig. 3-5) to bring mast to plumb on the Y axis.

Leveling - Side to Side

Use the mast leveling lever (item 1, fig. 3-5) to bring mast to plumb on the X axis.

Push lever to move top of mast to right (away from operator).

Pull lever to move top of mast to left (towards operator).

Fig. 3-6a Instrument Panel - John Deere Engine
1. Vertical Indicator Digital Readout

Outer Kelly Crowd/Hoist/Float

The outer kelly bar is raised and lowered by applying oil to the crowd cylinder. The motion of the cylinder is transmitted to the kelly via wire rope and sheaves. For normal hoisting and lowering into the hole the outer kelly bar is controlled by the outer kelly crowd/float control (item 1, fig. 3-7). This lever is located to the right of the operator. Pushing the control lever away from the operator to the CROWD position lowers the outer kelly bar. Pulling the lever toward the operator to the HOIST position raises the outer kelly bar. The lever is spring returned to the neutral position.

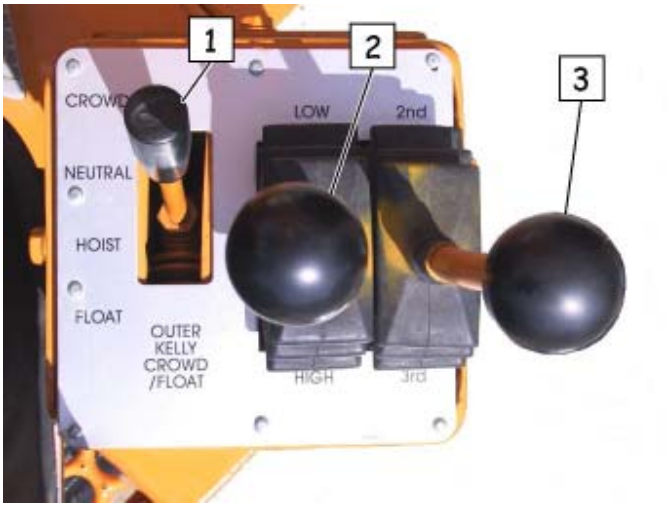


Fig. 3-7 Outer Kelly and Gear Selectors
1. Outer Kelly Hoist/Crowd/Float Control
2. Low/High Gear Selector
3. 2nd/3rd Gear Selector

CROWD

For slow lowering to keep crowd force on the auger during drilling.

HOIST

To raise the outer kelly bar.

FLOAT

In this position there is no pressure on the crowd cylinder. This position is used to lower the outer and raise the outer and inner kelly bars at the same time.

Crowd Pressure Adjustment

To change the amount of crowd force exerted on the auger, turn the crowd pressure control knob (item1, fig. 3-7a):

CAUTION:

Maximum crowd pressure is 3000 PSI (207 bar).
Be careful not to bottom out the control knob, or valve seat damage will occur. If valve seat is damaged, oil can bypass valve and go to rotation circuit.

1. CLOCKWISE to INCREASE pressure.
2. COUNTERCLOCKWISE to DECREASE pressure.

   Read pressure on the system pressure gauge (item 5, fig. 3-7a).

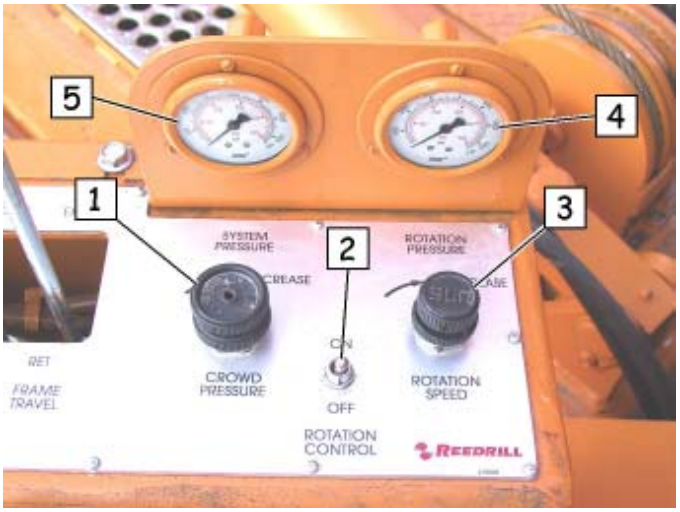


Fig. 3-7a Main Control Valve Console - Right Side
1. Crowd Pressure Control
2. Rotation Control Switch
3. Rotation Speed Control
4. Rotation Pressure Gauge
5. System Pressure Gauge

Inner Kelly Up/Down/Float

The inner kelly bar is suspended on a cable from the inner kelly winch. The winch is controlled by the inner kelly/turntable swing joystick (fig. 3-8).

- Pull joystick back to raise the inner kelly bar.
- Push joystick forward to lower the inner kelly bar.

NOTE

When working in deep holes, lower both the inner and outer kelly bars at the same time by using the OUTER KELLY lever FLOAT position.

Inner Kelly Winch Float Position

WARNING

NEVER use the inner kelly FLOAT as a free-fall devise. Operation in this manner can cause serious personal injury.

Depressing the button on top of the joystick will release the brake on the inner kelly winch and thus will allow cable to be pulled from the winch during drilling or while raising the mast.

Fig. 3-8 Joystick and Emergency Stop

1. Joystick - Functions as follows:
   - Move Right - Turntable Swings Right
   - Move Left - Turntable Swings Left
   - Push Forward - Lowers Inner Kelly
   - Pull Back - Raises Inner Kelly
   - Depress Top Button - Inner Kelly Winch Float position
2. Emergency Stop

Turntable (Swing)

WARNING

USE CARE when swinging over the side of the truck with large, heavy, or heavily loaded augers. Depending on terrain, instability could be experienced. When on any degree of side incline, do not swing the auger to the downhill side.
AT ALL TIMES, be careful when swinging over the side of the truck making sure the auger is clear of the jacks. Hitting the jacks with the auger can cause damage to the machine.

The turntable, which is hydraulically controlled, provides 240° of swing to allow digging on either side, as well as at the rear of the truck.

- Move joystick right swings the auger right.
- Move joystick left swings the auger left.

Fig. 3-8 Joystick and Emergency Stop
1. Joystick - Functions as follows:
   - Move Right - Turntable Swings Right
   - Move Left - Turntable Swings Left
   - Push Forward - Lowers Inner Kelly
   - Pull Back - Raises Inner Kelly
   - Depress Top Button - Inner Kelly Winch Float position
2. Emergency Stop

Frame Travel

CAUTION:

Retract frame all the way (towards truck cab) before lifting any loads with the service winch.
Retract frame all the way (towards truck cab) before lowering mast or mast will not contact mast rest.

Frame travel greatly expedites spotting the auger of the hole site. In addition to spotting the auger, frame travel permits larger augers to be swung around the rear jacks. Always have the frame fully retracted before lifting any loads with the service winch.

- Pull lever to retract frame.
- Push lever to extend frame.

Service Winch

WARNING

NEVER attempt to move the machine with a load suspended from the winch line. Always keep the mast vertical and the auger on the ground when lifting a load.
DO NOT swing with a suspended load. Failure to heed this warning may cause serious personal injuries and/or machine damage.

The hydraulically driven winch has a safe load rating of 8,000 lbs. (3632 kg.), but the capacity is hydraulically limited to 5,000 lbs (2270 kg.).

- Push Service Winch lever (9) away from operator, to reel out (lower) cable.
- Pull Service Winch lever (9) toward operator, to reel in (raise) cable.

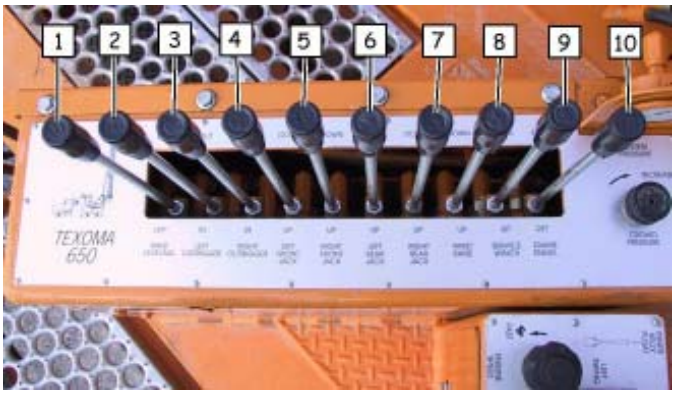


Fig. 3-9 Main Valve Bank
1. Mast Leveling - LEFT/RIGHT
2. Left Outrigger - IN/OUT
3. Right Outrigger - IN/OUT
4. Left Front Jack - UP/DOWN
5. Right Front Jack - UP/DOWN
6. Left Rear Jack - UP/DOWN
7. Right Rear Jack - UP/DOWN
8. Mast Raise - UP/DOWN
9. Service Winch - UP/DOWN
10. Frame Travel - RETRACT/EXTEND

Auger Sizes

WARNING

The use of large augers under certain terrain conditions can cause a loss of stability and control. Operate with extreme caution.
The use of an auger larger than listed could void warranty.

Maximum Auger Size = 60 inches (152.4 cm)

NOTE

The maximum size auger to be used on the Model 650 digger, under ideal digging conditions (i.e. soft dirt, NOT ROCK) is 60 inches (152.4 cm).

When using the larger augers, spin off the dirt at the lowest speed possible. All augers have some amount of imbalance and a spin off speed which is too high will cause discomfort to the operator and cause premature wear on the digger.

Notes

Section 4

Pre-Start Inspection

Fig. 4-0 Left Front View

Fig. 4-0a Right Side View

Although the digger is shipped from the factory ready for use, prior to placing the digger in use for the first time a thorough visual inspection should be made in order to detect any damage or losses which may have occurred during shipment.

To ensure that the digger is kept in good operational condition, it should be systematically inspected before starting on a job and again after the job is completed. In addition, the operator should always be on the alert during operation in order to detect any trouble which might occur. Any trouble discovered during operations should be noted by the operator for correction at the earliest possible time. The operator should stop the digging operation immediately if a defect is discovered which could result in loss of control and personnel injury and/or machine damage if operations were continued.

Pre-start Inspection:

- **Overall Inspection -** Make a thorough visual inspection of the digger and see that it is in good general working condition. Look for loose, missing, or damaged parts, especially making sure all guards are in good condition and are securely in place. Never operate without all guards correctly installed. Check for leaks and anything that appears unsafe.
- **Fuel System -** Examine fuel tank and make sure there are no loose hose or line connections and all caps are on tight. Check tank for damage that could cause leaks. Fill fuel tank. Drain fuel/water separator.
- **Engine Oil -** Check oil level on dipstick, add if required. See Lubrication & Maintenance section or engine owner's manual for correct oil type.
- **Exhaust System** - Check for cracks, breaks, loose or missing clamps or caps.
- **Air Intake System -** Inspect the air cleaner and hoses for leaks, making sure all joints are tight. Leaks in the air ducting between the engine and cleaner can cause a ruined ("dusted") engine.
- **Electrical System -** Check wiring for insulation cracks, breaks, or other signs of damage. Check for loose connections and signs of scorching which could indicate overheating or short circuits. Check all gauges to be sure they are in good operating condition.
- **Belt Tension -** Check the alternator. Make sure it is securely fastened and check for the correct belt tension.
- **Hydraulic Oil -** Check hydraulic oil reservoir sight gauge. Oil should be halfway up the sight gauge with all cylinders fully retracted.
- **Coolant -** Check radiator and hoses for leaks. Check that radiator is filled to the correct level with 50/50 mix of anti-freeze and water plus conditioner.
- **Transmission -** Check transmission for correct oil level and any signs of leakage (refer to lubrication section).
- **Gearcases -** Check the right angle drive and final drive for correct oil level and any signs of leakage (refer to Lubrication & Maintenance section).
- **Lubrication -** Make sure the complete digger is greased at the required locations (refer to Lubrication & Maintenance section).
- **Winch Cables -** Check winch cables for signs of damage, kinks or fraying. Report damaged cables to supervisor and replace immediately.

Start-up Procedures - Cummins Engine

DANGER

LOOK UP before raising mast.
DO NOT allow mast to come near electrical power lines. See Minimum Clearance Chart for Energized High Voltage lines. This machine is not insulated.

WARNING

DO NOT operate machine before you have read and understood all warnings and cautions listed in section 1 of this manual.
CHECK for obstructions before moving machine.
DO NOT attempt lubrication or service while the machine is running.
DO NOT operate machine in an enclosed area without first installing proper outlet exhaust ventilation equipment.

CAUTION:

DO NOT engage the starting motor more than 30 seconds. Wait two minutes between each attempt to start, to prevent damage to starting motor.

Start-up Procedure

1. Complete the Pre-start checklist BEFORE starting machine.
2. Be sure all controls are in the OFF or NEUTRAL position and parking brake is set on truck mounted machines.
3. Hold Override/Shutdown switch (3) in OVERRIDE position and turn ignition switch (2) to START position.
4. Release ignition switch (2) after engine starts, and release override/shutdown switch (3) after oil pressure comes up on gauge (8).

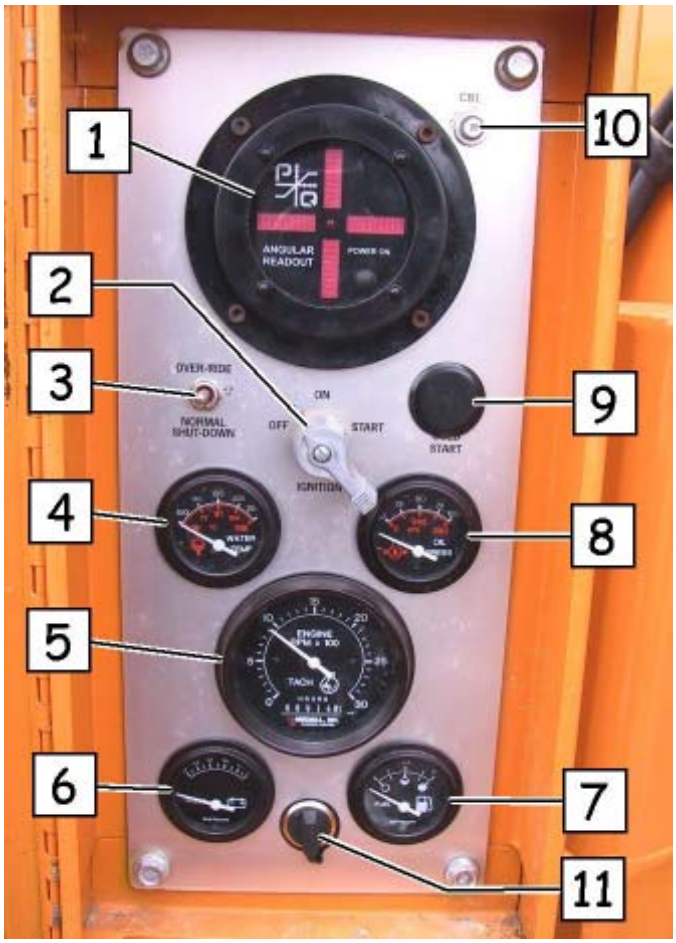


Fig. 4-1 Instrument Panel - Cummins Engine
1. Vertical Indicator Digital Readout
2. Ignition Switch
3. Override/Shutdown Switch
4. Engine Water Temperature Gauge
5. Engine Tachometer/Hourmeter
6. Voltmeter
7. Fuel Gauge
8. Engine Oil Pressure Gauge
9. Cold Start Switch (optional)
10. Circuit Breaker
11. 12VDC Power Outlet

Cold Start Procedure

WARNING

DO NOT use starting fluid on engines equipped with air intake heaters.
DO NOT use starting fluid near fire or sparks.
DO NOT incinerate or puncture a starting fluid container.

- Consult engine operator manual for specific instructions regarding cold weather starting procedures and troubleshooting.
- Set throttle to full RPM after engaging starter. See chart below and use ether if needed. Use ether injection (if equipped) or have someone spray ether into engine air cleaner intake while cranking engine. Do not use excessive amounts of ether or engine damage will result.
- If engine does not start after three attempts, check the fuel supply system. Absence of blue or white exhaust smoke during cranking indicates no fuel is being delivered.
- After engine starts, be sure engine oil pressure is indicated on gauge.

Shutdown Procedure

CAUTION:

BEFORE LOWERING MAST be sure it is vertical from side-to-side with respect to the machine.
Retract frame all the way (towards truck cab) or mast will not contact mast rest.

1. Retract the in/out frame travel to the fully retracted position (toward truck cab).
2. Lower the mast into the transport position.
3. Raise the jacks and retract outriggers on truck mounted machines.
4. Let the engine run at low idle for a few minutes and then turn ignition switch to OFF position.

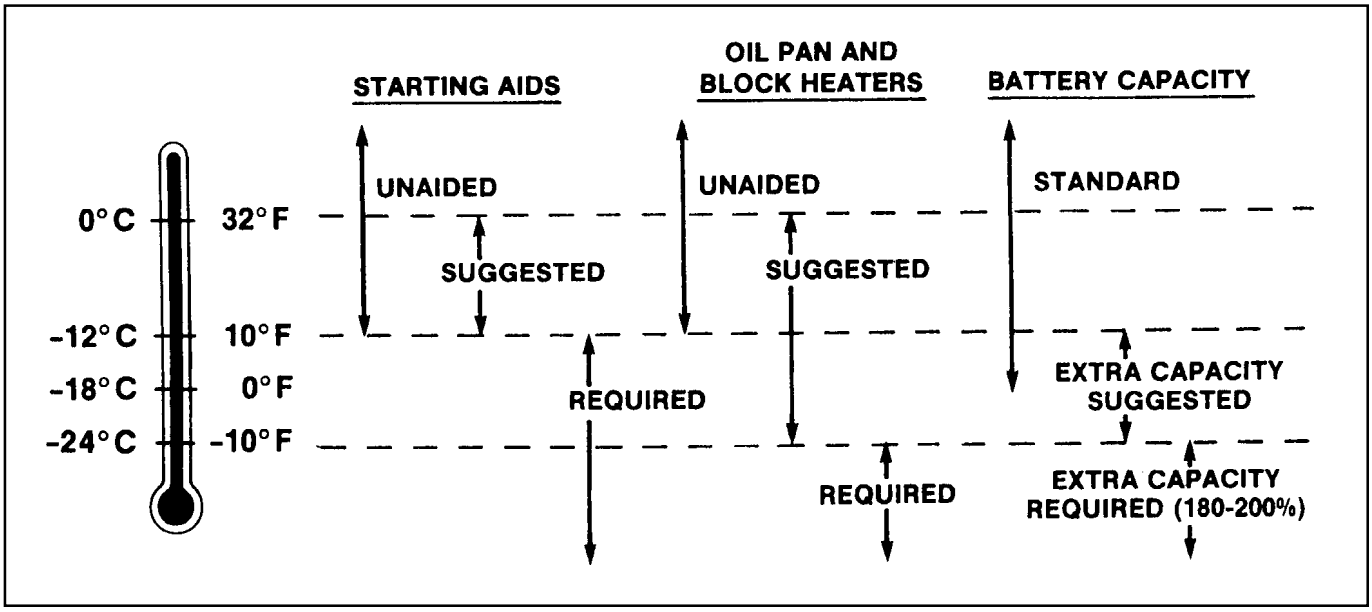


Table 4-1 Cold Weather Starting Aid Suggestion (ref. Cummins B Series Engines)

Start-up Procedures - John Deere Engine

DANGER

LOOK UP before raising mast.
DO NOT allow mast to come near electrical power lines. See Minimum Clearance Chart for Energized High Voltage lines. This machine is not insulated.

WARNING

DO NOT operate machine before you have read and understood all warnings and cautions listed in section 1 of this manual.
CHECK for obstructions before moving machine.
DO NOT attempt lubrication or service while the machine is running.
DO NOT operate machine in an enclosed area without first installing proper outlet exhaust ventilation equipment.

CAUTION:

DO NOT engage the starting motor more than 30 seconds. Wait two minutes between each attempt to start, to prevent damage to starting motor.

Start-up Procedure

1. Complete the Pre-start checklist BEFORE starting machine.
2. Be sure all controls are in the OFF or NEUTRAL position and parking brake is set on truck mounted machines.
3. Place low idle switch (12) in OFF position.
4. Turn ignition switch (10) to START position, release switch so it returns to ON position after engine starts. When engine is running with low idle switch (12) in OFF position, engine will idle at 1800 RPM.
5. After engine warms up and before using any drill or setup functions, switch low idle switch (12) to ON position. Use throttle switch (11) to increase engine speed to high idle (2200 RPM).

NOTE

Engine speed cannot be adjusted with throttle switch (11) when the low idle switch (12) is in OFF position.

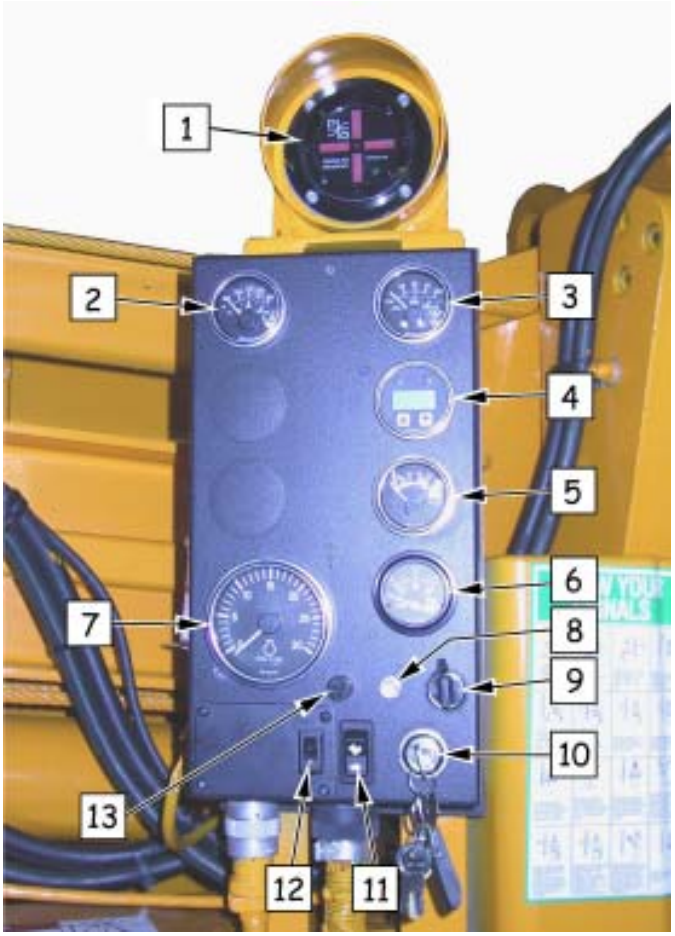


Fig. 4-1a Instrument Panel - John Deere Engine
1. Vertical Indicator Digital Readout
2. Engine Water Temperature Gauge
3. Engine Oil Pressure Gauge
4. Engine Hourmeter
5. Voltmeter
6. Fuel Gauge
7. Tachometer
8. Circuit Breaker for power outlet
9. 12VDC Power Outlet
10. Ignition Switch
11. Throttle Switch
12. Low Idle ON/OFF Switch
13. Fuse Holder

Fuel/Water Separator

Check Daily

Check the fuel filter for water or debris. If filter has a see - through bowl, drain as needed, based on visual inspection.

To Drain Water

1. Loosen drain plug (1) two or three turns.
2. Loosen air bleed plug (2) two full turns. Drain water into a catch can until fuel starts to drain out, then tighten drain plug.

NOTE

Be responsible, dispose of water/fuel mixture in a proper manner according to local regulations.

3. Leave the air bleed plug open and operate the fuel primer lever (3) until fuel is free from air bubbles.
4. Tighten air bleed plug and continue to pump the fuel primer lever until pumping action is not felt. Push fuel primer lever in towards engine as far as it will go. If further bleeding is necessary, see engine operator's manual.

Fig. 4-1b Fuel/Water Separator
1. Drain Plug
2. Air Bleed Plug
3. Fuel Supply Pump Primer Lever

Cold Start Procedure

WARNING

DO NOT use starting fluid on engines equipped with air intake heaters.
DO NOT use starting fluid near fire or sparks.
DO NOT incinerate or puncture a starting fluid container.

- Starting aids are required below 32°F (0°C). Using the correct weight of engine oil is critical to achieving adequate cold weather cranking speed.
- Consult engine operator manual for specific instructions regarding cold weather starting procedures and troubleshooting.
- Use ether injection (if equipped) or have someone spray ether into engine air cleaner intake while cranking engine. Do not use excessive amounts of ether or engine damage will result.
- If engine does not start after three attempts, check the fuel supply system. Absence of blue or white exhaust smoke during cranking indicates no fuel is being delivered.
- After engine starts, be sure engine oil pressure is indicated on gauge.

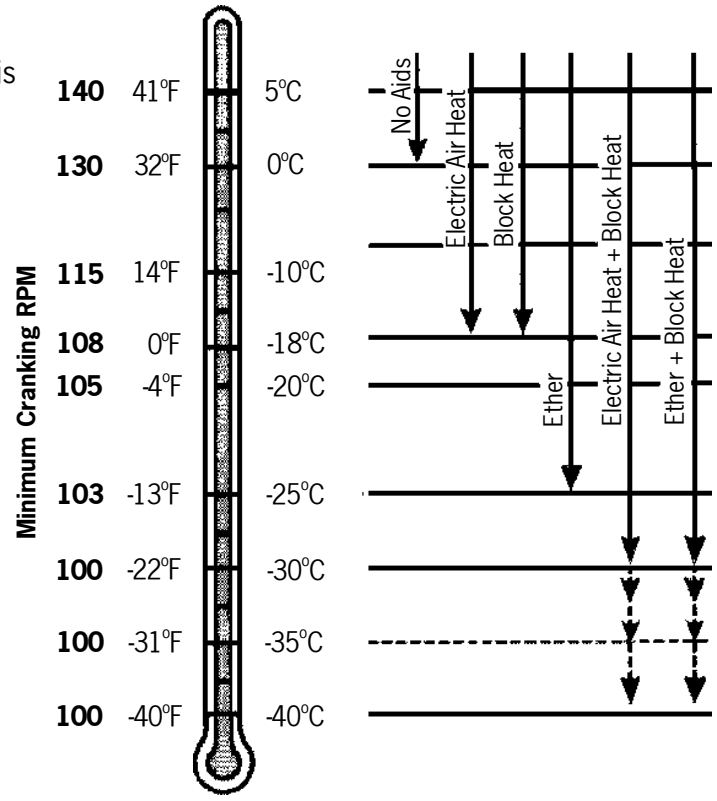


Table 4-1a Cold Weather Starting Aid Guidelines
(ref. John Deere 4.5L & 6.8L Engines)

Shutdown Procedures - John Deere Engine

Normal Shutdown Procedure

CAUTION:

BEFORE LOWERING MAST be sure it is vertical from side-to-side with respect to the machine.
Retract frame all the way (towards truck cab) or mast will not contact mast rest.

1. Retract the in/out frame travel to the fully retracted position (toward truck cab).
2. Lower the mast into the mast rest.
3. Raise the jacks and retract outriggers on truck mounted machines.
4. Switch the low idle switch (12) to OFF. RPM will drop to 1800 RPM. Let engine idle for at least two minutes before turning ignition switch (10) OFF.

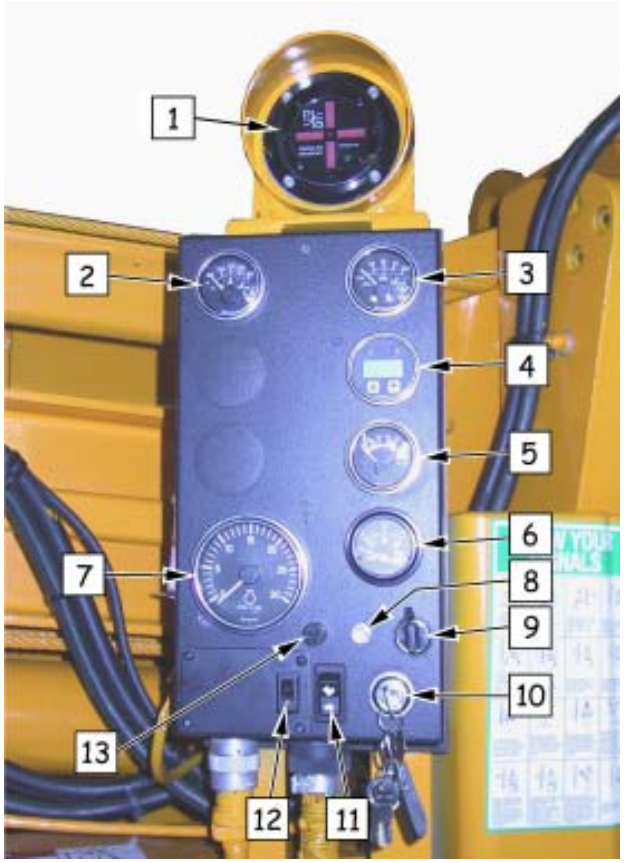


Fig. 4-1a Instrument Panel - John Deere Engine
10. Ignition Switch
11. Throttle Switch
12. Low Idle ON/OFF Switch

Emergency Shutdown

PRESS RED BUTTON to STOP machine.

The emergency stop button is located to the left of the operator's seat adjacent to the inner kelly/swing joystick (fig. 4-1b).

If emergency shutdown was the result of machine malfunction, determine cause and correct before re-starting machine.

Pull up button to reset, before starting machine.

Fig. 4-1c Emergency Stop Button

Lowering Jacks

1. Start engine and allow time for it to warm up to ambient temperature, in extremely cold temperatures, machine should be allowed additional time to warm up (refer to "Cold Start Procedure" at the beginning of this section or consult engine manual).
2. On truck mounted machines:

a. Extend the FRONT OUTRIGGERS (2 & 3) left and right.

c. Lower the LEFT REAR JACK (6).

d. Lower the LEFT FRONT JACK (4).

e. Lower the RIGHT REAR JACK (7).

f. Lower the RIGHT FRONT JACK (5).

3. After all jacks are lowered to the ground, you are ready to level the unit by pulling and pushing the appropriate jack levers.

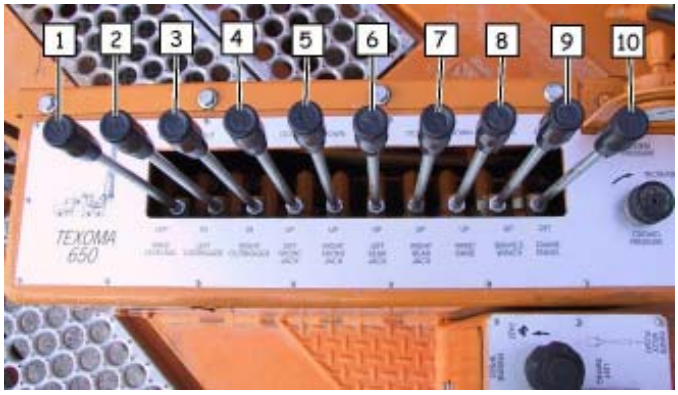


Fig. 4-2 Main Valve Bank

1. Mast Leveling - LEFT/RIGHT
2. Left Outrigger - IN/OUT
3. Right Outrigger - IN/OUT
4. Left Front Jack - UP/DOWN
5. Right Front Jack - UP/DOWN
6. Left Rear Jack - UP/DOWN
7. Right Rear Jack - UP/DOWN
8. Mast Raise - UP/DOWN
9. Service Winch - UP/DOWN
10. Frame Travel - RETRACT/EXTEND

Fig. 4-3 Joystick and Emergency Stop

1. Joystick - Functions as follows:
   - Move Right - Turntable Swings Right
   - Move Left - Turntable Swings Left
   - Move Forward - Lowers Inner Kelly
   - Move Back - Raised Inner Kelly
   - Depress Top Button - Inner Kelly Float position
2. Emergency Stop Button

Raising Mast

DANGER

LOOK UP before raising mast.
DO NOT allow mast to come near electrical power lines. See Minimum Clearance Chart for Energized High Voltage lines. This machine is not insulated.

CAUTION:

When raising mast be sure to depress button on top of joystick so cable will spool off of inner kelly winch.
If machine has service winch mounted on frame, be sure to spool off cable as mast is being raised or damage to cable and or mast components will result

If machine has service winch mounted on frame:

3 functions must be performed at the same time:

1. Press button on top of JOYSTICK (fig. 4-3) to let cable spool off of inner kelly winch.
2. Pull MAST RAISE LEVER (item 8, fig. 4-2) to raise mast.
3. Push SERVICE WINCH LEVER (item 9, fig. 4-2) to spool off cable as mast raises.

If machine has service winch mounted on mast:

2 functions must be performed at the same time:

1. Press button on top of JOYSTICK (fig. 4-3) to let cable spool off of inner kelly winch.
2. Pull MAST RAISE LEVER (item 8, fig. 4-2) to raise mast.

NOTE

It is not necessary to spool off cable from service winch if it is mounted on the mast, as it raises with the mast.

Clearances from High Voltage Lines	
Voltage	**Minimum Clearance**
up to 50 kv	10 ft. (3 m)
over 50 to 75 kv	11 ft. (3.4 m)
over 75 to 125 kv	13 ft. (4 m)
over 125 to 175 kv	15 ft. (4.6 m)
over 175 to 250 kv	17 ft. (5.2 m)
over 250 to 370 kv	21 ft. (6.4 m)
over 370 to 550 kv	27 ft. (8.2 m)
over 550 to 1000 kv	42 ft. (12.8 m)

Table 4-1 Minimum safe distances from high voltage lines.

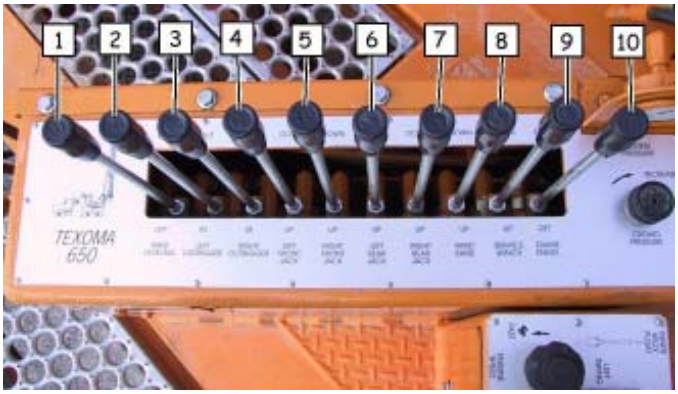


Fig. 4-2 Main Valve Bank

1. Mast Leveling - LEFT/RIGHT
2. Left Outrigger - IN/OUT
3. Right Outrigger - IN/OUT
4. Left Front Jack - UP/DOWN
5. Right Front Jack - UP/DOWN
6. Left Rear Jack - UP/DOWN
7. Right Rear Jack - UP/DOWN
8. Mast Raise - UP/DOWN
9. Service Winch - UP/DOWN
10. Frame Travel - RETRACT/EXTEND

Fig. 4-3 Joystick and Emergency Stop

1. Joystick - Functions as follows:
   - Move Right - Turntable Swings Right
   - Move Left - Turntable Swings Left
   - Move Forward - Lowers Inner Kelly
   - Move Back - Raised Inner Kelly
   - Depress Top Button - Inner Kelly Float position
2. Emergency Stop Button

Mast Leveling

Vertical Indicator

The digital readout (fig. 4-4) is connected to a sensor mounted on the mast.

There are 10 display lights in each axis:

Y+ (upper lights)

Y - (lower lights)

X+ (right hand lights)

X - (left hand lights)

Each light represents 0.6 degrees.

The lights remain ON if the mast is more than 6 degrees from plumb in any direction. The lights will go out successively as the mast approaches plumb in each direction.

Fig. 4-4 Instrument Panel - John Deere Engine
1. Vertical Indicator Digital Readout

Leveling - Front to Back

Use the MAST RAISE LEVER (item 8, fig. 4-2) to bring mast to plumb on the Y axis.

Leveling - Side to Side

Use the MAST LEVELING LEVER (item 1, fig. 4-2) to bring mast to plumb on the X axis.

Push lever to move top of mast to right (away from operator).

Pull lever to move top of mast to left (towards operator).

Frame Travel

When mast is vertical, you are ready to use your FRAME TRAVEL LEVER (item10, fig. 4-2) to move the frame in or out in order to line up with the drill stake. After you line the auger point up with the drill stake and before you start to drill, check vertical indicator to be sure mast is plumb.

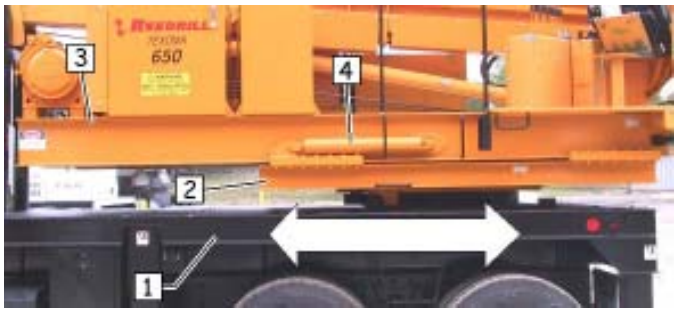


Fig. 4-4a Frame - Left Side
1. Base Frame
2. Sub-Frame
3. Main Frame
4. Frame Travel Cylinder

Drilling

1. Now you are ready to lower the inner kelly down to the ground level and start drilling. Start by pushing the INNER KELLY/TURNTABLE SWING JOYSTICK (fig. 4-5) forward. When the auger contacts the ground, you are ready to drill. Depress the button on top of the joystick while drilling, this releases the inner kelly winch brake.

NOTE

The auger will not drill into the ground if the winch is holding the inner kelly back.

2. Use the TRANSMISSION GEAR SELECTORS (2 & 3, fig. 4-6) to select the proper gear in which to drill. You can also adjust engine RPM which will change the displacement of the transmission drive motor.

3. After placing transmission in gear, depress the right hand foot pedal for FORWARD ROTATION (1, fig. 4-7).

   The rotation speed can be controlled in two ways:

   a. Use the foot control valve (fig. 4-7). As the pedal is depressed the rotation speed increases.

   b. Use the rotation speed control valve (item 3, fig. 4-7a). To activate the valve, turn the rotation control switch (item 2, fig. 4-7a) to ON. Turn the knob CLOCKWISE to INCREASE rotation speed. You can set the rotation speed and not have to keep your foot on the foot pedal. However, you can still use the foot pedal to IN CREASE the rotation speed. When the rotation control switch is turned OFF, the rotation con trol valve is non-functional.

4. Place the OUTER KELLY CONTROL LEVER (1, fig. 4-6) in CROWD position. You can adjust the crowd pressure by turning the knob (item 1, fig. 4-7a) CLOCKWISE to INCREASE pressure or COUNTER-CLOCKWISE to DECREASE pressure. Read the pressure on the system pressure gauge (item 5, fig. 4-7a).

5. After the auger has cut the material and you are ready to remove the cuttings out of the hole, place the transmission in neutral, take your foot off the KELLY ROTATION FOOT PEDAL (fig. 4-7).

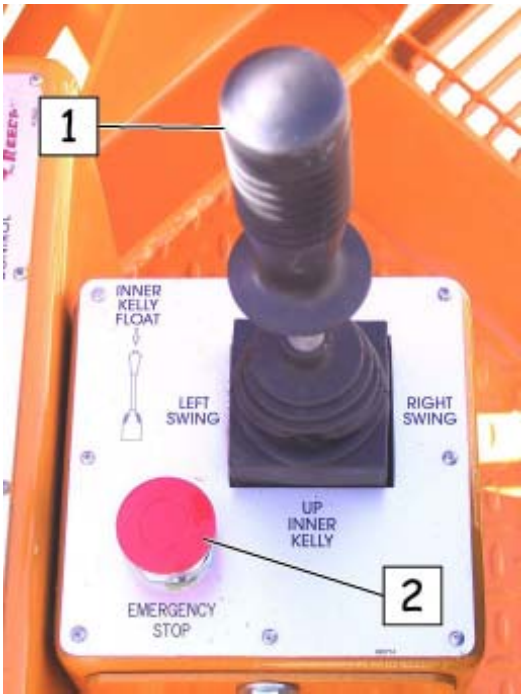


Fig. 4-5 Joystick and Emergency Stop
1. Joystick - Functions as follows:
   Move Right - Turntable Swings Right
   Move Left - Turntable Swings Left
   Move Forward - Lowers Inner Kelly
   Move Back - Raised Inner Kelly
   Depress Top Button - Inner Kelly Float position
2. Emergency Stop Button

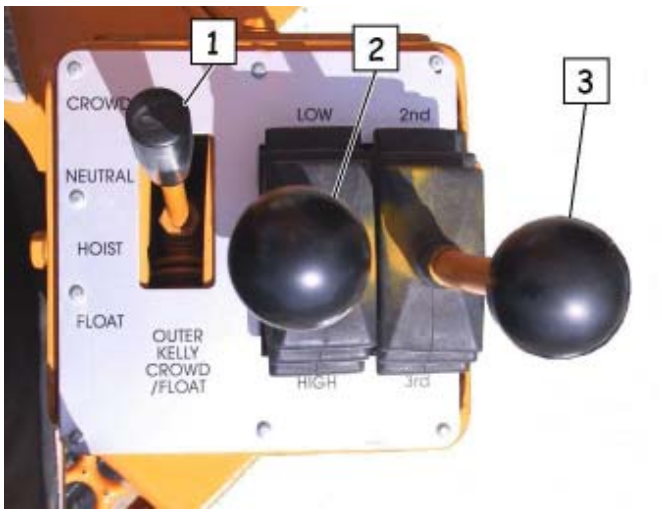


Fig. 4-6 Outer Kelly and Gear Selectors
1. Outer Kelly Hoist/Crowd/Float Control
2. Low/High Gear Selector
3. 2nd/3rd Gear Selector

Drilling - continued

6. Place the OUTER KELLY CONTROL LEVER (1, fig.4-6) in the HOIST position to raise the outer kelly or FLOAT position to raise the outer and inner kelly bars together.

Reverse Drilling

If you have over-drilled the auger in the ground, place the transmission in neutral, shift into LOW gear and depress the REVERSE FOOT PEDAL and back out of the load. Pull the INNER KELLY CONTROL LEVER back to raise the inner kelly. This will allow you to break away from the bottom of the hole.

Turntable Swing

WARNING

Unit Can become unstable and overturn. Use care when swinging over the side of the base with large, heavy or heavily loaded augers. When on any degree of side incline, do not swing the auger to the downhill side.

CAUTION:

Hitting the machine base with the auger can cause damage to the machine. At all times, be careful when swinging over the side of the base making sure the auger is clear of the structures.

7. After the auger has been removed from the hole, use the TURNTABLE SWING/INNER KELLY JOYSTICK (fig. 4-5) to swing the auger to either side; left or right, to spin the dirt off the auger. Swing back over the hole and lower the auger back in the hole.

8. Repeat steps 1-4 to continue drilling

NOTE

When lowering the auger back into the hole, do not pay off cable after the auger makes contact with the bottom of the hole. This will cause a backlash or "bird nest" on the winch drum.

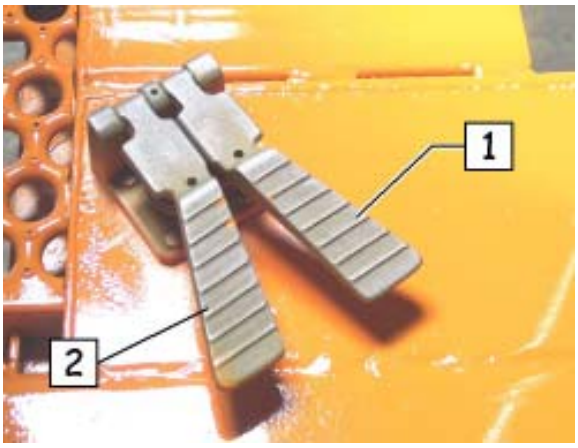


Fig. 4-7 Kelly Rotation Selector Foot Pedal
1. Forward Rotation (clockwise)
2. Reverse Rotation (counterclockwise)

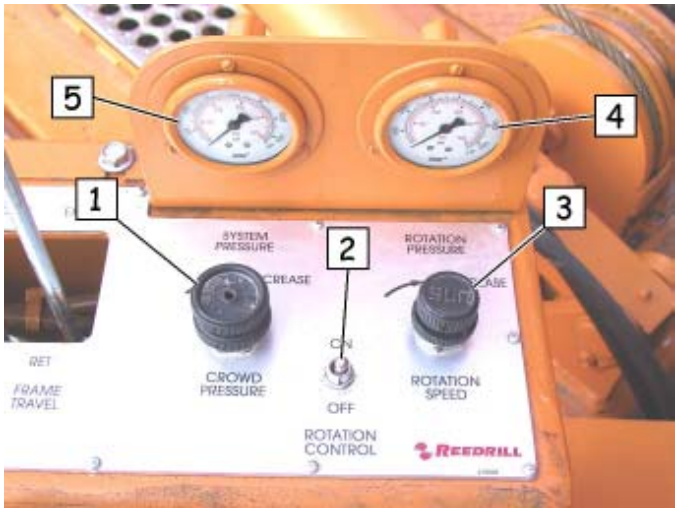


Fig. 4-7a Main Control Valve Console - Right Side
1. Crowd Pressure Control
2. Rotation Control Switch
3. Rotation Speed Control
4. Rotation Pressure Gauge
5. System Pressure Gauge

After Drilling - Before Moving to Next Hole

WARNING

NEVER move machine with the mast up. Lower mast onto mast rest (headache rack) before moving machine.

Lower Mast

CAUTION:

BEFORE LOWERING MAST be sure it is vertical from side-to-side with respect to the machine.
Retract frame all the way (towards truck cab) or mast will not contact mast rest.

If machine has service winch mounted on frame:

3 functions must be performed at the same time:

1. Push joystick (fig. 4-8) forward wind cable onto inner kelly winch.
2. Push mast lever (item 8, fig. 4-8a) to lower mast.
3. Pull service winch lever (item 9, fig. 4-8a) to wind cable onto winch as mast is lowered.

If machine has service winch mounted on mast:

2 functions must be performed at the same time:

1. Push joystick (fig. 4-8) forward wind cable onto inner kelly winch.
2. Push mast lever (item 8, fig. 4-8a) to lower mast.

NOTE

It is not necessary to wind cable onto service winch if it is mounted on the mast, as it lowers with the mast.

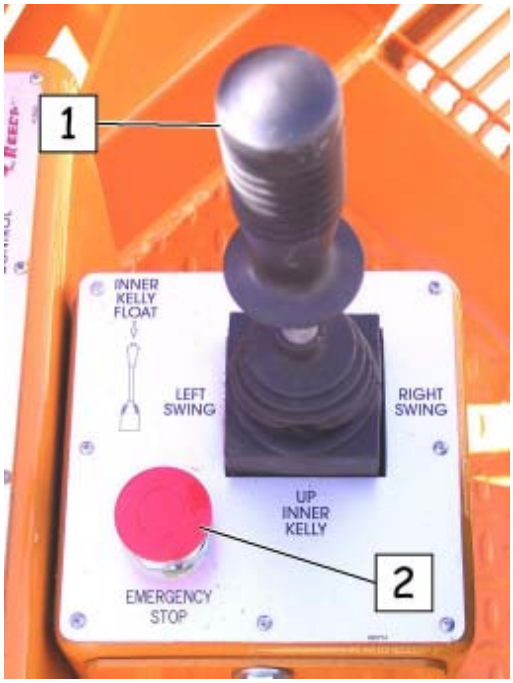


Fig. 4-8 Joystick and Emergency Stop
1. Joystick - Functions as follows:
   Move Right - Turntable Swings Right
   Move Left - Turntable Swings Left
   Move Forward - Lowers Inner Kelly
   Move Back - Raised Inner Kelly
   Depress Top Button - Inner Kelly Float position
2. Emergency Stop Button

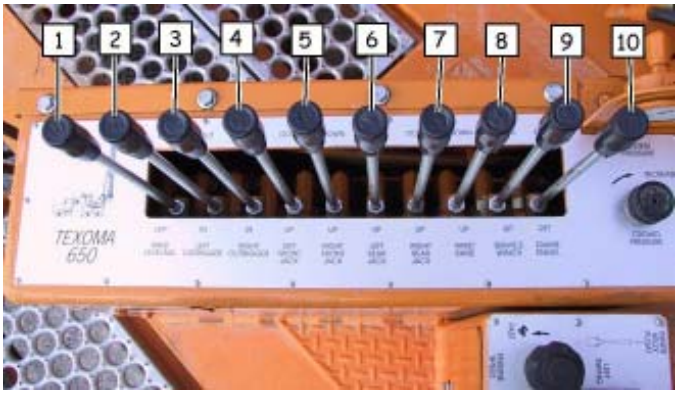


Fig. 4-8a Main Valve Bank
1. Mast Leveling - LEFT/RIGHT
2. Left Outrigger - IN/OUT
3. Right Outrigger - IN/OUT
4. Left Front Jack - UP/DOWN
5. Right Front Jack - UP/DOWN
6. Left Rear Jack - UP/DOWN
7. Right Rear Jack - UP/DOWN
8. Mast Raise - UP/DOWN
9. Service Winch - UP/DOWN
10. Frame Travel - RETRACT/EXTEND

Inspection

Check auger bits and points for excessive wear or defects. Replace as necessary.

Removal and Installation

Figure 4-9 shows an auger with blade type teeth, retained by a roll pin. There are several types of teeth and points available to suit different drilling conditions. The following page shows the basic tooth styles and how they are replaced.

Contact your **Reedrill** distributor or factory office to obtain a copy of **Texoma Drilling Tools Catalog**. This catalog lists all of the augers, cutting tools and accessories available and detailed descriptions of their uses.

Auger Sizes

Maximum size auger for the Model 650 is 60" diameter (152.4 cm).

NOTE

The use of an auger larger than listed will void warranty of that machine.

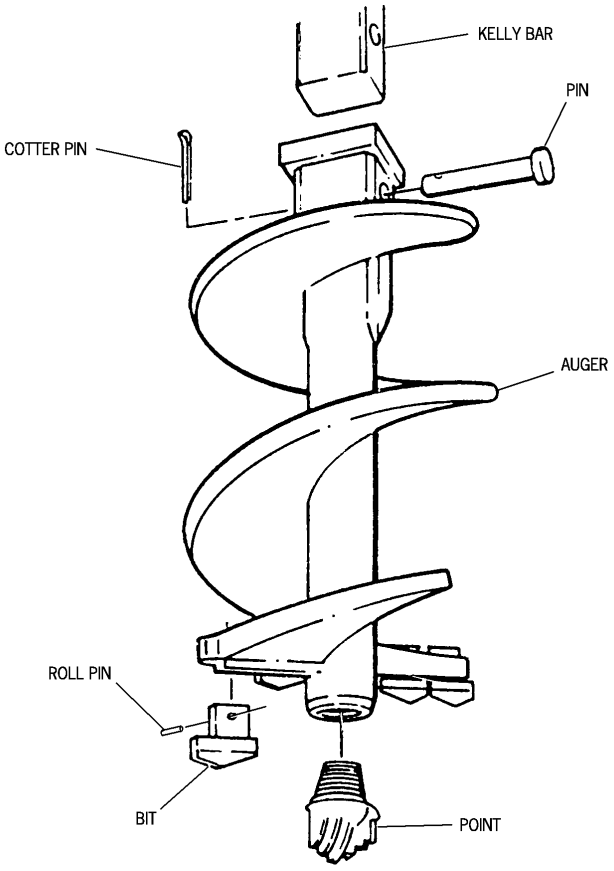


Figure 4-9 Typical Auger Assembly

Auger Teeth

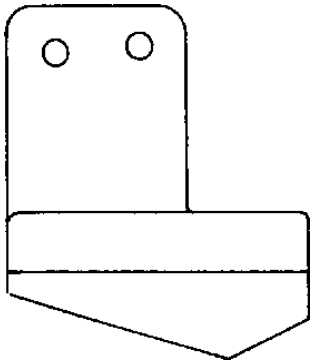


Fig. 4-10 Blade Type Tooth
Retained with roll pin or cotter pin.
Remove pin, then remove tooth.
Install new tooth and pin.
DO NOT hit carbide face with hammer.

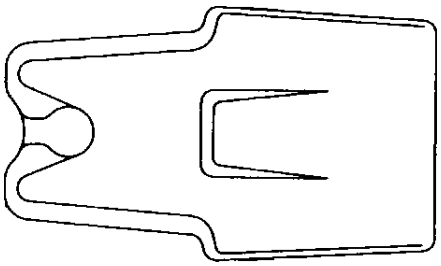


Fig. 4-11 Taper-Fit Tooth
Retained with "horseshoe nail" type fastener.
Drive out tooth with punch to remove.
Install new tooth, secure with "horseshoe nail" type fastener.
DO NOT hit carbide face with hammer.

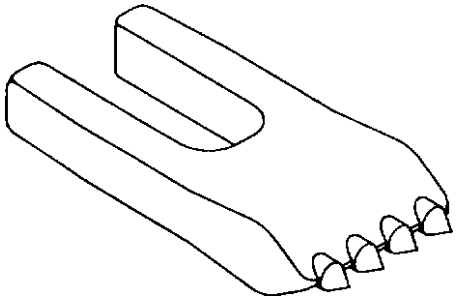


Fig. 4-12 TX-50 series ("Bear Claw") Type Tooth
Retained with rubber wedge.
Drive out tooth with punch to remove.
Install rubber wedge and install tooth.
DO NOT hit carbide tips with hammer.

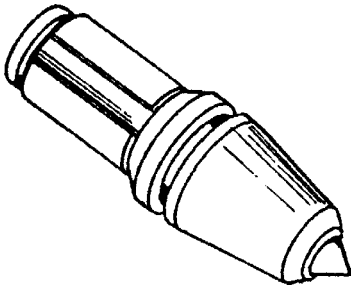


Fig. 4-13 Bullet Type Tooth
Retained with retainer ring.
Use C-123 bit puller (below) to remove.
Drive in tooth, retainer ring will hold tooth in place.
DO NOT hit carbide tip with hammer.

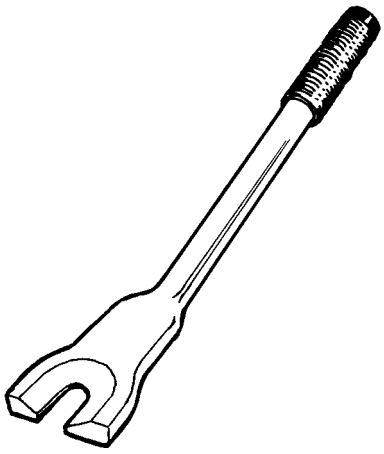


Fig. 4-14 C-123 Bit Puller (Part No. 29937)
Use to remove bullet type teeth.

Section 5

Lubrication & Maintenance

Lubrication Diagram

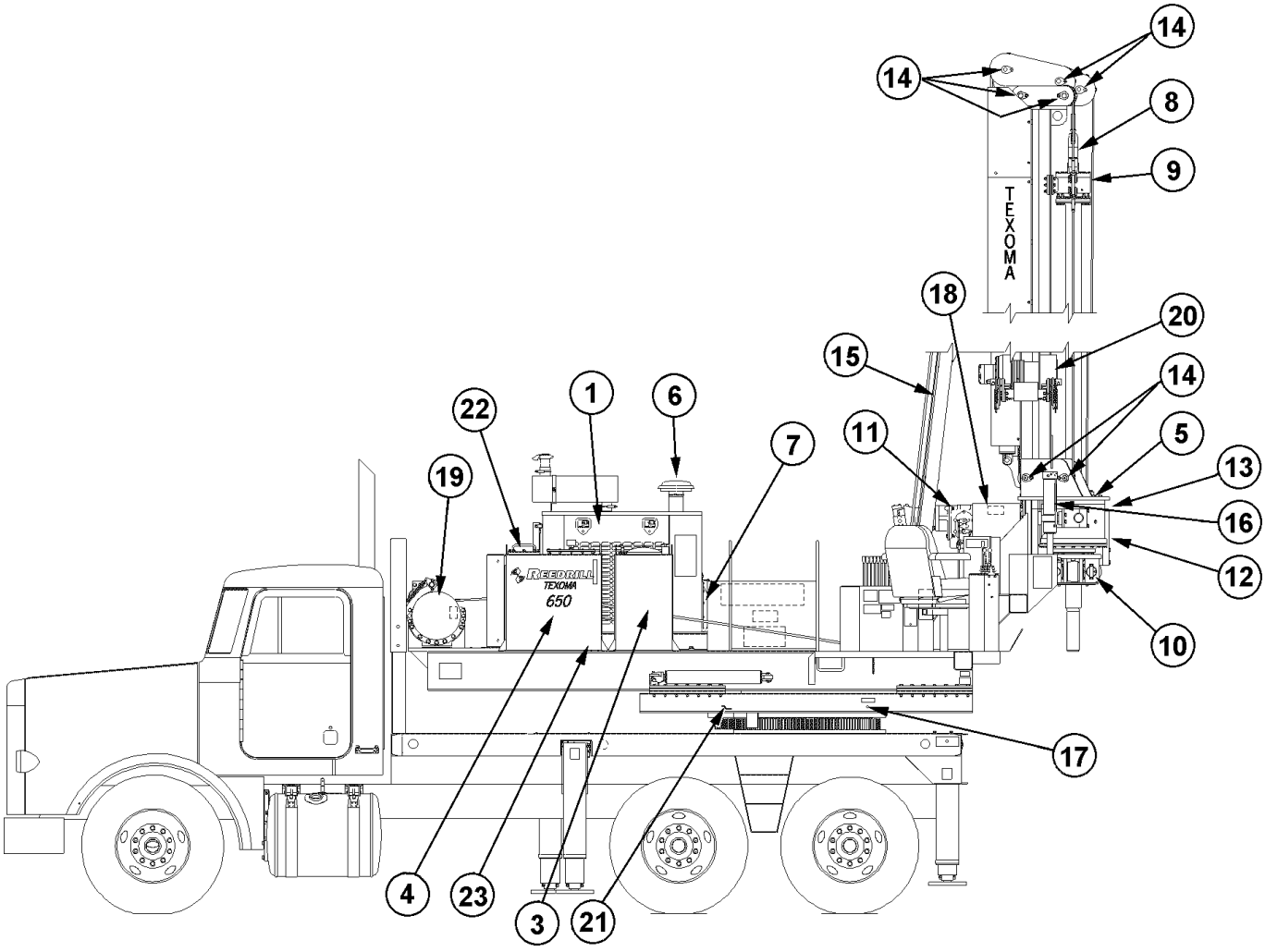


Fig. 5-1 Model 650 Lube Points (ref. 420715)

Lubrication Chart

Ref.	Frequency of Service	Equipment to be Serviced	Recommended Lubricant	Special Instructions
1	Daily	Engine Oil John Deere 6068T	15W-40 diesel engine oil see John Deere engine oil chart on page 5-6.	Check level, add if required
		New John Deere engines have break-in oil - Change oil & filter after 100 hrs., then every 250 hrs.		
1	Daily	Engine Oil Cummins 6BT 5.9	15W-40 diesel engine oil see Cummins engine oil chart on page 5-7.	Check level, add if required
		DO NOT use break-in oil in Cummins engines.		
		Fuel/Water Separator		Drain water
		Fan, Drive Belts		Inspect for damage and wear
		Coolant	50/50 mix, anti-freeze/water	Check level, add if required
2	Daily	Water Tank (optional)	Water	Check level, fill up
3	Daily	Fuel Tank	No. 2 Diesel Fuel	Check Level, fill up
4	Daily	Hydraulic Tank	ISO 32 Hydraulic Oil	Check sight gauge, add if required
5	Daily	Final Drive Top Bearing	EP NLGI No. 2 Grease	Grease 1 place
6	Daily	Engine Air Filter		Check indicator, replace if required
7	Daily	Hydrostatic Filter		Check indicator, replace if required
8	Daily	Inner Kelly Swivel	EP NLGI No. 2 Grease	Grease 1 place
9	Daily	Outer Kelly Swivel	EP NLGI No. 2 Grease	Grease 1 place
10	Daily	Roller Box	EP NLGI No. 2 Grease	Grease 4 places
11	Weekly	Transmission	80W-90 Gear Oil	Check level, add if required
12	Weekly	Right Angle Drive	80W-90 Gear Oil	Check level, add if required
13	Weekly	Final Drive	80W-90 Gear Oil	Check level, add if required
14	Weekly	All Mast Sheaves	EP NLGI No. 2 Grease	Grease 14 places
15	Weekly	Elevating Cylinder	EP NLGI No. 2 Grease	Grease 2 places
16	Weekly	Leveling Cylinder	EP NLGI No. 2 Grease	Grease 1 place
17	Weekly	Turntable Bearing	EP NLGI No. 2 Grease	Grease 2 places
18	Weekly	Driveshaft	EP NLGI No. 2 Grease	Grease 3 places
19	Weekly	Inner Kelly Winch	80W-90 Gear Oil	Check level, add if required
20	Weekly	Service Winch	80W-90 Gear Oil	Check level, add if required
21	Weekly	Turntable Drive	80W-90 Gear Oil	Check level, add if required - Change oil after first 50 hours of operation, then every 500 hours.
1	250 Hours or 3 Months	Engine Oil & Filter John Deere 6068T	See John Deere Oil Chart 21 qts. (19.9 L)	Change oil, replace filter
1		Engine Oil & Filter Cummins 6BT 5.9	See Cummins Oil Chart 17.3 qts. (16.4 L)	Change oil, replace filter
6		Engine Air Filter		Change filter element
7		Hydrostatic Filter		Change filter element
19		Inner Kelly Winch	80W-90 Gear Oil 5.3 qts. (5L)	Change oil after first 250 hours of operation or 6 months, whichever occurs first, then every 500 hours or 12 months whichever occurs first.
20		Service Winch	80W-90 Gear Oil 1.6 qts. (1.5L)	same as Inner Kelly Winch

continued next page . . .

Lubrication Chart

Ref.	Frequency of Service	Equipment to be Serviced	Recommended Lubricant	Special Instructions
1	500 Hours or 6 Months	Engine Fuel Filter		Change filter element
22	plus all listed	Hydraulic Filter (in tank)		Change filter element
23	under	Hydraulic Strainer (in tank)		Remove and clean
19	250 Hours	Inner kelly Winch	80W-90 Gear Oil	Change Oil
20		Service Winch	80W-90 Gear Oil	Change Oil
21		Turntable Drive	80W-90 Gear Oil	Change Oil, 2.5 pints (1.2 L)
11		Transmission	80W-90 Gear Oil	Change Oil, 3 quarts (2.8 L)
4	1000 Hours or Yearly	Hydraulic Oil	ISO 32 Hydraulic Oil	Drain, clean tank, refill
12	plus all listed	Right Angle Drive	80W-90 Gear Oil	Drain and Replace
13	under 250 and 500 Hours	Final Drive	80W-90 Gear Oil	Drain and Replace

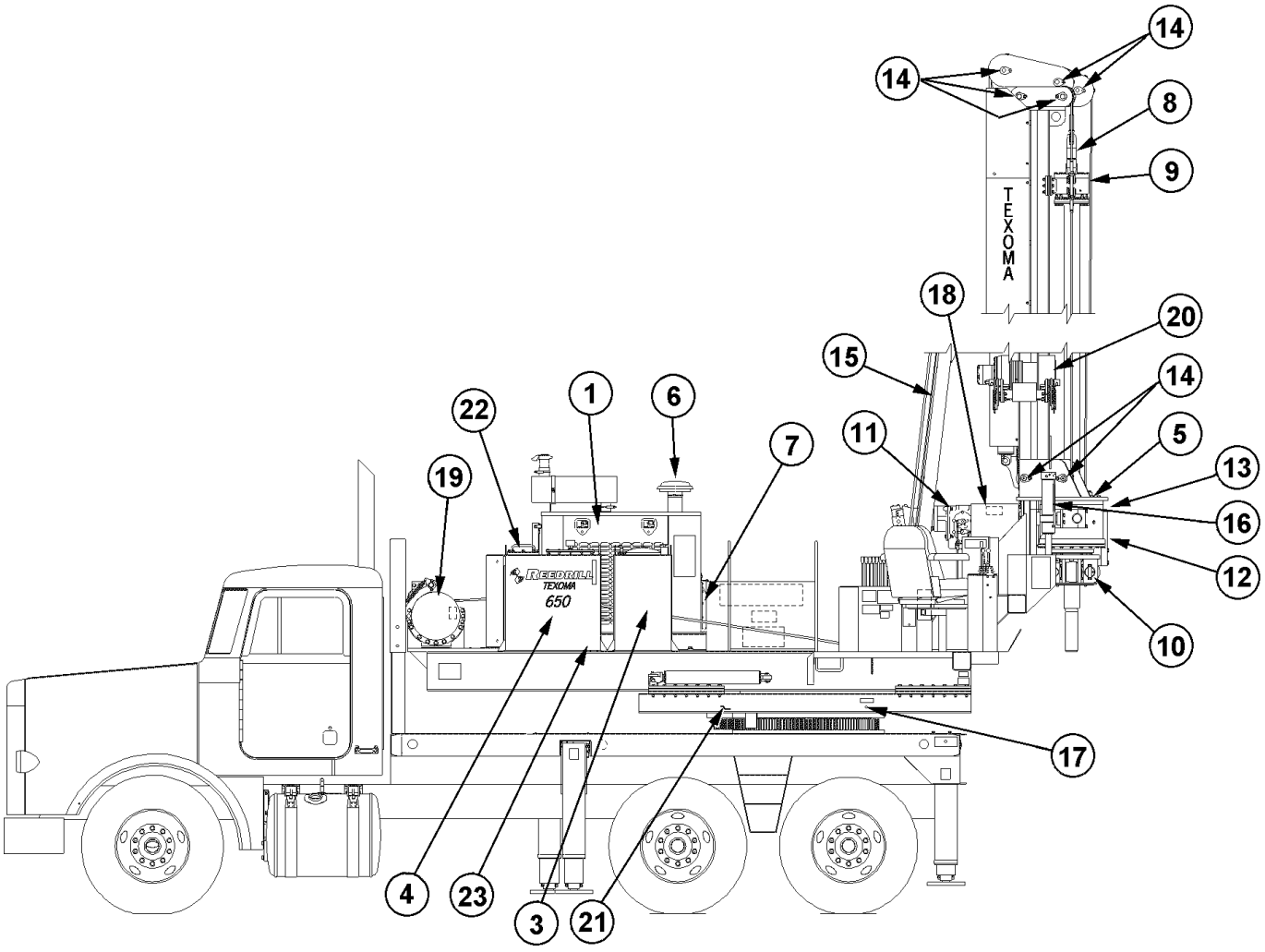


Fig. 5-1 Model 650 Lube Points (ref. 420715)

Selection of Hydraulic Oil

Machines are factory filled with Chevron AW MV **ISO 32** Hydraulic Oil, unless specified otherwise by the customer.

Hydraulic Oils meeting the specifications in the chart below will be acceptable for use in the **Model 650** Auger Drill. If in doubt, contact your oil supplier or your nearest Reedrill distributor.

	Chevron Hydraulic Oils AW				
ISO Grade	**15**	**32**	**46**	**68**	**100**
CPS Number	232953	255678	255679	232952	232950
API Gravity	27.3	32.6	31.9	30.9	30.7
Viscosity, Kinematic					
cSt at 40°C	15.8	30.4	43.7	64.6	95.0
cSt at 100°C	4.0	6.1	8.0	10.6	13.5
Viscosity, Saybolt					
SUS at 100°F	85.3	155	222	329	487
SUS at 210°F	39.7	46.6	53.0	62.3	73.4
Viscosity Index	159	153	157	154	143
Pour Point, °C (°F)	-54 (-65)	-48 (-54)	-42 (-44)	-42 (-44)	-39 (-38)
Flash Point, °C (°F)	150 (302)	190(374)	186 (367)	212 (414)	232 (450)
Oxidation Life, ASTM D 943, hr[1]	-	3000+	3000+	3000+	2000+

[1] 6000+ hours for ISO 32, 46 and 68 from the West Coast (Richmond, El Segundo, and Willbridge).

Gear Oil Specifications

Gearboxes are filled at the factory with Chevron RPM Universal Gear Lubricant SAE 80W-90 unless specified otherwise. DO NOT mix different types of gear oil. If the factory fill lubricant is not available in your area, drain all of the oil from the gearbox and refill with a compatible oil which meets the same specifications of the factory fill.

John Deere Engine Oil Specifications

Break-In Oil

- New engines come with break-in oil.
- Change oil and filter after first 100 hours of operation of a new or rebuilt engine.
- If oil needs to be added during the break-in period, and John Deere engine break-in oil is not available, use one of the following oils for the first 100 hours:

  API Service Classification CD

  API Service Classification CC

  ACEA Specification E1

Oil Recommendations After Break-In Period (100 hrs.)

- John Deere PLUS-50® diesel engine oil is preferred.
- John Deere TORQ-GARD SUPREME® is also recommended.
- Other oils may be used if they meet one or more of the following:

  API Service Classification CI-4

  API Service Classification CH-4

  API Service Classification CG-4

  API Service Classification CF-4

  ACEA Specification E5

  ACEA Specification E4

  ACEA Specification E3

  ACEA Specification E2

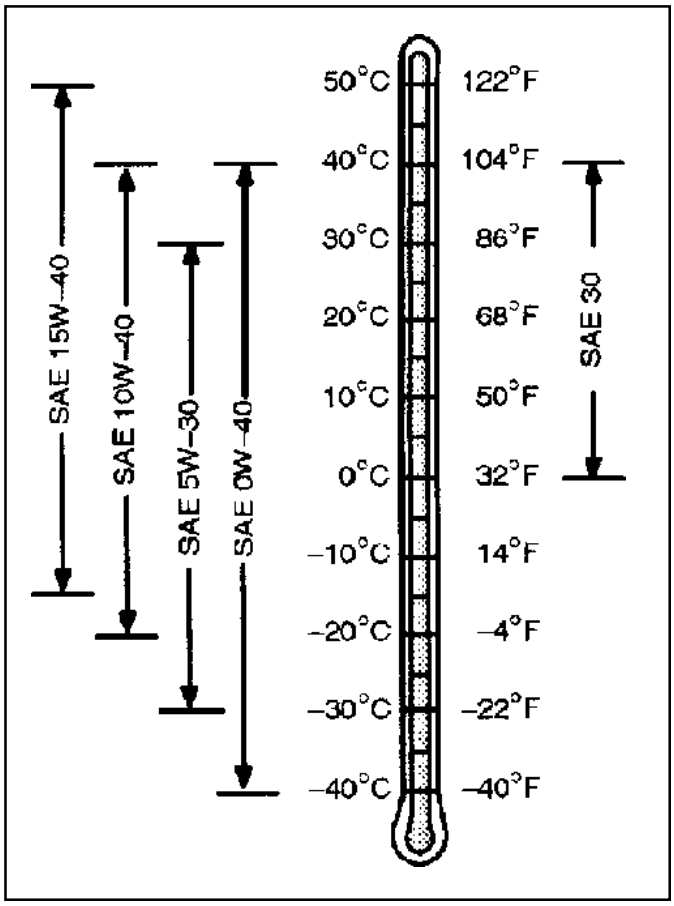


Fig. 5-2 Oil Recommendations for John Deere diesel engines

Alternative and Synthetic Lubricants

Conditions in certain geographical locations may require lubricant recommendations different from those listed above. Synthetic lubricants may be used if they meet the performance requirements listed above.

Re-refined base stock products may be used if the finished lubricant meets the performance requirements.

NOTE **The temperature limits and service intervals apply to both conventional and synthetic oils.**

Break-in Oil

DO NOT use break-in oils for new or rebuilt Cummins engines. Use the same type of oil during break-in as that used in normal operation.

Oil Recommendations

Cummins Engine Company, Inc. recommends the use of a high quality SAE 15W-40 heavy-duty engine oil (such as Cummins Premium Blue®), which meets the American Petroleum Institute (API) performance classification CE/SG.

CC/CD or CD/SF engine oils can be used in areas where CE oil is not available, but the oil change interval must be reduced to one half the normal change interval, i.e.; 125 hours instead of 250 hours.

15W-40 oil is recommended for most climates, refer to the chart below for oil recommendations for extreme climates.

NOTE **Limited use of low viscosity oils, such as 10W-30, can be used for easier starting at ambient temperatures below 23°F (-5°C). However, continuous use of low viscosity oils can decrease engine life due to wear.**

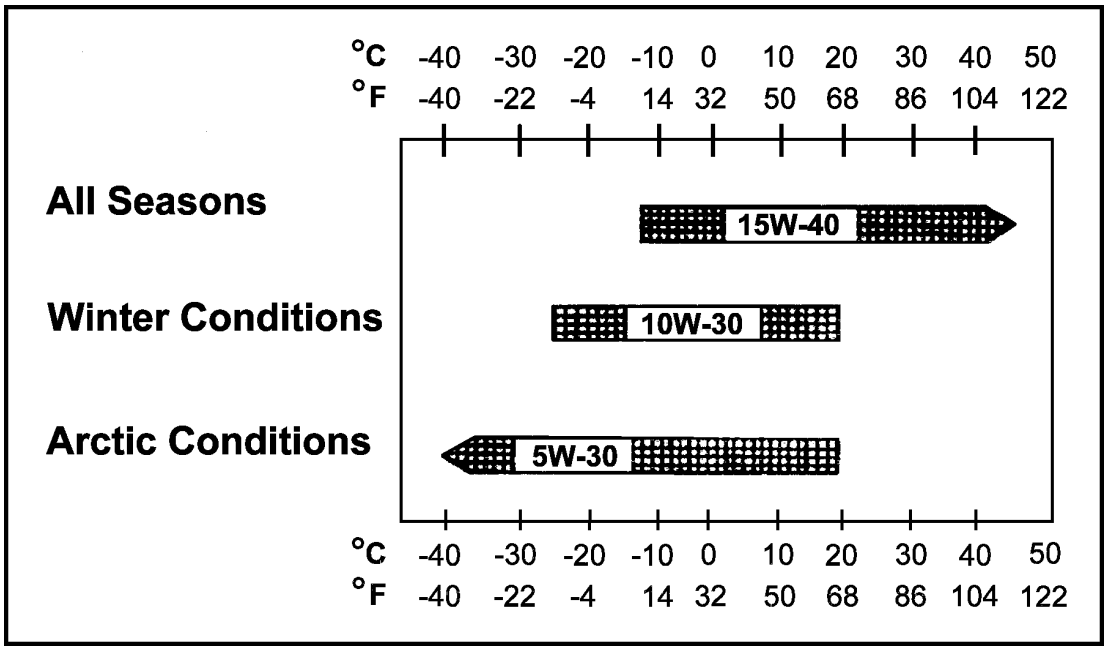


Fig. 5-3 Oil Recommendations for Cummins engines

Arctic Operation

If engine is operated in ambient temperatures consistently below -10°F (-23°C) and there is no provision to keep the engine warm when not in operation, use a synthetic CE/SG engine oil with adequate low temperature properties.

NOTE **The use of a synthetic-based oil does not justify extended oil change intervals. Extended oil change intervals can decrease engine life due to factors such as corrosion, deposits, and wear.**

General Tightening Torque Specifications

Procedure No. 1-87 REVISION A

Torque Values: Bolts, Screws and Studs (Lubricated or Plated)
Tolerance Values in all cases to +5 % - 0 % of the Value listed below.
Note: K = .15 for plated or lubricated fasteners.

	Nominal Diameter	SAE Grade 5 ASTM A-449 Tightening Torque Ft. Lbs. (Nm) Newton meter	SAE Grade 8 Tightening Torque Ft. Lbs. (Nm) Newton meter
UNC	1/4	6 (8.2)	9 (12.2)
	5/16	13 (17.7)	18 (24.5)
	3/8	23 (31.3)	33 (44.9)
	7/16	35 (47.6)	55 (74.8)
	1/2	57 (77.5)	80 (108.8)
	9/16	82 (111.5)	115 (156.4)
	5/8	113 (153.7)	159 (216.2)
	3/4	200 (272)	282 (383.5)
	7/8	322 (437.9)	455 (618.8)
	1 also UNS	483 (656.9)	681 (926.2)
	1-1/8	596 (810.6)	966 (1313.8)
	1-1/4	840 (1142.4)	1363 (1853.7)
	1-3/8	1102 (1498.7)	1786 (2429)
	1-1/2	1462 (1988.3)	2371 (3224.6)
	1-3/4	1714 (2331)	
	2	2576 (3503.4)	
	2-1/4	3768 (5124.5)	
	2-1/2	5155 (7010.8)	
	2-3/4	6996 (9514.6)	
	3	9231 (12554.2)	
UNF	1/4	7 (9.5)	10 (13.6)
	5/16	14 (19)	20 (27.2)
	3/8	26 (35.4)	37 (50.3)
	7/16	40 (54.4)	60 (81.6)
	1/2	64 (87)	90 (122.4)
	9/16	91 (123.8)	128 (174.1)
	5/8	127 (172.7)	180 (244.8)
	3/4	223 (303.3)	315 (428.4)
	7/8	355 (482.8)	502 (682.7)
	1	528 (718.1)	746 (1014.6)
	1-1/8	668 (908.5)	1083 (1472.9)
	1-1/4	930 (1264.8)	1509 (2052.2)
	1-3/8	1254 (1705.4)	2034 (2766.2)
	1-1/2	1645 (2237.2)	2668 (3628.5)
UN	1-3/4	1879 (2555.4)	
	2	2857 (3885.5)	
	2-1/4	4127 (5612.7)	
	2-1/2	5726 (7787.4)	
	2-3/4	7693 (10462.5)	
	3	10064 (13687)	

Bolt Maintenance

WARNING:
BE SURE all bolts are tight and not damaged. Pay particular attention to critical areas, such as; feed ram, right angle drive pivot, final drive mounting, elevating and leveling cylinder pivots, or any areas where loose bolts could cause a component to fall and cause injury.

Retorque bolts after first 50 hours of machine operation. Retorque any bolts that are less than the specified value as listed in the Bolt Torque Specifications sheet or as specified on the assembly drawing. Pay particular attention to critical mounting areas, such as; feed ram, right angle drive pivot, final drive mounting, elevating and leveling cylinder pivots, or any areas where loose bolts could cause a component to fall and cause injury or machine damage.

Periodically inspect bolts for damage and replace as necessary. Check torque and retorque as required.

Bolt Grade Identification

Fig. 5-4 shows the common markings on bolt heads used on Reedrill/Texoma auger drills to identify what grade the bolt is. The grades shown are not all inclusive, but show what is commonly used on Reedrill/Texoma augers.

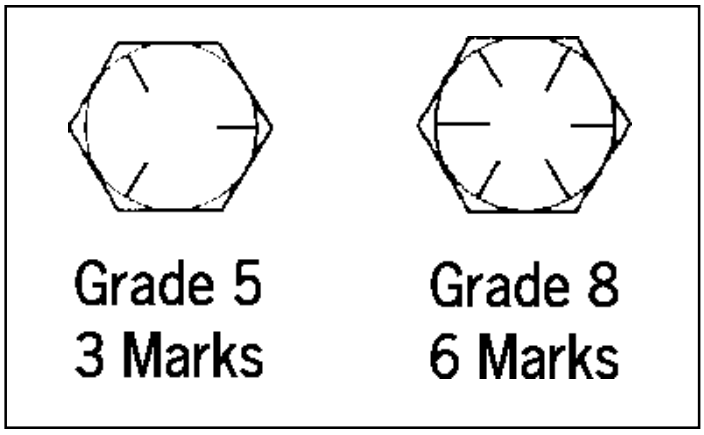


Fig. 5-4 Two commonly used bolt head markings

Maintenance Record

DATE	DESCRIPTION OF SERVICE PERFORMED	SERVICE PERFORMED BY:

Maintenance Record

DATE	DESCRIPTION OF SERVICE PERFORMED	SERVICE PERFORMED BY:

Maintenance Record

DATE	DESCRIPTION OF SERVICE PERFORMED	SERVICE PERFORMED BY: