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Operation and Maintenance Manual

FH110 Face Haulage

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Characters and symbols used

The following characters and symbols are used for safety instructions and important information in the operating manual.

Try to memorize the symbols and their meanings.

DANGER!
Points in the text marked with this symbol draw your attention to immediately impending danger. Possible consequences are: very serious injury or even death.

WARNING!
These points contain information on dangerous situations. Possible consequences are: very serious injury or even death.

CAUTION!
This symbol draws attention to dangerous situations. Possible consequences are: light to moderately serious injuries and machine damage.

NOTICE!
Points in the text marked with this symbol draw attention to harmful situations. Possible consequences are: damage to the machine or damage in the immediate vicinity.

IMPORTANT!
Points in the text marked with this symbol contain useful tips and information intended to facilitate work for you. They do not warn about harmful or dangerous situations.

Installation and start-up

inclined face

On inclined faces secure all component parts by chains, e.g. to the support.

environmental acceptability

When working with oils, greases and other chemical substances, observe the safety regulations applicable to the product.

Dispose of cleaning rags, etc. which have been soiled with oil, grease or other chemical substances in an environmentally safe manner.

controls

When starting up machine, do not operate any controls located inside the operator's compartment from outside the compartment.

starting procedures

Follow the starting procedure instructions in chapter 5 of this manual.

hazard zone

Do not operate any levers, pedals or controls if anyone is in the hazard zone. (See Hazard zone in Chapter 5 of this manual)

Operation

training

Operate the machine only if you have a profound knowledge of the control elements and their functions. It is necessary that you have been task trained on the respective machine.

before start-up

Before start-up, ensure that there are no persons or obstructions in your line of travel or in the articulation area when steering the unit.

protective devices

Check that all protective devices are installed on the machine and function properly.

operator's compartment

Clean the operator's compartment at regular intervals. Ensure that the operating symbols are legible in order to avoid any operator errors and resulting accidents.

Never climb onto, or climb out of the machine while it is in motion.

Do not operate the machine with any part of your body outside of the operator's compartment in order to prevent body parts from being crushed between the machine and outside objects .

traveling

Use extreme caution when traveling in close quarters or in congested or blind-travel areas. The warning gong should be sounded to alert personnel of your movement.

passengers

Never carry passengers to prevent the passengers from being thrown off or crushed between the machine and outside objects.

safety rules

Always follow all safety rules of each particular mine when operating the machine.

problems and malfunctions

If problems or malfunctions are encountered while operating the unit, it must be properly shutdown and the problem corrected immediately.

Before transport

temperatures below freezing

Before transporting the equipment at temperatures below freezing, all hydraulic components operated with emulsion (HFAE or HFAS) must be completely drained and then filled with a corrosion inhibitor/frost-proofing fluid (e.g. CV 50).

Transport of equipment at temperatures between -6° F (-21° C) and 40° F (-40° C) is only permissible when certain measures were taken to meet these conditions at the design and manufacture stages. Nevertheless, the individual parts and devices of this equipment must not be subjected to sudden impact loads at such low temperatures and may only be loaded statically or quasi-statically.

During transport of this equipment with floor-mounted vehicles at such low temperatures, measures must also be taken to ensure that the parts and devices are not subjected to sudden impact loads. At very low temperatures and on poor roads, the transport vehicle speed must therefore be limited to a maximum of 15 mph (25 kph) for truck transport.

electronic components

Electrical and electronic components must be removed for overseas transport or prolonged storage outdoors unless these components or the complete equipment is protected against harmful environmental influences by a suitable packaging.
The electrical cables remain in the equipment. They must be carefully protected against transport damage and soiling of the connections.

5 Operation

Table 3, continued: Controls handle functions

Component	Function	Operation
5. PARK BRAKE	Used to set or release the park brake.	1. To set the park brake and leave the pump motor running: a. Press the PARK BRAKE button 2. To release the park brake (pump motor must be running): a. Press the In-Position button and hold. b. Press the PARK BRAKE button and hold until the display indicates “PARK BRAKE RELEASED”. c. Release the In-Position button. d. Release the PARK BRAKE button.
6. STOP	Used to shut down the machine—stops the pump motor, turns off the lights, and sets the park brake.	1. Press the STOP button
7. LIGHTS (trailer end)	Activates the lights on the trailer end of the machine.	1. To activate the lights, press the LIGHT button. 2. To activate All Position lights (headlights follow the selected tram direction): a. Press the In-Position button and hold. b. Press the battery end LIGHTS button (LIGHTS ⇦). c. Release the In-Position button. Lights will stay in the auto position until STOP or either LIGHT button is pushed.
8. TRAM (trailer end)	Activates tramming toward the trailer end of the machine.	1. To enable tramming (pump motor must be running and park brake must be released). a. Press the in-position button and hold. b. Depress the TRAM button and hold. c. Hold both the TRAM and in-position buttons in until the display indicates tram selection. d. Release the TRAM button. e. Release the in-position button. 2. To disable tramming, push the TRAM button. Note: Tram speed is controlled by the foot speed switch (accelerator).

Shutdown procedure

1. Tram the machine to its designated parking place.

2. Stop the machine by releasing the accelerator pedal and depressing the foot brake pedal. When the accelerator pedal is released, the tram (traveling) motors will deenergize but will continue to rotate. Applying the foot brake will stop forward (or reverse) motion. The hydraulic pump's electric motor will still be running, making a whining sound.

WARNING!
Always check before moving the ejector blade and false bottom control lever to make sure no one has any part of their body between the ejector blade/false bottom and the front of the rear (payload) section.

3. Return the ejector blade/false bottom to the front of the payload section. There should be no obstructions behind the ejector blade/ false bottom.

Note: Refer to Fig. 14 for illustration of control handle.

4. Before leaving the operator's compartment, press "STOP" to turn the machine off.

5. Before leaving the operator's compartment, turn off the machine circuit breaker by pressing the "EMERGENCY STOP" button.

6. Connect the steering lockout device (Fig. 15):

   a. remove the steering lockout device from its storage lugs

   b. remove the hitch pin from the end farthest from the center section

   c. adjust turnbuckle until holes line up between the turnbuckle lug and the front section lug

   d. insert the hitch pin into the front section lug through the turnbuckle

WARNING!
Never enter the articulation area while the machine is running. Completely shutdown the machine as outlined before connecting the steering lockout device. Failure to observe this precaution may result in injury or death.

CAUTION!
This unit is equipped with a canopy. Be careful not to hit your head when entering or leaving the operator's compartment.

Critical torque values

Table 5: Critical torque values

Location	Bolt size	Grade	Torque (ft-lb)
Steering cylinder pins			
Tire-Wheel mounting	3/4-16X1-3/4	8	300
Planetary wheel end-to-frame mounting	3/4-10X3-1/4	8	300
Gear case-to-frame mounting	3/4-10X2-1/4	8	300
Drive motor-to-gear case mounting	3/4-10X2-3/4	5	300

Lubricants, fluids and capacities

Table 6: Lubricants, fluids and capacities

Location	Lubricant	Approximate capacity	Notes
Hydraulic oil	Spec. 100-1	65 Gallons	1
Gear case	Spec. 100-8	4 Gallons Each	2, 3
Grease points	Spec. 100-3	As Required	4

Notes:

1. With false bottom/ejector blade completely retracted.
2. 4 gallons of oil to completely fill dry system. Actual level should be checked after running unit to fill cooling system. Use dipsticks (one in each drive gear case) to check oil level. If not equipped with dip-stick, use the plug approximately located at center on one end of the gearbox.
3. Drain gear case and wheel end separately. Fill gear case only to proper level on dipstick.
4. Pump grease into fitting until old grease can be observed coming out of component.

First week of service

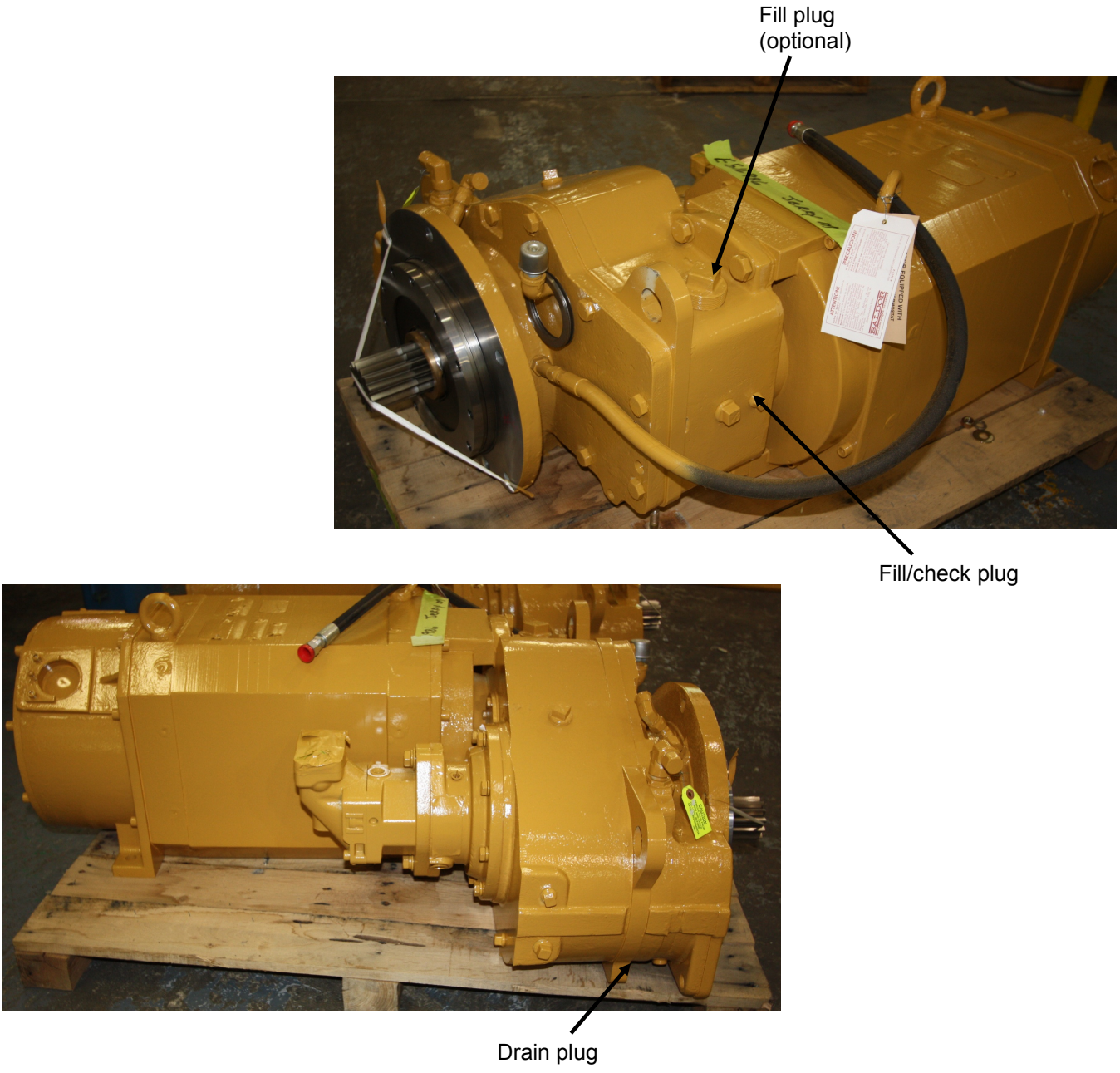
gear case and planetary wheel end

Change the oil in both gear cases and planetary wheel ends after the first week of service (Fig. 31).

1. Remove the drain plug (or hose connection if equipped with rear tractive assist) from the gear case and planetary wheel end (common drain plug) and allow the oil to completely drain .

2. Replace the drain plugs and refill with oil (Spec. 100-17) until oil begins to flow from check/level plug.

Fig. 31: Gear case and planetary wheel end oil



Monthly

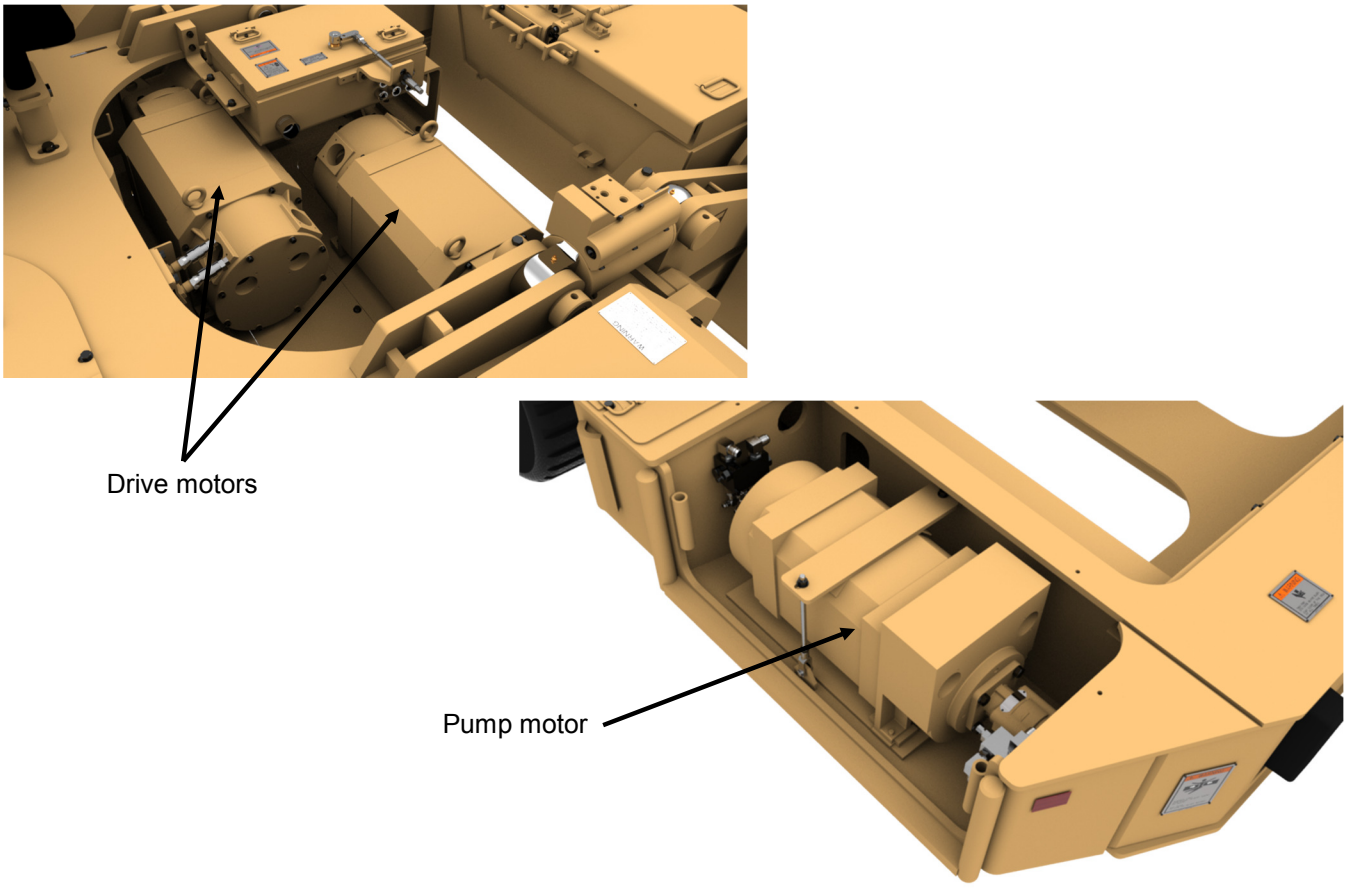
drive and pump motor (s)

Inspect the drive and pump motors (Fig. 43).

1. Be sure that the machine circuit breaker lever is in the "OFF" position.
2. Remove the inspection cover.
3. Inspect the windings, bearings, and motor connections.
   a. Windings should be dry and free of dust, grease, oil, and dirt.
   b. The leads and motor connections should be examined for corrosion, burn spots and for tightness.
4. Replace the inspection plate being sure it is securely tightened.

IMPORTANT!
The drive and pump motors do not require periodic lubrication. The pump motor bearings are sealed. The drive motors have one bearing sealed and the other bearing receives lubrication from the gear case oil.

Fig. 43: Drive and pump motors



Freewheeling (continued)

A check valve with an opening pressure of 30 PSI (2 bar) in the drain line regulates the pressure in the case. Limitation of pressure peaks in the case is accomplished by dimensioning the return line and check valve to correspond with the maximum intended speed of the motors at the moment of engaging/disengaging.

Under certain circumstances (e.g. with long length of pipe, high rotational speeds, or high viscosity oil) it is recommended to connect an accumulator (with at least 1/4 nominal capacity of the motor) to the drain line “C” (1-speed motor) of “C1” (2-speed motor with 2 drain lines). The accumulator should be as close to the motor as possible. Hydraulic accumulators designed for storing low pressure are sufficient. At the moment of engaging or disengaging the need for increased charge pressure must be taken into account.

Closed circuit

For vehicles having special hydraulic motors, freewheeling can provide higher speed ranges, since the total pump output is divided between fewer working motors.

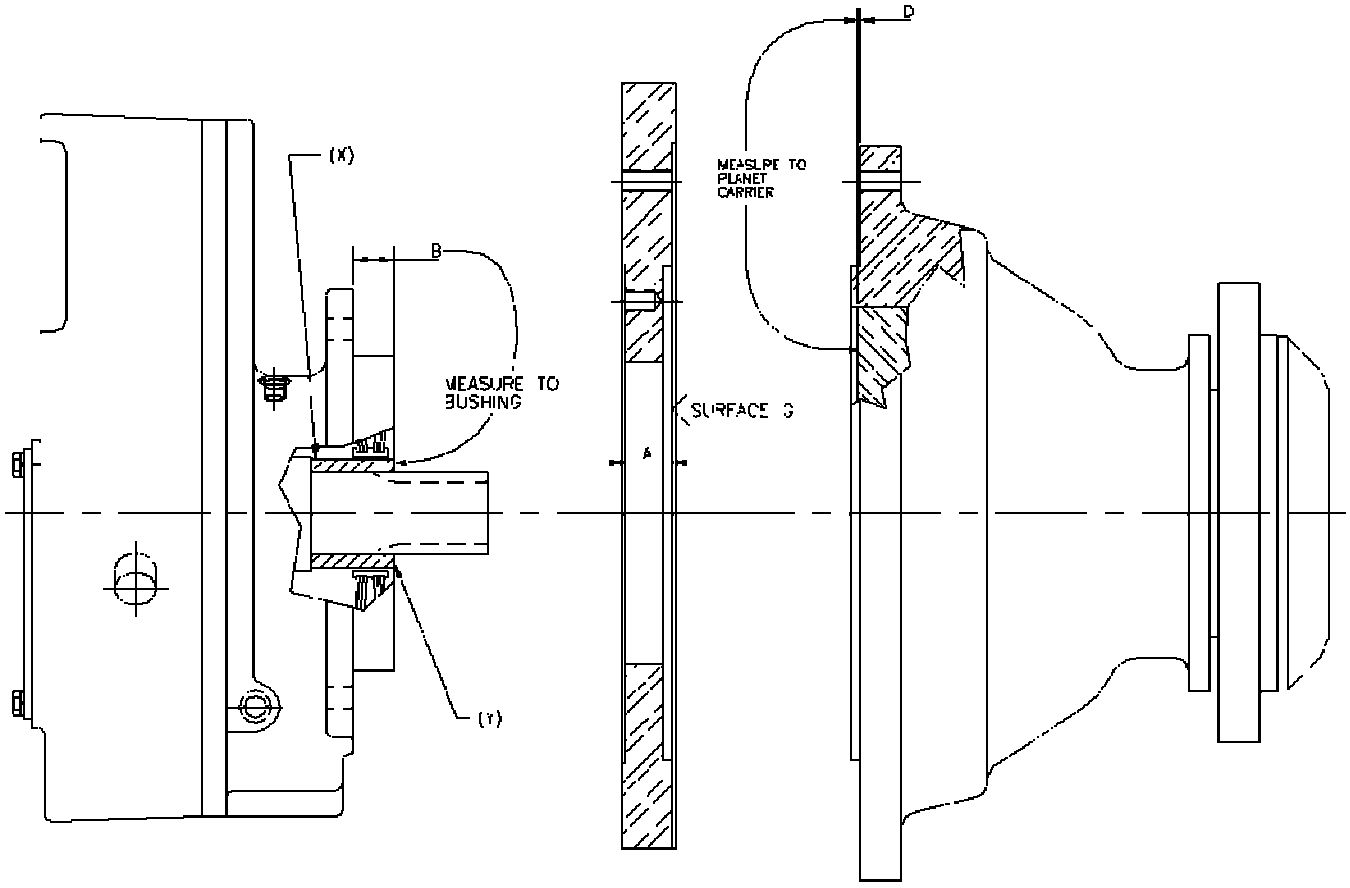
Disengaging the motor (shifting to higher speed range)

1. Motors to be freewheeled are detached to form an independent free circulation circuit.
2. A path from the motor circuit to the reservoir is rapidly opened, after which the constant small pressure in the casing disengages the motor.
3. The system charge pressure must be maintained in the pump circuit throughout the shifting procedure.
4. While shifting speed ranges, the sum of the displacement of the motors in operation changes gradually. The pump delivery is to be adjusted manually or automatically as required.
5. To avoid jerking during alteration of the pump delivery, the pump lines must be softly throttled.

Engaging the motor (shifting to lower speed range)

1. Disengaged motors are brought back into operation by connecting the “A” and “B” ports back into closed loop.
2. A charge pressure is rapidly applied to this circulation, forcing the pistons into motion. The charge pressure must be high enough to cover the pressure losses in the free circulation circuit as well.
3. The motors are connect to the same circuit as the pump.
4. The pump delivery is adjusted as required. Jerking can be avoided in the same way as when disengaging.
5. If the charge pump is too small, an accumulator is required to maintain the charge pressure

Fig. 54: Gear case and planetary wheel end shim procedure



Gear case and planetary wheel end shim procedure number 1 (shimming procedure does not apply to Fairfield gearboxes)

The purpose of the shim procedure is to set the axial end play between the gear case spacer (bronze) and the planet carrier/wheel end from 0.005” to 0.030” (loose).

NOTICE!
The following procedure is only for installing a new drive, wheel end or gear case only where stamped measurements are visible. If the drive or wheel end have had parts replaced, refer to Gear case and planetary wheel end shim procedure number 2 in this chapter. For an alternate, easier shimming procedure, refer to Gear case and planetary wheel end shim procedure number 3 in this chapter.

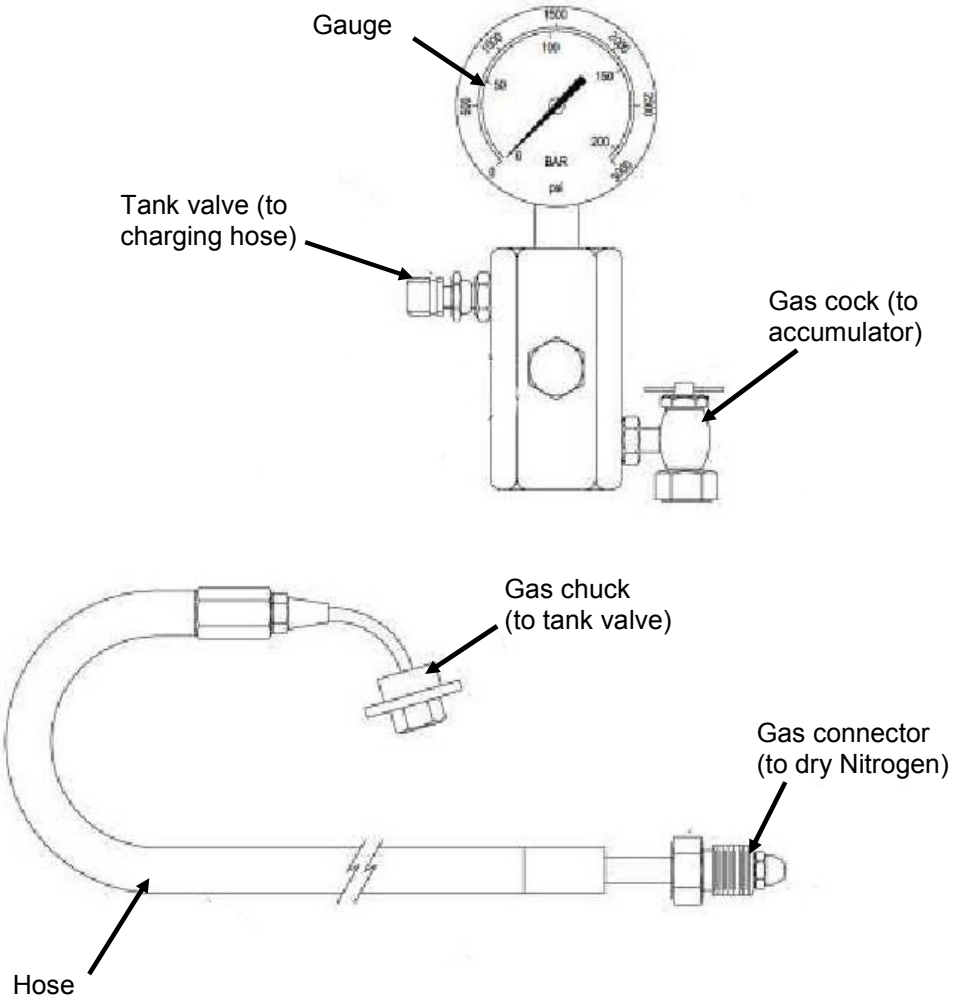
DANGER!
You could be seriously injured or even killed by falling loads. Observe the safe working load of the lifting and blocking devices and keep a safe distance away from suspended loads.

To calculate the required amount of shims for the gear case and planetary wheel end proceed as follows (Fig. 60).

1. Measure machined plate thickness of wheel well plate. Record figure on line “A”.
2. Locate the value stamped on machined mount face of drive unit (gear case). Record this value on line “B”.
3. Subtract line “B” from line “A” to get line “C”.
4. Locate the value stamped on machined mount face of wheel end. Record this value on line “D”.
5. If “C” is larger then “D”, proceed to step 6. If “D” is larger than “C”, proceed to step 7.
6. Subtract “D” from “C” to get ”E”. Then divide “E” by .025 and round answer up to nearest whole number. This is the number of shims that must be added at location “X”.
7. Subtract “C” from “D” to get ”F”. Then divide “F” by .025 and round answer up to nearest whole number. This is the number of shims that must be removed from location “X”.

A. _____	If “C” is greater:	IF “D” is greater:
B. -_____	C._____	D._____
C. _____	D.-_____	C.-_____
D. _____	E._____	F._____
	E / .025 = Number of shims to be added	F / .025 = number of shims to be added

Fig. 63: Nitrogen charging assembly, typical



Battery lift assembly removal procedure

WARNING!
Because you will be working with the battery lift cylinders, you must completely shutdown the unit (see shutdown procedure) and disconnect the battery plug to prevent accidental movement of the cylinders. Follow all rules and regulations regarding lockout/ tagout. Failure to lockout the machine may result in severe injury or death.

WARNING!
Observe the safe working load limits of all lifting and blocking devices. Failure to do so may result in severe injury or death or in machine damage.

To remove the battery lift assembly (reference Fig. 69):

Note: The battery lift assembly is operated by two hydraulic cylinders.

1. Fully raise the battery assembly.
2. Shutdown the machine following all lockout/tagout regulations.
3. Attach a crane or hoist, capable of lifting the assembly, to the assembly and take up any slack in hoist chain.
4. Remove, tag, and cap the hydraulic hoses from the lift cylinders.
5. Remove the cylinder pins that attach the lift assembly to the cylinders.
6. Remove the lift pins from the assembly
7. Lift the assembly out of the unit.

To install the battery lift assembly (reference Fig. 69):

1. Attach a lifting device to the battery lift assembly and position the assembly in the machine.
2. Insert the two lift pins into the assembly, securing the assembly to the frame.
3. Insert the cylinder pins that attach the lift assembly to the cylinders.
4. Connect the hydraulic hoses to the cylinders.

Tightening torques

IMPORTANT!
Due to the application of fasteners being subject to great stresses and heavy or extreme vibration, it is imperative that all bolts be applied with an adequate amount of torque. For this reason this list of recommended torque settings for different types and sizes of fasteners used has been compiled.
The tightening torques stated in the spare parts lists have to be observed, as well, for installation and maintenance.

Set screws

Table 4: Set screws (Socket long-lok)

Nominal diameter	Recommended torque setting
#6	6 in-lbs
#8	9 in-lbs
#10	13 in-lbs
¼”	30 in-lbs
5/16”	5 ft-lbs
3/8”	8 ft-lbs
7/16”	11 ft-lbs
½”	16.7 ft-lbs

Table 5: Set screws (Socket standard steel)

Nominal diameter	Recommended torque setting
#6	9 in-lbs
#8	16 in-lbs
#10	30 in-lbs
¼”	6 ft-lbs
5/16”	12 ft-lbs
3/8”	18 ft-lbs
7/16”	29 ft-lbs
½”	43 ft-lbs
5/8”	100 ft-lbs
¾”	146 ft-lbs
7/8”	199 ft-lbs
1”	262 ft-lbs