

Gillison's Variety Fabrication, Inc.



Orbit Lift Owners Manual

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INTRODUCTION

INTRODUCTION

The information in this publication describes the safety requirements, operation, maintenance and servicing of the Gillison Orbit Lift. Every effort has been made to provide correct and concise information to you, the operator, as available at the date of publication. Your Gillison dealer is available should items in this book or details of your machine not be understood.

This book is supplied with each machine to familiarize the operator with proper instructions needed for operation and maintenance. Studying and adhering to these instructions will insure optimum machine performance and longevity. A machine that is maintained properly and operated in the intended manner will provide greater dividends than one that is neglected and/or operated in a manner other than as intended. Design and servicing of this machine has been kept as simple as possible to permit maintenance operations to be carried out with tools normally available.

This book should be thoroughly read and understood prior to operation of this machine. Inexperienced operators should study contents of this publication and receive instruction from an experienced operator when possible. Your Gillison dealer can assist in areas concerning machine operation and provide details concerning safe operation. It is suggested that this booklet be kept readily accessible, preferably with the machine, for future reference if questions or concerns arise. If the original book should become lost or damaged, consult your Gillison dealer in regards to acquiring a replacement.

Customers are strongly advised to use an authorized Gillison dealer in connection with any service problems and adjustments that may occur.



CAUTION: READ THIS BOOK IN ITS ENTIRETY PRIOR TO OPERATING THE MACHINE. Use only parts from your Gillison dealer for repairs and/or replacement.



SAFETY

INTRO TO SAFETY

The safety of the operator is one of the main concerns in designing a new piece of equipment. Designers build in as many safety features as possible. However, every year many accidents occur which could have been avoided by a few seconds of thought and a more careful approach to handling equipment. You, the operator, can avoid many accidents by observing the following precautions. To avoid personal injury, study the following precautions and insist those working with you or for you follow them.

In order to provide a better view, certain photographs or illustrations in this manual may show an assembly with a safety shield removed. However, the equipment should never be operated in this condition. Keep all shields in place. If shield removal becomes necessary for repairs, replace shield prior to further operation.

SAFETY ALERT SYMBOL

FIG. 1: This is the safety alert symbol. It means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!** Look for it, both in this manual and on safety decals on the equipment. It will direct your attention to information that involves your safety and the safety of others.



FIG. 1

SIGNAL WORDS

FIG. 2: The words **DANGER**, **WARNING**, or **CAUTION** are used with the safety alert symbol. Learn to recognize these safety alerts, and follow the recommended precautions and safe practices.



DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.



WARNING indicates an imminently hazardous situation that, if not avoided, could result in death or serious injury.



CAUTION indicates an imminently hazardous situation that, if not avoided, could result in minor or moderate injury.



FIG. 2

Replace any **DANGER**, **WARNING**, **CAUTION** or instructional decal that is not readable or is missing. The locations and part numbers of these decals are identified later in this section of the manual.

GENERAL SAFETY RULES

FIG. 3: Always keep this manual with the machine.

This manual must be made available to the operator of the machine at all times. Special care must be taken to keep this manual safe from the weather and in readable condition.

Read this manual carefully and learn how to use the machine correctly.

Do not let anyone operate this machine without thorough instruction.

Beware of bystanders, particularly children! Always look around to make sure that everyone is clear before starting the engine or moving the machine. This is particularly important with higher noise levels as you may not hear people shouting.

FIG. 4: No passengers allowed. Do not carry passengers anywhere on the machine.

Dismount and park machine in the correct manner. When dismounting and/or leaving the operator's platform FOR ANY REASON always:

1. Lower boom completely.
2. Shut off engine.
3. Park on level ground.
4. Remove the key.



WARNING: An operator should not use alcohol or drugs which can affect their alertness or coordination. An operator on prescription or 'over the counter' drugs needs medical advice on whether or not he/she can properly operate equipment.

FIG. 5: Wear protective clothing. Do not wear loose clothing, as this may catch on moving parts of the machine causing injury.

Always wear protective clothing and appropriate safety equipment.

It is recommended that suitable protective hearing and safety glasses be worn.

Do not attempt to service machine, clear obstructions or unplug blockages with the engine running. Always shut off the engine first.

Keep all shields and guards in place.



FIG. 3



FIG. 4



FIG. 5

FIG. 6: Additional equipment: A fire extinguisher and first aid kit should be carried with the machine or be kept readily available at all times.

Keep emergency telephone numbers for immediate access.

SAFETY WHILE OPERATING



CAUTION: READ THIS BOOK IN ITS ENTIRETY PRIOR TO OPERATING MACHINE.

Keep the machine properly maintained. Do not operate a machine when it is broken or has missing parts. Make sure that the maintenance procedures in this operator's book are completed before using the machine.

Check all controls regularly and adjust where necessary.

Periodically check all nuts and bolts for tightness, especially wheel hub and rim nuts.

Clear the area. Ensure that all bystanders, particularly children, are in a safe position before starting the engine.



FIG. 7: Be aware of electrocution hazards. To prevent injury or death from electrocution:

Stay away from overhead power lines when operating pruning tower in raised position. This machine is not grounded. Electrocution can occur without direct contact.

Be observant of the operating area and terrain. Watch for holes, rocks or other hidden hazards. ALWAYS inspect area prior to operation.



FIG. 8: Be aware of side hill hazard. To prevent serious injury or death:

Do not operate pruning tower on 5° or greater side hill with bucket raised.

DO NOT operate near edge of banks. Setback distance from bank should equal or exceed the overall height of the bank.

DO NOT operate on steep slopes as overturning may result.

If necessary to cross a steep slope, avoid turning uphill.

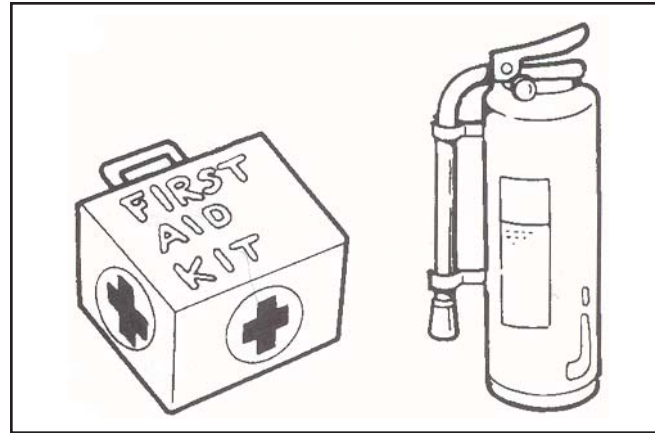


FIG. 6

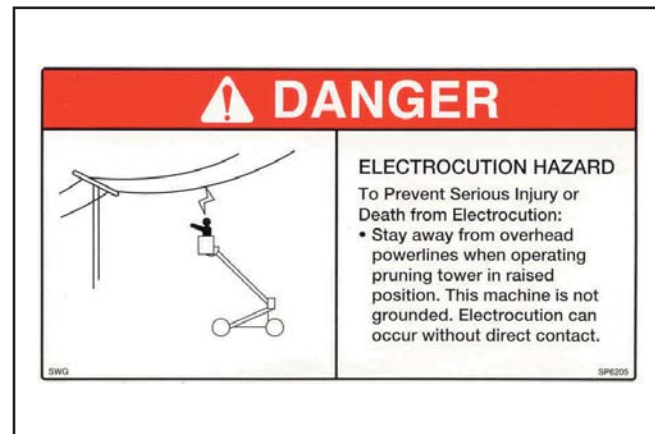


FIG. 7



FIG. 8

Slow down and make a wide turn. Travel directly up or down the slope, never cross it. Keep the heavy end of the machine on the uphill side.

FIG. 9: Do not use starting fluid. Starting fluid must only be used when an ether-start aid is fitted as original equipment by the manufacturer or when installed by a dealer as an approved accessory.

The orbit lift is equipped with glow plugs. These must be removed prior to the use of starting fluid or ether aid.

Use of starting fluid on engine equipped with glow plugs can result in severe engine damage.

Make sure there is plenty of ventilation. Never operate the engine in a closed building.

Always start and operate engine in a well-ventilated area.

If in an enclosed area, vent the exhaust to the outside.

Do not tamper with or modify the exhaust system with unapproved extensions.



FIG. 9

SAFETY WHILE SERVICING THE MACHINE

Stop the machine. DO NOT service the machine while the engine is running or hot, or if the machine is in motion.

NOTE: When making major repairs or complicated adjustments, it is recommended that you consult your Gillison Dealer and have the work carried out by trained personnel.

The following precautions should be observed. These have been arranged by machine area or component.

Cooling System

FIG. 10: DO NOT remove the radiator cap (see 1) when the engine is running or hot.

DO NOT add coolant to the radiator while the engine is running.

Before removing the radiator cap, turn the cap slowly to relieve the pressure.

When adding coolant, make sure coolant being added is compatible and will mix with existing coolant.

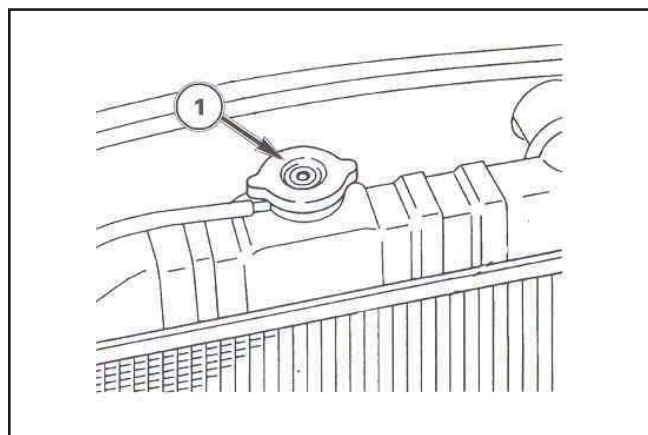


FIG. 10

Electrical System

FIG. 11: To prevent serious injury or death from exploding gasses:



Do not work on batteries without proper instruction and training.

FIG. 12: Before making adjustments or servicing the electrical system, disconnect the battery negative (-) cable (see 1) first to prevent short circuits.

Keep sparks, flames and cigarettes away. Use a flashlight to check the battery electrolyte level if necessary.

Do not produce sparks with cable clamps when charging the battery or starting the machine engine with a slave (jumper) battery.

Batteries contain sulfuric acid electrolyte. Always wear protective clothing and eye protection when servicing.

In case of electrolyte contact, rinse area with plenty of water and seek medical attention.

Batteries produce explosive hydrogen gas when charged. Charge in area with adequate ventilation. Halt charging if battery temperature exceeds 52°

Wash hands after handling battery.

Hydraulic System

FIG. 13: High pressure fluid hazard. To prevent serious injury or death:



Relieve pressure on system before repairing or adjusting or disconnecting.

Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.

Keep all components in good repair.

Ensure that all hydraulic connections are tight.

Relieve all pressures before disconnecting hoses or lines. Escaping oil under pressure can cause serious injury.

All fluids should be handled with care. If you are injured by or swallow any fluid, seek medical attention immediately and show the label on the product.

Fluid escaping from a very small hole can be almost invisible and can penetrate the skin causing serious injury. Keep hands and body away from pin holes and nozzles which eject fluids under high pressure. When



FIG. 11

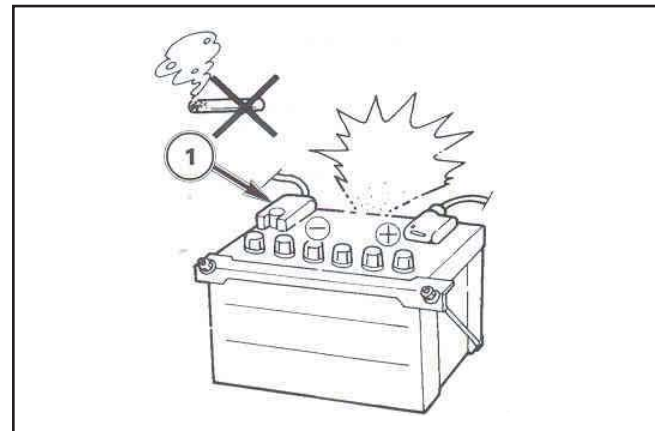


FIG. 12



FIG. 13

checking for leaks always use a piece of cardboard or wood. Never use your hands to find a pressure leak.

If ANY fluid is injected into the skin, it must be attended to by a doctor immediately.

Fuel System

FIG. 14: Diesel fuel is flammable and must be handled with care.

Never refuel or service the fuel system on the machine while smoking or when near open flames or sparks.

Never refuel the machine while the engine is running.

DO NOT use a fuel can unless necessary.

Always clean up any spilled fuel.

Fuel system components rely upon clean fuel for lubrication and optimum performance. Extreme care must be taken to prevent contamination from dirt and moisture so to prevent damage.

Fuel injection system servicing must be referred to your Gillison Dealer. Unauthorized servicing may void all warranties.

Wheels and Tires

Do not attempt to service a tire unless you have the proper equipment and experience to perform the job. Have the work carried out by your Gillison Dealer or a qualified repair service.

The machine must be supported on suitable blocks or stands, NOT a hydraulic jack.

When seating tire beads onto rims, never exceed 2.4 bar (35 psi) or the maximum inflation pressure specified on the tire. Inflation beyond this maximum pressure may break the bead, or even the rim, with dangerous, explosive force.

When preparing a calcium chloride solution for fluid blasting the tires, NEVER pour water onto the calcium chloride. A chlorine gas can be generated which is poisonous and explosive. This can be avoided by slowly adding calcium chloride flakes to water and stirring until they are dissolved.

Wear suitable protective clothing, gloves and eye/face protection.

Replacement Parts

FIG. 15: Where replacement parts are necessary for periodic maintenance and servicing, replacement parts from Gillison's must be used to restore your equipment to original specifications.

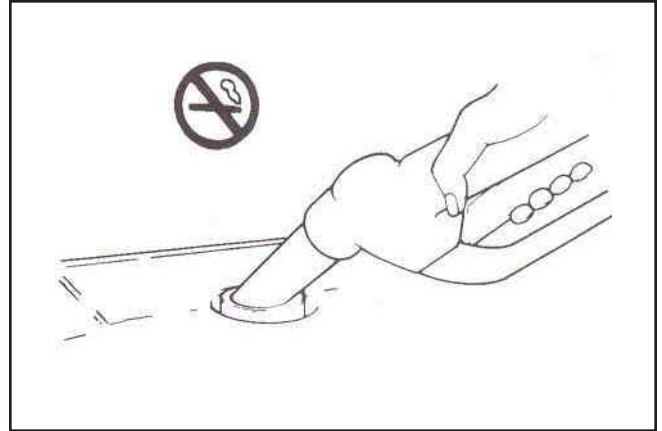


FIG. 14

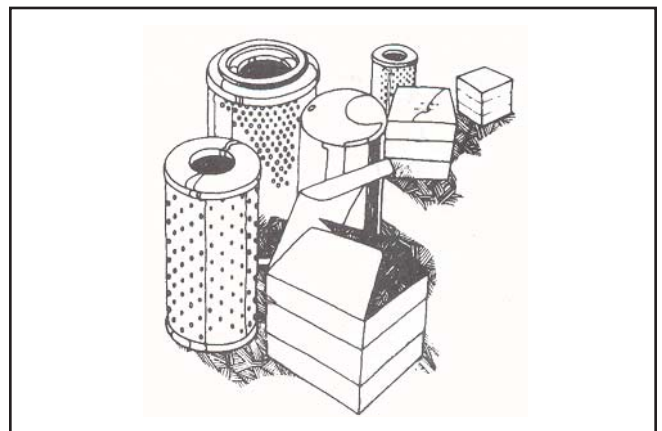


FIG. 15

CAPACITY LIMITATION

The orbit lift operators platform is rated for 300 lbs. This excludes a standard hydraulic pruner, saw and fall protection.

MISUSE AS A CRANE

The Orbit Lift shall not be used as a crane. This is not the intended use of the machine. Use of the machine in this manner could result in injury.

RECORD RETENTION

The owner shall retain the following records for at least 3 years:

A. Purchase Information

B. Records of persons trained upon delivery of the Orbit Lift

C. Written records of frequent inspections, maintenance performed and parts replaced

OWNERSHIP RECORDS

When a change of ownership of an Orbit Lift occurs, it is the responsibility of the seller to notify Gillison's Variety Fabrication Inc. with the following information within 60 days of the sale:

A. Serial number of machine

B. Name & address of new owner

OPERATION

PRIOR TO OPERATION

Be sure to read this entire manual especially the sections containing safety information and operation information.

STARTING

Turn ignition CCW to operate glow plugs then wait for 15 seconds.

Turn ignition switch CW while holding in the Murphy bypass switch to crank and start the engine.

Allow time for engine and hydraulic oil temperature to warm before operation.

INSTRUMENTS AND CONTROLS

Joystick

Enable switch must be depressed for joystick to be operational. If moving and enable switch is released, the orbit lift will stop, as if joystick was released to neutral.

Move joystick in the direction intended to move. See **FIG. 17**

The farther the direction that the joystick is moved in, the faster the travel speed. The joystick is proportional with travel speed. When trying to slow and stop, move joystick to neutral.

Lift

Step on one side of lift pedal to raise operators platform and the other side to lower operators platform.

Lowering can be accomplished at anytime as long as the key is on.

There is an emergency lower switch on the hydraulic manifold located by the engine. See **FIG. 18**

There is also a switch located at engine controls that allows operator to raise platform or lower platform. See **FIG. 21**

Emergency Stop

The emergency stop is located in operators platform at joystick controls. Press to stop. See **FIG. 19**

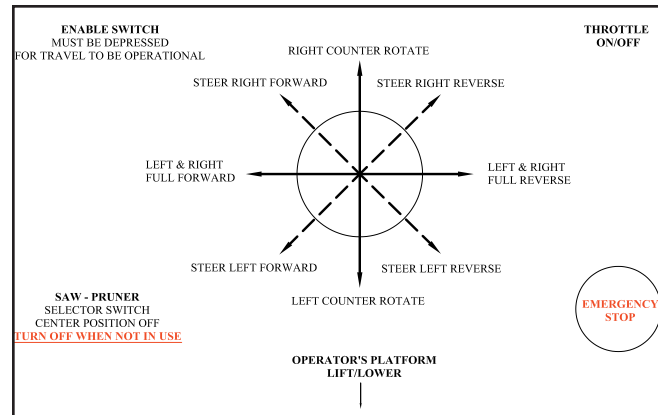


FIG. 17

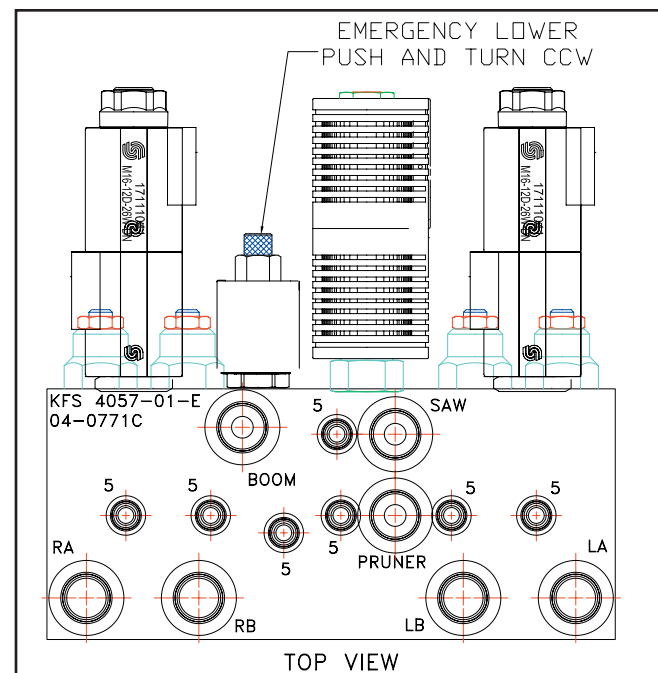


FIG. 18

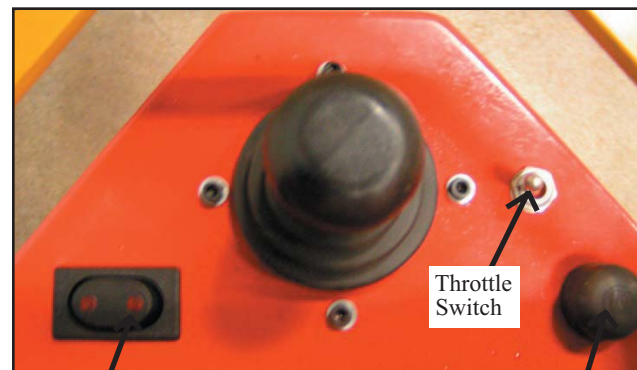


FIG. 19

Pruner / Saw Selector

Emergency Stop

Throttle

The throttle switch is located in operators platform at joystick controls. Throttle switch, normally at idle when turned on, increases engine RPM to working speed. See **FIG. 19**

Pruner / Saw Selector

Pruner / saw selector switch selects hydraulic valve to power either the saw or pruner. See **FIG. 19** Center position is off. Turn off when not using the pruner or saw. If either the pruner or the saw is left on while not in use, excessive heat is created and could cause damage to hydraulic system.

Pruner and saw are automatically turned off when joystick is moved from neutral to preserve power.

Instruments

SEE **FIG.20**

- 1 - Ignition switch**
- 2 - Murphy Bypass**
- 3 - Oil Pressure Gauge** (reads engine oil pressure.)
- 4 - Water Temperature Gauge** (reads engine water temperature)
- 5 - Voltmeter** (reads battery charge)
- 6 - Glow Plug Light** (indicates when glow plugs are in operation)
- 7 - Hour Meter** (measures hours of engine operation. Refer to meter for maintenance schedule)
- 8 - Lift Lower Switch** (toggle up to raise boom, toggle down to lower boom)

If there is a loss of oil pressure or high water temperature, Murphy system will automatically shut down the engine.

Observe gauges while machine is in use to ensure engine is operating in the correct ranges.



FIG. 20

LOWERED BOOM DRIVING REQUIREMENTS

Under all travel conditions, the operator shall use careful discretion to gauge a safe travel speed. Take into consideration conditions of ground surface, congestion of area, visibility, slope, location of personnel and other factors that could cause a hazardous situation.

ELEVATED BOOM DRIVING REQUIREMENTS

Before and during driving while the platform is elevated, the operator shall:

A. Maintain a clear view of the path of travel.

B. Maintain a safe distance from obstacles, debris, drop-offs, holes and other hazards to ensure safe elevated travel.

C. Maintain a safe distance from overhead obstacles especially power lines.

At no time shall the operator climb to an elevated position in the platform to increase reach. The operator must maintain firm footing on the platform floor while working.

The operator must report immediately any problems or malfunctions of the orbit lift to a supervisor. If the problem concerns safety it shall be repaired prior to continued operation.

TOWING THE ORBIT LIFT

Raise back of orbit lift with provided jack.

Install hitch to correct height so pivot wheels are off the ground.

Use hardened pin to hook up to towing vehicle.

Always use a safety chain.

Disconnect towable hubs, pull locking pin out then pull center shaft out approximately 1 inch. Reinstall locking pin. Machine may need to be rocked back and forth for pin to slide freely. See **FIG. 22**

Do this to both drive wheels.

On 25' orbit lift slide wheels in and lock in place before towing.

The orbit lift is now ready for towing. Maximum speed 25 MPH.

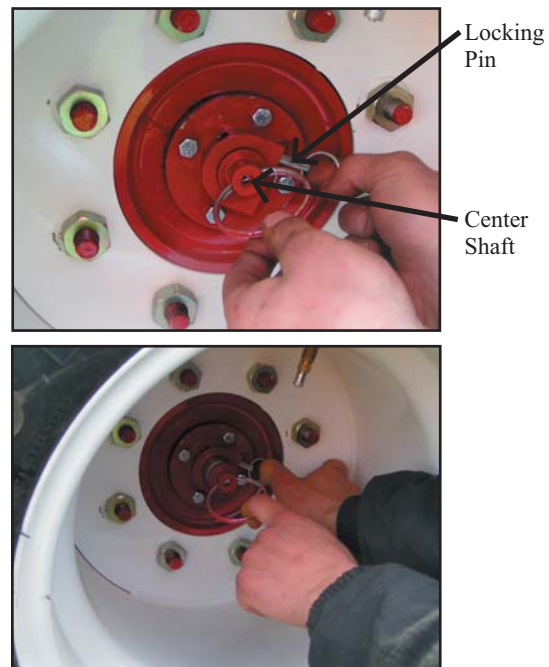


FIG. 22

UNAUTHORIZED USE

Means shall be used to prevent use of machine by unauthorized persons.

LUBRICATION & MAINTENANCE

ENGINE LUBRICATION & MAINTENANCE

Follow recommendations of engine manufacturer. Refer to engine manual.

GENERAL MACHINE LUBRICATION & MAINTENANCE

All pivots with grease fittings should be greased weekly or every 50 hours of operation, whichever ever is met first. See **FIG. 21**

Check tire air pressure monthly. Refer to tire specifications for proper inflation.

Check wheel nut torque monthly.

HYDRAULIC SYSTEM

Fluid level must be checked daily. Reservoir must be kept full and free of contaminants.

Refer to hydraulic schematic for hydraulic oil specifications, part numbers and filters. See **PAGE 24**

If high pressure filter indicator light turns from green to red, replace immediately or damage to system could occur.

Maintenance Chart

ITEM	Daily	50 hrs	200 hrs	600 hrs	1000 hrs
Check Oil Level and Cleanliness	●				
Change High Pressure Oil Filter				●	
Change Return Oil Filter				●	
Change Hydraulic Oil				●	
Grease Lubrication Points		●			
Check Drive Hub Fluid Level (See FIG.26)			●		
Replace Drive Hub Fluid		● (initial change)			●

THROTTLE SPEED ADJUSTMENT

Factory set speeds: 1500 RPMs low, 2500 RPMs high

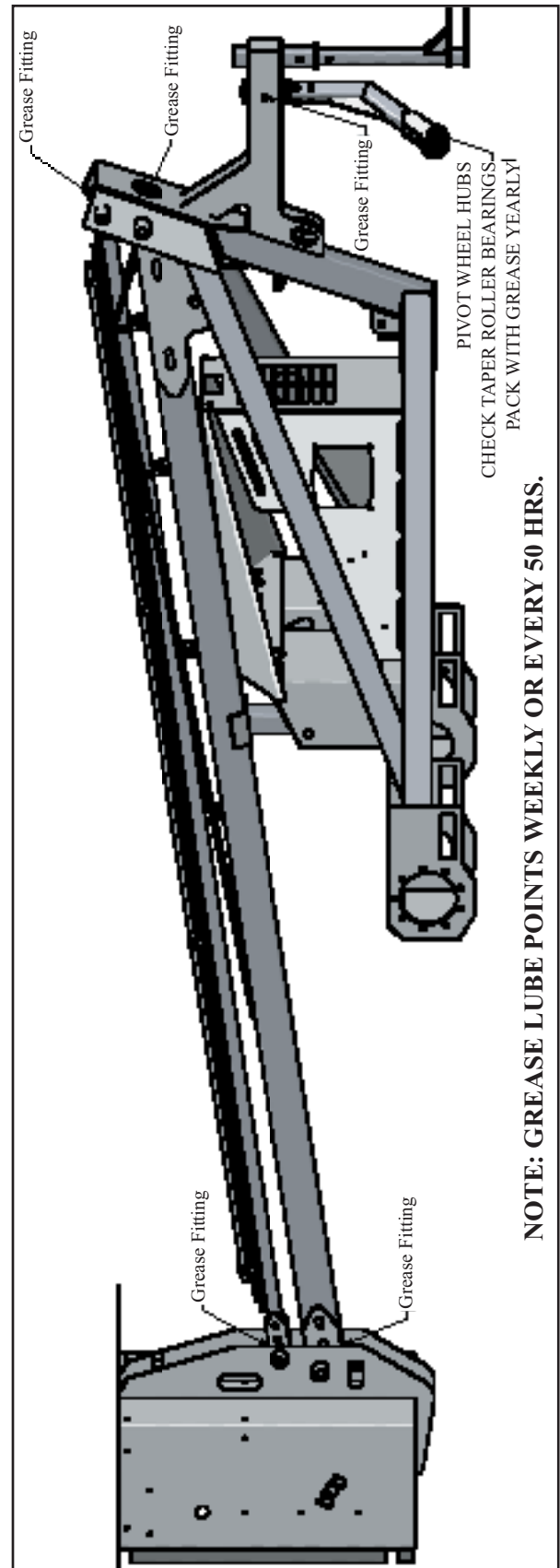


FIG. 21

See FIG. 22

- 1 - Loosen set screw.
- 2 - Thread cylinder CW to increase RPMs.
- 3 - Check speed with Photo Tach on water pump pulley.
- 4 - Last, retighten set screw.

FREQUENT INSPECTIONS

The Orbit Lift requires frequent inspections to be performed:

- A. Every 150 hours of service or every 3 months, which ever is met first.
- B. Before putting into service a machine which has been out of service for a period longer than 3 months of time.

The inspections must be made by a qualified Orbit Lift technician. The inspections shall include the following:

- A. All functions of movement including the boom moving up and down, propelling in all directions, and checking for speed and smoothness.
- B. Make sure enable switch for directional controls is operational.
- C. Make sure boom up/down switch at engine component is operational.
- D. Make sure emergency lower valve is operational.
- E. Lubrication of all pivot points.
- F. Check hydraulic fluid level, cleanliness, filter element, and look for hydraulic leaks.
- G. Visual inspection of structural components: boom, stabilizer arm, fasteners, cotter pins and machine chassis.
- H. Make sure all warning and operation insignia are in place.

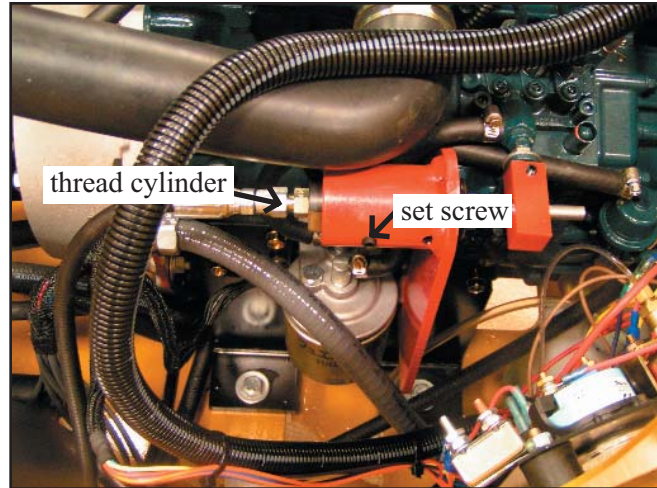


FIG. 22

TROUBLESHOOTING

PLUS 1 ECU

When troubleshooting the Plus 1 ECU use the diagnostic tool. The diagnostic tool is a 'window' into the controller showing all inputs, outputs and the current status of the controller. (An example of an input would be the analog signal from the joystick. An example of an output would be the PWM signals to the hydraulic manifold to drive the wheels.) The diagnostic tool shows any active fault codes with the description of the code. All set ups and calibrations for the Plus 1 are done with the diagnostic tool. The tool is easily navigated with specific headings. (list headings and picture of tool)

The items needed in order to troubleshoot the Plus 1 ECU are the Can link and software. The software is loaded onto a laptop computer and the Can link connects the computer to the Plus 1. **Part number GO 13160. For connector location. See FIG. 23**

If the diagnostic tool is unavailable the Plus 1 also will flash blink error codes with the LED status lights located on the controller. See FIG. 24

ERROR CODE CHART

Below is the error chart for the KSD1006 red LED flash codes:

FLASH CODE	COMPONENT	ERROR
Constant ON	JOYSTICK	Error on both axis
Constant Flash	JOYSTICK	Joystick not calibrated
1	JS Y AXIS	Input value too low
2	JS Y AXIS	Input value too high
3	JS Y AXIS	Input value is at zero
4	JS Y AXIS	Input value at sensor power
5	JS X AXIS	Input value too low
6	JS X AXIS	Input value too high
7	JS X AXIS	Input value is at zero
8	JS X AXIS	Input value at sensor power
9	"Left Front" coil	coil/wiring error
10	"Left Rear" coil	coil/wiring error
11	"Right Front" coil	coil/wiring error
12	"Right Rear" coil	coil/wiring error

The red LED on the controller will flash according to the error that is being received, with joystick errors taking priority over coil errors.

If more than one coil is in error, the service tool will show this but the flash code will give the lowest numerical error. For example, if "Left Rear" and "Right Front" coils are in error then the error code will be 10.

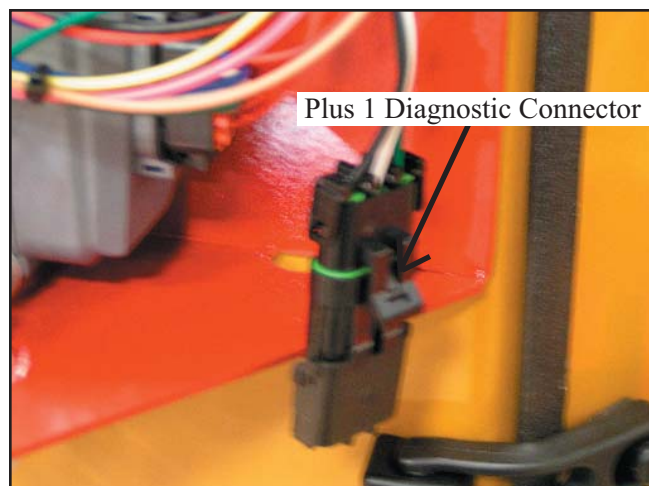


FIG. 23

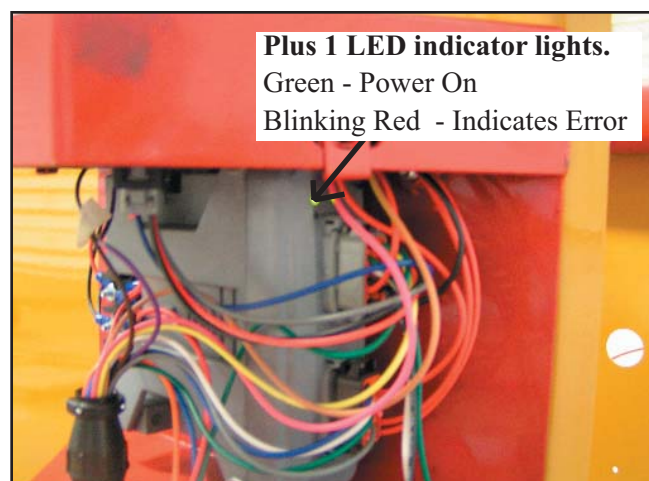
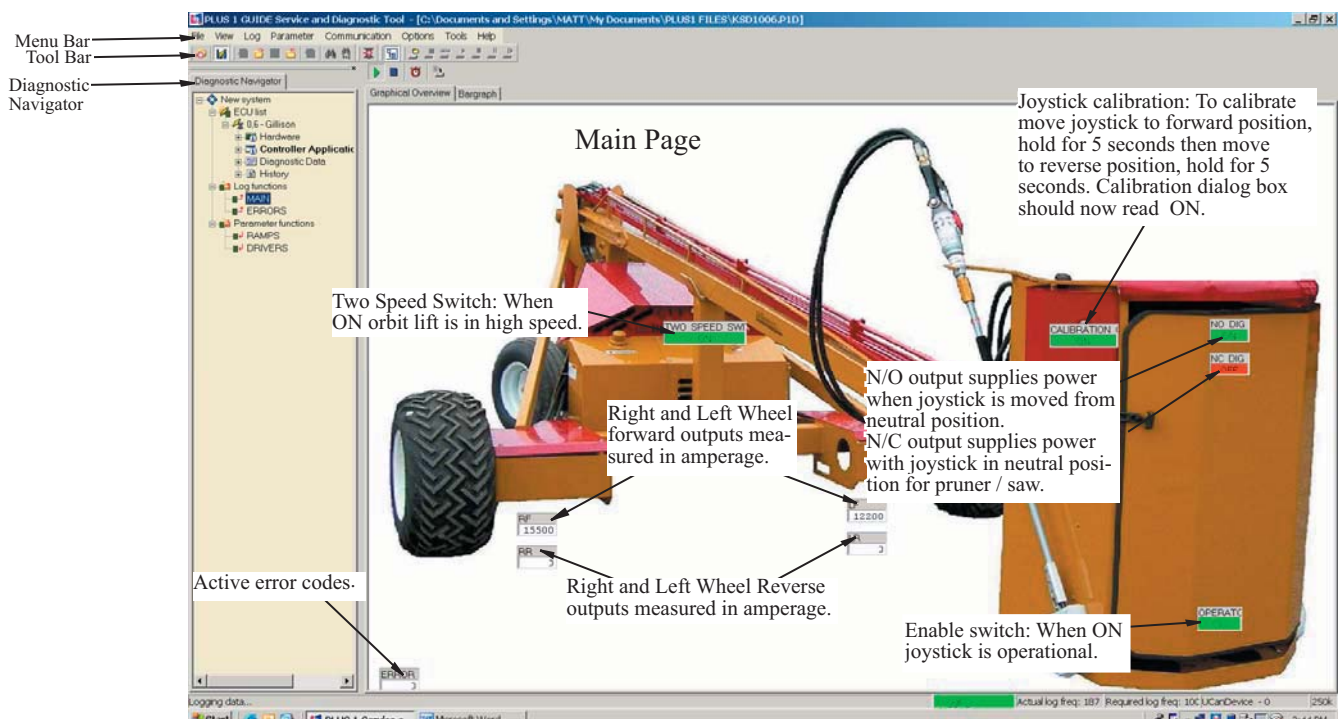
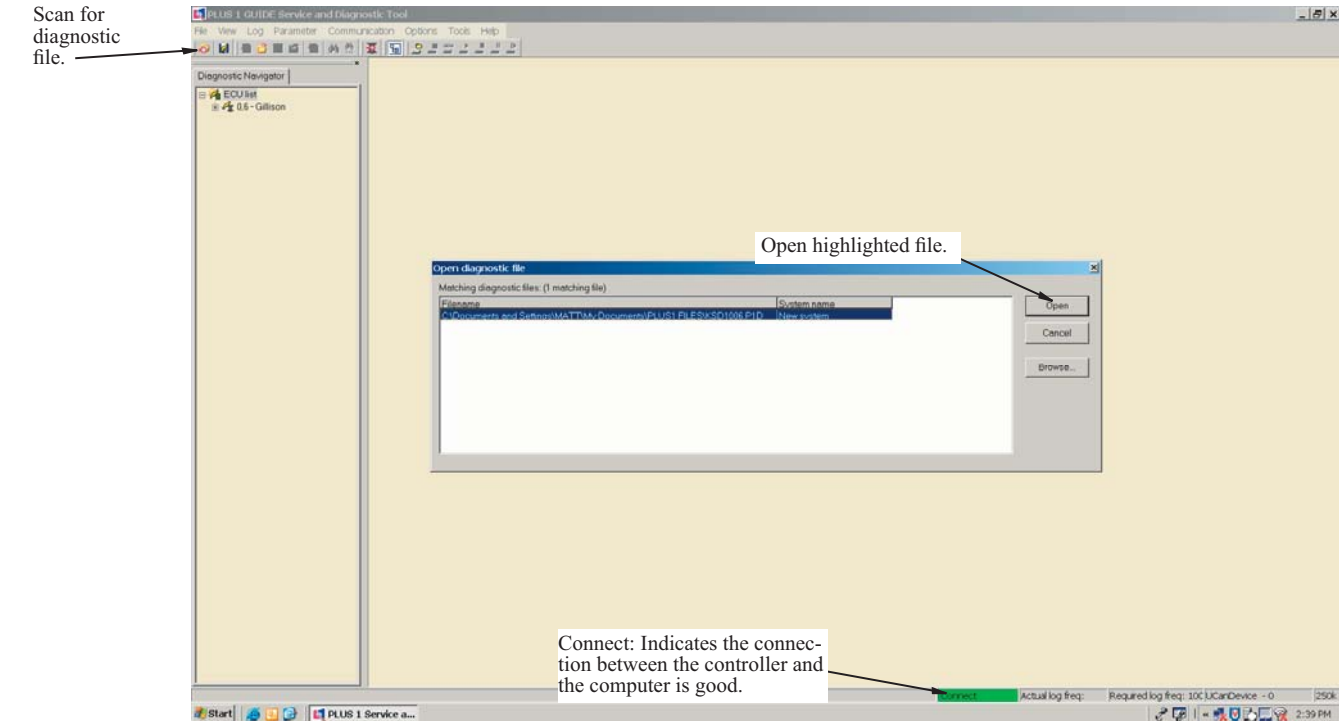


FIG. 24

Once the “Left Rear” error is gone the error code will be 11 until that error is gone as well. Flash code will continue indefinitely until power is cycled. Cycling the power will reset the error/flash code data.

Note: The constant flash rate for the joystick being out of calibration is noticeably faster than the regular flash code pattern.

USING THE DIAGNOSTIC SOFTWARE



USING THE DIAGNOSTIC SOFTWARE CONT.

Drivers Page

To adjust click upload then highlight data to be changed and type in desired value then click download.

PWM Start is the initial amperage to move the machine.

Low Max % is a percentage of high speed. The higher the percentage, the faster low speed is.

Note: To make the orbit lift drive straight, adjust PWM Max for high speed in each direction. Next adjust the Low Speed percentage for both wheels to drive straight. Then click download to save data.

PWM Max is the maximum amperage for high speed. To correct steering in high, adjust these amperages.

Download must be clicked after a change is made to save data.

Upload must be clicked before any change can be made.

Ramps Page

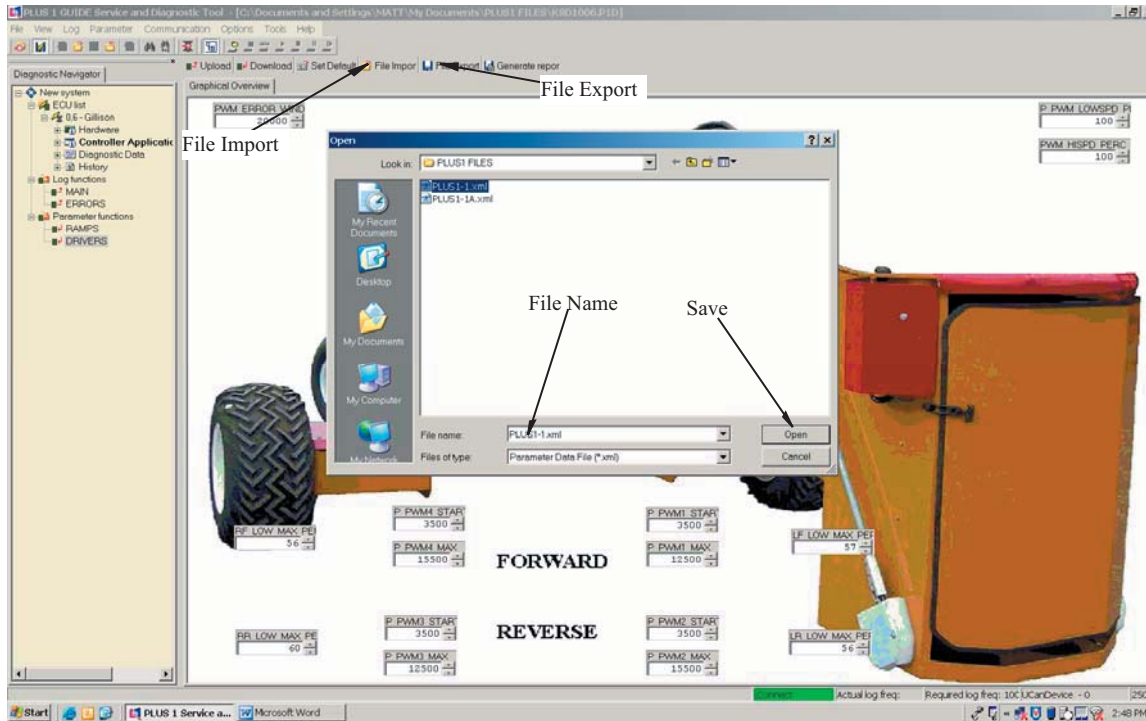
Type in time desired into field then press enter.

Ramps are in m/s and 1,000 m/s = one second

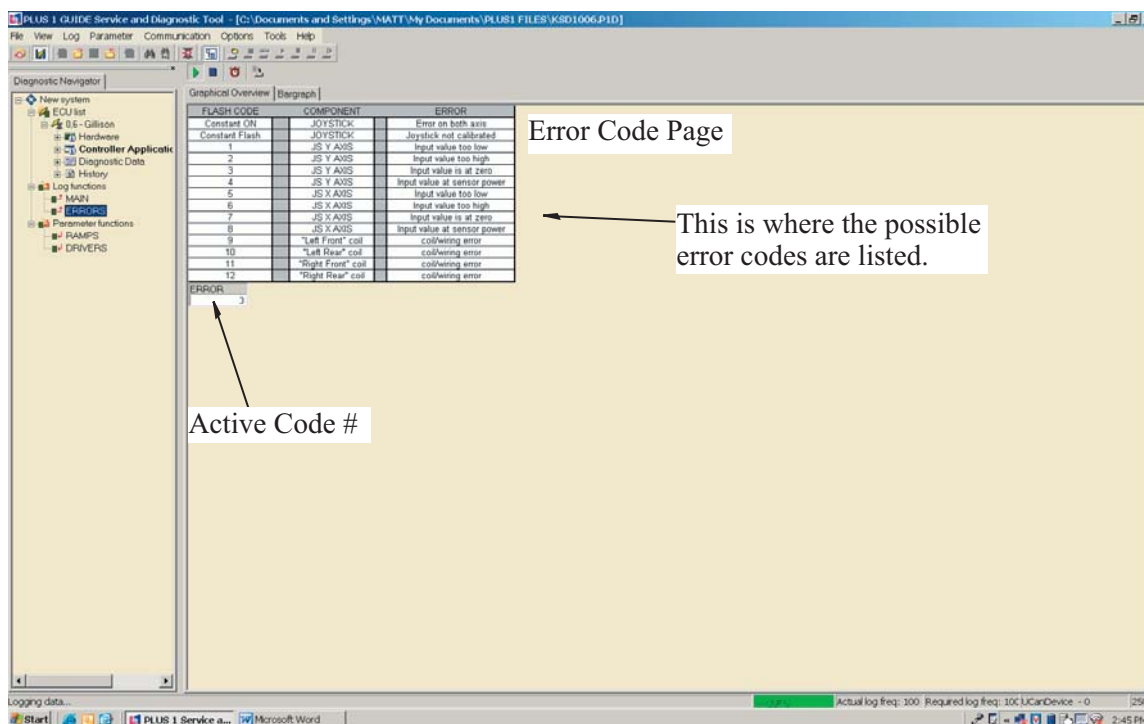
Warning! Test the performance of the orbit lift in an open area when adjusting any ramps or PWM outputs. Always jack up the drive wheels when making any adjustment.

USING THE DIAGNOSTIC SOFTWARE CONT.

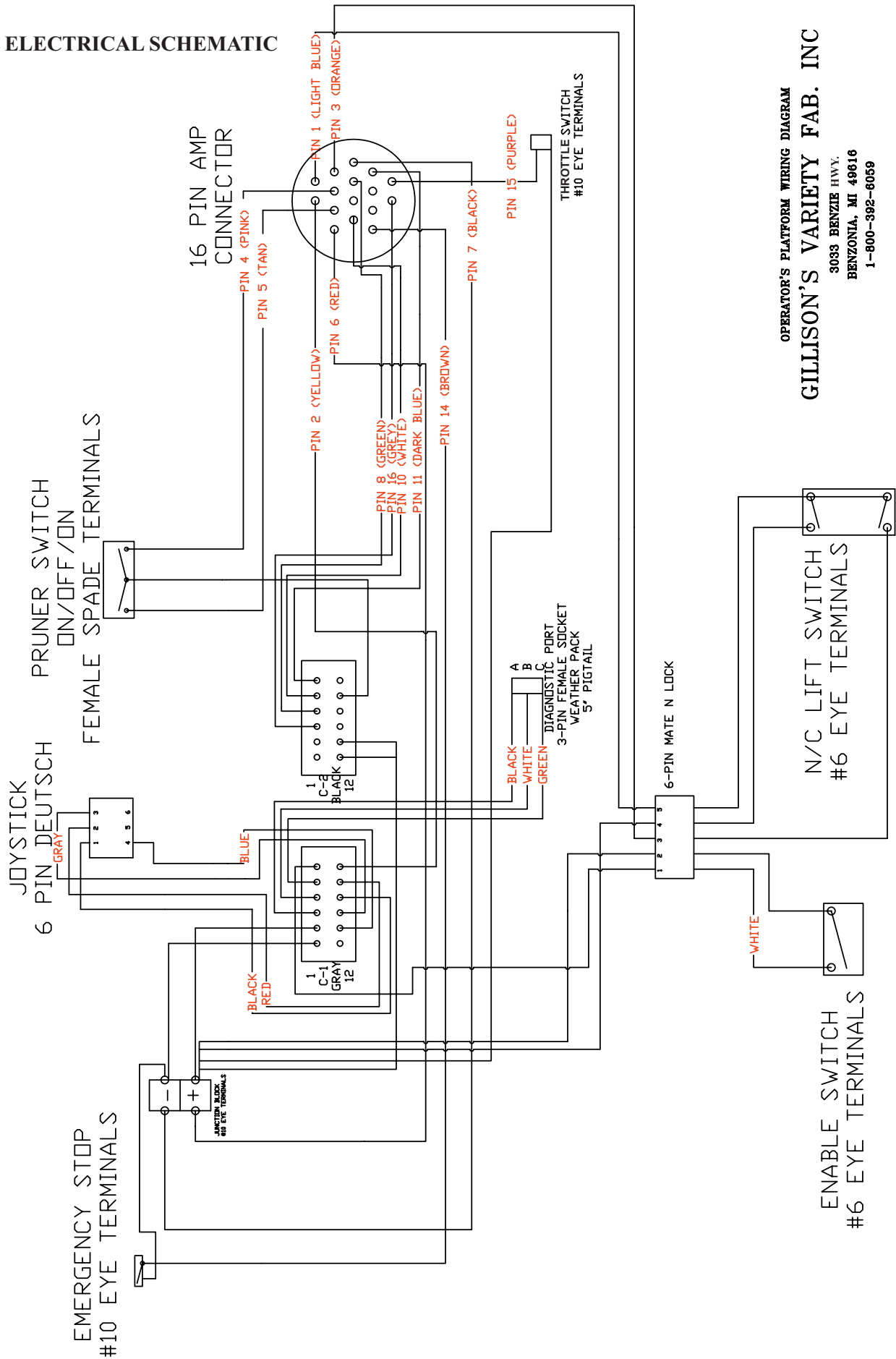
To save a calibration to your computers hard drive for future downloads: Click File Export, Name the File and Save on your hard drive for future use.



To import a calibration file: Click on File Import, select the file on your hard drive and Open. Then click Download.

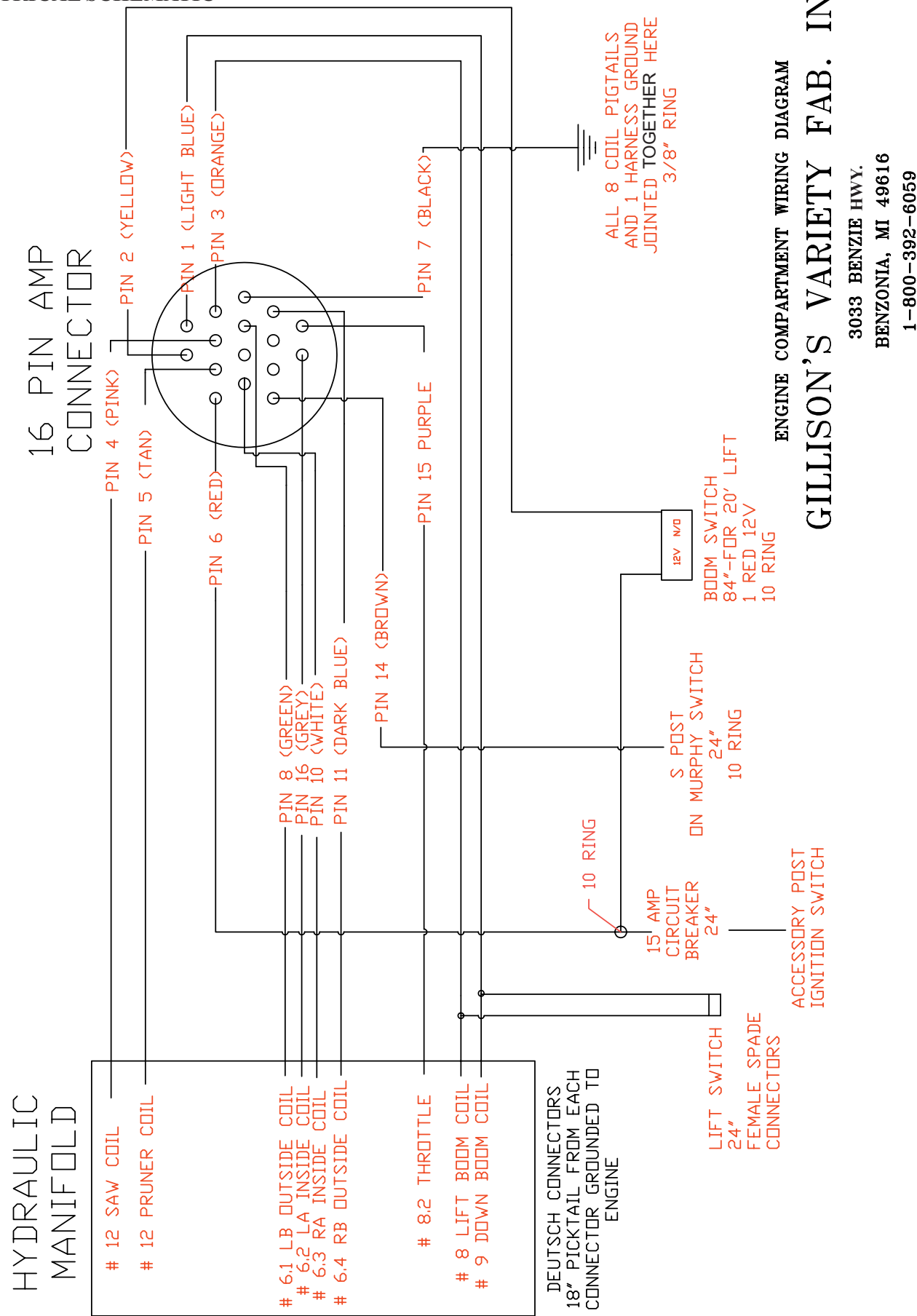


ELECTRICAL SCHEMATIC

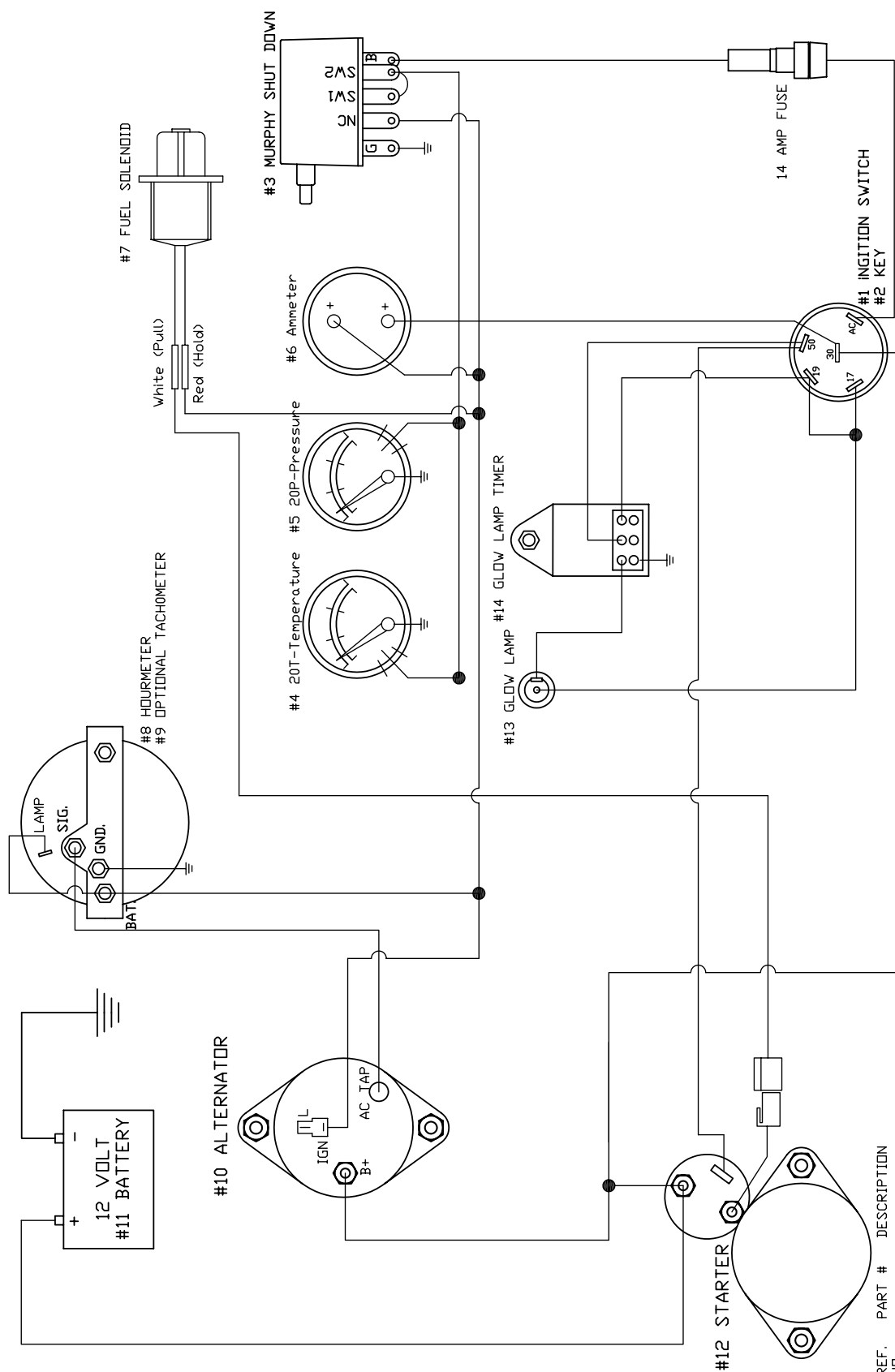


OPERATOR'S PLATFORM WIRING DIAGRAM
GILLISON'S VARIETY FAB. INC.
3033 BENZIE HWY.
BENZONIA, MI 49616
1-800-392-6059

ELECTRICAL SCHEMATIC



ELECTRICAL SCHEMATIC



REF.	PART #	DESCRIPTION

- | | | |
|-----|----------|--------------------|
| 1. | GO 12065 | IGNITION SWITCH |
| 2. | GO 12066 | KEY |
| 3. | GO 13035 | MURPHY SWITCH |
| 4. | GO 13038 | TEMPERATURE GAUGE |
| 5. | GO 13037 | OIL PRESSURE GAUGE |
| 6. | GO 13036 | VOLT METER |
| 7. | GO 13042 | FUEL SOLENOID |
| 8. | GO 13039 | HOURLMETER |
| 9. | GO 13040 | TACHOMETER |
| 10. | GO 13041 | ALTINATER |
| 11. | K 1275 | BATTERY |
| 12. | GO 13034 | STARTER |
| 13. | GO 13043 | GLOW PLUG LAMP |
| 14. | GO 13044 | GLOW PLUG TIMER |

KUBOTA D905 WIRING DIAGRAM

GILLISON'S VARIETY FAB. INC.

3033 BENZIE HWY.
BENZONIA, MI 49616
1-800-392-6059

HYDRAULIC SYSTEM

Hydraulic Diagnostic Pressure Port Location on pump.
Diagnostic connector part number GO 13086.

See **FIG. 25**

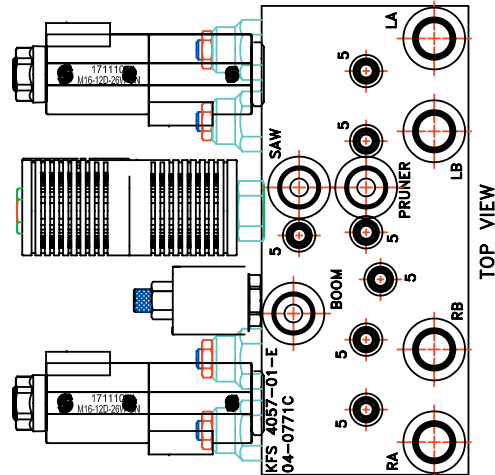
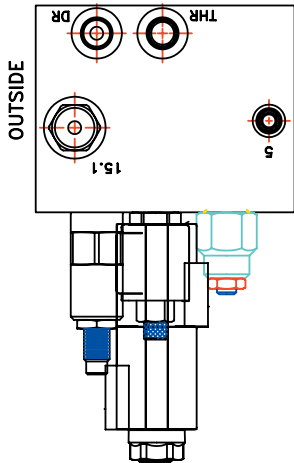
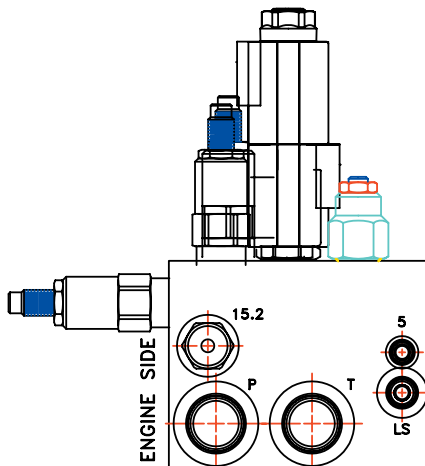
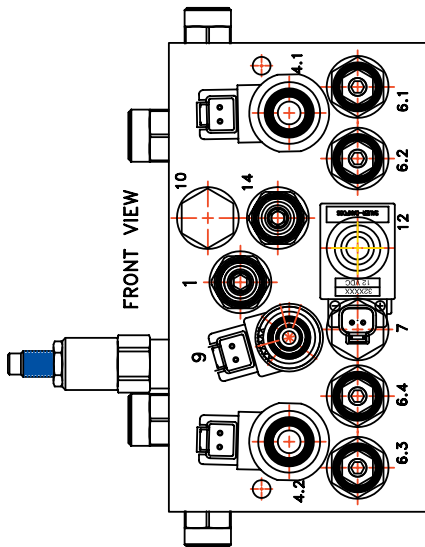
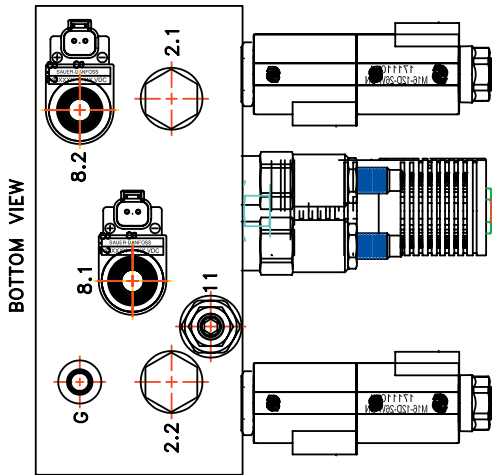


FIG. 25

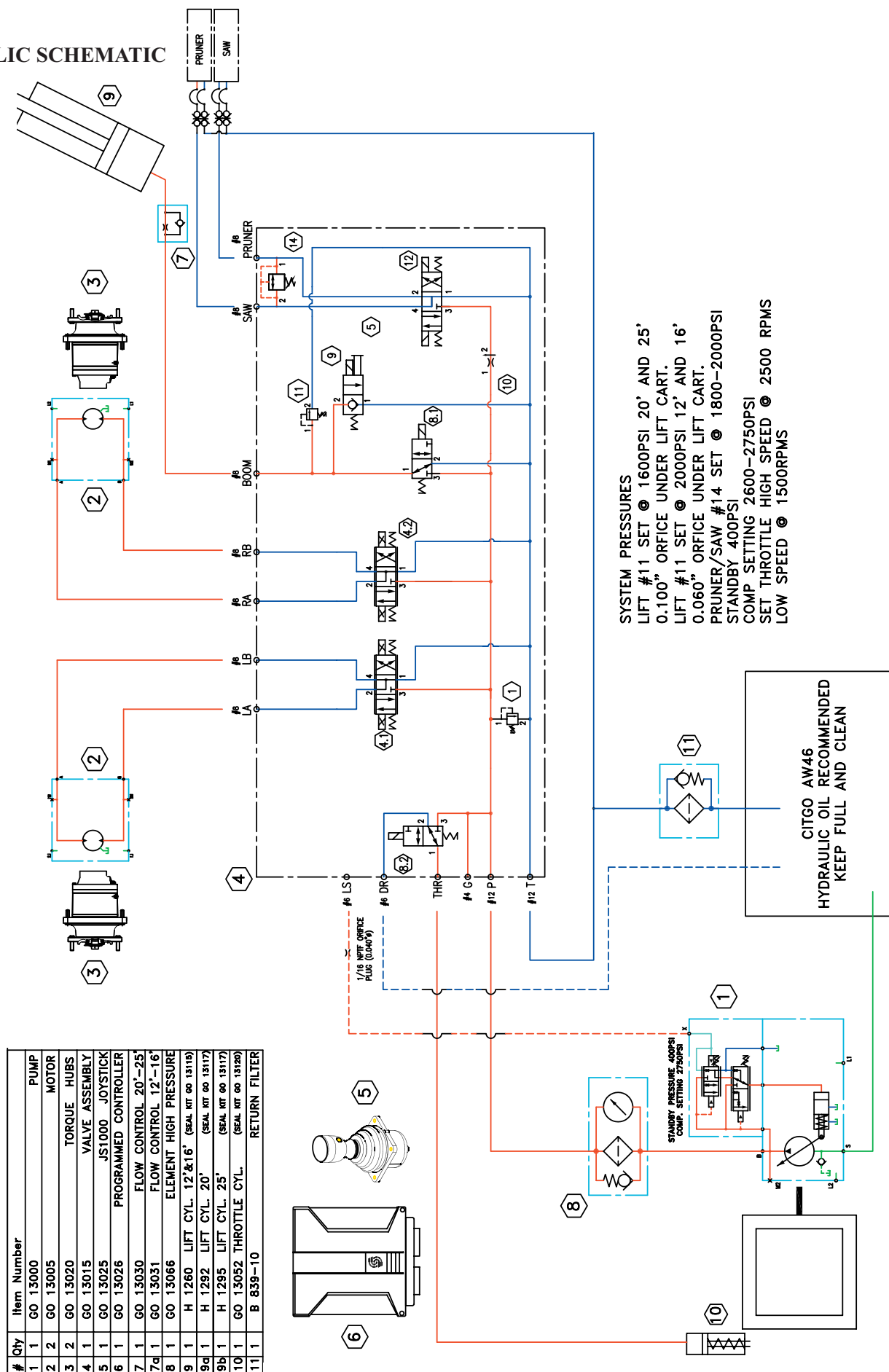
PRESSURES

ITEM#	QTY	PRESSURE SETTING	DESCRIPTION
1	1	3000 PSI	CARTRIDGE, MAIN RELIEF
11	1	1600 PSI 20' & 25' 2000 PSI 12' & 16'	CARTRIDGE, LIFT RELIEF CARTRIDGE, LIFT RELIEF
14	1	1800-2000 PSI TURN PRUNER SELECTOR SWITCH ON TO READ PRESSURE (WITH NO TOOLS PLUGGED IN)	RELIEF, CROSS PORT PRUNER

NOTE: USE PRESSURE GAUGE ON PUMP TO SET ALL PRESSURES
TURN ADJUSTING SCREW CW TO INCREASE PRESSURE
CCW TO DECREASE PRESSURE ON ALL RELIEFS



HYDRAULIC SCHEMATIC



GENERAL TROUBLESHOOTING CHART

TROUBLESHOOTING PROBLEM	POSSIBLE CAUSE	REMEDY
Orbit lift will not move in any direction but all other functions work.	Enable Switch inoperative	Check for 12V power through switch
	Internal problem with controller	Check for fault codes or use diagnostic tool
No machine functions operational	Low load sense pressure	Install gauge, check pressure
	Low Main relief pressure	Check pressure
	Bad circuit breaker	Check power supply
Operator's platform will not raise	Bad Lift Switch	Check for 12V power through switch
	Low relief pressure	Install gauge, check pressure
Operator's platform will not lower	Bad Lower Switch	Check for 12V power through switch
Operator's platform settling	Faulty lift relief valve	Check pressure
	Lift valve leaking	Check o rings
Machine will not switch to high speed	Faulty Boom Switch	Check for 12V power through switch
		Check to see if boom is contacting the switch
	Faulty Controller	Use diagnostic tool
Pruner or Saw not working	Selector Switch	Check for 12V power through switch
	Relief valve	Check pressure
	Controller	Use diagnostic tool
2 speed throttle not working	Throttle Switch	Check for 12V power through switch
	Cylinder out of adjustment	Adjust cylinder
Emergency stop not working	Bad switch	Check for continuity through switch
	Bad ground	Fix ground at switch
Slow travel speed	2 speed switch bad	Check switch
	Plugged suction strainer	Clean, replace oil
	Controller out of range	Use diagnostic tool
Hydraulic oil hot	Relief pressures out of range	Check pressures
	Pruner or saw on	Turn off when not in use

TROUBLESHOOTING THE PUMP

**EXCESSIVE NOISE AND /
OR VIBRATION**

Item	Description	Action
Check fluid level in reservoir.	Insufficient hydraulic fluid will cause cavitation.	Fill the reservoir to proper level.
Check for air in system.	Air in system will cause noisy, erratic control.	Purge air and tighten fittings. Check inlet for leaks.
Check pump inlet pressure / vacuum.	Improper inlet conditions will cause erratic behavior and low output flow.	Correct pump inlet pressure / vacuum conditions.
Inspect shaft couplings.	A loose or incorrect shaft coupling will cause excessive noise and/or vibration.	Repair or replace coupling and ensure that correct coupling is being used.

**ACTUATOR RESPONSE IS
SLUGGISH**

Item	Description	Action
Check external system relief valve setting.	Low external relief valve setting will slow down system.	Adjust external relief valve setting per manufacturer's recommendations. External relief setting must be above PC setting for proper operation.
Check PC and LS control setting.	Low PC setting will prevent the pump from achieving full stroke. Low LS setting will limit output flow.	Adjust PC and LS setting.
Check LS control signal pressures.	Incorrect LS signal will not allow pump to operate correctly.	Inspect system, ensure that proper LS signal is transmitted to the pump.
Internal system leaks.	Worn internal parts will not allow the pump to operate properly.	Refer to Authorized Service Center for repairs as required.
Hydraulic fluid viscosity above acceptable limits.	Hydraulic fluid viscosity above acceptable limits or low fluid temperature will not allow the pump to fill or control to operate properly.	Allow system to warm up before operation or use fluid with the appropriate viscosity grade for expected operating temperatures.
Check external system valving.	Malfunctioning valving may not allow system to respond properly.	Repair or replace system valving as required.
Check pump case pressure.	High case pressure will cause the system to be sluggish.	Correct case drain line restrictions.
Check pump inlet pressure / vacuum.	High inlet vacuum will cause low output flow.	Correct inlet pressure conditions.

SYSTEM OPERATING HOT

Item	Description	Action
Check fluid level in reservoir.	Insufficient volume of hydraulic fluid will not meet cooling demands of system.	Fill reservoir to proper level. Verify proper size of reservoir.
Check external system relief valve setting.	Fluid passing through relief valve adds heat to system.	Adjust external system relief valve setting per manufacturer's recommendations. External relief valve setting must be above PC setting for proper operation.
Check pump inlet pressure / vacuum.	High inlet vacuum adds heat to system.	Correct inlet pressure / vacuum conditions.

**PRESSURE OR FLOW
INSTABILITY**

Item	Description	Action
Check for air in system.	Air in system will cause erratic operation.	Activate PC, allowing system to bleed air. Check inlet line for leaks and eliminate source of air ingress.
Check control spools.	Sticking control spools will cause erratic operation.	Inspect spools for free movement in bore. Clean or replace as needed.

**PRESSURE OR FLOW
INSTABILITY (continued)**

Item	Description	Action
Check LS setting.	Low LS setting may cause instability.	Adjust LS setting to proper level.
Check LS signal line.	Blocked LS signal line will interfere with proper LS operation.	Remove blockage.
Check external relief valve and PC setting.	Insufficient pressure differential between PC setting and external relief valve.	Adjust external relief valve or PC control settings to appropriate level. Relief valve setting must be above PC setting for proper operation.
Check external relief valve.	Chattering external relief valve may cause unstable feedback to pump control.	Adjust or replace relief valve.

**SYSTEM PRESSURE NOT
REACHING PC SETTING**

Item	Description	Action
Check PC control setting.	System pressure will not rise above PC setting.	Adjust PC to appropriate setting.
Check external relief valve.	External relief valve setting below PC setting will prevent pressure compensation.	Adjust external relief valve per manufacturer's recommendations. External relief valve must be set above PC setting for proper operation.
Inspect PC control spring.	Broken, damaged, or missing spring will cause erratic operation.	Replace spring as required.
Inspect PC spool for wear.	Wear of the PC spool will cause internal leakage in the control.	Replace the spool as required.
Inspect PC spool for proper orientation.	Improper orientation will result in poor operation.	Correct orientation of spool.
Check PC control for contamination.	Contamination may interfere with movement of the PC Spool.	Clean PC control components, take appropriate action to eliminate contamination.

HIGH INLET VACUUM**ⓘ CAUTION**

High inlet vacuum causes cavitation which can damage internal pump components.

Item	Description	Action
Check fluid temperature.	Low temperature increases viscosity. High fluid viscosity causes high inlet vacuum.	Allow system to warm up before operation.
Inspect inlet screen.	Blocked or restricted inlet screen will cause high inlet vacuum.	Clean screen / remove blockage.
Check inlet piping.	Too many fittings, bends, or long piping will cause high inlet vacuum.	Eliminate fittings to make path more direct.
Hydraulic fluid viscosity above acceptable limits.	High fluid viscosity causes high inlet vacuum.	Select fluid with appropriate viscosity for expected operating temperature.

PC CONTROL**⚠ WARNING**

Escaping hydraulic fluid under pressure can have sufficient force to penetrate your skin causing serious injury and/or infection. Relieve pressure in the system before removing hoses, fittings, gauges, or components.

Unintended movement of the machine or mechanism may cause injury to the technician or bystanders.

To protect against unintended movement, secure the machine or disable / disconnect the mechanism while servicing.

⚠ CAUTION

Contamination can damage internal components and void the manufacturer's warranty. Take precautions to ensure system cleanliness when removing and reinstalling system lines.

PC setting is indicated in the pump model code. Refer to the *Series 45 Open Circuit Axial Piston Pumps Technical Information Manual*, BLN-10128, for more information.

Note: Before performing adjustments, read page 14, *Pressure measurement*, for recommendations.

1. Install a pressure gauge in port M2 to measure system pressure. Install a pressure gauge in case drain port L1 or L2 to measure case pressure. ⚠
2. Start the prime mover and allow fluid to reach normal operating temperature. Operate a hydraulic function to its full extension, loading the pump at maximum pressure and zero flow.
3. Loosen the PC set screw and turn the PC adjustment screw until the desired setting is indicated on the pressure gauge at port M2. Clockwise rotation will increase pressure, counterclockwise rotation will decrease; approximate gain = 35 bar [507 psi] per turn.

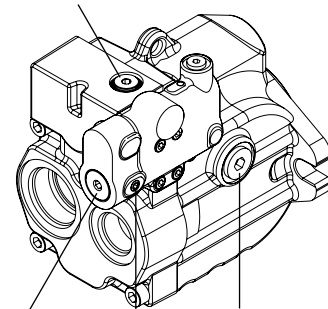
Note: If the pressure does not increase, an external system relief valve may require adjustment. External system relief valve must be set above the PC setting for proper operation.

4. While holding the position of the PC adjustment screw, torque the PC set screw to 7-11 N•m [6-8 lbf•ft].
5. Stop the prime mover, remove the pressure gauges, and return the system to its normal operating configuration.

PC control adjustment

Gauge port M2

0-300 bar [0-5000 psi]	M14
9/16-18	6mm
1/4 in	27-35 N•m
34-68 N•m [25-50 lbf•ft]	[20-26 lbf•ft]



PC adjustment screw

6mm

PC set screw

4mm

7-11 N•m [6-8 lbf•ft]

P101 652E

Case drain port L1

0-10 bar [0-100 psi]

7/8-14

3/8 in

54-136 N•m

[40-100 lbf•ft]

Adjustment screw, set screw, and gauge locations shown

LS CONTROL**⚠ WARNING**

Escaping hydraulic fluid under pressure can have sufficient force to penetrate your skin causing serious injury and/or infection. Relieve pressure in the system before removing hoses, fittings, gauges, or components.

Unintended movement of the machine or mechanism may cause injury to the technician or bystanders.

To protect against unintended movement, secure the machine or disable / disconnect the mechanism while servicing.

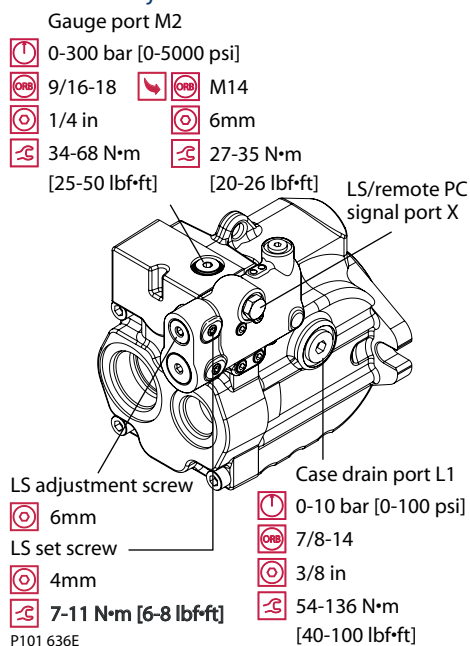
⚠ CAUTION

Contamination can damage internal components and void the manufacturer's warranty. Take precautions to ensure system cleanliness when removing and reinstalling system lines.

The LS setting is indicated in the pump model code. Refer to the *Series 45 Open Circuit Axial Piston Pumps Technical Information Manual*, BLN-10128, for more information.

Note: Before performing adjustments, read page 14, *Pressure measurement*, for recommendations.

1. Install a pressure gauge in port M2 to measure system pressure. Install a pressure gauge in drain port L1 or L2 to measure case pressure. Tee-in a gauge to the LS / remote PC signal line (port X). ⚠
2. Start the prime mover and allow fluid to reach normal operating temperature. Slowly operate a hydraulic function which will demand approximately half flow from the pump, but keep system pressure below the PC set point.
3. Loosen the LS set screw. While watching the pressure gauges, turn the LS adjustment screw until the desired pressure differential between port M2 and port X is achieved¹. Clockwise rotation will increase the setting, counterclockwise rotation will decrease; approximate gain = 12 bar [170 psi] per turn.

LS control adjustment

Adjustment screw, set screw, and gauge locations shown

4. While holding the position of the LS adjustment screw, torque the LS set screw to 7-11 N•m [6-8 lbf•ft].
5. Operate a hydraulic function to its full extension loading the pump at maximum pressure and zero flow.
6. Loosen the PC set screw and turn the PC adjustment screw until the desired setting is indicated on the pressure gauge at port M2². Clockwise rotation will increase pressure, counterclockwise rotation will decrease; approximate gain = 35 bar [507 psi] per turn.

Note: If the pressure does not increase, an external system relief valve may require adjustment. External system relief valve must be set above the PC setting for proper operation.

7. While holding the position of the PC adjustment screw, torque the PC set screw to 7-11 N•m [6-8 lbf•ft].
8. Stop the prime mover, remove the pressure gauges, and return the system to its normal operating configuration.

Minor repair

SHAFT SEAL REPLACEMENT

A lip type shaft seal is used in the Series 45 open circuit variable pumps. This seal can be replaced without major disassembly of the unit. Replacement of the shaft seal requires removal of the pump from the machine.

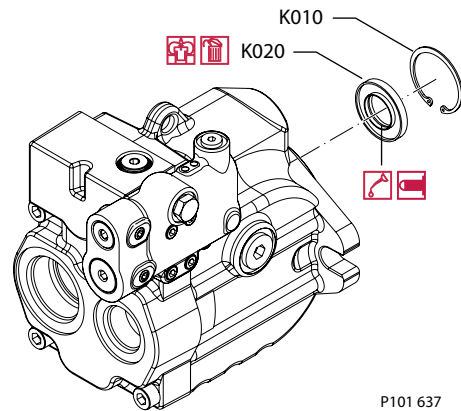
Removal

1. Using the appropriate snap-ring pliers, remove the retaining ring (K010) from the housing.
2. Remove the shaft seal (K020) from the bore in the pump housing and discard. Avoid damaging the pump housing or shaft.



Puncture the face of the seal with a packing hook, or use a slide-hammer type puller to remove the seal.

Shaft seal and retaining ring



P101 637

Installation

3. Inspect the pump housing and new seal for damage. Inspect the sealing area on the shaft for rust, wear, or contamination. Polish the sealing area on the shaft if necessary.
4. Lubricate the lip of the new shaft seal with clean hydraulic fluid. Place a protective sleeve over the shaft end to prevent damage to the seal during installation.
5. Keeping the seal perpendicular to the shaft, press the new seal into the housing just far enough to clear the retaining ring groove. **CAUTION** Install seal with the cupped side toward the shaft bearing. Do not damage the seal during installation.
6. Using the appropriate snap ring pliers, install the seal retaining ring.
7. Remove the installation sleeve.

CAUTION

Premature bearing failure can result if the shaft seal contacts the shaft bearing.

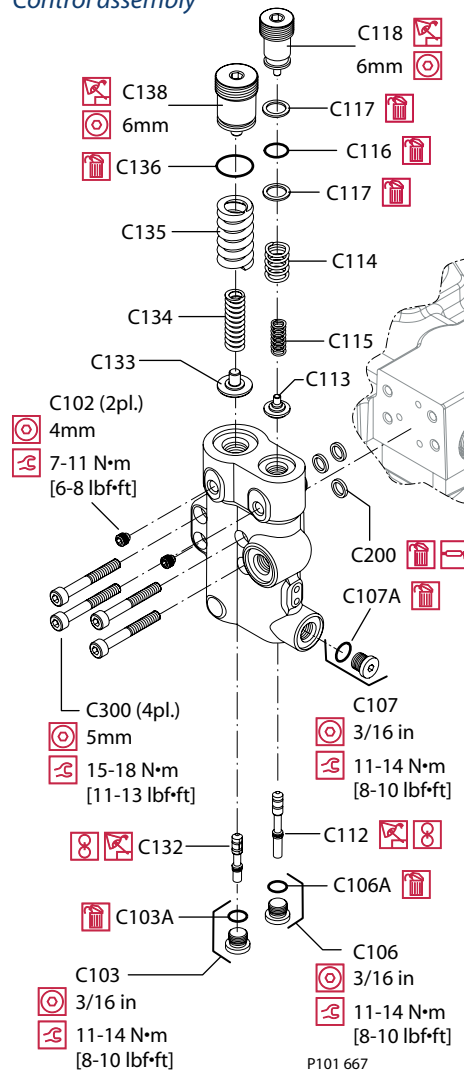
Press the seal into the housing only far enough to clear the retaining ring groove.

CONTROL**Disassembly**

1. Remove the four screws (C300) holding the control housing onto the end cap.
2. Remove the control and discard the three interface O-rings (C200).
3. Remove the PC set screw (C102), PC adjustment screw (C138), O-ring (C136), springs (C135, C134), and seat (C133). Discard the O-ring.
4. Remove the plug (C103), O-ring (C103A), and PC spool (C132) from the control housing; discard the O-ring. Note orientation of the spool for reassembly.
5. Remove the plug (C107) and O-ring (C107A); discard the O-ring.

Note: For PC only controls, skip steps 6 and 7.

6. Remove the LS set screw (C102), LS adjustment screw (C118), O-ring (C116), back-up rings (C117), springs (C114, C115), and seat (C113); discard the O-ring.
7. Remove the plug (C106), O-ring (C106A), and LS spool (C112) from the control housing; discard the O-ring. Note orientation of the spool for reassembly.

Control assembly

LS control shown; parts C106 and C112 through C118 are not used on PC control

Inspection

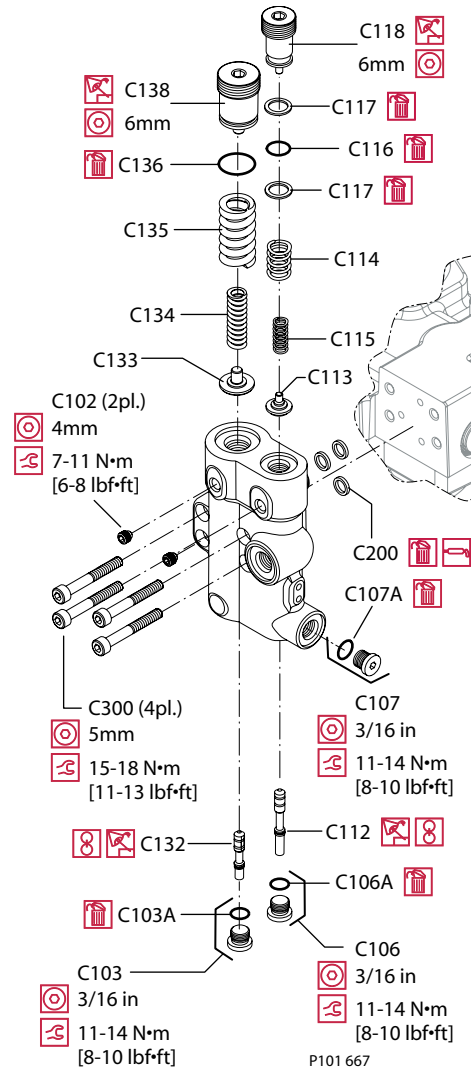
8. Inspect the adjustment screws for wear at the tips and where they contact the springs; replace as necessary
9. Inspect the springs and spring guides for wear or damage; replace as necessary.
10. Carefully inspect the spools. Ensure the sealing lands are free of nicks and scratches. Check the ends that contact the spring guides for wear. Replace spools as necessary.
11. Inspect the control housing for damage. Check the spool bores for excessive wear.
12. Clean all parts and lubricate spools, springs, guides and new O-rings with clean hydraulic fluid.

CONTROL
(continued)**Reassembly**

13. Install the PC spool, spherical end first, into the PC bore. The PC spool is the shorter of the two. Using a new O-ring, install the plug (C103). Torque to 11-14 N•m [8-10 lbf•ft].
14. Place the two PC springs onto the spring guide and install into the PC bore. Place a new O-ring onto the PC adjustment screw and thread it into the PC bore until flush, then make another full turn. Install and torque the set screw to 7-11 N•m [6-8 lbf•ft].

Note: For PC only controls, skip steps 15 and 16.

15. Install the LS spool, spherical end first, into the LS bore. The LS spool is the longer of the two. Using a new O-ring, install the plug (C106). Torque to 11-14 N•m [8-10 lbf•ft].
16. Place the two LS springs onto the spring guide and install into the LS bore. Place a new O-ring and back-up rings onto the LS adjustment screw and thread it into the LS bore until flush, then make another full turn. Install and torque the set screw to 7-11 N•m [6-8 lbf•ft].
17. Using a new O-ring, install the plug (C107). Torque to 11-14 N•m [8-10 lbf•ft].
18. Using petroleum jelly to retain them, install the three interface O-rings (C200) in the recesses on the control housing.
19. Install the control assembly onto the endcap using the four screws (C300). Torque to 15-18 N•m [11-13 lbf•ft]. Torque screws in a criss-cross pattern and re-torque the first screw to ensure proper torque retention.
20. Check and adjust the control setting.

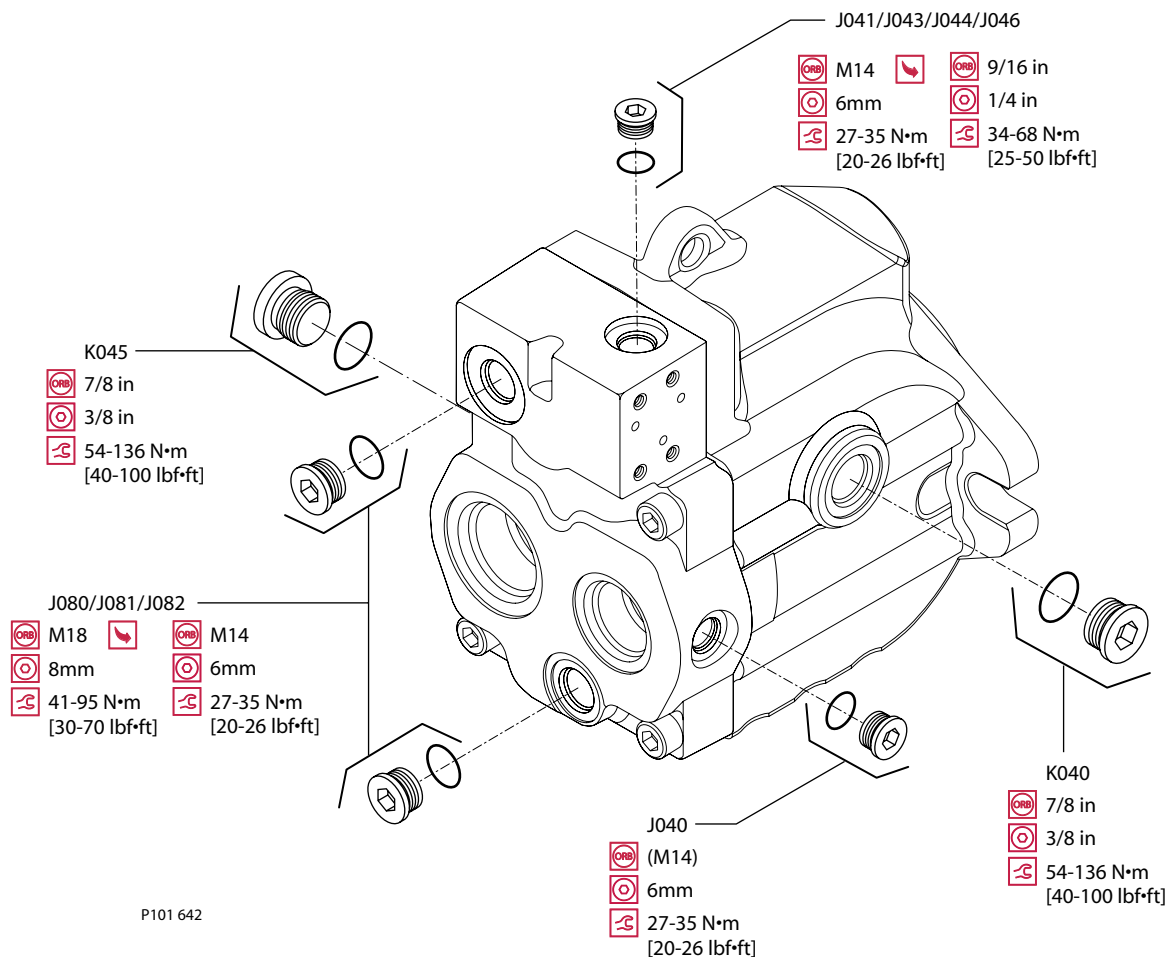
Control assembly

LS control shown; parts C106 and C112 through C118 are not used on PC control

PLUG AND FITTING SIZES AND TORQUES

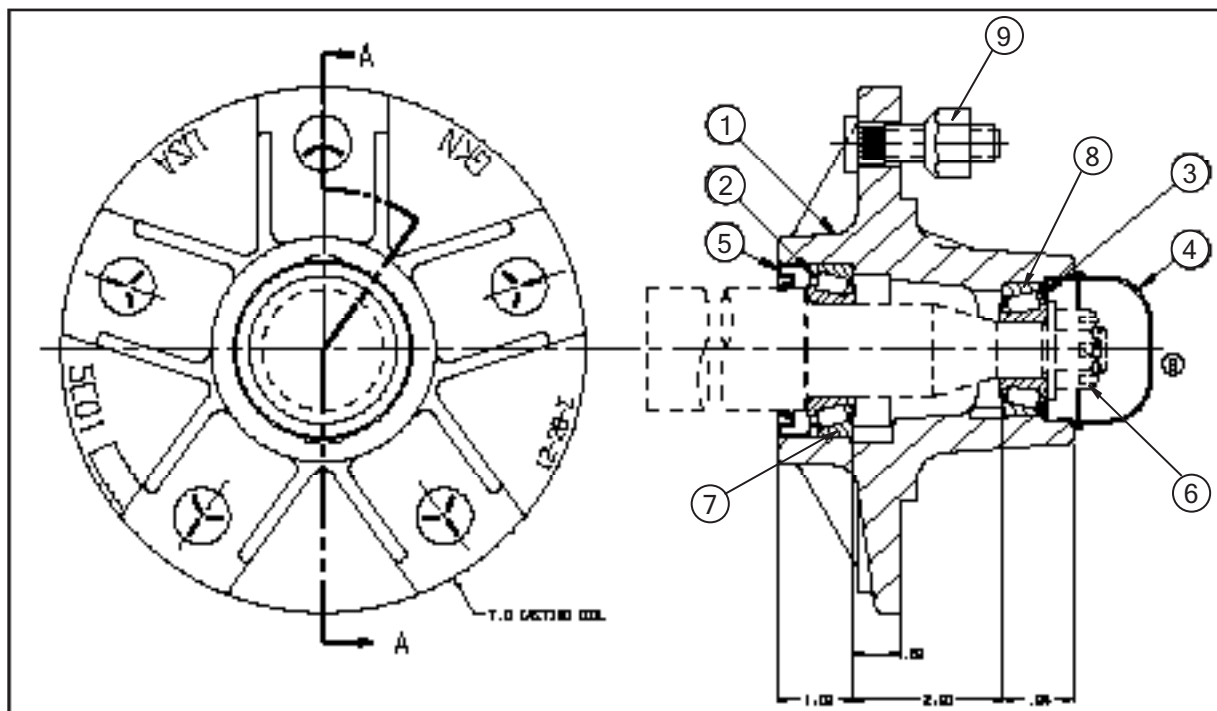
If any plugs or fittings are removed from the unit during service, install and torque as indicated here. This drawing is a composite. Your configuration may differ but the appropriate wrench size and torque can be found here.

Plug locations, sizes, and torques



PARTS

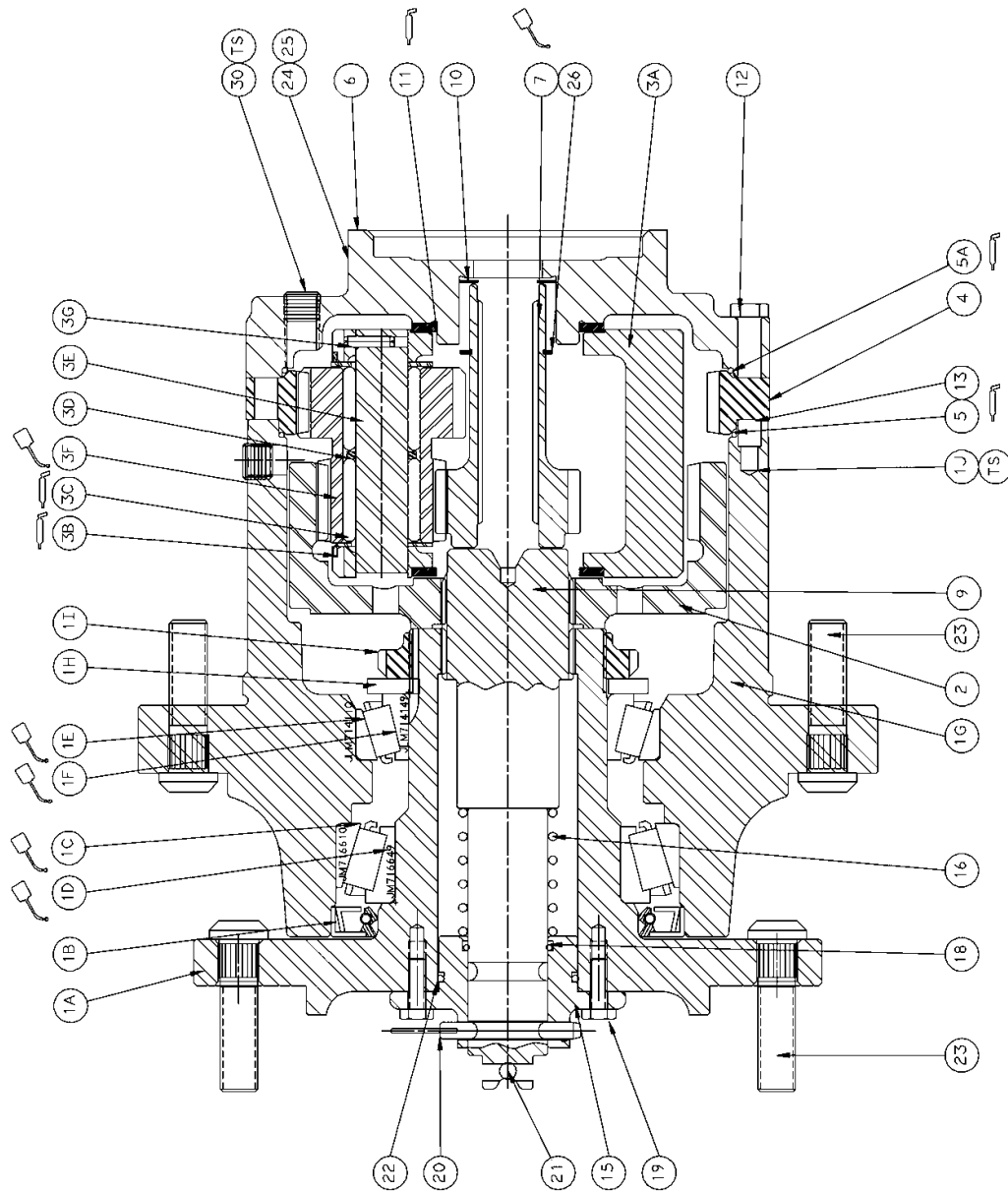
PIVOT WHEEL HUB BREAKDOWN



<u>Ref. No.</u>	<u>Part Number</u>	<u>Description</u>
1.	GO 11656	HUB 5-5.5IN-4IN- 2000#
2.	GO 11754	BEARING INNER
3.	GO 11755	BEARING OUTER
4.	GO 11751	DUST CAP
5.	GO 11752	SEAL
6.	N 1761	CASTLE NUT, 3/4-16
7.	GO 11753	BEARING INNER RACE
8.	GO 11756	BEARING OUTER RACE
9.	GO 11646	NUT, STUD

NOTE: ITEM 1 INCLUDES – ITEMS 2,3,4,5,6,7,8 & 9

TORQUE HUBS



(key for reference numbers on next page)

TORQUE HUBS CONTINUED

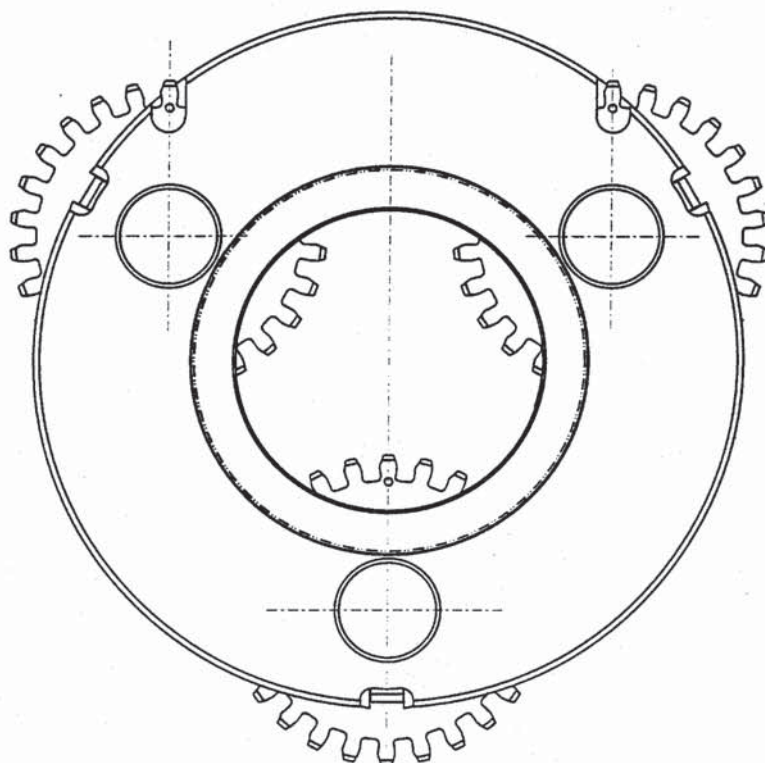
GO 13020 Hub, Torque Fairfield

<u>Item Number</u>	<u>Ref. No.</u>	<u>Quantity</u>	<u>Description</u>
AM1200028	3	1.00 EA	A/M CARRIER S-A *INDIA (18, 30:1)
11000127	7	1.00 EA	GEAR, SUN
1200301	11	2.00 EA	WASHER, THRUST *INDIA*
1200309	10	1.00 EA	WASHER, THRUST (.882, .0315)
1400066	2	1.00 EA	GEAR, INTERNAL *INDIA*
1400741	1A	1.00 EA	SPINDLE
1500073	4	1.00 EA	GEAR, RING *INDIA*
1500436	6	1.00 EA	COVER, INPUT
1500674	1G	1.00 EA	HOUSING
1500815	1E	1.00 EA	(JLM714110) BRG, TAPERED-CUP
1500816	1F	1.00 EA	(JLM714149) BRG, TAPERED-CONE
1900104	9	1.00 EA	DISCONNECT SHAFT
1900416	15	1.00 EA	DISENGAGE, CAP
1940001	5	1.00 EA	O-RING (SPECIAL)
1940004	5A	1.00 EA	O-RING (WHITE, 6.564, .103)
3500803PR	1C	1.00 EA	(JM716610) BRG, TAPERED-CUP
3500804PR	1D	1.00 EA	(JM716649) BRG, TAPERED-CONE
3501301	1B	1.00 EA	SEAL, LIP (38731, 3.875)
900465	21	1.00 EA	SPLIT RING (90177A225)
901202	24	1.00 EA	PLATE, ID *INDIA*
901529	16	1.00 EA	SPRING (1.460, 2.000)
9100333	26	1.00 EA	RET, RING-EXT (1.041, 5100112)
920144	13	4.00 EA	PIN, DOWEL (.3361, 1.000)
920205	20	1.00 EA	PIN, QUICK RELEASE (.250,1.500)
930004	19	4.00 EA	BOLT, HEX-UNC (.250-20, .75 GR5)
930101	12	12.00 EA	BOLT, HEX-UNC (.313-18, 2.25 GR8)
930301	25	2.00 EA	SCREW, DRIVE (#2, .188)
9400180	18	1.00 EA	O-RING (-123, 1.174, .103)
9400189	22	1.00 EA	O-RING (-134, 1.862, .103)
950002	1J30	3.00 EA	PIPE PLUG, STD-NPTF (.250-18)
960303HT	1H	1.00 EA	WSR, FLT-TANG (2.988, .228) *INDIA*
97000G	23	17.00 EA	STUD (.562-18 UNF, GR7, SPECIAL)
980155	1I	1.00 EA	NUT, BRG (2.8843-12) *INDIA*
99130B		1.00 EA	PLUG, CARDBOARD (4.000, B-MOUNT)

TORQUE HUBS CONTINUED

DIFFERENTIAL CARRIER TIMING

NEW CARRIER DESIGN WITH TIMING SLOTS



- Place Carrier Sub-Assembly onto Timing Fixture orientated as shown above, with the large end of Cluster Gears (3F) facing up. Position all three punch-marks on the face of the large gears at 12 o'clock. Timing marks on the two upper cluster gears will be visible thru the slots in the carrier if the cluster gears are correctly marked. Secure the gear teeth using timing fixture.
- Place ring gear onto large end of clustergears to secure timing.
- Remove carrier sub-assembly and ring gear from the fixture and assemble into the internal gear being careful to keep the ring gear, or sun gear, in mesh with the cluster gears.
- **After engaging internal gear teeth and before rotating carrier, look at the carrier sub-assembly in the main assembly and insure the timing is correct by locating the timing marks in the slots in the carrier and at 12 o'clock on the gear that the timing mark is visible in the carrier bore.**
- Rotate the carrier to insure correct assembly.

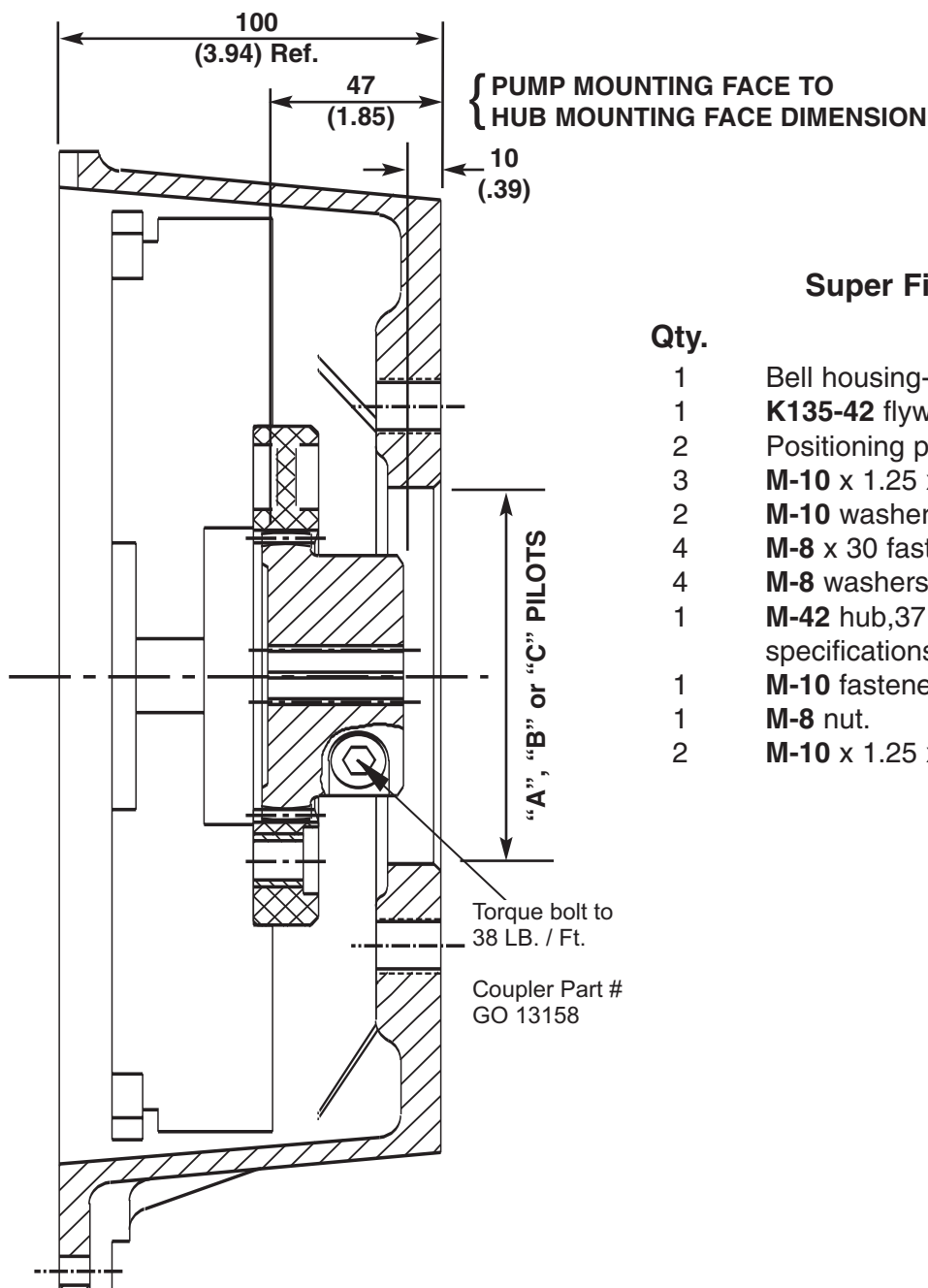
PUMP DRIVE

For KUBOTA Super Five Series Engines

135-42 FLE Pump Housing Kit

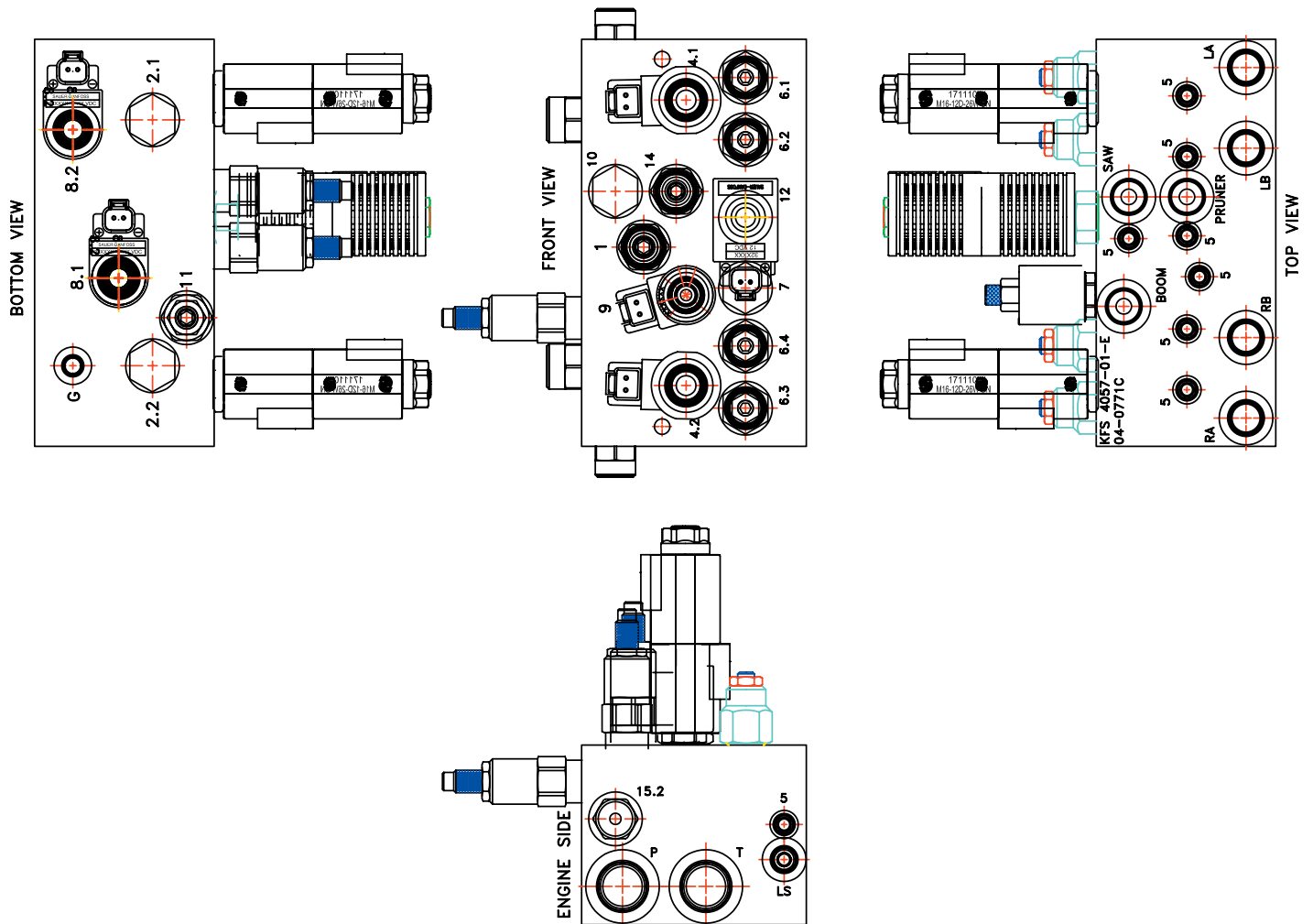
KUBOTA Engines:**D905 V1205****D1005 V1305****D1105 V1505****For B-1 Flywheel Mounting****Stocked Pump Housings**

SAE "A" PILOT	3.25" dia.	2 bolt
SAE "B" PILOT	4.00" dia.	2 & 4 bolt
SAE "C" PILOT	5.00" dia.	2 & 4 bolt

**Super Five Housing and Coupling Kit****Qty.****Items Included**

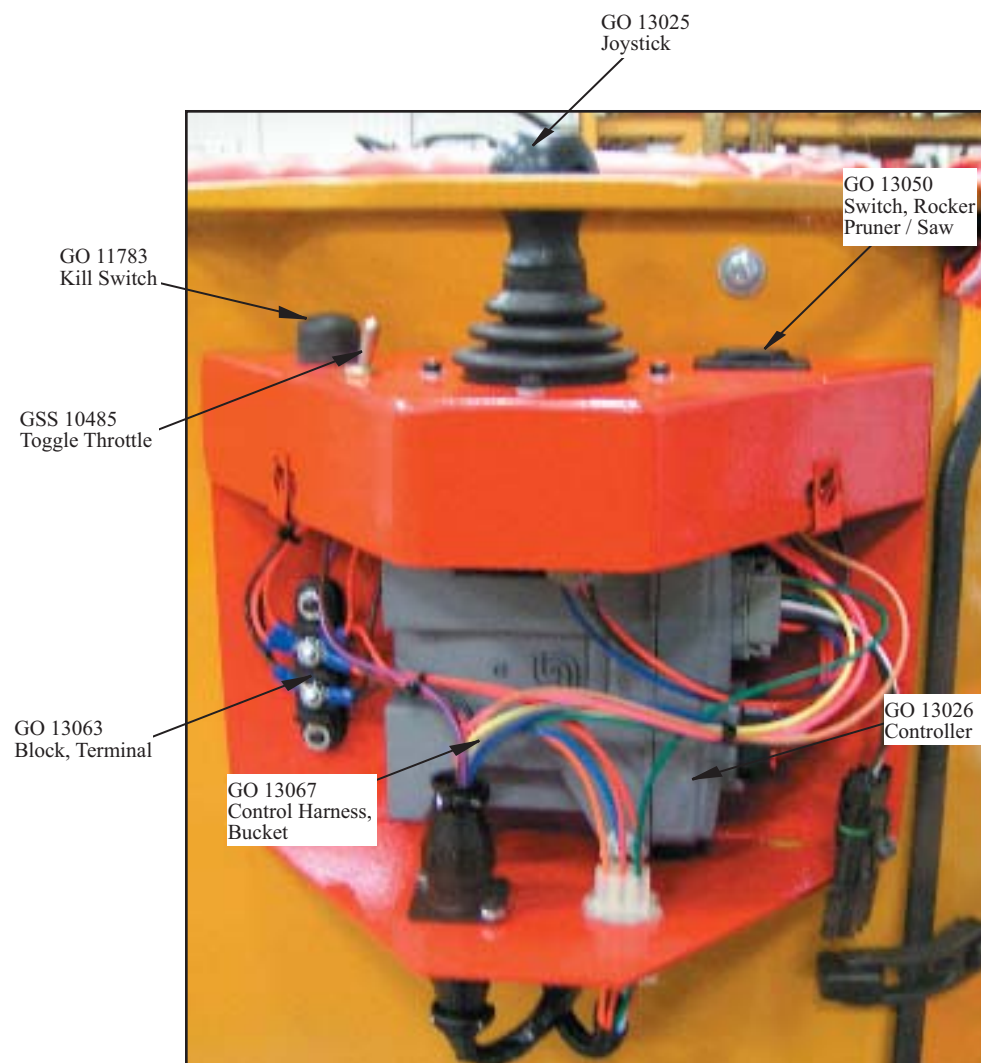
- 1 Bell housing- "A", "B", or "C" pilot.
- 1 **K135-42** flywheel flange.
- 2 Positioning pins (installed)
- 3 **M-10** x 1.25 x 30 fasteners (**A**) position.*
- 2 **M-10** washers (**C**) position.
- 4 **M-8** x 30 fasteners (**B**) position.
- 4 **M-8** washers (for bell housing).
- 1 **M-42** hub, 37 mm long machined to customer specifications.
- 1 **M-10** fastener furnished for splined hubs.
- 1 **M-8** nut.
- 2 **M-10** x 1.25 x 35 Bolt (**C**) position.

ITEM#	QTY	PART#	DESCRIPTION
1	1	GO 13122	CARTRIDGE, MAIN RELIEF
2	2	GO 13125	COMPENSATOR, PRESSURE
4	2	GO 13127	VALVE DRIVE, 3 POSITION-4 WAY
5	9	GO 13130	VALVE CHECK, LOAD SENSE
6	4	GO 13132	VALVE, COUNTER BALANCE
7	1	GO 13135	VALVE, LIFT CHECK
8	2	GO 13137	VALVE, 2 POSITION LIFT & THROTTLE
9	1	GO 13140	VALVE, LOWER 2 POS NC
10	1	GO 13142	FLOW CONTROL, PRUNER
11	1	GO 13145	CARTRIDGE, LIFT RELIEF
11a	1	GO 13032	DISC, ORFICE 12" & 16"
11b	1	GO 13155	DISC, ORFICE 20" & 25"
12	1	GO 13147	VALVE, PRUNER/SAW
14	1	GO 13150	RELIEF, CROSS PORT PRUNER
15	2	GO 13152	FLOW CONTROL, LOAD SENSE



GENERAL PARTS

Operators Platform



GENERAL PARTS CONTINUED



G V F WARRANTY

Gillison's Variety Fabrication, Inc. will replace or repair at GVF option, any GVF manufactured item that is, in the opinion of GVF, defective in material or workmanship for a period of 1 year from the date of purchase, and is returned to the GVF plant or service center at the expense of the customer. This warranty is made expressly in lieu of all other warranties expressed or implied. **The Warranty Registration card must be completed in full and returned to GVF within thirty (30) days of date of delivery to qualify for this warranty.**

The owner is specifically responsible for the operation and service of the machine. This warranty shall not apply to any product that has been subject to misuse, negligence or accident. In the event of a defect in material or workmanship, GVF sole responsibility is to the repair or replacement of the defective part and is not responsible for lost time or any other expenses incurred due to lost time.

All OEM items such as Tires, Batteries, Engines and Hydraulic components are warranted by the original equipment manufacturer. GVF controls the installation of these products but not the manufacture; therefore, GVF warranty applies to the proper installation but not the OEM component itself.

Retail Customer Responsibility: It is the Retail Customer and/or Operator's responsibility to read the Operator's Manual to operate, lubricate, maintain, and store the product in accordance with all instructions and safety procedures. Failure of the operator to read the Operator's Manual is misuse of this equipment. It is the Retail Customer and/or Operator's responsibility to inspect the product and to have any part(s) repaired or replaced when continued operation would cause damage or excessive wear to other parts or cause a safety hazard.

It is the Retail Customer's responsibility to deliver the product to the authorized GVF dealer, from whom he purchased it, for service or replacement of defective parts, which are covered by warranty. Repairs to be submitted for warranty consideration must be made within 45 days of failure. The Retail Customer is responsible for any cost incurred by the Dealer for traveling to or hauling of the product for the purpose of performing a warranty obligation or inspection.

