# SERVICE MANUAL
## Tigercat T240B Track Loader

ISSUE 1.0, AUGUST, 2006

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240BT-SM00

**T240B Available Literature**

| | |
|---|---|
| Operator's Manual | Part No. 29312A |
| Service Manual (This Manual) | Part No. 29313A |
| Parts Catalog | Part No. 13044A |


Tigercat®

P.O. Box 544
Paris, Ontario
Canada N3L 3T6
**Tel: (519) 442-1000**
Fax: (519) 442-1855

# Tigercat T240B Track Loader

# INTRODUCTION

An Operator's manual, Service manual and a Parts catalog are provided by **Tigercat** to assist the dealer, customer and operator in becoming familiar with the features of the Tigercat T240B Track Loader.

Serial Number **240T0271** and up.

The operator's manual will assist the operator with the techniques of proper and safe operation of the T240B Track Loader. There is also important information regarding the safe operation of the saw head. The service manual contains safety and servicing procedures and a preventive maintenance schedule to ensure optimum machine performance.

Section 1 in both the operator's manual and the service manual contains safety information that must be followed. As well, throughout the rest of the manuals, WARNING and CAUTION notices are displayed where necessary, drawing attention to possible hazards when performing certain procedures.

Only trained personnel should be allowed to operate or work on the machine.

The information contained in this manual is current at time of printing. Improvements to the machine are on-going and may not be covered, therefore in these cases contact your **Tigercat** dealer for the appropriate information.

The phrase **“and up”** appearing in this manual after the serial number implies that the related information is current for any machine serial number HIGHER than the serial number preceding the **“and up”**.

Tigercat reserves the right to make changes to the machine after this manual release date that may not immediately appear in this manual.

Every effort is made to send out updates on a regular basis. If the machine in question was built after the release date of this manual and there is a discrepancy, call Tigercat service department. The release date appears on the first page.

The Company reserves the right to change information contained herein at any time without prior notice.

### Tigercat Industries Inc.

## NON-APPROVED FIELD PRODUCT CHANGES

The installation of any unauthorized attachment or changes made of any kind to this **Tigercat** product could affect the product's ability to perform as originally intended. The product's integrity, stability and safety could be at serious risk.

IT IS **Tigercat** POLICY THAT NO CHANGES ARE TO BE MADE TO ITS PRODUCTS INCLUDING DELETIONS OR ADDITIONS OTHER THAN A **Tigercat** APPROVED OPTION FITTED IN THE FACTORY APPROVED MANNER.

Official approval to make changes or install options is **only** as follows:

i) The relevant options for that product must be shown or listed on current **Tigercat** documentation or literature such as a printed specification sheet, price list, parts manual, or product literature issued by **Tigercat .**

ii) Approved options or product changes authorized in writing by the **Tigercat** Engineering Manager.

**Authorization by any other person is unacceptable.**

Unauthorized changes made or contributed to by a person or organization may result in creating a dangerous situation and therefore the person or organization will be considered to have assumed the risk involved or be negligent in creating this situation.

Weight is an important factor when considering the addition of options or an attachment, Refer to your **Tigercat** distributor for information on maximum permissible operating weight and the effect the addition of various options may have on your machine.

**Tigercat** will not be held responsible for any situation that may arise resulting from Non-approved Field Product Changes to its product.

Should **Tigercat** become involved in a suit resulting from changes made to the product without proper authorization by **Tigercat** as stated above, **Tigercat** will take whatever action is appropriate to protect its interests.

The product warranty policy and the certification on any safety items installed on the modified product will become NULL and VOID if the above policy is not adhered to as specified.

Non-approved product changes also nullify warranties given to **Tigercat** by its component manufacturers.

**Tigercat Industries Inc.**

# Tigercat T240B Track Loader

# SECTION 1 - SAFETY

AUGUST, 2006

## CONTENTS - SECTION 1

# SAFETY SYMBOLS

This safety alert symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

The safety alert symbol identifies important safety messages on machines, safety signs, in manuals, or elsewhere. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

**Understanding Signal Words**

**DANGER**

**DANGER** identifies the most serious hazards where failure to follow listed procedures would result in a high probability of death or serious injury.

**WARNING**

**WARNING** denotes a hazard exists which can result in serious injury or death if proper precautions are not taken.

**CAUTION**

**CAUTION** is used in areas where failure to follow listed procedures may cause personal injury, component damage or subsequent malfunction.

**IMPORTANT**

**IMPORTANT** is used to focus attention on items that should be checked, controlled, adjusted or cleaned to ensure the efficiency and long term operation of the machine.

# GENERAL SAFETY PRECAUTIONS

Remember that safety is a prime responsibility of all.

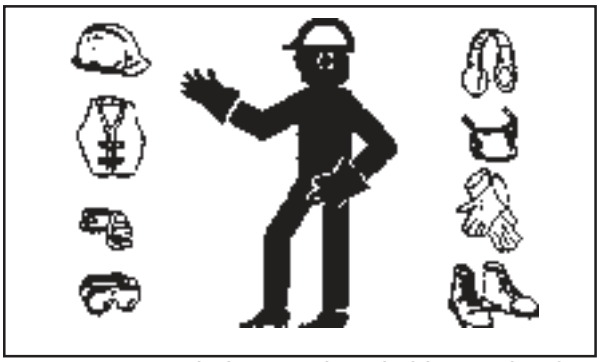
To minimize the risks and promote safety at all times, this section of the operator's manual details a number of safety rules which should always be followed and obeyed.

Study all the safety messages in this manual and on the labels on the machine carefully.

Follow all instructions from safety inspector and supervisors.

Operators of this equipment must be fully trained by a qualified person in safety and operating procedures. The operator must be fully aware of the capabilities and limitations of the equipment and must at no time exceed them. The machine is to be used only for its intended purpose. Learn the most efficient operating techniques.

Do not let an untrained person operate the machine.



Use recommended protective clothing and safety devices such as gloves, safety boots, safety hat, goggles, and ear protection when necessary.

Fellow workers and other bystanders around the machine must also be provided with the appropriate safety devices mentioned above.

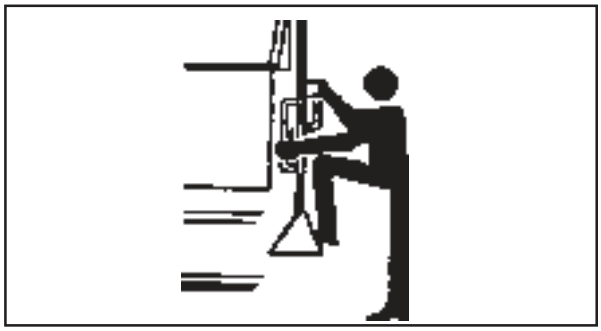
These safety rules highlight both general and specific measures that the operator should be familiar with and adhere to. More specific measures are illustrated with pictograms which may also be attached to the machine in locations pertinent to their respective message. Keep safety labels in good condition. Repair or replace damaged labels.

## KEEP CLEAR

When approaching an operating machine on foot, stay at least 300 feet (90M) away from the machine and all related attachments including the grapple, delimber, topping saw and ground saws until the operator recognizes your presence. Make sure that all equipment is shut down with grapple resting securely on stable ground before advancing to the machine.

Always avoid the discharge path of all saws.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against noise. Prolonged exposure to loud noise can cause impairment or loss of hearing.



Use the handrails and steps provided when mounting and dismounting from the machine. Do not climb onto or jump off the machine at any time. Do not use the seat armrest or joystick as handle when entering or leaving the cab.

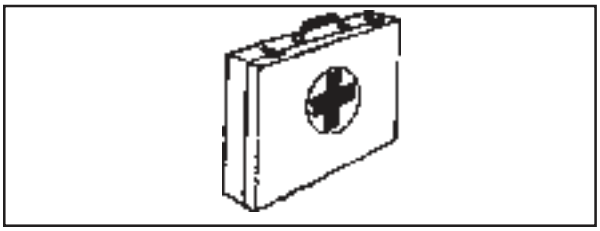
When mounting or dismounting the machine always use the 3 point technique - Use one hand with 2 feet or 2 hands with one foot.

## GENERAL SAFETY PRECAUTIONS continued

Avoid mounting or dismounting the machine in areas with slippery surfaces.

If this is not possible clean up or cover slippery surfaces with a non-slip material.

Machines should be completely cleaned of debris at least daily, particularly around the engine exhaust components. Hydraulic oil leaks, excess grease, fuel and oil accumulation (including spillage) should be eliminated immediately. Machine should be washed completely at every major service.



Keep a first aid kit in an easily accessible location on the vehicle at all times.

Do not operate the equipment with anyone in the cab, on platforms, or anywhere else within 300 feet the machine or related equipment. The machine is provided and approved with seating for the operator only.

Do not allow anyone to operate the machine who may not be physically fit or who may be under the influence of alcohol or drugs.

Inspect the machine daily for signs of damage, unusual wear, fluid leaks, or faulty operation. Repair or replace malfunctioning parts and systems immediately.

Do not operate the machine with any defective or inoperable components.

Do not operate the machine with any of the exhaust system, safety covers, or other devices removed.

When moving the machine, ensure that adequate clearance is available on both sides and above the machine or any of its attachments. Extra clearance may be required particularly where the ground is uneven.

Approach with extreme caution, any area where overhanging electrical powerlines are present. Serious injury or death by electrocution can result if the machine or any of its attachments are not kept a safe distance from these lines.

Maintain a minimum distance of 10 ft. (3m) between the machine or boom and any power line carrying up to 50,000 volts or less.

Powerlines carrying more than 50,000 volts require a minimum safety distance of 10 ft. (3m) plus 1/2 inch (10mm) for each addition 1,000 volts above the 50,000 volt level. If State/Provincial, local or job site regulations require even greater safety distances than stated above, adhere strictly to these regulations for your own protection.

When the machine is transported, make sure that it is adequately secured to the transporting vehicle.

Comply with instructions in this manual and also your company's regulations for the operation of this machine.

Read, understand and follow all general safety precautions specified by grapple, delimber and saw manufacturers.

**WARNING**

Engine exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

**WARNING**

Battery posts, terminals and related accessories contain lead and lead compounds. **Wash hands after handling.**

# OPERATING SAFETY PRECAUTIONS

Shut off engine when refuelling - DO NOT refuel the engine while smoking or when near open flame or sparks.

During refuelling do not leave the filler nozzle unattended.

Avoid over filling and immediately clean up spilled fuel.

Before starting the engine, check to ensure that all doors, panels, and access covers are installed properly and secured.

Make sure that all of the controls are positioned as specified in the *starting instructions* in the operator's manual.

Check that no other personnel have moved into a hazardous area before starting the machine.

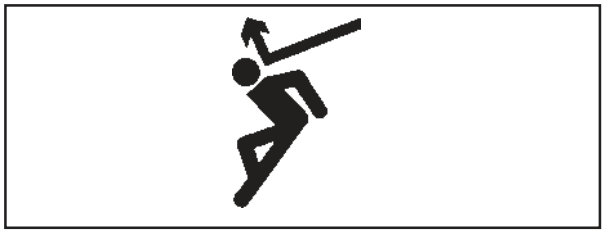
Sound the machine horn before starting the machine.


For engine *starting* and *stopping* procedures refer to STARTING ENGINE and STOPPING ENGINE in SECTION 2 of the THIS MANUAL. For *correct engine speeds,* refer to THROTTLE CONTROL in SECTION 2 of the THIS MANUAL.

***Never use a liquid starting aid to start an engine with a pre-heat device.***

Prior to commencing work, check all equipment controls to ensure that the machine responds correctly.

Ensure that the windshield guard is installed and properly secured.



Keep the cab door closed when operating the machine to prevent accidental entry of branches and debris into the cab.

Always rest the grapple on solid ground or trailer when not operating, regardless if the engine is running or shut off.

When the engine is running, DO NOT allow anyone in areas of the machine where they may be injured or crushed by moving components.

Maintain a safe operating distance between the machine and other personnel. Never swing the boom with or without trees, over the heads of bystanders.

Use only prearranged and approved signalling practices.

Operate the machine only from a seated position in the operator’s seat.

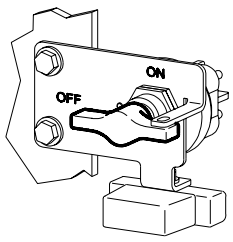
## OPERATING SAFETY PRECAUTIONS continued

Do not allow other people either in the cab or anywhere else on the machine.

Before leaving operator's cab, lower the grapple onto solid ground or the trailer.

When leaving the operator's cab for an extended period shut the engine off.

Never work alone. Regularly inform other crew members of your intentions, location and length of time to perform duties.




240B-003 **BATTERY DISCONNECT SWITCH**

Turn the battery disconnect switch off if the vehicle is to be idle for an extended period of time (Example - overnight).

Before transporting the machine:

- Secure the grapple to the trailer and raise the stabilizers.
- Shut down the engine and turn the master disconnect switch off.
- Check to ensure that all doors, panels and access covers are installed and properly secured.

**WARNING**

**Always lower the boom to the ground and shut down the engine before leaving the cab.**

**WARNING**

**Safe mounting of this loader onto a trailer or truck is the responsibility of the owner.**

**WARNING**

**An unstable loader can cause serious injury or death or equipment damage. Do not operate the loader without lowering the stabilizers onto firm ground and with the loader level.**

**DANGER**

**A moving stabilizer can cause serious injury or death. Before lowering the stabilizers make sure the area is clear of personnel.**

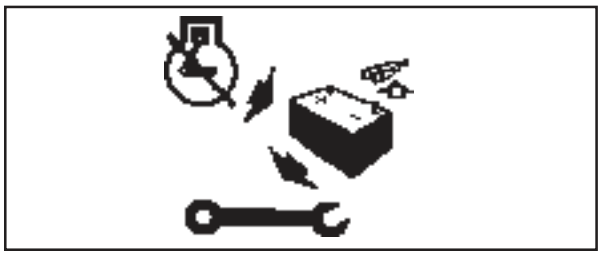
**DANGER**

**A falling or swinging load or boom can cause serious injury or death. Do not operate the loader when personnel are in the area of the machines operating reach or load movement. Do not move the boom or load over the heads of people.**

**WARNING**

**Do not allow the driver to remain in the truck cab during loading operations and do not move loads over the top of the truck cab. Serious injury or death or property damage may result.**

# SERVICING SAFETY PRECAUTIONS



Conduct maintenance inspections at least as frequently as recommended in section 3 of the operator's manual.

When servicing or repairing equipment, shut the engine down. Turn Master Disconnect switch OFF.

Install a “DO NOT START ENGINE” sign on the operator’s cab door when making repairs to the machine.

Before performing maintenance or repair work on any equipment, consult the manufacturer’s instruction manual and follow recommended procedures.

The radiator and the engine cooling system should be inspected daily and cleaned as necessary to maintain moderate engine temperatures.

**WARNING**

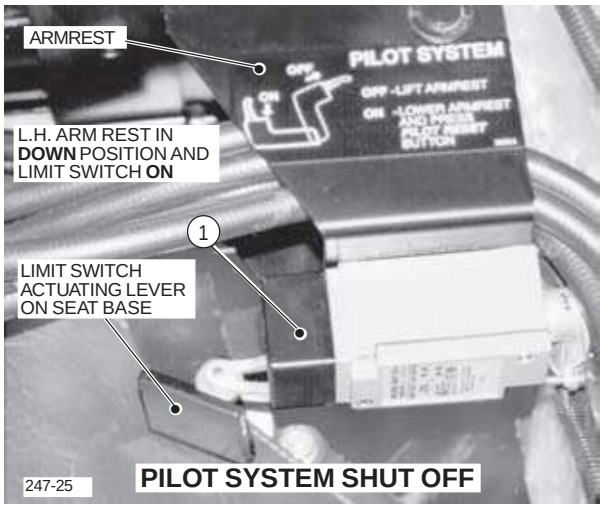
**WARNING, HOT FLUIDS AND HOT MACHINE SURFACES CAN CAUSE SERIOUS BURNS!**

- Before servicing the machine, allow the engine cooling system, fuel system, exhaust system, hydraulic system and machine surfaces to cool down.
- Use a thermometer to check surface and system temperatures to ensure it is safe to begin service work.
- DO NOT begin service work until the surface or system temperature has cooled down to below 100°F (38°C)!

**SAFETY INTERLOCK SWITCH ON LEFT ARMREST:**

The left arm rest is equipped with a safety interlock switch (1) to prevent the machine from being operated while the armrest is in the raised position (pilot system is shut off).

**NOTE:** The engine can be started but the machine functions cannot be operated with the left arm rest up.




To operate:

With the engine running and the left arm rest DOWN, push the pilot reset switch.

Once the safety interlock system has been activated, the safety of both the operator and all persons outside the cab becomes the responsibility of the operator.

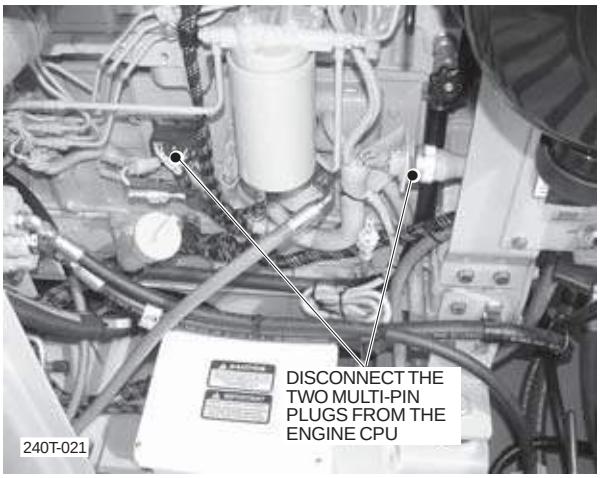
The left arm rest safety interlock switch (pilot system shut off limit switch) and the pilot reset switch are a safety feature and their function must not be defeated in any way.

## SERVICING SAFETY PRECAUTIONS continued

**Prior to welding** on any part of the machine, it should be cleaned and a fire extinguisher should be made available at the welding location. Care must be taken in attaching the welding machine grounding clamp so current does not pass through pins and bearings, especially the swing bearing.

**Turn the battery disconnect switch off.** Also,

**Disconnect the engine CPU** (Central Processing Unit) by unplugging the two multi-pin connectors from the left side of the engine.




**WARNING**

**Diesel fuel or hydraulic fluid under pressure can penetrate the skin and cause serious personal injury, blindness, or death. If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with treating this type of injury.**

Never use your bare hand to check for fluid leaks.

Fluid leaks under pressure may not be visible. When searching for leaks, wear work gloves and use a wrench or piece of wood to move hydraulic hoses. Do not grab hold of hydraulic hoses. Wear safety goggles for eye protection.

Explosive release of fluids from the pressurized cooling system can cause serious burns.

Shut off engine. Only remove engine radiator filler cap when cool enough to touch with bare hands.

Slowly loosen cap to first stop to relieve pressure before removing completely.

Do not change any pressure or relief setting unless authorized instruction has been obtained.

Use the proper tool for the job. Repair or replace worn or damaged tools including lifting equipment immediately.

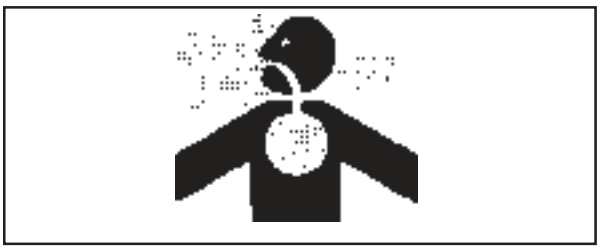
## SERVICING SAFETY PRECAUTIONS continued

Keep your hands, feet, head, and loose clothing away from power driven parts. Tie long hair behind your head. Remove rings and other jewellery to prevent electrical shorts and entanglement in moving parts.

Always be aware of machine pinch points that could cause injury. Never place body parts within the range of motion of the working parts of the machine.

Never stand under an object supported with hydraulics. Always use safety stands or a locking device.

Before performing work on the grapple or boom, ensure they are firmly supported.



If the engine is running inside a building, ensure that sufficient ventilation is available to prevent a build-up of toxic exhaust fumes. Run the engine only when it is necessary for testing or adjustments.

Work in a ventilated area. If it is necessary to run an engine in an enclosed area, use an exhaust pipe extension to remove toxic exhaust fumes.

If you don't have an exhaust pipe extension, either work outside, or open the shop doors.

Dispose of all fluids properly according to all applicable laws and regulations for the region.

Do not pour fluids into the ground, stream, pond or lake.

Before draining any fluids, know the proper way to dispose of them.

# FIRE PREVENTION

**When working in a forest environment,** it is impossible to prevent combustible debris from collecting in tight corners of the machine. This debris, in itself, may cause a fire; however, when mixed with fuel, oil or grease in a hot or confined place, the danger of fire is greatly increased.

The following fire prevention guidelines should be used to supplement the operator's fire prevention efforts. In no case should the guidelines be used, or assumed, as replacements for diligent operator efforts at preventing fires.

The following guidelines will help to keep your equipment up and running efficiently **and keep the risk of fire damage to a minimum.**

1. **Maintain a CHARGED fire extinguisher** on the machine at all times and KNOW HOW TO USE IT.
2. **Inspect the machine** for any signs of fuel or hydraulic system leakage and check for worn or eroded fuel or hydraulic lines before starting up any equipment.
3. **Inspect the EXHAUST SYSTEM DAILY** for any signs of **LEAKAGE**. Check for worn, cracked, broken, or damaged pipes or muffler. Also check for missing or damaged bolts or clamps. Should any exhaust leaks or defective parts be found, repairs must be made immediately. Engine exhaust leaks can cause fires, **DO NOT OPERATE** the machine until the exhaust leak is repaired.
4. **During daily operation** of the machine, the occurrence of **exhaust leaks** are usually accompanied by a **change or increase in engine exhaust noise levels**. These **audible warnings** cannot be ignored. Should any exhaust leaks occur during operation, the machine must be **shut down immediately** and not put back to work until the necessary repairs have been completed.
5. **Remove debris and blow out dust regularly** from the air intake doors, engine radiator, hydraulic oil cooler and A/C condenser core to prevent overheating of the engine and hydraulics. Refer to CLEANING A/C CONDENSER, OIL COOLER AND RADIATOR in SECTION 2 of the OPERATOR'S MANUAL.
6. **Blow off all debris and dust accumulated** near hot engine exhaust components (turbocharger and exhaust manifold as well as exhaust pipes and muffler) at the completion of each work shift or more frequently depending on logging conditions. Visual inspection after blow off to ensure thorough cleanliness is vital. Engine exhaust systems provide numerous small pockets where saw dust, small wood chips and other flammable forest debris can gather. Even small accumulations close to hot exhaust components can ignite and smolder. If dislodged by vibration this smoldering debris can fall into other areas of the machine and thereby spread a fire.
7. **Clean out all accumulated forest debris** (twigs, pine needles, branches, bark, leaves, saw dust, small wood chips) and any other combustible materials from inside the machine belly pans or lower machine structures as well as from areas in proximity to the engine, fuel and hydraulic oil systems no less frequently than at the completion of each work shift.
8. **AFTER transporting (trucking) a machine** from one job sight to the next, open all doors and access panels and blow off any debris that may have repositioned itself onto the engine and exhaust parts due to wind turbulence caused by the journey.
9. **Clean up any grease, diesel fuel, hydraulic and lubricating oil** accumulation and spillage immediately.
10. **Steam clean the engine,** fuel and hydraulic tank compartments of all equipment at least once a month or more frequently depending on logging conditions.
11. **Be cautious when smoking.** An open flame, a lighted cigarette, etc., should not be permitted around any vehicle, especially during fuelling operations and/or when the fuel system is open to the atmosphere, and/or when servicing batteries.

## FIRE PREVENTION continued

12. **Shut down equipment immediately** when a problem is suspected or smoke is detected.
13. **Park the machine at least 50 feet away** from other equipment at the end of each shift.
14. **Turn the battery disconnect switch to OFF** at shut down to avoid loss by electrical short.
15. **Remain with the machine** for at least 45 minutes at the end of operations while the machine cools.
16. **Once a fire has started** on a machine hoses will quickly burn through causing pressurized fluids (diesel fuel, hydraulic oil, etc.) to fuel the fire. NEVER leave the machine parked with booms or arches suspended off the ground, as they will inject hydraulic oil into the fire if a supporting hose burns through.
17. **Remove all keys,** lock equipment and fuel cap at the end of operations to reduce the risk of vandalism.
18. **Before starting repair work,** such as welding, the surrounding area should be cleaned and a fire extinguisher should be close by.
19. **Use only nonflammable solutions for cleaning** the machine or components.
20. **Store rags and other combustible materials** in a safe, fireproof location.
21. **Do not use the machine** on top of or to push piles of burning timber. A machine fire will result.

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EQUIPMENT FIRES ADVERSELY EFFECT YOUR ABILITY TO LOG, MAY INCREASE YOUR INSURANCE PREMIUMS DRAMATICALLY OR PREVENT YOU FROM OBTAINING INSURANCE COVERAGE AT ALL.

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**WHAT ELSE TO DO BEFORE YOU EXPERIENCE A FIRE**

- Ensure that you are familiar with emergency procedure in the event of a fire.
- Ensure that your fire suppression system* is charged and functional.
- Ensure that any hand held fire extinguishers are charged and functional.
- Ensure that any stored water systems on the machine are charged and functional.
- Ensure that the nozzle of any hand held extinguishers available at the work site fits within the access holes in the doors of the machine.
- Ensure that you have the proper fire extinguishers on site. Most fires involving mobile equipment will be of the **A** or **B** type. You should have a dry chemical extinguisher rated **ABC** and a pressurized water extinguisher rated **A**.
- Prevent the fire from happening by ensuring that the machine is cleaned regularly and all systems are well maintained.

***NOTE:** Dry chemical fire suppression systems are offered by Tigercat as an optional installation on some of the Tigercat product lines. Please disregard any references made to fire suppression systems if not installed on your machine.

**WHAT TO DO IN CASE OF A MACHINE FIRE**

- At all times ensure your own personal safety and the safety of anyone that may be in the area. Approach any fire with extreme caution.
- If the machine is in a dangerous position, attempt to move to a safe position. Lower working attachment to the ground.
- Shut the engine off.
- Activate the fire suppression system*
- Radio or call for help (as appropriate).
- Exit the machine taking fire extinguisher or water hose (if applicable) with you.
- If you can safely open the access panels to the machine, in the area of the fire, do so.
- If you can safely do so, attempt to extinguish the fire.
- If you can safely do so, turn OFF battery disconnect switch.
- A dry chemical fire extinguisher should be used first, if available.

**Continued on page 12**

## FIRE PREVENTION continued

**Continued from page 11**

- Use the **PASS** method with most extinguishers.
  - **P**ull the pin. This will allow you to discharge the extinguisher.
  - **A**im at the base of the fire. If you aim at the flames (which is frequently the temptation), the extinguishing agent will fly right through and do no good. You want to hit the fuel.
  - **S**queeze the top handle or lever. This depresses a button that releases the pressurized extinguishing agent in the extinguisher.
  - **S**weep from side to side until the fire is completely out. Once the fire is out, keep an eye on the area in case it re-ignites.

20229A **TYPICAL FIRE EXTINGUISHER ACCESS HOLE**

- Place the nozzle of the fire extinguisher into the appropriate fire extinguisher access hole and discharge the extinguisher.
- Failing all attempts to access the machine compartment, attempt to discharge the extinguisher through the mesh or any available openings on the machine.
- Use the pressurized water hose supplied with the machine (if applicable) or a pressurized water extinguisher (if available) after the discharge of a dry chemical extinguisher or suppression system* to remove heat build up from the area. A fire suppressed by a dry chemical powder may re-ignite with the latent heat of any debris in the area.
- Remain with the machine until help arrives to ensure that the fire does not re-ignite.
- Ensure that the machine and all components have cooled down sufficiently after a fire has occurred. Beware of the possibility of coolant or hydraulic hoses rupturing after a fire spraying hot oil or coolant which may result in severe burns.

### WHAT TO DO AFTER A FIRE

- Notify your equipment dealer and or T**igercat Industries Inc.** by completing an incident report, Tigercat form number 5101.
- Ensure that the cause of the fire is determined and all appropriate repairs are completed before returning the machine to work.
- Ensure that the fire suppression system* is properly serviced and returned to a functional state (if applicable).
- Ensure that all extinguishers used in fighting the fire are replaced or recharged as appropriate.

***NOTE:** Dry chemical fire suppression systems are offered by Tigercat as an optional installation on some of the Tigercat product lines. Please disregard any references made to fire suppression systems if not installed on your machine.

# Tigercat T240B Track Loader

# SECTION 3 - LUBRICATION & MAINTENANCE

AUGUST, 2006

## CONTENTS - SECTION 3

# PREVENTIVE MAINTENANCE SCHEDULE FOR T240B TRACK LOADER

## NEW MACHINE MAINTENANCE

### *INITIAL PRE-DELIVERY INSPECTION:-

PERFORM THE INITIAL PRE-DELIVERY INSPECTION
USING Tigercat FORM NUMBERS 5281 AND 5282;
"*PDI AND 50-100 HOUR INSPECTION REPORT*"

### *FIRST 50-100 HOUR INSPECTION AND SERVICE REPORT:-

WITH THE OWNER'S MECHANIC PRESENT,
PERFORM AN INSPECTION AND SERVICE
ACCORDING TO THE Tigercat FORM NUMBERS 5281 AND 5282;
"*PDI AND 50-100 HOUR INSPECTION REPORT*"
THIS MUST BE COMPLETED WITHIN THE FIRST 50-100 HOUR TIME FRAME.

***IMPORTANT:** TO QUALIFY FOR CONTINUED WARRANTY,
THIS REPORT MUST BE COMPLETED AND RETURNED TO
Tigercat Industries Inc. WARRANTY DEPARTMENT.

**Tightening points:~**

- ☐ Check torque on swing bearing retaining bolts
- ☐ Engine mounting bolts
- ☐ Pump drive gearbox mounting bolts
- ☐ Pilot pump mounting bolts
- ☐ Swing gearbox mounting bolts
- ☐ Swing motor mounting bolts
- ☐ Cab securing bolts
- ☐ Boom pin nuts
- ☐ Track shoe bolts
- ☐ Track roller retaining bolts
- ☐ Track sprocket retaining bolts
- ☐ Track drive gearbox mounting bolts
- ☐ Track drive motor mounting bolts
- ☐ All hydraulic connections
- ☐ Hose clamps
- ☐ Pin retainers
- ☐ Any other loose nut, bolt or fitting

**NOTE: Use of filters other than genuine Tigercat replacement filters is not recommended.**

Refer to diesel engine service manual and attachment manual for additional required maintenance at this scheduled time period.

**IMPORTANT**

**Before driving machine ensure that the track tension (sag) is set correctly.**

**Track sag may be set less than specified for shipping purposes.**

**OIL LOST FROM LEAKAGE**

| LEAKAGE RATE | LOST 0IL (GALLONS) PER DAY | PER MONTH | PER YEAR |
|---|---|---|---|
| ONE DROP IN 10 SECONDS | 0.112 | 3.36 | 40.0 |
| ONE DROP IN 5 SECONDS | 0.225 | 6.75 | 81.0 |
| ONE DROP SECOND | 1.125 | 33.75 | 405.0 |
| THREE DROP PER SECOND | 3.75 | 112.5 | 1,350.0 |
| DROPS BREAK INTO STREAM | 24.00 | 720.0 | 8,640.0 |

# GENERAL

**CAUTION**

**All handles, steps and platforms must be kept free of grease, oil, fuel mud, snow ice and forest debris to prevent risk of personal injury**

**WARNING**

**WARNING, HOT FLUIDS AND HOT MACHINE SURFACES CAN CAUSE SERIOUS BURNS!**

- Before servicing the machine, allow the engine cooling system, fuel system, exhaust system, hydraulic system and machine surfaces to cool down.
- Use a thermometer to check surface and system temperatures to ensure it is safe to begin service work.
- DO NOT begin service work until the surface or system temperature has cooled down to below 100°F (38°C)!

- ☑ Clean around filler caps before checking or adding fluids
- ☑ Clean around hydraulic fittings before breaking connection. Plug or cap immediately
- ☑ Clean up spills as soon as possible
- ☑ Always use clean oil and containers
- ☑ Drain dirty oil while still warm
- ☑ Do not exceed recommended fluid levels
- ☑ Service all hydraulic filters after the failure of a pump, motor, cylinder or valve. Failures of this nature could contaminate the entire hydraulic system
- ☑ Top up diesel fuel at each shift to reduce contamination by condensation
- ☑ Clean up oil spills on walking surfaces in engine enclosure immediately
- ☑ Before welding on machine be sure the negative battery terminal is disconnected
- ☑ When welding, secure ground connection as close to working position as possible to prevent arcing across machined surfaces or through bearings
- ☑ Clean away all branches, bark and chips. Clean up all traces of oil to avoid fires
- ☑ Always have a fire extinguisher at hand
- ☑ For safety, always lower boom assy. To the ground when leaving cab, leaving machine unattended or during service

# SCHEDULED MAINTENANCE

## EVERY 8 HOURS:~

- Check engine coolant level
- Check engine oil level
- Drain fuel/water separator
- Check hydraulic oil level
- Check swing gearbox oil level

  Fill reservoir to halfway mark

**Lubricate:~**

- Swing pinion;
  1-fitting - 10 shots while swinging
- Swing bearing;
  1-fitting - 10 shots while swinging
- ‡ Boom joints;
  4-fittings - purge
- ‡ Cylinders; boom, stick & tilt;
  4-fittings total - purge

‡ **Lubricating cylinder pins and boom joints:-**

1. Ensure machine is on level ground
2. Fully extend stick boom cylinder
3. Lower main boom and rest grapple firmly on ground or stable trailer
4. While in this position lubricate all cylinder retaining pins and boom joints

**NOTE:** This procedure will allow grease to flow to the normally "loaded" side of the pin/bearing surfaces.

**Clean:~**

- Oil cooler, engine radiator and a/c condensor
- Remove potentially damaging limbs or sticks and all debris

**Check:~**

- For leakage around hydraulic components and flexible hoses
- For loose nuts, bolts and fittings
- Condition and tension of fan belts.
- Conduct an overall visual inspection.
- Refer to diesel engine service manual and attachment manual for additional required maintenance at this scheduled time period.

## EVERY 125 HOURS:~

- **Perform 8 hour maintenance**

**And in addition replace:~**

- Return filters restriction indicator with engine running at high idle and oil flow
- Track drive gearbox oil level with both level plugs in line with the horizontal plane and above center
- Fluid level in batteries unless maintenance free
- Engine rpm.
- All hydraulic pressures
- Hydraulic pumps and motor securing bolts
- Torque tightening points as per new machine maintenance

**Visually check for damage to:~**

- Main and stick booms and cylinders
- Tracks, track frames and carbody
- Swing bearing area
- Attachment

Make repairs immediately

**Visually inspect for:~**

- Frayed electrical wiring and hydraulic hoses
- Wear in any other components

**Clean/replace:~**

- Air conditioner re-circulation filter
- Cab fresh air filter
- Refer to diesel engine service manual and attachment manual for additional required maintenance at this scheduled time period.

Continued on page 5

# SCHEDULED MAINTENANCE

Continued from page 4

## EVERY 250 HOURS:~

- **Perform 8 hour maintenance**
- **Perform 125 hour maintenance**

**And in addition:~**

- Replace engine oil and filter
- Replace engine fuel filter
- Replace air intake primary element
- Pump drive gearbox
- Track drive gearboxes

  Fill track drive gearbox with both level plugs in line with the horizontal plane and above center

## EVERY 500 HOURS:~

- **Perform 8 hour maintenance**
- **Perform 125 hour maintenance**
- **Perform 250 hour maintenance**

**And in addition replace:~**

- Air intake safety element
- Hyd. Oil return filters †
- Hyd. Oil pilot pressure filter †
- Oil in swing gearbox

  Fill reservoir to halfway mark

**Lubricate:~**

- Door and cover hinges
  8 fittings - 1 shot

**Check:~**

- Torque on swing bearing and swing gearbox retaining bolts
- Torque on track drive gearboxes and motor mounting bolts
- Track rollers and idlers for oil leakage. These components are filled with oil and considered maintenance free. If oil leakage is detected repair of component(s) will be necessary.
- Refer to diesel engine service manual and attachment manual for additional required maintenance at this scheduled time period.

## EVERY 1000 HOURS:~

- **Perform 8 hour maintenance**
- **Perform 125 hour maintenance**
- **Perform 250 hour maintenance**
- **Perform 500 hour maintenance**

**And in addition check:~**

- Fuel intake strainer

## EVERY 2000 HOURS:~

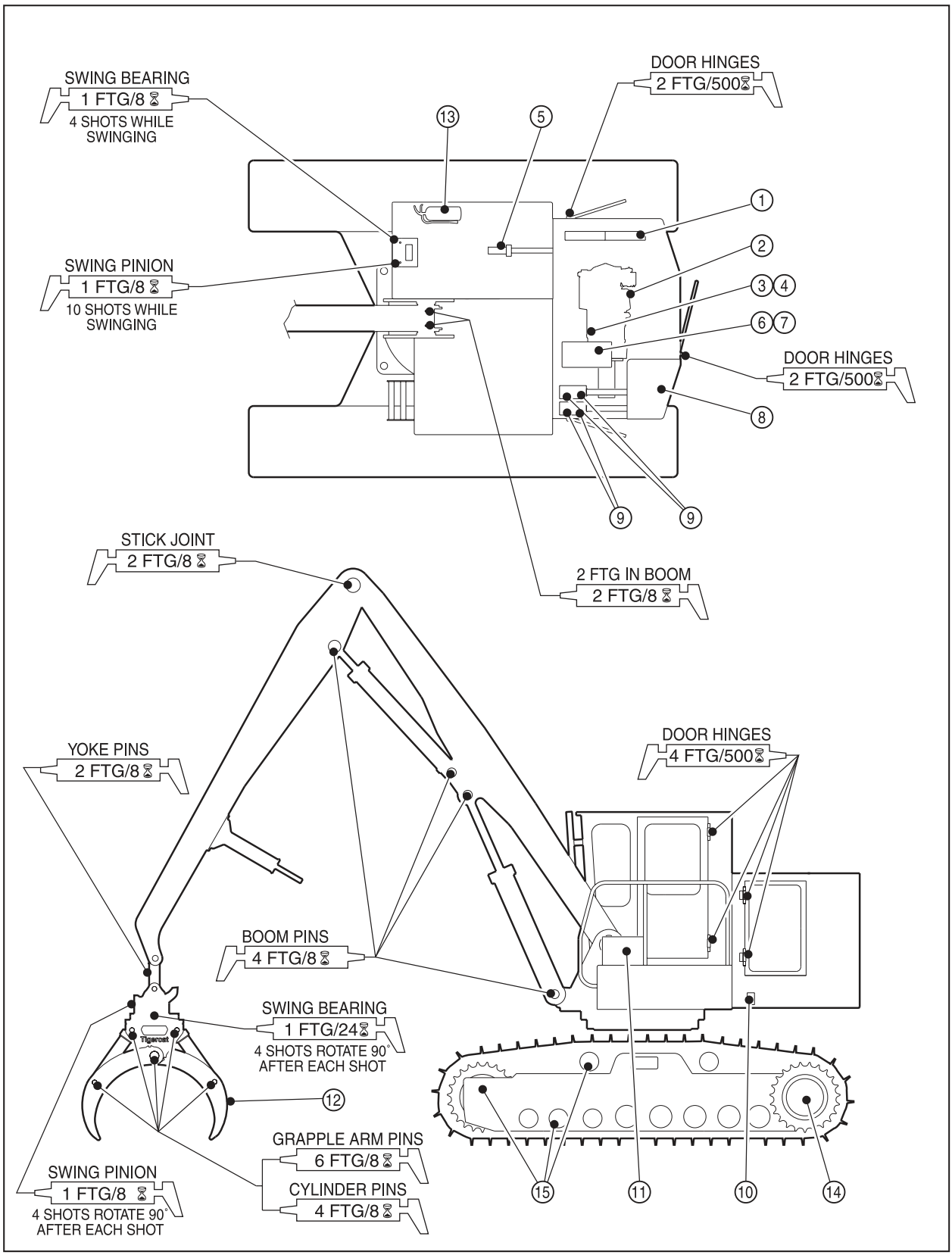
Drain and refill hydraulic oil tank with recommended hydraulic oil. See APPROVED HYDRAULIC OILS

# APPROVED HYDRAULIC OILS

**Use *only* one of the following oils to fill or replenish the hydraulic system.**

| | |
|---|---|
| Chevron | Tractor hydraulic fluid (summer) |
| Citgo | Tractor hydraulic fluid (33-310) (summer) |
| Imperial | Esso hydraul 56 (summer)<br>Hydraul 50 (low visc) (winter) |
| Shell | Donax td (summer)<br>Donax tdl (winter) |
| Sun | Sunfleet th fluid (summer) |
| John deere | Type j20c (hy-gardtm) (summer)<br>Type j20d (hy-gardtm) (winter) |

† **NOTE: Use of filters other than genuine Tigercat replacement filters is not recommended.**



# Tigercat® T240B Loader On Tracks
# SERVICE AND LUBRICATION POINTS

THIS CHART IS INTENDED FOR QUICK REFERENCE.
ADDITIONAL SERVICE INFORMATION IS CONTAINED IN THE Tigercat OPERATOR'S MANUAL FOR THIS MACHINE.

| SERVICE POINT NO. | ITEM | SERVICE EVERY | | | | | | CAPACITY | | | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8 | 125 | 250 | 500 | 1000 | 2000 | LITER | US GAL | QTY. | |
| ** ① | COOLING SYSTEM | CHK | CHANGE COOLANT EVERY 2 YEARS | | | | | 30 | 8 | | MIXTURE 50% DISTILLED WATER 50% ANTIFREEZE (GM 6038M SPEC.) |
| ② | ENGINE OIL AND FILTER CUMMINS 'B' | CHK | | REP | | | | 24 | 6.3 | | SEE ENGINE MANUFACTURER'S SERVICE MANUAL |
| ③ | FUEL FILTER (ENGINE) | | | REP | | | | | | 1 | |
| ④ | FUEL/WATER SEPARATOR | DRN | | REP | | | | | | 1 | |
| ⑤ | INTANK FUEL STRAINER | | | | | CHK | | | | 1 | DRAIN TANK, CLEAN OR REPLACE AS NECESSARY |
| ⑥ | AIR INTAKE PRIMARY FILTER ELEMENT | | CHK | REP | | | | | | 1 | CHECK FILTER RESTRICTION INDICATOR AT FULL ENGINE RPM |
| ⑦ | AIR INTAKE SAFETY FILTER ELEMENT | | | | REP | | | | | 1 | |
| ⑧ | HYDRAULIC RESERVOIR | CHK | | | | | D/R | 350 | 92 | 1 | DRAIN AND REFILL AS REQ'D BY SEASONAL OIL CHANGE. SEE APPROVED HYD. OILS |
| ⑨ | RETURN FILTERS (4 ELEMENTS) | | CHK | | REP ◆ | | | | | 4 | CHECK FILTER RESTRICTION INDICATOR ON FILTER HEADS WITH ENGINE RUNNING AT HIGH IDLE AND WITH OIL FLOW |
| ⑩ | PRESSURE FILTER PILOT | | | | REP ◆ | | | | | 1 | |
| ⑪ | SWING GEARBOX | CHK | | | D/R | | | † | † | 1 | †HALF FILL RESERVOIR WITH SAE 75W90 EP OIL |
| ⑫ | GRAPPLE, **Tigercat** | SEE LUBRICATION POINTS DIAGRAM | | | | | | | | | |
| | GRAPPLE, OTHER MANUFACTURERS | SEE MANUFACTURERS MAINTENANCE SCHEDULE | | | | | | | | | |
| ⑬ | FIRE EXTINGUISHER | | | CHK | | | | | | 1 | TURN TO MIX CONTENTS |
| ⑭ | TRACK DRIVE GEARBOX | | CHK | | | D/R | | 6 | 1.5 | 2 | CHECK IN HORIZONTAL POSITION, FILL WITH SAE 75W90 SYNTHETIC GEAR OIL |
| ⑮ | TRACK ROLLERS & IDLERS | | | | CHK | | | 7.6 | 2 | 1 | CHECK FOR OIL LEAKAGE. FILL WITH SAE 30 OR 40 IF REQ'D |

## LEGEND

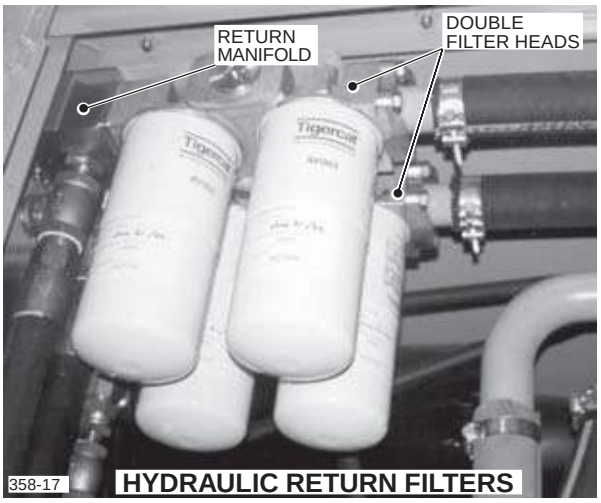
2 FTG/125 ⏳ LUBRICATION POINT WITH A DESIGNATED NUMBER OF FITTINGS (2 FTG) AND HOURS BETWEEN SERVICING (125 ⏳). EXCEPT WHERE SPECIFIED, PURGE WITH LITHIUM BASED EP2 GREASE CONTAINING MOLYBDENUM DISULFIDE "MOLY".

** ANTIFREEZE MUST MEET GM 6038M SPECIFICATIONS - SEE ENGINE MANUFACTURERS MAINTENANCE MANUAL.

◆ **Use of hydraulic oil filters other than the Tigercat brand could lead to severe wear and rapid failure of hydraulic system components.**

⏳ ..... HOURS
CHK..... CHECK
REP ..... REPLACE
DRN ..... DRAIN
D/R ..... DRAIN AND REFILL

16619B R1

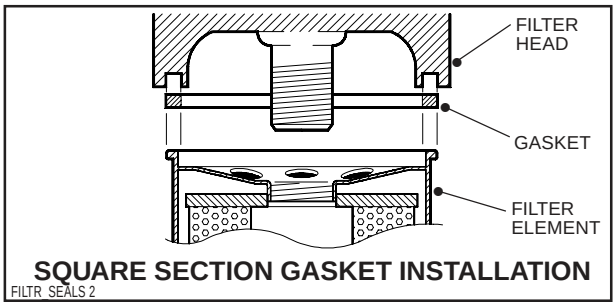



**HYDRAULIC OIL RETURN FILTERS**

Two double filter heads (four 7 micron elements) filter all returning hydraulic oil except pilot, prior to entering the hydraulic reservoir. Each filter head has a bypass valve with a 25 psi cracking pressure so that oil can bypass the filters if they become restricted. For service and replacement intervals see SERVICE AND LUBRICATION CHART in THIS SECTION.

**Changing the filters:**

1. Ensure Loader is on level ground with stabilizers down. Lower grapple to ground, stop engine, put parking brake ON.
2. Wipe clean the area around the filter and head.
3. Place rags below to catch the spillage of oil.
4. Wearing face protection (in case of an oil squirt), unscrew the old filter. Dispose of old filter and any oil properly.
6. The new **Tigercat** filter is supplied with two gaskets enclosed, examine the filter head closely to determine which gasket should be used and follow the instructions to ensure proper installation.




■ **Square Section Gasket**

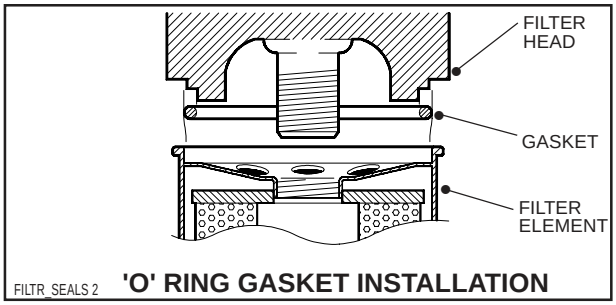
Remove used gasket and clean groove in head.

Apply clean oil to new gasket surfaces.

Install new gasket into groove in filter head.

Screw on new filter until gasket makes contact.

Tighten filter an additional 3/4 turn.




● **'O' Ring Gasket**

Remove used gasket and clean gasket seat in head.

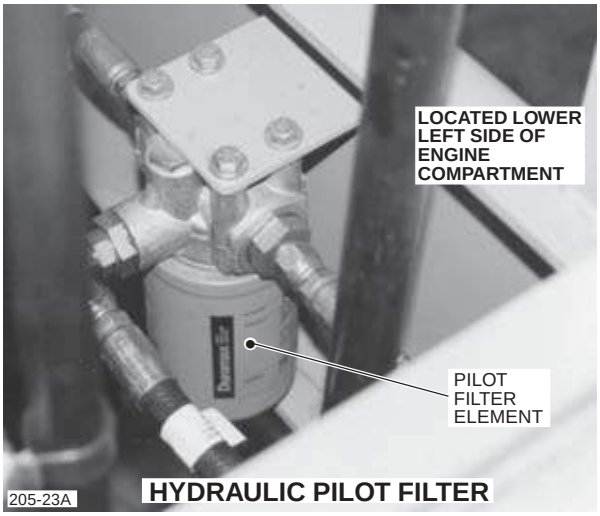
Apply clean oil to new gasket surfaces.

Install new gasket on inside lip of filter.

Screw on new filter until gasket makes contact.

Tighten filter until top edge makes metal to metal contact with filter head. (approximately 1 1/2 additional turns after gasket contact)

10. Start the engine and check for leaks.




**HYDRAULIC PILOT FILTER**

**PILOT RETURN PRESSURE FILTER**

This single full flow filter, is mounted in the output line between the pilot pump and the pilot manifold. For service and replacement intervals see SERVICE AND LUBRICATION CHART in THIS SECTION.

**Changing the filter:**

1. Ensure Loader is on level ground. Lower grapple to ground, stop engine, put parking brake ON.
2. Wipe clean the area around the filter and head.
3. Place rags below to catch the spillage of oil.
4. Wearing face protection (in case of an oil squirt), unscrew the old filter. Dispose of old filter and any oil properly.
5. Check the seating area for the gasket on the filter head and wipe it clean.
6. The new filter has an attached gasket, apply hydraulic oil to the gasket surface.
7. Screw on the new filter until the gasket makes contact with the seat in the filter head.
8. Turn filter an additional **1/2 turn by hand** to tighten.
9. Start the engine and check for leaks.

**IMPORTANT**

**Filters that are an integral part of the engine (fuel and lubricating oil) should be serviced and replaced according to the engine manufacturer's operation and maintenance manual.**

**IMPORTANT**

**Contaminated hydraulic fluid can lead to premature failure of hydraulic components and costly repairs. Filters must be replaced at the recommended time intervals, Refer to SCHEDULED MAINTENANCE in THIS SECTION.**

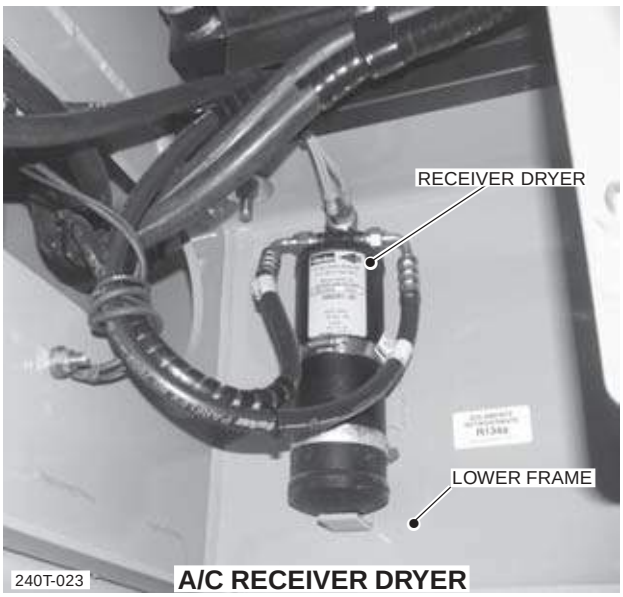
**Use of hydraulic oil filters other than the Tigercat brand could lead to severe wear and rapid failure of hydraulic system components.**

## AIR CONDITIONING - SERVICE

**IMPORTANT:** It is recommended that during cold weather when the A/C system is not in use, that it be run for a period of 5 minutes every two weeks to circulate oil to all components of the system.

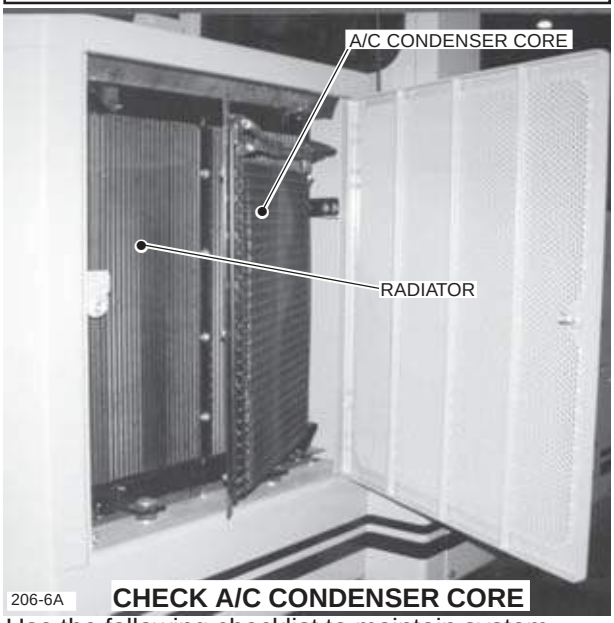
| R134a REFRIGERANT | PAG OIL (polyalkylene glycol) |
|---|---|
| 2 LBS. 12 OZ. | 2 OZ. |

**Any service work must be performed by authorized A/C technicians.** The system should be charged with 2 lbs. 12 oz. of R134a refrigerant. At least 2 oz. of PAG (polyalkylene glycol) oil should be present in the system and must be used on 'O' rings and fittings during assembly.


**CAUTION**

**If using compressed air for cleaning filters, use at 30 psi. or less. Always use personal protective equipment to guard against flying**




Use the following checklist to maintain system between service intervals. The compressor and charge valves are located on the left side of the engine and accessible through the engine compartment door. The receiver dryer is located in the lower engine compartment beside the front left engine mount and accessible from either underneath the engine compartment or through the engine compartment door.

**Perform the following checks on system:**

- **a.** Check and adjust compressor drive belt tension.
- **b.** Check fresh air filter and re-circulating air filter. Clean or replace as required.
- **c.** Check to see that compressor clutch will engage.
- **d.** Check blower operation and air vents.
- **e.** Check the condenser core for dirt and debris.

**CAUTION**

**If using water or compressed air for cleaning, always use personal protective equipment to guard against flying debris.**

## TORQUE CHART

| LOCATION | THREAD DIAMETER | TORQUE (LUBRICATED) | |
|---|---|---|---|
| | | lbf-ft | Nm |
| Cylinders | | | |
| Piston nut, main boom cylinder | 2 1/2"-12 UNF (GC) | 3200 | 4320 |
| Piston nut, stick cylinder | 2 1/2"-12 UNF (GC) | 3200 | 4320 |
| Piston nut, heel cylinder | 2 1/4"-12 UNF (GC) | 2100 | 2835 |
| Piston nut, grapple cylinder | 1 3/4"-12 UNF (GC) | 1750 | 2355 |
| Gland, grapple cylinder | 4 1/2" I/D CYLINDER | 450 | 607 |
| Keeper plate bolts, heel cylinder | 3/4"-10 UNC (G8) | 275-325 | 370-440 |
| Keeper plate bolts, Main boom cylinder | 7/8"-14 UNF (G8) | 300-325 | 405-440 |
| Keeper plate bolts, Stick boom cylinder | 3/4"-16 UNF (G8) | 240-270 | 323-363 |
| Boom joint and cylinder pin retaining bolts | 3/4"-10 UNC (G8) | 282-310 | 393-420 |
| Main and Stick boom pin retaining nut | 2"-12 UNF (G8) | 400 | 540 |
| Heel to Stick boom pin retaining nut | 1 3/4"-12 UNF (G8) | 400 | 540 |
| Cab securing bolts | 7/8"-9 UNC (G8) | 450-500 | 610-680 |
| Swing bearing bolts | 7/8"-9 UNC (G8) | 400-450 | 540-610 |
| Swing gearbox mounting bolts | 5/8"-11 UNC (G8) | 160-175 | 215-235 |
| Swing motor mounting bolts | M14-2 (10.9) | 130 | 175 |
| Engine mounting | | | |
| Bolts, bracket/mount to chassis | 7/8"-9 UNC (G8) | 450-500 | 610-680 |
| Bolts, bracket to engine | M12-1.75 (10.9) | 75 | 100 |
| Engine cooling fan mounting bolts | M10-1.5 (12.9) | 40 | 54 |
| Pump drive | | | |
| Drive plate to flywheel | 3/8"-16 UNC (G8) | 40 | 54 |
| Bell housing to engine | M10-1.5 (10.5) | 45 | 60 |
| Undercarriage | | | |
| Track shoe bolts | 3/4 UNF | T/T* | T/T* |
| Idler bolts | M16-2 (10.9) | 175 | 235 |
| Roller mounting bolts | 7/8"-9 UNC (G8) | 450 | 610 |
| Sprocket bolts | M20-2.5 (10.9) | 380 | 515 |
| Gearbox mounting bolts | 3/4"-10UNC (G8) | 310 | 417 |
| Drive motor mounting bolts | M12-1.75 (10.9) | 80 | 110 |

***T/T** represents **Torque-Turn**, this is a method of torquing the track shoe bolts. Refer to SECTION 11 in the Tigercat SERVICE MANUAL for a complete description on this method of applying torque.

Torque values pertaining to the engine and attachment are provided in the appropriate manuals.

# GENERAL TORQUE SPECIFICATIONS

## IMPERIAL

The torque values listed below are for general use only. DO NOT use these values if a different torque value or tightening procedure is shown for a specific application.

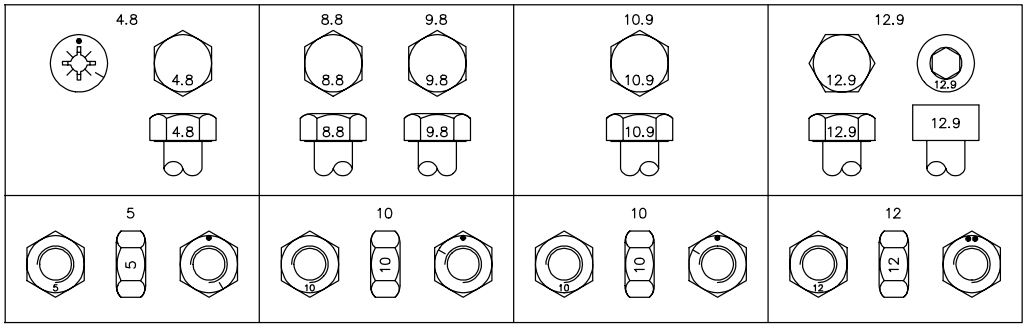
 **GRADE 8 BOLTS**

 **GRADE 5 BOLTS**

**IMPERIAL BOLT TORQUE SPECIFICATIONS**

| GRADE 8 BOLTS | | | | | GRADE 5 BOLTS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| COARSE | DRY | | LUBRICATED | | COARSE | DRY | | LUBRICATED | |
| THREAD | lbf-ft | Nm | lbf-ft | Nm | THREAD | lbf-ft | Nm | lbf-ft | Nm |
| 1/4" - 20 | 11 - 12 | 15 - 16 | 8 - 10 | 11 - 13 | 1/4" - 20 | 7- 8 | 10 - 11 | 8 - 10 | 11 - 13 |
| 5/16" - 18 | 26 - 30 | 35 - 40 | 20 - 28 | 27 - 38 | 5/16" - 18 | 14 - 18 | 19 - 24 | 10 - 15 | 13 - 20 |
| 3/8" - 16 | 44 -48 | 60 - 65 | 33 - 36 | 45 - 49 | 3/8" - 16 | 31 - 34 | 42 - 46 | 23 - 25 | 31 - 34 |
| 7/16" - 14 | 70 - 77 | 95 - 104 | 52 - 57 | 71 - 77 | 7/16" - 14 | 49 - 54 | 66 - 73 | 37 - 41 | 50 - 55 |
| 1/2" - 13 | 106 - 117 | 144 - 158 | 80 - 88 | 109 - 119 | 1/2" - 13 | 75 - 83 | 102 - 112 | 57 - 63 | 77 - 85 |
| 9/16" - 12 | 153 - 168 | 208 - 228 | 115 - 127 | 156 - 172 | 9/16" - 12 | 109 - 120 | 148 - 162 | 82 - 90 | 111 - 122 |
| 5/8" - 11 | 212 - 233 | 288 - 316 | 159 - 175 | 216 - 237 | 5/8" - 11 | 150 - 165 | 204 - 223 | 113 - 124 | 152 - 168 |
| 3/4" - 10 | 376 - 414 | 510 - 561 | 282 - 310 | 393 - 420 | 3/4" - 10 | 266 - 293 | 360 - 397 | 200 - 220 | 271 - 298 |
| 7/8" - 9 | 606 - 667 | 822 - 904 | 455 - 501 | 617 - 679 | 7/8" - 9 | 394 - 433 | 535 - 586 | 296 - 326 | 402 - 441 |
| 1" - 8 | 909 - 1000 | 1233 - 1355 | 682 - 750 | 925 - 1016 | 1" - 8 | 591 - 649 | 802 - 879 | 443 - 489 | 601 - 663 |
| 1 1/8" - 7 | 1288 - 1417 | 1746 - 1921 | 966 - 1062 | 1310 - 1441 | 1 1/8" - 7 | 794 - 873 | 1077 - 1183 | 596 - 656 | 808 - 889 |
| 1 1/4" - 7 | 1817 - 1999 | 2464 - 2710 | 1360 - 1496 | 1844 - 2027 | 1 1/4" - 7 | 1120 - 1232 | 1519 - 1670 | 840 - 924 | 1139 - 1252 |
| FINE | DRY | | LUBRICATED | | FINE | DRY | | LUBRICATED | |
| THREAD | lbf-ft | Nm | lbf-ft | Nm | THREAD | lbf-ft | Nm | lbf-ft | Nm |
| 1/4" - 28 | 13 - 14 | 18 - 19 | 10 - 13 | 14 - 17 | 1/4" - 28 | 9 - 10 | 12 - 13 | 9 - 10 | 12 - 13 |
| 5/16" - 24 | 23 - 28 | 31 - 38 | 18 - 25 | 25 - 33 | 5/16" - 24 | 17 - 22 | 23 - 29 | 16 - 20 | 21 - 27 |
| 3/8" - 24 | 49 - 54 | 67 - 73 | 37 - 41 | 50 - 55 | 3/8" - 24 | 35 - 39 | 48 - 53 | 26 - 29 | 35 - 39 |
| 7/16" - 20 | 78 - 86 | 106 - 116 | 58 - 64 | 79 - 86 | 7/16" - 20 | 55 - 61 | 75 - 83 | 41 - 45 | 56 - 61 |
| 1/2" - 20 | 120 - 132 | 163 - 179 | 90 - 99 | 122 - 134 | 1/2" - 20 | 85 - 94 | 116 - 127 | 64 - 70 | 87 - 95 |
| 9/16" - 18 | 171 - 188 | 232 - 255 | 128 - 141 | 174 - 191 | 9/16" - 18 | 121 - 133 | 164 - 180 | 91 - 100 | 124 - 135 |
| 5/8" - 18 | 240 - 264 | 326 - 358 | 180 - 198 | 244 - 268 | 5/8" - 18 | 170 - 187 | 231 - 253 | 128 - 141 | 174 - 191 |
| 3/4" - 16 | 420 - 462 | 570 - 626 | 315 - 347 | 427 - 470 | 3/4" - 16 | 297 - 327 | 403 - 443 | 223 - 245 | 303 - 332 |
| 7/8" - 14 | 668 - 735 | 906 - 996 | 501 - 550 | 679 - 745 | 7/8" - 14 | 434 - 477 | 589 - 646 | 326 - 359 | 442 - 486 |
| 1" - 14 | 995 - 1096 | 1359 - 1486 | 746 - 821 | 1012 - 1113 | 1" - 14 | 646 - 711 | 876 - 965 | 484 - 534 | 657 - 724 |
| 1 1/8" - 12 | 1445 - 1590 | 1960 - 2155 | 1083 - 1191 | 1469 - 1613 | 1 1/8" - 12 | 891 - 980 | 1208 - 1328 | 668 - 735 | 906 - 996 |
| 1 1/4" - 12 | 2012 - 2213 | 2728 - 2997 | 1509 - 1660 | 2046 - 2250 | 1 1/4" - 12 | 1240 - 1364 | 1682 - 1849 | 931 - 1024 | 1262 - 1387 |

## METRIC




**METRIC BOLT TORQUE SPECIFICATIONS**

| SIZE | CLASS 4.8 | | | | CLASS 8.8 OR 9.9 | | | | CLASS 10.9 | | | | CLASS 12.9 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LUBRICATED | | DRY | | LUBRICATED | | DRY | | LUBRICATED | | DRY | | LUBRICATED | | DRY | |
| | Nm | lbf-ft | Nm | lbf-ft | Nm | lbf-ft | Nm | lbf-ft | Nm | lbf-ft | Nm | lbf-ft | Nm | lbf-ft | Nm | lbf-ft |
| M6 | 4.8 | 3.5 | 6.0 | 4.5 | 9.0 | 6.5 | 11.0 | 8.5 | 13.0 | 9.5 | 17.0 | 12.0 | 15.0 | 11.5 | 19.0 | 14.5 |
| M8 | 12.0 | 8.5 | 15.0 | 11.0 | 22.0 | 16.0 | 28.0 | 20.0 | 32.0 | 24.0 | 40.0 | 30.0 | 37.0 | 28.0 | 47.0 | 35.0 |
| M10 | 23.0 | 17.0 | 29.0 | 21.0 | 43.0 | 32.0 | 55.0 | 40.0 | 63.0 | 47.0 | 80.0 | 60.0 | 75.0 | 55.0 | 95.0 | 70.0 |
| M12 | 40.0 | 29.0 | 50.0 | 37.0 | 75.0 | 55.0 | 95.0 | 70.0 | 110.0 | 80.0 | 140.0 | 105.0 | 130.0 | 95.0 | 165.0 | 120.0 |
| M14 | 63.0 | 47.0 | 80.0 | 60.0 | 120.0 | 88.0 | 150.0 | 110.0 | 175.0 | 130.0 | 225.0 | 165.0 | 205.0 | 150.0 | 260.0 | 190.0 |
| M16 | 100.0 | 73.0 | 125.0 | 92.0 | 190.0 | 140.0 | 240.0 | 175.0 | 275.0 | 200.0 | 350.0 | 225.0 | 320.0 | 240.0 | 400.0 | 300.0 |
| M18 | 135.0 | 100.0 | 175.0 | 125.0 | 260.0 | 195.0 | 330.0 | 250.0 | 375.0 | 275.0 | 475.0 | 350.0 | 440.0 | 325.0 | 560.0 | 410.0 |
| M20 | 190.0 | 140.0 | 240.0 | 180.0 | 375.0 | 275.0 | 475.0 | 350.0 | 530.0 | 400.0 | 675.0 | 500.0 | 625.0 | 460.0 | 800.0 | 580.0 |
| M22 | 260.0 | 190.0 | 330.0 | 250.0 | 510.0 | 375.0 | 650.0 | 475.0 | 725.0 | 540.0 | 925.0 | 675.0 | 850.0 | 625.0 | 1,075.0 | 800.0 |
| M24 | 330.0 | 250.0 | 425.0 | 310.0 | 650.0 | 475.0 | 825.0 | 600.0 | 925.0 | 675.0 | 1,150.0 | 850.0 | 1,075.0 | 800.0 | 1,350.0 | 1,000.0 |
| M27 | 490.0 | 360.0 | 625.0 | 450.0 | 950.0 | 700.0 | 1,200.0 | 875.0 | 1,350.0 | 1,000.0 | 1,700.0 | 1,250.0 | 1,600.0 | 1,150.0 | 2,000.0 | 1,500.0 |
| M30 | 675.0 | 490.0 | 850.0 | 625.0 | 1,300.0 | 950.0 | 1,650.0 | 1,200.0 | 1,850.0 | 1,350.0 | 2,300.0 | 1,700.0 | 2,150.0 | 1,600.0 | 2,700.0 | 2,000.0 |
| M33 | 900.0 | 675.0 | 1,150.0 | 850.0 | 1,750.0 | 1,300.0 | 2,200.0 | 1,650.0 | 2,500.0 | 1,850.0 | 3,150.0 | 2,350.0 | 2,900.0 | 2,150.0 | 3,700.0 | 2,750.0 |
| M36 | 1,150.0 | 850.0 | 1,450.0 | 1,075.0 | 2,250.0 | 1,650.0 | 2,850.0 | 2,100.0 | 3,200.0 | 2,350.0 | 4,050.0 | 3,000.0 | 3,750.0 | 2,750.0 | 4,750.0 | 3,500.0 |

TORQUECHARTGENERAL.XLS

# PRESSURE SETTINGS FOR T240B LOADER ON TRACKS

| LOCATION | PRESSURE |
|---|---|
| **Pilot** relief valve | 450 |
| Main relief **stick** valve | 3000 |
| Port relief L. H. track forward | Turn In |
| Port relief L. H. track reverse | Turn In |
| Port relief stick out | 3500 |
| Port relief stick in | 1500 |
| Port relief grapple saw cut(if equipped) | 3500 |
| Port relief slasher cut | 2500 |
| Main relief **hoist** valve | 3000 |
| Port relief grapple open | 3500 |
| Port relief grapple close | 3500 |
| Port relief hoist up | 3500 |
| Port relief hoist down | 1500 |
| Port relief R. H. track forward | Turn In |
| Port relief R. H. track reverse | Turn In |
| Main relief **swing** valve | 2500 |
| Port relief swing ccw | 3000 |
| Port relief swing cw | 3000 |
| Port relief grapple rotate ccw | 1750 |
| Port relief grapple rotate cw | 1750 |
| Port relief slasher cut | 3000 |
| Port relief slasher retract | 1500 |
| Crossline reliefs **swing** motor | 2000 SEE NOTE (4) |
| Tilt Cab Valve | 2000 |
| Tilt Cab C.B. Valve | 3000 |
| Drive Brake Release Pressure | 500 |
| Drive Begin of Regulation | 2500 |

5334B-R1.03-28-06

**NOTE:**
The above values are for reference purposes only,
SEE SERVICE MANUAL FOR SETTING PROCEDURE

**IMPORTANT**

1. System to be at **operating temperature** when setting pressures.
2. All pressures measured in **psi**.
3. All main and port relief valves to be set at **full engine rpm**.
4. Swing motor crossline relief valves to be set at **engine idle** and;
   **Using the following procedure:**
   a. Install swing locking device or secure boom to keep the machine from swinging.
   b. Disconnect and cap the pilot hose running to the swing motor crossline relief valves.
   c. At **idle** adjust both swing motor crossline relief valves to the value given on the chart.
   d. Reconnect the pilot hose and purge the air out of the lines.
5. Track drive begin of regulation valves to be set at full engine RPM using the folowing procedure:
   a. Lower track drive main relief valves to 2500 psi.
   b. Disconnect and plug both motor brake release lines.
   c. Operate track in high speed (track should not move).
   d. Adjust begin of regulation valve on each motor to give pressure between 800-1000 psi at motor test port.
   e. Reset main relief valves and reconnect brake lines.
6. Track drive speeds set at max. RPM to 16.5 rpm LOW and 28 rpm HIGH.

TILT CAB

1. Turn C.B. valve out fully then in 2 turns to achieve desired pressure. Valve is pre-set at 2000 psi.

Parker

# Assembly Torque

The 4-Bolt Split Flange consists of four main components:

A body (flange head)

An O-ring

One “captive” or two “split” flange clamps

Four bolts and washer

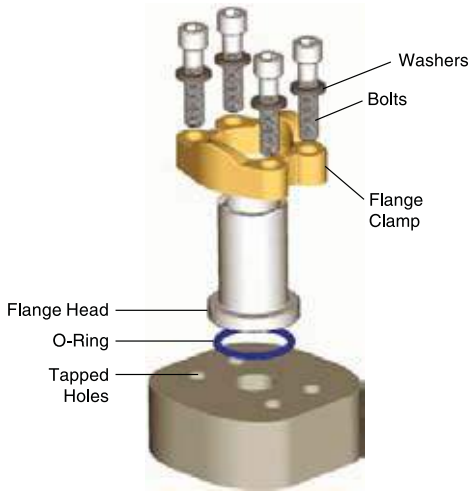



**Fig. T8 – 4-Bolt Split Flange Components**

The four-bolt port is simply a circular opening (flow passage) surrounded by four tapped holes in a certain pattern for acceptance of the flange clamping bolts. The flat surface of the port compresses the O-ring contained in the groove in the flange head when the clamp bolts are torqued. In some instances, the groove is in the port and not in the flange head. The bolts, through the clamp halves, clamp down the flange head on to the flat surface of the port compressing and trapping the O-ring in the groove and leaving no gap for it to extrude under pressure. The hydraulic pressure is thus sealed by the compressed O-ring as long as the bolts are tightened enough to maintain solid metal to metal contact between the flange head at the outside diameter of the O-ring and the top of the port.

**Flange Port Assembly**

The steps to properly assemble the flange port clamping bolts are:

1. Make sure sealing surfaces are free of burrs, nicks, scratches or any foreign particles.
2. Lubricate the O-ring.
3. Position flange and clamp halves.
4. Place lock washers on bolts and insert through clamp halves.
5. Hand tighten bolts.
6. Torque bolts in diagonal sequence (see Fig. T9) in small increments to the appropriate torque level listed in Table T6 or Table T7 on this page.

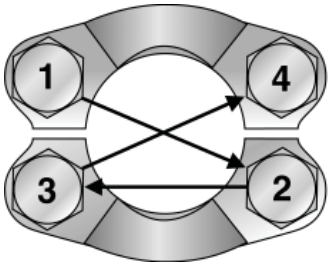



**Fig. T9 – Flange Bolt Tightening Sequence**

| Dash Size | Flange Size | Inch Bolt (J518) | Torque ft. lbs. | Metric Bolt (ISO 6162) | Torque N-m |
|---|---|---|---|---|---|
| 8 | 1/2 | 5/16-18 | 17 ± 2 | M8 | 25 |
| 12 | 3/4 | 3/8-16 | 25 ± 4.5 | M10 | 49 |
| 16 | 1 | 3/8-16 | 31 ± 4.5 | M10 | 49 |
| 20 | 1-1/4 | 7/16-14 | 41 ± 5 | M12* | 85 |
| 24 | 1-1/2 | 1/2-13 | 52 ± 6 | M12 | 85 |
| 32 | 2 | 1/2-13 | 60 ± 6 | M12* | 135 |
| 40 | 2-1/2 | 1/2-13 | 85 ± 9 | M12 | 95 |
| 48 | 3 | 5/8-11 | 144 ± 15 | M16 | 220 |
| 56 | 3-1/2 | 5/8-11 | 125 ± 8 | M16 | 220 |
| 64 | 4 | 5/8-11 | 125 | ± 8 16 M | 220 |
| 80 | 5 | 5/8-11 | 125 | ± 8 16 M | 220 |

* Does not meet ISO 6162 specification.

**Table T6 – Code 61 Flange Recommended Bolt Torque**

| Dash Size | Flange Size | Inch Bolt (J518) | Torque ft. lbs. | Metric Bolt (ISO 6162) | Torque N-m |
|---|---|---|---|---|---|
| 8 | 1/2 | 5/16-18 | 17 ± 2 | M8 | 25 |
| 12 | 3/4 | 3/8-16 | 30 ± 4.5 | M10 | 49 |
| 16 | 1 | 7/16-14 | 46 ± 4.5 | M12 | 85 |
| 20 | 1-1/4 | 1/2-13 | 69 ± 6 | M14* | 135 |
| 24 | 1-1/2 | 5/8-11 | 125 ± 8 | M16 | 210 |
| 32 | 2 | 3/4-10 | 208 ± 20 | M20 | 425 |

* Does not meet ISO 6162 specification.

**Table T7 – Code 62 Flange Recommended Bolt Torque**

Parker

# Assembly Torque

## JIC 37 Degree Flare

| SAE Dash Size | Thread Size | Tube Connection FFWR | Swivel or Hose Connection FFWR |
|---|---|---|---|
| -2 | 5/16-24 | NA | NA |
| -3 | 3/8-24 | NA | NA |
| -4 | 7/16-20 | 2 | 2 |
| -5 | 1/2-20 | 2 | 2 |
| -6 | 9/16-18 | 1 1/2 | 1 1/4 |
| -8 | 3/4-16 | 1 1/2 | 1 |
| -10 | 7/8-14 | 1 1/2 | 1 |
| -12 | 1 1/16-12 | 1 1/4 | 1 |
| -14 | 1 3/16-12 | 1 | 1 |
| -16 | 1 5/16-12 | 1 | 1 |
| -20 | 1 5/8-12 | 1 | 1 |
| -24 | 1 7/8-12 | 1 | 1 |
| -32 | 2 1/2-12 | 1 | 1 |
| -40 | 3-12 | 1 | 1 |

**F.F.W.R : Flats From Wrench Resistance**
**All values are for Steel, Stainless Steel and Brass**

## NPTF

| SAE Dash Size | Thread Size | Tube Connection TFFT | Swivel or Hose Connection TFFT |
|---|---|---|---|
| -2 | 1/8-27 | 2-3 | 2-3 |
| -3 | NA | NA | NA |
| -4 | 1/4-18 | 2-3 | 2-3 |
| -5 | NA | NA | NA |
| -6 | 3/8-18 | 2-3 | 2-3 |
| -8 | 1/2-14 | 2-3 | 2-3 |
| -10 | 7/8-14 | NA | NA |
| -12 | 3/4-14 | 2-3 | 2-3 |
| -14 | NA | NA | NA |
| -16 | 1-11 1/2 | 1.5-2.5 | 1.5-2.5 |
| -20 | 1 1/4-11 1/2 | 1.5-2.5 | 1.5-2.5 |
| -24 | 1 1/2-11 1/2 | 1.5-2.5 | 1.5-2.5 |
| -32 | 2-11 1/2 | 1.5-2.5 | 1.5-2.5 |
| -40 | NA | NA | NA |

**T.F.F.T. : Turns from finger tight**
**All pipe values are for Steel, Stainless Steel and Brass**

## O'ring Face Seal / Seal-Lok

| SAE Dash Size | Thread Size | Tube Connection FFWR | Swivel or Hose Connection FFWR |
|---|---|---|---|
| -2 | NA | NA | NA |
| -3 | NA | NA | NA |
| -4 | 9/16-18 | 1/4 TO 1/2 | 1/2 TO 3/4 |
| -5 | NA | NA | NA |
| -6 | 11/16-16 | 1/4 TO 1/2 | 1/2 TO 3/4 |
| -8 | 13/16-16 | 1/4 TO 1/2 | 1/2 TO 3/4 |
| -10 | 1-14 | 1/4 TO 1/2 | 1/2 TO 3/4 |
| -12 | 1 3/16-12 | 1/4 TO 1/2 | 1/3 TO 1/2 |
| -14 | NA | NA | NA |
| -16 | 1 7/16-12 | 1/4 TO 1/2 | 1/3 TO 1/2 |
| -20 | 1 11/16-12 | 1/4 TO 1/2 | 1/3 TO 1/2 |
| -24 | 2-12 | 1/4 TO 1/2 | 1/3 TO 1/2 |
| -32 | NA | NA | NA |
| -40 | NA | NA | NA |

**F.F.W.R : Flats From Wrench Resistance**
**All values are for Steel, Stainless Steel and Brass**

## BSPT

| SAE Dash Size | Thread Size | Tube Connection TFFT | Swivel or Hose Connection TFFT |
|---|---|---|---|
| -2 | 1/8-28 | 2-3 | 2-3 |
| -3 | NA | NA | NA |
| -4 | 1/4-19 | 2-3 | 2-3 |
| -5 | NA | NA | NA |
| -6 | 3/8-19 | 2-3 | 2-3 |
| -8 | 1/2-14 | 2-3 | 2-3 |
| -10 | NA | NA | NA |
| -12 | 3/4-14 | 2-3 | 2-3 |
| -14 | NA | NA | NA |
| -16 | 1-11 | 1.5-2.5 | 1.5-2.5 |
| -20 | 1 1/4-11 | 1.5-2.5 | 1.5-2.5 |
| -24 | 1 1/2-11 | 1.5-2.5 | 1.5-2.5 |
| -32 | 2-11 | 1.5-2.5 | 1.5-2.5 |
| -40 | NA | NA | NA |

**T.F.F.T. : Turns from finger tight**
**All pipe values are for Steel, Stainless Steel and Brass**

**SAE J1926 Straight Thread Port Assembly Torques**

| | | Assembly Torque (+10% -0) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Non-Adjustable | | | | Adjustable | | | | Plugs | | | |
| | | Seal-Lok | | Triple-Lok Ferulok Pipe Fittings | | Seal-Lok | | Triple-Lok Ferulok | | Hollow Hex HP5ON-S | | Hex Head P5ON-S | |
| SAE Dash | Thread Size | ft.lbs. (in. lbs) | N-m | ft.lbs. (in. lbs) | N-m | ft.lbs. (in. lbs) | N-m | ft.lbs. (in. lbs) | N-m | ft.lbs. (in. lbs) | N-m | ft.lbs. (in. lbs) | N-m |
| 2 | 5/16-24 | | | (85) | 10 | | | (60) | 7 | (30) | 3.5 | (85) | 10 |
| 3 | 3/8-24 | | | (155) | 18 | | | (100) | 11 | (55) | 6 | (155) | 18 |
| 4 | 7/16-20 | (310) | 20 | (260) | 29 | (310) | 20 | (180) | 20 | (120) | 13.5 | (260) | 29 |
| 5 | 1/2-20 | (360) | 40 | (280) | 32 | (360) | 40 | (250) | 28 | (170) | 19 | (280) | 32 |
| 6 | 9/16-18 | (420) | 46 | (350) | 40 | (420) | 46 | (350) | 40 | (410) | 46 | (350) | 40 |
| 8 | 3/4-16 | 60 | 80 | (620) | 70 | 60 | 80 | (620) | 70 | 60 | 80 | (620) | 70 |
| 10 | 7/8-14 | 100 | 135 | 85 | 115 | 100 | 135 | 85 | 115 | 100 | 135 | 85 | 115 |
| 12 | 1 1/16-12 | 135 | 185 | 135 | 183 | 135 | 185 | 135 | 183 | 135 | 185 | 135 | 183 |
| 14 | 1 3/16-12 | 175 | 235 | 175 | 237 | 175 | 235 | 175 | 237 | 175 | 235 | 175 | 237 |
| 16 | 1 5/16-12 | 200 | 270 | 200 | 271 | 200 | 270 | 200 | 271 | 200 | 270 | 200 | 271 |
| 20 | 1 5/8-12 | 250 | 340 | 250 | 339 | 250 | 340 | 250 | 339 | 250 | 340 | 250 | 339 |
| 24 | 1 7/8-12 | 305 | 415 | 305 | 414 | 305 | 415 | 305 | 414 | 305 | 415 | 305 | 414 |
| 32 | 2 1/2-12 | 375 | 510 | 375 | 509 | 375 | 510 | 375 | 509 | 375 | 510 | 375 | 509 |

# EATON Aeroquip

# *Assembly Torque*

**Recommended Parallel Connection Assembly torque**

Eaton recommends that a Torque wrench be used to assure proper fitting assembly of these connections.

The values listed are for steel connections. Contact Eaton Aeroquip for torques values for other materials

**Straight Thread O-Ring Boss Low Pressure with 37º (SAEJ514)**

| Dash Size | Thread Size (inches) | Jam Nut or Straight Fitting Torque lb.-ft. | Jam Nut or Straight Fitting Torque Newton Meters |
|---|---|---|---|
| -03 | 3/8-24 | 8-9 | 12-13 |
| -04 | 7/16-20 | 13-15 | 18-20 |
| -05 | 1/2-20 | 14-15 | 19-21 |
| -06 | 9/16-18 | 23-24 | 32-33 |
| -08 | 3/4-16 | 40-43 | 55-57 |
| -10 | 7/8-14 | 43-48 | 59-64 |
| -12 | 1 1/16-12 | 68-75 | 93-101 |
| -14 | 1 3/16-12 | 83-90 | 113-122 |
| -16 | 1 5/16-12 | 112-123 | 152-166 |
| -20 | 1 5/8-12 | 146-161 | 198-218 |
| -24 | 1 7/8-12 | 154-170 | 209-230 |
| -32 | 2 1/2-12 | 218-240 | 296-325 |

**Straight Thread O-Ring Boss High Pressure with ORS (J1453)**

| Dash Size | Thread Size (inches) | Jam Nut or Straight Fitting Torque lb.-ft. | Jam Nut or Straight Fitting Torque Newton Meters |
|---|---|---|---|
| -03 | 3/8-24 | 8-10 | 11-16 |
| -04 | 7/16-20 | 14-16 | 20-22 |
| -05 | 1/2-20 | 18-20 | 24-27 |
| -06 | 9/16-18 | 24-26 | 33-35 |
| -08 | 3/4-16 | 50-60 | 68-78 |
| -10 | 7/8-14 | 72-80 | 98-110 |
| -12 | 1 1/16-12 | 125-135 | 170-183 |
| -14 | 1 3/16-12 | 160-180 | 215-245 |
| -16 | 1 5/16-12 | 200-220 | 270-300 |
| -20 | 1 5/8-12 | 210-280 | 285-380 |
| -24 | 1 7/8-12 | 270-360 | 370-490 |

**ORS**

| Dash Size | Thread Size (inches) | Swivel Nut Torque lb.-ft. | Swivel Nut Torque Newton Meters |
|---|---|---|---|
| -04 | 9/16-18 | 10-12 | 14-16 |
| -06 | 11/16-20 | 18-20 | 24-27 |
| -08 | 13/16-16 | 32-35 | 43-47 |
| -10 | 1-14 | 46-50 | 62-68 |
| -12 | 1 3/16-12 | 65-70 | 88-95 |
| -16 | 1 7/16-12 | 92-100 | 125-136 |
| -20 | 1 11/16-12 | 125-140 | 170-190 |
| -24 | 2-12 | 150-165 | 204-224 |

**SAE 37º (JIC)**

| Dash Size | Thread Size (inches) | Swivel Nut Torque lb.-ft. | Swivel Nut Torque Newton Meters |
|---|---|---|---|
| -04 | 7/16-20 | 11-12 | 15-16 |
| -05 | 1/2-20 | 15-16 | 20-22 |
| -06 | 9/16-18 | 18-20 | 24-28 |
| -08 | 3/4-16 | 38-42 | 52-58 |
| -10 | 7/8-14 | 57-62 | 77-85 |
| -12 | 1 1/16-12 | 79-87 | 108-119 |
| -16 | 1 5/16-12 | 108-113 | 148-154 |
| -20 | 1 5/8-12 | 127-133 | 173-182 |
| -24 | 1 7/8-12 | 158-167 | 216-227 |
| -32 | 2 1/2-12 | 245-258 | 334-352 |

**Metric**

| Thread Size | | Straight Adapter or Locknut Torque |
|---|---|---|
| mm | lb.-ft. | Newton Meters |
| M10x1 | 13-15 | 18-20 |
| M12x1.5 | 15-19 | 20-25 |
| M14x1.5 | 19-23 | 25-30 |
| M16x1.5 | 33-40 | 45-55 |
| M18x1.5 | 37-44 | 50-60 |
| M20x1.5 | 52-66 | 70-90 |
| M22x1.5 | 55-70 | 75-95 |
| M26x1.5 | 81-96 | 110-130 |
| M27x2 | 96-111 | 130-150 |
| M33x2 | 162-184 | 220-250 |
| M42x2 | 170-192 | 230-260 |
| M48x2 | 258-347 | 350-470 |

**BSPP**

| Nominal Thread Size | | Straight Adapter or Locknut Torque |
|---|---|---|
| inches** | lb.-ft. | Newton Meters |
| G1/8-28 | 13-15 | 18-20 |
| G1/4-19 | 19-23 | 25-30 |
| G3/8-19 | 33-40 | 45-55 |
| G1/2-14 | 55-70 | 75-95 |
| G3/4-14 | 103-118 | 140-160 |
| G1-11 | 162-184 | 220-250 |
| G1 1/4-11 | 170-192 | 230-260 |
| G1 1/2-11 | 258-347 | 350-470 |

** "G" denotes parallel threads, other than ISO 6149 (Port connection only)

**Eaton Aeroquip** Fluid Conveyance Products A-HOOV-MC001-E January 2005

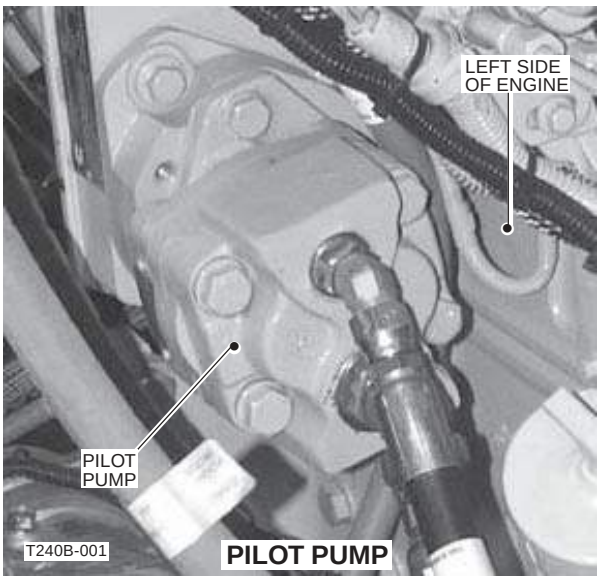
# Tigercat T240B Track Loader

# SECTION 5 - PILOT SYSTEM

AUGUST, 2006

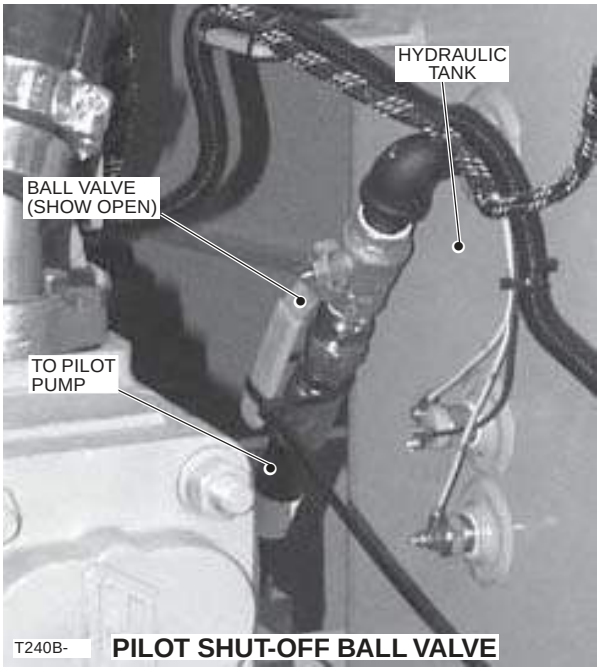
## CONTENTS - SECTION 5

## PILOT SYSTEM COMPONENTS



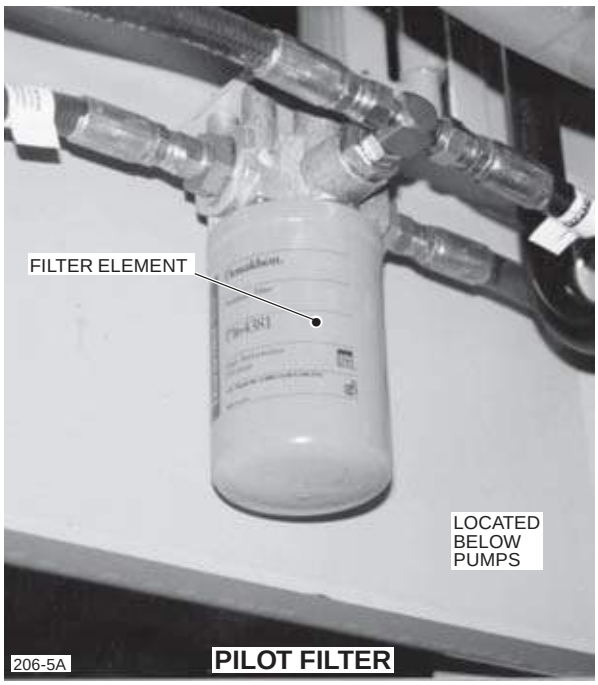

The pilot circuit is supplied with oil from the pilot pump which is driven by the auxiliary drive off the left side of the engine.

Oil is first filtered by an in-line pressure filter before entering the pilot manifold. A *pilot relief valve* built into the pilot manifold maintains the pilot system pressure at **450 psi.** The oil enters pilot manifold (inlet port) at this reduced pressure and is then distributed by the pilot manifold to the various pilot actuated functions of the machine. Solenoid operated pilot valves within the pilot manifold control the flow of pilot oil to various functions.



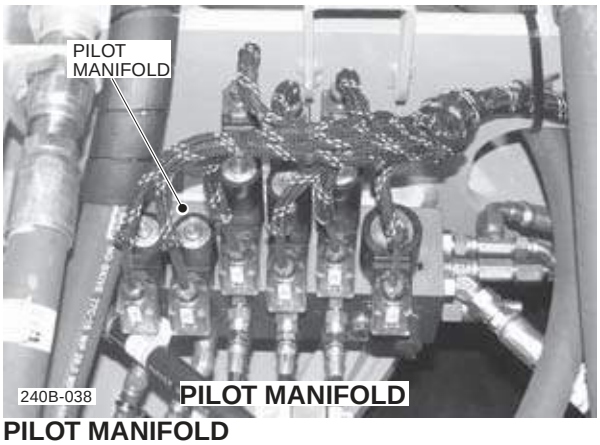

**NOTE:** Low pilot pressure can influence machine controls causing slow or sluggish response times, If this symptom occurs, first check hydraulic oil level in reservoir, if the level is correct, verify that the pilot relief valve setting is **450 psi**. Refer to SET PILOT PRESSURE in THIS SECTION.

A shut-off valve is installed in the pilot suction line at the hydraulic tank connection. Use this valve to isolate the pilot hydraulic system when disconnecting any hoses or fittings. A plastic tie is installed on the shut off valve at the factory to prevent the valve from being accidentally turned to the CLOSED position when the engine is running, this could cause serious damage to the pilot pump. The tie should be replaced whenever it is taken off to operate the shut off valve.




### PRESSURE FILTER

This filter is a cartridge filter with a built-in differential pressure relief valve, if the pressure differential at the oil filter exceeds 50 psi this valve will bypass the pilot oil back to the tank. This will also result in lower pilot pressure. If a loss of controls or slow response is experienced the filter element may need to be changed.




## PILOT MANIFOLD

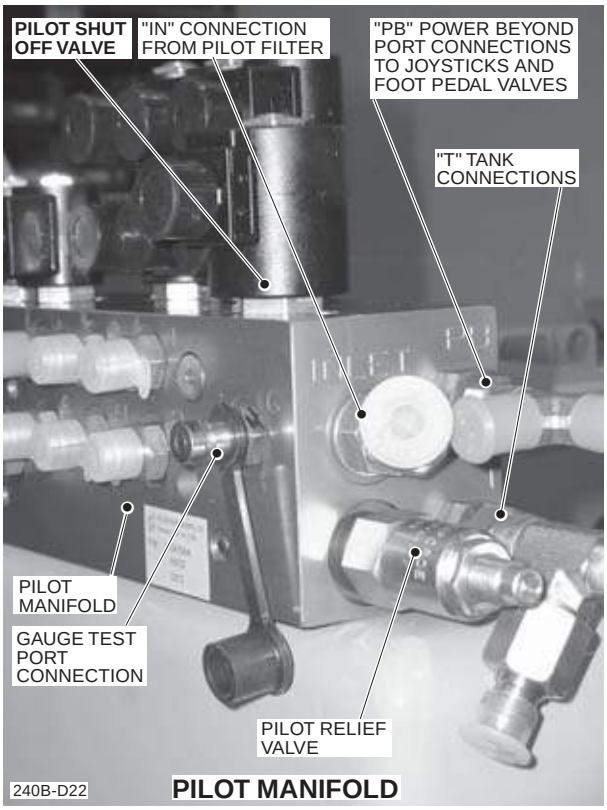
The pilot manifold is located below the floor plates in the hydraulic valve compartment.

The pilot manifold distributes oil to the following circuits:

- Joysticks (both) (PB) port
- Swing control foot pedal (PB) port
- Gauge test port (G) port
- Slasher saw, cut (1) solenoid valve
- Slasher saw, retract (2) solenoid valve
- Top saw, cut (3) solenoid valve
- Delimber, open (4) solenoid valve
- Optional Live Heel (5) solenoid valve
- Optional Live heel (6) solenoid valve
- Track Drive Enable (7) solenoid valve
- Travel Speed Low (8) solenoid valve

Pilot oil enters the manifold through the **inlet port**.

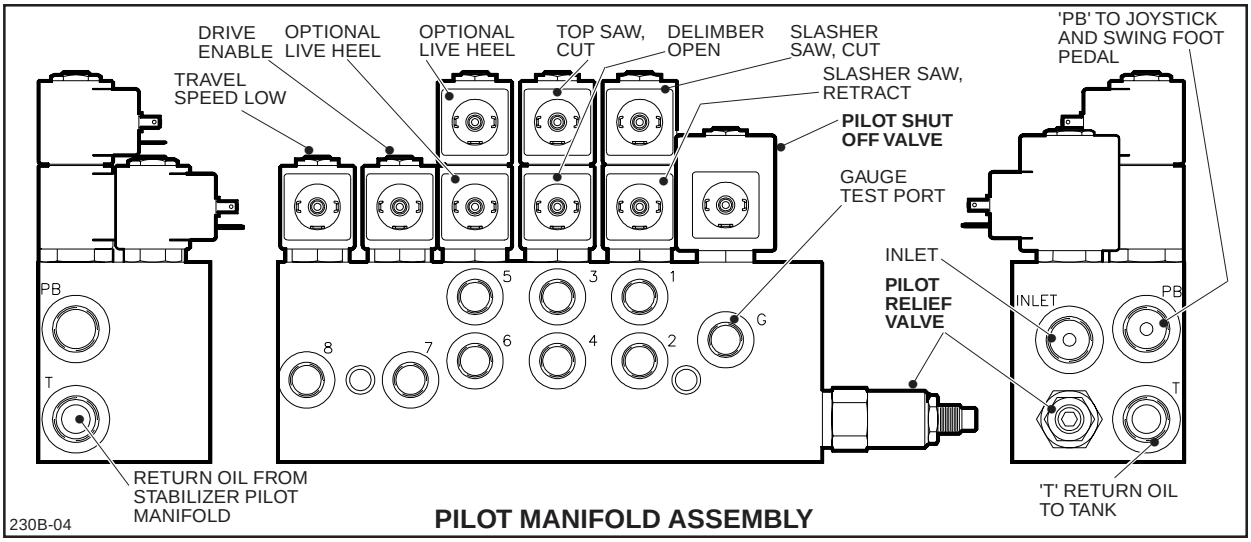
The **pilot shut off valve,** which is an integral part of the pilot manifold, controls the flow of oil from the INLET port to the three outlet ports labelled (PB and G) and to the eight solenoid operated pilot valves. The **pilot shut off valve** is activated by pressing the pilot reset switch in cab (with the left armrest down).




Two **outlet ports** ('PB') on each end of the pilot manifold, feed both joysticks and the swing foot pedal valve. A gauge test port (G) has a quick connect fitting installed for connecting a pressure gauge to perform pressure setting procedures.

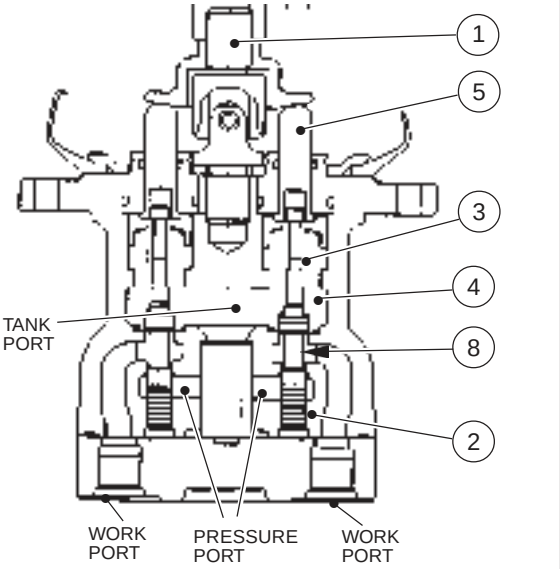
Eight **solenoid operated pilot valves** on the manifold, *when energized***,** supply "on demand" pilot oil to the corresponding functions. These valves are activated by controls in the cab.

Two **tank ports** ('T') drain return oil to the reservoir.

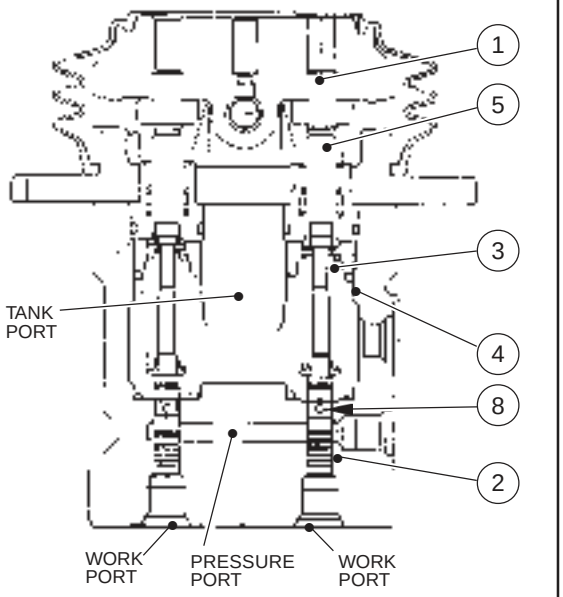


### JOYSTICKS AND FOOT PEDALS

These pilot valves are manually operated, directional control valves and operate on the same principle as a direct operating pressure reducing valve. Both the joystick and foot control valves (pedals) use similar spool arrangements. Operated by hand or foot these valves direct pilot oil to the main control valve pilot end caps. The corresponding spool valve then shifts from its centre position and directs pump flow to operate a function.




AW015 **JOYSTICK PILOT VALVE (KAWASAKI)**




**FOOT PEDAL PILOT VALVE (KAWASAKI)**

AW017

### OPERATING DESCRIPTION

In the neutral position the joystick lever, or foot pedal is held centered by return springs (4). When the lever (1) is operated, the plunger (5) is pushed against its return spring (4). At the same time the regulating spool (2) is moved down against the regulating spring (3). When the regulating stroke begins, there is a connection made between the *pressure port*, via holes (8) in the spool and *work ports* in the base of the valve.

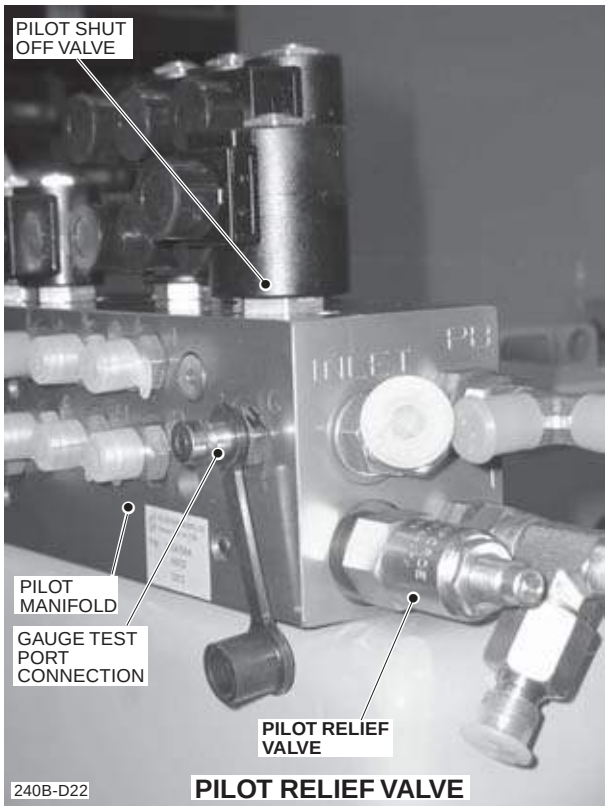
Pilot pressure is directly proportional to the operator position of the joystick or foot pedal and the regulating spring characteristics.

## PILOT SYSTEM ELECTRICAL CIRCUIT

**Refer to circuit diagram;**

The *pilot shut off* valve solenoid is not energized until the armrest is down and the pilot reset switch is pushed. Wire 33 connects the armrest switch to the *pilot shut off* valve solenoid. Wire 95 connects the pilot reset switch to the armrest switch. When the pilot reset switch is pushed ON with the armrest DOWN, the coil on the pilot shut off relay is energized closing the circuit between wires 6 and 11 to energize the coil in the pilot shut off valve. With the coil energized the valve spool in the pilot shut off valve is shifted to supply oil to the pilot circuit. At the same time wire 95A from the pilot reset switch is connected back to the pilot shut off relay through a diode and thus latches the pilot shut off relay in the energized position.

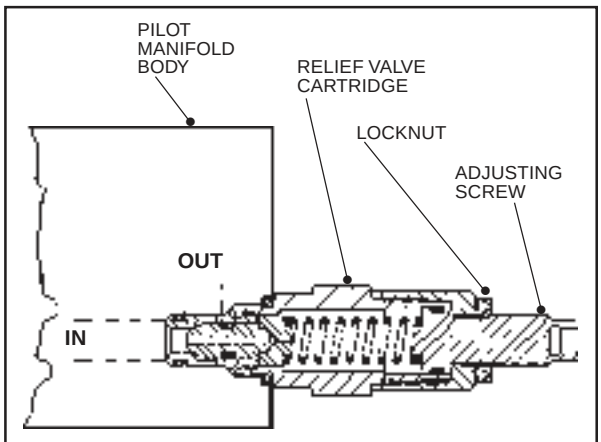
The diode in the circuit prevents the flow of current to the *pilot shut off* valve solenoid when the armrest switch is open (armrest up). Even if the pilot reset switch is held down, it will not operate. Whenever the arm is raised and the switch opens, the voltage is interrupted to the pilot shut off relay coil and the relay contacts open resulting in the *pilot shut off* valve returning to the normally closed position. This prevents pilot oil from reaching the controls.




**PILOT RELIEF VALVE**

## SET PILOT PRESSURE

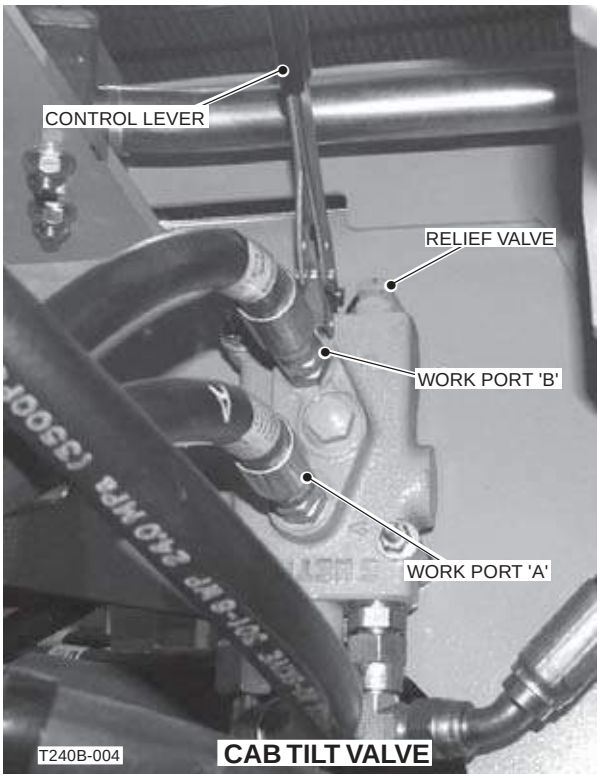
1. With hydraulic oil at **operating temperature**, connect a 0-1000 psi. gauge to the gauge test fitting on the pilot manifold.
2. Loosen locknut and turn adjusting screw all the way OUT on pilot relief valve, tighten locknut on adjusting screw.
3. Start engine and set throttle in **FULL** position.
4. Loosen locknut on pilot relief valve and turn adjusting screw IN until pressure gauge at pilot manifold reads **450 psi.**
5. Stop engine, and remove pressure gauge.




**PILOT RELIEF VALVE**

### CAB TILT CIRCUIT

One cylinder is used to tilt the cab forward or backwards. Operating oil is supplied from the pilot pump to the inlet section of the cab tilt control



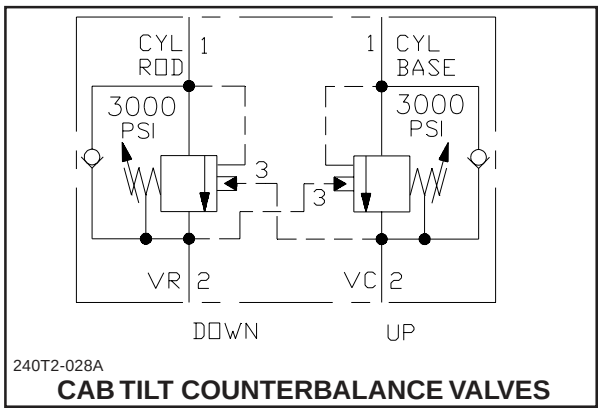
CAB TILT VALVE

valve. A relief valve is installed in the inlet section of the tilt control valve to protect the circuit components from abnormally high pressure spikes. A counterbalance valve is installed in the tilt circuit on the tilt cylinder. The pilot operated counterbalance valve ensures that the cylinders will remain in any extended supporting position should a problem occur with the hydraulic system such as a leaking or broken hose. The cracking pressure for each of the two valve cartridges is pre-set to 3000 psi.

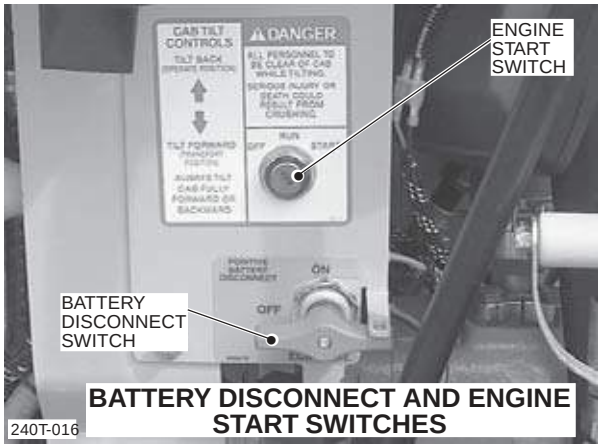
During normal machine operating conditions the pilot oil from the pilot pump passes through the "open center" spool section of the cab tilt valve to supply the pilot system.

When the lever on the *cab tilt valve* is pulled forward to tilt the cab, oil is directed from the pilot pump via the control valve and pilot operated counterbalance valve to the base end of the cab tilt cylinder to tilt the cab forward. A 1/32" dia. orifice is installed into each elbow at the cylinder port connections to control the rate of speed at which the cab will tilt.

See CAB TILTING PROCEDURE in SECTION 2 of the OPERATOR'S MANUAL.



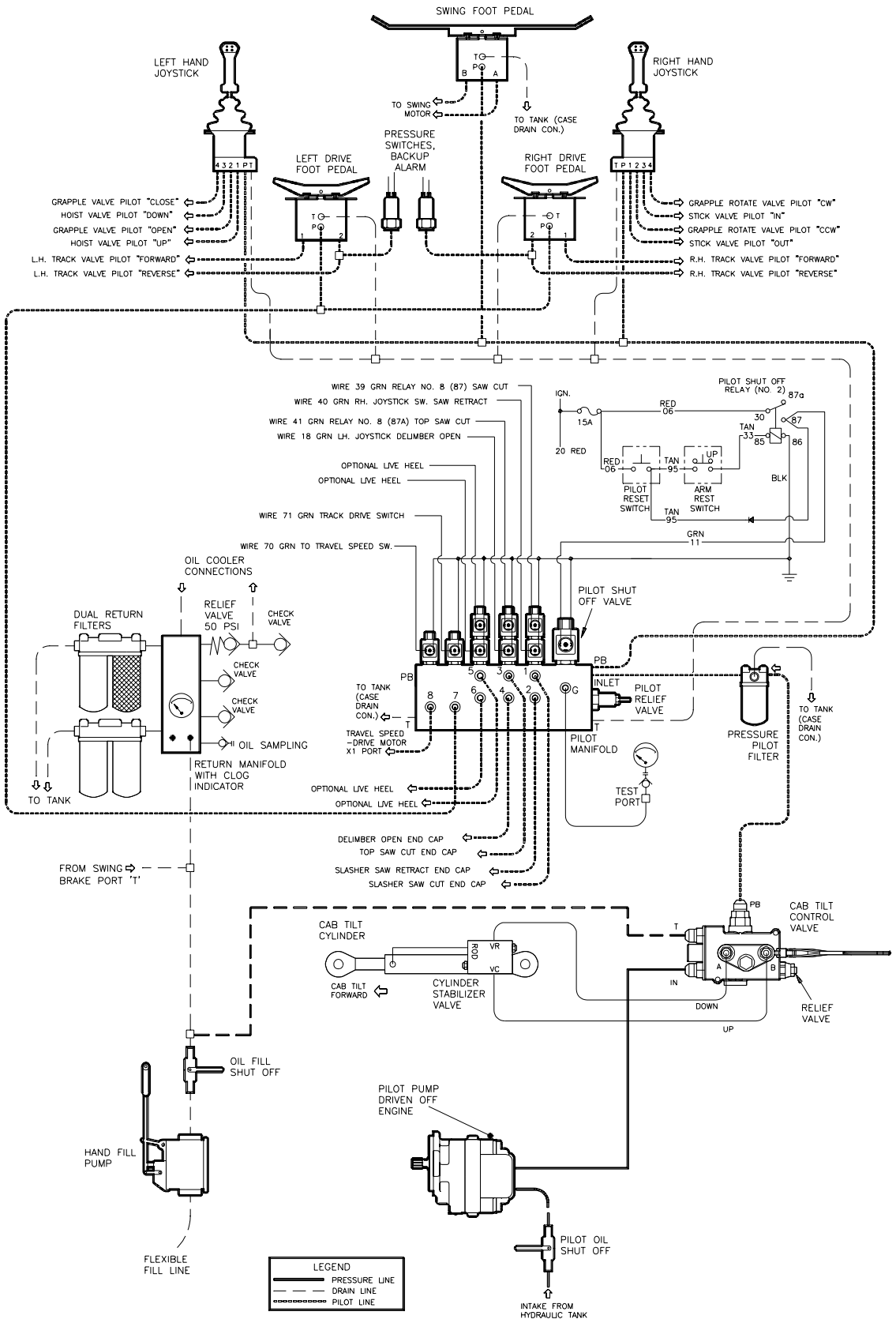
CAB TILT COUNTERBALANCE VALVES



BATTERY DISCONNECT AND ENGINE START SWITCHES

### SET CAB TILT RELIEF VALVE

1. Park machine on level ground.
2. Ensure that the hydraulic oil is at **operating temperature**.
3. "Tee" into work port 'A' on the cab tilt control valve and install a 0 - 5000 psi pressure gauge at the "Tee".
4. Loosen the locknut on the relief valve and turn the relief adjusting screw **out** until spring pressure is relieved, then turn the adjusting screw **one full turn in**.
5. Start the engine and put the throttle control to the **FULL** position.
6. With the cab tilt locking bolt still in place, push and hold the tilt lever in the **FORWARD** position, check the gauge reading, if less than set value, turn relief valve adjusting screw IN until 2000 psi is obtained on gauge.
7. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
8. Stop engine, remove pressure gauge and "Tee" fitting and reconnect hose to work port 'A'. Wipe up any excess oil from the gauge connection area.




**PILOT SYSTEM CIRCUIT DIAGRAM**

240T2-003

# Tigercat T240B Track Loader
# SECTION 6 - ELECTRICAL, GAUGES & ALARMS

AUGUST, 2006

## CONTENTS - SECTION 6

## GAUGES AND ALARMS

The T240B Loaders are monitored for proper operation by sensors located in the hydraulic system and on the engine. These sensors are connected to the PowerView Display and warning lights.

The operator may sound the warning horn at any time.

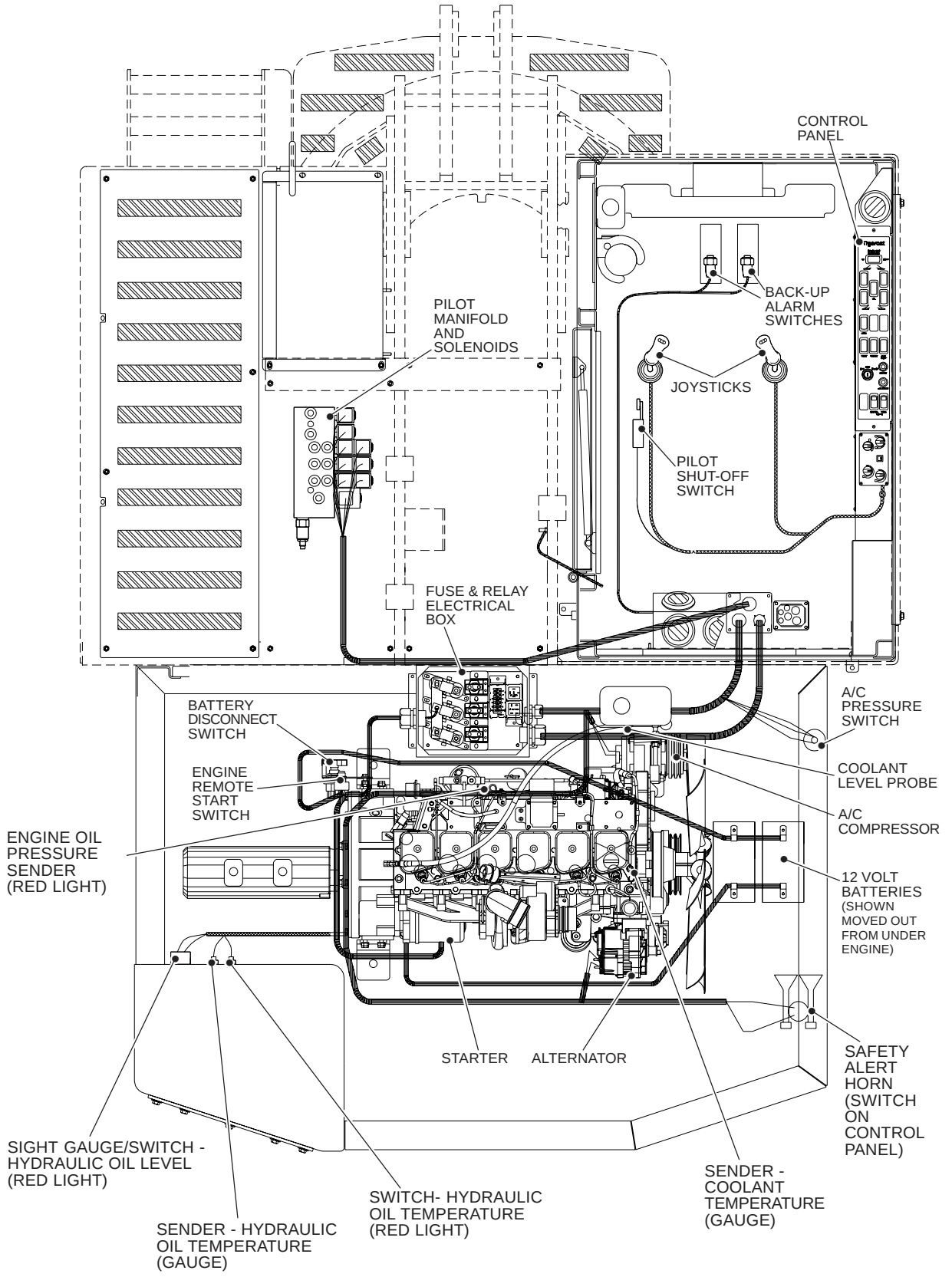
For operation of the PowerView Display and warning lights listed in the sensor chart below, refer to SECTION 2 of the OPERATOR'S MANUAL.

For replacement parts information, refer to GAUGES AND SENDERS in GROUP 600 of the PARTS CATALOG.

| SENSOR FUNCTION | GAUGE RANGE | LIGHT | INFORMATION |
|---|---|---|---|
| Engine oil pressure | 0 - 100 psi | YES | RED Light comes ON below 15psi. * STOP engine below 15 psi |
| Engine coolant temp. | 100°F - 280°F | YES | 181°F-203°F operating range (Cummins engine) RED light comes ON above 215°F * |
| Engine coolant level | NONE | YES | RED light comes ON when level in surge tank is LOW |
| Hydraulic oil temp. | 100°F - 240°F | YES | RED light comes ON above 205°F * |
| Hydraulic oil level LOW | SIGHT GLASS | YES | Red light comes ON indicates 13 gallons below FULL * |
| Wait to start | NONE | YES | YELLOW light turns ON when grid heater elements ON |
| Water in fuel | NONE | YES | YELLOW light comes ON when fuel/water separator needs to be drained |
| Safety Alert HORN | NONE | NONE | Switch on control panel - press to sound horn |

***NOTE:**

Panel buzzer sounds when engine oil pressure too low OR engine coolant temperature too high OR hydraulic oil temperature too high OR hydraulic oil level too low.




240T2-005

**SENSORS AND ELECTRICAL COMPONENT LOCATIONS**

## POWERVIEW DISPLAY MODULE

244-046 **POWERVIEW DISPLAY MODULE**

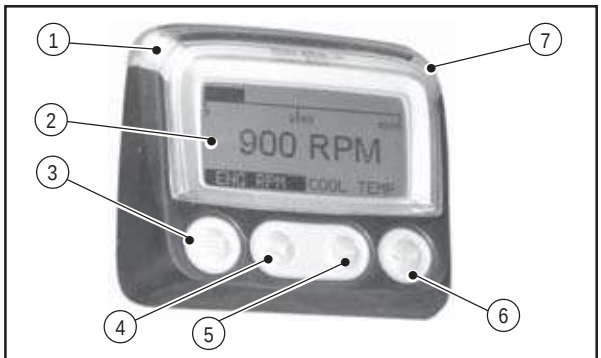
The PowerView Display Module is the operator interface with the electronic engine controls.The PowerView is a multifunction tool that enables the operator to view various engine parameters and service codes. The PowerView includes a graphical backlit LCD screen controlled via menu selection. The display can show either a single parameter or a quadrant display showing 4 parameters simultaneously. Diagnostic capabilities include fault codes with text translation for the most common fault conditions.

The PowerView has four buttons used to navigate the display with ease.

### DISPLAY PARAMETERS

The following are some of the functions displayed by the PowerView Display Module:

Engine RPM
Engine Hours
Machine Hours
System Voltage
% Engine Load at the current RPM
Coolant Temperature
Oil Pressure
Fuel Economy
Throttle Position
Engine Manifold Air Temperature
Current Fuel Consumption
Active Service Codes
Stored Service Codes from the engine
Set Units for display (English or Metric)
Engine Configuration Parameters




244-007 **POWERVIEW DISPLAY MODULE**

### COMPONENT DESCRIPTION

1. Amber Warning LED
2. Display
3. Menu Key
4. Left Arrow Key
5. Right Arrow Key
6. Enter Key
7. Red Shutdown LED

### START-UP OPERATION

#### KEYPAD FUNCTIONS

**MENU KEY** - This key is pressed to enter or exit menu screens.

**LEFT ARROW KEY** - This key is pressed to scroll through the screen either moving the parameter selection toward the left or down.

**RIGHT ARROW KEY**- This key is pressed to scroll through the screen either moving the parameter selection toward the right or up.

**ENTER KEY** - This key is pressed to select the parameter that is highlighted on the screen.

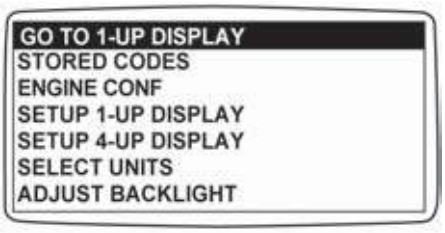
*Refer to manufactures Operations Manual (supplied with the machine) for detailed information.*

When power is first applied to the PowerView, the “Logo Screen” will be displayed, the “Wait to Start” message will be displayed. Once the “Wait to Start” message is no longer displayed the operator may start the engine. When the engine has started the display will show the single engine parameter display.


244-007 **SINGLE PARAMETER DISPLAY**

**MAIN MENU NAVIGATION**

1. Starting at the single or four engine parameter display, depress the “Menu Button”.




244-047

2. The first seven items of the “Main Menu” will be displayed.
3. Depressing the “Arrow Buttons” will scroll through the menu selections.
4. Pressing the right arrow button will scroll down to reveal the last items of “Main Menu” screen highlighting the next item down.
5. Use the arrow buttons to scroll to the desired menu item or press the “Menu Button” to exit the Main menu and return to the engine parameter display.

**FAULTS AND WARNINGS**

During normal operation the single or four parameter screen will be displayed. When the PowerView receives a fault code from an engine control unit the single or four parameter screen will be replaced with the “Active Fault Codes” message.

To acknowledge and “Hide” the fault and return to the single or four parameter display press the “Enter Button”. The display will return to the single or four parameter screen. Indicates Auxiliary Gage Fault. Indicates Fault Warning Indicates Derate or Shutdown Condition Fault

Pressing the “Enter Button” will redisplay the hidden fault. Pressing the “Enter Button” once again will hide the fault and return the screen to the single or four parameter display.

**NOTE:** The fault can only be cleared by correcting the cause of the fault condition.

Some of the display and warning functions are:

**LOW ENGINE OIL PRESSURE - RED LED**

This light will come ON when the engine oil pressure falls below 15 psi. If this light comes ON stop the engine and determine cause.

**ENGINE COOLANT TEMP. - RED LED**

This light will come ON when the engine coolant temperature rises above 215°F If this light comes ON stop engine and determine cause. Do not continue to operate machine.

**TACHOMETER**

This display indicates the RPM. of the engine.

**HOUR METER**

There are two options available for displaying hours:

TOTAL ENGINE HOURS - displays total hours the engine has run as provided by the engine computer.

MACHINE HOURS - displays the total hours the engine has run as calculated by the display module.

**ENGINE OIL PRESSURE**

Oil pressure must be greater than 15 psi at all times. If the oil pressure drops below 15 psi, stop the engine and determine cause. Check engine oil pressure every time the engine is started.

The oil pressure at high idle and full load should normally operate between 30 and 60 psi.

**NOTE:** At low idle rpm the oil pressure will be low. This is not an abnormal condition, however it must be closely monitored.

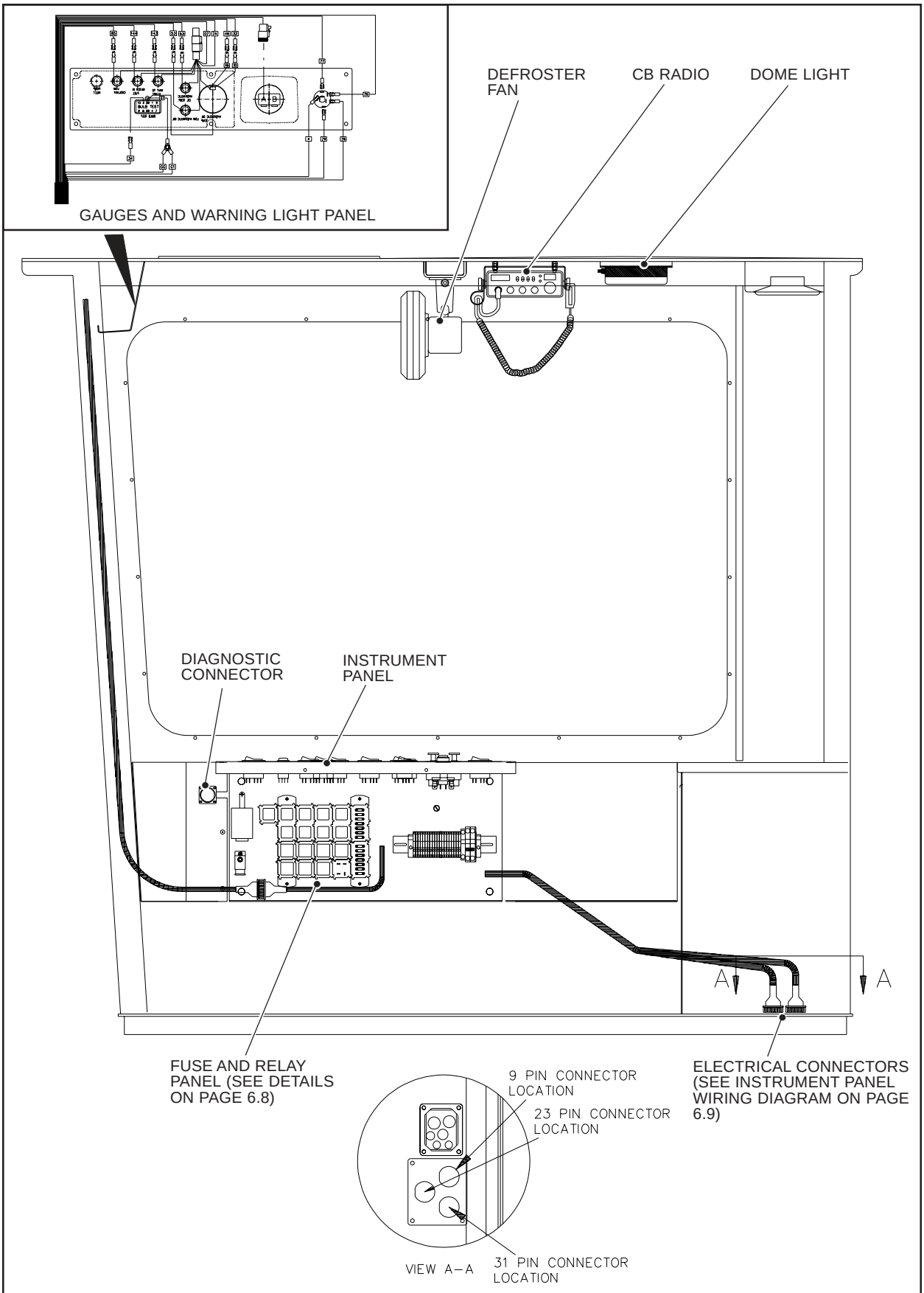
**ENGINE COOLANT TEMP.**

Normal operating range is between 181°F and 203°F. If the temperature rises beyond 210°F, reduce the load on the engine and check for a plugged radiator. If the temperature does not drop, stop engine and determine cause. Do not continue to operate machine.

**VOLTAGE DISPLAY**

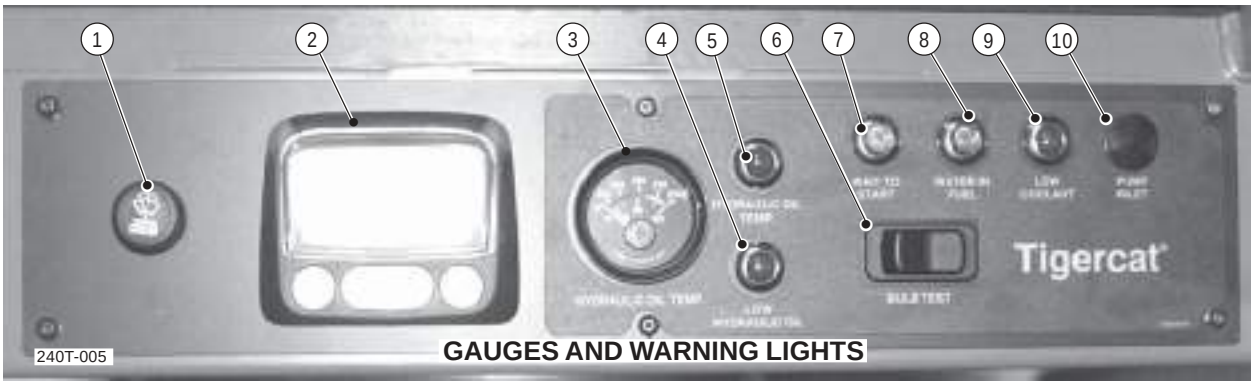
Normal operating range is between 12-13.5 volts. A reading in excess of 15 volts indicates a possible faulty voltage regulator. A reading of less than 12 Volts indicates a possible faulty battery or alternator.

*Refer to manufactures Operations Manual (supplied with the machine) for detailed information.*




**CAB WIRING AND ELECTRICAL COMPONENT LOCATIONS**

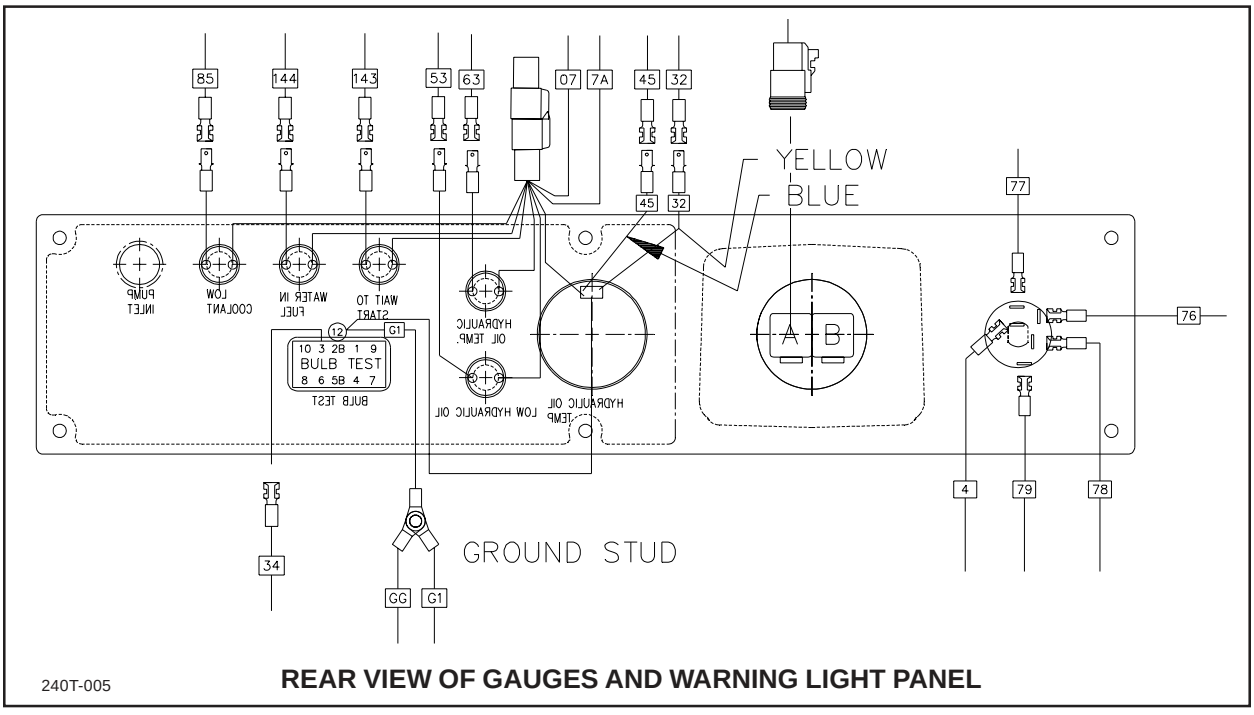
## GAUGES AND WARNING LIGHTS



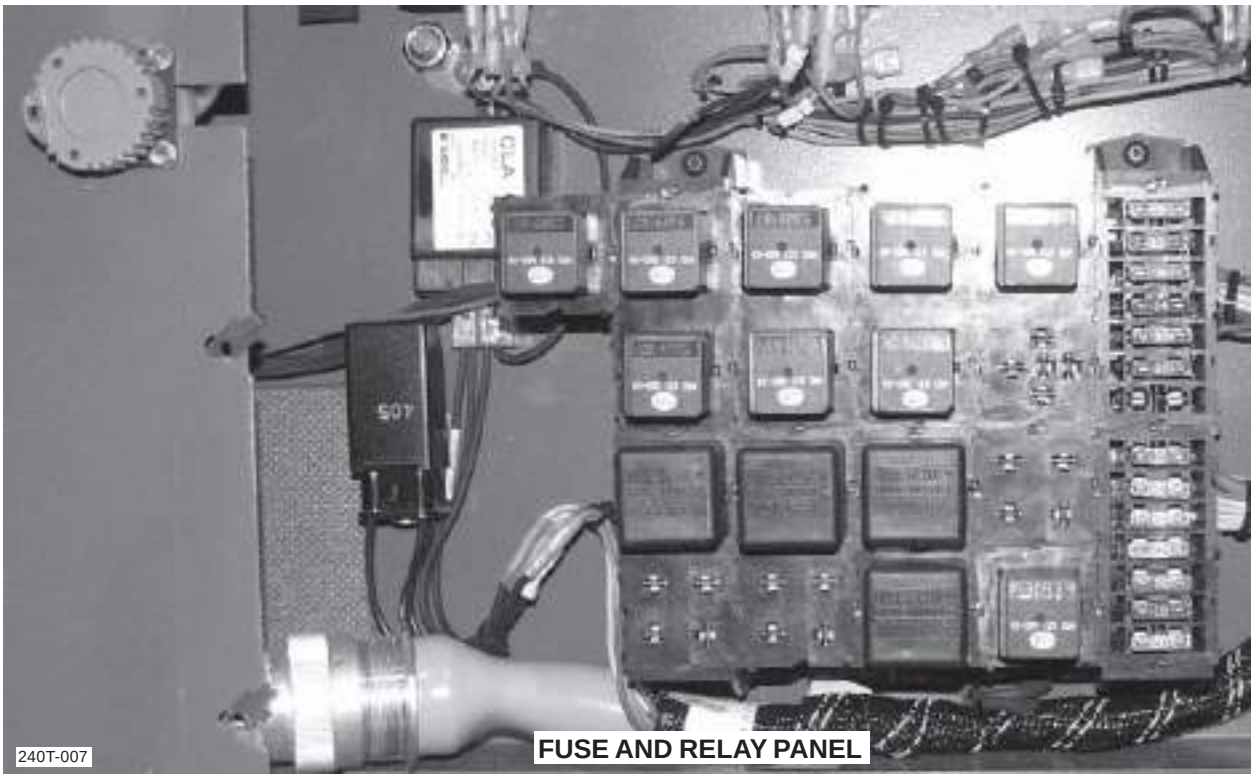

**GAUGES AND WARNING LIGHTS**

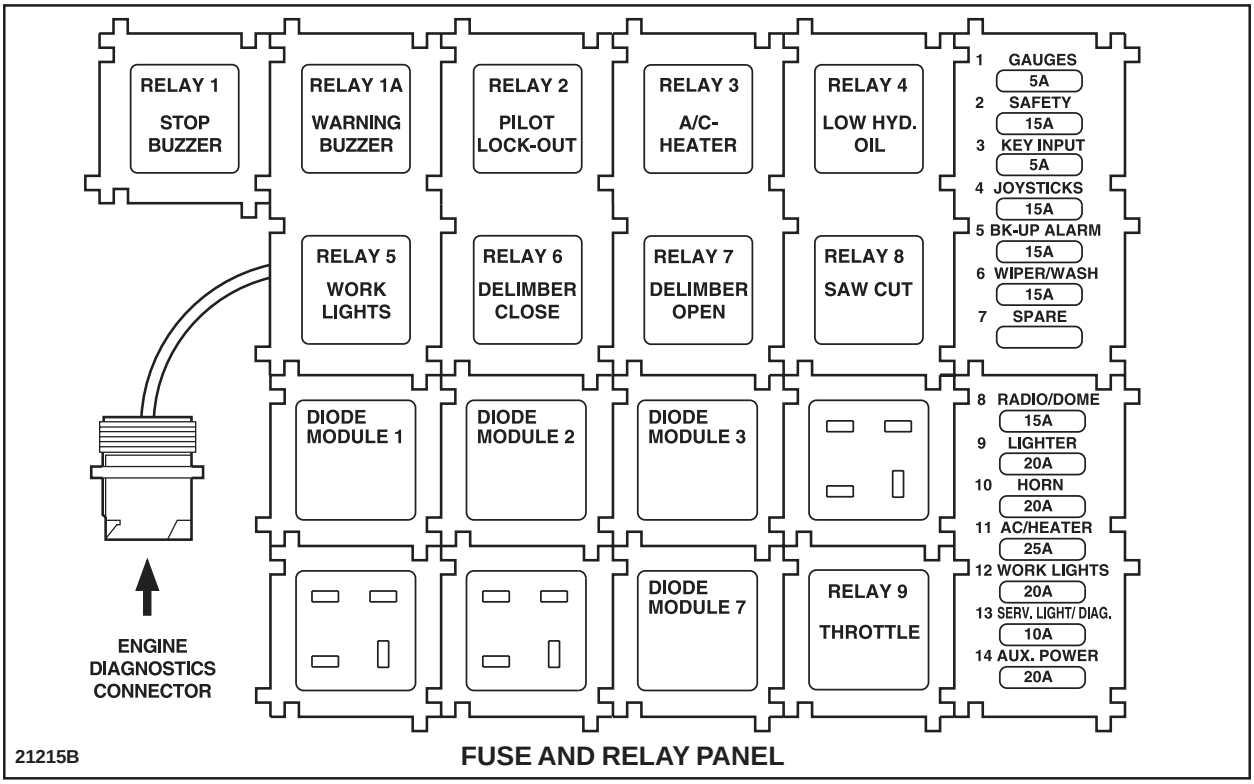
Component description

1. Windshield Wiper Switch
2. PowerView Display Module
3. Hydraulic Oil Temperature Gauge
4. Low Hydraulic Oil Light - Red
5. Hydraulic Oil Temperature Light - Red
6. Bulb Test Switch
7. Wait To Start Light - Yellow
8. Water In Fuel Light - Yellow
9. Low Coolant Light - Red
10. Not Used




**REAR VIEW OF GAUGES AND WARNING LIGHT PANEL**

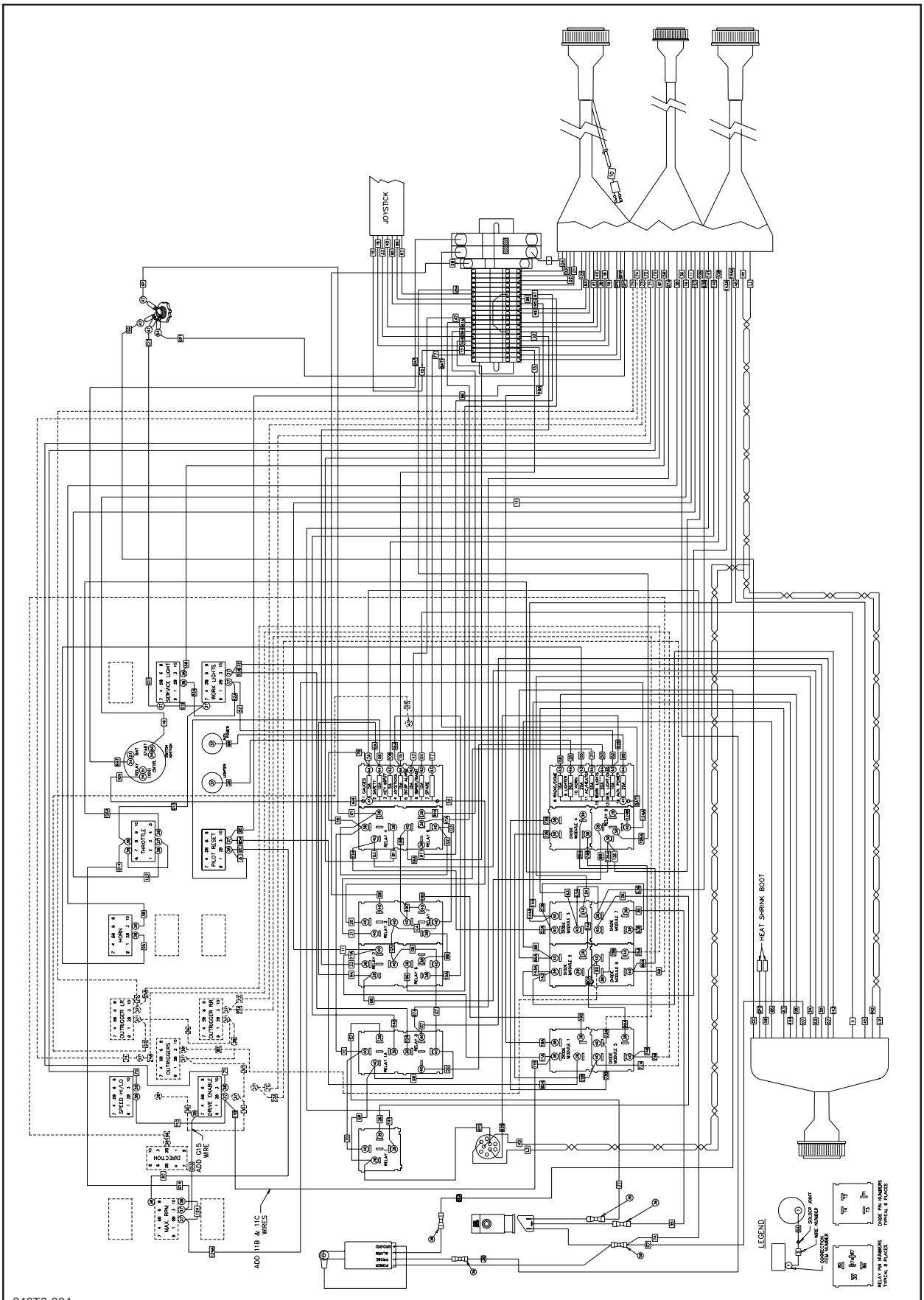


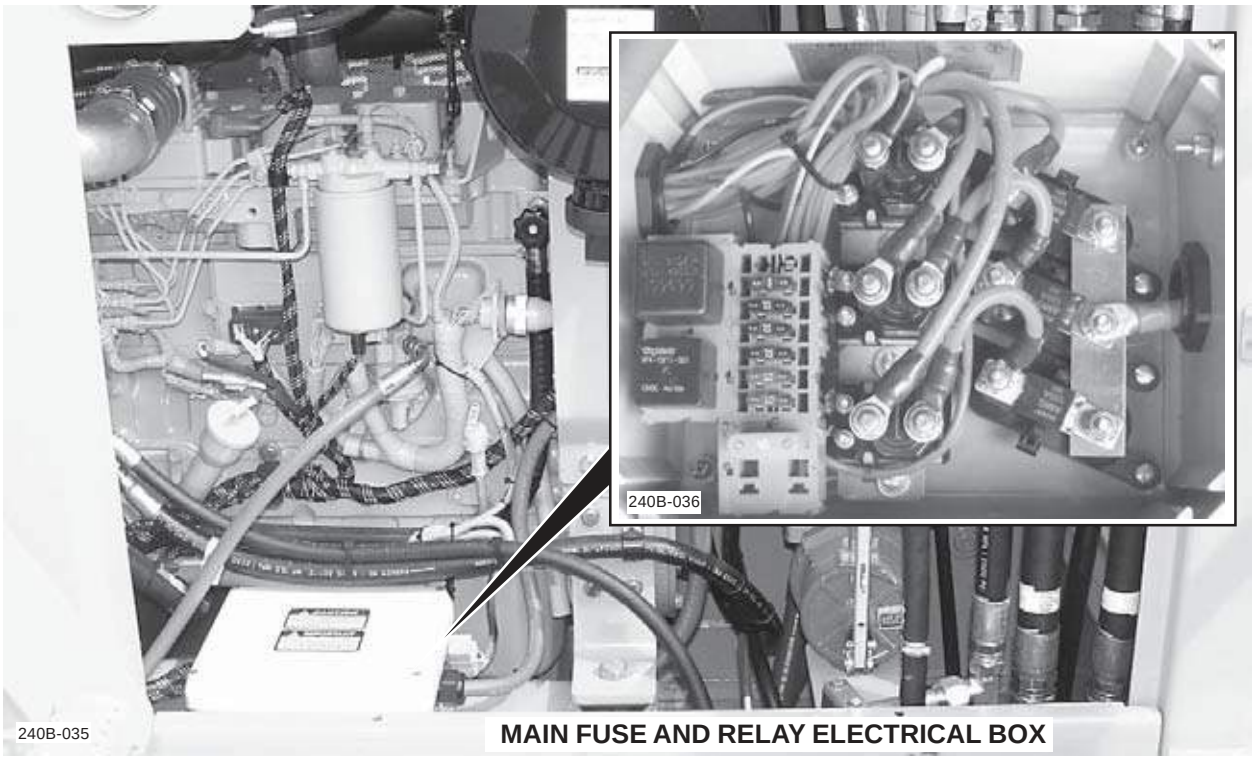

## FUSE AND RELAY PANEL

The fuse panel is located inside the control panel behind a removable cover.

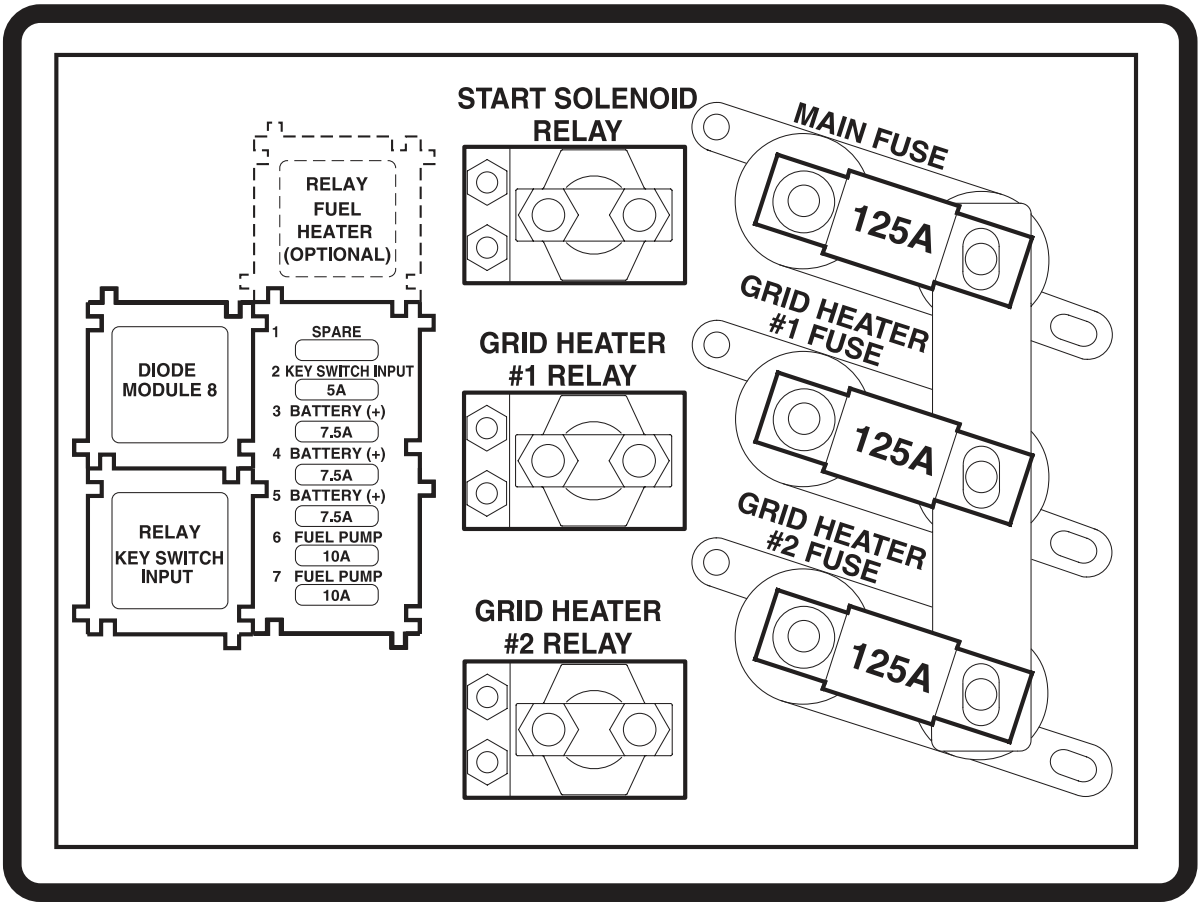
Each circuit of the machine is protected by a fuse. If a fuse is blown it must be replaced by one of the same value. If the fuse blows again, the circuit should be inspected for possible short circuit or other malfunction.




**INSTRUMENT PANEL WIRING DIAGRAM**

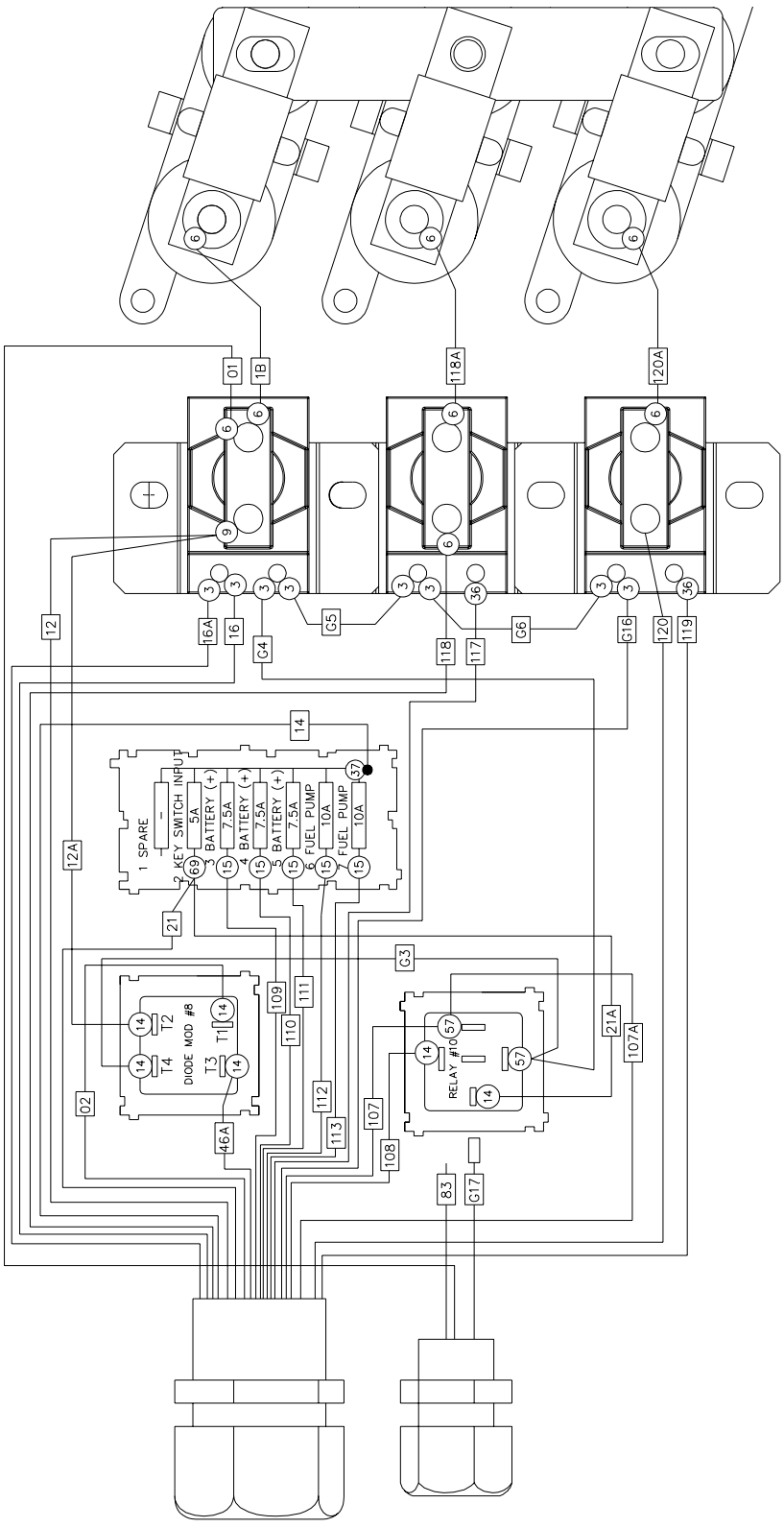



MAIN FUSE AND RELAY ELECTRICAL BOX



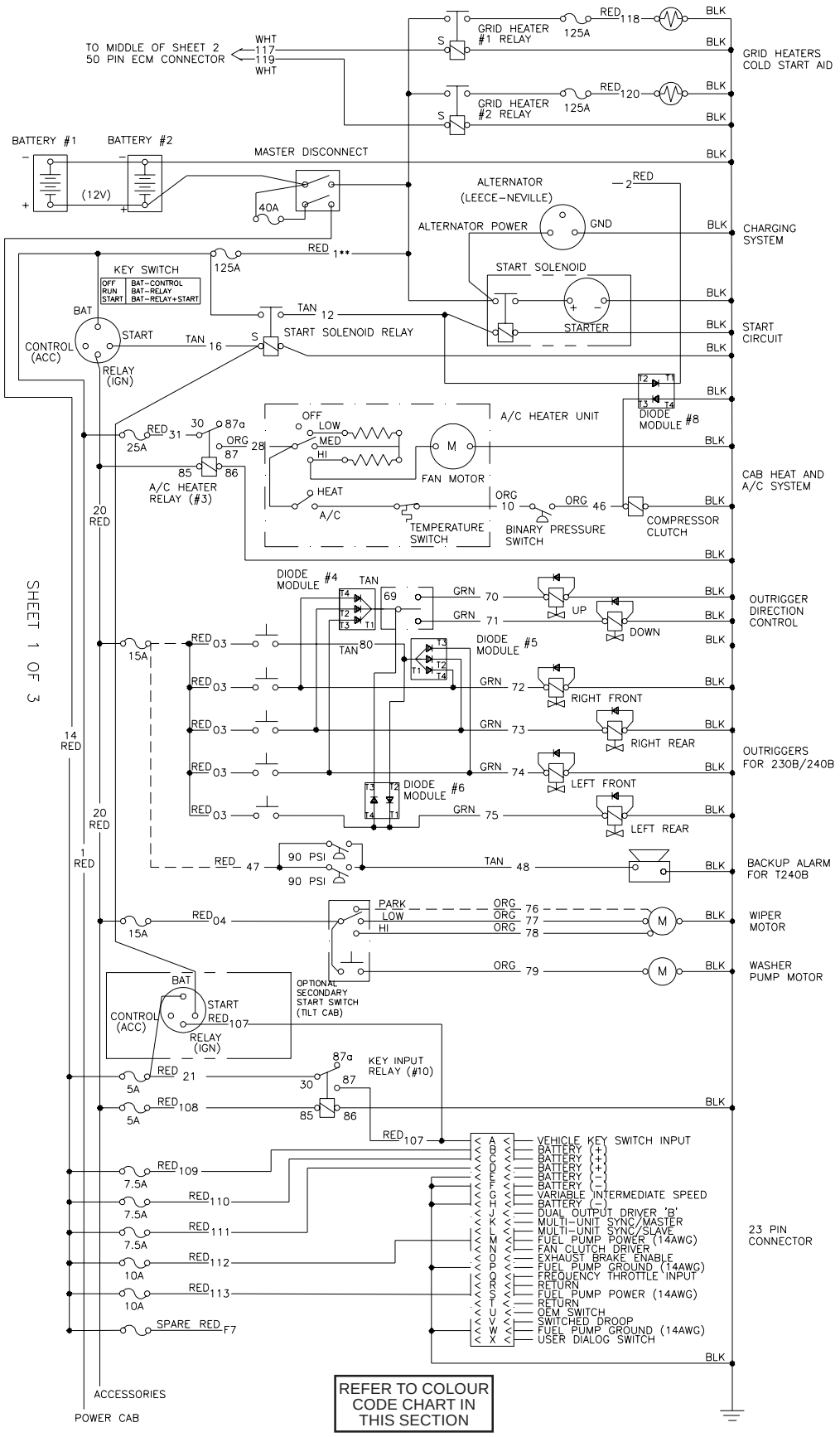

**FUSES AND RELAYS - ELECTRICAL BOX**

This Main Fuse and Relay electrical box is located in the engine compartment.

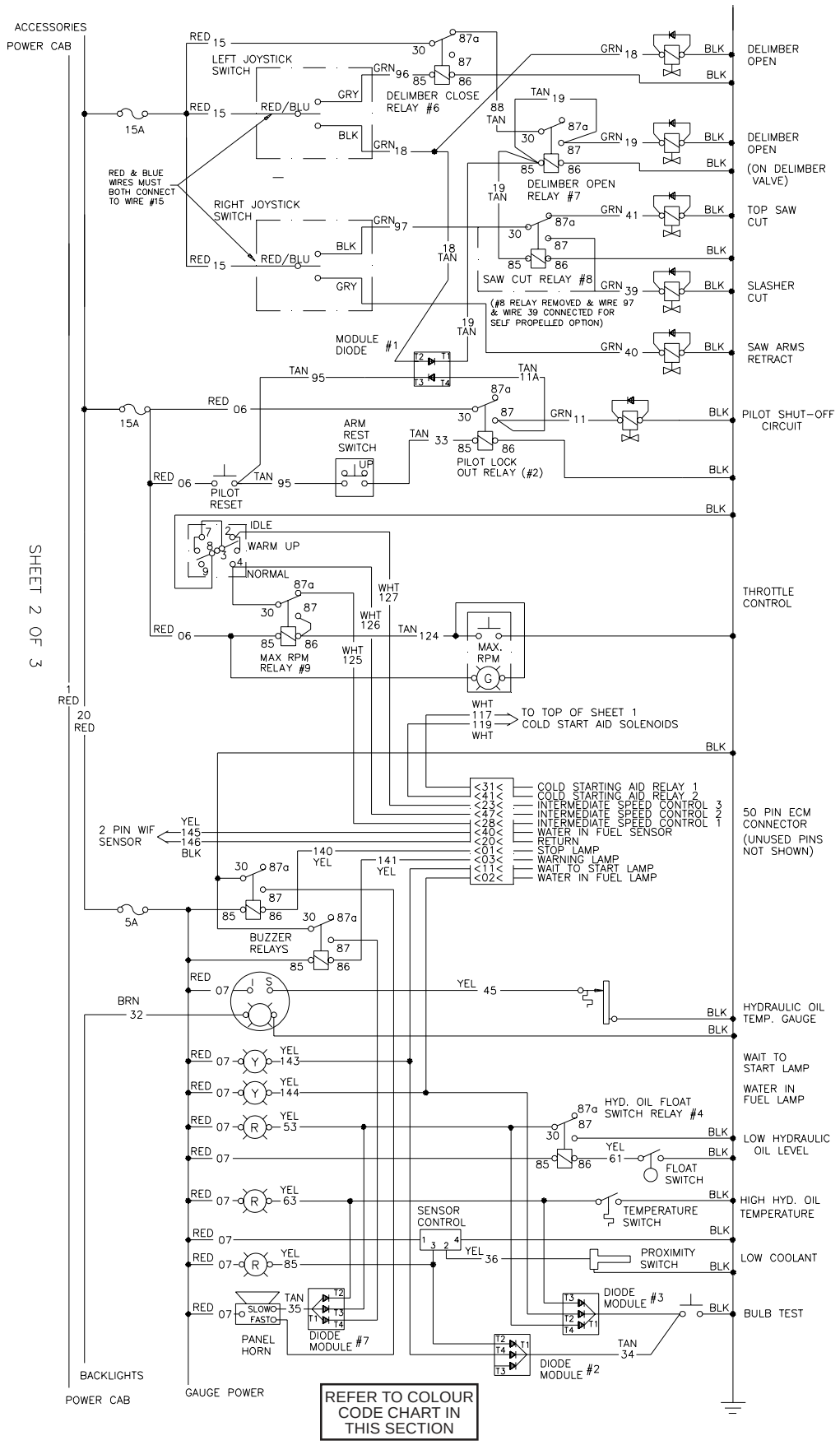



240B-011(23825B)

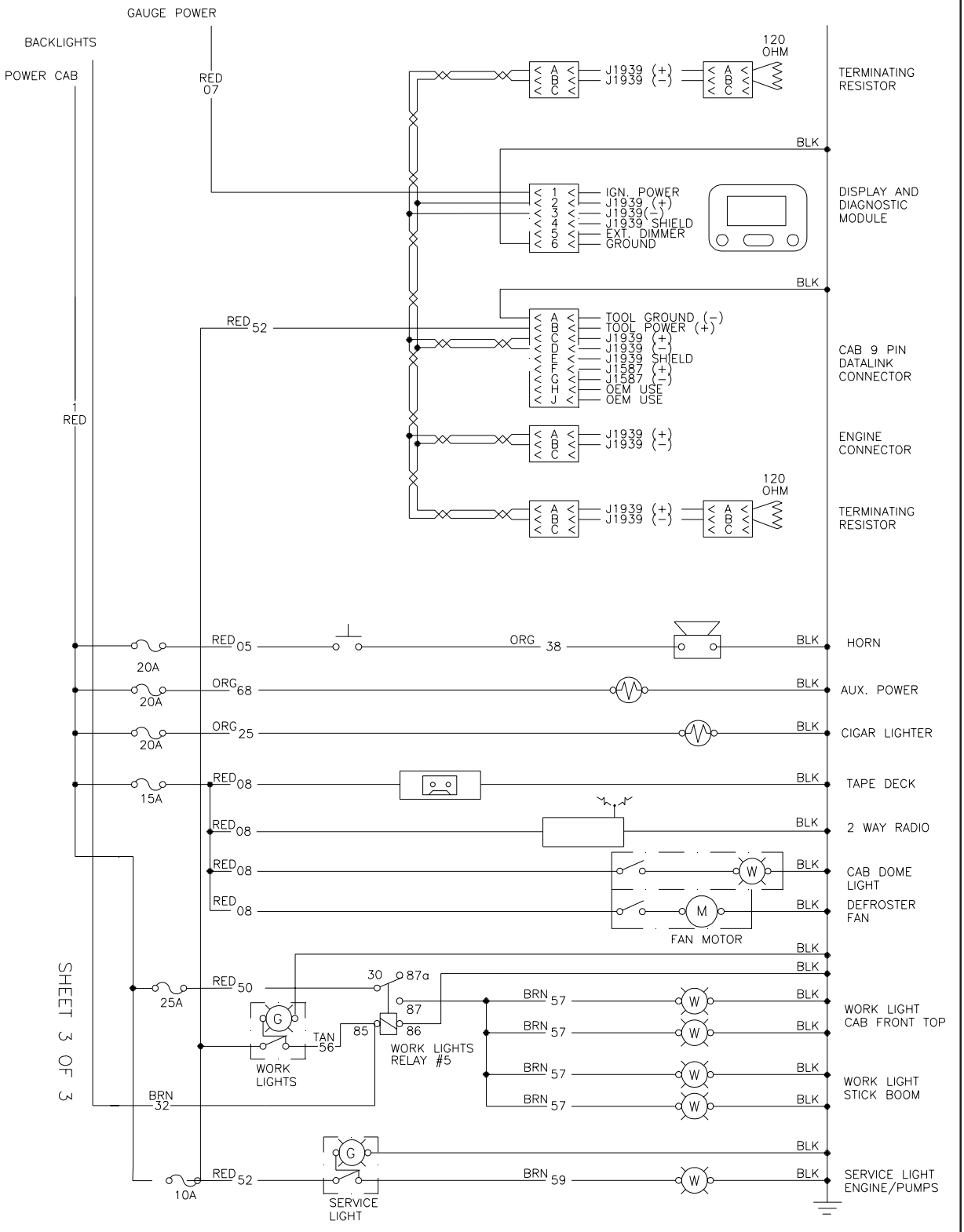
**ELECTRICAL BOX WIRING DIAGRAM**




**ELECTRICAL SCHEMATIC DIAGRAM (SHEET 1)**




**ELECTRICAL SCHEMATIC DIAGRAM (SHEET 2)**




REFER TO COLOUR CODE CHART IN THIS SECTION

240B-009

**ELECTRICAL SCHEMATIC DIAGRAM (SHEET 3)**

# Tigercat T240B Track Loader

# SECTION 7 - ENGINE START AND STOP

AUGUST, 2006

## CONTENTS - SECTION 7

## ENGINE START CIRCUIT

**For detailed engine information, refer to the engine manufacturer's manual.**

For engine *starting* and *stopping* procedures refer to STARTING ENGINE and STOPPING ENGINE in SECTION 2 of the OPERATOR'S MANUAL. For *correct engine speeds,* refer to THROTTLE CONTROL in SECTION 2 of the OPERATOR'S MANUAL.

To start engine; Turn battery disconnect switch to the ON position. Turn ignition key to the START position and releasing it to the RUN position after the engine starts.

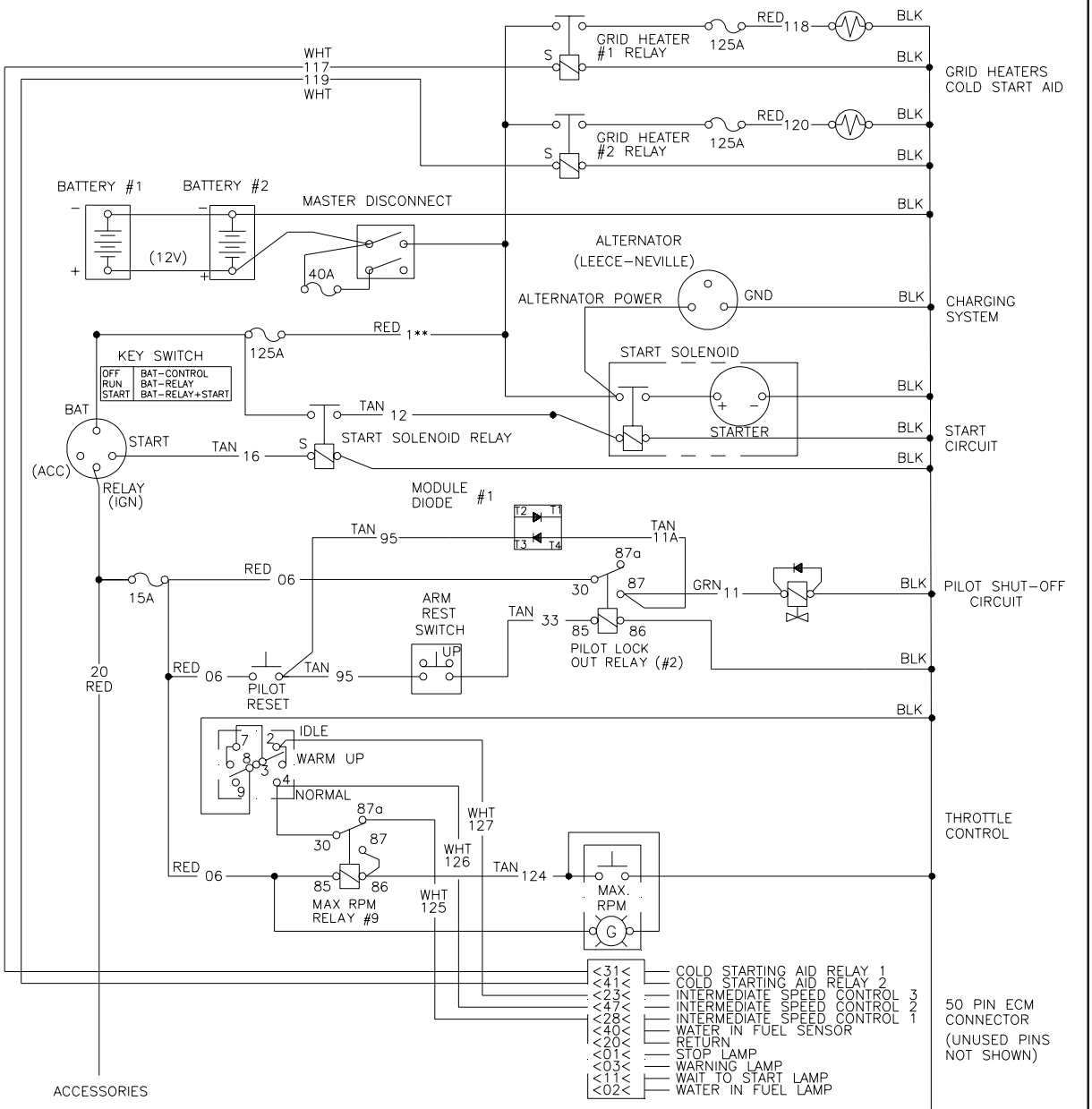
### CIRCUIT DESCRIPTION

With the *battery disconnect switch* ON, current is supplied the *start solenoid* contact, the positive connection on the *alternator* and the BATTERY contact *of the key switch (ignition switch).*

When the key switch is turned to the START position, the BATTERY contact is connected to the RELAY and START contacts. Current (voltage) then flows through wire (16) to energize the coils of the *start solenoid relay.* The *start solenoid relay* contacts also close and current flows from the alternator + RED wire (1) through wire (12) to the *starter solenoid coil* to close the contacts and operate the *start motor* to start the engine.

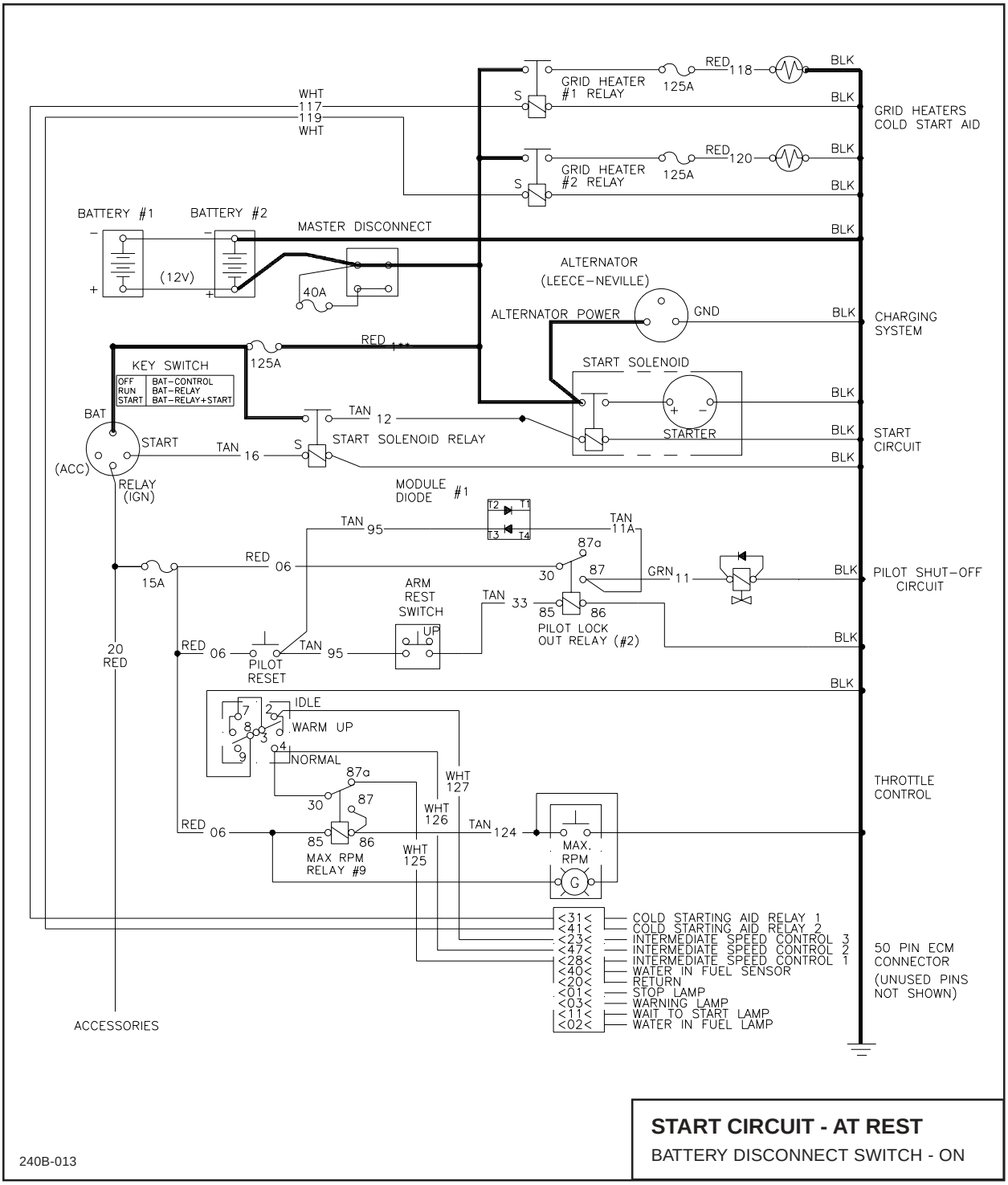
In order to operate the machine functions after starting the engine, the arm rest must be in the latched DOWN position and the PILOT RESET button pushed. This will energize the pilot shut off relay, close the contacts and allow current to flow through wires (6) and (11) to energize the pilot shut off solenoid valve on the pilot manifold. After the PILOT RESET button is released current will continue to flow through wire (95) and the diode to latch the pilot shut off relay in the energized position and allow current to flow through wires (6) and (11) to the pilot shut off solenoid valve.

For additional information on the PILOT SYSTEM refer to SECTION 5 in THIS SERVICE MANUAL.




240B-012

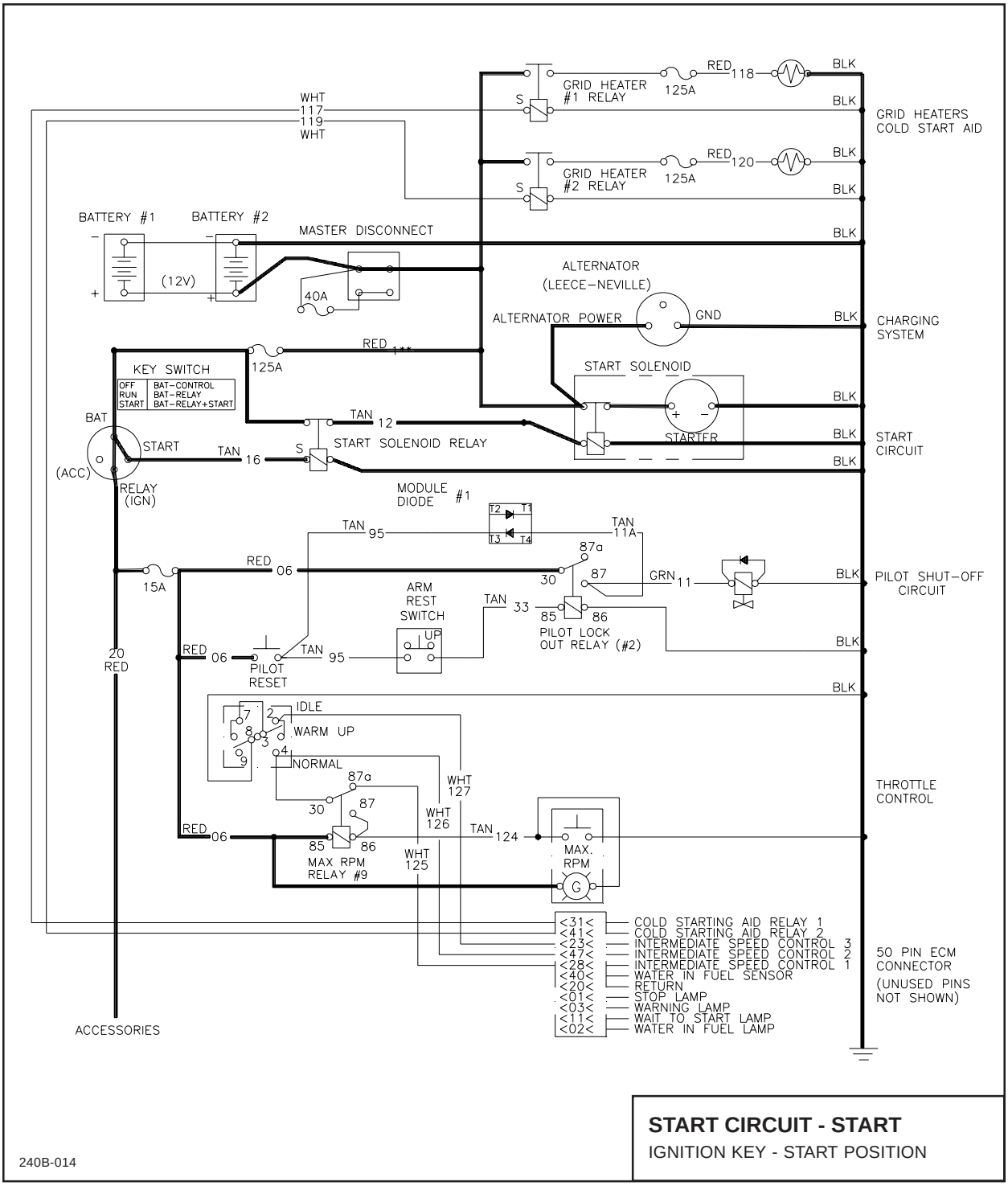
**START CIRCUIT - AT REST**




**START CIRCUIT - AT REST**

BATTERY DISCONNECT SWITCH - ON

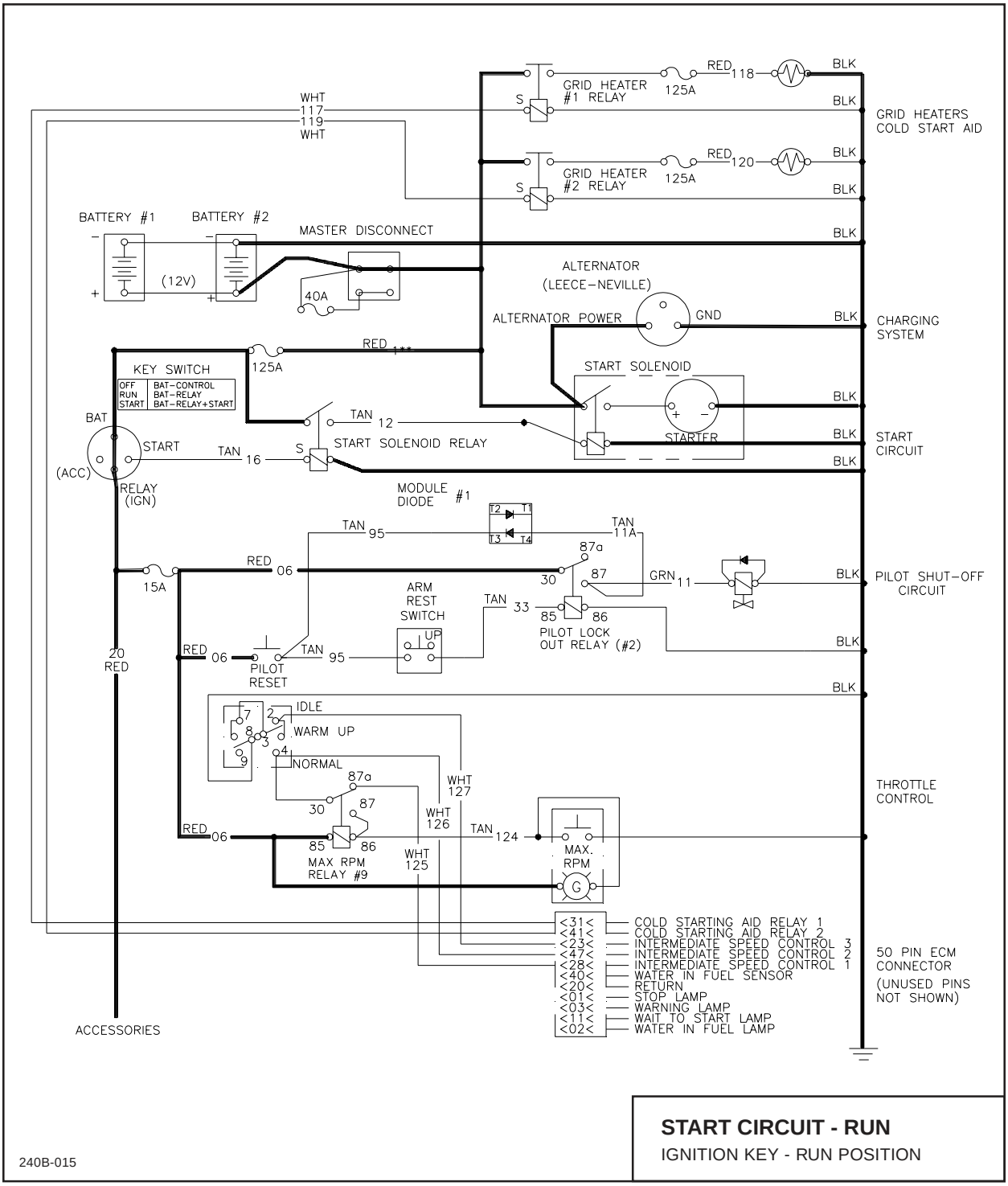
240B-013




**START CIRCUIT - START**

IGNITION KEY - START POSITION

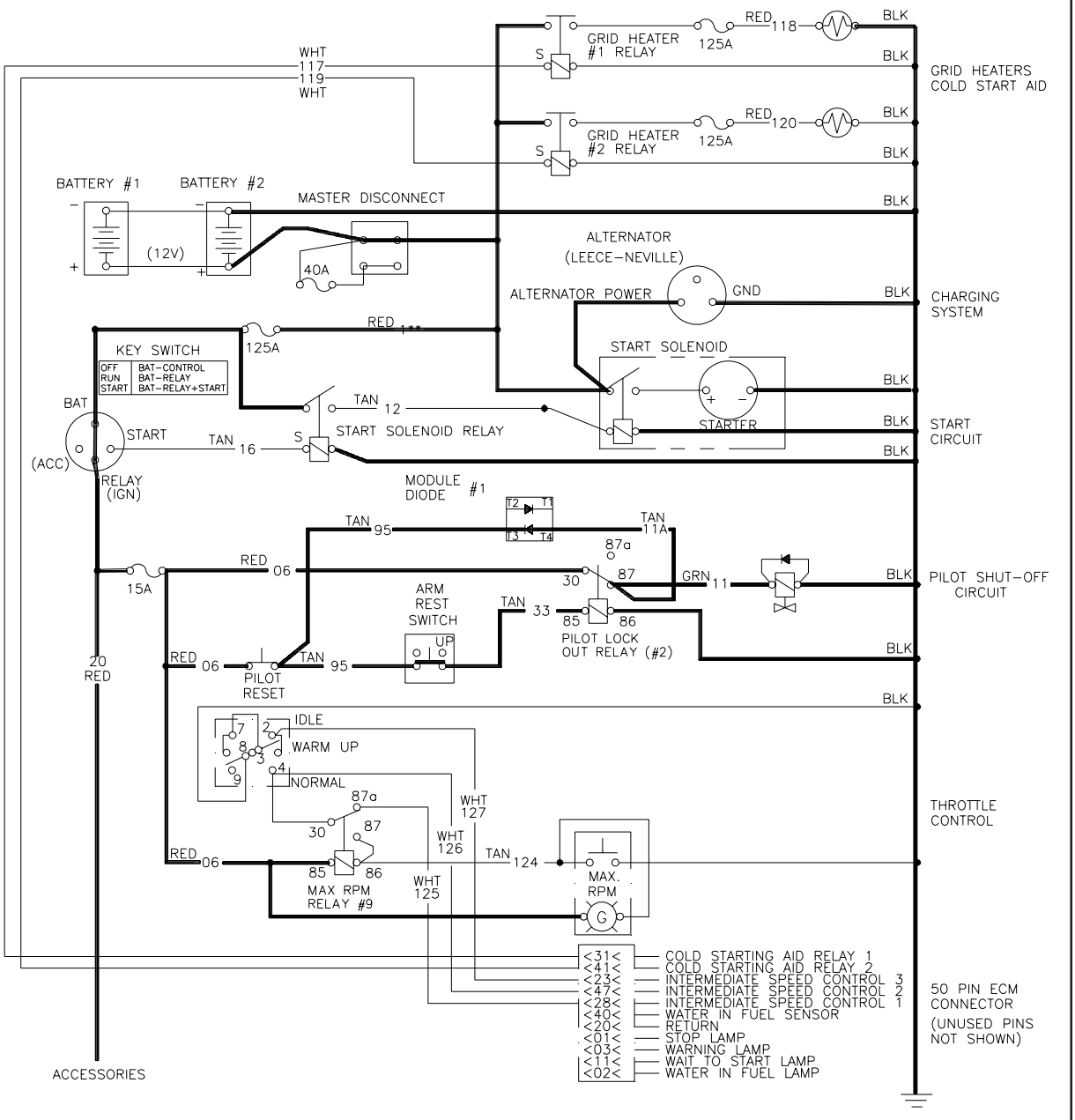
240B-014




**START CIRCUIT - RUN**

IGNITION KEY - RUN POSITION

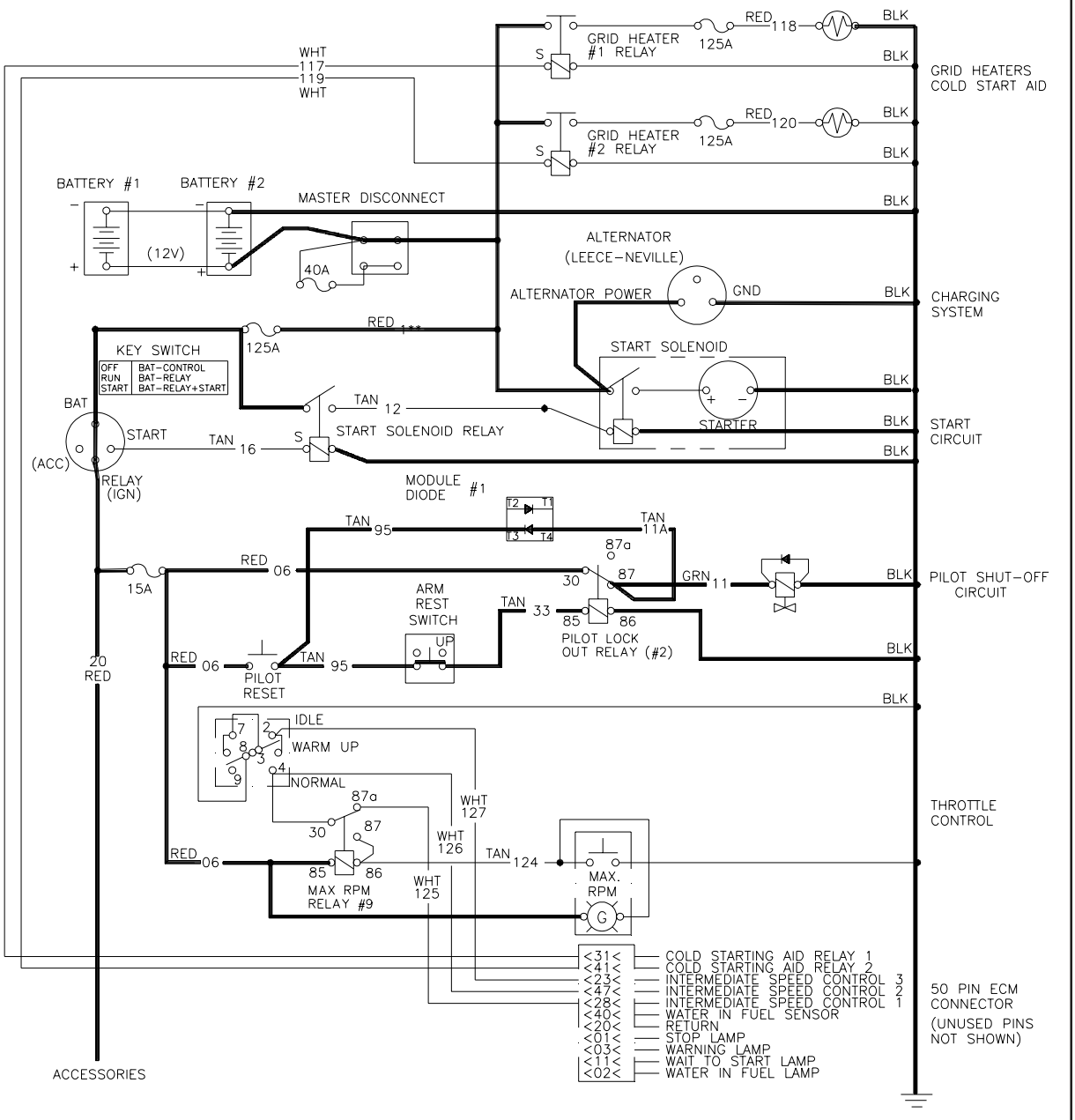
240B-015




240B-016

**START CIRCUIT - RUN**

IGNITION KEY - RUN POSITION
PILOT RESET SWITCH - HELD ON
ARM REST DOWN/ARM REST SWITCH - ON




240B-017

**START CIRCUIT - RUN**

IGNITION KEY - RUN POSITION
PILOT RESET SWITCH - RELEASED
ARM REST DOWN/ARM REST SWITCH - ON

# Tigercat T240B Track Loader

# SECTION 11 - TRACK DRIVE

AUGUST, 2006

## CONTENTS - SECTION 11

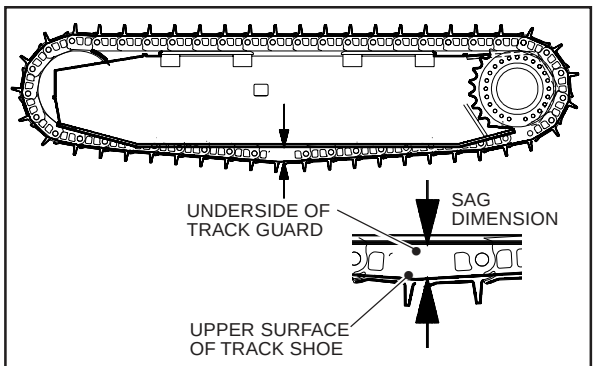
## IMPORTANT TRACK DRIVE NOTES

### NEW MACHINE

Before driving a new machine ensure that track sag is set correctly. Track sag may be set less than specified for shipping purposes. The correct track sag must be adjusted once a machine has been delivered to the job sight and operating in the accumulated soil buildup in the undercarriage.

### TRACK SAG

The **track sag** dimension is very important and should be checked regularly. A 50% increase in the life of the track assembly can be realized, particularly in bushing O/D wear and 'track pitch' by maintaining the correct amount of track sag. A track that is too tight will wear out significantly faster due to increased tension in the chain. Refer to MEASURING TRACK SAG in THIS SECTION.

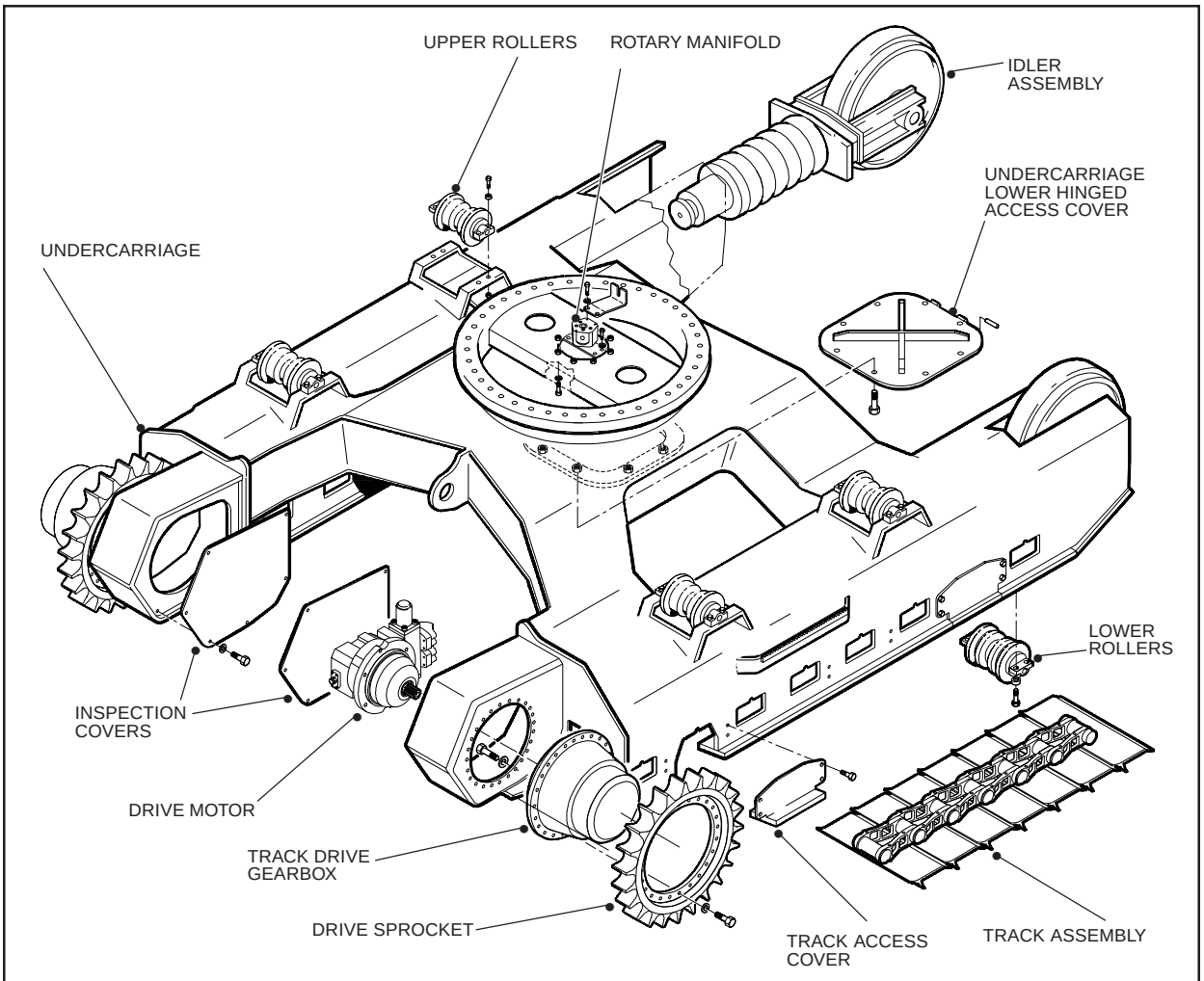



853ILL8 **MEASURING SAG DIMENSION**

### STRAIGHT TRAVEL

If the machine does not travel straight, the right and left track speeds are not set the same. Refer to TRACK SPEED SET-UP PROCEDURE in THIS SECTION.

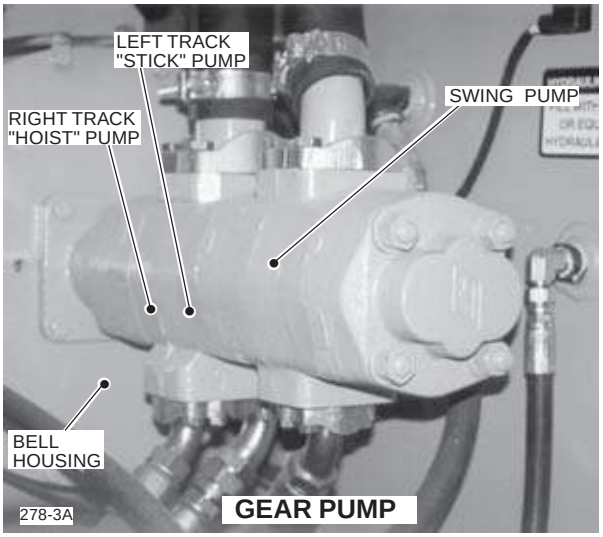
Check the speed of each track and follow the set-up procedures closely to obtain straight travel.




240T-13 **TRACK DRIVE ASSEMBLY**

## TRACK DRIVE COMPONENTS

### HYDRAULIC PUMPS

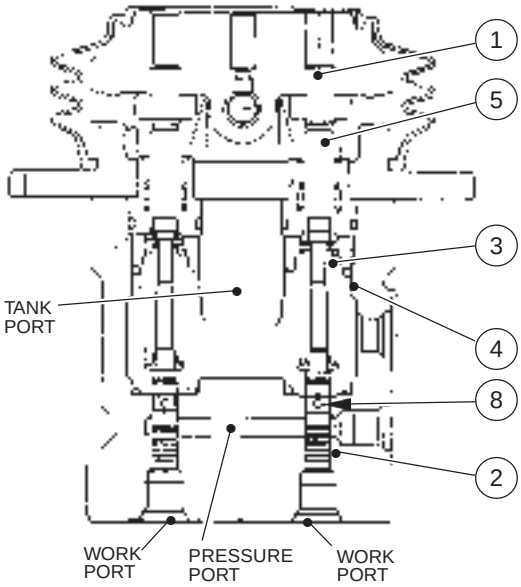



**GEAR PUMP**

The hydraulic pumps used on the T240B track loader are fixed displacement gear pumps.

The track drive circuit utilizes two of the three gear pumps to supply hydraulic oil to both the left and right track drive motors via a valve section in each of the two boom valves.

For a more detailed description of the triple gear pump, refer to SECTION 12 in THIS SERVICE MANUAL.

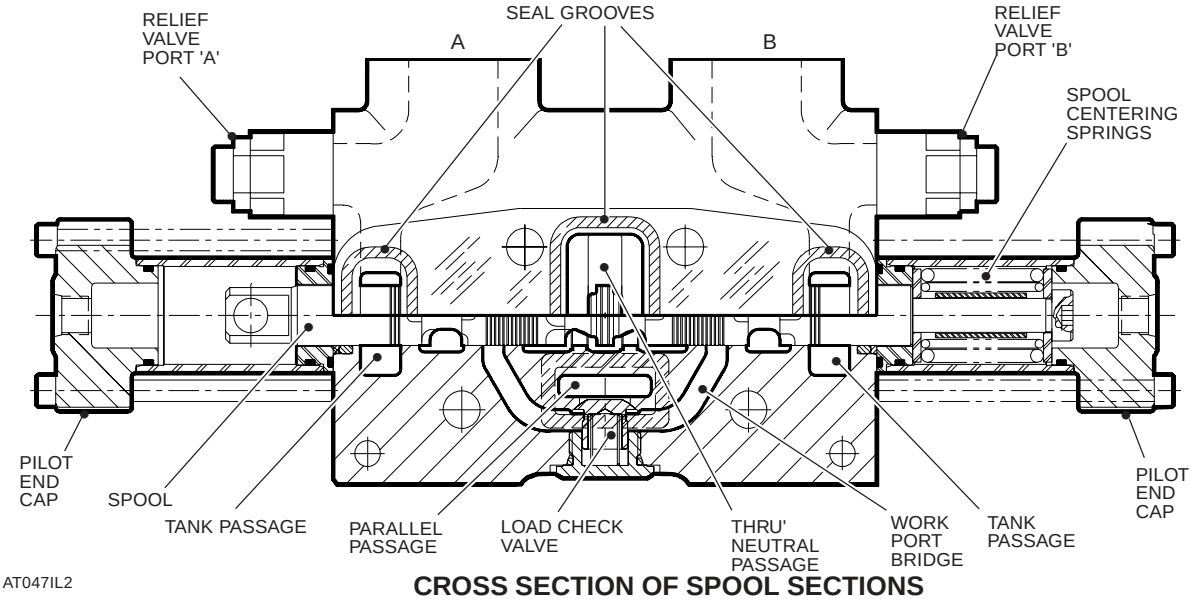



**FOOT PEDAL PILOT VALVE**

### FOOT PEDAL CONTROL VALVE

The drive function is controlled by two center foot pedal valves which send proportional pilot signals to the left and right track drive spool sections in the "hoist" and "stick" valves which supply oil to the track drive motors.

For a detailed description of the foot pedal control valves, refer to SECTION 5 in THIS MANUAL.

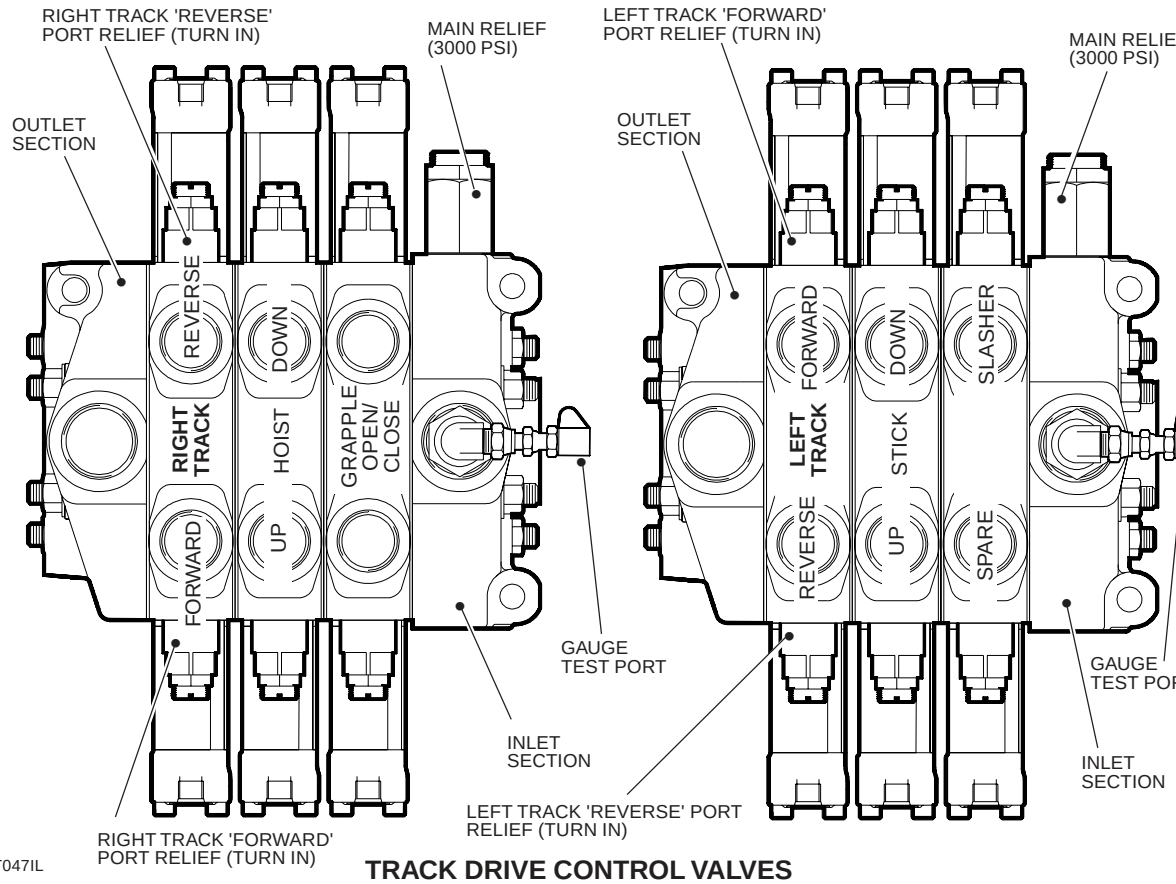



**CROSS SECTION OF SPOOL SECTIONS**

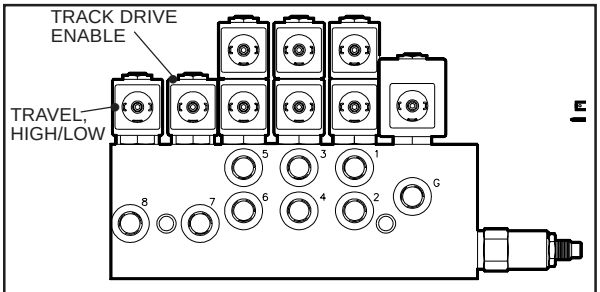
## TRACK CONTROL VALVES

The right track forward and reverse function is controlled by one of three spool sections in the "hoist" valve and the left track forward and reverse function is controlled by one of three spool sections in the "stick" valve. The control valves are located in the upper frame below the floor plates inside the valve compartment.

For a detailed description of the "hoist" and "stick" control valves, refer to SECTION 12 in THIS MANUAL.




**TRACK DRIVE CONTROL VALVES**




230B-04 **PILOT MANIFOLD ASSEMBLY**

## TRAVEL AND DRIVE ENABLE SOLENOID VALVES

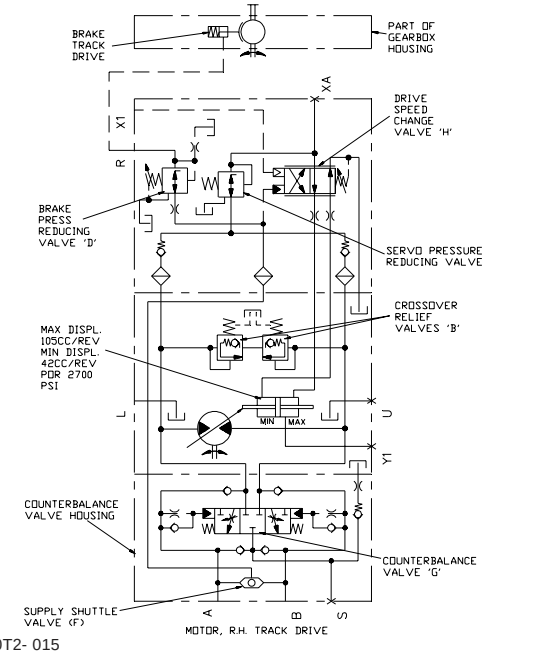
Pilot oil flows to both track drive foot pedals via the *track drive enable* solenoid valve located on the pilot manifold assembly. A *track drive switch* in the operator's cab when in the ON position energizes this solenoid valve and allows pilot oil to flow to the 'P' port on the foot pedal control valves. When the switch is in the 'OFF' position, the valve is de-energized and pilot oil is blocked from reaching the foot pedal control valves.

A *travel high/low* solenoid valve located next to the *drive enable* solenoid valve on the pilot manifold assembly controls the flow of pilot oil to the *drive speed change valve* in both track drive motors (port 'Z'). A *track speed switch* in the operator's cab when in the "LOW" position energizes this solenoid valve and allows pilot oil to shift the spool in the drive speed change valve and place the motor at maximum displacement (slower speed). When the switch is in the "HIGH" position, the solenoid valve is de-energized preventing pilot oil from reaching the drive speed change valve in the motor which places the motor at minimum displacement (higher speed).

## TRACK DRIVE HYDRAULIC CIRCUIT DESCRIPTION

The power is transmitted to the tracks by a variable displacement piston motor through a triple reduction planetary gearbox on each track frame. The gearbox has an integral spring apply, hydraulic-release, multi-disc brake which is automatically released whenever the drive system is pressurized.

In order to control the vehicle movement in situations where the vehicle may roll down a grade, each motor is equipped with a counterbalance valve. These valves have a spool valve which controls the flow of oil out of the motor, in the *motor schematic diagram* it is shown in the centre, closed position.

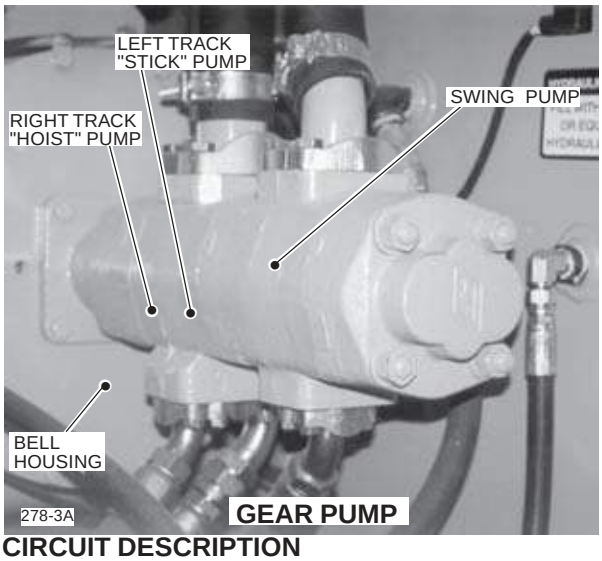



**TRACK DRIVE MOTOR SCHEMATIC**

The valve will remain in the closed position as long as there is no oil pressure in the line from the track control valve. When the track control valve spool is shifted and oil flows to the motor, a check valve in the counterbalance valve (G) opens and oil pressure builds up in the motor pistons.

The motor cannot move until the oil pressure shifts the counterbalance spool to permit the oil on the low pressure side of the motor to flow back through the counterbalance valve to the track control valve and then to tank.

The hydraulic motor is equipped internally with a *drive speed change valve* which is controlled by a switch in the cab (TRACK DRIVE HIGH/LOW) and a solenoid operated control valve on the pilot manifold assembly. For further information refer to TRAVEL AND DRIVE ENABLE SOLENOID VALVES in THIS SECTION.

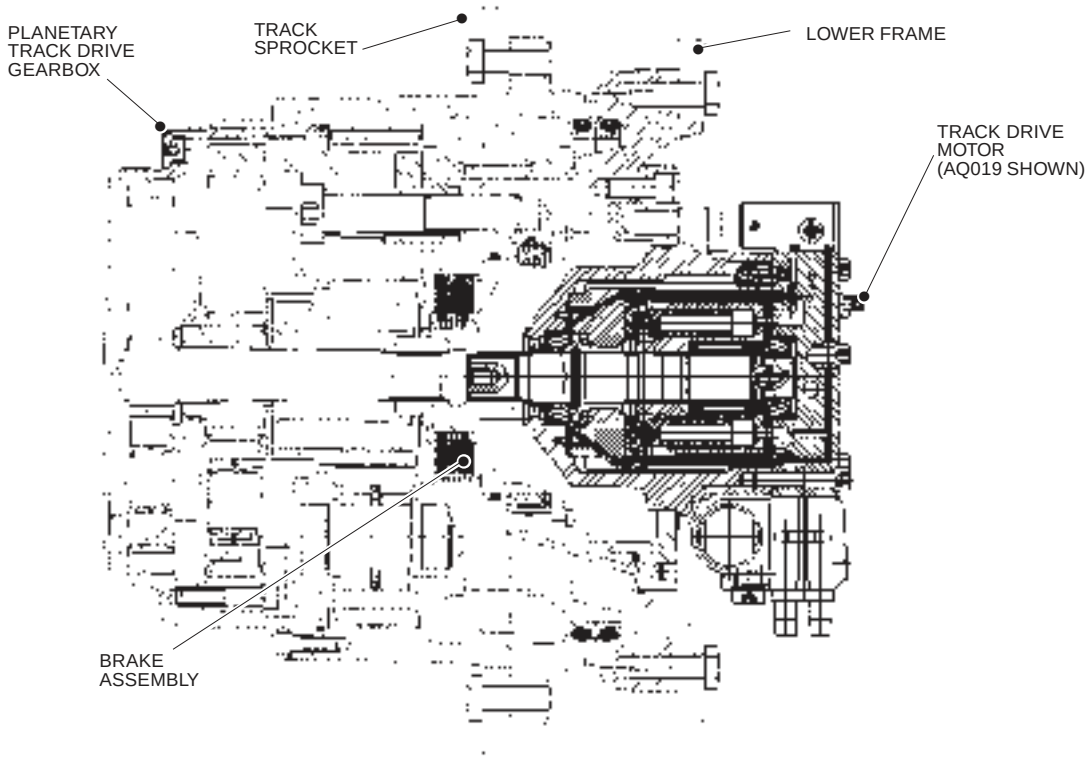



**GEAR PUMP**

## CIRCUIT DESCRIPTION

The types of pumps used on the T240B track loader are fixed displacement triple gear pumps.

The track drive circuit utilizes the first and second gear housings from the shaft end of these pumps to supply hydraulic oil flow to the left and right hydraulic track motor 'A' and 'B' ports via spool sections in the "stick" and "hoist" control valves.Two foot pedal control valves in the cab when operated in the FORWARD or REVERSE direction direct pilot oil to each end of the *track* spool sections in each of the "stick" and "hoist" control valves. A drive enable solenoid valve on the pilot manifold assembly controlled by a DRIVE ON/ OFF switch in the cab, controls the supply of pilot oil to the drive foot pedals. With the switch ON and the foot pedals depressed, the track spools in the "stick" and "hoist" control valves will shift directing oil from the pumps to the track drive motors. Return oil from the motors is directed back through the spool sections, to the *outlet* section, through the dual head return oil filter and back to tank.

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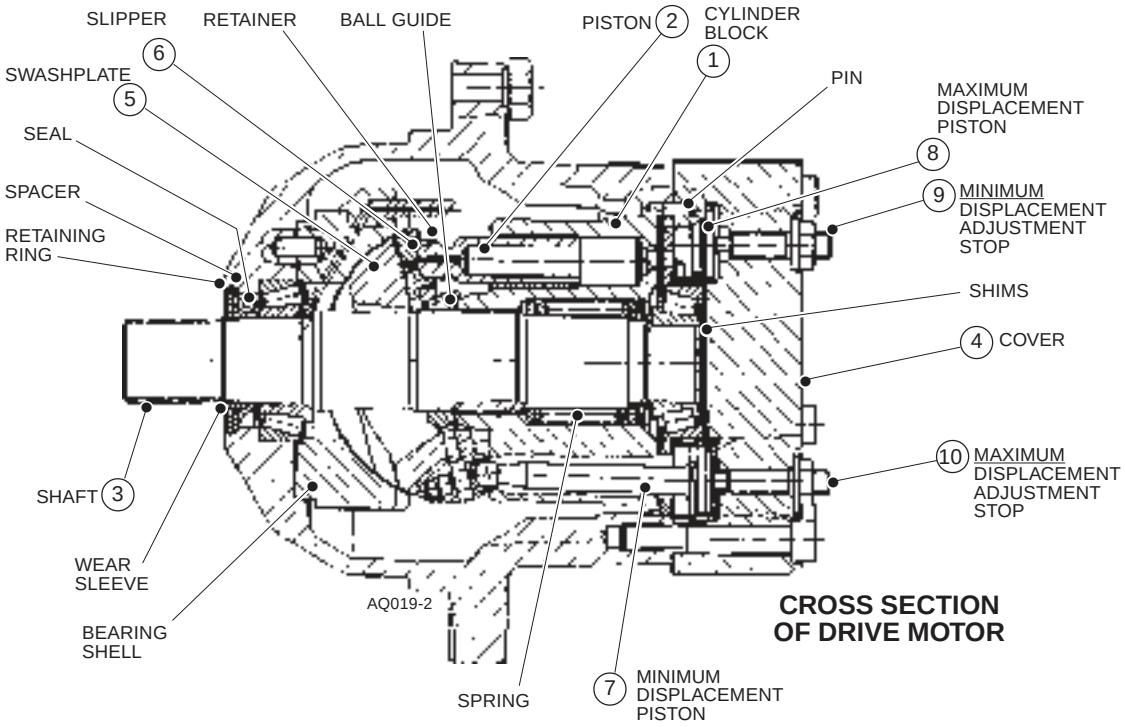
**TRACK DRIVE MOTOR AND GEARBOX ASSEMBLY**

**DRIVE MOTOR DESCRIPTION**

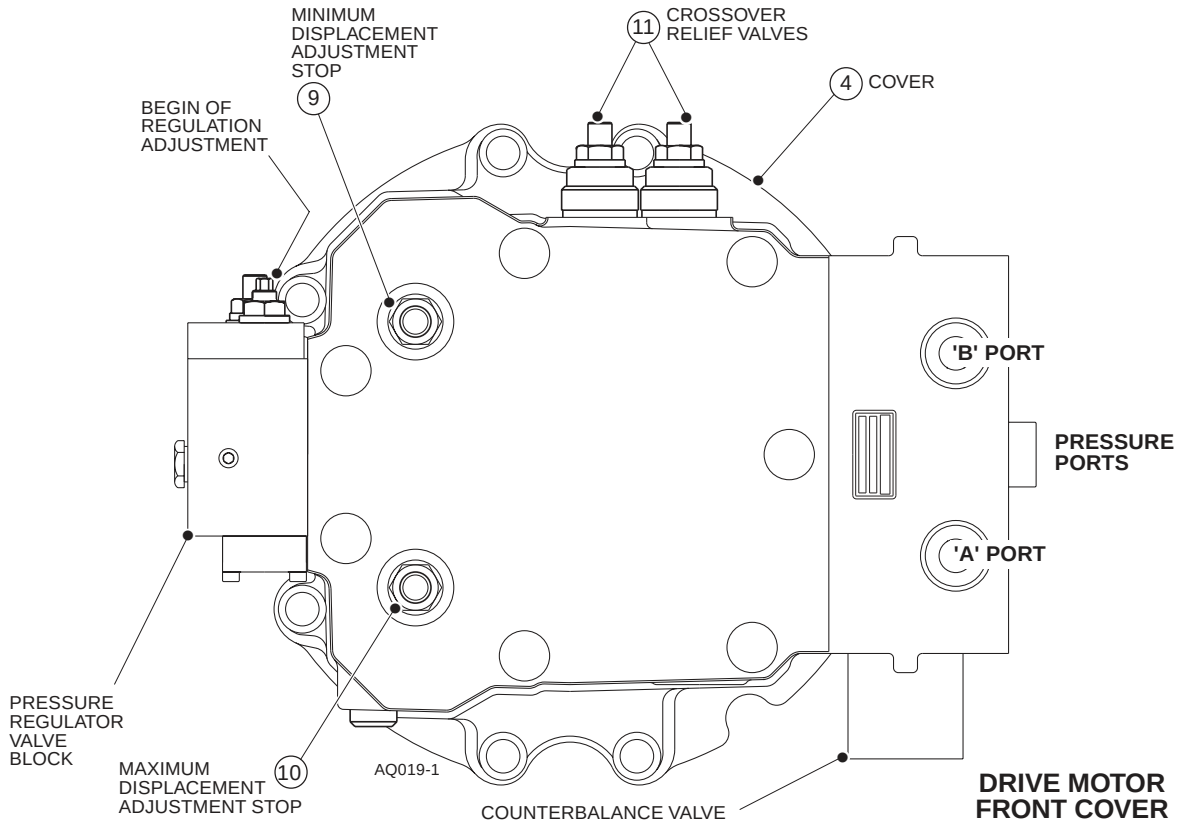
The drive motor is a variable displacement swashplate design. The motor is interchangeable from side to side.

The motor rotating group consists of a cylinder block (1) with nine pistons (2) and an output shaft (3) that is splined to the cylinder block.

Supply oil from the drive control valve enters the motor through the cover (4) to the pistons. During operation, high pressure supply oil enters the




**CROSS SECTION OF DRIVE MOTOR**




**DRIVE MOTOR FRONT COVER**

piston bores in the cylinder block (1). This forces the pistons against an angled swashplate (5). Piston sliding action causes the rotating group to turn. The cylinder block is splined to the output shaft (3) which causes the output shaft to turn. During the second half of the motor rotation, low pressure is discharged as the pistons ride up to a higher position on the swashplate. To reverse rotation, oil flow is reversed. During operation a small amount of supply oil flows through the centre of each piston. This oil lubricates the piston to slipper (6) joint and the slipper to swashplate area.

High pressure supply oil also flows through a tube to lubricate the swashplate to bearing shell area. Normal leakage and lubrication oil aid in flushing and cooling the motor during drive operation.

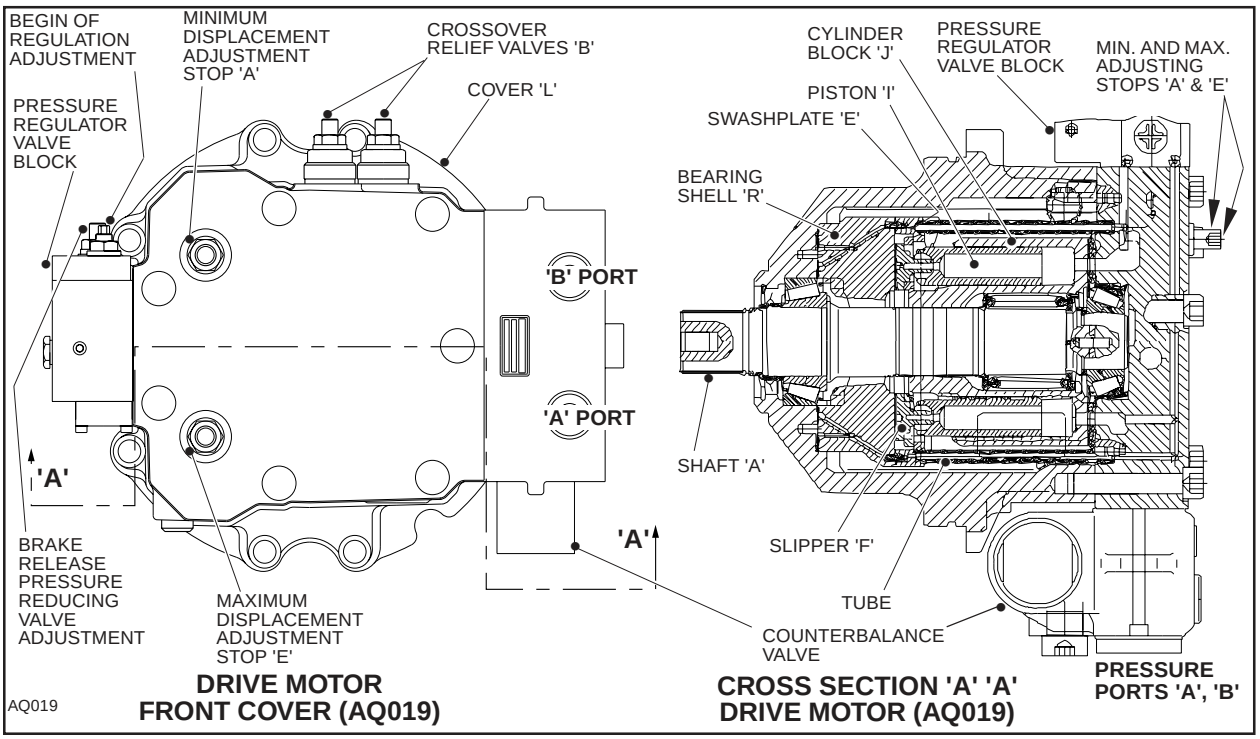
The swashplate (5) angle is changed by the **minimum** displacement piston (7) and **maximum** displacement piston (8). When supply oil acts on the **minimum** displacement piston (7), the motor runs at its highest speed. When supply oil acts on the **maximum** displacement piston (8), the motor runs at its slowest speed. The **maximum** displacement piston is larger than the **minimum** piston and will hold the motor in **maximum** displacement when equal pressure acts on both pistons.

**NOTE:** Swashplate angle (motor displacement) is limited by the minimum and maximum displacement pistons contacting the minimum (9) and maximum (10) displacement adjustment stops. For minimum displacement, the maximum displacement piston contacts the minimum displacement adjustment stop. For maximum displacement, the minimum displacement piston contacts the maximum displacement adjustment stop.

**Refer to front cover illustration;**

The drive motor cover (4) consists of several components to operate the drive functions.

The minimum displacement adjustment stop (9) limits the minimum angle the swashplate can move. The maximum displacement adjustment stop (10) limits the maximum angle the swashplate can move. The crossover relief valve(s) (11) protects the motor circuit from pressure spikes.

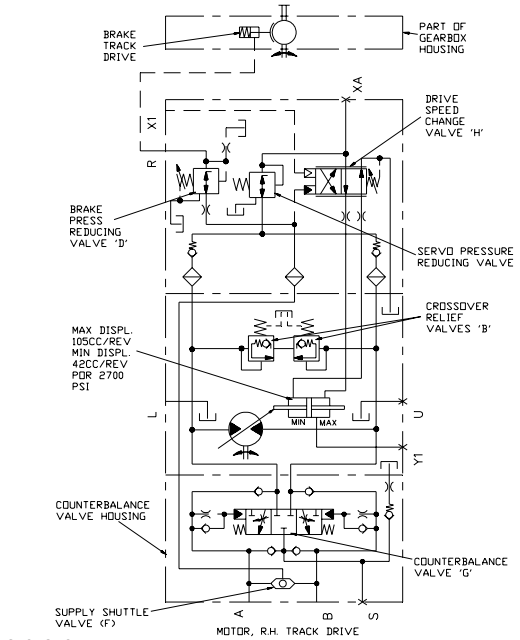


The drive motor may be operated in two ranges;

MAXIMUM DISPLACEMENT = 105cc/rev.
MINIMUM DISPLACEMENT = app. 50cc/rev.

These two ranges are controlled by a solenoid pilot valve on the pilot manifold which is operated by the TRACK (LOW/DRIVE) switch in the cab. In the LOW position the solenoid on the pilot valve is energized and the motor is in its **maximum** displacement mode which will give the **slowest** speed and maximum tractive effort.

For faster travelling modes the TRACK (LOW/DRIVE) switch can be put in the DRIVE position and the motor will be in its **minimum** displacement position which will give the **fastest** speed. When in this high speed mode the motor will automatically increase motor displacement in the event that a high load is encountered, e.g. a short grade or obstacle. This increase in motor displacement is controlled by the drive speed change valve. This valve controls the hydraulic pressure signal to the maximum displacement piston. The piston increases motor displacement as the pressure rises above the drive speed change valve setting.

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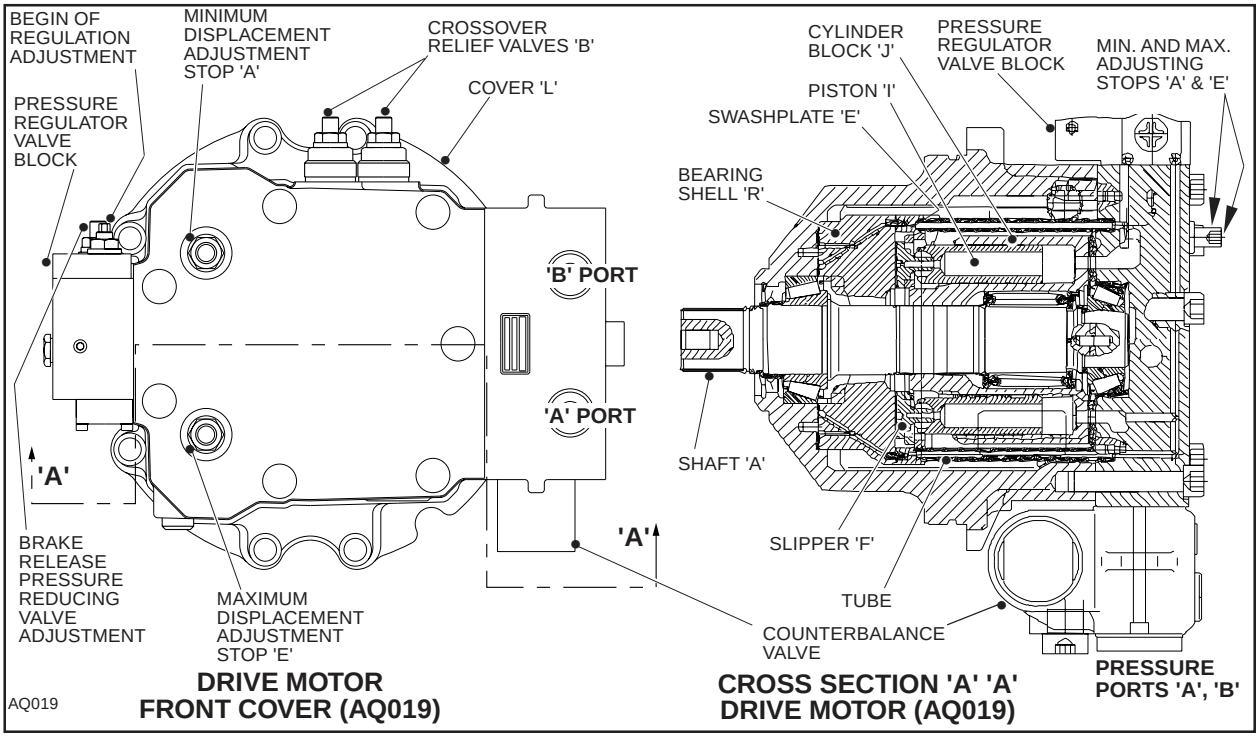
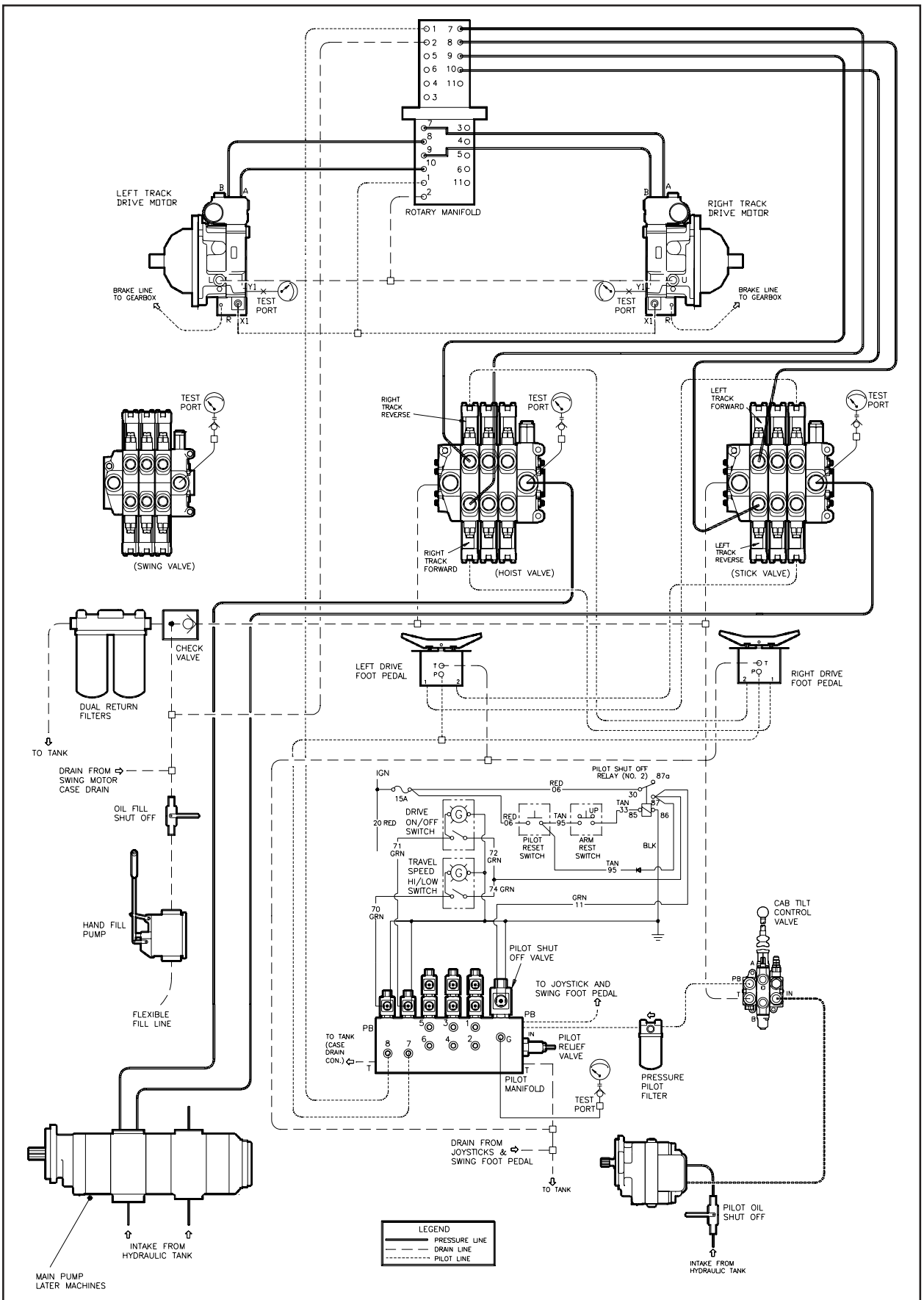
**TRACK DRIVE MOTOR SCHEMATIC**




AQ019

**DRIVE MOTOR FRONT COVER (AQ019)**

**CROSS SECTION 'A' 'A' DRIVE MOTOR (AQ019)**




240T2-011

**TRACK DRIVE CIRCUIT DIAGRAM**

## DRIVE MOTOR START-UP PROCEDURE

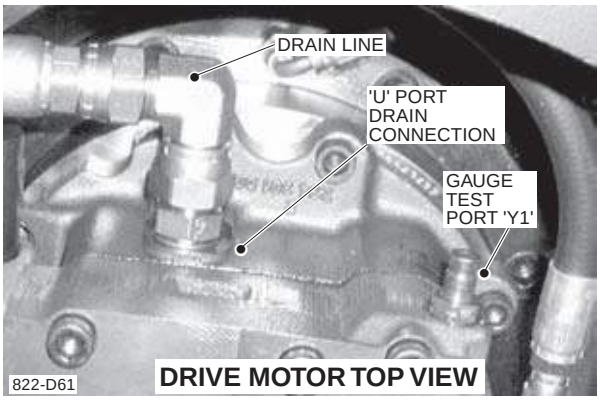
**IMPORTANT:**

The minimum displacement adjusting screws on the track drive motors must be turned in 2 full turns before running the track. The preset speed of a new motor is too fast and the motor will immediately fail if this adjustment is not performed.

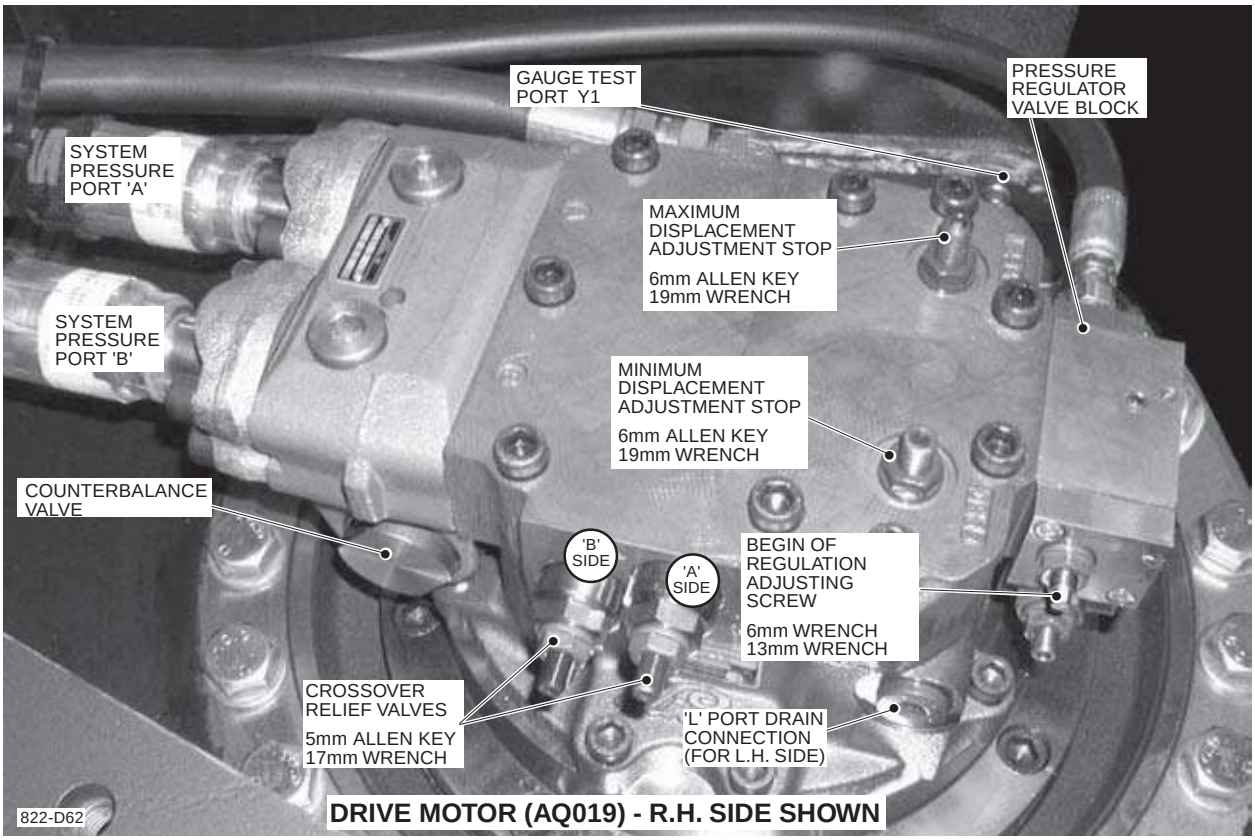
**IMPORTANT:**

The drive motor will be damaged if is not filled with oil before operating the drive function. This procedure must be performed whenever a new drive motor or drive pump is installed or whenever oil has been drained from the motor.

1. Disconnect drive motor drain line on top of motor.
2. Install plug in line to minimize loss of oil.
3. Remove port adapter from motor drain port.
4. Fill motor with oil through the drain port. Add oil slowly until level is to the top of drain port.
5. Re-connect drain line.
6. Run each drive motor **slowly** with track off the ground for three track revolutions to remove air from the drive circuit.



DRIVE MOTOR TOP VIEW



DRIVE MOTOR (AQ019) - R.H. SIDE SHOWN

**CAUTION**

**Use caution when in the cab as a slight touch of the controls can cause sudden rotation of the upper frame and booms or movement of the tracks**

**CAUTION**

**Be aware of other personnel in the area. Operator is responsible for the safe operation of the machine.**

**WARNING**

**Ensure that no one is standing near the grapple during this procedure.**

**IMPORTANT**

**Avoid blowing oil over relief for longer than five seconds, as this will cause excessive heating of the hydraulic fluid.**

## LEFT TRACK RELIEF VALVE SETTINGS

**Left track/"Stick" valve main relief setting ..... 3000 psi**

**Left track port relief setting .....Turn in Fully**

1. Park machine on level ground.
2. Ensure hydraulic oil is at **operating temperature.**
3. Remove final drive inspection covers.
4. Disconnect brake release lines at brake port on final drive gearboxes. Plug hoses with size 06 JIC plug and cap port adapters on gearbox.

### SET LEFT TRACK MAIN RELIEF VALVE

5. Loosen the locknut on both *port relief* valve adjusting screws for the TRACK FORWARD/ REVERSE spool section of the "stick" valve and check that the adjusting screws **are turned in fully**. Tighten locknuts.
6. Connect a 0-5000 psi pressure gauge to the "stick" control valve test port on the inlet section of the valve.
7. Start engine and place throttle control to **full**.
8. Set pilot pressure to **450 psi** at **full** throttle.
9. Place engine throttle control to **full** throttle.
10. Slowly depress the L.H. drive foot pedal to ensure brake holds. While holding the LEFT drive foot pedal in the FORWARD position, check gauge pressure reading.
11. If less than set value, loosen locknut on stick main relief valve and turn *relief* valve adjusting screw in or out until **3000 psi.** is obtained on gauge.
12. Tighten locknut on the *main relief* adjusting screw taking care not to turn the adjusting screw. Verify setting.

### RIGHT TRACK RELIEF VALVE SETTINGS

**Right track/"Hoist" valve main relief setting ..... 3000 psi**

**Right track port relief setting .....Turn in Fully**

Follow pressure setting procedure for LEFT TRACK RELIEF VALVE SETTINGS - use "hoist" control valve.

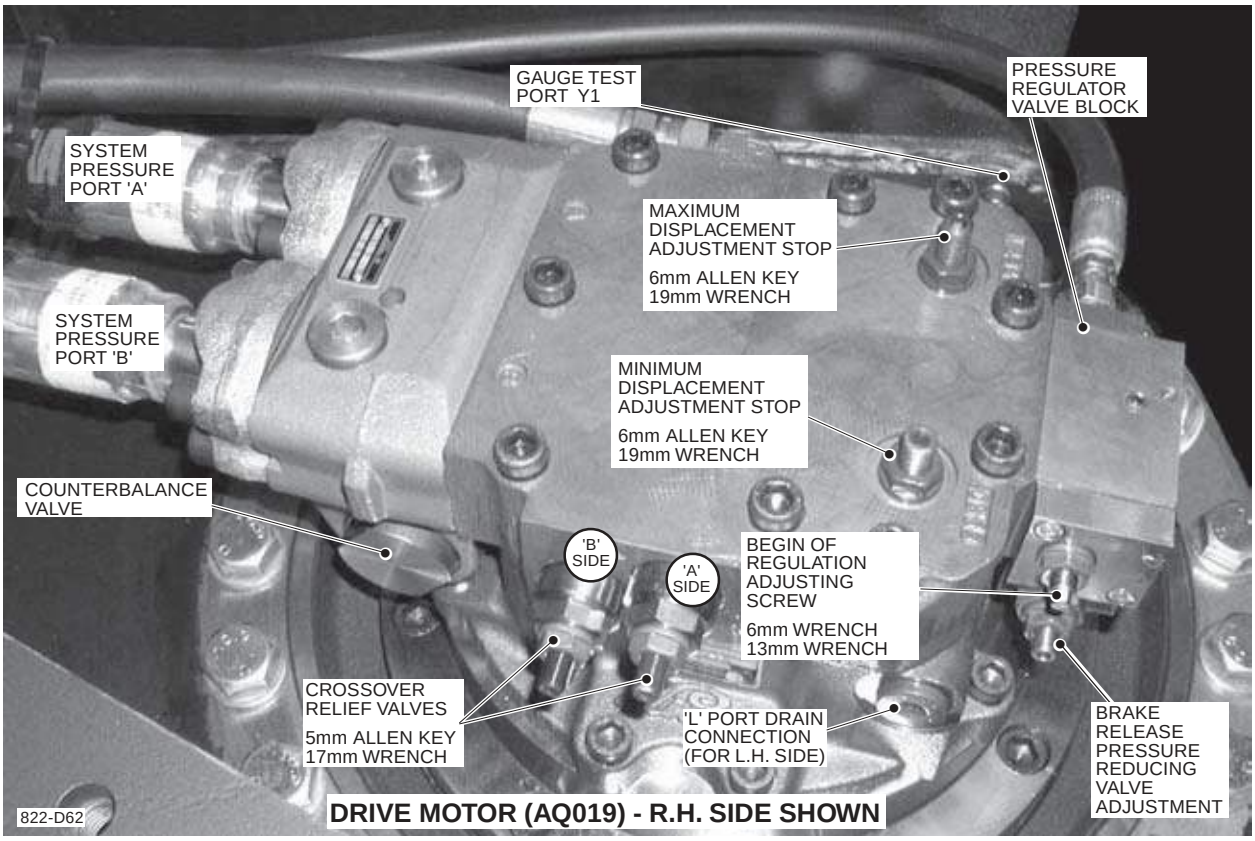
13. Stop engine, reconnect the brake release line(s) at the brake port on the track drive gearbox
14. Replace inspection covers.
15. Remove pressure gauge and wipe up any excess oil from test port area.

**SET BEGIN OF REGULATION (DRIVE SPEED CHANGE VALVE)**

**Note:** Begin of regulation adjustment is made with both track drive main relief valves set at 2500 psi.

1. Ensure hydraulic oil is at **operating temperature.**
2. Remove both LEFT and RIGHT drive motor inspection covers.
3. Disconnect LEFT and RIGHT brake line at port on final drive gearbox. Plug hose with size 06 JIC plug and cap port adapter on gearbox.
4. Install a 0 to 5,000 psi gauge on drive motor gauge test ports 'Y1', size 04JIC quick connect.
5. Start engine and set throttle to FULL...
6. Lower left arm rest and depress the pilot reset switch to activate the *pilot system*.
7. Place HIGH/LOW switch to HIGH position.
8. Activate LEFT track drive foot pedal in both FORWARD and REVERSE directions to ensure that the track does not move. At this time **ADJUST BOTH TRACK DRIVE MAIN RELIEF VALVES TO 2500 psi**.
9. With the aid of an assistant, activate LEFT track drive foot pedal in the FORWARD direction and check pressure reading on gauge at motor gauge test port 'Y1' it should show between **800 and 1,000 psi.**

   If adjustment is required, loosen locknut on *begin of regulation adjusting screw* and turn screw **in** to increase pressure or **out** to decrease pressure. Tighten locknut.
10. Repeat steps (4) through (9) for the right drive motor.
11. Reset track drive main releif valve pressure to 3000 psi.
12. Re-connect brake line(s) to both gearboxes.
13. Remove pressure gauge and wipe up any spills.
14. Replace both LEFT and RIGHT drive motor inspection covers.

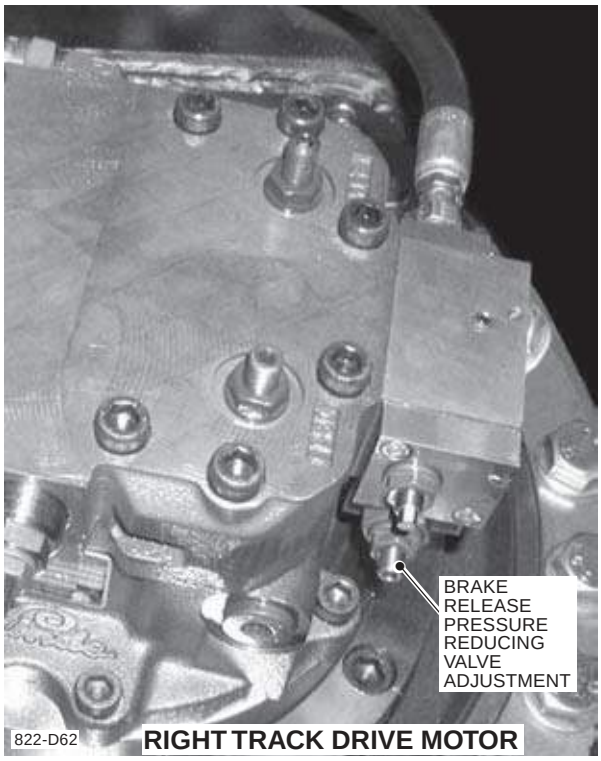



**DRIVE MOTOR (AQ019) - R.H. SIDE SHOWN**

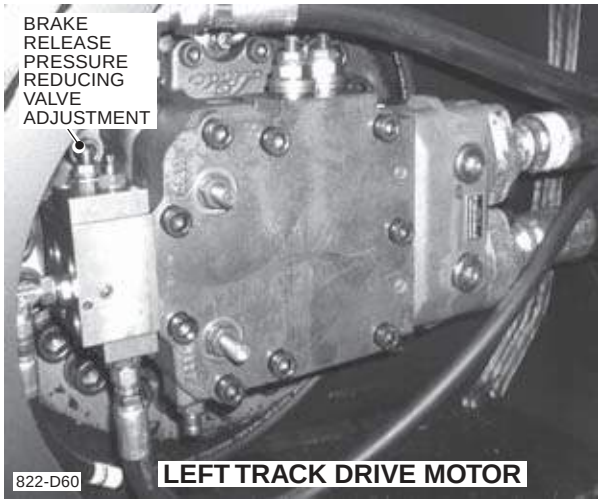
## TRACK DRIVE BRAKE RELEASE PRESSURE

1. Ensure hydraulic oil is at **operating temperature.**
2. Remove both LEFT and RIGHT drive motor inspection covers.
3. Disconnect LEFT and RIGHT brake line at port on final drive gearbox. Install a test hose and tee fitting between the brake lines and ports on final drive gearboxes.
4. Install a 0 to 1,000 psi gauge on both tee fittings.
5. Start engine and set throttle to FULL ...
6. Lower left arm rest and depress the pilot reset switch to activate the *pilot system*.
7. With the aid of an assistant, activate LEFT track drive foot pedal in the FORWARD direction and check brake pressure reading on gauge at brake line it should show **500 psi.**

   If adjustment is required, loosen locknut on *brake pressure reducing valve* and turn screw **in** to increase pressure or **out** to decrease pressure. Tighten locknut.
8. Repeat step (7) for the right track drive brake pressure adjustment.
9. Set engine speed to low idle, shut engine off and remove test gauges, hoses and fittings.
10. Reinstall LEFT and RIGHT brake line at port on final drive gearbox. Wipe up any spilled oil.
11. Reinstall both LEFT and RIGHT drive motor inspection covers.



RIGHT TRACK DRIVE MOTOR



LEFT TRACK DRIVE MOTOR

## TRACK SPEED SET-UP PROCEDURE

**IMPORTANT:**

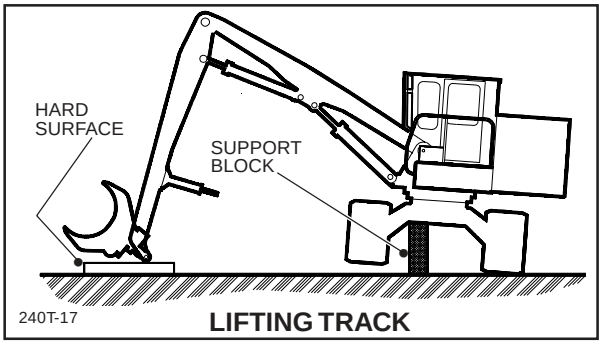
- Ensure hydraulic oil is up to **operating temperature.**

1. Remove both left and right final drive inspection covers to access track drive motors.

**LEFT TRACK ADJUSTMENT**

**POSITION MACHINE:**

2. Swing boom to LEFT side of machine.
3. Place grapple on solid ground and by forcing down with boom controls, lift track clear of ground. (Hoist down and stick out)



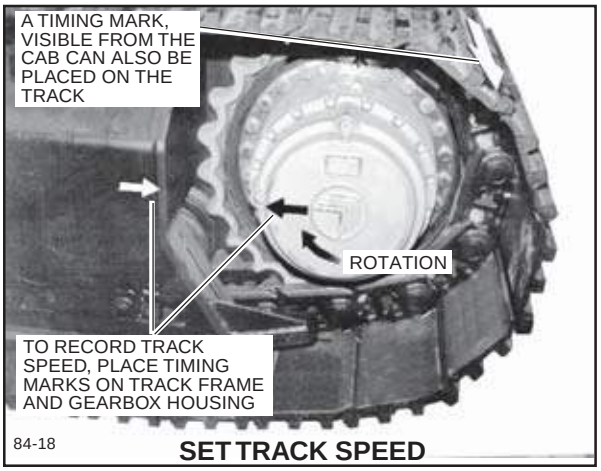
LIFTING TRACK

4. Use blocks to firmly support track frame in raised position. DO NOT place arms, legs or body under track while in the raised position.

**SET LOW SPEED (motor maximum displacement)**

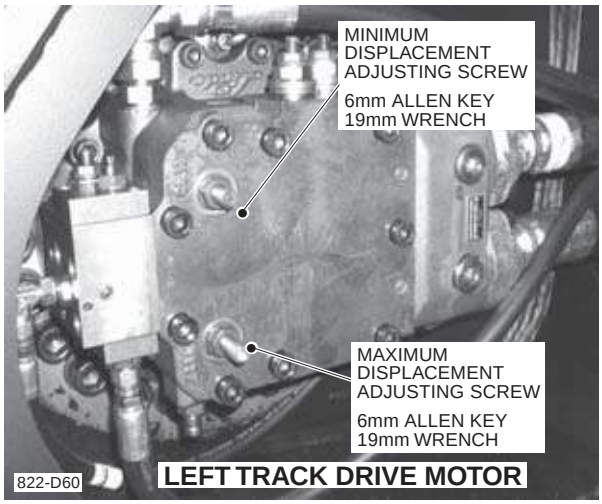
**NOTE:** Turn the maximum displacement adjusting screw either IN (clockwise) to speed up or OUT (counterclockwise) to slow down the final drive.

5. Set TRACK HIGH/LOW switch to LOW.
6. Set throttle to FULL.

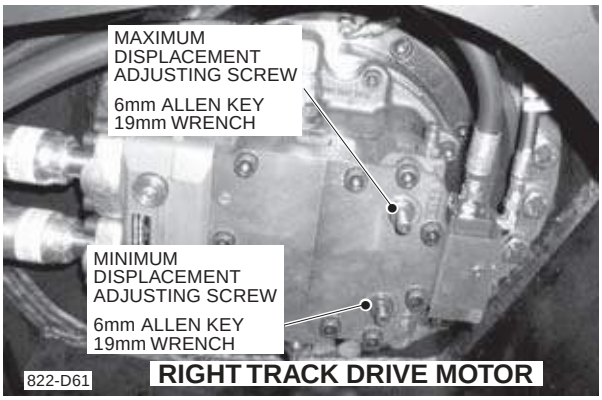


SET TRACK SPEED

7. With an assistant depressing the LEFT TRACK drive pedal FORWARD, record the track drive sprocket speed. A reading of **17 rpm** is desired.
8. Turn the maximum displacement adjustment screw on the left drive motor IN to speed up or OUT to slow down the final drive. Continue adjusting the motor and checking the track drive sprocket speed until **17 rpm** is obtained.



LEFT TRACK DRIVE MOTOR



RIGHT TRACK DRIVE MOTOR

**SET HIGH SPEED**
**(motor minimum displacement)**

9. Turn HIGH/LOW switch to HIGH.
10. Set engine to full throttle.
11. With an assistant depressing the left track drive pedal forward record the track drive sprocket speed. A reading of 28 rpm is desired.
12. Turn the minimum displacement adjustment screw on the left drive motor OUT to speed up or IN to slow down the final drive. Continue adjusting the motor and checking the track drive sprocket speed until 28 rpm is obtained.

**IMPORTANT:** DO NOT exceed 30 rpm since over speeding will damage the drive motor.

### RIGHT TRACK ADJUSTMENT

13. Lower the left track onto the ground, swing the boom around to the right side of the machine and proceed to raise the right track clear of the ground.
14. Use blocks to firmly support track frame in raised position. DO NOT place arms, legs or body under track while in the raised position.
15. Follow steps 5 through 12 from LEFT TRACK ADJUSTMENT.
16. Lower machine down onto the ground, stop the engine and replace the final drive inspection covers.

### SET STRAIGHT TRAVEL

Following completion of TRACK SPEED SET-UP PROCEDURE, try driving machine in both forward and reverse directions with the 'DRIVE/LOW' switch in both 'HIGH' and 'LOW' positions.

If machine does not travel straight, the right and left track speeds are not set the same, therefore the above set-up procedures need to be rechecked.

## SUMMERY OF PRESSURE SETTINGS

### LEFT TRACK ADJUSTMENT

- Park machine on level ground.
- Ensure hydraulic oil is at operating temperature.
- Remove final drive inspection covers.
- Disconnect and plug brake lines.
- Turn TRACK FORWARD and REVERSE port relief valves on "stick" valve **fully in**..
- Connect pressure gauge to "stick" valve.
- Start engine and place throttle control to **full**.
- Set PILOT PRESSURE.
- Place throttle control to **1/4 throttle**.
- Set stick main relief.
- Stop engine, re-connect brake lines.
- Replace inspection covers.

### RIGHT TRACK ADJUSTMENT

Follow LEFT TRACK ADJUSTMENT procedure above but use "hoist" control valve.

## SUMMERY OF TRACK SPEED SET-UP PROCEDURE

- Park machine on level ground.
- Ensure hydraulic oil is at operating temperature.
- Remove final drive inspection covers.
- Raise LEFT track off ground.
- Set LEFT track **low** speed.
- Set LEFT track **high** speed.
- Raise RIGHT track off ground.
- Set RIGHT track **low** speed.
- Set RIGHT track **high** speed.
- Lower machine onto ground.
- Set straight travel.
- Replace inspection covers.

## TRACK COMPONENTS

**IMPORTANT:**

**New machine:** Before driving a new machine ensure that track sag is set correctly. Track sag may be set less than specified for shipping purposes.

The correct track sag must be adjusted once a machine has been delivered to the job sight and operating in the accumulated soil build-up in the undercarriage.

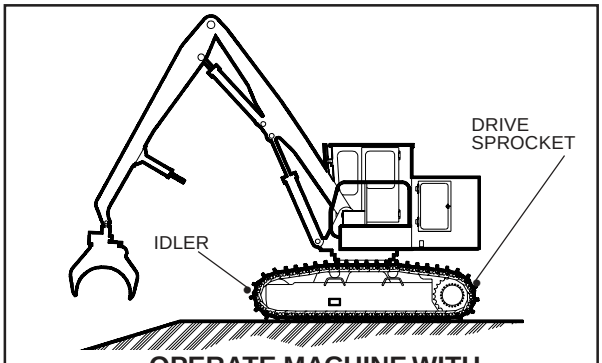
**TRACK SAG NOTE:**

The track sag dimension is very important and should be checked regularly, 50% increase in the life of the track assembly can be realized, particularly bushing O/D wear and track pitch by maintaining the correct amount of track sag. A track that is too tight will wear out significantly faster due to increased tension in the chain.

Track components operate under varying terrain conditions, most of which cause excessive wear. Wear to one component can quickly spread to the rest of the track assembly.

To ensure that the track components are always in good running order, a periodic inspection should be made to ensure that components have not come loose, that bolts are at the correct torque, that components are within the specified wear limits (discussed further in this section) and where applicable, check lubrication points.

For a guide on inspection, refer to the PERIODIC MAINTENANCE SCHEDULE in SECTION 3 OF THIS MANUAL.

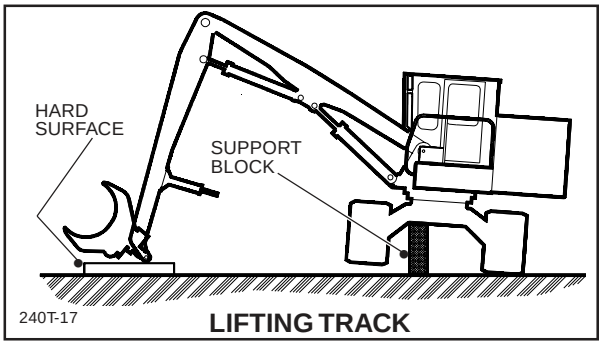



**OPERATE MACHINE WITH GRAPPLE OVER IDLERS**

**OPERATING THE MACHINE**

Whenever possible the machine should always be operated with the felling head over the IDLERS and not over the SPROCKETS.

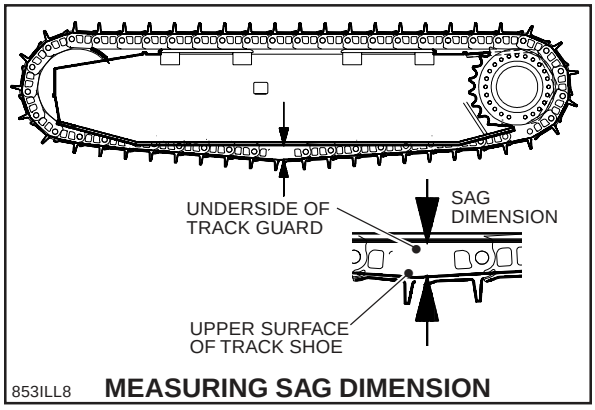
Operating over the sprockets will result in overloading of the contact surfaces between the sprocket and the track bushings. Bushings could crack during sprocket impact.




**LIFTING TRACK**

**MEASURING TRACK SAG**

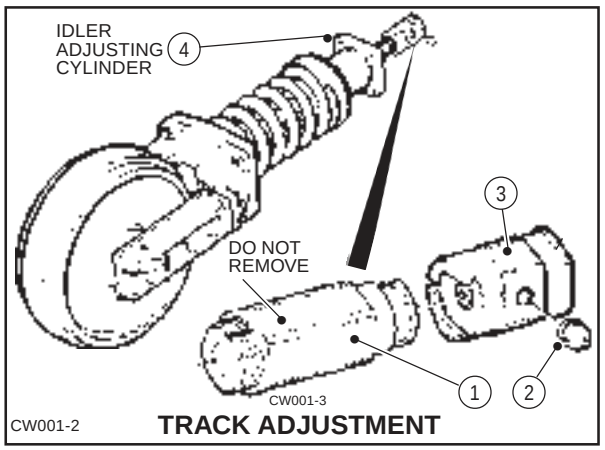
1. Swing boom to side of machine.
2. Place grapple on ground as shown and by forcing down with boom controls, lift track clear of ground.
3. Rotate track in forward and reverse several times. Stop the track while in reverse. Do not clean the track.
4. Stop engine.
5. Measure distance between top surface of track shoe at centre of lower surface of track frame.




**MEASURING SAG DIMENSION**

6. This dimension should be between 6" and 8" for normal operations.

**NOTE:** If track sag is less than specified, track chain wear will be accelerated. If track sag is excessive, it is possible for the track to jump off the sprocket.



CW001-2 **TRACK ADJUSTMENT**

### TRACK SAG ADJUSTMENT

To tighten track, attach adjustment fitting adapter (3) onto valve body (1). Connect a grease gun to the grease fitting (2) on the adjustment fitting adapter (3). Add grease until track sag dimension is within recommended limits. Remove adjustment fitting adapter.

**CAUTION: The grease is under very high pressure, DO NOT REMOVE the adjustment fitting valve body (1) from the idler adjusting cylinder (4).**

To loosen track, slowly loosen valve body (1) until grease begins to escape via a relief passage in the valve body housing, grease will be seen escaping from around valve body threads. When track sag is correct, tighten valve body.

## TORQUING UNDERCARRIAGE BOLTS

It is important to check the torque values of the track shoe retaining bolts and the bottom roller retaining bolts at the NEW MACHINE MAINTENANCE time period (first 100 hours) and the EVERY 125 HOURS SCHEDULED MAINTENANCE time period.

When installing new components, all traces of paint and dirt must be removed from all mating surfaces including the contact area under the bolt head and nut.

Both the bolt and the nut on the track shoes should be lightly lubricated with SAE 30 oil and tightened using the **Torque-turn** method.

**The torque-turn** method involves torquing the bolt to an *initial predetermined value*, plus an additional 1/3 turn (not the value shown in the torque charts). This ensures a more accurate and consistent torquing of the bolts, with less likelihood of the bolt/nut coming loose later.

When checking the torque values at the first 100 hours and every 125 hours thereafter use the CHECKING TORQUE values listed in the following paragraphs.

If loose shoes or under torqued bolts are discovered during the FIRST 100 HOUR check, they should be removed, surfaces cleaned, and reused using the **torque-turn** method. If the shoe is not loose but a single bolt is low on torque, loosen the bolt and re torque-turn.

If loose or under torqued bolts are discovered any time after the 100 HOUR check, the bolts and nuts must be replaced with **NEW** ones, surfaces cleaned, and re **torque-turned**.

### TRACK SHOE RETAINING BOLTS

Track shoes must be fastened together applying the exact torque values shown below and using the **Torque-turn** method described in TORQUING UNDER CARRIAGE BOLTS earlier in this section.

**TRACK COMPONENT TORQUE VALUES**

Track shoe bolts and nuts are designed specifically for this purpose and should not be substituted with standard off the shelf hardware.

Only bolts with grade '12.9' or '170' designation forged in the head are approved.

When checking the torque values at the first 100 hours and every 125 hours thereafter use the checking torque value.

Track shoe bolts ~ 3/4" UNC

TORQUE-TURN ..... 220LBF/FT. + 1/3 TURN.

CHECKING TORQUE ..... 450 LBF/FT.

### ROLLER RETAINING BOLTS

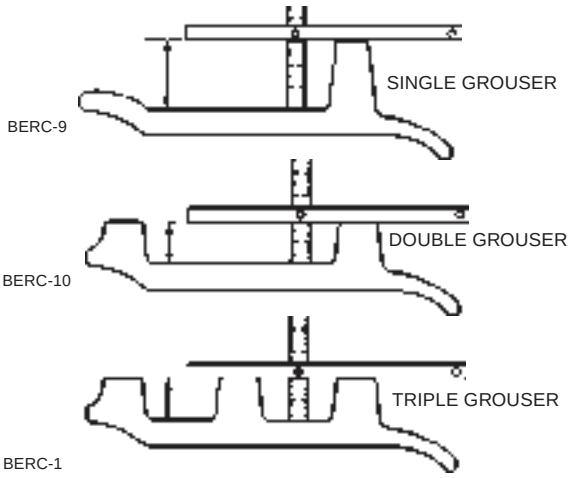
The rollers must be fastened to the lower frame applying the exact torque values shown below.

When installing new rollers, apply "NEVER-SEEZ" to the bolt.

When checking the torque values at the first 100 hours and every 125 hours thereafter use the torque value(s) shown below.

Roller bolts ~ 7/8" UNC
TORQUE ..... 450 LBF/FT.

For a complete maintenance check Refer to the PREVENTIVE MAINTENANCE SCHEDULE in SECTION 3 of this manual.




**GROUSER WEAR (HEIGHT)**

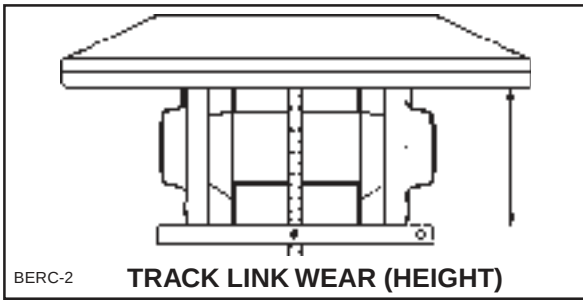
## WEAR LIMITS

### TRACK SHOE GROUSER HEIGHT WEAR

WEAR LIMITS

| | New | 75% wear | 100% wear |
|---|---|---|---|
| Single | 2.82" (716.2mm) | 1.37" (348mm) | 0.93" (236.2mm) |
| Double | 1.37" (348mm) | 0.71" (180.3mm) | 0.43" (109.2mm) |
| Triple | 1.06" (269.2mm) | 0.51" (129.5mm) | 0.36" (91.4mm) |

**NOTE:** Allowable wear for soft ground conditions is 100%. Allowable wear for rocky ground conditions is 75%.



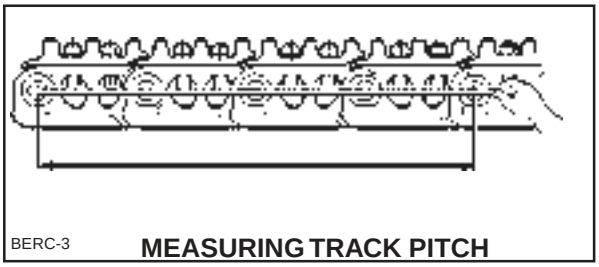

**TRACK LINK WEAR (HEIGHT)**

### TRACK LINK WEAR

WEAR LIMITS
New link height ..... 4.78" (121.5mm)
50% wear ..... 4.60" (116.8mm)
75% wear ..... 4.48" (113.8mm)
100% wear ..... 4.34" (110.2mm)

### PIN AND BUSHING WEAR

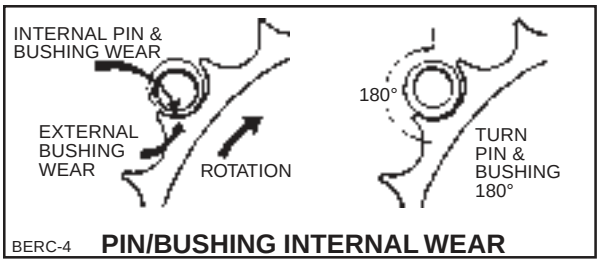
To obtain the track internal wear, i.e., the wear between the pin and the internal diameter of the bushing, measure the track pitch over four sections of track (5 pins).



BERC-3 **MEASURING TRACK PITCH**

To take this measurement,

1. Remove slack by placing a steel pin between sprocket and chain, then slowly move machine in reverse to tighten chain.
2. Measure pitch across two four link sections, except section on each side of the master pin, to find average chain wear.




BERC-4 **PIN/BUSHING INTERNAL WEAR**

**NOTE:** Wear to the pins and bushings only occurs in a small localised area, to extend the life of these components, the pins and bushings may be turned 180° or replaced provided other components are within specified wear limits:

1. Track link wear is 75% or less.
2. Change in track pitch is 32.50:" (825.5mm) per link or less.
3. Bushing external wear less than 100% or 75% or less in rocky ground.
4. There is at least 0.008" (0.2mm) press fit available between pin and bushing and link.

WEAR LIMITS

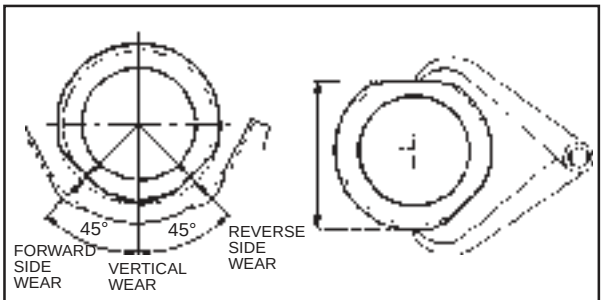
| | |
|---|---|
| New length of four sections | 32" (813.0mm) |
| 75% worn | 32.37"(822.2mm) |
| 100% worn | 32.50"(825.5mm) |

**NOTE:** Allowable wear in rocky ground is 75%

**NOTE:** These wear limits are to be used as a guide for when to turn the pins and bushings. If pins and bushings are not to be turned, the chain can be run past the 100% wear limit, until chain failure.

### BUSHING WEAR, OUTSIDE DIAMETER

Use a calliper to measure the wear of the bushing O.D. in three places.




**MEASURING BUSHING WEAR** BERC-5

**NOTE:** Bushing outside diameter is measured at three places because of the forward and reverse travel of the machine and a vertical wear that takes place.

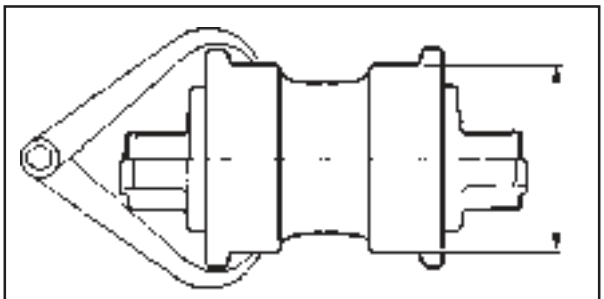
WEAR LIMITS

| | |
|---|---|
| New bushing O.D. | 2.62" (66.6mm) |
| 75% worn | 2.5" (63.5mm) |
| 100% worn | 2.43" (61.7mm) |

**NOTE:** Allowable wear in rocky ground is 75%

### ROLLER WEAR

Measure the roller diameter on the tread contact surface with a large calliper to obtain the worst wear condition.



BERC-6 **MEASURING ROLLER WEAR**

If accessibility to the rollers is impaired by guards, then concentrate on the front and rear rollers, these will be the most worn.

WEAR LIMITS, LARGER ROLLERS

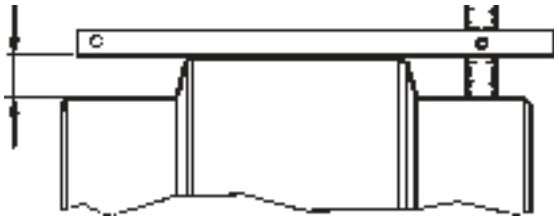
| | |
|---|---|
| New roller. | 8.26" (210.0mm) |
| 75% worn | 7.64" (194.0mm) |
| 100% worn | 7.36" (187.0mm) |

WEAR LIMITS, SMALLER & UPPER ROLLERS

| | |
|---|---|
| New roller. | 6.61" (168.0mm) |
| 75% worn | 6.10" (155.0mm) |
| 100% worn | 5.91" (150.0mm) |

### IDLER WEAR

Measure the idler wheel side diameters (tread contact surface) at several points to obtain the worst wear condition. Position a depth gauge or measuring tape as close as possible toward the centre of the idler with the gauge flat on the centre flange and parallel to the idler shaft.



BERC-7 **MEASURING IDLER WEAR**

WEAR LIMITS
New idler dimension ..... 0.85" (22.0mm)
100% wear ..... 1.18" (30.0mm)

# Tigercat T240B Track Loader

# SECTION 12 - BOOM

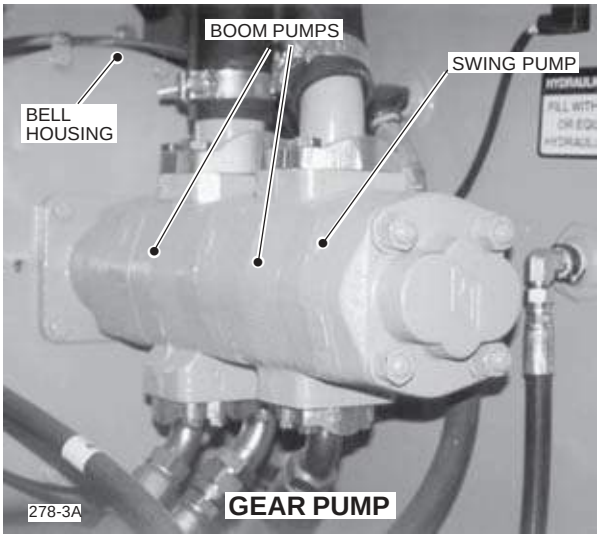
AUGUST, 2006

## CONTENTS - SECTION 12

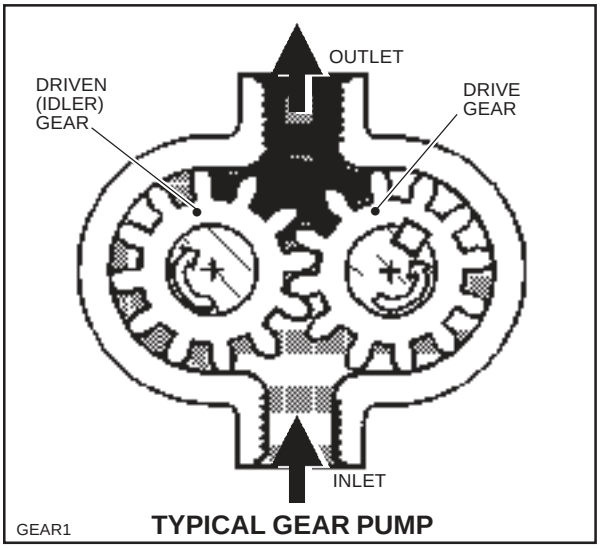
## BOOM SYSTEM COMPONENTS

### BOOM PUMP

The pump is bolted onto the bell housing and driven directly off the engine. To ensure optimum performance of the hydraulic system when operating the machine, the engine must always be set at FULL throttle.




A gear pump consisting of three gear housing sections, all connected together internally supply hydraulic oil to all of the functions on the machine except the pilot system. The first two gear housings at the shaft end supply oil for the boom functions and the end gear housing supplies oil for the swing circuit.




The operation of a typical external gear pump (so called because the gear teeth are on the external surface of the hub) is shown in Figure *gear1*.

A gear pump carries oil from the inlet to the outlet in the spaces between gear teeth. The pumping chamber is formed by the gears, the pump housing, and side plates. One of the two gears, called the drive gear, will be connected to the drive shaft. The other idler gear is driven by the drive gear.

### JOYSTICK CONTROL VALVE

The hoist boom and stick boom functions are controlled by the left and right joysticks which when operated send proportional pilot signals to the two boom control valves which supply oil to the two boom cylinders.

For a detailed description of the joystick control valve refer to SECTION 5 in THIS MANUAL.

### BOOM CONTROL VALVES

The hoist boom and stick boom are each controlled by two spool sections located in two separate identical control valves. Each control valve consists of three pilot operated, open center *spool sections*, an *inlet section* and an *outlet section*. The *outlet section* directs return oil back to tank. The control valves are located in the upper frame below the floor plates inside the valve compartment.

### CONTROL VALVE OPERATING DESCRIPTION

Oil enters the *inlet* section and is allowed to pass through the three *spool* sections and back to tank via the *outlet* section. Each of these spool sections has a self centering 3-position spool which is open centered. A spring in the spool end cap holds the spool in the center neutral position. The spool is shifted by pilot pressure being applied to either end of the spool. Shifting the spool directs oil to operate any one of the three functions (or all at the same time if required but with reduced flow to each).

To protect components and hoses when the valve is closed, each work port in the valve sections have a **port relief valve** with an anti-cavitation function.

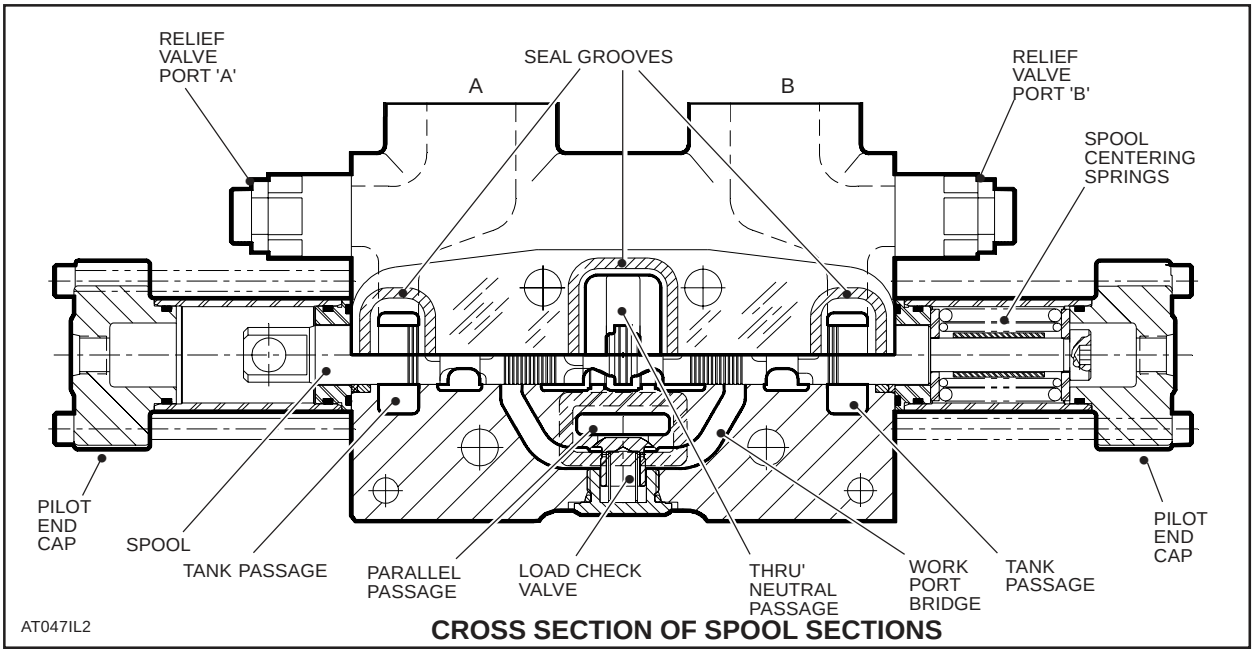
A **main relief valve** is installed in the *inlet section* of the valve to protect the hydraulic system against overload pressures.

### HYDRAULIC RETURN FILTERS

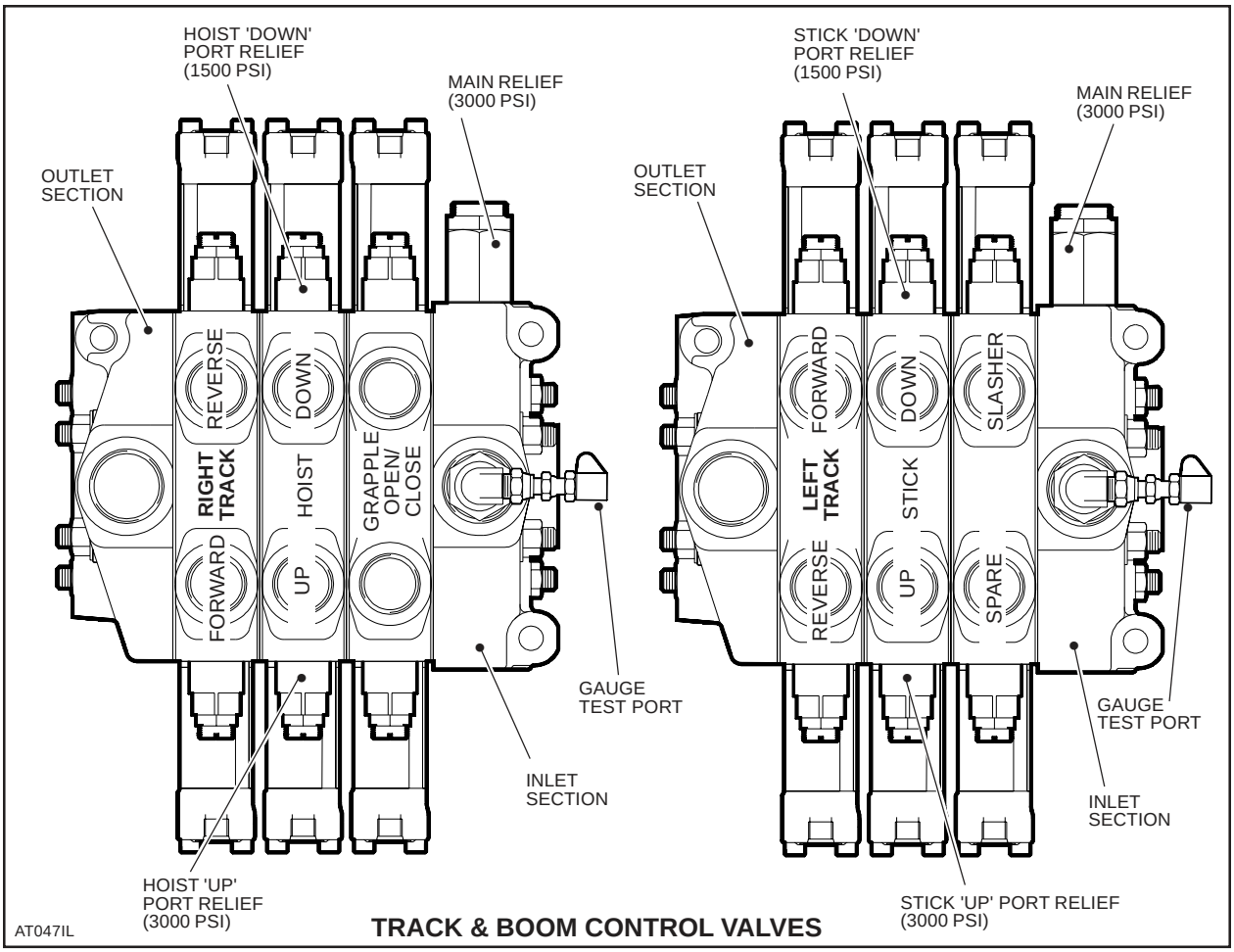
The majority of return oil entering the hydraulic tank passes through 4 spin-on hydraulic oil filters. One of the filters is a water absorbing filter (color blue) which is in place to assist with the removal of unwanted moisture from the hydraulic oil (the filters are rated 10m abs).


**HYDRAULIC RETURN FILTERS**

Each filter head has a bypass valve with a 25 psi cracking pressure so that oil can bypass the filters if they become restricted. The "in" side of the filter heads are connected to a return manifold. A filter restriction indicator and an oil sampling connector are mounted onto the manifold. To check the condition of the filter elements; With the hydraulic oil at **normal operating temperature**, place engine throttle control to FULL and with **no** machine functions operating, the filter restriction indicator should be in the GREEN zone. If the pointer is in the RED zone replace all four filter elements.




**CROSS SECTION OF SPOOL SECTIONS**

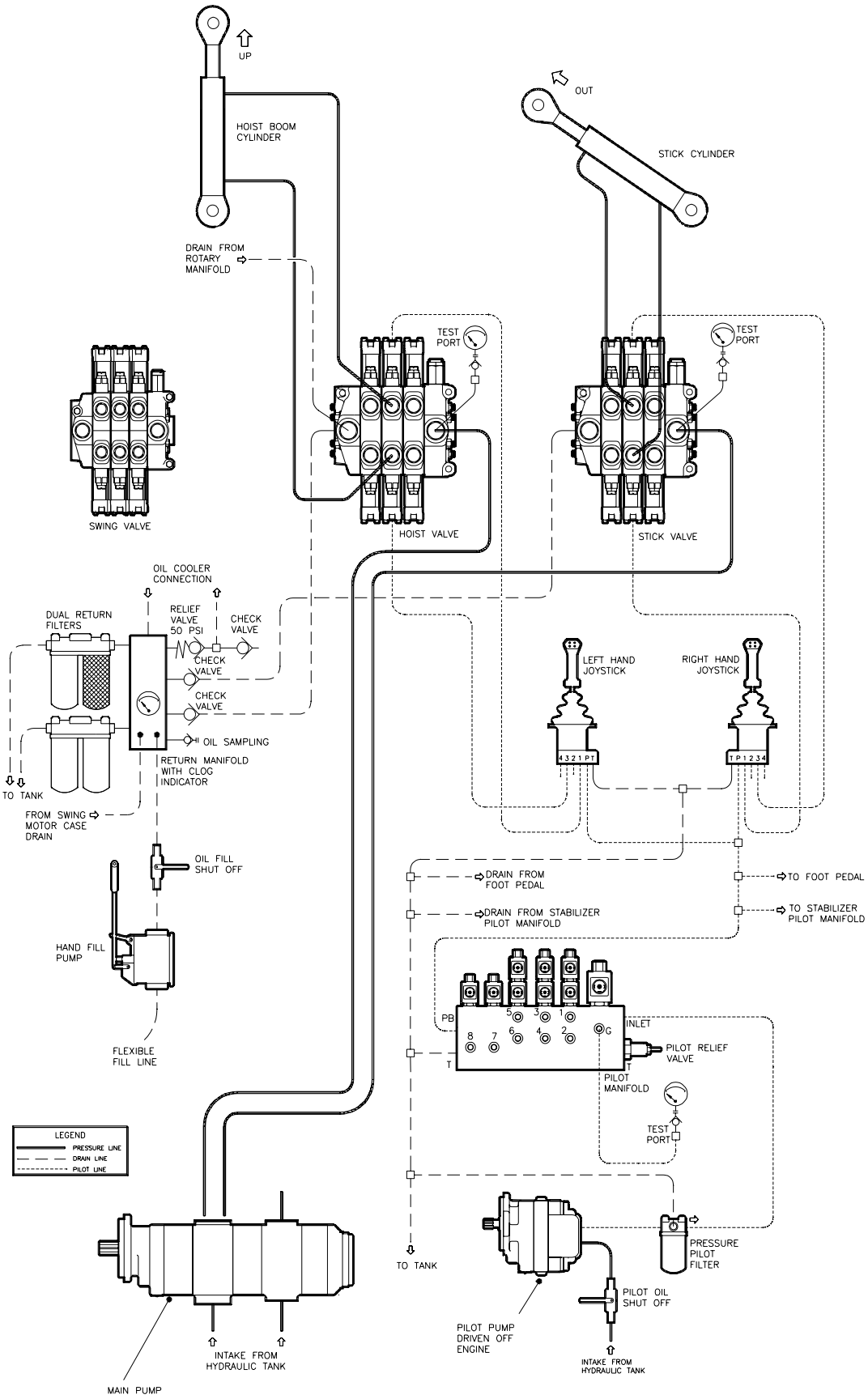



**TRACK & BOOM CONTROL VALVES**

## BOOM CIRCUIT DESCRIPTION

The boom circuit is supplied with oil from two of the three gear housing sections on the main pump. Each of the two boom valves receive oil at the *inlet sections* and directs the oil through the three open center spool sections, to the *outlet* section. From there it is directed back to tank via a check valve to the return manifold and two dual element filters, which are equipped with an internal 25 psi element bypass valve.

Moving either of the joysticks in the cab will direct pilot oil to the ends of the *hoist* or *stick* spool sections in the boom valves to shift the spools and direct hydraulic oil from the pump to the *hoist* or *stick* hydraulic cylinders to raise or lower to booms. Return oil from the cylinders is directed back through the spool sections, to the *outlet* section, through the return manifold, the two dual head return oil filters and back to tank.




240T2-012

**BOOM CIRCUIT**

**CAUTION**

**Use caution when in the cab as a slight touch of the controls can cause sudden rotation of the upper frame and booms or movement of the tracks**

**CAUTION**

**Be aware of other personnel in the area. Operator is responsible for the safe operation of the machine.**

**WARNING**

**Ensure that no one is standing near the grapple during this procedure.**

**IMPORTANT**

**Avoid blowing oil over relief for longer than five seconds, as this will cause excessive heating of the hydraulic fluid.**

## PRESSURE SETTINGS

**HOIST VALVE RELIEF VALVE SETTINGS**

**Hoist main relief setting** ..... 3000 psi

**Hoist up port relief setting** ..... 3500 psi

**Hoist down port relief setting** ..... 1500 psi

1. Position machine on flat level ground.
2. Ensure that the hydraulic oil is at **operating temperature.**
3. Connect a 0 - 5000 p.s.i. pressure gauge to the "hoist" control valve test port on the inlet section of the valve.
4. Loosen the locknut on the "hoist" *main relief* valve and turn the relief adjusting screw all the way **in,** tighten locknut.
5. Turn both *port relief* valve adjusting screws on the "hoist" *spool section* of the valve **out** until spring pressure is relieved then turn adjusting screws **one full turn in**.
6. Start the engine, and put the throttle control to the **FULL** position.
7. While holding the L.H. joystick in the HOIST UP position (fully extended), check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
8. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
9. While holding the L.H. joystick in the HOIST DOWN position (fully retracted), check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
10. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
11. Repeat steps 7 and 9 to verify settings.

    **reset main relief valve:**

12. Loosen locknut on "hoist" *main relief* and unscrew adjusting screw **3 full turns**.
13. While holding the L.H. joystick in the HOIST UP position (fully extended), check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
14. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
15. Stop engine. Remove pressure gauge and wipe up any excess oil from test port area.

**IMPORTANT**

**Approach the gauge reading slowly and deliberately by turning the adjusting screw in a little at a time. The pressure setting must not exceed the above value.**

**SUMMARY:**

1. Ensure hydraulic oil is at operating temperature.
2. Connect gauge to "hoist" valve.
3. Turn main relief fully "in".
4. Turn both "hoist" port reliefs **out**.
5. Start engine.
6. Set HOIST UP port relief.
7. Set HOIST DOWN port relief.
8. Reset main relief.

**CAUTION**

**Use caution when in the cab as a slight touch of the controls can cause sudden rotation of the upper frame and booms or movement of the tracks**

**CAUTION**

**Be aware of other personnel in the area. Operator is responsible for the safe operation of the machine.**

**WARNING**

**Ensure that no one is standing near the grapple during this procedure.**

**IMPORTANT**

**Avoid blowing oil over relief for longer than five seconds, as this will cause excessive heating of the hydraulic fluid.**

**STICK VALVE RELIEF VALVE SETTINGS**

**Stick main relief setting** ..... 3000 psi

**Stick out port relief setting** ..... 3500 psi

**Stick in port relief setting** ..... 1500 psi

1. Position machine on flat level ground.
2. Ensure that the hydraulic oil is at **operating temperature.**
3. Connect a 0 - 5000 p.s.i. pressure gauge to the "stick" control valve test port on the inlet section of the valve.
4. Loosen the locknut on the "stick" *main relief* valve and turn the relief adjusting screw all the way **in,** tighten locknut.
5. Turn both *port relief* valve adjusting screws on the "stick" *spool section* of the valve **out** until spring pressure is relieved then turn adjusting screws **one full turn in**.
6. Start the engine, and put the throttle control to the **FULL** position.

**IMPORTANT**

**Approach the gauge reading slowly and deliberately by turning the adjusting screw in a little at a time. The pressure setting must not exceed the above value.**

7. While holding the R.H. joystick in the STICK OUT position (fully extended), check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
8. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
9. While holding the R.H. joystick in the STICK IN position (fully retracted), check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
10. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
11. Repeat steps 7 and 9 to verify setting.

**reset main relief valve:**

12. Loosen locknut on "stick" main relief and unscrew adjusting screw **3 full turns**.
13. While holding the R.H. joystick in the stick OUT position (fully extended), check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
14. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
15. Stop engine. Remove pressure gauge and wipe up any excess oil from test port area.

**SUMMARY:**

1. Ensure hydraulic oil is at operating temperature.
2. Connect gauge to "stick" valve.
3. Turn main relief fully "in".
4. Turn both "stick" port reliefs **out**.
5. Start engine.
6. Set STICK UP port relief.
7. Set STICK DOWN port relief.
8. Reset main relief.

# Tigercat T240B Track Loader

# SECTION 15 - SWING

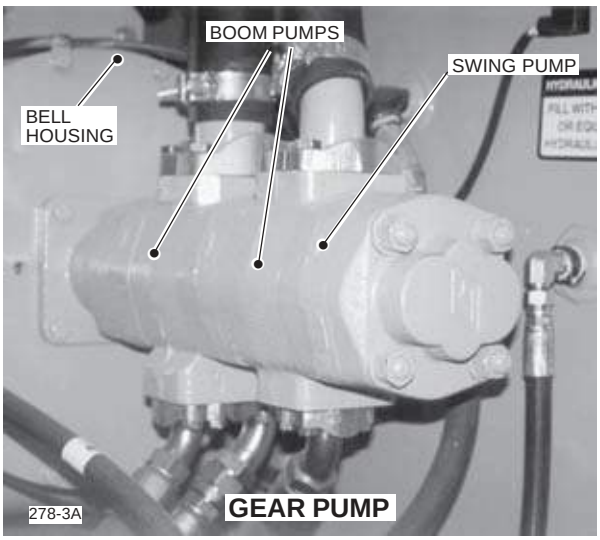
AUGUST, 2006

## CONTENTS - SECTION 15

## SWING DRIVE COMPONENTS

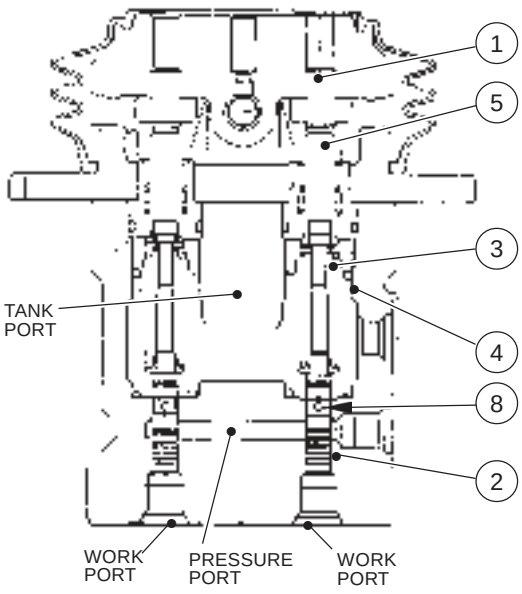
### SWING PUMP

The swing pump is a fixed displacement external triple gear pump.




The swing drive system utilizes the third gear housing from the shaft end of the pump to supply hydraulic oil to the swing valve.

For a more detailed description of the triple gear pump, refer to SECTION 12 in THIS SERVICE MANUAL.




**FOOT PEDAL PILOT VALVE (KAWASAKI)**

### FOOT PEDAL CONTROL VALVE

The swing function is controlled by the center foot pedal valve which sends proportional pilot signals to the swing valve which supplies oil to the swing motor.

In the neutral position the foot pedal is held centered by return springs (4). When the lever (1) is operated, the plunger (5) is pushed against its return spring (4). At the same time the regulating spool (2) is moved down against the regulating spring (3). When the regulating stroke begins, there is a connection made between the *pressure port*, via holes (8) in the spool and *work ports* in the base of the valve.

Pilot pressure is directly proportional to the operator position of the foot pedal and the regulating spring characteristics.

### SWING CONTROL VALVE

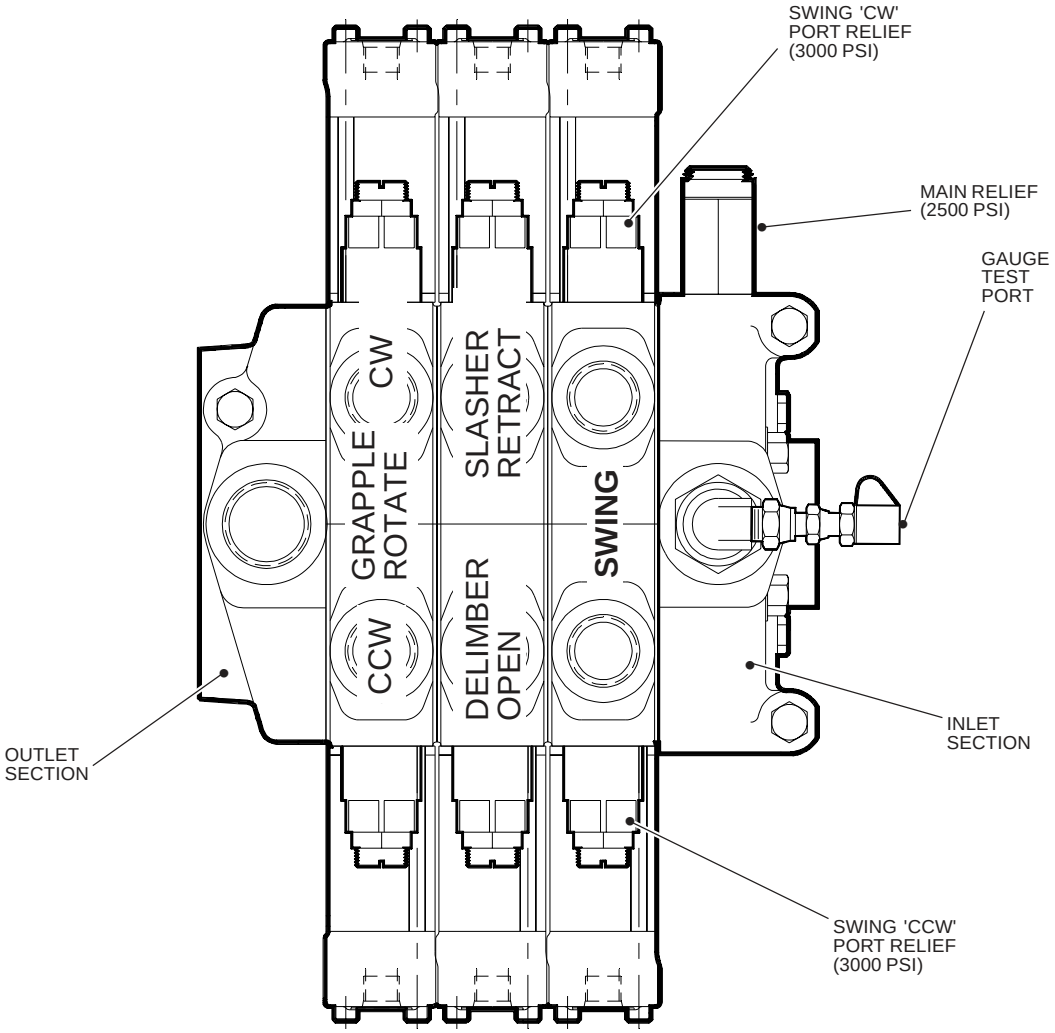
The swing drive is controlled by one of three spool sections in a three section control valve. The control valve consists of three pilot operated, open center *spool sections*, an *inlet section* and an *outlet section*. The *outlet section* directs return oil back to tank. The control valve is located in the upper frame below the floor plates inside the valve compartment.

### CONTROL VALVE OPERATING DESCRIPTION

Oil enters the *inlet* section and is allowed to pass through the three *spool* sections and back to tank via the *outlet* section. Each of these spool sections has a self centering 3-position spool which is open centered. A spring in the spool end cap holds the spool in the center neutral position. The spool is shifted by pilot pressure being applied to either end of the spool. Shifting the spool directs oil to operate any one of the three functions (or all at the same time if required but with reduced flow to each).

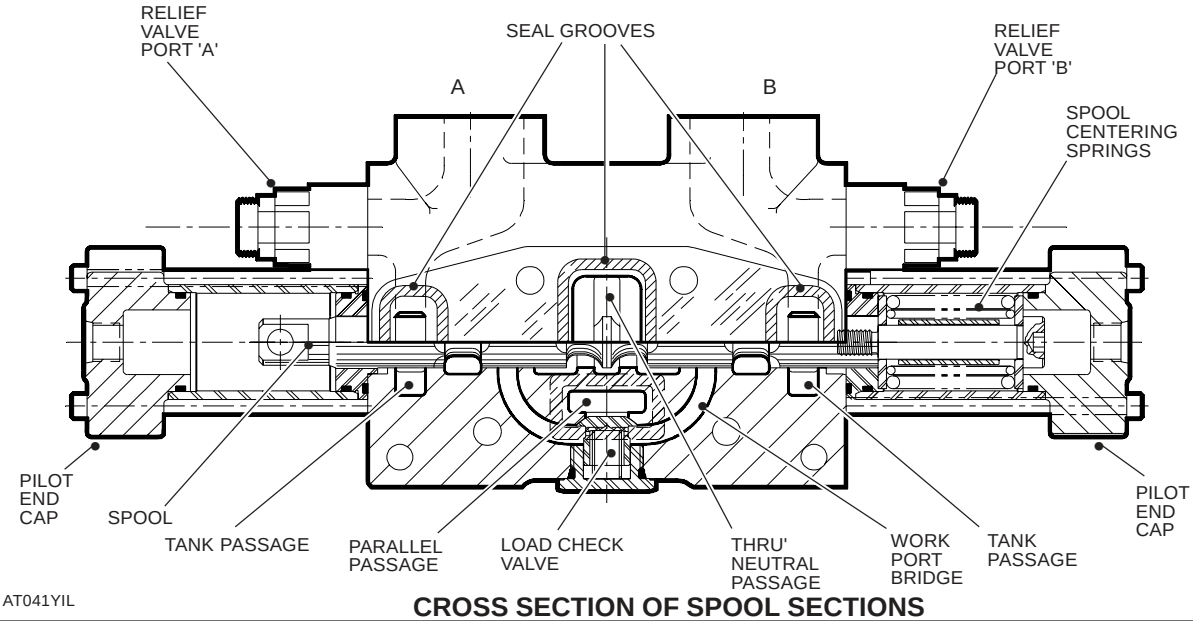
To protect components and hoses when the valve is closed, each work port in the valve sections have a **port relief valve** with an anti-cavitation function.

A **main relief valve** is installed in the *inlet section* of the valve to protect the hydraulic system against overload pressures.




AT041ZIL

**SWING CONTROL VALVE**

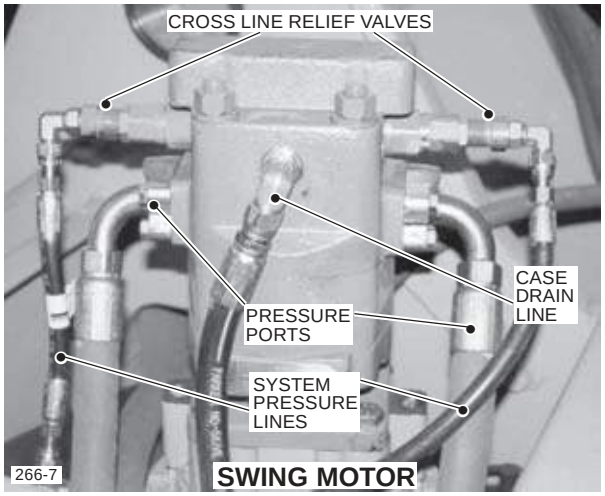



AT041YIL

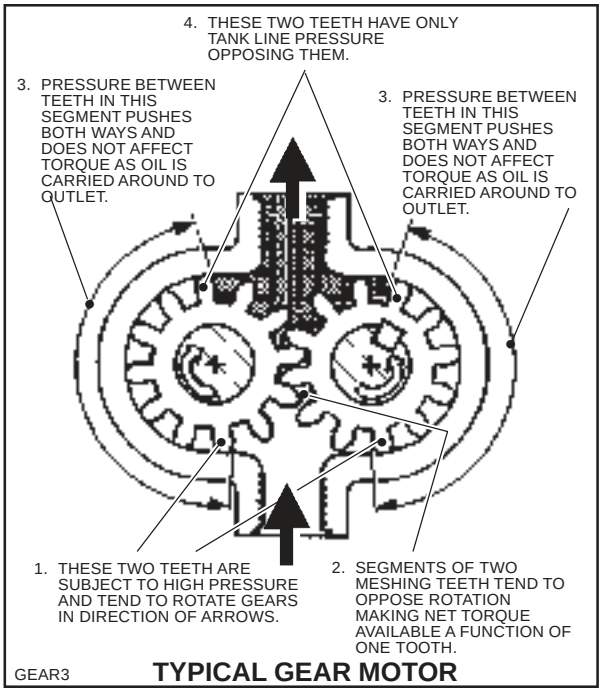
**CROSS SECTION OF SPOOL SECTIONS**

## SWING MOTOR

The swing motor is a gear motor with two, 2-stage crossline relief valves mounted on the port end cover. The crossline relief valves provide a

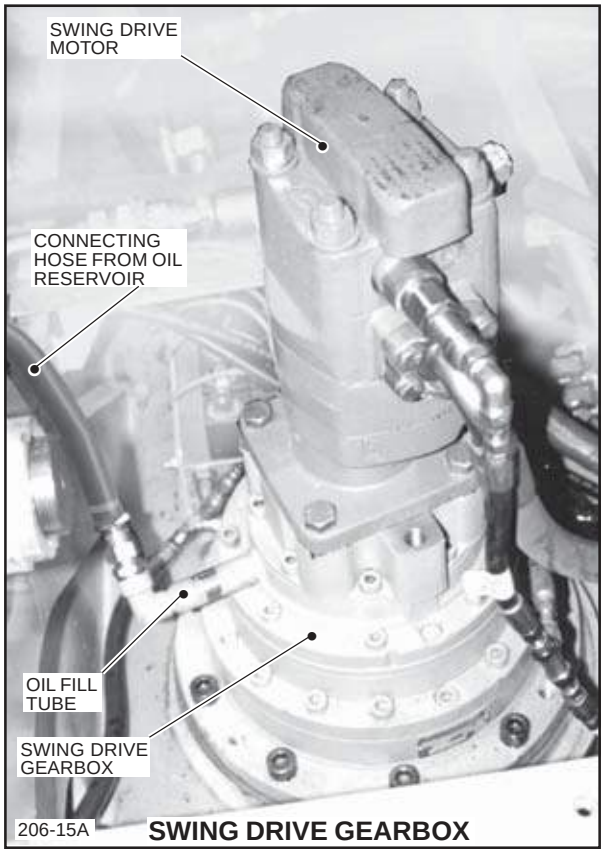



cushion to the high forces that occur during start and stop of the boom swing. The 2-stage relief involves increasing the relief setting by 1000 psi during swing acceleration. When coasting to a stop, the relief valve opens at a lower pressure resulting in a soft stop.




A cross sectional view of an external gear hydraulic motor is shown in Figure *Gear3* This design is referred to as “external gear” design because the gear teeth are machined on the outside of the gears. One of the gears is connected to an output shaft which in turn is connected to the swing drive gearbox input coupling, and the other is an idler gear. Not shown in the illustration are the side plates, which create a sealing wear surface on the sides of the gear set.

Gear motors operate because of a pressure differential, between the motor inlet and outlet. This pressure differential acts across the gear teeth, creating a force that tries to rotate the gear. As the diagram shows, there are two paths around the periphery of the gears, and one path through the intersection of the two gears. In each path, the pressure works against the area of one tooth so that there are two tooth forces working in one direction, and one tooth force working in the opposite direction. The net result is the force of one tooth working around the periphery to rotate the output shaft.




**MOTOR REMOVAL NOTE:**
Before removing the drive motor, drain the oil from the reservoir bottle by disconnecting the hose at the oil fill tube. Replace the oil fill tube.

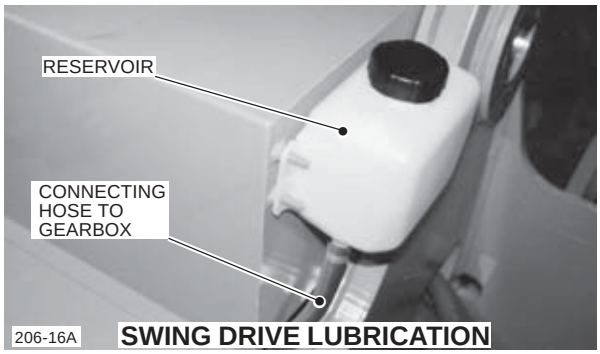
**IMPORTANT:** Do not allow dirt to enter the gearbox during and after the motor has been removed.

After the motor has been replaced, partly fill the reservoir with correct oil. Bleed swing gearbox by loosening air bleed plug. Add oil to reservoir until half full.

## SWING DRIVE GEARBOX

Power is transmitted from the motor to a double reduction planetary gearbox. The swing gearbox upper gearing is lubricated by oil stored in a reservoir attached to the side of the gearbox cover. The reservoir must remain half full of oil* at all times. The lower bearing area is lubricated by grease where the cavity is filled with grease at assembly, a grease fitting is not provided since additional greasing is not necessary.

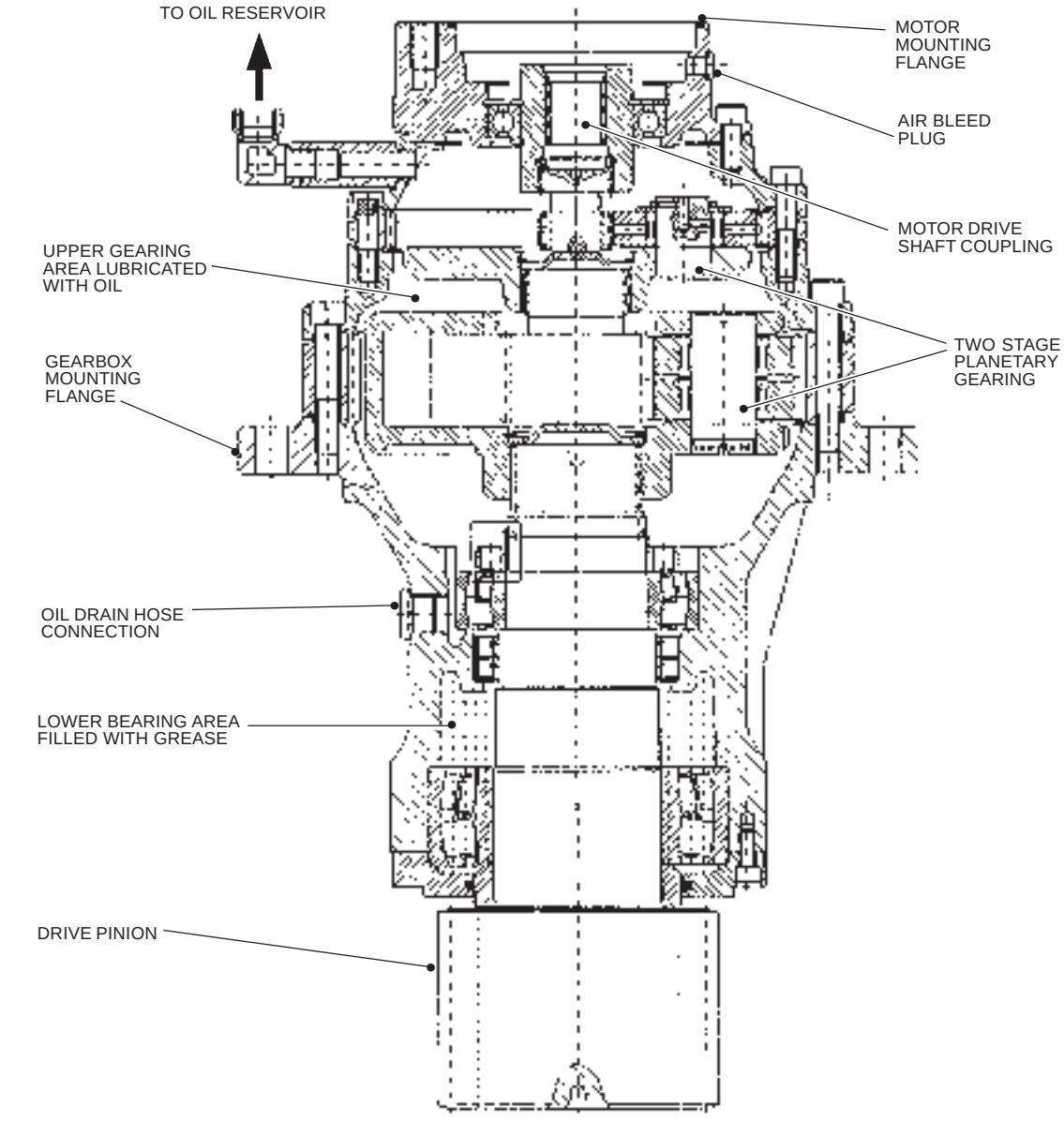
**To fill** the gearbox with oil, unscrew the air bleed plug located on the motor flange, remove the cap on the reservoir and add oil to the reservoir. When oil begins to come out of the air bleed hole replace the plug and continue to add oil until the reservoir is half full. Replace the cap on the reservoir.




**SWING DRIVE LUBRICATION**

To drain the gearbox unscrew the drain plug and allow oil to drain into a suitable container. To facilitate draining, the oil should be warm.

*For correct oil specification and maintenance schedule, refer to SECTION 3 in THIS MANUAL.

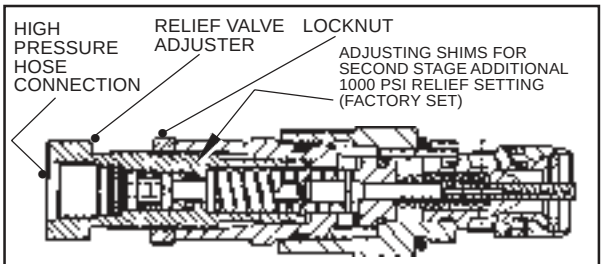



**SWING DRIVE GEARBOX**

## SWING CIRCUIT DESCRIPTION

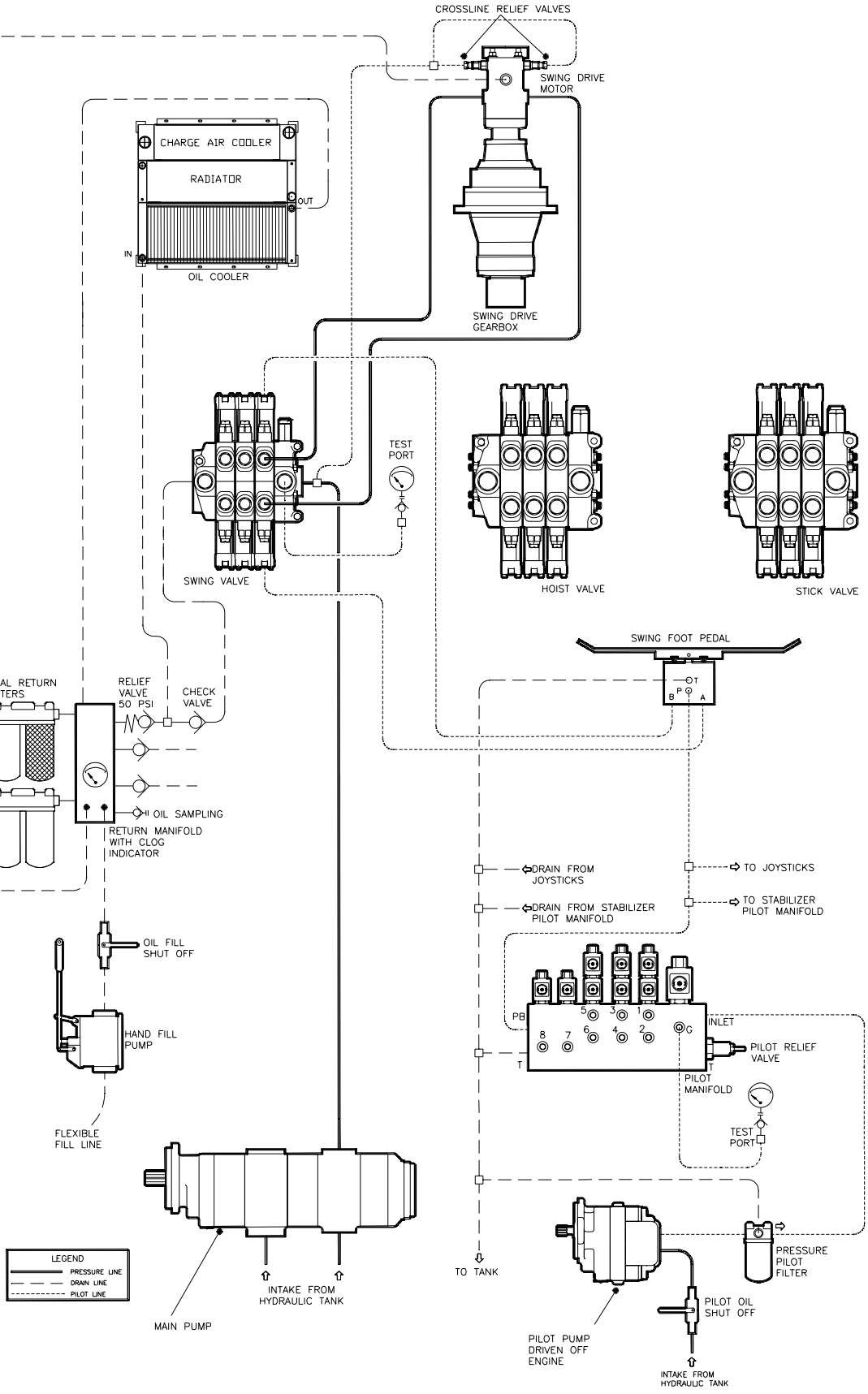
The swing circuit is supplied with hydraulic oil by a fixed displacement gear pump. The swing valve receives oil at the inlet section and directs it through the three open center spool sections, to the outlet section. From there it is directed back to tank via the oil cooler, a check valve to the return manifold and two dual element filters. A 50 psi. relief valve is installed in the oil cooler line to bypass the oil around the oil cooler, usually on cold start ups when the oil is cold and thicker.

Pressing the foot pedal in the cab directs pilot oil to either end of the swing spool section on the swing valve to shift the spool and direct hydraulic oil to the swing motor causing it to rotate either clockwise or counterclockwise.




AQ014-2 **MOTOR CROSSLINE RELIEF VALVE**

Crossline relief valves on the motor provide a cushion to the high forces that occur during start and stop of the boom swing. The crossline relief valves used on this motor are 2-stage which means that when the foot pedal is pressed and the control valve spool shifts to swing the upper frame, inertia caused by the mass of the upper frame creates a pressure increase at the inlet section of the control valve. This pressure increase is transmitted through a hose line connected to the ends of the crossline relief valves. A piston in the end of each relief valve moves to activate the **high** pressure relief setting to provide a faster swing acceleration time. During deceleration the relief valve opens at the **low** pressure setting resulting in a softer stop. Internal leakage in the swing motor is returned to tank via the case drain port on the motor, through the dual element return filter.




**SWING DRIVE CIRCUIT - LATER MACHINES**

240B-018

## PRESSURE SETTINGS

**CAUTION**

**Use caution when in the cab as a slight touch of the controls can cause sudden rotation of the upper frame and booms or movement of the stabilizers**

**CAUTION**

**Be aware of other personnel in the area. Operator is responsible for the safe operation of the machine.**

**WARNING**

**Ensure that no one is standing near the grapple during this procedure.**

**IMPORTANT**

**Avoid blowing oil over relief for longer than five seconds, as this will cause excessive heating of the hydraulic fluid.**

**SET SWING RELIEF VALVES**

**Swing main relief valve setting** ..... 2500 psi

**Swing left port relief setting** ..... 3000 psi

**Swing right down port relief setting** ... 3000 psi

**Motor crossline relief valves (low setting)**

Left ..... 2000 psi
Right ..... 2000 psi

1. Position machine on flat level ground.
2. Ensure that the hydraulic oil is at **operating temperature.**
3. Loosen locknut on the *swing main relief* valve and turn main relief adjusting screw all the way **in**, tighten locknut.
4. Turn both *port relief* valve adjusting screws on the *swing spool section* of the valve **out** until spring pressure is relieved then turn adjusting screws **one full turn in**.
5. Loosen locknut on *motor crossline relief* valves and turn relief valve adjusters all the way **in**, tighten locknut.
6. Install a 0-5000 psi pressure gauge on the test port at the inlet section of the swing valve.
7. Start engine and place throttle control in **FULL**.
8. Lower boom assembly to the ground and restrict boom swing movement in both directions.
9. With the aid of an assistant, Press and hold the swing foot pedal in the SWING LEFT position, check gauge pressure reading. If less than set value, turn *swing left relief valve* adjusting screw **in** until set value is obtained on gauge.

**IMPORTANT**

**Approach the gauge reading slowly and deliberately by turning the adjusting screw in a little at a time. The pressure setting must not exceed the above value.**

10. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
11. Press and hold the swing foot pedal in the SWING RIGHT position, check gauge pressure reading. If less than set value, turn *swing right relief valve* adjusting screw **in** until set value is obtained on gauge.
12. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
13. Repeat steps 9 and 11 to verify settings.

**reset main relief valve:**

14. Loosen locknut on *swing main relief* and unscrew adjusting screw **3 full turns**.
15. While holding the foot pedal in the SWING LEFT position, check gauge pressure reading. If less than set value, turn *swing main relief valve* adjusting screw **in** until set value is obtained on gauge.
16. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.

**SET SWING MOTOR CROSSLINE RELIEF VALVES**

17. Set engine throttle control to **IDLE.**
18. Disconnect each hose from the ends of the crossline relief valves and install steel plugs in hose ends. Install caps on crossline relief valves.
19. While holding the foot pedal in the SWING LEFT position, check gauge pressure reading. If less than set value, turn *swing left crossline relief valve* adjuster **in** until set value is obtained on gauge.
20. Tighten locknut on adjuster taking care not to turn the adjuster.
21. While holding the foot pedal in the SWING RIGHT position, check gauge pressure reading. If less than set value, turn *swing right crossline relief valve* adjuster **in** until set value is obtained on gauge.
22. Tighten locknut on adjuster taking care not to turn the adjuster.
23. Repeat steps 18 and 21 to verify settings.
24. Stop engine. Remove pressure gauge and wipe up any excess oil from test port area.
25. Reconnect two hoses to ends of crossline relief valves.

---

## SUMMARY:

1. Ensure hydraulic oil is at operating temperature.
2. Turn main relief on "swing" valve fully **in**.
3. Turn both "swing" port reliefs **out**.
4. Turn motor crossline relief full **in.**
5. Connect gauge to "swing" valve.
6. Start engine.
7. Set SWING LEFT port relief.
8. Set SWING RIGHT port relief.
9. Reset main relief.

**Set swing motor crossline reliefs:-**

10. Disconnect hoses from both crossline reliefs and plug hoses .
11. Set SWING LEFT crossline relief.
12. Set SWING RIGHT crossline relief.
13. Reconnect hoses to crossline reliefs.

---

# SECTION 17 - GRAPPLE

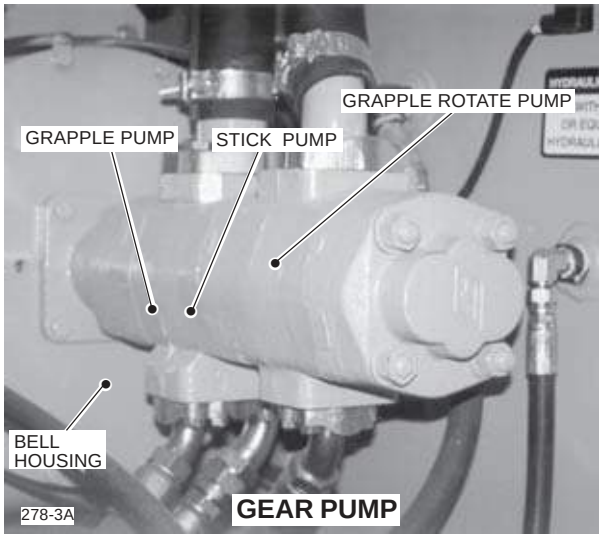
AUGUST, 2006

## CONTENTS - SECTION 17

## GRAPPLE SYSTEM COMPONENTS

### PUMP

This is a fixed displacement external triple gear pump.




The grapple circuit utilizes two of the three gear housings of this pump to supply hydraulic oil to the grapple open/close control valve spool section and the grapple rotate control valve spool section in the "hoist" valve and the "swing" valve.

For a more detailed description of the triple gear pump, refer to SECTION 12 in THIS SERVICE MANUAL.

### JOYSTICK CONTROL VALVE

The grapple open/close and grapple rotate functions are controlled by the left and right joysticks which when operated send proportional pilot signals to the "hoist" and "swing" control valves to shift a spool(s) and supply system oil to the grapple open/close cylinders and the grapple rotate motor.

For a detailed description of the joystick control valve refer to SECTION 5 in THIS MANUAL.

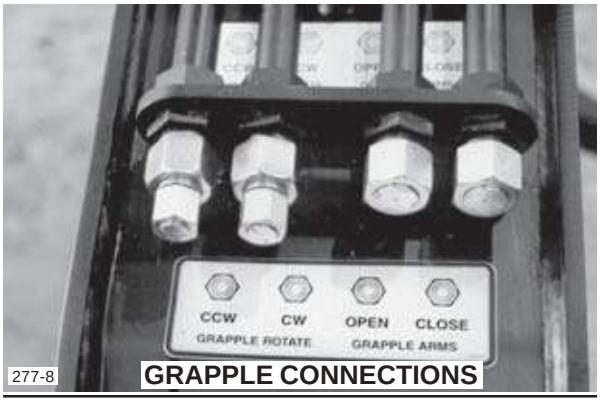
### GRAPPLE CONTROL VALVES

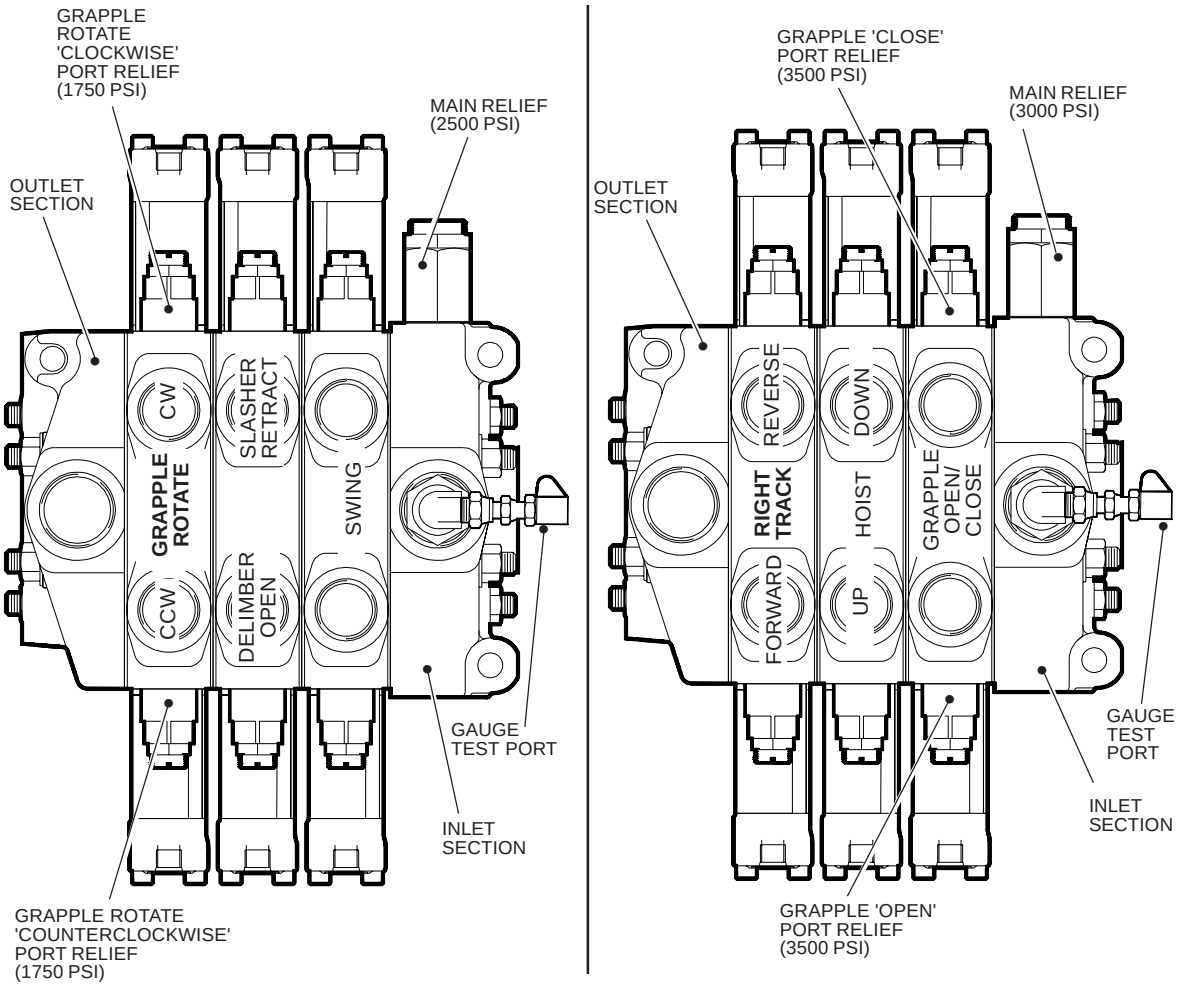
The grapple open/close function is controlled by one of three spool sections in the "hoist" valve and the grapple rotate motor is controlled by one of three spool section in the "swing" valve. The control valves are located in the upper frame below the floor plates inside the valve compartment.

For a detailed description of the "hoist" and "swing" control valves, refer to SECTIONS 12 and 15 in THIS MANUAL.

### GRAPPLE CONNECTIONS TO BOOM

When a factory installed grapple is not specified, hydraulic lines are provided up to the end of the boom and sealed off with steel plugs.



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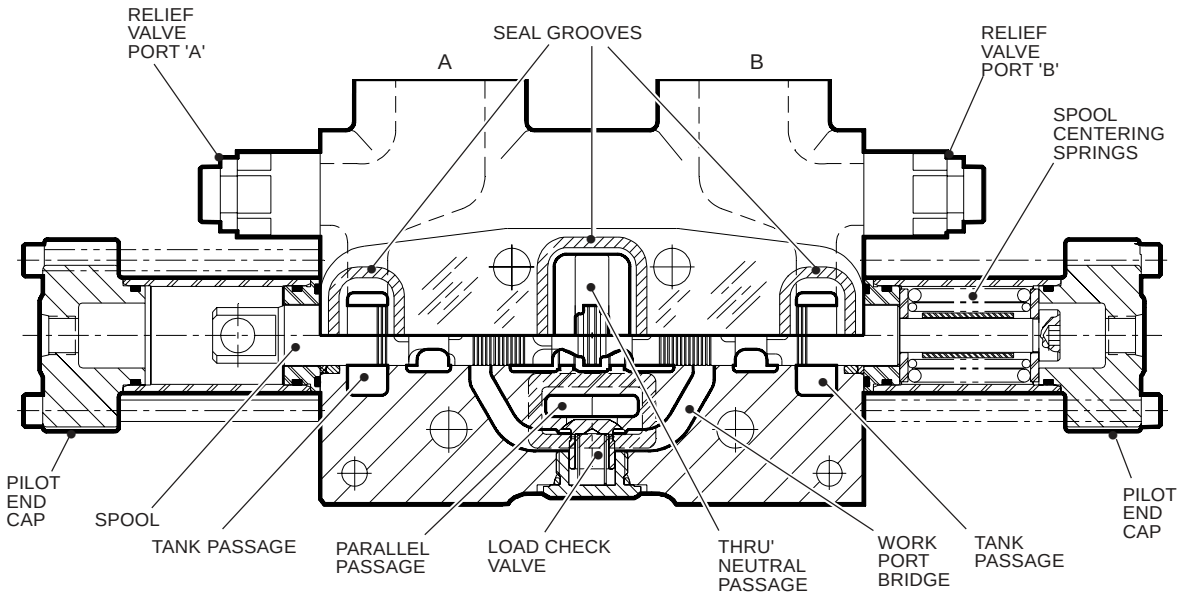
**GRAPPLE OPEN/CLOSE & GRAPPLE ROTATE CONTROL VALVES**

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**CROSS SECTION OF SPOOL SECTIONS**

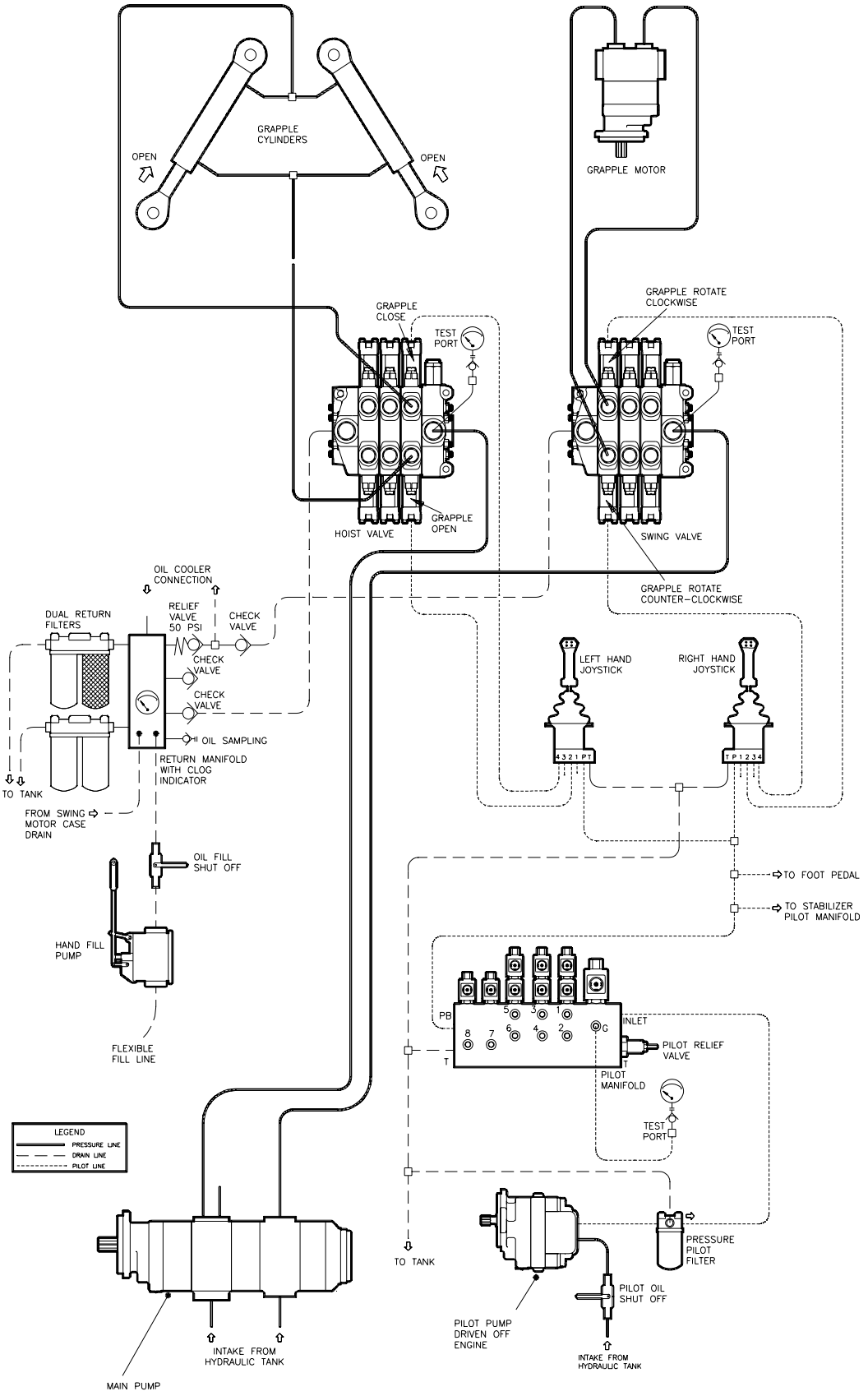
## GRAPPLE CIRCUIT DESCRIPTION

The grapple circuit is supplied with oil from two of the three gear housing sections on the main pump. The "hoist" and "swing" valves receive oil at their *inlet sections* and direct the oil through the three open center spool sections, to the *outlet* section. From there it is directed back to tank via a check valve to the return manifold and two dual element filters, which are equipped with an internal 25 psi element bypass valve.

Moving L.H. joystick in the cab will direct pilot oil to the ends of the *open/close* spool section in the "hoist" valve to shift the spool and direct hydraulic oil from the pump to the *grapple open/close* hydraulic cylinders to OPEN or CLOSE the *grapple arms*.

Return oil from the cylinders is directed back through the spool sections, to the *outlet* section, through the dual head return oil filter and back to tank.

Moving R.H. joystick in the cab will direct pilot oil to the ends of the *grapple rotate* spool section in the "swing" valve to shift the spool and direct hydraulic oil from the pump to the *swing motor* to rotate the grapple in either a CLOCKWISE or COUNTERCLOCKWISE direction.

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**GRAPPLE CIRCUIT**

**CAUTION**

**Use caution when in the cab as a slight touch of the controls can cause sudden rotation of the upper frame and booms or movement of the tracks**

**CAUTION**

**Be aware of other personnel in the area. Operator is responsible for the safe operation of the machine.**

**WARNING**

**Ensure that no one is standing near the grapple during this procedure.**

**IMPORTANT**

**Avoid blowing oil over relief for longer than five seconds, as this will cause excessive heating of the hydraulic fluid.**

## PRESSURE SETTINGS

**GRAPPLE OPEN/CLOSE RELIEF VALVE SETTINGS**

**Grapple open/close "Hoist" main relief setting:-**

..... 3000 psi

**Grapple open port relief setting** ..... 3500 psi

**Grapple close port relief setting** ..... 3500 psi

1. Position machine on flat level ground .
2. Ensure that the hydraulic oil is at **operating temperature.**
3. Loosen the locknut on the *"hoist" main relief* valve and turn the relief adjusting screw all the way **in,** tighten locknut.
4. Loosen the locknuts on both *port relief* valve adjusting screws for the GRAPPLE OPEN AND GRAPPLE CLOSE *spool section* of the "hoist" valve and turn the adjusting screws **out** until spring pressure is relieved then turn adjusting screws **one full turn in**.
5. Connect a 0 - 5000 p.s.i. pressure gauge to the *"hoist"* control valve test port on the inlet section of the valve.
6. Start the engine, and put the throttle control to the **FULL** position.
7. While holding the L.H. joystick in the GRAPPLE OPEN position (cylinders fully retracted), check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.

**IMPORTANT**

**Approach the gauge reading slowly and deliberately by turning the adjusting screw in a little at a time. The pressure setting must not exceed the above value.**

8. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
9. While holding the L.H. joystick in the GRAPPLE CLOSE position (cylinders fully extended), check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
10. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.

    **reset main relief valve:**

11. Loosen locknut on *"hoist" main relief* and unscrew adjusting screw **3 full turns**.
12. While holding the L.H. joystick in the GRAPPLE CLOSE position (cylinders fully extended), check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
13. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
14. Stop engine. Remove pressure gauge and wipe up any excess oil from test port area.

**CAUTION**

**Use caution when in the cab as a slight touch of the controls can cause sudden rotation of the upper frame and booms or movement of the tracks**

**CAUTION**

**Be aware of other personnel in the area. Operator is responsible for the safe operation of the machine.**

**IMPORTANT**

**Avoid blowing oil over relief for longer than five seconds, as this will cause excessive heating of the hydraulic fluid.**

**GRAPPLE ROTATE RELIEF VALVE SETTINGS**

**Grapple rotate/"Swing" main relief setting:-**

..... 2500 psi

**Rotate clockwise port relief setting** .... 1750 psi

**Rotate counterclockwise port relief setting** ..... 1750 psi

1. Position machine on flat level ground.
2. Ensure that the hydraulic oil is at **operating temperature.**
3. Position and secure grapple to prevent from rotating in either direction.

**WARNING**

**Ensure that no one is standing near the grapple during this procedure.**

4. Loosen the locknuts on both *port relief* valve adjusting screws for the GRAPPLE ROTATE *spool section* of the "swing" valve and turn the adjusting screws **out** until spring pressure is relieved then turn adjusting screws **one full turn in**.
5. Connect a 0 - 5000 p.s.i. pressure gauge to the "swing" control valve test port on the inlet section of the valve.
6. Start the engine, and put the throttle control to the **FULL** position.

**IMPORTANT**

**Approach the gauge reading slowly and deliberately by turning the adjusting screw in a little at a time. The pressure setting must not exceed the above value.**

7. While holding the R.H. joystick in the ROTATE CLOCKWISE position, check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
8. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
9. While holding the R.H. joystick in the ROTATE COUNTERCLOCKWISE position, check gauge pressure reading. If less than set value, turn relief valve adjusting screw **in** until set value is obtained on gauge.
10. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
11. Release grapple from it's secured position.
12. Remove pressure gauge and wipe up any excess oil from test port area.

## SUMMARY:

1. Ensure that hydraulic oil is at operating temperature.
2. Turn main relief on "hoist" valve fully **in**.
3. Turn GRAPPLE OPEN and CLOSE port reliefs on "hoist" valve **out**.
4. Connect gauge to "hoist" valve.
5. Start engine.
6. Set GRAPPLE OPEN port relief on "hoist" valve.
7. Set GRAPPLE CLOSE port relief on "hoist" valve.
8. Reset main relief.

**Grapple rotate/"stick" valve:-**

1. Secure grapple to prevent from rotating.
2. Ensure that hydraulic oil is at operating temperature.
3. Turn GRAPPLE ROTATE C/W and CC/W port reliefs on "swing" valve **out**.
4. Connect gauge to "swing" valve.
5. Set GRAPPLE ROTATE C/W port relief on "swing" valve.
6. Set GRAPPLE ROTATE CC/W port relief on "swing" valve.

## Tigercat T240B Track Loader

# SECTION 18 - DELIMBER/SLASHER

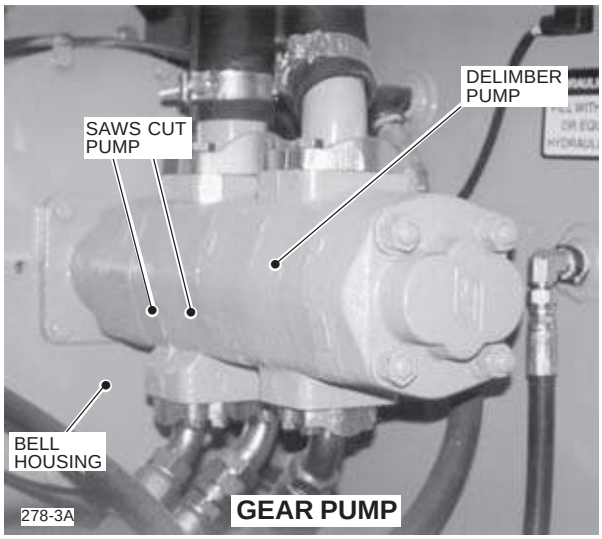
AUGUST, 2006

### CONTENTS - SECTION 18

## DELIMBER/SLASHER CIRCUIT COMPONENTS

### PUMP

This is a fixed displacement external triple gear pump.

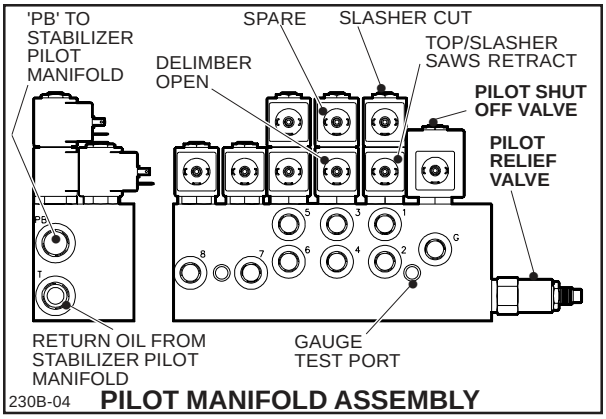



The delimber and slasher circuits utilize two of the three gear housings of this pump to supply hydraulic oil to the two main control valve spool sections of the swing valve and stick valve.

For a more detailed description of the triple gear pump, refer to SECTION 12 in THIS SERVICE MANUAL.

### PILOT MANIFOLD

Four solenoid operated pilot valves (positions 1, 2, and 4) on the pilot manifold control the flow of pilot oil to operate the delimber, and saw functions.




For a detailed description of the pilot manifold refer to SECTION 5 in THIS MANUAL.

### DELIMBER CONTROL VALVE (SWING VALVE)

The delimber arms OPEN/CLOSE functions are controlled by one of three spool sections in the three section "swing" control valve.

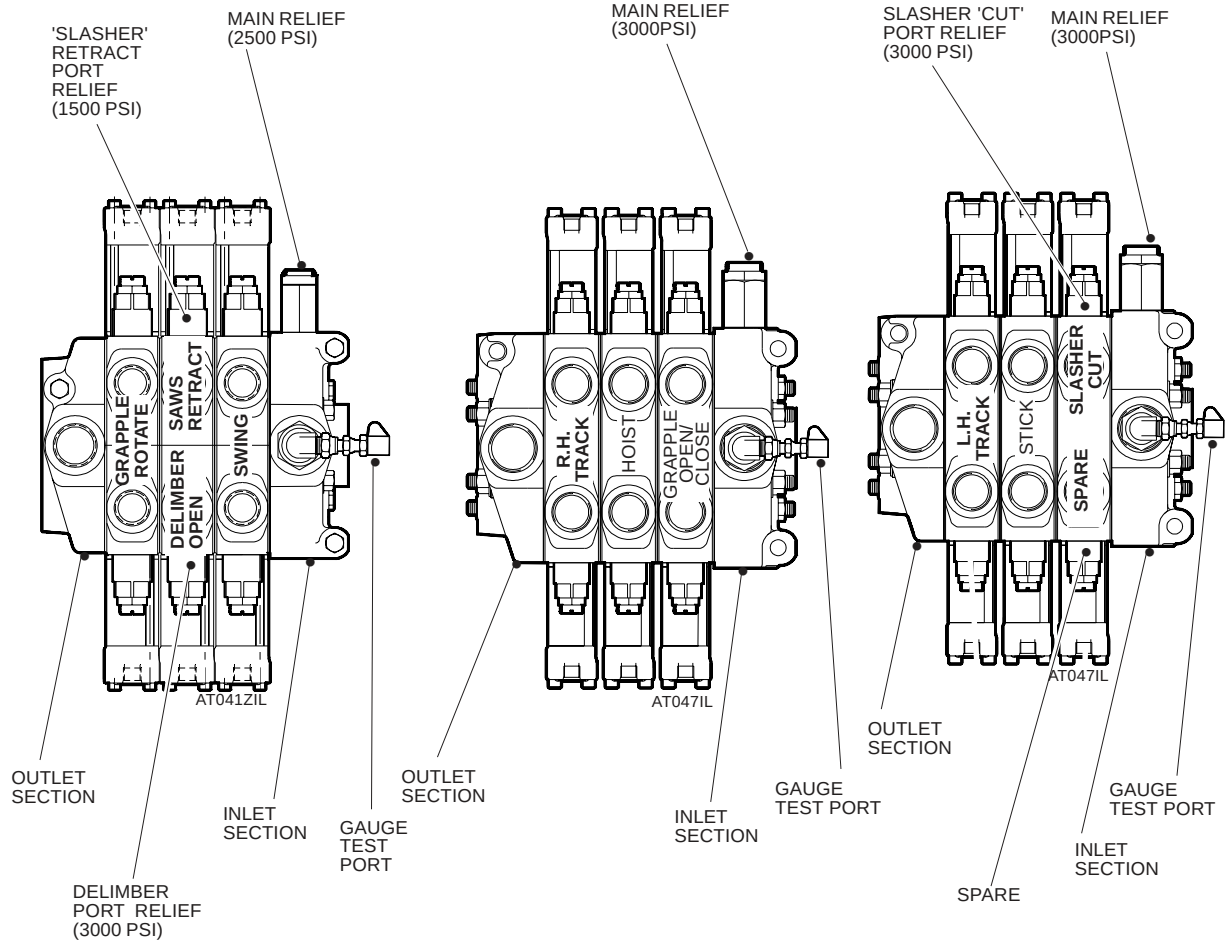
### SAW CUT CONTROL VALVE (STICK VALVE)

The saw cutting function is controlled by one of three spool sections in the "stick" control valve.

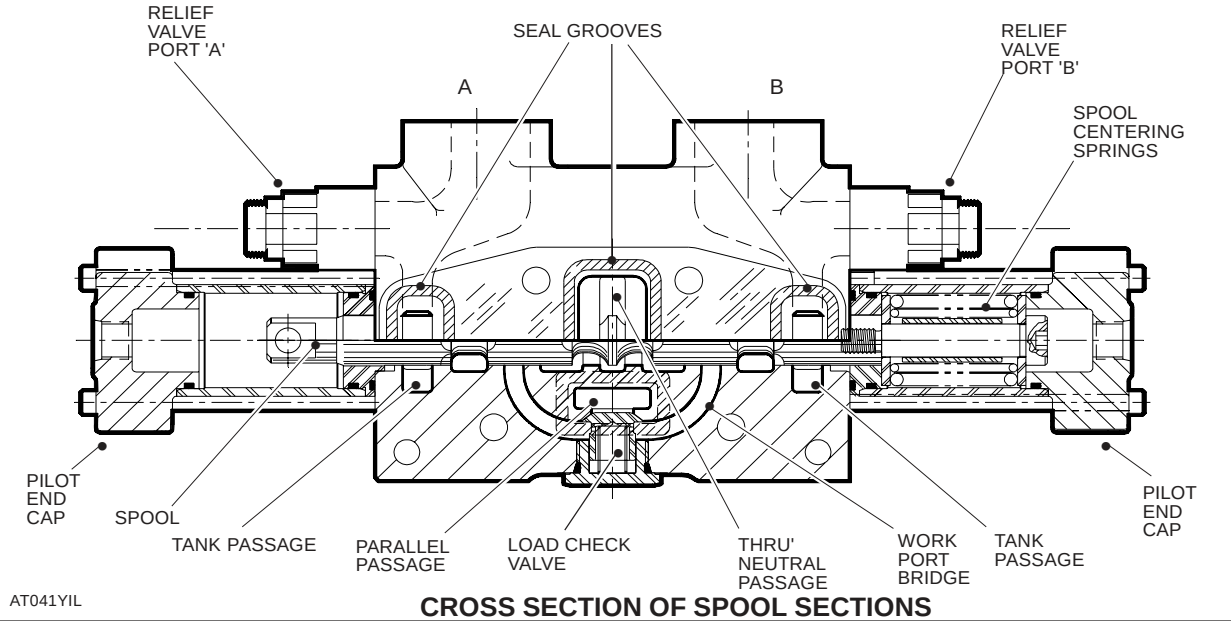
### SAWS RETRACT CONTROL VALVE (SWING VALVE)

The slasher saw cutting function and the retraction of both the slasher saw and the top saw are controlled by one of three spool sections in the "swing" control valve.

For a detailed description of the "swing", "hoist" and "stick" control valves, refer to SECTION 12 and 15 in THIS MANUAL.



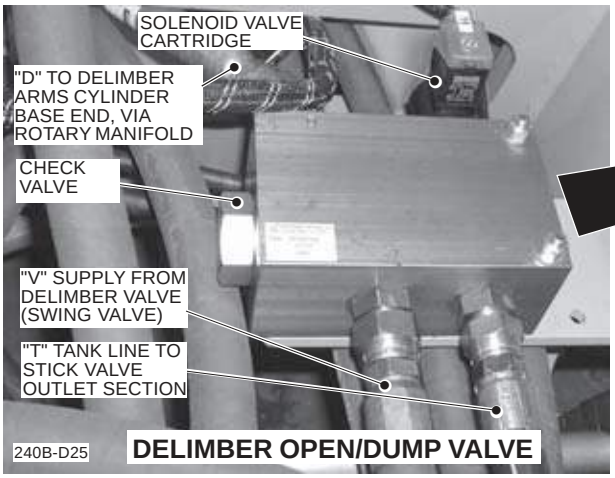

**"SWING", "HOIST" AND "STICK" CONTROL VALVES**



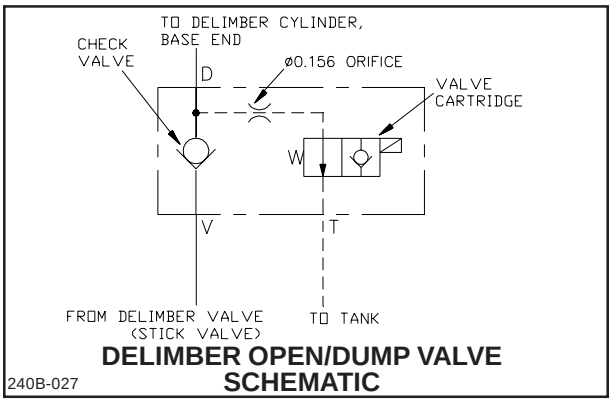

**CROSS SECTION OF SPOOL SECTIONS**

## DELIMBER OPEN/DUMP VALVE

The delimber open/dump valve is a solenoid operated three way directional valve consisting of an aluminium valve body, a screw-in, solenoid operated valve cartridge and a screw-in check valve cartridge. The valve is located in the upper frame.



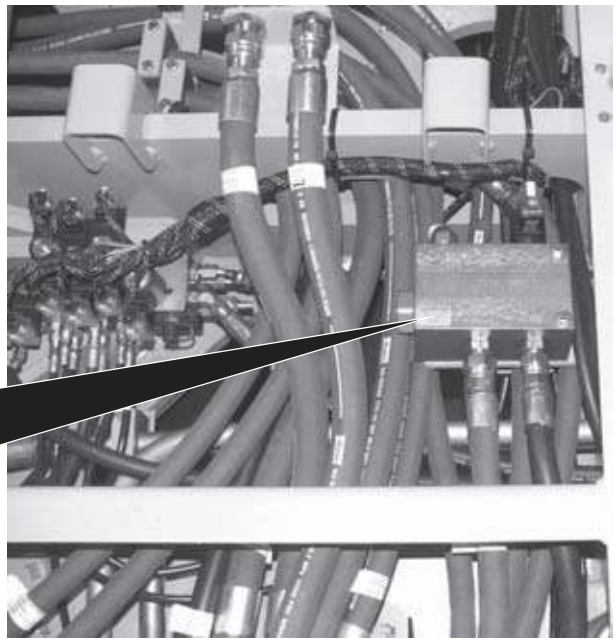

**DELIMBER OPEN/DUMP VALVE**




**DELIMBER OPEN/DUMP VALVE SCHEMATIC**

In the neutral position with the solenoid coil de-activated, port 'D' is open to tank port 'T', allowing oil to flow from the base end of the delimber arms cylinder and "dump" to tank. An orifice in the connecting port controls the flow of this return oil so that the delimber arms do not CLOSE too fast.

When the LH. joystick switch is pressed to OPEN the delimber arms, the solenoid coil on the dump valve is energized and shifts the valve cartridge to block the connection between ports 'D' and 'T' and instead allow system oil to flow from port 'V', "through" the check valve to port 'D' to the base end of the cylinder to open the delimber arms.



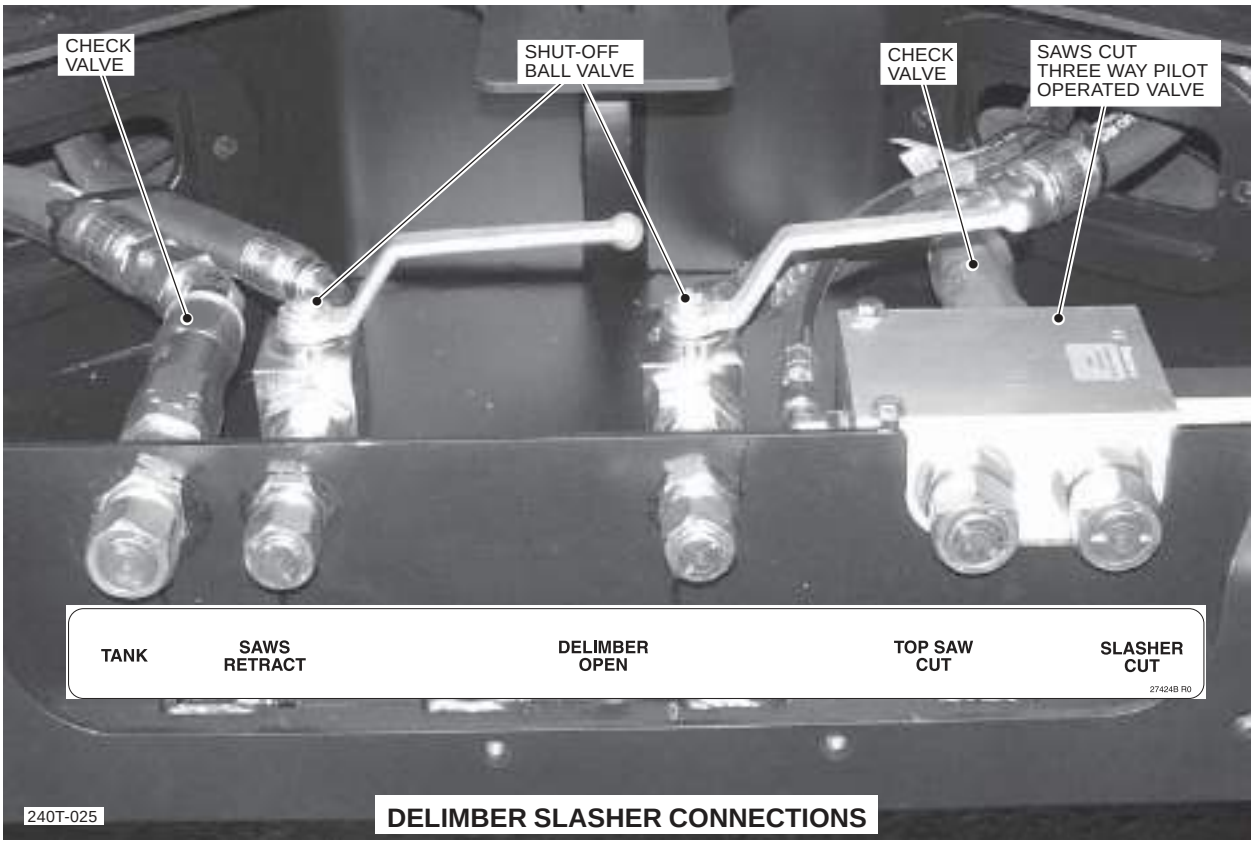
## SLASHER CONNECTIONS - STANDARD BULKHEAD


**SLASHER CONNECTIONS - STANDARD BULKHEAD**

Hydraulic connections for the slasher (Standard Bulkhead) are located on the undercarriage. The connections consist of one No.12 JIC connector fittings and two No. 16 JIC connector fittings. All fittings are capped when not in use with special steel caps to prevent leakage. Always ensure caps are tightly in place when not operating a slasher. When making the hydraulic connection to the slasher, it is very important to clean around the fittings before disconnecting them to prevent dirt from entering the system

**IMPORTANT**

**Always check hydraulic oil level after connecting and running the delimber and/or slasher.**




DELIMBER SLASHER CONNECTIONS

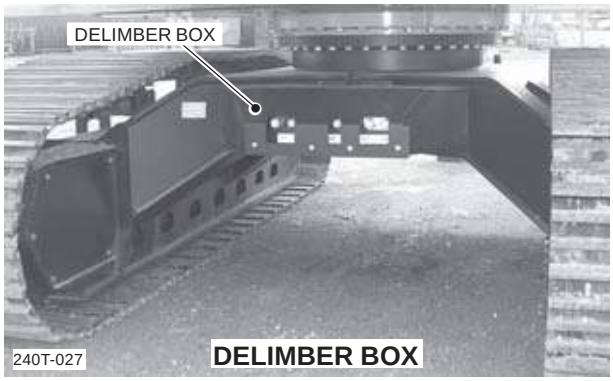
## DELIMBER/SLASHER CONNECTIONS

Hydraulic connections for the delimber and slasher are located on the undercarriage in the delimber box. The connections consist of two No.12 JIC connector fittings and three No. 16 JIC connector fittings. All fittings are capped when not in use with special steel caps to prevent leakage. Always ensure caps are tightly in place when not operating a delimber or slasher. When making the hydraulic connection to either the delimber or the slasher, it is very important to clean around the fittings before disconnecting them to prevent dirt from entering the system.

**IMPORTANT**

**Always check hydraulic oil level after connecting and running the delimber and/or slasher.**

For information on the DELIMBER or SLASHER, please refer to the MANUFACTURERS MANUAL.




DELIMBER BOX

## SHUT-OFF (BALL) VALVES

Two ball valves, one in the saws retract circuit and one in the delimber open circuit provide a means of shutting off these circuits when connecting or disconnecting hoses.

## CHECK VALVES

Two check valves prevent the flow of hydraulic fluid from the tank return circuit and saws cut circuit when connecting and disconnecting hoses.

## PILOT OPERATED THREE-WAY VALVE

A pilot operated three-way directional valve consisting of an aluminium valve body and a screw-in, pilot operated valve cartridge is used to divert hydraulic oil flow from the stick valve saws cut circuit and direct the flow to the top saw cut circuit when the pilot is deactivated and slasher cut circuit when the pilot is activated by the delimber open circuit.

## DELIMBER/SLASHER CIRCUIT DESCRIPTION

### REFER TO CIRCUIT DIAGRAMS

The delimber/slasher circuit is supplied with hydraulic oil by a fixed displacement gear pump. One spool section in the stick and swing *control valves* hydraulically control all of the delimber or slasher functions. The stick and swing control valves each receive oil at their *inlet* sections, from there it is directed through the three open center *spool sections*, to the *outlet* sections. From there it is directed back to tank via a check valve to the return manifold and two dual element filters, which are equipped with an internal 25 psi element bypass valve.

Two 3-position joystick switches and two relays (numbers 6 and 7) electrically control the delimber and slasher functions:-

**Open delimber arms;** Push LEFT side of L.H. Joystick switch, Current flows through wires 18 to energize a DELIMBER OPEN SOLENOID valve on the *pilot manifold* and allow pilot oil to shift the spool in the *delimber spool section* of the *swing valve* and direct system oil to the delimber arms cylinders. Current also flows through wire 18 to energize the DELIMBER OPEN RELAY (7) and allow current to energize the DELIMBER OPEN/ DUMP VALVE SOLENOID. This will allow system oil from the *delimber spool section* of the *swing valve* to flow through the ROTARY MANIFOLD to the base end of the DELIMBER ARM CYLINDERS to open the arms.

Current also flows via the contacts of DELIMBER CLOSE RELAY (6) through wire 88 and jumper wire 19 to "latch" RELAY (7) in the energized position so that the joystick switch may be released to the spring return center position while the delimber arms remain in the OPEN position. A diode in diode module #1 in wire 18 prevents the current from traveling back to the joystick switch and also the DELIMBER OPEN SOLENOID valve on the *pilot manifold,* which was de-energized when the joystick switch was released.

**Close delimber arms;** Push RIGHT side of L.H. Joystick switch, Current flows through wire 86 (96 on later machines) and energizes DELIMBER CLOSE RELAY (6).

In this condition oil from the base end of the DELIMBER ARMS CYLINDER is returned to tank via the DELIMBER OPEN/DUMP VALVE, due to oil entering the rod end of the cylinders from the DELIMBER ACCUMULATOR to close the arms.

**Cut with delimber top saw;** Push RIGHT side of L.H. Joystick switch, Push LEFT side of R.H. joystick switch, Current flows through wire 97 to wire 39 and energizes SAW SOLENOID valve on *pilot manifold*.

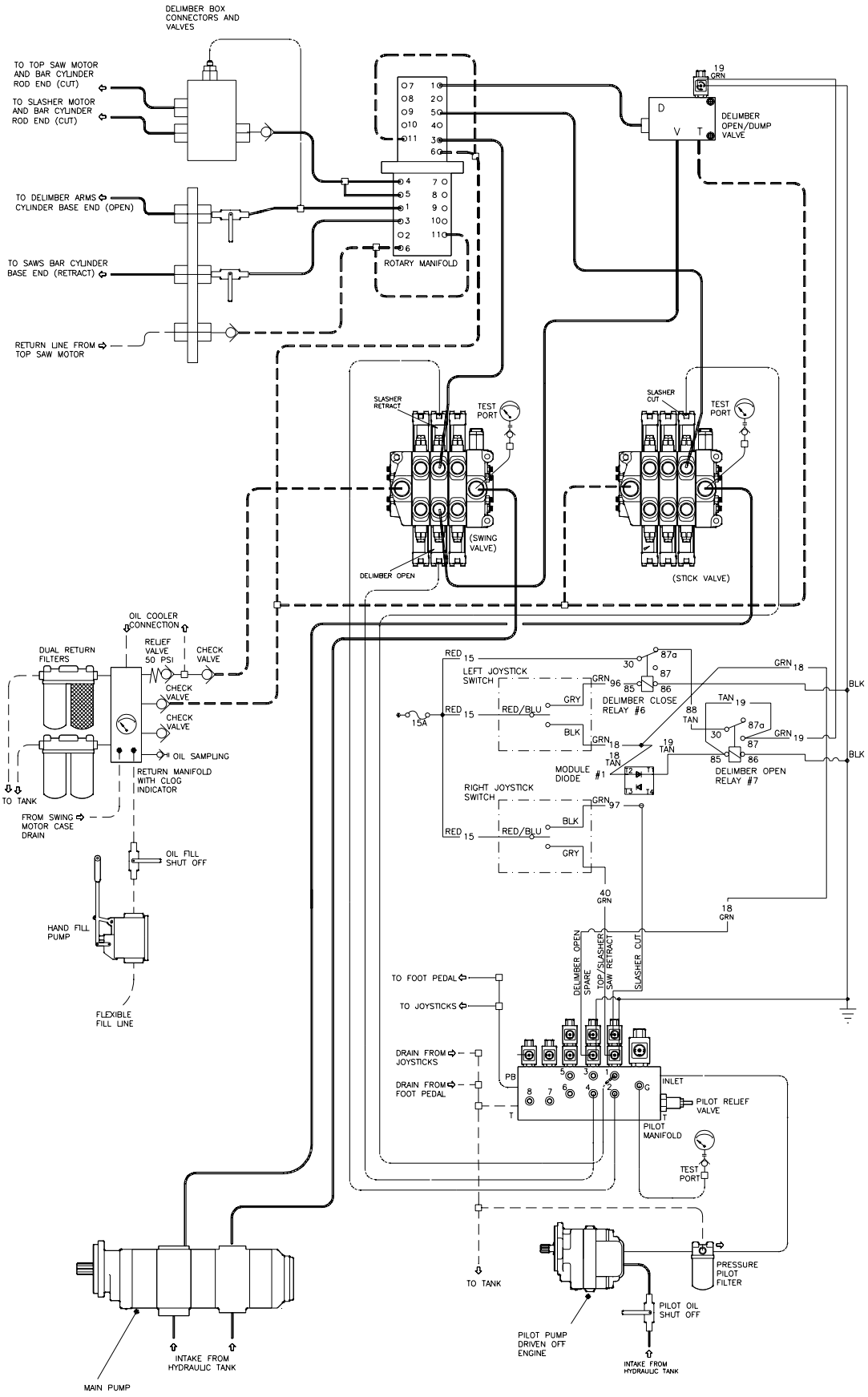
Pilot oil flows through the SAW CUT solenoid pilot valve to shift the spool in the SAW CUT (stick valve) to allow system oil to flow through the ROTARY MANIFOLD to the pilot operated three-way valve. Because the delimber knives are closed there is no pressure to shift the three-way valve and the system oil flows to the TOP SAW MOTOR and the rod end of the TOP SAW CYLINDER to run the saw motor and cut with the saw bar.

**Cut with slasher saw;** Push LEFT side of L.H. Joystick switch, Push LEFT side of R.H. joystick switch, Current flows from L.H. joystick switch through wire 18 and 19, to open delimber knives. Current also flows from R.H. joystick switch through wire 97 to wire 39, to energize SLASHER CUT solenoid valve on *pilot manifold*.

Pilot oil flows through the SLASHER CUT solenoid pilot valve on the *pilot manifold* to shift the spool in the SLASHER CUT (stick valve) to allow system oil to flow through the ROTARY MANIFOLD to the pilot operated three-way valve. Because the delimber knives are open there is pressure to shift the three-way valve and the system oil flows to SLASHER SAW MOTOR and the rod end of the BAR CYLINDER to run the saw motor and cut with the saw bar.

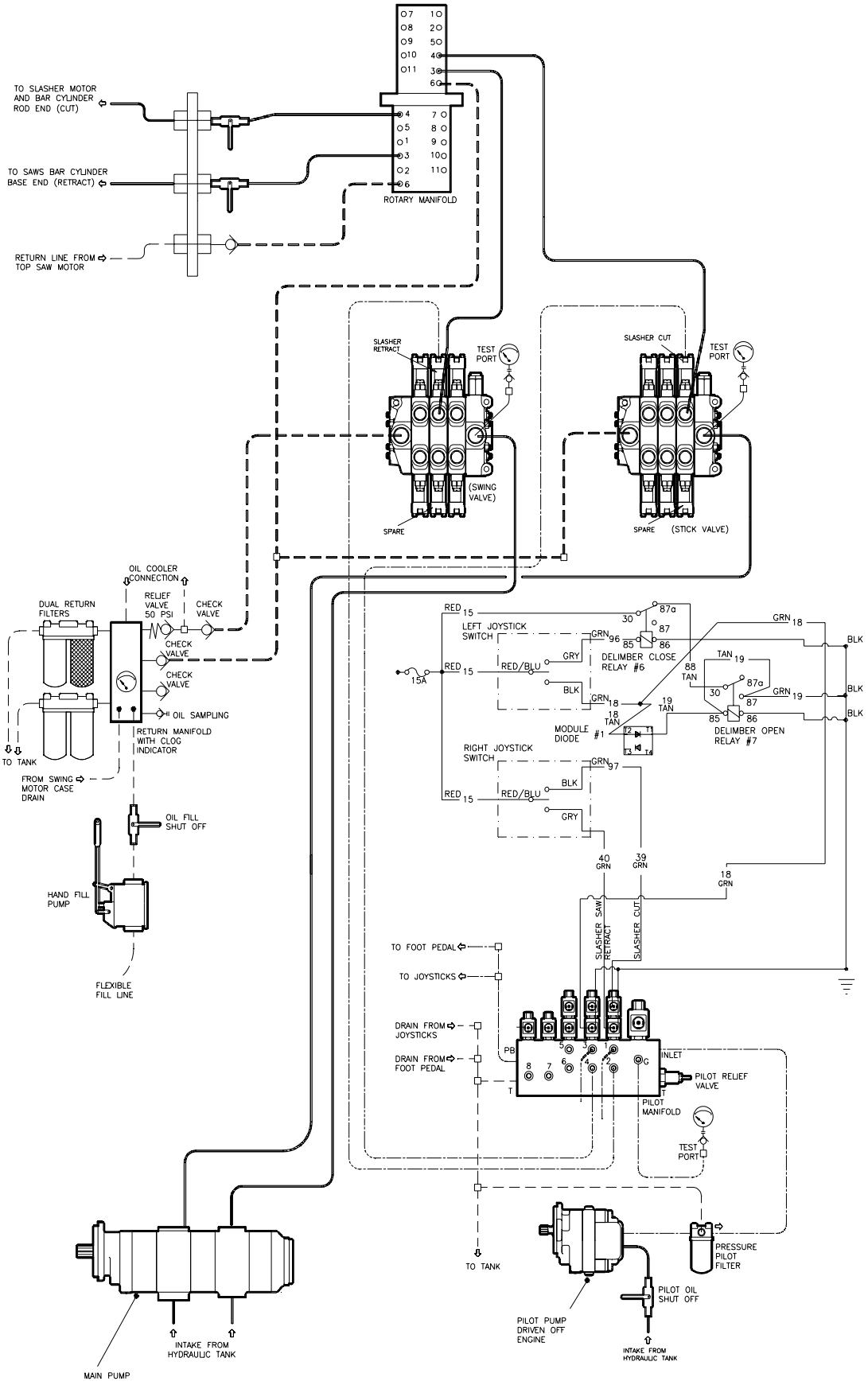
**Retract delimber top saw and/or slasher saw;** Push RIGHT side of R.H. joystick switch, Current flows through wire 40 and energizes TOP SAW/ SLASHER SAW RETRACT solenoid valve on *pilot manifold*.

Pilot oil flows through the TOP SAW/SLASHER SAW RETRACT solenoid pilot valve to shift the spool in the SAW RETRACT VALVE (swing valve) to allow system oil to flow through the ROTARY MANIFOLD to the base end of the TOP SAW BAR CYLINDER and the SLASHER SAW CYLINDER base end to retract the saw bar(s).




240T2-019

**DELIMBER/SLASHER CIRCUIT**




240T2-021

**SLASHER CIRCUIT - STANDARD**

## PRESSURE SETTINGS FOR TOP SAW CUT, SLASHER CUT AND DELIMBER

**CAUTION**

**Use caution when in the cab as a slight touch of the controls can cause sudden rotation of the upper frame and booms or movement of the tracks**

**CAUTION**

**Be aware of other personnel in the area. Operator is responsible for the safe operation of the machine.**

**WARNING**

**Ensure that no one is standing near the grapple during this procedure.**

**IMPORTANT**

**Avoid blowing oil over relief for longer than five seconds, as this will cause excessive heating of the hydraulic fluid.**

**NOTE:**

**The Delimber and/or Slasher hydraulic hoses must be disconnected at the loader bulkhead connections before carrying out the following procedure. Cap the hoses to keep clean and use the appropriate steel caps on the bulkhead fittings to prevent leakage during the pressure setting procedure.**

**RELIEF VALVE SETTING**
**TOP SAW CUT (STICK VALVE)**

**Stick main relief setting** ..... 3000 psi

**Saw cut port relief setting** ..... 2500 psi

1. Position machine on level ground.
2. Ensure that the hydraulic oil is at **operating temperature.**
3. Loosen the locknut on *port relief* valve adjusting screw for the SAW CUT *spool section* of the "stick" valve and turn the adjusting screw **out** until spring pressure is relieved then turn adjusting screw **one full turn in**.
4. Connect a 0 - 5000 psi.. pressure gauges to the "stick" control valve test port on the inlet section of the valve.
5. Start the engine, and put the throttle control to the **FULL** position.
6. While holding the R.H. joystick switch in the SAW EXTEND position, check gauge pressure reading at "stick" valve test connection. If less than set value, turn SAW CUT port relief valve adjusting screw **in** until set value is obtained on gauge.
7. Tighten locknut on adjusting screw taking care not to turn the adjusting screw. SAW CUT port relief on "stick" valve is now set.
8. Stop engine, remove pressure gauges and wipe up any excess oil from test port area.

**RELIEF VALVE SETTING**
**SLASHER CUT, SAW RETRACT (SWING VALVE)**

**"Swing" main relief setting** ..... 3000 psi

**Saw retract port relief setting** ..... 1500 psi

1. Position machine on level ground.
2. Ensure that the hydraulic oil is at **operating temperature.**
3. Loosen the locknuts on *port relief* valve adjusting screw for the SAW RETRACT *spool section* of the "swing" valve and turn the adjusting screw **out** until spring pressure is relieved then turn adjusting screw **one full turn in**.
4. Connect a 0 - 5000 psi.. pressure gauges to the "swing" control valve test port on the inlet section of the valve.
5. Start the engine, and put the throttle control to the **FULL** position.

**IMPORTANT**

**Approach the gauge reading slowly and deliberately by turning the adjusting screw in a little at a time. The pressure setting must not exceed the above value.**

6. While holding the R.H. joystick switch in the SAW RETRACT position, check gauge pressure reading at "swing" valve test connection. If less than set value, turn SAW RETRACT port relief valve adjusting screw **in** until set value is obtained on gauge.
7. Tighten locknut on adjusting screw taking care not to turn the adjusting screw. SAW RETRACT port relief on "swing" valve is now set.
8. Stop engine, remove pressure gauges and wipe up any excess oil from test port area.

**RELIEF VALVE SETTINGS**
**DELIMBER ARMS (SWING VALVE)**

**Delimber/"Swing" main relief setting:-** .. 2500 psi

**Delimber open port relief setting**:- ..... 3000 psi

1. Position machine on level ground.
2. Ensure that the hydraulic oil is at **operating temperature.**
3. Loosen the locknut on the "swing" *main relief* valve and turn the relief adjusting screw all the way **in,** tighten locknut.
4. Loosen the locknut on the delimber *port relief* valve adjusting screw and turn the adjusting screw **out** until spring pressure is relieved then turn adjusting screw **one full turn in**.
5. Connect a 0 - 5000 psi.. pressure gauge to the "swing" control valve test ports on the inlet section of the valve.
6. Start the engine, and put the throttle control to the **FULL** position.
7. While holding the L.H. joystick switch in the DELIMBER OPEN position, check gauge pressure reading at "swing" valve test connection. If less than set value, turn DELIMBER port relief valve adjusting screw **in** until set value is obtained on gauge.
8. Tighten locknut on adjusting screw taking care not to turn the adjusting screw. DELIMBER port relief on "swing" valve is now set.

**reset main relief valves:**

9. Loosen locknut on "swing" *main relief* and unscrew adjusting screw **3 full turns**.
10. While holding the L.H. joystick switch in the DELIMBER OPEN position, check gauge pressure reading. If less than set value, turn "swing" *main* relief valve adjusting screw **in** until set value is obtained on gauge.
11. Tighten locknut on adjusting screw taking care not to turn the adjusting screw.
12. Stop engine, remove pressure gauges and wipe up any excess oil from test port area.
13. Re-connect delimber and slasher hoses to bulkhead fittings on loader.

## SUMMARY:

1. Disconnect Delimber and Slasher hoses from Loader.
2. Ensure hydraulic oil is at operating temperature.

Top saw cut/"stick" valve:-

3. Turn SAW CUT port reliefs on "stick" valve **out**.
5. Connect gauge to "stick" valve.
6. Start engine.
7. Set SAW CUT port relief on "stick" valve.
8. Remove gauge.

Slasher cut, saw retract/"swing" valve:-

1. Turn SAW RETRACT port reliefs on "swing" valve **out**.
2. Connect gauge to "swing" valve.
3. Start engine.
4. Set SAW RETRACT port relief on "swing" valve.

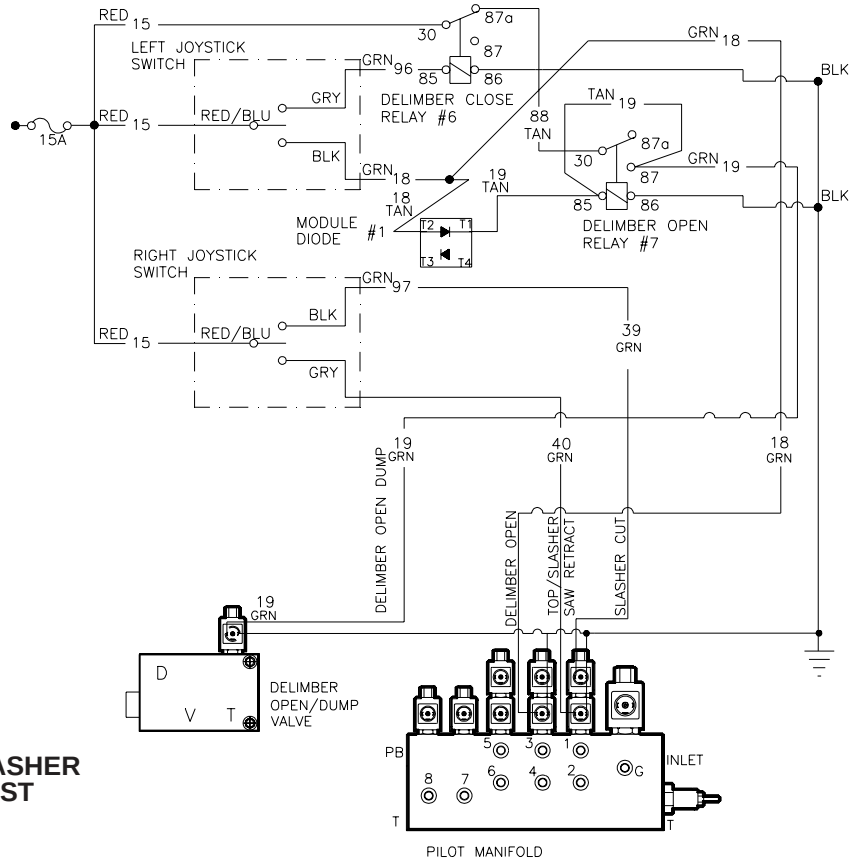
Delimber/"swing" valve:-

1. Connect gauge to "swing" valve.
2. Turn main relief fully **in**.
3. Turn DELIMBER port relief **out**.
4. Set DELIMBER port relief.
5. Re-set "swing" main relief.
6. Stop engine.
7. Remove all gauges.
8. Re-connect Delimber and Slasher units to Loader.

**TROUBLESHOOTING**
**DELIMBER RELAY CIRCUIT**

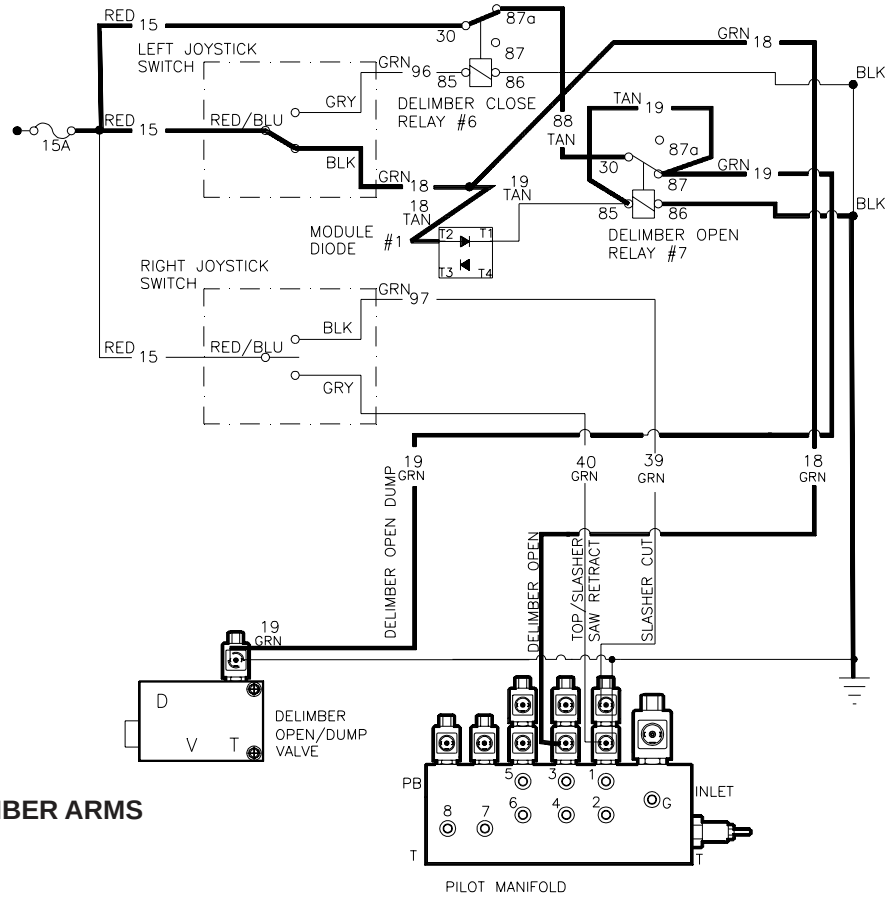
If an electrical problem is suspected, the operation of the joystick switches and the delimber relays can be verified with the following procedure.

1. With the *delimber arms switch* in OPEN position, voltage should be present at wires 18 and 19; if so, go to step 2. If voltage is not present in wire 18, operate the joystick switch in the other direction (ARMS CLOSE) and check wire 86/96. If voltage is present at wire 86/96, there may be problem in the *joystick switch* or in wire 18 from the joystick switch to the instrument panel. If voltage is not present in wire 86/96, check for voltage at wire 15 in the *instrument panel*. If voltage is not present at wire 15, check *15 amp fuse*; if voltage is present at wire 15, check *joystick switch* and wiring to switch.
2. With the *delimber arms switch* RELEASED to center position, voltage should still be present at wire 19 but not at wire 18. If this is the case go to step 3. If voltage is present at wire 18, check *diode module no. 1*. If voltage is not present at wire 19, check *relays 6 & 7*.
3. With the *delimber arms switch* in CLOSED position, voltage should be present at wire 86/96 and voltage at wire 19 will drop to zero. If voltage on wire 19 does not drop to zero, check *relay 6* for operation.
4. With the *delimber arms switch* RELEASED to center position, voltage will drop to zero on wire 86/96 and will remain at zero on wire 19. If this does not happen suspect the *joystick switch*.
5. When the *saw switch* in the CUT (SAW EXTEND) position, voltage should be present at wire 97 and 39 regardless of the delimber arms position. If this does not happen check jumper wire between wire 97 and 39 at terminal strip.
6. When the *saw switch* is in the RETRACT position, voltage should be present in wire 40 regardless of the delimber arms position.



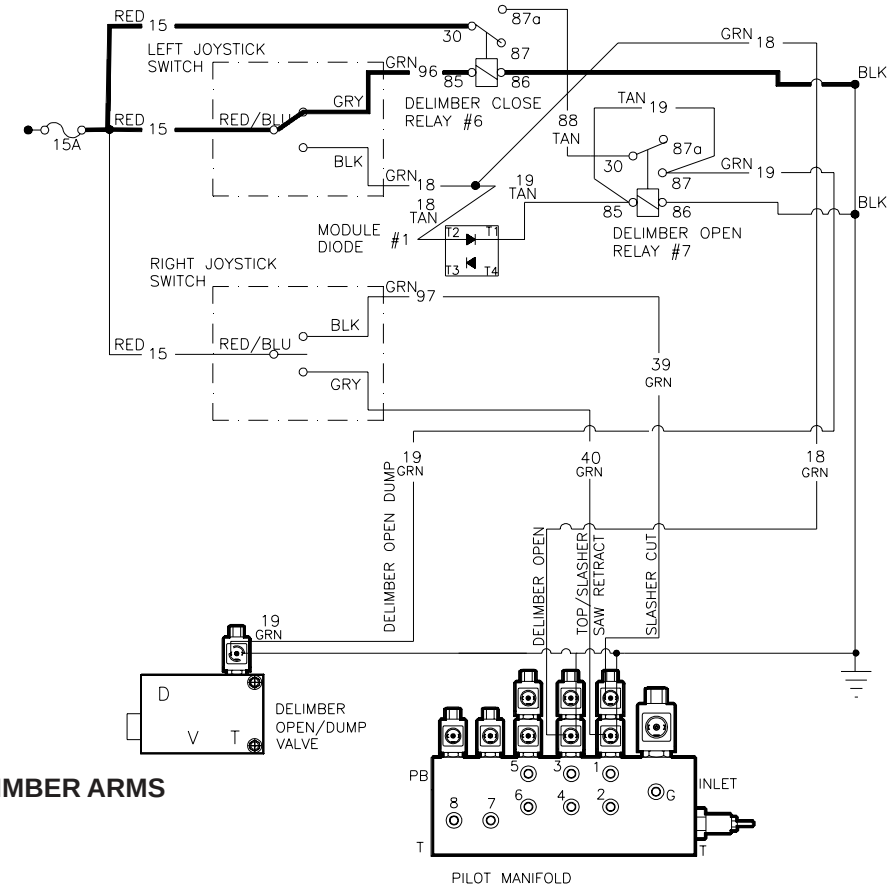

**DELIMBER/SLASHER CIRCUIT AT REST**

240T2-022



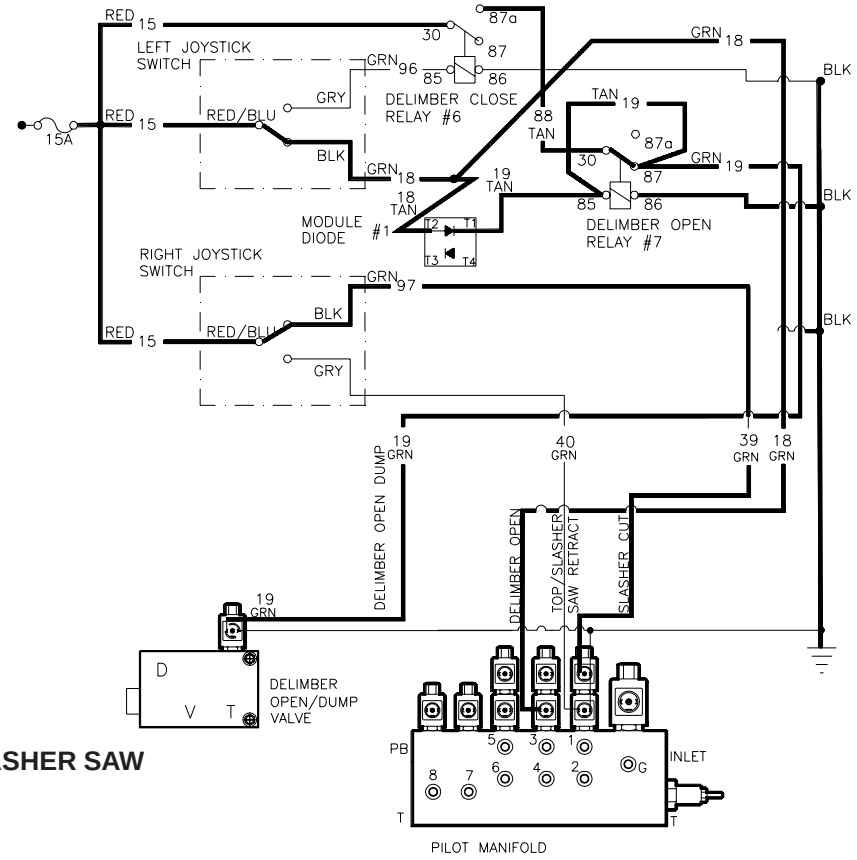

**OPEN DELIMBER ARMS**

240T2-023



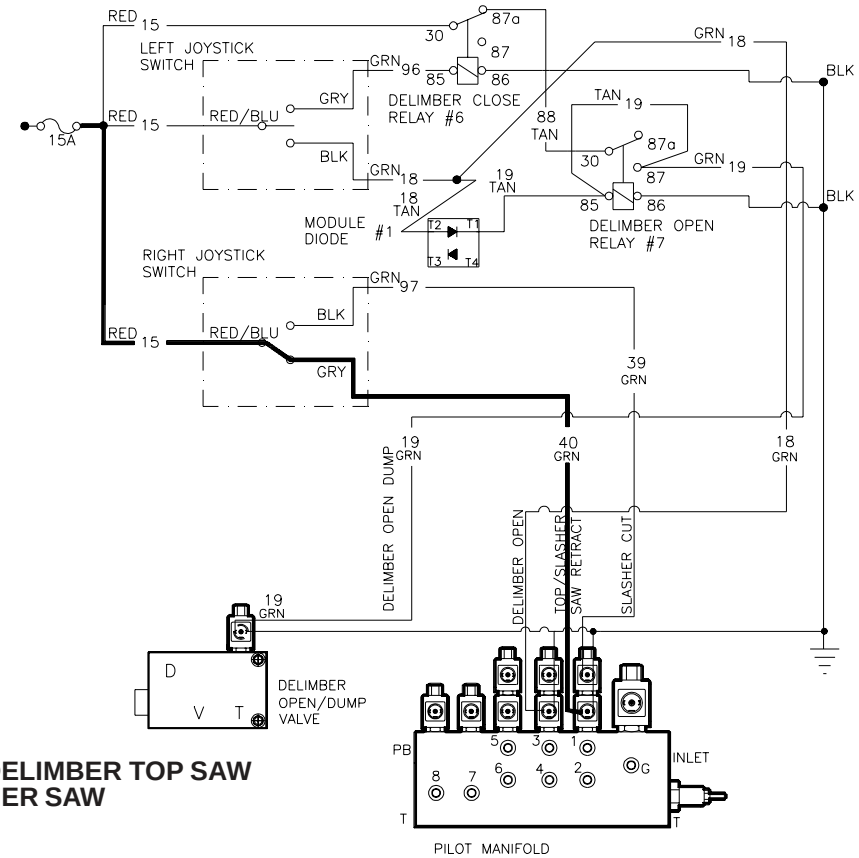

**CLOSE DELIMBER ARMS**

240T2-024



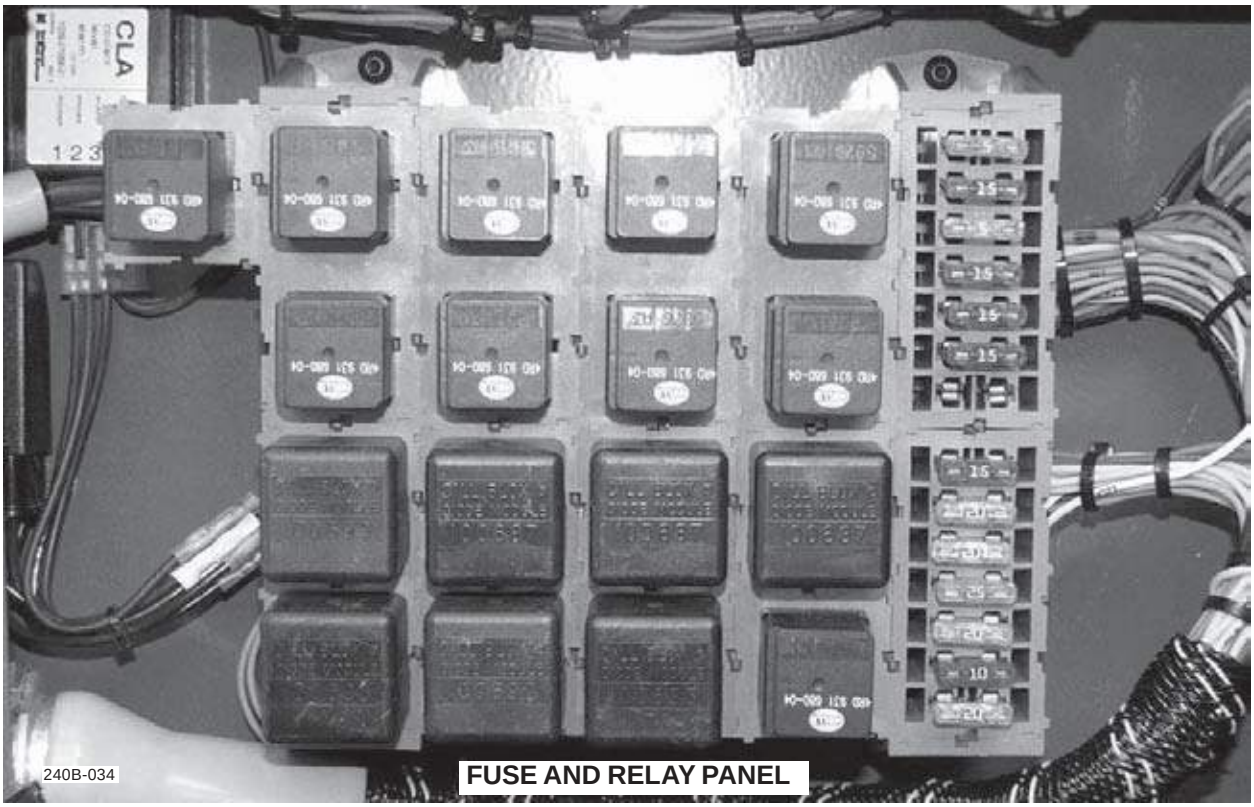

**CUT WITH SLASHER SAW OR TOP SAW**

240T2-026

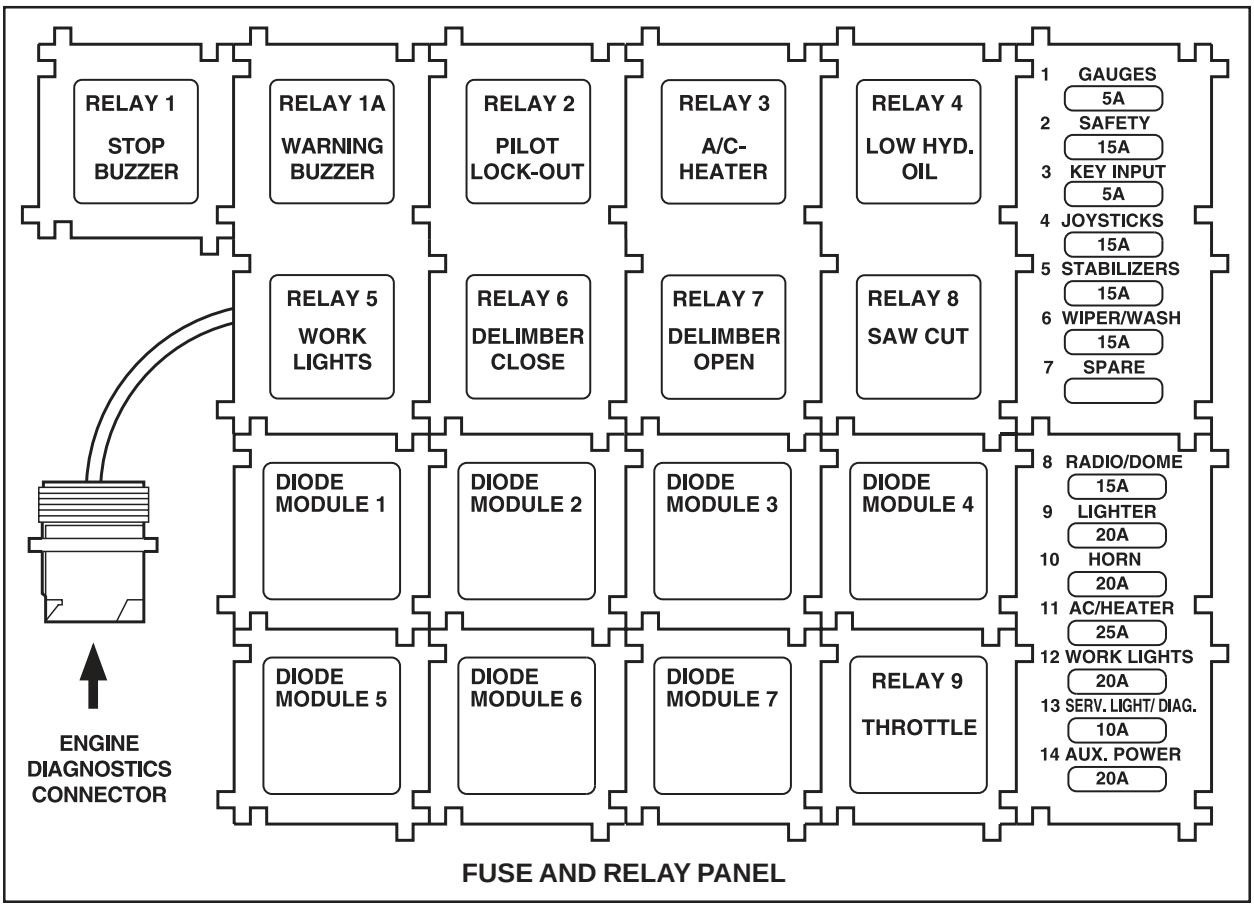



**RETRACT DELIMBER TOP SAW AND SLASHER SAW**

240T2-027




FUSE AND RELAY PANEL




FUSE AND RELAY PANEL