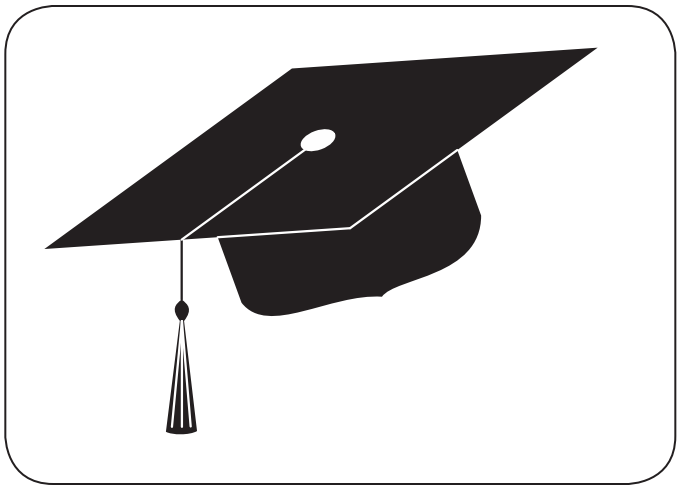
Section 7.1



Track Drive Circuit - General System

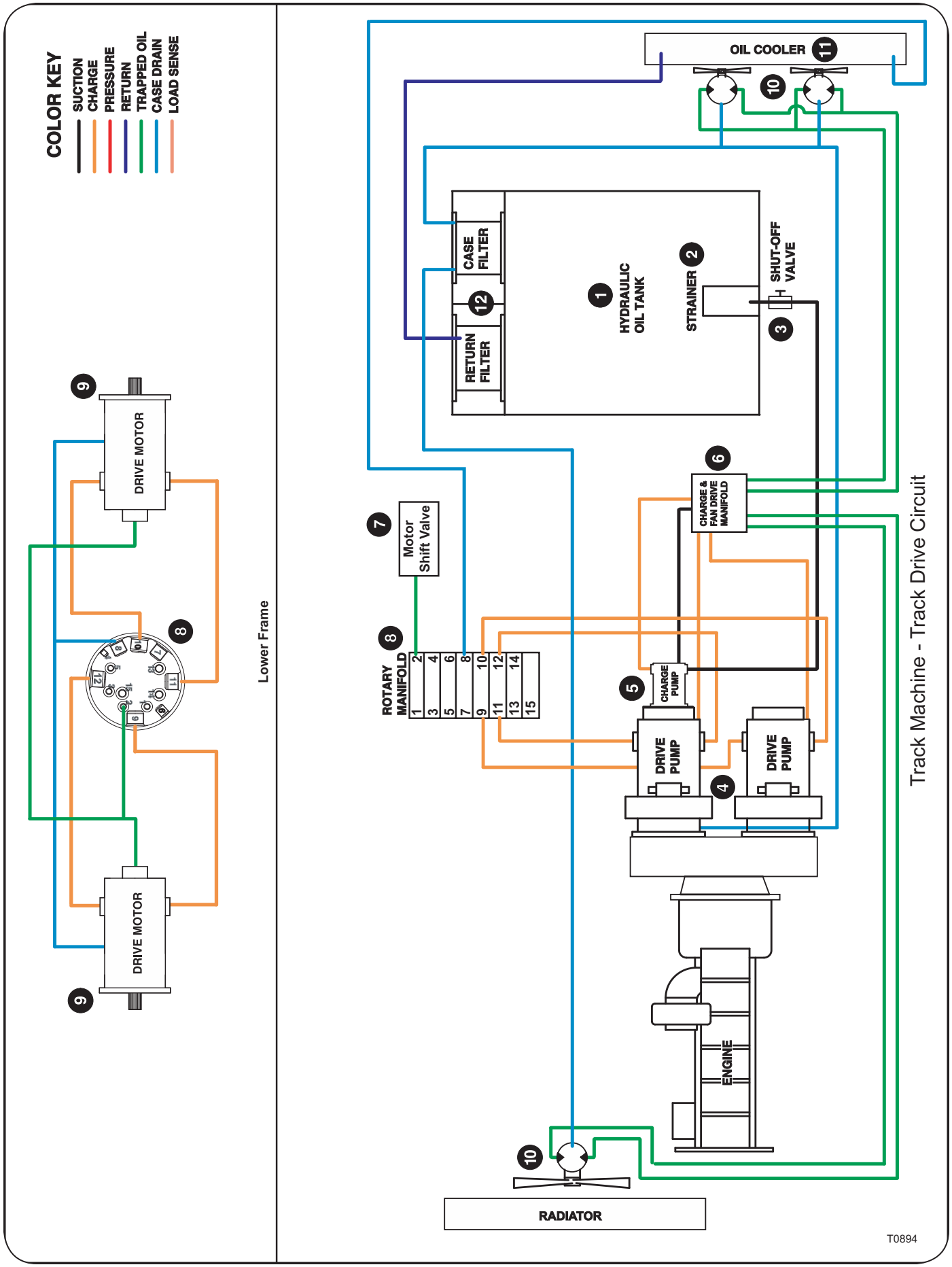


Figure 1: Simplified Travel Circuit Diagram - NEUTRAL CONTROLS

General (See Figures 1, 2 & 3)

The track drive, or travel circuit, is a closed loop hydrostatic system made up of the following main components:

1) 60 gal. (227 liter) hydraulic oil tank for storage and cooling of the hydraulic oil. See Section 3.2 in this manual for important information on the hydraulic tank and its components.

2) 100-mesh implement suction strainer w/ magnetic stem.

3) Suction line shut-off valve.

4) Rexroth variable displacement, over-center, axial piston drive pumps.

5) Charge pump piggy-back mounted to the Implement pump. The charge pump is a 52cc pump. Charge pressure is controlled by the charge pressure manifold/filter assembly (Ref #6). The purpose of the charge pump is to provide make-up oil for the closed loop hydrostatic travel circuit. Flushing orifices in the pump and motors (and natural internal leakage) allow a small amount of oil to bleed from the hydrostatic loop. This leakage is replenished by the charge pump. A filter in the charge pressure manifold/filter assembly (Ref #6) cleans the charge oil before it enters the hydrostatic loop.

6) The charge pressure manifold/filter assembly contains the charge pressure relief and the charge oil filter. A sequence cartridge is used because the downstream pressure does not effect the valve pressure setting. Any increase of pressure downstream will not be additive to the charge pressure. This makes the charge pressure setting more constant. Charge pressure also provides stroke control for the drive pump, swing brake release pressure, and controls the hydraulic cooler and radiator fans.

7) Motor Shift Solenoid Valve. The valve is used to shift the hydraulic track drive motors to MAX displacement, giving the hydraulic motors maximum torque but slower speed.

8) 14-port rotary manifold for 360° continuous rotation swing. In the track drive circuit it provides the hydrostatic link to the drive motors, shift, parking brake, and leveling hydraulics.

9) Rexroth variable displacement track drive motors.

The speed and drawbar pull of the machine is varied by automatically changing the displacement of the track drive motor(s) according to system pressure.

The Motors can manually be controlled by using the “motor shift switch” (figure #8) located on the right handcontrol panel.

In high range (fast speed - less drawbar) the motor(s) are at minimum displacement.

In low range (low speed - high drawbar) the motor(s) are at maximum displacement.

10) Fixed displacement, bi-directional, gear motors that turn the cooling fans for the engine radiator and hydraulic oil cooler.

11) High capacity oil cooler with a 120°-140°F (49°-60°C) thermal bypass and 50 psi (3,45 kPa) back pressure bypass.

12) Return and case drain filters in the hydraulic tank. See Section 2.2 in this manual for important information on the hydraulic tank and its components.

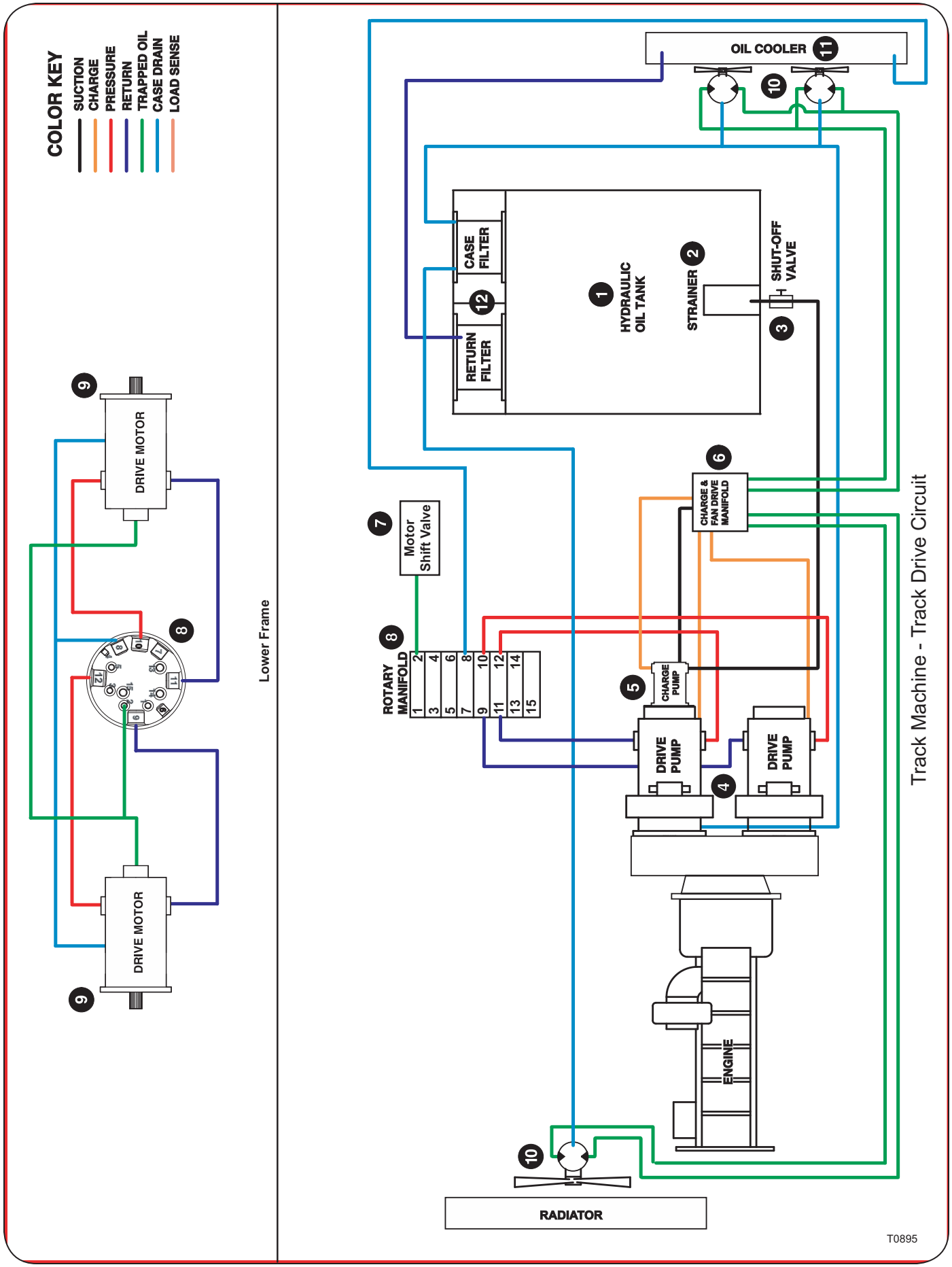


Figure 2: Simplified Travel Circuit Diagram - FORWARD TRAVEL (Dual Track Drive Motors)

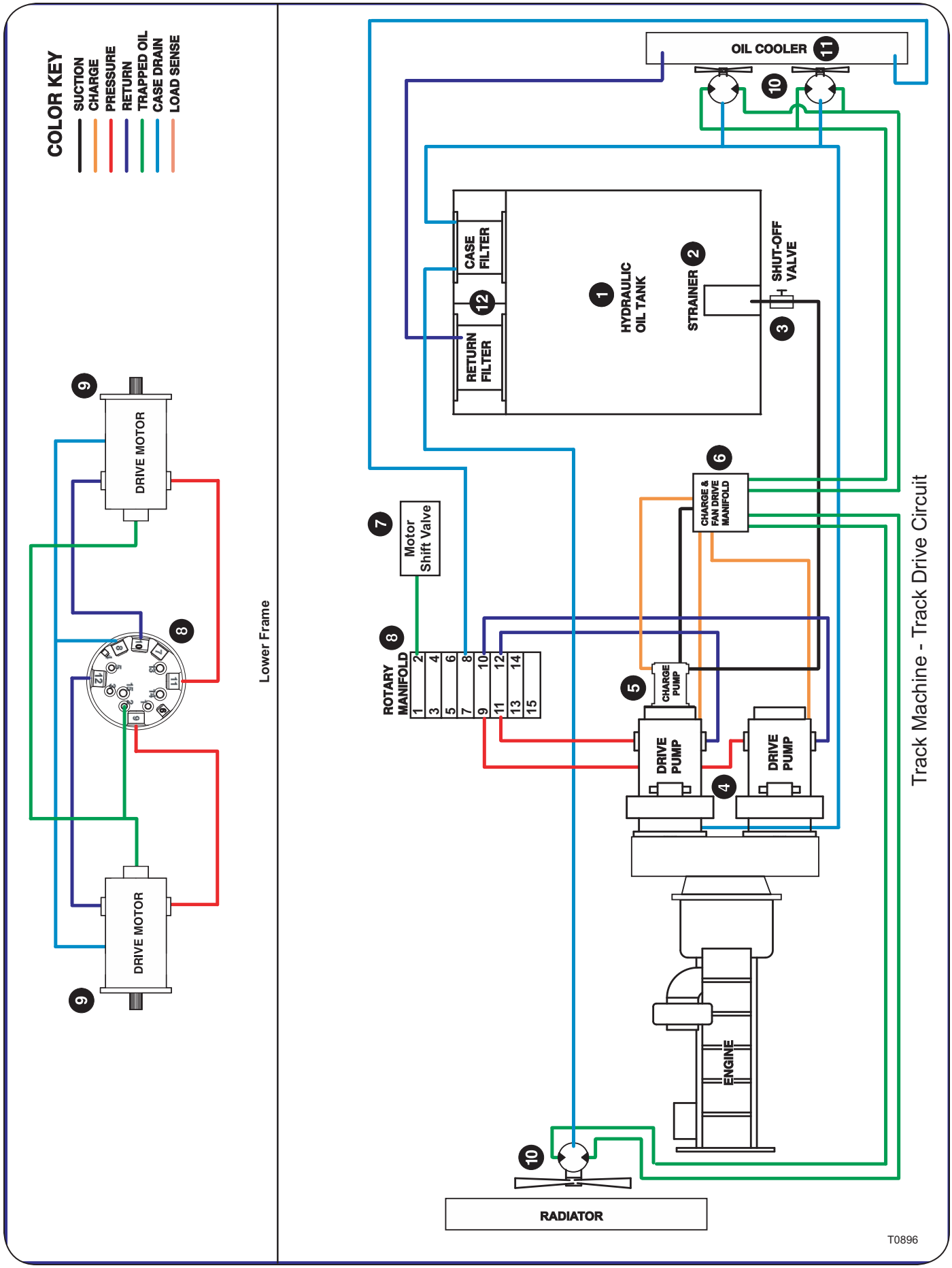


Figure 3: Simplified Travel Circuit Diagram - REVERSE TRAVEL (Dual Track Drive Motors)

Track Drive Circuit

General

The circuit type is a closed loop hydrostatic system. The directional changes in machine movement are controlled by swiveling the pump rotating group from a centered, neutral position to either forward or reverse. This is controlled by an electrical signal sent from a control pedal actuated by the operator to the Iqan control system where the signal from the foot control is converted to a current output that conrtrols the coils on the track drive pumps.

Description

A two Rexroth pumps are used on all configurations. These pumps are referred to as a over-center pump. This means that the rotary group, which provides oil flow around the hydrostatic loop, can travel over-center on either side of the neutral swash plate position. This allows oil flow to be reversed in the hydrostatic loop. The direction of machine travel is controlled by the angle of the pump swash plate to either side of neutral.

The track drive pumps are driven through a gearbox with a speed increaser. Doing so allows the top engine RPM to be reduced from 2200 to 1800 (which is the peak torque level of the Cummins engine). This is being done to reduce the fuel required and reduce the noise level in the cab.

The pumps then feed pressure down through the rotary manifold and to the two variable displacement Rexroth motors which are mated to the track drive planetaries.

Mechanics

When the operator activates the travel pedal for the forward direction, an electrical signal is sent to the pump controller via the IQAN digital control system.

The electrical signal activates the solenoid on the pump controller, which in turn moves a small control spool that allows command oil to the pump servo. The pump servo is connected directly to the swash plate in the pump and when it is shifted, strokes up the pump in the desired direction and forces the pump to produce flow to the motors via the rotary manifold. When changing directions, the swash plate goes to the opposite side of neutral to change the direction of oil flow.

The oil returning from the motors is then routed through the rotary manifold to the opposite work port on the pump. This oil is then reused by the pump and sent back down to the motors.

Charge / Fan Drive Pump

Because of the cooling requirements of the drive circuit, it is necessary to push oil through flushing circuits to keep the pump and motors cool. The charge pump provide the make-up oil for cooling the closed loop hydrostatic pump/motors and to provide pump control pressure. The pump and motors have a natural manufacturing leakage which cannot be eliminated. This leakage must be made up or the closed loop system would run dry of oil. The charge system continually feeds oil into the low pressure side of the closed hydrostatic loop.

The maximum pressure setting of the charge circuit is regulated by a charge sequence valve located above the track drive pumps. (see figure 6) Charge pressure is set at 400-425 PSI (27.6-29 bar) at 1400 RPM with a screw-type adjustment cartridge. Charge pressure also is used to release the swing brake, supply the pilot pressure manifold, and as make-up oil for the implement valve to prevent cavitation.

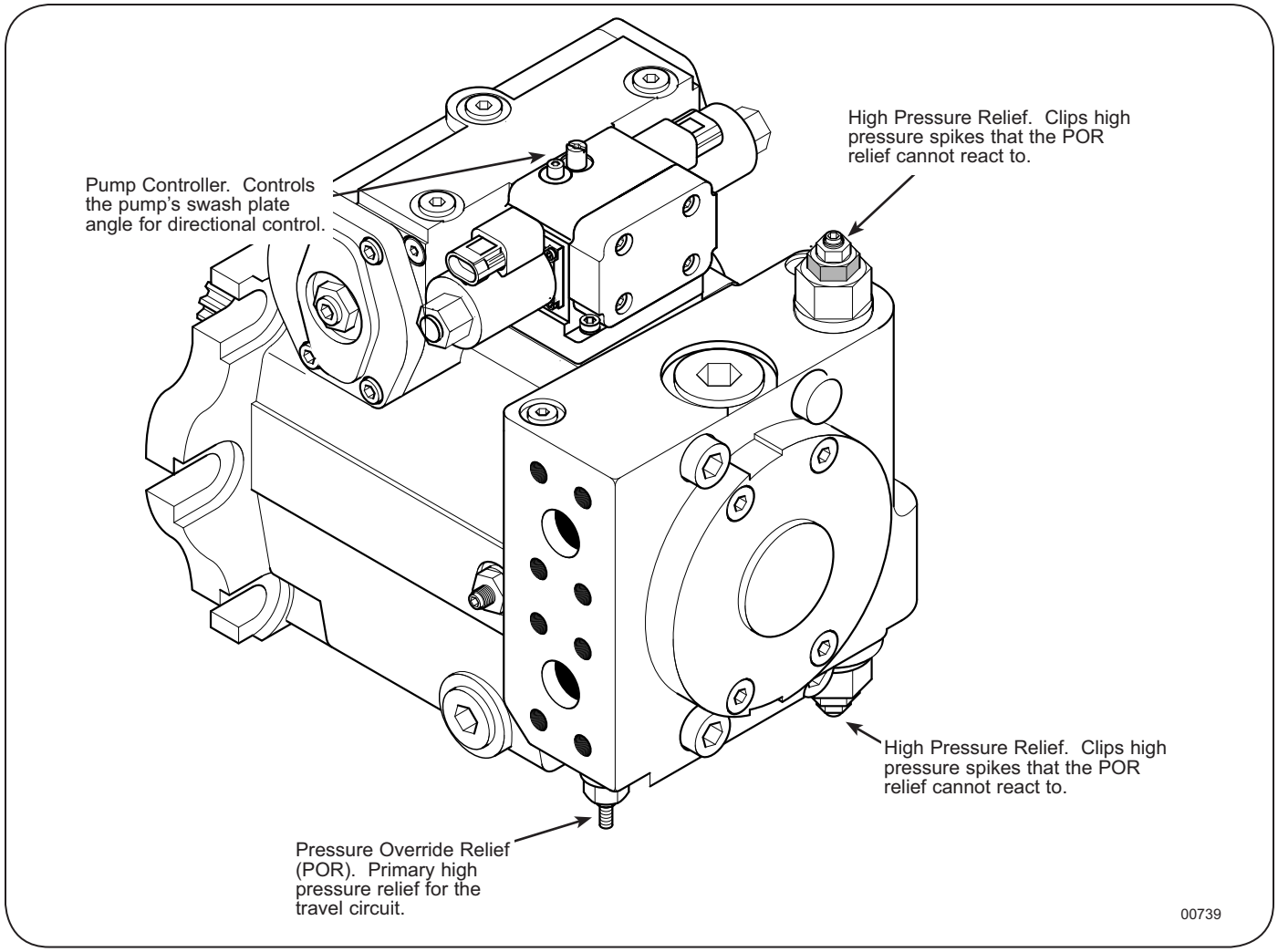


Figure 5: Drive Pump Breakdown

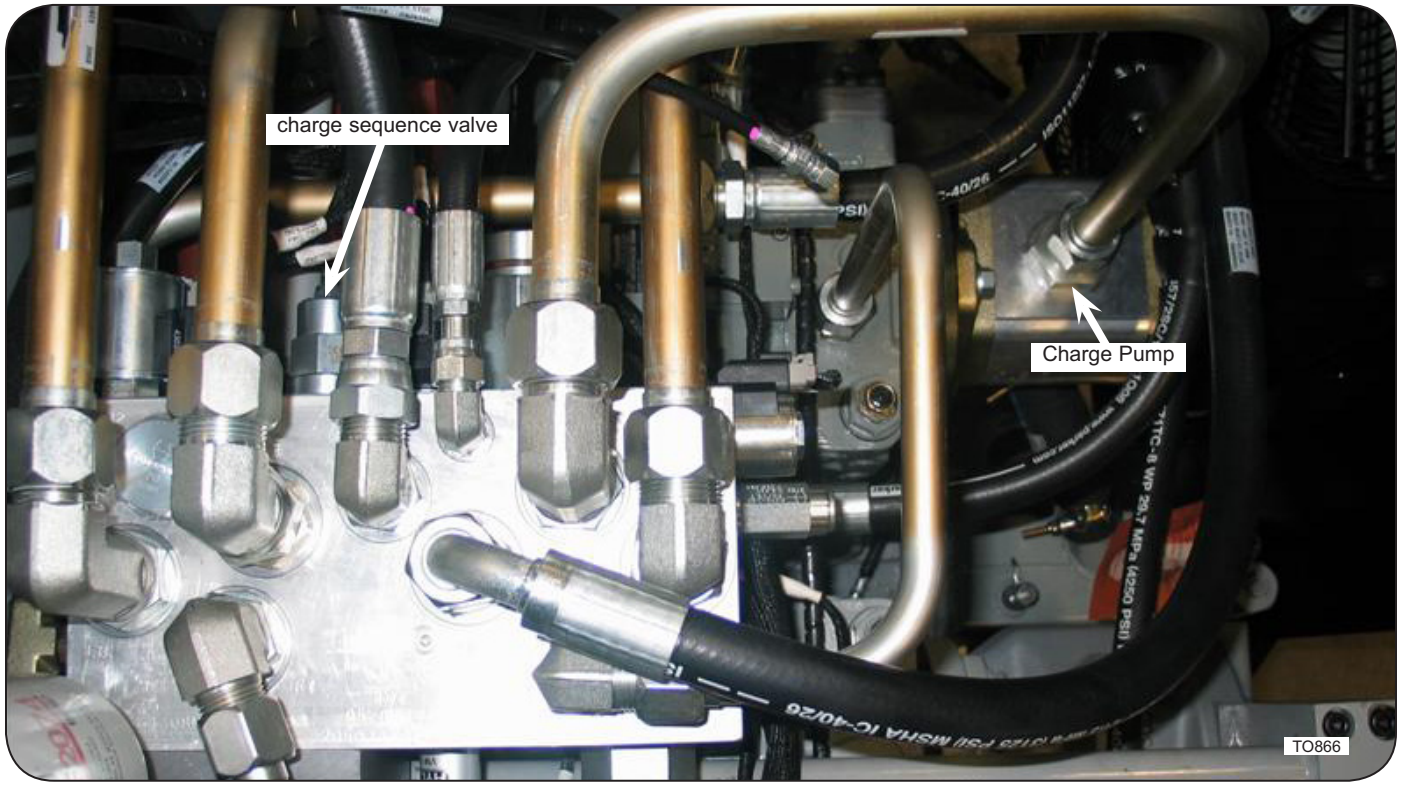


Figure6: Charge System

Drive Pump POR (Pressure Override)

The pressure override valve is unique in that it can limit the maximum allowed pump pressure without putting high pressure oil over a relief. See Figure 5.

When the machine encounters a condition where the drive pressure starts to exceed the maximum setting, the POR valve senses this. The POR valve then dumps the command oil that controls the pump servo to case. This allows the swash plate to move back towards the neutral position and reduce the pump flow to an amount that is enough to maintain the maximum allowed pressure.

The POR valve is adjustable and is set at 5500 PSI (380 bar) at 1400 RPM. See Section 7.2 in this manual for adjustment procedures.

High Pressure Relief Valves

The high pressure reliefs perform two important functions:

1) Prevent system or machine damage by venting oil from the hydrostatic loop should the machine stall against an immovable object. In this situation, a pressure spike is created in the circuit which could damage components. The high pressure reliefs sense this pressure spike and, if it exceeds the relief setting, vents oil from the hydrostatic loop into the charge system. This allows the pressure spike to dissipate without causing damage.

   Venting oil through a high pressure relief also generates an excessive amount of heat, so it is important that they are adjusted properly. The high pressure reliefs are like a safety relief and are seldom active in a properly designed and adjusted circuit.

   The high pressure reliefs are adjustable and are set at 6000 PSI (414 bar) at 1400 RPM. See Section 7.2 in this manual for adjustment procedures.

2) A high pressure relief, when located on the low pressure side of the hydrostatic loop, also acts as a check valve to allow charge oil to replenish the hydrostatic loop oil volume. This is required because of internal leakage in the pump and motors. If the leakage oil is not replaced, the hydrostatic loop would run low on oil and component damage would occur.

Case Flushing Orifices

Both the pumps and motors are equipped with case flushing orifices. The purpose of these orifices is to help keep the hydrostatic loop cool.

Hot oil in the hydrostatic loop is vented through the case flushing orifices into the case drains and then routed through the oil cooler. The vented loop oil is replaced by cool charge oil. This is very important, overheating would occur without the constant removal and replacement of a small amount of loop oil.

Pump Case Flushing Orifice

The pump case flushing orifice is located in the head of the pump and is part of the charge pressure spike relief. The charge spike relief protects the charge oil circuit from high pressure spikes.

Motor Case Flushing Orifice

The motor case flushing orifice is located in the control head of the motor.

Hydraulic Drive Motors Operation

Oil flow is controlled by engine speed or RPM of the track drive pump. The Track drive motors, being driven by the pump, change displacement automatically depending on the drawbar requirements.

When the machine starts to move and the pressure reaches 3500 PSI the front motor begins to shift. (42cc displacement all the way to the maximum displacement of 107cc for 735) and (52cc displacement all the way to the maximum displacement of 92cc for 725)

Because of the HP requirement, it is very important to back off on the foot pedal to maintain engine RPM when a tough pull is encountered. By backing off on the pedal, the displacement of the pump is reduced allowing the engine to maintain its RPM while holding pressure to keep moving the load at the sacrifice of speed. The reason it is so important to maintain engine RPM is because when the engine is slowing under heavy load there is more heat being generated and without RPM the engine fan and water pump slow down, not giving the cooling efficiencies required.

When maximum drawbar is required for a tough pull, the motor shift switch on the right handcontrol panel can be used to lock the Track drive motors in maximum displacement (maximum power and low speed). See Figure 7.

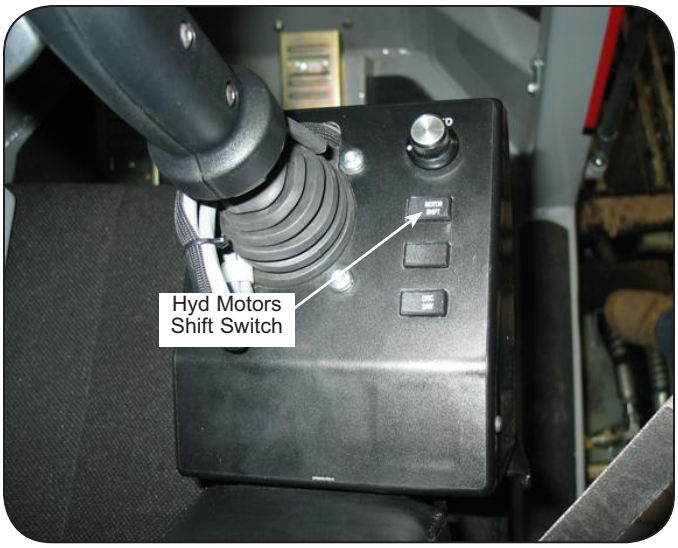


Figure 7: Drive Motor

Fan Drive Manifold

The Fan Drive Manifold is supplied oil from the charge pump and controls the oil cooler fans, the radiator fan, charger heater circuit and also regulates and filters the charge oil being supplied to the Track drive pump.

1) **Charge Heater Valve -** SV08-21 allows flow from 2 to 1. When energized, the valve's poppet closes on its seat, blocking flow from 1 to 2. When energized, the valve's poppet closes on its seat, blocking flow from 2 to 1. In this mode the cartridge will allow 1 to 2 flow after overcoming the solenoid force.

2) EV16-S34 is a spring-biased blocking valve which will shift to allow full flow from 1 to 2 only when 3 is vented to create a pressure drop across the internal orifice which exceeds the pressure value of the selected bias spring force. EV16-S34 is a vent-to-open directional valve.

3) **Oil Cooler Fan Valve -** TS38-21 blocks flow from 1 to 2 until sufficient pressure is present at 1 to open the valve by overcoming the preset spring force. With no current applied, the valve will relieve at ±50 psi of the spring maximum. Applying current to the coil reduces the induced spring force thereby reducing the valve setting.

4) **Radiator Fan Valve -**TS38-21 blocks flow from 1 to 2 until sufficient pressure is present at 1 to open the valve by overcoming the preset spring force. With no current applied, the valve will relieve at ±50 psi of the spring maximum. Applying current to the coil reduces the induced spring force thereby reducing the valve setting.

5) **Charge Pressure Adjustment -** SCGA Direct-acting sequence valves with reverse-flow check will supply a secondary circuit with flow once the pressure at the inlet (port 1) has exceeded the valve setting. Additionally, these valves incorporate an integral check valve to provide reverse flow from port 2 (sequence) to port 1 (inlet). The pressure setting of a sequence valve controls the pressure at port 1 relative to the pressure at the drain (port 3).

6) EP12-S35 is a spring-biased blocking valve which will shift to allow full flow from 1 to 2 only when pressure at 1 exceeds the cumulative pressure of 3, plus the bias spring pressure value.

7) **Charge Heater Valve -** When de-energized, the SV08-20 acts as a check valve, allowing flow from 1 to 2, while blocking flow from 2 to 1.When energized, the cartridge's poppet lifts to open the 2 to 1 flow path. In this mode, flow from 1 to 2 is severely restricted.

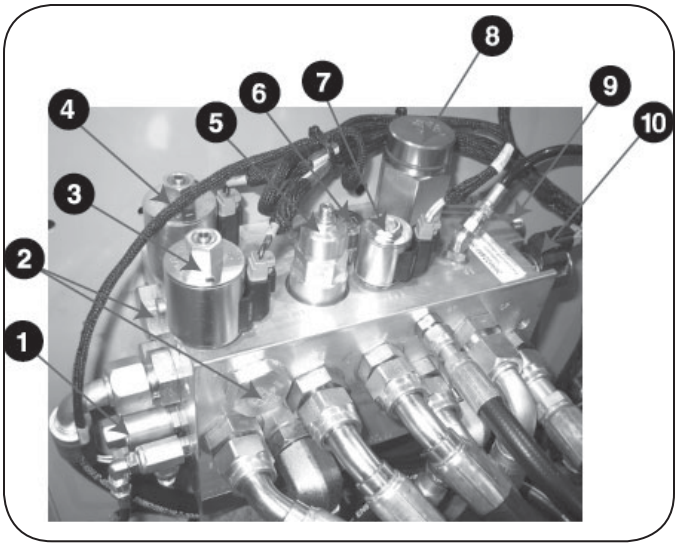


Figure 8: Charge Valve

8) PD42-M40 allows flow passage from 3 to 2 bidirectionally, while flow is blocked at 4. V is a spring chamber vent-to-atmosphere, which is internally O-ring sealed from the cartridge flow paths. On remote pilot signal at 1, the valve shifts to open from 3 to 4, while blocking flow at 2.

9) **Charge Heater Adjustment** - RV10-22 blocks flow from 2 to 1 until sufficient pressure is present at 2 to force the poppet from its seat.

10) **Fans Reverse Valve -** When de-energized, the SV08-20 acts as a check valve, allowing flow from 1 to 2, while blocking flow from 2 to 1.When energized, the cartridge's poppet lifts to open the 2 to 1 flow path. In this mode, flow from 1 to 2 is severely restricted.**Drive Pump POR (Pressure Override)**

Charge Filter / Fan Control Manifold

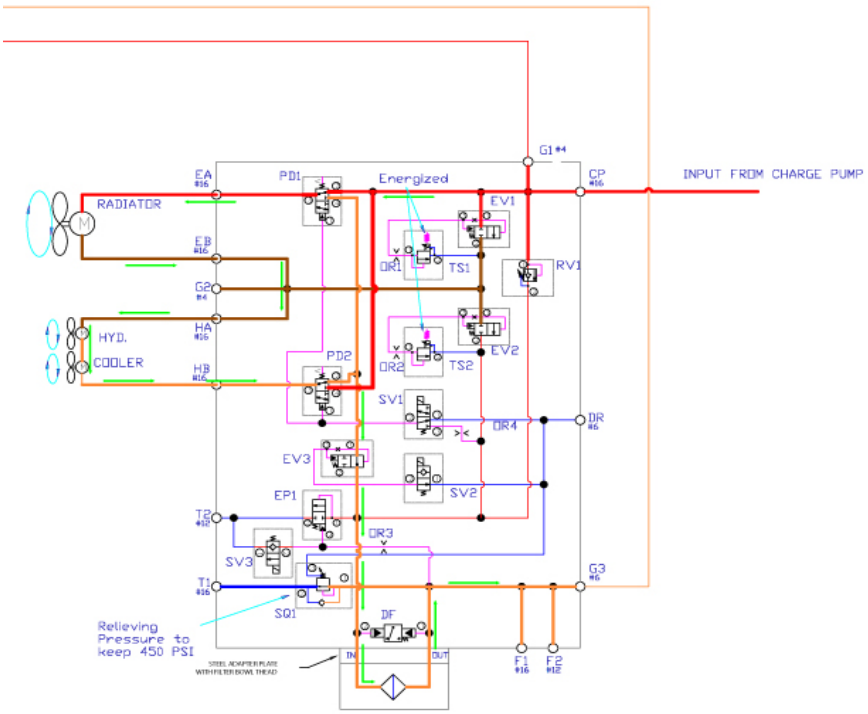
The charge filter / fan control manifold (CFFC) is located above the pump gear box. The CFFC controls the radiator fan speed, hydraulic cooler fans speed, fan direction, charge heater circuit and make up oil for the hydrostatic drive system. The charge pump (located on the back of the implement pump – wheeled machine and outside track pump – track machine) provides the flow of 32 gpm to the CFFC. The charge pump is a fixed displacement gear pump.

The charge oil enters the CFFC at the CP port. The radiator fan speed is control by an electrical activated solenoid (TS1) which in turn controls a proportional relief (EV1 - fan speed control). There is also a piloted directional valve (PD1) for auto reversing the fan. Remember, the charge oil will take the path of least resistance. IQAN electronically signals the TS1 solenoid to open or close the relief valve EV1. As the relief valve EV1 closes down, (higher pressure) the more oil flow is directed to the radiator PD1 directional valve and the faster the radiator fan turns. It takes around 950 psi to get the radiator fan to its top speed of 1900 to 2000 RPM at that time all the oil is flowing to the fan motor. If the TS1 solenoid tells the EV1 relief valve to open completely, all the oil flow will travel across the cartridge and not turn the radiator fan. Remember, oil takes the path of least resistance so why spin a fan if you do not have to. The CFFC ports feeding the radiator fan motor is EA and the oil returned to EB in the forwarder direction.

The charge oil that returns into the EB port is also directed to the hydraulic oil cooler motor thru port HA. The amount of oil that goes to the hydraulic oil cooler fan motors is controlled by the electrical activated solenoid (TS2) which in turn controls a proportional relief (EV2 - fan speed control). As explained above, the more the EV2 relieve is closed the more oil is directed to the hydraulic cooler fans and the faster they turn. It takes around 1000 psi to get the hydraulic cooler fans to their top speed of 2500 RPM.

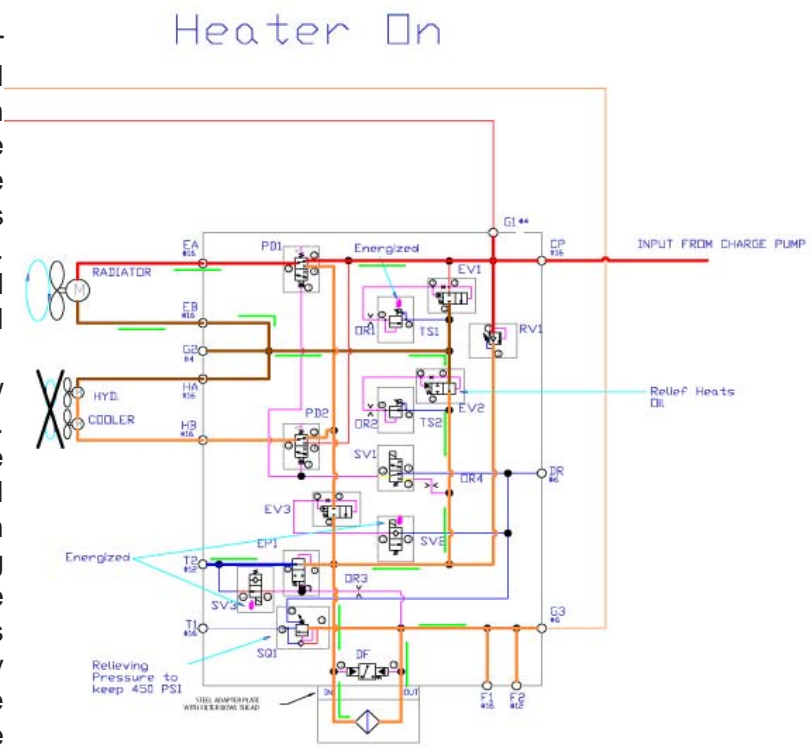
The EV3 piloted relief is open when the charge heater is off. The charge oil is now directed to the charge filter assembly. Clean charge oil passes thru the filter and flows to the F1 and F2 hydrostatic pump make up oil circuit. The charge pressure is maintained by the SQ1 relief cartridge (450 psi). If the charge oil is cold or the charge filer is plugged, the charge oil will start to build up pressure against the EP1 pilot relief cartridge and this cartridge will allow oil back to tank via the T2 port. The charge pressure filter is monitored by a differential pressure switch (DF). If the filter becomes plugged the pressure switch sends a signal to IQAN and a warning will appear on the IQAN display.

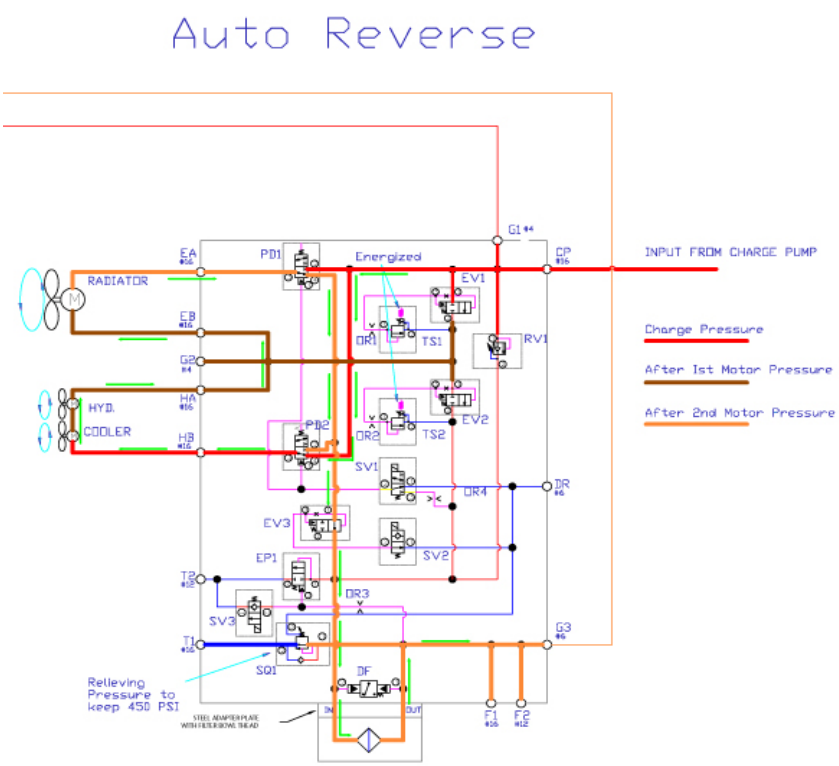
Fans On (Full RPM)



Charge Heater Circuit

The operator can select the charge heater circuit to heat up the hydraulic oil in cold weather. The charge heater activation button is feed into the IQAN computer system. If the button is activated IQAN sends a signal to the SV3 and SV2 solenoids. This in turn shifts the EP1 and EV3 piloted operated cartridges. Oil is blocked by the EV3 cartridge so the oil cooler fans will not turn and the oil is directed over the EV2 which heats up the oil. The EP1 cartridge is opened so the hot oil can flow directly to the hydraulic tank thru the T2 port. Please note that the engine cooling fans are still active. If engine cooling is needed IQAN sends a signal to the TS1 cartridge which signals the EV1 piloted relief to close forcing oil to the engine fan motor. Remember the more EV1 closes the faster the engine fans will turn. The hydraulic oil cooler fans are by passed during the charge heater mode. The hydraulic oil cooler fans will not turn in charge heater mode.





Auto Reversing Fans

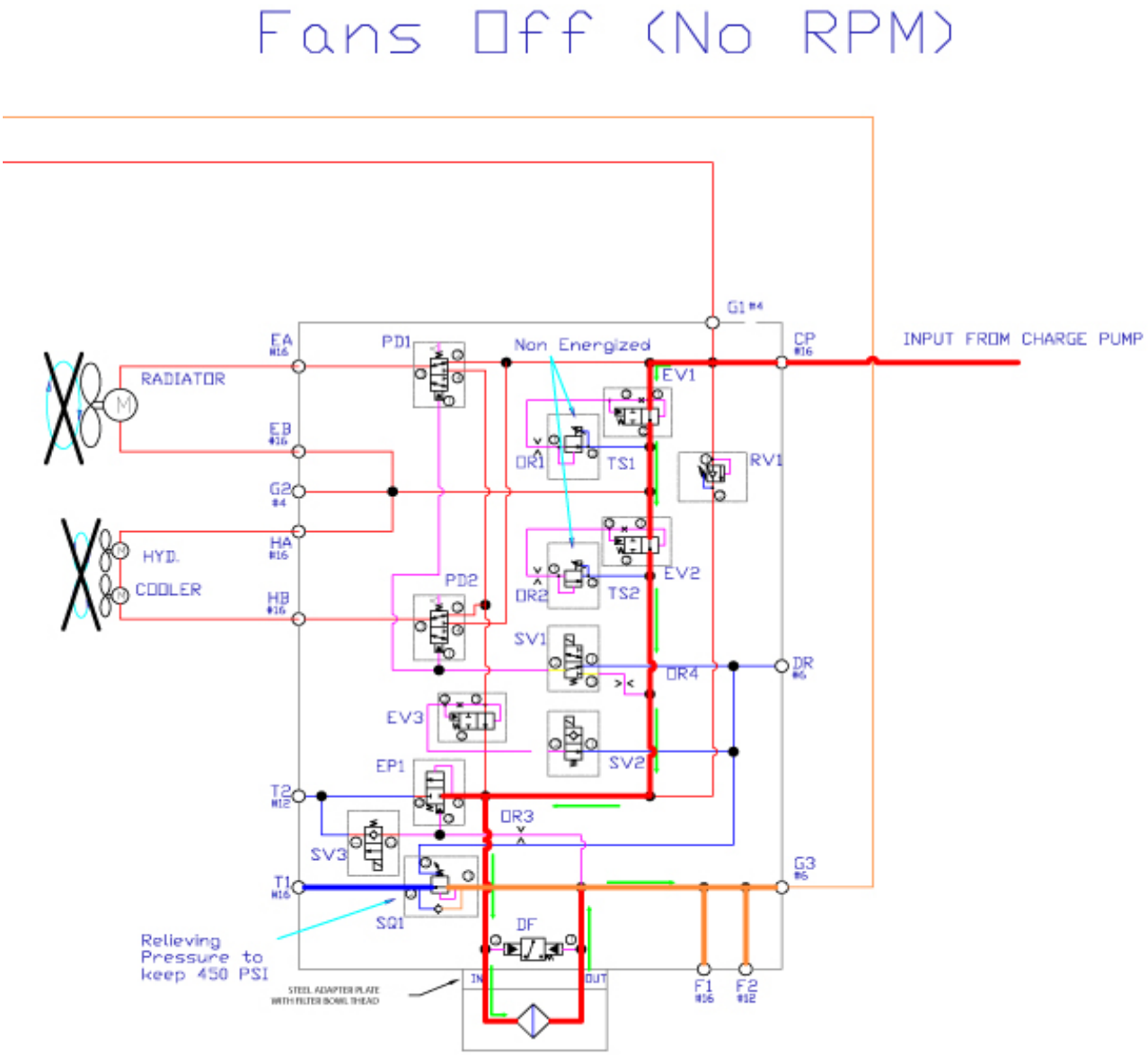
The auto fan reversing cycle is adjustable in the IQAN display. You can adjust how often the fans reverse and the duration of time the fans run in reverse. Once programmed, IQAN sends a signal to the SV1 solenoid valve which it turns activates the PD1 and PD2 directional valves. The charge oil that comes into the manifold in now blocked by the PD1 directional valve so the oil is directed to the PD2 directional valve which is now open to the hydraulic oil cooler fan motors. The TS1 and EV1 cartridges now control the speed of the oil cooler fan motors. The oil returns into the HA port and based on the TS2 and EV2 settings the radiator fan speed in reverse will vary.

There is a main relief for the manifold. The RV1 cartridge is the main relief for the system. Note all the fans and charge circuit are in series so there working pressure add together. The total system pressure for the CFFC manifold is (900 psi radiator fan, 1000 psi cooler fans, 450 psi charge make up oil and 50 psi control valve make up check valve which equals 2400 psi) the relief is set to 2500 psi.

Fans Off

With the EV1 and EV2 variable relief we can control the speed of the engine and hydraulic oil cooler fans. It takes horsepower (fuel) to spin fans so we do not want to over cool the engine and hydraulic oil. It is just wasted energy. The IQAN control system monitors the engine cooling needs. As the air to air or engine coolant temperatures increase IQAN controls the fan speeds to keep the system at an optimal temperature. The air conditioning condenser is also part of the radiator package. If the air conditioning is turned on a signal is sent to turn the engine fan on to ¼ its speed. The hydraulic oil temperature is monitored by a thermo sending unit mounted in the hydraulic reservoir. Based on the hydraulic oil temperature IQAN controls the speed of the hydraulic oil cooling fans. Because the temperature limits for the hydraulic oil depends on the viscosity index of the oil (ISO 32, 42, 68), IQAN will adjust the temperature / speed relationship of the cooling fan and oil temperature warning alarms based on the grade of oil in the machine.

When engine and hydraulic oil cooling is not needed the fans are off saving energy. At this time there is no signal to the TS1 and TS2 fan control cartridges which opens EV1 and EV2 proportional relief. Oil takes the path of least resistance, so the fans do not turn and the oil flows directly to the charge filter.



Troubleshooting Problems:

What to look for if both the engine radiator and oil cooler fans do not function or run slow.

1. Check the electrical output to the TS1 and TS2 cartridge. IQAN is monitoring the signal to the solenoid so if a wire breaks you should get a error code on the IQAN display. You can also check the output to the TS1 and TS2 cartridge by selection the cylinder Icon at the bottom of the screen. You will see a fan Icon appear on the right side of the display. Select this Icon. All the fan information will be shown on the display. Check and make sure you have current to the cartridges. If you do not have an output to the solenoid the following problems could exist.

   - Engine and oil cooler not to temperature.
   - Bad IQAN Module

2. Over ride the TS1 and TS2 solenoid cartridge by screwing in the cartridge stem. This will override the solenoid eliminating the need for the IQAN signal to the cartridge. If the fans work the problem is in the TS1 / TS2 cartridge or the EV1 or EV2 proportional relief.

3. If the fans still do not function the most likely problem is in the charge pump. The charge pump is common to both the radiator and oil cooler fans. If the charge pump flow rate is diminished the fan speeds will be affected.

4. The last place to look is at the fan motors. One would think it is unlikely that all three fan motors could be bad, but it is a remote possibility.

5. Check if the OR1 and OR2 orifices are plugged

What to look for if the oil cooler fan or fans are not functioning or running slow.

1. Check the electrical output to the TS2 cartridge. IQAN is monitoring the signal to the solenoid so if a wire breaks you should get an error code on the IQAN display. You can also check the output to the TS2 cartridge by selection the cylinder Icon at the bottom of the screen. You will see a fan Icon appears on the right side of the display. Select this Icon. All the fan information will be shown on the display. Check and make sure you have current (400 ma) to the cartridges.

2. Over ride the TS2 solenoid cartridge by screwing in the cartridge stem. This will override the solenoid eliminating the need for the IQAN signal to the cartridge. If the fans work the problem is in the TS2 cartridge or the EV2 proportional relief.

3. If one fan is working and the other operating slow the problem is most likely in the fan motor.

4. If both fans are slow the problem could be in both fan motor and or the charge pump. Over ride both radiator fan and oil cooler fan TS1 and TS2 cartridge. Check the pressure at the charge heater port. At full engine speed the pressure should read over 2000 psi. If not the problem is most likely in the pump.

What to look for if the radiator fan is not functioning or running slow.

1. Check the electrical output to the TS1 cartridge. IQAN is monitoring the signal to the solenoid so if a wire breaks you should get an error code on the IQAN display. You can also check the output to the TS1 cartridge by selection the cylinder Icon at the bottom of the screen. You will see a fan Icon appears on the right side of the display. Select this Icon. All the fan information will be shown on the display. Check and make sure you have current (425 ma) to the cartridges.

2. Over ride the TS1 solenoid cartridge by screwing in the cartridge stem. This will override the solenoid eliminating the need for the IQAN signal to the cartridge. If the fans work the problem is in the TS1 cartridge or the EV1 proportional relief.

3. If the fan is still slow the problem could be in the fan motor and or the charge pump. Over ride both radiator fan and oil cooler fan TS1 and TS2 cartridge. Check the pressure at the charge heater port. At full engine speed the pressure should read over 2000 psi. If not the problem is most likely in the pump. To check the fan motor remove the case drain and record the case drain flow. The flow should not be more then 1 gpm.

What to look for if the charge heater circuit does not work.

1. With a volt meter checks to see if you have 24 volts to the SV2 and SV3 solenoid. If you do not have a signal to the solenoid using the IQAN display check the charge heater output. This can be done by selecting the cylinder Icon at the bottom of the screen. You will see a fan Icon appears on the right side of the display. Select this Icon. All the fan information will be shown on the display. The charge heater should read true. IF the charge heater output does read true and you do not have 24 volts to SV2 adnSV3 check for a broken wire.

2. If you have power to both SV2 and SV3 solenoids make sure the coils are working. The coil should be magnetized if energized. If it is not magnetized change the coil.

3. If the coils are magnetized, you will need to inspect the SV2, SV3, EP1 and EV5 cartridges. Remove the cartridges and check for bad o-rings or defective components. Replace as needed.

What to look for if the wheel drive power seems weak.

1. Check the charge pressure at the charge pressure manifold port. The pressure should read 450 psi while the wheel pump is energized. Set the pressure using the SQ1 cartridge.

2. Check the charge filter for contamination. If you find aluminum in the filter most likely the charge pump is damaged. You should also see a reduction on engine and oil cooler fan speeds.

3. Change the charge filter element.

4. If the charge heater cartridges are stuck on (SV3, SV2, EV5 or EP1) the oil could be diverted from the charge system and sent directly to tank via the T2 port. Cap off the T2 port and see if the charge pressure increases. If so the cartridges should re cleaned or replaced. Do not operate the machine with the T2 line capped off.

What to look for if the auto reversing fan function does not work.

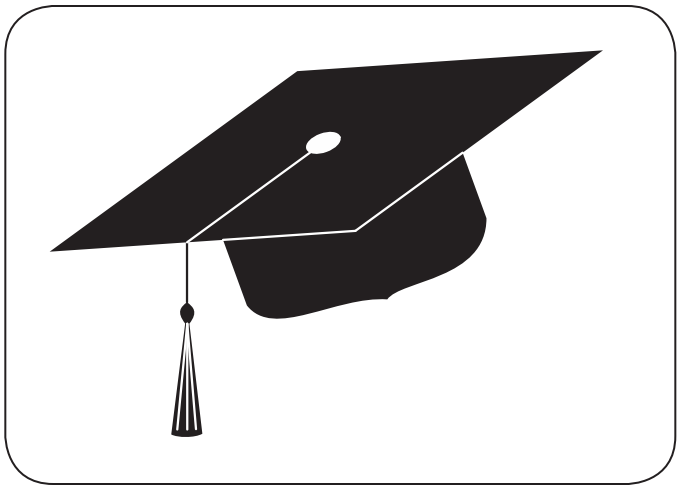
1. Check if you have power to the SV1 cartridge using a volt meter. If you do not have a signal to the solenoid using the IQAN display check the auto reversing output. This can be done by selecting the cylinder Icon at the bottom of the screen. You will see a fan Icon appears on the right side of the display. Select this Icon. All the fan information will be shown on the display. The fan reverse output should read true. If the output does read true you need to check for a broken wire.

2. Check to make sure the SV1coil is magnetized if powered. Change the coil of needed.

3. The SV1 coil controls the directional cartridges PD1 and PD2. Remove the directional cartridges check for bad o-rings or other defects.

4. Using the IQAN display check to make sure you have output to the TS1 and TS2 solenoids.

Section 7.2



Track Drive Circuit - Tests & Adjustments

Safety information

NOTICE

You must read and understand the warnings and basic safety rules, found in Group-1 of the Operation & Maintenance manual, before performing any operation, test or adjustment procedures.

Diesel exhaust fumes contain elements that are hazardous to your health. Always run engine in a well ventilated area. If in an enclosed space, vent exhaust to the outside.

At operating temperature, the engine, exhaust system components, cooling system components and hydraulic system components are HOT. Any contact can cause severe burns.

Tools Required

- Tachometer
- 0 - 60 psi (0 - 1000 kPa) pressure gauge
- 0 - 600 psi (0 - 5 Mpa) pressure gauge
- 0 - 6000 psi (0 - 50 Mpa) pressure gauge
- 0 - 10,000 psi (0 - 80 Mpa) pressure gauge
- 9/16”, 5/8”, 11/16”, 3/4”, 7/8”, 13/16”, 15/16”, 1-1/4”, & 1-3/8” wrenches
- 5/32” & 1/4” allen wrenches
- 10mm, 13mm, 17mm, 24mm wrenches
- 3mm, 4mm, 5mm, 8mm allen wrenches
- (2) PN# 15869, TIMBCO quick-couple adapter
- PN# 16031, #4 ORS plug
- PN# 16032, #8 ORS plug
- PN# 15176, #4 ORS run tee
- Gauge test hose
- (2) Gauge test hose w/#4 JICF ends
- #8 test hose w/#8 ORSF ends
- 24” (61cm) jumper hose w/#4 JICM ends
- (2) #6 ORBM - #4 JICM adapter
- #12 ORBM - #4 JICM adapter
- Calibrated container - 10 gallons (38 litres)
- Stop watch

- The operator or another mechanic may be required to operate a control while a pressure reading is being taken.

NOTE: Each machine is shipped from the factory with at least one 600 psi and one 10,000 psi gauge with quick-couple adapters. The gauges can be found in the machine Up-Time Kit.

Track Drive Charge Pressure

Specification:

NOTICE

DO NOT set charge pressure above 450 psig (31 bar). Overheating of the circuit and damage to the system can result.

425 psig (29.3 bar)

Test Standards:

- Hydraulics at operating temperature of 140°F (60°C) or greater.
- Engine operating at high idle (approx. 1400 RPM).

Procedure:

1. Ensure the hydraulics are at correct operating temperature.

2. Start the engine and run at low idle.

3. Connect the 600 psi pressure gauge, with the quick-couple adapter attached, to the gauge port tap provided on the centralized pressure check manifold. See Figure 1.

   NOTE: Only install a 600 psi pressure gauge after the engine is running. If the gauge is installed before the engine is started it can be damaged.

6. Increase engine throttle to high idle (approx. 1400 RPM).

7. Read the pressure gauge, the track drive charge pressure should be set at 425 psig (29.3 bar).

   If track drive charge pressure setting is correct, go to step #10. If adjustment is required, continue with step #8.

8. Open the rear engine guard and locate the track drive charge pressure manifold assembly. See Figure 2.

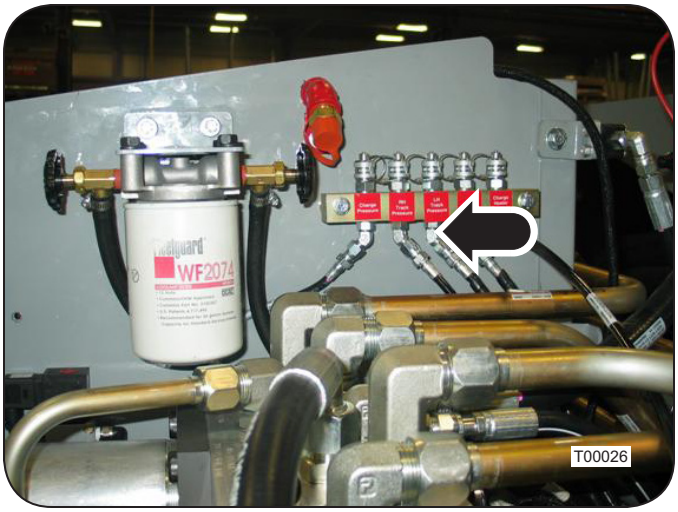


Figure 1: Drive Charge Pressure Gauge Port Tap

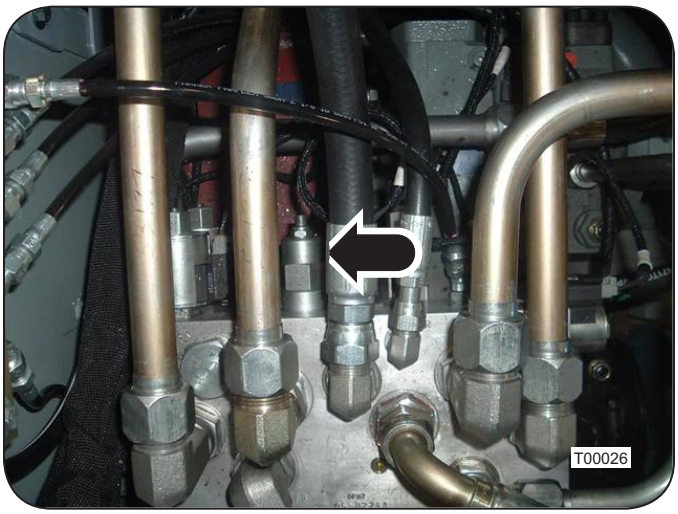


Figure 2: Charge Pressure Manifold

9. Locate the large charge pressure relief cartridge. See Figure 2. Use the 9/16” wrench and 5/32” allen wrench to loosen the jam nut.

   Turning the adjustment setscrew CLOCKWISE increases the pressure setting. Turning the setscrew COUNTER-CLOCKWISE decreases the pressure setting.

10. Read the pressure gauge, re-adjust pressure setting as required. After the correct pressure setting is made, tighten the jam nut to lock adjustment setting.

11. Shut down the engine. Remove the pressure gauge, remove the pin stock in the left and right track sprocket. Close and secure all covers and guards.

Track Drive Pump Directional Relief Pressure

Specification:

6000 psi (414 bar)

Test Standards:

- Hydraulics at operating temperature of 140°F (60°C) or greater.
- Engine operating at high idle (approx. 1400 RPM).

Procedure:

NOTICE

Operating the track drives over relief produces extreme heat that can damage hydraulic system components. Make all readings and adjustments as quickly as possible.

1. Ensure the hydraulics are at correct operating temperature.
2. Insert 2 1/2” pin stock in left and right track sprocket. See Figure 3. This will prevent the machine from moving.
3. Connect the 10,000 psi pressure gauge, with the quick-couple adapter attached, to the gauge port tap provided on the centralized pressure check manifold. See Figure 4.
4. Access the track drive pump behind the operator’s cab in front of the hydraulic tank.
5. Before the directional reliefs can be set the track drive POR relief must be cancelled. Locate the POR relief on the track drive pump. See Figure 5.

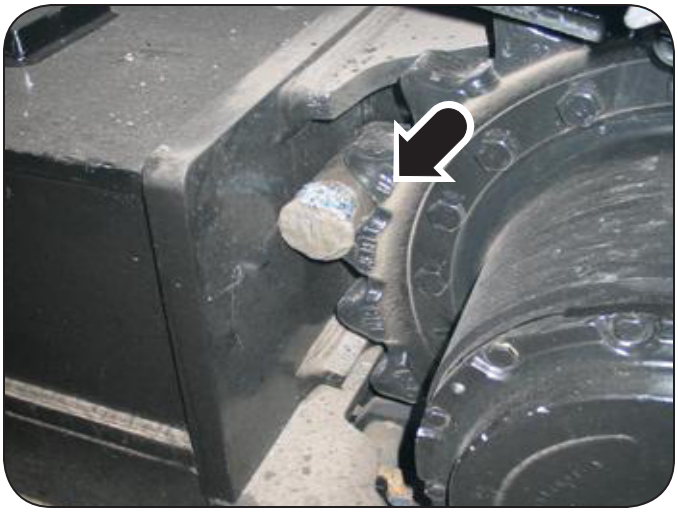


Figure 3: Lock Pin in Sprocket

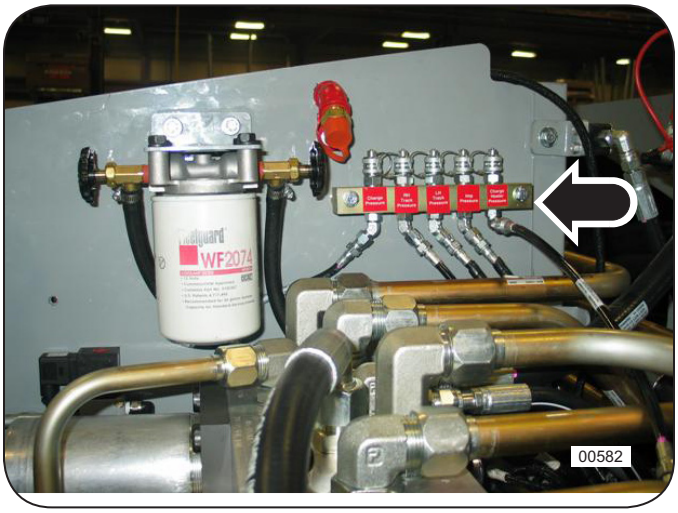


Figure 4: Drive Pump Pressure Gauge Port Tap

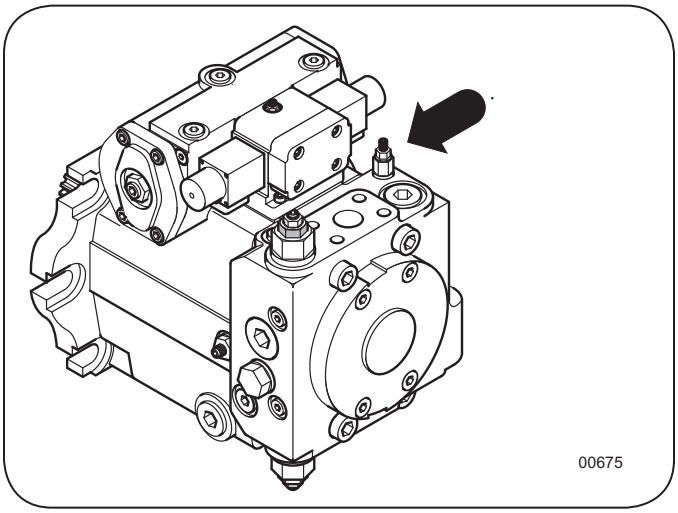


Figure 5: Drive PRO Relief

6. Use the 13mm wrench and 4mm allen wrench to loosen the jam nut on the POR relief adjustment setscrew.

7. Very carefully, turn the POR adjustment screw in CLOCKWISE until it just touches bottom then back it off 1/4 turn. This cancels the POR relief and allows the gauge to read the directional relief settings.

   NOTE: Do not turn the POR adjustment setscrew in too far or it will damage the relief valve when it bottoms out.

8. Instruct the operator or another mechanic to start the engine and run at high idle (approx. 1400 RPM).

9. On your signal, have the operator or another mechanic apply the travel brake and activate the FORWARD travel function while you take a pressure reading. Then activate the REVERSE travel function and take a reading. Track drive directional relief pressure should be set at 6,000 psi (414 bar) in both directions.

   If track drive directional relief pressure settings are correct, go to step #15. If an adjustment is required, continue with step #10.

10. Locate the directional relief for the direction of travel that requires adjustment. See Figure 6.

11. Use the 17mm wrench and 5mm allen wrench to loosen the jam nut on the directional relief adjustment setscrew.

13. On your signal, have the operator or another mechanic apply the travel brake and activate the required direction of travel while you set the directional relief to 6,000 psi (414 bar).

    Turning the adjustment setscrew CLOCKWISE increases the pressure setting. Turning the setscrew COUNTER-CLOCKWISE decreases the pressure setting.

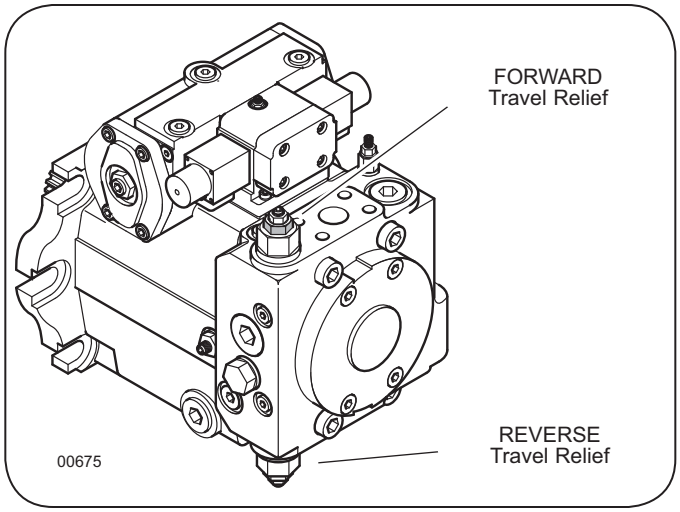


Figure 6: Drive POR Relief

14. After the correct pressure setting is made, hold the adjustment setscrew stationary and tighten the jamnut to hold the pressure setting.

15. After testing or making adjustments to the track drive reliefs, re-adjust the track drive POR pressure setting to specification.

16. Shut down the engine and remove the pressure gauge.

17. Remove the pin stock in the left and right track sprocket. Close and secure all covers and guards.

18. If possible, start the engine and operate the track drives to help cool the circuit down.

19. Shut down the engine.

Track Drive Pump POR Pressure

Specification:

5500 psig (379 bar)

Test Standards:

- Hydraulics at operating temperature of 140°F (60°C) or greater.
- Engine at high idle (approx. 1400 RPM).
- Track drive pump charge pressure and charge spike relief set to specification.

Procedure:

NOTICE

Operating the track drives over relief produces extreme heat that can damage hydraulic system components. Expedite all pressure readings and adjustments.

1. Ensure the hydraulics are at correct operating temperature.

2 .Insert 2 1/2” pin stock in left and right track sprocket. See Figure 7. This will prevent the machine from moving.

NOTE: Lower solenoid manifold location varies by machine configuration.

3. Connect the 10,000 psi pressure gauge, with the quick-couple adapter attached, to the gauge port tap provided on the centralized pressure check manifold. See Figure 8.

4. Instruct the operator or another mechanic to start the engine and run at high idle (approx. 1400 RPM).

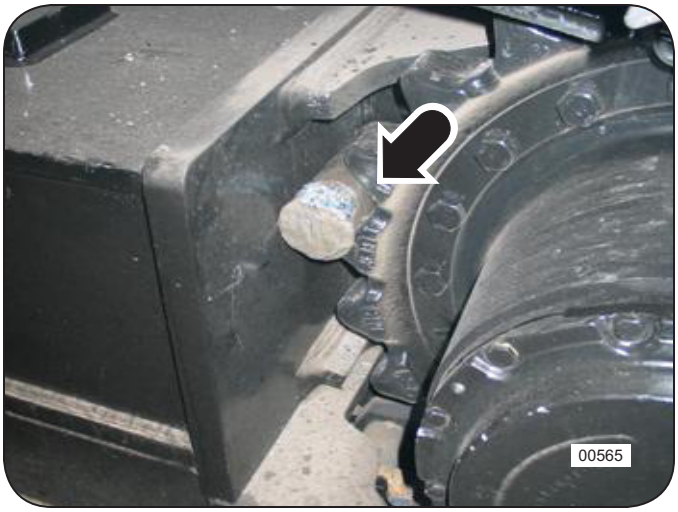


Figure 7: Lock Pin in Sprocket

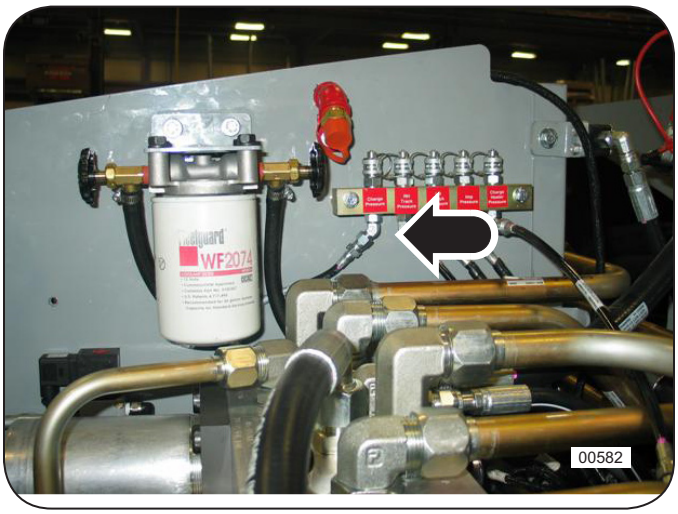


Figure 8: Drive Pump Pressure Gauge Port Tap

5. On your signal, have the operator or another mechanic apply the travel brake and activate the FORWARD travel function while you take a pressure reading. Track drive pump POR pressure should be set at 5500 psig (379 bar).

If track drive pump POR pressure is correct, go to step #11. If an adjustment is required, continue with step #7.

6. Locate the POR relief on the track drive pump. See Figure 9. Use the 13mm wrench and 4mm allen wrench to loosen the jam nut on the POR relief adjustment setscrew.

7. On your signal, have the operator or another mechanic apply the travel brake and activate the FORWARD travel function while you set the POR relief to 5500 psig (379 bar).

   Turning the adjustment setscrew CLOCKWISE increases the pressure setting. Turning the setscrew COUNTER-CLOCKWISE decreases the pressure setting.

8. After the correct pressure setting is made, hold the adjustment setscrew stationary and tighten the jamnut to hold the pressure setting.

9. Shut down the engine and remove the pressure gauge.

10. Remove the pin stock in the left and right track sprocket. Close and secure all covers and guards.

11. If possible, start the engine and operate the track drives to help cool the circuit down.

12. Shut down the engine.

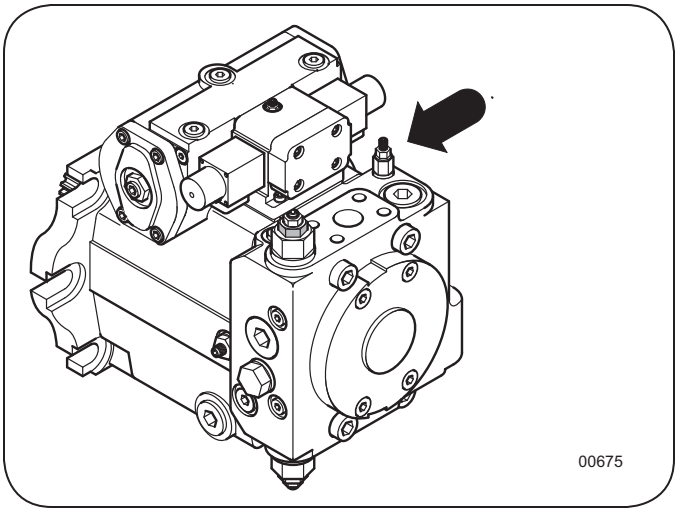


Figure 9: Drive POR Relief

Track Drive Pump Null

Specification:

Obtain the lowest possible pressure between ports “X1” and “X2” with the jumper hose installed.

Test Standards:

- Hydraulics at operating temperature of 140°F (60°C) or greater.
- Engine operating at idle

Procedure:

1. Ensure the hydraulics are at correct operating temperature.
2. Insert 2 1/2” pin stock in left and right track sprocket. See Figure 10. This will prevent the machine from moving..
3. Access the track drive pump behind the swing-out guard located below the hydraulic tank.
4. Using the 3/16” allen wrench, remove the plugs from ports “X1” and “X2”. See Figure 12. Install the #6 ORBM adapters into the ports.
5. Connect the 24” (61cm) jumper hose between ports “X1” and “X2”.
6. Start the engine and run at idle. The engine will remain running throughout the procedure.
7. Connect the 10,000 psi pressure gauge, with the quick-couple adapter attached, to the gauge port tap on the track drive pump. See Figure 11.

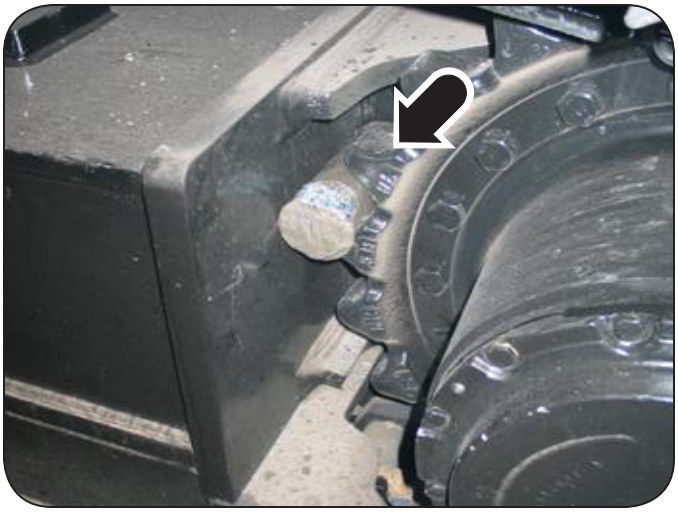


Figure 10: Lock Pin in Sprocket

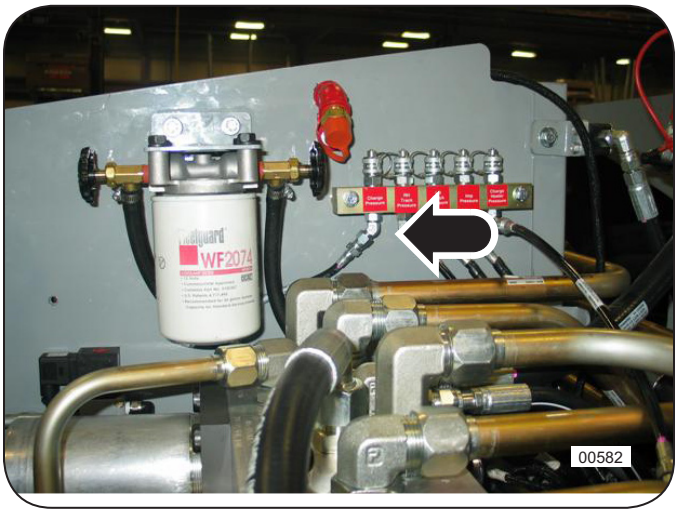


Figure 11: Drive Pump Pressure Gauge Port Tap

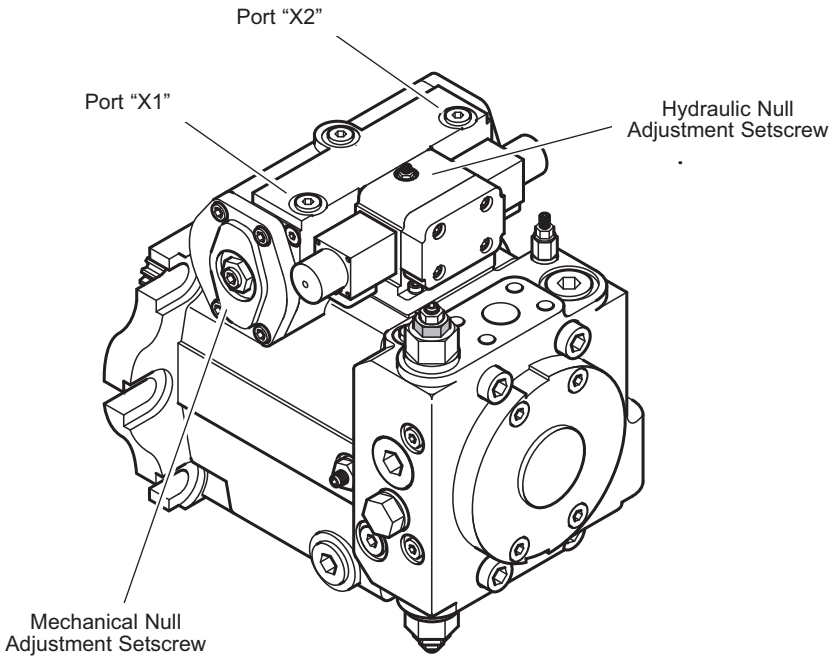


Figure 12: Hydrostatic Pump Null Adjustments

8. The mechanical null adjustment is made with a large setscrew in the control piston cover. See Figure 13. Use the 24mm wrench and 8mm allen wrench, to loosen the jamnut and turn the adjustment setscrew in and out until the gauge reads the lowest possible pressure.

   NOTE: The lowest pressure reading indicates when the control piston is in the centered null position.

9. Remove the 10,000 psi gauge and install the 600 psi gauge in its place. Repeat step #8 to make the final adjustment.

10. Remove the 600 psi gauge and install the 10,000 psi gauge in its place.

NOTICE

The hydraulic null adjustment is made with an eccentric pin and should not be turned more than 90° from center (as indicated by a notch on the adjustment screw), otherwise damage to the eccentric pin could result.

11. The hydraulic null adjustment is made with a small setscrew on top of the stroke control. See Figure 12. Use the 13 mm wrench and 4 mm allen wrench, to loosen the jam nut and turn the adjustment setscrew in and out until the gauge reads the lowest possible pressure.

    NOTE: The lowest pressure reading indicates when the control spool is in the centered null position.

12. Remove the 10,000 psi gauge and install the 600 psi gauge in its place. Repeat step #11 to make the final adjustment.

13. Shut-down engine and remove jumper hose, fittings, and gauge.

14. Remove the pin stock in the left and right track sprocket. Close and secure all covers and guards.

15. Procedure complete.

Track Drive Pump Case Drain Pressure

Specification:

Maximum 30 psi (2 bar) allowed.

Test Standards:

- Hydraulics at operating temperature of 140°F (60°C) or greater with correct track drive and charge pressure settings.
- Engine operating at full throttle

Procedure:

1. Produce a gauge test hose that will allow you to connect a 60 psi gauge to the adapter that will be installed into the track drive pump case drain port.

2. Ensure the hydraulics are at correct operating temperature.

3. Insert 2 1/2" pin stock in left and right track sprocket. See Figure 13. This will prevent the machine from moving.

4. Access the track drive pump behind the operator's cab in front of the hydraulic tank.

5. Locate and remove the track drive pump case drain plug in port "R". Install the #12 ORBM - #4JICM adapter into the port.

6. Install the gauge test hose and pressure gauge to the case drain port adapter.

NOTICE

Be sure the pump case is full of oil before starting the machine otherwise catastrophic damage to the pump will occur.

7. Start engine and set the hydraulic motor shift control to the "OFF" or "High" position. See Figure 14.

8. Advance engine to full throttle.

9. On your signal, have the operator or another mechanic apply the travel brake and activate full FORWARD travel while you take a pressure reading. Then activate full REVERSE travel and take a reading.

   The track drive pump case drain pressure should not exceed specification. If the specification is exceeded, look for conditions that would increase backpressure in the case drain circuit such as a plugged case drain filter element, failing component, etc.

10. Shutdown the engine and re-install the track drive pump case port plug.

11. Re-connect the parking brake solenoid coil harness.

12. Procedure complete.

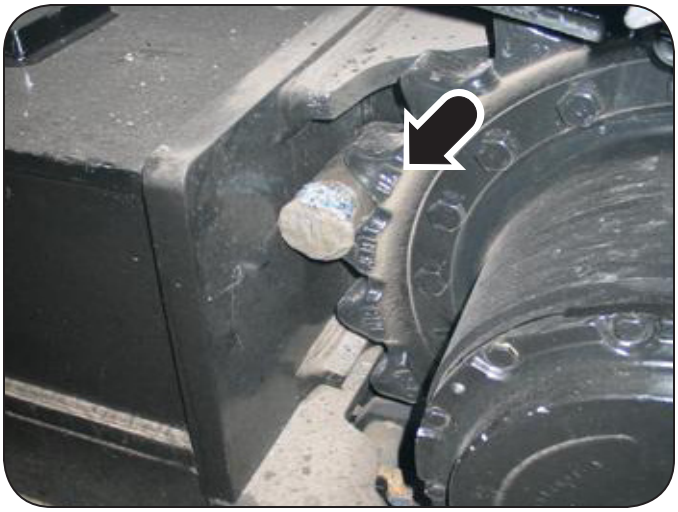


Figure 13: Lock Pin in Sprocket

Figure 14: Hydraulic Motor Shift Control

Track Drive Motor Begin Of Stroke

Specification:

Track drive pump POR relief pressure:

- 5500 psig (379 bar)

Begin of stroke pressure:

Track Motor:
3500 psig (241 bar)

Shift pressure:

Motor:
- Motor - 1750 psig (138 bar)

Test Standards:

- Hydraulics at operating temperature of 140°F (60°C) or greater with correct track drive and charge pressure settings.
- Engine at running at idle.

NOTICE

Operating the track drives over relief produces extreme heat that can damage hydraulic system components. Expedite all pressure readings and adjustments.

Procedure:

1. Ensure the hydraulics are at correct operating temperature.

2. Release turbo boost pressure in the hydraulic tank at the turbo boost release valve. See Figure 16.

3. Insert 2 1/2” pin stock in left and right track sprocket. See Figure 17. This will prevent the machine from moving..

4 . Access the track drive pump behind the operator’s cab in front of the hydraulic tank.

5. Remove the guards over the track drive motors and gearbox in the rear frame.

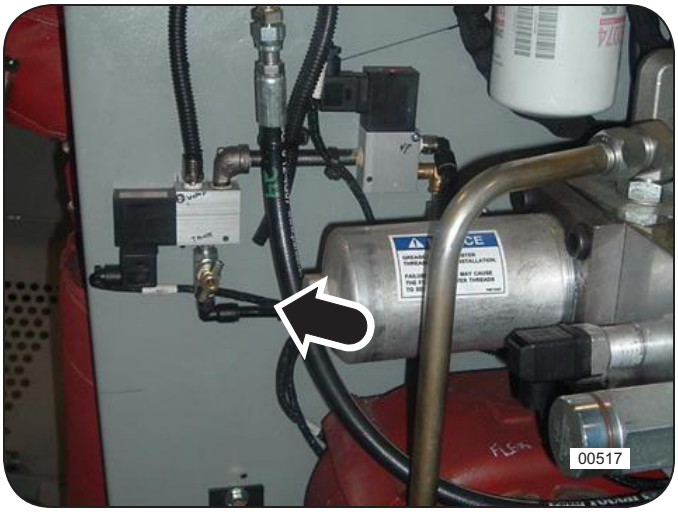


Figure 16: Turbo Boost Release Valve

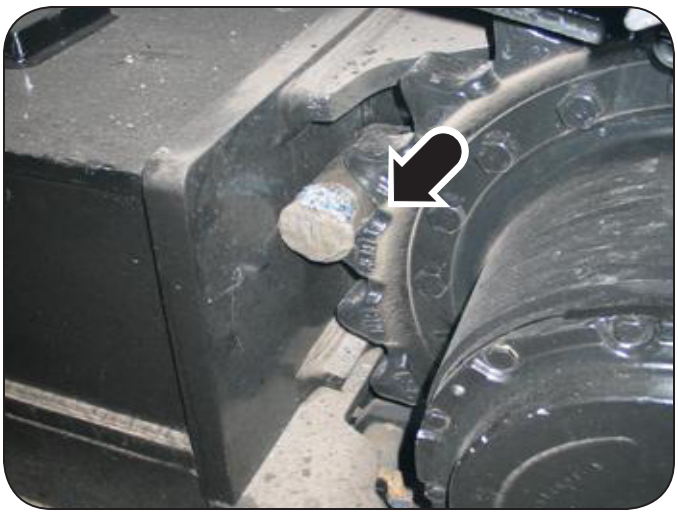


Figure 17: Lock Pin in Sprocket

6. Locate port “M1” on each track drive motor. See Figure 18.

7. Remove the plug in port “M1” of each motor and install a #06ORBM adapter into the port. Install a gauge test hose to each adapter.

8. Disconnect the motor shift line where it enters port “X”. See Figure 19. Plug the line and leave the fitting open to atmosphere.

   NOTE: Failure to leave the motor fitting open to atmosphere will result in an incorrect begin of stoke pressure readings.

9. Set the track drive pump POR pressure to the Begin Of Stroke Pressure value for the motor being adjusted. See “Track Drive POR Pressure Adjustment” in this section for procedure.

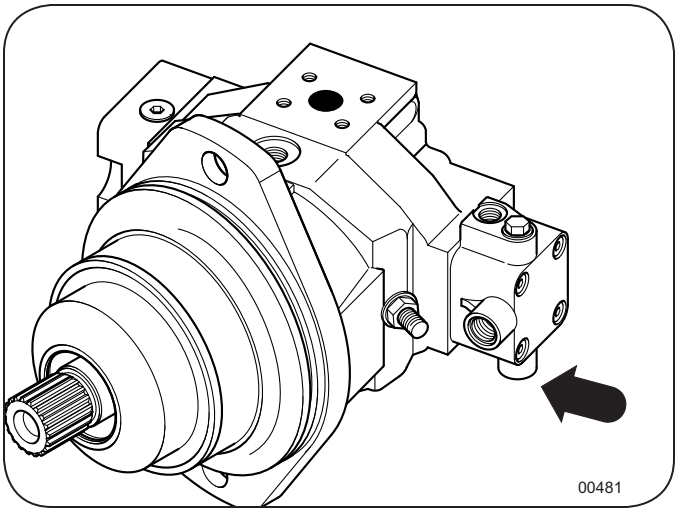


Figure 18: Drive Motor Port “M1”

NOTE: If the begin of stroke pressure is 3500 psi then the track drive pump POR will be set to 3500 psi and the motor shift setting will be 1750 psi.

10. Connect the 6000 psi pressure gauge to the gauge test hose from the motor being adjusted.

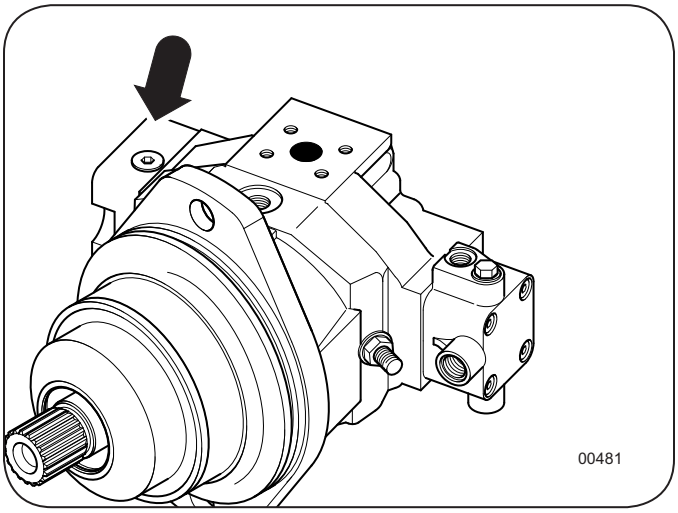


Figure 19: Drive Motor Port “X”

11. Locate the begin stroke adjustment setscrew on the motor. See Figure 20. Use the 10mm wrench and 3mm allen wrench to loosen the jamnut and back the setscrew out COUNTER-CLOCKWISE a few turns. This will allow easier setting of the motor.

    NOTE: The begin of stroke adjustment is made using the motor shift pressure at port “M1”. The motor shift pressure should be 1/2 the desired begin of stroke pressure.

Figure 20: Drive Motor Begin Of Stoke Adjustment

12. On your signal, have the operator or another mechanic apply the travel brake and activate full FORWARD travel function while you turn the begin of stoke setscrew in CLOCKWISE until the shift pressure reaches specification.

13. Instruct the operator or another mechanic to deactivate the FORWARD travel function as soon as the adjustment is made to avoid excessive heat build-up in the track drive circuit.

14. After the correct pressure setting is made, hold the adjustment setscrew stationary and tighten the jamnut to hold the pressure setting.

15. If required, repeat step #12 thru #16 for the other track drive motor.

NOTE: Because the motor shift setting can be very sensitive to adjust, you may want to repeat adjustment a second time to insure proper adjustment.

16. After begin of stroke pressure have been adjusted, reset the track drive pump POR relief pressure to specification.

17. Shut down the engine.

18. Release turbo boost pressure at the turbo boost release valve.

19. Remove the #06ORBM adapters and gauge test hoses from the track drive motors. Re-install the plugs to port “M1”.

20. Re-install the guards over the track drive motors and transfer case.

21. Remove the pin stock in the left and right track sprocket. Close and secure all covers and guards.

22. Procedure complete.

Drive Motor Case Drain Pressure

Specification:

Maximum 45 psig (3.1 bar) allowed.

Test Standards:

- Hydraulics at operating temperature of 140°F (60°C) or greater with correct track drive and charge pressure settings.

00482

- Engine operating at full throttle.

Procedure:

1. Produce a gauge test hose that will allow you to connect a 60 psi gauge to the #4 adapter that will be installed into the track drive motor case drain port.

2. Ensure the hydraulics are at correct operating temperature.

3. Insert 2 1/2” pin stock in left and right track sprocket. See Figure 21. This will prevent the machine from moving.

4. Access the track drive pump behind the operator’s cab in front of the hydraulic tank.

5. Remove the guards over the track drive motors.

6. Locate and remove a track drive motor case drain plug in a port 180° from the motor’s case drain line. Install the #12 ORBM adapter into the port.

7. Install the gauge test hose and pressure gauge to the case drain port adapter.

NOTICE

Be sure the pump case is full of oil before starting the machine otherwise catastrophic damage to the pump will occur.

8. Start engine and run at idle.

9. Set the hydraulic motor shift control to the “High” position. See Figure 22.

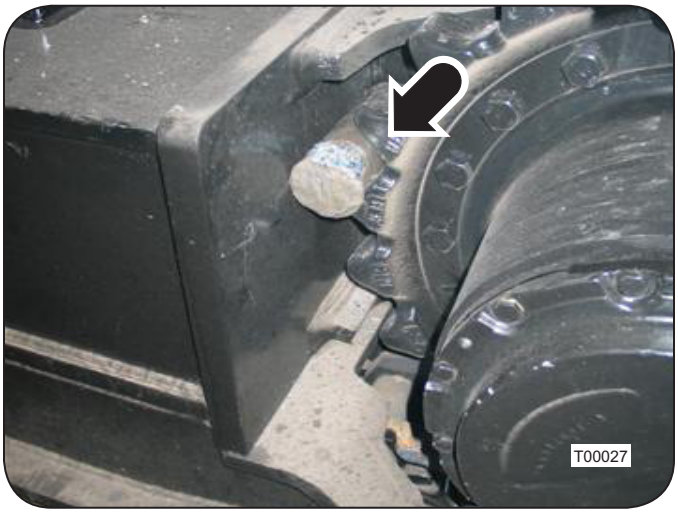


Figure 21: Lock Pin in Sprocket

Figure 14: Hydraulic Motor Shift Control

10. Advance engine to full throttle.

11. On your signal, have the operator or another mechanic apply the travel brake and activate full FORWARD travel while you take a pressure reading. Then activate full REVERSE travel and take a reading.

12. Shutdown the engine and remove the pin stock in the left and right track sprockets.

13. Start the engine and move the machine several feet forward.

14. Shutdown the engine and Insert 2 1/2” pin stock in left and right track sprockets. See Figure 21.

15. Repeat step #8 thru #11 with the machine in the new position.

NOTE: The track drive motor case drain pressure should not exceed specification. If the specification is exceeded, look for conditions that would increase backpressure in the case drain circuit such as a plugged case drain filter element, failing component, etc.

16. Shutdown the engine and re-install the track drive motor case port plug.

17. Remove the pin stock in the left and right track sprocket. Close and secure all covers and guards.

18. Procedure complete.

Track Drive Motor Case Drain Flow

Specification:

Maximum 5.0 gpm (18.9 litres) allowed.

Test Standards:

- Hydraulics at operating temperature of 140°F (60°C) or greater with correct track drive and charge pressure settings.
- Engine operating at full throttle.

Procedure:

1. Ensure the hydraulics are at correct operating temperature.

2. Insert 2 1/2” pin stock in left and right track sprocket. See Figure 21. This will prevent the machine from moving.

3. Remove the guards over the Track drive motors.

4. Use the 3/4”, 7/8” and 15/16” wrenches to remove the track drive motor case drain line at the motor. Plug the case drain hose to prevent contaminates from entering the hydraulic system.

5. Install the #08 test hose to the motor case drain fitting and place the open end of the hose into the calibrated container.

NOTICE

Be sure the pump case is full of oil before starting the machine otherwise catastrophic damage to the pump will occur.

6. Start engine and run at idle. Set the hydraulic motor shift control to the “High” position. See Figure 22.

7. Advance engine to full throttle..

8. On your signal, have the operator or another mechanic apply the travel brake and activate full FORWARD travel.

9. After one minute, deactivate the travel function and shutdown the engine.

10. Remove the track drive motor case drain hose from the container.

11. Measure the oil in the container. If the amount exceeds specification, the track drive motor is worn or failing and may have to be replaced.

12. Repeat steps #11 thru #14 for REVERSE travel.

13. Shutdown the engine and re-connect the track drive motor case drain hose to the motor.

14. Remove the pin stock in the left and right track sprocket. Close and secure all covers and guards.

17. Procedure complete.

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