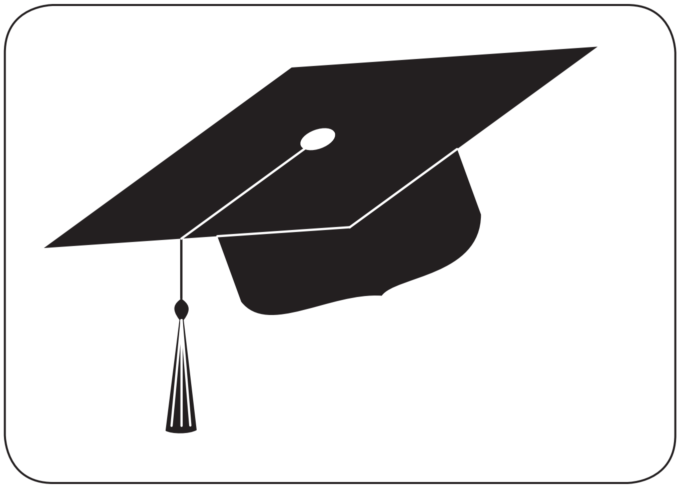
Section 9.1



Lower Solenoid Manifold Circuits

Lower Solenoid Manifold

The lower solenoid manifold is the heart of several auxiliary control circuits found in the lower frame area, including:

A) Axle differential lock
B) Wheel motor shift
C) Parking brakes
D) Gearbox shift (when required)
E) Frame lock brake (when required)

The manifold is an aluminum block located in the front frame. It includes two pressure reducing valves, five solenoid valves and two check valves. See Figures 1and 2.

2000 PSI (13,8 Mpa) oil is supplied to port P of the lower solenoid manifold from the upper solenoid manifold port P1. The pressure circuit uses gallery 12 of the rotary manifold. Drain oil from the lower solenoid manifold port T returns through gallery 11 of the rotary manifold.

Pressure Reducing Valves

Almost all the circuits supplied by the lower solenoid manifold are fed by the two pressure reducing valves, PR1 and PR2. Only the frame lock solenoid valve SV4 uses the full 2000 PSI (13,8 Mpa) available.

Pressure Reducing Valve PR1

Pressure reducing valve PR1 is factory set at 400 PSI (2,8 Mpa) and is non-adjustable. This pressure reducing valve supplies pressurized oil to the following:

A) Differential lock solenoid valve SV1
B) Motor shift solenoid valve SV2
C) 2-speed gearbox shift solenoid valve SV5

A pressure check point is provided at port G1.

A 500 PSI (3,4 Mpa) non-adjustable relief valve is connected to the PR1 pressure gallery at port BS. This relief valve is mounted near the lower solenoid valve and protects all three solenoid valve circuits (especially axle differential lock) from any excessive pressure generated in the motor shift circuit. The relief drains back to tank via a tee connection at the lower solenoid valve port T.

Pressure Reducing Valve PR2

Pressure reducing valve PR2 is factory set at 1100 PSI (7,6 Mpa) and is not adjustable. This pressure reducing valve supplies pressurized oil to the parking brake solenoid valve SV3.

A pressure check point is provided at port G2.

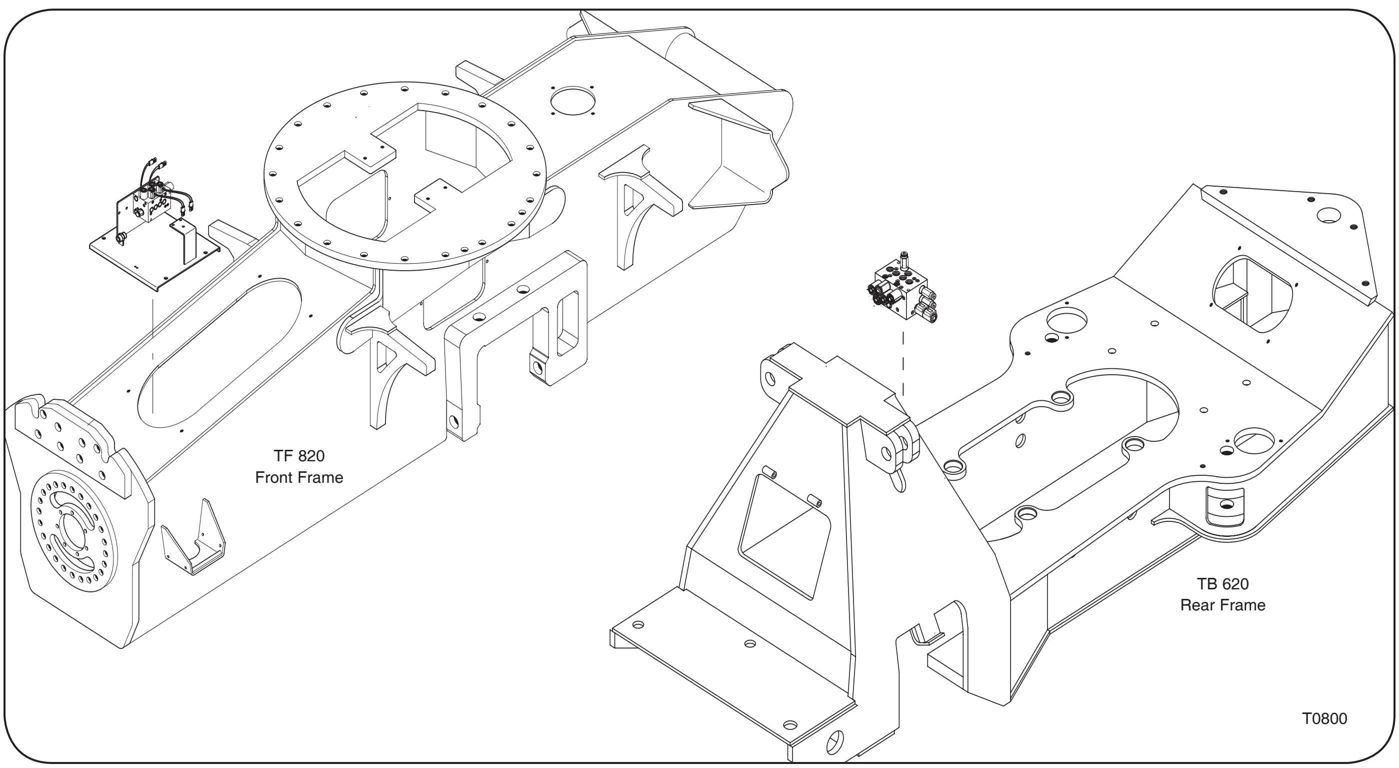


Figure 1: Lower Solenoid Manifold Locations

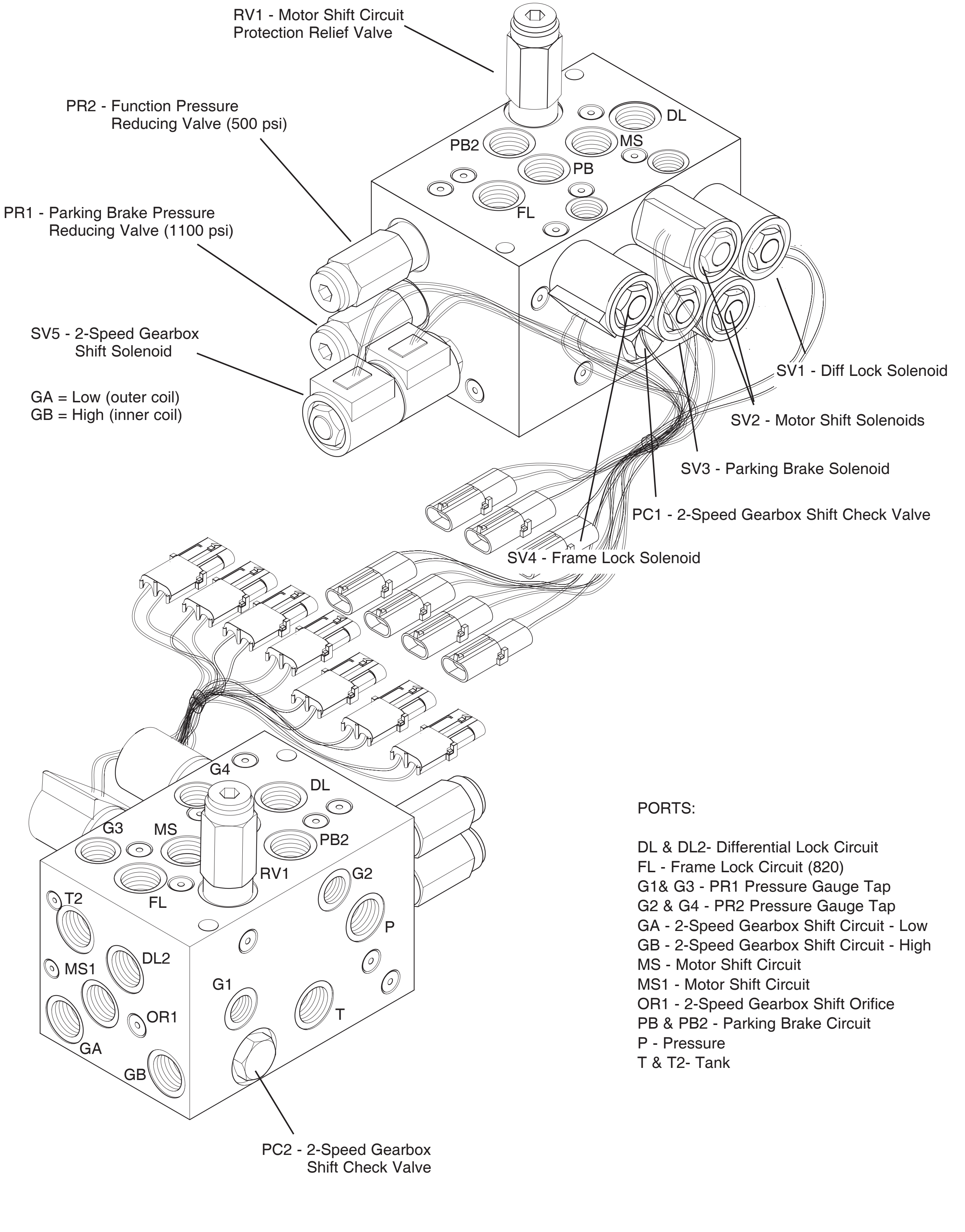


Figure 2: Lower Solenoid Manifold Cartridge & Port Locations

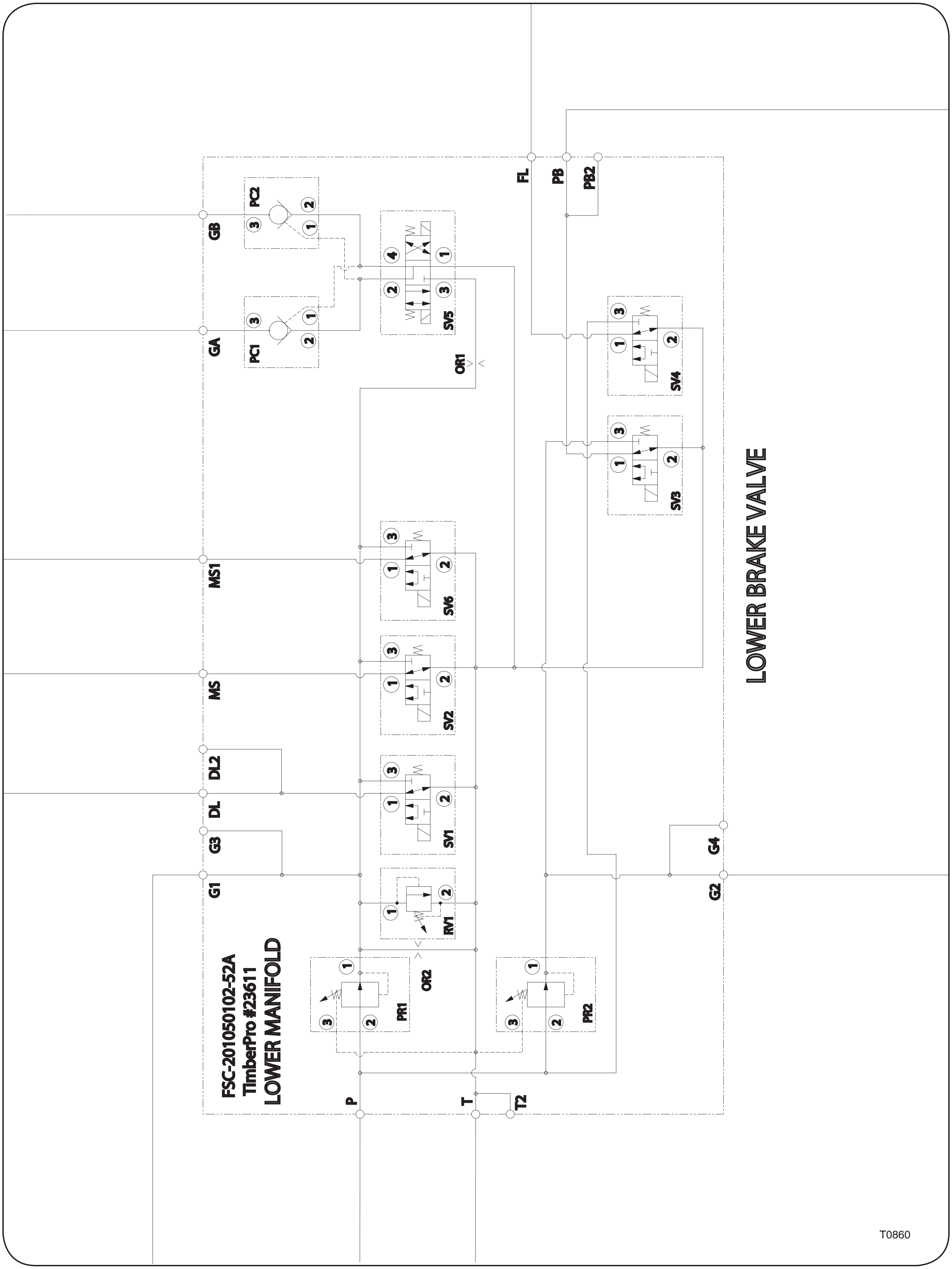


Figure 3: Lower Solenoid Manifold Schematic

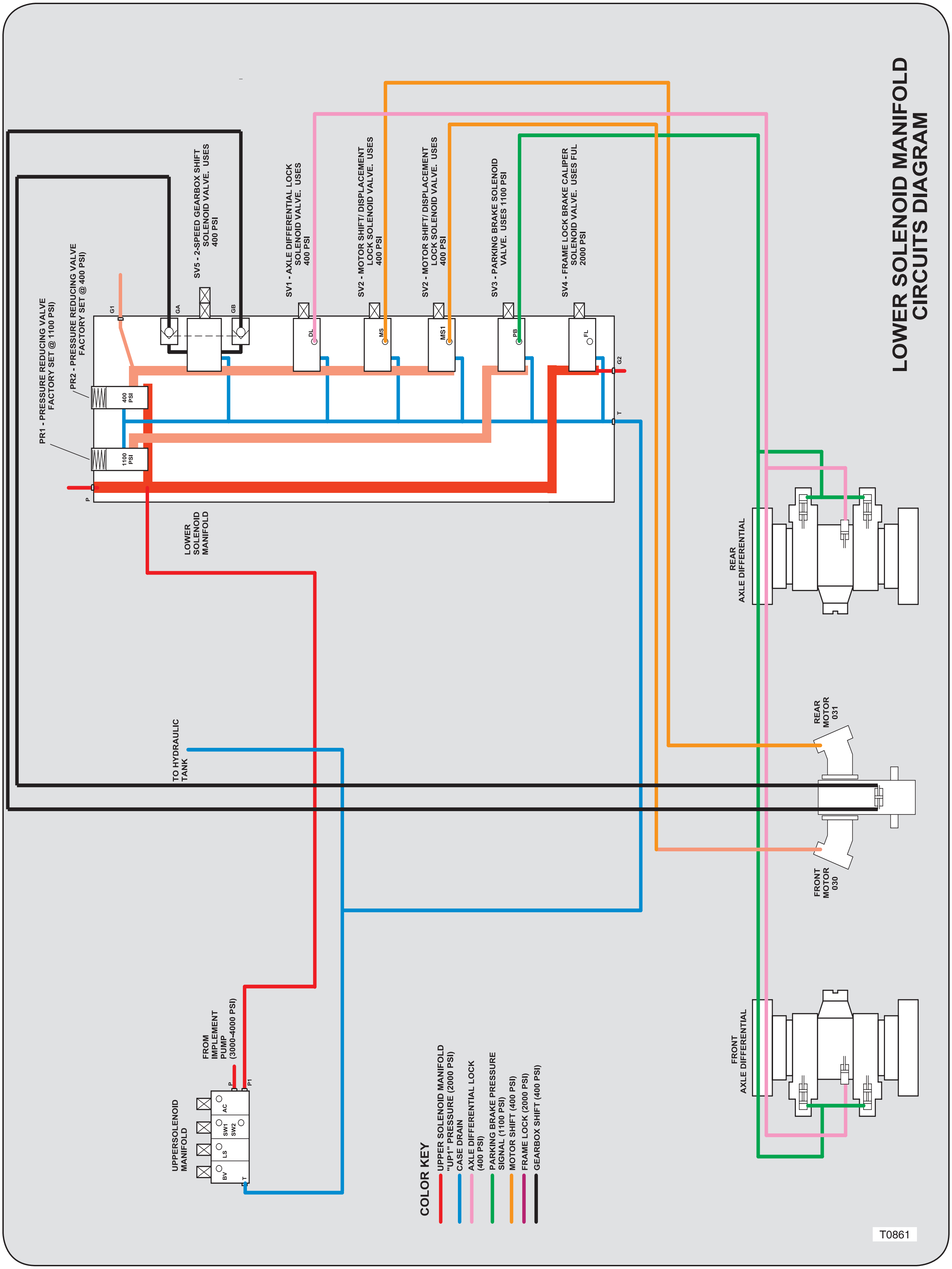


Figure 4: Lower Solenoid Manifold Circuits Diagram

Solenoid Valves

All of the solenoid valves found in the lower solenoid manifold are the replaceable cartridge type equipped with 24-volt ON/OFF coils. The solenoid valves are "normally closed" and vent the auxiliary circuits to tank when the coil is not energized.

SV1 - Axle Differential Lock

Solenoid valve SV1 controls the axle differential lock circuit. It's coil is energized by the operator when the axle differential lock switch in the cab dash is activated.

When the dash switch is activated, the coil is energized and the valve opens. This allows a 400 PSI (2,8 Mpa) control pressure signal (supplied by pressure reducing valve PR1) to enter the circuit. Hydraulic pressure overcomes mechanical spring force and the differential lock is engaged.

When the dash switch is deactivated, the coil is de-energized and the valve closes. The circuit vents to tank and mechanical spring force overcomes hydraulic pressure to disengage the differential lock.

See "Axle Differential Lock Circuit" for more detailed information.

SV2 - Wheel Motor Shift

Solenoid valve SV2 controls the wheel drive motor shift circuit. It's coil is energized by the operator when the motor shift switch in the cab dash is in the "low speed" position.

When the dash switch is in the "low speed" position, the coil is energized and the valve is open. This allows a 400 PSI (2,8 Mpa) control pressure signal (supplied by pressure reducing valve PR1) to enter the circuit. The control pressure signal overrides the wheel drive motor's internal control module and holds the motor in high displacement.

When the dash switch is in the "high speed" position, the coil is de-energized and the valve is closed. The circuit vents to tank and the wheel drive motor's internal control mechanism resumes control of motor displacement.

NOTE: High displacement offers the most torque and forces low speed travel. Low speed should be used when loading/unloading the machine and when operating on soft, rough or uneven ground.

See "Wheel Drive Motor Shift Circuit" for more detailed information.

SV3 - Parking Brake

Solenoid valve SV3 controls the parking brake circuit. It's coil is wired to energized immediately when the machine is started to release the parking brakes. The operator can prevent the release of the parking brake on startup, or set the parking brake while the machine is running, by activating the parking brake switch in the cab dash.

NOTE: The parking brake switch in the cab is wired backwards so when when the switch is in the OFF position it appears in the same configuration as the other dash switches when they are turned ON.

The parking brakes are mechanical spring force applied and hydraulic pressure released.

When the machine is started an electrical signal is sent to the parking brake switch in the cab dash. If the switch is activated, the electrical circuit remains open and the electrical signal cannot reach the coil. With the coil de-energized, the valve remains closed and the parking brake circuit remains vented to tank. Mechanical spring force keeps the parking brakes engaged.

When the operator deactivates the parking brake switch (or the switch was deactivated before the machine was started) the electrical signal passes through the dash switch and energizes the coil. With the coil energized, the valve opens and allows a 1100 PSI (7,6 Mpa) control pressure signal (supplied by pressure reducing valve PR2) to enter the circuit. The control pressure signal overcomes mechanical spring force and the parking brakes are released.

When the dash switch is activated, or the machine is shut down, the coil is de-energized and the valve closes. This vents the circuit to tank and mechanical spring force overcomes hydraulic pressure to engage the parking brake.

NOTE: The machine parking brake should always be set when parking the machine after the work shift. This prevents the brakes from being released on machine startup.

See “Parking Brake Circuit” for more detailed information.

SV4 - Frame Lock (When Required)

Solenoid valve SV4 controls the frame lock brake circuit. It’s coil is energized immediately when the machine is started and automatically de-energized when the drive pedal is actuated. This design allows the frame lock brake to be released whenever the machine is moving, making travel over rough ground easier, and engaged when the machine is stopped, improving overall stability while loading.

When the machine is started, an electrical signal is sent to the coil and the valve opens. This allows a 2000 PSI (13,8 Mpa) control pressure signal to actuate the caliper pistons and the frame brake is applied.

When the travel pedal is actuated, the electrical signal to the coil is broken. The coil de-energizes and the valve closes. This vents the circuit to tank and the caliper pistons are able to retract to allow the frames to rotate at the steering joint.

See “Frame Brake Circuit” for more detailed information

SV5 - 2-Speed Gearbox Shift (When Required)

Solenoid valve SV5 controls the 2-speed gearbox shift circuit. This valve is a little different because it is is a 2-position valve with dual coils. The coils are energized by the operator when the gearbox shift switch in the cab dash is operated. The switch in the dash is a double-pole design so one of the coils will always be energized while the ignition is on.

The gearbox shifting mechanism is basically a double-acting cylinder attached to a shifting fork. A control pressure signal line is connected between each side of the cylinder and one of the positions of the valve. Between the cylinder and valve are dual pilot-operated check valves which keep the gearbox from slipping out of gear if the hydraulic pressure were to suddenly drop or bleed away.

Depending on the position of the gearbox shift switch, the corresponding coil is energized and the valve will open to the position regulated by that coil. This allows a 400 PSI (2,8 Mpa) control pressure signal (supplied by pressure reducing valve PR1) into one of the connections to the shift cylinder while venting the other connection to tank. At the same time, a pilot signal from the pressurized connection opens the opposing connection’s check valve to allow the oil to escape from one side of the shift cylinder and shift the gearbox.

The gearbox will remain in the position it is in (because of the check valves) until the dash switch is activated in the opposite direction. Even when the engine is shut down and the valve returns to the normally closed position, which vents both connections to tank, oil will be trapped in the shift cylinder by the check valves. This creates a hydrostatic lock in the cylinder.

NOTE: Pressure will always be trapped in the connections between the gearbox shift cylinder and lower solenoid manifold due to the pilot operated check valves in the circuit (even with the engine shutdown). Open these connections with care to avoid injury from escaping oil under pressure.

See “2-Speed Gearbox Shift Circuit” for more detailed information.

Axle Differential Lock Circuit

(See Figure 5)

Description

The operator has the ability to lock and unlock the bogie differentials for all-wheel drive when conditions warrant. When the differentials are not locked the bogies are allowed to free-wheel on one side and drive on the other. The normal position is with the differentials unlocked which allows easier steering, a tighter turning radius and better fuel economy.

The axle differential lock circuit is hydraulic pressure engaged, mechanical spring force released. A pressure signal of at least 300 PSI (2,0 Mpa) is required to engage the differential lock.

The circuit is made up of four primary components, the differential lock mechanism in each axle, a pressure reducing valve, a solenoid valve and an ON/OFF rocker switch in the cab dash. The pressure reducing valve (PR1) and solenoid valve (SV1) are found in the lower solenoid manifold.

At engine startup, a pressure signal from the upper solenoid manifold port P1 travels through the rotary manifold (gallery #12) and enters the lower solenoid manifold at port P. Pressure reducing valve PR1 reduces the pressure signal to 400 PSI (2,8 Mpa) and makes it available at solenoid valve SV1.

Solenoid valve SV1 is normally closed. In this state, the axle differential lock circuit is vented to tank and spring force keeps the differential locks disengaged. When the operator moves the dash switch to the ON position a power signal is sent through the rotary manifold (wire #6) to the coil. The coil energizes and the solenoid valve opens. This allows the 400 PSI (2,8 Mpa) pressure signal into the circuit through port DL.

The pressure signal acts on a small piston in the differential lock cylinder. The piston works against spring force to drive a shifting fork and sleeve assembly into a cluch coupling sleeve. The shifting sleeve assembly is splined to the axle shaft and the clutch coupling sleeve is splined to the differential cage. Engaging the sleeves locks the differential in all-wheel drive.

When the dash switch is moved to the OFF position the coil de-energizes and the solenoid valve closes. The pressure signal is vented to tank allowing spring force to work against the differential lock cylinder pistion and disengage the sleeves. When the sleeves disengage the differential unlocks.

Important Things To Note

A) DO NOT lock the axle differentials when the machine is in motion. Damage to the shifting fork and/or sleeve splines will result. Always stop the machine before locking the axle differentials.

B) Use the differential lock only when required. The machine steers better and uses less fuel when the differential locks are not engaged.

Basic Troubleshooting Hints

Differential lock will not engage:

The differential locks are spring force released, hydraulic pressure applied. If the differential lock will not engage, the most likely reason is that there is either a weak signal pressure or no pressure at all. Check the following items:

A) Bad coil on solenoid valve SV1 or damaged o-rings on the valve cartridge causing a weak or no pressure signal in the circuit. The coil and valve cartridge can be swapped with any of the other three next to it for a quick test.

B) Failed pressure reducing cartridge PR1 or damaged o-rings on the valve cartridge causing a weak pressure signal. Check o-rings or replace cartridge.

C) Bad switch in dash. Replace switch.

Usually the problem is electrical or hydraulic, but if the above check out OK, there may be a mechanical problem at the differential lock cylinder. Check for damage to the cylinder, piston or shifting fork. It is also possible that the sleeve splines have been stripped away from trying to lock the differentials while the machine is in motion.

Differential lock will not disengage:

If the differential lock will not disengage, the most likely reason is that the circuit is not venting the pressure signal. Check to see if solenoid valve SV1 is stuck open and not allowing the pressure signal to drain to tank. In this case, the coil and valve cartridge can be swapped with any of the other three next to it for a quick test.

Another other cause would be a mechanical problem in the axle differential lock mecanism not allowing the sleeves to disengage. Check for damage to the cylinder, shifting fork or return spring that is not allowing the mechanism to retract.

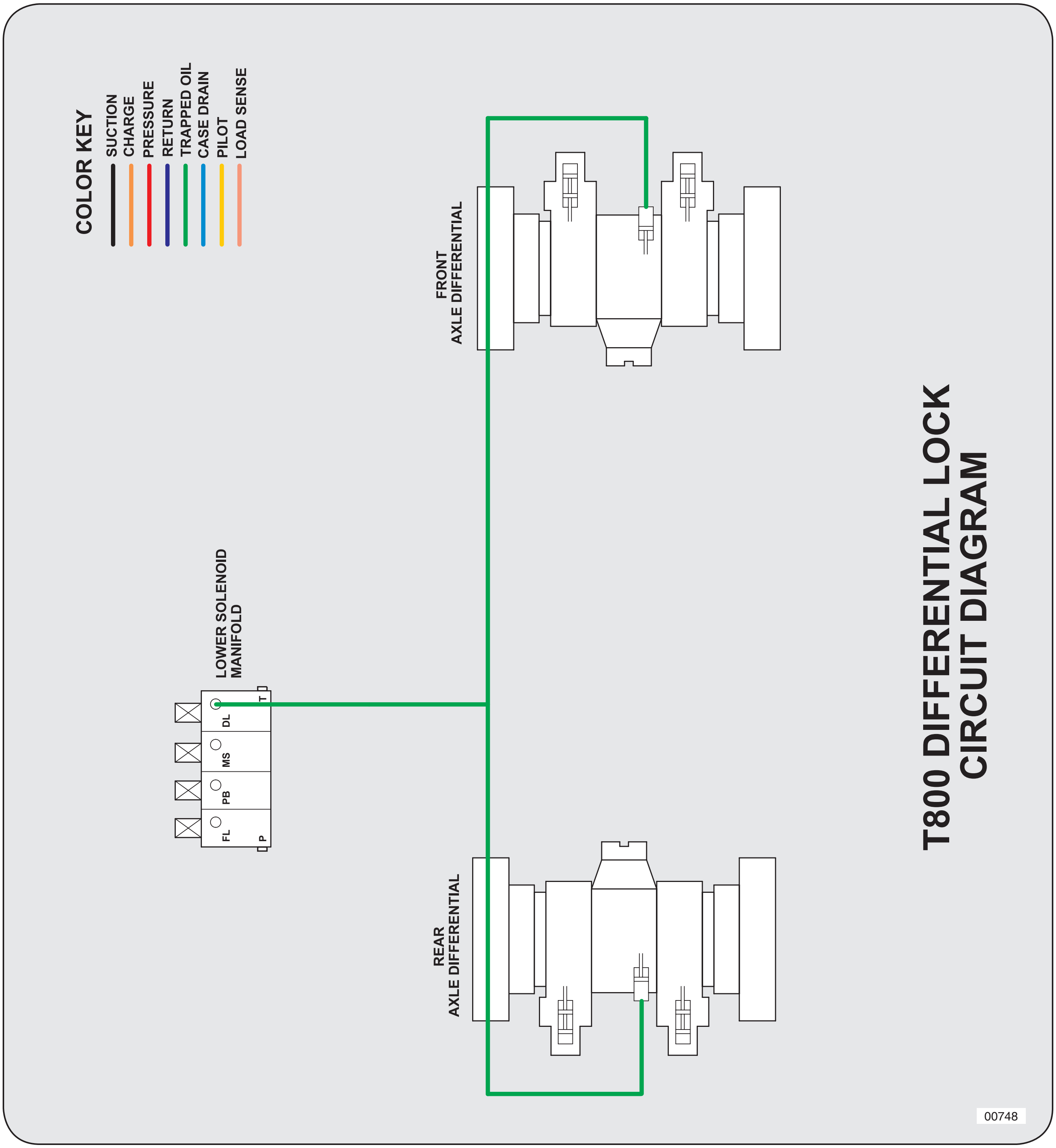


Figure 5: Simplified Differential Lock Circuit

Motor Shift Circuit

(See Figure 6)

Description

The operator has the ability to “lock” the wheel drive motor(s) in high displacement, low speed operation when conditions warrant.

Wheel drive motor displacement is determined by the motor’s swashplate angle. During normal operation, the motor’s HA2T control module regulates swashplate angle by balancing work port A/B pressure against a mechanical spring force. The motor shift circuit doesn’t actually “lock” the motor(s) in high displacement. The circuit is designed to be additive to the HA2T control module which then overwhelms spring force and holds the swashplate at the high displacement angle. See Section 7.1.12 for a detailed description of motor swashplate control.

The motor shift circuit is hydraulic pressure actuated and pressure vented to tank for release. Venting the circuit allows the HA2T control module to resume regulating swashplate angle. A minimum pressure signal of only 145 PSI (1,0 Mpa) is required to override the HA2T control module.

The motor shift circuit is made up of four primary components, the HA2T control module in each wheel drive motor, a pressure reducing valve, a solenoid valve and an ON/OFF rocker switch in the cab dash. The pressure reducing valve (PR1) and solenoid valve (SV2) are found in the lower solenoid manifold.

At engine startup, a pressure signal from the upper solenoid manifold port P1 travels through the rotary manifold (gallery #12) and enters the lower solenoid manifold at port P. Pressure reducing valve PR1 reduces the pressure signal to 400 PSI (2,8 Mpa) and makes it available at solenoid valve SV2.

Solenoid valve SV2 is normally closed. In this state, the motor shift circuit is vented to tank and only the HA2T control module regulates swashplate angle.

When the operator moves the dash switch to the ON position a power signal is sent through the rotary manifold (wire #7) to the coil. The coil energizes and the solenoid valve opens. This allows the 400 PSI (2,8 Mpa) pressure signal into the circuit through port MS. The pressure signal enters the HA2T control module at port X and combines with the work port A/B pressure signal to overwhelm spring force and hold the swashplate at the maximum displacement angle.

When the dash switch is moved to the OFF position the coil de-energizes and the solenoid valve closes. The pressure signal is vented to tank allowing the HA2T control module to resume regulating swashplate angle.

PR1 Pressure Gallery Relief Valve

A 500 PSI (3,4 Mpa) non-adjustable relief valve is connected to the PR1 pressure gallery at port BS. This relief valve is mounted near the lower solenoid valve and protects the other two solenoid valve circuits (especially axle differential lock) from any excessive pressure generated in the motor shift circuit.

Anytime the motor shift circuit is activated, the entire PRI pressure gallery could be subject to the full 6000 PSI (414.0 Mpa) used in the wheel drive system. This can happen because the motor shift circuit pressure signal is additive to the work port A/B pressure used by the HA2T control module to regulate the swashplate. PR1 gallery pressure exceeding 500 PSI (3,4 Mpa) can easily damage the lower solenoid manifold and axle differential.

Basic Troubleshooting Hints

Motor(s) will not “lock” in high displacement:

The motor shift circuit is hydraulic pressure applied. If the the motor(s) will not “lock” into high displacement, the most likely reason is that there is either a weak signal pressure or no pressure at all. Check the following items:

A) Bad coil on solenoid valve SV2 or damaged o-rings on the valve cartridge causing a weak or no pressure signal in the circuit. The coil and valve cartridge can be swapped with any of the other three next to it for a quick test.

B) Failed pressure reducing cartridge PR1 or damaged o-rings on the valve cartridge causing a weak pressure signal. Check o-rings or replace cartridge.

C) Bad switch in dash. Replace switch.

Motor(s) will not “unlock” from high displacement::

If the motor(s) will not “unlock” from high displacement, the most likely reason is that the circuit is not venting the pressure signal. Check to see if solenoid valve SV2 is stuck open and not allowing the pressure signal to drain to tank. In this case, the coil and valve cartridge can be swapped with any of the other three next to it for a quick test.

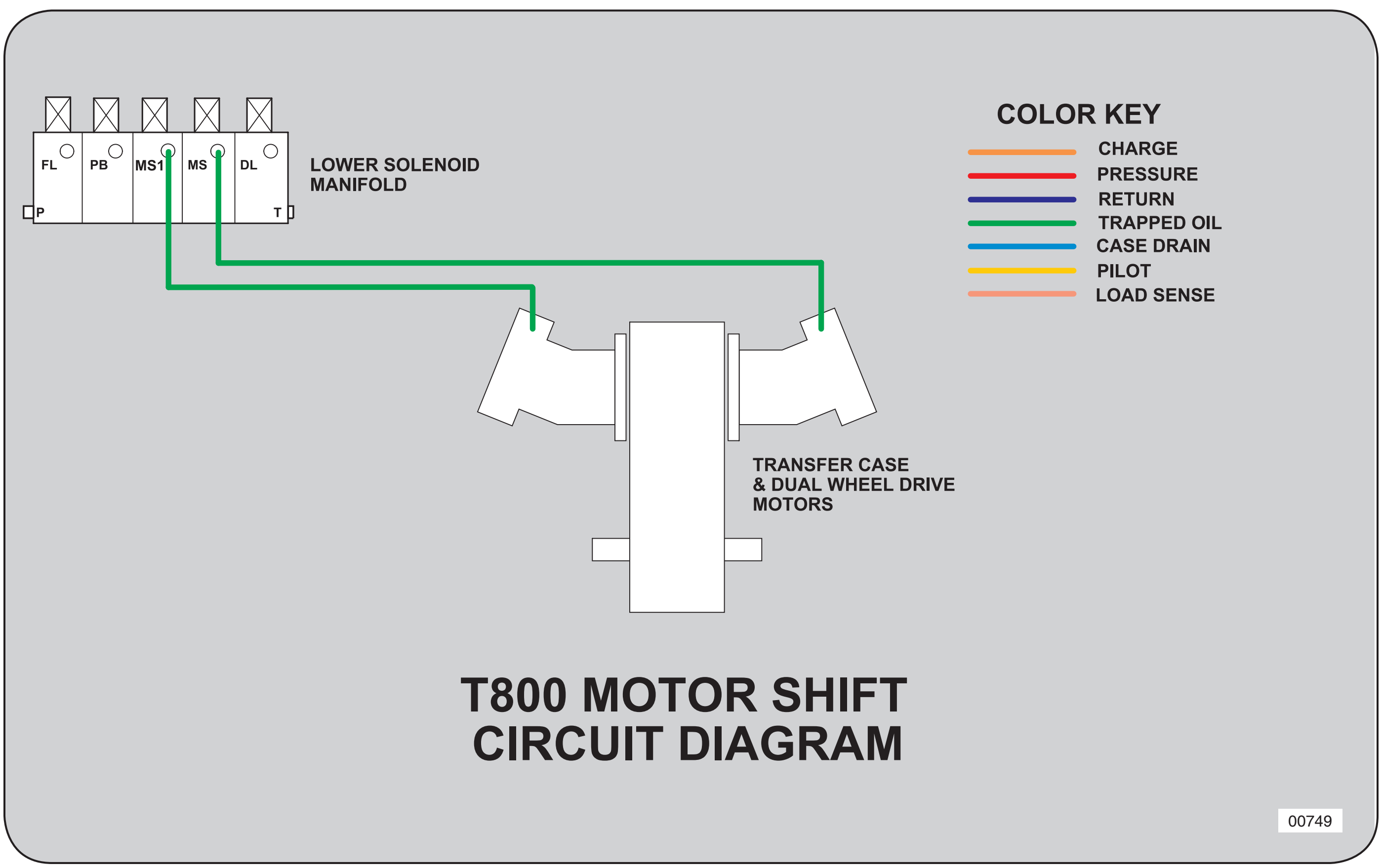


Figure 6: Simplified Differential Lock Circuit

Parking Brake Circuit

(See Figure 7)

Description

The parking brake cicuit is mechanical spring force applied, hydraulic pressure released. A pressure signal of at least 800 PSI (5,5 Mpa) is required to release the brakes. The parking brakes are automatically engaged when the engine is shut down.

The circuit is made up of four primary components, the brake canisters in each axle, a pressure reducing valve, a solenoid valve, and an ON/OFF rocker switch in the cab dash. The pressure reducing valve (PR2) and solenoid valve (SV3) are found in the lower solenoid manifold.

Two things immediately happen when the engine is started that affect the parking brake circuit:

> Hydraulic - A pressure signal from the upper solenoid manifold port P1 travels through the rotary manifold (gallery #12) and enters the lower solenoid manifold at port P. Pressure reducing valve PR2 reduces the pressure signal to 1100 PSI (7,6 Mpa) and makes it available at solenoid valve SV3.
>
> Electrical - Power is supplied to the parking brake switch in the dash from the ACC terminal of the ignition switch. If the switch is ON, the circuit remains open and the parking brakes remain engaged. If the switch is OFF, power passes through the switch, through the rotary manifold (wire #8) and energizes the coil on solenoid valve SV3.

Solenoid valve SV3 is normally closed. In this state, the parking brake circuit is vented to tank and spring force keeps the parking brakes engaged. When the coil is energized, the solenoid valve opens and allows the 1100 PSI (7,6 Mpa) pressure signal into the circuit through port PB. The pressure signal overcomes spring force and the parking brakes are released.

If the dash switch is moved to the "ON" position, or the engine is shut down, the coil de-energizes and the solenoid valve closes. The pressure signal is vented to tank and spring force engages the parking brakes.

Important Things To Note

A) The parking brake switch in the dash is wired backwards so that turning the parking brakes "ON" is actually moving the switch to the OFF position to open the circuit.

B) Opening the cab door while the engine is running will not engage the parking brakes. The coil will remain energized because electrical power is taken from the ignition switch which is not part of the cab door interlock circuit. Hydraulic pressure will also be available because of an accumulator system backing up the service (travel) brakes in case of engine or hydraulic failure while the machine is in motion.

C) If the parking brake dash switch is not "ON", the parking brakes will immediately disengage when the engine is started. ALWAYS engage the parking brakes before shutting down the engine.

Basic Troubleshooting Hints

Parking Brakes will not disengage:

The parking brakes are spring force applied, hydraulic pressure released. If the brakes will not disengage, the most likely reason is that there is either a weak signal pressure or no pressure at all. Check the following items:

A) Bad coil on solenoid valve SV3 or damaged o-rings on the valve cartridge causing a weak or no pressure signal in the circuit. The coil and valve cartridge can be swapped with any of the other three next to it for a quick test.

B) Failed pressure reducing cartridge PR2 or damaged o-rings on the valve cartridge causing a weak pressure signal. Check o-rings or replace cartridge.

C) Bad switch in dash. Replace switch.

D) Failed pressure reducing cartridge PR1 (in the upper solenoid manifold) or damaged o-rings on the valve cartridge causing a weak pressure signal to be sent to the entire lower manifold. Check o-rings or replace cartridge.

An easy way to test this is to tap a gauge into the upper solenoid manifold pressure test port G1. You should read 2000 PSI (13,8 Mpa) if the pressure signal from the upper solenoid manifold is good.

Usually the problem is electrical or hydraulic, but if the above check out OK, there may be a mechanical problem at one of the four axle brake canisters. If this is the case, one set of bogies will probably drag.

Parking Brakes will not engage:

There are really only two things that could cause the parking brakes to not engage. The first would be the solenoid valve SV3 sticking open and not allowing the pressure signal to drain to tank. In this case, the coil and valve cartridge can be swapped with any of the other three next to it for a quick test.

The other cause would be a mechanical problem in the axle brake canister not allowing the brake disks to mesh.

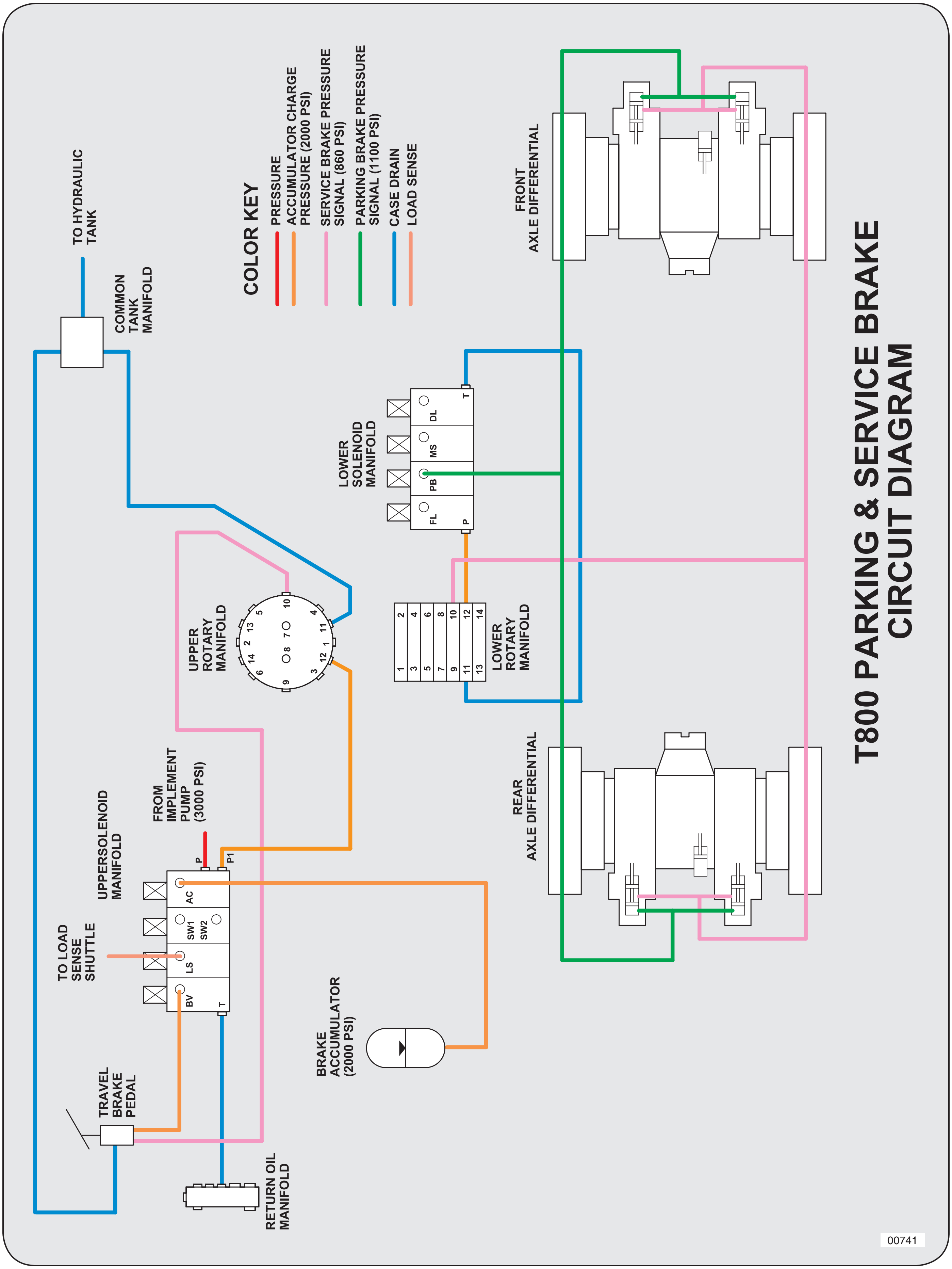


Figure 7: Simplified Service & Parking Brake Circuit

Frame Lock Circuit (820)

(See Figure 8)

When the machine is equipped with booms and a bearing in the center steer joint it is necessary to be able to lock the frames (keep them from oscillating). This is required to improve machine stability while operating the booms and still retain the ease of mobility over obstacles during travel. This is done with a large capacity caliper brake installed at the center steer joint. The system is automatically done by actuation of the travel pedal.

The frame lock circuit is hydraulic pressure actuated and pressure vented to tank for release. Venting the circuit lets the brake caliper release and allows the frames to oscillate while travelling.

The circuit is made up of four primary components, the frame lock caliper brake, the IQAN control box, a solenoid valve and the travel pedal. The solenoid valve (SV4) is found in the lower solenoid manifold.

At engine startup, a 2000 PSI (13,8 Mpa) pressure signal from the upper solenoid manifold port P1 travels through the rotary manifold (gallery #12) and enters the lower solenoid manifold at port P. The pressure signal is now available at solenoid valve SV4.

Solenoid valve SV4 is normally closed. In this state, the frame lock circuit is vented to tank and frames are free to oscillate. When the operator arms the IQAN control system, power is sent through the rotary manifold (wire #9) to the coil. The coil energizes and the solenoid valve opens. This allows the 2000 PSI (13,8 Mpa) pressure signal into the circuit through port FL.

The frame lock caliper brake is mounted to the front frame. A large plate, acting as a brake rotor, is bolted between the articulation casting and articulation bearing. The pressure signal from solenoid valve SV4 acts on three large brake pad pistons in the frame lock caliper brake. The pistons force the brake pads against brake plate and lock the frames in position. Now the center steering joint is rigid and the machine is ready to load or harvest with the booms.

When the operator activates the travel pedal to move the machine the IQAN control box automatically cuts off the electrical signal to the coil. The coil de-energizes and the solenoid valve closes. The frame lock circuit is now vented to tank which releases the caliper brake pistons. The frames are now free to oscillate, making travel over rough ground much easier.

When the operator releases the travel pedal the IQAN box automatically re-energizes the coil to set the frame brake once again.

Important Things To Note

A) Do not operate the booms and wheel drives at the same time. The machine could become unstable when on rough or uneven ground, especially if the booms are positioned off the side of the machine.

B) The frame lock will not engage until the IQAN system is armed.

Basic Troubleshooting Hints

Frame lock will not engage:

The frame lock is pressure actuated. If the frame lock caliper brake will not engage, the most likely reason is that there is either a weak signal pressure or no pressure at all. Check the following items:

A) Bad coil on solenoid valve SV4 or damaged o-rings on the valve cartridge causing a weak or no pressure signal in the circuit. The coil and valve cartridge can be swapped with any of the other three next to it for a quick test.

B) Failed pressure reducing cartridge PR1 (in the upper solenoid manifold) or damaged o-rings on the valve cartridge causing a weak pressure signal to be sent to the entire lower manifold. Check o-rings or replace cartridge.

   An easy way to test this is to tap a gauge into the upper solenoid manifold pressure test port G1. You should read 2000 PSI (13,8 Mpa) if the pressure signal from the upper solenoid manifold is good.

Usually the problem is electrical or hydraulic, but if the above check out OK, there may be a mechanical problem at the frame lock caliper brake. Check for sticking pistons or oil leaks indicating bad piston seals.

Frame lock will not release:

There are really only two things that could cause the frame lock caliper brake to not release. The first would be the solenoid valve SV4 sticking open and not allowing the pressure signal to drain to tank. In this case, the coil and valve cartridge can be swapped with any of the other three next to it for a quick test.

The other cause would be a mechanical problem in the frame lock caliper brake not allowing the pistons to release.

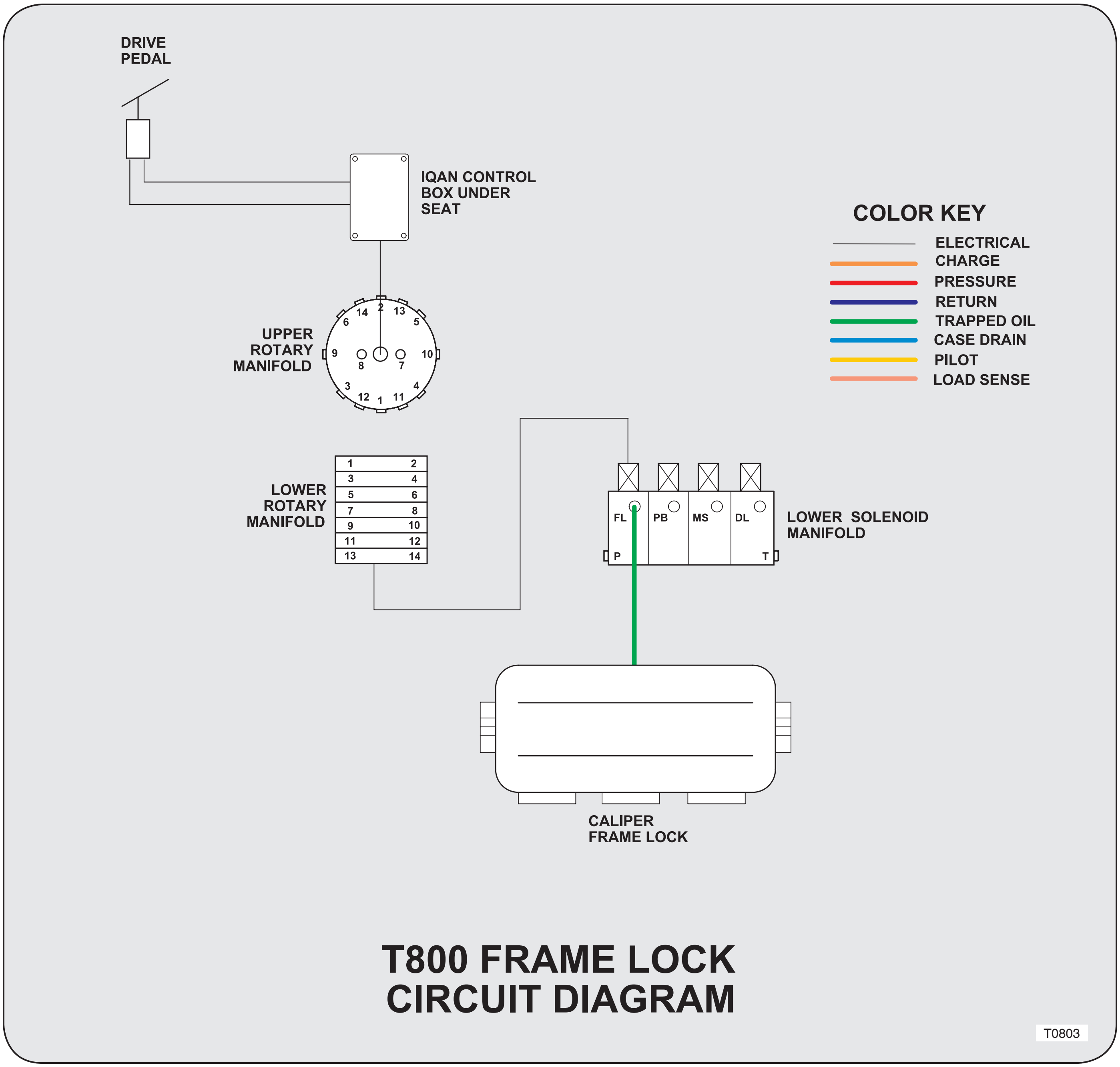


Figure 8: Simplified Frame Lock Circuit

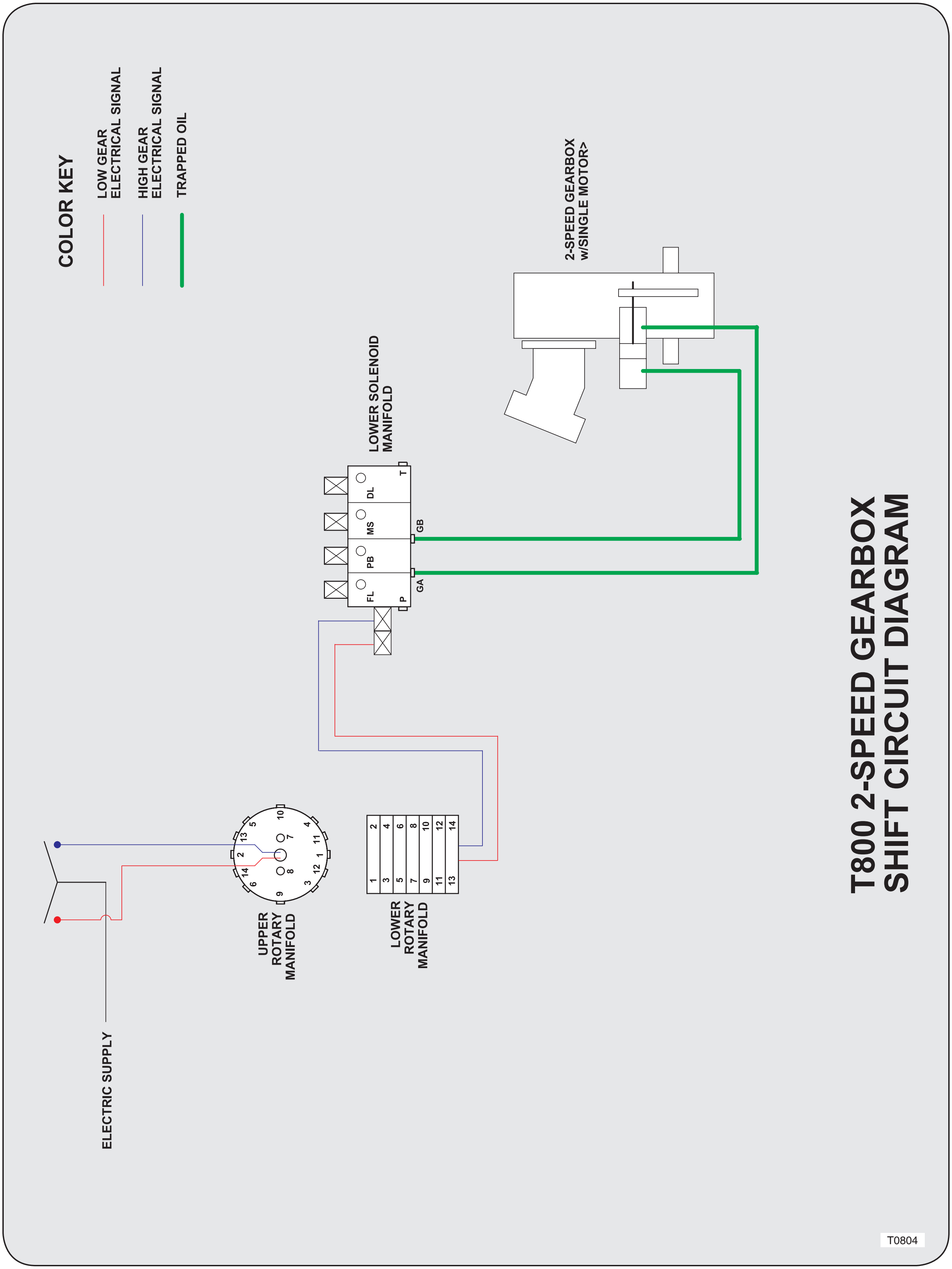


Figure 9: Simplified 2-Speed Gearbox Shift Circuit

2-Speed Gearbox Shift Circuit

(See Figure 9)

Description

When equipped, the operator has the ability to shift the gearbox between low and high speed as conditions warrant.

The gearbox shift circuit is hydraulic pressure actuated for both low and high speeds. Shifting the gearbox is done by sending pressurized oil to one side or the other of a dual acting cylinder. A minimum pressure signal of 220 PSI (1,5 Mpa) is required to shift the gearbox.

The gearbox shift circuit is made up of five primary components, the gearbox, a pressure reducing valve, a 2-position solenoid valve, dual pilot operated check valves and an ON/OFF rocker switch in the cab dash. The pressure reducing valve (PR1), solenoid valve (SV5) and pilot operated check valves (PC1 & PC2) are found in the lower solenoid manifold.

Two things immediately happen when the engine is started that affect the gearbox shift circuit:

Hydraulic - A pressure signal from the upper solenoid manifold port P1 travels through the rotary manifold (gallery #12) and enters the lower solenoid manifold at port P. Pressure reducing valve PR1 reduces the pressure signal to 400 PSI (2,8 Mpa) and makes it available at solenoid valve SV5.

Electrical - Power is supplied to the gearbox shift switch (double pole) in the dash from the ACC terminal of the ignition switch. One side of the switch is always ON so power passes through the switch, through the rotary manifold (wire #11 for low speed, wire #10 for high speed) and energizes the corresponding coil on solenoid valve SV5.

Depending on which coil is energized, the solenoid opens and allows the 400 PSI (2,8 Mpa) pressure oil into the circuit through either port GA or GB. The pressured oil passes through a check valve and enters one side of the shift cylinder. At the same time, a pressure signal from the pressurized connection opens the check valve of the opposing connection. This allows oil in the other side of the shift cylinder to escape and be vented to tank through solenoid valve SV5.

The shift cylinder is connected to a shifting fork which adjusts the gearing to shift the gearbox. Because one side of the switch in the dash is always ON with the engine running, one side of the shift cylinder will always be pressurized to hold the gearbox in gear. Even if the engine is shutdown, the pilot operated check valves (PC1 & PC2) will act as counterbalance valves to hold the gearbox in gear.

When the operator moves the gearbox shift switch in the dash to the other position, the above sequence is repeated using the other circuit connection and other side of the shift cylinder.

Important Things To Note

A) Pressure will always be trapped in one of the shift connections because of the check valves. Beware of oil escaping under pressure when disconnecting gearbox shift hoses.

B) The gearbox shift circuit is activated immediately on engine start-up because of the double-pole switch in the dash that receives power from the ingition switch ACC terminal.

C) The gearbox is not a syncro-mesh system. The machine must be completely stopped before shifting. Damage to the gearbox will result if it is shifted while the machine is in motion.

D) Use high speed ONLY when travelling over flat, smooth surfaces. Always use low speed when working on rough or uneven ground. Damage to the gearbox can result if it is left in high speed at all times or shifted continuously throughout the working shift.

E) It may be necessary to operate the machine briefly in the opposite direction after shifting to mesh the gears.

Basic Troubleshooting Hints

Gearbox will not shift:

The gearbox will always be in one gear or the other because of the pilot operated check valves in the circuit. If the The gearbox will not shift, it is most likely reason is that there is either a weak signal pressure or no pressure at all. Check the following items:

A) Contamination in spool and seat area of the SV5 solenoid valve. Remove and clean cartridge. Replace cartridge if necessary.

B) Bad coils on solenoid valve SV5 or damaged o-rings on the valve cartridge causing a weak or no pressure signal in the circuit. The coils can be swapped with any of the other solenoid valves next to it for a quick test. Remove and inspect the valve cartridge for bad seals. Check o-rings or replace cartridge.

C) Failed pressure reducing cartridge PR1 or damaged o-rings on the valve cartridge causing a weak pressure signal. Check o-rings or replace cartridge.

D) Bad switch in dash. Replace switch.

E) Malfunction of the 1st or 2nd gear sensors on the gearbox shift cylinder. Replace sensor unit.

Usually the problem is electrical or hydraulic, but if the above check out OK, there may be a mechanical problem at the gearbox.

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