

Service Call:

Planetary Slip Drive Rotation

Tools Required:

- S-Wrench Set
- Load Cell
- Hydraulic Pressure Gauge
- Side Pull Sheave (Z653)
- Allen Wrench Set
- Suitable Anchor

Model(s):

- C5000 (After 7/03)
- C6000 (After 1/02)
- C7000 (After 10/02)
- General (After 9/96)
- General 95

Tech Tip Safety Rules



Danger

Failure to obey the instructions and safety rules in the appropriate Operator's Manual and Service Manual for your machine will result in death or serious injury. Many of the hazards identified in the operator's manual are also safety hazards when maintenance and repair procedures are performed.

Do Not Perform Maintenance Unless:

- You are trained and qualified to perform maintenance on this machine.
- You read, understand and obey:
 - manufacturer's instructions and safety rules
 - employer's safety rules and worksite regulations
 - applicable governmental regulations
- You have the appropriate tools, lifting equipment and a suitable workshop.

The information contained in this tech tip is a supplement to the service manual. Consult the appropriate service manual of your machine for safety rules and hazards.

Introduction

The planetary slip drive rotation utilizes both a mechanical parking brake and a hydraulic valve braking system.

There are three parts to the rotation system on a Digger Derrick to protect the unit from structural overload of the boom or rotation system.

1. The parking brake is used to lock the boom in position when the rotation system is not being used such as road travel. The mechanical brake, located on top of the planetary gearbox, is either full on or full off. There is typically no lubricant in this mechanical parking brake.
2. The rotation port relief valves limit the maximum side force that the rotation system will generate when rotating the boom.
3. The slip drive protects the boom when winching or while digging or setting screw anchors when a side load is generated.

When rotating, digging, or winching, a hydraulic pilot signal is sent to release the mechanical parking brake. During any of these operations, a sequence valve located in the rotation slip drive hydraulic manifold performs the braking. If a side load exceeds the sequence valve setting, the slip drive will slip by back-driving through one of the two sequence valves. The Old-Style valve was used up until 1/1/2016. Anything after that date will have the New Style valve as shown below.

New Style

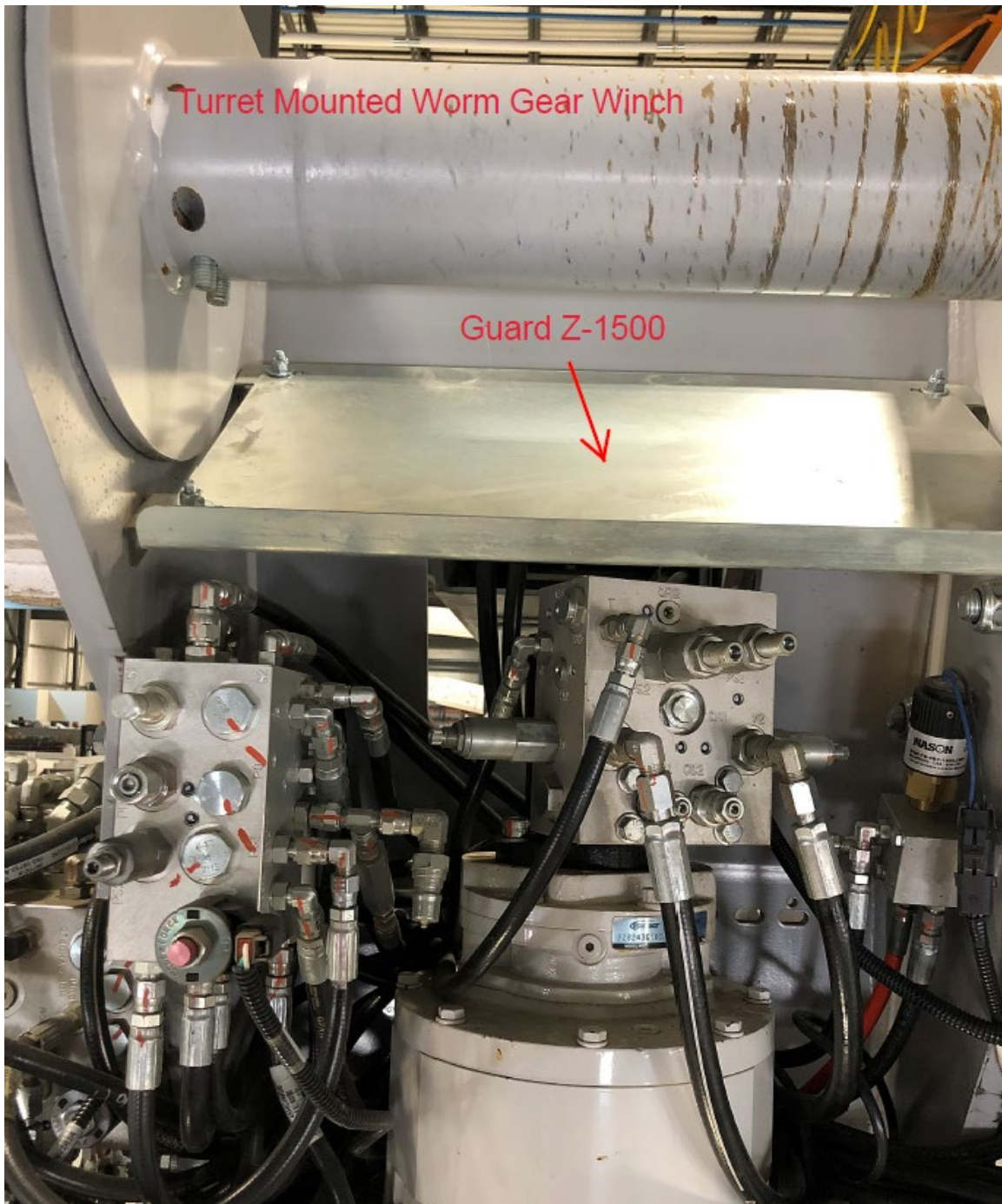


Old Style



Planetary Slip Drive Test & Adjustment

On units with a turret mounted worm gear winch, there is a guard available to help keep the rope from getting hooked on the valve assembly on the rotation motor. The kit to order is Z-1500.

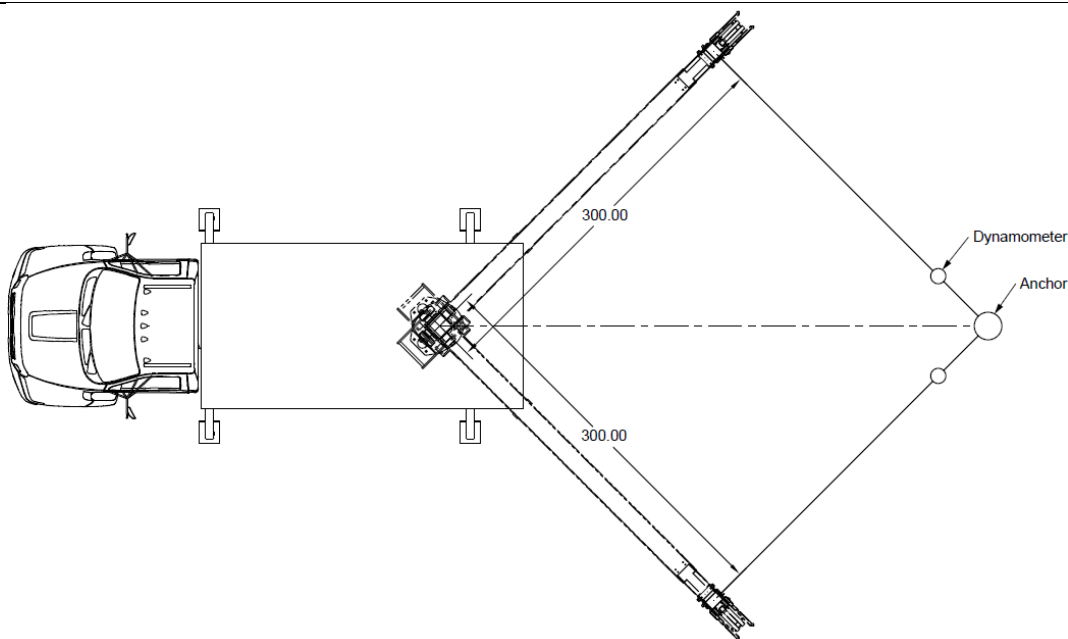


Step 1: Set up

Bring the unit up to operating temperature. Operate the rotation for several revolutions in each direction to prime the hydraulic lines. Locate a suitable anchor capable of holding 2500 lbs. in an area with no overhead obstructions. The area on each side of the anchor must be clear to be able to position the boom on both sides and apply side load. Position and set up the truck near the anchor so the load line can be positioned to pull with the side pull attachment at 300 inches from the centerline of rotation except on the General 95.



The anchor must be capable of holding up to 2,500 lbs. of force

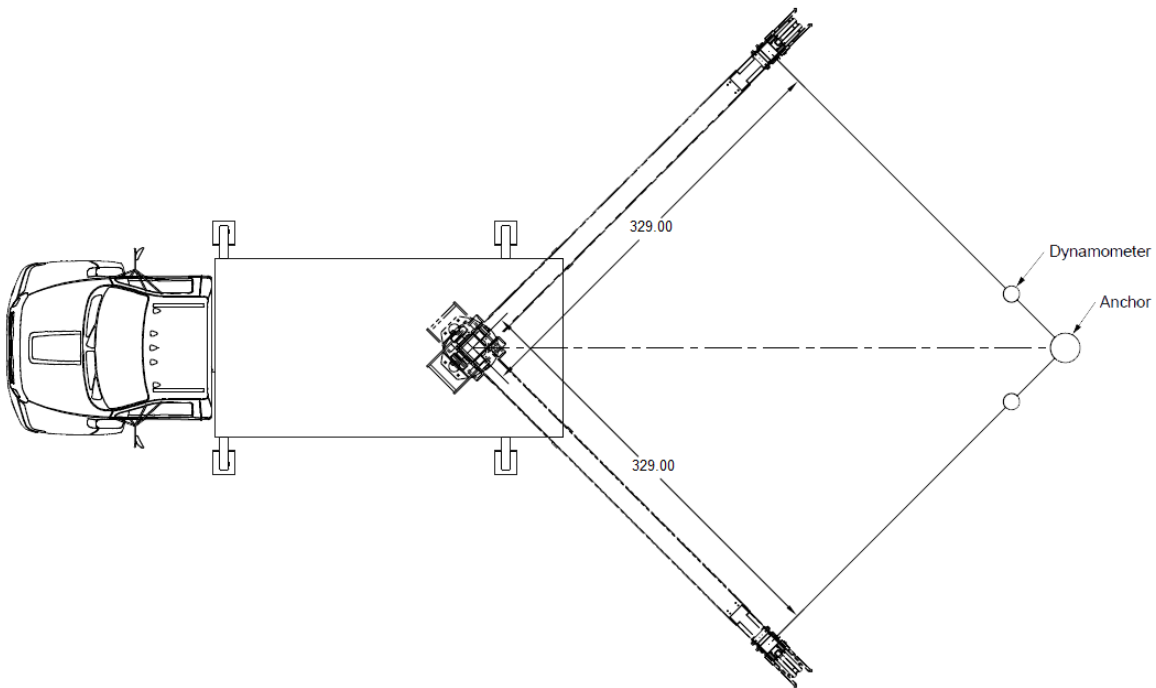


Test Set up

With a General 95 position and set up the truck near the anchor so the load line can be positioned to pull with the side pull attachment at 329 inches from the centerline of rotation. This should be fully retracted.



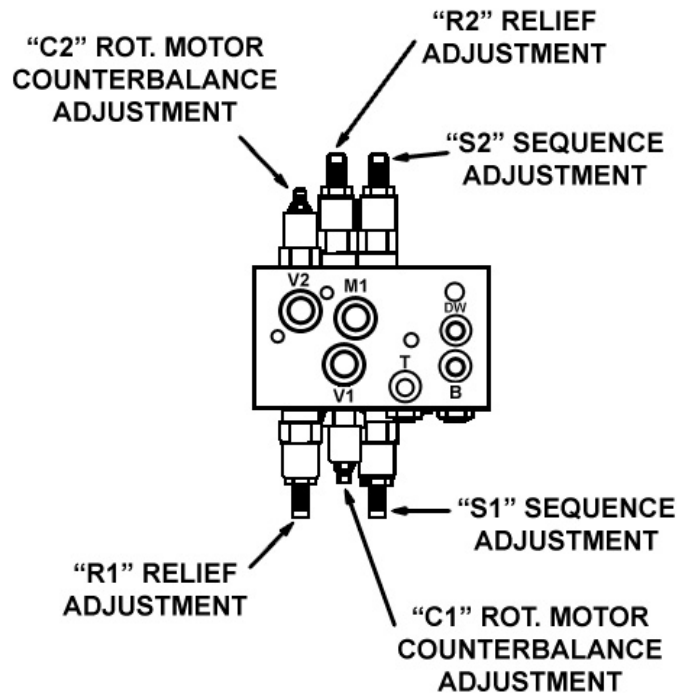
The anchor must be capable of holding up to 2,500 lbs. of force



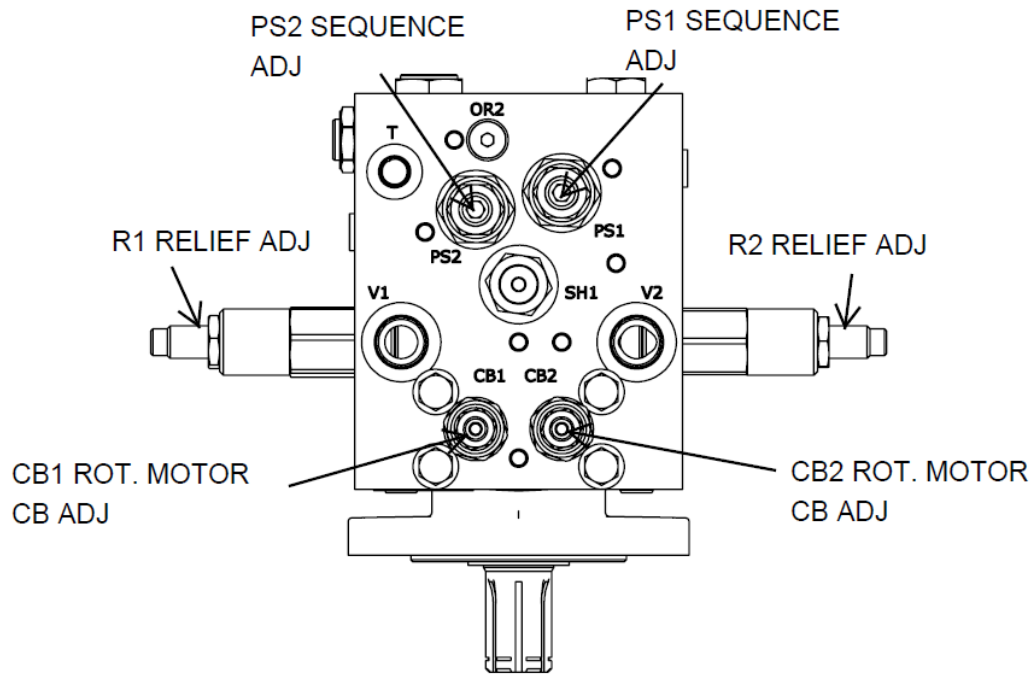
Test Set up

Step 2: Setting the Minimum Rotation Pressure

Set the counter-balance valves, C1 and C2 or CB1 and CB2 located in the rotation slip drive hydraulic manifold, to 800 – 1,000 PSI. This is accomplished by installing a hydraulic pressure gauge at the inlet of the derrick control valve. Meter into rotation and monitor the hydraulic gauge pressure required for initial boom movement in each direction. One counter-balance valve adjusts clockwise rotation while the other adjusts counter-clockwise.



Old Style Pre 1/1/2016



New Style After 1/1/2016

Step 3: Boom position

With the truck in the working position, rotate the boom off the back or side placing the sheave head approximately four to six feet off the ground. The boom should be positioned so the anchor is perpendicular to the boom as shown in the diagram on page 5. When performing any of the following steps for all units except the General 95, the load line must be perpendicular to the boom at 300 inches from the centerline of rotation and approximately level. The General 95 must be full retracted at 329 inches from the centerline of rotation.

Step 4: Connecting the Load Line to the Anchor

Attach a load cell between the load line and the fixed anchor using a side pull sheave. Do not try to side pull without this adapter or load line will be damaged.

The side pull sheave is attached to the second and the third is extended enough to prevent rope damage and allow the line to align with the side pull sheave. On all units except the General 95, the second section is extended so that the line comes off 300 inches from the centerline of rotation. The General 95 is fully retracted at 329 inches.



The side pull sheave is only used for testing. Side pull is not permitted during operation, only for testing purposes.



Part Number Z653 – Side Pull Sheave Attachment

Step 5: Verifying Minimum Parking Brake Force

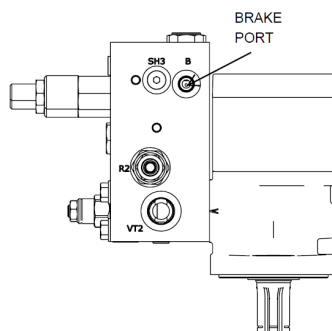
Remove the hydraulic line from port B on the rotation manifold to brake on rotation gear box. Cap port B and leave the port on brake open to atmosphere. While monitoring the load cell, operate winch up to achieve a minimum force of 2000 lb. Do not pull more than 2500 lbs or damage to the rotation system may occur. The brake should not slip during this test although load value may decrease as the synthetic rope elongates under load.

If the brake slips during this test, repair as necessary.

Reinstall hydraulic line to brake after performing this test.



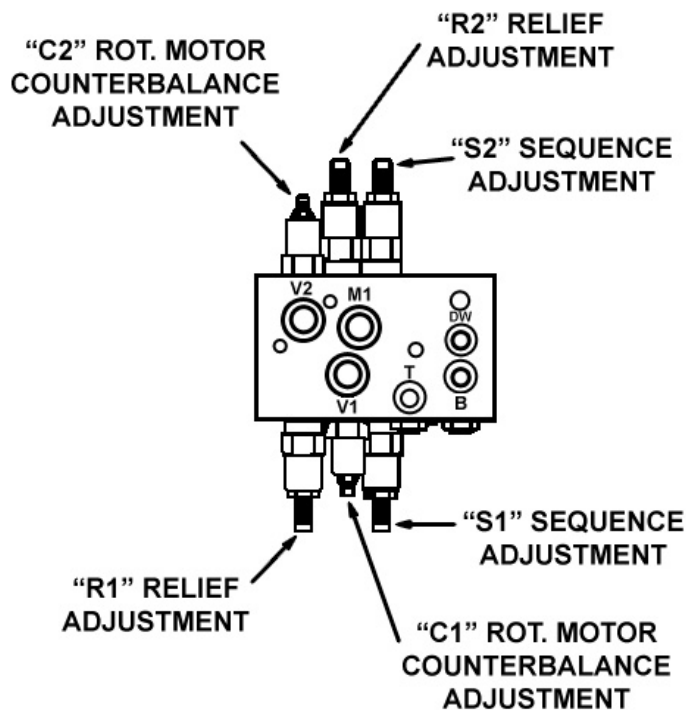
Do not exceed 2,500 lbs. of side load or damage may occur.



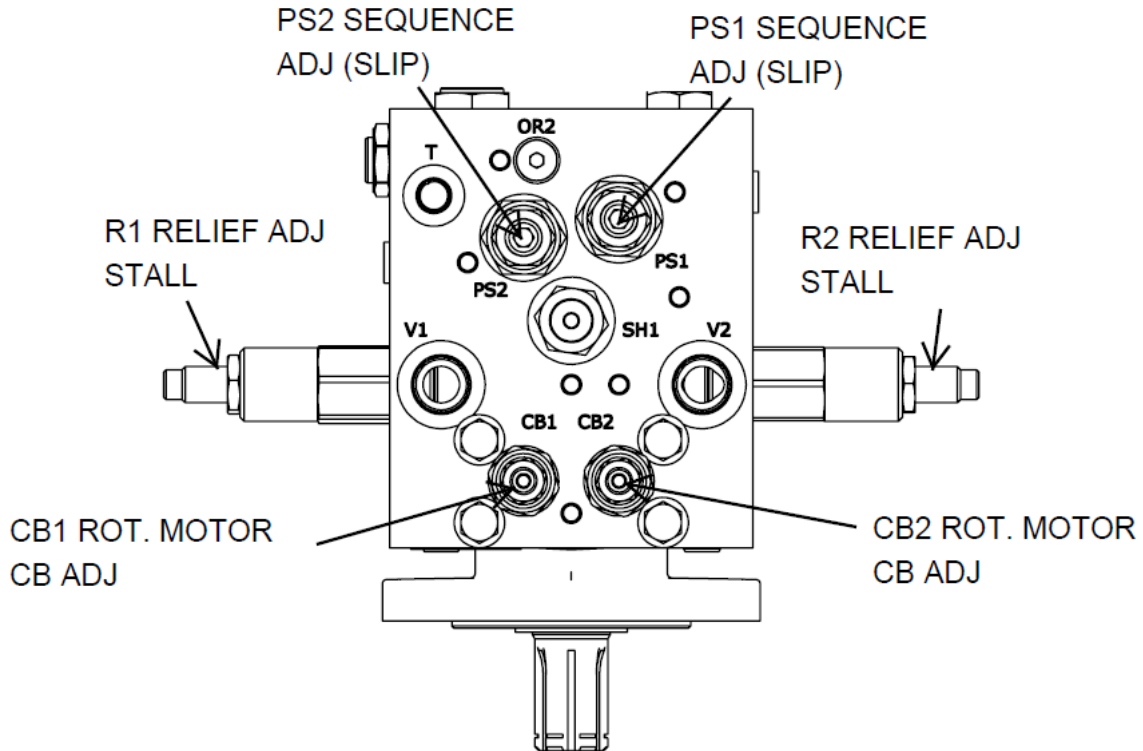
Step 6:

Setting Hydraulic Motor Force (stall)

Ensure brake line is reconnected from Step 5. Using the lower control, rotate away from the fixed anchor until the rotation stalls. Adjust relief cartridges, R1 and R2, in the rotation slip drive hydraulic manifold, until the proper load cell reading is achieved as stated in the Hydraulic motor force (stall) value or the quick reference section of the Maintenance manual. One relief valve adjusts clockwise rotation while the other adjusts counterclockwise.



Old Valve Pre 1/1/2016



New Valve After 1/1/2016

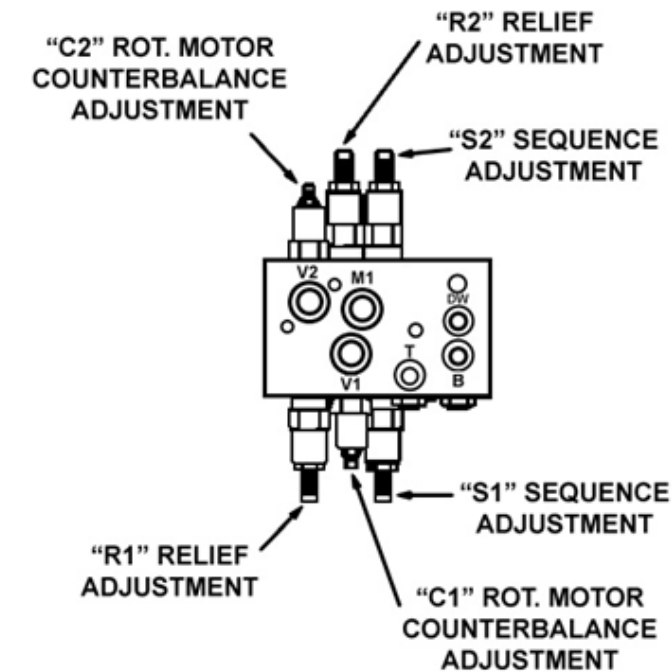
Hydraulic Motor Force (stall) Relief Valve Setting	
Model	Force lbs
C4000	1,400 – 1,600
C5000 (After 7/03)	950 – 1,150
C6000 (After 1/02)	1,200 – 1,300
C7000 (After 10/02)	1,200 – 1,300
General (After 9/96)	1,200 – 1,300
General 80 (After 1/14)	1,350 – 1,450
General 95	1,100 – 1,200

Step 7: Slip Drive Adjustment

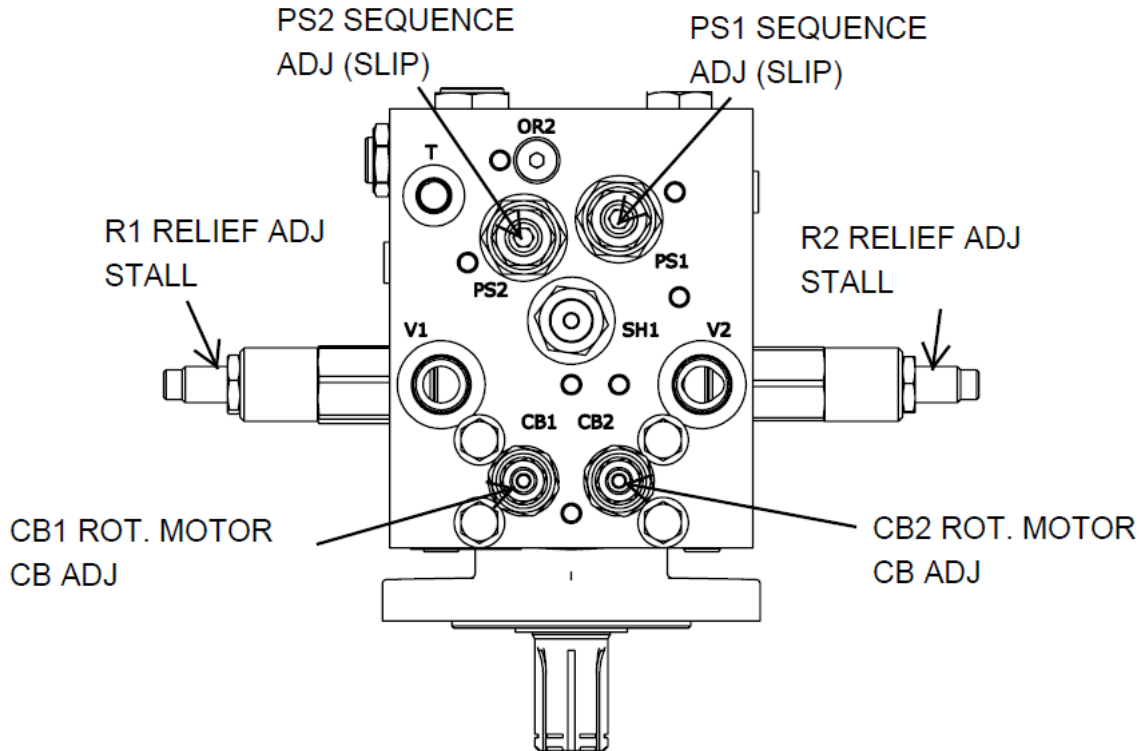
Using the winch up function, pull up slowly creating a side-load on the boom. The rotation should slip at the values stated in the maintenance manual, do not exceed 2500 lbs. Adjust the slip value up or down by adjusting the sequence cartridges, S1 and S2 or PS1 and PS2 in the rotation slip drive hydraulic manifold. One sequence valve adjusts clockwise rotation while the other adjusts counterclockwise.



Do not exceed 2,500 lbs. of side load or damage may occur.



Old Valve Pre 1/1/2016



New Valve After 1/1/2016

Slip Drive Values	
Model	Force lbs
C4000	1,900 – 2,200
C5000 (After 7/03)	1,400 – 1,550
C6000 (After 1/02)	1,700 – 1,900
C7000 (After 10/02)	1,700 – 1,900
General (After 9/96)	1,700 – 1,900
General 80	1,900 – 2,100
General 95	1,600 – 1,700

Step 8: Return to service

Remove all tools used, load cell and side pull sheave from load line and operate to verify smooth operation.