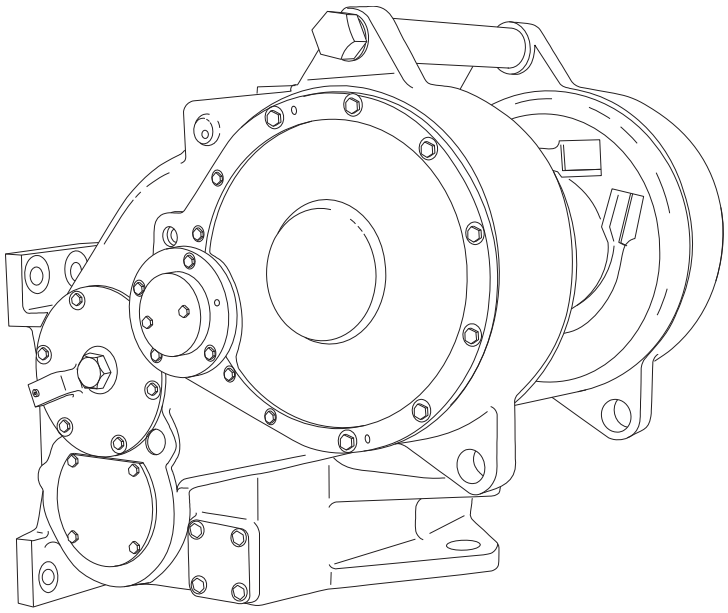
CARCO®

MODELS 50A & 70
50B & 70A
OPERATORS MANUAL



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FOREWORD

Please read and understand this entire manual **BEFORE** operating or servicing your CARCO winch. Retain this manual for future reference.

This manual contains instructions for the operation of CARCO Models 50A & 70 and 50B & 70A power shift winches. When instructions apply to only one series of winch, the specific model number (i.e. 50A & 70 only) will appear at the beginning of the pertinent text. If not identified in this manner, the text applies to BOTH series of winches; 50A & 70 and 50B & 70A.

Some illustrations in this manual may show details or attachments which may be different from your winch. Also, some components may have been removed for illustrative purposes.

Continuing product improvement may cause changes in your winch which may not be included in this manual. Whenever a question arises regarding your CARCO winch or this publication, please contact the PACCAR Winch Technical Support Department:

Phone: (918) 251-8511, Monday - Friday, 0800 hrs - 1630 hrs CST
Fax: (918) 259-1575
Email: winch.service@paccar.com

Provide the complete winch MODEL NUMBER and SERIAL NUMBER when making inquiries.

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Safety and informational callouts used in this manual include:

⚠ WARNING ⚠

WARNING - This emblem is used to warn against hazards and unsafe practice which COULD result in severe personal injury or death if proper procedures are not followed.

⚠ CAUTION ⚠

CAUTION - This emblem is used to warn against potential or unsafe practices which COULD result in personal injury, and product or property damage if proper procedures are not followed.

GENERAL SAFETY RECOMMENDATIONS

Safety for operators and ground personnel is of prime concern. Always take the necessary precautions to ensure safety to others as well as yourself. To ensure safety, the tractor and winch must be operated with care and concern by the operator for the equipment, and a thorough knowledge of the machine's handling and performance capabilities. The following recommendations are offered only as a guide for the operator. Local rules and regulations will also apply.

⚠ WARNING ⚠

FAILURE TO OBEY THE FOLLOWING SAFETY RECOMMENDATIONS MAY RESULT IN PROPERTY DAMAGE, INJURY OR DEATH

1. Read all warning tag information and become familiar with all controls **BEFORE** operating the winch.

2. **NEVER** attempt to clean, oil or perform any maintenance on the winch with the tractor engine running, unless specifically instructed to do so in this manual.

3. Before starting the tractor engine, be certain all controls move freely and are placed in the "Brake On" (neutral) position.

4. NEVER operate the winch controls unless you are properly seated at the operator's station on the tractor and you are sure all personnel are clear of the work area.

5. NEVER attempt to handle winch cable when the hook end is not free. Keep all parts of body and clothing clear of winch drum, cable rollers and entry area of fairleads and arches.

6. Ground personnel should stay in clear view of the tractor operator and clear of the winch drum. **DO NOT** allow ground personnel near a winch line under tension. A safe distance of 1½ times the working length of the cable should be maintained. **NEVER** allow anyone to stand under a suspended load.

7. Avoid sudden "shock" loads or attempting to "jerk" a load free. This type of operation may cause heavy loads in excess of the rated winch capacity, which may result in the failure of the cable and/or winch.

8. Use only GENUINE CARCO parts. Do not use parts from other winch manufacturers on your CARCO winch. Do not use CARCO parts on winches from other manufacturers.

9. Use the correct size ferrule for the cable and pocket in the winch drum. Never use knots to secure or attach cable to the winch drum, or the hook to the cable. The cable anchor or ferrule pocket in the cable drum is designed to provide a self release in the event a back-sliding load must be released from the tractor in an emergency situation. The cable anchor or ferrule alone will **NOT** support the rated capacity of the winch. Therefore, a minimum of five (5) complete wraps must be maintained on the winch drum.

NOTE: *We suggest painting the last five wraps of cable bright red to serve as a visual warning.*

RECOMMENDED OPERATING PRACTICES

1. Leather gloves should be used when handling winch cable.

2. Operate the winch to match line speeds to job conditions.

3. Assure that personnel who are responsible for hand signals are clearly visible and that the signals to be used are thoroughly understood by everyone.

4. Inspect winch cable, rigging, winch and tractor at the beginning of each work shift. Defects should be corrected immediately.

5. Position the tractor for the straightest line of pull to reduce the wear on the winch cable and ensure even spooling.

6. When winding winch cable on the winch drum, never attempt to maintain tension by allowing the winch cable to slip through the hands. Always use the "hand-over-hand" technique, being careful to keep hands and clothing away from winch drum and fairlead rollers.

7. Be sure of tractor ground stability before winching in a load.

8. Store unused chokers, slings and rigging in a neat and orderly fashion to prevent damage to equipment or injury to personnel.

9. CARCO Standard Power Shift (PS) winch model numbers indicate the unit's maximum rated bare drum line pull in thousands of pounds:
   Model 50A & 50B = 50,000 lbs. (22,680 kg)
   Model 70 & 70A = 70,000 lbs. (31,752 kg)
   For Power Shift Contractor (PSC) winches with slow speed gear sets, the bare drum line pull is higher.

   Do not operate the winch under loads that exceed the maximum rated bare drum line pull. If excessive loads are encountered, use a multi-part line and sheave blocks. Any attempt to exceed the capacity of one winch (such as coupling two or more tractors together) is extremely hazardous.

10. The factory approved adaptions for CARCO winches are designed and intended for use on specific models of crawler tractors. Changing winches between tractors is not possible in some cases because of differences in tractor models. Some changes cannot be approved by CARCO because of safety limitations. Call a CARCO dealer or the CARCO factory prior to attempting winch modifications or before mounting on a different tractor.

11. CARCO power shift winches are equipped with hydraulic accumulators. Discharge accumulator stored oil supply before removing any hydraulic lines or fittings or servicing winch. Personal injury may result from the sudden release of oil pressure. To discharge the accumulator, stop the engine, slowly cycle the Power Shift control handle into full Reel-In then Reel-Out positions a minimum of five (5) times.

12. On machines having hydraulically, mechanically and/or cable controlled equipment, be certain the equipment is either lowered to the ground or blocked securely before servicing, adjusting and/or repairing the winch. Always apply the tractor parking brakes and lower any equipment to the ground before dismounting the tractor.

13. The winches described in this manual are neither designed nor intended for use or application in the lifting or moving of persons.

14. Install guarding to prevent personnel from getting any part of their body or clothing caught at a point where the cable is wrapped onto the drum or drawn through the fairlead rollers.

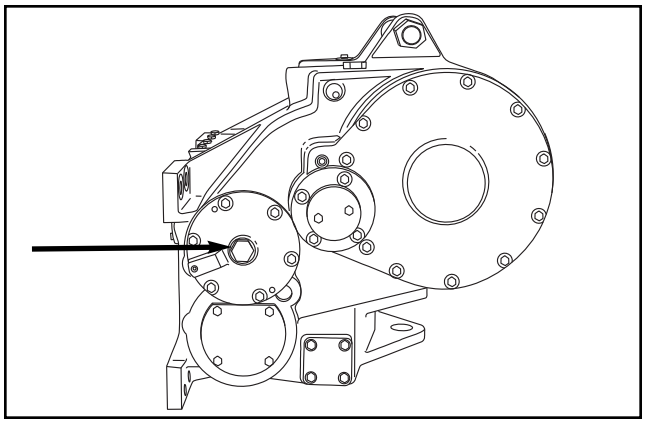
15. Keep equipment in good operating condition. Perform the scheduled servicing and adjustments defined in the "Preventive Maintenance" section of this manual. Use of proper lubricants is crucial.

16. An equipment warm-up procedure is recommended for all tractor start-ups, and is essential at ambient temperatures below +40°F (+5°C). Refer to the "Warm-Up Procedure" listed in the "Preventive Maintenance" section of this manual.

MODEL DESCRIPTION

The CARCO Power Shift Winch is a single drum unit that mounts to the rear of a crawler tractor. It is driven by engine power through the tractor PTO (Power Take-Off). The winch may be operated independently or with the tractor transmission engaged. When operated properly, it is capable of utilizing maximum engine horsepower. The winch has equal speed gearing, power-in and power-out, using multiple-disc oil actuated friction clutches and a spring applied hydraulically released multiple-disc oil brake.

The winch may be manufactured as a Standard PTO or Low PTO configuration, depending on the tractor application. In the Standard PTO configuration, the bevel gear group, clutch and brake components are located in the upper bores of the winch case.



Standard PTO Shown

The Low PTO configuration has the bevel gear group, clutches and brake assembly located in the lower bores of the winch case.

The Model 50A/70 and 50B/70A may have either a 3-shaft or 4-shaft gear train configuration depending upon the tractor horsepower, PTO speed and line speed requirements of the winch application.

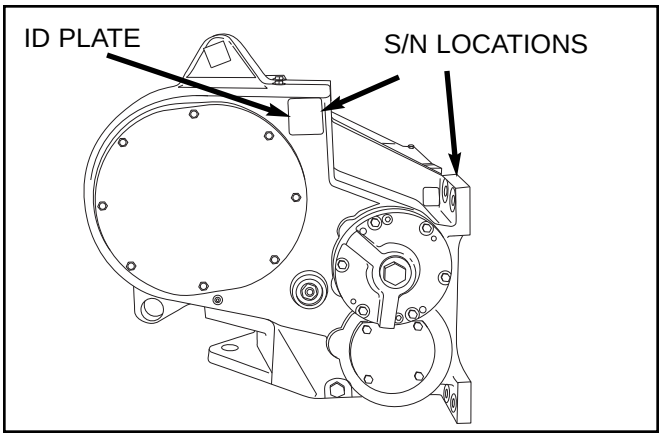
Standard and Low PTO configurations are available as either a PS or PSC. The standard Power Shift (PS) Winch is primarily used in logging, land clearing and general utility applications. The PS Model has gear ratios which match the cable drum rotation in Reel-In (forward) to reverse track speeds for optimum advantage in tractor recovery.

The Power Shift Contractor (PSC) Model is similar to the PS but uses slow speed gearing and the Manual Override (MOR) brake for greater load control. The PSC is well suited to oil and gas field, mining and pipeline applications.

Optional features increase the ability of the winch to meet specific application requirements. Options available for the 50A/70 and 50B/70A series winches include:

- Free Spool
- Gear Ratios
- Three or Four Roller Fairleads
- PSC Package (included Manual Override {MOR} Brake System and Slow Speed Gear Ratio)

The winch model number is an important reference as to what optional components included when the winch was manufactured. The winch identification plate is located on the right hand side of the winch case. The serial number is also stamped into the upper right hand mounting pad.



The winch model number contains the following configuration data:

MODEL

C 0 0 0 0 0

50A & 70
50B & 70A
PS or PSC

Bevel Gear Ratio
A-1:1
B-1.27:1
C-1.64:1
D-2.11:1
E-2.79:1

0-Overwind
1-Underwind

0-Standard Brake
1-Manual Override (MOR) Brake

0-Without Free Spool
1-With Free Spool

0-Four shaft winch
1-Three shaft winch

0-No fairlead
3-Three roller fairlead
4-Four roller fairlead

Important: *Always refer to the serial number and model number when requesting information or service parts.*

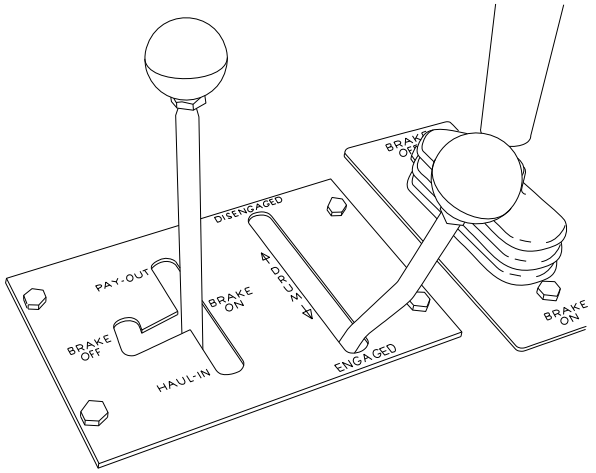
WINCH OPERATION

HYDRAULIC SYSTEM

The winch contains an independent, internal hydraulic system. The winch housing serves as a reservoir and stores filtered oil for the internally mounted hydraulic pump. The pump is driven by a gear pressed onto the bevel pinion gear. The pump supplies oil whenever the PTO shaft is turning. Oil from the pump is routed through a pressure filter then directed to the control valve where a stand-by system pressure is maintained at 320-400 PSI (22.4-28.1 kg/cm^2).

The system oil pressure is routed through the control valve body to the Directional and Brake control cartridges. Movement of the Directional control spool opens passages which direct oil to apply the Reel-In (forward) or Reel-Out (reverse) clutches and release the spring applied multi-disc oil brake.

Movement of the Brake spool will direct oil to release the brake only. The movement of the spools responds to the position of the operators Power Shift control lever by means of flexible control cables.



Winch controls with optional Free Spool and Manual Override (MOR) brake control levers.

The winch hydraulic system is equipped with an accumulator. The accumulator stores a small amount of oil at system pressure to assist the application of clutches and release the brake under all operating conditions. The stored oil supply may also be used to release the spring-applied brake whenever the tractor engine or torque converter is stalled. The accumulator-stored oil supply is continuously refilled by the winch pump and valve whenever the tractor PTO is turning.

On tractors which supply PTO power through the torque converter, it is possible to cause the torque converter to stall if the tractor engine speed is too low. It is important that engine idle be set to factory specifications.

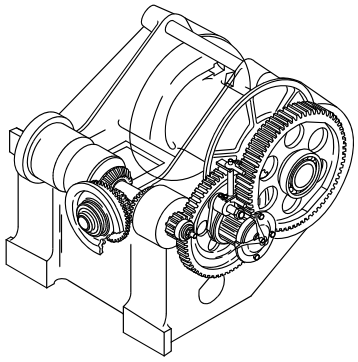
⚠ CAUTION ⚠

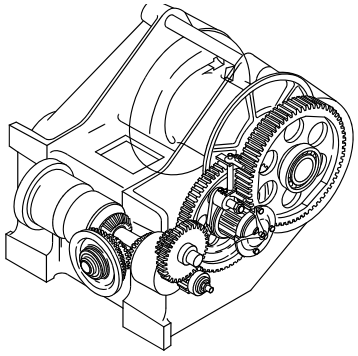
Discharge accumulator oil supply **BEFORE** removing any hydraulic lines or servicing winch. Personal injury may result from the sudden release of oil pressure. To discharge the accumulator, stop engine, slowly cycle Power Shift control handle into full Reel-In then Reel-Out positions a minimum of five (5) times.

GEAR TRAIN

The winch bevel pinion, bevel gears, hydraulic pump and clutch friction discs are rotating whenever the tractor PTO shaft is rotating. Application of a clutch, Reel-In or Reel-Out, and the simultaneous release of the brake will cause the rotation of the remaining gear train and cable drum. See illustrations below.

Standard PTO case, 4 shaft gear train, CCW PTO shaft rotation, reel-in clutch applied.





Low PTO case, 4 shaft gear train, CCW PTO shaft rotation, reel-in clutch applied.

The clutch shaft assembly (with bevel gears) must turn 40.4 times for one (1) rotation of the cable drum on a 4 shaft gear train winch and 22.3 times on a 3 shaft gear train winch.

The direction of the tractor PTO shaft rotation and the right and left hand clutch location is determined by facing the rear of the tractor.

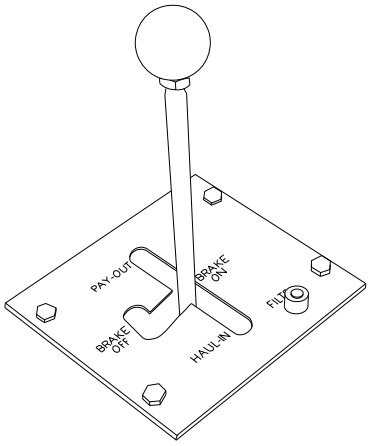
The cable drum rotation may be easily changed from overwind (standard) to underwind by reversing clutch pressure lines at the control valve ports C_1 and C_2 and installing the wire rope in the opposite cable drum ferrule pocket.

CONTROL OPERATION - Morse

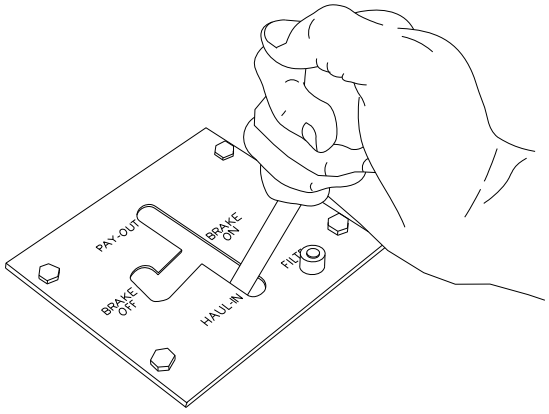
POWER SHIFT (PS) - SINGLE LEVER

The operator's control lever must ALWAYS be moved to its full travel in Reel-In (forward) and Reel-Out (reverse). The speed of the cable drum rotation should be controlled by varying the tractor engine RPM. Sufficient hydraulic pressure will be available to fully apply the clutches at engine (PTO) speeds above low idle. If the winch is mounted on a direct drive tractor, the tractor master clutch MUST be engaged BEFORE moving the power shift lever. The internal winch pump is only driven when the PTO shaft is turning. A continuous oil supply is needed to provide reliable clutch and brake operation.

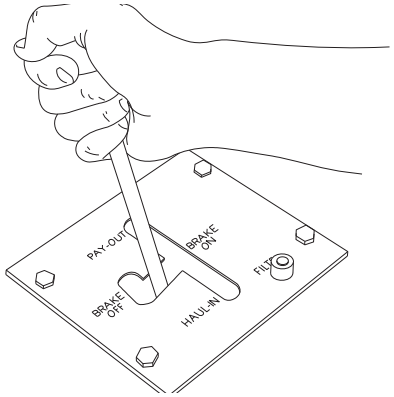
> **⚠ CAUTION ⚠**
>
> Any attempt to regulate drum speed (line speed) through the control lever by "feathering" clutches will cause excessive heat due to slippage and severe damage to clutch discs may result.



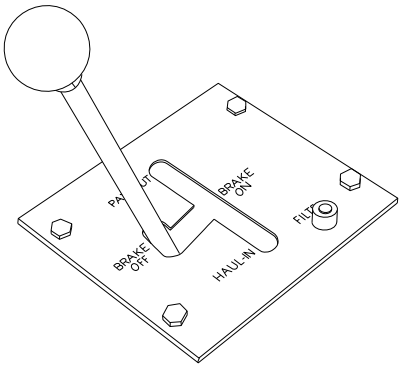
Brake-On (neutral). Control lever is spring centered to Brake-On. Brake is applied by spring force.



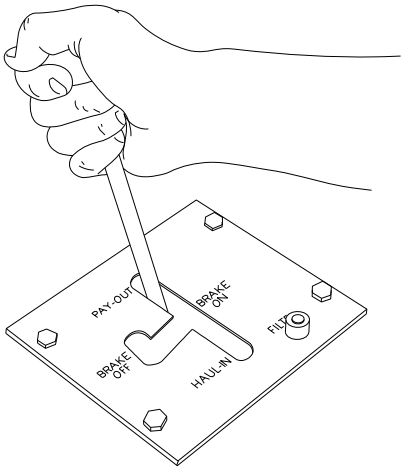
Reel-In (forward). Control lever is pulled toward operator to fully engaged position. Brake is hydraulically released and Reel-In (forward) clutch is hydraulically applied.



Brake-Off. The brake is hydraulically released by moving the control lever to the left. Partial brake release may be achieved by slowly moving the control lever into the gate. The amount of brake release is proportional to the distance the lever moves into the gate.

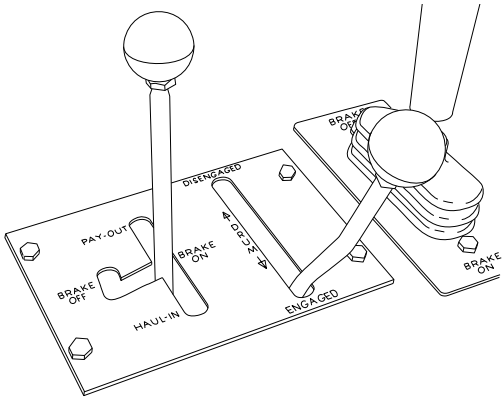


Full brake release is achieved by moving the lever to the left then up into the lock position. With the brake released, the tractor may walk away from the load. Always return the control lever to Brake-On (neutral) position.

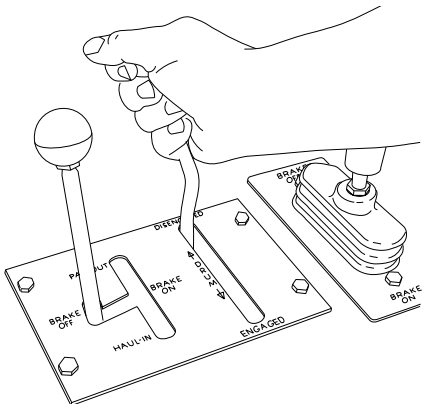


Reel-Out (reverse). Control lever is pushed away from operator to fully engaged position. Brake is hydraulically released and Reel-Out (reverse) clutch is hydraulically applied.

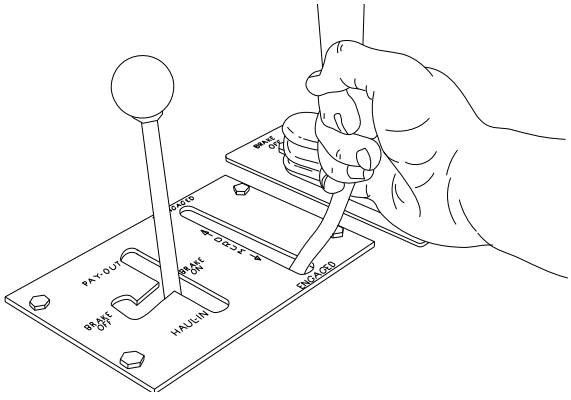
FREE SPOOL CONTROL OPERATION



For normal winch and tractor operation, the Free Spool (drum) lever should remain in the drum Engaged position (toward operator).



To operate Free Spool, place Power Shift lever into Brake-Off position and shift Free Spool lever into drum Disengaged position (away from operator). This will disengage the drum drive gears from the gear train and brake which permits the wire rope to be easily pulled off the drum by hand. Return Power Shift lever to Brake-On (neutral) position to hold gear train stationary.



To resume powered operation of the cable drum, shift the Free Spool control lever to the drum Engaged position (toward operator).

If the gear train will not engage, *momentarily* apply the Reel-In (forward) clutch to "bump" the gear train while holding slight pressure on the Free Spool lever. **NEVER** force the Free Spool lever. The shift will be made with ease when the gears are aligned.

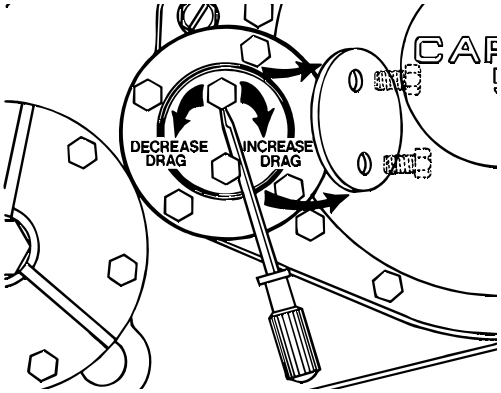
⚠ WARNING ⚠

Freespool is **ONLY** to be used when the tractor is stopped for pulling wire rope off the cable drum by hand. **DO NOT** use Freespool when the tractor is in motion, to release a load or to move away from a load that is attached to the wire rope. Damage to the gear train and loss of load control may result. Loss of load control may result in property damage, injury or death.

To release a load, or to move away from a load, the Reel-Out (reverse) function or the Brake-Off function **MUST** be used. Remove any load from the winch cable **BEFORE** selecting Freespool.

The tractor and the winch cable drum **MUST** be stopped **BEFORE** engaging the gear train. Gear train damage will result from attempting to reengage the gear train when the cable drum is rotating.

A cable drum drag adjustment may be made to eliminate "birdnesting" caused by drum overrun. Adjustment is made by removing the lock plate and turning the threaded adjuster clockwise to increase drag; counter clockwise to decrease drag.



Using a long screw driver or pry bar, turn the threaded adjuster clockwise until tight. Tap the adjuster with a hammer to seat the bearing and continue turning until the adjuster can no longer be tightened. Back the adjuster out no more than 1/16 turn maximum and secure with lock plate and capscrews. Tighten the capscrews to 75 lb•ft (102 N•m) torque.

NOTE: Tightening the threaded adjuster pushes the tapered bearing cup (outer race) into closer contact with the bearing cone and increases the bearing drag; much like tightening a wheel bearing nut on an automobile or truck. The snug fitting bearing cup will NOT move outward with the threaded adjuster when the adjuster is loosened. The winch must be operated under load for a brief period to allow the gear train load to push the outer bearing cup out against the threaded adjuster before a reduction in bearing drag can be noticed.

⚠ CAUTION ⚠

DO NOT back off adjuster more than 1/16 turn as this allows excessive shaft end play and may cause gear train misalignment, accelerated wear and noise.

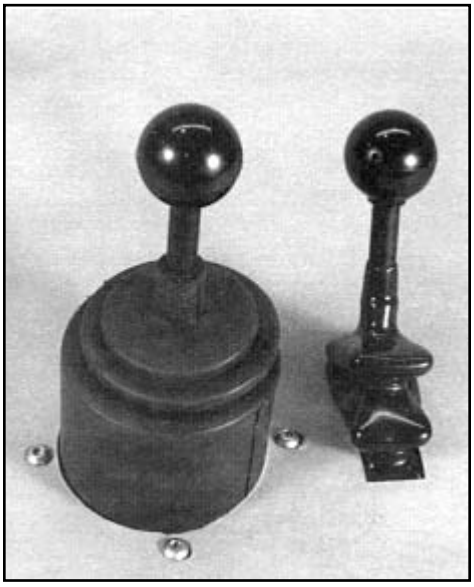
CONTROL OPERATION - Quadco

POWER SHIFT (PS) – SINGLE LEVER

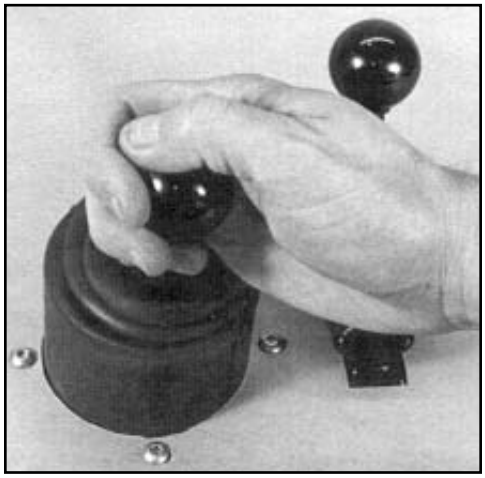
The operator's control lever must ALWAYS be moved to its full travel in Reel-In (forward) and Reel-Out (reverse). The speed the cable drum rotates should be controlled by varying the tractor engine RPM. Sufficient hydraulic pressure will be available to fully apply the clutches at engine (PTO) speeds above low idle. If the winch is mounted on a direct drive tractor, the tractor master clutch MUST be engaged BEFORE moving the power shift lever. The internal winch pump is only driven when the PTO shaft is turning. A continuous oil supply is needed to provide reliable clutch and brake operation.

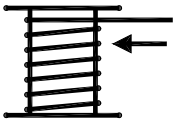
⚠CAUTION⚠

Any attempt to regulate drum speed (line speed) through the control lever by partially applying or "feathering" the clutches will cause excessive heat due to slippage and severe damage to clutch discs may result.

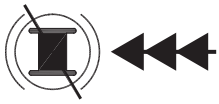


Brake-On (neutral). The control lever is spring centered to Brake-On. The brake is applied by spring force. The cable drum and load is held secure by the spring-applied brake.

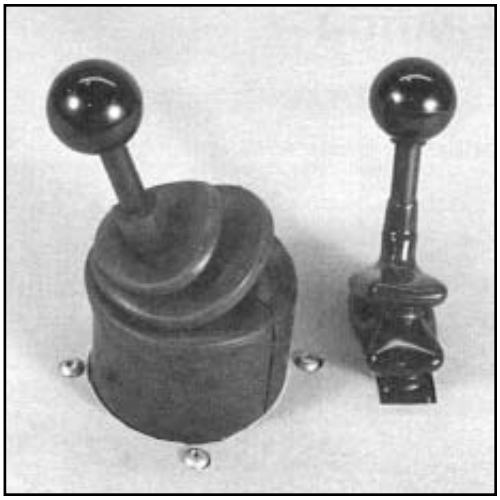




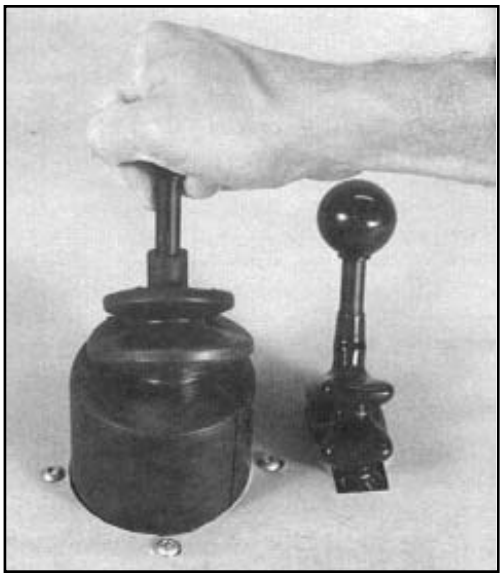
Reel-In (forward). The control lever is pulled toward the operator to the fully engaged position. The brake is hydraulically released and the Reel-In (forward) clutch is hydraulically applied.

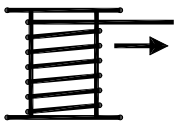


Brake-Off. The brake is hydraulically released by moving the control lever to the left. Partial brake release may be achieved by slowly moving the control lever into the gate. The amount of brake release is proportional to the distance the lever moves into the gate.



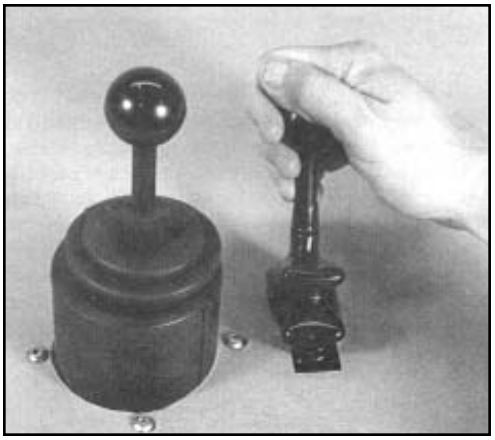
Full Brake Release. Full brake release is achieved by moving the lever fully to the left into the lock position. With the brake released, the tractor can drive away from the load. Always return the lever to the Brake-On (neutral) position when the operation is complete.

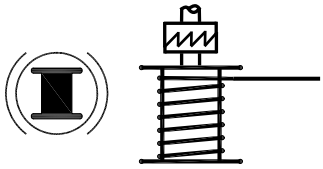




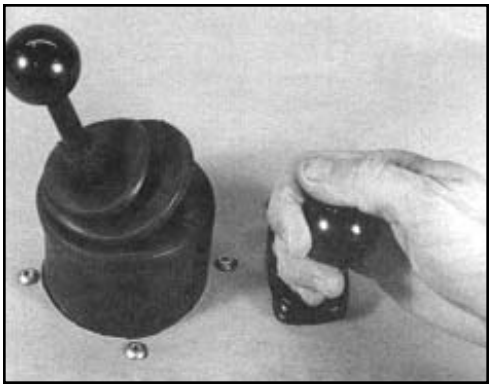
Reel-Out (reverse). The control lever is pushed away from the operator to the fully engaged position. The brake is hydraulically released and the Reel-Out clutch is hydraulically applied.

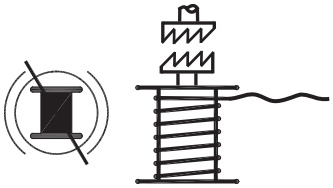
FREESPOOL CONTROL OPERATION



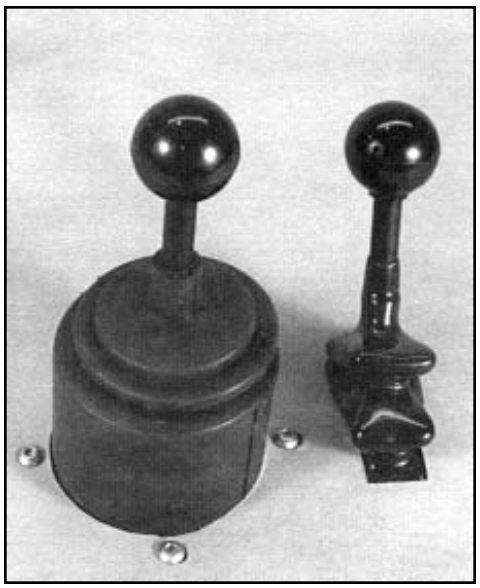


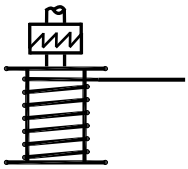
For normal winch and tractor operation, the Freespool lever should remain in the drum engaged position (away from operator).





To operate Freespool, place the Power Shift lever into the Brake-Off position, then shift the Freespool lever into the Disengaged position (toward the operator). This will disengage the drum drive gears from the gear train and brake, which permits the wire rope to be easily pulled off the drum by hand. Return the Power Shift lever to the Brake-On (neutral) position to hold the gear train stationary.





To resume powered operation of the cable drum, shift the Freespool control lever to the Engaged position (away from the operator).

If the gear train will not engage, *momentarily* apply the Reel-In (forward) clutch to "bump" the gear train while holding slight pressure on the Freespool lever. Never force the Freespool lever. The shift will be made with ease when the gears are properly aligned.

⚠ WARNING ⚠

Freespool is **ONLY** to be used when the tractor is stopped for pulling wire rope off the cable drum by hand. **DO NOT** use Freespool when the tractor is in motion, to release a load or to move away from a load that is attached to the wire rope. Damage to the gear train and loss of load control may result. Loss of load control may result in property damage, injury or death.

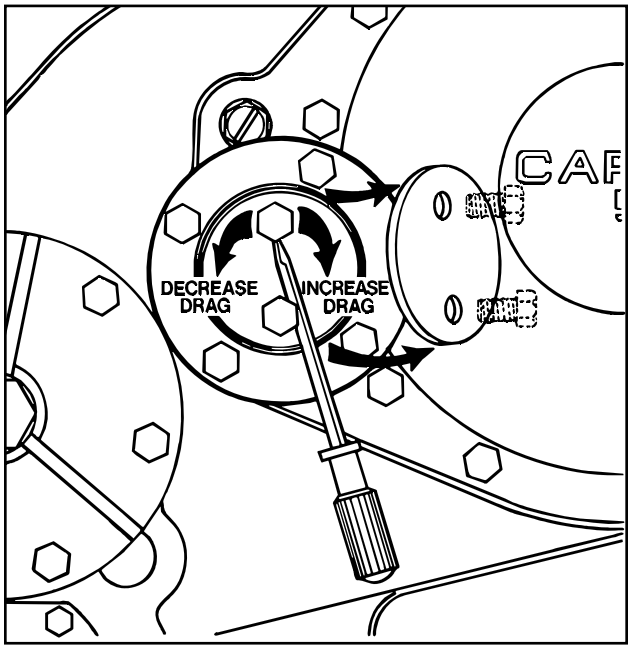
To release a load, or to move away from a load, the Reel-Out (reverse) function or the Brake-Off function **MUST** be used. Remove any load from the winch cable **BEFORE** selecting Freespool.

The tractor and the winch cable drum **MUST** be stopped **BEFORE** engaging the gear train. Gear train damage will result from attempting to reengage the gear train when the cable drum is rotating.

NOTE: *FREESPOOL is to be used **ONLY** for handling wire rope by hand. **DO NOT** attempt to release a load using FREESPOOL or to engage or disengage the gear train while the cable drum is rotating or when the tractor is in motion.*

FREESPOOL ADJUSTMENT

A cable drum drag adjustment may be made to eliminate birdnesting" caused by drum overrun. Adjustment is made by removing the lock plate and turning the threaded adjuster clockwise to increase drag; counterclockwise to decrease drag.



Using a long screw driver or pry bar, turn the threaded adjuster clockwise until tight. Tap the adjuster with a hammer to seat the bearing and continue turning until the adjuster can no longer be tightened. Back the adjuster out no more than 1/16 turn maximum and secure with lock plate and capscrews. Tighten the capscrews to 75 lb•ft (102 N•m) torque.

NOTE: *Tightening the threaded adjuster pushes the tapered bearing cup (outer race) into closer contact with the bearing cone and increases the bearing drag; much like tightening a wheel bearing nut on an automobile or truck. The snug fitting bearing cup will NOT move outward with the threaded adjuster when the adjuster is loosened. The winch must be operated under load for a brief period to allow the gear train load to push the outer bearing cup out against the threaded adjuster before a reduction in bearing drag can be noticed.*

△ CAUTION △

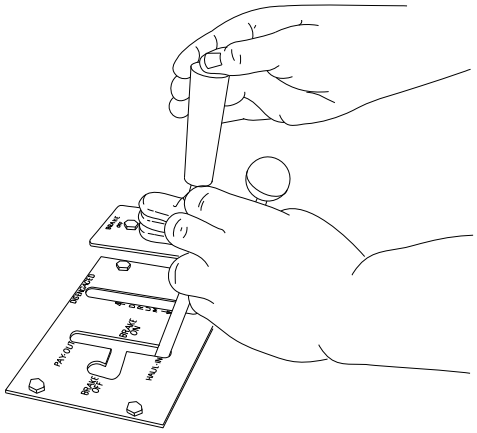
DO NOT back off adjuster more than 1/16 turn as this allows excessive shaft end play and may cause gear train misalignment, accelerated wear and noise.

OPTIONAL MANUAL OVERRIDE BRAKE (MOR) OPERATION

The Manual Override brake (MOR) option provides additional control for applications requiring precise load positioning.

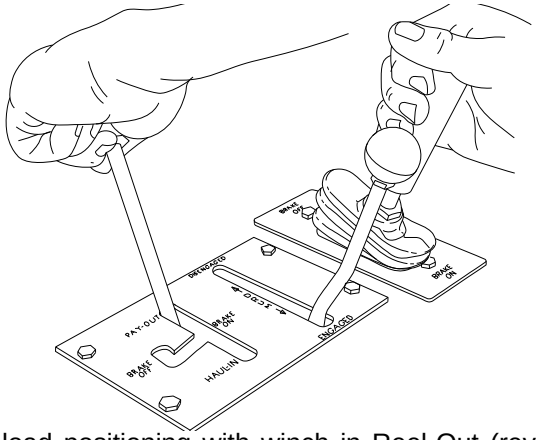
1. Brake-Off - Completely releases winch brake in the same manner as moving the Power Shift control lever.
2. Neutral - no effect on winch operation.
3. Brake-On - lever may be moved between neutral and Brake-On to precisely “feather” the application of the winch brake and improve load control.

The MOR brake may be operated independently of the Power Shift lever or together with the Reel-In or Reel-Out clutches.



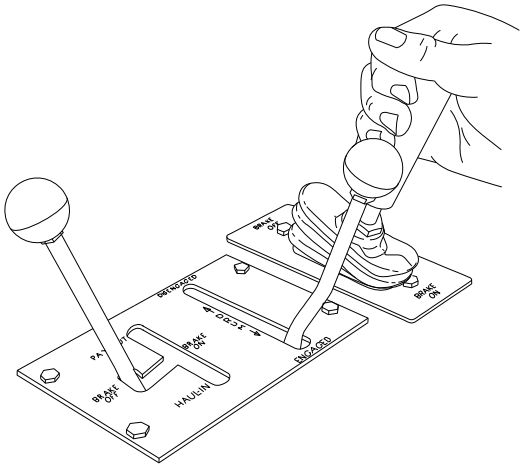
For load positioning with winch in Reel-In (forward) apply the brake by moving the MOR brake lever toward operator while moving the Power Shift lever from Reel-In (forward) to Brake-On (neutral).

When releasing the clutch, always fully return the Power Shift lever to Brake-On (neutral) then release the MOR brake lever to neutral.



For load positioning with winch in Reel-Out (reverse), apply brake by moving MOR brake lever toward operator while moving the Power Shift lever from Reel-Out (reverse) to Brake-On (neutral).

When releasing the clutch, always fully return Power Shift lever to Brake-On (neutral) then release MOR brake lever to neutral.



For critical load positioning while lowering very short distances, the Manual Override brake may be used independently as follows:

Move the MOR brake lever toward operator to fully apply the brake. Then, move the Power Shift lever from Brake-On (neutral) to Brake-Off. SLOWLY release the MOR brake lever until load begins to move. When desired position is reached, move the MOR brake lever toward operator to full Brake-On position.

With load held in desired position, move the Power Shift lever to Brake-On (neutral), then return the MOR brake lever to neutral.

⚠ WARNING ⚠

Lowering loads with Manual Override (MOR) brake independent of Reel-Out (reverse) clutch, will accelerate brake disc wear and may result in rapid load descent if MOR brake lever is released too quickly. Sudden movement of load may cause serious property damage, personal injury or death.

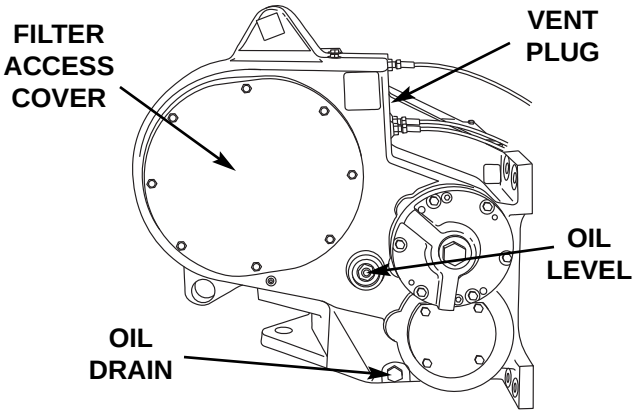
PREVENTIVE MAINTENANCE & SPECIFICATIONS

A regular program of preventive maintenance for your CARCO winch will minimize the need for emergency servicing and promote long product life and trouble-free service.

The service intervals suggested in this manual will optimize component service life. The intervals may be gradually increased or decreased with experience of a particular lubricant and evaluation of your application.

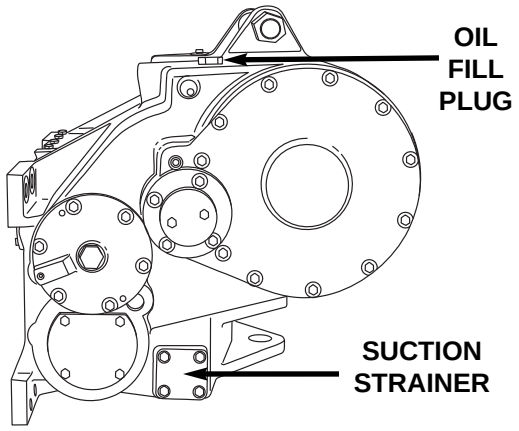
⚠ CAUTION ⚠

Discharge accumulator oil supply **BEFORE** removing any hydraulic lines or servicing winch. Personal injury may result from sudden release of oil pressure. To discharge the accumulator, stop engine, slowly cycle Power Shift control handle into full Reel-In then Reel-Out positions a minimum of five (5) times.



1. Oil Level

Check the oil level at the beginning of each work shift, with tractor and winch in level position. The oil must be visible in the upper half of the sight gauge. If an oil level plug is used in place of the sight gauge, the oil level should be at the bottom of level plug hole. Add oil as required through the fill plug at the top of winch case.



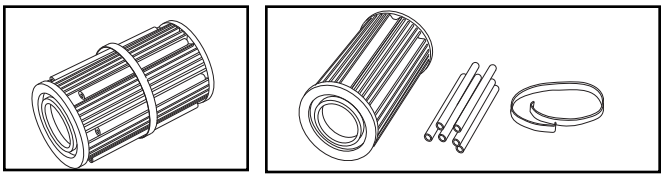
2. Oil Change, Filter and Strainer Service

Under normal operating conditions, the oil and pressure circuit filter should be changed, and the suction strainer cleaned after the first 100-250 hours of operation, then every 1000 hours or six months, whichever occurs first, or when the filter bypass indicator light remains on after initial warm-up.

⚠ CAUTION ⚠

Hot oil may cause injury. Make certain oil has cooled to safe temperature before servicing.

To drain the oil, place tractor and winch in a level position and remove drain plug located at lower right hand side of winch case. Drain oil into a suitable container and recycle or dispose of used oil in an environmentally responsible manner. Install plug securely after oil has been drained. After oil has drained, remove four suction strainer cover capscrews and cover. Remove suction strainer from winch case then remove metal band and magnetic rods from suction strainer. Thoroughly wash strainer in clean safety solvent and blow dry with compressed air, inspect wire mesh for damage or clogging with debris. Do not reuse a damaged suction strainer.



Install magnetic rods onto suction strainer using metal band. Lubricate o-ring and install strainer spring and cover into winch case.

Refill winch to proper level with the recommended oil.

OIL CAPACITY:

50A & 70 Std. PTO -	83 qts. (79 ltr.)
50A & 70 Low PTO -	71 qts. (67 ltr.)
50B & 70A Std. PTO -	78 qts. (74 ltr.)
50B & 70A Low PTO -	66 qts. (63 ltr.)

⚠ CAUTION ⚠

To prevent serious damage to winch, **DO NOT** run engine while oil is drained from winch.

Winches adapted to Komatsu power shift tractors are equipped with an adapter gear box (drop box) assembly. Later units are lubricated with a captive supply of 90 wt. gear oil which should be drained through a plug found at the bottom of the housing. Refill gear box to the oil level plug found approximately 1/3 of the housing length from the bottom with 90 wt. gear oil which meets API specification GL5 or MIL-L-2105C.

Service the gear box vent plug as described below.

The pressure filter is located behind the right hand, eight-bolt access cover. Remove the cover, locate the spin-on pressure filter and remove the filter element with a strap wrench.

Lubricate the filter gasket and adapter threads with hydraulic oil and install new filter element onto filter head. Hand tighten ½ - ¾ turn after seal ring makes contact with filter head.

Start tractor and operate engine at low idle. Correct any leaks.

The indicator light may come on for a short time during initial cold start-up, but should go out as the oil warms up. If the light remains on, this indicates a restricted filter element, sending unit stuck in the bypass position or accidentally grounded sending unit wire.

3. Control Cable and Pressure Adjustment

While the access cover is removed, it is advisable to check control cable adjustment and hydraulic main relief pressure. Place the Power Shift control lever in the center “Brake-On” (neutral) position. Install the yoke pins into the cable yokes/control valve spools and secure with hitch pins. The yoke pins should slip easily into the bores without any binding. The control valve spools are spring centered. If you notice any binding, turn the cable adjusters in or out until you obtain a “free pin” condition.

Make certain accumulator stored oil supply has been discharged as described earlier. Install an accurate 0-600 PSI (0-42 Kg/cm^2) gauge onto the - 4 J.I.C. gauge port next to the control cables. Start tractor and operate engine at approximately 800-1000 RPM until pressure stabilizes. Maximum pressure during “charging” mode should peak at 400 PSI (28.1 Kg/cm^2). Pressure will slowly fall back approximately 15-20% from the relief setting then quickly return to 400 PSI when the valve cycles.

Carco winches have used two different control valves over time. 50A/70 winches and early 50B/70A winches used Gresen valves, identified with “Gresen” logo on the front face of valve and an internally adjustable pressure unloading valve. Current production 50B/70A winches, with usage beginning in early 2004, use a Parker valve, identified with “Parker” logo on the front face and externally adjustable, screw-in type cartridge valves.

If pressure adjustment is required:

For Early “Gresen” Valve -

Locate the adjustment screw hole behind port “P” of the control valve. With a ¼ in. Allen key, loosen the outer lock screw. Insert a 3/16 in. Allen key through the lock screw and turn the adjusting screw clockwise to increase peak pressure; counterclockwise to decrease peak pressure. Tighten the lockscrew.

For Current “Parker” Valve -

Locate the differential pressure unloading (PU) cartridge on top of the control valve. Loosen the jam nut and, with a 3/16 in. hex key, turn the adjusting screw clockwise (CW) to increase peak pressure and counter clockwise (CCW) to decrease peak pressure.

⚠CAUTION⚠

The control valve has several exhaust ports that will spray oil out toward the technician when the control valve is operated. Install the cover between tests or use a piece of cardboard to deflect the oil spray.

Stop the engine, discharge the stored oil pressure from the accumulator as described earlier and move the test gauge to the "B" port on the brake assembly. A -6 ORB adapter is needed.

Start the tractor engine and operate at approximately 800-1000 RPM. Move the control lever into the brake-off position and observe the brake release pressure at port "B" on the brake.

Adjust the control cable to achieve the highest pressure, approximately the same as the main system pressure, when the control lever is latched in the brake-off position. The pressure gauge MUST read 0 PSI (0 kPa) in the brake-on position.

⚠CAUTION⚠

If the brake release pressure does NOT return the 0 PSI (0 kPa) when the control lever is in the brake-on position, the brake may slip when holding a heavy load which may result in loss of load control, property damage, injury or death. This condition indicates that the control cable is not adjusted correctly and may also result in excessive heat and accelerated wear of brake and hydraulic components.

Reinstall the filter element as described earlier.

Model 50A & 70 winches were originally equipped with a nitrogen gas charged accumulator which should be checked at this time.

Discharge accumulator stored oil supply as described earlier. Remove pressure filter element to gain access to accumulator. Install gauge assembly to accumulator and observe pressure. Recharge unit to 190-210 PSI (13.36-14.76 Kg/cm^2) with dry nitrogen. If the accumulator will not hold a gas charge, then the unit should be replaced by the spring/piston type accumulator. Order kit P/N 62138, reference Carco Service Bulletin 95. The spring/piston accumulator requires no periodic service.

Place the control lever in brake-on position, remove the pressure gauge from the brake test port and install the plug.

Operate the engine at approximately 1200 RPM for five minutes to recharge the hydraulic system. Check for proper operation of all functions and check for leaks. Install the access cover and tighten the eight fasteners to 75 lb•ft (102 N•M) torque.

4. Vent Plug

The vent plug is located in the top of a fill plug on Model 50A & 70 winches built from mid 1988 until early 1990. The vent is located next to the power shift control cables on earlier 50A & 70 and all 50B & 70A model winches. It is very important to keep this vent clean and unobstructed. Whenever the oil is changed, remove vent plug, clean in safety solvent and reinstall. Do not replace with a solid plug.

5. Winch Cable (wire rope)

Inspect entire length of wire rope, chokers and hooks according to wire rope and rigging manufacturer's recommendations.

6. Mounting Fasteners

Check/tighten all winch mounting fasteners to recommended torque after the first 100-250 hours of operation, then every 1000 operating hours or six (6) months, whichever occurs first.

7. Warm-Up Procedure

⚠ WARNING ⚠

A warm-up procedure is recommended at each start-up, and is essential at ambient temperatures below +40°F (4°C). Failure to warm the oil and the winch hydraulic system may result in erratic clutch/brake operation which may result in property damage, personal injury or death.

Start tractor engine and operate at low idle for five minutes.

Shift the Free Spool lever (if equipped) to the Disengaged position. Then, with the tractor engine at low idle, place Power Shift lever in Reel-In (forward) position. The winch gear train will rotate and warm the oil to operating temperature.

⚠ CAUTION ⚠

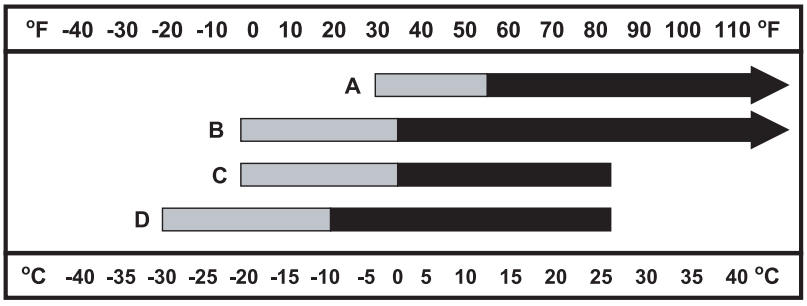
DO NOT shift free spool lever and attempt to engage cable drum while the cable drum or gear train is rotating. Winch gear train damage may result.

If not equipped with Free Spool, operate winch alternately in Reel-Out and Reel-In with little or no load to warm the oil and lubricate the gear train.

RECOMMENDED OIL

We have published the following specification to help you determine which lubricant is best suited to your application. Your lubricant supplier should assure you that his product meets this specification. If there is still any doubt as to the suitability of a lubricant, contact the CARCO Winch Service Department, providing a detailed copy of the product specifications.

Prevailing Ambient Temperature



⚠ WARNING ⚠

Cold start-up in this ambient temperature range requires extended equipment warm-up to prevent erratic clutch and brake operation which may result in property damage, injury, or death.

A - HTF Type C3/C4 SAE 30, CAT TO4 SAE30
B - Case TCH MS 1210, CAT TO4 SAE 10W30, JD HY-GARD J20C
C - HTF Type C4/C4 SAE 10, CAT TO4 SAE 10W, KOM HDTF 10
D - CAT TO4 SAE 5W20 spc., JD HY-GARD LOW VISCOSITY J20D

BASIC OIL REQUIREMENTS

20,000 SUS maximum allowed viscosity at cold start-up; requires extended equipment warm-up, 3,500 SUS maximum allowed viscosity at cold start-up; requires normal equipment warm-up. 60 SUS minimum allowed viscosity at maximum winch operating temperature assuming ambient plus 80°F (27°C).

Oil must possess high temperature oxidation stability, rust and corrosion protection, good dispersant and detergent characteristics, anti-wear additives and remain compatible with nitrile base seals.

NOTE: Dexron II is not recommended for use in early 50A & 70 winches with graphitic (black) clutch and brake discs. Dexron II is a registered trademark of General Motors Corporation.

SPECIFICATIONS:

Unit Weight w/o oil, cable, or specific tractor adapters . . . . . .50A & 70 1900 lbs. (862 kg)
. . . . . .50B & 70A 1960 lbs. (885 kg)

Gear Ratios

3 - Shaft Gear Train
- Bevel Gear Ratio . . . . . .1.00:1 . . .1.27:1 . . .1.64:1 . . .2.11:1 . . .2.78:1
- Overall Ratio . . . . . .22.3:1 . . .28.3:1 . . .36.6:1 . . .47.0:1 . . .62.2:1

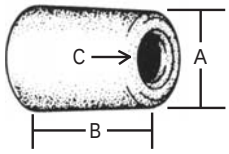
4 - Shaft Gear Train
- Bevel Gear Ratio . . . . . .1.00:1 . . .1.27:1 . . .1.64:1 . . .2.11:1 . . .2.78:1
- Overall Ratio. . . . . .40:4:1 . . .51.4:1 . . .66.3:1 . . .85.3:1 . . .112.8:1

Multiply above overall ratios by 1.29 for the adapter gear box used on Komatsu Power Shift tractors.

Cable Drum Dimensions
- Barrel Diameter . . . . . .10 in. (254 mm)
- Flange Diameter . . . . . .19 7/8 in. (504 mm)
- Barrel Length . . . . . .12 3/8 in. (314 mm)
- Throat Clearance . . . . .approx 9 in. (229 mm)

Cable Storage Capacity
- 3/4 in. (19 mm) . . . . . .319 ft. (97 m)
- 7/8 in. (22 mm) . . . . . .226 ft. (69 m)
- 1 in. (25 mm) . . . . . .154 ft. (47 m)

Cable Ferrule Part Number - L Series
- 3/4 in. (19 mm) 29424
- 7/8 in. (22 mm) 29425
- 1 in. (25 mm) 29426



A - 2.12 in. (54 mm)
B - 2.56 in. (65 mm)
C - To match cable dia.

Hydraulic System
- Oil Capacity . . . . . .50A & 70 . . . . . .50B & 70A
- Standard PTO . . . . . .83 Qts. (79 Lt.) . . . . . .78 Qts. (74 Lt.)
- Low PTO . . . . . .71 Qts. (67 Lt.) . . . . . 66 Qts. (63 Lt.)
- Operating Pressure . . . . . .390-410 PSI (2,690-2,830 kPa)
- Stand-by Pressure . . . . . .315-370 PSI (2,170-2,550 kPa)
- Typical Operating Temperature . . . . . .Up To Ambient Plus 80°F (26.7°C)
- Adapter Gear Box Oil Capacity - Komatsu Adaptions Only
  - 50A & 70 . . . . . .2 Qts. (1.9 Lt.) . . . . . .90 wt. API-GL5 Gear Oil
  - 50B & 70A . . . . . .1.8 Qts. (1.7 Lt.) . . . . . .90 wt. API-GL5 Gear Oil

RECOMMENDED FASTENER TORQUE

Higher or lower torques for special applications will be specified such as the use of spanner nuts, nuts on shaft ends, jam nuts and where distortion of parts or gaskets is critical.

Lubricated Torque values based on use of SAE 30wt engine oil applied to threads and face of bolt or nut.

Avoid using thread lubricants as the applied torque may vary by 10-40% depending upon product used.

		Torque (LB-FT)			
Bolt Dia. Inches	Thds Per Inch	Grade 5		Grade 8	
		Dry	Lubed	Dry	Lubed
1/4	20 28	8	6	12	9
5/16	18 24	17	13	24	18
3/8	16 24	31	23	45	35
7/16	14 20	50	35	70	50
1/2	13 20	75	55	110	80
9/16	12 18	110	80	150	110
5/8	11 18	150	115	210	160

		Torque (LB-FT)			
Bolt Dia. Inches	Thds Per Inch	Grade 5		Grade 8	
		Dry	Lubed	Dry	Lubed
3/4	10 16	265	200	380	280
7/8	9 14	420	325	600	450
1	8 14	640	485	910	680
1 1/8	7 12	790	590	1290	970
1 1/4	7 12	1120	835	1820	1360
1 3/8	6 12	1460	1095	2385	1790
1 1/2	6 12	1940	1460	3160	2370

To convert lb ft to kg•m, multiply lb•ft value by 0.1383.

METRIC CONVERSION TABLE

English to Metric			Metric to English		
LINEAR					
inches (in.)	X 25.4	= millimeters (mm)	millimeters (mm)	X 0.3937	= inches (in.)
feet (ft.)	X 0.3048	= meters (m)	meters (m)	X 3.281	= feet (ft.)
miles (mi.)	X 1.6093	= kilometers (km)	kilometers (km)	X 0.6214	= miles (mi.)
AREA					
$inches^2$ (sq.in.)	X 645.15	= $millimeters^2$ (mm^2)	$millimeters^2$ (mm^2)	X 0.000155	= $inches^2$ (sq.in.)
$feet^2$ (sq.ft.)	X 0.0929	= $meters^2$ (m^2)	$meters^2$ (m^2)	X 10.764	= $feet^2$ (sq.ft.)
VOLUME					
$inches^3$ (cu.in.)	X 0.01639	= liters (l)	liters (l)	X 61.024	= $inches^3$ (cu.in.)
quarts (qts.)	X 0.94635	= liters (l)	liters (l)	X 1.0567	= quarts (qts.)
gallons (gal.)	X 3.7854	= liters (l)	liters (l)	X 0.2642	= gallon (gal.)
$inches^3$ (cu.in.)	X 16.39	= $centimeters^3$ (cc)	centimeters3 (cc)	X 0.06102	= $inches^3$ (cu.in.)
$feet^3$ (cu.ft.)	X 28.317	= liters (l)	liters (l)	X 0.03531	= $feet^3$ (cu.ft.)
$feet^3$ (cu.ft.)	X 0.02832	= $meters^3$ (m^3)	meters3 (m3)	X 35.315	= $feet^3$ (cu.ft.)
fluid ounce (fl.oz.)	X 29.57	= millileters (ml)	milliliters (ml)	X 0.03381	= fluid ounce (fl.oz.)
MASS					
ounces (oz.)	X 28.35	= grams (g)	grams (g)	X 0.03527	= ounces (oz.)
pounds (lbs.)	X 0.4536	= kilograms (kg)	kilograms (kg)	X 2.2046	= pounds (lbs.)
tons (2000 lbs.)	X 907.18	= kilograms (kg)	kilograms (kg)	X 0.001102	= tons (2000 lbs.)
tons (2000 lbs.)	X 0.90718	= metric tons (t)	metric tons (t)	X 1.1023	= tons (2000 lbs.)
tons (long) (2240 lbs.)	X 1013.05	= kilograms (kg)	kilograms (kg)	X 0.000984	= tons (long) (2240 lbs.)
PRESSURE					
inches Hg (60^oF)	X 3600	= kilopascals (kPa)	kilopascals (kPa)	X 0.2961	= inches Hg (60^oF)
pounds/sq.in. (PSI)	X 6.895	= kilopascals (kPa)	kilopascals (kPa)	X 0.145	= pounds/sq.in. (PSI)
pounds/sq.in. (PSI)	X 0.0703	= kilograms/sq.cm. (kg/cm^2)	kilograms/sq.cm. (kg/cm2)	X 14.22	= pounds/sq.in. (PSI)
pounds/sq.in. (PSI)	X 0.069	= bars	bars	X 14.5	= pounds/sq.in. (PSI)
inches H_2O (60^oF)	X 0.2488	= kilopascals (kPa)	kilopascals (kPa)	X 4.0193	= inches H_2O (60^oF)
bars	X 100	= kilopascals (kPa)	kilopascals (kPa)	X 0.01	= bars
POWER					
horsepower (hp)	X 0.746	= kilowatts (kW)	kilowatts (kW)	X 1.34	= horsepower (hp)
ft.-lbs./min.	X 0.0226	= watts (W)	watts (W)	X 44.25	= ft.-lbs./min.
TORQUE					
pound-inches (in.-lbs.)	X 0.11298	= newton-meters (N-m)	newton-meters (N-m)	X 8.851	= pound-inches (in.lbs.)
pound-feet (ft.-lbs.)	X 1.3558	= newton-meters (N-m)	newton-meters (N-m)	X 0.7376	= pound-feet (ft.-lbs.)
pound-feet (ft.-lbs.)	X .1383	= kilograms/meter (kg-m)	kilogram/meter (kg-m)	X 7.233	= pound-feet (ft.-lbs.)
VELOCITY					
miles/hour (m/h)	X 0.11298	= kilometers/hour (km/hr)	kilometers/hour (km/hr)	X 0.6214	= miles/hour (m/h)
feet/second (ft./sec.)	X 0.3048	= meter/second (m/s)	meters/second (m/s)	X 3.281	= feet/second (ft./sec.)
feet/minute (ft./min.)	X 0.3048	= meter/minute (m/min)	meters/minute (m/min)	X 3.281	= feet/minute (ft./min.)

TEMPERATURE

$^oCelsius = 0.556 (^oF - 32)$ $^oFahrenheit = (1.8^oC) + 32$

COMMON METRIC PREFIXES

mega	(M)	= 1,000,000 or 106	deci	(d)	= 0.1 or 10^{-1}
kilo	(k)	= 1,000 or 10^3	centi	(c)	= 0.01 or 10^{-2}
hecto	(h)	= 100 or 10^2	milli	(m)	= 0.001 or 10^{-3}
deka	(da)	= 10 or 10^1	micro	(μ)	= 0.000.001 or 10^{-6}