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AC-S-#19 WINCH



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**OPERATOR'S
And
SERVICE MANUAL**

**GEARMATIC
MODEL 19 WINCH**



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Model 19 Gearmatic Winch

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DESCRIPTION

The Models 19 mechanically driven winch designed to give long, trouble free service. The design features are the result of many years experience in the tractor winch business.

The model 19 is sealed and fitted on a crawler tractor.

These winches are powered from the tractor P.T.O. through a ring gear and pinion set. The ring gear is rigidly supported by the ring gear carrier. The cable drum is connected to the ring gear through a high capacity, self energizing friction clutch. The clutch bands have a large contact area and are designed with positive location and adjustment features.

During towing operations, the cable drum is held by a self energizing, heavy duty brake band. When the brake is released, the drum will "free spool" with just enough resistance to prevent the cable drum from unspooling more cable than is required. The clutch and brake compartment on the model 19 is completely sealed from mud and water,

The winch is controlled by a single lever which operates a master control unit. When the control handle is in the neutral position, the brake is spring applied for towing operations. When the control handle is pulled to engage the clutch, the master control unit supplies hydraulic fluid to a slave cylinder in the clutch for the "winching in" operation. The harder the operator pulls on the control handle, the greater will be the clutching effort. When the control handle is moved to its full extent in the brake release direction it will remain in that position, releasing the brake for "free spooling". The clutch and brake hydraulic cylinders are each connected to an independent master cylinder in the master control unit and operate in the same manner as an automobile's master cylinder which is connected to the wheel brakes.

When the model 19 winch is mounted on the rear of a crawler tractor, the adapter housing is installed between the winch and the tractor. The adapter housing contains a gear train which is designed to suit the P.T.O. speed and rotation to provide the maximum rated line pull at the winch drum.

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OPERATING INSTRUCTIONS

Operation Ref. Fig. 'A'

To engage the clutch, pull the handle of the master control in the "engage clutch" direction (See Fig. 'A'). To apply the brake, release the handle from the clutching position and allow it to return to the neutral position. To release the brake, move the handle in the "release brake" direction until the degree of brake release required is obtained. To lock the brake in full release for "free spooling", move the handle to the end of its travel in the "release brake" direction. The handle will remain in this position until released manually.

IMPORTANT: When "winching in" do not allow the clutch to slip. The heavier the load, the harder it is necessary to pull the master control handle.

NEUTRAL (BRAKE APPLIED)



FIGURE A

Lubrication Ref. Fig. 'B'

Winches With a Filler Hole in the Adapter

Remove the filler plugs and oil level plugs from the ring gear end of the winch and the adapter assembly. Fill both gear compartments to the oil level plugs.

Winches Without a Filler Hole in the Adapter

Remove the filler plug from the top of the ring gear end of the winch. Add six quarts of oil through the filler hole. This oil will pass through an oil transfer hole in the winch housing.

Before running the winch check to see that oil has entered the adapter assembly. This can be done by slowly removing the drain plug from the adapter. If there is no oil in the adapter assembly, see the note below before proceeding.

When oil has entered the housing, run the winch for 15 minutes. Top up the oil level if necessary.

IMPORTANT: Check oil weekly.

TEMP.	GEAR OIL	MASTER CONTROL
Below 32°F.	6 qts.—SAE 75 EP	Standard automotive hydraulic brake fluid
32°F. to 90°F.	6 qts.—SAE 90 EP	
Above 90°F.	6 qts.—SAE 140 EP	

Gear Oil Spec.: MIL-L-2105B or better

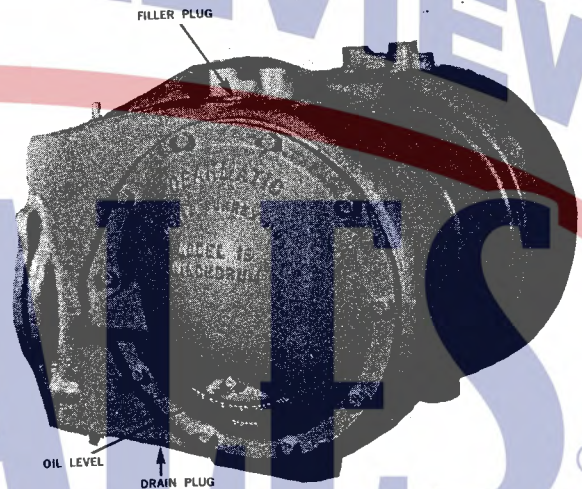


FIGURE B

Bleeding Hydraulic System

The X710C master control is shipped from the factory filled with hydraulic brake fluid.

When the master control unit has been installed, remove the red sealing tape covering the vent hole in the filler plug (See Fig. 'C'). Set the tractor engine at idle with the P.T.O. engaged. Move the master control handle through its entire stroke several times. Move the control handle as far as it will go in the brake release direction (See Fig. 'A'), and slacken off a fitting in the brake line at the highest point in that line so that air may escape. Tighten the fitting and return the control handle to neutral. After a slight

SERVICE INSTRUCTIONS

Brake Disassembly

Ref. Fig. 1, 2 and 3

Remove the drag adjustment screw (10) and the drag spring (11) from the top of the main housing (12).

Remove the capscrews (19) and the end cap (18) Fig. 2. Remove the hydraulic tube (17) Fig. 2 from the end of the drum shaft (See Fig. 'D').



FIGURE D

Place the hydraulic tube, still connected to the hydraulic line, at a point above the master control unit so that the brake fluid will not leak out of the line. Remove the clutch cover (21).

Remove the spring cap (12) and the spring (11) Fig. 2 will drop out. Now remove the primary brake band (15) by gripping it at the ends and slide the band off the brake levers (13 and 14) Fig. 3, using a rocking motion if necessary. The lever block (16) and push rod (10) Fig. 3 can now be removed as one unit (See Fig. 'E'). Remove the brake anchor pin (12) and rotate the brake band clockwise until it can be removed as explained for removing the primary brake band.

The secondary brake lever (13) Fig. 3 will be removed with the secondary band. With a hammer and punch, drive the pin (9) into the center of the brake lever (13) then remove the brake lever with the pin from the secondary brake band. Remove the brake cylinder assembly by removing the capscrews (1) Fig. 2 (See Fig. 'E').

Brake Cylinder Disassembly

Ref. Fig. 2

Remove the boot (9), piston (8), spring (7), primary piston (6), cup (5) and spring (4) from the brake cylinder (3). Discard the cup (5) and install a new part on reassembly. Inspect all parts for wear or damage and replace if necessary.



FIGURE E

Brake Cylinder Assembly

Ref. Fig. 2

Clean the cylinder bore, if necessary, using extra fine emery cloth and wash all parts in clean brake fluid. Assemble all parts in the order shown on Fig. 2 so that the large end of spring (4) contacts the bottom of the brake cylinder (3). Spring (7) must be installed in the counter bore end of the primary piston (6) and must contact the flat end of piston (8).

Brake Assembly

Ref. Fig. 1 and 2

To assemble the brake, proceed in the reverse order of disassembly. Replace the clutch cover (21), then hydraulic tube (17).

Secure the end cap (18) in place using the capscrews (19).

Drag Adjustment

Adjust to set drum drag when Brake is in "Free Spool".

J303

Brake Adjustment

Ref. Fig. 2

No brake adjustment is required on this winch under normal operating conditions. However, if the bands are worn to a point where more braking is required, the spring cap (12) may be turned over so that the counter bore is away from the

spring to give an additional $\frac{3}{8}$ " compression on the spring. If the winch is new and the brake does not hold the required load, the brake may require to be "run in". See Trouble 'B', cause 1 in Trouble Shooting section.

Clutch Disassembly

Ref. Fig. 4

Remove the clutch cover (21), Fig. 1, as instructed above for "Brake Disassembly". Release the adjusting cams (19) by loosening the cap-screws (21) and rotating the cams until the flat side of each cam is towards the bands (See Fig. ('F')). Release the clutch push rod (28) by depressing it into the clutch cylinder (23) and releasing it from the primary clutch band socket. The primary clutch band can now be removed.

To remove the secondary clutch band (29) it is necessary to remove the clutch hub (17). Remove the clutch hub (17) and clutch lever (22) with the secondary clutch band (29) attached as follows. Disconnect the hydraulic hose assembly at the hydraulic fitting (9), then remove the fitting (9) from the drum shaft. Remove the four socket head capscrews (16) from the gland cap (15). Remove the gland cap (15) and shims (12) being careful not to damage the seal diameter inside the bore of the drum shaft (21), Fig. 5. Using three $\frac{1}{2}$ " N.C. capscrews as jacks in the holes provided in the clutch hub (17), remove the clutch hub from the drum shaft, (Gearmatic tool Number A 13154 can be supplied for this purpose) (See Fig. 'G'). This procedure also removes the bearing (11). Now the secondary clutch band (29)



FIGURE F

and clutch lever (22) can easily be removed from the clutch hub by removing the snap ring (10) and the spring (4) and sliding the clutch lever off the clutch hub. Disconnect the hose assembly (8) from the clutch cylinder (23) and remove the clutch cylinder. Remove the pivot pin (5) and lever arm (1).

Remove and discard the 'U' seal (14) and 'O' ring (13) from the gland cap (15) and replace the 'U' seal and 'O' ring with new parts on reassembly. Inspect the bearing diameters of the hydraulic tube (17), Fig. 2, for wear. If wear is excessive, replace the hydraulic tube.

Clutch Cylinder Disassembly

Ref. Fig. 4

Remove the push rod (28), boot (27), piston (26), cup (25) and spring (24) from the clutch cylinder (23). Discard the 'U' cup (25) and install a new part on reassembly. Inspect all parts for wear and replace if necessary.

Clutch Cylinder Assembly

Ref. Fig. 4

Clean the cylinder bore, if necessary, using extra fine emery cloth and wash all parts in clean brake fluid. Coat the bore of the cylinder (23) with Tru-Torque Oil.

Assemble all parts in the order shown on Fig. 4 so that the large end of the spring (24) contacts the bottom of the clutch cylinder (23) and the flat side of the 'U' cup (25) contacts the flat end of the piston (26).



FIGURE G

Clutch Assembly

Ref. Fig. 1, 2, 3 and 4

Pack the grooves in the clutch lever (22) with grease and install it on the clutch hub (17). Then install the snap ring (10). Install the lever arm (1), pivot pin (5), push rod (3) and spring (4). Install the secondary clutch band (29). Install the clutch hub (17) on the drum shaft (18), on Fig. 5, so that the hole in the side of the clutch hub (17) lines up with the $\frac{1}{8}$ N.P.T. hole in the drum shaft (18) on Fig. 5. Install the bearing (11). Check that the clutch hub (17) contacts the drum bearing (8) and that the bearing (11) contacts the clutch hub (17) by installing the gland cap (15) on the end of the drum shaft. Carefully tighten the capscrews (16) one half turn at a time progressively around until the capscrews

are secure. Remove the gland cap (15) and, using a depth micrometer, measure the depth from the edge of the bearing (11) to the end of the drum shaft, (See Fig. H). Measure the length of the gland cap pilot diameter with the depth micrometer (See Fig. J). Subtract this length from the depth already measured to establish the total thickness of shims (12) required.



FIGURE H

Add an additional .010" shim (12) to ensure clearance between the bearing (11) and the gland cap (15). Install a new 'U' cup (14) and O-Ring (13) in the gland cap (15). Install the shims (12) and the gland cap (15) and tighten the cap screws (16) one half turn at a time progressively around until the cap screws are secure. Torque to 18 lbs. ft. Using a heavy drift on the inside of the cable drum flange, drive the cable drum (1) towards the clutch assembly. This will remove any pre-load imposed on the bearings while the shims (12) were being established. Set the adjusting cams (19) to give the required clearance between the clutch bands (29) and (30) and the drum (6) by following the instructions "To Adjust the Clutch". Install the clutch cover (21), hydraulic tube (17), elbow (20), tube assembly, the end cap (18) and tighten all cap screws to the required torque.



FIGURE J

Clutch Adjustment

With the primary clutch band removed and the adjusting cams engaged in the centre groove of the secondary clutch band, adjust the secondary clutch band by turning the adjusting cams with a screw driver inserted in one of the slots provided in each cam (See Fig. 'F'). Set all of the adjusting cams to give a clearance of .010" to .015" between the lining and the inside of the drum all around. Install the primary clutch band and adjust to the required clearance of .010" to .015". When the correct setting has been obtained tighten all cap screws to 25 lbs. ft. torque. Release the brake and check that the drum rotates freely.

Drum Disassembly

Ref. Fig. 3

Remove the brake bands and clutch assembly as outlined under "Brake Disassembly" and "Clutch Disassembly". The drum can now be removed by drifting carefully on the cable side of the drum flange next to the brake end. The brake drum (6) and the seal flange (3) will be removed with the cable drum (1) as an assembly. After removing this assembly from the main housing, separate the drums (1) and (6) using two ½ N.C. cap screws as jacks in the holes provided on the inside wall of the brake drum (6). After the drums are separated, remove and inspect the oil seal (4) and O-Ring (2) for damage or wear. Replace on reassembly.

Drum Assembly

If the brake drum (6) has been removed from the cable drum (1), pack the oil seal (4), Fig. 3, completely full of grease in the cavity between the two oil seal lips (Fig. K). Fill the space surrounding 'O' ring (5) with grease and pack grease into the bore of oil seals (15) and (16) installed at the ring gear compartment end of the winch housing (12). The grease used in the oil



FIGURE K

seals (16), (17), (5) and 'O' ring (5) should be of the water repellent type (e.g. Shell Darina Grease). Assemble the cable drum (1), seal flange (3), oil seal (4) and brake drum (6) and install this assembly in the winch as a unit.

When the cable drum (1) and brake drum (6) assembly has been installed, then install the bearing (7) on the drum shaft so that it contacts the shoulder in the brake drum bore.

Ring Gear and Pinion Disassembly

Ref. Fig. 1 and 5

Remove the winch drum from the tractor, then remove the brake, clutch and drum assemblies from the winch, as outlined under the appropriate headings. Now remove the gear cover (3). Be careful not to damage the oil wiper (4). Remove the ball bearing (25) from the drum shaft using a suitable bearing puller (Gearmatic Tool Number C 13199 can be supplied for this purpose). (See Fig. M).

Remove the lock key (19) from the drum shaft (18). Unscrew the locknut (24) from the drum shaft (Gearmatic Tool No. C 13189 can be supplied for this purpose) (See Fig. N). Remove O-ring (28) and replace with a new part on reassembly. Protecting the end of the drum shaft, drive it out of the main housing.

Remove the cotter pin (1), nut (4), washer (5) and the pinion gear or sprocket. Next remove the capscrews (2) and, using two $\frac{5}{8}$ " N.C. capscrews as jacks in the tapped holes provided in the bearing housing (9), remove the bearing housing (9). Then shims (10). If the pinion bearings (8), or (13) require to be replaced, remove the pinion (16) by pressing it out of the assembly. A piece of $\frac{3}{4}$ " plate having a 3.625" diameter bored hole can be used to locate over the pinion and contact the outer race of the roller bearing (15) while the pinion (16) is pressed out of the assembly.

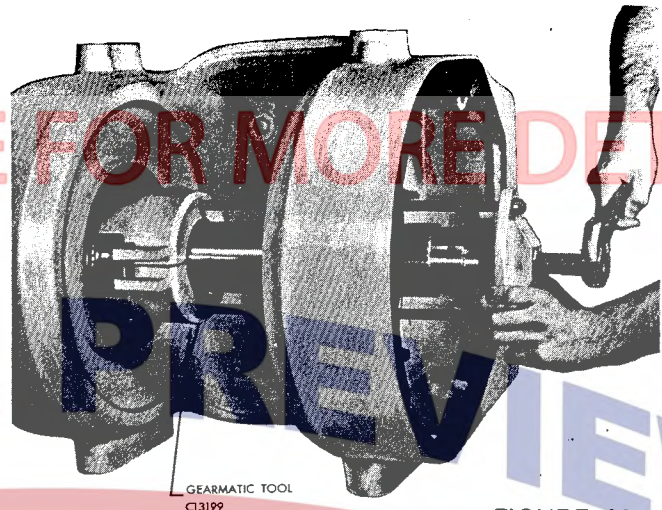


FIGURE M

Ring Gear and Pinion Assembly

Ref. Fig. 5

If the pinion bearings (8) and (13) are being replaced, it is necessary to re-adjust the shims (10) for the correct preload, as follows. Press the outer races of the bearings (8) and (13) in their ends of the bearing housing (9). Press the bearing (15), spacer sleeve (12) and the inner race of the bearing (13) on the pinion shaft as illustrated. Make sure that the large radius on the inside of the inner race (13) goes onto the



FIGURE N

pinion shaft first. Place the pinion shaft in the bearing housing so that the outer race (13) and inner race (13) mate up. Then from the flange end of the bearing housing, install the bearing spacer (12). Place a piece of soft lead gage wire

on the end of the bearing spacer then press the inner race of the bearing (8) on the pinion shaft. Install the preload bushing (6) or sprocket or gear previously removed, washer (5) and nut (4). With this assembly held securely in a vise, proceed with preloading. Fasten a piece of string (12" to 18") to the bearing housing flange and wrap the excess around on the O.D. of the bearing housing, then attach the free end to a suitable spring balance. Tighten the nut (4) until a reading of 6½ to 10 pounds on the spring balance is required for continuous rotation of the bearing housing about the shaft. Remove the nut (4), washer (5), preload bushing (6) and the inner race of the bearing (8). Carefully remove the lead gauge wire and measure the compressed thickness to determine the correct number and size of the shims (10). Install the shims, then replace the inner race of the bearing (8), pinion gear or sprocket previously removed, washer (5) and nut (4). Torque the nut to 100-120 lbs. ft. and check the preload using the spring balance (Fig. O). Install the cotter pin (1). This assembly is now complete and ready for assembly in the main housing.

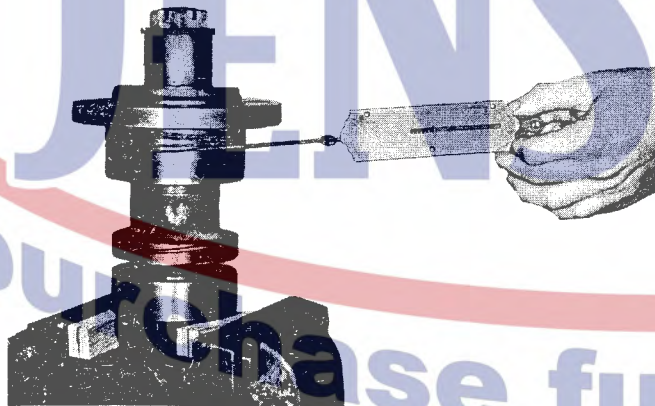


FIGURE O

Pre-load of Drum Shaft Bearings

Ref. Fig. 5

If the roller bearings (21) on the drum shaft are being replaced they require to be pre-loaded to 11-20 in. lbs. torque when the adjusting nut is tightened to 150 lbs. ft., making the bearing cones (21) grip the bearing spacer (22).

To establish the correct spacer length use a bearing spacer (22) that is approximately .025" shorter than the original bearing spacer. (Gearmatic Spacer Tool Number A 13088 can be used for this purpose.) The length of each bearing spacer A 19022 is marked with electric pencil on the I.D. of the spacer.

Assemble the bearings with Spacer Tool A 13088 and a piece of soft lead gauge wire between the bearings. Tighten the adjusting nut until it requires 11-20 inch pounds to rotate the

drum shaft against the bearing pre-load. Remove the Spacer Tool A 13088 and gauge wire and measure the total thickness of the spacer tool and compressed gauge wire. This will be the exact length of the bearing spacer A 19022 required.

Bearing Spacer A 19022 is available in twelve lengths which vary by .002 increments. The faces of spacer A 19022 must be parallel within .0005.

To check the pre-load (11-20 lbs. inch), wrap a piece of string around the outside diameter of the drumshaft and attach the free end to a suitable spring balance. The correct pre-load will have been obtained when a reading of 5-9 lbs. on the spring balance is obtained for continuous rotation of the drum shaft (18).

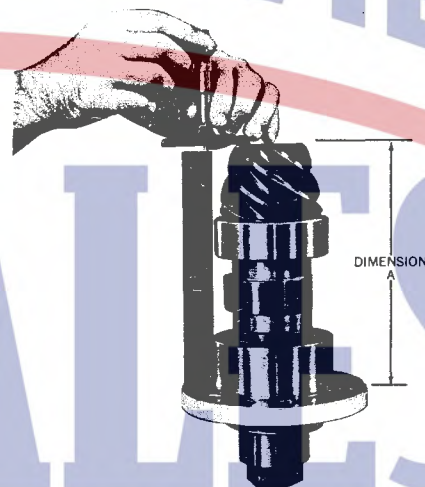


FIGURE P

IMPORTANT: Shims must not be used between the bearing cones (21) and the bearing spacer (22). A bearing spacer having the correct length for the required pre-load must be used.

Ring Gear and Pinion Adjustment (Model 19 only)

(Winches Serial Number 19-8999 and Down)

Ref. Fig. Q

The following instructions are to be followed whenever the ring gear and pinion setting has been disturbed due to disassembly of the winch or replacement of the pinion shaft bearings (7) and (8) or drum shaft bearing (6).

Establish the total thickness of shims (11) required under the flange of the pinion bearing housing (12), as follows. When the bevel pinion bearings have been correctly preloaded, as explained above, measure dimension 'Y' as shown on Fig. Q. Place the bevel pinion assembly on a surface table so that it stands on the end of the pinion and use an inside micrometer to measure dimension 'Y'. Dimension 'Z' is marked on the end of the bevel pinion and dimension 'X' is marked on the back of the winch housing as indicated. Add dimensions 'Y' and 'Z' and subtract dimension 'X' from this total. The result will be