



OPERATOR'S MANUAL
SELF-LOADING COMBO TRAILER
MODEL #CT2710C-LT-SL

6" PIPE MAXIMUM

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OPERATOR'S MANUAL

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EQUIPMENT SAFETY

Safety Alerts

This hazard alert sign  appears in this manual. When you see this sign, carefully read what it says. **YOUR SAFETY IS AT STAKE.**

You will see the hazard alert sign with these words: **DANGER, WARNING, and CAUTION.**

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

In this manual you should look for two other words: **NOTICE** and **IMPORTANT.**

NOTICE: can keep you from doing something that might damage the machine or someone's property. It may also be used to alert against unsafe practices.

IMPORTANT: can help you do a better job or make your job easier in some way.

Read and Understand

Do not operate this equipment until you have carefully read, and understand the "Safety" and "Operation" sections of this manual, and all other equipment manuals that will be used with it.

Your safety and the safety of others depends upon care and judgment in the operation of this equipment.

Follow all applicable federal, state, local, and industry specific regulations.

We cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this manual and on the machine are therefore not all inclusive. You must satisfy yourself that a procedure, tool, work method, or operating technique is safe for you and others. You should also ensure that the machine will not be damaged or made unsafe by the method of operation or maintenance you choose.



EQUIPMENT SAFETY

General Safety

Safety is important. Report anything unusual that you notice during set up or operation.

LISTEN for thumps, bumps, rattles, squeals, air leaks, or unusual sounds.

SMELL odors like burning insulation, hot metal, burning rubber, hot oil, or natural gas.

FEEL any changes in the way the equipment operates.

SEE problems with wiring and cables, hydraulic connections, or other equipment.

REPORT anything you see, feel, smell, or hear that is different from what you expect, or that you think may be unsafe.



Wear Safety Equipment

Wear a hard hat, safety shoes, safety glasses, and other applicable personal protective equipment.

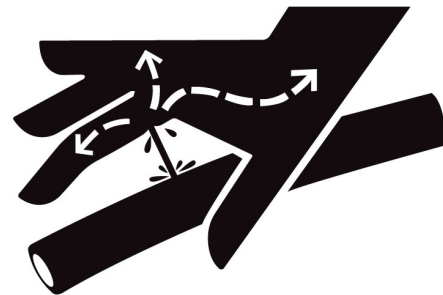
Remove jewelry and rings, and do not wear loose-fitting clothing or long hair that could catch on controls or moving machinery.



Units With Hydraulics

Although the hydraulic pressures in this machine are low compared to some hydraulically operated equipment, it is important to remember that a sudden hydraulic oil leak can cause serious injury, or even be fatal if the pressure is high enough.

⚠ WARNING *Escaping fluid under pressure can penetrate the skin causing serious injury. Keep hands and body away from pinholes which eject fluid under pressure. Use a piece of cardboard or paper to search for leaks. If any fluid is injected into the skin, it must be immediately removed by a doctor familiar with this type of injury.*

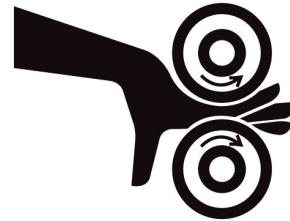


NOTICE: Wear safety glasses, and keep face clear of area when bleeding air from hydraulic system to avoid spraying oil into eyes.

Keep Personnel Away

⚠️ WARNING

The rollers in this machine are under hydraulic pressure and can cause severe bodily harm. All personnel must keep hands and body away from moving parts of machine.



Where to Stand

All non-participating personnel should be at least 15 feet away from pipe coil and machine during pull.

⚠️ WARNING

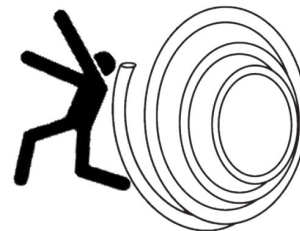
Coiled pipe can uncoil unexpectedly, posing a safety hazard for anyone in close proximity. Stay away from pipe coil and machine during pull to avoid injury.



Cutting Steel Bands

⚠️ WARNING

Coiled pipe can uncoil with considerable force, causing extreme bodily injury if not properly contained. Do not cut the steel straps around the coil until the coil is contained in a suitable reel trailer or coil cage.



Leave plastic straps on coil. Do not cut.

Operator's Seat

Always operate the machine from the control side with the operator in the control seat. Use the seat belt at all times.

Never stand on the LineTamer® during operation.



Gas Powered Units

⚠ DANGER Gasoline engines will cause explosions when operated in a hazardous environment. Do not operate gas powered machines in a hazardous environment.

Do not place flammable substances near the engine while it is operating.

A spark arrester is available as an optional part for this engine. It is illegal in some areas to operate an engine without a spark arrester. Check local laws and regulations before operating.



Fuel Handling

⚠ DANGER Gasoline and diesel fuel are extremely flammable and their vapors will explode if ignited.

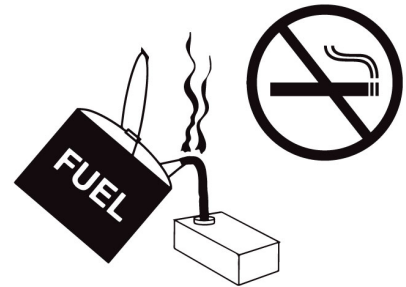
Do not fill the fuel tank while the engine is hot or running, as spilled fuel could ignite.

Refuel in a well ventilated area. Do not smoke or allow flames or sparks in the area where the engine is refueled, or where gasoline is stored.

Do not start the engine near spilled fuel. Wipe up spills immediately.

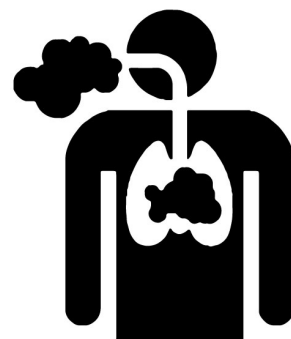
Make sure the fuel tank cap is closed and properly secured.

Avoid repeated or prolonged contact with skin or breathing of vapor.



Carbon Monoxide

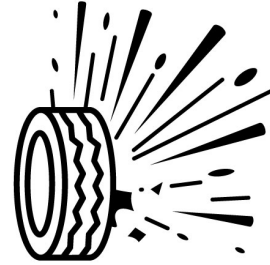
⚠ DANGER Engine exhaust gases contain poisonous carbon monoxide. Carbon monoxide can cause severe nausea, fainting and death. Avoid inhaling exhaust fumes and never run the engine in a closed or confined area.



Have Tires Properly Serviced

⚠️ WARNING

Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death. Have tires mounted by someone that is experienced, and has the proper equipment to perform the job safely.

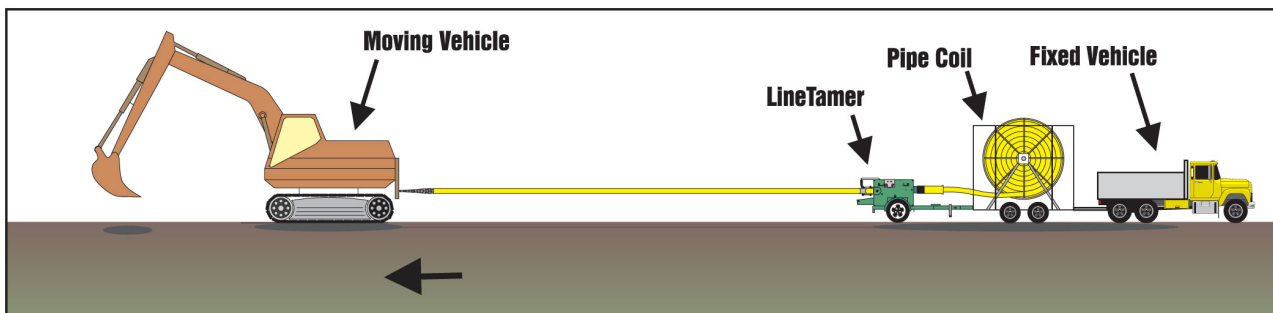


OVERVIEW

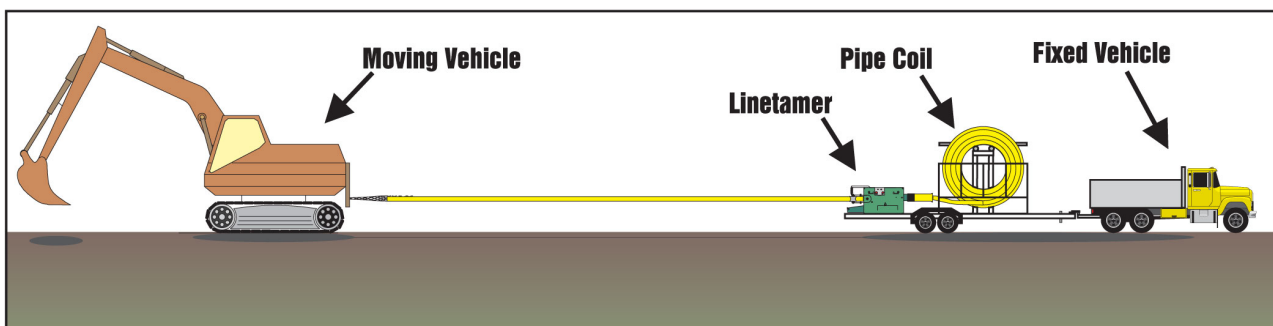
USAGE OPTIONS

1. Pulling pipe from the LineTamer® and stringing the pipe on the ground for direct burial (in the trench) or relining an existing pipeling
2. Pulling LineTamer® behind vehicle with pipe reel or cage for stringing out straightened pipe along right of way.
3. Pulling LineTamer® behind vehicle with plowing vehicle pulling pipe directly into the ground.
4. Stationary: LineTamer® connected to coil trailer with plowing vehicle pulling a pipe directly into the ground.
5. Stationary: LineTamer® connected to a coil trailer with pipe being pulled through existing pipe for relining.
6. Stationary: LineTamer® connected to a coil trailer with directional boring unit pulling pipe directly into the ground.

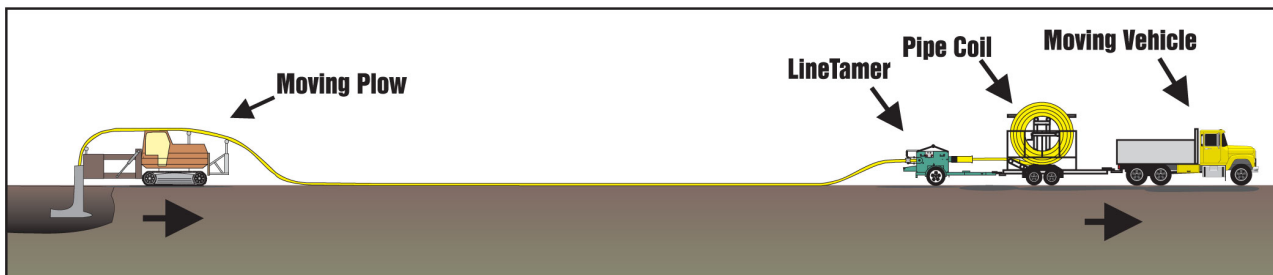
I: Stringing Pipe



II: Stringing Pipe

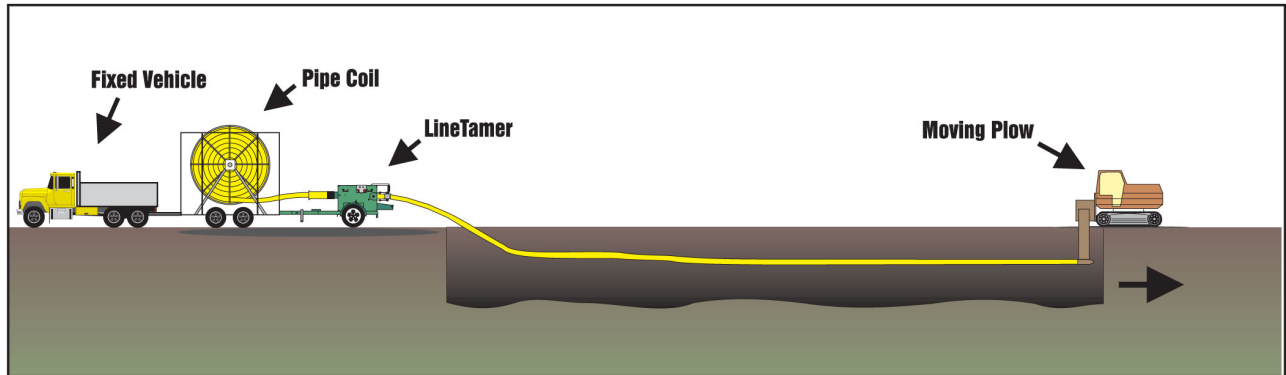


III: Stringing & Planting Pipe

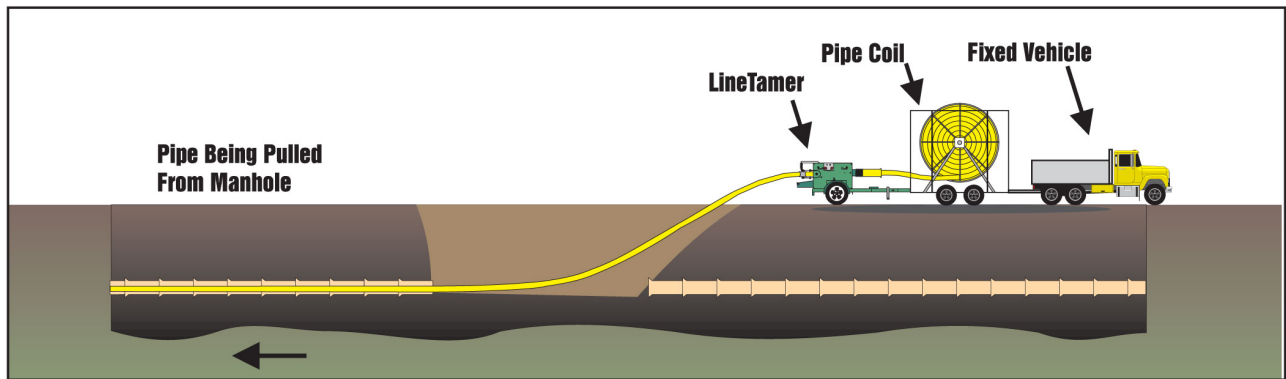


OVERVIEW

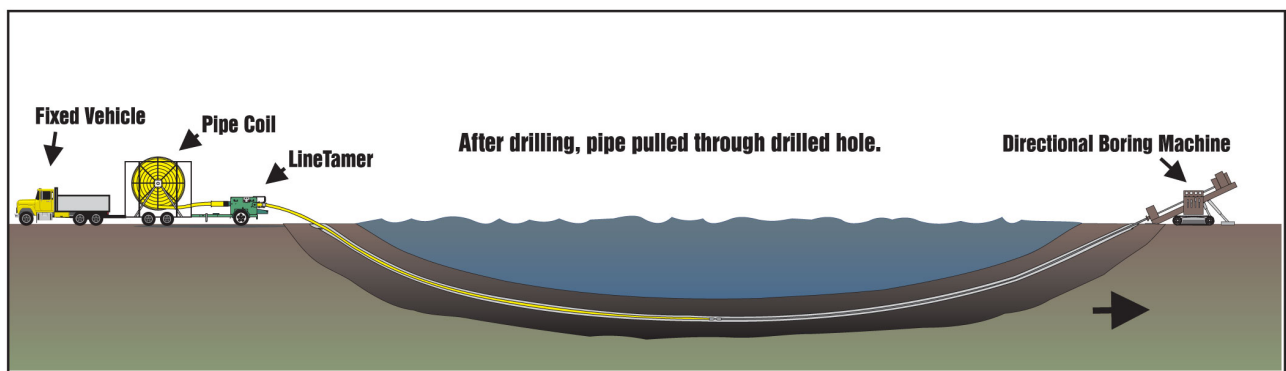
IV: Stringing & Plowing Pipe



V: Straightening Pipe for Relining



VI: Straightening Pipe for Directional Boring



OVERVIEW

Hydraulic Power Unit

- (A) Hydraulic fluid fill.
- (B) Gasoline fill.
- (C) Starter rope.
- (D) Engine oil check and fill.
- (E) System pressure gauge

The hydraulics are an open center flow system. The pressure relief valve is set at 2500 psi.



Fuel Valve

The fuel valve should be turned off when transporting the equipment, or when not being used.

Turn the valve control in to turn off. Turn the control out to turn on.



Engine Control Lever

All the way back to the left, shuts the engine off.

All the way forward to the right, is the choke position. Between these two positions, the desired engine speed can be set.

IMPORTANT: Do not use the choke if the engine is warm or the ambient temperature is high.



Hydraulic Fluid

Check fluid level in reservoir. Proper level is indicated on the sight gauge. If level drops below this point, fill reservoir to the HIGH level on the sight gauge. Refer to the "Hydraulic Fluids" section of this manual for hydraulic oil recommendations.

Never allow dirt or other foreign matter to enter the open tank.



TRANSPORTING

Lock Machine

Disconnect coil pipe from preparation machine.

Install the yellow-colored transport locking pin to prohibit movement of pipe guide.

Move seat to position inside trailer and lock into place.



Read Before Towing Trailer

Never tow a trailer before you check to be sure of the following.

- Electric brakes are operating properly.
- Break away switch cable is safely attached to tow vehicle.
- Coupler and safety chains are safely secured to hitch.
- Trailer jack is in the raised position.
- Check all fasteners for proper tightness.
- Wheel lug nuts are properly tightened.
- Wheel bearings are properly adjusted and maintained.
- Load is within maximum load carrying capacity.
- Tires are properly inflated.
- All trailer lighting is working properly.

Follow all federal, state local and industry standards when towing a trailer.



IMPORTANT

PIN MUST ALWAYS BE FULLY INSERTED INTO BREAKAWAY SWITCH. REMOVING PIN (AS SHOWN) WILL ACTIVATE BRAKES, & MAY DAMAGE TIRES, BRAKES, BATTERY, WIRING, & OTHER PARTS.



SAFETY FIRST!

IMPORTANT

Always wear Safety Harness
(Not Provided)

Attached to Hook

When Climbing on Trailer

Never Climb when Trailer is Operating



INSTRUCTIONS

LOADING INSTRUCTIONS

ALL PERSONNEL MUST STAND CLEAR OF COIL WHILE LOADING.

PULL TRAILER ALONG SIDE OF COILED PIPE & BEYOND ENOUGH TO OPEN GATE.

BE SURE COIL IS POSITIONED FOR PIPE TO UNCOIL FROM BOTTOM TO REAR

OPEN GATE FULLY AND BACK TRAILER TO CENTER OF COIL..

REMOVE OUTRIGGER SAFETY CHAINS & PINS AND PULL OUT ABOUT 3 1/2 FEET.
LOWER TO GROUND.

KEEP TENSION ON CABLE TO KEEP IT PROPERLY COILED ON WINCH DRUM.

1. PUSH "ARM" "DN" LEVER AND "CABLE" "DN" LEVER FORWARD AS NECESSARY TO POSITION FOR LOADING.
2. ATTACH CABLE TO COILED PIPE BY PLACING CABLE AROUND PIPE AND HOOKING TO CABLE TO FORM A CHOKER (MOST EASILY DONE BY THROWING ROPE WITH LOOP OVER COIL & HOOKING CABLE IN LOOP: THEN PULL ROPE BACK.) (BE SURE PIPE IS PROTECTED FROM CABLE BY RUBBER COVERING.)
3. PULL "CABLE" "UP" LEVER FULLY TOWARD YOU AND HOLD THERE THROUGH OUT LOADING.
4. WHEN COIL HAS BEEN LIFTED TO THE CORRECT HEIGHT TO CLEAR THE SUPPORT ROLLERS, WHILE CONTINUING TO HOLD FULL BACK ON "CABLE" "UP" LEVER, PARTIALLY PULL "ARM" "UP" LEVER TOWARD YOU, AS COIL MOVES HORIZONTALLY, MAINTAIN HEIGHT BY MOVING "ARM" LEVER AS NECESSARY.
5. WHEN THE ARM IS VERTICAL AND THE SIDE OF THE COIL TOUCHES THE ARM, RELEASE BOTH LEVERS.
6. PUSH "CABLE". "DN" LEVER FORWARD UNTIL COIL IS SUPPORTED BY ROLLERS.
7. PULL "CABLE" "UP" LEVER & "ARM" "UP" LEVER TOWARD YOU AS NECESSARY TO "STORE" ARM WHILE KEEPING SLIGHT TENSION ON CABLE.
8. WHEN ARM IS IN "STORED" POSITION, PULL "CABLE" "UP" LEVER TOWARD YOU TO PULL COIL TO PROPER POSITION.
9. REMOVE CABLE FROM COIL AND SECURE.

COIL & COMBO TRAILER

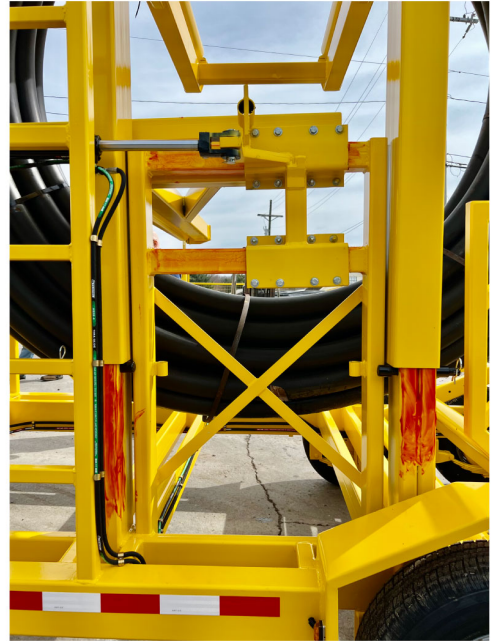
LOADING INSTRUCTIONS

Raise Mast

Use a lifting device to raise or lower the mast and rollers to the height required by the coil being used. The channels that the mast slides on have holes to insert pins through to hold the mast up.

Raise the mast above the desired pin location. Insert the pins through the channel. Place the spacers on the pins and secure in place with locking pins. Lower the mast to rest on top of the pins.

IMPORTANT: The mast should be raised and lowered without a coil of pipe loaded. The added weight of the pipe will cause the mast to bind, making it difficult to raise and lower.



Load Coil

Unpin and swing side gate out on trailer.

Lift pipe coil up with a sling onto top rollers. Move coil all the way back on the rollers. If using a forklift, protect the pipe from being damaged by the forks.

Close side gate and pin in position.



LOADING COIL

Interior Coil Roller

The interior coil roller can be adjusted using the hydraulic control lever.

The roller should be adjusted until it butts up against the inside of the coil.



Narrow Coils

NOTICE: The side gate must be positioned close enough to the coil to contain it from the side.

The side gate can be unpinned and moved back to a narrower position when required to contain the coil.

Reinstall pins after moving.

To position gate:

- (1) Open gate fully.
- (2) Lift end of gate to relieve pressure on pins.
(2 men may be required)
- (3) Remove both pins and while lifting end of gate, slide gate in or out as necessary to desired position.
- (4) Reinstall pins after moving.

ALWAYS ADJUST GATE AS CLOSE TO COIL AS POSSIBLE.



THREADING PIPE

Loading Pipe into LineTamer®

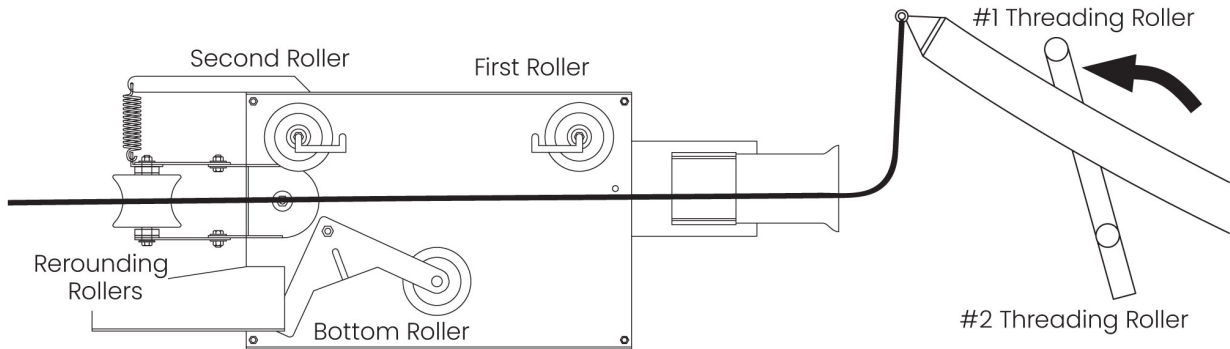
Install pulling head in pipe.

Raise threading rollers to highest position and manually roll pipe beneath #1 threading roller.

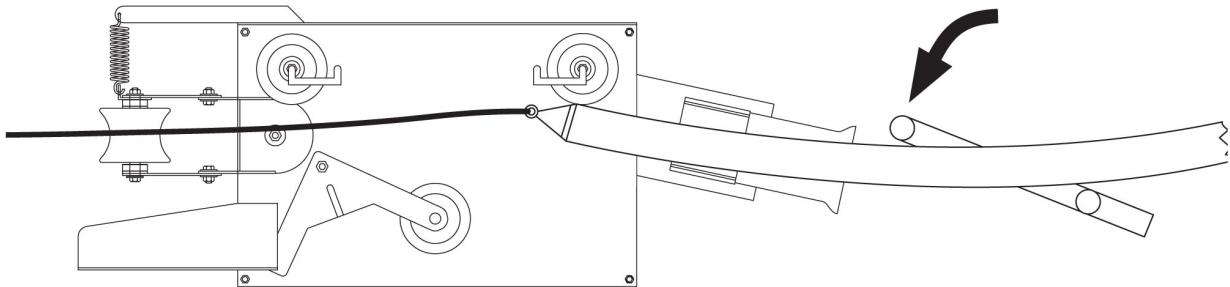
Attach pulling strap to pulling head.

NOTICE: Use only soft straps or rope to avoid any sharp edges which can damage rollers.

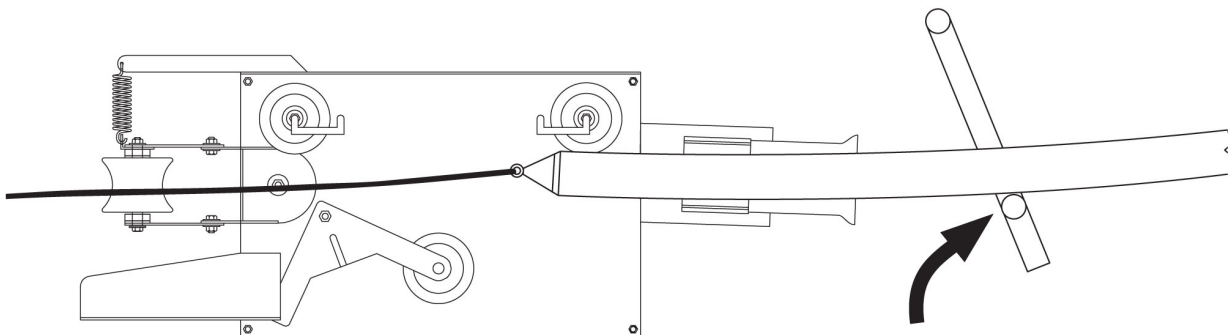
Lower threading roller #1 to align pipe with LineTamer pipe guide.



Pull pipe just past the first roller and stop.



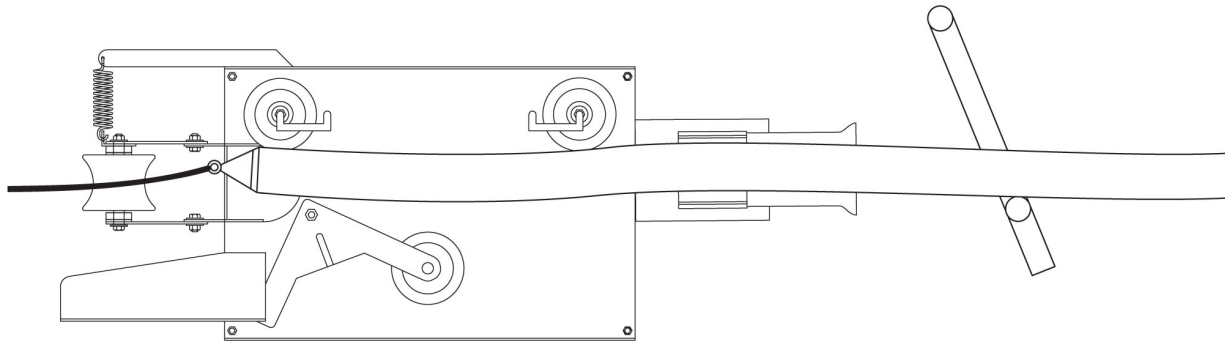
Raise threading roller #2 to align pipe with second roller.



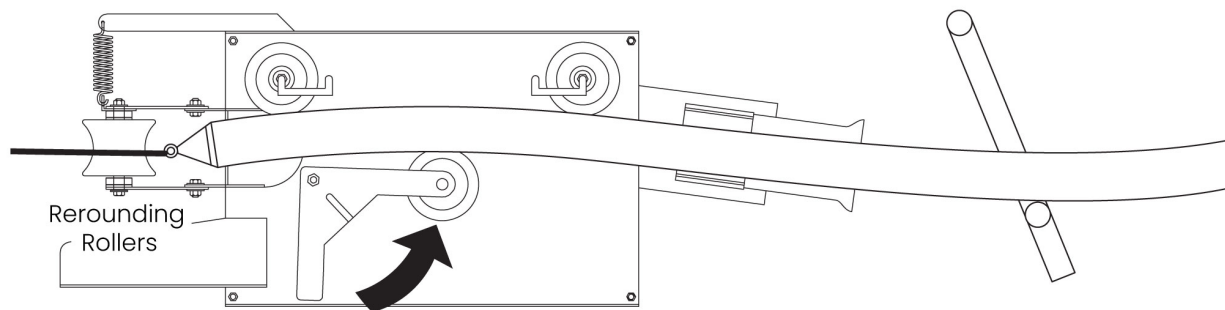
THREADING PIPE

Loading Pipe into the LineTamer® (continued)

Pull pipe just past the second roller and stop.



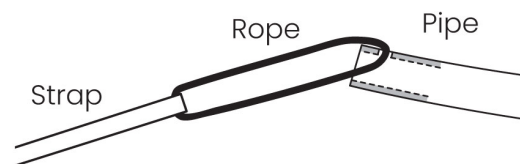
Raise bottom roller in the LineTamer® to align pipe with the re-rounding rollers and pull pipe through.



Important: The use of a pulling head while loading pipe in the machine may pose a damage potential to the rollers. Many pulling heads have strap edges and hard metal surfaces that could collide with the rollers and cause damage.

An alternative would be to use a strap and rope to pull and align the pipe in the machine.

To use the strap and rope to load the pipe in the machine, drill a hole about 2 to 3 inches from the end of the pipe. Thread the rope through the hole and attach to the strap (as shown). The Strap and rope will pull the pipe downward and forward. This downward force makes it easier to pass each of the rollers in the LineTamer®.



We recommend a pulling head to payout the coil of pipe as it provides means of attaching to the pipe.

If a pulling head is not available, you can use a similar arrangement of the strap and rope. Drill two holes inline about 2 to 3 inches from the end of the pipe. Thread the rope through both holes and attach the strap. Use the strap to pull the pipe to payout the coil.



MAINTENANCE

Preventative Maintenance

To insure optimum performance, the machine must be kept clean and well maintained.

With reasonable care, this machine will give years of service. Therefore, it is important that a regular schedule of preventive maintenance be kept.

Store machine inside, out of the weather, whenever possible.



Washing the Machine

An important factor in the service life of this machine is cleanliness. The machine should be cleaned with soap and water as needed.

When exposed to dust and mud in a field location, the machine should be washed at the end of each days work.



Check the Hydraulic Fluids

Periodically check the hydraulic fluid level in reservoir. All hydraulic cylinders must be retracted before checking fluid to get an accurate level. Maintain fluid at HIGH Level.

Never allow dirt or foreign matter to enter the open tank.

Refer to the "Hydraulic Fluids" section of this manual for hydraulic oil recommendations.



Brake System

Periodically check electric brake breakaway switch battery for full charge.

Check wires and connections to brakes for damage. Repair or replace parts as required.



MAINTENANCE

Grease

All moving parts should be greased periodically. All pipe rollers have fittings for lubricating the bearings. Grease the fittings once a month, or as required.



Grease sliding linkage of rerounder system.



Check axles for grease. Follow manufacturer's recommendations in front of right fender.

Check the grease level in your Trailer Buddy Axle before you launch.

If the blue Auto Check ring is visible you do not need to add grease.



Grease Bearings and Sleeves

Periodically grease all fittings for bearings and sleeves.



MAINTENANCE

Air Pressure

Air Pressure in tires should be maintained according to the PSI rating located on the tire.



HYDRAULIC FLUIDS

The use of proper hydraulic fluid is mandatory to achieve maximum performance and machine life. Use a clean, high quality, anti-wear hydraulic fluid with a viscosity index (VI) of 135 minimum. It should have a maximum viscosity of 500 cSt (2000 SSU) at startup (ambient temperature) and a minimum viscosity of 13 cSt (65 SSU) at the maximum fluid temperature (generally 80°F above ambient). Using hydraulic fluids that do not meet these criteria may cause poor operation and/or damage to the hydraulic components.

The following table specifies the fluid temperature at various viscosities. Temperature rise of the hydraulic fluid can vary from 30°F to about 80°F over the ambient temperature depending on the pressure setting, age of the pump, wind, etc. Mobil Unavis N46 hydraulic fluid is installed at our factory. The advantage of this fluid is a wider temperature range, however, this fluid should not be used for continuous operation below 24°F

Hydraulic Fluids Characteristics																	
Manufacturer	Fluid Name	cSt 100F	cSt 210F	V.I.	-20F	-10F	0F	10F	30F	50F	70F	90F	110F	130F	150F	Range °F	Range °C
Mobil	DTE 10 Excel 15	15.8	4.1	168	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	-16 - 113	-27 - 45
	DTE 10 Excel 32	32.7	6.6	164				*****	*****	*****	*****	*****	*****	*****	*****	12 - 154	-11 - 68
	DTE 10 Excel 46	45.6	8.5	164				*****	*****	*****	*****	*****	*****	*****	*****	23 - 173	-5 - 7
	DTE 10 Excel 68	68.4	11.2	156				*****	*****	*****	*****	*****	*****	*****	*****	37 - 196	3 - 91
	Unavis N-32	34.9	6.9	164				*****	*****	*****	*****	*****	*****	*****	*****	12 - 150	-11 - 66
	Unavis N-46	46	8.5	163				*****	*****	*****	*****	*****	*****	*****	*****	24 - 166	-4 - 74
	Unavis N-68	73.8	12.1	160				*****	*****	*****	*****	*****	*****	*****	*****	39 - 193	4 - 89

NOTE: This chart is based on pump manufacturer recommendations of 13 to 500 cSt.

NOTE: Temperatures shown are fluid temperatures. – NOT ambient temperatures.

OPERATING THE MAST

RAISE AND LOWER MAST

(Without Hydraulic Mast Cylinder)

While Unloaded ONLY
With Loading Arm Retracted

1. REMOVE CABLE FROM LOADING ARM.
2. LOWER HOOK & CABLE BETWEEN WINCH DRUM & REAR WINCH MOUNT ON REAR SIDE OF ARM.
3. PASS CABLE AROUND PULLY AT BOTTOM OF MAST.
4. HOOK CABLE LOOP (NOT HOOK) OVER HANGER (IN FRONT OF TENSION ROLLER HYDRAULIC CYLINDER MOUNT) WITH HOOK TOWARD FRONT, AS SHOWN IN PICTURE.
5. PULL "CABLE" "UP" LEVER TO RAISE MAST AND EXPOSE MAST HEIGHT ADJUSTMENT PIN HOLES.

*TWO HEIGHT ADJUSTMENT HOLES ONLY ARE AVAILABLE
DO NOT GO HIGHER SAYOTS -Tulsa Winch.*

6. PLACE PINS IN HOLES & INSTALL SAFETY PINS.
7. LOWER MAST ONTO PINS & REPLACE CABLE ON ARM.



OPERATING THE MAST

RAISE AND LOWER MAST

(With Hydraulic Mast Cylinder – HMI Option)

While Unloaded ONLY

With Loading Arm Retracted



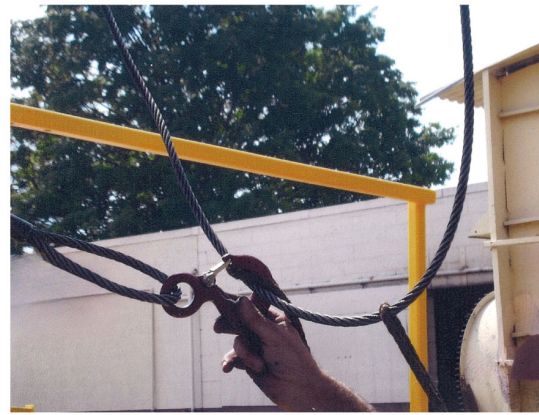
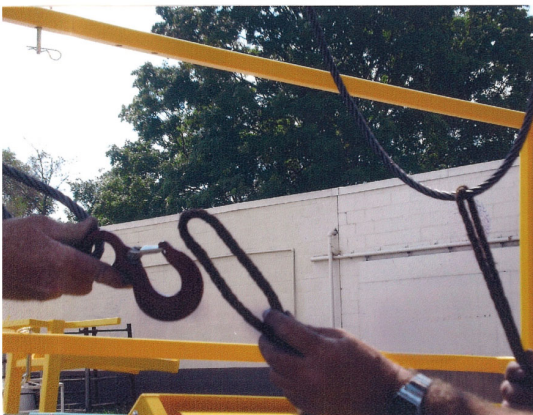
1. Open Gate
2. Pull Mast Lever to Raise Mast
3. Place Pins in Selected Height Holes
4. Take Pressure off Mast Cylinder by Lowering Onto Safety Pins

ATTACHING CABLE

TO ATTACH CABLE TO COIL IN VERTICAL POSITION

NOTE: REQUIRES A 3/8" X 20' ROPE WITH LOOP ON ONE END

1. **HELPER** – STANDING INSIDE TRAILER, THROW ROPE (ATTACHED TO CABLE HOOK) OVER LOADING ARM PIVOT TUBE TO PLACE CABLE OUTSIDE TRAILER.
2. **OPERATOR** – RELEASES WINCH CLUTCH OR PUSHES "CABLE" "DN" LEVER PAY OUT CABLE, AS HELPER KEEPS CABLE TAUNT.
3. **OPERATOR** – EXTENDS LOADING ARM.
4. **HELPER** – STANDING INSIDE TRAILER, LOOP ROPE AROUND CABLE & HOLD ENDS TO ALLOW CABLE TO BE PULLED WITHIN REACH, TO BE HOOKED IN STEP 6.
5. **OPERATOR** – UNHOOKS ROPE AND CARRIES HOOK & CABLE AROUND AND THROUGH PIPE COIL AND HOOKS INTO ROPE EYE.
6. **HELPER** – PULLS BOTH ENDS OF ROPE AND ATTACHES HOOK OVER CABLE TO MAKE CHOKER AROUND PIPE, MOVES OUTSIDE TRAILER, AND STEADIES PIPE WHILE LOADING.
7. **OPERATOR** – LOADS PIPE. (SEE LOADING INSTRUCTIONS)





MODEL: CT2710C-LT-SL

SPECIFICATIONS

DESCRIPTION

MODEL – CT2710C-LT-SL
GVWR – 9,850 lbs.
Empty Weight – 6,300 lbs.
Carrying Capacity – 3,200 lbs.
Overall Length – 27 ft.
Overall Width – 96 in.
Overall Height – 8 ft. – 4 in.
Maximum Coil OD – 125 in.
Minimum Coil ID – 48 in.
Maximum Width – 66 in.

RUNNING GEAR

Dual Axle – 5,200 lbs. Each
Brakes – Electric
Tires – ST225/75R15 LRD
Wheels – 15 x 6 6 Bolt Mod
Suspension – Slipper Leaf Spring

FRAME

Main Frame – Double Frame – 8 x 2 x 3/16" Tube
6 x 4 x 3/16" Tube
Coil Cage – 2 x 2 x 1/4" Square Tube
Mast Uprights Inside – 6 x 2 x 3/8" Rect. Double Tube
Mast Uprights Outer – 7 x 5 x 3/16" Rect. Tube
Mast Rollers – 5" Sch. 40 Pipe
Threading Rollers – 3 1/2" Sch 40 Pipe
Interior Roller – 3 1/2" Sch 40 Pipe
Tongue – 6 x 4 x 3/16" Tube with Pintle Eye
Fenders – 12 ga.

ELECTRICAL

Plug – 7 RV Molded Plug
Wiring – Enclosed in Tube with Junction Box
Lights – Standard LED

SAFETY

Chains – 3/8" with Heavy Duty Hook & Safety Latch
Breakaway – Battery, Battery Box and Switch
Decals – Warning Decals and Reflective Tape

INCLUDED ACCESSORIES

McElroy 4-6 in. LineTamer® (LT0048)

FINISH

Sherwin-Williams Paint
Industrial Urethane Yellow

HYDRAULICS

Motor – 5.5 HP Honda Motor
Hydraulic Winch
Valve – One 1 Spool Valve and One 3 Spool Valve
Hydraulic Arm Cylinder – 5 x 24 in. Tie Rod
Interior Roller Cylinder – 2 x 12 in. Tie Rod
Threading Roller Cylinder – 2 1/2 x 6 in. Tie Rod

AVAILABLE OPTIONS

Optional McElroy 2" LineTamer® (LT0122)
Optional 2" LineTamer® Mount (LTM2)
Optional 3" Re-Round Kit (LT0037)
Optional Hydraulic Operated Mast (HM1)





📍 127 Industrial Park Rd, Sweetwater, TN 37874
☎ Office: 423.337.3466 · Fax: 423.337.7208
🌐 www.pipetrailer.com

Sweetwater Metal Products “Limited One (1) Year Warranty”

Sweetwater Metal Products – Sweetwater, TN 37874-3055, provides the following limited one (1) year warranty on products manufactured by it to the purchaser of such products and to any person to whom such product is transferred during the duration of this warranty.

The warrantor’s obligation shall be limited to repairing or replacing at the factory in Sweetwater, TN 37874, any part or parts which shall within the one (1) year period hereinafter specified be returned to it with transportation prepaid and which upon examination by Sweetwater Metal Products shows to have been defective. This warranty shall not apply if:

- (A) The product has been altered, repaired or modified outside the warrantor’s factory in any way that would adversely affect its operation.
- (B) The product has been subjected to misuse or damage while in the possession of the purchaser or any person to whom the product was transferred by the purchaser or was installed or operated other than in accordance with the manufacturer’s operating instructions.
- (C) The product was used with accessories not recommended by Sweetwater Metal Products or for loads in excess of those listed as rated for the product.

The one (1) year limited warranty period shall commence with the date the product is sold to the purchaser by the dealer or, if this date cannot be established, the date the product was sold by Sweetwater Metal Products.

The implied warranties of merchantability and fitness for particular purpose are limited to the duration of this warranty – one (1) year – after said one (1) year, Sweetwater Metal Products expressly disclaims any warranty of merchantability or fitness for any particular purpose.

Purchase or other acceptance of the product by the claimant shall be on the condition and agreement that Sweetwater Metal Products shall not be liable for incidental or consequential damages of any kind.

Sweetwater Metal Products shall not be liable for paint damage due to rock chipping.

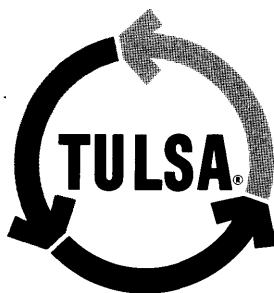
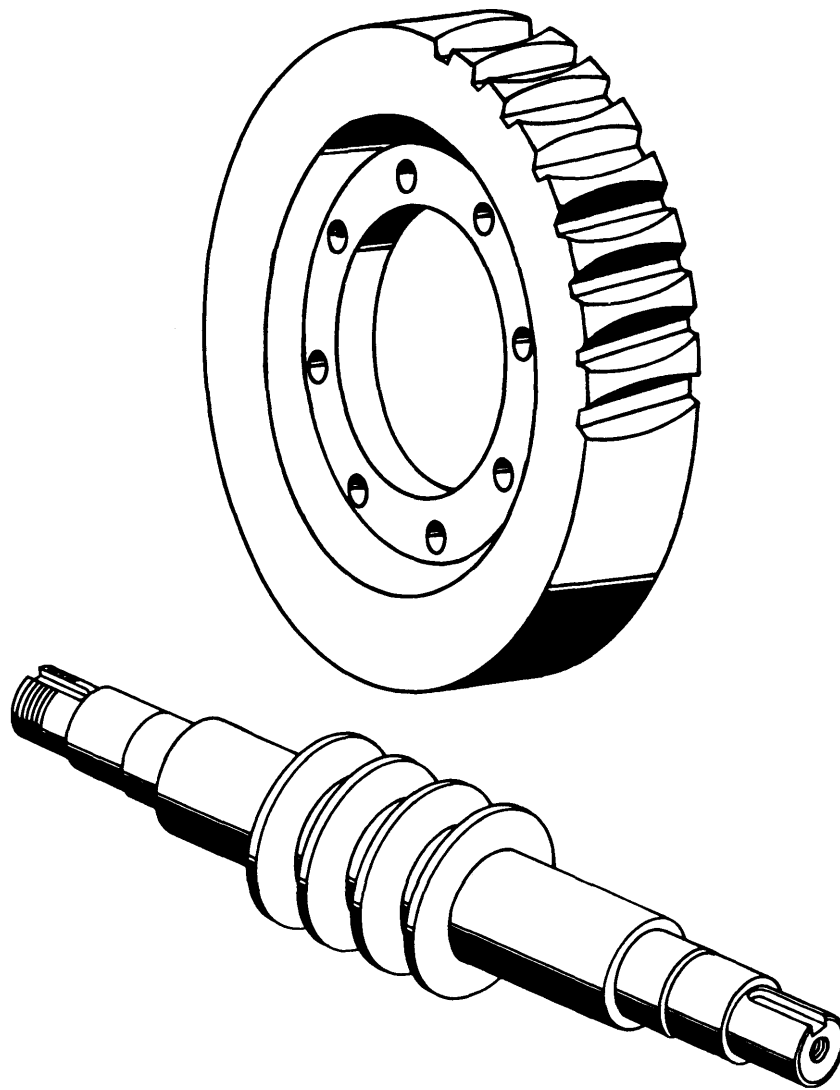
Tires are not included under the one (1) year warranty and should the purchaser find them unsatisfactory, should make a claim directly to the tire manufacturer.

To make a claim under this warranty, write directly to Sweetwater Metal Products – 127 Industrial Park Rd – Sweetwater, TN 37874-3055, identifying the product and giving its location. Return instructions will be provided by the company. Sweetwater Metal Products will make its best efforts to repair or replace the products, if found to be defective within the terms of this warranty, within sixty (60) days after return of the product to the company.

In order to validate warranty, fill out the accompanying warranty registration card and return with ten (10) days from the date of purchase.

Service Parts Information

900 SERIES WINCHES



Tulsa Winch

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XI. CHECKING THE ASSEMBLY ARRANGEMENT AND WORM BRAKE SETTING:

1. The worm brake must be set so the cam clutch engages in the payout direction only. The winch model code determines which direction the cam clutch should be installed.

EXAMPLE #1: (900-SLRF0)

The LRFO is as viewed from the rear of the truck with the winch behind the cab: (NOTE: The lettering on the cam clutch is facing outward from the gearbox.)

- L=Left hand worm
- R=Gearbox is on the right side of the winch.
- F=Input shaft to front of truck.
- O=Cable wraps over the drum.

EXAMPLE #2. (9000-SRLRU)

The RLRU is as viewed from the rear of the truck with the winch behind the cab: (NOTE: lettering on

the cam clutch is facing inward toward the gearbox.)

- R=Right hand worm.
- L=Gearbox is on left side of winch.
- R=Input shaft to rear of truck.
- U=Cable wraps under the drum.

Install Cam Clutch (63)
W/lettering inward to
gearbox on the follow-
ing assemblies.

- RRRU RLFO RRFO
- RLRU LRFU LLRO
- LRRO LLFU

Install Cam Clutch (63)
W/lettering outward
from gearbox on the
following assemblies.

- RRRO RLFU RRFU
- RLRO LRFO LLRU
- LRRU LLFO

2. If the winch is used in a model configuration it was not designed for, the brake must be checked. Damage to the brake can happen if installed wrong. If help is needed, contact your nearest Tulsa Winch sales/service representative before running your winch.

XII. HYDRAULIC SYSTEMS:

Refer to the performance chart below to properly match your hydraulic system to the 900 series winch. The chart contains first layer line pulls and line speeds @ various pressures and flow rates. Below the chart, are multipliers to figure 2nd, 3rd, and 4th layer line pulls and line speeds.

H938 WINCH—FIRST LAYER PERFORMANCE

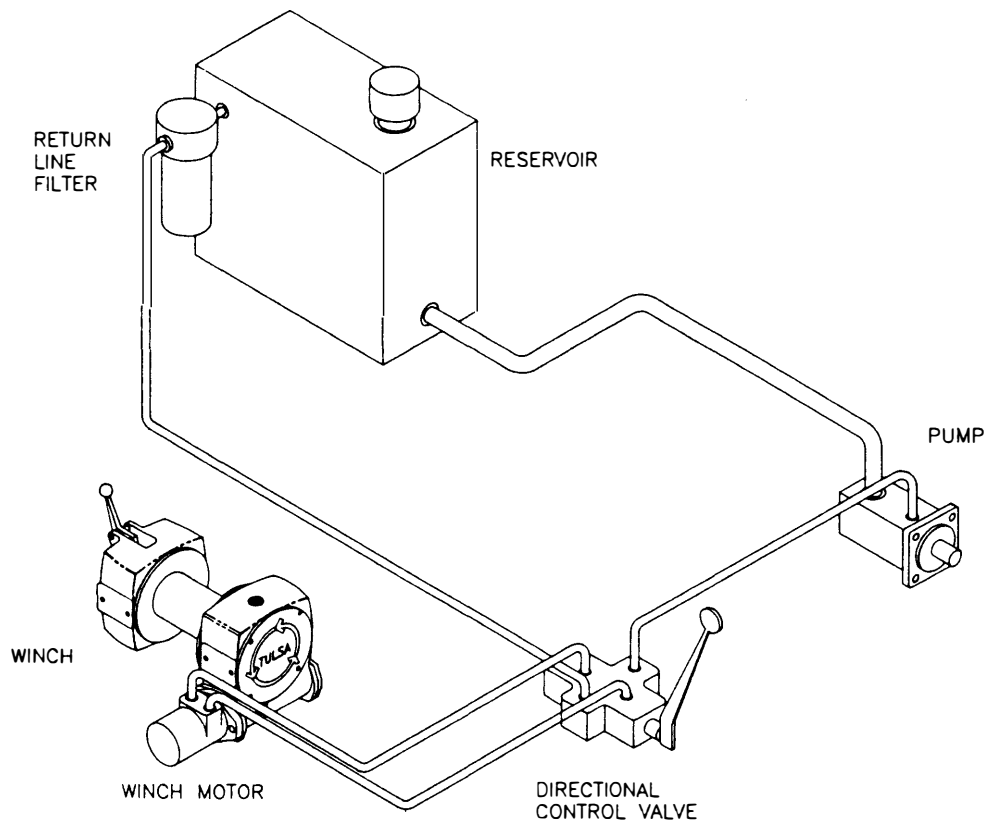
PRESSURE (PSI)

	200	400	600	800	1000	1200	1400	1600	1800	2400	
FLOW (GPM)	2	757 2.7	1,590 2.7	2,449 2.7	3,280 2.6	4,111 2.5	4,949 2.4	5,680 2.3	6,495 2.2	7,197 2.1	9,090 1.4
	4	824 5.5	1,824 5.5	2,763 5.4	3,769 5.3	4,734 5.3	5,682 5.2	6,597 5.1	7,552 4.9	8,417 4.8	10,940 4.2
	6	845 8.3	1,889 8.2	2,950 8.2	4,031 8.1	5,103 8.0	6,158 7.9	7,147 7.8	8,203 7.7	9,205 7.5	
	8	816 11.0	1,859 11.0	3,025 10.9	4,135 10.8	5,268 10.7	6,382 10.7	7,452 10.5	8,580 10.4	9,661 10.2	
	10	729 13.8	1,803 13.7	3,055 13.6	4,144 13.5	5,352 13.5	6,551 13.3	7,673 13.2	8,838 13.1	9,987 12.9	
	12	588 16.5	1,733 16.4	2,990 16.4	4,135 16.3	5,389 16.2	6,642 16.0	7,795 15.9	8,985 15.8	10,189 15.6	
	14	445 19.2	1,594 19.2	2,867 19.0	4,091 18.9	5,320 18.8	6,612 18.7	7,837 18.6	9,074 18.5		
	15	376 20.6	1,513 20.5	2,797 20.4	4,033 20.3	5,273 20.2	6,586 20.1	7,803 19.9	9,067 19.8		
	18	149 24.5	1,287 24.5	2,475 24.4	3,729 24.3	5,121 24.2	6,464 24.1	7,695 23.9	9,075 23.8		

CL H, 4.5 CU.IN.

FOR LAYER NUMBER	MULTIPLY	
	LINEPULL BY	LINESPEED BY
2	0.818	1.222
3	0.692	1.444
4	0.600	1.667

XIII. TYPICAL HYDRAULIC CIRCUIT FOR A WINCH:



XIV. TROUBLE SHOOTING TIPS:

CONDITION	POSSIBLE CAUSE	CORRECTION
CLUTCH HANDLE WON'T LATCH.	<ol style="list-style-type: none"> 1. Clutch jaws not aligned. 2. Damaged yoke or linkage. 	<ol style="list-style-type: none"> 1. Align jaws by rotating drum. 2. Replace yoke or clutch.
OIL LEAKS FROM HOUSING.	<ol style="list-style-type: none"> 1. Seal damaged or worn. 2. Too much gearbox oil. 	<ol style="list-style-type: none"> 1. Replace seal. 2. Drain excess oil.
LOAD DRIFTS DOWN.	<ol style="list-style-type: none"> 1. Oil-cooled brake is out of adjustment or worn. 	<ol style="list-style-type: none"> 1. Adjust brake until load doesn't drift. 2. Replace parts as required.
WINCH RUNS TOO SLOW.	<ol style="list-style-type: none"> 1. Low flow rate. 2. Hydraulic motor worn out. 	<ol style="list-style-type: none"> 1. Check flow rate. 2. Replace motor.
CABLE DRUM WON'T FREE SPOOL	<ol style="list-style-type: none"> 1. Winch is not mounted square. 2. Clutch not disengaged. 	<ol style="list-style-type: none"> 1. Check mounting. 2. Disengage clutch.
CABLE "BIRDNESTS" WHEN CLUTCH IS DISENGAGED.	<ol style="list-style-type: none"> 1. Drag brakes are worn. 	<ol style="list-style-type: none"> 1. Replace brakes.
HYDRAULIC FLUID LEAKS FROM THE GEARBOX.	<ol style="list-style-type: none"> 1. Damaged motor shaft seal. 	<ol style="list-style-type: none"> 1. Replace seal.
WINCH WON'T PICK UP HEAVY LOADS.	<ol style="list-style-type: none"> 1. Too much cable on the drum. 2. System pressure too low. 	<ol style="list-style-type: none"> 1. Use a snatch block or remove some cable from the drum. 2. Correct the hydraulic system pressure.

TEST PROCEDURE FOR AN ELECTRIC MOTOR

The Tulsa Winch motor is a (4 pole-4 coil) series wound 12 volt or 24 volt DC motor. This motor will provide high torque at low speeds.

To determine if the motor is operating correctly, apply the following test

1. Secure the motor to a bench or stable work place.
2. Connect a jumper wire (at least a number 6 wire) from F-1 to terminal A (see figure 2.0)
3. Attach a wire (at least a number 6 wire) from positive (+) battery terminal to motor terminal F-2.
4. Ground negative (-) battery terminal to motor

housing (see figure 2.0). Motor should now run.

NOTE: Always attach positive battery wire solidly to positive motor terminal. Make and break the negative connection at the battery to avoid burning the motor terminals. **CAUTION:** Do not run motor for a long period of time.

To reverse motor direction:

1. Attach wire from F-2 to motor terminal A (see figure 2.1).
2. Attach wire from positive (+) battery terminal to motor terminal F-1.

TULSA WINCH MODELS 938 & E945

I. INTRODUCTION:

PLEASE READ THIS MANUAL CAREFULLY.

This manual contains ideas for operating your Tulsa Winch safely and efficiently.

II.



WARNING!

- DO NOT USE THE WINCH TO LIFT, SUPPORT, OR TRANSPORT PEOPLE.
- WINCHES WITHOUT AUTOMATIC WORM BRAKES MUST NEVER BE USED TO LIFT LOADS.
- A MINIMUM OF FIVE WRAPS OF CABLE MUST BE AROUND THE DRUM BARREL TO LIFT OR HOLD THE RATED LOAD. THE CABLE CLAMP IS NOT DESIGNED TO HOLD THE RATED LOAD OF THE WINCH.
- DO NOT EXCEED THE MAXIMUM RATED LINE PULL OF THE WINCH.
- THE CLUTCH MUST BE FULLY ENGAGED BEFORE OPERATING THE WINCH.
- DO NOT ATTEMPT TO DISENGAGE THE CLUTCH UNDER LOAD.
- STAY AWAY FROM SUSPENDED LOADS.
- STAND CLEAR OF CABLE WHILE OPERATING. DO NOT TRY TO GUIDE CABLE.

III. WARRANTY:

Tulsa winches are designed and built to exact specifications. Great care and skill go into every winch we make. Warranty assistance can be obtained by contacting your nearest Tulsa Winch sales/service representative.

IV. WINCH OPERATION:

It is very important that the winch is mounted securely for proper alignment of the gear box, and clutch end.

All Tulsa winches are furnished with recommended mounting angles. The angle size for 938/E945 is $\frac{3}{8}'' \times 3'' \times 2\frac{1}{2}''$.

V. CABLE INSTALLATION:

1. Unroll desired cable out in a straight line on the ground. This will prevent kinking. Securely wrap the end of the cable, opposite the hook, with tape to prevent fraying.
2. Insert the taped end of the cable into the hole in the drum. Secure the cable using the setscrew furnished. Tighten the setscrew.
3. Carefully run the winch in the "reel in" direction, keeping tension on the cable. Spool all cable on to the drum in neat layers. Do not over speed the winch during initial cable installation.

VI. BREAK-IN:

A winch, like any other machinery, must be broken-in to perform properly. **DO NOT** over speed the winch during initial cable installation. Run the winch half the rated load and speed for the first thirty minutes.

VII. WINCH OPERATION:

It is best to make test runs with your winch before you actually use it. Remember, you hear your winch as well as see it operate. Get familiar with the sounds of a light pull, a heavy pull, and the sounds caused by the load jerking or shifting.

Uneven spooling of the cable is not a problem unless too much cable collects at one end of the drum. If this happens, reverse the winch to relieve the load and move your point of contact closer to the center of the vehicle. After the job is over, unspool and rewind the cable evenly on the winch drum.

Check the oil level of the winch every month. Replace oil every six months or earlier, depending on the winch use. Use three pints of SAE 140 multipurpose gear lube. Under adverse environmental conditions SAE 250 and SAE 90 gear lube may be required (Consult Tulsa Winch for proper selection). If the oil is contaminated with metallic particles, inspect the winch for the cause of the wear. A small amount of bronze present is normal wear for a worm gear winch.

Inspect cable frequently. If cable becomes frayed replace it immediately.

To engage the clutch, move clutch handle to the position marked "IN" or, the vertical 12-o'clock.

The jaws of the winch and the drum must be aligned for proper engagement. Drum rotation may be necessary for good alignment.

The clutch is held in the engaged position by the reverse draft angle of the clutch as well as the over-center action of the clutch lever. These provide a mechanical lock.

To disengage the clutch, move the clutch handle to the "OUT" position. **CAUTION, DO NOT ATTEMPT TO DISENGAGE WITH A LOAD ON THE WINCH**

VIII. ADJUSTING THE OIL COOLED BRAKE

All parts of the automatic oil-cooled brake are submerged in the gearbox lubricant. This brake uses a one way cam clutch (63) allowing free spooling in the in-haul position and braking in the payout direction. When the brake wears to the point that the load begins to drift simply adjust as follows:

1. Loosen locknut (67) and adjusting screw (66).
2. Tighten the brake by turning adjusting screw (66) clockwise. **CAUTION:** A slight $\frac{1}{4}$ turn is usually all that is required. Over-tightening can cause overheating and premature wear on brake parts. Tighten locknut (67) after adjustment is completed. The brake should be adjusted only enough to hold the heaviest load you lift. If the brake does not respond to adjustment, replacement of the stator plates (62), friction discs (61), or spring (64) may be required.

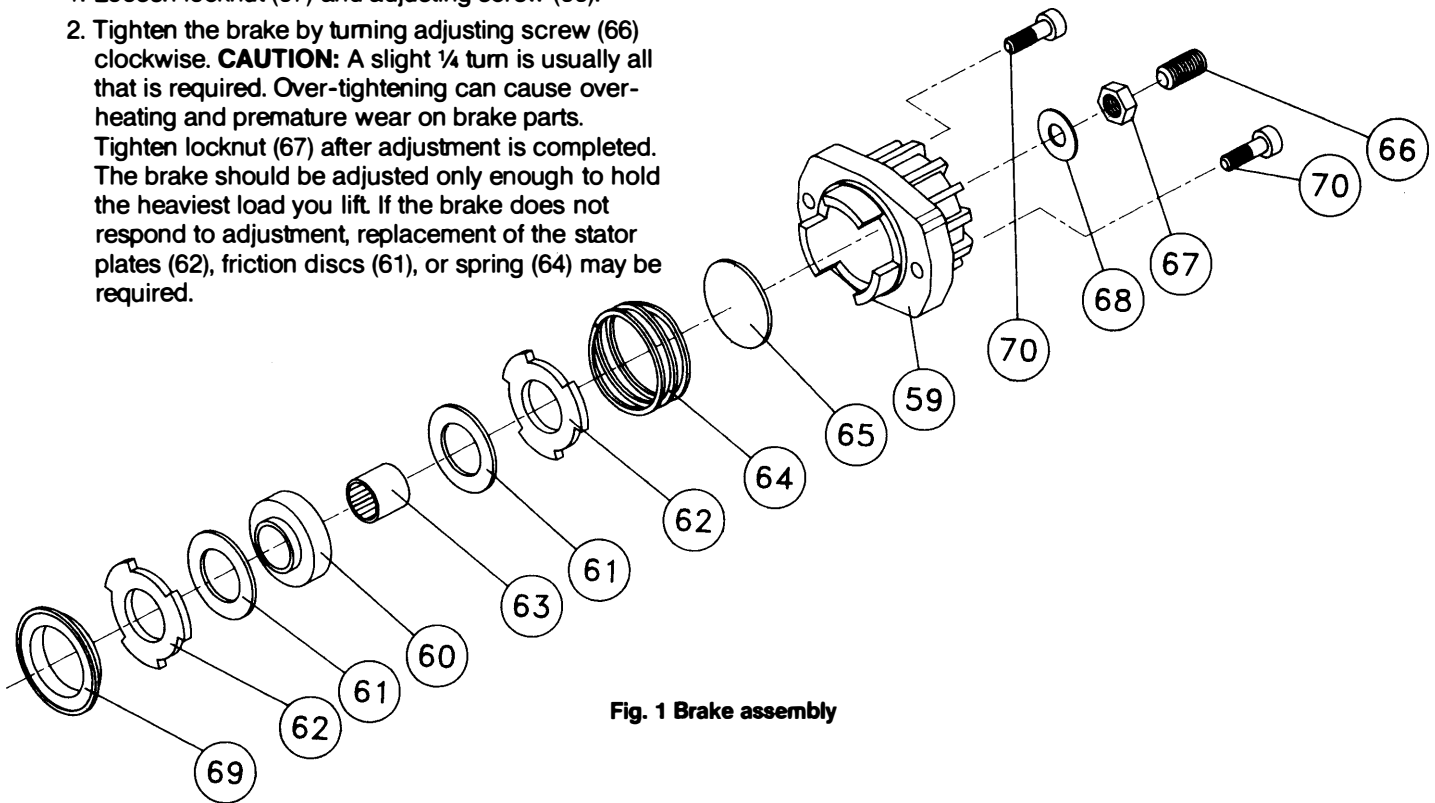


Fig. 1 Brake assembly

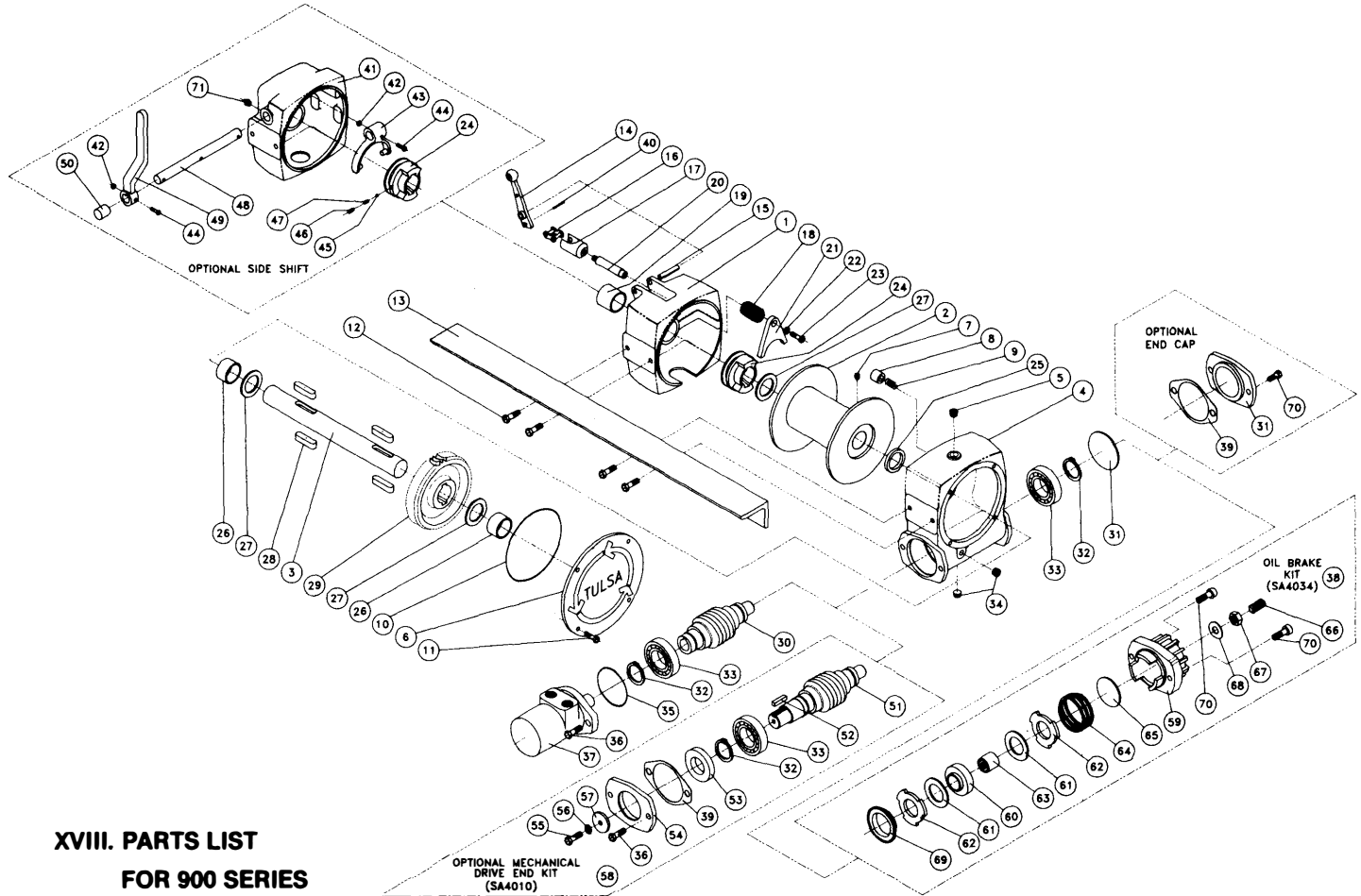
IX. SERVICING THE OIL COOLED BRAKE:

1. Remove bottom plug (34). See XVII.
2. Back off locknut (67) and adjusting screw (66) two or more turns to loosen brake.
3. Remove capscrews (70) from brake housing (59).
4. Remove brake housing (59), thrust washer (65), and spring (64) from gear box housing.
5. Remove stator plates (62), friction discs (61), brake hub (60), and cam clutch (63) from the worm (30).
NOTE: Make sure to note the direction that the cam clutch is installed before it is removed. It must be replaced the same way.
6. Inspect parts as follows:
 - A. Inspect friction discs (61) for uneven or excessive wear.
 - B. Inspect flat surfaces of brake hub (60), stator plates (62), and thrust washer (65) for warpage or other damage. Replace if necessary.
 - C. Inspect spring (64) for wear and discoloration. Replace if necessary.
 - D. Cam clutch (63) should be free of all debris and have all rollers intact. If it needs replacing, a new cam clutch should be carefully pressed into the brake hub (60).

X. RE-ASSEMBLING AND CHECKING THE BRAKE:

1. With brake housing cover face up, insert the following parts in this order;
 - thrust washer (65)
 - spring (64)
 - stator plate (62)
 - friction disc (61)
 - cam clutch (63) brake hub (60) assembly
 - friction disc (61)
 - stator plate (62)
 - brake spacer (69)
 - gasket (39) See XVII.Reference fig. 1 brake assembly diagram for assistance.
2. Place complete brake assembly on gearbox housing (4) and secure with two capscrews (70).
3. Install pipe plug (34) into bottom of gearbox housing and add three pints of SAE 140 gearbox lubricant.
4. Tighten brake adjustment screw (66) until tension from spring (64) is felt. Refer to section VIII. "Adjusting the oil cooled brake" and set brake to hold required load. Do not set brake for loads greater than winch rating.

XVII. PARTS ASSEMBLY DRAWING FOR 900 SERIES:



**XVIII. PARTS LIST
FOR 900 SERIES**

ITEM #	QTY./ UNIT	PART #	DESCRIPTION
1	1	40955	End Bracket
2	1	40462	Drum 11"
	1	40575	Drum 8"
	1	40393	Drum 6"
3	1	40464	Shaft
4	1	40383	Housing
5	1	27504	Breather
6	1	40391	Cover
7	1	23582	Set Screw
8	1	25692	Drag Brake
9	1	25774	Spring
10	1	40547	O-ring
11	4	40407	Capscrew
12	8	20522	Capscrew
13	2	41131	Frame 11" Drum
	2	41177	Frame 8" Drum
	2	40623	Frame 6" Drum
14	1	40708	Handle
15	1	27801	Pin
16	1	40865	Chain Link
17	1	40707	Rod
18	1	40404	Spring
19	1	40399	Bushing
20	1	40767	Shift Rod
21	1	40402	Yoke
22	1	30841	Washer
23	1	33233	Capscrew
24	1	40377	Clutch
25	1	40401	Seal
26	2	40400	Bushing
27	3	29017	Washer
28	4	40518	Key
29	1	40618	Gear R.H. H938, M938
	1	40374	Gear R.H. E945
30	1	40598	Worm R.H. H938
	1	40635	Worm R.H. M938
	1	41178	Worm R.H. E945 W/Brake
	1	40375	Worm R.H. E945 W/O Brake
31	1	40397	Plug Cap
	1	40042	End Cap
32	2	40396	Ring

ITEM #	QTY./ UNIT	PART #	DESCRIPTION
33	2	40395	Bearing
34	2	32220	Pipe Plug
35	1	32566	O-ring
36	2	40410	Capscrew
37	1	40271	Hydraulic Motor
38	1	4034	Brake Kit
39	1	40147	Gasket
40	1	40866	Roll Pin
41	1	41220	End Bracket, Side Shift
42	2	16990	Nut
43	1	41224	Yoke, Side Shift
44	2	31748	Capscrew
45	1	41237	Ball
46	1	10351	Set Screw
47	1	41236	Spring
48	1	41234	Shaft, Shifter
49	1	41222	Handle, Shifter
50	1	40397	Plug
51	1	40635	Worm, Mechanical
52	1	20105	Key
53	1	20232	Seal
54	1	40082	End Cap
55	1	20278	Screw
56	1	20526	Lockwasher
57	1	20092	Washer
58	1	SA4010	Mechanical Drive Kit
59	1	40069	Brake Housing
60	1	40617	Brake Hub
61	2	40075	Friction Disc
62	2	40076	Stator Plate
63	1	40013	Cam Clutch
64	1	40077	Spring
65	1	40078	Thrust Washer
66	1	40775	Set Screw
67	1	40774	Locknut
68	1	29044	Washer
69	1	40599	Spacer
70	2	40546	Socket Capscrew
71	2	21128	Grease Zerk

XIX. DISASSEMBLY OF E945 COMPONENTS:

A. Disassembly of E945 transmission.

1. Remove twelve capscrews (22).
2. Remove gasket (31).
3. Remove both needle bearings (24) and thrust washers (25). Inspect and replace if necessary.
4. Remove smaller spur gear (45) and larger spur gears (26). Inspect and replace if needed.
5. Remove input shaft (28) and input shaft (41). Inspect and replace if needed.
6. Remove thrust washer (25) and needle bearing (24). Inspect and replace if needed.
7. Remove nuts (39) and remove motor (36).
8. Loosen set screw (44) and remove spur gear (43), o-ring (42), and key (37) from motor shaft. Check and replace if needed.
9. Remove capscrews (32) and remove transmission housing (34). Inspect transmission housing bushing (33), seal (35), seal (38), and gasket (48) for excessive wear. Press new bushing or seals if needed.

B. Disassembly of an E945 relay kit.

1. Remove two top capscrews (16) from relay cover (14) and remove cover. Unplug receptacle (20) and remove cover (14).
2. Remove bottom two capscrews (16) to remove relay kit (SA4060-12V or SA4068-24V).

2. Press seal (35) into back of transmission housing (34).
3. Secure transmission housing to gear housing with two capscrews (32) and gasket (48).
4. Insert key (29) on shaft (41).
5. Assemble shaft (41), washer (25), and needle bearing (24). Install into transmission housing (34).
6. Install keys (27) (30) into shaft (28) and insert shaft into worm end (30).
7. Place spur gear (26) on shaft (41).
8. Place spur gear (26) on shaft (28).
9. Place spur gear (45), thrust washer (25), and needle bearing (24) on shaft (41).
10. Place needle bearing (24) on shaft (28).
11. Insert two dowel pins (40) into transmission housing (34).
12. Apply sealer and gasket (31) to transmission housing (34).
13. Install transmission cover (23) to housing with twelve capscrews (22).

B. ASSEMBLY OF AN E945 RELAY KIT:

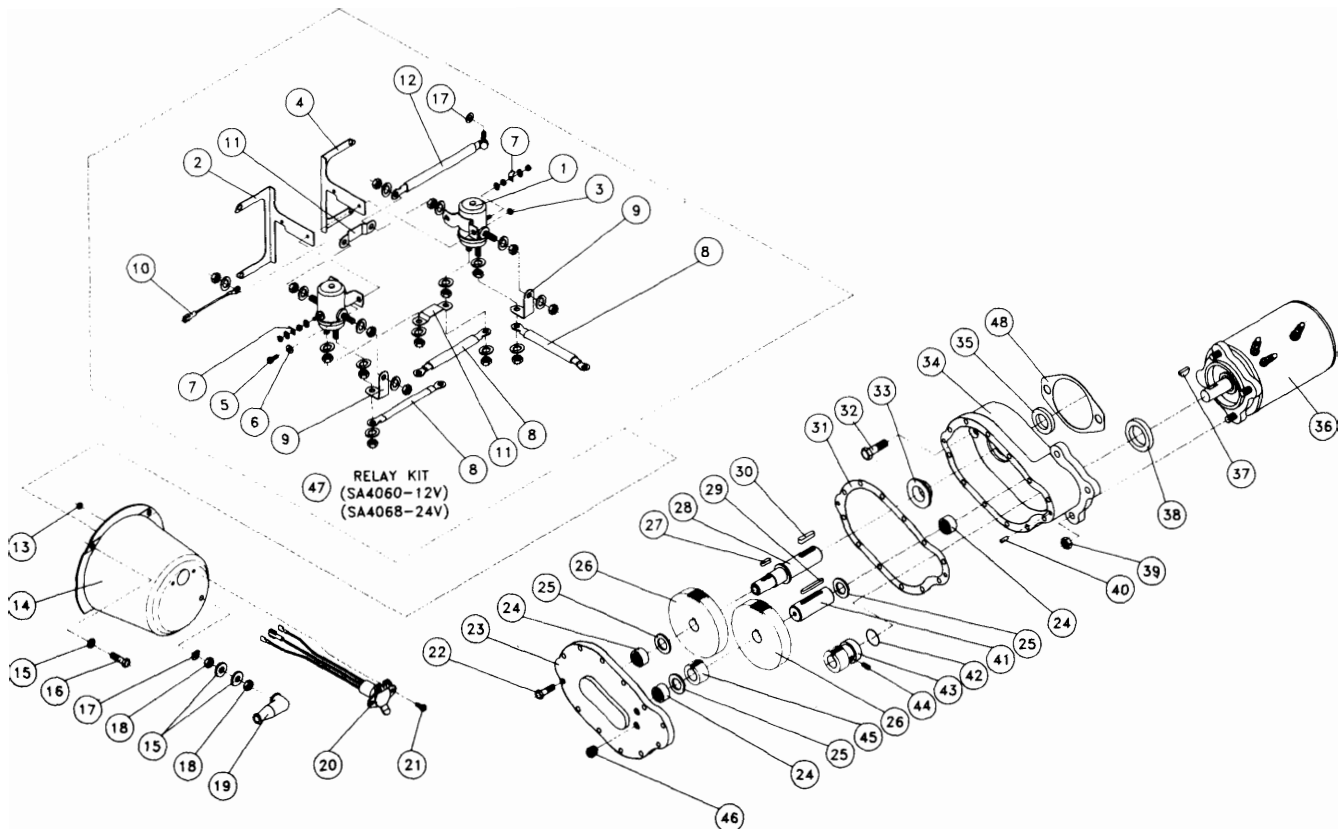
1. Secure female receptacle (20) to relay cover (14).
2. Secure relay kit to gearbox cover (6) with two capscrews (16) in the bottom two holes.
3. Plug receptacle ends (20) to relay ends.
4. Secure cover (14) to gearbox cover (6) with two capscrews (16) in the top two holes.

XX. ASSEMBLY OF E945 COMPONENTS.

A. ASSEMBLY OF AN E945 TRANSMISSION:

1. Press bushing (33) into transmission housing (34)

XXI. PARTS DRAWING E945 TRANSMISSION AND RELAY KIT:



3. Ground negative (—) battery terminal to motor housing (see figure 2.1). Motor should now run.

The running idle on the bench will draw 55 amperes and must run free and easy. If the ampere draw is more than 60 amperes and the motor runs rough, it should be replaced.

With the motor mounted on the winch (less cable on drum) the ampere draw should be approximately 65 to 70 amps. If this test greatly exceeds 70 amps refer to section (XIV. TROUBLE SHOOTING TIPS) for the mechanical portion of the winch.

See figure 2.2 for solenoid connection to the motor and battery.

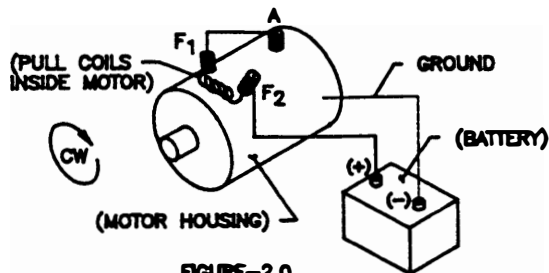


FIGURE-2.0
MOTOR-CLOCKWISE ROTATION

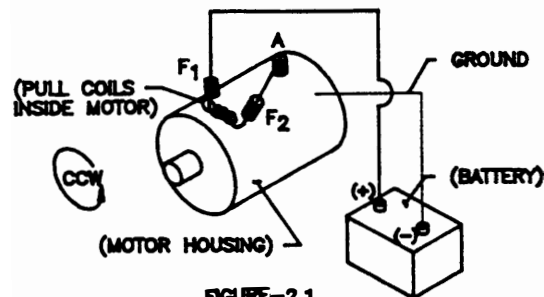
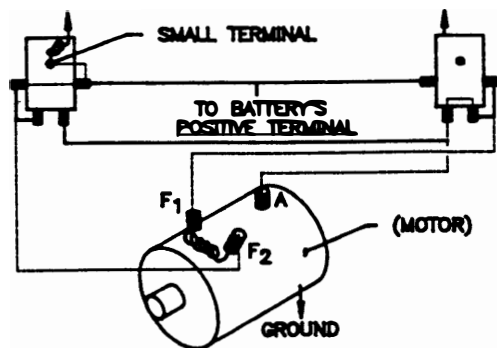


FIGURE-2.1
MOTOR-COUNTER CLOCKWISE ROTATION



SOLENOIDS TO MOTOR CONNECTIONS

THE DASHED LINES ARE CURRENT'S PATH IN FORWARD ROTATION. SOLID LINES ARE CURRENT'S PATH AT ALL TIMES.
NOTE: DIRECTION OF MOTOR ROTATION DEPENDS ON WHICH SMALL TERMINAL OF EITHER SOLENOID IS CONNECTED TO BATTERY'S POSITIVE TERMINAL.

FIGURE-2.2

TEST PROCEDURE FOR SOLENOIDS:

When testing the DC motor the motor and the battery must be of the same voltage.

1. Secure motor to a bench or stable work surface. (see figure 3.0)
2. On the motor, attach a No. 6 wire from terminal A to terminal F-2.
3. Attach motor terminal F-1 to one side terminal of

the solenoid. (see figure 3.0)

4. Ground the solenoid to the motor as shown.
5. Attach positive (+) battery terminal to the opposite solenoid terminal.
6. Ground negative (—) battery terminal to the motor housing.
7. Touch the positive wire from the battery to the small terminal of the solenoid. The motor should now run if the solenoid is good. If not, make sure the motor will run directly from the battery. (see test procedure for an electric motor)
8. To test the upper contacts of the solenoid use the same procedure except use the top contacts of the solenoid. (see figure 3.1) When hooked up, the motor should start running. When the positive wire is touched to the small terminal of the solenoid the motor will stop running.

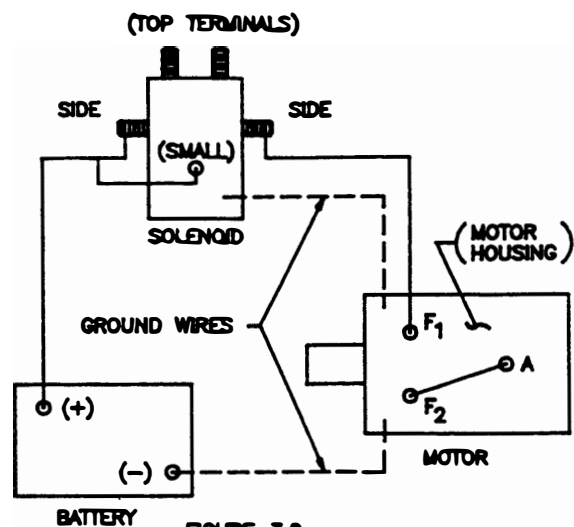


FIGURE-3.0

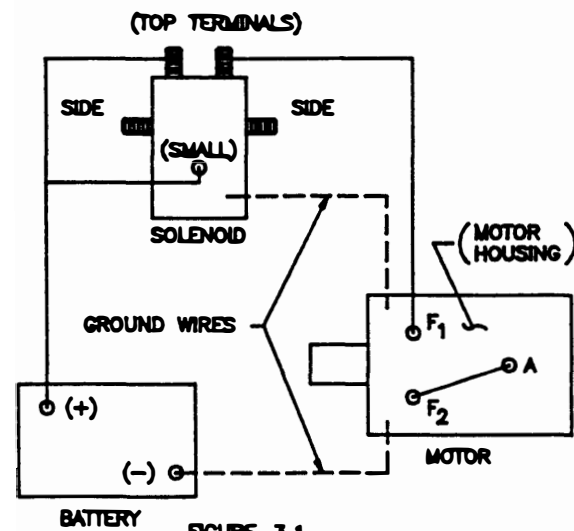


FIGURE-3.1

XV. DISASSEMBLY OF A TULSA MODEL 900 SERIES WINCH:

1. Remove plug (34) to drain oil.
2. Remove frame angles (13) from gearbox (4) by removing eight cap screws (12).
3. For hydraulic drive, remove motor (37) from gearbox housing (4) by removing capscrews (36).
4. Check o-ring (35) and replace if required.
195. For mechanical drive, remove key (52) from worm (51). Remove end cap (54) and seal (53). Inspect and replace if necessary. Care should be taken in removing the end cap (54) from the gearbox housing so as not to damage the seal (53).
6. For an oil-cooled brake, remove the brake sub-assembly (SA 4034) from the gearbox housing (4) by unscrewing capscrews (70). See section IX. "SERVICING THE OIL-COOLED BRAKE" for details.
7. For a winch without a brake, remove end cap (31) and gasket (39) by removing capscrews (70). Inspect gasket and replace if necessary.
8. Slide end cover sub-assembly (1) off output shaft (3). The clutch (24) will slide off with the end cover sub-assembly.
9. Check the bushing (19) in the end cover (1) sub-assembly for signs of wear. Press a new bushing in the end cover sub-assembly if necessary.
10. Check yoke (21) for wear by unscrewing cap screw (23).
11. Check clutch (24) for wear and replace if needed.
12. Remove keys (28) from output shaft (3) and replace if needed.
13. Remove outside thrust washer (27) from output shaft (3), replace if needed.
14. Remove drum (2). Inspect bores and replace if needed.
15. Remove drag brake discs (8) and springs (9). Inspect and replace if needed.
16. Remove gearbox housing cover (6) and o-ring (10). Inspect o-ring and replace if needed. Check bushing (26) for wear and press a new bushing in if needed.
17. Remove thrust washer (27). Check for wear and replace if needed.
18. Remove output shaft (3) from bronze gear (29) through the cover side of the gearbox.
19. Remove the bronze gear (29). The bronze must be tilted up and out to clear the teeth of the worm (30).
20. Remove the snap rings (32) and press the worm (30) out of the gearbox housing. Turn the gearbox around and press the other bearing (33) out the other end. Inspect worm, bearings and snap rings and replace if necessary.
21. Inspect gearbox bushing (26) and seal (25). Press a new bushing and seal in if necessary. It is recommended that the seal be changed if the bushing is replaced.

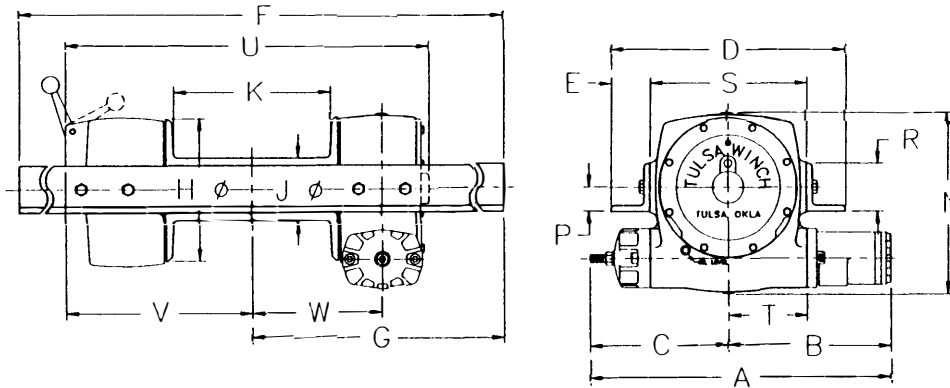
XVI. ASSEMBLY OF A 900 SERIES TULSA WINCH:

1. Press bushing (26) into gearbox housing (4).
2. With one bearing (33) pressed onto the worm (30). Install snap ring (32) to retain bearing. Press worm into gearbox. Press another bearing (33) on the other end of the worm. Secure other bearing with a snap ring (32).
3. Place thrust washer (27) inside gearbox housing.
4. Position bronze gear (29) in housing.
5. Install keys (28) into the output shaft (3).
6. Carefully insert output shaft (3), from the cover side, through the bronze gear and thrust washer (27). Make sure the keys line up through bronze gear (29).
7. Place thrust washer (27) over the output shaft onto the bronze gear (29).
8. Place o-ring (10) on cover (6) and lubricate with grease.
9. With bushing in cover, place cover on gearbox and secure with four capscrews (11). Do not over tighten. NOTE: For electric model reference XVIII. PART B
10. Press seal (25) into housing if not present.
11. Install springs (9) and drag brakes (8) into the pockets of the gearbox.
12. Slide drum (2) onto the output shaft (3).
13. Slide thrust washer (27) onto the output shaft.
14. Place yoke in groove of clutch (24). Secure yoke and clutch with cap screw (23) and spring (18).
15. Aligning clutch (24), slide end cover sub-assembly (1) onto the output shaft (3).
16. If the winch does not have a brake, install gasket (39) and end cap (31) to housing with capscrews (70).
17. For a hydraulic drive winch, secure hydraulic motor (37), o-ring (35) to gearbox housing with capscrews (36).
18. For mechanical drive, secure seal (53), gasket (39), and end cap (54) onto worm (51) with capscrews (36). Secure key (52) with washer (57), nut (56), and capscrew (55).
19. For an electric drive see section XVIII. "ASSEMBLY OF E945 COMPONENTS". 945, secure gasket (67), seal (35), and transmission assembly (22-46) to gearbox housing with capscrews (32). Install key (37) and seal (38) and secure electric motor (36) to transmission housing (34) with set screws and nuts (39)
20. Secure frames (13) onto the gearbox housing and end cover.

XXII. PARTS LIST FOR E945 TRANSMISSION AND RELAY KIT:

ITEM #	QTY./ UNIT	PART #	DESCRIPTION	ITEM #	QTY./ UNIT	PART #	DESCRIPTION
1	2	40999	Relay, 12V	25	1	40993	Thrust Washer
	2	41176	Relay, 24V	26	2	40992	Gear
2	1	41010	Bracket, L.H.	27	1	40997	Key
3	2	41014	Nut	28	1	40984	Shaft
4	1	41011	Bracket, R.H.	29	1	25395	Key
5	2	41013	Screw	30	1	23900	Key
6	2	41028	Washer	31	1	40996	Gasket
7	2	41029	Wire Terminal, Male	32	2	40803	Capscrew
8	3	41031	Wire Assembly	33	1	40994	Bushing
9	2	41032	Buss Bar	34	1	40981	Transmission Housing
10	1	41034	Wire Assembly	35	1	30414	Seal
11	2	41036	Buss Bar	36	1	40998	Electric Motor
12	1	41030	Wire Assembly	37	1	22925	Woodruff Key
13	2	41014	Nut	38	1	34118	Seal
14	1	41009	Cover	39	3	21723	Nut
15	6	30841	Washer	40	2	31545	Dowel Pin
16	4	40407	Capscrew	41	1	40983	Shaft
17	2	31569	Washer, Star	42	1	34251	O-ring
18	2	26432	Nut	43	1	41203	Spur Gear
19	1	41180	Nipple, Terminal	44	1	41205	Set Screw
20	1	4062	Receptacle, Female	45	1	40990	Spur Gear
21	2	41013	Screw	46	1	23521	Plug
22	12	41132	Capscrew	47	1	SA4060	Relay Kit 12V
23	1	40979	Cover, Transmission		1	SA4080	Relay Kit 24V
24	3	27897	Bearing, Needle	48	1	40147	Gasket

XXIII. INSTALLATION DIMENSIONS AND PERFORMANCE DATA:



Model	A	B	C	D	E	F	G	H	J	K	N	P	R	S	T	U	V	W
H938-6"	16.54	9.04	7.50	13.44	3.00	34.00	17.00	7.25	3.50	6.00	10.00	1.25	2.50	7.44	3.72	18.12	8.74	5.25
H938-11"	16.54	9.04	7.50	13.44	3.00	34.00	17.00	7.25	3.50	11.00	10.00	1.25	2.50	7.44	3.72	23.12	11.24	7.75

SPECIFICATIONS

<i>Safe Working Capacity</i> Pounds	<i>Drum Shaft Diameter</i>	<i>Worm Gear Ratio</i>	<i>Transmission Ratio</i>	<i>Weight Pounds</i>
9,000	1½"	45:1	10.24:1	W/6" Drum 126.5 W/8" Drum 130.5 W/11" Drum 138.0 Add for Brake 3.5

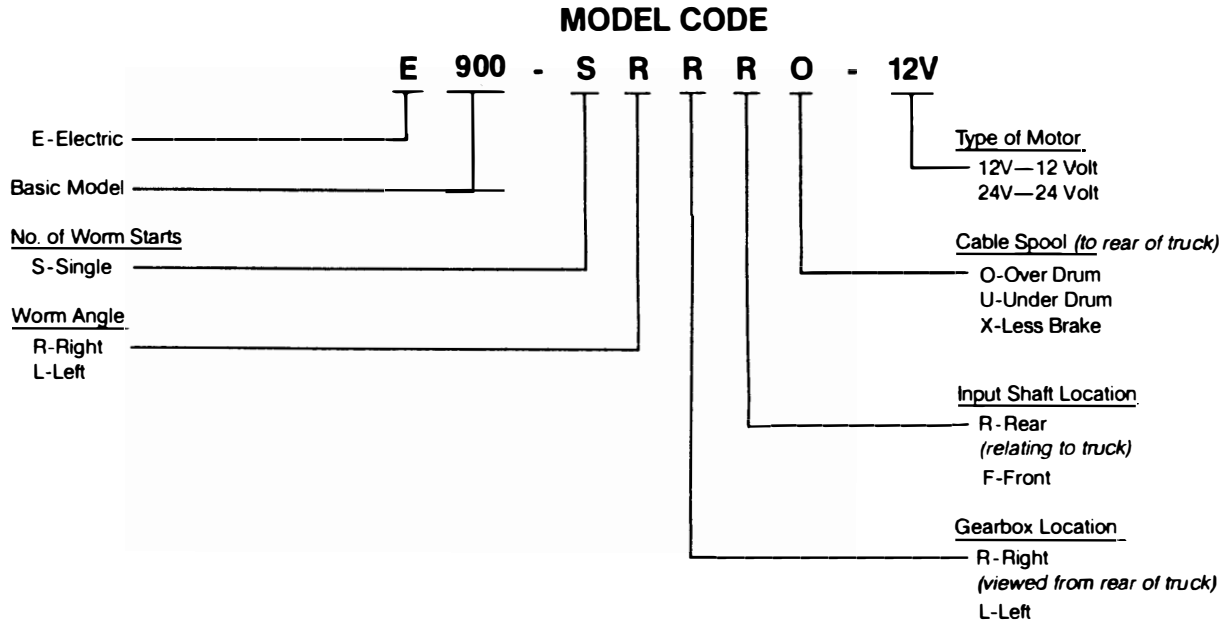
RATED LINEPULL IN POUNDS PER LAYER OF CABLE

Cable Size	1st Layer	2nd Layer	3rd Layer
7/16"	9000	7364	6231

CABLE CAPACITY IN FEET (7/16" CABLE)

Drum Size	1st Layer	2nd Layer	3rd Layer
6"	12	27	44
8"	17	37	61
11"	23	52	85

XXIV. MODEL CODE



XXV. LIMITED WARRANTY

LIMITED WARRANTY

Tulsa Winch expressly warrants its products against defects in material and workmanship under normal and ordinary use and service for a period of One (1) year from the date of purchase from Tulsa Winch or any authorized distributor of Tulsa Winch products. This warranty is not applicable to product failure due to improper operation or usage, misapplication, or employment for other than normal and ordinary purposes.

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