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Forest Service
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5100—Fire

Manual
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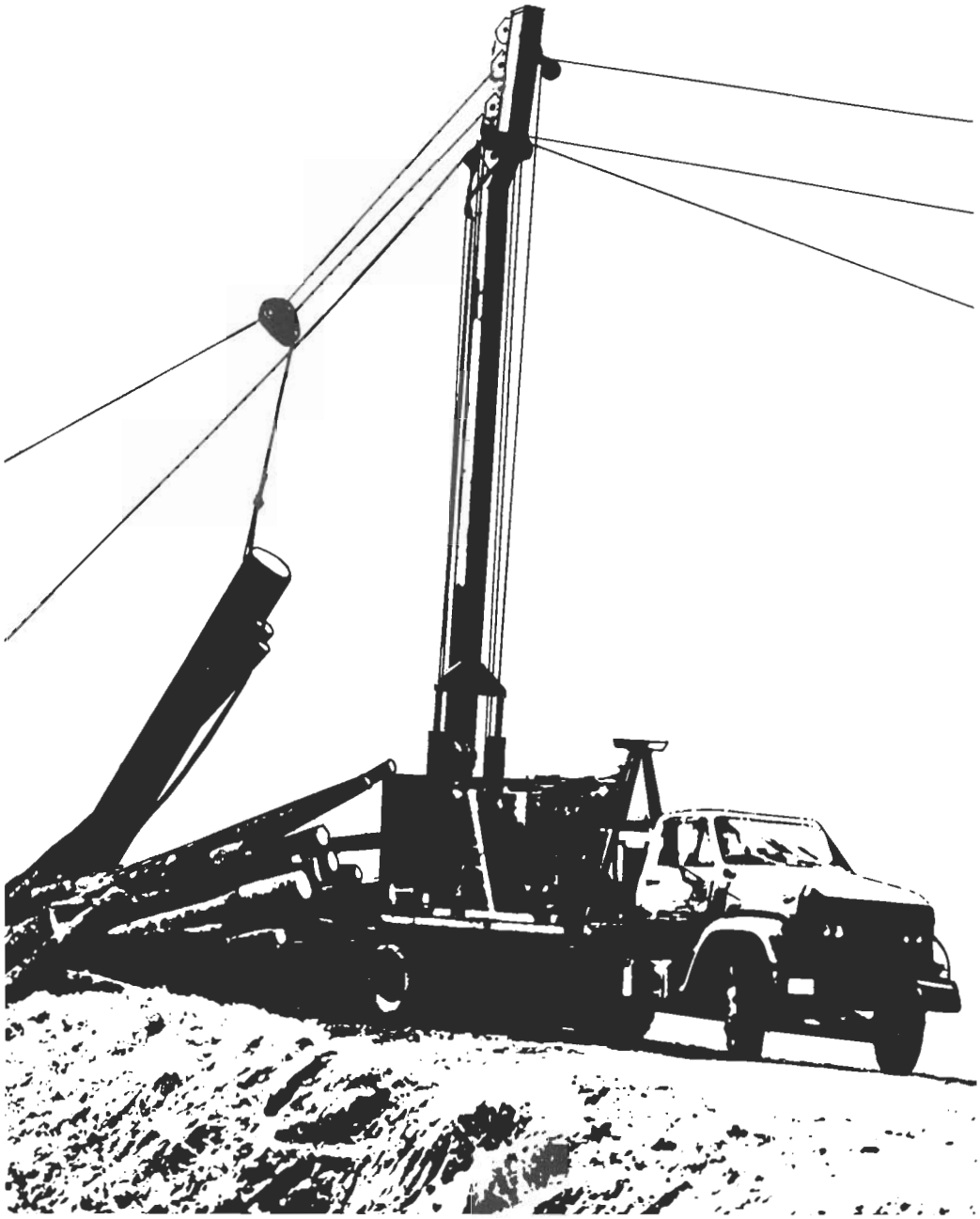
Clearwater Yarder

Operator's Manual



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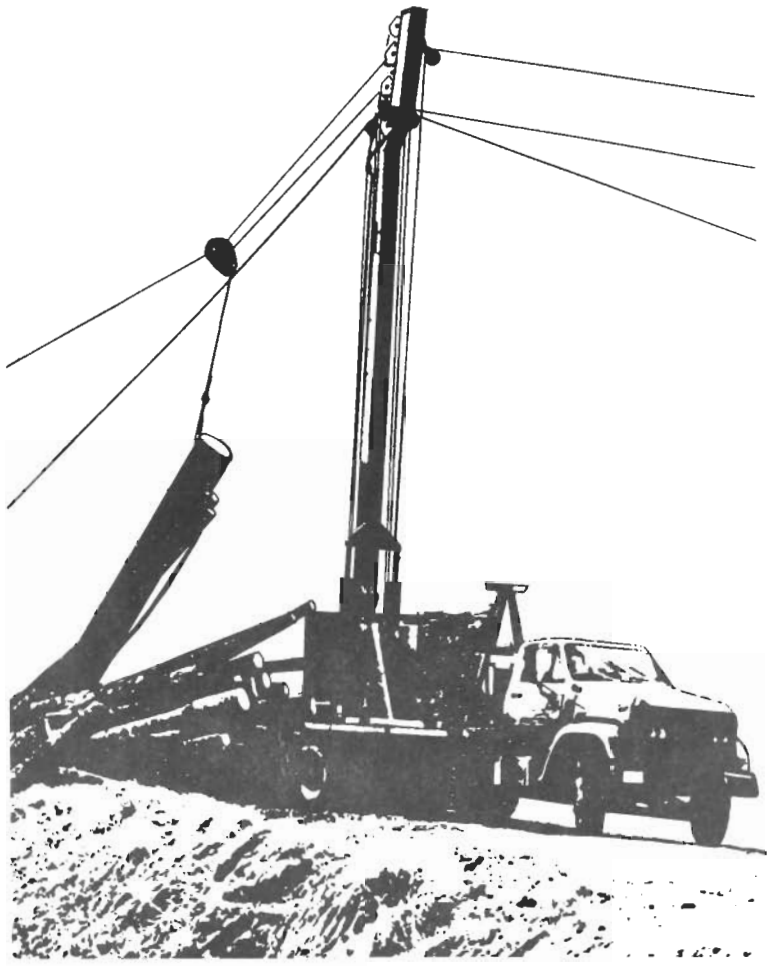


ED&T 8035
Cable Systems for
Forest Residues

May 1981

Contents

Introduction

The accumulation of fuels on forested lands, whether by natural causes or man's management activities, creates a potential fire hazard. Many of the most devastating forest fires known to this country started in or were accentuated by logging or thinning slash. Growing demands for wood make harvesting techniques and residues utilization imperative. Terrain and soils or small logs can make traditional yarding equipment too costly to use.

Engineers at the Missoula Equipment Development Center (MEDC) have developed the Clearwater Yarder, a small cable yarding system, to remove slash, dead or diseased timber, and small trees from steep, rugged terrain (fig. 1). Even where accessibility is aggravated by small volumes per acre, this yarder is economical because it is relatively inexpensive to build and can be rapidly set up (fig 2).

MEDC developed this yarder for the Clearwater National Forest in Idaho. Harry Cummings, fire management officer on the Canyon Ranger District, faced a difficult problem—reduce the fire hazard from slash on clearcuts that also contain new growth. Instead of destroying the slash—and new trees—by prescribed fire, he decided to yard out the dead wood. After an unsuccessful search for suitable equipment he came to MEDC with his idea and performance requirements for a yarder.

This operator's manual contains detailed instructions for the startup, operation, and maintenance of the Clearwater Yarder.

The three-drum yarder weighs only 13,000 pounds, yet can pull loads up to 3,500 pounds and has maximum line speeds of 1,000 feet per minute. It can operate on steep slopes and at yarding distances of 800 feet. Its design meets accepted logging industry safety practices.

Figure 1.—Clearwater Yarder.

Figure 2.—Operating Clearwater Yarder.

Features

- Designed to be built in small shops using standard parts.
- Design meets accepted logging industry safety practices.
- Live skyline.
- Easily mounted on a suitable flatbed truck or trailer.
- Uphill and downhill yarding up to 800 feet.
- Line speeds to 1,000 feet per minute.
- Each level-wind winch can be powered independently in both directions, free wheeled, or braked.
- Dual axis controller provides mainline and haulback interlock.
- Hydrostatic transmissions balance load and speed at maximum engine power.
- Remote control operation for safety, improved visibility, and minimum crew size.
- Slack pulling capability when operated with Christy carriage.
- Designed for rapid, simple setup.
- Mast hydraulically raised and lowered.

Specifications

Overall Weight:
13,000 lb fully rigged
Engine:
Ford industrial model LSG–633 P 6 cylinder, 200 cu in, 68 hp @ 2,800 rpm
Hydrostatic Transmission:
Dynapower pumps with Hagglund & Soner wheelmotors, 300 rpm maximum
Yarding Distance:
Up to 800 ft
Brakes:
Drum type, hydraulically operated
Skyline:
800 ft of ½-in cable
7,500 lb maximum line pull
0-500 fpm line speed
Mainline:
900 ft of 3/8-in cable
3,500 lb maximum line pull
0-1,000 fpm line speed
Haulback:
1,800 ft of 3/8-in cable
3,500 lb maximum line pull
0-1,000 fpm line speed
Mast:
10-in by 10-in by ½-in wall square tubing
170° fairlead swivel
Hydraulically raised and lowered
Control:
Remote up to 50 ft
12-volt dc electric over hydraulic

Throttle

Engine speed is controlled by a switch located on the remote control box (fig. 3). This control is a spring centering type toggle switch that allows incremental increases or decreases in the engine speed (rpm). The amount of increase or decrease in engine speed is determined by the length of time the switch is held in the respective position.

NOTE: Always idle the engine when power is not required, even if only for a few seconds. This will reduce fuel consumption and prevent heat buildup in the hydraulic oil. Normal hydraulic oil operating temperature should be 85° to 180° F.

Emergency Switch

The emergency switch is a pull type switch on the remote control box (fig. 3). It automatically sets all three winch brakes and stops the engine. A light inside the knob comes on when the emergency switch has been activated.

Note: Immediately after activating emergency switch, turn the engine ignition switch off and deactivate the emergency switch. Failure to do so can cause the coil wire to burn out and make the engine inoperable. The emergency switch is not for general use in applying the brakes and should be used only in case of emergency.

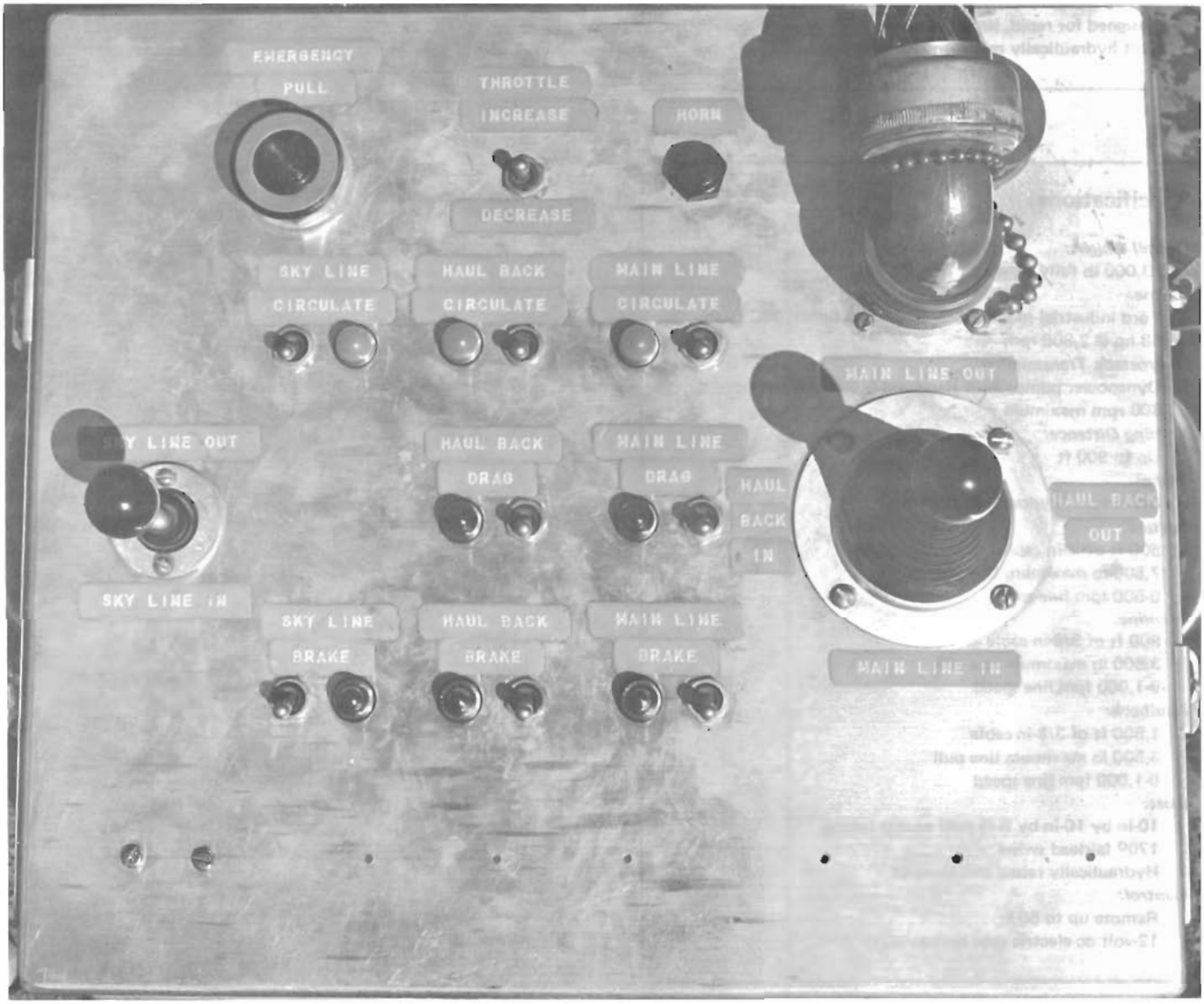


Figure 3.—Panel of remote control box.

Skyline Controller

The skyline winch is controlled by a single axis, stick type manual controller located on the remote control box (fig. 3). Moving the stick will either pull the skyline in or pay the line out. The center position is neutral. To prevent unnecessary pressure surges in the system, the control stick should be moved slowly when operating and not jerked to the limits of its travel.

If the winch drum rotates with the control in neutral and no load on the skyline. See Pump Actuator Linkage, page 12, for proper adjustment. This controller should not be moved from the neutral position when the brake or circulation mode is activated.

Mainline/Haulback Controller

The mainline and haulback winches are controlled by a dual axis joy-stick type manual controller located on the remote control box (fig. 3). This allows both winches to operate at the same time in the same direction or in opposite directions. Each winch can also be operated separately. Moving the stick will either pull the line in or pay the line out. The center position is neutral. This controller should be moved slowly when operating and not jerked to the limits of its travel to prevent unnecessary pressure surges in the system.

If the winch drum rotates with the controller in neutral and no load on the line, see page 12 Pump Actuator Linkage for proper adjustment. The controller should not be moved from neutral for a specific winch system if that system brake or circulation mode is activated.

Brake

Each winch brake is controlled by an on/off toggle switch on the remote control box (fig. 3). Turning the switch on releases the hydraulic pressure and allows the spring-loaded brake cylinder to apply the brake. Turning the switch off allows hydraulic pressure to compress the spring and release the brake. An amber light indicates when each brake is on. To reduce the potential for damage to the skyline hydraulic system when the skyline brake is realeased under heavy load, an adjustable flow control valve was placed in the skyline hydraulic brake circuit. See *Skyline Brake Release Interval,* page 14, for adjustment procedures.

Failure to adjust the skyline brake flow control valve properly may damage the components in the hydraulic system.

Circulation Mode

Each winch has a circulation mode that is activated by an on/off switch on the remote control panel (fig. 3). Activating the circulation mode allows the winch drum to turn without any hydraulic resistance so the line can be pulled out by hand. Turning the switch off puts the system back into normal operation. A white light comes on when a system is in the circulation mode.

To prevent damage to the hydraulic system when shifting out of the circulation mode, a flow-control valve was added to the shifting circuit and a dynamic braking circuit was added. See *Circulation,* page 12, for system adjustments.

Never shift from the circulation mode to normal operation while the winch drum is turning. Always brake the drum to a complete stop before shifting. Failure to adjust the flow-control valve and dynamic breaking system may damage the hydraulic system.

Drag Mode

The mainline and haulback winches have a drag mode that is controlled by individual on/off toggle switches on the remote control panel (fig. 3). Blue lights on the panel indicate when a system is in the drag mode. This mode allows cable to be payed out with varying degrees of resistance or drag. The drag is especially useful in keeping lines taut. The amount of drag is controlled by the pressure set on the low pressure relief valve. See *Drag,* page 12, for proper valve adjustments.

Do not activate or deactivate the drag mode while the drum is rotating as this could damage the system. Always brake drum to a complete stop before shifting.

Horn

A push button for activating the horn is on the remote control box (fig. 3). The horn can be used for signaling between the yarder and the choker setters.

Oil Cooler Fan

The hydraulic oil cooler fan control is a lever-operated directional valve located next to the oil reservoir (fig. 4). Normally the cooler fan should be turned on when the oil temperature reaches approximately 140° F. The temperature gage is on the side of the hydraulic reservoir.

Do not operate the yarder at hydraulic oil temperatures over 180° F.

Mast Raising/Lowering Control

A lever-operated directional control valve located near the hydraulic oil reservoir is used to raise and lower the mast (fig. 4). It is a three-position valve. The center position is the stop position. Moving the lever from the center position either raises or lowers the mast. The mast can be stopped in any position by moving the lever to the center "stop" position. A pressure gage is located in the mast/raising and lowering circuit (fig. 4). The pressure required to raise the mast is approximately 2,000 to 2,500 psi. **Note**: This directional valve is a spring centering type. However, under the high pressure generated when raising or lowering the mast, it must be manually moved to the stop position. This is especially important when the mast reaches the limits of its travel in either the up or down position. If it is not immediately moved to the stop position, it will cause undue stress in the raising/lowering mechanism.

Be familiar with the procedure for raising and lowering the mast before attempting to do so. See Raising and Lowering Mast, page 8.

Figure 4.—Fan and mast controls.

Start Up Procedure

1. Check hydraulic oil level in reservoir. Oil should be at the "full" line on the sight gage. (Use Dexron II type hydraulic oil.)

2. Open completely all three gate valves in the charge pump suction lines between the tank and the pump (fig. 5).

3. Check engine oil, water, and fuel levels. If necessary, fill according to the engine manufacturer's operator's manual.

4. Disengage clutch.

5. Turn engine ignition switch on and start engine. Allow engine to warm up briefly before engaging the clutch. (For more detailed starting instructions see engine manufacturer's maintenance and operator's manual.)

6. Immediately after engaging clutch, check all three charge pump pressure gages (fig. 5) and the back pressure gage located in the hydraulic return line. The charge pump pressure should read greater than 100 psi at engine idle (fig. 5). **Note:** If no pressure is indicated in any one of the three systems, immediately disengage the clutch and repeat steps 1 and 2. Charge pump pressures less than 100 psi would indicate a charge pump malfunction.

The back pressure in the hydraulic return line should not exceed 30 psi. If the back pressure gage is indicating 30 psi or more, reduce the engine speed and allow the hydraulic oil to warm up to approximately 85° F before increasing engine speed or attempting to operate the yarder. The temperature gage is on the side of the hydraulic reservoir.

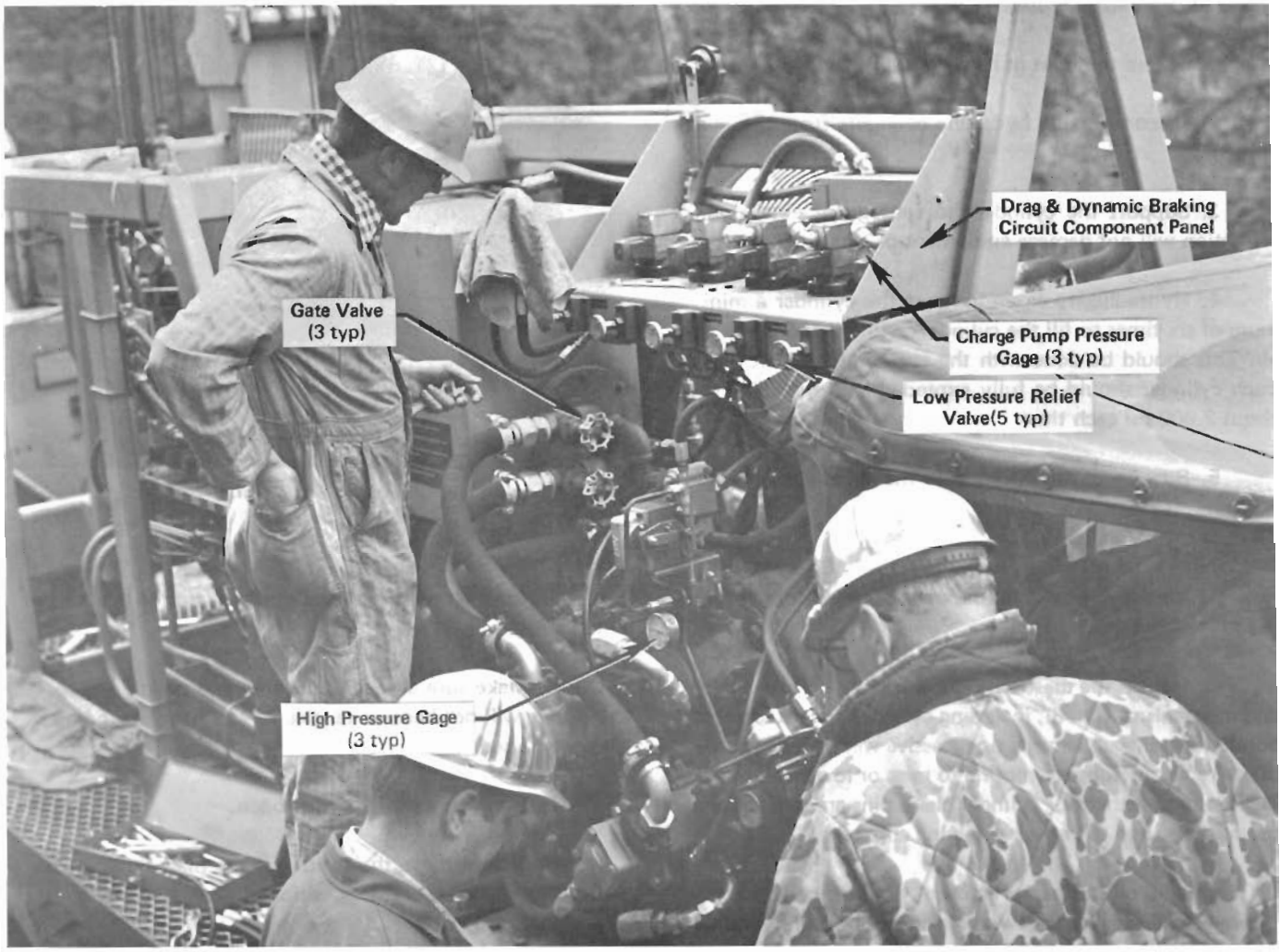


Figure 5.—Drag and circulation system.

Operating the system without charge pump pressure will damage the main pump. Operating the yarder at a return pressure (back pressure) greater than 30 psi will damage the hydraulic motor shaft seals. High return pressure can be caused by operation of the system at a hydraulic oil temperature.

Raising and Lowering Mast

Do not attempt to raise or lower the mast without first insuring that the hydraulic cylinders attached to the mast are free of air and full of hydraulic oil. This is especially important if the system has not been raised for a long time, that is, 30 days, or if the hydraulic oil has been lost or removed from the system for any reason.

To fill the hydraulic cylinder:

1. Secure the mast in its current positon.

2. Disconnect the hydraulic cylinders from the mast (fig. 6).

3. Support the cylinders so subsequent extension/retraction will not damage equipment or personnel.

4. Hydraulically extend/retract the cylinder a minimum of six times to fill the cylinders with oil and purge any air. This should be done with the engine at full throttle. Each cylinder should be fully extended and pressurized to about 2,000 psi each time.

5. Reconnect the cylinders to the mast.

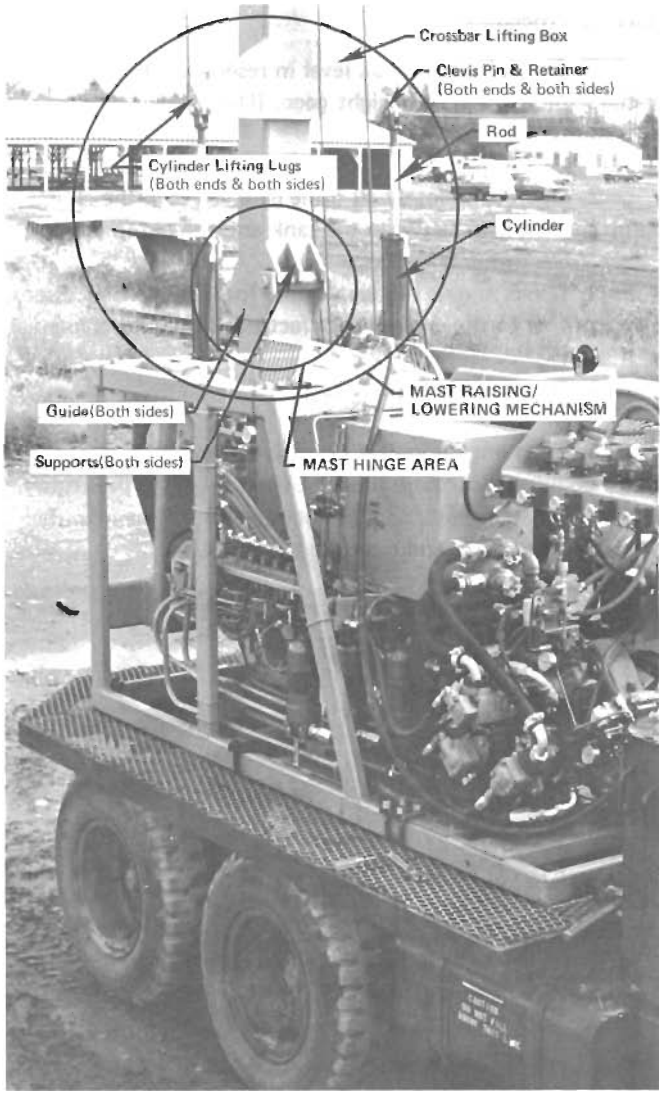


Figure 6.—Mast raising/lowering mechanism.

To raise the mast:

1. Yarder must be approximately level before attempting to raise the mast.

2. Inspect the mast raising/lowering hydraulic system and mechanisms (fig. 6), including cylinder and attachment points for leakage, damage, or excessive wear. Make appropriate repairs before attempting to raise or lower the mast. Make sure that the four cylinder clevis pins are in place and properly secured with their retaining clips.

If hydraulic oil has been removed, drained, or if parts have been removed, follow the procedure to fill hydraulic cylinders before continuing.

3. Clear all personnel and obstacles out of the path of mast's rotation.

4. Make sure all cables are free and positioned so that they will not become tangled or caught while the mast is being raised.

5. Set engine throttle wide open.

6. Slowly move the handle of the mast directional valve (fig. 4) to the "raise" position.

Check the mast lowering speed for proper operation each time the mast is raised. This is accomplished by stopping the mast after it is about 6 inches above the mast cradle and observing the time required to lower the mast back to the cradle. If the mast lowers much faster than it raises, check the system for leaks or damaged parts.

7. When the mast is fully up, move the lever to the "stop" position immediately to prevent undue stress in the raising mechanism.

8. Secure the mast in the upright position by securing the three bolts opposite the hinge pin (fig. 7).

9. Secure all four guylines and make sure each anchor is adequate.

Important. The minimum distance between each guyline's anchor and the mast shall be 50 feet, or the angle between a horizontal line from the anchor to the mast and the guyline shall be less than 35^{o}. The rear guyline shall be in line and opposite to the skyline. The forward guyline should be located under and slightly off to the side of the skyline to allow passage of the carriage. The side guyline shall be on each side and rearward of the mast.

The completed guyline anchoring system should look like a chicken's foot when viewed from above.

Figure 7.—Secure mast.

10. Plumb the mast using the pointers provided on the mast (fig. 8). This is accomplished by tightening the appropriate guyline.

To lower the mast:

1. Inspect mast hydraulic system as in Step 2 for raising the mast.

2. Release all guylines and check to see that all cables are free and positioned such that they will not become tangled or caught while the mast is being lowered.

3. Clear all personnel and obstacles out of the path of rotation of the mast.

Figure 8.—Plumb mast.

4. Set engine throttle wide open and momentarily move the mast directional valve handle to the "raise" position until approximately 2,000 psi is read on the hydraulic system pressure gage, then move handle to the "stop" position.

This step is used to check the functioning of the hydraulic system; if the system cannot develop 2,000 psi, check for leaks or damage and make necessary repairs. Then follow the procedure for filling the hydraulic cylinders before continuing.

5. Remove the three bolts opposite the mast hinge pin (fig. 7).

6. Move the mast directional valve lever to the "lower" position, and hold until the mast contacts the cradle. The mast can be stopped at any time by moving the lever to the "stop" position. However, this is not recommended because of shock loads.

7. Immediately after the mast is resting in the cradle, move the lever to stop position to prevent undue stress from building up in the mechanism.

8. Secure all lines to the yarder.

Adjusting Line Pull

Maximum line pull is determined by the maximum hydraulic pressure available. The maximum hydraulic pressure in the skyline, mainline, and haulback hydraulic circuits is determined by the pump high pressure relief valve setting. These high pressure relief valves must be adjusted so the bare drum line pull cannot exceed 7,500 pounds for the skyline and 3,500 pounds for the mainline and haulback winches.

Failure to adjust the high pressure relief valve will allow the winches to exceed line pull specifications and overload the cable, causing it to break prematurely.

To adjust the bare drum line pull for the respective system, a dynamometer or other suitable device that can accurately measure line tension must be used. The hydraulic oil must be at about 100° F and the engine running at full throttle: 2,800 rpm. The line pull is adjusted as follows:

1. Secure all four guylines to adequate anchors and remove all of the cable except about one-half of the first layer on the winch drum.

2. Secure the dynamometer to the end of the cable and to a suitable anchor.

3. Loosen the locking nut on the high pressure adjustment screw (fig. 9). (The relief valve adjustment screw is on the side of the pump opposite the high pressure outlet connection.)

4. With the engine at full throttle, slowly move the manual controller to bring the line in.

5. Observe the dynamometer reading and adjust the relief valve until the desired line pull is obtained (7,500 pounds for the skyline winch and 3,500 pounds for the mainline and haulback winches).

6. Tighten the relief valve locking nut and repeat steps 4 and 5 several times to verify the value of line pull.

7. Note this system hydraulic pressure at maximum line pull and record this pressure. It can be used in the future to verify the setting of the relief valve.

Any time the relief valve is disassembled for maintenance or the valve adjustment has been altered for any reason, repeat the above adjustment procedures.

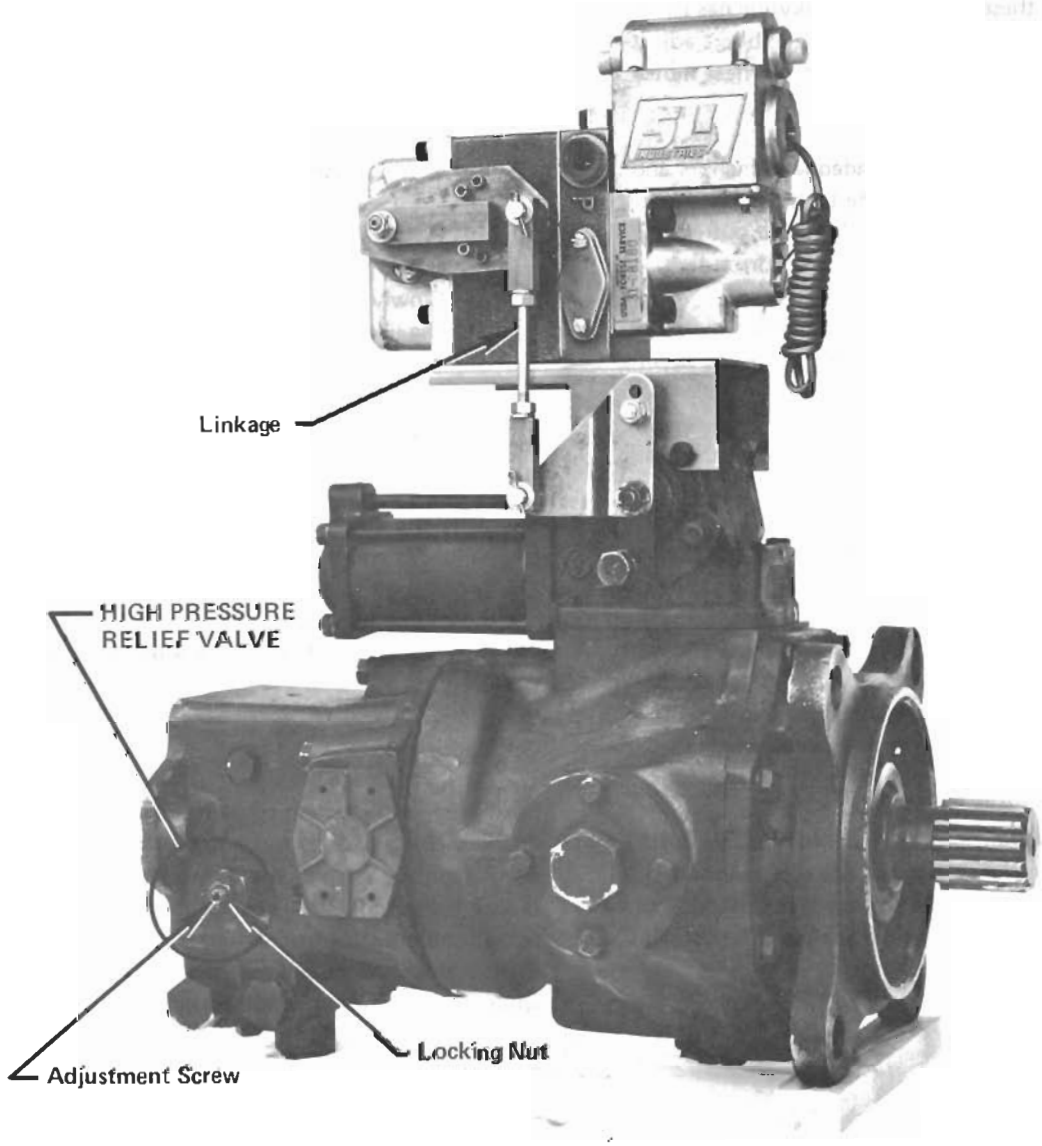


Figure 9.--Pump and controls.

Adjusting Skyline Brake

The skyline winch brake must be adjusted so it will slip if a high load is accidentally introduced into the skyline cable. The brake should be adjusted so that it will slip when the cable load slightly exceeds the maximum line pull of 7,500 pounds.

Failure to adjust the skyline winch brake properly may result in line loads that overload the cable and may cause it to break. In addition, the excessive load may damage other components.

The following procedure can be used to adjust the skyline winch brake. Follow these steps after the skyline has been adjusted for maximum line pull and the initial brake adjustment has been made in accordance with the wheel motor instructional manual.

1. Secure all four guylines to adequate anchors and secure the skyline cable to an adequate tailhold. (This adjustment must be performed with all of the cable out except about one half of the first layer on the winch drum.)

2. With the engine at full throttle and the hydraulic oil temperature at approximately 100° F, move the skyline controller to bring the cable in.

3. When maximum line pull is obtained, set the brake.

4. Adjust the brake adjuster screw until the brake starts to slip, then turn the screw to tighten the brake by one notch.

5. Release the brake and repeat the procedure to make sure that the brake will hold. If it does not, tighten the brake adjuster screw in one-notch increments until it holds. (The brake adjustment is the same as those found on cars with drum brakes.)

6. The brake should be checked occasionally during normal operation to make sure it will not slip under heavy line load and adjusted as indicated above if necessary. This procedure must be repeated any time the brake adjustment has been changed for any reason.

Pump Actuator Linkage

If any winch drum rotates more than 2 rpm with its controller in neutral, its brake off, and no load on the cable, adjust the linkage (fig. 9) between the pump actuator (SLI part PCS-600) and the pump low pressure servo control (Dynapower part 892629). Follow the procedure in the pump actuator installation and service manual.

Drag

The amount of drag for each drag circuit is adjusted initially by opening the low pressure relief valve one-half turn (fig. 5). This should give a drag pressure for the mainline and haulback of approximately 400 psi and can be checked for each system by:

- Setting the brake
- Setting engine at fast idle
- Activating the drag mode switch
- Slowly moving the manual controller to bring the line in
- Observing the system high pressure gage, and adjusting the low pressure relief valve to give the desired drag pressure (400 psi)

Normally the amount of drag practical will be determined by the load it creates on the engine.

If the engine lugs down considerably when the drag is in use, reduce the drag low pressure relief valve setting slightly.

Circulation

Each circulation system contains a flow control valve (fig.10) in the shifting circuit, and a low pressure relief valve and a flow control valve in the dynamic braking circuit. These reduce the potential for damage to the hydraulic system due to hydraulic slack loads should the system accidentally be shifted from the circulation mode to normal operation while the winch drum is still turning.

Figure 10.—Typical flow control valve.

The initial setting for the flow control valves in the shifting circuits of the skyline, mainline, and haulback systems is approximately one complete turn open. This should provide a 1-second shifting interval for each system and can be checked by the following procedure:

With the hydraulic system at operating temperature (about 100° F), the engine at idle and the brake set:

- Activate the circulation mode; at this time, the hydraulic oil can be heard flowing through the motor valve body.
- Deactivate the circulation mode and measure the time that the oil is heard flowing through the motor valve body. This is the shifting interval.
- Repeat the procedure and adjust the flow control valve for each system until a 1-second shifting interval is obtained.

The dynamic braking circuit was added to the main pump relief valve section and also contains a flow control valve (fig. 10) that controls the amount of time the low pressure relief valve (fig. 5) can relieve any high pressure surges that may develop in the system when shifting. This flow control valve should be adjusted for a 3-second dynamic braking interval, and the low pressure relief valve adjusted for a dynamic braking pressure of approximately 800 psi.

In each dynamic braking circuit the initial setting for the flow control valve is one-sixteenth of a turn open. For the low pressure relief valve the setting is approximately one-quarter turn open. Settings can be checked by the following procedures:

Dynamic braking pressure—With the hydraulic system at operating temperature, the engine at fast idle and the brake set:

1. Activate the circulation mode for a system.
2. Slowly move the respective controller to the "in" direction until no increase in the high pressure gage reading is observed. Stop movement and hold the controller in this position. *This pressure is the dynamic braking pressure.*
3. Adjust the low pressure relief valve to produce a dynamic braking pressure 800 psi, then release the manual controller.

Dynamic braking interval—With the hydraulic system at normal operating temperature, the engine at fast idle, and the brake set:

1. Activate the circulation mode for a system.
2. Set the respective controller slightly past the point that causes pressure to reach the dynamic breaking pressure of 800 psi.
3. Place the circulation mode switch in the "off" position and measure the time between switch off and when the system pressure starts to increase above the dynamic braking pressure. *This time is the dynamic braking interval and should be approximately 3 seconds.* If it is not, adjust the flow control valve and repeat the procedure.

Skyline Brake Release Interval

The skyline brake hydraulic circuit has a flow control valve that controls the brake release time, and thus the rate at which heavy skyline loads can be released and the energy absorbed by the hydraulic system. This valve regulates oil flow and allows the brake to release slowly. It should be adjusted so there is a 3-second interval between switch off and when the brake is actually released. The initial setting is approximately one-sixteenth of a turn open. To check this setting use the following procedure:

With the hydraulic system at normal operating temperature, engine at fast idle, and the skyline brake set:

1. Position the skyline manual controller so the system high pressure gage reads approximately 2,500 psi.

2. Move the brake switch to the "off" position.

3. Measure the time from brake switches off until the pressure starts to drop. This is the brake release interval and should be approximately 3 seconds. If it is not, adjust the flow control valve and repeat the procedure.

If a knocking sound is heard in the skyline hydraulic system when the brake is released while the skyline is bearing a heavy load, readjust the flow control valve so that it allows a longer time interval, even if the interval has been set at 3 seconds. Failure to adjust the system properly may result in damage to components in the hydraulic system.

Lubrication

Table I—Lubrication Chart

	50 hours or weekly[8]	100 hours or biweekly[8]	250 hours or monthly[8]	As required
Guyline winch bushings (two fittings each winch)[1]			X	X
Skyline, mainline, haulback, winch drum bearings (one fitting each drum)[1]	X			
Fairlead sheaves (one fitting each sheave)[1]	X			
Guyline sheave (one fitting each sheave)[1]		X		
Mast hinge pin (two fittings)[1]			X	
Clutch (one fitting)[1]	X			
Engine oil and filter[2]		X		X
Engine air filter[2]		X		X
Engine fuel filter				X
Gear box[3]				X
Hydraulic oil[4]				X
Hydraulic oil filter[5]				X
Hydraulic pump control linkage[6]		X		
Guyline rachet assembly[6]				X
Hydraulic pump activator filter[7]				X

[1] Use a good grade multipurpose molybdenum disulfide grease.

[2] Use a good grade multiviscosity SAE 10W-40 oil, or, in the case of dry type air cleaner, replace element.

[3] Use a multipurpose gear lubricant type API-GL-4-90W, and change only if contaminated.

[4] Use Dexron-II automatic transmission fluid. Change only when oil is contaminated or smells burnt. Remove the drain plug from the hydraulic oil reservoir and drain any collected water from the tank each season.

[5] Change only when the filter indicator indicates a change is necessary or if the hydraulic system has been opened up for major repairs or inspection. (After major repairs or inspection operate the unit approximately 40 hours and change filters again.)

[6] Use a light lubricating oil (engine oil).

[7] Clean filter when and if pump controls seem sluggish. See pump activator installation and service manual for procedure.

[8] Whichever comes first.

Inspection

All welds and structures subjected to high stress should be inspected weekly. These areas are:

- Mast raising/lowering mechanism, including the crossbar lifting box and its attachment welds, cylinder lifting lug (both ends), and the cylinder (rod, clevis, and pins) (fig. 6)
- Mast hinge area (fig. 6)
- Fairlead assembly and attach points (fig. 11)
- Guyline sheave block attachment lugs (fig. 11)
- Mast-to-frame welds
- Main winch support brackets and supporting structure (fig. 12)
- Mast area in general

The inspection should consist of a visual inspection of all welds for cracks or breaks, bent or deformed components and structures, and loose or missing nuts, bolts, pins, and their retainers. This inspection should be accomplished not only weekly but any time the yarder is subject to shock loading such as falling trees across tensioned skyline, skyline or guyline breaking under heavy load or skidding logs into the unit, and other similar situations.

Any time cracked or broken welds, bent or deformed components or structures, or missing components are detected, shut down the yarder immediately, determine the cause of the problem, make corrections and repairs. All welding should be done by a certified welder.

The operator must always be observant of the structural condition of the yarder.

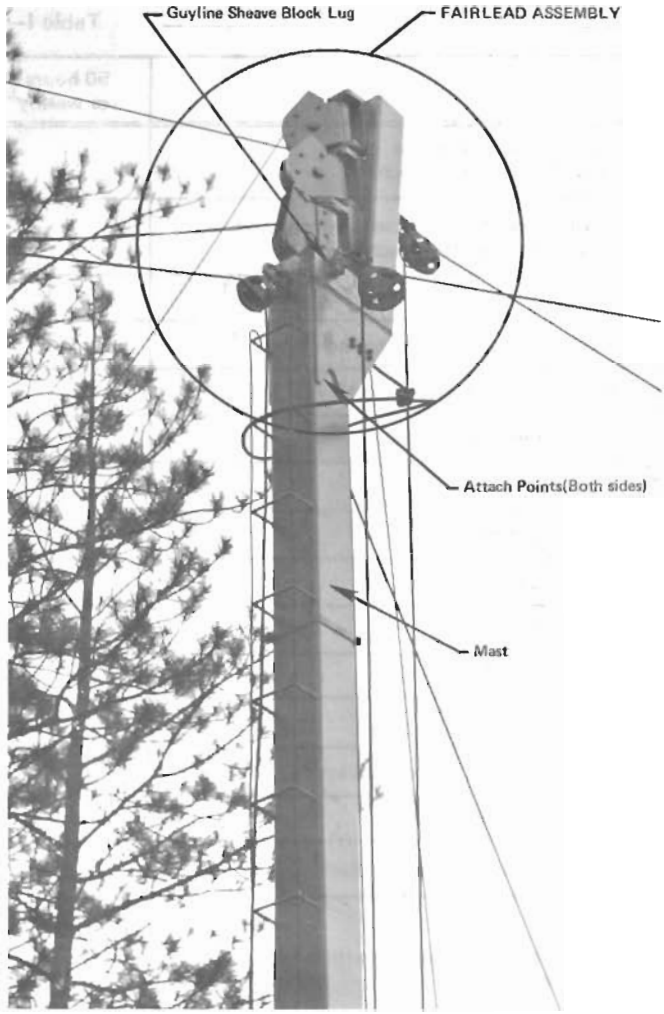


Figure 11.—Fairlead assembly.

Figure 12.—Winch support brackets.

1. Do not operate the system at full throttle until the hydraulic system oil temperature reaches a minimum of 85° F or until the hydraulic system return pressure does **not** exceed 30 psi. To heat the oil, operate the engine at a fast idle with the clutch engaged, the hydraulic oil cooler fan "off," and all brakes "on."

2. Do not operate the yarder when the hydraulic oil temperatures exceed 180° F.

3. Do not move the yarder with the mast in the raised position. Hidden changes in the ground surface condition, obstacles, or soft ground could cause the yarder to tip over, damaging the unit.

4. Do not attempt to lift or hold a load completely off the ground with the skyline when yarding. The buildup in the line tension could cause the skyline to break. The skyline should be tight enough to lift (lead) the end of the log only. If it appears the log is going to be fully suspended at any time, lower the skyline. If the skyline span is quite long, intermediate supports may be necessary to provide sufficient lead for the log.

5. Check the condition of guyline anchors and the tightness of the guylines frequently. If any anchor shows signs of pulling out, select another anchor. If the guylines are loose, tighten them and then replumb the mast. If the top of the mast moves noticeably when a load is applied, it usually indicates a guyline to too loose and should be tightened immediately.

6. When raising or lowering the mast, clear all personnel and obstacles from the path of the mast's rotation.

7. Operate yarder's remote controls from a position near the yarder but clear of the mast guylines and moving logs. The complete yarding operation must be in view at all times.

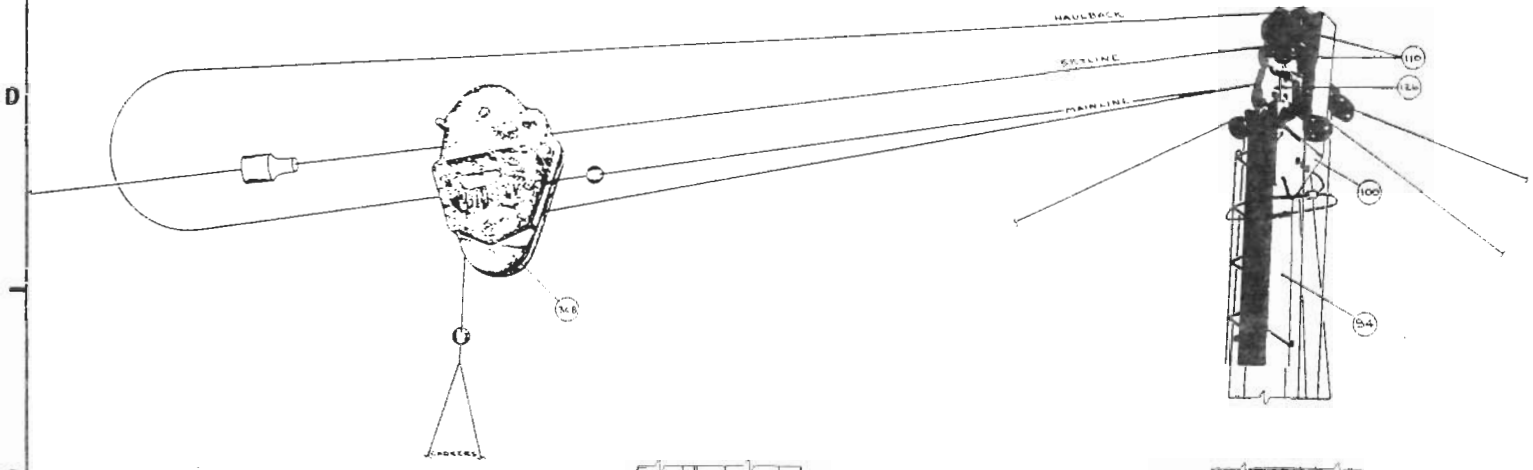
8. At maximum engine speed, only small movement of the manual controller from the neutral (center) position is required to produce maximum line pull.

9. To prevent hydraulic oil from draining out of the reservoir when working on the hydraulic system, close the gate valve in the pump suction line. To prevent siphoning, loosen a fitting at the return filter. Open valve and tighten fitting before operating system.

10. When power is not required from the yarder, idle the engine to prevent excess heat buildup in the hydraulic oil and to conserve fuel.

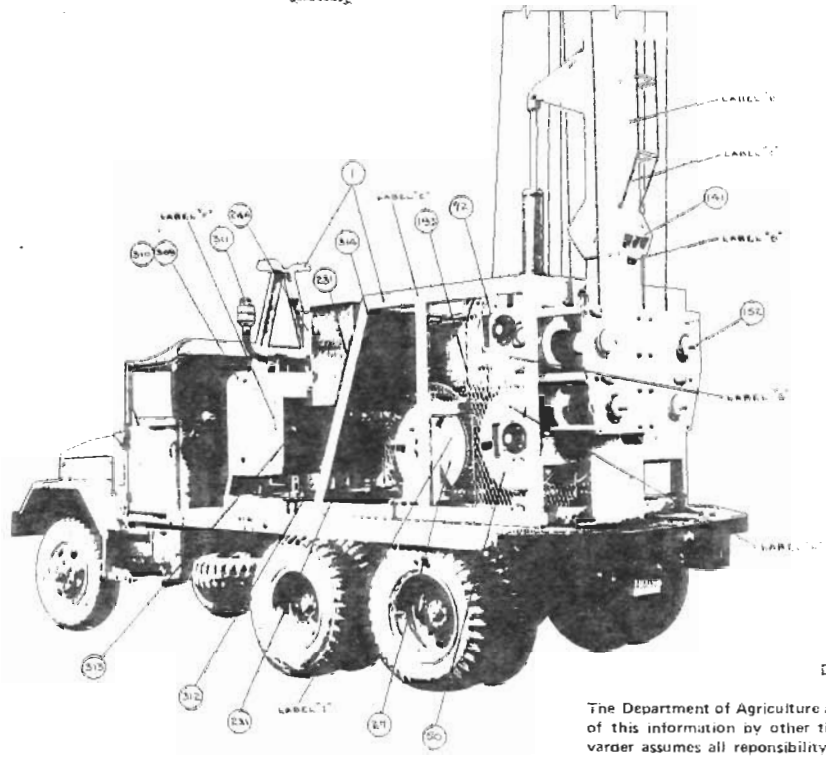
11. When winches are not in use, the brakes should be "on."

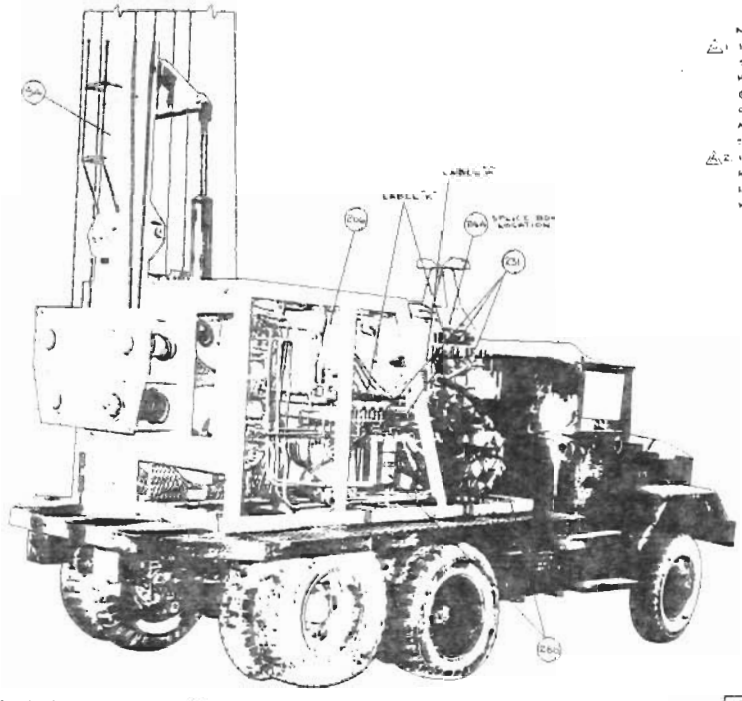
12. Do not climb mast without the use of a climbing belt.



MATERIALS LIST

NO	PART NAME	REQD	MATERIAL - DESCRIPTION	SHEET
1	FRAME & MTR MT	1	PARTS 2 - 26	2
27	HAULBACK WINCH	1	" 28-49	3
50	MAINLINE "	1	" 51-71	4
72	SKYLINE "	1	" 73-93	5
94	MAST ASSY	1	" 95-102, 328, 329	6
100	" MD ASSY	1	" 101-140	7
110	STANDARD FAIRLEAD	2	" 111-125	8
126	WIDE "	1	" 127-140	9
141	MAST HINGE ASSY	1	" 142-151, 325	10
152	GUYLINE WINCH "	1	" 153-181, 328	11
195	SIDE GUARD "	1	" 194-206	12
206	HYDRAULIC TANK	1	" 207-230	13
231	BRACKET ASSY	7	" 232-245, 315-327	14
246	ELECTRICAL SYSTEM	1	" 245-278	15
280	HYDRAULIC "	1	" 281-307	16
308	CARRIAGE	1	CHRISTY-MODIFIED FOR SLACK LINE PULL 160 M	
⚠ SEE NOTE 1 - 309	ENGINE	1	FORD 192 CID GASOLINE, MOD 192GF W/ # 4 SAE	
			FLYWHEEL HOUSING, 4 CYL, 58 BHP @ 2800	
			RPM, 127 LBS-FT TORQUE @ 1700 RPM	
⚠ SEE NOTE 2 - 310	PUMP DRIVE	1	PUNK MOD 28215 TRIPLE HYDRAULIC DRIVE W # 4	
			SAE CLUTCH COVER HOUSING # 28193 (8" PUMP	
			DRIVE CLUTCH W TDC-110, 1.048:1 RED RATIO	
			W/ # 28050 PINION & 28046 GEAR, 3 SAE "O"	
			PUMP ADAPTOR FLANGES # 28007	
311	MUFFLER	1	GILL # 5CVED W/CAP REQ, SPARK ARRESTOR TYPE	
312	BATTERY	1	12 VDC W/WEATHER TIGHT BOX & MOUNTING FRAME	
313	FAN GUARD	1	1/2" NO 16 EXPANDED METAL W/FRAME	
314	COIL "	1	" " " "	





NOTES:

⚠1 ITEM 309 MAY BE SUBSTITUTED WITH FORD MOD 256 & 352 SHEET METAL COVERED ENGINE WITH # 4 SAE FLYWHEEL HOUSING, 200 CID 6 CYL, 68 BHP @ 3800 RPM 130 LBS-FT TORQUE @ 1800 RPM. INSTALLATION OF THIS POWER UNIT WILL REQUIRE CHANGES IN MOTOR MOUNT ASSY, THROTTLE LINKAGE ACTUATOR ASSY, & POSSIBLY OTHER MINOR CHANGES NOT SHOWN IN THESE DRAWINGS PLUS A FUEL TANK.

⚠2 ITEM 310 NO LONGER MANUFACTURED WITH 1.048:1 REDUCTION RATIO & # 28050 PINION & # 21046 GEAR. 1:1 RATIO IS AVAILABLE WITH # 59015 GEARING NO CHANGES HAVE BEEN MADE IN OTHER DRIVE NOMENCLATURE.

Disclaimer ⚠

The Department of Agriculture assumes no responsibility for interpretation or use of this information by other than its own employees. Anyone fabricating this yarder assumes all reponsibility and liability as the designer and manufacturer. The Department of Agriculture or its employees cannot be held liable for any damage or injury incurred from operation of said yarder. The decision to build the yarder or a similar machine from these specifications and drawings is entirely up to the individual/company. Subsequent fabrication does not imply receiving yarding contracts from the government.

Fabrication of a yarder from these drawings does not relieve the manufacturer from the responsibility of preparing an operator and maintenance manual prior to any operational use.

	DATE	REVISION	BY
⚠	11	ADDED DISCLAIMER	"
	11-80	ADDED NOTES 1&2	LOWRY

TOLERANCES:
FRACTIONS ± ____
DECIMALS ± ____
ANGLES ± ____

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA, MONTANA

DRAWN W.H. WYATT
DESIGNED
CHECKED
APPROVED
SCALE NONE
DATE OCT-79

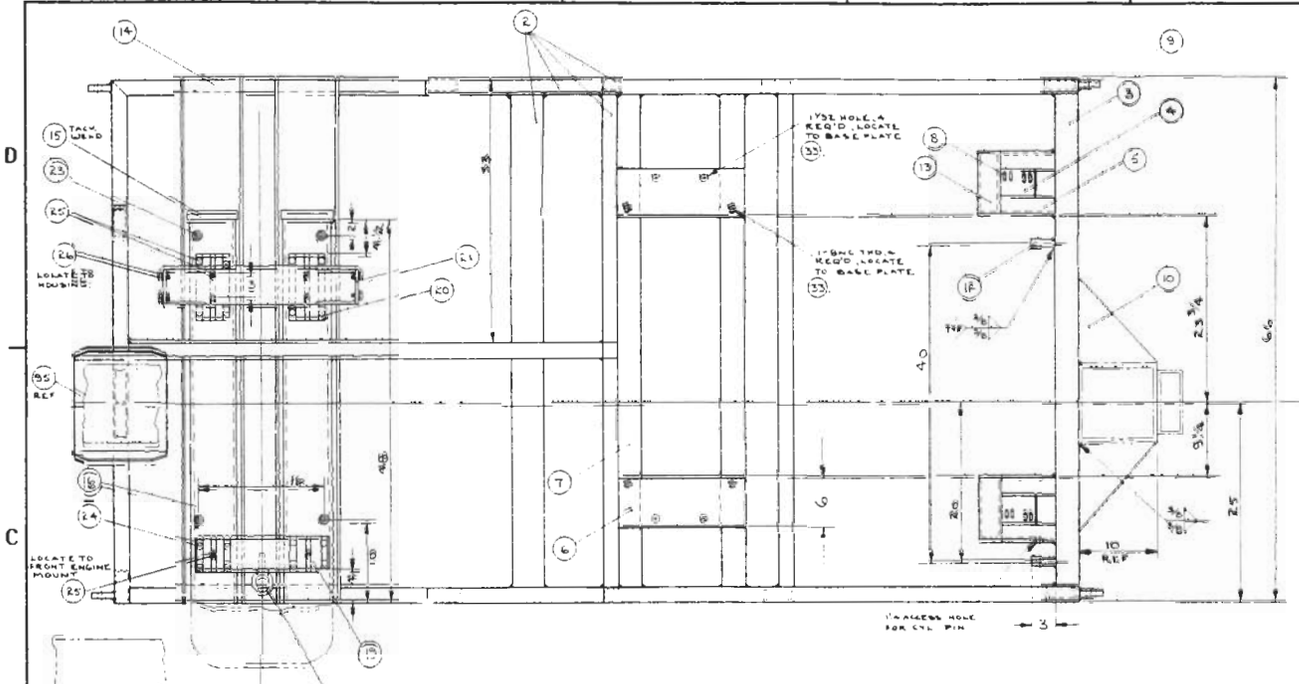
TITLE
CLEARWATER YARDER

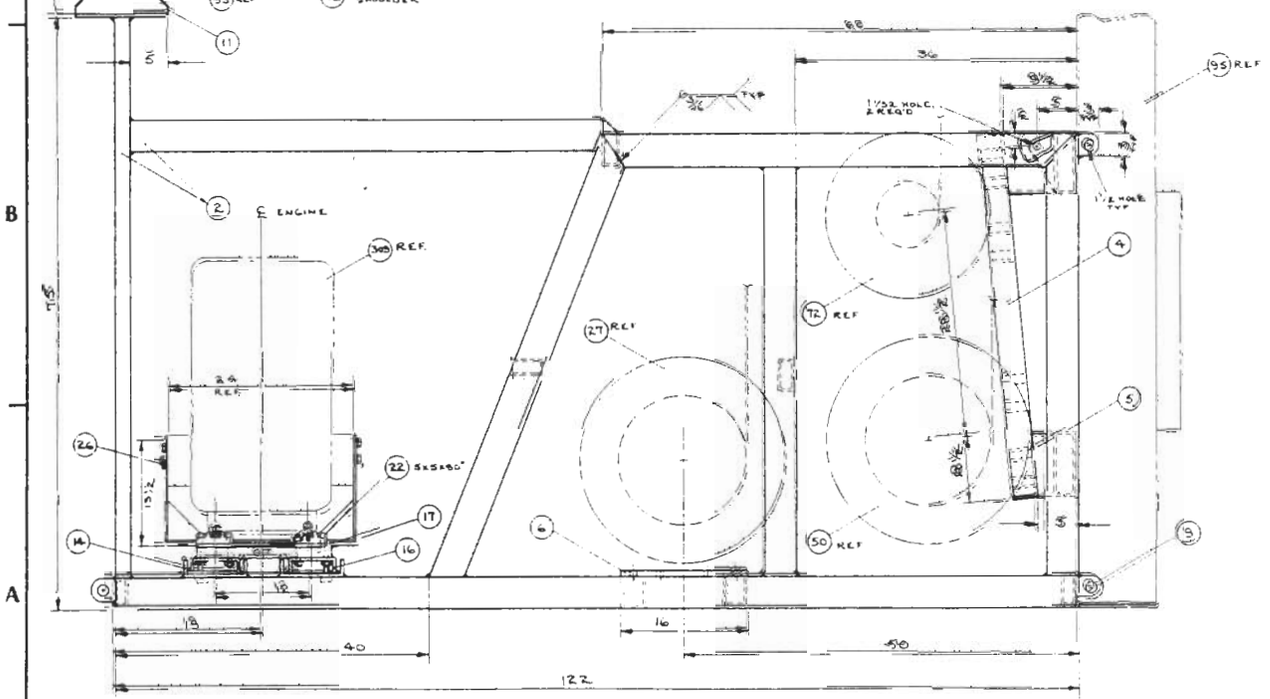
SHEET 1 OF 17

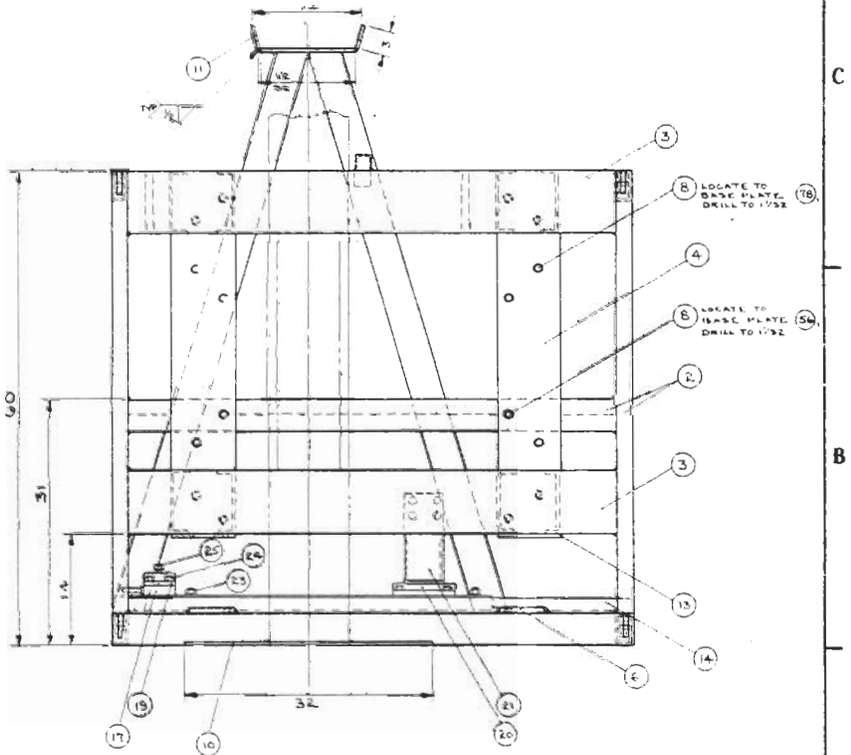
MEDC-637-A

MATERIALS LIST

NO	PART NAME	REQD	MATERIAL-DESCRIPTION	SHEET
1	FRAME/MTR MT	1	PARTS 2-26	
2	MAIN FRAMING	AR	2 X 4 X 1/4 WALL TUBING, STEEL (ASTM-A36 GRDE)	
3	MAST SUPPORT	2	3 X 8 X 3/8 " " "	
4	WINCH "	2	" " " " "	
5	" "	8	8 X 13.75 CHANNEL, STEEL	
6	" "	2	3/16 PLATE, STEEL	
7	" "	2	3 X 4 X 1/4 WALL TUBING, STEEL	
8	" BUSHING	16	2.00 X 1/2 WALL TUBING STEEL	
9	LIFTING LUG	6	1 PLATE, STEEL	
10	MAST BASE	1	1/8 " "	
11	" HOLDER	1	" " "	
12	CYL LUG	2	1 PLATE "	
13	CAP	4	1/4 " "	
14	GUIDE	2	8 X 13.75 CHANNEL, STEEL	
15	STOP BLOCK	2	1/2 PLATE, 1 WIDE X 6 1/2 LG, STEEL	
16	RAIL	2	6 X 13.0 CHANNEL, STEEL	
17	SPACER	1	1 3/8 X 2 WIDE X 17 LG FLAT BAR, STEEL	
18	EYE BOLT	1	MCMASTER CARR # 3013T18 OR EQ 1 1/2 I.D EYE	
19	MOUNT	2	LORD # J-2172-1 TYPE I CHANNEL MOUNT	
20	"	2	" # J-2173-1 " "	
21	BRACKET MOUNT	1	3/8 X 5 FLAT BAR, STEEL	
22	GUSSET	4	" " "	
23	BOLT	4	1/2 ONE X 3 LG HEX HD CAP SCREW W/ NUT & LOCK WASH	
24	BOLT	8	5/16-18 X 3 LG " " "	
25	BOLT	14	3/8-16 X 1 1/2 LG " " "	
26	BOAT	8	5/8-11 X 1 LG " " "	







(1) FRAME & MOTOR MOUNT

WELDED CONSTRUCTION
ALL WELDS 1/4 FILLET UNLESS SPECIFIED
SPECIFIC WELDS NOTED

This is a REDUCED PRINT, full size print available upon request.

TOLERANCES: FRACTIONS ± 1/16, DECIMALS ±, ANGLES ± 1°0'	U.S. DEPT. OF AGRICULTURE FOREST SERVICE EQUIPMENT DEVELOPMENT CENTER MISSOULA MONTANA
DRAWN W. K. LYNATT	TITLE: CLEARWATER YARDER FRAME & MOTOR MOUNT
DESIGNED CLUSTER	
CHECKED KARSKY	
APPROVED	
SCALE 3/8	
DATE OCT-79	SHEET 2 OF 17 — MEDC-637-A

(27) HAULBACK WINCH

WELDED CONSTRUCTION
ALL WELDS 3/16 FILLET UNLESS SPECIFIED
SPECIFIC WELDS NOTED

← MAST

FLANGE & END CAP DETAIL
SCALE 1" = 1 1/2

NO	PART NAME	REQD	MATERIAL DESCRIPTION	SHEET
27	HAULBACK WINCH	-	PARTS 28-49	
28	BRAKE CYL	1	HAGGLUND TYPE BC1-11	
29	" LEVER	1	" " BL-10	
30	" ASSY	1	" " 138-11	
31	" LUG	1	3/8 PLATE, STEEL (ASTM-A36 OR EQ)	
32	MOUNT PLATE	2	" " " "	
33	BASE "	2	" " " "	
34	SIDE "	4	3/8 " " "	
35	TOP "	1	" " " "	
36	BOLT	4	1-8NC x 3 LG HEX HD CAP SCREW W/NUT & LOCK W	
37	"	4	" x 1 1/2 " " " " /LOCK W	
38	FLANGE BEARING	1	FMC LINK BELT # FC-D3244 OR EQ, 2 1/2 SHAFT BORE, 5 1/2 SHOULDER BORE	
39	BOLT	4	1/2-13NC x 1 1/4 LG HEX HD CAP SCREW W/NUT & LOCK W	
40	SHAFT	1	3 RD BAR, 1018 CR STEEL	
41	FLANGE & END CAP	2	3/4 PLATE, STEEL (ASTM-A36 OR EQ)	
42	DRUM	1	1400 x .844 WALL TUBING, STEEL "	
43	HUB	1	6 1/2 OD x 1/2 " " " "	
44	" FLANGE	1	1 PLATE, STEEL "	
45	STUD BOLT	6	3/4-10NF x 3 LG STUD W/NUT & LOCK WASHER	
46	CABLE	1800	5/8 DIA, 6X25 CONST IWRC, PREFORMED, EX IMPROVED STL	
47	" CLAMP	1	3/4 x 1 1/2 FLAT BAR, STEEL	
48	BOLT	2	1/2-13NC x 1 1/2 LG FLAT HD SOCKET CAP SCREW	
49	BOLT	8	5/8-11NC x 2 1/2 LG SOCKET HD CAP SCREW W/WASHER	

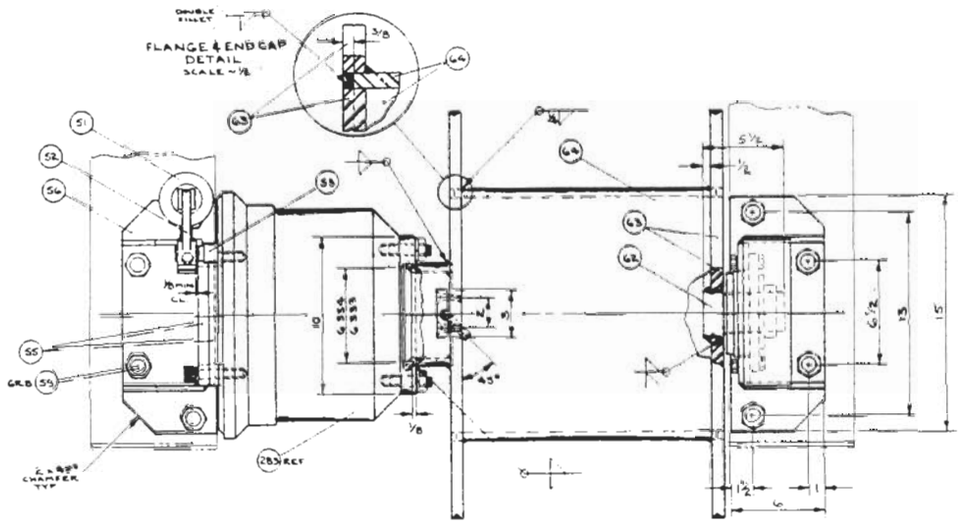
This is a REDUCED PRINT, full size print available upon request.

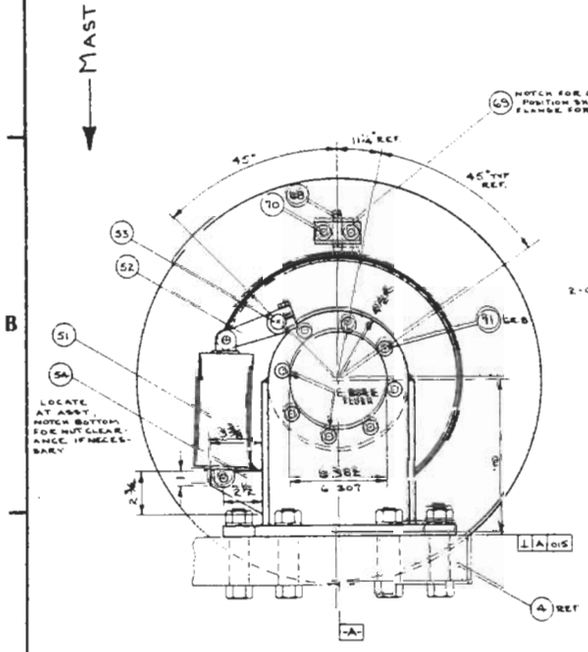
(47) NOTCH FOR CABLE, LEFT LAY CABLE POSITION SHOWN, LOCATE TO OPPOSITE FLANGE FOR RIGHT LAY CABLE

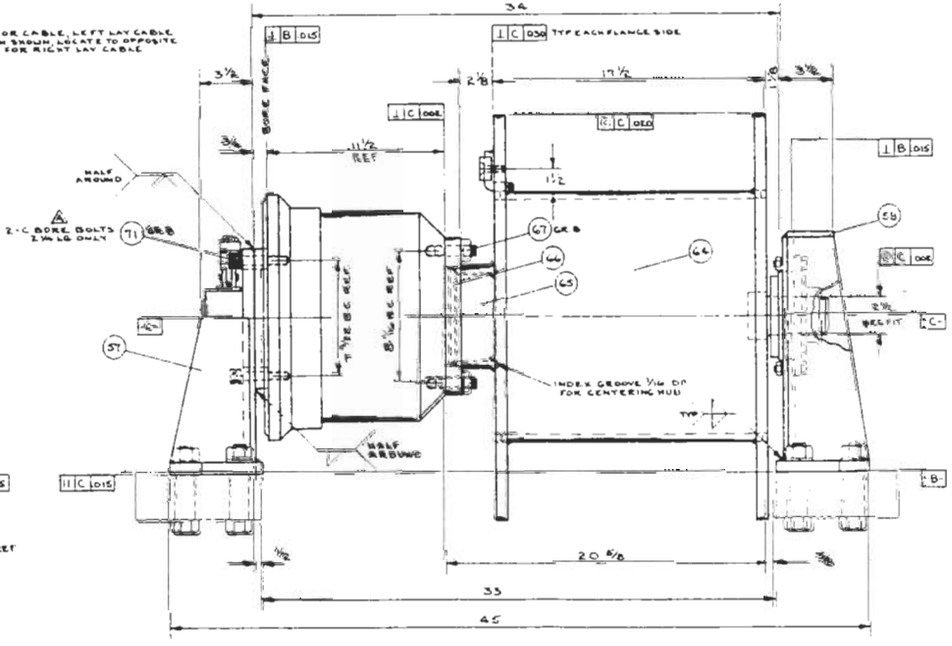
TOLERANCES: FRACTIONS ± 1/64, DECIMALS ± .03, ANGLES ± 1/2°	DATE	REVISION - SAME AS SHEET 5	BY
DRAWN W.H. WYATT	U.S. DEPT. OF AGRICULTURE FOREST SERVICE EQUIPMENT DEVELOPMENT CENTER MISSOULA MONTANA		
DESIGNED GLUSTER	TITLE CLEARWATER YARDER HAULBACK WINCH		
CHECKED KARSKY			
APPROVED			
SCALE 1/4			
DATE OCT '68	SHEET 3 OF 17	MEDC- 637-A	

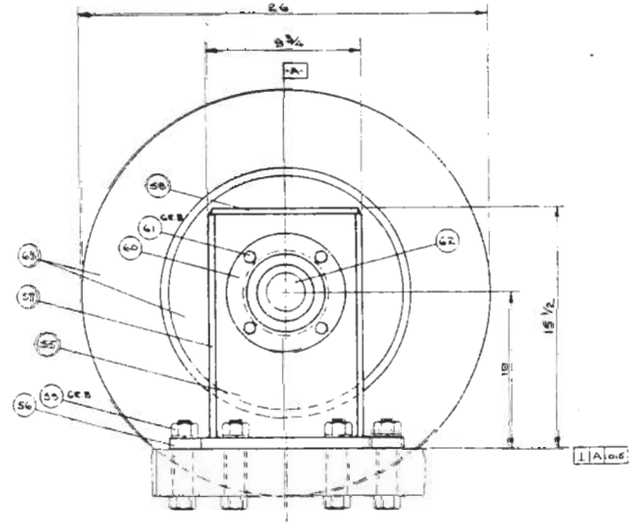
(50) MAINLINE WINCH

WELDED CONSTRUCTION
ALL WELDS 5/16 FILLET UNLESS SPECIFIED
SPECIFIC WELDS NOTED









This is a REDUCED PRINT, full size print available upon request.

MATERIALS LIST

NO	PART NAME	REQ'D	MATERIAL DESCRIPTION	SHEET
50	MAINLINE WINCH	1	PARTS 51 - 71	
51	BRAKE CYL	1	MAGGLUND TYPE BC1-11	
52	" LEVER	1	" " BL-10	
53	" ASSY	1	" " ISB-11	
54	" LUG	1	5/8 PLATE, STEEL (ASTM-A36 OR EQ)	
55	MOUNT PLATE	2	" " "	
56	BASE "	2	" " " "	
57	SIDE "	4	3/8 " " "	
58	TOP "	1	" " " "	
59	BOLT	8	1-8 NC X 5 REG HEX HD CAP SCREW W/NUT & LOCK W	
			1 MC LINK BELT # PC-0224 OR OR EQ, 2 1/2 SHAFT BORE, 3 1/2 SHOULDER BORE	
60	FLANGE BEARING	1		
61	BOLT	4	1/2-13 NC X 2 REG HEX HD CAP SCREW W/NUT & LOCK W	
62	SHAFT	1	3 RD BAR, 1018 C.R. STEEL	
63	FLANGE & END CAP	2	3/4 PLATE, STEEL (ASTM-A36 OR EQ)	
64	DRUM	1	16.00 X .844 WALL TUBING, STEEL	
65	HUB	1	6 1/2 OD X 1/2 " " " "	
66	" FLANGE	1	1 PLATE, STEEL	
67	STUD BOLT	6	3/4-16 UNF X 3 LG STUD W/ NUT & LOCK WASHER	
68	CABLE	4000'	5/8 DIA., 6 X 25 CLASS, IWRC, PREFORMED, EIP PLOW STL	
69	" CLAMP	1	5/16 X 1 1/2 FLAT BAR, STEEL	
70	BOLT	2	1/2-13 NC X 1 1/4 LG FLAT HD SOCKET CAP SCREW	
71	BOLT	8	5/8-11 NC X 2 1/4 LG SOCKET HD CAP SCREW W/WASHER	

TOLERANCES
FRACTIONS ± 1/16
DECIMALS ± .03
ANGLES ± 1°

DATE | REVISION - SAME AS SHEET 5 | BY

U.S. DEPT OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA MONTANA

DRAWN W.H. WYATT
DESIGNED CLUSTER
CHECKED KARSKY
APPROVED
SCALE 1:4
DATE OCT - 79

TITLE
CLEARWATER YARDER
MAINLINE WINCH

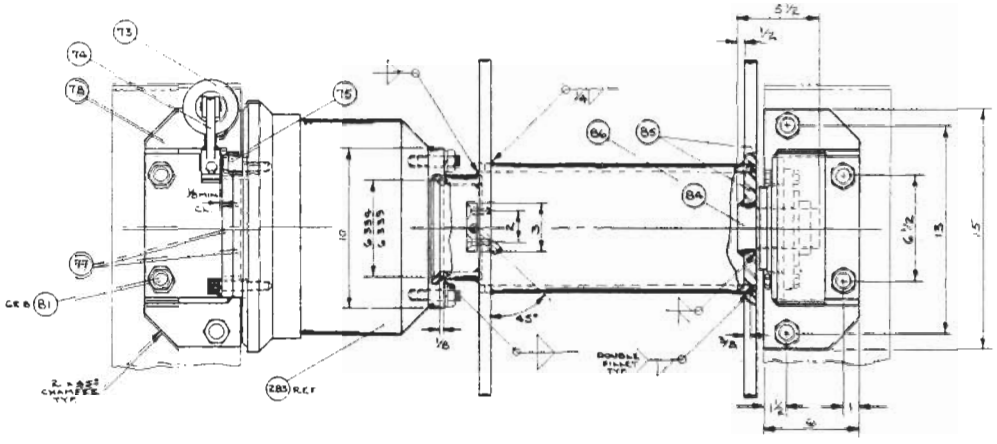
SHEET 4 OF 17 | MEDC- 637-A

MATERIALS LIST

NO	PART NAME	REQD	MATERIAL - DESCRIPTION	SHEET
72	SKYLINE WINCH	1	PARTS 73-93.	
73	BRAKE CYL	1	HAGGLUND TYPE BCI-11	
74	" LEVER	1	" " BL-10	
75	" ASSY	1	" " ISB-11	
76	" LUG	1	3/8 PLATE, STEEL (ASTM-A36 OR EQ)	
77	MOUNT PLATE	2	" " " "	
78	BASE "	2	" " " "	
79	SIDE "	4	3/8 " " " "	
80	TOP "	1	1/4 " " " "	
81	BOLT	8	1-8 NC X 5 1/2 LG HEX HD CAP SCREW W/NUT & LOCK W	
82	FLANGE BEARING	1	SKF LINK BELT # FC-BZ644 OR EQ, 2 1/2 SHAFT BORE, 5 1/2 SHOULDER BORE.	
83	BOLT	4	1/2-13 NC X 2 1/2 LG HEX HD CAP SCREW W/NUT & LOCK W	
84	SHAFT	1	3 RD BAR 1018 CR STEEL	
85	FLANGE END CAP	2	3/4 PLATE, STEEL (ASTM-A36 OR EQ)	
86	" DRUM	1	8.00 X 1/2 WALL TUBING, STEEL "	
87	HUB	1	6 1/2 OD X 1/2 " " " "	
88	" FLANGE	1	1 PLATE, STEEL "	
89	STUD BOLT	6	3/4-10 NF X 3 LG STUD WITH NUT & LOCK WASHER	
90	CABLE	800'	1/2 DIA, 6X37 CONST, IWRC PREFORMED, EIP (IMP PLOW) STL	
91	" CLAMP	1	3/8 X 1 1/2 FLAT BAR, STEEL	
92	BOLT	2	1/2-13 NC X 1 1/2 LG FLAT HD SOCKET CAP SCREW	
93	BOLT	8	5/8-11 NC X 2 1/2 LG SOCKET HD CAP SCREW W/LOCK W	

(72) SKYLINE WINCH

WELDED CONSTRUCTION
ALL WELDS 3/8 FILLET UNLESS SPECIFIED
SPECIFIC WELDS NOTED



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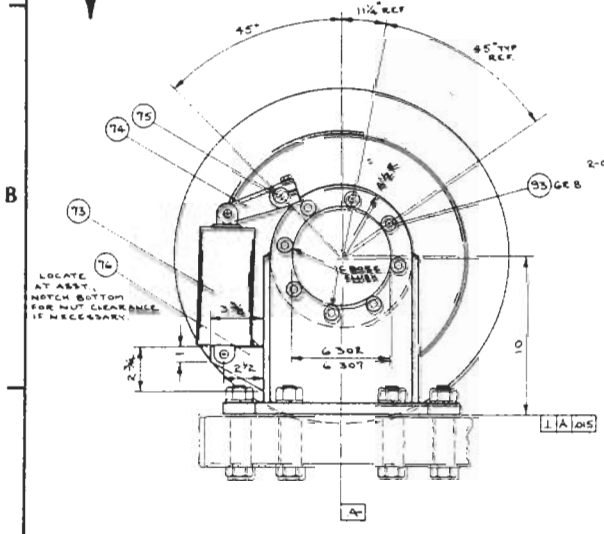
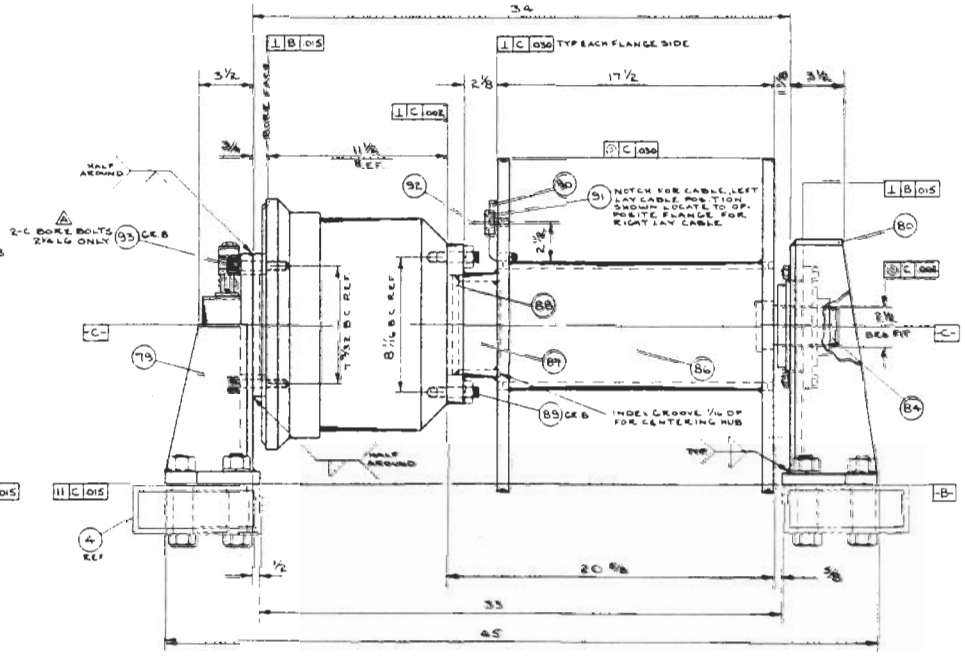
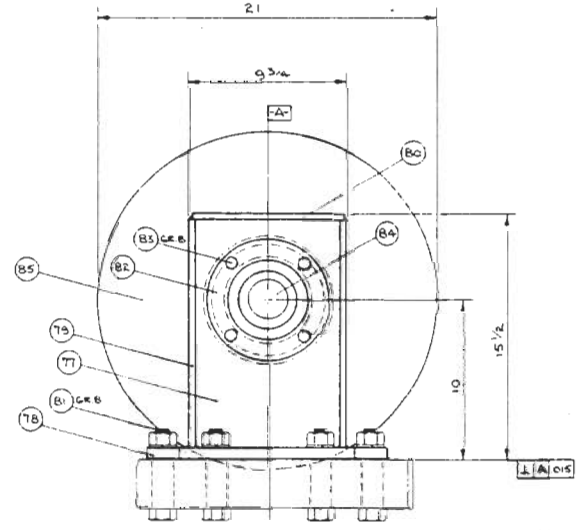
MAST







11	SHORTENED 2-C BORE BOLTS (ITEM 93) TO 2 1/4 LG	11
11-80	CHANGED ITEMS 78 & 79 PART NOS TO BCI-11 & ISB-11.	WWW

DATE	REVISION	BY

UNLESS OTHERWISE SPECIFIED
TOLERANCES:
FRACTIONS ± 1/16
DECIMALS ± .01
ANGLES ± 1°
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA, MONTANA

DRAWN	W.H. WYATT
DESIGNED	CLUSTER
CHECKED	KARSKY
APPROVED	
SCALE	1/4
DATE	OCT-75

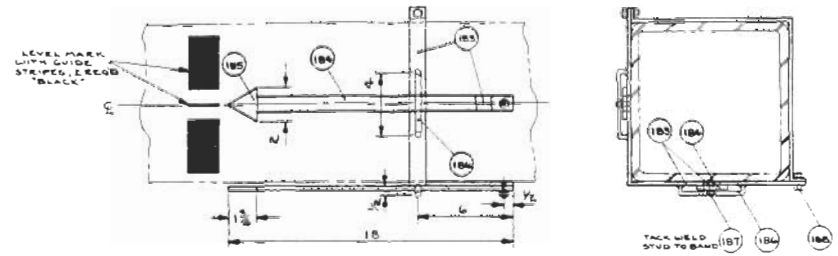
TITLE
CLEARWATER YARDER
SKYLINE WINCH

SHEET 5 OF 17

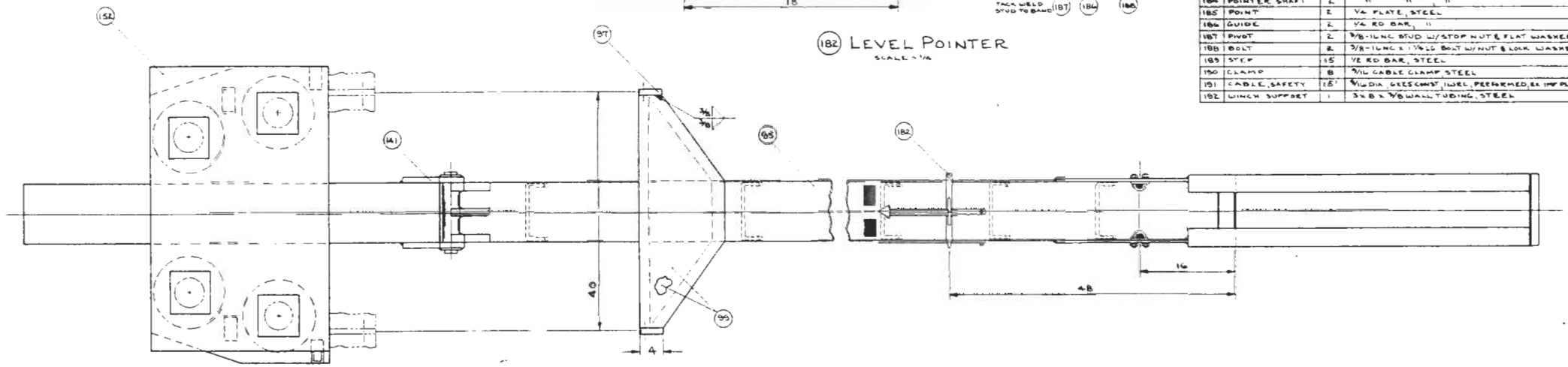
MEDC-637-A

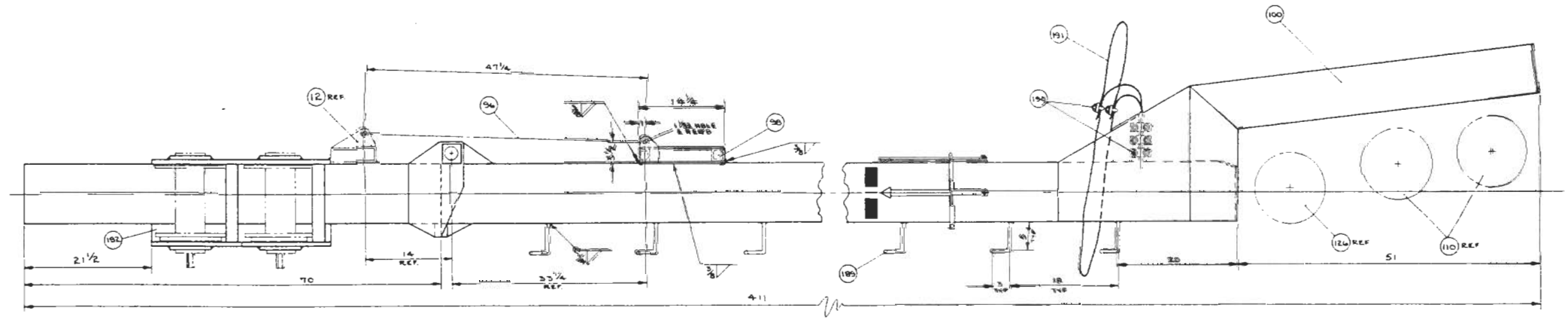
MATERIALS LIST

NO	PART NAME	REQD	MATERIAL-DESCRIPTION	SHEET
94	MAST ASSY	1	PARTS 95-192,328,329	4,5,6, 8,9,11
95	MAIN BEAM	1	10 SQ x 1/4 WALL TUBING, STEEL (ASTM A-500 GR. B OR EQ)	
96	CYLINDER	2	PRINCE # PHC-9 SIL OR EQ, 5 1/2 BORE X 16 STROKE,	
			3 1/2 RETRACT, 1 DIA PINS WITH CLIPS INCLUDED	
97	" LUG	2	1 PLATE, STEEL (ASTM A-36 OR EQ)	
98	YOKE FRAME	1	2 x 2 x 1/4 WALL TUBING STEEL "	
99	" PLATE	1	3/8 PLATE, STEEL "	
100	MAST HEAD ASSY	1	PARTS 101-140	7,8,9
141	" HINGE	1	" 141-151,329	10
152	GUYLINE WINCH ASSY	1	" 153-181,328	11
182	LEVEL POINTER	1	" 183-188	
183	BAND	1	1/8 x 1 FLAT BAR, STEEL	
184	POINTER SHAFT	2	" " "	
185	POINT	2	1/4 PLATE, STEEL	
186	GUIDE	2	1/4 RD BAR, "	
187	PIVOT	2	3/8-16 NC STUD W/STOP NUT & FLAT WASHER	
188	BOLT	8	3/8-16 NC x 1 1/2 LG BOLT W/NUT & LOCK WASHER	
189	STEP	15	1/2 RD BAR, STEEL	
190	CLAMP	8	9/16 CABLE CLAMP, STEEL	
191	CABLE, SAFETY	15'	9/16 DIA, 6X25 CONST, IWRC, PREFORMED, EX IMP PLOW STL	
192	WINCH SUPPORT	1	3 x 8 x 3/8 WALL TUBING, STEEL	



(182) LEVEL POINTER
SCALE ~ 1/4





(94) MAST ASSEMBLY
WELDED CONSTRUCTION
SPECIFIC WELDS NOTED
SCALE ~ 1/8

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UNLESS OTHERWISE SPECIFIED
TOLERANCES:
FRACTIONS ± 1/16
DECIMALS ± .___
ANGLES ± 1°
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

DATE	REVISION	BY

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA, MONTANA

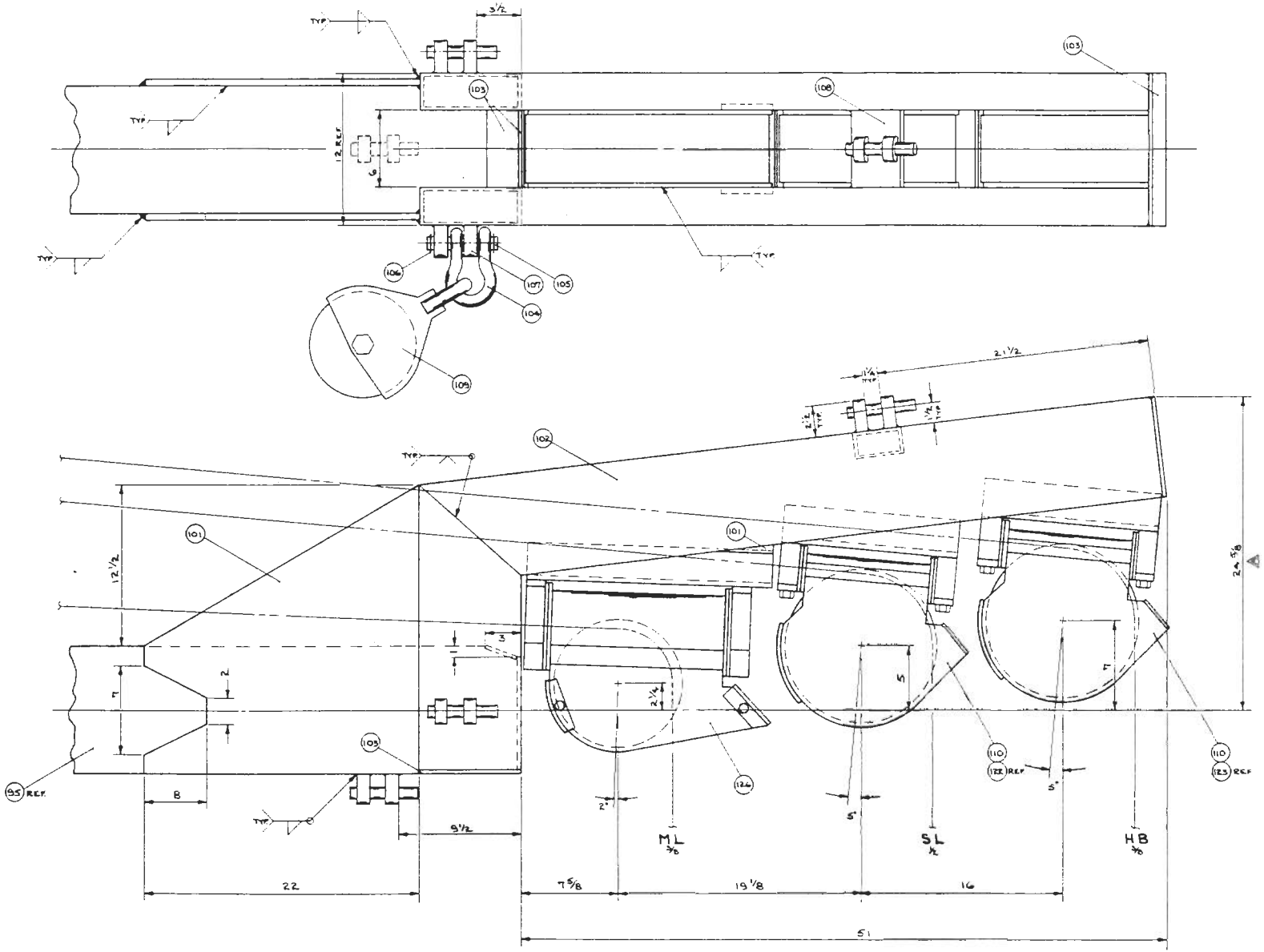
DRAWN	W.K.W.SMITH
DESIGNED	KARSKY
CHECKED	JASUMBACK
APPROVED	
SCALE	NOTED
DATE	OCT.-79

TITLE
CLEARWATER YARDER
MAST ASSEMBLY

SHEET 6 OF 17 | MEDC-637-A

MATERIALS LIST

NO	PART NAME	REQD	MATERIAL-DESCRIPTION	SHEET
100	MAST HEAD ASSY	1	PARTS 101-140	7,8,&9
101	GUSSET	4	1/2 PLATE, STEEL (ASTM A-36 OR EQ.)	
102	FRAME	1	3x8x3/8 WALL TUBING, STEEL (ASTM A-513 OR EQ)	
103	CAP	5	3/8 PLATE, STEEL (ASTM A-36 OR EQ)	
104	SHACKLE	4	SKOOKUM # 351 RD PIN SHACKLE, 7/8 SIZE	
105	" PIN	4	1 x 5 1/2 LG RD. BAR, 1018 CR STEEL	
106	" " CLIP	8	1 SHAFT SIZE HAIR PIN COTTER	
107	" LUG	8	1 x 2 FLAT BAR, STEEL (ASTM A-36 OR EQ)	
108	" " BASE	1	2 x 4 x 1/4 WALL TUBING, STEEL "	
109	SHEAVE BLOCK	2	SKOOKUM # A-8 HALF SIDE BLOCK, 8x1 1/8 SHEAVE	
110	STANDARD FAIRLEAD	2	PARTS 111-125	8
126	WIDE "	1	" 127-140	8



This is a REDUCED PRINT, full size print available upon request.

(100) MAST HEAD ASSEMBLY

WELDED CONSTRUCTION
ALL WELDS 3/16 SIZE UNLESS SPECIFIED
SPECIFIC WELDS NOTED

NO	DATE	REVISION	BY
11		DELETED 16 3/4 HEAD DIM & ADDED 24 5/8 DIM	11
11-80		CHANGED ITEM 104 PART NO FROM 383 TO 351	LWW

UNLESS OTHERWISE SPECIFIED
TOLERANCES
FRACTIONS ± 1/16
DECIMALS ± .1
ANGLES ± 1°
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

DRAWN W.H. WYATT
DESIGNED KARSKY
CHECKED JASUMBACK
APPROVED
SCALE 1/2"
DATE OCT -79

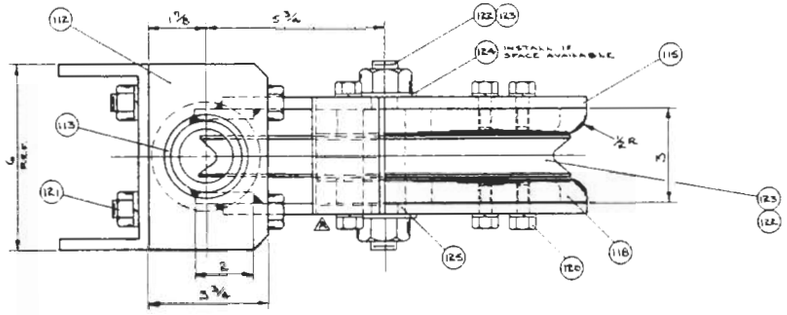
U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA MONTANA

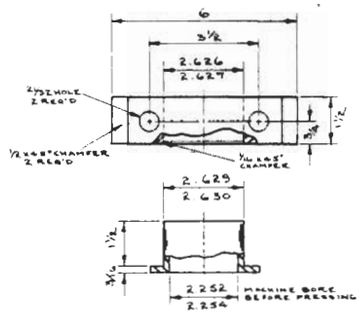
TITLE
CLEARWATER YARDER
MAST HEAD ASSEMBLY

SHEET 7 OF 17
MEDC-637-A

MATERIALS LIST

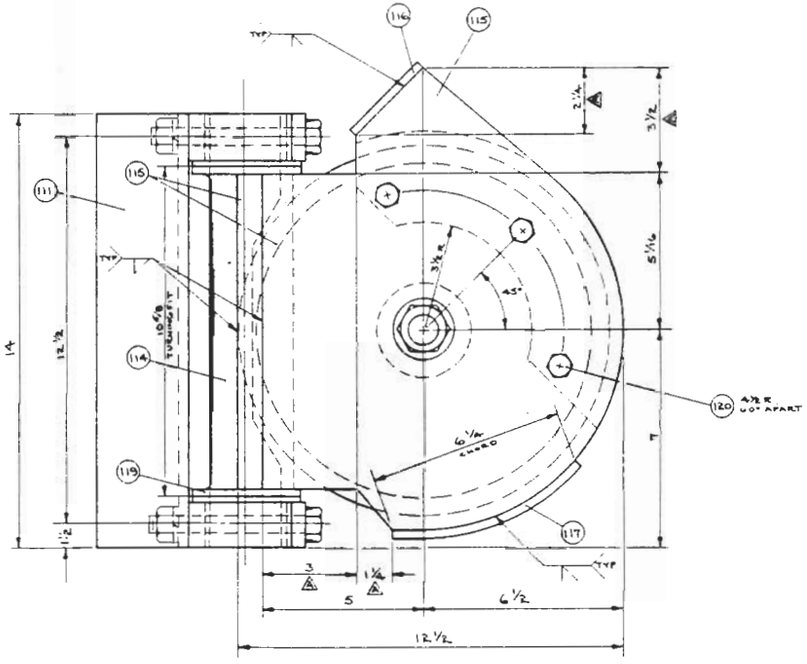
NO	PART NAME	REQD	MATERIAL-DESCRIPTION	SHEET
110	STANDARD FAIRLEAD	1	PARTS 111-125	
111	MOUNT	2	6" x 16 # SHIP CHANNEL, STEEL (ASTM A-36 OR EQ)	
112	BEARING BLOCK	4	1 1/2" PLATE, STEEL "	
113	"	4	3 5/8 OD x 2 1/2 ID CORED BAR STOCK, SUPER DILITE	
114	SWIVEL SHAFT	2	2 1/4 OD x 5/16 WALL TUBING, 1026 C.D.S. STEEL	
115	SIDE PLATE	4	3/8 PLATE, STEEL (ASTM A-36 OR EQ)	
116	TOP "	2	" "	
117	BOTTOM "	2	" "	
118	SPACER	4	3/4 " "	
119	"	4	1/4 " STEEL	
120	BOLT	12	1/2-13NC x 1 1/2 LG HEX HD CAP SCREW W/LOCK WASH.	
121	BOLT	8	5/8-11NC x 2 1/2 LG HEX HD CAP SCREW W/NUT & LOCK WASH.	
122	SHEAVE ASSY	1	SKOOKUM PART # 5734-410 COMPLETE W/BEARING,	
			1 1/2 PIN, 2 NUTS, 12 x 1 3/8 SHEAVE FOR 1/2 CABLE	
123	" "	1	SAME AS ABOVE EXCEPT 3/8 " "	
124	WASHER	4	1/4 FLAT WASHER	
125	BUSHING	2	1 1/2 OD x 1/8 WALL x 1 13/32 LG TUBING, STEEL	

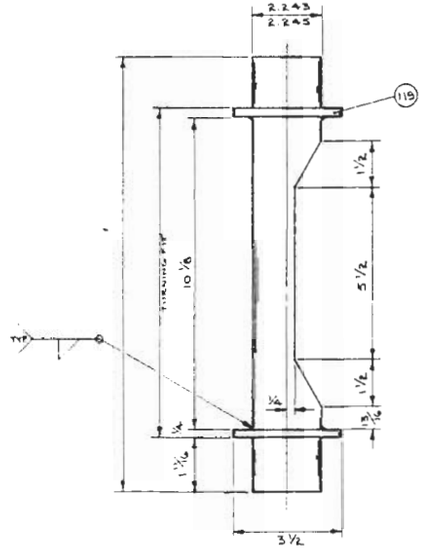




112 BEARING BLOCK

113 BEARING





114 SWIVEL SHAFT

110 STANDARD FAIRLEAD

WELDED CONSTRUCTION
ALL WELDS 1/4 SIZE UNLESS SPECIFIED
SPECIFIC WELDS NOTED

This is a REDUCED PRINT, full size print available upon request.

11	INCREASE TOP & BOTTOM CLEARANCE FROM 2 3/4 TO 3	11
11-80	REDESIGNED & LOWERED TOP OF FAIRLEAD	WHW
DATE	REVISION	BY

UNLESS OTHERWISE SPECIFIED
TOLERANCES:
FRACTIONS ± 1/16
DECIMALS ± .01
ANGLES ± 1°
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA, MONTANA

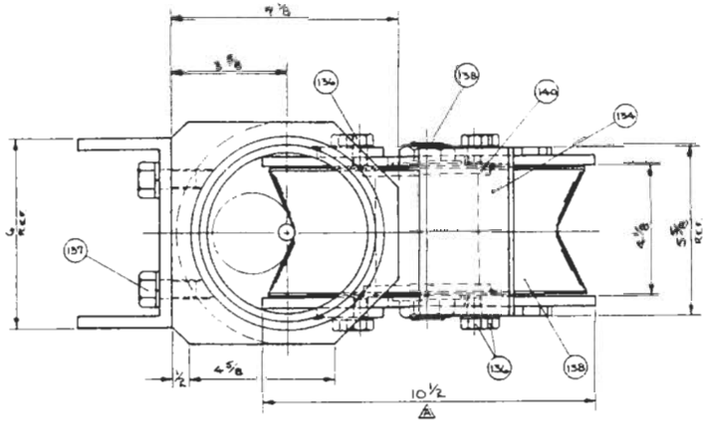
DRAWN W.H. WYATT
DESIGNED KARSKY
CHECKED JASUMBACK
APPROVED
SCALE 1/2
DATE OCT -79

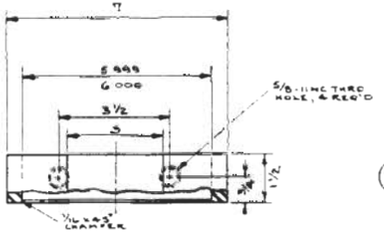
TITLE
CLEARWATER YARDER
STANDARD FAIRLEAD

SHEET 8 OF 17
MEDC-637-A

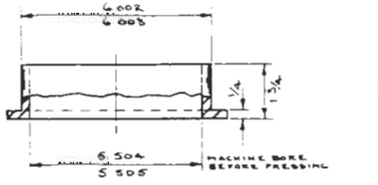
MATERIALS LIST

NO	PART NAME	REQD	MATERIAL - DESCRIPTION	SHEET
126	WIDE FAIRLEAD	1	PARTS 127 - 140	
127	MOUNT	1	6 X 1/16 S. SHIP CHANNEL, STEEL (ASTM A-36 OR EQ)	
128	BEARING BLOCK	2	1 1/2 PLATE, STEEL "	
129	"	2	7 7/8 OD X 4 ID CHRED BARSTOCK, SUPER OILITE	
130	SWIVEL SHAFT	1	5 1/2 OD X 1/4 WALL TUBING, 1026 COS STEEL	
131	SPACER	2	1/4 PLATE, STEEL	
132	SIDE PLATE	2	5/8 " " (ASTM A-36 OR EQ)	
133	BOLT "	2	" " " "	
134	TOP CAP	1	" " " "	
135	BOTTOM "	1	" " " "	
136	BOLT	14	1/2 - 13 NC X 3/4 LG HEX HD CAP SCREW W/LOCKWASH	
137	BOLT	6	5/8 - 11 NC X 1 1/4 LG " " "	
138	SHEAVE ASSY	1	SKOOKUM PART # 339710 COMPLETE W/BEARING,	
			1 6/16 PIN, 2 NUTS 10 X 4 SHEAVE FOR 5/8 CABLE	
139	WASHER	2	1 FLAT WASHER	
140	SPACER	2	1/4 PLATE, 4 SQ, STEEL	

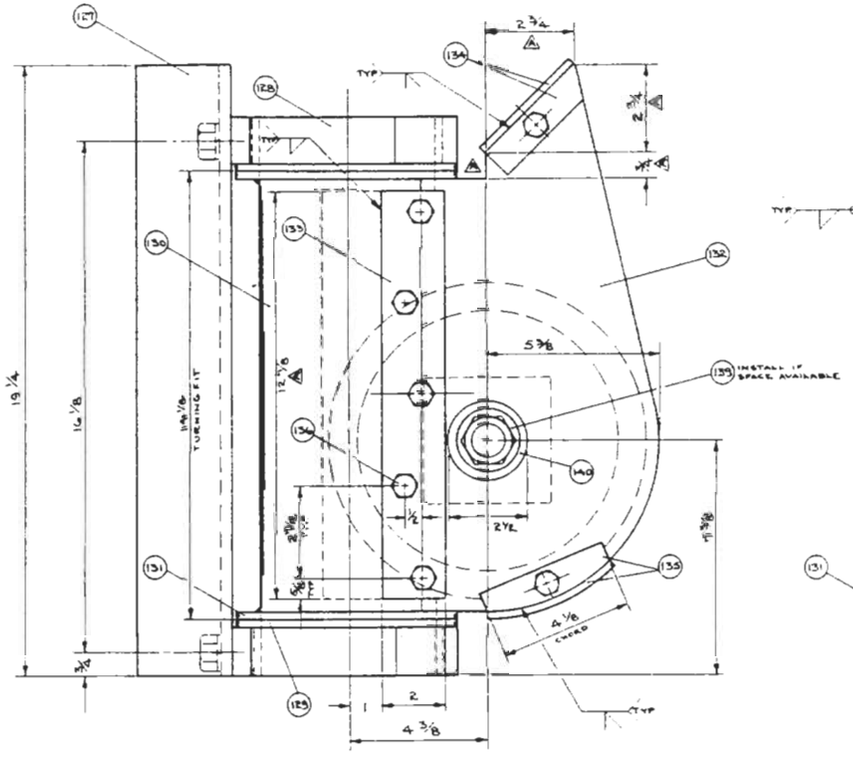


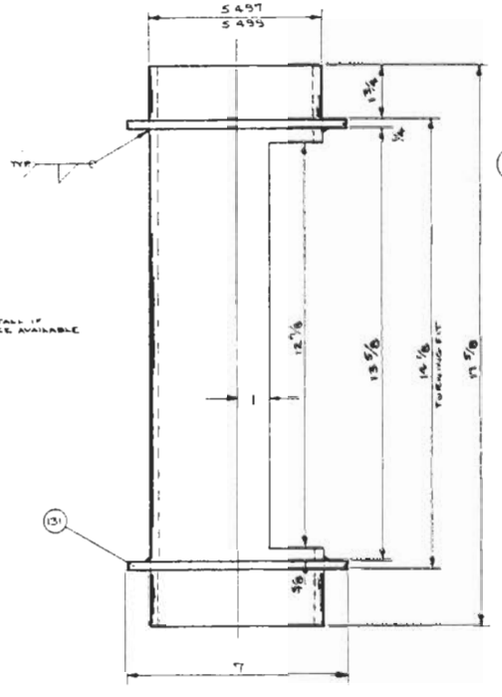


(128) BEARING BLOCK



(129) BEARING





(130) SWIVEL SHAFT

This is a REDUCED PRINT, full size print available upon request.

(126) WIDE FAIRLEAD

WELDED CONSTRUCTION
ALL WELDS 1/4 SIZE UNLESS SPECIFIED
SPECIFIC WELDS NOTED

11	CHANGED ITEM 132 WIDTH FROM 10 3/4 TO 10 1/2	11
11	INCREASED TOP CLEARANCE	11
11	ADDED 12 5/8 DIMENSION	11
11-80	CHANGED ITEM 140 FROM 5/16 TO 1/4 PLATE.	WJW40
DATE	REVISION	BY

UNLESS OTHERWISE SPECIFIED
TOLERANCES
FRACTIONS ± 1/16
DECIMALS ± .01
ANGLES ± 1°
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA MONTANA

DRAWN	W.H. WYATT
DESIGNED	KARSKY
CHECKED	JABUMBACH
APPROVED	
SCALE	1/2
DATE	OCT - 79

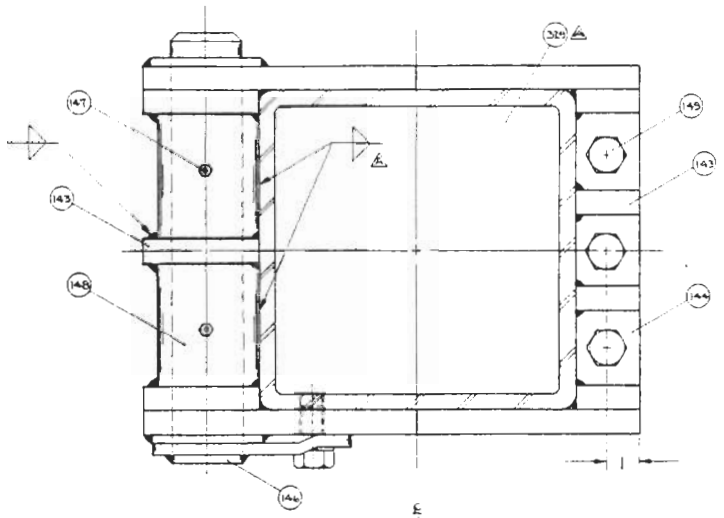
TITLE
CLEARWATER YARDER
WIDE FAIRLEAD

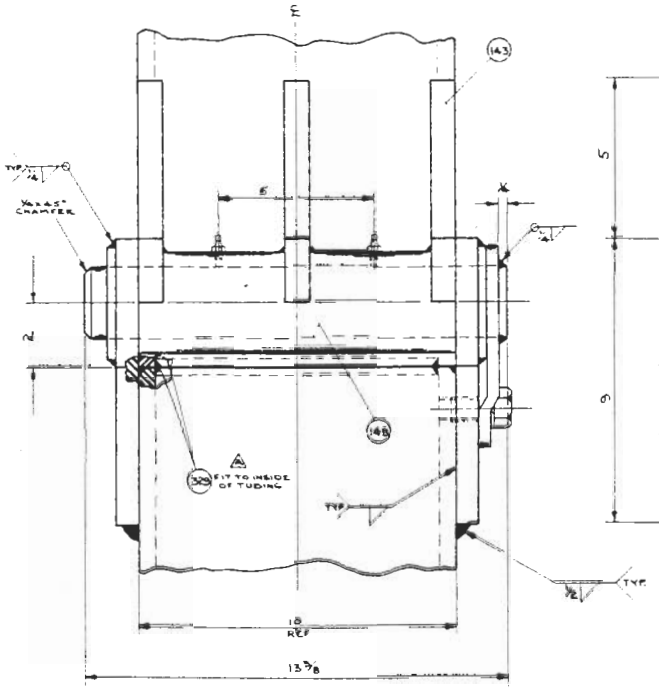
SHEET 9 OF 17 | MEDC-637-A

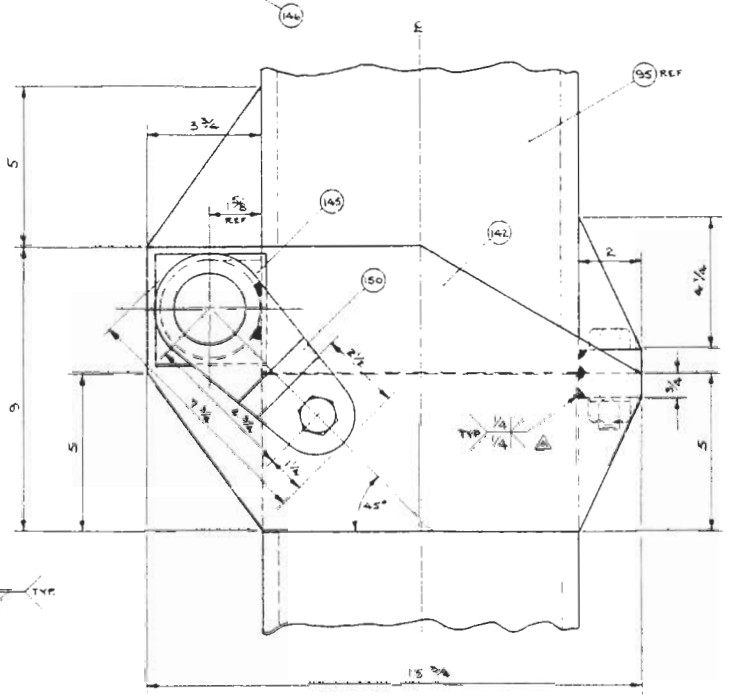
(141) MAST HINGE ASSEMBLY

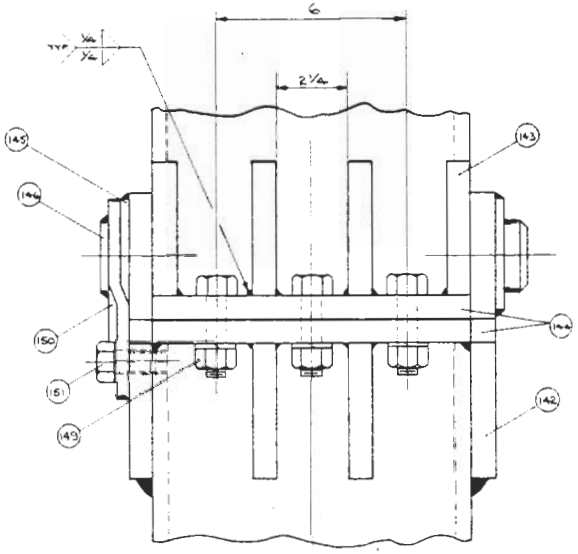
WELDED CONSTRUCTION
ALL WELDS 3/8 SIZE UNLESS SPECIFIED
SPECIFIC WELDS NOTED

MATERIALS LIST				
NO	PART NAME	REQD	MATERIAL - DESCRIPTION	SHEET
141	MAST HINGE ASSY	1	PARTS 142-151, 325	
142	SIDE PLATE	2	3/8 PLATE, STEEL (ASTM A-36 OR 60)	
143	GUSSET	5	" " "	
144	BOLT PLATE	2	" " "	
145	SPACER	2	1/4 x 3 1/2 SQ PLATE, STEEL	
146	HINGE PIN	1	2 1/4 RD BAR, 1018 C.R. STEEL	
147	GREASE FITTING	2	1/4-28 THRD, STRAIGHT BODY	
148	BUSHING	1	3 1/4 OD x 1/2 WALL TUBING, 1026 CDS STEEL	
149	BOLT	5	3/4-10 NC x 3 LG GRADE 8 HEX HD CAP SCREW, WITH NUT & LOCK WASHER	
150	FLANGE	1	3/8 PLATE, STEEL	
151	BOLT	1	3/4-10 NC x 1 1/2 LG HEX BOLT W/ LOCK WASHER	
325	END CAP	2	1/4 PLATE, STEEL	









This is a REDUCED PRINT, full size print available upon request.

NO	DATE	REVISION	BY
11		ITEM 325 WITH BREAK AWAY DETAIL	
10	11-80	ADDED WELD SYMBOLS FOR ITEMS 144 & 148.	WRW

TOLERANCES:
FRACTIONS ± 1/16
DECIMALS ±
ANGLES ± 1°
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

DRAWN W.R.WYATT
DESIGNED KARSKY
CHECKED JABUMBACK
APPROVED
SCALE 1/2
DATE OCT-79

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA MONTANA

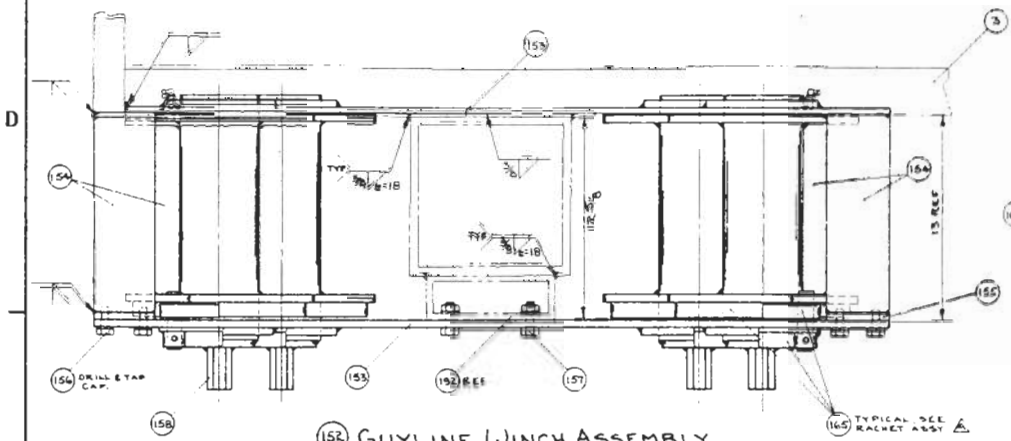
TITLE
CLEARWATER YARDER
MAST HINGE ASSEMBLY

SHEET 10 OF 17

MEDC-637-A

MATERIALS LIST

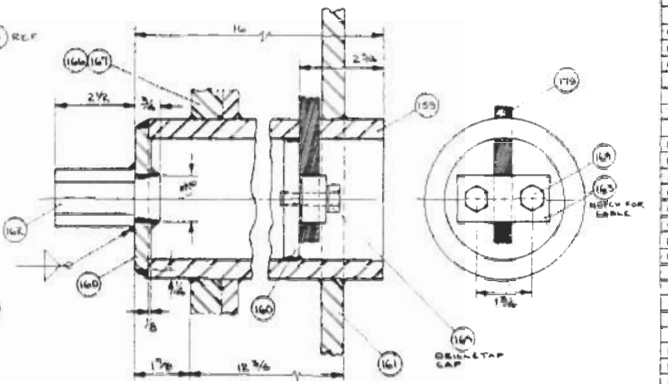
NO	PART NAME	REQD	MATERIAL-DESCRIPTION	SHEET
152	GUYLINE WINCH ASSY.	1	PARTS 153-181, 328	
153	SIDE PLATE	2	1/2 PLATE, STEEL (ASTM A-36 OR EQ)	
154	BRACE	4	2 x 6 x 1/4 WALL TUBING, STEEL "	
155	" CAP	4	1/2 PLATE, STEEL "	
156	BOLT	8	3/4-10 NC x 1 1/2 LG HEX HD W/ LOCK WASHER, GRADE 8	
157	BOLT	8	SAME AS ABOVE EXCEPT 1 3/4 LG W/ NUT	
158	DRUM ASSY	4	PARTS 159-164	
159	DRUM	4	5 OD x 3/8 WALL TUBING 1026 COS STEEL	
160	" CAP	8	1/2 PLATE, STEEL (ASTM A-36 OR EQ)	
161	FLANGE	4	5/16 " " "	
162	CRANK SHAFT	4	1 1/2 HEX BAR, 1018 CR STEEL	
163	CABLE CLAMP	4	3/8 x 1 1/2 x 3 3/4 FLAT BAR, STEEL	
164	BOLT	8	1/2-13 NC x 1 1/2 HEX HD W/ LOCK WASHER	
165	RACHET ASSY	4	PARTS 166-170, 328	
166	FLANGE	4	1/2 PLATE, STEEL (ASTM A-36 OR EQ)	
167	GEAR	4	1 " " "	
168	HANDLE BASE	4	1/4 " " "	
169	" SLEEVE	4	1 1/2 OD x 1/4 WALL TUBING, STEEL	
170	" PIN	4	1/4 x 1 1/2 LG ROLL PIN.	
171	RACHET TOOTH	4	PARTS 172-174	
172	BODY	4	1 x 2 FLAT BAR STEEL (ASTM A-36 OR EQ)	
173	PIN	4	1 RD BAR, 1018 C.R. STEEL	
174	SPRING LUG	4	1/4 x 1/2 FLAT BAR, STEEL	
175	"	4	MCMASTER-CARR #56 53X26 OR EQ, 3/16 OD x 3 1/8 FREE LG x 12 GA. WIRE, EXTENSION TYPE	
176	" BOLT	4	1/4-20 NC x 1 1/2 LG HEX HD CAP SCREW WITH NUT.	
177	BUSHING PLATE	8	1/2 PLATE, STEEL	
178	GREASE FITTING	8	1/4-28 THRD, 90° BODY	
179	CABLE	AS REQ'D	5/16 DIA., 6 X 36 CONST., IWRC, PREFORMED, EIP PLOW STL	
180	BRACE	2	1 SCH 40 BLK PIPE, STEEL	
181	BOLT	4	3/4-10 NC x 1 1/2 LG HEX HD. W/ NUT & LOCK WASHER	
328	PIN LUG	4	1/2 x 2 FLAT BAR, STEEL (ASTM A-36 OR EQ)	



152 GUYLINE WINCH ASSEMBLY

WELDED CONSTRUCTION - ALL WELDS 1/4 SIZE, UNLESS SPECIFIED SPECIFIC WELDS NOTED

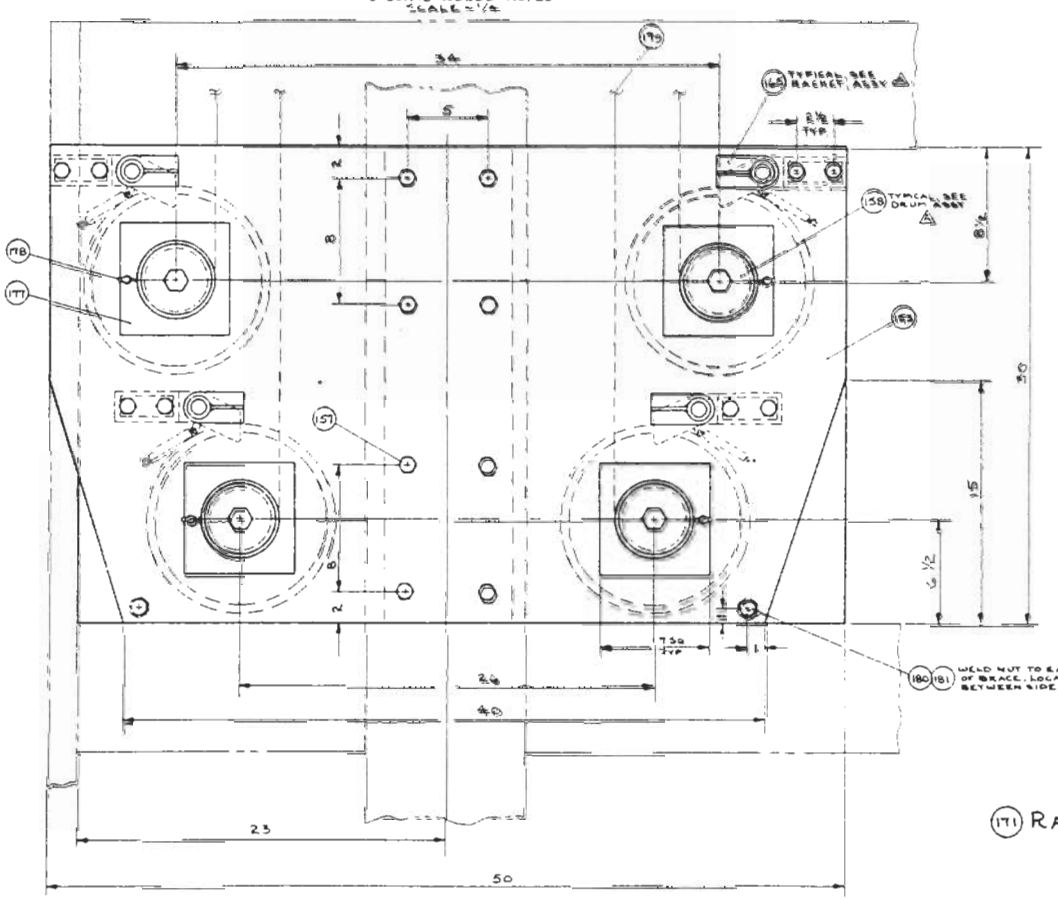
SCALE ~ 1/2



158 DRUM ASSEMBLY

TYPICAL

SCALE ~ 1/2

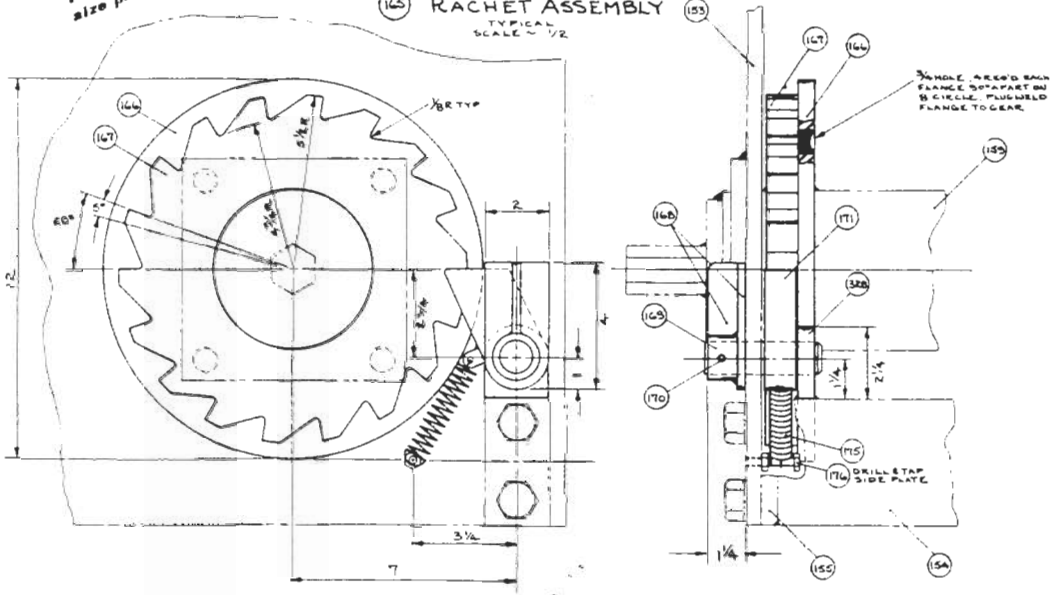


This is a REDUCED PRINT, full size print available upon request.

165 RACHET ASSEMBLY

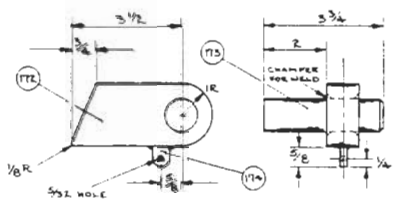
TYPICAL

SCALE ~ 1/2



171 RACHET TOOTH

SCALE ~ 1/2



11-80	ADDED NOTE FOR CLARITY ON ITEMS 158 & 165	WHW
DATE	REVISION	BY

UNLESS OTHERWISE SPECIFIED
TOLERANCES:
FRACTIONS ± 1/16
DECIMALS ±
ANGLES ± 1°
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA MONTANA

DRAWN	W. H. WYATT
DESIGNED	CLUSTER
CHECKED	HARSEY
APPROVED	
SCALE	NOTED
DATE	OCT - 79

TITLE

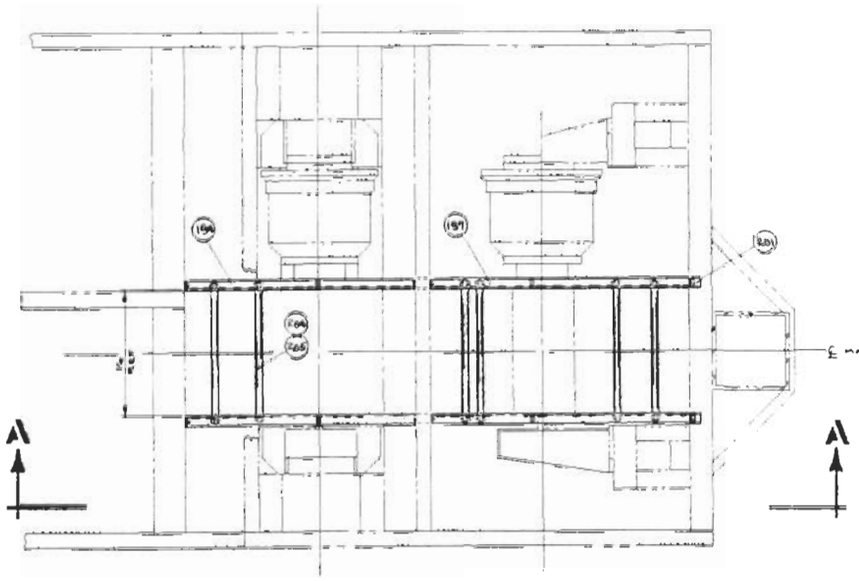
CLEARWATER YARDER
GUYLINE WINCH ASSEMBLY

SHEET 11 OF 17

MEDC-637-A

MATERIALS LIST

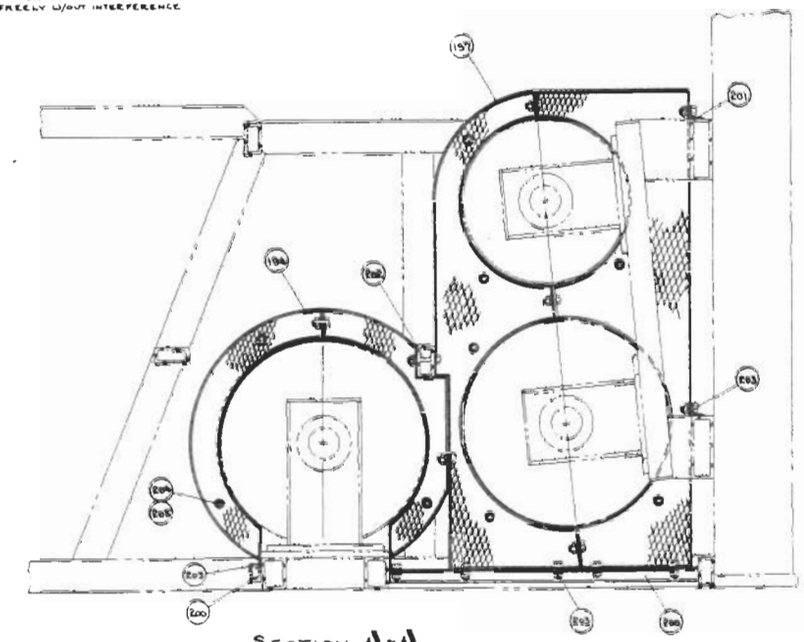
NO	PART NAME	REQD	MATERIAL - DESCRIPTION	SHEET
193	SIDE GUARD ASSY	1	PARTS 194 - 205	
194	HAULBACK SIDE GUARD	2 PR	" 195 - 196	
195	MESH	AR	3/4 NO 10 EXPANDED METAL, STEEL	
196	FRAME	AR	1/8 x 1 1/2 FLAT BAR, STEEL	
197	SKY & MAINLINE GUARD	2 PR	PARTS 198 - 199	
198	MESH	AR	3/4 NO 10 EXPANDED METAL, STEEL	
199	FRAME	AR	1/8 x 1 1/2 FLAT BAR, STEEL	
200	BASE	4	1 1/2 x 1 1/2 x 1/4 ANGLE, "	
201	BRACKET	4	" " "	
202	BOLT	2	5/8-11 NC x 3 LG HEX HD W/ NUT & LOCK WASHER	
203	"	26	" x 1 3/4 LG " " " "	
204	ROD	9	1/2-13 NC x 18 LG THRD ROD W/ NUT & FLAT WASHER	
205	SLEEVE	9	1/2 SCH 80 BLK PIPE, STEEL	



(193) SIDE GUARD ASSEMBLY

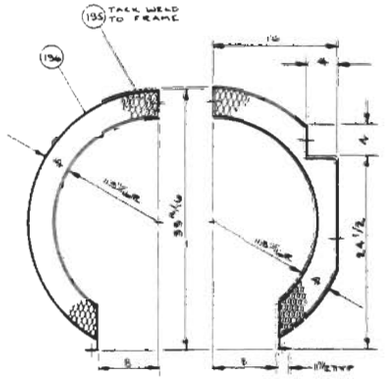
WELDED CONSTRUCTION

DRUM FLANGES TO REVOLVE FREELY W/OUT INTERFERENCE

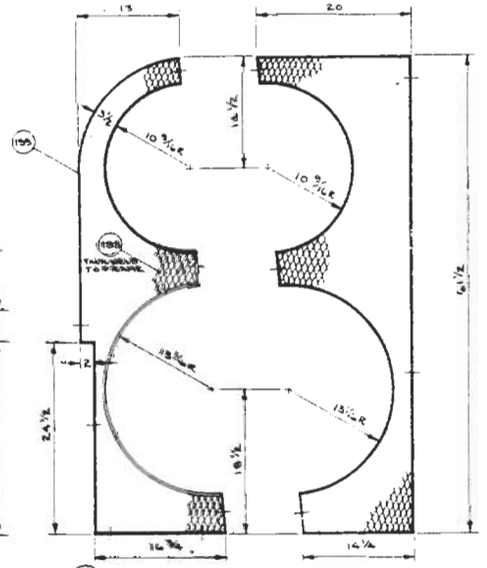


SECTION A-A

This is a REDUCED PRINT, full size print available upon request.



(194) HAULBACK SIDE GUARD



(197) SKY & MAINLINE SIDE GUARD

UNLESS OTHERWISE SPECIFIED

TOLERANCES:
FRACTIONS ± 1/16
DECIMALS ± .10
ANGLES ± 1°

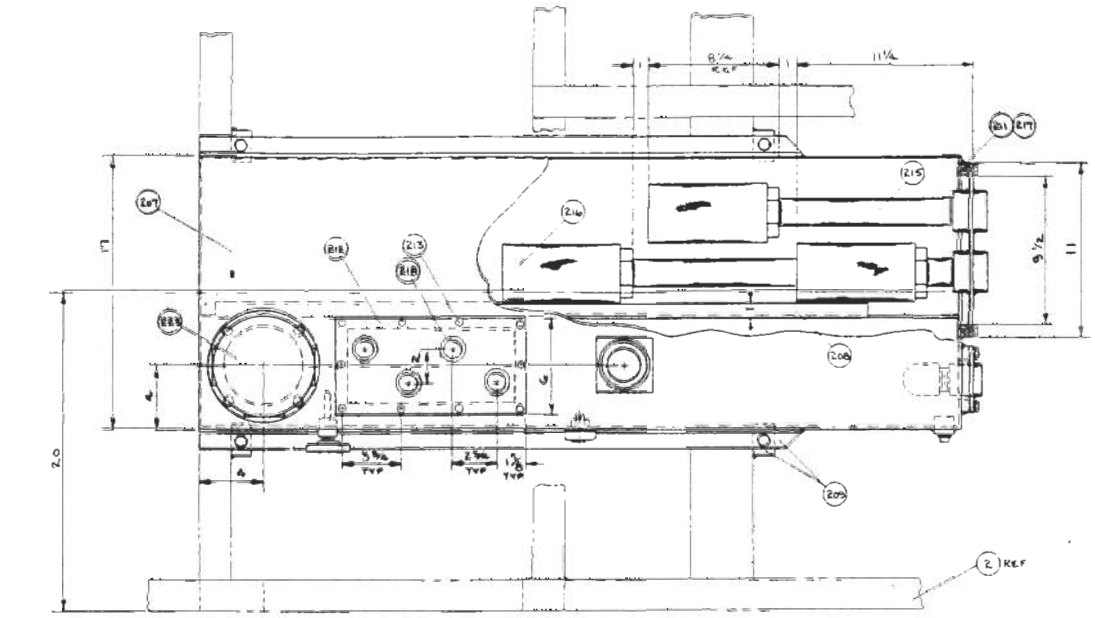
DATE | REVISION | BY

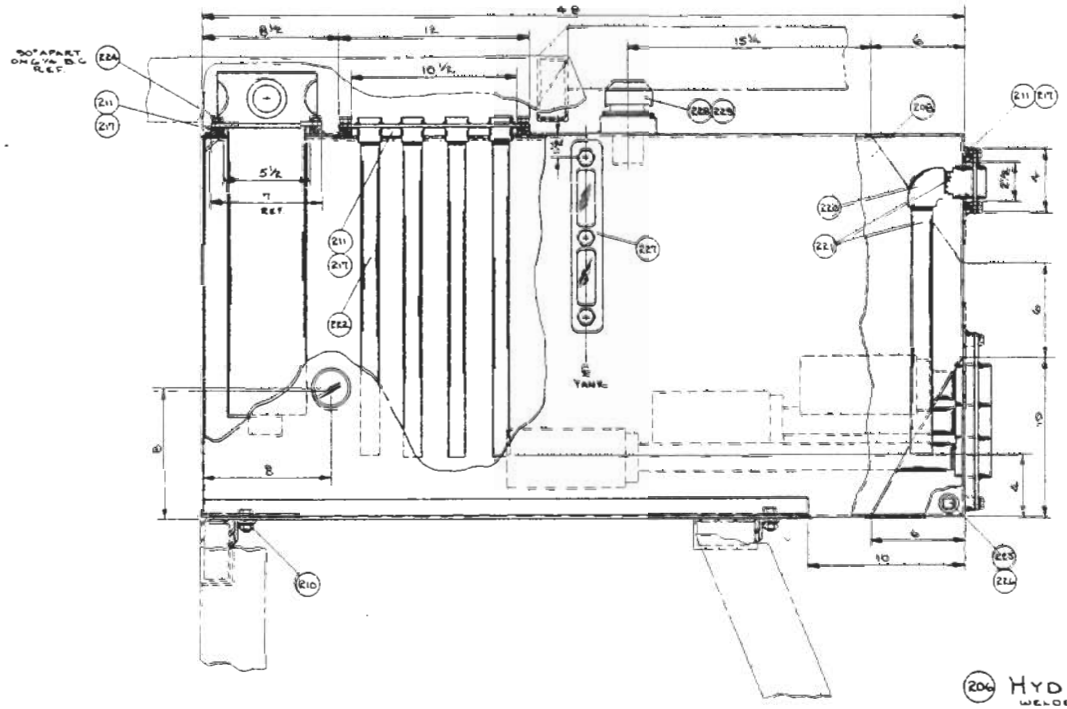
U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA MONTANA

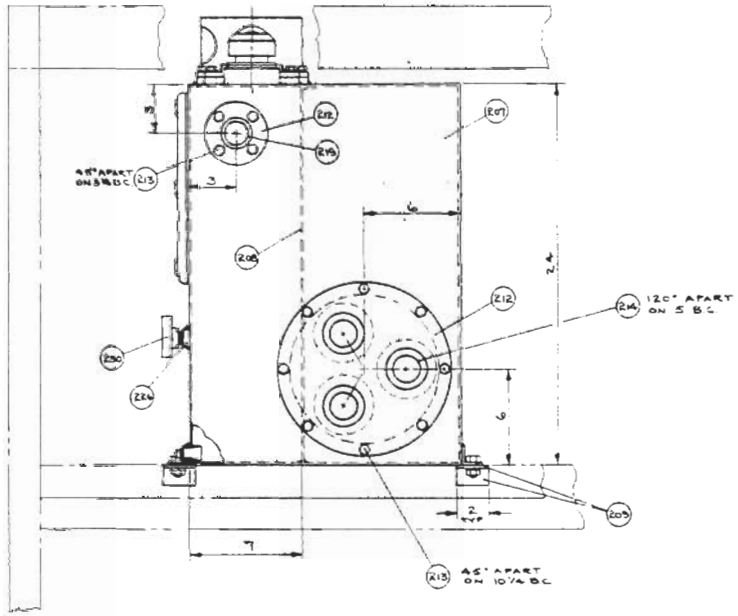
DRAWN	W.K.WYATT
DESIGNED	KARSKY
CHECKED	JASUMBACK
APPROVED	
SCALE	1/8
DATE	OCT-79

TITLE
CLEARWATER YARDER
SIDE GUARD ASSEMBLY

SHEET 12 OF 17 | MEDC-637-A







(206) HYDRAULIC TANK
WELDED CONSTRUCTION

*This is a **REDUCED PRINT**, full size print available upon request.*

MATERIALS LIST

NO	PART NAME	REQD	MATERIAL - DESCRIPTION	SHEET
206	HYDRAULIC TANK	1	PARTS 207 - 230	
207	BODY	1	11 GA SHEET, C.R. STEEL	
208	BAFFLE	1	" " "	
209	MOUNT FLANGE	6	1¼ x 1¼ x ¼ ANGLE, STEEL	
210	BOLT	4	⅝-11NC x 1¼ LG HEX HD W/ NUT & LOCK WASHER	
211	FLANGE	4	½ PLATE STEEL	
212	" PLATE	3	¼ " "	
213	BOLT	22	⅜-16NC x 1 LG HEX HD W/ LOCK WASHER	
214	COUPLING	3	1½ NPT, 150# BLK PIPE, STEEL	
215	PIPE	3	1½ SCH 40 BLK PIPE, STEEL	
216	SUCTION ELEMENT	3	UCC MOD UC-SE-1324, 30 GPM, 1½ NPT	
217	GASKET	4	⅛ NEOPRENE	
218	COUPLING	4	1 NPT, 150# BLK PIPE, STEEL	
219	"	1	1¼ " " " "	
220	ELBOW, 90°	1	" " " "	
221	PIPE	2	1¼ SCH 40 BLK PIPE, STEEL	
222	"	4	1 " " " "	
223	RETURN ELEMENT	1	SCHROEDER MOD RT-2 (X10-PC-Y2.0), 100 GPM, 1½ NPT	
224	BOLT	4	⅜-16NC x 1 LG HEX HD W/ LOCK WASHER	
225	DRAIN PLUG	1	¾ NPT PIPE PLUG, STEEL	
226	COUPLING	2	¾ NPT 150# BLK PIPE, STEEL	
227	SIGHT GAUGE	1	UCC MOD UC-FLT-1381, 10 IN B.C. SIZE	
228	FILLER-BREATHER	1	UCC MOD UC-AB-1165-AC, SERIES A	
229	WELD RISER	1	HYDRO-CRAFT # WR-120, 6 PILOT HOLES ON 2.98 B.C.	
230	TEMP GAUGE	1	McMASTER-CARR # 3554K37 ORDER 50-300°F	

11-80	CHANGED ITEM 229 FROM WR-28 TO WR-120	WHW
DATE	REVISION	BY

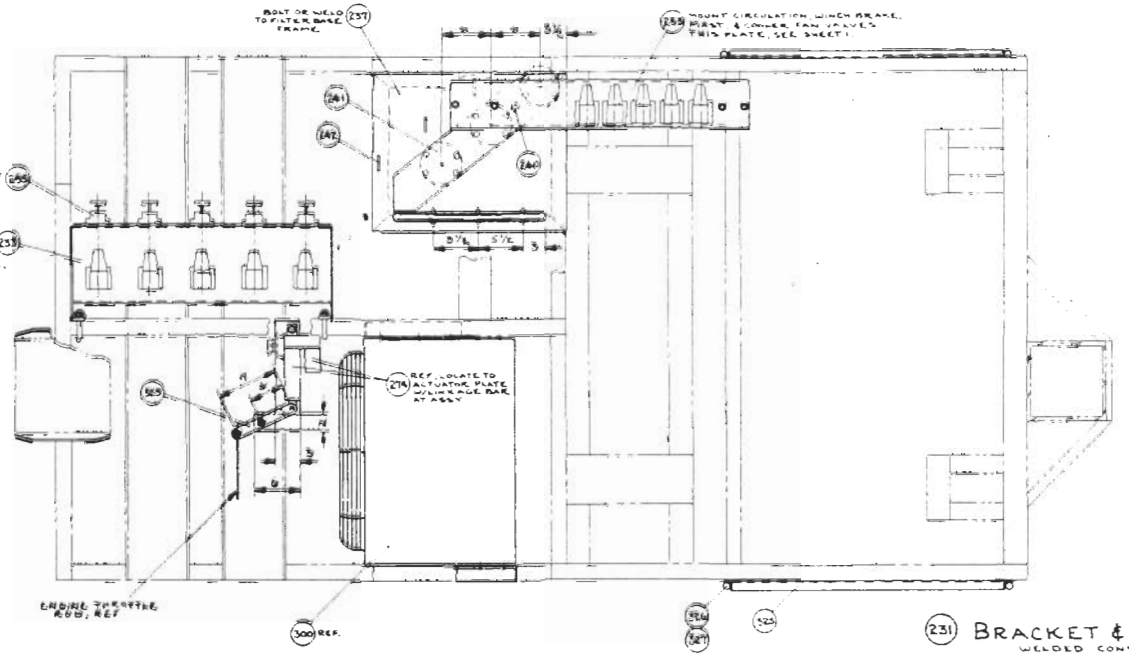
UNLESS OTHERWISE SPECIFIED
TOLERANCES:
FRACTIONS ± 1/16
DECIMALS ±
ANGLES ± 1°0'
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

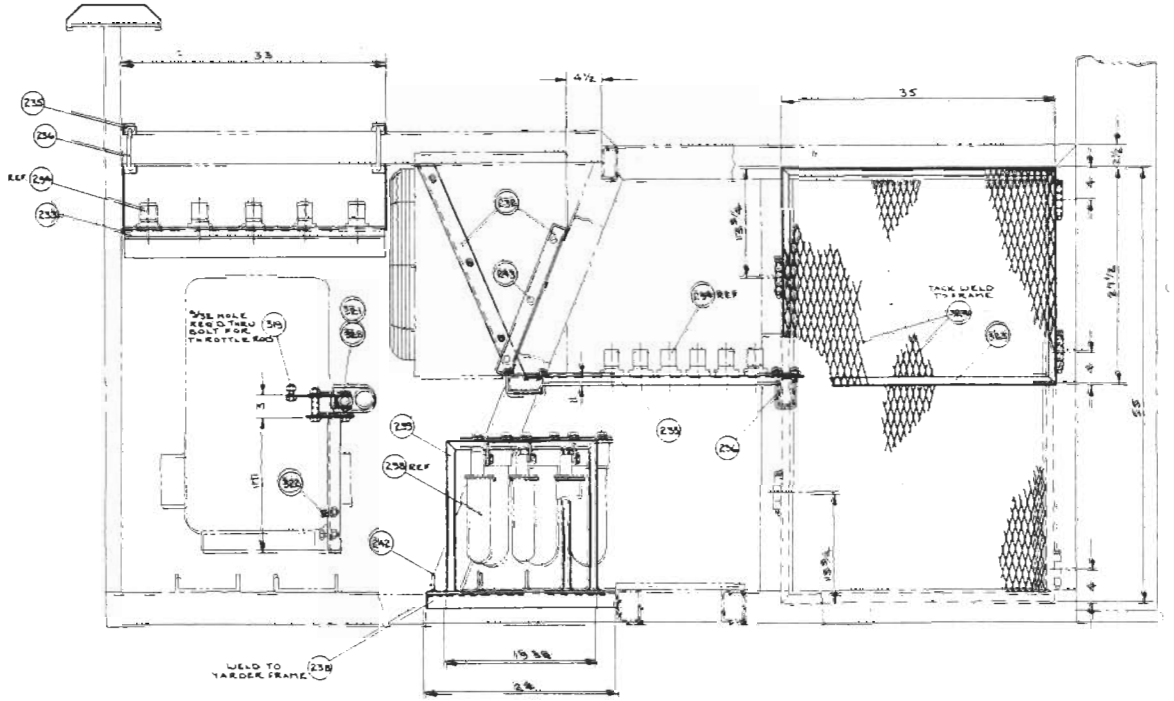
U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA, MONTANA

DRAWN W.K. WYATT
DESIGNED CLUSTER
CHECKED KARSKY
APPROVED
SCALE ¼
DATE OCT '79

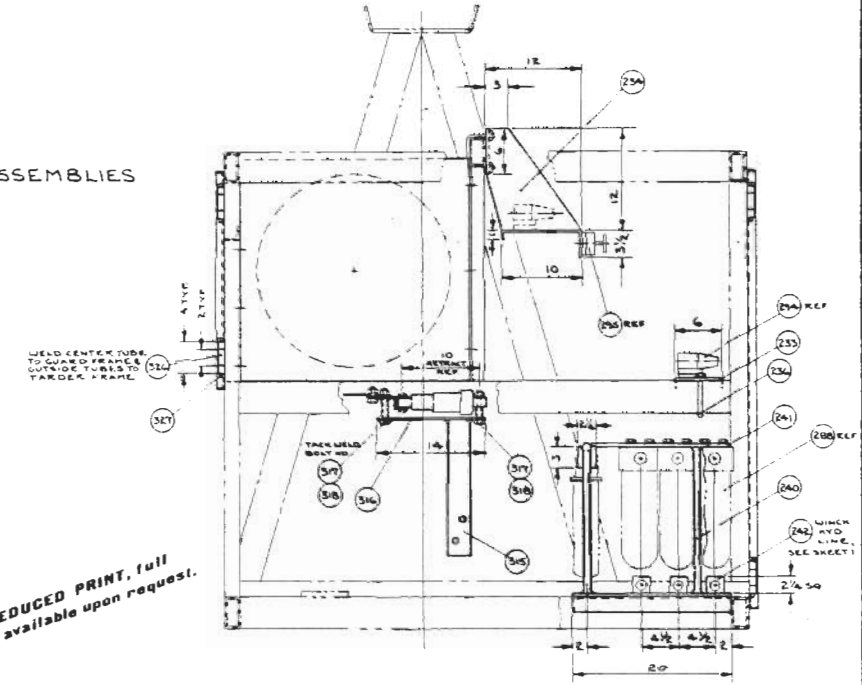
TITLE
CLEARWATER YARDER
HYDRAULIC TANK

SHEET 13 OF 17
MEDC- 637-A





(231) BRACKET & GUARD ASSEMBLIES
WELDED CONSTRUCTION



This is a REDUCED PRINT, full size print available upon request.

MATERIALS LIST

NO	PART NAME	REQD	MATERIAL - DESCRIPTION	SHEET
231	BRACKET ASSY	1	PARTS 232-248, 315-327	
232	COOLER BRACKET	2	2½ x 2½ x ¼ ANGLE, STEEL	
233	VALVE BASE PLATE	2	11 GA PLATE, STEEL	
234	" SIDE "	2	" "	
235	BOLTING BAR	2	¼ x 1½ FLAT BAR, STEEL	
236	U-BOLT	4	⅜-16NC THRD ROD WITH NUTS & LOCK WASHERS	
237	FILTER BASE PLATE	1	¼ PLATE, STEEL	
238	" " FRAME	1	2 x 2 x ¼ ANGLE, STEEL	
239	" RACK	1	1 SCH 80 BLK PIPE, STEEL	
240	" BRACE	1	" " "	
241	" TOP PLATE	1	⅝ x 5 FLAT BAR, STEEL	
242	LINE BRACE	3	¼ PLATE, STEEL	
243	BOLT	6	⅜-16 x 1½ LG HEX HD W/NUT & LOCK WASH	
315	THROTTLE BRACKET	1	3x4 CHANNEL, STEEL	
316	ACTUATOR PLATE	1	⅜ PLATE, STEEL	
317	BOLT	2	½-20NF x 2½ LG HEX HD W/STOP NUT & FLAT WASHER	
318	SPACER	2	¾ OD x ⅛ WALL TUBING, STEEL	
319	BOLT	1	½-20NF x 1¼ LG HEX HD W/STOP NUT	
320	PIN	1	½ x 2½ RD BAR, 1018 CR STEEL	
321	" RETAINER	2	½ HAIR PIN COTTER	
322	BOLT	2	½-13NC x 1¼ LG HEX HD W/NUT & LOCK WASHER	
323	LINKAGE BAR	1	¼ x 1½ FLAT BAR, STEEL	
324	GUARD MESH	2	36 - NO 10 EXPANDED METAL, STEEL	
325	" FRAME	2	1½ x ¼ ANGLE, STEEL	
326	HINGE	7	100 x ¼ WALL TUBING, STEEL	
327	" PIN	7	½-13NC x 3 LG HEX HD BOLT	

	DATE	REVISION	BY

TOLERANCES
FRACTIONS ± 1/16
DECIMALS ±
ANGLES ± 1°

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA MONTANA

DRAWN W.H. WYATT
DESIGNED CLUTTER
CHECKED KARSKY
APPROVED
SCALE 1/8
DATE OCT '79

TITLE
CLEARWATER YARDER
BRACKET & GUARD ASSEMBLIES

SHEET 14 OF 17
MEDC- 637- A

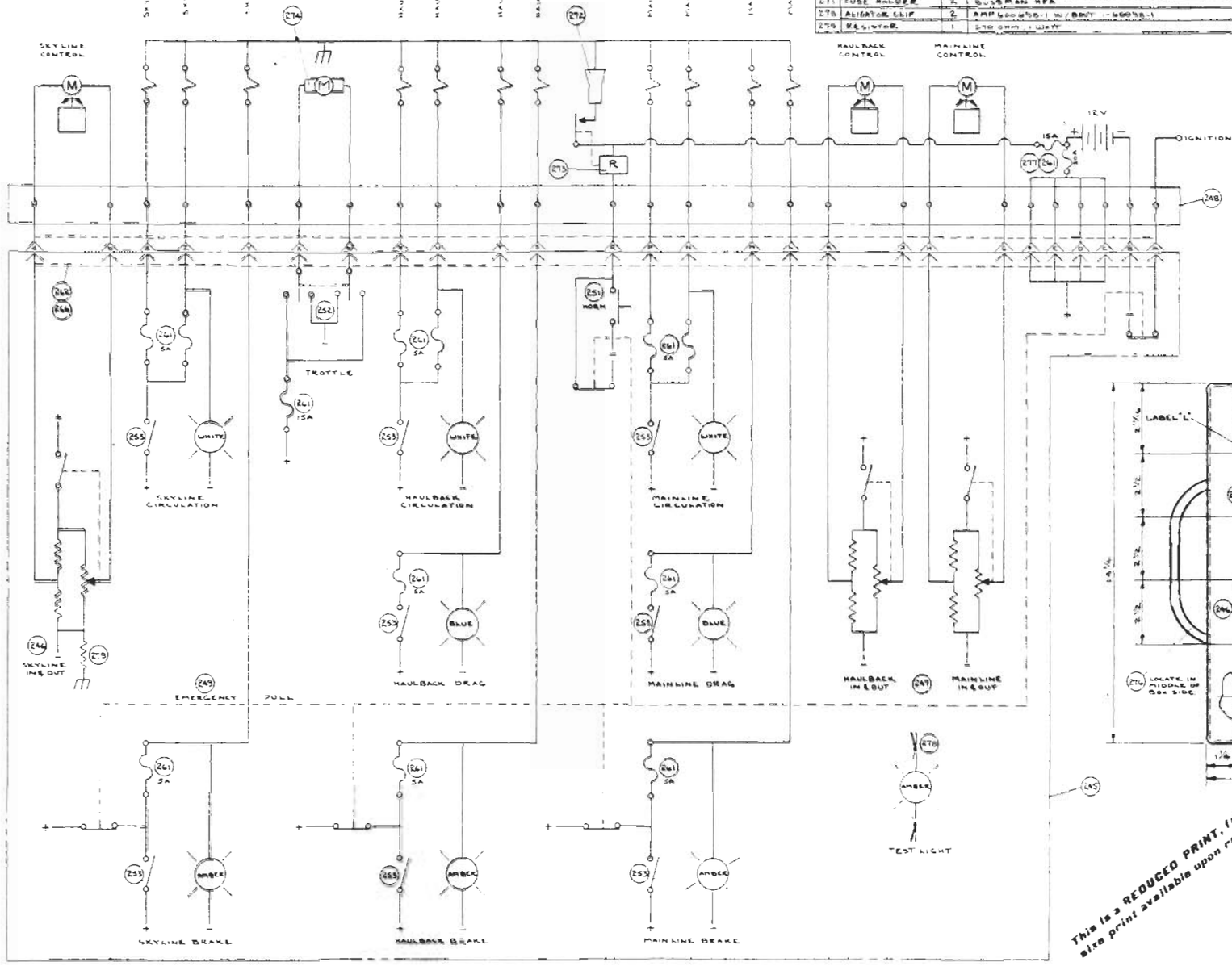
(244) ELECTRICAL SYSTEM - SCHEMATIC

MATERIALS LIST

NO	PART NAME	REQD	MATERIAL DESCRIPTION	SHEET
266	ANGLE PLUG	1	# MS 3108F-28-12S WITH CAP & CHAIN # MS 25082-28D	
267	ADAPTOR	1	E/B-12 TPI OD x 1 7/16-18 TPI ID x 1 11/16 LG, BRASS	
268	RING GRIP	1	USED HEAD # PPE-A21-12Z	
269	POWER CORD	50'	16 AWG 26 CONDUCTOR, TYPE SO	
270	BRACKET	1	3/16 x 1 FLAT BAR, (GOV.) ALUM	
271	BOLT	3	1/4-20 NC x 3/4 LG HEX HD W/STOP NUT & F WASH	
272	HORN	1	DELCO REMY # D1936 OR EQ	
273	" RELAY	1	" " " # D1956 "	
274	LINEAR ACTUATOR	1	WARNER # DC4705 MC, 45 OLD RATING, 4 IN STROKE	
275	SUNT	1	1/4-20 NC x 3/4 LG HEX HD W/WASHNUT & F WASH	
276	HANDLE	5	NATIONAL #V191 OR EQ, 1 1/2 LG	
277	FUSE HOLDER	1	BUSSMAN HFA	
278	ALIGATOR CLIP	2	AMP 600458-1 W/BOOT - 600459-1	
279	RESISTOR	1	3.76 OHM, 1 WATT	

MATERIALS LIST

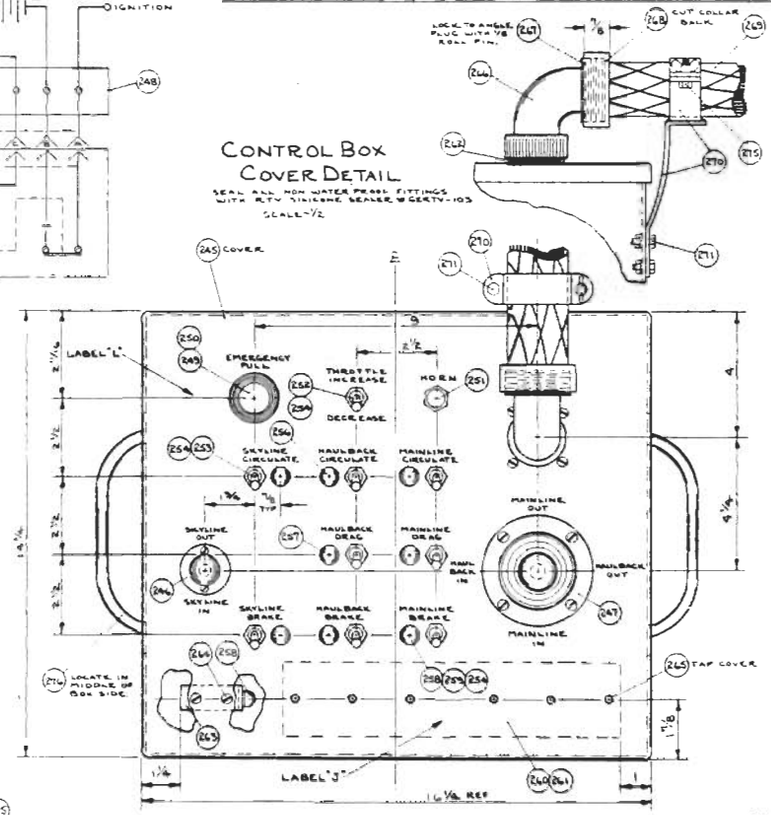
NO	PART NAME	REQD	MATERIAL DESCRIPTION	SHEET
244	ELECTRICAL SYSTEM	1	PARTS 245-279	
245	CONTROL BOX	1	HOFFMAN # A-16 IN NFAL, NEMA 4 JIC BOX, ALUM.	
246	MANUAL CONTROL	1	SLI # C-11E-1R, SPRING CENTER HANDLE, 1-AXIS	
247	" "	1	SLI # C-21E-1R, " " 2- "	
248	SPLICE BOX	1	HOFFMAN # A-16 DLP, W/TERMINAL BARRIER NEMA 4 JIC	
249	EMERGENCY SW	1	SQUARE D CLASS 9001 TYPE K-1R, PUSH-PULL	
250	CONTACT BLOCK	5	" # KA-3	
251	PUSH BUTTON SW	1	MICRO SWITCH # 1PB4	
252	TOGGLE SW	1	" # 2TL1-7, DPDT CENTER OFF	
253	"	8	" # TL1-2, 4PST	
254	SW PANEL SEAL	9	" # 15 PA87	
255	LAMP HOLDER	9	DIALIGHT # 177-8430-09-503	
256	LENS CAP, WHITE	3	" # 177-0935-005	
257	" BLUE	2	" # 177-0936-005	
258	" AMBER	4	" # 177-0933-005	
259	LAMP	9	# 330	
260	FUSE BLOCK	1	LITTLE FUSE # 366 01R, 12 POLE	
261	FUSE	18	AGC TYPE	
262	BOX RECEPTACLE	1	# MS 3102E-28-12P WITH CAP & CHAIN # MS 25082-28D	
263	BRACKET, 90°	1	1/16 x 1 FLAT BAR, ALUMINUM	
264	SCREW	2	6-32 NC x 1/2 LG BINDING HD W/NUT & WASH	
265	"	6	" 3/16 LG FLAT HD.	



CONTROL BOX COVER DETAIL

SEAL ALL NON WATER PROOF FITTINGS WITH RTV SILICONE SEALER # GE RTV-103

SCALE - 1/2



This is a REDUCED PRINT, full size print available upon request.

	DATE	REVISION	BY
△	11-80	CHANGED ITEM 267 FROM 1 7/16-16 TPI TO 1 7/16-18 TPI	WHW

UNLESS OTHERWISE SPECIFIED
TOLERANCES
FRACTIONS ± 1/16
DECIMALS ± ____
ANGLES ± ____
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

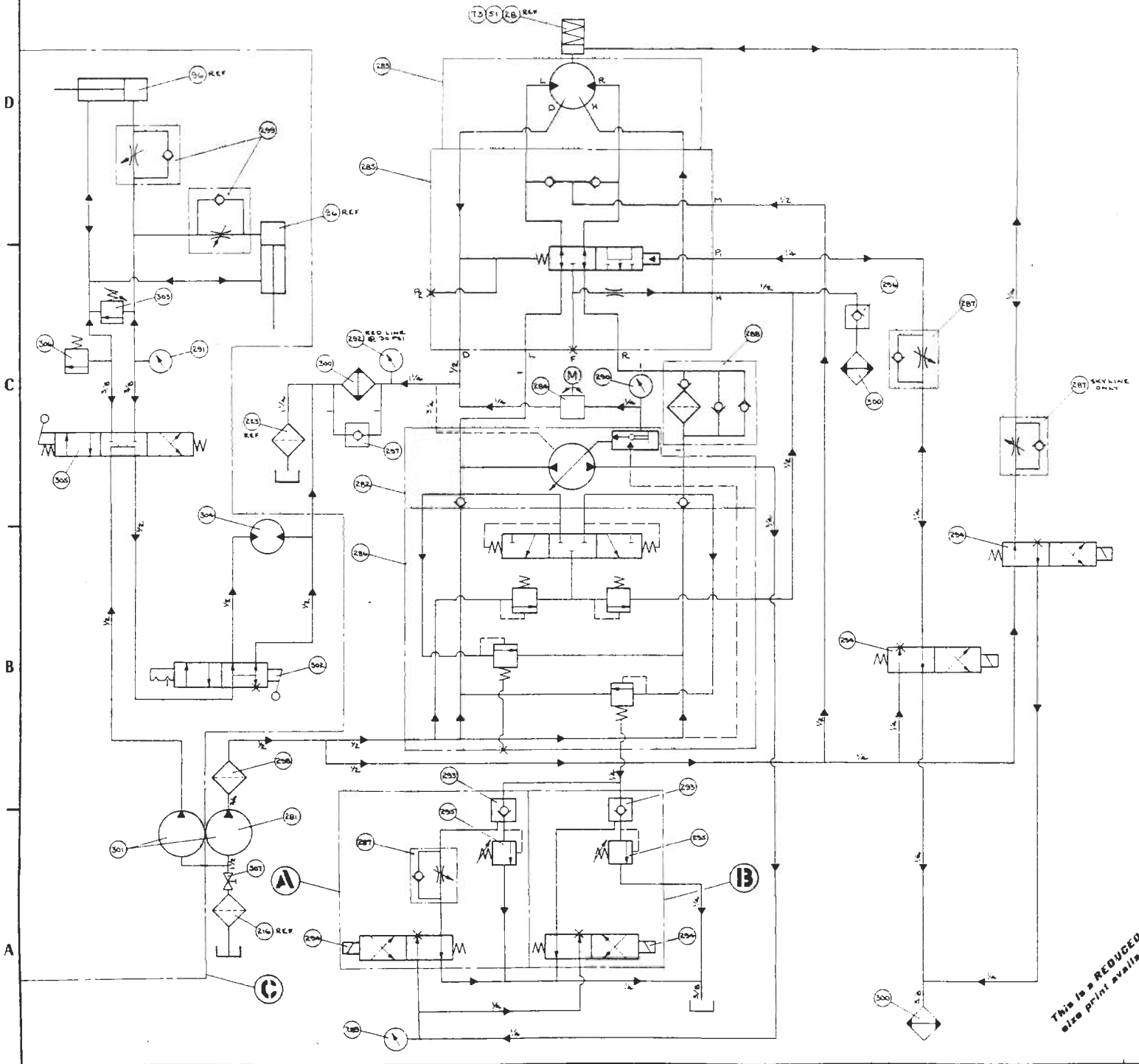
U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA MONTANA

DRAWN	W.H. WYATT
DESIGNED	GARVODA
CHECKED	KARSKY
APPROVED	
SCALE	1/2
DATE	OCT. '79

TITLE
CLEARWATER YARDER
ELECTRICAL SYSTEM - SCHEMATIC

SHEET 15 OF 17

MEDC-637-A



MATERIALS LIST

NO	PART NAME	REQD	MATERIAL - DESCRIPTION	SHEET
280	HYDRAULIC SYSTEM	1	PARTS 281-307	
281	CHARGE PUMP	2	VICKERS VANE PUMP PVED-6PER-15C-12L SAE "B" 2 BOLT FLANGE & MALE SPLINE, 6 GPM @ 1200 RPM & 100 PSI	
282	VARIABLE VOLUME	3	DYNAPOWER PHASE IV MOD 45 # 895176 W/ LOW PRESS SERVO CONTROL # 892629, SAE "D" FLANGE & MALE SPLINE, 4 SAE "B" 2 BOLT FLANGE & FEMALE SPLINE	
283	WHEEL MOTOR	3	HUGGLUND MODEL 1-30850 W/ BRAKE TYPE 130-11	
284	PUMP ACTUATOR	3	SEI INDUSTRIES MOD PCS-601 W/ MOUNTING KIT # 51363-4 S FOR DYNAPOWER MOD 45 PUMP	
285	CIRCULATION VALVE	3	HUGGLUND FREE WHEELING VALVE TYPE VF 10-C-1 FOR HUGGLUND MOD C-1150 MOTOR	
286	RELIEF VALVE ASSY	3	DYNAPOWER # 895176 ABOVE	
287	FLOW CONTROL VALVE	7	DEXTROL FLUID PRODUCTS # 203 OR EQ	
288	HIGH PRESS FILTER	3	PAUL MUNROE HYDRAULICS - FAIREY # 872A-ZERS-210	
289	PRESSURE GAUGE	3	UCC PRODUCTS INC # UC-3820 OR EQ, 0-5000 PSI, 1/4 NPT STEM, GLYCERINE FILLED, 2 1/2 DIA DIAL	
290	"	3	UCC PRODUCTS INC # UC-1615 OR EQ, 0-1000 PSI, 1/8 NPT STEM, GLYCERINE FILLED, 2 1/2 DIA DIAL	
291	"	1	UCC PRODUCTS INC # UC-3842 OR EQ, 0-5000 PSI, 1/8 NPT STEM, 2 1/2 DIA DIAL	
292	"	1	MCMASTER CARR # 4008K, OR EQ., STEEL CASE, 2 1/2 DIA DIAL 0-6.0 PSI	
293	PILOT OPERATED CHECK VALVE	3	RACINE FLUID POWER PRODUCTS # 160B-EF OR EQ	
294	DIRECTIONAL VALVE	11	VICKERS MOD DG4V-3-2A-W-G-10 W/ SUB PLATE # DGVM-3-10-3 OR EQ	
295	RELIEF VALVE	3	DOUBLE A PRODUCTS MOD CA-02-10A2 OR EQ	
296	CHECK "	3	FLUID CONTROLS INC. # 3C14-6-15 OR EQ	
297	" "	1	" " " # 3C16-10-15 "	
298	FILTER	3	SCHROEDER BROS CORP # TF-1-2A10-P-D.	
299	FLOW CONTROL	2	RACINE FLUID POWER # FF3-NKP0-04 $ ORIFICE, ORIFICE 0.6 GPM @ 2,000 PSI & 100°F USING DEXTRON II ATF	
300	COOLER	1	HAYDEN TEMP TROLLER MOD TT-3R, 100,000 BTU/HR. @ 100°F TEMP DIFF COOLING CAP	
301	DOUBLE CHECK PUMP	1	VICKERS VANE DOUBLE PUMP MOD. V2010-1F7S11CCA, SAE "B" 2 BOLT FLANGE & MALE SPLINE, 7 GPM @ 1200 RPM & 100 PSI SHAFT END PUMP, 1 GPM @ 1200 RPM & 100 PSI COVER END PUMP	
302	DIRECTIONAL VALVE	1	WILLIAMS MACH. & TOOL MOD 2000-S-O-H-F-D-R OR EQ., RELIEF PRESS. 2,500 PSI	
303	RELIEF "	1	FLUID CONTROLS INC. # 1L22-F3-405, OR EQ., RELIEF PRESS. 3000 PSI	
304	FAN MOTOR	1	DELTA POWER HYDRAULIC CO., SERIES DM, MOD. DM-2 W/ K-4 MOUNTING BRACKET.	
305	DIRECTIONAL VALVE	1	WILLIAMS MACH. & TOOL MOD 2000-3-T-H-B-3-R OR EQ, RELIEF PRESS. 2,500 PSI.	
306	RELIEF "	1	FLUID CONTROLS INC # 1D11-F2-603 OR EQ., RELIEF PRESS. 3500 PSI	
307	GATE VALVE	3	1" STD DUTY, BRONZE BODY, NON RISING STEM	

(280) HYDRAULIC SYSTEM - SCHEMATIC

TYPICAL FOR MAINLINE, HAULBACK, & SKYLINE CIRCUITS

NOTES:

1. GROUP (A) COMPONENTS PROVIDE DYNAMIC BRAKING WHEN SWITCHING FROM THE CIRCULATION MODE TO NORMAL OPERATION
2. GROUP (B) COMPONENTS PROVIDE A DRAG MODE FOR MAINLINE & HAULBACK ONLY
3. ITEM 285 BOLTS DIRECTLY TO WHEEL MOTOR
4. ITEMS 281, 284, 286, & 301 BOLT DIRECTLY TO VARIABLE PUMP
5. ITEM 301 & GROUP (C) COMPONENTS USED ONLY ON THE SKYLINE VARIABLE PUMP
6. ITEMS 292, 297, & 300 ARE SHARED BY MAINLINE, HAULBACK, & SKYLINE CIRCUITS.
7. GROUPS (A) & (B) TO BE CONNECTED TO HIGH PRESSURE RELIEF VALVE IN ITEM 284, SUBJECT TO PRESSURE DURING WINCH POWER "IN" CYCLE
8. ITEM 288 TO BE ON HIGH PRESSURE SIDE OF VARIABLE PUMP DURING NORMAL OPERATION
9. ALL HOSES/TUBING BETWEEN VARIABLE PUMP, WHEEL MTR, & GROUPS (A) & (B) TO BE RATED 4000 PSI MIN W.P.
10. GROUP (C) HOSES/TUBING TO BE RATED 3300 PSI MIN W.P.
11. ITEM 299 PLUMBED DIRECTLY TO ITEM 96, USING STEEL HYDRAULIC FITTINGS
12. PLUMBING REQUIRES SAME LINE SIZE FOR TUBING AS FOR HOSE EXCEPT 3/4 LINES TO BE 3/4 OD WHEN TUBING USED

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DATE	REVISION	BY
11-80	ITEM 281 # FROM V20-6PEPCL TO V20-6PEP-16C-12L.	WHW
"	CHANGED ITEM 285 TO MOD 12-00850 & BRAKE 130-11	"
"	DELETED CALLOUT OF RELIEF VALVE IN ITEM 282	"
"	" " " 296 FROM # 3C14-10-15 TO 3C14-6-15.	"
"	" " " 302 " -S-O-H-B-O-R TO-S-O-H-F-D-R	"

TOLERANCES: FRACTIONS ± ____ DECIMALS ± ____ ANGLES ± ____

DRAWN	W.H.WYATT
DESIGNED	JASUMBACK
CHECKED	KARSKY
APPROVED	
SCALE	NONE
DATE	OCT-79

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA, MONTANA

TITLE
CLEARWATER YARDER.
HYDRAULIC SYSTEM - SCHEMATIC

SHEET 16 OF 17

MEDC-637-A

OPERATION LABELS

SEE SHEET 1 FOR LOCATION EXCEPT WHERE NOTED
ALL LABELS SHALL BE PERMANENTLY FIXED TO THE YARDER & COMPLY WITH OSHA STANDARDS

MATERIALS LIST				
NO	PART NAME	REQD	MATERIAL DESCRIPTION	SHEET

Caution

- Level the machine before raising mast
- Before raising or lowering the mast:
  make sure hydraulic lift cylinders are free of air
  clear all personnel & obstacles from mast area
- Lower mast before moving machine
- Use all four guylines when operating
- Adjust skyline brake so that it will slip with line loads larger than the maximum pull
- See operators manual for complete instructions

A

Most Combined Load Rating

SL Pull 7,500 lb
ML Pull 3,500 lb
HB Pull 3,500 lb

Guylines anchored 90 ft. maximum from mast. Mast angle not more than 5 degrees from vertical in any direction.

B

CAUTION

USE SAFETY BELT WHEN WORKING FROM MAST

C

Attention
Tighten Bolts Before Operating

D

Warning

Rotating Machinery Keep Clear

E

LOCATE ON BOTH SIDES OF FRAME.

DANGER FAN

F

This is a REDUCED PRINT, full size print available upon request.

Skyline Drum	
Cable Size	1/2"
Cable Const.	6 x 25 IWRC Extra Improved Plow Steel
Cable Length	800 ft
Max Pull	7,500 lb

G

Mainline Drum	
Cable Size	3/8
Cable Const.	6 x 25 IWRC Extra Improved Plow Steel
Cable Length	900 ft
Max Pull	3,500 lb

H

Haulback Drum	
Cable Size	3/8
Cable Const.	6 x 25 IWRC Extra Improved Plow Steel
Cable Length	1,800 ft
Max Pull	3,500 lb

I

Caution

- Operate controls from safe location
- Do not suspend load

J

SEE SHEET 15

ML Circulation	ML Dynamic Brake
SL Brake	ML Brake
SL Circulation	SL Dynamic Brake
HB Brake	HB Dynamic Brake
HB Circulation	HB Drag
	ML Drag

K

EACH LABEL UNDER APPROPRIATE VALVE

IMPORTANT
When Emergency Switch is pulled
TURN IGNITION SWITCH OFF IMMEDIATELY

L

SEE SHEET 15

11-80	REWORDED LABELS A, B, D, E, F, J & L	WMW
DATE	REVISION	BY

UNLESS OTHERWISE SPECIFIED
TOLERANCES:
FRACTIONS ± ____
DECIMALS ± ____
ANGLES ± ____
DIMENSIONS ARE IN INCHES
BREAK SHARP EDGES

DRAWN W. H. WYATT
DESIGNED
CHECKED
APPROVED
SCALE
DATE OCT. '79

U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
EQUIPMENT DEVELOPMENT CENTER
MISSOULA, MONTANA

TITLE
CLEARWATER YARDER
OPERATION LABELS

SHEET 17 OF 17

MEDC-637-A