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BRODERSON MFG. CORP.  
LENEXA, KANSAS 66215

# OWNER'S MANUAL

## IC-80-1D

# YARDRUNNER

OWNER:

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SOLD AND SERVICED BY:

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MODEL NO:

IC-80-1D

SERIAL NO:

126427

1900-00113

BRODERSON MANUFACTURING CORP.

STATEMENT OF WARRANTY

Broderson Manufacturing Corp. ("BMC") warrants its products to be free from defects in material or workmanship at the date of shipment from BMC. This warranty shall be effective only as to defects reported to BMC in writing within 180 days from the date of shipment. THIS WARRANTY DOES NOT APPLY TO ENGINES, DRIVE TRAINS, HYDRAULIC SYSTEM COMPONENTS, OR ACCESSORY EQUIPMENT, WITH RESPECT TO WHICH BMC MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND NO OTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED; the sole warranty, if any, with respect thereto being that made by the respective manufacturers thereof.

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# BRODERSON MANUFACTURING CORP.

## YARDRUNNER

### INTRODUCTION

The BMC Yardrunner was designed and built to provide safe, dependable and efficient crane service. This we warrant by our testing and quality control procedures. To properly utilize the full potential of the equipment, we feel the following customer controlled conditions must exist:

1. The operator must understand the equipment.
2. The operator must know the operating characteristics.
3. The operator must observe the safety rules.
4. The equipment must be given proper maintenance.

This manual was written to provide information required to reach these conditions. The recommendations for periodic inspection, test and maintenance are minimum standards for safe and economical performance.

When ordering parts, the unit serial number, unit model number, part number, part description and quantity must be provided.

This unit must not be altered or modified without written factory approval.

To reorder this manual, ask for Yardrunner Owner's Manual  
P/N 0-990-30025

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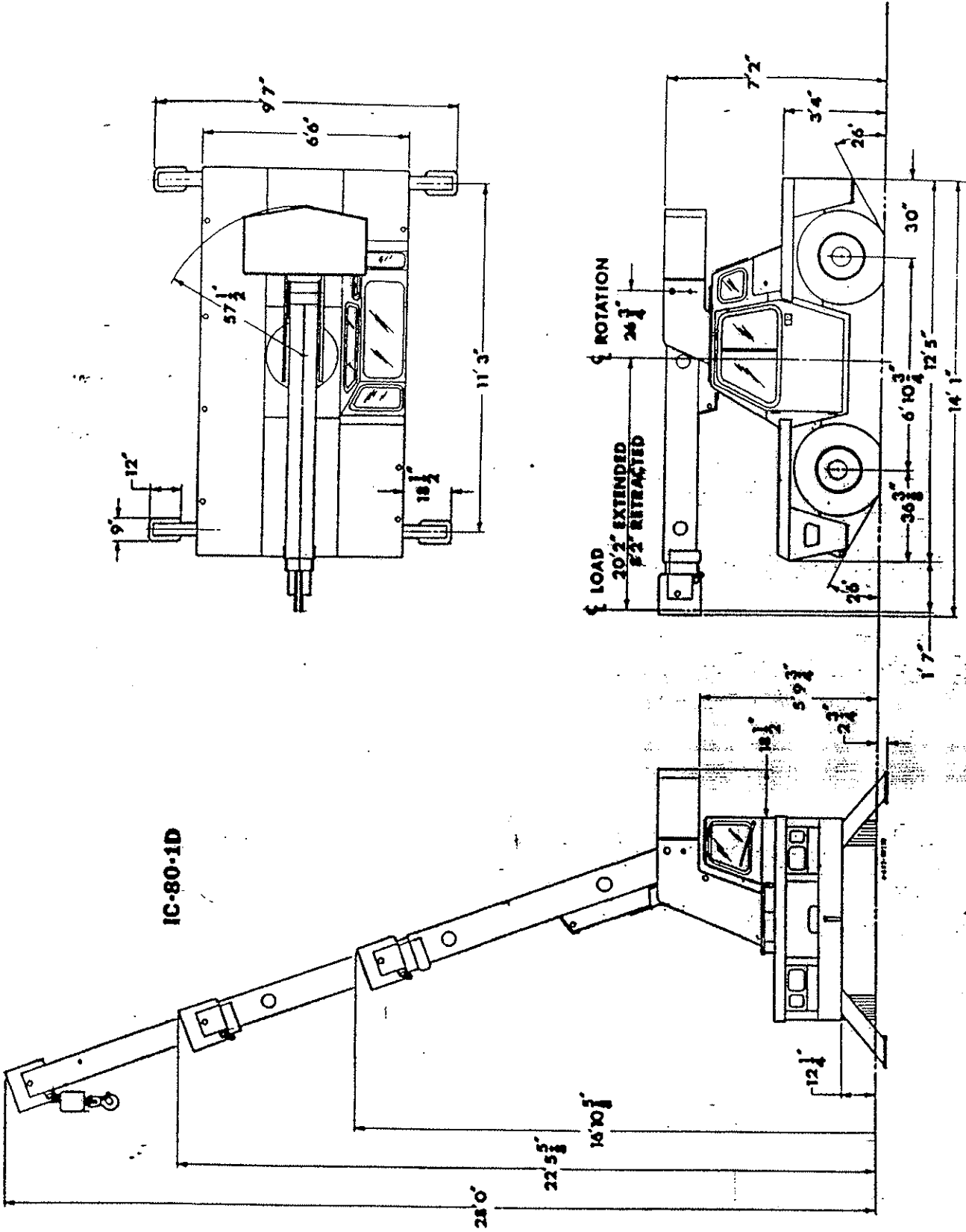
### GENERAL DESCRIPTION

The BMC Yardrunner is a self-propelled vehicle designed for the lifting, placement and material handling normally associated with in-plant maintenance, manufacturing, and other process operations.

The vehicle is self-contained, and consists of the self-propelled chassis and the hydraulic-powered crane assembly. The chassis frame is of all welded, unitized construction. The drive system consists of an engine, torque convertor, reversing transmission, 3-speed transmission, driveline, differential driving axle, and steering axle assembly. The front driving axle is mounted rigidly to the frame. The rear steering axle is pin-connected to the frame to allow  $1\frac{1}{2}^{\circ}$  of oscillation. The unit is equipped with four-wheel hydraulic brakes and a mechanical handbrake. The full power, hydraulic steering control is mounted on the operator's control panel. This, coupled with the placement of gear shift, transmission control, brake, accelerator and crane controls, provides the operator full-vehicle control during normal travel and crane operations. The chassis is equipped with four hydraulic actuated outriggers for maximum crane stability.

The crane assembly is fully powered, and consists of a rotating boom support, and a 3-section telescopic boom hinged to the turret. Double-acting cylinders elevate and telescope the boom assembly. A hydraulically-powered winch is mounted in the turret weldment. A hydraulic motor driving through a worm gear assembly powers the rotating turret assembly.

IC-80-1D



## BASIC SPECIFICATIONS AND COMPONENT MANUFACTURERS' DATA

The BMC Yardrunner has many components which are common to production trucks and other equipment. The following descriptive information is provided as a guide for obtaining the proper replacement parts for components not manufactured by BMC. Your BMC dealer is equipped to service your Yardrunner and will be happy to assist you in locating any parts you may require.

### ENGINES:

Gasoline  
(Standard)

Continental Industrial Model TM27

Displacement - 165 cu. in.

Bore - 3.58 in.

Stroke - 4.06 in.

Weight - 535 lbs.

Governed Speed - 2500 RPM

Horsepower - 64 at 2500 RPM

Torque - Max. 143 ft. lbs. at 1800 RPM

Fuel - Regular or Unleaded Grade Gasoline

Oil Crankcase Capacity - 6 qts. (7 with filter change)

Oil Filter Element - Fram No. PH8A

Oil Pressure - 40-60 PSI

Firing Order - 1-3-4-2

Air Cleaner - Dry Type

Cooling System Capacity - 11 qts.

Diesel  
(Optional)

Perkins Industrial Model D4.203

Displacement - 204 cu. in.

Bore - 3.6 in.

Stroke - 5.0 in.

Weight - 635 lbs.

Governed Speed - 2300 RPM

Horsepower - 63 at 2300 RPM

Torque - 164 ft. lbs. at 1350 RPM

Fuel - No. 2 Diesel, 50 Cetane

Oil Crankcase Capacity - 4 qts. (5 with filter change)

Oil Filter Element - Fram No. PH2895

Oil Pressure - 30-65 PSI

Air Cleaner - Dry Type

Cooling System Capacity - 12 qts.

TORQUE CONVERTOR:

Borg & Beck Model S-11 with stall torque ratio of 2.15.  
Attached to engine flywheel.

TRANSMISSION:

Borg Warner Model 72T/T18. Consists of a reversing gear box and manual shift three-speed gear box. Multiple disc clutch packs in the reversing gear box provide reverse, neutral and forward. Shifting is accomplished by a hand lever control in the operator's compartment. The manual shift gear box is synchronized in second and third speeds. A conventional stick shift lever is located in the operator's compartment. An oil cooler for torque converter and reversing gear box oil is standard equipment.

The Gear Ratios Are:

	<u>Forward</u>	<u>Reverse</u>
1st	6.324 to 1.0	6.956 to 1.0
2nd	3.092 to 1.0	3.401 to 1.0
3rd	1.686 to 1.0	1.855 to 1.0

DRIVE LINE:

Equipped with Spicer 1350 Series Universal Joints.

FRONT DRIVING AXLE:

Rockwell Standard Model F-146 drive axle with 7.2 to 1.0 ratio. Rigid mounted. Oil capacity 14 pints.

REAR STEERING AXLE:

Rockwell Standard Model FF-931 steering axle. 1½° oscillation in either direction.

TIRES:

- Standard - 9.00 x 15 - 12 ply rating highway type
- Optional - 10.00 x 15 - 12 ply rating highway type
- Optional - 2.50 x 15 - Solid Rubber
- Optional - 9.00 x 15 - 12 ply foam filled highway type
- Optional - 10.00 x 15 - 12 ply foam filled highway type
- Optional - 10.00 x 15 - 14 ply mining and industrial

BATTERY:

- For gasoline engine
- BCI Group No. 24F - 385 CCA
- For diesel engine & gasoline w/LP fuel
- BCI Group No. 27F - 560 CCA



WIRE ROPE:

Length - 90 ft.  
Diameter - 9/16 in.  
Construction - 6 x 37 IWRC - EIP  
BMC No. 0-861-18001

PUMP DRIVE:

Spicer 1310 series drive shaft  
BMC No. 3-333-10040

WINCH CONTROL VALVE:

Gresen 25P Per P3565A  
4-Way, 3-Position - Single Spool  
Pilot Operated Relief - Adjustable  
2500 PSI  
BMC No. 0-550-00016

BOOM AND OUTRIGGER CONTROL VALVE:

Gresen V-20-1218  
4-Way, 3-Position - 5 Spool  
Poppet Relief Valve  
3000 PSI (See Maintenance Section - Pg. III-9)  
BMC No. 0-550-00076 (Standard 5 Spool)  
BMC No. 0-550-00077 (Optional 6 Spool - Req'd w/opt. Front Winch)

OUTRIGGER CYLINDER HOLDING VALVE:

Gresen LO-25-DA; B4-5204  
Double Acting - Flange Mounted  
Non-Adjustable  
BMC No. 0-552-00013

BOOM ELEVATION AND EXTENSION CYLINDER HOLDING VALVE:

Sarasota 25725-3G  
Gasket Mounted - Single Valve - Adjustable  
BMC No. 0-552-00011

OUTRIGGER CYLINDER:

Double Acting Hydraulic  
2-1/2" Bore - 23-1/2" Stroke - 1-1/2" Rod  
BMC No. 3-540-10040

BOOM ELEVATING CYLINDER:

-Double Acting Hydraulic  
6" Bore - 21" Stroke - 3" Rod.  
BMC No. 3-540-80020

BOOM EXTENSION CYLINDER:

Double Acting Hydraulic, Rod Fed  
3-1/4" Bore - 72" Stroke - 2-1/2" Rod; Base Section 72" Stroke  
BMC No. 3-540-30054; Tip Section - 3-540-30055

SUCTION STRAINER:

Flow-ezy #S-50-100  
100 Mesh (141 Micron) 260 sq. in.  
Reuseable Wire Filter Element  
BMC No. 0-501-01029

RETURN LINE FILTER:

Gresen #F101-100E  
10 Micron Filtration  
23 GPM  
BMC No. 0-501-01018

Replaceable Filter Element - BMC No. 0-501-01019

PUMP:

Vickers 2520VQ17 A8-11 CB 20L  
Tandem High Performance Vane Type  
Driven Direct Off Engine Crankshaft  
Shaft End Section 34 GPM @ 2500 PSI and 2500 RPM  
Cover End Section 16 GPM @ 2500 PSI and 2500 RPM  
BMC No. 0-520-00002

STEERING UNIT:

Char-Lynn #243-1004  
Open Center - Load Sensing - Load Blocked in Neutral  
7.4 cu. in. per revolution  
BMC No. 0-559-00045

STEERING CYLINDER:

Gould #8010-018  
2" Bore - 7-3/4" Stroke - 7/8" Rod  
BMC No. 3-540-10027

TURRET ROTATION MOTOR:

Char-Lynn Orbitrol Motor #101-1012  
BMC No. 0-530-20023

TURRET ROTATION GEAR BOX:

Worm Gear Drive  
Worm Gear Ratio: 30 to 1  
Spur Gear Cut on Output Shaft  
BMC No. 0-280-00134

PLANETARY GEAR WINCH:

Gear Products Model 110-00051  
Capacity - 10,000 lbs.  
Double Planetary Reduction  
Planetary Ratio 36:1  
Drum Dia. 9-3/4"  
Drum Length - 13-1/4"  
Flange Dia. - 13"  
Internal Safety Brake  
Spring Engaged  
Hydraulically Released  
BMC No. 0-280-00125

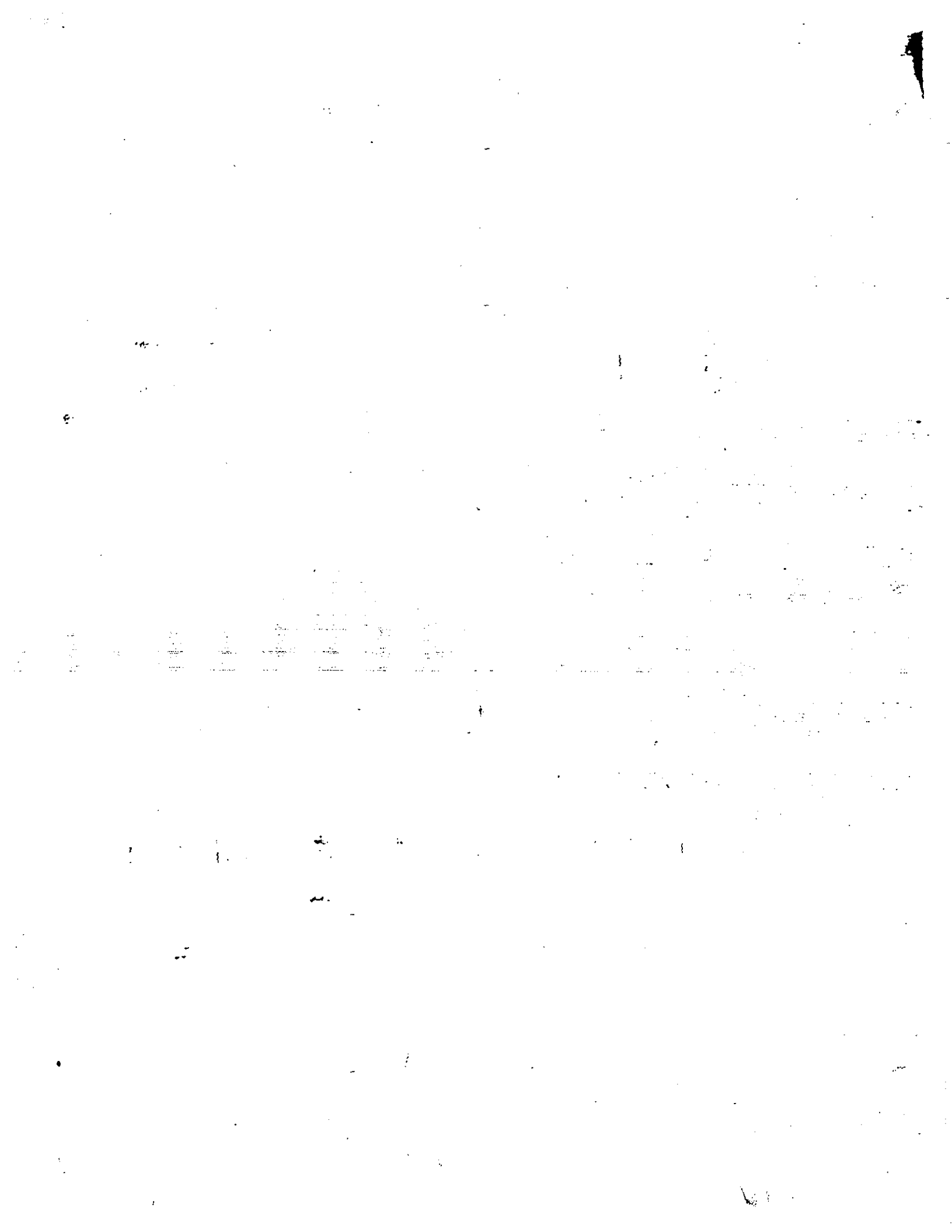
PLANETARY GEAR WINCH MOTOR:

Commercial Shearing Model No. 303-9310-061 25X  
2-1/4" Gear Size  
BMC No. 0-530-20019

OPTIONAL FRONT WINCH

AUXILIARY FRONT WINCH:

Braden Winch - Model HU-8A  
Line Pull, 5000 lbs @ 46 ft./minute on bare drum  
Worm Gear type  
Drum dia. 3 1/2", drum length 11"  
Flange dia. 7 5/16"  
Has 75' of 3/8" wire rope  
Ross Hydraulic Motor - #MAF-06-0-01  
Lubricant for Worm Gear Box is EP90 wt.  
Gear Oil API Class GL-S



OPERATION

## INSTRUMENTS AND CONTROLS

The Yardrunner dashboard is equipped with a standard instrument package showing electrical system amperage, fuel level, oil pressure, convertor oil temperature, and water temperature. The ammeter shows amount of charge being generated by, or used by, the electrical system. An hourmeter is also included in the instrument package.

The ignition switch is key operated and has "ACC'SY.", "RUN" and "OFF" positions. A push button start switch is located slightly below and to the left of the ignition switch. The ignition switch should always be turned off and the key removed when the vehicle is left unattended.

The choke knob is located at the left end of the dashboard.

The BMC Yardrunner is equipped with a standard lighting package, an on-off switch and a high beam indicator are on the dashboard. The dimmer switch is located near the cab floor at the left front of the operators compartment. Stop lights are controlled by operating the foot brakes. The turn signal control is located on the left side of the steering column. Moving the lever down indicates a left turn; moving the lever up indicates a right turn. The emergency flasher lights are actuated by pulling outward on the lever when it is in the neutral position. This turn signal is not self cancelling. A two-block warning light is on the dashboard.

The hand brake lever is located on the right side of the operator's seat. To apply, lift the lever until the "over-center" position is reached. When adjustment is required, turn the knurled knob on the end of the lever clockwise to tighten. The brake must be released before adjustment can be made.

The brake and accelerator pedals are located and operated as they are in other vehicles already familiar to the operator.

A hand operated lever, near the right front corner of the operators seat, controls the forward and reverse transmission. When this lever is in neutral, the main transmission can be shifted into first, second or third gear. Moving the lever forward shifts the forward and reverse transmission for forward travel. To put this transmission in reverse, the machine should be brought to a complete stop. The lever then is pulled rearward - through the neutral position, into reverse.

The transmission and drive train components can be severely damaged by shifting from forward to reverse or vice versa while the unit is in motion, or while the engine speed is above 1000 RPM.

A neutral safety switch in starter circuit prevents starting engine with forward-reverse transmission engaged. Shift lever must be in neutral to start engine.

The transmission gear shift lever is located to the right of the operator's seat which provides first, second and third gear speed ranges. A dash mounted placard shows the shifting pattern.

The steering wheel is direct mounted to the valve of the full hydraulic power steering system. The steering system will provide limited steering even though the engine should stop running.

Every effort has been made to make the Yardrunner a stable vehicle, however, with the rigid front axle suspension and the oscillating rear axle suspension, the operator should control the vehicle speed to be compatible with conditions of rough roads or uneven terrain.

The controls for operating the outriggers, boom rotation, boom elevation, boom extension and winch are located along the forward dashboard area. These handles are direct-connected to the 4-way hydraulic control valves. The placard located adjacent to these handles identifies the function controlled and movement resulting from each handle actuation.

#### OPTIONAL FOUR-WHEEL STEERING

If the crane is equipped with the four-wheel steering system, a Selector knob is provided in the operators compartment to select either two-wheel steer or four-wheel steer mode. When this knob is pushed in, two-wheel steer is available - only the rear axle is steered. When the knob is pulled out, four-wheel "round steer" is available. This makes the steering radius much smaller and the crane can be maneuvered into tighter places. Two-wheel steer should be used for traveling long distances. To change from four-wheel to two-wheel steer, make sure the front wheels are pointed straight ahead, then push the selector knob into "rear axle steer only" position.

## SEQUENCE OF OPERATION

### Driving the Vehicle

The following procedure is recommended for driving the vehicle to the job site:

1. Apply hand brake.
2. Place forward and reverse transmission control lever in neutral.
3. Start engine and allow a warming period.
4. Check to see that boom is retracted.
5. Check to see that boom is centered.
6. Check to see that boom is lowered.
7. Check to see that outriggers are retracted.
8. Shift manual transmission lever to desired travel speed.
9. Release hand brake.
10. Shift forward and reverse transmission control lever to desired travel position.
11. Depress accelerator pedal to reach travel speed.

### Operating the Crane

The following procedure is recommended for placing the crane in operation:

1. Apply hand brake.
2. Start engine and allow warming period.
3. All outriggers must be extended firmly to ground at all times before operation is conducted and remain extended until work operations are completed and boom is restored to road-travel position, except for pick and carry operation.
4. During operations, the controls should always be metered when beginning or terminating movement to prevent sudden starting or stopping, which imposes undue shock loads on the equipment, especially when handling heavy loads. The control should be slightly actuated to begin movement and then slowly increased to fully actuated position for maximum operating speed. The results obtained from metering the control lever can also be achieved by coordinating the throttle control.

Never hold a control lever in the open position after the function has reached the end of its travel. This will impose unnecessary stresses on the components and reduce service life.

When conducting lifting operations, the operator must have studied the capacity placard and adhere to the load capacities and radii of handling given. The information provided on this placard is indicative of both structural capacities and tipping factors. Therefore, if any doubt arises about a given load or radius, the operator must refer to this chart.

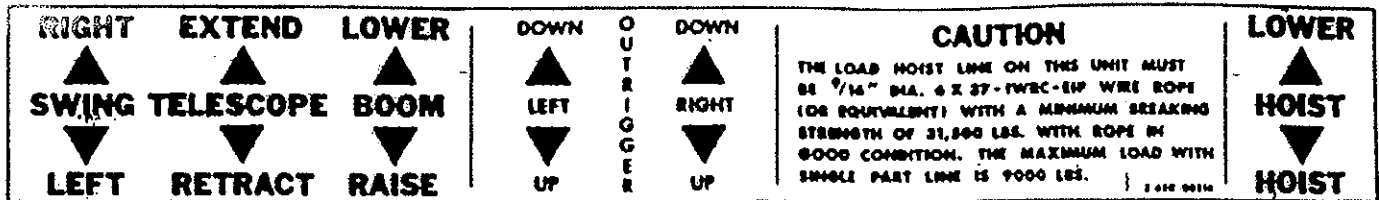
Maximum load capacity ratings on this equipment are given on the basis that operations are to be conducted on firm and level terrain with outriggers extended firmly to ground. These capacity ratings are reduced in proportionate degree to the extent of deviation from the prescribed conditions. Any unfavorable environmental conditions, such as soft, sloping or uneven terrain, constitute a deviation.

All capacities are given in direct relationship to the radius at which the load is being handled. The greatest load that may be handled by the BMC Yardrunner is 17,000 pounds but only at a 5' radius. All variances of loads and radii of handling are shown on the load capacity chart and on the capacity placards. These placards are provided near the operator's seat for the express purpose of informing the operator when a load can or cannot be safely handled.

The capacities shown on the capacity chart apply to the entire 360° rotation of the boom, and are maximum allowable at the indicated radius. All radii are measured from the centerline of turret rotation to loadline.



## CONTROLS AND FUNCTIONS



All controls are identified by placard and the direction of actuation for desired movement is indicated on the same placard.

Boom: Pulling back will raise the boom; pushing forward will lower it.

Telescope: Pulling back on the lever will retract the boom; pushing forward will extend the boom.

Swing: Pulling back on the lever will rotate the boom to the operators left; pushing forward will rotate it to the operators right.

Hoist: Pulling back on the lever will raise the loadline; pushing forward will lower the loadline.

All controls may be used for simultaneous operation to achieve combinations of movements. Some controls must be used conjunctively. For instance the boom extension and the loadline controls must be used together to maintain clearance between boom and loadline hook.

## SAFETY DEVICES

There are certain safety devices on the Yardrunner that are designed to maintain control of a load even though power or hydraulic line failure should occur. The operator should understand the function and operation of these devices so that a continual check on their performance can be made.

### Outrigger Cylinder Check Valve:

A double-acting check valve is flange-mounted on each of the outrigger cylinders. This valve holds the outrigger in the extended position should power or hydraulic line failure occur. This valve has no adjustment. If an outrigger creeps up while supporting a load, there is an internal leak in the valve or in the outrigger cylinder piston seal. In either case, maintenance is required.

### Boom Elevation Cylinder Holding Valve:

A single-acting holding valve is flange-mounted on the cylinder barrel. This valve holds the boom in the elevated position should power or hydraulic pressure line failure occur. This valve is adjustable to hold the desired load. If the boom creeps down with loads up through maximum capacity, this valve should be adjusted. If adjustment fails to correct the problem, there is an internal leak in the holding valve or the hydraulic cylinder. Refer to the maintenance instructions.

### Boom Extension Cylinder Holding Valve:

A single-acting holding valve is flange-mounted to the cylinder rod end. This valve holds the cylinder in the extended position should power or hydraulic pressure line failure occur. This valve is adjustable to hold the desired load. If the boom creeps in under load, this valve should be adjusted. If adjustment fails to correct the problem, there is an internal leak in the holding valve or the hydraulic cylinder. Refer to the maintenance instructions.

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### Two-Block Warning:

Standard equipment on this crane includes an anti-two-block warning device. When the downhaul weight comes within approximately 20" of the boom tip, a red warning light in the operator's compartment will begin to flash, and an audible warning will sound for six seconds. After six seconds, the audible warning will no longer sound, but the red warning light will stay on until the load is lowered. This system DOES NOT PREVENT TWO BLOCKING. (An optional system is available that dumps the hydraulic system and will prevent two-blocking.)

The Anti-Two-Block with DUMP option is a fail safe system. If a wire is broken or other malfunction occurs, it may be impossible to operate the boom. An EMERGENCY OVERRIDE SWITCH is provided so the boom

can be operated in case of system failure. This key-operated switch is located under the left side of the instrument panel.

#### WARNING

We recommend the Emergency Override Switch be used with discretion. Improper or careless use of this switch can cause damage to the crane and endanger people and property. The operator who uses this key in an emergency should use good judgement.

#### SAFETY RULES

1. Since the manufacturer has no direct control over machine application and operation, conformance with good safety practice is the responsibility of the user or his operating personnel.
2. The operator shall not engage in any practice which will divert his attention while actually operating the crane.
3. The operator shall be responsible for those operations under his direct control. Whenever there is any doubt as to safety, the operator shall have the authority to stop and refuse to handle loads until safety has been assured.
4. Always refer to Crane Capacity Chart in operator's compartment before handling load. Do not exceed load ratings. Under some conditions even the full standard capacity ratings cannot be recommended and must be adjusted downward to compensate for special hazards, such as supporting ground and other factors affecting stability, wind, hazardous surroundings, operator experience, etc.
5. Inspect load hoist rope and wedge socket daily. We recommend rope inspection, replacement and maintenance be in accordance with ANSI B30.5-1982, Section 5-2.4.
6. Do not allow anyone to stand or pass under a load on the hook.
7. The operator shall not leave his position at the controls while the load is suspended.
8. Do not use crane to drag loads sideways.
9. Do not hoist, lower, swing or travel while anyone is on the load or hook.
10. Always keep crane boom at least 10 feet away from electric power lines. If boom should accidentally contact a power line - keep ground personnel away from crane.
11. Crane shall not be refueled with the engine running.
12. Always use adequate parts of load hoist line for lifting heavy loads. Consult Crane Capacity Chart.

## SAFETY RULES

13. Always be sure the rope is properly seated and wound level on hoist drum.
14. Keep hands away from load hoist rope when winch is being operated.
15. When handling loads below ground level, be sure at least five wraps of rope are left on the hoist drum to insure against rope pulling out of its anchor.
16. The amount of counterweight supplied with this crane should never be changed. Unauthorized addition of counterweight in the field to increase lifting ability constitutes a safety hazard.
17. For Pick and Carry operation. Traveling with suspended loads involves so many variables such as ground conditions, boom length, momentum in starting and stopping, etc., that it is impossible to devise a single standard rating procedure with any assurance of safety. For such operations, the user must evaluate prevailing conditions and determine safe practices, using precautions, such as the following:
  - a. The boom shall be centered over front axle.
  - b. Use shortest boom practical.
  - c. Carry load as close to ground as practical.
  - d. Travel speed reduced to suit conditions (3 mph max.)
  - e. Maintain specified tire pressures.
  - f. Avoid sudden starts and stops.
  - g. Provide tag or restraint lines to snub swinging of the load.
  - h. Do not carry maximum boom loads and maximum deck loads at the same time.
18. For Carrying loads on Decks.
  - a. Boom must be retracted, centered and lowered to horizontal.
  - b. Retract all outriggers.
  - c. A 12,000 lb. load can be carried on front or side deck if load is centered over or between axles. When decks are loaded to capacity, do not "Pick & Carry" load on boom.
  - d. Travel in first gear only - 3 mph when carrying capacity deck load.
19. Avoid "Two Blocking".
  - a. Stop raising hoist line before downhaul weight or hook block strikes boom tip plates.
  - b. Pay out hoist line while extending boom.
  - c. Maintain clearance between downhaul weight or hook block and boom tip while booming down.

## SAFETY RULES

20. Before beginning operation each day, thoroughly inspect the entire crane to be sure it is in good operating condition.
21. If crane is equipped with a cab, keep all window glass clean. Keep gauges clean also.
22. Keep operator's compartment and decks free of mud and grease.
23. When raising the boom or moving the unit with boom elevated, be sure there is adequate overhead clearance for boom.
24. Cranes with rear steering require close watch because of "tail swing" when operating in close quarters.
25. When servicing or repairing this crane, always stop engine and remove key from ignition.
26. When this crane is to be parked on a downgrade, block wheels or extend outriggers fully.
27. The above list of rules is only a supplement to all federal, state and local safety rules that may apply.

### WARNING

Vapors can be formed inside a fuel tank and cause a build up of pressure that can result in a sudden expulsion of gasoline and gasoline vapors from the filler neck when the gasoline cap is removed from a hot tank.

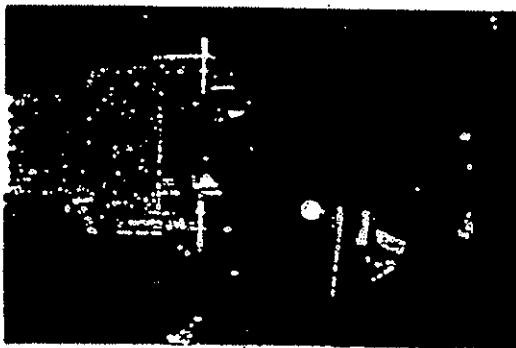
**WARNING!** Remove cap slowly. Fuel spray may cause injury.

## STOWING BOOM EXTENSION

When Boom Extension is mounted on the tip section Boom, here are the steps to follow to stow the Boom Extension along side of the base Boom.

1. Lower the boom to horizontal and retract the booms fully.
2. Remove cable retaining pins at outer end of Boom Extension. Remove cable from sheave and replace pins.
3. Uncouple anti-two-block cable. Remove 1" pins from left side of boom. Swing Boom Extension 170° to right (along side of base Boom). Remove pin from support tube on base Boom. Swing Boom Extension inward so lugs line up and pin Boom Extension to base Boom.
4. Remove 1" pins from lugs on right side of tip section Boom and stow these pins in outside lugs of Boom Extension.
5. Remove pin from rear lugs on base Boom, swing tip end of Boom Extension inward and pin to base Boom.
6. Install cable in main boom sheave.
7. Main boom is now ready for normal crane use.
8. Boom Extension is installed in reverse order.

### WARNING



The illustrations above show that when the Boom Extension is stowed on the Base Boom and Work Platform or Bucket is installed on the Tip Section, the Tip Section cannot be fully retracted. Personal injury and/or structural damage can occur when the boom is retracted under these conditions.

For SAFETY'S SAKE - to workmen and the cranes structure -  
REMOVE BOOM EXTENSION - from Base Boom when using Work  
Platform or Personnel Bucket/s.

## YARDRUNNER MAINTENANCE

The Yardrunner, like all hydraulically operated mechanical equipment, will perform with high efficiency for longer periods if a program of inspection, lubrication, adjustment and general preventive maintenance is followed. We recommend the following schedule.

NEW UNIT INSPECTION AND TEST

Each Yardrunner undergoes a thorough inspection and operations test at the factory. At this time, all adjustments are made and it is determined that the unit is properly assembled, and that the unit performs in accordance with the specifications.

The following new unit inspection and test should be made before placing the unit on the job. This will insure that no damage or loss of operating capability occurred during shipment.

## 1. General Inspection:

- (a) Check for physical damage.
- (b) Check for leaks in hydraulic fittings.
- (c) Check radiator coolant level.
- (d) Check engine oil level.
- (e) Check hydraulic oil reservoir level.
- (f) Check torque convertor oil level.
- (g) Check fuel tank level.
- (h) Check battery water level.
- (i) Check tire pressure (95 psi).
- (j) Check for loose pins, bolts, and retainers.

## 2. Operational Test:

- (a) Operate forward and reverse transmission control lever for forward, neutral and reverse positions.
- (b) Operate foot brake - check for operation.
- (c) Operate hand brake - check for operation and adjustment.
- (d) Operate accelerator pedal - check for operation.
- (e) Start engine.
- (f) Check oil pressure.
- (g) Check ammeter.
- (h) Check power steering for operation.
- (i) Check transmission shift lever for operation.
- (j) Check all lights and turn signals for operation.
- (k) Test drive unit and check for normal operation.

- (l) Check operation of hydraulic outriggers.
- (m) Check boom rotation.
- (n) Check boom elevation.
- (o) Check boom extension (payout winch cable during power extension).
- (p) Check anti-two-block operation. Flashing red light and audio alarm operates properly- standard equipment --or hydraulic dump system operates properly-optional equipment.

### OPERATOR MAINTENANCE

An operator, in the course of normal crane operation, should make certain observations, inspections and tests to determine that the unit is ready and able to perform safely at rated capacities.

#### Daily:

1. Check radiator coolant level.
2. Check engine oil level.
3. Check fuel level.
4. Check hydraulic oil level.
5. Check general condition of tires.
6. Visually inspect for loose bolts, pins, oil leaks, or physical damage.
7. Check engine oil pressure.
8. Check engine coolant temperature.
9. Check battery charging amperage.
10. Check convertor oil temperature.
11. Check forward and reverse transmission control lever operation.
12. Check hydraulic brake operation. (Use Dexron II ATF fluid)
13. Check hand brake operation.
14. Check power steering operation.
15. Observe chassis for normal driving operation.
16. Observe boom operation for normal power and speed.
17. Check for winch line damage.

#### Weekly:

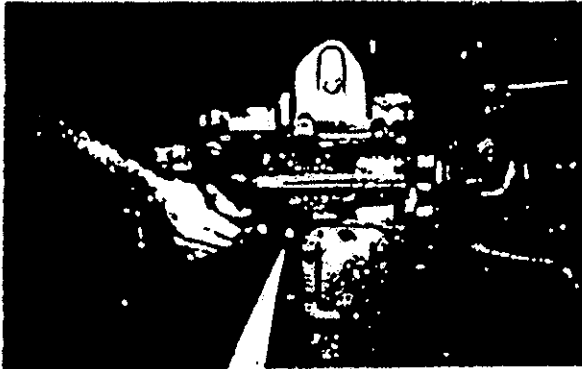
1. Check tire pressure (95 psi).
2. Check front axle mounting bolts for tightness.
3. Check wheel nuts for tightness.
4. Check battery water level.
5. Check lights and turn signals.
6. Check brake lines for damage.
7. Check power steering lines for damage.

#### Monthly:

1. Check rotation gear attachment to frame for tightness.
2. Check backlash in rotation gear train.
3. Check outrigger cylinder holding valves for operation.
4. Check boom topping cylinder holding valve for operation.

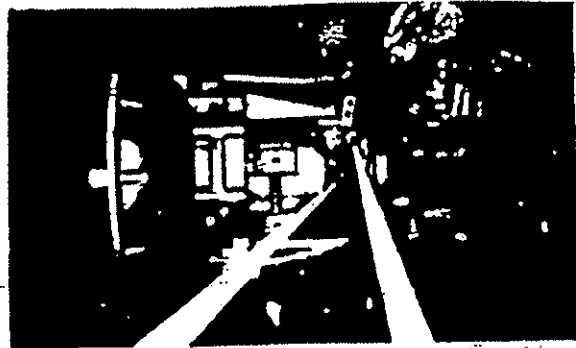


5. Check boom extension cylinder holding valve for operation.
6. Check hydraulic center post for leaks.
7. Visually inspect all hydraulic fittings for leaks.
8. Visually inspect all bolts for tightness.
9. Visually inspect all hinge pins for secureness.
10. Visually inspect all welds for cracks.



OIL FILL HOLE  
FILL OIL TO BOTTOM OF FILL NECK

MAIN TRANSMISSION

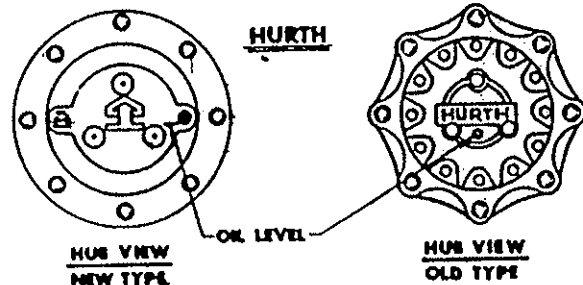
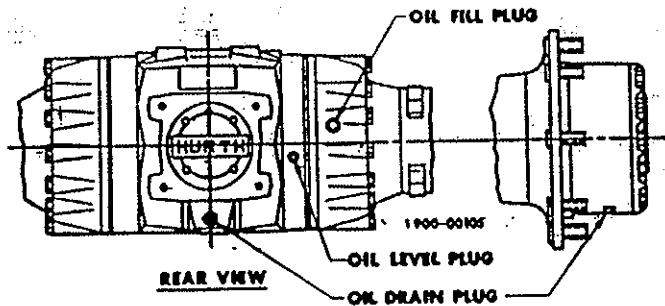
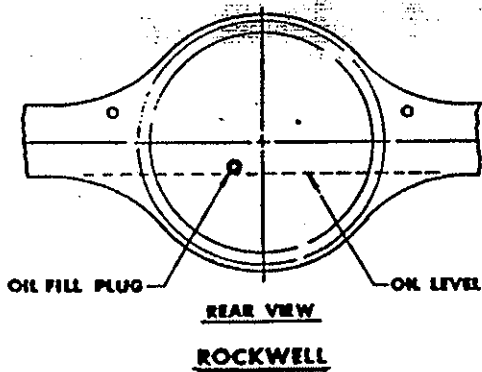


OIL FILL HOLE

OIL LEVEL DIPSTICK

REVERSING TRANSMISSION

### DRIVE AXLES



## LUBRICATION SCHEDULE

ITEM	DESCRIPTION	LUBE SYMBOL	LUBRICATION INTERVALS (HOURS)					NOTES
			DAILY	50	500	1000	YEARLY	
1.	Engine Oil	EO	X					Check Per Mfg. Recom. Replace Semi-Annual Replace Yearly Replace Yearly  Replace Yearly Replace Yearly 3 Zerks 2 Zerks  8 Zerks 4 Zerks Clean & Repack 1 Zerk  2 Zerks 1 Zerk 1 Zerk At Wear Points  1 Zerk At Wear Points 1 Zerk At Wear Points  Replace Yearly Replace Yearly Repack & Overhaul Coat Teeth  2 Zerks 1 Zerk 1 Zerk Brush on Boom
2.	Engine Oil Drain	EO						
3.	Hydraulic Oil	HO	X			X		
4.	Reversing Trans. 4 Speed Trans.	ATF MPL		X			X X	
5.	Drive Axle (Rockwell) Drive Axle (Hurth)	MPL MPL $\Delta$			X X		X X	
6.	Drive Shaft	MPG		X			X	
7.	PTO Shaft	MPG		X				
8.	Steering Cyls. Ends	MPG						
9.	Tie Rod Ends	MPG			X			
10.	Wheel Brgs.	WBG			X			
11.	Boom Hinge Pin	MPG			X		X	
12.	Topping Cyl.	MPG				X		
13.	Tip Sheave	MPG			X			
14.	Axle Pivot Point	MPG			X			
15.	Control Valve Links	EO		X				
16.	Accel. Linkage	MPG				X		
17.	Shift Linkage	EO		X				
18.	Shifter Reversing Hand Brake Linkage	MPG EO		X X				
19.	Planetary Hub	MPL $\Delta$						
20.	Winch	MPL*			X		X	
21.	Rot. Gear Box	MPG					X	
22.	Rot. Gear	OGG		X				
23.	Sheave Block	MPG		X				
24.	Rot. Gear Brgs.	MPG		X				
25.	King Pins	MPG		X				
26.	Boom Rub Pads	WO		X				

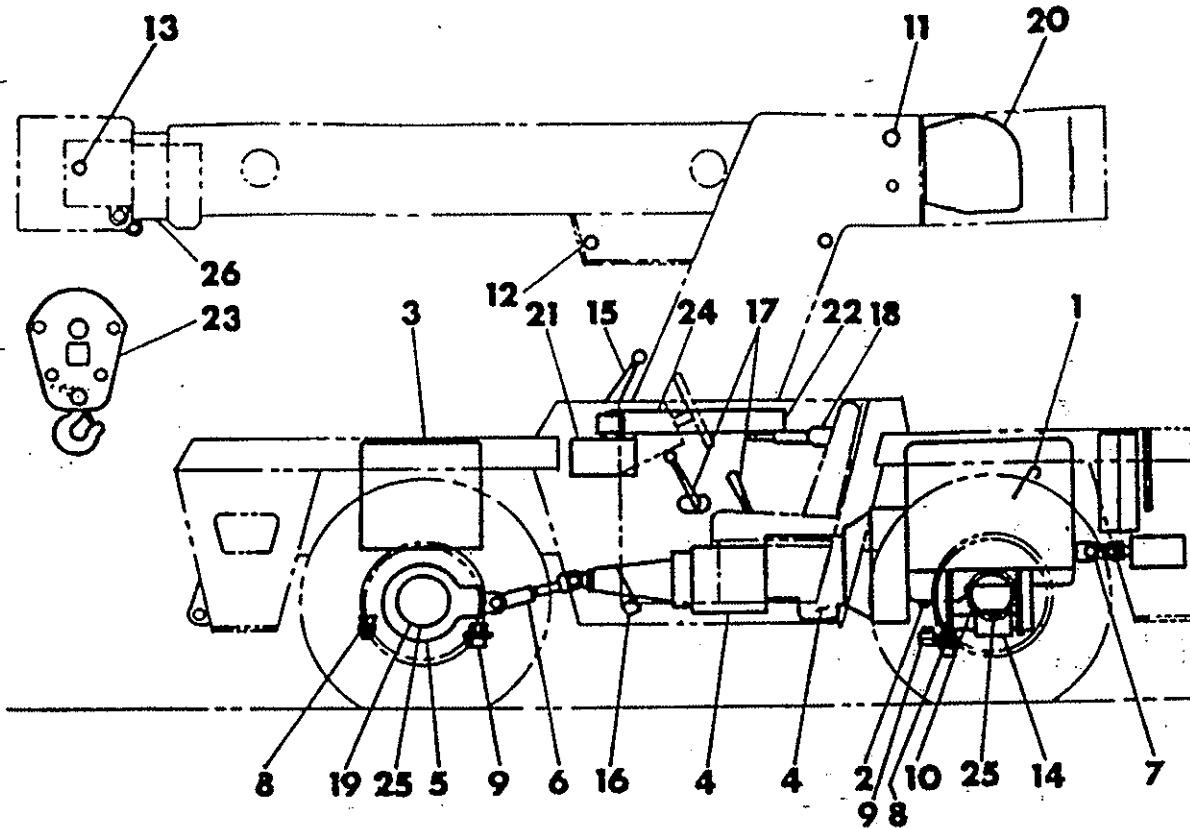
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### LUBE SYMBOLS

- MPG - Multipurpose Grease
- MPL - Multipurpose Gear Lub - SAE 90
- MPL $\Delta$  - Multipurpose Gear Lub - Mobile #46
- MPL\* - Multipurpose Gear Lub - SAE 140
- WBG - Wheel Brg. Grease
- HO - Hydraulic Oil
- EO - Engine Oil
- OGG - Open Gear Grease - Example: Mobilkote S
- ATF - Automotive Trans. Fluid - Example: Mobilfluid #423
- WO - Ways Oil - Example: Vactra #4 Mobile

NOTE: Under extremely dusty conditions intervals should be shortened. The above are only minimum recommended schedules.

# IC-80 YARDRUNNER LUBRICATION CHART



## Hydraulic System:

The hydraulic system is the "Heart" of the BMC Yardrunner. To obtain the most efficient operation and longest life from the machine, it is important that certain principles be followed.

## Care of Hydraulic Oil:

Hydraulic Oil does not wear out and could be left in a machine forever if it were not for contamination by dirt, metal particles, water and acids.

The BMC Yardrunner is equipped with a 100 mesh, reusable, suction line strainer to remove the larger particles from the oil before they enter the pump and other components. In the return line there

**WARNING**  
**USE DEXRON ATF (MINERAL OIL) IN BRAKE SYSTEM.**

is a 10 micron filter to remove fine particles. The filter must be serviced after the first 50 hours of operation to eliminate from the system the unavoidable products of manufacturing processes and initial run-in. To minimize oil loss, close the "shut-off" valve before servicing the filter.

BE SURE THE SHUT-OFF VALVE IS OPENED FULLY BEFORE PUTTING THE PUMP BACK IN OPERATION.

The return line filter requires a new disposable cartridge for proper servicing. All parts should be cleaned and reassembled with a new cartridge in the same manner as an automotive oil filter is changed. Return line filter element should be replaced every 250 hours of operation.

Although the filter keeps the system clean and free of particles, it is impossible to eliminate the water and acids which build up in the oil due to condensation and oxidation. It is, therefore, important that the oil be drained from the system and replaced with fresh oil after each 500 hours of operation and/or each year. Suction strainer should be serviced at this time.

The suction strainer is threaded into the hydraulic tank suction port. To service, drain the oil from the tank. Remove the gate valve from the suction port. Remove the suction strainer by turning the 3½ inch hex bushing counterclockwise. Wash the element in clean solvent and allow to dry. Dry the threads inside the suction port of the tank. Apply non-sieze pipe sealant and reassemble.

#### HYDRAULIC OILS FOR IC-80

AMBIENT TEMP RANGE:	<u>-40° TO 75°F</u>	<u>-15° TO 110°F</u>	<u>50° TO 130°F</u>
POUR POINT	-40°F MAX	-15°F MAX	0°F MAX
VISCOSITY INDEX:	140 MIN	95 to 100	95 to 100
VISC. SSU @ 100°F:	200 MAX	230 MAX	340 MAX
SSU @ 210°F:	44 MIN	47 MIN	53 MIN
EXAMPLES:	MOBIL DTE-13 MOBIL UNIV-ATF TEXAMATIC TYPE F	MOBIL AW-46 MOBIL DTE-25 CONOCO SUPER 46	MOBIL AW-68 MOBIL DTE-26 CONOCO SUPER 68

OTHER REQUIREMENTS: - Must contain rust and oxidation inhibitor, and antifoam and antiwear agents. Must pass Vickers Vane Pump Test.

The IC-80 is factory filled with hydraulic oil for the -15° to 110°F range. If significant portions of time are spent operating below 20°F or above 100°F, the oil should be replaced with an extreme temperature oil.

The oils shown on the opposite page are compatible with and may be combined with MS 10W or MS20-20W motor oil if it is necessary to add oil between changes and the recommended oils are not available. These MS motor oils are not suitable substitutes when changing hydraulic oil because they lack certain additives which make the DTE oils superior for hydraulic system use.

#### CAUTION

Never add kerosene or other "thinners" to hydraulic oil. These fluids have low aniline points and consequently will cause rapid deterioration of certain packings and seals in the hydraulic system.

The fluid level in the reservoir should be checked with all hydraulic cylinders retracted.

#### CAUTION

Serious damage to the pump will result if it is run with the shut-off valve closed or with insufficient oil level in the reservoir.

Observe the operation of the machine. If the oil is too heavy, the machine will get sluggish and should be warmed up further before sustained hard work is attempted. If the oil is too light, leakage will increase, pump efficiency will go down, and moving parts will not be properly lubricated. Be certain machine is filled with the proper oil if it is used in extreme operating temperatures. If operating temperature is excessive, rapid deterioration of the oil will result and moving parts will wear more quickly. The cause of the excess heat should be determined and corrected. Other indications of an excessive operating temperatures are:

- a. Control handles become more difficult to operate.
- b. Control handles stick instead of returning to neutral.

#### Pressure Settings:

The hydraulic system is divided up into two separate pressure circuits, each having its own protective adjustable relief valve.

1. Winch Circuit - 2500 PSI at full flow.
2. Boom and Outrigger Circuit - See page III-8.

A good quality pressure gauge with at least a 3000 PSI scale is required to make adjustments properly. A piece of 3000 PSI working-pressure hose with adapters to fit the 3/8 tube pressure ports is required to install the gauge where it can be read easily.

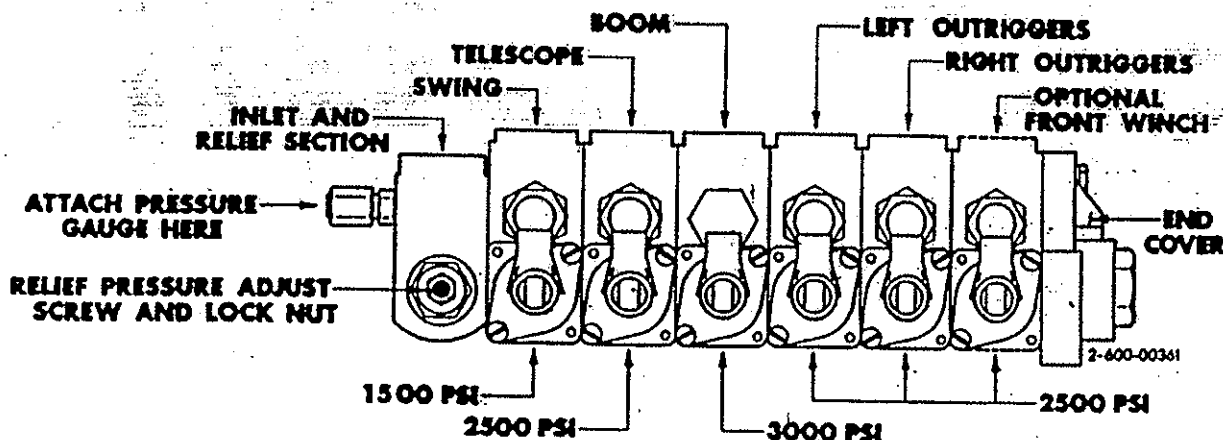
The following procedures are suggested when taking pressure readings:

1. Winch Circuit: Remove the 3/8 cap from the 90° fitting on the side of the Gresen Control Valve and install 3000# test gauge. To obtain full flow reading, run pump at 2000 RPM and actuate winch control to "raise" position, and hold until maximum reading is made. If a pressure of 2500# is not possible, check the following:

- a. Broken mechanical connection to the pump shaft.
- b. Low oil level in the reservoir.
- c. Clogged suction filter or shut-off valve not fully opened.
- c. Valve spool linkage not allowing control valve to fully open. Valve spool should move 3/8" each way from neutral position.
- e. Adjust relief valve by removing plug in top of relief cartridge and turning slotted screw clockwise to increase pressure or counter-clockwise to lower pressure.
- f. Foreign particle in pilot-operated relief.
- g. Worn or defective hydraulic pump.

2. Boom and Outrigger Circuit.

The functions operated by the five (or six) spool crane valve require different pressures for different functions. These are shown below.



The relief valve pressure setting at the inlet end of valve is 3000 psi. This pressure is required for the "Boom" circuit. Work port relief valves (two per valve spool) are installed in all other circuits. These relief valves are set at the pressures indicated in the illustration above.

The relief pressure at the inlet end of the valve can be adjusted with a wrench and allen wrench. Loosen the nut and tighten the threaded stem with allen wrench to increase pressure, and loosen stem to decrease pressure. Lock in place with nut. Actuate boom topping lever when making this adjustment.

While the pressure gauge is attached, the other functions may be checked by actuating the appropriate control lever. If these pressures are improper, the work port relief valve can be removed and shims added or removed as needed. Part numbers for the work port relief valves and shims are listed below.

9-340-00069	Work Port Relief Valve-Gresen #7460-004	PS 2500 C
9-340-00070	Work Port Relief Valve-Gresen #7460-002	PS 1500 C
9-340-00032	Shim - .010"-Gresen #0462-001	
9-340-00031	Shim - .020"-Gresen #0459-001	
9-340-00030	Shim - .040"-Gresen #0458-001	

(Pressure is changed approximately 100 to 125 psi for each .010" shim).

#### Leaks:

All hydraulic fittings and hose connections should be kept tight to prevent loss of fluid from the system, and unnecessary "dripping" from the machine. Most hydraulic fittings on the BMC Yardrunner are an "O" ring type seal, and if tightening the fitting fails to stop the leak, the "O" ring should be replaced. Do not over-tighten a pipe thread connection on which Teflon Sealer has been used. Leaks in component parts such as pumps, valves, and motors which cannot be stopped by tightening bolts can usually be stopped by replacing the seals in the component.

Seal and packing replacement is the only maintenance which an owner should attempt on component parts unless they have a well-equipped shop, with mechanics trained in hydraulic component overhaul.

Leakage in the pump suction lines may not cause oil to appear externally, but may allow air to enter the line during operation. The air entrained in the oil will cause pumps to be noisy, and if allowed to continue, can damage the pump. If a pump becomes noisy, immediately check the fluid level in the reservoir and be sure all suction fittings are tight. If noise continues, squirt hydraulic fluid on the suction connections and listen for a change in the noise, and watch for oil being "sucked" into a minute opening in the connection. When the reservoir is full, the "shut-off" valve is open and all suction connections are tight, most pump noises will disappear. If they do not, a worn or faulty pump is indicated.

On a routine basis, all hoses should be checked for wear, deterioration, and physical damage. Defective hose should be replaced for maximum economy for the user.

## MECHANICAL ADJUSTMENTS

### General:

All fasteners on the Yardrunner should be checked and retightened if required, as a part of the preventive maintenance program. Particular attention should be given to the drive axle mounting bolts, pump mounting bolts, pump drive shaft bolts, bull gear bolts, rotation assembly bolts, winch bolts, etc. All bolts used in assembly are heat-treated Grade 5 except the bolts attaching the bull gear to the mainframe and turret, which are Grade 8. The torque of the bull gear mounting bolts (3/4 dia.) must be maintained at 300 ft. lb.. A regular torque chart can be used on all other bolts.

### Rotation Gear Box:

The rotation gear box assembly is attached to the chassis top-plate by four capscrews. It is held in proper engagement with the external teeth on the bull gear by two setscrews in the turntable backplate. It is further restrained from torsional movement by four bolts in the frame sideplates. Proper adjustment exists when there is .010 inch backlash between the pinion and bull gear teeth. If adjustment is required, loosen the gear box mounting bolts and the side bolts. Tighten the two rear setscrews until proper adjustment is obtained. Tighten the mounting bolts and the side bolts. Lock setscrews and bolts into position.

### Boom Cylinder Holding Valve:

A holding valve is flange-connected to the base of the topping cylinder barrel and to the base of the extension cylinder rod. These valves are designed to hold the boom in position should loss of power or pressure line failure occur.

To check and adjust the topping cylinder holding valve, place the boom in a horizontal position and lift a rated load about three feet above the ground. An example of rated load is 3550 lbs. at a 20 ft. radius. Turn the engine off and move the boom control lever to the "Lower" position. If the boom moves down, the valve should be adjusted. Loosen the jam nuts on the holding valve adjusting screw and tighten screw until unpowered boom movement stops. Retighten the jam nuts to hold the proper adjustment.

The extension cylinder valve should be checked with the boom elevated to the maximum position and the boom extended several feet. 9,000 lbs. on a single part line is desired for this test. The extension cylinder may be required to lift this first load off the ground. The radius of the test load should be within the rating on the capacity chart. The same test and adjustment procedure described for the topping cylinder should be used except that the telescope lever should be moved to the "retract" position.



## MECHANICAL ADJUSTMENTS

### Wheel Bearing Adjustment:

Wheel bearing adjustment must be maintained at all times. Adjustment is made each time the bearings are repacked (500 hours or annually). Wheel bearings are adjusted by the adjust nut. This nut should be tightened until only a slight drag is felt when rotating the wheel.

### WHEEL ALIGNMENT

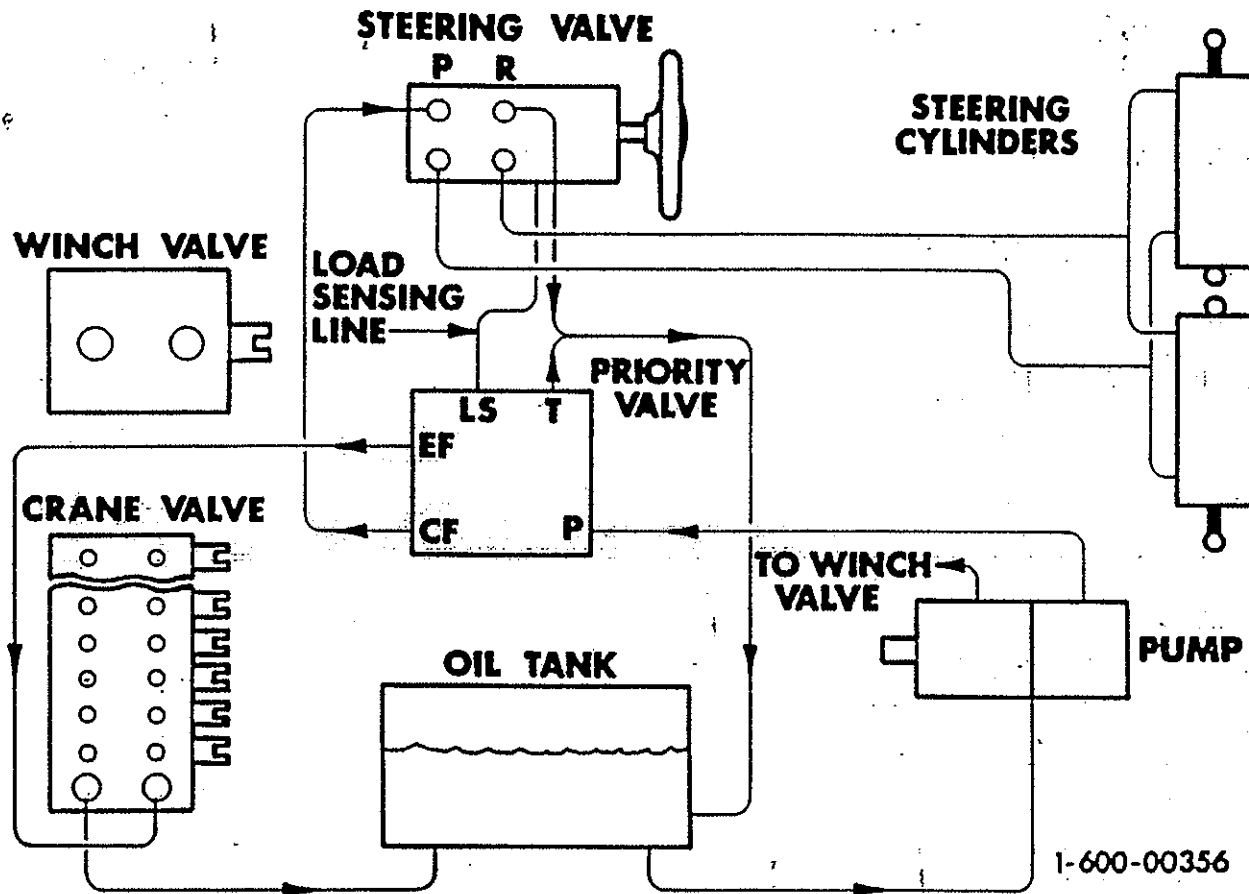
Wheels must be kept in proper alignment in order to assure ease of steering and satisfactory tire life. The steering axle wheels should be set at zero toe-in.

## STEERING SYSTEM

Your BMC Yardrunner is equipped with a full time power steering system. Most power steering systems use a belt or gear driven hydraulic pump for power steering. The Yardrunner system is designed to use power from the main hydraulic pump, only when steering power is needed, and eliminate the conventional separate steering pump.

This is a load sensing power steering system which uses a demand-type priority valve that diverts all of the flow not used in the steering circuit to the main hydraulic system.

The following diagram and comments will explain how the system operates.



Oil from the small (rear) section of the pump goes into the Priority Valve at port "P". When no steering is required, the entire flow goes through the Priority Valve and leaves through port "EF" to the Crane Valve. The crane operating speed and power are not affected, since there is no loss of volume or pressure by passing through the Priority Valve.

When the steering wheel is turned, and steering power is required, the load sensing line signals the Priority Valve to divert the required amount of oil to the Steering Valve to meet the steering system requirements. The excess oil, not required for steering

flows to the Crane Valve as usual. Since the amount of oil required for steering is usually a small portion of the pump output, the Crane Valve is always operational while the unit is being steered. Crane operation speed is reduced such a slight amount it is usually not noticed.

The steering system pressure was set at 1250 psi at the factory and should not need adjustment.

### THE OVERLOAD ALERT SYSTEM

This system is designed to prevent STRUCTURAL DAMAGE to the crane.

This system WILL NOT prevent TIPPING at all load radii.

This system is inoperative when the boom topping cylinder is fully retracted (boom completely lowered).

This system does not protect crane from side load pulls with winch or severe shock loads.

The Overload Alert System consists of a pilot operated unloader valve installed in the pressure lines between the pump and the control valves. The pilot port in the unloader valve is piped to the holding valve on the boom topping cylinder. The unloader valve is set to open at 3100 psi. As the boom load is increased, the pressure in the base end of the topping cylinder is increased accordingly and the pilot line in the holding valve carries this pressure through a 1/4 inch hose to the pilot port in the unloader valve. At a pressure of 3100 psi in the base of the topping cylinder, the machine will lift from 10 to 30% (depending on boom angle) over rated capacities shown on the load chart. Once the unit is overloaded, the unloader valve is opened by the pilot line pressure, and all oil flow from the pump is dumped directly back to tank, and all functions will become inoperable. A spring loaded override valve is provided in the return line to tank to temporarily resume oil flow to control valves to allow the overload to be lowered. This override valve should be used only to return the unit from an overloaded condition, and will return to normal position when released.

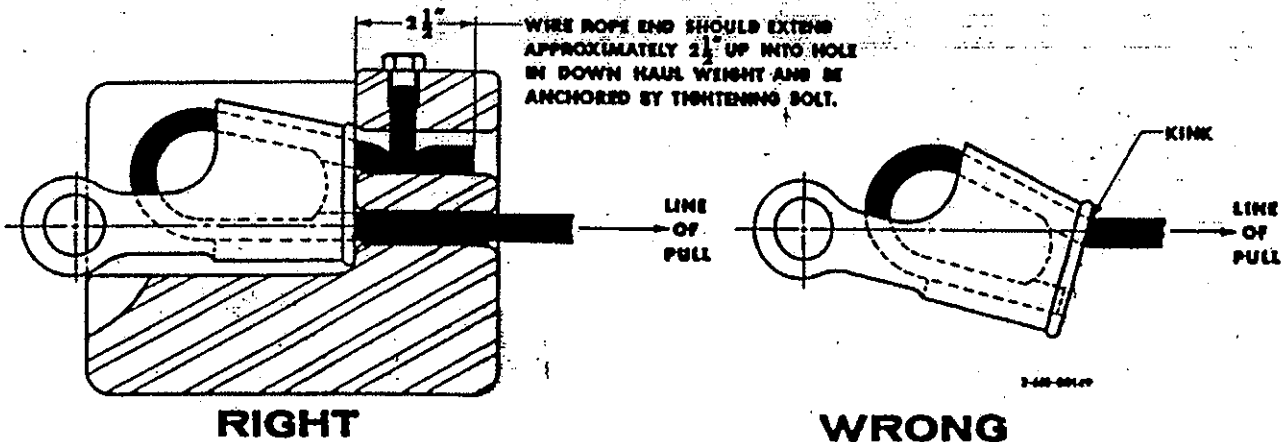
## Load Hoist Rope Care

Greater safety and longer life can be expected from the load hoist rope supplied with your BMC crane if these suggestions are followed.

For rope break in, install a sheave block for two or more parts of line as needed to lift the maximum rated load. Lower the outriggers. Attach a light load - 500 to 1000 lbs. Elevate boom fully and telescope boom fully. Raise and lower this load several times and check the rope on the winch drum to be sure it is winding smooth and even. Add more load and repeat to be sure rope winds evenly on winch drum.


Never lift more load with a given number of parts of line than recommended on the Crane Capacity Chart. For rope lubrication we recommend Amovis lubricant #2-X or equivalent. We suggest a light coat of this lubricant be applied to the load hoist rope while the required periodic inspection is being made.

### WIRE ROPE INSTALLATION



**WARNING**

NEVER USE A ROPE CLIP ON LIVE SIDE OF THE LOAD HOIST ROPE. THIS WILL SERIOUSLY WEAKEN THE ROPE. DEATH OR SERIOUS INJURY CAN RESULT FROM THE USE OF A ROPE CLIP ON THE HOIST ROPE.



2-651-0040

(Always check the Owner's Manual for complete instructions)

Check

- Engine starts easily and runs smoothly.
- Hydraulic lines and fittings for leaks or damage.
- Radiator and oil cooler fins clean.
- Hydraulic functions for proper operations.
- Brakes for proper operations.
- Proper operation of transmission shift linkage.
- Proper operation of parking brake.
- Check winch cable for damage and proper spooling.
- Check air cleaner.
- Check defroster fan (if equipped).
- Check exhaust system.
- Check steering for proper operation.
- Check tire pressures and condition of tires.  
(9.00X15 tire - 95 psi.; 10.00X15 tire - 85 psi.)
- Check for loose fasteners.
- Condition of sheave blocks (if equipped).
- Rotation gear box for proper adjustment.
- Back-up alarm (if equipped).
- Check operation of heater (if equipped).
- Cable retainer's on boom, and boom extension.
- Check operation of lights.
- Check operation of windshield wiper.
- Check cab door (if equipped).
- Check operation of instrument panel gauges.
- Check engine drive belts for proper adjustments.
- Boom extension-properly stored and all pins in proper location (if equipped).
- Check condition of all control, warning, and capacity charts.
- Check glass (if equipped).
- Inspection of boom sections for visible signs of overload, shock loads, and recommended replacement or repair.
- Operation of overload alert (if equipped).
- Operation of anti-two-block.

SUGGESTED MAINTENANCE CHECKLIST CONT'D.

Lubricate: W-Weekly;M-Monthly

- Boom slide pads (W) (Silicone spray or ways lube).
- Control lever linkage (W) (WD 40).
- Boom sheave pins (W) (Chassis lube).
- Rear axle pivot pin (W) (Chassis lube).
- Steering cylinder ends (W) (Chassis lube).
- Drive lines and U-joints (W) (Chassis lube).
- Gear shift and throttle linkage (W) (WD 40).
- Rotation gear teeth (M) (Open gear lube).
- Rotation gear race (Semi-annual or 500 hrs. of operation) (Chassis lube).
- Outrigger cylinder bearings IC-80 (M) (Chassis lube).
- Pump driveshaft U-joints (W) (Chassis lube).
- Steering king pins (M) (Chassis lube).

Fluid Levels

- Radiator coolant.
- Battery.
- Brake master cylinder.
- Transmission.
- Axle differential.
- Hydraulic oil reservoir.
- Engine oil.

UNIT MODEL # \_\_\_\_\_ UNIT SERIAL # \_\_\_\_\_ HOUR METER \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Time Spent: \_\_\_\_\_

Parts Required: \_\_\_\_\_

Date: \_\_\_\_\_

Serviceman: \_\_\_\_\_