

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. 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 THEREO BEING THAT MADE BY THE RESPECTIVE MANUFACTURERS THEREOF.

NOTWITHSTANDING THE PROVISIONS OF SECTION 5-109(2) OF THE UNIFORM COMMERCIAL CODE, THE SOLE REMEDY FOR BREACH BY BMC OF ITS WARRANTY HEREIN SHALL BE THE REPLACEMENT OF THE PARTS WHICH ARE DEFECTIVE AT THE DATE OF THE DEFECTIVE PARTS. THE DEFECTIVE PARTS MUST BE RETURNED TO BMC AT THE DATE OF SHIPMENT. THE COST OF LABOR IN CONNECTION WITH THE REPLACEMENT OF DEFECTIVE PARTS OR THE COST OF TRANSPORTATION OF SUCH PARTS OR REPLACEMENTS THEREOF.

OWNER'S MANUAL

IC-20-1A

YARDRUNNER

OWNER: _____

SOLD AND SERVICED BY: _____

MODEL NO: _____ SERIAL NO: _____

1-900-00063

BRODERSON MANUFACTURING CORP.

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NOTWITHSTANDING THE PROVISIONS OF SECTION 2-719(2) OF THE UNIFORM COMMERCIAL CODE, THE SOLE REMEDY FOR BREACH BY BMC OF ITS WARRANTY HEREIN MADE SHALL BE THE REPLACEMENT OF ANY PARTS WHICH WERE DEFECTIVE AT THE DATE OF SHIPMENT. IN NO EVENT SHALL BMC BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND WHATSOEVER. The remedy herein provided shall be available only if the defective parts are returned to BMC at its plant in Lenexa, Kansas, promptly after the defect is reported to BMC. BMC shall have the right to inspect any parts so returned to determine whether they were defective at the date of shipment. This warranty does not obligate BMC to bear the cost of labor in connection with the removal or replacement of defective parts or the cost of transportation of such parts or replacements therefor.

The warranty herein made is extended only to the original purchaser from BMC. BMC shall have no liability hereunder with respect to products which have been subjected to misuse, negligence, accident or other external forces which may have caused or accentuated any apparent failure of such products to conform to the warranty herein made.

BMC does not warrant any product or part to meet any state, local or municipal law, ordinance, code, rule or regulation. The purchaser must assume the responsibility for maintaining and operating the products which are the subject of this warranty in compliance with such of the foregoing as may be applicable and BMC shall not be liable for the purchaser's failure to meet such responsibility.

THE WARRANTY HEREIN MADE IS IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED. BMC MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF ANY OTHER EXPRESS OR IMPLIED WARRANTY OF ANY KIND. NO PERSON IS AUTHORIZED TO ACT ON BEHALF OF BMC IN MODIFYING THE WARRANTY HEREIN MADE OR IN MAKING ANY ADDITIONAL OR OTHER WARRANTY.

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 0-990-30018.

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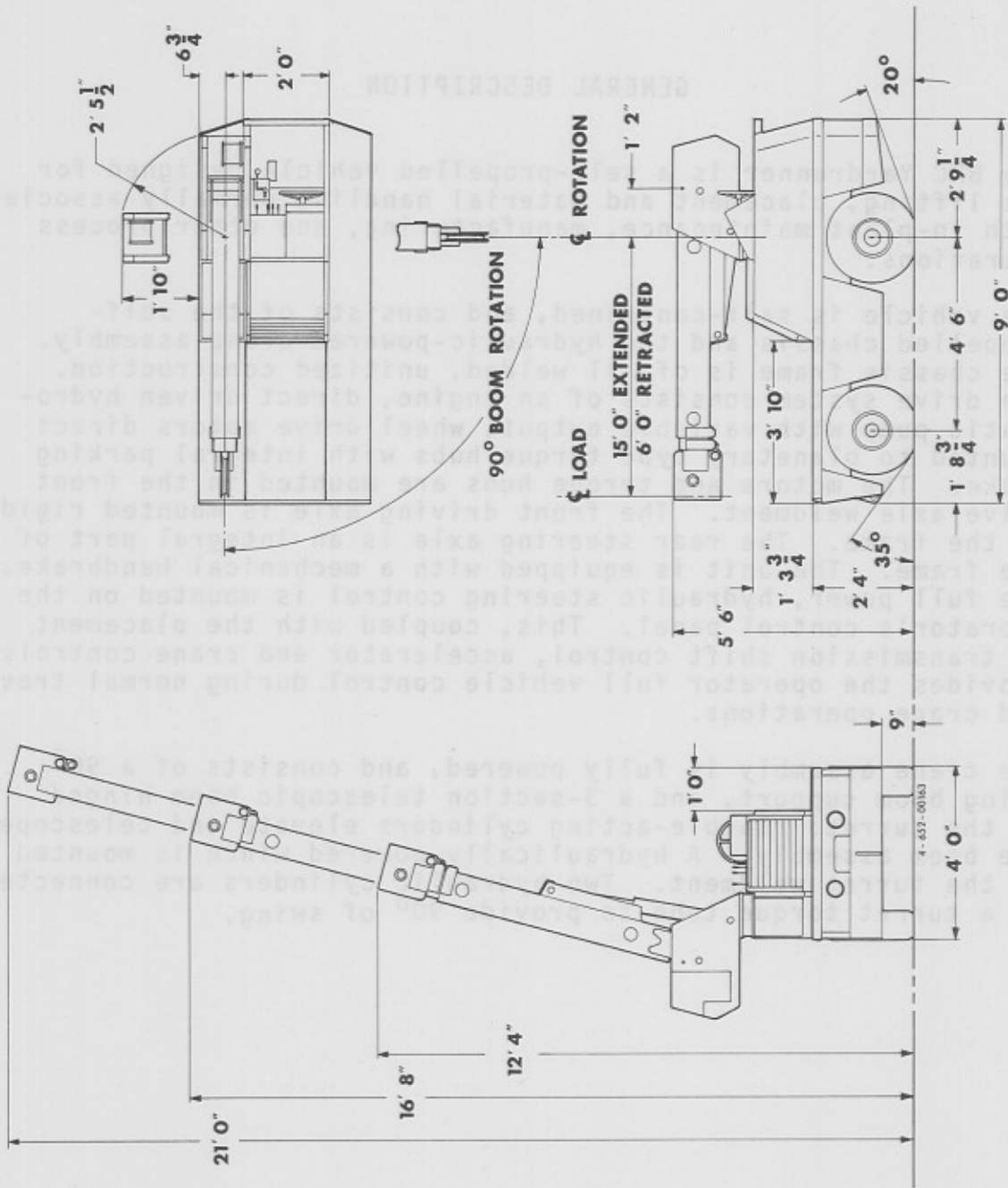
SECTION I

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, direct driven hydrostatic pump with variable output, wheel drive motors direct mounted to planetary type torque hubs with integral parking brake. The motors and torque hubs are mounted in the front drive axle weldment. The front driving axle is mounted rigidly to the frame. The rear steering axle is an integral part of the frame. The unit is equipped with a mechanical handbrake. The full power, hydraulic steering control is mounted on the operator's control panel. This, coupled with the placement of transmission shift control, accelerator and crane controls, provides the operator full vehicle control during normal travel and crane operations.

The crane assembly is fully powered, and consists of a 90° swing 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. Two hydraulic cylinders are connected to a turret torque tube to provide 90° of swing.



BASIC SPECIFICATIONS AND COMPONENT MANUFACTURERS' DATA

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.

ENGINE:

(Gasoline)
Standard

Continental Industrial Model Y112

Displacement - 112 cu. in.
Bore - 3.19 in.
Stroke - 3.5 in.
Weight - 290 lbs.
Governed Speed - 2500 RPM
Horsepower - 36 at 2500 RPM
Torque - 87 ft. lbs. at 1500 RPM
Fuel - Regular Grade Gasoline
Oil Crankcase Capacity - 3.5 qts. (4.5 with filter change)
Oil Filter Element - Fram No. PB50
Oil Pressure - 7 PSI idle - 40 PSI max.
Firing Order - 1-3-4-2
Air Cleaner - Dry Type
Cooling System Capacity - 12.5 qts.

(Diesel)
Optional

Kubota Model V1902-B

Displacement - 113.6 cu. in.
Bore - 3.35 in.
Stroke - 3.23 in.
Weight - 393 lbs.
Governed Speed - 2500 RPM
Horsepower - 40 at 2500 RPM
Torque - 89 ft. lbs. at 1600 RPM
Fuel - No. 2 Diesel, 50 Cetane
Oil Crankcase Capacity - 8.5 qts. (9.5 with filter change)
Oil Filter Element - Kubota No. 15521-32439
Oil Pressure - 7-64 PSI
Air Cleaner - Dry Type
Cooling System Capacity - 10 qts.

DRIVE SYSTEM:

The drive system of this crane is a variable speed hydrostatic transmission. It consists of a piston type hydraulic pump, two wheel drive motors and two torque hubs. These components are described below.

PISTON PUMP:

Cessna 70442-RCM
High performance piston type w/built in charge pump.
Driven direct off engine crankshaft.
Displacement 2.48 in³/rev.
Delivery 25GPM, Max. Pressure 4000 psi.
BMC No. 1-520-00023

WHEEL DRIVE MOTORS:

Ross Motor #MAE 10016
Displacement 8.6 in³/rev.
BMC No. 0-530-30015 R.H. w/shuttle valve.
0-530-30013 L.H. w/o shuttle valve.

TORQUE HUBS:

Fairfield #S07B with parking brake.
Overall gear ratio 4.1:1
BMC No. 0-600-11013

REAR STEERING AXLE:

Axle beam is an integral part of the frame weldment.
Thrust bearings provide low steer effort and long life.

TIRES:

Standard - 7.50 x 10 - 16 ply pneumatic tire.
Optional - 7.50 x 10 - Solid rubber.

BATTERY:

For gasoline engine
BCI Group No. 24F - 385 CCA
For diesel engine
BCI Group No. 27F - 550 CCA

WIRE ROPE:

Length - 80 ft.
Diameter - 5/16 in.
Construction - 6 x 37 IWRC
BMC No. 1-861-13002

PUMP DRIVE:

Spicer 1310 series drive shaft
BMC No. 3-333-10050

BOOM AND WINCH CONTROL VALVE:

Racine Model ML15
4-way, 3 position - 4 spool
Adjustable relief valve - 2500 psi.
BMC No. 1-550-00083 (Standard 4 spool)
BMC No. 1-550-00084 (Optional 5 spool-req'd w/opt. front winch)

BOOM ELEVATION AND EXTENSION CYLINDER HOLDING VALVE:

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

BOOM ELEVATING CYLINDER:

Double Acting Hydraulic
3.5" Bore - 20-15/16" Stroke - 1-3/4" Rod
BMC No. 3-540-30075

BOOM EXTENSION CYLINDER:

Double Acting Hydraulic, Rod Fed
2.5" Bore - 54" Stroke - 1.5" Rod; Base Section 54" Stroke
BMC No. 3-540-10036; Tip Section - 3-540-10037

SUCTION STRAINER:

Gresen #FLR1
100 Mesh (165 Micron) 300 sq. in. - 50GPM rating
Reuseable Wire Filter Element - 3 psi by-pass
BMC No. 1-501-01025

RETURN LINE FILTER:

Canflo #CFRS-60-20N-10N-1
10 Micron Filtration - Area = 1215 sq. in.
50 GPM Warning gauge on dash panel
BMC No. 0-501-01023

Replaceable Filter Element - BMC No. 0-501-01024

PUMP:

Cessna #132-X25383-RAK
Tandem High Performance Gear Type
Driven Direct By Engine Crankshaft
Front End Section 10 GPM @ 2500 PSI and 2500 RPM
Rear End Section 5 GPM @ 2500 PSI and 2500 RPM
BMC No. 0-520-00022

STEERING UNIT:

Char-Lynn Orbitrol #213-1001
Open Center - Load Sensing-Load Blocked in Neutral
4.5 cu. in. per revolution
BMC No. 0-559-00035

STEERING CYLINDER:

Gould #8303-075
2.5" Bore - 3-5/8" Stroke - 1" Rod
BMC No. 3-540-10038

TURRET SWING CYLINDERS:

Gould #7903-019 (Two Used)
2" Bore - 6-1/2" Stroke - 3/4" Rod
BMC NO. 3-540-00018

WORM GEAR WINCH:

Koenig Model HU8
Capacity - 3500 lbs.
Worm Gear Reduction
Ratio 36:1
Drum Dia. - 5.6"
Drum Length - 4.9"
Flange Dia. - 8"
BMC No. 3-280-00127

WORM GEAR WINCH MOTOR.

Ross #MAF-06-0-01
3 in 3/rev. displacement
BMC No. 0-530-20026

SECTION II

OPERATION

INSTRUMENTS AND CONTROLS

The Yardrunner has a lower and upper instrument panel. The lower panel consists of the standard engine instruments and controls. These are water temperature, oil pressure, ammeter, fuel gauge and choke. Also on this panel are the headlight switch, ignition key, start and horn buttons. The ignition switch is key operated and has "ACC'SY.", "RUN" and "OFF" positions. The ignition switch should always be turned off and the key removed when the vehicle is left unattended. (When unit is equipped with optional diesel engine, this panel will include glow plug light, glow plug button and engine shut off knob.)

At the top of the upper instrument panel we have an oil temperature gauge and filter condition indicator gauge. A red light that flashes when the parking brake is on, is located between these gauges. The engine hourmeter and slope indicator are located on the vertical portion of this panel.

The parking brake lever is located on the right side of the operator's compartment. To apply, push down on 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.

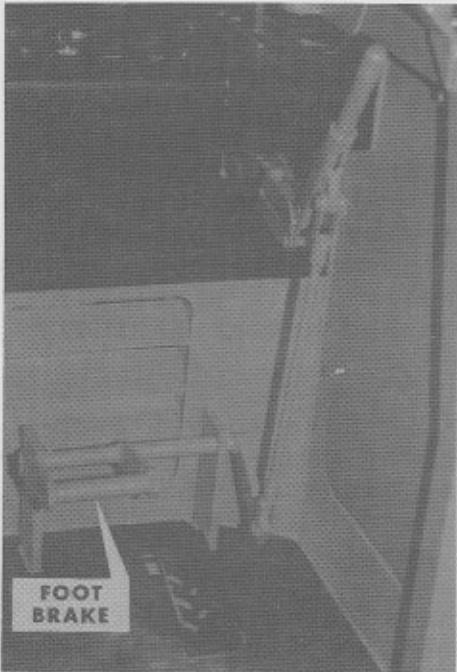
The accelerator pedal is located in the floor of the operator's compartment.

The hydrostatic transmission control lever is located to the right of the steering wheel. After the engine is started, release the parking brake, and move the control lever forward smoothly until full forward position is reached. This lever movement can be made at the same time as the engine is being brought up to desired speed. Always operate this transmission control lever smoothly.

When you have little or no deck load and want to travel on a fairly level surface, the transmission control lever can be moved to full position before or during the time the engine is coming up to full speed. If you have a heavy deck load or want to travel up a steep grade, it is best to bring the engine up near full speed before moving the transmission shift lever.

The hydrostatic transmission will normally stop the crane on a grade - but some oil will slip through the wheel drive motors and allow the crane to creep. ALWAYS apply parking brake when operating the crane, or leaving the crane unattended. Remember the hydrostatic transmission is NOT a parking brake.

BE SURE to release parking brake before moving the transmission control lever toward forward or reverse.



The crane will "coast" on some down hill ramps when the surface is uneven and one drive wheel is raised off the ramp. The forward motion of the crane may not always be satisfactorily controlled by the hydrostatic wheel drive motors under these conditions. The foot brake can be applied if the operator feels the machine is traveling faster than desired.

The transmission and drive train components can be damaged by shifting from forward to reverse or vice versa while the unit is in motion.

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

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.

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

SEQUENCE OF OPERATION

Driving the Vehicle

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

1. CAUTION - Always lower the backrest bar behind you before operating the crane.
2. Apply parking brake.
3. Place hydrostatic transmission control lever in neutral.
4. Start engine and allow a warming period.
5. Check to see that boom is retracted.
6. Check to see that boom is centered over right hand deck.
7. Check to see that boom is lowered.
8. Check to see that winch line is snug.
9. Release parking brake.
10. Shift hydrostatic transmission control lever to desired travel position.
11. Depress accelerator pedal to reach travel speed.
12. Observe slope indicator and do not travel on surfaces that exceed 7° slope to the right.
13. Slow down when making sharp left turns.

Operating the Crane

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

1. Apply parking brake.
2. Start engine and allow warming period.
3. Crane must be positioned on firm, level surface at all times before operation is conducted and remain there until work operations are completed and boom is restored to travel position, except for pick and carry operation.
4. During operations, the controls should always be metered when beginning or ending 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. 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.

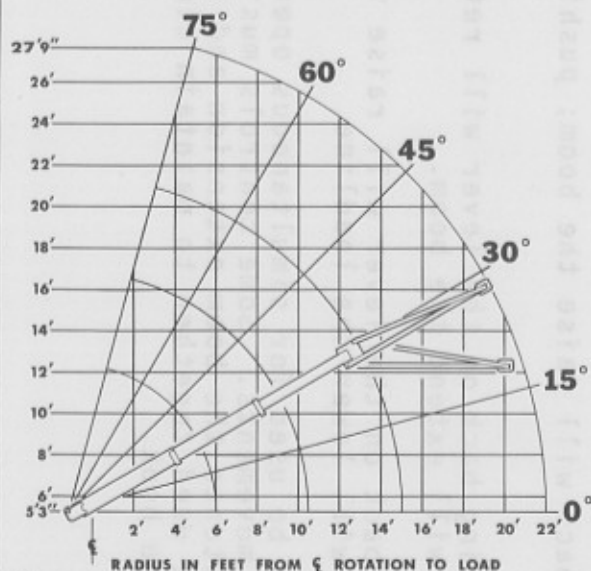
All capacities are given in direct relationship to the radius at which the load is being handled. All variances of loads and radii of handling are shown on the load capacity chart and on the capacity placard. These placards are provided near the operator's station for the express purpose of informing the operator when a load can or cannot be safely handled.

The capacities shown on the capacity chart apply to the 90° swing of the boom, and are maximum allowable at the indicated radius. All radii are measured from the centerline of turret rotation to loadline.

C A U T I O N

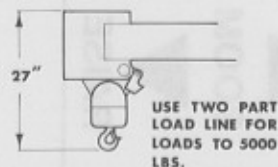
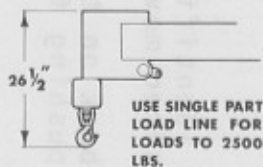
A capacity load may be carried on the boom, or a capacity load may be carried on the deck. DO NOT carry capacity deck loads and capacity boom loads at the same time.

CRANE CAPACITY CHART



ALL CAPACITIES FOR 90° SWING

LOAD RADIUS FEET	3-SECTION BOOM	7 FT. JIB INSTALLED	
		IN-LINE	30° OFFSET
4	5000	1300	
5	4000	1100	
6	3000	900	750
8	2250	750	650
10	1400	550	550
12	1025	500	500
15	725	500	500
17		500	500
19		500	500
22		390	



CARRY CAPACITY SPEED LIMIT 3 MPH

DECK LOAD CAPACITY 5000 LBS. (CENTERED OVER AXLE)

PERSONNEL BUCKET CAPACITY 300 LBS. - THE BOOMS ON THIS UNIT ARE ALL STEEL AND HAVE NO LINE VOLTAGE RATING.

MAXIMUM HYDRAULIC PRESSURE 2500 PSI

ALL CAPACITIES APPLY TO OPERATION ON FIRM LEVEL SURFACES.

OPERATION:

1. READ AND UNDERSTAND OWNERS MANUAL BEFORE OPERATING THIS CRANE.
2. CHECK LEVEL OF HYDRAULIC OIL DAILY.
3. CHECK UNIT FOR VISIBLE DEFECTS AND LOOSE PARTS.
4. START ENGINE.
5. SET VEHICLE PARK BRAKE SECURELY.
6. OPERATE ALL HYDRAULIC CONTROLS SLOWLY AND DELIBERATELY FOR SMOOTH MOTION.
7. DRIVE SLOW WHEN MAKING SHARP TURNS TO THE LEFT.

THE LOAD HOIST LINE ON THIS UNIT MUST BE 5/16" DIA. 6 X 37-1WRC-1P WIRE ROPE WITH A MINIMUM BREAKING STRENGTH OF 9160 LBS.

MODEL NO. [REDACTED]

SERIAL NO. [REDACTED]

BRODERSON MANUFACTURING CORP.
P.O. BOX 14770 LENEXA, KANSAS 66215

CONTROLS AND FUNCTIONS

CAUTION			
THE LOAD HOIST LINE ON THIS UNIT MUST BE $5/16$ " DIA. 6 X 37-IPS-RRL-IWRC WIRE ROPE (OR EQUIVALENT) WITH A MINIMUM BREAKING STRENGTH OF 9,160 LBS. THE MAXMUM LOAD WITH SINGLE PART LINE IS 2,600 LBS.			
3 650 00237			
RIGHT ▲ SWING ▼ LEFT	LOWER ▲ BOOM ▼ RAISE	EXTEND ▲ TELESCOPE ▼ RETRACT	LOWER ▲ HOIST ▼ RAISE

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

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

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.

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.

Boom Elevation Cylinder Holding Valve:

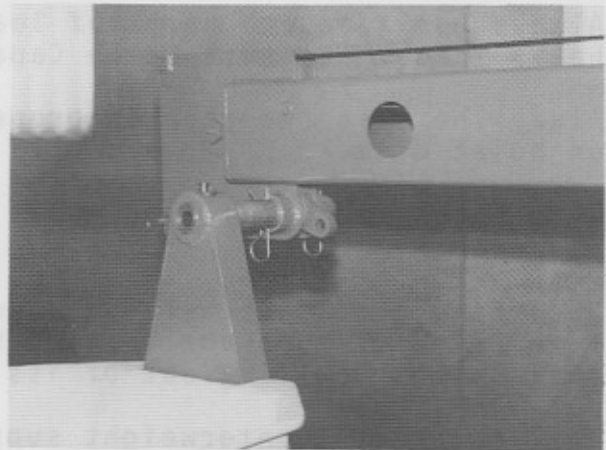
A single-acting holding valve is flange-mounted on the cylinder barrel. This valve holds the boom in the elevated position should power or hydraulic pressure line failure occur. This valve is adjustable to hold the desired load. If the boom creeps down with loads up through maximum capacity, this valve 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 instruction.

W A R N I N G

DUE TO THE SMALL SIZE AND LIGHT WEIGHT OF THE IC-20 YARDRUNNER, WE LIMIT THE FIBERGLASS BUCKET USE TO ONE ONLY. NEVER USE TWO FIBERGLASS BUCKETS OR A TWO MAN WORK PLATFORM ON THIS CRANE. INSTALL THE FIBERGLASS BUCKET ON THE LEFT-HAND SIDE OF THE BOOM AS SHOWN.



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 B30.5-1968, 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.
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.

SAFETY RULES

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 (100 psi).
 - 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 over right hand deck and lowered to horizontal.
 - b. A 5,000 lb. load can be carried on deck if load is centered over axle. When deck is loaded to capacity, do not "Pick & Carry" load on boom.
 - c. Travel slow - 3 mph when carrying capacity deck loads.
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.
20. Before beginning operation each day, thoroughly inspect the entire crane to be sure it is in good operating condition.
21. Keep gauges clean.
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, apply parking brake and block wheels.
27. The above list of rules is only a supplement to all federal, state and local safety rules that may apply.

SAFETY RULES

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- d. Travel speed reduced to suit conditions (3 mph max.)
- e. Maintain specified tire pressures (100 psi).
- 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.

DANGER

18. **THIS CRANE HAS MORE THAN $\frac{2}{3}$ OF ITS TOTAL WEIGHT ON THE RIGHT HAND WHEELS. IT WILL TIP OVER ON MUCH LESS SLOPE THAN MOST VEHICLES YOU NORMALLY OPERATE.**

DO NOT OPERATE ON SOFT SURFACES OR SURFACES SLOPING TO THE RIGHT OF MORE THAN 7° (12% GRADE). SEE SLOPE INDICATOR IN FRONT OF STEERING WHEEL.

19. **DEATH OR SERIOUS INJURY CAN RESULT FROM TIPPING CRANE OVER**

- a. Stop raising hoist line before downward weight or hook block strikes boom tip plates.
- b. Pay out hoist line while extending boom.
- c. Maintain clearance between downward weight or hook block and boom tip while lowering boom.

20. Before beginning operation each day, thoroughly inspect the entire crane to be sure it is in good operating condition.

21. Keep gauges clean.

22. Keep operator's compartment and deck 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 work because of "tail swing" when operating in close quarters.

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SECTION III

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 fuel tank level.
 - (g) Check battery water level.
 - (h) Check tire pressure (100 psi).
 - (i) Check for loose pins, bolts, and retainers.
2. Operational Test:
 - (a) Operate hydrostatic transmission control lever for forward, neutral and reverse positions.
 - (b) Operate parking brake - check for operation and adjustment. (Red light, on upper instrument panel, should flash when parking brake is on).
 - (c) Operate accelerator pedal - check for operation.
 - (d) Start engine.
 - (e) Check oil pressure.
 - (f) Check ammeter.
 - (g) Check power steering for operation.
 - (h) Check headlights for operation.
 - (i) Test drive unit and check for normal operation.

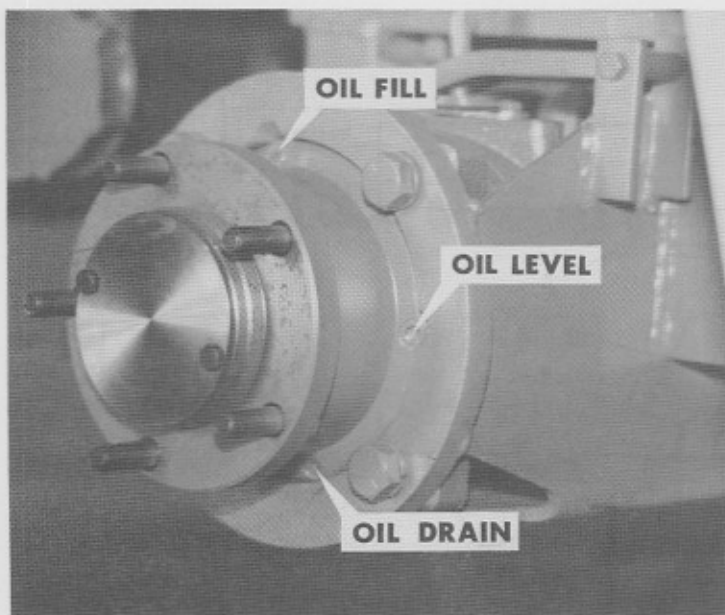
- (j) Check boom swing.
- (k) Check boom elevation.
- (l) Check boom extension (payout winch cable during power extension).

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 hydraulic oil temperature.
 - 11. Check hydrostatic transmission control lever operation.
 - 12. Check parking brake operation.
 - 13. Check power steering operation.
 - 14. Observe chassis for normal driving operation.
 - 15. Observe boom operation for normal power and speed.
 - 16. Check for winch line damage.
- Weekly:
- 1. Check tire pressure (100 psi).
 - 2. Check front axle mounting bolts for tightness.
 - 3. Check wheel nuts for tightness.
 - 4. Check battery water level.
 - 5. Check lights.
 - 6. Check power steering lines for damage.
- Monthly:
- 1. Check rotation gear attachment to frame for tightness.
 - 2. Check swing cylinder end fittings for tightness.
 - 3. Check boom topping cylinder holding valve for operation.

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



TORQUE HUBS

Use Mobil EP-90 oil or equivalent.

On new cranes, drain oil after first 50 hours of use and refill.

Check oil level every 30 days.

Drain and refill after 1000 hours of operation or after one year of service, whichever comes first.

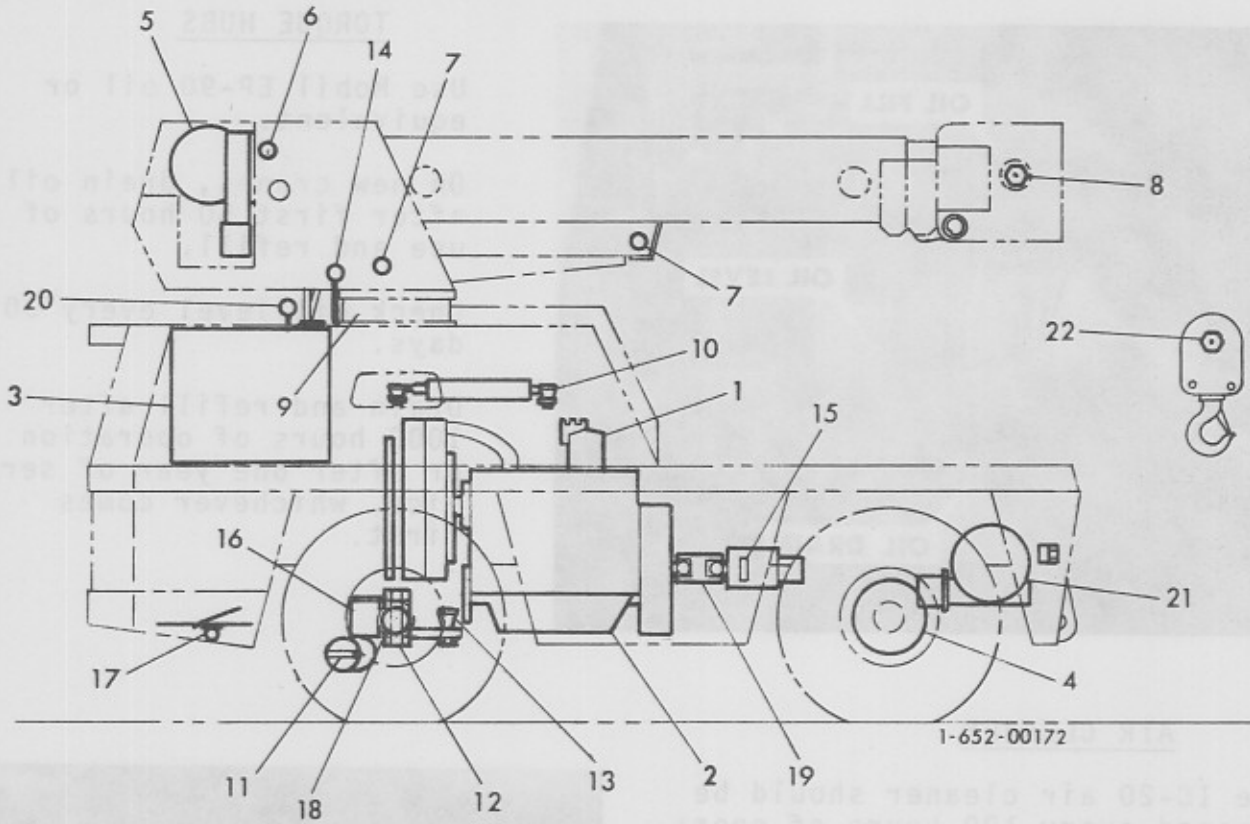
AIR CLEANER

The IC-20 air cleaner should be cleaned every 100 hours of operation. This air cleaner does not have a replaceable element. To remove the cleaner, raise the door that covers the swing cylinders, and loosen the hose clamp that holds the air cleaner in place. Fill a 3 to 5 gallon bucket or pan with warm water and add some good laundry detergent soap. Let the air cleaner soak in this warm soapy water for 30 minutes to an hour. Slosh the air cleaner around in the water two or three times to loosen and wash out dirt. Then take a hose and rinse the soapy water out of the cleaner. Let it dry and replace it on the crane.



The air cleaner can be washed three times, then it should be discarded and replaced by a new one.

IC-20 YARDRUNNER LUBRICATION CHART



When initially starting a new or a rebuilt production system, it is extremely important that the start-up procedure be followed. It prevents the chance of damaging the unit which might occur if the system was not properly purged with oil before start-up.

After the production components have been properly installed into the machine, the machine should be running at least half full with oil.

LUBRICATION SCHEDULE

ITEM	DESCRIPTION	LUBE SYMBOL	LUBRICATION INTERVALS (HOURS)					NOTES
			DAILY	50	500	1000	YEARLY	
1	Engine Oil	EO	X					Per Mfg. Reccom. Replace Semi-Annual
2	Engine Oil Drain	EO						
3	Hydraulic Oil	ATF	X			X		
4	Drive Hubs	MPL		X			X	Replace Yearly
5	Winch Gear Box	MPL*			X		X	Replace Yearly
6	Boom Hinge Pin	MPG		X				1 Zerk
7	Topp. Cyl. Pins	MPG		X				2 Zerks
8	Tip Sheave	MPG		X				1 Zerk
9	Rot. Brg.	MPG		X				1 Zerk
10	Swing Cyl. Ends	MPG		X				4 Zerks
11	Steer. Cyl. Ends	MPG		X				2 Zerks
12	King Pin Brg.	MPG		X				4 Zerks
13	Tie Rod Ends	MPG		X				4 Zerks
14	Control Links	EO		X				At Wear Points
15	H. S. Cont. Rod Ends	MPG			X			3 Zerks
16	Steer. Sector	MPG			X			1 Zerk
17	Accel. Shaft	MPG			X			1 Zerk
18	Rear Wheel Brg.	WBG				X		Clean & Repack
19	PTO Shaft	MPG			X			2 Zerks
20	Shift Control	EO			X			At Wear Points
21	Aux. Front Winch	MPL			X		X	Replace Yearly
22	Sheave Block	MPG		X				1 Zerk

1-652-00174

LUBE SYMBOLS

- MPG - Multipurpose Grease
- MPL* - Multipurpose Gear Lub - SAE 140
- MPL - Multipurpose Gear Lub - SAE 90
- WBG - Wheel Brg. Grease
- ATF - Dexron II - Automatic Transmission Fluid
- EO - Engine Oil

START-UP PROCEDURE - PISTON PUMP

When initially starting a new or a rebuilt propulsion system, it is extremely important that the start-up procedure be followed. It prevents the chance of damaging the unit which might occur if the system was not properly purged with oil before start-up.

1. After the propulsion components have been properly installed onto the machine, fill the pump housing at least half full with an approved oil that has been filtered through a 10 micron filter. Connect all hydraulic lines and check to be sure that they are tight.

2. Install and adjust all control linkage.

3. Fill the reservoir with an approved oil that has been filtered through a 10 micron filter. Install a 0 to 300 psi gauge in charge pressure port as shown in picture.

4. Gasoline or L. P. engines: remove the coil wire and turn the engine over for 15 seconds. Diesel engines: shut off the fuel flow to the injector and turn the engine over for 15 seconds.



This procedure enables the charge pump to pick up the oil before start-up.

5. Replace the coil wire or return the fuel flow to the injectors. Place the propulsion unit in the neutral position, start the engine and run it at a low idle. The charge pump should immediately pick up oil and fill the system. If there is no indication of fill in 30 seconds (gauge in charge pressure port of pump should register about 100 psi), stop engine and determine the cause.

6. After the system starts to show signs of fill, slowly move pump camplate to a slight cam angle. Continue to operate system slowly with no load on motors until system responds fully.

7. Check fluid level in the reservoir and refill if necessary to the proper level with an approved oil that has been filtered through a 10 micron filter.

8. Check all line connections for leaks and tighten if necessary.

9. The machine is now ready to be put into operation.

10. Short hour filter changes are recommended for the first two changes after placing the machine back in operation. The first filter should be changed in 3-5 hours and the second at approximately 50 hours. Routine scheduled filter system changes are recommended for maximum life of the hydraulic system.

TROUBLE SHOOTING - PISTON PUMP

POSSIBLE TROUBLE	CAUSES	REMEDIES
<p>1. System will not operate in either direction.</p>	<p>A. Oil supply low. B. Oil filter clogged. C. Oil too heavy. D. Control linkage misadjusted. E. Low charge pressure. F. Charge pump key sheared. G. Charge pump relief valve damaged.</p>	<p>A. Check oil level, fill. B. Replace filter element. C. Use proper viscosity oil. D. Check to see if control linkage is binding or unfastened. E. See below: F, G, H, & I. Pressure should be 60-100 PSI. F. Inspect charge pump for damage and replace key. G. Remove relief valve parts, examine parts and seat. Replace necessary parts.</p>
	<p>H. Charge pump gears worn or scored. I. Internal charge pump damage. J. Drive coupling broken. K. Relief valve stuck open. L. Damaged check valve.</p>	<p>H. Remove parts and examine. Replace defective parts. If severe scoring is indicated, remove complete pump unit, disassemble, clean and inspect for damage. I. Disassemble pump, inspect for damage. J. Inspect coupling for sheared spline, key or broken chain. K. Remove relief valve clean or replace. L. Disassemble and check if check valve is faulty or damaged.</p>

POSSIBLE TROUBLE	CAUSES	REMEDIES
2. System Noisy	A. Air in system.	A. Low oil level in reservoir.
	B. Loose suction line.	B. Tighten fittings.
	C. Clogged suction filter.	C. Replace filter element.
	D. Internal pump or motor damage.	D. Disassemble, inspect and repair.
3. Sluggish response to acceleration or deceleration.	A. Air in system.	A. See step 1-A, 1-B, 1-C, 2-B.
	B. Low charge pressure.	B. See step 1-F, 1-G, 1-I.
	C. Internal pump or motor wear or damage.	C. Disassemble, inspect and repair.
	D. Relief valve dirty or damaged.	D. Remove, clean or replace.

APPROVED HYDRAULIC FLUIDS

<u>DESIGNATION</u>	<u>FLUID SUPPLIER</u>	<u>LIMITATIONS</u>
*DEXRON II A.T.F.	ANY	NONE
SAE 10 W 40	ANY	NONE
HYTRAN	ANY	CONTROLLED BY I.H.C.

*DEXRON II Hydraulic Fluid was used at the factory to fill the hydraulic system of your IC-20 crane.

Care of Hydraulic Oil:

The BMC Yardrunner is equipped with a 100 mesh suction line strainer to remove the larger particles from the oil before they enter the pump and other components. In the return line, there is a micron filter to remove particles down to 10 microns in size. The strainer and 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" valves before servicing the strainer and filter.

BE SURE SHUT-OFF VALVES ARE OPENED FULLY BEFORE PUTTING THE PUMP BACK IN OPERATION.

The suction strainer is located in the suction line between the hydraulic tank and hydraulic pump. This strainer has a reusable wire screen element. To service this strainer, unscrew the retainer cap and remove the housing. Remove the element and wash it in cleaning solvent and allow element to drain dry. Check by-pass valve in the center of the element to be certain no foreign matter is lodged in the valve. Reassemble the strainer.

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.

Although the BMC Yardrunner has been equipped with an excellent filtering system, 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 spring and fall. Suction filter should be serviced at this time. Return line filter element should be replaced every 250 hours of operation - or when the oil filter condition gauge on the upper instrument panel reads 15 psi.

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 valves closed or with insufficient oil level in the reservoir.

Pressure Settings:

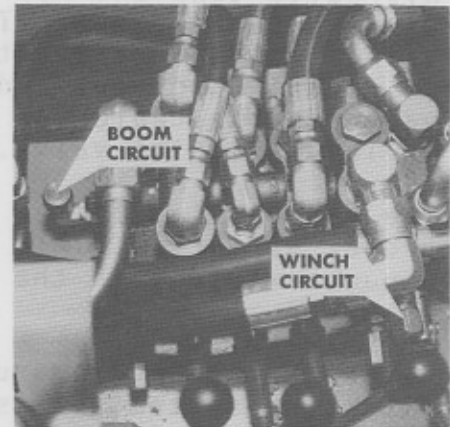
The hydraulic system is divided up into two separate pressure circuits (in one control valve), each having its own protective adjustable relief valve.

1. Boom Circuit - 2500 PSI at full flow.
2. Winch Circuit - 2500 PSI at full flow.

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

The following procedures are suggested when taking pressure readings:

1. Boom Circuit: Remove the 3/8 cap from the 90° fitting and install 3000# test gauge. To obtain full flow reading, run pump at 2000 RPM and actuate boom topping lever 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.
- d. Valve spool linkage not allowing control valve to fully open. Valve spool should move 5/16" each way from neutral position.
- e. Adjust relief valve by removing 3/4" long cap from relief valve cartridge, loosen jam nut, then use Allen wrench to adjust relief valve. Turn screw clockwise to increase pressure or counter-clockwise to lower pressure.
- f. Foreign particle in pilot-operated relief.
- g. Worn or defective hydraulic pump.

*If the crane is equipped with optional Anti Two-Block System, you would have to disconnect one wire from the switch box at the boom tip to prevent the boom circuit from "dumping" for this test.

2. Winch Circuit: The relief pressure for the winch valve can be adjusted the same as for the boom circuit. The cap must be removed from the fitting on the middle of the valve and a 3000 (or greater) PSI pressure gauge attached. Actuate the winch lever when making this adjustment.

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 "O" ring type seals, 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 very small 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 re-tightened 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, 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 (5/8 Dia.) must be maintained at 200 ft. lbs. A regular torque chart can be used on all other bolts.

Boom Swing System:

Two double acting cylinders are used to swing the crane boom. Two adjustable swing stops are used to stop the boom when it is straight ahead and when it is 90° to the left. The cylinder sockets should be inspected periodically to be sure the tapered socket ends are tight, and the clamps that lock the sockets to the cylinder should also be tight.

If the boom is swung to the left when an engine or hydraulic failure occurs, two hoses can be loosened or removed from the swing cylinders and the boom pushed into the straight ahead position by hand.

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 1000 lbs. at a 12 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 60° and the boom extended five to six feet. 2500 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.

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

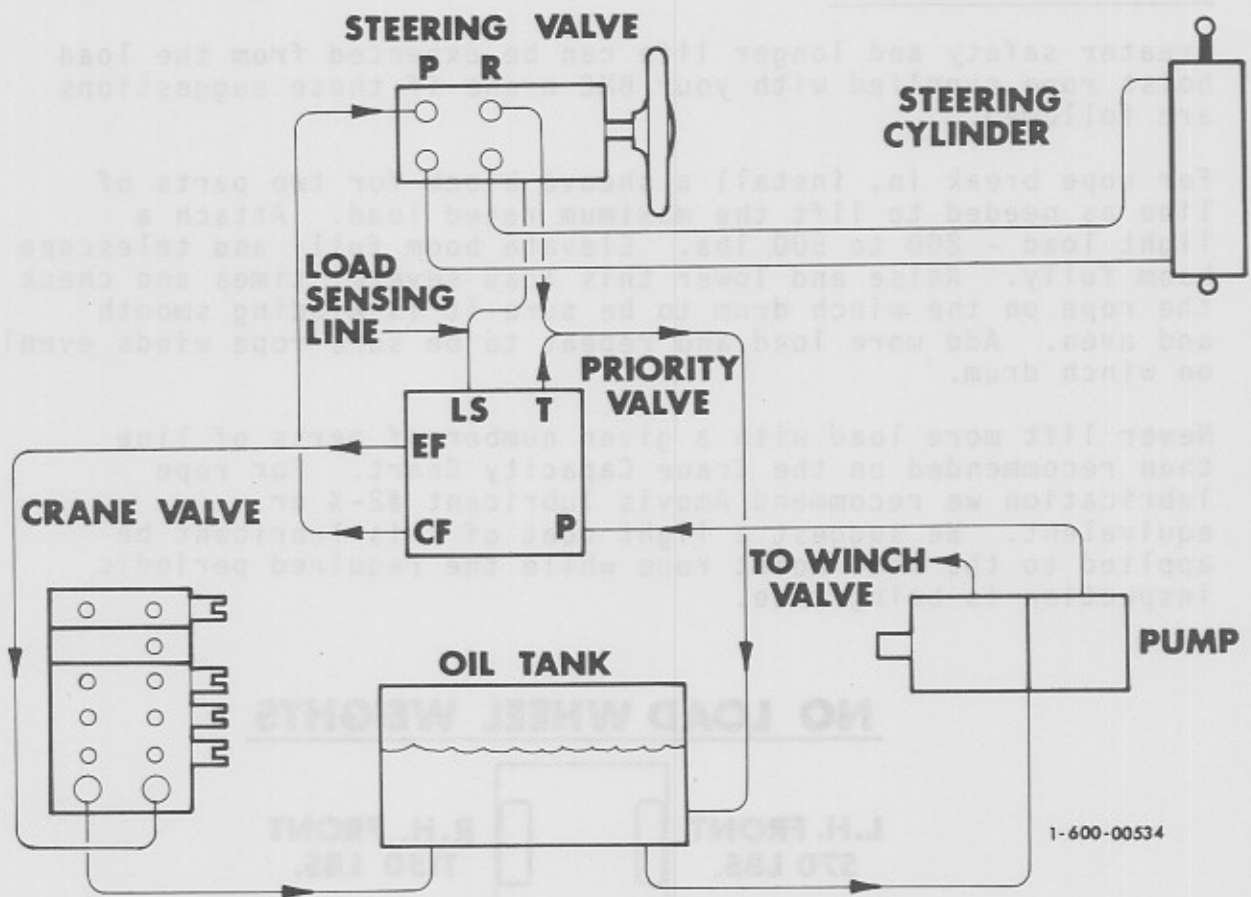
Wheels must be kept in proper alignment in order to assure ease of steering and satisfactory tire life. The steering axle wheels should be set at zero toe-in.

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.

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 parts of line as needed to lift the maximum rated load. Attach a light load - 200 to 500 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.

NO LOAD WHEEL WEIGHTS

**L.H. FRONT
570 LBS.**

**R.H. FRONT
1150 LBS.**

IC-20

**L.H. REAR
1165 LBS.**

**R.H. REAR
3055 LBS.**

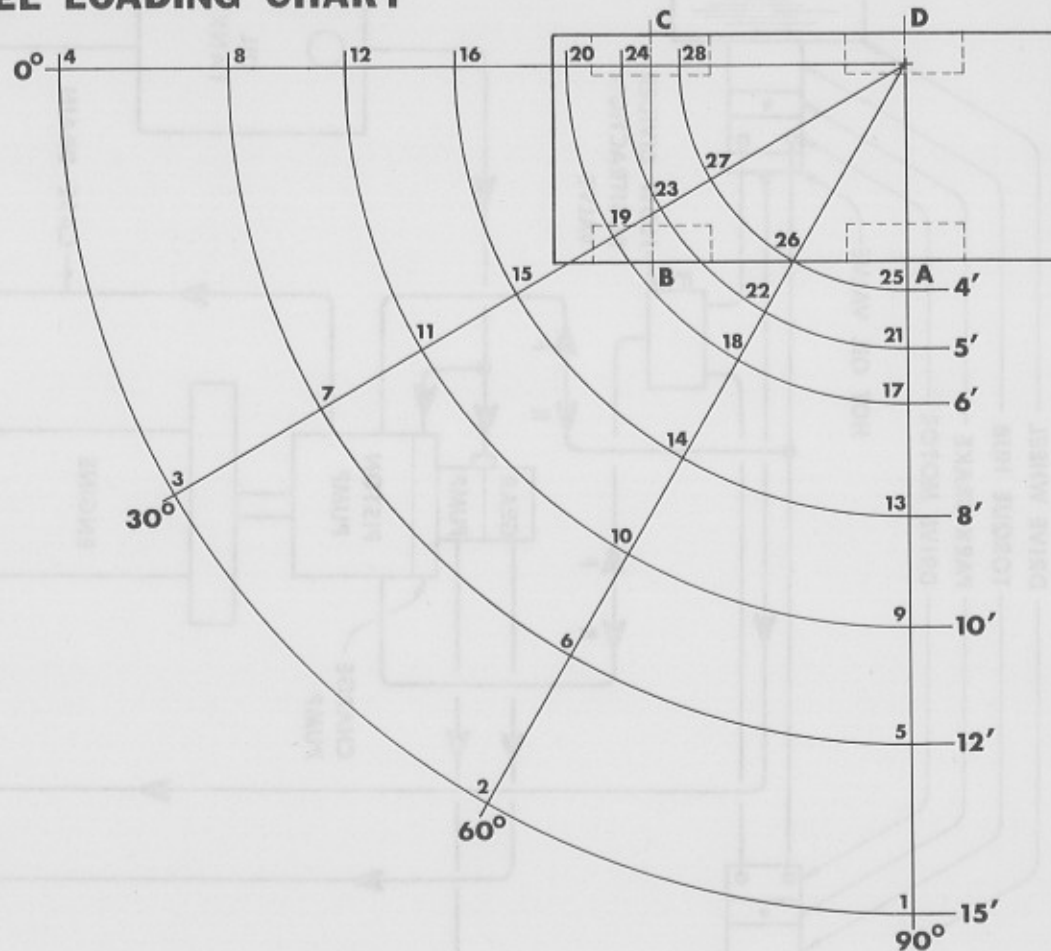
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TOTAL=5940 LBS.

IC-20 WHEEL LOADING CHART

RADIUS FEET	LOAD POUNDS	LOAD POSITION	WHEEL LOAD-POUNDS			
			A	B	C	D
15	725	1	4700	1350	0	550
		2	2400	3050	0	1150
		3	1000	2800	1330	1500
		4	250	1650	2900	1800
12	1025	5	4900	1450	0	550
		6	2450	3150	0	1300
		7	1050	2850	1500	1550
		8	200	1650	3070	2000
10	1400	9	5350	1400	0	550
		10	2650	3350	0	1300
		11	1150	3000	1600	1550
		12	100	1650	3380	2150
8	2250	13	6500	1400	0	250
		14	3050	3800	0	1300
		15	1300	3400	1900	1500
		16	0	1550	4500	2100
6	3000	17	7300	1100	0	500
		18	3350	3750	0	1800
		19	1400	3310	2000	2200
		20	0	1500	4500	2900
5	4000	21	7700	730	0	1500
		22	3700	3300	200	2700
		23	1650	2950	2200	3100
		24	0	1300	4500	4100
4	5000	25	7800	1290	0	1800
		26	4100	3450	400	2900
		27	1700	3050	2600	3500
		28	200	1900	4400	4400

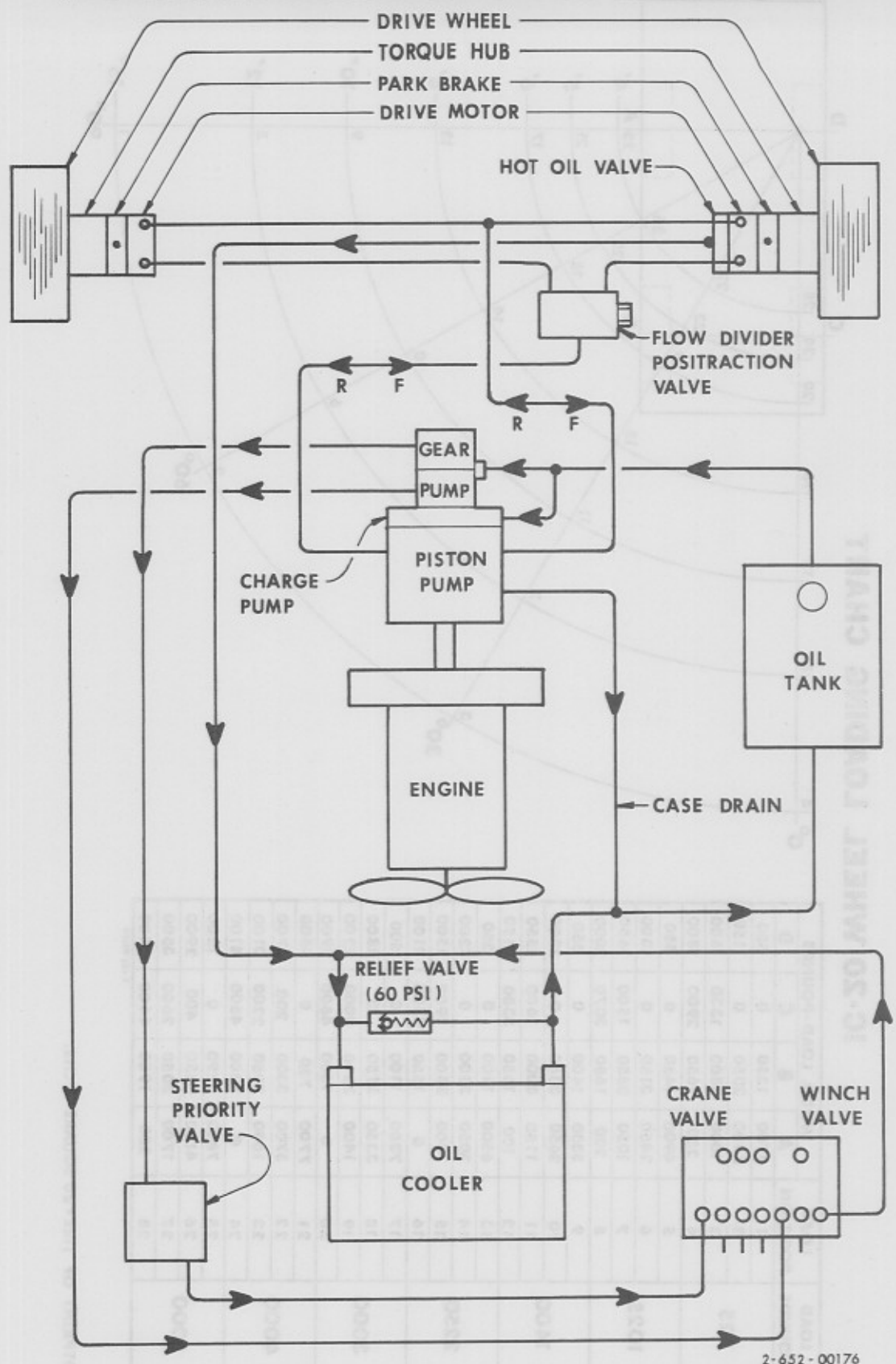
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NOTE:

1. FOOTPRINT OF TIRE = 36 SQUARE INCHS.

HYDRAULIC AND PROPULSION DRIVE SCHEMATIC



2-652-00176

HYDRAULIC AND PROPULSION DRIVE SYSTEMS

The HYDRAULIC system is quite similar to the system on other BMC cranes. Starting at the oil tank, suction oil flows to the inlet port of the tandem gear pump. (A small suction line is tied into the main suction line. The small line feeds the charge pump on the piston pump. This will be discussed in more detail later). One side of the gear pump supplies oil to the crane portion of the control valve (5 gpm @ 2500 psi). The other side of the gear pump supplies oil to the winch portion of the control valve (10 gpm @ 2500 psi). The 5 gpm from the crane valve is added to the 10 gpm flow from the pump by means of a combiner valve section, thus providing 15 gpm for the winch circuit. The return oil then goes through the oil cooler and back to the oil tank. A spring type relief valve is provided across the inlet and outlet ports of the cooler. This is to allow very cold oil to bypass the cooler and eliminate possible component damage.

The PROPULSION DRIVE system is new to BMC cranes, but certainly not new to the construction machinery industry.

The variable volume piston pump is direct driven from the rear end of the engine crankshaft. The propulsion drive is a "closed loop" type system. The pump can deliver up to 25 gpm of oil and can provide 4000 psi to the wheel drive motors.

The built in charge pump maintains approximately 100 psi of pressure to the intake side of the piston pump whenever the engine is running. When the transmission control lever in the operator compartment is moved for forward travel, the pump starts delivering oil to the wheel drive motors for forward travel. When the control lever is returned to neutral, the pump does not deliver oil and the wheel drive motors stop. If this is done on level ground, the crane will stop and stand still. If this is done on an incline, the crane will stop but roll slowly, or creep, down the incline due to oil leaking through the wheel drive motors. ALWAYS apply the parking brake when the crane is stopped.

When the crane is on fairly level ground and little or no deck load, the shift control can be actuated to start the crane moving at low engine speed, then the engine speed and control lever movement increased to maximum at the same time for maximum travel speed. If the crane is on an uphill grade or has a heavy deck load, it is advisable to bring the engine up near full speed before moving the shift control lever.

When the crane is traveling on fairly level ground and under conditions not requiring high pressures, the oil loss through the wheel drive motors is very low. Therefore, the same oil will stay in the loop longer and become hot. The "hot oil" valve on the right hand wheel motor always bleeds 2 gpm out of the "loop circuit", and lets cool oil be drawn into the pump from the tank, thereby maintaining a lower loop oil temperature under these conditions.

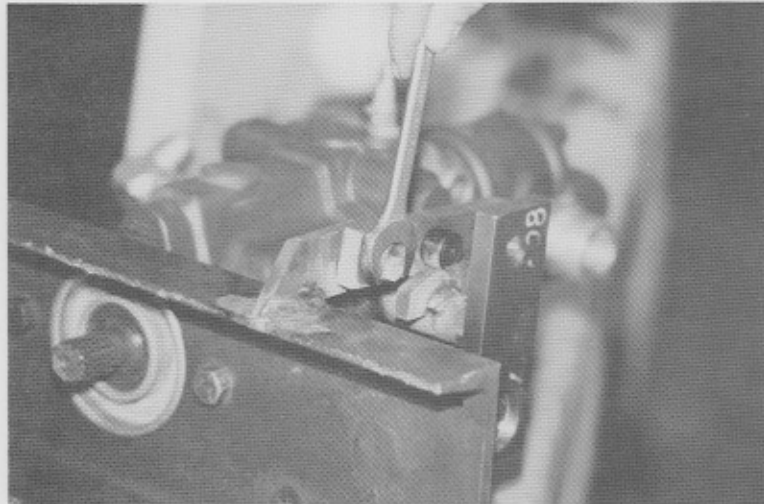
Since the crane does not have an oscillating axle, one drive wheel will come off the ground at times, when angling onto an inclined ramp, crossing a hole or depression, etc. A flow divider positraction valve is located in the line between the pump and drive motors. When a wheel is lifted off the ground, is on ice, or for any reason starts to spin, it will momentarily take more oil than the wheel that has traction. When this happens, a shuttle valve inside the positraction valve will shift over and restrict the high flow of oil to the spinning wheel and force oil to flow to the wheel with traction. This desired action is not as positive at low oil flow rates. To obtain maximum effort from the wheel with traction, the transmission control lever should be fully actuated and the engine speed be increased until travel is resumed. You should be ready to reduce engine speed quickly as soon as the spinning wheel reaches solid footing. This will minimize the tendency to "lurch" in the direction of travel.

The crane is equipped with a large oil cooler that will allow it to operate properly when the ambient temperature is slightly over 100°F. An oil temperature gauge is provided just ahead of the steering wheel. The sensor for this gauge is located at the inlet side of the oil cooler. If this gauge reads above 200°F, the unit should be shut down and the reason for the excessive temperature located and corrected. The fins on the oil cooler and engine radiator may be dirty and need cleaning if the system gets too hot.

PISTON PUMP NEUTRAL DETENT ADJUSTMENT

It is desirable for the pump to be in neutral and pump no oil when the transmission control lever is in neutral. Due to a slight misadjustment of the linkage, or worn linkage, the pump may not be in perfect neutral when the control lever is in neutral and tend to make the crane creep. To overcome this annoyance, a neutral detent is provided. A roller on a spring loaded bar is pulled into a detent to help the pump go to a "perfect neutral" when the control lever is neutralized.

The pivot end of the bar supporting the roller is an eccentric pin. The bolt holding the eccentric pin can be loosened, then the eccentric pin turned with a wrench as needed to fully neutralize the pump. This adjustment can best be made and the neutral position determined more accurately if the front end of the crane is lifted off the ground and the parking brake released. With the engine running while this adjustment is being made, it is easy to see the wheels turning if the pump is not in a perfectly neutral position.



WIRE ROPE INSTALLATION

