BearCat Mfg.

FIELD OPERATIONS & MAINTENANCE

Model BC-401

Cab-Operated Liquid Asphalt Distributor

This manual covers:

Unit Serial No. _____

Customer _____

Date of Service _____

BearCat Manufacturing, Inc.
3650 Sabin Brown Rd.
Wickenburg AZ 85390
928-684-7851

IMPORTANT SAFETY NOTICE

BearCat liquid asphalt distributors are designed and manufactured to ensure the safety of operating personnel to the greatest extent possible.

However, this equipment makes use of volatile materials at high temperatures and pressures and employs highly combustible or explosive fuels. Potentially life-threatening hazards may exist in its operation.

These hazards are identified and the appropriate precautions are given in SECTION 2 of this manual.

ALL PERSONS INVOLVED IN THE OPERATION OF THE EQUIPMENT ARE URGED TO FAMILIARIZE THEMSELVES WITH THE CONTENTS OF SECTION 2, AND IN ADDITION TO OBSERVE THE CAUTION NOTICES THAT ARE MARKED WITH THE WARNING SYMBOL ⚠ THROUGHOUT THIS MANUAL.

WARRANTY AND CLAIM PROCEDURES

LIMITED WARRANTY

BearCat Manufacturing, Inc. (hereinafter referred to as "BearCat") extends to the original purchaser-user of its products, the following warranty covering goods manufactured by BearCat, subject to the qualifications listed.

This warranty applies only when the product: (1) is properly used and maintained in accordance with BearCat instructions, diagrams, and specifications, and recommendations of governing agencies or associations; (2) is being operated under proper fuel and/or cargo characteristics; (3) is not subject to corrosive or abrasive atmosphere or materials; (4) has not been damaged through malice or ignorance; (5) has not been subject to flood, lightning, accidents, misuse, neglect or unauthorized modification, repair, or service.

Parts replaced under this warranty are warranted only through the remaining time of the original warranty.

BearCat warrants that at the time of delivery, the product manufactured by BearCat and delivered new to the original purchaser-user shall be free from defects in materials and workmanship for a period of one (1) year after delivery when operated and maintained under normal use and service and in accordance with the written instructions provided by BearCat.

WARRANTY CLAIMS

BearCat agrees, at its option, to repair or replace, FOB Wickenburg, Arizona, any part acknowledged by BearCat to be defective when returned to BearCat; provided that (1) the defective part is returned transportation charges prepaid to BearCat for inspection and that (2) BearCat determines that defective part had failed under the terms of the above warranty.

BearCat will not install and will not pay any installation costs, transportation costs, travel time, mileage, labor costs or other expenses of any defective parts replaced or repaired unless the user has reached a prior agreement with BearCat.

The user shall notify BearCat of any defect within this warranty no later than thirty (30) days after a defect is discovered.

No defective part will be accepted for return or replacement without the written authorization of BearCat. Upon such authorization, the part should be returned to BearCat, shipping charges prepaid, at the following address:

BEARCAT MANUFACTURING, INC.
Wickenburg Industrial Airpark
P.O. Box 2059
Wickenburg, Arizona 85358
Telephone (602) 684-7851

EXCLUSIONS

The provisions of the foregoing warranty are BearCat's sole obligation and exclude all other warranties express or implied.

BearCat shall not be responsible for any loss, damage, incidental or consequential damages of any kind, whether based upon warranty, contract, or negligence, arising in connection with the sale, use, or repair of the product.

Components manufactured by any supplier other than BearCat shall bear only that warranty made by the manufacturer of that product.

BEARCAT MANUFACTURING, INC.
P.O. Box 2059
Wickenburg, Arizona 85358

BearCat Mfg.

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MANUAL OF OPERATING & MAINTENANCE INSTRUCTIONS

MODEL BC-401
Cab-Operated Liquid Asphalt Distributor

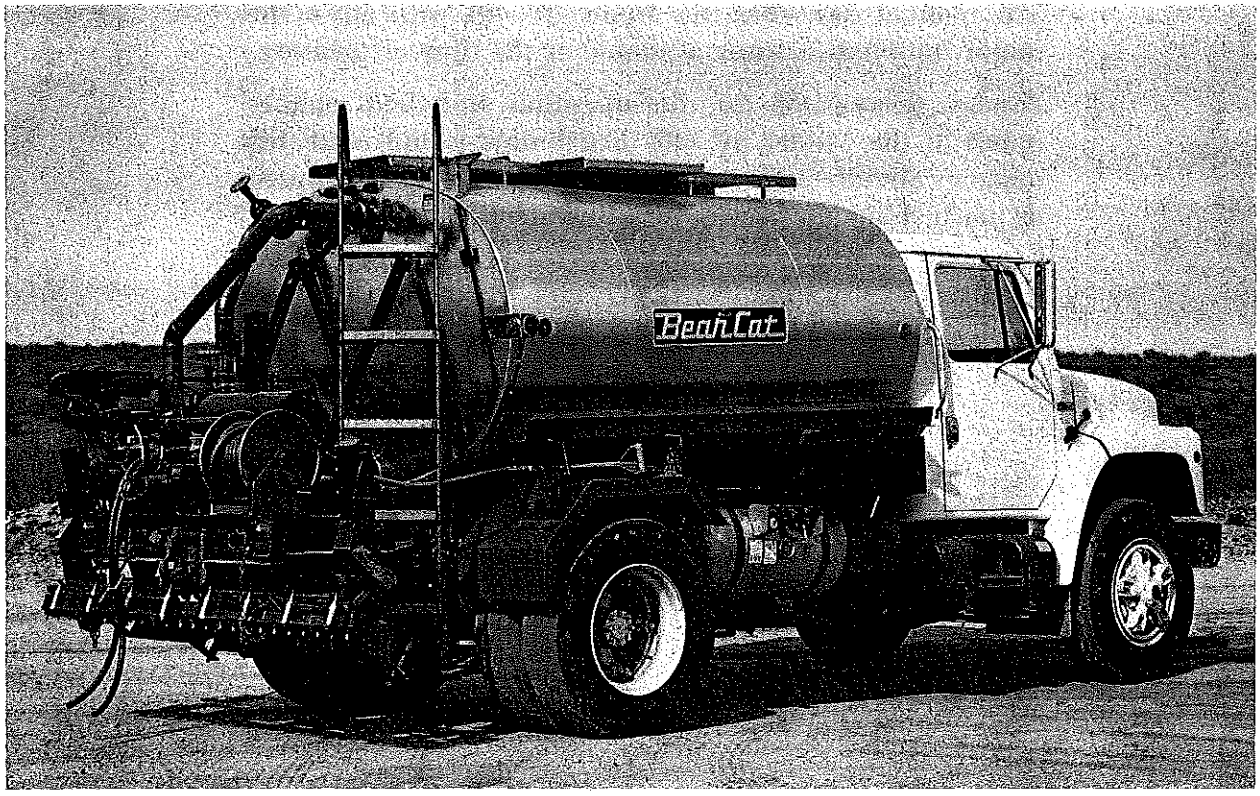
This manual describes the Model BC-401 Cab-Operated Liquid Asphalt Distributor manufactured by BearCat Manufacturing, Inc. The contents of the manual include the following:

- Equipment Description & Specifications
- Required Safety Precautions
- Preparation of the Equipment for Use
- Operating Instructions
- Recommended Operating Practices
- Field Maintenance
- Appropriate Wiring Diagrams, Hydraulic Diagrams, and Parts Lists
- Supporting Literature describing Manufactured Components incorporated into the Model BC-401

The manual describes the Model BC-401 with all of the major optional features available at the time of printing.

Persons responsible for the operation and field maintenance of the Model BC-401 distributor should read this manual carefully before attempting to operate the equipment or performing any service or adjustment procedures on it.

(1.1) MODEL BC-401 CAB-OPERATED LIQUID ASPHALT DISTRIBUTOR, DRIVER'S SIDE



(1.2) MODEL BC-401 CAB-OPERATED LIQUID ASPHALT DISTRIBUTOR, CURB SIDE

SECTION 1
EQUIPMENT DESCRIPTION & SPECIFICATIONS

Equipment Description

The Model BC-401 Cab-Operated Liquid Asphalt Distributor is illustrated in the photographs, Figures 1.1 and 1.2. The following description of the equipment should be read to familiarize yourself with the operating features and capabilities of the Model BC-401 asphalt distributor.

Power Take-Off

Hydraulic power is used to turn the asphalt pump, move the spray bar, and operate the blower used with diesel-fueled asphalt heating systems. Primary power for the hydraulic system is derived from a power take-off (PTO) driven by the truck engine. Either a transmission PTO or a crankshaft PTO may be employed.

The transmission PTO consists of a gearbox mounted to the truck transmission, from which a drive line connects to a hydrostatic pump. The PTO gearbox operates only when the truck clutch is engaged. When the clutch is disengaged, the PTO stops, in turn stopping the hydrostatic pump and the asphalt pump.

The PTO is engaged by use of a switch on the Cab Control Panel. In general, the PTO can be switched on when the truck arrives at the job site and left on until the shift is finished for the day.

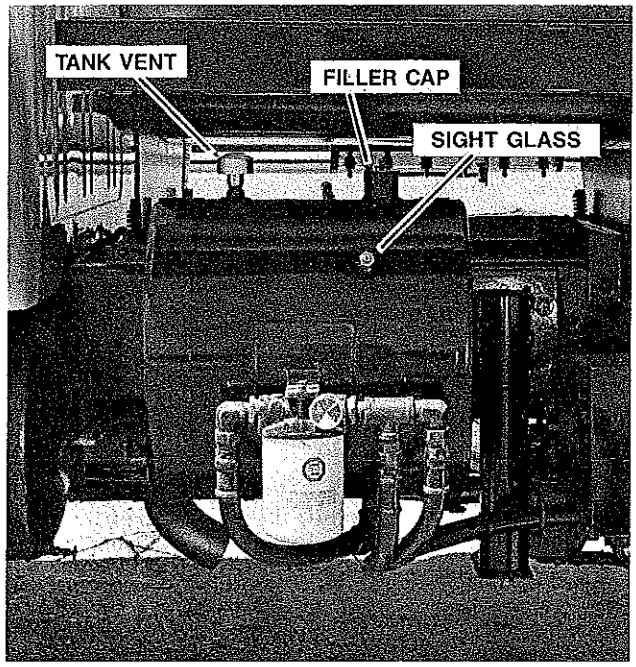
The crankshaft PTO is driven directly by the truck crankshaft, allowing the hydrostatic pump and asphalt pump to be operated independently of the truck clutch. Depending on the configuration ordered, the crankshaft PTO may include a separate clutch isolating the PTO from the hydrostatic pump.

The crankshaft PTO is particularly convenient when the asphalt distributor is used for extensive hand spraying. It can be left engaged at highway speeds.

Hydraulic Reservoir and Filters

Hydraulic fluid for the hydrostatic pump and motor is stored in a 25-gallon tank (1.3) mounted to the truck frame. The system uses Type F Automatic Transmission Fluid. The tank includes a sight glass that indicates the presence of sufficient fluid to operate the system.

A 10-micron filter is located immediately adjacent to the tank. A vacuum gauge mounted on the filter housing serves as an indication of the condition of the filter element. When the element is clean and unobstructed, the gauge will indicate pressure in the range −5 to −10 inches Hg.



(1.3) HYDRAULIC RESERVOIR & FILTER

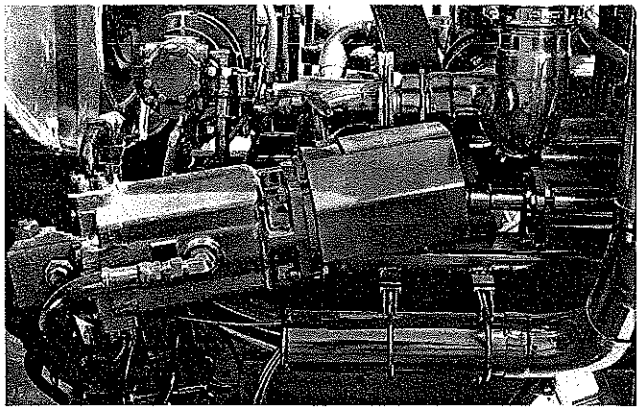
Instructions for the maintenance of the hydraulic reservoir and filter are included in SECTION 6.

Hydrostatic Pump

A heavy-duty, variable displacement hydrostatic pump (1.4) is used to drive the hydrostatic motor that turns the asphalt pump.

The hydrostatic pump is a sealed, self-lubricating unit. It operates in either the forward or reverse direction, at any speed within its operating range, as determined by a vernier control mounted in the truck cab. (BC-401 distributors equipped with computerized rate control equipment, described later in this Section, include pump controls on the Cab Control Panel instead of the cab-mounted vernier control.)

The hydrostatic pump receives power directly from the PTO. It is a quiet, smooth-running unit under the conditions normally encountered in asphalt spreading operations. Should the pump become noisy, the most common cause is insufficient hydraulic fluid due to a clogged filter or a blocked hydraulic line. The pump should not be operated under these conditions.



(1.4) HYDROSTATIC PUMP
(1.5) HYDROSTATIC MOTOR

Hydrostatic Motor

The hydrostatic motor (1.5) is a fixed-displacement type that is driven by the hydrostatic pump through high-pressure hydraulic lines. The motor responds instantaneously to changes in either the speed or the direction of the pump. The motor is equiped with an integral relief valve that opens if the maximum rated output torque is exceeded, as may occur if the asphalt is frozen or the asphalt pump attempts to force asphalt against a closed valve.

The output shaft of the hydrostatic motor is coupled directly to the asphalt pump. A magnetic sensor installed at the motor shaft coupling provides signal information to the gallons-per-minute (GPM) display in the cab.

Asphalt Pump

The asphalt pump (1.6) is a positive-displacement geared pump with a delivery capacity of 0.48 gallon per revolution, to a maximum of 460 gallons per minute. The intake and outlet orifices are of 4-inch (102 mm) diameter. The operation of the pump is illustrated in Figure 6.3.

The direct coupling of the asphalt pump to the shaft of the hydrostatic motor results in a direct relationship between truck speed and pump output. If truck speed is increased, pump output automatically increases an appropriate amount to maintain the correct flow of asphalt through the spray nozzles.

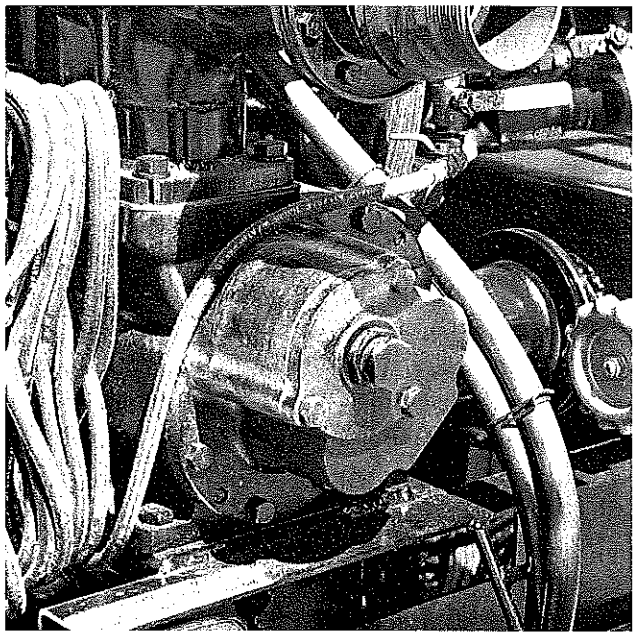
The pump operates in either direction, at any flow rate within its operating range, as required by either the cab-mounted pump control or the computerized rate control system. The asphalt flow rate, or pump output, is displayed in gallons-per-minute (GPM) on a digital display in the truck cab.

The pump is capable of pumping any bituminous material at temperatures up to 450°F (232°C). It is easily accessible at the rear of the truck.

The standard pump is equipped with a conventional stuffing box. An optional version is available with Teflon® seals that eliminate the need for periodic repacking of the stuffing box. Asphalt pump maintenance procedures are given in SECTION 6.

Two screens are provided to protect the pump impellers and chamber from foreign matter in the asphalt: one for forward operation and one for reverse operation. A third screen is used to keep particles from the spray valves and nozzles. The screens should be cleaned periodically in accordance with instructions given in SECTION 6.

For forward pumping operation, the asphalt pump is equipped with a pressure relief valve that opens if internal pressure exceeds 85 PSI. In reverse operation, there is no internal pressure relief.



(1.6) ASPHALT PUMP

Auxiliary Hydraulic System

The auxiliary hydraulic system consists of a small hydraulic pump mounted on the main hydrostatic pump, two electro-hydraulic valves for control of spray bar movements, and a non-adjustable pressure relief valve. The auxiliary system draws hydraulic fluid from the 25-gallon reservoir described above.

The auxiliary pump provides power for spray bar movements (side shift right and left, raise, and lower). The pump also operates the blower used in diesel-fired asphalt heating systems. The bar movement and blower functions are interlocked; that is, the bar is not movable when the blower is running.

Spray Bar

The spray bar used on the Model BC-401 distributor is a full-circulation type; that is, it permits circulation of asphalt throughout the entire interior of the bar structure. This configuration allows the fully enclosed spray valve bodies to be totally immersed in asphalt, assuring immediate application of material when the valve is opened.

The poppet valves that release the spray are opened and closed by electrically controlled air cylinders (1.7) that operate through a mechanical linkage when the operator actuates the corresponding switches on the Cab Control Panel or Rear Control Panel.

(1.7) SPRAY BAR AIR CYLINDERS

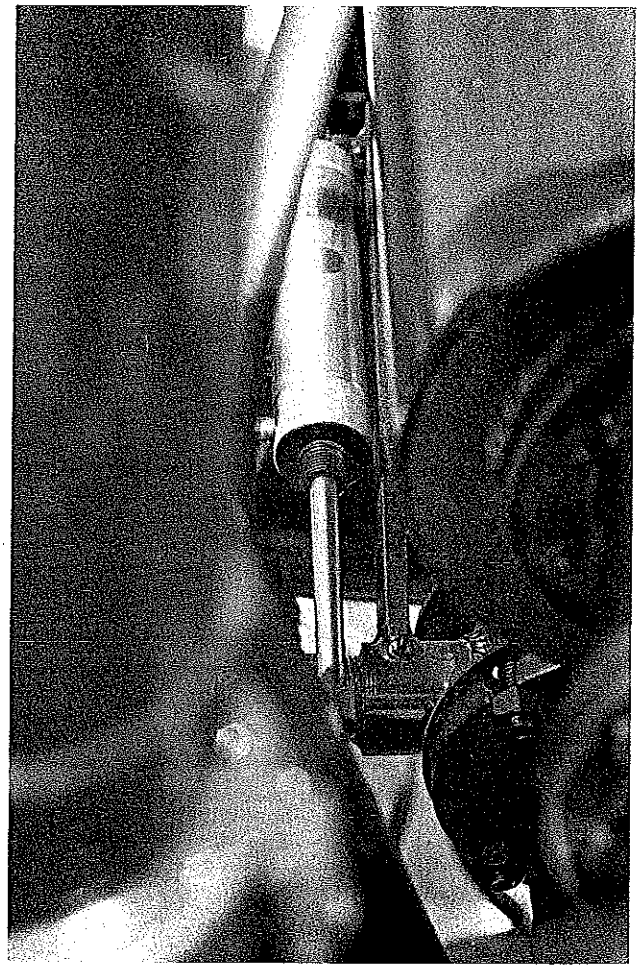
Spray valves are spaced along the bar on 4-inch (102 mm) centers. In the standard spray bar, valves are controlled in groups of six per switch, occupying 24 inches or 610 mm.

Optional configurations are available.

The spray bar includes a pressure equalizing valve (1.8) that is connected with the MASTER switches on the cab and rear control panels. When both of these switches are on, the equalizer valve is open, permitting asphalt to flow equally throughout the bar and wings for uniform distribution. When the MASTER switches are off, the valve is closed. Asphalt circulates from the pump, through the bar, and back to the tank.

Through switches on both control panels, the spray bar can be moved right and left (side shift); total travel is 20 inches (508 mm). The bar can be raised to approximately 20 inches above the ground and lowered to within 10 inches (254 mm) of the ground. A hydraulic lockout valve holds the bar at any height within this range. A mechanically adjustable stop is provided to limit downward travel.

The right and left wings can be manually lifted to a vertical position, which places them well inside the width of the vehicle.



(1.8) PRESSURE EQUALIZING VALVE

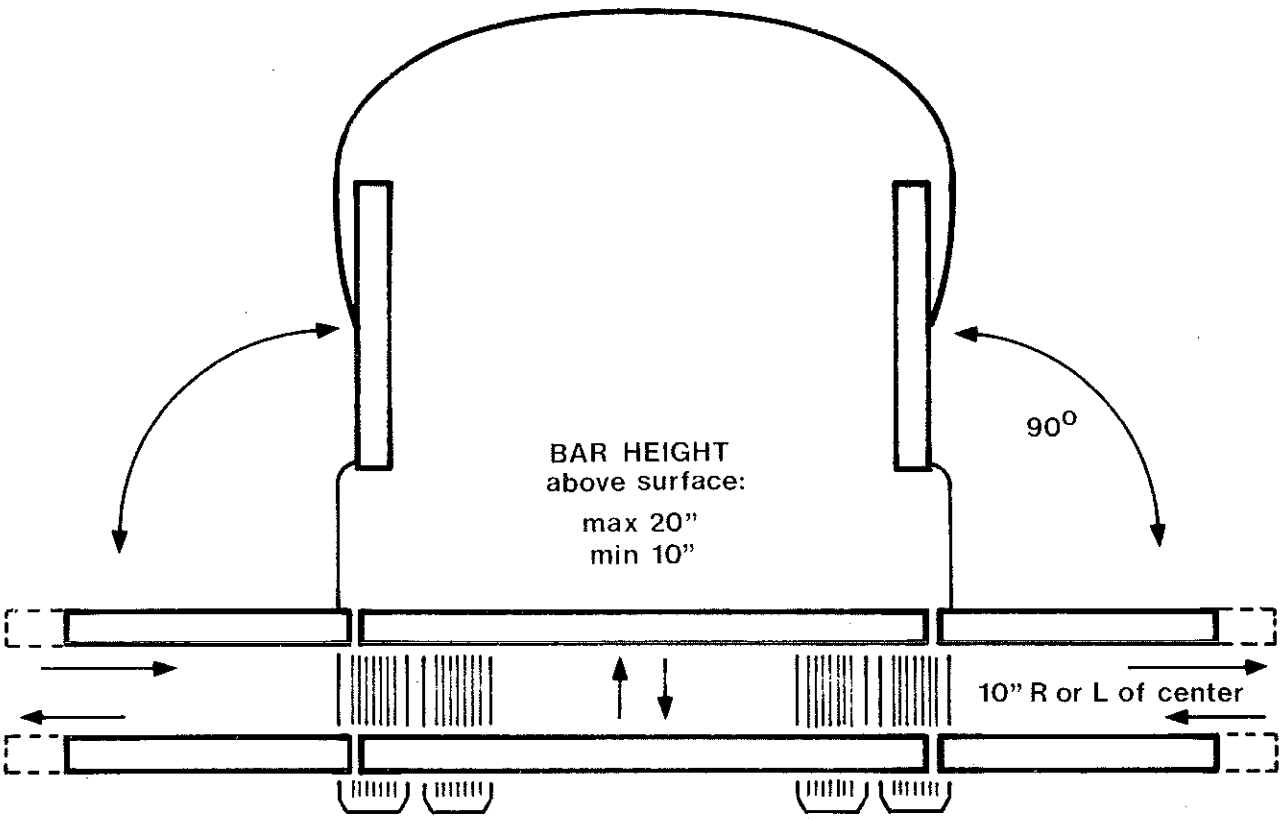
The movements of the spray bar are illustrated in Figure 1.9.

When in the spreading, or horizontal, position, the wings can pivot forward or backward without damage if they should hit an obstruction. Replaceable shear pins (1.10) are used to assure correct alignment of the wings with the main bar. Spare shear pins are provided with Model BC-401.

Cab Control Panel

The operation of the Model BC-401 distributor can be controlled from the driver's seat of the truck through the Cab Control Panel. The functions of opening and closing spray valves, positioning the spray bar, engaging the PTO, adjusting the optional remote mirror, and engaging the optional warning beacon are all controlled with switches on the Cab Control Panel.

Units equipped with computerized rate monitoring and control systems also contain pump selector controls on the Cab Control Panel.



(1.9) SPRAY BAR MOVEMENTS

(1.10) WING SHEAR PINS

Computerized Rate Monitor (CRM-88)

The BearCat Computerized Rate Monitor is provided as standard equipment on Model BC-401 asphalt distributors.

By using the CRM-88 in conjunction with the asphalt pump vernier control, the driver can set the correct spread rate in gallons per square yard (GSY), which is then automatically held constant regardless of truck speed. The driver does not need to reset the rate unless either truck gearing or spread width is changed. Instructions for setting spread rates are given in SECTION 4.

CRM-88 Functions

(1) Digital displays are provided for:
Asphalt pump flow rate in gallons per minute (GPM).
Cumulative feet traveled with master switch on (bitumeter function).
Rate of vehicle travel in feet per minute (FPM).
Working spread width in feet.
Spread rate in gallons per square yard (GSY).
(2) Sensor Check Mode; used only to test performance of sensors that report vehicle motion and asphalt pump operation.
(3) On-Off switch.
(4) Reset-Select switch; used to reset bitumeter function, to enter working spread width, and to enter Sensor Check Mode.
(5) High-Low switch; sets unit to agree with truck axle range.

Computerized Rate Control (CRC)

The BearCat Computerized Rate Control System is optionally available on Model BC-401 asphalt distributors. When the CRC System is ordered, it replaces the CRM-88 rate monitor described above.

The CRC System automatically holds the spread rate at the selected level regardless of truck speed or gearing, in forward or reverse, or during mid-pass changes in spray bar width.

On CRC-equipped units, the pump vernier control is mounted on the Cab Control Panel rather than separately as it is with the CRM-88 installations.

Rear Control panel

The Rear Control Panel contains switches for controlling spray bar movements and spray valves, and a master switch. The panel also includes asphalt pump controls when the BC-401 vehicle is equipped with the optional Computerized Rate Control (CRC) System (see above). If the unit is equipped with diesel-fired asphalt heaters, the Rear Control Panel contains burner and washdown switches.

The master and spray bar switches on the Rear Control Panel exactly duplicate the functions of those on the Cab Control Panel.

Hydrostatic Pump Control

The standard control for the speed and direction of the hydrostatic pump is a vernier type located in the cab of the truck. On vehicles equipped with the optional CRC System, the pump control is mounted on the Cab Control Panel.

Asphalt Heating System Options

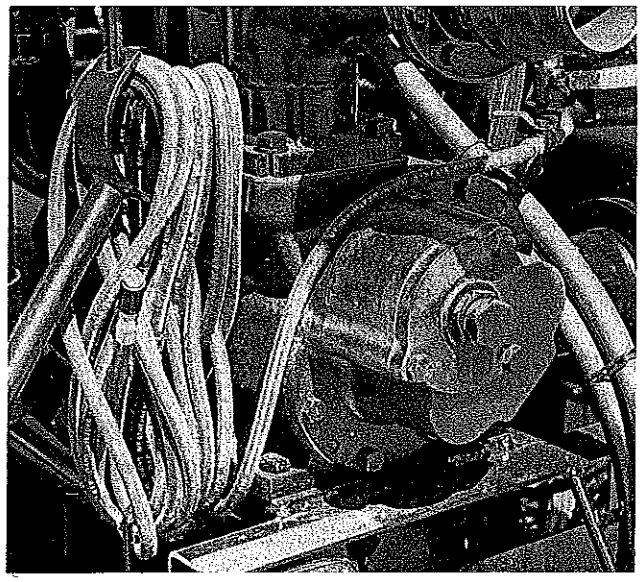
Diesel-Fired Burners—This option provides two 8-inch-diameter flues, each containing an atomizing burner pressurized at approximately 120 PSI. The burners are individually ignited by solid-state ignitors powered from the vehicle electrical system and controlled by switches on the Rear Control Panel.

LPG-Fired Burners—This option provides LPG-rated storage tanks, and the necessary valves, pressure regulators, and plumbing. The fuel is burned in two LP gas burners mounted in 8-inch-diameter flues. There are no controls other than valves in the standard LPG heating system.

With either the diesel-fired or the LPG-fired system, asphalt temperature is displayed on a dial thermometer mounted at the front of the asphalt tank.

Washdown Facilities

The standard washdown system installed on the Model BC-401 distributor includes a 15-gallon diesel fuel tank mounted on the curb side of the truck. The fuel under pressure from the vehicle air supply is routed to a washdown hose (1.11). The hose is 25 feet long and is fitted with an on-off valve.



(1.11) WASHDOWN HOSE

Vehicles equipped with diesel-fired asphalt heaters employ a washdown system in which the fuel pump for the burners is used to propel diesel fuel from the truck tank through the washdown hose.

Spray Bar Flushing System

A valve is provided to allow diesel fuel from an external source to flow through the spray bar for the purpose of flushing it clear of residual asphalt. The procedure for flushing the bar is given in SECTION 4 and repeated in SECTION 6. This procedure should always be followed carefully.

Hand Spray System

The Model BC-401 distributor is equipped with a hand spray consisting of an aluminum spray wand and 50 feet (15 m) of rubber hose. The spray wand is fitted with a drip-free valve. The hose is stored on a manually operated reel (1.12) with a swivel.

Instructions for the use of the hand spray are included in SECTION 4.

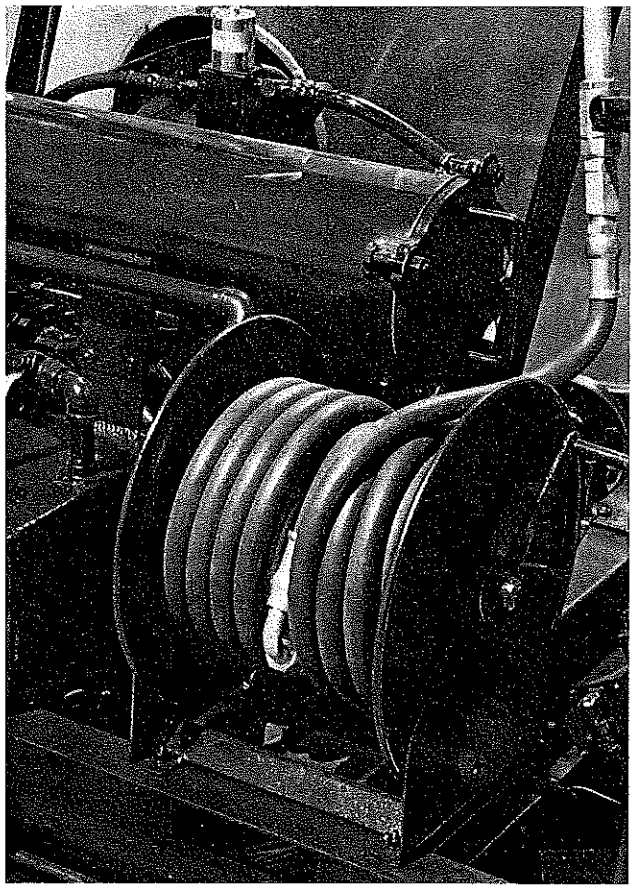
Pattern Spray Capability

As described above, the spray valves in the standard BearCat spray bar can be opened and closed in groups of six valves per control panel switch. This design enables the operator to exercise a high degree of control in the application of liquid asphalt material. patterns can be deposited in increments as small as two feet or as large as the combined width of the main bar and both wings. In combination with the ability of the bar to shift laterally approximately 10 inches in either direction, this selectivity allows the user to apply asphalt to precisely defined areas in relatively complex patterns.

Examples of the pattern spray capabilities of the Model BC-401 distributor are given in SECTION 4. The drawings are intended only to illustrate the flexibility of the system. Any number of patterns other than those shown can be developed.

Remote Curbside Mirror

The optional curbside mirror can be positioned from the driver's seat to show the normal field of view for highway travel, or adjusted to view the curbside wing extension and the space adjacent to the truck. The mirror position is controlled through switches on the Cab Control Panel and actuated by compressed air taken from the truck supply.



(1.12) HAND SPRAY HOSE REEL

Specifications

Spread Rate Accuracy[Note 1]	±2.0%
Maximum Temperature Capability	350°F (177°C)
Recommended Operating Pressure, PSI	8-12
Asphalt Handling Functions	Self-load, self-load thru spray bar, off-load, transfer, circulate, heat, spray, flush

Spray Bar

Over-All Length, ft (m)	
Standard	12 (3.7)
Options Available	14 (4.3)
	16 (4.9)
Position Control	
Maximum Height, in (cm)	20 (51)
Minimum Height, in (cm)	10 (25)
Total Side Shift, in (cm)	20 (51)
Wing Lift, degrees	90
Wing Swivel Seals	3-inch O-rings
Spray Nozzle Valves	
Type	Poppet
Center-to-Center Spacing, in (cm)	4 (10)
Control Increments, ft (cm)	
Standard	2 (61)
Option	1 (30)
Control	Console Switches
Actuation	Solenoid/Pneumatic Cylinder

Metering & Gauging[Note 3]

Asphalt Flow, gallons per minute	
Distance Traveled, feet per minute	
Spread Rate, gallons per square yard	
Spray Bar Width, feet	CRM-88 or CRC System Digital Display
Asphalt Tank Contents, gallons	Float Gauge
Asphalt Temperature, degrees F	Dial Thermometer

Asphalt Pump

Type	Positive Displacement
Capacity, gallons per minute	460
liters per minute	1741
Seals	
Standard	High Temperature Shaft Packing
Optional	Teflon® Shaft Seal
Internal Pressure Relief, PSI[Note 4]	85

Pump Drive

Type	Hydrostatic Transmission
Capacity	
Axial Piston Variable Pump	3.9 in³/revolution
Axial Piston Fixed Motor	5.4 in³/revolution

Asphalt Piping

Intake Diameter, in (cm)	4 (10)
Discharge Diameter, in (cm)	3 (8)
Flexible Hoses (feed to spray bar)	
Diameter, in (cm)	2.5 (6.4)
Material	Rubber

Asphalt Valves

Type	Gate
Actuation	Manual

Asphalt Screens

Load Screen	
Mesh Size, in (mm)	1/4 (6.4)
Construction	Conical
Bar Screen	
Mesh Size, in (mm)	1/8 (3.2)
Construction	Cylindrical
Pump Screen (intake strainer)	
Mesh Size, in (mm)	1/4 (6.4)
Construction	Cylindrical

Asphalt Tank

Standard Capacity, gallons	1500
liters	5678
Optional Capacities Available	See Note 5
Material	
Shell (mild steel)	
Standard	10 ga
Optional	12 ga HSLA
Heads & Baffles (mild steel)	
Standard	8 ga
Optional	10 ga HSLA
Manhole Diameter, in (cm)	20 (51)
Internal Crawl Holes, in (cm)	20 (51)
Overflow Drain, in (cm)	3 (7,6)
Vent, in (cm)	2 (5)
Insulation	Mineral Wool
Thickness, in (cm)	2 (5)
Exterior Jacket	
Body: Standard	0.032 aluminum
Optional	16 ga SS
Mounting	Single Blade Bolster; resilient attachment to truck
Grip-Strut Catwalk Width, in (cm)	24 (61)

Hand Spray

Hose Diameter, in (mm)	3/4 (19)
Hose Length, ft (m)	50 (15.2)

External Washdown

Standard Tank Capacity, gallons (liters)	15 (57)
Pressurization	Truck air
System supplied with units employing diesel-fired asphalt heaters	
Tank Capacity, gallons (liters)	15 (57)
Pressurization	Heater fuel pump
Hose Diameter, in (mm)	1/4 (6.4)
Hose Length, ft (m)	25 (7.6)

Curbside Remote Mirror[Note 2]

Size, in (cm)	11 W x 16 H (26 x 41)
Movements	Up-down, in-out
Control	Switches on cab control panel
Actuation	Pneumatic

Specifications (Cont'd.)

Asphalt Heating Systems

Diesel-Fired Burner	
Air Blower	Hydraulically driven; includes integral fuel pump and air and fuel filters
Fuel Source	Truck Tank
LP Gas Burner	
Fuel Source	Truck-mounted LPG tank; pressure regulator and valving provided
Burner Flue Liner	Stainless steel
Exhaust Flue	Stainless steel; rain cap provided
Heating Capacity, BTU	Up to 1,000,000 per flue

Fender Option

Material	Steel or aluminum, as specified
Configuration	Single or tandem, as required

Notes

1. Specification indicates spread rate accuracy obtainable when equipment is properly maintained and operated in accordance with the instructions in this manual.
2. Specification refers to optional equipment.
3. Instruments may be provided with metric readouts if so requested at time of order.
4. Internal pressure relief operates only with pump in forward mode.
5. Tanks are available in capacities of 1250, 1500, 1800, 2100, 2400, 2600, 3100, 3600, 4100, 4400, & 4500 gallons.

As part of a continuing program of product improvement, BearCat Manufacturing reserves the right to make changes in these specifications at any time.

SECTION 2
SAFETY PRECAUTIONS

The safety of persons working with or near the Model BC-401 asphalt distributor depends on careful observance of the hazard warnings and protective measures listed in this Section.

The materials used in the BC-401 distributor are normally heated to 300 to 400°F for application. At these temperatures, the materials are capable of causing serious or fatal burns and can become explosive under certain conditions. The diesel fuel or LP gas used in the burners that heat the material is also highly inflammable.

Extreme care must be exercised at all times to assure the safety of persons working in proximity to these potentially hazardous conditions.

CAUTION NOTE

Persons responsible for the operation and maintenance of the Model BC-401 distributor should read the following SAFETY PRECAUTIONS and the remainder of this manual carefully before attempting to operate the equipment. BearCat Manufacturing Inc. assumes no liability for accident or injury incurred through improper use of this equipment.

READ EACH ONE OF THE FOLLOWING CAUTIONS AND SAFETY REQUIREMENTS AND MAKE THEM A PART OF YOUR DAILY WORK ROUTINE.

⚠ SAFETY PRECAUTIONS ⚠

=ALWAYS=

PROTECT YOURSELF FROM BURNS: Wear suitable gloves and protective clothing when touching any part of the equipment. Shield your eyes with safety goggles. Hot asphalt can blind you!

Keep a dry chemical fire extinguisher on hand and fully charged at all times.

Remember that sparks from an engine exhaust can ignite volatile gases.

When using dual burners, always ignite the inside burner first; DO NOT reach across a lit burner to reignite the inside burner.

Allow the flues to ventilate for at least two (2) minutes before reigniting a burner that has gone out.

To prevent explosion, be sure flues are covered by at least a 6-inch (152 mm) depth of material before heating.

When spraying material that contains volatile cutbacks (solvents), keep away from open flames or sources of sparks.

Allow sufficient space in the tank for expansion of material when heating.

When heating material, position the vehicle broadside to the wind if possible.

Be sure to open the manhole cover slowly to relieve pressure in the tank.

Keep your body and clothing well clear of rotating drive parts.

Keep your unit CLEAN; wash it down after use; remember, a dirty rig cannot be monitored for your safety as well as a clean one.

Check all tank-mounting tie-downs and fasteners; king plate pin fasteners if used; and all suspension and running gear components after the first week of operation and repeat at least every month thereafter.

=NEVER=

Allow lighted cigarettes or other burning material near open manholes or overflow vents. EXPLOSION HAZARD!

Allow use of gasoline in a burner. A major explosion can result!

Allow burners to operate while pumping, while vehicle is unattended, while vehicle is in motion, or when vehicle is parked in a confined area.

Allow material to be removed from tank while burners are operating or automatic burner controls are set to operate.

Allow use of a match or lighter to ignite a burner; HAND TORCH ONLY.

Allow material to heat beyond the maximum temperature recommended by the supplier.

Allow material to be heated in a leaking tank.

Allow material to be heated in a tank containing moisture.

Allow a hand spray wand to be aimed toward yourself or another person.

Pump against a closed valve; if necessary to stop the flow of material while filling the tank, close the suction valve or pump intake.

Open a valve without first checking that all pipe and hose connections are secure. A leaking connection may spray hot material on yourself or others.

Open an intake valve until you have made sure the fill-line connection is securely attached.

Stand in an area that could be sprayed with hot material if a valve were accidentally opened.

SECTION 3
PREPARING THE EQUIPMENT FOR USE

This Section contains information with which the operator must be familiar in order to prepare the BC-401 equipment for a spraying operation. Five essential areas are covered:

1. Operating controls, gauges, and indicators; the operator should thoroughly understand the function of each gauge and control before attempting to use the equipment.
2. Nozzle size selection; the basis for the choice of a spray nozzle is given and nozzle installation procedures are outlined.
3. Loading asphalt; three alternate methods are described, the choice depending on the circumstances.
4. Heating asphalt; procedures are given and cautionary notes are emphasized for heating material to the required temperature.
5. Circulating asphalt in the spray bar; the procedure is given for circulation prior to spraying.

Familiarity with these five areas of activity will prepare the operator for efficient, safe operation of the equipment.

OPERATING CONTROLS
UNITS EQUIPPED WITH CRM-88 RATE MONITOR

CAB CONTROLS

Control Panel Switches

Panel Identification	*Function*
PTO	Acts through hydraulic relay to engage or disengage power take-off.
SPRAY BAR	Individual switches open and close spray bar valves in 2-foot increments.
MASTER*	Controls all spray valves simultaneously to open or closed position depending on setting of individual spray bar switches. This switch should be OFF except when spraying asphalt.
BITUMETER or FOOTAGE	Three-position: ON engages distance-measuring function; OFF disengages; ON W/ MASTER causes function to engage automatically when MASTER switch is ON.
LIFT	Controls vertical motion of spray bar.
SWING	Controls horizontal motion (side shift) of spray bar.
MIRROR UP-DOWN**	Controls vertical motion of curbside mirror.
MIRROR IN-OUT**	Controls horizontal motion of curbside mirror.
BEACON**	Activates beacon lamp.

*Both Cab and Rear MASTER switches must be ON to enable operation of spray valves.
**Optional equipment.

REAR CONTROLS

The Rear Control Panel switches marked SPRAY BAR, MASTER, LIFT, and SWING are functionally identical to those similarly marked on the Cab Control Panel, described above. Note that both MASTER switches must be ON to enable operation of spray bar valves.

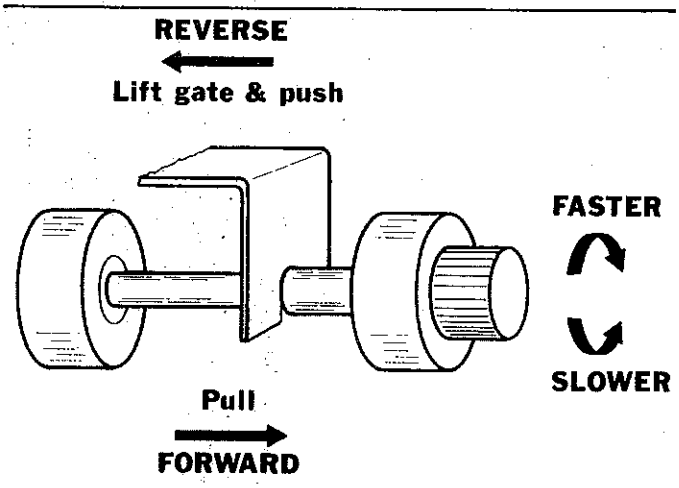
In addition, the Rear Control Panel includes the following switches on units equipped with diesel-fired asphalt heaters:

Panel Identification	*Function*
L. BURNER	Ignites and turns off left-hand (high) burner.
R. BURNER	Ignites and turns off right-hand (low) burner.
WASH	WASH position disables burners and provides pressurized diesel fuel in washdown hose.

Hydrostatic Pump Control

See Figure 3.1. The speed and direction of the pump are both determined by the setting of the single control shown. The pump is in neutral (no pumping action) when the control shaft rests against the detent gate. When the shaft is pulled toward the operator, the pump runs in the FORWARD mode. When the gate is lifted and the shaft pushed away from the operator, the pump runs in the REVERSE mode.

Pump speed is controlled by the vernier knob on the shaft. Turning the knob clockwise increases the speed of the pump.



(3.1) HYDROSTATIC PUMP CONTROL

CRM-88 Rate Monitor Controls

Panel Identification	*Function*
ON-OFF	Switches CRM unit on and off
RESET-SELECT	*Multifunctional:* (a) Resets distance traveled to zero (b) Enters working spread width to 16 feet maximum (c) Causes GSY (gallons per square yard) display to appear (d) Places CRM unit in and out of Sensor Check Mode
HIGH-LOW	Switches CRM unit to agree with truck axle setting

USE OF CRM-88 SENSOR CHECK MODE

The Sensor Check Mode is used only for testing purposes and is not a part of normal operations. It should be used only if a malfunction in CRM-88 performance is suspected.

To employ the Sensor Check Mode, proceed as follows:

(1) Turn off CRM-88 (right-hand switch OFF).
(2) Hold left-hand switch in SELECT position (down).
(3) Turn right-hand switch ON.
(4) When the legend, SENSOR CHECK appears on display, release left-hand switch.
(5) Drive truck forward and observe CRM-88 display; FPM should show a solid + sign. Check at low speed and again at higher speed.
(6) Turn asphalt pump on and observe display; GPM should show a solid + sign. Check at low pumping rate and again at higher rate.
(7) Turn right-hand switch OFF to return CRM-88 unit to normal mode for spreading operations.

UNITS EQUIPPED WITH CRC COMPUTERIZED RATE CONTROL SYSTEM

CAB CONTROLS

Control Panel Switches

Cab Control Panel switches are identical to those described above for CRM-88 units.

Hydrostatic Pump Control

Panel Identification	*Function*
INCREASE (vernier knob)	Controls speed of pump when pump selector is in MANUAL mode.
FORWARD OFF REVERSE LOAD	Selects pump direction when pump selector is in MANUAL mode.
CRC MANUAL (pump selector)	In CRC position, pump is under computer control. In MANUAL position, pump responds to controls described above.

CRC System Controls

ON-OFF	Switches CRC unit on and off.
ERASE-SELECT	*Multifunctional:* (1) Selects CRC functions for display (IDLE, NOZZLE SIZE, DISTANCE TRAVELED). (2) Returns DISTANCE TRAVELED display to zero.
▲ ▼	*Multifunctional:* (1) Raises or lowers pump idle speed (circulation rate). (2) Raises or lowers spread rate (GSY) to desired value.

REAR CONTROLS

The Rear Control Panel on CRC-equipped units is identical to that described for the CRM-88 above, with the following addition:

Panel Identification	*Function*
PUMP CONTROL	Increases or decreases pump speed in MANUAL mode; determines pump direction, forward or reverse.

ASPHALT TANK GAUGE (all units)

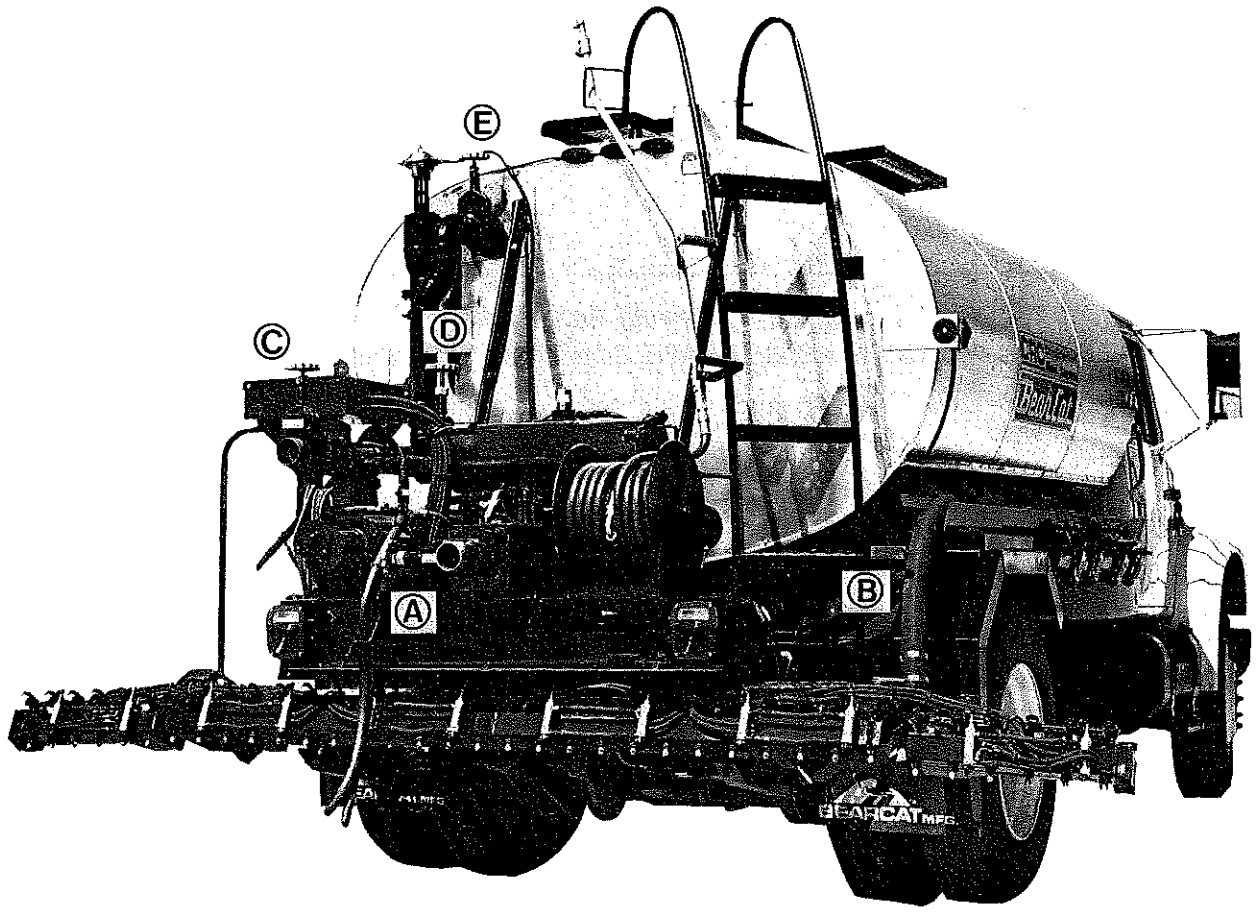
The amount of material in the tank is shown on a flotation-type gauge mounted on the driver's side of the tank behind the cab. The gauge is marked in 50-gallon increments. The vehicle must be stationary and level to obtain an accurate reading from the gauge.

ASPHALT TEMPERATURE GAUGE (all units)

The temperature of the material in the asphalt tank is shown on a dial thermometer mounted near the front of the tank on the driver's side. The thermometer must be monitored closely whenever the burners are operating.

Asphalt Valve Locations & Functions

The valves that control asphalt flow are identified in Figure 3.2.



*** IMPORTANT ***
Open Valve E *only* for tank circulation while heating asphalt.

Key	*Function(s)*
A	Intake from external source with pump in FORWARD Gravity unload
B	Tank valve
C	External discharge with pump in FORWARD Intake from external source with pump in REVERSE
D	Spray bar isolation
*E	Tank circulation

(3.2) ASPHALT VALVES

Selection of Correct Spray Nozzle

When the desired rate of travel in feet per minute and the required spread rate in gallons per square yard are known, the appropriate nozzle size can be selected with the aid of the BearCat Road Oil Spreading Calculator.

If the nozzles presently in the spray bar are not of a suitable size, change them according to the instructions given below while the asphalt is being heated.

Refer to Side 1 of the Calculator. Set the required SPREADING RATE opposite TRUCK SPEED. Then observe the scales visible in the windows and choose the one that fits most closely in the range 6 to 12 PSI. The acceptable range is actually 5 to 25 PSI; however, since operation at the lower end is preferable to minimize overspray and contamination of the equipment, the selected nozzle should be one that will yield the required coverage at 6 to 12 PSI.

Example	
SELECTED TRUCK SPEED	400 ft/min (chosen for compatibility with chip distributor)
REQUIRED SPREAD RATE	0.4 gal/sq yd
NOZZLE SELECTION (from calculator)	#1 - not usable #2 - not usable #3 - usable; causes 21 PSI #4 - optimum; causes 10 PSI

The example shows that a No. 4 nozzle will be the recommended choice for the operating parameters given.

Spray Nozzle Removal & Installation

To remove or install nozzles, use the wrench provided with the asphalt distributor. The wrench is equipped with a folding stop that should turn to and touch the next nozzle in the spray bar when properly aligned. See sketch. The output slot must be at an angle of 30° to the long axis of the spray bar for application of asphalt at the specified spread rate.

DO NOT attempt to estimate this angle; always use the wrench.

Initial Checkout of the Equipment

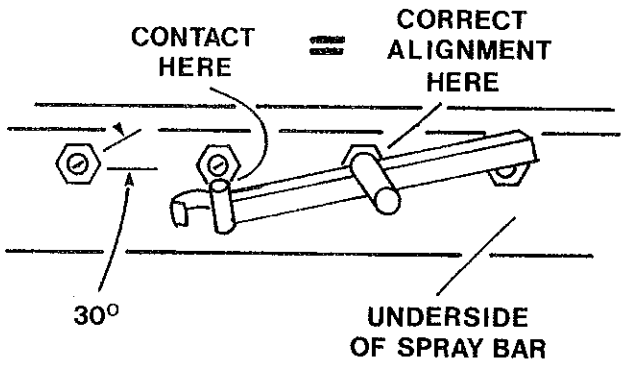
Before loading the tank with asphalt, and at the start of each working season, check the equipment as described below. Refer to Figure 3.2 for the locations of the valves used.

(1) Observe the sight glass on the hydraulic reservoir. Some fluid should be visible when the system is cold. If fluid is required, use Type F Automatic Transmission Fluid.
(2) Set MASTER switch OFF.
(3) Close Valve C.
(4) Start engine, run at idle, and turn on PTO.

NOTE

Take care to shift the truck transmission only by the throttle method whenever the PTO is engaged. If the clutch is disengaged to shift to another gear, the load imposed by the PTO can decelerate the transmission to the point where the desired gear cannot be entered.

(5) Start the hydrostatic pump running in either direction:
CRM-88 units - Use pump control shown in Figure 3.1.
CRC-equipped units - Set CRC-MANUAL switch to MANUAL Position and use adjacent vernier control.
(6) Hold SWING switch to the left. Spray bar should move approximately 10 inches to the left.
(7) Return the bar to the center position.
(8) Move the LIFT switch up and down and verify that the spray bar moves accordingly.



NOZZLE ALIGNMENT TOOL

Loading Asphalt

The tank can be loaded by any one of the three methods described below.

NOTE

Whenever you use the asphalt pump, the flow of material through the pump can conveniently be visualized as follows:

PUMP IN FORWARD	MATERIAL FLOWS IN AT THE BOTTOM, OUT AT THE TOP
PUMP IN REVERSE	MATERIAL FLOWS IN AT THE TOP, OUT AT THE BOTTOM

⚠ CAUTION ⚠

If any moisture is present in the tank, or if the distributor was previously used with emulsified material, do not load with new material at any temperature above 200°F (93°C). Allow a small amount of new material to circulate through the system before filling the tank.

If these cautions are not followed, a steam explosion can result.

Method A: Loading through Intake Valve C

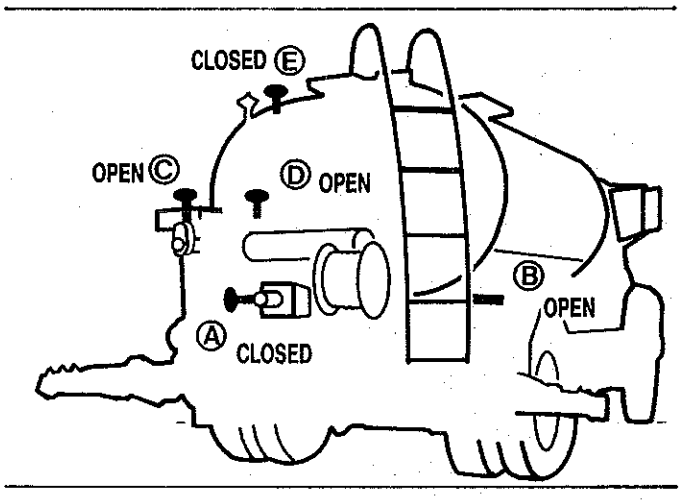
This method is the fastest and simplest way to load the tank.

(1) Make sure MASTER switch is OFF.

(2) Connect feed hose to fitting on Valve C.

(3) Run pump in REVERSE. Asphalt will be pulled through Valve C and into bottom of tank.

(4) When the desired amount of asphalt has been pumped, shut off the supply, remove the feed hose from the supply, and drain it into the tank.



Method B:
Loading through Spray Bar

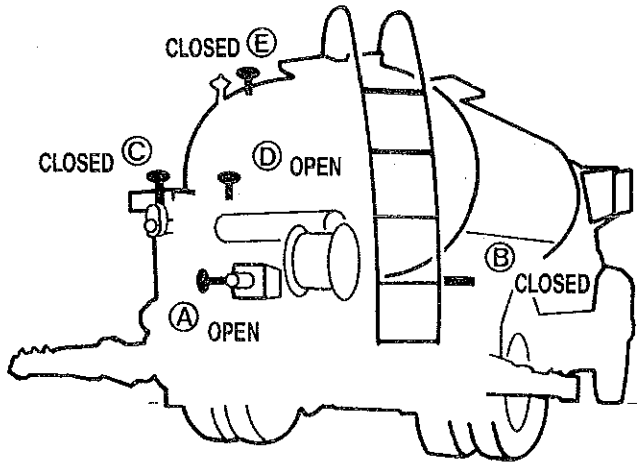
This method is useful when it is necessary to keep the material in the bar from freezing, as may occur when handling paving grade asphalt in cool weather. It is slower than Method (A), being limited to approximately 150 gallons per minute.

(1) Connect feed hose to fitting on Valve A.

(2) Run pump in FORWARD at approximately 150 gallons per minute. The pump will push asphalt through the spray bar and into the tank.

(3) When the desired amount of asphalt has been pumped, shut off the supply, remove the feed hose from the supply, and drain it into the tank.

(4) Close Valve D and open Valve B.

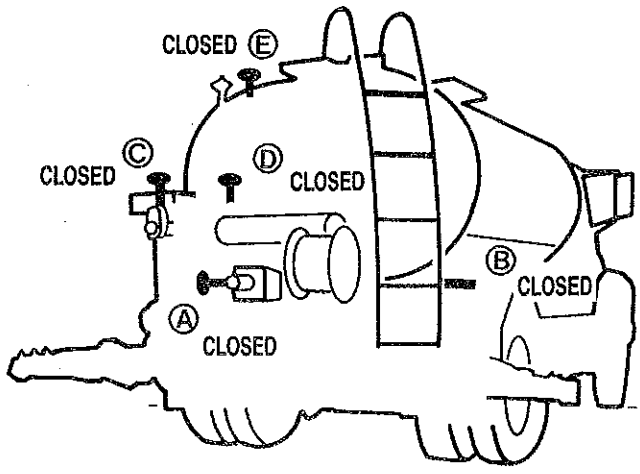


Method C:
Loading through Manhole

(1) Open the manhole cover slowly to allow any internal pressure to release gradually.

(2) To keep the material being loaded out of the asphalt pump and the circulation path, make sure Valves B and E are closed as specified.

(3) Monitor the filling procedure closely. Do not overfill. Allow space in the tank for expansion when material is heated.



Heating Asphalt

Before starting the heaters, position the vehicle broadside to the wind if possible. This will allow the wind to carry emitted vapors away from the hot exhaust stacks of the heater and truck engine air intake.

⚠ CAUTION ⚠

NEVER OPERATE THE BURNERS:

- While pumping asphalt
- While vehicle is in motion
- When vehicle is in a confined area
- While vehicle is unattended
- Unless heat tubes are covered by at least 6 inches (152 mm) of material; observe the fill level cautions on the float gauge plate.

Circulation while Heating

(A) Warm Asphalt

(1) Make sure MASTER switch is OFF.

(2) Run pump in FORWARD.

(3) Circulate asphalt at approximately 150 gallons per minute.

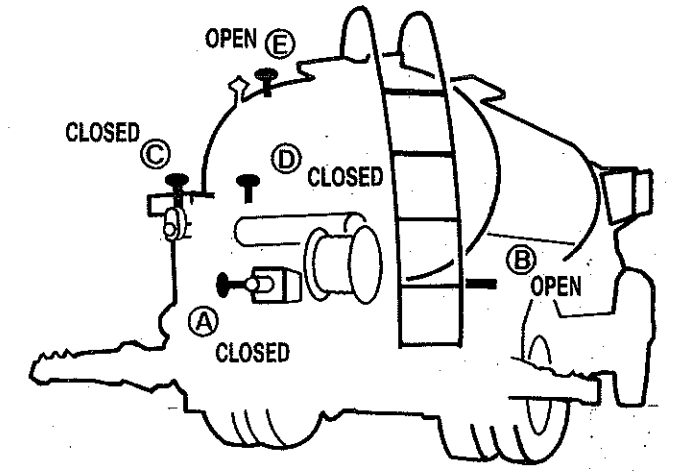
(B) Cold Asphalt (too stiff to circulate)

(1) Start heating slowly and begin circulation as soon as possible.

(2) Do not circulate material in the spray bar at first. As much as 30% of the heat developed in the asphalt can be dissipated due to heat losses in the spray bar.

⚠ CAUTION ⚠

If moisture is present in the tank, heat the material slowly and do not exceed 200°F (93°C).



Heating with Diesel-Fired Burners

(1) Open lids on top of exhaust stacks.

(2) Make sure MASTER switch is OFF.

(3) Turn L.BURNER SWITCH ON. Burner will ignite automatically.

(4) Turn R.BURNER switch ON. Note that burners must be lighted in the sequence given here.

(5) Monitor the temperature gauge; do not allow the asphalt temperature to exceed the maximum recommended by the supplier.

⚠ CAUTION ⚠

If a burner goes out, DO NOT attempt to relight it for at least two minutes to allow the vapors to dissipate from the flue.

Heating with LP Gas-Fired Burners

(1) Close the hand valve on the burner.

(2) Open the supply valve on the LP gas tank one-quarter turn. Be alert for the distinctive odor of LP gas. If you detect a leak, close the supply valve immediately and correct the leak before proceeding.

(3) With the supply valve open one-quarter turn, hold the red push-button down and light either burner with a torch. Hold the red button down until the burner stays lit—about 30 to 45 seconds. As soon as the burner stays lit, open the hand valve on the burner as far as it will go.

(4) If the burner goes out, wait two minutes and repeat the above procedure.

(5) Open the supply valve on the tank fully.

(6) Adjust the regulator so that the gauge reads 25 PSI.

(7) Adjust the flame with the hand valve at the burner.

(8) Monitor the temperature gauge on the tank closely. Do not allow the material to heat beyond the maximum temperature recommended by the supplier.

(9) When the material reaches the desired temperature, close the supply valve on the LP gas tank. The burner will continue to operate until the gas in the fuel line has been consumed.

(10) Watch the burner feed lines and fittings. They should frost over quickly. If they do not, the lines contain vapor instead of liquid. This condition must be corrected immediately to prevent damage to the burner.

Heating with Electronically Ignited LP Gas-Fired Burners

Units equipped with optional electronically ignited LP gas burners are fitted with a separate instruction plate affixed to the vehicle near the gas controls. Follow the instructions on this plate carefully in the operation of the burners.

NOTE

BearCat recommends adding one pint of absolute anhydrous methanol to 100 gallons of LP gas when the tank is filled. The methanol will prevent the regulator from freezing due to moisture in the LP gas.

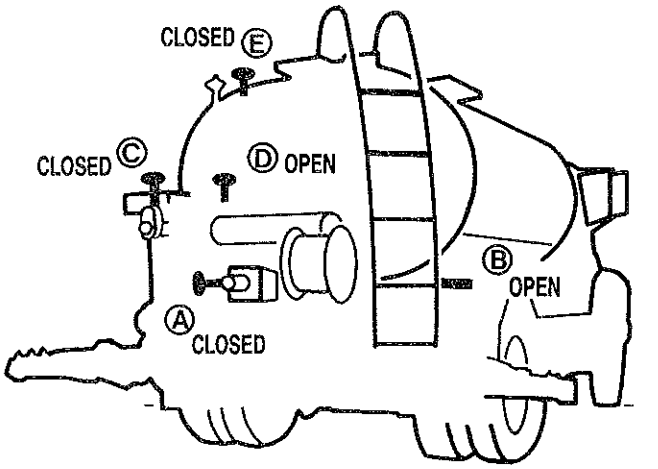
Circulating Asphalt in the Spray Bar

(1) Turn MASTER switch OFF.

(2) Open Valve D.

(3) Turn on CRM-88 unit. (If equipped with CRC, turn CRC unit ON and switch PUMP SELECTOR to MANUAL.)

(4) Run pump in FORWARD; adjust speed for approximately 80 GPM.



SPECIAL PROCEDURE
Circulating HOT asphalt in a WET Spray Bar

This procedure should be used to avoid foaming and boiling when circulating hot material in a spray bar containing moisture. The truck must be located in an area where a small amount of material can be sprayed on the ground.

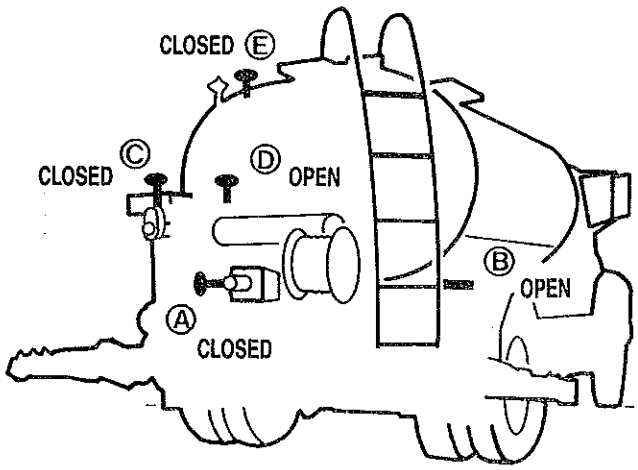
(1) Turn on all SPRAY BAR switches and the MASTER switch.

(2) With truck engine idling and PTO engaged, run hydrostatic pump in FORWARD at approximately 150 gallons per minute.

(3) As soon as all of the moisture has been driven out of the spray bar, turn MASTER switch OFF. Circulation will resume.

SECTION 4
OPERATING INSTRUCTIONS

SPRAYING OPERATIONS WITH CRM-88 RATE MONITOR



(1) At job site, make sure MASTER switch is OFF and engage PTO.

(2) Set SPRAY BAR switches as required for working width.

(3) Set spray bar at nominal operating height of 12 inches (30 cm) and center it.

(4) Turn CRM-88 unit ON.

(5) Enter working width by pressing left-hand switch to SELECT repeatedly until correct width appears on display.

(6) Set HIGH-LOW switch to agree with truck axle range setting.

(7) Drive truck at desired speed in any gear and adjust pump control to obtain specified spread rate (GSY) on CRM-88 display.

(8) Zero the footage function by pressing left-hand switch to RESET.

(9) Make the spray run, driving in the same gear as in Step (7). Turn MASTER switch ON to begin spraying, OFF to stop spraying.

Fine-tune the GSY setting by making *very small* adjustments with the pump vernier control. BE CAREFUL NOT TO OVER-COMPENSATE! After the first spray run, note GPM at engine idle speed. When starting similar runs, simply reset pump to previous GPM with engine idling. If needed, fine-tune the GSY setting as above while spraying.

Spread rate will automatically be held constant by CRM-88 unit unless you (a) change gears, or (b) change bar width.

(10) At end of run, record feet traveled from display if desired, before re-zeroing display for next run.

SPRAYING OPERATIONS WITH CRC COMPUTERIZED RATE CONTROL

Constant Width or Tapered Spray Runs

(1) At job site, make sure MASTER switch is OFF and engage PTO.

(2) Set CRC switch on Cab Control Panel to CRC.

(3) Turn PUMP CONTROL knob fully counterclockwise (minimun speed setting).

(4) Switch CRC unit ON (right-hand switch on CRC panel).

Display will show BEARCAT, followed by calibration data, and will then show the normal operating format:

GSY FPM GPM bar

where GSY = spread rate in gallons per square yard as presently entered into the CRC system.
FPM = vehicle speed in feet per minute.
GPM = asphalt pump flow rate in gallons per minute.
bar = spray bar width in feet, as determined by setting on control panel SPRAY BAR switches.

(5) Press center switch to ERASE. The GSY display will change to IDLE and will show the pump speed presently being used to maintain circulation. Whenever the MASTER switch is off, the pump will circulate asphalt at the IDLE speed.

To change the IDLE speed, use the left-hand switch (marked with arrow). Hold the switch up or down to raise or lower the idle speed. A normal value for the idle function is 40.

(6) Press ERASE again to return the GSY value to the display. To change GSY to a higher or lower value, hold the arrow switch up or down until the desired GSY number appears.

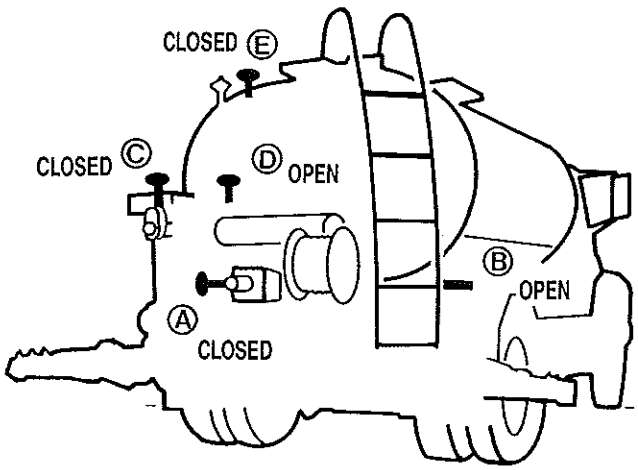
(7) Set the working width for the start of the spray run with the SPRAY BAR switches. The CRC bar display will change to correspond to the switch settings.

(8) Press SELECT to display feet traveled. Press ERASE to re-zero the display before starting the run.

(9) Make the spray run at any suitable speed, in any desired gear. Turn MASTER switch ON to begin spraying, OFF to stop spraying. The spread rate entered into the system in Step (6) will automatically be applied.

To change bar width during a run, as when shooting a taper, use the SPRAY BAR switches. The CRC System will automatically keep spread rate constant.

(10) At end of run, record feet traveled from display if desired, before re-zeroing display for next run.



NOTE

The small tick marks adjacent to the bar display indicate the spray nozzle size calculated as ideal for any combination of truck speed and pumping rate. Either 1, 2, 3, or 4 marks will appear, corresponding to No. 1 through No. 4 nozzles.

A more detailed presentation of the nozzle size display can be obtained by pressing SELECT. The display will present a graph marked 1 - 2 - 3 - 4 and a moving cursor that corresponds to the optimum nozzle size for a given truck speed and pumping rate.

For best results, drive the truck at the speed that causes the number of marks to agree with the size of the nozzles in the spray bar. If this is not possible, it will be advisable to change the nozzles.

Setting Spread Rate Manually

(1) **Use the BearCat Road Oil Spreading Calculator to set the spread rate manually.**

(2) **Determine the job requirement. For this example, we will assume it to be 0.4 gallon per square yard, to be spread over an area 12 feet wide and 1300 feet long.**

(3) **Determine a suitable speed for the truck. In this case, assume that the chip distributor following you is limited to a speed of 400 feet per minute (4.5 mph).**

(4) **Refer to Side 1 of the Road Oil Spreading Calculator. At the top of the calculator, align TRUCK SPEED (400 feet per minute) with SPREADING RATE (0.4 gallon per square yard).**

(5) **On the BAR LENGTH scale, locate 12 feet (the desired spreading width) and immediately above it, read the PUMP OUTPUT in gallons per minute. In this example, it is 215 GPM.**

(6) **Turn the calculator over to Side 2. From the table, select the TRUCK GEAR position that will yield 400 feet per minute at approximately 1000-1200 engine RPM.**

(7) **Set the engine to the required RPM and adjust the PUMP control until you obtain a flow rate of 215 GPM.**

(If the required pumping rate is higher than 150 GPM, close all spray valves and turn the MASTER switch ON. This will reduce the load on the pump and increase the accuracy of the GPM meter.)

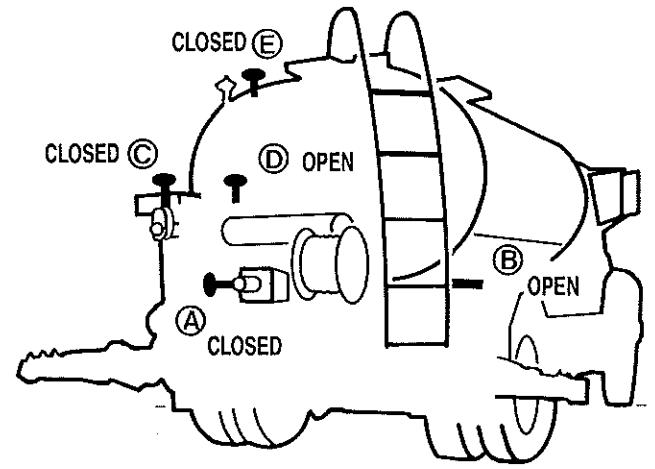
The distributor is now set up to deliver asphalt at a rate of 0.4 gallon per square yard, across a width of 12 feet, at any truck speed in the selected gear. The rate will be automatically controlled whether the truck is driven faster or slower than the specified 400 feet per minute, as long as it is not shifted into a different gear.

NOTE

As a time-saver when repeating the setup for another spray run, note the GPM reading with the engine running at dead idle speed. Use this value as the pump setting for the next spray run, setting it while the truck engine is idling. Then you need only monitor the GPM meter to be sure the pumping rate is correct at the operating speed.

(8) **On Side 2 of the calculator, set the SPREADING RATE (0.4 gallon per square yard) at the BAR LENGTH (12 feet). Read the OIL REQUIRED in gallons opposite DISTANCE TO BE SPRAYED. Since in this example the latter is 1300 feet, the calculator indicates that the amount of oil required is 700 gallons.**

Hand Spraying



(1) Turn MASTER switch OFF.

(2) With engine idling, run pump in FORWARD and set a flow rate of 60 GPM.

(3) Close Valve D.

(4) Open HAND SPRAY supply valve (See Figure 4.1).

(5) Before beginning to hand-spray, direct the wand nozzle into the manhole and open the valve. If the hose is cold, the initial discharge may be a thick rope of asphalt. Let the material go into the manhole until hot asphalt flows.

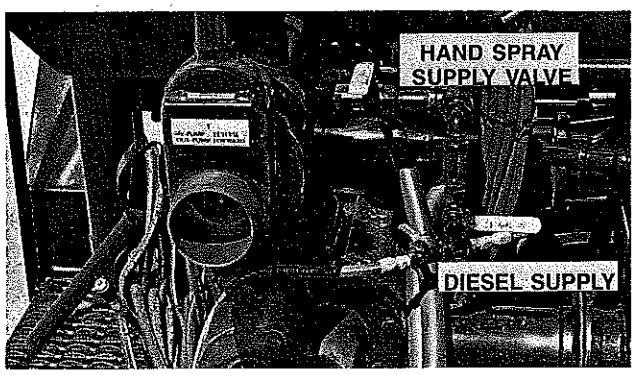
⚠ CAUTION ⚠

Be extremely careful NEVER to direct the spray toward yourself or other persons.

(6) Hand spray as nearly as possible to the same thickness of material as laid down by the spray bar.

(7) When finished hand spraying, flush out the equipment as follows:
   (a) Close the HAND SPRAY supply valve.
   (b) Open the FLUSHING DIESEL valve.
   (c) Aim the wand into the manhole and open the hand valve. Allow the material to flow until the discharge is clear.

(8) Close the valve and rewind the hose on the reel. The diesel fuel trapped in the hose will keep the hose ready for the next hand spray operation.



(4.1) HAND SPRAY & FLUSHING DIESEL SUPPLY VALVES

Pumping Spray Bar Empty and Flushing It

(1) **Turn MASTER switch OFF.**

(2) **Close Valve B.**

(3) **Run pump in FORWARD. Advance the throttle as needed to get a flow rate of 300 GPM.**

(4) **Open Valve A. The pump will pull air through the intake and push material into the tank.**

(5) **After approximately 3 minutes, close Valve A. The bar will now be empty.**

(6) **To flush the bar, place both of the short hose ends into a container holding 5 to 10 gallons of clean diesel fuel. See Figure 4.2.**

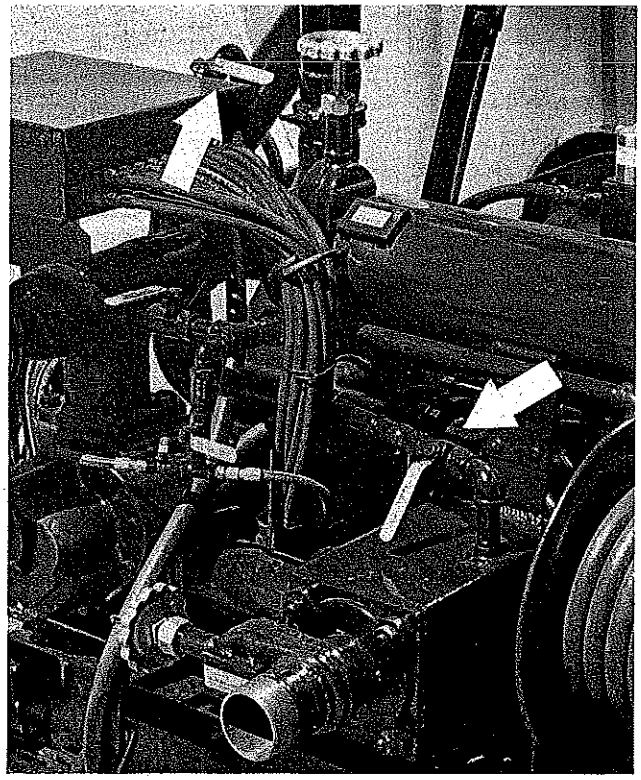
(7) **Open both of the valves shown in Figure 4.3 and set rear MASTER switch to FLUSH. Allow diesel fuel to circulate through the system for approximately 5 minutes.**

(8) **Close both of the valves shown in Figure 4.3 and turn rear MASTER switch ON.**

NOTE

The spray bar MUST be flushed with diesel fuel as described above after each work shift. This avoids the time-consuming problems that develop when residual asphalt is allowed to solidify in the spray bar. A quick flush takes much less time and is not nearly so tedious as having to free all of the valves in a frozen spray bar!

(4.2) FLUSHING DIESEL CONTAINER



(4.3) SPRAY BAR FLUSH VALVES

Washing the Unit Clean

Before beginning washdown, park the truck with the front end into the wind to minimize diesel fuel deposits on the cab.

⚠ CAUTION ⚠

Use only diesel fuel in the washdown tank. NEVER fill the tank with gasoline or volatile solvents. Extreme danger of fire or explosion will result.

The washdown will be most effective if it is carried out while hot asphalt is being loaded through the spray bar.

Units Equipped with Diesel-Fired Asphalt Heaters

(1) Turn MASTER switch OFF.

(2) Turn R.BURNER switch to WASH.

(3) Open the diesel washdown valve (Figure 4.4).

(4) Uncoil the washdown hose (Figure 4.4).

(5) Open the valve on the hose to obtain a stream of diesel fuel.

Units Equipped with LPG-Fired Asphalt Heaters or No Heaters

(1) Turn MASTER switch OFF.

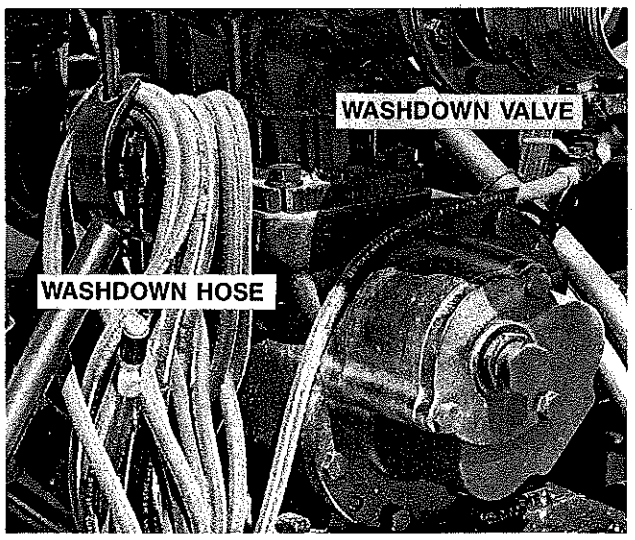
(2) Open the supply valve on the diesel fuel tank.

(3) Open the diesel washdown valve and proceed as above.

NOTE

It is important to wash down the exterior of the distributor at least once every working day. Always try to wash the unit while the components are hot.

Careful adherence to this routine will prevent build-up of asphalt on the unit and keep its working parts moving freely.



(4.4) DIESEL WASHDOWN FACILITIES

Transferring Asphalt from Truck Tank to Storage

Asphalt can be off-loaded from the tank by either of two methods:

Using On-Board Asphalt Pump

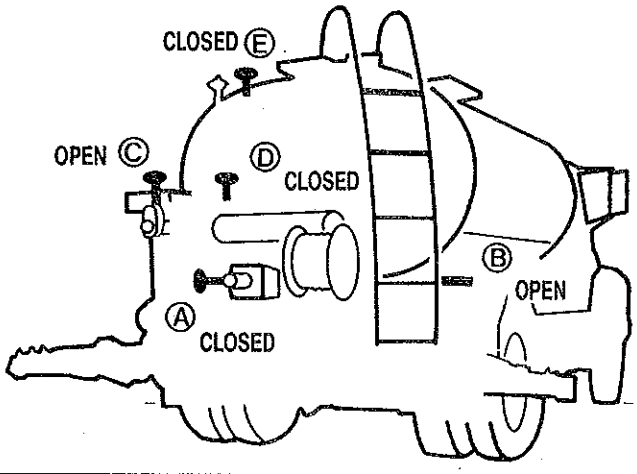
(1) Connect the asphalt hose to the fitting at Valve C.

(2) With engine idling, run pump in FORWARD.

(3) When transfer is complete, close tank Valve B.

(4) Open diesel intake valve.

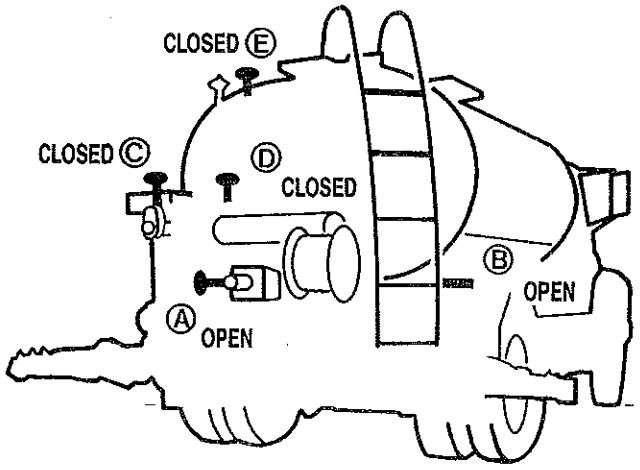
(5) Use bucket and run approximately three gallons of diesel through pump.



Using External (Plant) Asphalt Pump

(1) Connect the asphalt hose to the fitting at Valve A.

(2) Start the external pump.



Shutting the Equipment Down

At the end of a job, shut the distributor down and prepare it for highway travel as follows:

(1) **Flush the system clean and wash it down as described above.**

(2) **Center the spray bar and raise it to the maximum height. Engage the latches to lock it in place.**

(3) **Raise the wings fully upright and insert the safety pins.**

(4) **Turn MASTER switch OFF.**

(5) **Turn CRM-88 or CRC switches OFF.**

(6) **Lock the reel that holds the hand spray hose and make sure other hoses are secured in place.**

(7) **Set pump control in NEUTRAL.**

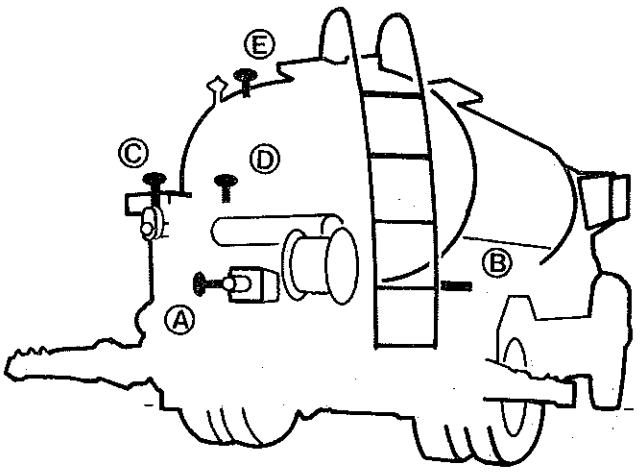
(8) **Disengage PTO.**

NOTE

Wipe the tail-lights clean of oil film. If left on the glass, the oil will quickly pick up enough dust to impair the effectiveness of the lights.

⚠ CAUTION ⚠

If driving with the PTO engaged, never allow pump GPM to exceed 50. Overloading and damage to the pump is possible.



ALL CLOSED

SPECIAL SECTION
SPRAYING COMPLEX PATTERNS

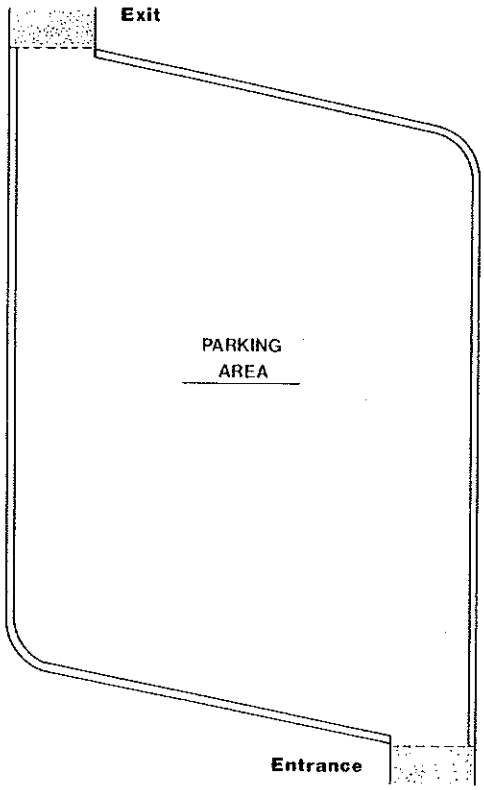
Any number of patterns or shapes can be sprayed quickly and accurately, using a minimum of hand work, when the Model BC-401 distributor is employed properly. Two ingredients are essential for the successful completion of a complex spray operation:

(1) The operator must be thoroughly familiar with the Model BC-401 operating controls.

(2) The moves required to complete a spraying operation must be planned in advance. No move should be undertaken until the next one is known.

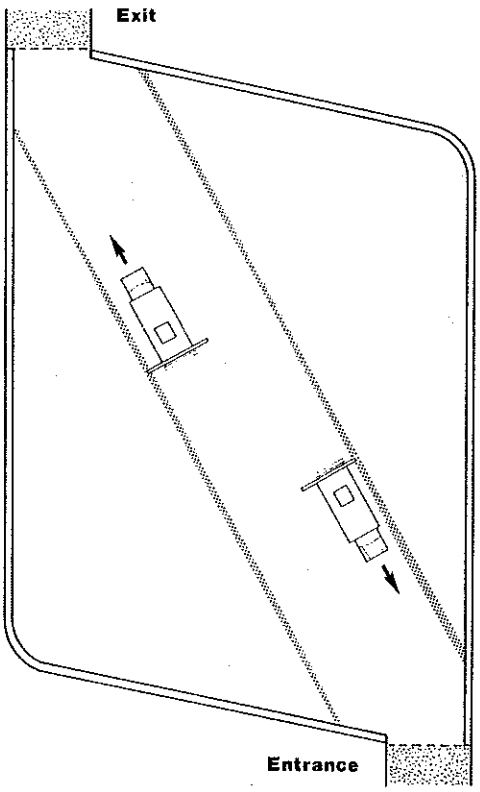
The following examples of pattern spray operations show typical ways in which the equipment can be employed. Many other approaches are possible. However, no operation should be commenced until both of the conditions listed above have been satisfied.

Example 1

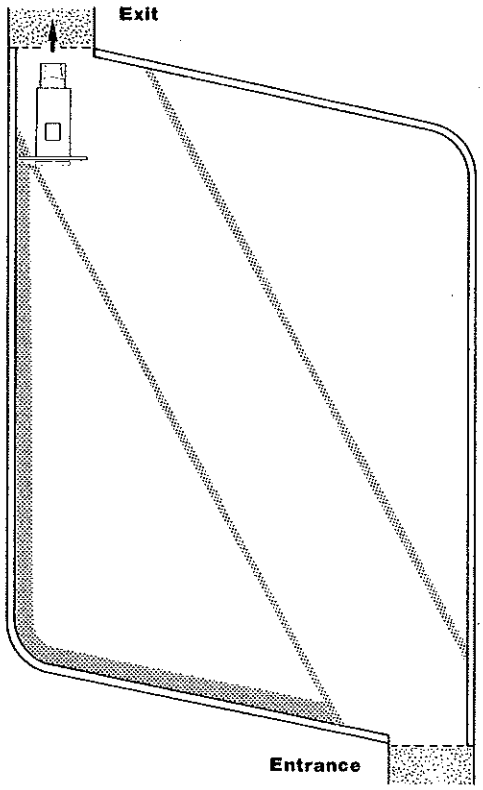


Plan of a parking area with restricted entrance and exit routes. The perimeter of the area is bounded by concrete curbing. The entire surface within the curbed area is to be sprayed. (The entrance and exit routes were previously completed to the dashed lines shown in the drawing.)

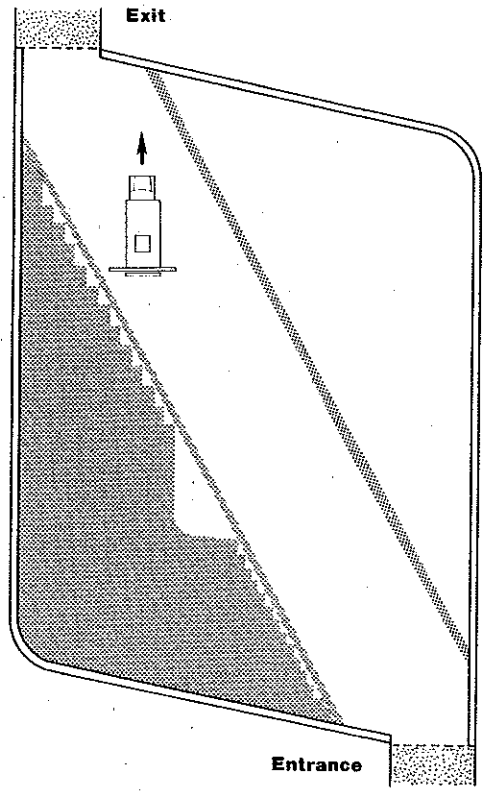
It is important to plan the operation so that there will be no need to drive the spreader truck across a sprayed area.



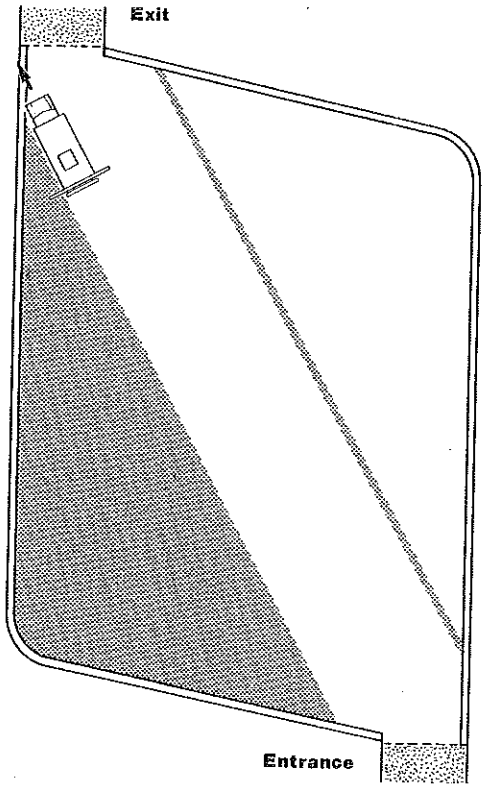
Step 1. To outline a central clear area, lines are drawn diagonally across the parking area so as to define a space that is twice the width of the spreader bars.



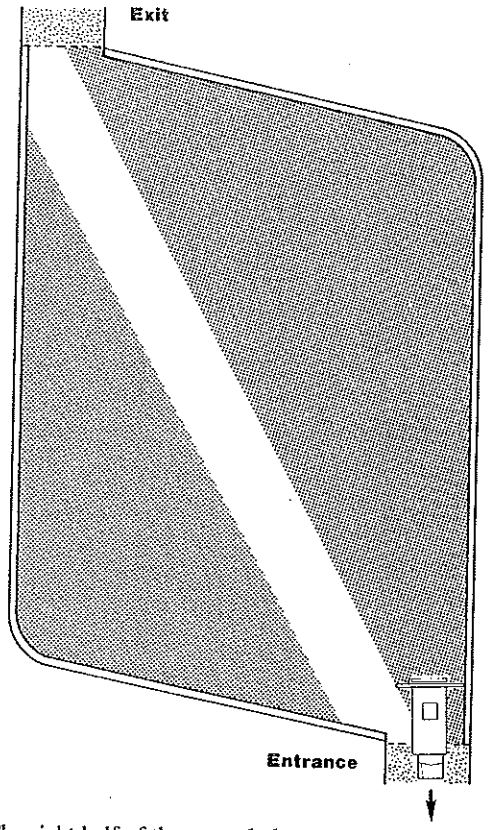
Step 2. The truck is driven around the left-hand portion of the curbed perimeter with only the left wing spray valves open. The spaces at the entrance and exit are left unsprayed.



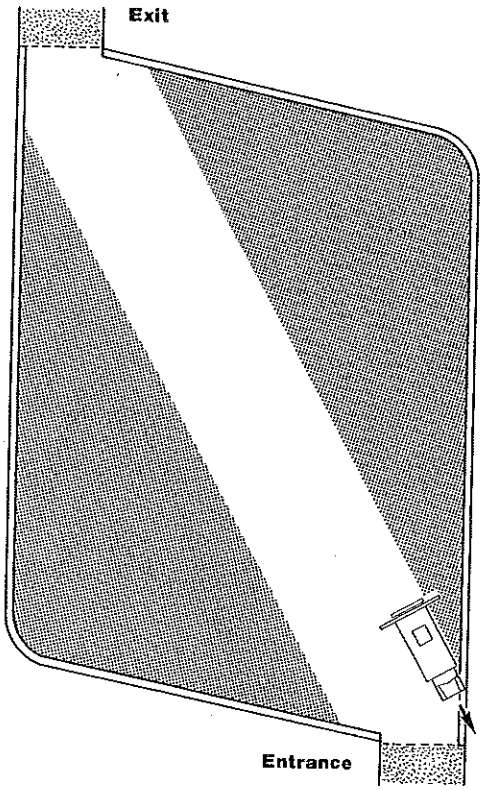
Step 3. The truck is positioned parallel to the left-hand curb at the entrance area. As the vehicle is moved forward, spray valve switches are turned on to produce the pattern shown. When the farther section of the area is reached, the switches are turned off in the appropriate sequence.



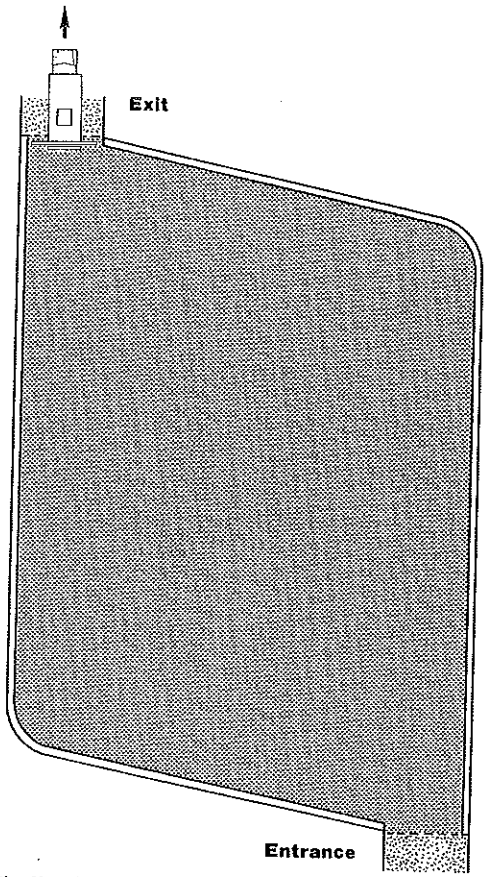
Step 4. The truck is driven along the central clear area with one wing projecting over the edge of the area sprayed in Step 3. The wing spray valves are switched on and off as needed to produce the pattern shown. The result is a straight edge along the clear area.



Step 6. The right half of the central clear area is sprayed in one pass from exit end. Recall that the clear area was made twice the full width of the spreader bar.



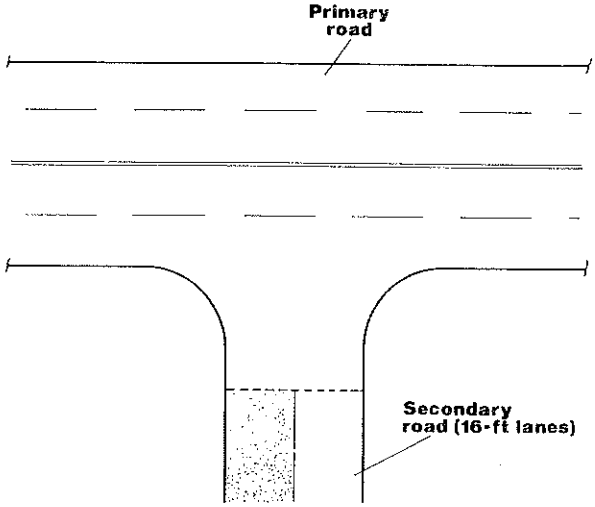
Step 5. Steps 2 through 4 are repeated on the right-hand side of the area to produce the pattern shown.



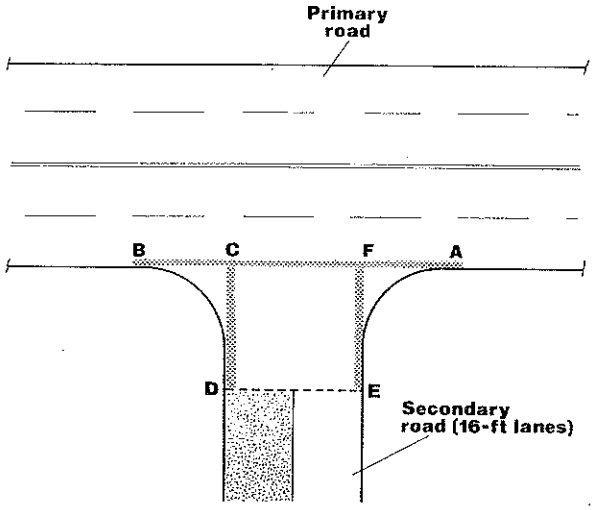
Step 7. Finally, the remaining half of the central area is sprayed in a single pass from the entrance to the exit.

The entire area can now be spread with chips.

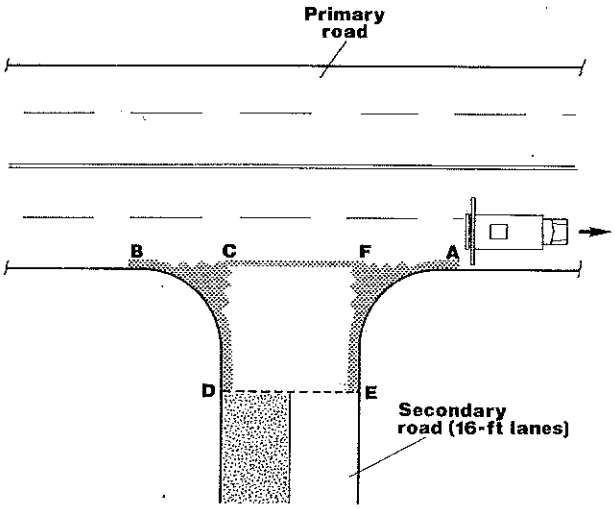
Example 2



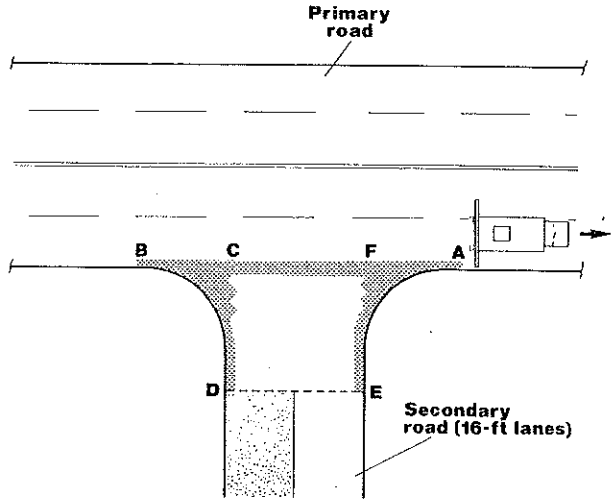
T intersection at which the job requirement is to coat the secondary road up to the line where it joins the primary. The chip distributor is instructed to stop at the dashed line and hold there until the intersection has been sprayed.



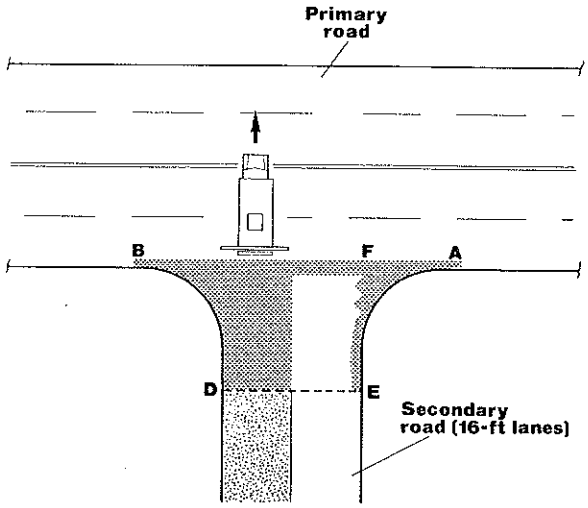
Step 1. To define the work area, lines are laid out from A to B, then from C to D and from E to F, to produce the guidelines shown.



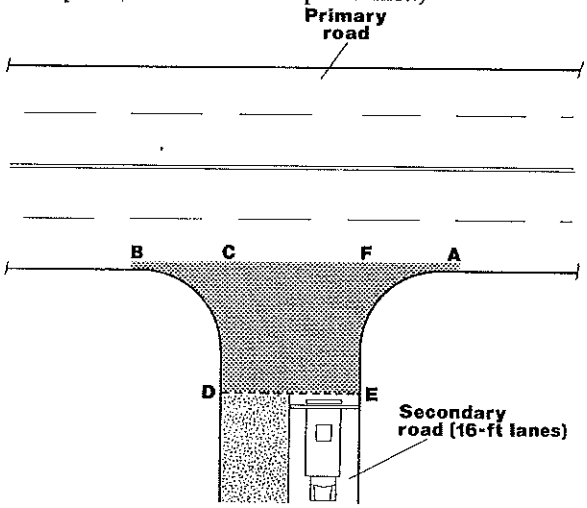
Step 2. The left-hand and right-hand corner areas are sprayed. As the truck is driven through the arcs, spray valve switches are turned on and off as needed to produce the patterns shown.



Step 3. The irregular edges along the lines BC and FA are sprayed. The truck is driven along the primary road with only as many wing spray valves open as are needed to make a smooth edge.



Step 4. The truck is backed into position to spray the left-hand portion of the secondary road, starting at the dashed line that marks the termination of the previous work. (If any hand spraying along the line DC is required, it should be completed first.)



Step 5. Last, the right-hand section of the road is sprayed (after any necessary hand spraying). At the conclusion of the spray run, the spreader truck is located as shown. The entire intersection can now be spread with chips.

SECTION 5
RECOMMENDED OPERATING PRACTICES

This Section contains procedures that have been developed through experience with asphalt distributors under a wide variety of working conditions. Users of BearCat asphalt distributors will find these procedures helpful and time-saving.

BearCat users who develop techniques to improve the efficiency of the spreading operation are encouraged to report these techniques. The information will be passed along to other holders of this Operating Manual.

Using a Guide Chain

A chain can be hung from the guard rail that runs along the top of the spray bar. It should be located at the outer limit of the spray pattern and positioned so that the end of the chain just touches the ground when the spray bar is at working height.

The chain will be visible from the cab, showing the exact location of the spray nozzles relative to the surface and helping to avoid overlaps and gaps.

Shooting a Straight Line

The following techniques will be helpful in controlling the vehicle so that the sprayed area follows a straight line with minimum need for weaving, jogging, and random corrections.

(A) When following an existing continuous line, such as a curb or guide string, use the side shift as little as possible. Steering the vehicle to the guideline will yield a smoother result.

(B) When following a line of stakes or markers, DO NOT attempt to guide the vehicle from stake to stake. You may create a scalloped effect. Instead, choose a reference point (power pole, building, tree, etc.) in line with your direction of travel and as far away as possible. Steer toward the reference point. As the spray bar passes each stake, watch it in the mirror and make minor corrections with the SWING switch.

(C) Always make steering corrections as gradually as possible. Avoid sharp jogs. They will be even more visible from ground level than they are from the cab.

Connecting to a Previously Sprayed Area

When backing the vehicle to connect with an area that has already been sprayed, it is common for the truck to be at a slight angle relative to the line of the existing spray. To keep to the required pattern, the operator must make a steering correction immediately when beginning the new spray run.

To avoid the appearance of a jog in the spray pattern under these conditions, use the following technique:

(1) Set the spray bar in the center of its travel (SWING).

(2) Drive to a point far enough away from the connection so that you have adequate space to back straight toward the connection.

(3) For approximately the final 50 feet of the backing run, grip the steering wheel firmly with your left hand and place your left arm solidly on the window frame. The object is to prevent the steering wheel from moving. In this way, you can make sure that the truck will arrive at the connection point with the wheels straight.

(4) At the connection point, the spray bar may be transversely offset from the existing pattern. Use the SWING switch to make the needed correction.

Moving to another Job Site

The asphalt distributor can be driven from one work area to another without disturbing the settings of the operating controls by disengaging the PTO for travel and re-engaging it at the new location.

Because the asphalt cannot circulate with the PTO disengaged, the interval should be kept as brief as possible.

SECTION 6
FIELD MAINTENANCE

Over-all productivity of the asphalt distributor can be increased and equipment downtime minimized by carefully following the procedures given in this Section.

Regular flushing of the spray bar is especially important to avoid the time-consuming process of clearing a bar plugged with frozen asphalt.

Pumping Spray Bar Empty and Flushing It

(1) Turn MASTER switch OFF.
(2) Close Valve B.
(3) Run pump in FORWARD. Advance the throttle as needed to get a flow rate of 300 GPM.
(4) Open Valve A. The pump will pull air through the intake and push material into the tank.
(5) After approximately 3 minutes, close Valve A. The bar will now be empty.
(6) To flush the bar, place both of the short hose ends into a container holding 5 to 10 gallons of clean diesel fuel. See Figure 4.2.
(7) Open both of the valves shown in Figure 4.3 and set rear MASTER switch to FLUSH. Allow diesel fuel to circulate through the system for approximately 5 minutes.
(8) Close both of the valves shown in Figure 4.3and turn rear MASTER switch ON.

NOTE

The spray bar MUST be flushed with diesel fuel as described above after each work shift. This avoids the time-consuming problems that develop when residual asphalt is allowed to solidify in the spray bar. A quick flush takes much less time and is not nearly so tedious as having to free all of the valves in a frozen spray bar!

Clearing a Spray Bar Clogged with Frozen Asphalt

(A) Preferred Method: Clearing with Live Steam

(1) Manually open the first set of spray valves at either end of the bar. Use a wrench if necessary but apply force as gently as possible to avoid damaging the valve linkage.
(2) Connect the steam supply to the outermost spray nozzle.
(3) Allow steam to enter the bar until asphalt flows from the two exposed nozzles (normally about 15 minutes).
(4) When the nozzles are clear of asphalt, close the valves and open the next set of three. Wait for them to clear.
(5) Repeat Steps (3) and (4) across the full length of the spray bar.

If a supply of steam is not available, use the following procedure instead.

(B) Alternate Method: Clearing with a Torch

⚠ CAUTION ⚠

DO NOT begin this procedure unless a dry chemical type fire extinguisher is immediately available.

(1) Manually open all of the spray valves on the bar. Use a wrench if necessary but apply force as gently as possible to avoid damaging the valve linkage.
(2) Apply heat with the torch to the underside of the spray bar, moving the torch back and forth until asphalt flows from the spray nozzles. BE SURE TO KEEP THE FLAME WELL AWAY FROM HOSES AND AIR CYLINDERS.
(3) Continue heating the bar until asphalt flows from the nozzles and then stops, indicating that the bar has been cleared of all material.

Clearing a Clogged Spray Nozzle

If asphalt does not flow from a single nozzle, the blockage is in the nozzle. Remove it with a wrench and clear the obstruction by pushing a wire through the nozzle.

If asphalt continues to flow when the valve is commanded to close, the blockage is in the valve seat area. Run the pump in REVERSE to remove material from the valve. If this step does not clear the obstruction and restore the valve to proper functioning, remove the bushing and clear it manually.

Cleaning Asphalt Intake Strainer

The intake strainer is located behind Valve A. Clean it daily or as needed.

(1) Remove the four nuts at the corners of the cover plate immediately behind Valve A.
(2) Remove the four lugs and take off Valve A.
(3) Pull out the cylindrical screen and remove the material collected on it.
(4) Inspect the flexible gasket on the cover plate. Replace it if any damage is visible.
(5) Replace the screen, valve, lugs, and nuts.
(6) Tighten the nuts evenly.

Cleaning Bar Screen

Clean the spray bar screen daily or as needed. The screen is located inside the Y chamber immediately behind the hand spray hose reel.

(1) Remove the four nuts that hold the cover plate.
(2) Take off the plate and remove the internal gasket.
(3) Pull out the cylindrical screen and remove the material collected on it.
(4) When re-inserting the screen, be sure it is properly seated in the locator ring inside the Y chamber. You may need to rotate the screen until it fully enters the chamber and seats in the locator ring.
(5) Replace the cover plate. Tighten the nuts evenly.

Replacing Swing Joint Seal

Carry out the following procedure if leakage develops at the wing joint:

Disassembly

(1) Lower the wing to the horizontal position.
(2) Remove the 2-inch pipe plug at the bottom of the swing joint.
(3) Clean out any asphalt debris from the opening and remove the two locking nuts from the shaft.
(4) Remove the two washers from the shaft.
(5) Pull the wing assembly out of the swing joint sleeve.
(6) Pry the seal out with a screwdriver. Push it away from you until it is clear of the seat; then remove it through the plug opening.

Seal Replacement

(7) Wipe the seat clean and apply a thin coating of Lubriplate No. 105 or equivalent grease.
(8) Hold the new seal in your fingers and position it so that the lips of the seal are pointing away from you.
(9) Very gently bend the seal into an oval or egg shape—only as much as necessary to slip it past the seat area.
(10) When the seal is past the seat area, gently work one end of the oval into the seat. Then move your fingertips around the seal, a little at a time, until it is seated. BE CAREFUL at all times not to force the seal or bend it excessively. If a kink develops, the seal will no longer be usable.

Reassembly

(11) Wipe the shank of the wing clean and apply a thin coating of grease.
(12) Replace the wing assembly. Maneuver it into the swing joint sleeve until it is fully seated.
(13) Replace the two washers.
(14) Replace the two locking nuts. Snug-tighten the first nut; then lock the second nut to it.
(15) Replace the 2-inch pipe plug.

Replacing Asphalt Pump Seals

In pumps equipped with the optional low-maintenance shaft seals, two Teflon® seals are located where the pump shaft connects to the drive shaft from the hydrostatic motor. These seals should be replaced if leakage appears. Replacement seals are available in a kit from BearCat Mfg.

(1) Unbolt the companion shaft from the pump housing and detach the drive shaft.
(2) Remove the key from the pump shaft. It can be pried out by using a punch and hammer.
(3) Remove three Allen-head cap screws and take off the seal retainer.
(4) Pry out the seal and discard it.
(5) Apply a thin coating of Lubriplate No. 105 or equivalent grease to the new seals.
(6) Insert the larger seal into the pump. Use the seal retainer to press it in place.
(7) Remove the inner ring seal from the retainer and install the new seal.
(8) Use emery cloth or fine sandpaper to smooth the pump shaft so there are no burrs or rough spots.
(9) Replace the seal retainer, with the seal facing outward, and tighten the cap screws securely.
(10) Replace the shaft key, drive shaft, and companion flange. Tighten the bolts securely.

Replacing Nozzle Valve Stem Seals

The spray nozzle valves are equipped with seals and O-rings that require replacement if leaks develop.

(1) Close Valve D and drain the spray bar.
(2) Use a 1-1/16" wrench to remove the seat bushing of the leaking valve. The bushing is located on the underside of the spray bar.
(3) Remove the locking nut from the top of the valve. Take off the lifting finger and put it aside.
(4) Push the valve stem assembly down through the seat hole and put it aside.
(5) Remove the snap ring from the valve hole. Use a snap ring pliers only. Then remove the washer.
(6) Remove the O-ring and the seal and discard them.
(7) For this and the following steps, use the two-piece seating tool furnished with the BearCat liquid asphalt distributor.

Place the shorter seating tool in the valve seat on top of the spray bar. Put a few drops of light oil around the inner surface of the tool.

This component of the tool may require grinding to enable it to clear the edge of the square tube valve lifter.

(8) Place the new seal on the longer tool. With the seal lips toward the spray bar, push the tool down inside the shorter tool until the seal is seated.
(9) Pull out both tool components.
(10) Install the new O-ring on top of the seal.
(11) Replace the washer on top of the O-ring.
(12) Replace the snap ring. MAKE SURE the ring is firmly snapped into the groove.
(13) Coat the valve stem assembly with light oil and reinstall it through the hole in the bottom of the spray bar.
(14) Replace the lifting finger and tighten the locking nut securely.

NOTE

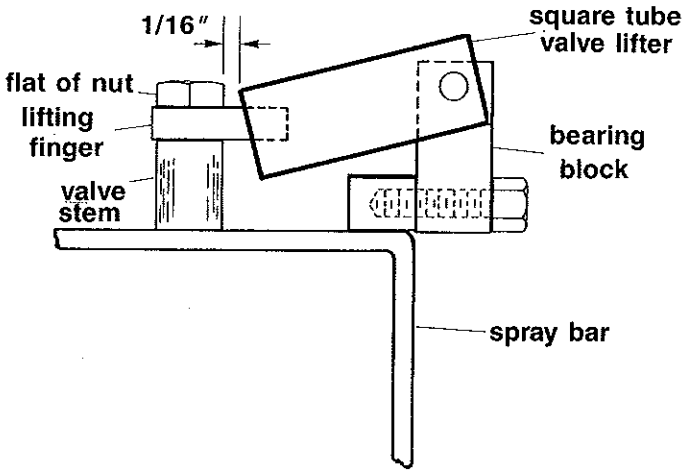
Make sure a flat of the locking nut is parallel to the edge of the square tube valve lifter.

(15) Clean the seat bushing and the washer. Coat the threads with No. 2 Permatex gasket cement.
(16) Reinstall the seat bushing. Tighten it snugly (not excessively). Avoid distorting the seat.

Adjusting Actuators for Spray Nozzle Valves

This adjustment is set at the factory. It should not be changed in the field unless a linkage has been damaged so that the affected valves do not close properly.

(1) Inspect the valve assemblies and make sure they are clean and free of obstructions between seat and ball.
(2) Make sure the switch controlling the affected valve is OFF. Inspect the pneumatic cylinder and verify that the actuator rod is fully extended (approximately 1 inch).
(3) Examine the center valve of the affected set. The valve stem should show 1/16" remaining travel when pushed down. Use a dial indicator to measure the distance if one is available.
(4) If valve stem travel is more or less than 1/16", heat the control lever (connected to pneumatic cylinder actuator rod) with a torch and bend it until the proper travel is established.
(5) When the center valve has been properly positioned, check the two remaining valves of the set. If adjustment is necessary to achieve 1/16" travel, twist the shaft as required.
(6) Refer to Figure 6.1. When all three valves have been properly positioned, measure the clearance between the edge of the square tube and the flat of the nut that secures the valve stem. It must be at least 1/16" or the valve may become cocked.



(6.1) SPRAY VALVE ACTUATOR ADJUSTMENT

Hydrostatic Transmission Maintenance

The hydrostatic transmission requires no regularly scheduled maintenance. Optional high-pressure filter elements may be replaced yearly or when the transmission is being serviced. Use only a Donaldson high-pressure filter element, obtainable from BearCat Mfg., Part No. P16-2235.

Adjusting Remote Curbside Mirror

Refer to Figure 6.2. The adjustable stops that determine the position of the mirror are located as follows:

UP

Upper of two adjustable bolts located on support bracket fastened to back of mirror.

DOWN

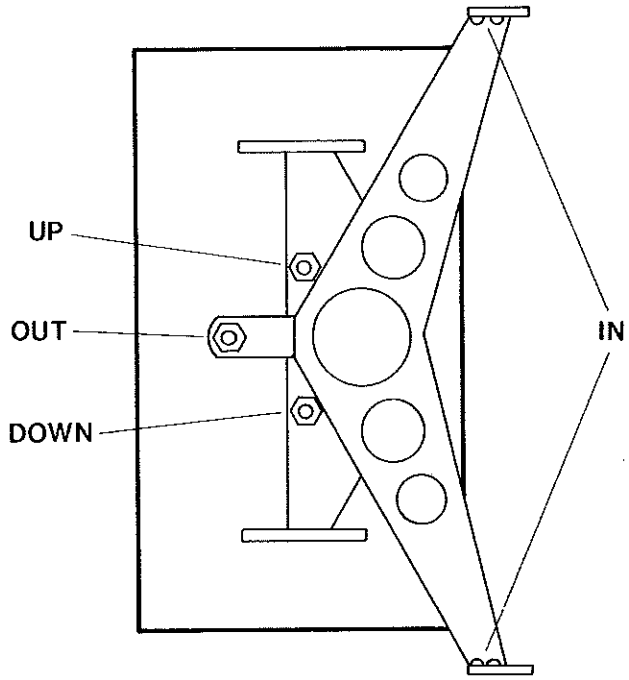
Lower of two adjustable bolts located on support bracket fastened to back of mirror.

IN

Adjustment bolts located in upper and lower mounting brackets where they join truck-mounted support frame.

OUT

Adjustable bolt located on mirror back surface.



(6.2) ADJUSTMENTS, REMOTE CURBSIDE MIRROR

Lubrication

Lubricate the distributor as listed below, at the intervals specified.

(1) Asphalt pump (certain models only): If the pump contains a fitting, lubricate weekly with chassis grease.
(2) Heating system air blower: Follow manufacturer's instructions included in this Operations Manual.
(3) Vehicle engine, drive train, running gear, etc: Follow maintenance instructions provided by vehicle manufacturer.

Preparation for Storage

To prepare the asphalt distributor for storage, as for a seasonal shutdown, proceed as follows:

(1) Purge any moisture that may be in the spray bar after distributing emulsified asphalt. Circulate approximately 20 gallons of diesel fuel or used engine oil in the system and allow it to remain in the spray bar.
(2) Close all asphalt valves and tank openings.
(3) Close off the tank vent located in the dome well to prevent moisture condensation. Use a plastic bag secured over the top of the vent with a rubber band.

Removal of Spray Bar

If the spreader assembly must be removed to free the vehicle for other uses, consult the BearCat Mfg. Service Department (telephone 602/684-7851) before proceeding.

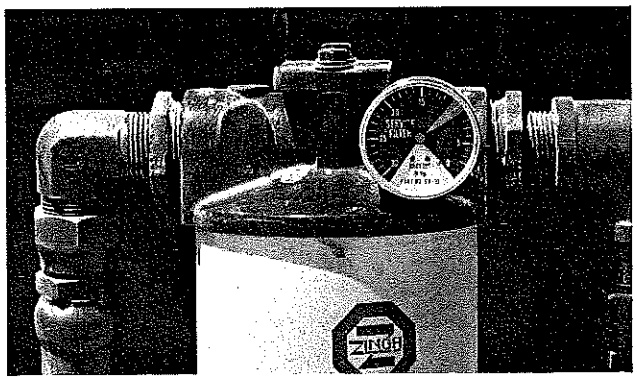
Hydraulic System Maintenance

The hydraulic system must be serviced at the beginning of each working season.

(1) Drain the system through the drain plug located in the bottom of the hydraulic tank.
(2) Remove the spin-on filter adjacent to the hydraulic tank and discard it.
(3) Install a new filter. Hand-tighten only. Use one of the filters listed in TABLE 6-1.
(4) Close the drain valve and refill the reservoir with 22 gallons of Type F Automatic Transmission Fluid.

Condensation that may build up in the hydraulic system is capable of clogging the filter. This condition can lead to insufficient hydraulic fluid at the pump, which will degrade the performance of the hydrostatic transmission and other components.

To monitor the condition of the filter, periodically observe the vacuum gauge mounted on the filter housing. The gauge should not indicate higher than −10 inches Hg when the system is operating. If a higher vacuum is shown, the filter is obstructed and must be replaced.



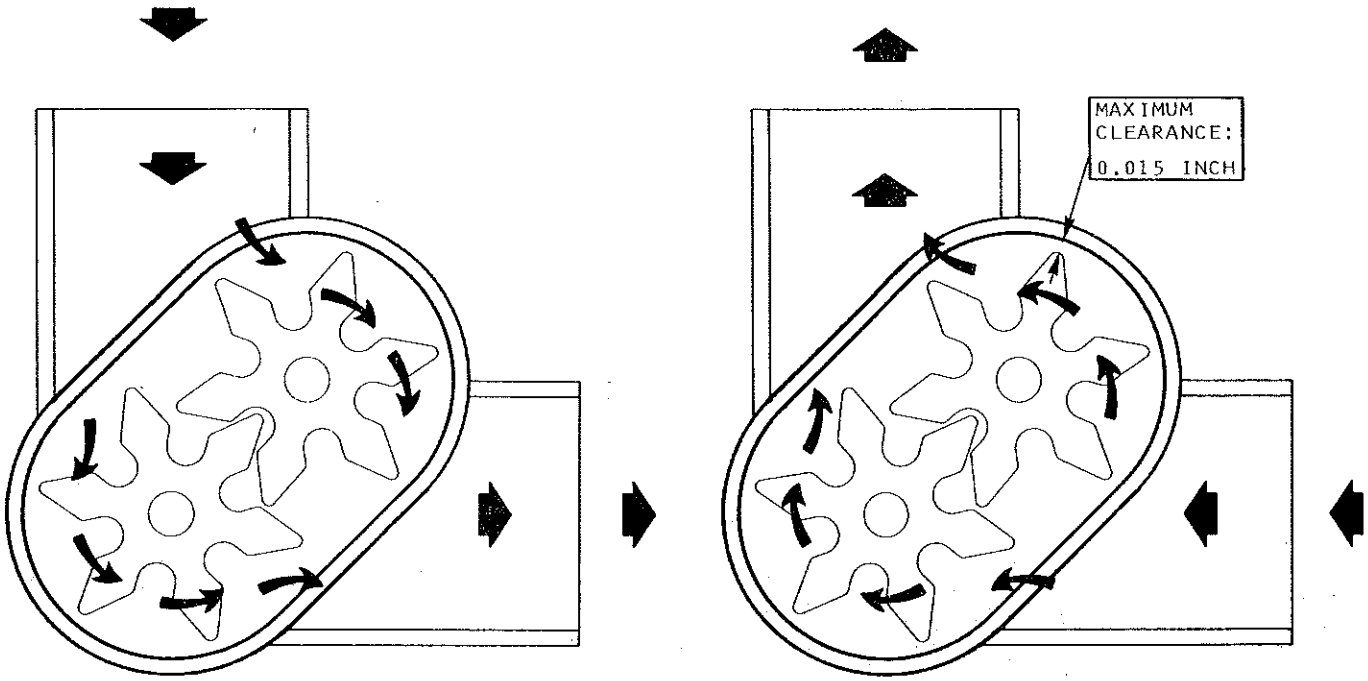
(6.3) HYDRAULIC FILTER VACUUM GAUGE

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	REMEDY
DOES NOT ACHIEVE PROPER SPREAD RATE.	1. Clogged filter screens.	1. Clean per instructions in this Section.
	2. Malfunction in equalizer valve.	2. Examine valve action to verify that valve opens when MASTER switch is on, closes when switch is off. Repair valve or actuator as needed.
	3. Malfunction in asphalt pump relief valve (valve opens at less than correct pressure or valve action is blocked by obstruction).	3. Verify valve action; repair or replace as needed.
	4. Excessive wear in asphalt pump.	4. Inspect pump and replace parts as needed.
	5. Obstruction in tank restricting flow of asphalt thru tank valve.	5. Clean tank to remove obstruction.
ASPHALT PUMP DEVELOPS EXCESSIVE NOISE.	Insufficient flow of asphalt due to clogged filter screen or blocked intake valve.	Inspect filter screens and valves and clean as required.
HYDROSTATIC PUMP DEVELOPS EXCESSIVE NOISE.	Insufficient fluid available due to clogged filter or plugged line.	Replace filter and inspect lines.
ASPHALT DOES NOT CIRCULATE THRU SPRAY BAR.	1. MASTER switch on.	1. Set switch off.
	2. Malfunction in equalizer valve.	2. Examine valve action to verify that valve opens when MASTER switch is on, closes when switch is off. Replace valve or actuator as needed.
	3. Bar clogged with hardened asphalt.	3. Clean bar by one of the methods given in this Section.

TROUBLESHOOTING GUIDE
Continued

SYMPTOM	POSSIBLE CAUSE	REMEDY
SPRAY BAR FAILS TO COMPLETE COMMANDED MOTION (BAR RAISE, BAR SHIFT, OR WING LIFT).	1. Blockage in solenoid-operated hydraulic valve.	1. Actuate valve manually by pressing plunger with small screwdriver.
	2. Lack of signal from control panel.	2. Check switches and wiring for continuity; replace as needed.
ONE SET OF SPRAY NOZZLE VALVES DOES NOT OPERATE.	Malfunction in solenoid-operated air valve.	Replace with new solenoid-operated air valve.



(6.4) DIAGRAM OF ASPHALT PUMP OPERATION

The direction of rotation of the gears determines which port will function as inlet and which as outlet. Recall the rule of cargo pump operation:

FWD = IN at bottom, OUT at top

REV = IN at top, OUT at bottom

The cargo pump operates on the positive displacement principle. That is, when the gears unmesh, a partial vacuum is produced. Atmospheric pressure can then force the bituminous material into the pump, where it is carried between the gear teeth and the casing to the other port. The meshing of the gears then forces the material through the outlet port.

Note that the maximum acceptable clearance between gear teeth and casing is 0.015″.

TABLE 6-1

RECOMMENDED SPARE PARTS

The following spare parts listed is provided as a guide to the user for convenience in the maintenance of the Model BC-401 Spreader. All of the parts listed are available in kit form from BearCat Manufacturing.

DESCRIPTION	*PART NO.*	*QTY*
Hydraulic Filter	22502	1
1' Standard Linkage	26387	1
Valve Stem Lifter	26587	2
Bar O-ring	26927	2
Swivel O-ring	26945	4
Swing Joint Seal, upper	27230	1
Swing Joint Seal, lower	27231	1
Bar Seal	27232	2
Suction Strainer Screen	27241	1
Versa-Valve only	27261	1
Seating Tool	27280	1
Seating Tool	27281	1
Equalizer Cylinder	27316	1
Bar Cylinder	27318	2
Cylinder Connector	27325	2
Spray Nozzle - #1	27191	2
Spray Nozzle - #2	27192	2
Spray Nozzle - #3	27193	2
Spray Nozzle - #4	27194	2
Valve Washer	27362	2
Snap Ring	27363	2
Valve Bushing	27371	2
Bushing Washer	27273	2
Y Strainer Screen	27396	1
Poppet Assembly	27414	2
3" Flange Gasket	29060	1
4" Flange Gasket	29065	1
Marker Gasket	29073	2
Suction Housing Gasket	29070	1
Strainer Gasket	29064	1
Momentary Switch	24274	1
On-Off Switch	24275	1

TABLE 6-2

AVAILABLE REPLACEMENT SPIN-ON FILTERS FOR MODEL BC-401 HYDRAULIC SYSTEM

(BearCat Part No. 22502)

FILTER MANUFACTURER	*PART NUMBER*
Can-Flo	RSE-50-10
UCC	MX-1591-4-10
Cross	1A9251
John Deere	AT44696
Gresen	K-23018
Michigan	S-58
Owatonna	170-32375
Pall	HC 9500 SUJ4H
J. I. Case	R25844
J. I. Case	A57857
Zinga	SE10
WIX	51759

PARTS LISTS

The following lists describe the parts pictured in the exploded views, Figures (6.6) through (6.19).

Key	*Part No.*	*Name*	*Key*	*Part No.*	*Name*
		DETAIL "A"			
A-01		Transmission	A-11	ELC-26149	GRM-FPM Sensor Assy.
A-02	BRK-27308	Air Tank Brackets	A-12	*	Tube Type Rear Cross Member
A-03	TNK-27300	Air Tank			
A-04	*	Pump to Motor Hyd. Hoses	A-13	*	Truck Drive Line
			A-14	BRK-26636	Tank Mount
A-05	PTM-27213	PTO to Hyd. Trans. Drive Line	A-15	MTR-22499	Hyd. Filter Gauge
			A-16	*	Hose Tie Rail
A-06	*	Hyd. Transmission	A-17	BRK-26636	Tank Mount
A-07	TNK-27300	Air Tank	A-18	TNK-27300	Air Tank
A-08	BRK-26636	Tank Mount	A-19	BRK-26377	Hyd. Tank Brackets
A-09	ELC-24293	Back Up Alarm	A-20	TNK-22225	Hyd. Tank
A-10	BRK-26636	Tank Mount	A-21	TNK-27300	Air Tank

Key	Part No.	Name	Key	Part No.	Name
		DETAIL "B"			
B-01			B-12	HSG-91107	BC Internal Exhaust Stack
B-02	MSM-21343	Insulation			
B-03	BRK-21531	Marker Light Bracket	B-13	MSM-21611	Alum. False Head
B-04	MSM-31203	.032 Alum. Skin Material	B-14	BRK-25254	Flue Liner and Mount Assy.
B-05	BRK-21276	Hose Trough			
B-06	FAS-28784	5/8-11 X 6 Tank Tie Down Bolt	B-15	TNK-22424	By-Pass Line
			B-16	FIT-29157	3" Steel Flange, 8-Hole
B-07	FAS-29422	Tank Spring	B-17	BRK-21254	7" Grip Strut Assy.
B-08		Tank Bolster	B-18	PIP-29683	2 1/2" Sch. 40 Pipe
B-09	TNK-25108	Bolster Tie Down Plate	B-19	HSG-21235	Manhole Assy.
B-10	FAS-28505	5/8-11 Hex Nut	B-20	TNK-22431	Dome Well Tank Breather
B-11	GRD-91084	BC Fender Assy.	B-21		Cat Walk
		DETAIL "Ba-1"			
Bal-01	FAS-25446	1/4-28 X 1 1/4 Sc. Hd. Cap. Screw	Bal-04	RNG-50157	Mac Vlv. Gasket
			Bal-05	FIT-29836	4MJ - 4 MP Adaptor
Bal-02	VLV-50159	Mac Vlv. End Plate	Bal-06	VLV-27263	4 Way Mac Vlv.
Bal-03	FAS-50158	1/4-20 M-FM Stud (Mac Vlv.)	Bal-07	VLV-27168	Mac Vlv. Repair Kit
			Bal-08	ELC-27169	Coil-Mac Vlv.
		DETAIL "C-1"			
C-01		Detail C-1	C-10	GRD-91081	Bumper
C-02	BRK-52044	Crosstie Pipe	C-11	BRK-91206	Hanger Support Assy.
C-03	BRK-52018	3" Hanger Pipe	C-12	MSC-22335	Hydraulic Manifold
C-04	BRK-52047	Stop Bolt	C-13	VLV-22326	Yocine Valve
C-05	MCH-52036	Left & Right Swing Arm	C-14	BRK-91053	Support Strap
C-06	BRK-27475	Cargo Pump Bracket	C-15	ELC-24200	Tail Light
C-07	FIT-52009	Pivot Bushing Assy.	C-16	ELC-24200	Tail Light
C-08	CYL-22300	Hyd. Swing Cyl.	C-17	MSM-26435	Bar Manifold Assy.
C-09	CYL-52040A	Hyd. Lift Cyl.			
		DETAIL "Da-1"			
Da-01	MTR-21286	120 Degree Scale Plate	Da-05	MTR-52155	Float Assy., "E" Size
Da-01A	MTR-21286A	90 Degree Load Scale Plate	Da-05A	MTR-21266	Float Assy., "C & D" Size
Da-02	MSC-21222	1215 Steel Packing Gland	Da-06	MTR-21263	7" Float
Da-02A	MSC-21220	Alum. Packing Gland	Da-07	BRK-21533	Retainer, 7" Float Assy.
Da-03	MTR-21225	Float Gage Needle Assy.	Da-08	FAS-21223	Packing Gland Nut
Da-04	STL-30016	5/8 Cold Roll Round Bar Stock			

Key	Part No.	Name	Key	Part No.	Name
		DETAIL "E"			
E-01	RNG-27363	Snap Ring	E-13C	FIT-27194	Spray Nozzle #4
E-02	FAS-27362	Vlv. Washer			105 Degree - 107 Degree
E-03	RNG-26927	Vlv. O-Ring			@ 18-22 PSI
E-04	RNG-27332	Vlv. Stem Seal	E-13D	FIT-27195	Spray Nozzle #5
E-05	FAS-27418	Vlv. Spring			104 Degree - 106 Degree
E-06-A	MCH-27414	Complete Poppet Assy.			@ 14 PSI
		E6, E7, E8, & E9	E-14	MCH-26587	Vlv. Stem Lifter
E-06	MSM-27416	Vlv. Stem	E-15	MCH-26387	Standard Linkage
E-07	FAS-27356	Poppet Spring	E-15A	MCH-26388	Finger Linkage
E-08	MCH-27364	9/16" Ball & Sleeve Assy.	E-16	CYL-27318	Spray Bar Air Cyl.
E-09	FAS-27359	Spring Pin	E-17	MCH-91005	R.H. 2' Wing
E-10	HSG-27365	Vlv. Body	E-17A	MCH-91006	L.H. 2' Wing
E-11	FAS-27373	Bushing Washer	E-18	HSG-24238	Mercury Switch Box Assy.
E-12	FIT-27371	Vlv. Bushing	E-18A	ELC-24285	Mercury Switch
E-13	FIT-27191	Spray Nozzle #1	E-20	MCH-91004	8' 401
		95 Degree - 97 Degree	E-21	MSC-26475	Cyc. Connecting Hose
		@ 20 PSI	E-22A	HSG-27291	Bar End Cap - R/H
E-13A	FIT-27192	Spray Nozzle #2			Female
		104 Degree - 106 Degree	E-22B	HSG-27292	Bar End Cap - Male
		@ 20 PSI		MSC-27280	Seatingtool - Poppet
E-13B	FIT-27193	Spray Nozzle #3			Assy.
		105 Degree - 107 Degree		MSC-27281	Seatingtool Bushing -
		@ 22 PSI			Poppet Assy.
		DETAIL "Ea-3"			
Ea-18		401 Wing Assy.	Ea-20	91013	401 Main Bar Assy.
Ea-19	27231	Seal	Ea-23		

Key	Part No.	Name	Key	Part No.	Name
		DETAIL "F"			
F-01	BRK-91022	401 Ladder	F-32	FTR-27242	Suction Strainer Screen
F-02	MSC-26436	Hose Reel Assy.	F-33	FTR-~~27242~~ 52165	Y-Strainer Screen Assy.
F-03	MSC-26480	Hand Wand Hose Assy.	F-34A	VLV-29229	3/4" Ball Vlv./SS Stem
F-04	MSC-27279	Hand Wand Applicator	F-34B	GRD-27080	Hand Wand Vlv. Handle
F-05	FIT-29800	Hose Reel Swivel	F-35	VLV-29227	3/4" Ball Vlv.
F-06	FIT-52135	Pipe & Fitting Assy.	F-36	MSC-27480	Clean Out & Burner Manifold
F-07	MSC-52120	Manifold Pump Outlet			
F-08	*	Circulate Line	F-37	VLV-29227	3/4" Ball Vlv.
F-09	FIT-29292	Gate Vlv. Fl-Fl	F-38	RNG-29060	3" Flange Gasket 8-Hole
F-10	HSG-52167	Y-Strainer Screen/Housing Assy.	F-39	RNG-29060	3" Flange Gasket 8-Hole
			F-40	RNG-29060	3" Flange Gasket 8-Hole
F-11	HSG-52176	Cover	F-41	RNG-29060	3" Flange Gasket 8-Hole
F-12	MSC-27494	Feed Tube Swivel Assy.	F-42	RNG-29060	3" Flange Gasket 8-Hole
F-13	VLV-27274	4" Butterfly Vlv. Assy.	F-43	RNG-29060	3" Flange Gasket 8-Hole
F-14	MSC-27494	Feed Tube Swivel Assy.	F-44	RNG-29060	3" Flange Gasket 8-Hole
F-15	FIT-52124	Tee and Elbow Assy.	F-45	RNG-29060	3" Flange Gasket 8-Hole
F-16	VLV-29291	3" Hose Gate Vlv.	F-46		
F-17	*	By-Pass Line	F-47	RNG-29060	3" Flange Gasket 8-Hole
F-18	VLV-27210	By-Pass Vlv.	F-48	CYL-27321	Air Cylinder
F-19	GRD-91189	Operator Platform Assy.	F-49	RNG-29061	Gasket
F-20	PIP-91062	Piping, Strainer Box to Pump	F-50	RNG-29066	4" Sq. Flange, 4-Hole Gasket
F-21			F-51	RNG-29066	4" Sq. Flange, 4-Hole Gasket
F-22	HSG-27246	Suction Strainer & Screen Hsg.	F-52	RNG-29065	4" Flange Gasket 8-Hole
			F-53	RNG-29065	4" Flange Gasket 8-Hole
F-23	VLV-29294	3" Modified Grooved Vlv. for Suction Strainer	F-54	RNG-29061	4" Flange Gasket 4-Hole
			F-55	RNG-29060	3" Flange Gasket 8-Hole
F-24	ELC-26149	Gear Tooth Sensor Assy.	F-56	RNG-52178	Suction Strainer Gasket
F-25	GRD-27478	Driveshaft Guard	F-57	RNG-29113	Victraulic Gasket
F-26	PMP-22216	Eaton Motor	F-58	RNG-29070	Gasket
F-27	BRK-26523	Hyd. Motor Mount	F-59		
F-28	PTM-26314	Motor to Pump, Drive Line (Taper)	F-60	RNG-29060	3" Flange Gasket
			F-61		
F-29	PTM-22480	Magnetic Pick-up Gear	F-62		
F-30	MSC-91130	Bar Feed Hoses	F-63		
F-31	FIT-29291	3" Gate Vlv. Fl-Gr			
		DETAIL "G"			
G-01	GRD-26383	Mirror Assembly	G-11	FAS-28524	1/4" NC ESNA Nut
G-02	BRK-26404	Bracket - Long	G-12	FAS-29558	Hinge
G-03	BRK-26407	Bracket - Short	G-13	FAS-28699	1/4-20X2" Bolt
G-04	BRK-26499	Bracket - Retaining Spring	G-14		3/16 Pop Rivets
			G-15	GRD-26379	Mirror
G-05	HSG-26381	Mirror Backing Plate	G-16	MSM-26380	1 Tape
G-06	FAS-29410	Long Spring	G-17	HSG-26372	8 Mirror Channel
G-07	FAS-29411	Short Spring	G-18	HSG-26373	15 Mirror Channel
G-08	CYL-27317	Cylinder (S7-1.00-60)	G-19		10-32X1/2" Machine Screw
G-09	CYL-27346	Cylinder (7/16" Bore 010.5)	G-20	FAS-29559	2" Continuous Hinge
G-10	FAS-25462	1/4-20X5/8 Soc. Hd. Cap Screw (Plated)			

Key	Part No.	Name	Key	Part No.	Name
		DETAIL "H"			
H-01			H-10	ELC-24220	20 Gang Cinch Conn.
H-02	ELC-24288	10 Turn 250 OHM Clarostat	H-11	MSC-24349	Console Manifold
			H-12	HSG-70187	Console Assy.
H-03	ELC-24267	On-Off Toggle Switch	H-12A	HSG-70186	Console Shell
H-04	ELC-24276	DPDT On-Off-On	H-12B	HSG-70185	Console Face Plate
H-05	MTR-26222	CRC Micro Processor	H-13	ELC-81029	Red Light PTO
H-05A	MTR-26223	CRM Micro Processor	H-14	ELC-24274	On-Off-On Momentary Switch
H-06	ELC-50160	C.R.M. Circuit Board			
H-07	ELC-24290	30 AMP Circuit Breaker	H-15	ELC-24268	DPST On-On
H-08	ELC-24190	6 Gang Cinch Conn.	H-16	ELC-24267	Toggle On-Off-CRC
H-09	ELC-24280	Air Toggle Switch	H-16A	ELC-24275	Toggle On-Off-CRM
		DETAIL "J"			
J-01	HSG-100016	Blower Housing	J-18	MSC-100019	Air Tube & Gun Assy.
J-02	PTM-25196	J-Pump Coupling	J-19	MSC-100019	Air Tube & Gun Assy.
J-03	MCH-25210	Adaptor-Blower Wheel	J-20	MSC-100019	Air Tube & Gun Assy.
J-04	MCH-25176	Blower Wheel	J-21		
J-05	MCH-25187	Adaptor Plate	J-22		
J-06			J-23		
J-07	PMP-81006	Motor, Hydraulic	J-24	FAS-25817	8-32 Thrd X 1 1/4 Round Head Mach. Screw
J-08	FIT-29843	8MJ-8MP Adaptor			
J-09	MSC-100019	Air Tube & Gun Assy.	J-25	PIP-25194	Fuel Line
J-10	MSC-100019	Air Tube & Gun Assy.	J-26	FIT-29870	4MJ-4MP 90 Deg.
J-11			J-27	PMP-100018	Fuel Pump
J-12	MSC-100021	Adjustable Flange	J-28	GRD-25192	Cover, Burner
J-13			J-29		
J-14	FIT-25197	Burner Nozzle 4.00 45 Deg. Plp.	J-30	FAS-25817	#8-32 X 1 1/4 Mach. Screw
J-15	MSC-100019	Air Tube & Gun Assy.	J-31	ELC-25186	Ignition Coil
J-16	MSC-100019	Air Tube & Gun Assy.	J-32	VLV-80704	Fuel Solenoid Vlv.
J-17	MSC-100019	Air Tube & Gun Assy.			

Key	Part No.	Name	Key	Part No.	Name
		DETAIL "L"			
L-01	HSG-33701	End Plate, Shaft	L-20	FAS-28762	1/2-13 X 1 1/2" Bolt
L-02	RNG-29993	Gasket	L-21	FAS-28919	1/2-13 X 6" Bolt
L-03	RNG-29066	Gasket	L-22	FAS-28833	1/2-13 X 2" Stud
L-04	HSG-33700	Gear Housing	L-23	FAS-33725	Clip
L-05	PTM-33711	Key 1/4" X 2"	L-24	HSG-33726	Packing Gland
L-06	PTM-33709	Drive Shaft-401	L-25	RNG-33728	Packing Set
L-06	PTM-33708	Drive Shaft-501	L-26	FAS-33729	Packing Washer
L-07	PTM-33711	Key 1/4" X 2"	L-27	FAS-25515	1/2-13 X 1 3/4" Socket Head Cap Screw
L-08	PTM-33711	Key 1/4" X 2"			
L-09	PTM-33712	Gear, L.H. Drive	L-28	FAS-25463	1/2-20 X 1/2" Socket Head Cap Screw
L-10	PTM-33713	Gear, R.H. Idler			
L-11	HSG-33702	End Plate, R.V.	L-29	RNG-27238	Seal, Oil
L-12	HSG-33714	Poppet-Spring Retainer	L-30	BRK-27548	Seal Retainer
L-13	MSC-33715	Spring, Standard	L-31	RNG-27233	Flange Seal
L-14	MSC-33716	Spring, High Pressure	L-32	FIT-27543	Housing Flange
L-15	HSG-33714	Poppet-Spring Retainer	L-33	RNG-26934	O-Ring, Bearing Housing
L-16	RNG-26940	O-Ring, Relief Valve	L-34	HSG-27544	Housing, Bearing
L-17	HSG-33717	Cap Plug	L-35	PTM-26272	Bearing, Inner Race
L-18	FAS-33718	Lock Nut	L-35	PTM-26270	Bearing, Outer Race
L-19	FAS-33719	Adjusting Screw	L-36	PTM-33707	Idler Shaft
		DETAIL "M"			
M-01	BRK-26510	Hyd. Pump Mount (Outside Frame)	M-11	PTM-27213	Unwelded Drive Line Assy.
M-01A	BRK-26548	Hyd. Pump Mount (Outside Frame Long)	M-12	PTM-22261	Yoke (To PTO)
			M-13	*	PTO
M-01B	BRK-26526	Hyd. Pump Mount (Inside Frame)	M-14	BRK-22167	Eaton Vlv. Control-Lever
			M-15	BRK-26377	20" Hyd. Tank Hanger & Straps
M-02	MCH-50161	CRC Moog Control			
M-02A	MCH-50162	CRM Moog Control	M-16	TNK-22225	20" Hyd. Oil Tank
M-03	MTR-50163	SCE M-9	M-17	FIT-26035	2" Rubber Plug
M-04	FIT-29932	16 MJ - 16 FL 90 Degree	M-18	BRK-22549	Can Flow Bracket
M04A	FIT-29924	16 MJ - 16 FLX 90 Degree	M-19	FTR-22502	Hyd. Filter
M-05	FIT-29916	12 MJ - 12MB 90 Degree	M-20	FTR-22503	Hyd. Filter Head
M-06	PMP-22216	Motor - Tapered Shaft	M-21	FTR-22527	Hyd. Tank Breather
M-07	FIT-29933	SFK-16 1" Flange	M-22	MTR-22499	Hyd. Filter Gauge
M-08			M-23	MTR-80207	Sight Plug
M-09	PMP-22203	Victor V-10	M-24	PTM-22275	Tapered Comp. Flange
M-10	PMP-22206	Hyd. Pump	M-25	PTM-22251	Yoke Flange (Spicer)

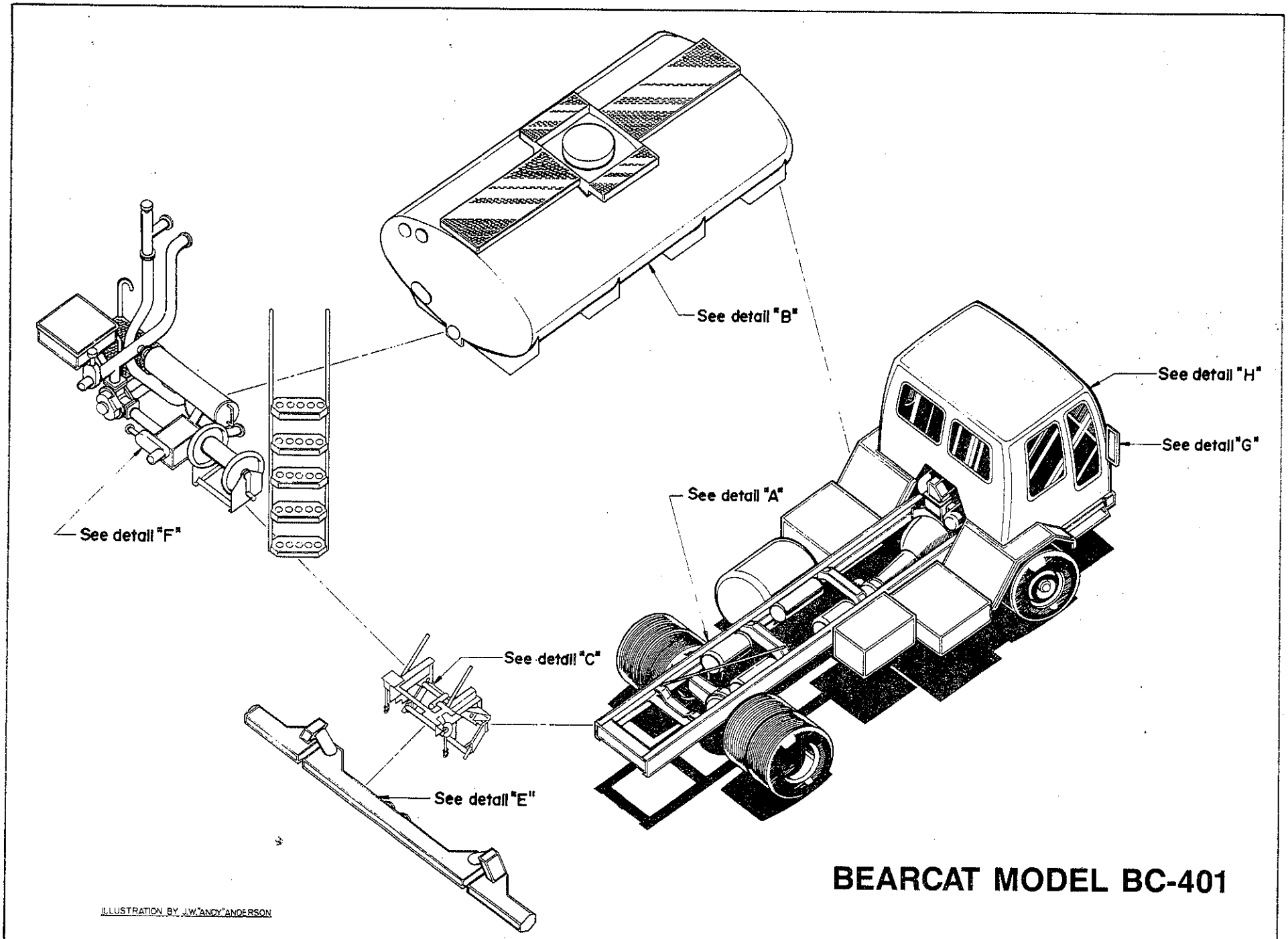

See detail "B"
See detail "H"
See detail "G"
See detail "A"
See detail "F"
See detail "C"
See detail "E"
BEARCAT MODEL BC-401
ILLUSTRATION BY J.W."ANDY"ANDERSON

FIGURE (6.5)

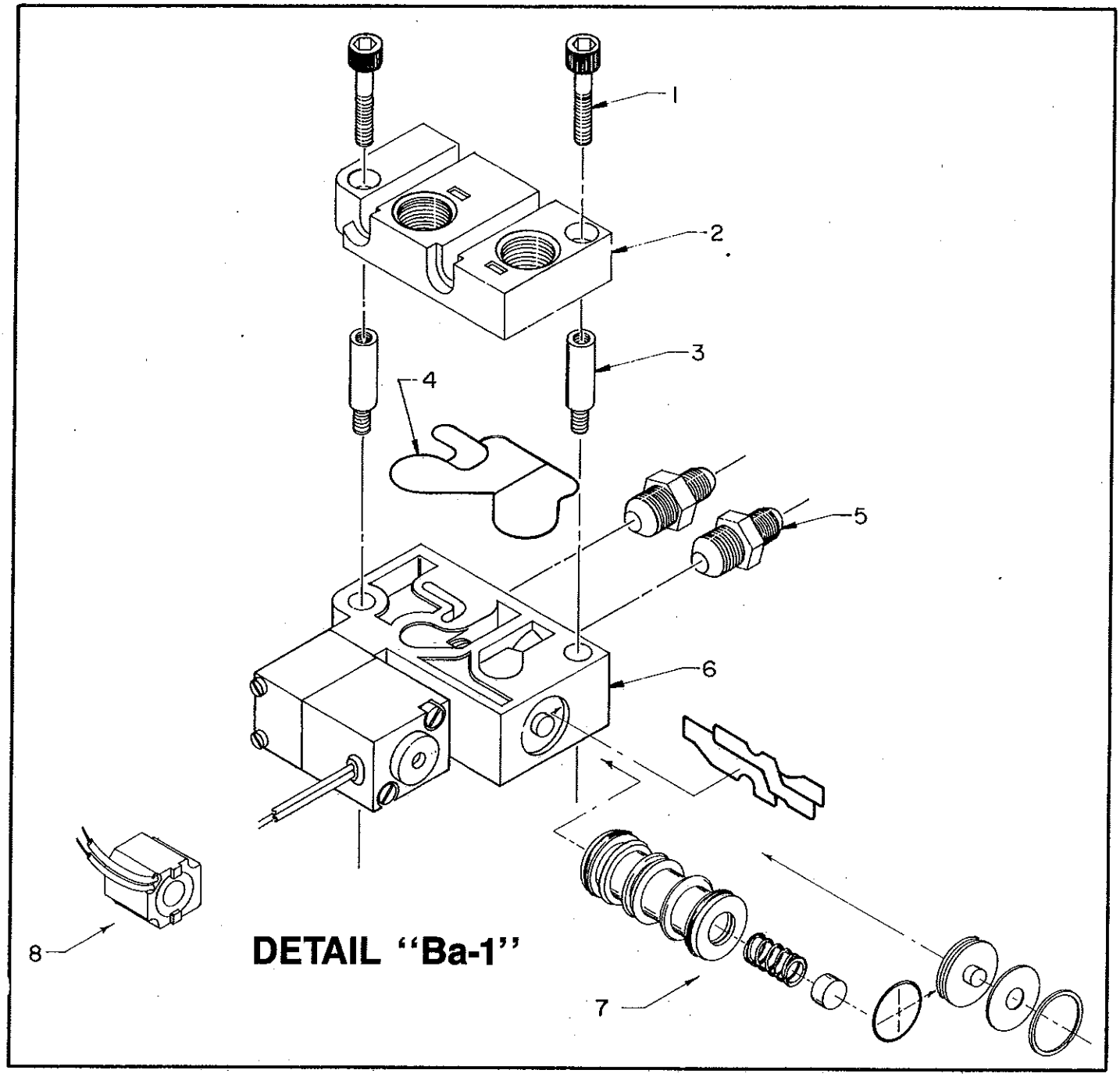


FIGURE (6.8)

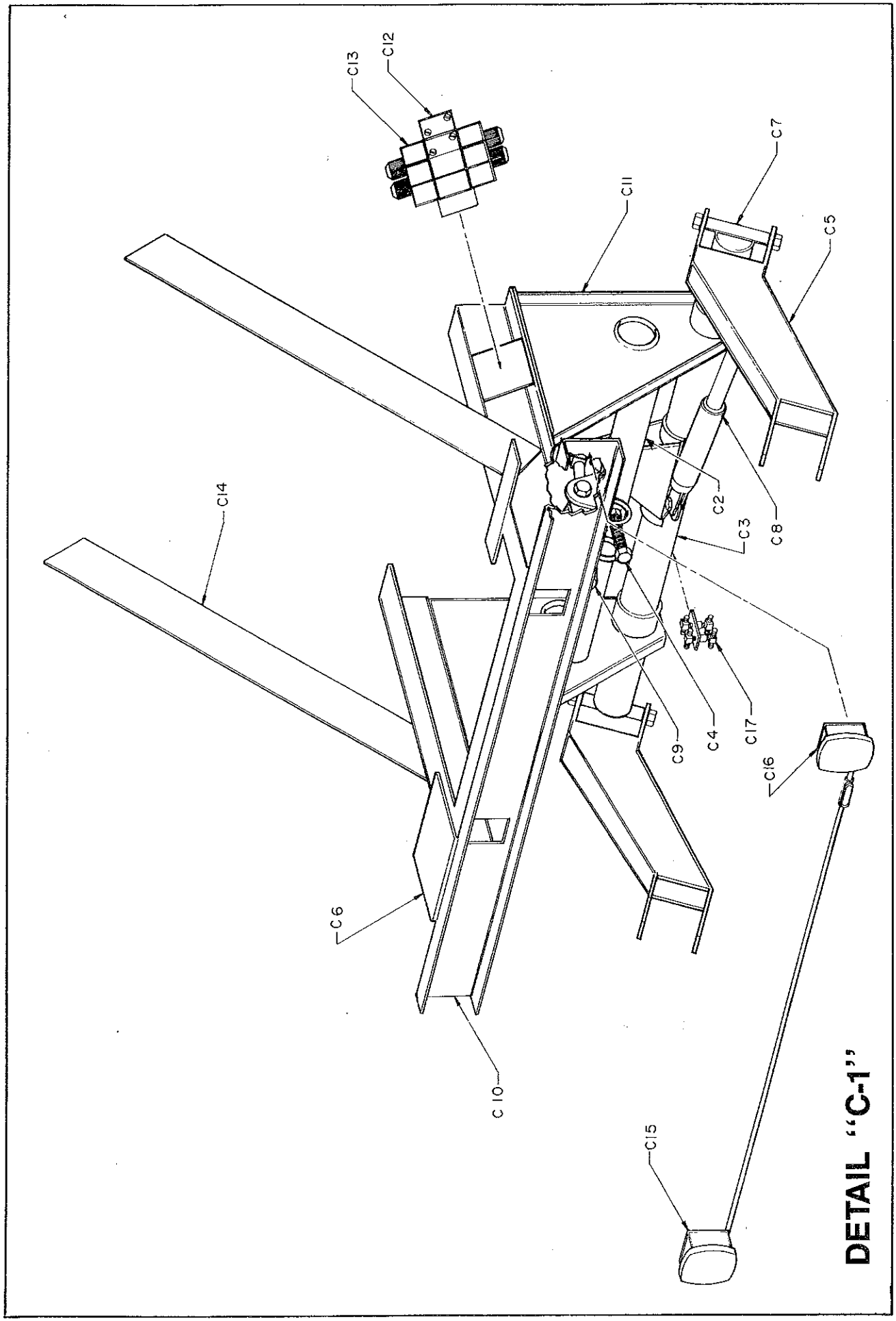
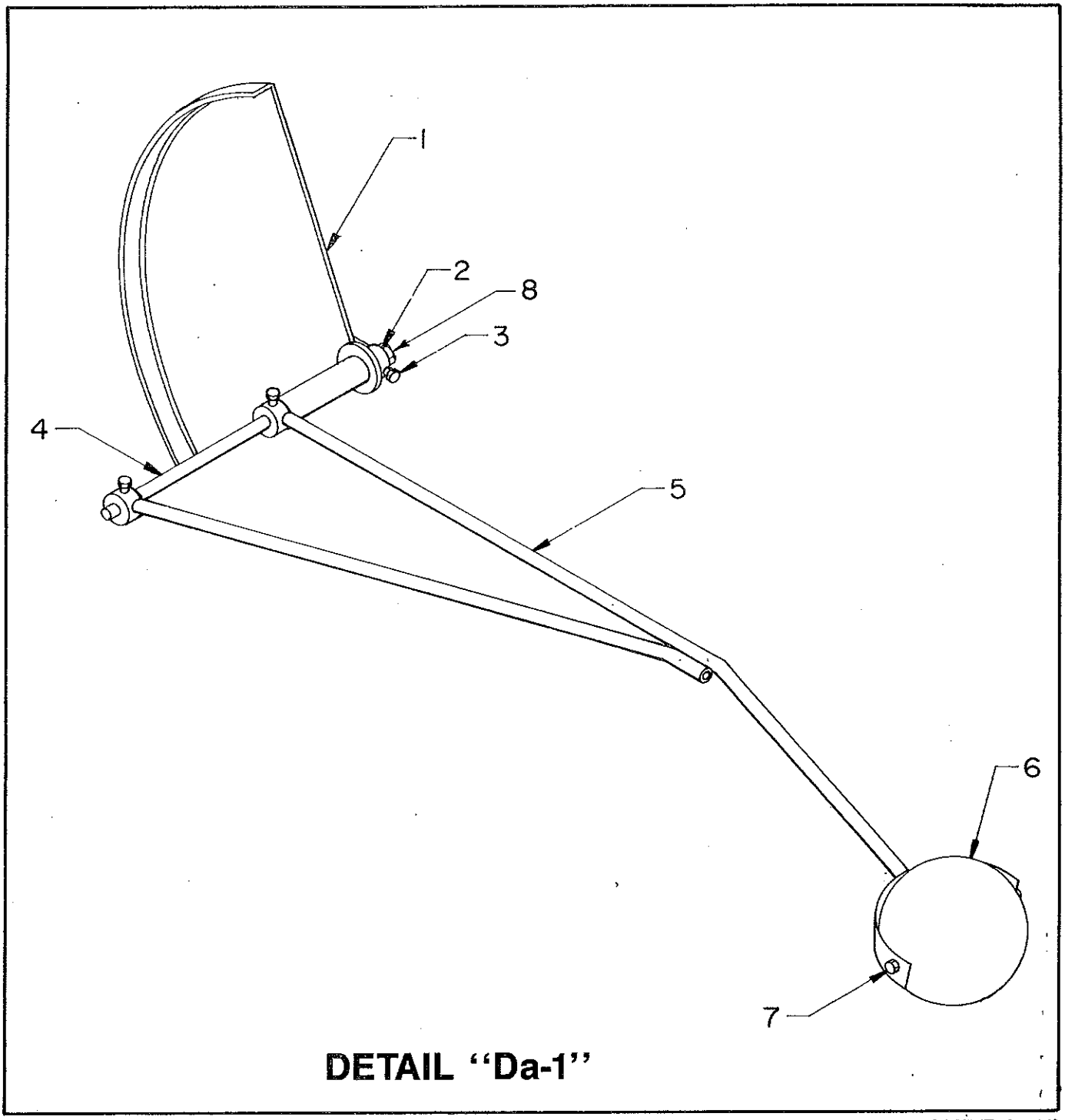


FIGURE (6.9)



DETAIL "Da-1"

FIGURE (6.11)

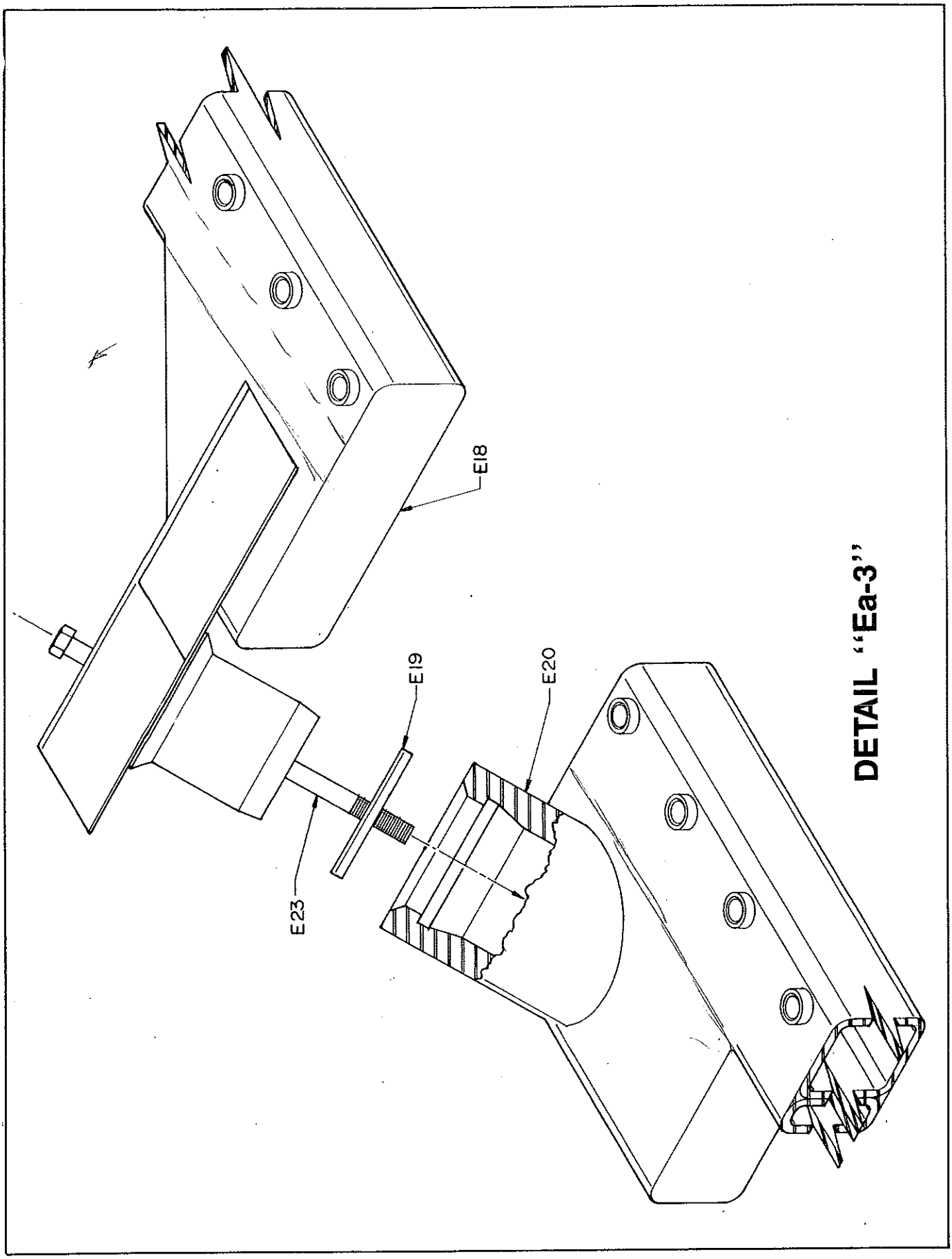
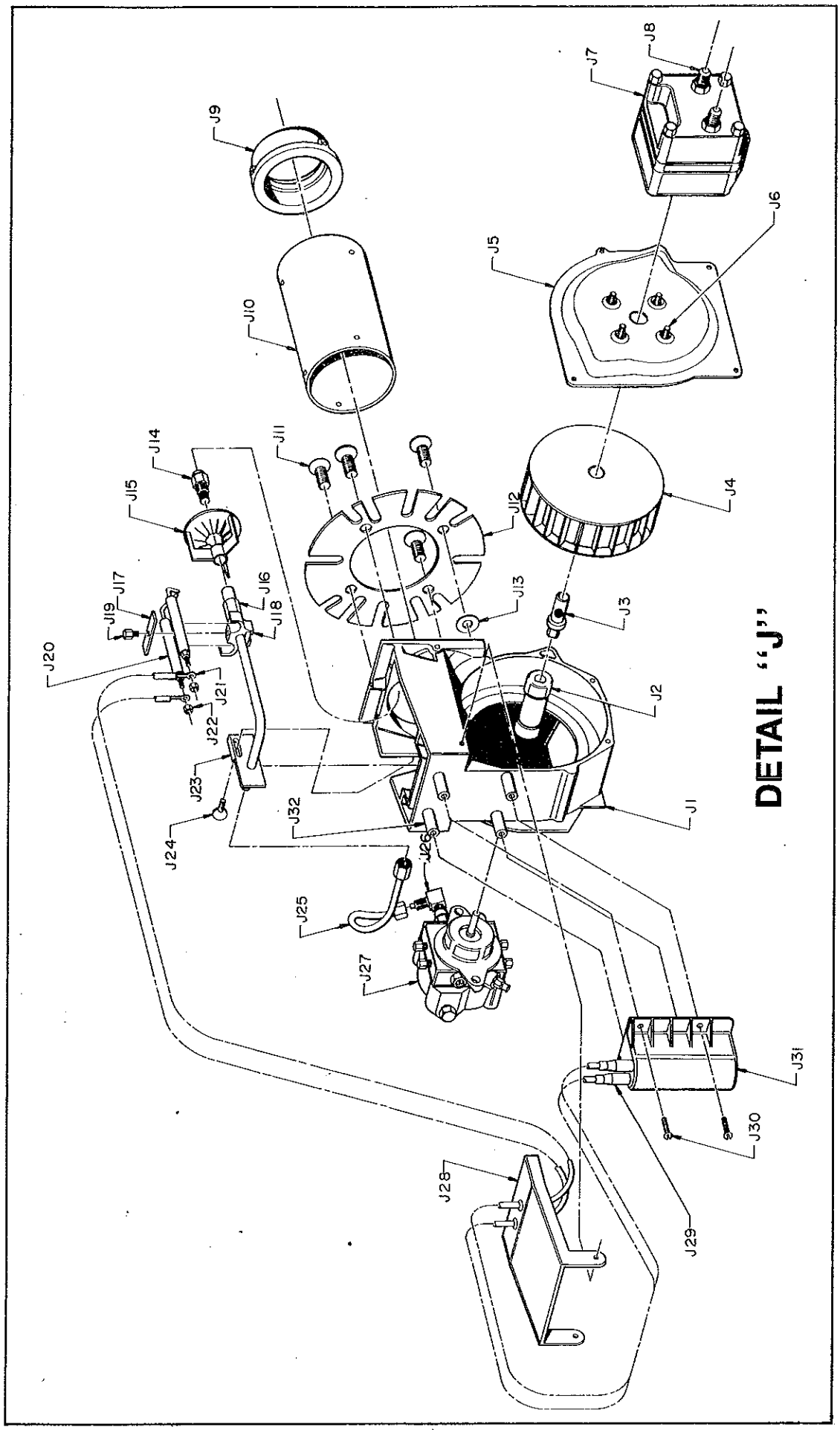


FIGURE (6.13)


DETAIL 'J'
J1
J2
J3
J4
J5
J6
J7
J8
J9
J10
J11
J12
J13
J14
J15
J16
J17
J18
J19
J20
J21
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J25
J26
J27
J28
J29
J30
J31
J32

FIGURE (6.17)

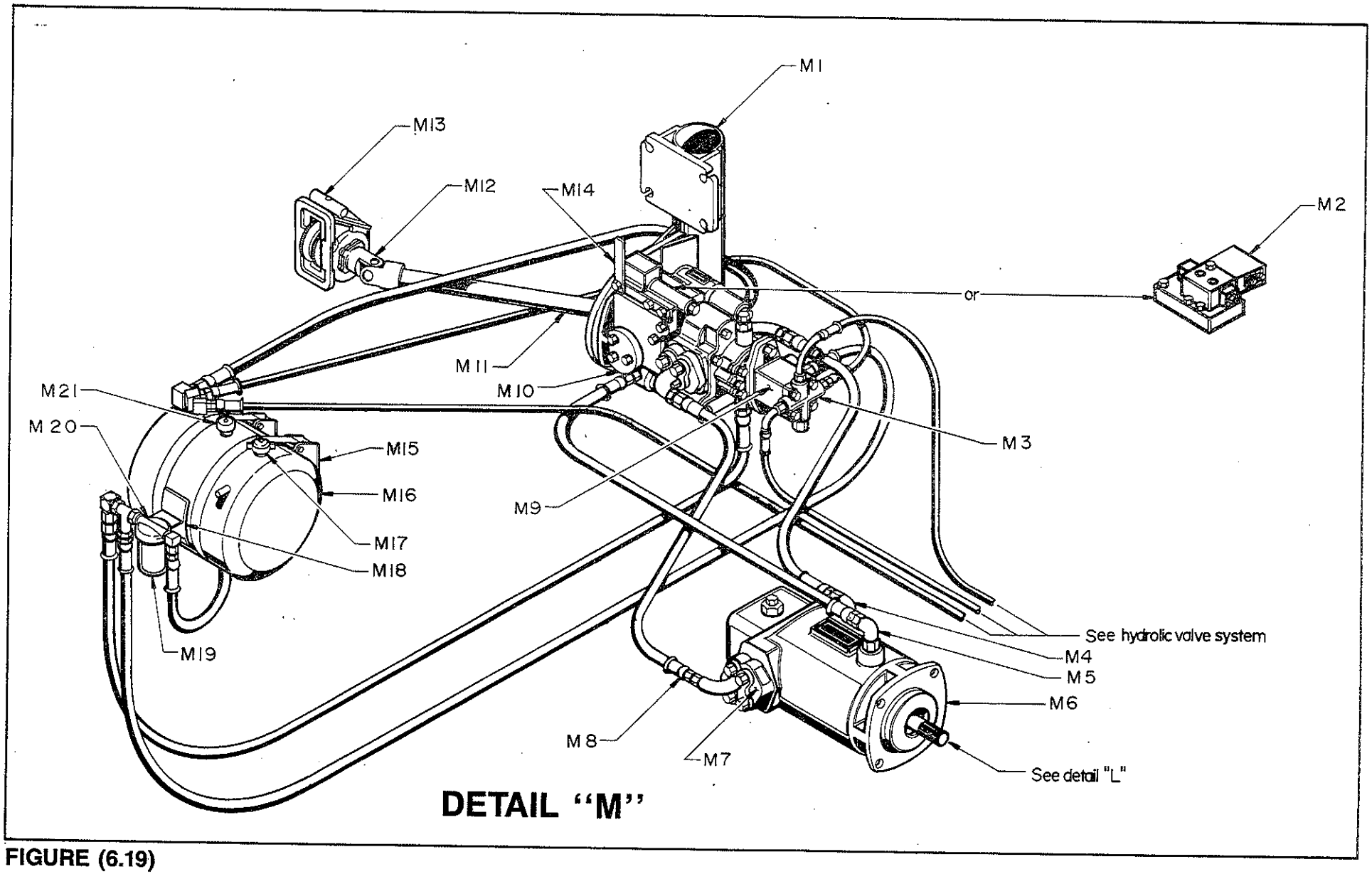
M1
M13
M12
M14
M2
or
M11
M10
M21
M20
M15
M16
M17
M18
M19
M9
M3
See hydrolic valve system
M4
M5
M6
M8
M7
See detail "L"
DETAIL "M"

FIGURE (6.19)