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REVISION NO. 2 DATED MAY 1, 2001

To the holders of the BearCat Field Operations and Maintenance Manual 1998/2000, Model 2002/CRC Computer-Controlled, Self-Propelled, Chip Spreader, Revision 1 dated 31 March 2001.

This is a partial revision to the chip spreader manual. Revision bars are used to identify any changes or additions to the manual. The revision bars are placed next to the change.

Remove the out-of-date pages and put the added and revised pages into your copy of this manual. Keep this highlights page in the front of your manual for reference purposes.

Page	Change
Title	Revised to show the new revision date of this manual, and provide new telephone numbers.
LEP	Revised to show where changes are made in this manual.
TC-1 thru TC-6	Revised table of contents and list of figures to list revision 2 changes.
3-22	Step 7 moved from page 3-23 to 3-22.
3-23	Added dump truck hitch bar requirements.
3-24	Added dump truck hitch bar illustrations.
6-1	Added lubrication specifications information to table note.
6-10	Added lubrication specifications section.
8-5/8-6	Revised wiring diagram.
8-11/8-12	Revised wiring diagram.
8-12.1/8-12.2	Added additional wiring diagram.

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**FIELD OPERATIONS & MAINTENANCE
1998/2000**

MODEL 2002/CRC

**Computer-Controlled, Self-Propelled
Chip Spreader**

Unit Serial Number: _____

Date of Service: _____

Customer: _____

Hopper ID Number: _____

Footage Calibration Number: _____

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This manual describes the Model 2002/CRC as it is normally delivered to the user. Due to a continuing program of product improvement, changes may be made in equipment delivered at a later date. Every attempt is made to keep users fully informed of such changes.

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Wickenburg, AZ 85390

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WARRANTY AND CLAIM PROCEDURES

Limited Warranty

BearCat Mfg., Inc. (hereinafter referred to as "BearCat") extends to the original purchaser-user of Model 2002/CRC Chip Spreader, the following warranty covering goods manufactured by BearCat and subject to the following qualifications.

The warranty applies only when the product:

1. Is properly used and maintained in accordance with BearCat instructions, governing agencies or associations.
2. Is being operated under proper fuel and/or cargo specifications.
3. Is not subjected to corrosive or abrasive atmosphere or materials.
4. Has not been damaged through malice or ignorance.
5. Has not been subjected 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 material 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 F.O.B. Wickenburg, Arizona, any part acknowledged by BearCat to be defective when returned to BearCat; provided that:

1. The defective part is returned for inspection with transportation charges prepaid to BearCat.
2. BearCat determines the defective part failed under the terms of the above warranty.

BEARCAT WILL NOT INSTALL AND WILL NOT PAY ANY INSTALLATION COST, TRANSPORTATION COST, 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.



Model 2002/CRC

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

No defective parts will be accepted for return or replacement without the written authorization of BearCat, or verbal authorization from the BearCat Service Department. Upon such authorization, the part should be returned to BearCat within sixty (60) days, shipping charges prepaid, at the following address:

BearCat Mfg., Inc.

3650 Sabin Brown Road
Wickenburg, AZ 85390

Phone: (928) 684-7851
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Exclusions

The provisions of the foregoing warranty are BearCat's sole obligation and exclude all other warranties, expressed 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 concerning the sale, use, or repair of the product.

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



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INTRODUCTION

BearCat Chip Spreaders (Model 2002/CRC) are designed and manufactured to ensure personnel safety when the equipment is operated properly and all safety precautions are strictly followed.

Persons responsible for the operation and field maintenance of the Model 2002/CRC Chip Spreader should read this manual carefully before attempting to operate the equipment or performing any service or adjustment procedures on it.

NOTE: BearCat Manufacturing assumes no liability for accident or injury incurred through improper use of this equipment.

WARNING: BEARCAT CHIP SPREADERS MOVE LARGE AMOUNTS OF ABRASIVE MATERIAL AT HIGH SPEEDS. THIS EQUIPMENT CONTAINS EXPOSED MOVING PARTS AND BELTS. POTENTIALLY LIFE-THREATENING HAZARDS MAY EXIST DURING EQUIPMENT OPERATION. PERSONNEL MUST BE TRAINED AND FAMILIAR WITH SECTION 2 (SAFETY PRECAUTIONS) BEFORE OPERATING BEARCAT EQUIPMENT.

WARNING: POTENTIALLY LIFE-THREATENING HAZARDS MAY EXIST DURING EQUIPMENT OPERATION. ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO OPERATE, SERVICE OR MAKE ADJUSTMENTS TO THE BEARCAT EQUIPMENT.

WARNING: FOLLOW THESE PRECAUTIONARY INSTRUCTIONS EXACTLY. DO NOT TAKE SHORTCUTS. DO NOT ASSUME THAT SOMEONE ELSE HAS ACTED ON YOUR BEHALF. IF ANY RULE OR PRECAUTION IS NOT CLEAR TO YOU, SEE YOUR SUPERVISOR BEFORE USING THE MACHINE.

Abbreviation/Definition Table

Abbreviation	Definition
CRC	Computerized rate control
CCW	Counterclockwise
CW	Clockwise
PSY	Pounds per square yard
KgSM	Kilograms per square meter
FPM	Feet per minute
MPM	Meters per minute
PSI	Pounds per square inch

SECTION 1. DESCRIPTION

Equipment Description

The Model 2002/CRC Computer Controlled, Self-Propelled Chip Spreader is illustrated in Figure 1-1 and Figure 1-2. The following description of the equipment should be read for familiarity with the operating features and capabilities of the Model 2002/CRC Chip Spreader.



Figure 1-1. Model 2002/CRC Chip Spreader, Curb Side



Figure 1-2. Model 2002/CRC Chip Spreader, Street Side

Power Train

Model 2002/CRC is equipped with a 6-cylinder diesel engine. The engine crankshaft is coupled to an axial-piston, high-torque hydrostatic pump and a hydraulic motor which drives a limited-slip front axle through a four-speed truck transmission. Four operating modes are provided:

- 1st - permits speeds up to 400 feet per minute
- 2nd - permits speeds up to 750 feet per minute
- 3rd - permits speeds up to 1300 feet per minute
- 4th - permits speeds up to 1600 feet per minute or a road speed of 18 mph

The particular configuration of the Model 2002/CRC power train, consisting of front drive (limited slip), hydrostatic transmission and single hydraulic motor, provides outstanding control and traction far exceeding that previously available. As an example, Model 2002/CRC is capable of pulling a fully loaded 15-cubic yard dump truck up a 12% grade from a dead stop.

Aggregate Delivery System

Model 2002/CRC employs two hydraulically driven 30-inch wide belts to move aggregate from the receiving hopper to the chip box. The belts form a 30°-trough angle, which increases the load capacity. They are capable of carrying twice the volume of rock while running only 2/3 as fast as a conventional 20-inch flat belt. The belt motion is controlled by solenoid-actuated valves that receive signals from level-sensing diaphragm switches mounted within the chip box.

NOTE: Optional belts are rated at 350° F (for use with hot aggregate).

The aggregate belt return rollers employ a self-cleaning design that prevents any accumulation of asphalt when the machine is used to spread pre-coated aggregate. Other than periodic lubrication of the shaft bearings, as specified in Section 6 of this manual, no maintenance is required for the belt return rollers.

Expandable Chip Box

The Model 2002/CRC is equipped with a telescoping chip box that can be quickly expanded from a minimum width of 10 feet to a maximum width of 16 feet, in 6-inch increments. By using the computer-controlled aggregate gates, the operator can spread material at any width from 1 foot to 16 feet. In Figure 1-3 the chip box is shown at the minimum width, 10 feet wide.

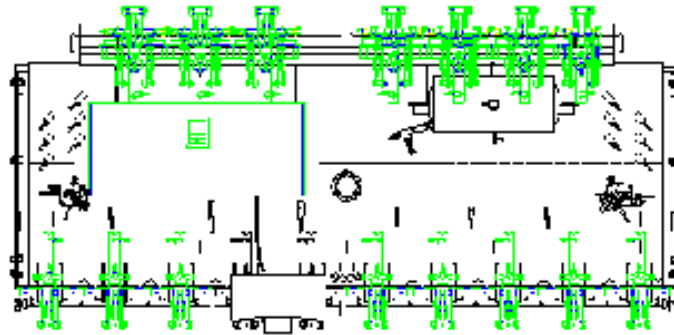


Figure 1-3. Chip Box at Minimum 10-Foot Width

To expand the chip box, hydraulic power is employed to move the telescoping sections of the chip box to the desired position. Once the width is established, the appropriate extra aggregate gates are added from the supply carried on the spreader. Seven extra gates are furnished. See Figure 1-4.

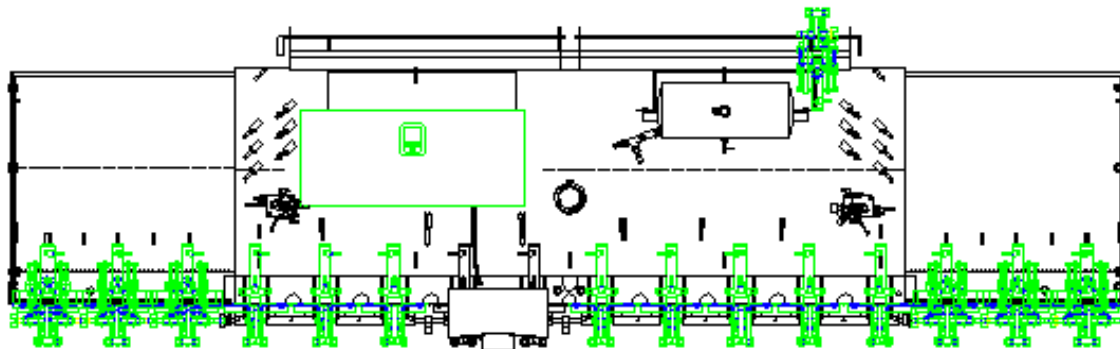


Figure 1-4. Chip Box Expanded to 16-Foot Width

The operator controls all gates individually from the operator's station. The addition or removal of gates is easily carried out by one man. The operation requires approximately five to ten minutes to expand or collapse the chip box. With the chip box collapsed to the 10-foot width, the machine is readily transportable.

There are no rotating components in the chip box, such as a feed roller or agitator bar. The pneumatically actuated gates and an independently controlled vibrator mode accomplish agitation of the aggregate material. With no moving parts located directly in the chip stream, wear and downtime are minimized.

When the chip box is set to a 16-foot width, the capacity of the chip box is 3.5 cubic yards. The struck capacity of the receiving hopper is 4 cubic yards. These capacities allow the Model 2002/CRC to operate for longer periods of time than conventional units in situations where the spreader cannot be accompanied by a dump truck.

Gate Control Valve Box

The valve box is mounted on the front of the chip box. It contains the solenoid valves that control the functions of the chip box. The solenoid valves can be manually controlled here but are normally controlled from the operator's station. The interior of the valve box is shown in Figure 1-5 and Figure 1-6.

The functions of the components within the valve box are described in Table 1-1. The key numbers in the table refer to the numbers in Figure 1-5 and Figure 1-6.

Table 1-1. Gate Control Valve Box Functions

Key	Description	Function
1	Power relay	Controls main power
2	Power relay	Controls computer slave
3	Power relay	Controls power to electric vibrators
4	Hydraulic valve	Controls left-hand extension
5	Hydraulic valve	Controls chip box tilt, fore and aft
6	Level control unit	Controls automatic leveling of chip box
7	Hydraulic valve	Controls right-hand extension
8	Hydraulic valve	Controls movement of camshaft
9	Cam potentiometer (early system only)	Cam position indicator for the computer (located on cam for late system)
10	Breaker	Controls the main electrical power
11	Switch (cam OPEN/CLOSE)	Manually controls the cam Manually operates gate operation Calibrates the computer
12	Toggle switches 1-16	Provides manual control to open and close individual gates Used for setup and cleaning Used for manual operation
13	Computer slave	Controls all of the functions of the Gate Control Valve Box as determined by the Computer Control.
14	Electro-pneumatic valves 1-16	Controls air flow to open or close the gates

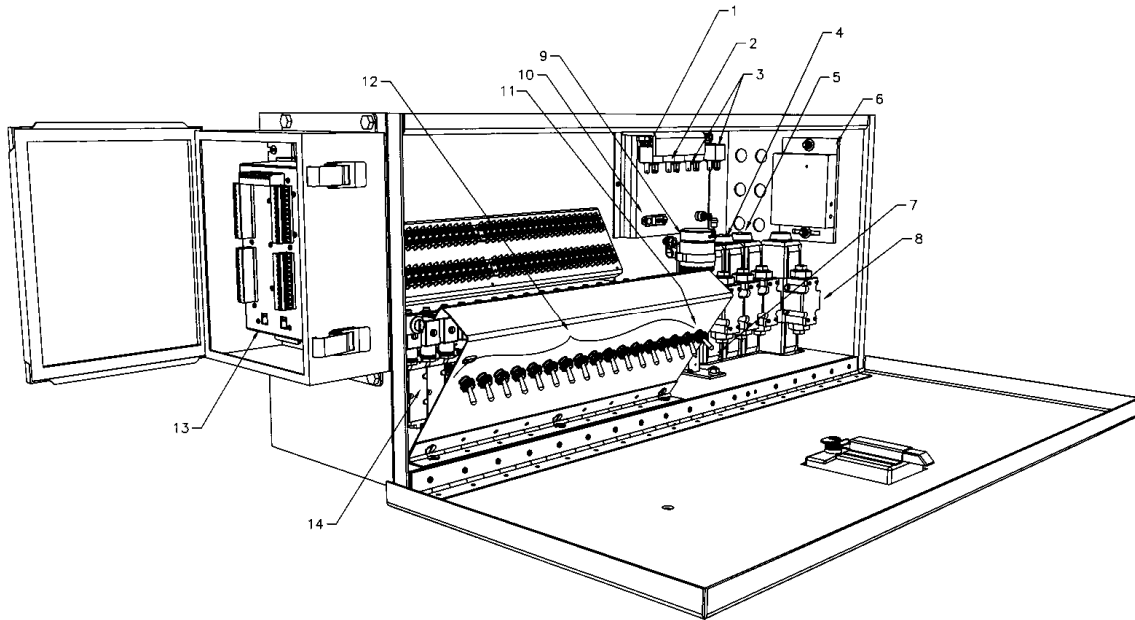


Figure 1-5. Gate Control Valve Box Interior (Early)

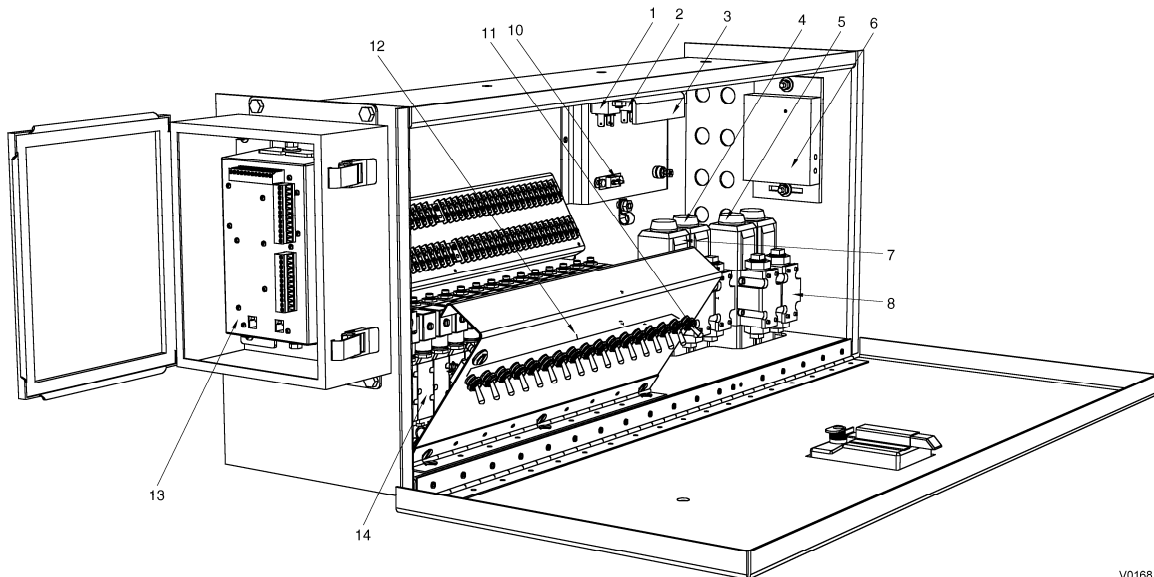


Figure 1-6. Gate Control Valve Box Interior (Late)

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Computerized Rate Control (CRC)

Model 2002/CRC employs an on-board computer working with appropriate sensors to provide fully automatic control of the aggregate flow at all times. Accuracy is assured for sand, rock, or any kind of coated or uncoated aggregate material. The computerized control system performs the following functions:

- Constantly measures the actual rate at which aggregate is being delivered
- Correlates the actual rate with the travel speed of the spreader
- Compares the actual flow rate to the rate selected by the operator

The computer then uses the information obtained from these three sources (actual aggregate flow, vehicle speed and desired aggregate flow rate) to maintain the desired rate at all times by automatically adjusting the flow through the gates of the chip box.

Because the computer constantly monitors the speed of the vehicle, automatic rate control is maintained regardless of speed variations such as can be encountered when the spreader moves up or down a grade or when accelerating or decelerating. Control is also constant whether the spreader is moving forward or backward.

It is important to note that the computerized control system responds instantaneously to changes in vehicle speed or to the selection of a different spread rate by the operator. Therefore, there is never any lag time. The actual rate at which aggregate is laid on the surface is always instantly maintained at the selected level required.

Changes in the width of the spread pattern, as for tapered areas, are accomplished by pressing the appropriate switches on the computer control panel. The corresponding gates are instantly closed, and the spread width varies accordingly. The operator does not need to leave his position to make these changes.

Regardless of the spread width selected or the changes made during a run, the spread rate is automatically maintained at the selected level of aggregate distribution.

Chassis

The chassis members are channel steel, bolted rather than welded, for maximum repairability. The length of the chassis, as shown in Figure 1-7, permits a wheelbase of 150 inches. This length, in combination with rubber spring suspension on the front axle, assures smooth, steady control.

The chip box is 10 feet wide when fully contracted and 16 feet wide when fully expanded.

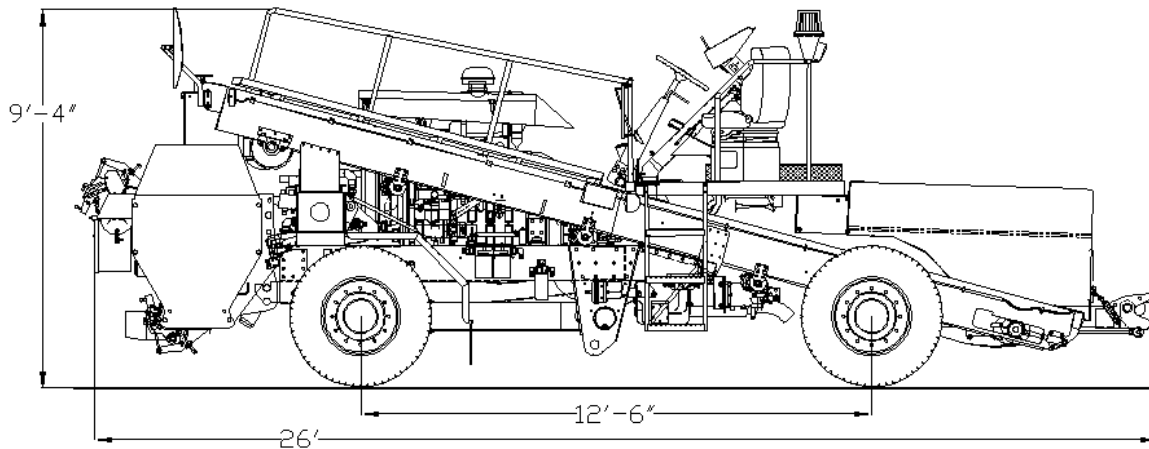


Figure 1-7. Chassis Dimensions

Hydraulically Powered Remote Control Hitch

The hydraulically operated hitch provides positive hooking and unhooking in any of a wide range of relative positions and angles of the Chip Spreader and the dump truck. The hitch is actuated through a switch on the operator's control panel.

NOTE: The hitch height is also adjustable from the operator's control panel.

Table 1-2. Specifications

Hydrostatic Drive System	
Type	Front-wheel drive, closed-loop feedback control system
Transmission	Axial piston high torque hydrostatic pump directly coupled to engine; hydraulic motor drives axle through 4-speed auxiliary truck transmission
Operating Modes	1 st (0-400 FPM) 2 nd (0-750 FPM) 3 rd (0-1300 FPM) 4 th (0-1600 FPM) (18 MPH) NOTE: The unit will pull a fully loaded 15-cubic yard dump truck up a 12% grade from a dead stop.
Diesel Engine	Cummins C-8.3 liter, turbocharged, with electric start, alternator, dual batteries, dry-type air cleaner and variable speed governor
Frame	Main: 10 1/2 in. X 3 in. channels Cross members: 10 in. X 3 in. channels
Rear Axle	
Type	Solid trailer axle (5 in. diameter tube)
Rating	25,000 lb
Front Axle	
Type	Drive/steering axle with planetary gear hubs, over-all 17.1 to 1 reduction, 42° steering angle; rubber spring suspension; 20,000 lb rating
Steering	
Type	Hydraulically powered orbital



Table 1-2. Specifications

Control	Hand wheel; no mechanical linkage
Brakes	
Front	Wet disc, air over hydraulic
Rear	16.5 in. X 7 in. drum S-cam air brake, Anchorlok parking brake
Wheels	Disc, front and rear interchangeable
Tires	Truck type, 22.5 X 15R, highway tread
Positive Lock Hitch	
Type	Hydraulically powered, positive grab and release
Adjustment Range	8 in. to 20 in. height, 6 in. fore and aft
Hydraulic System	
Type	Variable-volume, pressure compensated piston pump
Drive	Engine crankshaft
Configuration	Independent circuits for each conveyor and box function
Reservoir	60-gallon capacity, two 10-micron absolute return filters
Cooling	Hydraulically driven oil cooler with total return flow capacity
Power Steering	Engine-mounted vane pump feeding twin load-sensing closed-center steering valves (excess pump flow powers positive lock hitch)
Receiving Hopper	
Width	10 feet (305 cm)
Struck Capacity	4.0 cubic yards (3.06 cubic meters); includes rubber skirting to prevent spilling
Chip Box	
Width	Variable; 10 feet to 16 feet in 6-inch increments
Capacity	3.5 cubic yards at 16 feet width
Spread Width Range	6 inches to 16 feet
Spread Rate Range	1-80 lbs per square yard
Spread Rate Control	Computer controlled CRC system
Grade Compensation	Automatic leveling (manual override) to maintain constant spread rate regardless of road grade
Cut-Off Gates	Electro-pneumatic powered; 6 inches and 12 inches wide; infinite gate opening adjustment and preset capability from operator's station
Conveyors	
Belt Width	30 inches
Trough Angle	30°
Belt Rating	4-ply
Drive	Independent hydraulic motors
Motion Control	By solenoid valves through chip box-mounted level sensors
Conveyor Protection	Lined on each side; self-cleaning tail pulleys and return rollers; hooded deflectors at each head pulley



Table 1-2. Specifications

Operator's Station	Left-hand and right-hand adjustable cushioned seats with adjustable suspension; left-hand and right-hand adjustable tilt steering wheels; swing-over control/instrument panel with brake pedal and speed control
Controls and Instruments	
Operator's Panel	Controls - ignition switch, hitch, spread width and rate controls, parking brake, diverter, conveyor belts, transmission shifter, engine throttle; lockable covers included Instruments - fuel, hydraulic temperature, engine temperature, engine RPM, hour meter, oil pressure, charging system voltage, air pressure
Miscellaneous	
Empty Weight	20,540 lbs
Additional Equipment	60-gallon fuel tank; deck-mounted tool boxes under seats; ladders on each side; safety handrails; electric backup alarm; warning horn
Over All Dimensions	With 10-foot chip box and standard tires
Length	23 feet 11 inches
Width	10 feet
Height	9 feet 4 inches
Turning Radius	20 feet
Ground Clearance	10 inches
Wheel Base	12 feet 6 inches (150 inches)
Tread	
Front	91 inches
Rear	108 inches
NOTE:	As part of a continuing program of product improvement, BearCat Mfg., Inc. reserves the right to make changes in Model 2002/CRC specifications at any time.



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SECTION 2. SAFETY PRECAUTIONS

Personal Safety

Persons responsible for the operation and maintenance of BearCat Chip Spreaders should read the following safety precautions and the remainder of this manual carefully before operating the equipment.

WARNING: ALWAYS REMEMBER THAT CHIP SPREADING MACHINES CAN BE DANGEROUS. THEY CONTAIN EXPOSED MOVING PARTS AND BELTS, AND THEY MOVE LARGE AMOUNTS OF ABRASIVE MATERIAL AT HIGH SPEED. THE HYDRAULIC SYSTEM OPERATES AT HIGH PRESSURE AND THE FLUID AND LINES CAN REACH HIGH TEMPERATURES. YOU MUST HANDLE THIS MACHINE CAREFULLY TO PROTECT YOURSELF FROM PAINFUL OR EVEN FATAL INJURY. HAZARDS ASSOCIATED WITH THIS MACHINE, AND THE NECESSARY PRECAUTIONS TO AVOID DANGER, ARE GIVEN IN THIS MANUAL.

Safety Rules

Read each safety rule and make them a part of your daily work routine.

WARNING: FOLLOW THESE PRECAUTIONARY INSTRUCTIONS EXACTLY. DO NOT TAKE SHORTCUTS. DO NOT ASSUME THAT SOMEONE ELSE HAS ACTED ON YOUR BEHALF. FAILURE TO FOLLOW THESE SAFETY RULES CAN RESULT IN DEATH OR SERIOUS INJURY. IF ANY RULE OR PRECAUTION IS NOT CLEAR TO YOU, SEE YOUR SUPERVISOR BEFORE USING THE MACHINE.

- Keep clear of all moving parts.
- Stay out of the chip box when the diesel engine is running.
- Keep hands away from gates when connecting air hoses.
- Use caution around conveyor belts. They can start automatically.
- Keep clear of rear handrail. Contact with a dump truck tailgate is possible.
- Keep clear of the hitch. You could be injured if it actuates against any part of your body.
- Engage the parking brake and place both the mechanical transmission and the hydrostatic transmission in neutral before leaving the machine.
- Stop the engine before crawling under the machine.
- Keep the surface of the hydraulic oil cooler clear of obstructions.

NOTE: BearCat Manufacturing assumes no liability for accident or injury incurred through improper use of this equipment.



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SECTION 3. PREPARING EQUIPMENT FOR USE

This section contains information the operator must know in order to prepare the Model 2002/CRC Chip Spreader for safe and proper spreading operations.

WARNING: OPERATORS MUST READ AND UNDERSTAND THIS MATERIAL BEFORE ATTEMPTING TO USE THE MACHINE. FAILURE TO FOLLOW THESE OPERATING INSTRUCTIONS MAY RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.

CAUTION: THE INITIAL CHECKOUT PROCEDURES GIVEN BELOW ARE MINIMUM REQUIREMENTS. FAILURE TO PERFORM THESE STEPS CAN RESULT IN DAMAGE TO THE EQUIPMENT AND UNSAFE OPERATING CONDITIONS.

Initial Checkout of Machine

1. Make sure all fluid levels are adequate.

NOTE: Use Conoco Hydraulic 32 oil if the hydraulic system or the brake master cylinder level is low.

- A. Hydraulic fluid – the sight glass is located behind the left front fender brace.
- B. Brake master cylinder – located on the left side of the engine.
- C. Engine oil – the dipstick is located on the left side of the engine.

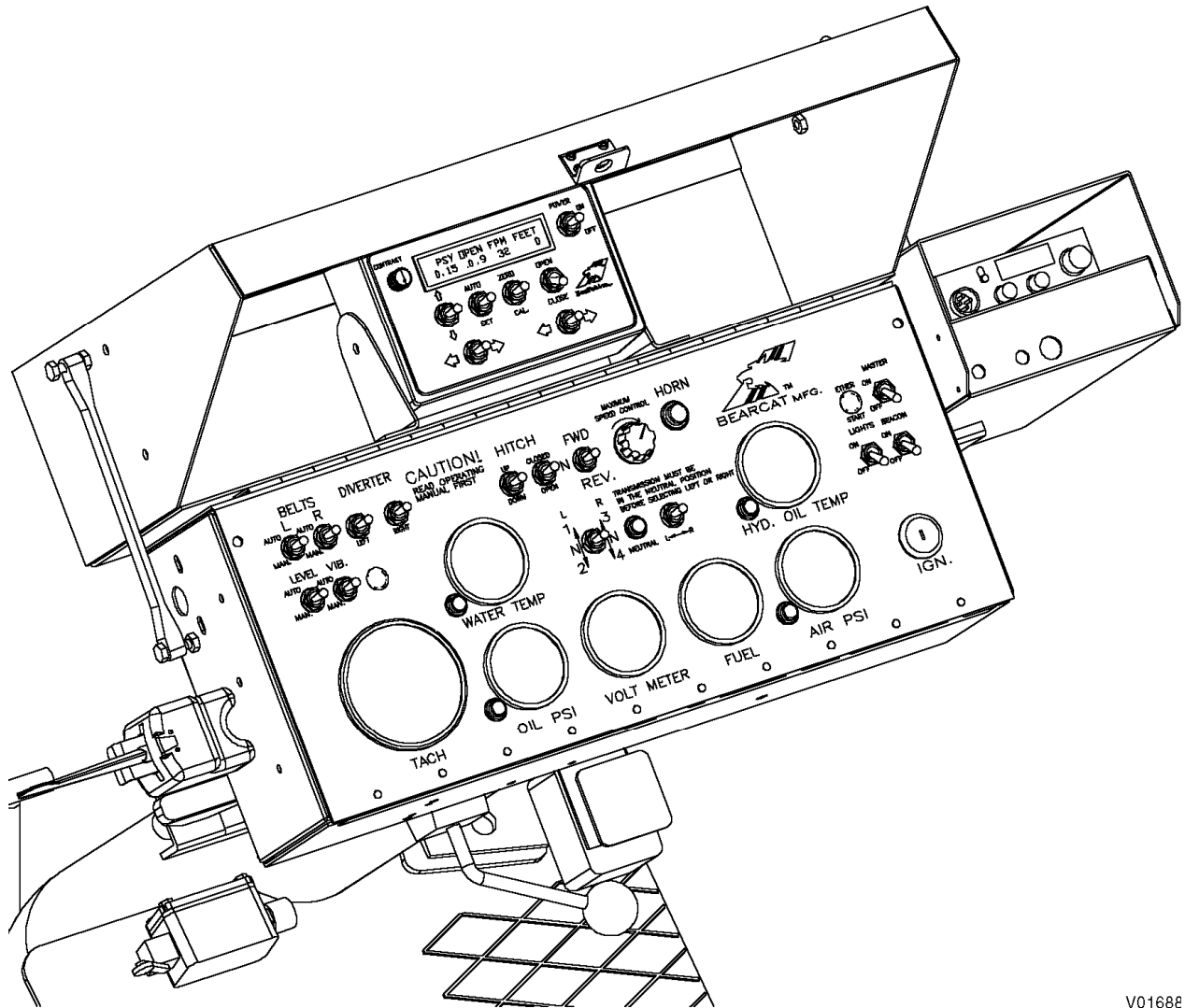
WARNING: RADIATOR SHOULD BE COOL TO THE TOUCH PRIOR TO REMOVING RADIATOR CAP. ESCAPING STEAM OR HOT LIQUID MAY OTHERWISE CAUSE BURNS.

- D. Radiator coolant – check the fluid level at the radiator cap.
2. Check the hydraulic line filters.

NOTE: If the gauge readings exceed 10 inches when the fluid is warm, replace the associated filter element.
 3. Visually inspect the tires, hoses, fittings and belts.
 4. Make sure the receiving hopper is filled with the appropriate aggregate for the job.
 5. Make sure the chip box diaphragm switches are extended to the outer end of the chip box extensions.

Control Panel Switches

Operators should thoroughly understand the functions of all of the control panel switches as pictured in Figure 3-1 and listed in Table 3-1.



V01688

Figure 3-1. Control Panel

Table 3-1. Control Panel Switches

Switch	Function
LF. BELT	AUTO: ON position enables the left belt to run until the chip box diaphragm switch turns it off. OFF: The belt is off. MAN: Manually runs the belt.
RT. BELT	AUTO: ON position enables the right belt to run until the chip box diaphragm switch turns it off. OFF: The belt is off. MAN: Manually runs the belt.
LF. DIVERTER	Moves the left belt's aggregate diverter left and right.
RT. DIVERTER	Moves the right belt's aggregate diverter left and right.
HITCH	OPEN: Used to open the hitch. CLOSED: Used to close the hitch.
HITCH LIFT Optional Equipment	UP: Moves the hitch up. DOWN: Moves the hitch down.
FWD / REV.	Selects the forward, neutral or reverse function of the hydrostatic drive.
MAXIMUM SPEED CONTROL	Variable speed control for hydrostatic drive. Used to adjust FPM rate of spreader. Turn knob CW to increase speed, turn knob CCW to decrease speed.
MASTER	Manually controls the air cylinders that operate the gates. Must be ON for any gate to open in CRC operation.
LEVEL	AUTO: Enables automatic tilt/leveling of the chip box to compensate for differences in grade. MAN: Manually tilts chip box. Used to manually tilt chip box back for towing.
VIB	AUTO: Vibrator is ON when the gates open and OFF when the gates close. OFF: Vibrator is OFF at all times. ON: Vibrator is ON.
TRANSMISSION GEAR SELECT CONTROLS	Switches used to select manual transmission gears. Control pneumatic cylinders on remote shift assembly. The neutral light indicates when transmission is in neutral position. See Section 4, Operating Instructions, for transmission gear select procedures.
LIGHTS	ON: Turns work, tail, and clearance lights on. OFF: Turns lights off.
BEACON	Turns warning beacon on and off.
IGNITION	Used to control spreader engine ignition system.

Computer Controls

Operators should thoroughly understand the computer controls and functions, which are listed in Figure 3-2 thru Figure 3-7 and Table 3-2 thru Table 3-5.

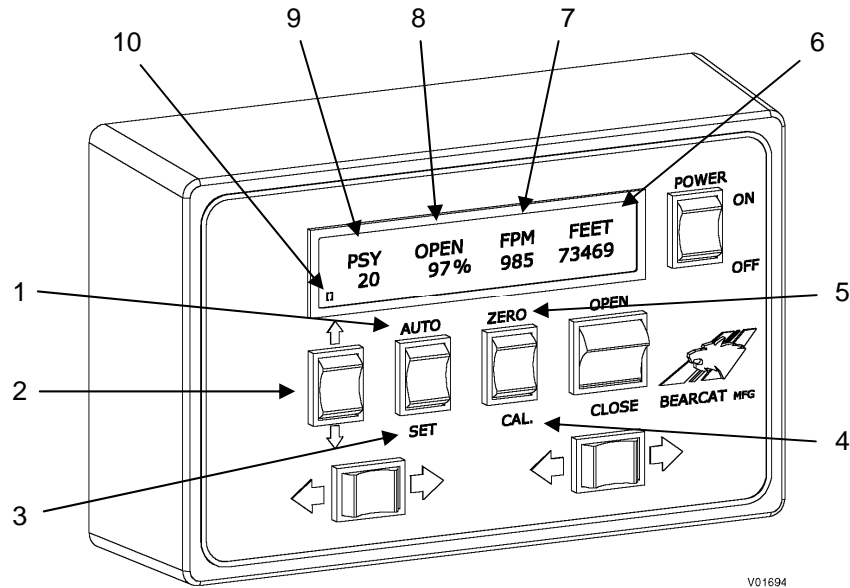


Figure 3-2. Computer Controls (Early) – View 1

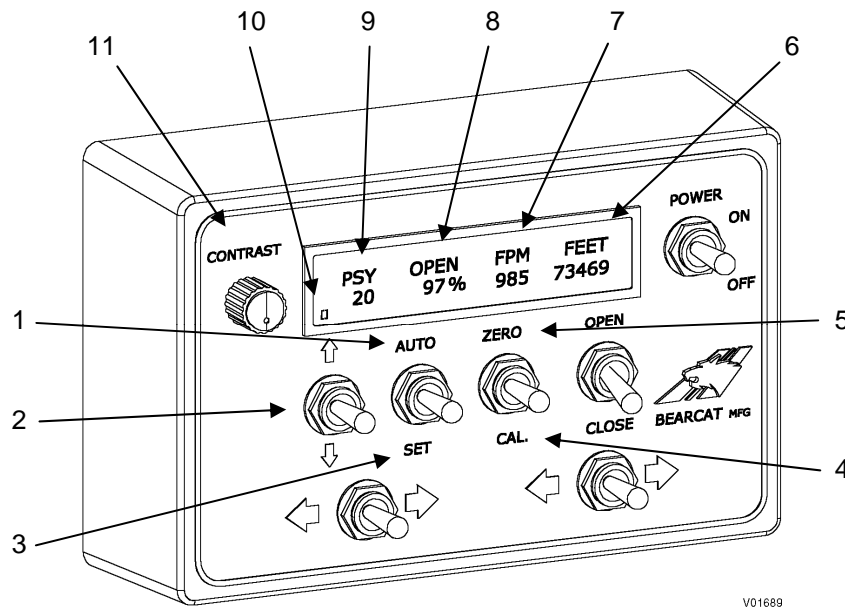


Figure 3-3. Computer Controls (Late) – View 1

Table 3-2. Control Functions for Figure 3-2 and Figure 3-3

Number	Control	Function
1	AUTO	Used to change from CRC to manual rate control. The default setting is CRC. To control the cam manually, press and hold the AUTO switch for 5 seconds. The PSY will disappear on the screen and the Rate Control Switches will now control the cam openings (speed variations will no longer affect the cam opening). To return to CRC, press and hold the AUTO switch again for 5 seconds, the PSY will reappear and the computer will resume control of the cam opening.
2	↑ ↓ (Rate Select Switch)	Used to change the PSY or spread rate.
3	SET	Used in all computer functions to save a setting.
4	CAL	Used to calibrate the spread rate and the footage. The computer must be calibrated when there is a change in aggregate size and weight. DO NOT confuse this with spread rate. Once the computer is calibrated for a particular aggregate, the spread rate can be changed at any time. Press and hold the switch for 5 seconds for aggregate calibration mode. Press it again in aggregate calibration mode for footage calibration.
5	ZERO	Resets the FEET to zero (press and hold for 5 seconds to clear the distance measurement).
6	FEET	Indicates the distance covered while spreading (it does not calculate width); it starts measuring when any gate is open; this number continually keeps track of the total distance spread, which will be reset to zero when the machine is shut off.
7	FPM (MPM)	Indicates the travel speed.
8	OPEN	Indicates the cam position; the cam controls how much the gates open. The computer controls the cam in relation to ground speed and desired rate.
9	PSY (KgSM)	Use the Rate Select Switch to change the application.
10	:	Indicates a break in communication between the master computer and the slave unit (check computer connection).
11	CONTRAST (late model only)	Used to increase or decrease the computer control panel display contrast. Adjust display for different lighting conditions.

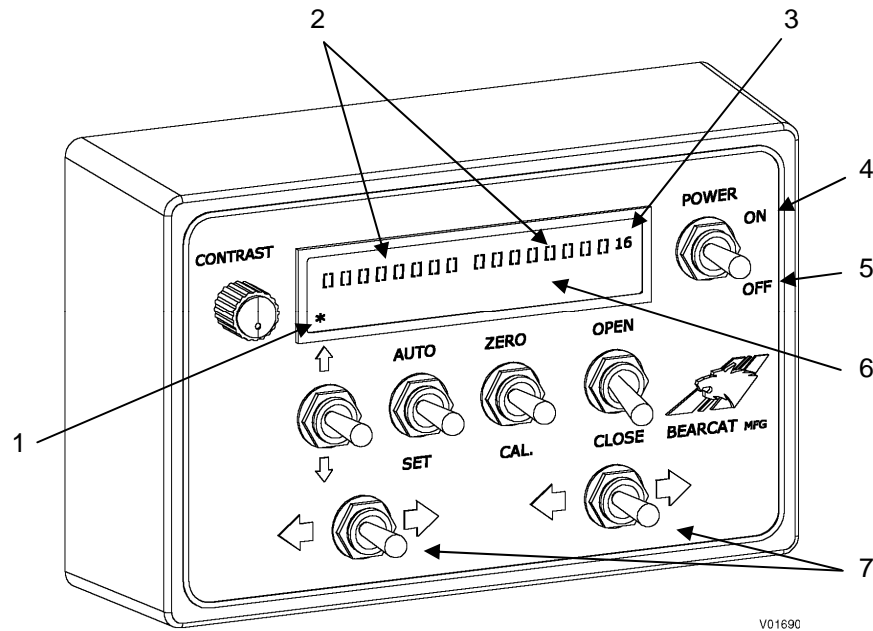


Figure 3-4. Computer Controls – View 2

Table 3-3. Control Functions for Figure 3-4

Number	Control	Function
1	ρ	Indicates the selected gates are open (the star disappears when the selected gates are closed).
2	GATE SELECTION INDICATOR	Indicates which gates are selected to open. Each black square represents a gate on the front chip box.
3	GATE COUNT	Indicates how many gates are open (spread width).
4	ON	Opens all selected gates.
5	OFF	Closes all gates.
6	DISPLAY	Changes to the current view whenever a GATE SELECTION, ON or OFF switch is pressed (after several seconds the display will change back to the original view).
7	← → ← → (Gate Select Switches)	Used to select which gates will open. These switches can also be used to control spread width while spreading.

The gate select switches can also be used to control spread width while spreading. Figure 3-5 shows several spread pattern examples.

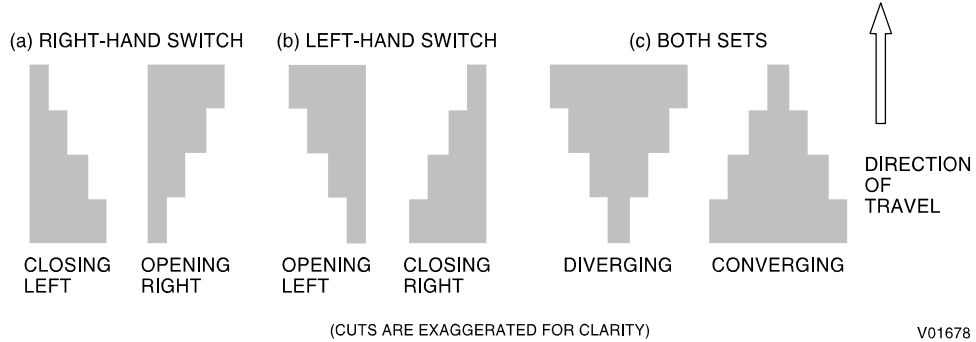


Figure 3-5. Examples of the Use of Computerized Gate Controls

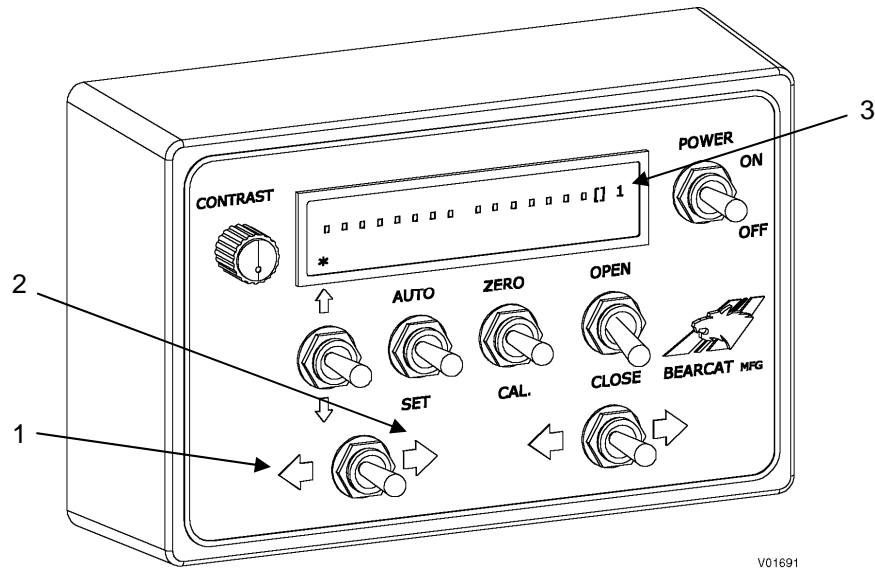


Figure 3-6. Computer Controls – View 3

Table 3-4. Control Functions for Figure 3-6

Number	Control	Function
1	← (Gate Select Switch)	Re-selects or opens gates from a previous selection.
2	→ (Gate Select Switch)	Pressing this switch repeatedly closes the gates from left to right. Note: The OPEN INDICATOR (ρ) is not visible, indicating that all gates are closed and you are just making a gate selection.
3	GATE COUNT	Indicates the number of gates selected (in this case, only one gate is selected).

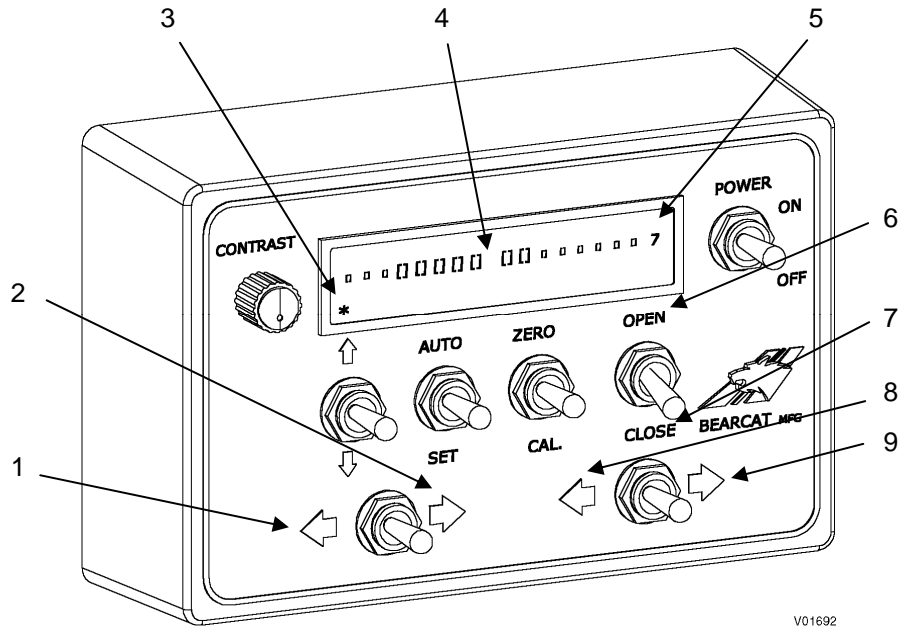


Figure 3-7. Computer Controls – View 4

Table 3-5. Control Functions for Figure 3-7

Number	Control	Function
1	← (Gate Select Switch)	Re-selects or opens gates from a previous selection.
2	→ (Gate Select Switch)	In this example, closes or de-selects gates from the left to the middle.
3	ρ	Shows selected gates are open.
4	CENTER SPACE	Shows the middle of the chip box and is also an Open Indicator.
5	GATE COUNT	Indicates the number of gates selected (7 gates in this example).
6	OPEN	Opens all selected gates.
7	CLOSE	Closes all gates.
8	← (Gate Select Switch)	In this example, closes or de-selects gates from the right to the middle.
9	→ (Gate Select Switch)	Re-selects or opens gates from a previous selection.

Setting Chip Box Width

WARNING: THE VALVE ON THE CHIP BOX AIR TANK MUST BE CLOSED WHILE PERFORMING THE FOLLOWING PROCEDURE. ALWAYS KEEP YOUR FINGERS CLEAR OF THE AGGREGATE GATES. IF A GATE SHOULD CLOSE UNEXPECTEDLY, SERIOUS PERSONAL INJURY MAY RESULT.

1. Toggle the chip box extension switch in the direction you want the chip box extension to move, as shown in Figure 3-8 and Figure 3-9. Expand the chip box far enough to accept the desired number of gates.

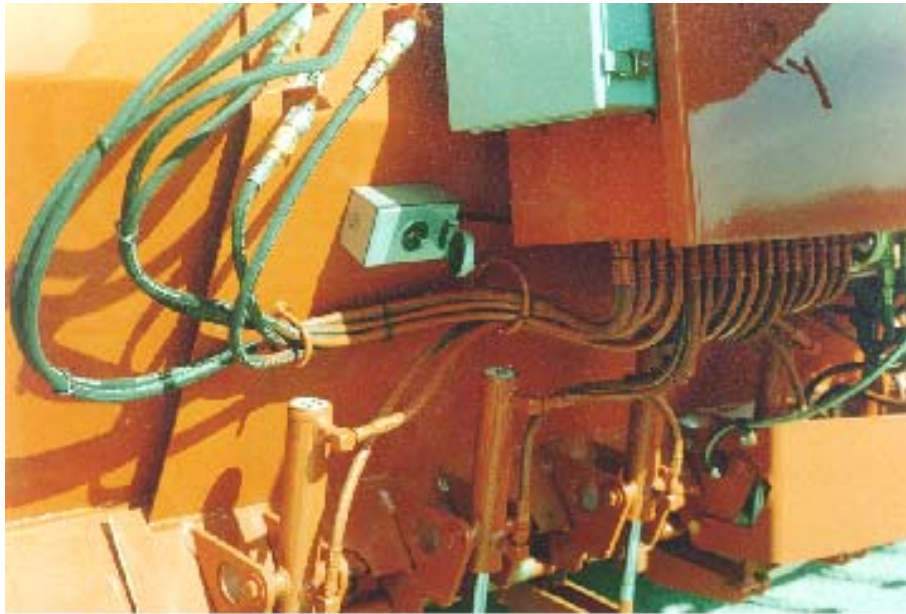


Figure 3-8. Location of Chip Box Extension Switch



Figure 3-9. Expanding the Chip Box

2. Remove the appropriate gate from the storage rack. See Figure 3-10.



Figure 3-10. Gate Storage

3. Hang the furnished gate chain from the hook on the chip box. The use of the chain will simplify positioning and installing the gate. See Figure 3-11.



Figure 3-11. Gate Hooks

4. Work the gate flange under, up and around the chip box edge as shown in Figure 3-12, Figure 3-13 and Figure 3-14.



Figure 3-12. Hanging the Gate



Figure 3-13. Gate Positioning



Figure 3-14. Adjusting the Gate

5. Slide the gate towards the outside of the chip box until the gate stops touch. Close the gate clamps. The adjusting nuts (see Figure 3-15) on each clamp permit a snug fit.

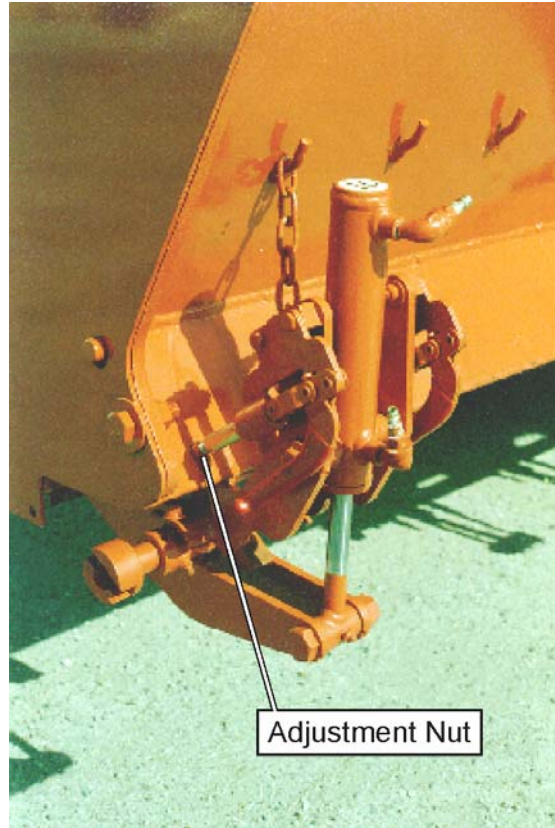


Figure 3-15. Gate Adjustment Nut

6. Add extension gates as needed, a maximum of three on each end. Work from the outside of the chip box towards the middle. See Figure 3-16 and Figure 3-17.

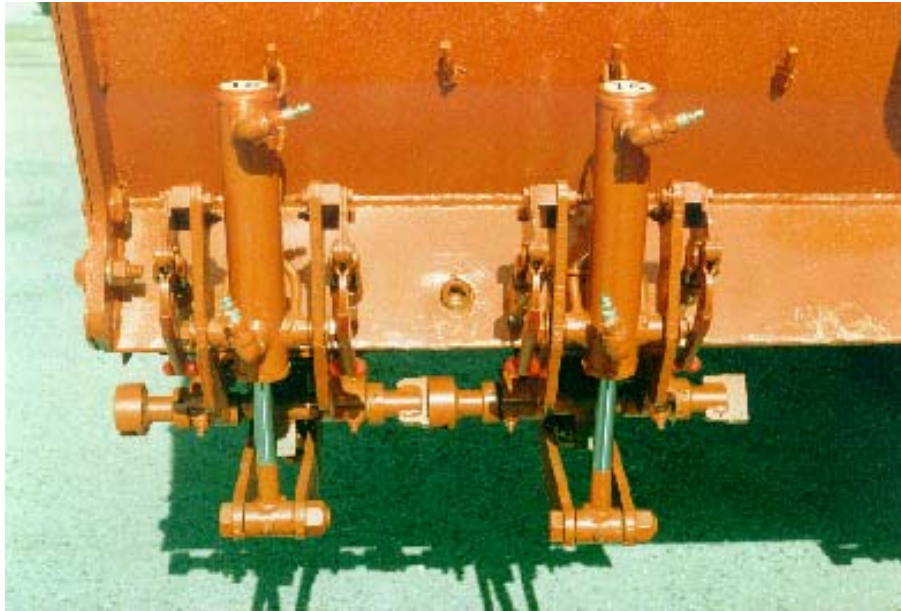


Figure 3-16. Additional Gates on the Outside of the Extension



Figure 3-17. Adding the Inside Additional Gate

WARNING: KEEP CLEAR OF ALL MOVING PARTS. THE CHIP BOX EXTENSION IS HYDRAULICALLY ACTUATED. IMPROPER OR UNSAFE OPERATION MAY CAUSE SERIOUS PERSONAL INJURY.

CAUTION: BE CAREFUL AS YOU CLOSE THE EXTENSION. THE GATE STOP MUST ONLY TOUCH THE MAIN CHIP BOX BUT NOT PRESS HARD AGAINST IT. OVERCLOSING THE CHIP BOX EXTENSION WITH THE GATES ATTACHED CAN FORCE THE GATES OFF THE BOX, RESULTING IN SEVERE DAMAGE TO THE GATE CLAMPS.

7. Close the chip box extension with the chip box extension switch as shown in Figure 3-18.



Figure 3-18. Closing the Chip Box Extension

8. Align the extension gate cam connector with the main chip box cam connector as you close up the extension. See Figure 3-19, Figure 3-20 and Figure 3-21.



Figure 3-19. Aligning the Extension Gate Cams



Figure 3-20. Proper Gate Cam Alignment

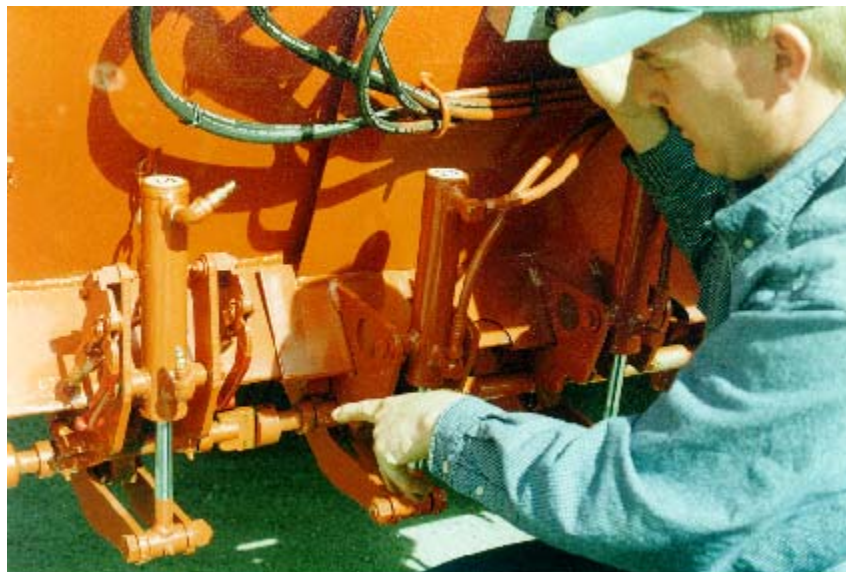


Figure 3-21. Closing the Extension

WARNING: KEEP HANDS AND LEGS CLEAR OF GATE MECHANISMS WHEN CONNECTING AIR HOSES. ONE OF THE AIR HOSES IS ALWAYS PRESSURIZED. DEPENDING UPON ITS POSITION, THE GATE COULD ACTUATE CAUSING BODILY INJURY.

9. Ensure all manual gate control switches located in the valve box are in the down (off) position prior to connecting air hoses to gates.
10. Ensure the computer is switched off and the air supply is closed prior to connecting air hoses to gates.

NOTE: Hoses are tied together in pairs – two hoses for every gate. The hoses are marked for the appropriate gates. The short hose of the pair goes on the top of the gate and the longer hose on the bottom.

11. Attach the air hoses to the gate as shown in Figure 3-22 and Figure 3-23. Attach the hoses in order, starting from the gate closest to the main chip box extending out, with any unused hoses being for the outer gates.



Figure 3-22. Attaching the Short Air Hose



Figure 3-23. Attaching the Long Air Hose

12. Open air supply.
13. Test the extension gates for free movement using the manual gate control switches located in the valve box. See Figure 3-24 and Figure 3-25.

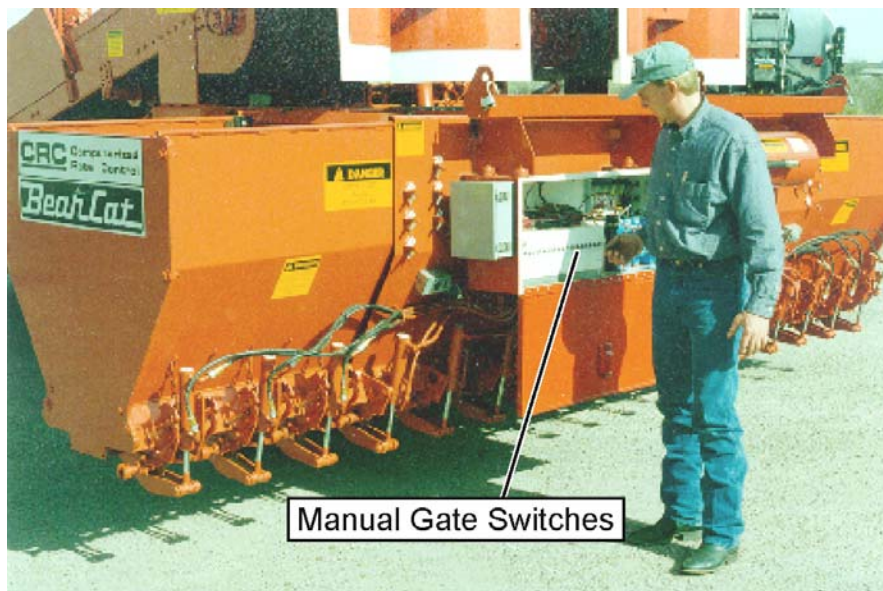


Figure 3-24. Manual Gate Switches



Figure 3-25. Testing the Gate Operation

14. Fill the chip box and perform the WEIGHT CALIBRATION and DISTANCE CALIBRATION procedures.

Weight Calibration

WARNING: POTENTIALLY LIFE-THREATENING HAZARDS MAY EXIST DURING EQUIPMENT OPERATION. ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO OPERATE, SERVICE, OR MAKE ADJUSTMENTS TO THE BEARCAT EQUIPMENT.

Proper weight calibration ensures the computer controlled aggregate gates are opening to the exact extent required to deposit the specified amount of aggregate, under all operating conditions.

This procedure should be performed on a level surface, after the installation of any additional chip box gates.

NOTE: It is not necessary to perform the weight calibration with all gates open. Select a spread width that allows the operator to cover the canvas (4 to 6 feet).

This weight calibration should be carried out whenever the aggregate material is changed to one of a different type or from a different source.

1. Fill the chip box with the new aggregate.
2. Place the yard-square piece of canvas (furnished) on the scale provided and set the scale to zero.
3. Lay the canvas out flat on level ground.

4. Switch the CRC unit ON and use the controls to enter the PSY (pounds per square yard) value desired for the job.
5. Switch the following functions on:
 - CHIP BOX LEVEL (set to level position and turn off)
 - R and L BELTS
 - MASTER
 - VIBRATOR (if it will be used on the job)
6. With the engine running at 1800-2000 RPM and the transmission in first gear, drive the machine as follows:
 - A. Set the SPEED control fully CCW and the FWD-REV switch to FWD.
 - B. Press the foot pedal down.
 - C. Turn the SPEED control CW. The machine will begin moving after about three full turns. Turn the control to obtain the approximate expected spreading speed for the job.
7. Drive toward the canvas square. Position the gate switch to OPEN to begin spreading just before reaching the canvas square (you must be traveling at the required speed for the job).
8. After passing over the canvas, position the gate switch to CLOSE and stop the machine by releasing the foot pedal.
9. Use the scale to weigh the canvas with the deposited aggregate.
10. If the actual weight differs from the value entered in Step 4, press and hold the CAL switch (refer to Figure 3-26). The display will instruct you to enter the *actual* weight of the aggregate sample.
11. Use the “↑↓” controls to enter the actual weight.
12. Press the SET switch. The display will show the PSY value entered in Step 4.

NOTE: If the difference between the entered PSY and the actual weight is large, a second calibration run may be necessary. In that event, repeat Step 6 thru Step 12.

Distance Calibration

Proper distance calibration ensures the correlation between machine ground speed and chip spreading density is accurately maintained through the distance-measuring circuits in the CRC computer.

This procedure should be performed once in each operating season. It is not necessary that the receiving hopper or chip box be filled.

1. With the engine running and the SPEED control fully CCW, turn on the CRC computer. Refer to Figure 3-1 and Figure 3-26 for the control locations.

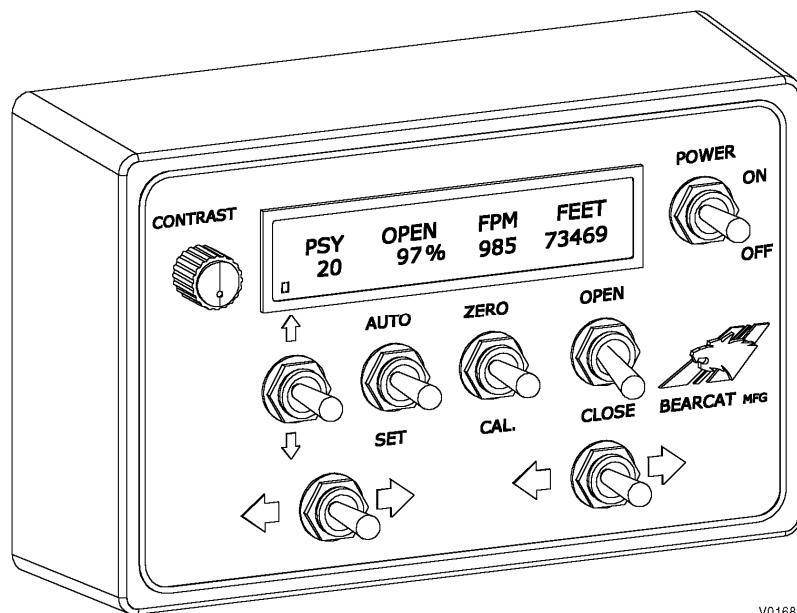


Figure 3-26. Computer Display During Distance Calibration

2. Press ZERO to zero the FEET display.
3. Set the FWD-REV switch to FWD, press the foot pedal all the way down and turn the SPEED control CW until the display indicates approximately 300 FPM.
4. Position the gate switch to OPEN and drive a carefully measured distance of 1000 ft.
5. At exactly 1000 ft, position the gate switch to CLOSE and stop the machine by releasing the foot pedal. The FEET display should now read approximately 1000.
6. Press and hold CAL twice, holding the switch down approximately five seconds each time.
7. Press “↑↓” to lower the displayed FEET value or to raise it, until it reads 1000.

8. When the display reads 1000, press SET. The distance calibration is now complete. The machine is in the normal operating mode.
9. Note the new distance (footage) calibration number and enter it on the title page of this manual. The computer control can be reset to this number if the box is replaced or the number is changed. If this number is used, the unit will not require a complete distance calibration.

Operator Station Adjustments

Control Panel

The control panel is moved to the left or right operator's station by pulling the spring-loaded pin at the base and rotating the assembly to either position. Lock the control panel in place with the pin. Because it may be necessary to operate the spreader from both sides, set up both stations comfortably.

Bi-View Mirrors

Optional bi-view mirrors are designed to give the operator a view of the blind side of the machine, the level of aggregate in the end of the chip box, and the level of aggregate in the center of the chip box. The mirror opposite to the operator's position gives a view of the blind side and the end of the chip box. The mirror on the same side of the operator gives a view of the center of the chip box.

Hitch Adjustments

Height

The hitch can be adjusted up and down using the chains. Pick the hitch up with one hand and move the links in or out of the slots, as desired.

NOTE: An optional hitch lift can be adjusted from the control panel.

Fore and Aft

The fore and aft adjustments are located between the conveyor rails underneath the chipper. Pull the spring pin and remove the bolt. There are four holes for adjustment.

NOTE: Be sure to replace the bolt, nut and spring pin.

Chip Spreader Hitch Bar Requirements

The location and measurements required to position the chip spreader hitch bar on the aggregate supply truck are shown in Figure 3-27. Figure 3-28 shows an example of the hitch bar. The exact positioning of the hitch bar is necessary for consistent aggregate flow to the receiving hopper without unnecessary spillage.

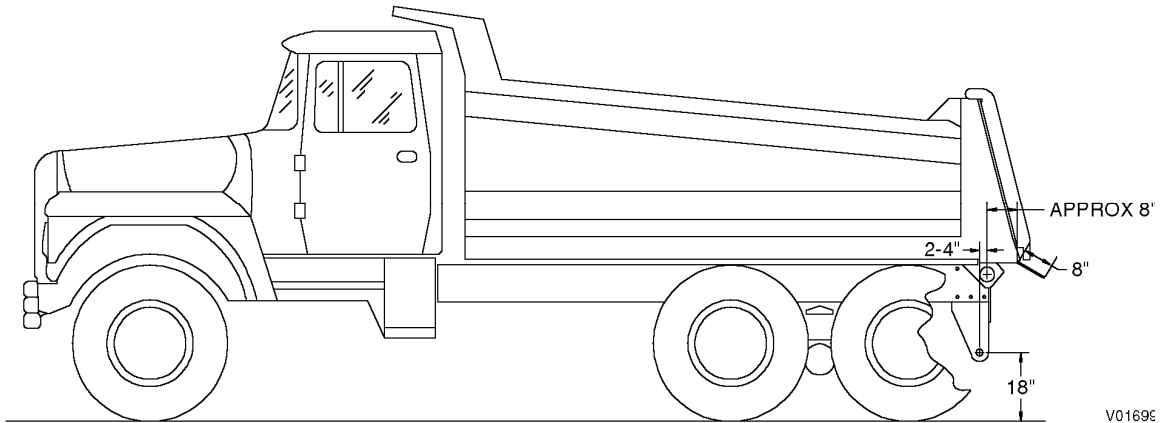


Figure 3-27. Hitch Bar Location on Dump Truck

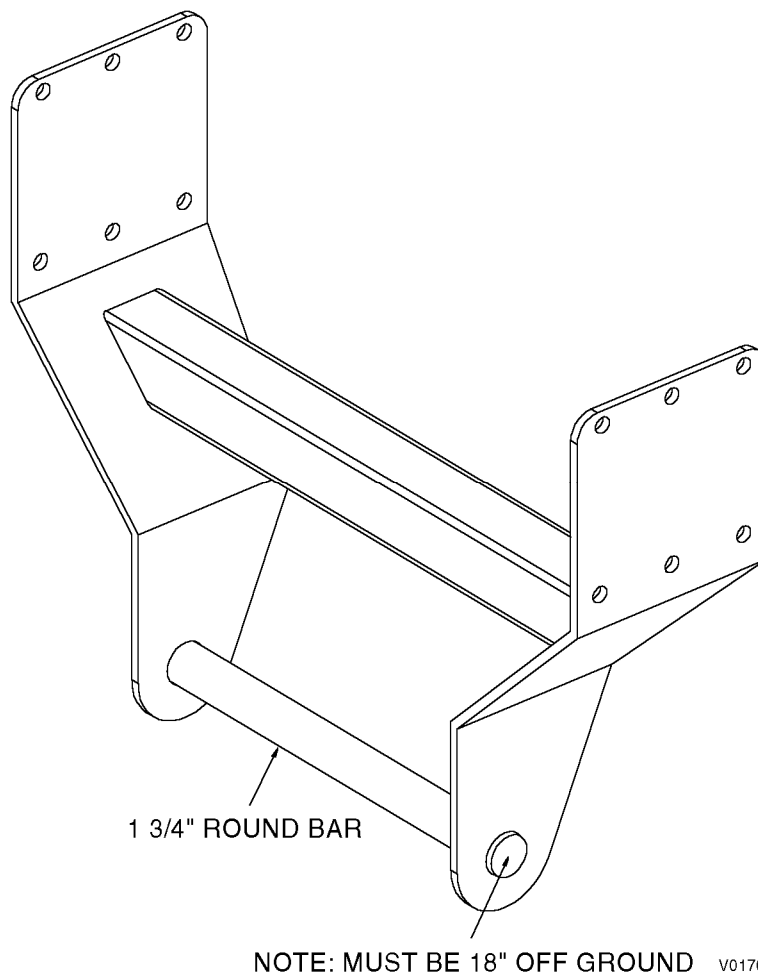


Figure 3-28. Typical Hitch Bar

SECTION 4. OPERATING INSTRUCTIONS

Mechanical Startup

Before starting the Chip Spreader, complete the fluid checks and visual inspection described under SECTION 3. PREPARING EQUIPMENT FOR USE.

WARNING: YOUR CONTINUED GOOD HEALTH AND EVEN YOUR LIFE MAY DEPEND ON FOLLOWING THE RULES OF OPERATION SET FORTH IN THIS MANUAL. ALWAYS REMEMBER THAT CHIP SPREADING MACHINES CAN BE DANGEROUS. THEY CONTAIN EXPOSED MOVING PARTS AND BELTS, AND THEY MOVE LARGE AMOUNTS OF ABRASIVE MATERIAL AT HIGH SPEED. THE HYDRAULIC SYSTEM OPERATES AT HIGH PRESSURE AND THE FLUID AND LINES CAN REACH HIGH TEMPERATURES. YOU MUST HANDLE THIS MACHINE CAREFULLY TO PROTECT YOURSELF FROM PAINFUL OR EVEN FATAL INJURY. HAZARDS ASSOCIATED WITH THIS MACHINE AND THE NECESSARY PRECAUTIONS TO AVOID DANGER ARE GIVEN IN THIS MANUAL.

1. Set the following controls as specified:
 - SET PARKING BRAKE (PULL)
 - R and L BELTS (OFF)
 - FWD-REV NEUTRAL
 - T-HANDLE
START UP VALVE (PULL)
 - RELEASE THROTTLE (PULL UP)
2. Start the engine and use the hand throttle to set it at 1000 RPM. Push the T-handle start up valve back. Once the air pressure builds up to approximately 100 PSI, shift the mechanical transmission to neutral.
3. Set the chip box to the desired width (in the computer).
4. Set the following controls as specified:
 - MASTER ON
 - BOX LEVEL AUTO
 - R and L BELTS AUTO
 - VIBRATOR (if needed) AUTO
5. Use the “↑↓” computer controls to enter the PSY or KgSM value desired for the job. The PSY or the KgSM may be adjusted during the run if necessary.
6. Release the parking brake.

Operation

Drive the Chip Spreader as follows:

1. Set the FWD-REV switch to the desired direction.
2. Turn the SPEED control CW approximately ten turns, until it stops.
3. Select a gear in the transmission.

NOTE: The shifter switches on the control panel operate pneumatic valves that control two air cylinders. The air cylinders move the shift lever of the mechanical transmission in and out of gear.

NOTE: The transmission must be synchronized both in and out of gear.

- A. Move the left transmission shifter switch to the middle or neutral position.
- B. Lightly press the right foot pedal down **VERY SLOWLY AND GENTLY** to see if the Chip Spreader moves. It may move for just a second, then stop when the transmission falls into neutral. The neutral indicator light should come on at this point.
- C. Move the right transmission shifter switch left or right, as needed.
- D. Shift the left switch into the gear.
- E. Lightly press the right foot pedal again to see if the Chip Spreader moves and the transmission is in gear. If the Chip Spreader still does not move, the mechanical transmission may not be in gear. If you are not sure if it is in gear, change directions with the hydrostatic transmission.

<p>WARNING: KEEP CLEAR OF THE HITCH. YOU COULD BE INJURED IF IT ACTUATES AGAINST ANY PART OF YOUR BODY.</p>
--

4. Adjust the hitch. Push down the hitch switch on the control panel for two seconds to open the hitch.
 - A. Back the chip spreader into the hitch bar of the dump truck you are using to supply the Chip Spreader with aggregate. The driver of the dump truck should hold his brakes while you back up the Chip Spreader.

NOTE: The optional hitch height can be adjusted from the control panel.

- B. Center the bed of the dump truck in the receiving hopper of the Chip Spreader. The mouth of the hitch should center itself vertically on the hitch bar. If the hitch mouth does not center itself because it is too high or low, use the chains that the hitch hangs from to adjust the height up and down.
- C. With the Chip Spreader hitch mouth pushing against the dump truck hitch bar, close the hitch by pressing up on the hitch switch for two seconds.

- D. If the position of the dump bed is either too far into the receiving hopper or too far out, the hitch can be adjusted fore and aft 6 inches to compensate.
5. Fill the receiving hopper with aggregate.
 - A. Give the dump truck a small tug with the Chip Spreader to check if the hitch is locked.
 - B. Using hand signals, tell the operator of the dump truck to release the tailgate, tip the bed and dispense aggregate into the receiving hopper. The belts are still running from Step 4 in the Mechanical Startup. The chip box should start filling with aggregate.
6. Adjust the belt diverters. As the chip box fills with aggregate, walk to the top end of the conveyor and inspect how the chip box is filling. The aggregate should dispense evenly across the chip box. There should not be any large piles or voids. Adjust the diverter left or right on each belt diverter to achieve an even distribution in the chip box. This is an initial setup procedure; properly adjusted diverters usually require minimal attention.

Setting Gate Opening for Manual Operation

This procedure enables the use of the machine in a non-automatic mode.

1. Remove the manual control wheel from the curbside of the chip box. Secure the wheel to the camshaft.
2. With the engine running and the computer switched OFF, use the cam switch (located in the valve box) to set the wheel to the same value at which the machine has been running.
3. Turn the MASTER switch OFF.

<p>WARNING: ALWAYS KEEP CLEAR OF THE AGGREGATE GATES. IF A GATE SHOULD OPEN OR CLOSE UNEXPECTEDLY, SERIOUS PERSONAL INJURY COULD RESULT.</p>

4. Open individual gates with switches 1 thru 16 (located in the valve box) as required for the job.
5. See the Calibration Chart provided on the Title Page of this manual. From the Chart, set the CRC SPEED control to the number of turns that most nearly corresponds to the actual FPM at which the machine has been running.
6. Drive the machine up to speed, then turn the MASTER switch ON and OFF to open and close the gates.

NOTE: When operating in the manual mode, it is important to remember that any open gate will remain open the same distance no matter what speed the machine is driven. There is NO automatic control of PSY during manual over-ride. In the manual mode, the most effective way to change PSY is by changing speed with the CRC SPEED control. Speed variations as small as 2% can readily be made with this control. As speed is raised, PSY decreases.

7. Upon completing the run, use the cam switch to return the cam to the closed position and close the gates. Replace the wheel on the side of the chip box.

Clearing a Clogged Gate

<p>WARNING: ALWAYS USE A METAL BAR OR ROD TO CLEAR AN OBSTRUCTION FROM A GATE. NEVER INSERT YOUR HAND INTO A GATE. UNEXPECTED OR ACCIDENTAL CLOSURE OF GATE COULD CAUSE SEVERE INJURY.</p>

If a gate becomes plugged by a rock, perform the following:

1. Open the gate from the front of the machine:
 - A. Use the cam switch in the valve box to set the cam fully open.
 - B. Open the clogged gate with the individual gate switch.
 - C. When the clog is cleared, return the switches to their normal positions.

Shutdown on Completion of a Job

At the end of the job, perform the following steps:

NOTE: Step 1 and Step 2 should always be done unless the aggregate is so dry that there is no danger of caking.

1. Empty the chip box.
2. Empty the receiving hopper.
3. Set the switches as follows:
 - MASTER (ON)
 - R and L BELTS (OFF)
 - CRC (OFF)

4. If the machine will be transported to another location, perform the following:
 - A. Hold the BOX LEVEL switch in MAN until the chip box stops moving. This will place the chip box in the travel position and lock it.
 - B. Remove any extension gates and retract the chip box to the 10 ft width.
 - C. Set the SPEED control fully CCW and the FWD-REV switch in NEUTRAL.
5. If the optional tow bar is used, see the instructions in SECTION 5. TOW BAR (OPTIONAL).
6. Shut off the engine and set the parking brake.



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SECTION 5. TOW BAR (OPTIONAL)

WARNING: STAY OUT FROM UNDER THE TOW BAR AND CHIP SPREADER WHEN RAISED AND SUPPORTED BY HYDRAULIC LIFT CYLINDER. DEATH OR PERSONAL INJURY MAY OTHERWISE OCCUR.

If the Chip Spreader is to be transported using the tow bar, perform the following steps:

1. Position the tow bar on a hard flat surface.
2. Using the “trailer” jack, disconnect the tow bar from the pickup or dump truck and lower the tow bar, raising the tires off the ground as shown in Figure 5-1.
3. Remove the tow bar tires and stow them in the tow bar. See Figure 5-2.
4. Drive the Chip Spreader up to the tow bar carefully, centering it for attachment. See Figure 5-3.
5. Tilt the chip box fully back.

WARNING: THE CHIP SPREADER ENGINE MUST BE SHUT DOWN TO REMOVE HYDRAULIC PRESSURE FROM THE SYSTEM WHILE DISCONNECTING OR RECONNECTING HYDRAULIC HOSES. FAILURE TO REMOVE HYDRAULIC PRESSURE FROM THE HOSES CAN CAUSE SEVERE PERSONAL INJURY.

6. Connect the long 1/4 inch hydraulic hoses on the tow bar to the quick disconnects located on the street side of the chip box. You must disconnect the chip box extension hydraulic hoses from the extension control valve. Reconnect the long hoses to the tow bar in their correct place. Now the valve controls the tow bar lift cylinder.
7. With the hydraulic lift cylinder, raise the tow bar as shown in Figure 5-3.
8. Position the wooden blocks (5 in. X 8 in. X 48 in.) as shown in Figure 5-3.
9. Carefully drive the Chip Spreader onto the tow bar keeping it centered.
NOTE: A large pry-bar is helpful in aligning the pins.
10. Adjust the pin-eye height with the lift cylinder and install the coupling pins and safety pins. See Figure 5-4 and Figure 5-5.

CAUTION: DO NOT USE THE TRAILERING JACK TO RAISE THE CHIP SPREADER. DAMAGE TO THE JACK MAY OTHERWISE OCCUR.

11. Raise the Chip Spreader and the tow bar with the hydraulic lift cylinder until the front chipper tires are at least 10 in. off the ground, as in Figure 5-6.

12. Adjust the pintle eye to match the towing vehicle (see Figure 5-7). Torque the pintle eye bolts to 300 FT-LB.
13. Couple the tow bar to the towing vehicle.
14. Make the air and light connections at each end of the tow bar. See Figure 5-5 and Figure 5-8.
15. Change the air valve to “Towing” position. (Located near the air glad-hand connection at the rear of the tow bar on the Chip Spreader)
16. Check the air brake operation from the towing vehicle, ensuring the rear brakes on the Chip Spreader function with the towing vehicle brakes.
17. Check all signal, brake and tail lights. Ensure they coordinate with the towing vehicle lights.
18. Attach the safety chains (2) to the towing vehicle. See Figure 5-8 and Figure 5-9.
19. Double check the safety pins on the coupling pins at the rear of the tow bar.

Towing Requirements

WARNING: FAILURE TO COMPLY WITH THE FOLLOWING MINIMUM TOWING REQUIREMENTS COULD RESULT IN ACCIDENTAL SEPARATION OF CHIP SPREADER FROM TOW VEHICLE WHILE IN TRANSIT, CAUSING A POTENTIALLY DEADLY SITUATION.

1. The towing vehicle must be three axle, ten wheel (minimum) with a GVW of 52,000 lb minimum (40,000 RAWR, 12,000 FAWR).
2. The pintle hook must be rated at 80,000 lb towing capacity and 15,000 lb vertical load minimum. See Figure 5-8. The pintle must be mounted no more than 56 inches rear of the tandem suspensions trunion. See Figure 5-9.
3. A combination hitch X-member complete with pintle and chipper hook bar can be supplied by BearCat (Part No. BRK-50960 Hitch and Hook Bar Assembly, MSC-50960 Premier 580 solid pintle coupling).

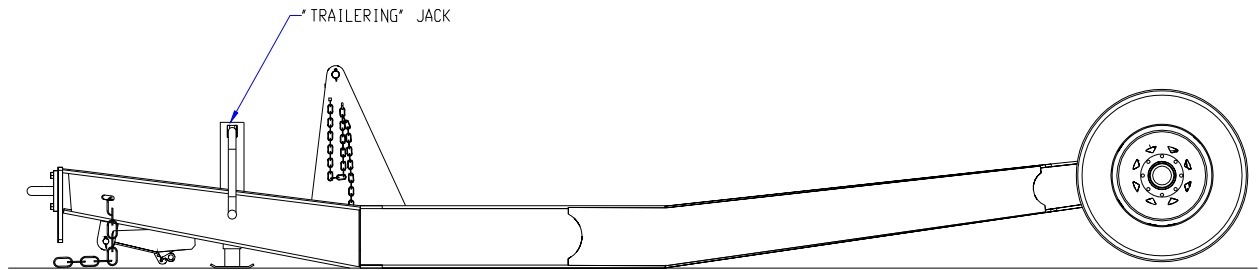


Figure 5-1. Wheel Placement and Removal Position

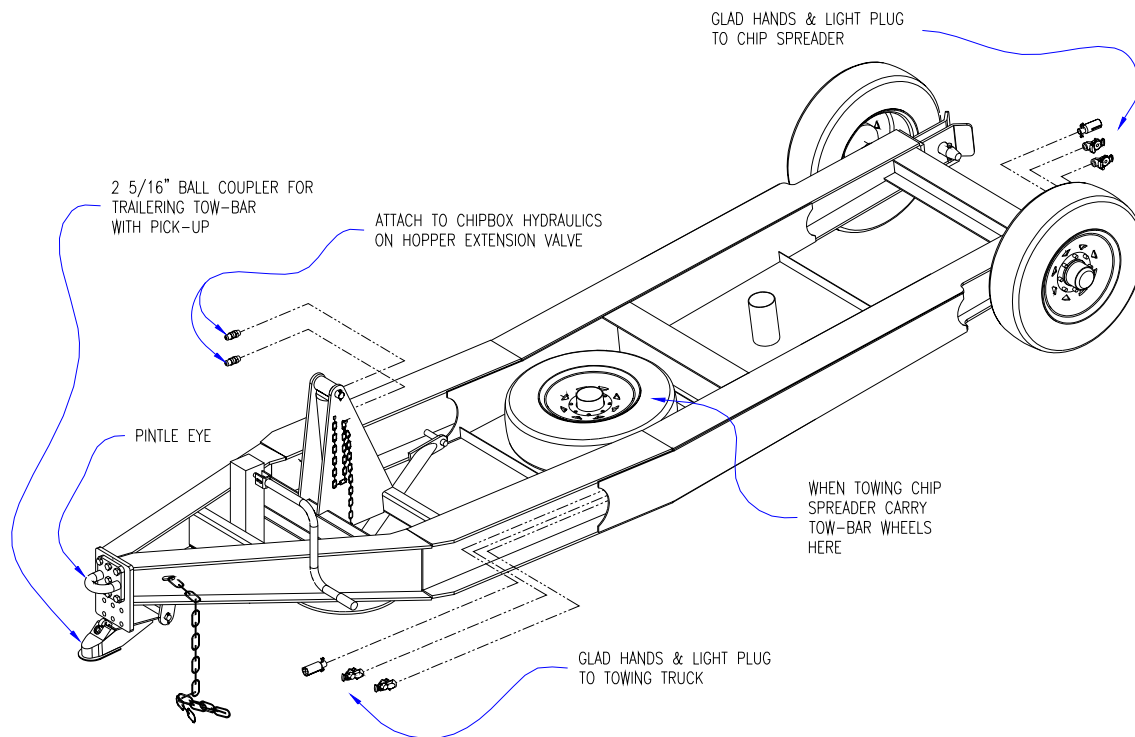


Figure 5-2. Tow Bar

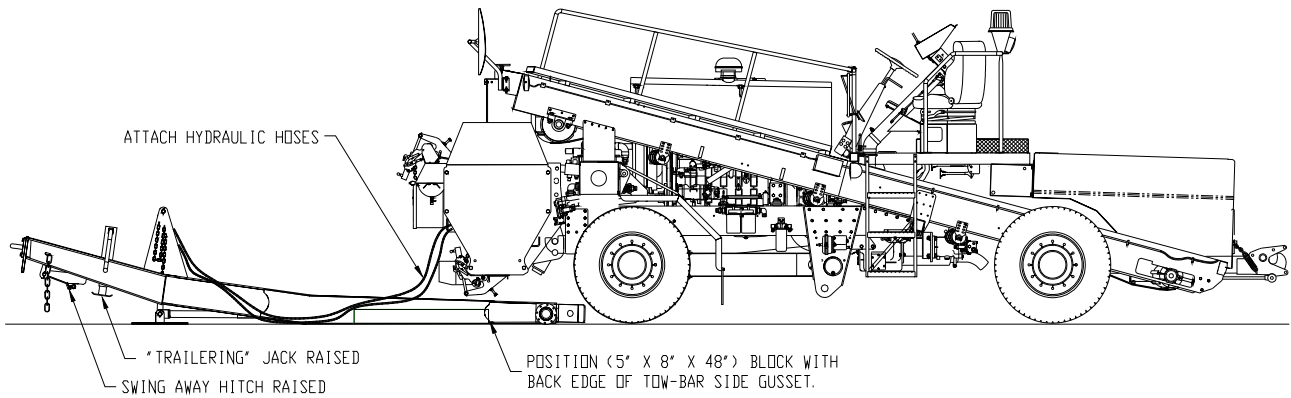


Figure 5-3. Position No. 1 Loading Chip Spreader

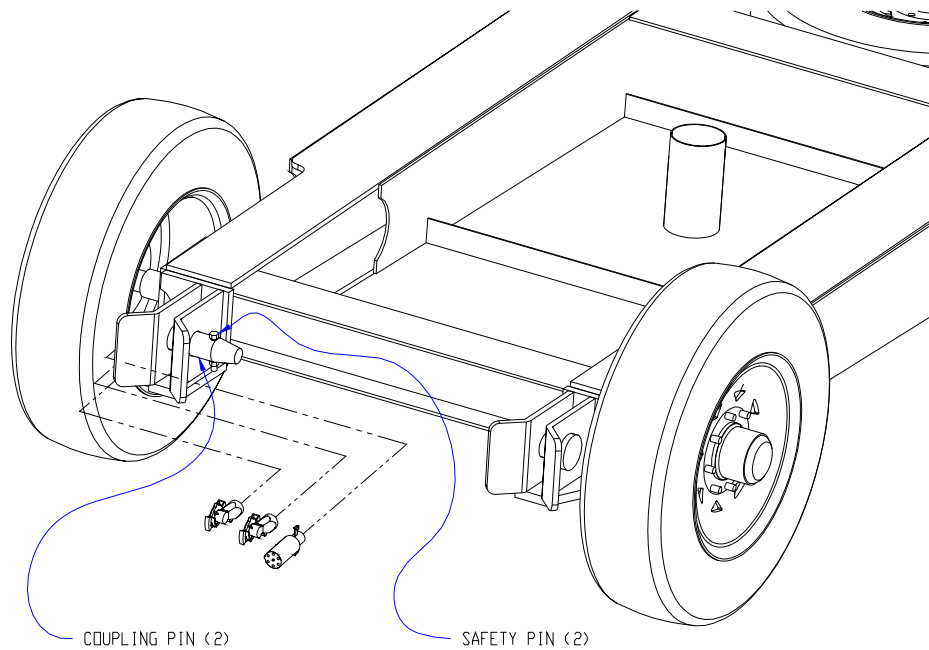


Figure 5-4. Rear View Coupling Pins

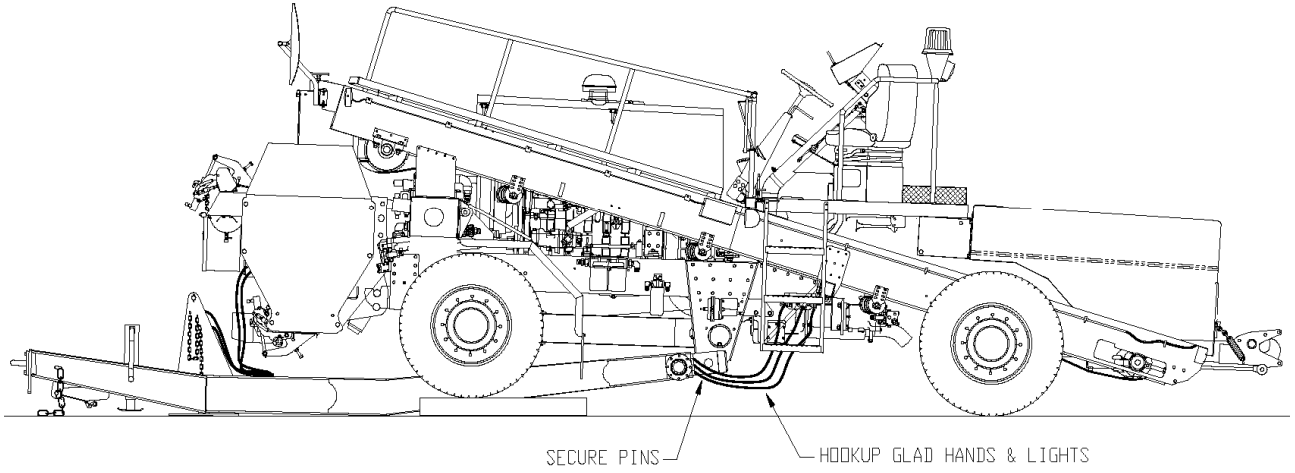


Figure 5-5. Position No. 2 Loading Chip Spreader

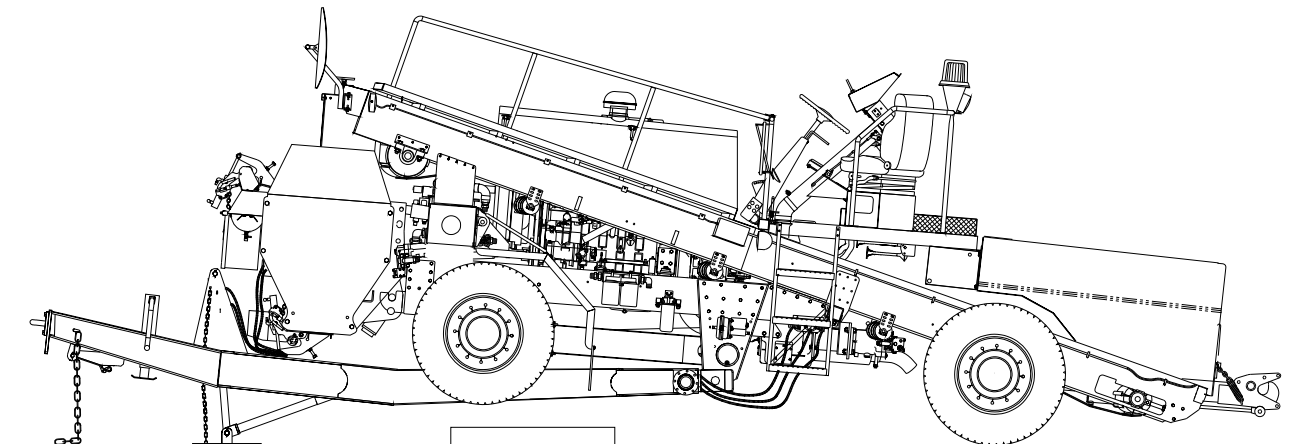


Figure 5-6. Position No. 3 Loading Chip Spreader

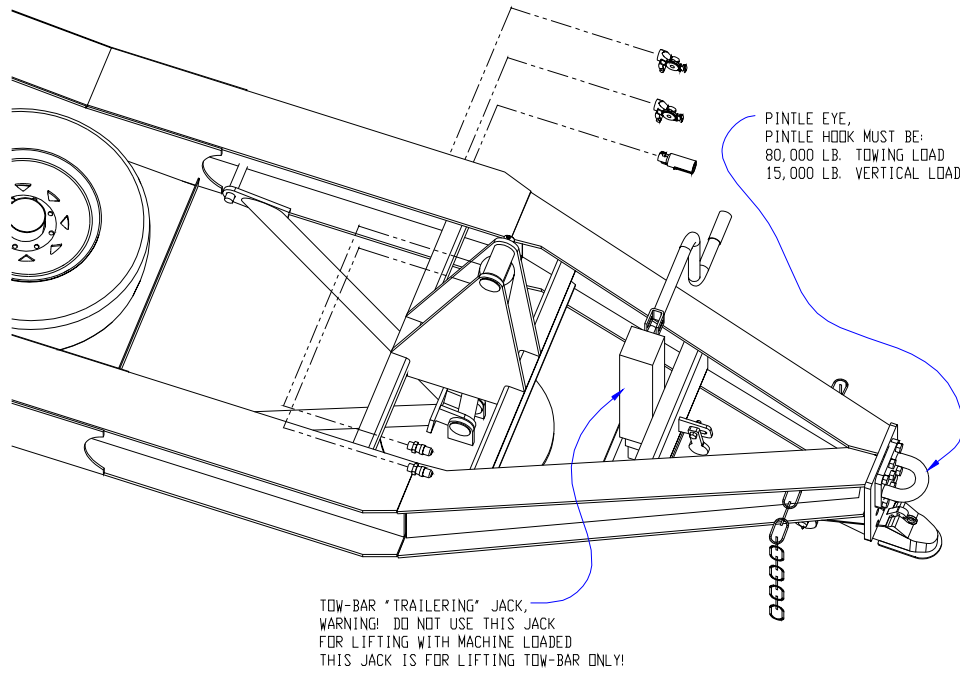


Figure 5-7. Trawling Jack and Pintle Eye

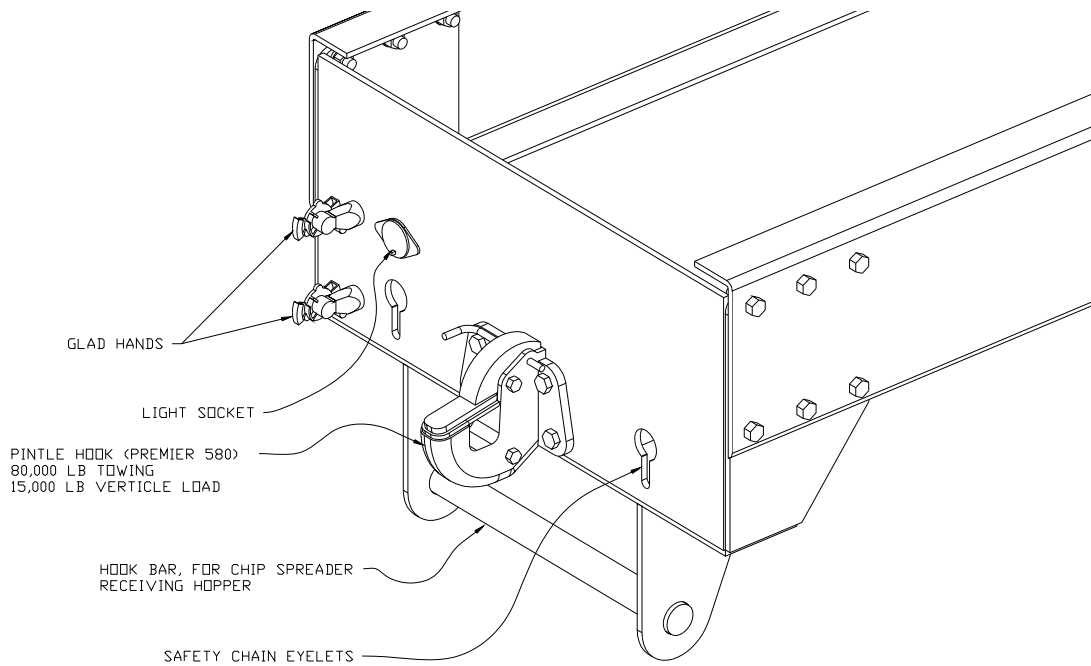


Figure 5-8. Truck Hitch and Hookups

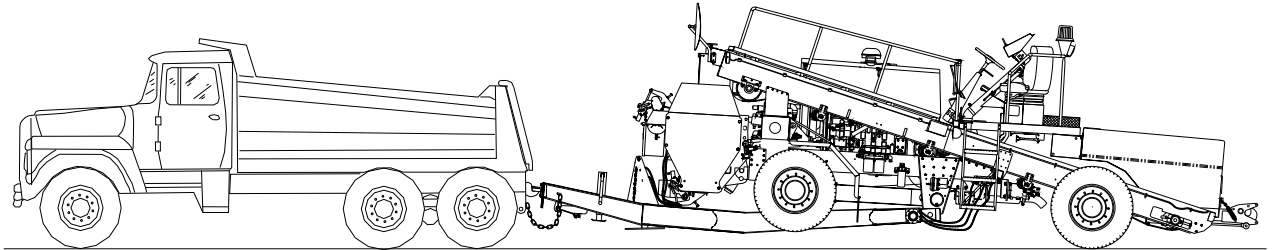


Figure 5-9. Position No. 4 Loading Chip Spreader



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SECTION 6. MAINTENANCE

Scheduled Maintenance

Table 6-1. Scheduled Preventive Maintenance

Period	Maintenance						
Daily	<ol style="list-style-type: none"> 1. Drain accumulated moisture from the air tank. 2. If using pre-coated aggregate: to prevent buildup, parts of the machine exposed to the aggregate must be pre-lubricated with a suitable biodegradable solvent. These areas must be lubricated at every stop during the work shift. 						
Weekly	<ol style="list-style-type: none"> 1. Grease the four fittings per foot on the camshaft: <ol style="list-style-type: none"> a. One on the shaft on each side of the gates. See Figure 6-1. b. One on the bottom of the gate. c. One on the rear of the gate (difficult to reach; requires a grease gun with a modified end). 2. Grease the head bearings on the front and rear belt rollers (two fittings per roller). 						
Monthly	<ol style="list-style-type: none"> 1. Grease the rear brakes' S-cam bushings. 2. Grease both ends of the tie rod. 3. Grease both ends of the steering cylinder. 4. Grease the top and bottom of both steering knuckles. 5. Grease both ends of the driveline. 6. Grease the front axle yoke bearing. 7. Verify the accuracy of the gate openings: <div style="border: 2px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center; margin: 0;">WARNING: TO AVOID INJURY KEEP FINGERS CLEAR OF THE GATE. SUDDEN OR UNEXPECTED MOVEMENT COULD CAUSE SERIOUS PERSONAL INJURY.</p> </div> <ol style="list-style-type: none"> a. Set switches as follows: <table style="margin-left: 20px; border: none;"> <tr> <td style="padding-right: 20px;">CRC</td> <td>OFF</td> </tr> <tr> <td>MASTER</td> <td>ON</td> </tr> <tr> <td>MANUAL GATE SWITCHES (all)</td> <td>OPEN</td> </tr> </table> b. Set the cam to the CLOSED position. c. Set any gate to a measured 1 1/2 inch opening. d. Adjust remaining gates to a 1 1/2 inch opening, using a 1 1/2 inch square tube as a feeler gauge. See Figure 6-2. 	CRC	OFF	MASTER	ON	MANUAL GATE SWITCHES (all)	OPEN
CRC	OFF						
MASTER	ON						
MANUAL GATE SWITCHES (all)	OPEN						
<p>NOTE: The grease used in these procedures is chassis grease. See Lubrication Specifications at the end of this section.</p>							

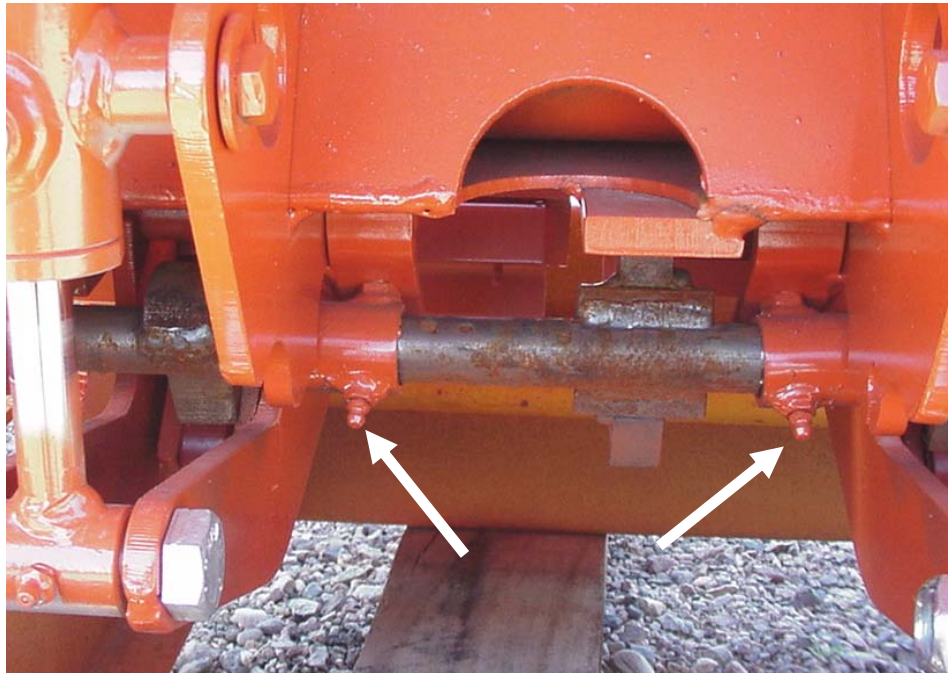


Figure 6-1. Cam Shaft Grease Fittings



Figure 6-2. Checking Gate Opening

Routine Maintenance

WARNING: OPERATORS MUST READ THIS MATERIAL CAREFULLY AND UNDERSTAND THE PROCEDURES BEFORE ATTEMPTING TO USE THE MACHINE. FAILURE TO OPERATE THE MACHINE CORRECTLY COULD CAUSE DEATH OR PERSONAL INJURY AND DAMAGE TO THE EQUIPMENT.

Weight Calibration

Proper weight calibration ensures the computer controlled aggregate gates are opening to the exact extent required to deposit the specified amount of aggregate under all operating conditions.

This procedure should be performed on a level surface after the installation of any additional chip box gates (see Section 3, Preparing Equipment for Use).

NOTE: It is not necessary to perform the weight calibration with all gates open. Select a spread width that allows the operator to cover the canvas (4 to 6 feet).

Weight calibration should be carried out whenever the aggregate material is changed to one of a different type or from a different source.

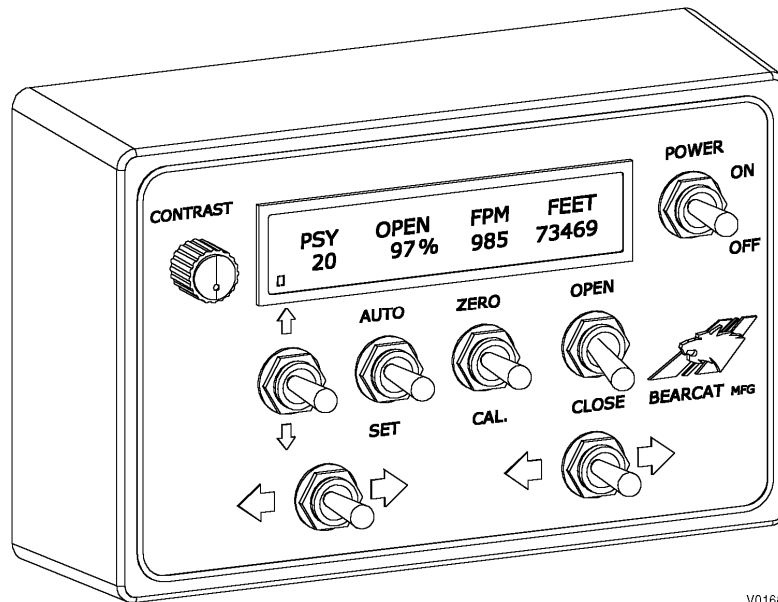
1. Fill the chip box with the new aggregate.
2. Place the yard-square piece of canvas (furnished) on the scale provided and set the scale to zero.
3. Lay the canvas out flat on level ground.
4. Switch the CRC unit ON and use the controls to enter the PSY (pounds per square yard) value desired for the job.
5. Switch the following functions on:
 - CHIP BOX LEVEL (set to level then turn off)
 - R and L BELTS
 - MASTER
 - VIBRATOR (if it will be used on the job)

6. With the engine running at 1800-2000 RPM and the transmission in first gear, drive the machine as follows:
 - A. Set the SPEED control fully CCW and the FWD-REV switch to FWD.
 - B. Press the foot pedal down.
 - C. Turn the SPEED control CW. The machine will begin moving after about three full turns. Turn the control to obtain the approximate expected spreading speed for the job.
 7. Drive toward the canvas square. Position the gate switch to OPEN to begin spreading just before reaching the canvas square (you must be traveling at the required speed for the job).
 8. After passing over the canvas, position the gate switch to CLOSE and stop the machine by releasing the foot pedal.
 9. Use the scale to weigh the canvas with the deposited aggregate.
 10. If the actual weight differs from the value entered in Step 4, press and hold the CAL switch. The display will instruct you to enter the actual weight of the aggregate sample.
 11. Use the “↑↓” controls to enter the actual weight.
 12. Press the SET switch. The display will show the PSY value entered in Step 4.
- NOTE:** If the difference between the entered PSY and the actual weight is large, a second calibration run may be necessary. In that event, repeat Step 6 thru Step 12.

Distance Calibration

Proper distance calibration ensures the correlation between machine ground speed and chip-spreading density is accurately maintained through the distance-measuring circuits in the CRC computer.

This procedure should be performed once in each operating season. It is not necessary that the receiving hopper or chip box be filled. Refer to Figure 6-3 for the location of the controls.



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Figure 6-3. Computer Display During Distance Calibration

1. With the engine running and the SPEED control fully CCW, turn on the CRC computer.
2. Press ZERO to zero the FEET display.
3. Set the FWD-REV switch to FWD, press the foot pedal all the way down and turn the SPEED control CW until the display indicates approximately 300 FPM.
4. Position the gate switch to OPEN and drive a carefully measured distance of 1000 ft.
5. At exactly 1000 ft, position the gate switch to CLOSE and stop the machine by releasing the foot pedal. The FEET display should now read approximately 1000.
6. Press and hold CAL twice, holding the switch down approximately five seconds each time.
7. Press "↑ ↓" to lower the displayed FEET value or to raise it, until it reads 1000.
8. When the display reads 1000, press SET. The distance calibration is now complete. The machine is in the normal operating mode.
9. Note the new distance (footage) calibration number and enter it on the title page of this manual. The computer control can be reset to this number if the box is replaced or the number is changed. If this number is used, the unit will not require a complete distance calibration.

Potentiometer Calibration (Early)

NOTE: If you are not replacing the potentiometer, skip to Step 3.

1. With the ignition key in the OFF position, press and hold the CAL switch while starting the engine – continue holding the switch. Ignore the STOP FACTORY SETTINGS message and continue holding until numbers appear on the screen and then release the switch.

NOTE: The cam stop is located in the center of the cam and the cam lobes are pointing down in the closed position.

2. In the valve box on the front of the chip box, close the cam with the manual cam switch. Make sure it is tight against the cam stop. Bump the switch a couple times to be sure. See Figure 6-4.

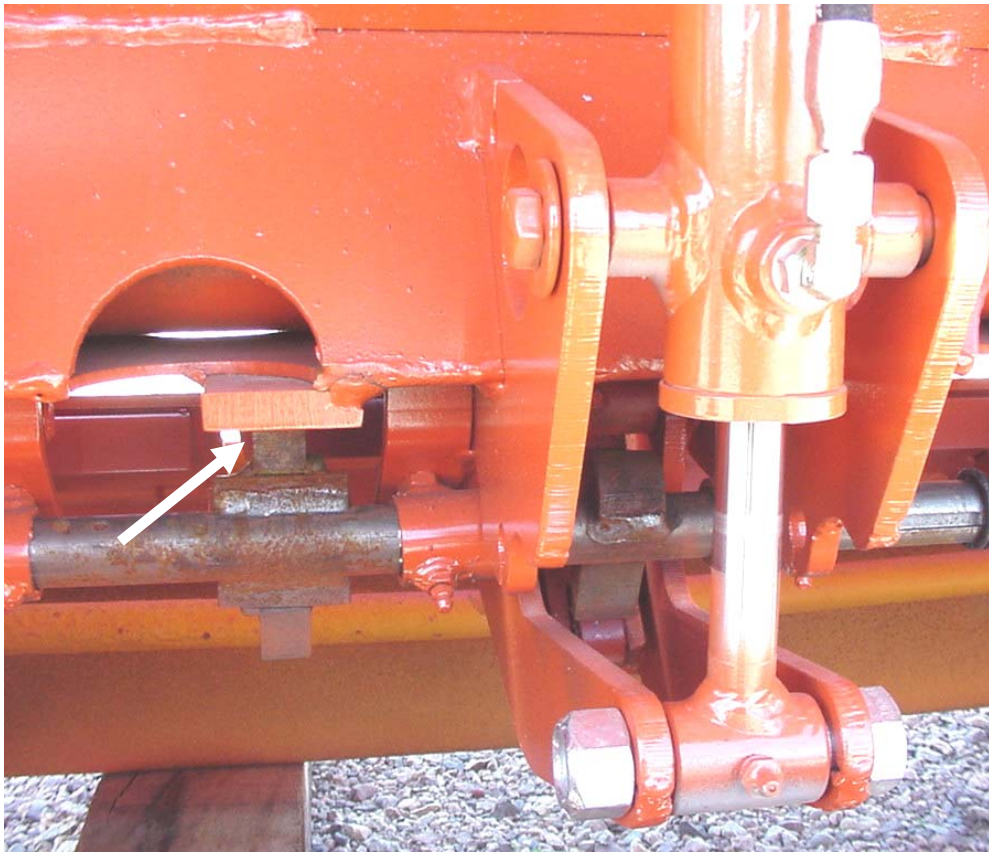


Figure 6-4. Location of Cam Stop

NOTE: Step 3 provides instructions for course adjustment of the potentiometer and Step 4 details fine adjustment procedures. If only a minor calibration adjustment is required, go to Step 4.

3. The potentiometer (Pot) is the black cylinder shaped object with a cable coming out of the bottom, as seen in Figure 6-5. With a 1/16 inch Allen wrench, loosen the upper screw on the Pot cable coupler. Have a helper watch the computer display and read the numbers on the far right of the display to you as you turn the top of the Pot. The numbers range from 1 to 255. Turn the Pot until you get roughly between 1 and 4 and then tighten the Allen screw.

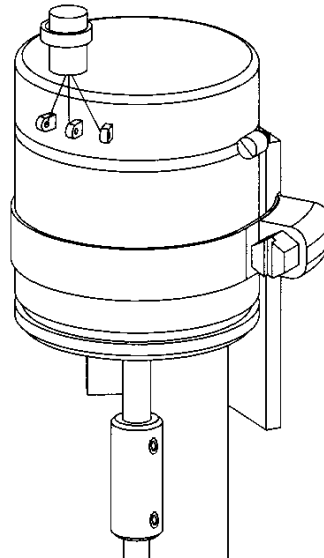


Figure 6-5. Potentiometer (Early)

4. With a regular screwdriver, loosen the hose clamp that holds the Pot enough to be able to turn it. Turn the Pot again until you reach a high 2 (when it flickers from 2 to 3) and tighten the hose clamp.
5. Open the cam with the manual cam switch and get it tight as in Step 2. Make sure the number on the far right of the display reads no more than 250 (less is OK). If it does, repeat Step 2 and Step 4 and change the far right display number to a high 1 (flickering from 1 to 2).

NOTE: Cam lobes are pointing up in the open position.

6. Back at the computer, press and hold the AUTO switch. With the ↑ (up) arrow, run the OPEN number to 7.0 or 100% (depending which computer you have). Push SET and shut the computer off.
7. Wait for ten seconds and turn the computer on. The cam should return to the closed position. The procedure is now finished.

Potentiometer Calibration (Late)

The early potentiometer (Pot) has been removed from the gate control valve box and the new type is mounted directly to the camshaft with a gearbox (see Figure 6-6). Once installed, no manual adjustment of the Pot is required. Perform the following steps to calibrate the Pot:

1. With the computer control POWER switch in the OFF position, press and hold the CAL switch and turn power ON.
2. Hold the switch in the CAL position until "SET POTS?" is shown on the computer control display and release the switch.
3. Immediately press the ↑ (up) switch to select YES and enter the Pot calibration mode.
4. When "MOVE CAMS NOW" is displayed, press the ↑ (up) switch to select YES and start cam movement and the Pot calibration routine. The computer control system will cycle the cam to the open and closed position and calibrate the Pot.
5. Once the cam has cycled and stopped, the Pot calibration is finished.

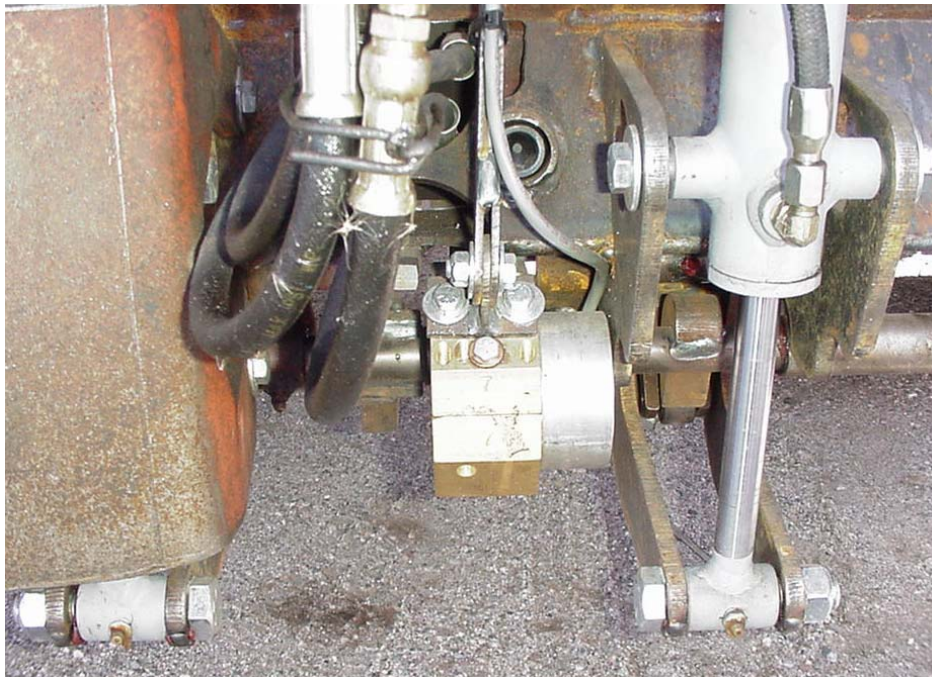


Figure 6-6. Potentiometer (Late)



Replacement Filters, Belts and Fans

Filters, belts and fans are not replaced during scheduled maintenance; they are replaced as needed. Table 6-2 lists BearCat's parts numbers for these components and the manufacturer's parts numbers.

Table 6-2. BearCat Part Numbers

Description	Brand	Part Number	BearCat Part Number	Quantity
Hydraulic Components				
Hydraulic Filters				
Hydraulic Filter (10 Micron)	Zinga	SE-10	FTR-22502	5
Hydraulic Filter (10 Micron 15 GPM)	Zinga	AE-10	FTR-51736	1
Cummins Engine Filters, Belt and Fan (1998)				
Oil Filters				
Oil Filter	Fleet Guard	LF3000	FTR-51260	1
Fuel Filters				
Fuel Filter (Primary)	Fleet Guard	FS1280	FTR-51261	1
Fuel Filter (Secondary)	Fleet Guard	FF5052	FTR-51262	1
Pre-Fuel Filter	Fleet Guard	FS19512	FTR-51269	1
Water Filter				
Water Filter (Service)	Fleet Guard	WF2071	FTR-60956	1
Air Filter				
Air Filter (Primary)	Fleet Guard	AF418	FTR-51265	1
Air Filter (Secondary)	Fleet Guard	AF490M	FTR-51266	1
Belt (92-96)				
Fan Belt (96-97) (Start Serial Number 45293079)	Cummins	3926862	PTM-60961	1
Fan (Puller)				
Fan (25") (93-97) (Pusher Type)	Kysor	4035-42599-80	MSC-51855	1

Lubrication Specifications

The following list references the various types of lubricants that BearCat specifies for use on the Chip Spreader.

Chassis Grease (grease zerks)

- Gate Cylinder Ends
- Cam Bearings
- Gate Hinge Pins
- Head Pulley Pins
- Cam Lock Pivots
- Driveline (belt pump)
- Front Driveline
- Take-Up Bearings (rear of conveyor)
- Spindle Bearings (top and bottom front axle)
- Tie Rod Ends

Cam Gear Box

Fill with MYSTIC grease only.

Hydraulic Oil

Conoco Hydraulic 32

Drive Axle

Must meet API GL-5 and MIL-PRF2105E qualifications

- Shell Spirax HD EP 80W-90 or EP 85W-140
- Texaco Multigear EP SAE 80W-90 or EP 85W-140
- Citco Premium 80W-90 Code 31310

Cummins Engine Oil

Shell SAE 30 WT All Guard Diesel Oil

SECTION 7. ILLUSTRATED PARTS LIST

The following recommended spare parts list (Table 7-1) is provided as a guide to the user for convenience in the maintenance of Model 2002/CRC Chip Spreader. All of the parts listed are available from BearCat Manufacturing, Inc.

Table 7-1. Recommended Spare Parts

Description	Part No.	Quantity
Belt Switch On/Off/Mom-On Single Pole	ELC-51748	2
Switch, On/Off/On Single Pole Toggle	ELC-24272	1
Switch, Fwd/Rev Switch 3 Pole 2 Position With Hesitation	ELC-51747	1
Switch, On/Off Single Pole Toggle	ELC-24275	1
Switch, Mom-On/Off/Mom-On Single Pole Toggle	ELC-24274	1
Switch, On/Off 2 Pole Toggle	ELC-24267	1
Switch, High Temperature Level Control	ELC-50915	1
Rheostat	ELC-24288	1
Potentiometer, Geared (Modified)	ELC-50591	1
Diaphragm, Material Level Switch	MSC-50831	1
Air Solenoid Valve, 4 Way Versa C-7	VLV-50902	1
Connector Cable 6-Cond	ELC-26228	2
CRC Cable 6-Cond	ELC-26226	30'
Gear Tooth Sensor Assembly	ELC-26148	1
Cylinder Chipper Gate	CYL-50703	1
Hinge Pin-Conveyor Belt	FAS-51763	2
3' X 3' Canvas Calibration Bag	MSC-51771	1
Calibration Scale, Weigh	MSC-51749	1
Hydraulic Filter, Zinga	FTR-22502	5
Filter, Vent Breather	FTR-22527	1
Diffuser	FTR-51688	1
Sump Strainer	FTR-51689	2
Fuel Filter, Primary	FTR-51261	1
Fuel Filter, Secondary	FTR-51262	1
Fuel Filter, Remote (inline)	FTR-51269	1
Coolant Filter, Water Service	FTR-60956	1
Air Filter, Primary	FTR-51265	1
Air Filter, Safety	FTR-51266	1
Oil Filter, (Chipper Engine)	FTR-51260	1
Belt, Chipper Engine (96-97 start serial number 45293079)	PTM-60961	1

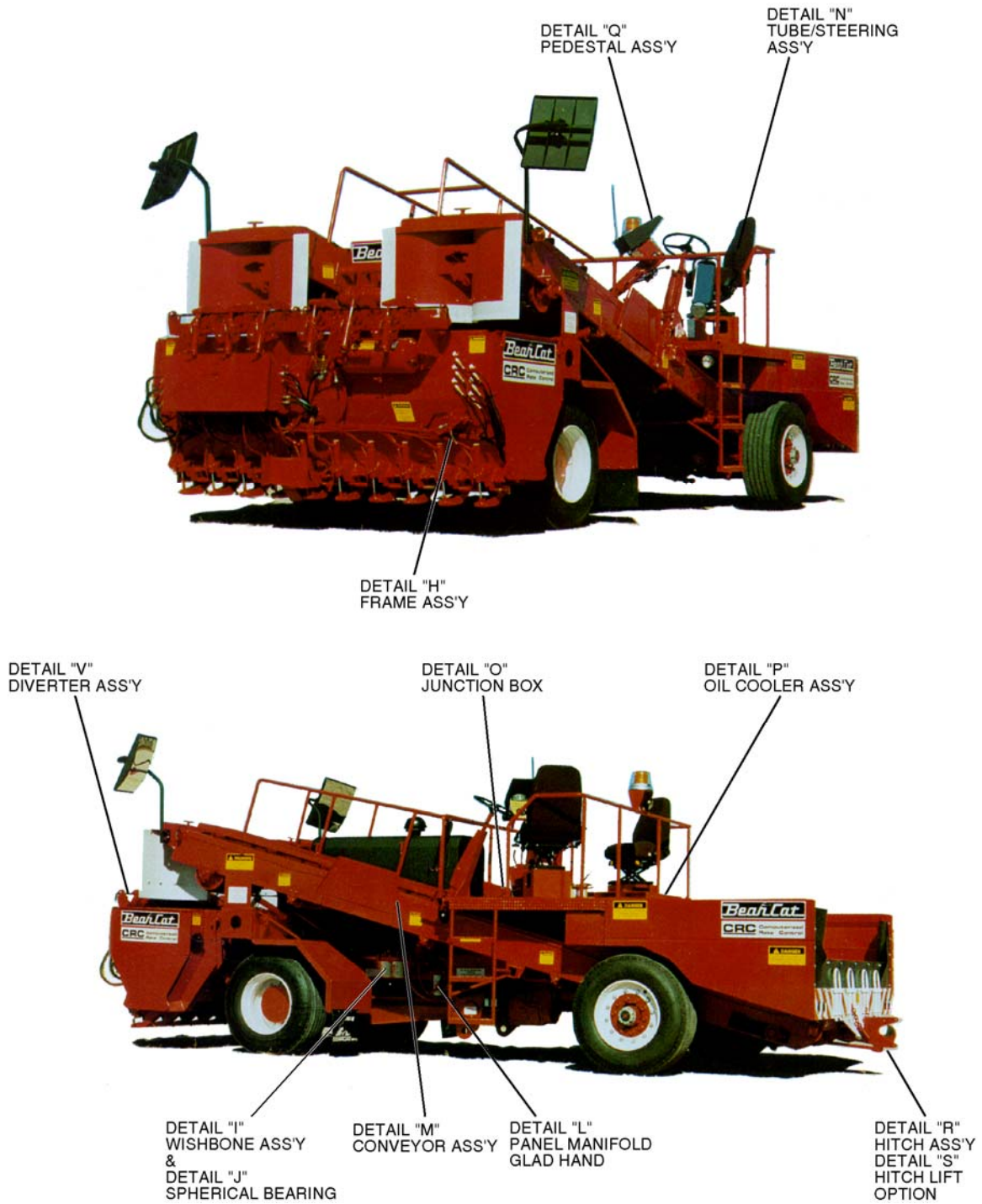


Figure 7-1. Model 2002/CRC Chip Spreader



Fig	Item	Description	Part No.	Qty
7-1		Chip Spreader	2002/CRC	RF
	-A	Chipper Assembly (See Fig. 7-2 for Details)		1
	-B	Transmission Spicer ES70-5A Assembly (See Fig. 7-3 for Details)		1
	-C	Engine/Hydrostatic Installation (See Fig. 7-4 for Details)		1
	-D	Drive Lines (See Fig. 7-5 for Details)		1
	-E	Exhaust System (See Fig. 7-6 for Details)		1
	-F	Shift Assembly Remote 98 (See Fig. 7-7 for Details)		1
	-G	Valve Cluster Assembly (See Fig. 7-8 for Details)		1
	H	Frame Assembly (See Fig. 7-9 for Details)		1
	I	Wish Bone Assembly (See Fig. 7-10 for Details)		1
	J	Spherical Bearing (See Fig. 7-11 for Details)		1
	-K	Manifold Return W/Fittings (See Fig. 7-12 for Details)		1
	L	Panel Manifold, Glad Hand and Socket Assembly (See Fig. 7-13 for Details)		1
	M	Conveyor Assembly Left-Hand and Right-Hand (See Fig. 7-14 for Details)		1
	N	Tube/Steering Assembly (See Fig. 7-15 for Details)		1
	O	Junction Box (See Fig. 7-16 for Details)		1
	P	Oil Cooler Assembly (See Fig. 7-17 for Details)		1
	Q	Pedestal and Control Box (See Fig. 7-18 for Details)		1
	R	Hitch Assembly (See Fig. 7-19 for Details)		1
	S	Hitch Lift (See Fig. 7-20 for Details)		1
	-T	Hitch Manifold W/Out Lift Option (See Fig. 7-21 for Details)		1
	-U	Hitch Manifold W/Lift Option (See Fig. 7-22 for Details)		1
	V	Diverter Option (See Fig. 7-23 for Details)		1
	-W	Chip Box 6 in. Mouth (See Fig. 7-24 for Details)		1



Fig	Item	Description	Part No.	Qty
7-1	-X	Extension Gate Assembly (See Fig. 7-25 for Details)		1
	-Y	Gear Box Assembly (See Fig. 7-26 for Details)		1
	-Z	Valve Box Assembly (See Fig. 7-27 for Details)		1
	-AA	Chip Box Hydraulic Manifold Assembly (See Fig. 7-28 for Details)		1
	-AB	Tow Bar Assembly (See Fig. 7-29 for Details)		1
	-AC	Heat Exchanger (See Fig. 7-30 for Details)		1

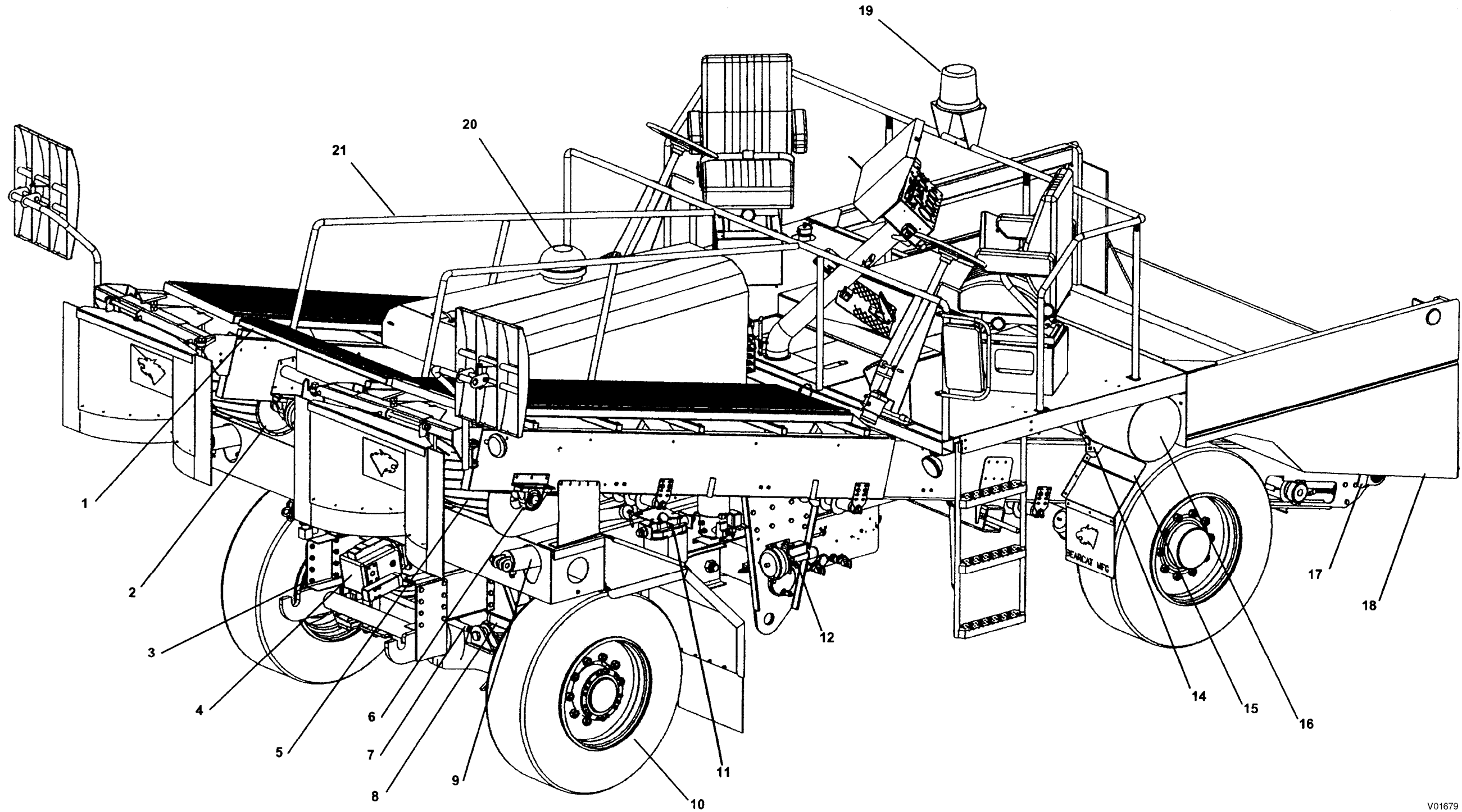
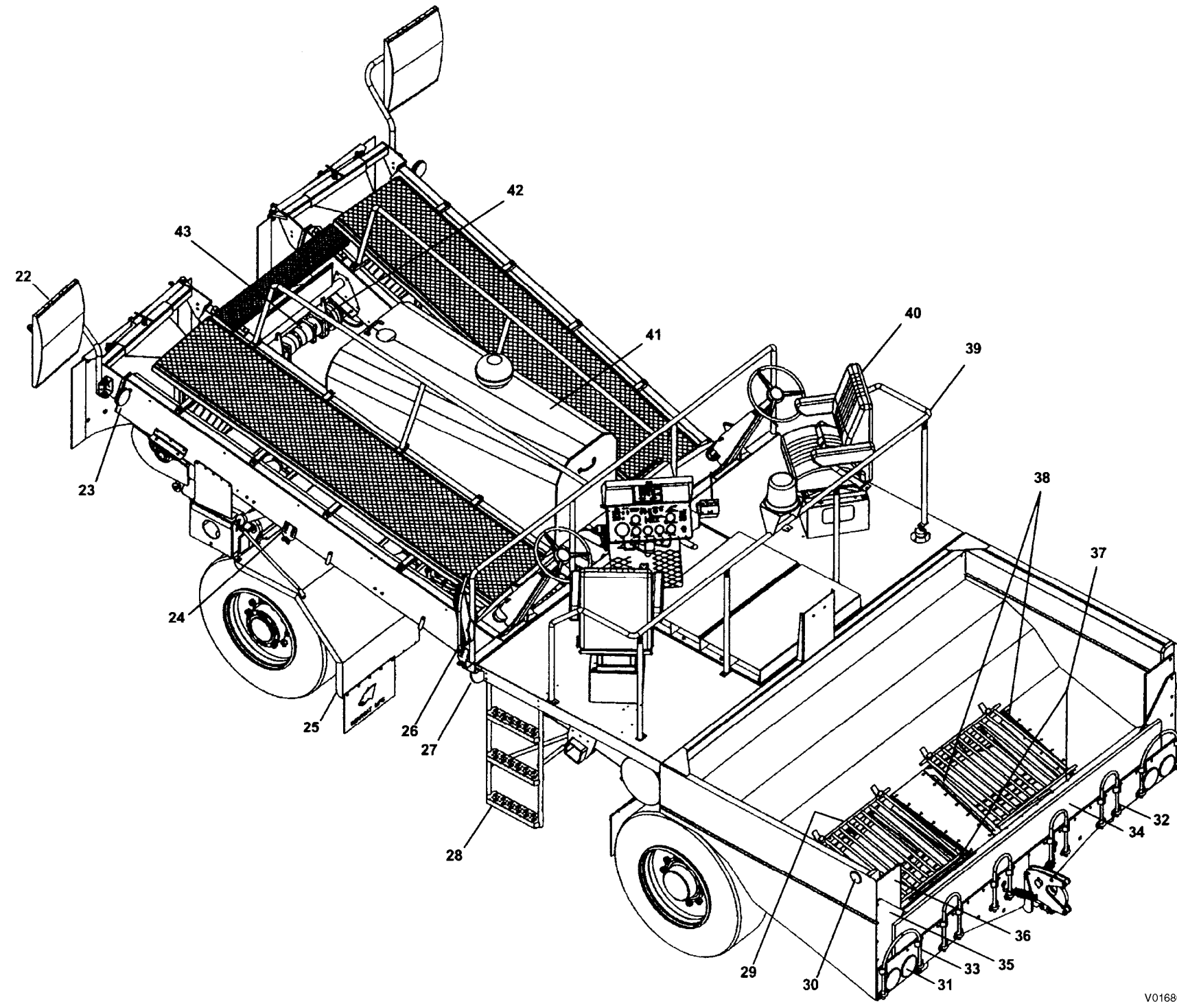


Figure 7-2 (Sheet 1). Chipper Assembly

V01679



V01680

Figure 7-2 (Sheet 2). Chipper Assembly



Fig	Item	Description	Part No.	Qty
7-2		Chipper Assembly		RF
	1	Cat Walk Forward Conveyor Cross-Over	GRD-61707	1
	2	Head Pulley Assembly (W/Lagging)	MCH-61404	2
	3	Adapter, Wheel Machined Spicer/Dana	BRK-61482	2
	4	Compensating Pressure Pump	PMP-51615	1
	5	Conveyor Belt Assembly 30" X 490" (reg) (standard)	MSC-60482	2
		Conveyor Belt Assembly 30" X 490" (hot) (optional)	MSC-51766	2
	6	SCM Pillow Block Bearing 1.938"	PTM-51415	4
	7	Sway Bar Assembly	PTM-51459	1
	8	Spring Timbren Rubber Suspension	MSC-100130	2
	9	Cylinder, Chip Box Tilt (4" X 8")	CYL-50667	2
	10	Wheel Assembly Spicer/Dana Axle and Rear axle	MSC-61466	4
		Tire 385/65R 22.5 160K	MSC-51739	4
		Nut Hex Conical 3/4" – 16 UNV-2B	FAS-61487	40
	11	Filter Head Assembly (suction 2-filter)	FTR-51731	1
		Filter Hydraulic Zinga 10-micron	FTR-22502	2
		Dual Filter Head	FTR-51733	1
		Gauge Vacuum	MTR-22499	1
	12	Master/Cylinder Air/Hydraulic JD & Spicer/Dana Brakes	PTM-51644	1
	13	Air Dryer Rockwell Wabco	FTR-60949	1
	14	Bracket, Diesel Tank Mount	BRK-61825	2
	15	Fender Rear	GRD-51808	2
	16	Tank, Chipper Diesel Tank Assembly "97"	TNK-61824	1
	17	Alarm Back-Up	ELC-24293	1
	18	Receiving Hopper Assembly	HSG-51435	1
	19	Beacon	ELC-24215	1
	20	Pre-Cleaner Syklone Model 9002	FTR-51857	1
	21	Hand Rail Conveyor Hand Rail "97"	GRD-61701	2
	22	Mirror Assembly Convex	GRD-61050	2
		Mirror Base Assembly (Right-Hand & Left-Hand)	BRK-61051	2
	23	Light Turn Signal Marker Stud Mount	ELC-51587	2
	24	Fender Strut	GRD-51805	2
	25	Fender Front	GRD-51806	2
	26	Mirror Bi-View Mirror Assembly	GRD-61050	1
	27	Light Tractor	ELC-51585	4
	28	Ladder Assembly	GRD-51528	2
	29	Grizzly Receiving Hopper	BRK-51846	2
	30	Light Red Clearance	ELC-24208	2
	31	Light Combination Stop/Tail/Turn/Return	ELC-51588	4
	32	Horizontal Seal Stiffener (inner)	BRK-51914	4
		3/4" Wire Rope Clamp	FAS-51446	8

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty
7-2	33	Horizontal Seal Stiffener (outer)	BRK-51915	2
		3/4" Wire Rope Clamp	FAS-51446	4
	34	Seal Receiving Hopper Horizontal Seal	RNG-51796	1
	35	Seal Receiving Hopper 45° Corner	RNG-60624	2
	36	Seal, Outside Vertical Rec. Hopper	RNG-51795	2
	37	Seal, Horizontal Conveyor Flashing	RNG-51798	2
		Clamp Conveyor Rear Seal	BRK-60645	2
	38	Seal Vertical Conveyor Flashing	RNG-51793	4
		Clamp Conveyor Rear Side Seal	BRK-60647	4
	39	Guard Rail AFT Chipper	GRD-51566	1
	40	Seat Driver With Seat Belt/Arm Rests	MSC-51773	2
	41	Hood, Chipper Engine Hood "98"	GRD-61708	1
	42	Coupling Rigid Taper Lock Female	PTM-60663	2
		Coupling Rigid Taper Lock Male	PTM-60664	2
		Bushing Taper Coupling 1.938"	PTM-60665	2
		Bushing Taper Coupling 1.50"	PTM-60666	2
	43	Motor Belt Drive Motor 22.84 C.I.	PMP-51619	2

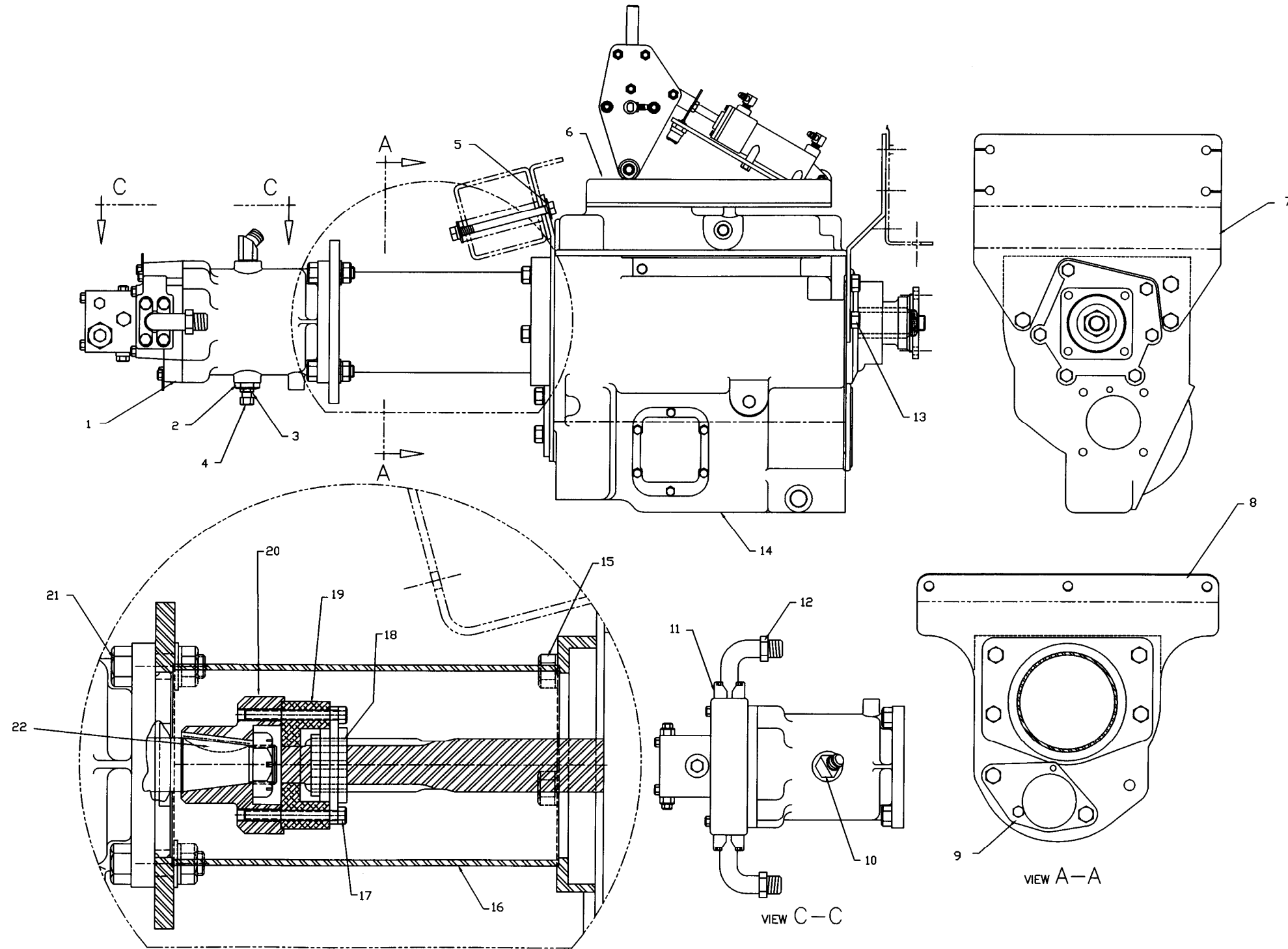


Figure 7-3. Transmission Spicer ES70-5A Assembly



Model 2002/CRC

Illustrated Parts List

Fig	Item	Description	Part No.	Qty.
7-3		Transmission Spicer ES70-5A Assembly		RF
	1	Motor Chipper Drive-Train MF7630-032	PMP-51630	1
	2	3/4" Male O-Ring X 1/4" Female O-Ring	12MB-4FB	1
	3	1/4" Male O-Ring X 1/4" Male Jic	4MB-4MJ	1
	4	Cap 1/4" Female Jic	C4FJ	1
	5	Hex Bolt 5/8" – 11 X 7" Gr. 8	FAS-28785A	3
		Lock-Washer 5/8"	FAS-28650	3
		Nut Hex 5/8" – 11 Gr. 8	FAS-28505A	3
	6	Shift Assembly Remote "98"	MCH-60845	1
	7	Forward Mount Spicer ES70-5 Transmission "98"	BRK-60727	1
	8	AFT Mount Spicer ES70-5 Transmission "98"	BRK-60728	1
	9	Bearing Cap Spicer ES70-5 Transmission	BRK-60724	1
	10	45° 3/4" Male O-Ring X 3/4" Male Jic	45D12MB-12MJ	1
	11	1" Flange Clamp Code 62	16FG62	2
	12	90° 1" Flange Code 62 X 1" Male Jic	90D16FG62-16MJ	2
	13	Hex Bolt 5/8" – 11 X 1" Gr. 8	FAS-28775A	3
		Lock-Washer 5/8" Gr. 8	FAS-28650A	3
	14	Transmission Spicer ES70-5A Assembly	PTM-60702	1
	15	Hex Bolt 5/8" – 11 X 2 3/4" Gr. 8	FAS-28996	4
		Lock-Washer 5/8" Gr. 8	FAS-28650A	4
	16	Adapter Hydrostatic Motor to Spicer Transmission	HSG-60704	1
	17	Hex Bolt 5/16" – 25 X 3"	FAS-28873A	10
	18	Splined Flange Spicer Transmission	PTM-60718	1
	19	Adapter Comp. Fig. Splined Flange	PMT-60723	1
	20	Companion/Flange Eaton 76 to ES70-5	PMT-60722	1
	21	Hex Bolt 3/4" – 10 X 3"	FAS-28796	4
		Flat Washer 3/4"	FAS-28638	4
		Lock-Washer 3/4"	FAS-28651	4
		Nut Hex 3/4" – 10	FAS-28506	4
	22	7/16" X .562" X 2 1/4"	Woodruff Key	4



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FOR DETAILS SEE AIR, HYDRAULIC,
AND ELECTRICAL SCHEMATICS.

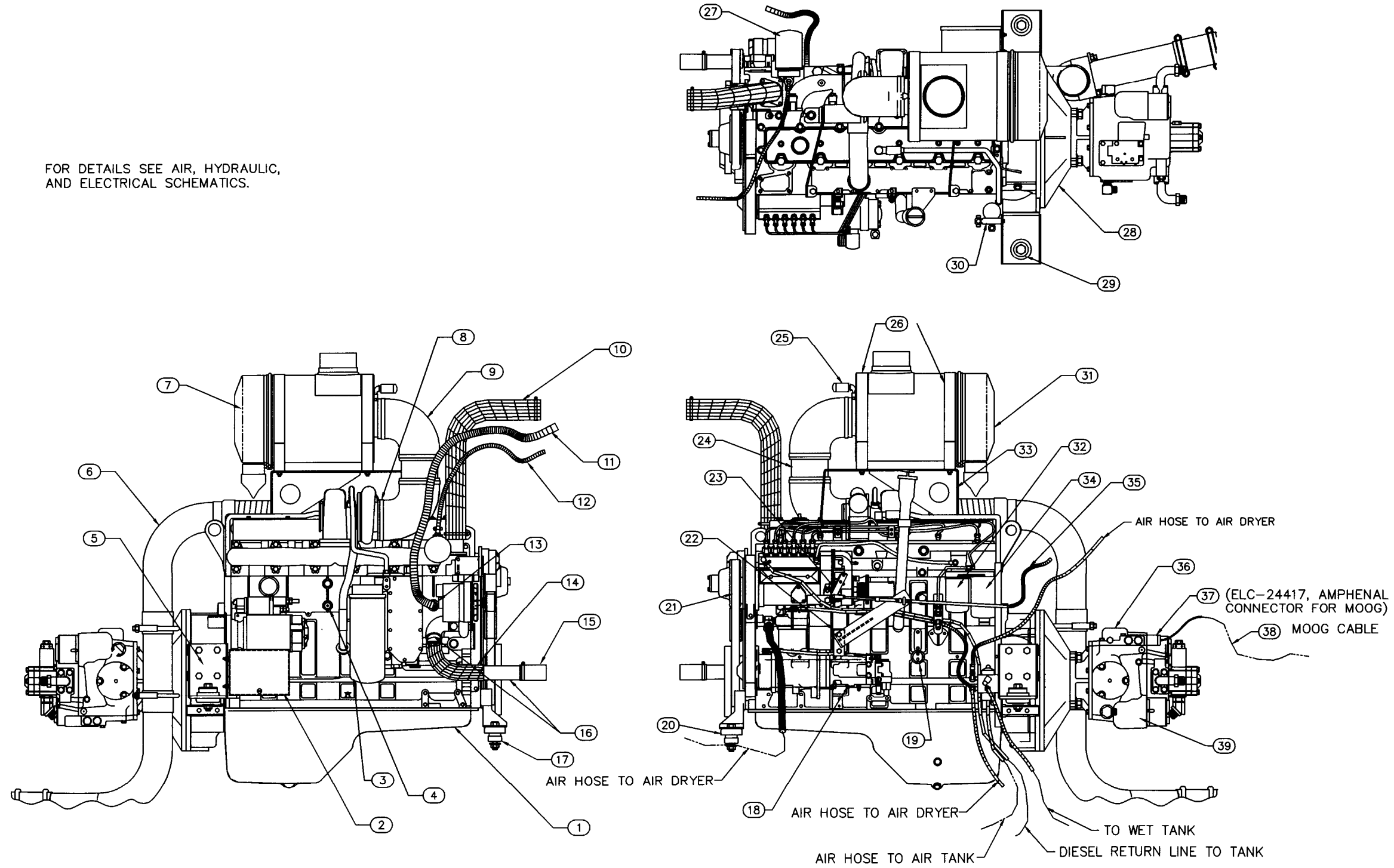


Figure 7-4. Engine/Hydrostatic Installation



Model 2002/CRC

Illustrated Parts List

Fig	Item	Description	Part No.	Qty.
7-4		Engine/Hydrostatic Installation		RF
	1	Cummins 6CT8.3(214HP)	MCH-51849	1
	2	Junction Box Assembly Engine Circuit	ELC-60932	1
	3	Oil Filter (1991-1997)	FTR-51260	1
	4	Sender/Switch 1/2" 250°/230°	ELC-60312	1
	5	Engine Mount Rear – Right-Hand & Left-Hand	BRK-51460	1
	6	Exhaust System Schematic	HSG-51869	1
	7	Filter Air Primary	FTR-51265	1
		Filter Air Safety	FTR-51266	1
	8	Clamp T-Bolt 5"	FAS-51861	4
	9	Elbow, 90° 5"	FIT-51855	2
	10	Radiator Hose Top (1995 – 1997)	PIP-51275	1
	11	Heater Hose 1"	PIP-60971	5'
	12	Hose, 3/8"	PIP-26325	4'
	13	Fitting 1" Heater Hose T 3/4" M.P.T.	FIT-60903	1
	14	Radiator Hose Bottom 90° (1990 – 1997)	PIP-51272	1
	15	Radiator Hose Bottom (1995 – 1997)	PIP-51276	1
	16	Lower Radiator Hose 2" Adapters	PIP-51273	1
	17	Front Isolator	BRK-60642	2
	18	Pump Steering Chipper "98"	PMP-51604	1
	19	Switch, Oil PSI Sender 8018 PSI	ELC-60311	1
	20	Front Washer	FAS-28661	2
		Front Washer	FAS-28662	2
	21	Fan Belt (1996 – 1997) (Start Serial Number 45293079)	PTM-60961	1
	22	Bracket Throttle Cable	BRK-61681	1
	23	Lever Throttle	MCH-51682	1
	24	Tube Air Intake 5" O.D.	FIT-51860	1
	25	Restriction Indicator (1990 – 1997)	MTR-51999	1
	26	Mounting bands (1990 – 1997)	BRK-51856	2
	27	Filter Water Service	FTR-60956	1
	28	Pump Mount & Drive (1995 – 1997)	PTM-51628	1
	29	Rear Isolator (1990 – 1997)	BRK-60641	2
		Rear Washer	FAS-28657	2
		Rear Washer (1990 – 1997)	FAS-28663	2
	30	D-2 Governor 03212 Valve 275491	VLV-51637	1
	31	Air Filter Assembly (1990 – 1997)	FTR-51854	1
	32	Fuel Filter (Secondary) (1990 – 1997)	FTR-51262	1
	33	Bracket, Air Cleaner Support	BRK-51826	1
	34	Fuel Filter (Primary) (1990 – 1997)	FTR-51261	1
	35	Cable Assembly Throttle	PTM-51634	1
	36	Valve EDC Moog Controller Eaton 76	VLV-29331	1



Model 2002/CRC

Illustrated Parts List

Fig	Item	Description	Part No.	Qty.
7-4	37	Amphenol Connector for Moog	ELC-24417	1
	38	Moog Cable Assembly (Chipper)	ELC-50960	1
	39	Pump Eaton 76 Hydrostatic Trans.	PMP-51629	1



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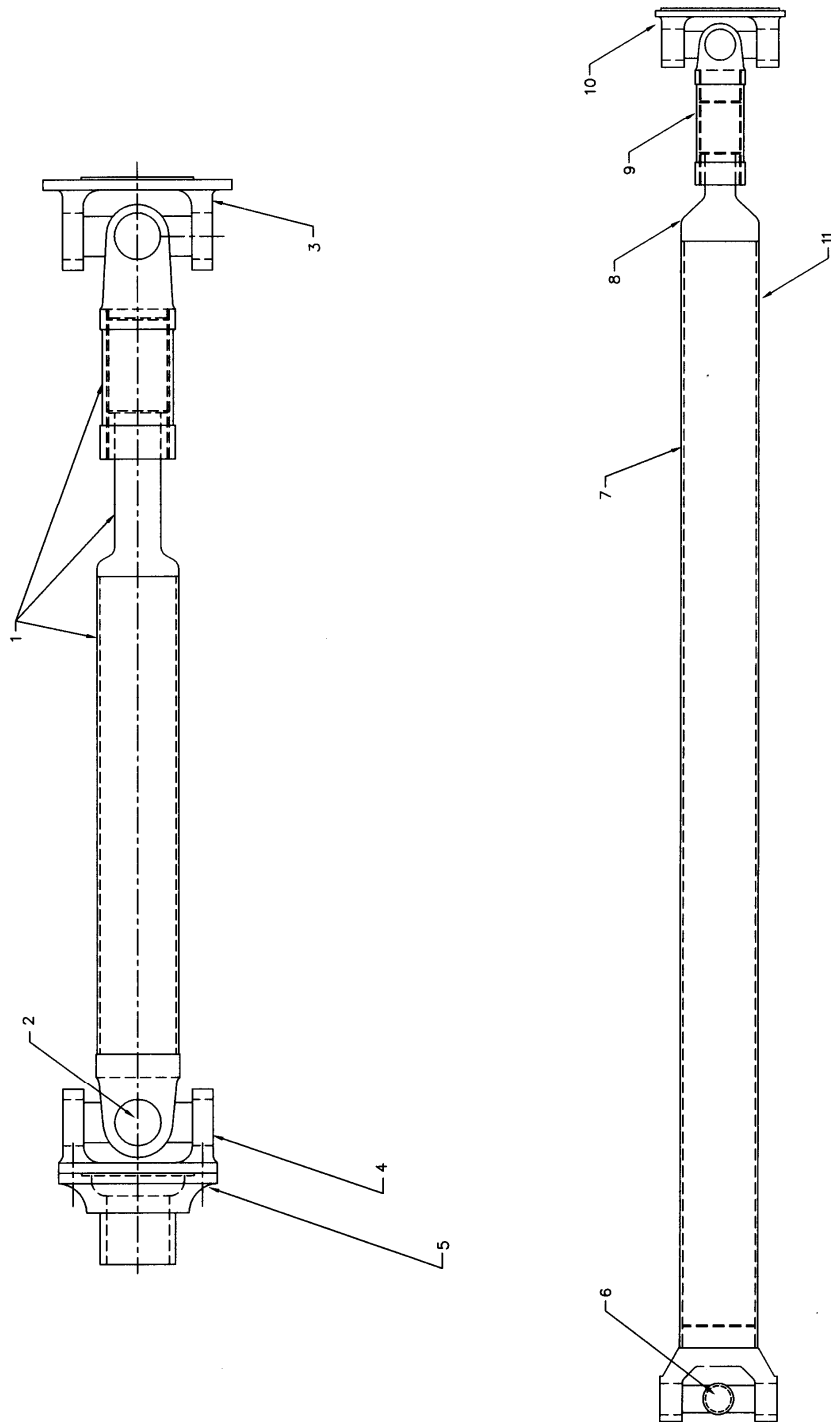


Figure 7-5. Drive Lines



Model 2002/CRC

Illustrated Parts List

Fig	Item	Description	Part No.	Qty.
7-5		Drive Lines		RF
	1	Drive Line Assembly Pro/Belt Drive Motor	PTM-51553	1
	2	U-Joint 5-153X	PTM-22288	2
	3	Flange Yoke 2-2-479	PTM-22252	1
	4	Flange Yoke 2-2-329	PTM-22251	1
	5	Companion Flange 2-1-333	PTM-22273	1
	6	U-Joint 1410 5 – 160X	PTM-51550	2
	7	Tube Yoke Assembly 3-17-14-5330	PTM-61566	1
	8	Tube Shaft 3-40-1571	PTM-61561	1
	9	Slip Yoke 3-3-1701KX	PTM-61562	1
	10	Flange Yoke 3-2-559	PTM-61563	1
	11	Drive Line Assembly Spicer/Dana Axle	PTM-61555	1

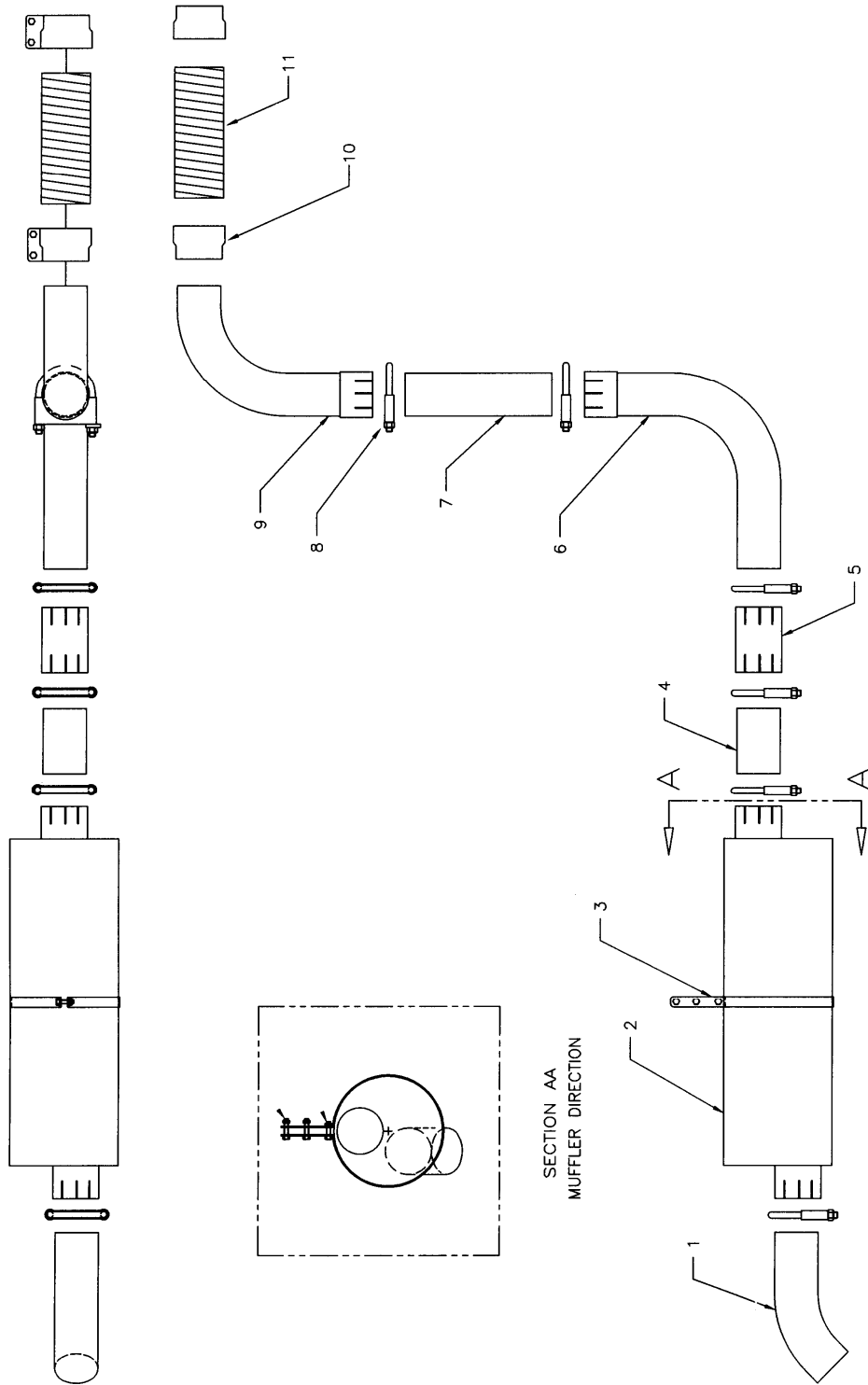


Figure 7-6. Exhaust System



Model 2002/CRC

Illustrated Parts List

Fig	Item	Description	Part No.	Qty.
7-6		Exhaust System		RF
	1	Tail Pipe	FIT-51884	1
	2	Horizontal Mufflers	MSC-51875	1
	3	Muffler Hanger	BRK-51877	1
	4	Nipple Exhaust (4" X .083" Wall Tube X 6" Long)		1
	5	Connector Tube	FIT-51874	1
	6	Elbow 18" X 18" 90°	FIT-51873	1
	7	Tube 4" X .083" W. Nipple Exh.	FIT-51885	1
	8	Clamp U Guillotine Type	FAS-51872	6
	9	Elbow 18" X 18" 90° (6" Cut Off End)	Modified FIT-51873	1
	10	Clamp Connector Stainless Steel	FIT-51871	2
	11	Tubing Flex 4" X 10 1/2"	FIT-51872	1

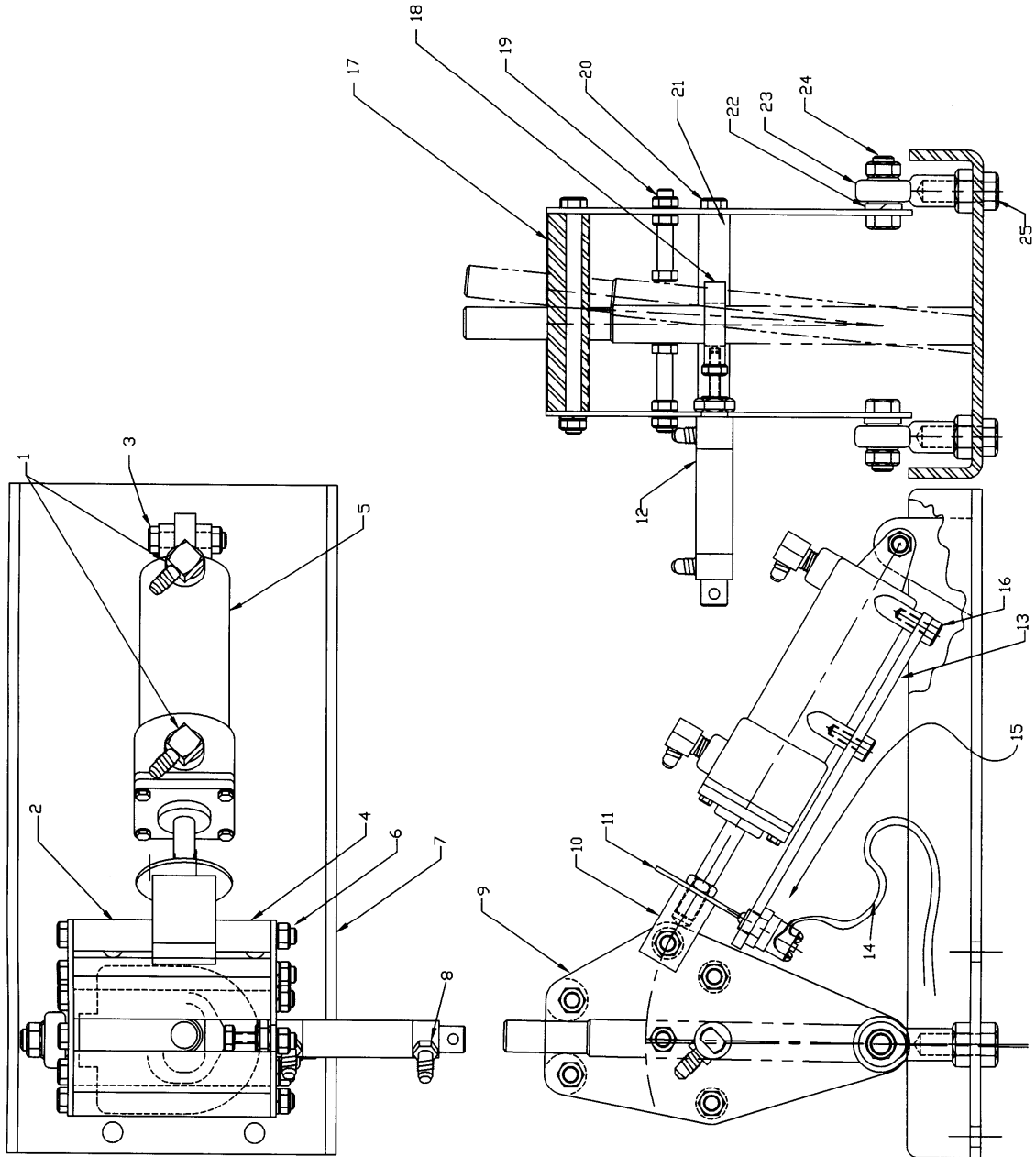


Figure 7-7. Shift Assembly Remote 98



Fig	Item	Description	Part No.	Qty.
7-7		Shift Assembly Remote 98		RF
	1	90° 1/4" Male Jic X 1/4" Male Pipe	90D4MJ-4MP	2
	2	Spacer (Clevis Positioning) Remote	BRK-60858-2	2
	3	Hex Bolt 3/8" – 24 X 1 3/4" Gr. 8	FAS-28980	1
		Nut Lock 3/8" – 24	FAS-28562	1
	4	Spacer (Clevis Positioning) Remote	BRK-60858-1	1
	5	Cylinder, Spring Centered, Shifter	CYL-60726	1
	6	Hex Bolt 3/8" – 16 X 5 1/2" Gr. 8	FAS-28729A	2
		Nut Lock 3/8" – 16 Gr. 8	FAS-28502A	2
	7	Base Remote Shift ES70 Transmission	BRK-60851	1
	8	1/4" Male Jic X 1/8" Male Pipe	4MJ-2MP	2
	9	Pivot Bracket Remote Shift	BRK-60846	2
	10	Clevis (Gear Select Cylinder) Remote	BRK-60857	1
	11	Washer (Indicator Stricken) Remote Shift	BRK-60861	1
	12	Spray Bar Cylinder	CYL-27318	1
	13	Indicator Switch Bracket Remote Shift	BRK-60853	1
	14	Switch Wiring (Black 14 Gauge Wire)		18"
		Switch Wiring (Green 14 Gauge Wire)		18"
	15	Switch Back-up (Normally Open)	ELC-24256	1
	16	Hex Bolt 5/16" – 18 X 3/4"	FAS-28715	4
	17	Slack Adjustment Spacer Remote Shift	BRK-60856	2
	18	Clevis (Neutral Gate Selector) Remote Shift	BRK-60859	1
	19	Hex bolt 3/8" – 16 X 2"	FAS-28735	2
		Nut Hex 3/8" – 16 Gr. 8	FAS-28502A	4
	20	Hex Bolt 3/8" – 16 X 5 1/2" Gr. 8	FAS-28729A	4
		Nut Hex 3/8" – 16 Gr. 8	FAS-28502A	4
		Lock-Washer 3/8"	FAS-28647	4
	21	Spacer, Remote Shift ES70 Transmission	BRK-60855	2
	22	Lock-Washer 1/2"	FAS-28649	2
	23	Rod End 1/2" Female Bore	PTM-60860	2
	24	Hex Bolt 1/2" – 13 X 1 1/2" Gr. 8	FAS-28762A	2
		Nut Lock 1/2" – 13 Gr. 8	FAS-28540	2
	25	Hex Bolt 1/2" – 20 X 1 1/4"	FAS-28911A	2

VALVE #1	BK	TO	TER #9
VALVE #2	RD	TO	TER #1
VALVE #3	BK	TO	TER #9
VALVE #4	RD	TO	TER #2
VALVE #5	BK	TO	TER #10
VALVE #3	RD	TO	TER #5
VALVE #4	BK	TO	TER #10
VALVE #4	RD	TO	TER #4

METAL JUMPERS:
 TER #9 TO TER #10
 TER #10 TO GROUND

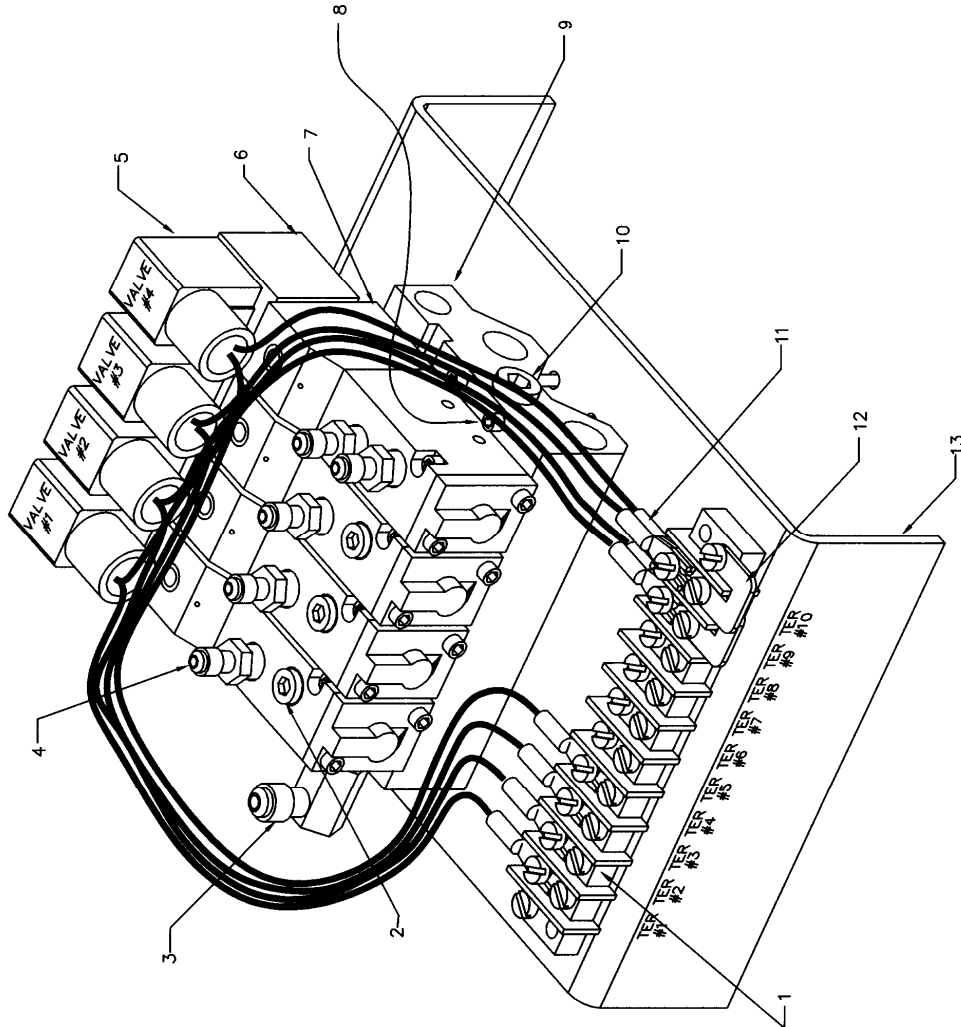


Figure 7-8. Valve Cluster Assembly

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-8		Valve Cluster Assembly		RF
	1	10 Gang Barrier Strip	ELC-24188	1
	2	Plug Pipe Soc. Hd. 1/8"	FIT-28295	3
	3	90° 1/4" Male Jic X 1/4" Male Pipe	90D4MJ-4MP	1
	4	1/4" Male Jic X 1/8" Male Pipe	4MJ-2MP	5
	5	Connector, Din Versa C-5/C-7 Valves	ELC-24416	4
	6	Coil Versa C-5/C-7 4 Way	ELC-26970	4
	7	Valve Air 4-Way Sol. Valve C-5 Versa	VLV-26970	4
	8	Soc. Hd. Screw 6 – 32 X 1 1/2"	FAS-25447	4
		Nut Hex 6 – 32	FAS-28551	4
	9	Manifold Air W/O Valves 4-Station Versa	MSC-27004	1
	10	Plug Pipe Soc. Hd. 1/4"	FIT-28296	1
	11	Connector Snap Spade	FAS-24103	8
	12	Jumper Cinch Connector	ELC-24218	2
	13	Base Valve Cluster Remote Shift	BRK-61862	1



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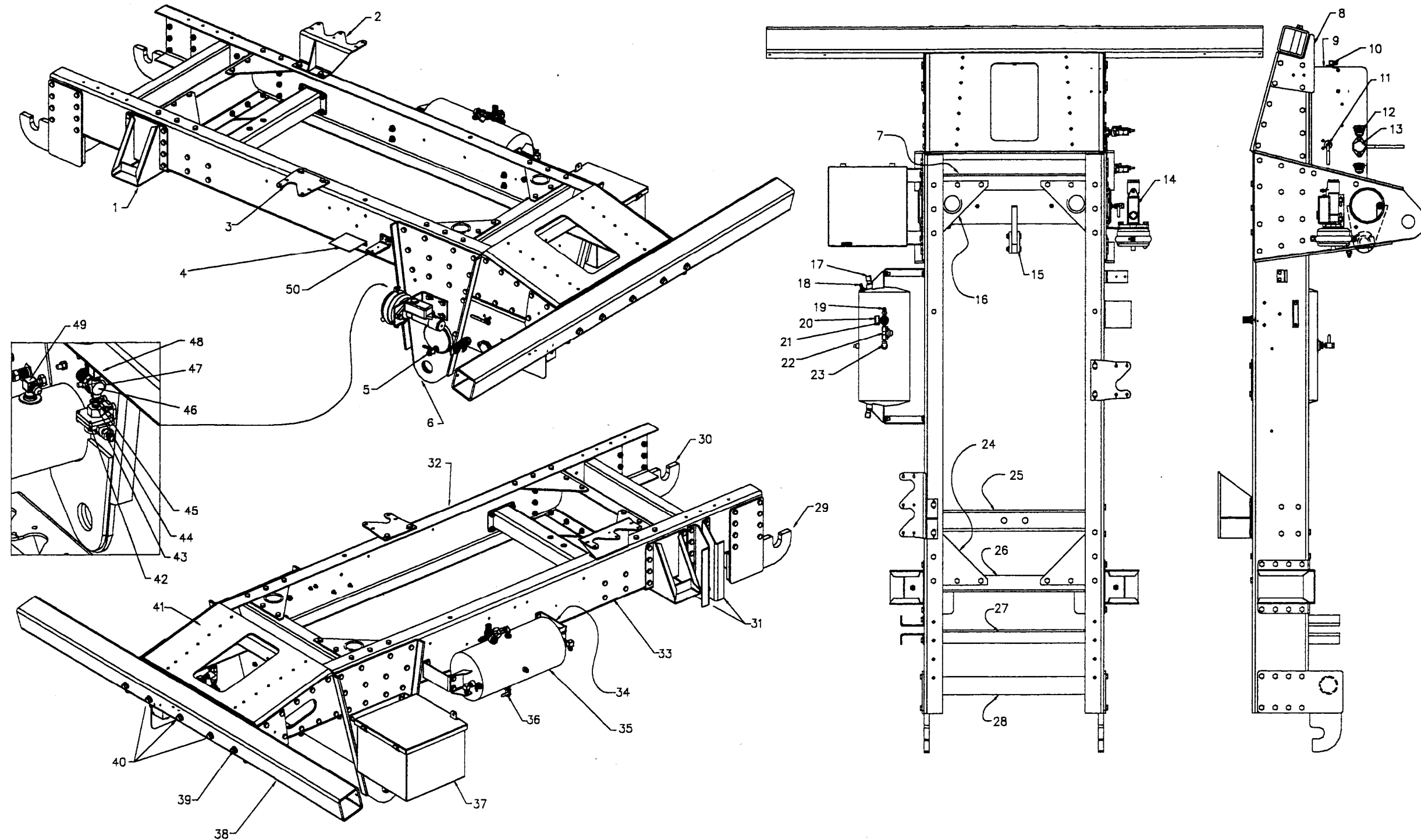


Figure 7-9. Frame Assembly

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-9		Frame Assembly		RF
	1	Bracket Assembly, Timbren Spring	BRK-51484	2
	2	Bracket, Triple Return F. Hex Mount	BRK-51679	1
	3	Bracket, Double Intake Filter Mount	BRK-51680	1
	4	Baffle Air Dryer	BRK-60948	1
	5	1/4" Ball Valve	VLV-29195	1
		1/4" X Close Nipple	FIT-28001	1
		1/4" Relief Valve	VLV-51638	1
	6	Right-Hand & Left-Hand Stanchion Plate	BRK-51481	2
	7	Channel Frame (W/Holes)	HSG-51486 (-3)	1
	8	Gusset, Frame/Tube X-member	BRK-61043	2
	9	Panel Assembly, Manifold, Tow Bar/Glad Hand	HSG-61059	1
	10	Manifold Assembly Hitch W/Out Option	HSG-61052	1
		Manifold Assembly Hitch With Lift Option	HSG-61053	1
	11	Tow Operate Ball Valve Assembly	HSG-51951	1
	12	Glad Hand Connector	ELC-22375	2
		1/2" M.P. X 3/4" Bulk Head X 1/2" M.P. Connector	8MP-12BH-8MP	2
	13	Socket 7-Cond. Pre-wired/Cord Assembly	ELC-60836	1
	14	Master/Cylinder Air/Hyd. JD & SP/Dana Brakes	PTM-51644	1
	15	Spherical Bearing Retainer	HSG-51513	2
		Spherical Bearing	PTM-51517	1
	16	Gusset, Cross member W/3" Hole	BRK-20234	2
	17	90° 1/2" Male Jic X 1/2" Male Pipe	90D8MJ-8MP	2
	18	90° 1/4" Male Jic X 1/4" Male Pipe	90Dd4MJ-4MP	1
	19	1/2" Male Jic X 1/4" Male Pipe	8MJ-4MP	1
	20	0-160 PSI Pressure Gauge	MTR-50665	1
	21	80# Fixed Regulator	VLV-26199	1
	22	60 PSI Air Regulator	MTR-25225	1
	23	1/2" 90° Pipe Elbow	FIT-28206	1
		1/4" X Close Pipe Nipple	FIT-28001	1
	24	Gusset, Truck Frame	BRK-20235	6
	25	Front Engine Mount	HSG-51472	1
	26	Channel Frame (No Holes)	HSG-51486 (-1)	1
	27	Stiffener, Frame (Cross Member)	BRK-61485	1
	28	Support Tube Chip Box Hooks	BRK-60925	1
	29	Hook, Left-Hand Chip Box Hook Plate Assembly	BRK-51471	1
	30	Hook Right-Hand Chip Box Hook Plate Assembly	BRK-51472	1
	31	Bracket Sway-Bar (Right-Hand & Left-Hand)	BRK-51485	2
	32	Frame Rail Left-Hand	HSG-61481	1
	33	Frame Rail Right-Hand	HSG-61480	1
	34	Spacer Air Storage Tank	BRK-51573	2

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-9	35	Air Tank Assembly Chassis	TNK-51993	1
	36	1/4" Ball Valve	VLV-29195	1
		1/4" X Close Pipe Nipple	FIT-28001	1
	37	Battery Box	HSG-51560	1
	38	Tube X-Member Transmission Mount	BRK-60660	1
	39	Hex Bolt 5/8" – 11 X 6 1/2" Gr. 8	FAS-28826A	2
		Lock-Washer 5/8"	FAS-28650	2
		Nut Hex 5/8" – 11 Gr. 8	FAS-28505A	2
	40	Hex Bolt 5/8" – 11 X 7" Gr. 8	FAS-28785A	3
		Lock-Washer 5/8"	FAS-28650	3
		Nut Hex 5/8" – 11 Gr. 8	FAS-28505A	3
	41	Plate, Conveyor to Frame Mount	HSG-61477	1
	42	Quick Release Valve	VLV-51642	1
	43	1/2" Male Jic X 1/4" Male Pipe	8MJ-4MP	1
	44	Hex Bushing 3/8" X 1/4"	FIT-28342	1
	45	1/2" X Close Pipe Nipple	FIT-28001	1
	46	45# Fixed Regulator	VLV-26201	1
	47	Soc. Hd. Pipe Plug 1/8"	FIT-28296	3
	48	90° 1/2" Male Jic X 1/4" Male Pipe	90D8MJ-4MP	1
	49	90° 1/2" Male Jic X 1/2" Male Pipe	90D8MJ-8MP	1
	50	Bracket, Primary Fuel Filter	BRK-60615	1



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Fig	Item	Description	Part No.	Qty.
7-10		Wish Bone Assembly		RF
	1	Spicer/Dana Drive Axle	PTM-61465	1
	2	Spicer/Dana Left-Hand Top Axle Plate	BRK-61459	1
	3	Spicer/Dana Right-Hand Top Axle	BRK-61461	1
	4	Spherical Bearing Spacer	PIP-51518	2
	5	Nut 1 1/2" – 12 Esan (Nylon) Lock	FAS-28593	1
	6	Hex Bolt 1 1/2" – 12 X 8" Gr. 8	FAS-28999A	1
	7	Spicer/Dana Channel A-Frame Axle	HSG-61464	2
	8	Spicer/Dana Axle Bottom Left-Hand Plate	BRK-61463	1
	9	Spicer/Dana Spacer Wish Bone Axle	BRK-61458	8
	10	Spicer/Dana Axle Bottom Right-Hand Plate	BRK-61463	1
	11	Hex Bolt 3/4" – 16 X 10 1/2" Gr. 8	FAS-28959A	8
	12	Washer SAE Flat 3/4" Gr. 8	FAS-28624	16
	13	Nut High Hex 3/4" – 16 Gr. 8	FAS-28614A	8
	14	Hex Bolt 1/2" – 13 X 1 1/2" Gr. 8	FAS-28762A	24
		Lock-Washer 1/2" Gr. 8	FAS-28649A	24
		Nut Hex 1/2" – 13 Gr. 8	FAS-28504A	24

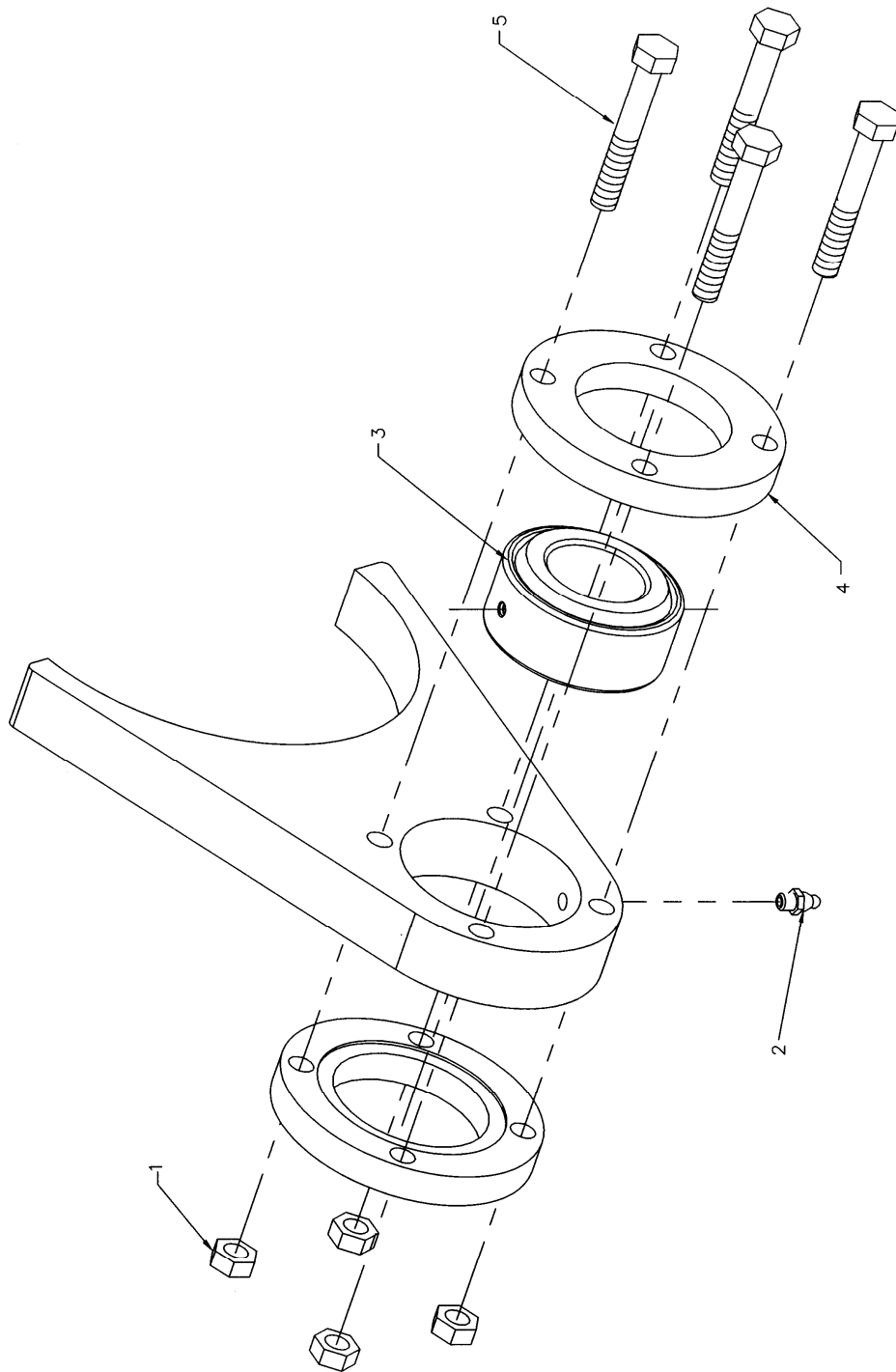


Figure 7-11. Spherical Bearing



Fig	Item	Description	Part No.	Qty.
7-11		Spherical Bearing		RF
	1	Nut Hex 3/8" – 16	FAS-28538	4
	2	1/4" Grease Zerk	.250-28M-2	1
	3	Spherical Bearing	PTM-51517	1
	4	Spherical Bearing Retainer	HSG-51513	2
	5	Hex Bolt 3/8" – 16 X 2 1/2"	FAS-28736	4

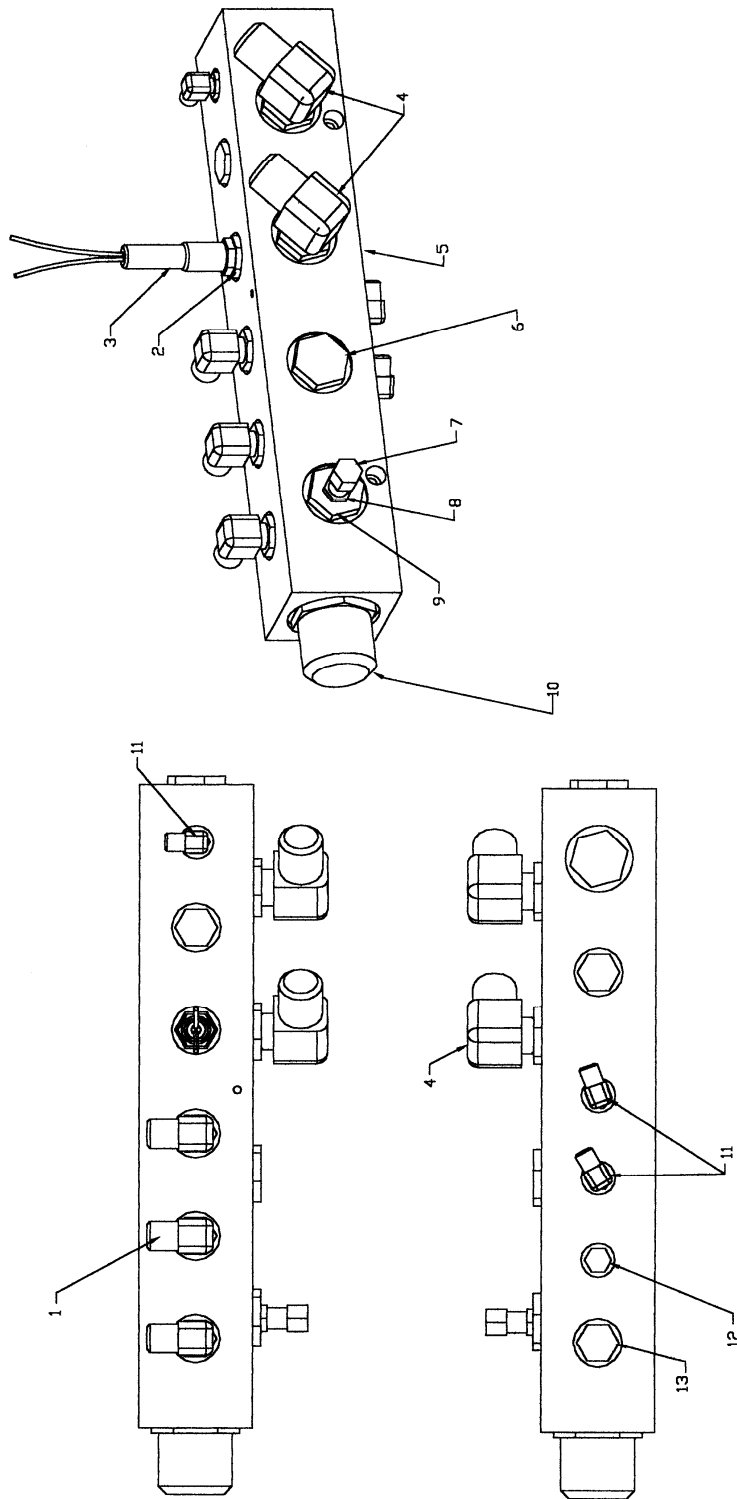


Figure 7-12. Manifold Return W/Fittings

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-12		Manifold Return W/Fittings		RF
	1	90° 1/2" Male O-Ring X 1/2" Male Jic	90D8MB-8MJ	3
	2	1/4" Female Pipe X 1/2" Male O-Ring	4FP-8MB	1
	3	Fan Switch, Oil Cooler 150°	ELC-51660	1
	4	90° 3/4" Male O-Ring X 3/4" Male Jic	90D12MB-12MJ	2
	5	Manifold Return Chipper	MSC-51591	1
	6	Plug 3/4" Male O-Ring	P12MB	3
	7	Cap 1/4" Female Jic	C4FJ	1
	8	1/4" Male O-Ring X 1/4" Male Jic	4MB-4MJ	1
	9	Bushing 3/4" Male O-Ring X 1/4" Female O-Ring	12MB-4FB	1
	10	1 1/4" Male O-Ring X 1 1/4" Male Jic	20MB-20MJ	1
	11	90° 1/4" Male O-Ring X 1/4" Male Jic	90D4MB-4MJ	3
	12	Plug 1/4" Male O-Ring	P4MB	1
	13	Plug 1/2" Male O-Ring	P8MB	3

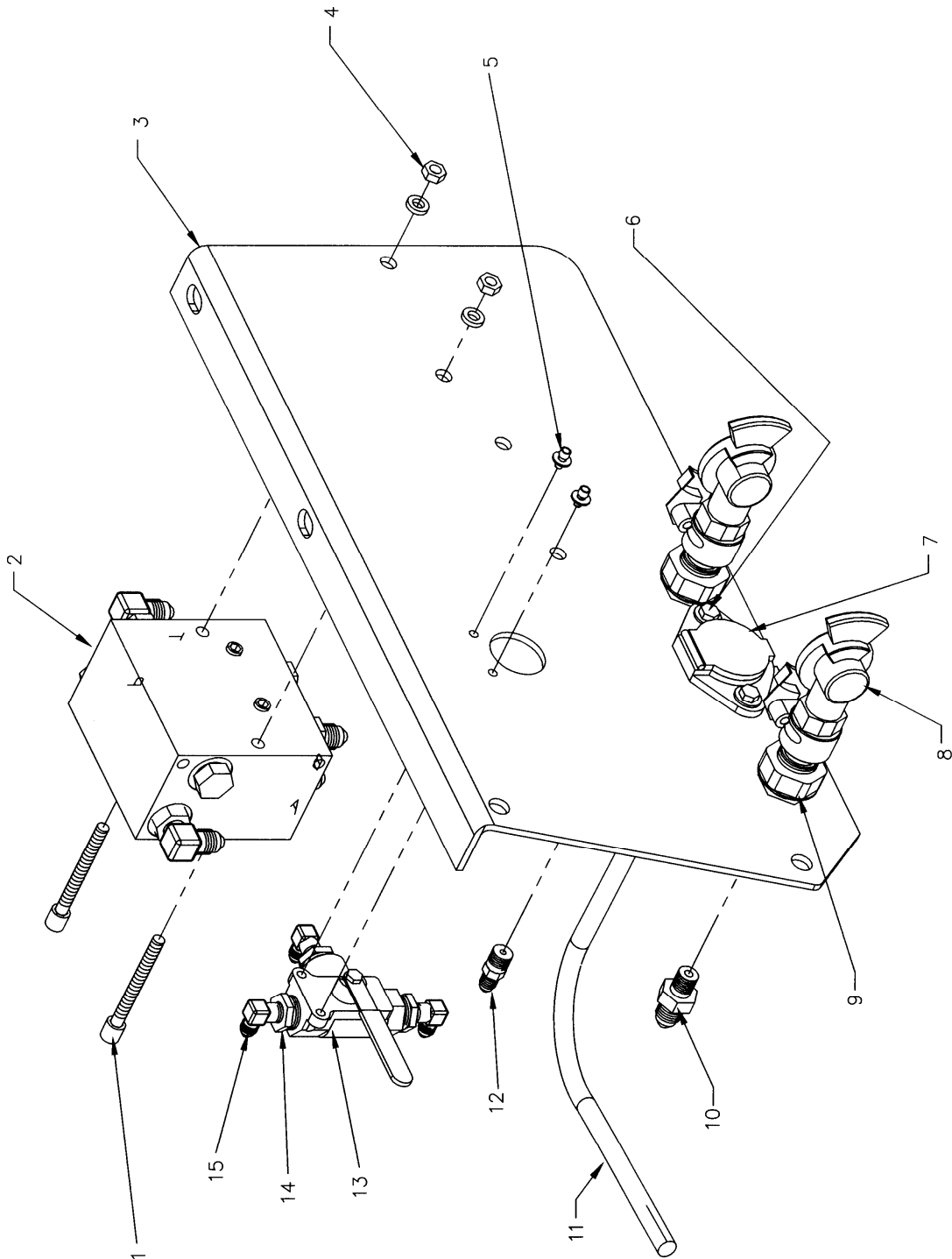


Figure 7-13. Panel Manifold, Glad Hand and Socket Assembly

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-13		Panel Manifold, Glad Hand and Socket Assembly		RF
	1	Soc. Hd. Bolt 5/16" – 18 X 3"	FAS-25483	2
	2	Hitch Manifold (W/Fittings Only)	HSG-61500	1
	3	Bracket, Hitch Manifold, Tow Bar Glad Hand	BRK-61048	1
	4	Nut Hex 5/16" – 18	FAS-28501	2
		Lock-Washer 5/16"	FAS-28646	2
	5	Soc. Hd. Screw 10 – 24 X 3/8"	FAS-25451	2
	6	Hex Bolt 1/4" – 20 X 1"	FAS-28702	2
		Flat Washer 1/4"	FAS-28632	2
		Lock-Washer 1/4"	FAS-28645	2
		Nut Hex 1/4" – 20	FAS-28500	2
	7	Socket 7-Pole Trailer Conn.	ELC-24245	1
		Socket Boot	ELC-24247	1
	8	Glad Hand	ELC-22375	2
	9	1/2" Male Pipe X 3/4" Bulk Head X 1/2" Male Pipe	8MP-12BH-8MP	2
	10	1/2" Male Jic X 1/4" Male Pipe	8MJ-4MP	1
	11	Cable 7-Cond. Stranded Trailer Cable	ELC-24058	10'
	12	1/4" Male Jic X 1/4" Male Pipe	4MJ-4MP	1
	13	Valve S/S 3-Way Ball Valve	VLV-29216	1
	14	Bushing Hex 1/2" X 1/4"	FIT-28344	3
	15	90° 1/4" Male Jic X 1/4" Male Pipe	90D4MJ-4MP	3



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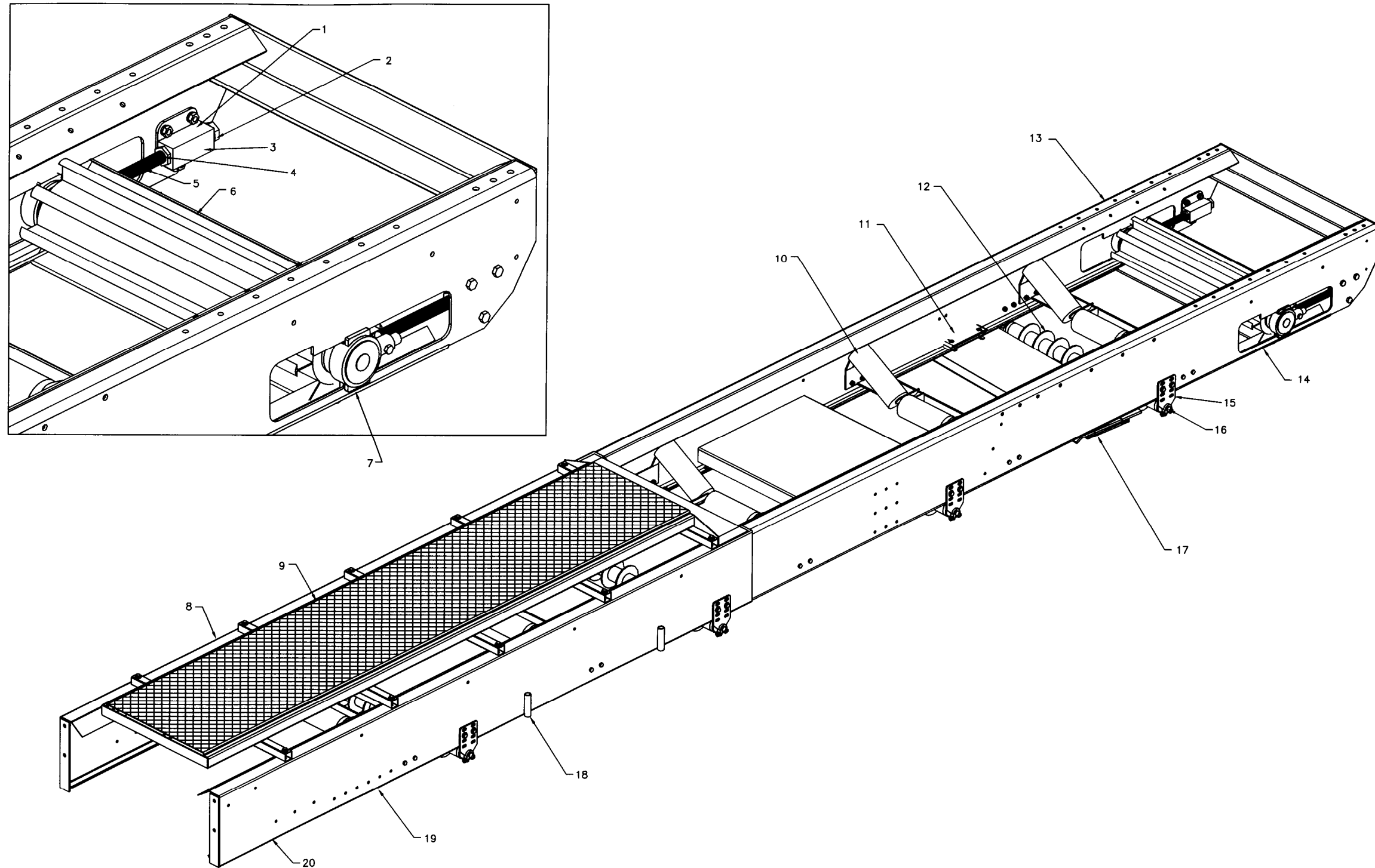


Figure 7-14. Conveyor Assembly Left-Hand and Right-Hand



Fig	Item	Description	Part No.	Qty.
7-14		Conveyor Assembly Left-Hand and Right-Hand		RF
	1	Take-Up Bearing Adjustment Assembly Left-Hand & Right-Hand	MCH-51965	4
	2	Washer 2" O.D. X 1 1/2" I.D.	FAS-60739	4
	3	Adjustment Screw Bearing	PTM-51967	4
	4	Adjustment Nut	FAS-51979	4
	5	Adjustment Screw Take-Up Bearing	FAS-51966	4
	6	Chipper Tail Pulley Assembly	MCH-51403	2
	7	Take-Up Bearing	PTM-51417	4
	8	Rail Front #2 Left Conveyor	HSG-61424	1
		Rail Front #4 Right Conveyor	HSG-61434	1
	9	Cat Walk "97" Chipper	GRD-61704	2
	10	Deep Troughing Roller Assembly	MCH-51402	10
	11	Conveyor Spacer	BRK-51930	4
	12	Return Roller Assembly	PTM-51413	8
	13	Rail Rear #2 Left Conveyor (1-Pc)	HSG-61417	1
		Rail Rear #4 Right conveyor (1-Pc)	HSG-61419	1
	14	Rail Rear #1 Left Conveyor (1-Pc)	HSG-61416	1
		Rail Rear #2 Right Conveyor (1-Pc)	HSG-61418	1
	15	Bracket Return Roller	BRK-51407	16
	16	Stub Shaft	MCH-51412	16
	17	Attach Plate (W/Shims)	BRK-51462	2
	18	Bracket Diverter Plate Holder	BRK-61611	4
	19	Rail Front #1 Left Conveyor	HSG-61425	1
		Rail Front #3 Right Conveyor	HSG-61435	1
	20	Conveyor Assembly Left-Hand	HSG-61601	1
		Conveyor Assembly Right-Hand	HSG-61602	1



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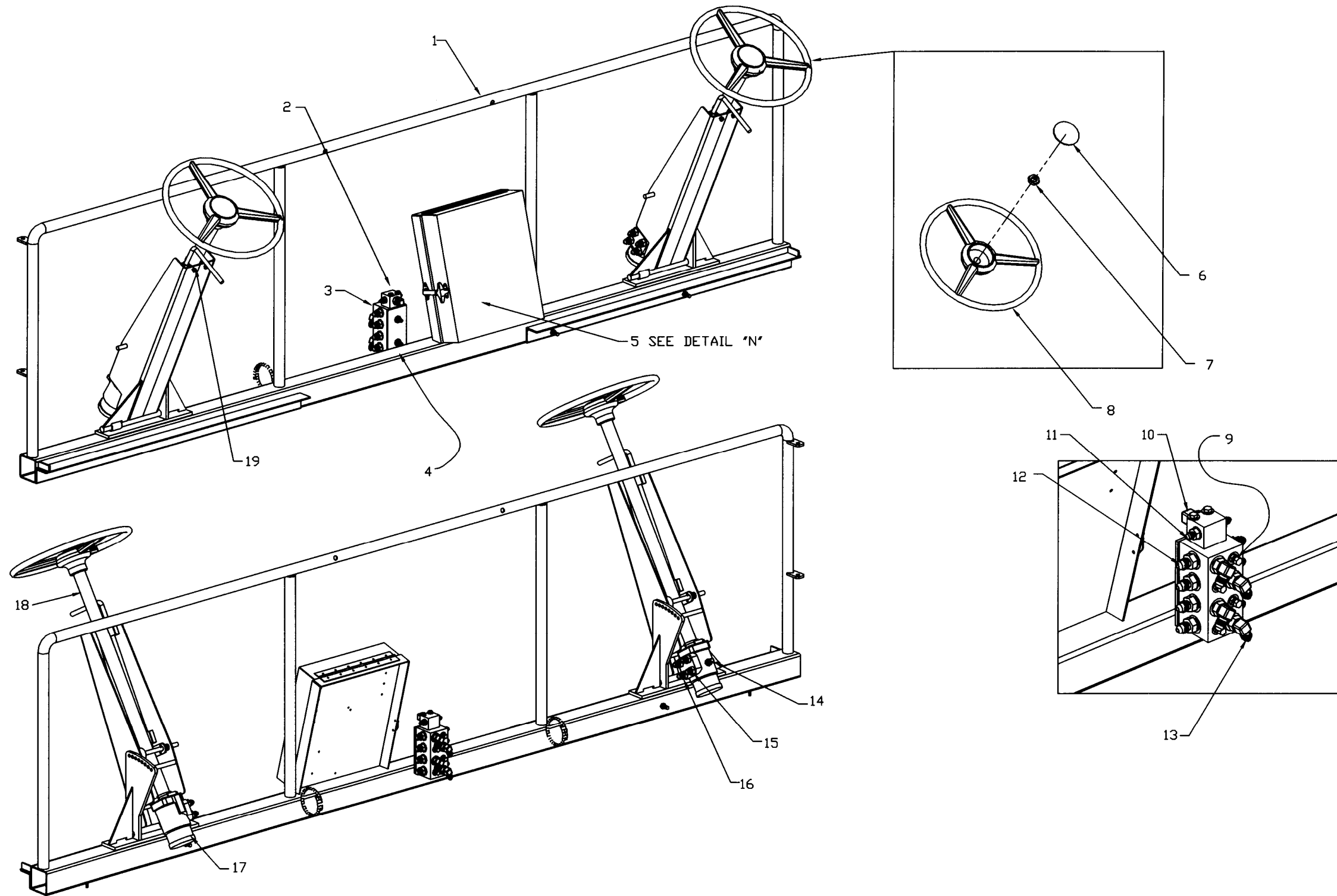


Figure 7-15. Tube/Steering Assembly



Fig	Item	Description	Part No.	Qty.
7-15		Tube/Steering Assembly		RF
	1	Platform Support/Forward Tube Assembly	BRK-60673	1
	2	Steering Shuttle Valve	VLV-51605	1
		Hex Bolt 1/4" – 20 X 2 1/4"	FAS-28707	2
		Lock-Washer 1/4"	FAS-28645	2
	3	Manifold, Steering	MSC-60995	1
	4	Soc. Hd. Cap Screw 5/16" – 18 X 3 1/2"	FAS-25493	2
		Flat Washer 5/16"	FAS-28646	2
		Nut Hex 5/16" – 18	FAS-28501	2
		Lock-Washer 5/16"	FAS-28646	2
	5	Junction Panel, Pre-Wired Assembly	ELC-60931	1
	6	Steering Wheel Cap	MCH-51610	2
	7	Steering Wheel Nut	FAS-51611	2
	8	Steering Wheel	MCH-51609	2
	9	1/4" Male O-Ring X 1/4" Male Jic	4MB-4MJ	4
		Cap 1/4" Female Jic	C4FJ	4
	10	90° 1/4" Male O-Ring X 1/4" Male Jic	90D4MB-4Mj	1
	11	3/8" Male O-Ring X 1/4" Male Jic	6MB-4Mj	2
	12	1/2" Male O-Ring X 1/2" Male Jic	8MB-8MJ	8
	13	90° 1/2" Male O-Ring X 1/2" Male Jic	90D8MB-8MJ	4
	14	90° 1/4" Male O-Ring X 1/4" Male Jic	90D4MB-4MJ	2
	15	1/2" Male O-Ring X 1/2" Male Jic	8MB-8MJ	6
	16	Inlet Check Valve	VLV-51606	2
	17	Valve Steering	VLV-51607	2
	18	Steering Column 30"	MCH-51608	2
	19	Clamp Muffler 1 1/2"	FAS-29362	2

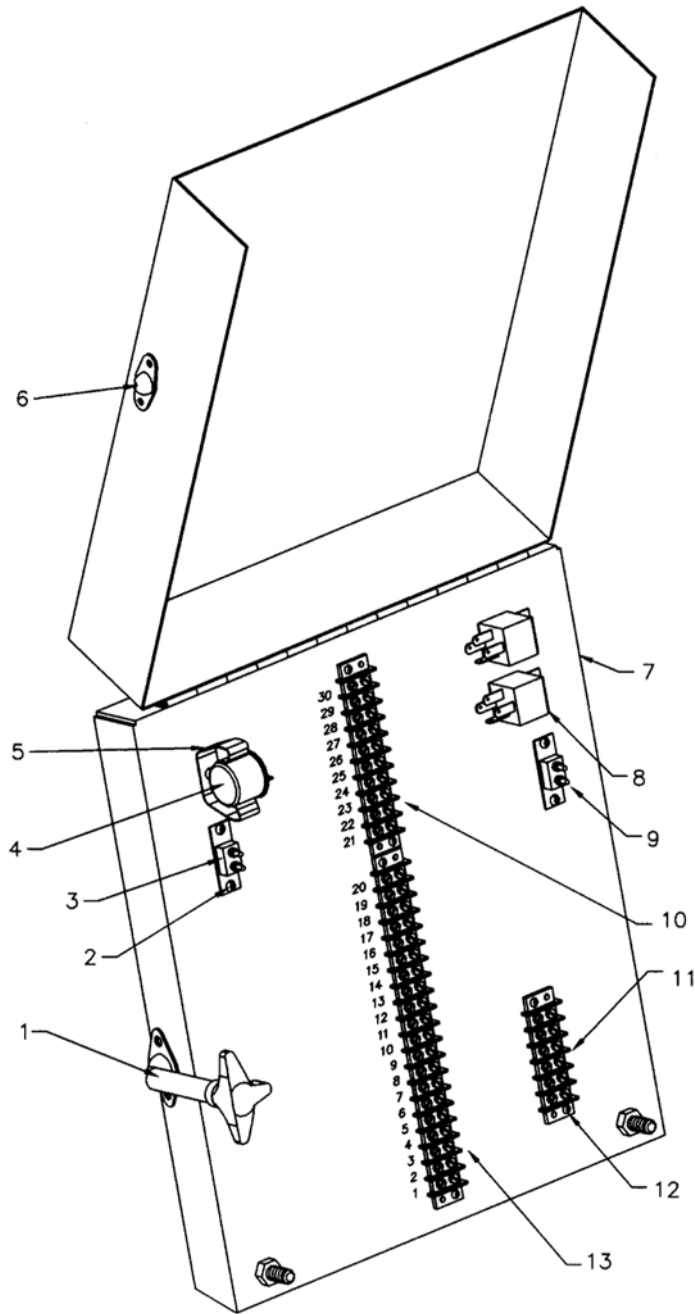


Figure 7-16. Junction Box



Fig	Item	Description	Part No.	Qty.
7-16		Junction Box		RF
	1	Latch T-Handle	FAS-24387	1
	2	Screw Machine Rd. Hd. 10 – 32 X 3/4"	FAS-25834	7
		Nut Hex 10-32	FAS-28554	7
	3	Breaker 15 Amp	ELC-24289	1
	4	Flasher Heavy Duty 2-Terminal	ELC-101889	1
	5	Clip, Flasher	BRK-51850	1
	6	Bracket Latch T-Handle	FAS-24387A	1
	7	Junction Panel Assembly	HSG-51848	1
	8	Relay 30 Amp	ELC-50612	2
	9	50 Amp Current Breaker	ELC-24184	1
	10	10 Lug Connector Cinch	ELC-24188	1
	11	Cinch Connector 6 Lug	ELC-24190	1
	12	Screw Machine Rd. Hd. 8 – 32 X 3/4"	FAS-25814	6
		Nut Hex 8 – 32	FAS-28552	6
	13	Connector 20 Lug Barrier Strip	ELC-24220	1



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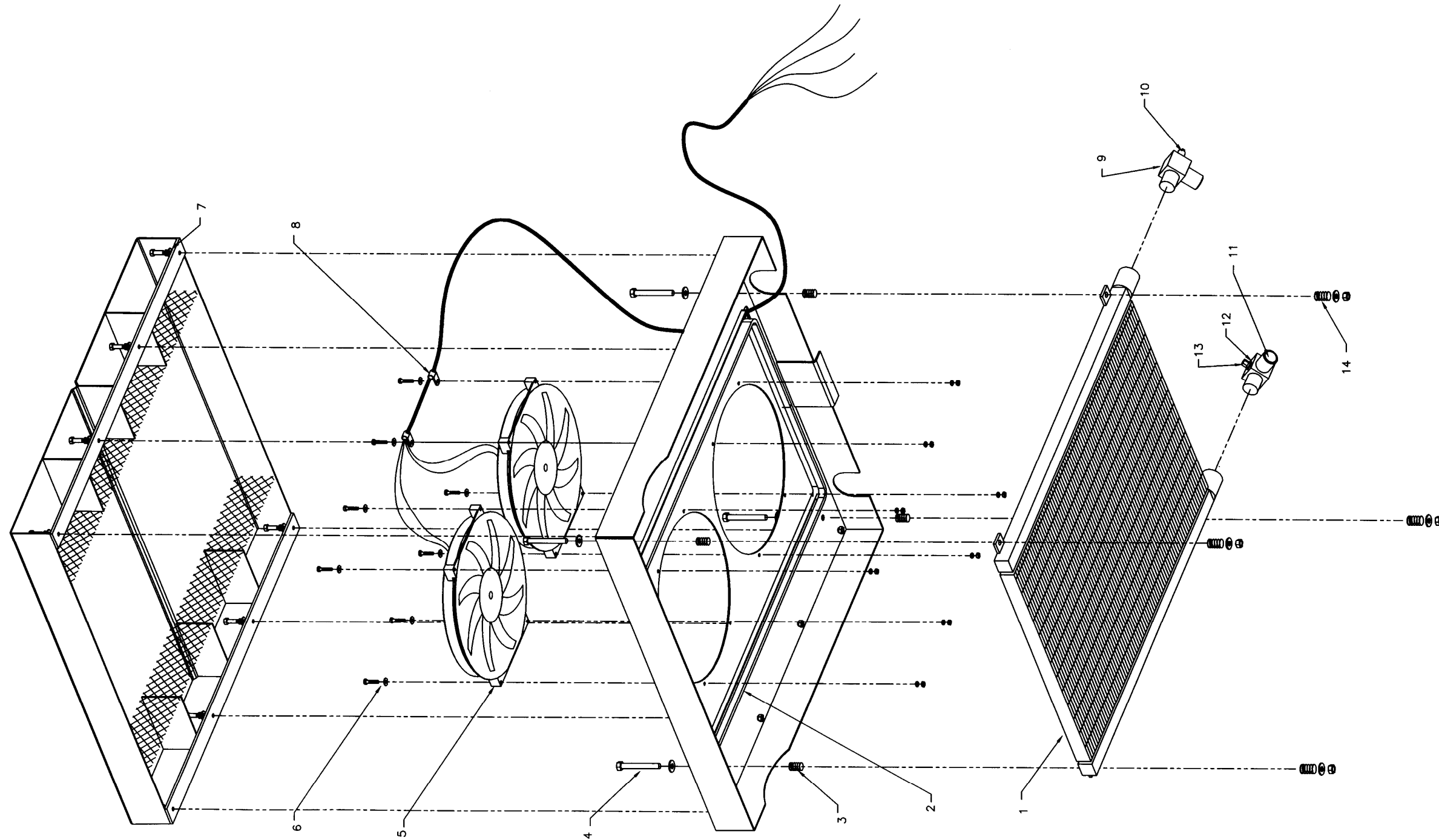


Figure 7-17. Oil Cooler Assembly



Model 2002/CRC

Illustrated Parts List

Fig	Item	Description	Part No.	Qty.
7-17		Oil Cooler Assembly		RF
	1	Oil Cooler Mobil Type	PTM-51938	1
	2	Rubber Foam 3/8" Thick X 2 1/4" Wide	RNG-21974	5'
	3	Oil Cooler Mounting Spring (Light)	FAS-29418	4
	4	Hex Bolt 1/2" – 13 X 4"	FAS-28767	4
		Flat Washer 1/2"	FAS-28636	8
		Nut Lock 1/2" – 13	FAS-28540	8
	5	Fan Electric, 12V 16" Diameter Oil Cooler	ELC-51939	2
	6	Hex Bolt 1/4" – 20 X 1 3/4"	FAS-28705	8
		Flat Washer 1/4"	FAS-28632	8
		Lock-Washer 1/4"	FAS-28645	8
		Nut Hex 1/4" – 20	FAS-28500	8
	7	Hex Bolt 3/8" – 16 X 1"	FAS-28731	8
		Flat Washer 3/8"	FAS-28634	8
		Nut Hex 3/8" – 16	FAS-28647	8
	8	1/2" LCRC Clamp	FAS-24476	2
	9	90° 1 1/4" Male Jic X 1 1/4" Male Pipe (Hyd. Temp Pressure Check Port)	FIT-24704	1
	10	Sender/Switch 1/2" (250°/230°)	ELC-60312	1
	11	90° 1 1/4" Male Jic X 1 1/4" Male Pipe (With Pressure Check Port)	FIT-24705	1
	12	1/4" Male O-Ring X 1/4" Male Jic	4MB-4MJ	2
	13	Cap 1/4" Female Jic	C4FJ	2
	14	Oil Cooler Spring (Heavy)	FAS-29419	4



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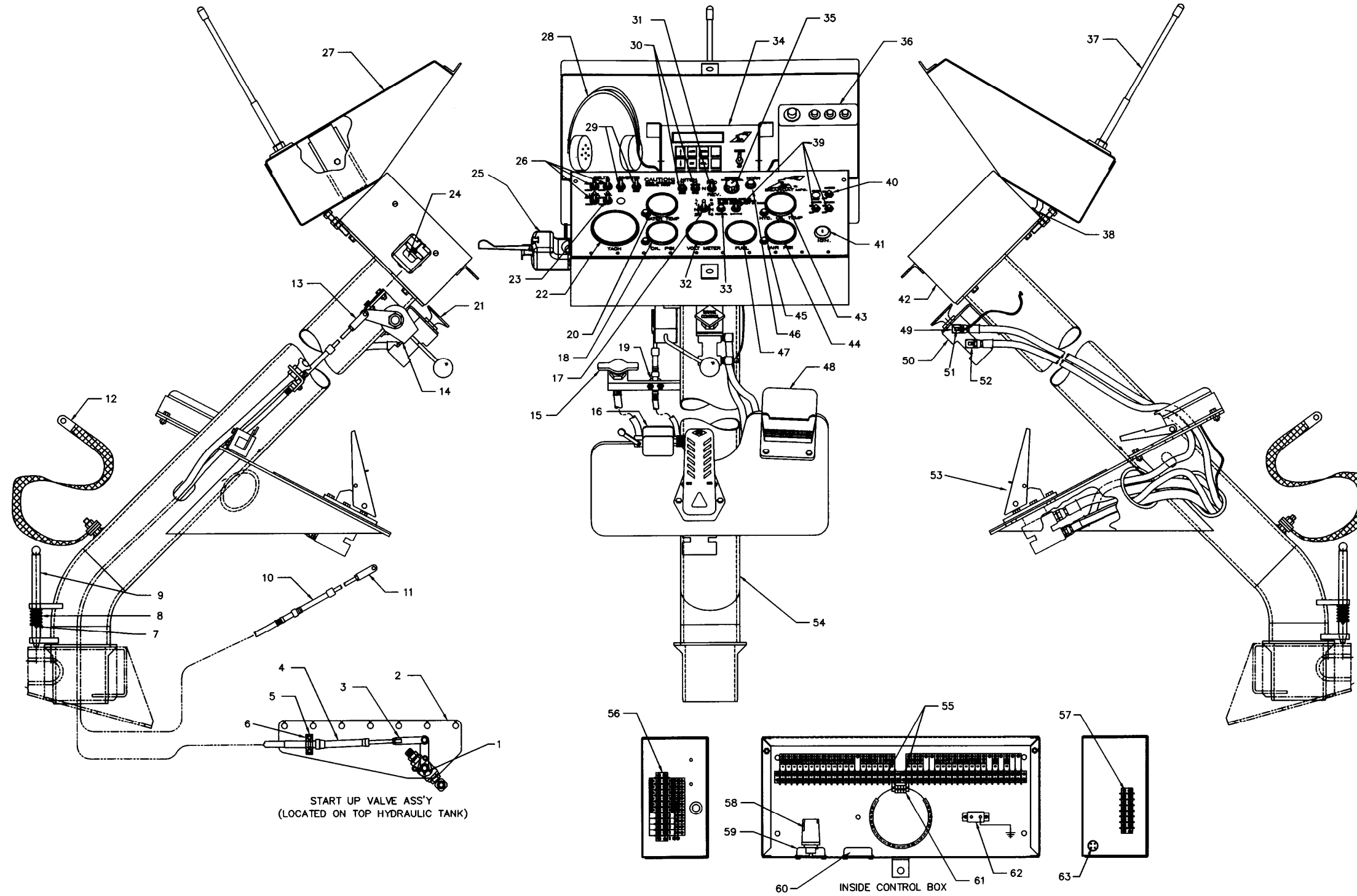


Figure 7-18. Pedestal and Control Box



Model 2002/CRC

Illustrated Parts List

Fig	Item	Description	Part No.	Qty.
7-18		Pedestal and Control Box		RF
	1	Modified 3/8" Ball Valve W/Mounting Tabs	VLV-60989	1
	2	Mounting Bracket Start-Up Valve	BRK-60985	1
	3	Clevis & Pin Start Cable 5/16" Hole 2 1/4" Long	FAS-60981	1
	4	Start Cable Assembly Push/Pull 14'	PTM-60980	1
	5	Clamp Start Cable .218" Holes/1" Centers	FAS-60982	1
	6	Mounting Bracket Start-Up Valve	BRK-60985	1
	7	Roll Pin 3/16" X 1"	FAS-27172	1
	8	Oil Cooler Spring Heavy	FAS-29419	1
	9	Latch Pin	51526-1	1
	10	Cable Assembly Throttle	PTM-51634	1
	11	Clevis & Pin Start Cable 5/16" Hole 2 1/4"	FAS-60981	1
	12	105-12G 12" Braided Ground Strap	ELC-24011	1
	13	Clevis & Pin Start Cable 5/16" Hole X 2 1/4"	FAS-60981	1
	14	Control Positive Lock	MCH-51633	1
	15	Start Cable Assembly Push/Pull 14'	PTM-60980	1
	16	Break Away Switch	ELC-24281	1
	17	Switch SP1DT On/Off/On	ELC-24272	1
	18	Gauge Oil Pressure 80 PSI	MTR-51669	1
	19	Clamp, Start Cable .218" Hole, 1" Center	FAS-60982	1
	20	Gauge Water Temperature 250°	MTR-51649	1
	21	Parking Brake Knob	MSC-51829	1
	22	Gauge Tachometer	MTR-51664	1
	23	Switch SP/DT On/Off/On	ELC-24272	1
	24	Grommet 3/4" X 9/16" I.D.	FAS-25389	1
	25	Turn Signal Switch	ELC-51586	1
	26	Switch, SP/DT On/Off/Mom	ELC-51748	3
	27	Security Box Assembly	HSG-51697	1
	28	Ear Phone (Headset 40-Channel CB)	ELC-60638	1
	29	Switch Mom/Off/Mom SP/DT	ELC-24274	2
	30	Switch Mom/Off/Mom SP/DT	ELC-24274	2
	31	Fwd/Rev Switch 3-Pole 2 Position W/Hesitation	ELC-51747	1
	32	Gauge Volt Meter 60 Amps	MTR-51663	1
	33	Light, Neutral Green	ELC-60306	1
	34	Chipper CRC Display	MTR-51753	1
	35	Potentiometer 10-Turn 250 ohms	ELC-24288	1
		Knob Computer Rate Control	ELC-24284	1
	36	CB 40 Channel (Radio Only)	ELC-60636	1
		Optional CB Radio & Head Phone Assembly	OPT-60643	1
	37	Antenna	ELC-60637	1
	38	Grommet 3/4" X 9/16 I.D.	FAS-25389	1
	39	Switch, On/Off SP/ST	ELC-24275	3

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-18	40	Switch On/Off Two Pole Switch Bar Master	ELC-24267	1
	41	Ignition Switch	ELC-51667	1
	42	Control Box Weldment	HSG-51520	1
	43	Gauge Hyd. Oil Temperature 250°	MTR-51647	1
	44	Gauge Air Pressure 150 PSI	MTR-51646	1
	45	Light Warning Red	ELC-60307	4
	46	Push Button Switch	ELC-24271	1
	47	Gauge Fuel Level	MTR-51662	1
	48	Switch Foot Modified	ELC-51831	1
	49	90° 1/8" Push Lock X 10 – 32 Thread	90D2PL-10-32M	1
	50	Valve PP3 Brake Control	VLV-51640	1
	51	Modified (90D4MJ-2MP) Air Supply (Gauge)	FIT-51998	1
	52	90° 1/4" Male Jic X 1/8" Male Pipe	90D4MJ-2MP	1
	53	Foot Pedal Brake Valve	BRK-51240	1
	54	Pedestal Assembly	HSG-51526	1
	55	Cinch Connector 20 Gang	ELC-24220	2
	56	Cinch Connector 10 Gang	ELC-24188	1
	57	Cinch Connector 6 Gang	ELC-24190	1
	58	Switch Relay 12 Volt DC	ELC-81004	1
	59	Switch Relay Socket 12 Volt DC	ELC-81005	1
	60	Buzzer Warning (Low Air, High Temp)	ELC-60310	1
	61	Resistor 150 ohms HB1515	ELC-24069	1
	62	Circuit Breaker 30 Amp 30055	ELC-24290	1
	63	Connector 4-Pin Mic Jack	ELC-60630	1



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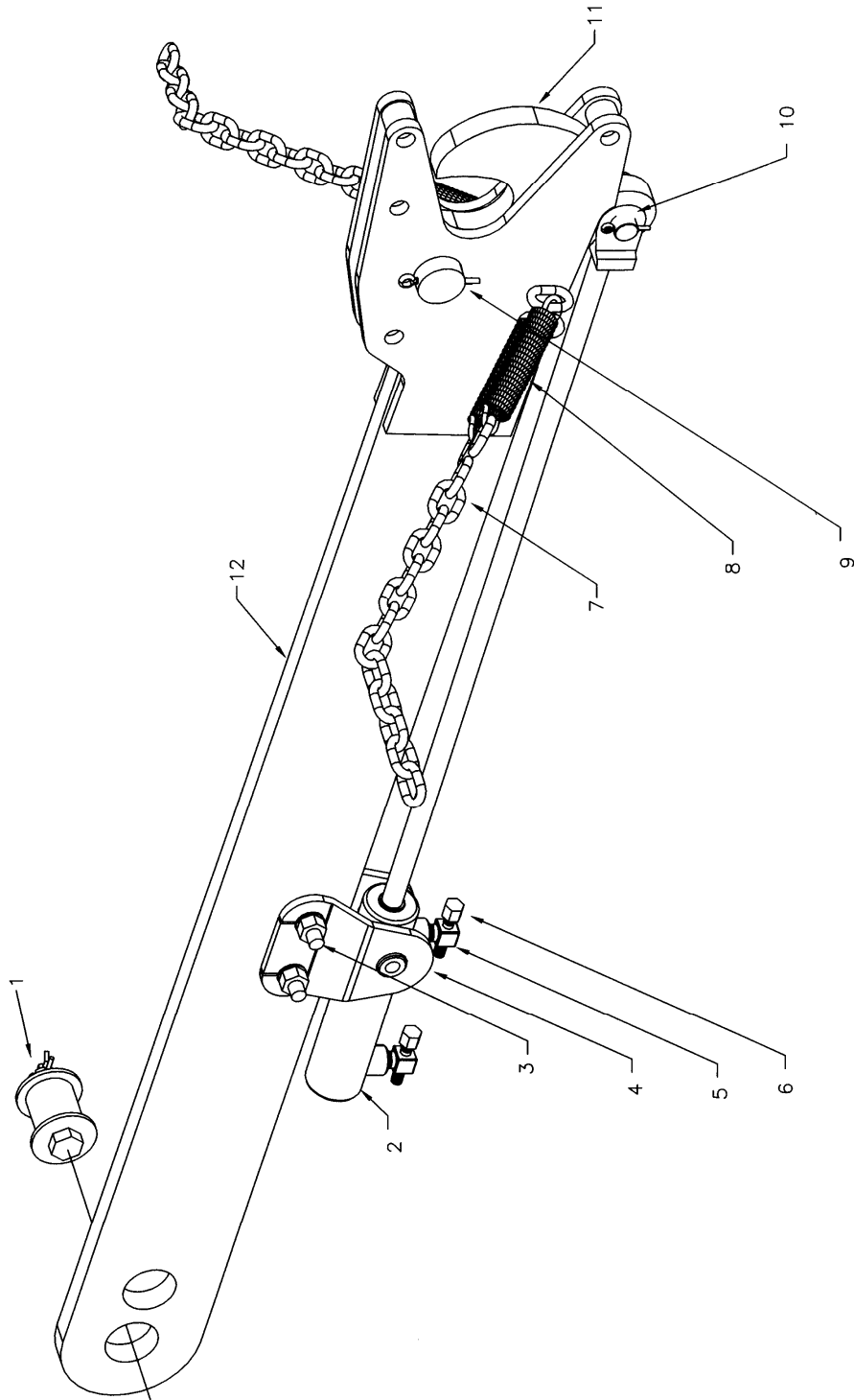
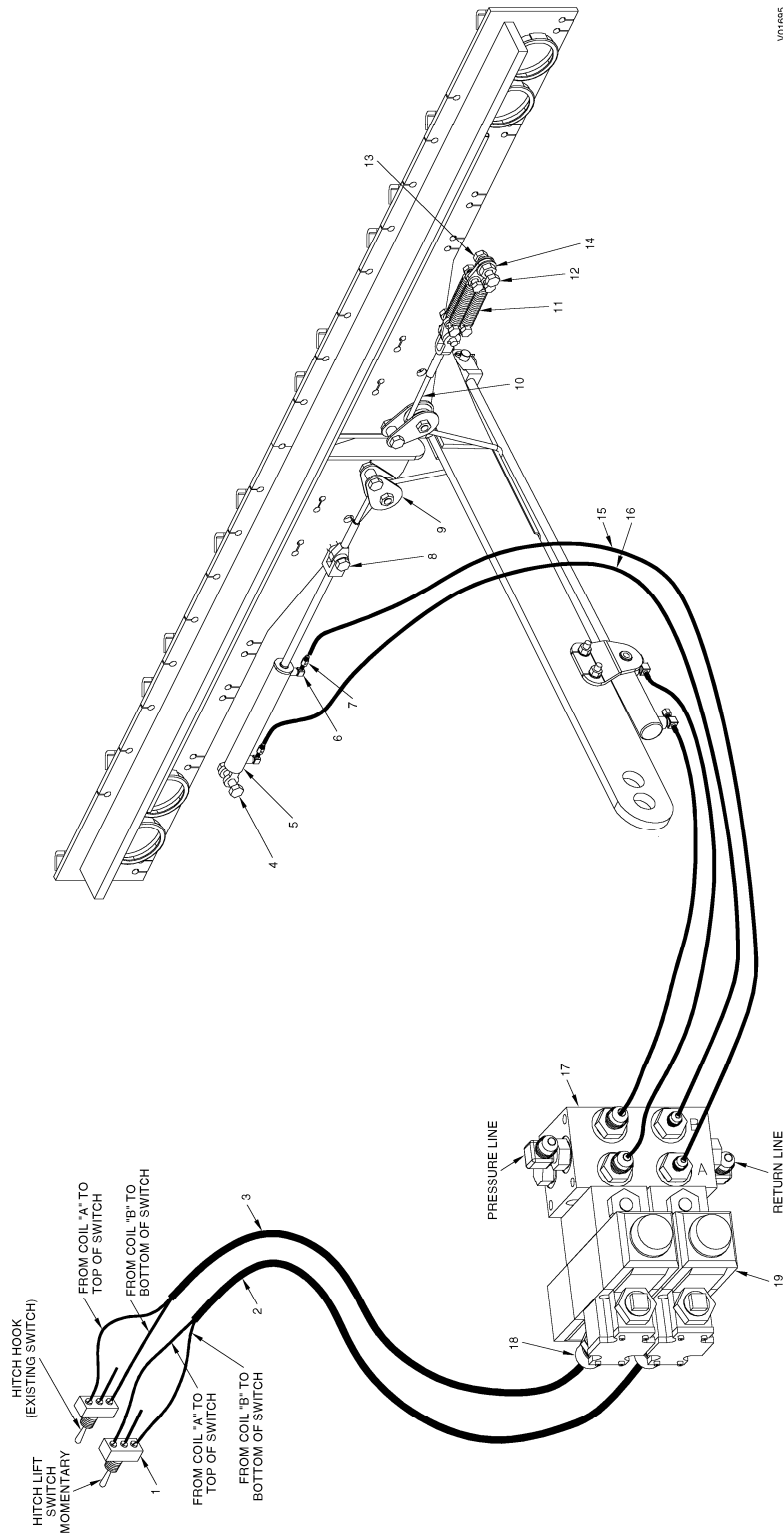


Figure 7-19. Hitch Assembly

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-19		Hitch Assembly		RF
	1	Chipper Hitch Pin	BRK-60658	1
	2	Chipper Hitch Cylinder	CYL-60651	1
	3	Hex Bolt 5/8" – 11 X 3"	FAS-28781A	2
		Lock-Washer 5/8"	FAS-28650	2
		Nut Hex 5/8" – 11	FAS-28505	2
	4	Hitch Assembly Cylinder Bracket	BRK-51505	2
	5	Tee 1/2 Male Jic X 1/2" O-Ring X 1/2" Male Jic	T8MJ-8MB-8MJ	2
	6	1/2" Female Jic Cap	C8FJ	2
	7	3/8" Grade 30 Chain (13 Links)	MSM-51814	2
	8	Hook Support Spring	FAS-51807	4
	9	Hitch Pin	FAS-51506	1
		Cotter Pin 1/4" X 2 1/2"	FAS-25944	1
	10	Pin Assembly Hitch Cylinder	FAS-60941	1
		Cotter Pin 3/16" X 2"	FAS-25935	1
	11	Hitch Hook	BRK-61501	1
	12	Hitch Assembly	MCH-51500	1



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Figure 7-20. Hitch Lift



Fig	Item	Description	Part No.	Qty.
7-20		Hitch Lift		RF
	1	Mom On/Off/Mom On, One Pole Toggles Switch	ELC-24274	1
	2	Hitch Raise, Jct Box/ Manifold Wire Loom	PIP-51693	1
	3	Hitch Hook, Jct Box/Manifold Wire Loom	PIP-51694	1
	4	Hex Bolt 3/4" – 10 X 3"	FAS-28796	1
		Nut Lock 3/4" – 10	FAS-28542	1
	5	Rec. Hitch Lift 1 1/2" X 10" Cylinder	CYL-22300	1
	6	90° 1/4" Male Jic X 1/4" Male Pipe	90D4MJ-4MP	2
	7	Restrictor Fitting With 1/32" Hole	FIT-29980	2
	8	Hex Bolt 3/4" – 10 X 2 1/2"	FAS-28795	1
		Nut Lock 3/4" – 10	FAS-28542	
	9	Snatch Block Assembly		2
		Snatch Block	PTM-52053	2
		Spacer	PTM-53323	2
		Nut Inner Spacer 7/8" – 9	FAS-28507	2
		Hex Bolt 3/4" – 10 X 3 1/2"	FAS-28954	2
		Nut Lock 3/4" – 10	FAS-28542	2
	10	Sling Cable Assembly	PTM-53333	1
	11	Spring Assembly	MCH-51816	1
	12	Hex Bolt 3/4" – 10 X 3"	FAS-28796	1
		Nut Lock 3/4" – 10	FAS-28542	1
	13	Flat Washer 3/4"	FAS-28638	4
	14	Nut Hex 7/8" – 9 (Spacer)	FAS-28507	1
		Nut Jam 7/8" – 9 (Spacer)	FAS-28519	1
	15	Hitch Raise (146") Hose Assembly	PIP-51762	1
	16	Hitch Raise (156") Hose Assembly	PIP-51760	1
	17	Manifold Assembly Hitch W/Lift Option	HSG-61500	1
	18	Connector Cord 1/2" (Strain Relief)	ELC-24420	2
	19	Directional Control Valve (Float Center)	VLV-51624	1

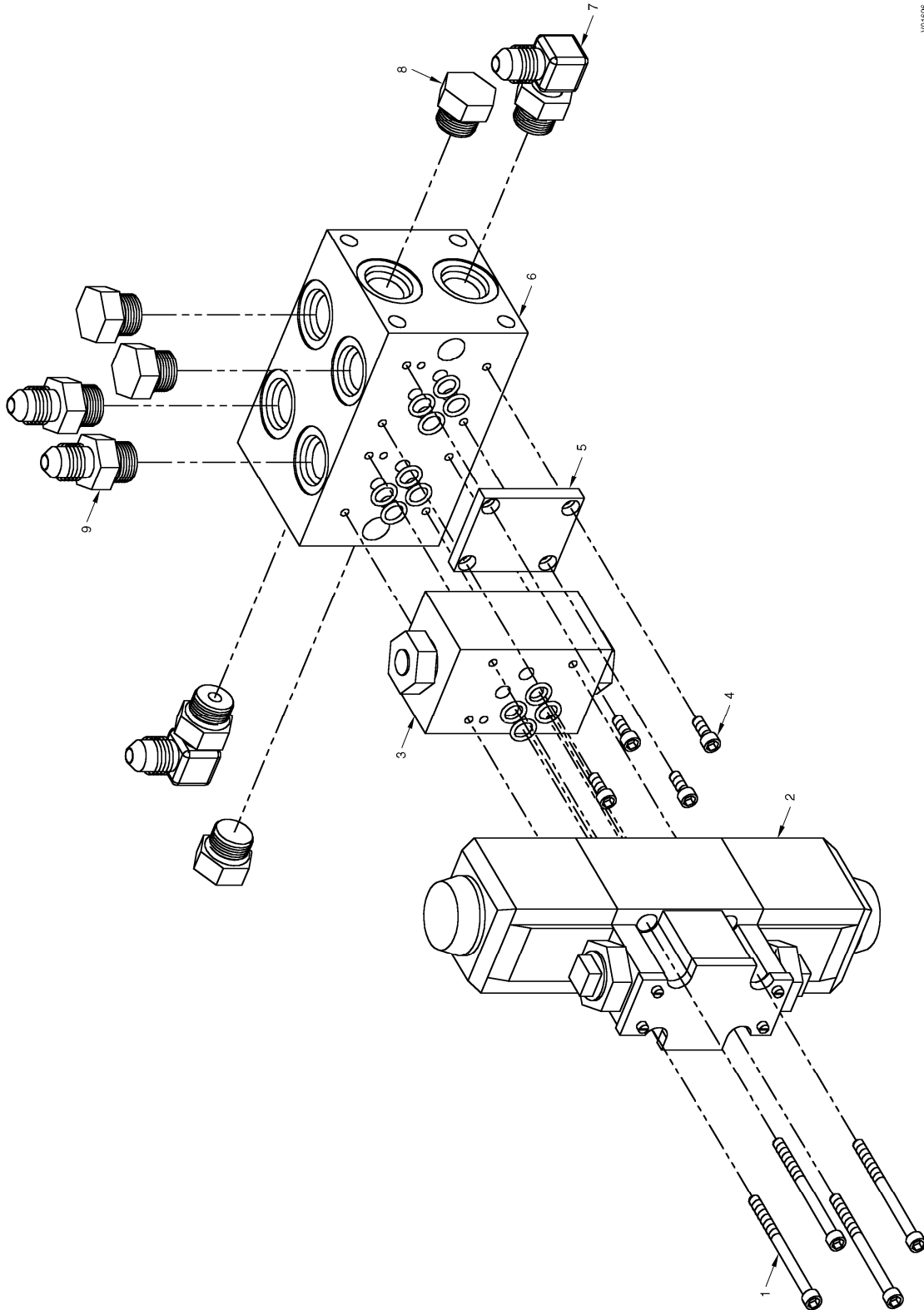


Figure 7-21. Hitch Manifold W/Out Lift Option



Fig	Item	Description	Part No.	Qty.
7-21		Hitch Manifold W/Out Lift Option		RF
	1	Soc. Hd. Cap Screw 10 – 24 X 2 3/4"	FAS-25459	4
	2	Valve Sol. Dir. Control Float Center	VLV-51624	1
	3	Double Check Stack-Up Valve	VLV-51920	1
	4	Soc. Hd. Cap Screw 10 – 24 X 1/2"	FAS-25450	4
	5	Cover Hyd. Manifold Closed Center	HSG-27355	1
	6	Manifold 2-Station Parallel	MSC-51621	1
	7	90° 1/2" Male O-Ring X 1/2" Male Jic	90D8MB-8MJ	2
	8	Plug 1/2" Male O-Ring	P8MB	4
	9	1/2" Male O-Ring X 1/2" Male Jic	8MB-8MJ	2



Fig	Item	Description	Part No.	Qty.
7-22		Hitch Manifold W/Lift Option		RF
	1	Soc. Hd. Cap Screw 10 – 24 X 2 3/4"	FAS-25459	8
	2	Valve Sol. Dir. Control Float Center	VLV-51624	2
	3	Double Check Stack-Up Valve	VLV-51920	2
	4	Manifold 2-Station Parallel	MSC-51621	1
	5	90° 1/2" Male O-Ring X 1/2" Male Jic	90D8MB-8MJ	2
	6	Plug 1/2" Male O-Ring	P8MB	2
	7	1/2" Male O-Ring X 1/4" Male Jic	8MB-4MJ	2
	8	1/2" Male O-Ring X 1/2" Male Jic	8MB-8MJ	2



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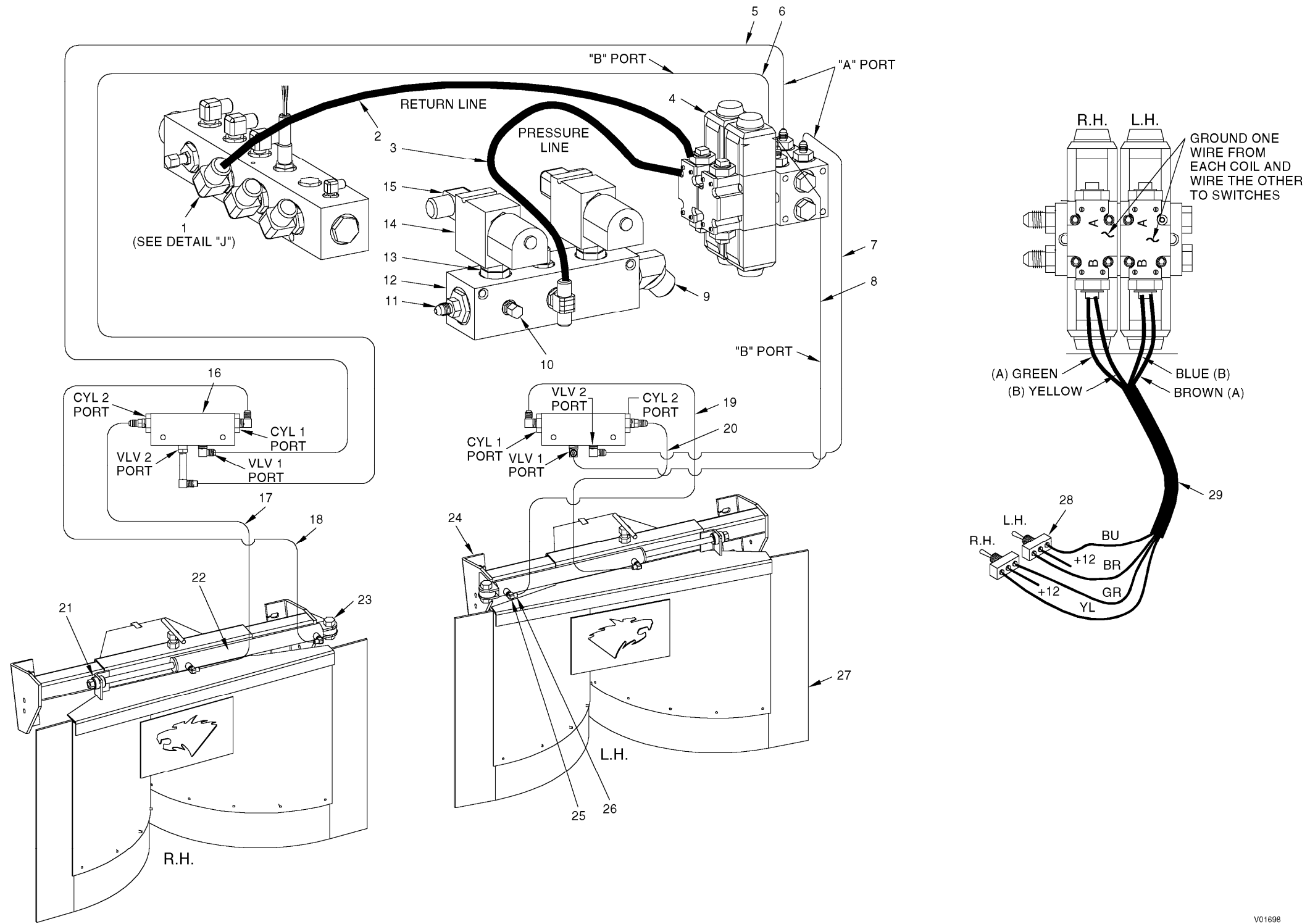


Figure 7-23. Diverter Option

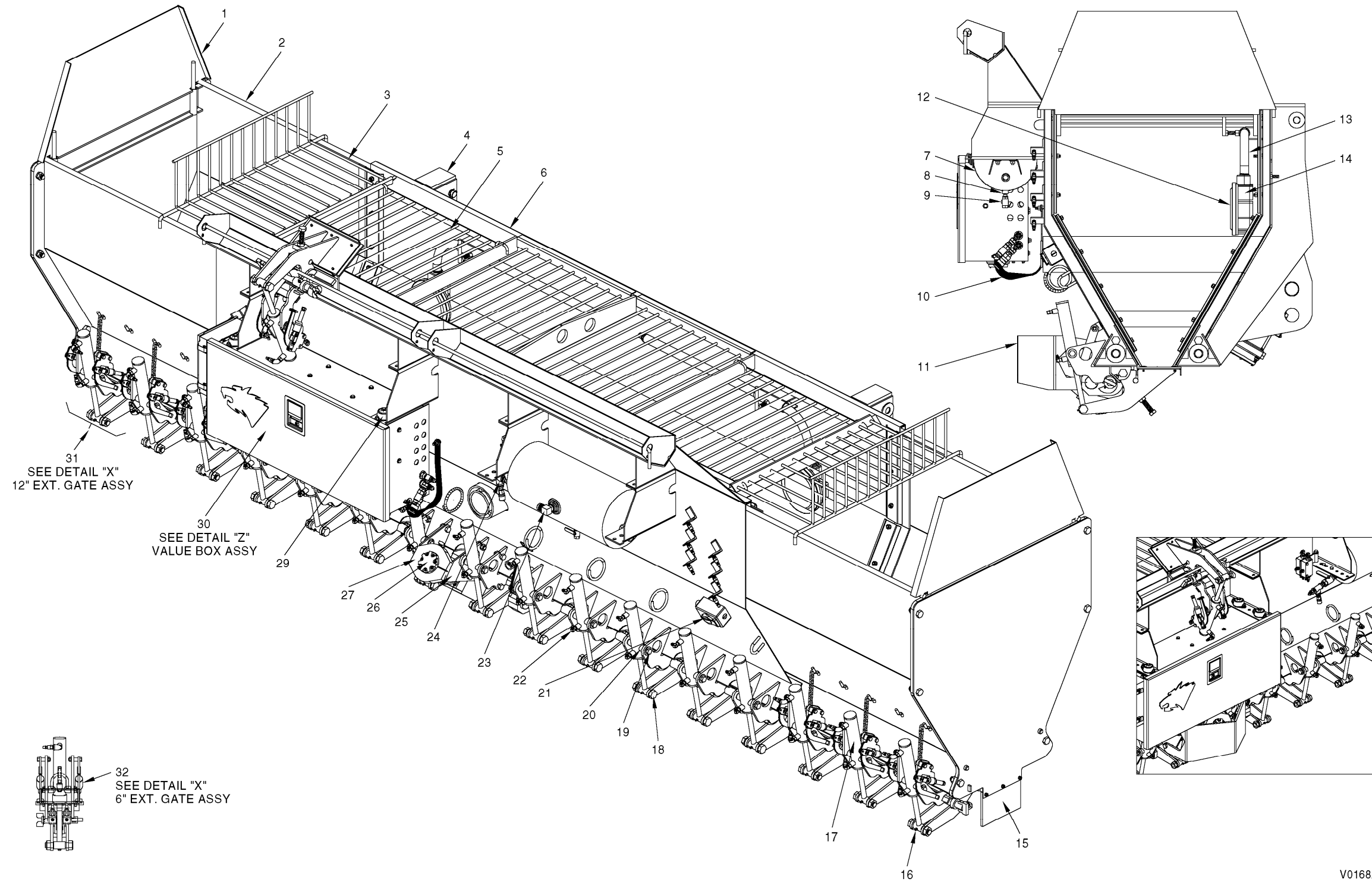
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Fig	Item	Description	Part No.	Qty.
7-23		Diverter Option		RF
	1	90° 3/4" Male O-Ring X 1/2" Male Jic	90D12MB-8MJ	1
	2	Hose Assembly, Return, Diverter Option	PIP-51739	1
	3	Hose Assembly Pressure Diverter Option	PIP-51740	1
	4	Manifold Assembly	HSG-60610	1
	5	Hose Assembly Right-Hand Diverter (Short 39")	PIP-51741	1
	6	Hose Assembly Right-Hand Diverter (Long 40")	PIP-51742	1
	7	Hose Assembly Left-Hand Diverter (12")	PIP-51745	1
	8	Hose Assembly Left-Hand Diverter (12")	PIP-51746	1
	9	1" Male O-Ring X 1" Male Jic	16MB-16MJ	1
	10	1/4" Male O-Ring X 1/4" Male Jic	4MB-4MJ	1
		Cap 1/4" Female Jic	C4FJ	1
	11	1" Male O-Ring X 1/2" Female O-Ring	16MB-8FB	1
		1/2" Male O-Ring X 1/2" Male Jic	8MB-8MJ	1
	12	Manifold Pressure	MSC-51598	1
	13	1/2" Male O-Ring X 1/2" Male O-Ring Union	8MB-8MB Union	2
	14	Valve Belt Hyd. Sol. Valve	VLV-51618	2
	15	90° 3/4" Male O-Ring X 3/4" Male Jic	90D12MB-12MJ	2
	16	4-Port Lockout Valve	VLV-22333	2
	17	Hose Assembly Right-Hand Valve (Long 41")	PIP-51743	1
	18	Hose Assembly Right-Hand Valve (Short 31")	PIP-51744	1
	19	Hose Assembly Left-Hand Valve (Short 31")	PIP-51743	1
	20	Hose Assembly Left-Hand Valve (Long 41")	PIP-51744	1
	21	2" 3-Ply Rubber Diverter Cushion	MSC-50780	4
		Flat Washer SAE 5/8"	FAS-28625	4
		Nut Hex Lock 5/8" – 18	FAS-28601	2
	22	Cylinder Chipper Conv. Diverter 16" Stroke	CYL-50671	2
	23	Hex Bolt 3/4" – 10 X 2"	FAS-28794	2
		Nut Lock 3/4" – 10	FAS-28542	2
	24	Deflector Assembly Conveyor	GRD-60618	2
	25	90° 1/4" Male Jic X 1/4" Male Pipe	90D4MJ-4MP	4
	26	Restrictor Fitting With 1/32" Hole	FIT-29980	2
	27	1/4" UHMW 27" X 27"	PLS-60618	4
		1/4" – 20 X 1" Phil. Flat Hd. Type F Cap Screw	FAS-25898	20
		Flat Washer 3/8"	FAS-28634	20
	28	Mom On/Off/Mom On 1-Pole Toggle Switch	ELC-24274	2
	29	14 Gauge Wire Tail-Light 4-Cond.	ELC-24326	12'

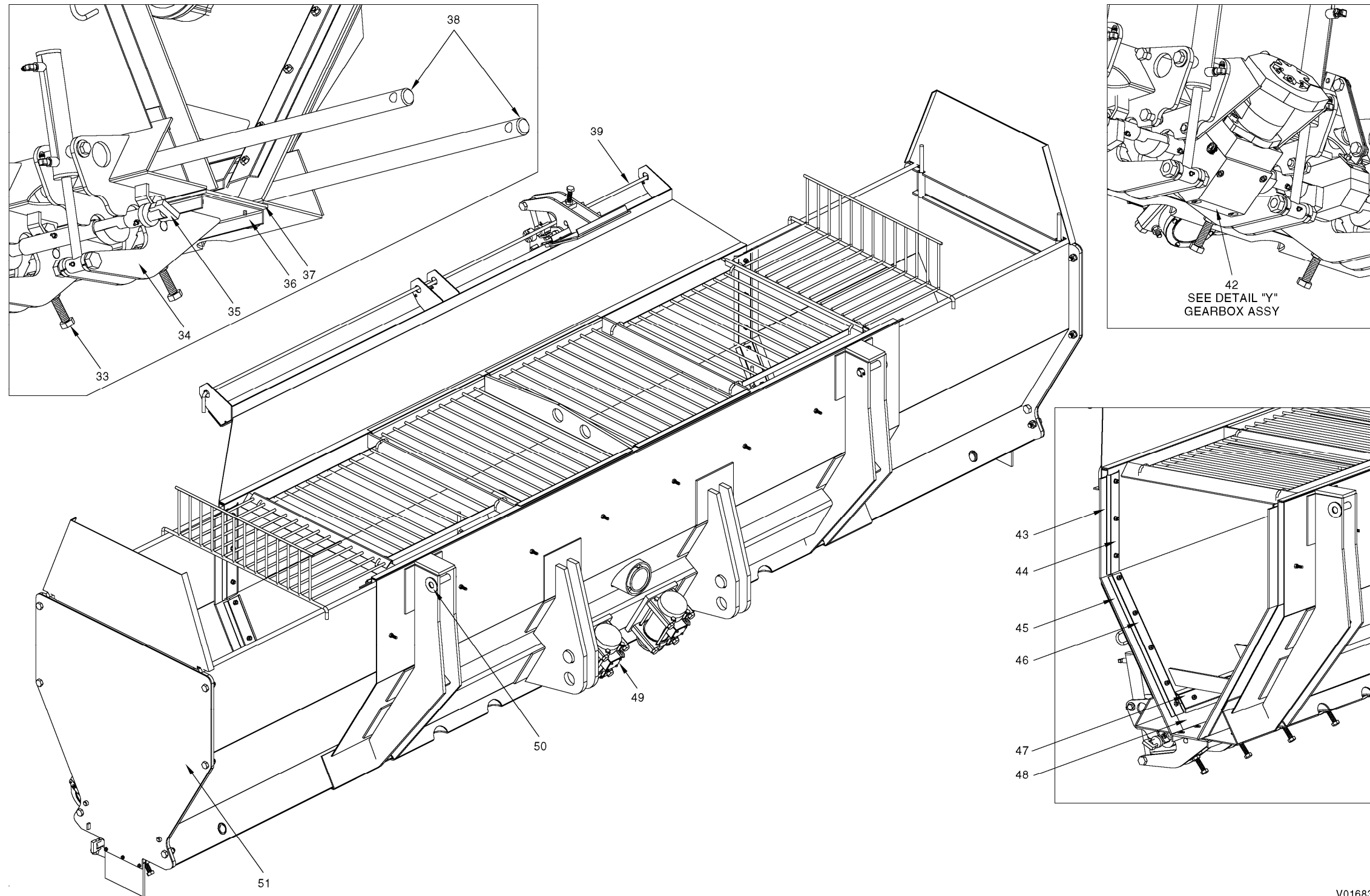


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V01682

Figure 7-24 (Sheet 1). Chip Box 6 in. Mouth



V01683

Figure 7-24 (Sheet 2). Chip Box 6 in. Mouth



Model 2002/CRC

Illustrated Parts List

Fig	Item	Description	Part No.	Qty.
7-24		Chip Box 6 in. Mouth		RF
	1	Deflector	GRD-50588	2
	2	Chip Box Ext. 6" Mouth Weldment	HSG-50616	2
	3	Grizzly Ext. Chip Box	GRD-60531	2
	4	Main Chip Box 6" Mouth Weldment	HSG-50730	1
	5	Outer Grizzly	GRD-60537	2
	6	Inner Grizzly	GRD-60530	2
	7	Air Tank Assembly	TNK-50635	1
	8	1/4" X Close Pipe Nipple	FIT-28001	1
	9	1/4" Ball Valve	VLV-29200	1
	10	12" Ground Strap	ELC-24011	1
	11	Gear Box Guard	BRK-50840	1
	12	Diaphragm Level Switch 0.031" Thick	MSC-50831	2
		Level Control High Temp. Micro Switch	ELC-50915	2
	13	Proximity Switch Assembly Right-Hand or Left-Hand	MTR-50934	2
	14	Proximity Switch	ELC-50811	2
	15	Rubber Edger (6" X 8 1/4")	RNG-51820	2
	16	1/8" Grease Zerk	2MP-Z	48
	17	Air Cylinder Gates	CYL-50703	16
	18	Hex Bolt 3/4" – 10 X 3 1/2"	FAS-28954	16
		Nut Hex 3/4" – 10	FAS-28506	16
	19	Hex Bolt 1/2" – 20 X 1 1/4"	FAS-28911	20
		Flat Washer 1/2"	FAS-28636	20
	20	Bushing Gate	FIT-50738	20
	21	Ext. Switch Box Assembly	HSG-51574	2
		Weather Tite Cover	HSG-51572	2
		Plate Switch	HSG-51569	2
		Switch Mom-On-Off-Mom-On	ELC-24274	2
		Weather Tite Electrical Box	HSG-51571	2
	22	90° 1/4" Male Jic X 1/4" Male Pipe	90D4MJ-4MP	20
	23	90° 3/4" Male Jic X 3/4" Male Pipe	90D12MJ-12MP	1
	24	1/4" X Close Pipe Nipple	FIT-28001	3
		Hex Pipe Bushing 1/2" X 1/4"	FIT-28344	1
		1/2" Male Jic X 1/2" Male Pipe	8MJ-8MP	1
		Tee Pipe 1/2"	FIT-28253	1
		1/2" Ball Valve	VLV-29214	1
		1/4" X 1/4" FP Female Quick Disconnect	FIT-50884	1
	25	Strut Gear Box	BRK-50693	2
	26	Hydraulic Motor	PMP-50619	1
	27	Retainer Gear Box	BRK-50694	1
	28	Cable Assembly (not used on late model)	PTM-50861	1

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-24	29	Vibration Isolator	BRK-50633	4
	30	Valve Box Assembly	HSG-60568	1
	31	Ext. Gate Assembly 12"	MCH-50704	6
	32	Ext. Gate Assembly 6"	MCH-50804	1
	33	Hex Bolt Full Thread 5/8" – 11 X 4"	FAS-50708	16
	34	Bearing Cam Roller	MCH-100098	16
		Roll Pin 3/8" X 1 1/2" S/S	FAS-100097	16
	35	Camshaft Main	MCH-50772	1
	36	12" Gate Assembly	MCH-50702	10
	37	Gate Pad UHMW 12" Standard	MSM-60483	16
		Gate Pad Teflon 12"	MSM-60490	16
	38	Cylinder Chip Box Ext. 2 1/2" X 37"	CYL-50701	4
	39	Rod Extension Lock	BRK-50692	1
	40	Clamp Cable Drive Housing (not used on late model)	BRK-50698	1
	41	Speedo Drive Retainer Bushing	BRK-50623	1
	42	Gear Box Assembly Cam Shaft	PTM-50620	1
	43	Seal Vertical Chip Box End Wiper 16"	RNG-50668	4
	44	Clamp, Vertical Chip Box 16"	BRK-50745	4
	45	Seal Vertical Chip Box End Wiper 28"	RNG-50669	4
	46	Clamp Vertical Chip Box 24"	BRK-50744	4
	47	Clamp Horizontal Chip Box 36"	BRK-50743	3
	48	Seal Horizontal Chip Box Gate Seal 112 3/4"	RNG-50670	1
	49	Vibrator	PTM-50839	2
	50	Pin Tilt Cylinder Clevis (Long)	BRK-50673	2
	51	Panel End Bolt – On 6" Mouth Ext. Box	HSG-60638	2



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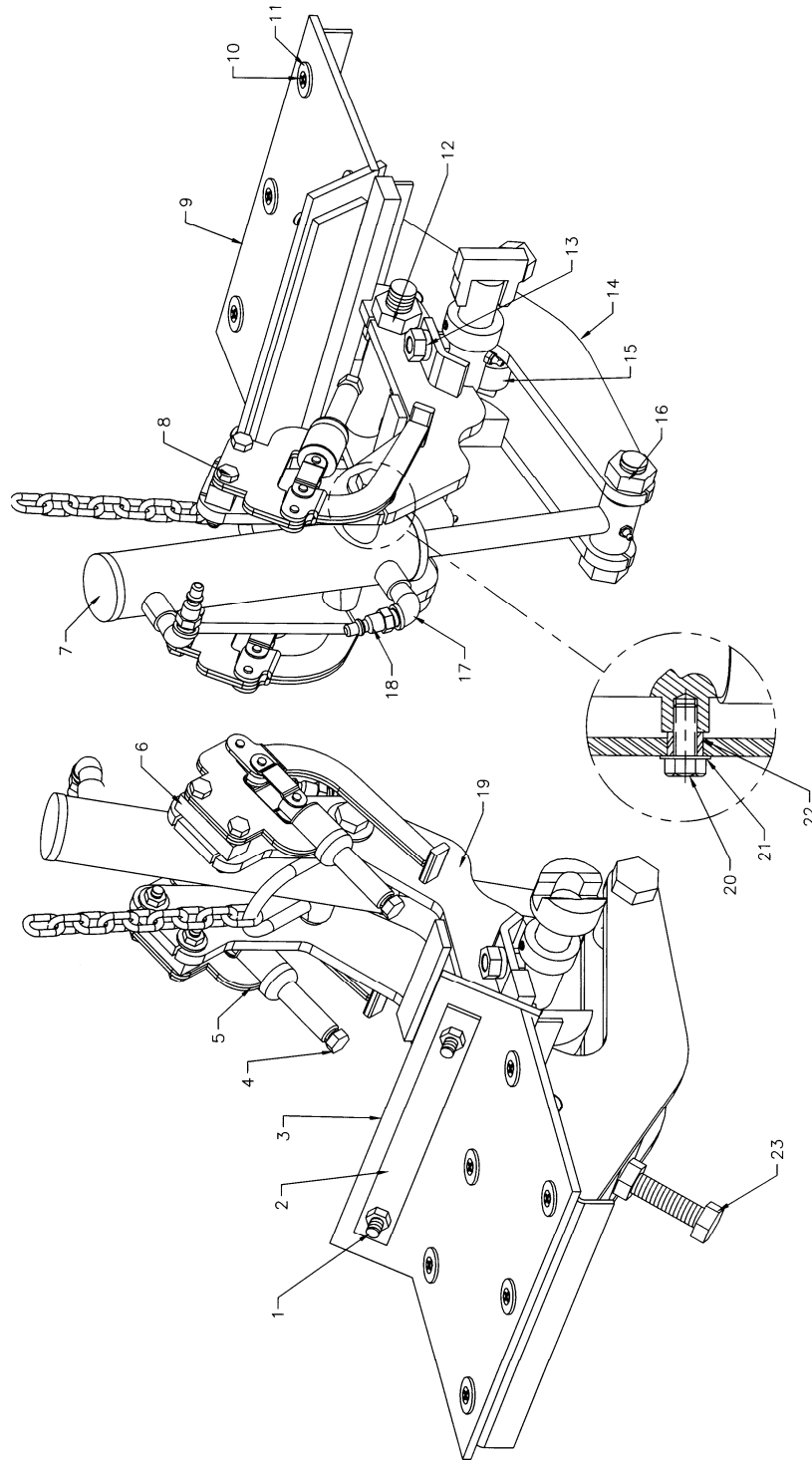


Figure 7-25. Extension Gate Assembly



Fig	Item	Description	Part No.	Qty.
7-25		Extension Gate Assembly		RF
	1	Hex Bolt 3/8" – 16 X 3/4"	FAS-28730	2
		Nut Lock 3/8" – 16	FAS-28538	2
	2	Clamp Plate 12" Ext. Gate	BRK-50598	1
		Clamp Plate 6" Ext. Gate	BRK-50931	1
	3	Seal, Horizontal 12" Ext. Gate	RNG-50598	1
		Seal, Horizontal 6" Ext. Gate	RNG-50930	1
	4	Hex Bolt 3/8" – 16 X 1"	FAS-28731	2
	5	Clamp Ext. Gate	FAS-100062	2
	6	Spacer Clamp Ext. Gate	BRK-50597	2
	7	Cylinder Assembly	CYL-50920	1
	8	Hex Bolt 5/16" – 18 X 1 3/4"	FAS-28719	4
		Flat Washer 5/16"	FAS-28646	4
		Nut Hex 5/16" – 18	FAS-28501	4
	9	Gate Pad UHMW 12" Standard	MSM-60483	1
		Gate Pad Teflon 12"	MSM-60490	1
		Gate Pad UHMW 6" Standard	MSM-60484	1
		Gate Pad Teflon 6"	MSM-6091	1
	10	Screw Flat Hd. Phillips Type F blunt Point	FAS-25898	6
	11	Flat Washer 3/8"	FAS-28634	6
	12	Hex Bolt 3/4" – 10 X 5 1/2"	FAS-28798	1
		Nut Lock 3/4" – 10	FAS-28542	1
	13	Nut Hex 7/16" – 14	FAS-28503	2
		Lock-Washer 7/16"	FAS-28648	2
	14	12" Gate Assembly	MCH-50702	1
		6" Gate Assembly	MCH-50802	1
	15	Bearing Cam Roller	MCH-100098	1
		Roll Pin 3/8" X 1 1/2" S/S	FAS-100097	1
	16	Hex Bolt 3/4" – 10 X 3 1/2"	FAS-28796	1
		Nut Lock 3/4" – 10	FAS-28542	1
	17	90° 1/4" Pipe Street Elbow	FIT-28236	2
	18	1/4" Male Quick Disconnect	FIT-50883	2
	19	Actuator Assembly 12" Ext. Gate	BRK-50703	1
		Bracket Ext. Gate 6"	BRK-50737	2
	20	Hex Bolt 1/2" – 20 X 1 1/4"	FAS-28911	2
	21	Flat Washer 7/16"	FAS-28635	2
	22	Bushing Gate Cylinder	BRK-50738	2
	23	Hex Bolt Full Thread 5/8" – 11 X 4"	FAS-50708	1

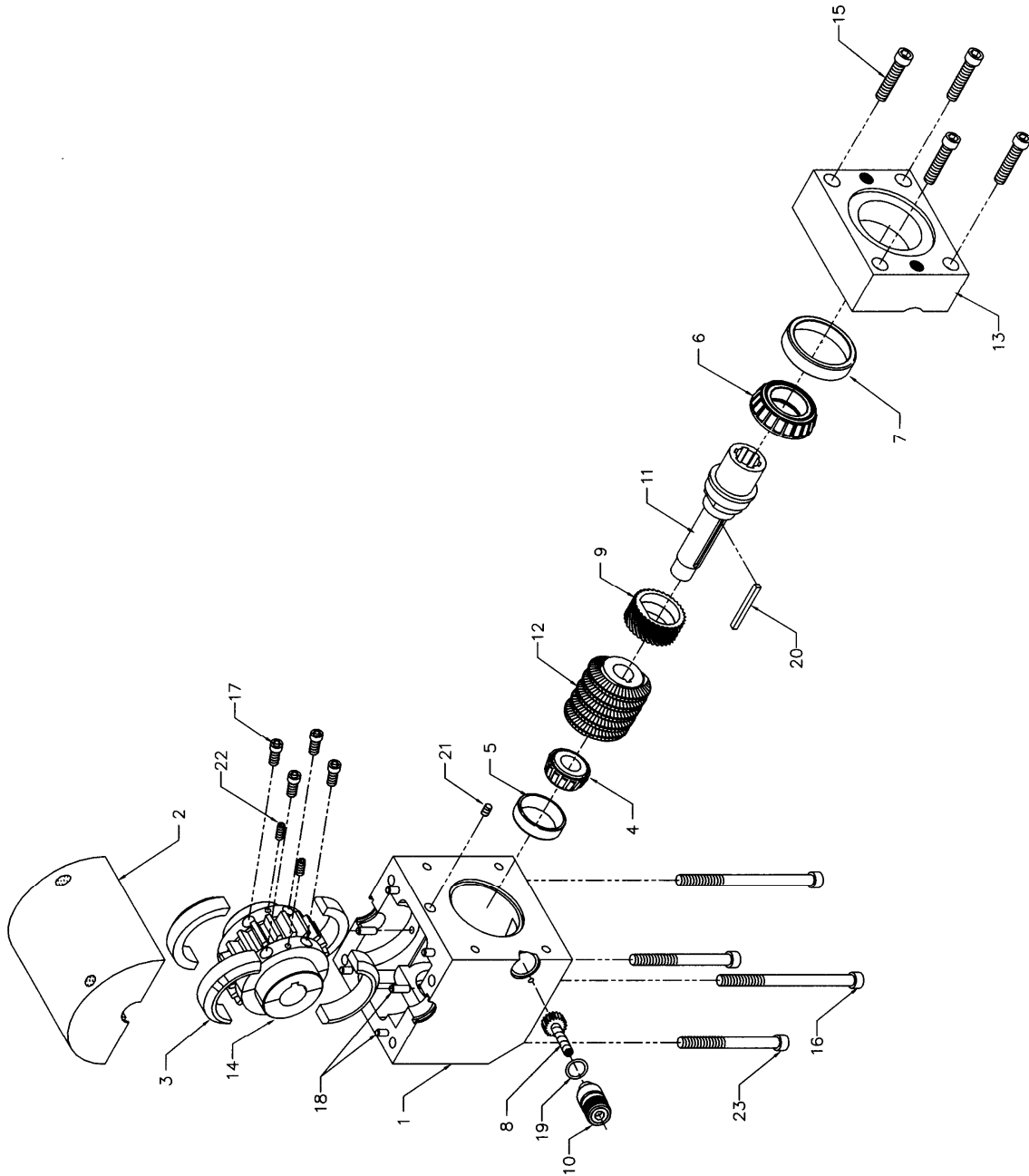


Figure 7-26. Gear Box Assembly



Fig	Item	Description	Part No.	Qty.
7-26		Gear Box Assembly		RF
	1	Gear Box Housing	HSG-50621	1
	2	Face Gear Box Housing	HSG-50622	1
	3	Gear Box Thrust Bearing (Matched Pairs)	PTM-50624	2
	4	Bearing Gear Box #LM11949	PTM-50845	1
	5	Bearing #11910 Cup	PTM-50846	1
	6	Bearing Gear Box #48548	PTM-50847	1
	7	Bearing #LM48510 Cup	PTM-50848	1
	8	Speedo Gear Small 19 Tooth (not used with late Pot)	PTM-50842	1
	9	Speedo Gear Large 19 Tooth	PTM-50843	1
	10	Housing Speedo Gear (not used with late Pot)	HSG-50844	1
	11	Shaft Worm Drive Gear Box	PTM-50856	1
	12	Helix Angle Worm #WGA-1G For	PTM-50850	1
	13	Motor Mount Gear Box	BRK-50855	1
	14	Gear Box Split	PTM-50858	1
	15	Soc. Hd. Cap Screw 3/8" – 16 X 1 3/4"	FAS-25489	4
	16	Soc. Hd. Cap Screw 3/8" – 16 X 5 1/2"	FAS-25496	2
	17	Soc. Hd. Cap Screw 5/16" – 18 X 1"	FAS-25480	4
	18	Dowel Pin 1/2" I.D. X 3/4"	FAS-25353	6
	19	O-Ring .688" I.D. X .875" O.D. X .094" Thick Buna (not used with late Pot)	RNG-20974	1
	20	3/16" X 3/16" X 2" Key	STL-30951	1
	21	1/8" Male Grease Zerk	2MP-Z	1
	22	Soc. Hd. Set Screw 10 – 24 X 1/2"	FAS-25614	2
	23	Soc. Hd. Cap Screw 3/8" – 16 X 4"	FAS-25499	2

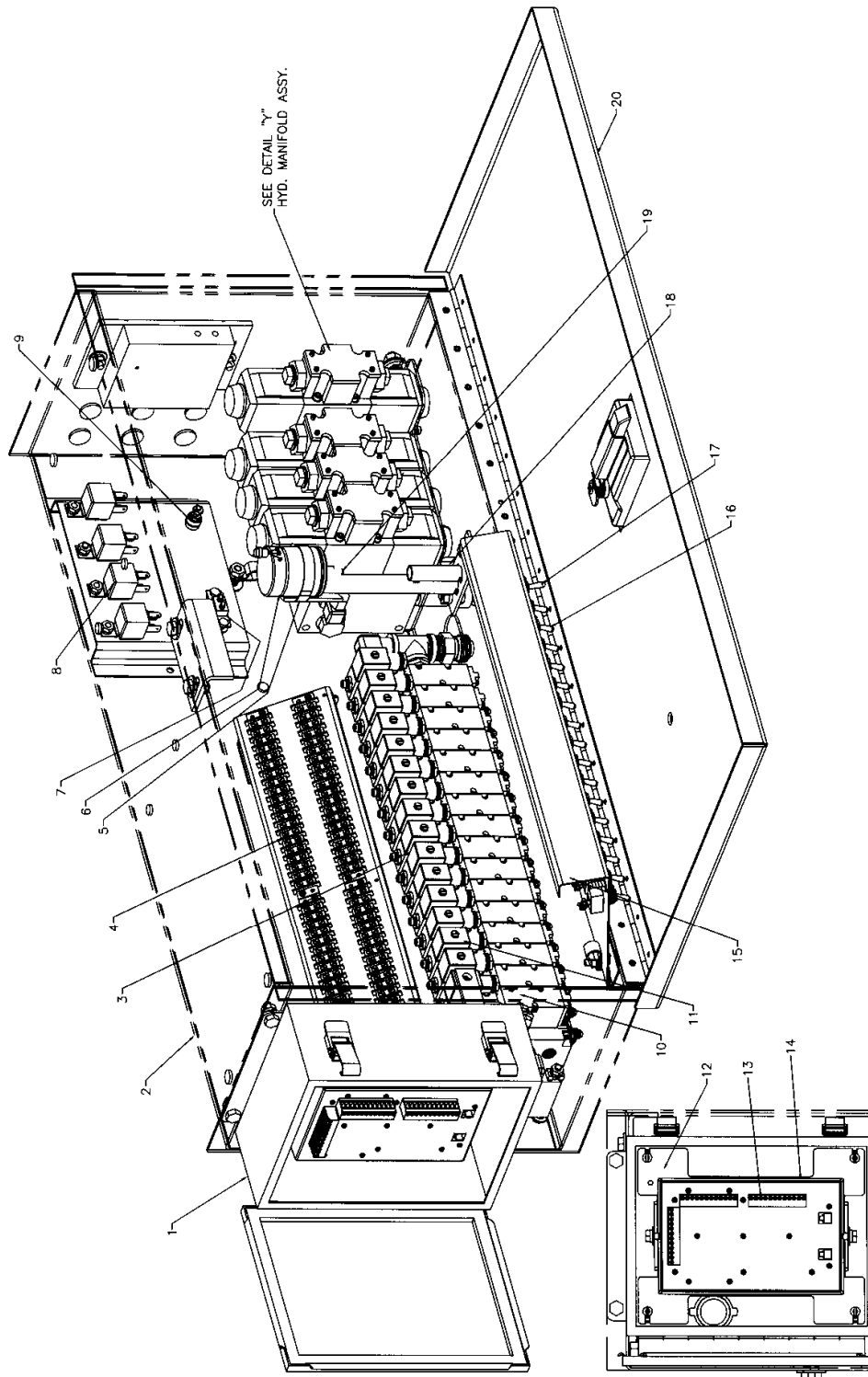
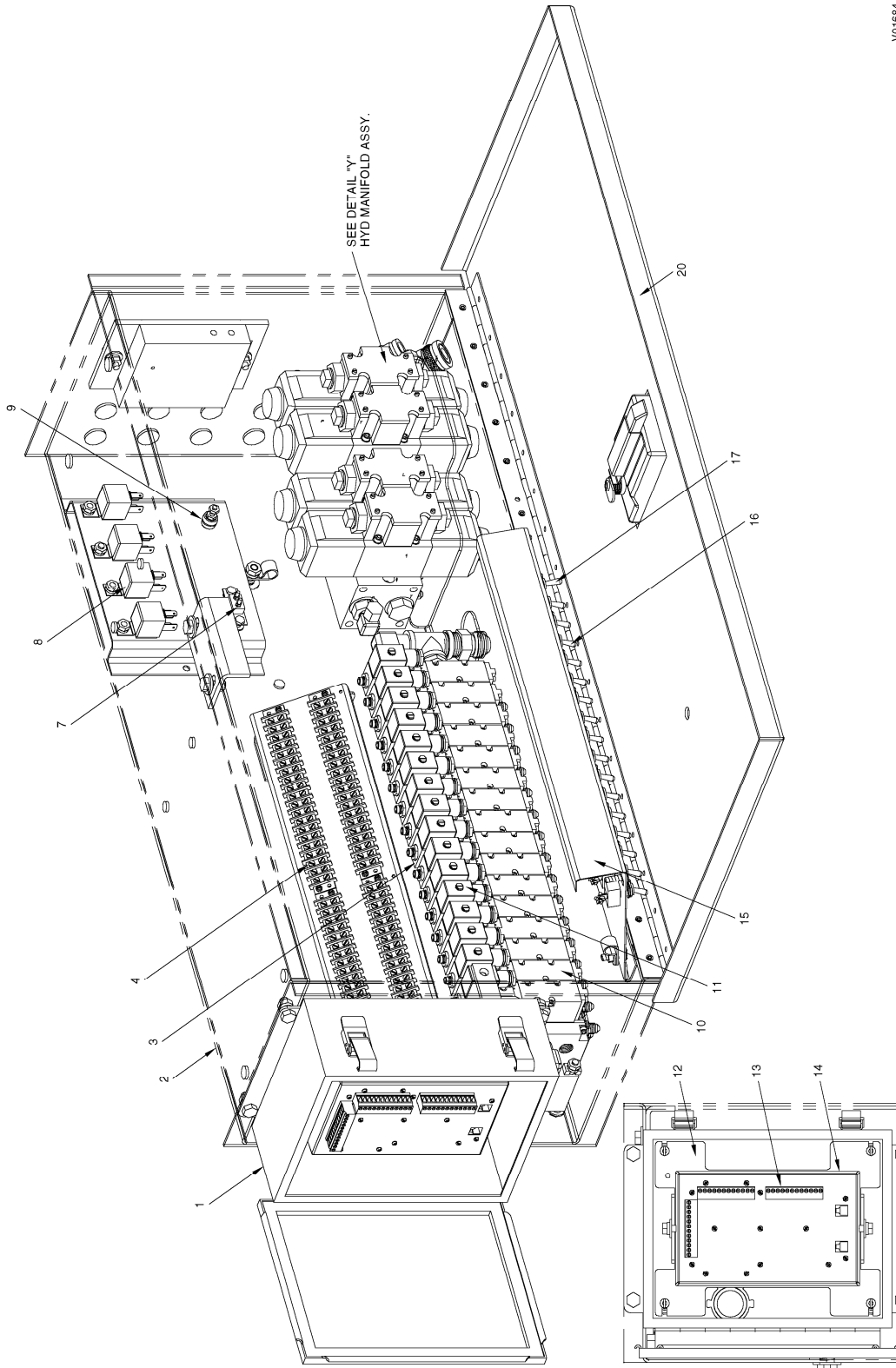
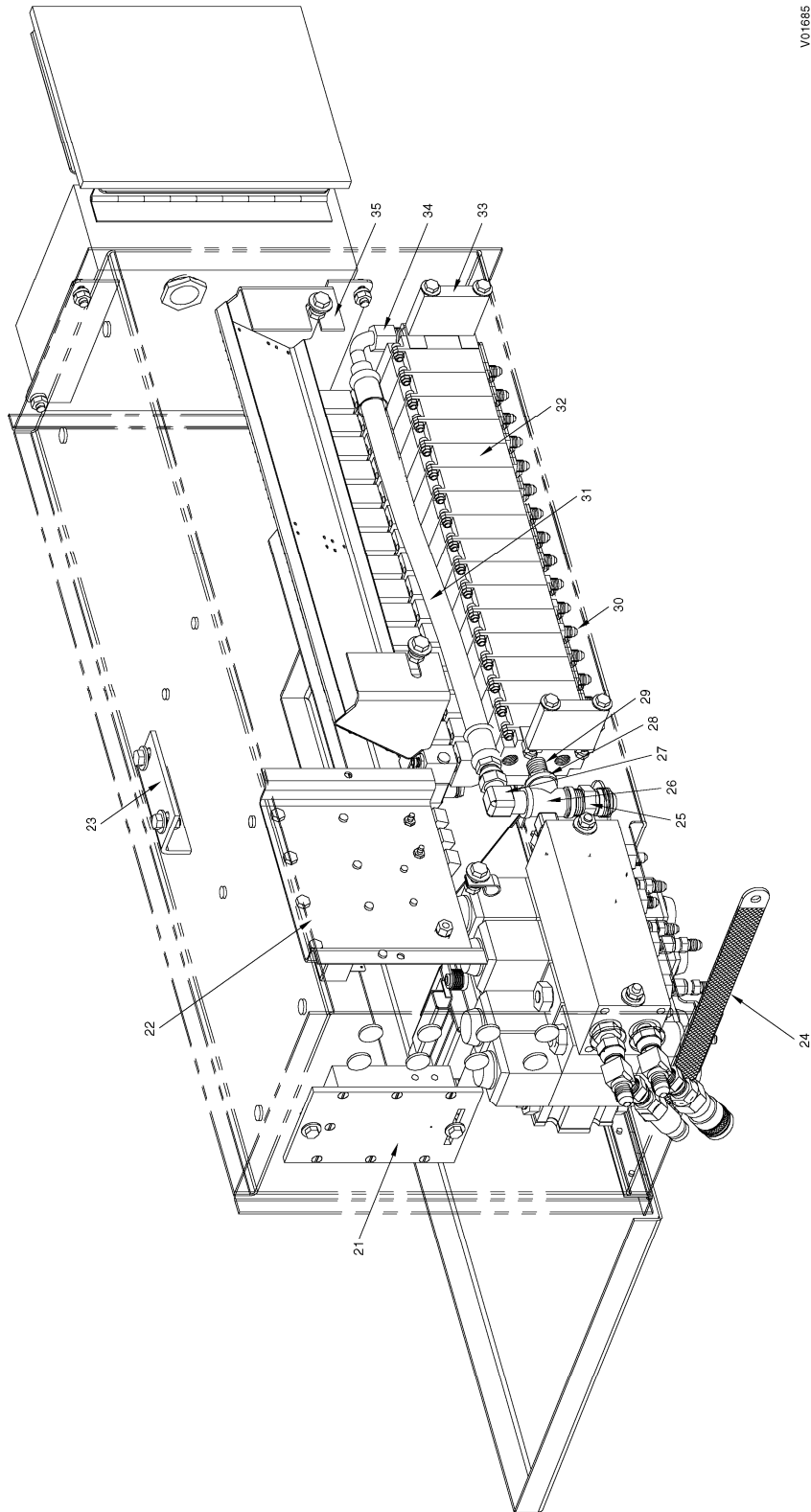


Figure 7-27 (Sheet 1). Valve Box Assembly (Early)



V01664

Figure 7-27 (Sheet 2). Valve Box Assembly (Late)



V01665

Figure 7-27 (Sheet 3). Valve Box Assembly

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-27		Valve Box Assembly		RF
	1	Oil Tight Box Enclosure 10" X 8" X 4"	HSG-24253	1
	2	Valve Box Weldment	HSG-60578	1
	3	Versa Valve Coil 4-Way Sol. Valve C5/C7	ELC-26970	16
	4	20 Gang Barrier Strip	ELC-24220	4
	5	Hose Clamp #32 (not used on late model)	FAS-26085	1
	6	Potentiometer Assembly (not used on late model)	ELC-50591	1
	7	30 Amp Circuit Breaker	ELC-24290	1
	8	70 Amp Relay	ELC-24270	4
	9	Plastic Insulator Bind Post	ELC-50152	2
		Rd. Hd. Brass Machine Screw 10 – 24 X 1 1/2"	FAS-25845	1
		Brass Flat Washer .445" O.D.	FAS-28616	2
		Brass Hex Jam Nut	FAS-28571	2
	10	4-Way Sol. Air Valve Versa C7	VLV-50916	16
	11	Din Connector Versa C5/C7	ELC-24416	16
	12	Backing Plate	BRK-24255	1
	13	Plug, 12-Pin Connector Serial System	ELC-26230	3
	14	CRC Slave Unit	MTR-61761	1
	15	Switch Panel	BRK-50573	1
	16	On/Off One Pole Toggle Switch	ELC-24275	16
	17	On/Off/Mom One Pole toggle Switch	ELC-24274	1
	18	Potentiometer Bracket Assembly (not used on late model)	BRK-50697	1
	19	Cable-Pot/Drive Adapter (not used on late model)	BRK-50696	1
	20	Lid Assembly	HSG-50582	1
	21	Leveling Switch	ELC-50580	1
	22	Relay Bracket	BRK-60579	1
	23	Striker	BRK-50706	1
	24	12" Ground Strap	ELC-24011	1
	25	3/4" Male Jic X 1/2" Male Pipe	12MJ-8MP	1
	26	Pipe Tee 1/2"	FIT-28283	1
	27	90° 1/2" Male Jic X 1/2" Male Pipe	90D8MJ-8MP	1
	28	Pipe Hex Bushing 1/2" X 3/8"	FIT-28345	1
	29	Pipe Nipple 3/8" X Close	FIT-28002	1
	30	1/4" Male Jic X 1/4" Male Pipe	4MJ-4MP	32
	31	Jumper Hose Assembly	MSC-60905	1
	32	Air Manifold W/Valves (16-Station)	VLV-50916	1
	33	Valve Box Spacer	BRK-60571	2
	34	90° 1/2" Male Jic X 3/8" Male Pipe	90D8MJ-6MP	1
	35	Barrier Strip Bracket	BRK-60575	1

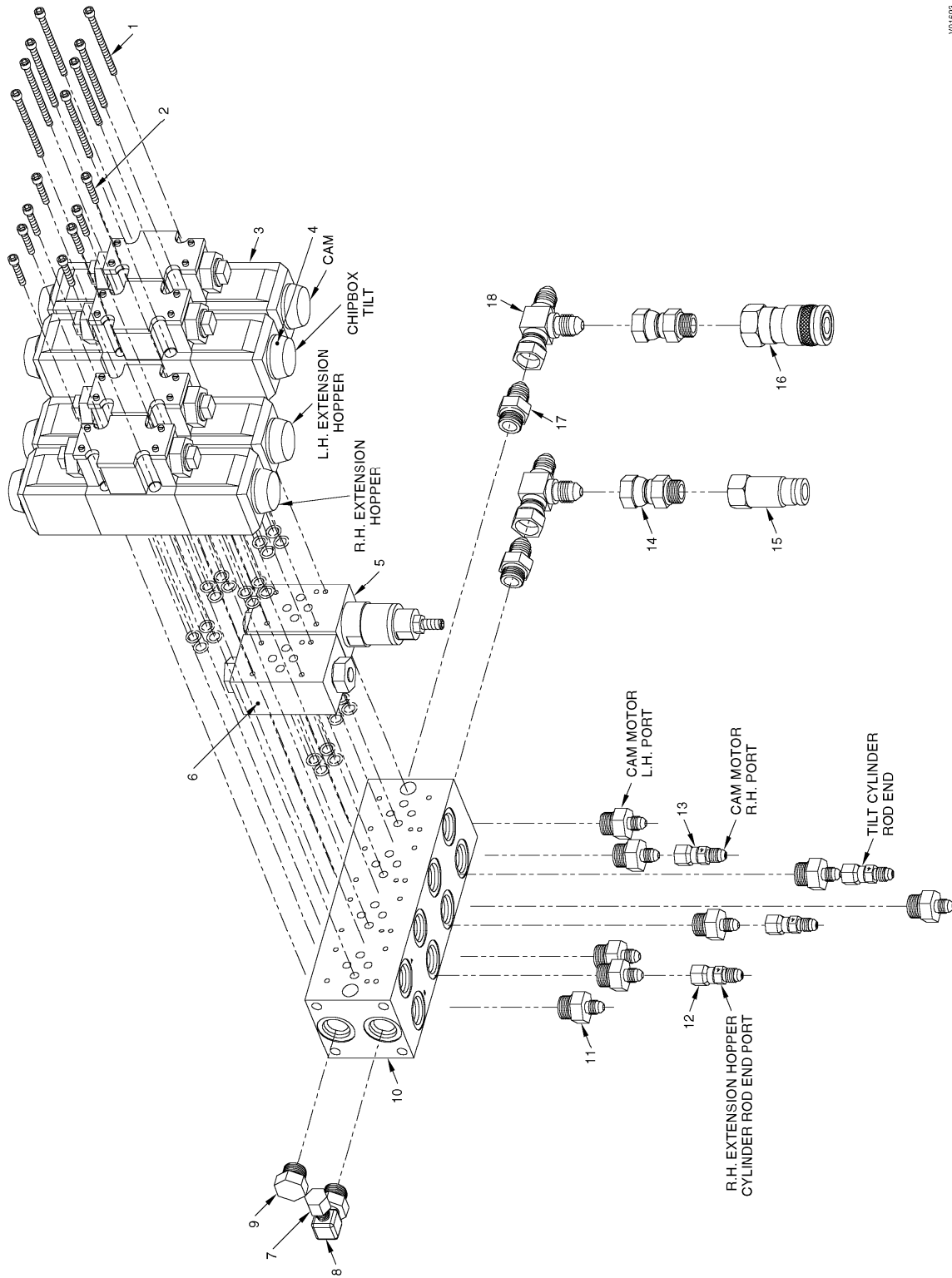


Figure 7-28. Chip Box Hydraulic Manifold Assembly

**Model 2002/CRC****Illustrated Parts List**

Fig	Item	Description	Part No.	Qty.
7-28		Chip Box Hydraulic Manifold Assembly		RF
	1	Soc. Hd. Screw 10 – 24 X 2 3/4"	FAS-25459	8
	2	Soc. Hd. Screw 10 – 24 X 1 1/4"	FAS-25453	8
	3	Directional Control Valve (Float Center)	VLV-51624	4
	4	Hydraulic Valve Coil	ELC-26980	8
	5	Pressure Reducing Valve	VLV-51929	2
	6	Double Pilot Check Valve (Stack-Up)	VLV-51920	1
	7	1/4" Female Jic Cap	C4FJ	1
	8	90° 1/2" Male O-Ring X 1/4" Male Jic	90D8MB-4MJ	1
	9	1/2" Male O-Ring Plug	P8MB	1
	10	4-Station Manifold (Parallel)	MSC-22332	1
	11	1/2" Male O-Ring X 1/4" Male Jic	8MB-4MJ	8
	12	#4 Restrictor Fitting	FIT-51991	3
	13	#7 Restrictor Fitting	FIT-51994	1
	14	1/2" Female Jic Swivel X 1/2" Male O-Ring	8FJX-8MB	2
	15	Quick Coupler Male	FIT-60912	1
	16	Quick Coupler Female	FIT-60911	1
	17	1/2" Male O-Ring X 1/2" Male Jic	8MB-8MJ	2
	18	Tee 1/2" Female Jic Swivel X 1/2" Male Jic X 1/2" Male Jic	T8FJX-8MJ-8MJ	2

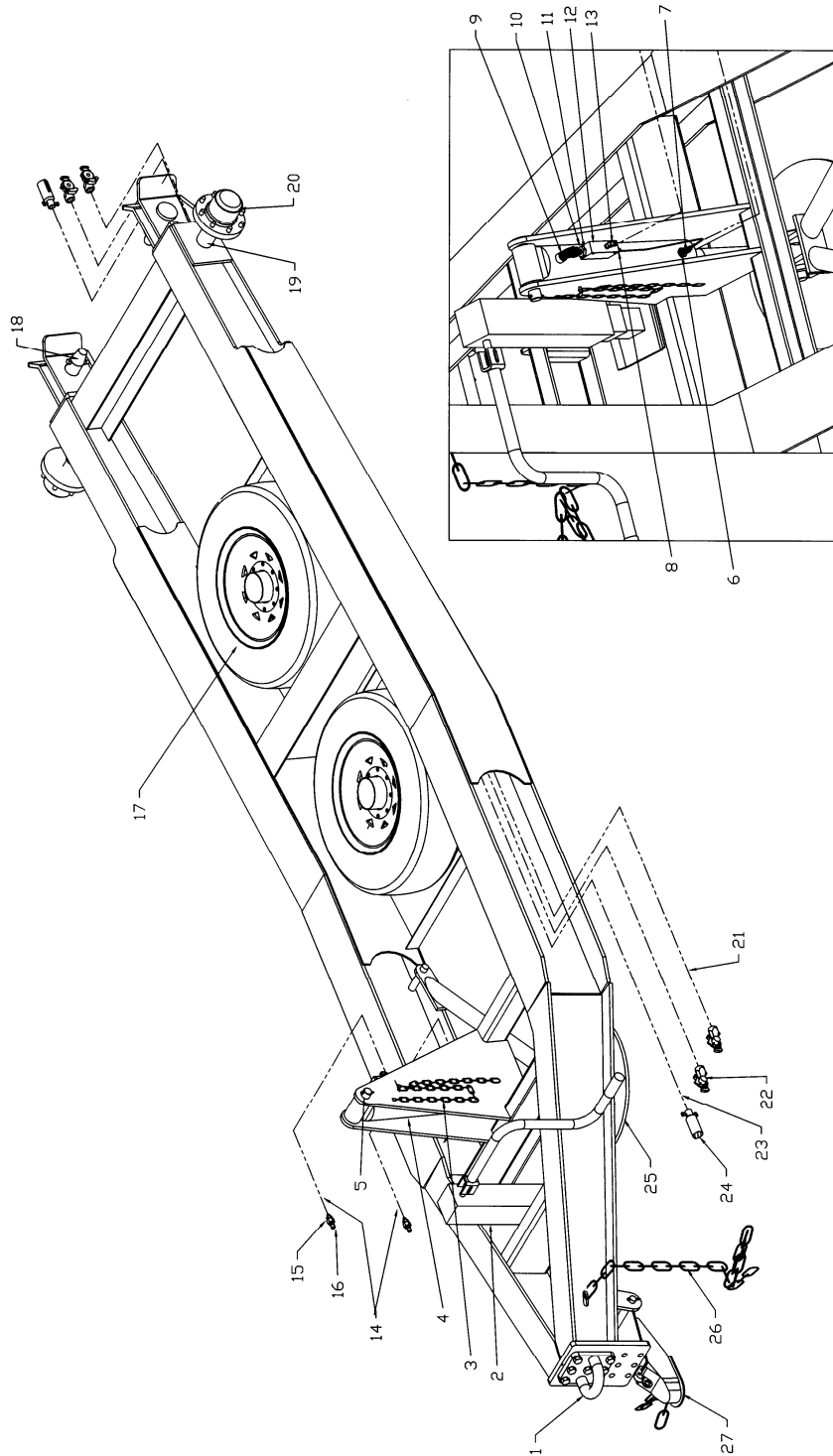


Figure 7-29. Tow Bar Assembly



Model 2002/CRC

Illustrated Parts List

Fig	Item	Description	Part No.	Qty.
7-29		Tow Bar Assembly		RF
	1	Pintle Eye	MSC-51961	1
	2	Drop Leg Jack	MSC-51960	1
	3	Safety Chain Lift Cylinder Shoe	BRK-60829	1
	4	4" X 20" Stroke Hyd. Cylinder	CYL-51962	1
	5	Tow Bar Cylinder Top & Bottom Pins	BRK-60825	2
	6	Bushing Hex 1/2" X 1/4"	FIT-28344	1
	7	Tee 1/4" Male Jic X 1/4" Male Jic X 1/4" Male Pipe	T4MJ-4MJ-4MP	1
	8	1/4" Male Jic X 1/4" Male Pipe	4MJX4MP	1
	9	Elbow Pipe Street 1/2"	FIT-28238	1
	10	Bushing Hex 1/2" X 1/4"	FIT-28344	1
	11	Nipple 1/4" X Close Sch. 80	FIT-28001	1
	12	Lock Out Valve	VLV-22319	1
	13	90° 1/4" Male Jic X 1/4" Male Pipe	90D4MJ-4MP	1
	14	Hyd. Supply Line Assembly	PIP-60844	1
	15	3/8" Male O-Ring X 1/4" Male Jic	6MB-4MJ	2
	16	Quick Disconnect Male HP 1/4" X 6 Mor	FIT-29632	2
	17	Wheel & Tire Assembly	MSC-80087	2
		Rim Assembly White Rim 16.5 X 6.75 Spoked 8-6.5	MSC-80126	2
		Tire 950-16.5 10 Ply Radial	MSC-80127-T	2
	18	2" Tow Bar Chipper Pin	BRK-60823	2
		Clip Click Pin Spring Loaded	FAS-60821	2
	19	Spindle Assembly	BRK-60832	2
	20	Hub Assembly	PTM-51964	2
	21	Air Supply Line Assembly	PIP-60842	2
	22	Glad Hands	ELC-22375	2
	23	Trailer Cord Assembly Chipper Tow Bar	ELC-60840	2
	24	Plug Trailer 7 Cond.	ELC-24246	2
	25	Hydraulic Cylinder Shoe	BRK-60787	1
	26	Safety Chain Tow Bar	BRK-60828	2
	27	Swing Away Hitch Assembly	MCH-60796	1

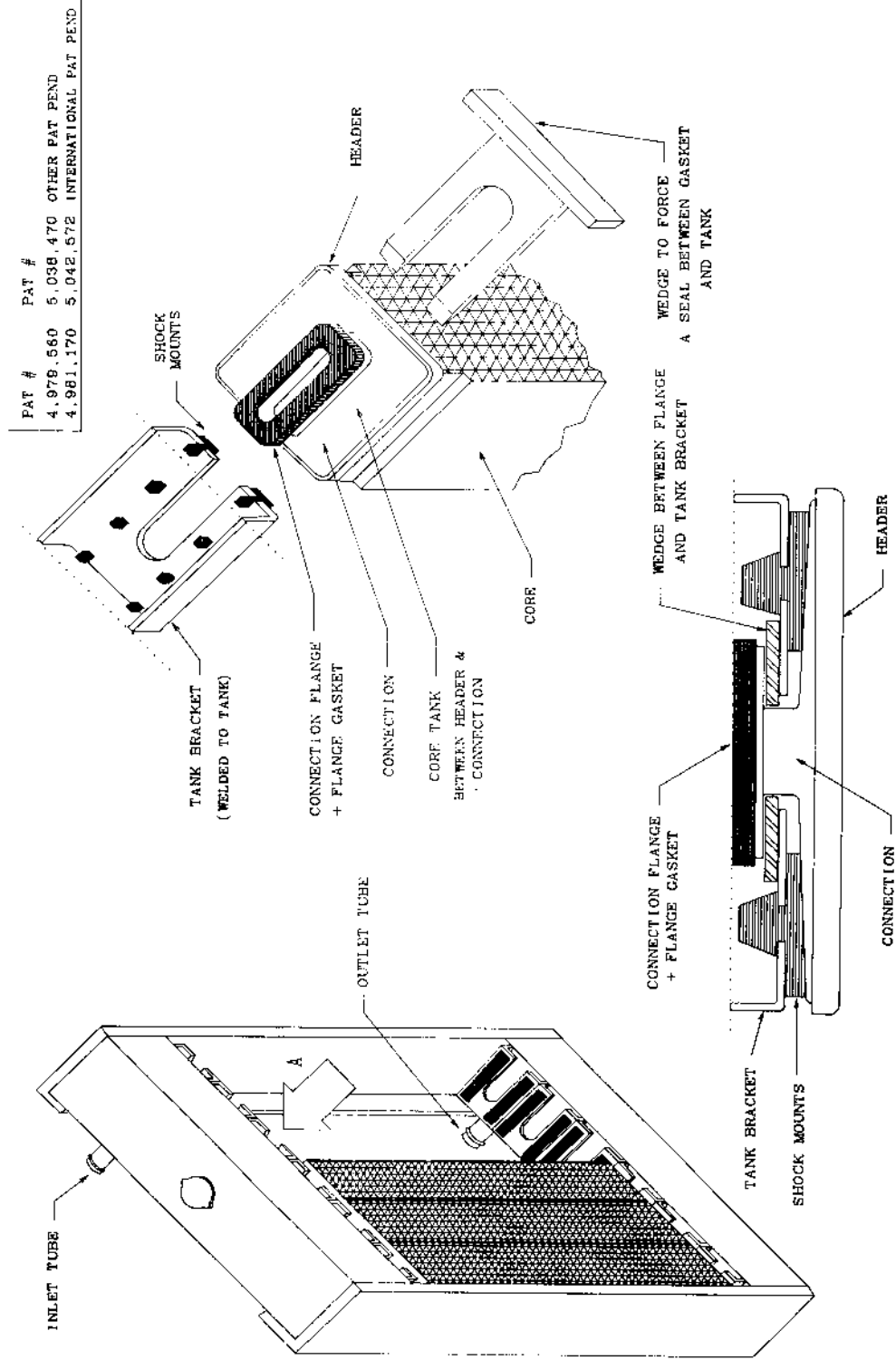


Figure 7-30. Heat Exchanger

SECTION 8. DIAGRAMS

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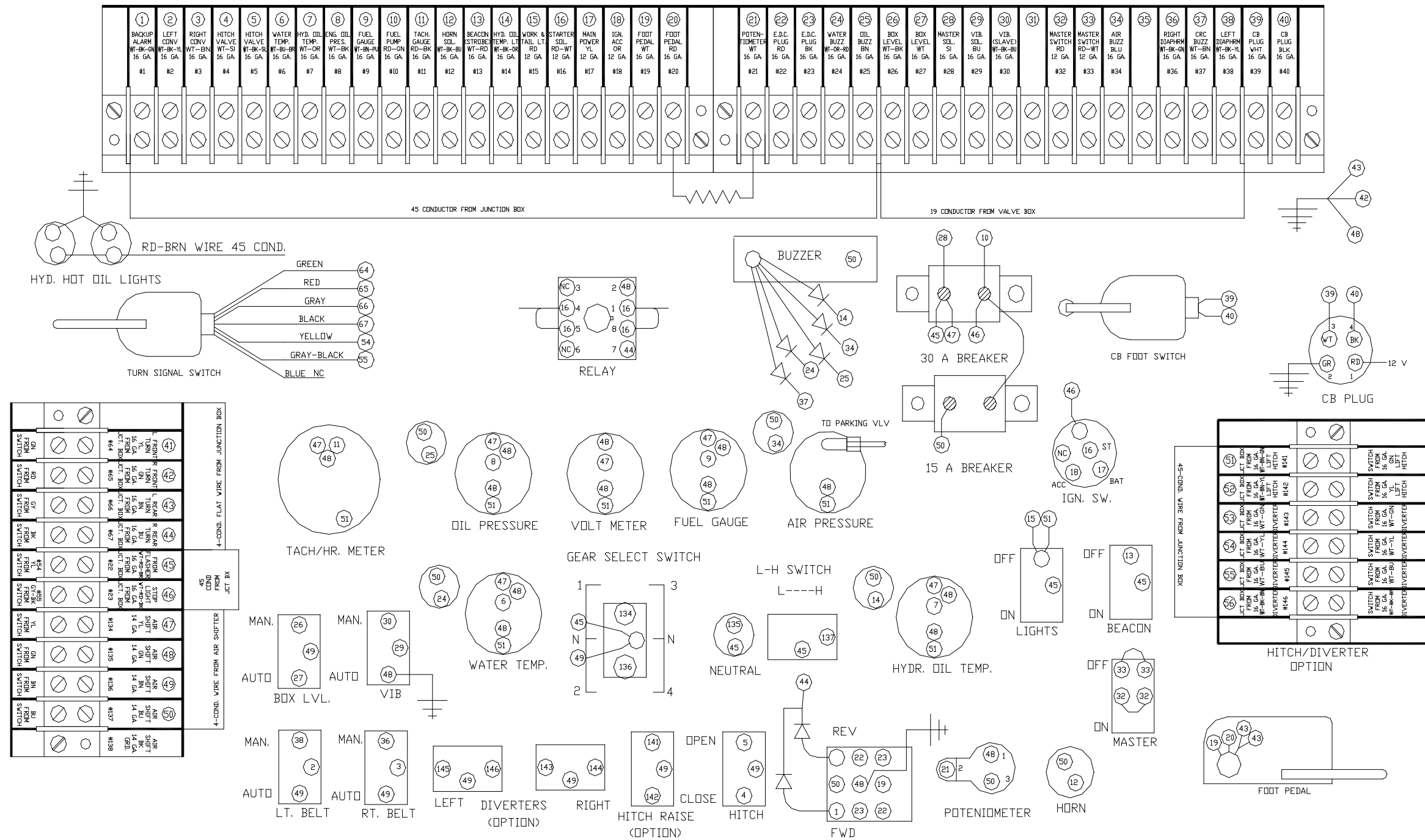
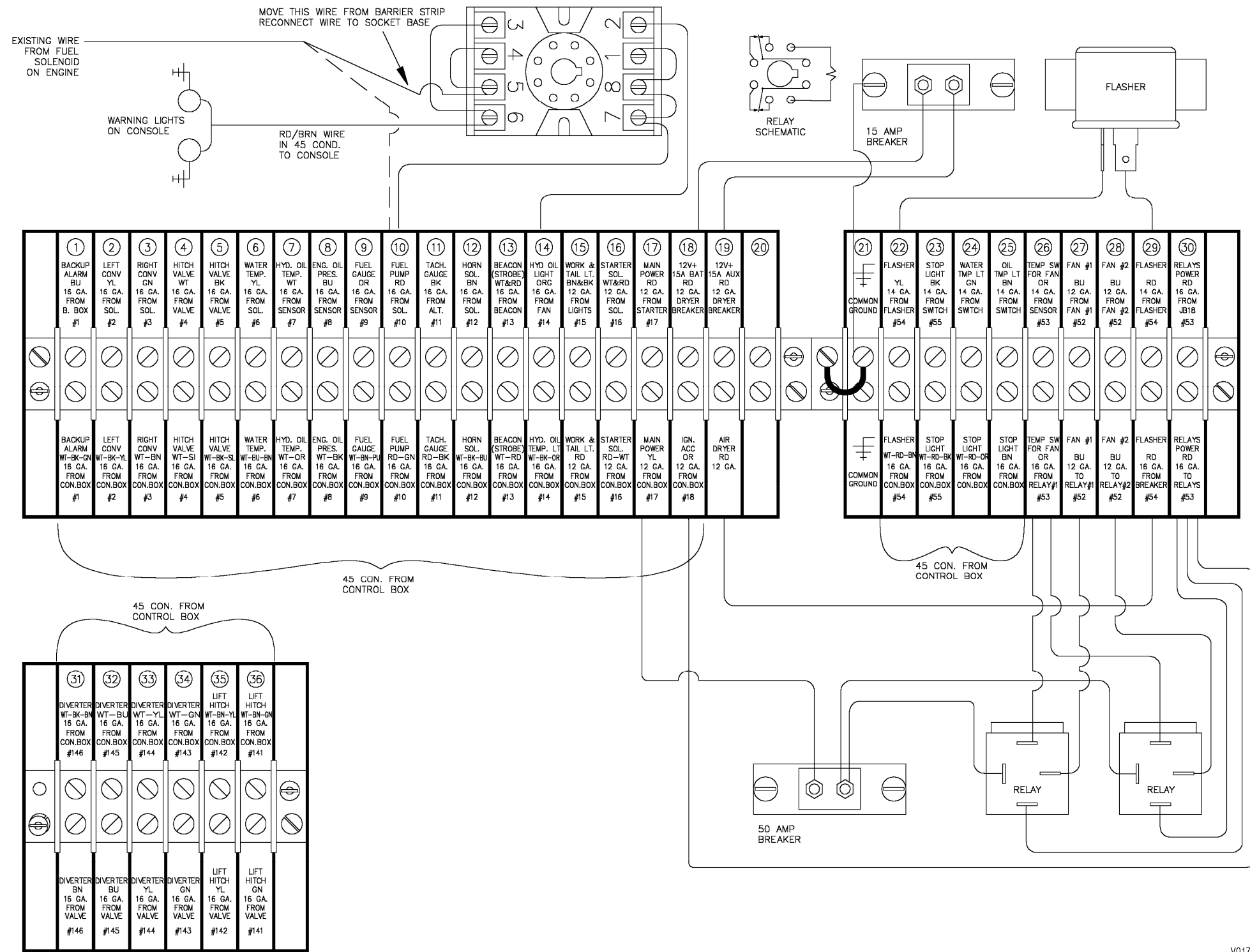


Figure 8-1. Chipper Console Wiring Detail



V01701

Figure 8-2. Chipper Junction Box Wiring Detail

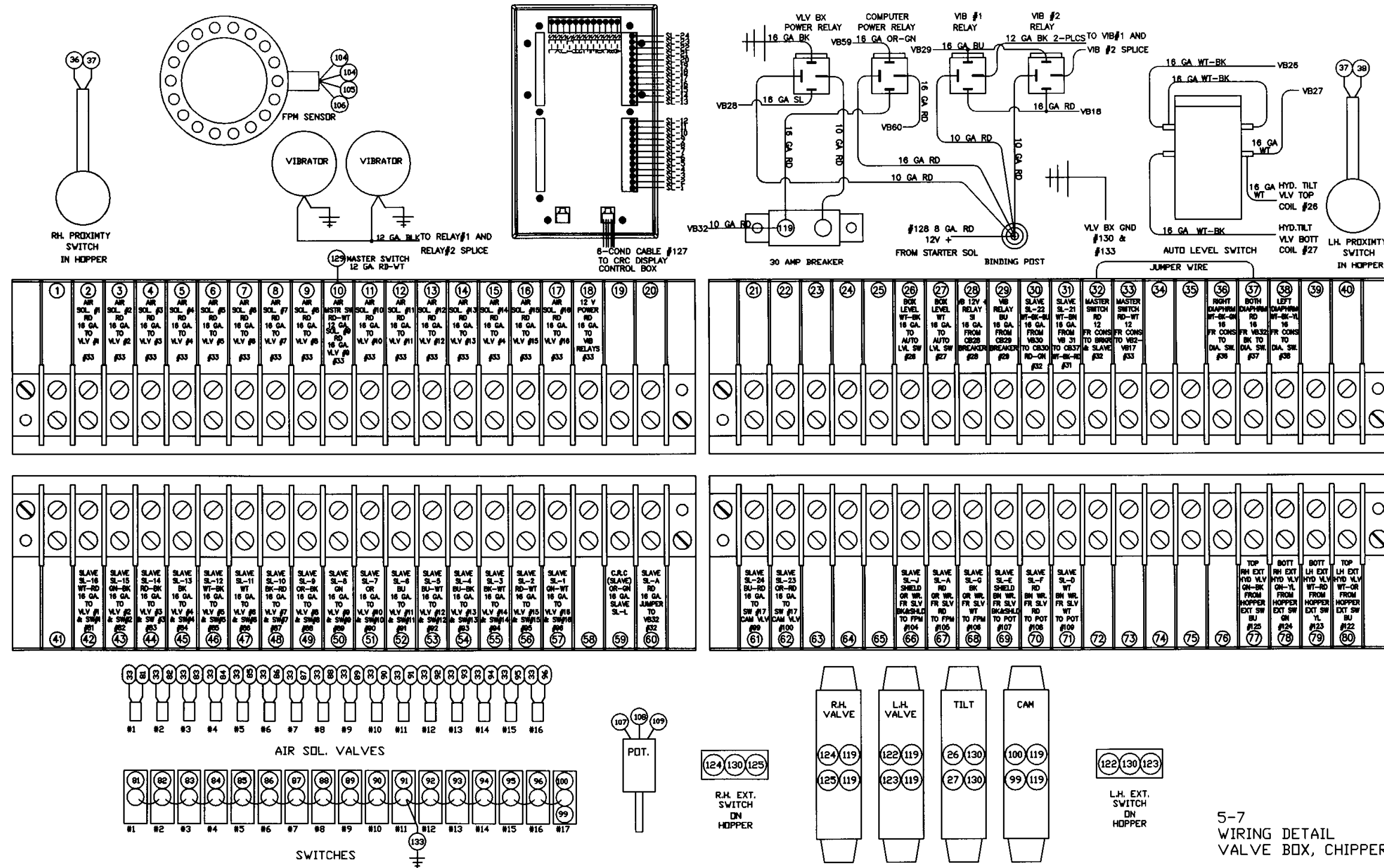
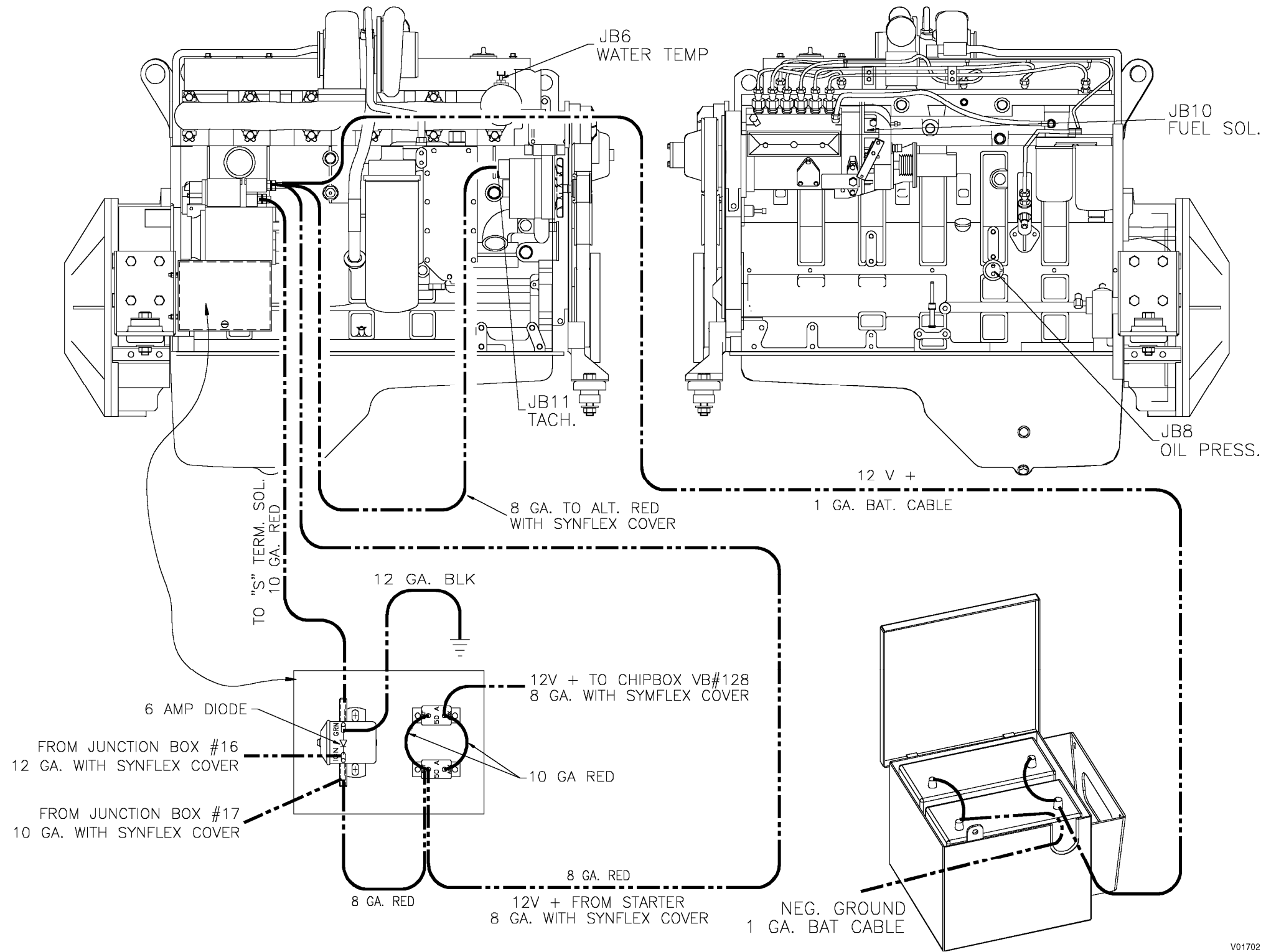
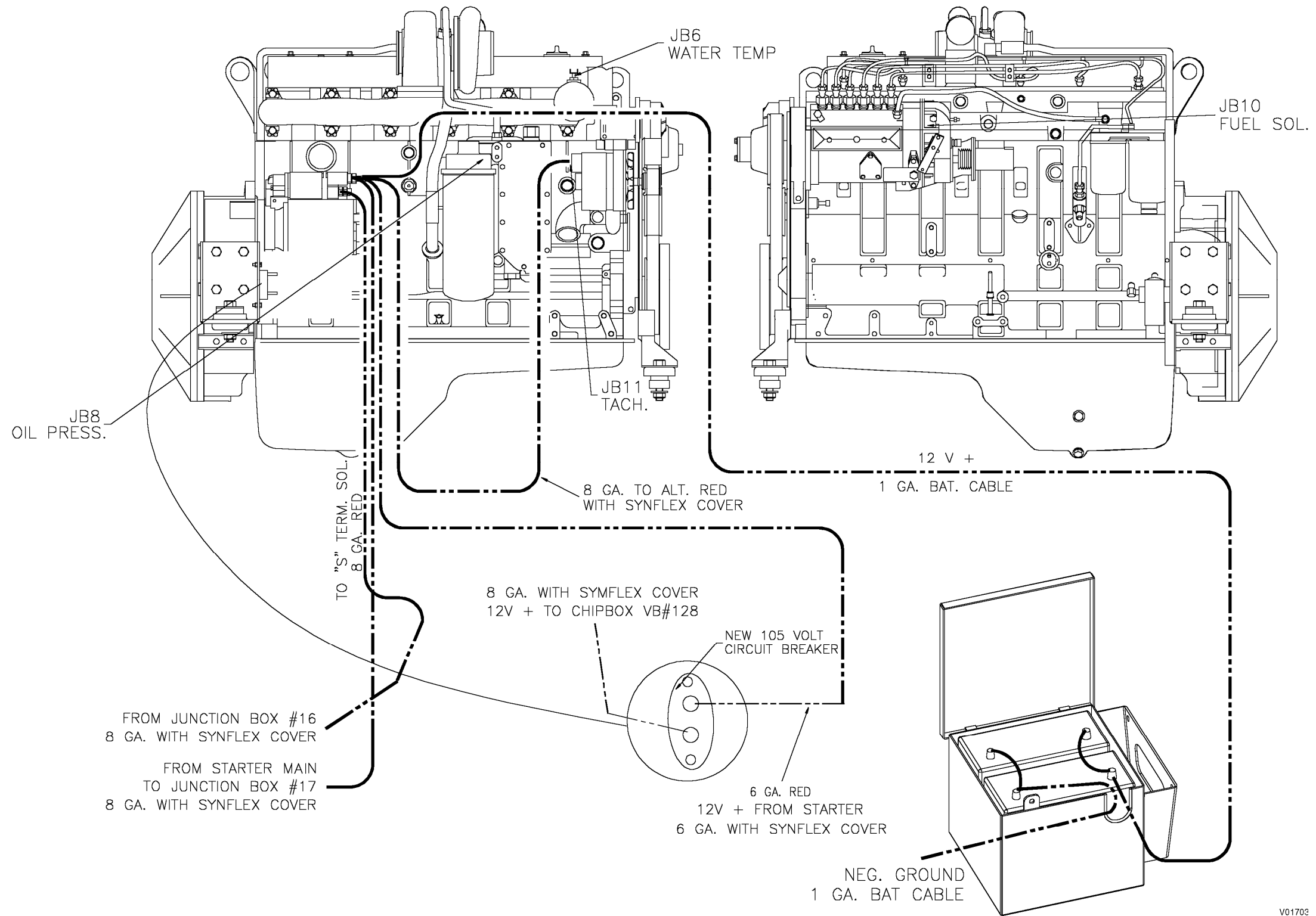


Figure 8-3 (Sheet 1). Chipper Valve Box Wiring Detail



V01702

Figure 8-4 (Sheet 1). Chipper Engine Wiring Detail (Early)



V01702

Figure 8-4 (Sheet 2). Chipper Engine Wiring Detail (Late)

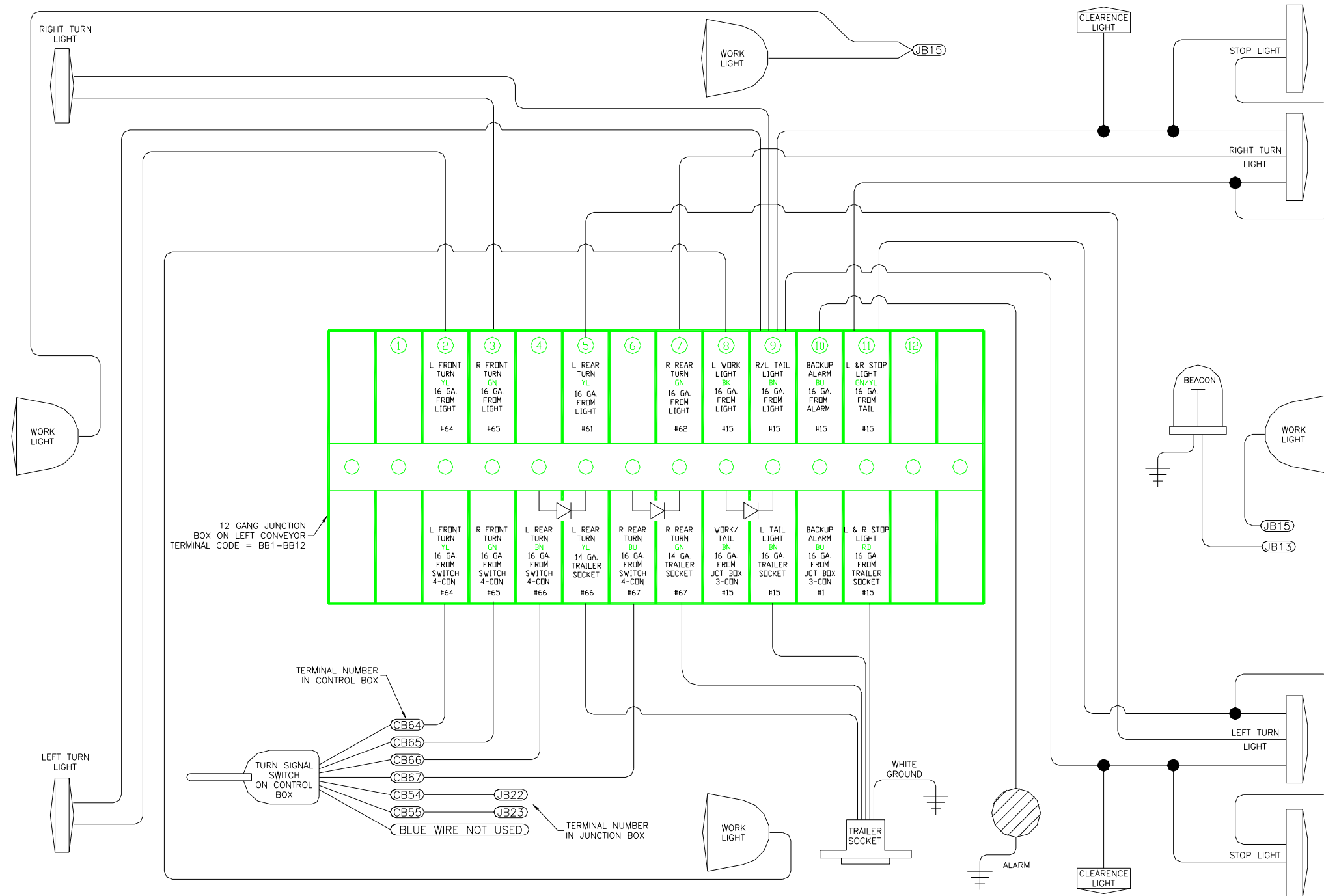


Figure 8-5. Chipper Lights Wiring Detail

Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
1	16	WT-BK-GN	CB1 to JB1 (back-up alarm)
1	16	BU	JB1 to BB10 (back-up alarm)
1	16	BU	BB10 to back-up alarm
2	16	WT-BK-YL	CB2 from left belt switch (mid term)
2	16	WT-BK-YL	CB2 to JB2 (left conveyor)
2	16	YL	JB2 to left conveyor sol.
3	16	WT-BN	CB3 from right belt switch (mid term)
3	16	WT-BN	CB3 to JB3 (right conveyor)
3	16	GN	JB3 to right conveyor sol.
4	16	WT-SL	CB4 from hitch switch (top term)
4	16	WT-SL	CB4 to JB4 (hitch open)
4	16	WT	JB4 to hitch control valve
5	16	WT-BK-SL	CB5 from hitch switch (bottom term)
5	16	WT-BK-SL	CB5 to JB5 (hitch closed)
5	16	BK	JB5 to hitch control valve
6	16	WT-BU-BN	CB6 from water temp gauge (S-term)
6	16	WT-BU-BN	CB6 to JB6 (water temp)
6	14	YL	JB6 to water temp sensor on engine
7	16	WT-OR	CB7 from hydraulic oil temp gauge (S-term)
7	16	WT-OR	CB7 to JB7 (hydraulic oil temp)
7	16	WT	JB7 to hydraulic oil temp sensor
8	16	WT-BK	CB8 from oil pressure gauge (S-term)
8	16	WT-BK	CB8 to JB8 (engine oil pressure)
8	14	BU	JB8 to engine oil pressure sensor
9	16	WT-BN-PU	CB9 from fuel gauge S-term)
9	16	WT-BN-PU	CB9 to JB9 (fuel gauge)
9	16	OR	JB9 to fuel gauge
10	16	RN-GN	CB10 from circuit breaker
10	16	RN-GN	Right term 30 amp circuit breaker to right term 15 amp circuit breaker
10	16	RD-GN	CB10 to JB10 (fuel pump sol.)
10	14	RD	JB10 to fuel pump sol.
11	16	RD-BU	CB11 from tach (bottom left term)
11	16	RD-BU	CB11 to JB11 (tach)
11	14	BK	JB11 to tach (off alternator)
12	16	WT-BK-BU	CB12 from horn switch (right term)
12	16	WT-BK-BU	CB12 to JB12 (horn)
12	14	BN	JB12 to RB (remote shift barrier) #1 term

Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
13	16	WT-RD	CB13 from beacon switch (top right term) to beacon switch (bottom right term)
13	16	WT-RD	CB13 to JB13 (beacon)
13	14	WT	JB13 to beacon light
14	16	WT-BK-OR	CB14 temp light & buzzer
14	16	WT-BK-OR	CB14 to JB14 (temp light)
14	14	OR	JB14 to sensor (on oil cooler)
15	12	RD	CB15 to light switch and to gauge lights
15	12	RD	CB15 to JB15 (work & tail lights)
15	16	BK	JB15 to front work light
15	16	BK	JB15 to right-hand work light
15	16	BK	JB15 to rear work light
15	14	BK	JB15 to BB8
15	14	BK	BB8 to left work light
15	Diode		BB8 to BB9
15	14	BN	BB9 to left tail light
15	14	BN	BB9 to right tail light
16	12	RD-WT	Ignition switch (S-term) to relay (term #4 & #5) from relay term (#1 * #8) to CB16
16	12	RD-WT	CB16 to JB16 (starter sol.)
16	12	RD-WT	JB16 to starter sol.
17	12	Y1	CB17 to ignition switch (batt. term)
17	12	Y1	CB17 to JB17 (starter post main +12V)
17	10	RD	JB17 to starter post (main +12V term)
17	8	RD	Starter post to battery (+12V term)
17	8	RD	Battery (+ term) to alternator (+12V term)
18	12	OR	CB18 from ignition switch (acc term)
18	12	OR	CB18 to JB18 (ignition acc)
18	12	RD	JB18 to 15 amp (battery term) breaker
18	12	RD	(Aux term) 15 amp breaker to JB19 to air dryer
19	14	RD	JB18 to air brake switch
19	16	WT	CB19 to forward and reverse switch (mid. term)
19	16	WT (from 3-cond)	CB19 to foot pedal
20	16	RD	CB20 to foot pedal
21	16	WT	CB21 to potentiometer (#2 term)
22	16	RD	CB22 from forward and reverse switch (bottom mid. term) to forward and reverse switch (top right term)
22	16	RD	CB22 to E.D.C. plug (on hydrostatic trans.)



Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
23	16	BK	CB23 to forward and reverse switch (bottom right term) to forward and reverse switch (top right term)
23	16	BK	CB23 to E.D.C. plug (on hydrostatic trans.)
24	16	WT-BK-OR	CB24 to buzzer & water temp. light
24	16	WT-RD-OR	CB24 to JB24
24	12	GN	JB24 to hydraulic temp sensor
25	16	BN	CB24 to buzzer and oil light
25	14	BN	CB24 to JB24
25	14	BN	JB24 to oil sending sensor
26	16	WT-BK	CB26 to level switch (bottom term)
26	16	WT-BK	CB26 to VB26 (in 19-cond. cable from valve box)
26	16	WT-BK	VB26 to top left-hand term leveling switch
26	16	WT-BK	From bottom left-hand term to top coil on tilt hydraulic valve
26	16	WT-BK	Leveling switch left-hand top term to top right-hand term leveling switch
27	16	WT	CB27 from level switch (top term)
27	16	WT	CB27 to VB27 (19-cond. cable from valve box)
27	16	WT	VB27 to bottom left-hand term of leveling switch
27	16	WT	Bottom left-hand term leveling switch to bottom coil tilt hydraulic valve
28	16	SL	CB28 to breaker (right-hand term)
28	16	SL	CB28 to VB29 (19-cond. cable valve box)
28	16	SL	VB28 to valve box power relay 1/4" term #86
28	16	BK	1/4" term #85 valve box power relay to gnd.
29	16	BU	CB29 to center term vibrator switch
29	16	BU	CB29 to VB29 (19-cond. cable valve box)
29	16	BU	VB29 to vibrator relay #1 and #relay #2 1/4" term. #85
30	16	WT-BK-BU	CB30 to vibrator switch (bottom term)
30	16	WT-BK-BU	CB30 to VB30 (19-cond. cable valve box)
30	16	RD-GN	VB30 to 12-pin conn. slave #22 pin
31	16	WT-BN	Buzzer left terminal to CB37
31	16	WT-BN	CB37 to VB31 (19-cond. cable valve box)
31	16	WT-BK-RD	VB31 to 12-pin conn slave #21 pin
32	12	RD	CB32 to master switch (top left-hand term) to master switch (top right-hand terminal)
32	12	RD	CB32 to VB32 (19-cond. cable valve box)
32	12	RD	VB32 to 30 amp circuit breaker aux term to computer power relay term #85

Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
32	16	RD	Computer power relay 1/4" term #86
32	16	OR-GN	Computer power relay 1/4" term #85 to VB59
32	16	OR-GN	VB59 to 12-pin connector slave # "L" pin
32	12	RD	VB32 to VB37 (jumper)
32	14	BN	VB37 to right-hand and left-hand hopper (diode) switches
33	12	RD-WT	CB33 to master switch (bottom right term) to master switch (bottom left term)
33	12	RD-WT	CB33 to VB33, VB33 jumper to VB10
33	Metal Jumpers		VB10 to VB2 through VB18
33	16	RD	VB2 to air sol. valve #1
33	16	RD	VB3 to air sol. valve #2
33	16	RD	VB4 to air sol. valve #3
33	16	RD	VB5 to air sol. valve #4
33	16	RD	VB6 to air sol. valve #5
33	16	RD	VB7 to air sol. valve #6
33	16	RD	VB8 to air sol. valve #7
33	16	RD	VB9 to air sol. valve #8
33	16	RD	VB10 to air sol. valve #9
33	16	RD	VB11 to air sol. valve #10
33	16	RD	VB12 to air sol. valve #11
33	16	RD	VB13 to air sol. valve #12
33	16	RD	VB14 to air sol. valve #13
33	16	RD	VB15 to air sol. valve #14
33	16	RD	VB16 to air sol. valve #15
33	16	RD	VB17 to air sol. valve #16
33	16	RD	VB18 to Vib relays term #86
34	16	BU	CB34 from buzzer and air pressure light
34	16	BU	CB34 to air pressure sending unit on throttle valve
35	10	RD	(4) Power (+) wires from binding post in valve box to (3/8" term #87) of 3-relays 70 amp
35	10	RD	Valve box power relay (3/8" term #30) to 30 amp breaker (batt. term)
36	16	WT-BK-GN	CB36 to right-hand belt switch (bottom term)
36	16	WT-BK-GN	CB36 to VB 36 (19-cond. cable valve box)
36	14	GN	VB36 to chip box diaphragm switch
37	14	RD	Jumper VB32 to VB37 +12V
37	14	BN	VB37 to right-hand and left-hand chip box switches



Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
38	16	WT-BK-YL	CB38 to left-hand belt switch (bottom term)
38	16	WT-BK-YL	CB38 to VB38 (19-cond cable valve box)
38	16	BU	VB38 to left-hand chip box (diaphragm) switch
39-40			CB39-CB40 spare retro-belt sol.
41	16	BK	(CB) ground to C.R.C. (computer)
42	SHLD		(CB) ground to C.R.C. (computer)
44	16	GN	(CB) forward and reverse switch from diodes to (CB) relay (term #7)
45	12	RD	(CB) breaker (left term) to beacon switch (mid. left term) to beacon switch (mid. right term)
46	10	RD	(CB) breaker (right term) to ignition switch (+12V term)
47	12	RD	(CB) breaker (left term) to voltmeter (+term)
47	16	RD	(CB) voltmeter (+term) to oil pressure gauge (+ term) to fuel gauge (+ term) to tach. (+ term) to water temp gauge (+ term) to hydraulic oil temp gauge (+term)
48	16	BK	(CB) ground to relay (term #2) to all lights & gauges (also forward & reverse switch) & (Pot)
49	16	RD	(CB) C.R.C. switch (top term) to beacon switch (mid. right term) to box level switch (mid. term) to left belt switch (top term) to hitch switch (mid. term) to right belt switch (top term)
50	16	RD	(CB) horn switch (left term) to left term 15 amp circuit breaker to potentiometer (+term) to forward and reverse switch (mid. left term)
51	16	BU	(CB) light switch (mid. left term) to all gauge lights
52	8	RD	JB17 to breaker (batt. term)
52	12	RD	Out breaker (aux term) to relays #1 & #2 (#30 term) out
52	16	BU	Relay #1 (#87 term) to JB27
52	16	BU	JB27 to fan #1 to relay #2 (#87 term)
52	16	BU	Relay #2 (#87 term) to JB28
52	16	BU	JB28 to fan #2
53	16	RD	JB18 to JB30 (ACC to relay to sensor)
53	16	RD	JB30 to relay #1 jump to relay #2 (#86 term)
53	16	OR	Out relay #2 (#85 term) jump to relay #1 (#85 term) to JB26
53	16	OR	JB26 to temp switch on hydraulic return manifold
54	16	YL	Turn signal switch to JB22
54	16	YL	JB22 to flasher
54	16	RD	Out flasher to JB29
54	16	RD	JB29 to breaker (aux. term)

Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
55	16	BK	Turn signal switch to JB23 (ground)
55	16	BK	JB23 to stop light switch/double check valve
55	16	RD	Light switch/double check valve to JB18
56			Slave
57-59			JB24-JB25 (spare)
60	16	BK	BB1 from ground
60	16	WT	BB1 to female trailer light socket (ground)
61	16	YL	BB5 to female trailer light socket – optional
62	16	GN	BB7 to female trailer light socket – optional
63	16	BN	BB9 to female trailer light socket – optional
64	16	BU	Turn signal switch to BB2
64	16	YL	BB2 to left front turn signal
65	16	GN	Turn signal switch to BB3
65	16	GN	BB3 to right front turn signal
66	16	YL	Turn signal switch to BB4
66	Diode		BB4 to BB5
66	16	GN	BB5 to left rear turn signal
67	16	BN	Turn signal switch to BB6
67	Diode		BB6 to BB7
67	16	GN	BB7 to right rear turn signal
68			VB1 (spare)
70-76			VB19-VB25 (spare)
77			VB30 (spare)
78-79			VB36-VB37 (spare)
80			VB41 (spare)
81	16	WT-RD	VB42 from computer slave SL-16
81	16	BK	VB42 to air sol. valve #1
81	16	WT-RD	VB42 to switch #1 (bottom term)
82	16	GN-BK	VB43 from computer slave SL-15
82	16	BK	VB43 to air sol. valve #2
82	16	GN-BK	VB43 to switch #2 (bottom term)
83	16	RD-BK	VB44 from computer slave SL-14
83	16	BK	VB44 to air sol. valve #3
83	16	RD-BK	VB44 to switch #3 (bottom term)
84	16	BK	VB45 from computer slave SL-13
84	16	BK	VB45 to air sol. valve #4
84	16	BK	VB45 to switch #4 (bottom term)

Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
85	16	WT-BK	VB46 from computer slave SL-12
85	16	BK	VB46 to air sol. valve #5
85	16	WT-BK	VB46 to switch #5 (bottom term)
86	16	WT	VB47 from computer slave SL-11
86	16	BK	VB47 to air sol. valve #6
86	16	WT	VB47 to switch #6 (bottom term)
87	16	BK-RD	VB48 from computer slave SL-10
87	16	BK	VB48 to air sol. valve #7
87	16	BK-RD	VB48 to switch #7 (bottom term)
88	16	OR-BK	VB49 from computer slave SL-9
88	16	BK	VB49 to air sol. valve #8
88	16	OR-BK	VB49 to switch #8 (bottom term)
89	16	GN	VB50 from computer slave SL-8
89	16	BK	VB50 to air sol. Valve #9
89	16	GN	VB50 to switch #9 (bottom term)
90	16	OR	VB51 from computer slave SL-7
90	16	BK	VB51 to air sol. valve #10
90	16	OR	VB51 to switch #10 (bottom term)
91	18	BU	VB52 from computer slave SL-6
91	16	BK	VB52 to air sol. valve #11
91	16	BU	VB52 to switch #11 (bottom term)
92	16	BU-WT	VB53 from computer slave SL-5
92	16	BK	VB53 to air sol. valve #12
92	16	BU-WT	VB53 to switch #12 (bottom term)
93	18	BU-BK	VB54 from computer slave SL-4
93	16	BK	VB54 to air sol. valve #13
93	16	BU-BK	VB54 to switch #13 (bottom term)
94	16	BK-WT	VB55 from computer slave SL-3
94	16	BK	VB55 to air sol. valve #14
94	16	BK-WT	VB55 to switch #14 (bottom term)
95	16	RD-WT	VB56 from computer slave SL-2
95	16	BK	VB56 to air sol. valve #15
95	16	RW-QT	VB56 to switch #15 (bottom term)
96	16	GN-WT	VB57 from computer slave SL-1
96	16	BK	VB57 to air sol. valve #16
96	16	GN-WT	VB57 to switch #16 (bottom term)
97-98			VB58 – VB59 (spare)

Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
99	16	BU-RD	VB61 from computer slave pin #24
99	16	BU-RD	VB61 to switch #17 (top term)
99	16	BU	VB61 to hydraulic cam valve bottom coil
100	16	OR-RD	VB62 from computer slave pin #23
100	16	OR-RD	VB62 to switch #17 (bottom term)
100	16	OR	VB62 to hydraulic cam valve top coil
101-103			VB63 – VB65 (spare)
104	16	UNSHD	VB66 from computer slave (off gray 3 wire)
104	16	BK	VG66 to FPM sensor
104	16	UNSHD	VB66 to FPM sensor
105	16	RD	VB67 from computer slave (off gray 3 wire)
105	16	RD	VB67 to FPM sensor
106	16	BK	VB68 from computer slave (off gray 3 wire)
106	16	WT	VB68 to FPM sensor
107	16	UNSHD	VB69 from computer slave (off brown 4 wire)
107	16	BK	VB69 to potentiometer right term as mounted
108	16	RD	VB70 from computer slave (off brown 4 wire)
108	16	RD	VB70 to potentiometer left term as mounted
109	16	BK	VB71 from computer slave (off brown 4 wire)
109	16	WT	VB71 from computer slave (off brown 4 wire)
109	16	WT	VB71 to potentiometer mid. term as mounted
119	16	RD	Cam hydraulic valve coils (+12V) to left term circuit breaker
119	16	RD	Left-hand ext. hydraulic valve coil (+12V) to left term circuit breaker
119	16	RD	Right-hand ext. hydraulic valve coil (+12V) to left term circuit breaker
122	16	WT-OR	VB80 from left-hand ext. hydraulic valve top coil
122	14	BU	VB80 to ext. switch on ext left-hand chip box
123	16	WT-RD	VB79 from left-hand ext. hydraulic valve bottom coil
123	14	YL	VB79 to ext. switch on left-hand ext. chip box
124	16	GN-YL	VB78 from right-hand ext. hydraulic valve top coil
124	14	GRN	VB78 to right-hand ext. switch on right-hand ext. box
125	16	GN-BK	VB77 from right-hand ext. hydraulic valve bottom coil
125	14	BU	VB78 to right hand-ext. switch on right-hand ext. box
126	14	BN	From left-hand and right-hand ext. box switches center term to ground top of VB

Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
127	6-cond. cord		Slave plug to CRC computer display plug
128	8	RD	VB binding post from starter sol. (batt.)
129	12	RD-WT	CB master switch (bottom term)
129	12	RD-WT	CB 33 to VB10 (19-cond. cable) (jumped cable switches)
130		Ground	VB top of box from hydraulic tilt top and bottom #130 coils
133	16	BK	Jump switches #1 - #17 ground from switch #10
134	16	YL	CB47 from gear select switch (bottom term)
134	14	YL (4-cond)	CB47 to RB2 (remote shift 10-gang barrier) #2 term
134	16	RD	#2 term to #2 air valve coil
135	16	GN	CB 48 from neutral light
135	14	GN (4-cond)	CB48 to RB5 (remote shift 10-gang barrier) term #5
135	14	GN	RB5 (10 gang barrier) to remote switch on shifter
135	14	BK	Remote shifter switch to RB8 (10-gang barrier) ground
136	16	BN	CB49 from gear select switch (to term)
136	14	BN (4-cond)	CB49 to RB3 (remote shift 10-gang barrier) #3
136	16	RD	RB3 term to #3 air valve coil
137	16	BU	CB50 from left-hand switch
137	14	BU (4-cond)	CB50 to RB4 (remote shift 10-gang barrier #4
138	16	BK	RB9&10 from air valve coils #1, #2, #3 and #4
138	Metal Jumpers		RB9 & 10 to ground screws
141	16	WT-BN-GN	CB51 from switch (hitch raise) (bottom term)
141	16	WT-BN-GN	CB51 to VB36
141	14	GN	VB36 to hydraulic valve (top term) hitch raise
142	16	WT-BN-YL	CB52 from switch (hitch raise) (top coil)
142	16	WT-BN-YL	CB52 to VB25
142	14	YL	VB35 to hydraulic valve (bottom coil) hitch raise
143	16	WT-GN	CB53 to switch right-hand diverter (left-hand term)
143	16	WT-GN	CG53 to VB34
143	14	GN	VB34 to right-hand hydraulic valve (bottom coil) right-hand diverter
144	16	WT-YL	CB54 to switch right-hand diverter (right-hand term)
144	16	WT-YL	CB54 to VB33
144	14	YL	VB33 to right-hand hydraulic valve (top coil) right hand Diverter
145	16	WT-BU	CB55 to switch left-hand Diverter (left-hand term)
145	16	WT-BU	CB55 to VB32

Table 8-1. Chipper 1998 2002/CRC Electrical Circuit

Wire Number	Wire Size	Wire Color	Description
145	14	BU	VB32 to left-hand hydraulic valve (bottom coil) left-hand Diverter
146	16	WT-BK-BN	CB56 to switch 2H Diverter (right-hand term)
146	16	WT-BK-BN	CB56 to VB31
146	14	BN	VB31 to hydraulic valve (top coil) left-hand Diverter

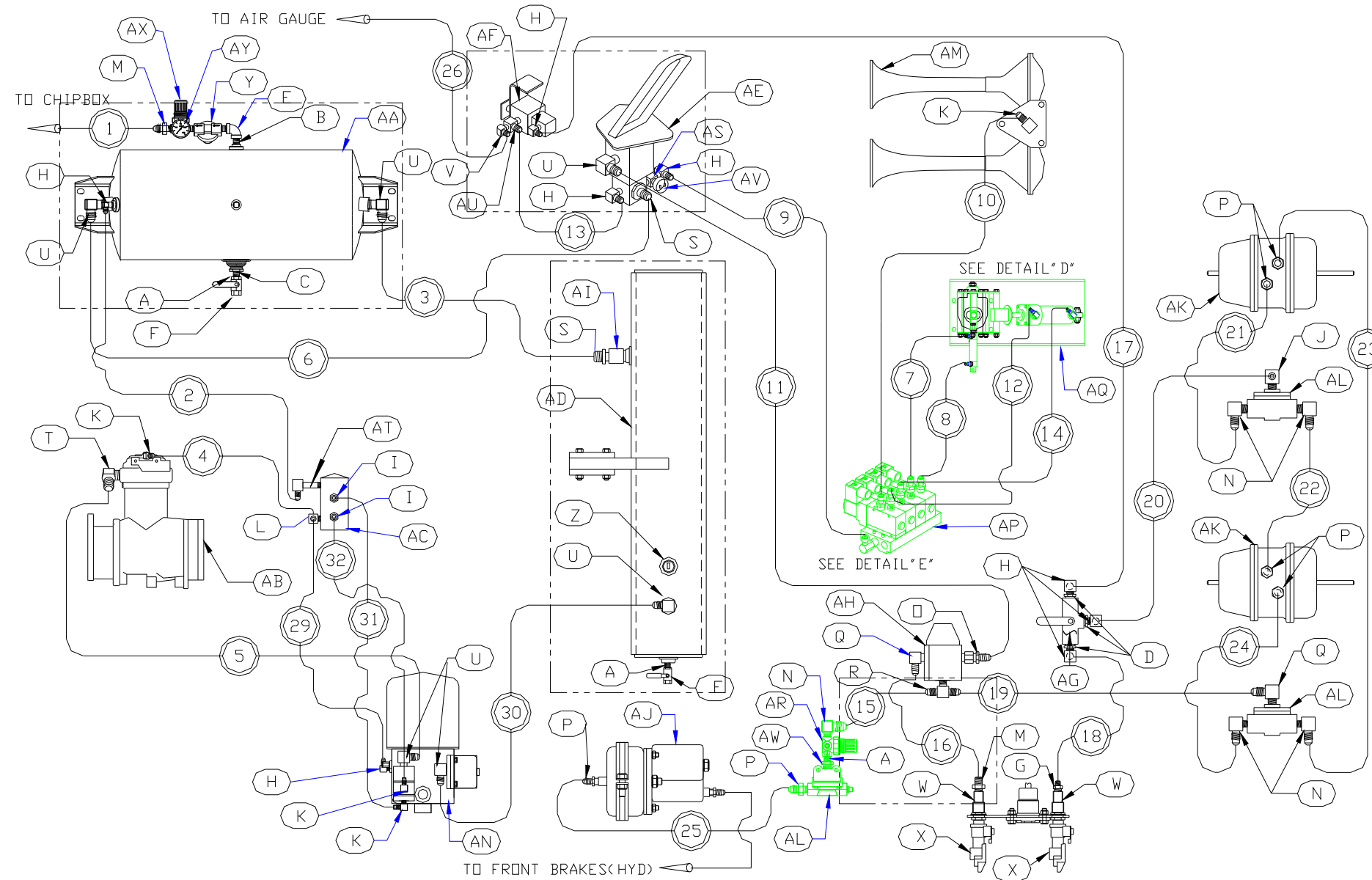


Figure 8-6. Chipper Air System Hosing and Fitting Diagram



Table 8-2. Chipper Air System Hosing and Fittings

Hose Number	Hose Type	Length	Fitting	Hose Description
1	H10408	186"	8U-8FJX 2Plcs	From Regulator on Top Port of Air Tank (on Frame) to Chip Box Air Tank.
2	100R5.188	108"	4U-4FJX 2Plcs.	From 90D4MJ-4MP on End of Air Tank (on Frame) to Front Top 90D4MJ-2MPL on D-2 Governor.
3	H10408	60"	8u-8FJX 2Plcs.	From 90D8mj-8MP o Rear of Air Tank (on Frame) to Check Valve (comes with Air Dryer) on Wet Tank Right-Hand side.
4	100R5.188	32"	4U-4FJX 2Plcs.	From 90D4MJ-4MP on top of Compressor (on Cummins Engine) to Tee on Front of D-2 Governor.
5	S-10TW	68"	8E4-8FJX 2Plcs.	From Compressor (Supply S/S Hose) to Top Port of E-Con Valve (comes with Air Dryer).
6	H10408	100"	8U-8FJX 2Plcs.	From Air Tank (on Frame) to Right-Hand Front 8MJ-8MP on Treadle Valve.
7	100R5.188	12"	4U-4FJX & 90D4E-4FJX	From Air Manifold (Shifter) #4 Valve 4MJ-2MP (Next to Din Connector) to Rod End at small Air Cylinder on Shifter.
8	100R5.188	12"	4U-4FJX & 90D4E-4FJX	From Air Manifold (Shifter) #4 Valve 4MJ-2MP (Forward Port) to Brake Port on Small Air Cylinder on Shifter.
9	100R5.188	49"	4U-4FJX 2Plcs	From Tee on Left-Hand Front Port of Shuttle Valve (with Low Pressure Switch) to in Port of Air Manifold for Shifter.
10	100R5.188	97"	4U-4FJX 2Plcs	From Air Manifold (Shifter) #1 Valve 4MJ-2MP (A-Port) to Dire Horn.
11	H10408	50"	8U-8FJX 2Plcs.	From 90D8MJ-8MP Top Right-Hand Port of Treadle Valve to Right Hand Port of Stop Light Switch.
12	100R5.188	14"	4U-4FJX 2Plcs.	From Air Manifold (Shifter) #2 Valve 4MJ-2MP to Rod End of Large Air Cylinder on Shifter.
13	100R5.188	36"	4U-4FJX 2Plcs	From 90D4MJ-4MP on Right-Hand Lower Port of Treadle Valve to 90D4MJ-2MP on Front Center Port of Emergency Brake Control.
14	100R5.188	19"	4U-4FJX 2Plcs.	From Air Manifold (shifter) #3 Valve 4MJ-2MP to Brake Port of Large Air Cylinder on Shifter.
15	H10408	50"	8U-8FJX 2Plcs.	From 90D8MJ-4Mp Top Port of 45# Fixed Regulator to Tee on Bottom Port of Double Check Valve Brake Switch.
16	H10408	34"	8U-8FJX 2Plcs	From Left-Hand Port of Double Check Valve Brake Switch to 8MJ-4MP Forward Glad Hand.
17	100R5.188	85"	4U-4FJX 2Plcs.	From 90D4MJ-4MP on Right-Hand Rear Port of Emergency Brake Control Valve to Upper Port of 3-Way Ball Valve.
18	100R5.188	20"	4U-4FJX 2Plcs.	From Lower Port of 3-Way Ball Valve to 4MJ-4MP of Glad Hand
19	H10408	57"	8U-8FJX 2Plcs.	From Tee on Bottom Port of Double Check Valve Brake Switch to Middle Port of Left-Hand Quick Release Valve.
20	100R5.188	106"	4U-4FJX 2Plcs.	From Center Port of 3-Way Ball Valve to Center Port of Right-Hand Quick Release Valve.
21	H10408	26"	8U-8FJX 2Plcs.	From Front Port of Quick Release Valve to Forward Port of Right-Hand Air Brake Chamber.
22	H10408	34"	8U-8FJX 2Plcs.	From Rear Port of Right-Hand Quick Release Valve to Forward Port of Left-Hand Air Brake Chamber.
23	H10408	34"	8U-8FJX 2Plcs.	From Right-Hand Rear Port on Right-Hand Air Brake Chamber to Rear Port of Left-Hand Quick Release Valve.

Table 8-2. Chipper Air System Hosing and Fittings

Hose Number	Hose Type	Length	Fitting	Hose Description
24	H10408	26"	8U-8FJX 2Plcs.	From Front Port of Left-Hand Quick Release Valve to Rear Port of Left-Hand Air Brake Chamber.
25	H10408	15"	8U-8FJX 2Plcs.	From Front Port of Quick Release Valve (With 45# Regulator) to Front Port of Air Can on Master Cylinder.
26	Spare			
27	Spare			
28	Spare			
29	100R5.188	10 1/2"	4U-4FJX 2Plcs.	From Tee on Bottom of D-2 Governor to Air Dryer Left-Hand Port.
30	H10408	30"	8U-8FJX 2Plcs.	From 90D8MJ-8MP on Right-Hand Front of Air Dryer to 90D8MJ-8MP on Top Left-Hand Port of Wet Tank.
31	100R5.188	17"	4U-4FJX 2Plcs.	From 90D4MJ-4MP (Fitting Comes With E-Con Valve, has Built In Check Valve) on Bottom Port of E-Con Valve to Top Outside 4MJ-2MP Port of D-2 Governor.
32	100R5.188	19"	4U-4FJX & 90D4E-4FJX	From 90D4MJ-4MP Front Center Port of E-Con Valve to Lower Outside Port 4MJ-2MP on D-2 Governor.

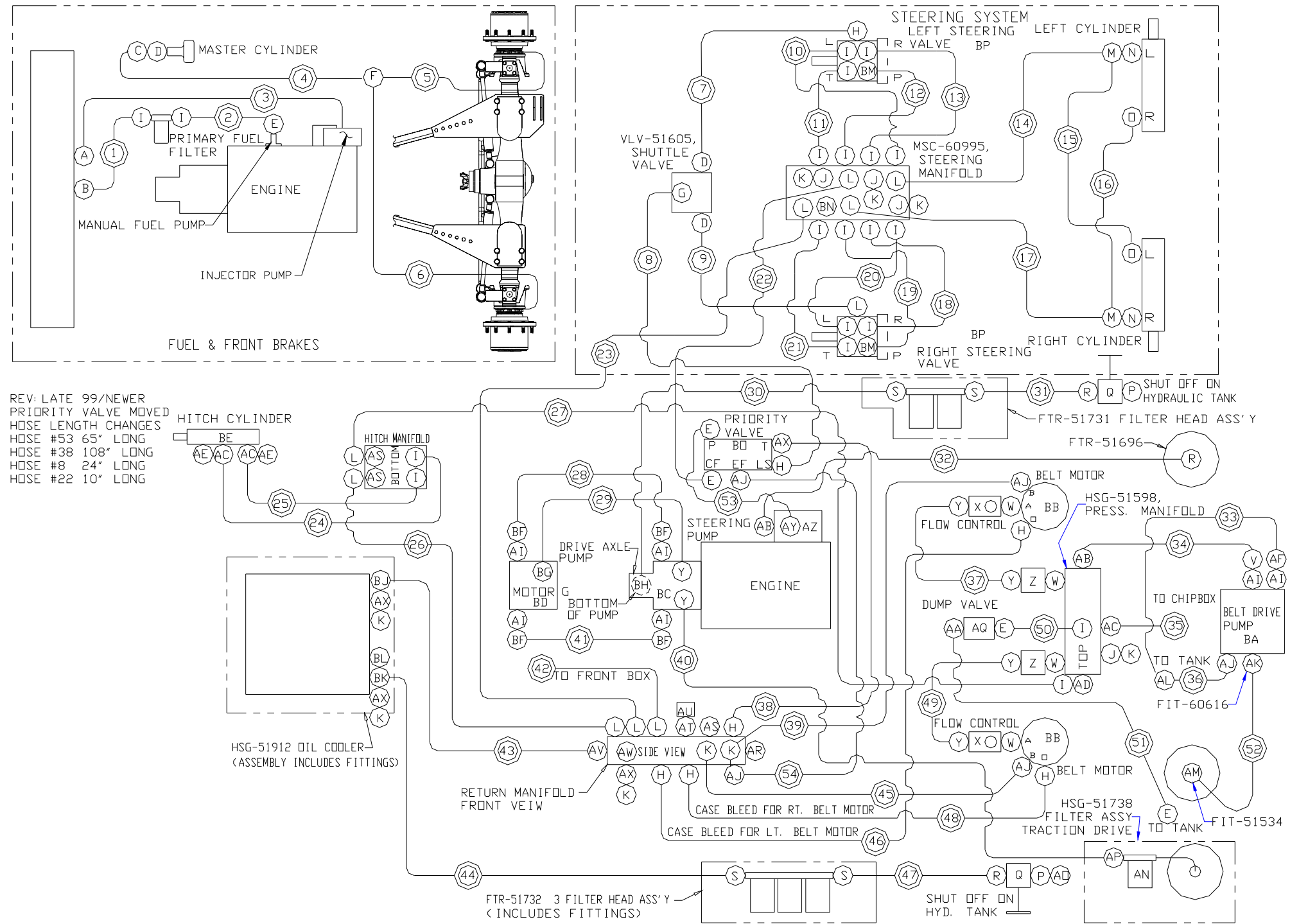


Figure 8-7. Chipper Hydraulic/Misc. Hosing and Fittings

Table 8-3. Chipper Air System Parts and Fittings Chart

Item Number	Description	Part Number	Quantity
A	Nipple 1/4" X Close	FIT-28001	3
B	Nipple 1/4" X 1 1/2"	FIT-28012	1
C	Bushing Hex 3/4" X 1/4"	FIT-28346	1
D	Bushing Hex 1/2" X 1/4"	FIT-28344	3
E	90° Pipe Straight Elbow 1/4"	FIT-28236	1
F	Valve Ball 1/4"	VLV-29195	2
G	1/4" Male Jic X 1/4" Male Pipe	4MJ-4MP	1
H	90° 1/4" Male Jic X 1/4" Male Pipe	90D4MJ-4Mp	7
I	1/4" Male Jic X 1/8" Male Pipe	4MJ-2MP	2
J	90° 1/4" Male Jic X 3/8" Male Pipe	90D4MJ-6MP	1
K	90° 1/4" Male Jic X 1/8" Male Pipe	90D4MJ-2MP	4
L	Tee 1/4" Male Jic X 1/4" Male Pipe X 1/4" Male Jic	T4MJ-2MP-4MJ	1
M	1/2" Male Jic X 1/4" Male Pipe	8MJ-4MP	2
N	90° 1/2" Male Jic X 1/4" Male Pipe	90D8MJ-4MP	5
O	3/8" Female Pipe X 1/2" Male Jic	6FP-8MP	1
P	1/2" Male Jic X 3/8" Male Pipe	8MJ-6MP	6
Q	90° 1/2" Male Jic X 3/8" Male Pipe	90D8MJ-6MP	2
R	Tee 1/2" Male Jic 3/8" Male Pipe X 1/2" Male Jic	T8MJ-6MP-8MJ	1
S	1/2" Male Jic 1/2" Male Pipe	8MJ-8MP	2
T	1/2" Male Jic X 3/4" Male Pipe	8MJ-12Mp	1
U	90° 1/2" Male Jic X 1/2" Male Pipe	90D8MJ-8MP	6
V	90° 1/2" Push Lock X 10-32 Thread	90D2PL-10-32M	1
W	1/2" MP X 3/4" Bulk Head X 1/2" Male Pipe	8MP-12BH-8MP	2
X	Glad Hand	ELC-22370	2
Y	60 PSI Governor	MTR-25255	1
Z	Safety Relief Valve (150 PSI)	VLV-51638	1
AA	Air Tank Assembly Chassis	TNK-51993	1
AB	Cummins Engine Part	Compressor	1
AC	D-2 Governor	VLV-51637	1
AD	Wet Air Tank	HSG-51437	1
AE	E3 Brake Valve	VLV-51639	1
AF	Valve PP3 Brake Control	VLV-51640	1
AG	Valve S/S 3-Way Ball Valve	VLV-29216	1
AH	DS2 DB1 Check & Stop Light Switch	VLV-51641	1
AI	Comes With Air Dryer	Pressure Controlled CK Valve	1
AJ	Master/Cylinder Air/Hydraulic JD&SP/Dana	PTM-51644	1

Table 8-3. Chipper Air System Parts and Fittings Chart

Item Number	Description	Part Number	Quantity
AK	Comes on Rear Axle	Air Chamber Rear Brakes	2
AL	QR-1 Quick Release Valve	VLV-51642	3
AM	Horn	MSC-51645	1
AN	Comes With Air Dryer	E-Con Valve	1
AO	Air Dryer Rockwell Wabco	FTR-60949	1
AP	Valve Cluster Assembly Remote Shift	MCH-61863	1
AQ	Shift Assembly Remote Spicer	MCH-60850	1
AR	Regulator Air 45# fixed 1/4" NPT	VLV-26201	1
AS	Tee 1/4" Female Pipe X 1/4" Female Pipe 1/4" Male Pipe	T4FP-4FP-4MP	1
AT	90° 1/4" Male Jic X 1/4" Male Pipe Long	90D4MJ-2MP-L	1
AU	Modified (90D4MJ-2MP) Air Supply	FIT-51998	1
AV	Switch Low Air 65 PSI Control Grnd	ELC-60309	1
AW	Bushing Hex 3/8" X 1/4"	FIT-28342	1
AX	Regulator Air 80# Fixed 1/4" NPT	VLV-26199	1
AY	Gauge 1 1/2" Dia (O-160) 1/8" NPT Control Port	MTR-50665	1

Table 8-4. Hydraulic/Misc. Hosing and Fittings

Item Number	Hose Type	Length	Fitting	Hose Description
1	H10408	104"	8U-8FJX 2-Plcs	From Diesel Tank (Supply to In Port Primary Fuel Filter on Frame
2	H10408	50"	8U-8FJX 2Plcs	From Out Port of Primary Fuel Filter on Frame to Cummins Primary Fuel Filter.
3	5/16 Fuel Hose	145"	5PL-4MP& 90D5PL-4MP	Return Off Injector Pump to Fuel Tank
4	100R5-.188	104"	4U-4FJX 2Plcs	From Brake Master Cylinder to T4MJ-4MJ-4MJ Tee on Left-Hand Brake on Drive Axle.
5	100R5-.188	18 1/2"	4U-4FJX 2Plcs	From T4MJ-4MJ-4MJ Tee to Left-Hand Brake.
6	100R5-.188	60"	4U-4FJX 2Plcs	From T4MJ-4MJ-4MJ Tee to Right-Hand Brake.
7	100R5-.188	39 1/4"	4U-4FJX 2Plcs	From 90D4MB X 4MJ on Left Steering Valve (LS-Port) to 6MB X 4MJ on Shuttle Valve Port on Left Side.
8	100R5-.188	74"	4U-4FJX 2Plcs	From 90D4MB-4MJ (LS-Port) of priority Valve to Center Port of Shuttle Valve.
9	100R5.188	39 1/4"	4U-4FJX 2Plcs	From 90D4MB-4MJ Hand Steering Valve (LS-Port) to 6MB-4MJ on Right-Hand Side of Shuttle Valve.
10	H10408	35 1/2"	8U-8FJX 2Plcs	From 8MB-8MJ Bottom Port on Steering Manifold Left-Hand Side to 8MB-8MJ (L-Port) at Left-Hand Steering Valve.
11	H10408	35 1/2"	8U8FJX 2Plcs	From 8MB-8MJ Top Part on Steering Manifold Left-Hand Side to 8MB-8MJ (T-Port) of Left-Hand Steering Valve.

Table 8-4. Hydraulic/Misc. Hosing and Fittings

Item Number	Hose Type	Length	Fitting	Hose Description
12	H10408	35 1/2"	8U-8FJX 2Plcs	From 8MB-8MJ 2 nd Port From Top on Steering Manifold Left-Hand Side to (P-Port) of Left-Hand Steering Valve.
13	H10408	35 1/2"	8U-8FJX 2Plcs	From 8MB-8MJ 3 rd Port From Top Steering Manifold Left-Hand Side to (R-Port) of Left-Hand Steering Valve.
14	H10408	110"	8U-8FJX 2Plcs	From 90D8MB-8MJ Front Bottom Left to T8MB-8MJ-8MJ Tee on Port of Rod End of Left-Hand Steering Cylinder.
15	H10408	27"	8U-8FJX 2Plcs	From T8MB-8MJ-8MJ Tee on Left-Hand Steering Cylinder to 90D6MB-8MJ on Rear Port of Right-Hand Steering Cylinder.
16	H10408	27"	8U-8FJX 2Plcs	From T8MB-8MJ-8MJ Tee on Right-Hand Steering Cylinder to 90D6MB-8MJ on Rear Port of Left-Hand Steering Cylinder.
17	H10408	110"	8U8FJX 2Plcs	From 90D8MB-8MJ Front Bottom Right to T8MB-8MJ-8MJ Tee on Port of Rod End of Right-Hand Steering Cylinder.
18	H10408	35 1/2"	8U8FJX 2Plcs	From 8MB-8MJ 3 rd Port From Top on Steering Manifold Right-Hand Side to (R-Port) of Steering Valve.
19	H10408	35 1/2"	8U8FJX 2Plcs	From 8MB-8MJ 2 nd Port From Top on Steering Manifold Right-Hand Side to (P-Port) of Right-Hand Steering Valve.
20	H10408	35 1/2"	8U8FJX 2Plcs	From 8MB-8MJ Bottom Port on Steering Manifold Right-Hand Side to 8MB-8MJ (L-Port) of Right-Hand Steering Valve.
21	H10408	35 1/2"	8U-8FJX 2Plcs	From 8MB-8MJ Top Port on Steering Manifold Right-Hand Side to 8MB-8MJ (T-Port) of Right-Hand Steering Valve.
22	H10408	71"	8U8FJX 2Plcs	From 90D8MB-8MJ Center Left-Hand Port of Steering Manifold to 90D8MB-8MJ of "CF" Port of Priority Valve.
23	H10408	77"	8U-8FJX 2Plcs	From 90D8MB-8MJ Top Right-Hand Port of Steering Manifold to 90D8MB-8MJ 2 nd Port on Top of Return Manifold.
24	H10408	108"	8U-8FJX 2Plcs	From 90D8MB-8MJ (B-Port) of Hitch Manifold to T8MB-8MJ-8MJ Tee Rod End of Hitch Cylinder.
25	H10408	115"	8U-8FJX 2Plcs	From 8MB-8MJ (A-Port) of Hitch Manifold to T8MB-8MJ-8MJ Tee Rear Port of Hitch Cylinder.
26	H10408	96"	8U-8FJX 2Plcs	From (T-Port) on Hitch Manifold to Top 1 st Port Return Manifold.
27	H42508	180"	8U8FJX & 90D8U-8FJX	From 90D8MB-8MJ on Right-Hand Port of Pressure Manifold to (P-Port) of Hitch Manifold.
28	H47016	52"	16E6-16FJX 2Plcs	From Left-Hand Port on Eaton Pump to Left-Hand Port of Eaton Motor.
29	H10412	57"	12U-12FJX 2Plcs	Eaton Motor Case Bleed Port to Eaton Pump Lower Case Bleed Port.
30	H10420	45"	20U-20FJX 2Plcs	From Eaton Pump (Drive Pump) Suction Port to Left-Hand 2-Filter Assembly Out Port.
31	H10420	29"	20U-20FJX 2Plcs	From In Port on 2-Filter Assembly to Left Shut-Off Gate Valve on Hydraulic Tank
32	H10416	60"	16U-16FJX 2Plcs	From Suction Screen on Top of Hydraulic Tank to Front Port on Power Steering Pump on Engine.
33	H10412	29"	12U-16FJX & 12U-14FJX	From Compensator Valve on Belt Drive Pump to T12MP-12MJ-12MJ Tee on Hydraulic Tank



Table 8-4. Hydraulic/Misc. Hosing and Fittings

Item Number	Hose Type	Length	Fitting	Hose Description
34	H47016	25"	16E6-16FJX 2Plcs	From Left-Hand Pressure Port of Belt Drive Pump to Left-Hand End Port Pressure Manifold.
35	H42508	96"	8U-8FJX 2Plcs	From Pressure Manifold Center Front Port to Chip Box (Valve Box) Hydraulic Manifold.
36	H10412	18"	12U-12FJX & 90D12U-12FJX	From Right-Hand Back Port of Belt Pump (Case Bleed) to Tee on Front Right-Hand Side Hydraulic Tank.
37	H43012	24"	12E4-12FJX 2Plcs	From Left-Hand Flow Control Valve of Left-Hand Belt Motor to Left-Hand Belt Motor to Left-Hand Belt Solenoid Valve on Pressure Manifold
38	100R5.188	112"	4U-4FJX 2Plcs	From "T" Port of Priority Valve to Top Front Port of Return Manifold.
39	H10412	90"	12U-12FJX 2Plcs	From Left-Hand Belt Motor Port (B-Port) to From Side Port Return Manifold.
40	H10412	110"	12U-12FJX 2Plcs	From Eaton Pump Upper Case Bleed Port to Traction Filter Assembly on Hydraulic Tank.
41	H47016	52"	16E-16FJX 2Plcs	From Right-Hand Port on Eaton Pump to Right-Hand Port on Eaton Motor.
42	H10408	138"	8U-8FJX 2Plcs	From (T-Port) on Chip Box Hydraulic Manifold to Center Top Return Manifold.
43	H10420	98"	20U-20FJX 2Plcs	From Left-Hand Port of Oil Cooler to Rear Port of Return Hydraulic Manifold.
44	H10420	125"	20U-20FJX 2Plcs	From Right-Hand Port of Oil Cooler to In Port of 3-Filter Assembly.
45	H10412	90"	12U-12FJX 2Plcs	From Right-Hand Belt Motor (B-Port) to 2 nd Side Port of Return Hydraulic Manifold.
46	100R5.188	103"	46-4FJX 2Plcs	From Case Bleed of Left-Hand Belt Motor to Bottom Front Port of Hydraulic Return Manifold.
47	H10420	23"	20U-20FJX 2Plcs	From Out Port of 3-Filter Assembly to Gate Valve on Hydraulic Tank.
48	100R5.188	103"	4U-4FJX 2Plcs	From Case Bleed Right-Hand Belt Motor to Bottom Center Port of Hydraulic Return Manifold.
49	H43012	24"	12E4-12FJX 2Plcs	From Right-Hand Plow Control Valve DF Right-Hand Belt Motor to Right-Hand Belt Solenoid Valve on Pressure Manifold.
50	H42508	15"	8U-8FJX 2Plcs.	From Top of Pressure Manifold to Front Port of Pump Valve.
51	H10408	15"	8U-8FJX 2Plcs	From Back Port of Pump Valve to 90D8MP8MJ on Top of Hydraulic Tank.
52	2 1/2" Suction Hose	30 1/2"	None 5/8" Banding	From Right-Hand Filter.
53	H42508	8"	90D8U-8FJX-L 8U-8FJX	From Top Port of Steering Pump (on Engine) to 90D8MB-8MJ "P" Port on Priority Valve.
54	H10412	105"	12U-12FJX & 90D12-12FJX	From "EF" Port of Priority Valve to Bottom Front Port of Return Manifold.