Technical Manual

GEARING SETUP

The 3612 Miner contains four completely separate main drive systems. They are tram, pump, gathering head/conveyor and cutter drum.

The Tram System consists of two separate drives, one for the left track and the other for the right track. The tram system works on the principle of a motor driving a shaft which drives a right angle drive and a primary planetary, which then drives a tram gear case containing three helical gears. Power is transferred through these gears to the sprocket shaft, which drives the track. Direction of travel is determined by the direction the motor shaft is made to rotate.

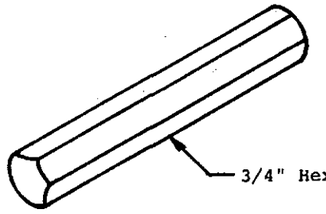
The Pump System consists of a motor driving a shaft which drives a coupling assembly. Power is transferred through a coupling assembly to the hydraulic pump. The pump motor should rotate counter clockwise when viewed from the output shaft side, thus providing correct hydraulic pump rotation.

The Gathering Head and Conveyor System consists of one motor, on the left side of the machine. The power is transferred from the motor to the primary gear case, which is located on the right side of the gathering head, by means of a prop shaft. The primary gear case contains two helical gears and three spur gears and a clutch. The primary supplies power to the right side gathering head gear case. The gathering head gear case contains a coupling which drives a pinion. The pinion drives a ring gear which is connected to a table that rotates, causing the gathering arms to work. At the same time, the foot shaft sprocket turns, causing the conveyor chain and left hand gathering head gear case to work. This is accomplished by a coupling which connects the foot shaft to the gear case pinion.

The direction the conveyor chain and gathering arms move is determined by the direction the motor shaft is made to rotate. The clutch in the primary gear case allows slippage in the system, in case of blockage on the gathering arms or conveyor chain. The clutch is factory pre-set to the correct torque setting but should be checked periodically to make sure proper adjustment is maintained.

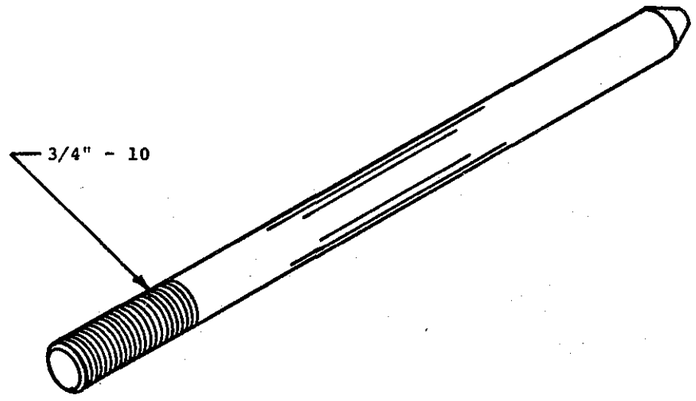
The Cutter Drum System consists of two motors, one on each side of the machine. Each motor has a dry type clutch at the back side which is driven by a motor shaft. The clutch has a wear indicator that should be checked periodically to see if disc are worn to point where replacement is necessary. The clutch disc is connected to a shaft that runs through the motor driving helical gears which drive the pinion. The pinion drives a bevel ring gear which in turn drives a double planetary that rotates the end drum. The outer planetary carrier also drives the drum drive shaft which goes back through both planetaries and the ring gear. The shaft then rotates the center drum.

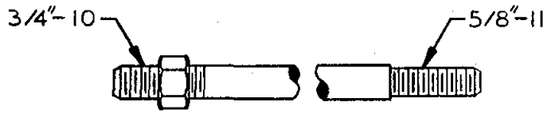
TYPICAL TOOLS FURNISHED WITH MACHINE



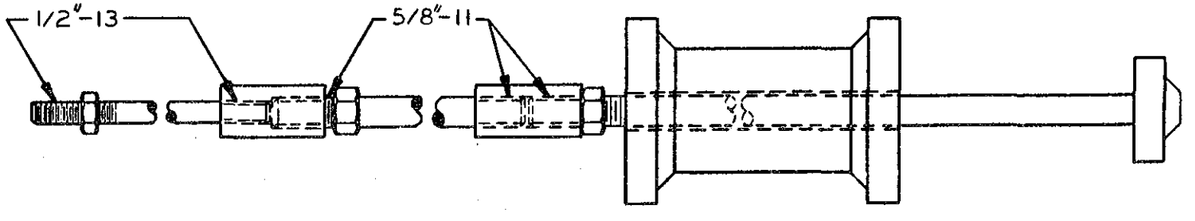
Part Number 6004 7420
Gathering Head Clutch Adjustment Tool

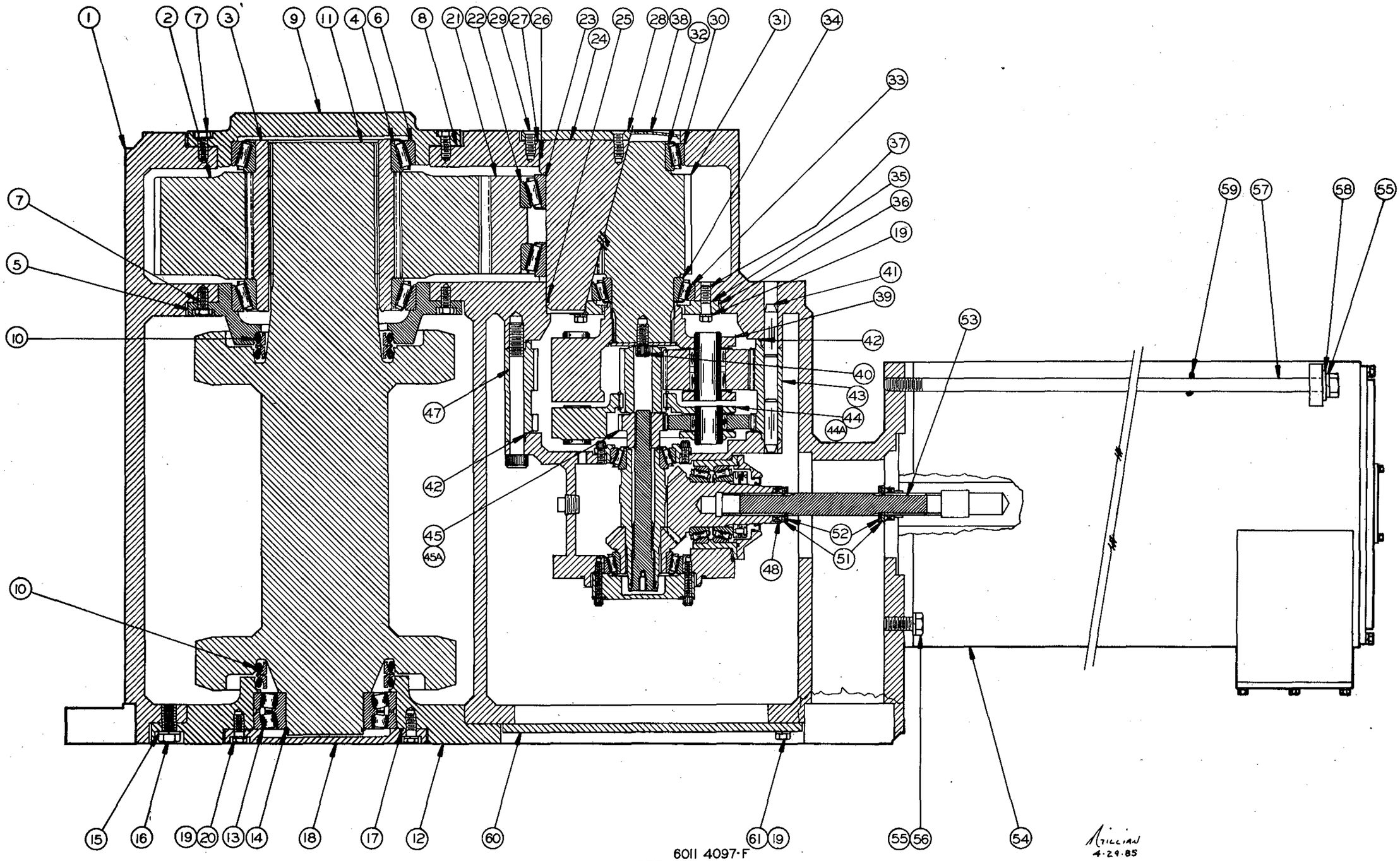
6021 0986 (24")
Part Number 6002 1763 (12")
GUIDE PINS





Part Number 6021 0960
Slide Hammer
with
3/4"-10,5/8"-11,1/2"-13 Thread Adapters





WITHOUT BRAKE

6011 4097-F
REF. 6011 3669-F

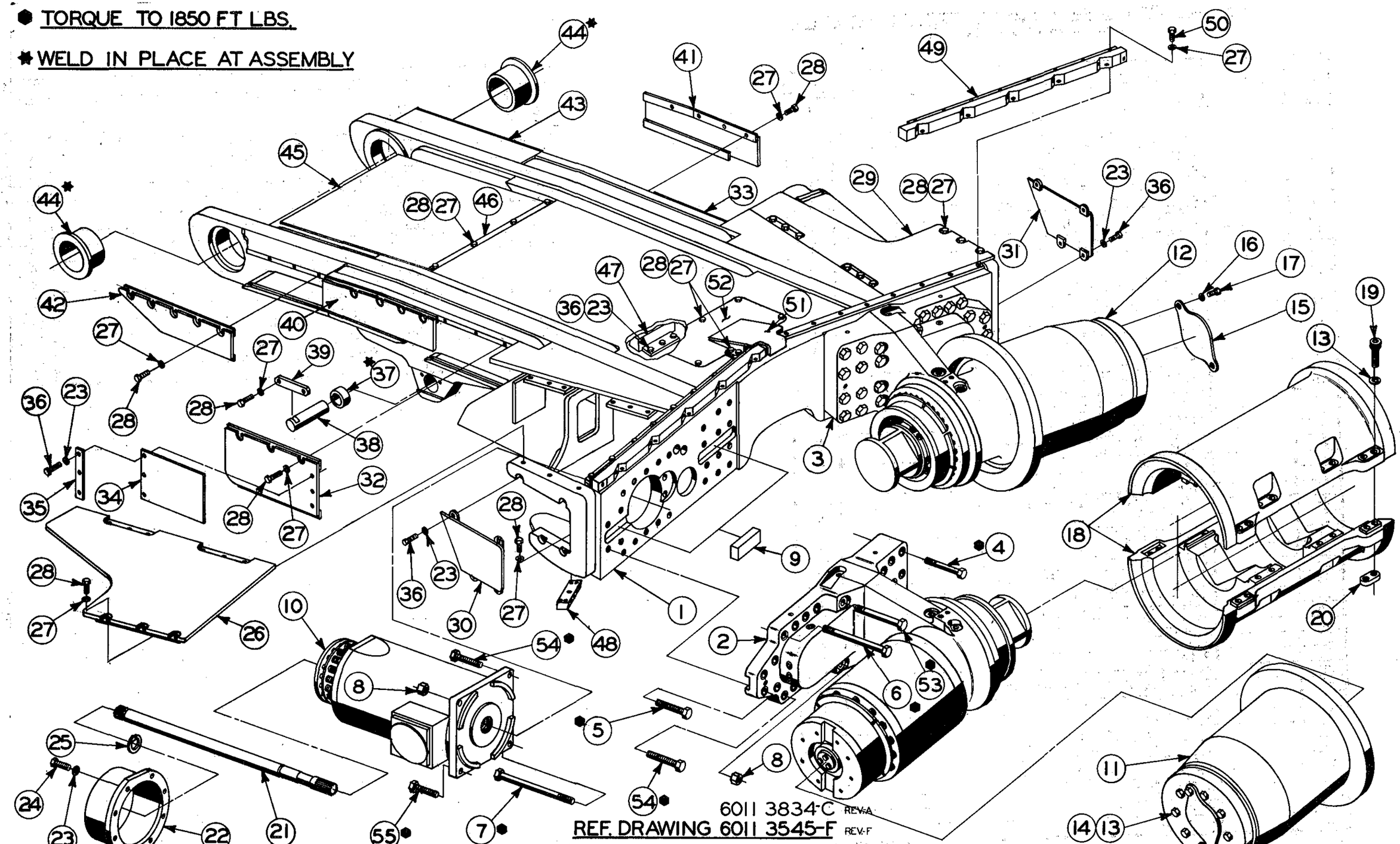
3612 TRAM DRIVE

REV.-D
9107 6323 LMD

TILLIAN 4-29-85

● TORQUE TO 1850 FT LBS.

✱ WELD IN PLACE AT ASSEMBLY



6011 3834-C REV-A

REF. DRAWING 6011 3545-F REV-F

3612 BOOM ASSEMBLY

REV.-F

9109 0688-L MD

Jim Riggs 3-29-85

machine. Note: Before moving coupling be sure there is some slack in conveyor chain, if necessary loosen chain.

7. Remove the three pot covers (20), (22) and (23) by removing nine 1/2"-13 x 1-1/4" hex head cap screws (21) and 1/2" lockwashers (16) using a 3/4" socket wrench for covers (20) and (22). Secure cover (23) with four 1"-8 x 4-1/2" hex head cap screws (25) with 1" lockwashers (24).

8. Using a 1-1/8" wrench, loosen the pot location post (60) so that the gear case may be slid towards the footshaft (66).

9. (Ref. drawing 9106 5219LMF) Steps 9 and 10 apply to operator's side pot only. Remove the bearing retainer (46) by removing the eight 1/2"-13 x 1" hex head cap screws (48) and 1/2" lockwashers (47) using a 3/4" socket wrench. Care must be taken not to damage shims or bearings at this point. Remove retaining ring (36), using retaining ring pliers. Remove the output seal (35) and "O" ring (34) using a 1/2"-13 puller bolt. Using retaining ring pliers, remove retaining ring (33).

10. (Ref. drawing 9109 0621LMD) Using a 5/8"-11 puller bolt, pull the coupling shaft (7) from the primary gear case.

11. (Ref. drawing 9103 9495LMD) Remove the gear case mounting cover (49) by removing two 1/2"-13 x 3/4" flat socket head cap screws (50) using a 5/16" hex key wrench.

12. Rotate gear case table so the eight 1"-8 x 4" hex head mounting screws (59) (Drawing 9109 0621LMD) can be removed. Use a 1-1/2" socket wrench to remove the screws. Remove four locking tabs (58).

13. Lift gathering head pot from the gathering head platform.

INSTALLATION

Note: Right (operator's) side pot must have coupler (9) and snap rings (8) and (10) in position in pot. Left side does not use this coupler.

14. Check to be sure "O" ring (61) is in the groove on the pot, then lower the pot into the platform.

15. Adjust the pot location post (60) until the gear case is seated solidly against the platform.

16. Secure the gear case to the platform using eight 1"-8 x 4" hex head cap screws (59) and four locking tabs (58). Torque screws to 690 ft. lbs., using a 1-1/2" socket wrench. Bend up corners of locking tabs against flats on hex head cap screws. Rotate gear case table as needed.

17. (Ref. drawing 9103 9495LMD) Install gear case mounting cover (49) with two 1/2"-13 x 3/4" flat socket head cap screws (50). Use a 5/16" hex key socket wrench to torque screws to 87 ft. lbs.

18. (Ref. drawing 9109 0621LMD & 9106 5219LMF) Slide the coupling shaft (7) into the primary gear case (2) and pot (57). Install retaining ring (36) and output seal (35) with "O" ring (34) into the primary gear case. Install the bearing retainer (46) onto the primary gear case making sure same shims are used so bearing adjustment will remain proper. Torque screws to 87 ft. lbs.

19. Slide the foot shaft coupling (62) onto the gear case (pot) shaft. Position and secure the foot shaft collar (64) to the sprocket assembly (66) with four 1/2"-13 x 1-1/2" socket head cap screws (65) using a 3/8" hex key socket wrench. Torque to 170 ft. lbs.

20. Using a 1-1/8" socket wrench, install the entrance plate (35) with eight 3/4"-10 x 2" hex head cap screws (4) and lockwashers (5). Use a 3/4" drive wrench to torque screws to 86 ft. lbs. Readjust conveyor chain as explained on conveyor drawing (9109 1033LMD)

21. Install the three gear case covers (20, 22,23). Secure with nine 1/2"-13 x 1-1/4" hex head cap screws (21) and lockwashers (16) for covers (20) and (22). Secure cover (23) with four 1"-8 x 4-1/2" hex head cap screws (25) and lockwashers (24).

22. Mount gathering arm (71) on gathering arm link (85) and gear case (57). Use care not to damage seals or bearings. Secure arm to link by putting retaining ring (79) onto link shaft with retaining ring pliers. Mount gathering arm link cover (80) using six 1/2"-13 x 1-1/2" hex head cap screws (17) and lockwashers (16). Torque to 87 ft. lbs. Grease as required.

23. Place bearing retainer (73) and shims (72) in the gathering arm and secure with three 3/4"-10 x 1-3/4" hex head cap screws (drilled) (74). Using a 1-1/8" socket wrench, torque to 370 ft. lbs. Safety wire screws. Place gathering arm cover (76) on gathering arm and secure with four 1/2"-13 x 1" hex head cap screws (77) and lockwashers (16). Torque to 87 ft. lbs. using a 3/4" socket wrench. Grease as required.

24. Fill primary gear case and gathering head pot with 90 wt. non E.P. gear lubricant, as specified on lubrication diagram. Note: The pots lubricate separate from the primary and should be filled to the plug in the center of the turn table.

WHILE ROTATING TABLE TORQUE CAP SCREWS (28) TO 30-70 IN. LBS. MEASURE GAP THROUGH PORT AND FILL GAP WITH SUFFICIENT SHIMS THUS PUTTING .0024"/.0044" PRELOAD ON BEARINGS. (THIS SHOULD BE DONE WITH SEALS REMOVED)

.012 TO .016 BACKLASH

CRANK PIN

SUPPORT POST

.000"-.003" END PLAY

.008 TO .012 BACKLASH

1/2-13

● ITEMS (29), (30), (31) ARE INSTALLED IN RIGHT SIDE GEAR CASE ONLY

● BREATHER SHOULD BE TOWARDS REAR OF MACHINE

REV.- 9103 9495 LMD

DM-167

REF. DWG. 6010 3371 D

3080
3612/5012N GATHERING HEAD GEAR CASE ASSEMBLY

7. The "Potentiometer Reference" LED will turn on when the tram lever pedal is operated to show that the drive is receiving a reference (speed) signal from the potentiometer in the tram switch case. If the "Potentiometer Reference" LED is not turning on when the tram lever is operated and the miner does not tram, the tram switch potentiometer or associated wiring is defective. The "FWD" LED turns on when tramming in the forward direction only and the "REV" LED turns on when tramming in the reverse direction only.

8. The "Output Current" LEDs turn on at 60 amps of load current. The "FWD" LED is on during forward tramming and the "REV" LED is on during reverse tramming. However, during forward regenerative braking, the "FWD" LED will turn off and the "REV" LED will momentarily turn on. During reverse regenerative braking the "REV" LED will turn off and the "FWD" LED will momentarily turn on.

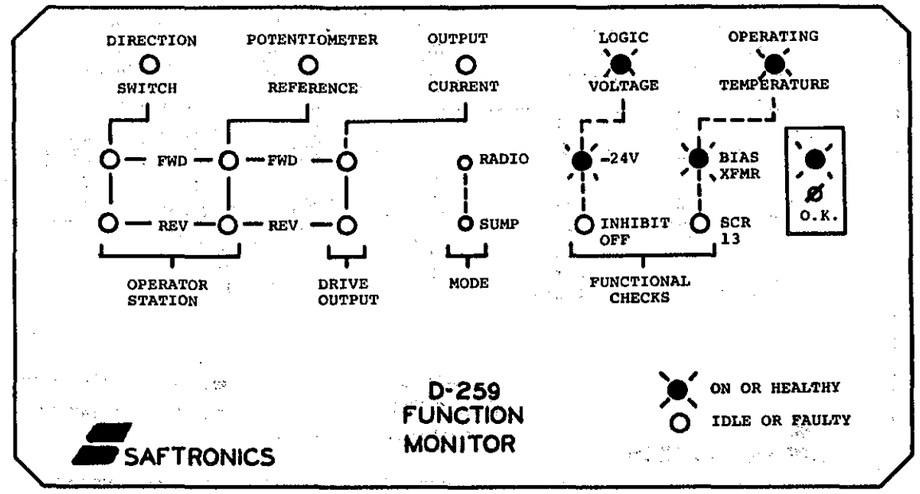
9. The "Inhibit Off" LED will turn on any time the tram lever is moved out of neutral. The drive needs a direction signal in order to have output. When in neutral the LED is off and the drive is considered to be in "Inhibit" mode and no SCR gating (output) can occur.

10. The "BIAS XFMR" LED indicates there is proper continuity (no blown fuse) in the bias transformer circuit. If the bias transformer fuse is blown the "BIAS XFMR" LED will be out and the drive will not tram.

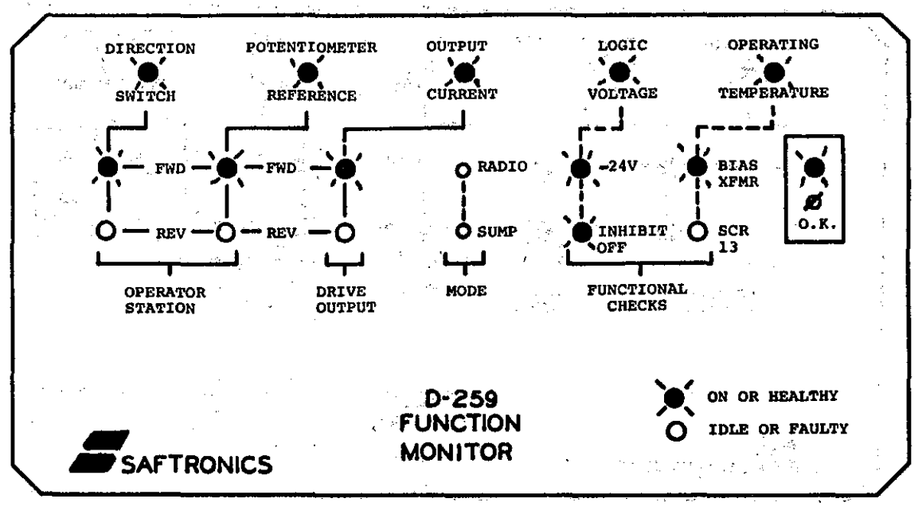
11. The "SCR13" LED turns on when the drive goes into the regenerative braking mode. The silicon controlled rectifier SCR13 converts the series motor to a shunt motor generator during braking by causing a steady field excitation current to be applied to the series field. Regenerative braking occurs when the operator releases the tram lever from any position to a lesser position of travel while tramming. Maximum braking effort occurs when the tram lever is released suddenly from full tram position to neutral position. If SCR13 does not turn on, braking effort will roughly surge off and on.

12. The "Sump" LED turns on when the operator places the miner in sump speed operation. Note that the miner will sump in forward direction only.

13. The "Radio" LED turns on when remote radio miner control equipment is being used.



1. Diagnostic panel display when AC power is applied to the drive showing proper phase rotation and availability. Tram switch is in neutral position. If there is an open phase or improper phase rotation the only LEDs that will be on are the "Logic Voltage" and "-24 Volts" LEDs. The "Ø OK" and "Operating Temperature" LEDs will be off. The "BIAS XFMR" LED may or may not be on in case of a phase loss depending on whether or not the phase feeding this single phase transformer has failed.

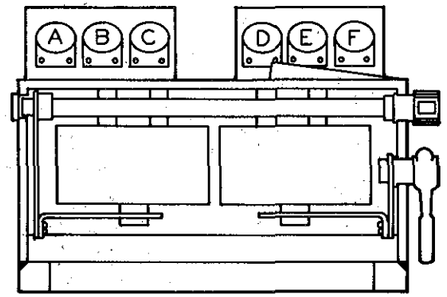


2. Diagnostic display showing tram lever in full forward tram position.

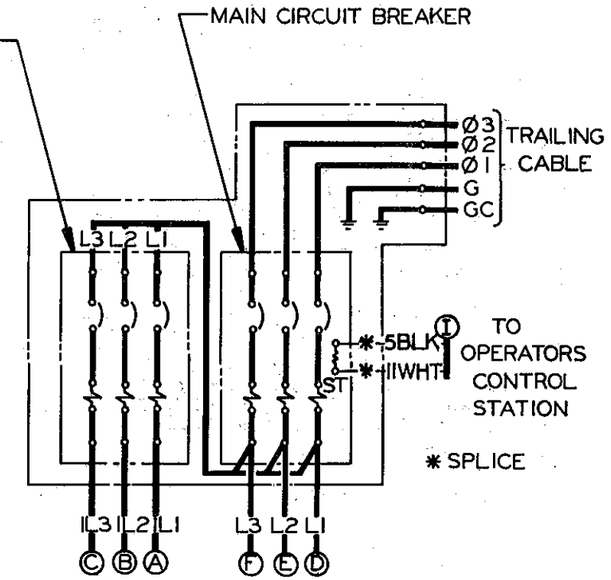
   Note that "Inhibit Off" LED is on. Also in reverse both the "FWD" and "REV" direction switch LEDs will be on.

   If the operator is operating in sump mode, the "Sump" LED would be on.

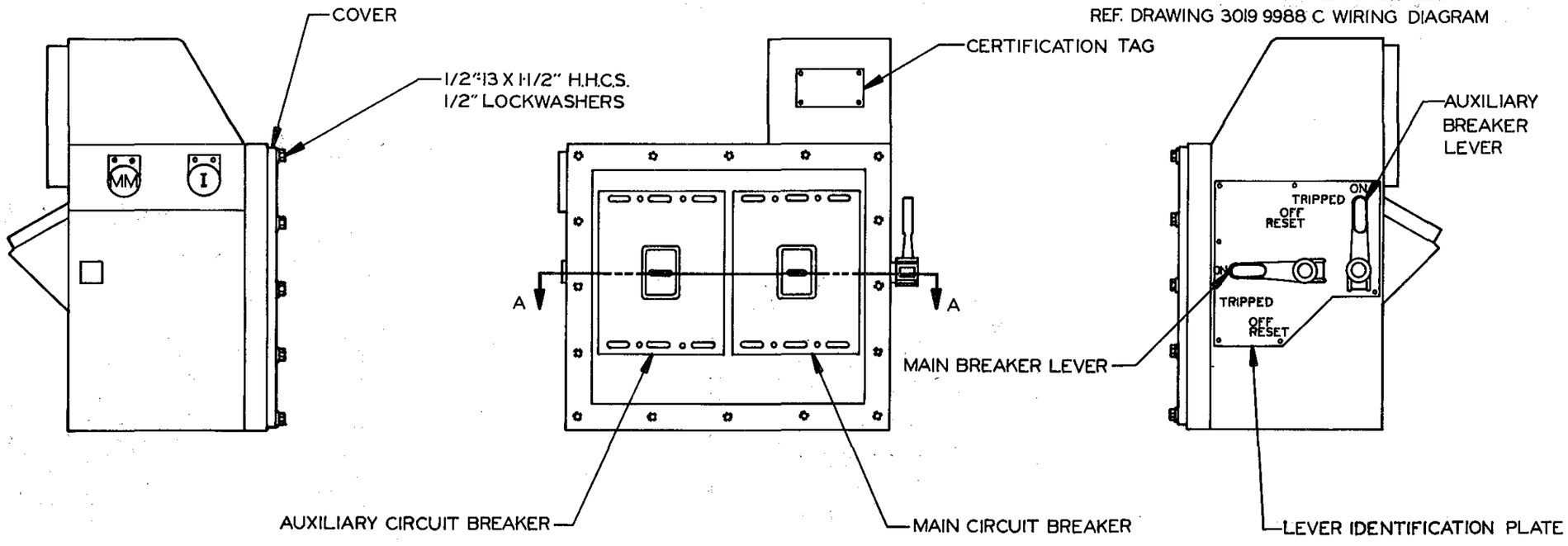
GLAND	ROUTING
A THRU F	TO MAIN CONTROLLER CASE
I	TO OPERATORS CONTROL STATION
MM	PLUGGED



VIEW A-A



TO MAIN CONTROLLER CASE REV. A
REF. DRAWING 3019 9988 C WIRING DIAGRAM

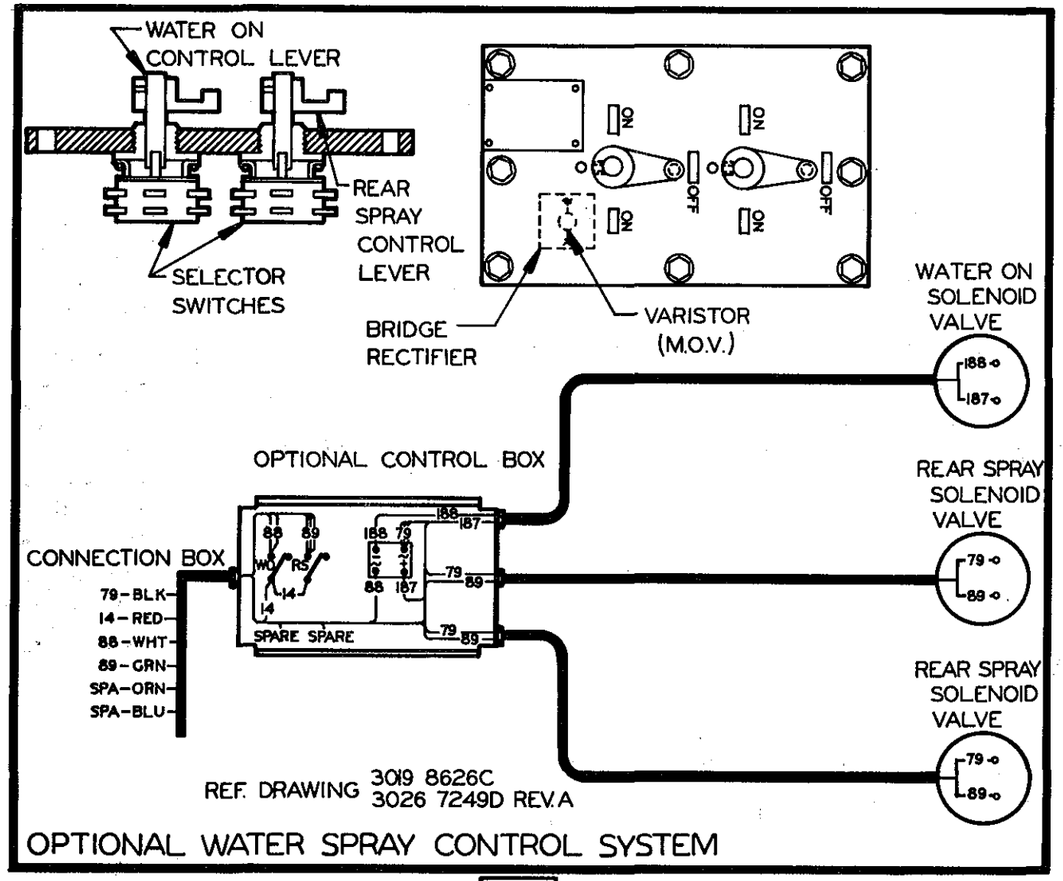


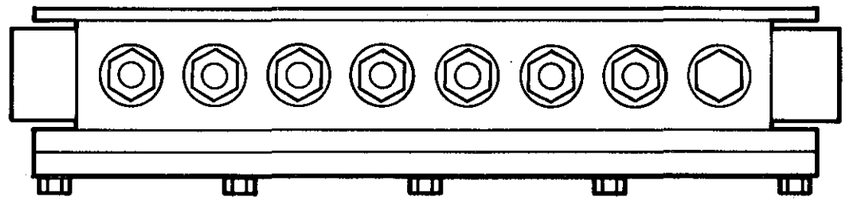
REF. DRAWING 3015 5485-D REV-E

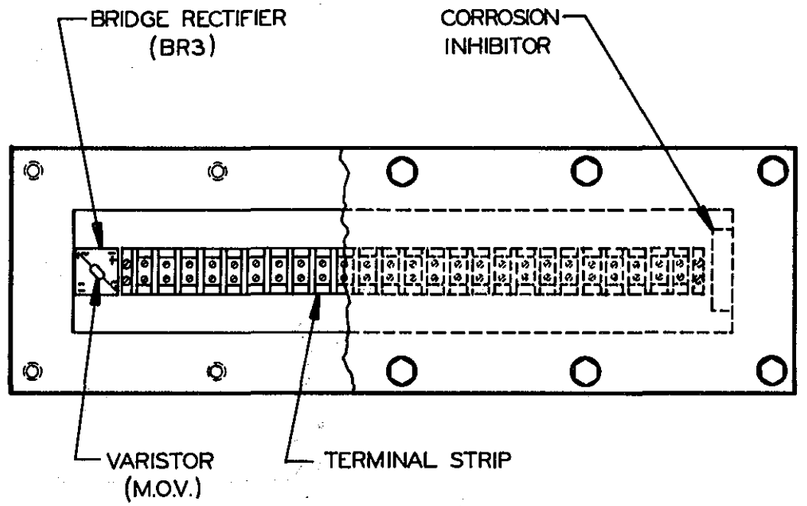
3612 AUXILIARY CONTROLLER CASE

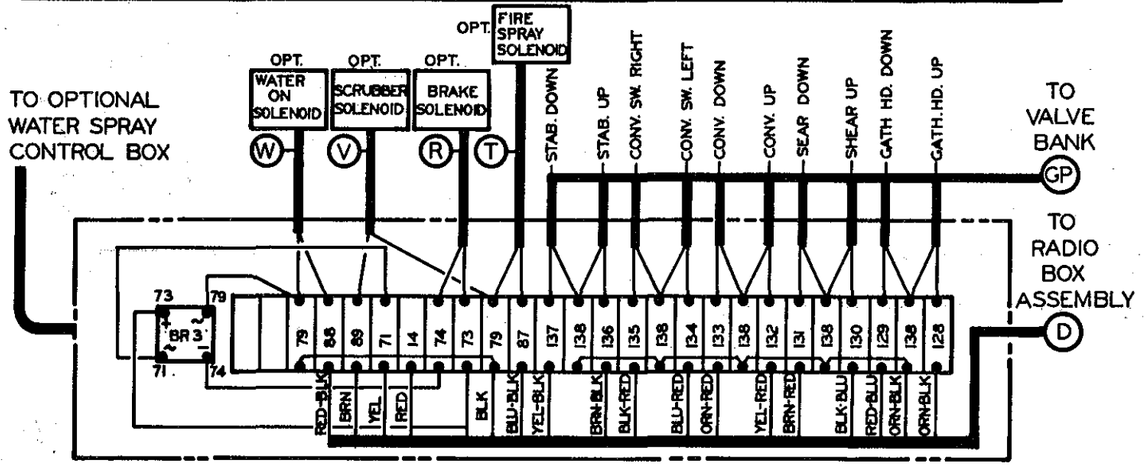
M. Tillian 11.19.85

9109 6487-LMC

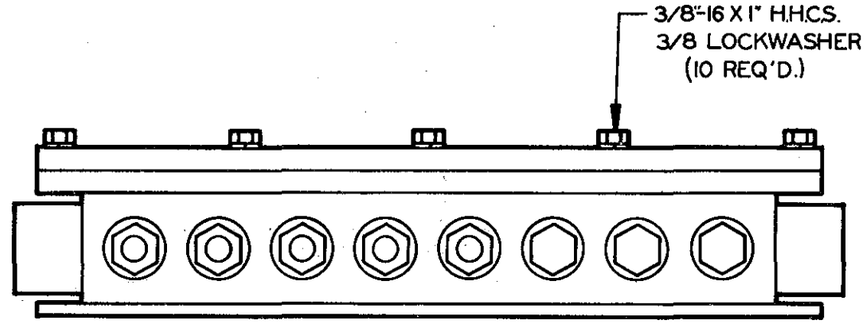








VALVE CONNECTION BOX WIRING DIAGRAM
REF. DRAWING 3026 7454-D REV.-A



REF DRAWING 3016 8066D REV.-

Millican 1-2-84

9109 8202-LMC

3612 SOLENOID VALVE CONNECTION BOX ASSEMBLY

PROCEDURE TO TEST 3612 WATER SYSTEM

Attach water pump assembly to 3612 water inlet.

Test 1. Drum miner should have power on, pump motor not started.

A. Back out relief valve on water pump assembly.

B. Start up water pump assembly.

C. Adjust relief valve (water pump assembly) until 250 PSI is read on miner water gauge.

No water should be spraying from miner - If water is spraying out throat, spray, refer to "Continuous flow out throat spray with pump motor off."

If water is spraying out side, throat, front, or bottom boom sprays, refer to "Continuous flow out front sprays when miner or switch (front spray) is "OFF".

If water is spraying out fire sprays, refer to "Fire sprays on continuously".

Test 2. With water pump assembly running, turn "ON" (miner) pump motor.

Water should be spraying out throat spray only - If water is spraying out side, front or bottom boom sprays, refer to "Continuous flow out front sprays when miner or switch (front spray) is "OFF".

All following tests should be with water pump assembly running and (miner) pump motor "ON".

Test 3. Turn "ON" manual front spray valve.

Water should be spraying out the throat spray, and either front sprays (right side sprays, front, and right boom sprays spraying to left) or left sprays (left side sprays and front, and left bottom boom sprays spraying to right).

If no front, bottom boom, or side sprays, check if manual water diversion valve is in "Center" position. If so, move lever to right or left position. If valve is not in center position, refer to "Low pressure at front sprays".

Test 3B. Turn manual water diversion valve to "Left" position.

Water should be spraying out left side sprays, front, and bottom boom spray spraying to right.

A. Check that all nozzles in that circuit are spraying. Clean out nozzles, if needed.

Test 3C. Turn manual water diversion valve to "Center" position.

Water should be spraying out throat spray only.

Test 3D. Turn manual water diversion valve to "Right" position.

Water should be spraying out right sige sprays, front and bottom boom spray spraying to left.

A. Check that all nozzles in that circuit are spraying. Clean out nozzles, if needed.

Turn "OFF" manual front spray valve.

*Test 4. Turn "ON" the front spray switch (transmitter).

Water should be spraying out right side sprays, front, and bottom boom sprays spraying to left.

*Test 4B. Turn "OFF" the front spray switch (transmitter).

Water should be spraying out throat spray only.

TESTING FIRE SPRAY CIRCUIT

With pump assembly running - pump motor "OFF".

Test 5. Turn "ON" right manual fire spray valve.

Water should spray from all fire spray nozzles (right side and left side).

A. Turn "OFF" right manual fire spray valve.

Test 5B. Turn "ON" left manual fire spray valve.

Water should spray from all fire spray nozzles (right side and left side).

A. Turn "OFF" left manual fire spray valve.

TURN ON PUMP MOTOR

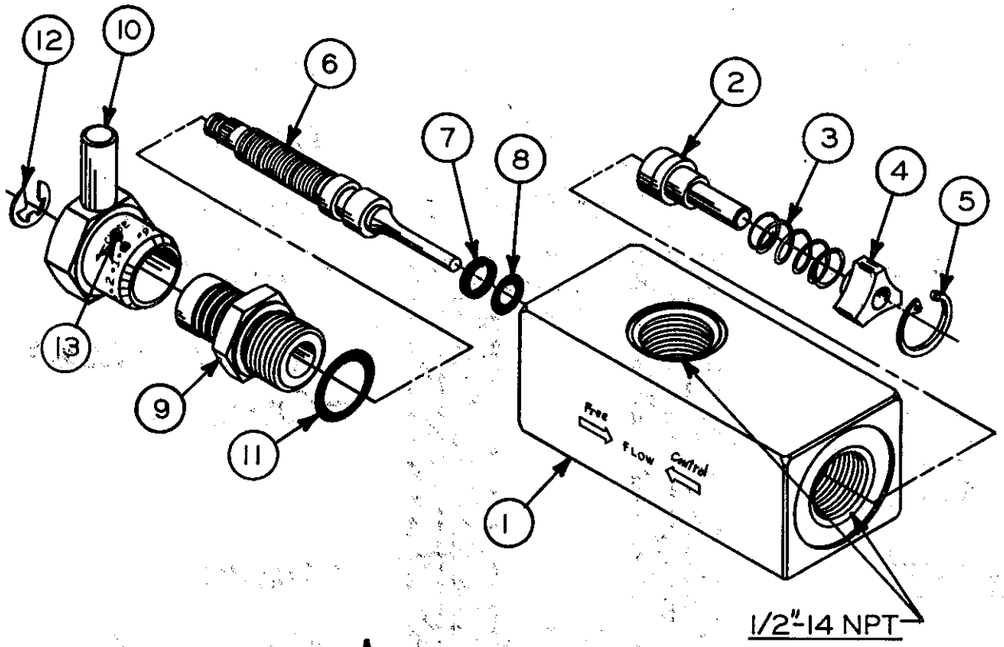
*Test 6. Turn "ON" fire spray switch (transmitter)

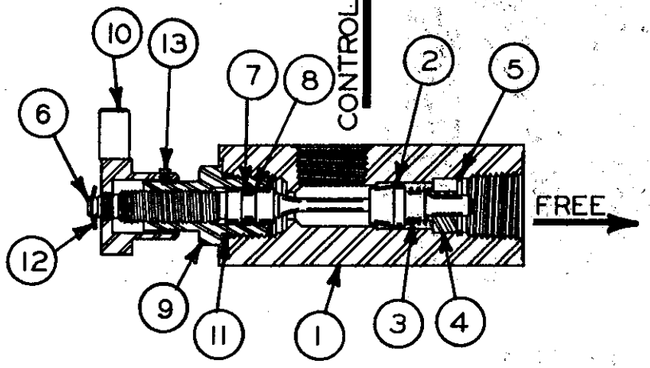
Water should spray from all fire spray nozzles (right side and left side).

*Radio only.

SYMPTOM	PROBABLE CAUSES	REMEDY
Internal Pump Components Damaged-Cont'd.	2. Pump seizure from oil starvation.	2. Check for suction line blockages or leaks. Repair or replace as needed.
	3. "Dirt" wedged in pump.	3. Disassemble & remove dirt. Repair or replace as needed.
	4. Pinched pressure hose.	4. Replace hose.
	5. Tie bolts overtorqued.	5. Retorque.
Hydraulic System Overheating	1. Relief valves set too high.	1. Readjust to correct pressures.
	2. Pump leaking internally	2. Check pump for leakage. Repair or replace pump.
	3. Oil viscosity too heavy. (oil too thick)	3. Check oil viscosity, Change if needed.
	4. Pump tie bolts overtorqued after rebuild or repair.	4. Check torque valve Retorque if req'd.
Load will creep when valve is in neutral position *Shear or conv. lift cyl(s) only.	1. Cylinders or valves leaking internally.	1. Replace piston & rod seals or replace cyl. if walls are scored. Repair or replace valves.
	2. Cyl. port relief valve faulty.	2. Clean & adjust relief, replace if needed.
	3. Operating valve not returning to neutral pos.	3. Place valve in neutral pos. & check for broken end caps or springs.
	*4. Check for broken O-ring or backup ring on overcenter valve(s).	4. Replace as needed.
	*5. Overcenter valve set too low.	5. Reset to correct pressure.
	*6. Faulty overcenter valve.	6. Replace valve.
Excessive valve or cylinder wear	1. Hyd. oil contaminated w/abrasive particles.	1. Drain tank, replace oil, change all elements.
	2. Moving parts misaligned.	2. Check & realign.
	3. Excessive pressures	3. Check relief setting & reset.
	4. Oil viscosity too low (oil too thin)	4. Check & change to higher viscosity oil.
	5. Air in system	5. Bleed air, find & repair all leaks.

SYMPTOM	PROBABLE CAUSES	REMEDY
Excessive valve or cylinder wear cont'd.	6. Components mounted loose.	6. Tighten mounting device. Repair or replace if damaged.
Cylinder leaking around end cap or packing nut.	1. High packing & packing nut wear.	1. Tighten or replace packing. Check mounting & alignment of moving parts.
Functions moving slow.	1. Air in system.	1. Fix leaks & bleed air from system.
	2. Cylinder or valves leaking internally.	2. Replace piston & rod seals or replace cyl. if walls are scored. Repair or replace valves as needed.
	3. Worn pump	3. Repair or replace.
	4. Relief(s) stuck open,	4. Clean or replace relief.
	5. Oil viscosity too heavy (oil too thick)	5. Drain tank, replace oil w/lighter visc. oil.
	6. Pump running slow.	6. Check motor rpm. Check for low voltage.
Functions moving sluggish or erratic	1. Relief set too high or too low.	1. Adjust reliefs.
	2. External leaks.	2. Check for loose fittings, blown hoses, etc.
	3. Cold hyd. fluid (oil too thick).	3. Allow pump to run until oil warms.
	4. Oil contaminated w/foreign matter causing relief valves to stick open.	4. Inspect reliefs for dirt, scoring, or broken springs, change filter elements.
	5. Pump gears or thrust plates worn, leaking oil.	5. Repair or replace pump.
	6. Low hyd. oil level.	6. Fill tank to full mark on dipstick indicator.
	7. Wrong type & viscosity oil.	7. Drain & refill with correct type & viscosity oil.

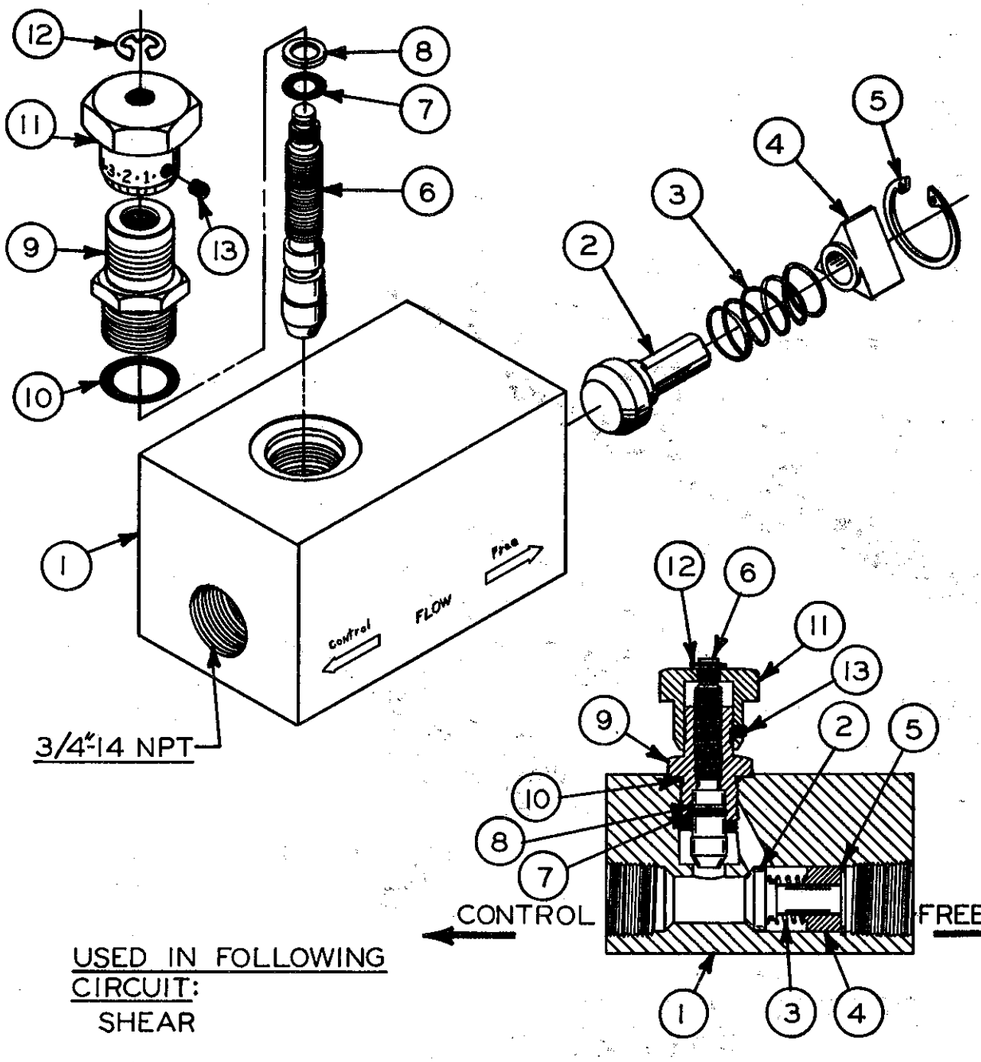




USED IN FOLLOWING CIRCUIT:
CONVEYOR SWING

REF. DRAWING 9230 5309A

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	BODY	8	"O" RING
2	POPPET	9	STEM CAP
3	SPRING	10	ADJUSTING HANDLE
4	RETAINER	11	"O" RING
5	SNAP RING	12	SNAP RING
6	STEM SUB-ASSEMBLY	13	*8-32 CUP POINT SET SCREW
7	BACKUP RING		



USED IN FOLLOWING CIRCUIT:
SHEAR

REF. DRAWING 9230 5259A

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	BODY	8	BACKUP RING
2	POPPET	9	STEM CAP
3	SPRING	10	"O" RING
4	RETAINER	11	ADJUSTING HANDLE
5	SNAP RING	12	SNAP RING
6	STEM SUB-ASSEMBLY	13	*8-32 CUP POINT SET SCREW
7	"O" RING		

FLOW CONTROL VALVES

REV.- (DM-433)
9107 6208 LMC