

## **Providing Solutions Since 1921**

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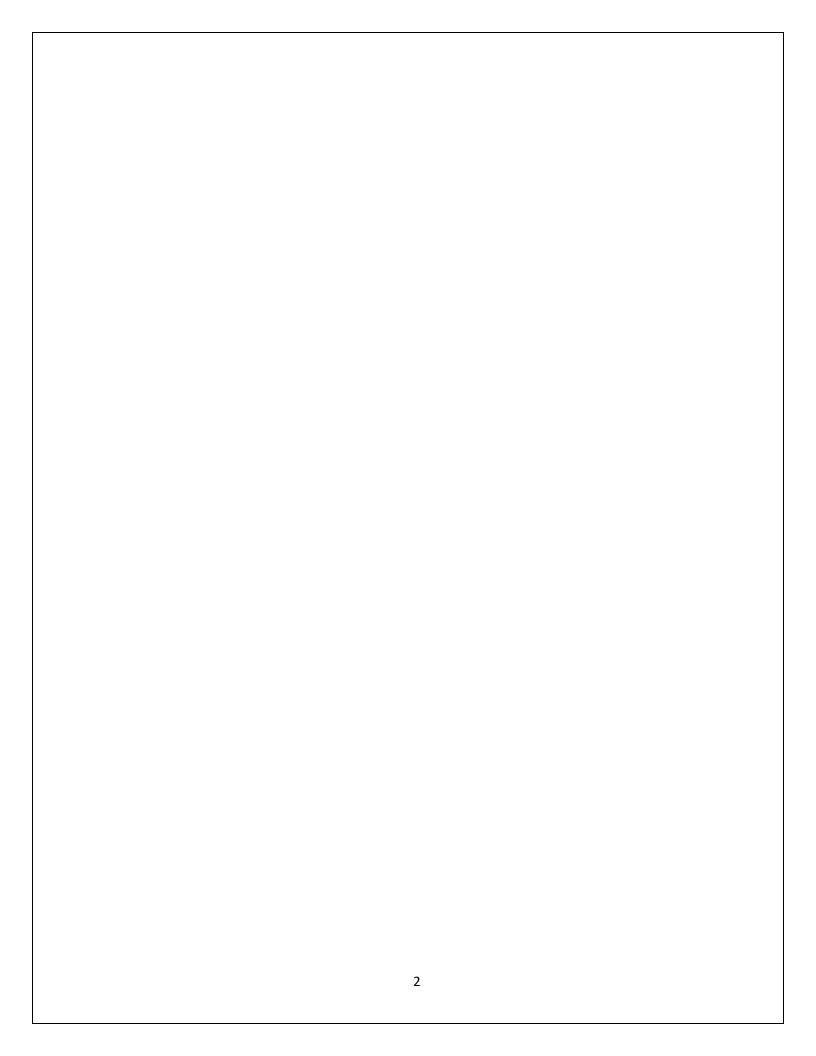
#### PARTS MANUAL

VX30-500 VX30-500LT E850518

SERIAL NUMBER - V5S0217172401 TO 7HWY192F5LG005103 3/30/2016

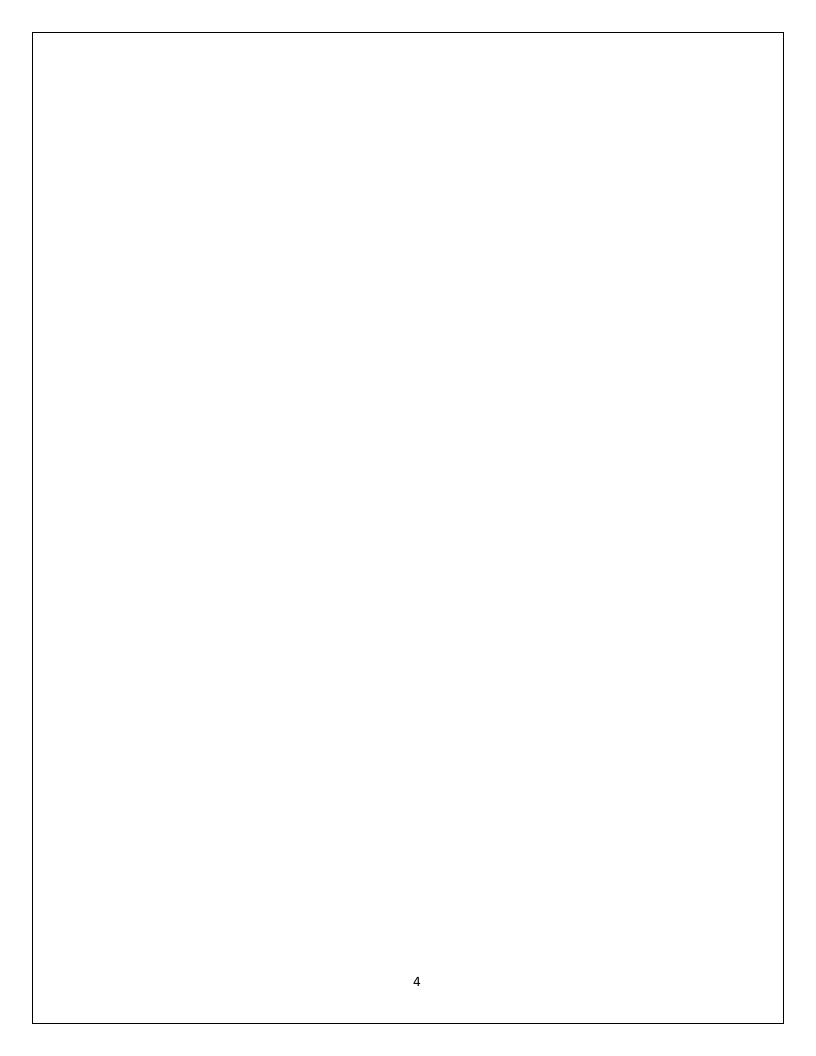
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#### **SYSTEM OPERATIONS SPECIFICATIONS**

			1	ı			
PART	PART #	FIRST	EVERY	EVERY	EVERY	EVERY	EVERY
		50	250	400	500	3000	1
		HOURS	HOURS	HOURS	HOURS	HOURS	YEAR
ENGINE OIL	15W40	✓ Daily		Х			
	CJ-4						
ENGINE COOLANT	50/50 mixture of	✓ Daily					
	PROPYLENE GLYCOL						
	AND WATER that						
	meets ASTM D6210						
	specifications						
OIL FILTER (KUBOTA)	T700075	Х		Х			
FUEL FILTER	T700045				Х		
(KUBOTA)							
AIR FILTER (KUBOTA)	8093601-07		Х				Х
FUEL-WATER	8047266-01	Х					
SEPARATOR FILTER							
HYDRAULIC OIL	INDUSTRIAL TYPE	<b>✓</b> Daily					
	HYDRAULIC FLUID						
BLOWER OIL	INDUSTRIAL TYPE,	✓ Daily, X	Х				
	<b>HEAVY DUTY, NON-</b>						
	<b>DETERGENT MOTOR</b>						
	OIL						
WATER PUMP OIL	GENERAL PUMP	✓ Daily					
	SERIES 100 OIL or						
	SAE30, NON-						
	<b>DETERGENT, MOTOR</b>						
	OIL						
DIESEL PARTICULATE					Х		
FILTER							

HYDRAULIC	0-120°F (-18°-40°C) SAE 10 GRADE HYDRAULIC OIL or DEXTRON II ATF
TEMPERTURE RANGE	32-175°F (0-80°C) SAE 20 GRADE HYDRAULIC OIL
	3QTS (2.8L)

BLOWER	30°F (-1°C) AND UNDER SAE 20
TEMPERTURE RANGE	30-90°F (-1-32°C) SAE 30
	90°F (32°C) AND ABOVE SAE 40

<sup>\*\*\*\*</sup>WATER PUMP – (Remove fill cap and fill crankcase to dot on oil gauge window.)

<sup>\*\*\*\*</sup>Refer to Component Manual specific Component Specifications.

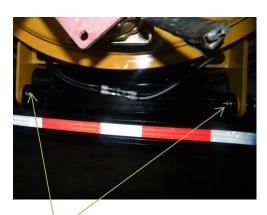
#### **GREASE GUN LUBE POINTS**



STRONGARM GREASE POINT



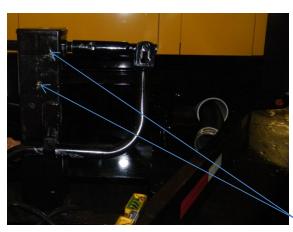
ENGINE GREASE POINT



TANK PIVOT TUBE GREASE POINT



4-WAY VALVE GREASE POINT



TRAILER JACK GREASE POINT



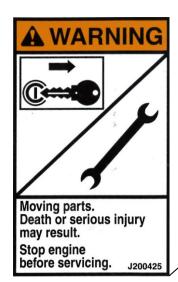
ENTANGLEMENT HAZARD Rotating pullies and belts could cause serious injury.

Do not operate without guards in place.

J200445



J<u>200435</u>









**ENTANGLEMENT HAZARD** Rotating pullies and belts could cause serious injury. Do not operate

without guards in place.

J200445



J200425

J200425





8049882



#### **INSTRUCTIONS**

#### WATER PUMP OPERATION

- Start unit.
- Open water tank ball valve.
  Push soft key on LCD display on left side with the words
- To turn off water pump push the same soft key the words above it say (water on).

#### VX50 ANTIFREEZE PROCEDURE

- Drain water tanks and wye strainer.
- Close main water supply valve. Fill antifreeze tank.
- Open antifreeze ball valve.
- Disconnect tooling from hose. Open hose reel ball valve.
- Start engine. Press and hold the far left soft button labeled as antifreeze on LCD screen until antifreeze is coming from hose. Release soft button. Close reel ball valve. Open tank cleanout valve.
- Press and hold antifreeze button until you see antifreeze coming from drain valve on spoil tank. Release antifreeze button.
- Close tank cleanout valve.
   Press antifreeze button 5 times to winterize bypass circuit.
- 11. Turn machine off.12. Close antifreeze ball valve and open main supply ball valve.

Decal: J200220

J200220

#### **INSTRUCTIONS**

#### **GREASE POINTS Placement** Qty **Placement** TANK PIVOT TANK LIFT CYLINDERS (Depend on Model) 4-WAY VALVE EACH AXLE HUB (Non Oil Bath Hubs) MANUAL JACK VACUUM/PRESSURE SELECTOR PLATE **ENGINE TAIL SHAFT BOOM PACKING GLAND** SWIVEL on HOSE REEL BOOM ROTATING BEARING **BOOM RAISE/LOWER CYLINDER** BOOM SLEW DRIVE (HYD. ROTATION) BOOM EXTENT/RETRACT CYLINDER STRONG ARM PIVOT

J200810

J200810

Qty

BOOM GATE VALVE CYLINDER





#### EXPLOSION HAZARD! CONTENTS UNDER PRESSURE!

Relieve tank pressure before opening. Failure to comply will result in death or serious injury.

#### **AWARNING**



HIGH PRESSURE WATER Pressure wand can cause serious injury.

Keep hands and feet away. Wear protective clothing.

J200450





#### **A WARNING**

CRUSHING WEIGHT

DEATH OR SERIOUS INJURY COULD RESULT

**EMPTY TANK BEFORE SERVICING** 

ALWAYS INSTALL SAFETY BAR WHEN WORKING ON RAISED TANK J200458

J200458



#### **A WARNING**

Pinch point.
Serious injury may result.
Keep hands clear
when closing door
or lowering tank.

J20045





#### **EXPLOSION HAZARD! CONTENTS UNDER** PRESSURE!

Relieve tank pressure before opening. Failure to comply will result in death or serious injury.

J200423

#### DANGER



#### SUFFOCATION HAZARD.

Vacuum hoses will cause death or serious injury.

Keep hoses and tools away from face and body.

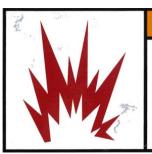
J200415

#### **A DANGER**



Crushing weight. Spoil and door will cause death or serious injury. Unlock door only under vacuum. Stay away from door when dumping.

J200410



#### **AWARNING**

**FIRE OR EXPLOSION** POSSIBLE.

Do not vacuum flammable or combustible substances.



#### **AWARNING**



#### Flammable liquid.

Fuel and fumes can explode or catch fire.

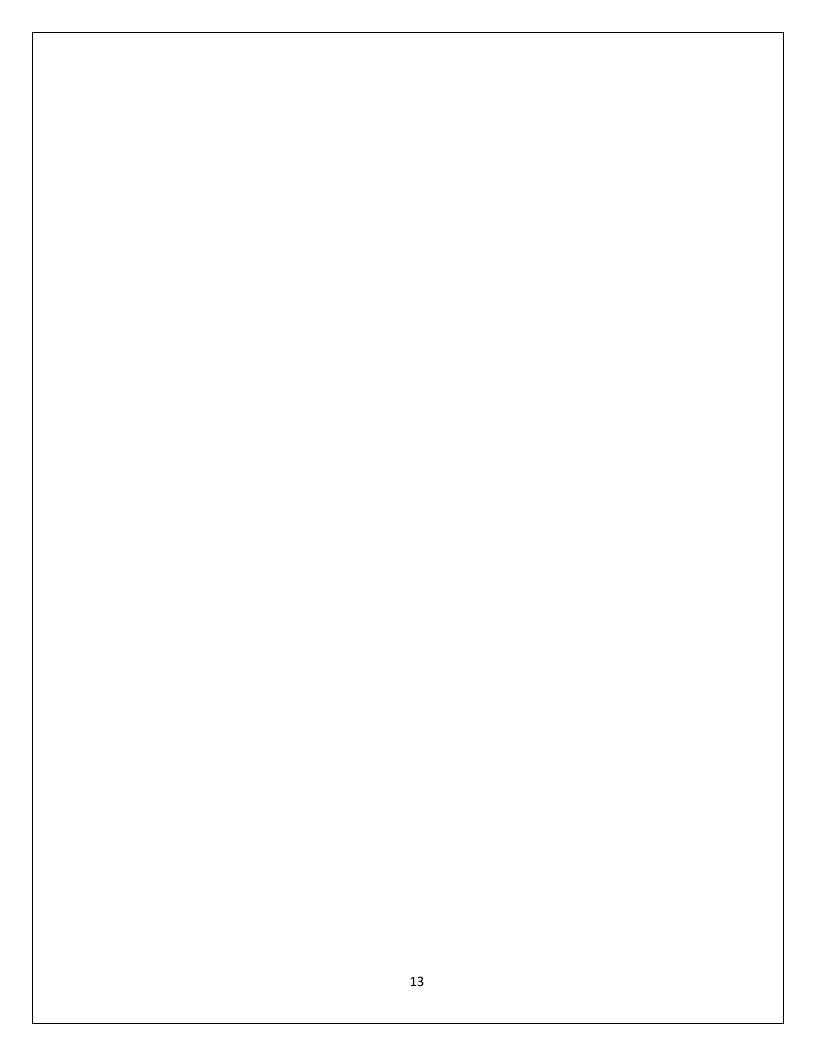
Turn off engine BEFORE fueling.

Wipe up spilled fuel immediately.

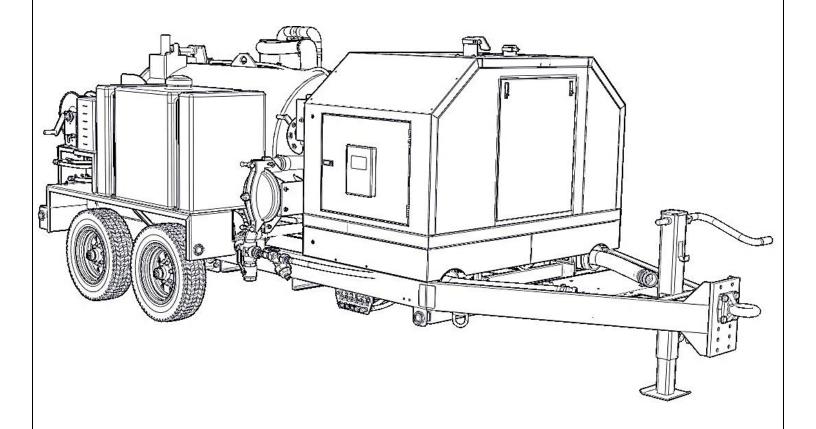


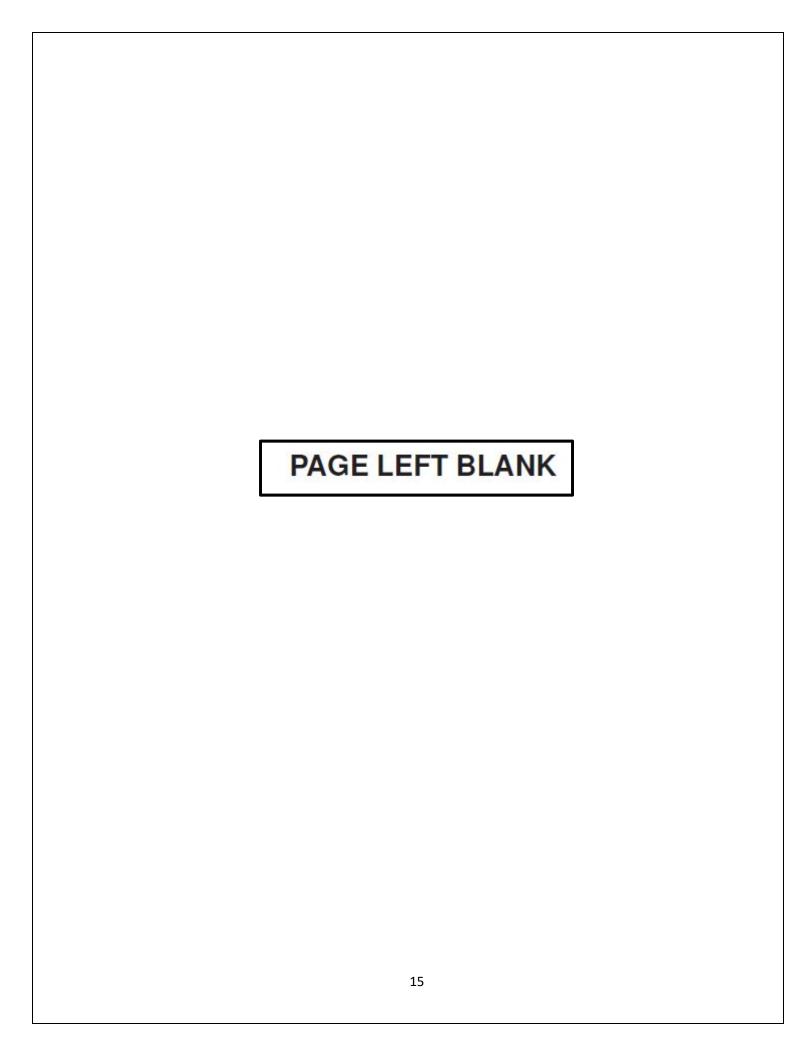




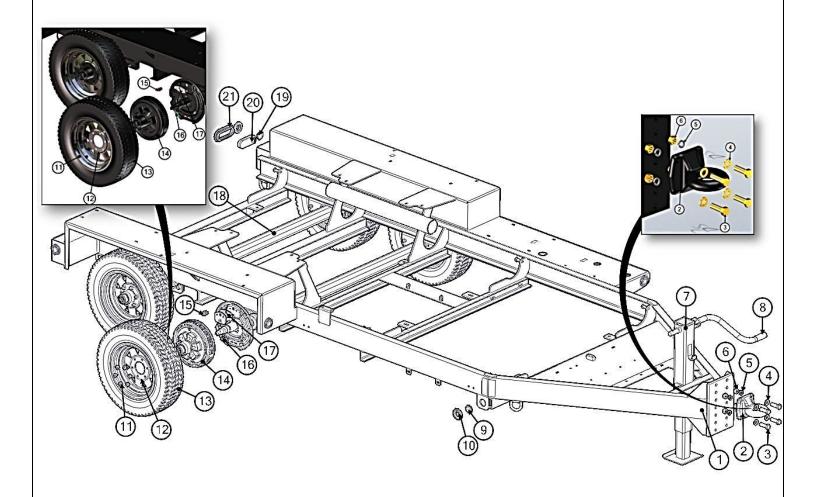


### VX30-500 COMPLETE





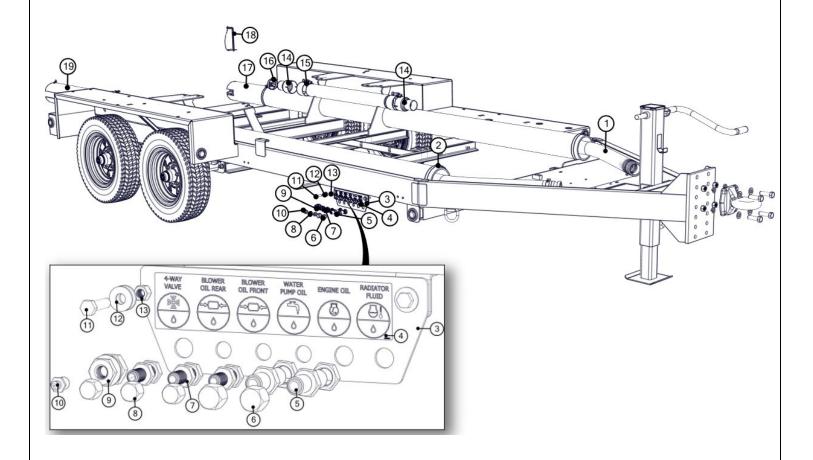
## VX30-500 TRAILER



### VX30-500 TRAILER

BOM ID	Qty	Name	
1	1	8092411	TRAILER, VX50-500
2	1	8045366	PINTLE EYE
3	4	U001420	SCREW, HC .750-10 X 2.50 ZP G5
4	4	U200160	WASHER, FLAT .750 ZP
5	4	U210160	WASHER, LOCK .750 ZP
6	4	U100200	NUT,HEX .750-10 ZP G5
7	τ-	8043548	JACK, MANUAL
8	7	8043984	JACK, HANDLE
9	4	8091468	LIGHT,TRAILER 2" LED AMBER
10	8	8091469	GROMMET, LIGHT 2in RUBBER
11	24	8043987	LUG NUT
12	4	8045152	WHEEL, R16 X 6
13	4	8045708	TIRE, ST235 X 80 R16
14	4	8047035	HUB
15	4	8046306	ADJUSTER KIT
16	4	8046304	MAGNET KIT
17	4	8046305	SHOE KIT
18	2	8045710	AXLE, 6000LBS #11
19	4	8091370	LIGHT,2" LED RED MARKER
20	2	8091470	LIGHT, TRAILER OVAL LED_RED
21	2	8091471	GROMMET,LIGHT OVAL LED

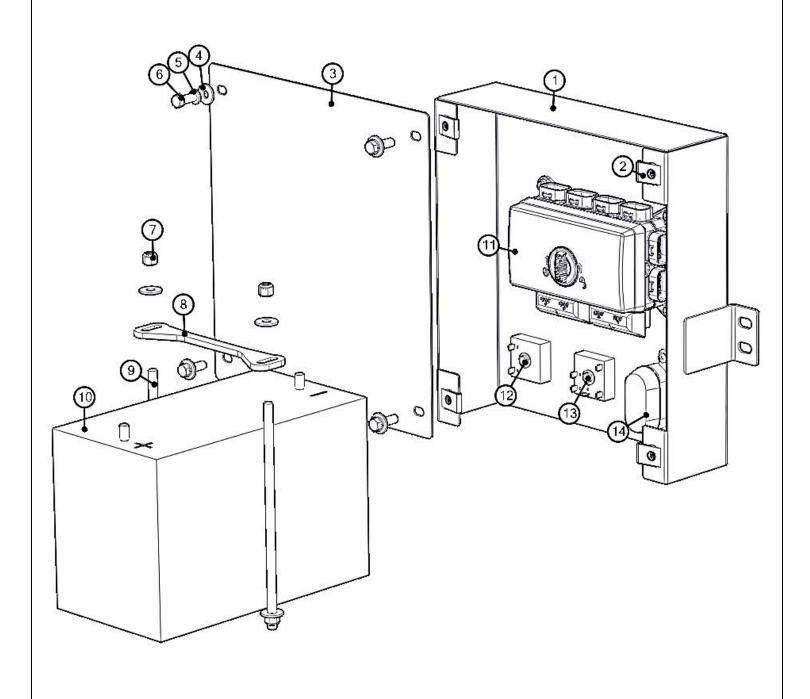
### TRAILER ASSEMBLY



## TRAILER ASSEMBLY

BOM ID	Qty	Description	n
1	2	8093685	ASSEMBLY, HOSE KANAFLEX 3-180"
2	5	8093153	CLAMP, HOSE T-BOLT 750
3	1	8092697	PLATE, REMOTE DRAIN
4	1	J200247	DECAL, REMOTE DRAIN
5	2	T400387	BULKHEAD 8MJ_8MJ
6	2	T405205	CAP, 1/2" FEM.JIC HEX HEAD
7	3	T400391	BULKHEAD 6MJ_6MJ
8	3	T405203	CAP, 3/8" FEM.JIC HEX HEAD
9	1	T400383	BULKHEAD, 1/4"FP X 1/4"FP
10	1	T500100	FITTING, GREASE .250 NPT STR
11	2	U000460	SCREW, HC .375-16 X 1.50 ZP G5
12	4	U200060	WASHER, FLAT .375 ZP
13	2	U120110	NUT, LOCK .375-16 NY ZP
14	2	8040791	EXHAUST REDUCER 4"ID X 3"OD
15	2	8030400	CLAMP, BAND 4.00" EXHAUST
16	1	8042605	CLAMP, HOSE T-BOLT 350
17	2	8092782	PIPE, 6" PVC X 156"LG HOSE STORAGE
18	3	8092776	ASSEMBLY, RETAINING ROD
19	1	8092781	PIPE, 6" PVC X 72" SUCTION TOOL HOLDER

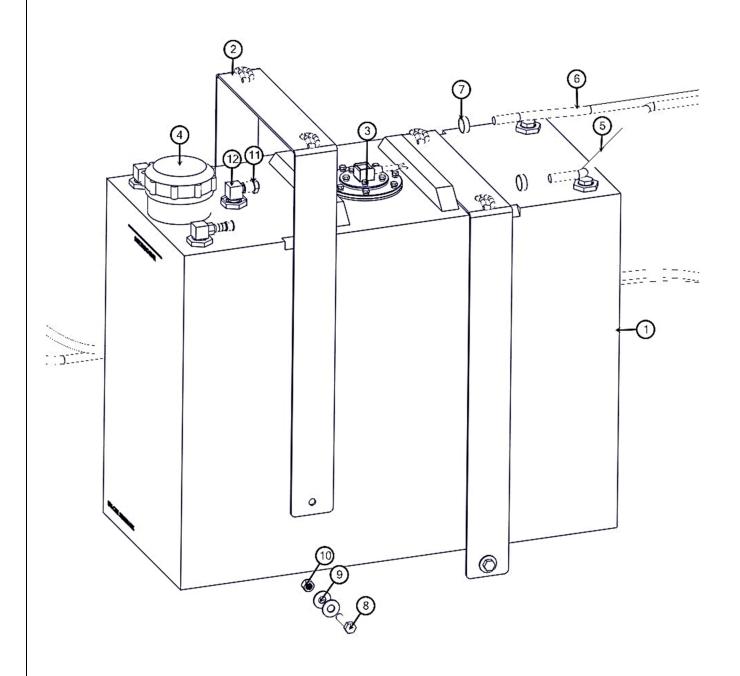
## **ELECTRICAL ASSEMBLY**



## ELECTRICAL ASSEMBLY

BOM ID	Qty	Description	n
1	1	8093654	BOX, ELECTRIC VX30
2	4	U100062	NUT, CLIP .375-16
3	1	8093655	COVER PLATE, ELECTRIC BOX
4	8	U200060	WASHER, FLAT .375 ZP
5	4	U210060	WASHER, LOCK .375 ZP
6	4	U000440	SCREW, HC .375-16 X 1.25 ZP G5
7	4	U120110	NUT, LOCK .375-16 NY ZP
8	1	8050016	STRAP, BATTERY
9	2	8043741	ROD, BATTERY HOLD DOWN
10	1	X400050	BATTERY, 31-MHD WORKAHOLIC
11	1	X000239	ELECTRICAL CENTER
12	1	8042282	SWITCH, RELAY DELAY 2 SEC
13	1	X000241	RELAY TIMER 15 SEC SHUTDOWN
14	1	8043800	FUSE HOLDER AMG

### FUEL TANK ASSEMBLY

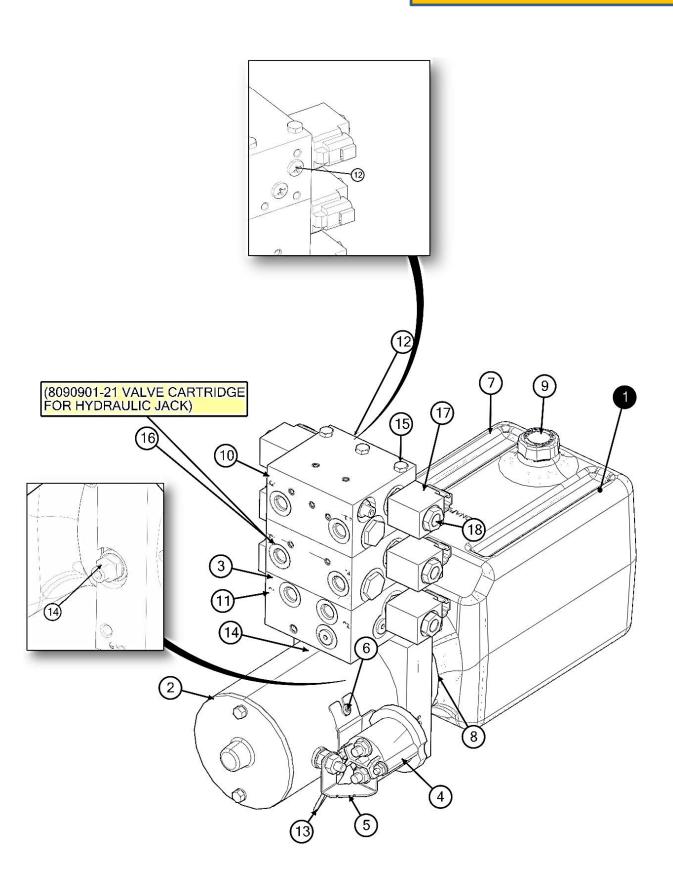


#### FUEL TANK ASSEMBLY

BOM ID	Qty	Name
1	1	8092841 TANK, FUEL 22 GAL DIESEL
2	2	8092577 WELDMENT, FUEL TANK STRAP
3	1	8092841-03 SENDING UNIT, FUEL TANK 22 GAL
4	1	8095103 CAP, FUEL TANK (NON-LOCKING)
5	1	T300457-155.50 HOSE, FUEL 3/8 X 155 1/2"
6	1	T300457-153.00 HOSE, FUEL 3/8 X 153"
7	4	U800030 CLAMP, HOSE 5/16"-7/8"
8	2	U000460 SCREW, HC .375-16 X 1.50 ZP G5
9	6	U200060 WASHER, FLAT .375 ZP
10	4	U120110 NUT, LOCK .375-16 NY ZP
11	1	8093160 BREATHER VENT with SPLASH GUARD
12	3	8090235 FUEL PICKUP PLASTIC 3/8"NPT SC

OPTION: CAP, FUEL (LOCKING) - 8092841-01 KEY, FUEL CAP - 8092841-02

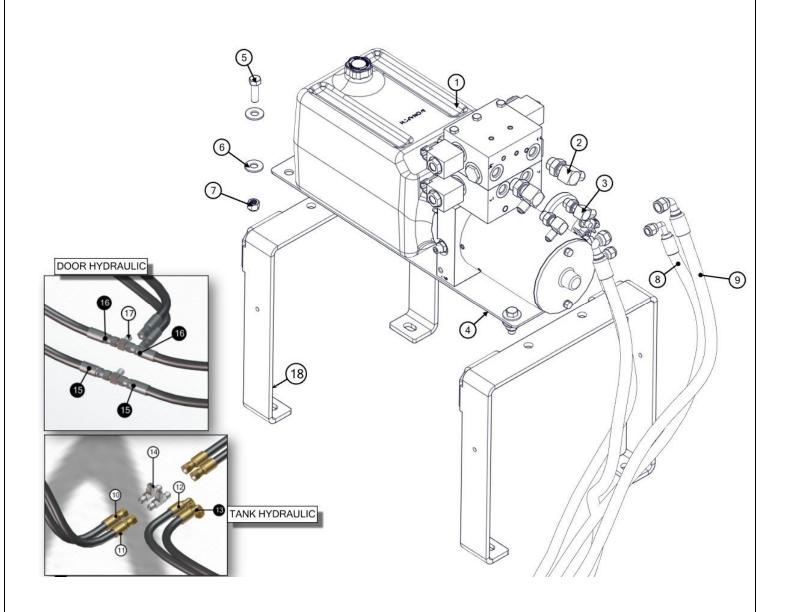
### HYDRAULIC PUMP 12V



### HYDRAULIC PUMP 12V

BOM ID	Qty	Name
1	1	8090901 PUMP, HYD. 12V
2	1	8090901-03 MOTOR, HYDRAULIC PUMP
3	2	8090901-07 O-RING, .63 X .75 X .06-016
4	1	8090901-08 SWITCH, SOLENOID 12VDC
5	1	8090901-09 STRAP, MOTOR SOLENOID CONNECTING
6	2	8090901-10 SCREW,PAN HD TORX. 10-32 X 5/16
7	1	8090901-11 RESEVOIR, PLASTIC 6.7 X 6.7 X 11 H/WT
8	1	8090901-12 CLAMP, HOSE WORM GEAR RSV. M-SER
9	1	8090901-13 PLUG, RESEVOIR
10	1	8090901-14 VALVE, ASSEMBLY 12VDC 4W. RV ON CT
11	٦	8090901-15 VALVE, ASSEMBLY ELECTRIC 12VDC
12	2	8090901-18 FITTING, PLUG 1/4-20 SCREW
13	1	8090901-19 WIRE, ASSEMBLY 16AWG HS RING
14	1	8090901-17 VALVE, ASSEMBLY R/V 1001PSI AND UP
15	3	8090901-20 SCREW,HHC 1/4-20 X 7 1/2 G8
16	1	8090901-21 VALVE, ASSEMBLY 12VDC 4W CARTRIDGE
17	1	8090901-22 COIL, 10VDC #8 INT 2 PIN HI WT
18	1	8090901-23 CARTRIDGE, 3W/2P #8 3000PSI

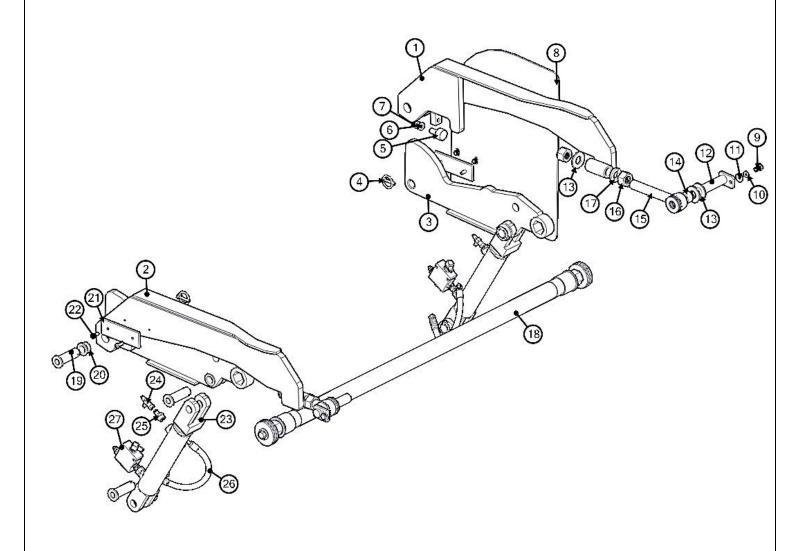
### HYDRAULIC PUMP ASSEMBLY



## HYDRAULIC PUMP ASSEMBLY

BOM ID	Qty	Name	
1	1	8090901	PUMP, HYD. 12V
2	2	T401250	ELBOW, 90 6MB-6MJ
3	2	T401660	ELBOW, 90 6MB-4MJ
4	1	8092597	MOUNT PLATE
5	4	U000440	SCREW, HC .375-16 X 1.25 ZP G5
6	8	U200060	WASHER, FLAT .375 ZP
7	4	U120110	NUT, LOCK .375-16 NY ZP
8	2	8093191	HOSE ASSY VAC 4-116" ST-90
9	2	8091100	HOSE ASSY VAC 6-35" ST-90
10	1	8046817	HOSE ASSY VAC 6-32" ST-ST
11	1	8046818	HOSE ASSY VAC 6-54" ST-ST
12	1	8093186	HOSE ASSY VAC 6-44" ST-90
13	1	8093199	HOSE ASSY VAC 6-66" ST-90
14	2	T402154	TEE 6MJ_6MJ_6MJ
15	2	8093183	HOSE ASSY VAC 4-46" ST-90
16	2	8093184	HOSE ASSY VAC 4-55" ST-90
17	2	T402035	TEE 4MJ_4MJ_4MJ
18	2	8093447	PLATE, MOUNT HYD SYSTEM

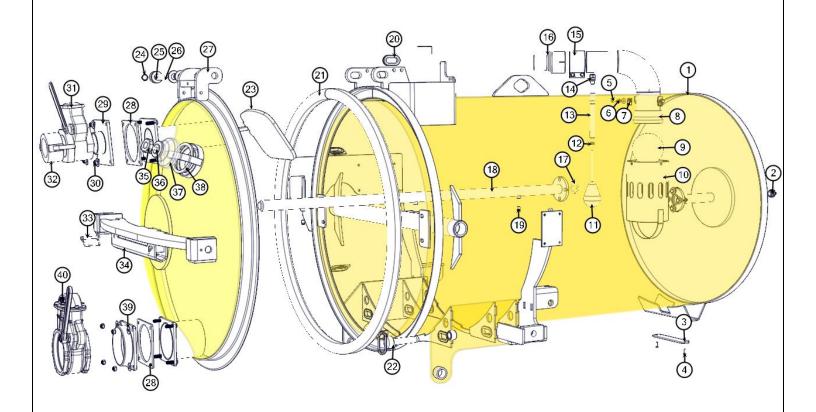
#### HYDRAULIC ARM ASSEMBLY



#### HYDRAULIC ARM ASSEMBLY

BOM ID	Qty	Name	
1	1	8049763	LINKAGE, LONG WELDMENT
2	1	8049765	LINKAGE, LONG WELDMENT
3	2	8049766	LINKAGE, SHORT ARM WELDMENT
4	6	U340050	PIN LINCH 3/16 X 1 9/16 ZP
5	2	W000020	BEARING, CAMROL 1.25"
6	2	U210100	WASHER, LOCK .500 ZP
7	2	U160015	NUT, JAM .500-20
8	1	8049762	GUARD, HYD. ARM
9	2	U000400	SCREW, HC .375-16 X .75 ZP G5
10	2	U210060	WASHER, LOCK .375 ZP
11	2	U200060	WASHER, FLAT .375 ZP
12	2	8043844	CYLINDER PIN FLANGED 1" X 5 1/2"
13	14	U200170	WASHER, FLAT 1.00 ZP
14	2	8041524	BUSHING BRONZE 1.25 X 1.00 X .75 PL
15	2	8043131	ROD END 1"-8 X 7 1/2"
16	2	U100240	NUT, HEX 1.00-8 ZP G2
17	2	U210200	WASHER, LOCK 1.00 ZP
18	1	8090906	LINKAGE CROSS TUBE ASSEMBLY
19	6	8042489	CYLINDER PIN
20	8	8041883	BUSHING BRONZE 1.25 X 1.00 X .63 FL
21	2	8049376	STRIP, PLASTIC 1/4" X 2" X 6"
22	4	U030017	SCREW, SFH .250-20 X 1.00 ZP
23	2	8041327	CYLINDER, HYD. DOOR
24	2	T402010	TEE, 4FJ-4MJ-4MJ
25	2	T400611	REDUCER, 8MB-4MJ
26	2	8044748	HOSE ASSY VAC 4-13" ST-90
27	2	8090248	ASSEMBLY, PO CHECK

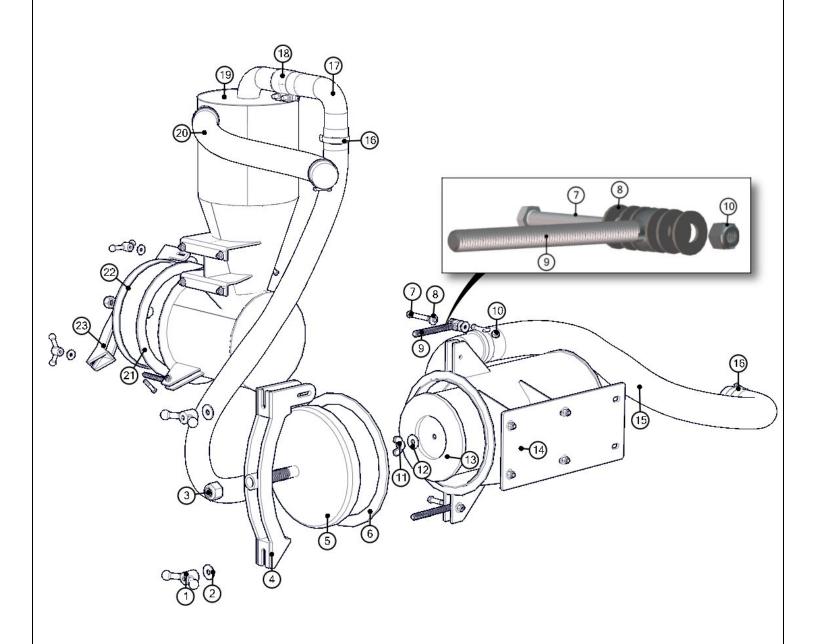
## SPOIL TANK ASSEMBLY



## SPOIL TANK ASSEMBLY

BOM ID	Qty	Description	
1	1		TANK, SPOIL 500
2	1	T400310	REDUCER, 1"MB - 3/8"MJ
3	1	8091150	STRIP. PLASTIC 1/4" X 2" X 15"
4	2	U030017	SCREW, SFH .250-20 X 1.00 ZP
5	2	U000440	SCREW, HC .375-16 X 1.25 ZP G5
6	2	U210060	WASHER, LOCK .375 ZP
7	2	U100062	NUT, CLIP .375-16 PHOSPHATE
8	1	8043571	SEAT. 4" RUBBER FOR FLOAT BALL
9	1	8043570	BALL, STAINLESS FLOAT 6"
10	1	8043700	WELDMENT, BALL FLOAT SCREEN
11	1	8030531	SWITCH FLUID LEVEL
12	1	8041291	BUSHING, RUBBER 7/8"HEAD X 21/32"BODY
13	1	8040769	TUBE, TANK FULL SWITCH 8"
14	1	X000113	STRAIN RELIEF 1/2"NPT .250375
15	1	8030400	CLAMP, BAND 4" EXHAUST
16	1	8040791	REDUCER, EXHAUST 4"ID X 3"OD
17	1	8030446	O-RING, #328 BUNA-N
18	1	8043166	WELDMENT, TANK ROD 500
19	3	8030369	NOZZLE, TANK CLEANOUT
20	10	8042812	GROMMET, 2"ID X 3.0"OD X 1/4"WOG
21	1	8041765	SEAL, DOOR SQ 136 BONDED
22	1	8041626	PIN HITCH 1" X 4 1/2"
23	1	8092385	DEFLECTOR, BOLT-ON
24	2	U500020	SNAP RING, EXT 1" SHAFT ZP
25	6	U200170	WASHER, FLAT 1.00
26	1	8040058	ROD, DOOR HINGE
27	1	8092384	DOOR, 500 BOLT-ON DEFLECTOR
28	2	8046191	GASKET, DOOR INLET/OUTLET
29	1	8046197	GATE VALVE TANK FLANGE 3in
30	8	U120132	NUT, LOCK .438-14 NY
31	1	8042408	VALVE, 3" GATE BRASS LEVEL TYPE
32	1	8041585	COUPLING, PP 3"FCAM X 3"MNPT
33	2	8041213	PIN, SAFETY SNAP
34	1	8091336	BRACE, TANK SAFETY VX500
35	1	8031046	SCREW, HANDWHEEL SIGHT GLASS
36	1	8031047	PLATE, SIGHT GLASS
37	1	8031048	SIGHTGLASS, 5" GLASS ONLY
38	1	8032007	GASKET, 4" FLAT ALUM COUPLER
39	1	8046199	GATE VALVE TANK FLANGE 6"
40	1	8030849	VALVE, 6" GATE BRA\$\$ LEVER TYPE

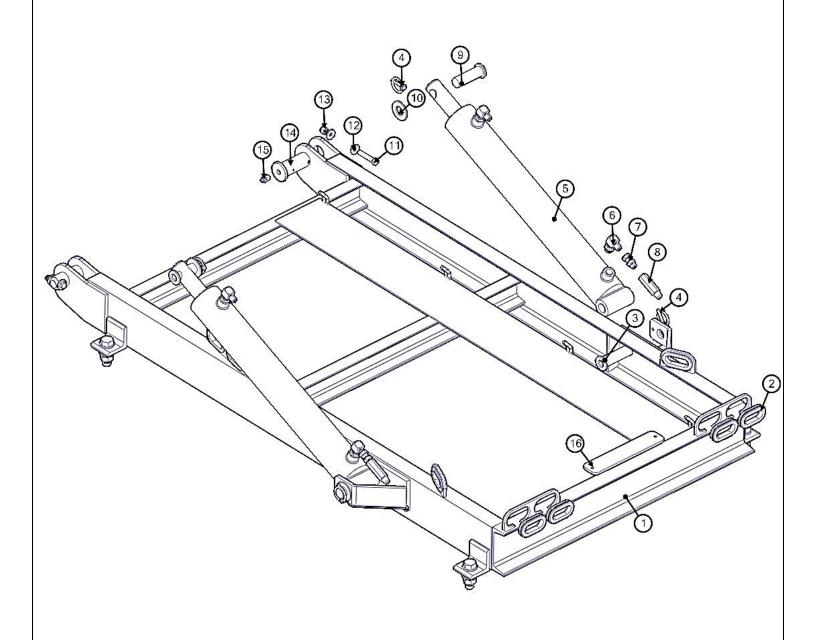
## FILTRATION ASSEMBLY



## FILTRATION ASSEMBLY

BOM ID	Qty	Description
1	4	8041594 HANDLE, WING 1/2-13
2	4	U200100 WASHER, FLAT .500 ZP
3	2	U120060 NUT, LOCK 1.00-8 NY ZP G2
4	1	8044622 DOOR LATCH WELDMENT
5	1	8044620 575 RF AIR FILTER DOME (door) ASSEMBLY
6	1	8044819 GASKET, REV FLOW AIR FILTER
7	2	U000580 SCREW, HC .375-16 X 3.50 ZP G5
8	19	U200060 WASHER, FLAT .375 ZP
9	4	8041593 BOLT, EYE 1/2-13 X 6
10	4	U120110 NUT, LOCK .375-16 NY ZP
11	1	U130080 NUT,WING .500-13 ZP G2
12	1	U200100 WASHER, FLAT .500 ZP
13	1	8031178 FILTER,AIR WASHABLE 575CFM
14	1	8046337 FILTER HSG AIR 575 RF
15	1	8030420-68.00 HOSE VAC KANAFLEX 3" X 68"LG
16	6	8042605 CLAMP, HOSE T-BOLT 350
17	1	8040682 ELBOW, 90 3"EXHAUST (3"RAD, ID-OD)
18	1	8048927 CLAMP, HOSE SPIRAL 3" DBL BOLT
19	1	8044589 CYCLONE HOUSING 575 RF
20	1	8042630-052.00 HOSE AG SUCTION 3 X 52"LG
21	1	8041612 GASKET, REV FLOW CYCLONE
22	1	8041402 DOME, CYCLONE REV FLOW
23	1	8041552 LATCH, CYCLONE DOME REV FLOW

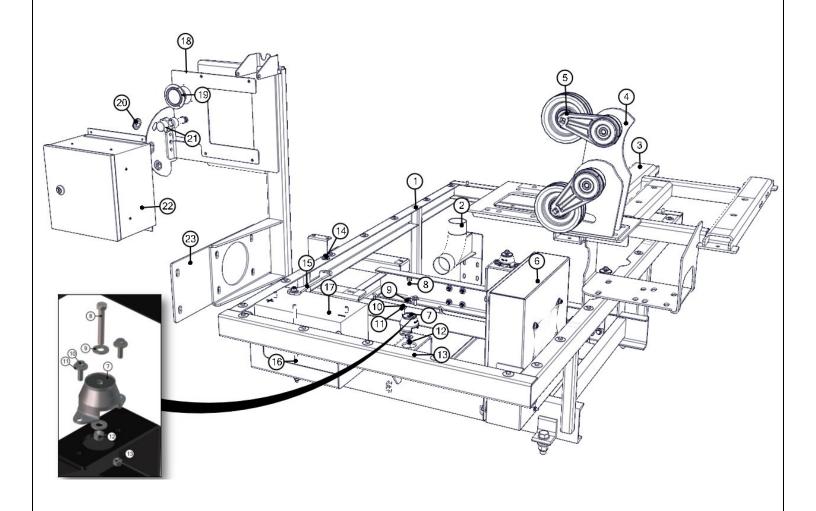
## TANK SKID ASSEMBLY



## TANK SKID ASSEMBLY

BOM ID	Qty	Name	
1	1	8092337	SKID, TANK 500 & 800
2	8	8042812	GROMMET, 2"ID X 3"OD X 1/4"WOG
3	2	8092495	WELDMENT, PIN 1"DIA X 5 1/2"
4	4	U340050	PIN LINCH 3/16 X 1 9/16 ZP
5	2	8030359	CYLINDER, HYD 3" X 20"
6	4	T401270	ELBOW, 90 8MB-6MJ
7	2	T400036	UNION, 6MB-6FJ
8	2	8048286	VALVE, CHECK VELOCITY 6.0GPM
9	2	8042489	CYLINDER PIN
10	4	U200170	WASHER, FLAT 1.00 ZP
11	2	U000520	SCREW, HC 3/8-16 X 2.25" ZP G5
12	4	U200060	WASHER, FLAT 3/8" ZP
13	2	U120110	NUT, LOCK 3/8-16 NY ZP
14	2	8092401	PIN, TANK PIVOT
15	2	T500100	FITTING, GREASE 1/4" NPT STR
16	1	8091150	STRIP, PLASTIC 1/4" X 2" X 15"

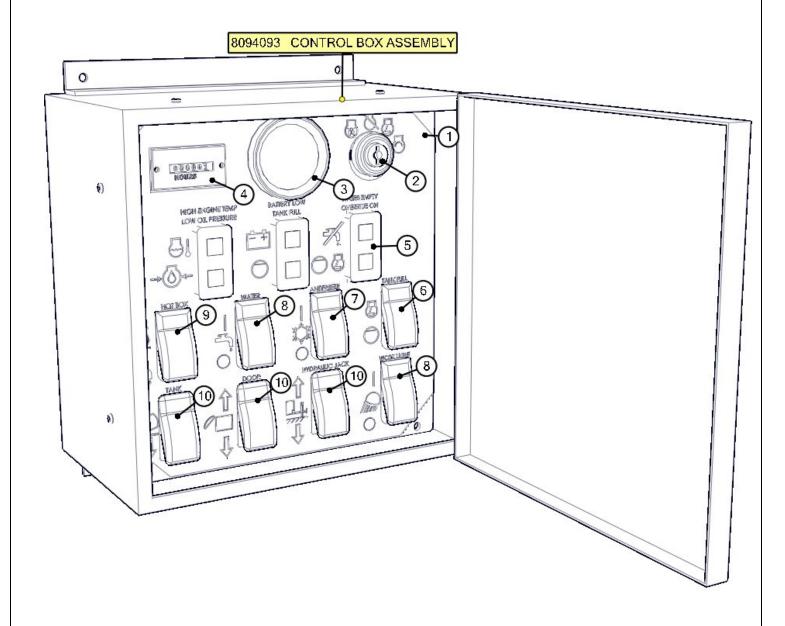
#### POWERPACK SKID ASSEMBLY



## POWERPACK SKID ASSEMBLY

BOM ID	Qty	Description		
1	1	8092914	WELDMENT, SKID POWERPACK	
2	1	8093609	WELDMENT, SILENCER MOUNT	
3	1	8092957	WELDMENT, ENGINE SKID	
4	1	8093580	WELDMENT, TENSIONER BRACKET	
5	2	8049156	AUTO TENSIONER FOR DUAL V BELT	
6	1	8093668	ASSEMBLY, ELECTRIC VX30	
7	4	8090378	MOTOR MOUNT	
8	4	U000540	SCREW, HC .375-16 X 2.50 ZP G5	
9	8	U200060	WASHER, FLAT .375 ZP	
10	8	U000200	SCREW, HC .312-18 X 1.00 ZP G5	
11	16	U200040	WASHER, FLAT .312 ZP	
12	4	U120110	NUT, LOCK .375-16 NY ZP	
13	8	U110040	NUT, HEX .312-18 NY ZP G2	
14	4	U120110	NUT, LOCK .375-16 NY ZP	
15	1	8050016	STRAP, BATTERY	
16	2	8043741	ROD, Z BATTERY HOLD DOWN VK	
17	1	X400050	BATTERY, 31-MHD WORKAHOLIC	
18	1	8094166	VAC GAUGE/THROTTLE MOUNT PLATE	
19	1	8041074	VACUUM GAUGE	
20	3	8048585	GROMMET, REV FLOW PLATE	
21	1	8093702	THROTTLE CABLE	
22	1	8094093	ASSEMBLY, CONTROL BOX	
23	1	8093581	ADAPTER PLATE 575 AIR	

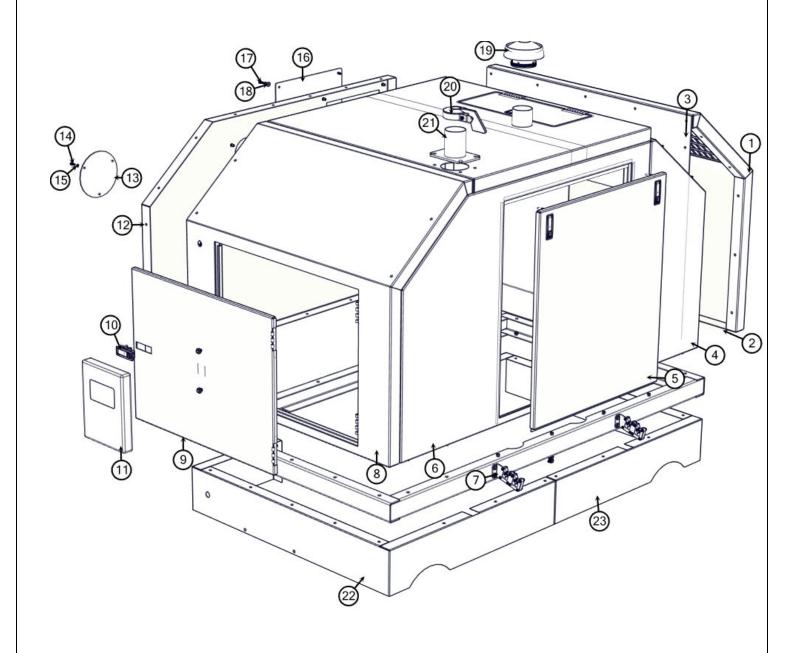
## CONTROL BOX ASSEMBLY



## CONTROL BOX ASSEMBLY

BOM ID	Qty	Description		
1	1	8094093-004 DECAL, CONTROL BOX VX30		
2	1	8030458 SWITCH, IGNITION		
3	1	8030330 GAUGE, FUEL		
4	1	X000300 HOUR METER		
5	3	X000260 LIGHT, LED DUAL PANEL		
6	1	X000273 SWITCH, ROCKER SPST (ON) NONE OFF		
7	1	X000272 SWITCH, ROCKER DPST (ON) NONE-ON		
8	2	X000270 SWITCH, ROCKER SPST ON-OFF		
9	1	X000271 SWITCH, ROCKER DPST ON- NONE-ON		
10	3	X000274 SWITCH, ROCKER DPST (ON) OFF (ON)		

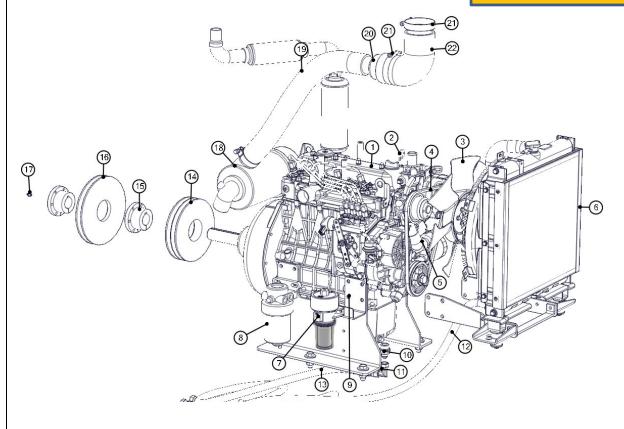
## ENCLOSURE ASSEMBLY

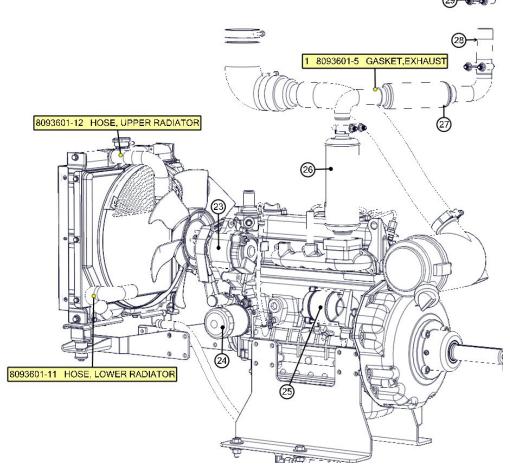


## ENCLOSURE ASSEMBLY

BOM ID	Qty	Name	
1	1	8092876 PANEL, ENCLOSURE STREETSIDE	
2	1	8092886 ASSEMBLY, FOAM ENCLOSURE	
3	1	8092877 PANEL, ENCLOSURE PLENUM UPPER	
4	1	8092872 PANEL, ENCLOSURE FRONT STREETSIDE	
5	1	8092881 DOOR, ENCLOSURE LIFT OUT FRONT	
6	1	8092871 WELDMENT, ENCLOSURE FRONT PANEL CURBSIDE	
7	2	8094491 TOOL HOLDER ASSEMBLY	
8	1	8092875 PANEL, ENCLOSURE CURBSIDE	
9	1	8092880 DOOR, ENCLOSURE HINGED CURBSIDE	
10	4	8048788 LATCH, COMPRESSION C2	
11	1	E250210 BOX, SAFETY MANUAL	
12	1	8094766 PANEL, ENCLOSURE BAC CURBSIDE (DUAL OUTLET)	
13	1	8094765 COVER PLATE, ENCLOSURE BACK PANEL	
14	3	U000040 SCREW, HC .250-20 X .750 ZP G5	
15	3	U210020 WASHER, LOCK .250 ZP	
16	1	8092885 PANEL, ENCLOSURE ACCESS COVER	
17	4	U000040 SCREW, HC .250-20 X .750 ZP G5	
18	4	U200020 WASHER, FLAT .250 ZP	
19	1	8091506-01 CAP, AIR IN-TAKE	
20	1	8044537 RAIN CAP, 3" SILENT	
21	1	8094022 WELDMENT, EXHAUST ENCLOSURE	
22	1	8092882 PANEL, ENCLOSURE SKIRT CURBSIDE	
23	1	8092883 PANEL, ENCLOSURE SKIRT STREETSIDE	

## **ENGINE ASSEMBLY**

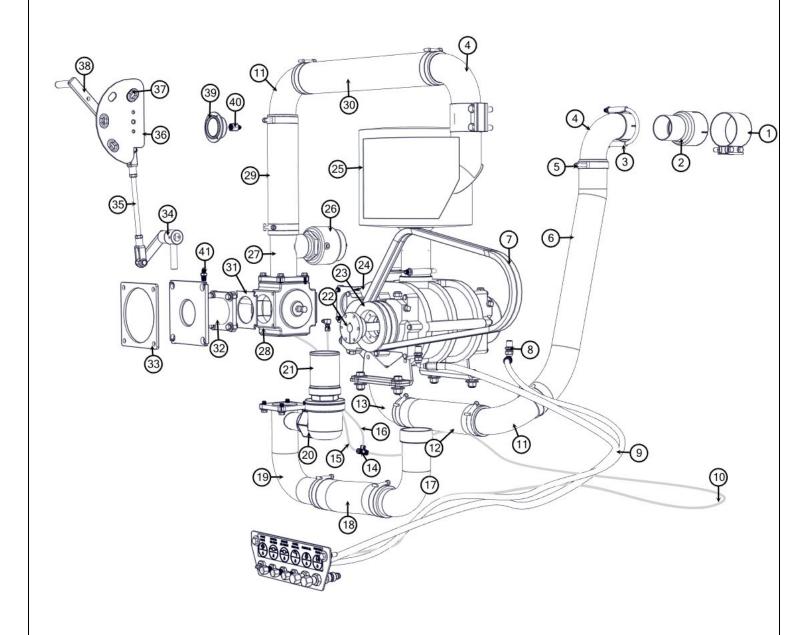




## **ENGINE ASSEMBLY**

BOM ID	Qty	Description
1	1	8093601 ENGINE, KUBOTA V1505 TIER4
2	1	8093601-01 OIL LEVEL GAUGE
3	1	8093601-02 FAN
4	1	8093601-11 BELT, FAN
5	1	8093601-12 PUMP, WATER
6	1	8093601-13 RADIATOR
7	1	8090999 PUMP, FUEL
8	1	8047266 FUEL-WATER SEPARATOR
9	1	8093791 BRACKET, FUEL PUMP
10	1	T401223 UNION, 8MJ-M22 MALE
11	1	T401625 ELBOW, 90 8FJ-8MJ
12	1	8030540-090.00 HOSE VAC PUSH 8-90"LG
13	1	8093181 HOSE ASSY VAC 8-72" ST-ST
14	1	8093604 SHEAVE, QD2/5V8.00
15	2	8047704 BUSHING, IDCSKX 1 1/2
17	1	8093601-06 GREASE FITTING
18	1	8093601-07 ELEMENT, AIR CLEANER
19	1	8093725-21.875 HOSE, AIR IN-TAKE 2" X 21 7/8"LG
20	1	8093722 REDUCER, INTAKE 3"OD-2"OD
21	2	8042605 CLAMP, HOSE T-BOLT 350
22	1	8091494 EXHAUST, IN-TAKE ELBOW 90 RUBBER
23	1	8093601-14 ALTERNATOR
24	1	T700075 FILTER, OIL
25	1	8093601-16 STARTER
26	1	8093601-3 MUFFLER
27	1	8093601-4 EXHAUST FLEX PIPE WELDMENT
28	1	8094214-4.75 EXHAUST FLEX TUBE 4.75"LG
29	2	8094220 CLAMP, HOSE COUSHINED 3 1/2"

## BLOWER ASSEMBLY

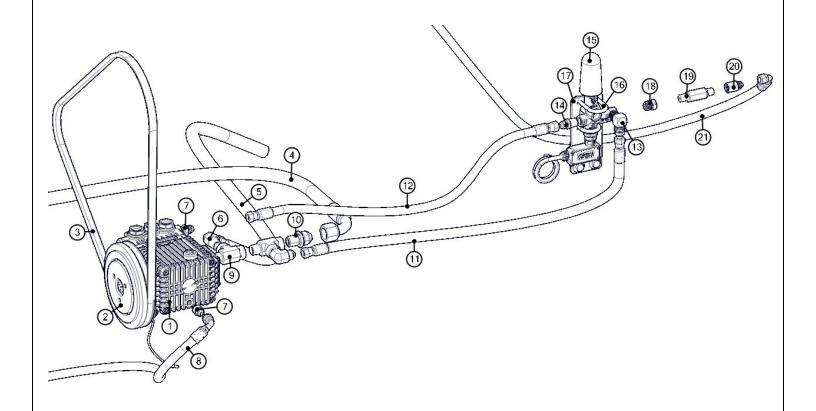


## BLOWER ASSEMBLY

BOM ID	Qty	Name
1	1	8030400 CLAMP, BAND 4" EXHAUST
2	1	8040791 REDUCER, EXHAUST 4"ID X 3"OD
3	2	8030395 CLAMP, U-BOLT 3IN EXHAUST
4	2	8094769 ELBOW, EXHAUST 3" (4" CL RAD)
5	10	8042605 CLAMP, HOSE T-BOLT 350
6	1	8042630-32.00 HOSE VAC AG SUCTION 32"LG
7	2	8093605 BELT, 5VX590
8	2	T400028 UNION, 6MP-6MJ
9	2	8093180 HOSE ASSY VAC 6 - 83" ST-90
10	1	8091531-125.00 TUBE, NYLON 1/4 X 125"
11	2	8094014 ELBOW, 90 3" OD-OD 6"LEG
12	1	8092928-15.00 HOSE, HOT AIR 3" - 15.00"LG
13	1	8093634 WELDMENT, EXHAUST 4-WAY TO SILENCER
14	1	T402009 TEE 1 4TB X 1 4TB X 1 4TB
15	1	8091531-022.00 TUBE, NYLON 1/4 X 22"
16	1	8091531-017.00 TUBE, NYLON 1/4 X 17"
17	1	8093641 WELDMENT, EXHAUST BLOWER
18	1	8092928-012.875 HOSE, HOT AIR 3" - 12.875"LG
19	1	8093637 WELDMENT, EXHAUST 4-WAY BOTTOM
20	1	8030337 VALVE, 2" AIR RELIEF SET 15"HG (STANDARD)
21	1	8040340 FILTER, AIR 2" KUNKLE VALVE
22	1	8040642 BUSHING, SDS 7/8"
23	1	8093603 SHEAVE, QD2/5V5.20
24	1	8041250 BLOWER 575 ASSEMBLY
25	1	8030332 SILENCER 500CFM COWL
26	1	8041034 VALVE, 2" RELIEF AIR SET 5PSI
27	1	8093618 WELDMENT, EXHAUST 4-WAY TOP
28	1	8041030 VALVE, 4-WAY 3" NPT THREADS
29	1	8042630-21.00 HOSE VAC AG SUCTION 21"LG
30	1	8042630-23.00 HOSE VAC AG SUCTION 23"LG
31	4	8044792 GASKET, 4-WAY VALVE 3"
32	1	8093614 WELDMENT, EXHAUST 4-WAY TO AIR
33	1	8046191 GASKET, DOOR LE INLET/OUTLET
34	1	8093628 WELDMENT, COLLAR 4-WAY VALVE
35	1	8092774 ROD, 4-WAY ACTION CONNECTING
36	1	8092766 PLATE, 4-WAY VALVE
37	3	8048585 GROMMET, REV FLOW PLATE
38	1	8092769 ASSEMBLY, DOOR ENCLOSURE HINGED
39	1	8041074 VACUUM GAUGE
40	1	T400110 UNION 4FP 4MJ
41	1	T400020 UNION 4MP_4MJ

NOTE: 8090946 - VALVE,2" AIR RELIEF SET 13"HG (HIGH ALTITUDE)

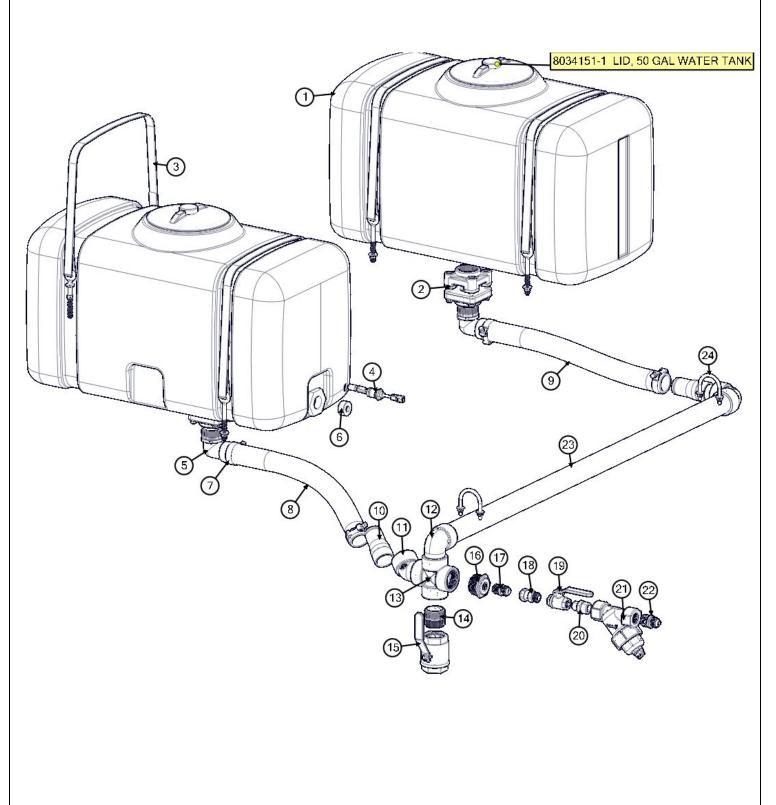
## WATER PUMP ASSEMBLY



## WATER PUMP ASSEMBLY

BOM ID	Qty	Description		
1	1	8040834 PUMP, WATER TX1510S34		
2	1	8040176 CLUTCH, ELECTRIC TX SERIES		
3	1	8093646 BELT, WATER PUMP A63		
4	1	8044765 HOSE ASSY VAC 12-50" ST-90		
5	1	8030540-132.00 HOSE VAC PUSH 8-132"		
6	2	T401140 ELBOW, 90 8MP-8MJ		
7	1	T400028 UNION 6MP_6MJ		
8	1	8093179 HOSE ASSY VAC 6-19.25 ST-90 (DRAIN)		
9	2	T402156 TEE -8MP -8MP -8FP STEEL		
10	1	T400070 REDUCER 12MJ-8MP		
11	1	8041152 HOSE ASSY VAC 6-30" ST-ST		
12	1	8046817 HOSE ASSY VAC 6-32" ST-ST		
13	1	T401120 ELBOW, 90 6MP-8MJ		
14	1	T400028 UNION, 6MP-6MJ		
15	1	8048979 VALVE, UNLOADER BLUE W/ SWITCH		
16	2	U010017 U-BOLT .250-20		
17	1	8093219 MOUNT, UNLOADER VALVE		
18	1	T400023 REDUCER, 6MP-4FP		
19	1	8030923 FILTER, WATER HIGH PRESSURE		
20	1	8031126 REDUCER, 4FP-6MJ		
21	1	8093192 HOSE ASSY VAC 6-165" ST-90		
22	1	T400118 UNION, 6MJ-4MB		

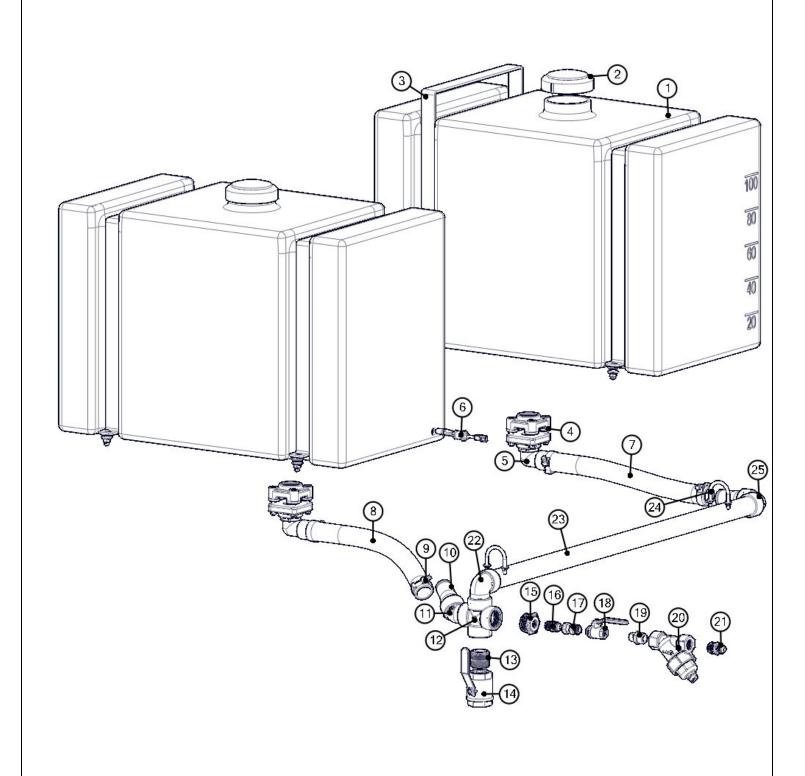
## WATER TANK ASSEMBLY 50 GALLON



# WATER TANK ASSEMBLY 50 GALLON

BOM ID	Qty	Name
1	2	8034151 TANK, WATER 50 GAL
2	2	8049750 BULKHEAD, 2" BOT. DRAIN BANJO
3	4	8043758 STRAP, EYEBOLT 1" X 55" OAL
4	1	8090896 SWITCH, WATER LEVEL (HORIZ)
5	2	8090209 FITTING, HOSE BARB 90 2" BANJO
6	2	T405068 PLUG, 1 1/4"NPT HEX SOCKET HEAD
7	4	8044580 CLAMP, HOSE T-BOLT 256
8	1	8043398-028.50 HOSE VAC CLEAR VINYL 2"-28.50"LG
9	1	8043398-027.50 HOSE VAC CLEAR VINYL 2"-27.50"LG
10	2	T410115 FITTING, 2"MNPT - 2" BARB STEEL
11	1	8090206 FITTING, ELBOW 45 2" BANJO
12	1	8090207 FITTING, ELBOW 90 2" BANJO
13	1	8091712 FITTING, CROSS 2"NPT BANJO
<b>1</b> 4	1	8030409 NIPPLE, CLOSE 2" SCHD 40 IRON
15	1	8090233 VALVE, BALL 2" W/LEVER HANDLE
16	1	8090208 FITTING, REDUCER BUSHING 2" X 3/4" BANJO
17	1	T400100 UNION, 3/4"MP - 3/4"MJ
18	1	T400101 UNION, 3/4"FJ - 3/4"MP
19	1	T000185 VALVE, BALL 3/4"FNPT BRASS
20	1	T404060 REDUCER, 1"MP - 3/4"MP
21	1	8040186 STRAINER, Y 1" BANJO
22	1	T400450 REDUCER, 1"MP - 3/4"MJ
23	1	8092712 PIPE, SCHD 40 2" X 61.50"LG
24	2	8031373 CLAMP, U-BOLT 2.5" EXHAUST

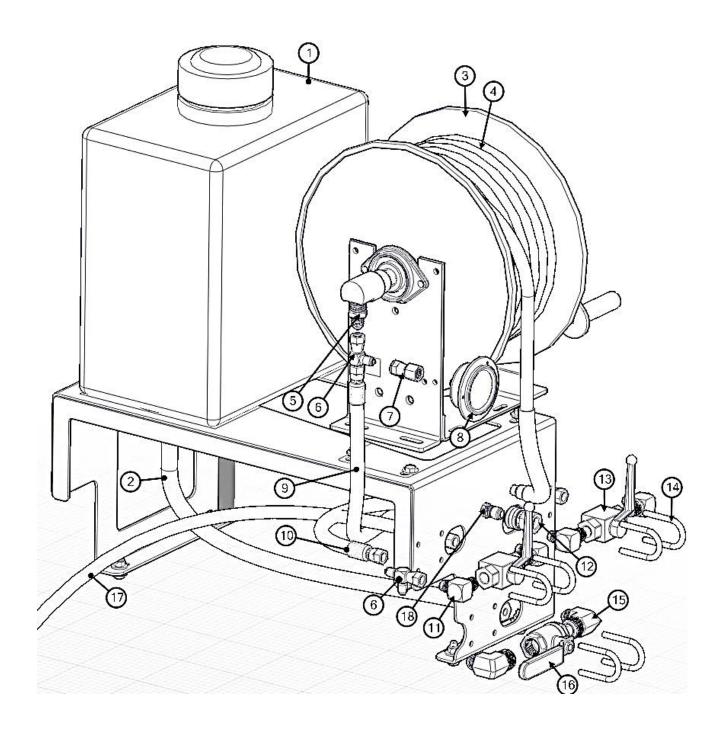
## WATER TANK ASSEMBLY 125 GALLON



# WATER TANK ASSEMBLY 125 GALLON

BOM ID	Qty	Name
1	2	8092393 TANK, WATER 125 GAL
2	2	8092393-02 LID, WATER TANK 125 GAL
3	4	8092395 STRAP, TANK SADDLE 125
4	2	8049750 BULKHEAD, 2" BOT. DRAIN BANJO
5	2	8090209 FITTING, HOSE BARB 2" 90 BANJO
6	1	8090896 SWITCH, WATER LEVEL HORIZ
7	1	8043398-027.50 HOSE VAC CLEAR VINYL 2" X 27.50"LG
8	1	8043398-028.50 HOSE VAC CLEAR VINYL 2" X 28.50"LG
9	4	8044580 CLAMP, HOSE T-BOLT 256
10	2	T410115 FITTING, 2"MNPT - 2"BARB STEEL
11	1	8090206 FITTING, ELBOW 45 2" BANJO
12	1	8091712 FITTING, CROSS 2"NPT BANJO
13	1	8030409 NIPPLE, CLOSE 2" SCHD 40 IRON
14	1	8090233 VALVE, BALL 2" W/LEVER HANDLE
15	1	8090208 FITTING, REDUCER BUSHING 2" X 3/4" BANJO
16	1	T400100 UNION, 12MP-12MJ
17	1	T400101 UNION, 12FJ-12MP
18	1	T000185 VALVE, BALL 3/4"FNPT BRASS
19	1	T404060 REDUCER, 16MP-12MP
20	1	8040186 STRAINER, Y 1" BANJO
21	1	T400450 REDUCER, 1"MP - 3/4"MJ
22	1	8090207 FITTING, ELBOW 90 2" BANJO
23	1	8092712 PIPE, SCHD 40 2" X 61.50"LG
24	2	8031373 CLAMP, U-BOLT 2.5" EXHAUST
25	1	8092856 FITTING, ELBOW 90 2" FP-FP

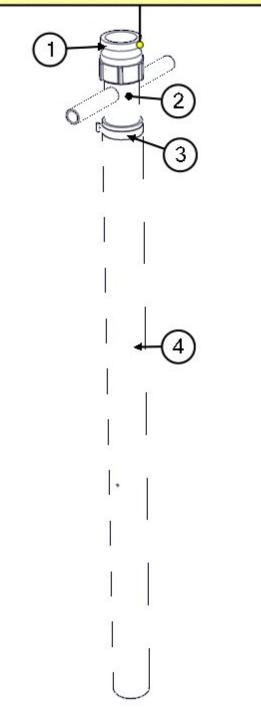
## ANTIFREEZE/WATER REEL ASSEMBLY



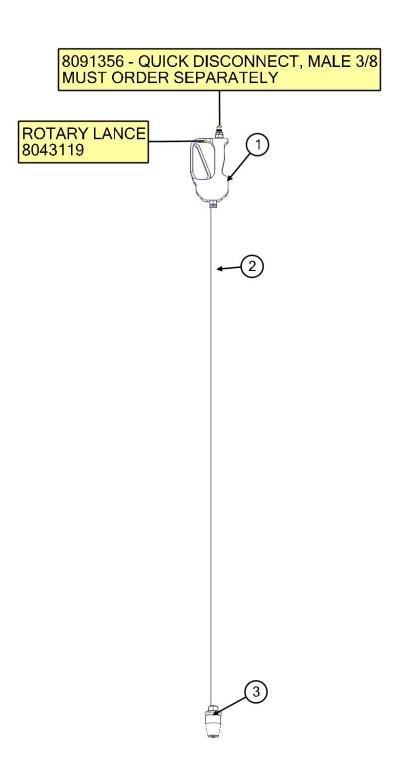
## ANTIFREEZE/WATER REEL ASSEMBLY

BOM ID	Qty	Name		
1	1	8092860 ANTIFREEZE TANK ASSEMBLY		
2	1	8030540-0	22.25 HOSE VAC PUSH 8 - 22.25"	
3	1	8030879	REEL ONLY WATER HANNAY 3/8 X 75'	
4	1	8041830	HOSE ASSEMBLY 3/8" X 50' 4000 PSI	
5	1	T400029	REDUCER, 8MP-6MJ	
6	2	T402153	TEE, 6FJ-6MJ-6MJ	
7	1	8031125	REDUCER, 4FP-6FJ	
8	1	8030372	GAUGE, PRESSURE WATER 5000 PSI	
9	1	8092869	HOSE ASSY VAC 6-28" ST-ST	
10	1	8090243	HOSE ASSY VAC 6-17 1/2" ST-ST	
11	4	T401102	ELBOW, 90 6MP-6MJ	
12	1	8091355	QUICK DISCONNECT 3/8" MALE	
13	2	8030351	VALVE, BALL 3/8" 3K PSI	
14	6	U010017	U-BOLT 1/4"-20	
15	2	T401160	ELBOW, 90 12MP-8MJ	
16	1	T000185	VALVE, BALL 3/4" FNPT BRASS	
17	1	8093197	HOSE ASSY VAC 6-280" ST-90	
18	1	8091356	QUICK DISCONNECT 3/8" MALE X MALE	

### SUCTION TOOL COMPLETE - 8030215



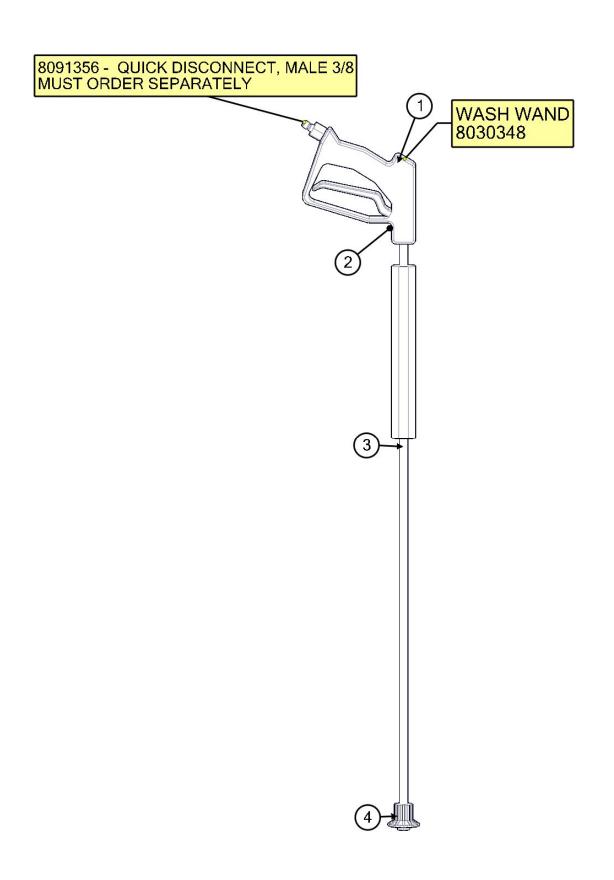
BOM ID	Qty	Name	
1	1	8030391	COUPLING, 3"BANJO M X FM
2	1	8030317	VACUUM TOOL HANDLE 3 INCH
3	1	8030356	CLAMP, 4" PUNCHLOCK P16-S
4	1	8030313	TUBE, VACUUM PVC 3"



BOM ID	Qty	Name	
1	1	8048567	GUN, SPRAY STRAIGHT
2	1	8043765	TUBE, CHROME 1/4NPT 60"LG
3	1	8094498	NOZZLE, ROTATING 055

\* NOT SHOWN

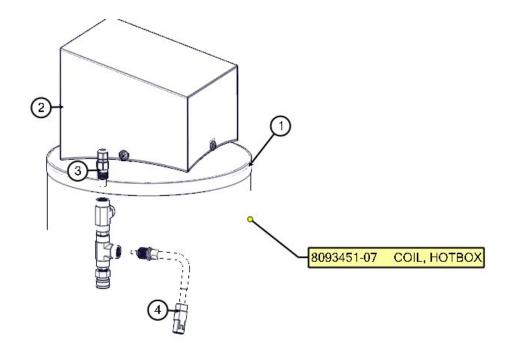
8092777 ROD RETAINING ASSEMBLY, TOOL STORAGE

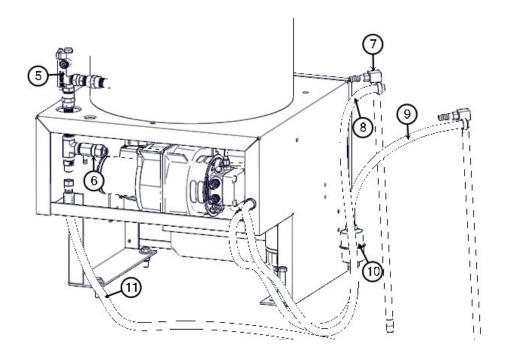


BOM ID	Qty	Name	
1	1	8030348	WAND COMPLETE
2	1	8030928	TRIGGER ASSEMBLY
3	1	8030847	WAND
4	1	8031303	NOZZLE, #10 40DEG

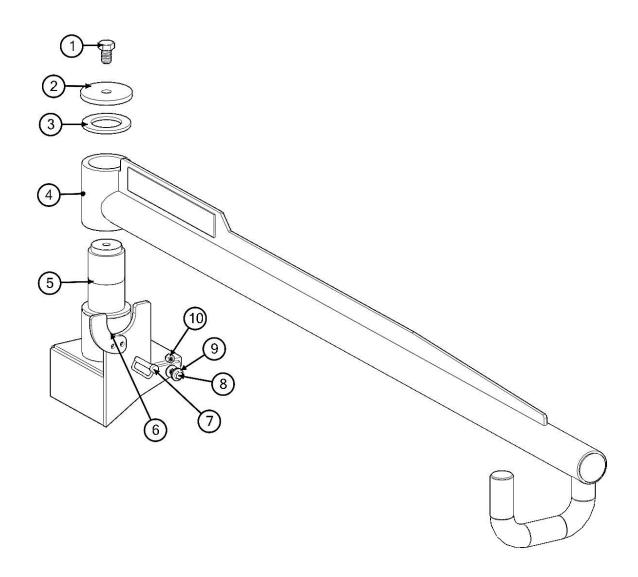
\* NOT SHOWN

1 8092777 ROD RETAINING ASSEMBLY, TOOL STORAGE

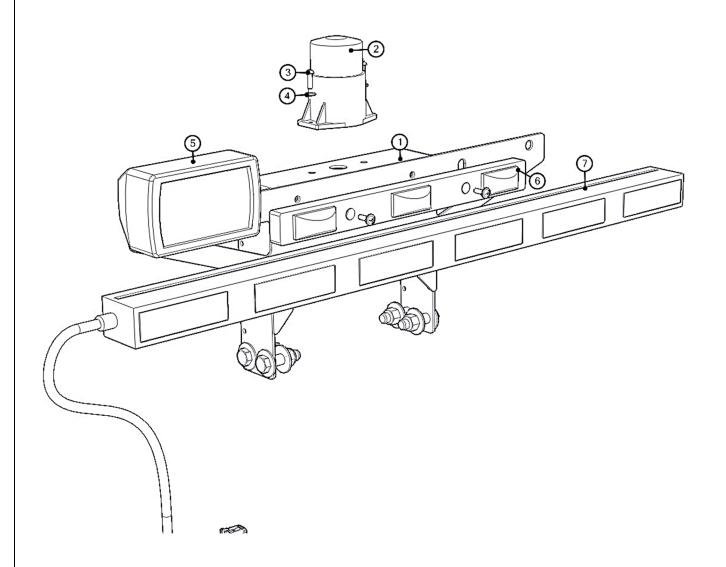




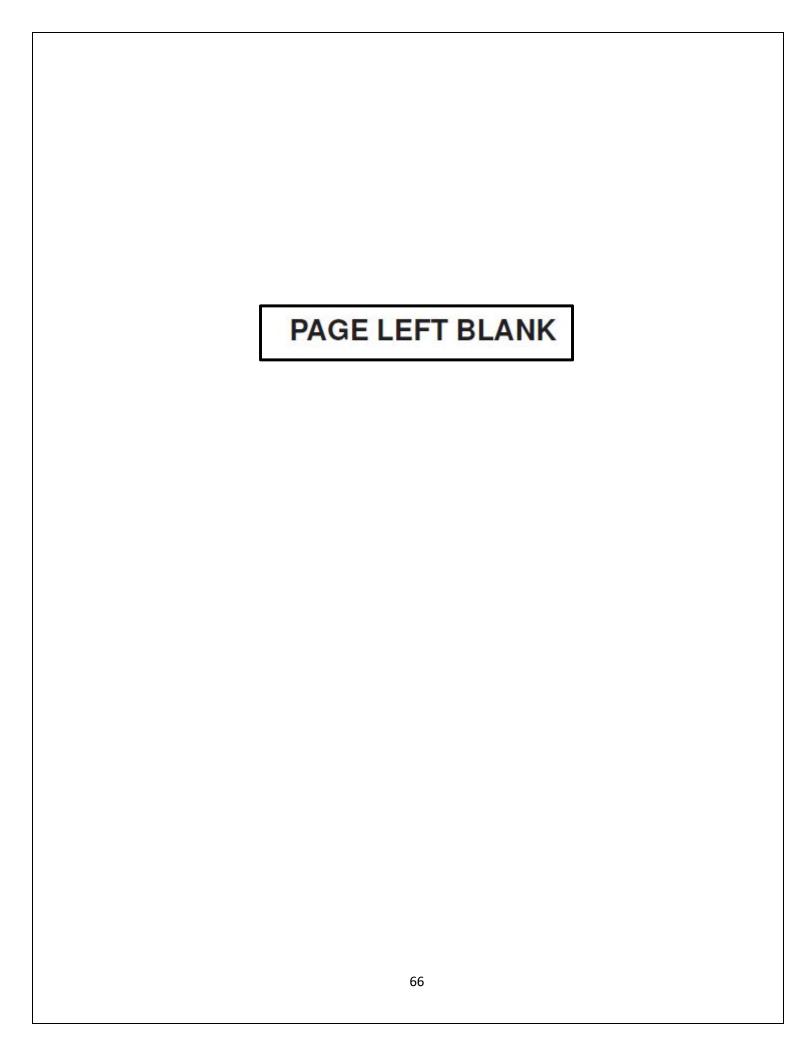
BOM ID	Qty	Description	
1	1	8093451	HOTBOX
2	1	8093451-02	STAINLESS STEEL RAIN CAP
3	1	8093451-03	HIGH LIMIT 110deg C
4	1	8093451-04	INDEX SENSOR
5	1	8093451-05	FLOW SWITCH
6	1	8093451-06	RELIEF VALVE
7	2	8092990	KIT, FUEL PICKUP AND RETURN
8	1	8049946-043.50	HOSE, FUEL 5/16 X 43.50"LG
9	1	8049946-031.00	HOSE, FUEL 5/16 X 31.00"LG
10	1	8030656	FILTER, FUEL INLINE
11	1	8046899	HOSE ASSY VAC 6-143" ST-90



BOM ID	Qty	Name
1	1	U001355 SCREW,HC 3/4-10 X1 .25 ZP G5
2	1	8047085 CAP, TOP
3	2	8047077 FLANGE, WEAR PIVOT ARM MOUNT
4	1	8091158 STRONGARM WELDMENT
5	2	8047076 BEARING, PIVOT TUBE
6	1	8047089 RETAINER FRONT PLATE
7	1	8041213 PIN, SAFETY SNAP
8	1	U000440 SCREW,HC 3/8-16x1-25 ZP G5
9	3	U200060 WASHER, FLAT 3/8 ZP
10	1	U120110 NUT,LOCK .375-16 NY ZP



BOM ID	Qty	Description	1
1	1	8093904	BRACKET, LIGHT DIRECTIONAL (SA)
2	1	8043139	LIGHT, STROBE LED DEUTSCH
3	4	U030809	SCREW, PAN HD PHIL 10-24 X .75
4	8	U200001	WASHER, FLAT #10
5	1	8043138	LIGHT, WORK VAC TRAP DEUTSCH
6	1	8041509	LIGHT, TANK CLEARANCE 3 BAR
7	1	8093914	LIGHT, DIRECTIONAL LED NO CONTROL W/PLUG





### Universal URAI-DSL

### Contents

Information Summary Safety Precautions Operating Limitations Lubrication Operation Troubleshooting
Inspection & Maintenance
Data
Assembly Drawings
Parts List

### Do These Things To Get The Most From Your ROOTS" blower

- Make sure both driving and driven equipment is correctly lubricated before start-up.
   See LUBRICATION.
- In event of trouble during installation or operation, do not attempt repairs of ROOTS furnished equipment. Notify ROOTS, giving all nameplate information plus an outline of operating conditions and a description of the trouble. Unauthorized attempts at equipment repair may void ROOTS warranty.
- Units out of warranty may be repaired or adjusted by the owner. Good inspection and maintenance practices should reduce the needs for repairs.

NOTE: Information in this manual is correct as of the date of publication. ROOTS reserves the right to make design or material changes without notice, and without obligation to make similar changes without notice, and without obligation to make similar changes on equipment of prior manufacture.



#### Lubrication

### For Units with Splash Lubrication on Both Ends

Bearings and oil seals are lubricated by the action of the timing gears or oil slingers which dip into the main oil sumps

causing oil to splash directly on gears and into bearings and seals. A drain port is provided below each bearing to prevent an excessive amount of oil in the bearings. Seals located inboard of the bearings in each headplate effectively retain oil within the sumps. Any small leakage that may occur should the seals wear passes into a cavity in each vented headplate and is drained downward.

Oil sumps on each end of the blower are filled by removing top vent plugs, Item (25), and filling until oil reaches the middle of the oil level sight gauge when the unit is not operating, Item (45 or 53), DO NOT FILL PAST THE MIDDLE OF THE SIGHT GLASS.

Initial filling of the sumps should be accomplished with the blower not operating, in order to obtain the correct oil level. Approximate oil quantities required for blowers of the various models and configurations are listed in Table 3. Use a good grade of industrial type non-detergent, rust inhibiting, anti-foaming oil and of correct viscosity per Table 2. \*ROOTS synthetic oil (Roots P/N 813-106-) is specified and recommended. Roots does not recommend automotive type lubricants, as they are not formulated with the properties mentioned above.

The oil level may rise or fall on the gauge during operation, to an extent depending somewhat on oil temperature and blower speed.

Proper lubrication is usually the most important single consideration in obtaining maximum service life and satisfactory operation from the unit. Unless operating conditions are quite severe, a weekly check of oil level and necessary addition of lubricant should be sufficient. During the first week of operation, check the oil levels in the oil sumps about once a day, and watch for leaks. Replenish as necessary. Thereafter, an occasional check should be sufficient. It is recommended that the oil be changed after initial 100 hours of operation. Frequent oil changing is not necessary unless the blower is operated in a very dusty location.

Normal life expectancy of petroleum based oils is about 2000 hours with an oil temperature of about 180°F (82°C). As the oil temperature increases by increments of 15-18°F (8°C - 10°C), the life is reduced by half. Example: Oil temperatures of 210-216°F (99°C - 102°C) will produce life expectancy of 1/4 or 500 hours. Therefore, it is considered normal to have oil change periods of 500 hours with petroleum based oils.

Normal life expectancy of ROOTS" Synthetic Oil is about 4000 to 8000 hours with an oil temperature of about 180°F (82°C). As the oil temperature increases by increments of 15-18°F (8°C - 10°C), the life is reduced by half. Example: Oil temperatures of 210-216°F (99°C - 102°C) will produce life expectancy of 1/4 or 1000 to 2000 hours.

NOTE: To estimate oil temperature, multiply the discharge temperature of the blower by 0.80. Example: if the discharge air temperature of the blower is 200° F, it is estimated that the oil temperature is 160° F.

"ROOTS™ Synthetic Oil & Grease is superior in performance to petroleum based products. It has high exidation stability, excellent corrosion protection, extremely high tilm strength and low coefficient of friction. Typical oil change intervals are increased 2-3 times over petroleum based lubricants. Also, ROOTS™ Synthetic Oil is 100% compatible with petroleum based oils. Simply drain the oil in the biower and refill the reservoirs with ROOTS™ Synthetic Oil to maintain optimum performance of your ROOTS™ blower.

### Operation

Before operating a blower under power for the first time, recheck the unit and the installation thoroughly to reduce the likelihood of avoidable troubles. Use the following procedure check list as a guide, but consider any other special conditions in the installation.

- Be certain that no bolts, tools, rags, or debris have been left in the blower air chamber or piping.
- If an outdoor intake without filter is used, be sure the opening is located so it cannot pick up dirt and is protected by a strong screen or grille. Use of the temporary protective screen as described under INSTALLATION is strongly recommended.
- Recheck blower leveling, drive alignment and tightness of all mounting bolts if installation is not recent. If belt drive is used, adjust belt tension correctly.
- Turn drive shaft by hand to make sure impellers still rotate without bumping or rubbing at any point.
- Ensure oil levels in the main oil sumps are correct.
- Check lubrication of driver. If it is an electric motor, be sure that power is available and that electrical overload devices are installed and workable.
- Open the manual unloading valve in the discharge air line. If a valve is in the inlet piping, be sure it is open.
- Bump blower a few revolutions with driver to check that direction of rotation agrees with arrow near blower shaft, and that both coast freely to a stop.

After the preceding points are cleared, blower is ready for trial operation under "no-load" conditions. The following procedure is suggested to cover this initial operation test period.

- Start blower, let it accelerate to full speed, then shut off. Listen for knocking sounds, both with power on and as speed slows down.
- After blower comes to a complete stop, repeat above, but let blower run 2 or 3 minutes. Check for noises, such as knocking sounds.
- c. After blower comes to a complete stop, operate blower for about 10 minutes unloaded. Check oil levels. Observe cylinder and headplate surfaces for development of hot spots such as burned paint, indicating impeller rubs. Be aware of any noticeable increase in vibration.

Assuming that all trials have been satisfactory, or that necessary corrections have been made, the blower should now have a final check run of at least one hour under normal operating conditions. After blower is restarted, gradually close the discharge unloading valve to apply working pressure. At this point it is recommended that a pressure gauge or manometer be connected into the discharge line if not already provided, and that thermometers be in both inlet and discharge lines. Readings from these instruments will show whether pressure or temperature ratings of the blower are being exceeded.

During the final run, check operating conditions frequently and observe the oil levels at reasonable intervals. If excessive noise or local heating develops, shut down immediately and determine the cause. If either pressure rise or temperature rise across the blower exceeds the limit specified in this manual, shut down and investigate conditions in the piping system. Refer to the TROUBLESHOOTING CHECKLIST for suggestions on various problems that may appear.

The blower should now be ready for continuous duty operation at full load. During the first few days make periodic checks to determine whether all conditions remain steady, or at least acceptable. This may be particularly important if the blower is supplying air to a process system where conditions can vary. At the first opportunity, stop the blower and clean the temporary inlet protective screen. If no appreciable amount of debris has collected, the screen may be removed. See comments under INSTALLATION. At this same time, verify leveling, coupling alignment or belt tension, and mounting bolt tightness.

Should operating experience prove that blower capacity is a little too high for the actual air requirements, a small excess may be blown off continuously through the manual unloading or vent valve. Never rely on the pressure relief valve as an automatic vent. Such use may cause the discharge pressure to become excessive, and can also result in failure of the valve itself. If blower capacity appears to be too low, refer to the TROUBLESHOOTING CHECKLIST.

### Vibration Assessment Criteria

With measurements taken at the bearing locations on the housings, see chart below for an appropriate assessment guide for rotary lobe blowers rigidly mounted on stiff foundations.

In general, blower vibration levels should be monitored on a regular basis and the vibration trend observed for progressive or sudden change in level. If such a change occurs, the cause should be determined through spectral analysis.

As shown on the chart below, the level of all pass vibration will determine the need to measure discrete frequency vibration levels and the action required.

All Pass Vibration (in/sec)	Discrete Frequency Vibration (in/sec)	Action
0.45 or less	N/R	Acceptable
Greater than 0.45 but 1.0 or less	0.45 or less @ any frequency	Acceptable
	Greater than 0.45 @ any frequency	Investigate
Greater than 1.0	Less than 1.0	Investigate
	Greater than 1.0	Investigate

Trouble	Item	Possible Cause	Remedy
No flow	1	Speed too low	Check by tachometer and compare with published performance
	2	Wrong rotation	Compare actual rotation with Figure 1 Change driver if wrong
	3	Obstruction in piping	Check piping, valves, silencer to assure open flow path
Low capacity	4	Speed too low	See item 1, If belt drive, check for slippage and readjust tension
	5	Excessive pressure rise	Check inlet vacuum and discharge pressure and compare with Published performance
	6	Obstruction in piping	See item 3
	7	Excessive slip	Check inside of casing for worn or eroded surfaces causin excessive clearances
Excessive power	8	Speed too high	Check speed and compare with published performance
	9	Excessive pressure rise	See Item 5
	10	Impeller rubbing	Inspect outside of cylinder for high temperature areas, the check for impeller contact at these points. Correct blower mounting, drive alignment
	11	Scale, sludge, rust or product build up	Clean blower appropriately
Damage to bearings	12	Inadequate lubrication	Check oil sump levels in gear and drive end headplates
or gears	13	Excessive lubrication	Check oil levels. If correct, drain and refill with clean oil or recommended grade
	14	Excessive pressure rise	See Item 5
	15	Coupling misalignment	Check carefully. Realign if questionable
	16	Excessive belt tension	Readjust for correct tension
Vibration	17	Misalignment	See Item 15
	18	Impellers rubbing	See Item 10
	19	Worn bearings/gears	Check gear backlash and condition of bearings, and replact as indicated
	20	Unbalanced or rubbing impeller	Scale or process material may build up on casing and impellers, or inside impellers. Remove build-up to restore original clearances and impeller balance
	21	Driver or blower loose	Tighten mounting bolts securely
	22	Piping resonances	Determine whether standing wave pressure pulsations are present in the piping
	23	Scale/sludge build-ups	Clean out interior of impeller lobes to restore dynamic balance
	24	Casing strain	Re-work piping alignment to remove excess strain
Driver stops, or will not start	25	Impeller stuck	Check for excessive hot spot on headplate or cylinder. See item 10. Look for defective shaft bearing and/or gear teeth
	26	Scale, sludge, rust or product build-up	Clean blower appropriately
Excessive breather	27	Broken seal	Replace seals
Blow-by or excessive oil leakage to vent area	28	Defective O-ring	Replace seals and O-ring
Excessive oil leakage in vent area	29 30	Defective/plugged breather Oil level too high	Replace breather and monitor oil leakage Check sump levels in gear and drive headplates.
	31	Oil type or viscosity incorrect	Check oil to insure it meets recommendations. Drain then fill with clean oil of recommended grade.
	32	Blower running hot	Check blower operating conditions to ensure they are with the operating limitations defined in this manual.

### Inspection & Maintenance: Universal RAI® series blowers

A good program of consistent inspection and maintenance is the most reliable method of minimizing repairs to a blower. A simple record of services and dates will help keep this work on a regular schedule. Basic service needs are:

- Lubrication
- Checking for hot spots
- Checking for increases or changes in vibration and noise
- Recording of operating pressures and temperatures

Above all, a blower must be operated within its specified rating limits, to obtain satisfactory service life.

A newly installed blower should be checked often during the first month of full-time operation. Attention there after may be less frequent assuming satisfactory performance. Lubrication is normally the most important consideration and weekly checks of lubricant levels in the gearbox and bearing reservoirs should be customary. Complete oil change schedules are discussed under **LUBRICATION**.

Driver lubrication practices should be in accordance with the manufacturer's instructions. If direct connected to the blower through a lubricated type coupling, the coupling should be checked and greased each time blower oil is changed. This will help reduce wear and prevent unnecessary vibration. In a belted drive system, check belt tension periodically and inspect for frayed or cracked belts.

In a new, and properly installed, unit there is no contact between the two impellers, or between the impellers and cylinder or headplates. Wear is confined to the bearings (which support and locate the shafts) the oil seals, and the timing gears. All are lubricated and wear should be minimal if clean oil of the correct grade is always used. Seals are subject to deterioration as well as wear, and may require replacement at varying periods.

Shaft bearings are designed for optimum life under average conditions with proper lubrication and are critical to the service life of the blower. Gradual bearing wear may allow a shaft position to change slightly, until rubbing develops between impeller and casing. This will cause spot heating, which can be detected by observing these surfaces. Sudden bearing failure is usually more serious. Since the shaft and impeller are no longer supported and properly located, extensive general damage to the blower casing and gears is likely to occur.

Oil seals should be considered expendable items, to be replaced whenever drainage from the headplate vent cavity becomes excessive or when the blower is disassembled for any reason. Some oil seal leakage may occur since an oil film under the lip is required for proper operation. Periodically leaked oil should be wiped off from surfaces. Minor seal leakage should not be considered as indicating seal replacement.

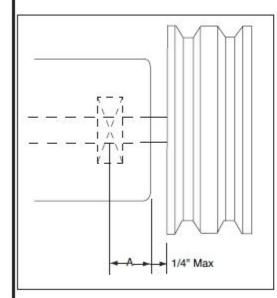
Timing gear wear, when correct lubrication is maintained, should be negligible. Gear teeth are cut to provide the correct amount of backlash, and gears correctly mounted on the shafts will accommodate a normal amount of tooth wear without permitting contact between lobes of the two impellers. However, too high an oil level will cause churning and excessive heating. This is indicated by unusually high temperature at the bottom of the gear housing. Consequent heating of the gears will result in loss of tooth-clearance, backlash and rapid wear of the gear teeth usually will develop. Continuation of this tooth wear will eventually produce impeller contacts (knocking), and from this point serious damage will be unavoidable if blower operation is continued. A similar situation can be produced suddenly by gear tooth fracture, which is usually brought on by sustained overloading or momentary shock loads.

Problems may also develop from causes other than internal parts failure. Operating clearances within a blower are only a few thousandths of an inch. This makes it possible for impeller interference or casing rubs to result from shifts in the blower mounting, or from changes in piping support. If this type of trouble is experienced, and the blower is found to be clean, try removing mounting strains. Loosen blower mounting botts and reset the leveling and drive alignment. Then tighten mounting again, and make sure that all piping meets blower connections accurately and squarely Foreign materials in the blower will also cause trouble, which can only be cured by disconnecting the piping and thoroughly cleaning the blower interior.

A wide range of causes & solutions for operating troubles are covered in the **TROUBLE SHOOTING CHECKLIST**. The remedies suggested should be performed by qualified mechanics with a good background. Major repairs generally are to be considered beyond the scope of maintenance, and should be referred to an authorized Roots distributor.

Warranty failures should not be repaired at all, unless specific approval has been obtained through Roots before starting work. Unauthorized disassembly within the warranty period may void the warranty.

Figure 2 - Allowable Overhung Loads for V-Belt Drives Universal RAI\*/URAI\*-DSL Units



Shaft Load (lb.in) = Belt Pull • (A + 1/4" + 
$$\frac{\text{Sheave Width}}{2}$$
)

Frame	Dimension	Max Allowable	Min Sheave	
Size	"A"	Shafft Load (lb-in)	Diameter	
59	1.13	1,325	6.00	

#### NOTE

Arc of sheave belt contact on the smaller sheave not to be less than 170°

Driver to be installed on the inlet side for vertical units, and on the drive shaft side for horizontal units.

Roots recommends the use of two or more 3V, 5V or 8V matched set or banded belts and shapes

### Specified Lubricants

ROOTS Synthetic Oil: ISO-VG-320 Grade

Part Number

 Quart
 13106004

 Gallon
 13106005

 Case (12 qts)
 13106007

ROOTS Synthetic Oil: ISO-VG-220 Grade

Part Number

 Quart
 13106001

 Gallon
 13106002

 Case (12 qts)
 13106008

ROOTS Synthetic Oil: ISO-VG-150 Grade

Part Number

 Quart
 13106020

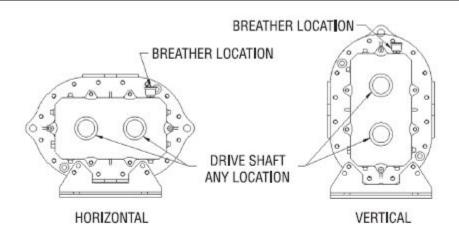
 Gallon
 13106021

 Case (12 qts)
 13106023

 5 Gallon Pall
 13106022

 55 Gallon Drum
 13106025

#### Drive End Breather Orientation for URA-DSL blowers with Oil Lube



#### **URAI DSL BREATHER ORIENTATION**

#### Table 1 - URAI, URAI-DSL Blowers, Maximum Allowable Operating Conditions

Frame	Gear	Speed	Temp. Rise	Delta Pressure	Inlet Vacuum
Size	Diameter (Inch)	RPM	Deg F (Deg C)	PSI (mbar)	INHG (mbar)
59	5	2,850	225 (125)	7 (483)	15 (500)

Table 2 - Recommended Oil Grades

Ambient Temperature °F (°C)	ISO Viscosity No.	
Above 90° (32°)	320	
32° to 90° (0° to 32°)	220	
0° to 32° (-18° to 0°)	150	
Below 0° (-18°)	100	

Ambient temperature is defined as the temperature of the space in which the blower and drive are located.

Table 3 - Approximate Oil Sump Capacities

These capacities are provided to assist in stocking the correct amount of oil. Exact sump capacities may differ slightly. See "Lubrication" section for proper filling instructions.

#### **URAI-DSL Splash Lubricated Blowers**

Frame	Gear End Capacity	Drive End Capaicty
Size	Fl. Oz (Liters)	Fl. Oz. (Liters)
59	27.6 (.82)	14.8 (.44)

Basic Connection & Drive Shaft Information

#### URAI DSL AIR BLOWERS (with Dual Splash Lubrication DSL)

ВОМ#	FRAME SIZE	INLET/DISCHARGE CONN.	SHAFT DIAMETER	BARE WEIGHT
T30361020	59	4" NPT	1.125	209

Universal RAI air blowers include detachable mounting feet which permit vertical or horizontal installation. The units are center timed for rotation in either direction. The bearings on the URAI are grease lubricated on the drive end and splash lubricated on the gear end. The URAI-DSI, is splash lubricated on BOTH ends.

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Viscosity No.
320
220
150
100

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## MODEL MSR-DC OIL BURNER



## MODEL MSR-DC SPECIFICATIONS

#### FIRING CAPACITIES - MODEL MSR-DC

0.50 To 2.75 GALLONS PER HOUR

70,000 TO 385,000 BTU/HR INPUT

#### **FUELS - MODEL MSR-DC**

Use No. 1 or No. 2 Heating Oil (ASTM D-396), Kerosene, Diesel or Jp8 Jet Fuel.

NEVER attempt to use gasoline as a fuel for your burner, as it is more combustible and could result in a serious explosion.

NEVER burn garbage or refuse in the heating unit.

NEVER try to ignite by tossing burning paper or other materials into the heating unit.

NEVER burn waste or crankcase oil in the heating unit.

#### **ELECTRICAL - MODEL MSR-DC**

Power supply 13.0VDC Minimum (at Battery)

Motor 4500 RPM (Std) or 3950 RPM (low RPM), Ball Bearing, Permanent Magnet

Ignition 20,000V/28MA/50VA Secondary, Intermittent Duty Electronic Ignitor

#### DIMENSIONS - MSR-DC (Standard

#### FUEL UNIT

neight	12/2
Width	
Depth	8%"

Suntec and DanFoss brands

#### MOUNTING

Rigid Flange, Adjustable Flange or Base mount.

#### DC OIL BURNER ELECTRICAL CONSIDERATIONS

- \* Not all generators are equally capable. A minimum of 13.0 volts must be provided at the battery.
- \* Generators should be operated at the maximum rated RPM during burner operation.
- \* Good quality batteries are strongly suggested. Batteries with higher Cold Cranking Amp (CCA) rating and deep draw/marine type batteries are recommended.
- \* Use automotive rated battery cabling. All other wiring should be OEM suggested wire type and gauge.
- \* Protect all wiring connection points with dielectric grease.
- \* Ambient temperature impacts electrical requirements. Higher temperatures will result in higher amp draws.
- \* Increased pump operating pressure settings will increase amp draw.
- \* Higher gallon rate nozzles and accompanying wider air band openings will increase amp draw.

#### INSTALLATION OF BURNER

INSTALLATION OF THE BURNER MUST BE DONE BY A QUALIFIED INSTALLER IN ACCORDANCE WITH REGULATIONS OF THE NATION-AL FIRE PROTECTION STANDARD FOR OIL-BURNING EQUIPMENT, NFPA NO. 31, AND IN COMPLETE ACCORDANCE WITH ALL LOCAL CODES AND AUTHORITIES HAVING JURISDICTION.

A QUALIFIED INSTALLER IS THE PERSON WHO IS RESPONSIBLE FOR THE INSTALLATION AND ADJUSTMENT OF THE EQUIPMENT AND WHO IS LICENSED TO INSTALL OIL-BURNING EQUIPMENT IN ACCORDANCE WITH ALL CODES AND ORDINANCES. WARRANTY IS VOIDED IF NOT INSTALLED BY SERVICE PERSON.

THESE INSTRUCTIONS SHOULD BE AFFIXED TO THE BURNER OR ADJACENT TO THE HEATING APPLIANCE.

#### TO THE CLEANING EQUIPMENT OWNER

Since 1970, Wayne has supplied the hot water pressure washer cleaning equipment industry with oil burners. You are obtaining a quality burner unsurpassed in engineering design and product development. It will provide you with many years of efficient trouble-free operation, if properly installed and serviced. Please read this manual carefully.



Wayne warrants its burners specifically to those who have purchased it for resale, including your dealer. If, in any case, you have a problem with your burner, or its installation, you should contact your dealer or the cleaning equipment manufacturer for assistance.

#### **FUEL UNITS AND OIL LINES**

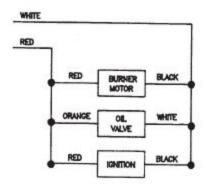
The model MSR-DC oil burner is provided with a single stage 3450 RPM fuel unit with by-pass plug removed for a single pipe installation; the by-pass plug for two pipe (inlet and return) is provided in the plastic bag attached to the fuel unit.

The installation of fuel filters are recommended. Check supply tank for sludge accumulation and leakage. Use only flare fittings on all piping and connections since compression fittings will eventually leak. With the system running, the vacuum should not exceed 12" mercury for single stage units. For ease of servicing, install a shut off valve near burner.

#### WIRING

The MSR-DC oil burner must be electrically wired and GROUNDED in accordance with local codes or in their absence, with National Electric Code ANS/NFPA No. 70-latest edition.

This oil burner requires a 12-volt DC power source. Use copper wire only not lighter than #12 awg. If a fused disconnect is used, it should be fused for a minimum of 20 amps. Refer to the wiring diagram in this manual or cleaning equipment manufacturers manual making sure the burner and controls are wired correctly.



#### AIR SUPPLY FOR COMBUSTION

The oil burner fired hot water pressure washer shall not be installed in an area where facilities for normal air circulation or infiltration are so limited as to interfere with ready attainment of all necessary for proper combustion and venting. When the heating appliance is installed in a confined space, two permanent openings shall be provided. One near the top of the enclosure and one near the bottom. Each opening shall have a free area of not less than one square inch per 1000 BTU per hour (140 square inch per gph) of the total input rating of all the appliances in the enclosure. When the building is of unusually tight construction, has an air ventilating system, exhaust fans, process dryer or vented fireplaces, it is recommended that combustion air be supplied through two permanent openings. The openings shall communicate directly, or by means of ducts, with outdoors or such spaces (attic or crawl) that freely communicate with outdoors. Avoid linty environments. For additional venting information, refer to the regulations of the National Fire Protection Standard for oil burning equipment, ANSI/NFPA No. 31-latest edition, or the cleaning equipment manufacturers recommendations.

#### NOZZLE AND AIR HANDLING PARTS SELECTION

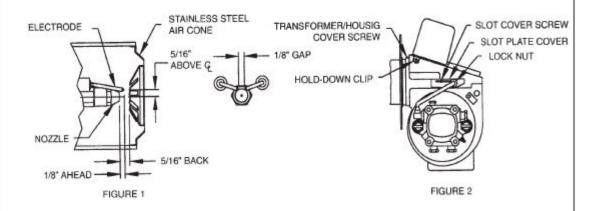
IMPORTANT: Thorough combustion and performance testing was done to establish the correct nozzle type and air handling parts on this MSR-DC oil burner. Under circumstance attempt to replace or alter the oil burner nozzle type or air handling parts (stainless steel flamelock, air cone, electrode support style static disc, blower wheel or slotted air circumstances attempt to fire the MSR-DC oil burner under its 1.00 gph minimum or over its 2.75 gph maximum input rating.



To remove the gun assembly once the burner has been installed on the appliance remove the ignitor/housing cover screw and loosen the screw in the hold-down clip and swing open the transformer. Next, disconnect the copper oil line where it attaches with a 7/16" hex flare nut on the gun assembly oil line adapter fitting and remove the 9/16" hex gun assembly locknut. Now, grasp the rear of the gun assembly where the oil line fitting adapter exits through the housing and pull oil line fitting adapter to the right out of the housing slot and slot plate cover. Gently lift, do not force, the rear of the gun assembly, rotating the oil line fitting adapter up a 45 degrees pulling the entire gun assembly out of the air tube and housing opening.

The recommended can be installed into the nozzle body adapter using the following steps. With the gun assembly removed from the burner, loosen the electrode clamp screw and rotate the electrodes up, out of the way of a nozzle wrench. Now, thread the nozzle into the adapter finger tight then tighten securely with a nozzle wrench. **CAUTION:** Do not over tighten. Next, reposition the electrodes as shown in figure 1. At this time reinstall the gun assembly into the burner using the preceding steps in reverse order. Position the nozzle face forward to a 5/16" setting behind the stainless steel air cone as shown in figure 1. Once in the required position, replace the 9/16" hex lock nut and the 7/16" hex flare nut on the gun assembly and tighten the slot cover screw (see figure 2).

**CAUTION:** Close the ignitor and observe for spring contact with the brass buss bars, taking care not to pinch the ignition transformer lead wires between the housing and cover plate. Reinstall the ignitor/housing cover screw and tighten the screw in the hold down clip (see figure 2).



## STARTING PROCEDURE

#### PREPARATION STEPS

- Calibrate and check operation of combustion analysis equipment, CO<sub>2</sub> (carbon dioxide) or O<sub>2</sub> (oxygen) analyzer, smoke pump tester, fuel gas thermometer and oil pressure/vacuum gages. Follow the manufacture recommendation for proper calibration and check out.
- 2. Install oil pressure gage and vacuum gage in the outlet pressure and inlet ports of the fuel unit.
- 3. Set oil burner slotted air band shutter 25% open.

#### STARTING BURNER

- 1. Turn off the main power switch to the burner and appliance.
- 2. Be sure main fuel tank is filled and all manual valves are open between the fuel tank and the burner.
- 3. Turn on the main power switch to the burner and appliance.
- Prime the fuel pump per its manufacturers recommendations, check fuel unit for 100 psi delivery pressure and check system vacuum (see paragraphs under Fuel Units and Oil Lines).

CAUTION: Do not run fuel unit dry for more than five minutes or damage to the fuel unit could result.

- Once the fuel unit is primed (no signs of air in oil bleeder port discharge), close the bleed port. Burner will ignite.
- When flame is established, make a temporary air adjustment to the slotted air band for a visually clean combustion smoke observed from the appliance vent. Allow the appliance to warm up approximately five minutes or until warm the water temperature reaches that recommended by the cleaning equipment manufacture.
- Adjust the slotted air band shutter until a #1 to #2 smoke (Shell Bacharach scale) is obtained at the appliance vent
- Check CO<sub>2</sub> (carbon dioxide) and/or O<sub>2</sub> (oxygen) percentages and smoke in the flue gas at the appliance vent. In general, CO<sub>2</sub> readings should be in the 10% to 12% range and O<sub>2</sub> readings in the 7.4% to 4.7% range.
- Once the desired combustion results are attained, securely tighten slotted air band screw and check that controls on the appliance are adjusted per the cleaning equipment manufactures instruction sheets. Remove oil pressure and vacuum gages from the fuel unit and reinstall pipe plug fittings.
- Check burner lighting with hot chamber, then allow burner and appliance to sufficiently cool. Then check burner lighting with a cold chamber.

SUGGESTION: all new installations should be reinspected after one or two weeks of normal operation.

#### MAINTENANCE

OILING MOTOR - The MSR\_DC oil burner is provided with a ball bearing shaft motor. Ball-bearing motors do not require oiling under normal service conditions.

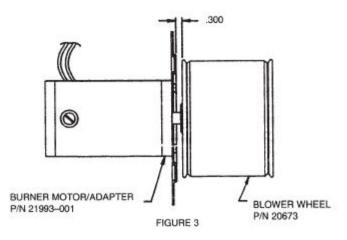
FILTER – The oil filter cartridge should be replaced, or sediment cleaned, periodically so the fuel oil will not become contaminated and plug up the fuel pump and nozzle of oil burner.

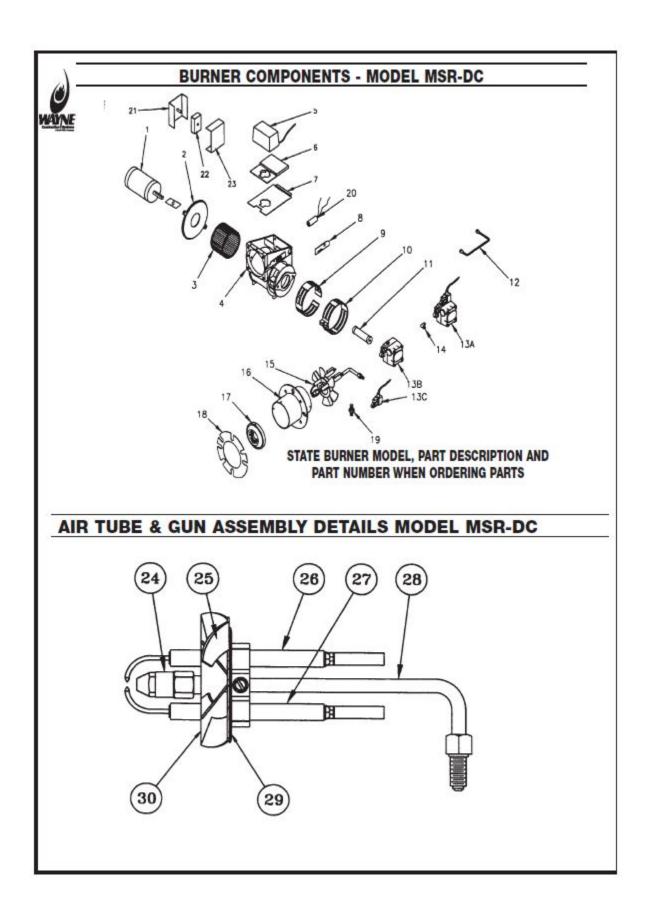
NOZZLE - The nozzle should be changed at least once each year or twice a year if the cleaning equipment is used daily through the year and should poor combustion occur. Replace with the proper nozzle.

COMPONENTS – If for any reason any of the burner parts have to be replaced, always use parts recommended by the manufacturer. Specify part numbers and description when ordering. (IN ALL COMMUNICATIONS STATE BURNER MODEL AND SIX DIGIT SPECIFICATION NUMBER).

**ELECTRODE SETTINGS** – This is very important for reliable ignition of the oil; check these once a year in accordance with the instructions provided in this manual. Replace electrodes if worn excessively or if porcelain insulator is oil soaked or cracked (See Figure 1).

FAN & BLOWER HOUSING – This must be kept clean, free of dirt and lint; open transformer to check fan blades from above. Be sure the electric power is off on burner when the transformer is opened up for this inspection. Should the blower wheel be removed for replacement or cleaning, reinstall as shown in figure 3.



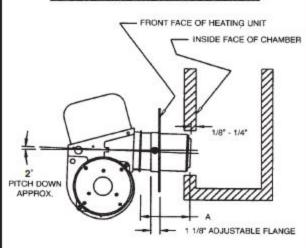


1 1 8046448-1 MOTOR 1/8 LOW AMP 2 1 8046448-2 MOTOR ADAPTER 3 1 8046448-3 BLOWER WHEEL 3 1/2 X 4 1/4 4 1 8046448-5 IGNITOR - 12VDC 6 1 8046448-6 MOUNTING BASE 7 1 8046448-7 HOUSING COVER 8 1 8046448-8 SLOT COVER PLATE 9 1 8046448-9 INNER AIR BAND 10 1 8046448-10 OUTER AIR BAND 11 1 8046448-11 COUPLING 12 1 8046448-12 OIL LINE ASSEMBLY 6" 1	ITEM	QTY	PART#	DESCRIPTION
2 1 8046448-2 MOTOR ADAPTER 3 1 8046448-3 BLOWER WHEEL 3 1/2 X 4 1/4 4 1 8046448-5 IGNITOR - 12VDC 6 1 8046448-6 MOUNTING BASE 7 1 8046448-7 HOUSING COVER 8 1 8046448-8 SLOT COVER PLATE 9 1 8046448-9 INNER AIR BAND 10 1 8046448-10 OUTER AIR BAND 11 1 8046448-11 COUPLING 12 1 8046448-12 OIL LINE ASSEMBLY 6" 1	1	1	8046448-1	MOTOR 1/8 STANDARD
3         1         8046448-3         BLOWER WHEEL 3 1/2 X 4 1/4           4         1         8046448-4         BURNER HOUSING           5         1         8046448-5         IGNITOR - 12VDC           6         1         8046448-6         MOUNTING BASE           7         1         8046448-7         HOUSING COVER           8         1         8046448-8         SLOT COVER PLATE           9         1         8046448-9         INNER AIR BAND           10         1         8046448-10         OUTERAIR BAND           11         1         8046448-11         COUPLING           12         1         8046448-12         OIL LINE ASSEMBLY 6"           12         1         8046448-13A         FUEL UNIT: SUNTEC COMBO           1         1         8046448-13B         FUEL UNIT: SUNTEC           1         8046448-13C         FUEL SOLENOID           14         1         8046448-15         GUN ASSEMBLY           16         1         8046448-15         GUN ASSEMBLY           16         1         8046448-16         AIR TUBE/FLANGEASM           17         1         8046448-18         GASKET           19         1				MOTOR 1/8 LOW AMP
4         1         8046448-4         BURNER HOUSING           5         1         8046448-5         IGNITOR - 12VDC           6         1         8046448-6         MOUNTING BASE           7         1         8046448-7         HOUSING COVER           8         1         8046448-8         SLOT COVER PLATE           9         1         8046448-9         INNER AIR BAND           10         1         8046448-10         OUTERAIR BAND           11         1         8046448-11         COUPLING           12         1         8046448-12         OIL LINE ASSEMBLY 6°           12         1         8046448-13A         FUEL UNIT: SUNTEC COMBO           1         1         8046448-13B         FUEL UNIT: SUNTEC           1         8046448-13C         FUEL SOLENOID           14         1         8046448-13C         FUEL SOLENOID           14         1         8046448-15         GUN ASSEMBLY           16         1         8046448-16         AIR TUBE/FLANGEASM           17         1         8046448-17         AIR CONE - #3A           18         1         8046448-19         CONNECTOR (USE WITH 13B, 13C)           20 <td< td=""><td></td><td></td><td>77.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7</td><td></td></td<>			77.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7	
5         1         8046448-5         IGNITOR - 12VDC           6         1         8046448-6         MOUNTING BASE           7         1         8046448-7         HOUSING COVER           8         1         8046448-8         SLOT COVER PLATE           9         1         8046448-9         INNER AIR BAND           10         1         8046448-10         OUTER AIR BAND           11         1         8046448-11         COUPLING           12         1         8046448-12         OIL LINE ASSEMBLY 6"           12         1         8046448-13A         FUEL UNIT: SUNTEC COMBO           1         8046448-13B         FUEL UNIT: SUNTEC           1         8046448-13B         FUEL SOLENOID           14         1         8046448-15         GUN ASSEMBLY           16         1         8046448-15         GUN ASSEMBLY           16         1         8046448-16         AIR TUBE/FLANGEASM           17         1         8046448-17         AIR CONE - #3A           18         1         8046448-18         GASKET           19         1         8046448-20         CAD CELL           20         1         8046448-21 <td< td=""><td></td><td></td><td>8046448-3</td><td>BLOWER WHEEL 3 1/2 X 4 1/4</td></td<>			8046448-3	BLOWER WHEEL 3 1/2 X 4 1/4
6         1         8046448-6         MOUNTING BASE           7         1         8046448-7         HOUSING COVER           8         1         8046448-8         SLOT COVER PLATE           9         1         8046448-9         INNER AIR BAND           10         1         8046448-10         OUTER AIR BAND           11         1         8046448-11         COUPLING           12         1         8046448-12         OIL LINE ASSEMBLY 6"           1         OIL LINE ASSEMBLY 8"         OIL LINE ASSEMBLY 8"           13         1         8046448-13A         FUEL UNIT: SUNTEC COMBO           1         8046448-13B         FUEL UNIT: SUNTEC           1         8046448-13C         FUEL SOLENOID           14         1         8046448-15         GUN ASSEMBLY           16         1         8046448-15         GUN ASSEMBLY           16         1         8046448-16         AIR TUBE/FLANGEASM           17         1         8046448-17         AIR CONE - #3A           18         1         8046448-18         GASKET           19         1         8046448-20         CAD CELL           20         1         8046448-21         CO			8046448-4	BURNER HOUSING
7         1         8046448-7         HOUSING COVER           8         1         8046448-8         SLOT COVER PLATE           9         1         8046448-9         INNER AIR BAND           10         1         8046448-10         OUTERAIR BAND           11         1         8046448-11         COUPLING           12         1         8046448-12         OIL LINE ASSEMBLY 6"           13         1         8046448-13A         FUEL UNIT: SUNTEC COMBO           1         1         8046448-13B         FUEL UNIT: SUNTEC           1         1         8046448-13C         FUEL SOLENOID           14         1         8046448-13C         FUEL SOLENOID           14         1         8046448-14         ELBOW (USE WITH 13A)           15         1         8046448-15         GUN ASSEMBLY           16         1         8046448-16         AIR TUBE/FLANGEASM           17         1         8046448-17         AIR CONE - #3A           18         1         8046448-18         GASKET           19         1         8046448-20         CAD CELL           20         1         8046448-21         CONTROL BOX           21			8046448-5	IGNITOR - 12VDC
8         1         8046448-8         SLOT COVER PLATE           9         1         8046448-9         INNER AIR BAND           10         1         8046448-10         OUTERAIR BAND           11         1         8046448-11         COUPLING           12         1         8046448-12         OIL LINE ASSEMBLY 6"           1         0IL LINE ASSEMBLY 8"           13         1         8046448-13A         FUEL UNIT: SUNTEC COMBO           1         8046448-13B         FUEL UNIT: SUNTEC           1         8046448-13C         FUEL SOLENOID           14         1         8046448-13C         FUEL SOLENOID           14         1         8046448-14         ELBOW (USE WITH 13A)           15         1         8046448-15         GUN ASSEMBLY           16         1         8046448-16         AIR TUBE/FLANGEASM           17         1         8046448-16         AIR TUBE/FLANGEASM           18         1         8046448-18         GASKET           19         1         8046448-18         GASKET           20         1         8046448-20         CAD CELL           21         1         8046448-21         CONTROL BOX			8046448-6	MOUNTING BASE
9 1 8046448-9 INNER AIR BAND 10 1 8046448-10 OUTERAIR BAND 11 1 8046448-11 COUPLING 12 1 8046448-12 OIL LINE ASSEMBLY 6"	7.1		8046448-7	
10 1 8046448-10 OUTERAIR BAND 11 1 8046448-11 COUPLING 12 1 8046448-12 OIL LINE ASSEMBLY 6"	8		8046448-8	SLOT COVER PLATE
11         1         8046448-11         COUPLING           12         1         8046448-12         OIL LINE ASSEMBLY 6"           1         0IL LINE ASSEMBLY 8"           13         1         8046448-13A         FUEL UNIT: SUNTEC COMBO           1         8046448-13B         FUEL UNIT: SUNTEC           1         8046448-13C         FUEL SOLENOID           14         1         8046448-14         ELBOW (USE WITH 13A)           15         1         8046448-15         GUN ASSEMBLY           16         1         8046448-16         AIR TUBE/FLANGE ASM           17         1         8046448-17         AIR CONE - #3A           18         1         8046448-18         GASKET           19         1         8046448-19         CONNECTOR (USE WITH 13B, 13C)           20         1         8046448-20         CAD CELL           21         1         8046448-21         CONTROL BOX           22         1         8046448-23         COVER, CONTROL BOX           24         1         8046448-24         ADAPTOR, NOZZLE SUPPORT           25         1         8046448-26         ELECTRODE (RH)           27         1         8046448-28 <t< td=""><td>9</td><td></td><td>8046448-9</td><td>INNER AIR BAND</td></t<>	9		8046448-9	INNER AIR BAND
12	10		8046448-10	OUTER AIR BAND
1 8046448-13A FUELUNIT: SUNTEC COMBO 1 8046448-13B FUELUNIT: SUNTEC 1 8046448-13C FUEL SOLENOID 14 1 8046448-14 ELBOW (USE WITH 13A) 15 1 8046448-15 GUN ASSEMBLY 16 1 8046448-16 AIR TUBE/FLANGE ASM 17 1 8046448-17 AIR CONE - #3A 1 AIR CONE - #4A 18 1 8046448-19 CONNECTOR (USE WITH 13B, 13C) 20 1 8046448-20 CAD CELL 21 1 8046448-21 CONTROL BOX 22 1 8046448-23 COVER, CONTROL BOX 24 1 8046448-24 ADAPTOR, NOZZLE SUPPORT 25 1 8046448-26 ELECTRODE SUPPORT ASM 26 1 8046448-27 ELECTRODE (LH) 27 1 8046448-28 OIL PIPE/FITTING 29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-29 DISC/BAFFLE PLATE			8046448-11	
13	12	1	8046448-12	
1 8046448-13B FUEL UNIT: SUNTEC 1 8046448-13C FUEL SOLENOID 14 1 8046448-14 ELBOW (USE WITH 13A) 15 1 8046448-15 GUN ASSEMBLY 16 1 8046448-16 AIR TUBE/FLANGE ASM 17 1 8046448-17 AIR CONE - #3A 1 AIR CONE - #4A 18 1 8046448-18 GASKET 19 1 8046448-19 CONNECTOR (USE WITH 13B, 13C) 20 1 8046448-20 CAD CELL 21 1 8046448-21 CONTROL BOX 22 1 8046448-22 TIMER, DROP OUT 23 1 8046448-23 COVER, CONTROL BOX 24 1 8046448-24 ADAPTOR, NOZZLE SUPPORT 25 1 8046448-25 ELECTRODE SUPPORT ASM 26 1 8046448-26 ELECTRODE (RH) 27 1 8046448-27 ELECTRODE (LH) 28 1 8046448-28 OIL PIPE/FITTING 29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-30 CAST STABILIZER		-		OIL LINE ASSEMBLY 8"
1 8046448-13C FUEL SOLENOID 14 1 8046448-14 ELBOW (USE WITH 13A) 15 1 8046448-15 GUN ASSEMBLY 16 1 8046448-16 AIR TUBE/FLANGE ASM 17 1 8046448-17 AIR CONE - #3A 1 AIR CONE - #4A 18 1 8046448-19 CONNECTOR (USE WITH 13B, 13C) 20 1 8046448-20 CAD CELL 21 1 8046448-21 CONTROL BOX 22 1 8046448-22 TIMER, DROP OUT 23 1 8046448-23 COVER, CONTROL BOX 24 1 8046448-24 ADAPTOR, NOZZLE SUPPORT 25 1 8046448-25 ELECTRODE SUPPORT ASM 26 1 8046448-26 ELECTRODE (RH) 27 1 8046448-27 ELECTRODE (LH) 28 1 8046448-28 OIL PIPE/FITTING 29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-30 CAST STABILIZER	13		8046448-13A	FUEL UNIT: SUNTEC COMBO
14         1         8046448-14         ELBOW (USE WITH 13A)           15         1         8046448-15         GUN ASSEMBLY           16         1         8046448-16         AIR TUBE/FLANGEASM           17         1         8046448-17         AIR CONE - #3A           18         1         8046448-18         GASKET           19         1         8046448-19         CONNECTOR (USE WITH 13B, 13C)           20         1         8046448-20         CAD CELL           21         1         8046448-21         CONTROL BOX           22         1         8046448-22         TIMER, DROP OUT           23         1         8046448-23         COVER, CONTROL BOX           24         1         8046448-24         ADAPTOR, NOZZLE SUPPORT           25         1         8046448-25         ELECTRODE SUPPORT ASM           26         1         8046448-26         ELECTRODE (RH)           27         1         8046448-28         OIL PIPE/FITTING           29         1         8046448-29         DISC/BAFFLE PLATE           30         1         8046448-30         CAST STABILIZER		1	8046448-13B	FUELUNIT: SUNTEC
15			8046448-13C	
16 1 8046448-16 AIR TUBE/FLANGEASM 17 1 8046448-17 AIR CONE - #3A 18 1 8046448-18 GASKET 19 1 8046448-19 CONNECTOR (USE WITH 13B, 13C) 20 1 8046448-20 CAD CELL 21 1 8046448-21 CONTROL BOX 22 1 8046448-22 TIMER, DROP OUT 23 1 8046448-23 COVER, CONTROL BOX 24 1 8046448-24 ADAPTOR, NOZZLE SUPPORT 25 1 8046448-25 ELECTRODE SUPPORT ASM 26 1 8046448-26 ELECTRODE (RH) 27 1 8046448-27 ELECTRODE (LH) 28 1 8046448-28 OIL PIPE/FITTING 29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-30 CAST STABILIZER	14		8046448-14	ELBOW (USE WITH 13A)
17	15			GUN ASSEMBLY
1 8046448-18 GASKET 19 1 8046448-19 CONNECTOR (USE WITH 13B, 13C) 20 1 8046448-20 CAD CELL 21 1 8046448-21 CONTROL BOX 22 1 8046448-22 TIMER, DROP OUT 23 1 8046448-23 COVER, CONTROL BOX 24 1 8046448-24 ADAPTOR, NOZZLE SUPPORT 25 1 8046448-25 ELECTRODE SUPPORT ASM 26 1 8046448-26 ELECTRODE (RH) 27 1 8046448-27 ELECTRODE (LH) 28 1 8046448-28 OIL PIPE/FITTING 29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-30 CAST STABILIZER	16		8046448-16	AIRTUBE/FLANGEASM
18         1         8046448-18         GASKET           19         1         8046448-19         CONNECTOR (USE WITH 13B, 13C)           20         1         8046448-20         CAD CELL           21         1         8046448-21         CONTROL BOX           22         1         8046448-22         TIMER, DROP OUT           23         1         8046448-23         COVER, CONTROL BOX           24         1         8046448-24         ADAPTOR, NOZZLE SUPPORT           25         1         8046448-25         ELECTRODE SUPPORT ASM           26         1         8046448-26         ELECTRODE (RH)           27         1         8046448-27         ELECTRODE (LH)           28         1         8046448-28         OIL PIPE/FITTING           29         1         8046448-29         DISC/BAFFLE PLATE           30         1         8046448-30         CAST STABILIZER	17		8046448-17	AIR CONE - #3A
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20         1         8046448-20         CAD CELL           21         1         8046448-21         CONTROL BOX           22         1         8046448-22         TIMER, DROP OUT           23         1         8046448-23         COVER, CONTROL BOX           24         1         8046448-24         ADAPTOR, NOZZLE SUPPORT           25         1         8046448-25         ELECTRODE SUPPORT ASM           26         1         8046448-26         ELECTRODE (RH)           27         1         8046448-27         ELECTRODE (LH)           28         1         8046448-28         OIL PIPE/FITTING           29         1         8046448-29         DISC/BAFFLE PLATE           30         1         8046448-30         CAST STABILIZER	18		8046448-18	
21       1       8046448-21       CONTROL BOX         22       1       8046448-22       TIMER, DROP OUT         23       1       8046448-23       COVER, CONTROL BOX         24       1       8046448-24       ADAPTOR, NOZZLE SUPPORT         25       1       8046448-25       ELECTRODE SUPPORT ASM         26       1       8046448-26       ELECTRODE (RH)         27       1       8046448-27       ELECTRODE (LH)         28       1       8046448-28       OIL PIPE/FITTING         29       1       8046448-29       DISC/BAFFLE PLATE         30       1       8046448-30       CAST STABILIZER	19		8046448-19	CONNECTOR (USE WITH 13B, 13C)
22       1       8046448-22       TIMER, DROP OUT         23       1       8046448-23       COVER, CONTROL BOX         24       1       8046448-24       ADAPTOR, NOZZLE SUPPORT         25       1       8046448-25       ELECTRODE SUPPORT ASM         26       1       8046448-26       ELECTRODE (RH)         27       1       8046448-27       ELECTRODE (LH)         28       1       8046448-28       OIL PIPE/FITTING         29       1       8046448-29       DISC/BAFFLE PLATE         30       1       8046448-30       CAST STABILIZER	20		8046448-20	CADCELL
23 1 8046448-23 COVER, CONTROL BOX 24 1 8046448-24 ADAPTOR, NOZZLE SUPPORT 25 1 8046448-25 ELECTRODE SUPPORT ASM 26 1 8046448-26 ELECTRODE (RH) 27 1 8046448-27 ELECTRODE (LH) 28 1 8046448-28 OIL PIPE/FITTING 29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-30 CAST STABILIZER	21		8046448-21	CONTROL BOX
24     1     8046448-24     ADAPTOR, NOZZLE SUPPORT       25     1     8046448-25     ELECTRODE SUPPORT ASM       26     1     8046448-26     ELECTRODE (RH)       27     1     8046448-27     ELECTRODE (LH)       28     1     8046448-28     OIL PIPE/FITTING       29     1     8046448-29     DISC/BAFFLE PLATE       30     1     8046448-30     CAST STABILIZER	22		8046448-22	TIMER, DROP OUT
25 1 8046448-25 ELECTRODE SUPPORT ASM 26 1 8046448-26 ELECTRODE (RH) 27 1 8046448-27 ELECTRODE (LH) 28 1 8046448-28 OIL PIPE/FITTING 29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-30 CAST STABILIZER	23			
26 1 8046448-26 ELECTRODE (RH) 27 1 8046448-27 ELECTRODE (LH) 28 1 8046448-28 OIL PIPE/FITTING 29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-30 CAST STABILIZER			8046448-24	ADAPTOR, NOZZLE SUPPORT
27 1 8046448-27 ELECTRODE (LH) 28 1 8046448-28 OIL PIPE/FITTING 29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-30 CAST STABILIZER	25		8046448-25	ELECTRODE SUPPORT ASM
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29 1 8046448-29 DISC/BAFFLE PLATE 30 1 8046448-30 CAST STABILIZER	27		8046448-27	ELECTRODE (LH)
30 1 8046448-30 CAST STABILIZER	28		8046448-28	OIL PIPE/FITTING
			8046448-29	DISC/BAFFLE PLATE
1 STAMPED STABILIZER	30	1	8046448-30	CAST STABILIZER
		1		STAMPEDSTABILIZER

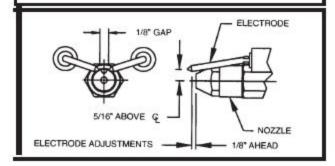
#### Suggested Combustion Chamber Dimensions Conversion or Upgrading Chamber Dimensions (In Inches)

Firing Rate	Square		Round	Height	Floor
(G.H.P)	Width	Length			Nozzle
0.85	8.5	8.5	8.5	8.5	8.5
1.00	9	9	10%	12%	5-6
1.25	10	10	11%	12%	5-6
1.35	10%	10%	11%	12%	5-6
1.50	11	11	12%	13	5-6
1.65	11%	111/2	13	13%	5-6
2.00	12%	12%	14%	13%	6-7
2.50	14%	14%	16	14	7-8
3.00	151/2	15%	17%	15	7-8

#### TO DETERMINE THE AIR TUBE LENGTH



THE AIR TUBE LENGTH (DIM A) IS THE DISTANCE FROM THE FRONT OF AIR TUBE RETAINER FLANGE TO FACE OF AIR CONE. NOTE ADJUSTABLE FLANGE WIDTH.



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# LIMITED WARRANTIES FOR OIL AND GAS BURNERS, MADE BY WAYNE AND USED IN RESIDENTIAL INSTALLATIONS

WAYNE COMBUSTION SYSTEMS ("WAYNE") warrants to those who purchase its Oil Burner Models for resale or for incorporation into a product of resale, that its burner is free from defects in material and workmanship under normal use and service for thirty-six (36) months from the date of manufacture. ALL GAS BURNERS manufactured by "WAYNE" will be similarly warranted for eighteen(18) months from date of manufacture except where original manufacture offers a greater warranty. (Reference #6 below) THESE LIMITED WARRANTIES DO NOT APPLY UNLESS THE BURNER COVERED BY IT IS PROPERLY INSTALLED BY A QUALIFIED, COMPETENT TECHNICIAN, WHO IS LICENSED WHERE STATE AND/OR LOCAL CODES PREVAIL, AND WHO IS EXPERIENCED IN MAKING SUCH INSTALLATIONS, IN ACCORDANCE WITH NEPA #31 OF THE NATIONAL FIRE PROTECTION ASSOCIATION AND IN ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES.

Any IN-WARRANTY burner component which is defective in material or workmanship will be either repaired or replaced as follows:

- Fuel units, motors, transformers, gas valves, and controls should be returned to an authorized service station or
  distributor of WAYNE for determination of applicability of this LIMITED WARRANTY as to either repair or
  replacement, where said service station or distributor is reasonably available in the customer's locality. The
  manufacturers of burner components regularly publish and distribute listings showing the locations of their network
  of service stations. Where such local service is NOT available for the burner components described above or other
  burner parts are involved, these items should be returned, freight prepaid, to WAYNE Service Department, 801
  Glasgow Ave, Fort Wayne, Indiana 46803.
- Burners and/or component(s) determined to be covered under this LIMITED WARRANTY by WAYNE shall be repaired or replaced at WAYNE's sole option.
- WAYNE is not responsible for any labor cost for the removal and replacement of said burner or burner components and equipment associated therewith.
- A burner so repaired will then carry the LIMITED WARRANTY equal to the unexpired portion of the original burner LIMITED WARRANTY.
- If inspection by WAYNE does NOT disclose any defect covered by this LIMITED WARRANTY, the burner or burner component(s) will be either repaired or replaced at the expense of the customer and WAYNE's regular charges will apply.
- If the original manufacturer of a burner component offers a warranty greater than either of our LIMITED WARRANTIES described above, then this portion will be added to our LIMITED WARRANTY.

This LIMITED WARRANTY does **NOT** cover products which have been damaged as the result of accident, abuse, misuse, neglect, improper installations, improper maintenance or failure to operate in accordance with WAYNE's written instructions.

These LIMITED WARRANTIES do not extend to anyone except the first purchaser at retail and only when the burner is in the original installation site.

IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE SHALL BE LIMITED TO THE DURATION OF THE LIMITED EXPRESS WARRANTIES CONTAINED HEREIN. WAYNE EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY NATURE FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY.

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you. Also, some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. WAYNE neither assumes or authorizes any person to assume for WAYNE any other liability or obligation in connection with the sale of these products. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

MSR & MSR-DC 22019-003 Rev. C 08/15/00



## WARRANTY RETURN GOODS POLICY

#### LIMITED WARRANTY

The Manufacturer warrants its products to be free from defects in material and workmanship for a period of twelve months from the date of shipment from the factory. The Manufacturer shall not be responsible for any damage resulting to or caused by its products by reason of installation, improper storage, unauthorized service, alteration of the products, neglect or abuse, or use of the product in a manner inconsistent with its design. The warranty does not extend to any component parts not manufactured by Manufacturer; however, Manufacturer's warranty herein shall not limit any warranties made by manufacturers of component parts which extend to Buyer.

Claims for defects in material and workmanship shall be made in writing to Manufacturer within ten days of discovery of defect. Manufacturer may either send a service representative or have the product returned to its factory at Buyer's expense for inspection. Upon notification of defect, Manufacturer will issue a return goods authorization number must accompany the product returned. If judged by the Manufacturer to be defective in material or workmanship, the product will be replaced or repaired at the option of the Manufacturer, free from all charges except authorized transportation. Buyer shall be responsible for all maintenance services consisting of lubrication and cleaning of equipment, replacing expandable parts, making minor adjustments, and performing operating checks, all in accordance with procedures outlined in Manufacturer's maintenance literature.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND NO REPRESENTATIONS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, (INCLUDING BUT NOT LIMITED TO A WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), ARE MADE BY THE MANUFACTURER IN CONNECTION WITH THE MANUFACTURE OR SALE OF ITS PRODUCTS. NO EMPLOYEE, DISTRIBUTOR, OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY ON BEHALF OF MANUFACTURER.

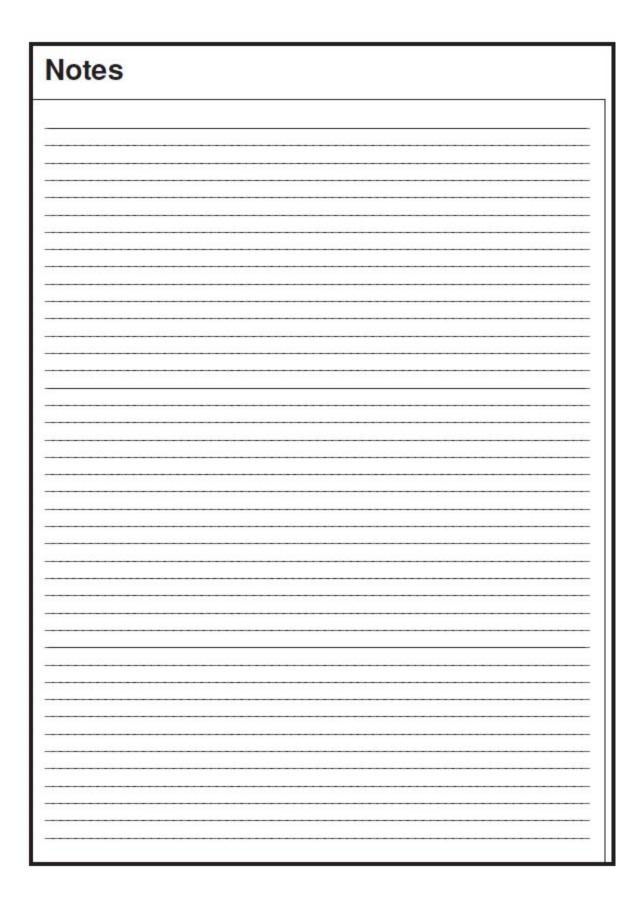
THE REMEDIES OF BUYER SET FORTH HEREIN ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER REMEDIES. THE LIABILITY OF MANUFACTURER WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, OR

OTHERWISE SHALL NOT EXTEND BEYOND ITS OBLIGATION TO REPAIR OR REPLACE, AT ITS OPTION ANY PRODUCT OR PART FOUND BY MANUFACTURER TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP. MANUFACTURER SHALL NOT BE LIABLE FOR COST OF INSTALLATION AND/OR REMOVAL OR BE RESPONSIBLE FOR DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE.

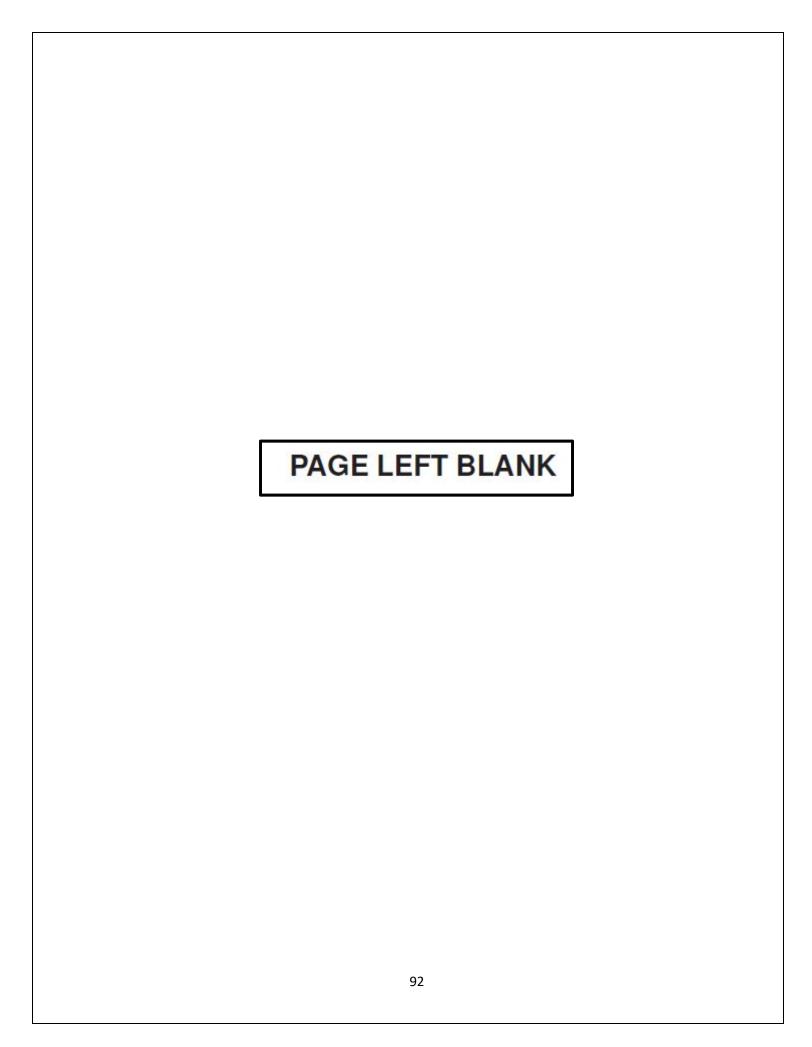
#### GENERAL RETURNS OF MERCHANDISE

- 1. All returns must be pre-authorized
  - A. Please call our parts department for an RGA number
  - B. Please include RGA number on the outside of box
  - C. Include any required paper work or special instructions
  - Items returned without an RGA number will not be accepted
- All returns are subject to a 20% restock charge.
- Special items are non-returnable
  - A. Non-stock parts
  - B. Custom parts
  - C. If you are unsure about a parts status when ordering, ask your McLaughlin representative if the item fits on of the above conditions.
- 4. Items must be returned within thirty days of original order date.
- Items not returned within 30 days from the date of RGA is issued will not be accepted.
- 6. The item(s) must be in new condition. Used item(s) are not returnable.

# **Maintenance Record** DATE SERVICE PERFORMED BY







# CALIFORNIA Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

# CALIFORNIA Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.