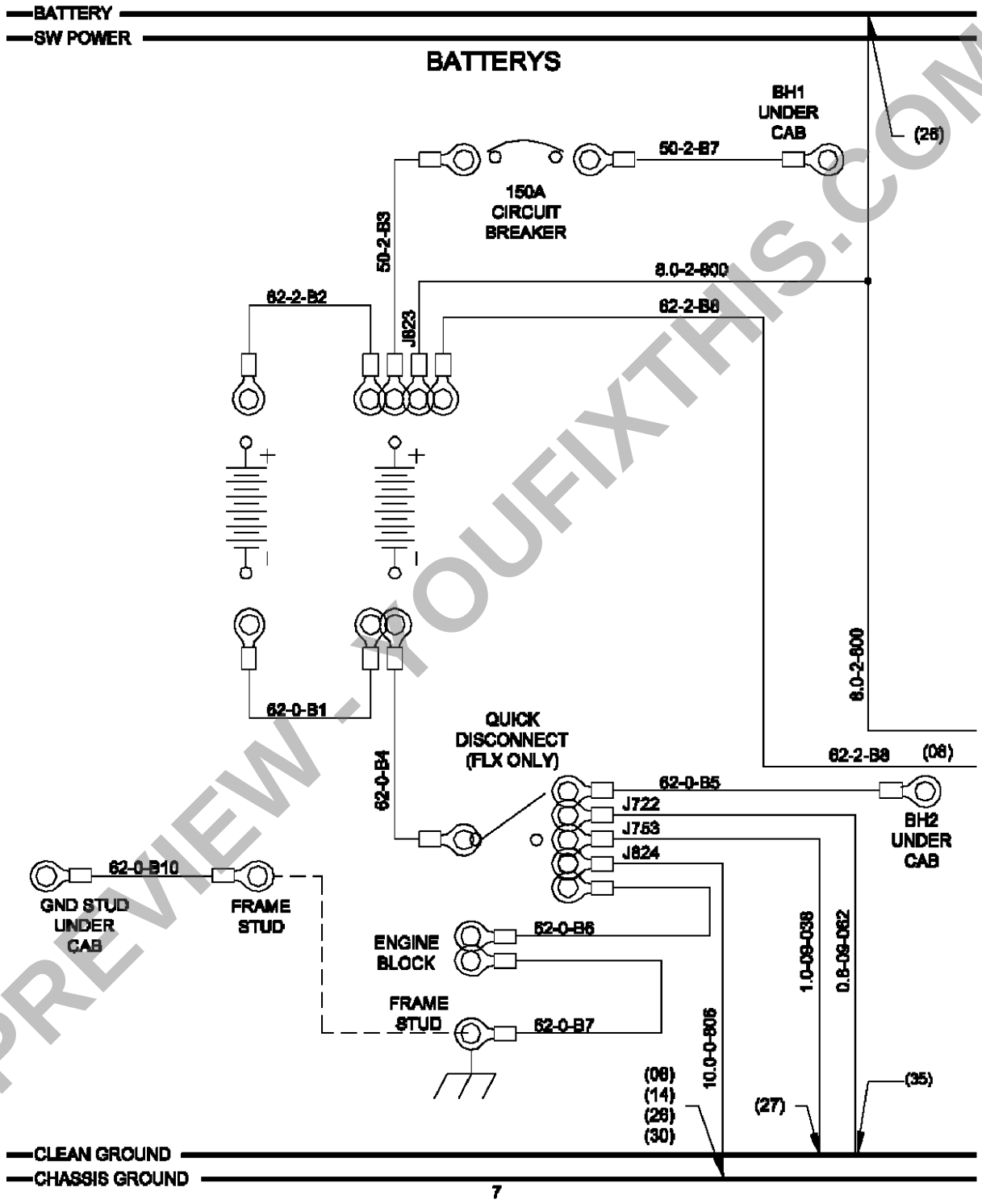
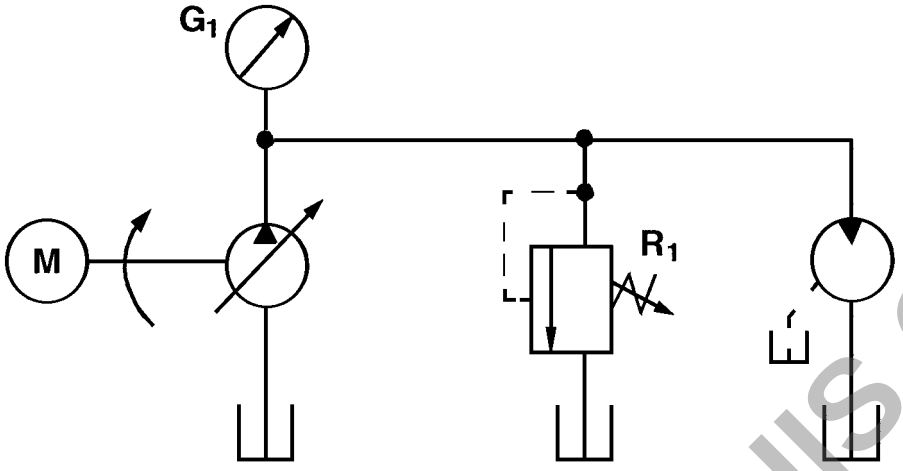


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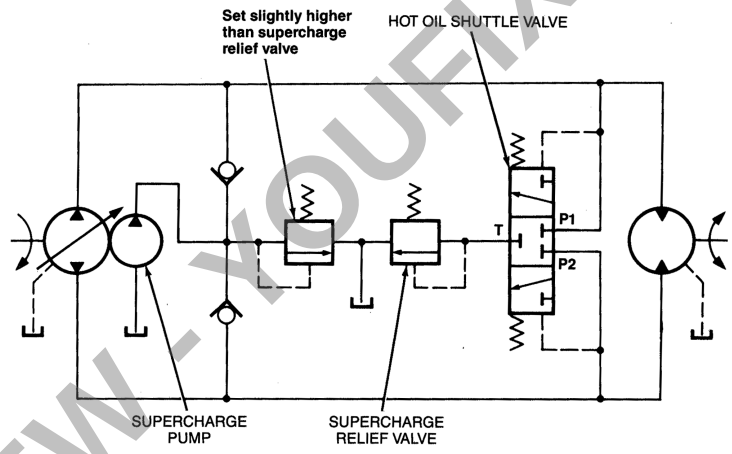
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HYDRAULIC SCHEMATICS AND DIAGNOSTICS

Open Loop



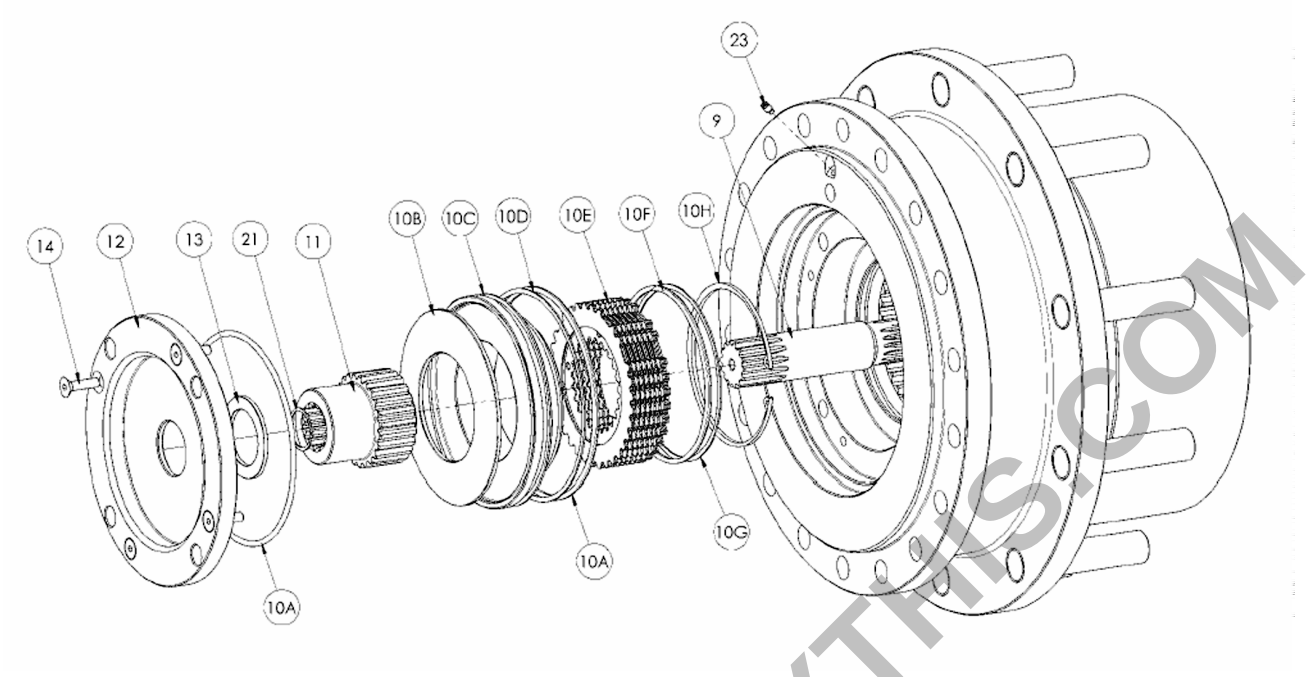
Closed Loop



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C014 MAIN DISASSEMBLY



1. Perform Roll Check, Leak Check and Brake Check if applicable prior to disassembling the unit.
2. Drain oil from unit. Note the condition and the volume of the oil.
3. Place the Torque-Hub on a bench with the cover side down.
4. Remove the mounting adapter (12) by removing the 4 Countersunk Bolts (14).

NOTE: *The spring force from the brake will force the Mounting Adapter (12) out. Gradually loosen each bolt so that the Mounting Adapter remains aligned during the disassembly.*

5. Remove Thrust Washer (13) from the Mounting Adapter (12) counterbore or from the end of the Coupling (11).
6. Remove the O'Ring (10A) from the mounting Adapter.
7. Remove the Coupling (11).
8. Remove Retaining Ring (21) from the Coupling (11) bore.
9. Remove the Belleville Spring (10B) from the back of the Piston. (10C).
10. Slowly and carefully add light air pressure to the brake port of the Spindle (1A) until the Brake Piston (10C) is forced out of the spindle bore. Remove the Piston.
11. Remove the O'Ring (10A) and Back-up Ring (10D) from the Piston (10C) groove.
12. Remove the Brake Friction Plate Stack (10E) from the Spindle (1A).

NOTE: *Try to keep the friction plates in the same order by removing them all together and then banding them together until re-assembly.*

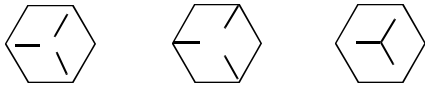
13. Remove the Brake Retaining Ring (10H), O'Ring (10G) and Backup Ring (10F) from the Spindle (1A) bore.
14. Remove the Input Shaft (9).
15. Turn over the Torque Hub so that the Cover is up.

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TORQUE SPECIFICATIONS - DECIMAL HARDWARE

Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphites, Molydisulfide greases, or other extreme pressure lubricants are used.

Grade 5 Bolts, Nuts and Studs		
		
Size	Pound-Inches	Newton Metres
1/4 inch	108 to 132	12 to 15
5/16 inch	204 to 252	23 to 28
3/8 inch	420 to 504	48 to 57
Size	Pound-Feet	Newton Metres
7/16 inch	54 to 64	73 to 87
1/2 inch	80 to 96	109 to 130
9/16 inch	110 to 132	149 to 179
5/8 inch	150 to 180	203 to 244
3/4 inch	270 to 324	366 to 439
7/8 inch	400 to 480	542 to 651
1.0 inch	580 to 696	787 to 944
1-1/8 inch	800 to 880	1085 to 1193
1-1/4 inch	1120 to 1240	1519 to 1681
1-3/8 inch	1460 to 1680	1989 to 2278
1-1/2 inch	1940 to 2200	2631 to 2983

Grade 8 Bolts, Nuts and Studs		
		
Size	Pound-Inches	Newton Metres
1/4 inch	144 to 180	16 to 20
5/16 inch	288 to 348	33 to 39
3/8 inch	540 to 648	61 to 73
Size	Pound-Feet	Newton Metres
7/16 inch	70 to 84	95 to 114
1/2 inch	110 to 132	149 to 179
9/16 inch	160 to 192	217 to 260
5/8 inch	220 to 264	298 to 358
3/4 inch	380 to 456	515 to 618
7/8 inch	600 to 720	814 to 976
1.0 inch	900 to 1080	1220 to 1465
1-1/8 inch	1280 to 1440	1736 to 1953
1-1/4 inch	1820 to 2000	2468 to 2712
1-3/8 inch	2380 to 2720	3227 to 3688
1-1/2 inch	3160 to 3560	4285 to 4827

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ICU Error Codes

Displaying And Clearing Codes

1. Hold DIAG key for 5 seconds to display error codes.
2. Press PROG key.
3. Errors for ICU will be displayed. See ICU error code list below for code identification. Increase and decrease keys will page through 10 error codes.
4. To clear (erase) error codes, press and hold the increase and decrease keys simultaneously for 5 seconds.
5. Press the PROG.
6. Use the Increase or Decrease key to scroll to EXIT.
7. Press PROG key to return to the Hourmeter display.

ICU ERROR CODES	MEANING
1015	Seat switch may be stuck closed.
3020	GOV engine speed data is “ERROR” or “NOT AVAILABLE” state from GOV.
5010	Engine oil pressure data is “ERROR” or “NOT AVAILABLE” state from GOV.
5011	Engine oil pressure sensor voltage out of range low.
10031	Loss of valid engine hours.
10032	Loss of vehicle configuration information. (vehicle model, controller configuration)
10033	Loss of customer configuration information. (tire radius, units settings)
10034	Loss of valid fuel table.
10035	Loss of valid radar calibration data.
11011	Fuel level sensor voltage out of range low.
12031	EDC off line.
12061	STCU off line.
12071	TRCU off line.
12081	PMU off line.
12091	GOV off line.
13010	Engine coolant temperature data is “ERROR” or “NOT AVAILABLE” state from GOV.
13011	Engine coolant temperature sensor voltage out of range low.
13012	Engine coolant temperature sensor voltage out of range high.
13040	Air to air intake temperature is “ERROR” or “NOT AVAILABLE” state from GOV.
13051	Air to air intake temperature sensor voltage out of range low.
13052	Air to air intake temperature sensor voltage out of range low

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RAVEN SCS 460

Common Conditions And Solutions

No Display Lights With Power On.

1. Check fuse on back of Console.
2. Check battery connections.
3. Check operation of POWER ON/OFF switch.
4. Return Console to your Dealer to replace Processor Board Assembly.

All Keyboard Lights On At Same Time.

1. Return Console to your dealer to replace Face Plate Sub-assembly.

A Digit Cannot Be Entered Via Keyboard.

1. Return Console to your Dealer to replace Face Plate Sub-assembly.

An Indicator Light On A Key Will Not Illuminate.

1. Return Console to your Dealer to replace Face Plate Sub-assembly and/or Processor Board Assembly.

Console Displays Flashing “Cal” Whenever Vehicle Engine Is Started.

1. Check battery voltage and battery connections.

Console Displays Flashing “Cal” Whenever Master Switch Is Turned On Or Off.

1. Check battery voltage and battery connections.

Console Displays Flashing “Cal” Whenever Speed Is Changed.

1. Check battery voltage and battery connections.

“Time” Function Is Inaccurate Or Drifting.

1. Return Console to Dealer to replace Processor Board Assembly.

One Display Digit Has One Or More Missing Segments.

1. Return Console to Dealer to replace LCD Display Board Assembly.

Speed Display “0”.

1. Check Speed Sensor cable connector and plug on back of Console for loose pins.
2. Clean pins and sockets on Speed Sensor cable connectors.
3. If no extension cable is used, replace Speed Sensor Switch Assembly.
4. If Speed Sensor Extension Cable is used, See page 4003-6

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Hydraulic System Specifications

Hydrostatic Pump Charge Pressure . . . . . 360-380 psig
Pressure checked at 1300 engine rpm.
Gauge pressure reading equal to charge relief setting plus case pressure.

Pressure Limiter Setting / System Pressure . . . . . .6450 psig
Pressure checked at 2200 engine rpm.
Gauge pressure reading equal to pressure limiter setting (6090 psi) plus charge pressure.

Wheel Motor Flush Flow (per motor) . . . . . 3 gpm
Check at 2200 engine rpm.
Nulling spools and caps required to perform test.

Wheel Motor Shift Point . . . . . 130-135 psi

Pressure Compensated Pump Setting . . . . . .2750 psi

Pressure Compensated Pump Flow (Max) . . . . . 15.2 gpm
Check at 2200 engine rpm.

Auxiliary Gear Pump Flow (Max) . . . . . 18.4 gpm
Check at 2200 engine rpm.

Product Pump Circuit Relief Valve Setting. . . . . .2500 psi
Check at 2200 engine rpm.

Remote Pressure Limiter Relief Valve Setting. . . . . .1700 psi

Inner Boom Fold Relief Valve Settings
Port A . . . . . .2950 psi
Port B . . . . . .1500 psi

Boom Level Relief Valve Setting . . . . . .200 psi

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SAFETY

WARNING: *This safety alert symbol indicates important safety messages in this manual. When you see this symbol, carefully read the message that follows and be alert to the possibility of personal injury or death.*

To prevent injury, always follow the Warning, Caution and Danger notes in this section and throughout the manual.

Before servicing a machine, park the machine on hard level ground. Turn off the engine, apply the parking brake and remove the key from the key switch. Put blocks in front of and behind either the front or rear wheels.

WARNING: *Read the Operators Manual to familiarize yourself with the correct control functions.*

WARNING: *Operate the machine and equipment controls from the seat position only. Any other method could result in serious injury.*

WARNING: *This is a one person machine, no riders allowed.*

WARNING: *Before starting engine, study Operators Manual safety messages. Read all safety signs on machine. Clear the area of other persons. Learn and practice safe use of controls before operating. It is your responsibility to understand and follow manufacturers instructions on machine operation, service, and to observe pertinent laws and regulations. Operator and Parts Manuals may be obtained from your equipment dealer.*

WARNING: *If you wear clothing that is too loose or do not use the correct safety equipment for your job, you can be injured. Always wear clothing that will not catch on objects. Extra safety equipment that can be required includes hard hat, safety shoes, ear protection, eye or face protection, heavy gloves and reflective clothing.*

WARNING: *When working in the area of the fan belt with the engine running, avoid loose clothing if possible, and use extreme caution.*

WARNING: *When doing checks and tests on the equipment hydraulics, follow the procedures as they are written. DO NOT change the procedure.*

WARNING: *When putting the hydraulic cylinders on this machine through the necessary cycles to check operation or to remove air from a circuit, make sure all people are out of the way.*

WARNING: *Always wear heat protective gloves to prevent burning your hands when handling heated parts.*

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SPX4410 TROUBLESHOOTING MANUAL

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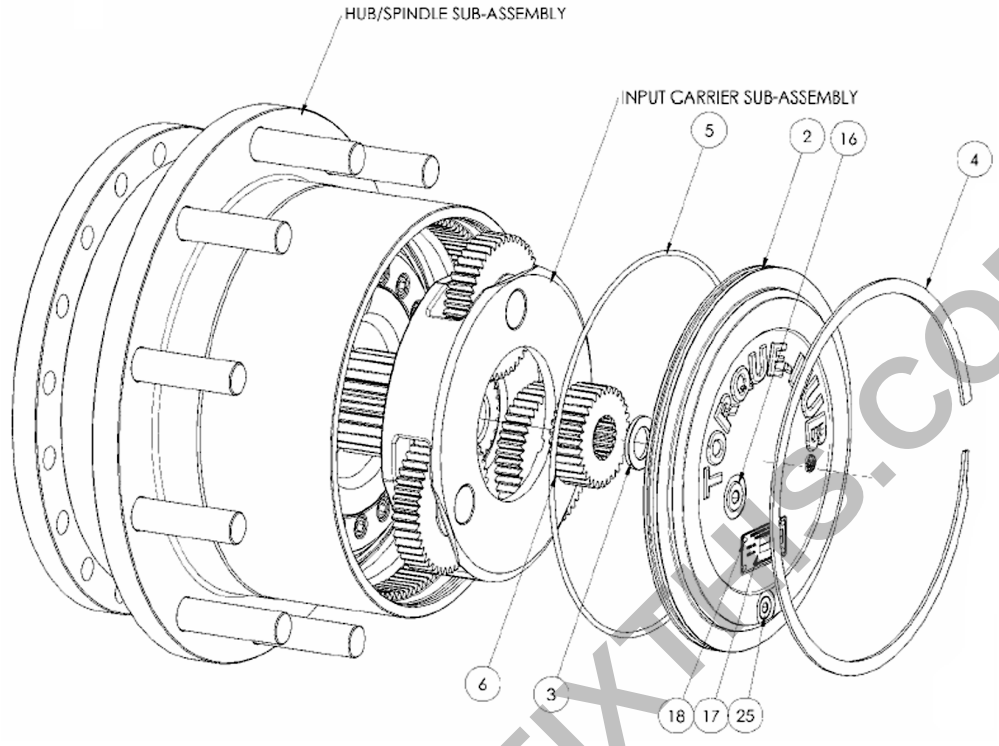
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C014 Main Disassembly (Cont'd)



16. Remove the Cover Retaining Ring (4) by prying the open end of the retaining ring out of the groove with a screwdriver, then grasp the loose end with pliers and pull the retaining ring completely out of the groove.
17. Remove the Cover (2) from the unit. This can be done by pulling the cover with a tool that attaches to the drain plug holes or by using a long metal rod to tap it out from the other side.

NOTE: *Be careful not to lose the Cover Thrust Washer (3) when removing the cover.*

18. Remove the O'Ring (5) from the cover.
19. Remove the Input Sun Gear (6).
20. Remove the Input Carrier sub-assembly.

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QUICK REFERENCE TO TROUBLESHOOTING

The following chapter covers common problems that might occur on your vehicle with probable causes and suggested corrective action.

The troubleshooting listings are theoretical, systematic searches for malfunctions in your vehicle. If all symptoms are known and properly diagnosed, it is relatively easy to determine what component is malfunctioning and what corrective action is required to restore your machine to proper operation.

Your sprayer consists of five major components not including optional equipment:

1. Engine
2. Hydraulic System
3. Electrical System
4. Liquid Spray System
5. Controller

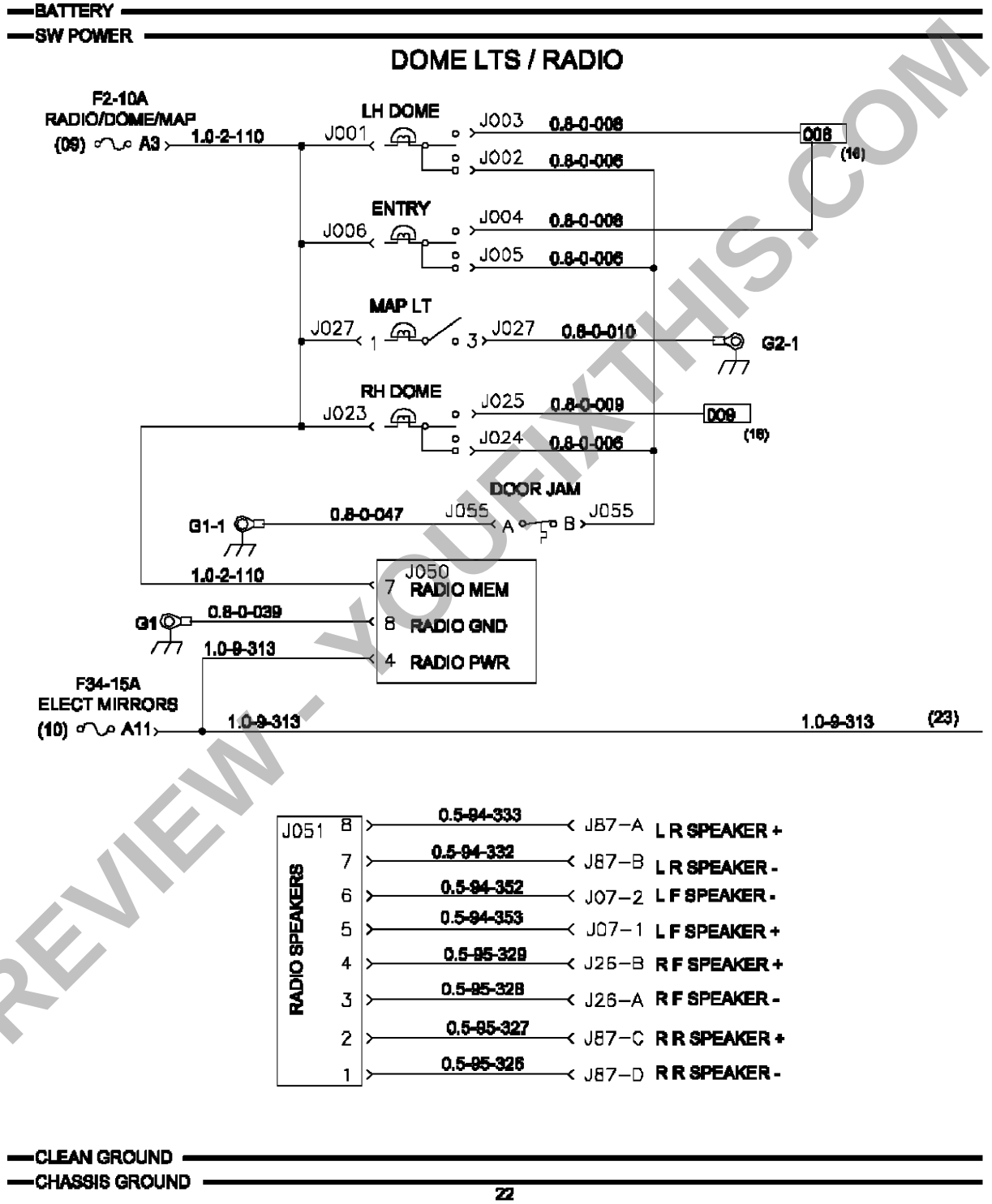
The sprayer has the following self-diagnostic equipment installed to simplify troubleshooting of the machine.

- Fuel gauge
- Engine coolant temperature gauge
- Engine oil pressure gauge
- Air cleaner restriction indicator and light
- Hydraulic oil tank level sight gauge and light
- Hydraulic oil temperature gauge and light
- Hydraulic system charge pressure light
- Hydraulic oil return filter light

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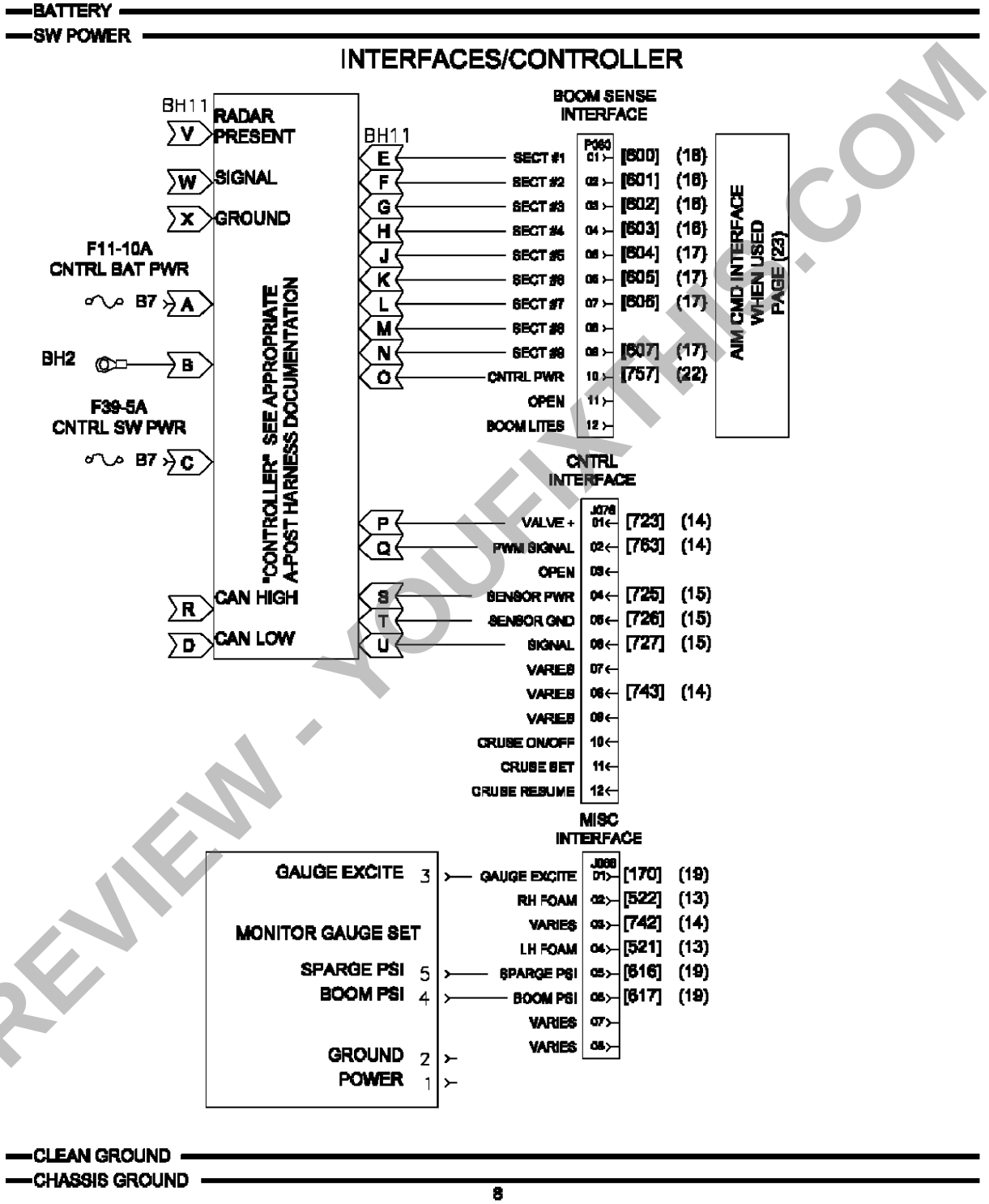
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Dome Lights / Radio



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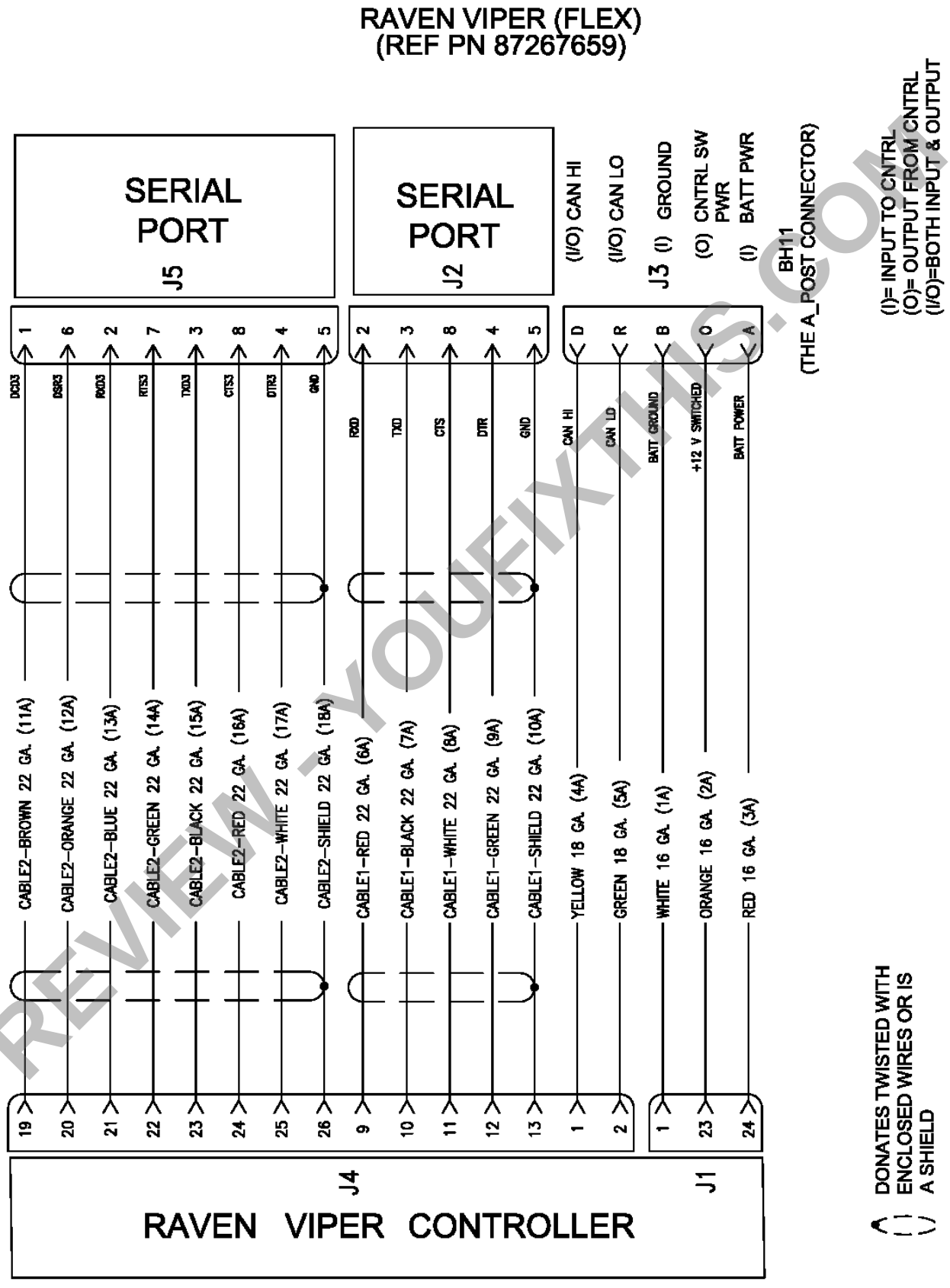
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RAVEN VIPER (Flex-Air)



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Pump Cavitation

FAULT	CAUSE	REMEDY
Pump Cavitation	Suction strainer clogged or to small.	Clean or renew.
	Bore of suction line to small.	Fit larger bore pipes.
	Too many bends in suction line.	Modify pipe layout.
	Suction line to long.	Reduce length or fit larger bore pipes.
	Fluid to cold.	Heat fluid to recommended temperature.
	Unsuitable fluid	Replace with correct fluid.
	Air breather blocked or to small.	Clean or replace element.
	Local restriction in suction line e.g. partly closed valve or hose collapse.	Open or modify valves, renew hoses, etc.
	Failure of boost pump.	Repair or replace boost pump.
	Pump running too fast.	Reduce to recommended speed.
	Pump mounted too high above oil level.	Modify pump installation.

Aeration of Fluid

FAULT	CAUSE	REMEDY
Aeration of Fluid	Reservoir fluid level low.	Fill to correct level.
	Return line in reservoir above fluid level.	Extend return pipe below fluid level.
	Unsuitable fluid.	Replace with correct fluid.
	Pump shaft seal worn or damaged.	Renew seals.
	Sit-in line joints allowing entry of air.	Renew or tighten joints.
	Porous suction hose.	Re-bleed system.
	Improper bleeding.	Re-bleed system.

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A/C System Troubleshooting Chart (Cont'd)

System Pressure	Symptom	Problem	Corrective Action
Low Side Pressure " Normal to slightly high" High Side Pressure "Normal to slightly high"	No or poor cooling in cab. Heater hoses to cab are very warm -warmer than ambient temperature.	Heater valve leaking (not working correctly)	Shut off coolant flow to heater and check difference in air out of evaporator. Inspect and repair/replace heater valve.
	Suction line warm Air out of evaporator only a little cool.	Air or moisture in system.	Check for and repair leaks. Evacuate, change receiver/dryer and recharge system.
	Compressor clutch excessively/ erratically engaging. Poor cooling in cab. ATC code 05 - Temperature potentiometer fault. ATC code 10 - Evaporator temperature sensor fault.	Temperature switch malfunction. Evaporator temperature sensor malfunction.	Test switch, replace if necessary. Test evaporator sensor, replace if necessary. Check for an electrical problem (bad ground etc.).
Low Side Pressure "High" High Side Pressure "High"	Warm air out evaporator/louvers. Condensation on suction lines. Heavy condensation on evaporator outlet.	Expansion Valve Malfunction.	Test expansion valve, replace if necessary.
	Engine is overheating. Liquid line is very hot. Poor cooling in cab. Cool to warm air out of evaporator. High pressure switch activates ATC code 01, standard A/C switch blinks rapidly - 13 times in a ten second period.	Poor air flow across condenser (condenser plugged with debris).	Check for loose fan belt. Possible defective viscous fan drive Check for restriction in air flow through condenser (plugged or bent fins, clean grille screens.
	Fair to poor cooling in cab. Cool to warm air out of evaporator. Liquid line is very hot. Compressor knocking. High pressure switch activates ATC code 01, standard A/C switch blinks rapidly - 13 times in a ten second period.	System overreached	Recover and recharge system with 1.9 kg (4.2lbs) of 134a.
	Suction line warm. Evaporator air out a little cool.	Air in system	Check for leaks and repair. Evacuate, change receiver/dryer and recharge system.
Low Side Pressure "Low" High Side Pressure "Normal"	Evaporator outlet cold or iced up. Continuous compressor operation. Low pressure switch activating ATC code 02, standard on/off switch blinks slowly - 7 times in a ten second period. ATC code 05 - Temperature potentiometer fault. ATC code 10 - Evaporator temperature sensor fault.	Temperature potentiometer malfunction. Evaporator temperature malfunction. Low evaporator air flow.	Check location of evaporator temperature sensor. Test potentiometer - replace if necessary. Test evaporator sensor - replace if necessary. Check evaporator seals.

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