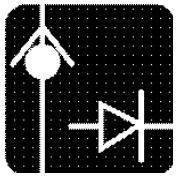
RT115

with Tier 2 Engine

Technical Supplement



Foreword

This manual is an important part of your equipment. It provides basic hydraulic and electrical information, harnesses, and diagrams to help you troubleshoot your Ditch Witch equipment. For detailed, step-by-step troubleshooting information, refer to your Ditch Witch repair guide.

If you need a replacement copy, contact your Ditch Witch dealer. If you need assistance in locating a dealer, visit our website at www.ditchwitch.com or write to the following address:

The Charles Machine Works, Inc.
Attn: Marketing Department
PO Box 66
Perry, OK 73077-0066
USA

The descriptions and specifications in this manual are subject to change without notice. The Charles Machine Works, Inc. reserves the right to improve equipment. Some product improvements may have taken place after this manual was published. For the latest information on Ditch Witch equipment, see your Ditch Witch dealer.

Thank you for buying and using Ditch Witch equipment.

RT115 Tier 2
Technical Supplement

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Part number 053-112

Table of Contents

How To Use This Supplement

This supplement contains the tools to help you perform basic electrical and hydraulic troubleshooting on your machine:

- basic electrical troubleshooting steps that can be followed for any electrical circuit
- how to read CMW electrical schematics
- how to use a digital multimeter
- description of common circuit faults
- description of common CMW circuits
- electrical schematics and wiring diagrams specific to your machine
- basic hydraulic troubleshooting steps for the 3 types of hydraulic circuits used at CMW: gear pump, hydrostat, and load sense
- hydraulic schematics specific to your machine

Use the basic troubleshooting steps combined with the schematics and diagrams to help isolate the cause of a malfunction on your machine.

For more details and guided, step-by-step troubleshooting procedures, refer to the “Troubleshooting” chapter of the repair guide for your machine.

Basic Hydraulic Troubleshooting

Gear Pump Circuits

Step 1: Test for Pump and Main Relief

Theory

If **all** functions of a gear pump circuit are malfunctioning, the problem may be poor suction conditions or a malfunction of the main relief, the first component in the circuit, or the pump.

Test Suction Conditions

1. Verify oil level.
2. Visually inspect the suction lines.
3. Remove suction lines and check for obstruction.

Test Main Relief

Main relief should be connected to the pressure line that comes from the pump. It may be located in the pump, as an independent relief, or in the first valve of the circuit. To check the relief:

1. Verify the pressure of the main relief.
2. If pressure is not correct, try adjusting the relief.

> **IMPORTANT:** Document the number of turns made to the adjustment in case you need to go back to the original position.

3. If adjusting the relief does not work, remove, clean, and inspect.
4. Install the relief and test again.

Test First Component in the Circuit

The first component in the circuit after the pump may have an internal leak or be obstructed in a way that effects the entire circuit. Depending on the circuit, this can be evaluated in different ways. Consider bypassing or inspecting the component.

IMPORTANT: Do **not** bypass the main relief.

Test Pump

Measure pump flow with a flowmeter and needle valve (such as test kit p/n 259-501). On a good pump, flow should not decrease more than 70% when the pressure is increased. Sometimes measuring the speed of a function can approximate flow. See your Ditch Witch repair guide for more information.

NOTICE: Always have a main relief in the circuit to avoid pump failure.

Step 2: Test Valves and Actuators

Theory

If **one** function is not operating properly, the problem is probably in a valve or actuators (cylinder or motor).

Test Valves

NOTICE: Perform these tests only after you have verified they will not damage components in the circuit. Before troubleshooting, identify if there are any orifices in the circuit.

- Test electric valves with manual overrides if available.
- Consider switching hoses (re-routing) with another valve to determine if the problem is in the valve or the actuator.
- For leakage on a valve that has PO checks, exchange checks with another location to determine if the leakage is due to the PO check.
- For valves with work port relief, exchange reliefs with another location to determine if the relief is malfunctioning.

Test Actuators

- For leakage in cylinders, perform a cylinder leak test.
- For motor actuators, measure the case flow.

Hydrostatic Circuits

Step 1: Check Charge Pressure

Theory

The charge pressure is low because of:

- oil leaking out of loop
- bad suction conditions
- pump malfunction

Test for Oil Leakage Out of the Loop

1. Measure charge pressure when the unit is malfunctioning.
2. If charge pressure is correct, go to Step 4.
3. If charge pressure is low, oil is probably leaking out of the loop. Look in the following places:
    - Flushing valves or hot oil shuttles (Determine if you can cap off the flushing valve for a test. Do not block case flow or you will cause a failure to the motor). If possible, measure the flushing flow
    - Shift valves, brakes, brake valves, gripper valves, or any other valves that us charge pressure (Determine if you can cap off these functions temporarily to test them)
    - Motor leakage into case. Measure case flow, but remember to adjust for hot oil shuttle flow if necessary. Consider measuring case pressure as an alternate test.

      IMPORTANT: Measuring flow is preferred because pressure varies and is not accurate.

    - Charge relief valve (either remove and inspect, or replace)

Test Suction Conditions

1. Verify oil level.
2. Visually inspect the suction lines.
3. Remove suction lines and check for obstruction.

Test Pump

The remaining causes for low charge pressure are charge relief, pump leakage, or charge pump malfunction.

Charge Relief

1. Remove, clean and inspect the charge relief.
2. Re-install and test again.

Pump Leakage or Charge Pump Malfunction

1. Cap and plug the loop lines and all other external lines except the case drain and suction. In this state, the pump is separated from the circuit.
2. If charge pressure is still low, you can eliminate everything external to the pump.
3. If charge pressure is correct, go to Step 4.

Step 2: Verify Main Pressures

Theory

The hydrostatic circuit is not producing the torque expected.

Test Main Pressure

1. If the pressures seem low, measure the maximum pressures of the main reliefs.

Step 3: Verify Pump and Motor Signal

Theory

The pump or motors are not being given the proper control signal, control pressure, mechanical control, or the pump is not being turned.

Test Signals

1. Check the linkage, cable, pilot pressure, or electrical signal.
2. If the pump is equipped with manual overrides, use them to check signal.
3. Verify that the pump shaft is turning.
4. If the pump and motors are getting the proper signal and power, go to Step 1.

Step 4: Test for Oil Leakage Across the Loop

Theory

The loop is leaking from one side to the other. In this situation, charge pressure might be correct, but the loop cannot produce full speed or torque.

Test

Look for ways the oil is leaking from one side of the loop to the other side. Consider the following

- Motor leakage across the loop (Will not show up in case flow. Cap off motor pressure lines.)
- Loop pressure relief valves (Exchange them to test.)
- Tow valve (Verify that it is closed.)
- Neutral valve
- Flushing valve

Load Sense Circuits

Step 1: Check Pump Differential

Theory

The reason for the malfunction is that the pump differential is wrong.

Test

1. Check the pump differential under the following conditions:
   - at standby (not using any functions)
   - when using functions that work properly
   - when useing functions that are not working properly.
2. If differential wrong in any condition, try to adjust it. If it can't be adjusted to the proper differential, go to Step 2.
3. If differential is correct, go to Step 3.

Step 2: Check Pump

Theory

The pump is not operating properly. Possible causes are poor suction conditions or pump malfunction.

Test Suction Conditions

1. Verify oil level.
2. Perform an external visual inspection of the suction lines.
3. Remove suction lines and check for obstruction.

Test Pump

1. Cap off pressure line from pump and connect load sense signal line to pressure line. Pump should go to compensator setting in this condition.
2. If pump does not go to compensator setting, the pump is malfunctioning.
3. If pump does go to compensator setting, the circuit may have an internal leakage in a valve in the pressure circuit. To test, reconnect pump to the circuit, and block off valves one by one.

Step 3: Check Shuttle Circuit

Theory

The shuttle circuit has a leak or blockage that is causing the problem.

Test

1. Functioning some valves in the circuit and identify changes in behavior to determine which shuttles could be leaking.
2. Cap off parts of the load sense signal circuit.
3. Run a separate independent signal line from the valve to the pump.
4. Identify any orifices in the load sense line and inspect for blockage.
5. Move shuttle cartridges from one location to another to see if the problem is effected.
6. If shuttle circuit does not have leakage or blockage, go to Step 4.

Step 4: Check Valves and Actuators

Theory

If **one** function is not operating properly, the problem is probably in a valve or actuators (cylinder or motor).

Test Valves

NOTICE: Perform these tests only after you have verified they will not damage components in the circuit. Before troubleshooting, identify if there are any orifices in the circuit.

- Test electric valves with manual overrides if available.
- Consider switching hoses (re-routing) with another valve to determine if the problem is in the valve or the actuator.
- For leakage on a valve that has PO checks, exchange checks with another location to determine if the leakage is due to the PO check.
- For valves with work port relief, exchange reliefs with another location to determine if the relief is malfunctioning.

Test Actuators

- For leakage in cylinders, perform a cylinder leak test.
- For motor actuators, measure the case flow.

HYDRAULIC SCHEMATIC
RT115

HARDLINE
9
GROUND DRIVE MOTOR
4
B
L1
L2
A
RETURN MANIFOLD
10
T1 T2 T3 T4 T5 T6
12
FILTER
ATTACH PUMP
ATTACH REV
P
7
L1
S2
FWD
A
AUX PUMP
13
B
REV
L1
GROUND DRIVE PUMP
ORIFICE
PF
PV
DRAIN
MULTI-FUNCTION VALVES
P
ATTACH FWD
STEERING
8
T
LS
P
A
B
COOLER
19
11
PB
T
ATTACH VALVE
P
AXLE LOCK
AXLE LOCK
HI / LO
2
P
T
HI / LO
AXLE LOCK
VALVE
FRAME TILT
REAR STEER
VALVE
1
P
T
B
A
P
B
A
P
B
A
.062
.062
.062
.062
REAR STEER
14
FRAME TILT
BFB VALVE
PB
A
B
A
B
A
B
3
P
BLADE TILT
14
BLADE LIFT
16
17
BLADE SWING
RESERVOIR
18
RELIEF VALVE
5
6
EF
CF
LS
T
P
PRIORITY VALVE
P
T7
GAUGE
15

C

808-191

Hydraulic Schematic Descriptions

Ref. Number	Component	Notes
0	John Deere engine	2650 rpm (no load)
1	frame tilt/rear steer valve	
2	high/low and axle lock manifold	
3	backfill blade valve	
4	ground drive motor	displacement: 4 in^3 (65 cc) at high speed, 1.9 in^3 (31cc) at low speed
5	auxiliary relief valve	
6	priority valve	
7	attachment and ground drive pumps (tandem)	attachment pump: 47gpm (178 L/min) flow; 4.57in^3 (75 cc) displacement; see T6
		attachment charge pump: 11 gpm (3.8 L/min) flow; 1.03in^3 (16.9 cc) displacement; see T5
		ground drive pump: 30.4 gpm (115 L/min) flow; 2.82in^3 (46 cc) displacement; see T2, T4
		ground drive charge pump: 9.2 gpm (34.8 L/min) flow; 0.86 in^3 (14 cc) displacement; see T3
8	steering valve	
9	hydraulic line	used without backhoe attachment
10	return manifold	see T1
11	check valve (cooler)	25 psi (1.7 bar)
12	oil filter	beta 10 = 75 filter with 25 psi (1.7 bar) bypass
13	auxiliary pump	14.8 gpm (57 L/min) flow; 1.37in^3 (22.4 cc) displacement; see T7
14	backfill blade tilt & frame tilt cylinders	
15	system pressure gauge	3000 psi (207 bar) gauge
16	backfill blade lift cylinder	
17	backfill blade swing cylinder	
18	hydraulic reservoir	21 gal (80 L) tank capacity; 29 gal (110 L) system capacity
19	oil cooler	
T1	return test port	up to 150 psi (10 bar) cold
T2	ground drive reverse test port	5000-5500 psi (345-380 bar)
T3	ground drive charge test port	250-400 psi (17-28 bar)
T4	ground drive forward test port	5000-5500 psi (345-380 bar)
T5	attachment charge test port	300-450 psi (21-31 bar)
T6	attachment forward test port	see note 1
T7	system and steering gauge	see note 2
Note 1	forward relief pressure: 6300-6550 psi (434-452 bar); reverse relief pressure 4750-5050 psi (328-348 bar)	

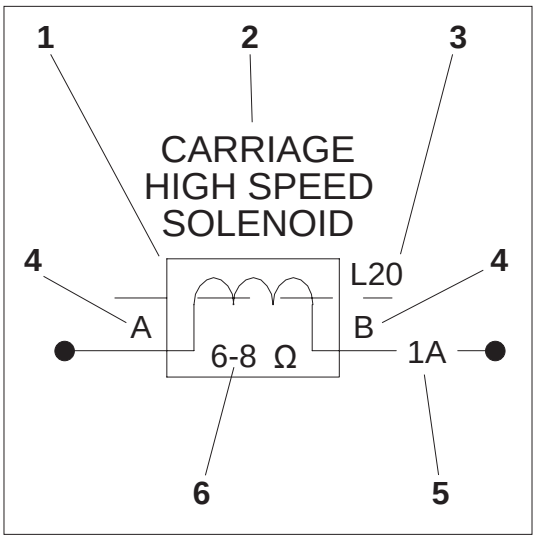
Hydraulic Schematic Descriptions

Ref. Number	Component	Notes
Note 2	with backfill blade held over relief, gauge should read 2450-2650 psi (169-183 bar); with steering held over relief, gauge should read 2300-2400 psi (159-165 bar)	

Basic Electrical Troubleshooting

Reading CMW Schematics

1. component symbol
2. component name
3. component ID (used in reference tables)
4. pinout ID
5. circuit number (used in reference tables)
6. resistance measurement



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Common CMW Circuits

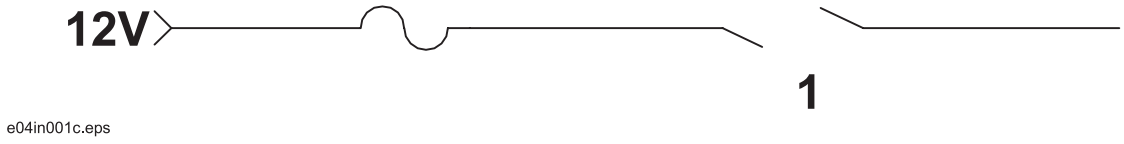
Circuit Type	Item	Circuit No./Wire Color
Ground		
	high current ground	1 black
	medium current ground	1A black/red
	low current ground	1B black/blue
	drain, shield, or ESD (CAN bus only)	1C bare, uninsulated
	11-bit drain, shield, or ESD (CAN bus only)	1D, bare, uninsulated
	sensor return lines	black/yellow or black/green
	analog ground	yellow/black
12-Volt		
	fused accessory	orange
	fused ignition	orange/green
	battery	red
	start	white/black

Circuit Type	Item	Circuit No./Wire Color
5-Volt		
	5V DC source	blue/green
	5V DC source	blue/yellow (Tier 2 only)
J1939 CAN		
	J1939 CAN low/fuel system CAN low	green
	J1939 CAN high/fuel system CAN high	yellow
Miscellaneous		
	fuel sender	brown
	oil sender	blue
	engine temperature sender	green
	hydraulic temperature	gray/black
	hydraulic filter	gray/yellow
	oil pressure sensor signal	blue/black
	coolant temperature sensor	green/black
	manifold air temperature sensor	tan/black
	tachometer signal	yellow

Circuit Type	Power Status
battery	has power all the time
ignition	has power when ignition switch is in run or start position
accessory	has power when ignition switch is in run position
start	has power when ignition switch is in start position

Circuit Faults

Open Circuit



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1. broken wire

Definition

A circuit with a break or separation that prevents current from flowing through the circuit.

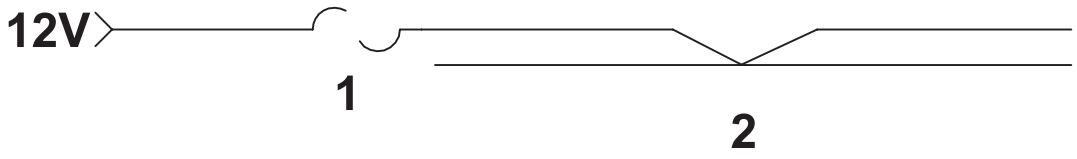
Common Causes

- broken wire
- disconnected terminal
- pin inside connector not making connection
- blown fuse
- failed switch or other component
- disconnected ground wire

Symptoms

- no function
- meter reads OL

Shorted Circuit



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1. blown fuse
2. wire shorted to another wire

Definition

A circuit with unwanted continuity.

Common Causes

- two or more wires rubbing together

Symptoms

- blown fuse
- meter reads 00.0

Grounded Circuit

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1. blown fuse
2. wire shorted to ground

Definition

Similar to a shorted circuit, a circuit with unwanted continuity to the battery ground terminal

Common Causes

- voltage wire in contact with machine frame

Symptoms

- blown fuse
- meter reads 00.0

High-Resistance Circuit

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1. point of high resistance

Definition

A circuit with unwanted resistance that causes a voltage drop and reduces current flow

Common Causes

- loose, dirty, corroded, or oily terminal
- broken wire strands
- poor frame ground

Symptoms

- function works slowly, intermittently, or not at all

How To Use a Digital Multimeter

A digital multimeter combines the functions a voltmeter, ohmmeter, and ammeter in one test instrument. This is the preferred electrical troubleshooting tool.

To Measure Voltage

1. Set multimeter to a voltage range higher than the circuit voltage (e.g. 20V range for a 12V circuit).
2. Turn ignition switch to run position.
3. Place red lead on positive side of the component and black lead on negative side of the component.
4. Observe voltage reading.

To Measure Resistance (Ohms)

1. Set multimeter to the ohms setting.
2. Disconnect the battery or disconnect the component you are testing.

> **NOTICE:** Never measure resistance in a circuit when voltage is present.

3. Place red lead on one side of the component and black lead on the other side of the component.
4. Observe resistance reading.

To Measure Current (Amps)

1. Set multimeter to the highest current setting.
2. Turn ignition switch to run position.
3. Disconnect a component or wire and place the meter “in series” with the circuit, so that current flows from the disconnected wire, through the meter, and back to the point where the wire was disconnected.

> **NOTICE:** Never use the multimeter to measure high current devices such as a starter motor, as this current far exceeds the measurement capabilities of the meter. For these types of devices, use a current clamp.

4. Observe current reading.

Basic Troubleshooting Checklist

1. Identify the malfunction.

- Example: Work lights don’t work.

2. Identify the components in the circuit.

- Refer to schematic.

3. Perform a visual inspection of the circuit.

- Look for dirty, loose, or broken connections.
- Look for water in or around any electrical components.
- Inspect wiring for cracks, breaks, or other damage.
- Inspect seals for cracks, breaks, or other damage.
- Look for poor crimp terminals.

4. Test the suspect component(s).

- Check for proper supply voltage to the component.
- Check for resistance from the component to battery negative post or to chassis ground. Resistance should not exceed 1.0 ohm.
- Check for correct output signal from the component

> **IMPORTANT:** If any of the above are not present, go to **step 5**.

- Check for resistance across the component, if applicable.

5. Inspect the wiring harness for continuity.

> **NOTICE:** Ensure that power is **off** before checking harness for continuity.

Tier 2 Diagnostic Codes

Problems with the Tier 2 engine usually are indicated by the operator alert indicator on the gauge cluster and by a diagnostic code displayed on the diagnostic gauge.

Operator Alert Indicator


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When a code is present, the operator alert indicator on the gauge cluster will light.

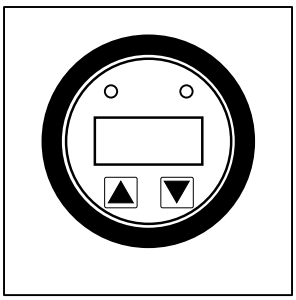
- If light flashes, a "warning" code is present. The diagnostic gauge will store the code, and the machine will continue to operate.
- If light is steady, an "engine shutdown" code is present. The diagnostic gauge will store the code, and the engine will shut down within 30 seconds.

Diagnostic Gauge

The diagnostic gauge displays two types of codes:

Code type	Display	Definition
active (service) code	SRVCCODE	indicates an error that is occurring immediately
stored code	STORCODE	indicates an error that has occurred previously

To display codes: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1. Press the up or down arrow to scroll through the gauge parameters until SRVCCODE or STORCODE is displayed.
2. Press and hold the up and down arrows at the same time. A two-line code will display.

IMPORTANT: For code explanations, see “Diagnostic Codes” on page 29.

3. Press the up or down arrow to scroll through all active or stored codes.

To clear active codes:

1. Turn ignition switch to STOP.
2. Turn ignition switch back on.

To clear stored codes:

1. Turn ignition switch on, engine off.
2. Press and hold the up and down arrows at the same time until display reads ********** (approximately 8 seconds).
3. Immediately press and hold the down arrow until the display reads **Send DM3**.
4. Turn ignition switch to STOP, then back on.

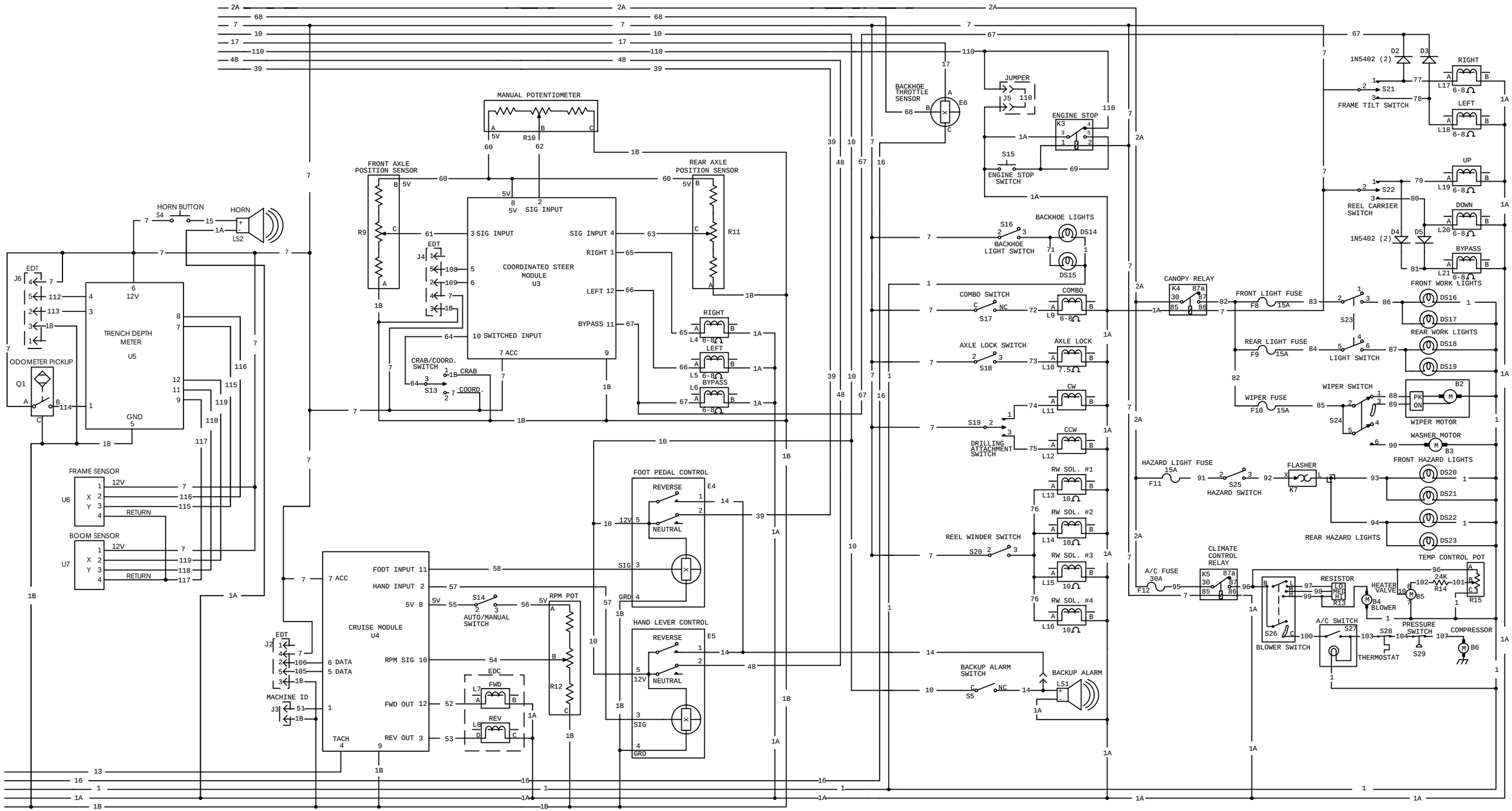
Diagnostic Codes

Two-line diagnostic code	Definition	Possible cause
SPN 28, FMI 3	attachment throttle input high	throttle sensor (E3)
SPN 28, FMI 4	attachment throttle input low	throttle sensor (E3)
SPN 29, FMI 3	primary throttle input high	throttle sensor (E3)
SPN 29, FMI 4	primary throttle input low	throttle sensor (E3)
SPN 100, FMI 1	engine oil pressure extremely low	oil pressure sensor (R11)
SPN 100, FMI 3	engine oil pressure input voltage high	oil pressure sensor (R11)
SPN 100, FMI 4	engine oil pressure input voltage low	oil pressure sensor (R11)
SPN 100, FMI 18	engine oil pressure moderately low	oil pressure sensor (R11)
SPN 105, FMI 3	manifold air temp input voltage high	manifold air temp sensor (R12)
SPN 105, FMI 4	manifold air temp input voltage low	manifold air temp sensor (R12)
SPN 105, FMI 16	manifold air temp moderately high	manifold air temp sensor (R12)
SPN 110, FMI 0	engine coolant temp extremely high	coolant temp sensor (R13)
SPN 110, FMI 3	engine coolant temp input voltage high	coolant temp sensor (R13)
SPN 110, FMI 4	engine coolant temp input voltage low	coolant temp sensor (R13)
SPN 110, FMI 15	engine coolant temp high least severe	coolant temp sensor (R13)
SPN 110, FMI 16	engine coolant temp moderately high	coolant temp sensor (R13)
SPN 158, FMI 17	ECU power down error	ignition switch (S2), ignition circuit
SPN 174, FMI 3	fuel temperature input voltage high	fuel temperature sensor (R14)
SPN 174, FMI 4	fuel temperature input voltage low	fuel temperature sensor (R14)
SPN 174, FMI 16	fuel temperature moderately high	fuel temperature sensor (R14)
SPN 190, FMI 0	engine overspeed extreme	crank position sensor (MT1)
SPN 190, FMI 16	engine overspeed moderate	crank position sensor (MT1)
SPN 620, FMI 3	sensor supply voltage high	wire 17 BLU/GRN, ECU (U9)
SPN 620, FMI 4	sensor supply voltage low	wire 17 BLU/GRN, ECU (U9)
SPN 627, FMI 4	ECU battery power missing	ECU (U9), batteries (BT1, BT2), primary power fuse (F1)
SPN 629, FMI 13	ECU error	ECU (U9)
SPN 637, FMI 2	crankshaft position input noise	crank position sensor (MT1), timing wheel

Two-line diagnostic code	Definition	Possible cause
SPN 637, FMI 10	crankshaft position input pattern error	crank position sensor (MT1), timing wheel
SPN 639, FMI 13	CAN error	ECU (U9), diagnostic gauge (M6), wiring connections
SPN 1076, FMI 0	pump control valve closure too long	fuel control solenoid (L20), injection pump
SPN 1076, FMI 1	pump control valve closure too short	fuel control solenoid (L20), injection pump, battery charge
SPN 1076, FMI 3	pump solenoid current high	wiring, injection pump
SPN 1076, FMI 5	pump solenoid circuit open	ECU (U9), wiring
SPN 1076, FMI 6	pump solenoid circuit severly shorted	wiring, injection pump
SPN 1076, FMI 7	pump control valve closure not detected	injection pump
SPN 1076, FMI 10	pump solenoid circuit moderately shorted	wiring, injection pump
SPN 1079, FMI 3	sensor supply voltage high	wire 17 BLU/GRN, ECU (U9)
SPN 1079, FMI 4	sensor supply voltage low	ECU (U9), wiring
SPN 1109, FMI 31	engine shutdown warning	various
SPN 1110, FMI 31	engine shutdown	various
SPN 1569, FMI 31	fuel derate	various
SPN 2000, FMI 6	internal ECU failure	ECU (U9)
SPN 2000, FMI 13	security violation	ECU (U9) programming

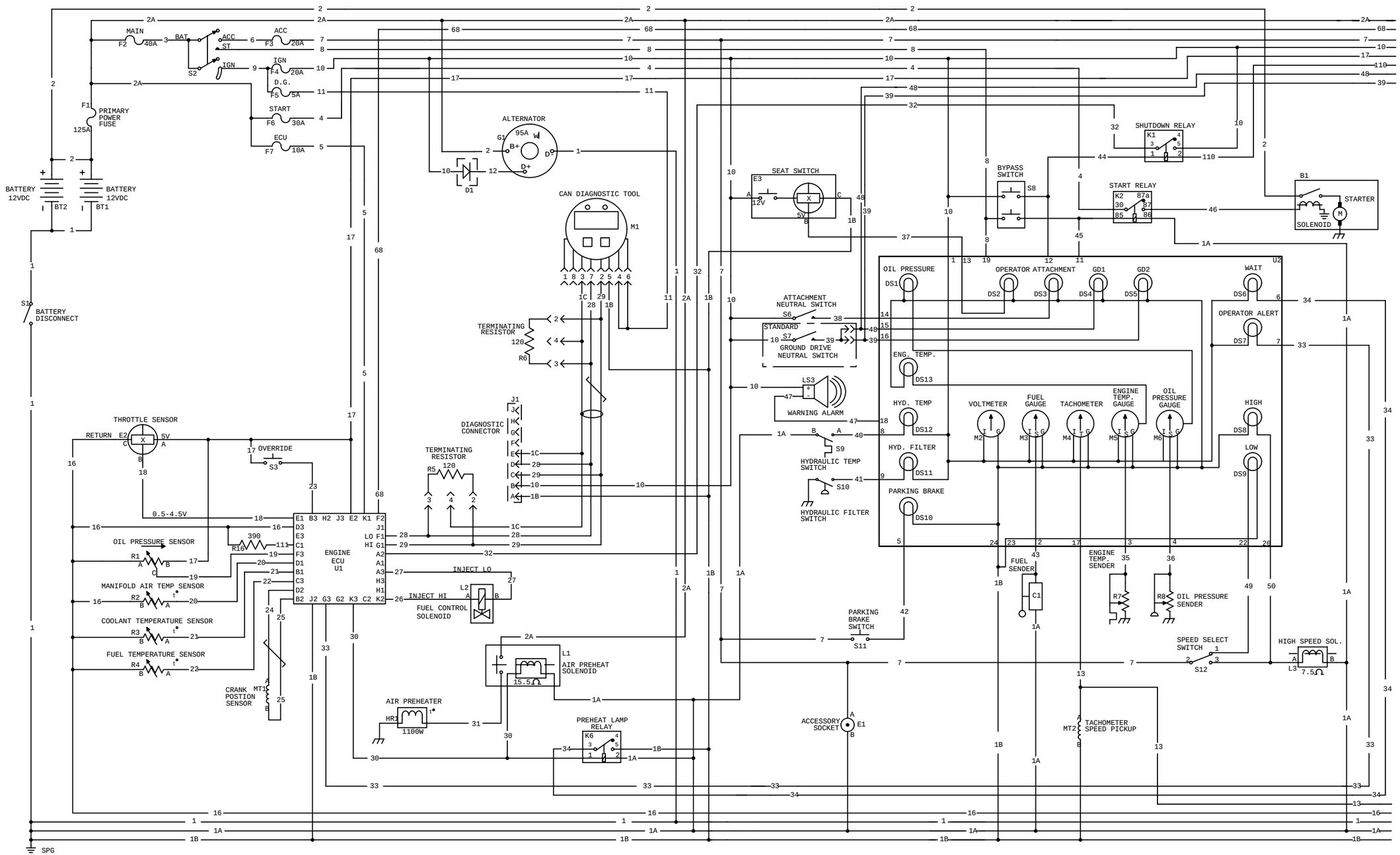
ELECTRICAL SCHEMATIC

RT115 TIER 2



ELECTRICAL SCHEMATIC

RT115 TIER 2



CIRCUIT DESCRIPTION

RT115 TIER II

Circuit Number	Wire Color	Function
1	blk	High current ground
1A	blk/red	Medium current ground
1B	blk/blu	Low current ground
1C	bare	CAN drain wire
2	red	Battery circuit
2A	red	Fused battery circuit
3	red	Fused battery circuit
4	pur	Fused start circuit
5	red/grn	Fused engine ECU circuit
6	org/brn	Accessory circuit
7	org	Fused accessory circuit
8	wht/blk	Start circuit
9	org/blu	Ignition circuit
10	org/grn	Fused ignition circuit
11	red/blu	Fused diagnostic gauge circuit
12	org/blu	Alternator exciter circuit
13	yel	Tachometer circuit
14	brn/red	Backup alarm switch to backup alarm
15	brn/yel	Horn button to horn
16	yel/blk	Sensor return
17	blu/grn	5VDC output
18	gra/blu	Throttle sensor signal 1.0V to 4.0V
19	blu/blk	Oil pressure sensor to engine ECU
20	tan/blk	Manifold air temperature sensor to engine ECU
21	grn/blk	Coolant temperature sensor to engine ECU
22	brn/blk	Fuel temperature sensor to engine ECU
23	pnk	Shutdown override switch to engine ECU
24	pur	Crankshaft position sensor to engine ECU
25	blk/yel	Crankshaft position sensor to engine ECU (return)
26	brn	Engine ECU to fuel control solenoid--inject hi
27	org/brn	Engine ECU to fuel control solenoid--inject lo
28	grn	CAN-L, Engine ECU to diagnostic gauge & resistors
29	yel	CAN-H, Engine ECU to diagnostic gauge & resistors
30	brn/org	Engine ECU to air preheat solenoid & preheat lamp relay
31	red	Air preheat solenoid to air preheater
32	org/gra	Shutdown relay to engine ECU
33	tan/blk	Engine ECU to gauge cluster operator alert indicator
34	blu/red	Preheat lamp relay to gauge cluster wait indicator
35	grn	Temperature sending unit to gauge cluster
36	blu	Oil pressure sending unit to gauge cluster
37	blu/grn	Operator presence switch to gauge cluster
38	wht/grn	Attachment neutral switch to gauge cluster
39	wht/blu	Ground drive neutral switch to gauge cluster
40	gra/blk	Hydraulic temperature switch to gauge cluster
41	gra/yel	Hydraulic filter switch to gauge cluster
42	tan	Park brake switch to gauge cluster
43	brn	Fuel sender to gauge cluster
44	org/bk	Gauge cluster to shutdown relay

CIRCUIT DESCRIPTION

RT115 TIER II

Circuit Number	Wire Color	Function
45	wht/blk	Gauge cluster to start relay & bypass switch
46	pur	Start relay to starter solenoid
47	brn/yel	Gauge cluster to warning light alarm
48	wht/red	Crowd neutral switch to gauge cluster (cruise only)
49	blu/org	Speed switch to gauge cluster low speed indicator
50	pur/org	Speed switch to gauge cluster high speed indicator & solenoid
51	blk/wht	Cruise module to machine identification connector
52	tan/red	Cruise module to EDC forward solenoid
53	tan/grn	Cruise module to EDC reverse solenoid
54	gra	RPM potentiometer to cruise module
55	blu/grn	5VDC Output from cruise module
56	blu/grn	Auto/manual switch from RPM potentiometer
57	gra/grn	Hand control signal to cruise module
58	gra/red	Foot control signal to cruise module
60	blu/grn	5VDC Output from coordinated steer module
61	grn/red	Front axle sensor to coordinated steer module
62	gra/blu	Manual potentiometer to coordinated steer module
63	grn/blu	Rear axle sensor to coordinated steer module
64	org/brn	Crab/coordinated steer switch to coordinated steer module
65	grn/blk	Coordinated steer module to right steer module
66	blu/blk	Coordinated steer module to left steer module
67	tan/blu	Coordinated steer module to bypass solenoid
68	blu/wht	Backhoe throttle sensor to engine ECU
69	yel/red	Engine stop switch to engine stop relay
70		Not Used
71	yel/grn	Backhoe light switch to backhoe worklights
72	tan/org	Combo switch to combo solenoid
73	tan/red	Axle lock switch to axle lock solenoid
74	yel/gra	Drilling attachment switch to cw solenoid
75	yel/blu	Drilling attachment switch to ccw solenoid
76	pur/red	Reel winder switch to reel winder solenoids
77	grn/org	Frame tilt switch to frame tilt right solenoid
78	blu/org	Frame tilt switch to frame tilt left solenoid
79	tan/grn	Reel carrier switch to reel carrier up solenoid
80	tan/wht	Reel carrier switch to reel carrier down solenoid
81	blu/wht	Diode cathodes to bypass solenoid
82	pur/wht	Canopy relay to canopy fuses
83	pur	Front work light fuse to work light switch
84	grn	Rear work light fuse to work light switch
85	brn	Wiper fuse to wiper switch
86	pur/blk	Worklight switch to front worklights
87	grn/blk	Worklight switch to rear worklights
88	pnk	Wiper switch to "PK" on wiper motor
89	pnk/blu	Wiper switch to "ON" on wiper motor
90	tan	Wiper switch to washer motor
91	wht	Hazard fuse to hazard light switch
92	blu/yel	Hazard light switch to flasher "x" terminal
93	yel/blk	Flasher to front hazard lights

CIRCUIT DESCRIPTION

RT115 TIER II

Circuit Number	Wire Color	Function
94	yel/blu	Flasher to rear hazard lights
95	red/blu	A/C fuse to climate control relay
96	pur	Climate control relay to blower switch, heater valve, & temp, control pot.
97	yel	Blower switch to blower resistor
98	lt. Blu	Blower switch to blower resistor
99	org/red	Blower switch to blower resistor & blower motor
100	pur/yel	Blower switch to A/C switch
101	wht/red	Temperature control pot to 24K resistor
102	wht/blu	24K resistor to heater valve
103	grn	A/C switch to thermostat
104	grn	Thermostat to pressure switch
105	gra	Cruise module to EDT connection (serial)
106	wht	Cruise module to EDT connection (serial)
107	grn/wht	A/C pressure switch to Air conditioning compressor
108	gra	Coordinated steer module to EDT connection
109	wht	Coordinated steer module to EDT connection
110	blk/org	Engine stop relay to shutdown relay
111	blu/wht	Engine ECU to resistor
112	pnk/wht	Trench depth meter to EDT connection (serial)
113	pnk/blu	Trench depth meter to EDT connection (serial)
114	yel/red	Odometer pickup to Trench Depth Meter
115	grn/red	Frame sensor (Y out) to trench depth meter
116	grn/blu	Frame sensor (X out) to trench depth meter
117	yel/blk	Sensor return
118	gra/red	Boom sensor (Y out) to trench depth meter
119	gra/blu	Boom sensor (X out) to trench depth meter

ELECTRICAL SCHEMATIC DESCRIPTION

RT115 TIER II

Ref. Number	Part Number	Component	Notes
B1	194-254	Starter	Includes solenoid
B2	214-897	Wiper motor	Cab option only
B3	344-115	Washer motor	
B4	499-704	Blower motor	
B5	499-705	Heater valve	
B6	499-706	A/C Compressor	
BT1	213-104	Battery	12V 875CCA
BT2	213-104	Battery	
C1	214-650	Fuel Sender	
D1	213-085	Alternator diode	
D2	See notes	Frame tilt diode	1N5402
D3	See notes	Frame tilt diode	
D4	See notes	Reel carrier diode	
D5	See notes	Reel carrier diode	
DS1	See notes	Oil pressure indicator	Component of 211-273 Gauge cluster
DS2	See notes	Operator presence indicator	
DS3	See notes	Attachment neutral indicator	
DS4	See notes	Crowd neutral indicator	
DS5	See notes	Ground drive neutral indicator	
DS6	See notes	Cold start wait indicator	
DS7	See notes	Operator alert indicator	
DS8	See notes	High speed indicator	
DS9	See notes	Low speed indicator	
DS10	See notes	Park brake indicator	
DS11	See notes	Hydraulic filter indicator	
DS12	See notes	Hydraulic temperature indicator	
DS13	See notes	Engine temperature indicator	
DS14	217-007	Backhoe worklight	
DS15	217-007	Backhoe worklight	
DS16	217-288	Front worklight	
DS17	217-288	Front worklight	
DS18	217-288	Rear worklight	
DS19	217-288	Rear worklight	
DS20	217-287	Front hazard light	
DS21	217-287	Front hazard light	
DS22	217-287	Rear hazard light	
DS23	217-287	Rear hazard light	
E1	214-301	Accessory socket	
E2	217-304	Throttle sensor	
E3	214-770	Seat switch	
E4	213-224	Foot pedal control	Cruise option only
E5	213-223	Hand lever control	
E6	217-304	Backhoe throttle sensor	
F1	211-305	Primary power fuse	125A HV/AMI fuse
F2	211-303	Main fuse	40A ATC
F3	217-812	Accessory fuse	20A ATC
F4	217-812	Ignition fuse	20A ATC

ELECTRICAL SCHEMATIC DESCRIPTION

RT115 TIER II

Ref. Number	Part Number	Component	Notes
F5	217-809	Diagnostic gauge fuse	5A ATC
F6	217-813	Start fuse	30A ATC
F7	217-810	ECU Fuse	10A ATC
F8	217-811	Front light fuse	15A ATC
F9	217-811	Rear light fuse	
F10	217-811	Wiper fuse	
F11	217-811	Hazard light fuse	
F12	217-813	A/C Fuse	30A ATC
G1	217-451	Alternator	95A
HR1	See notes	Air preheater	12V 1100W, No CMW service part available
J1	See notes	Diagnostic connection	DST service connection
J2	See notes	EDT connection	Cruise option only
J3	See notes	Machine identification connection	
J4	See notes	EDT connection	Coordinated steer option only
J5	See notes	Backhoe connection jumper	For use on tractors without a backhoe
J6	See notes	EDT connection	Trench depth meter option only
K1	217-710	Shutdown relay	
K2	217-826	Start relay	
K3	217-710	Engine stop relay	
K4	217-826	Canopy relay	
K5	217-826	Climate control relay	
K6	217-710	Preheat lamp relay	
K7	215-041	Flasher	
L1	214-979	Air preheat solenoid	
L2	See notes	Fuel control solenoid	No CMW service part available
L3	214-491	High speed solenoid	
L4	217-948	Coordinated steer right solenoid	Coordinated steer option only
L5	217-948	Coordinated steer left solenoid	
L6	214-909	Bypass solenoid	
L7	See notes	EDC forward solenoid	No CMW service part available
L8	See notes	EDC reverse solenoid	
L9	217-770	Combo solenoid	Combo option only
L10	214-491	Axle lock solenoid	
L11	See notes	Drilling attachment cw solenoid	No CMW service part available
L12	See notes	Drilling attachment ccw solenoid	
L13	211-270	Reel winder solenoid	Reel winder option only
L14	211-270	Reel winder solenoid	
L15	211-270	Reel winder solenoid	
L16	211-270	Reel winder solenoid	
L17	217-948	Frame tilt right solenoid	Frame tilt option only
L18	217-948	Frame tilt left solenoid	
L19	217-948	Reel carrier up solenoid	Reel carrier option only
L20	217-948	Reel carrier down solenoid	

ELECTRICAL SCHEMATIC DESCRIPTION

RT115 TIER II

Ref. Number	Part Number	Component	Notes
L21	214-909	Bypass solenoid	
LS1	306-602	Backup alarm switch	Saw option only
LS2	192-006	High Frequency Horn	
LS3	306-603	Warning alarm	
M1	260-1062	CAN Diagnostic Tool	
M2	See Notes	Voltmeter	Component of 211-273 Gauge cluster
M3	See notes	Fuel gauge	
M4	See notes	Tachometer	
M5	See notes	Engine temperature gauge	
M6	See notes	Oil pressure gauge	
MT1	213-080	Crankshaft position sensor	Uses 159-586 O-ring
MT2	213-080	Tachometer speed pickup	
Q1	214-692	Odometer pickup	Trench depth meter option only
R1	213-083	Oil pressure sensor	
R2	213-082	Manifold air temperature sensor	
R3	213-081	Coolant temperature sensor	
R4	See notes	Fuel temperature sensor	No CMW service part available
R5	211-274	CAN terminating resistor	120 Ohm
R6	211-274	CAN terminating resistor	
R7	217-565	Engine temperature sender	
R8	217-313	Oil pressure sender	
R9	217-259	Front axle position sensor	Coordinated steer option only
R10	217-273	Manual potentiometer	
R11	217-259	Rear axle position sensor	
R12	217-892	RPM potentiometer	Cruise option only
R13	See notes	Blower resistor	No CMW service part available
R14	See notes	Resistor	24K Ohm 1/4 watt
R15	See notes	Temperature control potentiometer	No CMW service part available
R16	See notes	Resistor	390 Ohm 1/2 watt
S1	217-819	Battery disconnect switch	
S2	214-852	Ignition switch	
S3	306-607	Engine override switch	Uses 306-608 button cover
S4	306-607	Horn button	
S5	217-703	Backup alarm switch	Saw option only
S6	See notes	Attachment neutral switch	No CMW service part available
S7	See notes	Ground drive neutral switch	
S8	217-704	Bypass switch	
S9	214-854	Hydraulic temperature switch	
S10	217-765	Hydraulic filter switch	
S11	217-705	Park brake switch	
S12	217-762	Speed select switch	
S13	217-854	Crab/coordinated steer switch	Coordinated steer option only
S14	217-762	Auto/manual switch	Cruise option only
S15	217-206	Engine stop switch	Backhoe option only
S16	217-762	Backhoe light switch	Backhoe light option only
S17	215-046	Combo switch	Combo option only

ELECTRICAL SCHEMATIC DESCRIPTION

RT115 TIER II

Ref. Number	Part Number	Component	Notes
S18	217-762	Axle lock switch	
S19	217-764	Drilling attachment switch	
S20	217-762	Reel winder switch	Reel winder option only
S21	217-764	Frame tilt switch	
S22	217-764	Reel carrier switch	Reel carrier option only
S23	217-762	Light switch	
S24	217-893	Wiper switch	Cab option only
S25	217-762	Hazard switch	
S26	499-707	Blower switch	Cab option only
S27	499-708	A/C switch	
S28	499-709	Thermostat	
S29	214-946	Pressure switch	
U1	See notes	Engine ECU	No CMW service part available
U2	211-273	5-gauge cluster	
U3	217-239	Coordinated steer module	Coordinated steer option only
U4	220-569	Cruise control module	Cruise option only
U5	220-086	Trench depth meter	Trench depth meter option only
U6	220-556	Frame sensor	
U7	220-556	Boom sensor	

WIRING HARNESSES

RT115 TIER II

Ref. Number	Part Number	Quantity	Description
1	214-971	1	Frame/engine harness
2	214-887	1	Hydraulic filter harness
3	213-111	1	Starter solenoid harness
4	211-276	1	CAN tee
5	214-994	1	CAN cable (trunk)
6	213-336	1	Console harness
7	214-977	1	Seat harness
8	214-978	1	Hydraulic pump harness
9	214-975	1	Cruise control harness
10	213-065	1	Frame tilt option harness
11	214-976	1	Coordinated steer harness
12	214-995	1	CAN gauge harness
13	213-004	1	CAN diagnostic harness
14	213-061	1	CAN multiport module
15	211-078	4	Connector cap
16	213-062	1	Light kit harness
17	213-041	1	A/C harness
18	213-064	1	Washer pump harness
19	214-972	1	Backhoe harness
20	213-063	1	Wiper/washer harness
21	214-973	1	RC/RW harness
22	213-066	1	Reel winder harness
23	213-015	1	Positive battery cable
24	213-017	1	Negative battery cable
25	213-067	1	Preheater solenoid cable
26	213-068	1	Preheater cable
27	215-375	1	Battery cable (blk)
28	217-293	1	Backup alarm harness
29	217-274	1	Combo switch harness
30	213-120	1	Backhoe light harness
31	213-075	1	Trench depth meter harness
32	213-168	1	Proximity switch jumper
33	260-1062	1	CAN Diagnostic Tool

ELECTRICAL DIAGRAM
FRAME/ENGINE HARNESS

U1
ENGINE ECU

TERM #		TERM #		TERM #	
A1	CAVITY PLUG	A2	ORG/GRA (32)	A3	ORG/BRN (27)
B1	GRN/BLK (21)	B2	BLK/YEL (25)	B3	PNK (23)
C1	BLU/WHT (111)	C2	CAVITY PLUG	C3	BRN/BLK (22)
D1	TAN/BLK (20)	D2	PUR (24)	D3	YEL/BLK (16)
E1	GRA/BLU (18)	E2	BLU/GRN (17)	E3	CAVITY PLUG
F1	GRN (28)	F2	BLU/WHT (68)	F3	BLU/BLK (19)
G1	YEL (29)	G2	CAVITY PLUG	G3	TAN/BLK (33)
H1	CAVITY PLUG	H2	CAVITY PLUG	H3	CAVITY PLUG
J1	CAVITY PLUG	J2	BLK/BLU (1B)	J3	CAVITY PLUG
K1	RED/GRN (5)	K2	BRN (26)	K3	BRN/ORG (30)

MT2
TACHOMETER
SPEED PICKUP

YEL (13) BLK/BLU (1B)

R7
ENGINE
TEMPERATURE
SENDER

GRN (35)

GRN/BLK (21)
YEL/BLK (16)

COOLANT
TEMPERATURE
SENSOR
R3

R4
FUEL TEMP SENSOR

BRN/BLK (22) YEL/BLK (16)

MT1
CRANK SENSOR

PUR (24) BLK/YEL (25)

L2
FUEL CONTROL SOLENOID

BRN (26) ORG/BRN (27)

BLU (36)

OIL PRESSURE
SENDER
R8

B1
STARTER SOLENOID

S PUR (22) PUR (46)

1
3

DRAIN (1C)
4
N.C.1
3 GRN (28)
2 YEL (29)

YEL/BLK (16)
BLU/BLK (19)
BLU/GRN (17)

OIL PRESSURE SENSOR
R1

4
R5
5

MAIN CAN CONNECTION

TO J BOX
-1-

A
B

GRA/YEL (41) PUR (22)

HYDRAULIC FILTER
SWITCH
S10

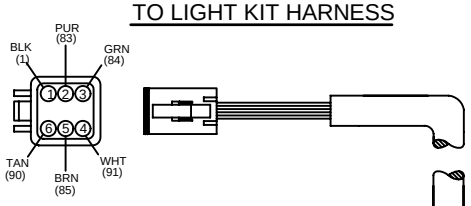
2

ELECTRICAL DIAGRAM
FRAME/ENGINE HARNESS

-YY-
TO POS BAT POST

RED (2A)

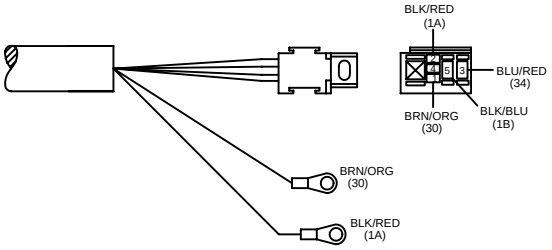
-GG-
TO LIGHT KIT HARNESS

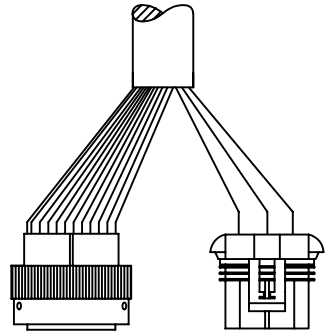


D

F

L1
AIR PREHEAT SOLENOID

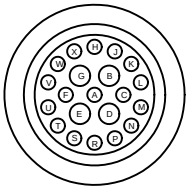




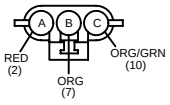
1

C

TERM #		TERM #		TERM #	
A	GRA/BLK (40)	H	BLK/RED (1A)	R	TAN/GRN (79)
B	PUR (83)	J	BLK/BLU (1B)	S	BLU/GRN (17)
C	BLK/ORG (110)	K	WHT (91)	T	YEL (13)
D	GRN (84)	L	RED/BLU (11)	U	BRN (43)
E	ORG/GRN (10)	M	PUR (96)	V	YEL/BLU (75)
F	CAVITY PLUG	N	PUR/ORG (50)	W	YEL/GRA (74)
G	BRN (85)	P	TAN/WHT (80)	X	BRN/YEL (15)



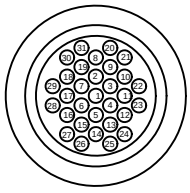
-BB-

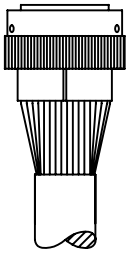


-AA-

TO CONSOLE HARNESS

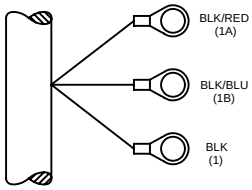
-CC-





B

S1
TO BATTERY DISCONNECT



TERM #		TERM #		TERM #	
1	RED/GRN (5)	11	GRN/BLK (65)	21	GRN (35)
2	GRA/GRN (57)	12	GRA/BLU (62)	22	BLU (36)
3	TAN/GRN (53)	13	GRN/RED (61)	23	TAN (42)
4	PNK (23)	14	GRN/BLU (63)	24	BLU/RED (34)
5	GRA (105)	15	GRA (108)	25	TAN/BLK (32)
6	WHT (106)	16	WHT (109)	26	ORG/GRA (33)
7	BLU/GRN (55)	17	BLU/GRN (60)	27	GRA/YEL (41)
8	GRA (54)	18	ORG/BRN (64)	28	BLU/GRN (37)
9	GRA/RED (58)	19	TAN/BLU (67)	29	WHT/GRN (38)
10	TAN/RED (52)	20	BLU/BLK (66)	30	WHT/RED (48)
				31	WHT/BLU (39)

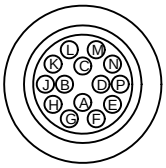
A

E

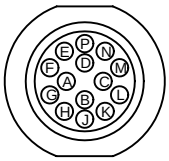
ELECTRICAL DIAGRAM
FRAME/ENGINE HARNESS

TERM #		TERM #	
A	BLK (1)	H	RED (2A)
B	BLK/RED (1A)	J	YEL/GRA (74)
C	YEL/BLK (16)	K	YEL/BLU (75)
D	BLU/WHT (68)	L	PUR/RED (76)
E	BLU/GRN (17)	M	TAN/GRN (79)
F	ORG (7)	N	TAN/WHT (80)
G	BLK/ORG (110)	P	CAVITY PLUG

TERM #		TERM #	
A	CAVITY PLUG	H	CAVITY PLUG
B	BLK/ORG (110)	J	CAVITY PLUG
C	CAVITY PLUG	K	CAVITY PLUG
D	CAVITY PLUG	L	CAVITY PLUG
E	CAVITY PLUG	M	CAVITY PLUG
F	CAVITY PLUG	N	CAVITY PLUG
G	BLK/ORG (110)	P	CAVITY PLUG



-DD-
TO BACKHOE



CAP
J5

D+

D1

ORG/GRN (10)

G1
TO ALTERNATOR

B+
RED (2A)

D-
BLK (1)

1

R2
MANIFOLD AIR TEMPERATURE SENSOR

TAN/BLK (20)

YEL/BLK (16)

A B

C

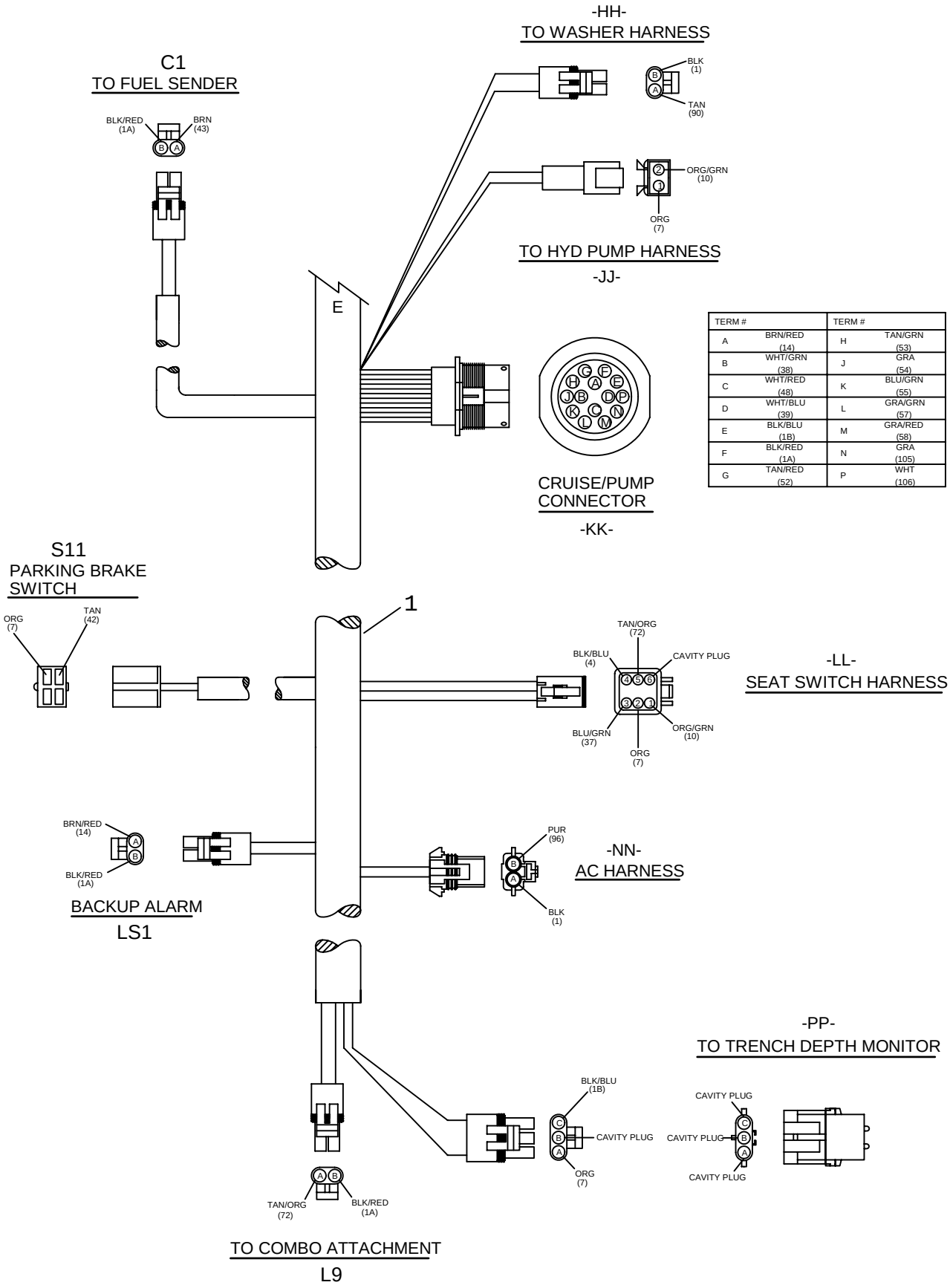
LS2
HORN

BLK/RED (1A)

BRN/YEL (15)

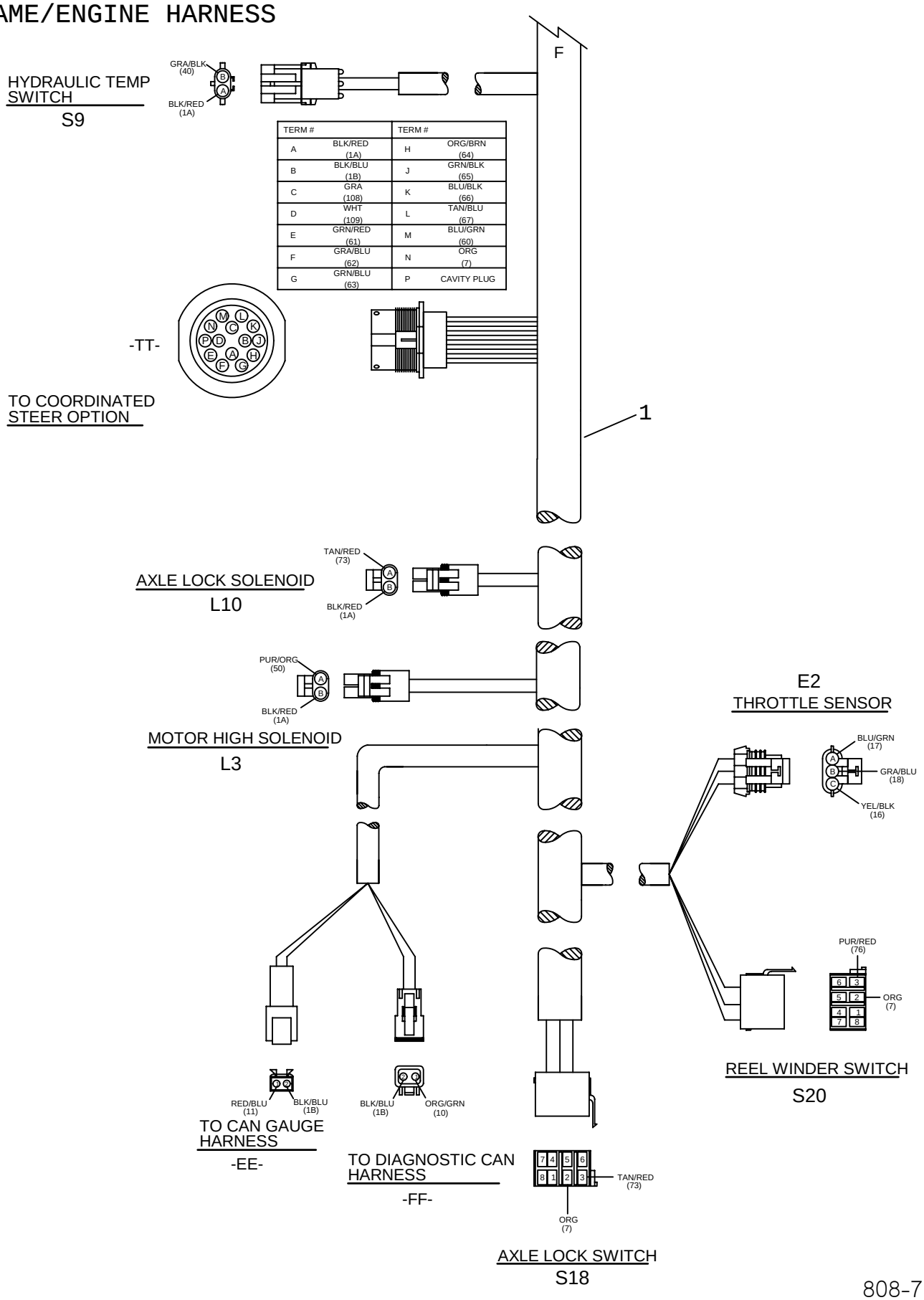
D

ELECTRICAL DIAGRAM
FRAME/ENGINE HARNESS

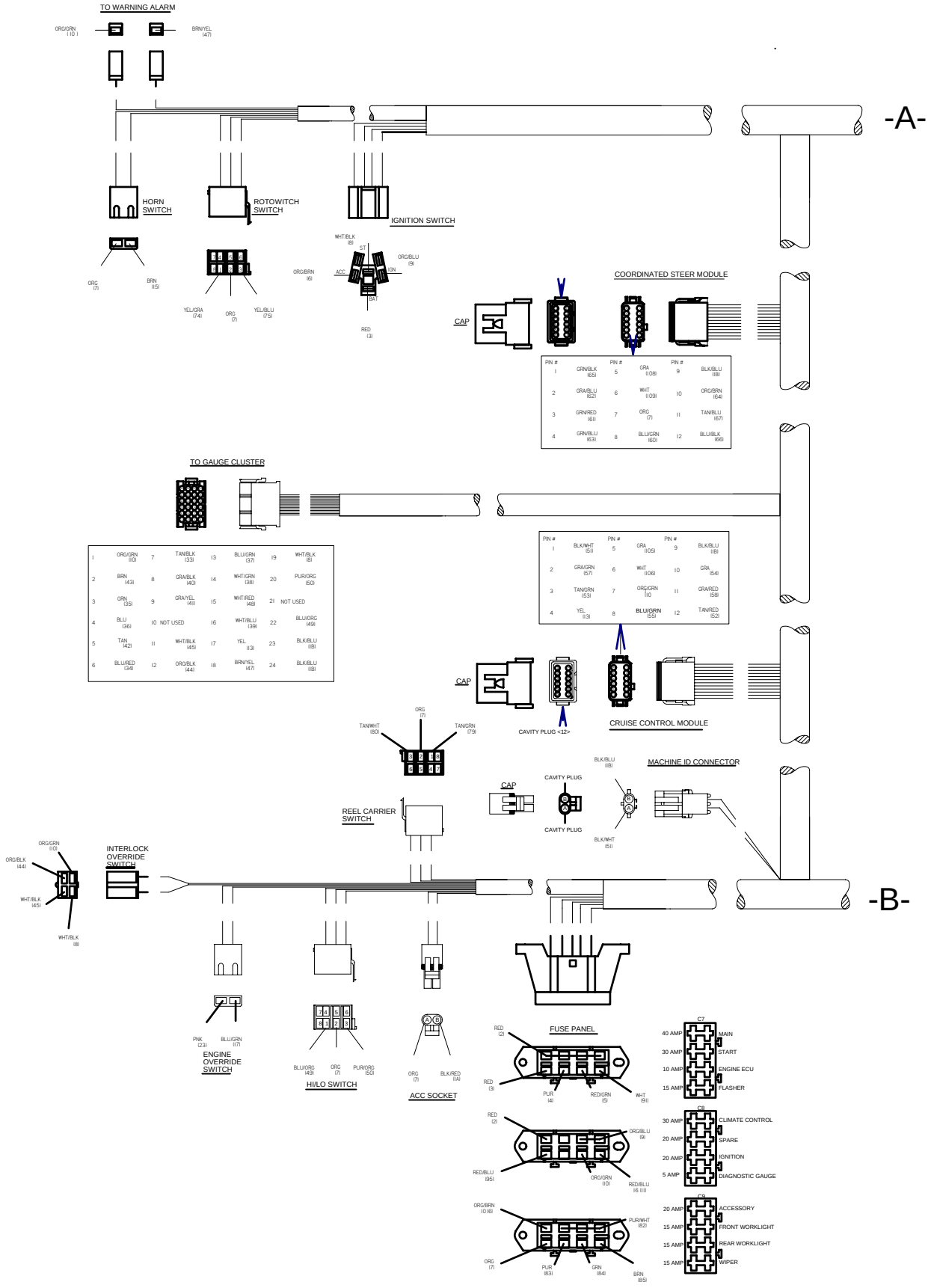


TERM #		TERM #	
A	BRN/RED (14)	H	TAN/GRN (53)
B	WHT/GRN (38)	J	GRA (54)
C	WHT/RED (48)	K	BLU/GRN (55)
D	WHT/BLU (39)	L	GRA/GRN (57)
E	BLK/BLU (1B)	M	GRA/RED (58)
F	BLK/RED (1A)	N	GRA (105)
G	TAN/RED (52)	P	WHT (106)

ELECTRICAL DIAGRAM
FRAME/ENGINE HARNESS

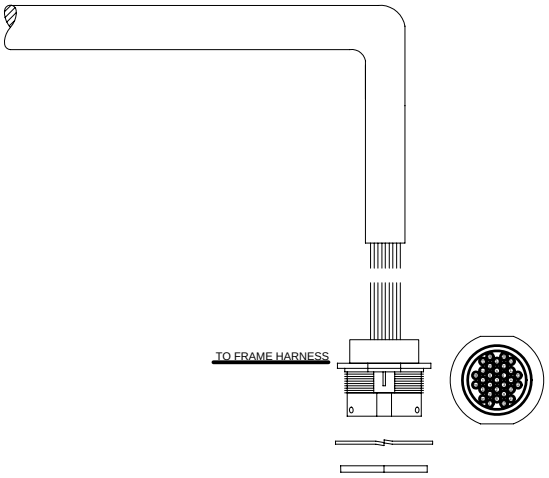


ELECTRICAL DIAGRAM
CONSOLE HARNESS



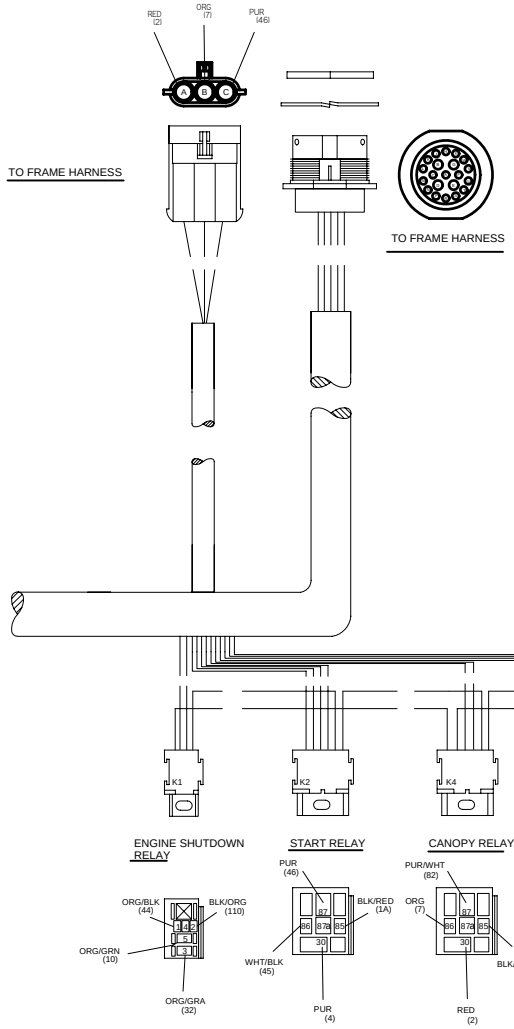
ELECTRICAL DIAGRAM
CONSOLE HARNESS

-A-



PIN #		PIN #		PIN #	
1	RED/GRN (5)	11	GRN/BLK (65)	21	GRN (35)
2	GRA/GRN (57)	12	GRA/BLU (62)	22	BLU (36)
3	TAN/GRN (53)	13	GRN/RED (61)	23	TAN (42)
4	PNK (23)	14	GRN/BLU (63)	24	BLU/RED (34)
5	GRA (105)	15	GRA (108)	25	TAN/BLK (33)
6	WHT (106)	16	WHT (109)	26	ORG/GRA (32)
7	BLU/GRN (55)	17	BLU/GRN (60)	27	GRA/YEL (41)
8	GRA (54)	18	ORG/BRN (64)	28	BLU/GRN (37)
9	GRA/RED (58)	19	TAN/BLU (67)	29	WHT/GRN (38)
10	TAN/RED (52)	20	BLU/BLK (66)	30	WHT/RED (48)
				31	WHT/BLU (39)

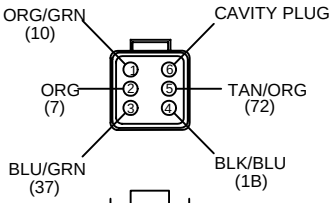
-B-

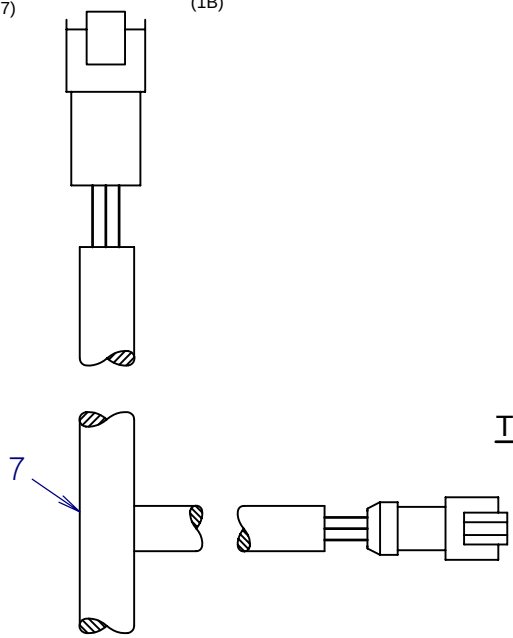


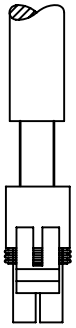
PIN #		PIN #		PIN #	
A	GRA/BLK (40)	H	BLK/RED (1A)	R	TAN/GRN (79)
B	PUR (83)	J	BLK/BLU (1B)	S	BLU/GRN (17)
C	BLK/ORG (110)	K	WHT (91)	T	YEL (13)
D	GRN (84)	L	RED/BLU (11)	U	BRN (43)
E	ORG/GRN (10)	M	PUR (96)	V	YEL/BLU (75)
F	WHT/BLK (8)	N	PUR/ORG (50)	W	YEL/GRA (74)
G	BRN (85)	P	TAN/WHT (80)	X	BRN (15)

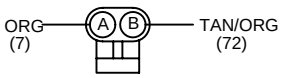
ELECTRICAL DIAGRAM
SEAT HARNESS

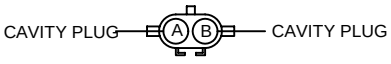
-LL-
TO FRAME / ENGINE HARNESS

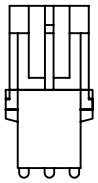








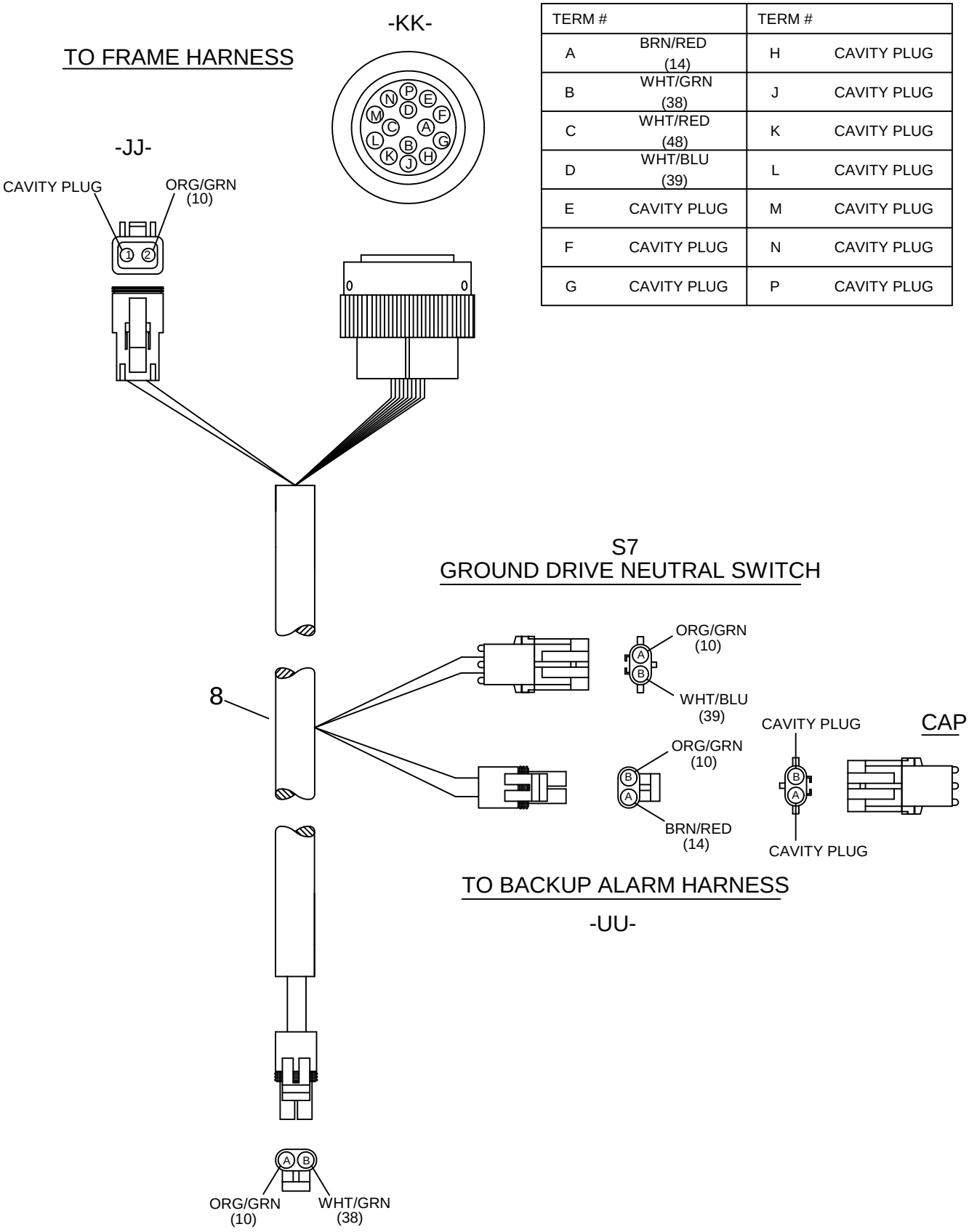




CAP

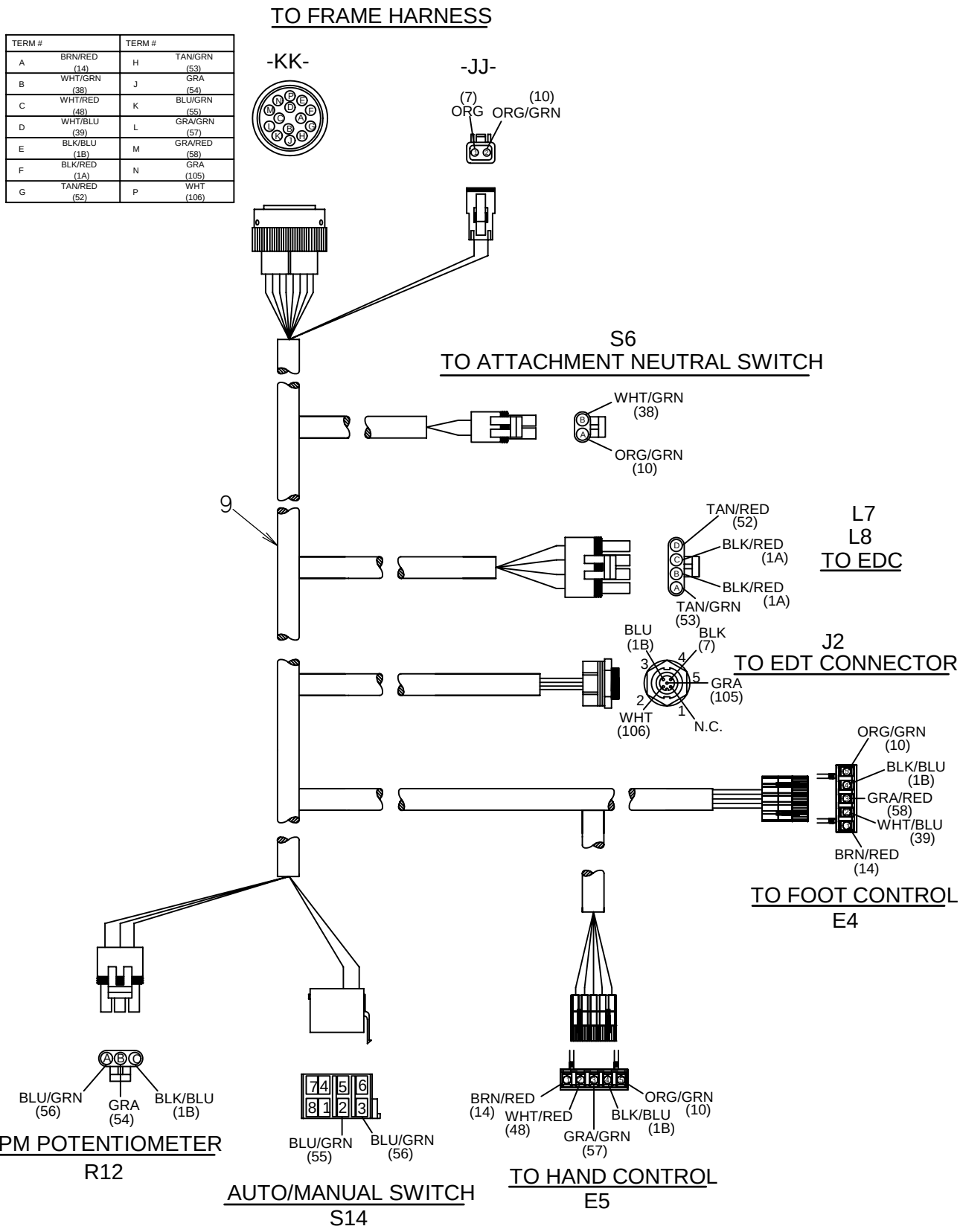
TO COMBO SWITCH HARNESS
-SS-

ELECTRICAL DIAGRAM
HYDRAULIC PUMP HARNESS



TERM #		TERM #	
A	BRN/RED (14)	H	CAVITY PLUG
B	WHT/GRN (38)	J	CAVITY PLUG
C	WHT/RED (48)	K	CAVITY PLUG
D	WHT/BLU (39)	L	CAVITY PLUG
E	CAVITY PLUG	M	CAVITY PLUG
F	CAVITY PLUG	N	CAVITY PLUG
G	CAVITY PLUG	P	CAVITY PLUG

ELECTRICAL DIAGRAM
CRUISE CONTROL HARNESS

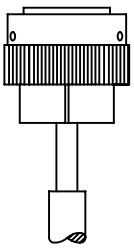


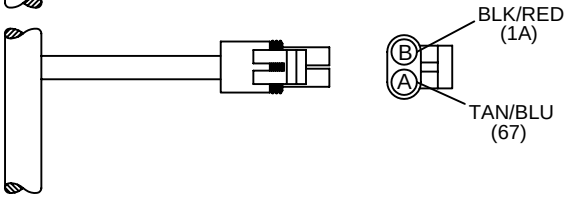
ELECTRICAL DIAGRAM
FRAME TILT OPTION HARNESS

-TT-

TO FRAME HARNESS

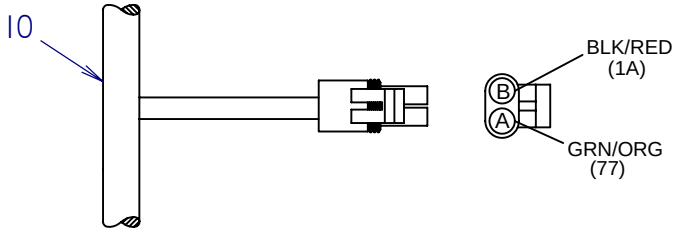
TERM #		TERM #	
A	BLK/RED (1A)	H	CAVITY PLUG
B	CAVITY PLUG	J	CAVITY PLUG
C	CAVITY PLUG	K	CAVITY PLUG
D	CAVITY PLUG	L	CAVITY PLUG
E	CAVITY PLUG	M	CAVITY PLUG
F	CAVITY PLUG	N	ORG (7)
G	CAVITY PLUG	P	CAVITY PLUG





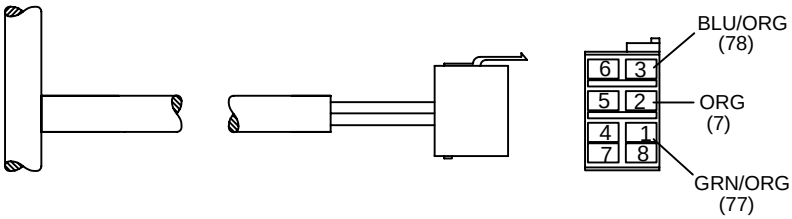
L6

BYPASS SOLENOID



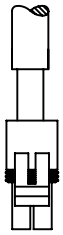
L17

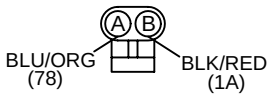
FRAME TILT RIGHT



TO FRAME TILT SWITCH

S21

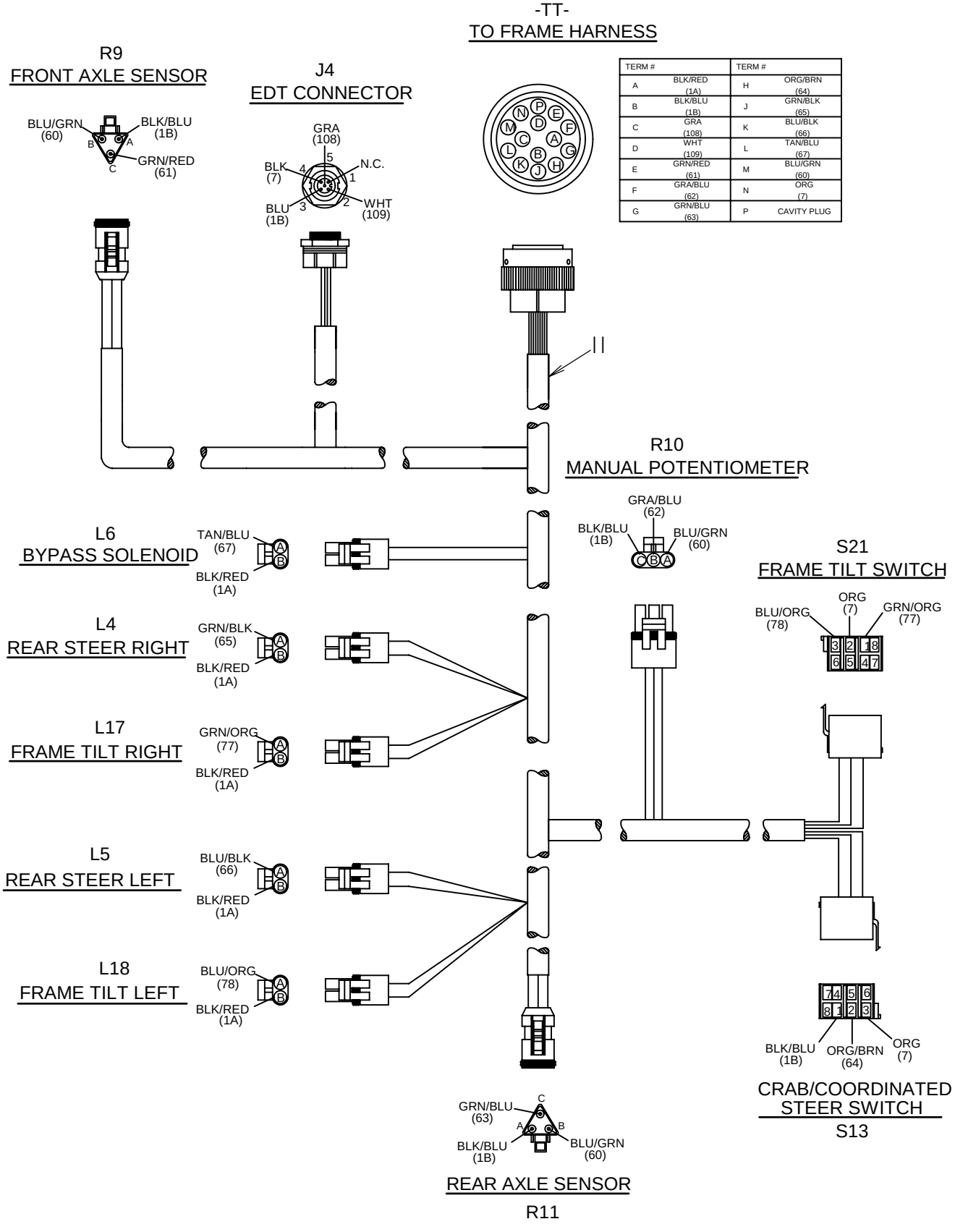




FRAME TILT LEFT

L18

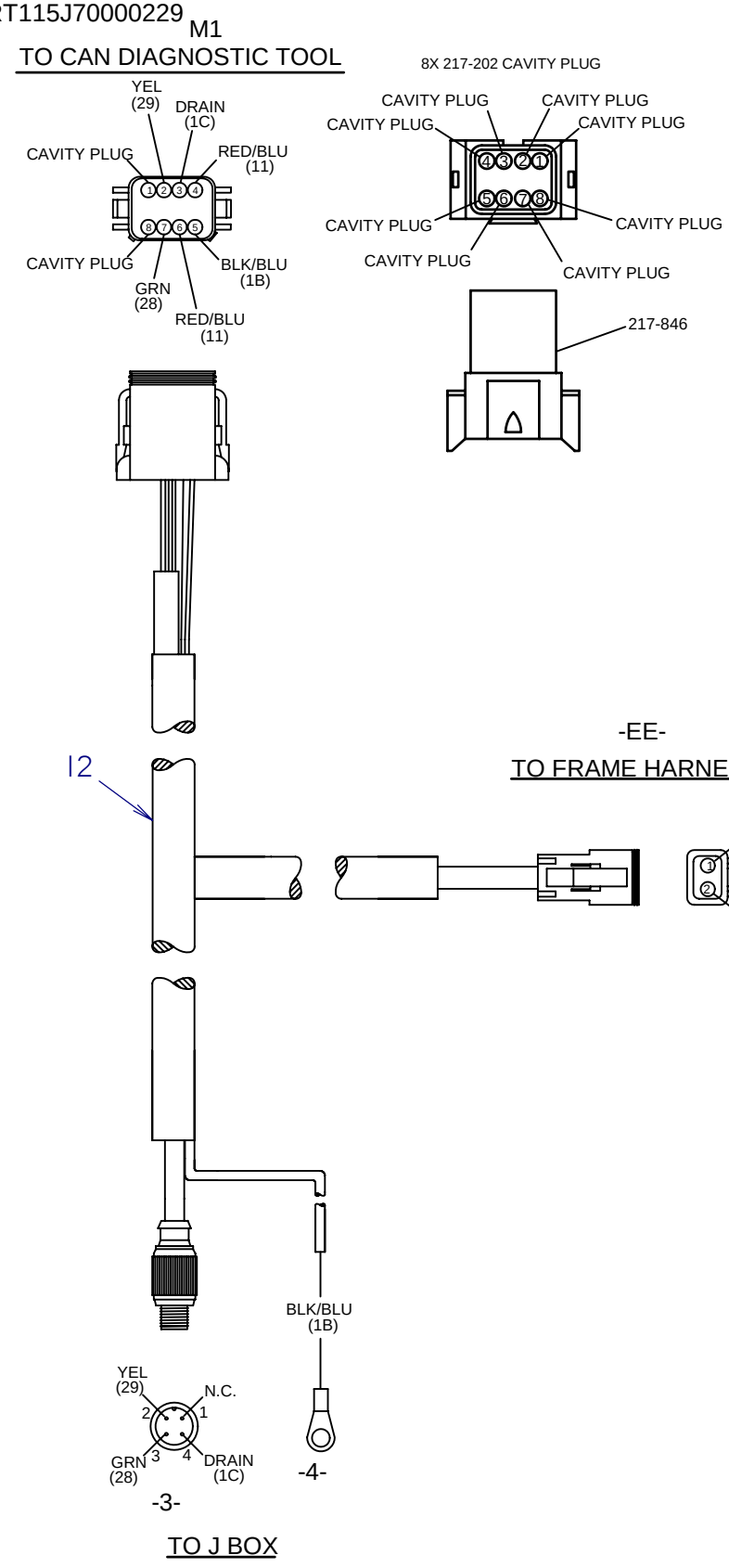
ELECTRICAL DIAGRAM
COORDINATED STEER HARNESS



ELECTRICAL DIAGRAM

J1939 CAN GAUGE HARNESS

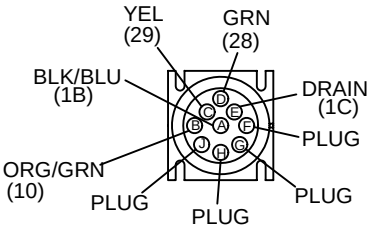
BEGINS WITH S/N CMWHT115J70000047
BEGINS WITH S/N CMWRT115J70000229

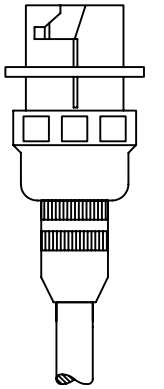


ELECTRICAL DIAGRAM
CAN DIAGNOSTIC HARNESS

J1

PC CONNECTION

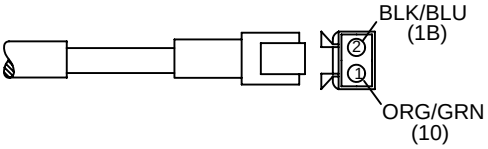


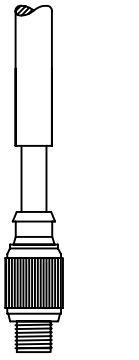


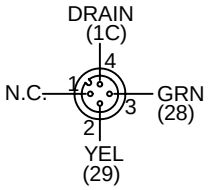
I3

-FF-

TO FRAME HARNESS







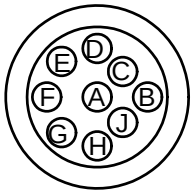
TO J BOX

-2-

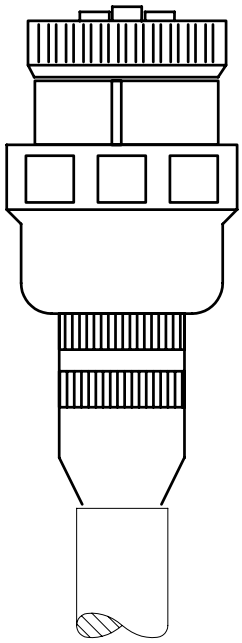
ELECTRICAL DIAGRAM

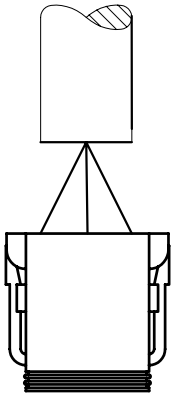
HARNESS INFO FOR CAN DIAGNOSTIC TOOL

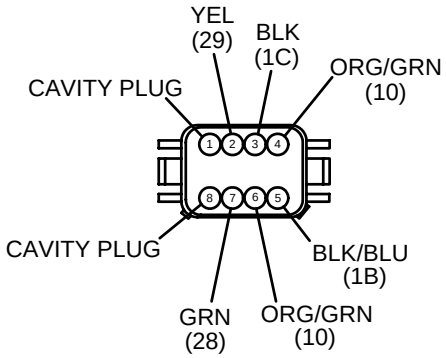
BEGINS WITH S/N CMWHT115J70000047
BEGINS WITH S/N CMWRT115J70000229



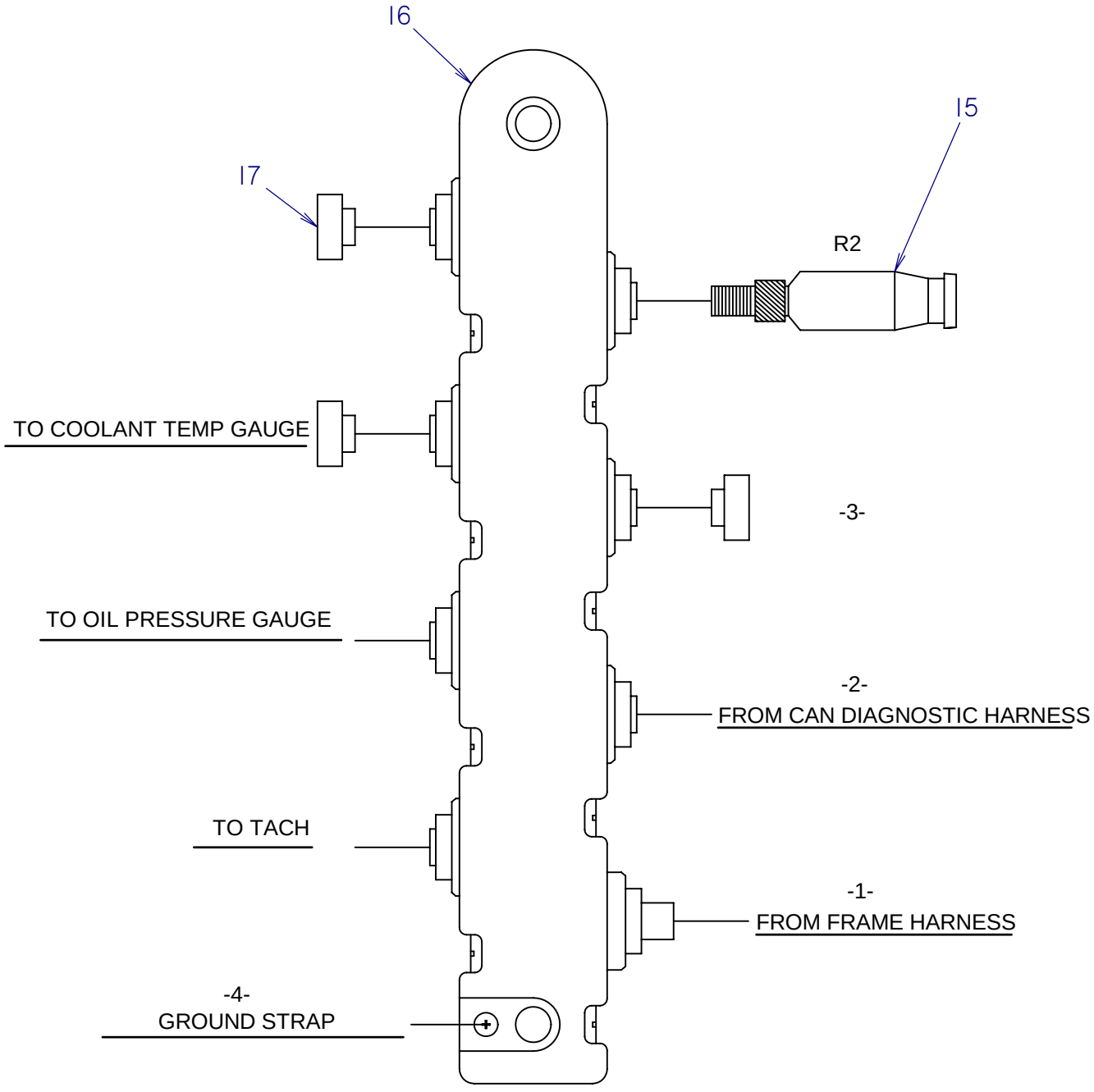
PIN#		PIN#	
A	BLK/BLU (1B)	F	CAVITY PLUG
B	ORG/GRN (10)	G	CAVITY PLUG
C	YEL (29)	H	CAVITY PLUG
D	GRN (28)	J	CAVITY PLUG
E	BLK (1C)		



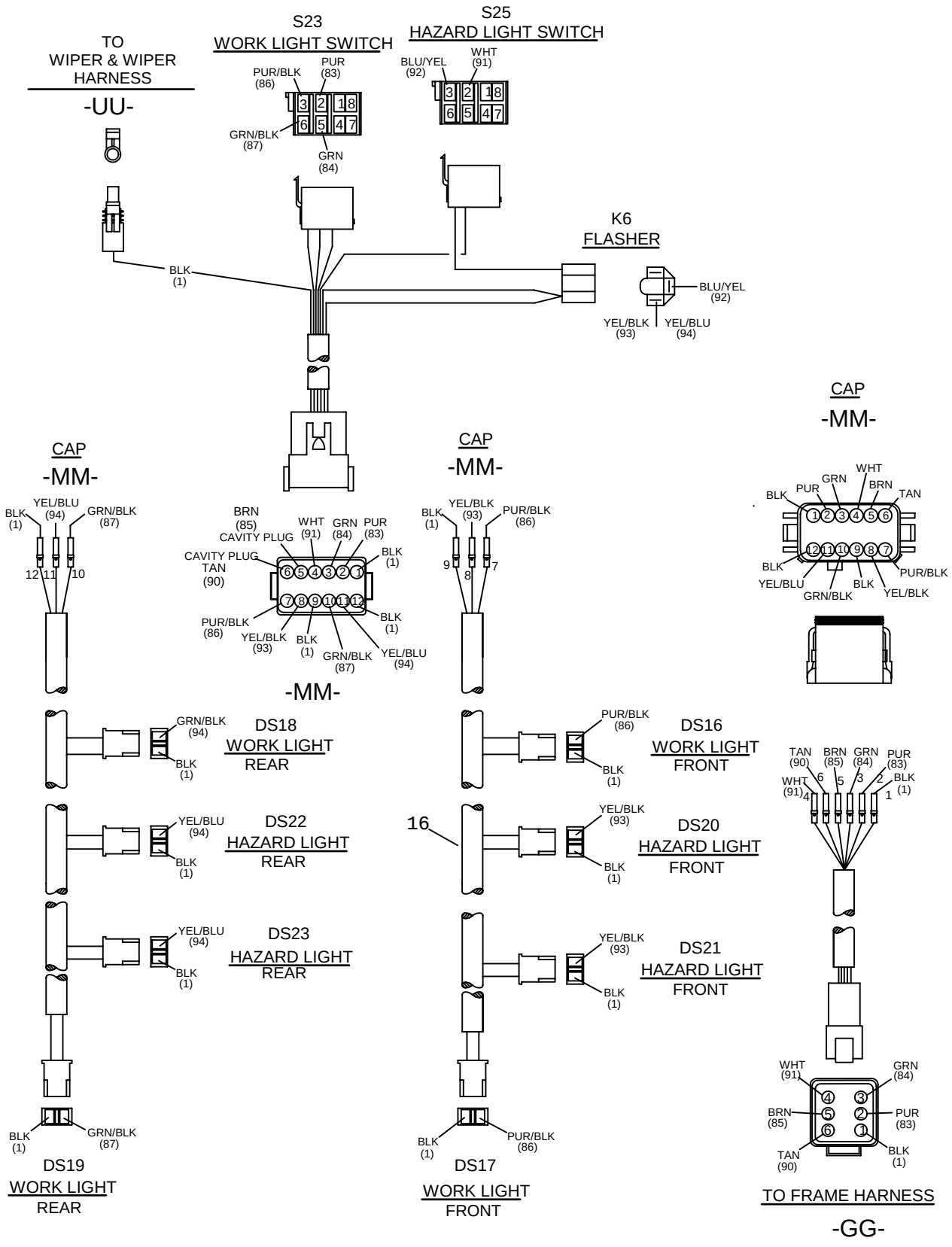




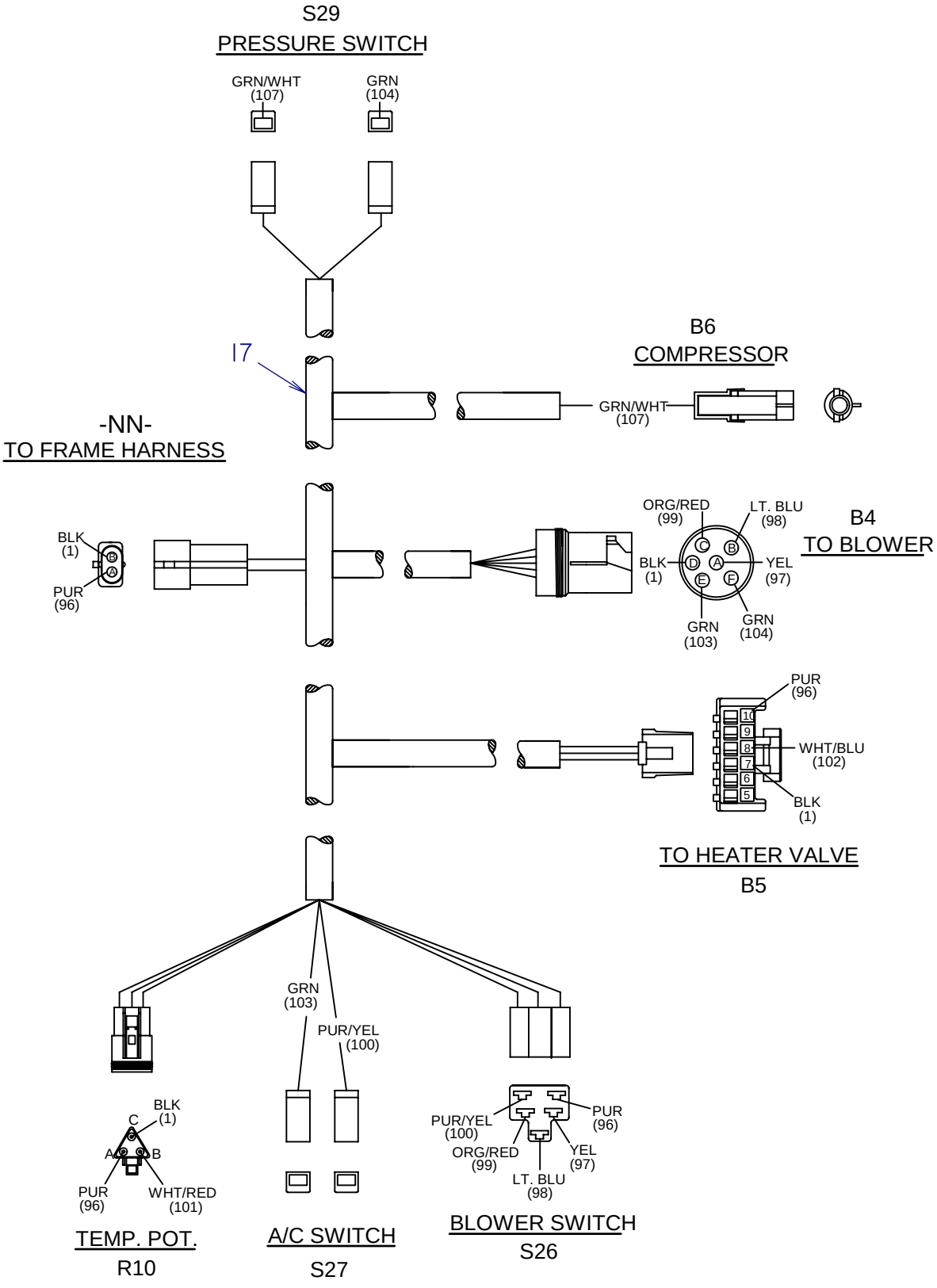
CAN MULTIPORT MODULE



ELECTRICAL DIAGRAM
LIGHT KIT HARNESS



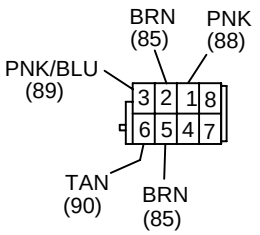
ELECTRICAL DIAGRAM
A/C HARNESS

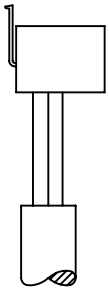


ELE DIA-WIPER/ WASHER HARNESS

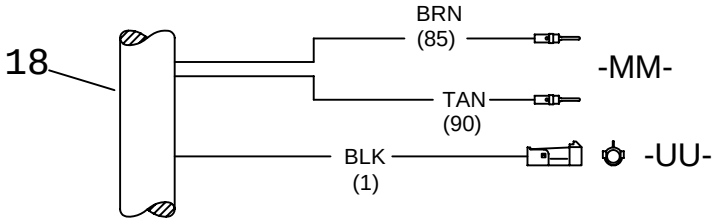
S24

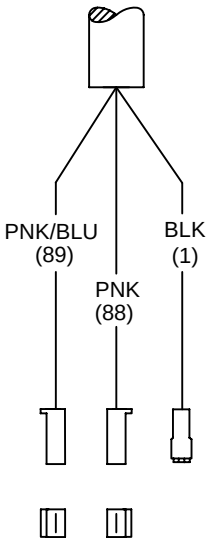
WIPER & WASHER SWITCH





TO WORK LIGHT HARNESS





TO WIPER MOTOR

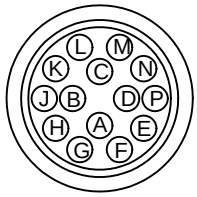
B2

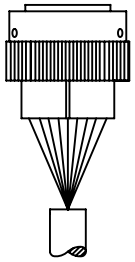
ELECTRICAL DIAGRAM
BACKHOE HARNESS

-DD-

TO FRAME HARNESS

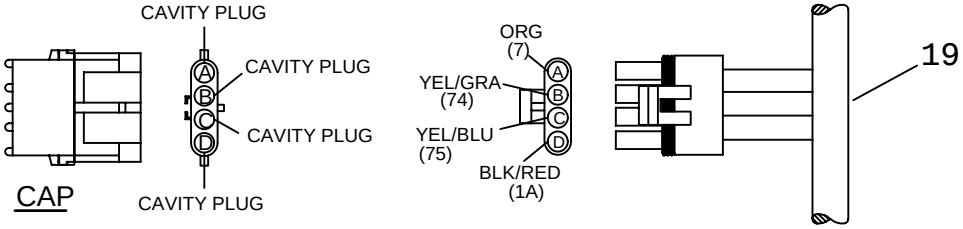
TERM #		TERM #	
A	BLK (1)	H	CAVITY PLUG
B	BLK/RED (1A)	J	YEL/GRA (74)
C	YEL/BLK (16)	K	YEL/BLU (75)
D	BLU/WHT (68)	L	CAVITY PLUG
E	BLU/GRN (17)	M	CAVITY PLUG
F	ORG (7)	N	CAVITY PLUG
G	BLK/ORG (110)	P	CAVITY PLUG





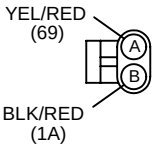
-VV-

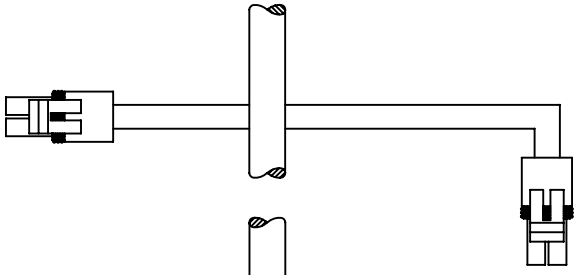
TO RC/RW HARNESS



S15

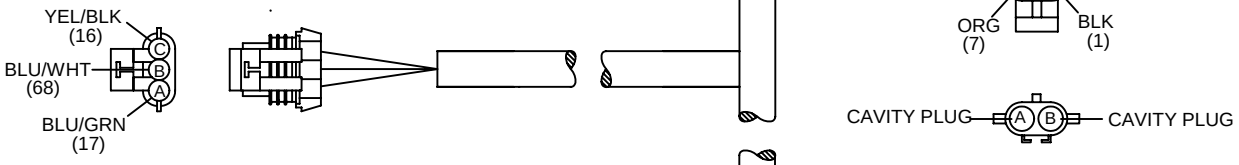
ENGINE STOP SWITCH

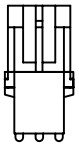




E6

THROTTLE SENSOR

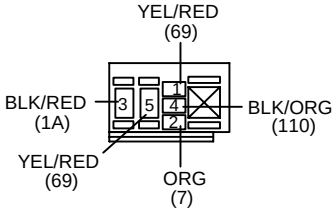


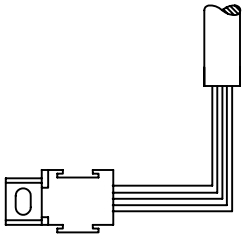


CAP

K3

ENGINE STOP RELAY





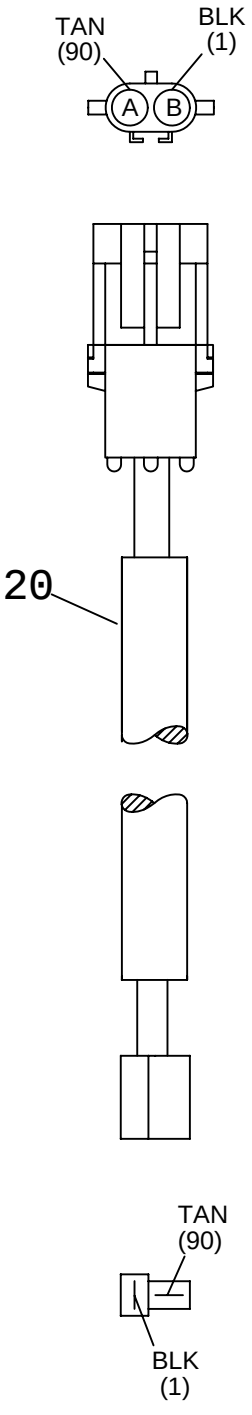
TO BACKHOE LIGHT HARNESS

-WW-

ELECTRICAL DIAGRAM
WASHER PUMP HARNESS

-HH-

TO FRAME HARNESS



TO WASHER PUMP

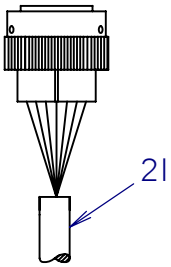
B3

ELECTRICAL DIAGRAM
RC/RW HARNESS

-DD-

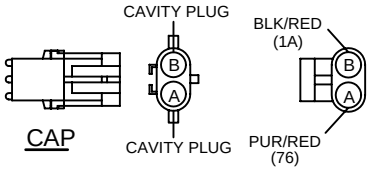
TO FRAME HARNESS

TERM #		TERM #	
A	CAVITY PLUG	H	CAVITY PLUG
B	BLK/RED (1A)	J	YEL/GRA (74)
C	CAVITY PLUG	K	YEL/BLU (75)
D	CAVITY PLUG	L	PUR/RED (76)
E	CAVITY PLUG	M	TAN/GRN (79)
F	ORG (7)	N	TAN/WHT (80)
G	BLK/ORG (110)	P	CAVITY PLUG



-XX-

TO REEL WINDER

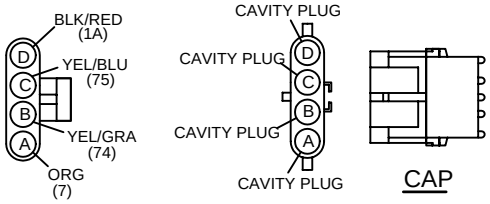


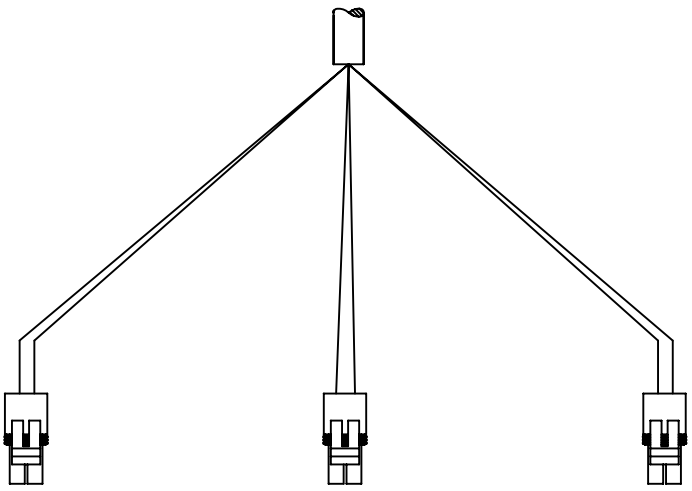
-VV-

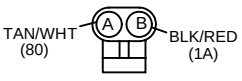
L11

L12

TO DRILLING ATTACHMENT

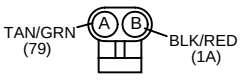






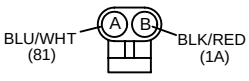
REEL CARRIER DOWN SOLENOID

L20



REEL CARRIER UP SOLENOID

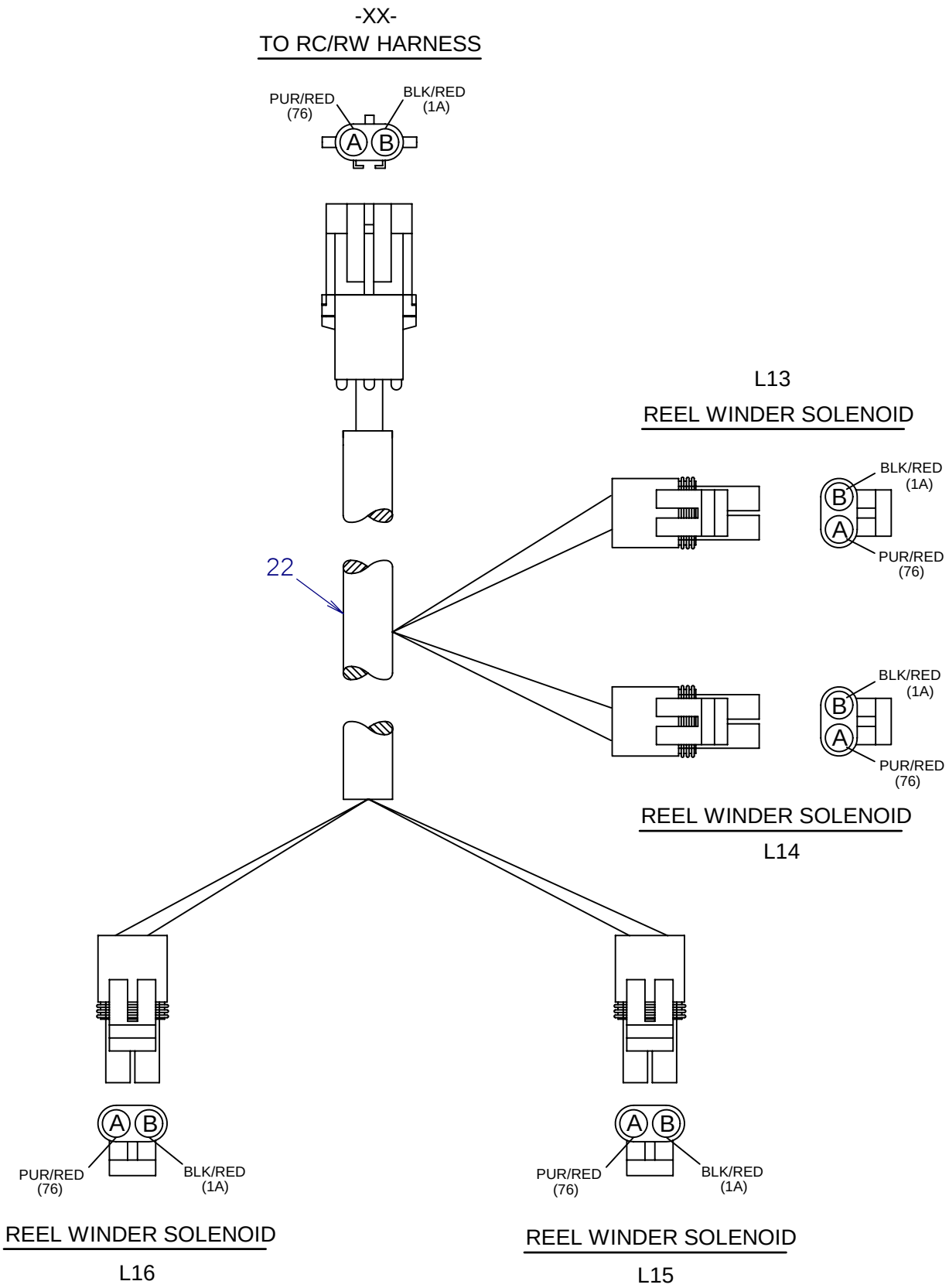
L19



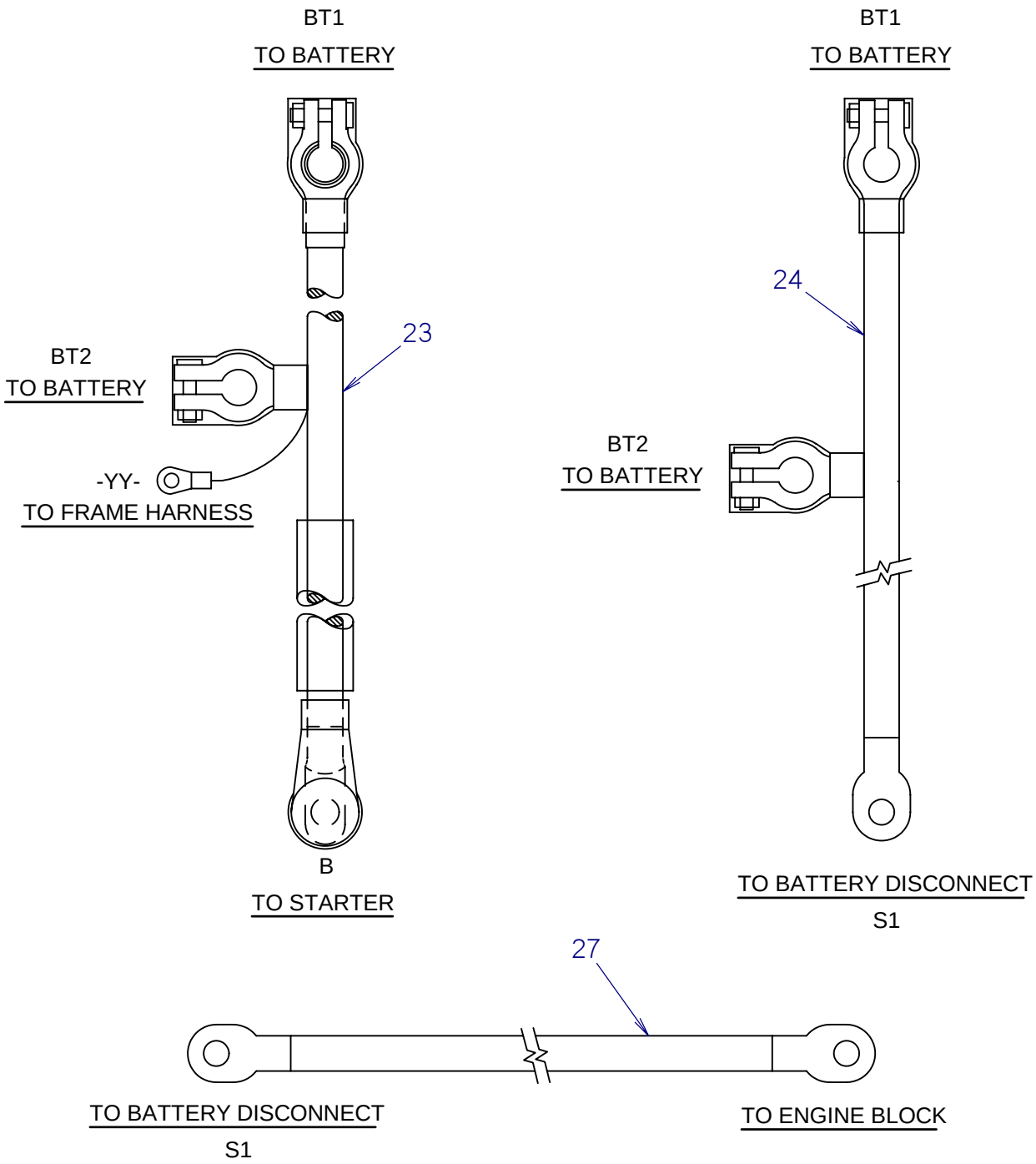
BYPASS SOLENOID

L21

ELECTRICAL DIAGRAM
REEL WINDER HARNESS



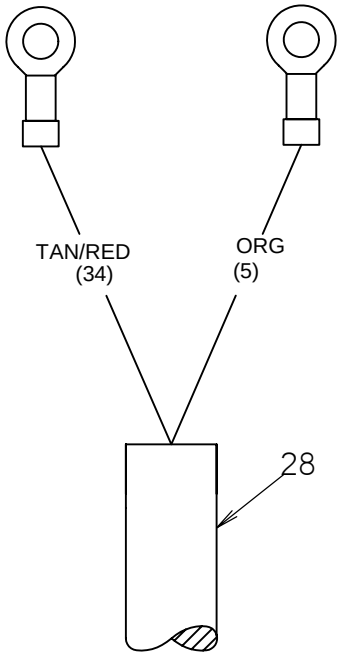
BATTERY CABLES
BATTERY CABLES

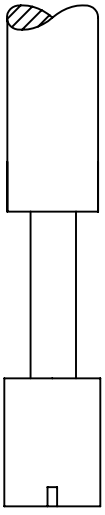


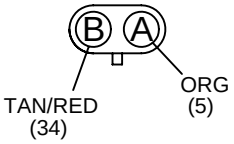
ELECTRICAL DIAGRAM
BACKUP ALARM HARNESS

S5

TO BACKUP ALARM SWITCH







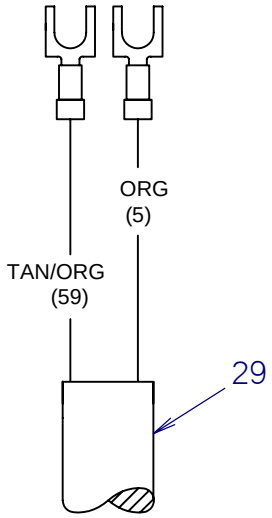
TO HYDRAULIC PUMP HARNESS

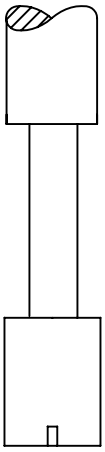
-UU-

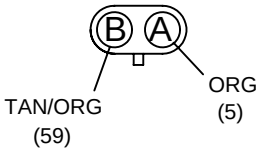
ELECTRICAL DIAGRAM
COMBO SWITCH HARNESS

S17

TO COMBO SELECT SWITCH



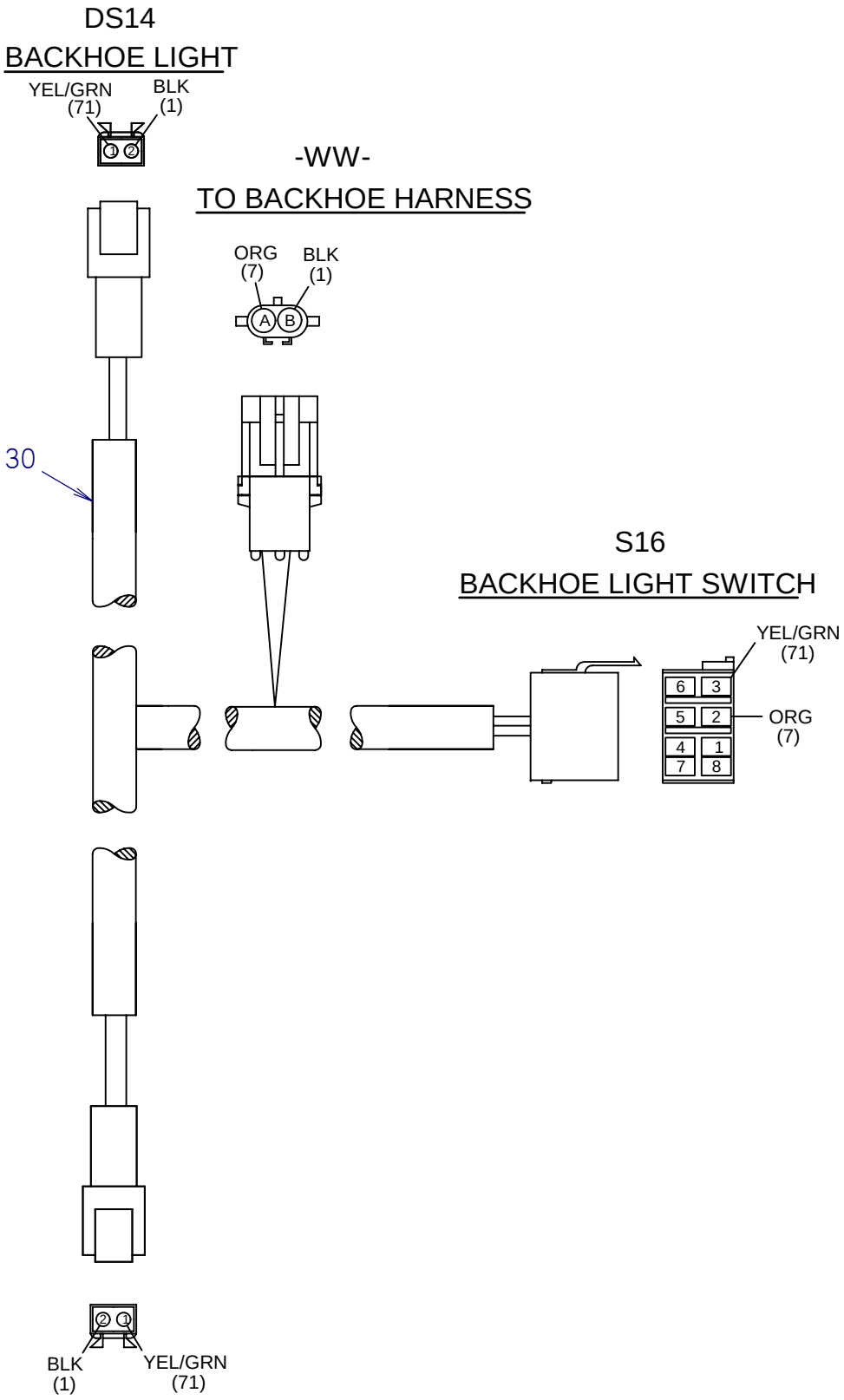




TO SEAT HARNESS

-SS-

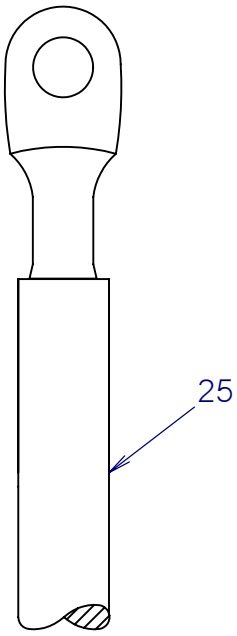
ELECTRICAL DIAGRAM
BACKHOE LIGHT HARNESS



PREHEATER CABLES
PREHEATER CABLES

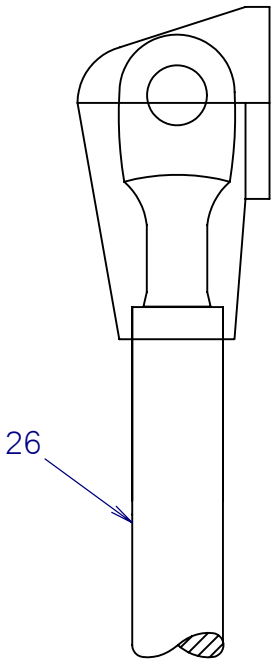
BT1

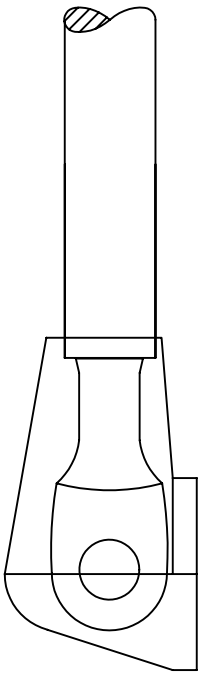
TO BATTERY



HR1

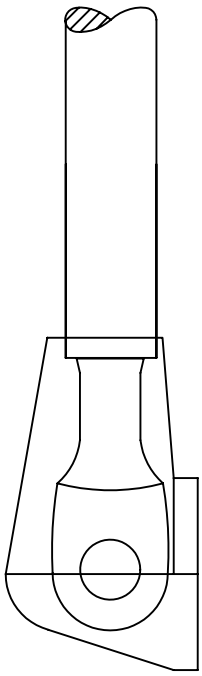
TO INTAKE AIR PREHEATER





TO PREHEAT SOLENOID

L1

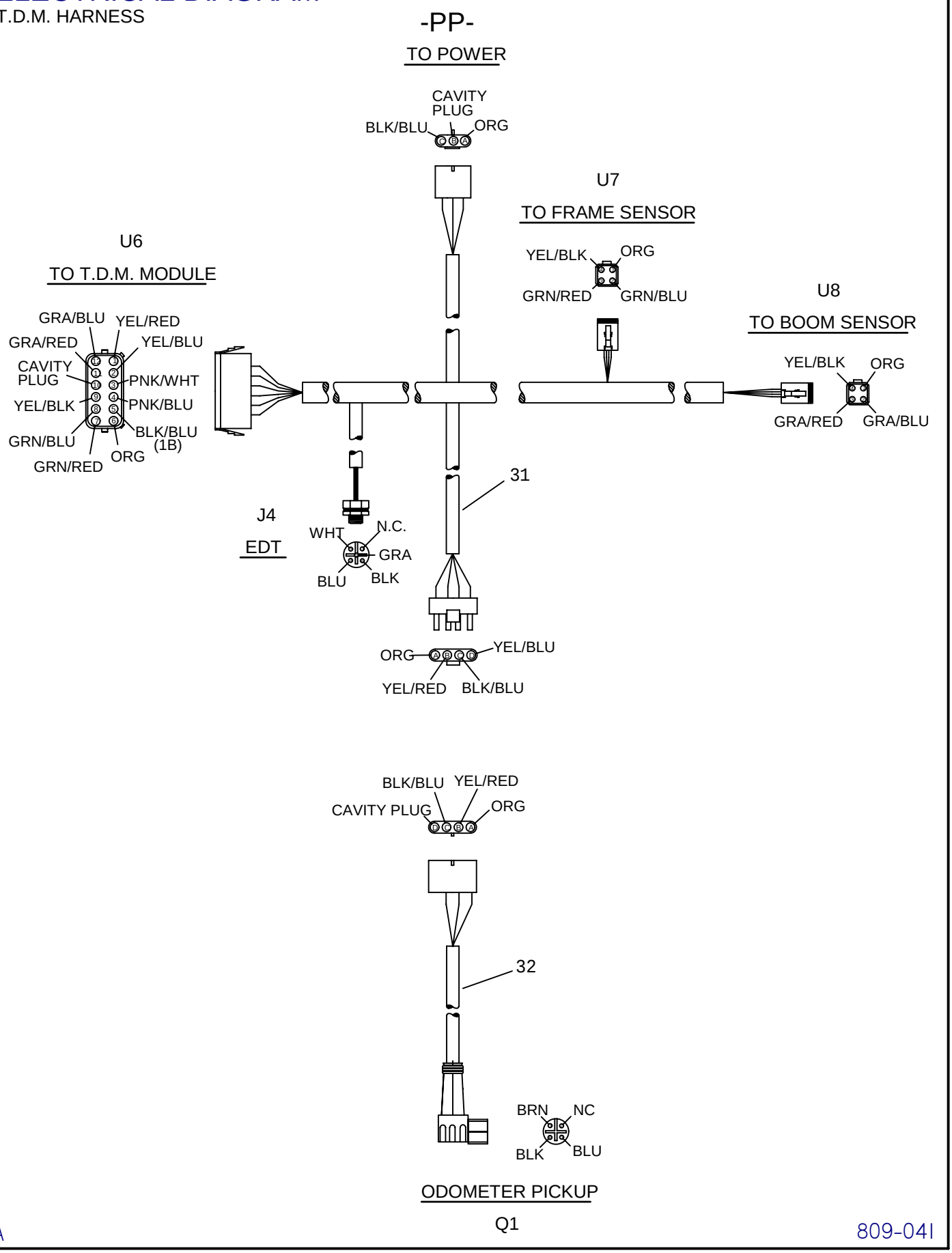


TO PREHEAT SOLENOID

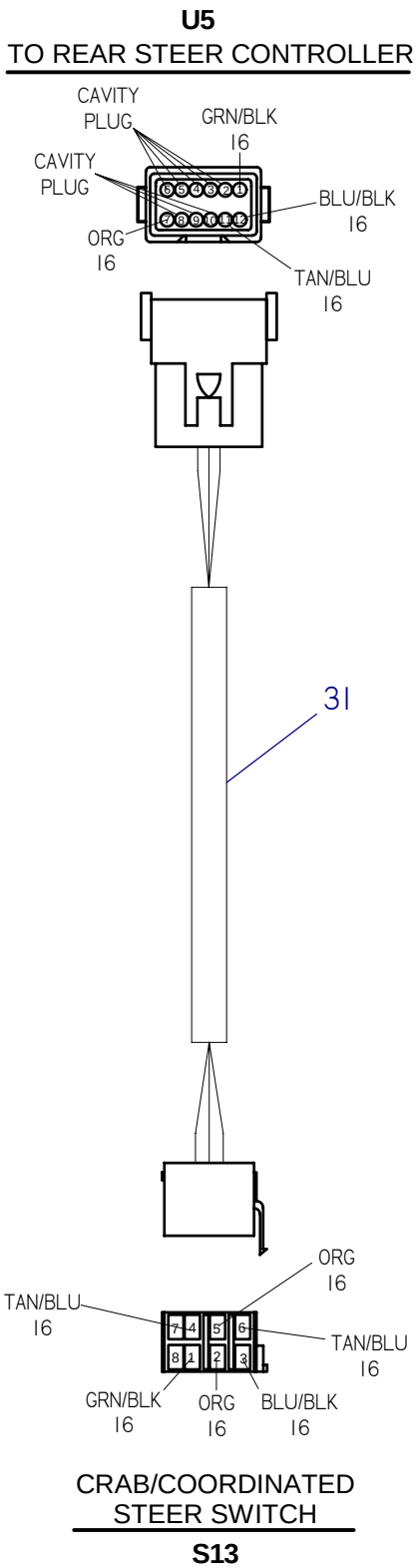
L1

ELECTRICAL DIAGRAM

T.D.M. HARNESS

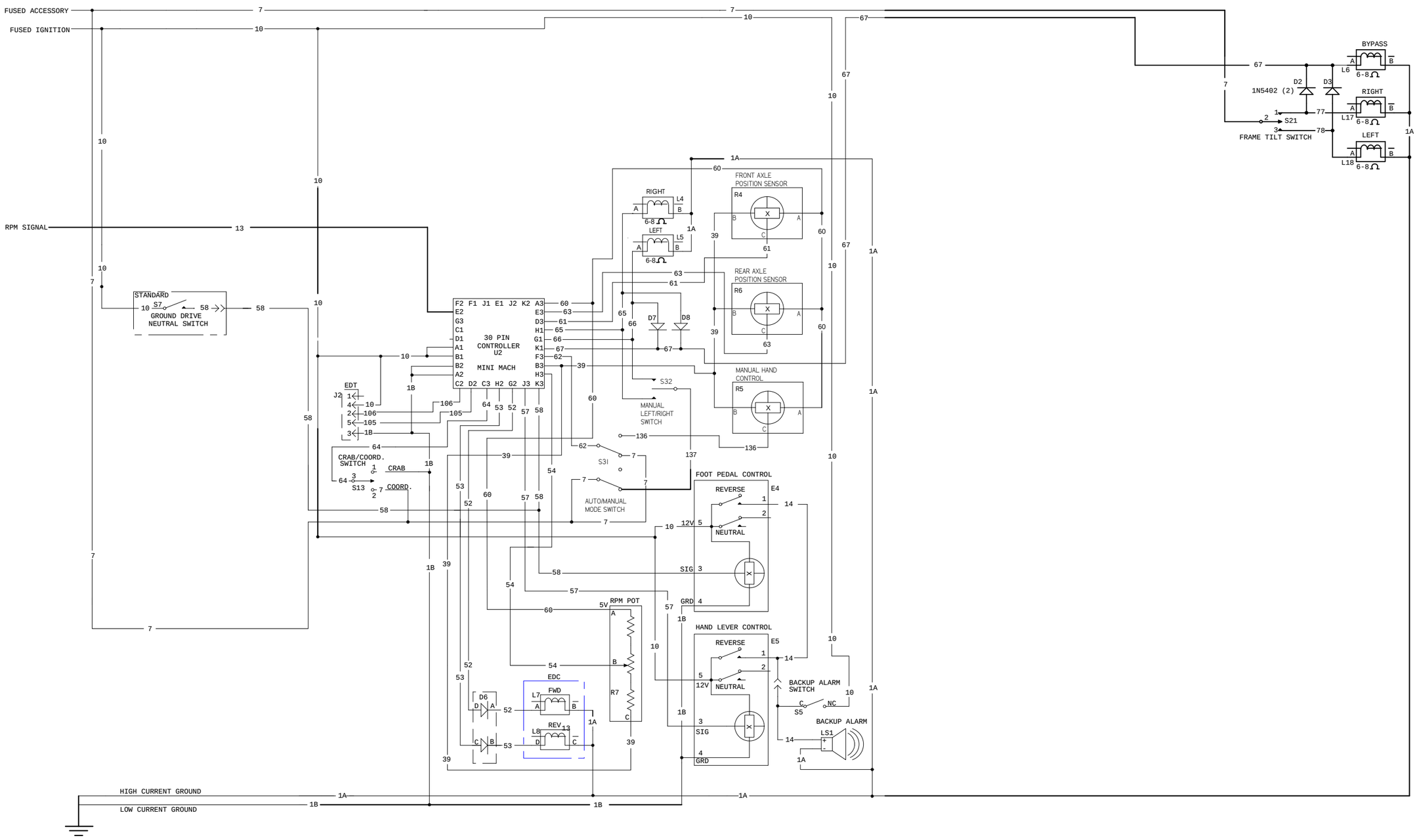


ELECTRICAL DIAGRAM
REAR STEER BYPASS HARNESS



REAR STEER ELECTRICAL SCHEMATIC ADDITION

RT70M/H, RT90M/H, RT75M/H, RT95T2M/H, RT115H, & RT115T2



COMPONENT DESCRIPTIONS

RT70M/H, RT90M/H, RT75M/H, RT95T2M/H, RT115H, RT115T2

Ref. No.	Part No.	Component	Notes
D2	See notes	Frame tilt diode	1N5402
D3	See notes	Frame tilt diode	
D6	214-449	Diode pack	Cruise option only
D7	See notes	Rear steer bypass diode	1N5402
D8	See notes	Rear steer bypass diode	
E4	215-1537	Foot pedal control	Cruise option only
E5	215-1536	Hand lever control	
J2	See notes	EDT connection	Machine ecu connection
L4	217-948	Coordinated steer right solenoid	Coordinated steer option only
L5	217-948	Coordinated steer left solenoid	
L6	214-909	Bypass solenoid	
L7	See notes	EDC forward solenoid	No CMW service part available
L8	See notes	EDC reverse solenoid	
L17	217-948	Frame tilt right solenoid	Frame tilt option only
L18	217-948	Frame tilt left solenoid	
LS1	306-602	Backup alarm switch	Saw option only
M5	211-326	Engine temperature gauge	
R4	215-1503	Front axle position sensor	Coordinated steer option only
R5	215-1619	Manual hand control	
R6	215-1503	Rear axle position sensor	
R7	217-892	RPM potentiometer	Cruise option only
S7	See notes	Ground drive neutral switch	
S8	217-704	Bypass switch	
S12	217-762	Speed select switch	
S13	217-854	Crab/coordinated steer switch	Coordinated steer option only
S14	217-789	Cruise switch	Cruise option only
S21	217-764	Frame tilt switch	
S30	215-1015	User Interface button	
S31	217-072	Auto/Manual Mode Switch	Coordinated steer option only
S32	217-817	Manual Left/Right Switch	Coordinated steer option only
U2	220-1213	30 pin controller	

CIRCUITS DESCRIPTIONS

RT70M/H, RT90M/H, RT75M/H, RT95T2M/H, RT115H, RT115T2

Circuit Number	Wire Color	Function
1A	blk/red	Medium current ground
1B	blk/blu	Low current ground
7	org	Fused accessory circuit
10	org/grn	Fused ignition circuit
13	yel	Tachometer circuit
14	brn/red	Backup alarm switch to backup alarm
39	yel/blk	Analog return
52	tan/red	Machine ECU to Diode to EDC forward solenoid
53	tan/grn	Machine ECU to Diode to EDC reverse solenoid
54	gra	RPM potentiometer to Machine ECU
57	gra/grn	Hand control signal to Machine ECU
58	gra/red	Foot control signal to Machine ECU
60	blu/grn	5VDC Output from Machine ECU
61	grn/red	Front axle sensor to Machine ECU
62	gra/blu	Rear steer auto/manual switch to Machine ECU
63	grn/blu	Rear axle sensor to Machine ECU
64	org/brn	Crab/coordinated steer switch to Machine ECU
65	grn/blk	Machine ECU to right steer module
66	blu/blk	Machine ECU to left steer module
67	tan/blu	Machine ECU to bypass solenoid
77	grn/org	Frame tilt switch to frame tilt right solenoid
78	blu/org	Frame tilt switch to frame tilt left solenoid
105	gra	Machine ECU to EDT connection (serial)
106	wht	Machine ECU to EDT connection (serial)
136	gra/yel	Rear steer manual hand control to auto/manual switch
137	pur/red	Rear steer auto/manual switch to manual left/right switch

WIRING HARNESSES

RT70M/H, RT90M/H, RT75M/H, RT95T2M/H, RT115H, RT115T2

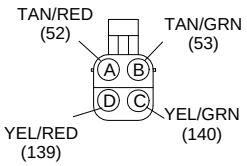
Ref. No.	Part No.	Quantity	Description
1	215-1527	1	Coordinated Steer Harness (RT70/75/90/95T2/115T1)
2	215-1528	1	Coordinated Steer Harness (RT115T2)
3	215-1529	1	Rear Steer Controller Harness (RT115T2)

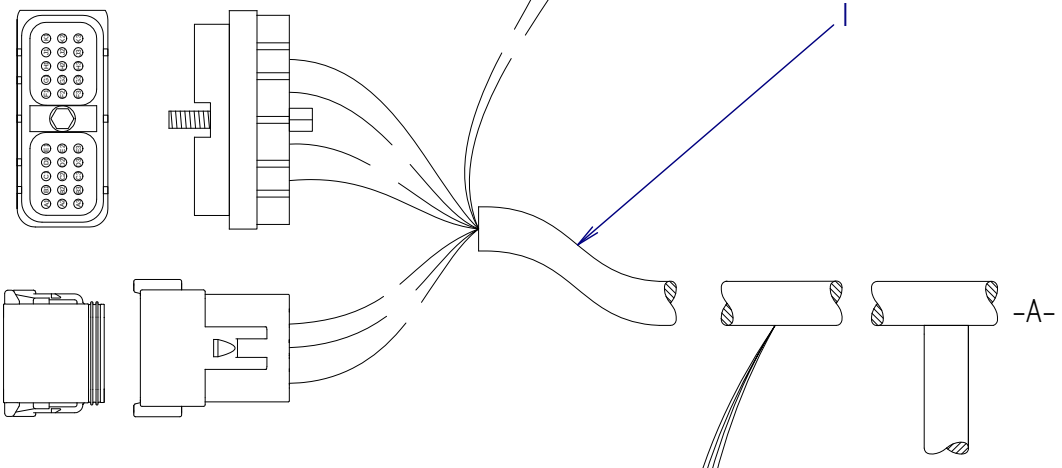
ELECTRICAL DIAGRAM
COORDINATED STEER HARNESS
RT70/75/90/95T2/115T1

PIN#		PIN#		PIN#	
A1	ORG/RED (138)	A2	BLK/BLU (1B)	A3	BLU/GRN (60)
B1	ORG/RED (138)	B2	BLK/BLU (1B)	B3	YEL/BLK (135)
C1	CAVITY PLUG	C2	WHT (106)	C3	ORG/BRN (64)
D1	CAVITY PLUG	D2	GRA (105)	D3	GRN/RED (61)
E1	CAVITY PLUG	E2	YEL (13)	E3	GRN/BLU (63)
F1	CAVITY PLUG	F2	CAVITY PLUG	F3	GRA/BLU (62)
G1	BLU/BLK (66)	G2	YEL/RED (139)	G3	CAVITY PLUG
H1	GRN/BLK (65)	H2	YEL/GRN (140)	H3	GRA (54)
J1	CAVITY PLUG	J2	CAVITY PLUG	J3	GRA/GRN (57)
K1	TAN/BLU (67)	K2	CAVITY PLUG	K3	GRA/RED (58)

MINI MACH CONTROLLER

DIODE PACK

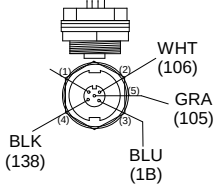




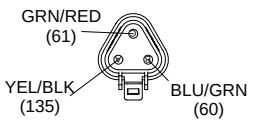
CAP

TO CRUISE CONTROL HARNESS

PIN#		PIN#	
1	ORG (7)	7	ORG/RED (138)
2	GRA/GRN (57)	8	BLU/GRN (60)
3	TAN/GRN (53)	9	BLK/BLU (1B)
4	YEL (13)	10	GRA (54)
5	GRA (105)	11	GRA/RED (58)
6	WHT (106)	12	TAN/RED (52)



MINI MACH EDT CONNECTION

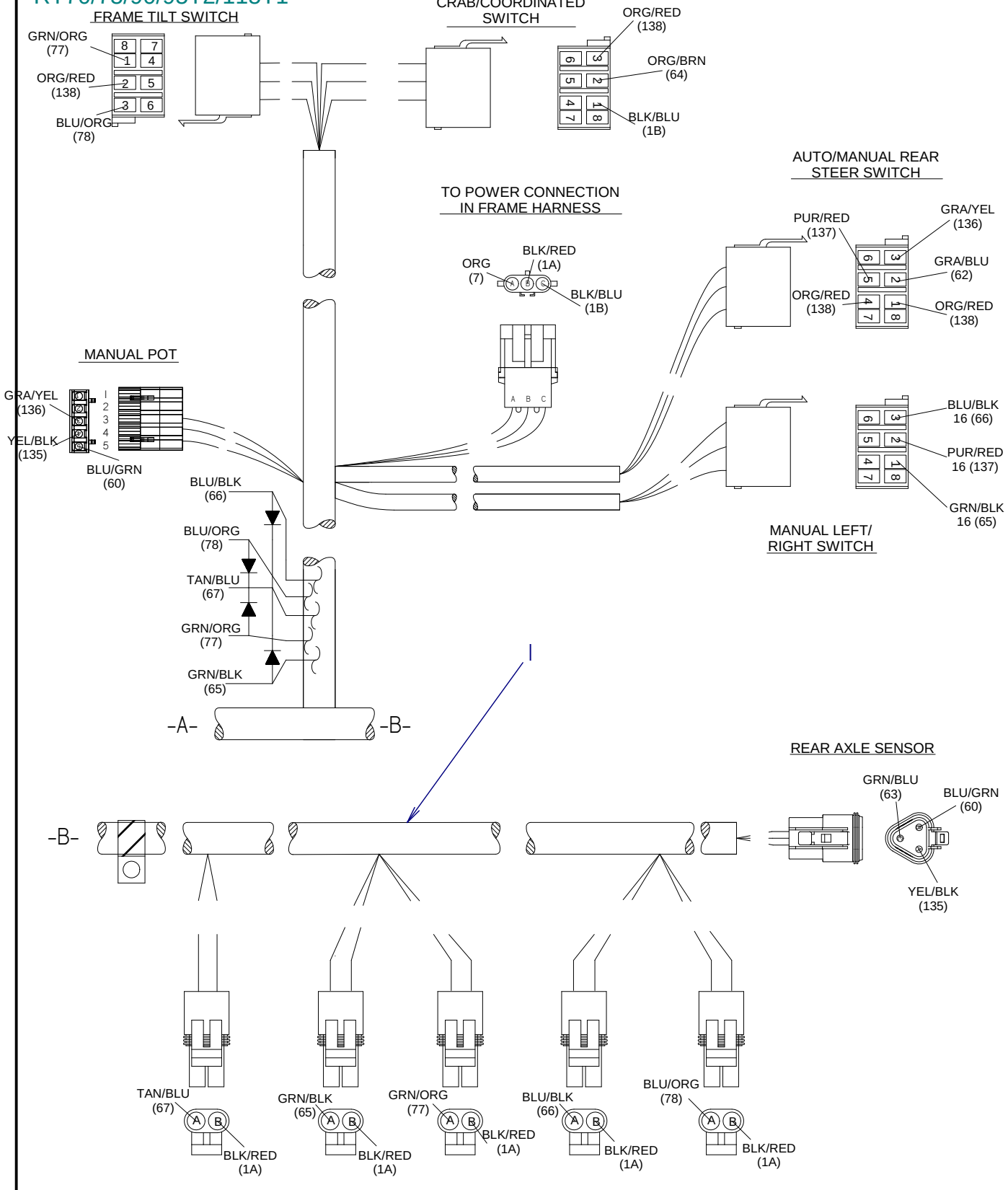


FRONT AXLE SENSOR

ELECTRICAL DIAGRAM

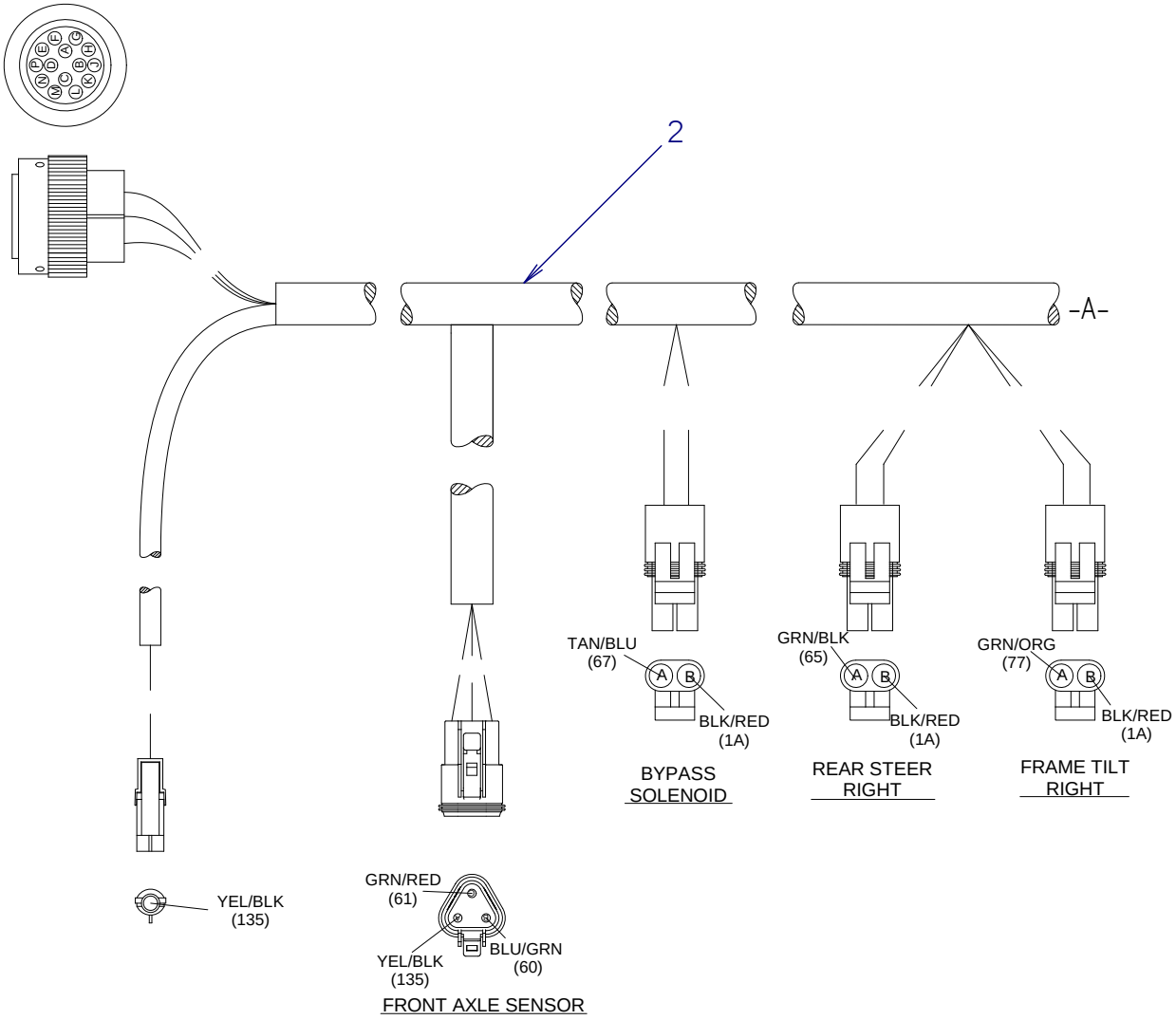
COORDINATED STEER HARNESS

RT70/75/90/95T2/115T1

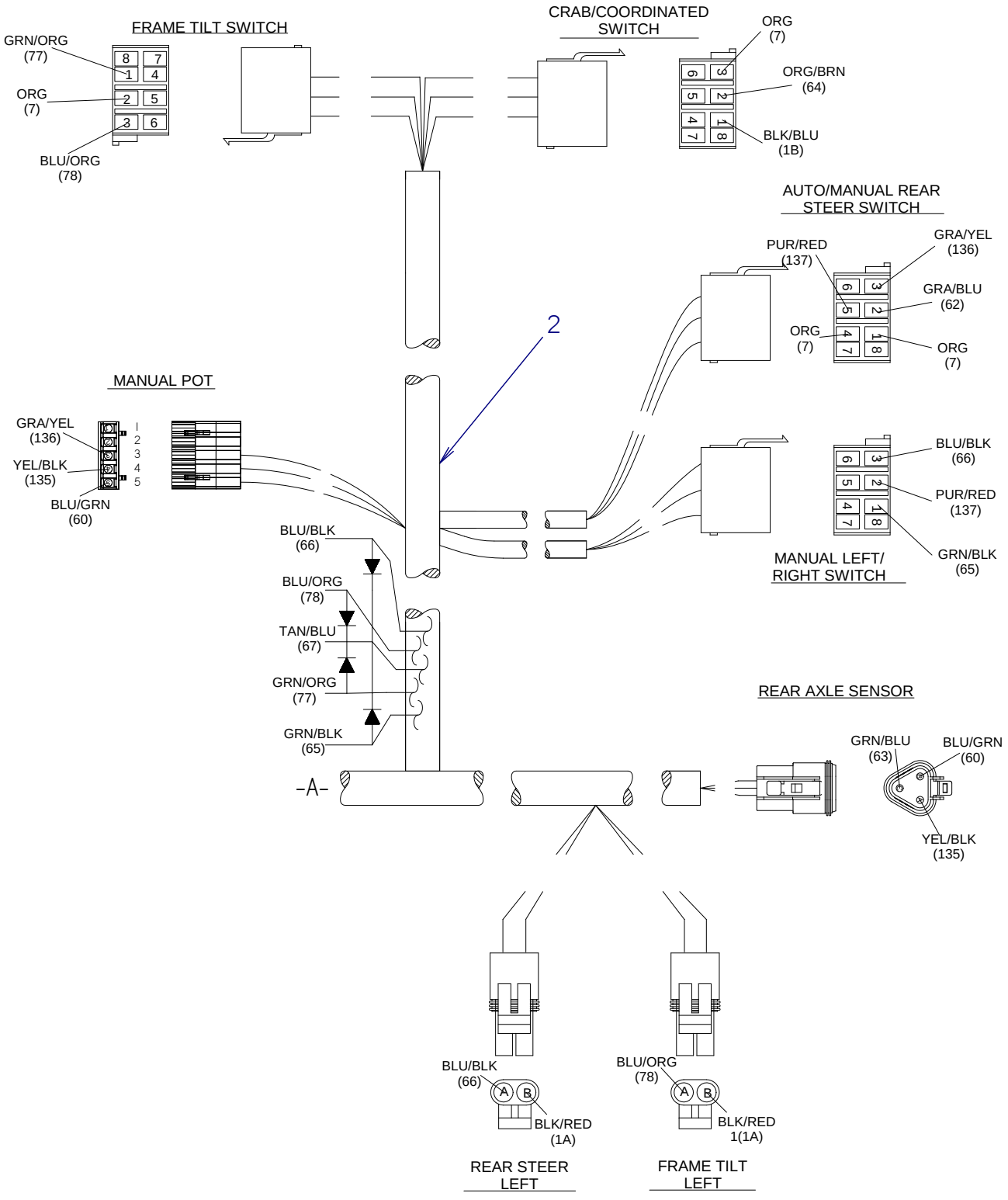


ELECTRICAL DIAGRAM
COORDINATED STEER HARNESS
(RT115T2)

PIN#		PIN#	
A	BLK/RED (1A)	H	ORG/BRN (64)
B	BLK/BLU (1B)	J	GRN/BLK (65)
C	CAVITY PLUG	K	BLU/BLK (66)
D	CAVITY PLUG	L	TAN/BLU (67)
E	GRN/RED (61)	M	BLU/GRN (60)
F	GRA/BLU (62)	N	ORG (7)
G	GRN/BLU (63)	P	CAVITY PLUG



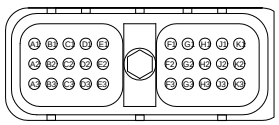
ELECTRICAL DIAGRAM
COORDINATED STEER HARNESS (RT115T2)

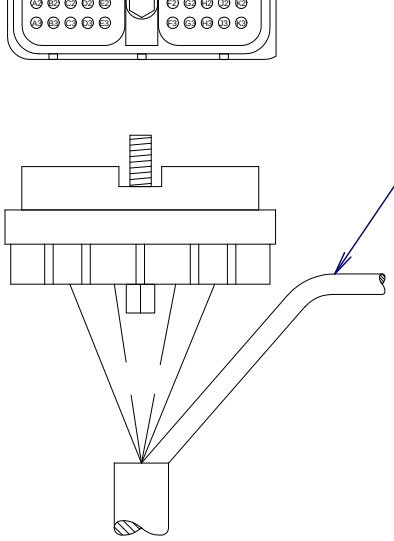


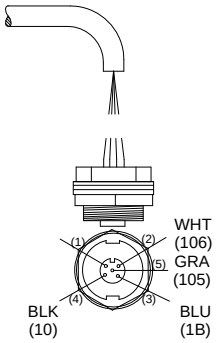
ELECRICAL DIAGRAM
REAR STEER CONTROLLER HARNESS
RT115T2

PIN#		PIN#		PIN#	
A1	ORG/GRN (10)	A2	BLK/BLU (1B)	A3	BLU/GRN 60)
B1	ORG/GRN (10)	B2	BLK/BLU (1B)	B3	YEL/BLK (135)
C1	CAVITY PLUG	C2	WHT (106)	C3	ORG/BRN (64)
D1	CAVITY PLUG	D2	GRA (105)	D3	GRN/RED (61)
E1	CAVITY PLUG	E2	YEL (13)	E3	GRN/BLU (63)
F1	CAVITY PLUG	F2	CAVITY PLUG	F3	GRA/BLU (62)
G1	BLU/BLK (66)	G2	YEL/RED (139)	G3	CAVITY PLUG
H1	GRN/BLK (65)	H2	YEL/GRN (140)	H3	GRA (54)
J1	CAVITY PLUG	J2	CAVITY PLUG	J3	GRA/GRN (57)
K1	TAN/BLU (67)	K2	CAVITY PLUG	K3	GRA/RED (58)

MINI MACH CONTROLLER

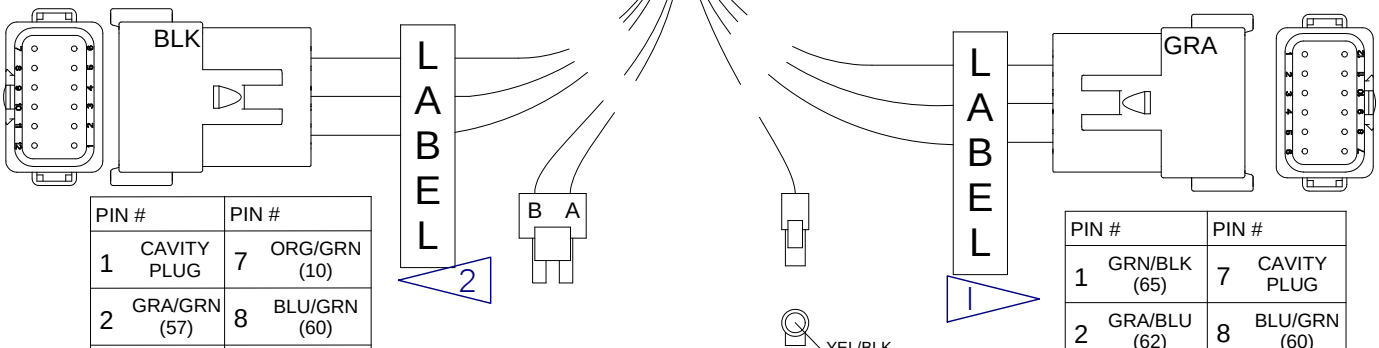




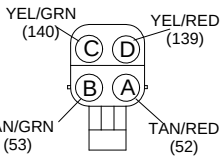


TO CRUISE CONTROL PLUG
IN CONSOLE HARNESS

TO COORDINATED STEER PLUG
IN CONSOLE HARNESS



PIN #		PIN #	
1	CAVITY PLUG	7	ORG/GRN (10)
2	GRA/GRN (57)	8	BLU/GRN (60)
3	TAN/GRN (53)	9	BLK/BLU (1B)
4	YEL 16 (13)	10	GRA (54)
5	GRA (105)	11	GRA/RED (58)
6	WHT (106)	12	TAN/RED (52)



DIODE PACK

TO COORDINATED
STEER HARNESS

PIN #		PIN #	
1	GRN/BLK (65)	7	CAVITY PLUG
2	GRA/BLU (62)	8	BLU/GRN (60)
3	GRN/RED (61)	9	BLK/BLU (1B)
4	GRN/BLU (63)	10	ORG/BRN (64)
5	CAVITY PLUG	11	TAN/BLU (67)
6	CAVITY PLUG	12	BLU/BLK (66)

LABEL NOTES:

1 TO REAR STEER

2 TO CRUISE