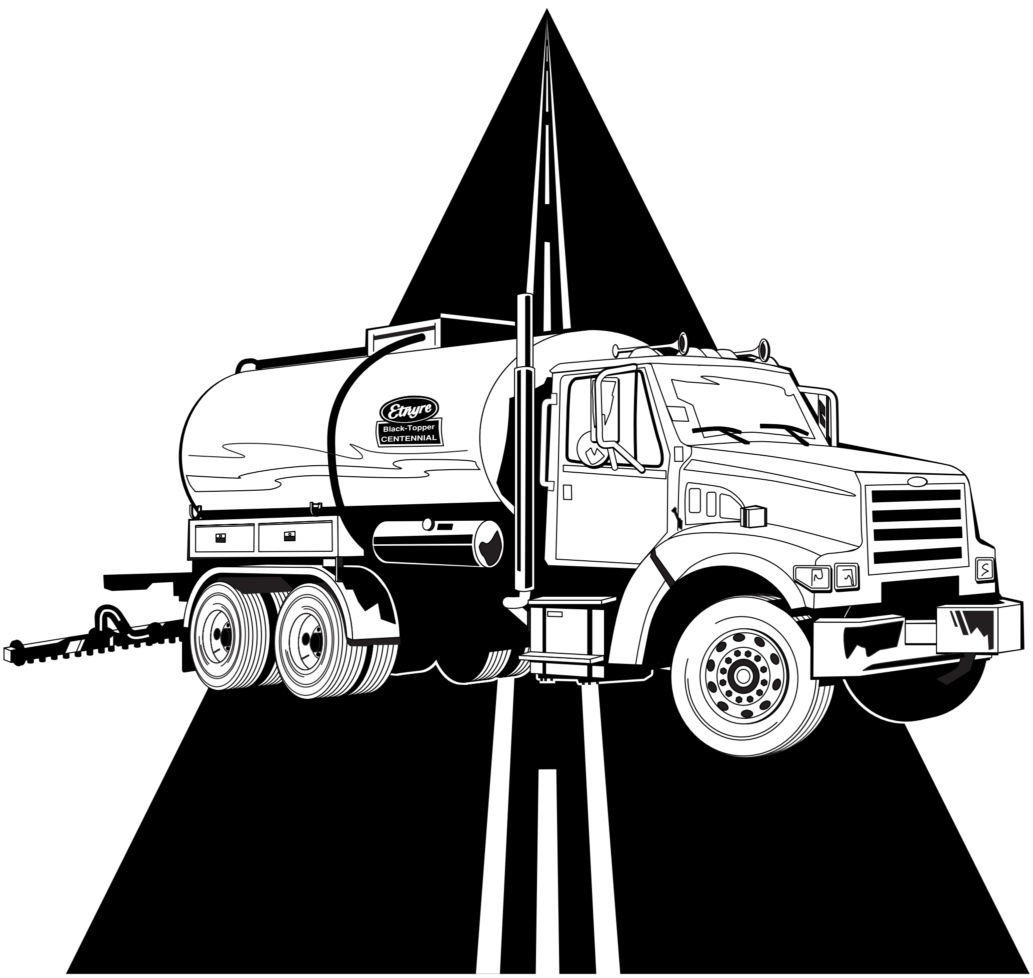
M-105-19

Supersedes M-105-08

Troubleshooting Guide
Asphalt Distributors

For Units with BT-1 Controls



E. D. ETNYRE & CO.

M-105-19
Supersedes M-105-08

Troubleshooting Guide
Problem Index

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Problem 1

Asphalt Pump will not turn when using Auto Mode

1) Check to make sure Master Spray Switch and Suck Back Override are in the (Off) position. (for further explanation refer to # 9).

2) Check to make sure the Pump Control Switch in the rear Control Panel is in the (Auto) mode.

   a) If the Pump Control Switch is in (Manual) mode, select (Auto) mode, and try to start pump by depressing the Start Switch.

   b) If the Pump Control Switch is in (Auto) mode and will not start the Asphalt Pump ....go to # 3

3) Select (Manual) mode at the Pump Control Switch and try to increase the Asphalt Pump speed by turning the Pump Speed Knob (cw to increase). 2010 and newer BT-1 Distributors require pressing the start switch even in manual mode to activate the pump relay which connects the circuits out to the Hydraulic pump EDC controller.

   a) Asphalt Pump still will not turn ....go to # 4

   b) Asphalt Pump turns (check to see if there is a GPM reading on the display in the front Control Panel).

   c) If GPM is reading on the display ....go to # 8

   d) If no GPM reading on the display .... go to Problem 7

4) Override Hydraulic Pump manually at pump servo (EDC).

NOTE: make sure to move the override in the correct direction, this varies depending on type of pump and input rotation (Asphalt Pump shaft rotation always remains the same ccw).

   a) Asphalt Pump still will not turn ....go to # 5

   b) Asphalt Pump turns...go to # 8

5) Make sure Asphalt Pump is free, turn manually.

   a) If pump does not turn free, inspect Asphalt Pump.
   b) If pump turns free ....go to # 6

6) Check pressure of Hydraulic Pump, making sure that the filters are not restricted and the pump is coming on stroke.

   a) If filter(s) are restricted. Replace filter(s).

   b) If pressure is low ....go to # 7

7) Check case drain of Hydraulic Pump and Hydraulic Motor.

   If problem is found, repair as needed.

8) Check Pump Control Switch in rear Control Panel.

a) Check connections at Pump Control Switch.

b) Check wiring from Pump Control Switch to Hydraulic Pump Servo (EDC).

c) Check wiring from Pump Control Switch to the BT-1 Controller, (OR) wire marked (EDC) from the Pump Control Switch to terminal strip # 5 then to BT-1 Controller connected at pin # 41.

9) Check to make sure that Suck Back Override Switch is in the (Off) position.

a) If in the (On) position, Turn (Off) and try to start pump again.

b) If in the (Off) position .... go to # 10

NOTE: IF Suck Back Override is turned (On) during operation, the pump stops and automatically selects all air operated valves for Bar Suck Back, It allows you to start pump to the Bar Suck Back selected value, If Suck Back Override is left in the (On) position when the Control Panel is powered up, the pump can only be started in Bar Suck Back mode. All other functions will not work.

10) Select a different mode with Function Knob and try to start pump.

a) If pump starts. .... go to # 11

b) If pump does not start .... go to # 12

11) Check all modes on Function Knob and note which functions are affected, (continue with #14).

12) Check for power at the Start Switches, located in the front and rear Control Panels. The value across the switch with the button depressed is 32VDC.

a) If 32VDC is present ....go to # 13

b) If 32VDC is not present...go to # 13d

13) Check the input voltage at the Function Knob, (R/W) wire at switch 32VDC. (refer to applicable Electrical Schematic).

a) If no voltage found, check at terminal strip # 6 in the rear Control Panel (R/W) Changing to (R) wire.

b) If no voltage found, check at terminal strip # 1 in the front Control Panel (R) changing to (R/W) wire.

c) If no voltage found, check at Suck Back Override Switch (R/W) wire at both contacts across the switch.

d) If no voltage is found, follow (R/W) wire from Suck Back Override Switch and check voltage at the CAN Switch Module in the front Control Panel (this is the source of 32VDC).

Repair or replace Defective connection, wire or part.

14) Check output voltage from the Function Knob (refer to Figure 1 or applicable Electrical Schematic).

Function Knob	Terminal Strip # 6	Terminal Strip # 2	CAN Switch Module	
		Wire	Conn	
Load/Transfer	BL/BK	PR (LOAD)	BL	# 49
Tank Circulate	GN/BK	PK (TCIRC)	PR	# 46
Bar Circulate	W /BK	PR (BCIRC)	GR	# 45
Bar Suck Back	OR/BK	PK (SUCK)	BR	# 50
Bar Flush	R /BK	PR (FLUSH)	GN	# 51
Unload	R /GN	PK (UNLOAD)	OR	# 48
Handspray	OR/GN	PR (HAND)	Y	# 47
Function	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>			Source

Figure 1

Problem 2

Asphalt Pump Surges while Spraying in Auto Mode

1) Make sure engine (RPM) does not exceed 1800 while spraying; this could put the mechanical ability of the pump at maximum. This will cause the computer to overcompensate and create a pulsing or surging effect.

2) Check Feet Per Minute (FPM) reading on display in front Control Panel while the Distributor is moving (maintain a steady speed during this test).

   a) FPM reading fluctuates (+ or -) 20 FPM ....go to # 3

   b) FPM reading is steady ....go to # 5

3) Check to make sure Radar Head does not have moisture inside lens, wiring connections or body of the radar head. Dry out Radar Head and test.

4) Check Radar Head Asm and wiring.

   a) Check input and output voltages at the Radar Head (refer to Figure 2 or applicable Electrical Schematic).

   b) Check wiring and connections between Radar Head and BT-1 Controller mounted next to the rear Contol Panel (refer to Figure 2).

   Repair and replace wiring, connections and components as needed.

Radar Head	Voltage	Terminal Strip #	BT-1 Controller
Red wire (R)	12VDC	PWR	
Black wire (B)	0	GND	
Green (GN)	4-7VAC	5	(W) # 30
	(while moving)		

Figure 2

5) Check Gallon Per Minute (GPM) reading on display in the front Control Panel in (Manual) mode.

   a) Turn Pump Control Switch to (Manual).

   b) Turn Pump Speed Control Knob to 0 (full ccw).

   c) Turn Function Knob to Tank Circulate.

   d) Increase Pump Speed to desired GPM.

   e) Monitor rotation of Asphalt Pump.

f) If Asphalt Pump rotation and GPM stay steady.

Check Hydraulic Pump and Servo.

g) If Asphalt Pump rotation stays steady, but GPM fluctuates.

Check GPM Sensor.. go to Problem 7

h) If Asphalt Pump rotation and GPM fluctuate.

Check Hydraulic Filter restriction.

Install New Hydraulic Filters.

Problem 3

When trying to Spray, Little or No Asphalt comes out of the Spray Bar (Spray Bar open)

1) Make sure that the Auto Circulation feature is working properly.
   - a) Turn Pump Control Switch to (Auto).
   - b) Turn Function Knob to Bar Circulate.
   - c) Select desired amount of feet (1ft Control Switches).
   - d) Select desired Application Rate.
   - e) Push the Start Switch and allow to Circulate (monitor the GPM and see if it goes to the proper circulation rate).
   - f) If Bar Circulate seems to work properly ....go to # 2
   - g) If Bar Circulate does not work properly (refer to the applicible Electrical Schematic).

2) Make sure that the Radar Head (FPM) is working properly.
   - a) Turn the power (On) at both Control Panels.
   - b) Drive the Distributor at a slow steady speed.
   - c) Monitor the (FPM) and see if it stays steady, and is consistant with the actual ground speed.
   - d) FPM is steady ....go to # 3
   - e) FPM is not steady .... go to Problem 2, # 2

3) Make sure the Auto Spray feature is working properly.
   - a) Turn Pump Control Switch to (Auto).
   - b) Turn fuction Knob to Bar Circulate.
   - c) Select desired amount of feet (1ft Control Switches).
   - d) Select desired Application Rate.
   - e) Push the Start Switch and allow to circulate.
   - f) Move the Distributor and turn Spray Switch to (On) maintain a steady speed and monitor the FPM and GPM and calculate to see if the Asphalt Pump is Producing the correct amount of asphalt.

NOTE: Note: tools to assist with calculating the correct pump rate are available:
   - a) 3390408 pump rate computator.
   - b) Interactive pump computator link @Etnyre.com in the resources section

c) Download the App (Etnyre pump rate calculator) at the appropriate app store for your service provider.

d) A149-19 Nozzle Application Charts Booklet.

4) Make sure that the Suction Valve is working properly.

a) Turn Function Knob to Bar Circulate and check to see if the Suction Valve (Opens) inspection glass on the end of the Suction Valve.

b) If Suction Valve opens..go to # 5.

c) If Suction valve does not open..go to # 6.

5) Check and inspect Strainer for obstructions.

a) Make sure Suction Box is empty before you remove clamps and open the access lid to the Strainer.

b) Remove Strainer (inspect and clean).

c) Install Strainer and lid properly.

d) Install clamps to secure lid.

6) Check the Mac Valve that controls the Suction Valve.

a) push in on the override and see if the Suction Valve operates (refer to Figure 6).

b) If Suction Valve opens..go to # 7.

c) If Suction Valve does not open ....go to # 8.

7) Check for voltage (12VDC) at the Mac Valve Coil.

NOTE: Make sure that you have the Function Knob is in Bar Circulate and the Suck Back Override Switch is in the (Off) position.

a) Make sure that you have (12VDC) on the power wire to the Mac Valve Coil (each Coil has 2 wires (1)12VDC and (1) ground, refer to Figure 6).

b) If no power is found (refer to the applicable Electrical Schematic).

c) If power is found...go to # 7d.

d) Make sure that you have a good ground circuit to the Mac Valve.

Repair or replace defective Coil or Mac Valve.

8) Make sure that you have enough air pressure to operate system.

a) Make sure that the truck is supplying enough air from the truck air system (120 PSI).

b) Make sure the Air Regulator is adjusted properly (refer to Figure 3).

c) For units with the Variable Width Spray Bar, the Air Regulator for the Tach Option should be adjusted to (20 PSI) refer to Figure 3.

NOTE: If this pressure is adjusted too high, it could allow Spray Bar to not turn on or turn on slowly.

d) adjust and repair as needed.

9) Check 4-way Valve positions (timing) Bar Circulate.

a) Turn Pump Control Switch to (Manual).

b) Turn Pump Speed Control Knob to 0 (full ccw).

c) Turn Function Knob to Tank Circulate (4-way Valve should not move and remain in the 12 o'clock position) refer to Figure 4.

d) Turn Function Knob to Bar Circulate (4-way Valve should rotate to the 9 o'clock position) refer to Figure 4.

e) If 4-way Valve rotates to the 9 o'clock position ....go to # 10.

f) If 4-way Valve rotates, but not all the way to 9 o'clock (refer to Figure 5).

g) If 4-way Valve does not rotate ....go to # 11.

10) Check to make sure 4-way Valve rotates to the Spray position.

a) Turn Pump Control Switch to (Manual).

b) Turn Pump Speed Control Knob to 0 (full ccw).

c) Turn Function Knob to Bar Circulate.

d) Turn (Off) all 1Ft Control Switches on the Front Control Panel.

NOTE: Not turning off these switches will allow spray bar to turn on and spray Asphalt.

e) Turn (On) Spray Switch, (4-way Valve should rotate to the 6 o'clock position) refer to Figure 4.

f) If 4-way Valve rotates to the 6 o'clock (it is working properly).

g) If 4-way Valve rotates, but not all the way to the 6 o'clock position (refer to Figure 5).

h) If 4-way Valve does not rotate ....go to # 11.

11) Check Mac Valve (air) that controls the rotation of the 4-way Valve (refer to Figure 6).

a) Remove access cover to the Mac Valves (LH side of Distributor).

b) Operate (Manual) override on the Mac Valve to check operation, and see if 4-way Valve rotates (refer to Figure 6).

c) If 4-way Valve rotates ....go to # 12.

d) If 4-way valve does not rotate ....go to # 13.

12) Check voltage (12VDC) and wiring at Mac Valves.

a) Each Coil has 2 wires (1) 12VDC and (1) Ground.

b) Make sure that you have power (12VDC) when the function is selected.

c) Make sure you have a good ground.

d) If you have both power and a good ground.

Replace Coil or Mac Valve asm.

e) If you do not have power or a ground (refer to applicable Electrical Schematic).

Repair as needed.

13) Check Air supply to and from Mac Valves to the Actuators.

a) Check Mac Valve operation.

b) Check Mac Valve spool (repair as needed).

c) Check for leaks (repair as needed).

d) Check for kinked, crushed or obstructed hoses (repair as needed).

e) Check for bad Actuator (leaking internally).

f) Turn (Off) air pressure and check operation of 4-way Valve and try to turn it manually.

Repair as needed.

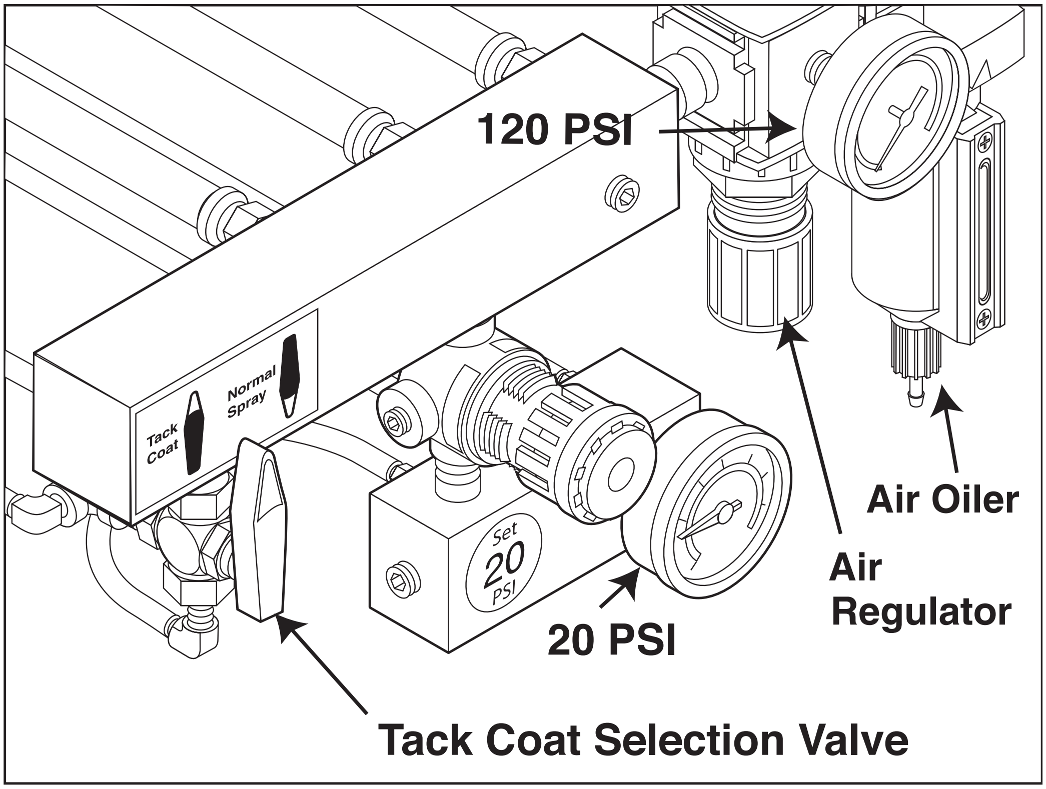


Figure 3

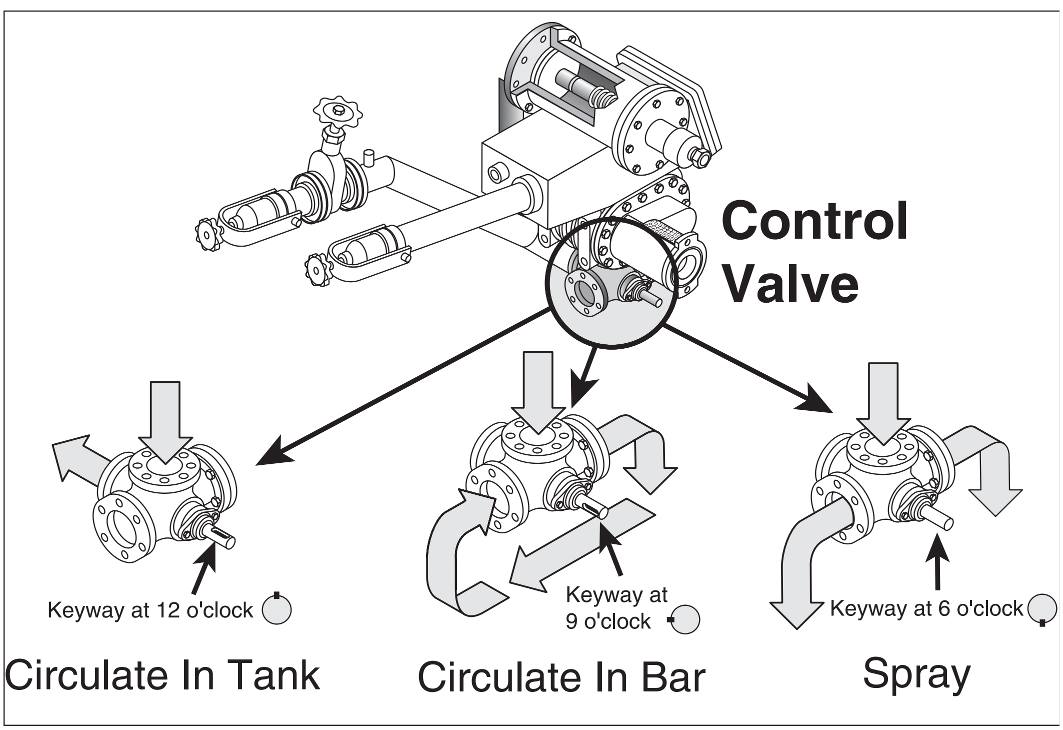


Figure 4

Timing Adjustment of Actuators

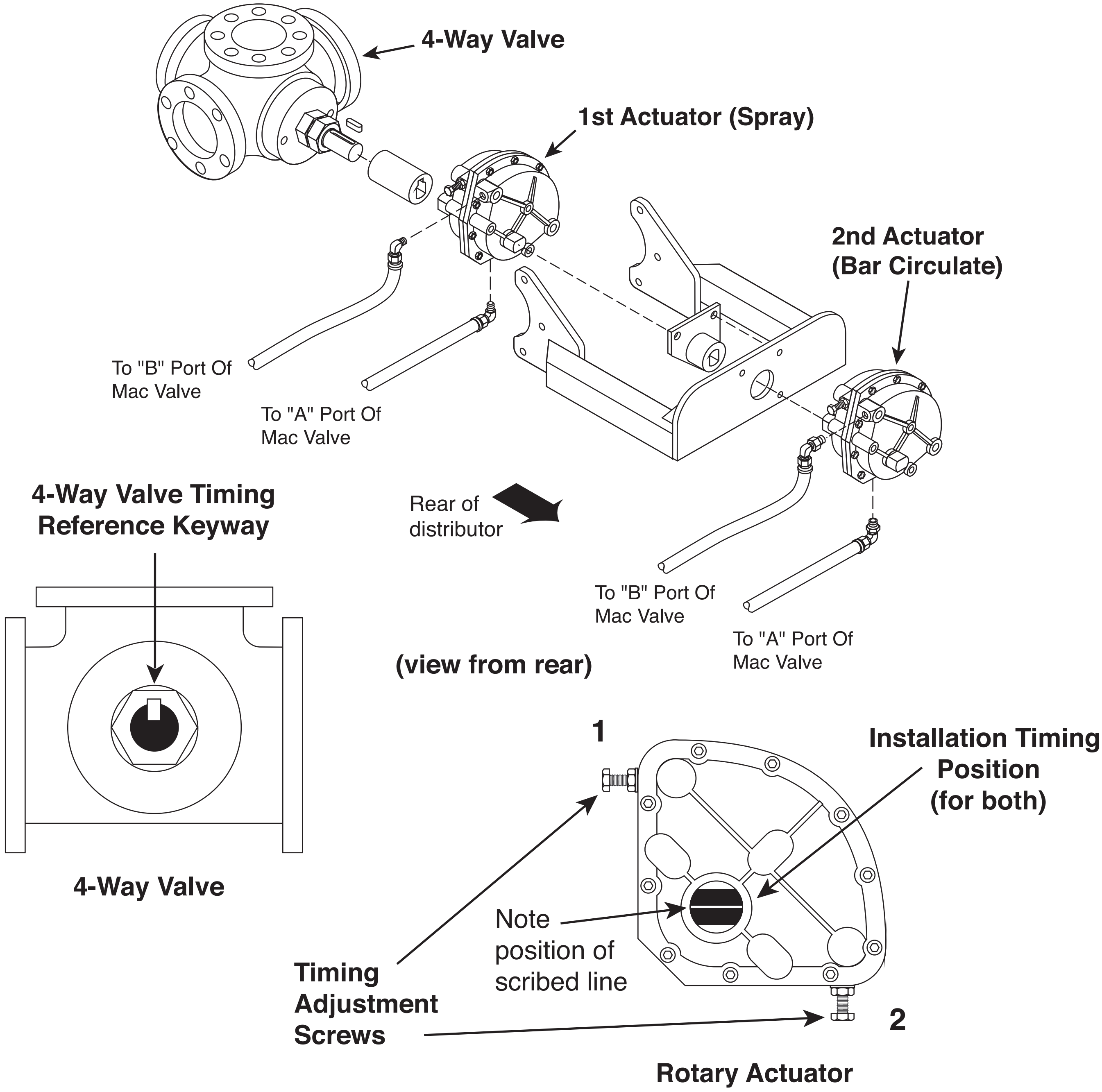
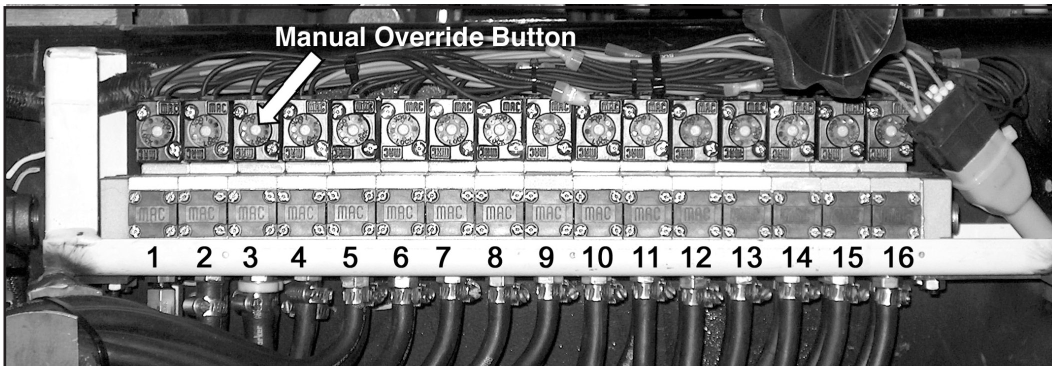


Figure 5



Function is identified by wire color with fuction stamped on the insulated coating of the wire

Location and style of MAC Valves may vary depending on the type of Distributor, and options the Distributor is equipped with. However there is a systematic installation process, (Figure 6) shows the LH side installation of a MAC Valve asm arranged (front to back). RH side is also arranged (front to back) on the RH Distributor frame

MAC Valve # 1 Thru # 4,5,6, or 7 on LH side are Auxillary Functions, depending on style and options. All remaining Mac Valves are for the 1 Ft Control functions for its respective side, usually starting at # 5 and sequenced on the Spray Bar starting at the center of the main bar going out to the end. The RH side only has MAC Valves for 1 Ft Control functions

Aux Function	Wire Color	Wire Marking
Balance Valves	(LTBL)	BALANCE
Suck Back	(BL)	SUCK
Spray	(LTGN)	SPRAY
Bar Circulate	(GN)	B CIRC
Rear Suction Valve	(BL)	R VALVE
Front Suction Valve	(LTBL)	F VALVE
Bar Unlatch	(GN)	UNLATCH

Figure 6

Problem 4

Spray Bar will not turn on

1) Make sure you have sufficent air pressure
   a) Check to make sure Air Supply Valve is in the (On) position
   b) Check to make sure other air operated functions are working
   c) If you have air pressure ....go to # 2
   d) If you do not have air pressure ....repair as needed

2) Determine if the whole spray bar is affected or only parts of it.
   a) If the whole bar is affected ....go to # 3
   b) If only part of the bar is affected ....go to # 7

3) Check to make sure all controls and switches are in the correct positions.
   a) Turn Pump Control Switch to (Auto).
   b) Turn Function Knob to Bar Circulate.
   c) Select the desired amount of feet (1ft Control Switches).
   d) Select the desired Application Rate (for testing purposes use a light rate .100 or less).
   e) Push the Start Switch and allow to circulate.
   f) Drive the Distributor and turn the Spray Switch to (On), then check to see if Spray Bar turns on.
   g) If Spray Bar turns on .... it is working properly.
   h) If Spray Bar does not turn on ....go to # 4.

4) Check to make sure you have a FPM reading on the display while the distributor is moving.
   a) If you have a FPM reading ....go to # 5.
   b) If you do not have a FPM reading .... go to Problem 2, # 1.

5) Test Spray Bar in manual mode.
   a) Turn Pump Control to (Manual).
   b) Turn Function Knob to Bar Suck Back.
   c) Turn Pump Speed Knob to 0 (full ccw).
   d) Select desired amount of feet (1ft Control Swiches).
   e) Turn Spray Switch to the (On) position...
   f) If Spray Bar turns on .... it is working properly.

g) If Spray Bar does not turn on ....go to # 6.

6) Check and see if you have voltage (12VDC) supplied to the Spray Delay Relay located inside the rear Control Panel.

a) Turn Pump Control to (Manual).

b) Turn Function Knob to Bar Suck Back.

c) Turn Pump Speed Knob to 0 (full ccw).

d) Turn all 1ft Control Switches to the (On) position.

e) Open rear Control Panel to access Spray Delay Relay.

f) Turn Spray Switch to the (On) position.

g) Check for voltage (12VDC) at terminal A on the Spray Delay Relay

h) If you have 12VDC at terminal A..go to # 7

i) If you do not have 12VDC at terminal A ....go to # 8

7) Check ground circuits to and from the Spray Delay Relay.

a) Check for main ground on terminal B supplied from the ground terminal strip ....repair as needed.

b) Check for ground at terminal 5 on Relay .... repair as needed.

c) Check to see if ground connects to the appropriate terminal when the Spray switch is turned (On).

Main Bar ground circuit 5 connecting to 8.

Left Bar .... 4 connecting to 7.

Right Bar.... 6 connecting to 9.

d) If you have a good ground on terminal 4,5 and 6, but they fail to connect to the appropriate terminalsreplace defective relay.

e) If you do not have a ground supplied to terminal 4 or 6 , refer to the Tilt Switch circuit.

NOTE: Ground is supplied to the wings thru a Tilt Switch (position sensor) located out on the wing. If Distributor is equipped with a bi-fold or tri-fold option, each fold has its own Tilt Switch. Check the appropriate Tilt Switch circuit.

Refer to the applicable Electrical Schematic.

8) Check the Spray Delay output voltage (12VDC) at the BT-1 Controller.

a) Turn Pump Control to (Manual).

b) Turn Function Knob to Bar Suck Back.

c) Turn Pump Speed Knob to 0 (full ccw).

d) Turn all 1ft Control Switches to the (On) position.

e) Open rear Control Panel to access Spray Delay Relay.

f) Turn Spray Switch to the (On) position

g) Check for voltage (12VDC) at the Spray Delay output on the BT-1 Controller, pin # 34.

h) If you have 12VDC ....re-check circuit to the relay

i) If you do not have 12VDC ....go to # 9

9) Check the Spray circuit input voltage (32VDC) at the BT-1 Controller.

a) Turn Pump Control to (Manual).

b) Turn Function Knob to Bar Suck Back.

c) Turn Pump Speed Knob to 0 (full ccw).

d) Turn all 1ft Control Switches to the (On) position.

e) Turn Spray Switch to the (On) position

f) Check for voltage (32VDC) at the Spray input on the BT-1 Controller, pin # 33

g) If you have 32VDC .... problem is in BT-1 Controller

h) If you do not have 32VDC ....go to # 10

10) Check the Spray Switch circuit input and output voltage (32VDC) at the Spray Switch.

a) Check voltage across the Spray Switch (32VDC).

b) Check voltage at the CAN Switch Module. 32VDC supplying the Spray Switch and 32VDC returning to the CAN Switch Module at pin # 1.

c) If you have 32VDC to the Spray Switch, but not back out to the CAN Switch Module..replace the Spray Switch

d) If you have 32VDC at pin #1, but no voltage at BT-1 Controller pin # 33 problem in CAN Switch Module or CAN wiring.

Refer to the applicable Electrical Schematic.

Problem 5

One side Of Spray Bar Sprays lighter than the other

1) Check 4-way Valve positions (timing) Bar Circulate.

a) Turn Pump Control Switch to (Manual).

b) Turn Pump Speed Control Knob to 0 (full ccw).

c) Turn Function Knob to Tank Circulate (4-way Valve should not move and remain in the 12 o'clock position) refer to Figure 4.

d) Turn Function Knob to Bar Circulate (4-way Valve should rotate to the 9 o'clock position) refer to Figure 4.

e) If 4-way Valve rotates to the 9 o'clock position ....go to # 2

f) If 4-way Valve rotates, but not all the way to 9 o'clock (refer to Figure 5)

2) Check to make sure 4-way Valve rotates to the Spray position.

a) Turn Pump Control Switch to (Manual).

b) Turn Pump Speed Control Knob to 0 (full ccw).

c) Turn Function Knob to Bar Circulate.

d) Turn (Off) all 1Ft Control Switches on the Front Control Panel.

NOTE: Not turning off these switches will allow spray bar to turn on and spray Asphalt

e) Turn (On) Spray Switch, (4-way Valve should rotate to the 6 o'clock position) refer to Figure 4.

f) If 4-way Valve rotates to the 6 o'clock ....go to # 3

g) If 4-way Valve rotates, but not all the way to the 6 o'clock position (refer to Figure 5).

h) If 4-way Valve does not rotate .... go to Problem 3, # 11

3) Check to make sure the Balance Valves are working properly (Equipped on Variable Width and Big Bar Distributors).

Note: Balance Valves are (Closed) in Bar Circulate, (Open) in Spray and Bar Suck Back.

a) Turn Pump Control Switch to (Manual).

b) Turn Pump Speed Control Knob to 0 (full ccw).

c) Turn Function Knob to Bar Circulate.

d) Turn (Off) all 1Ft Control Switches on the Front Control Panel.

e) Check to make sure there is air pressure at the B port on the Balance Valves, by removing hose or fitting. (this holds the valve closed) Refer to Figure 7.

f) If you have air pressure at the B port, reinstall hose or fitting.

g) Remove hose or fitting attached to the A port on the Balance Valves, this is to check for internal leakage (bad o-ring, etc).

h) If you have air present at the A port ....repair valve.

i) If there is no air present at the A port leave hose or fitting loose.

j) Turn Spray Switch to (On).

k) You now should have air at the A port.

Note: Listen to hear valve operating internally.

l) If you have air at the A port, The electric and air system are working properly.

m) If you are not able to hear the valve activate, Further inspection and / or repair of valve may be needed.

4) Inspect Spray Bar for internal damage.

a) Blockages.

b) Bent division plates.

c) twisted tubes inside swivel joints ....repair as needed.

Spray Bar Balance Valve

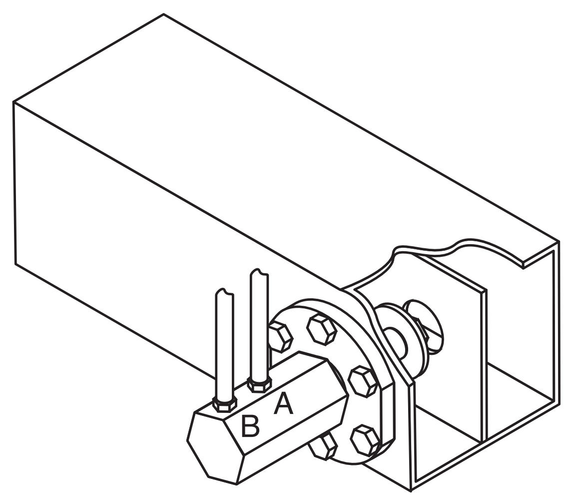


Figure 7

Problem 6

No Feet Per Minute (FPM) Reading on Display while moving

1) Check Radar mounting and angle

a) Check to make sure Radar is mounted solid to the Frame Rail, at a 35 degree angle ....refer to Figure 8

b) Check to make sure Radar Head does not have water inside the lens, wiring connections or body of the Radar Head. If water or moisture is found, dry out and test Radar Head again. (If you remove Radar Head to service, make sure to position the molded body line of the Radar Head where the two halfs meet correctly, it should be positioned to the side)

c) If Radar starts working ....go to # 3

d) If Radar still does not work ....go to # 2

Refer to Figure 8 for proper mounting, angle may change slightly due to frame pitch or how much the angle changes after the Distributor is loaded with material

2) Check wiring and connections to the Radar Head, for proper connection points (refer to Figure 2 or applicable Electrical Schematic)

3) Check Calibration and accuracy of Radar Head

a) Mark off a course to test the Radar (300 Ft)

b) Using the Select Switch, change Display to read the # of Ft traveled screen

c) re-set to 0 Ft using the Value Switch

d) Turn (Off) 1Ft Control Switches

e) Align Distributor with your start reference line

f) Drive Distributor thru the course turning (On) the Spray Switch at the beginning, and turning to (Off) at the end, using the same point of reference (the Radar should count up from 0 during this process)

e) If no Calibration is needed.........................the Radar is working properly

f) If Calibration is needed for accuracy ....go to # 4

4) Calibrating Radar

a) Make sure that the Radar is mounted properly (refer to Figure 8)

b) Mark off a course to Calibrate Radar (300Ft)

c) Align Distributor with the start reference line

d) Enter Computer set-up screens to Calibrate Radar by selecting the Memory Toggle Switch to 6-10, then depress Memory Button 6 and 10 at the same time while you turn the Power Switch to (On) Release Memory Buttons when screen changes to read:

```
UNITS = ENGLISH
BAR CONTROL = FT
```

e) Using the Select Switch, change display to read:

```
GROUND SPEED CAL
START AT 300FT BEGIN
```

f) Drive the Distributor thru the course, depressing the Start Switch at the beginning. The screen will change from reading BEGIN to read END (maintain a slow steady pace) at the end of the course, depress the Start Switch, and the display will change to read BEGIN again. Turn Power Switch to (Off)

g) Re-check accuracy if needed ....go to # 3

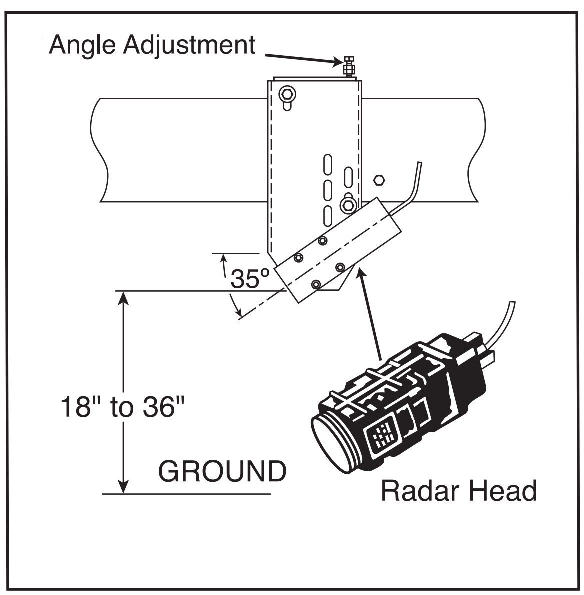


Figure 8

Problem 7

No Gallon Per Minute (GPM) Reading on Display

1) Check to see if you have a GPM reading on the display in (Manual)

a) Turn Pump Control Switch to (Manual)

b) Turn Pump Speed Control to 0 (full ccw)

c) Turn Function Knob to Load / Transfer

d) Increase Pump Speed to desired GPM

e) If Asphalt Pump turns, but still do not have GPM........................go to # 2

f) If Asphalt Pump does not turn.................................... go to Problem 1, # 4

2) Check GPM Speed Sensor and wiring

a) Make sure you have a good connection at the GPM Speed Sensor

If problem found, repair connection

b) Check input voltage at GPM Speed Sensor, (5VDC) Red wire attached to pin A of connector on sensor. Refer to Figure 9 or applicable Electrical Schematic.

c) If input voltage is not present .... check wiring, repair as needed

d) If input voltage is present ....continue to next test

e) Make sure you have a good ground at GPM Speed Sensor, Black wire attached to pin C of connector on sensor. Refer to Figure 9 or applicable Electrical Schematic.

f) If ground is not present ....check wiring , repair as needed

g) If ground is present ....continue to next test

e) Check output voltage (2-3VAC) while Asphalt Pump is turning. White wire attached to pin B of connector on sensor. Refer to Figure 9 or applicable Electrical Schematic.

g) If output voltage is not present ....go to # 3

h) If output voltage is present .... sensor is working properly

3) Check continuity (Ohms) on the output circuit

a) Disconnect GPM Speed Sensor at connector

b) Check Ohms between White wire attached to pin B of wiring harness connector and pin # 29 of the BT-1 Controller

c) If circuit is open, (no connection) check wiring, repair as needed

d) If circuit is closed (good connection) ....go to # 4

4) Install New GPM Speed Sensor (refer to Figure 10)

a) Turn (OFF) Ignition Switch of Distributor

b) Disconnect the GPM Speed Sensor

c) Loosen locknut and remove sensor

d) Install new sensor by hand until the bottom end gently touches the internal speed ring inside the Hydraulic Motor

e) Back off new sensor 1/2 to 3/4 of a turn, to allow for sensor clearance

f) Hold the sensor in place and tighten the locknut 10 lb-ft (13Nm)

g) test the new sensor

Gpm Sensor	Voltage	
(A) Red	5VDC	
(B) White	2-3VAC	with Asphalt Pump turning
(C) Black	0	this is the ground
(D) Green	0	this is the shield

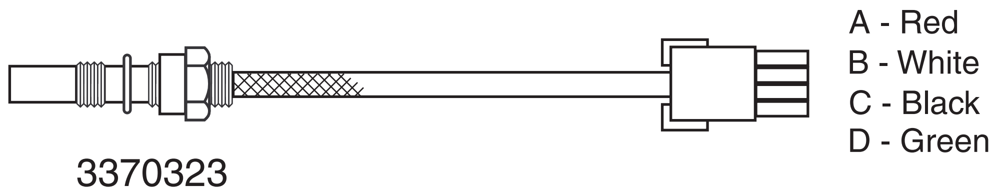
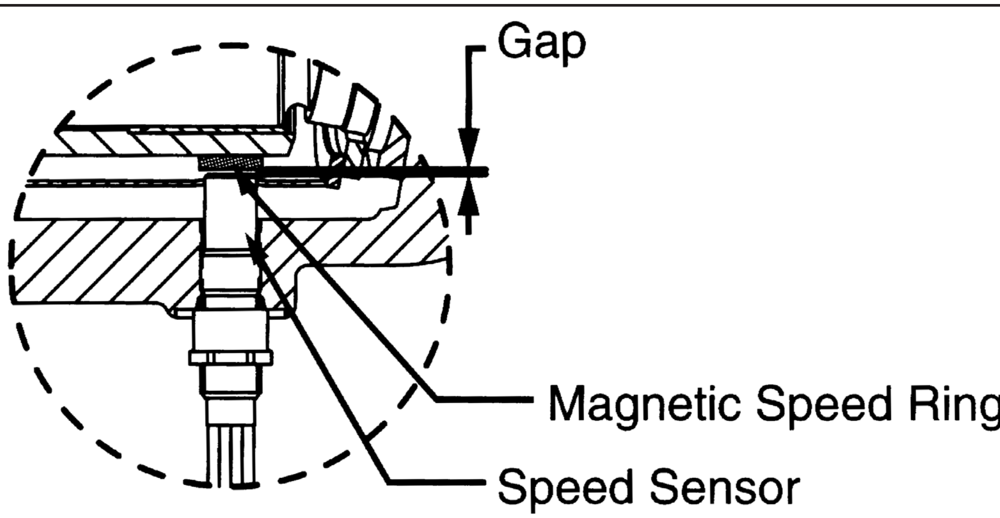


Figure 9



Cross Section View of Speed Sensor in Fixed Motor

Figure 10

Problem 8

Distributor Sprays lighter than Application Rate

1) Check to make sure the amount of feet on the display matches the amount of 1Ft Switches that you have selected.

   a) If the switches and feet match ....go to # 2

   b) If the switches and feet do not match .... go to Problem 10

2) Check Calibration of Asphalt Pump

   a) Check RPM of Asphalt Pump Shaft (RPM x 0.61 = GPM)

   b) If GPM is accurate..go to # 3

   c) If GPM is not accurate ....go to # 8

3) Check with Computator (# 3390408) while spraying to make sure the Asphalt Pump is producing the correct amount of (GPM) for the Application Rate selected, the width of Spray Bar selected and the ground speed (FPM) that you are travelling.

   a) If the GPM is accurate ....go to # 4

   b) If the GPM is not accurate...go to # 9

4) Check 4-way Valve position (timing) refer to Problem 3, # 9 for testing and adjusting proceedure

   a) If 4-way Valve timing is correct ....go to # 5

   b) If 4-way Valve timing is not correct ....adjust timing

5) Check to make sure Suck Back Valves are working properly.

   a) Check operation of air cylinder.

   b) Check linkage and connections (loose / worn).

   c) repair as needed.

6) Check and inspect Strainer for obstructions.

   a) Make sure Suction Box is empty before you remove clamps and open the access lid to the Strainer.

   b) Remove Strainer (inspect and clean).

   c) Install Strainer and lid properly.

   d) Install clamps to secure lid.

7) Check Suction Valve and Tank Outlet.

   Note: The tank must be empty of material to test these functions.

   a) Check Suction Vave operation (open / close, open all the way).

b) Make sure there is no obstruction or restriction blocking the tank outlet.

8) Check Asphalt Pump Speed Sensor (GPM)

a) Make sure sensor is reading properly

b) Check BT-1 Controller Setup value to make sure it has the correct information to calculate GPM (refer to Figure 11 for correct value)

Refer to Problem 7 for GPM Speed Sensor Calibration and testing proceedure

9) Check Radar Calibration

Refer to Problem 6 for FPM Calibration and testing proceedure.

Hydraulic Pump Type	Hydraulic Motor Type	Motor Pulses
42 Series		
3.1 *	1.53 *	43
90 Series		
4.57 *	3.1 *	46
6.1 *	2.69 *	46
* (CIR) Cubic inch per Revolution		

Figure 11

Problem 9

Distributor Sprays Heavier than Application Rate

1) Check Calibration of Asphalt Pump

   a) Check RPM of Asphalt Pump Shaft (RPM x 0.61 = GPM)

   b) If GPM is accurate ....go to # 2

   c) If GPM is not accurate ....go to # 4

2) Check with Computator (# 3390408) while spraying to make sure the Asphalt Pump is producing the correct amount of (GPM) for the Application Rate selected, the width of Spray Bar selected and the ground speed (FPM) that you are travelling.

   a) If the GPM is accurate ....go to # 3

   b) If the GPM is not accurate ....go to # 4

3) Check Radar Calibration

   Refer to Problem 6 for FPM Calibration and testing proceedure

4) Check Asphalt Pump Speed Sensor (GPM)

   a) Make sure sensor is reading properly

   b) Check BT-1 Controller Setup value to make sure it has the correct information to calculate GPM (refer to Figure 9 for correct value).

   Refer to Problem 7 for GPM Speed Sensor Calibration and testing proceedure

5) Check BT-1 Controller setup (Flow Factor) should be set at 1000

   Note: The value can be adjusted if the Asphalt Pump does not produce the correct amount of material due to wear on the impellors. The value is adjusted lower to make the distributor spray heavier. If the value has been adjusted make sure that it is correct.

6) Check Hydraulic Pump EDC Thresold to make sure it is correct (this could be a factor if trying to spray a really light rate).

Problem 10

Feet Selected does not match # of feet showing on the Display

1) Determine Distributor Type

   a) 1 Ft Control Units ....go to # 2

   b) Variable Width Units ....go to # 4

2) Lower Spray Bar and Wings into the Spray position

   a) Change Display to show the # of feet selected

   b) monitor the total # of feet

   c) Turn (On) one at a time, 1 Ft Control Switches. Each time a switch is activated it should add 1 Ft to the total

   d) If 1 Ft Control Switches connect ....check Tilt Switch circuits

   e) If 1 Ft Control Switches do not connect ....go to # 3

3) Check 1 Ft Control Switches

   a) open front Control Panel

   b) Check voltage at and across 1 Ft Control Switches, 1 side / circuit of the switch is 12VDC, this supplies voltage to the Mac Valves. The other side / cicuit is 32VDC, this connects to the CAN Switch Module which sends the signal to the BT-1 Controller.

   Refer to applicable Electrical Schematic.

4) Check operation of Variable Bar

   a) Retract both left and right spray bars

   b) Fold up wings

   c) Turn (On) 1 Ft Control Switches

   d) Total of feet on Display should be 8 Ft

   e) If Display reads 8 Ft ....go to # 5

   f) If Display does not read 8 Ft ....go to # 6

5) Check each wing individually

   a) Lower RH wing and monitor Display to see if feet are added when in the down position.

   b) If lowering the wing added feet...go to d

   c) If lowering the wing did not add feet...go to # 7

   d) Lower LH wing and monitor Display to see if feet are added when in the down position.

e) If lowering the wing added feet ....go to # 6

f) If lowering the wing did not add feet ....go to # 7

6) Calibrate the Spray Bar.

a) Retract the Spray Bars.

b) Enter Computer set-up screens to Calibrate Spray Bar by selecting the Memory Toggle Switch to 6-10, then depress Memory Button 6 and 10 at the same time while you turn the Power Switch to (On). Release Memory Buttons when screen changes to read:

```
UNITS = ENGLISH
BAR CONTROL = VW
```

c) Using the Select Switch, change display to read:

```
VWSB LEFT  FDBK =   0
START - FULL EXT/RET BAR
```

d) To start the calibration process, first insure that the spray bar is retracted all the way in and centered with the outer side. Press the (Start) button, extend the LH bar completely,

The feedback number that is displayed in the top RH corner should read (99-100). Now retract the LH bar completely and feedback should go to (0).

If correct feedback numbers were found (Save) by powering down system.

Note: feedback can be monitored without initiating the calibration sequence

e) Proceed with the RH Bar Change display to read:

```
VWSB RIGHT FDBK =   0
START - FULL EXT/RET BAR
```

f) Repeat process for Calibration as explained in (d) for RH Bar.

g) Turn Power Switch to (Off).

h) Turn Power Switch (On) and test.

7) Check Tilt Switch Wiring and Circuits (Ground Circuit).

a) Check for loose connections or defective wiring.

b) Repair as needed.

Problem 11

Material will not Suck Back in the Spray Bar

1) Check 4-way Valve timing (12 o'clock position) Refer to Figure 4, Refer to Figure 5 if adjustment is required.

2) Check for vacuum at the Fill Line.

a) Install Vacuum Gauge on Fill Line Cap (1/4 npt port available)

b) Turn Pump Control Switch to (Manual)

c) Turn Pump Speed Control to 0 (full ccw)

d) Turn Function Knob to Load-Transfer

e) Increase Pump Speed to desired GPM (200 GPM or higher)

f) Monitor vacuum on gauge (5 inches min.)

g) Vacuum Gauge indicates 5 inches or more vacuum .... go to # 3

h) Vacuum Gauge indicates no or low vacuum .... go to # 6

3) Change to different function and monitor vacuum.

a) Turn Pump Control Switch to (Manual)

b) Turn Pump Speed Control to 0 (full ccw)

c) Turn Function Knob to Bar Suck Back

d) Increase Pump Speed to desired GPM (200 GPM or higher)

e) Vacuum Gauge indicates 5 inches or more vacuum .... go to # 4

f) Vacuum Gauge indicates no or low vacuum .... go to # 7

4) Open manually (1) nozzle near the top of each wing.

Note: When opening nozzle, stand to the side out of the path of the nozzle in case material is under pressure

a) If no vacuum is present at Spray Bar .... go to # 5

b) If very little vacuum is present at Spray Bar .... go to # 8

c) If there is good vacuum .... it is working properly

5) Check Suck Back Valves

a) Check to make sure they are operating and adjusted properly (refer to Figure 12).

b) Check linkage (loose, bent, or worn)

c) Repair as needed

6) Install (pour) 1 quart of oil into Fill Line and reinstall Fill Line Cap with gauge. Increase GPM to 200 or higher and check vacuum.
   a) If there is good vacuum, the Asphalt Pump could have been dry and lost its prime
   b) If there is no or low vacuum, check for leaks in Suction system
   c) Suction Valve not seated properly
   d) Leak in gasket between Suction Box and Asphalt Pump
   e) Loose packing on Asphalt Pump Shaft
   f) Asphalt Pump condition (worn impellors)

7) Check for vacuum leaks
   a) Bad or leaking Suck Back hoses
   b) Cracked weld(s)

8) Check return valve
   a) Make sure return valve is open
   b) Make sure air cylinder and controls are operating properly
   c) For older units, make sure gate valve is completely open

   Note: If the return valve is not operating properly or the plumbing is blocked / plugged on the path to the tank, the machine will have difficulty or not suck back.

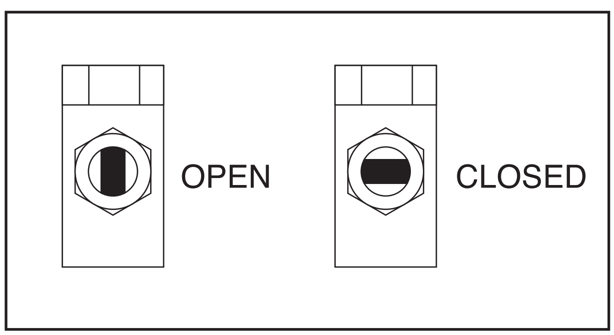


Figure 12

Problem 12

Auxillary Hydraulics do not function

1) Make sure that PTO (if equipped) is engaged and the Hydraulic Pumps are turning

a) If PTO is engaged ....go to # 2

b) If PTO is not engagedactivate and re-try

2) Check Hydraulic Functions individually at both front and rear Control Panels and note which functions are affected.

a) If all functions do not workgo to # 3

b) If (1) or more funtions do not work..go to # 4

3) Check Hydraulic Filters

If filters are restrictedreplace filters

4) Check voltage (12VDC) at Auxillary Hydraulic Function Switches each switch has 2 sides / circuits. 1 side / circuit is to activate the fuction and the other side / circuit is to activate the Dump Valve

Note: On Variable Width models Left Bar in/out, Right Bar in/out, and Bar Shift Function Switches are (32VDC) on the function side / circuit of the switch. The other side / circuit is (12VDC) to activate the Dump Valve

a) If voltage is present..go to # 5

b) If voltage is not presentrepair wiring / replace switch etc.

Refer to applicable Electrical Schematic.

5) Check input voltage at electrical coils on Auxillary Hydraulic Manifold

Note: each electrical coil has 2 wires, 1-power, and 1-ground. Identified by marking of the function on the wire

a) Check input voltage (12VDC) at the Dump Valve coil, this is energized each time a Function Switch is selected

b) Check input voltage (12VDC) at the Function coils

Note: On Variable Width models Left Bar in/out, Right Bar in/out, and Bar Shift Function coils are (32VDC)

Refer to applicable Electrical Schematic

c) If voltage is present..go to # 6

d) If voltage is not presentrepair defective wiring / connection

6) Check Dump Valve Asm.

a) Remove and inspect spool asm

b) Check magnatism of coil when power is applied

c) If Dump Valve is functioning properly .... go to # 7

d) If Dump Vale is not functioning .... repair as needed

7) Check Auxillary Hydraulic Pressure (1500 PSI)

a) Install a (2000 PSI) gauge into the test port located on the Auxillary Hydraulic Manifold. (refer to Figure 13)

b) Check pressure by operating a function and hold the switch to cause the system to (deadhead) and go over relief giving you the relief pressure

Note: If the function you select has a defective component, it may not give the relief pressure. Try a 2nd function to compare

c) If relief pressure (1500 PSI) is present .... it is working properly

d) If relief pressure is low or high........................adjust (refer to Figure 14)

e) If no pressure is presentgo to # 8

8) Check Auxillary Hydraulic Pump.

Repair or replace as needed.

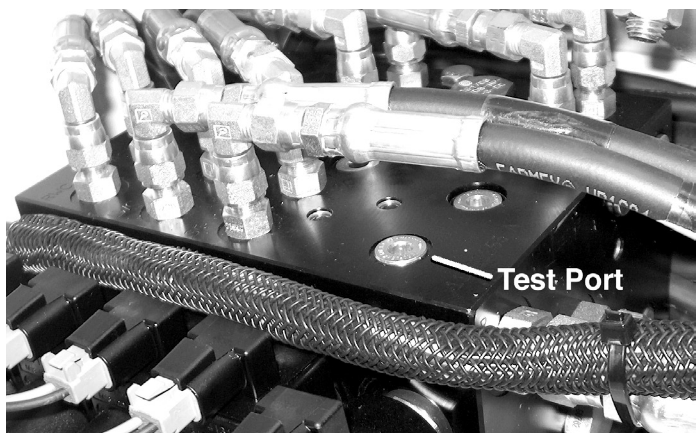
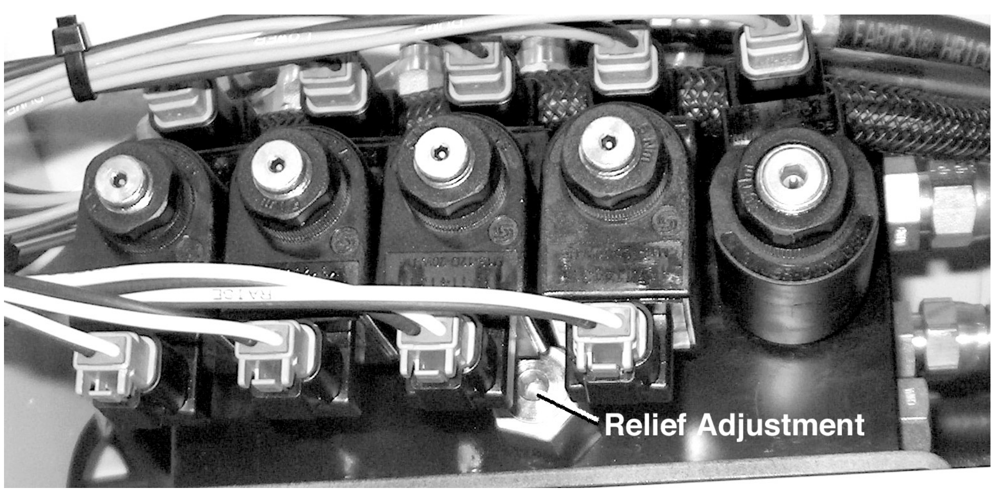


Figure 13

Figure 14



Problem 13

Switch Module Not Responding

This refers to the switch input module that is located inside the front control panel.

The input module creates a communication network throughout the distributor by transmitting 32 VDC created by a built-in, power convertor and uses it to recognize when switches are turned on/off, such as 1ft control and function rotary switches. Each active switch sends an input to the 50 pin connector of the module and the module translates the information and communicates it to the computer controller.

Note: Distributor will not fully operate with a switch module failure.

Troubleshooting:

1) Try to turn (OFF) power system and turn back (ON) (This resets a built-in circuit breaker)
2) Shut off all 1 ft control switches and retry power up sequence (OFF / ON)
3) Rotate function switch to a different function and retry power up sequence (OFF / ON)
4) Look for anything broken or out of place that might affect the power system.
5) Open up front control box and access the input switch module
6) Monitor LED lights, molded into the face of module (see figure # 1 for explanation of the lights).
7) Unplug the Gray Connector. Check between #10 Black wire and #12 Red wire for battery voltage (12 volts +) if not, check wiring to Power and Ground. See Figure 16.
8) Hook up Gray Connector. Trace #11 Red/White wire to first switch it is connected to and check for 32 volts. If there is not 32 volts there, shut power off and unhook that wire from the switch (that wire should be the wire running to #11 on the Gray Connector).
9) Turn power back on and check that wire for 32 volts. If you get 32 volts back, that indicates there is a short somewhere in the 32 volt system. Install wire back onto switch, then go to step 10.

If you do not get 32 volts back, that indicates the In-put Module is bad.

10) **To check for short in the 32 volt system:** With power off, find #1 Terminal Strip and unhook the 32 volt wire going to the Rear Control Box. Turn pow-

er back on and check for 32 volts coming out of the In-put Module. If you get 32 volts back, the short is somewhere between the Front Control Box to inside the Rear Control Box. If you do not get the 32 volts back, the short is in the Front Control Box. See Figure 18.

The short could be a wire touching ground or a switch grounding out internally. Repair as needed.

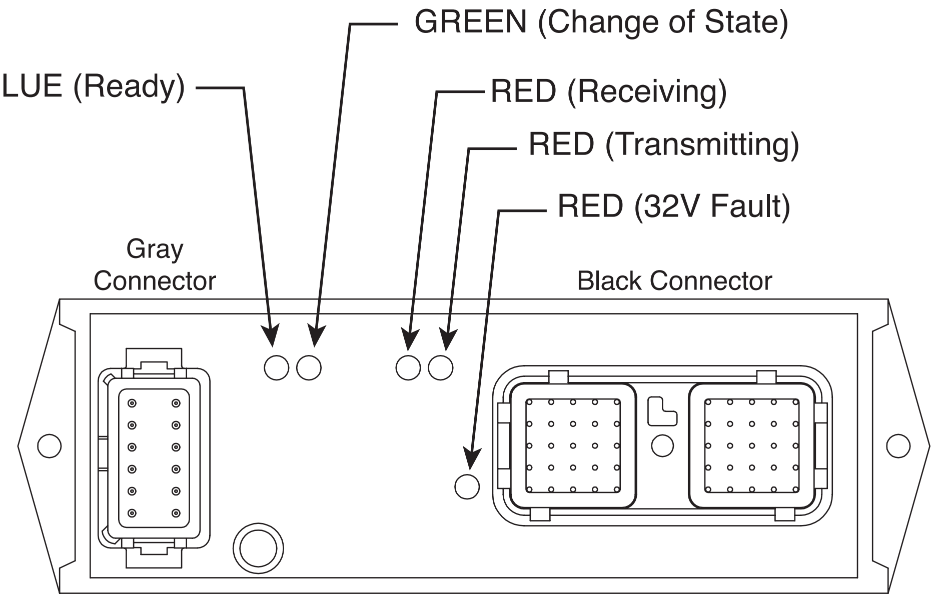
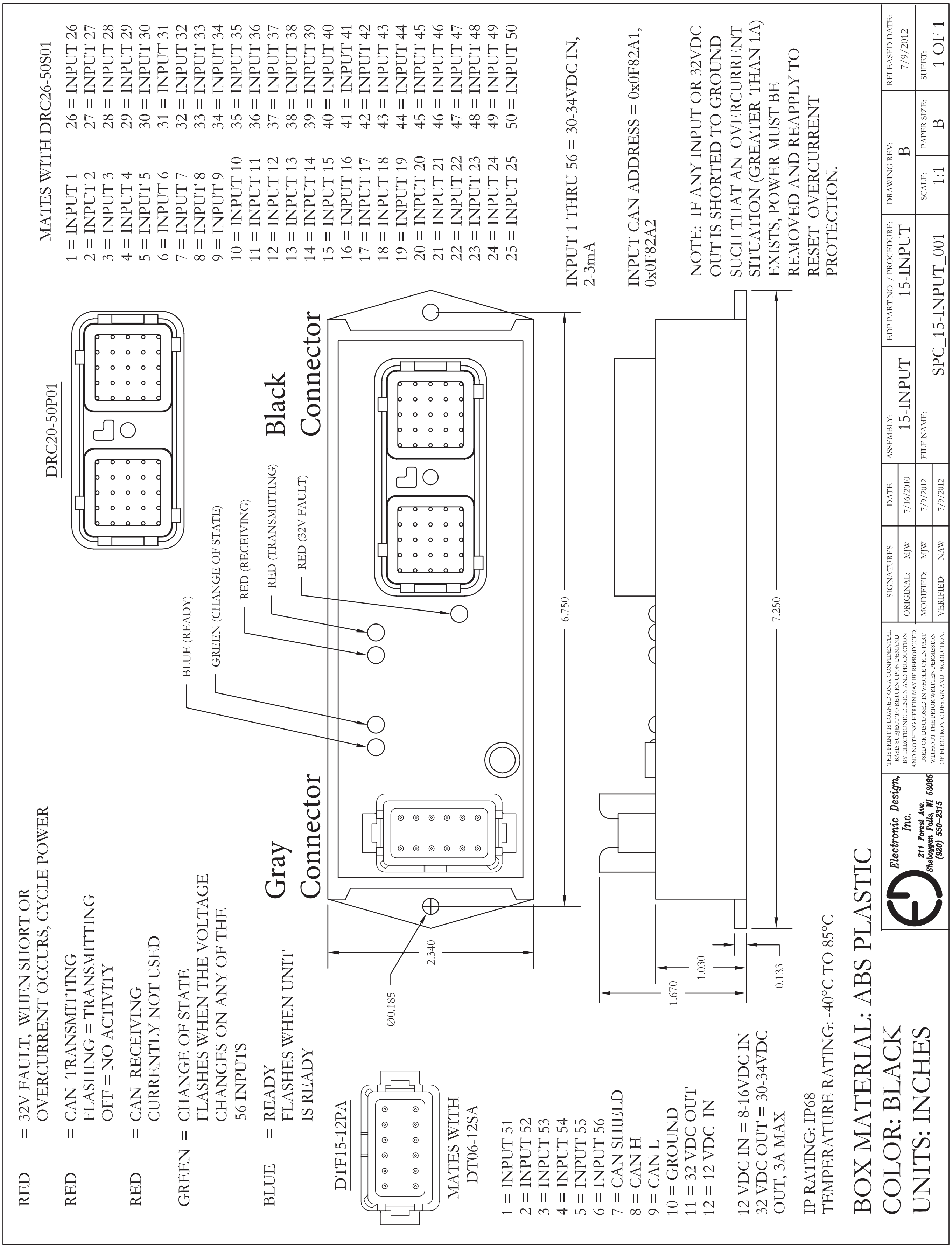


Figure 15.


RED = 32V FAULT, WHEN SHORT OR OVERCURRENT OCCURS, CYCLE POWER
RED = CAN TRANSMITTING FLASHING = TRANSMITTING OFF = NO ACTIVITY
RED = CAN RECEIVING CURRENTLY NOT USED
GREEN = CHANGE OF STATE FLASHES WHEN THE VOLTAGE CHANGES ON ANY OF THE 56 INPUTS
BLUE = READY FLASHES WHEN UNIT IS READY
DTF15-12PA
MATES WITH DT06-12SA
1 = INPUT 51
2 = INPUT 52
3 = INPUT 53
4 = INPUT 54
5 = INPUT 55
6 = INPUT 56
7 = CAN SHIELD
8 = CAN H
9 = CAN L
10 = GROUND
11 = 32 VDC OUT
12 = 12 VDC IN
12 VDC IN = 8-16VDC IN
32 VDC OUT = 30-34VDC OUT, 3A MAX
IP RATING: IP68
TEMPERATURE RATING: -40°C TO 85°C
BOX MATERIAL: ABS PLASTIC
COLOR: BLACK
UNITS: INCHES
Gray Connector
Black Connector
Ø0.185
2.340
1.670
1.030
0.133
6.750
7.250
BLUE (READY)
GREEN (CHANGE OF STATE)
RED (RECEIVING)
RED (TRANSMITTING)
RED (32V FAULT)
DRC20-50P01
MATES WITH DRC26-50S01
1 = INPUT 1
2 = INPUT 2
3 = INPUT 3
4 = INPUT 4
5 = INPUT 5
6 = INPUT 6
7 = INPUT 7
8 = INPUT 8
9 = INPUT 9
10 = INPUT 10
11 = INPUT 11
12 = INPUT 12
13 = INPUT 13
14 = INPUT 14
15 = INPUT 15
16 = INPUT 16
17 = INPUT 17
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38 = INPUT 38
39 = INPUT 39
40 = INPUT 40
41 = INPUT 41
42 = INPUT 42
43 = INPUT 43
44 = INPUT 44
45 = INPUT 45
46 = INPUT 46
47 = INPUT 47
48 = INPUT 48
49 = INPUT 49
50 = INPUT 50
INPUT 1 THRU 56 = 30-34VDC IN, 2-3mA
INPUT CAN ADDRESS = 0x0F82A1, 0x0F82A2
NOTE: IF ANY INPUT OR 32VDC OUT IS SHORTED TO GROUND SUCH THAT AN OVERCURRENT SITUATION (GREATER THAN 1A) EXISTS, POWER MUST BE REMOVED AND REAPPLY TO RESET OVERCURRENT PROTECTION.
Electronic Design, Inc.
211 Forest Ave. Sheboygan Falls, WI 53085 (920) 550-2315
SIGNATURES
DATE
ORIGINAL: MJW 7/16/2010
MODIFIED: MJW 7/9/2012
VERIFIED: NAW 7/9/2012
ASSEMBLY: 15-INPUT
EDP PART NO. / PROCEDURE: 15-INPUT
DRAWING REV: B
RELEASED DATE: 7/9/2012
FILE NAME: SPC_15-INPUT_001
SCALE: 1:1
PAPER SIZE: B
SHEET: 1 OF 1

Figure 16.

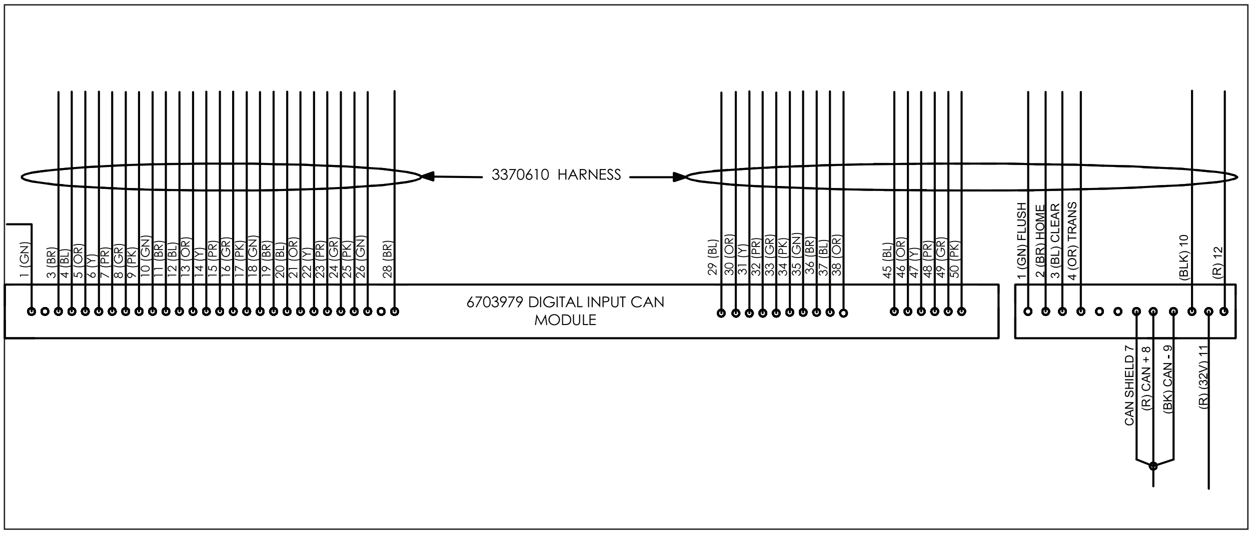


Figure 17.

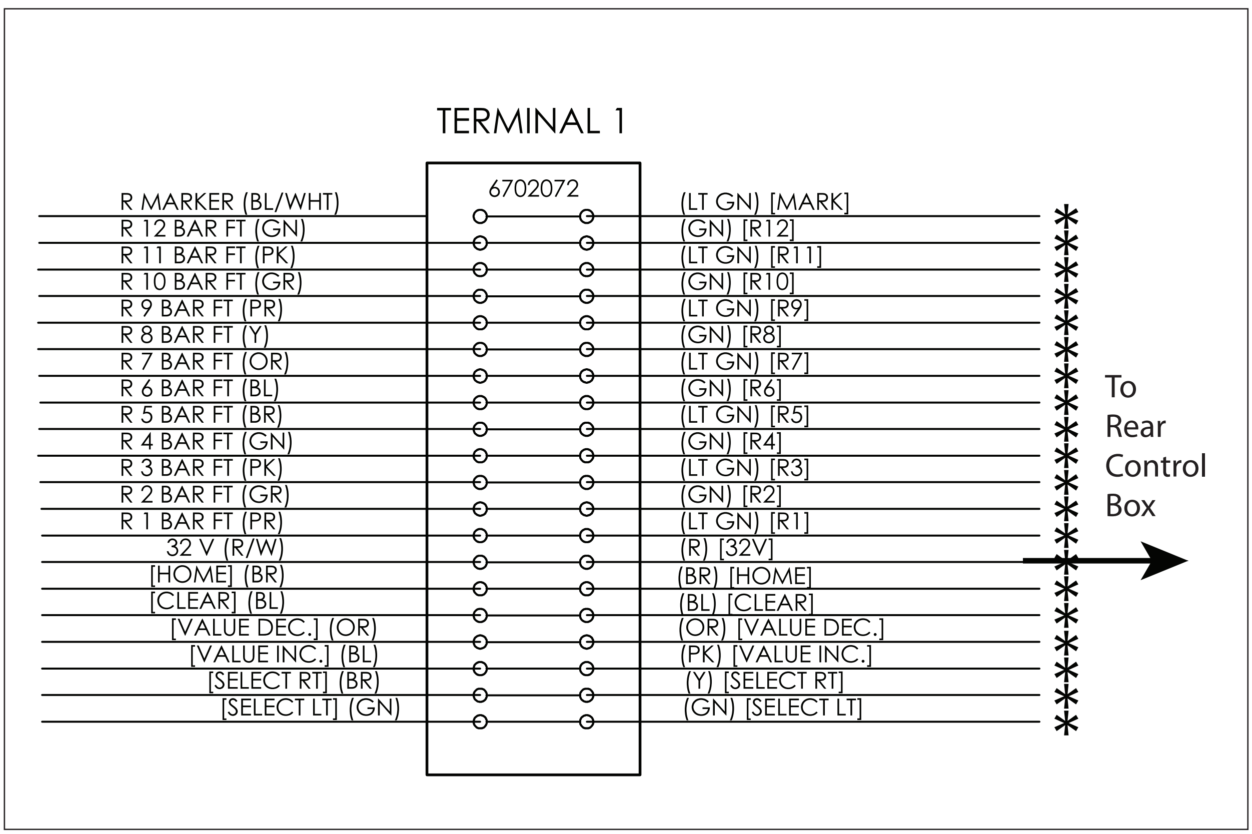


Figure 18.

Warning and Information Messages

1 Foot Control Distributors

Information Messages

The following messages will be displayed in order once before they are displayed again. Messages will be displayed only in the main operating screens and will alternate or flash between the message and the current operating screen.

Additional messages will become present if VW is selected for bar control in the setup screens. VW bar control should not be selected for units with FOOT bar control.

Application Pump

```
UNDER APPLICATION
PUMP AT MAX
```

```
OVER APPLICATION
PUMP AT MIN
```

These messages will only appear in the spraying operation. The over application message indicates that the ground speed is too slow and/or possibly the engine speed is too fast, while the under application message indicates that the ground speed is too fast and/or possibly the engine speed is too slow.

Hot Hydraulics

```
HYD TEMP
HOT
```

This message flashes on the display when the hydraulic reservoir temperature reaches or exceeds 200° F.

⚠ WARNING

Stop immediately and determine the cause of the high temperature. Failure to do so will result in damage to hydraulic components.

Switch Module

```
SWITCH MODULE
NOT RESPONDING
```

This message flashes on the display when the input module in the cab control box is not present on the CAN bus. There are several reasons why the module might not be recognized on the CAN bus. It may be unplugged from the CAN bus or electrical power or may be damaged.

Hydraulic Pump

```
HYD PUMP EDC
OUT OF RANGE
```

This message flashes on the display after the START switch has been selected in AUTO pump control if the EDC is disconnected from the computer or is electrically shorted.

Motor Feedback

```
CHECK
HYD MOTOR
```

This message flashes on the display after the START switch has been selected in AUTO pump control if the asphalt pump speed remains or becomes zero for too long. This may mean that the asphalt pump will not turn or the speed sensor is not set correctly, faulty, damaged or is disconnected from the computer.

Low Level

```
TANK LEVEL
LOW
```

This message flashes on the display when in bar circulate or spray and the asphalt tank material level reaches the low level.

Radar Calibration

RADAR CALIBRATION
OUT OF RANGE

This message flashes on the display after ground speed calibration when the radar is either not connected to the computer or produces a signal that is out of the acceptable range.

Bar Center

SPRAY BAR
CENTERED

This message flashes on the display when optional Bar Centered control switch is installed and when not in Spray or Bar Circulate modes.

Burner Timer

BURNER TIMER
ENDING

This message flashes on the display during the last 5 minutes of heating when the optional burner controls are installed.

Information Messages

Messages will be displayed only in the main operating screens and will alternate or flash between the message and the current operating screen. If more than one message is active, each of the active messages will be sent to the display before an individual message is repeated to the display.

Additional messages will become present if VW is selected for bar control in the setup screens. VW bar control should not be selected for units with FOOT bar control.

Application Pump

```
UNDER APPLICATION
PUMP AT MAX
```

```
OVER APPLICATION
PUMP AT MIN
```

These messages will only appear in the spraying operation. The over application message indicates that the ground speed is too slow and/or possibly the engine speed is too fast, while the under application message indicates that the ground speed is too fast and/or possibly the engine speed is too slow.

Hot Hydraulics

```
HYD TEMP
HOT
```

This message flashes on the display when the hydraulic reservoir temperature reaches or exceeds 200ºF.

WARNING

Stop immediately and determine the cause of the high temperature. Failure to do so will result in damage to hydraulic components.

Switch Module

```
SWITCH MODULE
NOT RESPONDING
```

This message flashes on the display when the input module in the cab control box is not present on the CAN bus. There are several reasons why the module might not be recognized on the CAN bus. It may be unplugged from the CAN bus or electrical power or may be damaged.

Hydraulic Pump

```
HYD PUMP EDC
OUT OF RANGE
```

This message flashes on the display after the START switch has been selected in AUTO pump control if the EDC is disconnected from the computer or is electrically shorted.

Motor Feedback

```
CHECK
HYD MOTOR
```

This message flashes on the display after the START switch has been selected in AUTO pump control if the asphalt pump speed remains or becomes zero for too long. This may mean that the asphalt pump will not turn or the speed sensor is not set correctly, faulty, damaged or is disconnected from the computer.

Low Level

```
TANK LEVEL
LOW
```

This message flashes on the display when in bar circulate or spray and the asphalt tank material level reaches the low level.

Radar Calibration

RADAR CALIBRATION OUT OF RANGE

This message flashes on the display after ground speed calibration when the radar is either not connected to the computer or produces a signal that is out of the acceptable range.

Left Module / Right Module

LEFT MODULE NOT RESPONDING

RIGHT MODULE NOT RESPONDING

This message flashes on the display when VW control is selected and either the left module by the rear control box or the right module by the rear control box is not present on the CAN bus. There are several reasons why the module might not be recognized on the CAN bus. It may be unplugged from the CAN bus or electrical power or may be damaged.

Left Smart Cylinder / Right Smart Cylinder

LEFT SMART CYL OUT OF RANGE

RIGHT SMART CYL OUT OF RANGE

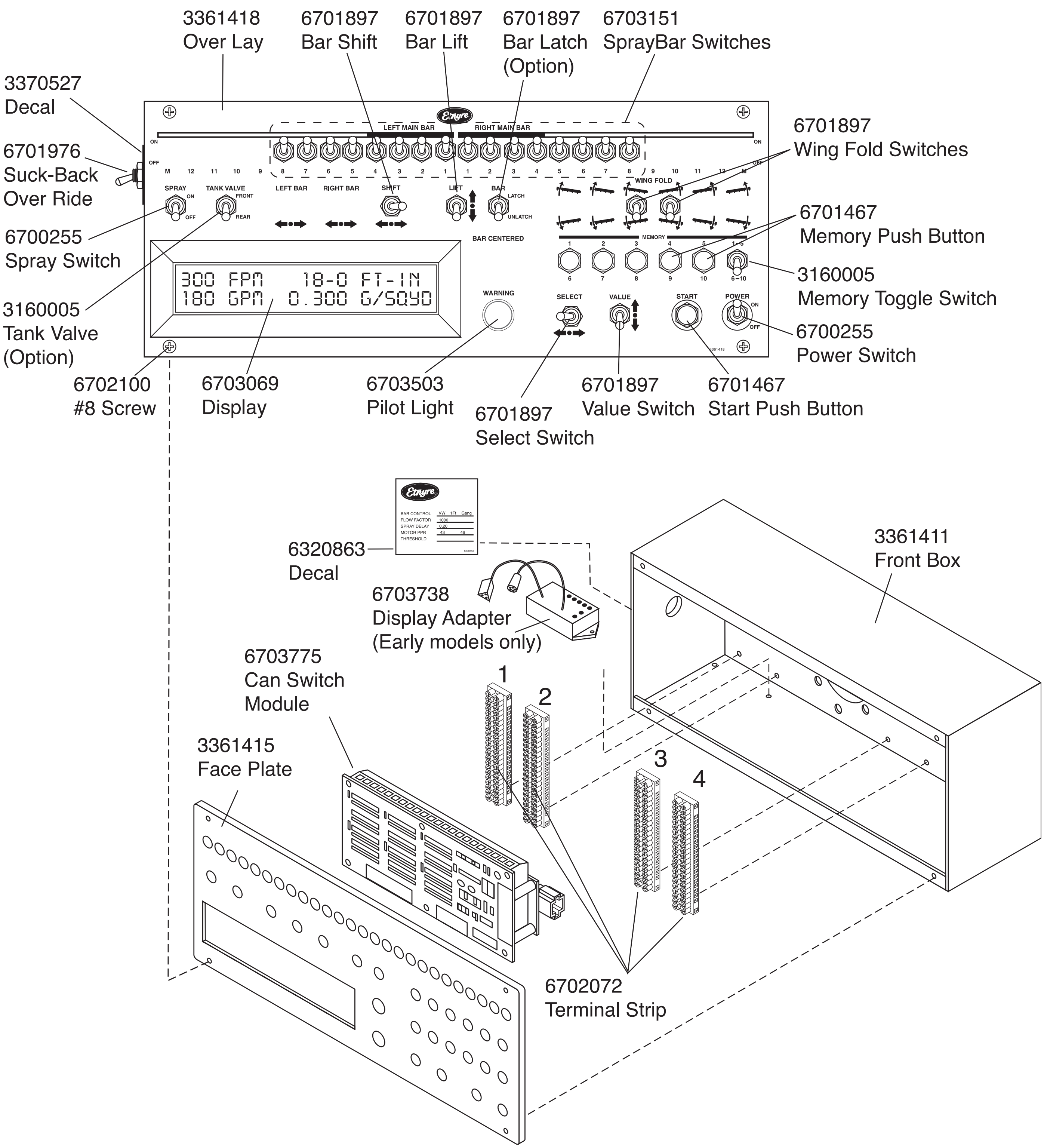
This message flashes on the display when VW control is selected and the feedback from either the left smart cylinder or the right smart cylinder is out of the acceptable range or has been calibrated incorrectly. There are several reasons why the feedback may be out of the acceptable range. It may be unplugged from the computer or electrical power or may be damaged.

Burner Timer

BURNER TIMER ENDING

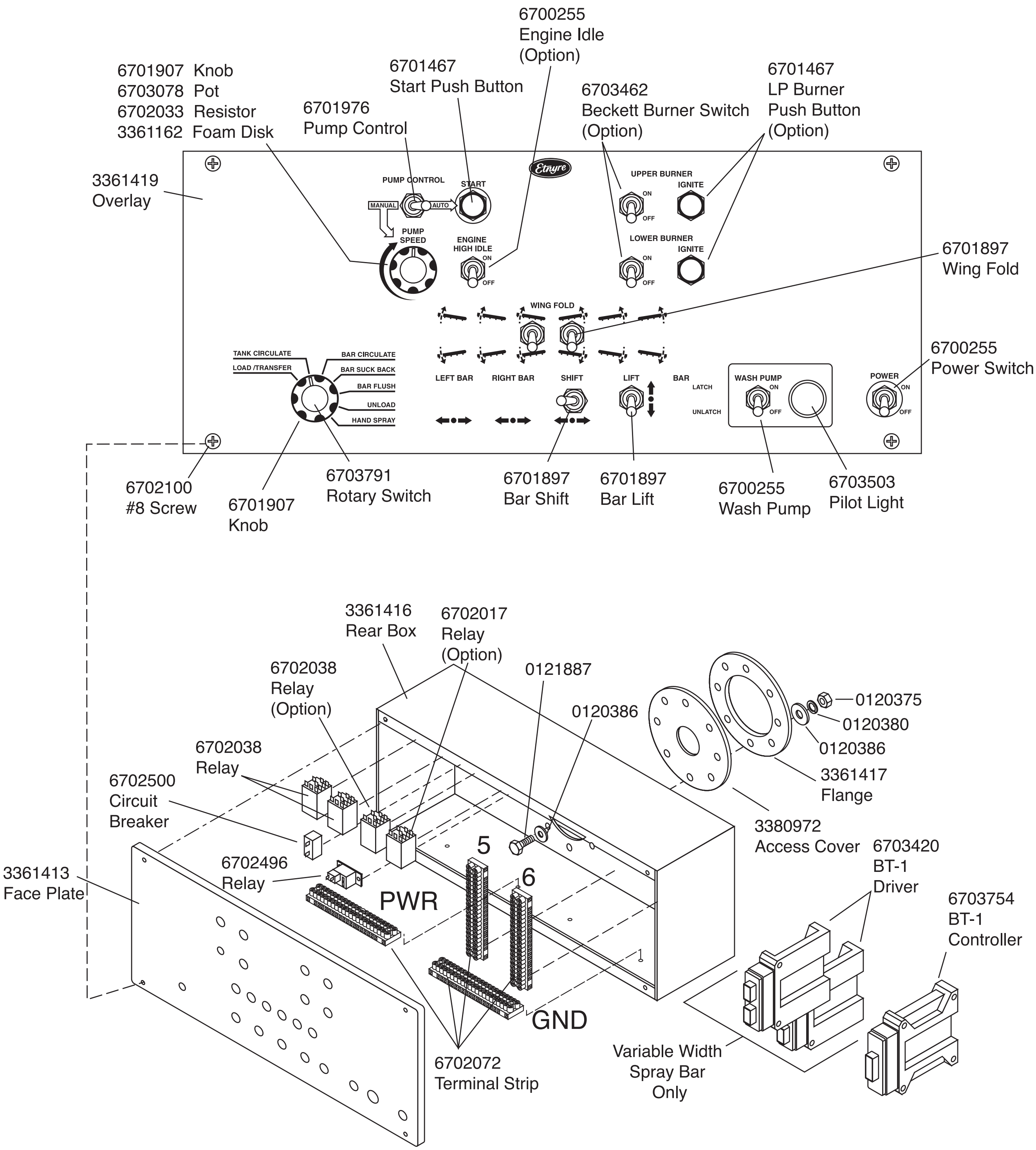
This message flashes on the display during the last 5 minutes of heating when the optional burner controls are installed.

2008
Front Control Panel



For further assistance call Etnyre service department at (1-800-995-2116)

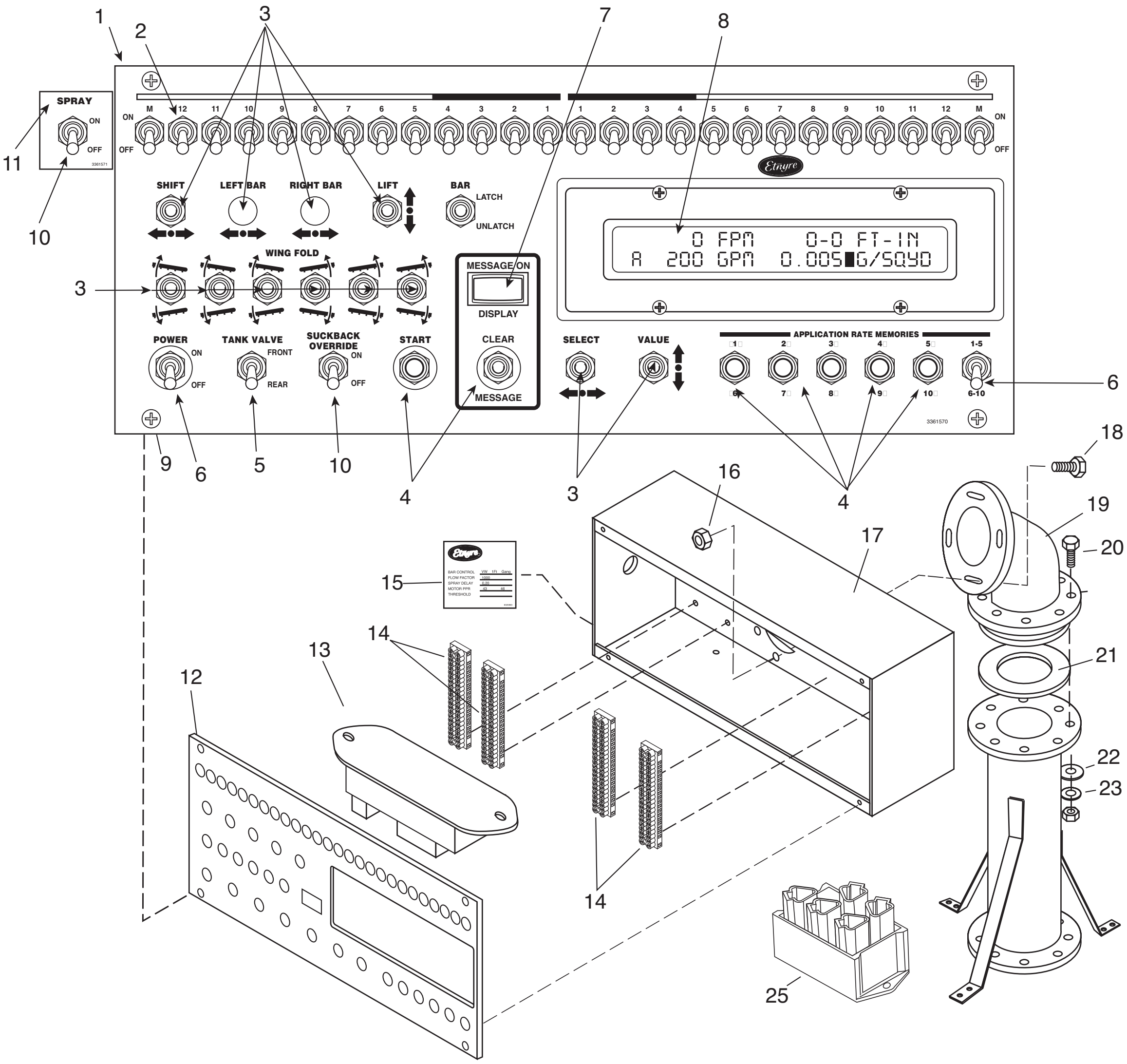
2008 BT-1
Rear Control Panel



2010 Cab Control Panel

BT-1 Computerized Application Rate Control

Units with 1' Spray Bar Controls, Gang Bar, or Variable Width Spray Bar

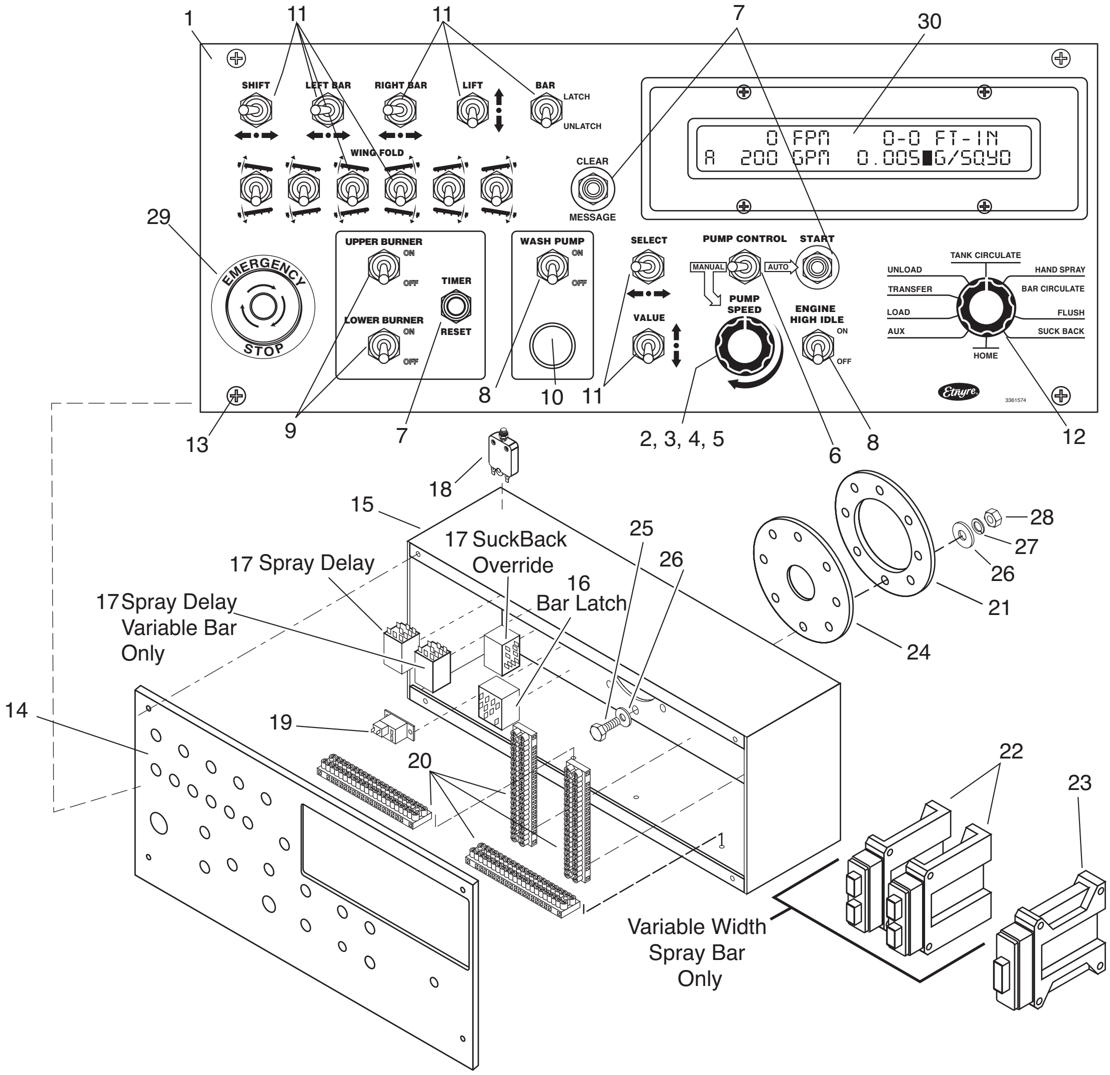


REF	PART NO.	QTY	DESCRIPTION	REF	PART NO.	QTY	DESCRIPTION
1	3361570	1	Overlay-Front control Panel	13	6703979	1	Module-Digital Input, Can
2	6703151	26	Switch-Toggle, DPDT, Long Bat	14	6702072	4	Terminal Strip 16/20 Pads
3	6701897	9	Switch-Toggle, DPDT, 3 Pos, Mom	15	6320863	1	Decal - Standard Settings
4	6701467	6	Switch-Push Button, Mon.N.O.	16	9413946	4	Lock Nut, 0.25NC
5	3160005	1	Switch-Toggle, SPDT, 2 Pos, Maint	17	3361565	1	Box-Control Panel
6	6700255	3	Switch-Toggle, SPST, 2 Pos, Maint	18	0121913	4	Screw, 0.25NC x 1.25
7	6703971	1	Light- Indicator, Blue, LED	19	3321456	1	Elbow Asm - Center Stand
8	6703851	1	Display-Digital, 2x24	20	0120233	8	Screw, 0.38NC x 1.00
9	6702100	4	Screw-Truss HD, 8NC-32 x 3/8"	21	3321306	1	Gasket-Teflon, Stand
10	6701976	1	Switch-3PDT-2Pos	22	0120388	8	Flat Washer, 0.38
11	3361571	1	Decal-Spray, On/Off	23	0120382	8	Lock Washer, 0.38
	3381480	1	Enclosure - Remote Master Spray	24	0120377	8	Nut, 0.38NC
	6703483	1	Toggle extension - 1.875" long, black	25	6703870	1	Can Port- 3 Device and 2 Bus
12	3361566	1	Faceplate Asm-Front5				

2010 Rear Control Panel

BT-1 Computerized Application Rate Control

Units with 1' Spray Bar Controls, Gang Bar, or Variable Width Spray Bar



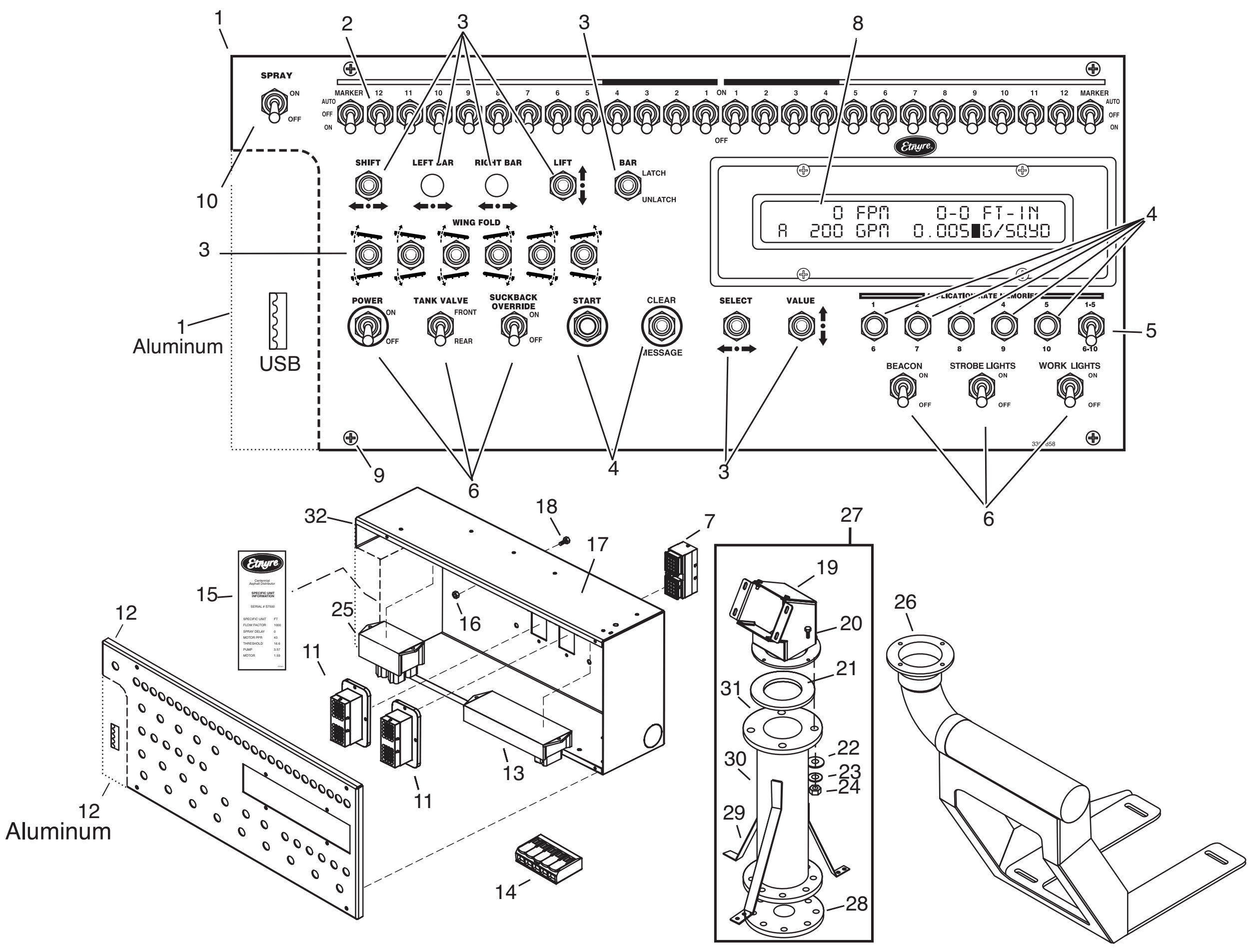
REF	PART NO.	QTY	DESCRIPTION
1	3361574-A	1	Overlay-Rear Control Panel
2	6701907	2	Knob-Control
3	6703078	1	Pot-1K, Single, Linear 2.25 W
4	6702033	1	Resistor-100 OHM, 0.50 W, 5 Per
5	3361162	1	Disk-Foam, 1.25 Dia., 0.25 Thick
6	6701976	1	Switch-Toggle,3PDT,2 Pos,ScrewTerm
7	6701467	3	Switch-Pushbutton, Mon.N.O.
8	6700255	AR	Switch-Toggle, SPST, 2 Pos
9	6701975	2	Switch-Toggle, SPST, 1/4 Tabs, On/Off
10	6704227	1	Light-Pilot, Green, LED, 5/8"
11	6701897	AR	Switch-Toggle, DPDT, 3 Pos, Mom
12	6704025	1	Switch-Rotary, 3 Pole, 10 Pos
13	6702100	4	Screw-Truss HD, 8NC-32 x 3/8"
14	3361572	1	Faceplate-Rear
15	3361573	1	Box-Control, Rear
16	6702017	1	Relay (Standard on Variable Width Bar, Optional on 1 Ft Control Spray Bar)
	6702018	1	Mounting Plate-Relay
17	6702038	AR	Relay-3PDT, 10A, 12 VDC Coil
18	6702500	1	Circuit Breaker-25 AMP
19	6702496	1	Relay-SPST-NO, 30A
20	6702072	4	Terminal Strip-Type KL 16/20 Pads
21	3361417	1	Flange-Control Box
22	6703420	2	Driver-Plus1, Sauer OX24-10 (Used on Variable Bar Only)
23	6703754	1	Controller-Plus1, Sauer MC50-20
24	3380972	1	Access Cover
25	0433056	4	Screw-Hex, 0.25NC x 0.75
26	0120386	AR	Washer-Flat, 0.25
27	0120380	AR	Washer-Lock, 0.25
28	0120375	AR	Nut-Lock, 0.25NC
29	6703408	1	Switch-Emer. Stop, Turn Reset
30	6703851	1	Display-Digital, 2x24

AR = As Required

2017 Cab Control Panel & Stand

BT-1 Computerized Application Rate Control

Units with 1' Spray Bar Controls, Gang Bar, or Variable Width Spray Bar

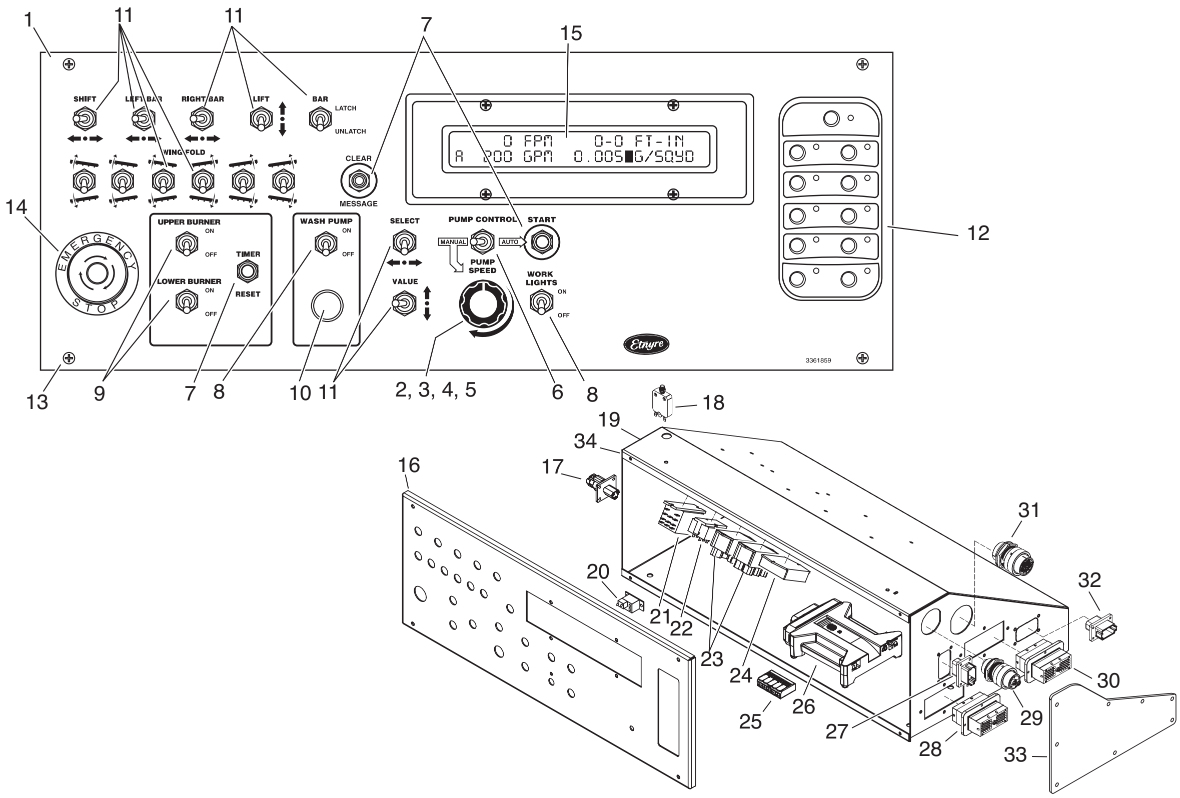


REF	PART NO.	QTY	DESCRIPTION	REF	PART NO.	QTY	DESCRIPTION
1	3361858	1	Overlay-Front Control Panel, 2016	16	9413946	4	Lock Nut, 0.25NC
	3361984	1	Overlay-Front Control Panel, Aluminum	17	3361845	1	Box-Control Panel, 2016
2	6703151	26	Switch-Toggle, DPDT, Long Bat		3361963	1	Box-Control Panel, Aluminum
3	6701897	13	Switch-Toggle, DPDT, 3 Pos, Mom	18	0121913	4	Screw, 0.25NC x 1.25
4	6701467	6	Switch-Push Button, Mon.N.O.	19	3361942	1	Elbow Asm - Center Stand
5	3160005	1	Switch-Toggle, SPST, 2 Pos, Maint	20	0120233	8	Screw, 0.38NC x 1.00
6	6703410	6	Switch-Toggle, SPST, 2 Pos, Maint	21	3321580	1	Gasket-Teflon, SAM Stand
7	3370835	1	Harness-Main Sax Conv, SB, 16	22	0120388	8	Flat Washer, 0.38
	3370891	1	Harness-Main Tax Conv, SB, 16	23	0120382	8	Lock Washer, 0.38
	3370892	1	Harness-Main, XL, SB, 16	24	0120377	8	Nut, 0.38NC
	3370817	1	Harness-Main Sax Conv, VW, 16	25	6703870	1	Can Port- 3 Device and 2 Bus
	3370847	1	Harness-Main Tax Conv, VW, 16	26	3361945	1	Cab Station Asm-International Truck
	3370893	1	Harness-Main, XL, VW, 16	27	3370906	1	Cab Stand Asm-Standard, FT & VWSB
8	6703851	1	Display-Digital, 2x24				*(Includes Ref 19, 21, 28–31. Does not*
9	6702100	4	Screw-Truss HD, 8NC-32 x 3/8"				*include 20, 22–24)*
10	6701976	1	Switch-3PDT-2Pos	28	3380972	1	Cover-Access Hole, Cabstand
11	3370834	2	Harness-Cab Box	29	3321031	3	Leg-Mtg. Shrt, Tach. Pump Cab
12	3361846	1	Faceplate Asm-Front, 2016	30	3321583	1	Tube Asm-SAM Stand
	3361979	1	Faceplate Asm-Front, Aluminum	31	3321301	1	Flange-SAM Stand Upper
13	6703979	1	Module-Digital Input, Can	32	3361969	1	Shade-Control Box, Front, Aluminum
14	6704594	AR	Connector-Lever Nut, Bussed, 5		6703972	2	Light-Strip, White LED, .313" x 24.0"
15	6320863	1	Decal - Standard Settings		6704569	1	Switch-Dimmer, ON/OFF, 12V

2017 Rear Control Panel

BT-1 Computerized Application Rate Control

Units with 1' Spray Bar Controls, Gang Bar, or Variable Width Spray Bar



REF	PART NO.	QTY	DESCRIPTION
1	3361859	1	Overlay-Rear Control Panel
2	6701907	1	Knob-Control
3	6703078	1	Pot-1K, Single, Linear 2.25 W
4	6702033	1	Resistor-100 OHM, 0.50 W, 5 Per
5	3361162	1	Disk-Foam, 1.25 Dia., 0.25 Thick
6	6701976	1	Switch-Toggle,3PDT,2 Pos,ScrewTerm
7	6701467	3	Switch-Pushbutton, Mon.N.O.
8	6703410	AR	Switch-Toggle, SPST, 2 Pos
9	6701975	2	Switch-Toggle, SPST, 1/4 Tabs, On/Off
10	6704227	1	Light-Pilot, Green, LED, 5/8"
11	6701897	AR	Switch-Toggle, DPDT, 3 Pos, Mom
12	6704432	1	Keypad-Digital Input
13	6702100	4	Screw-Truss HD, 8NC-32 x 3/8"
14	6703408	1	Switch-Emer. Stop, Turn Reset
15	6703851	1	Display-Digital, 2x24
16	3361856	1	Faceplate-Rear, 2016
	3361974	1	Faceplate-Rear, Aluminum
17	3370829	1	Computer Diagnostict
18	6702500	1	Circuit Breaker-25 AMP
19	3361857	1	Box-Control, Rear, 2016
	3361970	1	Box-Control, Rear, Aluminum
20	6702496	1	Relay-SPST-NO, 30A
21	6702038	2	Relay-3PDT, 10A, 12 VDC Coil *(Qty 1 used with Variable Width Spray Bars)*
22	6702017	1	Relay
	6702018	1	Mounting Plate-Relay
23	6704088	1	Can Port-4 Device, 2 Buss *(Qty 2 used with Variable Width Spray Bars)*
24	6704418	1	Converter-12 to 24VDC, 50Watt *(Used only with Variable Width Spray Bars)*
25	6704594	AR	Connector-Lever Nut, Bussed, 5
26	6704419	1	Controller-MC5120, PreProgrammed
27	3370839	1	Harness-Rear RTD/Speed, SB *Fixed Width Spray Bar*
	3370811	1	Harness-Rear Box, Cylinder, Int, 16 *Variable Width Spray Bar*
28	3370837	1	Harness-Hydraulic & Aux. Air, SB *Fixed Width Spray Bar*
	3370813	1	Harness-Hydraulic & Aux. Air, Int *Variable Width Spray Bar*
29	3370816	1	Harness-Power/Ground, Int, 16
30	3370840	1	Harness-Rear Box, Control, SB, 16 *Fixed Width Spray Bar*
	3370878	1	Harness-Bar Move, Int. *Variable Width Spray Bar*
31	3370836	1	Harness-Bar Move, SB *Fixed Width Spray Bar*
	3370877	1	Harness-Rear Box, Int. Vlv, 16 *Variable Width Spray Bar*
32	3370895	1	Harness-Auxiliary, 12 Pin
33	3382398	1	Endcap-Toolbox, Plate
34	3361976	1	Shade-Control Box, Rear, Aluminum
	6703972	2	Light-Strip, White LED, .313" x 24.0"
	6704569	1	Switch-Dimmer, ON/OFF, 12V

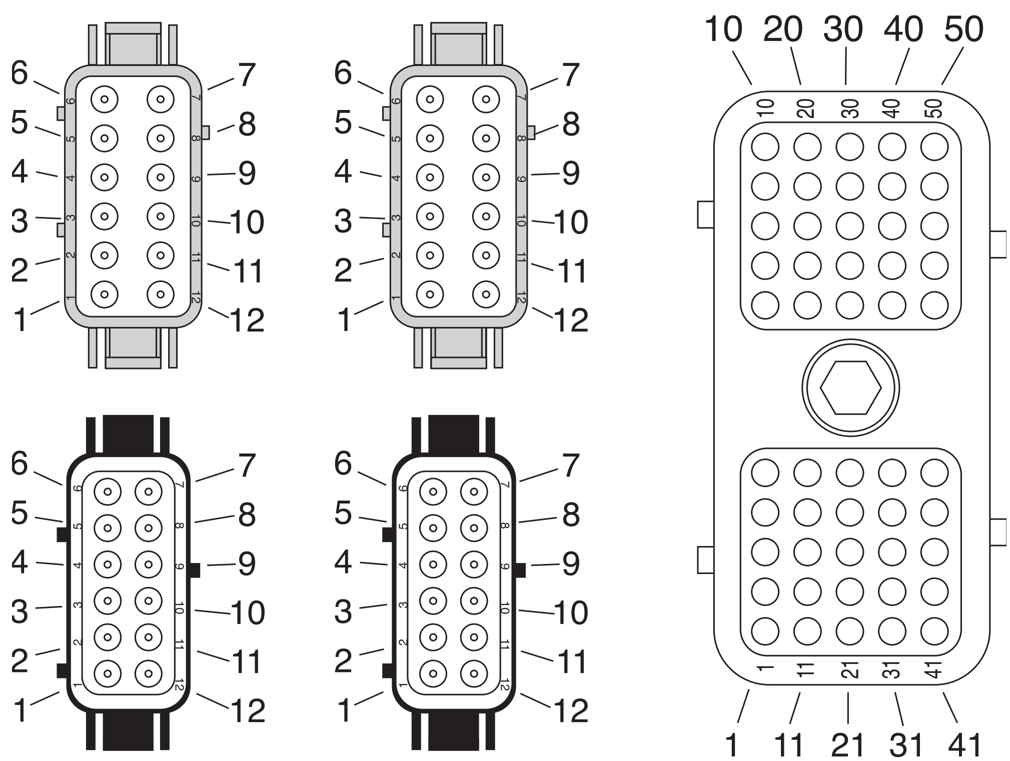
AR = As Required

Computer Wiring Connections

BT - 1 Controller

BT - 1 Drivers

Variable Width models only



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Page Number	Reference Number	Paragraph Number	Figure Number	Problem (please be specific)

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