
PROALL

Mobile Mixer

Service Manual
P-Model



MX04703

August 2020
Rev.1.0



5810 - 47 Avenue, Olds, Alberta, Canada, T4H 1V1
E info@proallinc.com | P 403-335-9500 | F 403-335-9560

1. Contents

1. SPECIFICATIONS	6
1.1 CAPACITIES	6
1.2 HYDRAULIC FITTINGS	6
1.3 FASTENERS	7
1.4 LUBRICANTS	8
1.5 SPECIAL TOOLS	8
2. COMPONENT LOCATION	9
3. THEORY OF OPERATION	10
4. TROUBLE SHOOTING	11
5. TESTS AND DIAGNOSTICS	13
5.1 CANBUS SPEED SENSORS	13
5.2 CONTROL VALVES	14
5.2.1 COIL REMOVAL	14
5.2.2 CARTRIDGE VALVE REMOVAL/INSTALLATION	15
5.2.3 VALVE MANUAL OVERRIDES	16
5.3 HYDRAULIC CIRCUITS	17
5.3.1 DIAGNOSTICS	17
5.3.2 BELT	17
5.3.3 AUGER	18
5.3.4 CHARGE	19
5.4 MIXER FUNCTION DIAGNOSTICS	21
5.4.1 WATER	21
5.4.2 ADMIX	22
5.4.3 BELT	24
5.4.4 CEMENT	25
5.4.5 AUXILLARY 1 (POZZOLAN)	26
5.4.6 COLOR	27
5.4.7 MIX AUGER	28
5.4.8 BOOM/CHUTE/SWING	29
5.4.9 CHAIN OILER	31
5.4.10 BELT BYPASS	32
5.5 FLOW METERS	32
5.6 PNEUMATICS	33

5.7 ELECTRICAL.....	34
5.7.1 SOLENOID INDICATORS.....	34
5.7.2 CONTINUITY AND CURRENT DRAW	34
5.7.3 SYSTEM VOLTAGE	35
5.8 ALARMS.....	36
5.9 DIAGNOSTIC MESSAGES.....	40
6. MIX AUGER SERVICE.....	43
6.1 BOTTOM IDLER SHAFT, SEAL AND BEARING REMOVAL.....	43
6.2 BOTTOM IDLER SHAFT AND SEAL INSTALLATION	46
6.3 BOTTOM BEARING INSTALLATION	50
6.4 TOP MOTOR, BEARING AND DRIVE SHAFT REMOVAL	52
6.5 TOP MOTOR, BEARING AND DRIVE SHAFT INSTALLATION	52
6.6 SHAFT AND BEARING INSTALLATION	53
6.7 MOTOR INSTALLATION	56
6.8 WEAR PLATE REMOVAL AND INSTALLATION	58
7. CONVEYOR BELT SERVICE PROCEDURE.....	60
7.1 BELT INSTALLATION	60
7.2 BELT REMOVAL	65
7.3 BELT INSTALLATION (ALTERNATE METHOD).....	65
7.4 LOOSEN THE CHAIN TENSIONER	66
7.5 TENSIONING THE CHAIN TENSIONER.....	67
8. CEMENT / AUX FEEDER	69
8.1 DISCHARGE MAINTENANCE	69
8.2 SPEED SENSOR REPLACEMENT	69
8.3 CHAIN MAINTENANCE	70
9. COLOR FEEDER	70
9.1 SPEED SENSOR REPLACEMENT	70
9.2 CHAIN MAINTENANCE	71
10. WATER.....	72
10.1 PRIMING THE SYSTEM.....	72
10.2 STRAINER CLEANING AND REPLACEMENT	72
10.3 FLOW METER CLEANING AND REPLACEMENT	73
11. ADMIX	73
11.1 PRIMING THE SYSTEM.....	73

11.2 STRAINER CLEANING AND REPLACEMENT	74
11.3 FLOW METER CLEANING AND REPLACEMENT	75
12. HYDRAULICS	76
12.1 BELT CIRCUIT PRESSURE ADJUSTMENTS.....	76
12.2 AUGER CIRCUIT PRESSURE ADJUSTMENT.....	77
12.3 PRESSURE FILTER REPLACEMENT.....	78
12.4 RETURN FILTER REPLACEMENT.....	79
12.5 OIL LEVEL.....	80
12.6 OIL COOLER	80
12.6.1 FAN FUSES	80
12.6.2 FAN REMOVAL / REPLACEMENT	81
12.6.3 TEMPERATURE SETTINGS.....	81
13. ELECTRICAL.....	82
13.1 RELAY AND FUSE REPLACEMENT	82
13.2 CANBUS NETWORKS	83
13.3 SUPPRESSION DIODES.....	84
14. APPENDIX	
14.1 HYDRAULIC	
14.1.1 SCHEMATIC	
14.1.2 CONTROL VALVE LOCATIONS	
14.1.3 PUMP SETUP	
14.2 PNEUMATIC	
14.2.1 SCHEMATIC	
14.3 ADMIXTURE	
14.3.1 SCHEMATIC	
14.4 ELECTRICAL	
14.4.1 CIRCUIT BOARD SCHEMATIC	
14.4.2 CABLE HARNESSES	

1. SPECIFICATIONS

1.1 CAPACITIES

PROALL MODEL CAPACITIES												
MODEL	TOTAL AGGREGATES		AGG SIDE A		AGG SIDE B		CEMENT		WATER		VMMB RATING	
P	m ³	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft ³	Liter	Gal	m ³	yd ³
P50	6.68	236	3.53	125	3.15	111	2.6/3.2	93/113	1500	400	5.4	7
P75	8.36	295	4.42	156	3.94	139	3.2/3.8/5.3	113/133/186	1500	400	6.5	8.5
P85	9.76	345	5.21	184	4.55	161	3.2/3.8/5.3	113/133/186	2250	600	7.6	10
P95	11.71	414	6.25	221	5.46	193	3.2/3.8/5.3	113/133/186	2250	600	9.2	12
P105	13.67	483	7.30	258	6.37	225	3.2/3.8/5.3	113/133/186	2250	600	10.7	14

COLOR BIN 4 ft³ (0.11m³)

ADMIX STD 10 gal (40 liter) / 20 gal (80 liter)

ADMIX HIGH VOL 35 gal (133 liter) / 45 gal (169 liter)

HYDRAULIC RESERVOIR 20 gal (80 liter)

CHAIN OILER RESERVOIR 2 qt (1.9 liter)

1.2 HYDRAULIC FITTINGS

All pressure side hydraulic fittings and hose ends are JIC/ORB. Split flange Code 61 connections are used at pump outlets and suctions. The suction (low pressure) side of the pumps use flange and JIC fittings / hose ends.

FITTING CHART										
	ORS	ORB/JIC	ORS	ORS	ORB	ORB	JIC	JIC	ORS	ORB
Tube Size	Thread Size	Thread Size	Torque Ft-lbs	Torque Nm	Torque Ft-lbs	Torque Nm	Torque Ft-lbs	Torque Nm	O-Ring	O-Ring
-4	9/16-18	7/16-20	10-12	14-16	13-15	18-20	11-12	15-16	-011	-904
-6	11/16-16	9/16-18	18-20	24-27	22-24	29-33	18-20	24-28	-012	-906
-8	13/16-16	3/4-16	32-35	43-47	40-43	49-53	36-39	49-53	-014	-908
-10	1-14	7/8-14	46-50	60-68	43-48	59-64	57-63	77-85	-016	-910
-12	1-3/16-12	1-1/16-12	65-70	90-95	68-75	93-102	79-88	107-119	-018	-912
-16	1-7/16-12	1-5/16-12	92-100	125-135	112-123	151-166	108-113	147-154	-021	-916
-20	1-11/16-12	1-5/8-12	125-140	170-190	146-161	198-218	127-133	172-181	-025	-920
-24	2-12	1-7/8-12	150-165	200-225	154-170	209-231	158-167	215-226	-029	-924

Note: ORS hose ends and fittings on special request.

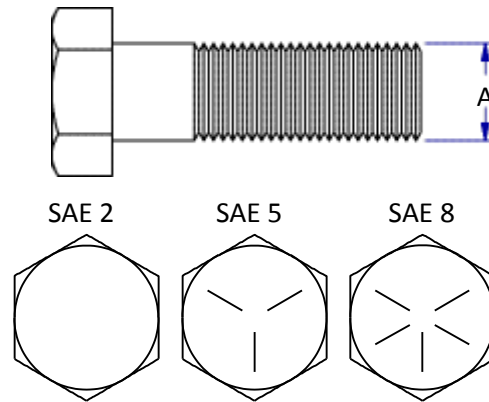
C61 FLANGE CHART		
Tube Size	Fasteners	O-Ring
-16	M10 x 1.5; 17 deep	-219
-24	M12 x 1.75; 20 deep	-225
-32	M12 x 1.75; 20 deep	-228

Buna-N (90-durometer nitrile) seals are recommended for the mixer hydraulic system. System temperature range from -40°F to 250°F (-40°C to 121°C).

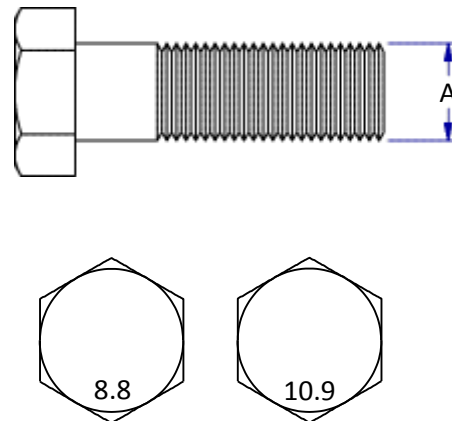
1.3 FASTENERS

The tables shown below give correct torque values for various bolts and cap screws. Tighten all bolts to the torque specified in chart unless otherwise noted. When assembling equipment, use bolt torque chart as a guide.

Bolt Diameter "A"	Bolt Torque *					
	SAE 2 (N-m) (ft-lbs)		SAE 5 (N-m) (ft-lbs)		SAE 8 (N-m) (ft-lbs)	
1/4"	8	6	12	9	17	12
5/16"	13	10	25	19	36	27
3/8"	27	20	45	33	63	45
7/16"	41	30	72	53	100	75
1/2"	61	45	110	80	155	115
9/16"	95	60	155	115	220	165
5/8"	128	95	215	160	305	220
3/4"	225	165	390	290	540	400
7/8"	230	170	570	420	880	650
1"	345	225	850	630	1320	970



Bolt Diameter "A"	Bolt Torque *			
	8.8 (N-m) (ft-lbs)		10.9 (N-m) (ft-lbs)	
M3	0.5	0.4	1.8	1.3
M4	3	2.2	4.5	3.3
M5	6	4	9	7
M6	10	7	15	11
M8	25	18	35	26
M10	50	37	70	52
M12	90	66	125	92
M14	140	103	200	148
M16	225	166	310	229
M20	435	321	610	450
M24	750	553	1050	774
M30	1495	1103	2100	1550
M36	2600	1917	3675	2710



Torque figures indicated above are valid for non-greased or non-oiled threads and heads. Therefore, do not grease or oil bolts or cap screws unless otherwise specified. When using locking nuts, increase torque values by 5%.

* Torque value for bolts and cap screws are identified by their head markings.

1.4 LUBRICANTS

Hydraulic Oil:

Proall mixers are shipped with Petro-Canada Hydrex XV hydraulic oil. This oil has a very high viscosity index making it suitable for many operating environments. Should a different oil be used to add or replace the OEM oil ensure that is a compatible anti-wear hydraulic oil with a suitable viscosity for your environment. Minimum recommended viscosity is 10cSt at max operating temperature of 72°C or 160°F.

HYDREX XV viscosity specifications:

Kinematic Viscosity, cSt @ 40°C	D445	47.9
cSt @ 100°C		9.7
SUS @ 100°F		242
SUS @ 210°F		58
cP @ -40°C (-40°F)	D2983	24,250
Viscosity Index	D2270	192

Chain Oil:



WARNING!

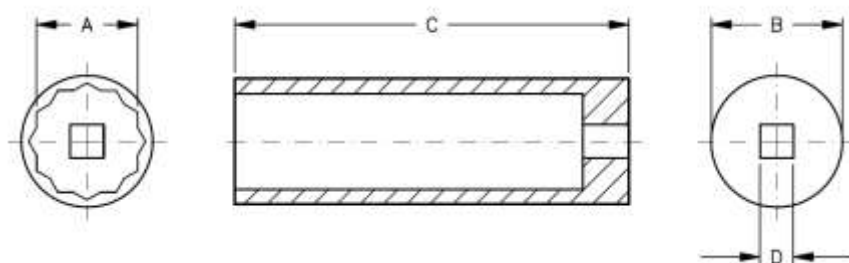
Always use new oil in chain oiler. Used oil may cause damage to chain oiler pump seals and valves.

Proall recommends SAE 30 oil for the chain oiler. For temperatures between 5-40°C (40-100°F). For different environmental conditions refer to the list below:

- SAE20 for Temperatures of 20-40° F
- SAE30 for Temperatures of 40-100° F
- SAE40 for Temperatures of 100-120° F
- SAE50 for Temperatures of 120-150° F
- Hydraulic fluid, or red automatic transmission fluid are also acceptable for use in chain oiler system.

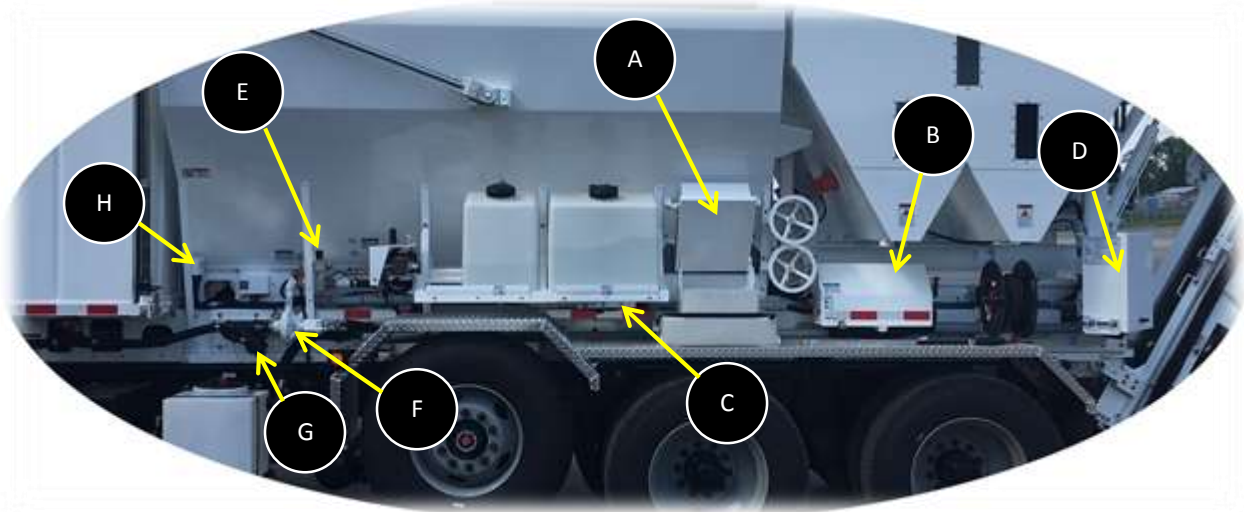
1.5 SPECIAL TOOLS

Cartridge valve deep sockets in 1 1/6" and 1 5/16" make removing cartridges much easier especially when multiples are installed next to one another. See sizing chart below.



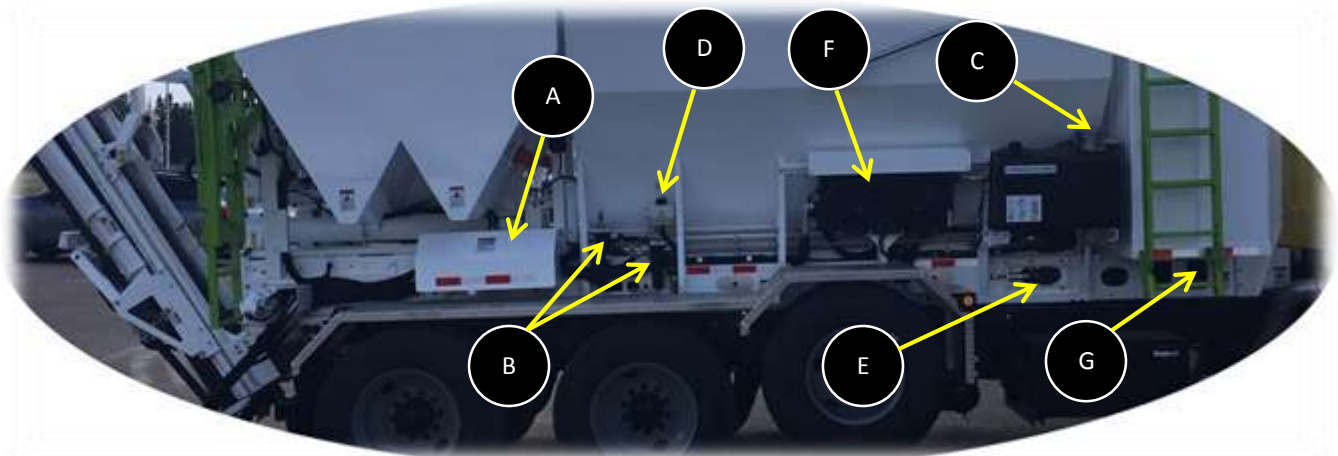
PART NUMBER	VALVE SIZE	"A" HEX	"B" O.D.	"C" LENGTH	"D" DRIVE
780657	10 SERIES	1 1/16"	1.38"	5.50"	½"
780658	12 SERIES	1 5/16"	1.75"	5.50"	½"

2. COMPONENT LOCATION



- A. Main Power Box
- B. Flow Meter Cabinet
- C. Admix Pumps
- D. Operator Panel

- E. Air Pressure Regulator
- F. Water Pump
- G. Water Pump Strainer
- H. Mixer Battery Power Connection



- A. Hydraulic Valve Cabinet
- B. Pressure Filters
- C. Return Filter
- D. Chain Oiler

- E. Belt Tension Adjustment (both sides)
- F. Oil Cooler
- G. Hydraulic Pumps

3. THEORY OF OPERATION

The Commander mixer's overall function is to dose / meter a pre-defined quantity of materials, which could be solids or liquids and mix these materials to achieve the end product. To do this many speed controlled and flow-controlled functions must work in unison to ensure the correct proportions are being administered.

Counts (or pulses) are used to measure and calibrate all material functions on the mixer. A count is basically just several points in one revolution of the shaft. Calibrations are done by weighing the total material dispensed and then dividing that by the total counts. This gives the weight per count or the amount of material dispensed between each count of the shaft. When looking at liquid calibration each measuring device records flow as a function of pulses or counts per unit volume.

The belt speed and counts are the basis for all dosage and total volume calculations. When belt speed is changed by the operator all the other material dosing functions will change in relation to this change in speed. This gives the operator the ability to change the production rate of the machine without having to change all the other material dosage functions at the same time.

Aggregate materials are metered via gates at the outlet of the aggregate bin. These materials are calibrated based on gate height in relation to belt counts. The higher the gate height the more weight per belt count is metered.

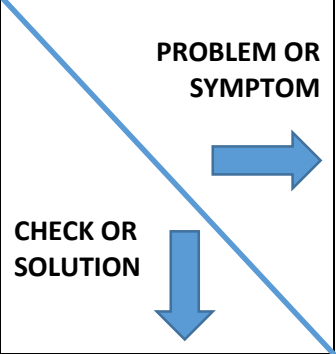
The speed-controlled functions operate based on RPM and counts. The counts determine the volume output based on calibration and the RPM determines dosage or production rate. The Commander control system uses the data in the mix design entered by the user to pre-determine required counts and RPM required. The RPM is monitored by the Commander computer to ensure the speed is maintained and is also variable when the belt speed changes.

The flow-controlled functions operate based on flow (multiple units of measure) and counts. The counts determine the volume output based on the flow meters k-factor (scaling). The flow determines the dosage or production rate. The Commander control system uses the data entered in the mix design to determine the required flow rates. The flow is monitored by the Commander computer to ensure flow is maintained and is also variable when the belt speed changes.

Since material flow measurements are the key to achieving the correct proportions it's important that all feedback devices are reading properly. The Commander system monitors the devices continuously during operation and will stop the mixer if the required feedback is not correct.

4. TROUBLE SHOOTING

The trouble shooting chart is to be used a guide to narrow down potential mixer control issues. There may be more than one check/solution to correct the problem, which can be found in more detail in the tests and diagnostics section. It's best to perform checks first before simply changing a component.

	SPEED FUNCTION HAS ALARM AUTO ERROR.	CONTROLS ARE NOT RESPONDING.	FLOW FUNCTION HAS ALARM AUTO ERROR.	SPEED CONTROLLED FUNCTION SPEEDS UP ON ITS OWN.	FLOW CONTROLLED FUNCTION INCREASES FLOW ON ITS OWN.	MIXER STOPS ON ITS OWN.	FUNCTION NOT TURNING.	NO ADMIX FLOW.	NO WATER FLOW.	MIXER SPEEDS ARE SLOW AND /OR ERRATIC.	OIL TEMP ALARM IS ON.	NO POWER TO MIXER.
CHECK IF SPEED SENSOR IS ACTIVE.	●			●								
CHECK IF SHOWING COUNTS AND/OR RPM.	●			●						●		
CHECK BELT PRESSURE IN DIAGNOSTICS.	●						●				●	
CHECK AUGER PRESSURE IN DIAGNOSTICS.							●				●	
CHECK IF ALL INSTALLED CANBUS DEVICES ARE ACTIVE.		●										
CHECK IF E-STOP IS PRESSED.												●
CHECK FUNCTION CURRENT DRAW.	●		●					●	●	●		
CHECK AIR REGULATOR PRESSURE.			●						●			
CHECK IF VOLUME STOP IS ON.						●						
CHECK MIXER DIAGNOSTIC MESSAGES.	●					●						
CHECK IF SHOWING FLOW READING.			●		●							
CHECK IF ALARM IS SHOWING.		●				●						
CHECK MIXER VOLTAGE SETTING.	●									●		
CHECK OIL COOLER TEMP SETTINGS.											●	
CHECK IF FUNCTION HAS A SET-POINT.	●		●				●	●	●			

CHECK IF BALL /GATE VALVE IS CLOSED.								●	●			
CHECK INLET STRAINER.			●					●	●			
CHECK ENGINE HIGH IDLE SPEED.	●									●		
CHECK BATTERY FUSE.												●
CHECK CHARGE PRESSURE.										●		
CHECK VALVE SOLENOID INDICATOR.	●								●			
CHECK OIL TEMPERATURE.	●										●	
CHECK PTO IS ON.	●	●				●						
CHECK AUGER VALVE RELIEF.										●	●	
CHECK BELT VALVE RELIEF.										●	●	
CHECK MASTER SWITCH IS ON.												●
MANUALLY OVERRIDE VALVE.	●											
REPLACE HYDRAULIC VALVE.	●		●								●	
REPLACE SPEED SENSOR.	●			●								
CLEAN OR REPLACE FLOW METER.			●		●							
REPLACE SENSOR CABLE.	●		●	●	●							
REPLACE CHECK VALVE.			●					●	●			
ADJUST PUMP LOAD SENSE COMPENSATOR.										●		

5. TESTS AND DIAGNOSTICS

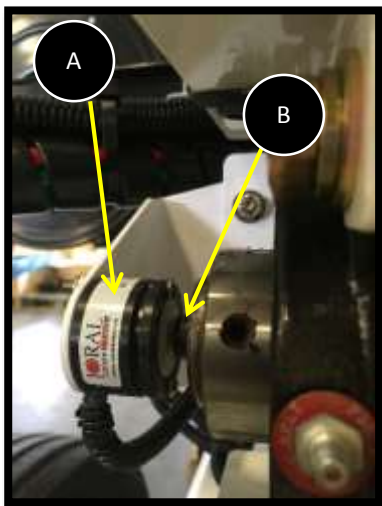
Use these tests as a guide to trouble-shoot and replace components if need be. The Commander display provides a lot of information that can be used to diagnose potential issues. Use this information first to narrow down potential issues before you replace or adjust components.

5.1 CANBUS SPEED SENSORS



IMPORTANT!

Speed sensor operation on the mixer is crucial to ensuring metering functions are reaching their speed set-points and in the calculation of total volume output. There are ways to run the mixer in a “LIMP” mode when a sensor has failed, but this should only be done in emergency circumstances.



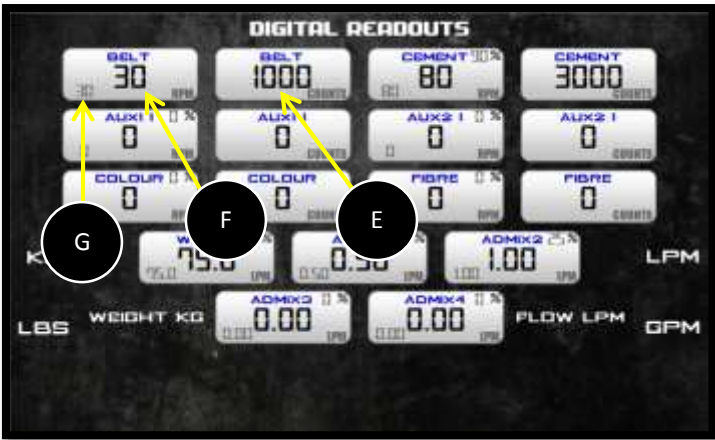
Sensor components:

- The speed sensor is made up of two main components. The first is the sensor **A** and the second the magnet **B**.
- The magnet is threaded into the end of rotary shaft and the sensor measures via magnetic field the rotation of the shaft and converts this to a pulse and RPM output.

Electrical diagnostics:

- All CANBUS speed sensors can be checked for operation on the Commander display.
- Should an issue arise that points to a speed sensor not working the first step is to check Electrical Diagnostics to see what is active (green) **C** and what isn't (red) **D**.
- All speed sensors are designated by their function and the abbreviation “ENC”, which is short for encoder.
- If a function shows up as red it is either not connecting to the CANBUS network or it isn't physically installed (various optional equipment).
- If the sensor diagnostic is red check wiring connections to ensure they are not loose or broken. Also, inspect connections for corrosion, pins broken or pushed back.





Checking operation:

- To check actual sensor output, go to the Digital Readouts screen. Here you will find all the main mixer process information in digital format.
- The counts **E** are the total counts accumulated by the speed sensor. If the sensor is counting, then it is working.
- The speed sensor RPM **F** is the actual RPM reading of the function. The small number **G** on the bottom left is the RPM set-point. When the mixer is running in mix mode the actual RPM should match the set-point. These numbers may bounce up and down 1RPM depending on the function but should follow each other.
- If the actual and set-point RPM numbers are not following each other the mixer will go into an auto fault for that function. See fault description for next steps.

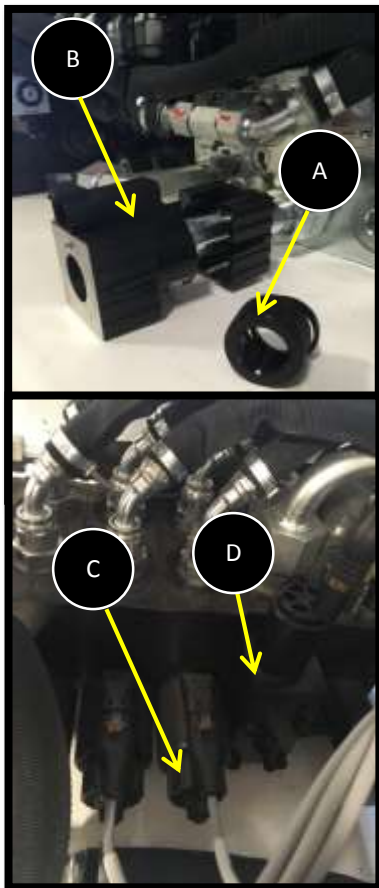
5.2 CONTROL VALVES

5.2.1 COIL REMOVAL



WARNING!

When installing cartridge valve coil nuts do not use pliers or any other hand tools to tighten. These nuts only need to be hand tight. Excessive tightening can stretch and distort the cartridge valve body causing the spool to stick.



Cartridge Valves:

- To remove cartridge valve coil, unplug the electrical cable and unscrew and remove coil nut and spacer **A**. Slide the coil assembly **B** back from cartridge body to remove.

Sectional Valves:

- To remove direct acting coil, unplug the electrical cable and unscrew and remove the coil nut **C**. Slide the coil back from the core tube to remove.
- To remove pilot operated coils, unplug the electrical cable. Use a #3 metric Allen key to remove the two socket head cap screws **D**. Pull the coil up and out of the body. Be careful not to drop any contaminants into the coil cavity as this is a pilot operated valve and contamination can cause the valve to malfunction.

5.2.2 CARTRIDGE VALVE REMOVAL/INSTALLATION

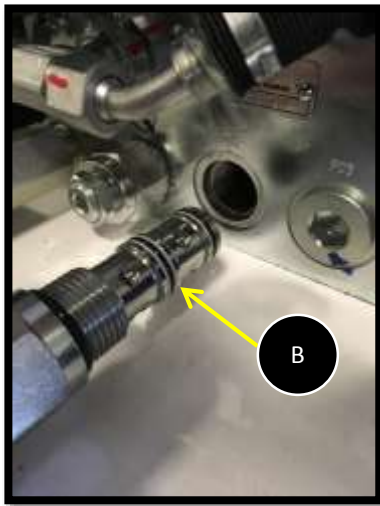
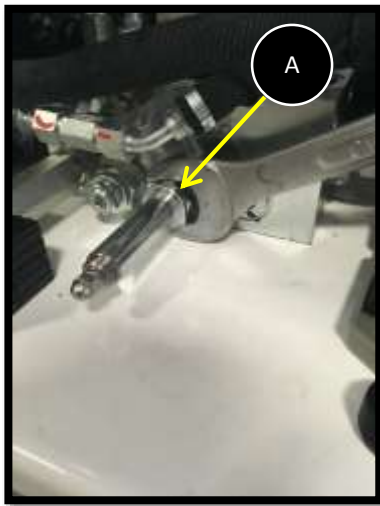


WARNING!

Never remove a valve when the truck is running, and PTO is on.

When installing cartridge valves do not over tighten. Follow torque recommendations below. Over tightening can distort cartridge body and cause the spool to stick.

Ensure that safe cleanup procedures are followed. Removing cartridge valve coils will drain some oil from the system, so do not remove the cartridge unless you are ready to replace it right away. Re-fill reservoir to top up oil level if required.



- Remove cartridge valve coil and electrical cable.
- Loosen the cartridge **A** using the appropriately sized socket or wrench for the cartridge hex. It is highly recommended to use a deep socket to remove and replace the cartridges. This will allow for much easier removal and replacement including proper re-torquing.

#10 size cartridge uses 1 1/16" wrench / socket (780657)

#12 size cartridge uses 1 5/16" wrench / socket (780658)

#10 size cartridge 54-61 N-m (45/50 FT-lbs)

#12 size cartridge 95-102 N-m (70/75 FT-lbs)

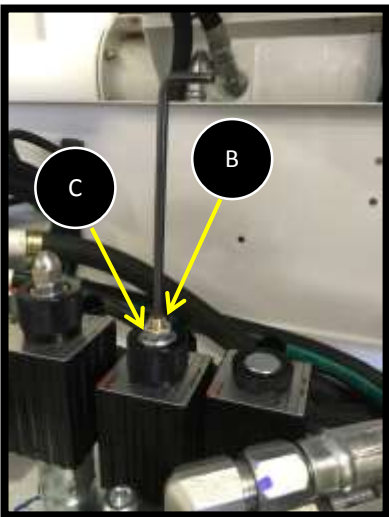
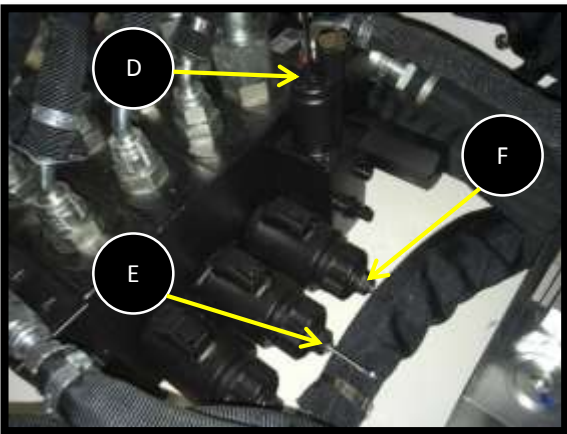
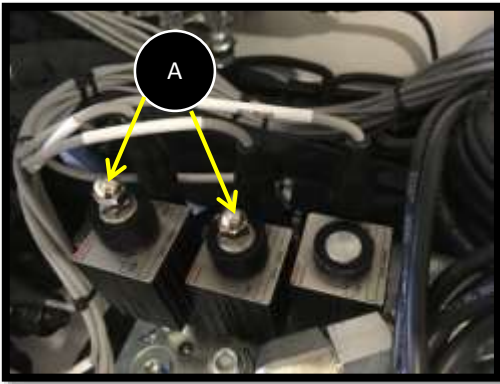
- When re-installing the valve be careful not to damage the valve seals **B**.

5.2.3 VALVE MANUAL OVERRIDES



WARNING!

Manually overriding valves should only be done in an emergency, or when troubleshooting and not in normal operation. Some valves when manually overridden will cause mixer functions to move, so ensure other equipment and personnel are out of harms way before attempting to over-ride a function manually.



Cartridge Valves:

- Remove acorn nuts (A) to get access to the manual override hex adjustment (B) using a 1/2" wrench.
- Loosen locknut (C) before attempting to adjust override adjustment.
- Using a 4mm Allen key turn the override adjustment screw in CW until function movement begins, or adjustment is far enough for desired speed / diagnostics.
- Once testing is complete ensure override adjustment is turned all the way out CCW until it stops. If the override is left in even a little bit the function may creep or go into an alarm once in normal operation.
- The mixer is designed to control these valves electrically only unless in an emergency.
- Ensure locknut (C) is hand tight and acorn nut is replaced.

Sectional Valves:

- To manually override the mix auger section, use a small Allen key and push down on override pin (D). The more you push down the faster the auger will turn.
- To manually override the boom, chute, or swing functions push in on override pin (E).
- Do not loosen locknut (F) or attempt to adjust the bias screw in or out. This is factory set and will affect function performance if adjusted incorrectly.

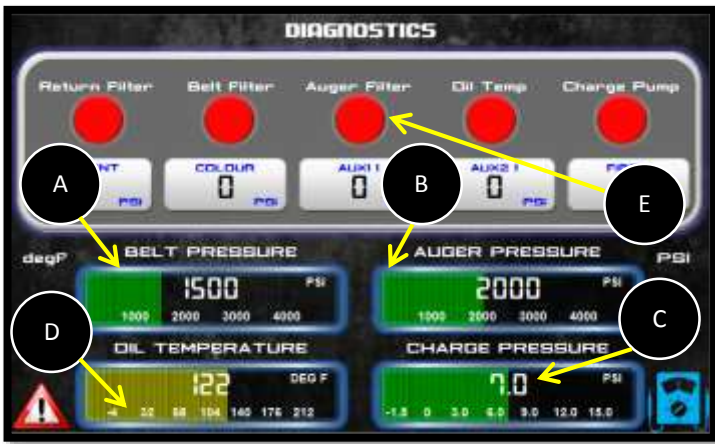
! INFORMATION

There is more detailed information when to use manual overrides for individual functions in the following sections. Manual overrides should only be used when electrical diagnostics have not shown any issues and as a last resort.

5.3 HYDRAULIC CIRCUITS

5.3.1 DIAGNOSTICS

The Diagnostics page provides a quick few of all the hydraulic system operating conditions.



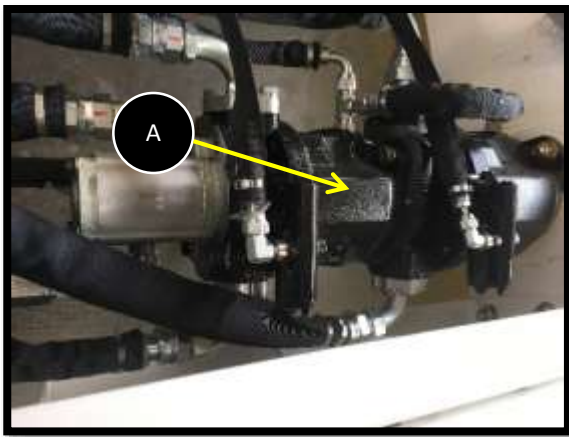
- The belt pressure **A** and auger pressure **B** are used for troubleshooting and pump/valve setup.
- The charge pressure **C** is used to verify proper operation of charge relief in the return filter housing and overall charge circuit function.
- The oil temperature **D** is a good indicator of overall system operation as well as oil cooler function.
- The filter indicators **E** allow maintenance personnel to pinpoint which individual filters are in bypass or have potential indicator issues.

5.3.2 BELT

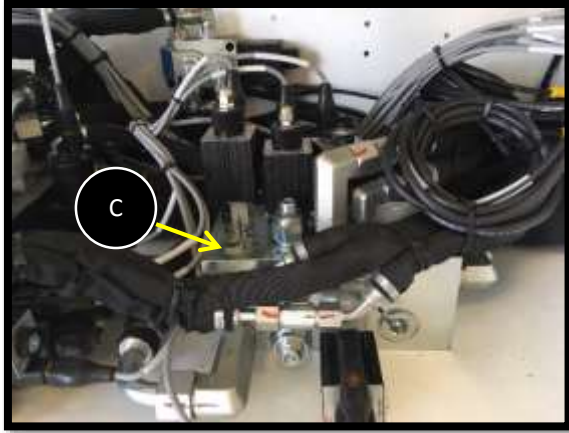


IMPORTANT!

The belt hydraulic circuit is powered by the second (middle) load sensing piston pump **A** that is referred to as the belt pump. The belt circuit also operates the water pump, cement and any other auxiliary functions such as fly ash and color. The belt function is the first function in the circuit with cement and auxiliary functions running in series after the belt. The water pump is the only parallel function that runs with the belt and is independent of the belt operation.



- When testing individual functions on the belt circuit it is best to run them independently using the “UNLOAD” functions **B** in the Mixer Control screen or on the keypad.
- By watching the belt pressure, the technician can see what loads are on the belt circuit.
- If the pump sounds like it's loading up more than normal or if a function or functions have stopped working, then start running functions individually to narrow down where the issue is coming from.
- Run the water pump then the belt individually first and check if the pressure changes.
- If the pressure increases when the water pump or belt are run individually then run the series functions individually



and see if the pressure increases again. Start with the last function in the series first.

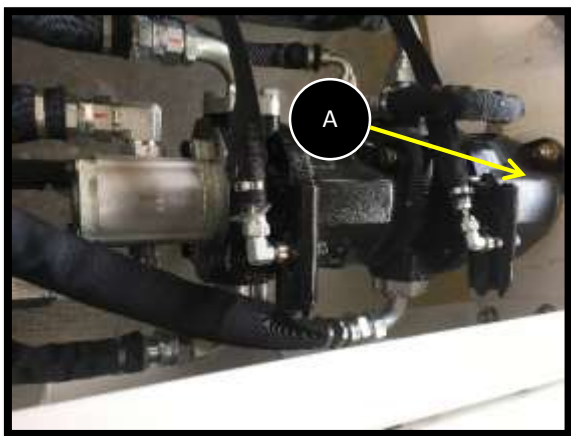
- An increased pressure up to the compensator setting of the pump (>3400psi) can indicate a mechanical blockage/jam of that function or a sticking/stuck hydraulic valve.
- To check pump pressure compensator setting you must plug the inlet hose to the belt motor. Since, there are no cylinder functions on the belt circuit there is no way to test this setting otherwise (see belt circuit pressure adjustment).
- The belt hydraulic manifold **C** houses all the cartridge valves that run the belt hydraulic circuit. Valve cables are labelled to show valve function.

5.3.3 AUGER

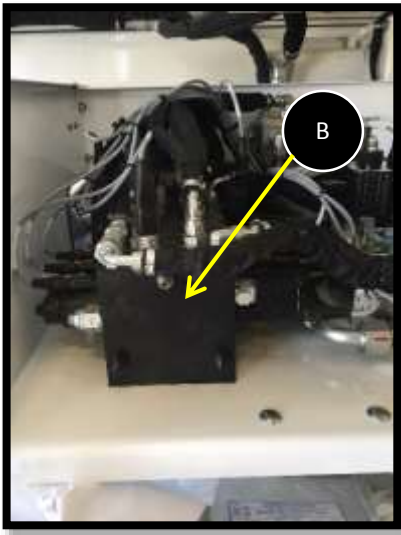


IMPORTANT!

The auger hydraulic circuit is powered by the first load sensing piston pump **A** that is referred to as the auger pump. The auger circuit operates the mix auger, boom, chute(s), swing and chain oiler. All the functions operate in parallel, so each one can run independently of the other.



- When testing individual functions on the auger circuit simply operate that function individually using the joystick and/or keypad.
- Checking pump max pressure settings can be done by simply extending or retracted the chute tilt function to the end of stroke.
- The auger hydraulic valve **B** is a sectional load sensing directional control valve. It uses pilot operated actuators for the mix auger circuit and direct acting actuators for the boom, chute and swing circuits. All valve actuators have manual overrides for testing and troubleshooting and testing.



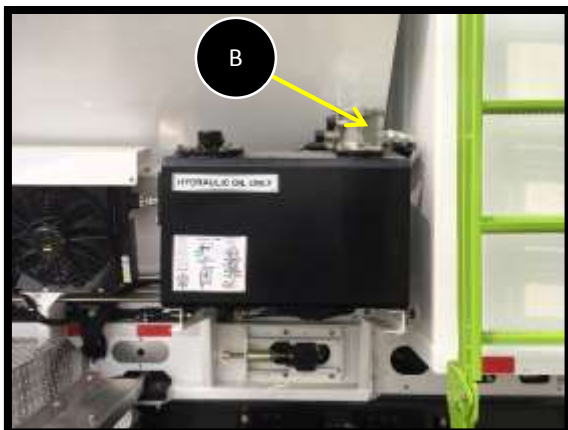
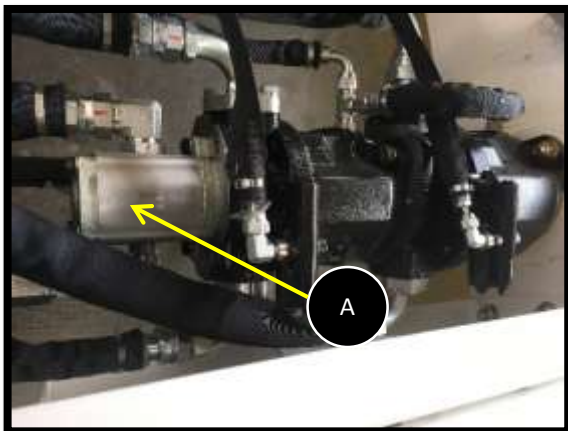
- The mix auger section has additional work port anti-shock and anti-cavitation valves. These valves prevent over pressure spikes and cavitation protection when auger is turned off at high speed.

5.3.4 CHARGE

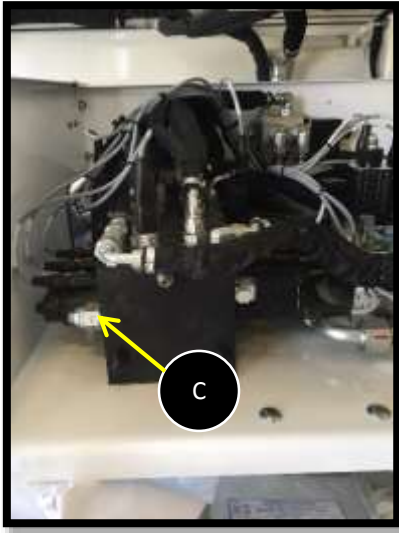


IMPORTANT!

The charge circuit is powered by the last pump **A**, which is a simple fixed displacement gear pump. The charge pump circuit is only used to make up leakage in the returning oil from the system as well as to provide a positive (supercharged) inlet pressure to the two main load sensing piston pumps. The other benefit is the addition of continuous cooling flow even when the mixer is idle with PTO still on.



- Charge pressure should be about 15psi (1bar) when the mixer is at standby and nothing is running. As the functions are turned on this pressure will drop by as much as half the standby pressure. This is normal as the charge pump makes up for system leakage through drain connections back to the reservoir.
- The main return filter housing **B** has special valving inside that ensures there is a positive pressure feeding the piston pumps. The most important of these valves is the back pressure or charge relief valve. Any oil not being feed back to the inlet of the piston pumps must pass across this back-pressure valve before entering the reservoir.
- If the charge pressure is significantly below 15psi (1bar) at standby, then the issue is either a faulty back pressure valve in the filter housing or there is a drain connection that is allowing charge oil to go directly back to tank.
- The only valve in the hydraulic system that has a direct connection back to the reservoir from the drain is the chain oiler pressure reducing valve **C**. If this valve is faulty or



has been removed and not replaced, then the charge pressure will drop to zero.

5.4 MIXER FUNCTION DIAGNOSTICS

5.4.1 WATER



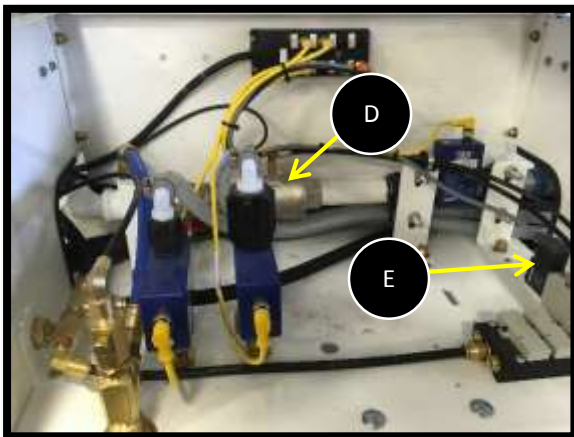
IMPORTANT!

The water system has two modes on all Commander mixers. One is automatic and one is manual. In automatic mode the water output flow (green bar) is controlled by the computer to match the set-point (red bar) target. In manual mode the water is controlled solely by the operator and can be done by changing the pump speed manually on the display or by fine tuning using the outlet ball valve.



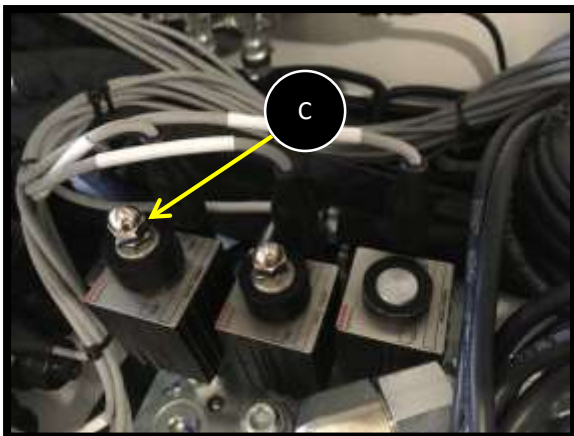
Water is flowing into mix bowl:

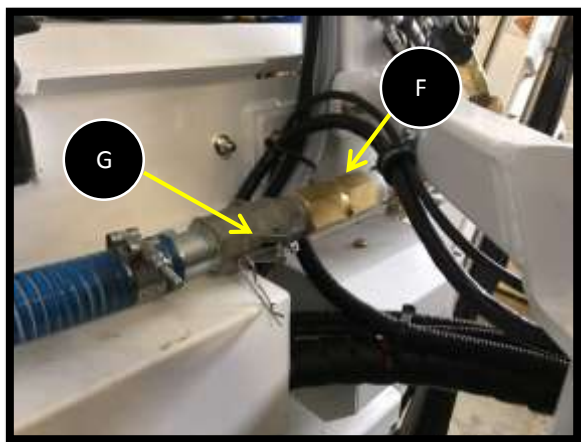
- If the Commander system is showing an auto water alarm, then this is an indication that the output flow is not matching the set-point flow.
- The first place to look if a water alarm is active is the flow meter reading. If there isn't a green bar (A) or a digital reading (B) then the system is not measuring flow, and this is reason for the alarm (see the Flow Meters section for more detailed troubleshooting)
- The flow reading can be checked quickly by pressing button #13 on the keypad to add water to the mix bowl.
- Check the flow meter K-Factor in the Sensor Calibration screen to ensure it isn't zero (div by zero). The default setting is 379 pulses/gal (100 pulses/litre).
- Check the water strainer for build-up that may be impeding the flow of water.
- Check for loose inlet connections or any indication of air in water output. Air will affect flow meter reading and be difficult to control. Is the winter blow down valve closed?



No water is flowing:

- Is the water pump turning? If not is the water pump hydraulic valve (C) ON? Check to see if the solenoid indicator light is ON.
- Check the water pump coil current in Electrical Diagnostics. Is there current going to the coil? Should be greater than 1000mA (12V) when button #13 is pressed.
- If electrical checks are good manually override water pump valve to see if pump starts turning. Turn override in and out several times and re-test using electrical connection. If it still does not work replace the valve.
- Check the water strainer for build-up that may be blocking the flow of water.





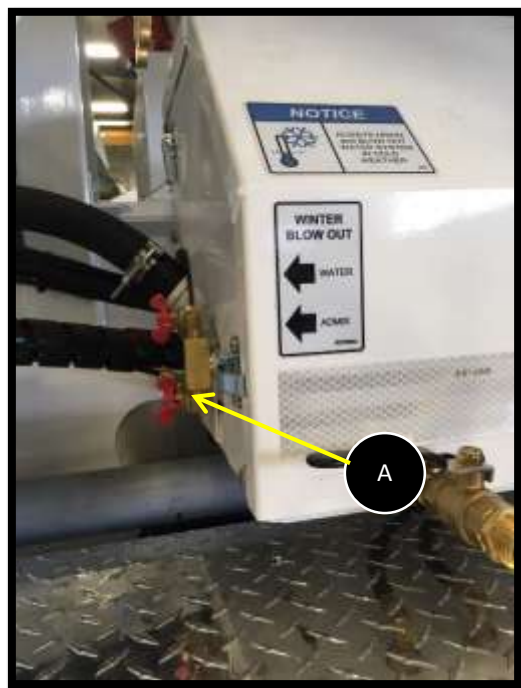
- Make sure water pump inlet gate valve is open.
- Check to make sure water ON/OFF valve (D) is opening.
- Check air regulator is 75psi or higher.
- Check to see if water ON/OFF valve connector light (E) is ON.
- Is the mixer set to Dry Mix Mode (Mixer Control)?
- Is the outlet check valve (F) stuck closed? You can temporarily remove the check valve from the circuit by disconnecting cam lock (G).

5.4.2 ADMIX



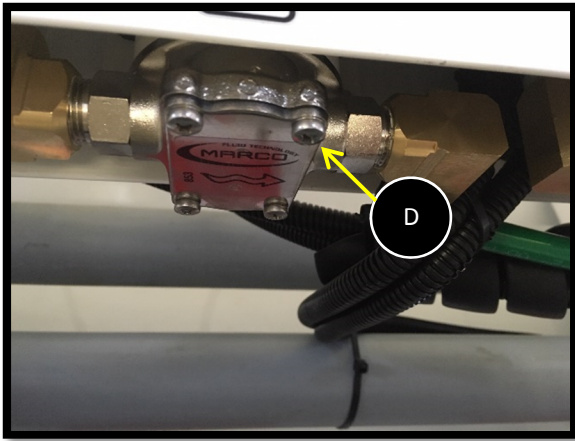
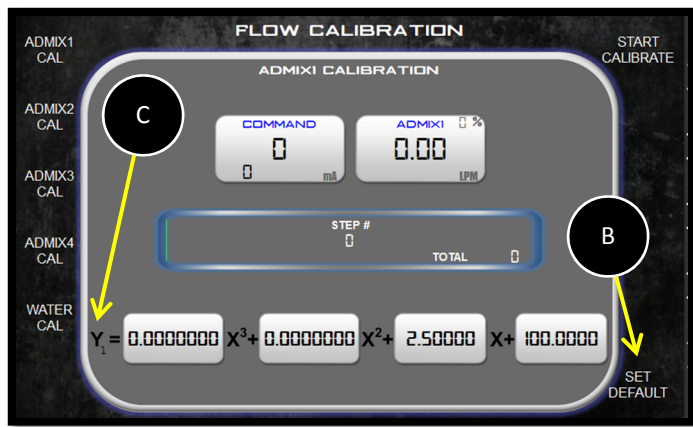
IMPORTANT!

The admix system on the Commander mixer works in the same way as the water system. The operator has a choice on how to control the admixture output. In auto mode (Admix Auto and Admix Electronic is selected in Mixer Settings and Mixer Options) the computer will control the pump speed to meet flow targets. In manual mode (Mixer Settings, Admix 1,2 Manual) the operator can control the pump speed directly. The third operation is to run the pump at max speed and use the control valves to manually control the output flow. This third mode must have both Admix Electric and Admix Auto de-selected in Mixer Settings and Mixer Options.



Admix is flowing into mix bowl:

- If the Commander system is showing an auto admix alarm, then this is an indication that the output flow is not matching the set-point flow.
- Check to see if a green bar or digital reading is showing for flow. If no flow reading is showing on the screen this is the reason for the alarm if in auto mode (see the Flow Meters section for more detailed troubleshooting).
- Flow readings can be checked quickly by putting the admix pump in "Prime" mode (amber light) on the keypad.
- Check the flow meter K-Factor in the Sensor Calibration screen to ensure it isn't zero (div by zero). The default setting varies based on the admix outputs for your mixer.
 - Low flow system default is 30000 pulses/gal (7925 pulses/litre)
 - Medium flow system default is 15000 pulses/gal (3962 pulses/litre)
 - High flow system default is 4000 pulses/gal (1057 pulses/litre)
 - If unsure which system you have check the side of the flow meter for the label showing flow rating and K-factor.



- Check the admix strainer for build-up that may be impeding the flow of admixture.
- Check for loose inlet connections or any indication of air in admix output. Air will affect flow meter reading and be difficult to control. Is the winter blow down valve **A** closed?
- Ensure the admix system is primed sufficiently, and lines are full.
- As a final check if the system is in Admix Auto and generating an alarm go to the Sensor Calibration and then Flow Curves screens. In flow curves for the admix or admixes with alarms press the Set Default **B** button to reset the flow curves. Try the admix in auto again. If it still does not work, you can run the calibration and let the computer generate the flow curve **C**.

No admixture is flowing:

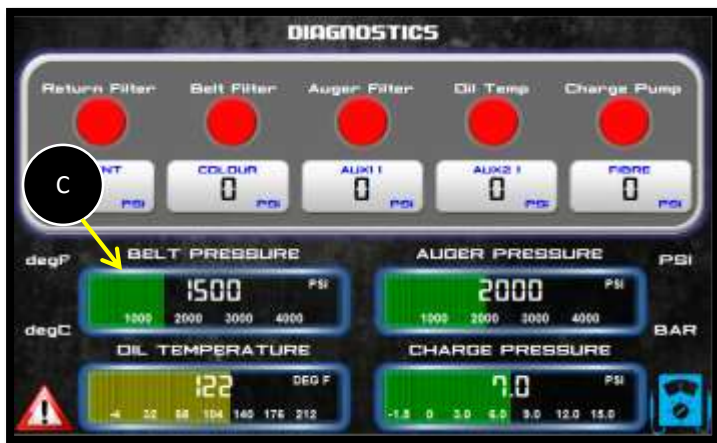
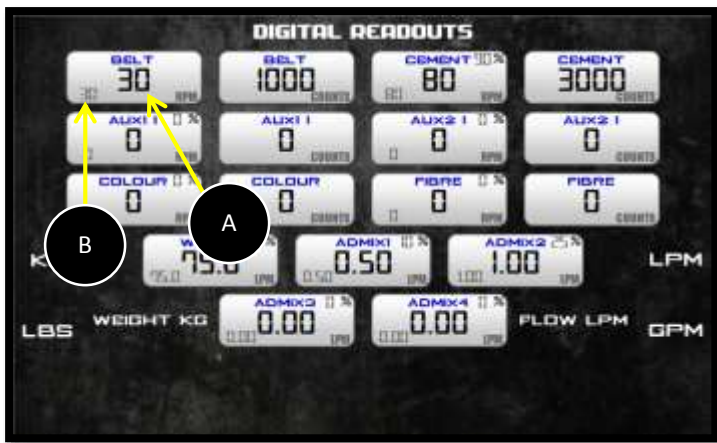
- Is the admix pump turning? You can generally hear or touch the motor to see if the pump is on.
- Check the admix pump current in Electrical Diagnostics. Is there current going to the pump? If the current draw is greater than 10000mA then the pump may be locked up. If your mixer has diaphragm pumps disregard.
- To unlock the pump, loosen slightly the four Philips screws **D**. If the pump leaks you have gone too far. See if the current draw goes down and pump starts turning.
- Be careful not to loosen the screws to far, you may lose the O-ring seal behind the cover plate.
- Once you get flow moving through the lines tighten the screws back up. Hand tight is all they need.
- If the fluid is still not moving and the pump current draw is greater than 10000mA then there may be a blocked or sticking outlet check valve **E**. Uncouple the quick connect fitting and try to run the pump again. If current draw drops and fluid starts to flow, then replace the check valve.
- If the pump is turning and current draw is normal (typically runs around 3000-5000mA depending on chemical) then the pump is still not primed properly.
- Follow priming procedure to see if flow goes to tank when valve is in full bypass (zero setting). Turn the valve back to the wide-open position and see if fluid is flowing to the water line.

5.4.3 BELT

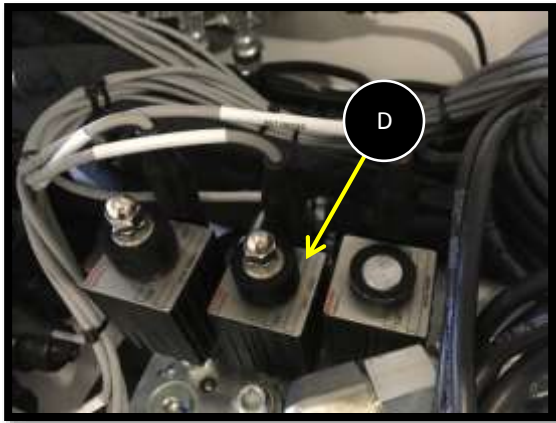


IMPORTANT!

The belt function is critical in the automatic operation of the mixer. The belt is the first function in the series hydraulic circuit, which feeds all the downstream functions such as the cement auger, fly ash and color. All the downstream functions including the water and the admix use the belt speed as the primary variable in the calculation of each functions set point values. If the belt speed sensor is not providing feedback (ie. 0 RPM) then all the other functions set point equations will multiply by zero resulting in a zero setpoint. It is possible to continue to run the mixer in a limp mode. This only applies to mixes without fly ash (AUX1) or color and if the cement ratio in the mix design is set at or near 100%. To activate the limp mode the operator can select Cement Full, Water Manual, Belt Manual and Admix Manual. There will be no belt counts in this limp mode (ie. no volume totals), but the operator can still run the mixer manually this way if need be.



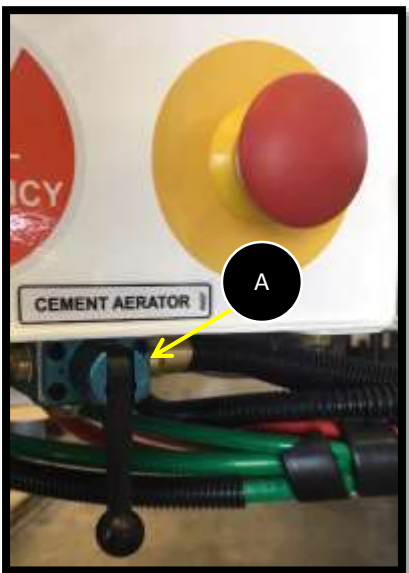
- If the Commander system is showing an auto belt alarm, then this is an indication that the output speed is not matching the set-point speed.
- Check to see if the actual RPM is showing in Digital Readouts and that it matches the set-point RPM when mixing (see the CANBUS Speed Sensor section for more detailed troubleshooting). Also, confirm that the engine high idle speed is working properly. If there is not enough flow from the belt pump, then the belt will not meet it's setpoint.
- If the oil temperature is not above 15°C (60°F) and the belt is set for maximum speed then slow the belt speed down to 50% or warm up the system by running the mix auger empty for 5 min to get the oil temperature up to at least 30°C (90°F) before trying to run the belt at full speed. Very cold oil is too high a viscosity to allow for max oil flow through valves without a warmup first.
- In the Electrical Diagnostics screen select the belt current diagnostic and check and see if the current increases when the belt is activated. Also, confirm that the belt speed solenoid indicator light is on.
- If the speed sensor is working properly and electrical current is going to the belt valve coil the next step is to check the belt pressure in the Diagnostics screen. Run the belt in belt unload mode and watch the belt pressure. If the pressure is under 2000psi and the belt is turning, then the belt itself is free. If the pressure is at the pump's compensator setting of about 3600psi then something may be jamming the belt.
- If the belt is turning freely in belt unload, but the pressure is at or near 3600psi when running all downstream functions



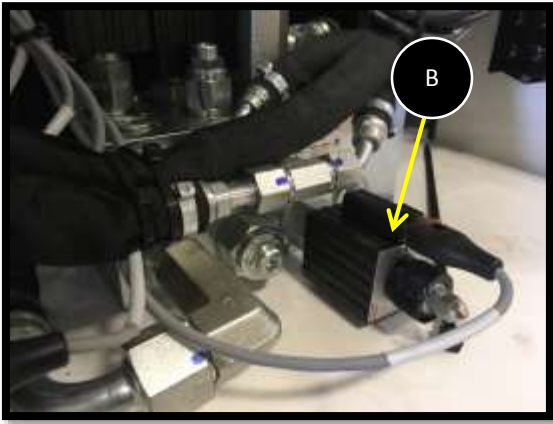
then there is blockage or stuck downstream valve/function (cement, color or aux).

- In the Mixer Control screen activate the last downstream function in unload mode first. For example, if the mixer has a color feeder as the last function in the series circuit then run the color feeder by itself first. Run each function individually checking to see if it turns and the pressure has dropped below 3600psi.
- During this sequential process you will likely get to a function when in unload mode that causes the pump to go to compensator pressure of 3600psi.
- There are a couple reasons for a function to cause the pump to compensate at high pressure. One of those reasons is a stuck hydraulic valve. You can try and manually override the valve to free it up. If this does not work, you can try and replace the valve with another downstream function and see if the issue moves. If the issue moves or goes away, then the valve needs to be replaced.
- If replacing and/or manually overriding the valve does not work, then there is something mechanically blocking/jamming the function from turning.

5.4.4 CEMENT



- If the Commander system is showing an auto cement alarm, then this is an indication that the output speed is not matching the set-point speed.
- Check to see if the actual RPM is showing in Digital Readouts and that it matches the set-point RPM when mixing (see the CANBUS Speed Sensor section for more detailed troubleshooting).
- Confirm that the speed set-point is above about 10RPM. If the mix design entered has a very low content of cement then the output speed required may be very low, which may cause control issues. If possible, increase the belt speed % to increase the cement setpoint.
- In the Electrical Diagnostics screen select the cement current diagnostic and check and see if the current increases when the cement is activated. Also, confirm that the cement speed solenoid indicator light is on.
- If the speed sensor is working properly and electrical current is going to the cement valve coil the next step is to check the belt pressure in the Diagnostics screen. Run the cement in cement unload mode and watch the belt pressure. If the pressure is under 2000psi and the cement is



turning, then the cement auger itself is free. If the pressure is low and the cement auger is still not turning check that the drive chain isn't broken. If the pressure is at the compensator setting of about 3600psi then something may be jamming the cement auger.

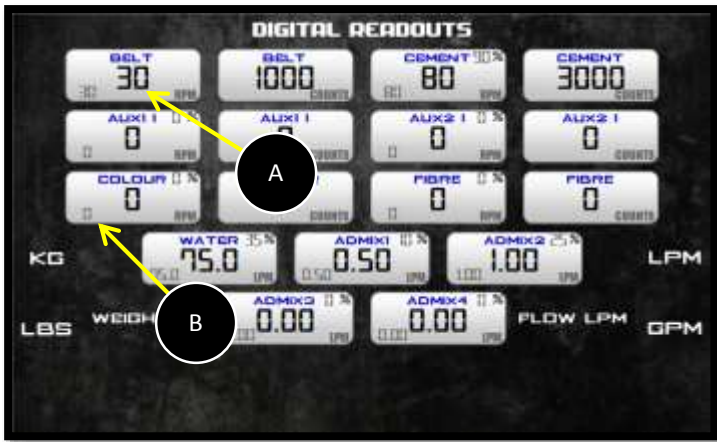
- If the cement auger does not turn in cement unload and the belt pressure is at max compensator pressure of about 3600psi then there may be packed cement powder around the cement auger. Also, check the drop tube sock on the cement auger outlet to make sure it isn't plugged. Activate the cement aerator circuit **A** to loosen up the powder over the cement metering auger. Turn the cement unload function on and off several times to get the cement auger to turn.
- If the cement auger still does not turn and the pressure is at compensator pressure of about 3600psi then the hydraulic valve **B** may be stuck/sticking. To determine if the cement valve itself is the issue run the belt in belt unload mode and see if belt will turn or is at the same high pressure. This is an indication that the cement valve is stuck blocking the flow of oil from the belt motor as well.
- Replace the cement valve if required.

5.4.5 AUXILLARY 1 (POZZOLAN)



- AUX1 is essentially a second cement (pozzolan) metering system and the diagnostics steps are the same as the primary cement metering system.
- Typically, AUX1 systems run much slower than the cement metering system, so be careful of low (<10RPM) setpoints.
- The Commander control system will warn the mix design creator / operator when the speed ratio **A** goes below 15% by changing the text to red.

5.4.6 COLOR



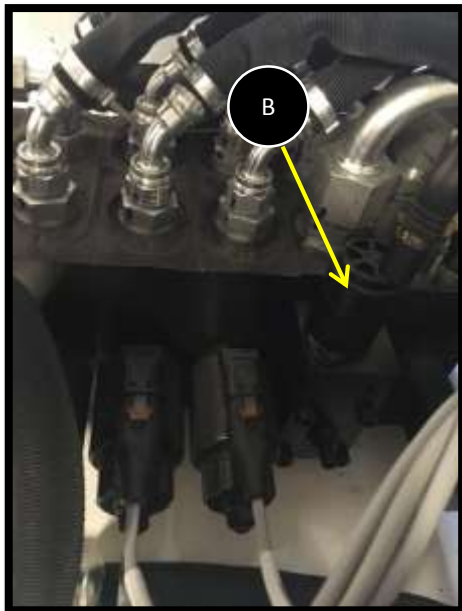
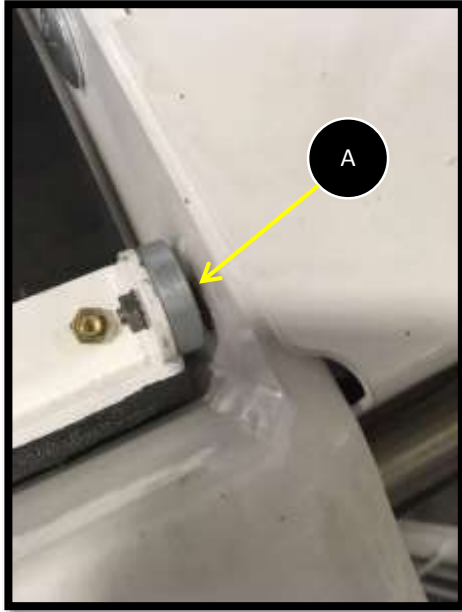
- Although the color feeder is not considered a pozzolan metering system in the Commander computer it does function in the same way as the cement and AUX1 metering systems.
- The diagnostics steps are the same as the primary cement metering system.
- The color feeder also typically runs at much lower speed ratio then the cement, so also be careful of low (<10RPM) setpoints. If the speed setpoint is low, increase your belt speed **A** as high as you can. This will increase the color speed setpoint **B** at the same time.
- The Commander control system will warn the mix design creator / operator when the speed ratio goes below 15% by changing the text to red.

5.4.7 MIX AUGER



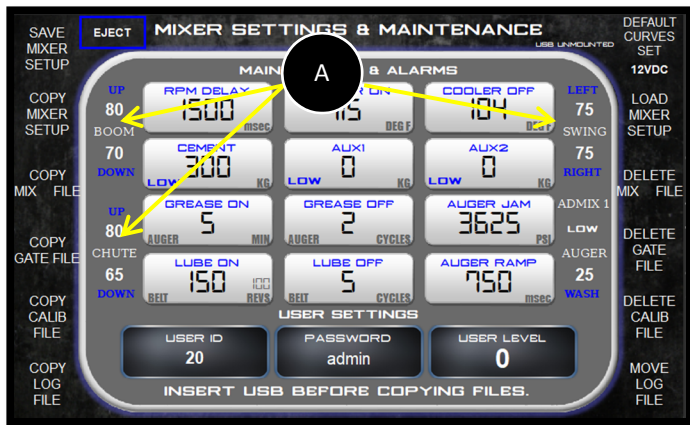
WARNING!

The mix auger uses a limit switch in the lid that stops the mix auger from turning if the lid is open. If this switch or electrical connection fails, then the mix auger will be disabled until a new switch or cable is installed. If the switch and/or connection is bypassed in any way, then this will allow the operator to open the lid while the mix auger is turning creating a potentially fatal hazard.



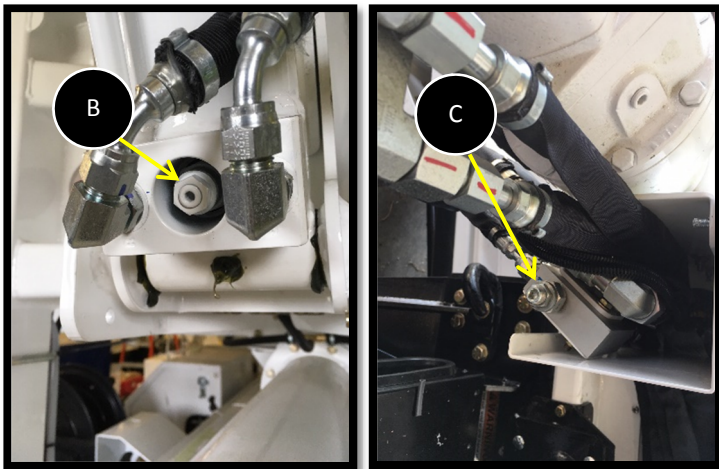
- If the mix auger is not turning check for any alarm indicators. The diagnostics message will read (Auger Limit Switch Open!) and button #20 will flash red if auger lid is not closed properly or if limit switch **A** is not working.
- If the lid switch alarm is active check for broken wires from lid switch back to the connection in the hydraulic valve I/O #1 block (port #8).
- Check fuse F17. If this fuse is blown it is very likely there is broken and shorted wire to the lid limit switch.
- Check to see if the solenoid indicator light is ON.
- Check the auger mix or auger reverse coil current in Electrical Diagnostics. Is there current going to the coil?
- If the mix auger turns in one direction and not the other it may be the pilot solenoid valve **B**.
- Manually override the valve and see if the mix auger starts turning in either direction.
- If the mix auger still does not turn when manually overridden, then it's likely a plugged or stuck valve. Replace the valve or swap with the opposite side if only one side isn't working to see if the issue reverses.
- Replace the pilot solenoid valve if required.

5.4.8 BOOM/CHUTE/SWING



All functions:

- If the boom, chute or swing seem slow or is not moving check the speed settings on the Mixer Settings and Maintenance screen **A**.
- All three functions have indicator lights on the coils. Current draw readings are accessible in the Electrical Diagnostics screen.
- These three functions run off the auger hydraulic circuit, so pressure can be monitored by reading the auger pump pressure.
- In the event of an electrical failure all three functions can be manually overridden to stow the mix auger and make the truck ready for transport. See valve manual overrides section.

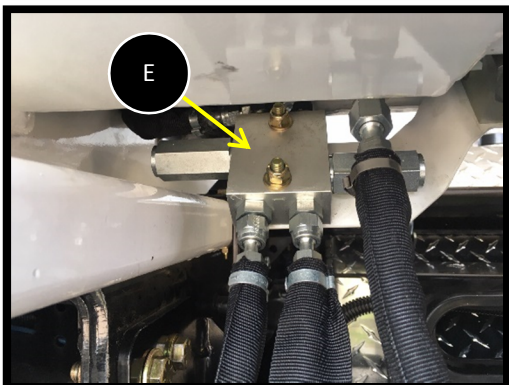
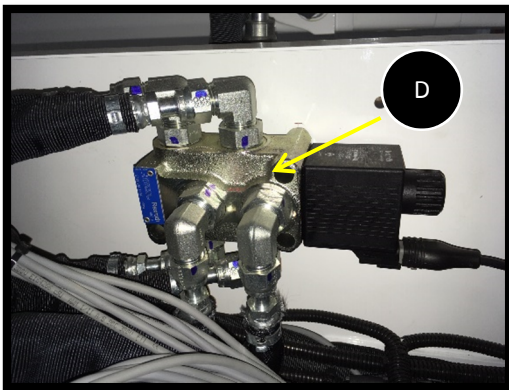


Boom:

- If the boom creeps down on its own when loaded the boom counterbalance valve **B** needs to be adjusted. Loosen the locknut with a 9/16" socket and turn the screw CCW using a 4mm Allen key to increase the pressure setting until the boom stops creeping. Tighten the lock nut.

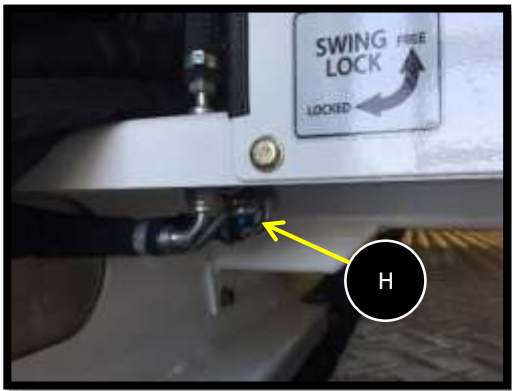
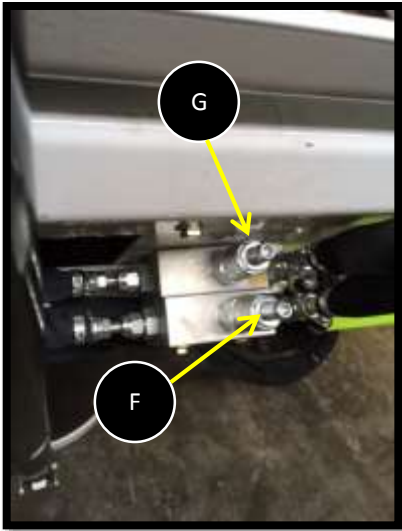
Chute Tilt:

- If the chute creeps down on its own when loaded the chute counterbalance valve **C** needs to be adjusted. Loosen the locknut with a 19mm wrench and turn the screw CW using an 8mm Allen key to increase the pressure setting until the chute stops creeping. Tighten the lock nut.



Chute Extend/Retract: (Special Version, may not apply)

- The chute extension circuit is shared with the boom and only one can be activated at a time. The diverter valve **D** is energized when the chute extension function is on.
- A cross port relief valve **E** protects the chute extension system from excessive loads by limiting the pressure below that of the auger pump max pressure. This valve is pre-set both sides to 2500psi, but it is adjustable up to 3300psi.
- The extension chutes are sequenced in and out by an adjustable sequence valve circuit. Only one chute can move at a time. Sequence valve **F** adjusts the out-sequence pressure and is pre-set to 1500psi. Sequence valve **G** adjusts the in-sequence pressure and is pre-set to 2000psi.

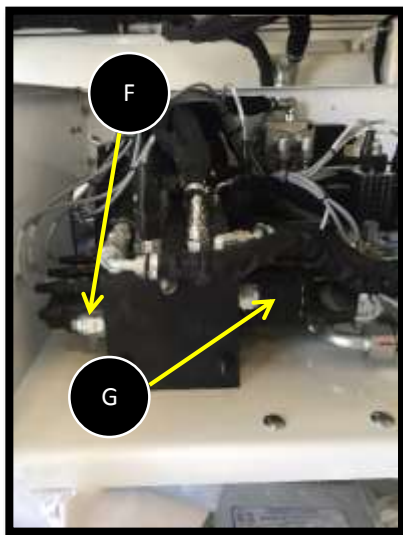
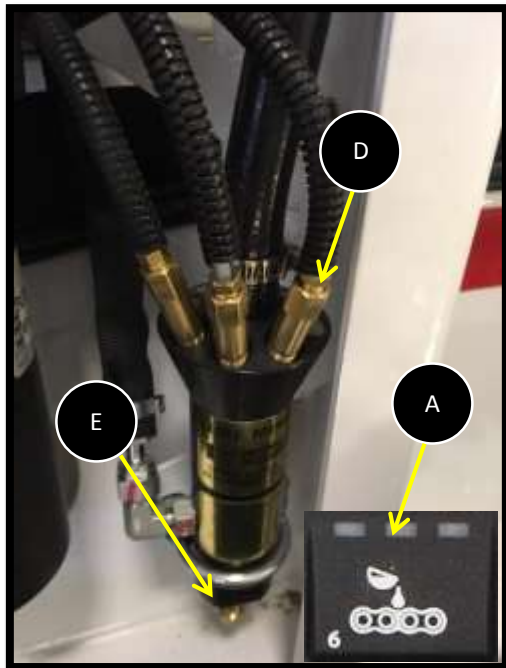
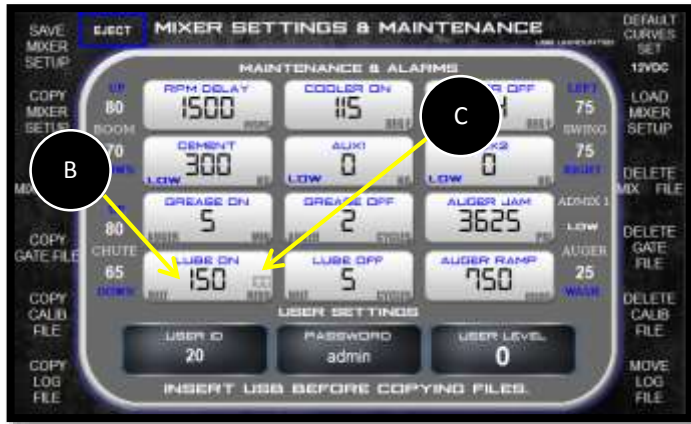


- If a function is moving out of sequence, then it is possible one of these sequence valves needs adjustment. By reading the auger pump pressure on the Diagnostics screen, each directions pressure can be adjusted.

Swing:

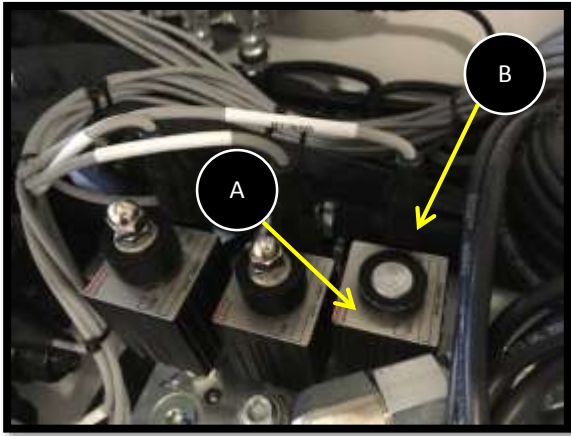
- If the swing is not working check to make sure the free swing valve **H** is not open first.
- Also, check the Electrical Diagnostics page and check the joystick indication light. Is it green and is there a message saying Swing fault? If there is a fault message, then the joystick needs to be replaced. You can use the wireless remote as a backup.
- If electrically everything is okay, and the manual overrides still do not allow the mix auger to swing then it is possible the rotary actuator pressure seal has failed. Contact Proall for seal kit and Helac repair instructions.

5.4.9 CHAIN OILER



- If the chain oiler does not appear to be working check to make sure button #6 **A** on the keypad is active and flashing green. The chain oiler only cycles when the belt is activated.
- If there is insufficient lubricant on the chain / brushes, then adjust the lube on cycle **B** in the Mixer Settings and Maintenance screen. The lube on cycle is the number of belt revolutions reached before the lube pump will cycle (5 times/cycles over the length of the belt). The small number **C** is the current revolution count. This number is stored in memory on power down. To lube more often lower the lube on revolutions number.
- To fast track the testing of the chain lube system, activate the manual lube button on the Mixer Settings screen. This will ignore the lube revolution counter and start the lube system when the belt starts.
- Confirm that the solenoid **G** light is cycling on and off during the lube cycle. The keypad button #6 will go from solid red to solid green when this is happening as well.
- If electrically everything is working and still no lube oil is dispensed increase the pressure reducing valve **F** pressure up by loosening the locknut with a 19mm wrench and adjust CW one turn with an 8mm Allen key. Try the manual lube cycle again.
- If adjusting the pressure still doesn't work, then check to make sure the pump stroke adjustment **E** has not been turned in all the way. These come from the factory at full stroke all the way out.
- If it is only one brush not getting oil it may be a plugged outlet manifold **D**. Loosen the nut and remove the tubing and ferrule. The cement chain outlet check has a small orifice plug installed. Remove the manifold and inspect for a blockage. Replace the manifold if need be.

5.4.10 BELT BYPASS



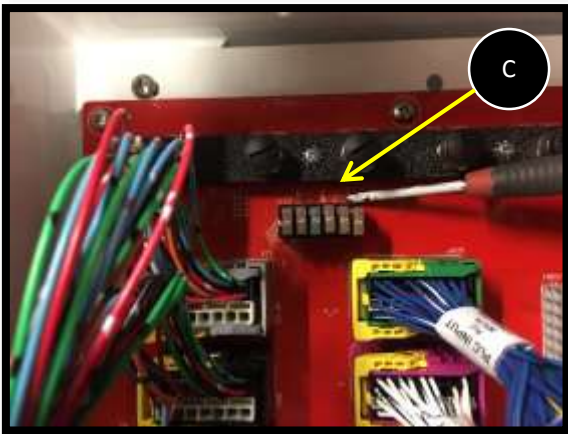
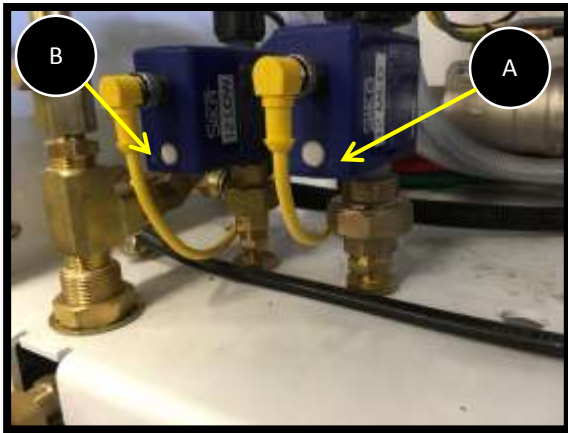
- The belt bypass valve **A** is energized automatically when any of the downstream functions are set to “unload”. This includes functions such as cement, AUX1 and color.
- If any one of these unload functions are activated and the belt is turning, then the belt bypass valve is not being shifted.
- A simple check is to look at the belt bypass valve coil / connector **B** and see if the indicator light goes on when an unload function is activated. The technician can also disconnect the cable and use a multimeter to check voltage at the connector pins.
- If the light does not go on, then it is likely that the cable connection to the valve is loose or broken. Inspect the cable for damage and replace if necessary.

5.5 FLOW METERS



WARNING!

The Sika VMZ flow meter is maintenance-free and cannot be repaired by the user. In case of a defect, the device must be replaced or sent back the manufacturer for repair.



- Check to ensure there is power to the flow meter itself by looking at the indicator LED's on the top of the meter.
 - The red LED **A** is constantly lit to indicate that the flow meter is operational.
 - The green LED **B** blinks according to the frequency of the output signal.
 - This blinking is not perceptible to the human eye at frequencies above 30 to 40 Hz, so the green LED appears to be constantly lit.
- If there is no power to the flow meters check fuse F19 **C** on the circuit board. If the fuse is replaced and blows again then one of the flow meters is likely to have a short circuit.
- Disconnect all the flow meters and connect one at a time to find out which one is faulty.
- If there appears to be power to the flow meter, but still not working then it is possible the flow meter needs to be cleaned (see cleaning instructions in maintenance section).
- If the flow meter still does not read after checking power, K-factor settings and cleaning then replace it.



IMPORTANT!

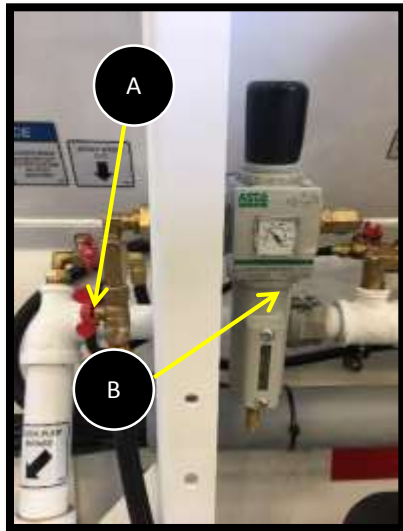
The magnetic inductive flow sensor VMZ must only be used for measuring and metering liquids with a minimum conductivity of 20 $\mu\text{S}/\text{cm}$. If your liquid is under this value or if the flow meter reads fine with water, but not with your liquid then a different style of flow meter may be required. Contact your Proall representative for more information.

5.6 PNEUMATICS

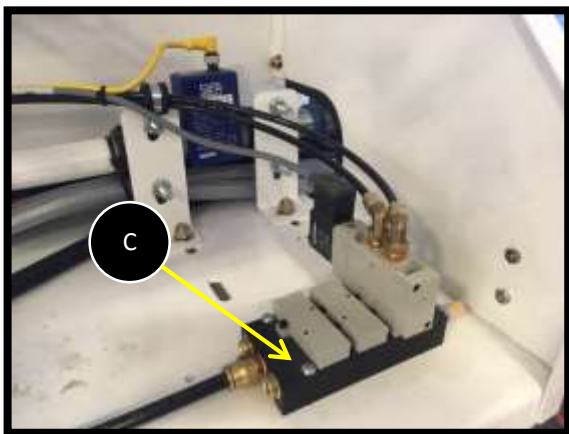


IMPORTANT!

The pneumatic system on the mixer body runs off the truck pneumatic system. The primary function of the pneumatic system on the mixer body is to cycle the water ON/OFF valve, but it is also used for the cement aeration system and winter blow down. Other optional functions like pneumatic fiber feeders can also be added.

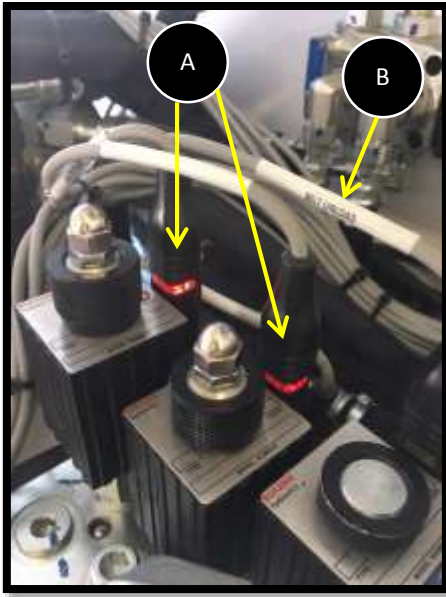


- If the water ON/OFF valve is not working and there is no air to the mixer body, make sure the air shut-off valve **A** is not closed.
- Also ensure that the filter regulator **B** pressure setting is at or above 75psi. The regulator is equipped with an automatic drain to expel and water in the bowl once it hits a pre-set level.
- The pneumatic valve manifold **C** has three stations with one being populated with a solenoid valve to actuate the water ON/OFF valve and two blanks.
- If air is leaking from any of the pneumatic valves or blanking covers then they need to be re-sealed and/or replaced.



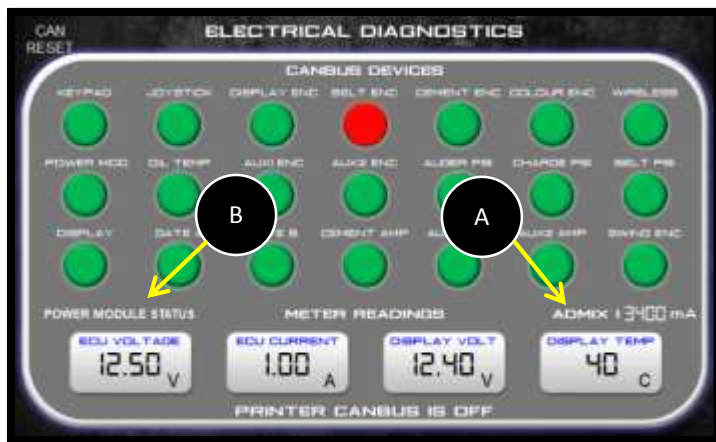
5.7 ELECTRICAL

5.7.1 SOLENOID INDICATORS



- The hydraulic solenoid valves have connectors **A** that light up when power is applied. This is a useful tool in troubleshooting and can be used as a quick visual indication that a function is being actuated.
- Each wire is also labeled with the associated function name **B**. This label can be used to verify if the correct cable is connected to the correct valve or just for general valve identification.

5.7.2 CONTINUITY AND CURRENT DRAW



- The current draw for individual functions can be found in the Electrical Diagnostics screen. By touching the function name **A** a green box will appear allowing the user to rotate the knob on the display and select the desired functions current output.
- The output is shown in mA and is available to all functions that use variable output signals including higher current outputs such as the admix pumps.
- Power module status **B** shows error codes from the power module. This includes open and short circuits. This applies to vibrators and the admix pumps that are powered by this module.

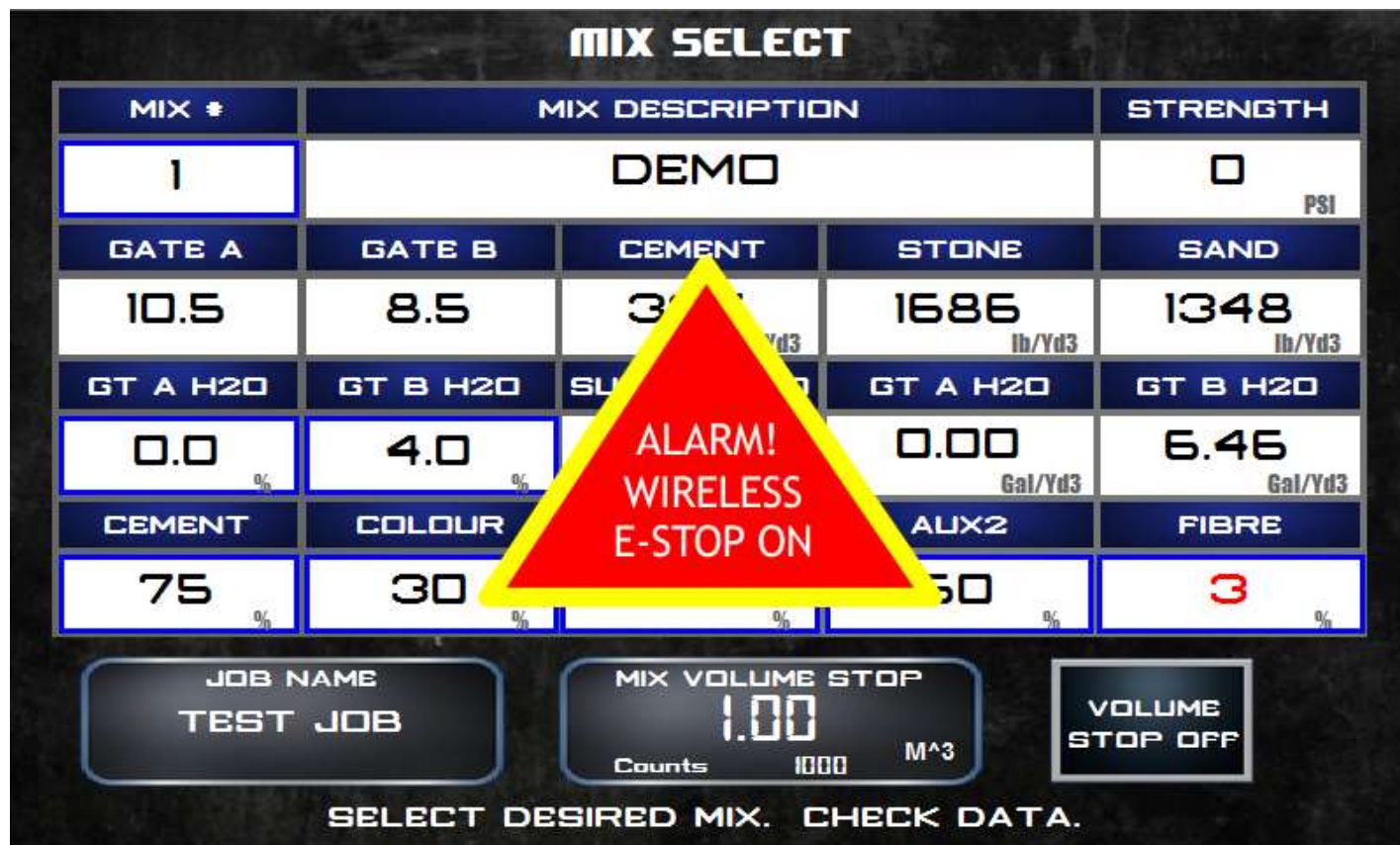
5.7.3 SYSTEM VOLTAGE



- The system ECU and display voltage can be checked on the Electrical Diagnostics screen and is a good indicator of truck voltage regulation and loose or bad main power connections.
- Voltage below 9V will cause electronic devices to shutdown and/or go into a fault condition.
- Another good indicator of the Commanders set voltage is shown on the Mixer Settings and Maintenance screen. The Commander can be set for either 12V or 24V systems. If the voltage setting **A** does not show the correct voltage for the system press the default curves set button and see if it changes.
- If it does not change, reboot the Commander display by pressing the E-Stop and waiting 3-4 seconds and restart. Go back to the Mixer Settings and Maintenance screen and check the voltage setting again.
- If it still reads the incorrect voltage call Proall as this may indicate the system has been reset in the Factory Settings and needs to be re-configured.
- If the Commander system is set for the wrong voltage the control valves will not function properly. Mixer functions will be either really fast or really slow (may not run at all).

5.8 ALARMS

Alarm messages, when activated, show on the screen in the form of a triangle or circle with a brief description of the alarm. If more than one alarm is active, they cycle through every few seconds depending on their priority and then repeat. Once an alarm is reset it will disappear from the display. An alarm log on the display stores up to 100 alarm messages for reference. Below is a summary of all alarms that are possible on the display.



Emergency Stop (E-Stop) pressed on the wireless remote (RED button). The mixer will stop when this alarm is activated. The alarm cannot be removed until the wireless E-Stop is reset.



Belt auto alarm. This alarm indicates the control system cannot reach the RPM set point. This alarm will stop the mixer. The operator must acknowledge the alarm by pressing the belt button on the control knob (#5). This will place the belt in open loop mode and the

control system will ignore belt speed set points; however, the unit will continue to function. Downstream automatic functions such as cement and water metering will continue to follow the belt speed if the speed sensor is working. Typically causes for this alarm are:

1. The hydraulic system has not had enough time to become warm for high belt speeds. Slow the belt until operating temperature is achieved. Typically, above 90°F/32°C.

2. The engine RPM is below high idle. If the pump is turning too slow, the oil flow rate required for the belt RPM setting may not be achievable. Increase engine RPM.
3. There may be a problem with the RPM sensor. The control system requires feedback from the RPM sensor to maintain the desired belt speed. Check the sensor gap or replace the RPM encoder.
4. The coil on the belt hydraulic valve may be faulty or the valve may be sticking reducing the required oil flow rate to the motor.



Cement auto alarm. This alarm indicates the control system cannot reach the set point. This alarm will shut off the mixer operation. The cement motor speed is based on the mix design ratio and on the belt motor output flow. For this reason, the cement motor may be unable to reach its required speed if the belt speed is very slow and the cement ratio is also very low. Other causes for this alarm unrelated to belt speed are:

1. There may be a problem with the RPM sensor. The control system requires feedback from the RPM sensor to maintain the desired cement speed. Check the sensor gap or replace the RPM encoder. The operator can manually over-ride the cement control valve to a “full” or 100% open position. More cement powder will be consumed if the mix design is a lean mix.
2. The coil on the cement hydraulic valve may be faulty or the valve may be sticking reducing the required oil flow rate to the motor. If the problem is a faulty coil, the operator can manually override the valve and set the desired cement ratio on the mixer control screen using the “Actual” value shown in the rpm field. This is a temporary solution and should be done with a fixed belt speed.



Radio remote has lost link to the receiver. This is typically caused when batteries need to be replaced or the remote is too far away from the receiver. If this alarm is activated the

machine will stop. The operator must acknowledge the alarm by pressing the belt button on the mixer control knob (#5). The machine can then be run without the wireless.



Colour auto alarm. This alarm indicates the control system cannot reach the set point. This alarm will shut off the mixer operation. The colour motor speed is based on the mix design ratio and on the belt motor output flow. For this reason, the colour motor may be unable to reach its required speed if the belt speed is very slow and the colour ratio is also very low. Other causes for this alarm unrelated to belt speed are:

1. There may be a problem with the RPM sensor. The control system requires feedback from the RPM sensor to maintain the desired colour speed. Check the sensor gap or replace the RPM encoder. If manual operation is desired, then the operator will need to confirm the correct ratio by visual inspection of the product colour. A fixed belt speed will help achieve this.
2. The coil on the colour hydraulic valve may be faulty or the valve may be sticking reducing the required oil flow rate to the motor. If the problem is a faulty coil, the operator can manually over-ride the valve and set the desired colour ratio on the mixer control screen using the “Actual” value shown in the rpm field. This is a temporary solution and should be done with a fixed belt speed.



Aux1 or Aux2 auto alarm. This alarm indicates the control system cannot reach the set point. This alarm will shut off the mixer operation. The aux motor speed is based on the mix design ratio and on the belt motor output flow. For this reason, the aux motor may be unable to reach its required speed if the belt speed is very slow and the aux ratio is also very low. Other causes for this alarm unrelated to belt speed are:



1. There may be a problem with the RPM sensor. The control system requires feedback from the RPM sensor to maintain the desired aux speed. Check the sensor gap or replace the RPM encoder. If manual operation is desired, then the operator can over-ride the aux control valve to “full” or 100% open. More product will be consumed if the desired ratio is smaller.
2. The coil on the aux hydraulic valve may be faulty or the valve may be sticking reducing the required oil flow rate to the motor. If the problem is a faulty coil, the operator can manually over-ride the valve and set the desired aux ratio on the mixer control screen using the “Actual” value shown in the rpm field. This is a temporary solution and should be done with a fixed belt speed.



Water PID alarm. This alarm indicates that the desired water flow rate cannot be achieved when the control system is in automatic water mode. This alarm will shut off the mixing operation. The operator must acknowledge the alarm by pressing the belt button on the keypad. The mixing operation may be continued by performing the following operations.

If there is a problem with the automatic mode, the water control can be placed in manual water mode (see Mixer Control). Water control is in manual mode when the yellow light flashes on the Water ON button on the keypad (#17). Manual mode allows the operator to control the water pump or water valve manually using the Water to Cement (W/C) ratio dial on the HOME PAGE. The W/C ratio is no longer a real time value. It is simply a percentage out of 100. If the problem is with the water valve controls, then the operator can manually over-ride the hydraulic valve and control the water flow using the manual water control valve at the back of the mixer. Typical causes for this alarm are:

1. The hydraulic system has not had sufficient time to become warm before high water flows can be achieved. Reduce water flow requirement until operating temperature is achieved, typically above 90°F/32.2°C. Water flow required is reduced by lowering the belt speed.

2. The engine RPM is not at high idle. If the pump is not turning fast enough the oil flow rate required for the water pump and the belt circuit may not be achievable. Increase engine RPM.
3. There may be a problem with the water flow meter. The control system requires feedback from the water flow meter to maintain the desired water flow rate. Check the water flow on the display to see if a reading is showing.
4. The coil on the water hydraulic valve may be faulty or the valve may be sticking reducing the required oil flow rate to the water pump motor.



The charge pressure feeding the main pumps is low. Check charge pump operation ensuring the charge pump suction valve is open. If oil is cold, allow the system to warm up before running belt or mix auger at high speed.



The hydraulic oil temperature is reaching a critical limit and should be monitored. Check to ensure cooler is running and oil levels are correct.



The hydraulic oil level is at a critically low level. Verify tank level on sight glass to ensure the sensor is working properly.



The hydraulic pressure filter for the belt circuit is in bypass. Change the filter element to see if alarm goes away.



The hydraulic pressure filter for the auger circuit is in bypass. Change the filter element to see if alarm goes away.



The hydraulic return filter is in bypass. Change the filter element to see if alarm goes away. You can confirm the filter is in bypass by checking the gauges on the filter housing.



Auger jam alarm. The mix auger pressure has reached the pressure limit as entered in the mixer settings screen and the belt stops. Check to see why pressure max has been reached (auger jammed) or increase pressure limit if need be.



Cement low level sensor activated. Must override to continue (see Mixer Control).



Vibrator pulse select indicates the operator has placed the system in automatic vibrator select mode. Any of the four vibrators may be selected to automatically turn on with the belt.



Water ON is a warning message indicating that the operator has not turned the water on (keypad button) before running the belt in auto mode.



The mixer has been placed in belt unload mode by the operator. Turn off by pressing button 10 on the keypad.



The mixer has been placed in cement unload mode by the operator (see Mixer Control).



The mixer has been placed in colour unload mode by the operator (see Mixer Control).



The mixer has been placed in aux1 unload mode by the operator (see Mixer Control).



The mixer has been placed in aux2 unload mode by the operator (see Mixer Control).

5.9 DIAGNOSTIC MESSAGES

On the HOME PAGE of the COMMANDER display there is a diagnostic message window showing currently activated functions and alarm notifications. If more than one message is active, they are cycled through every couple second and then repeat. These messages are intended to give the operator an indication of what controls are selected and if there are any warning items that should be addressed.



DISPLAY MESSAGE	EXPLANATION
BELT AUTO OFF. MANUAL CONTROL.	Belt has been placed in manual mode. Used typically for diagnostic purposes and if running in limp mode.
AUTO BELT OFF. RPM SENSOR / OIL TEMP?	Belt auto alarm has been activated. Belt is not meeting the RPM setpoint. Is there an RPM reading? Belt pressure? Is the hydraulic oil temperature cold?
AUTO CEMENT OFF. RPM SENSOR?	Cement auto alarm has been activated. Cement is not meeting the RPM setpoint. Is there an RPM reading? Belt pressure?
AUTO COLOUR OFF. RPM SENSOR?	Colour auto alarm has been activated. Colour is not meeting the RPM setpoint. Is there an RPM reading? Belt pressure?
AUTO AUX1 OFF. RPM SENSOR?	Aux1 auto alarm has been activated. Aux1 is not meeting the RPM setpoint. Is there an RPM reading? Belt pressure?
AUTO AUX2 OFF. RPM SENSOR?	Aux2 auto alarm has been activated. Aux2 is not meeting the RPM setpoint. Is there an RPM reading? Belt pressure?
AUTO WATER OFF. FLOW? BLOCKAGE?	Water auto alarm has been activated. Water is not meeting the flow setpoint. Is there a flow reading? Is water going into mix bowl?
AUTO ADMIX1 OFF. FLOW? BLOCKAGE?	Admix1 auto alarm has been activated. Admix1 is not meeting the flow setpoint. Is there a flow reading? Is admix1 going into mix bowl?
AUTO ADMIX2 OFF. FLOW? BLOCKAGE?	Admix2 auto alarm has been activated. Admix2 is not meeting the flow setpoint. Is there a flow reading? Is admix2 going into mix bowl?

AUTO ADMIX3 OFF. FLOW? BLOCKAGE?	Admix3 auto alarm has been activated. Admix3 is not meeting the flow setpoint. Is there a flow reading? Is admix3 going into mix bowl?
AUTO ADMIX4 OFF. FLOW? BLOCKAGE?	Admix4 auto alarm has been activated. Also applies to Latex mixer. Admix4 is not meeting the flow setpoint. Is there a flow reading? Is admix4 going into mix bowl?
LOW VOLTAGE. CHECK BATTERY/CONNECTION.	Low voltage. Check battery and/or alternator output. Check to make sure mixer is set-up for correct voltage input.
MAX WATER FLOW, BELT SPEED LIMITED.	Belt speed is automatically limited if mixer operation is demanding more water than water pump can deliver.
WATER IN MANUAL MODE.	Water has been placed in manual mode (see Mixer Control).
DRY MIX OVERRIDE ON.	Mixer is in dry mix mode. Water pump not required to run when mixing. Water ON/OFF valve will not open in this mode, but wash hose is still available.
LEVEL OVERRIDE ON.	Low level override has been activated. Used to override cement bin low level, water low level and gate material sensors to finish job.
POWDER CALIBRATION ON.	Reminder that powder calibration mode is active. Belt will not run in the mode.
GATES CALIBRATION ON.	Reminder that gates calibration mode is active. Cement will not run in this mode.
RPM HIGH ON FOR MIXING!	The high idle must be activated before mixing.
AUGER LIMIT SWITCH OPEN!	Auger safety limit switch is triggered. Ensure lid is closed.
CEMENT FULL MODE IS ON!	Cement full mode has been activated. Used for emergencies to set cement control to full. Overrides cement valve to full open.
MIX VOLUME STOP ACTIVATED.	Indicates mixing has stopped due to volume stop being reached.
NO BELT FEEDBACK. IS BELT TURNING?	A speed command is given to the belt to run and no feedback rpm is detected. Check to ensure belt rpm sensor is working and pto is engaged.
ADMIX4 PUMP ON? FLASHING GREEN TO ARM.	Mix design calls for Admix4 and pump is not ON.
MAX ADMIX4 FLOW, BELT SPEED LIMITED.	Belt speed is automatically limited if mixer operation is demanding more admix4 then the pump can deliver.

ADMIX3 PUMP ON? FLASHING GREEN TO ARM.	Mix design calls for Admix3 and pump is not ON.
MAX ADMIX3 FLOW, BELT SPEED LIMITED.	Belt speed is automatically limited if mixer operation is demanding more admix3 then the pump can deliver.
ADMIX2 PUMP ON? FLASHING GREEN TO ARM.	Mix design calls for Admix2 and pump is not ON.
MAX ADMIX2 FLOW, BELT SPEED LIMITED.	Belt speed is automatically limited if mixer operation is demanding more admix2 then the pump can deliver.
ADMIX1 PUMP ON? FLASHING GREEN TO ARM.	Mix design calls for Admix1 and pump is not ON.
MAX ADMIX1 FLOW, BELT SPEED LIMITED.	Belt speed is automatically limited if mixer operation is demanding more admix1 then the pump can deliver.

6. MIX AUGER SERVICE

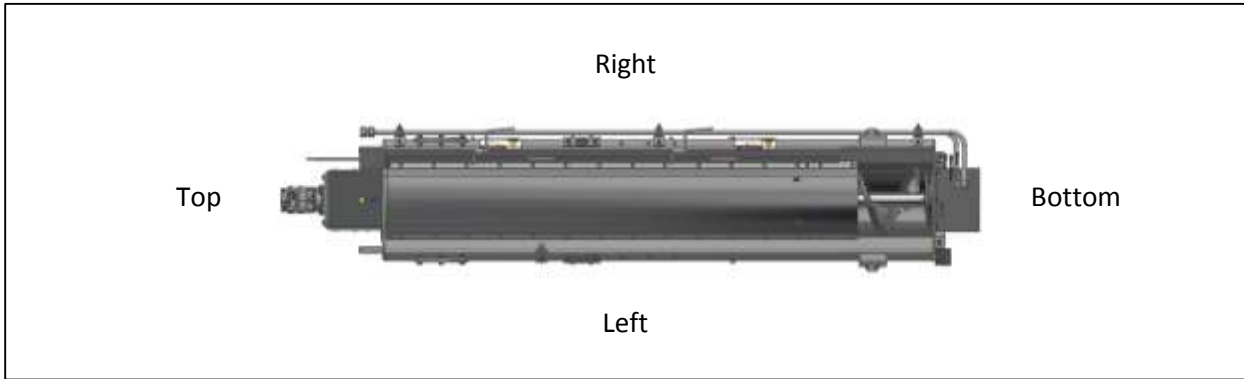


Figure 1. Upper view and orientation of Mix Auger

Suggested grease: NLGI GC-LB standard grade 2 for wheel and chassis lubrication such as Petro Canada Precision XL EP2 Lithium or Delco ESI EP grade 2 NLGI Lithium or equivalent.

Suggested silicone: RTV silicone sealant such as Dow Corning DOWSIL 786 or equivalent.

Suggested anti-seize compound: Tool joint compound such as Jet-Lube Kopr-Kote or Loctite LB 8008 or equivalent.

6.1 BOTTOM IDLER SHAFT, SEAL AND BEARING REMOVAL

Note: when servicing idler shaft or idler shaft seal assembly only, the motor does not need to be removed but can remain attached to the auger assembly. For removal of the motor, please see the “6.4 TOP MOTOR, BEARING AND DRIVE SHAFT REMOVAL” section.

Note: To make removal easier, support the auger screw with a crane or other lifting device throughout the following procedure.

1. Remove grease hoses (PN 189112)



Figure 2. Remove grease hoses

2. Remove bearing bolts
3. Loosen set screw on bearing.
4. Loosen bearing collar using a collar wrench or punch and mallet.



Figure 3. Loosen bearing collar

5. Remove bearing (PN AGBR006) from idler shaft (REJ314).
 - a. The bearing may be difficult to remove. In the case where the bearing is seized onto the shaft, it is recommended that a cutting disk or torch be used to cut the bearing housing on both sides of the idler shaft, ensuring the idler shaft or mix auger frame are not damaged in the process.
 - b. Using a chisel and mallet, break the bearing housing apart.
 - c. Using a torch, cut the inner bearing race free from the shaft.



Figure 4. A cutting tool may be necessary to remove bearing

6. Remove the auger seal (PN AGSL005A), bearing seal assembly (PN REJ432), and auger seal (PN AGSL005) from the idler shaft.
7. Remove the bolts holding the idler shaft and seal assembly to the mix auger frame. The bolts may need to be cut off during this process.

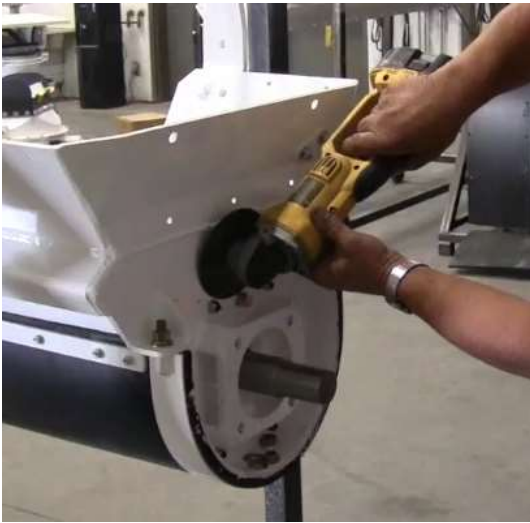


Figure 5. Remove idler shaft seal assembly bolts

8. Remove 4 bolts holding the offset bracket (PN MX10006) to the mix auger frame.

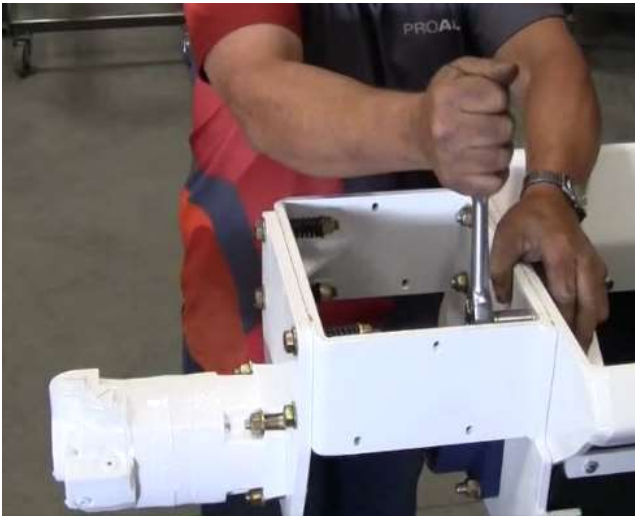


Figure 6. Remove offset bracket from mix auger frame

9. Pull the motor, housing and auger assembly towards the top of the mix auger until the auger shaft clears the bottom of the mix auger frame.



Figure 7. Separate mix auger from bottom of mix auger frame

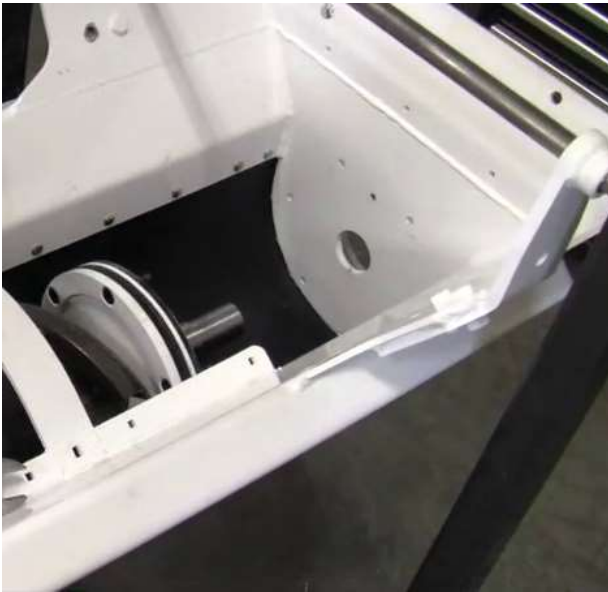


Figure 8. Auger separated from bottom mix auger frame

10. Remove the wear plate (PN REJ426) and spacer ring (PN REJ593) from the idler shaft.



Figure 9. Remove wear plate and spacer ring

11. Remove the idler shaft bolt. This bolt will likely have to be cut off.
12. Cut the welded portion of the idler shaft pin (PN MX03261) and remove.
13. Remove the idler shaft (PN RE3314), inner seal (PN AGSL001D), inner cover plate (PN REJ591) and retaining ring (PN REJ315).

6.2 BOTTOM IDLER SHAFT AND SEAL INSTALLATION

1. With the wear plate (PN REJ426) on a flat surface, place the spacer ring (PN REJ593) over the wear plate aligning the bolt holes.
2. Grease both surfaces of the flat disk on the idler shaft (PN REJ314) with generous amounts of grease.



Figure 10. Grease surfaces of idler shaft disk

3. Place the flat surface of the idler shaft disk on the surface of the wear plate.
4. Place the rubber inner seal (PN AGSL001D) over the idler shaft.
5. Place the inner cover plate (PN REJ591) over the inner seal.
6. Place the retaining ring (PN REJ315) over the inner cover plate. Align the bolt holes through all seal parts and using two bolts, one on either side of the idler shaft, align the stack together.



Figure 11. Use two bolts to align seal assembly

7. From the inside of the mix auger frame, orient the seal assembly so the slotted hole in the wear plate is towards the upper side of the mix auger and aligns with the grease hole in the bottom of the mix auger frame. Install the seal assembly using the two bolts for alignment of the seal assembly and to secure the seal assembly in place while installing the remaining bolts.



Figure 12. Slotted hole in wear plate towards the upper side of the mix auger



Figure 13. Align slot in seal assembly with grease hole in rear of mix auger frame

8. Install the remaining bolts so the inner rubber seal (PN AGSL001D) just compresses.
9. Once installed turn the auger shaft by hand to ensure the shaft spins easily. A small amount of side movement is expected.
10. Place anti-seize compound on the idler shaft to help prevent rust buildup and ease future removal of the shaft from the auger tube.



Figure 14. Place anti-seize on idler shaft

Note: To make installation easier, support the auger screw with a crane or other lifting device for the following steps.

11. Align the bolt holes in the mix auger tube with the holes in the idler shaft and slide the mix auger onto the idler shaft.
12. Using a rod or drift, align the holes in the auger with the idler shaft and install a shaft bolt (PN 1261817 & 233111) into the hole farthest from the bottom bearing. This bolt is close in size to the hole and may need to be tapped in with a hammer.



Figure 15. Use rod or drift to align holes in shaft and auger



Figure 16. Tap bolts into place

13. Insert a 5/8 x 3-1/8 inch cold rolled dowel pin (PN MX03261) into the hole closest to the bottom bearing. Weld the dowel to the auger tube.

Note: Only weld on one end of the dowel pin and only on the side of the pin farthest from the bottom bearing. Welding both ends of the pin or completely around the end of the pin will make it difficult to extract the pin in future service intervals.



Figure 17. Weld pin closest to the bottom bearing

6.3 BOTTOM BEARING INSTALLATION

1. Place a bead of silicone in one continuous ring around the center of both sides of the auger seal (PN AGSL005) and slide over the idler shaft (PN REJ314) on the outside of the mix auger frame.



Figure 18. Place silicone on both sides of auger seal

2. Lightly grease the oil seal (PN 327200) within the bearing seal assembly (PN REJ432) to aid in seal installation.
3. With a seal pick or equivalent, place the bearing seal assembly over the shaft ensuring the grease hose hole in the outer edge of the bearing seal assembly is oriented towards the upper right-hand side of the mix auger. Slide the assembly over the shaft, contacting the auger seal.



Figure 19. Install bearing seal assembly

4. Install the auger seal (AGSL005A) over the shaft.
5. Loosen the collar of the bearing (PN AGBR006) and orient the grease fitting hole to the right-hand side of the mix auger frame.



Figure 20. Install bearing with grease fitting to the right

6. Install the bearing bolts through the bearing, auger seal and bearing seal assembly, lightly compressing the auger seal next to the bearing.
7. Tighten the bearing collar by hand then using a collar wrench or punch and mallet, tighten the collar until the collar meets resistance then turn the collar another $\frac{1}{4}$ turn. Tighten the bearing collar set screw.
8. Install a 45 degree pipe fitting on the bearing and auger seal and 90 degree fitting in the bottom of the mix auger frame.
9. Install three grease hoses (PN 189112) into the three pipe fittings and install in the grease hose mount bracket (PN MX01373) in the order they are installed on the seal assembly; the upper most hose being the hose attached to the mix auger frame and lowest hose attached to the bearing.
10. Install a coupling (PN 196198) on each grease hose then a grease nipple (PN 189001) on each hose.

Important: Be careful to install the coupling with a small amount of torque as the grease hose fittings may split when too much torque is applied.

6.4 TOP MOTOR, BEARING AND DRIVE SHAFT REMOVAL

Note: To make removal easier, support the auger screw with a crane or other lifting device throughout the following procedure.

1. Remove the top shield (PN MX01846) and bottom shield (PN MX01795) from the offset bracket (PN MX10006)
2. Remove bolts holding the hydraulic motor mount plate (PN MX01803) to the offset bracket. Retain the compression springs (PN 347212).
3. Remove the splined coupling (PN MX00017).
4. Loosen the two set screws from the bearing (PN AGBR004A) and using a collar wrench or punch and mallet, loosen the collar from the bearing.
5. Slide the bearing off the auger drive shaft (PN MX01389).
6. Remove the bolts holding the drive shaft to the auger. This may require the bolts be cut.
7. Remove the drive shaft.
8. Remove bolts holding the offset bracket to the mix auger frame and remove offset bracket.

6.5 TOP MOTOR, BEARING AND DRIVE SHAFT INSTALLATION

Note: To make removal easier, support the auger screw with a crane or other lifting device throughout the following procedures.

6.6 SHAFT AND BEARING INSTALLATION

1. Place anti-seize compound on the portion of the drive shaft (PN MX01389) with bolt holes and slide the shaft into the auger tube. Install the 2 shaft bolts (PN 1261718 & 233111).



Figure 21. Place anti-seize on drive shaft



Figure 22. Install shaft bolts

2. Install the offset bracket with 4 bolts (PN 119162 & 387708 & 233108).



Figure 23. Install offset bracket

3. Remove the bearing collar from the bearing (PN AGBR004A).



Figure 24. Remove bearing collar

4. Remove the insert from the bearing and place on the drive shaft.



Figure 25. Remove bearing insert



Figure 26. Place insert over drive shaft

5. Install the bearing housing over the insert, ensuring one of the grease nipples is aligned with the upper surface of the mix auger.



Figure 27. Installing bearing with grease nipple facing upwards

6. Install the carriage bolts with the head inside the mix auger frame and the nuts at the bearing side loose so the bearing is free to move along the face of the offset bracket.
7. Install the bearing collar by hand then using a collar wrench or punch and mallet tighten the collar until resistance is felt then turn the collar another $\frac{1}{4}$ turn.



Figure 28. Tighten bearing collar

8. Tighten the two set screws in the bearing.

6.7 MOTOR INSTALLATION

1. Place grease on the splines of the drive shaft (PN MX01389) and motor shaft (PN HYMT009).



Figure 29. Place grease on drive shaft splines



Figure 30. Place grease on motor splines

2. Install splined coupling (PN MX00017) on drive shaft.

3. Install motor to mount plate (PN MX01803) with 4 bolts (PN 1261198 & 387708 x2 & 233108).
4. Install motor and mount plate on splined coupling and rotate the mount plate until the holes in the mount plate align with the holes in the offset bracket (PN MX10006).



Figure 31. Install motor and motor mount plate

5. Install 4 bolts (PN 1261288 & 387708 x2 & 233108) through the mount plate and offset bracket then place a compression spring (PN 347212) over each bolt and secure with washers and nuts. Tighten the nut on each bolt until each spring is compressed to 1-3/8 inch.



Figure 32. Compress springs to 1-3/8 inch

6. Using a pry bar, ensure the splined coupling moves freely between the drive shaft and motor. This indicates the auger is centered in the mix auger frame. If the splined coupler does not move, adjust the auger until the coupling moves freely then tighten the nuts on the bearing.



Figure 33. Move coupling with pry bar to test alignment of auger and bearing

6.8 WEAR PLATE REMOVAL AND INSTALLATION

Note: Wear plates should be replaced when the distance between the outer edge of the wear plate and the auger screw flighting is within 1/8 inch. In general, wear plate replacement should take place before the auger flighting shows signs of wear.

Note: The auger screw should be replaced when the distance between the outer edge of the auger flighting and bolt HOLE is within 1/8 inch. When the auger flighting has worn to the bolt holes, the entire auger screw will need to be replaced (PN MX10803).



Figure 34. Worn auger wear plates in need of replacing



Figure 35. Typical worn stir tabs shown next to auger wear plates. The closest stir tab shown in this figure should have its wear plate replaced because the tab itself is worn as much as it can be. The furthest stir tab in this figure may be worn more as the stir tab wear is over 1/8 inch from the nut holding the stir tab wear plate to the stir tab.



Figure 36. A newly replaced auger wear plate shown next to older wear plates. The older wear plates in this figure are not yet in need of replacement. New stir tab wear plates are shown on stir tabs that have worn down as far as possible without having to replace the stir tabs.

1. Remove the mix auger screw from the mix auger using the “6.1 BOTTOM IDLER SHAFT, SEAL AND BEARING REMOVAL” and “6.4 TOP MOTOR, BEARING AND DRIVE SHAFT REMOVAL” procedures outlined above.
2. Cut the bolts off the wear plates and stir tabs using a cutting wheel or torch.

Note: Ensure the orientation of the replacement wear plates and stir tabs matches the replaced parts.

3. Install bolts (PN 1260358 & 233107) into the auger screw and replacement auger wear plates (PN AGWP002) and stir tab wear plates (PN AGWP003) ensuring the bolt head is adjacent to the auger or stir tab wear plate. Install the mix auger screw using the “6.2 BOTTOM IDLER SHAFT AND SEAL INSTALLATION”, “6.3 BOTTOM BEARING INSTALLATION” and “6.5 TOP MOTOR, BEARING AND DRIVE SHAFT INSTALLATION”

7. CONVEYOR BELT SERVICE PROCEDURE

Suggested caulk: Wurth polyurethane glue and seal 890.1003 or equivalent.

7.1 BELT INSTALLATION

Note: It may be possible to install the new belt using the old belt in which case, refer to the section “7.3 Belt installation (alternate METHOD)” otherwise proceed with the following section for belt installation.

1. Remove the mix auger and mix bowl.
1. Ensure the chain tensioner is loose as described in the section “Using the belt hydraulics to install the belt, engage the drive in the reverse direction to feed the belt into the mixer.
2. Keep feeding the belt into the mixer until the ends of the belt are even, one above the other on the rear of the mixer.
3. Remove the old belt from the new and continue the installation of the new belt from step 11 in the “7.1 BELT INSTALLATION” procedure.
2. 7.4 LOOSEN THE CHAIN TENSIONER.”
3. Use a spacer between the belt and frame, this can be 1 inch round bar oriented and temporarily attached to the mixer frame as shown for both sides of the belt.

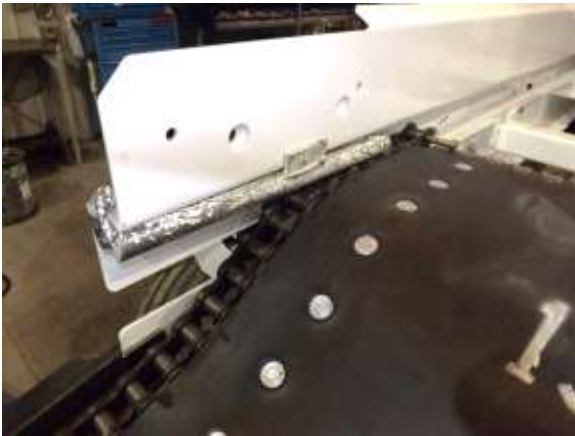


Figure 37. This spacer is made of 1 inch round bar and has tabs welded to it to keep it attached temporarily to the mixer frame.

4. Put bolts, such as 7/16 x 2-1/4 inch capscrews, into the last link to keep the links from falling onto the chain guide and potentially jamming the chain as it is pushed through the mixer body.



Figure 38. Add temporary bolts to the free end of the chain links.

5. Put rolled belt onto a spindle that allows the belt to rotate as the belt is unrolled.



Figure 39. Example spindle used while unwinding the belt.

6. Protect the frame below the belt as the belt unwinds from the spindle. The belt will fall and can catch on the frame.



Figure 40. Guard shown below the belt to protect the mixer frame from the belt.

7. Using the belt hydraulics to install the belt, engage the drive in the reverse direction to feed the belt into the mixer.
8. When the belt appears at the front of the mixer, remove the bolts holding the links above the belt.



Figure 41. Remove bolts holding the chain links at this stage of the procedure.

9. Wrap the belt around the belt sprockets and feed the belt back into the mixer, pushing the belt periodically as the belt is belt hydraulics pushes the belt into the mixer body.



Figure 42. Push the belt into the mixer as the belt comes out the front.

10. Keep feeding the belt into the mixer until the ends of the belt are even, one above the other on the rear of the mixer.



Figure 43. Belt lacing ends.

11. Using a pry bar, pry the bottom belt towards the rear of the mixer.



Figure 44. Pry using pry bar and the mixer frame.

12. Ensure the chain rollers are resting on both the upper and lower chain guides. Adjust if necessary, until the chain rollers are resting on the guides.



Figure 45. Chain properly resting on upper chain guide.



Figure 46. Chain properly resting on lower chain guide.

13. Install the coupling link on both sides of the belt lacing, including the link plates and cotter pins.



Figure 47. Install coupling links next to belt lacing.

14. Using a ratchet strap, place the strap around the ends of the belt and attach the strap to the bin body such as the last gusset on the aggregate bin. Ensure the strap is offset from the edge of the belt by about 4 inches.



Figure 48. Installing ratchet strap for tightening belt lacing.

15. Pry the bottom links of the belt towards the rear of the mixer to remove as much slack in the belt as possible.



Figure 49. Pry bottom links towards rear of the mixer.

16. Tighten the ratchet strap to bring the lacing teeth together and insert the lacing bar into the lacing.



Figure 50. Tighten ratchet strap and bring upper and lower lacing teeth together along with lacing bar.

17. Hammer the lacing bar into the lacing until the bar reaches through the lacing teeth entirely. The bar will zip the lacing together as it is pounded in.



Figure 51. Hammer lacing bar into the lacing.

18. Caulk the lacing with a generous amount of caulk well within and between each of the lacing teeth. Spread the remaining caulking over the lacing, covering the lacing entirely.



Figure 52. Caulk the lacing seam well into the lacing teeth.

19. Rotate the belt so the lacing lays flat and allow the caulk to cure for the recommended period of time according to the caulk manufacturers instructions.
20. Tension the belt as described in the section “7.5 TENSIONING THE CHAIN TENSIONER.”

7.2 BELT REMOVAL

Note: It may be possible to use the old belt to install the new belt in which case, refer to the section “7.3 Belt installation (alternate METHOD)” otherwise proceed with the following section for belt removal.

1. Remove the mix auger and mix bowl.
2. Rotate the belt so the belt lacing is facing the rear of the mixer.
3. Cut the belt lacing and remove the coupling chain links at the lacing.
4. Using the belt hydraulics, run the upper portion of the belt off the rear of the mixer completely, allowing the lower portion of the belt to be pulled through the mixer.

7.3 BELT INSTALLATION (ALTERNATE METHOD)

Note: The alternate method of installing the conveyor belt may be possible and simplifies both the old belt removal and new belt installation. For this method to be successful, the lacing teeth on the new belt must align perfectly with the old lacing so that both belts are centered along their length.

4. Remove the mix auger and mix bowl.

5. Rotate the belt so the belt lacing is facing the rear of the mixer.
6. Cut the lacing of the existing belt on the bottom laces, leaving the top lacing complete. Remove the old lacing bar and separate the top and bottom lacing.
7. Attach the new belt to the old belt lacing.
8. Using the belt hydraulics to install the belt, engage the drive in the reverse direction to feed the belt into the mixer.
9. Keep feeding the belt into the mixer until the ends of the belt are even, one above the other on the rear of the mixer.
10. Remove the old belt from the new and continue the installation of the new belt from step 11 in the “7.1 BELT INSTALLATION” procedure.

7.4 LOOSEN THE CHAIN TENSIONER

1. Loosen the nut on the threaded shaft next to the bearing to allow the shaft to rotate.



Figure 53. Loosen bearing nut.

2. Loosen the nut on the threaded shaft next to the spring until the nut touches the bearing.



Figure 54. Loosen spring nut.

3. Loosen the nut on the drive end of the threaded rod until the nut makes contact with the bearing guide.



Figure 55. Adjust releasing nut.

4. Holding the nut touching the bearing guide with a wrench, loosen the threaded rod. This will cause the bearing to move towards the rear of the mixer and therefore loosening the tension on the belt.

Note: Make sure the nut holding the end of the threaded rod to the bearing does not come off the threaded rod during this procedure.



Figure 56. Loosen chain tensioner.

7.5 TENSIONING THE CHAIN TENSIONER

1. Loosen the nut on the threaded rod that is touching the bearing guide until the nut touches the drive end nut on the threaded rod. Tighten this nut to keep it from wandering on the threaded rod.



Figure 57. Adjust releasing nut towards threaded rod drive end.

2. Tighten the tension adjust nut against the spring until there is approximately $\frac{1}{4}$ inch or 6mm of space between the spring tube and the washer when the tube is held against the bearing guide.



Figure 58. Adjust spring nut.

3. Secure the threaded rod to the bearing by tightening the nut in the bearing against the lock washer on the threaded rod.



Figure 59. Secure bearing nut.

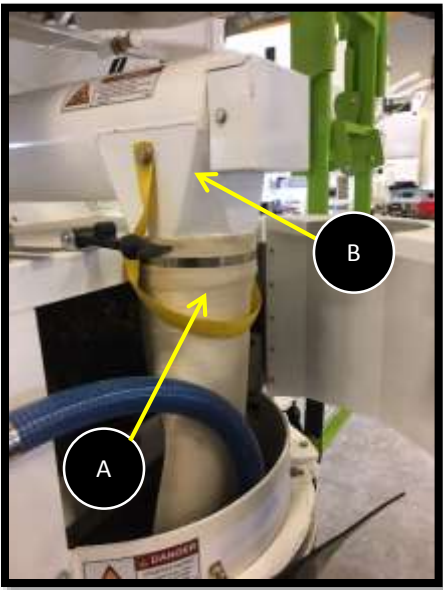
8. CEMENT / AUX FEEDER

8.1 DISCHARGE MAINTENANCE



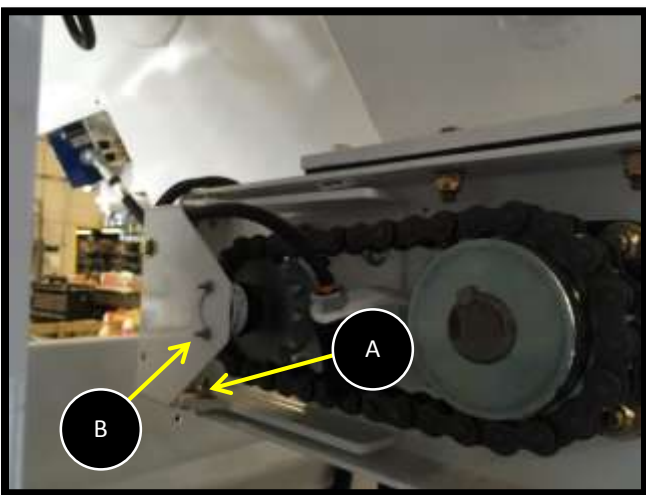
IMPORTANT!

The cement auger discharge tube (sock) must be kept clear of hardened cement powder or it will eventually impede cement flow and cause a cement auto fault or balloon the rubber tube.



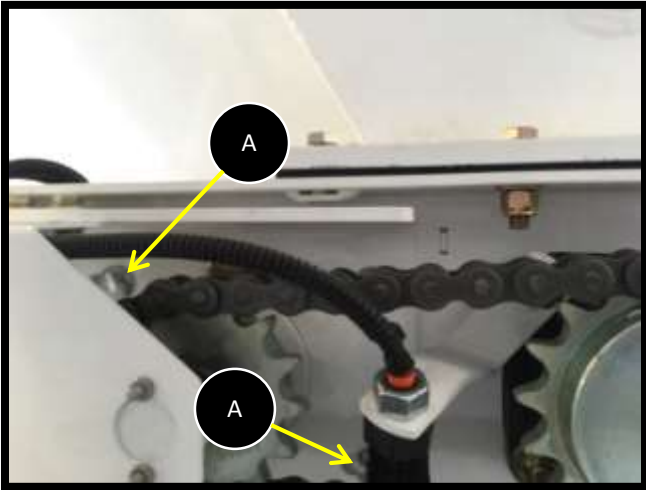
- Ensure discharge tube **A** is free of hardened cement. Scrap and tap out as much hardened cement as possible and roll the tube up, so that it can be secured by provided strap.
- If the discharge tube is full of hardened cement it may need to be removed to properly clean it. Loosen gear clamp and pull the tube off. When the discharge tube is off, inspect inside the cement discharge throat **B** to make sure it is free can clear of hardened cement powder as well.

8.2 SPEED SENSOR REPLACEMENT

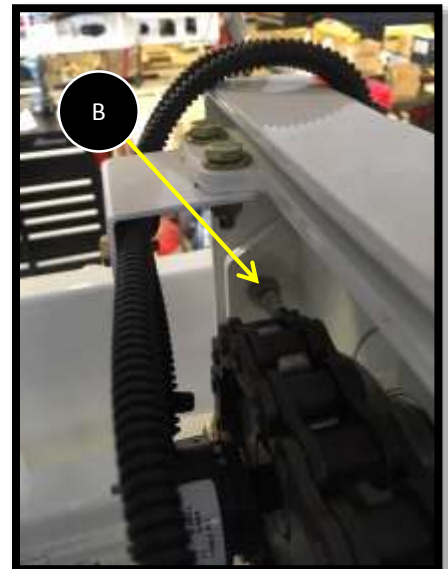
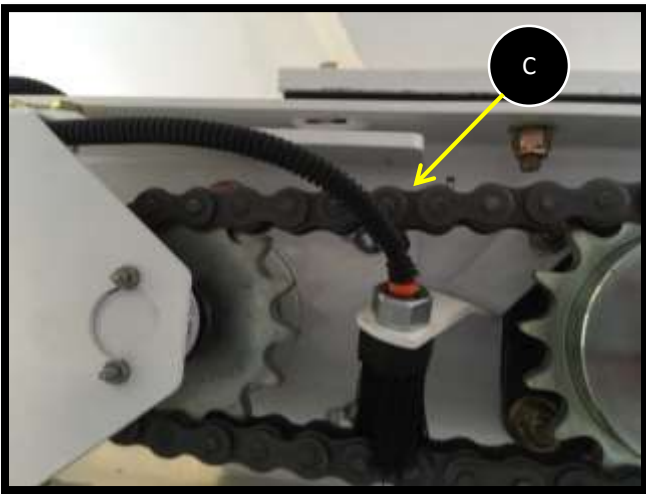


- Remove bolts **A** (top and bottom) to allow sensor mounting plate to be removed. Disconnect sensor wire and remove wire from clamp.
- Remove sensor bolts **B** from mounting plate and old sensor can now be replaced with the new sensor. Make sure when mounting the new sensor that it is not bolted back on upside down. The target sticker should face the magnetic in the end of the motor shaft.
- Re-install the mounting bracket bolts **A** and slide the bracket forward enough to ensure the sensor to magnet gap is approximately 1/8" (3mm). Also, the bracket should be level on the vertical face to ensure the sensor is square to the magnet. Tighten the bolts.

8.3 CHAIN MAINTENANCE

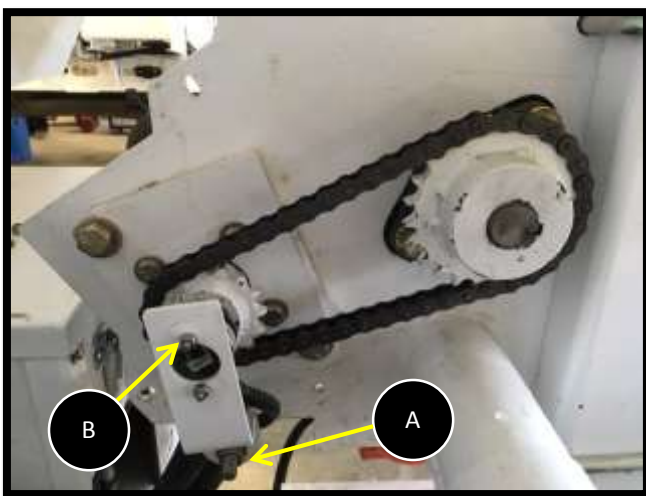


- To replace or tighten the chain loosen the four bolts **A** to allow the motor mounting bracket to slide forward.
- Adjust the tensioner bolt **B** as necessary to release the tension on the chain and allow for chain removal.
- When replacing the chain or adjusting the tension ensure that the chain deflection **C** is approximately 2-4% of the centerline distance between the shafts.
- Inspect the chain oiler brush for wear and that it is oiling the chain.
- If tension is good tighten up bolts **A**.



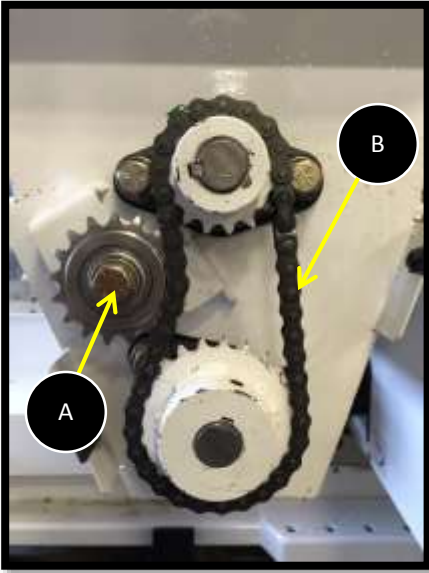
9. COLOR FEEDER

9.1 SPEED SENSOR REPLACEMENT



- To replace the speed sensor, remove sensor bracket nut **A** and slide the bracket off the bolt. Unplug the speed sensor cable and remove sensor mounting bolts **B**.
- Install the new speed sensor and re-position the mounting bracket so that the sensor gap is 1/8" (3mm). Also ensure that the sensor centerline is aligned with the centerline of the magnet in the end of the motor shaft.

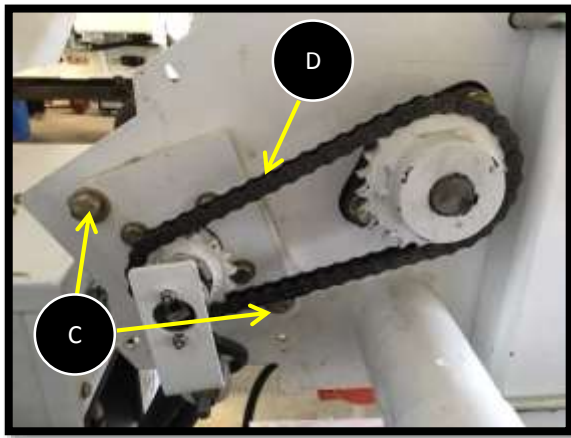
9.2 CHAIN MAINTENANCE



Outer Chain:

- To replace or tighten the outer chain loosen the bolt **A** to allow tensioning / idler sprocket to move upward.
- When replacing the chain or adjusting the tension ensure that the chain deflection **B** is approximately 2-4% of the centerline distance between the shafts.
- To tension the chain move the idler sprocket down until the chain is properly tensioned and tighten the bolt **A**.
- Manually lubricate the chain before replacing the cover.

Inner Chain:



- To replace or tighten the inner chain loosen the two bolts **C** to allow the motor mounting plate to slide forward.
- When replacing the chain or adjusting the tension ensure that the chain deflection **D** is approximately 2-4% of the centerline distance between the shafts.
- To tension the chain slide/pry the motor mounting plate backwards until the chain is properly tensioned and tighten the bolts **C**.
- Manually lubricate the chain before replacing the cover.

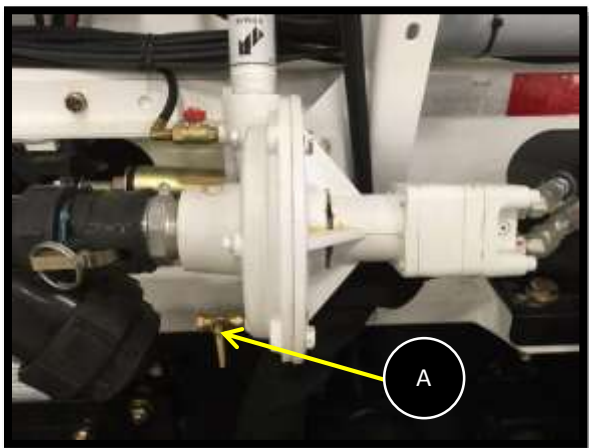
10. WATER

10.1 PRIMING THE SYSTEM



IMPORTANT!

The water line must be primed before mixing. Air in the lines will cause false readings from the water flow meter and delay the water flow into the mix bowl on start-up.



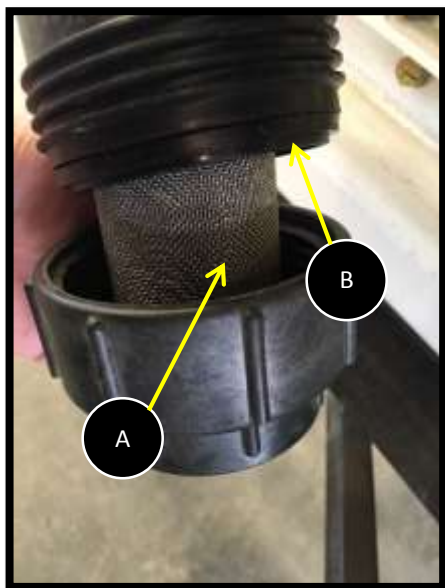
- To prime the pump, ensure the suction ball valve is open at the water tank and open bleed valve **A**.
- Turn water pump on at the control panel (button #17) and allow initial air out of the system through bleed port.
- Close bleed port when air slows or stops sputtering out of the valve.
- Turn on the water outlet into the mix bowl (button #13) to allow the water to flow through to the outlet. Turn off the water outlet when air in the line is gone and flow reading are stable.

10.2 STRAINER CLEANING AND REPLACEMENT



IMPORTANT!

A dirty water strainer will cause the Commander control system to speed up the water pump when in auto mode, which will eventually cause it to go into a fault if it can't meet its water flow target. Check the water strainer regularly for buildup.



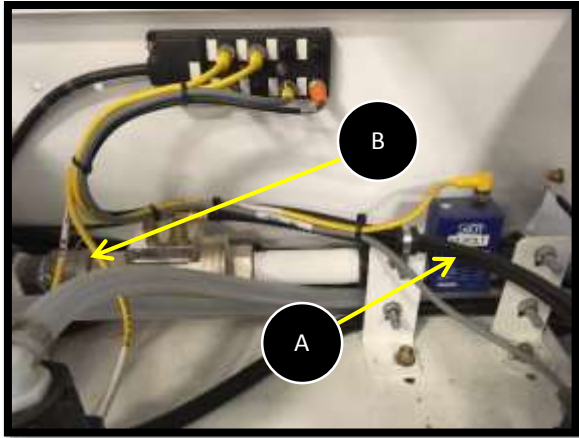
- To remove and inspect the water inlet strainer unthread the cap and pull the strainer **A** out of the housing.
- Be careful not to lose the seal **B**.
- Clean the strainer as necessary ensuring all debris is removed and outer mesh is clean.
- If the strainer is plugged beyond reasonable cleaning or it is damaged, then replace it.

10.3 FLOW METER CLEANING AND REPLACEMENT



IMPORTANT!

Depending on the water source it may be required to remove the water flow meter and clean it periodically. If the water source is not clean, then this may be required more often. Using an open water source (algae, etc.) will require more cleaning and maintenance than city water.



- To clean or replace the water flow meter **A** uncouple the quick connects **B** at each end and remove the U-bolts on either side of the flow meter.
- Disconnect the air lines to the ON/OFF valve and the electrical cable. Remove the assembly from the flow meter cabinet. Removing the right-hand side panel will make removing assembly easier.
- Disconnect the pipes from the flow meter to replace it and re-apply Teflon tape as required.
- To clean the flow meter, use a non-metal pipe cleaning brush or a lint-free cloth.

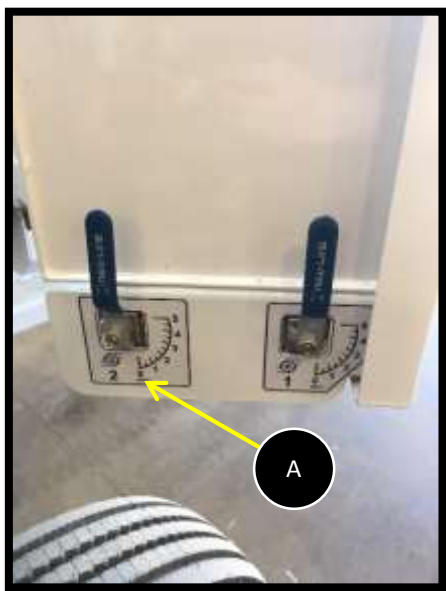
11. ADMIX

11.1 PRIMING THE SYSTEM

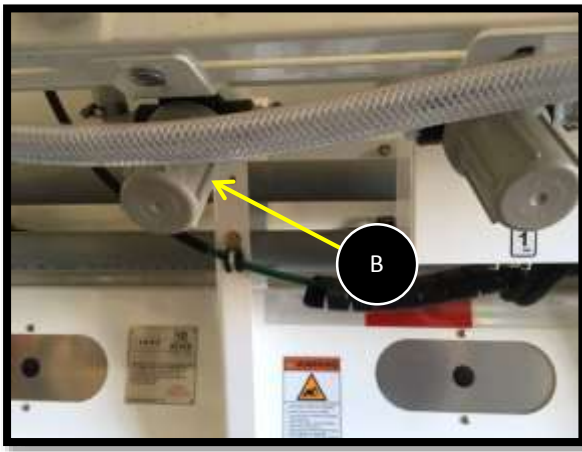


IMPORTANT!

The admix lines must be primed before mixing. Air in the lines will cause false readings from the flow meters and delay the admix flow into the mix bowl on start-up.



- To prime the admix pumps first ensure the outlet ball valves **A** are in the off (zero) position. This cycles the fluid straight back to tank instead of the mix bowl outlet.
- Run the pump in prime mode (amber led position). Take the lid off the admix tank and see if fluid is coming out of re-circulation tube in the top.
- If fluid is circulating or the pump has been on for several seconds turn the ball valve **A** to the fully open position. Have a pail to catch the chemical coming out of the line into the mix bowl. Keep running the pump until a steady stream of fluid appears and no visible air is in the line.
- You should also have a steady flow reading on the screen if all the air is out.



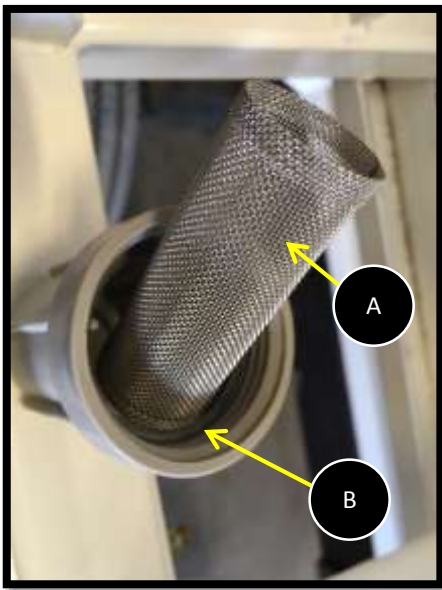
- If the pump is still not pumping or there is still air in the line, try cracking the strainer bowl **B** slightly to remove any potential air locks. If fluid is running out and pump is pumping tighten the bowl.

11.2 STRAINER CLEANING AND REPLACEMENT



IMPORTANT!

A dirty admix strainer will cause the Commander control system to speed up the admix pump when in auto mode, which will eventually cause it to go into a fault if it can't meet it's admix flow target. Check the admix strainer regularly for buildup.



- To remove and inspect the admix inlet strainer unthread the bowl and pull the strainer **A** out of the housing.
- Be careful not to lose the seal **B**.
- Clean the strainer as necessary ensuring all debris is removed and outer mesh is clean.
- Clean and dump any debris out of the bowl as well.
- If the strainer is plugged beyond reasonable cleaning or it is damaged, then replace it.

11.3 FLOW METER CLEANING AND REPLACEMENT



IMPORTANT!

The same buildup that occurs on the strainer can also over time build up on the inside of the flow meter, which will cause the flow meter to stop reading. Flushing the admix system with water weekly will help prevent this buildup.



- To remove the flow meter, uncouple union fitting **A** and remove the hose and gear clamp.
- Disconnect the electrical wire. If removing more than one flow meter for cleaning be careful not to mix up the wires when re-installing.
- To clean the flow meter run a non-metal pipe cleaner **B** through the flow meter several times to clean any debris or build-up inside the flow meter.



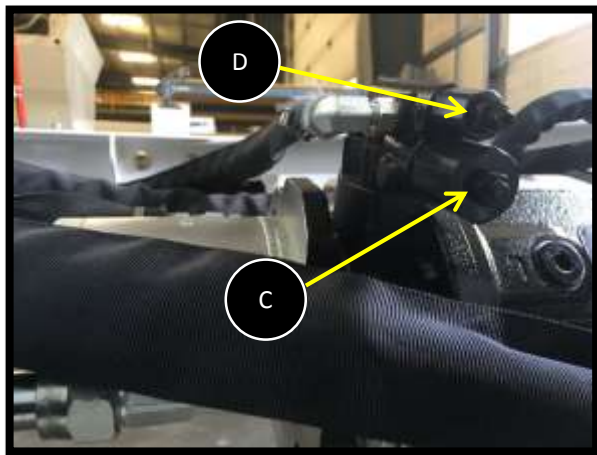
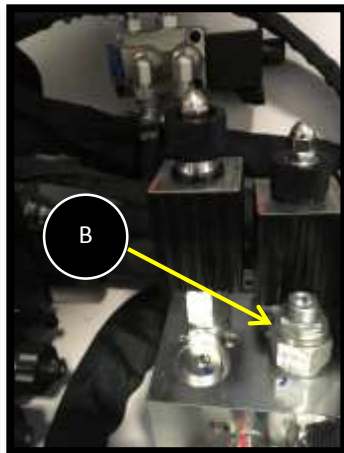
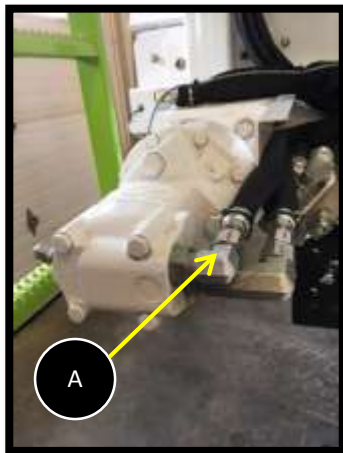
12. HYDRAULICS

12.1 BELT CIRCUIT PRESSURE ADJUSTMENTS



WARNING!

Do not adjust belt circuit pressure relief valve lower than belt pump pressure compensator. This can result in functions not operating and/or excessive heat build up in the hydraulic system.



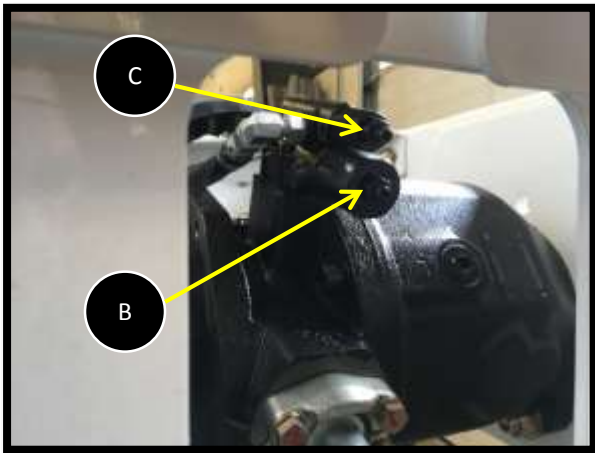
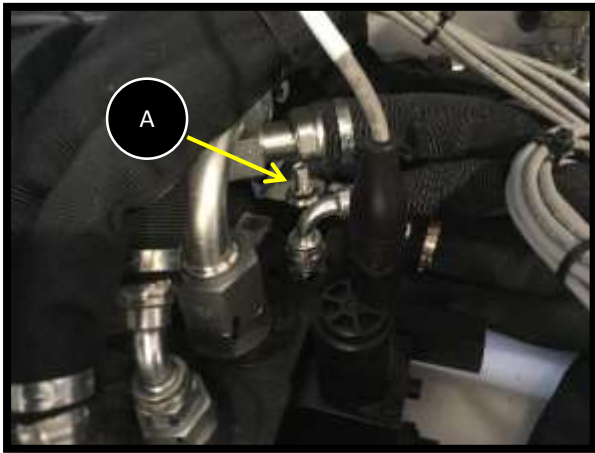
- To set the max pressure on the belt circuit the belt motor inlet (A) must be plugged. There are no cylinder functions on the belt circuit that would allow the system to be dead ended.
- Loosen the lock nut on relief valve (B) using a 3/4" wrench and turn the adjustment screw in all the way using an 8mm Allen key.
- Loosen the lock nut on belt pump compensator (C) using a 13mm wrench. With belt unload activated, adjust the pressure to 3900psi using a 3mm Allen Key. (Activate belt unload by pressed button #10 and then button #14 on the keypad).
- Turn the relief valve adjustment out until the pressure on the display starts to drop below 3900psi. You should here the engine load up as well. Turn the relief valve back until the display reads 3900psi and the engine load is reduced. Lock the relief valve setting.
- Go back and adjust the belt pump compensator until it reads 3600psi. Tighten the lock nut.
- Relief valve is now 300psi higher than pump compensator setting.
- Turn belt OFF. Set pump standby pressure to 250psi by loosening the lock nut on load sense compensator (D) with 13mm wrench and adjust with 3mm Allen key.

12.2 AUGER CIRCUIT PRESSURE ADJUSTMENT



IMPORTANT!

The auger valve relief is a load sense relief only and is used to limit the max load sense signal to the pump compensators. This relief is set lower than the pump pressure compensator to allow the mix auger to continue to operate when boom, chute and swing functions are at max load sense pressure.



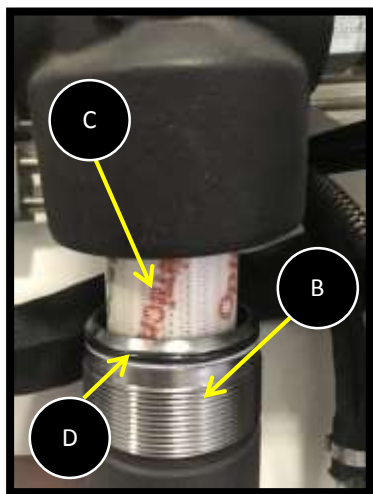
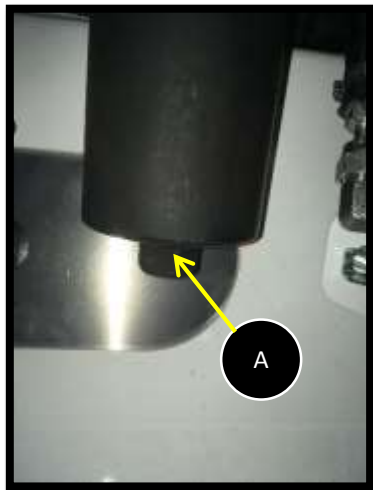
- To set the max pressure on the mix auger circuit loosen the lock nut using a 13mm wrench and turn the load sense relief (A) all the way in using a #4 Allen key.
- Loosen the lock nut on the auger pump pressure compensator (B) using a 13mm wrench.
- With the chute tilt cylinders bottomed out adjust the auger pump pressure compensator (B) to 3900psi using a 3mm Allen key. Release chute tilt function. Tighten the lock nut.
- With the chute tilt cylinders bottomed out again adjust the load sense relief (A) until the pressure reads 3600psi. Release chute tilt function. Tighten the lock nut.
- The load sense relief valve setting is now 300psi lower than the pump compensator pressure.
- With auger pump functions all off. Set pump standby pressure to 320psi by loosening the lock nut on load sense compensator (C) with 13mm wrench and adjust with 3mm Allen key.

12.3 PRESSURE FILTER REPLACEMENT



WARNING!

Ensure truck is off before performing any maintenance on the pressure filters. The filters have a direct connection to the pump outlets and can result in serious injury if removed when truck is running and PTO on.



Removing the element:

1. If hydraulic system is running, turn it off and allow pressure to bleed off to zero before attempting to remove pressure filter bowl.
2. Unscrew filter bowl (A) using a 24mm wrench (drain fluid into a suitable container and clean or dispose of it in accordance with environmental regulations).
3. Replace filter element (C).
4. Clean filter bowl and filter head; particular attention must be given to the threads (B)!
5. Examine filter, especially sealing surfaces (D), for mechanical damage.
6. Check O-rings – and replace if necessary.

Bowl O-Ring 67.95 x 2.62

Replacing the element:

1. Wet the sealing surfaces and thread on the filter head and bowl, as well as the O-ring (E), with clean operating fluid.
2. When fitting a new filter element, check that the designation corresponds to that of the old element.
3. Place filter element carefully on to the element spigot.
4. Screw in filter bowl fully and then unscrew by one quarter-turn.
5. Turn on PTO on run belt unload (belt filter) or mix auger (auger filter) at 50% speed to slowly fill bowl and dissipate any air.
6. Run for about 5 min checking filter for oil leaks.

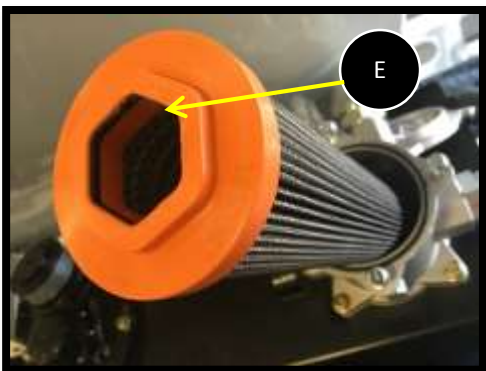
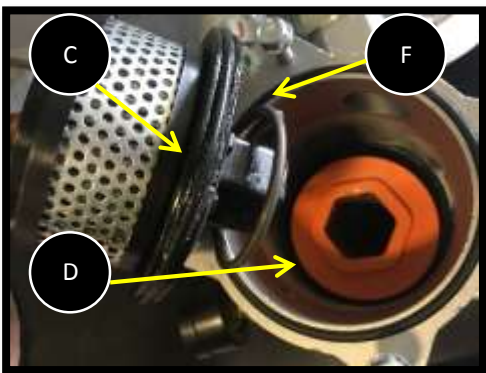
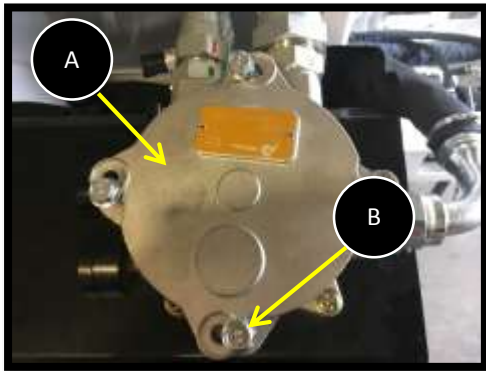
Filter O-Ring 25 x 3.53

12.4 RETURN FILTER REPLACEMENT



WARNING!

Ensure truck is off before performing any maintenance on the return filter. The filter will always have charge pump flow going through it even if all the mixer functions are off.



Removing the element:

- Depressurise the system and clean the filter lid (A) of any dirt or debris.
- Loosen the lid bolts (B) using a 13mm wrench. The lid will rotate if the bolts are loosened off enough, so the bolts do not need to be removed completely.
- Remove the diaphragm and safety filter assembly (C).
- Remove the filter element (D).
- Collect the spent oil and cartridge in a suitable container and dispose of them in compliance with statutory legislation.

Replacing the element:

- Lubricate the filter element seal (E) and diaphragm seal with the operating fluid. Fix the element on the diaphragm.
- Insert the element back into the bowl.
- Check the condition of the lid seal (F). If renewing, lubricate the new seal with the operating fluid before installing.
- Re-install the filter lid.

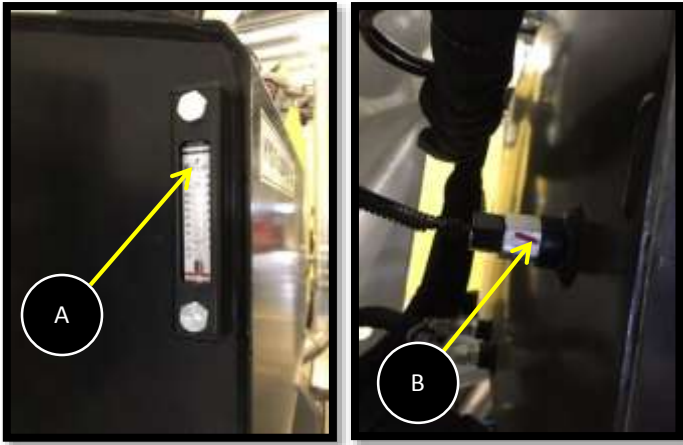
Lid O-Ring	177 x 4
Bowl O-Ring	98.02 x 3.53
Head O-Ring	123.19 x 5.34

12.5 OIL LEVEL



WARNING!

Operating the hydraulic system without enough oil in the reservoir will cause permanent damage to hydraulic pumps.



- Cold oil level should not go above the top black line on the reservoir sight glass **A**. Enough air space must be left in the reservoir to allow for oil expansion when at operating temperature.
- A low oil level switch **B** is used to monitor a low oil condition and generate an alarm, which will turn off the trucks PTO.

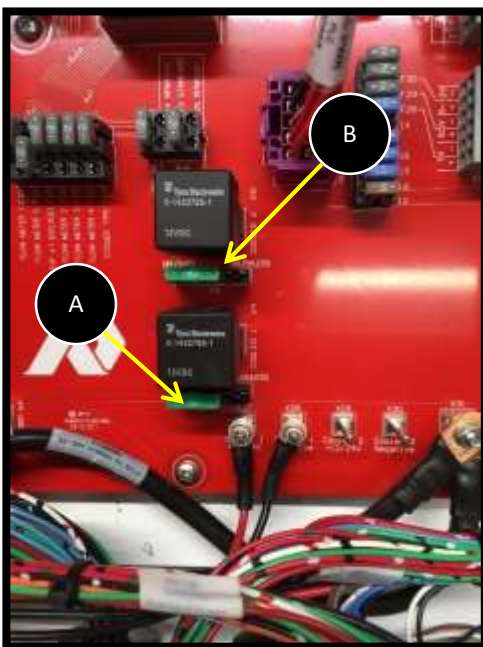
12.6 OIL COOLER



WARNING!

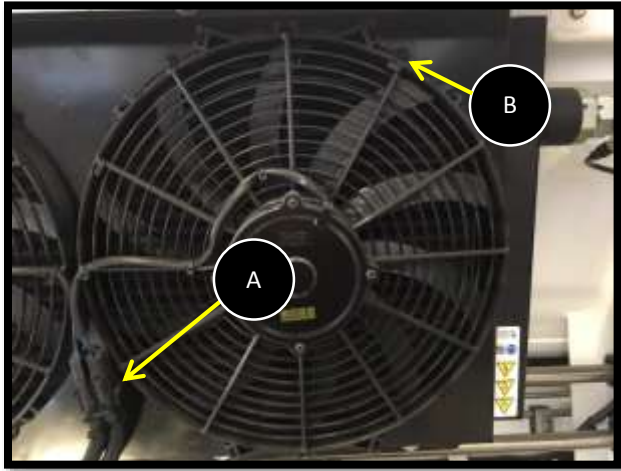
The hydraulic oil cooler operation is critical in ensuring oil temperature is kept under 70°C (160°F). Ensure cooler core is not plugged with debris and fans are running. If oil temperature rises abnormally or is going into temperature alarm check to ensure fans are on.

12.6.1 FAN FUSES



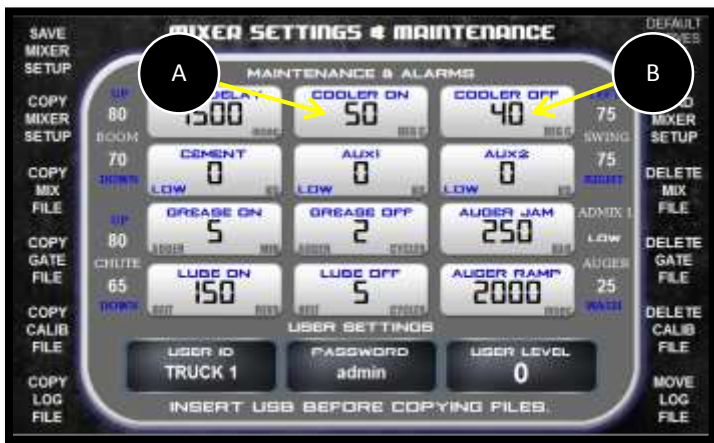
- Oil cooler fans can be turned on manually on the Mixer Settings screen by pressing “Cooler ON”. This is a good tool to troubleshooting fan operation and for blown fuses.
- The oil cooler has two fans that have separate fuses located at F5 **A** and F6 **B**.
- If a new fuse continues to blow, then the oil cooler fan may be shorted or jammed (see removal and replacement).

12.6.2 FAN REMOVAL / REPLACEMENT



- Oil cooler fans can be removed to check for bearing failures, jammed fans or to clean/inspect cooler core.
- Disconnect the fan connector **A** before attempting to remove the fan from the shroud.
- To remove the fan, unscrew the four bolts **B** using a 4mm Allen key.
- Inspect the fan and ensure that it turns and the fan bearing has not failed.
- If the fan is blowing fuses constantly the motor may be shorted. Replace the fan.

12.6.3 TEMPERATURE SETTINGS



- Depending on the ambient temperature conditions it may be necessary to adjust the cooler on and off settings.
- The cooler on temperature **A** needs to be higher than the off temperature **B**.
- Generally, the cooler on temperature is set for between 40-50°C (104-122°F) and the off to between 32-40°C (90-104°F).
- In hot ambient conditions, above 35°C (90°F) it's best to have the cooler turning on sooner and shutting off later to ensure the heat load can be managed with higher ambient air temperatures.

13. ELECTRICAL

13.1 RELAY AND FUSE REPLACEMENT



IMPORTANT!

All relay and fuse information are printed on the mixer circuit board and can also be found in the circuit board schematics in the appendices.

Fuse Descriptions					
Fuse Label	Description	Constant, Switched or Selector fuse	Fuse Position		
			1	2	3
F1	Autolube (Option)	Switched			
F2	RPM V+	Switched			
F3	High Level Cement Aux (Option)	Switched			
F4	Water Heat Exchanger (Option)	Switched			
F5	Cooler #1	Switched			
F6	Cooler #2	Switched			
F7	Spare Relay #1	Switched			
F8	Spare Relay #2	Switched			
F9	Work Lights (Display Box Sw. Opt.)	Constant			
F10	Display Box Screen	Constant			
F11	Charge Cradle	Constant			
F12	PLC Supply	Constant			
F13	PLC Supply (Outputs #1)	Switched			
F14	PLC Supply (Outputs #2)	Switched			
F15	PLC Supply (Outputs #3)	Switched			
F16	PLC Supply (Outputs #4)	Switched			
F17	I/O #1 (Hydraulic Controls #1)	Switched			
F18	I/O #2 (Hydraulic Controls #2)	Switched			
F19	I/O #3 (Flow Meters)	Switched			
F20	Printer	Switched			
F21	Display Box	Switched			
F22	Water Flow Meter Selection	Selector Fuse			
F23	RPM type selector (Determined by the Truck)	"Connect Two"			Only One of the three slots should have a Fuse.
F24		V+ Switched			
F25		V- Switched			
F26	Admix 4 Flow Meter Selection	Selector Fuse			
F27	Extra E-Stop (No, Yes)	Selector Fuse			
AF28	PLC Aux Power Supplies	5V			
AF29		8.5V			
AF30		5-12V			
F31	Admix 1 Flow Meter Selection	Selector Fuse			
F32	Admix 2 Flow Meter Selection				
F33	Admix 3 Flow Meter Selection				
F34	Cooler Fan Type Selector (Brushless, Brushed)	Selector Fuse			
AF4	J1939 Network Supply	Switched			
AF5	Aux Supply	Switched			
AF6	Aux Supply	Switched			
AF7	Aux Supply	Switched			
AF8	Aux Supply	Switched			
AF9	Aux Supply	Switched			
Additional Componenets					
Terminals	Component		Description of Purpose		
X7-1	120 Ohm 1/4 Watt Resistor		PLC Programing network resistor		
X7-2					
X7-3	120 Ohm 1/4 Watt Resistor		J1939 network resistor		
X7-4					
X7-7	120 Ohm 1/4 Watt Resistor		CANOpen network resistor		
X7-8					
X2-CAN 2 V-	TVS Diode	Black End	Voltage spike surge protector		
X2-CAN 2 V+		Striped End			

- The main power fuse **A** is bolted directly to the battery post. There is a spare fuse inside the main power box on the side of the mixer body.
- Inside the main power box there is also a fuse chart as shown that itemizes the fuse numbers and use.
- Some fuses are used as selectors based on the functions wiring setup. Be careful not to mix up the positions should one of these fuses be removed.

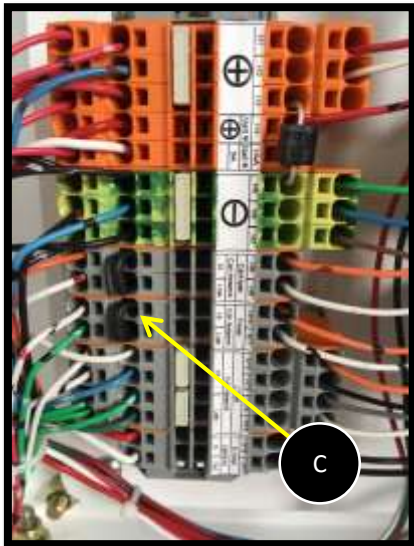
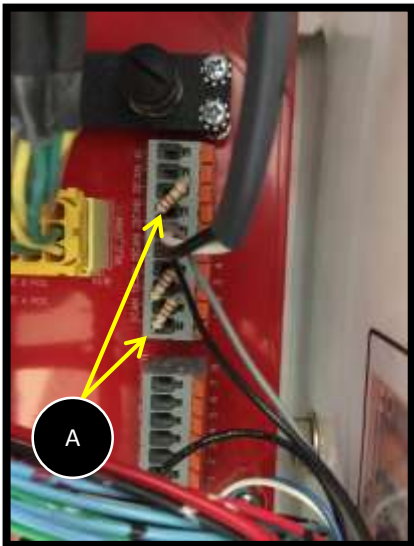


13.2 CANBUS NETWORKS

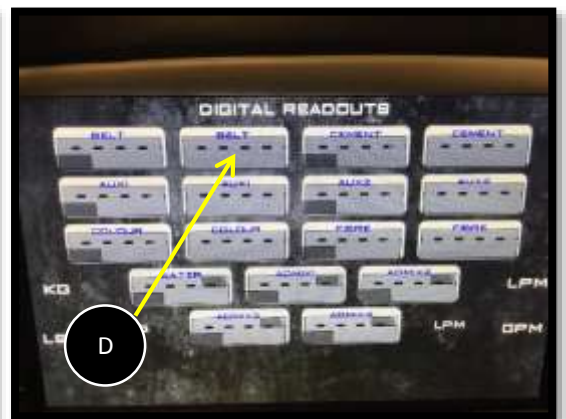
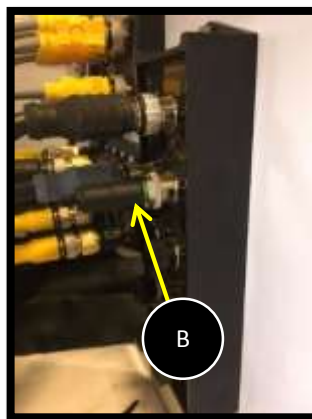


IMPORTANT!

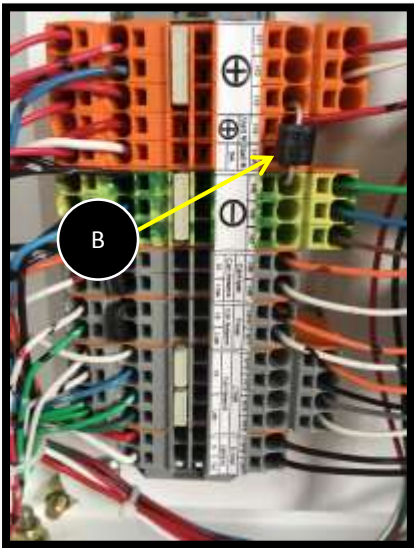
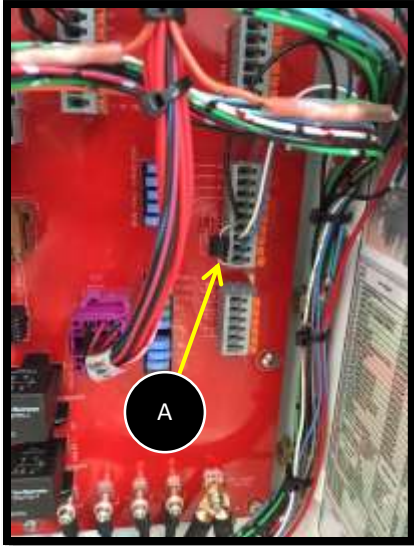
The Commander mixer has three active networks and one programming network. The active networks are CAN2, CAN3 and PRINTER CAN. The programming network is on CAN1 and is used strictly for downloading ECU updates. The CAN2 network uses the J1939 protocol running at 250kbit/s and CAN3 is CANOpen running at 125kbit/s. The CAN2 network is primarily used for input and output device communication. The CAN3 network is the communication used between the ECU and the display. The PRINTER CAN network is connected to the CAN1 port of the display and is used strictly for sending coded CAN messages that are converted to ASCII for printing.



- All CAN networks are terminated at each end with 120ohm resistors. When testing CANBUS resistance you should have a total of 60ohms nominal between the CAN H and CAN L terminals when the power is **off**. A range of 55-65ohms is typical.
- There are CAN resistors inserted on the circuit board **A** that serve as the start of the network for CAN 1,2 and 3.
- The CAN2 end terminating resistor **B** is in the M12 CAN splitter block mounted inside the hydraulic valve cabinet.
- The CAN3 and PRINTER CAN end terminating resistors can be found in the display box terminals **C**. The PRINTER CAN module has its own terminating resistor and is mounted inside the console in the cab.
- The Electrical Diagnostics screen on the Commander display can be used to monitor all CAN2, CAN3 and PRINTER CAN networks. The nodes will be red if not communicating and if all nodes are red then the network is down.
- If the CAN3 network (display) is down, greyed out boxes with dashed lines **D** will appear on the screen indicating that a connection to the ECU is broken.



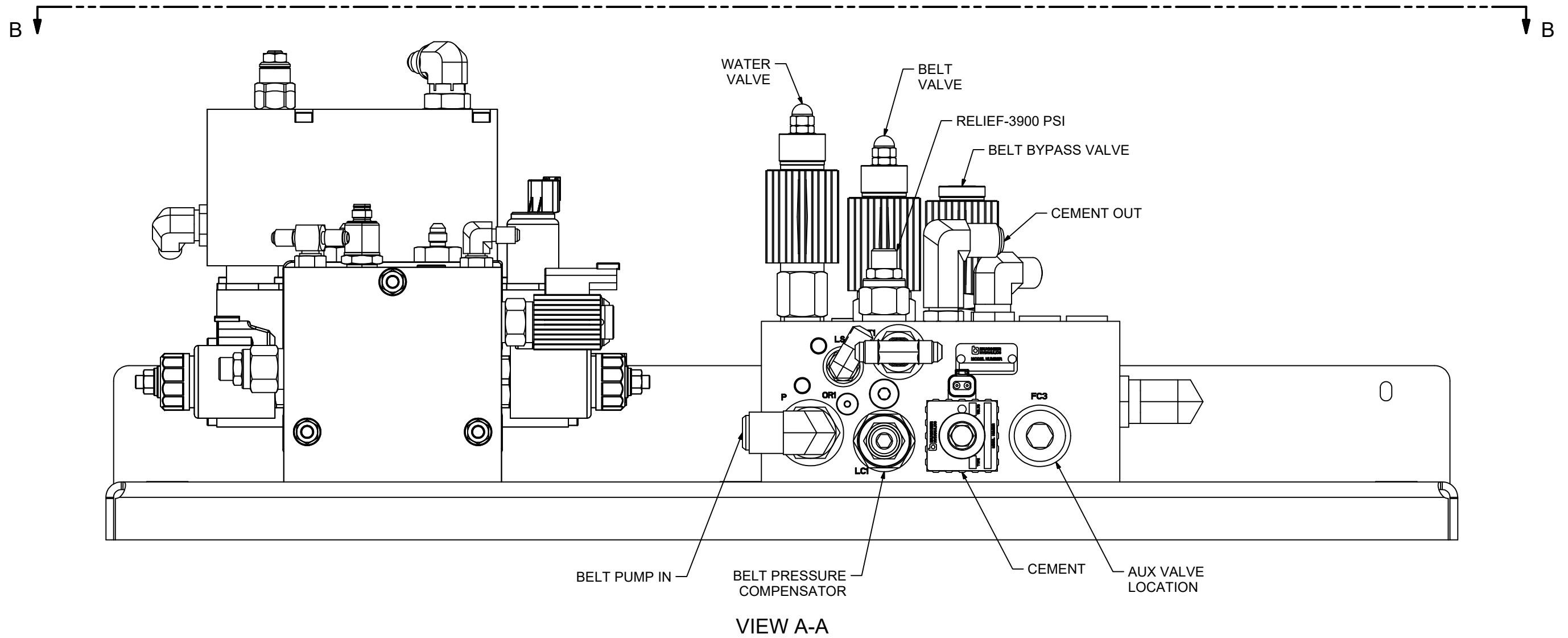
13.3 SUPPRESSION DIODES




- There are two location where additional voltage surge suppression diodes have been installed.
- One is in the main power box installed on circuit board terminals **A** and the other is in the display box **B**.
- These will be work seamlessly in the background, but should one fail it will fail closed causing a short circuit. The short is protected by fuses and are as follows.
 1. Fuse AF4 will blow if suppression diode in the main power box fails.
 2. Fuse F10 will blow if suppression diode in the display box fails.
- If fuse F10 or AF4 are blowing right away after install simply remove the associated suppression diode and try again. If the fuse is good, then replace the suppression diode.
- Fuse AF4 is the main power feed for all CAN (J1939) input devices on the mixer (eg. Belt and cement speed encoders). If multiple sensors are down check your fuse.
- Fuse F10 is the main power feed to the display. The display will not turn on if this fuse is blown.

! INFORMATION

The suppression diodes protect against voltage spikes caused by alternator load dumps, inductive loads from cooling fans and other potential high voltage sources. All electronic components such as sensors, display and plc have this type of protection already. The addition of the external TVS diodes is simply for precautionary purposes and as a supplementary device.



REV	DESCRIPTION	BY	DATE	APPR
 PROALL International Manufacturing Inc.		DWN TC	DATE 24 May 16	
		MODEL PGN	DATE 25 Jan 16	
		SCALE	NTS	
TOLERANCES - UNLESS OTHERWISE SPECIFIED LINEAR $\pm 1/32"$ ANGULAR $\pm 1^\circ$ DECIMAL $\pm .002"$ DIAMETRICAL $\pm 1/64"$				
VALVE ENCLOSURE ASSEMBLY - 12/24 VDC		SHEET 2 OF 7	REV A	
VIEW A-A		DWG NO MX30101		

THIS DRAWING AND THE INFORMATION IT DISCLOSES ARE CONFIDENTIAL PROPERTIES OF PROALL INTERNATIONAL MFG. INC. AND MAY NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED FOR THE MANUFACTURE OR OTHER PURPOSES WITHOUT PRIOR CONSENT. THIS DRAWING SHALL BE RETURNED TO PROALL INTERNATIONAL MFG. INC. UPON REQUEST.

NOTE A: MANUAL OVER-RIDE

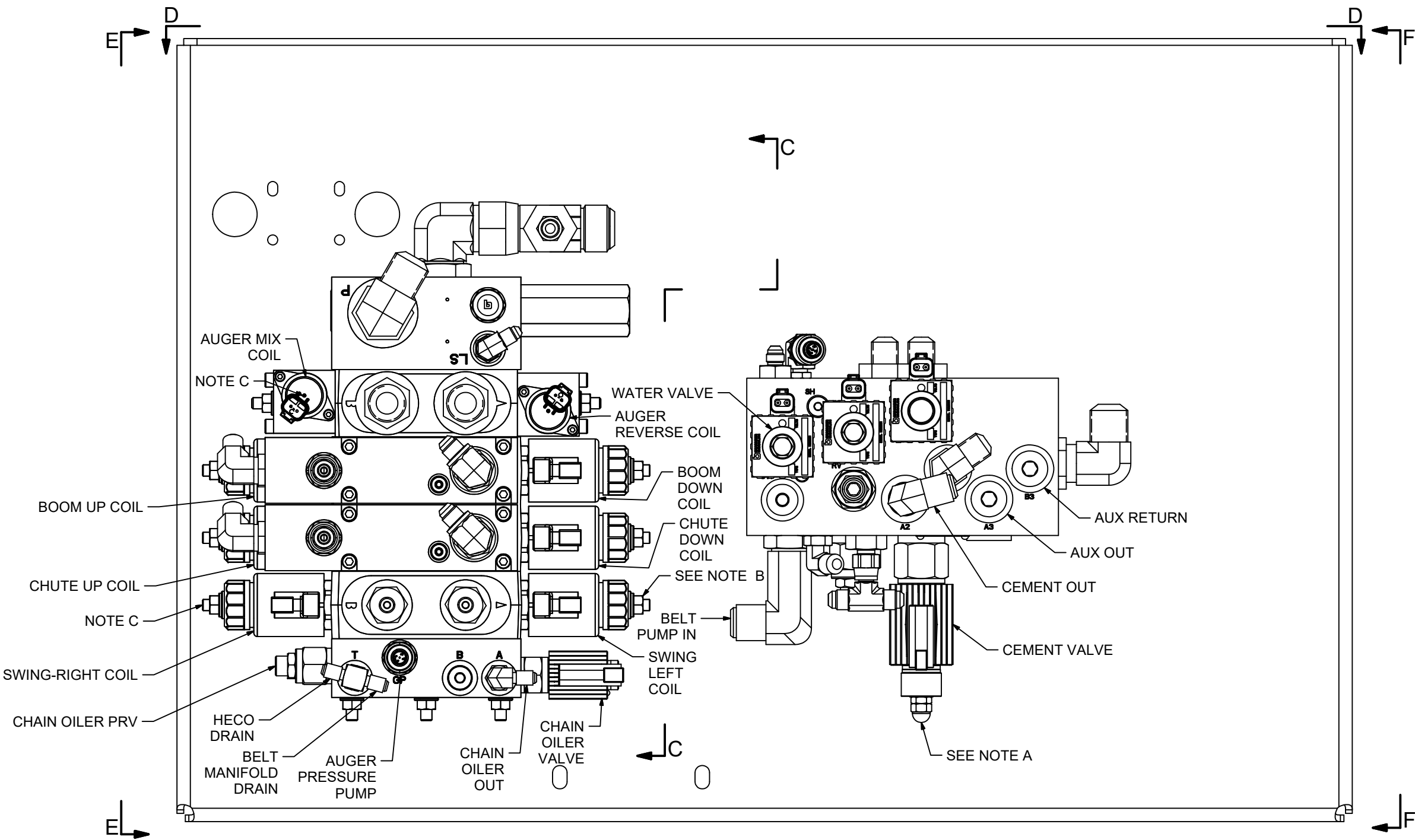
REMOVE ACORN NUT AND ADJUST HEX SCREW IN TO FORCE VALVE OPEN & CONTINUE TO TURN IN TO ADJUST SPEED. USED FOR TROUBLE SHOOTING PURPOSES ONLY. SHOULD NOT BE TURNED IN UNDER NORMAL OPERATION.

NOTE B: SPOOL SPRING TENSION ADJUSTMENT.


ADJUSTING THIS WILL CHANGE THE MINIMUM CURRENT REQUIRED TO SHIFT THE SPOOL. PRE-SET AT THE FACTORY. DO NOT ADJUST.

NOTE C: MANUAL OVER-RIDE.

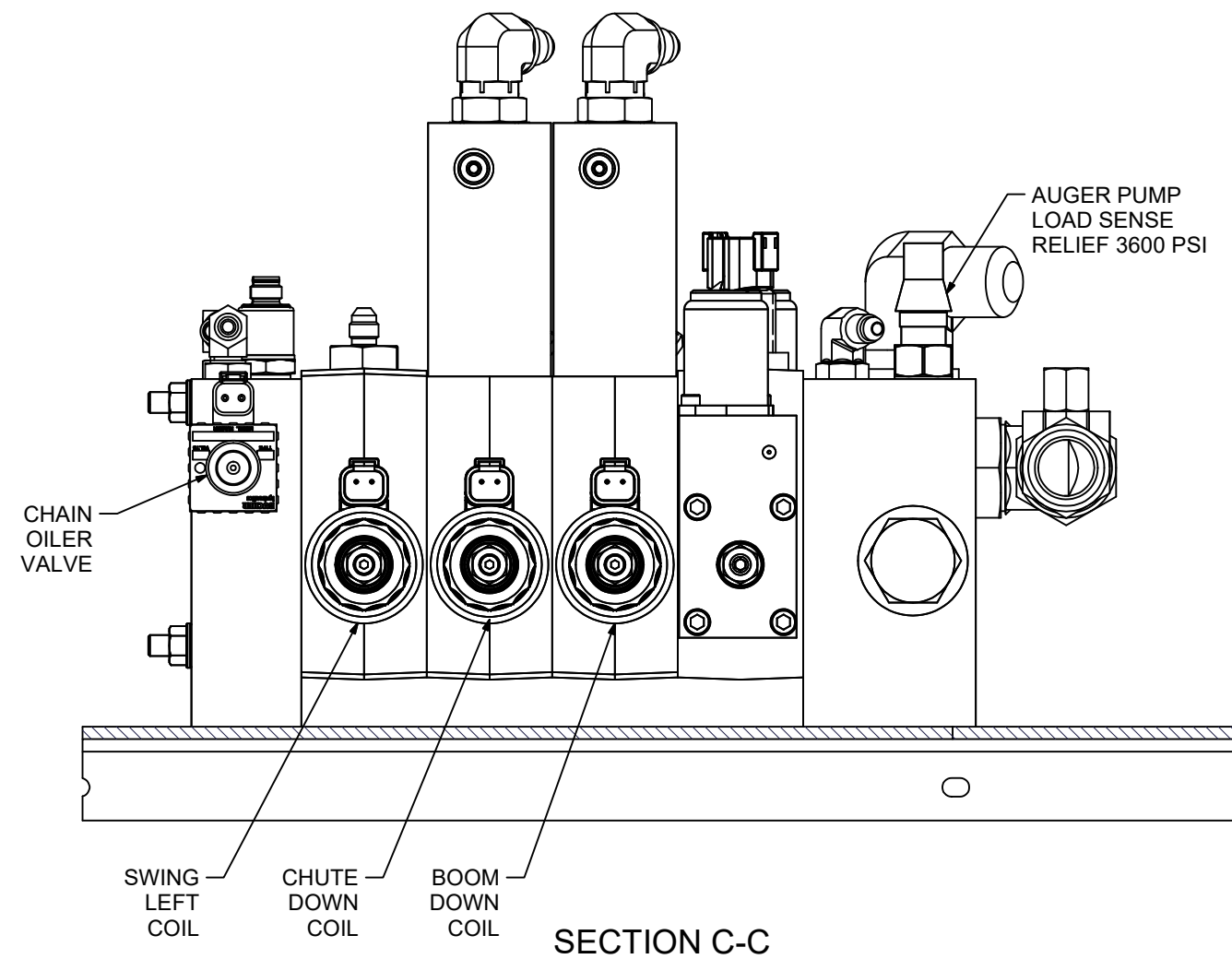
USE SMALL ALLAN KEY TO SHIFT SPOOL USED FOR EMERGENCY/TROUBLE SHOOTING PURPOSES.




VIEW B-B

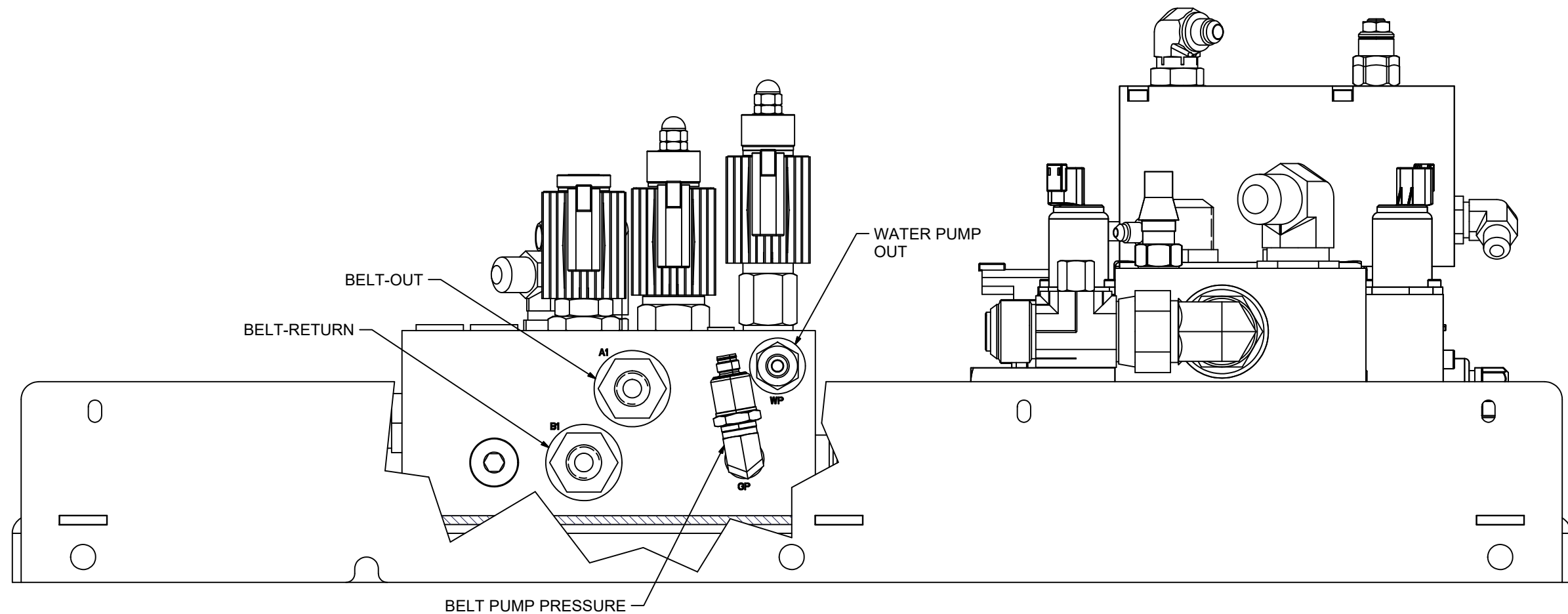
REV	DESCRIPTION	BY	DATE	APPR
 PROALL International Manufacturing Inc.		DWN TC	DATE 24 May 16	
		MODEL PGN	DATE 25 Jan 16	
		SCALE	NTS	
TOLERANCES - UNLESS OTHERWISE SPECIFIED		LINEAR ± 1/32"	ANGULAR ± 1°	DECIMAL ± .002"
				DIAMETRICAL ± 1/64"
VALVE ENCLOSURE ASSEMBLY - 12/24 VDC		SHEET 3 OF 7	REV A	
VIEW B-B		DWG NO MX30101		

THIS DRAWING AND THE INFORMATION IT DISCLOSES ARE CONFIDENTIAL PROPERTIES OF PROALL INTERNATIONAL MFG. INC. AND MAY NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED FOR THE MANUFACTURE OR OTHER PURPOSES WITHOUT PRIOR CONSENT. THIS DRAWING SHALL BE RETURNED TO PROALL INTERNATIONAL MFG. INC. UPON REQUEST.




REV	DESCRIPTION	BY	DATE	APPR
 PROALL International Manufacturing Inc.		DWN	TC	DATE 24 May 16
		MODEL	PGN	DATE 25 Jan 16
		SCALE	NTS	
TOLERANCES - UNLESS OTHERWISE SPECIFIED LINEAR ± 1/32" ANGULAR ± 1° DECIMAL ± .002" DIAMETRICAL ± 1/64"				
VALVE ENCLOSURE ASSEMBLY - 12/24 VDC SECTION C-C		SHEET	4	OF 7
		DWG NO	MX30101	
		REV A		

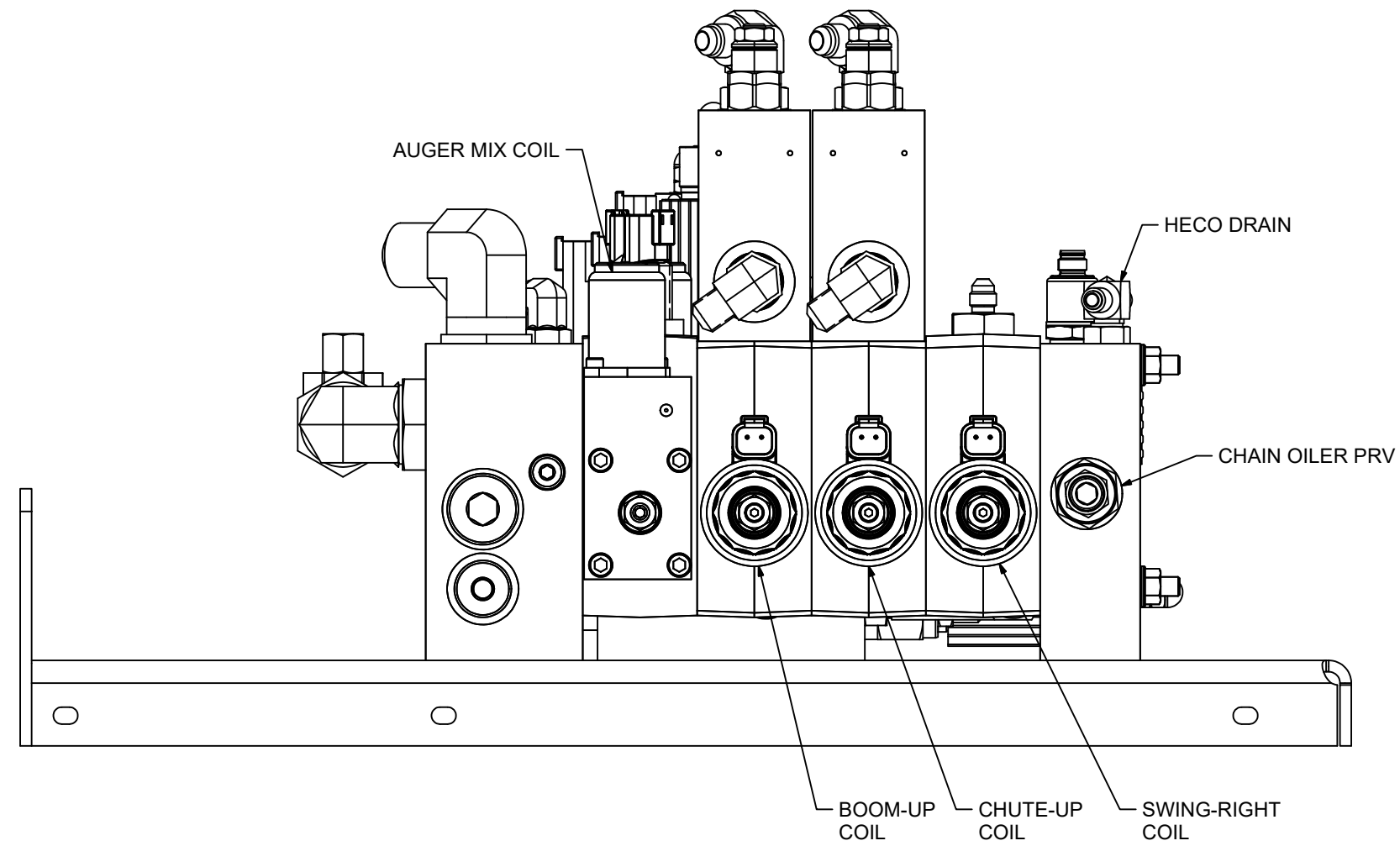
THIS DRAWING AND THE INFORMATION IT DISCLOSES ARE CONFIDENTIAL PROPERTIES OF PROALL INTERNATIONAL MFG. INC. AND MAY NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED FOR THE MANUFACTURE OR OTHER PURPOSES WITHOUT PRIOR CONSENT. THIS DRAWING SHALL BE RETURNED TO PROALL INTERNATIONAL MFG. INC. UPON REQUEST.



VIEW D-D


REV	DESCRIPTION	BY	DATE	APPR	
 PROALL International Manufacturing Inc.		DWN	TC	DATE 24 May 16	
		MODEL	PGN	DATE 25 Jan 16	
		SCALE	NTS		
TOLERANCES - UNLESS OTHERWISE SPECIFIED LINEAR ± 1/32" ANGULAR ± 1° DECIMAL ± .002" DIAMETRICAL ± 1/64"					
VALVE ENCLOSURE ASSEMBLY - 12/24 VDC		SHEET	5	OF 7	REV
VIEW D-D		DWG NO	MX30101		A

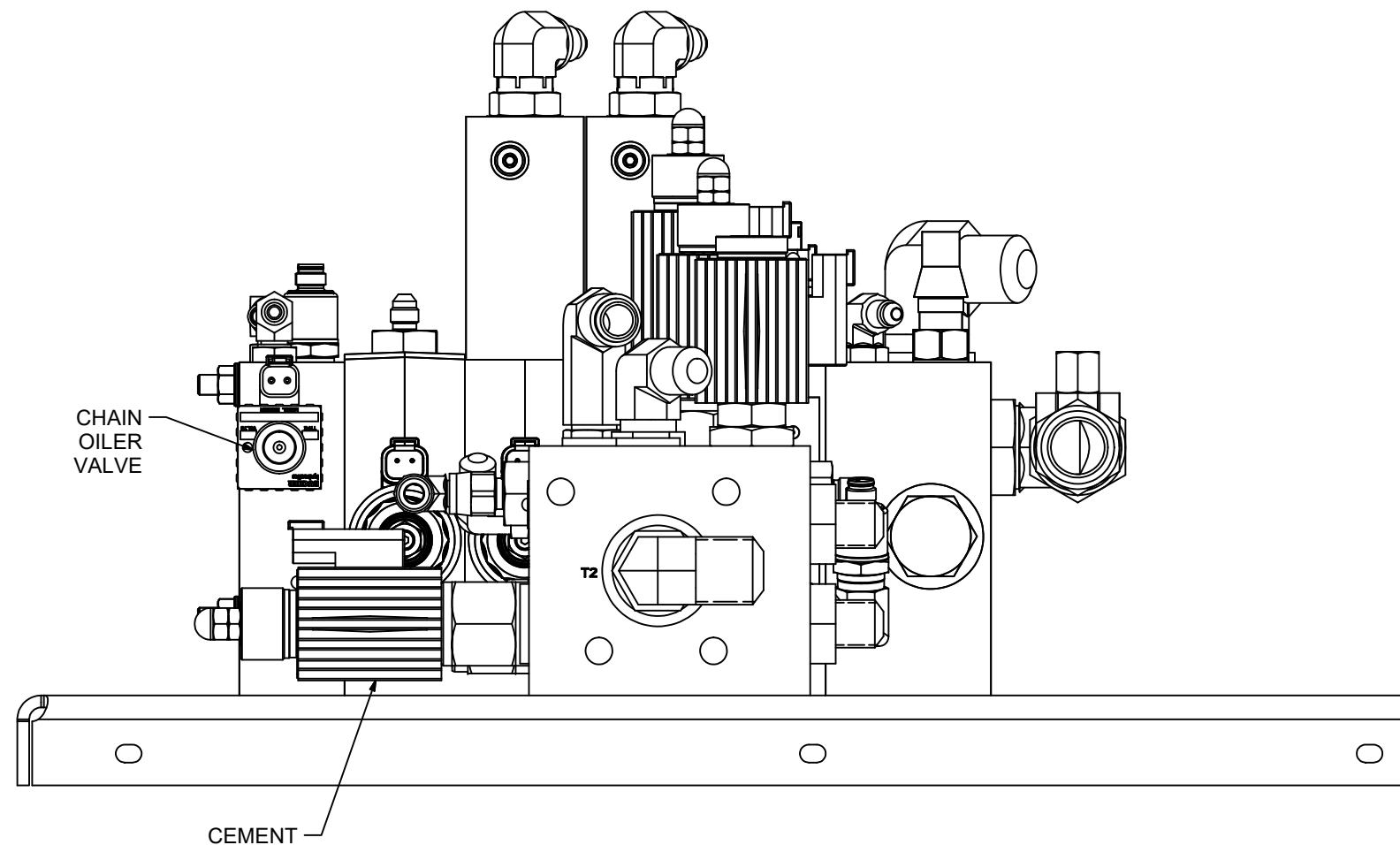
THIS DRAWING AND THE INFORMATION IT DISCLOSES ARE CONFIDENTIAL PROPERTIES OF PROALL INTERNATIONAL MFG. INC. AND MAY NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED FOR THE MANUFACTURE OR OTHER PURPOSES WITHOUT PRIOR CONSENT. THIS DRAWING SHALL BE RETURNED TO PROALL INTERNATIONAL MFG. INC. UPON REQUEST.




VIEW E-E

THIS DRAWING AND THE INFORMATION IT DISCLOSES ARE
CONFIDENTIAL PROPERTIES OF PROALL INTERNATIONAL
MFG. INC. AND MAY NOT BE REPRODUCED OR DISCLOSED
TO OTHERS OR USED FOR THE MANUFACTURE OR OTHER
PURPOSES WITHOUT PRIOR CONSENT. THIS DRAWING
SHALL BE RETURNED TO PROALL INTERNATIONAL MFG.
INC. UPON REQUEST.

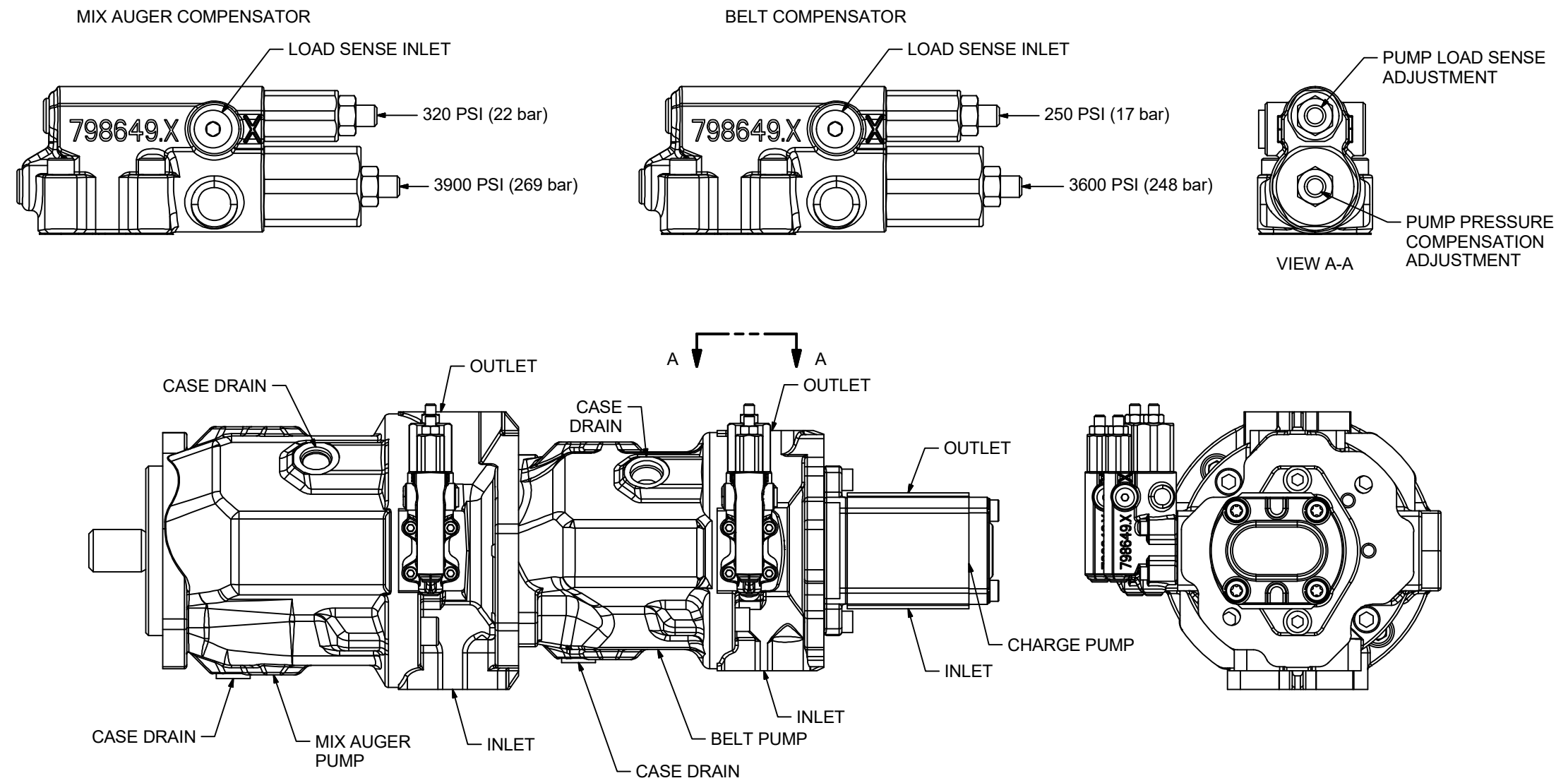
REV	DESCRIPTION		BY	DATE	APPR
 PROALL International Manufacturing Inc.			DWN	TC	DATE 24 May 16
			MODEL	PGN	DATE 25 Jan 16
			SCALE		NTS
TOLERANCES - UNLESS OTHERWISE SPECIFIED LINEAR ± 1/32" ANGULAR ± 1° DECIMAL ± .002" DIAMETRICAL ± 1/64"					
VALVE ENCLOSURE ASSEMBLY - 12/24 VDC			SHEET	6 OF 7	REV
VIEW E-E			DWG NO	MX30101	A



VIEW F-F

REV	DESCRIPTION	BY	DATE	APPR
 PROALL International Manufacturing Inc.		DWN	TC	DATE 24 May 16
		MODEL	PGN	DATE 25 Jan 16
		SCALE		NTS
TOLERANCES - UNLESS OTHERWISE SPECIFIED LINEAR ± 1/32" ANGULAR ± 1° DECIMAL ± .002" DIAMETRICAL ± 1/64"				
VALVE ENCLOSURE ASSEMBLY - 12/24 VDC		SHEET	7	OF 7
VIEW F-F		DWG NO	MX30101	
				REV A


THIS DRAWING AND THE INFORMATION IT DISCLOSES ARE CONFIDENTIAL PROPERTIES OF PROALL INTERNATIONAL MFG. INC. AND MAY NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED FOR THE MANUFACTURE OR OTHER PURPOSES WITHOUT PRIOR CONSENT. THIS DRAWING SHALL BE RETURNED TO PROALL INTERNATIONAL MFG. INC. UPON REQUEST.



GENERAL NOTES:

1. RIGHT HAND PUMP ROTATION IS SHOWN.

THIS DRAWING AND THE INFORMATION IT DISCLOSES ARE CONFIDENTIAL PROPERTIES OF PROALL INTERNATIONAL MFG. INC. AND MAY NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED FOR THE MANUFACTURE OR OTHER PURPOSES WITHOUT PRIOR CONSENT. THIS DRAWING SHALL BE RETURNED TO PROALL INTERNATIONAL MFG. INC. UPON REQUEST.

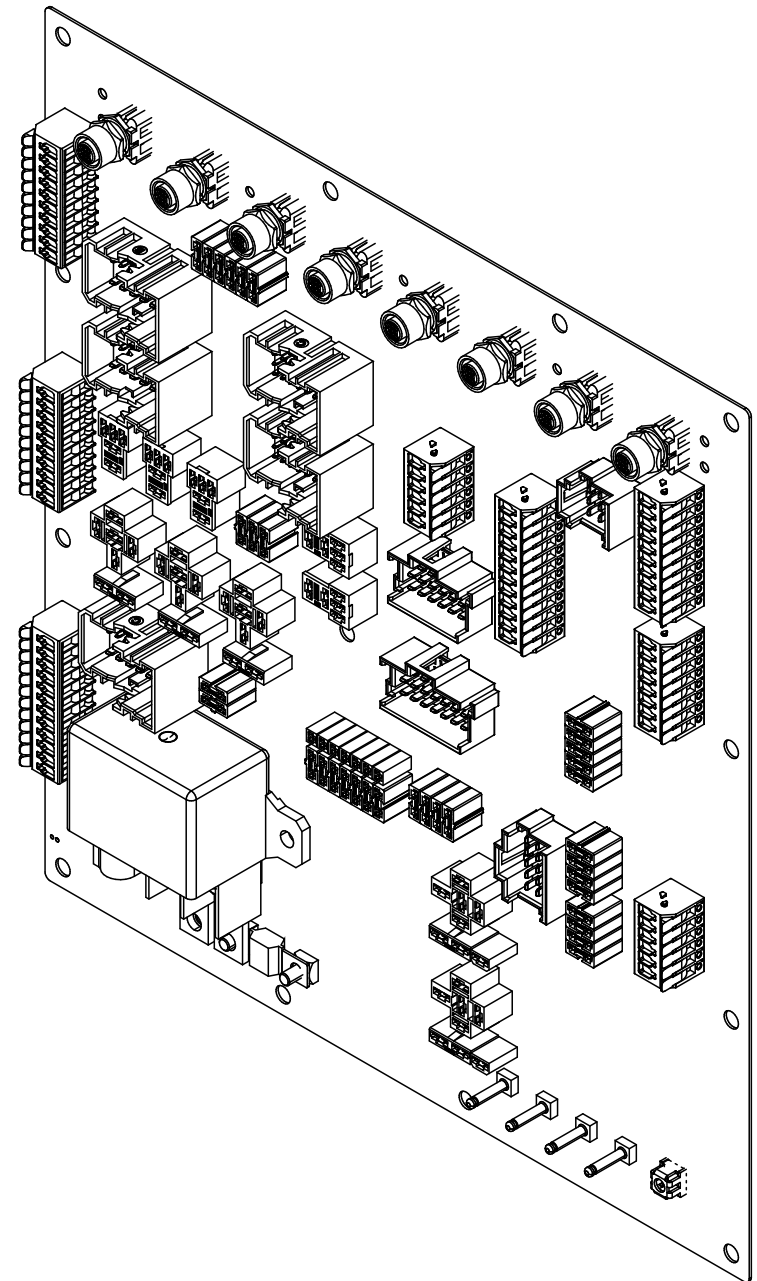
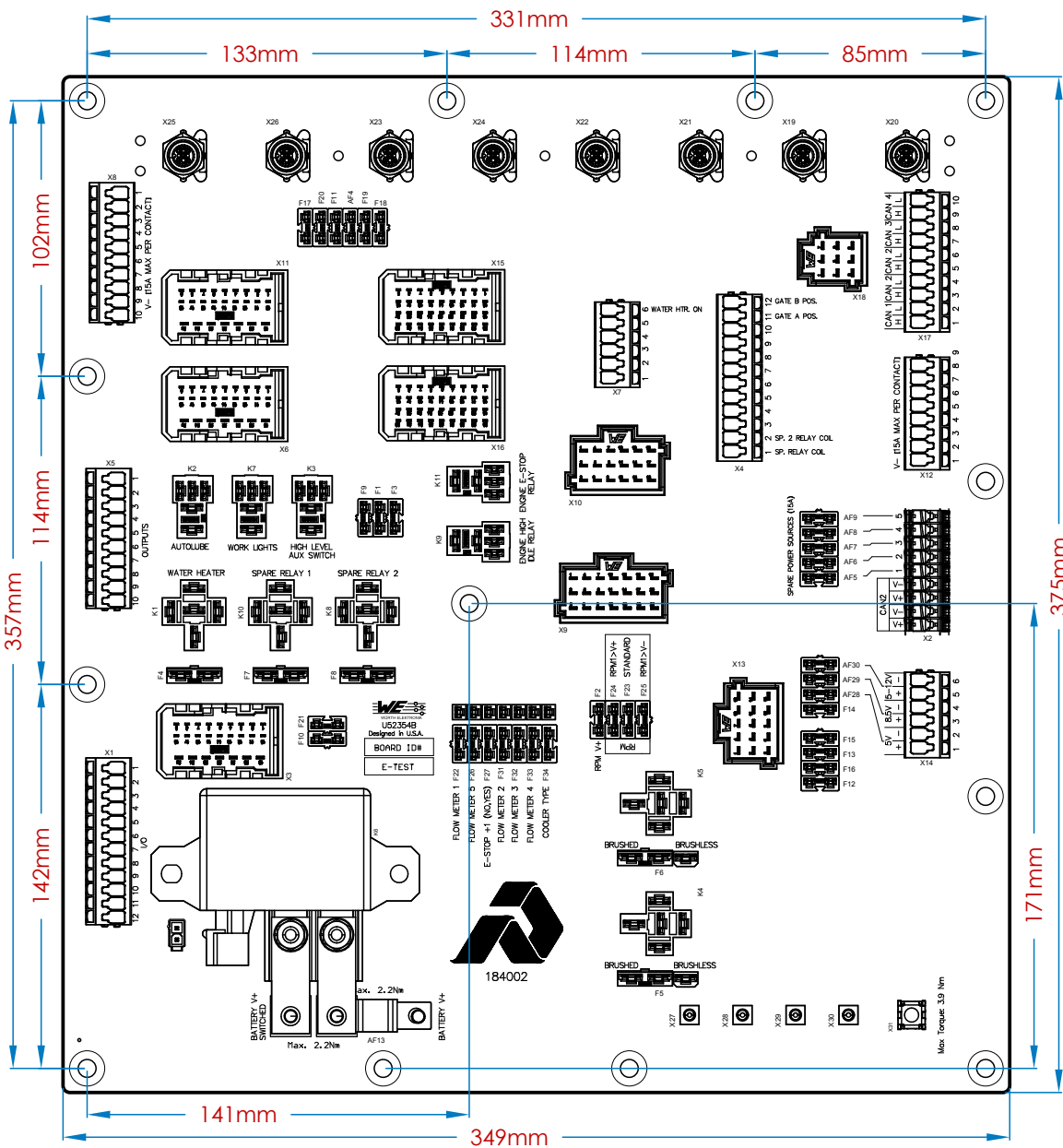
REV	DESCRIPTION		BY	DATE	APPR
 PROALL International Manufacturing Inc.	DWN	TC	DATE	07 Jun 16	
	MODEL	TC	DATE	07 Jun 16	
	SCALE	NTS			
TOLERANCES - UNLESS OTHERWISE SPECIFIED LINEAR ± 1/32" ANGULAR ± 1° DECIMAL ± .002" DIAMETRICAL ± 1/64"					
REXROTH 71-45-25 PUMP RIGHT HAND ROTATION			SHEET	1 OF 1	REV
			DWG NO	Rexroth 71-45-25 Pump	A

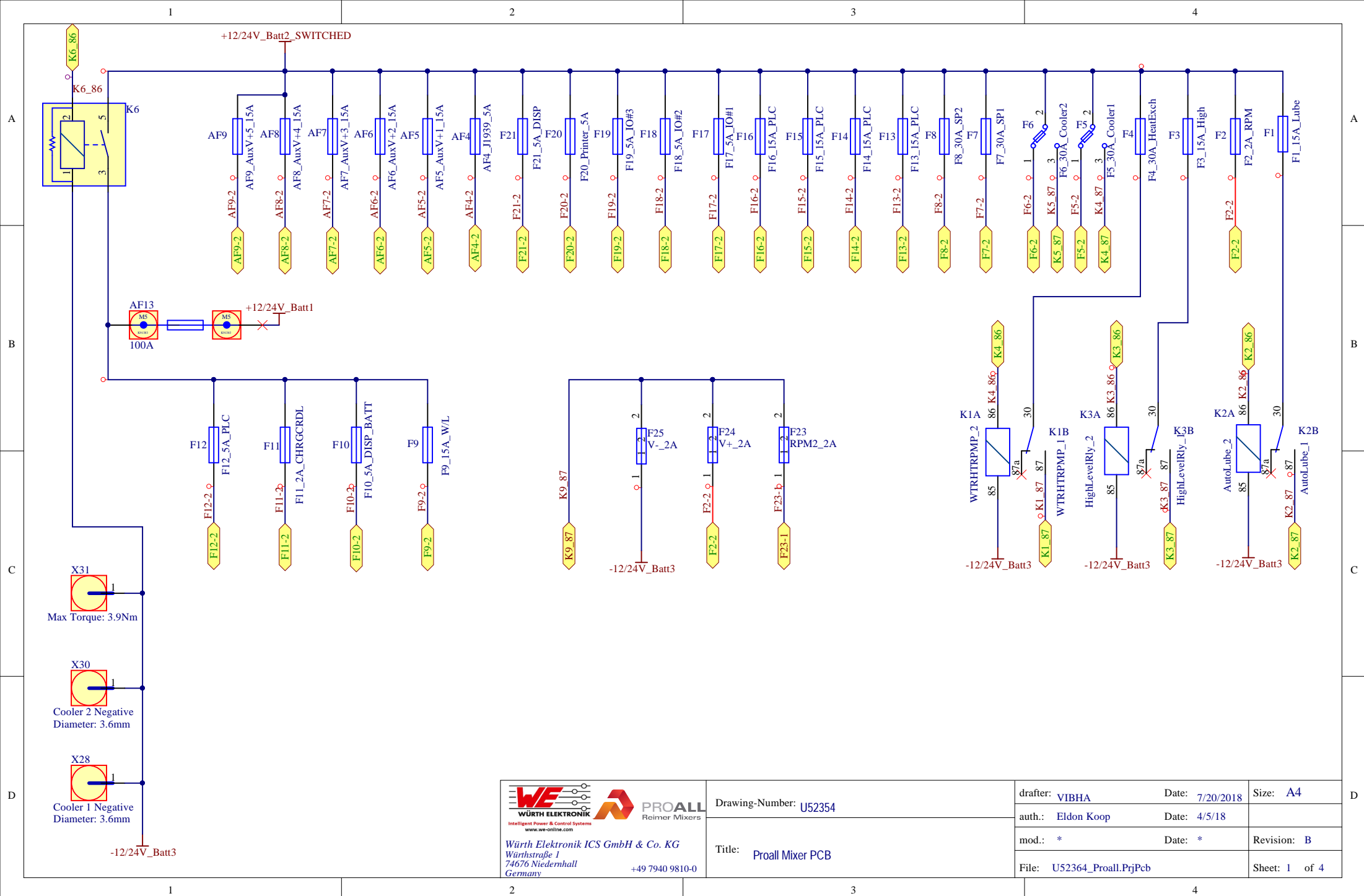
1

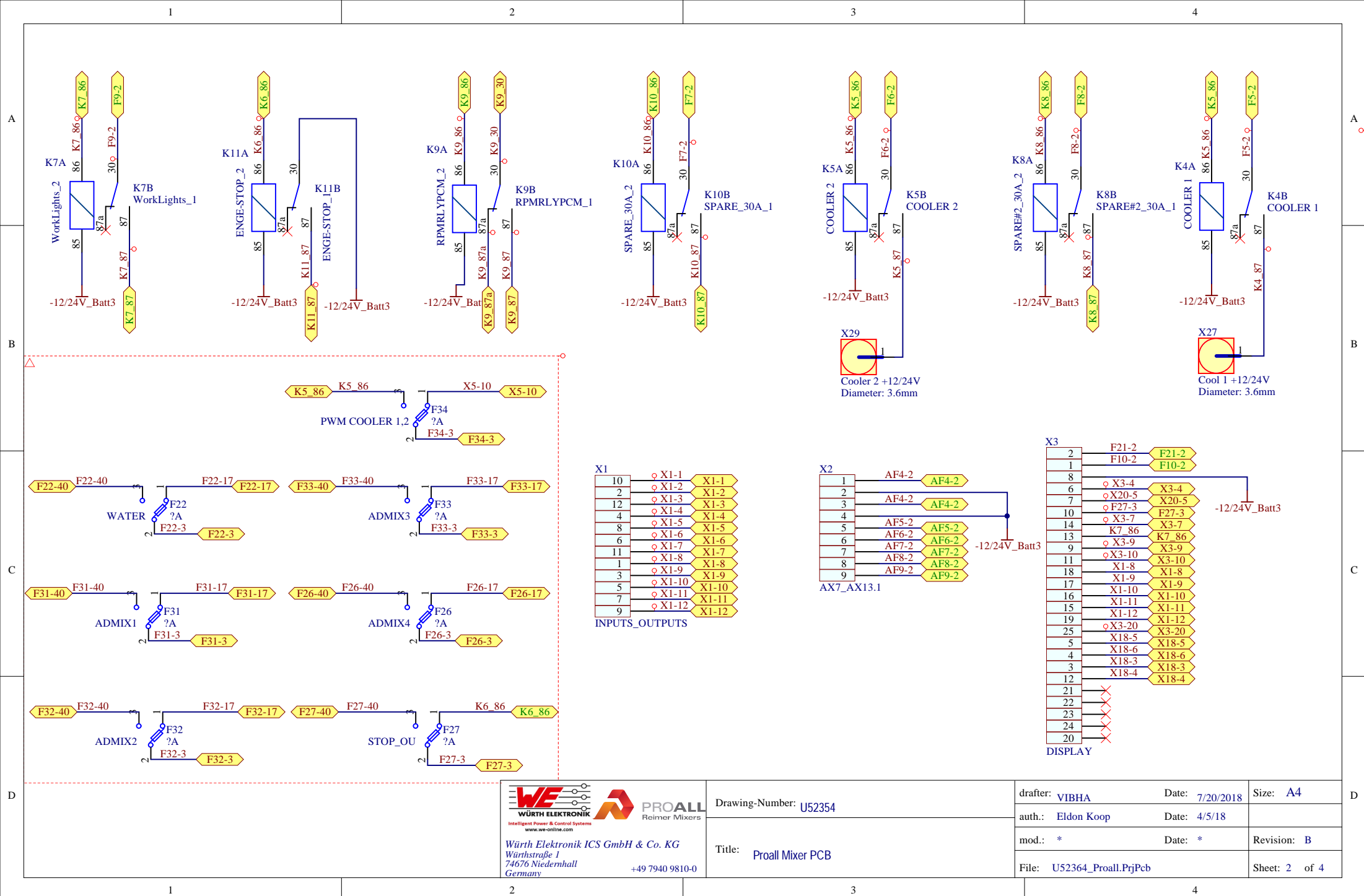
2

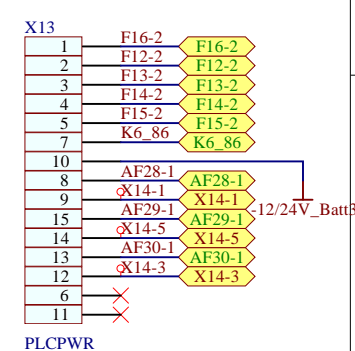
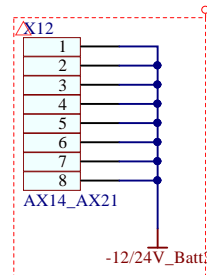
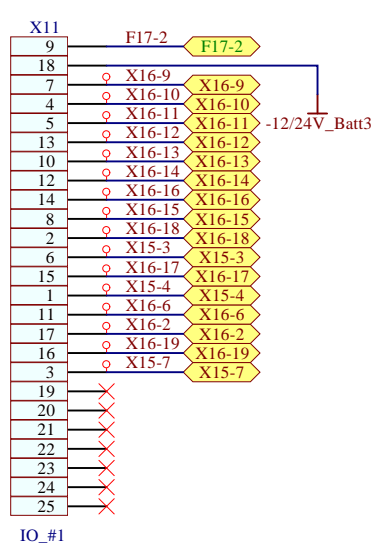
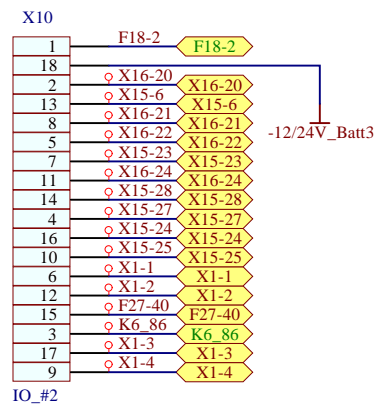
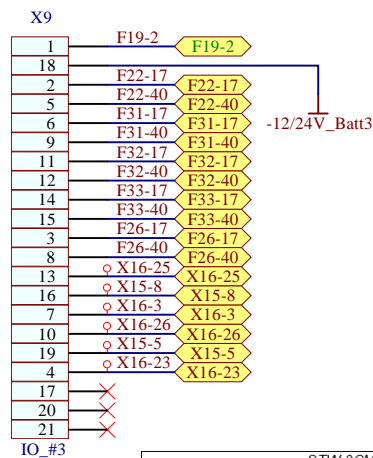
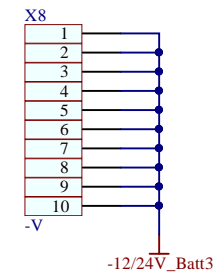
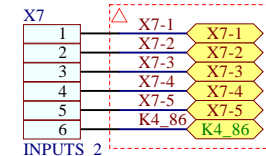
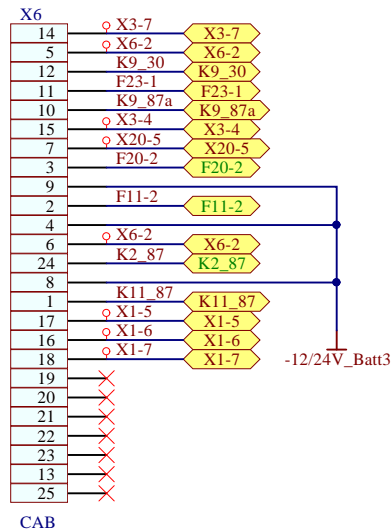
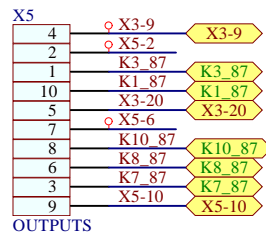
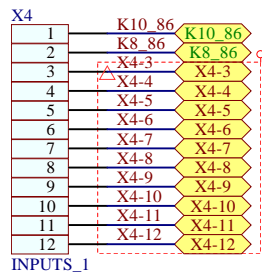
1

2









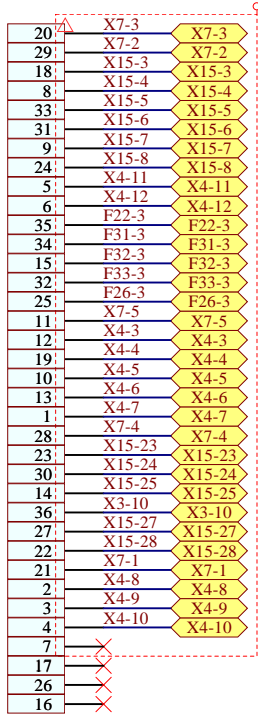
STW 3CM POWER			
STW Pin	CONN PIN	Description	Wire Color
1	5	Supply	RED
6	1	ECU Supply	RED
5	2	Supply	RED
3	3	Supply	RED
4	4	Supply	RED
25	7	IGN	RED/WHITE
2	10	Ground	BLACK
40	8	Ground / AGND 5V	BLACK/BLUE
24	9	Sensor Supply +5V	RED/BLUE
56	15	Ground / AGND 8.5V	BLACK/BLUE
53	12	Sensor PWR 8.5V	RED/BLUE
66	14	Sensor Power +12V	RED/BLUE
47	13	Sensor Power -	BLACK/BLUE



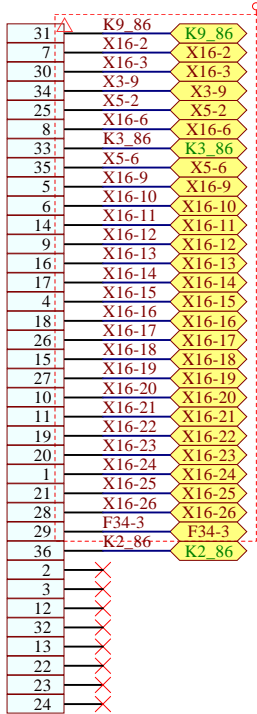
Drawing-Number: U52354

Title: Proall Mixer PCB

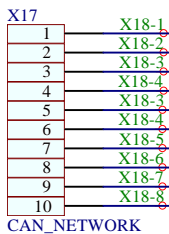
drafter: VIBHA	Date: 7/20/2018	Size: A4
auth.: Eldon Koop	Date: 4/5/18	
mod.: *	Date: *	Revision: B
File: U52364_Proall.PrjPcb		Sheet: 3 of 4



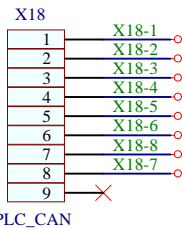
X15
PLC INPUT



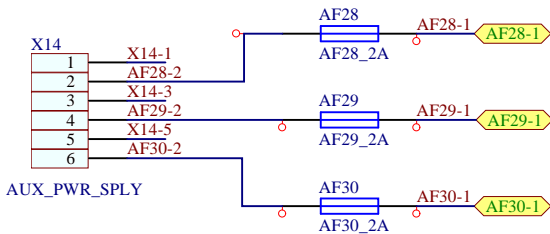
X16
PLC OUTPUT



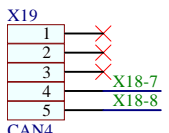
CAN_NETWORK



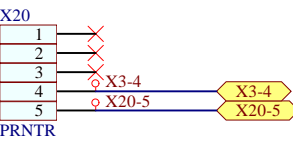
PLC_CAN



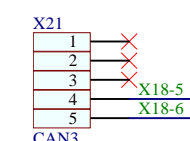
AUX_PWR_SPLY



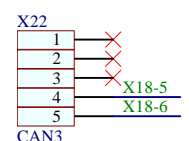
CAN4



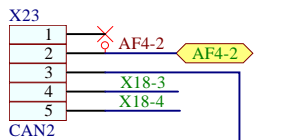
PRNTR



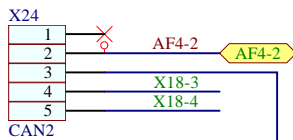
CAN3



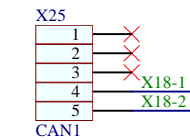
CAN3



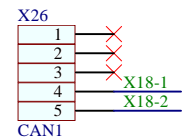
CAN2



CAN2



CAN1



CAN1

STW 3CM INPUTS			
STW Pin	CONN PIN	Description	Wire Color
9	18	Auger Pump Pressure	BLUE
28	8	Belt Pump Pressure	BLUE
60	33	Cement Bin Low Level	BLUE/WHITE
79	31	Cement Bin High Level	BLUE/WHITE
69	9	Auger Limit Switch	BLUE/BLACK
67	24	Water Tank Level (Pressure)	BLUE
18	5	GTA Position	BLUE/WHITE
37	6	GTB Position	BLUE/WHITE
68	35	Water Flow Meter	BLUE/BLACK
10	34	Admix 1 Flow Meter	BLUE/BLACK
29	15	Admix 2 Flow Meter	BLUE/BLACK
48	32	Admix 3 Flow Meter	BLUE/BLACK
11	25	Admix 4 Flow Meter	BLUE/BLACK
74	12	Spare Input	BLUE
16	19	Spare Input	BLUE
35	10	Spare Input	BLUE
54	13	Spare Input	BLUE
73	1	Spare Input	BLUE
21	23	Boom Limit Switch	BLUE/WHITE
70	30	GTA Level Detect	BLUE/BLACK
12	14	GTB Level Detect	BLUE/BLACK
76	36	Auto Stow Switch	BLUE/WHITE
41	27	Aux 1 Bin Low Level	BLUE/WHITE
57	22	Aux 1 Bin High Level	BLUE/WHITE
31	21	Aux 2 Liquid 3CM	BLUE/BLACK
50	2	Spare Input	BLUE/BLACK
30	3	Spare Input	BLUE/BLACK
49	4	Spare Input	BLUE/BLACK
15	28	CAN1 High	YELLOW
34	11	CAN1 Low	GREEN
63	20	RS-232 Receive	GREY
44	29	RS-232 Transmit	GREY

STW 3CM OUTPUTS			
STW Pin	CONN PIN	Description	Wire Color
43	31	Engine RPM	WHITE/BROWN
62	7	Chain Oiler	WHITE/BROWN
80	30	Fibre	WHITE/BROWN
22	34	Belt Trigger	WHITE/BROWN
75	26	Aux Output	WHITE/BLUE
71	9	Belt Bypass	WHITE
59	5	Auger Mix	WHITE/BLACK
78	6	Auger Reverse	WHITE/BLACK
20	14	Boom Up	WHITE/BLACK
39	9	Boom Down	WHITE/BLACK
58	16	Chute Up	WHITE/BLACK
77	17	Chute Down	WHITE/BLACK
19	18	Swing Right	WHITE/BLACK
38	4	Swing Left	WHITE/BLACK
32	26	Belt	WHITE
33	15	Water	WHITE
51	27	Cement	WHITE
52	10	Colour	WHITE
13	11	Aux 1	WHITE
14	19	Aux 2	WHITE
17	20	Admix ON/OFF (Citric Acid)	WHITE/BLUE
72	1	Latex	WHITE
81	21	Water ON/OFF	WHITE/BROWN
23	28	Latex ON/OFF	WHITE/BROWN
42	29	Cooler ON/OFF	WHITE/BROWN
61	36	Auto Lube	WHITE/BROWN
55	35	Spare Output	WHITE/BLUE
36	33	High Level Trigger	WHITE/BLUE

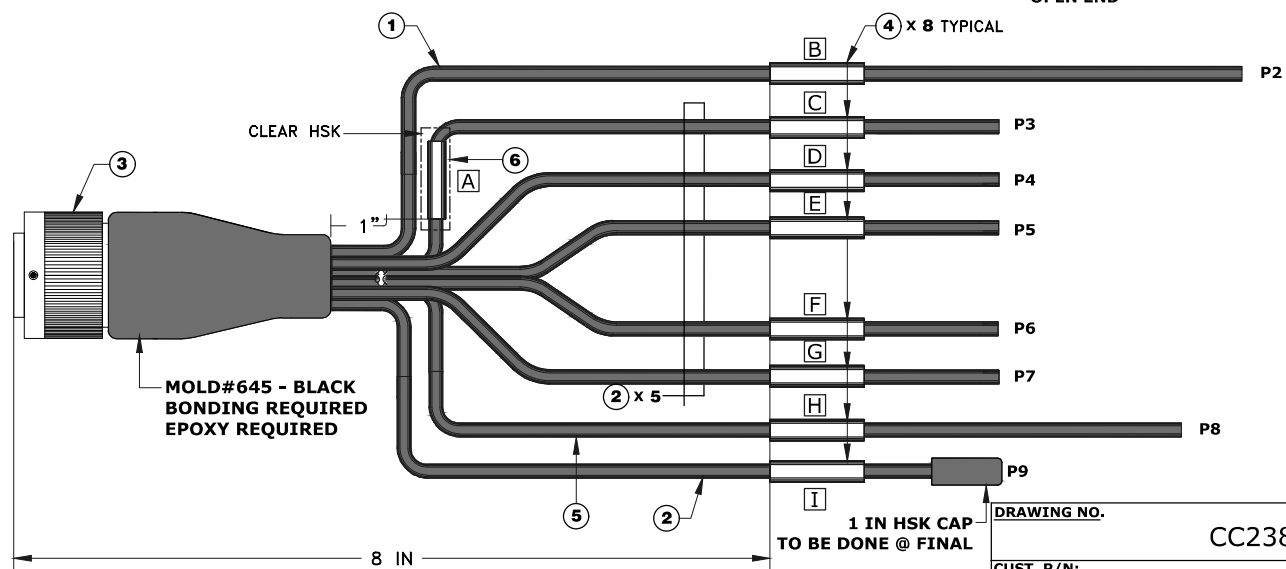
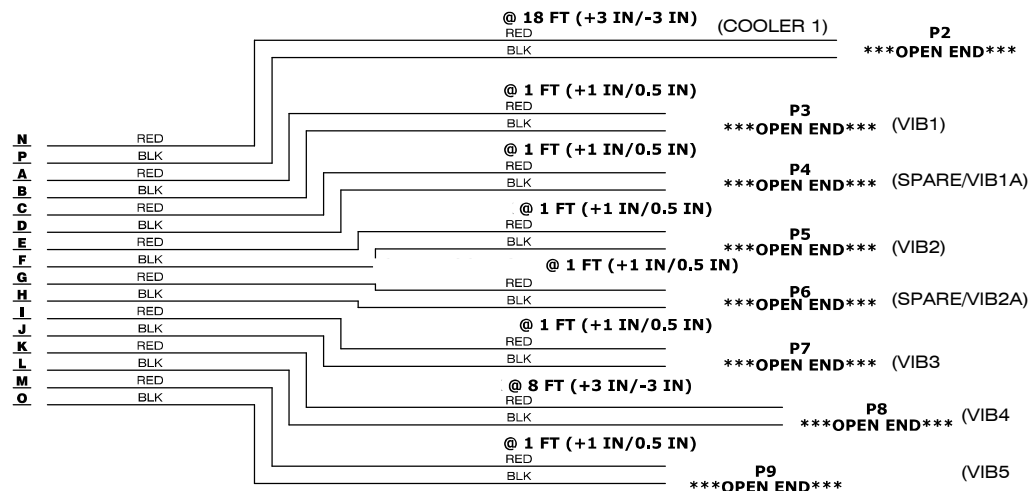
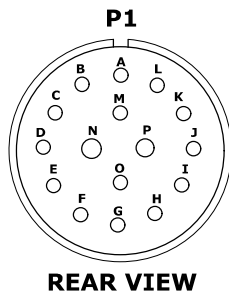


Drawing-Number: U52354

Title: Proall Mixer PCB

STW 3CM CAN			
STW Pin	CONN PIN	Description	Wire Color
7	1	CAN1 High	YELLOW
26	2	CAN1 Low	GREEN
45	3	CAN2 High	YELLOW
64	4	CAN2 Low	GREEN
8	5	CAN3 High	YELLOW
27	6	CAN3 Low	GREEN
46	7	CAN4 High	YELLOW
65	8	CAN4 Low	GREEN

drafter: VIBHA	Date: 7/20/2018	Size: A4
auth.: Eldon Koop	Date: 4/5/18	
mod.: *	Date: *	Revision: B
File: U52364_Proall.PrjPcb		Sheet: 4 of 4



NOTES:

1. MOLD WILL HAVE DROP IN INSERT FOR MULTIPLE LEG TYPES.

LABELS		
REF.	INFORMATION	POSITION
A	183117 CC23886 CABLE ASSY, EXT VIB COOLER	SEE VISUAL
B	COOLER	
C	VIBRATOR 1	
D	VIBRATOR 1A	
E	VIBRATOR 2	
F	VIBRATOR 2A	
G	VIBRATOR 3	
H	VIBRATOR 4	
I	VIBRATOR 5	

2.0	ADDED ASSY GUIDE	TR	JR	03-15-17
1.0	INITIAL RELEASE	TR	PK	01-11-13
REV NO.	DESCRIPTION	DRN	VER	DATE

DRAWING NO.		CC23886
CUST. P/N:		183117
CUST. NAME:		PRO ALL
DESCRIPTION:		CABLE ASSY, EXT VIB COOLER
REVISION	SIZE	SHEET
2.0	TABLOID	No. 1 OF 1

THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO

PROALL
Reimer Mixers

MRO

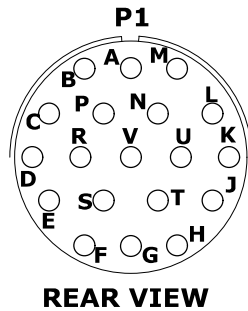
Manufactured IAW IPC/WHMA-A-620

ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS

DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

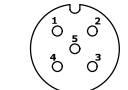
IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in



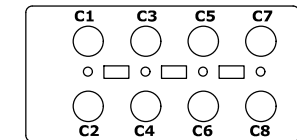
A	BRN	(+V 5A)	+VDC-1
B	BLU	(-V)	-VDC-3
C	GRY/PNK	(+V FLOW METER)	C1-2
D	RED/BLU	(+V FLOW METER)	C2-2
E	WHT/GRN	(+V FLOW METER)	C3-2
F	BRN/GRN	(+V FLOW METER)	C4-2
G	WHT/YEL	(+V FLOW METER)	C5-2
H	WHT	(WATER FLOW)	C1-4
J	GRN	(ADMIX1 FLOW)	C2-4
K	YEL	(ADMIX2 FLOW)	C3-4
L	GRY	(ADMIX 3 FLOW)	C4-4
M	PNK	(ADMIX 4 FLOW)	C5-4
N	YEL/BRN	(WATER ON)	C6-2
P	RED	(WATER LEVEL)	C6-4
R	WHT/GRY	(FIBRE)	C7-2
S	BLK	(LATEX ON)	C7-4
T	GRY/BRN	(CEMENT LOW)	C8-2
U	VIO	(ADMIX AUX)	C8-4

(C1-C8) TYPICAL



FRONT VIEW

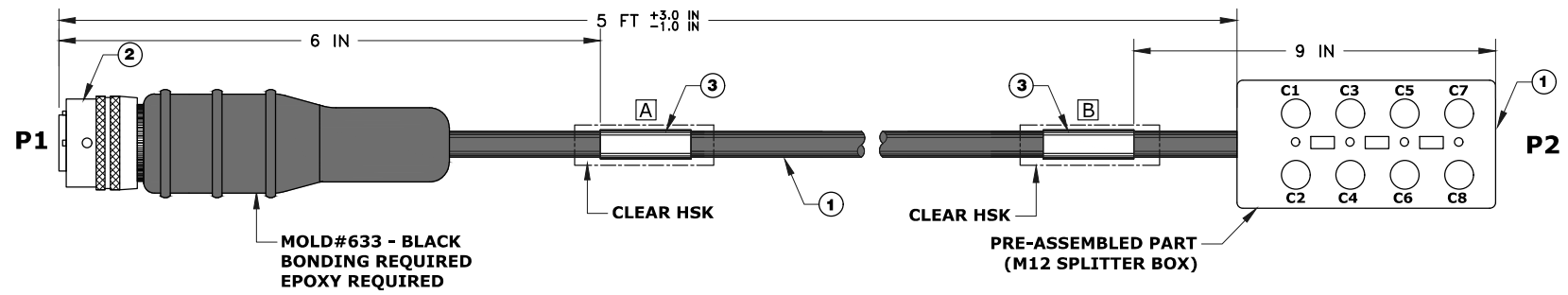
P2



CONNECTOR # IN SERIES

+VDC-1 = PIN 1 OF C1 TO C8
 -VDC-3 = PIN 3 OF C1 TO C8
 C1 = CONNECTOR 1
 C1-2 = CONNECTOR 1 (PIN2)

LABELS		
REF.	INFORMATION	POSITION
A	183121 CC23889 CABLE ASSY, IO#3 EXT	SEE VISUAL
B	183121 CC23889 CABLE ASSY, IO#3 EXT	



MOLD#633 - BLACK BONDING REQUIRED
 EPOXY REQUIRED

PRE-ASSEMBLED PART
 (M12 SPLITTER BOX)

DRAWING NO.		CC23889	
CUST. P/N:		183121	
CUST. NAME:		Pro All	
DESCRIPTION:		CABLE ASSY, IO#3 EXT	
REVISION	SIZE	SHEET	
2.0	TABLOID	No. 1	OF 1
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			

PROALL
Reimer Mixers

Manufactured IAW IPC/WHMA-A-620

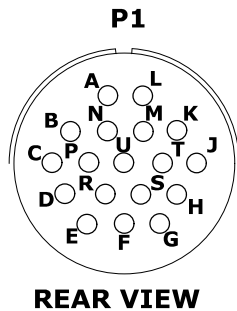
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS

DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

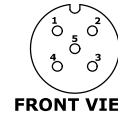
≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in

2.0	ADDED ASSY GUIDE	TR	JR	03-15-17
1.0	INITIAL RELEASE	TR	PK	01-11-17
REV NO.	DESCRIPTION	DRN	VER	DATE

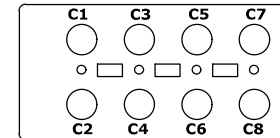


A	BRN	(+V 5A)	+VDC-1
B	BLU	(-V)	-VDC-3
C	GRY/PNK	(AUGER MIX)	C1-2
D	WHT	(AUGER REV)	C1-4
E	RED/BLU	(BOOM UP)	C2-2
F	GRN	(BOOM DN)	C2-4
G	WHT/GRN	(CHUTE UP)	C3-2
H	YEL	(CHUTE DN)	C3-4
J	BRN/GRN	(SWING RIGHT)	C4-2
K	GRY	(SWING LEFT)	C4-4
L	WHT/YEL	(WATER PUMP)	C5-2
M	PNK	(AUGER PSI)	C5-4
N	YEL/BRN	(BELT)	C6-2
P	RED	(BELT PSI)	C6-4
R	WHT/GRY	(BELT BYPASS)	C7-2
S	BLK	(CHAIN OILER)	C7-4
T	GRY/BRN	(CEMENT)	C8-2
U	VIO	(AUGER SAFETY)	C8-4

(C1-C8) TYPICAL.



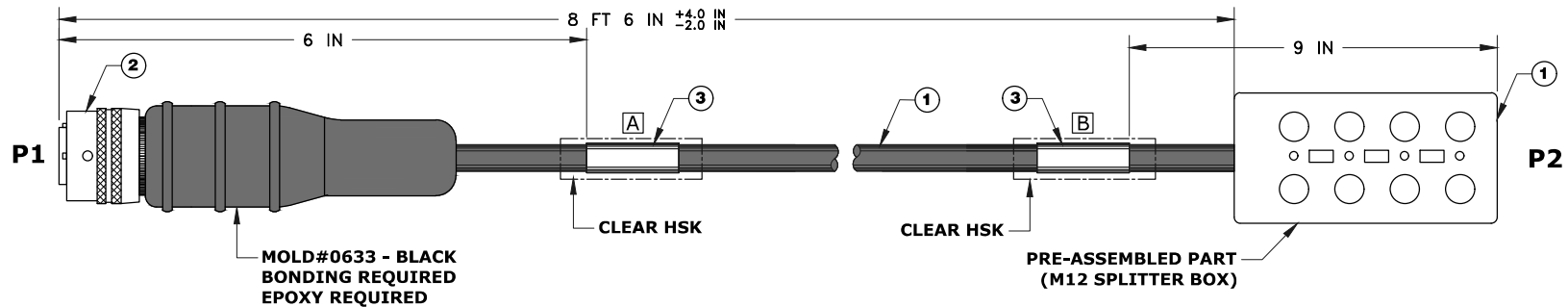
P2



CONNECTOR # IN SERIES

+VDC-1 = PIN 1 OF C1 TO C8
 -VDC-3 = PIN 3 OF C1 TO C8
 C1 = CONNECTOR 1
 C1-2 = CONNECTOR 1 (PIN2)

LABELS		
REF.	INFORMATION	POSITION
A	183119 CC23891 CABLE ASSY, EXT IO#1	SEE VISUAL
B	183119 CC23891 CABLE ASSY, EXT IO#1	



DRAWING NO.		CC23891	
CUST. P/N:		183119	
CUST. NAME:		Pro All	
DESCRIPTION:		CABLE ASSY, EXT IO# 1	
REVISION	SIZE	SHEET	
2.0	TABLOID	No. 1 OF 1	
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			

2.0	ADDED ASSY GUIDE	TR	JR	03-15-17
1.0	INITIAL RELEASE	TR	PK	01-11-17
REV NO.	DESCRIPTION	DRN	VER	DATE

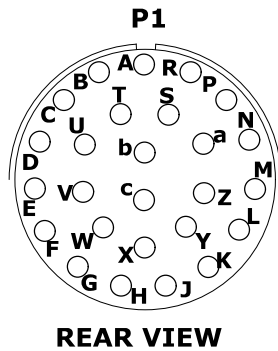
Manufactured IAW IPC/WHMA-A-620

ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS

DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

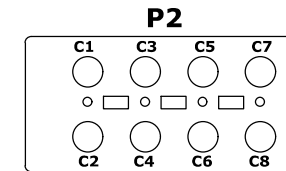
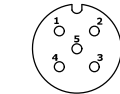
IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in



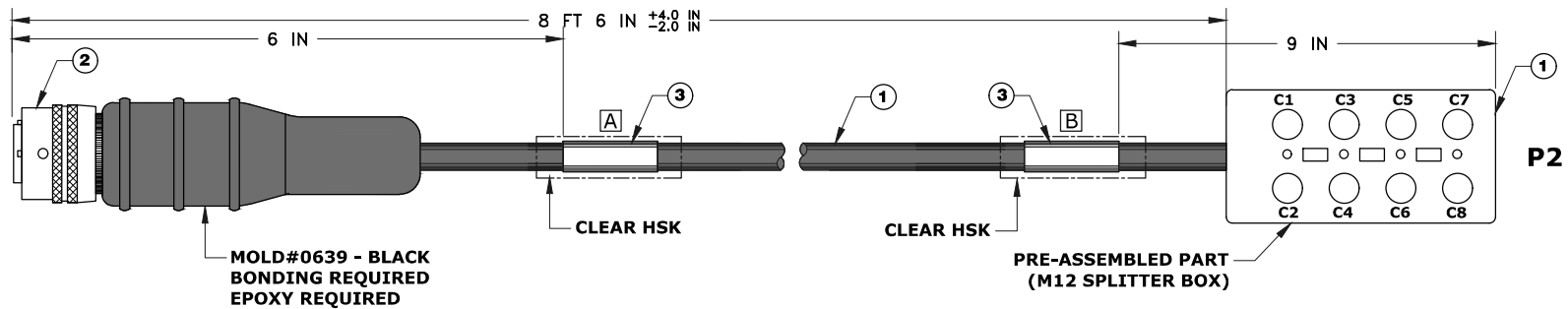
A	BRN (+V 5A)	+VDC-1
B	BLU (-V)	-VDC-3
C	GRY/PNK (COLOUR)	C1-2
D	WHT (CEMENT HIGH)	C1-4
E	RED/BLU (AUX1)	C2-2
F	GRN (AUX2)	C2-4
G	WHT/GRN (BOOM LIMIT)	C3-2
H	YEL (LATEX)	C3-4
J	BRN/GRN (AUX1 HIGH)	C4-2
K	GRY (AUX1 LOW)	C4-4
L	WHT/YEL (MAT A - TEACH)	C5-2
M	PNK (MAT A DETECT)	C5-4
N	YEL/BRN (MAT B - TEACH)	C6-2
P	RED (MAT B DETECT)	C6-4
R	WHT/GRY (REMOTE ESP OUT)	C7-2
S	BLK (REMOTE ESP IN)	C7-4
T	GRY/BRN (SPARE)	C8-2
U	VIO (SPARE)	C8-4

(C1-C8) TYPICAL.



+VDC-1 = PIN 1 OF C1 TO C8
 -VDC-3 = PIN 3 OF C1 TO C8
 C1 = CONNECTOR 1
 C1-2 = CONNECTOR 1 (PIN2)

LABELS		
REF.	INFORMATION	POSITION
A	183123 CC23893 CABLE ASSY, IO#2 EXT	SEE VISUAL
B	183123 CC23893 CABLE ASSY, IO#2 EXT	



DRAWING NO.		CC23893	
CUST. P/N:		183123	
CUST. NAME:		Pro All	
DESCRIPTION:		CABLE ASSY, IO#2 EXT	
REVISION	SIZE	SHEET	
2.0	TABLOID	No. 1 OF 1	
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			

Manufactured IAW IPC/WHMA-A-620

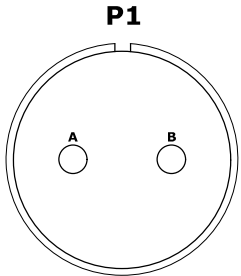
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS
 DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in

2.0	ADDED ASSY GUIDE	TR	JR	03-16-17
1.0	INITIAL RELEASE	TR	PK	01-11-17
REV NO.	DESCRIPTION	DRN	VER	DATE

LABELS		
REF.	INFORMATION	POSITION
A	183116 CC23895 CBL ASSY, EXT BATTERY	SEE VISUAL

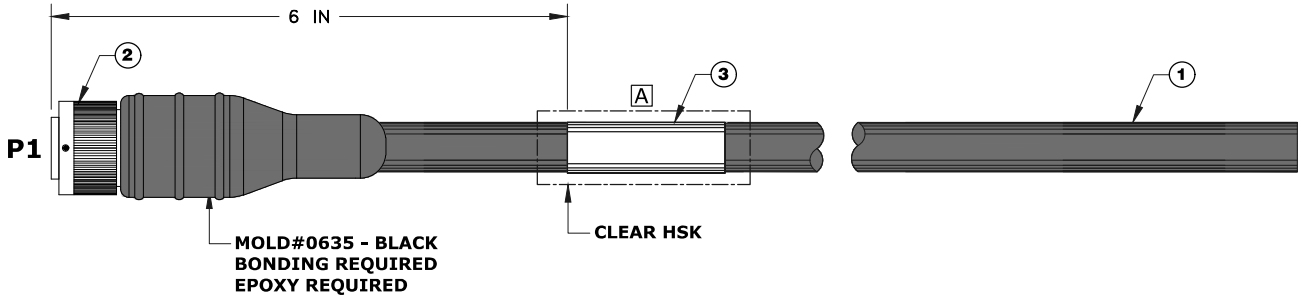


REAR VIEW

A	_____	RED	(BATTERY +V)
B	_____	BLK	(BATTERY -V)

OPEN END



CUT CABLE @ 14 FT (+5 IN/-5 IN)



DRAWING NO.			CC23895		
CUST. P/N:			183116		
CUST. NAME:			Pro All		
DESCRIPTION:			CBL ASSY, EXT BATTERY		
REVISION	2.0	SIZE	TABLOID	SHEET	No. 1 OF 1

2.0	ADDED ASSY GUIDE	TR	JR	03-16-17
1.0	INITIAL RELEASE	TR	PK	02-10-17
REV NO.	DESCRIPTION	DRN	VER	DATE

THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO

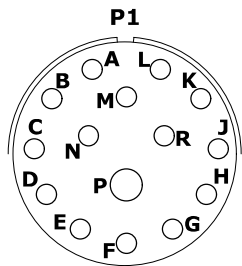


Manufactured IAW IPC/WHMA-A-620

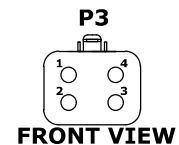
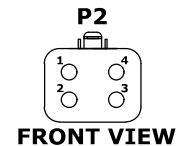
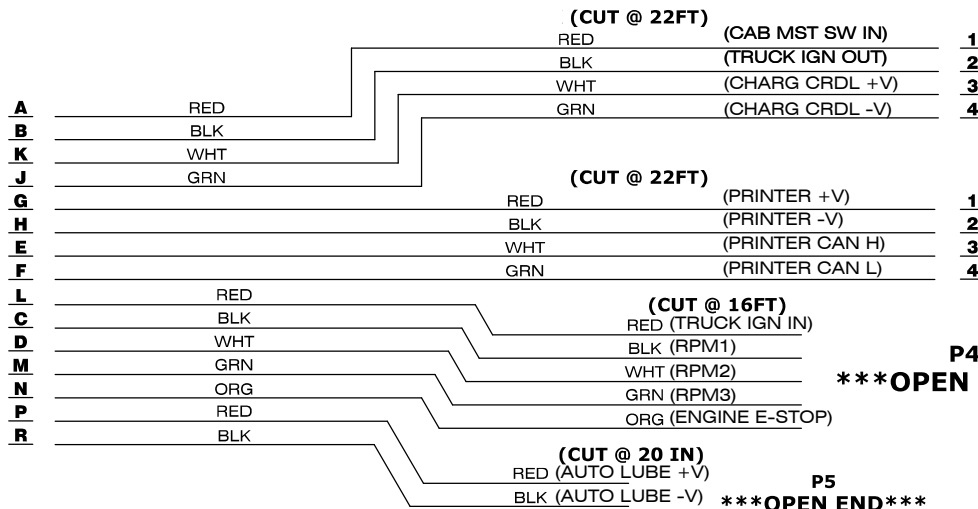
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in

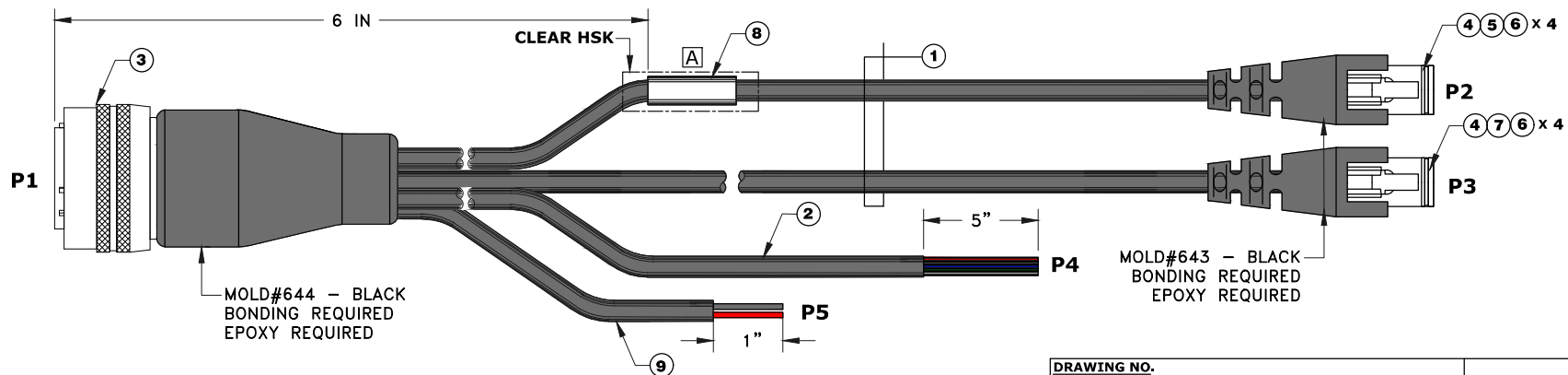


REAR VIEW



P4
OPEN END

P5
OPEN END



DRAWING NO.	CC23897
CUST. P/N:	183109
CUST. NAME:	Pro All
DESCRIPTION:	CBL ASSY, EXT CAB

REVISION	SIZE	SHEET
3.0	TABLOID	NO. 1 OF 1

THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO

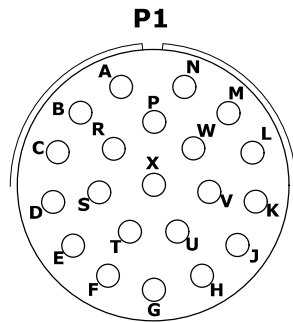
LABELS		
REF.	INFORMATION	POSITION
A	183109 CC23897 CBL ASSY, EXT CAB	SEE VISUAL



Manufactured IAW IPC/WHMA-A-620
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

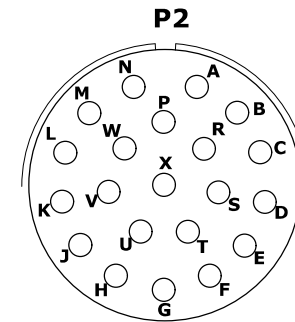
IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:	
≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in

REV NO.	DESCRIPTION	DRN	VER	DATE
3.0	ADDED P5 LEG	TR	PJ	03-16-17
2.0	AFTER FA, CHANGED WIRING, ADDED ASSY GUIDE	TR	JR	03-03-17
1.0	INITIAL RELEASE	TR	PK	01-10-17



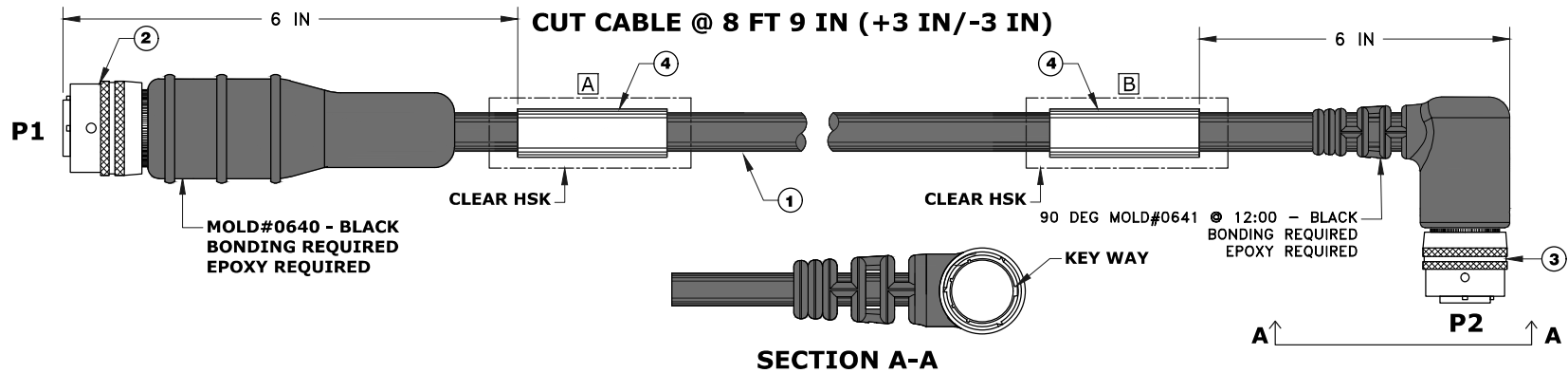
REAR VIEW

A	WHT/GRN (DISP+V)
B	WHT/BLK (BATT+V)
C	WHT/YEL (-V)
D	WHT/PUR (CANOPEN H)
E	WHT/ORG (CANOPEN L)
F	ORG/BLK (PRT CAN H)
G	ORG/YEL (PRT CAN L)
H	ORG/PUR (J1939 H)
J	PNK (J1939 L)
K	WHT/PNK (E-STOP IN)
L	WHT/BRN (CAB MST OUT)
M	WHT/GRY (TRUCK IGN OUT)
N	WHT/RED (WL SW IN)
P	BLU (AUTO STOW SW)
R	GRN (SPARE)
S	YEL (SPARE)
T	BLK (SPARE)
U	ORG/GRN (SPARE)
V	WHT (SPARE)
W	PUR (SPARE)
X	RED (SPARE)



REAR VIEW

LABELS		
REF.	INFORMATION	POSITION
A	183127 CC23899	SEE VISUAL
	CBL ASSY, EXT DISPLAY	
B	183127 CC23899	
	CBL ASSY, EXT DISPLAY	



2.0	ADDED ASSY GUIDE	TR	JR	03-16-17
1.0	INITIAL RELEASE	TR	PK	01-11-17
REV NO.	DESCRIPTION	DRN	VER	DATE

DRAWING NO.		CC23899	
CUST. P/N:		183127	
CUST. NAME:		Pro All	
DESCRIPTION:		CBL ASSY, EXT DISPLAY	
REVISION	2.0	SIZE	TABLOID
		SHEET	NO. 1 OF 1
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			

PROALL
Reimer Mixers

Manufactured IAW IPC/WHMA-A-620

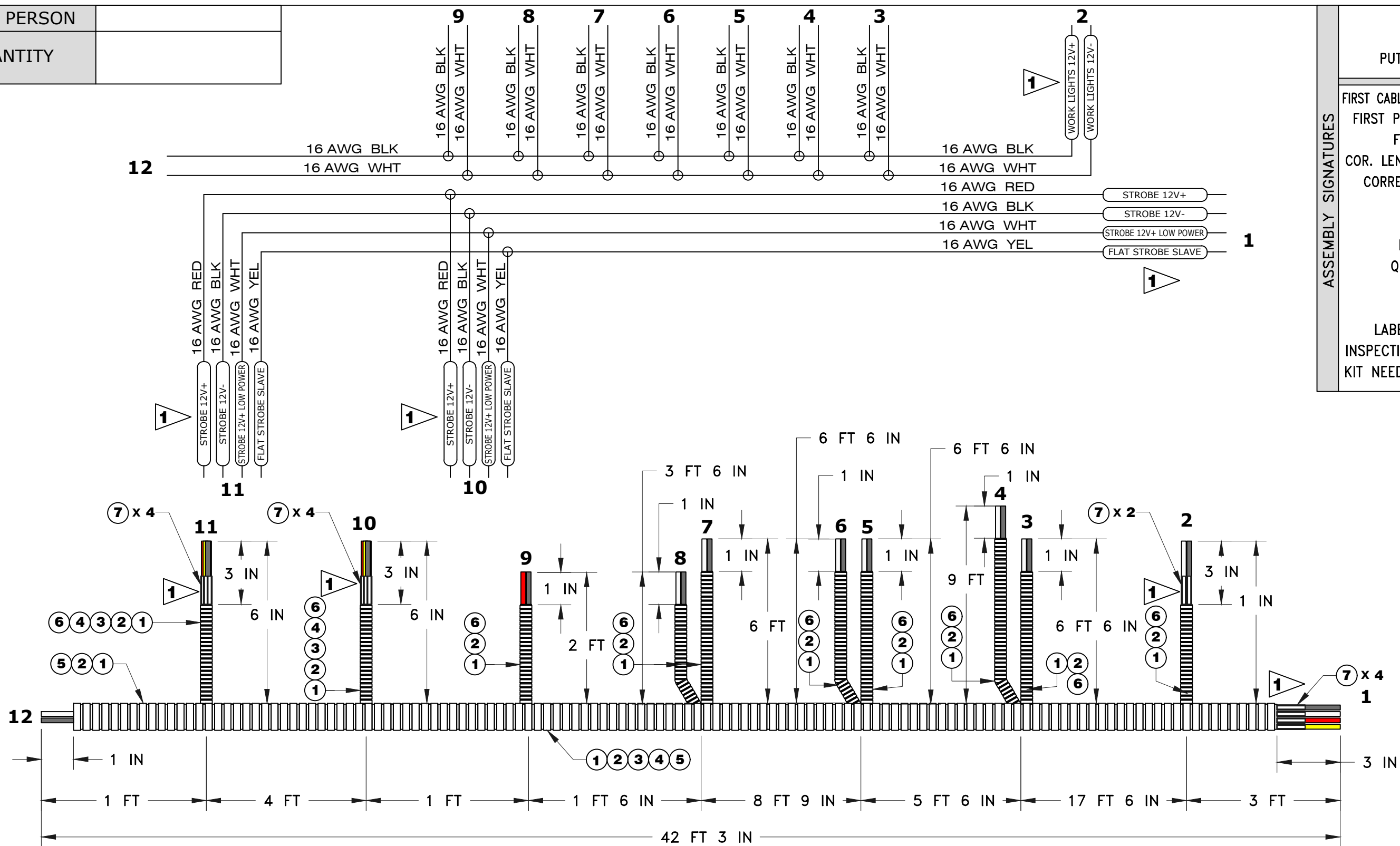
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS

DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in

SALES PERSON	
QUANTITY	



ASSEMBLY SIGNATURES	CABLE CUT BY:	
	ASSEMBLED BY:	
	PUTTIED/POTTED BY:	
	FIRST CABLE CUT INSPECTION:	
	FIRST PIECE INSPECTION:	
	FINAL INSPECTION:	
	COR. LENGTH AND CABLE:	
	CORRECT CONNECTORS:	
	PULL TEST:	
	PIN INSPECTION:	
ELECTRICAL TEST:		
QUALITY & COLOR:		
TEST & MATE:		
RF TEST:		
LABEL VERIFICATION:		
INSPECTION CERTIFICATE:		
KIT NEEDED:	QTY. VER:	


NOTES:

1. INSTALL SMALL WHITE HEATSHRINK LABELS ON EXPOSED WIRES AS SHOWN.

7	14	LABEL		WHITE HEATSHRINK LABEL
6	35.5 FT	34-521-30M		SPLIT LOOM FLEX CONDUIT 0.25INCH 30MTR
5	42.25 FT	34-522-200M		SPLIT LOOM FLEX CONDUIT 3/8Inch 200Mtr
4	42.25 FT	16AWG YELLOW		105C 300V UL1007/1569 PVC CSA TR-64 ROHS
3	42.25 FT	16AWG RED		105C 300V UL1007/1569 PVC CSA TR-64 ROHS
2	115.5 FT	16AWG WHITE		105C 300V UL1007/1569 PVC CSA TR-64 ROHS
1	115.5 FT	16AWG BLACK		WIR 16G(26/30ST) UL1007 BLACK
ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION

X1.0	FOR APPROVAL	OO	TR	06-07-19
REV NO.	DESCRIPTION	DRN	VER	DATE

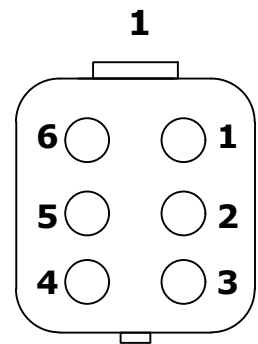
<u>DRAWING NO.</u>		CC26208	
<u>CUST. P/N:</u>		183151	
<u>CUST. NAME:</u>		Pro All	
<u>DESCRIPTION:</u>		NYC WORKLIGHT/STROBE HARNESS	
<u>REVISION</u>	<u>SIZE</u>	<u>SHEET</u>	
X1.0	TABLOID	<u>NO.</u> 1 <u>OF</u> 1	
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			



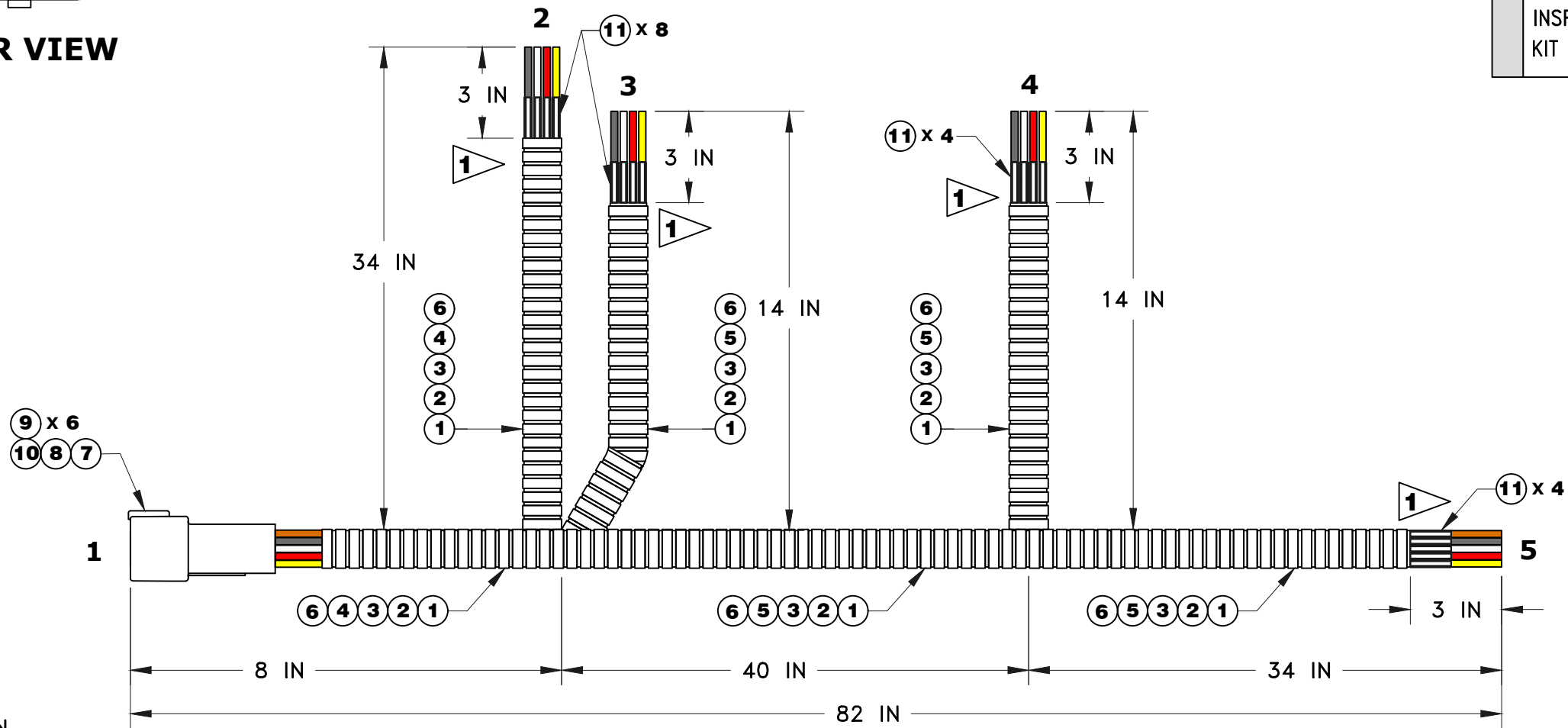
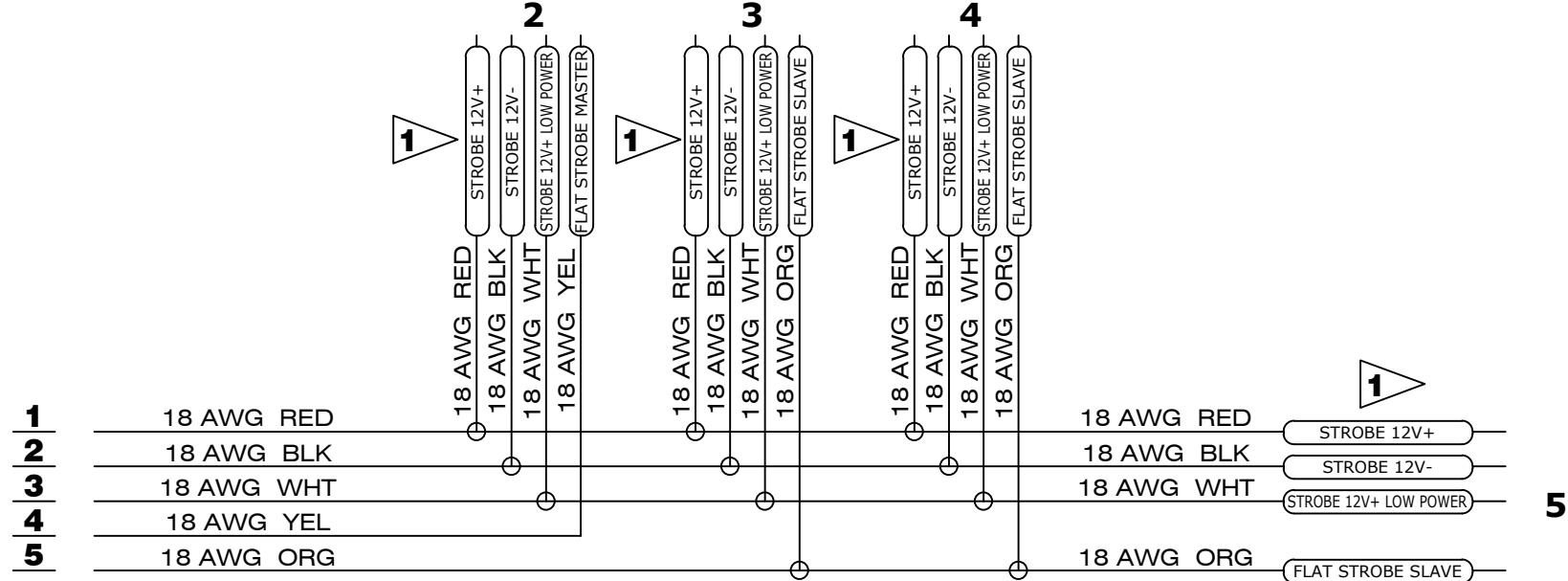
Manufactured IAW IPC/WHMA-A-620
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:		
≤ 1 ft	+1 in -0 in	
>1 ft - 5 ft	+2 in -0 in	
>5 ft - 10 ft	+4 in -0 in	
>10 ft - 25 ft	+6 in -0 in	
>25 ft	+5% -0 in	

SALES PERSON	
QUANTITY	



REAR VIEW



ASSEMBLY SIGNATURES

CABLE CUT BY:	
ASSEMBLED BY:	
PUTTIED/POTTED BY:	
FIRST CABLE CUT INSPECTION:	
FIRST PIECE INSPECTION:	
FINAL INSPECTION:	
COR. LENGTH AND CABLE:	
CORRECT CONNECTORS:	
PULL TEST:	
PIN INSPECTION:	
ELECTRICAL TEST:	
QUALITY & COLOR:	
TEST & MATE:	
RF TEST:	
LABEL VERIFICATION:	
INSPECTION CERTIFICATE:	
KIT NEEDED:	QTY. VER:

NOTES:
1. INSTALL SMALL WHITE HEATSHRINK LABELS ON EXPOSED WIRES AS SHOWN.

11	16	LABEL		WHITE HEATSHRINK LABEL
10	1	114017		DEUTSCH DT SERIES SEALING PIN
9	6	0460-202-16141		CONTACTS SOLID CRIMP TYPE 16-20AWG PIN
8	1	W6P		LOCKING WEDGE RECEPTACLE 6P DEUTSCH
7	1	DT04-6P		DEUTSCH DT-SERIES RECPETACLE 6 PIN
6	72 FT	34-521-30M		SPLIT LOOM FLEX CONDUIT 0.25INCH 30MTR
5	12 FT	18AWG ORG		WIR 18G(16/30ST) UL 1569/1007 300V ORG
4	3.5 FT	18AWG YELLOW		WIR 18G(16/30ST) UL 1569/1007 300V YEL
3	12 FT	18AWG WHITE		WIR 18G(16/30ST) UL 1569/1007 300V WHITE
2	12 FT	18AWG BLACK		WIR 18G(16/30ST) UL 1569/1007 300V BLACK
1	12 FT	18AWG RED		WIR 18G(16/30ST) UL 1569/1007 300V RED
ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION

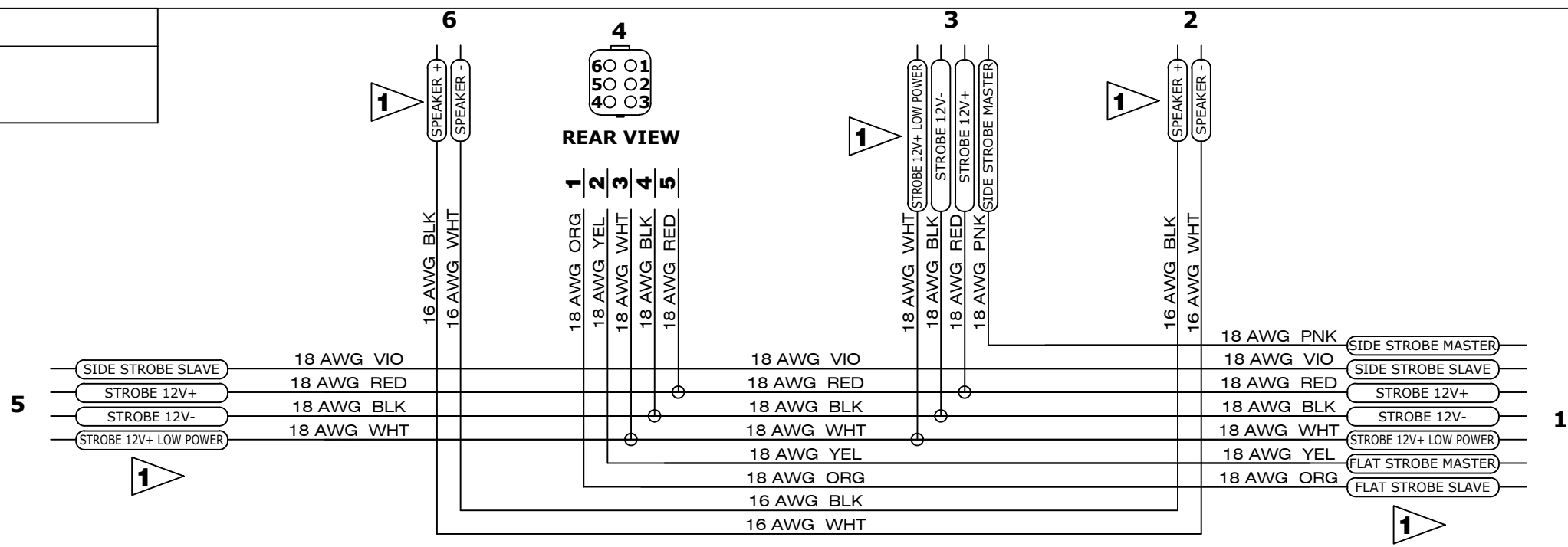
X1.0	FOR APPROVAL	OO	TR	06-07-19
REV NO.	DESCRIPTION	DRN	VER	DATE

<u>DRAWING NO.</u>		CC26209	
<u>CUST. P/N:</u>		183152	
<u>CUST. NAME:</u>		P r o A l l	
<u>DESCRIPTION:</u>		NYC GRILL STROBE LIGHTS HARNESS	
<u>REVISION</u>	<u>SIZE</u>	<u>SHEET</u>	
X1.0	TABLOID	<u>NO.</u> 1 <u>OF</u> 1	
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			



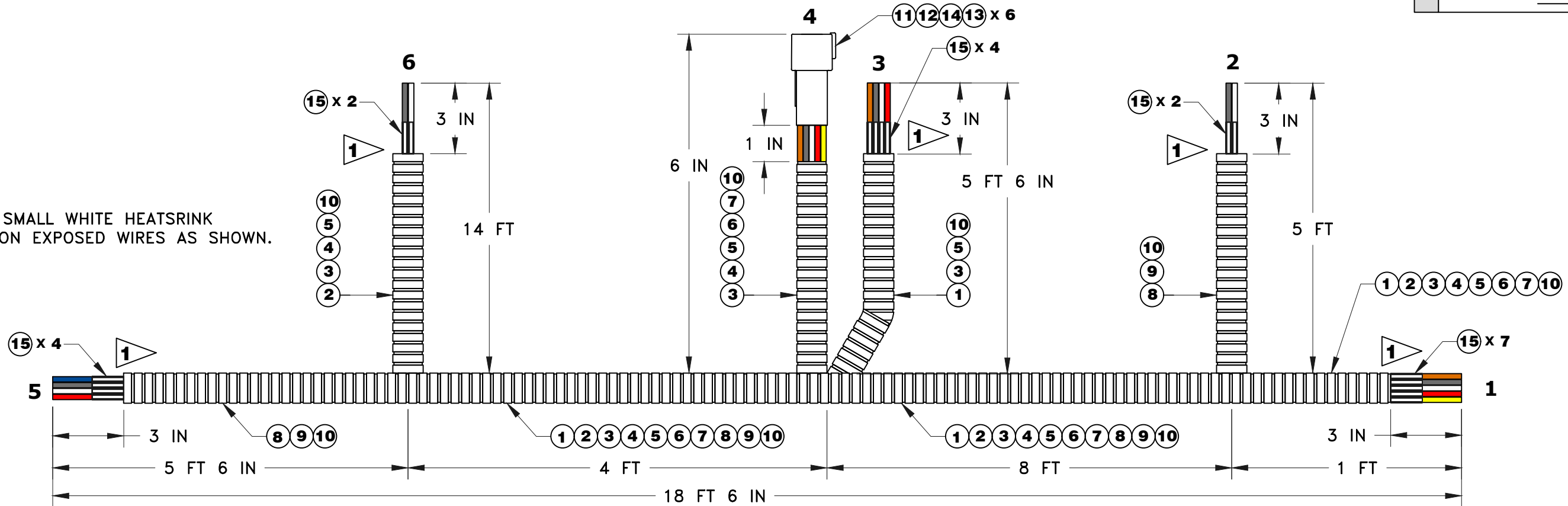
Manufactured IAW IPC/WHMA-A-620
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED
IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:
≤ 1 ft +1 in -0 in
>1 ft - 5 ft +2 in -0 in
>5 ft - 10 ft +4 in -0 in
>10 ft - 25 ft +6 in -0 in
>25 ft +5% -0 in

SALES PERSON	
QUANTITY	



ASSEMBLY SIGNATURES	CABLE CUT BY:	_____
	ASSEMBLED BY:	_____
	PUTTIED/POTTED BY:	_____
	FIRST CABLE CUT INSPECTION: _____	
	FIRST PIECE INSPECTION: _____	
	FINAL INSPECTION: _____	
	COR. LENGTH AND CABLE: _____	
	CORRECT CONNECTORS: _____	
	PULL TEST: _____	
	PIN INSPECTION: _____	
	ELECTRICAL TEST: _____	
	QUALITY & COLOR: _____	
	TEST & MATE: _____	
	RF TEST: _____	
	LABEL VERIFICATION: _____	
INSPECTION CERTIFICATE: _____		
KIT NEEDED: _____ QTY. VER: _____		


NOTES:
1. INSTALL SMALL WHITE HEATSHRINK LABELS ON EXPOSED WIRES AS SHOWN.



15	19	LABEL		WHITE HEATSHRINK LABEL
14	1	114017		DEUTSCH DT SERIES SEALING PIN
13	6	0462-201-16141		DEU CONTACT SIZE16 CRIMP TYPE 16-18G (F)
12	1	W6S		LOCKING WEDGE RECEPTACLE 6P DEUTSCH
11	1	DT06-6S		DEUTSCH DT-SERIES PLUG 6 SOCKET
10	261 FT	34-522-200M		SPLIT LOOM FLEX CONDUIT 3/8Inch 200Mtr
9	31 FT	16AWG WHITE		105C 300V UL1007/1569 PVC CSA TR-64 ROHS
8	31 FT	16AWG BLACK		WIR 16G(26/30ST) UL1007 BLACK
7	9.5 FT	18AWG ORG		WIR 18G(16/30ST) UL 1569/1007 300V ORG
6	9.5 FT	18AWG YELLOW		WIR 18G(16/30ST) UL 1569/1007 300V YEL
5	24.5 FT	18AWG WHITE		WIR 18G(16/30ST) UL 1569/1007 300V WHITE
4	24.5 FT	18AWG BLACK		WIR 18G(16/30ST) UL 1569/1007 300V BLACK
3	24.5 FT	18AWG RED		WIR 18G(16/30ST) UL 1569/1007 300V RED
2	18.5 FT	18AWG VIO		WIR 18G(16/30ST) UL 1569/1007 300V VIOLE
1	6.5 FT	18AWG PINK		WIR 18G(16/30ST) UL 1569/1007 300V PINK
ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION

X1.0	FOR APPROVAL	OO	TR	06-07-19
REV NO.	DESCRIPTION	DRN	VER	DATE

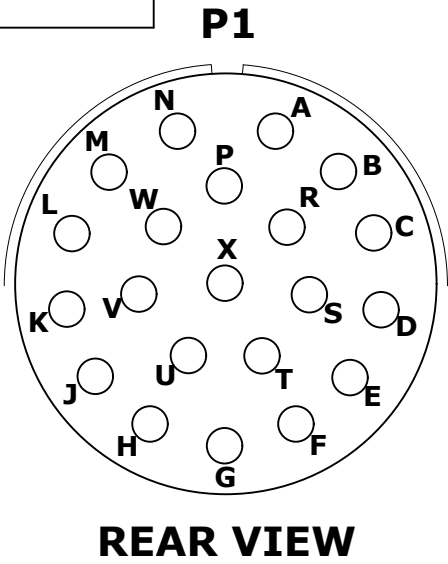
<u>DRAWING NO.</u>		CC26210	
<u>CUST. P/N:</u>		183153	
<u>CUST. NAME:</u>		Pro All	
<u>DESCRIPTION:</u>		NYC TRUCK STROBE LIGHTS/PA SPEAK	
<u>REVISION</u>	<u>SIZE</u>	<u>SHEET</u>	
X1.0	TABLOID	<u>NO.</u> 1 <u>OF</u> 1	
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			



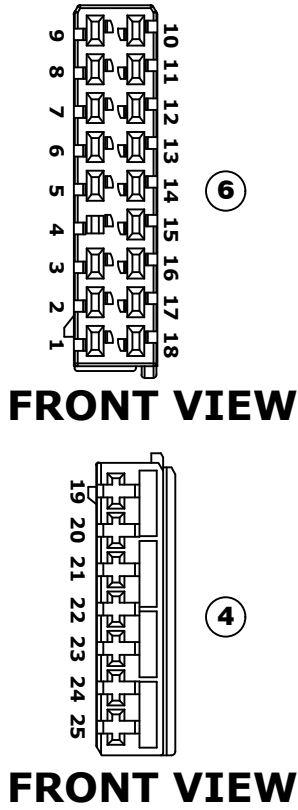
Manufactured IAW IPC/WHMA-A-620
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:		
≤ 1 ft	+1 in	-0 in
>1 ft - 5 ft	+2 in	-0 in
>5 ft - 10 ft	+4 in	-0 in
>10 ft - 25 ft	+6 in	-0 in
>25 ft	+5%	-0 in

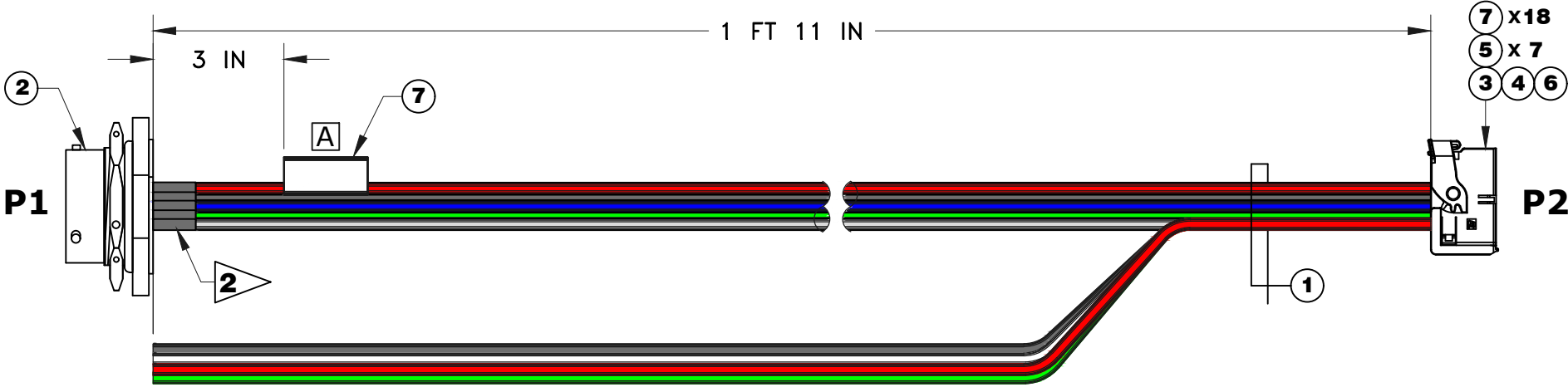
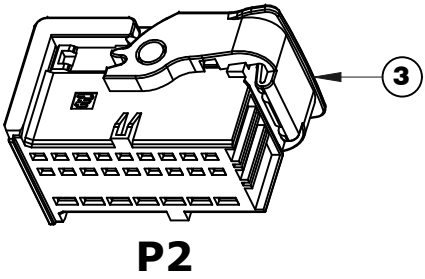
SALES PERSON	
QUANTITY	



A	RED	2
B	RED/BLK	1
C	GRN	8
D	ORG/RED	5
E	WHT/RED	4
F	ORG/BLK	6
G	WHT/BLK	7
H	ORG	3
J	WHT	12
K	BLK/RED	10
L	BLK	14
M	RED/WHT	13
N	BLK/WHT	9
P	RED/GRN	11
R	ORG/GRN	19
S	GRN/WHT	25
T	BLU/WHT	15
U	BLU/RED	18
V	BLU/BLK	17
W	BLU	16
X	GRN/BLK	21
N/C	BLK/WHT/RED	22
N/C	WHT/BLK/RED	23
N/C	RED/BLK/WHT	24
N/C	GRN/BLK/WHT	20



INSTALL ITEM
4 & 6 INSERTS
THIS SIDE



LABELS		
REF.	INFORMATION	POSITION
A	183146 CC25047 DISPLAY 25 WAY-BLUE	FLAG STYLE (ON RED WIRE)

ASSEMBLY SIGNATURES

CABLE CUT BY:	
ASSEMBLED BY:	
PUTTIED/POTTED BY:	
FIRST CABLE CUT INSPECTION:	
FIRST PIECE INSPECTION:	
FINAL INSPECTION:	
COR. LENGTH AND CABLE:	
CORRECT CONNECTORS:	
PULL TEST:	
PIN INSPECTION:	
ELECTRICAL TEST:	
QUALITY & COLOR:	
TEST & MATE:	
RF TEST:	
LABEL VERIFICATION:	
INSPECTION CERTIFICATE:	
KIT NEEDED:	QTY. VER:

NOTES:

1. STRIP OFF THE ENTIRE JACKET OF ITEM 1.

2. APPLY INDIVIDUAL HEATHRINK ON SOLDER CUPS.

DRAWING NO.		
CC25047		
CUST. P/N:		
183146		
CUST. NAME:		
Pro All		
DESCRIPTION:		
DISPLAY 25 WAY-BLUE		
REVISION	SIZE	SHEET
X3.0	TABLOID	<u>NO.</u> 1 <u>OF</u> 1
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO		

X3.0	ADDED CUST. P/N. UPDATED PINOUT. ADDED FLYING LEADS. CHANGED LENGTH FROM 2FT 8INCHES	AR	TR	06-27-18
X2.0	CHANGED LENGTH FROM 5 FT, P2 PIN OUT	AR	TR	04-17-18
X1.0	FOR APPROVAL	TR		04-04-18
REV NO.	DESCRIPTION	DRN	VER	DATE

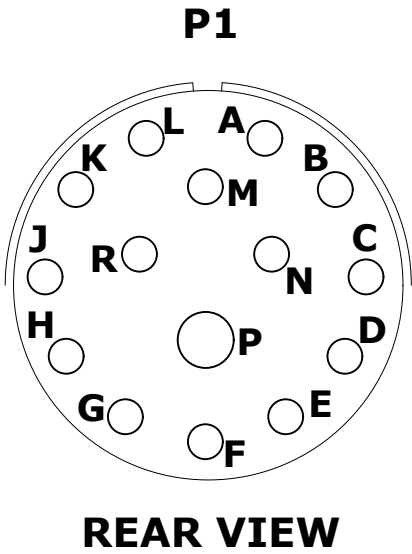


Manufactured IAW IPC/WHMA-A-620	
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS	
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED	
IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:	
≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in

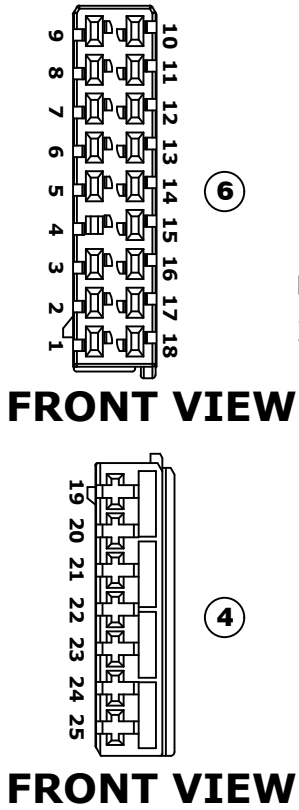
ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION
------	------	--------------	-----	-------------

SALES PERSON	
QUANTITY	

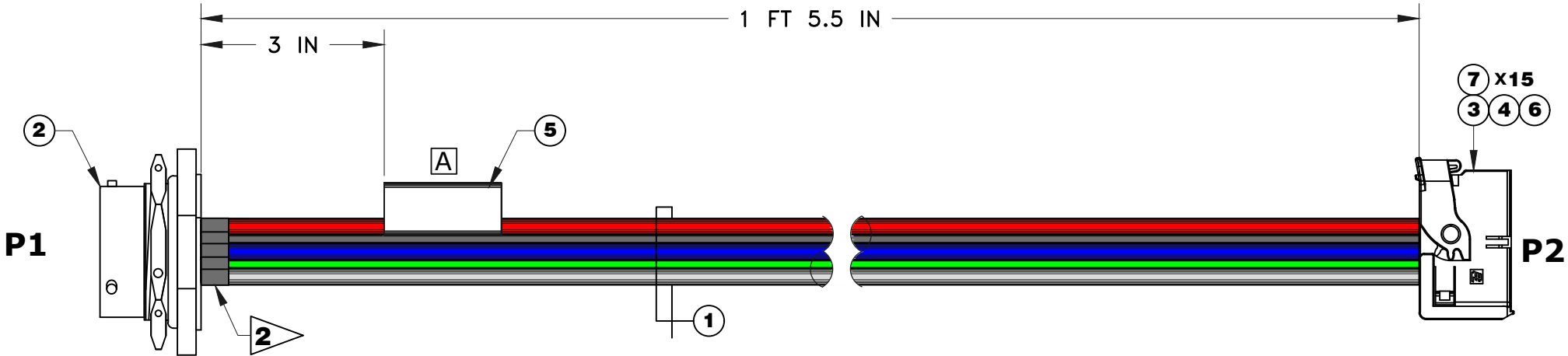
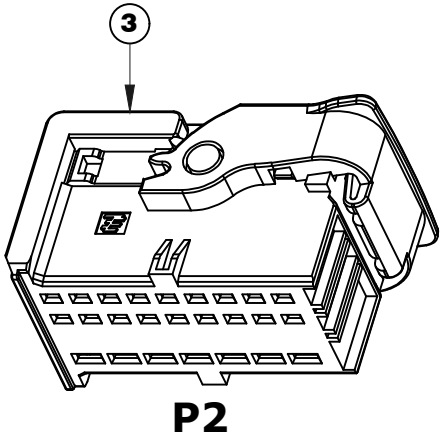
LABELS		
REF.	INFORMATION	POSITION
A	183139 CC25048 CBL ASSY, CABWIRE PNL MNT	SEE VISUAL (ON RED WIRE) FLAG STYLE



A	RED	14
B	BLK	5
C	GRN	12
D	BLK/RED	11
E	ORG/BLK	15
F	WHT/BLK	7
G	GRN/BLK	3
H	BLU/RED	9
J	BLK/WHT	4
K	GRN/WHT	2
L	BLU/WHT	6
M	RED/WHT	10
N	BLU/BLK	1
R	RED/BLK	8
P	RED/GRN	24
NC	ORG	17
NC	WHT	16
NC	BLU	18



INSTALL ITEM
4 & 6 INSERTS
THIS SIDE



ASSEMBLY SIGNATURES	CABLE CUT BY: _____
	ASSEMBLED BY: _____
	PUTTIED/POTTED BY: _____
	FIRST CABLE CUT INSPECTION: _____
	FIRST PIECE INSPECTION: _____
	FINAL INSPECTION: _____
	COR. LENGTH AND CABLE: _____
	CORRECT CONNECTORS: _____
	PULL TEST: _____
PIN INSPECTION: _____	
ELECTRICAL TEST: _____	
QUALITY & COLOR: _____	
TEST & MATE: _____	
RF TEST: _____	
LABEL VERIFICATION: _____	
INSPECTION CERTIFICATE: _____	
KIT NEEDED: _____ QTY. VER: _____	


NOTES:

1. STRIP OFF THE ENTIRE JACKET OF ITEM 1.
2. APPLY INDIVIDUAL HEATHRINK ON SOLDER CUPS.

<u>DRAWING NO.</u>		CC25048	
<u>CUST. P/N:</u>		183139	
<u>CUST. NAME:</u>		Pro All	
<u>DESCRIPTION:</u>		CAB 25 WAY-BLACK	
<u>REVISION</u>		<u>SIZE</u>	<u>SHEET</u>
X3.0		TABLOID	<u>NO.</u> 1 <u>OF</u> 1
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			

X3.0	ADDED CUST. P/N. CHANGED LENGTH FROM 2.25 FT. UPDATED PINOUT	AR	TR	06-27-18
X2.0	CHANGED LENGTH FROM 5 FT, P2 PIN OUT	AR	TR	04-17-18
X1.0	FOR APPROVAL	TR		04-05-18
REV NO.	DESCRIPTION	DRN	VER	DATE

ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION
------	------	--------------	-----	-------------



MRO
Electronic Supply Ltd

Manufactured IAW IPC/WHMA-A-620

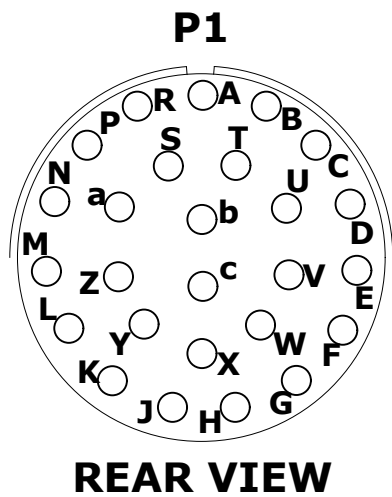
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS

DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

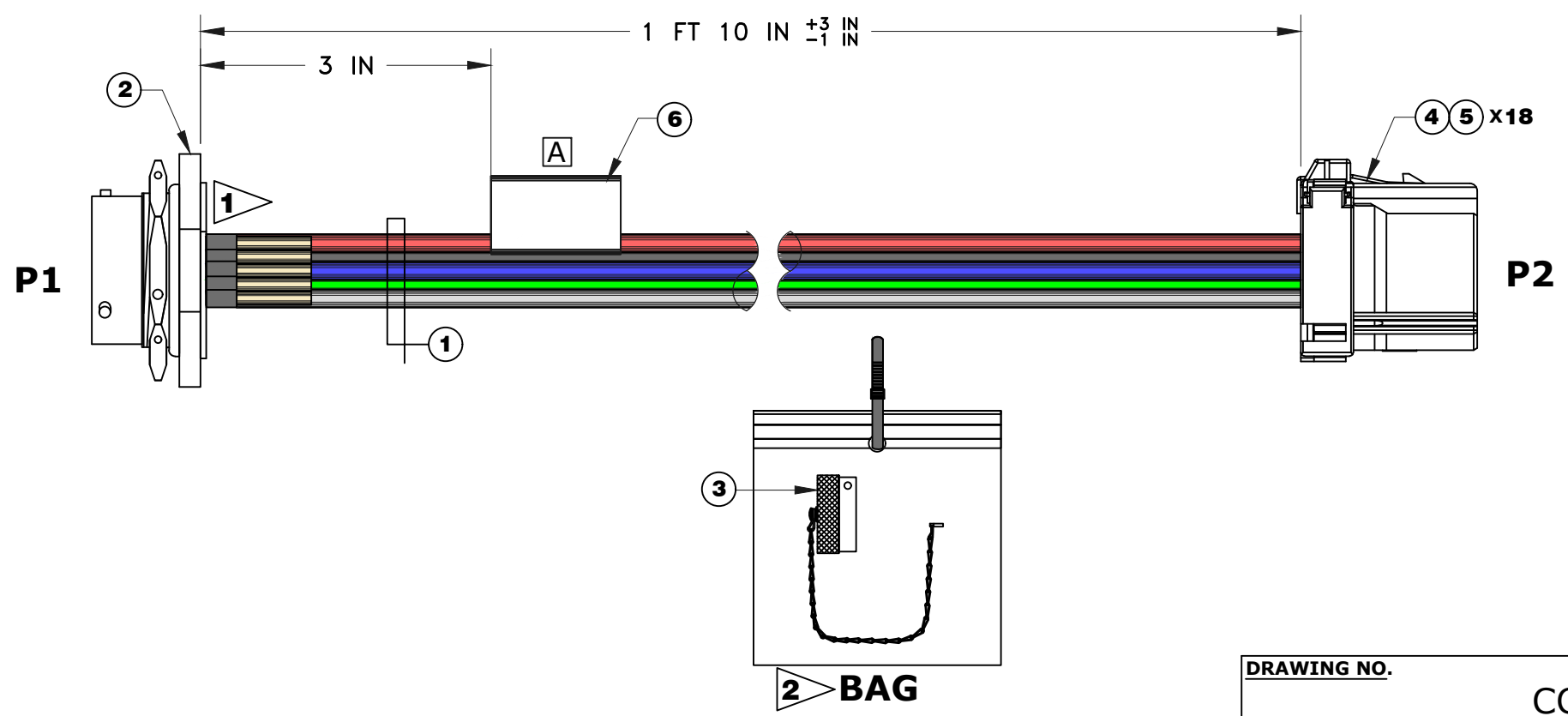
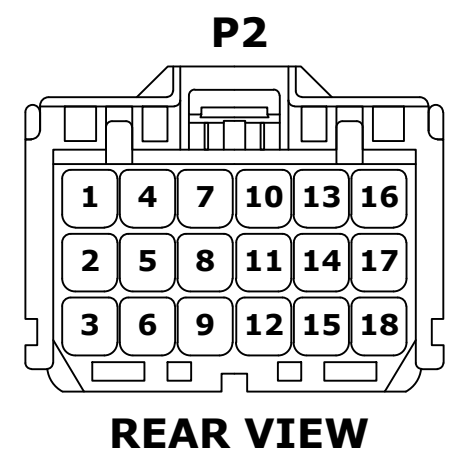
IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in

SALES PERSON	
QUANTITY	



A	RED	1
B	GRN	18
C	BLU	2
D	GRN/BLK	13
E	RED/WHT	8
F	BLK/WHT	5
G	RED/GRN	7
H	ORG/GRN	11
J	GRN/WHT	14
K	BLU/WHT	4
L	BLU/RED	12
M	BLU/BLK	16
N	WHT/BLK/RED	6
P	GRN/BLK/WHT	10
R	RED/WHT/BLK	15
S	BLK/RED/WHT	3
T	BLK/RED	17
U	BLK	9



- NOTES:**
- 1. APPLY INDIVIDUAL HEATHRINK ON SOLDER CUPS.
 - 2. PLACE DUST CAP(ITEM 3) IN A BAG AND ATTACH TO CABLE PRIOR TO SHIPPING.
 - 3. STRIP OFF THE ENTIRE JACKET OF ITEM 1.

6	1	TAG22T3-100B		SMALL/THERMAL LABEL 1.0x1.43 5k/Roll	3.0	EC-10969, UPDATED WIRING AS PER CUSTOMER'S REDLINED	TR		12-21-19
5	18	1-968849-1		2.8K 18-20G CRIMP TINNED COPPER REC CONT	2.0	UPDATED AS PER FAA, ADDED LENGTH TOL. ADDED ASSY GUIDE	AR	OO	10-01-18
4	1	8-968974-1		AUTO CONNECTOR MCP2.8 GEH 18P GRAY	1.0	INITIAL RELEASE. UPDATED WIRING	AR	TR	08-21-18
3	1	MS3181-16CA		DUST CAP #16 FITS B02A16 W/CHAIN	X3.0	ADDED CUST. P/N. CHANGED LENGTH FROM 2FT 10INCHES	AR	TR	06-28-18
2	1	PT07A16-26S		SIZE 16 JAM NUT REC BAYONET CON 26P FEMALE	X2.0	CHANGED LENGTH FROM 4FT 3 IN, P2 PIN OUT	AR	TR	04-17-18
1	1.92 FT	314-023-1825-FR		CBL 18G 25C GRY PVC JKT OD TBD	X1.0	FOR APPROVAL	AR	TR	04-11-18
ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION	REV NO.	DESCRIPTION	DRN	VER	DATE

LABELS		
REF.	INFORMATION	POSITION
A	183144 CC25049 IO#2 18 WAY-GRAY	FLAG STYLE (ON RED WIRE)

ASSEMBLY SIGNATURES	CABLE CUT BY: _____
	ASSEMBLED BY: _____
	PUTTIED/POTTED BY: _____
	FIRST CABLE CUT INSPECTION: _____
	FIRST PIECE INSPECTION: _____
	FINAL INSPECTION: _____
	COR. LENGTH AND CABLE: _____
	CORRECT CONNECTORS: _____
	PULL TEST: _____
	PIN INSPECTION: _____
	ELECTRICAL TEST: _____
	QUALITY & COLOR: _____
	TEST & MATE: _____
	RF TEST: _____
	LABEL VERIFICATION: _____
INSPECTION CERTIFICATE: _____	
KIT NEEDED: _____ QTY. VER: _____	

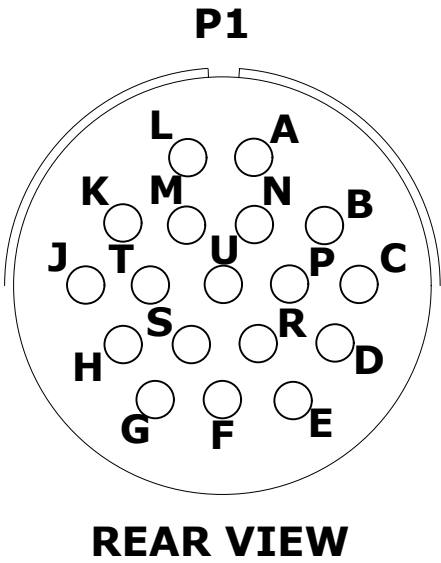
<u>DRAWING NO.</u>			CC25049		
<u>CUST. P/N:</u>			183144		
<u>CUST. NAME:</u>			Pro All		
<u>DESCRIPTION:</u>			IO#2 18 WAY-GRAY		
<u>REVISION</u>			<u>SIZE</u>	<u>SHEET</u>	
3.0			TABLOID	<u>NO.</u> 1 <u>OF</u> 1	
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO					

Manufactured IAW IPC/WHMA-A-620
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

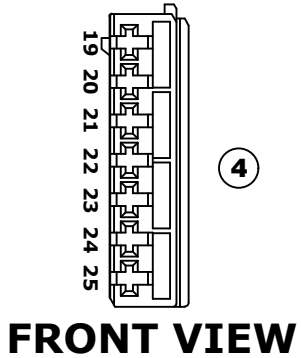
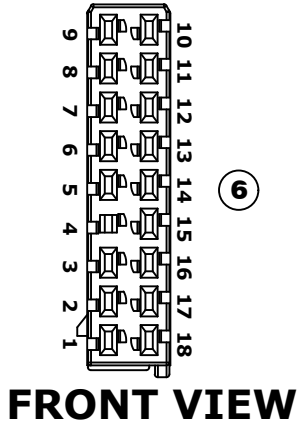
IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:		
≤ 1 ft	+1 in	-0 in
>1 ft - 5 ft	+2 in	-0 in
>5 ft - 10 ft	+4 in	-0 in
>10 ft - 25 ft	+6 in	-0 in
>25 ft	+5%	-0 in

SALES PERSON	
QUANTITY	

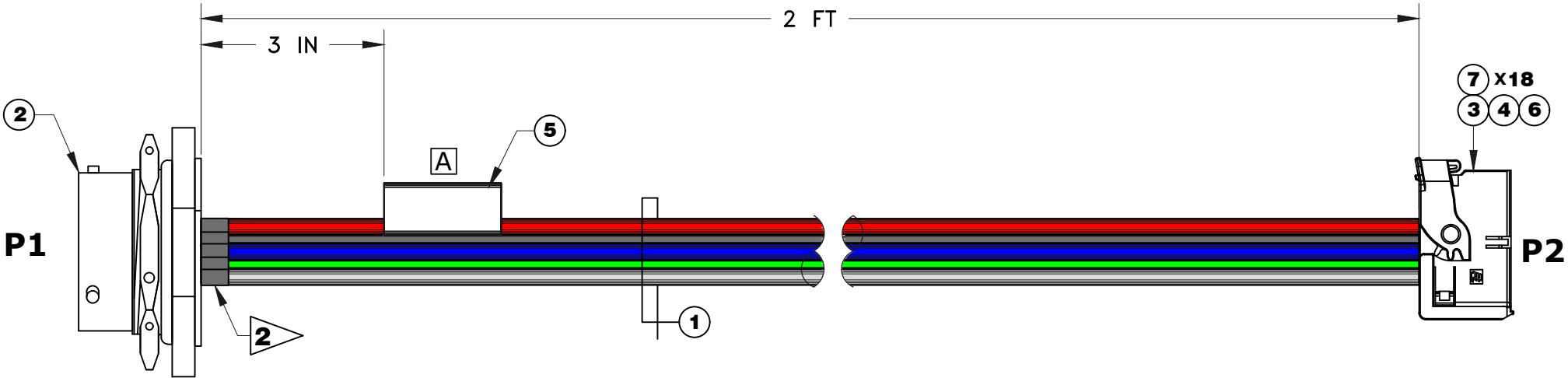
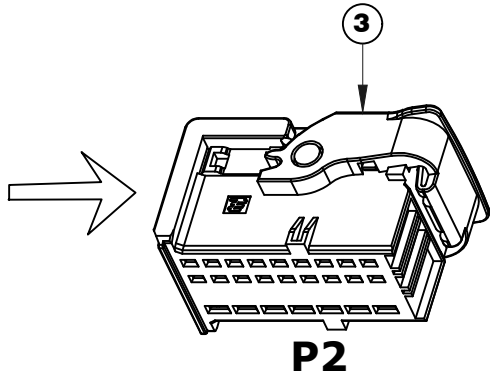
LABELS		
REF.	INFORMATION	POSITION
A	183142 CC25050 IO#1 25 WAY-GRAY	FLAG STYLE (ON RED WIRE)



A	RED	9
B	GRN	18
C	BLU	7
D	GRN/BLK	4
E	RED/WHT	5
F	BLK/WHT	13
G	RED/GRN	10
H	ORG/GRN	12
J	GRN/WHT	14
K	BLU/WHT	8
L	BLU/RED	2
M	BLU/BLK	6
N	WHT/BLK/RED	15
P	GRN/BLK/WHT	1
R	RED/WHT/BLK	11
S	BLK/RED/WHT	17
T	BLK/RED	16
U	BLK	3



INSTALL ITEM
4 & 6 INSERTS
THIS SIDE



ASSEMBLY SIGNATURES	CABLE CUT BY: _____
	ASSEMBLED BY: _____
	PUTTIED/POTTED BY: _____
	FIRST CABLE CUT INSPECTION: _____
	FIRST PIECE INSPECTION: _____
	FINAL INSPECTION: _____
	COR. LENGTH AND CABLE: _____
	CORRECT CONNECTORS: _____
	PULL TEST: _____
ASSEMBLY SIGNATURES	PIN INSPECTION: _____
	ELECTRICAL TEST: _____
	QUALITY & COLOR: _____
	TEST & MATE: _____
	RF TEST: _____
	LABEL VERIFICATION: _____
	INSPECTION CERTIFICATE: _____
	KIT NEEDED: _____ QTY. VER: _____

- NOTES:**
1. STRIP OFF THE ENTIRE JACKET OF ITEM 1.
 2. APPLY INDIVIDUAL HEATHRINK ON SOLDER CUPS.

<u>DRAWING NO.</u>		CC25050	
<u>CUST. P/N:</u>		183142	
<u>CUST. NAME:</u>		Pro All	
<u>DESCRIPTION:</u>		IO # 1 25 WAY-GRAY	
<u>REVISION</u>		<u>SIZE</u>	<u>SHEET</u>
X3.0		TABLOID	<u>NO.</u> 1 <u>OF</u> 1
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			

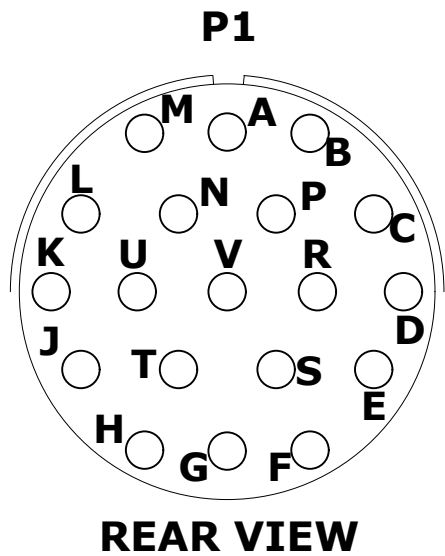
X3.0	ADDED CUST. P/N. CHANGED LENGTH FROM 2FT 5 INCHES	AR	TR	06-28-18
X2.0	CHANGED LENGTH FROM 4FT 3 IN, P2 PIN OUT	AR	TR	04-17-18
X1.0	FOR APPROVAL	AR	TR	04-11-18
REV NO.	DESCRIPTION	DRN	VER	DATE



Manufactured IAW IPC/WHMA-A-620		
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS		
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED		
IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:		
≤ 1 ft	+1 in -0 in	
>1 ft - 5 ft	+2 in -0 in	
>5 ft - 10 ft	+4 in -0 in	
>10 ft - 25 ft	+6 in -0 in	
>25 ft	+5% -0 in	

ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION
------	------	--------------	-----	-------------

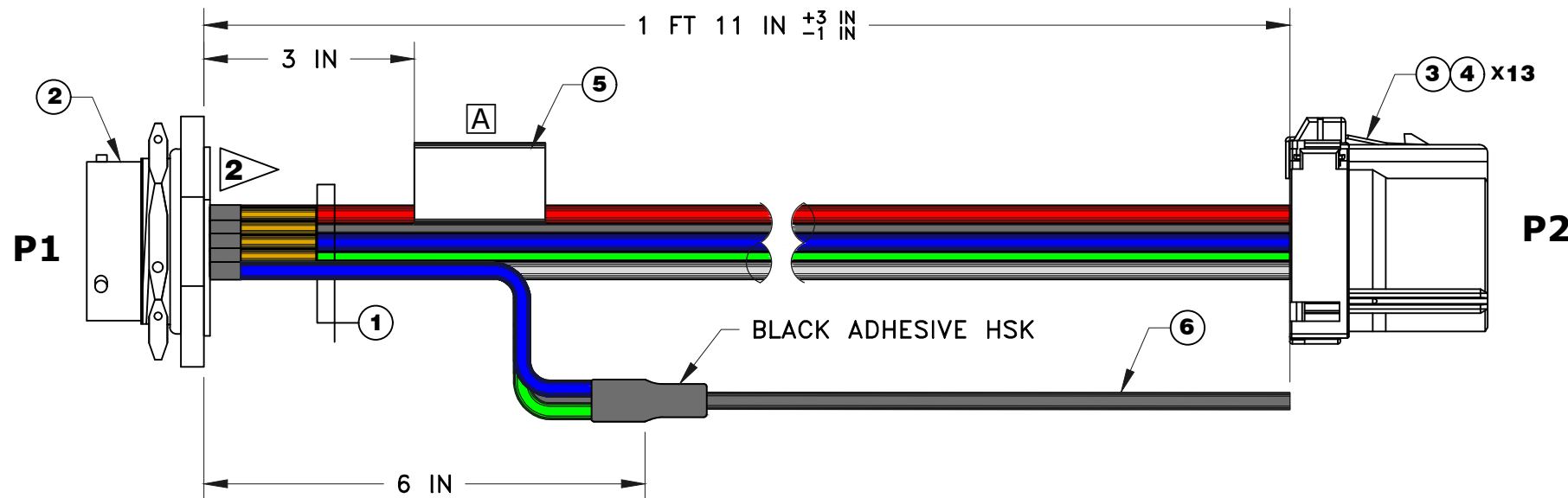
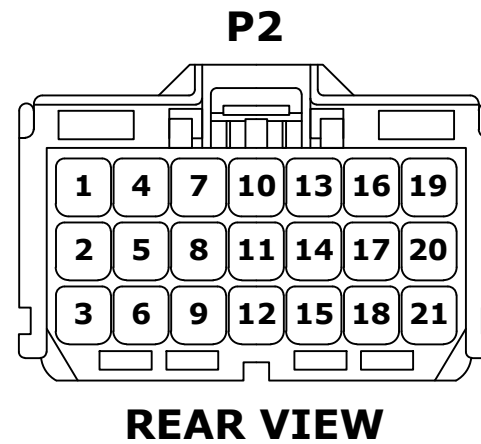
SALES PERSON	
QUANTITY	



A	RED	1
B	GRN	18
H	ORG/GRN	5
J	GRN/WHT	9
K	BLU/WHT	12
L	BLU/RED	15
M	BLU/BLK	8
N	WHT/BLK/RED	13
P	GRN/BLK/WHT	16
R	RED/WHT/BLK	7
S	BLK/RED/WHT	10
T	BLK/RED	4
U	BLK	19
C	BLU	
D	GRN/BLK	
E	RED/WHT	
F	BLK/WHT	
G	RED/GRN	

BLK-18AWG

OPEN END



NOTES:

- STRIP OFF THE ENTIRE JACKET OF ITEM 1.
- APPLY INDIVIDUAL HEATHRINK ON SOLDER CUPS.

6	1 FT 5 IN	18AWG BLACK		WIR 18G(16/30ST) UL 1569/1007 300V BLACK
5	1	TAG22T3-100B		SMALL/THERMAL LABEL 1.0X1.43 5K/ROLL
4	13	1-968849-1		2.8K 18-20G CRIMP TINNED COPPER REC CONT
3	1	8-968975-1		AUTO CON MCP2.8 GEH 21 POS BROWN
2	1	PT07A14-19S		SIZE 14 JAM NUT REC BAYONET CON 19P FEMA
1	2 FT	314-023-1825-FR		CBL 18G 25C GRY PVC JKT OD TBD
ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION

3.0	EC-11027: SWITCHED PIN 19 TO PIN 4 ON P2 CONNECTOR	OO		02-28-19
2.1	ADDED MACH. CRIMPER ON ASSY G.	TR		01-11-19
2.0	UPDATED AS PER FAA, ADDED LENGTH TOL. ADDED ASSY GUIDE.	AR	OO	10-01-18
1.0	INITIAL RELEASE. UPDATED WIRING TO HAVE SPLICE	AR	TR	08-21-18
X4.0	UPDATED WIRING. ADDED FLYING LEADS	AR	TR	07-23-18
X3.0	ADDED CUST. P/N. CHANGED LENGTH FROM 2 FT	AR	TR	06-28-18
X2.0	CHANGED LENGTH FROM 2FT, P2 PIN OUT	AR	TR	04-17-18
X1.0	FOR APPROVAL	AR	TR	04-11-18
REV NO.	DESCRIPTION	DRN	VER	DATE

<u>DRAWING NO.</u>		CC25051	
<u>CUST. P/N:</u>		183143	
<u>CUST. NAME:</u>		PRO ALL	
<u>DESCRIPTION:</u>		IO#3 21 WAY-BROWN	
<u>REVISION</u>		<u>SIZE</u>	<u>SHEET</u>
3.0		TABLOID	<u>NO.</u> 1 <u>OF</u> 1
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			

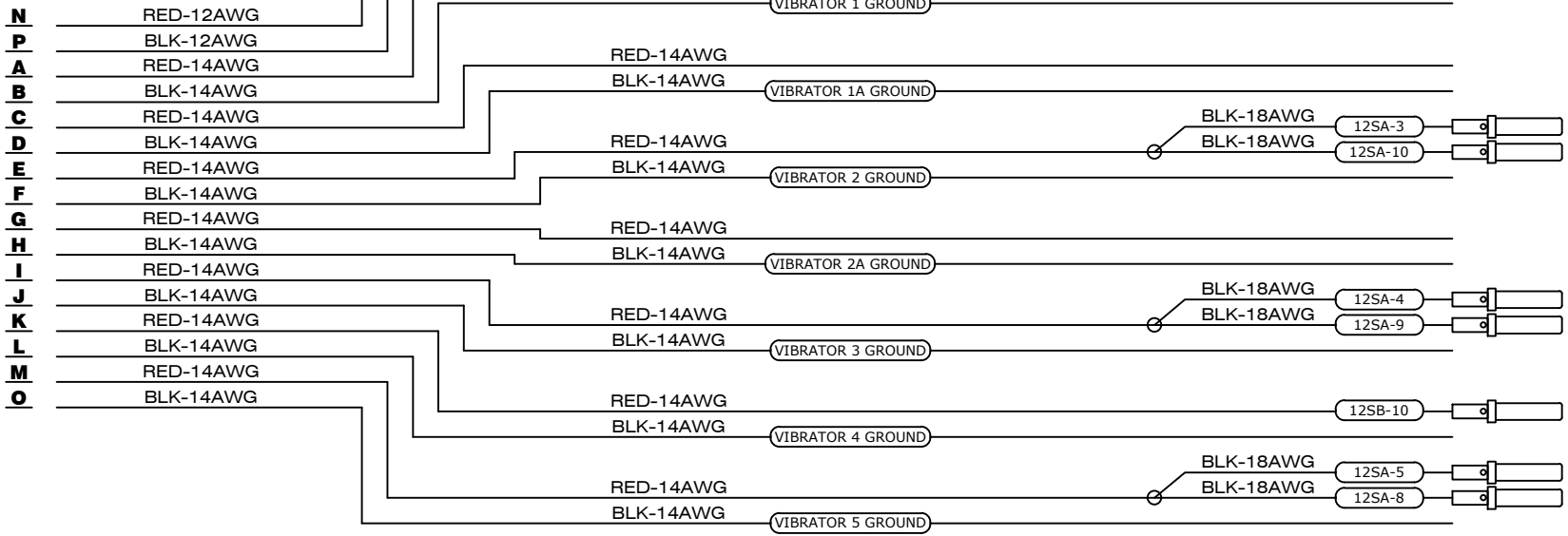
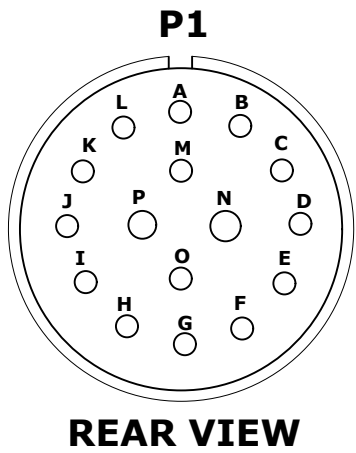
LABELS		
REF.	INFORMATION	POSITION
A	183143 CC25051 IO#3 21 WAY-BROWN	(FLAG STYLE) (ON RED WIRE)

ASSEMBLY SIGNATURES	CABLE CUT BY: _____
	ASSEMBLED BY: _____
	PUTTIED/POTTED BY: _____
	FIRST CABLE CUT INSPECTION: _____
	FIRST PIECE INSPECTION: _____
	FINAL INSPECTION: _____
	COR. LENGTH AND CABLE: _____
	CORRECT CONNECTORS: _____
	PULL TEST: _____
	PIN INSPECTION: _____
	ELECTRICAL TEST: _____
	QUALITY & COLOR: _____
	TEST & MATE: _____
	RF TEST: _____
	LABEL VERIFICATION: _____
INSPECTION CERTIFICATE: _____	
KIT NEEDED: _____ QTY. VER: _____	

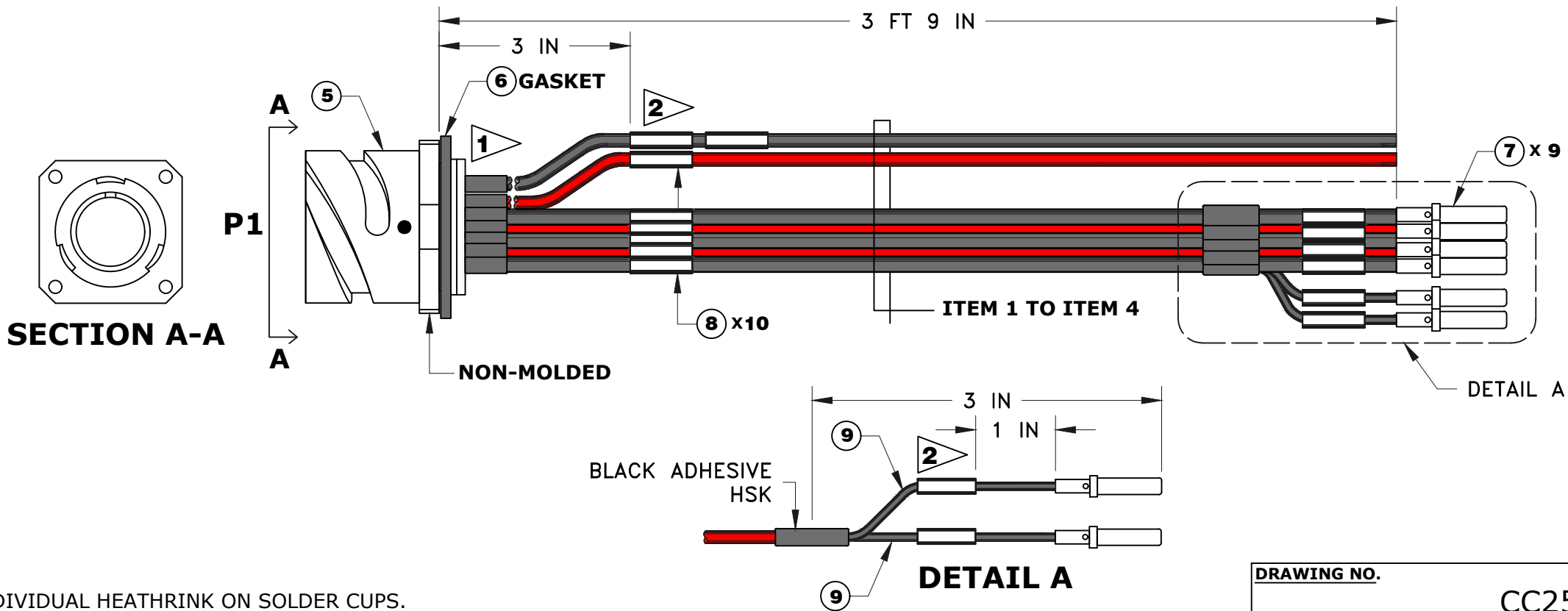


Manufactured IAW IPC/WHMA-A-620		
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS		
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED		
IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:		
≤ 1 ft	+1 in -0 in	
>1 ft - 5 ft	+2 in -0 in	
>5 ft - 10 ft	+4 in -0 in	
>10 ft - 25 ft	+6 in -0 in	
>25 ft	+5% -0 in	

SALES PERSON	
QUANTITY	



OPEN END



- NOTES:**
- 1. APPLY INDIVIDUAL HEATHRINK ON SOLDER CUPS.
 - 2. TAG HOOK UP WIRES WITH LABELS (ITEM 8) AS SHOWN.

ASSEMBLY SIGNATURES	CABLE CUT BY: _____
	ASSEMBLED BY: _____
	PUTTIED/POTTED BY: _____
	FIRST CABLE CUT INSPECTION: _____
	FIRST PIECE INSPECTION: _____
	FINAL INSPECTION: _____
	COR. LENGTH AND CABLE: _____
	CORRECT CONNECTORS: _____
	PULL TEST: _____
PIN INSPECTION: _____	
ELECTRICAL TEST: _____	
QUALITY & COLOR: _____	
TEST & MATE: _____	
RF TEST: _____	
LABEL VERIFICATION: _____	
INSPECTION CERTIFICATE: _____	
KIT NEEDED: _____ QTY. VER: _____	

DRAWING NO. CC25052		
CUST. P/N: 183145		
CUST. NAME: PRO ALL		
DESCRIPTION: VIB COOLER PNL MNT		
REVISION	SIZE	SHEET
X3.1	TABLOID	NO. 1 OF 1
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO		

X3.1	CORRECTED WIRING TO HAVE 18AWG FOR SPLICE	AR	TR	08-07-18
X3.0	ADDED CUST. P/N, LABELS FOR THE CONTACTS & ITEM 9	AR	TR	07-05-18
X2.0	CHANGED 18AWG WIRES TO 14AWG, LENGTH FROM 2FT 9 IN	AR	TR	04-17-18
X1.0	FOR APPROVAL	AR	TR	04-11-18
REV NO.	DESCRIPTION	DRN	VER	DATE

MRO
Electronic Supply Ltd

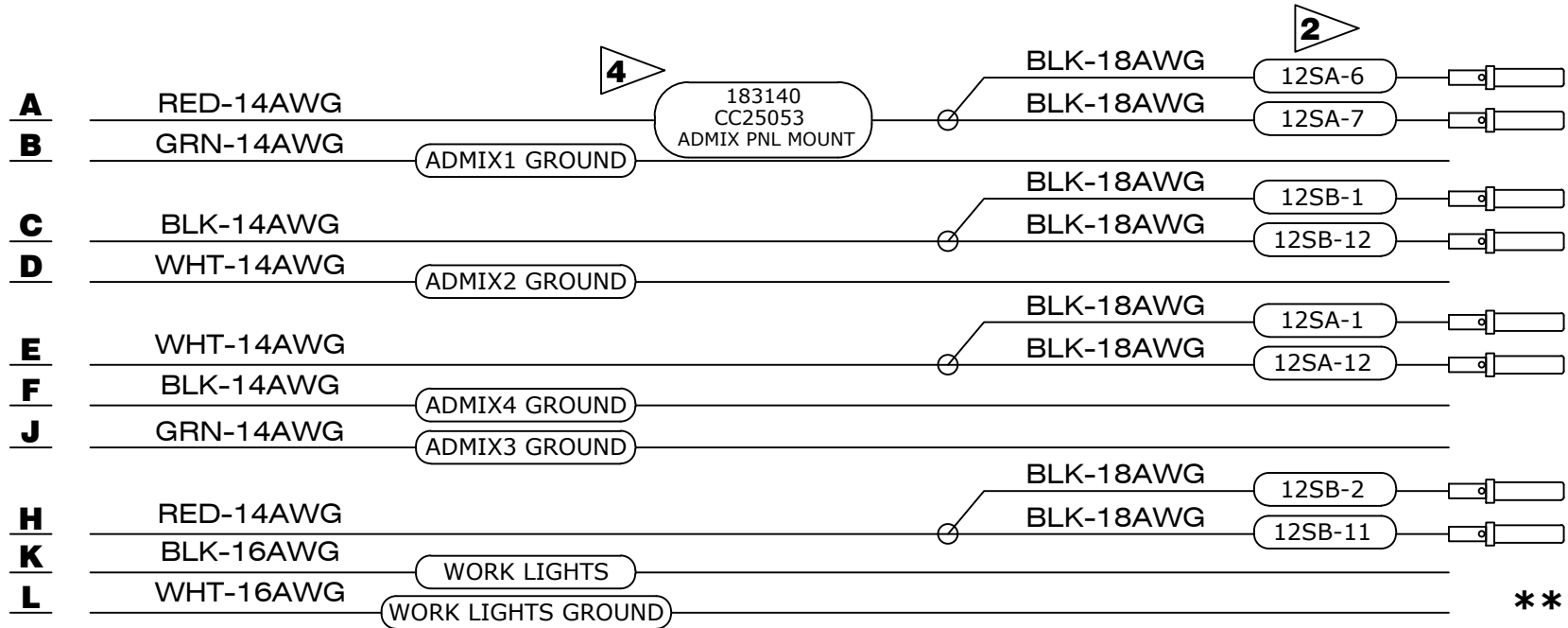
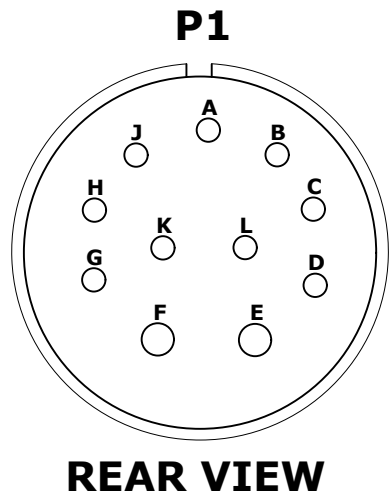
Manufactured IAW IPC/WHMA-A-620
ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

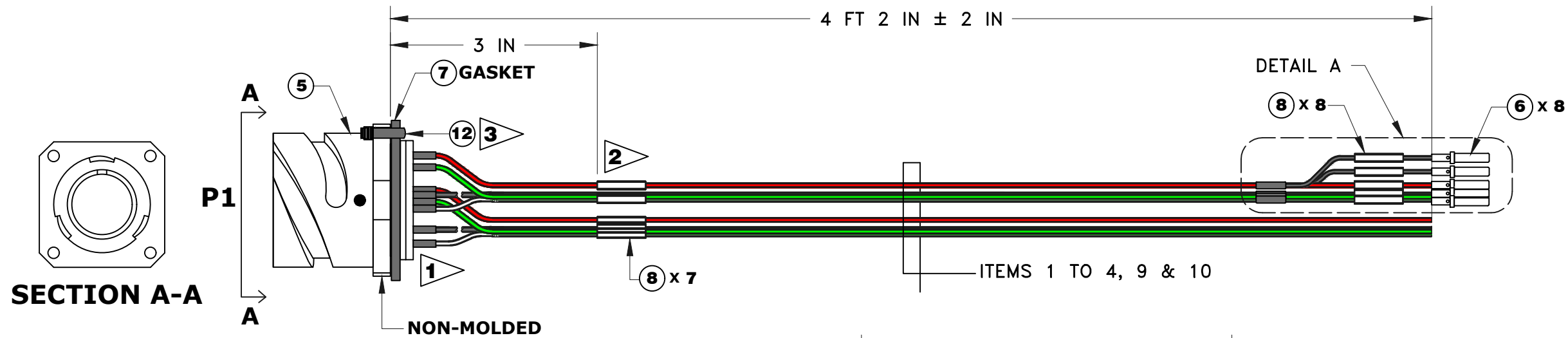
≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in

ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION
------	------	--------------	-----	-------------

SALES PERSON	
QUANTITY	

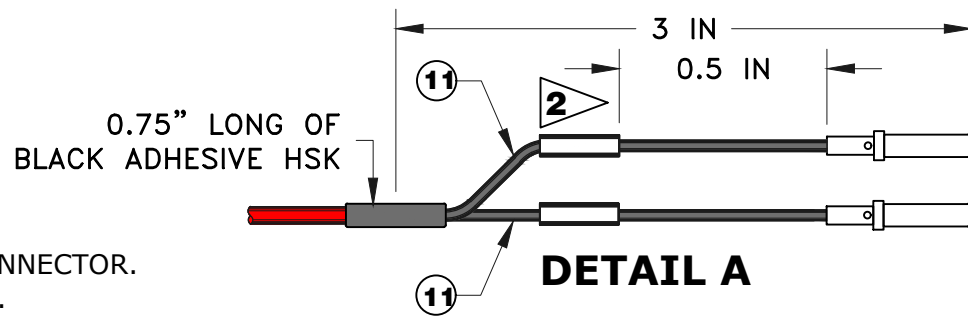


Eldon Koop



NOTES:

1. APPLY INDIVIDUAL HEATHRINK ON SOLDER CUPS.
2. TAG HOOK UP WIRES WITH LABELS (ITEM 8) AS SHOWN.
3. USE TIE WRAP(ITEM 12) TO SECURE GASKET(ITEM 7) P1 CONNECTOR.
4. MAIN LABEL SHOULD BE 3 INCHES BACK OF P1 CONNECTOR.



ASSEMBLY SIGNATURES	CABLE CUT BY: _____
	ASSEMBLED BY: _____
	PUTTIED/POTTED BY: _____
	FIRST CABLE CUT INSPECTION: _____
	FIRST PIECE INSPECTION: _____
	FINAL INSPECTION: _____
	COR. LENGTH AND CABLE: _____
	CORRECT CONNECTORS: _____
	PULL TEST: _____
	PIN INSPECTION: _____
ELECTRICAL TEST: _____	
QUALITY & COLOR: _____	
TEST & MATE: _____	
RF TEST: _____	
LABEL VERIFICATION: _____	
INSPECTION CERTIFICATE: _____	
KIT NEEDED: _____ QTY. VER: _____	

12	1	T18S0C2		CABLE TIE 3.3" 18lbs BLK 100/Pkg
11	1.67 FT	18AWG BLACK		WIR 18G(16/30ST) UL 1569/1007 300V BLACK
10	8.33 FT	14AWG WHITE		WIR 14G(41/30ST) UL 1581/1569 WHITE
9	8.33 FT	14AWG BLACK		WIR 14G(41/30ST) UL 1581/1569 BLACK
8	15	TAG22T3-100B		SMALL/THERMAL LABEL 1.0x1.43 5k/Roll
7	1	MS52000-9 SZ 24		GASKET SZ 24 CANNON
6	8	0462-201-16141		CONTACT SOLID CRIMP TYPE 16-18AWG SOCKET
5	1	CA3102-24-20SB		CONN 11 PIN F PNL MNT
4	4.25 FT	16AWG WHITE		105C 300V UL1007/1569 PVC CSA TR-64 ROHS
3	4.25 FT	16AWG BLACK		WIR 16G(26/30ST) UL1007 BLACK
2	8.5 FT	14AWG-GRN		WIR 14G(41/30ST) UL 1581/1569 GREEN
1	8.17 FT	14AWG RED		WIR 14G(41/30ST) UL 1581/1569 RED
ITEM	QTY.	MATERIAL P/N	SUB	DESCRIPTION

3.0	EC-11037: SWITCHED PIN-H & PIN-J. UPDATED LABEL	OO		03-13-19
2.1	UPDATED NOTES, HS PREP GUIDE	OO		12-03-18
2.0	UPDATED AS PER FAA, ADDED LENGTH TOL. ADDED ASSY GUIDE & ITEM 12	AR	OO	10-02-18
1.0	INITIAL RELEASE. CORRECTED WIRING TO HAVE 18AWG FOR SPLICE	AR	TR	08-21-18
X3.0	ADDED CUST. P/N, CONTACT LABELS & ITEM 11. FIXED PIN-J & H WIRING	AR	TR	07-05-18
X2.0	CHANGED WIRE GAUGE FROM 18AWG. LENGTH FROM 3 FT 2 IN	AR	TR	04-17-18
X1.0	FOR APPROVAL	AR	TR	04-11-18
REV NO.	DESCRIPTION	DRN	VER	DATE

<u>DRAWING NO.</u>		CC25053	
<u>CUST. P/N:</u>		183140	
<u>CUST. NAME:</u>		PRO ALL	
<u>DESCRIPTION:</u>		ADMIX PNL MOUNT	
<u>REVISION</u>		<u>SIZE</u>	<u>SHEET</u>
3.0		TABLOID	<u>NO.</u> 1 <u>OF</u> 1
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			



Manufactured IAW IPC/WHMA-A-620

ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS

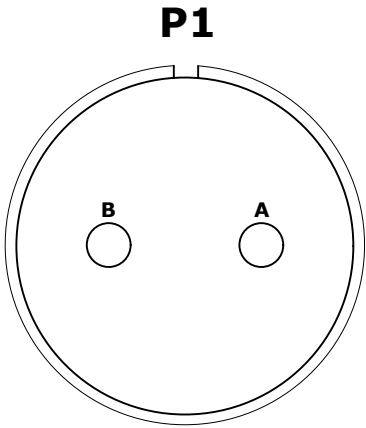
DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in

SALES PERSON	
QUANTITY	

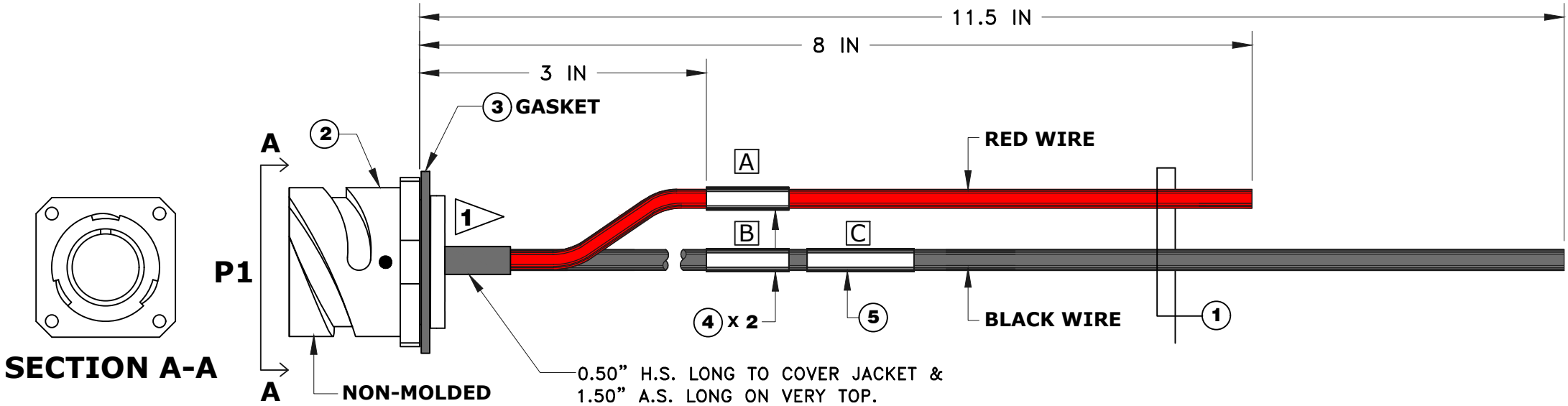
LABELS		
REF.	INFORMATION	POSITION
A	POWER	SEE VISUAL
B	GROUND	
C	183141 CC25066 BATTERY INETRNL PNL MOUNT	



REAR VIEW

A	RED
B	BLK


OPEN END



ASSEMBLY SIGNATURES	CABLE CUT BY: _____
	ASSEMBLED BY: _____
	PUTTIED/POTTED BY: _____
	FIRST CABLE CUT INSPECTION: _____
	FIRST PIECE INSPECTION: _____
	FINAL INSPECTION: _____
	COR. LENGTH AND CABLE: _____
	CORRECT CONNECTORS: _____
	PULL TEST: _____
	PIN INSPECTION: _____
	ELECTRICAL TEST: _____
	QUALITY & COLOR: _____
	TEST & MATE: _____
	RF TEST: _____
	LABEL VERIFICATION: _____
	INSPECTION CERTIFICATE: _____
	KIT NEEDED: _____ QTY. VER: _____

- NOTES:
- 1. APPLY INDIVIDUAL HEATHRINK ON SOLDER CUPS.
 - 2. CUT SEAM ON THE CABLE TO SPLIT WIRES INTO TWO.

DRAWING NO.		CC25066	
CUST. P/N:		183141	
CUST. NAME:		PRO ALL	
DESCRIPTION:		BATTERY INETRNL PNL MOUNT	
REVISION		SIZE	SHEET
X2.0		TABLOID	NO. 1 OF 1
THIS INFORMATION IS CONFIDENTIAL AND DISCLOSED TO YOU ON CONDITION THAT NO FURTHER DISCLOSURE IS MADE WITHOUT AUTHORIZATION FROM MRO			
REV NO.	DESCRIPTION	DRN	VER DATE
X2.0	UPDATED CUST P/N. CHANGED LENGTH FROM 19 INCHES	AR	TR 06-28-18
X1.0	FOR APPROVAL	AR	TR 04-11-18



Manufactured IAW IPC/WHMA-A-620

ASSEMBLY TESTED FOR HIPOT, CONTINUITY AND SHORTS

DIMENSIONS ARE IN INCHES/IMPERIAL, UNLESS OTHERWISE STATED

IPC TOLERANCE, UNLESS OTHERWISE SPECIFIED:

≤ 1 ft	+1 in -0 in
>1 ft - 5 ft	+2 in -0 in
>5 ft - 10 ft	+4 in -0 in
>10 ft - 25 ft	+6 in -0 in
>25 ft	+5% -0 in