

## TABLE OF CONTENTS

<b>DESCRIPTION</b>	<b>PAGE NO.</b>
TABLE OF CONTENTS	PAGE 1
WARRANTY	PAGE 2
SAFETY RULES	PAGE 3
MAIN COMPONENT LIST & DWG	PAGE 4,5
SET UP PROCEDURE	PAGE 6
OPERATING PROCEDURE	PAGE 7
PREPARING SILO FOR TRANSPORT	PAGE 8
SILO # 5 AND BATCH PLANT GENERAL ARRANGEMENT	PAGE 9
WEIGH HOPPER & DIFFUSER ASSEMBLY & DWG	PAGES 10,11
AIR BLOWER & RELATED COMPONENTS & DWG	PAGES 12,13
HYDRAULIC VALVE ASSEMBLY	PAGES 14, 15
GAS OR DIESEL ENGINE HYDRAULIC ASSEMBLY	PAGES 16,17
ELECTRIC MOTOR HYDRAULIC ASSEMBLY	PAGES 18,19
HYDRAULIC ASSEMBLY FLOW CONTROL, COOLER, FILTER	PAGES 20,21
HYDRAULIC ASSEMBLY CYLINDERS	PAGES 22,23
HYDRAULIC COMPONENT PLACEMENT	PAGES 24,25
WEIGH SYSTEM	PAGES 26,27
SILO DISCHARGE PIPE COMPONENTS	PAGES 28,29
BUTTERFLY VALVE ASSEMBLY	PAGES 30,31
WEIGH HOPPER AND VALVES	PAGES 32,33
AERATOR SYSTEM	PAGES 34,35
BAGHOUSE ASSEMBLY & DWG	PAGES 36,37
SILO GUARD RAIL ASSEMBLY & DWG	PAGES 38,39
LADDER W/LADDER CLIMBER&S SAFETY EQUIPMENT	PAGES 40,41
TRAILER FRAME ASSEMBLY REAR SECTION	PAGES 42,43
TRAILER FRAME ASSEMBLY FRONT SECTION	PAGES 44,45
ELECTRICAL ENCLOSURE 480 VOLT 3 PHASE	PAGES 46,47
ELECTRICAL ENCLOSURE 240 VOLT 3 PHASE	PAGES 48,49
ELECTRICAL 12 VOLT DC	PAGES 50,51
ELECTRICAL CONNECTION FOR TOWING	PAGES 52
MAINTENANCE	PAGE 53
SCALE CALIBRATION ARMS	PAGE 54
CARDINAL SCALE 205-210 WEIGHT INDICATING SYSTEM W/ TABLE OF CONTENTS	
HYDRAULIC PUMP REPAIR MANUAL	



2011 Harnish Blvd.  
Billings, MT 59101

---

Phone: (406)656-4360/(800)523-3888  
Fax: (406)656-4363

## **FAST-WAY LIMITED WARRANTY POLICY**

Ideal Manufacturing, Inc., hereinafter referred to as “Manufacturer” warrants FAST-WAY equipment to be free from defect in material and workmanship, under normal use and service, for a period of one (1) year from the date of original purchase. Manufacturer will, at its option, replace or repair at factory in Billings, MT, any part or parts which shall appear, to the satisfaction of the Manufacturer, upon inspection at its factory, to have been defective in material or workmanship. This warranty does not obligate the Manufacturer to bear any transportation charges in connection with replacement or repair of defective parts. This warranty does not cover products or accessories that are not manufactured by Ideal Manufacturing, Inc. That product follows the warranty, and guidelines of that manufacturer. This warranty excludes electrical components and damage due to Acts of God, unauthorized modifications, misuse, abuse or negligence to this product.

In order to proceed with a warranty claim, Ideal Manufacturing must be notified of the problem. A new part will be shipped out prepaid (Ground UPS). If the customer requests that the part be expedited that shipping charge will be charged to the owner.

The part that is being warranted must be returned to Ideal Manufacturing postage prepaid. When the new part is shipped out, it will go out with an invoice and a warranty part return number. The defective part must be returned to Ideal Manufacturing, Inc freight prepaid, with the warranty part return number. At that time the invoice will be considered paid in full.

This warranty is exclusive and in lieu of all other obligation, liabilities or warranties. In no event shall Ideal Manufacturing be liable or responsible for incidental or consequential damage or for any other direct or indirect damage loss, cost, expense or fee.

This warranty shall not apply to any products or parts that have been altered or repaired without written consent of Ideal Manufacturing.

Labor to remove and reinstall defective product or parts will be paid from a labor rate and schedule only. Consult Ideal Manufacturing for that rate and schedule.

For further information on returning your product or questions concerning Ideal Manufacturing warranty, please contact Ideal Manufacturing.

Ideal Manufacturing Inc., 2011 Harnish Blvd., Billing’s, Montana 59101, 1-800-523-3888 toll free, 1-406-656-4360 phone, 1-406-656-4363 fax

# SAFETY RULES

1. Follow instructions, don't take chances. If you don't know, ask. When setting up, lowering or putting equipment into traveling position, follow all instructions in operator's manual.
2. Correct or report unsafe conditions. If not sure of how to correct a hazard, report it and get help.
3. Keep everything clean and orderly. Trips or falls can cause serious injuries.
4. Use the right tools and equipment for the job. Use them safely. Replace all machine guards after repair.
5. Report all injuries and get first aid or medical treatment promptly.
6. Use prescribed protective equipment. Keep it in good condition. Wear your hardhat, safety climbing devices or belt. Wear safe clothing to protect you from material being handled cold or hot. Wear a dust mask when conditions require them. When conditions require them, use gloves, eye protection/safety glasses, and earplugs for noise.
7. Use, adjust, and repair equipment only when authorized.
8. Remember, all petroleum fumes, gasoline, L.P. gasses are highly explosive.
9. Don't horseplay: avoid distracting others.
10. When lifting, bend your knees and get help for heavy loads.
11. Don't repair or adjust equipment while in motion. Shut off power source, gasoline engines or electric motors.
12. Comply with safety rules and signs.

## MAIN COMPONENT LIST

1. Trailer unit 15,000 pounds net load.
2. Trailer front support screw jack.
3. Folding support base at each side with position retaining pin.
4. Holddown turnbuckle at each side. Pull type. Red color.
5. Cement silo 1155 cu. ft., 275 barrel capacity.
6. Bag type dust collector unit.
7. Cement filler line.
8. Aerator pad-six (6) installed.
9. Silo inspection cover and access manhole.
10. Access ladder safety cable with non-slip device including safety belt receptacle.
11. Weigh hopper unit. 7,000 pounds capacity.
12. Weigh hopper outlet. Air diffuser cover.
13. Flexible connector.
14. Cement discharge line.
15. Cement line-rotating union.
16. Weigh scale load cell.
17. Weigh scale read-out unit.
18. Holdup turnbuckle. Four (4) installed push type. Red color.
19. Holddown turnbuckle. Six (6) installed pull type. Red color.
20. Hydraulic pump unit. 22 HP gas engine, or 20 HP electric motor.
21. Hydraulic driven blower.
22. Hydraulic control pendent plug.
23. Hydraulic positioning cylinder.
24. Electric storage battery for gas engine installation.
25. Manual valve-to provide air for silo cone aeration.
26. Manual valve-to provide air for weigh hopper discharge.
27. Manual valve with adjacent pressure gauge. To vent air displacement during weigh hopper-loading operation.
28. Manual operator for weigh hopper inlet butterfly valve.
29. Manual operator for silo discharge butterfly valve.
30. Manual operator for weigh hopper discharge butterfly valve.
31. Fold down operator platform.
32. Location of blower control panel. Starter-choke-throttle for gas installation. Start-stop for electric motor installation.
33. Discharge line overhead extension.
34. Upper clamp bolts.





**SILO #5**  
**SET UP PROCEDURE**  
**See Drawing S5-101 page 5 for REF#**

1. Select a level site with solid footing for setting up and operating cement silo.
2. Align silo trailer and tow vehicle in a straight line. Leave tow vehicle hooked to trailer with brakes released and transmission in neutral position.
3. At front of trailer on each side, release red color turnbuckle, (REF# 4).
4. At rear of trailer on each side, remove retaining pin and lower folding support base. Place pin in pipe on inside of frame to secure base in down position, (REF# 3).
5. Before elevating silo, screw in cement discharge line overhead extension at elbow,(REF# 33) and loosen upper clamp bolts,(REF# 34).
6. At rear of trailer plug in cylinder control pendent,(REF# 22). Start hydraulic power unit, (REF# 20). Let power unit run for a few minutes before raising or lowering silo. Proceed to elevate silo with the control pendent,(REF# 22).  
CAUTION: Observe pressure indicator gauges and do not exceed 2,600 p.s.i. up pressure.
7. Level silo with hydraulic system and shim under support as required.
8. Disconnect tow vehicle.
9. At weigh hopper, release six (6) red color, holddown, pull type turnbuckle, (REF# 19).
10. At weigh hopper, release four (4) red color, holdup, push type turnbuckles, (REF# 18). Replace hopper end bolt in turnbuckle to prevent loss.
11. At weigh hopper, release four (4) red color, transport flat bars. (REF# 35)

**SILO #5**  
**OPERATING PROCEDURE**  
**See Drawing S5-101 page 5 for REF#**

1. CHARGING SILO

- a. Close silo discharge valve, (REF# 29).
- b. Air pump cement thru filler pipe, (REF# 7).
- c. You must shake upper section of bag-house to clean filter bags each time after filling silo, (REF# 6).

2. CHARGING WEIGH HOPPER

- a. Close weigh hopper cement discharge line valve, (REF# 30).
- b. Open weigh hopper air displacement valve, (REF# 27).
- c. Open weigh hopper cement inlet valve, (REF# 28).
- d. Open silo discharge valve, (REF# 29), in a gradual fashion while observing weigh scale read-out dial. Close valve when desired weight has been reached.

NOTE: If at any time during the weigh hopper charging operation, cement fails to flow freely as indicated by the scale read-out dial, silo cone aeration must be induced.

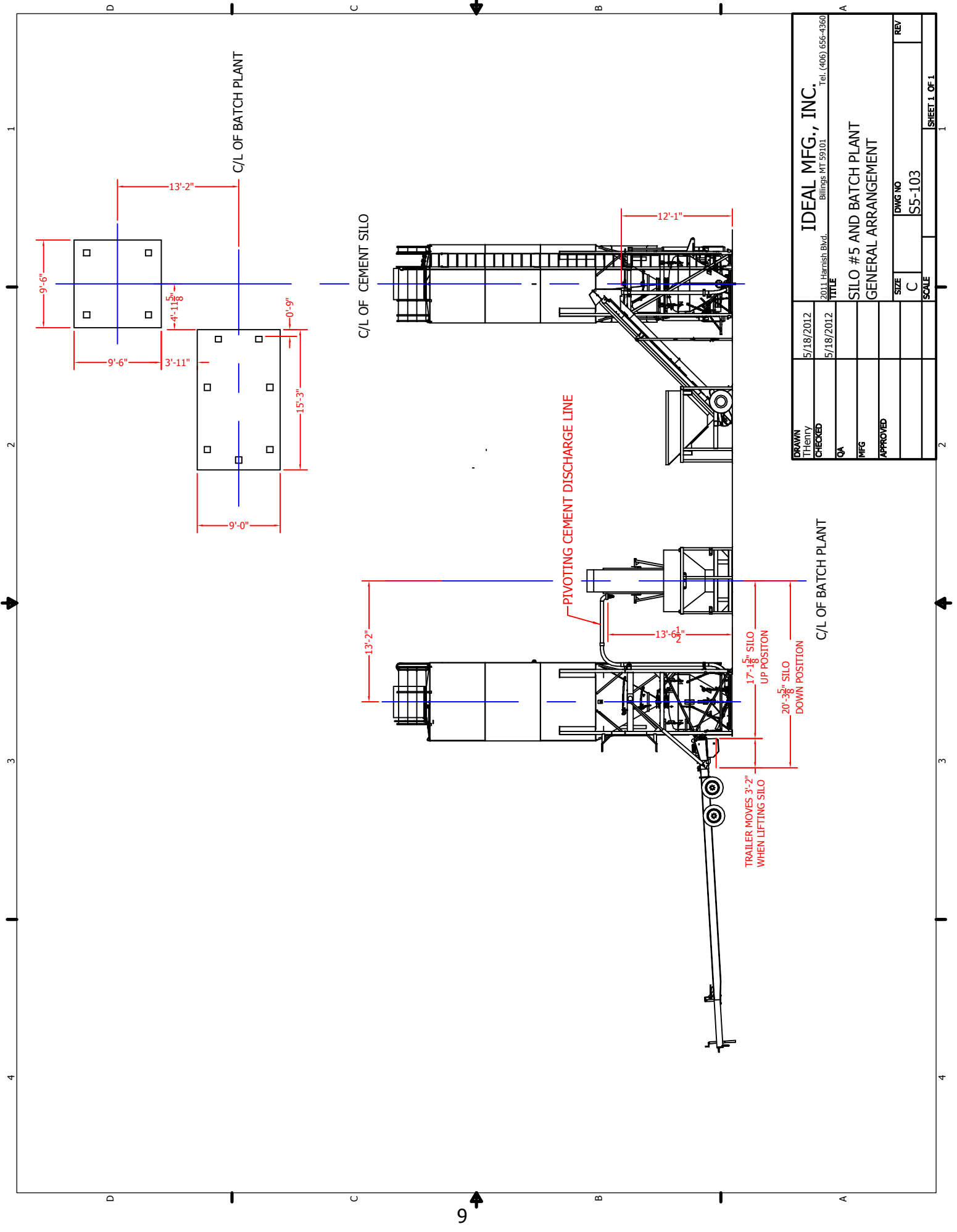
- e. Close weigh hopper discharge air supply line valve, (REF# 26).
- f. Open aerator supply line valve, (REF# 25).
- g. Start air pump unit, (REF# 32).
- h. When charging operation is complete, stop air pump unit.

3. DISCHARGE WEIGH HOPPER

- a. Close weigh hopper inlet valve, (REF# 28).
- b. Close weigh hopper air displacement valve, (REF# 27).
- c. Close aerator supply line valve, (REF# 25).
- d. Open weigh hopper discharge air supply valve, (REF# 26).
- e. Start air pump unit, (REF# 32).
- f. Observe air pressure gauge located at top of weigh hopper until a reading of approximately 8 p.s.i. is indicated.
- g. Open weigh hopper cement discharge valve, (REF# 30), in a gradual fashion to control the desired discharge rate.
- h. Observe the weigh scale read-out dial to determine when weigh hopper has fully discharged. If hopper fails to discharge completely, close discharge valve and allow pressure to increase, then open valve again.
- i. Stop air pump unit, (REF# 32).

**SILO #5**  
**PREPARING SILO FOR TRANSPORT**  
**See Drawing S5-101 page 5 for REF#**

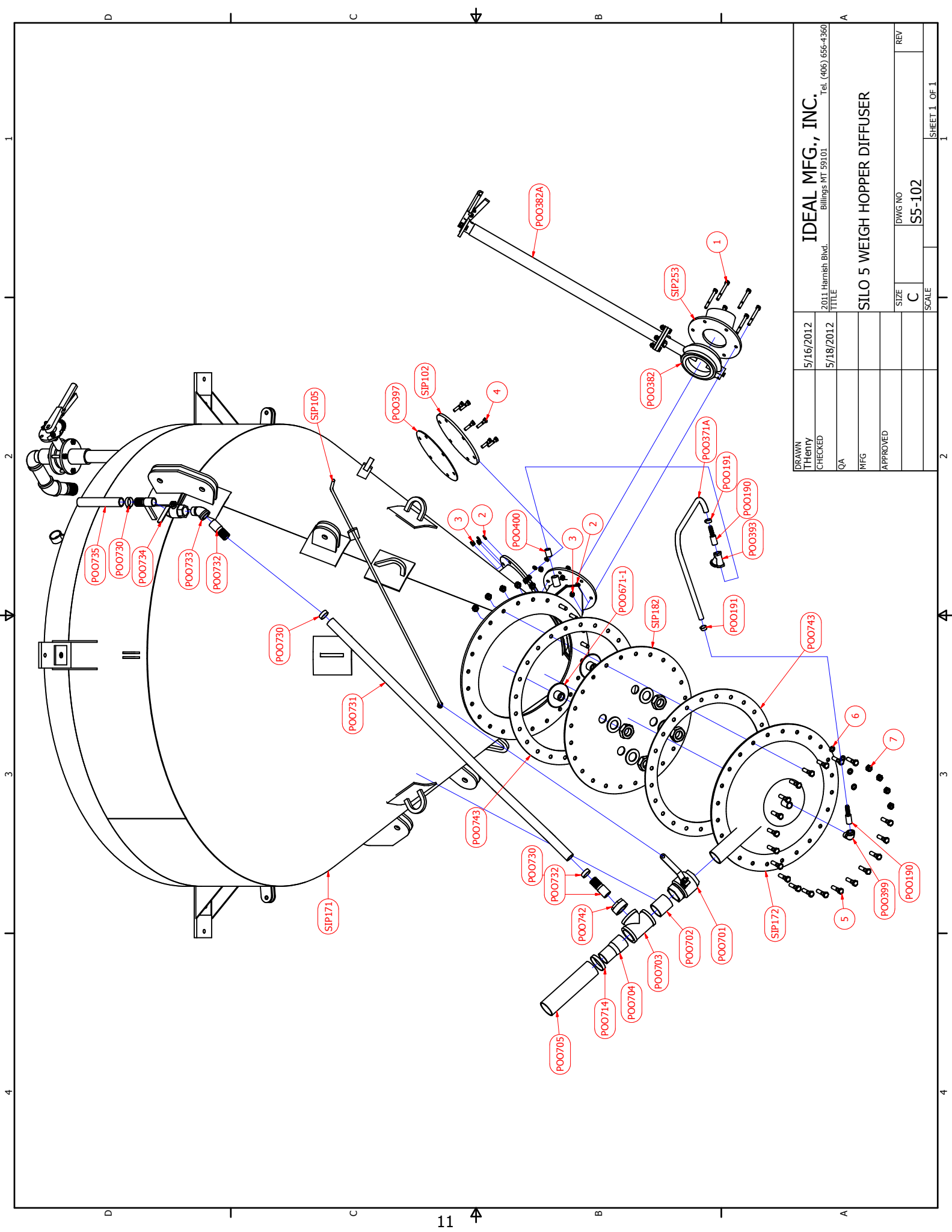
1. Most important is to be positive that all cement has been removed from systems before lowering silo.
2. Weigh scale read-out will indicate an empty hopper.
3. Remove inspection cover at top of silo and observe interior.
4. At weigh hopper bottom, connect two (2) red color, vertical, hold down, pull type turnbuckles, (REF# 19). Tighten in an equal, uniform fashion to point where a reading of 500 pounds is indicated on scale.
5. At weigh hopper mid-section, connect four (4) red color, hold-up, push type turnbuckles, (REF# 18). Tighten in an equal, uniform fashion to an indicated reading of zero (0) pounds on scale.
6. At weigh hopper bottom, connect four (4) red color, pull type turnbuckles with chains, (REF# 19). Tighten to a point of snugness only.
7. At weigh hopper top, connect four (4) red color transport flat bars (REF# 35).
8. Connect tow vehicle to trailer in a straight line and retract from support screw jack, (REF# 2). Insure that hitch pintle hook is closed and locked.
9. Be positive that tow vehicle brakes are released and that transmission is in neutral position.  
  
**CAUTION:** If on an incline, guard against coasting.
10. At rear of trailer plug in cylinder control pendent. (REF# 22). Start hydraulic power unit, (REF# 20) proceed to lower silo with the cylinder control pendent, (REF# 22).
11. At front of trailer on each side, connect red color turnbuckles and tighten.
12. At rear of trailer on each side, remove retaining pin and raise folding support base. Replace pin to secure base, (REF# 3).
13. At top of silo, unscrew and remove cement discharge line overhead extension, (REF# 33) and tighten upper clamp bolts, (REF# 34).
14. Connect and check stop, signal and clearance electrical running lights.



DRAWN	5/18/2012	IDEAL MFG., INC.	
THENTRY		2011 Harbush Blvd. Billings, MT 59101 Tel. (406) 656-4360	
CHECKED	5/18/2012	TITLE	
QA		SILO #5 AND BATCH PLANT GENERAL ARRANGEMENT	
MFG		SIZE	DWG NO
APPROVED		C	S5-103
		SCALE	REV
			SHEET 1 OF 1

**SILO WEIGH HOPPER AND DIFFUSER ASSEMBLY  
WITH RELATED PARTS  
See Page 11 Drawing # S5-102**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	N/A	3/8 X 3 1/2 Hex Bolt	6
2	N/A	3/8 Lock Washer	12
3	N/A	3/8 Hex Nut	12
4	N/A	3/8 X 1 1/2 Hex Bolt	6
5	N/A	1/2 X 2 Hex Bolt	24
6	N/A	1/2 Lock Washer	24
7	N/A	1/2 Hex Nut	24
POO190	POO190	1/2" NPT X 1/2" Hose Barb	2
POO191	POO191	Hose Clamp	2
POO371A	POO371A	1/2" Hose X 30"	1
POO382	POO382	4" Butterfly Valve	1
POO382A	POO382A	4" Butterfly Valve Extension	1
POO393	POO393	Valve (check)	1
POO397	POO397	Gasket (clean out cover)	1
POO399	POO399	1/2" 90 deg. Street Elbow	1
POO400	POO400	1/2" NPT Sch 80 Close Nipple	1
POO671-1	POO671-1	Fluidizer Assembly (7/8" cut off)	4
POO701	POO701	2" Ball Valve (main air-mod.)	1
POO702	POO702	2" NPT X 2 1/2" Nipple	1
POO703	POO703	2" NPT Tee	1
POO704	POO704	2" NPT X 2" Hose Barb	1
POO705	POO705	2" Hose X 42"	1
POO714	POO714	Hose Clamp	1
POO730	POO730	Hose Clamp	3
POO731	POO731	1" Hose X 54"	1
POO732	POO732	1" NPT X 1" Hose Barb	2
POO733	POO733	1" 45 deg Street Elbow	1
POO734	POO734	1" Ball Valve	1
POO735	POO735	1" Hose X 67"	1
POO742	POO742	2" x 1" Reducer	1
POO743	POO743	Red Rubber Gasket	2
SIP102	SIP102	Cover (clean out cover)	1
SIP105	SIP105	Handle (main air valve)	1
SIP171	SIP171	Hopper (weigh)	1
SIP172	SIP172	Cover (fab. Diffuser cover assembly.)	1
SIP182	SIP182	Fluidizer Plate	1
SIP253	SIP253	4" butterfly Valve Flange	1



<b>IDEAL MFG., INC.</b> 2011 Harnish Blvd. Billings MT 59101 Tel. (406) 656-4360	
DRAWN THenry	5/16/2012
CHECKED QA	5/18/2012
QA	
MFG	
APPROVED	
<b>SILO 5 WEIGH HOPPER DIFFUSER</b>	
SIZE C	DWG NO S5-102
SCALE	REV
SHEET 1 OF 1	

**SILO AIR BLOWER AND RELATED COMPONENTS**  
**SEE PAGE 12 DRAWING S5-104**

REF. NO.	PART NO.	DESCRIPTION	REQ'D
1	N/A	3/8 X 1 1/2 Hex Bolt	2
2	N/A	3/8 X 1 1/4 Hex Bolt	8
3	N/A	3/8 Lock Washer	10
4	N/A	3/8 Hex Nut	10
5	N/A	3/8 Flat Washer	4
6	N/A	1/4 X 3/4 Hex Bolt	2
7	N/A	1/4 Lock Washer	2
8	N/A	1/4 Hex Nut	2
9	N/A	1/4 Wing Nut	1
10	N/A	1/4 Flat Washer	1
POO268	POO268	Battery Ground Strap	1
POO269	POO269	Battery Positive Cable	1
POO374	POO374	12 Volt Battery	1
POO374A	POO374A	Battery Box	1
POO406	POO406	Valve (safety pop)	1
POO409	POO409	Base (air cleaner)	1
POO410	POO410	Air cleaner assembly. (includes POO410A)	1
POO410A	POO410A	Element (air cleaner (included in POO410))	1
POO702	POO702	Nipple	1
POO704	POO704	Hose barb	1
POO705	POO705	Hose (air blower discharge)	1
POO707	POO707	Air blower (see mfg. manual for service parts)	1
POO708	POO708	Reducer	1
POO709	POO709	Nipple	1
POO710	POO710	Tee	1
POO711	POO711	Valve (check)	1
POO712	POO712	Nipple	1
POO713	POO713	Elbow	1
POO714	POO714	Clamp	1
POO876	POO876	Coupler Half 5/8 X 5/32	1
POO877	POO877	Coupling Insert	1
POO1036	POO1036	Hydraulic Motor (26706-DAC)	1
POO1042	POO1042	Coupler Half 15/16 X 1/4	1
POO1058	POO1058	5/8" Hose 10 JIC 10 JIC 90deg X 23 1/2"	1
POO1059	POO1059	5/8" Hose 10 JIC 10 JIC 90deg X 36"	1
POO1074	POO1074	Fitting 10 JIC 12 ORB 45 deg.	1
POO1078	POO1078	Fitting 10 JIC 12 ORB 90 deg.	1
SIP111	SIP111	Adapter (air cleaner)	1
SIP255	SIP255	Blower Mounting Plate	1
SSC107	SSC107	Coupler Guard	1
SSC108	SSC108	Hydraulic Motor Mount Plate	1





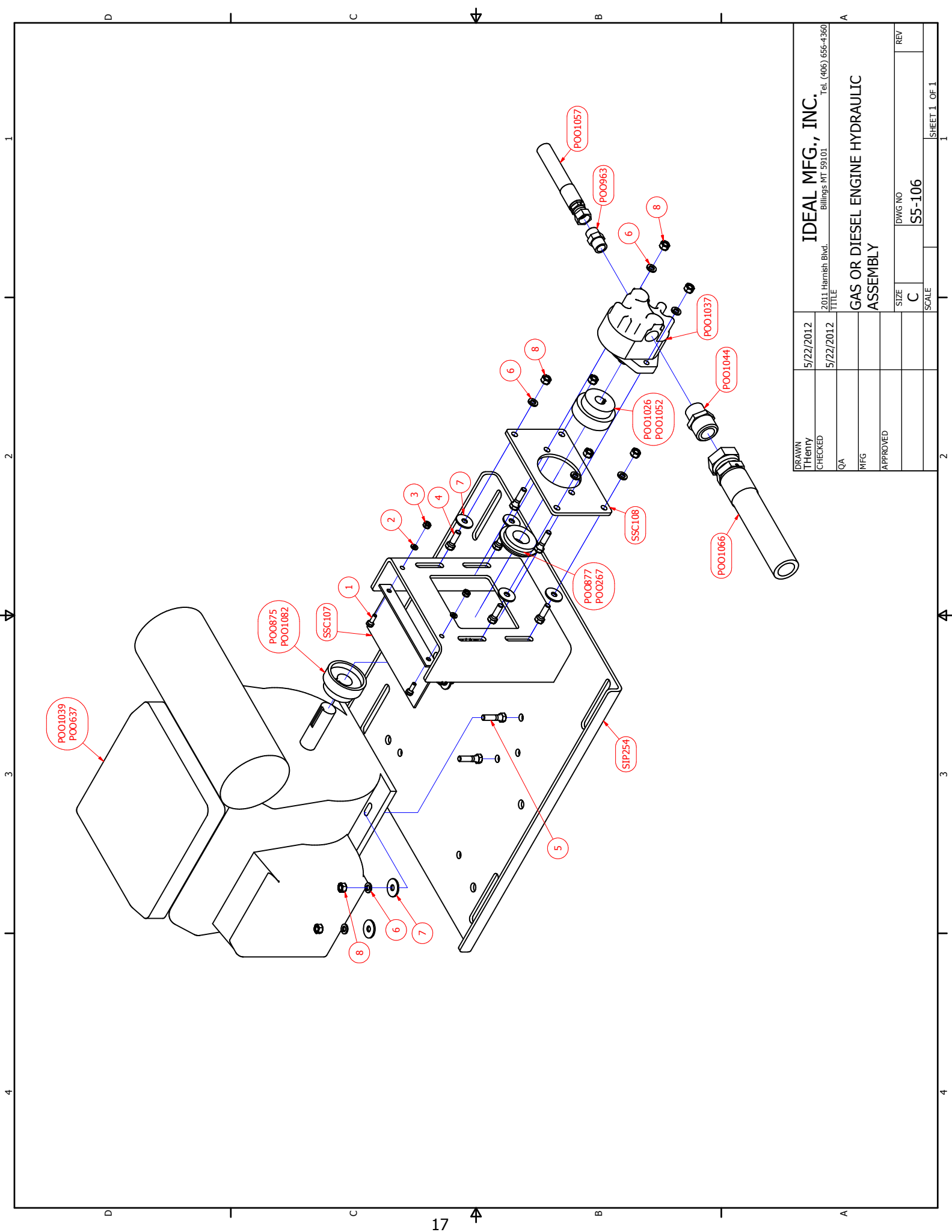
**SILO #5**  
**HYDRAULIC VALVE ASSEMBLY**  
**SEE PAGE 15 DRAWING S5-105**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	N/A	5/16-18 X 1/2 HEX FLANGE SCREW	4
2	N/A	MOUNTING BRACKET	2
3	F91106	10-24 X 3 SOCKET HEAD CAP SCREW	4
4	F91100	10-24 X 1 1/4 SOCKET HEAD CAP SCREW	4
5	N/A	O-RING	12
POO370-1	POO370-1	PRESSURE GAUGE	1
POO880	POO880	12-10 STRAIGHT JIC ORING BOSS 3/4 X 5/8	1
POO963	POO963	10-10 MJIC ORB STRAIGHT	1
POO964	POO964	10-08 JIC ORB STRAIGHT	2
POO1027	POO1027	10 ORB PLUG	1
POO1030	POO1030	2 STATION MANIFOLD	1
POO1031	POO1031	RELIEF VALVE 10-S-0-35	1
POO1032	POO1032	VALVE DG4V 3 8C VM FW G7 61	1
POO1033	POO1033	VALVE DG4V 3 OB M FW G7 60	1
POO1034	POO1034	COUNTERBALANCE VALVE A323W	1
POO1035	POO1035	COUNTERBALANCE CARTRIDGE	2
POO1048	POO1048	8-8 JIC ORB STRAIGHT	2
POO1051	POO1051	10 ORB 4 JIC STRAIGHT	1
POO1055	POO1055	3/4" HOSE 12 FJIC 12 FJIC X 48 3/4"	1
POO1057	POO1057	5/8" HOSE 10 FJIC 10 FJIC 90 X 19"	1
POO1058	POO1058	5/8" HOSE 10 FJIC 10 FJIC 90 X 23 1/2"	1
POO1059	POO1059	5/8" HOSE 10 FJIC 10 FJIC 90 X 36"	1
POO1063	POO1063	1/2" HOSE 8 MNPT 8 FJIC X 23"	1
POO1072	POO1072	1/2" HOSE 8 MNPT 8 FJIC X 30"	1
POO1079	POO1079	4 FNPT 4 FJIC	1



**SILO #5**  
**GAS OR DIESEL ENGINE HYDRAULIC ASSEMBLY**  
**SEE PAGE 17 DRAWING S5-106**

<b>REF. NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D NO.</b>
1	N/A	1/4-20 X 3/4 hEX BOLT	2
2	N/A	1/4 LOCK WSHER	2
3	N/A	1/4-20 HEX NUT	2
4	N/A	3/8-16 X 1 1/4 HEX BOLT	4
5	N/A	3/8-16 X 1 1/2 HEX BOLT	6
6	N/A	3/8 LOCK WASHER	10
7	N/A	3/8 FLAT WASHER	8
8	N/A	3/8-16 HEX NUT	10
POO1026	POO1026	COUPLER HALF 3/4 X 3/16 GAS ENGINE	
POO1052	POO1052	COUPLER HALF 3/4 X 3/16 DIESEL ENGINE	1
POO1037	POO1037	0.84 CIR PUMP GAS DIESEL	1
POO1039	POO1039	GAS ENGINE	
POO637	POO637	DIESEL ENGINE	1
POO1044	POO1044	20-16 JIC ORB STRAIGHT	1
POO1057	POO1057	5/8" HOSE 10 FJIC 10 FJIC 90 X 19"	1
POO1066	POO1066	1 1/4" HOSE 20 FJIC 20 FJIC 90 X 77"	1
POO875	POO875	COUPLER HALF 1 1/8 X 1/4 GAS ENGINE	
POO1082	POO1082	COUPLER HALF 1 7/16 X 3/8 DIESEL ENGINE	1
POO877	POO877	COUPLING INSERT GAS ENGINE	
POO267	POO267	COUPLER INSERT DIESEL ENGINE	1
POO963	POO963	10-10 MJIC ORB STRAIGHT	1
SIP254	SIP254	MOTOR PLATE	1
SSC107	SSC107	COUPLER GUARD	1
SSC108	SSC108	HYDRAULIC PUMP MOUNTING PLATE	1

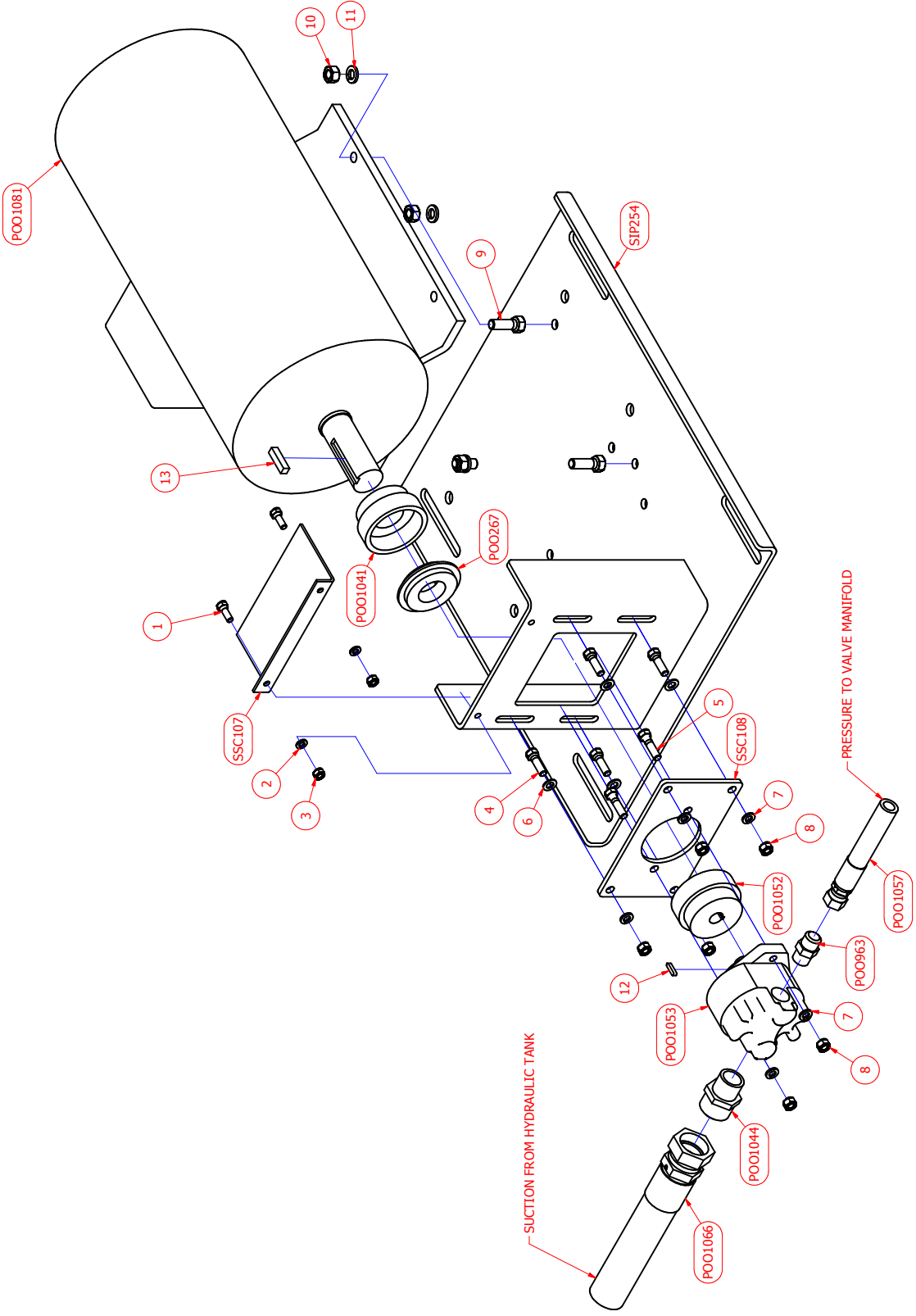


DRAWN T.Henry		5/22/2012	IDEAL MFG., INC. 2011 Harmish Blvd. Billings MT 59101 Tel. (406) 656-4360	
CHECKED	QA	5/22/2012	TITLE	
MFG		GAS OR DIESEL ENGINE HYDRAULIC ASSEMBLY		
APPROVED		SCALE		
REV		SIZE	DWG NO	REV
		C	S5-106	
				SHEET 1 OF 1

**SILO #5  
ELECTRIC MOTOR HYDRAULIC ASSEMBLY**

**SEE PAGE 19 DRAWING S5-107**

<b>REF. NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D NO.</b>
1	N/A	5/16-15 X 7/8 HEX BOLT	2
2	N/A	5/16 LOCK WASHER	2
3	N/A	5/16-18 HEX NUT	2
4	N/A	3/8 -16 X 1 1/4 HEX BOLT	4
5	N/A	3/8-16 X 1 1/2 HEX BOLT	2
6	N/A	3/8 FLAT WASHER	4
7	N/A	3/8 LOCK WASHER	6
8	N/A	3/8-16 HEX NUT	6
9	N/A	1/2-13 X 1 1/2 HEX BOLT	4
10	N/A	1/2-13 HEX NUT	4
11	N/A	1/2 LOCK WASHER	4
12	N/A	3/16 KEY X 5/8	1
13	N/A	3/8 KEY X 1 1/2	1
POO267	POO267	COUPLING INSERT	1
POO963	POO963	10-10 MJIC ORB STRAIGHT	1
POO1041	POO1041	COUPLING HALF 1 5/8 x 3/8	1
POO1044	POO1044	20-16 JIC ORB STRAIGHT	1
POO1052	POO1052	COUPLING HALF 3/4 X 3/16	1
POO1053	POO1053	1.69 CIR PUMP ELECTRIC	1
POO1057	POO1057	5/8" HOSE 10 FJIC 10 FJIC 90 X 19"	1
POO1066	POO1066	1 1/4" HOSE 20 FJIC 20 FJIC 90 X 77"	1
POO1081	POO1081	20 HP MOTOR	1
SIP254	SIP254	MOTOR PLATE	1
SSC107	SSC107	COUPLER GUARD	1
SSC108	SSC108	HYDRAULIC PUMP MOUNT	1



DRAWN T.Henry	5/22/2012	IDEAL MFG., INC. 2011 Harnish Blvd. Billings MT 59101 Tel. (406) 656-4360	
CHECKED QA	5/22/2012	TITLE SILO 5 ELECTRIC MOTOR HYDRAULIC ASSEMBLY	
APPROVED MFG		SIZE C	DWG NO S5-107
		SCALE	REV
			SHEET 1 OF 1

**SILO #5**  
**HYDRAULIC ASSEMBLY**  
**FLOW CONTROL, COOLER, FILTER**  
**SEE PAGE 21 DRAWING S5-109**

REF NO.	PART NO.	DESCRIPTION	REQ'D
1	N/A	1/2-13 X 1 1/4 Hex Nut	4
2	N/A	1/2 Flat Washer	4
3	N/A	1/2 Lock Washer	4
4	N/A	1/2-13 Hex Nut	4
POO265	POO265	Breather With Dip Stick	1
POO400	POO400	1/2ö NPT Sch. 80 Close Nipple	4
POO758	POO758	2ö X 10ö Pipe Nipple	1
POO762	POO762	2ö Coupler	1
POO1020	POO1020	1 1/4ö X 4ö Pipe Nipple	1
POO1021	POO1021	1 1/4ö 90 deg Elbow	1
POO1022	POO1022	Suction Strainer	1
POO1023	POO1023	Filter Head	1
POO1024	POO1024	Filter Element	1
POO1025	POO1025	Filter Indicator Gage	1
POO1028	POO1028	Heat Exchanger / Cooler	1
POO1029	POO1029	Flow Control (factory set do not adjust)	2
POO1038	POO1038	Temperature Switch	1
POO1043	POO1043	20-20 JIC NPT Straight	1
POO1047	POO1047	12-20 JIC NPT Straight	1
POO1054	POO1054	Breather and Fill Cap Fuel Tank	1
POO1055	POO1055	3/4ö Hose 12 FJIC 12 FJIC X 48 3/4ö	1
POO1056	POO1056	3/4ö Hose 12 FJIC 12 FJIC 90 deg X 26ö	1
POO1063	POO1063	1/2ö Hose 8 MNPT 8 FJIC X 23ö	1
POO1064	POO1064	1/2ö Hose 8 MNPT 8 MNPT X 56 1/4ö	2
POO1065	POO1065	1/2ö Hose 8 MNPT 8 MNPT X 101ö	2
POO1066	POO1066	1 1/4ö Hose 20 FJIC 20 FJIC 90 deg X 77	1
POO1072	POO1072	1/2ö Hose 8 MNPT 8 FJIC X 30ö	1
POO1073	POO1073	12 JIC 16 ORB 90 deg	2
POO1075	POO1075	8 FNPT Female Coupler	2
POO1076	POO1076	8 FNPT Male Coupler	2





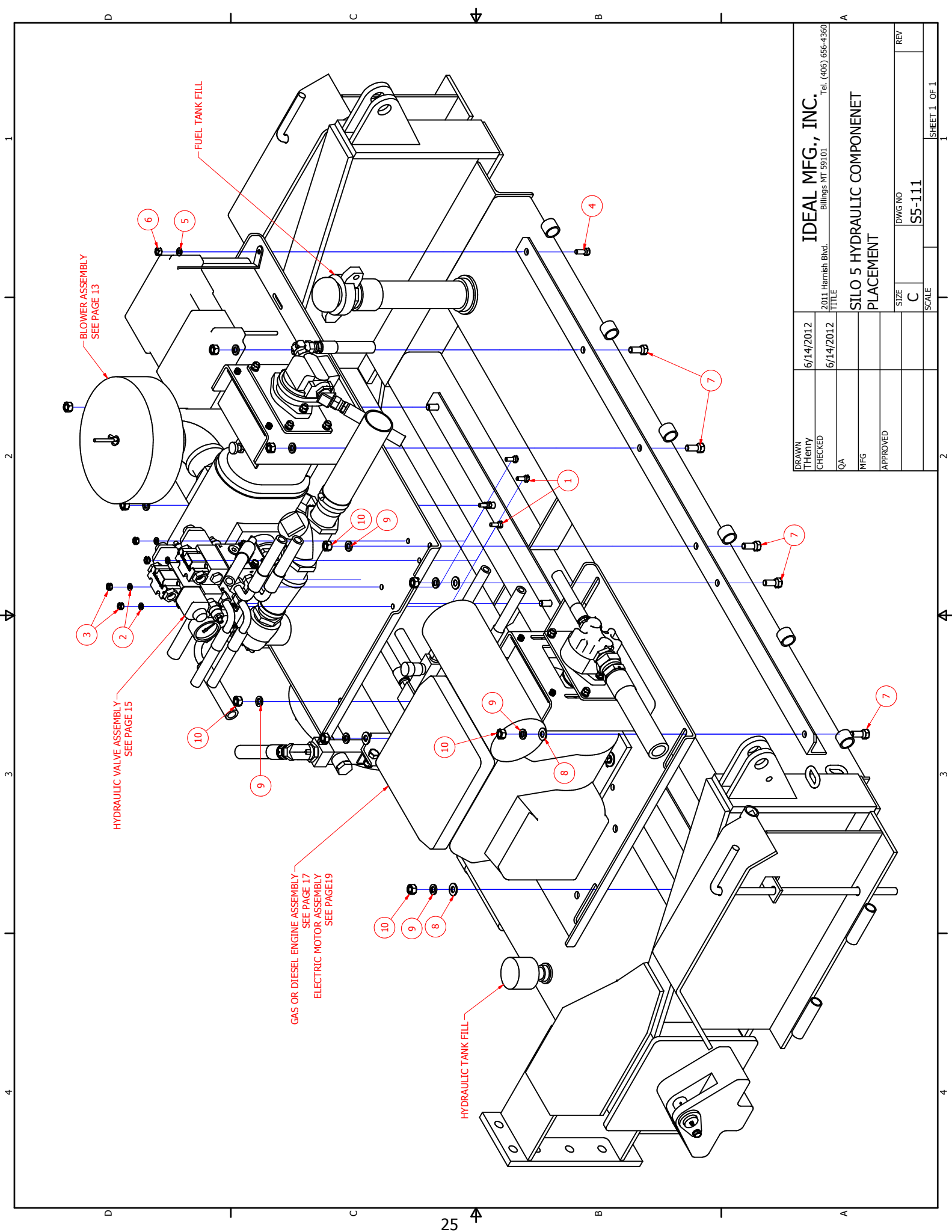
**SILO #5**  
**HYDRAULIC ASSEMBLY CYLINDERS**  
**SEE PAGE 23 DRAWING S5-110**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	N/A	3/8-16 X 1 Hex Bolt	2
2	N/A	3/8 Lock Washer	2
3	N/A	Grease Zerk	2
POO369	POO369	Hydraulic Cylinder	2
POO400	POO400	1/2" NPT sch 80 Close Nipple	4
POO642	POO642	Clamp	2
POO807	POO807	Flow Restrictor 1/2" MNTP 1/2" FNPT (Shop Drill 3/32 Orifice)	4
POO808	POO808	1/2" MNPT 1/2" FNPT 90 deg Elbow	4
POO1029	POO1029	Flow Control (factory set do not adjust)	2
POO1063	POO1063	1/2" Hose 8 MNPT 8 FJIC X 23"	1
POO1064	POO1064	1/2" Hose 8 MNPT 8 MNPT X 56 1/4"	2
POO1065	POO1065	1/2" Hose 8 MNPT 8 MNPT X 101"	2
POO1072	POO1072	1/2" Hose 8 MNPT 8 FJIC X 30"	1
POO1073	POO1073	12 JIC 16 ORB 90 deg	2
POO1075	POO1075	8 FNPT Female Coupler	2
POO1076	POO1076	8 FNPT Male Coupler	2
POO1080	POO1080	Hose Clamp Base	2
SIP251	SIP251	Lower Cylinder Pin	2



**SILO #5**  
**HYRAULIC COMPONENT PLACEMENT**  
**SEE PAGE 25 DRAWING S5-111**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	N/A	5/16-18 X 7/8 Hex Bolt	4
2	N/A	5/16 Lock Washer	4
3	N/A	5/16-18 Hex Nut	4
4	N/A	3/8-16 X 1 1/4 Hex Bolt	1
5	N/A	3/8 Lock Washer	1
6	N/A	3/8-16 Hex Nut	1
7	N/A	1/2-13 X 1 1/4 Hex Bolt	11
8	N/A	1/2 Flat Washer	4
9	N/A	1/2 Lock Washer	11
10	N/A	1/2-13 Hex Nut	11



BLOWER ASSEMBLY  
SEE PAGE 13

FUEL TANK FILL

HYDRAULIC VALVE ASSEMBLY  
SEE PAGE 15

GAS OR DIESEL ENGINE ASSEMBLY  
SEE PAGE 17  
ELECTRIC MOTOR ASSEMBLY  
SEE PAGE 19

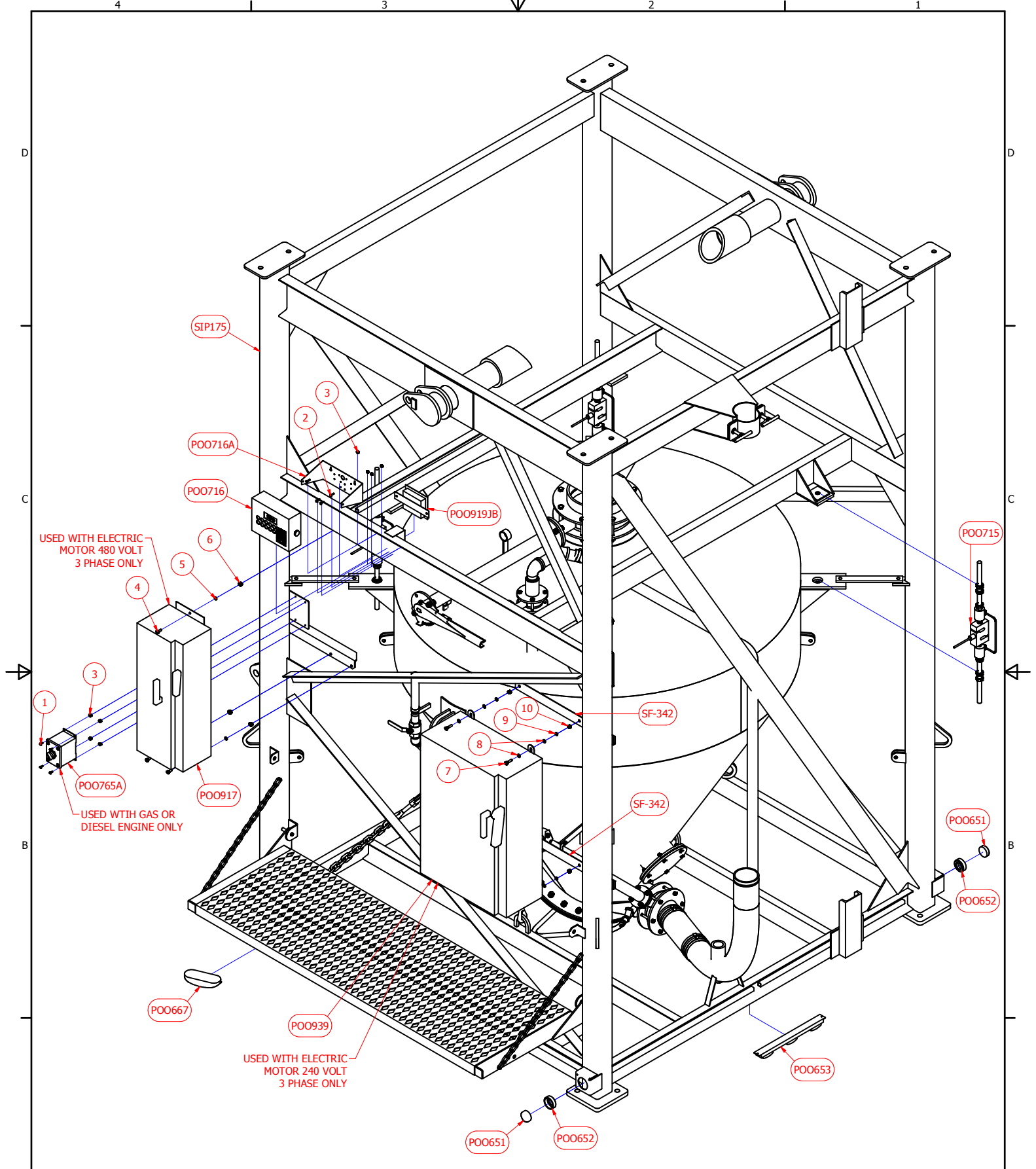
HYDRAULIC TANK FILL

IDEAL MFG., INC. 2011 Harnish Blvd. Billings MT 59101 Tel. (406) 656-4360	
DRAWN T.Henry	6/14/2012
CHECKED	6/14/2012
QA	
MFG	
APPROVED	
SIZE C	DWG NO S5-111
REV	
SCALE	SHEET 1 OF 1

SILO 5 HYDRAULIC COMPONENT  
PLACEMENT

**SILO #5**  
**WEIGH SYSTEM**  
**SEE PAGE 27 DRAWING S5-112**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	N/A	10-24 X 1/2 Machine Screw	4
2	N/A	10-24 X 3/4 Machine Screw	4
3	N/A	10-24 Hex Nut	8
4	N/A	5/16-18 X 3/4 Hex Bolt	3
5	N/A	5/16 Lock Washer	3
6	N/A	5/16-18 Hex Nut	3
7	N/A	5/16-18 X 1 1/4 Hex Bolt	4
8	N/A	5/16 Flat Washer	8
9	N/A	5/16 Lock Washer	4
10	N/A	5/16-18 Hex Nut	4
POO667	POO667	Signal-Stop Light	2
POO650	POO650	Clearance Light Amber (not shown)	4
POO651	POO651	Clearance Light Red	2
POO652	POO652	Rubber Grommet	6
POO653	POO653	Combination Identification Lights	1
POO715	POO715	Load Cell (set of four)	1
POO716	POO716	Digital Weigh Indicator	1
POO716A	POO716A	Mounting Bracket	1
POO765A	POO765A	Switch Box (gas / diesel only)	1
POO917	POO917	Electrical Enclosure 480 Volt 3 ph	1
POO939	POO939	Electrical Enclosure 240 Volt 3 ph	1
SIP175	SIP175	Frame Structure	1
SF-342	N/A	Factor Installed	2

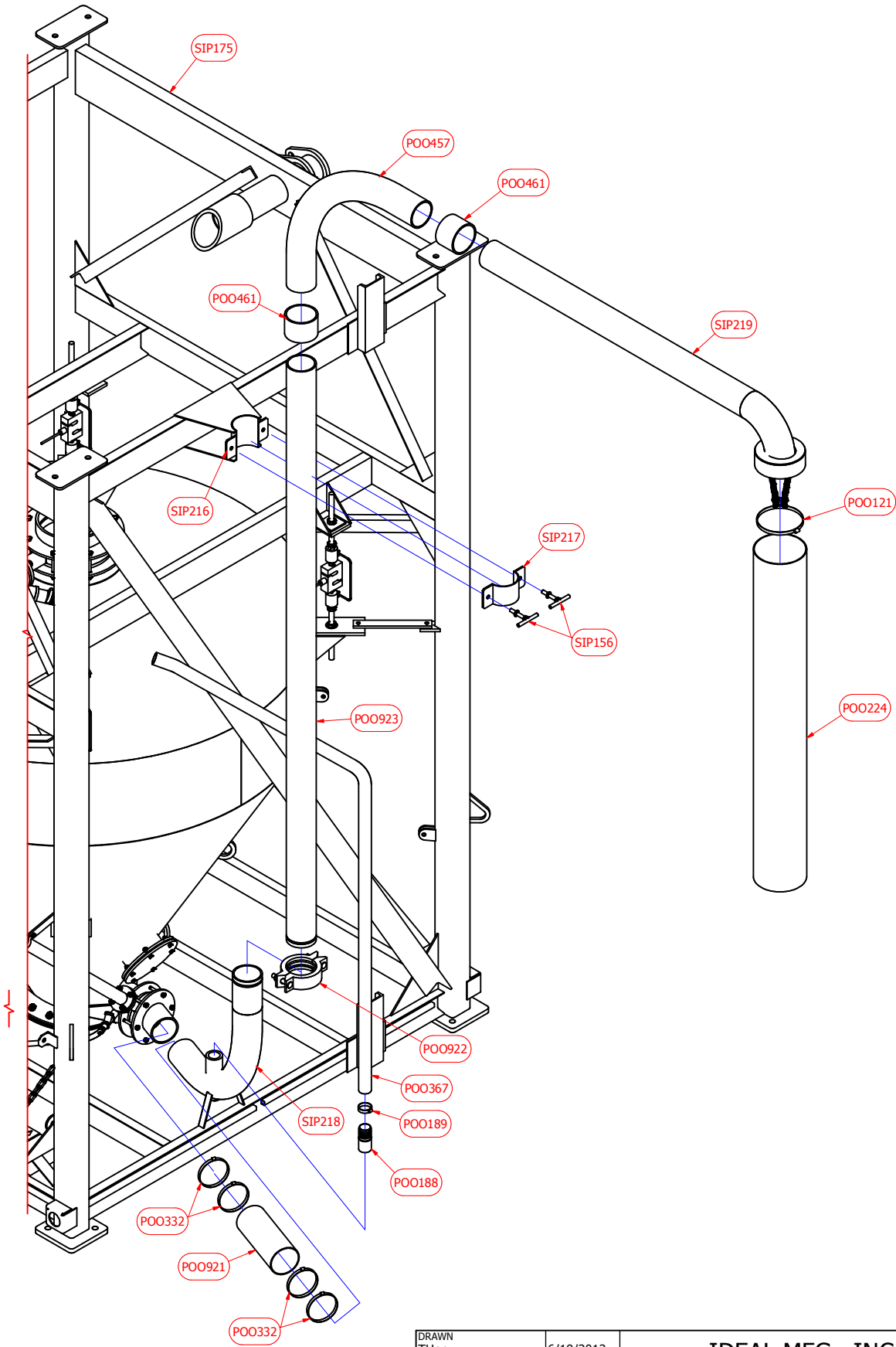


DRAWN	THenry	6/18/2012	<b>IDEAL MFG., INC.</b> 2011 Hamish Blvd. Billings MT 59101 Tel. (406) 656-4360		
CHECKED		6/18/2012			
QA			TITLE		
MFG			SILO 5 WEIGH SYSTEM		
APPROVED			SIZE	DWG NO	REV
			C	S5-112	
			SCALE	SHEET 1 OF 1	

**SILO #5**  
**DISCHARGE PIPE COMPONENTS**  
**SEE PAGE 29 DRAWING S5-113**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
POO121	POO121	Clamp	1
POO188	POO188	Nipple	1
POO189	POO189	Clamp	1
POO224	POO224	Boot (Main Discharge)	1
POO332	POO332	Clamp	4 (2 Ea. End of Boot)
POO367	POO367	Hose	1
POO457	POO457	4ö Elbow (Upper)	1
POO461	POO461	4ö Coupling	2
POO921	POO921	Discharge Boot Hopper to Discharge Pipe	1
POO922	POO922	4ö Victaulic Coupler	1
POO923	POO923	4ö Discharge Pipe with Victaulic Section	1
SIP156	SIP156	Discharge pipe bracket clamp 5/8" Bolt	2
SIP175	SIP175	Main Frame Structure	1
SIP216	SIP216	4ö Discharge Pipe Bracket Assembly	1
SIP217	SIP217	4ö Discharge Pipe Bracket Clamp	1
SIP218	SIP218	4ö Elbow (Lower Installed at Factory)	1
SIP219	SIP219	4ö Discharge Pipe (Horz. Sec.) with Diffuser	1

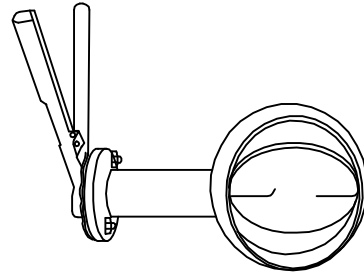
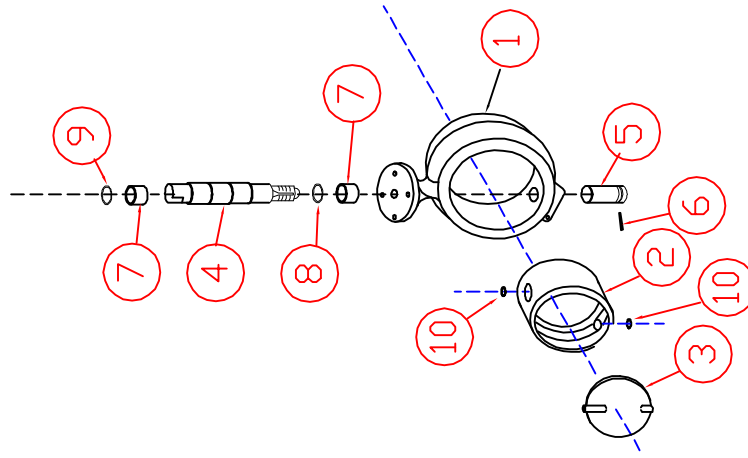
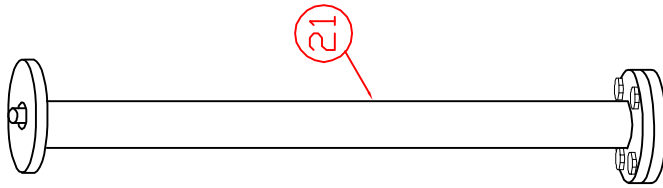
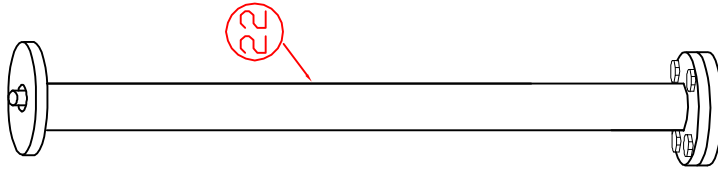
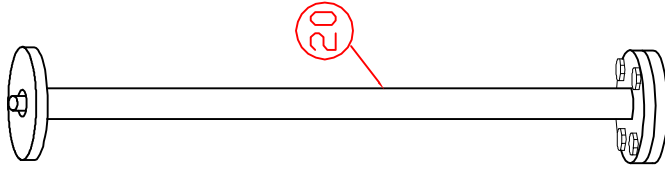
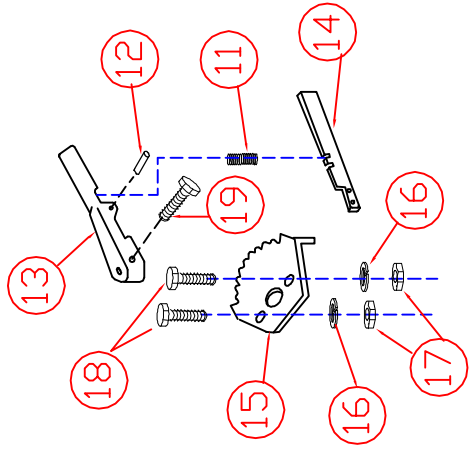




DRAWN	THenry	6/19/2012	<b>IDEAL MFG., INC.</b> 2011 Harnish Blvd. Billings MT 59101 Tel. (406) 656-4360		
CHECKED		6/19/2012			
QA			TITLE		
MFG			SILO 5 DISCHARGE PIPE		
APPROVED			SIZE	DWG NO	REV
			C	S5-113	
			SCALE	SHEET 1 OF 1	

**SILO #5**  
**BUTTERFLY VALVE ASSEMBLY**  
**SEE PAGE 31 DRAWING # NU. 50**

REF. NO.	2" PART NO.	4" PART NO.	10" PART NO.	DESCRIPTION	REQ'D NO.
1	22137-012	22140-012	22144-0121	Body wafer	1
2	POO391C	POO382C	POO380C	Seat	1
3	POO391B	POO382B	POO380B	Disc	1
4	POO391E	POO382E	POO380E	Upper stem	1
5	POO391F	POO382F	POO380F	Lower stem	1
6	5448-18720	5448-18720	5448-25028	Spring pin	1
7	POO391G	POO382G	POO380G	Bushing	2
8	22117	13704	13706	Retainer	1
9	5526-114	5526-115	5526-115	Top O ring	1
10	5526-113	5526-116	5526-214	Stem O ring	2
11	16238	16238	16238	Spring	1
12	5445-25014	5445-25014	5446-37516	Spring pin	1
13	24237-001	24237-001	24240-001	Handle	1
14	23719-001	23719-001	23721-001	Latch	1
15	24242-001	24242-001	24245-001	Plate	1
16	5900-006	5900-006	5900-008	Lock washer	2
17	5327-024	5327-024	5327-028	Nut	2
18	5650-24020	5650-24020	5650-28024	Cap screw	2
19	5717-22012	5717-22012	5717-22016	Set screw	1
20		POO382A		4ö valve extension & inside shaft.	1
		POO382A-1		Inside shaft only	1
21			POO380A	10ö valve extension & inside shaft. (weigh hopper 32ö)	1
			POO380A-1	Inside shaft only	1
22			POO381A	10ö valve extension & inside shaft. (storage tank 34 ¾ö)	1
			POO381A-1	Inside shaft only	1



2" BUTTERFLY VALVE

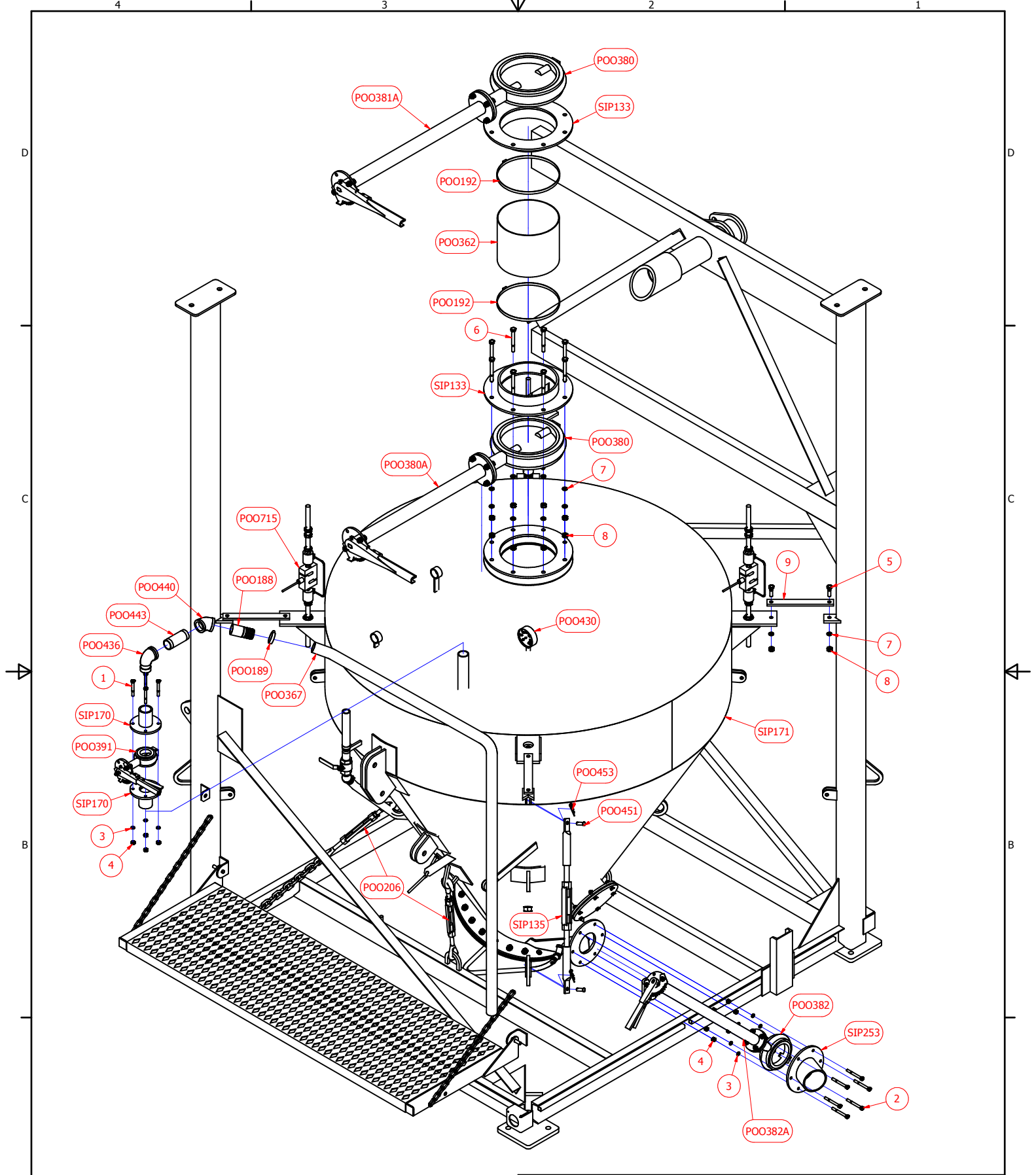
4" BUTTERFLY VALVE

10" BUTTERFLY VALVE

IDEAL MANUFACTURING INC.  
 PHONE (406)-656-4360 FAX: (406)-656-4363  
 SILO #5  
 2",4" & 10" BUTTERFLY VALVES ASSEMBLY  
 NU-50  
 DATE: 5-22-2013 ACAD-PAC / THH

**SILO #5**  
**WEIGH HOPPER, VAVLES & TIE-DOWNS**  
 SEE PAGE 33 DRAWING S5-114

REF. NO.	PART NO.	DESCRIPTION	REQ'D NO.
1	N/A	3/8-16 X 3 Hex Bolt	4
2	N/A	3/8-16 X 3 1/2 Hex Bolt	6
3	N/A	3/8 Lock Washer	10
4	N/A	3/8-16 Hex Nut	10
5	N/A	1/2-13 X 2 Hex Bolt	8
6	N/A	1/2-13 X 4 1/2 Hex Bolt	16
7	N/A	1/2 Lock Washer	24
8	N/A	1/2-13 Hex Nut	24
9	N/A	Shipping Bracket	4
POO188	POO188	Nipple	1
POO189	POO189	Clamp	1
POO192	POO192	Clamp (filler boot)	2
POO206	POO206	Turnbuckle tie-down 5/8" eye to jaw or 4 corner tie-down turnbuckle & chain assembly.	6
POO362	POO362	Filler boot	1
POO367	POO367	Hose (air by-pass)	1
POO380	POO380	10" butterfly valve assembly.	2
POO380A	POO380A	32" extension & handle (See Drawing# NU 50) page 33 for service parts	
POO381A	POO381A	34 3/4" extension & handle (See Drawing# NU 50) page 33 for service parts	
POO382	POO382	4" butterfly valve assembly.	1
POO382A	POO382A	Extension & handle (See Drawing# NU 50) page 33 for service parts	
POO391	POO391	Valve (2" butterfly & handle assembly.)	1
POO430	POO430	Pressure gauge	1
POO436	POO436	Elbow	1
POO440	POO440	Elbow	1
POO443	POO443	Nipple	1
POO451	POO451	Pin	8
POO453	POO453	Hair pin clip	8
POO715	POO715	Load cell (set of four)	1
SIP133	SIP133	10" valve flange weight boot adapter (1 each 10" valve assembly.)	2
SIP135	SIP135	Turnbuckle stiff-leg assembly.	4
SIP170	SIP170	Valve connection flange	2
SIP171	SIP171	Hopper 7000#	1
SIP253	SIP253	4" Butterfly valve flange weight boot adapter	1



DRAWN	THenry	6/19/2012	<b>IDEAL MFG., INC.</b> 2011 Harnish Blvd. Billings MT 59101 Tel. (406) 656-4360	
CHECKED		6/19/2012		
QA			TITLE	
MFG			SILO 5 WEIGH HOPPER AND VALVES	
APPROVED			SIZE	DWG NO
			C	S5-114
			SCALE	REV

**SILO #5**  
**AERATOR SYSTEM**  
**SEE PAGE 35 DRAWING S5-115**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
POO671	POO671	Fluidizer	6
POO672	POO672	EZ In Kit	6
POO730	POO730	Hose Clamp	11
POO732	POO732	1ö MNPT X 1ö Hose Barb	11
POO735	POO735	1øHose X 67ö	1
POO736	POO736	1ö Tee	1
POO737	POO737	1ö Close Nipple	1
POO738	POO738	1ö Hose X 18ö	1
POO739	POO739	1ö Hose X 34ö	2
POO740	POO740	1ö Hose X 62ö	2
POO741	POO741	1ö 90 deg. Street Elbow	1
POO744	POO744	1ö X 3/4ö 90 deg. Elbow	2
POO745	POO745	1ö X 3/4ö Reducing Tee	4
POO746	POO746	3/4ö Close Nipple	4



**SILO #5  
BAGHOUSE ASSEMBLY**

**SEE PAGE 37 DRAWING S5-116**

REF. NO.	PART NO.	DESCRIPTION	REQ'D NO.
1	N/A	3/8"-16 X 1 1/4" Hex Bolt	24
2	N/A	3/8"-16 X 2 1/2" Hex Bolt	2
3	N/A	3/8"-16 X 3 1/2" Hex Bolt	4
4	N/A	3/8" Flat Washer	8
5	N/A	3/8" Lock Washer	26
6	N/A	3/8"-16 Hex Nut	26
7	N/A	3/8" Nylon Lock Nut	4
POO159	POO159	Gasket (inspection cover)	1
POO193	POO193	Clamp	18
POO196	POO196	Spring	4
POO364	POO364	Filter bag	18
POO365	POO365	Cover (weatherproof)	1
POO452	POO452	1/2"-13 Wing Nut	3
POO511	POO511	Gasket (manifold)	1
POO511A	POO511A	Gasket (man hole)	1
SIP138	SIP138	Manifold	1
SIP139	SIP139	Filter Bag Support Hoop	1
SIP140	SIP140	Support Hoop Post	1
SIP152	SIP152	Man Hole Cover	1
SIP153	SIP153	Cover (inspection)	1

**SUBJECT:** Silo Baghouse (Air Filtering System)

**PURPOSE:** To prevent cement dust from entering the atmosphere during the filling process of the storage vessel.

**DESCRIPTION:** Filters:  
Quantity - 18  
Material - 10 oz polyester material -  
25 cfm per square foot  
Filter Surface - (each) 784 sq. in. = 5.44 sq. ft  
Total square feet of filter material = 98 sq. ft.  
Total cfm at 25 cfm per square foot = 2450 cfm

**MAINTENANCE:** Spring loaded upper bag mount that facilitates bag shaking both by wind action as well as manual action to result in filter bag cleaning.

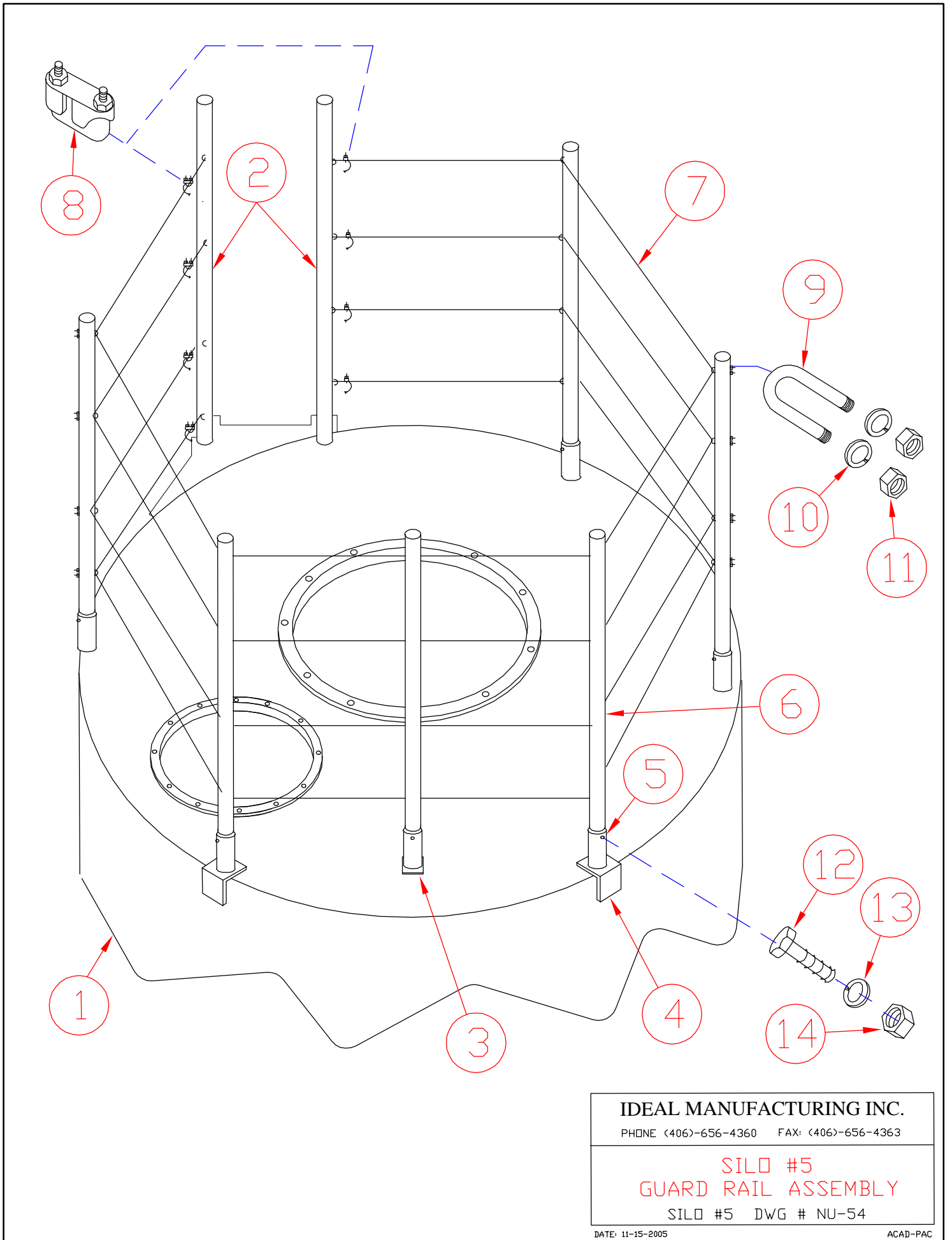
**EFFICIENCY:** 99.8%





**SILO #5**  
**GUARD RAIL ASSEMBLY**  
**DRAWING NU. # 54**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	SIP132	Storage Tank	
2	SIP141	Ladder Head Section	1 (Refer to Ladder Drawing)
3	SIP142	Socket Pad	1 (Factory Installed)
4	SIP143	Socket Angle	5 (Factory Installed)
5	SIP144	Socket	6 (Factory Installed)
6	SIP145	Guard Rail Post	6
7	POO485	Cable	4
8	POO205	Clamp	8
9	POO454	U-Bolt	24
10	NA	1/4 Lock Washer	48
11	NA	1/4-20 Nut	48
12	NA	3/8-16 X 2 Hex Bolt	6
13	NA	3/8 Lock Washer	6
14	NA	3/8-16 Hex Nut	6



**IDEAL MANUFACTURING INC.**  
 PHONE (406)-656-4360 FAX: (406)-656-4363

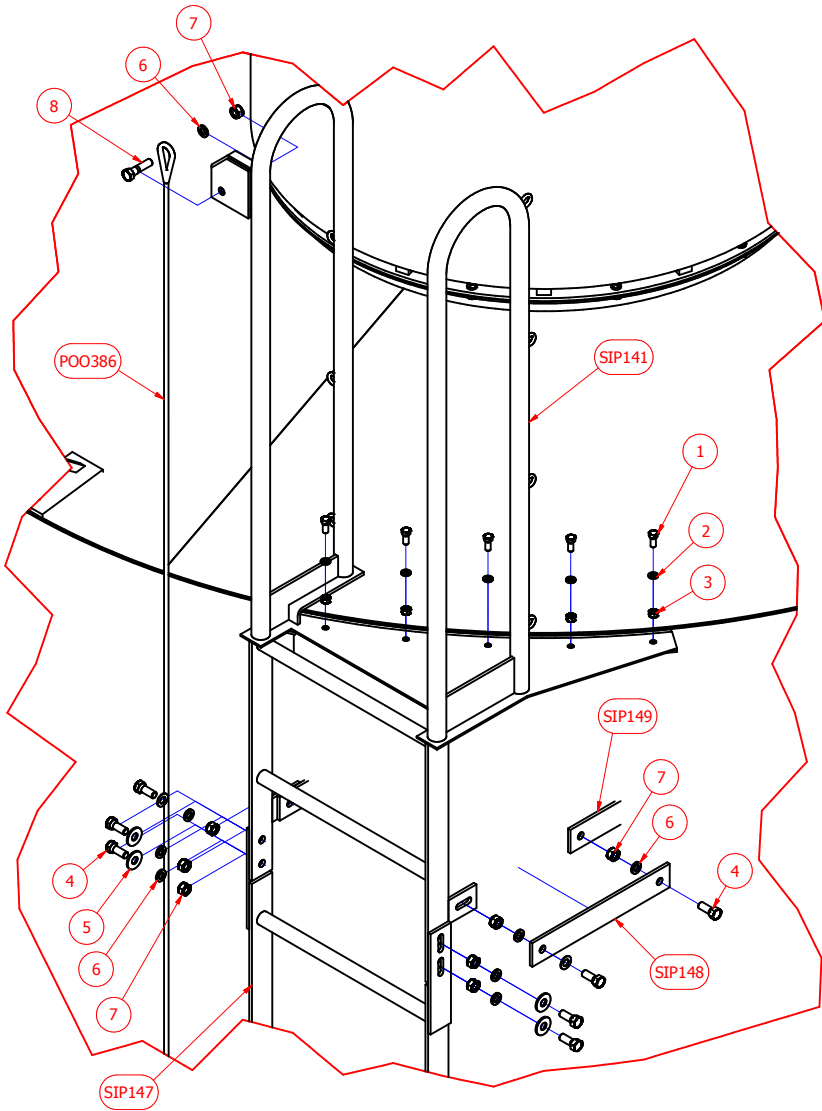
**SILO #5  
 GUARD RAIL ASSEMBLY**

SILO #5 DWG # NU-54

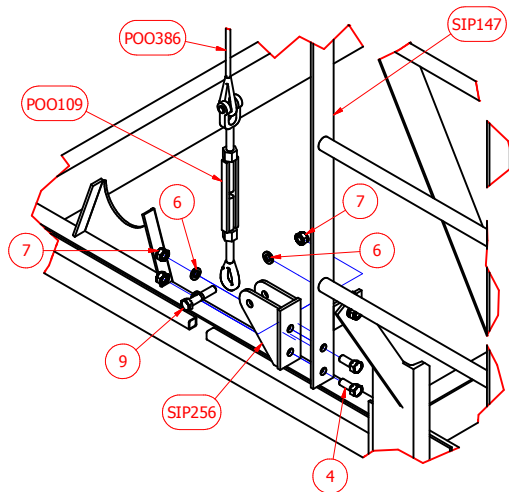
DATE: 11-15-2005 ACAD-PAC

**SILO #5**  
**LADDER WITH**  
**LADDER CLIMBERS SAFETY EQUIPMENT**  
**SEE PAGE 41 DRAWING S5-117**

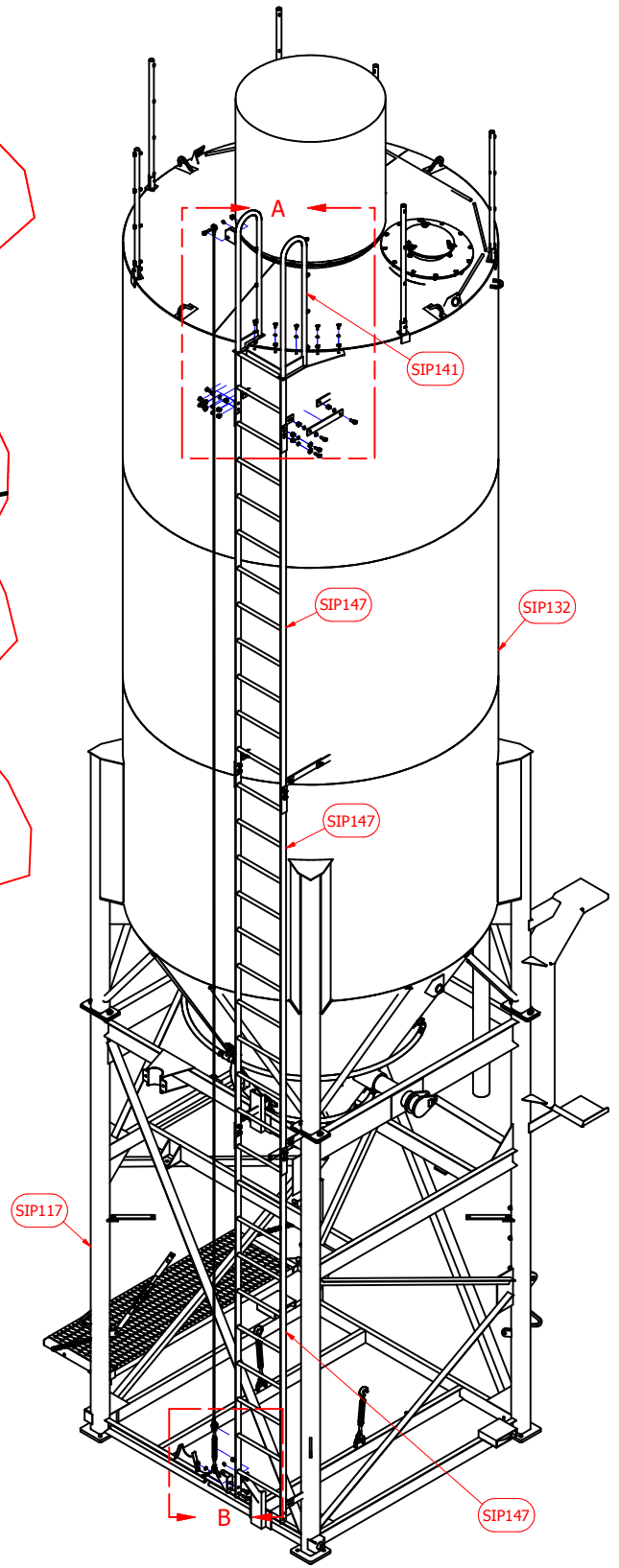
<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	N/A	3/8-16 X 1 Hex Bolt	5
2	N/A	3/8 Lock Washer	5
3	N/A	3/8-16 Hex Nut	5
4	N/A	1/2-13 X 1 1/4 Hex Bolt	24
5	N/A	1/2 Flat Washer	24
6	N/A	1/2 Lock Washer	26
7	N/A	1/2-13 Hex Nut	26
8	N/A	1/2-13 X 2 Hex Bolt	1
9	N/A	1/2-13 X 2 1/2 Hex Bolt	1
POO109	POO109	Turnbuckle	1
POO386	POO386	Cable	1
SIP117	SIP117	Main frame Structure	
SIP132	SIP132	Storage Tank	
SIP141	SIP141	Ladder Head Section	1
SIP147	SIP147	Main Ladder Section	3
SIP148	SIP148	Center Brace (Main Ladder Section)	3
SIP149	SIP149	Mounting Bracket (Main Ladder & Head Section)	8 (Factory Installed)
SIP256	SIP256	Safety Cable Mounting Bracket	1
Not Shown	POO385	Cable slide device	1
Not Shown	POO385A	3 ft. lanyard	1
Not Shown	POO385B	Carabineer	1
Not Shown	POO387	Safety Full-body harness	1



DETAIL A



DETAIL B



DRAWN THenry	6/22/2012	<b>IDEAL MFG., INC.</b> 2011 Harmish Blvd. Billings MT 59101 Tel. (406) 656-4360		
CHECKED	6/22/2012			
QA		TITLE		
MFG		SILO 5 LADDER AND COMPONENTS		
APPROVED		SIZE	DWG NO	REV
		C	S5-117	
		SCALE	SHEET 1 OF 1	

**SILO #5**  
**TRAILER FRAME WITH ASSEMBLY**  
**REAR SECTION**  
**SEE PAGE 43 DRAWING S5-118**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	N/A	5/8" X 1 1/2" Hex Bolt	8
2	N/A	5/8" Lock Washer	8
3	N/A	5/8" Hex Nut	8
4	N/A	3/4" X 2 1/2" Hex Bolt	20
5	N/A	3/4" Lock Washer	20
6	N/A	3/4" Hex Nut	20
POO1060	POO1060	Wheel Assembly	4
POO1061	POO1061	Axle Mount Angle (Welded to Trailer Frame)	N/A
POO1060-1	POO1060-1	9/16"-18 Lug Nut	32
POO1062	POO1062	Axle Assembly	2
SIP162	SIP162	Stabilizer Pin Holding Bar	2
SIP307	SIP307	Trailer Frame ó Front Section	1
SIP308	SIP308	Trailer Frame ó Rear Section	1

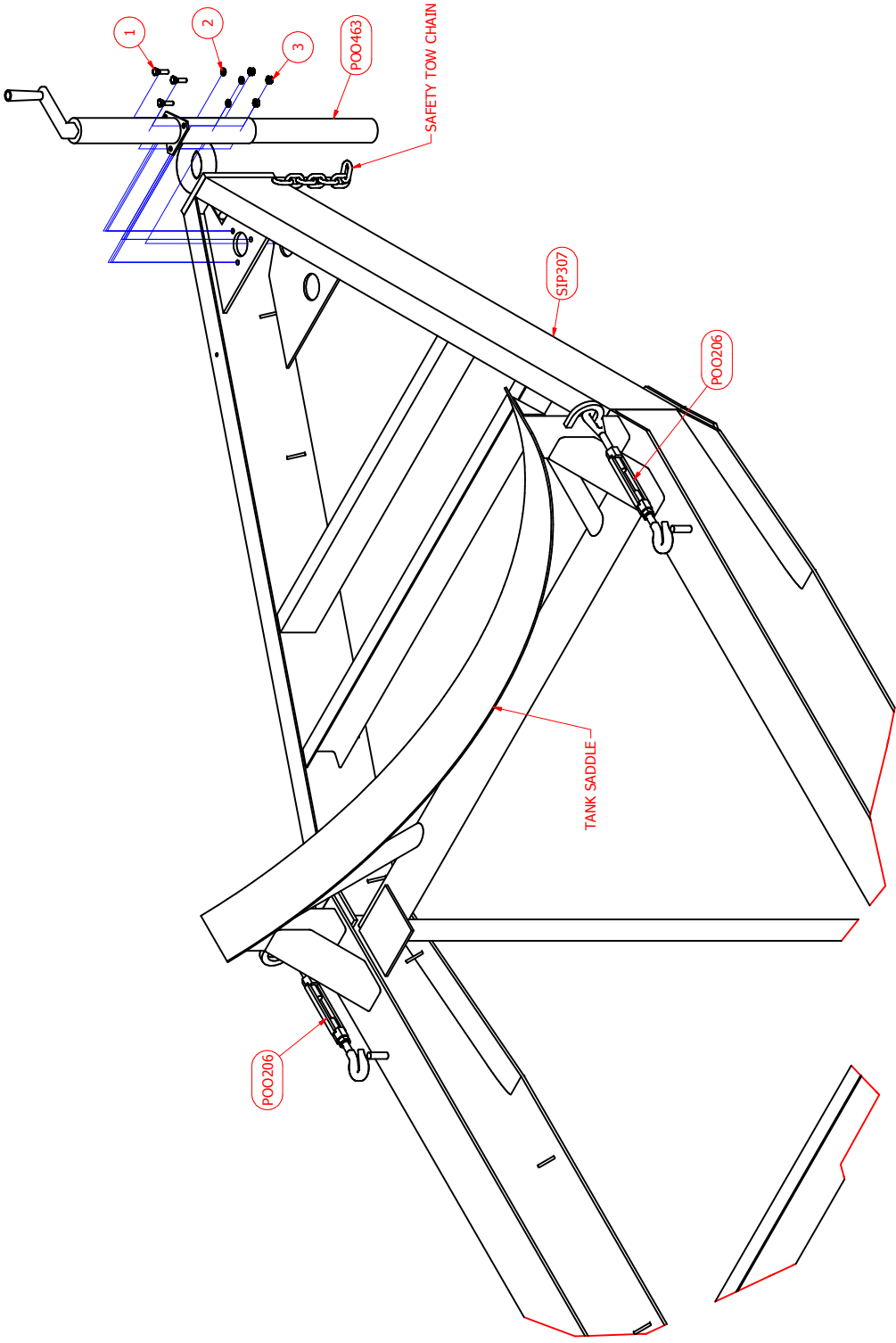


**SILO #5**  
**TRAILER FRAME ASSEMBLY**  
**FRONT SECTION**  
**SEE PAGE 45 DRAWING S5-119**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	N/A	3/8"-13 x 1 1/4" Hex Bolt	3
2	N/A	3/8" Lock Washer	3
3	N/A	3/8" Hex Nut	3
POO206	POO206	Silo Tie Down Turnbuckle	2
POO463	POO463	Tongue Jack	1
POO464	POO464	Jack Mounting Plate	1
POO465	POO465	Jack Foot (not shown)	1
SIP307	SIP307	Trailer Frame ó Front Section	1



SEE PAGE 43 FOR  
REAR HALF OF TRAILER

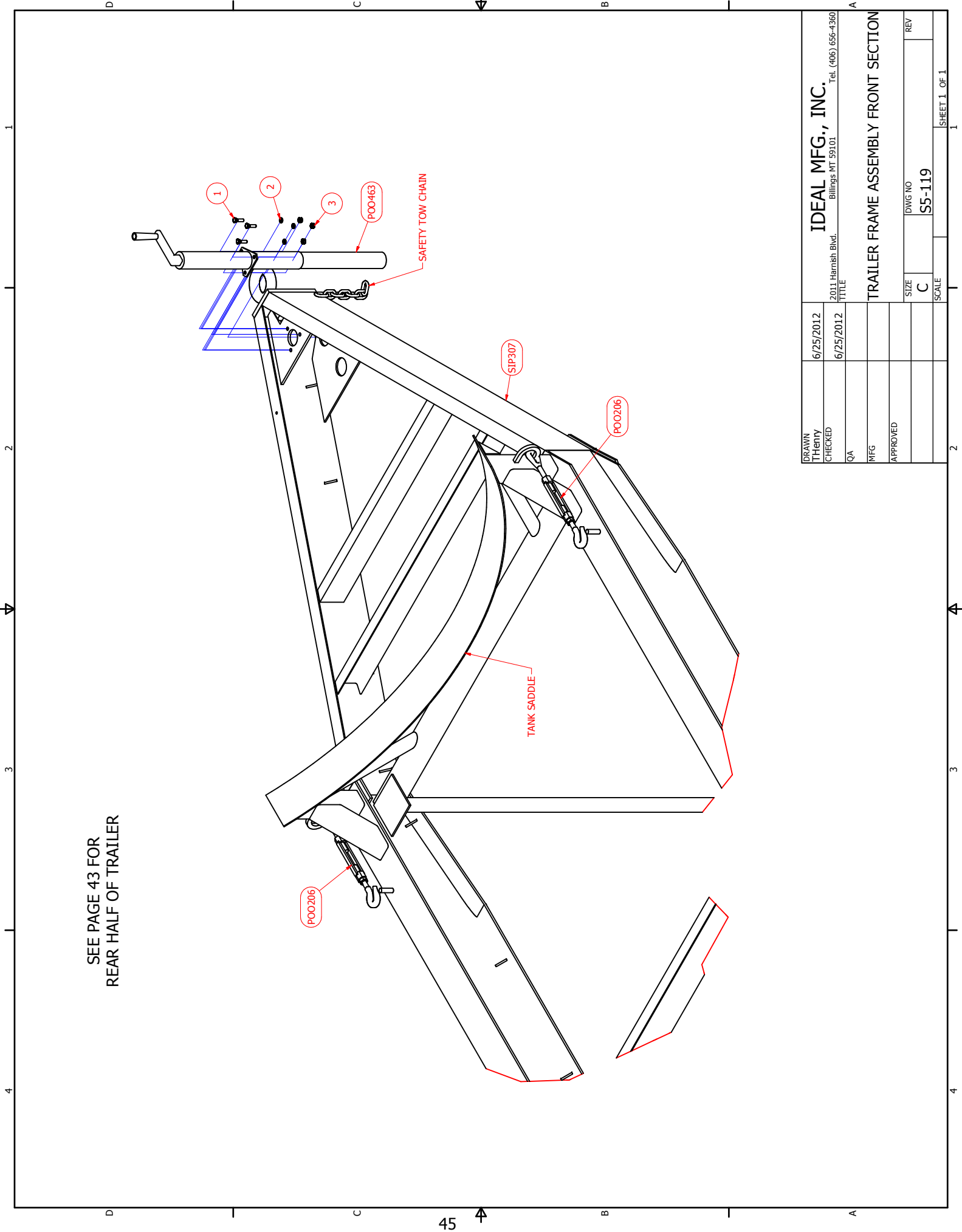


DRAWN	6/25/2012
THENRY	
CHECKED	6/25/2012
QA	
MFG	
APPROVED	
SCALE	
SIZE	C
DWG NO	S5-119
REV	

**IDEAL MFG., INC.**  
2011 Harmish Blvd. Billings MT 59101 Tel. (406) 656-4360

**TRAILER FRAME ASSEMBLY FRONT SECTION**

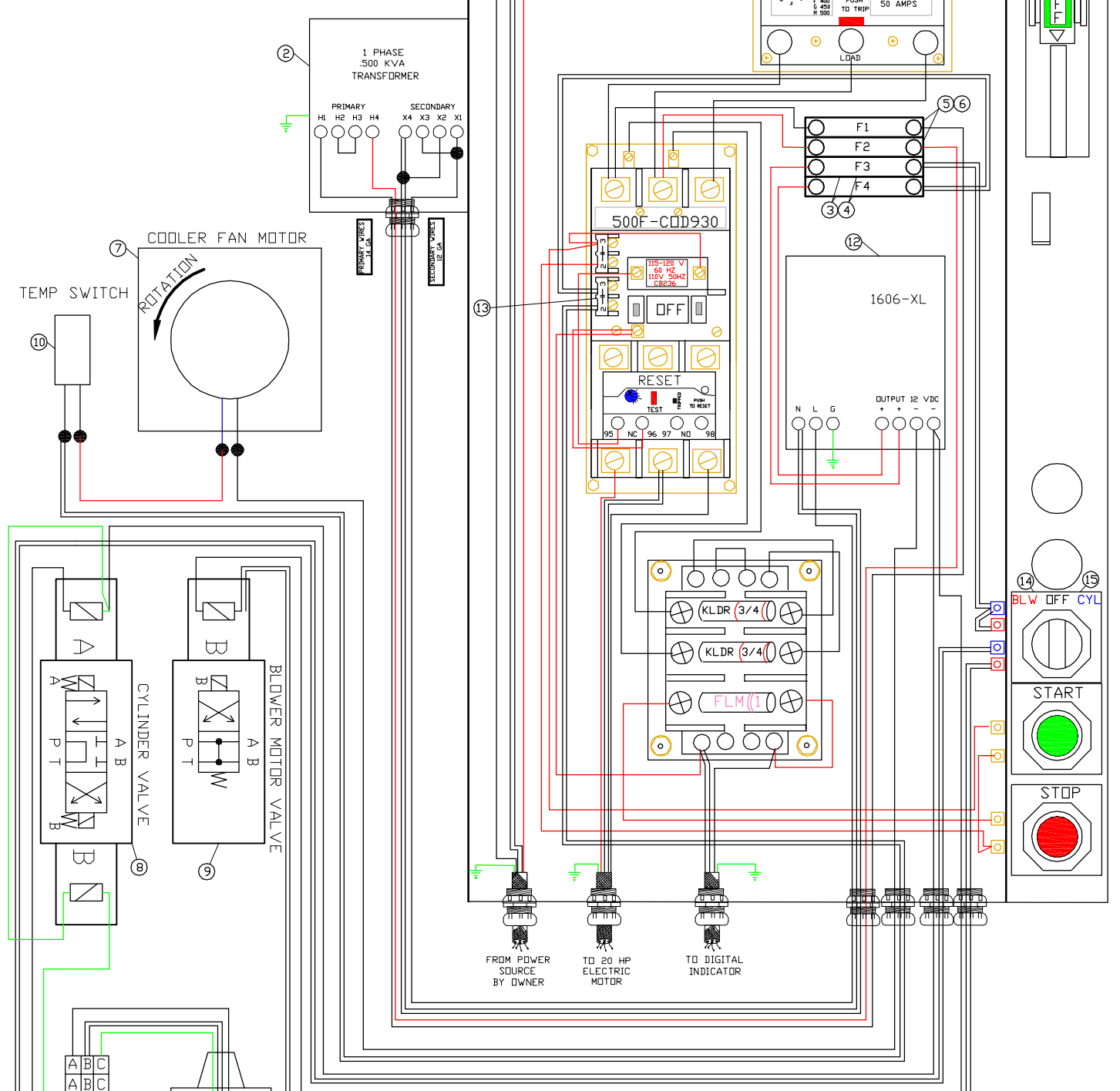
SCALE: \_\_\_\_\_ SHEET 1 OF 1



**SILO #5  
ELECTRICAL ENCLOSURE  
480 VOLT PRIMARY 3 PHASE  
110 VOLT SECONDARY  
20 HP MOTOR  
DRAWING S5-460**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	POO917	Combination Starter Assembly 480 Volt 3 Phase 20 HP Motor 513-CJB-A2J-1-6P-44	1
2	PEO280	Transformer 1 PH .500 KVA	1
3	PEO625	Fuse Block	2
4	PEO625A	Fuse 1 Amp 250 Volt	2
5	PEO647	Fuse Block	2
6	PEO648	Fuse 4 Amp 600 Volt	2
7	POO1028	Hydraulic Cooler (on hydraulic tank)	1
8	POO1032	Hydraulic Valve (cylinders)	1
9	POO1033	Hydraulic Valve (blower motor)	1
10	POO1038	Temperature Switch (hydraulic oil)	1
11	POO1110	Pendant	1
12	POO1111	Transformer 12VDC 180W	1
13	POO563-G	N. O. Contact	1
14	POO982	Three Way Switch	1
15	POO982A	Name Plate	1

ENCLOSURE SIZE 10' X 24' X 8 7/32" DEEP  
 COMBINATION STARTER 513-CJB-A2J-1-6P-44  
 20 HP 480VOLT 3 PHASE  
 NEMA SIZE 2  
 50AMP CIRCUIT BREAKER  
 500F-CDD930 STARTER (120V COIL)  
 592-EEFC OVERLOAD RELAY  
 1497-B-BASX-3-N 80VA TRANSFORMER  
 PRIMARY FUSE 1 AMP/KLDR  
 SECONDARY FUSE .75 AMP/FLM



<b>FUSE F1</b>	4 AMP / 600 VOLT
<b>FUSE F2</b>	4 AMP / 600 VOLT
<b>FUSE F3</b>	3 AMP / 32 VOLT
<b>FUSE F4</b>	15 AMP / 32 VOLT

LEGEND	
—	WHITE
—	RED
—	BLACK
—	GREEN

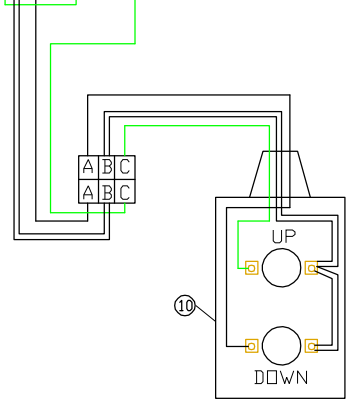
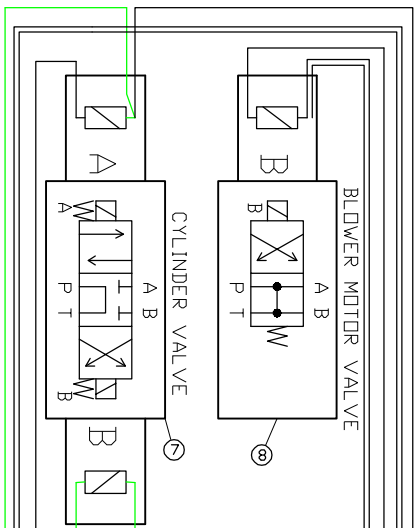
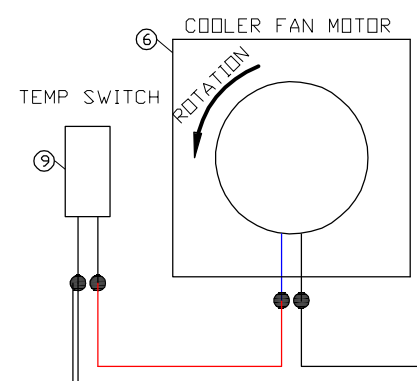
REVISIONS		
NO	DATE	DESCRIPTION
1	4-9-2014	ADDED CONTACT FOR COOLER FAN
2	4-10-2014	ADDED THREE WAY ON OFF SWITCH

IDEAL MANUFACTURING INC.	
2011 HARNISH BLVD, BILLINGS MT, 59101	
PHONE: (406)656-4360 FAX: (406)656-4363	
CEMENT SILO #5	
ELECTRICAL CONTROL PANEL	
480 VOLT 3 PHASE PRIMARY	
110 VOLT SECONDARY	
PAC	THH
DATE: 6-25-2012 DWG # SS-460	

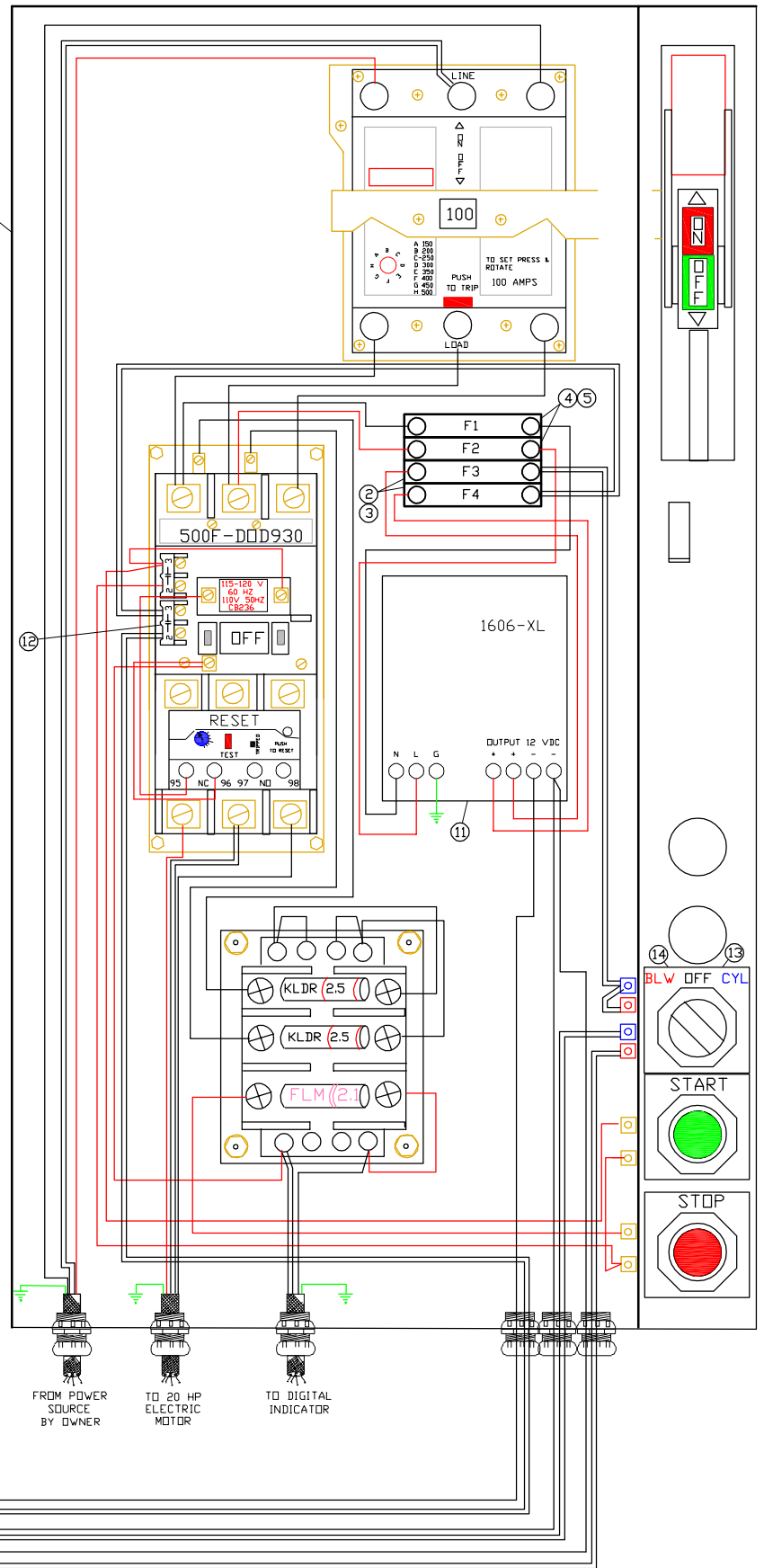
**SILO #5**  
**ELECTRICAL ENCLOSURE**  
**240 VOLT PRIMARY 3 PHASE**  
**110 VOLT SECONDARY**  
**20 HP MOTOR**  
**DRAWING S5-240**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	POO939	Combination Starter Assembly 240 Volt 3 Phase 20 HP Motor 513-DJA-A2L-1-6P-44	1
2	PEO625	Fuse Block	2
3	PE0625A	Fuse 1 Amp 250 Volt	2
4	PEO647	Fuse Block	2
5	PEO648	Fuse 4 Amp 600 Volt	2
6	POO1028	Hydraulic Cooler (on hydraulic tank)	1
7	POO1032	Hydraulic Valve (cylinders)	1
8	POO1033	Hydraulic Valve (blower motor)	1
9	POO1038	Temperature Switch (hydraulic oil)	1
10	POO1110	Pendant	1
11	POO1111	Transformer 12VDC 180W	1
12	POO563-G	N. O. Contact	1
13	POO982	Three Way Switch	1
14	POO982A	Name Plate	1

ENCLOSURE SIZE 10' X 24' X 8 7/32' DEEP  
 COMBINATION STARTER 513-DJA-A2L-1-6P-44  
 20 HP 240VOLT 3 PHASE  
 NEMA SIZE 3  
 100 AMP CIRCUIT BREAKER  
 500F-DDD930 STARTER (120V COIL)  
 592-EEGD OVERLOAD RELAY  
 1497-D-BASX-3-N 200VA TRANSFORMER  
 PRIMARY FUSE 2.5 AMP/KLDR  
 SECONDARY FUSE 2.1 AMP/FLM



①



<b>FUSE F1</b> 4 AMP / 600 VOLT
<b>FUSE F2</b> 4 AMP / 600 VOLT
<b>FUSE F3</b> 3 AMP / 32 VOLT
<b>FUSE F4</b> 15 AMP / 32 VOLT

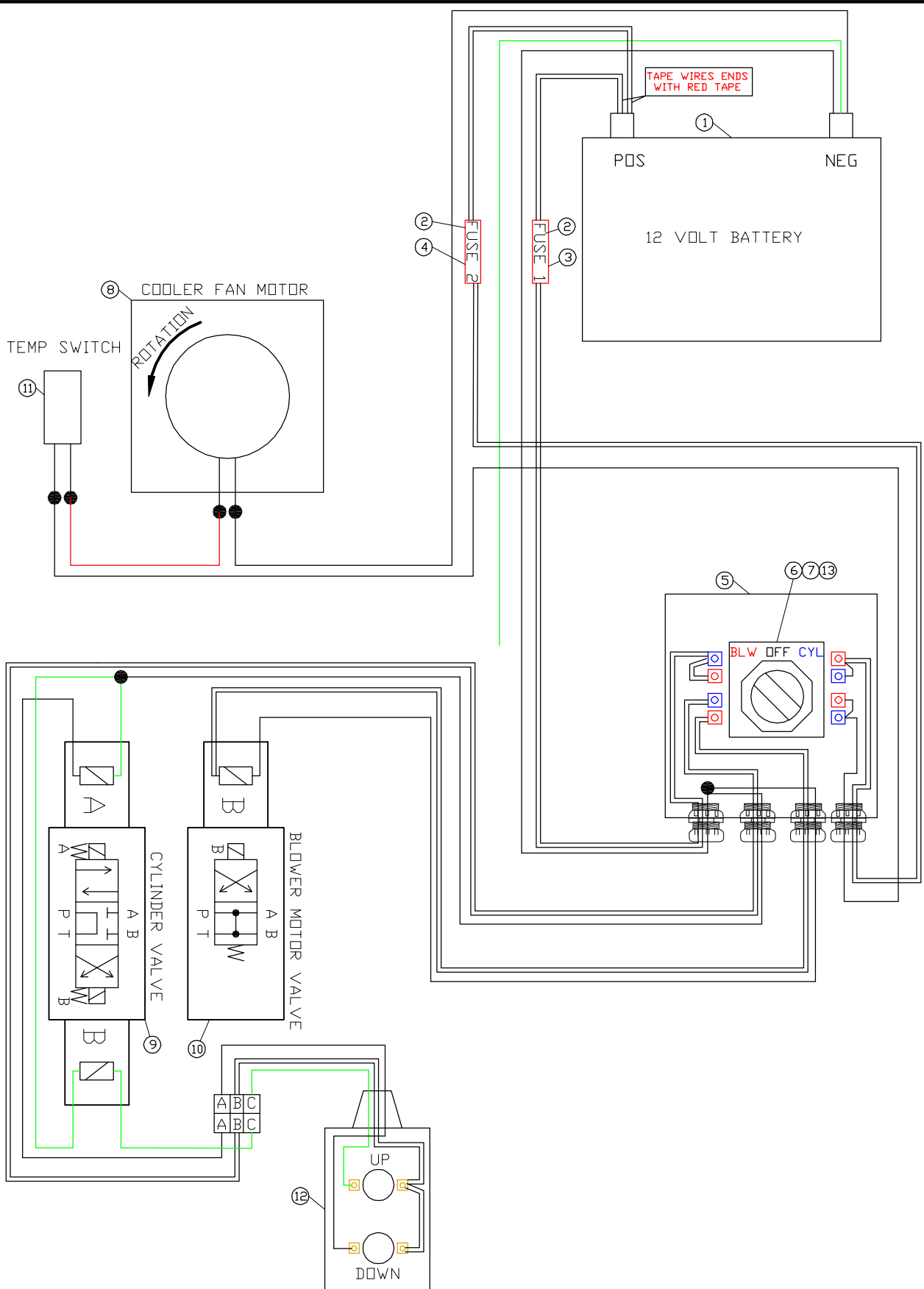
LEGEND	
—	WHITE
—	RED
—	BLACK
—	GREEN

REVISIONS		
NO	DATE	DESCRIPTION
1	4-9-2014	ADDED CONTACT FOR COOLER FAN
2	4-10-2014	ADDED THREE WAY ON OFF SWITCH

IDEAL MANUFACTURING INC. 2011 HARNISH BLVD, BILLINGS MT, 59101 PHONE: (406)656-4360 FAX: (406)656-4363	
CEMENT SILD #5	
ELECTRICAL CONTROL PANEL	
240 VOLT 3 PHASE PRIMARY 110 VOLT SECONDARY	
PAC ACAD TRH	DATE: 6-26-2012 DWG # 55-240

**SILO #5**  
**ELECTRICAL 12 VOLT DC**  
**DRAWING S5-12VDC**

<b>REF NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>REQ'D</b>
1	POO374	12 Volt DC Battery	1
2	N/A	Fuse Block	2
3	N/A	Fuse 3 Amp 32 Volt	1
4	N/A	Fuse 15 Amp 32 Volt	1
5	POO765A	Electrical Enclosure	1
6	POO982	Three Way Switch	1
7	POO766	Name Plate	1
8	POO1028	Hydraulic Cooler (on hydraulic tank)	1
9	POO1032	Hydraulic Valve (cylinders)	1
10	POO1033	Hydraulic Valve (blower motor)	1
11	POO1038	Temperature Switch (hydraulic oil)	1
12	POO1110	Pendant	1
13	POO973B	Contact	1

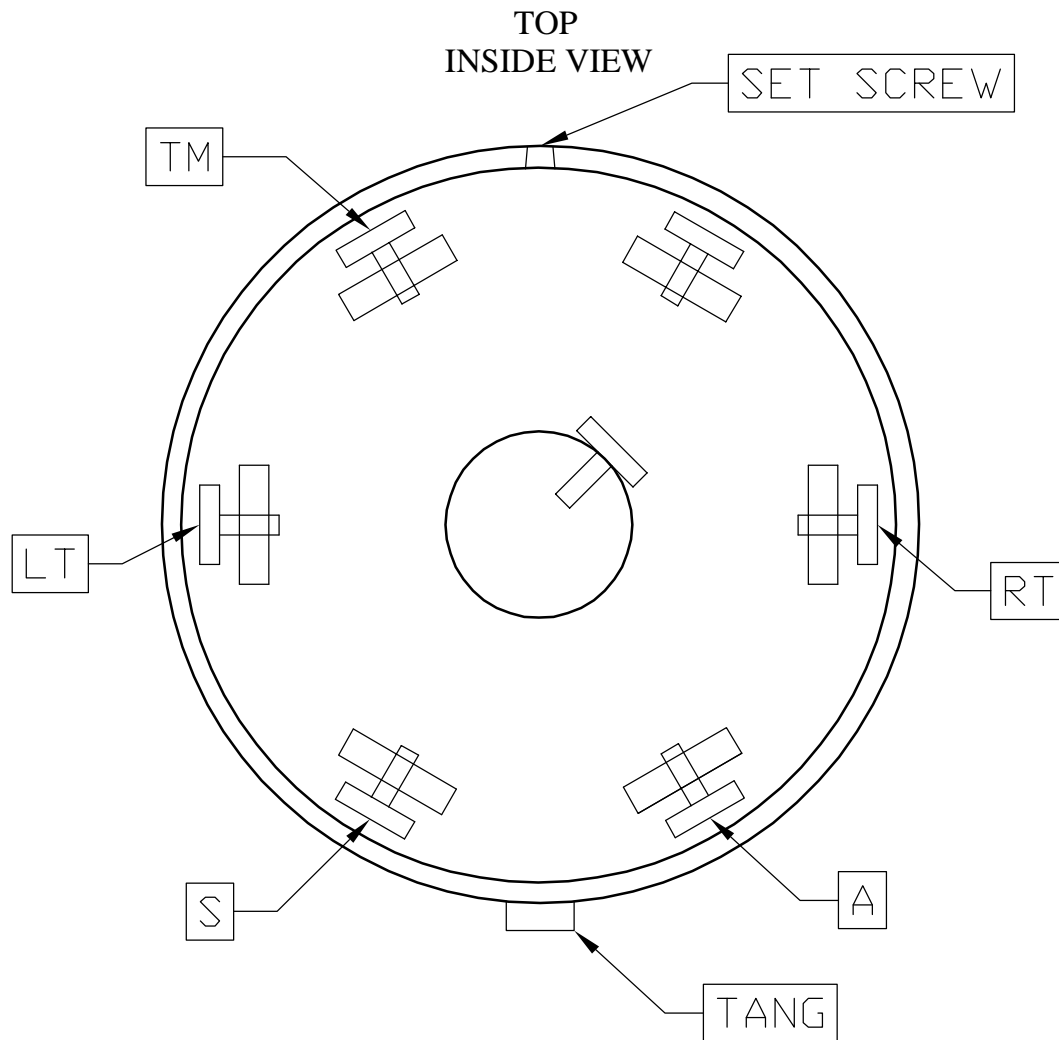


FUSE F1  
3 AMP / 32 VOLT

FUSE F2  
15 AMP / 32 VOLT

LEGEND  
 — WHITE  
 — RED  
 — BLACK  
 — GREEN

REVISIONS			IDEAL MANUFACTURING INC.	
NO	DATE	DESCRIPTION	2011 HARNISH BLVD. BILLINGS MT. 59101 PHONE: (406)656-4360 FAX: (406)656-4363	
			CEMENT SILO #5	
			ELECTRICAL DIAGRAM	
			12 VOLT DC	
			DATE: 6-27-2012	DWG # 55-12VDC



**SEVEN POLE PLUG CONNECTOR**

	DESCRIPTION	
TM	Tail & Clearance Lights	BROWN
S	Brake Ground	WHITE
RT	Right Signal	GREEN
LT	Left Signal	YELLOW
GD	Ground for Lights	WHITE
A	Hot Wire for Brake	BLACK

**IDEAL MANUFACTURING INC.**

PHONE (406)-656-4360 FAX: (406)-656-4363

SILO #5 ELECTRICAL CONNECTION  
FOR TOWING

SILO #5 DWG # NU-102

DATE: 6-28-2012

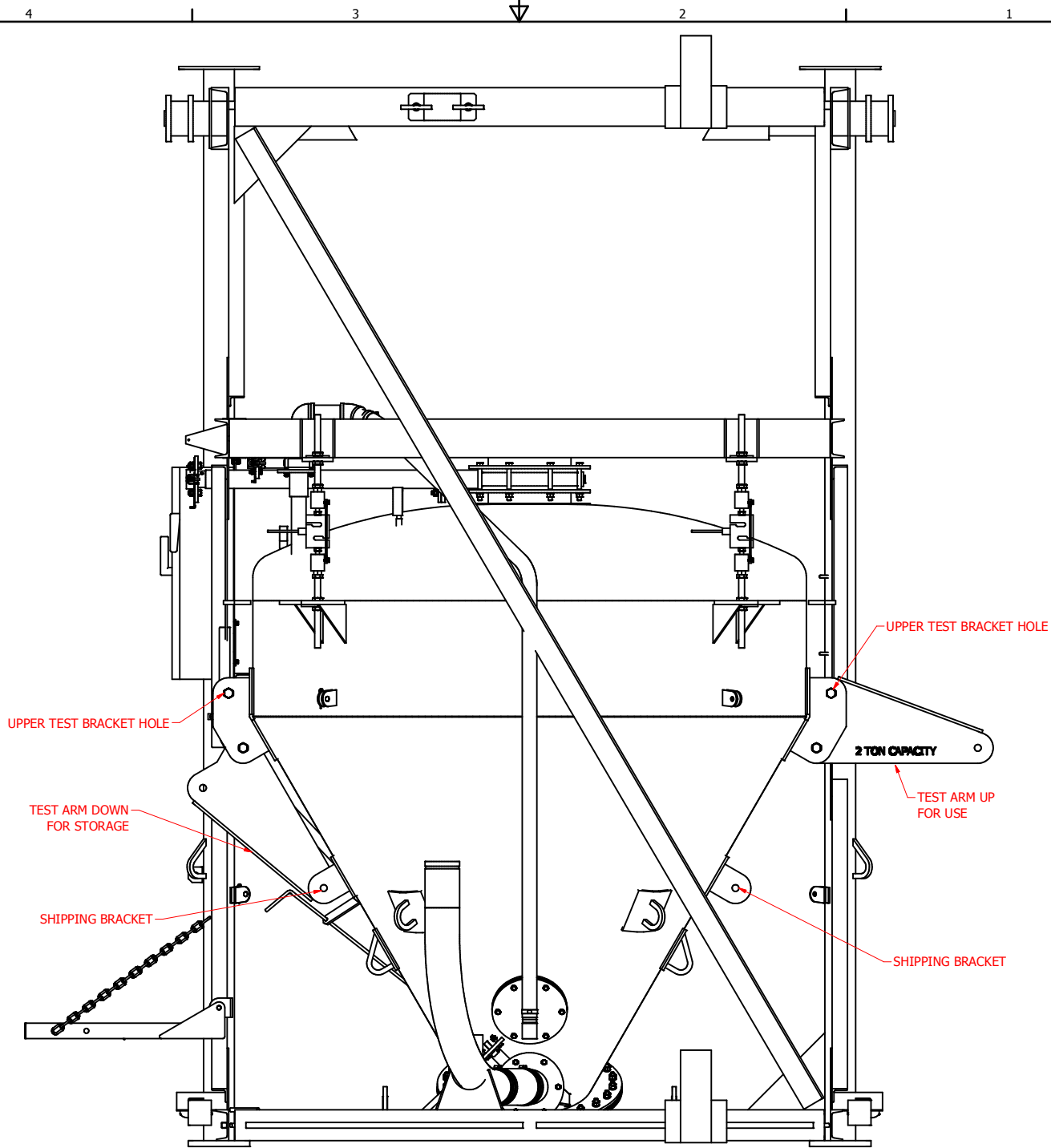
ACAD-PAC



## **RECOMMENDED MAINTENANCE**

1. Every 8 hour Shift.
  - a. Clean all cement dust off hydraulic cylinders.
  - b. Check hydraulic oil level in hydraulic tank (when adding hydraulic oil use A/W hydraulic oil all temp, multi VIS ASTM grade 150 ISO VG #32.
  - c. Clean cooling fins on hydraulic heat exchanger / cooler with compressed air.
  - d. Check engine oil.
2. Weekly
  - a. Check intake air filter on blower, and engine. Clean or replace if needed.
  - b. Check oil level on blower, both ends (use 30W non detergent oil only).
3. Monthly
  - a. Inspect Baghouse Filter Bags. Clean or replace as needed.
4. Yearly
  - a. Grease all pivot points on silo and trailer.

Note: Always use Full-body Harness, Lanyard, and Cable Slide Device when using Ladder to the top of the silo.



FOR CALIBRATION OF THE CARDINAL SCALE  
 ALL RED SHIPPING BRACKETS MUST BE REMOVED.  
 REMOVE BOLT FROM SHIPPING BRACKET  
 SWING WEIGHT TEST ARM UP AND  
 INSERT THE BOLT REMOVED INTO UPPER  
 TEST BRACKET HOLE. REPEAT ON OTHER SIDE.  
 MAXIMUM CAPACITY OF EACH ARM IS TWO TONS.  
 SEE CARDINAL SCALE OPERATION MANUAL FOR PROPER  
 CALIBRATION PROCEDURE OF THE 210 INDICATOR.  
 FOR BEST RESULTS PUT EQUAL WEIGHT ON EACH ARM.  
 AFTER CALIBRATION IS COMPLETE RETURN TEST  
 ARMS TO ORGNAL LOCATION.

DRAWN THenry	7/30/2012	<b>IDEAL MFG., INC.</b> 2011 Harnish Blvd. Billings MT 59101 Tel. (406) 656-4360	
CHECKED	7/30/2012		
QA		TITLE	
MFG		SCALE CALIBRATION ARMS	
APPROVED		SIZE C	DWG NO S5-120
		SCALE	REV
		SHEET 1 OF 1	



**210 and 215**  
**WEIGHT INDICATING INSTRUMENT**  
**INSTALLATION and TECHNICAL MANUAL**



8200-M411-O1 Rev B  
01/06

PO BOX 151 • WEBB CITY, MO 64870  
PH (417) 673-4631 • FAX (417) 673-5001  
[www.cardinalscale.com](http://www.cardinalscale.com)




Printed in USA



# TABLE OF CONTENTS

SPECIFICATIONS .....	Page 1
Standard Features .....	Page 2
Optional Features .....	Page 2
Certifications .....	Page 2
EUROPEAN DECLARATION OF CONFORMITY .....	Page 3
PRECAUTIONS .....	Page 4
SITE PREPARATION REQUIREMENTS .....	Page 5
INSTALLATION .....	Page 6
MOUNTING .....	Page 6
LOAD CELL CONNECTION .....	Page 7
LOAD CELL CONNECTIONS WITH OVER 30 FEET OF CABLE .....	Page 8
SERIAL I/O CABLE INSTALLATION .....	Page 9
OPTICALLY ISOLATED INPUTS .....	Page 9
OPTICALLY ISOLATED OUTPUTS .....	Page 9
RELAY BOARD (Optional) .....	Page 10
MAIN PCB (Figure No. 8) .....	Page 11
MAIN PCB JUMPERS .....	Page 12
RE-INSTALLING THE REAR PANEL .....	Page 12
KEYPAD FUNCTIONS .....	Page 13
ANNUNCIATORS .....	Page 18
SETUP AND CALIBRATION .....	Page 20
SETUP REVIEW .....	Page 39
CALIBRATION "C" NUMBERS .....	Page 39
ACCUMULATORS .....	Page 40
BEFORE YOU CALL SERVICE .....	Page 41
ERROR CODES .....	Page 42
CALIBRATION SEAL INSTALLATION .....	Page 43
AXLE WEIGHER OPERATION MODE .....	Page 44
PART IDENTIFICATION (210) .....	Page 46
PART IDENTIFICATION (215) .....	Page 50

SERIAL NUMBER _____
DATE OF PURCHASE _____
PURCHASED FROM _____
_____
_____
_____
RETAIN THIS INFORMATION FOR FUTURE USE

<b>PRECAUTIONS</b>					
<b>Before using this instrument, read this manual and pay special attention to all "WARNING" symbols:</b>					
	<b>IMPORTANT</b>		<b>ELECTRICAL WARNING</b>		<b>STATIC SENSITIVE</b>

## FCC COMPLIANCE STATEMENT

**WARNING!** This equipment generates uses and can radiate radio frequency and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference in which case the user will be responsible to take whatever measures necessary to correct the interference.

You may find the booklet “How to Identify and Resolve Radio TV Interference Problems” prepared by the Federal Communications Commission helpful. It is available from the U.S. Government Printing Office, Washington, D.C. 20402, stock No. 001-000-00315-4.

---

## PROPER DISPOSAL

When this device reaches the end of its useful life, it must be properly disposed of. It must not be disposed of as unsorted municipal waste. Within the European Union, this device should be returned to the distributor from where it was purchased for proper disposal. This is in accordance with EU Directive 2002/96/EC. Within North America, the device should be disposed of in accordance with the local laws regarding the disposal of waste electrical and electronic equipment.

It is everyone’s responsibility to help maintain the environment and to reduce the effects of hazardous substances contained in electrical and electronic equipment on human health. Please do your part by making certain that this device is properly disposed of. The symbol shown below indicates that this device must not be disposed of in unsorted municipal waste programs.



All rights reserved. Reproduction or use, without expressed written permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. While every precaution has been taken in the preparation of this manual, the Seller assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from use of the information contained herein. All instructions and diagrams have been checked for accuracy and ease of application; however, success and safety in working with tools depend to a great extent upon the individual accuracy, skill and caution. For this reason the Seller is not able to guarantee the result of any procedure contained herein. Nor can they assume responsibility for any damage to property or injury to persons occasioned from the procedures. Persons engaging the procedures do so entirely at their own risk.

# SPECIFICATIONS

*Unless otherwise noted, the specifications apply to both the Model 210 and Model 215.*

Power Requirements:	90 to 264 VAC (50/60 Hz) at 0.4A	
Enclosure Type:	NEMA 4X/IP66	
Enclosure Size:	9 3/16" W x 7 1/2" H x 3 1/8" D (233mm W x 191mm H x 79mm D)	
Weight:	8.2lbs - (9.6lb with battery)	
Operating Environment:	Temperature: 14 to 104 °F (-10 to +40 °C) Humidity: 90% non-condensing (maximum)	
Display:	<b>210</b>	<b>215</b>
	Six digit, seven segment, 0.6" high LED	Six digit, seven segment, 1" high LCD
Transducer Excitation:	12 VDC	
(Jumper selectable)	8 VDC with battery operation (jumper selectable)	
Signal Input Range:	1.0 mV min. to 40 mV max. (with dead load boost)	
Number of Load Cells:	8 each, 350 OHM minimum resistance	
Load Cell Cable Length:	1500 feet maximum. <b>Consult factory for other requirements</b> 30 feet maximum without sense lines	
Division Value:	1, 2, or 5 x 10, 1, 0.1, 0.01, 0.001 commercial 0 to 99, non-commercial	
Sensitivity:		
NON-COMMERCIAL	0.15 uV/e	
NTEP	0.3uV/e (Class III/IIIL)	
CANADA	0.3uV/e (Class III/IIHHD)	
OIML	0.7 uV/e (Class III)	
Scale Divisions:		
NON-COMMERCIAL	100 to 240,000	
NTEP	100 to 10,000 (Class III/IIIL)	
CANADA	100 to 10,000 (Class III/IIHHD)	
OIML	100 to 10,000 (Class III)	
Internal Resolution:	1 part in 16,777,216	
Tare Capacity:	Scale Capacity	
Sample Rate:	1 to 100 samples per second, selectable	
Auto Zero Range:	0.5 or 1 through 9 divisions	
Weighing Units:	<b>210</b>	<b>215</b>
	Tons, Pounds, Pounds-Ounces, Ounces, Metric Tons, Kilograms, Grams	Pounds, Pounds-Ounces, Ounces, Kilograms, Grams
Keypad:	Color coded Membrane type, 22 keys	
Standard I/O:	(1) bi-directional RS232 (20mA) (1) output only RS232 (20mA)	
Battery Operation:	210EU - CAM-350 Type, 12V 2Ah 215 – 10 "AA" Size, NiMH, 2300mAh	

## SPECIFICATIONS, Cont.

*Unless otherwise noted, the specifications apply to both the Model 210 and Model 215.*

### Standard Features:

- Push button tare function
- Gross, tare, net conversion
- Selectable key lockout
- Hi-Resolution mode
- Adjustable filtering
- Gross and Net accumulators
- Dual serial ports
- Remote input lines for Zero, Tare, Gross and Print (1000 feet maximum)
- Programmable print format using Visual Print or nControl (2 Visual Tickets available)
- SMA level 2 compliant serial communications  
(For more information see <http://www.scalemanufacturers.org>)
- Field re-programmable via PC interconnection
- Test feature (performs display and internal tests)
- Auto Shutoff and Sleep modes
- Battery operation  
(Requires additional hardware and includes additional documentation)
- Numeric keypad
- Keypad tare function
- Count feature with accumulator
- Time and Date with selectable 12 or 24 hour operation
- Checkweigher
- Three Preset Weight Comparators
- Axle Weigher (CWL-40) Operation Mode

### Optional Features:

Analog Output\*, Allen-Bradley Interface\*, 10/100 mbps Ethernet Adapter\*, Additional Serial Port\*, Checkweigher Light Bar\*, Internal Relay Box\*, External Relay Box\*, Special Filtering, and Column Mounting

\*This feature requires additional hardware and includes additional documentation.

### Certifications:

This equipment is certified to comply with the requirements for a Class III/IIIL device by the

- National Conference on Weights and Measurements (Certificate No. 01-011)
- Measurement Canada (Approval No. AM-5397)
- And for a Class III device by OIML R-76 (Certificate No. DK 0199.47).





# EUROPEAN DECLARATION OF CONFORMITY

Manufacturer: Cardinal Scale Manufacturing Company  
PO Box 151  
203 East Daugherty  
Webb City, Missouri 64870 USA

Telephone No. 417 673 4631  
Fax No. 417 673 5001

Product: Non-automatic Weight Indicating Instrument  
Model Numbers 200, 205, 210, 215 and 220  
Serial Number EXXXYY-ZZZ  
where XXX = day of year  
YY = last two digits of year  
ZZZ = sequential number

The undersigned hereby declares, on behalf of Cardinal Scale Manufacturing Company of Webb City, Missouri, that the above-referenced product, to which this declaration relates, is in conformity with the provisions of:

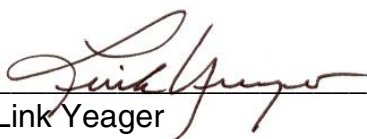
European Standard EN 45501: 1992 and equivalent International Recommendation OIML R76, edition 1992  
EU Type Approval Certificate Number DK 0199.47  
Report No. DANAK-195612

Council Directive 73/23/EEC (19 February, 1993) Low Voltage Directive as amended by Council Directive 93/68/EEC (22 July, 1993)

Council Directive 90/384/EEC (20 June, 1990) on the Harmonization Of the Laws of Member States relating to non-automatic weighing Systems as amended by:  
Council Directive 93/68/EEC (22 July, 1993)  
Report No. DANAK-195728

European Standard EN50082: 1995 for radiated emissions and  
European Standard EN50082-2: 1995 Class B for EMC immunity.

The Technical Construction File required by this Directive is maintained at the corporate headquarters of Cardinal Scale Manufacturing Company, 203 East Daugherty, Webb City, Missouri.

  
Link Yeager  
Director, Quality Assurance

# PRECAUTIONS

## Static Electricity



**CAUTION!** This device contains static sensitive circuit cards and components. Improper handling of these devices or printed circuit cards can result in damage to or destruction of the component or card. Such actual and/or consequential damage **IS NOT** covered under warranty and is the responsibility of the device owner. Electronic components must be handled only by qualified electronic technicians who follow the guidelines listed below.



**ATTENTION!** ALWAYS use a properly grounded wrist strap when handling, removing or installing electronic circuit cards or components. Make certain that the wrist strap ground lead is securely attached to an adequate ground. If you are uncertain of the quality of the ground, you should consult a licensed electrician.



**ALWAYS** handle printed circuit card assemblies by the outermost edges. **NEVER** touch the components, component leads or connectors. **ALWAYS** observe warning labels on static protective bags and packaging and never remove the card or component from the packaging until ready for use. **ALWAYS** store and transport electronic printed circuit cards and components in anti-static protective bags or packaging.

## Environmental

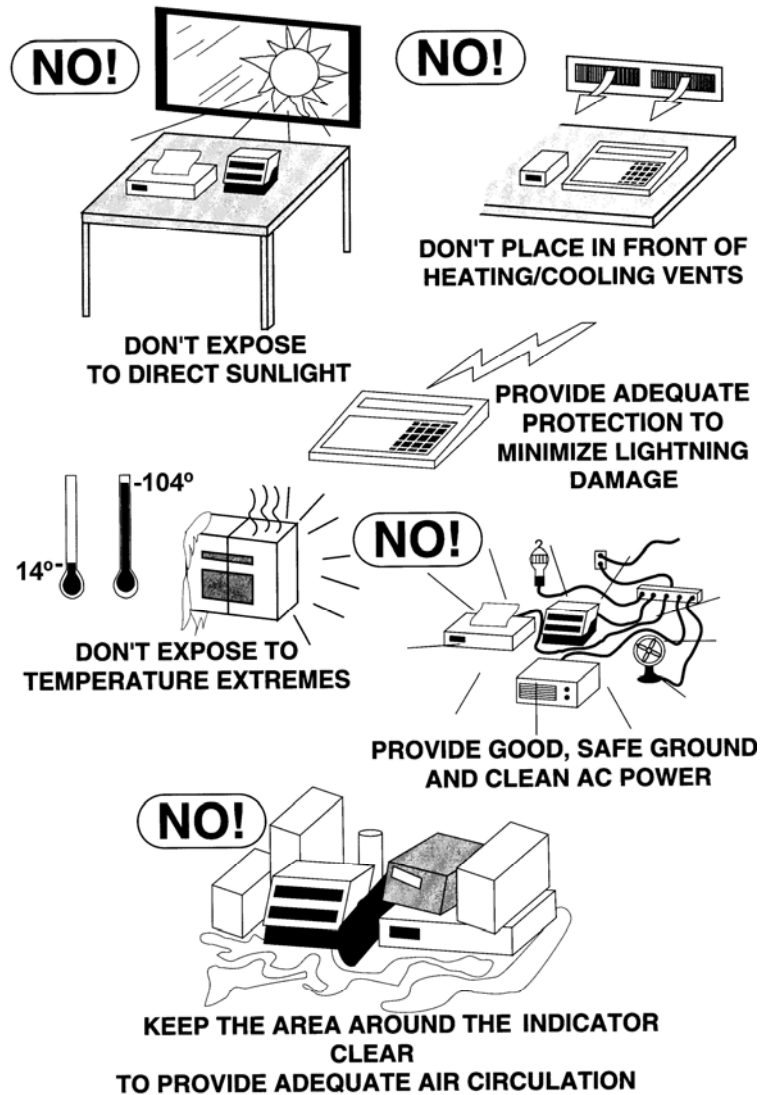
The 210/215 indicators meet or exceeds all certification requirements within a temperature range of 14 to 104 °F (-10 to +40 °C).

In order to keep cooling requirements to a minimum, the indicator should be placed out of direct sunlight and to provide adequate air circulation, keep the area around the indicator clear.

Make certain the instrument is not directly in front of a heating or cooling vent. Such a location will subject the indicator to sudden temperature changes, which may result in unstable weight readings.

Insure that the indicator has good, clean AC power and is properly grounded.

In areas subject to lightning strikes, additional protection to minimize lightning damage, such as surge suppressors, should be installed.



## PRECAUTIONS, Cont.

### Care and Cleaning

1. **DO NOT** submerge the indicator in water, pour or spray water directly on it.
2. **DO NOT** use acetone, thinner or other volatile solvents for cleaning.
3. **DO NOT** expose the indicator to temperature extremes.
4. **DO NOT** place the indicator in front of heating/cooling vents.
5. **DO** clean the indicator with a damp soft cloth and mild non-abrasive detergent.
6. **DO** remove power before cleaning with a damp cloth.

## SITE PREPARATION REQUIREMENTS

The Cardinal 210/215 indicators are precision weight-measuring instruments. As with any precision instrument, they require an acceptable environment to operate at peak performance and reliability. This section is provided to assist you in obtaining such an environment.

### Electrical Power

The 210/215 indicators have been designed to operate from 90 to 264 VAC at 50/60 Hz. Note that a special order is not required for operation at 230 VAC.



**CAUTION!** - To avoid electrical hazard and possible damage to the indicator, **DO NOT**, under any circumstance, cut, remove, alter, or in any way bypass the power cord grounding prong.

On models requiring 230 VAC power, **it is the responsibility of the customer** to have a qualified electrician install the proper power cord plug which conforms to national electrical codes and local codes and ordinances.

The power outlet for the indicator should be on a separate circuit from the distribution panel. This circuit should be dedicated to the exclusive use of the indicator. The wiring should conform to national and local electrical codes and ordinances and should be approved by the local inspector to assure compliance.

To prevent electrical noise interference, make certain all other wall outlets for use with air conditioning and heating equipment, lighting or other equipment with heavily inductive loads, such as welders, motors and solenoids are on circuits separate from the indicator. Many of these disturbances originate within the building itself and can seriously affect the operation of the instrument. These sources of disturbances must be identified and steps must be taken to prevent possible adverse effects on the instrument. Examples of available alternatives include isolation transformers, power regulators, uninterruptible power supplies, or simple line filters.



**CAUTION!** When in parallel runs, locate Load Cell cables a minimum of 24" away from all AC wiring.

# INSTALLATION

Before beginning installation of your 210/215 Weight Indicating Instrument, make certain that the instrument has been received in good condition. Carefully remove the instrument from the shipping carton and inspect it for any evidence of damage (such as exterior dents or scratches) that may have taken place during shipment. Keep the carton and packing material for return shipment if it should become necessary. It is the responsibility of the purchaser to file all claims for any damages or loss incurred during transit.

## MOUNTING

**NOTE!** Should your 210/215 indicator come already installed on a scale, the following information describing the installation of the instrument does not apply.

The Model 210/215 Indicator is housed in a NEMA 4X/IP66 stainless steel wall or desk-mount enclosure. The gimbal may be mounted on a desktop or other smooth, flat, horizontal surface or may be mounted on a wall. Refer to Figure No. 1 for a layout of wall-mounting bolts.

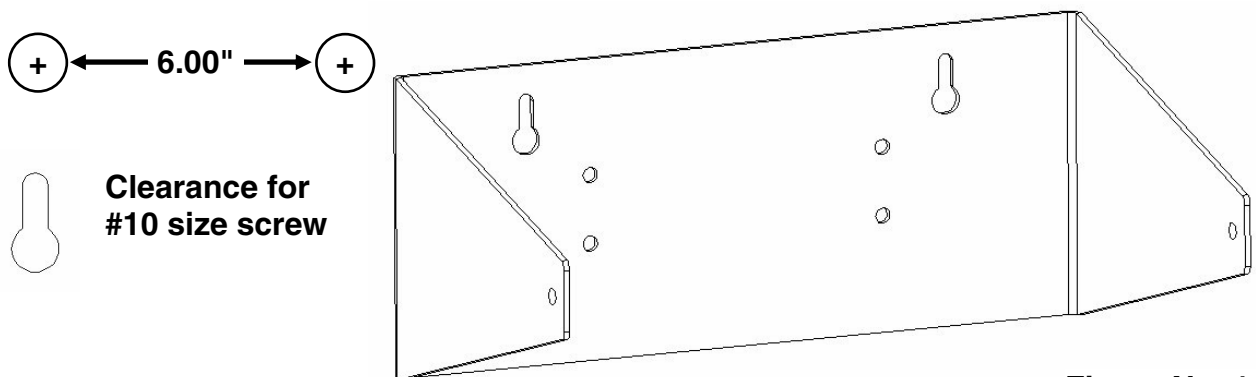


Figure No. 1

If wall mounted, make certain the mounting surface is strong enough to support the indicator. The mounting location should be where the display is easily viewed while being close enough to provide the operator easy access to the keypad. Carefully lay out the mounting hole locations, then drill and install the anchor bolts. Attach the gimbal to the wall and securely tighten the retaining bolts.

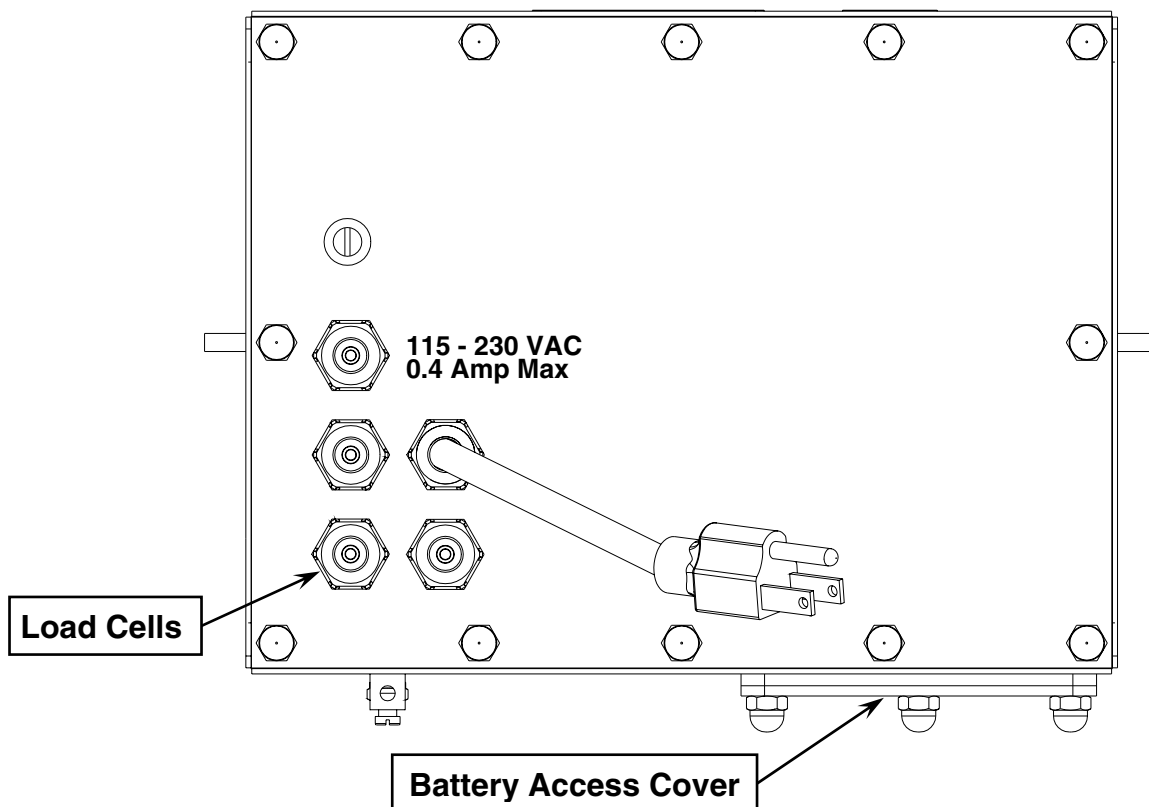


Figure No. 2

# INSTALLATION, CONT.

## LOAD CELL CONNECTION



**CAUTION!** Disconnect any external load cell power supply before connecting load cells to the indicator. Failure to do so will result in permanent damage to the indicator.

### Load Cell Cable Connection for RFI Suppression

The load cell cable should be routed through the special metallic gland connector and the shield wire must be connected to this gland connector for grounding and to eliminate RFI. Refer to Figure No. 2 and Figure No. 3 for the appropriate gland connector.

1. Remove the three acorn nuts securing the Battery Access Cover to the bottom of the indicator and then remove the battery tray (Model 215) or the battery (Model 210).
2. After removing the battery tray or battery, remove the 12 acorn nuts securing the back panel to main housing.
3. Loosen and remove the metal gland connector nut and remove the plastic insert.
4. Route the load cell cable through the nut and plastic insert and into the enclosure.
5. With the load cell cable routed into the enclosure, remove approximately 18 to 20 inches of the outer insulating jacket from the cable exposing the internal wires.
6. Cut the shield wire so that it extends past the outer jacket approximately 3/4 inch.
7. Remove 1/4" of insulation from the end of each of the 4 wires (without sense leads) or 6 wires with sense leads (refer to figure No. 4).
8. Connect each of the wires to terminal block P1 referring to labels on circuit board for terminal connections. Refer to Figure No. 8 for terminal block location.
9. To terminate a wire, press down on release bar for the terminal, insert wire into terminal opening then allow release bar to return to its original position, locking wire in place. Repeat procedure until all wires are in place.
10. Route load cell cable wires through the two cable clips provided on upper and left sides of enclosure interior.

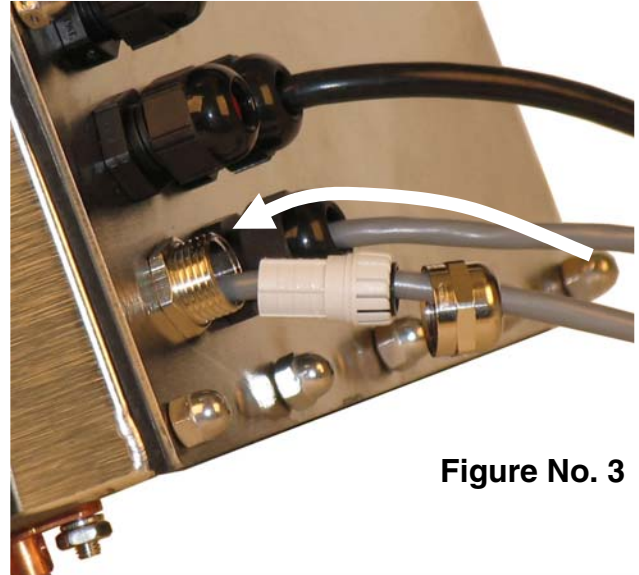


Figure No. 3

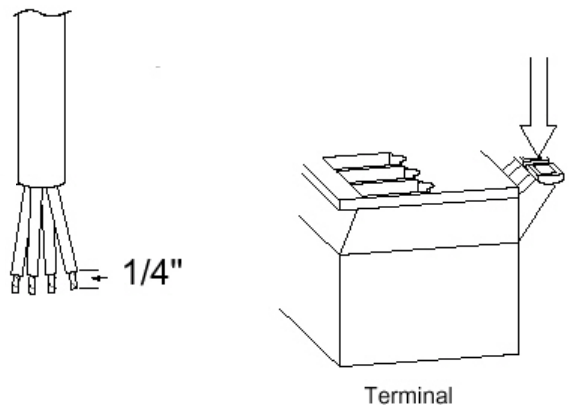


Figure No. 4

### LOAD CELL TERMINAL BLOCK P1

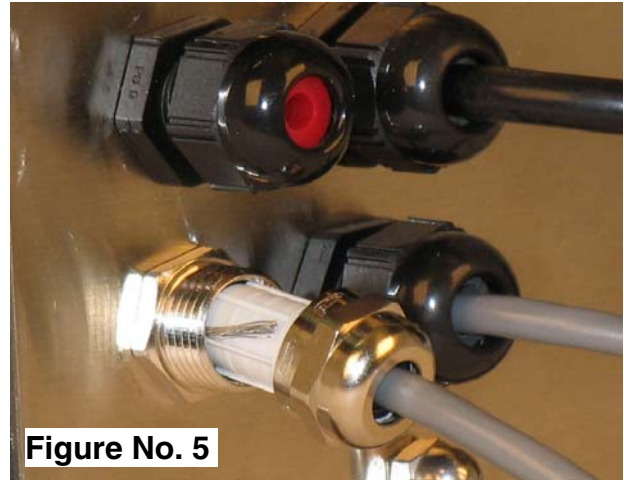
TERMINAL NO.	Function	TERMINAL NO.	Function
1	+ EXCITATION	5	- SIGNAL
2	+ SENSE	6	- SENSE
3	+ SIGNAL	7	- EXCITATION

**NOTE!** If the sense leads are NOT used, you must install plug-in jumpers at J4 and J5 adjacent to the terminal block. These jumpers attach the sense leads to the excitation leads. If sense leads ARE used (as in motor truck scales), these plug-in jumpers should be positioned on one plug-in pin only or removed and stored for later use (see Figure No. 8).

## INSTALLATION, CONT.

### Load Cell Cable Shield Wire Connection for RFI Suppression

1. After all terminations have been made, remove the excess cable from the enclosure.
2. Referring to Figure No. 5, fold the shield wire back over the plastic insert and then insert the plastic insert (with the shield wire) into the gland connector.
3. The shield wire is secured when tightening the gland connector nut.
4. Do not over-tighten the connector but make certain it is snug.



### Load Cell Cable Connection (Standard Gland Connector)

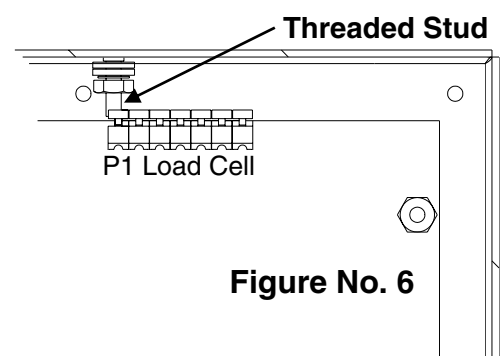
The following instructions describe the load cell connection should it be desired to route the load cell cable through a standard gland connector. If a standard gland connector is used, the shield wire should be connected to the threaded stud inside the indicator enclosure.

1. Remove the three acorn nuts securing the Battery Access Cover to the bottom of the indicator and then remove the battery tray (Model 215) or the battery (Model 210).
2. After removing the battery tray or battery, remove the 12 acorn nuts securing the back panel to main housing, and then loosen a gland connector for the load cell cable. Refer to Figure No. 2 for illustration of connector layout.
3. Slip the single cable from the load cell or load cell junction box through the gland connector and into the enclosure.
4. Remove 3" of the outer insulation jacket then remove 1/4" of insulation from each of the 4 wires and shield (without sense leads) or 6 wires and shield (with sense leads). Refer to Figure No. 4.
5. Connect each of the wires to terminal block P1 referring to labels on circuit board for terminal connections. Refer to Figure No. 8 for terminal block location.
6. To terminate a wire, first press down on release bar for the terminal, insert wire into terminal opening then allow release bar to return to its original position, locking wire in place. Repeat procedure until all of wires are in place.
7. Route load cell cable through the two cable clips provided on upper and left sides of enclosure interior.

### Load Cell Cable Shield Wire Connection (Standard Gland Connector)

The load cell cable shield wire should be connected to the threaded stud inside the indicator. This stud is located on the top inside of the indicator near the load cell connector P1. See Figure No.6.

The shield wire should be wrapped around the stud between the 2 flat washers and secured using hex nut.



### LOAD CELL CONNECTIONS WITH OVER 30 FEET OF CABLE

For installations with over 30 feet of cable between the indicator and the load cells, sense wires should be used. The sense wires must be connected between the +SENS, -SENS terminals on the indicator and the +EXCITATION, -EXCITATION wires of the load cells or the +SENS, -SENS terminals of the load cell trim board or the section seal trim board.

# INSTALLATION, Cont.

## SERIAL I/O CABLE INSTALLATION

The 210/215 indicators may be connected to a printer to record weight and associated data or it may be connected to a remote display or even to a computer for transmission of weight data. The weight data may be transmitted on demand (pressing the **PRINT** key or on receipt of a command from the computer). Refer to the Setup, SIO Serial I/O section of this manual.

1. Remove the 12 acorn nuts securing the back panel to main housing, then loosen a gland connector for the serial cable. Refer to Figure No. 2 for illustration of connector layout.
2. Slip the serial cable through the gland connector and into the enclosure.
3. Remove 2" of the outer insulation jacket then remove 1/4" of insulation from each of the wires (refer to Figure No. 4).
4. Connect each of the wires to the Serial Data terminal block (P11) referring to Figure No. 8 for terminal block locations.
5. To terminate, first press down on the release bar for the terminal, insert the wire into the opening then allow the release bar to return to its original position, locking the wire in place. Repeat the procedure until all of the wires are in place.

### BI-DIRECTIONAL SERIAL INTERFACE

<u>TERMINAL NO.</u>	<u>Function</u>
1	TXD 1 - RS232
2	RXD 1 - RS232
3	TXD 1 – 20 mA Active
4	GROUND

### SERIAL OUTPUT

<u>TERMINAL NO.</u>	<u>Function</u>
5	TXD 2 - RS232
6	TXD 2 – 20 mA Active
7	GROUND

## OPTICALLY ISOLATED INPUTS (requires additional hardware)

Included with the I/O are 4 programmable inputs that may be used to remotely (up to 100 feet) initiate various functions within the indicator. These inputs are accessed via a terminal block (P9) on the back of the PC board (see Figure No. 8). The 4 inputs are defined as follows:

<u>TERMINAL NO.</u>	<u>Function</u>
1	Gross
2	Print
3	Zero
4	Tare
5	Common

**NOTE! The input must be connected to Gnd to initiate the function.**

## OPTICALLY ISOLATED OUTPUTS (requires additional hardware)

### PRESET WEIGHT COMPARATOR CHECKWEIGHER LOGIC LEVEL OUTPUT

If desired, you may use the optically isolated outputs from your Model 210/215 indicator's preset weight comparators or checkweigher to remotely (up to 100 feet) control peripheral devices used to manage the flow of material or signal when the weight is within preset limits.

### J11 (12V) - ACTIVE REMOTE OUT JUMPER

The Active Remote Out jumper J11, when connected, allows the 210/215 indicator to supply (source) 12 VDC to a solid-state relay or other load of 200 ohms or greater. To operate from the 12 VDC source, the positive connection from the relays must be connected to the PWC connector pins and the negative wire from the relays to the GND pin. See Figure No. 8 for jumper and REMOTE OUTPUT connector location.

## INSTALLATION, Cont.

For completely isolated outputs, J11 must be open (positioned on one plug-in pin only or removed) and the user must provide 12 to 24 VDC to the SRC pin and a ground return to the load. The load must still be 200 ohms or greater.

To connect the control cable to the preset weight comparator/checkweigher logic level output connector P10, first loosen the gland connector located on the right side on the back of the 210/215. Refer to Figure No. 8 for the exact location of the connector. Slip the cable through the connector and into the enclosure. Remove 2 inches of the cable insulating jacket and then 1/4 inch of insulation from each of the internal wires (refer to Figure No. 4). Make the proper terminations on terminal block P10. To terminate a wire, first press down on the terminal block release bar, insert the wire into the terminal and remove pressure from the release bar locking the wire in place.

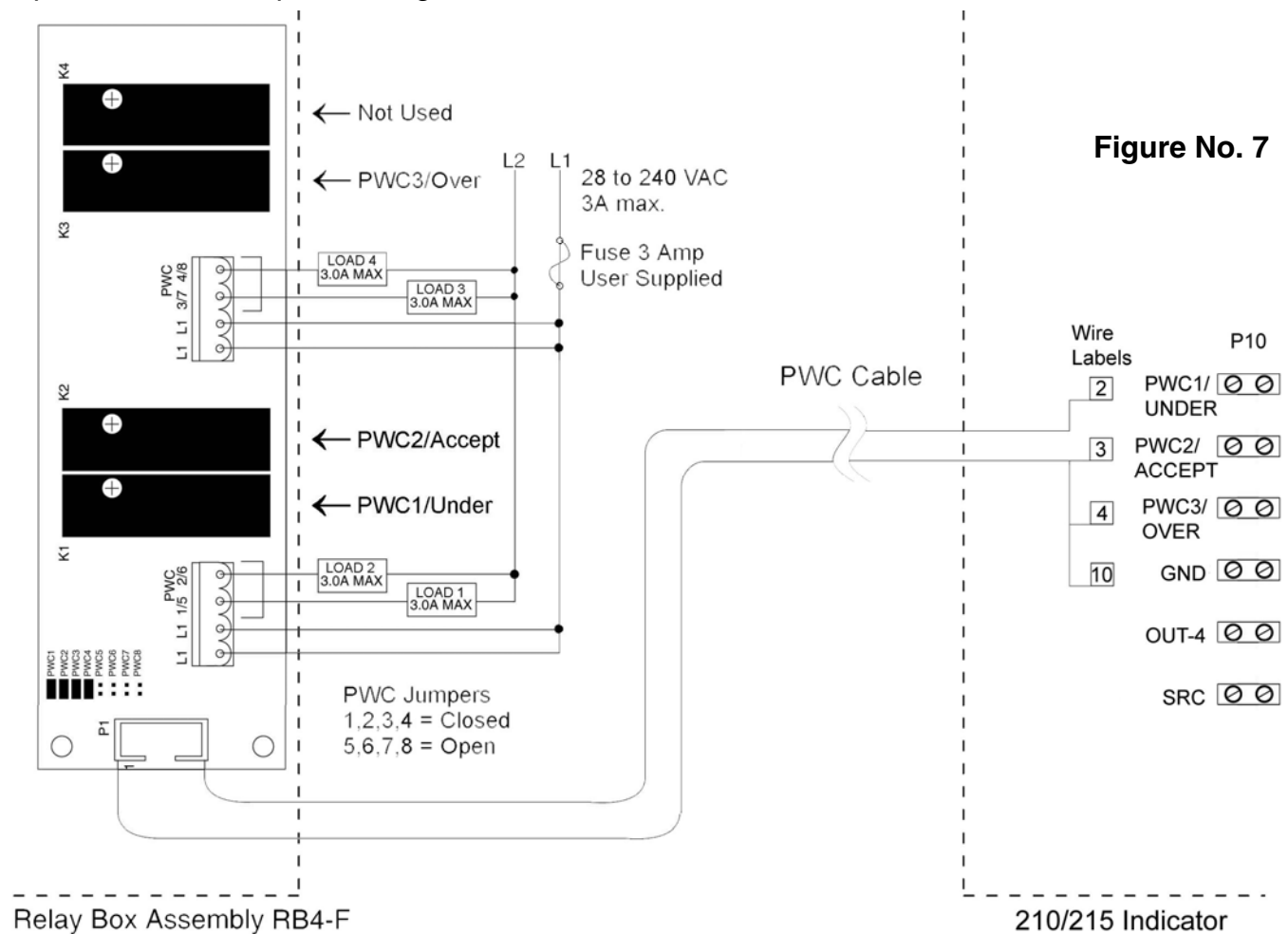
### RELAY BOARD - (Optional)

The relay board (Cardinal p/n 8539-C062-0A) is mounted in the RB4-F external junction box for use with the 210/215 Indicator. Connect devices to be controlled as shown in Figure No. 7.

The relays *must* be configured to be on (closed) or off (open) at weights under the preset weight then switch at the preset weight from on-to-off or off-to-on by setting the under weight condition to on or off during setup and calibration or setup review. Refer to the Setup and Calibration, “d out” (Digital Output) section of this manual for more information.

#### EXAMPLE: d out= 1,1

The PWC1 relay is on (closed) for weights under the preset weight and off (open) for weights equal to or over the preset weight.



**NOTE!** All relays are the “normally-open” type that will open when power to indicator is lost.



# INSTALLATION, Cont.

## MAIN PCB

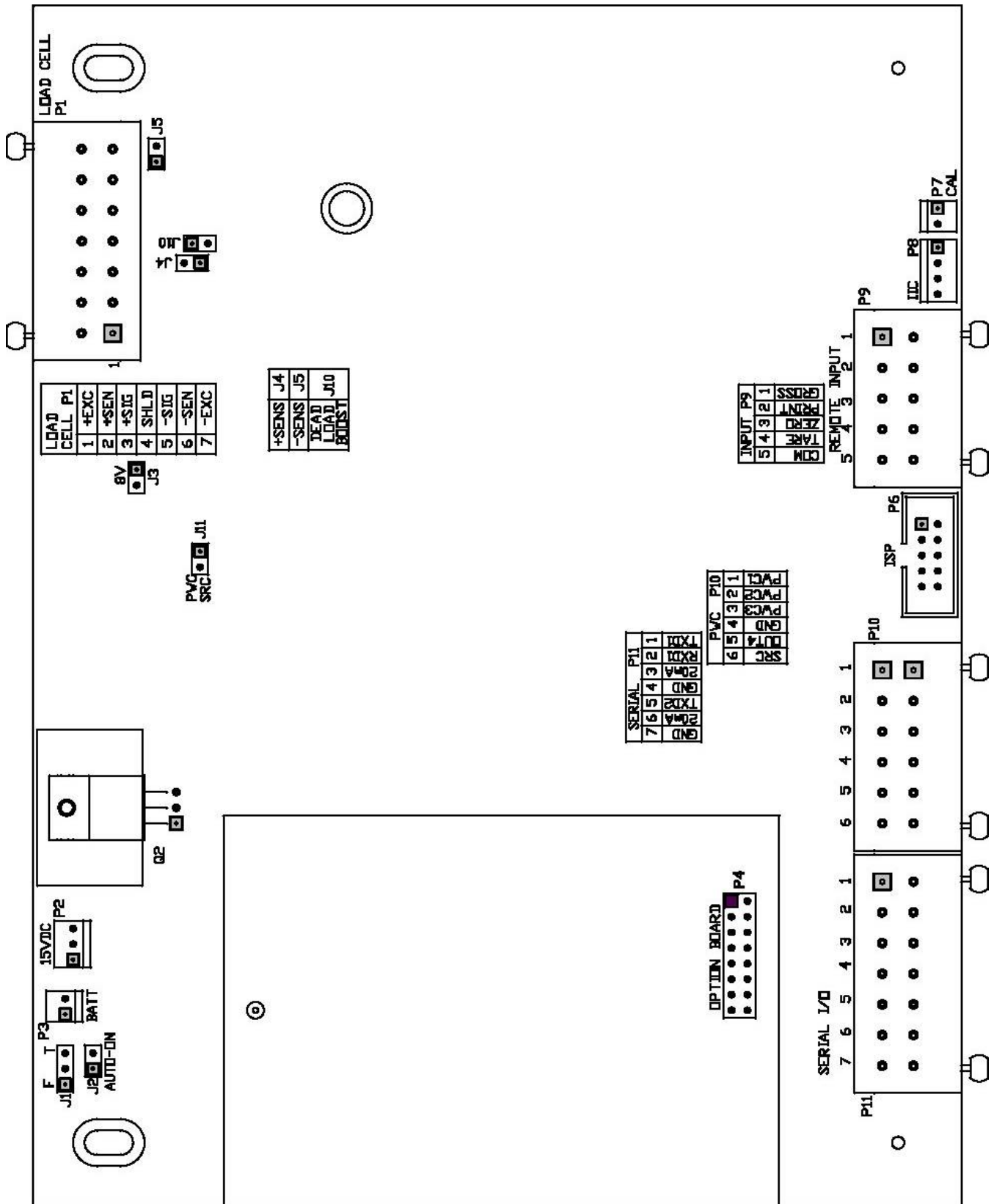


Figure No. 8

# INSTALLATION, Cont.

## MAIN PCB JUMPERS

### J1 - BATTERY CHARGE MODE (210 Only)

Place jumper J1 in the Full position when operating the indicator totally from battery power and only recharging the battery pack when it is low. Place jumper J1 in the Trickle position when operating the indicator from commercial power and using the battery pack to supply power only in the event of a power loss.

### J2 - AUTO-ON JUMPER

The AUTO-ON jumper J2, when connected, will cause the indicator to power on automatically whenever power is applied to the power input connector. If power is lost momentarily and then reapplied, the indicator will turn on without pressing the **ON** key.

### J3 - 8V EXCITATION JUMPER

The 8V EXCITATION jumper J3, when connected, sets the load cell excitation voltage to 8V for operation with the 12 VDC battery. To operate from the 12 VDC battery, the load cell excitation voltage **MUST** be set to 8 VDC (J3 *closed*). Battery operation with the load cell excitation voltage set to 12V will result in an unstable weight display.

### J4 AND J5 - SENSE JUMPERS

If the sense leads are NOT used, you must install plug-in jumpers at J4 and J5 adjacent to the terminal block. These jumpers attach the sense leads to the excitation leads. If sense leads ARE used (as in motor truck scales), these plug-in jumpers should be positioned on one plug-in pin only or removed and stored for later use.

### J10 - DEAD LOAD BOOST JUMPER

For very low dead loads (less than 10% of the combined load cell capacity) connect the dead load boost jumper J10 on the printed circuit board.

### J11 – PWC SRC (SOURCE)

The J11 jumper, when connected (closed) supplies 12 VDC from the 210/215 indicator to a solid-state relay or other load of 200 ohms or greater. When J11 is open (positioned on one plug-in pin only or removed), the 12 to 24 VDC must be provided from an external source to P10-6. The load must still be 200 ohms or greater.

## RE-INSTALLING THE REAR PANEL

After all terminations have been made, remove the excess cable from the instrument enclosure and securely tighten each of the cable gland connectors. Do not over-tighten these connectors but make certain they are snug. **DO NOT USE TOOLS!** Finger tighten only! Insure any unused gland connectors are plugged.

1. Make certain no cables or wires are exposed between the main housing and rear panel and then place the rear panel onto the main housing.
2. Secure with the 12 acorn nuts removed earlier. Follow a diagonal pattern when tightening the acorn nuts.
3. On the Model 215, place the narrow end of the battery tray in the guides of the opening.
4. Slide the battery tray into the opening, until you feel resistance and the edge of the battery tray is flush with the bottom of the indicator.
5. Replace the Battery Access Cover and install the three acorn nuts removed earlier, securing the battery tray in place.



**IMPORTANT!** On the Model 215, the battery tray (with or without batteries) must be installed for the indicator to function.

# KEYPAD FUNCTIONS

The Model 210/215 is equipped with a 22-key keypad. The keypad is used to enter commands and data into the instrument. This section describes each key along with its normal function. It is helpful to refer to the actual instrument while reading this section.

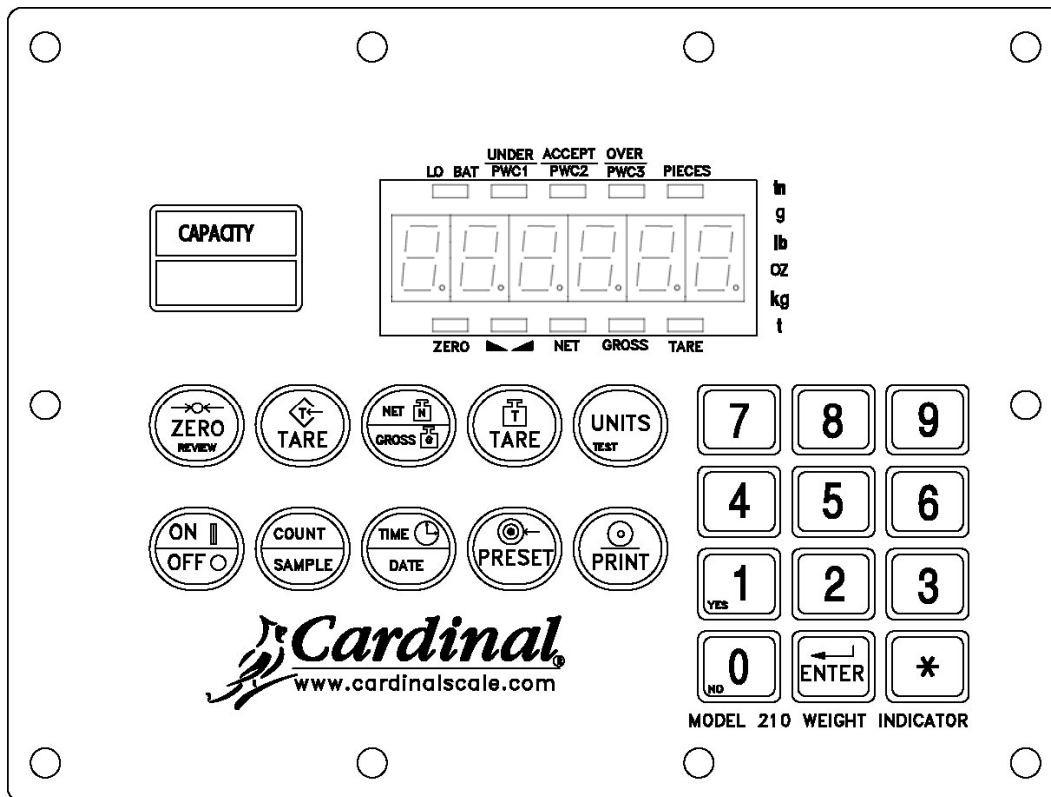


Figure No. 9 (210 Keypad)

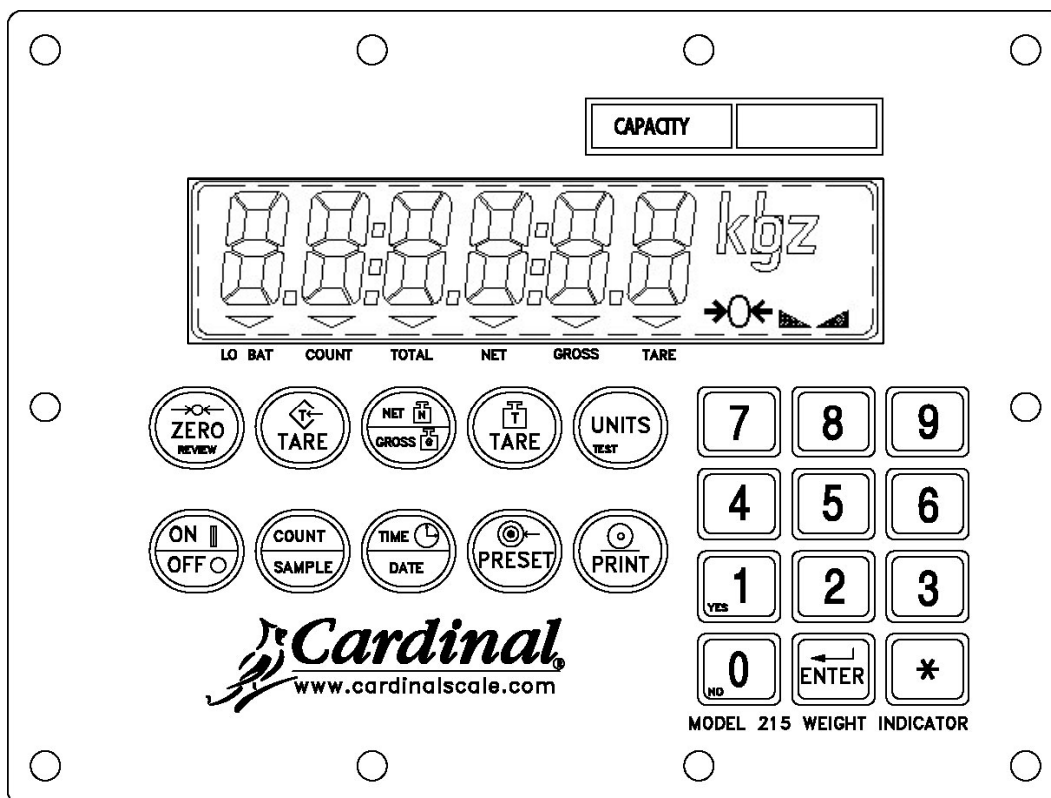


Figure No. 10 (215 Keypad)



**DO NOT** operate the keypad with pointed objects (pencils, pens, etc).  
**Damage to keypad resulting from this practice is NOT covered under warranty.**

# KEYPAD FUNCTIONS, Cont.

## ON/OFF KEY

This key performs two functions. Pressing it when the indicator is off will apply power to the instrument. If the indicator is already on, pressing this key will turn the indicator off.

## COUNT/SAMPLE KEY

This key performs two functions. The first time it is pressed, the indicator will count (unless piece weight is 0). The second time it is pressed (or if pcwt=0 on the first press) will show the prompt "ADD=5" on the display. Continued pressing of the **COUNT/SAMPLE** key will toggle between the ADD=5, 10, 25, 50, 75 prompts to select a sample size. When desired sample size is displayed, press the **ENTER** key *OR* with "ADD=XX" (5, 10 etc.) displayed, using the numeric keypad, key-in any desired sample value, then press the **ENTER** key. Press the **ASTERISK** key to abort the input operation. To exit the count function and display weight, press the **NET/GROSS** key.

## TIME/DATE KEY

This key is used to enter the clock mode to program the time, date and consecutive number.

Pressing the **TIME/DATE** key will enter the clock mode with the 210/215 displaying HoUr=.

### 12-Hour Format Selected In Setup (td=12)

1. With the display showing HoUr=, press the **ENTER** key.
2. If the time displayed is correct, press the **ENTER** key and proceed to step 4.
3. If the displayed time is incorrect, use the numeric keys to enter the correct time and press the **ENTER** key.
4. The display will change to A=. Press the **ENTER** key.
5. The display will show YES.
  - If the time is before noon (12:00 PM), press the **ENTER** key.
  - If the time is after noon (12:00 PM), press the **0/NO** key, then press the **ENTER** key.
6. The display will show dAtE=. Press the **ENTER** key.
7. If the date displayed is correct, press the **ENTER** key to proceed to the consecutive number prompt, Cn.C .n=.
8. If the date displayed is incorrect, use the numeric keys to enter the correct date and press the **ENTER** key to proceed to the consecutive number prompt. Remember to enter the date in the same format (month-day-year or day-month-year) as selected by the USA setup parameter. Note that with the USA=YES setting, the date format is month-day-year.

### 24-Hour Format Selected In Setup (td=24)

1. With the display showing HoUr=, press the **ENTER** key.
2. If the time displayed is correct, press the **ENTER** key and proceed to step 4.
3. If the displayed time is incorrect, use the numeric keys to enter the correct time and press the **ENTER** key. Note that with the 24-hour format selected, entering all times after noon (12:00 PM), you must add 12 to the time, i.e. 3 PM would be 1500.
4. The display will show dAtE=. Press the **ENTER** key.
5. If the date displayed is correct, press the **ENTER** key to proceed to the consecutive number prompt, Cn.C .n=.
6. If the date displayed is incorrect, use the numeric keys to enter the correct date and press the **ENTER** key to proceed to the consecutive number prompt. Remember to enter the date in the same format (month-day-year or day-month-year) as selected by the USA setup parameter. Note that with the USA=YES setting, the date format is month-day-year.

# KEYPAD FUNCTIONS, Cont.

## Consecutive Number

If the consecutive number displayed is correct, press the **ENTER** key to resume normal operation. If the consecutive number displayed is incorrect, use the numeric keys to enter the correct consecutive number (up to 6 digits) and press the **ENTER** key to resume normal operation.

## PRESET KEY

This key is used to enter the weight values for the three preset weight comparators or for the checkweigher feature depending on which feature was selected (setup parameter "d out") during setup and calibration.

## Preset Weight Comparator

If the Preset Weight Comparator feature was selected, the PWC1 annunciator will flash and the display will show the currently stored value for the number 1 preset weight comparator. If the value displayed is acceptable, press the **ENTER** key, otherwise, use the numeric keys to enter the new preset value and press the **ENTER** key. The PWC2 annunciator will now flash and the display will show the currently stored value for the number 2 preset weight comparator. As before, if the value displayed is acceptable, press the **ENTER** key, otherwise, use the numeric keys to enter the new value and press the **ENTER** key. The PWC3 annunciator will now flash and the display will show the currently stored value for the number 3 preset weight comparator. Again, if value displayed is acceptable, press the **ENTER** key, otherwise, use numeric keys to enter a new value and press the **ENTER** key.

## Checkweigher

If the Checkweigher feature was selected and the **PRESET** key pressed, the ACCEPT and UNDER annunciators will flash and the preset value for the minimum acceptable weight will be displayed. Press the **ENTER** key if the displayed value is correct or use the numeric keys and enter the new value and press the **ENTER** key. The ACCEPT and OVER annunciators will now flash and the display will show the minimum value of weight over the accepted range. As before, if the value shown is correct, press the **ENTER** key. If the value is incorrect, enter the new value and press the **ENTER** key to save it. Note that this value must be greater than the accept value. Remember that both the preset weight comparators and checkweigher functions operate on the absolute value of weight ignoring the polarity. After the second preset value is entered, the indicator will return to normal operation.

## PRINT KEY

Pressing this key will add the displayed gross or net weight or piece count to the associated accumulator and initiate the transmission of weight and other data selected during setup of the Print menu items via the selected printer output port (see Port= under Print menu) unless the continuous data feature of this port was enabled during setup and calibration.

If the  $id =$  (ID Prompt) has been enabled during setup, when the **PRINT** key is pressed, the indicator will prompt for an ID to be printed on the ticket.

If the  $id =$  is set to 1 (Yes), input up to 6 digits for the ID and then press the **ENTER** key to complete the transaction. Upon pressing the **ENTER** key, the print function will occur.

If the  $id =$  is set to 0 (no), press the **ENTER** key to display the current ID. If ID displayed is acceptable, press the **ENTER** key again to complete transaction. Otherwise, input up to 6 digits for ID then press the **ENTER** key to complete the transaction. The print function will occur after the **ENTER** key is pressed.

Note that the indicator will not respond to the Print command unless the weight display is stable. If displaying gross weight, the only weight printed is gross weight. If displaying net weight, the gross, tare, and net weights are printed.

## KEYPAD FUNCTIONS, Cont.

The 210/215 includes support for visual tickets. Visual tickets are designed by the PC based programs Visual Print or nControl, then downloaded to the indicator. Two programmable formats in addition to the standard print tab settings are allowed.

Print formats are selected by using the **ASTERISK** and **PRINT** keys in combination (refer to the next section for details). **NOTE!** When the **PRINT** key is pressed, the indicator looks for the selected format. If a visual ticket is not found it reverts to the print tab settings.

#2
10:19 23/08/2000
100.00 lb G
20.00 lb T
80.00 lb N
0.00 lb GROSS ACCUM
272.00 lb NET ACCUM

### TICKET EXAMPLE

#### ZERO/REVIEW KEY

This key performs two functions. In normal operation, pressing this key will cause an immediate zeroing of the weight display up to the selected limit of 4% or 100% of the scale's capacity. Note that this selection is made during the setup and calibration of the instrument. Pressing this key after the **ASTERISK** key will enter the Review mode of Setup and Calibration. Refer to description of **ASTERISK** key and the Setup Review section of this manual for details.

#### TARE KEY (with diamond "T" symbol)

This is a dual function key. Pressing the **TARE** key alone (Pushbutton Tare mode) will store the current gross weight as a new tare weight and cause the weight display to change to the net weight display mode (Net annunciator turns on). Pressing it key after entering a numeric value (Keypad Tare) will cause the value entered to be accepted as a new tare weight.

**NOTE:** Tare weights equal to or greater than scale capacity cannot be entered. In addition, keypad tare weight division value must be same as scale division value. For example, a unit with .005 lb as division value will display **-Error** if you enter 1.003 for tare weight.

#### NET/GROSS KEY

This key is used to toggle between Net and Gross weight modes. The selected mode is indicated by turning on the appropriate annunciator on the display. Note that if no valid tare weight has been entered, pressing this key will cause a momentary "notArE" display error and the indicator will remain in the Gross weight mode.

#### TARE KEY (with weight "T"symbol)

Pressing this key will display the current tare weight for three seconds.

#### UNITS/TEST KEY

This key performs two functions. In normal operation, it is used to select the units in which the weight is to be displayed. The available units of measure ("unit1" and "unit2") are enabled or disabled in setup. The available units include tons, pounds only, pound-ounces, ounces only, tonnes (metric tons), kilograms, and grams. Note that not all combinations are supported. Pressing this key after the **ASTERISK** key will enter the Test mode. The Test mode is used to conduct a test of all display elements. Refer to description of **ASTERISK** key for details.

#### 0 THROUGH 9 KEYS

These keys are used to enter numeric data during the setup and calibration as well as during normal operation of the instrument. **NOTE:** The 1 and 0 keys have dual functions. They are used to enter numeric data during setup and calibration as well as during normal operations and are also used to answer yes (1 = YES) or no (0 = NO) to various prompts.

## KEYPAD FUNCTIONS, CONT.

### ENTER KEY

This key serves two purposes. First, when reviewing setup parameters, pressing the **ENTER** key will display the current setting of the parameter. Second, the **ENTER** key is used to signal completion of the entry of data and causes the indicator to process the data entered.

### ASTERISK KEY

This key is used for several functions. During Setup, when a setup parameter (not a parameter value) is displayed, pressing it key will "backup" to the previous prompt. In normal operation, this key is used in conjunction with other keys on the keypad to access additional indicator features. These features and their associated key combinations are as follows:

#### **ASTERISK, ZERO/REVIEW KEY**

This combination will enter the Review mode of Setup and Calibration. Refer to Setup Review section of this manual for details.

#### **ASTERISK, NET/GROSS KEY**

This combination will display the Net accumulator.

#### **ASTERISK, NET/GROSS KEY, PRINT KEY**

This combination will print the Net accumulator.

#### **ASTERISK, NET/GROSS KEY, ZERO KEY**

This combination will zero (clear) the Net accumulator.

#### **ASTERISK, NET/GROSS KEY, NET/GROSS KEY**

This combination will display the Gross accumulator.

#### **ASTERISK, NET/GROSS KEY, NET/GROSS KEY, PRINT KEY**

This combination will print the Gross accumulator.

#### **ASTERISK, NET/GROSS KEY, NET/GROSS KEY, ZERO KEY**

This combination will zero (clear) the Gross accumulator.

#### **ASTERISK, UNITS KEY**

This combination will enter the Test mode. The Test mode is used to test of all the display elements. It consists of five (5) cycles, each lasting about one (1) second:

1. All horizontal segments will turn on (no annunciators).
2. All vertical segments and decimal points will turn on (no annunciators).
3. All annunciators will turn on.
4. All display elements off.
5. The model number (210) and the software version X.X.
6. The calibration numbers (C1 to C4).

#### **ASTERISK, PRINT KEY**

This combination is used to *change* the selected print ticket format. Pressing the **ASTERISK** then the **PRINT** key will display a prompt "Prt=". Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are:

**0** = print tab settings      **1** = visual ticket format 1      **2** = visual ticket format 2

In addition to using the **ASTERISK, PRINT** key combination to change the print ticket format, the operator (just prior to printing the ticket) can change the print ticket format at the end of the weighing operation. This is accomplished by performing the normal weighing operation, then pressing the desired format number (0, 1 or 2), followed by pressing the **PRINT** key.

**NOTE! When a print format is selected (by either method), it will remain active until changed by the operator.**

# ANNUNCIATORS

Annunciators are turned on to indicate that the display is in the mode corresponding to the annunciator label or that the status indicated by the label is active. The annunciators flash on and off to indicate that the indicator is waiting for input from the keypad for the mode indicated by the flashing annunciator. Refer to Figure No. 9 and Figure No.10 for location of the annunciators.

## **ZERO (210)**

### **→○← (215)**

This annunciator is turned on to indicate that the weight displayed is within +/- 1/4 division of the center of zero.

## **ξψ (STABLE)**

This annunciator is turned on when the weight display is stable. When off, it means that the change in successive weight samples is greater than the motion limits selected during setup.

## **NET**

This annunciator is turned on to show that the displayed weight is the net weight (gross weight less tare weight).

## **GROSS**

This annunciator is turned on to show that gross weight is displayed. Gross weight will be displayed when no tare weight is stored.

## **TARE**

This annunciator is turned on to show that the displayed weight is the tare weight.

## **LO BAT**

This annunciator is used with the battery operation and will turn ON to indicate the battery has less than one hour useful life before recharging will be required. If continued use further drains the battery, no change in operation will occur until just before the battery voltage drops to a level where operation is affected. At this level, the indicator will automatically turn itself off.

## **UNDER/PWC1 (210 Only)**

This annunciator is used to signal that the displayed weight is less than the minimum value of acceptable weight used in the Checkweigher feature. Note that this annunciator is active only when the Checkweigher feature is enabled.

The PWC1 annunciator is turned on to indicate that the displayed weight is equal to or greater than the weight value stored as preset number 1. Note that this annunciator is active only when the Preset Weight Comparator feature has been enabled.

## **ACCEPT/PWC2 (210 Only)**

This annunciator is used to signal that the displayed weight is within the acceptable weight limits for the Checkweigher feature. That is, it is equal to or greater than the minimum acceptable weight and equal to or less than the maximum acceptable weight. Note that this annunciator is active only when the Checkweigher feature has been enabled.

The PWC2 annunciator is turned on to indicate that the displayed weight is equal to or greater than the weight value stored as preset number 2. Note that this annunciator is active only when the Preset Weight Comparator feature has been enabled.



# ANNUNCIATORS

## **OVER/PWC3 (210 Only)**

This annunciator is used to signal that the displayed weight is equal to or greater than the minimum value of over weight used in the Checkweigher feature. Note that this annunciator is active only when the Checkweigher feature has been enabled.

The PWC3 annunciator is turned on to indicate that the displayed weight is equal to or greater than the weight value stored as preset number 3. Note that this annunciator is active only when the Preset Weight Comparator feature has been enabled.

## **tn (210 Only)**

This annunciator is located to the right of the weight display and is turned on to show that the displayed weight unit is tons.

## **g**

This annunciator is located to the right of the weight display and is used to indicate that the displayed unit of weight measurement is grams.

## **lb**

This annunciator is located to the left of the weight display and is turned on to show that the displayed weight unit is pounds.

## **oz**

This annunciator is located to the right of the weight display and is turned on to show that the displayed weight unit is ounces.

## **kg**

This annunciator is located to the left of the weight display and is used to indicate that the displayed unit of weight measurement is kilograms.

## **t (210 Only)**

This annunciator is located to the right of the weight display and is used to indicate that the displayed unit of weight measurement is tonnes (metric tons).

## **PIECES (210)**

## **COUNT (215)**

This annunciator shows that the display is in the Count mode and the value displayed is the count quantity and not weight.

## **TOTAL (215 Only)**

This annunciator shows that the display is in the Count mode and that the value displayed is the current contents (total) of the count accumulator.

## SETUP AND CALIBRATION

Your Model 210/215 indicator has been thoroughly tested and calibrated before being shipped to you. If you received the indicator attached to a scale, calibration is not necessary. If the indicator is being connected to a scale for the first time or recalibration is necessary for other reasons, proceed as indicated.

The calibration switch is located on a bracket on the inside of the enclosure rear panel. You may gain access to this switch simply by removing the calibration switch access screw on the rear panel. Refer to Figure No. 11.

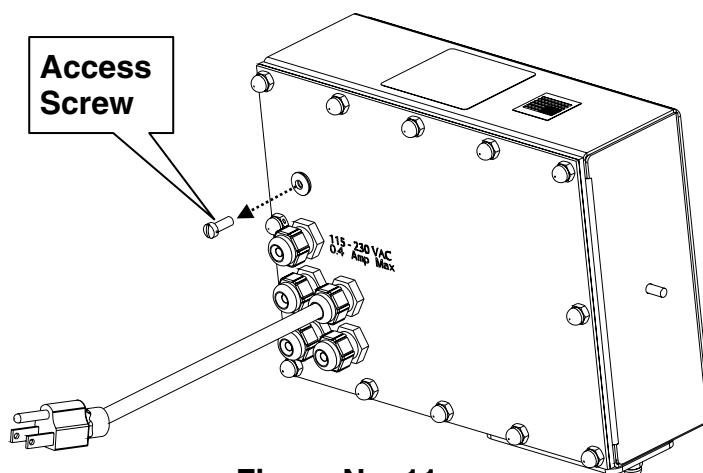


Figure No. 11

*During the setup and calibration process it is necessary to enter operational parameters via the indicator's keypad. Pressing the **ENTER** key without entering a new value will retain the current setting and advance to the next prompt. To change a setting, enter a new value and press the **ENTER** key. This will save the new value and advance to the next prompt. Pressing the **ASTERISK** key will "backup" to the previous prompt.*



**DO NOT** operate the keypad with pointed objects (pencils, pens, etc).  
Damage to keypad resulting from this practice is **NOT** covered under warranty.

### Enter Setup Mode

To enter the setup mode, with the indicator ON, insert a small screwdriver or other tool through the calibration switch access hole on the rear panel. Press and release the calibration switch. The menu Setup will be displayed. Continue to press and release the switch to rotate through the beginning point for entering the setup mode.

<b>SEtUP</b>	Setup Mode (starts at USA prompt)
<b>A-d</b>	Analog to Digital Filtering (starts at dFLt= prompt)
<b>CAL</b>	Calibration (starts at CAL1 prompt)
<b>Sao</b>	Serial Input/Output (starts at BAUD prompt)
<b>Print</b>	Print Tab Settings (starts at PORT prompt)
<b>F SPAn</b>	Fine Span Adjustment
<b>Hi rES</b>	Display high resolution weight mode
<b>LoCoUt</b>	Key lock out function

If you press the **ENTER** key at the SetUP prompt, you may proceed through to the next section (up to and including FSPAn) by pressing the **ENTER** key.



**NOTE!** Setup may be interrupted at any time. **ALL** data previously entered and finalized with the **ENTER** key will be retained in the non-volatile memory.

Pressing the calibration switch *at any prompt* will return you to the SEtUP menu. To exit setup, press the **ASTERISK** key with any of the above menu selections displayed or cycle power at any time (press the **ON/OFF** key twice).

## SETUP AND CALIBRATION, Cont.

**NOTE!** With the exception of the SEtUP prompt, the prompts displayed for each section are different if you push the calibration switch instead of pressing the **ENTER** key to proceed through the section. *For example*, if you press the calibration switch with the SEtUP displayed, the next prompt displayed will be A-d. If you step through the setup prompts by pressing the **ENTER** key, the next prompt displayed will be A-d?. In addition, at a prompt with the question mark (?) displayed, you must press the **ENTER** key, the **1/YES** key then the **ENTER** key again to proceed with that section. To skip the section and advance you to the next menu selection, press the **ENTER** key twice.

### SEtUP

#### USA = (Domestic or International)

With SEtUP displayed, press the **ENTER** key. The display will change to USA=. Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

#### USA = 1 (Domestic)

Date = mm/dd/yy  
Trl = no  
Cap + 4% to OC

#### USA = 0 (International)

Date = dd/mm/yy  
Trl = yes  
Cap + 9 grads to OC  
PT printed with tare  
Lamp test on power up

If you selected **USA = 0** (International), an additional prompt, "**PASS=**" will be displayed.

If you selected **USA = 1** (Domestic) proceed to **Lft=** (Legal For Trade).

#### PASS (Password Y/N)

The PASS (Password Y/N) prompt determines whether a password is required to enter Setup and Calibration on indicators programmed for international use. Note that this prompt is only displayed when **USA = 0** (International) is selected.

With the display showing **PASS**, press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

#### PASS (No)

Password protection is not needed.  
Setup advances to the **Lft=** prompt

#### PASS (Yes)

Password protection is desired. The next prompt will be **PASS=**

Press the **ENTER** key to see the current password value. If the password displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new password (up to 6 digits) and then press the **ENTER** key to save it.

#### Password Operation

With the **PASS** prompt enabled (set to YES), anytime the operator tries to enter Setup, the display will show the **PASS=** prompt requiring the operator to enter the correct password. If the wrong password is entered the indicator displays **ERROR** momentarily and returns to the weight mode. Note that the password is not shown on the display when the operator is entering it.

It is recommended to write the password down and store it in a secure location. If the password is forgotten or lost and a change to the indicator setup is required, the indicator must be reprogrammed. **WARNING!** Reprogramming the indicator will erase all the contents of the Nov-Ram and memory.

## SETUP AND CALIBRATION, CONT.

### LfT = (Legal For Trade)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

#### LfT = 1

Interval Settings (Int=) allowed  
are: 1, 2, 5, 10, 20, 50

#### LfT = 0

Interval Setting (Int=) is  
selectable from 1 to 99.

**NOTE!** When both *LfT=1 and USA=1*, the followings results occur:

Scale must have between 100 and 10,000 divisions  
Tra = .5 or 0 to 3  
Inhibit serial data during input  
Disables **COUNT** key  
Date = mm/dd/yy  
Trl = no  
Cap + 4% to OC

**NOTE!** When *LfT=1 and USA=0*, the followings results occur:

Uns = 1  
Date = dd/mm/yy  
Trl = yes  
Cap + 9 grads to OC  
PT printed with tare  
Lamp test on power up

### Unit1 = (Weighing Unit 1)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are:

0 = none

1 = tn (tons) – *Only on 210*

2 = g (grams)

3 = lb (pounds)

4 = oz (ounces)

5 = kg (kilograms)

6 = tonnes (metric tons) – *Only on 210*

7 = lb/oz (pounds/ounces)

### Int = (Interval Setting)

Press the **ENTER** key to show the current value.

If LfT = 1 (Legal For Trade = YES), using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1, 2, 5, 10, 20 or 50.

If LfT=0 (Legal For Trade = NO), using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 through 99.

In either case, if the setting displayed is acceptable, press the **ENTER** key again it.

### dPP = (Decimal Point Setting)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2 or 3.

0 = XXXXXX

1 = XXXXX.X

2 = XXXX.XX

3 = XXX.XXX

## SETUP AND CALIBRATION, Cont.

### CAP = (Capacity)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 through 999,999.

**NOTE!** Capacity cannot exceed 999,999.

### Unit2 = (Weighing Unit 2)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are:

0 = none

1 = tn (tons) – *Only on 210*

2 = g (grams)

3 = lb (pounds)

4 = oz (ounces)

5 = kg (kilograms)

6 = tonnes (metric tons) – *Only on 210*

7 = lb/oz (pounds/ounces)



**NOTE!** The selection for Unit2 can not be the same as Unit1. In addition, dependent upon the selection for Unit1 and the interval and decimal point settings, not all unit combinations are available.

### trA = (Zero Tracking Range)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0 (disables Zero Tracking), .5, or 1 through 9.

### trL = (4% Zero Range)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

**trL = 1 (Yes)**

4% of scale capacity

**trL = 0 (No)**

Full capacity (no limit)

### PUO = (Power-Up Zero Feature)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

**PUO = 1 (Yes)**

Automatic Re-Zero on Power-Up

**PUO = 0 (No)**

No Re-Zero on Power-Up

### td = (12 or 24 Time Format)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to select the format (12 or 24 hour) of the Model 210 clock operation, then press the **ENTER** key to save it. Note that in the 24 hour format, 12 is added to all times after noon, i.e. 3 PM would be 1500.

**td = 12**

12 hour clock (3PM displays 3:00)

**td = 24**

24 hour clock (3PM displays 15:00)

## SETUP AND CALIBRATION, Cont.

### d oUt = X, Y (Digital Output)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to select the X, Y values for the digital output, then press the **ENTER** key to save it.

#### d out = X, Y

where: X = State below cutoff (0 = LOW, 1 = High)  
Y = Preset Number or Checkweigher Mode

0 = Digital Output is disabled

1 = Low State before cutoff with 1 active Preset

2 = Low State before cutoff with 2 active Presets

3 = Low State before cutoff with 3 active Presets

11 = High state before cutoff with 1 active Preset

12 = High state before cutoff with 2 active Presets

13 = High state before cutoff with 3 active Presets

4 = Low State before cutoff on Checkweigher Mode

14 = High state before cutoff on Checkweigher Mode

5 = Axle Weigher Operation Mode

### P-bAL = (Preset Print-On-Balance)

With only one Preset selected (d OUt= 1 or 11), an additional prompt P-bAL= (automatic Print on Balance) will be displayed. If selected (P-bAL=YES), when weight is above or equals the preset value and all motion stops, weight will be printed (if a printer is attached). The weight must go below 50% of the preset value before another print operation can be performed.

If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

#### P-bAL = 1 (Yes)

Automatic Print on Balance Enabled

#### P-bAL = 0 (No)

Automatic Print on Balance Disabled

### P-bAL = (Checkweigher Print-On-Accept)

With Checkweigher selected (dOUt= 4 or 14), an additional prompt P bAL, Print on Balance, (automatic print on accept) will be displayed. If selected (P-bAL=YES), when the scale weight is stable and in the accept range of the checkweigher, the weight will be printed (if a printer is attached).

If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

#### P-bAL = 1 (Yes)

Automatic Print on Accept Enabled

#### P-bAL = 0 (No)

Automatic Print on Accept Disabled

## SETUP AND CALIBRATION, Cont.

### **SLEEP = (Sleep Mode Feature)**

The Sleep Mode feature conserves battery power when the indicator remains unused for a selected period of time. With the feature enabled, the load cell excitation will be reduced and the display will be blank.

**NOTE!** The sleep mode only functions on the 215, when the indicator is powered by the NiMH batteries and not by AC power.

Press the **ENTER** key to show the current status of this feature. If a number other than 0 is shown, this feature is selected and the number shown corresponds to the number of minutes of a stable zero weight reading before the indicator enters the sleep mode. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new value (0 to 10) then press the **ENTER** key to store the new setting. Note that entry of a 0 disables this feature.

### **A oFF = (Auto Shutoff)**

The Automatic Shutoff feature will automatically turn the indicator off (when it is not in use) after a predetermined period of inactivity to prolong battery life. To turn the instrument back on you must press the **ON / OFF** key.

Press the **ENTER** key to show the current status for this feature. A number other than 0 indicates that the auto shutoff feature is enabled and the displayed number corresponds to the number of minutes of stable weight displayed before the indicator is turned off automatically. Note that a 0 indicates the feature has been turned off. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new value (0 to 10) then press the **ENTER** key to store the new setting.

### **CLtAr = (Clear Tare)**

The Clear Tare feature allows the indicator to clear the Stored Tare weight when the Net weight goes below a value greater than 1/2 the stored tare weight or goes below zero (a negative net weight after display of a positive net weight). With this feature enabled, the operator must re-set the tare after completion of a transaction when the load (container plus item) is removed from the scale.

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

#### **CLtAr = 1 (Yes)**

Automatically clears Stored Tare when Net weight goes below zero

#### **CLtAr = 0 (No)**

Stored Tare is not cleared when Net weight goes below zero

*The following is a typical example of the Clear Tare feature in use.*

1. Place container on scale, then press **TARE** key (with diamond "T" symbol).
2. Load container with item to be weighed and perform normal weighing operation.
3. Remove load (item *AND* container) from scale.
4. Scale weight returns to below zero (weight of container) and is then reset to zero.
5. Operator is required to repeat step 1 before next weighing operation.

## SETUP AND CALIBRATION, Cont.

### id = (ID Prompt)

The  $id =$  (ID=) prompt enables an ID prompt before printing a ticket.

With the display showing  $id =$ , press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

#### $id = 1$ (Yes)

$id =$  will be displayed when **PRINT** key is pressed and printed on the ticket.

#### $id = 0$ (No)

Normal print operation (no ID prompt) will occur.

If you selected  $id = 1$  (Yes, ID Prompt), an additional prompt, " $A cLr =$ " will be displayed.

If you selected  $id = 0$  (No ID Prompt) proceed to  $A - d$  ( $A - d^2$ ) Analog to Digital Filtering.

### A cLr = (Auto Clear ID)

The  $A cLr =$  (Auto Clear ID) prompt determines whether the ID is automatically cleared after printing the ticket. Note that it is only displayed when  $id = YES$  is selected.

With the display showing  $A cLr =$ , press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

#### $A cLr = 1$ (Yes)

Automatically clears the ID after the ticket has printed.

#### $A cLr = 0$ (No)

ID is not cleared when ticket prints and can be used for next transaction.



## SETUP AND CALIBRATION, Cont.

### A - d (A - d?) - Analog to Digital Filtering

#### dFLt = (Digital Filtering)

With A - d (A - d?) displayed, press the **ENTER** key. The display will change to dFLt=. Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2 or 3. Note, that if you select 3 (Custom Filtering) two additional prompts will be displayed.

#### dFLt =

0	Disabled – NO Filtering
1	MINIMAL FILTERING (sample rate = 2)
2	MODERATE FILTERING (sample rate = 1)
3	CUSTOM FILTERING

**NOTE!** The prompts, F= (Filter Level) and b= (Break Range) will only be displayed if you selected 3 (Custom Filtering) for the dFLt= (Digital Filtering) prompt.

#### F = (Filter Level)

Press the **ENTER** key to show the current setting for the filter level. The filter level is a number from 1 to 99 that corresponds to the level of filtering with 99 being the greatest filtering and 1 the least. To accept the value displayed, press the **ENTER** key, otherwise, use the numeric keys to enter a new value then press the **ENTER** key to save it.

#### b = (Break Range)

Press the **ENTER** key to show the current setting for the break range. The break range is a number from 1 to 255 that corresponds to the number of division change to break out of the filtering. Press the **ENTER** key to keep the displayed value or use the numeric keys to enter a new value and press the **ENTER** key to save the new setting. Note that entry of a 0 disables this feature.

#### Sr = (Sample Rate)

Press the **ENTER** key to show the current setting for the sample rate. The value displayed is the sample rate in samples per second. Press the **ENTER** key to save the displayed value or use the numeric keys to enter a new value (1 to 100) and press the **ENTER** key to save it.

#### UnS = (Motion Range)

Press the **ENTER** key to view the current setting for the range of motion detection. If the displayed value is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new range (the number of divisions of change permitted before indicating unstable), then press the **ENTER** key to save the new setting. Allowable range values are: 0 through 99 divisions.

#### SC = (Stable Count)

Press the **ENTER** key to view the current setting for the number of consecutive stable weight readings before indicating stable weight. This helps filter weight readings for stability for use with Auto Print on Balance, or anything trying to capture stable weight. If the displayed value is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter a new value and press the **ENTER** key to save the new setting. Allowable values for the stable count are: 3 through 255.

# SETUP AND CALIBRATION, Cont.

## FILTER SETTING RECOMMENDATIONS

### Non Critical Sample Rate

If the sample rate is not critical, as in static weighing, set dFLt= to "0" (no filtering), dFLt= "1" (F=6, b=12, Sr= 2/Sec), or dFLt= "2" (F=6, b=8, Sr= 1/Sec).

### Critical Sample Rate

If the sample rate is critical, as in a filling operation, use the Custom Filtering (set dFLt= to "3").

1. Sr= SAMPLE RATE (1 to 100 samples/second) determination:

Set the sample rate as close as possible to produce a display graduation change for every graduation of material added to the scale.

$$\frac{\text{Material Flow Rate (lbs/second)}}{\text{Resolution}} = \text{Sr}$$

EXAMPLE:  $\frac{100\text{lbs/sec}}{10\text{lbs}} = 10\text{s/s} = \text{Sr}$

2. b= BREAK RANGE (1 to 255 graduations) determination:

Turn the filtering off by setting the dFLt= setting to "0". Operate the system as it will be normally used and, by observation, determine the number of grads of instability that needs to be filtered out. Set the break range (b=) to that value.

$$\frac{\text{Weight Change}}{\text{Graduation Value}} = b$$

EXAMPLE: 20,000 x 10lb capacity scale with 800lb variation in the weight display.

$$\frac{800}{10} = b = 80$$

3. F= FILTER SETTING (1 to 99) determination: Set to desired results.

4. If stability is unacceptable with any setting of F=, reduce the sample rate and/or increase the break range, b= setting for increased filtering.

# SETUP AND CALIBRATION, Cont.

## CAL (CAL?) - Calibration

With CAL (CAL?) displayed, press the **ENTER** key. The display will change to show the current setting NO. If calibration is desired, press the **1/YES** key, then press the **ENTER** key to continue to the CAL1= setting, otherwise press the **ENTER** key to advance to the Sio menu.

## CALIBRATION MODES

The 210/215 indicators have five modes that can be used to perform calibration. Three of the modes require a test load or test weights, one requires the scale to be empty (and at zero) and the last uses the calibration "C" numbers from a previous calibration. The modes are as follows:

### 1. Dual-Point with Zero (First Zero)

This is a standard calibration method requiring one weight, an empty scale and has one conversion factor. This method uses two calibration points (CAL1= and CAL2=) to establish a zero (no load) calibration value and to span the indicator. The two points correspond to zero weight and the test load or test weight and can be applied in any order. This method should be used for first-time calibration and complete recalibration.

### 2. Dual-Point without Zero (False Zero)

This calibration method requires one test weight and establishes a new conversion factor only. It is used to establish a false (temporary zero) zero without affecting the zero calibration value stored during the last calibration. This is particularly useful in tank weighing applications, where it may be impractical or impossible to completely empty the tank. This method uses two calibration points, CAL1= and CAL2=. The value of the test weight is entered when CAL1= is displayed and the **NET/GROSS** key is pressed when CAL2= is displayed.

### 3. Single-Point for Span Only (Last Zero)

This calibration method requires one test weight and establishes a new conversion factor (span) without affecting the zero calibration value stored during the last calibration. This minimizes placing and removing test weights and is especially useful when checking high capacity scales. This method uses two calibration points, CAL1= and CAL2=. The value of the test weight is entered when CAL1= is displayed and the **ZERO** key is pressed when CAL2= is displayed.

### 4. Single-Point for Zero Only (Only Zero)

This calibration method requires no test weight, an empty scale and establishes a new zero without affecting the conversion factor (span). This is useful to regain the full range of zero limit when the dead load of the scale has changed. This would occur for example, if a guard rail has been added to the scale platform. This method uses two calibration points, CAL1= and CAL2=. The **ENTER** key is pressed when CAL1= is displayed and the **ZERO** key is pressed when CAL2= is displayed.

### 5. Calibration "C" Numbers

The calibration "C" numbers (C1, C2, C3 and C4) are displayed only during the Test mode operation and are shown at the end of the test. Each number is displayed for approximately 4 seconds, allowing you to record them. These numbers correspond to the calibration setting of the indicator. The numbers may be up to three digits in length. By recording these numbers you will be able to return the indicator to its present calibration settings without using test weights simply by entering the "C" numbers. *Refer to the Calibration "C" Number section of this manual for instructions on viewing the "C" numbers.*

# SETUP AND CALIBRATION, CONT.

## Dual-Point with Zero (First Zero) Calibration

### CAL1= – FIRST CALIBRATION WEIGHT

The display will show CAL1=0. This is the first of two calibration weights. This weight could be ZERO (NO LOAD) or the TEST WEIGHTS / TEST LOAD.

- If the first calibration weight is to be ZERO (NO LOAD), press the **ENTER** key.
- If the first calibration weight is to be the TEST WEIGHTS / TEST LOAD, use the numeric keys to input the value of the calibrated test weights. **NOTE!** When entering values for CAL1=, the digits start displaying on the right side of the display and proceed to the left. When large values are used (more than 3 digits), the CAL1= prompt will automatically scroll off the left side of the display to show the additional digits on the right as they are entered.
- Place the weights on the scale platform, then press the **ENTER** key.
- Starting at the left and proceeding right, a series of dashes will appear on the display. The dashes will stay on the display momentarily, then disappear, after which the display will show: CAL2=.

### CAL2= - SECOND CALIBRATION WEIGHT

The display will show CAL2=0. This is the second of two calibration weights. This weight could be ZERO (NO LOAD) or the TEST WEIGHTS / TEST LOAD.

- If the second calibration weight is to be ZERO (NO LOAD), press the **ENTER** key.
- If the second calibration weight is to be the TEST WEIGHTS / TEST LOAD, use the numeric keys to input the value of the calibrated test weights. **NOTE!** When entering values for CAL2=, the digits start displaying on the right side of the display and proceed to the left. When large values are used (more than 3 digits), the CAL2= prompt will automatically scroll off the left side of the display to show the additional digits on the right as they are entered.
- Place the weights on the scale platform, then press the **ENTER** key.
- Starting at the left and proceeding right, a series of dashes will appear on the display. The dashes will stay on the display momentarily, then disappear, after which the display will show: Sio?.

# SETUP AND CALIBRATION, CONT.

## Dual-Point without Zero (False Zero) Calibration

### CAL1= – FIRST CALIBRATION WEIGHT

The display will show CAL1=0. This is the first of two calibration steps. This weight is the TEST WEIGHTS / TEST LOAD.

- Place the weights on the scale platform.
- Using the numeric keys, input the value of the calibrated test weights / test load, then press the **ENTER** key. **NOTE!** When entering values for CAL1=, the digits start displaying on the right side of the display and proceed to the left. When large values are used (more than 3 digits), the CAL1= prompt will automatically scroll off the left side of the display to show the additional digits on the right as they are entered.
- Starting at the left and proceeding right, a series of dashes will appear on the display. The dashes will stay on the display momentarily, then disappear, after which the display will show: CAL2=.

### CAL2= - SECOND CALIBRATION WEIGHT

The display will show CAL2=0. This is the second of two calibration steps.

- Remove the weights on the scale platform, then press the **NET/GROSS** key.
- Starting at the left and proceeding right, a series of dashes will appear on the display. The dashes will stay on the display momentarily, then disappear, after which the display will show: Sio?.

## Single-Point for Span Only (Last Zero) Calibration

### CAL1= – FIRST CALIBRATION WEIGHT

The display will show CAL1=0. This is the first of two calibration steps. This weight is the TEST WEIGHTS / TEST LOAD.

- Zero the scale, then place the weights on the scale platform.
- Using the numeric keys, input the value of the calibrated test weights / test load, then press the **ENTER** key. **NOTE!** When entering values for CAL1=, the digits start displaying on the right side of the display and proceed to the left. When large values are used (more than 3 digits), the CAL1= prompt will automatically scroll off the left side of the display to show the additional digits on the right as they are entered.
- Starting at the left and proceeding right, a series of dashes will appear on the display. The dashes will stay on the display momentarily, then disappear, after which the display will show: CAL2=.

### CAL2= - SECOND CALIBRATION WEIGHT

The display will show CAL2=0. This is the second of two calibration steps.

- Remove the weights on the scale platform, then press the **ZERO** key.
- The display will advance to Sio?.

## SETUP AND CALIBRATION, Cont.

### Single-Point for Zero Only (Only Zero) Calibration

#### CAL1= – FIRST CALIBRATION WEIGHT

The display will show CAL1=0. This is the first of two calibration steps.

- Insure the scale is empty.
- Press the **ENTER** key.
- Starting at the left and proceeding right, a series of dashes will appear on the display. The dashes will stay on the display momentarily, then disappear, after which the display will show: CAL2=.

#### CAL2= - SECOND CALIBRATION WEIGHT

The display will show CAL2=0. This is the second of two calibration steps.

- Press the **ZERO** key.
- The display will advance to Sio?.

### Calibration “C” Numbers

1. With CAL1= displayed, press the "diamond T" TARE key.
2. At the C1= prompt, press the **ENTER** key to show the current value of the C1 number.
3. If the C1= number displayed is acceptable, press the **ENTER** key again to save it.
4. Otherwise, use the numeric keys to enter a new C1= number, then press the **ENTER** key.
5. Repeat steps 2 through 4 for C2=, C3= and C4=.



**NOTE!** If any components have been changed that affect calibration and/or your scale is used in a commercial application and must be "Legal for Trade" you cannot use the “C” numbers to re-calibrate.

## SETUP AND CALIBRATION, Cont.

### Sio (Sio?) - Serial Input/Output

With Sio (Sio?) displayed, press the **ENTER** key. The display will change to show the current setting "no". To skip configuring the Sio (serial input/output) and proceed to the Print? menu, press the **ENTER** key again. To configure the Sio, press the numeric key **1/YES** then the **ENTER** key. After pressing the **ENTER** key, the display will change to bAud=.

### bAUd= (Serial Port Baud Rate)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new baud rate for the serial ports, then press the **ENTER** key to save it. Allowable values are:

12 = 1200 Baud	24 = 2400 Baud	48 = 4800 Baud
96 = 9600 Baud	19 = 19.2k Baud	38 = 38.4k Baud
76 = 76.8k Baud		

### Prty= (Serial Port Parity)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, or 2.

0 = NONE (No Parity)	1 = Odd Parity	2 = Even Parity
----------------------	----------------	-----------------

### bitS= (Serial Port Data Bits)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 7 or 8.

### StoP= (Serial Port Stop Bits)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 or 2.

### Cont1= (Continuous Output Serial Port 1)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

<b>Cont1= 1 (Yes)</b> Continuous Output	<b>Cont1= 0 (No)</b> No Continuous Output
--	--

If you selected Cont1= 1 (Yes Continuous Output), an additional prompt, "tyPE=" will be displayed.

If you selected Cont1= 0 (No Continuous Output) proceed to the Weight On Demand section.

### tyPE= (Continuous Output Format)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are:

0 = SMA	1 = SB-400	2 = SB-200	3 = Rice Lake IQ355
4 = AnDFV	5 = WI110	6 = Number	7 = Toledo Short

## SETUP AND CALIBRATION, Cont.

If SMA is selected, the data will be transmitted in the following format:

```
<lf><s><r><n><m><f><xxxxxx.xxx><uuu><cr>
```

Where:

lf =	Line Feed	
s =	Flags	Z= center of Zero, O = Overcap, E = zero Error, e = weight not currently being displayed
r =	Range	1, 2, 3, ...
n =	Mode	G = Gross, T = Tare, N = Net
m =	Motion	M = Motion, " "(blank) = no motion
f =	Custom	Custom flag
xxxxxx.xxx =	Weight	Six digits with decimal point
uuu =	Units	ton, lb , l/o, oz , t , kg , g
cr =	Carriage Return	(hex 0D)

If SB-400\* or Computer is selected, the data will be transmitted in the following format:

```
<s><xxxxxx><d><uu><m><cc><cr>
```

Where:

s =	Sign	"-" = negative, " " (blank) = positive
xxxxxx.xxx =	Weight	Six digits
d =	Decimal point	Added to string if enabled in setup
uu =	Units	tn, lb, l/o, oz, t, kg, g
m =	Mode	G = Gross, N = Net
cc =	Weight Status	OC = overcap CZ = center of zero MO = motion ee = weight not currently being displayed
cr =	Carriage Return	(hex 0D)

\*The SB-80, SB-300 (*multiple displays not supported*) and WinVRS use the SB-400 format.

If SB-200 is selected, the data will be transmitted in the following format:

```
<cr><s><xxxxxx><d><c><uu><m> ETX
```

Where:

cr =	Carriage Return	(hex 0D)
s =	Sign	"-" = negative, " " (blank) = positive
xxxxxx.xxx =	Weight	(with leading zeros)
d =	Decimal point	Embedded into weight (after weight dpp=0)
c =	status	m = motion o = overcap e = weight not currently being displayed
uu =	Units	tn, lb, l/o, oz, t, kg, g
m =	Mode	G = Gross, N = Net
ETX =	End of TeXt	(hex 03) MUST terminate ALL serial commands

If Rice Lake IQ355 is selected, the data will be transmitted in the following format:

```
<stx><s>xxxxxxx<u><m><s><cr><lf>
```

If AnDFV is selected, the data will be transmitted in the following format:

```
<hdr1>,xxxxx<uu><cr><lf>
```



## SETUP AND CALIBRATION, Cont.

If WI110 is selected, the data will be transmitted in the following format:

<m><sp><s>xxxxx<sp><uu><cr><lf>

If number only is selected, the data will be transmitted in the following format:

xxxxxx<cr><lf>

If Toledo Short is selected, the data will be transmitted in the following format:

<stx><swa><swb><swc>xxxxxx<cr><sum>

### Weight On Demand

If continuous output has not been selected for Serial Port 1 (Cont1=NO), the 210/215 indicator will respond to a weight request (ENQ).

The host device (computer) sends:

ENQ - (hex 05)

The 210/215 will respond:

<s><xxxxxx><d><uu><m><cc><cr>

Where:

s =	Sign	"-" = negative, " " ( <i>blank</i> ) = positive
xxxxxx.xxx =	Weight	Six digits
d =	Decimal point	Added to string if enabled in setup
uu =	Units	tn, lb, l/o, oz, t, kg, g
m =	Mode	G = Gross, N = Net
cc =	Weight Status	OC = overcap CZ = center of zero MO = motion ee = weight not currently being displayed
cr =	Carriage Return	(hex 0D)

**NOTE! The Weight On Demand function is not available for Serial Port 2.**

### Cont2= (Continuous Output Serial Port 2)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting and then press the **ENTER** key to save it.

**Cont2= 1 (Yes)**

Continuous Output

**Cont2= 0 (No)**

No Continuous Output

If Cont2= Yes (Continuous Output) is selected, an additional prompt, "tyPE=" will be displayed.

### tyPE= (Continuous Output Format)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are:

0 = SMA	1 = SB-400	2 = SB-200	3 = Rice Lake IQ355
4 = AnDFV	5 = WI110	6 = Number	7 = Toledo Short

**NOTE!** See Continuous Output Serial Port 1, tyPE= for description of output formats.

## SETUP AND CALIBRATION, Cont.

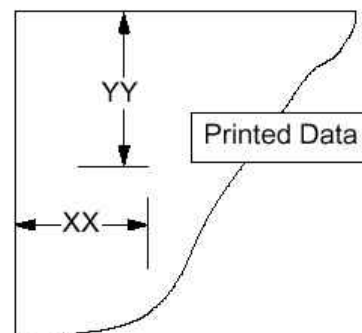
### Print (Print?) - Print Tab Settings

With Print (Print?) displayed, press the **ENTER** key. The display will change to show the current setting “no”. To skip configuring Print Tab Settings and proceed to the FSPAN? menu, press the **ENTER** key again. To configure Print Tab Settings, press the numeric key **1/YES** and then the **ENTER** key. After pressing the **ENTER** key the display will change to Port=.

The general format for the input is  $A = YY.XX$  where A is the character identifying the data printed, YY is the number of lines down and XX is the number of spaces to the right.



**NOTE!** Enter 00 in either location, YY or XX, to disable the data from printing.



### Port= (Select Port for Printer)

Press the **ENTER** key to show the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new setting and then press the **ENTER** key to save it. Allowable values are: 1 or 2.



**NOTE!** Although either port can be used for the printer port, it is recommended to use the bi-directional port 1 with a bi-directional cable.

### HoUr= (Time Print Location)

Press the **ENTER** key to show the current setting for the location of time printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### dAtE= (Date Print Location)

Press the **ENTER** key to show the current setting for the location of date printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### id = (ID Prompt Print Location)

Press the **ENTER** key to show the current setting for the location of ID prompt printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### CnC n= (Consecutive Number Print Location)

Press the **ENTER** key to show the current setting for the location of consecutive number printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### GroSS= (Gross Weight Print Location)

Press the **ENTER** key to show the current setting for the location of Gross weight printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### tArE= (Tare Weight Print Location)

Press the **ENTER** key to show the current setting for the location of Tare weight printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

## SETUP AND CALIBRATION, Cont.

### **nEt= (Net Weight Print Location)**

Press the **ENTER** key to show the current setting for the location of Net weight printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### **G ACC= (Gross Weight Accumulator Print Location)**

Press the **ENTER** key to show the current setting for the location of Gross weight accumulator printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### **n ACC= (Net Weight Accumulator Print Location)**

Press the **ENTER** key to show the current setting for the location of Net weight accumulator printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### **CoUnt= (Count "number of pieces on the scale" Print Location)**

Press the **ENTER** key to show the current setting for the location of Count (number of pieces on scale) printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### **EACH= (Piece Weight Print Location)**

Press the **ENTER** key to show the current setting for the location of Piece weight printing. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, use the numeric keys to enter a new location and then press **ENTER** to save it.

### **CrLF= (Carriage Return Line Feed) - *Data Format Termination***

Data transmitted from the serial I/O port can be terminated with a single carriage return and either no line feed or a single line feed command. Press the **ENTER** key to view the current setting. A "YES" displayed means the data will be terminated with a carriage return AND a line feed. A "no" displayed means the data will be terminated with a single carriage return only.

If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

### **EoP= (End-Of-Print Line Feeds)**

At the end of a data transmission to a printer, the indicator can transmit a pre-selected number of line feed commands to space the paper in the printer to the desired position for withdrawal or for the next print.

Press the **ENTER** key to view the current setting. If the displayed value is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new the number of End-Of-Print linefeeds, then press the **ENTER** key to save the new setting. Allowable values are: 0 through 99.

## SETUP AND CALIBRATION, Cont.

### F SPAn (FSPAN?) - Fine Span Adjustment



**NOTE!** The FSPAN and Hi rES modes require a load of 10% of Capacity be on the scale before adjustments can be made.

*With the F SPAn? prompt displayed after pressing the **ENTER** key at the last Print prompt:*

With FSPAN? displayed, press the **ENTER** key. The display will change to show the current setting "no". To skip the Fine Span Adjustment and return to the SEtUP menu, press the **ENTER** key again. To perform the Fine Span Adjustment, place a calibrated test weight on the scale and press the numeric key **1/YES** then the **ENTER** key.

After pressing the **ENTER** key, the display will change to show the amount of the test weight and the annunciators will alternately flash off and on i.e. (all ON, weighing unit off, then all OFF, weighing unit ON). Press the **1/YES** to increase the span *OR* press the **0/NO** key to decrease the span. Press the **ASTERISK** key to return to the previous prompt or press the **ENTER** key to exit FSPAN? and return to the SetUP menu.

*With the F SPAn prompt displayed after pressing the Calibration switch:*

With F SPAn displayed, place a calibrated test weight on the scale and press the **ENTER** key. After pressing the **ENTER** key, the display will change to show the amount of the test weight and the annunciators will alternately flash off and on (all ON, weighing unit off, then all OFF, weighing unit ON). Press the **1/YES** to increase the span *OR* press the **0/NO** key to decrease the span. Press the **ASTERISK** key to return to the previous prompt or press the **ENTER** key to exit F SPAn and return to the SEtUP menu.

### Hi rES - Display High Resolution Weight

With Hi rES on the display, pressing the **ENTER** key will show the active weight in "high resolution" mode (in 1/10 interval). Press the **PRINT** key to print the weight (followed by the text TEST) via the selected printer output port enabled during setup and calibration.

### LoCoUt - Key Lock Out Function

With LoCoUt on the display, pressing *any* key will display "LoCd" (locked) or "UnLoCd" (unlocked) for the current key state. Pressing a locked key during normal operation will result in a 1/2 second display "LoCd" and the key will be ignored. To exit the LoCoUt function, press the calibration switch or cycle power (press the **ON/OFF** key twice).



**NOTE!** The menu selections Hi rES and LoCoUt can only be selected using the calibration switch.

## SETUP REVIEW

The 210/215 indicators allow several operational parameters to be reviewed and changed without breaking the calibration seal. These operational parameters are:

Power Up Zero Reset Enable/Disable  
Time Format  
Digital Output Control Enable/Disable  
Sleep Mode Feature Enable/Disable  
Auto Shutoff Feature Enable/Disable

Serial Input / Output Configuration  
Baud Rate  
Parity  
Number of Data Bits  
Number of Stop Bits  
Continuous Output Port 1  
    Continuous Output Format  
Continuous Output Port 2  
    Continuous Output Format

Print Tab Settings  
Printer Port Selection  
Time  
Date  
Consecutive Number  
Gross Weight  
Tare Weight  
Net Weight  
Gross Weight Accumulator  
Net Weight Accumulator  
Count  
Piece Weight

To enable the Setup Review feature, with the indicator ON:

1. Press the **ASTERISK** key. The indicator will respond by showing the FunCt= (Function) prompt and alternately flashing off and on (all ON, weighing unit off, then all OFF, weighing unit ON) the annunciators.
2. Press the **ZERO/REVIEW** key. The display will change to the prompt for the selection of power-up zeroing (PUO=).
3. Using the same procedure as described in the Setup and Calibration section of this manual, make the required changes.
4. Press the **ASTERISK** key to return to the previous prompt.
5. To exit Setup Review, press the **ENTER** key to step the remaining prompts *OR* at anytime, cycle the power (press the **ON/OFF** key twice).

## CALIBRATION "C" NUMBERS

The "C" numbers are displayed only during the Test mode operation by pressing the **ASTERISK** key then the **UNITS/TEST** key. The "C" numbers are shown at the end of the test operation and each number is displayed for approximately 4 seconds, allowing you to record them. Each number may be up to three (3) digits in length. By recording these numbers you will be able to return the indicator to its present calibration settings without using test weights simply by entering the "C" numbers. *Refer to the Setup and Calibration, "CAL" section of this manual for instructions on using the "C" numbers.*



**If any components have been changed that affect calibration and/or your scale is used in a commercial application and must be "Legal for Trade" you can not use "C" numbers to re-calibrate.**

# ACCUMULATORS

## To *view* the NET accumulator:

1. Press the **ASTERISK** key then the **NET/GROSS** key.
2. Press the **ASTERISK** key to return to normal operation.

## To *print* the NET accumulator:

1. Press the **ASTERISK** key, the **NET/GROSS** key, then the **PRINT** key
2. The indicator will return to normal operation when printing has been completed.

## To *clear (zero)* the NET accumulator:

1. Press the **ASTERISK** key, the **NET/GROSS** key, then the **ZERO** key
2. Press the **ASTERISK** key to return to normal operation.

## To *view* the Gross accumulator:

1. Press the **ASTERISK** key then the **NET/GROSS** key twice.
2. Press the **ASTERISK** key to return to normal operation.

## To *print* the Gross accumulator:

1. Press the **ASTERISK** key, the **NET/GROSS** key twice, then the **PRINT** key
2. The indicator will return to normal operation when printing has been completed.

## To *clear (zero)* the Gross accumulator:

1. Press the **ASTERISK** key, the **NET/GROSS** key twice, then the **ZERO** key
2. Press the **ASTERISK** key to return to normal operation.

## To *view* the Count accumulator:

1. Press the **ASTERISK** key then the **COUNT/SAMPLE** key.
2. Press the **ASTERISK** key to return to normal operation.

## To *print* the Count accumulator:

1. Press the **ASTERISK** key, the **COUNT/SAMPLE** key, then the **PRINT** key
2. The indicator will return to normal operation when printing has been completed.

## To *clear (zero)* the Count accumulator:

1. Press the **ASTERISK** key, the **COUNT/SAMPLE** key, then the **ZERO** key
2. Press the **ASTERISK** key to return to normal operation.

## NOTES FOR THE MODEL 215 ONLY

1. If LfT (Legal For Trade) is enabled, the scale must be at Gross weight zero to review the accumulators.
2. The scale must return to Gross weight zero between accumulations.
3. When viewing the Gross or Net accumulators, the display will toggle between the total accumulator and the total count for the selected accumulator.

## BEFORE YOU CALL FOR SERVICE

The 210/215 indicators have been designed to provide you with years of trouble-free operation. However, should you experience a problem, please refer to the troubleshooting guide below before you call for service. The following describes several types of symptoms along with suggested remedies.

### PROBLEM

Display does not turn on

### POSSIBLE SOLUTIONS

AC operation:

Is the AC power cord fully inserted into the wall receptacle? Check wall receptacle for proper AC power. Try another electrical appliance in the same receptacle, does it work? Check the circuit breaker. Has there been power failure?

Battery operation:

Check if battery is installed and correctly. Is battery discharged - replace or recharge.

**NOTE! The battery tray (with or without batteries) must be installed for the Model 215 to function.**

Incorrect weight displayed

Has the instrument been calibrated? Insure that the scale platform isn't touching an adjacent object. Check the load cell connector wiring. If using four (4) wire load cells, insure the sense lead jumpers (J4 & J5) are installed. Have proper operation procedures been followed?

Indicator will not display weight

Refer to Error Codes section and make certain that the "oCAP" message is not displayed. If so, and scale is not loaded, perform the calibration sequence.

The printer prints but does not use the Print Tab Settings or prints a test ticket

The print tab setting or visual ticket format must be selected prior to beginning the weighing operation or just prior to printing the ticket.

To select the ticket format prior to beginning the weighing operation:

1. Press the **ASTERISK** key then the **PRINT** key. The display will change to the "Prt=".
2. Press the **ENTER** key to show the current value.
3. If the value displayed is acceptable, press the **ENTER** key again to save it.
4. If the displayed value is incorrect (or another ticket format is desired), use the numeric keys to enter the new value, then press the **ENTER** key to save it.

To select the ticket format just prior to printing the ticket:

1. Press the desired format number.
2. Pressing the **PRINT** key.

**Allowable values for ticket formats are:**

- 0 = print tab settings
- 1 = visual ticket format 1
- 2 = visual ticket format 2

**NOTE! When a print format is selected (by either method), it will remain active until changed by the operator.**

# ERROR CODES

The 210/215 indicators are equipped with software that indicates when an error in the operation takes place. The following lists the error codes displayed by the 210/215 along with their meaning. Should you encounter an error code, please refer to this list for the cause.

## **CALbtn (Calibration Button)**

CALbtn will be displayed (until the condition changes), on power-up if the calibration switch is pressed in by the operator, the calibration access screw is the wrong length and is depressing the switch, the switch is disconnected from the PC board, or the switch is defective.

CORRECTIVE ACTION: Release the switch. Insure correct screw (#10 x ½ Stainless Steel fillister head) was installed for the calibration access screw. Referring to Figure No. 6, make sure calibration switch cable is plugged into P7 on the PC board. Replace calibration switch assembly. Consult your scale service provider.

## **ConFiG (Configuration)**

E<sup>2</sup>PROM checksum failure. Indicates improper stored calibration data, calibration is necessary.

CORRECTIVE ACTION: Recalibrate with calibrated test weight.

## **Error**

An invalid keypad entry was attempted:

- A. **PRINT** key pressed with a negative weight.
- B. **TARE** key pressed to enter a push button tare value of a negative value.
- C. **ENTER** key pressed to enter a tare weight value that exceeds the scale capacity.
- D. **ENTER** key pressed to enter a tare weight value that is inconsistent with the scale division value (i.e. attempt to enter a tare of 123 with scale divisions of 5).
- E. **ZERO** key pressed when the gross weight is outside the scale zero weight range.
- F. **lb/kg** key pressed to change to kg when the kg tare weight value exceeds 4 digits in length.

CORRECTIVE ACTION: Determine which of the reasons for the error display is applicable and take the appropriate corrective action.

## **ErrAh (Analog Error High)**

1. The load cell input is above the range of the indicator.

CORRECTIVE ACTION: Check for improper load cell wiring, excessive load, and for output of 1 to 40mV.

2. Load cell or circuit failure.

CORRECTIVE ACTION: Consult your scale service provider.

## **ErrAL (Analog Error Low)**

1. The load cell input is below the range of the indicator.

CORRECTIVE ACTION: Check for improper load cell wiring and for output of 1 to 40mV.

2. Load cell or circuit failure.

CORRECTIVE ACTION: Consult your scale service provider.

## **Err1**

A program checksum mismatch has been detected.

CORRECTIVE ACTION: Consult your scale service provider.

## **Err3**

Internal RAM failure.

CORRECTIVE ACTION: Consult your scale service provider.



## ERROR CODES, Cont.

### HuH?

**UNITS** key pressed in an attempt to perform a “unit” conversion that is not allowed.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

### notArE

**NET** key pressed with no stored tare weight value.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

### OCAP (Over Capacity)

The load on the scale exceeds the scale capacity plus nine (9) divisions.

CORRECTIVE ACTION: Remove the over capacity load from the scale platform. May indicate miscalibration.

### -oF- (Overflow)

The indicator is attempting to display a positive number greater than six (6) digits in length or a negative number of more than five (5) digits.

CORRECTIVE ACTION: Return to Gross Weight mode and review Tare value. May indicate miscalibration.

### toobiG

**UNITS** key pressed in an attempt to perform a “unit” conversion where the interval would have been greater than 50.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

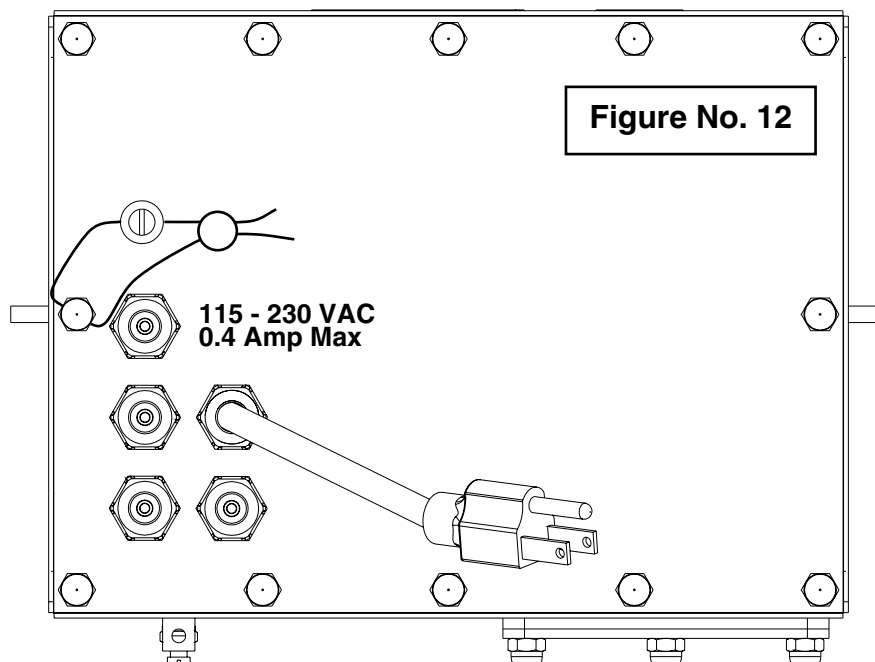
### UnStb (Unstable)

Motion is present when trying to power up, print, zero or perform a push button tare function.

CORRECTIVE ACTION: Wait for a stable weight display (*STABLE* annunciator on) before performing any of these operations.

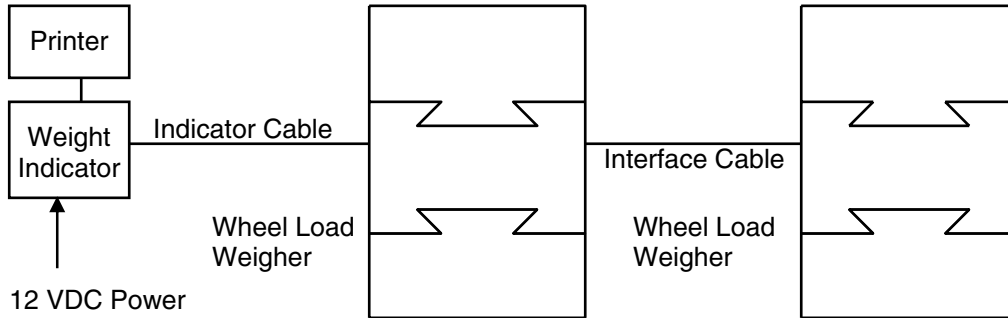
## CALIBRATION SEAL INSTALLATION

If your 210/215 Weight Indicating Instrument is used in a commercial application it must be tested and sealed by your local weights and measurements official. The 210/215 is designed to accept a lead and wire security seal to prevent unauthorized access to the calibration adjustments. Refer to Figure No. 12 for details on the installation of the seal.

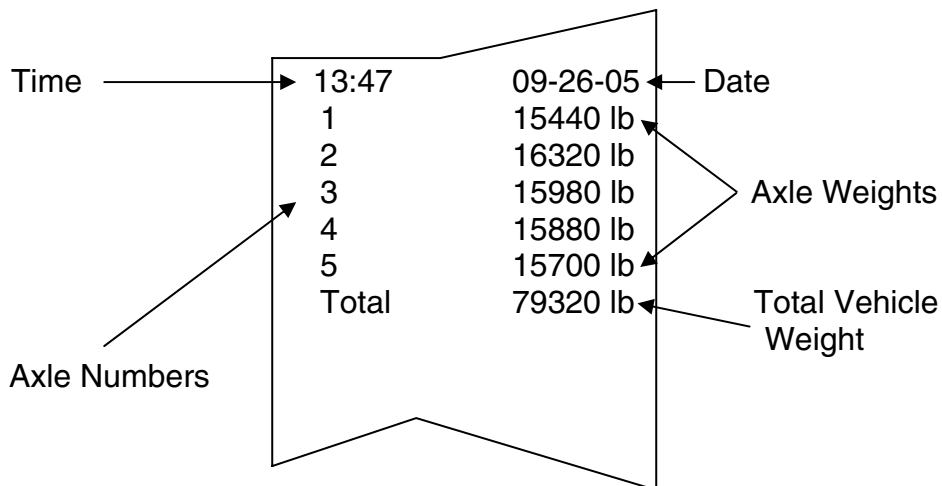


# AXLE WEIGHER MODE OPERATION

After placing the wheel load weighers on the ground in front of the vehicle(s) to be weighed, the two weighers are connected together using the interconnection cable assembly. One weigher (makes no difference which) is connected to the indicator using the indicator interface cable. The interconnection diagram is shown below:



1. With power applied to the indicator, press the **ON** key to turn on the indicator.
2. Verify that the weight display is at zero ( 00 ). If not, press the **ZERO** key.
3. Have the vehicle driven forward until the first axle is on the center of the wheel load weighers.
4. Observe the weight of the first axle and press the **PRINT** key to record the weight, date and time.
5. Have the vehicle pull forward until the next axle is on the center of the wheel load weighers. **NOTE!** If the next axle is a tandem or tridem set of axles, place **ONLY** the first axle of the group on the wheel load weighers.
6. Observe the weight of this axle and press the **PRINT** key to record the weight, date and time.
7. Repeat step 5 until all of the remaining axles have been weighed and printed.
8. After the last axle has been weighed and its value recorded, pull the vehicle off the wheel load weighers.
9. Press the \* (asterisk) key and then press the **PRINT** key. The total of all of the vehicle axle weights will be recorded and printed. The example below illustrates a typical print ticket for a five-axle truck.



## AXLE WEIGHER MODE OPERATION, Cont.

### Additional Features

If you wish to also record the total of any axle groups, press the number key corresponding to the number of axles in the axle group to be totaled when the first axle in the group is weighed. After the last axle in the group is recorded, the printer will automatically record the subtotal of the axle group weights. In the previous example, assume that axles 2 and 3 form a tandem pair of axles as do axles 4 and 5. To record the total weight of these axle groups, press the number 2 key followed by the **PRINT** key when printing axles 2 and 4. This indicates that the next two axles form an axle group whose total is to be recorded. The example below illustrates the print format when the two axle groups are identified.

13:47	09-26-05
1	15440 lb
2	16320 lb
3	15980 lb
2,3	32300 lb
4	15880 lb
5	15700 lb
4,5	31580 lb
Total	79320 lb

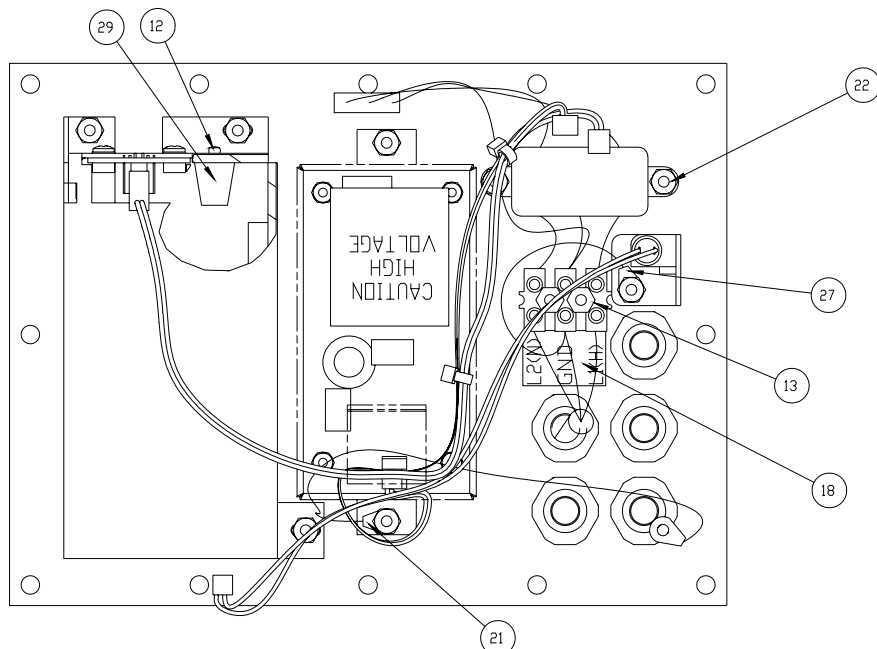
Note that there is a maximum of 9 single axles in an axle group and that the axles must be weighed in a consecutive group. The axles comprising the axle group are also identified on the printed record.

If you wish to print additional copies of the printed record for the vehicle, press the \* (asterisk) key again followed by the **PRINT** key and a summary print will be produced. This can be repeated as often as necessary to secure the number of desired copies. Note, however, that as soon as the first axle of the next vehicle is printed, the weights from the previously weighed vehicle are cleared.

# PART IDENTIFICATION

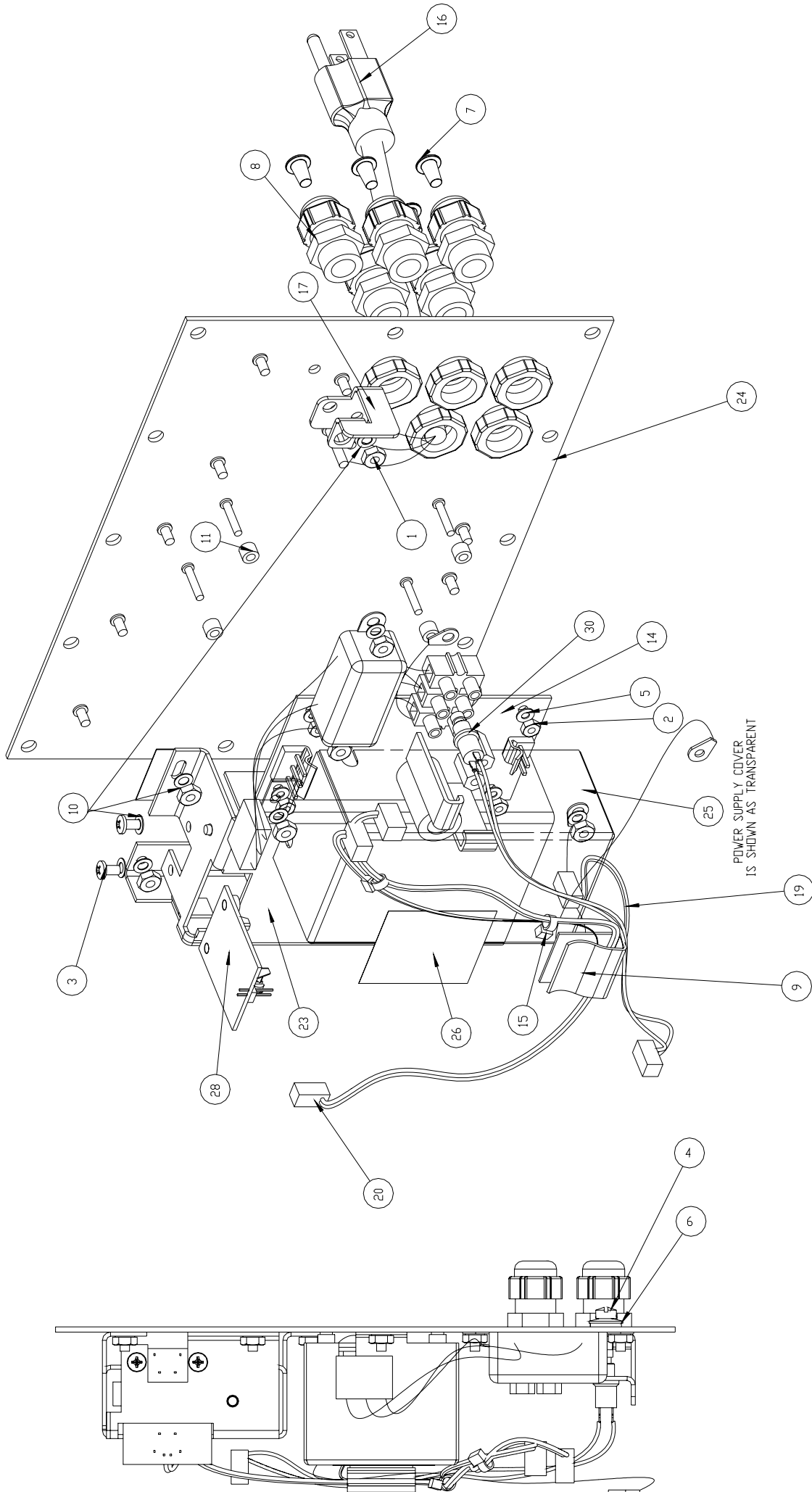
## (210 Rear Enclosure Sub Assembly)

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	8	6013-0039	HEX NUT #6-32
2	4	6013-0245	HEX NUT #4-40
3	2	6021-0654	SCW PAN HEAD #6-32 x .250 PDMS
4	1	6021-1108	SCW FILLISTER MACHINE-SCW #10-32 x .375 S.S.
5	4	6024-0108	WASHER LOCK INT. TOOTH #4 S.S.
6	1	6024-1081	WASHER FLAT #10 NEOPRENE BACKING S.S.
7	4	6540-1104	PLUG, HOLE 0.173-.240 RED POLYETH
8	5	6610-2248	GLAND CONNECTOR
9	1	6610-5007	CABLE CLIP
10	10	6680-0004	WASHER LOCK INT. TOOTH #6 Z/P
11	4	6680-0138	SPACER #6 x .187 NYLON
12	1	6680-0200	POP RIVET
13	2	6680-0203	SPACER (PCB) #6-32 x .500
14	1	6800-1032	POWER SUPPLY BOARD
15	2	6980-0014	WIRE TIE 4" BLACK
16	1	6980-1030	POWER CORD 18/3 SVT CEE 6.3 FT
17	1	8200-B019-08	BRACKET: CALIBRATION SWITCH
18	1	8200-B104-08	LABEL: 205/210 TERM. BLOCK
19	1	8200-B204-0A	CABLE: 205/210 POWER SUPPLY OUTPUT
20	1	8200-B205-0A	CABLE: 205/210 BATTERY CABLE
21	1	8200-B212-0A	CABLE: GND
22	1	8200-B215-0A	CABLE: AC POWER W/FILTER 205/210 DWI
23	1	8200-C012-08	BRACKET, BATTERY HOLDER
24	1	8200-C016-0A	WELDMENT: ENCLOSURE REAR
25	1	8200-C018-08	POWER SUPPLY COVER
26	1	8510-C346-0I	LABEL – HIGH VOLTAGE
27	1	8512-B350-0A	WIRE: 18GA, GRN, 5.0, #8RT/TINNED
28	1	8200-B206-0A	BATTERY POWER BOARD
29	1	8526-B232-08	SPRING, BATTERY COVER
30	1	8539-B254-0A	ASSEMBLY: CABLE, CALIBRATION SWITCH



# PART IDENTIFICATION

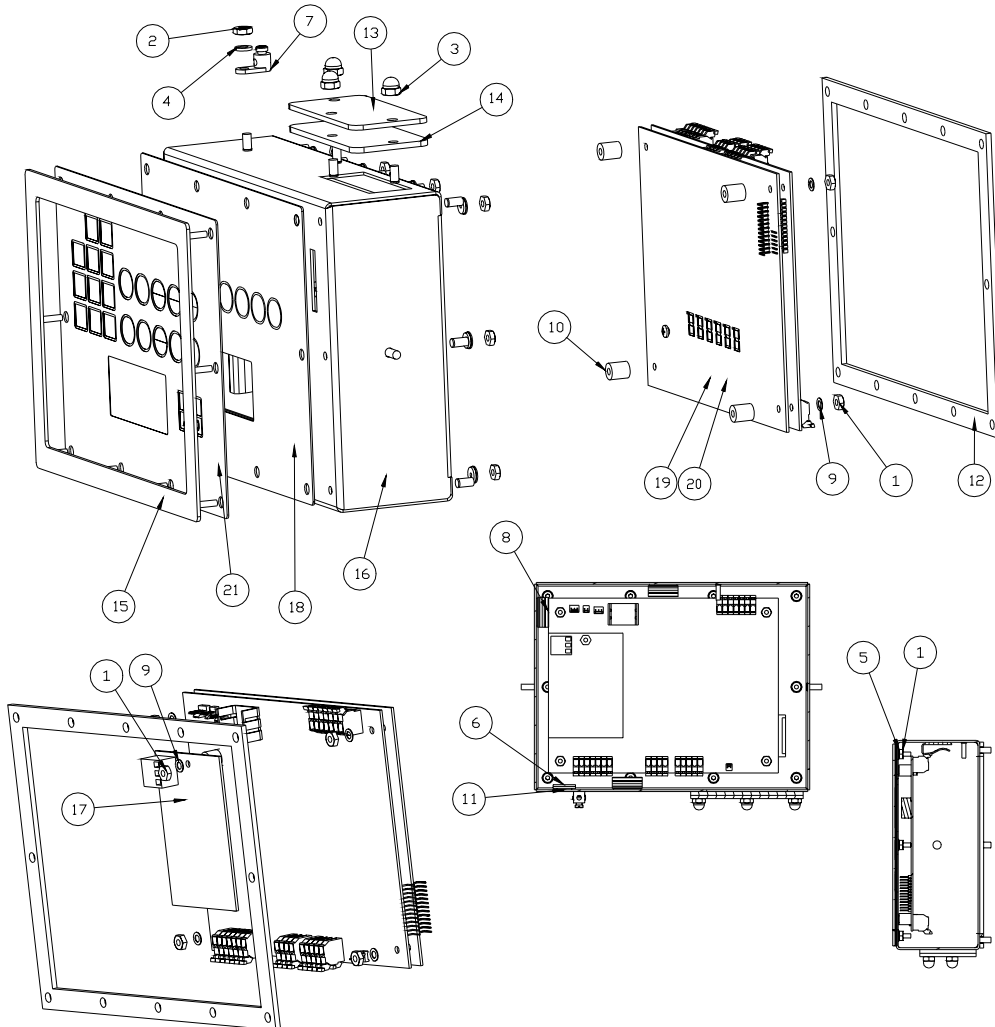
## (210 Rear Enclosure Sub Assembly)



# PART IDENTIFICATION

## (210 Front Enclosure Sub Assembly)

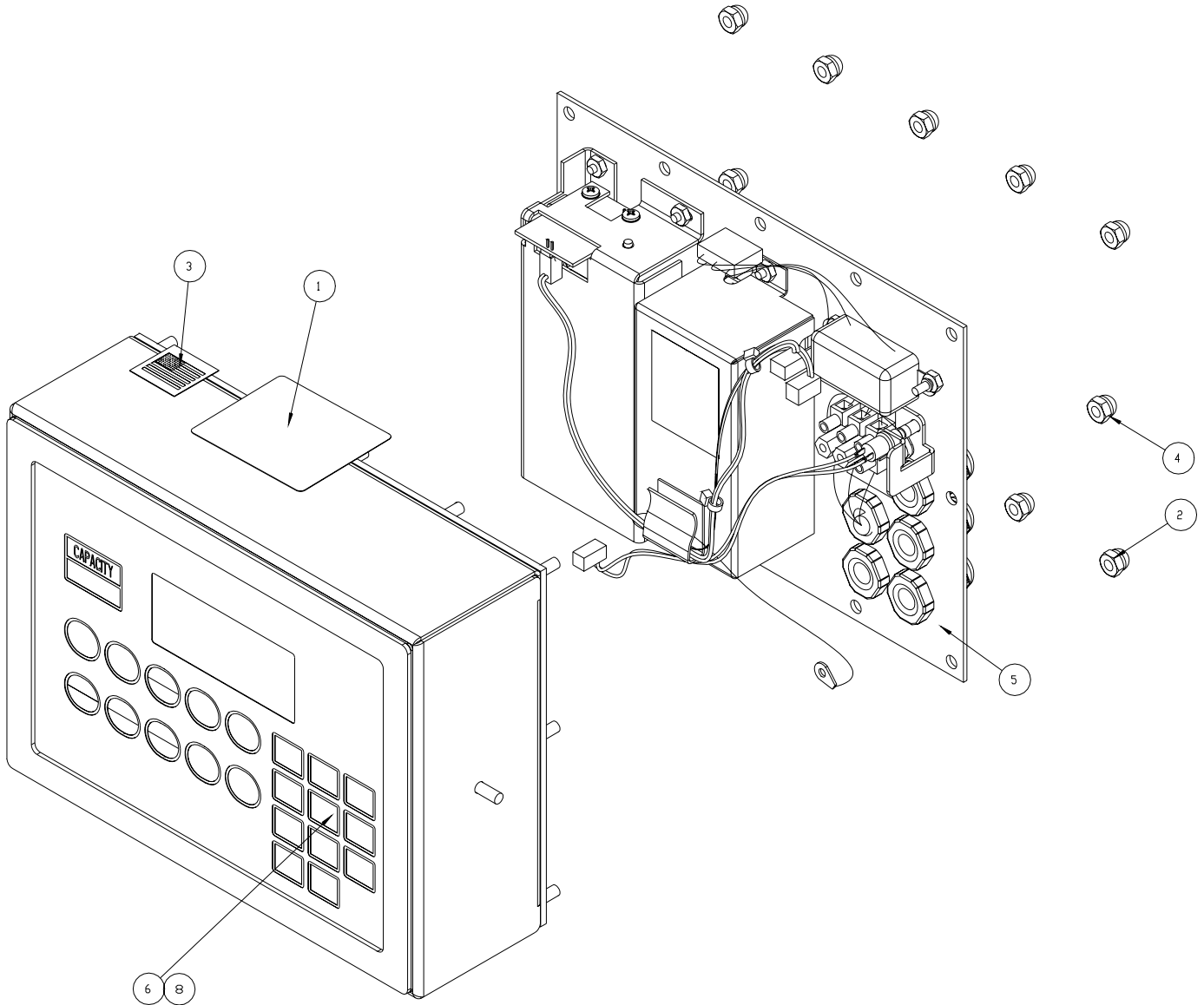
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	14	6013-0039	NUT HEX #6-32
2	1	6013-0297	NUT 10-32 HEX
3	3	6013-0433	NUT HEX #10-32 ACORN S.S.
4	1	6021-0623	SCW PAN HEAD #6-32 x .750 PDMS
5	10	6024-1078	WASHER FLAT #6 NEOPRENE BACKING S.S.
6	1	6560-0064	DESSICCANT 1 x 1 BAG
7	1	6610-5002	GROUND LUG
8	3	6610-5007	CABLE CLIP
9	4	6680-0004	WASHER LOCK INT. TOOTH #6 Z/P
10	4	6680-1049	SPACER (PCB) #6 x .438
11	1	6710-1017	TAPE DBL SIDED 1.0 WIDE 45 MIL THK.
12	1	8200-B014-08	GASKET FOR 210 ENCLOSURE
13	1	8200-B020-08	COVER, BATTERY
14	1	8200-B021-08	GASKET: BATTERY DOOR
15	1	8200-C015-0A	WELDMENT: BEZEL FOR 210
16	1	8200-C017-0A	WELDMENT: ENCLOSURE, FRONT
17		8200-C210-0A	DAC PCB (OPTIONAL)
20	1	8200-D201-1A	PC BD, ASSY. 210 MAIN
21	1	8200-D202-08	KEYPAD: 210 DWI



# PART IDENTIFICATION

(210 Final Assembly)

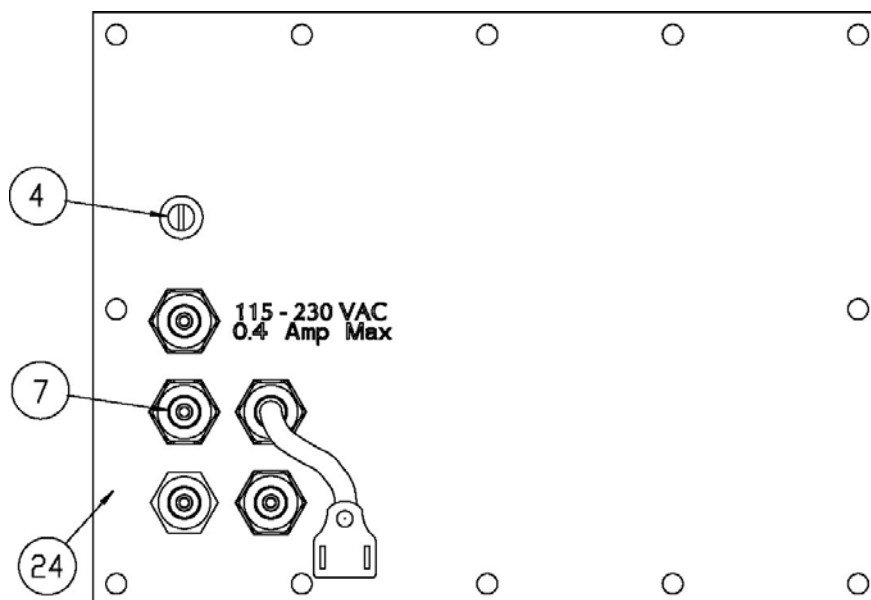
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	593GR986	SERIAL TAG ASSEMBLY
2	11	6013-0433	NUT HEX #10-32 ACORN S.S.
3	1	6650-0087	LABEL: MADE IN THE USA
4	1	8200-B026-08	NUT HEX #10-32 ACORN S.S. DRILLED
5	1	8200-D207-0A	SUB ASSEMBLY: REAR ENCLOSURE
6	1	8200-D208-0A	SUB ASSEMBLY: FRONT



# PART IDENTIFICATION

## (215 Rear Enclosure Sub Assembly)

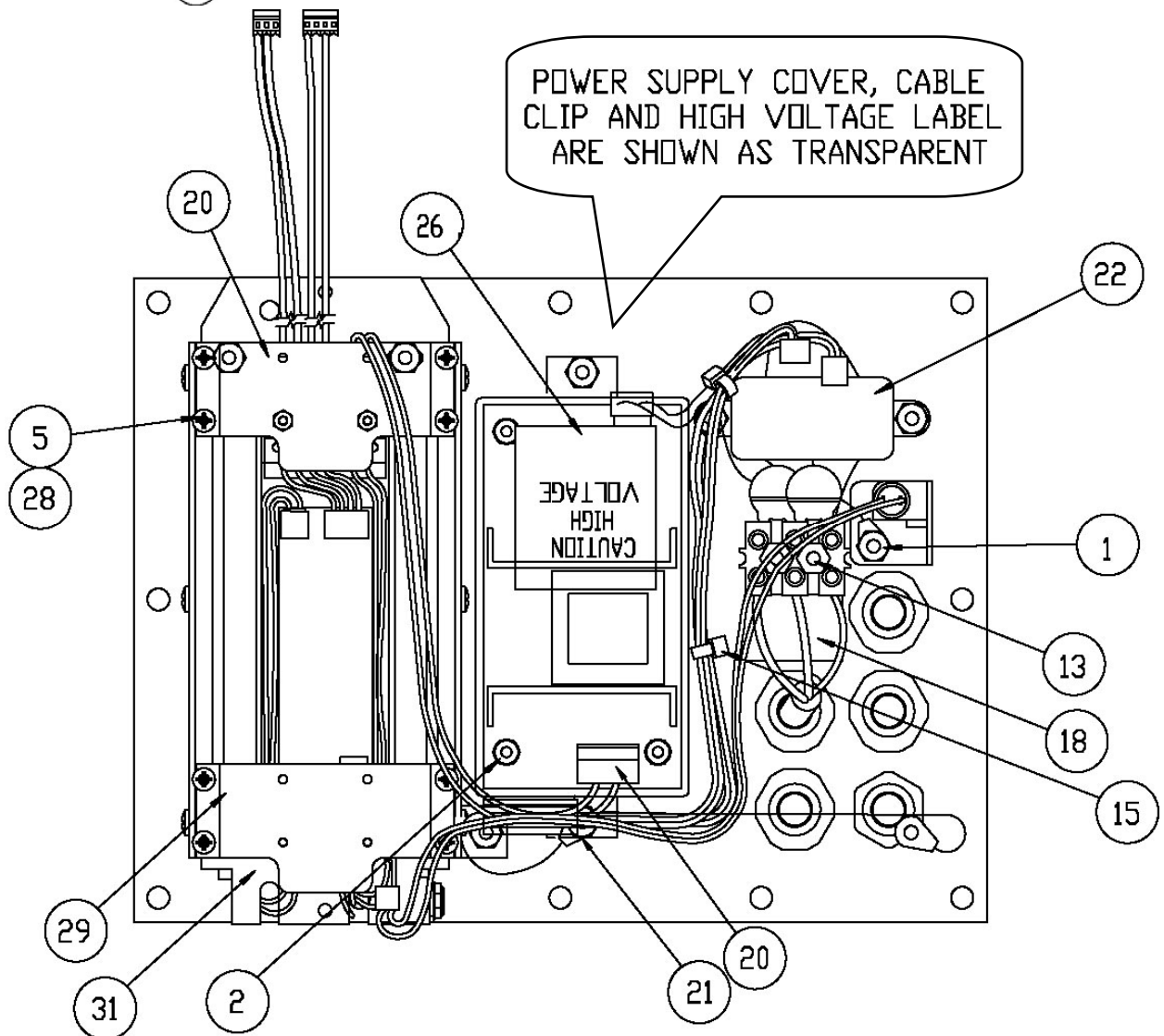
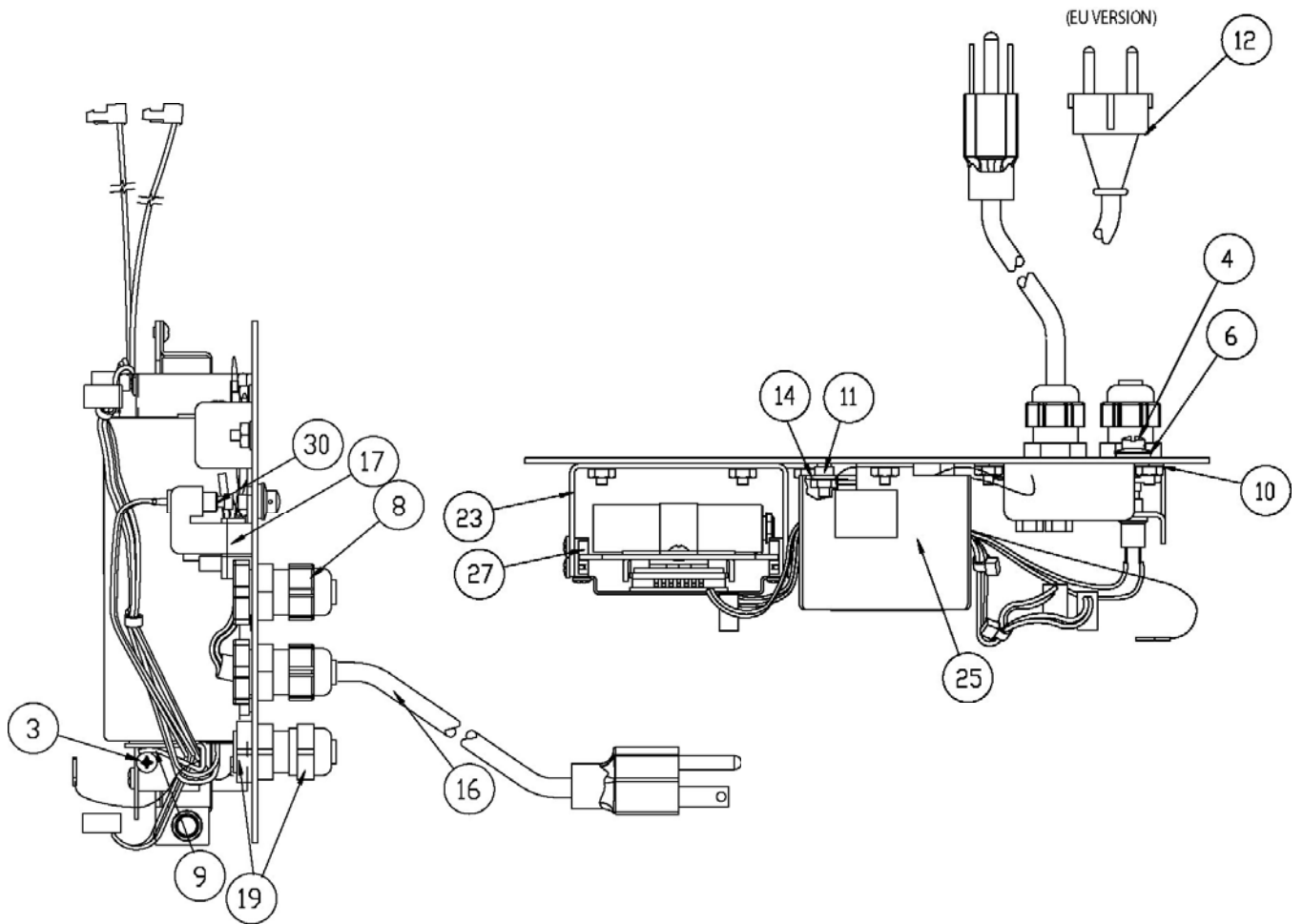
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	8	6013-0039	NUT HEX #6-32
2	3	6680-1107	SPACER #4-40 x 0.75"
3	6	6021-0654	SCW PAN HEAD #6-32 x .250 PDMS
4	1	6021-1108	SCW FILLISTER MACHINE-SCW #10-32 x .375 S.S.
5	8	6021-0502	SCW PAN HEAD #4-40 x .187 PDMS
6	1	6024-1081	WASHER FLAT #10 NEOPRENE BACKING S.S.
7	4	6540-1104	PLUG, HOLE 0.173-.240 RED POLYETH.
8	4	6610-2248	CONN GLAND .187-.312 GRIP .599 MTG BLK
9	1	6610-5007	CABLE CLIP
10	8	6680-0004	WASHER LOCK INT. TOOTH #6 Z/P
11	4	6680-0138	SPACER #6 x .187 NYLON
12	1	6980-0250	EU POWER CORD H05VV-F3G 1mm, 10A/250V, BLACK
13	2	6680-0203	SPACER (PCB) #6-32 x .500
14	1	6800-1032	POWER SUPPLY BOARD
15	2	6980-0014	WIRE TIE 4" BLACK
16	1	6980-1030	US POWER CORD 18/3 SVT CEE 6.3 FT
17	1	8200-B019-08	BRACKET: CALIBRATION SWITCH
18	1	8200-B104-08	LABE: 205/210 TERM. BLOCK
19	1	6610-1506	GLAND CONN. NICKEL
20	1	8200-C420-0A	CONNECTOR BD./BRKT. ASSY.
21	1	8200-B212-0A	CABLE: GND
22	1	8200-B237-0A	CABLE: AC POWER W/FILTER 205/210 DWI
23	1	8200-C404-08	BATTERY BRACKET
24	1	8200-C016-0A	WELDMENT: ENCLOSURE, REAR
25	1	8200-C018-08	POWER SUPPLY COVER
26	1	8510-C346-0I	LABEL – HIGH VOLTAGE
27	2	8200-C405-08	BATTERY GUIDE
28	8	6680-0052	WASHER, LOCK HELICAL #4
29	1	8200-B410-08	CONNECTOR BOARD MT.
30	1	8539-B254-0A	ASSEMBLY: CABLE, CALIBRATION SWITCH
31	1	8200-C415-0A	BATTERY TRAY ASSEMBLY





# PART IDENTIFICATION

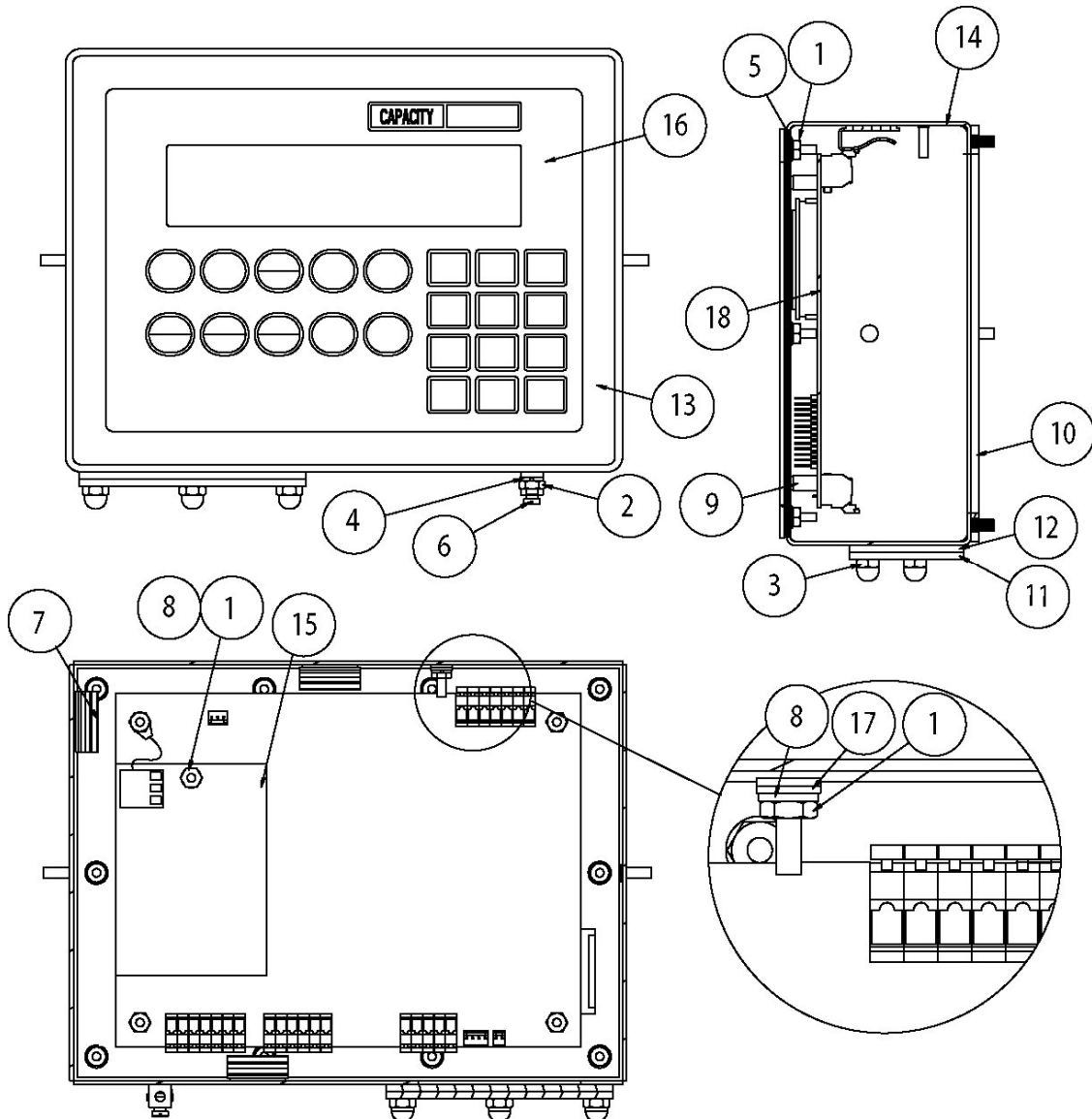
## (215 Rear Enclosure Sub Assembly)



# PART IDENTIFICATION

## (215 Front Enclosure Sub Assembly)

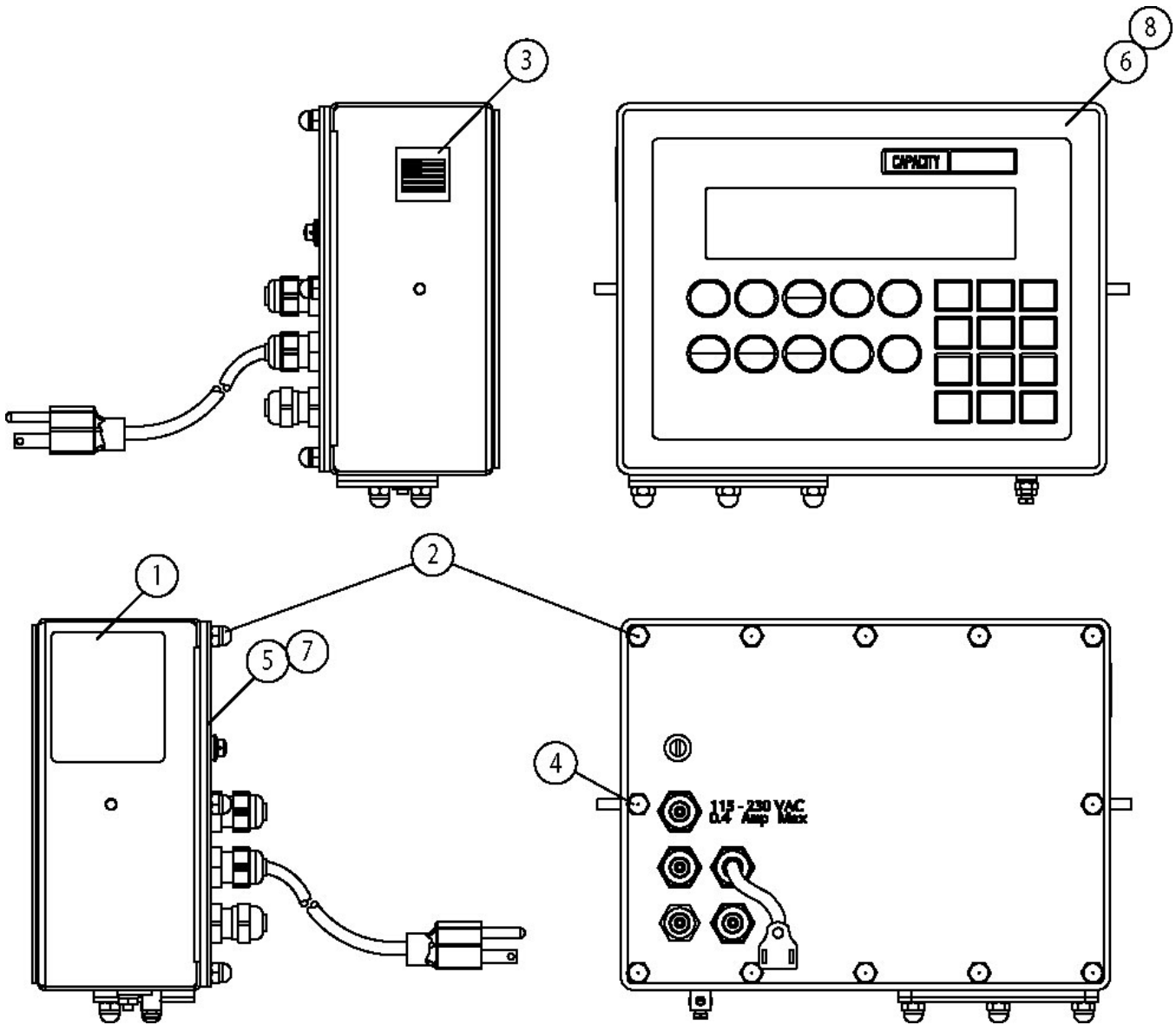
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	16	6013-0039	NUT, HEX #6-32
2	1	6013-0297	NUT, HEX #10-32
3	3	6013-0433	NUT, HEX #10-32 ACORN S.S.
4	1	6024-0037	WASHER, LOCK #10 HELICAL SPLIT
5	10	6024-1078	WASHER, FLAT #6 NEOPRENE BASCKING S.S.
6	1	6610-5002	GROUND LUG
7	3	6610-5007	CABLE CLIP
8	6	6680-0004	WASHER, LOCK INT. TOOTH #6 Z/P
9	4	6680-0204	SPACER (PCB) #6 x 0.531
10	1	8200-B014-08	GASKET FOR 210 ENCLOSURE
11	1	8200-B020-08	COVER, BATTERY
12	1	8200-B021-08	GASKET: BATTERY DOOR
13	1	8200-C015-0A	WELDMENT: BEZEL FOR 210
14	1	8200-C408-0A	WELDMENT: ENCLOSURE, FRONT
15	1	8200-C210-0A	DAC PCB (OPTIONAL)
16	1	8200-D402-08	KEYPAD: 215 DWI
17	2	6024-1022	#6 FLAT WASHER
18	1	8200-D401-0A	PC BD. ASSY. 215 MAIN



# PART IDENTIFICATION

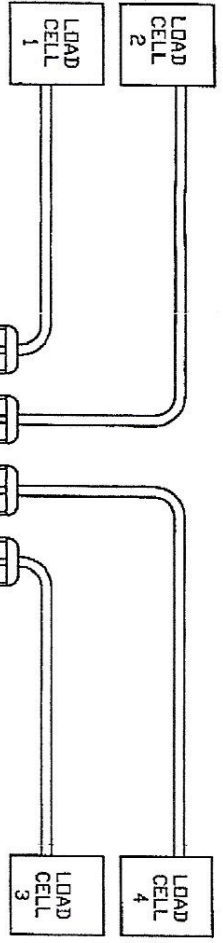
(215 Final Assembly)

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	593GR986	SERIAL TAG ASSY.
2	11	6013-0433	NUT HEX #10 ACORN S.S.
3	1	6650-0087	LABEL: MADE IN USA
4	1	8200-B026-08	NUT HEX #10 ACORN S.S. DRILLED
5	1	8200-D412-0A	SUB ASSEMBLY: REAR ENCLOSURE
6	1	8200-D413-0A	SUB ASSEMBLY: FRONT 215
7	1	8200-D412-1A	SUB ASSEMBLY: REAR ENCLOSURE EU MODEL
8	1	8200-D413-1A	SUB ASSEMBLY: FRONT 215-A (with DAC Option)



# NOTES

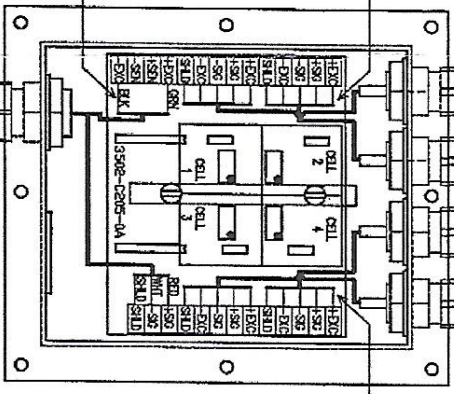
REVISION RECORD			
LTR	DESCRIPTION	DATE	BY
D	REMOVE OVERALL J-BOX DIM DETAIL	9/19/00	21089 JMT/CS
E	UPDATED TO MATCH PART, ADDED MOUNTING STRAP DETAIL	3/20/01	21346 RML
F	NOW SHOWN 4-CONDUCTOR AND 6-CONDUCTOR CONNECTION DETAIL	7/8/02	21988 bs/bs
G	ADDED NOTE	10/14/03	22511 EML/bs



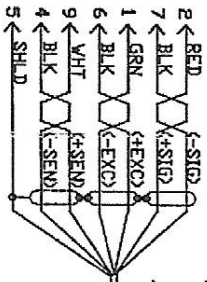
FOR LOAD CELL COLOR CODE, SEE TABLE A

FOR LOAD CELL COLOR CODE, SEE TABLE A

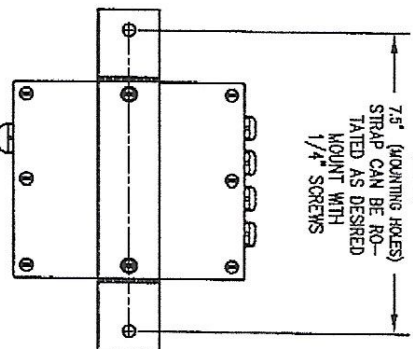
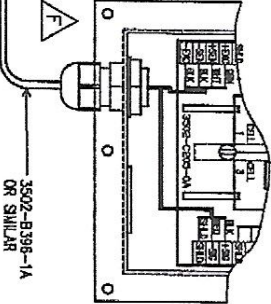
STRIP WIRES BACK 3/16" AND TWIST TOGETHER BEFORE INSERTING (TYPICAL)



4-CONDUCTOR CABLE

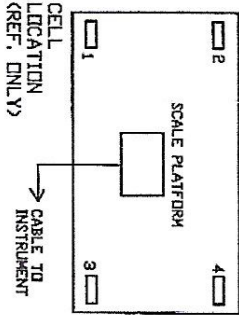


6-CONDUCTOR CABLE



LOAD CELL COLOR CODE

WIRE	CARDINAL COLOR CODE	WEST COAST COLOR CODE
+EXC	GREEN	RED
-EXC	BLACK	BLACK
+SIG	RED	GREEN
-SIG	WHITE	WHITE



QTY.	QTY.	QTY.	ITEM	PART/DWG. NUMBER	DESCRIPTION	MATERIAL OR SOURCE	WT. EACH
			WT.				

PARTS/MATERIAL LIST

UNLESS OTHERWISE SPECIFIED TOLERANCE ON DIMENSIONS ARE: ANGLES ± 1/2° DECIMALS (X) ± 0.03 IN. DECIMALS (XX) ± 0.01 IN. DECIMALS (XXX) ± 0.009 IN. NOTE: WHOLE NUMBERS MUST BE WRITTEN XX.000 TO INVOLVE DECIMAL TOLERANCES.

THIS DRAWING IS THE PROPERTY OF THE CARDINAL SCALE MFG. CO. AND SHALL NOT BE USED NOR REPRODUCED EITHER WHOLLY OR IN PART EXCEPT WITH WRITTEN AUTHORIZATION. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.

**Cardinal**  
Cardinal Scale Manufacturing Co.  
WEST CO. DIV., MISSOURI, USA 64570

CARDINAL DETECTO FULLER WEIGHING SYSTEMS

TITLE: INTERCONNECT WIRING DIA. FOR UP TO 4 CELLS W/ TRIM SCALE

DR. EMJ DATE 10/9/90

CH. *bs* DATE 5/26/06

MODEL FH / TANK

SHEET 1 OF 1

DWG. NO. 3502-B208-02

REV. G

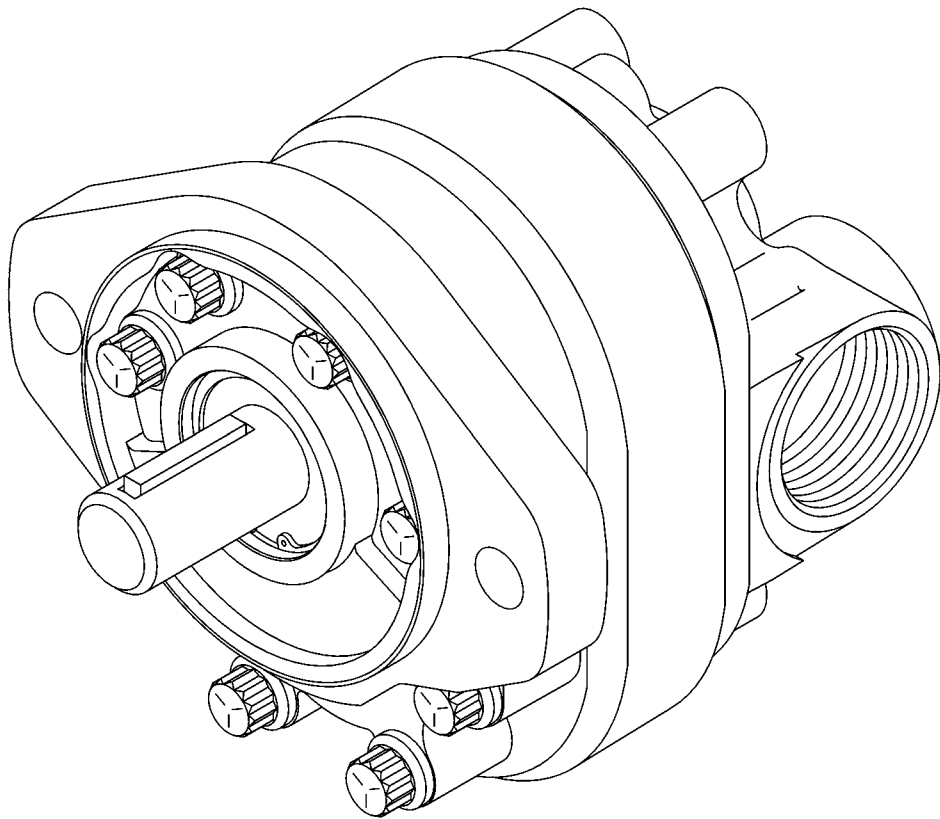


**EATON**

**Hydraulics**

**Series 26**

**Model 26000 Single Gear Pumps**



# Introduction

## Table of Contents

Introduction .....	2
Identification .....	3
Tools Required .....	3
Exploded View Drawing .....	4
Parts List .....	5
Disassembly .....	5 & 6
Reversibility .....	7
Inspection .....	8
Reassembly .....	9 & 10
Specific Backplate Parts List .....	11 & 12
Placing Pump Back into Operation .....	13
Trouble Shooting .....	14
Ordering Information .....	16

## Introduction

This manual provides service information for the Eaton model 26000 single gear pumps. Step by step instructions for the complete disassembly, inspection, and reassembly of the pumps are included.

The following recommendations should be followed to insure successful repairs.

- Remove the pump from the application.
- Cleanliness is extremely important.
- Clean the port areas thoroughly before disconnecting the hydraulic lines.
- Plug the pump ports and cover the open hydraulic lines immediately after they're disconnected.
- Drain the oil and clean the exterior of the pump before making repairs.
- Wash all metal parts in clean solvent.
- Use compressed air to dry the parts. Do not wipe them dry with paper towels or cloth.
- The compressed air should be filtered and moisture free.
- Always use new seals when reassembling hydraulic pumps.
- For replacement parts and ordering information refer to parts list 6-634.
- Lubricate the new rubber seals with a petroleum jelly (vaseline) before installation.
- Torque all bolts over gasket joints, then repeat the torquing sequence to makeup for gasket compression.
- Verifying the accuracy of pump repairs on an authorized test stand is essential.



# Identification and Tools Required

**Product Number: 26 0 01 - R Z A**

**Series** \_\_\_\_\_  
 26 = Gear Pump  
 ( SAE "A" Mount )

**Features** \_\_\_\_\_  
 0 = Standard Single Pump  
 1 = Standard Single W/ Relief  
 2 = Flow Divider Backplate  
 3 = Flow Divider W/ Load Sense  
 4 = Tandem Backplate  
 5 = Multiple Pumps

**Displacement cm<sup>3</sup>/r [ in<sup>3</sup> /r ]** \_\_\_\_\_  
 01 = 6.6 [.40]    08 = 22.5 [1.37]  
 02 = 8.2 [.50]    09 = 24.3 [1.48]  
 03 = 9.5 [.58]    10 = 25.2 [1.54]  
 04 = 10.8 [.66]   11 = 27.7 [1.69]  
 05 = 13.8 [.84]   12 = 29.0 [1.77]  
 06 = 16.7 [1.02] 13 = 30.6 [1.87]  
 07 = 19.7 [1.20]

**Input Rotation** \_\_\_\_\_  
 R = Right-hand (clockwise)  
 L = Left-hand (Counterclockwise)

**Catalog / Non-Catalog** \_\_\_\_\_  
 Z = Cataloged Pump  
 A-Y = Non-Cataloged Pump

**Shafts , Porting Size and Location** \_\_\_\_\_

**B 95 01 31 JB** **Serial Number Code:**

\_\_\_\_\_ Testers Initials  
 \_\_\_\_\_ Day of Month (two digits)  
 \_\_\_\_\_ Month (two digits)  
 \_\_\_\_\_ Last two digits of year built.  
 ( 95 for 1995 etc.)  
 \_\_\_\_\_ Revision level of parts list.

**Side Ports**

- A = 3/4 in. 11 Tooth, 1 5/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- C = 3/4 in. Str. Keyed, 1 5/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- E = 3/4 in. 9 Tooth, 1 5/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- G = 5/8 in. Str. Keyed, 1 1/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- J = 5/8 in. 9 Tooth, 1 1/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- L = 5/8 in. Str. Keyed, 1 5/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- N = 3/4 in. 11 Tooth, 1 1/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- R = 3/4 in. Str. Keyed, 1 1/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure

**Rear Ports**

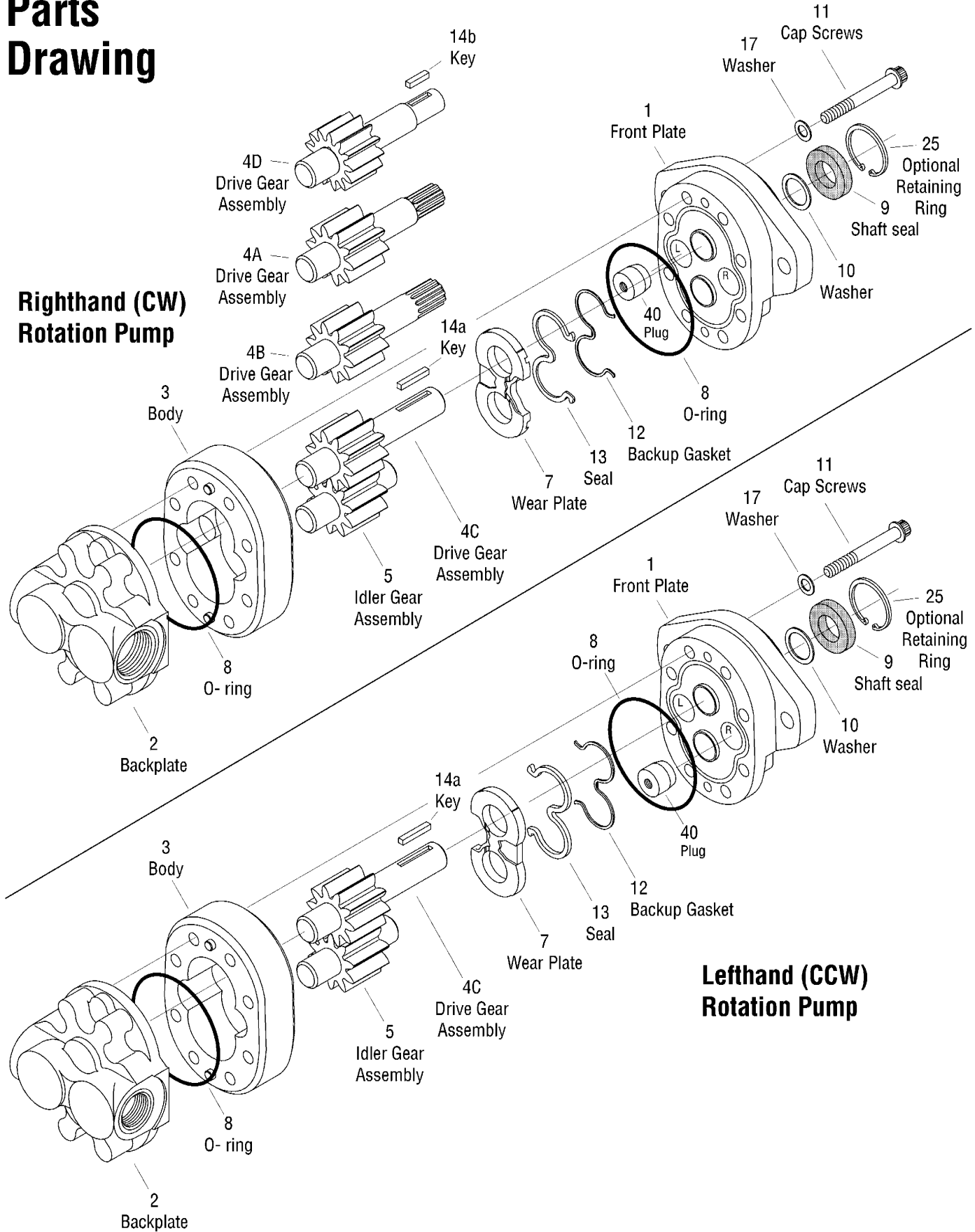
- B = 3/4 in. 11 Tooth, 1 5/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- D = 3/4 in. Str. Keyed, 1 5/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- F = 3/4 in. 9 Tooth, 1 5/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- H = 5/8 in. Str. Keyed, 1 1/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- K = 5/8 in. 9 Tooth, 1 1/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- M = 5/8 in. Str. Keyed, 1 5/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- P = 3/4 in. 11 Tooth, 1 1/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure
- S = 3/4 in. Str. Keyed, 1 1/16-12 UN-2B Suction, 7/8-14 UNF-2B Pressure

## Tools Required

- 3/8 in. socket and ratchet wrench
- Internal Retaining Ring Pliers (straight .090 tip)
- O-ring Pick
- Thread 3/8 dia. UNC bolt/screw
- Torque Wrench (135.6 N-m [100 lbf-ft] capacity)
- Hammer (soft face)
- Light Petroleum Jelly
- Seal Driver
- Arbor Press

# Parts Drawing

## Righthand (CW) Rotation Pump



## Lefthand (CCW) Rotation Pump

# Disassembly

## Repair Information - Model 26000

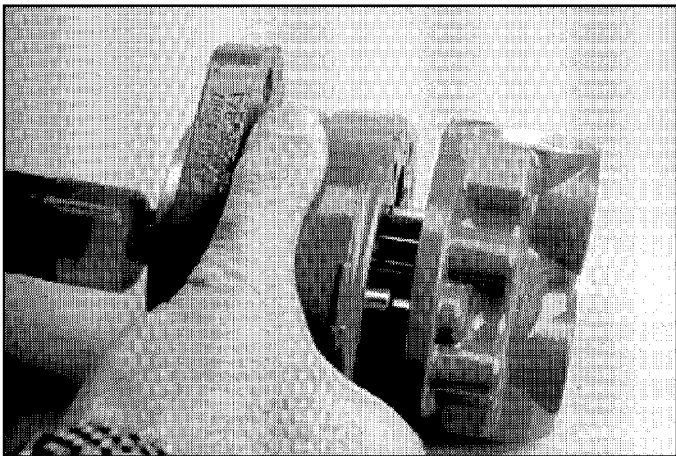
Work in a clean area; cleanliness is extremely important when repairing hydraulic pumps. Before disconnecting the lines, clean port area of pump. Disconnect hydraulic lines, removing pump assembly from vehicle and plugging ports. Thoroughly clean the outside of pump. After cleaning, remove port plugs and drain oil.

### Disassembly

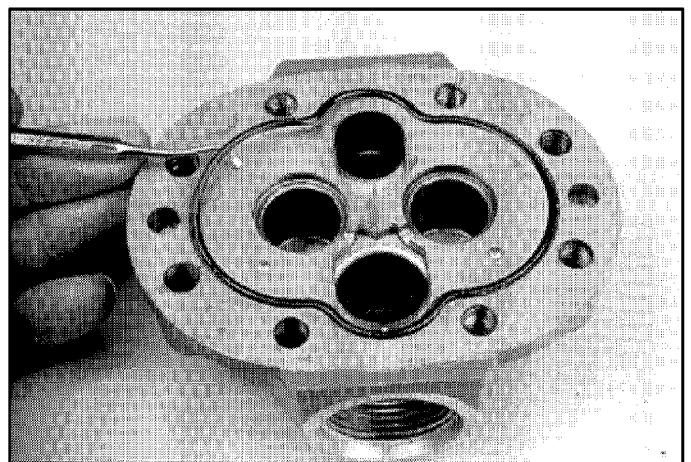
- 1 Remove *key* from drive shaft if keyed drive gear assembly is used.
- 2 Put a *location mark* across front plate, body and backplate to assure proper reassembly.
- 3 Clamp pump in vise, shaft end up.
- 4 Remove *cap screws* (eight each) and washer (four each).
- 5 Remove pump from vise, hold pump in hands and tap shaft with plastic hammer or rawhide mallet to separate front plate from backplate. Body will remain with either front plate or backplate.

### Parts List

Item No.	Description	Qty.
1	Front plate Assembly	1
2	Backplate	1
3	Body Assembly	1
4	Drive Gear Assembly	1
5	Idler Gear Assembly	1
~ 7	Wear Plate	1
~ 8	O-ring	2
~ 9	Shaft Seal	1
~ 10	Washer	1
11	Cap Screw	8
~ 12	Backup Gasket	1
~ 13	Seal	1
14	Key for Straight Shaft	1
~ 17	Washer	4
25	Retaining Ring (optional)	1
40	Plug	1
~ Seal Kit	26000-901 for Single Pumps	



- 6 Remove *o-ring* seal from backplate.

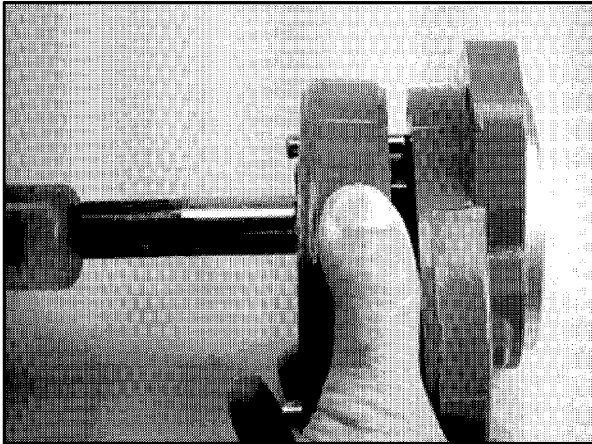


- 7 To disassemble the *relief valve backplate, flow divider backplate, and tandem flow divider backplate* see page 11 & 12.

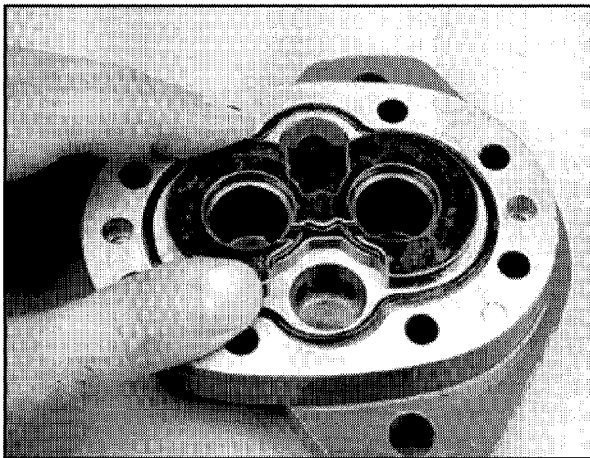
# Disassembly

8 Remove *idler gear assembly* from body.

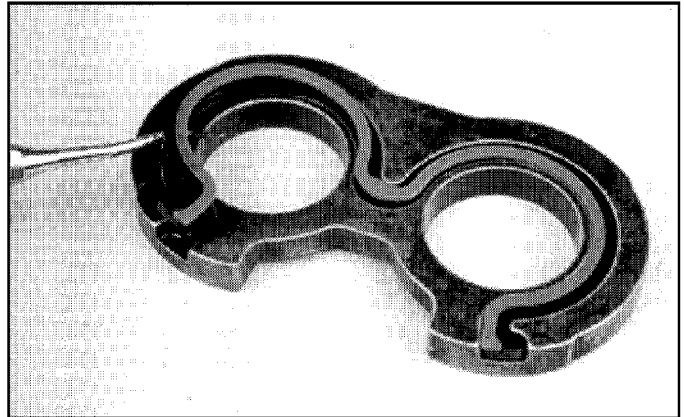
9 To separate *body* from the plate it remained with, place *drive gear assembly* in gear pocket and tap protruding end with plastic hammer or rawhide mallet. Remove drive gear assembly.



10 Remove wear plate and o-ring seal, noting position of open side of wear plate.

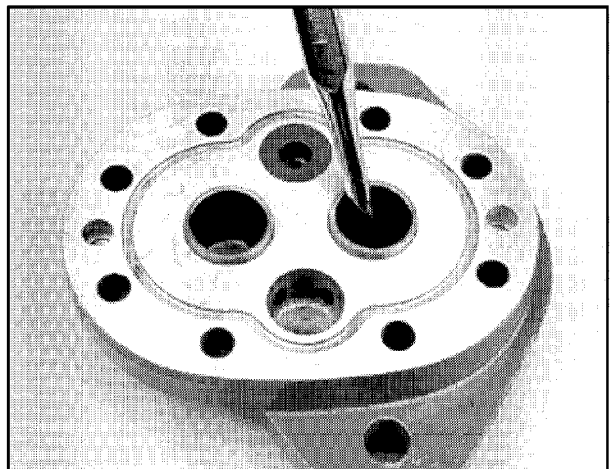


11 Remove *back-up gasket and seal* from wear plate by extracting with a o-ring tool.



12 Remove snap ring (if applicable) from the front of the front plate shaft seal area.

13 Remove *shaft seal* and *washer* from front plate with a blunt punch from the back side.



14 Removing the *plug* in front plate is not necessary, unless you intend to change rotation. See Reversibility - Changing Input Rotation of Pump.

# Reversibility

## Changing Input Rotation of Pump

**1** Place pump in a protected jaw vise with shaft end up. Remove the eight cap screws.

**2** Remove front plate, noting orientation of drive shaft through bearing in reference to the backplate.

**3** Notice the location of the open side of wear plate and remove wear plate.

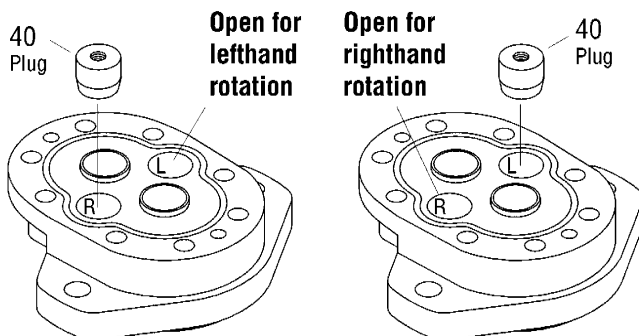
**4** Switch *drive gear and idler gear* within gear pockets. Do not flip idler gear end for end.

Note: Gear housing body and backplate do not need altering.

**5** Re-install wear plate into gear pockets over the gears with seal and backup gasket up. (Same orientation as removed)

**6** Front plate disassembly and assembly:

- Thread 3/8 UNC threaded bolt into *plug cavity*. Start with fingers, then place bolt head in vise and turn front plate to engage threads 2-3 turns.
- Holding bolt in vise, tap front plate with rubber hammer to disengage *plug*.
- Remove *plug* from bolt.
- Install plug in the other casting cavity and tap flush with rubber hammer. Note L or R at bottom of cavity.



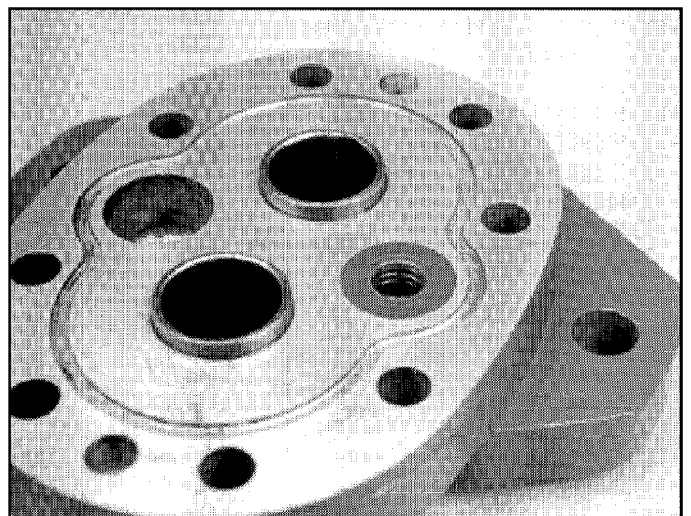
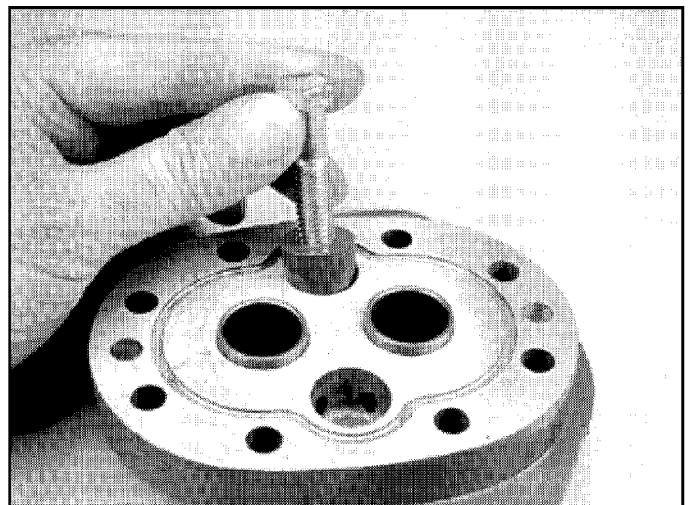
- Ensure that bearing drain holes are free of debris.
- Note proper placement of o-ring in groove of front plate.

**7** Hold o-ring in groove of front plate with petroleum jelly. Reassemble front plate over drive shaft end, being careful not to damage shaft seal.

**8** Torque 8 cap screws 34 to 38 N•m [25 to 28 lbf•ft].

**9** Lubricate gears and mating surfaces with hydraulic oil through ports.

**10** Rotate shaft (manually) to ensure proper assembly of components.



# Inspection

## Inspect Parts for Wear

### General

- 1 Clean and dry all parts.
- 2 Remove all nicks and burrs from all parts with emery cloth.

### Gear Assembly Inspection

- 1 Check spline drive shaft for twisted or broken teeth or check keyed drive shaft for broken or chipped keyway.
- 2 Inspect both the drive gear and idler gear shafts at bushing points and seal area for rough surfaces and excessive wear.
- 3 Replace gear assembly if shaft measures less than 19 mm [.748 in] in bushing area. (One gear assembly may be replaced separately; shafts and gears are available as assemblies only.)
- 4 Inspect gear for scoring and excessive wear.
- 5 Replace gear assembly if gear width is below the following dimensions. Refer to chart on this page.
- 6 Assure that snap rings are in grooves on either side of drive and idler gears.
- 7 If edge of gear teeth are sharp, break edge with emery cloth.

## Front plate and Backplate Inspection

- 1 Oil groove in bushings in front plate should be in line with dowel pin holes and 180° apart. The oil grooves in the backplate bushings should be at approximately 37° to the pressure side.
- 2 Replace the backplate or front plate if I.D. of bushings exceed 19,2 mm [.755 in] (Bushings are not available as separate items).
- 3 Bushings in front plate should be at 3,20 mm [.126 in] above surface of front plate.
- 4 Check for scoring on face of backplate. Replace if wear exceeds ,038 mm [.0015 in].

## Body Inspection

- 1 Check body inside gear pockets for excessive scoring or wear.
- 2 Replace body if I.D. of gear pockets exceeds 43,7 mm [1.719 in].

Model Number	26001	26002	26003	26004	26005	26006	26007	26008	26009	26010	26011	26012	26013
Pump Disp. cm <sup>3</sup> /r [in <sup>3</sup> /r]	6,6 [.40]	8,2 [.50]	9,5 [.58]	10,8 [.66]	13,8 [.84]	16,7 [1.02]	19,7 [1.20]	22,5 [1.37]	24,3 [1.48]	25,2 [1.54]	27,7 [1.69]	29,0 [1.77]	30,6 [1.87]
Gear Width mm [in]	7,85 [.309]	9,75 [.384]	11,20 [.441]	12,95 [.510]	16,15 [.636]	19,35 [.762]	22,56 [.888]	25,76 [1.014]	28,12 [1.107]	28,96 [1.140]	32,16 [1.266]	33,78 [1.330]	35,36 [1.392]

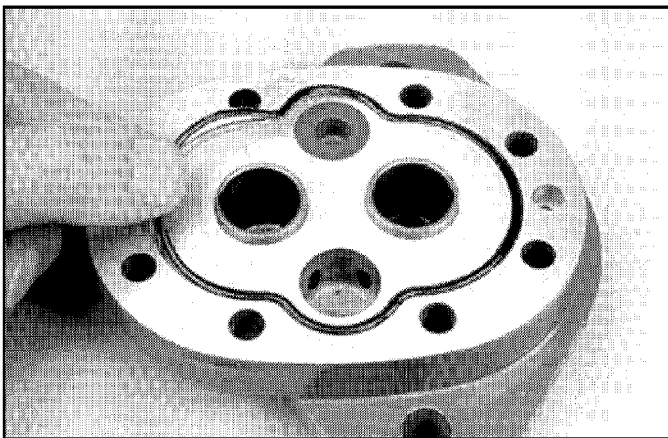
# Reassembly

## General Information

It is important that the relationship of the backplate, body, wear plate and front plate is correct. You will note two half moon cavities in the body. Note: The smaller half moon port cavity must be on the pressure side of the pump. The side of wear plate with midsection cut out must be on suction side of pump. Suction side of backplate is always side with larger port boss.

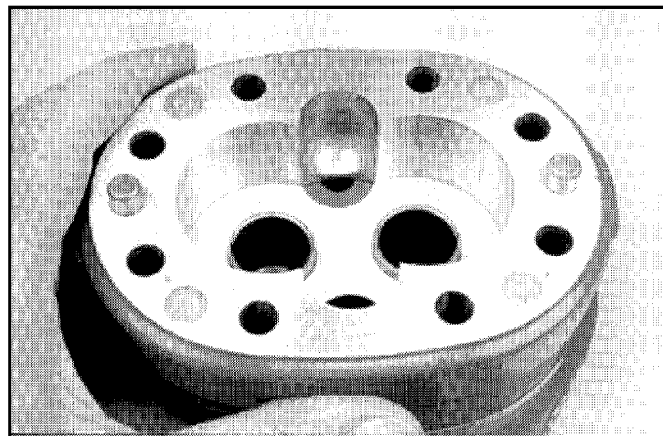
## Reassembly

- 1 During the reassembly replace the *wear plate, seal, back-up gasket, shaft seal and o-rings* as new parts.
- 2 Install *o-ring* in groove of front plate.

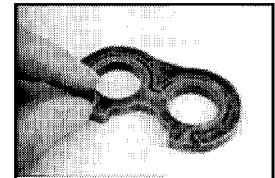
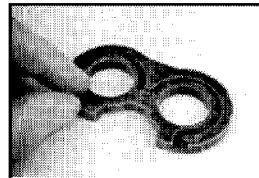


- 3 Apply a thin coat of petroleum jelly or hydraulic oil to both milled gear pockets of body. Slip body onto front plate with half moon port cavities in body facing away from front plate.

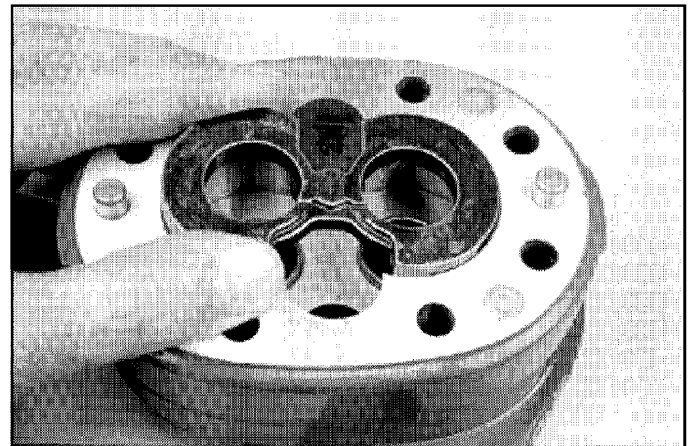
Note: The small half moon port cavity must be on the pressure side (the plugged side of the front plate) of pump.



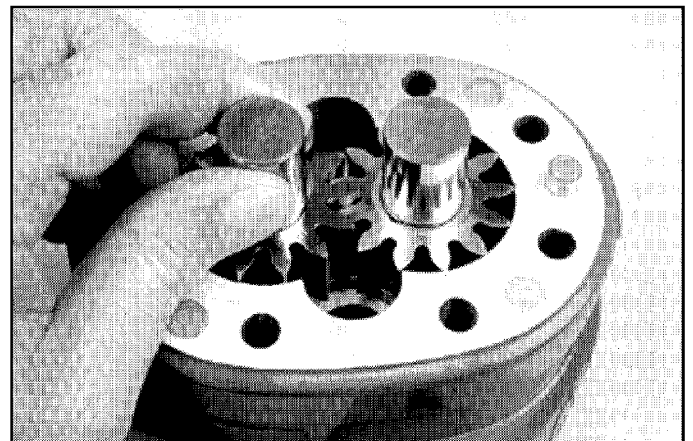
- 4 Install new *seal* and new *backup gasket* into wear plate. Note in the middle of the backup gasket a flat section or support. This area must face away from the wear plate inside the seal.



- 5 Place new *wear plate, seal, and backup gasket* into gear pocket with seal and backup gasket next to front plate. The side of the wear plate with the mid section cut-away must be on the suction side of pump.

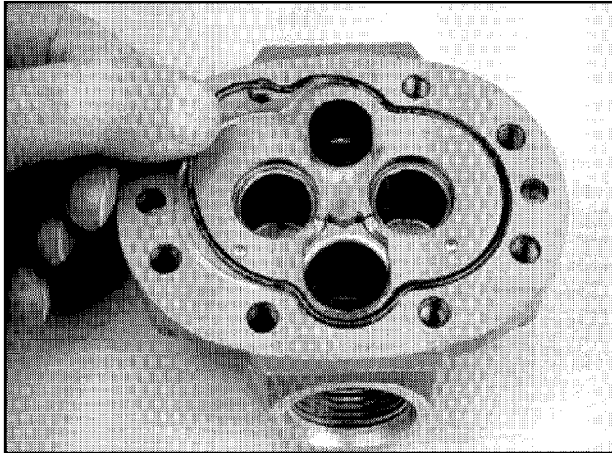


- 6 Dip *gear assemblies* into oil and slip into front plate bushings and gears into pockets of body.



# Reassembly

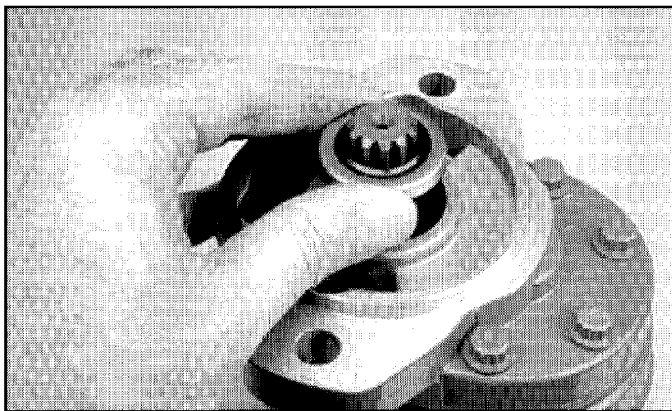
7 Install new *o-ring* in groove of backplate.



8 Make sure port orientation is correct and then slide *backplate* over gear shafts until dowel pins are engaged.

9 Secure with *cap screws* and new *washers*. Tighten cap screws evenly in a crisscross pattern 34 to 38 N•m [25 to 28 lbf•ft] torque.

10 Place washer over drive shaft into housing. Liberally oil shaft seal and install over drive shaft, carefully so that rubber sealing lips are not cut.



11 Place 1-5/16 in. O.D. sleeve over shaft and press in shaft seal until flush with front surface of front plate.

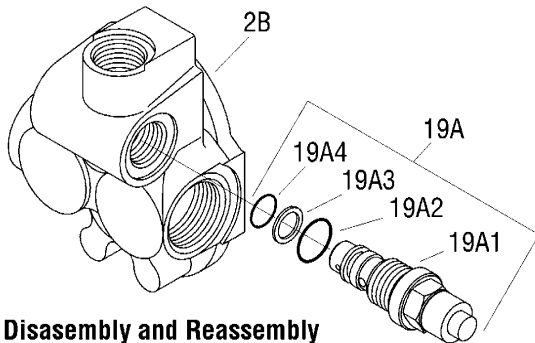
13 Install key on keyed shaft.

Note: Refer to Start-up Procedure and Trouble Shooting Procedure.



# Specific Backplate Parts List

## Relief Valve Backplate

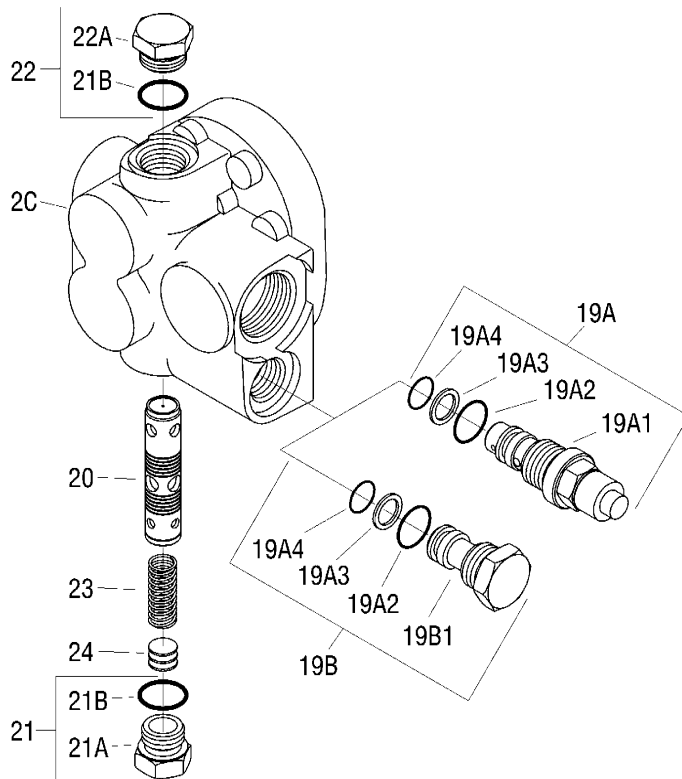


### Disassembly and Reassembly

- 1 After removing *relief valve*, remove and replace o-rings and backup ring with new parts.
- 2 Install *relief valve* and torque 41 to 46 N•m [30 to 34 lbf•ft]

Item No.	Description	Qty.
2	Relief Valve Backplate	1
18	O-ring	3
19A	Relief Valve Assembly	1
19A1	Relief Valve	1
~ 19A2	O-ring	1
~ 19A3	Backup Ring	1
~ 19A4	O-ring	1
19B	Plug Assembly	1
19B1	Plug	1

## Flow Divider Backplate

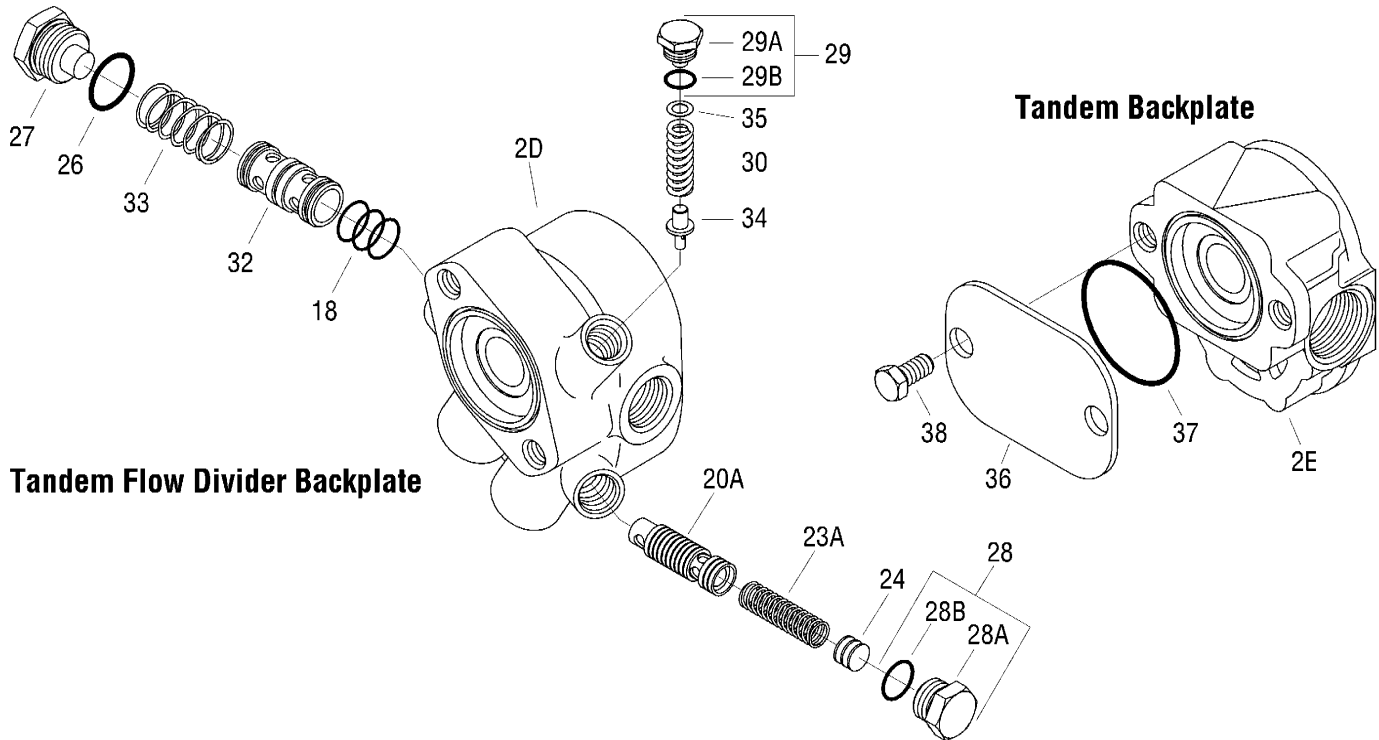


### Disassembly and Reassembly

- 1 After removing *relief valve or plug*, remove and replace o-ring and backup ring with new parts.
- 2 Install *relief valve or plug* and torque 41 to 46 N•m [30 to 34 lbf•ft]
- 3 Remove flow divider *plugs, shims, spring, and spool* from backplate. (Notice orientation of spool with cavity in backplate)
- 4 Install new plug *seals* on plugs. Install *spool, spring, shims, and plug assemblies* into backplate. Torque plugs 29 to 33 N•m [21 to 24 lbf•ft]

Item No.	Description	Qty.
2C	Flow Divider Backplate	1
19A	Relief Valve Assembly	1
19A1	Relief Valve	1
~ 19A2	O-ring	1
~ 19A3	Backup Ring	1
~ 19A4	O-ring	1
19B	Plug Assembly	1
19B1	Plug	1
20	Flow Divider Spool	1
21	Plug/O-ring Assembly	1
21A	Plug	1
~ 21B	O-ring	2
22	Plug/O-ring Assembly	1
22A	Plug	1
23	Spring	1
24	Shim (.0239 inch thick)	A/R
A/R	- As Required	

# Specific Backplate Parts List



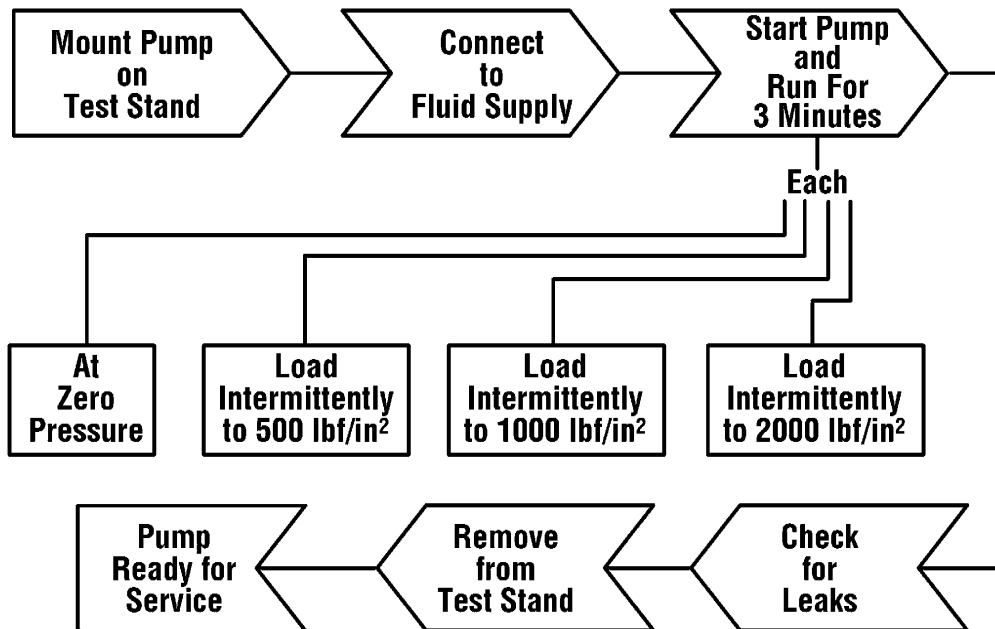
## Disassembly and Reassembly

- 1** Remove *relief valve plug, shim, spring, and poppet* from backplate. Do not remove internal relief valve seat. Seat is loctited to a predetermined depth. Remove o-ring from plug and replace with new o-ring.
- 2** Install *poppet, spring, shim, and relief valve plug* and torque 14 to 16 N•m [10 to 12 lbf•ft]
- 3** Remove flow divider *plugs, shims, springs, spool, and sleeve* from backplate. (Notice orientation of spool with cavity in backplate) Remove *o-rings* from sleeve and replace with new *o-rings*.
- 4** Install *sleeve, spool, springs, shims, and plug assemblies* into backplate. Torque plug #27 48 to 54 N•m [35 to 40 lbf•ft] and plug #28 29 to 33 N•m [21 to 24 lbf•ft]

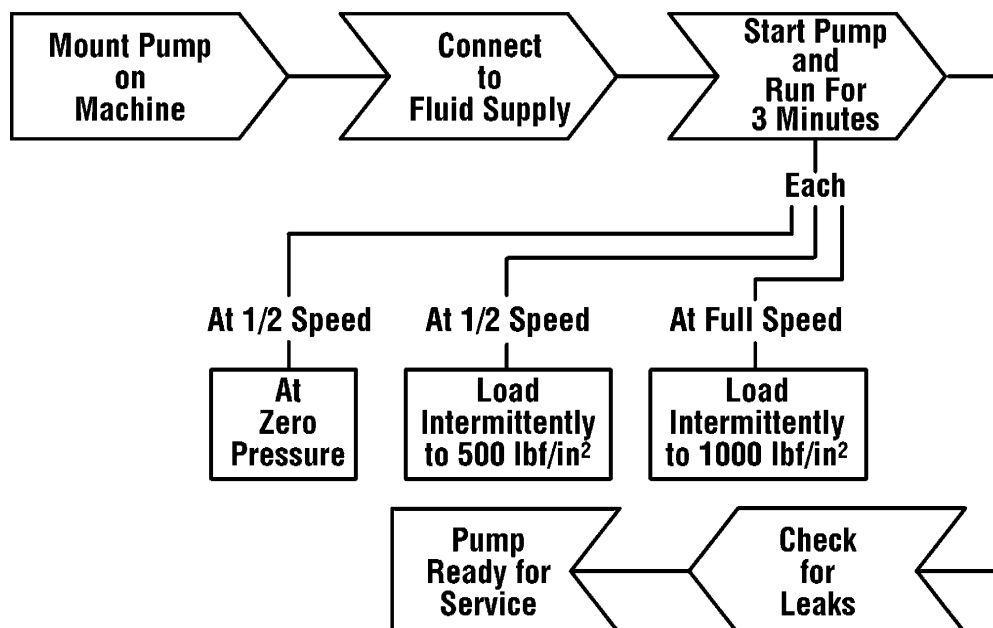
Item No.	Description	Qty.
2D	Tandem Flow Divider Backplate	1
2E	Tandem Backplate	1
18	O-ring	3
20A	Spool for Tandem Flow Divider Backplate	
23A	Spring for Tandem Flow Divider Backplate	1
24	Shim (.0239 inch thick)	A/R
~ 26	O-ring	1
27	Plug	1
28	Plug/O-ring Assembly	1
28A	Plug	1
~ 28B	O-ring	2
29	Plug/O-ring Assembly	1
29A	Plug	1
~ 29B	O-ring	1
30	Relief Valve Spring	1
32	Sleeve	1
33	Spring	1
34	Poppet	1
35	Shim Washer (.010 inch thick)	A/R
36	Tandem Cover Plate	1
37	O-ring	1
38	Cap Screw	2
A/R	- As Required	

# Placing Series 26 Gear Pump Back into Operation

When test stand is *available*.



When test stand is *not available*.



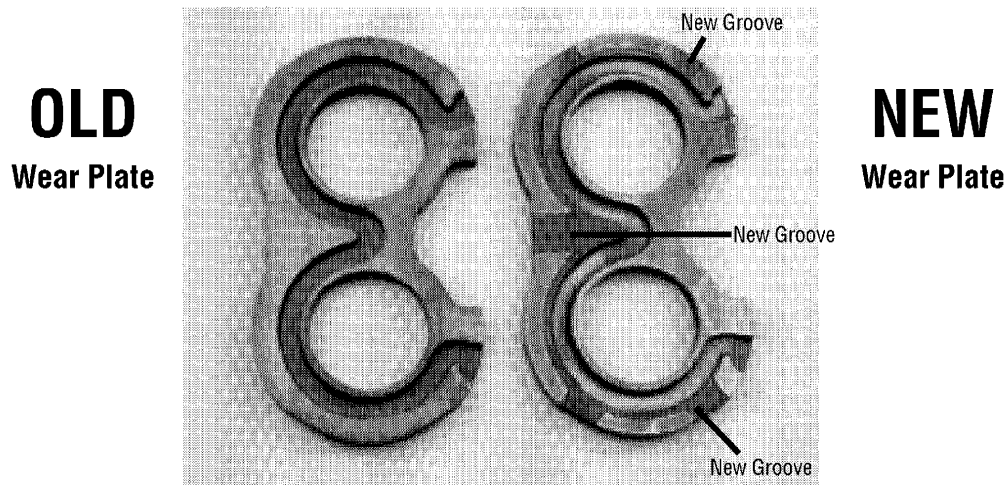
# Trouble Shooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Correction</b>
Cavitation	<ul style="list-style-type: none"> <li>a. Oil too heavy.</li> <li>b. Oil filter plugged.</li> <li>c. Suction line plugged or too small.</li> </ul>	<ul style="list-style-type: none"> <li>a. Change to proper viscosity</li> <li>b. Clean filter.</li> <li>c. Clean line and check size of line.</li> </ul>
Oil heating	<ul style="list-style-type: none"> <li>a. Oil supply low.</li> <li>b. Contaminated oil.</li> <li>c. Setting of relief valve too high or too low.</li> <li>d. Oil in system too light.</li> </ul>	<ul style="list-style-type: none"> <li>a. Fill reservoir.</li> <li>b. Drain reservoir and refill with clean oil.</li> <li>c. Set to correct pressure.</li> <li>d. Drain reservoir and refill with proper viscosity oil.</li> </ul>
Shaft seal leakage	<ul style="list-style-type: none"> <li>a. Worn shaft seal.</li> <li>b. Worn shaft in seal area.</li> <li>c. Debris in shaft seal suction side drain holes.</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace shaft seal.</li> <li>b. Replace drive assembly.</li> <li>c. Disassemble pump and inspect.</li> </ul>
Foaming oil	<ul style="list-style-type: none"> <li>a. Low oil level</li> <li>b. Air leaking into suction line</li> <li>c. Wrong kind of oil.</li> </ul>	<ul style="list-style-type: none"> <li>a. Fill reservoir.</li> <li>b. Tighten fittings.</li> <li>c. Drain and fill reservoir with non-foaming oil.</li> </ul>

# Note

## Wear Plate Identification

A product improvement has been made to the Model 26000 gear pump with a new designed wear plate. To identify the new wear plate, look for grooves placed in the seal side of the wear plate as shown below.



This new wear plate enables better pressure clamping with aerated oil in pumps 1.37 cubic inch or smaller. Aerated oil may occur during a cold start-up in applications with long suction lines or when the mouth of the inlet line is temporarily exposed to air.

**Order parts from 6-634 Parts Information booklet.  
Each order must include the following information.**

1. Product and/or Part Number
2. Serial Number Code
3. Part Name
4. Quantity

**Eaton**  
Fluid Power Group  
Hydraulics Business USA  
14615 Lone Oak Road  
Eden Prairie, MN 55344  
USA  
Tel: 952-937-9800  
Fax: 952-294-7722  
[www.eaton.com/hydraulics](http://www.eaton.com/hydraulics)

**Eaton**  
Fluid Power Group  
Hydraulics Business Europe  
Route de la Longeraie 7  
1110 Morges  
Switzerland  
Tel: +41 (0) 21 811 4600  
Fax: +41 (0) 21 811 4601

**Eaton**  
Fluid Power Group  
Hydraulics Business Asia Pacific  
11th Floor Hong Kong New World Tower  
300 Huaihai Zhong Road  
Shanghai 200021  
China  
Tel: 86-21-6387-9988  
Fax: 86-21-6335-3912