

FORCE UNLTD. SPREADERS*GPS EQUIPMENT*CONVEYORS

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SAFETY



The safety alert symbol is used to call your attention to instructions involving your personal safety and that of others. Failure to follow these instructions can result in injury or death.



Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. The signal word is to be limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.



Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.



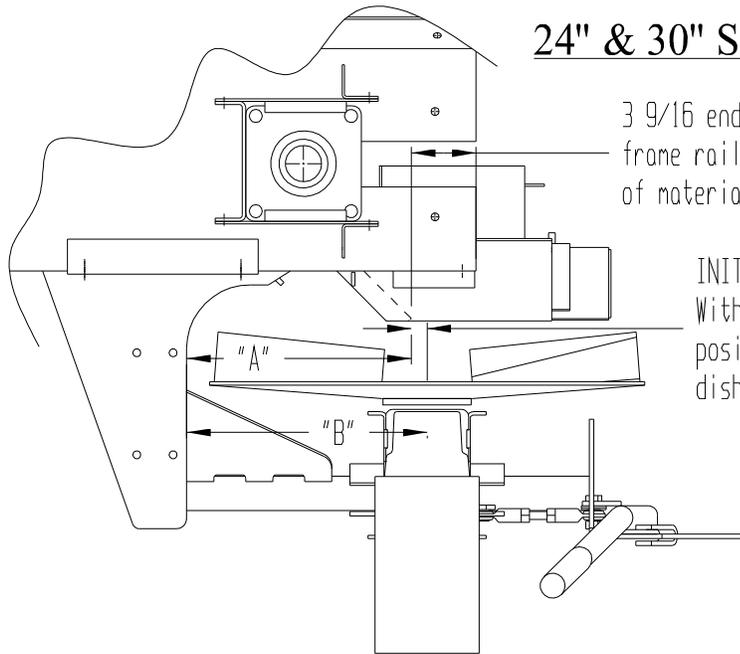
Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



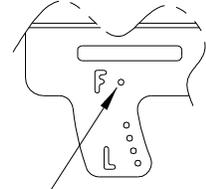
Is used for informational purposes in areas which may involve damage or deterioration to equipment but generally would not involve the potential for personal injury.

****OWNER AND/OR OPERATOR IS RESPONSIBLE FOR SETTING THE SPINNER LOCATION TO ACQUIRE & MAINTAIN CORRECT SPREAD PATTERN****

24" & 30" SPINNER DISC SET UP LOCATION



3/8" end of conveyor frame rail to drop off point of material flow divider



INITIAL SETUP:

With spinner assembly in the "F" (Fertilizer) position adjust to 1" from center of spinner dish to drop off point of material flow divider**

**Verify Dim. "B" is the same for both spinner motors. Verify both spinner motors are level with the frame they are mounted to.

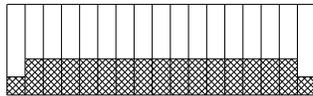
**To obtain 1" from center of spinner dish to drop off point of material flow divider, measure Dim. "A" and add 1" to get Dim. "B" Make adjustments via the threaded rod between the lever arm & spinner frame.

Running Spread Pattern Test

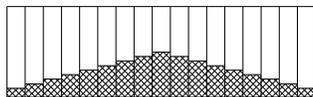
1) Adjust spinner speed to obtain desired spread width.

	24" Spinner Assy	30" Spinner Assy
Fertilizer (80' Pattern)	700 RPM	650 RPM
Line (50' to 60' Pattern)	600 RPM	550 RPM

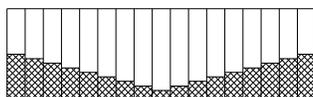
2) Adjust spinner assembly forward or backward according to spread pattern test results. See below.



Ideal Spread Pattern Test Results -
Flat & taper off for the outside 5 to 10 Ft.

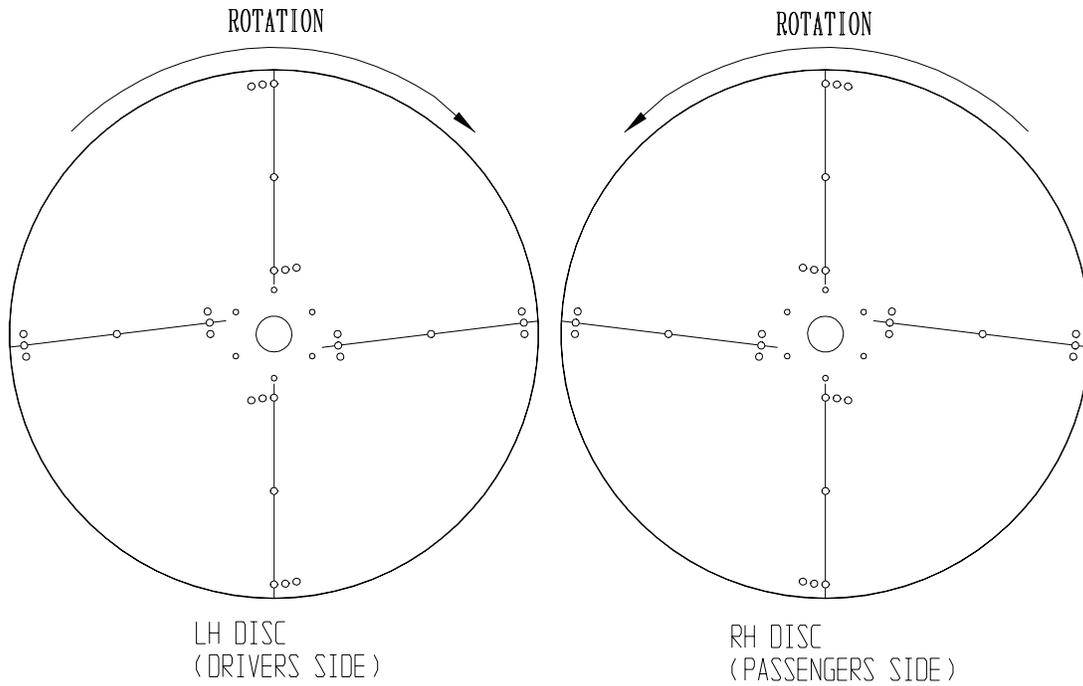


Heavy In The Center Spread Pattern Test Results
To Correct: Adjust spinner assembly towards box.

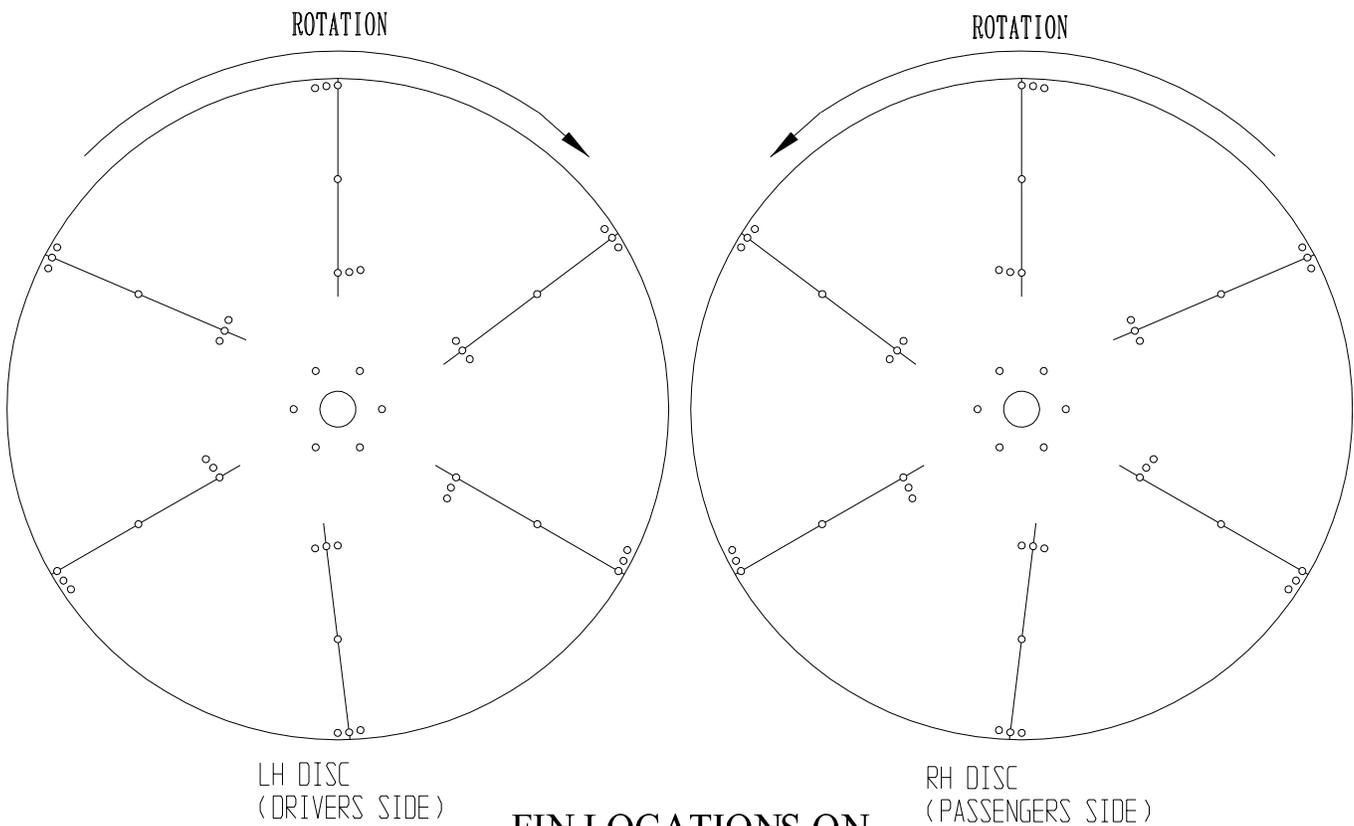


Light In The Center Spread Pattern Test Results
To Correct: Adjust spinner assembly away from box.

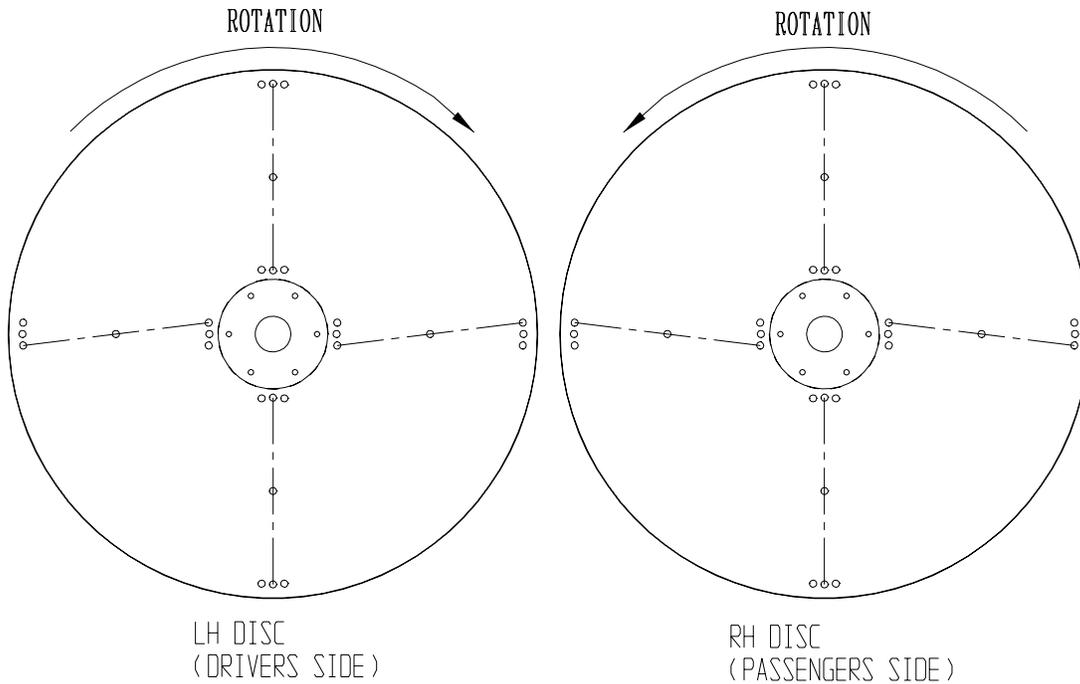
NOTE: If the above mentioned adjustments have been made & your spread pattern still isn't desirable, refer to Instructional Pg. 3.1



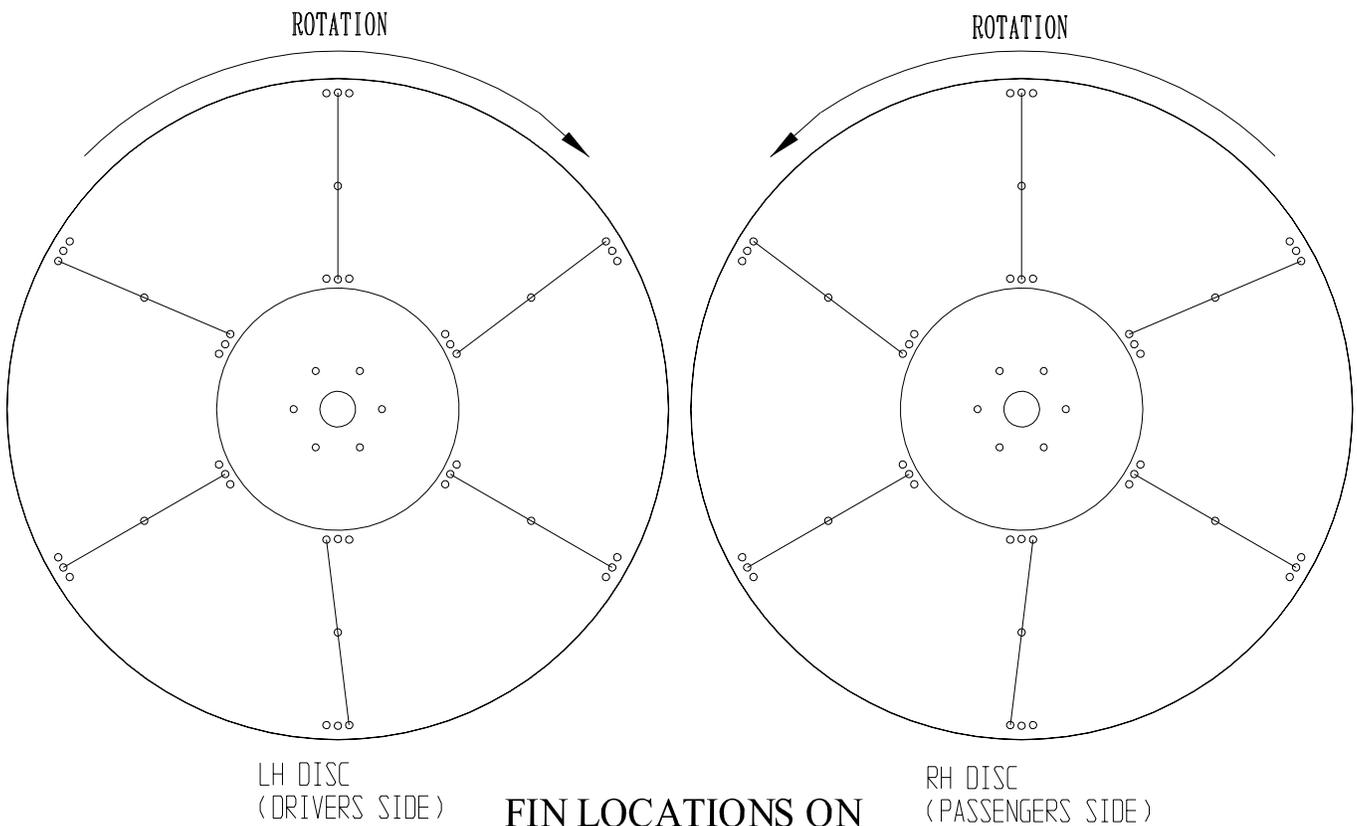
**FIN LOCATIONS ON
OLD STYLE 24" DISCS**



**FIN LOCATIONS ON
OLD STYLE 30" DISCS**



**FIN LOCATIONS ON
NEW STYLE UNIVERSAL 24" DISCS**

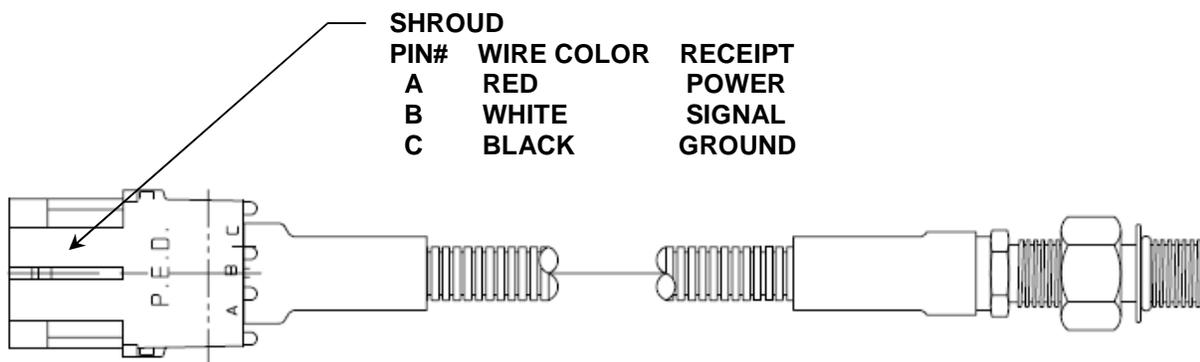
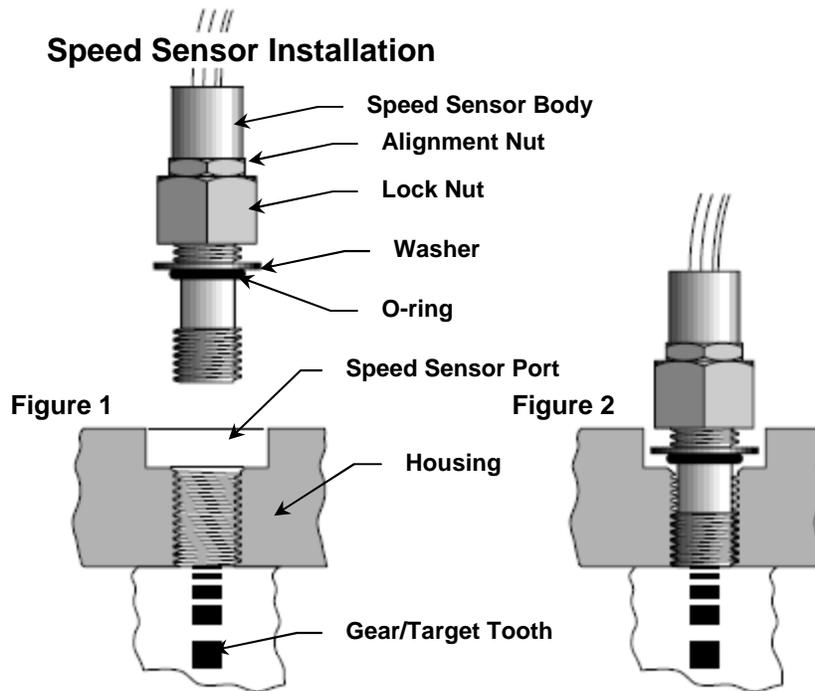


**FIN LOCATIONS ON
NEW STYLE UNIVERSAL 30" DISCS**

Conveyor Motor Speed Sensor

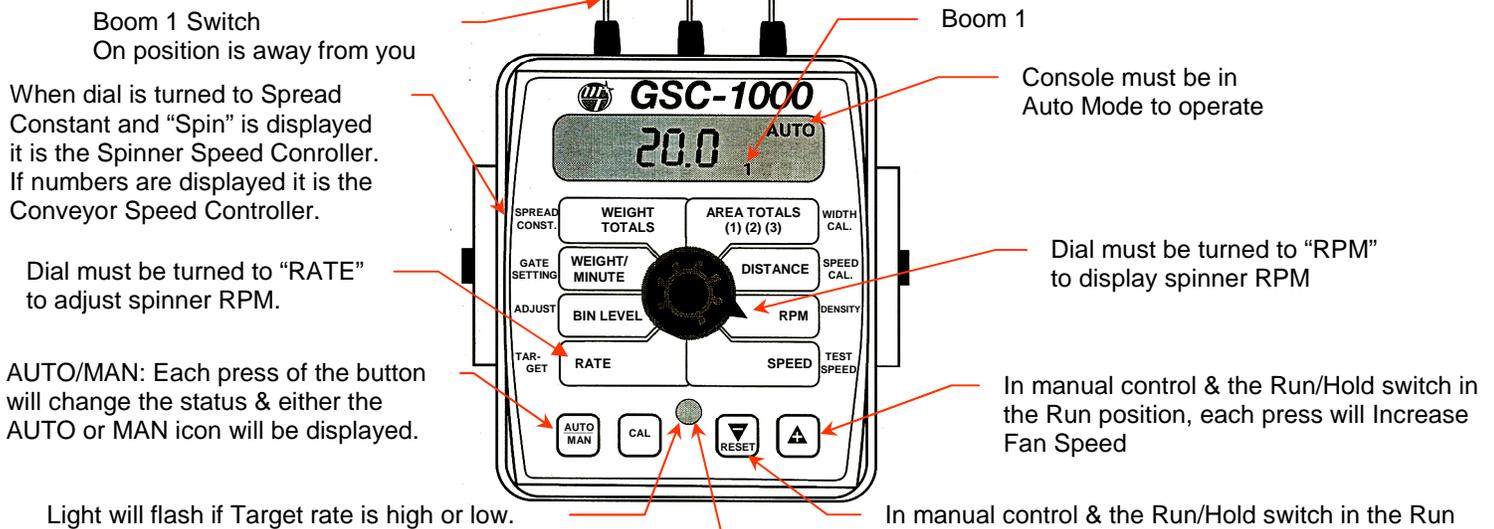
1223 600 Installation Information

1. Make sure the lock nut and its threads are clean and dry for the proper torque. Position the lock nut against the alignment nut as shown in Figure 1.
2. Move the washer and the o-ring up against the speed sensor body threads as shown in Figure 1.
3. By hand, lightly thread the speed sensor body into the housing until the sensor touches against the motor (gear/target) tooth.
4. **Do not force the sensor against the (gear/target) tooth, damage may occur.**
5. Make sure the o-ring or the washer do not touch the housing — See Figure 2.
6. Turn the speed sensor body out 3/8 to 1/2 turn (CCW) and tighten the lock nut to 75-125 lb-in. (torque values are for clean dry threads).



Optional Spinner Speed Control

When you power up monitor it will first show Hours, Powered Valve (STD or PWM) and version.



Light will flash if Target rate is high or low.

MAIN CALIBRATION SPINNER	
Spread Constant	N/A
Gate Setting	N/A
Adjust Rate	Incremental Adj
Target Rate	Fan Speed
Width Cal	N/A
Speed Cal	N/A
Density	N/A
Test Speed	N/A

**To enter Main Cal mode: Hold Cal button for 3 seconds. (Light will stay on in Cal mode.)

**To exit Main Cal mode: Hold the Cal button .

REFER TO MICRO-TRAK MANUAL PG. 19 FOR COMPLETE INSTRUCTION IF NEEDED.

SPECIAL CALIBRATION SPINNER FOR INITIAL SET-UP ONLY (Servo Valve)		
DO NOT CHANGE		
Rotary Selector Position	Setting Page 1	Setting Page 2
Spread Constant	Off (Bin Size)	SPEC
Gate Setting	Off (Bin Level)	SPEC
Adjust Rate	On (Auto Shut-Off)	SPEC
Target Rate	0 (Valve Delay)	SPEC
Width Cal	ENG	12
Speed Cal	SPIN	BYPASS
Density	-2 (Valve Response)	0
Test Speed	4 (Fan Pick-Ups)	SPEC

**To enter Special Cal mode: Place Run/Hold switch in Hold position then hold Auto & Cal buttons while turning on Controller.

**To exit Special Cal mode: Hold the Cal button .

**To scroll from Page 1 to Page 2 press Cal button.

For PWM valve Page-2
 WIDTH 90 PWM Freq.
 Speed Cal 100 Max Freq.
 Density 30 Min Freq.

Optional Conveyor Speed Control

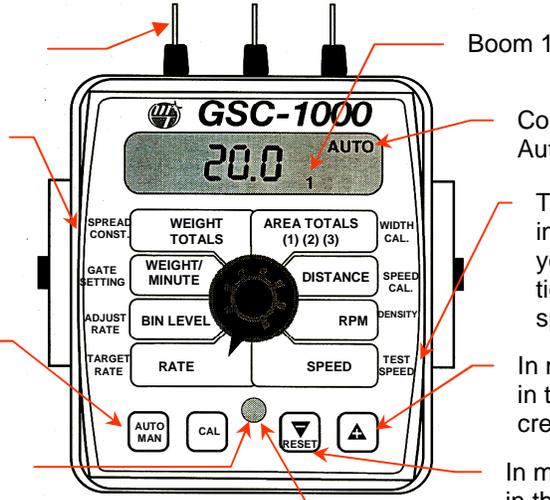
When you power up monitor it will first show Hours, Powered Valve (STD or PWM) and version.

Boom 1 Switch
On position is away from you

When dial is turned to Spread Constant and "Spin" is displayed it is the Spinner Speed Controller. If numbers are displayed it is the Conveyor Speed Controller.

AUTO/MAN: Each press of the button will change the status & either the AUTO or MAN icon will be displayed.

Light will flash if Target rate is high or low.



Console must be in Auto Mode to operate

TEST SPEED: In CAL Mode—Is used in performing pre-field checks. It allows you to simulate your spreading application while remaining stationary. Test speed is cancelled by exiting CAL.

In manual control & the Run/Hold switch in the Run position, each press will Increase Belt Speed

In manual control & the Run/Hold switch in the Run position, each press will Decrease Belt Speed

**To enter Main Cal mode: Hold Cal button for 3 seconds. (Light will stay on in Cal mode.)

**To exit Main Cal mode: Hold the Cal button .

****Should be .147 for most radars. Refer to radar manual to adjust if necessary.

MAIN CALIBRATION CONVEYOR	
Spread Constant (See Micro-Trak ManualPg. 41)	703 (FL 3024) 618 (FL 3424)
Gate Setting	Gate Height
Adjust Rate	Incremental Adj
Target Rate	Spread Rate
Width Cal	Spread Width
Speed Cal (See Micro-Trak ManualPg. 40)	Radar Cal ****
Density	Material Density
Test Speed	Unload Speed

REFER TO MICRO-TRAK MANUAL PG. 19 FOR COMPLETE INSTRUCTION IF NEEDED.

SPECIAL CALIBRATION CONVEYOR FOR INITIAL SET-UP ONLY (Servo Valve) **DO NOT CHANGE**		
Rotary Selector Position	Setting Page 1	Setting Page 2
Spread Constant	Off (Bin Size)	SPEC
Gate Setting	Off (Bin Level)	SPEC
Adjust Rate	On (Auto Shut-Off)	SPEC
Target Rate	0 (Valve Delay)	SPEC
Width Cal	ENG	12
Speed Cal	STD	BYPASS
Density	-2 (Valve Response)	0
Test Speed	4 (Fan Pick-Ups)	SPEC

**To enter Special Cal mode: Place Run/Hold switch in Hold position then hold Auto & Cal buttons while turning on Controller.

**To exit Special Cal mode: Hold the Cal button .

**To scroll from Page 1 to Page 2 press Cal button.

For PWM valve Page-2

WIDTH 90 PWM Freq.
Speed Cal 100 Max Freq.
Density 30 Min Freq.

SPREADER CONSTANT FOR GATE SETTING

RAVEN 660 & 661

PRESS and hold the **METER CAL** button for 5 seconds to get to where the **SPREADER CONSTANT** is set. Press **ENTER** and then the new spreader constant. Then press **ENTER** to accept the new constant.

GATE SETTING	FL3024 SPREADER CONSTANT	FL3424 SPREADER CONSTANT
1 INCH	703	618
2 INCH	351	308
3 INCH	234	206
4 INCH	175	154
5 INCH	140	123
6 INCH	117	103
7 INCH	100	88
8 INCH	87	77
9 INCH	78	68
10 INCH	70	62
11 INCH	63	55
12 INCH	58	51

Fan Speed Constant: 4

Product **DENSITY** is set by pressing the **METER CAL** button briefly. Enter product density per cubic foot.

Calibrating the Spread Rate:

- 1) Run material through the gate and measure its depth to determine gate setting.
- 2) Spread a known amount of product to fine tune the gate opening.
- 3) Mark both the box and tailgate so you can find this setting in the future.

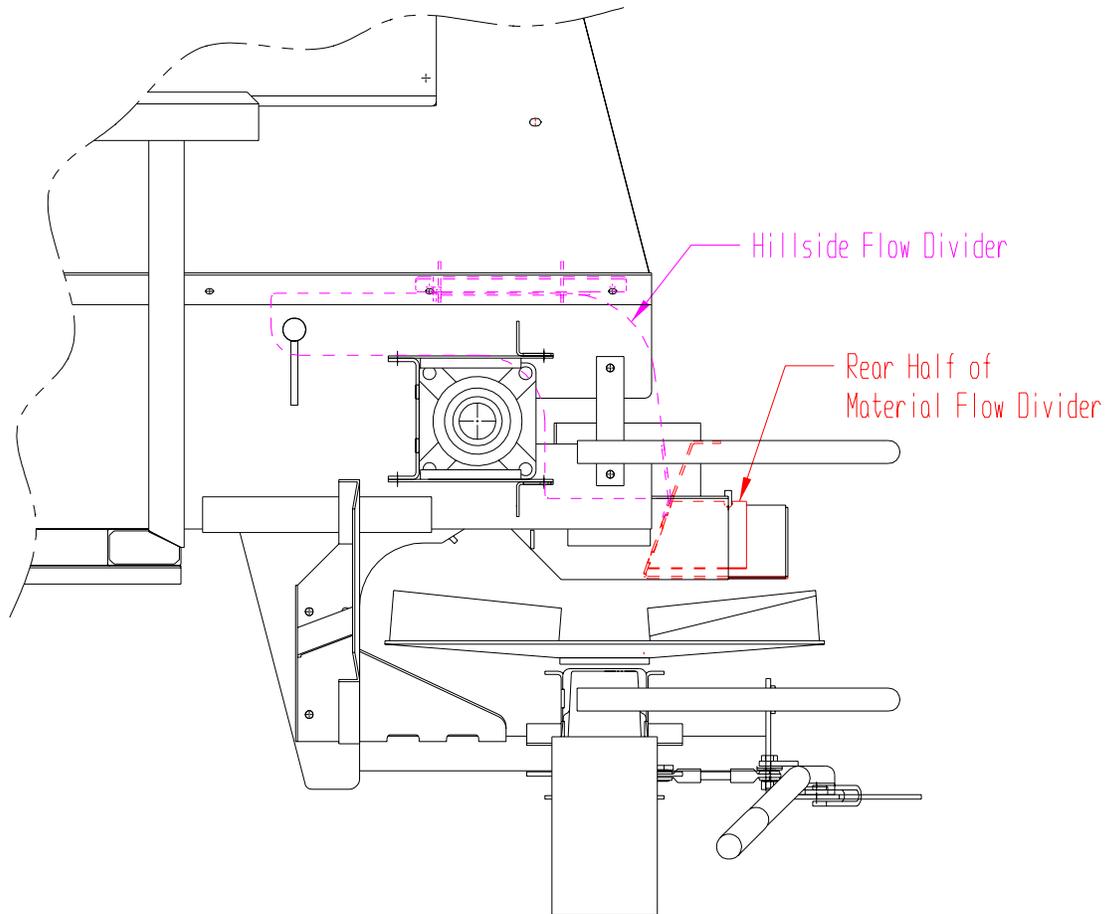
Control Valve Settings – Raven Controllers:



Servo Valve: Granular, C-FC and a Valve Cal of 743.

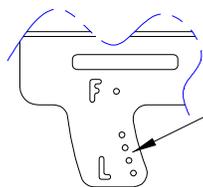


PWM Valve: Granular, PWM Close Valve, Freq of 50hz, Valve Cal of 23, Min Pw = 35, Pre Set Pw = 253



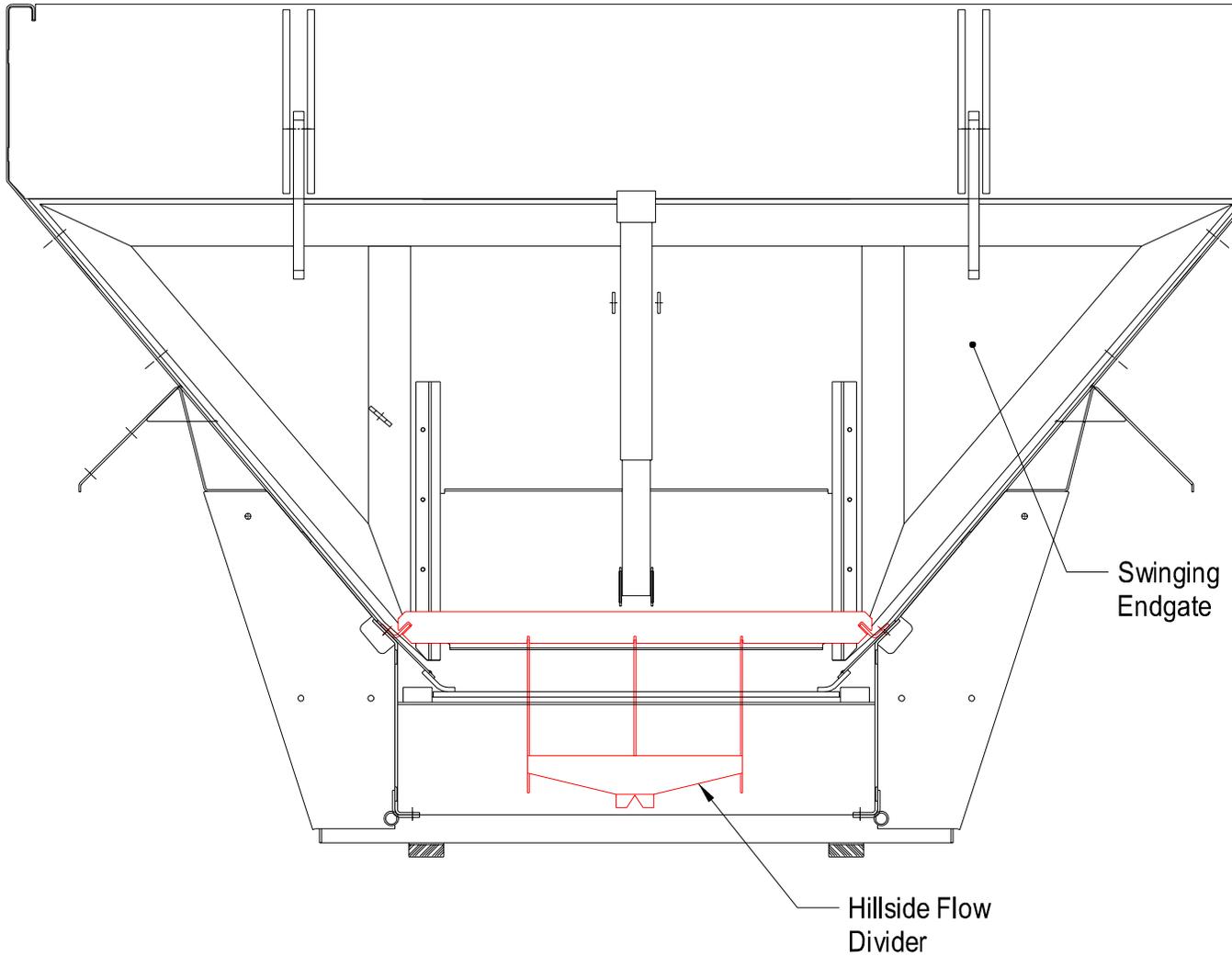
TO SPREAD LIME

- 1) Remove rear half of material flow divider.
- 2) Remove hillside flow divider.
- 3) Units w/optional Duo-Force (2nd product bin) must remove the conveyor insert & the two bolts in the lower hinged panels to allow them to rest on the box. If product flow is not acceptable remove the lower half of the center box divider.
- 4) Open the gate to at least 7 inches.
Adjust spreader constant for the new gate setting.
- 5) See Instructional Pg. 1.1 for spinner speed setting & spread pattern info.



Adjust the spinner to one of the four "L" (lime) positions depending on your spread pattern test results.

- 6) Lime DENSITY varies greatly. Adjust DENSITY ONLY - NOT spreader constant or gate.



**** WARNING ****

Swinging Endgate CAN NOT be swung open when Hillside Flow Divider is installed.

FORCE UNLTD. SPREADERS*GPS EQUIPMENT*CONVEYORS

FORCE Unltd. PT. #	TORQUE FOOT/LBS	COIL NUT TORQUE
1211-01 (Valve - Hyd Servo)	46-54	
1211-08 (Proportional Valve - 10 NC)	55-60	Hand Tighten
1211-011 (Proportional Valve - 16 NC)	95-100	Hand Tighten
1211-80 (Cartridge - PSI Compensator)	65-75	
1211-945 (3500 PSI Relief Valve)	45-50	9 Foot/LBS
1211-95 (4000 PSI Relief Valve)	45-50	9 Foot/LBS
1222-108 (Valve - Cartridge, Logic Element)	65-75	
1222-109 (Solenoid Valve)	18-20	4-5 Foot/LBS

Steel 37° JIC Adapters		
Dash Size	Flared Thread Size	Torque Foot/Lbs.
-6	9/16-18	18-20
-8	3/4-16	27-39
-10	7/8-14	36-63
-12	1 1/16-12	65-88
-14	1 3/16-12	75-103
-16	1 5/16-12	85-113
-20	1 5/8-12	115-133
-24	1 7/8-12	125-167

Steel Pipe Adapters		
DASH SIZE	NPSM THREAD SIZE	TORQUE FOOT/LBS
-4	1/4-18	25
-6	3/8-18	40
-8	1/2-14	54
-12	3/4-14	78
-16	1-11 1/2	112
-20	1 1/4-11 1/2	154
-24	1 1/2-11 1/2	211

STEEL SAE O-RING ADAPTERS J514 & J1926/3 TORQUE VALUES			
DASH SIZE	STRAIGHT THREAD SIZE	STRAIGHT STUD TORQUE FOOT/LBS	ADJUSTABLE STUD TORQUE FOOT/LBS
-6	9/16-18	18-24	12-16
-8	3/4-16	27-43	20-30
-10	7/8-14	36-48	30-36
-12	1 1/16-12	65-75	44-54
-14	1 3/16-12	75-99	53-70
-16	1 5/16-12	85-123	59-80
-20	1 5/8-12	115-161	75-100
-24	1 7/8-12	125-170	105-125

FORCE UNLTD. TRAILER INSTRUCTIONS

**TORQUEING THE BOLTS ABOVE THEIR RATING WILL FAIL THE BOLT -
--DON'T OVER TORQUE THE BOLTS**

TIRE PRESSURE

ALWAYS CHECK WHAT IS ON THE TIRE

900/60R32 = 35 PSI
480/80R46 = 35 PSI

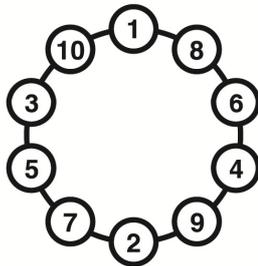
NUT TIGHTENING SEQUENCE & TORQUE

NOTICE

DO NOT OVER TORQUE!

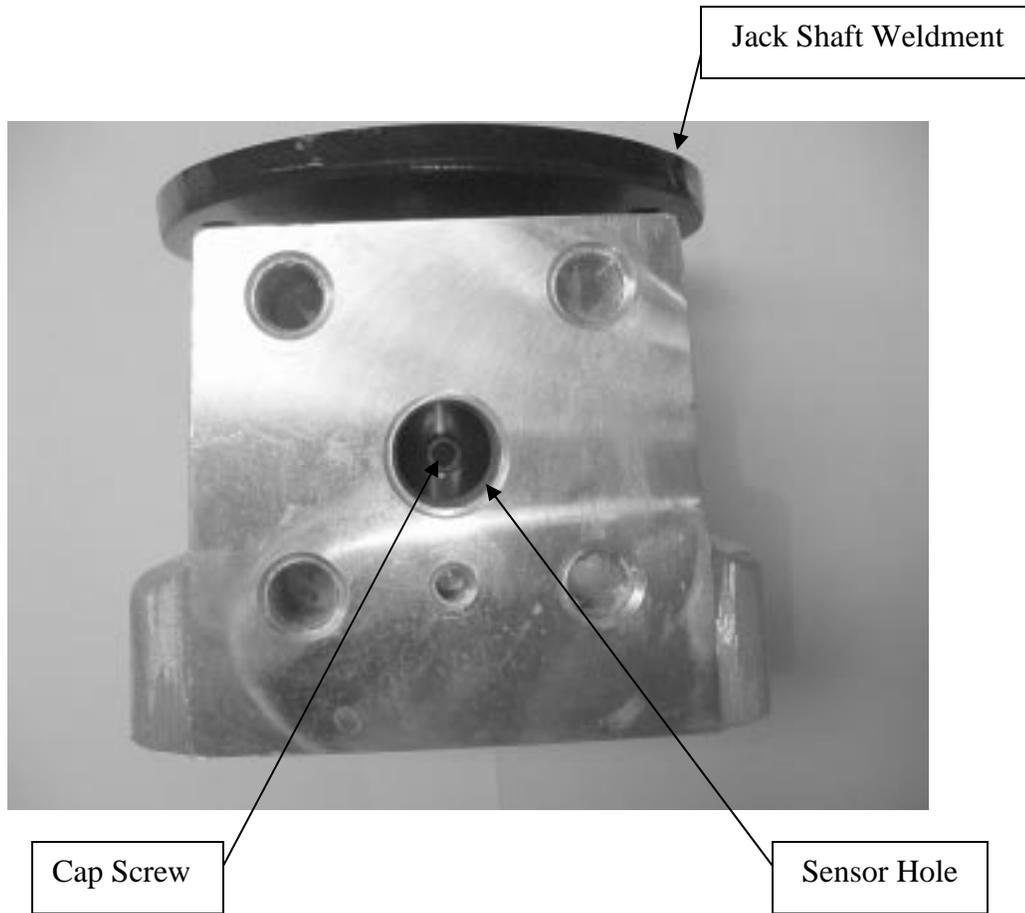
10 ON 285.75MM STUD HUBS
FOR HUB-PILOTED DISC WHEELS
RECOMMENDED TORQUE DRY:
M22 X 1.5 TREAD **450-500 LB. FT.**

NUT
TIGHTENING
SEQUENCE



2 PIECE FLANGE NUT - Torque 2 Piece
Flange Nuts to 50 lb.-ft. using
sequence shown. Then tighten 2-piece
Flange Nuts to recommended torque.

**RECHECK EVERY 500
REVOLUTIONS UNTIL NO CHANGE**

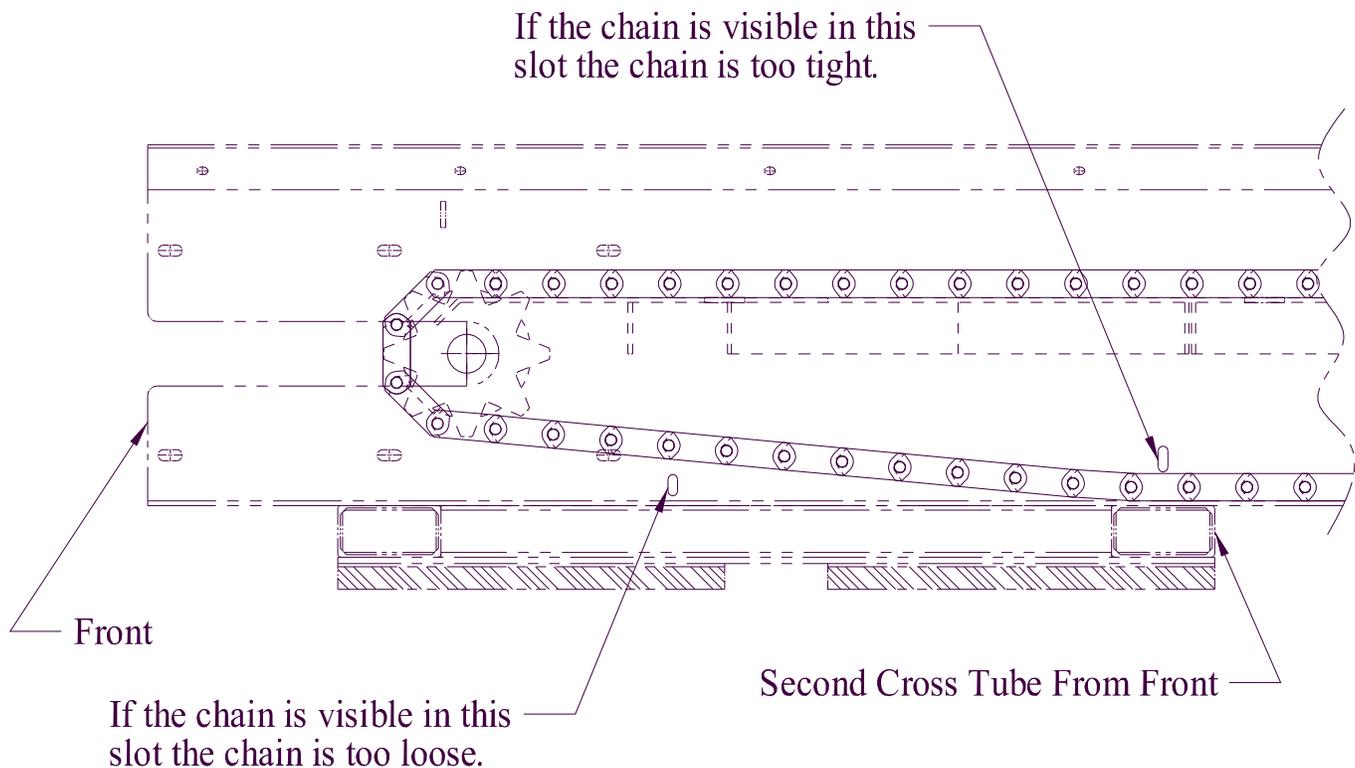


Note:

Before disassembling the jack shaft assembly, remove (4) cap screws from jack shaft by rotating jack shaft weldment until cap screw can be seen through sensor hole.

IMPORTANT

- * Proper chain tension is an essential factor in chain & sprocket life.
- * Chains that are TOO TIGHT tend to stretch & will cause excess sprocket wear & eventually breakage.
- * Chains that are TOO LOOSE present the possibility of catching on the sub frame parts which will cause damage to the body also.
- * Straighten or replace bent or distorted chain bars immediately.
- * Worn sprockets will compound any issues when chain is TOO TIGHT or TOO LOOSE.
- * When repairing or replacing chain links install a cotter key & tack weld the cotter key side of the pin to each connector link.



CHAIN TENSION & LUBRICATION

- 1) Tighten chain to second cross tube from the front.
Make sure both sides of chain are tensioned equally.
- 2) See Instructional Pg. 2.4 for chain lubrication.

FORCE UNLTD. SPREADERS*GPS EQUIPMENT*CONVEYORS

<u>LOCATION</u>	<u>PLACES</u>	<u>LUBRICANT</u>	<u>FREQUENCY</u>
Bearings - Drive	2	Multi-Purpose Grease NLGI No. 2	Weekly, See Below
Bearings - Idler	2	Multi-Purpose Grease NLGI No. 2	Weekly, See Below
Gear Box	1	Synthetic SAE 90 Requires Approx. 2 quarts	Check Monthly, Change Annually, See Below
Bolt, Take-Up	2	Never Seize	Annually
Gears - Feedgate Jack	1	Multi-Purpose Grease NLGI No. 2	Monthly, See Below
Tube - Feedgate Jack	1	Multi-Purpose Grease NLGI No. 2	Monthly, See Below
Spinner - Jack Shaft Assembly	2	Multi-Purpose Grease NLGI No. 2	Monthly, See Below

CONVEYOR CHAIN

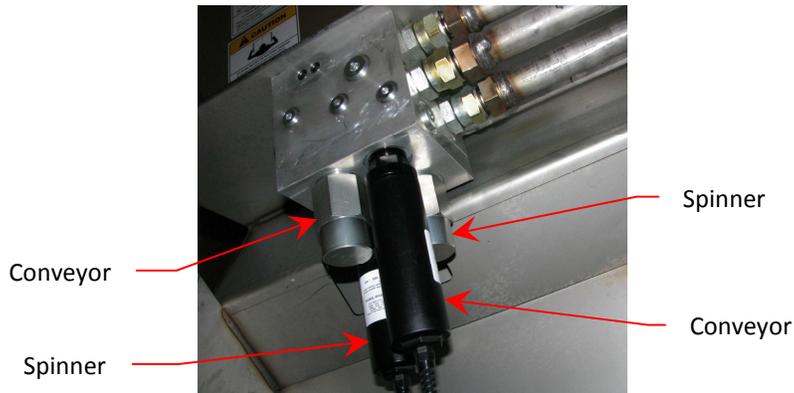
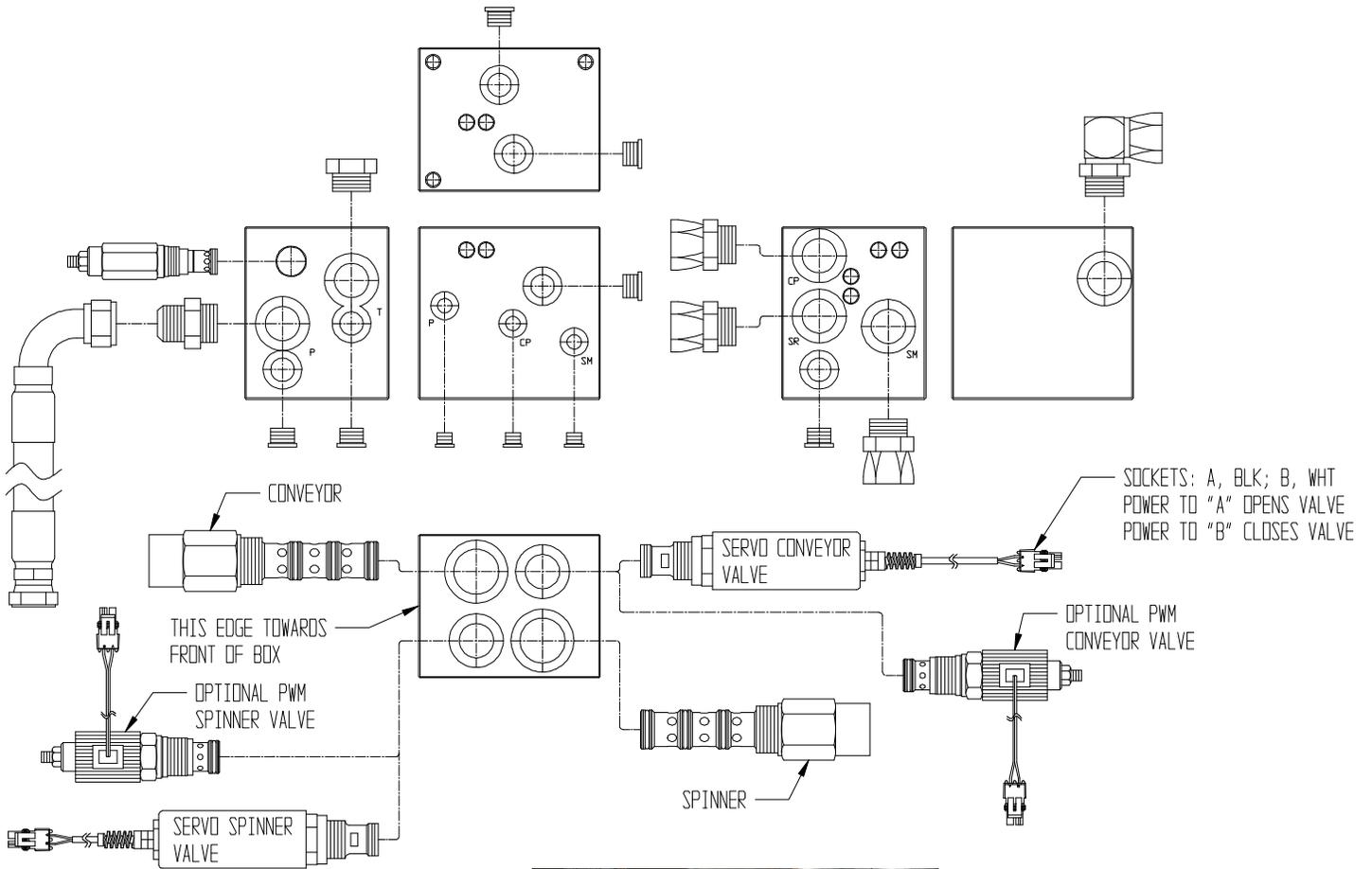
Oil the conveyor chain monthly and definitely at the end of the season. A mixture of 50% used motor oil and diesel fuel should be used. Use a hand sprayer and don't get the mixture on the belt.

CHANGING GEAR BOX OIL:

Refer to Instructional Pg 2.5 for details.

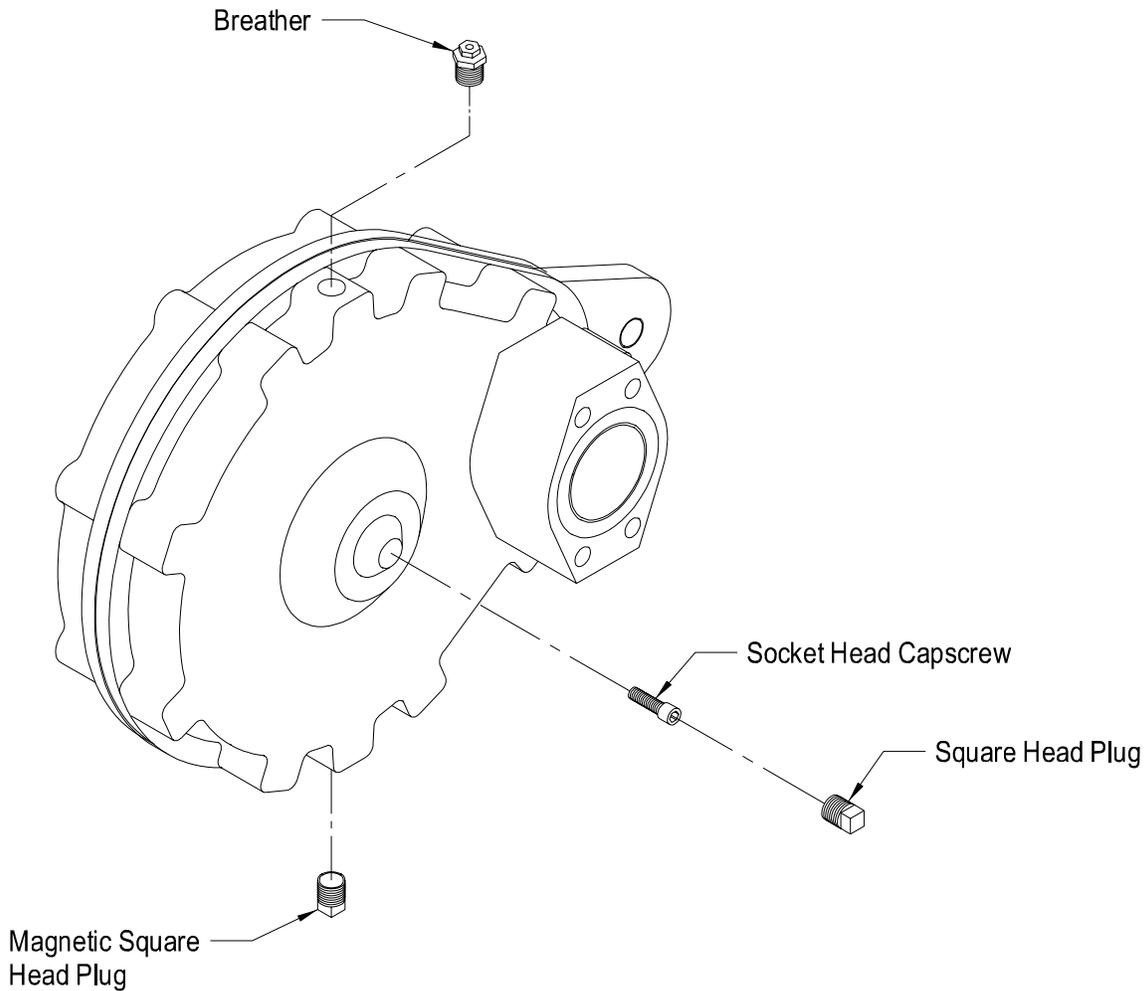
NOTE: Grease Bearings, Feedgate Jack & Jack Shaft Assembly until grease purges.

NOTE: Completely lubricate all locations and check oil levels at the end of the season.



**MAIN VALVE BLOCK ASS'Y
(SPINNER & CONV. SETUP)**

1) See Instructional Pg. 2.1 for torque specs.



GEAR BOX REMOVAL

- 1) Remove Square Head Plug
- 2) Using 1/4" Allen wrench remove Socket Head Capscrew
- 3) Gear box should slide off with minimal resistance.

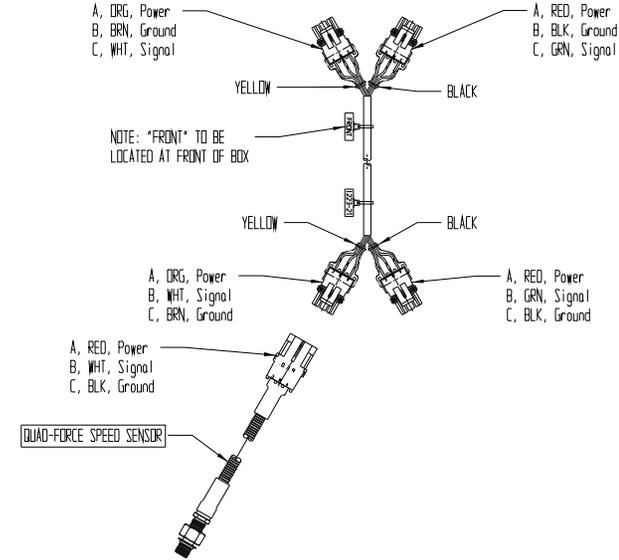
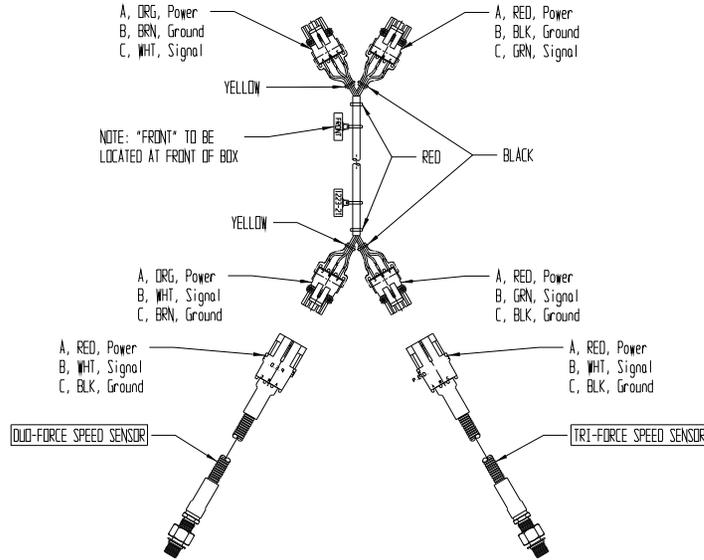
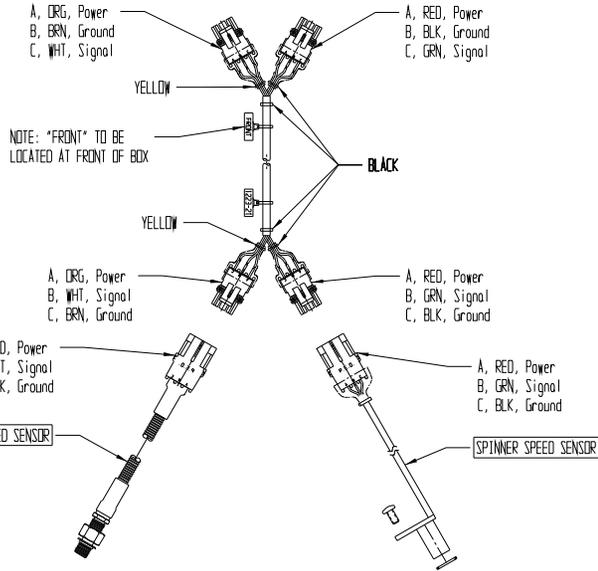
CHANGING GEAR BOX OIL

- 1) Remove Magnetic Square Head Plug & Breather
- 2) Clean any metal shavings off of Magnetic Square Head Plug
- 3) After oil has drained replace Magnetic Square Head Plug
- 4) Remove Square Head Plug
- 5) Fill gear box through breather hole with Synthetic SAE 90 oil until it starts to run out of the hole the Square Head Plug was removed from.
Approx. 2 quarts
- 6) Replace Square Head Plug & Breather

FORCE UNLTD.

SPREADERS * GPS EQUIPMENT * CONVEYORS

NOTE:
FOR OPERATING SETUP MAINTAIN TIE STRAP COLOR
CODING BETWEEN SENSORS & CONSOLE HARNESS

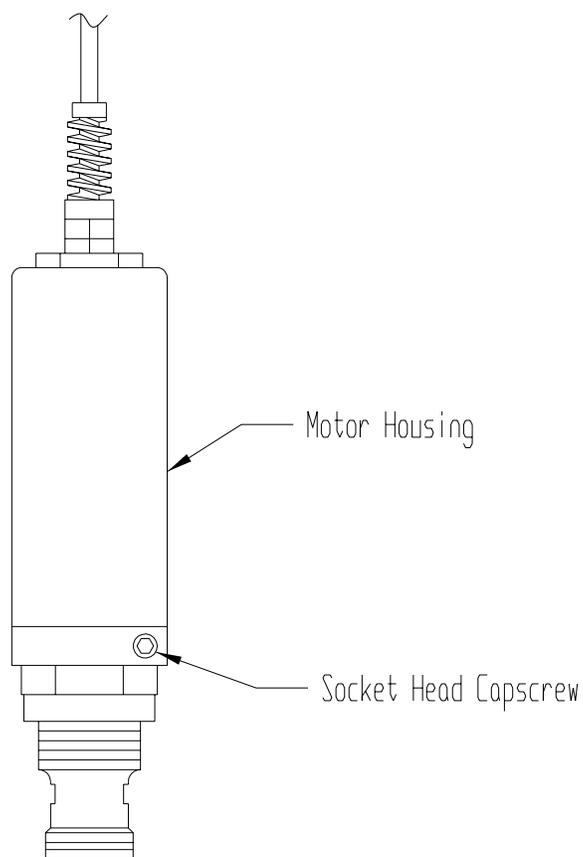


TROUBLE SHOOTING SENSOR WIRING HARNESS

If console loses rate or spinner speed and the function is moving, the connectors shown on this page can be swapped at the rear of the spreader to trouble shoot the system.

EXAMPLE: If the spinners speed is working and the connectors are switched the spinners should show up as an application rate. If the application rate still isn't reading you have a controller or cable problem. Check your programming numbers and cables. If you do get a rate reading the sensor could be bad.

Different controllers supply different voltages. You should have at least 5 volts on the power and signal leads.



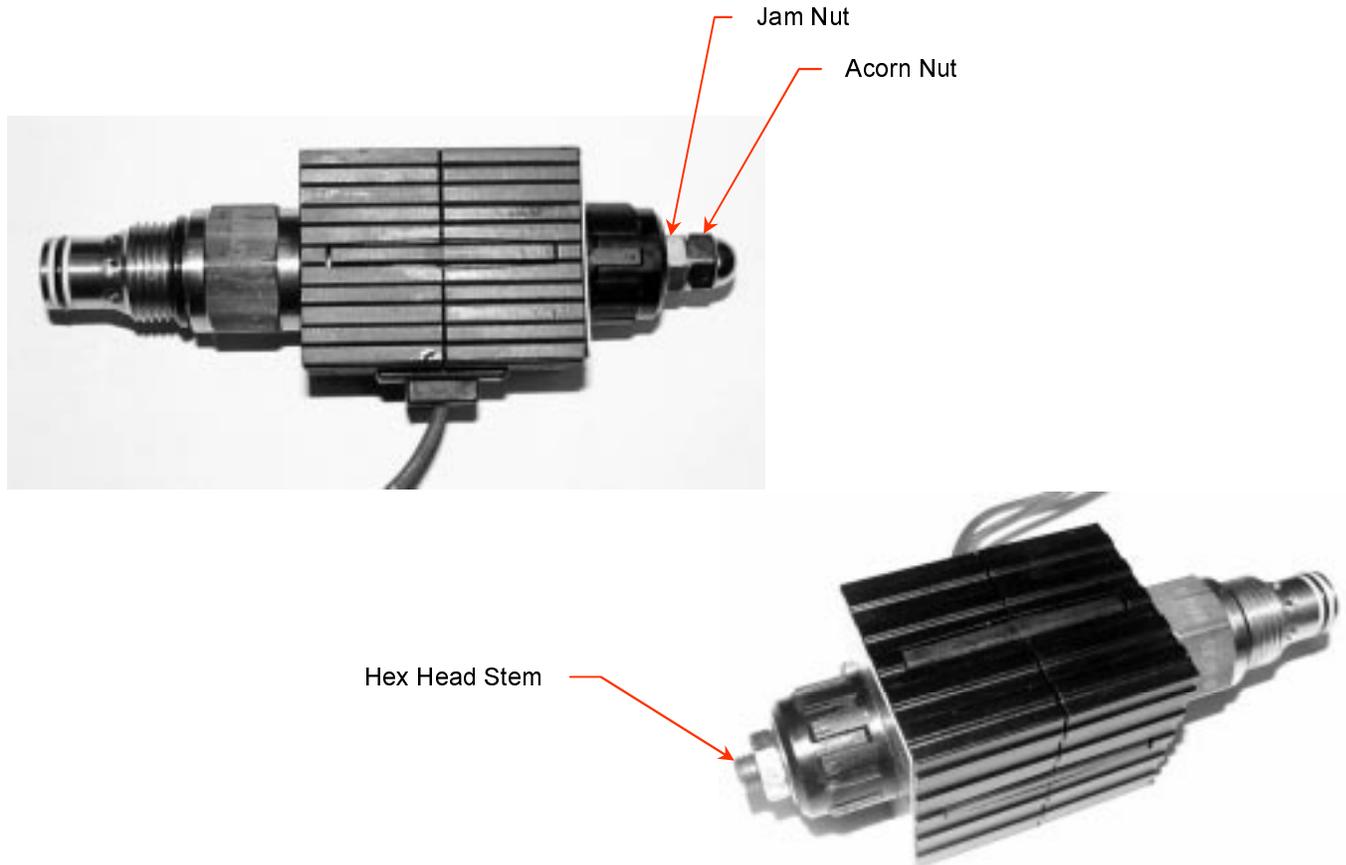
MANUAL OVER-RIDE & TIMING OF HYDRAULIC SERVO VALVE

NOTE: Valve adjusts through full range in 90 Deg. rotation.

Never turn more than a total of 1 turn counter clockwise.

- 1) Loosen socket head capscrew on lock collar using 3/16" hex wrench.
- 2) Run engine at desired RPM.
- 3) Grab the motor housing with your HAND ONLY and turn the can clockwise to the desired flow setting.
- 4) Tighten lock collar to hold position.
- 5) If further adjustments are necessary, repeat steps 1 through 4 as required.
- 6) Retine valve after manual adjustment before returning to 12 VDC operation. To retine valve, turn off control switch and adjust motor housing slowly counter clockwise until conveyor or fans just stop.

Manual Override of Hydraulic PWM Valve

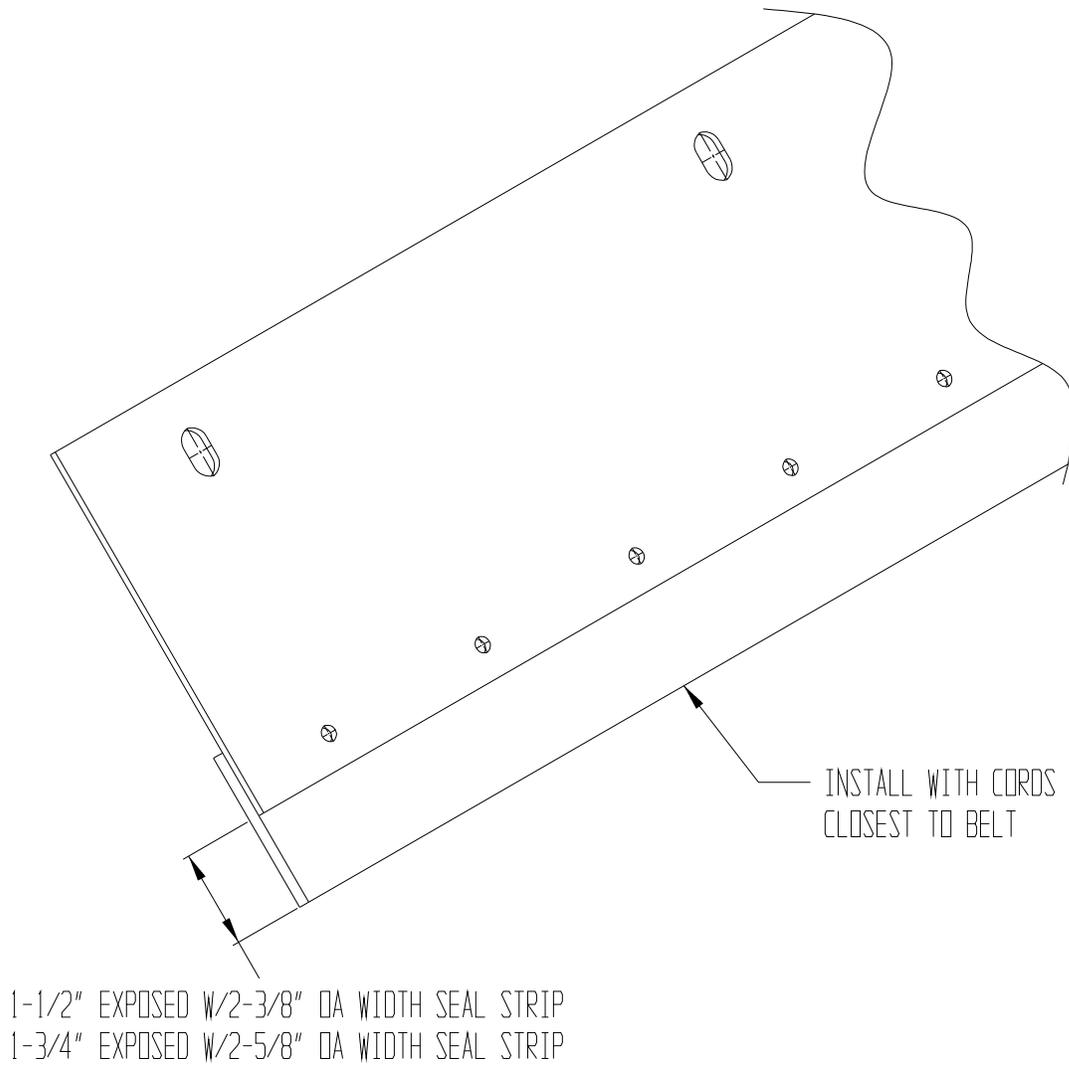


To manually override:

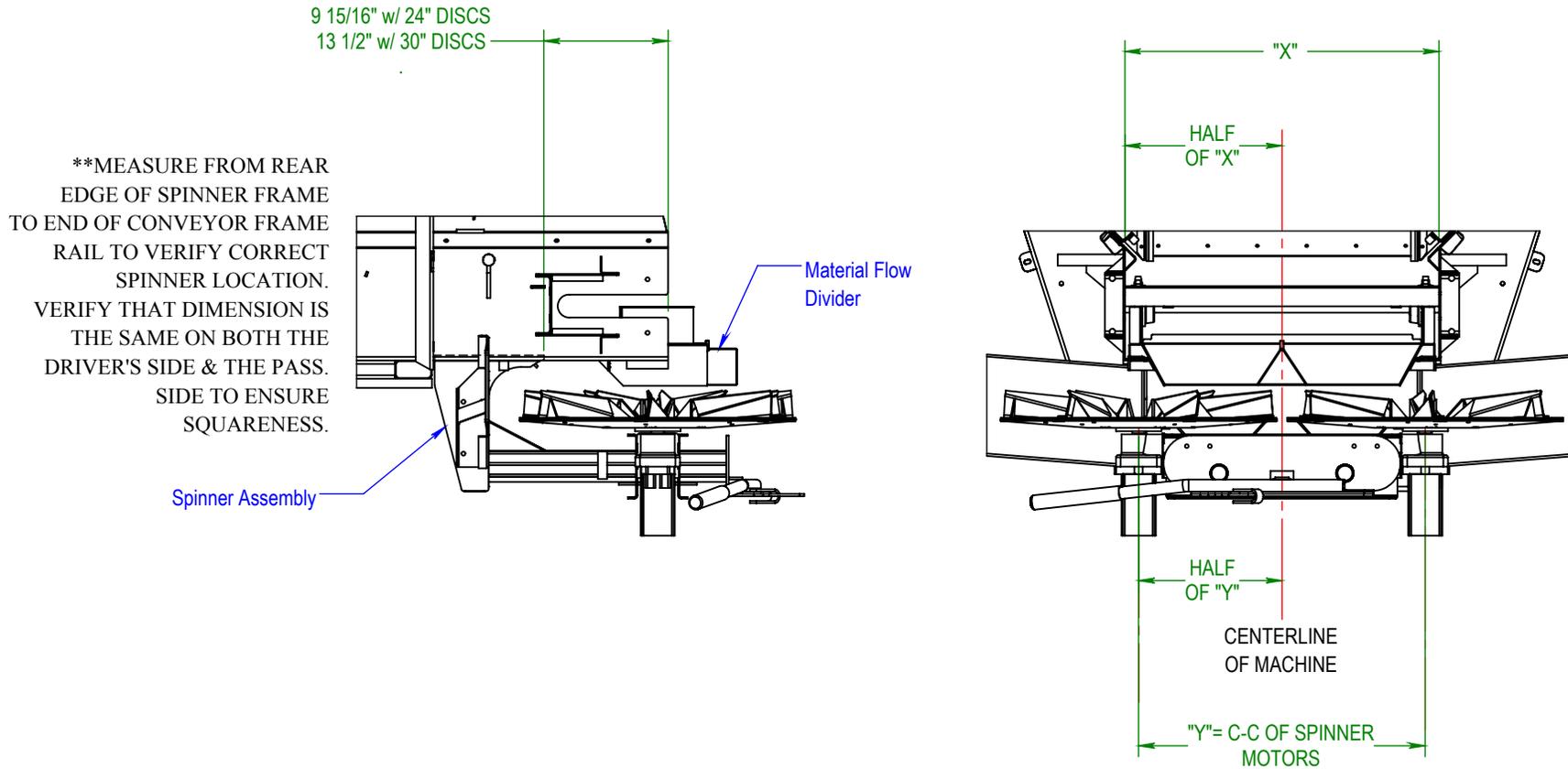
1. Using 1/2" wrench - remove acorn nut.
2. Loosen jam nut.
3. Keeping track of turns - turn in 5/32" hex head stem until flow starts (up to 4 turns).

To Reset:

1. Turn 5/32" hex head stem out the same number of turns it was turned in.
2. While holding the 5/32" hex head stem in place tighten the jam nut.
3. Replace acorn nut.



INSTALLING CHAIN SHIELD RUBBER



****IMPORTANT****

SPINNER ASSEMBLY & MATERIAL FLOW DIVIDER LOCATION

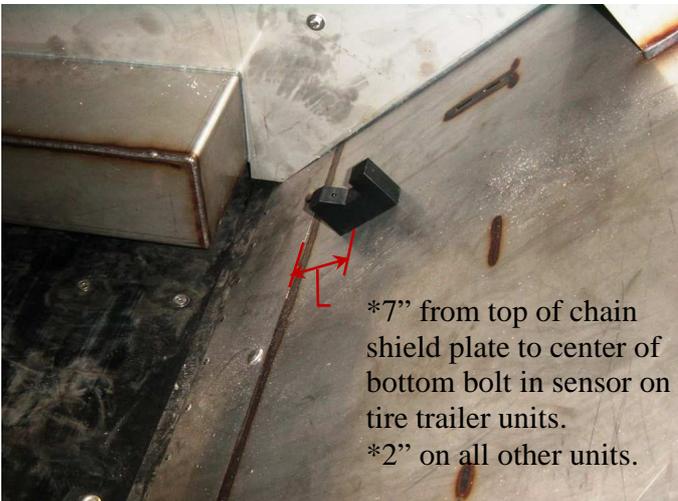
NOTE: Verify all dimensions to ensure squareness of spinner assembly & material flow divider. If these items are not located properly, **the spread pattern will be affected**. The material flow divider & spinner assembly MUST be centered in the flow of material to get an adequate spread pattern.

FORCE UNLTD. SPREADERS*GPS EQUIPMENT*CONVEYORS



Pictured at left:
Remove pins
from weather
pak to install
cable through
side of box.

Insert pins back into
weather pak after cable is
through box.
Red (positive) into "A"
Clear (negative) into "B"
Black (signal) into "C"

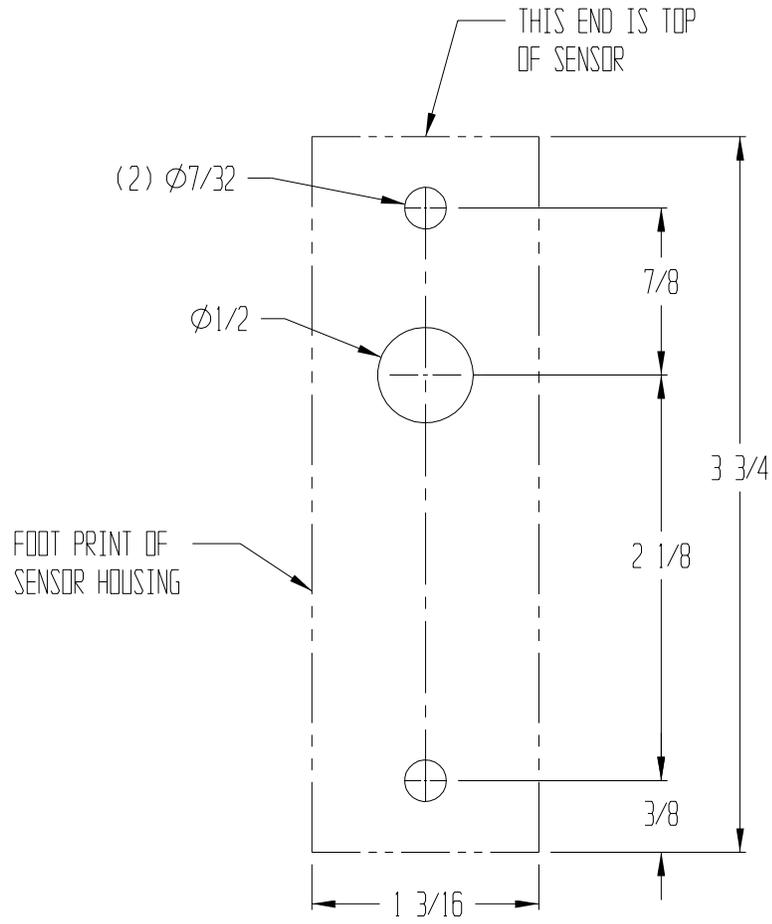


Pictured at left:
Bin level sensor
installed on drivers
side box panel, just
in front of Duo
Force center
divider panel.



Pictured at left:
Bin level sensor
installed on rear
panel of box.

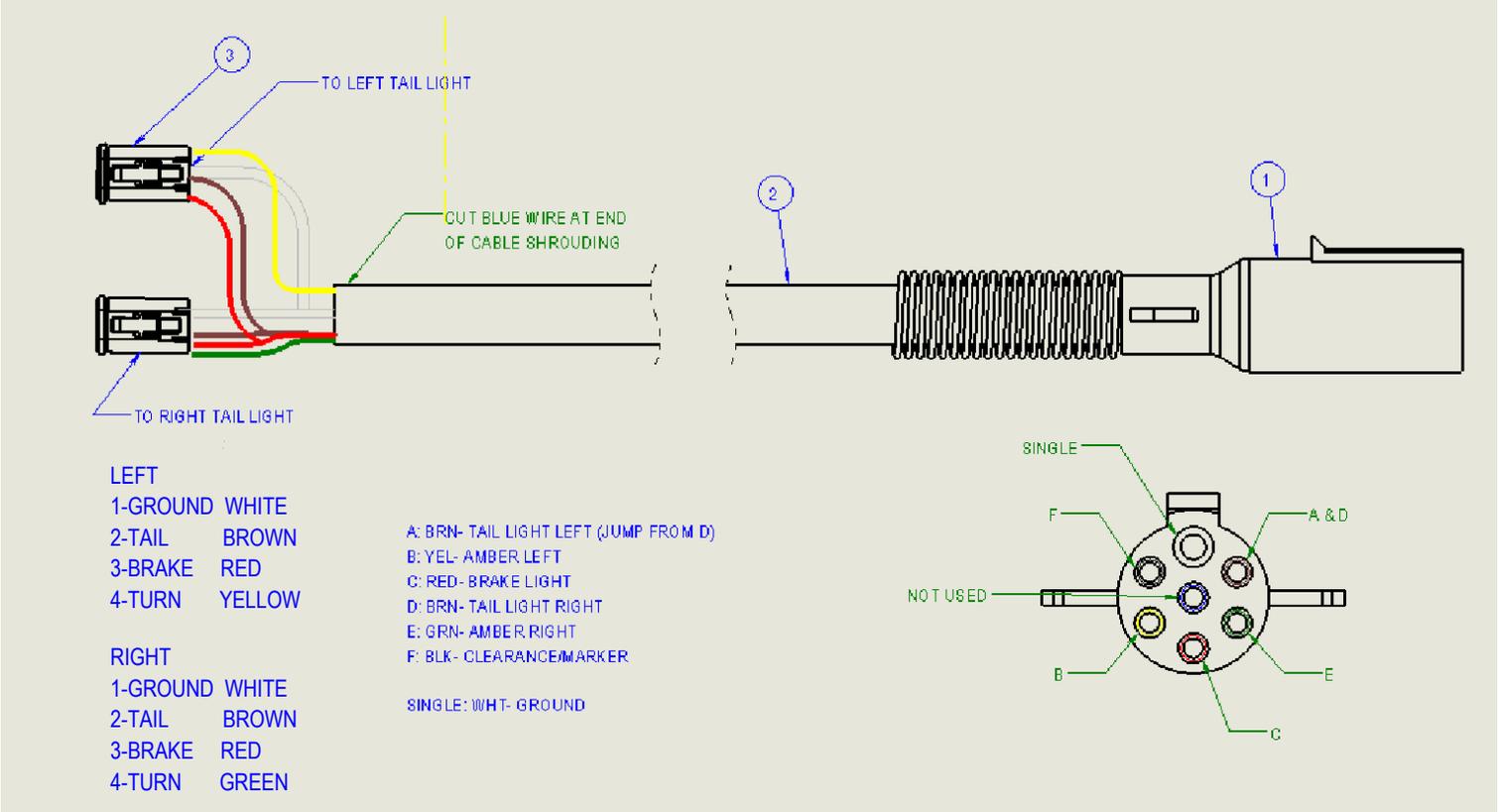
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



- NOTE: 1) AFTER PRINTING TEMPLATE PAGE - VERIFY IT PRINTED IN FULL SCALE BY CHECKING THE DIMENSIONS SHOWN
 2) USE TEMPLATE TO DETERMINE WHERE YOU ARE GOING TO INSTALL SENSOR & DRILL HOLES.
 3) SEE INCLUDED PICTORIALS FOR SUGGESTED LOCATIONS.

FORCE Unltd. OELWEIN, IA	DESCRIPTION:	1223-64 BIN LEVEL SENSOR TEMPLATE	
	MATERIAL:		
DRAWN BY: GM	DATE: 10/5/04	SCALE: 1" = 1"	DWG. NO. Bin Level Sensor

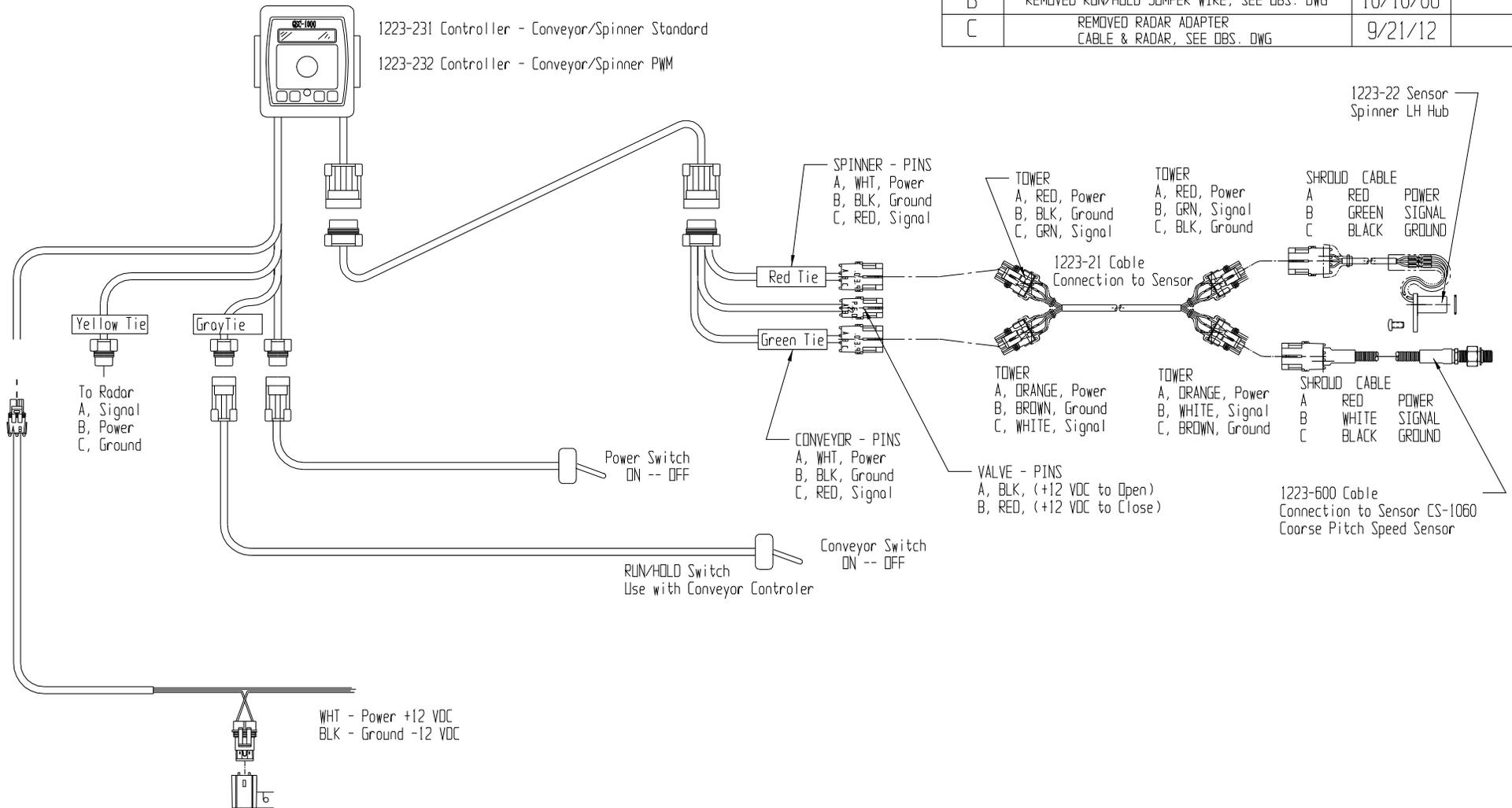
TRAILER TAIL LIGHT EXTENSION CABLE



ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	1214-268	7 Pin Zinc Die-Cast Plug w/ Cable Guard
2	1	1214-268C	7 CONDUCTOR, 6/14, 1/12GA.,
3	2	1214-DT06-4	CONNECTOR, DUETSCH 4 PIN

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	SEE OBS. DWG		
B	REMOVED RUN/HOLD JUMPER WIRE, SEE OBS. DWG	10/10/06	
C	REMOVED RADAR ADAPTER CABLE & RADAR, SEE OBS. DWG	9/21/12	



Instructional Manual Pg. 3.7

FORCE Unltd. OELWEIN, IA	DESCRIPTION: Controller - M/T GSC-1000		
	MATERIAL: WIRE HARNESS		
DRAWN BY: EEH	DATE: 5/24/05	SCALE: NONE	DWG. NO. 1237-910