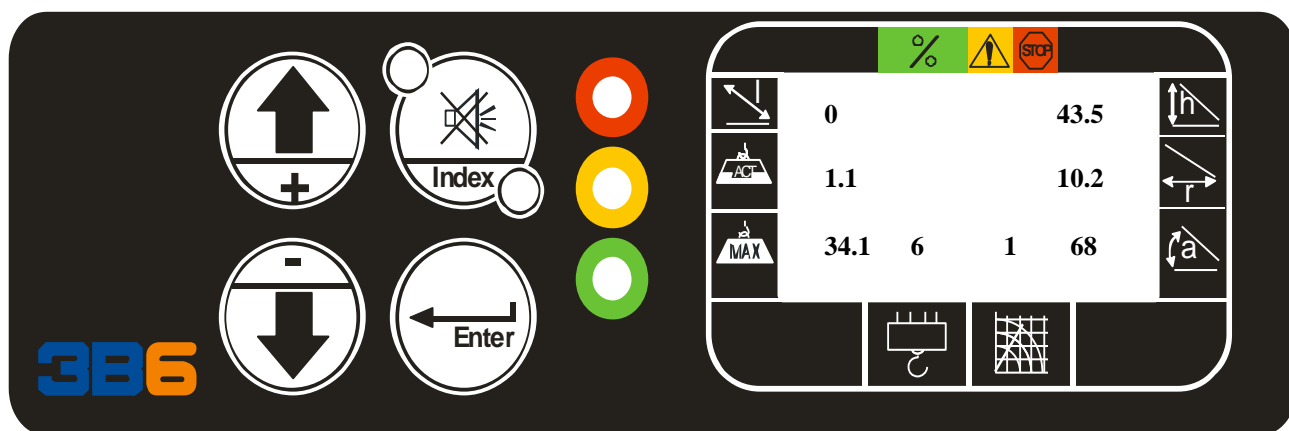




SLIM

Troubleshooting Manual



Rev 9 1-4-13
Software TXW003TME



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Introduction

WARNING

The SLIM system is an LMI, with Range limiting features.

The system should be checked for the shutoff functions prior to programming the Operating mode and confirming by trying to move the boom functions to ensure the shutoff is disabled.

A full check confirming all features on the system are functioning properly prior to lifting any loads!

To obtain the optimum performance from this system we recommend that you read and understand this manual before using the system.

WARNING

For proper use of the system, carefully read and understand this page.

MAINTENANCE

The SLIM system power cable must be disconnected when welding, battery replacement, charging or jump starting the battery. Failure to comply will result in serious damage to the system.

MACHINE WASHING

If washing the machine with a high pressure power washer, you must protect all the system components from direct spraying to avoid damage to the components.

Failure to comply with the above warnings will result in voiding the warranty!

WARRANTY

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, MADE BY EITHER THE DISTRIBUTOR OR THE MANUFACTURER ON NEW 3B6 SYSTEMS AND COMPONENTS, EXCEPT THE MANUFACTURER'S WARRANTY AGAINST DEFECTS, MATERIAL AND WORKMANSHIP SET OUT BELOW.

NEW EQUIPMENT WARRANTY

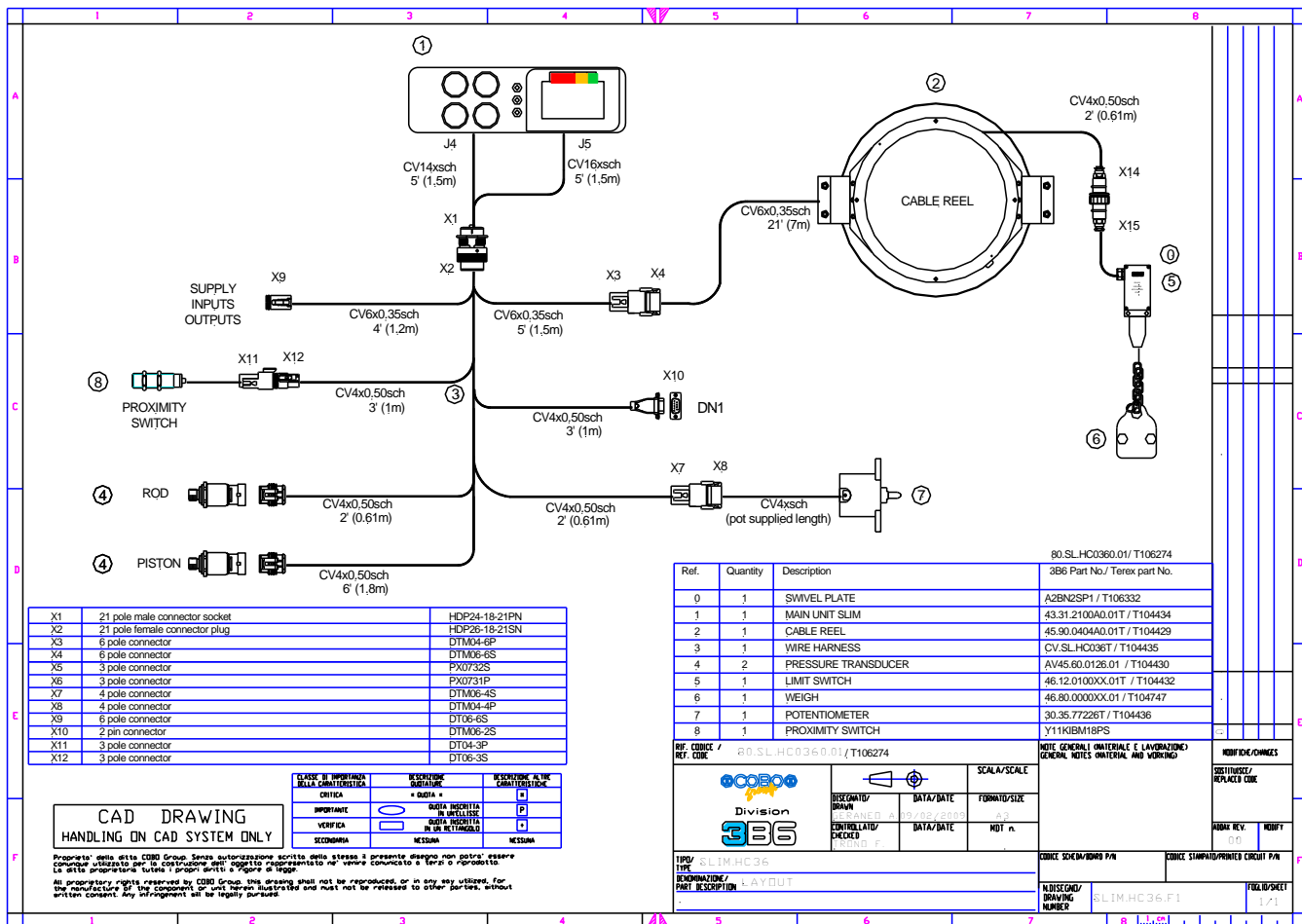
“The manufacturer warrants each new product made by the manufacturer to be free from defects in material and workmanship, its obligation and liability under this warranty being limited to replacing free of charge at its factory any part proving defective under normal use and service within twelve (12) months from the date of initial sale, providing the product is on record with the manufacturer as being installed by the distributor. If the product is not on record as being installed by the distributor, the manufacturer will consider the date of shipment from the factory as the date of initial sale. This warranty is in lieu of all other warranties, expressed or implied and the obligation and liability of the manufacturer under this warranty shall not include any transportation or other charges or the cost of installation or any liability for direct, indirect or consequential damages or delay resulting from the defect. Any operation beyond rated capacity or the improper use of the product or the substitution upon it of parts not approved by the manufacturer shall void this warranty. This warranty covers only the products of 3B6. The products of other manufacturers are covered only by such warranties as made by their manufacturers.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATIONS OR LIABILITY OF THE PART OF THE MANUFACTURER, AND 3B6 NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH SUCH EQUIPMENT.

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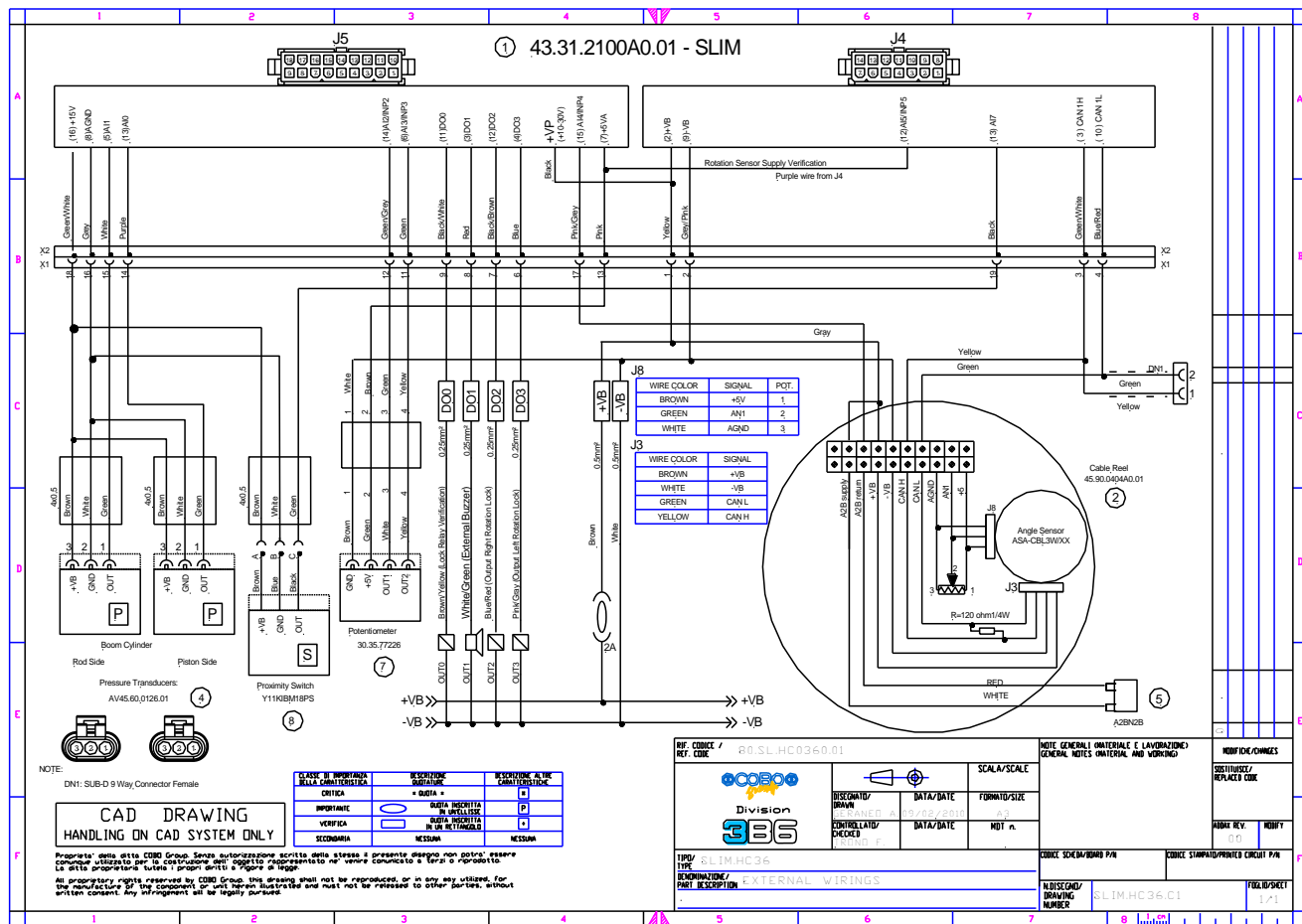
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System Layout



Wiring Diagram

SLIM Rev 6 9-29-10



WARNING CODES

WARNING 5 Rope overload	Exceeded single line pull of wire rope	Increase reeving Reduce weight
WARNING 6 Exceeded load program change	Suspended load when changing program	Lower load to ground to change program
WARNING 7 Rigging & Travel	Rigging & Travel mode selected	N/A
WARNING 8 Pre-warning rotation	Rotation approaching limit range	Increase Boom angle above 10 degrees
WARNING 9 Rotation limit stop	Exceeded rotation limits	Increase Boom angle above 10 degrees Rotate opposite direction
WARNING 10 5 vdc supply rotation pot fault	5vdc supply is low to rotation pot	Check wiring Check harness to pot Replace pot
WARNING 11 Virtual wall Angle preset limit	Preset for virtual wall exceeded	Increase boom angle Reset ISAAC angle setting, page 14 operator manual
WARNING 12 Virtual wall radius exceeded	Preset for Virtual wall exceeded	Decrease radius Reset ISAAC radius setting, page 14 operator manual
WARNING 13 Virtual wall Height exceeded	Preset for Virtual wall exceeded	Decrease height Reset ISAAC height setting, page 14 operator manual
WARNING 15 Virtual Wall Rotation min exceeded	Preset for Virtual wall exceeded	Increase Rotation min Reset ISAAC ROT MIN setting, see page 14 operator manual
WARNING 16 Virtual Wall Rotation min exceeded	Preset for Virtual wall exceeded	Decrease Rotation Max Reset ISAAC ROT MAX setting. See page 14 operator manual

Alarm/Fault codes

MESSAGE	CAUSE	SOLUTION
ALARM 1 Memory Data Fault	Internal memory fault	Cycle system power, if continued Contact Service
ALARM 2 Angle sensor 1 reading lower than minimum	<ul style="list-style-type: none"> • Potentiometer inside Reel is faulty. • Possible lack of continuity in wires carrying the signals • Fault in Display unit connector • Angle out of adjustment 	<ul style="list-style-type: none"> • Check Wiring from cable reel to Display Unit • Check 12vdc supply to angle pot in cable reel • Replace pot if damaged • Check CAN BUS lines
ALARM 3 Angle sensor 1 reading higher than maximum	<ul style="list-style-type: none"> • Potentiometer inside reel is faulty. • Lack of continuity in wiring • Fault in display unit connector • Angle out of adjustment 	<ul style="list-style-type: none"> • Check Wiring from cable reel to display unit • Check 12vdc supply to angle sensor • Replace pot if damaged • Check CAN BUS lines • Call Service
ALARM 4 Length Sensor 1 reading lower than minimum	<ul style="list-style-type: none"> • Potentiometer inside reel is faulty. • Lack of continuity in wiring • Fault in display unit connector • Length out of adjustment 	<ul style="list-style-type: none"> • Check Wiring from cable reel to display unit • Check 5 vdc supply to length sensor • Replace pot if damaged • Adjust length pot values fully retracted 0.250vdc • Check CAN BUS lines • Call Service
ALARM 5 Length Sensor 1 reading higher than maximum	<ul style="list-style-type: none"> • Potentiometer inside reel is faulty. • Lack of continuity in wiring • Fault in display unit connector • Length out of adjustment 	<ul style="list-style-type: none"> • Check Wiring from cable reel to display unit • Check 5 vdc supply to length sensor • Replace pot if damaged • Adjust length pot values fully retracted 0.250 vdc • Check CAN BUS lines • Call Service

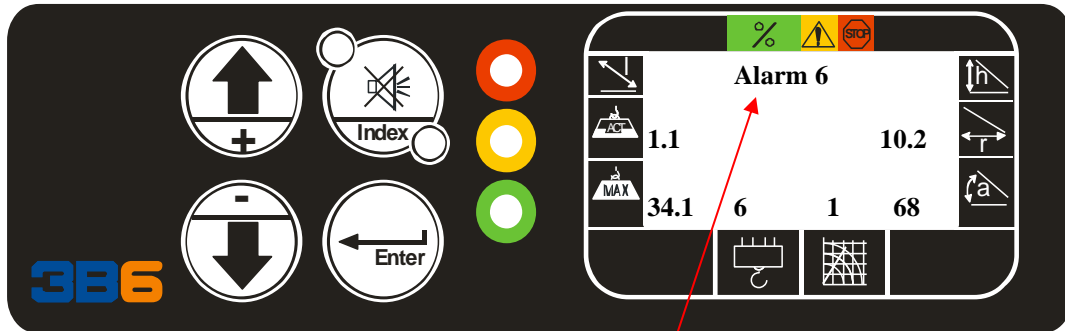
Alarm/Fault codes

MESSAGE	CAUSE	SOLUTION
ALARM 8 <i>Piston pressure sensor output lower than minimum</i>	<ul style="list-style-type: none"> • <i>Piston Pressure sensor faulty.</i> • <i>Lack of continuity in wiring</i> • <i>Moisture in connector.</i> • <i>Sensor broken or disconnected</i> 	<ul style="list-style-type: none"> • <i>Check for 15vdc supply</i> • <i>Check for output 0.5 vdc</i> • <i>Check for moisture or fluid.</i> • <i>Check connector and wiring</i> • <i>Replace Transducer if faulty</i>
ALARM 9 <i>Piston pressure sensor output higher than maximum</i>	<ul style="list-style-type: none"> • <i>Piston Pressure sensor faulty.</i> • <i>Lack of continuity in wiring</i> • <i>Moisture in connector.</i> • <i>Sensor broken or disconnected</i> 	<ul style="list-style-type: none"> • <i>Check for 15vdc supply</i> • <i>Check for output 0.5 vdc</i> • <i>Check for moisture or fluid.</i> • <i>Check connector and wiring</i> • <i>Replace Transducer if faulty</i>
ALARM 10 <i>Rod pressure sensor output lower than minimum</i>	<ul style="list-style-type: none"> • <i>Rod Pressure sensor faulty.</i> • <i>Lack of continuity in wiring</i> • <i>Moisture in connector.</i> • <i>Sensor broken or disconnected</i> 	<ul style="list-style-type: none"> • <i>Check for 15vdc supply</i> • <i>Check for output 0.5 vdc</i> • <i>Check for moisture or fluid.</i> • <i>Check connector and wiring</i> • <i>Replace Transducer if faulty</i>
ALARM 11 <i>Rod pressure sensor output higher than maximum</i>	<ul style="list-style-type: none"> • <i>Rod Pressure sensor faulty.</i> • <i>Lack of continuity in wiring</i> • <i>Moisture in connector.</i> • <i>Sensor broken or disconnected</i> 	<ul style="list-style-type: none"> • <i>Check for 15vdc supply</i> • <i>Check for output 5.5 vdc</i> • <i>Check for moisture or fluid.</i> • <i>Check connector and wiring</i> • <i>Replace Transducer if faulty</i>
ALARM 16 <i>Shutoff output fault.</i>	<ul style="list-style-type: none"> • <i>Lack of continuity in wiring</i> • <i>Fault internal SLIM</i> • <i>Shutoff solenoid</i> 	<ul style="list-style-type: none"> • <i>Check for 12vdc supply</i> • <i>Check connector and wiring</i>
ALARM 22 <i>Internal WDO fault</i>	<ul style="list-style-type: none"> • <i>Faulty display</i> 	<ul style="list-style-type: none"> • <i>Check wiring of display and harness</i>
ALARM 41 <i>CRC Error EPROM SW</i>	<i>Internal fault SLIM display</i>	<i>Cycle power on SLIM display Call Service</i>
ALARM 42 <i>CRC Error in program</i>	<i>Internal fault SLIM display</i>	<i>Cycle power on SLIM display Call Service</i>
ALARM 43 <i>CRC Error in Load chart</i>	<i>Internal fault SLIM display</i>	<i>Cycle power on SLIM display Call Service</i>
ALARM 50 <i>Cable reel CANBUS</i>	<i>Faulty wiring from display to cable reel</i>	<i>Check wiring and CAN line for 120 ohm resistor.</i>

Alarm/Fault codes

ALARM 60 A2B condition	Approaching A2B condition	Lower hook block. Check A2B switch cable
ALARM 61 Overload SWL 110%	Exceeded 110% SWL	Reduce SWL
ALARM 62 Overload SWL 115%	Exceeded 115% SWL	Reduce SWL
ALARM 63 Overload SWL 120%	Exceeded 120% SWL	Reduce SWL
ALARM 64 Bypass enabled	Faulty wiring System bypassed	Check wiring from harness to bypass
ALARM 70 Rotation pot ADC value	Faulty wiring Internal fault rotation pot	Check wiring from harness to rotation pot Call Service
ALARM 71 Rotation prox switch	<ul style="list-style-type: none"> Faulty mechanical hardware Internal fault SLIM display	<ul style="list-style-type: none"> Check wiring from harness to rotation pot Check pot hardware
ALARM 72 Rotation sensor malfunction	Faulty wiring Defective rotation sensor	Check wiring from harness to rotation sensor Call Service

System Alarm Codes



The SLIM system will automatically alert the operator by Audible and or Visual alarm codes on the display of a condition. When in a alarm condition the Length and Height indicator are blanked out to display the message.

Alarm 1 Memory Data fault (SLIM Display)

1. Cycle power on the display and check wiring for damage.
2. CALL SERVICE

NOTE

Do not check wiring for output from any can bus component when power is applied to the system. Damage to the system will be the result

System Alarm Codes

Alarm Code 2 or 3 (Angle Sensor)

This code is caused by the output voltage of the angle sensor is lower (code 2) than the minimum or higher (code 3) than the maximum voltage.

*Actions to take; Level the machine, **Fully retract the boom and lower the angle to zero degrees using a angle finder** to determine zero degrees. All wire color is the connection cable coming from turret. See figure 3.*

- 1. Remove the cover of the cable reel using a m3 allen wrench and check the +12.00vdc (Typically the voltage is about 11.95vdc) supply voltage (Brown wire) and the ground wire (white wire). See Fig 3. If the voltage is ok continue to step 2, if not check the wiring from the cable reel to the display for damage.*
- 2. Check the 120 ohm resistor (with no power on) between the yellow and green wires inside the cable reel (CAN BUS lines). If the wiring is ok, loosen the three screws (Fig 4) on the angle pot and adjust the pot until the display indicates what the angle finder indicates. Check the high angle setting at 75 degrees for accuracy.*
- 3. If adjusting the angle pot and the angle does not change on the display, change the angle pot and set the angle sensor by the display.*
- 4. Call for service if angle is still incorrect or to set angle sensor.*

Fig 3

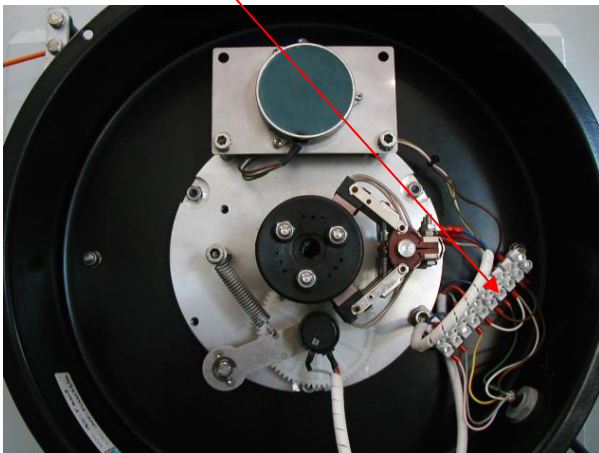
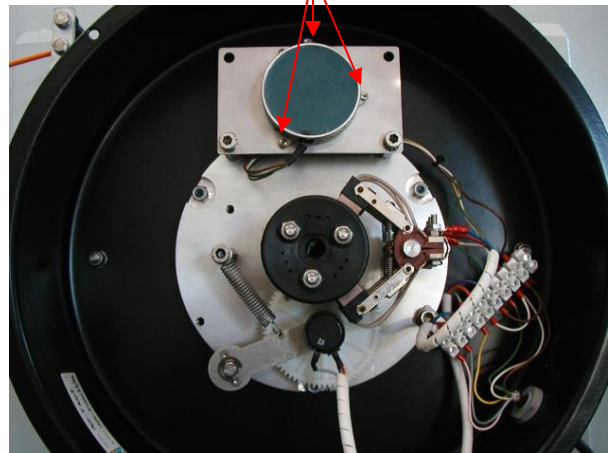


Fig 4



System Alarm Codes

Alarm Code 4 or 5 (Length Sensor)

This code is caused by the output voltage of the length sensor is lower (code 4) than the minimum, higher (code 5) than the maximum voltage or higher than the actual value.

Actions to take; Level the machine, **Fully retract the boom and lower the angle to zero degrees.** **Length indication is in percentage of length 0-100%**

1. Check the cable is spooling properly on the drum. If cable is built up on one side of drum correct it and adjust the roller guide on the cable reel to correct.
2. Remove the cover of the cable reel using a m3 allen wrench and check the +12.00vdc (Typically the voltage is about 11.94vdc) supply voltage (Brown wire) and the ground wire (white wire). See Fig 5. If the voltage is ok continue to step 2, if not check the wiring from the cable reel to the display for damage.
3. Check the output of the length sensor. The output of the length sensor when the boom is fully retracted should be approximately .250vdc.(wire), (tolerance .246 to .254vdc is OK). If it is higher or lower check the wiring first for damage. If the wiring is ok, press down on the length pot swing arm(Fig 6) and adjust the gear until the display indicates what the minimum boom length for that model of machine. Check the voltage and record this for later use.
4. If adjusting the length gear assembly and the length does not change on the display, remove the output wire and check if the voltage changes, if not change the length pot and adjust the length.
5. If still incorrect call service to set length sensor in display

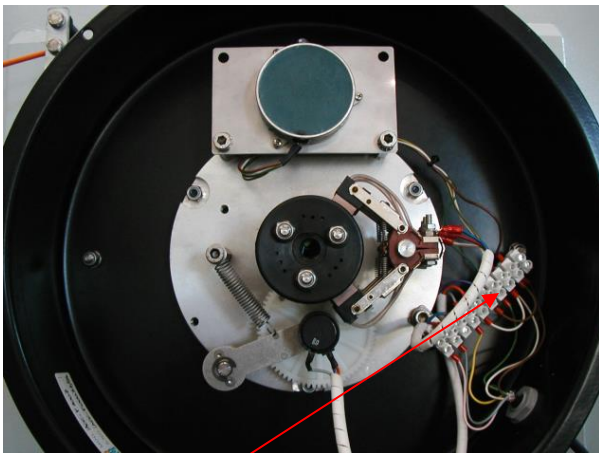


Fig 5

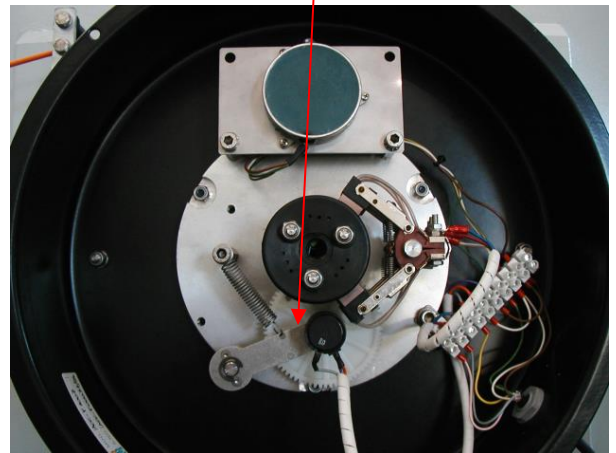


Fig 6

System Alarm Codes

Alarm Code 8 or 9 (Piston Pressure Sensor)

This code is caused by the output voltage of the piston pressure sensor is lower (code 8) than the minimum or higher (code 9) than the maximum voltage.

*Actions to take; **Fully retract the boom and lower the angle to zero degrees.** Piston pressure sensor is located on the top side of the lift cylinder. See figure 7.*

1. *Using your finger lift the lock tab on the sensor connector and switch the connector and see if the code changes to the opposite sensor, if it does check the wiring from the display to the sensor and check that air is not creating the code by bleeding the sensor or hydraulic fluid is in the connector.*
2. *Check the supply voltage and ground at the connector end. See figure 7. If the code does not change and wiring is ok bleed pressure sensor or replace it.*
3. *Supply voltage for pressure sensors is 15vdc, Output with no load should be around .70 to .90vdc*
4. *Call for service if code is still present.*

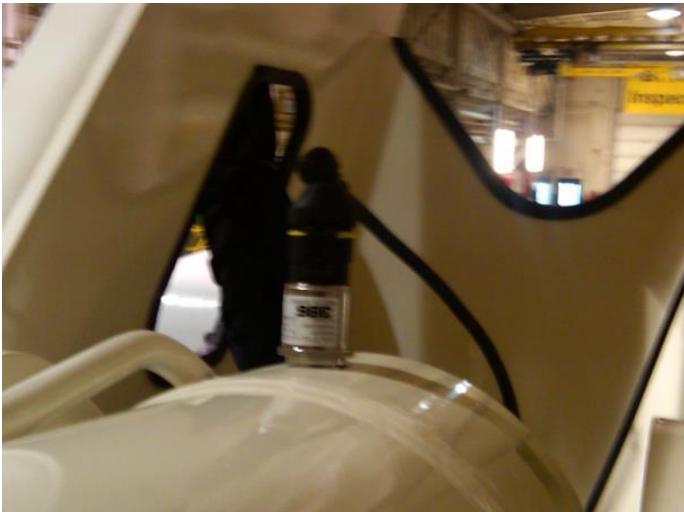
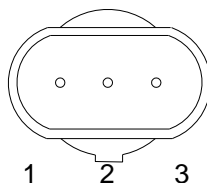


Fig 7



PIN 3 Wires

1 +15vdc

2 output signal 0,5 .. 5,5 V

3 GND

System Alarm Codes

Alarm Code 10 or 11 (Rod Pressure Sensor)

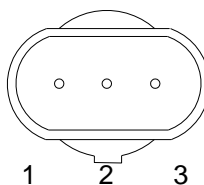
This code is caused by the output voltage of the rod pressure sensor is lower (code 10) than the minimum or higher (code 11) than the maximum voltage.

Actions to take; Fully retract the boom and lower the angle to zero degrees. Rod pressure sensor is located inside the turret area on the control valve line. See figure 8.

1. *Using your finger lift the lock tab on the connector and switch the connector and see if the code changes to the opposite sensor, if it does check the wiring from the display to the sensor and check that air is not creating the code by bleeding the sensor or hydraulic fluid is in the connector.*
2. *Check the supply voltage and ground at the connector end. See figure 8. If the code does not change and wiring is ok bleed pressure sensor or replace it.*
3. *Supply voltage for pressure sensors is 15vdc, Output with no load should be around .50 to .70vdc*
4. *Call for service if code is still present.*



Fig 8



PIN 3 Wires

- | | |
|---|----------------------------|
| 1 | +15vdc |
| 2 | output signal 0,5 .. 5,5 V |
| 3 | GND |

System Alarm Codes

ALARM 16 Shutoff output circuit not verified

Faulty wiring

Internal fault SLIM display Check wiring from harness to shutoff valves

Call Service

ALARM 22 Output supply not verified

Check wiring from harness to shutoff valves

Call Service

ALARM 41 CRC Error in SW running

Internal fault SLIM display

Cycle power on SLIM display, Call Service

ALARM 42 CRC Error EPROM SW program

Internal fault SLIM display

Cycle power on SLIM display, Call Service

ALARM 43 CRC Error in EPROM load chart pages

Internal fault SLIM display Cycle power on SLIM display, Call Service

ALARM 50 Cable reel CANBUS lost

Check +12 vdc inside cable reel

Check wiring from harness to cable reel

Check angle sensor is functioning

Check for 120 ohm resistor between CAN H and CAN L lines

ALARM 60 A2B Condition

Faulty wiring

Check wiring from harness to Cable reel and A2B switch

ALARM 61, 62, or 63 LMI Overload

Exceeded rated capacity, Reduce capacity or radius

Cylinder topped

ALARM 64 Bypass enabled

Faulty wiring

Check wiring from harness to bypass

Call Service

Alarm 70 Rotation pot ADC value

Check wiring to rotation pot

Alarm 71 Rotation prox switch

Check wiring to pot

Check mechanical hardware on pot.

Alarm 72 Rotation pot malfunction

Check wiring to pot

Check voltage supply to pot +5vdc

Check pot output with boom directly over rear should be around +2.50 vdc

Check display diagnostics P10

Replace pot

System Fault Conditions

A-2-B alarm (Alarm 60)

This code is caused by an open circuit in the A-2-B switch.

Actions to take; Fully retract the boom and lower the angle to zero degrees.

1. Check if the machine is in a A-2-B condition, lower hook block.
2. Check if the cable or connectors are damaged between the switch to the display.
3. Remove the four screws in the switch cover and check the micro-switch for continuity. or +12vdc supply voltage.
4. Check for moisture, dry and seal connector.
5. Replace the switch or cable.
6. Call for service if code is still present.

The circuit is supplied at 10-30 vdc.

A-2-B wire terminal	Connector terminal
---------------------	--------------------

Yellow wire 22	N	4.7k resistor inline
White wire 21	L	

Cable reel end.

Cable reel wires	Connector wire terminals
------------------	--------------------------

Red wire	N
White wire	L

Fig 9



Cable replacement

Remove all tension from the cable reel to avoid injury or damage to the spring package of the cable reel.

Fully retract the boom and lower to zero degrees angle. Remove the black connector from the end of the cable to reuse it later (Fig 14). Then we will need to remove the cable reel from the boom of the machine in order to replace the cable. Remove the four bolts from the bracket and set the reel on a surface that will not damage it (Fig 15).



Fig 14

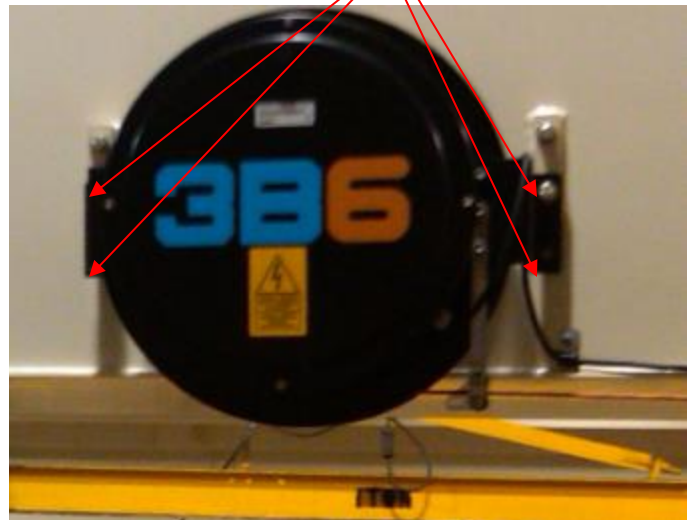


Fig 15

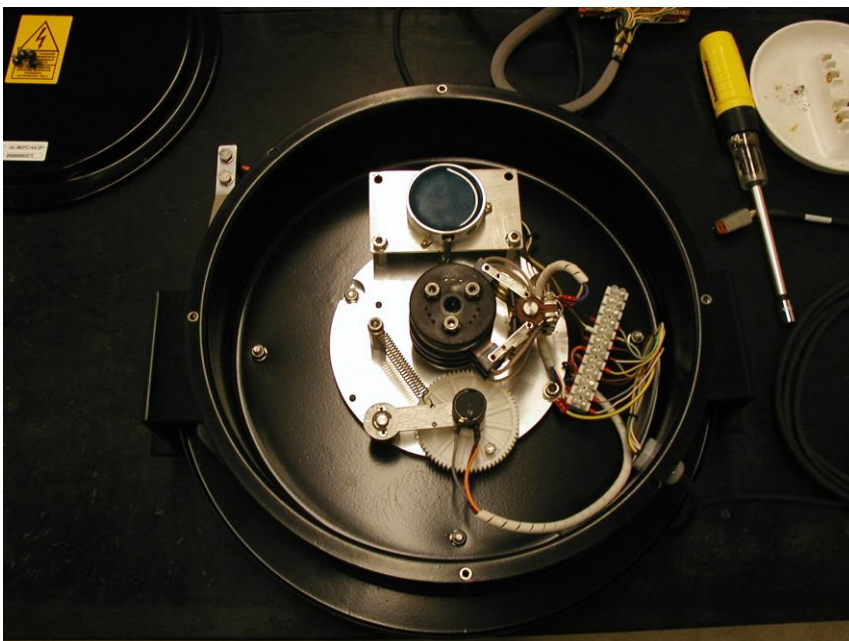
Cable replacement

Remove all the cable from the cable reel drum and push up the cable protective loom and cut it off at the back side of the cable reel (Fig 16). Lay the cable reel on its mounting bracket to access the front area (Fig 17).

Fig 16



Fig 17



Cable replacement

Remove three self locking nuts using a 10mm wrench (Fig 18). Carefully remove the plastic slip ring cover cap (Fig 19). You may require using a flat tip screwdriver to pry it . Insert the tip of the screwdriver just enough to catch the side of the cap. **DO NOT INSERT IT TOO DEEP OR YOU CAN DAMAGE THE SLIPRING!**

Fig 18

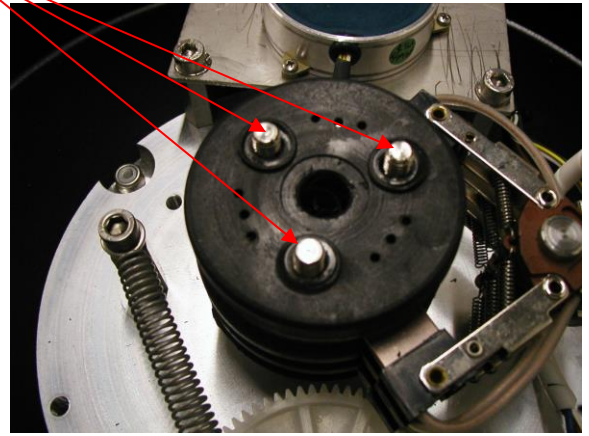
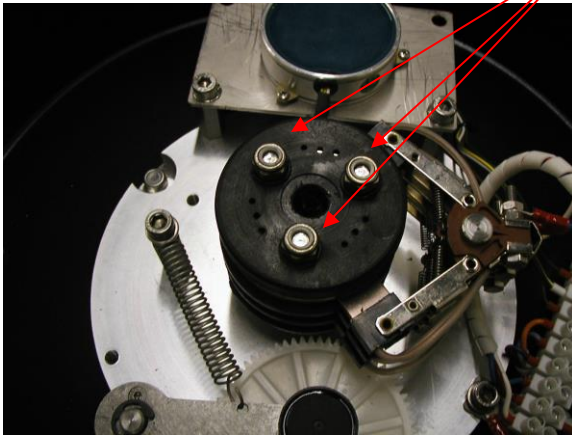
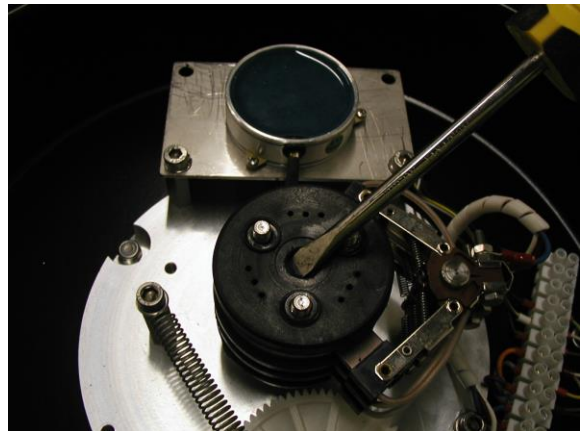
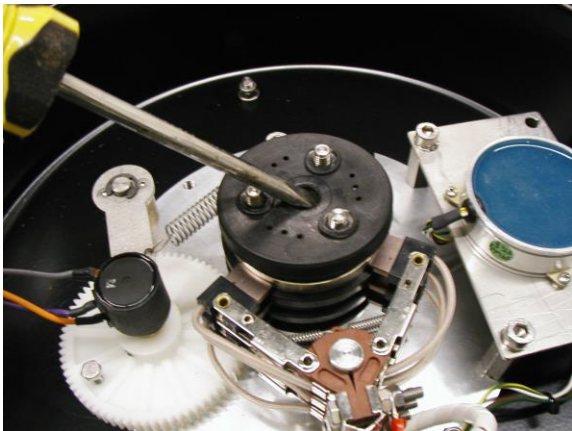


Fig 19

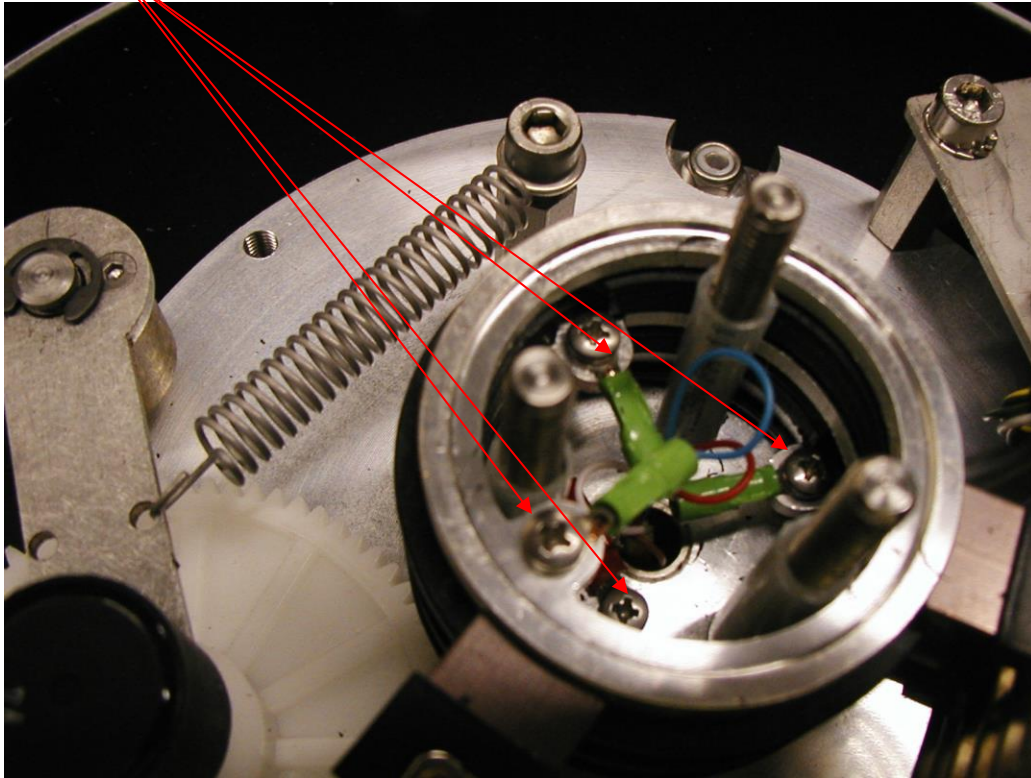
Using the screwdriver tip to carefully pry up the cap to access the wiring. Use the hardware as a lever for the screwdriver.



Cable replacement

Now that the cap is removed we can remove the existing cable. Remove the four Phillips head screws, noting the color code and location on the slip ring. Cut the ring terminals off. (Fig 20).

Fig 20

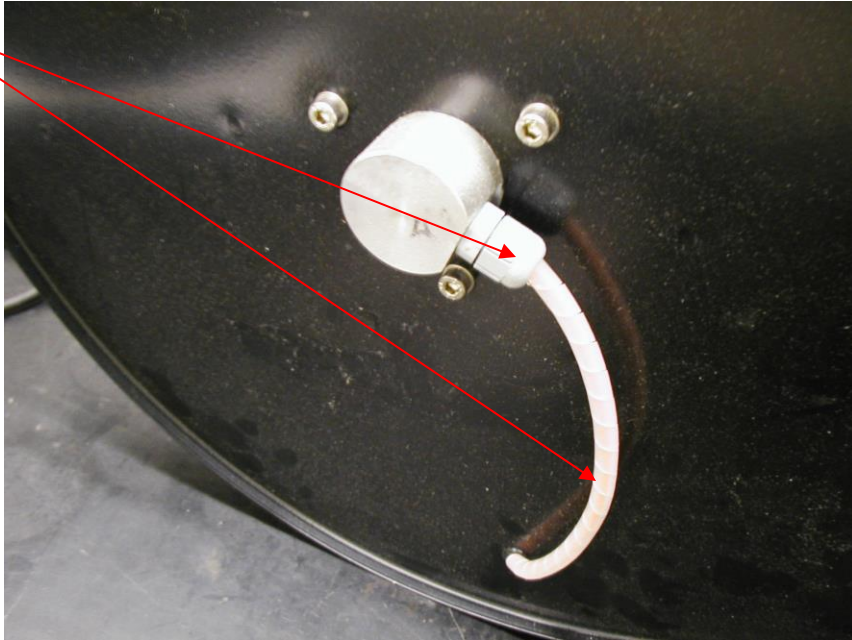


Wiring code
Collector

Bottom = White
Middle = Red
Top = Blue
Shield = base

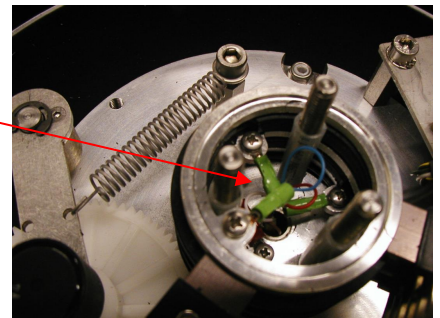
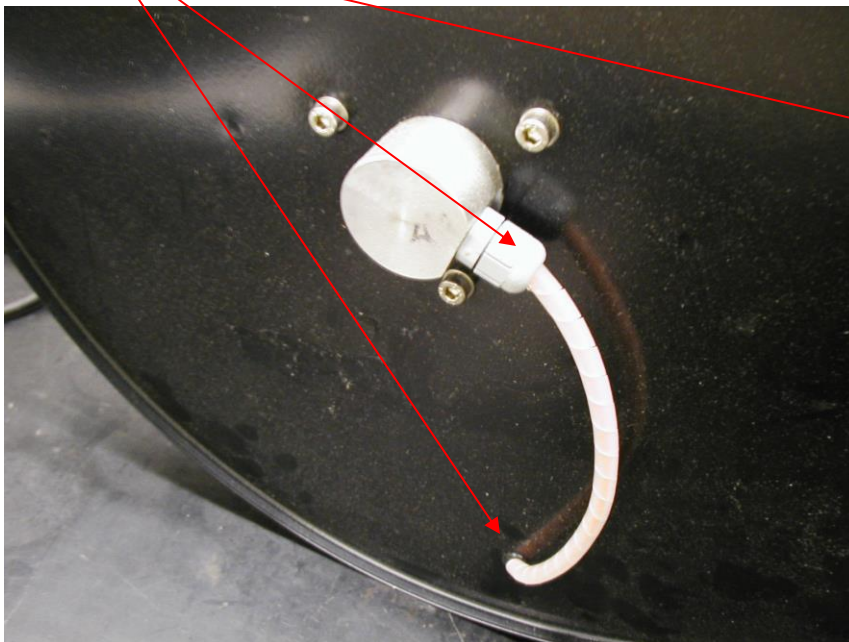
Cable replacement

Set the cable reel on its side, loosen the pg strain relief connector and remove the cable (Fig 21).



Strip back one end of the replacement cable the same length as the old cable or approximately 12 inches and feed it through the cable reel drum access hole from the inside of the drum area and then into the base connector and up into the slip ring collector (Fig 22).

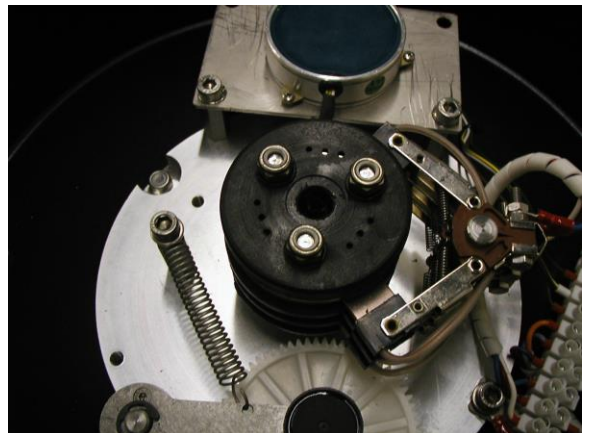
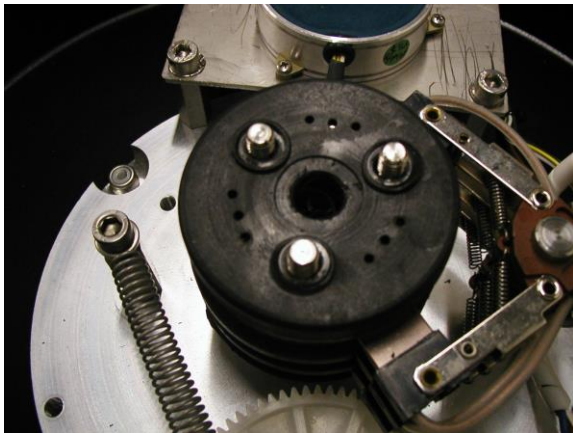
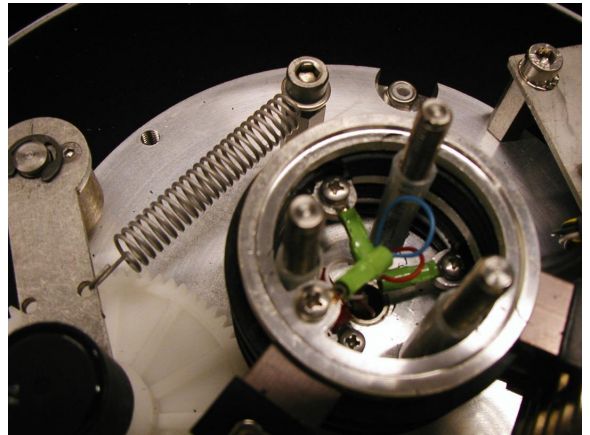
Fig 22



Cable replacement

The cable inserted into the pg strain relief must have the outer jacket on in order for the strain relief to work. Tighten the pg connector strain relief nut. Cut off any access wire inside the slip ring and install the ring terminal and connect the wire to the proper terminal of the slip ring collector.

Tighten the phillips screws and replace the cap and self locking nuts.



Wiring code

Collector

Bottom = White

Middle = Red

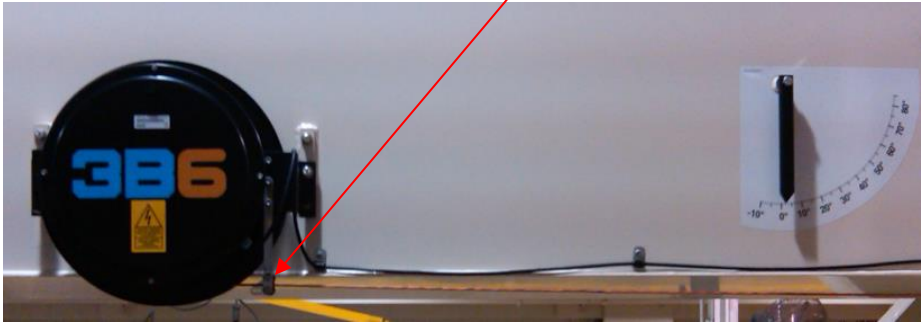
Top = Blue

Shield = base

Cable replacement

Install the replacement cable back onto the drum, except for 42 ft of slack, which will require being routed inside the boom, place a tie wrap on the cable at the roller guide on the reel and install it back on the boom. Feed the cable through the boom to the boom tip and connect the strain relief and the black connector. The tension on the reel should be between 2-5 wraps.

Tie wrap



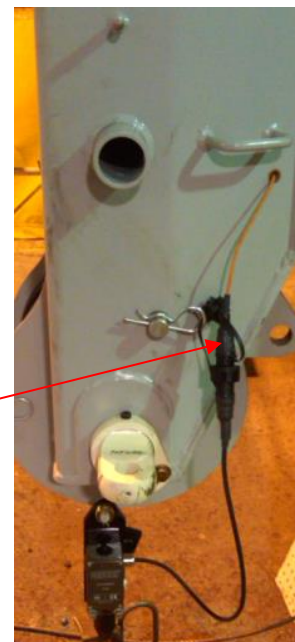
Cable routing

Cable Guide



Strain relief at boom tip area

Connector

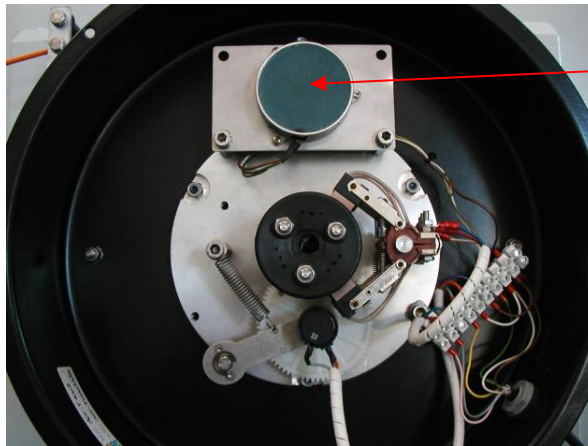


Angle adjustment

Fully retract the boom and lower the angle to zero degrees using a angle finder to determine

zero degrees. Remove the cover of the cable reel and check the +12.00vdc (Typically the voltage is about 11.9- 13.5vdc) supply voltage (Brown wire) and the ground wire (white wire).

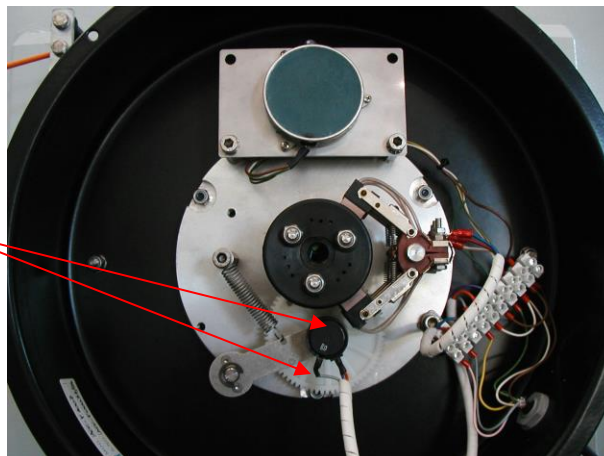
If it is not correct loosen the three mounting screws with a flat tip screwdriver and adjust the pot until the angle indicates zero degrees on the display. Tighten the screws and check it at other angles for accuracy.



Angle sensor (ASA)

Length adjustment

Check the voltage output of the length pot is approximately .250vdc (wire), (tolerance of .246 to .254) with fully retracted boom, if not adjust the length gear assembly until it is. Check the length indication on the display. If it is correct, extend the boom and check the fully extended length. The Brown wire (+12vdc supply voltage) and White wire (Ground) used for the angle is the same supply voltage and ground for the length.



Length sensor and gear assembly

Rotation Pot Replacement

Swing the boom, centered directly over the rear of the Machine.

Location is inside turret

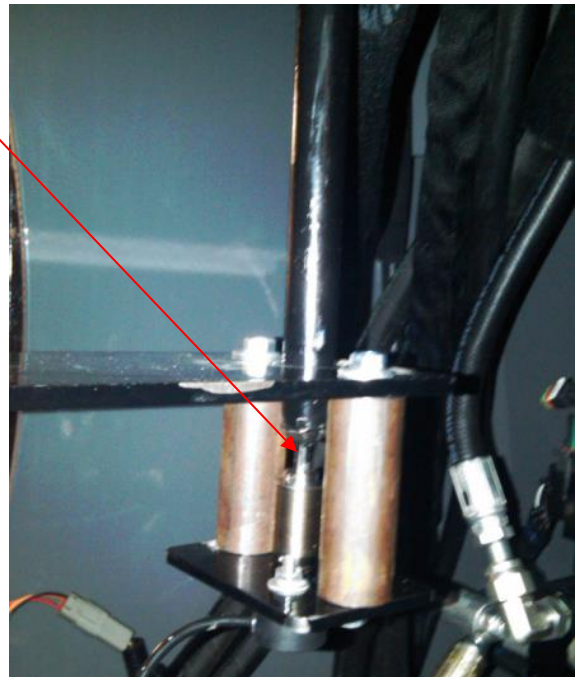
Drive Assembly

Collar

Rotation pot



Loosen the top side set screws on the collar



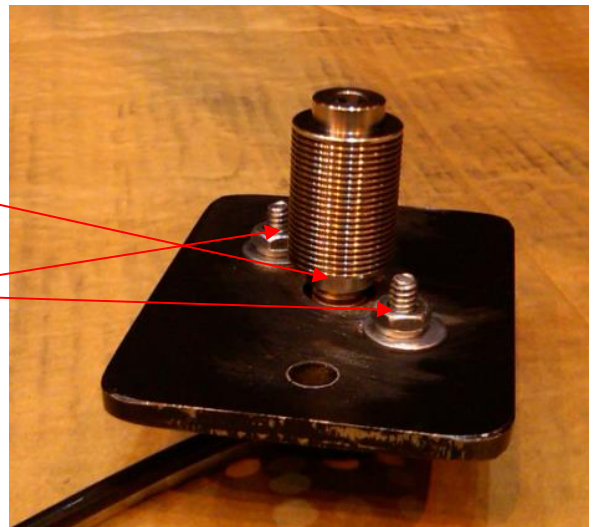
Rotation Pot Replacement

Remove the hardware attaching the bracket and pot bracket. Set aside for reinstalling later.



Remove the bracket with pot and collar attached. Loosen set screws on collar and remove.

Remove the pot hardware and set aside for reinstallation later.



Rotation Pot Replacement

Reassemble pot bracket assembly and tighten Hardware. Pot wire direction should match photo.



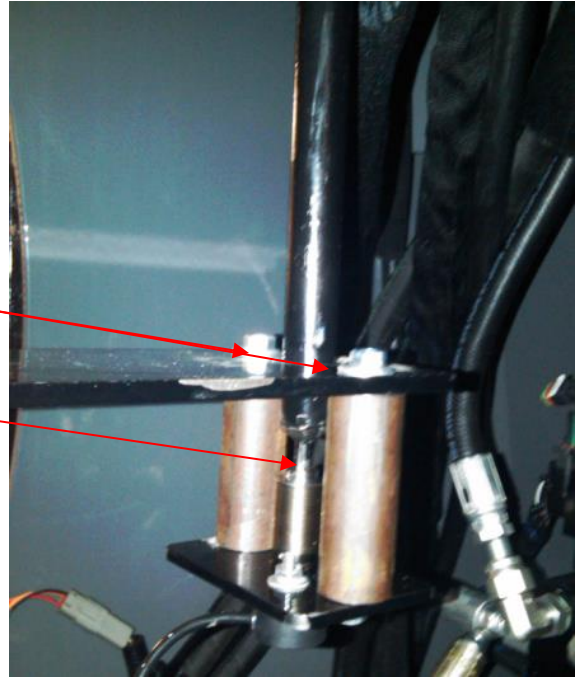
Shaft recess

Assemble new pot to collar and then tighten the collar set screws down.



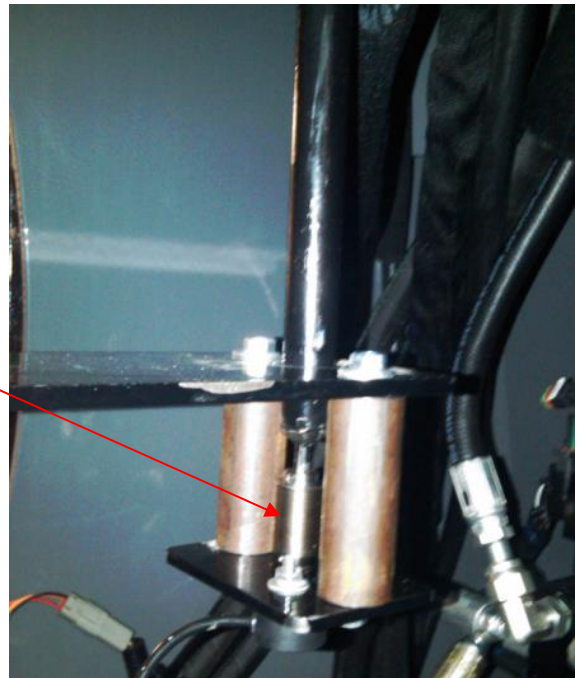
Rotation Pot Replacement

*Install the hardware back into place and tighten.
Do not tighten the top set screws on Drive
assembly at this time.*



*Go to page 30 and then adjust the pot collar until the
display read out is indicating an
average of 180 degrees. Now tighten the set screws
on the drive assembly.*

Now check the rotation stop points.

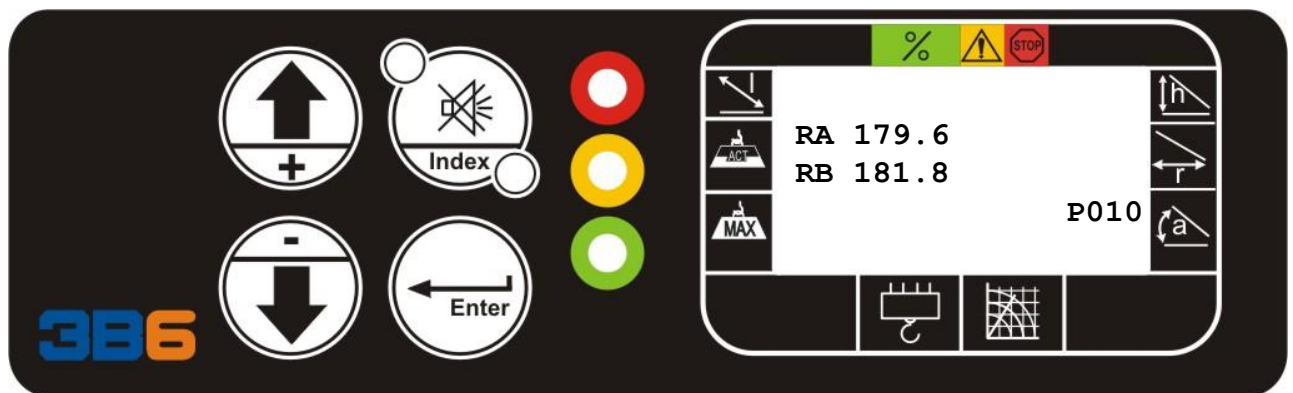


AUTO DIAGNOSTIC

Rotation sensor

Press and release the ENTER pushbutton and scroll to page P10 of the auto diagnostics, the RA is the channel we will adjust the pot to read 180 degrees (average between the two outputs of channel A and B when the boom is directly over the rear of the machine and tighten the set screws on the upper drive assembly and then tighten the drive assembly set screw. Example Channel A is 179.6 channel B is 181.8. Average is around 180 degrees.

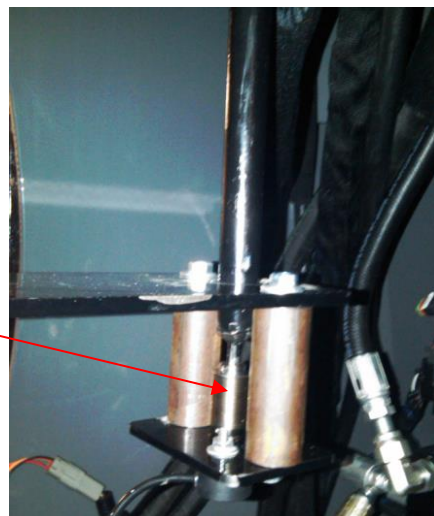
Now verify the rotation.



The displayed parameters are as follows:

- RA : Channel A of rotation pot values between 0 to 360 degrees
- RB : Channel B of rotation pot values between 0 to 360 degrees

Set screws upper drive assembly



AUTO DIAGNOSTIC*Cylinder topping*

In the event the cylinder is topped the system detects a shutoff condition due to the piston pressure has exceeded the calibration data inside the system. In order to boom the machine back down out of the upper stops, you must select the Rigging and Travel mode to allow this or bypass the system using the bypass key switch.

Once the unit has reset to the normal operating condition select the proper program for operation.

