ACC RADIO CONTROL SYSTEM

Rev A 12/23/14

Thaintainer

Advanced Crane Control (ACC)

ACC- Advanced Crane Control
When performing a lift, the crane boom, weight of the load, angle of the truck, and the angle of the boom all need to be known.

The ACC system allows the crane to pick extra capacity at various boom angles, without increasing the overall foot-lb rating of the crane. It also adds a layer of stability protection because the truck level is being monitored.

Status Light

<u>Warning Light</u>- Informs the operator of the current lifting status
Green Light – 0- 90% Load of the Crane
Yellow Light - 90-100% Load of the Crane
Red Light - 100% Load of the Crane

Wireless Transmitter (FM)

FM Transmitter

- 100% Proportional push button control.
  - Allows for multiple speed control on each function independently. Non Contacting (Hall Effect) Push Buttons – with neoprene seal
- Multiple Speed control settings for the Crane to allow for four speed rates From full speed to “creep”. Settings are 100%, 75%, 50%, and 25% for fine control
- Multiple functions can be enabled simultaneously without reduction in flow to other functions
- Fully sealed transmitter -Light weight- 70% weight reduction over Pistol grip style remotes
- Belt clip attachment, for reduced job site loss
- Environmental Sealing IP66 rated Heavy Duty Water Spray Certified
- CE certified (for Europe)
- ON/OFF Button Removable to disable Radio
- 300 Foot Range of Radio Control

Wireless Transmitter (FM)

OFF-ON-START/SPEED- Enables the transmitter to communicate with the Receiver and sets the Machine speeds

Off- Transmitter is Suspended From Operation and Shuts Down NOTE: Transmitter MUST be turned to the off position to prevent battery drain

On- Transmitter is told to activate and begin Communication- Status light will blink showing activation

Start/Speed- Momentary Setting- After Turning “ON” the transmitter “Start” tells the transmitter to talk to the Crane Receiver (think of it like a car’s ignition key switch, start and run)

OFF-ON-START/SPEED

E-STOP

LED – Speed Indicator- Status

Main Boom- Up Down Speed Setting Buttons

Rotate- CW/CCW

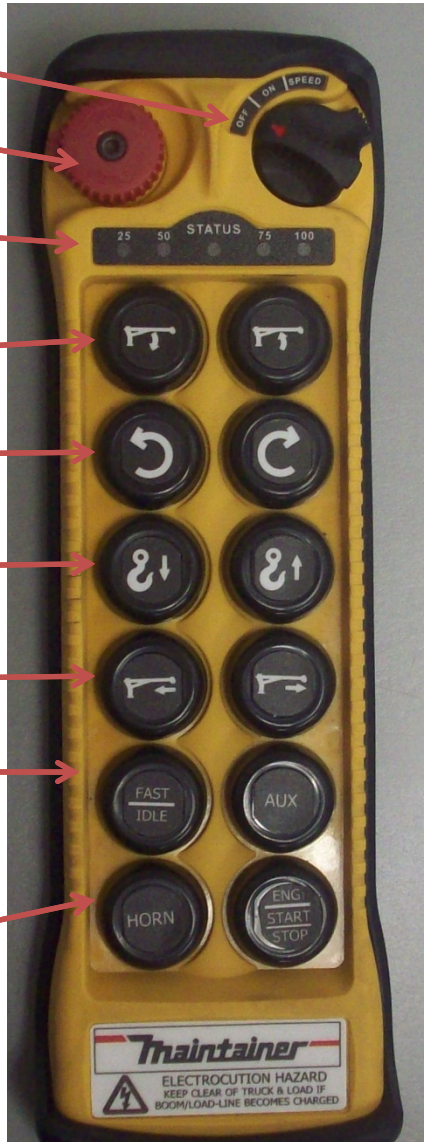
Hoist – Up/Down

Telescope- Extend/Retract

Engine Fast Idle- Auxiliary – A/C

Horn

Engine Start- Engine Stop



Setting Crane Speed

Start /Speed- By Holding the Start/Speed Switch and the Pressing Boom Up/Down Buttons the Speed of the Crane can be changed.

Action
Hold Down Start/Speed Switch, simultaneously press Up or Down on the MAIN BOOM Switches to change Speed output to the valves

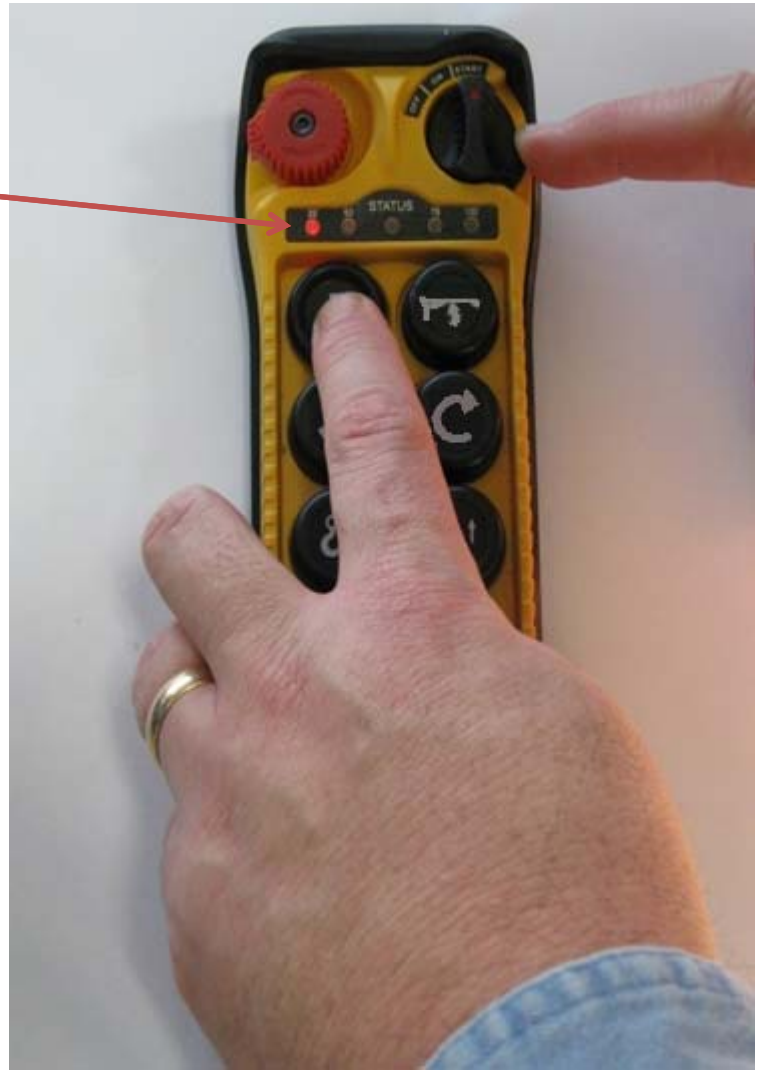
What does this mean-
Ability to change the maximum speed of the crane from 100% to 25% (creep) directly from the Transmitter

This allows the Operator to "CREEP" the load and allow for precise location of the load.

Status Indicator- Light flashes when button is pressed

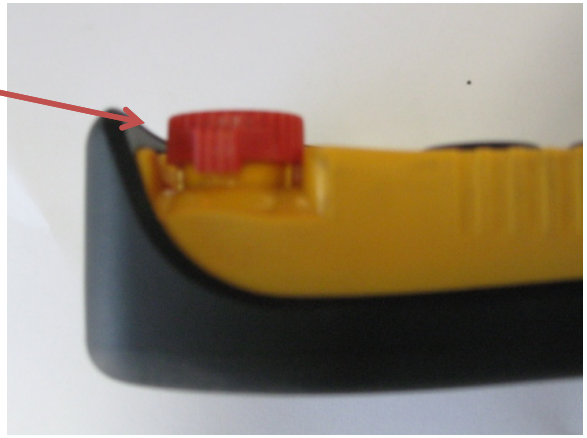
Speed- 25%,50%,75%,100%
LED shows current speed selected
Center Status Light
turns Red when:

- Pressing a button while enabling the transmitter.
- When E Stop is pressed.
- Error in Transmitter.



E-Stop

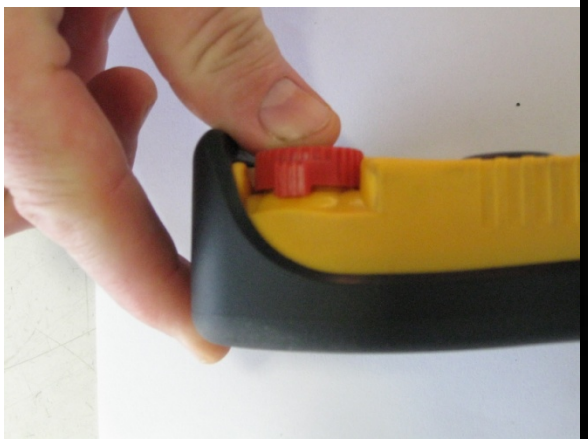
<u>E Stop</u>- Normal Operation Mode- E Stop is in the “UP” position



<u>Release E Stop</u>-
Use Your Thumb and Press “UP” on the E Stop - This will Snap back to the Normal Position.

NOTE: To begin transmitting again the Start Indicator on the Right must be reactivated.

E Stop activated when pressed “DOWN” – Locks in this condition- All Outputs to the transmitter are stopped and the receiver will show E-Stop Activated. Additionally, the signal rate will go to zero (0)



Machine Control
Proportional Buttons

Proportional Controls-
The transmitter controls the speed of each crane function the farther the button is depressed, the faster the function.

Ramping- All functions have a Ramp-On and Ramp-Off feature. Even when a button is quickly depressed, the function is “ramped”, which reduces the shock loading and bouncing of the boom.

Reducing shock loading means longer life, and less downtime.

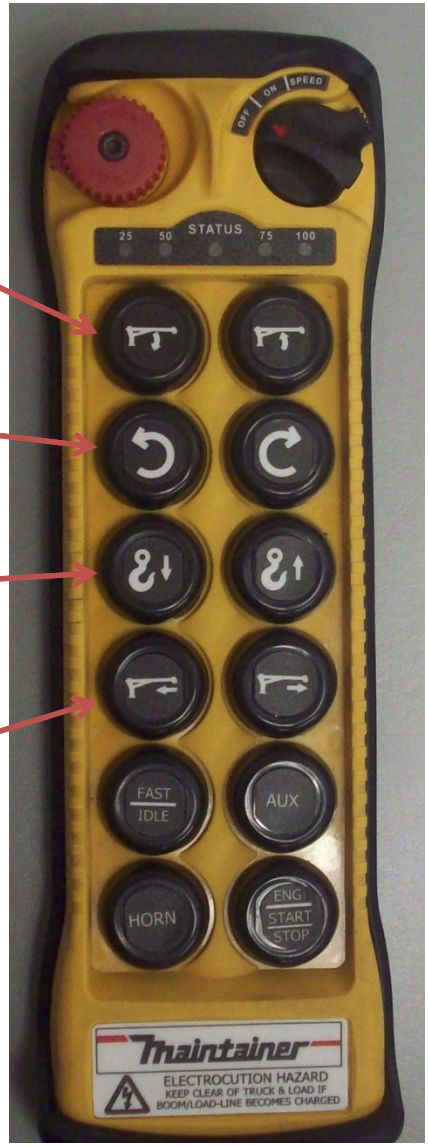
Variable speed to each function means the operator gets infinite control while reducing “bouncing” of the load.

Main Boom- Up Down Speed Setting Buttons

Rotate- CW/CCW

Hoist – Up/Down

Telescope- Extend/Retract



Transmitter Additional Functions

Fast Idle- Ramps engine from low-idle to high-idle. Pressing button toggles On/OFF

Auxiliary- Welder/ Air Compressor- Pressing button toggles On/OFF

Engine Start/Stop- Momentary- By pressing holding and holding, the receiver sends a command to the engine to stop
Pressing the button a second time gives a separate output for engine start.

Horn– Momentary- Pressing and holding, the Receiver sends a command to the horn for worksite notification (Required by OSHA)

Fast Idle

Aux / Air Compressor

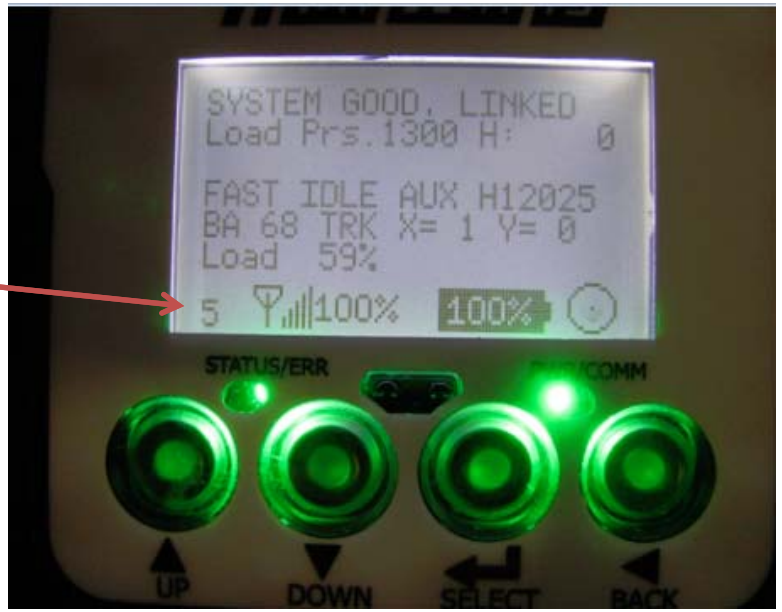
Engine Start- Engine Stop

Horn

Sleep Mode

Sleep Mode- To save battery life the transmitter

When a System is “AWAKE” the transmitter will be sending messages- This number should read 5 or 6.



Transmitter goes to “Sleep Mode” after five (5) minutes of not operating.
When a system is in “Sleep Mode” the transmitter signals will read zero (0), and the top line will read “System Good, No Link”

To bring the system out of “Sleep Mode”, rotate the Start/Speed button to “speed” for 2 seconds.

Receiver

Receiver

- LCD Display - Complete Diagnostics for the crane that a field operator can easily read
- Alarm System - Names the functions - No obscure error codes
- Environmental Sealing - IP66 rated
- CE Certified for full Crane Operation and Machine Safety per EC rules
- Transmitter Signal Strength indicator (similar to cell phone bar graph)
- Transmitter Battery Life Display
    - Warning on Low Battery - 100 hours of functioning battery life
- Verification of output to hydraulic valve as you actuate the FM transmitter
- Crane Hours are monitored with hours displayed on front screen
- USB port for programming and diagnostics
- Full / smooth "RAMP UP" and "RAMP DOWN" of each crane function independently
- External antenna for maximum radio range, and reduced obstacle intrusion

Four Light Indicators

<u>UP/DOWN Lights</u>- The are green with the system has no alarms. When an Alarm occurs the lights turn red.

SYSTEM GOOD- Indicates crane is ready to use, with no alarms or warnings.

When an alarm is activated (such as E-Stop) then the UP/DOWN Light flags an issue and turns red.

The Status Error Light also show issues. The PWR/COM are used for data transfer and output.

All four buttons are used for accessing and changing the adjustable parameters.

Receiver Controller and Display

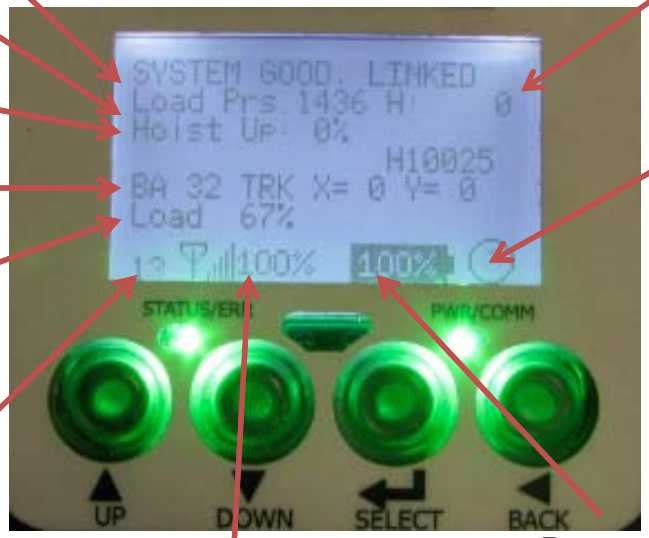
Machine/Alarm Status

Load Pressure (psi)

Function Activated
Signal Percent %

Boom Angle
(Degrees)

Boom Load
(% of Total Load)



Crane Hours- H….12
- = 12 hours

Watch Dog Timer-
Continuous rotation shows that the processor in the receiver is functioning properly

Active Signals From Transmitter
0= Not Active
5-6 Active but Waiting
9-10 Means Button being pressed

Transmitter Signal Range %
Signal strength from transmitter to receiver

Battery Life In Transmitter
Explains How Much Expected Life in AA Batteries
2 Batteries Per transmitter
% Percent left

ACC Crane Alarms & Outputs

A1. BOOM PSI LOW (Bridging, when pressure is below 30psi)
A4. TRK TILT WARNing -7% Slope (4.5 Degrees)
A5. TRK TILT ALARM - 11.3 % Slope (6.5 Degrees)
A6. ANTI-2-BLOCK
A7. 90% LOAD WARN
A8. 100% LOAD ALARM
A9. SLOW ROTATE ACT
A10. BOOM SENSOR ERROR
A11. BOOM ANGLE RANGE
A12. BOOM PT ERR
A13. TRUCK LEVEL SENSOR ERROR

Output 1	Boom up
Output 2	Boom Down
Output 3	Rotate CW
Output 4	Rotate CCW
Output 5	Hoist/winch Up
Output 6	Hoist/winch Down
Output 7	Boom Extend
Output 8	Boom Retract
Output 9	Horn
Output 10	Unloader valve / Dump Solenoid
Output 11	Engine Stop
Output 12	Engine Start
Output 13	Auxiliary
Output 14	High Idle
Output 15	90% alarm (amber light)
Output 16	100% alarm (red light)

Alarm: A1- Boom PSI Low

Boom PSI Low / Bridging-

A1 BOOM PSI LOW
When the boom Pressure Drops Below 30 PSI the A1 Alarm Occurs.

Functions Allowed:
Hoist/Winch Down
Boom Up
Boom Extend/Retract

Functions Disabled:
Hoist/Winch Up
Boom Down
Rotate- CW/CCW

Alarm A4 and A5 Truck Angle

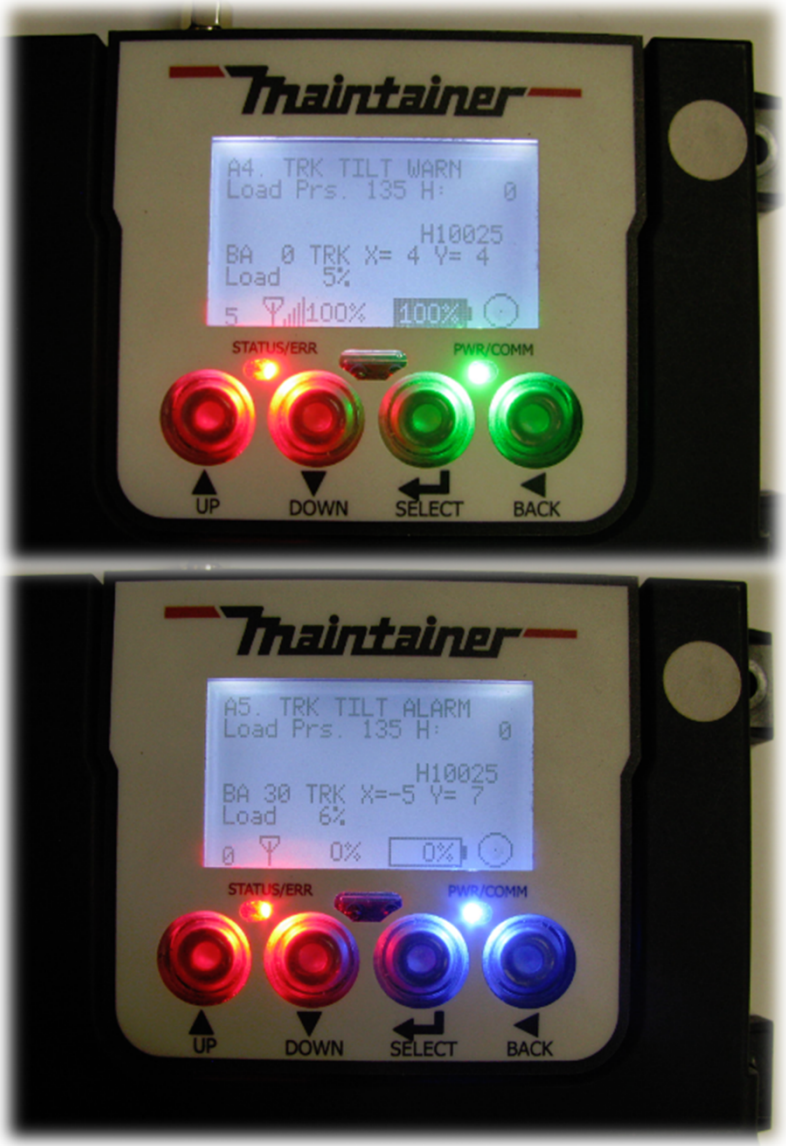
Truck Tilt Warning

A4 - TRUCK TILT **WARNING**

- The alarm occurs when the truck is greater than 4.5 degrees out of level.
- Alarm status light flashes amber
- All crane functions limited to 50% maximum speed

A5 - TRUCK TILT **ALARM**

- The alarm occurs when the truck is greater than 6.5 degrees out of level.
- Alarm status light flashes red
- All crane functions Disabled, except Hoist/Winch down, Telescope In/ Retract



Tilt Alarm Over-ride

Truck Tilt Alarm Over-ride

If A5 - TRUCK TILT **ALARM** is activated, pressing and holding the “HORN” button on the remote will put the crane back into an A4 warning

- This allows the crane to be operated at 50% speed capacity
- The audible warning horn will sound the entire time this operation is occurring
- The operator must manually verify the stability of the truck with the current operating conditions.
- The operator must not side load the crane (this can occur when the crane is located perpendicular to the ground slope)

Horn

Alarm A6- Anti 2 Block

A6 Anti 2 Block

When the load block has been retracted too far, a limit switch is activated to prevent damage to the crane or load block.

Functions Allowed:

- Hoist/Winch Down
- Boom Up/Down
- Boom Retract
- Rotate- CW/CCW

Functions Disabled:

- Hoist/Winch: Up
- Extend Out

Note: The Limit Switch is wired normally closed, so a broken or disconnected limit switch will activate the alarm as well.

A7- 90% Load Alarm

A7 90% Load Warning

When the load value exceeds 90% of the allowed load moment for the crane the A7 Alarm activates.
The alarm status light goes from GREEN to YELLOW.

Function limits:

- Hoist/Winch - 50% Speed
- Boom Up/Down – 50% Speed
- Boom Ext/Retract- 75 % Speed
- Rotate CW/CCW- 50% Speed

A8- 100% Load Alarm

A8 100% Load Alarm
When the load value exceeds 100% of the allowed load moment for the Crane the A8 Alarm activates.
The alarm status light goes from YELLOW to RED.

Functions Allowed:
Hoist/Winch Down- 50%Speed
Boom Retract- 50% Speed
Rotate CW/CCW- 25% Speed

Functions Disabled:
Hoist/Winch Up
Boom Up & Down
Boom - Extend

A9- Boom Slow Rotate

A9 SLOW ROTATE

When the Boom Pressure Transducer exceeds 600psi. The rotate speed goes from fast rotate to 75% speed. This ensures that when a operator has no load, the rotate is fast, but once loaded the speed is reduced to a safe rate to reduce undesirable load swing.

This Alarm is not displayed

Functions Allowed:

Hoist/Winch Up/Down- Full Speed
Boom Up/Down – Full Speed
Boom Ext/Retract- Full Speed
Rotate CW/CCW- Max Speed 75%

A10 - Boom Angle Sensor Error

A10 BOOM SENSOR ERROR
The system is in constant communication with the boom angle sensor.

If the boom sensor fails or the wiring connection is broken, the green status light will flash on/off & all table values will default to the 30˚ boom operation values.

- The sensor must be mounted 30˚ off level when the boom is at 0˚ .

A11- Boom Angle Range

A11 BOOM ANGLE RANGE

If the Main Boom angle Sensor is less than – 15 degrees or greater than +85 degrees then this error occurs.

If the boom sensor fails the green status light will flash on/off & all table values will default to the 30˚ boom operation values.

A12- Boom Pressure Transducer Error

A12- BOOM PT ERROR

If the Pressure Transducer is damaged or disconnected, the control system senses the missing transducer, and there will be an A12 alarm

Functions Disabled:

All crane functions disabled except Hoist/Winch down & Boom Retract

Pressure Transducer

Boom Pressure Transducer:

The Boom Transducer is a 0-3000 psi sensor.

The sensor is given a 5 Volt Supply Signal but reads from 0.5 for 0 psi to 4.5 volts for 3000 psi.

If a cable is broken , the system can sense the error and it is displayed on the LCD Screen & status light.

System Alarms- Proportional Output Error

System Errors-

If the cable to the coil is broken or not connected the system can see this problem. The receiver monitors the current out to a function and monitors the current back from the function. When you read the output signal to a valve coil you are actually looking at the current returning from the valve coil. If the function displays 0% while the transmitter button is fully depressed, the coil is disconnected or broken.

System Errors

The S error codes are the System Errors S(xx).

S0.	E-STOP ACTIVE
S1.	RECEPTION OF A CAN MESSAGE TIMED OUT
S2.	TEMP OUT OF RANGE -40˚ c TO +85˚ C
S16.	OUTPUT 1 (Boom down) OVERCURRENT ERROR
S17.	OUTPUT 2 (Boom up) OVERCURRENT ERROR
S18.	OUTPUT 3 (Rotate CW) OVERCURRENT ERROR
S19.	OUTPUT 4 (Rotate CCW) OVERCURRENT ERROR
S20.	OUTPUT 5 (Winch up) OVERCURRENT ERROR
S21.	OUTPUT 6 (Winch down) OVERCURRENT ERROR
S22.	OUTPUT 7 (Boom Extend) OVERCURRENT ERROR
S23.	OUTPUT 8 (Boom Retract) OVERCURRENT ERROR
S24.	OUTPUT 9 (Horn) OVERCURRENT ERROR
S25.	OUTPUT 10 (Over-ride valve) OVERCURRENT ERROR
S26.	OUTPUT 11 (Eng. Stop) OVERCURRENT ERROR
S27.	OUTPUT 12 (Eng. Start) OVERCURRENT ERROR
S28.	OUTPUT 13 (Auxiliary) OVERCURRENT ERROR
S29.	OUTPUT 14 (High Idle) OVERCURRENT ERROR
S30.	OUTPUT 15 (90% light) OVERCURRENT ERROR
S31.	OUTPUT 16 (100% light) OVERCURRENT ERROR
S32.	OUTPUT 1 (Boom down) +vb SHORT
S33.	OUTPUT 2 (Boom up) +VB SHORT
S34.	OUTPUT 3 (Rotate CW) +VB SHORT
S35.	OUTPUT 4 (Rotate CCW) +VB SHORT
S36.	OUTPUT 5 (Winch up) +VB SHORT
S37.	OUTPUT 6 (Winch down) +VB SHORT
S38.	OUTPUT 7 (Boom Extend) +VB SHORT
S39.	OUTPUT 8 (Boom Retract) +VB SHORT
S40.	OUTPUT 9 (Horn) +VB SHORT
S41.	OUTPUT 10 (Over-ride valve) +VB SHORT
S42.	OUTPUT 11 (Eng. Stop) +VB SHORT
S43.	OUTPUT 12 (Eng. Start) +VB SHORT
S44.	OUTPUT 13 (Auxiliary) +VB SHORT
S45.	OUTPUT 14 (High Idle) +VB SHORT
S46.	OUTPUT 15 (90% light) +VB SHORT
S47.	OUTPUT 16 (100% light) +VB SHORT

S48.	OUTPUT 1 (Boom down) -vb SHORT
S49.	OUTPUT 2 (Boom up) -vb SHORT
S50.	OUTPUT 3 (Rotate CW) -vb SHORT
S51.	OUTPUT 4 (Rotate CCW) -vb SHORT
S52.	OUTPUT 5 (Winch up) -vb SHORT
S53.	OUTPUT 6 (Winch down) -vb SHORT
S54.	OUTPUT 7 (Boom Extend) -vb SHORT
S55.	OUTPUT 8 (Boom Retract) -vb SHORT
S56.	OUTPUT 9 (Horn) -vb SHORT
S57.	OUTPUT 10 (Over-ride valve) -vb SHORT
S58.	OUTPUT 11 (Eng. Stop) -vb SHORT
S59.	OUTPUT 12 (Eng. Start) -vb SHORT
S60.	OUTPUT 13 (Auxiliary) -vb SHORT
S61.	OUTPUT 14 (High Idle) -vb SHORT
S62.	OUTPUT 15 (90% light) -vb SHORT
S63.	OUTPUT 16 (100% light) -vb SHORT