



OPERATORS MANUAL

Crown Saver





CAUTION



Failure to operate this equipment properly may result in damaged equipment, downtime or injury. For any questions or training, contact Rigsmart Systems before use.

Rigsmart Systems Best Practices

- **Washing** - Please do not pressure-wash Rigsmart components. Direct application of high-pressure water can break seals and lead to moisture damage.
- **Replacing Components** - Remove batteries from spares, or components that have been replaced. Spares and replacement components will share the operating frequency of the unit they are replacing and can interfere with normal system operation if allowed to transmit.
- **Swapping components between rigs** - Rigsmart components are not directly transferable between Rigsmart systems. An identical component from one rig cannot readily be used to replace one from another rig. All components are initialized for a system receiver. This allows adjacent installations while eliminating cross-talk between components.
- **Welding** - Disconnect or power off the Rigsmart system before any welding takes place near the systems placed on the rig. Our components have built-in current protection, but welding can interfere with normal operation.
- **Adding wireless devices** – Wireless routers, bridges and or controls for non-Rigsmart systems, can potentially cause interference with Rigsmart system communications. Please consult a technician before adding wireless devices to a rig.
- **Recalibration** - Loss of power, ground thaws, slipping line and changing components can necessitate a recalibration. Consult this manual for system recalibration. If assistance is required, please contact Rigsmart Systems, at 1-780-438-9475.
- **System Malfunction** - In the event of a system malfunction, record the status of the Rigsmart system, including all alarms and current readings, prior to powering off the system. This information will assist the Rigsmart technicians determine the nature of the problem and find a prompt solution.
- **Pneumatic Device Care**- DO NOT blow Glycol or other methyl hydrates – such as brake line antifreeze or tanner gas, through air lines that lead to Rigsmart pneumatic devices. Permanent damage may occur and safety critical devices may not operate correctly.

Table of Contents

CAUTION	2
Warranty	4
1 Normal Operation	5
1.1 Start Up	5
1.2 Main Operation Screen	5
2 Operating Alarms	6
2.1 Using Bypass	7
2.2 Using the Raise Derrick Menu	8
3 Limits	10
4 Troubleshooting	11
4.1 Testing the Hardware Wireless Crown Saver, with a Software Crown Saver Installed	11
4.2 Using the Supervisor Permission Code	12
4.3 Diagnostics	17
4.4 Battery Replacement	19
4.5 Antenna and Signal Issues	20
4.6 Measuring Block and Top Drive Heights	21
4.7 Common Error Messages Codes and Solutions	22
4.8 Alarm Code Master List	24
4.9 In the Event of System Power Loss	28
5 Service	29
5.1 Regular System Maintenance	29
5.2 The Rigsmart Replacement Exchange System:	31
6 Rigsmart Systems Training- DRILLER SIGN OFF PAGE	34

**For sales, service or assistance:
1-780-438-9475**

*You have invested in the industry's leading technology in rig safety equipment.
Thank you for your business.*

RIG SAFETY. MADE SIMPLE.

This manual covers the operation of the Rigsmart system.
Each system is custom designed to the rig and customer.
Not all information contained in this manual may pertain to your specific system.
For any questions about system design, contact Rigsmart Systems.

Warranty

Rigsmart Systems warrants to the purchaser of each new Rigsmart System that any part thereof which proves to be defective in material or workmanship within one (1) year from date of delivery will be repaired or replaced at no charge if the system is returned to us in Edmonton, Alberta with all freight charges prepaid. If a performance problem should occur, contact our office in Edmonton, Alberta at 1-780-438-9475.

This warranty does not cover defects resulting from accident, alteration, improper use, or failure of the purchaser to follow normal operating procedures as outlined in this instruction manual.

PLEASE NOTE:

OPENING THE DISPLAY/RECEIVER PANEL VOIDS WARRANTY.
THIS WARRANTY IS IN LIEU OF ANY WARRANTY OR MERCHANTABILITY AND OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ALL OF WHICH ARE HEREBY EXCLUDED.

Rigsmart Systems shall in no event be liable for any special, indirect, or consequential damages whatsoever and neither assumes nor authorizes any person to assume for it any other obligation or liability.

1 Normal Operation

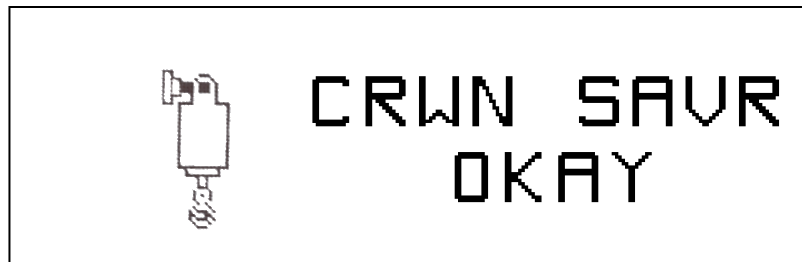
1.1 Start Up

When the Rigsmart system is powered on, a screen will appear asking for the user to accept control over the system. For safety purposes all outputs from the system are activated at this point, engaging the rig's brakes. When the user accepts control of the system, the rig's brakes are released and normal use can begin. This intermediary control between the system and the operator safeguards the rig in the event of an unexpected power loss/restore situation. To assume control over the system, press the SELECT button on the display panel.



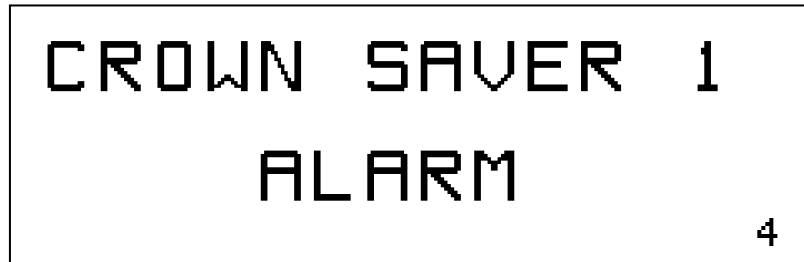
1.2 Main Operation Screen

In normal operation the panel will display the current state of the crown saver as shown below.



2 Operating Alarms

When the system encounters a problem (or a pre-set limit) an alarm message will flash on the display panel. For more important alarms, the panel will also beep continuously and if necessary, the rig brakes will also be applied. The message will flash and the beeping will continue until the detected problem is resolved. If however, the panel's Setup Menu is active when the system detects a problem, the alarm will instead be displayed in the status bar near the bottom of the screen and the panel will not beep.



If any of the components fail, or if a signal is lost for an extended period of time, a *system alarm* will sound to indicate that there is a problem. The system alarm will display in the same way as a regular operating alarm, but will be accompanied by a faster beeping sound. System alarms for top drive sensors will trigger the brake output as if the sensor had indicated that the top drive was in an unsafe position.



NOTE: *The illustrations above show the Crown Saver Alarm screens. The first illustration shows the initial alarm screen, and the second screen follows a few seconds later.*

For more information on alarms see the Troubleshooting section at the end of this manual.

2.1 Using Bypass


The panel's BYPASS button can be used if a component is malfunctioning or needs to be temporarily overridden. Pressing BYPASS will disable the alarms and outputs for 30 seconds and allow the blocks to be moved to a safe position. The display panel will count down the 30 second interval, and then resume normal operation.



****It's very important to use the BYPASS button with caution. If rig activity is resumed before the bypass state is fully counted down, any potential collisions during the countdown will not be prevented by the system.****


2.2 Using the Raise Derrick Menu

The Raise Derrick Mode is used to disable alarms associated with the crown saver counterweight. Normally, the rig brakes are applied when weight is taken off the counterweight, in order to avoid a collision between the top drive and the crown. In Raise Derrick Mode however, the counterweight alarm will not be triggered and the rig brakes will not be applied, in order to facilitate a rig-up or rig-down situation. The Raise Derrick option is only available when using the supervisor permission code.



Raise Derrick Mode

When the Rigsmart system is put into Raise Derrick Mode, all outputs are bypassed and the system will not prevent any potential collisions.



- Using the instructions in the Troubleshooting section, enter the supervisor permission code.
- From the Top Menu, use the arrow buttons to highlight OPERATIONS and press the SELECT button.
- While in Raise Derrick Mode (as indicated by the displayed message) the panel outputs will be disabled.

```

TOP MENU
-▶COMPONENTS      SYSTEM
  HEIGHT RE-CAL   DIAGNOSTIC
  OPERATIONS      CALCULATIONS

MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT
  
```

```

TOP MENU
COMPONENTS      SYSTEM
HEIGHT RE-CAL   DIAGNOSTIC
-▶OPERATIONS     CALCULATIONS

MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT
  
```

```

TOP MENU▶OPERATIONS
TOP DRIVE on
-▶RAISE DERRICK
RUN CASING

MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT      BACK      TOP MENU
  
```



```
TOP MENU>OPERATIONS>RAISE DERRICK
Outputs are disabled.
Exit menu to resume normal operation.
RAISING DERRICK - OUTPUT DISABLED = 27
->EXIT      BACK      TOP MENU
```

To re-enable the brake output and return to normal operation, use the arrow buttons to highlight EXIT and press SELECT. Press the ACCEPT button to confirm switching modes.

****While in Raise Derrick Mode, all statuses for system sensors are unavailable.****

3 Limits

The Rigsmart system uses digitally stored limits to determine when the traveling blocks or top drive is in an unsafe position. Situations where the Rigsmart system would intervene include:

Crown Saver

- The Crown Saver prevents collisions between the travelling block and the rig crown.
- The Crown Saver is activated when the block lifts the counterweight.

See below for instructions on how to set limits that define the above situations.

4 Troubleshooting

It is important to note that after the Rigsmart system sets an alarm or detects a significant disruption, the panel may display a corresponding message even after the conditions have been returned to normal. This commonly occurs during rig-up operations, or after the rig air supply has been shut off. Pressing the BYPASS button on the panel will advance these screen messages and return the system to normal operation.

4.1 Testing the Hardware Wireless Crown Saver, with a Software Crown Saver Installed

Usually the hardware wireless crown saver is set higher in the derrick than the software crown saver. To test the hardware crown saver the software crown saver must temporarily be disabled. If the software crown saver is not temporarily disabled, then the brakes will be applied before hitting the hardware crown saver. To temporarily disable the software crown saver complete the following steps:

- After entering the supervisor permission code, use the arrow keys to highlight the COMPONENTS option in the Top Menu and press SELECT.

```

TOP MENU
- COMPONENTS      SYSTEM
  HEIGHT RE-CAL  DIAGNOSTIC
  OPERATIONS     CALCULATIONS

MAIN LOAD=      1,500dN BLOCK  4.5m
EXIT
  
```

- This will open the Components Menu. Use the arrow buttons to highlight the LIMITS option and press SELECT.

```

TOP MENU COMPONENTS
- LIMITS          ENABLE/DISABLE
  CALIBRATE
  SETTINGS

MAIN LOAD=      1,500dN BLOCK  4.5m
EXIT            BACK        TOP MENU
  
```

- Highlight the PAY-OUT option and press SELECT.

```

TOP MENU>COMPONENTS>LIMITS
LOAD      ->PAY-OUT
          TD ANGLE
-----
MAIN LOAD= 1,5000N BLOCK 4.5m
EXIT      BACK      TOP MENU
  
```

- Highlight the CROWN & FLOOR option and press SELECT.

```

TOP MENU>COMPONENTS>LIMITS>PAY-OUT
          ->CROWN & FLOOR
          ANTI-COLLISION
          BLOCK SPEED
-----
BLOCK HEIGHT 4.5m
EXIT      BACK      TOP MENU
  
```

- This will open the Crown & Floor Saver Limits Menu.

```

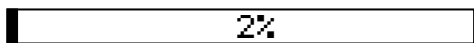
TOP MENU>COMPONENTS>LIMITS>CRWN & FLR
CROWN SUR HT 31.8m SET HERE
FLOOR SUR HT 0.0m SET HERE
->CROWN SAVER on FLOOR SAVER on
TD BTM FLOOR HT -.9 SET HERE
RAIL LENGTH 3.0m ADJ FLOOR off
-----
BLOCK HEIGHT 4.5m
EXIT      BACK      TOP MENU
  
```

- Select the option for CROWN SAVER and change the value to OFF.
- Test the crown saver.
- Repeat the steps listed above and turn the software crown saver back ON.

4.2 Using the Supervisor Permission Code

The supervisor permission code is used to make changes to the system. The code is given to the rig manager or supervisor when the system is installed. If this code has been lost, Rigsmart Systems can provide the code to the rig manager over the phone.

- From the Main Operation Screen press the SELECT button.

1,500dN		BLOCK HEIGHT
		4.5m
MAX LOAD = 53,400dN		MAX 25.9m MIN .0m

SYSTEM INFO		
BLOCK ANG	BAIL ANG	ELEV POS
0.0°	0.0°	TRIP
EXIT←	TARE SIG	INFO SETUP

- Use the up and down arrows on the panel to highlight the SETUP option and press SELECT.

SYSTEM INFO		
BLOCK ANG	BAIL ANG	ELEV POS
0.0°	0.0°	TRIP
EXIT	TARE SIG	INFO→ SETUP

If no buttons are pressed for 8 seconds while viewing the Secondary Operation Screen, redirection to the Main Operation Screen will automatically occur. Press SELECT again to return to the Secondary Operation Screen.

- From the Top Menu, use the up and down arrows to highlight SYSTEM and press SELECT.

TOP MENU			
	→SYSTEM		
		DIAGNOSTIC	
		CALCULATIONS	
MAIN LOAD=	1,500dN	BLOCK	4.5m
EXIT			

- Use the up and down arrow buttons to highlight PERMISSION and press SELECT.

```

TOP MENU>SYSTEM
->ABOUT          PERMISSION
  LCD CONTRAST

MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT      BACK      TOP MENU
  
```

```

TOP MENU>SYSTEM
  ABOUT          ->PERMISSION
  LCD CONTRAST

MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT      BACK      TOP MENU
  
```

- On the PERMISSION screen, with the word PERMISSION highlighted, press the SELECT button.

```

TOP MENU>SYSTEM>PERMISSION
Enter Permission code:
      ->PERMISSION 127
MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT      BACK      TOP MENU
  
```

```

TOP MENU>SYSTEM>PERMISSION
Enter Permission code:
      PERMISSION 127<-
MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT      BACK      TOP MENU
  
```

- Use the up and down arrows to change the value to the predetermined supervisor permission code. This number is set with the rig manager during installation.

```

TOP MENU>SYSTEM>PERMISSION
Press ACCEPT to save changes.
Press SELECT to discard changes.
PERMISSION 128←
MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT BACK TOP MENU
  
```

- When the desired value is reached, press the ACCEPT button once to accept the change, then again to confirm and save the selection.

```

TOP MENU>SYSTEM>PERMISSION
SAVE - ARE YOU SURE?
PERMISSION 128←
MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT BACK TOP MENU
  
```

```

TOP MENU>SYSTEM>PERMISSION
SAVING ...
PERMISSION 128←
MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT BACK TOP MENU
  
```

- After entering the correct permission code, the Top Menu will open. New options will be available in many menus.

```
TOP MENU
->COMPONENTS      SYSTEM
  HEIGHT RE-CAL  DIAGNOSTIC
  OPERATIONS     CALCULATIONS

MAIN LOAD= 1,5003N BLOCK 4.5m
EXIT
```

- If an incorrect permission code is entered, simply use the up and down arrows to highlight PERMISSION and repeat the previous steps to retry.

If the permission code is unavailable, please contact Rigsmart Service at 1-780-438-9475.

4.3 Diagnostics

If there is a problem with the Rigsmart system, it might be necessary to access important system information for troubleshooting purposes. A 'Diagnostic Menu' is available via the supervisor permission code. All of the information under this menu is read only; no damage can be done to the system by viewing it.

To enter the Diagnostics Menu:

- Enter the supervisor permission code as outlined in the Troubleshooting section of this manual.
- From the Top Menu, use the arrow buttons to highlight DIAGNOSTICS and press the SELECT button.

```

TOP MENU
COMPONENTS          SYSTEM
HEIGHT RE-CAL →DIAGNOSTICS
OPERATIONS          CALCULATIONS

MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT
  
```

```

TOP MENU>DIAGNOSTIC
SIGNALS             VIEWER             RF METER
OUTPUTS             VOLTAGE
→DEVICE DIAG       FIRMWARE

MAIN LOAD= 1,500dN BLOCK 4.5m
EXIT
  
```

4.3.1 Signals

The Signals Screen shows the signal strength of all enabled wireless devices.

4.3.2 Outputs

The Outputs Screen shows the current output status of either the Alarm Hub or Panel wire.

4.3.3 Device Diag

The Device Diag Screen shows very detailed information about specific devices. Each device shows different information specific to its function.

4.3.4 Viewer

The Viewer Screen displays load calibration info and device IDs.

4.3.5 Voltage

The Voltage Menu displays the current voltage entering the panel.

4.3.6 Firmware

The Firmware Menu displays information about the panel's loaded firmware.

4.3.7 RF Meter

The RF Meter Screen shows the quality of the wireless signals being received. This is different than the Signals Screen, which shows the signal strengths.

4.4 Battery Replacement

The Rigsmart Display Panel will indicate a low battery for approximately three weeks before the battery fails. Before replacing the batteries, call the Rigsmart Systems service department at (780) 438-9475, with the serial number of the system readily available. The serial number can be found on the display panel or the transmitter itself. Once the technical problem has been verified as being due to a dead battery, follow the steps below to replace it.

Tools and Equipment for Battery Replacement:

The battery replacement kit contains:

- (1) 3.6 Volt Lithium Ion D-cell battery
- (1) 1/8 Inch Allen key

NOTE: *The transmitter should be removed from the rig before battery replacement occurs. However, replacement can still be done with the transmitter on the rig. If it is raining or snowing, remove the transmitter and perform the battery replacement indoors or under cover.*

To Replace the Battery:

1. Remove the screws from the battery compartment lid and remove the lid.
2. Remove the battery from the holder.
3. Insert the new battery according to the battery orientation diagram on the base of the battery clip.
4. Ensure that the o-ring is greased and has not been damaged, as this will affect the seal.
5. Secure the lid with the screws.



Front View with Lid On



Front View with Lid Off





Front View with Battery Out

4.5 Antenna and Signal Issues

All of the wireless sensors on the Rigsmart system are received by the panel through a common antenna. If there is a problem with the antenna, the wireless sensors may not work correctly. Also, if there is outside wireless interference in the local environment, there may be a reduction in signal strength and quality.

For the best possible communication, the Rigsmart antenna should have a clear line-of-sight to each wireless transducer, which should be no more than 100m away. In practice this may be challenging to obtain; the best compromise for line-of-sight to every wireless transducer should be made.

The Rigsmart antenna can be fitted with an extension cable so that it can be placed further away from the panel. Every effort should be made to reduce the number of extension cables and connector fittings used; each extension and connector fitting will reduce the signal strength.

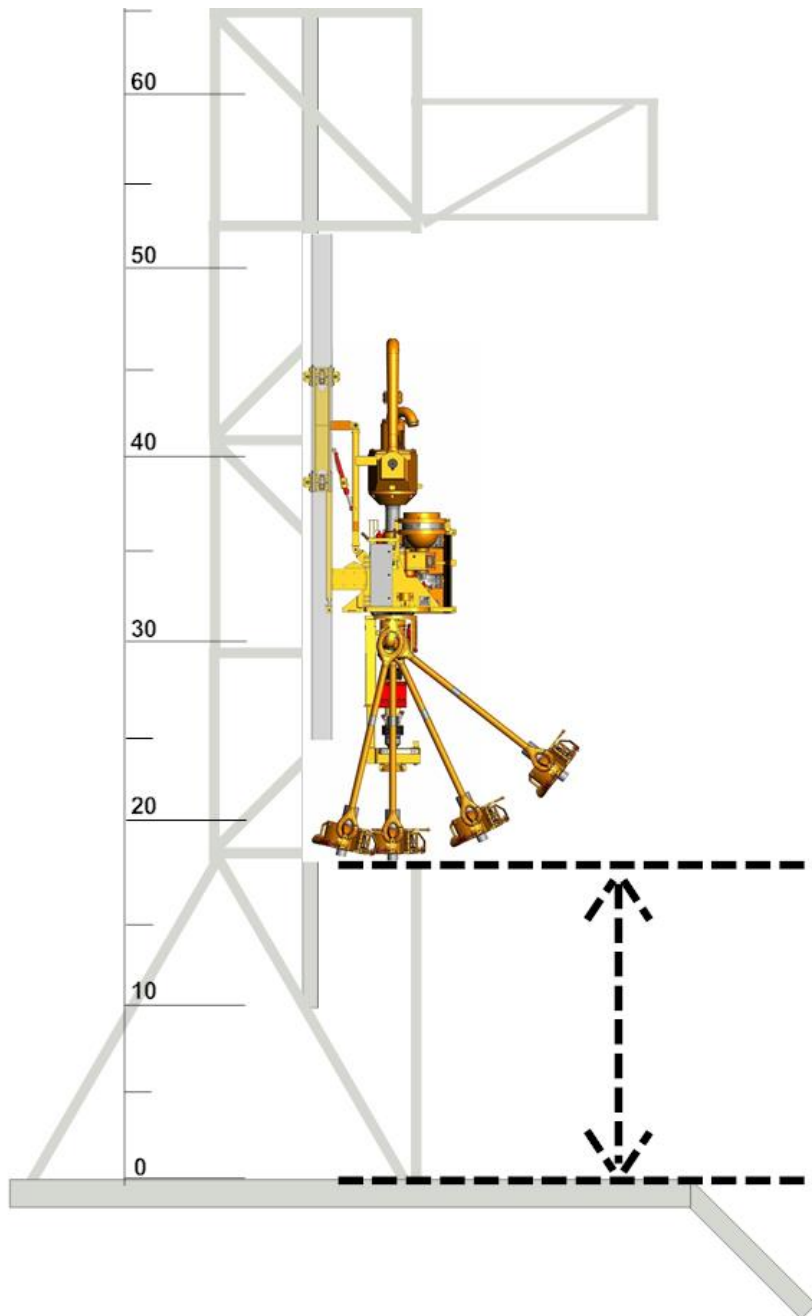
	SIGNAL STRENGTH	RF
LOAD MAIN	 60%	15
CROWN SUR1	 10%	7
BAIL ANG	FAIL	0
PAY-OUT	FAIL	0
EXIT	BACK←	TOP MENU

If any particular sensor is experiencing a loss of signal, there are a few quick troubleshooting steps that can easily be completed before contacting technical support:

1. The most common issue is a dead battery. If the battery in a sensor is dead, it cannot transmit and will have no signal. Replace the battery and recheck the signal.
2. Move the sensor closer to the antenna. Check to see if the signal has returned.
3. Check to ensure there are no breaks, pinches or cuts in the antenna cable. Very tight bends or crimps in the antenna cable may permanently damage the wire inside.
4. If all transducers are experiencing a signal failure, there may be an issue with the antenna – it is the common point for all the devices.
 - a. Move the antenna around and check to see if the signal has returned.
 - b. Often, moving the antenna inside the derrick structure will improve signals from a top drive.
 - c. Change the orientation of the antenna; if it is placed vertically, change it so it is mounted horizontally.
 - d. Replace the antenna completely.

4.6 Measuring Block and Top Drive Heights

When calibrating block height or setting anti-collision limits, it is very important to measure heights correctly. It should be noted that the 'Block Height' is not actually the height of the traveling blocks, rather the height of the lowest point of the top drive or the top of the Kelly bar. This is common to most height calculation systems. The drill floor is always used as the reference point of measurements. When using a top drive, measure from the floor to the bottom of the elevators. If there is no top drive, measure from the floor to the top of the Kelly bar. The important factor is that measurement reference points remain constant through the calibration and limit-setting process.



4.7 Common Error Messages Codes and Solutions

During the course of operation, alarms may be displayed on the panel screen. The following list contains all alarms, with their reference numbers and brief descriptions. Refer to this list for troubleshooting purposes.

Alarm Text	Number	Description
** BY-PASS ** XX SEC REMAIN	0	This message indicates that the BYPASS button has been pressed, which will disable all alarms for 30 seconds. During this 30 seconds, this message will flash to indicate how much time is left.
MAIN LOAD ABOVE PRESET	3	This alarm indicates that the measured load is above the entered load limit. If this alarm is being triggered at too low or too high a load value, the limit may need to be adjusted.
CROWN SAVER 1 ALARM	4	This alarm indicates that the Crown Saver Counterweight is lifted and the block is approaching the crown of the rig.
BLOCK HEIGHT ABOVE MAXIMUM	8	This alarm indicates that the measured block height is above the entered preset crown saver height. If this alarm is being triggered when the block is not near the crown the block height may need recalibration, or the crown saver height value may need to be changed.
BLOCK HEIGHT BELOW MINIMUM	9	This alarm indicates that the measured block height is below the entered preset minimum (floor) height. If this alarm is being triggered when the block is not near the floor, the minimum height value or block height may need recalibration.
Em SHUTDOWN 1 *** STOP ***	12	This alarm indicates that the Emergency Shutdown button has been pressed.
CROWN SAVER 1 ABOVE THRESHOLD	14	This alarm indicates that the weight on the Crown Saver Switch is too high or that it has been damaged. Check for extra weight on the crown saver counterweight or obvious physical damage.
TOP DRIVE BLOCK EXTENDED	19	This alarm indicates that the top drive is extended away from the derrick while there is a danger of it contacting the monkey board. If this alarm is being triggered while the top drive is not extended, it may be necessary to zero the block angle or adjust the set limits. See the Calibration or Limits section for more information.
TOP DRIVE BAILS TILTED	20	This alarm indicates that the bails are tilted while there is a danger of them contacting the monkey board. If this alarm is being triggered while the bails are not tilted, it may be necessary to zero the bail angle or adjust the set limits. See the Calibration or Limits section for more information.
ELEVATOR POS ALARM	21	This alarm indicates that the bails are tilted while the elevator is <i>not</i> in trip nor drill position. If this alarm is being triggered while the elevator <i>is</i> in trip or drill position, it may be necessary to adjust the positioning of the sensor in relation to the RFID targets.
TOP DRIVE BLK & BAILS EXT	25	This alarm indicates that both the bails and block are at least partially extended while there is a danger of the bails contacting the monkey board. If this alarm is being triggered while the bails are not tilted, it may be necessary to zero the bail angle or adjust the set limits. See the Calibration or Limits section for more information.
TOP DRIVE BAILS TILTED	26	This alarm indicates that the bails are tilted while there is a danger of them contacting the torque track. If this alarm is being triggered while the bails are not tilted, it may be necessary to zero the bail angle or adjust the set limits. See the Calibration or Limits section for more information.
LOAD 90% OF MAXIMUM LOAD	29	This alarm indicates that the measured load is approaching the entered load limit. If this alarm is being triggered at too low or too high a load value, the limit may need to be adjusted.

ALARM HUB MALFUNCTION	43	This alarm indicates that the panel cannot communicate with the attached Alarm Hub. This can happen if the cable between the panel and the Alarm Hub is disconnected or damaged.
MAIN LOAD SYSTEM ALARM	45	This alarm indicates that the panel is not receiving a signal from the Load Sensor. Either the sensor has stopped functioning due to a dead battery, damage, or failure, or the signal strength from the switch is too low. Try repositioning the antenna for a more direct line-of-sight with the sensor.
CROWN SAVER 1 SYSTEM ALARM	47	This alarm indicates that the panel is not receiving a signal from the Crown Saver Switch. Either the switch has stopped functioning due to a dead battery, damage, or failure, or the signal strength from the switch is too low. Try repositioning the antenna for a more direct line-of-sight with the switch.
RFID TAG READER SYSTEM ALARM	51	This alarm indicates that the Elevator Position Transmitter cannot communicate with the RFID Tag Reader. This can happen if the cable between the Tag Reader and Transmitter is disconnected or damaged.
LINE PAY-OUT SYSTEM ALARM	54	This alarm indicates that the panel is not receiving a signal from the Pay-Out Sensor. Either the sensor has stopped functioning due to lost power, damage, or failure, or the signal strength from the sensor is too low. Try repositioning the antenna for a more direct line-of-sight with the sensor.
Em SHUTDOWN 1 SYSTEM ALARM	59	This alarm indicates that the panel is not receiving a signal from the Emergency Shutdown sensor. Either the sensor has stopped functioning due to a dead battery, damage, or failure, or the signal strength from the sensor is too low. Try repositioning the antenna for a more direct line-of-sight with the sensor.
BLOCK ANGLE SYSTEM ALARM	63	This alarm indicates that the panel is not receiving a signal from the Block Angle Sensor. Either the sensor has stopped functioning due to a dead battery, damage, or failure, or the signal strength from the sensor is too low. Try repositioning the antenna for a more direct line-of-sight with the sensor.
BAIL ANGLE SYSTEM ALARM	64	This alarm indicates that the panel is not receiving a signal from the Bail Angle Sensor. Either the sensor has stopped functioning due to a dead battery, damage, or failure, or the signal strength from the sensor is too low. Try repositioning the antenna for a more direct line-of-sight with the sensor.
ELEVATOR POS SYSTEM ALARM	65	This alarm indicates that the panel is not receiving a signal from the Elevator Position Sensor. Either the sensor has stopped functioning due to a loss of power, damage, or failure, or the signal strength from the sensor is too low. Try repositioning the antenna for a more direct line-of-sight with the sensor.
LOW BRAKE PRESSURE DETECTED	69	This alarm indicates that the rig air pressure into the Main Air Kill has dropped below 70psi. This may have been done intentionally to bypass the Rigsmart system, or it may be due to an air pressure leak or malfunction. To resolve this, increase the rig air pressure going into the Main Air Kill.
MAIN LOAD LOW BATTERY	72	This alarm indicates that the battery in the Load Sensor is low. Please contact our service department for a replacement.
CROWN SAVER 1 LOW BATTERY	74	This alarm indicates that the battery in the Crown Saver Switch is low. Please contact our service department for a replacement.
Em SHUTDOWN LOW BATTERY	84	This alarm indicates that the battery in the Emergency Shutdown Sensor is low. Please contact our service department for a replacement.
BLOCK ANGLE LOW BATTERY	87	This alarm indicates that the battery in the Top Drive Extend Angle Sensor is low. Please contact our service department for a replacement.
BAIL ANGLE LOW BATTERY	237	This alarm indicates that the battery in the Bail Tilt Angle Sensor is low. Please contact our service department for a replacement.

4.8 Alarm Code Master List

No.	Alarm Text 1	Alarm Text 2	Menu Alarm Text
1	STRING WEIGHT	TOO HIGH	STRING WEIGHT TOO HIGH
2	LOAD OVER	PIPE STRENGTH	MAIN LOAD OVER PIPE STRENGTH
3	MAIN LOAD	ABOVE PRESET	MAIN LOAD ABOVE PRESET
4	CROWN SAVER 1	ALARM	CROWN SAVER 1 ALARM
7	THROT OVERRIDE	PEDAL PRESSED	THROT OVERRIDE PEDAL PRESSED
8	BLOCK HEIGHT	ABOVE MAXIMUM	BLOCK HEIGHT ABOVE PRESET MAXIMUM
9	BLOCK HEIGHT	BELOW MINIMUM	BLOCK HEIGHT BELOW PRESET MINIMUM
10	H2S 1	ABOVE LIMIT	H2S 1 LEVELS ABOVE MAXIMUM LIMIT
11	LEL 1	ABOVE LIMIT	LEL 1 LEVELS ABOVE MAXIMUM LIMIT
12	Em SHUTDOWN 1	*** STOP ***	Em SHUTDOWN 1 ***STOP***
13	PRESSURE 1	ABOVE PRESET	PRESSURE 1 ABOVE PRESET MAXIMUM
14	CROWN SAVER 1	ABOVE THRESHOLD	CROWN SAVER 1 ABOVE THRESHOLD
15	ROLL	ABOVE PRESET	ROLL OVER PRESET MAXIMUM
16	IRON DERRICKMAN	EXTENDED	IRON DERRICKMAN EXTENDED
17	MAIN ANGLE	ABOVE PRESET	MAIN ANGLE ABOVE PRESET MAXIMUM
18	MAIN ANGLE	BELOW PRESET	MAIN ANGLE BELOW PRESET MINIMUM
19	TOP DRIVE	BLOCK EXTENDED	TOP DRIVE BLOCK EXTENDED
20	TOP DRIVE	BAILS TILTED	TOP DRIVE BAILS TILTED
21	ELEVATOR POS	ALARM	TOP DRIVE ELEVATOR POSITION ALARM
22	WIND SPEED	ABOVE PRESET	WIND SPEED ABOVE PRESET MAXIMUM
23	RAM1	CLOSED	RAM1 IS CLOSED
24	RAM1 SIDE A	CLOSED	RAM1 SIDE A IS CLOSED
25	TOP DRIVE	BLK & BAILS EXT	TOP DRIVE BLOCK & BAILS EXTENDED
26	TOP DRIVE	BAILS TILTED	TOP DRIVE BAILS TILTED
27	RAISING DERRICK	OUTPUT DISABLED	RAISING DERRICK - OUTPUT DISABLED
28	MAIN 90% OF	PIPE STRENGTH	MAIN LOAD AT 90% OF PIPE STRENGTH
29	MAIN 90% OF	PRESET	MAIN LOAD AT 90% OF MAXIMUM LOAD
30	** BY-PASS **	SEC REMAIN	** BY-PASS PRESSED **
31	BLOCK SPEED	OVER LIMIT	BLOCK SPEED OVER MAXIMUM LIMIT
32	BLOCK SPEED	OVER LIMIT	BLOCK SPEED OVER MAXIMUM LIMIT
39	SERIAL ADC IN	MALFUNCTION	SERIAL ADC INPUT MALFUNCTION
40	THROT CONTROL	MALFUNCTION	THROTTLE CONTROL MALFUNCTION
41	BRAKE CONTROL	MALFUNCTION	BRAKE CONTROL MALFUNCTION
42	SERIAL LIMIT TX	MALFUNCTION	LIMIT TRANSMITTER MALFUNCTION
43	ALARM HUB	MALFUNCTION	ALARM HUB MALFUNCTION
44	STROBE HUB	MALFUNCTION	STROBE HUB MALFUNCTION
45	MAIN LOAD	SYSTEM ALARM	MAIN LOAD NOT FUNCTIONING
46	MAIN ANGLE	SYSTEM ALARM	MAIN ANGLE NOT FUNCTIONING
47	CROWN SAVER 1	SYSTEM ALARM	CROWN SAVER 1 NOT FUNCTIONING
48	LASER	SYSTEM ALARM	LASER NOT FUNCTIONING
49	INPUT SIGNAL	SYSTEM ALARM	INPUT SIGNAL NOT FUNCTIONING
50	WIND SPEED	SYSTEM ALARM	WIND SPEED NOT FUNCTIONING
51	RFID TAG READER	SYSTEM ALARM	RF TAG READER NOT FUNCTIONING
52	LEVELING	SYSTEM ALARM	LEVELING SENSOR NOT FUNCTIONING
53	RAM1 SIDE A	SYSTEM ALARM	RAM1 SIDE A SENSOR NOT FUNCTIONING


No.	Alarm Text 1	Alarm Text 2	Menu Alarm Text
54	LINE PAY-OUT	SYSTEM ALARM	LINE PAY-OUT SYSTEM NOT FUNCTIONING
55	THROT LIMITER	SYSTEM ALARM	THROTTLE LIMITER NOT FUNCTIONING
56	THROT OVERRIDE	SYSTEM ALARM	THROTTLE OVERRIDE NOT FUNCTIONING
57	H2S 1	SYSTEM ALARM	H2S 1 SYSTEM NOT FUNCTIONING
58	LEL 1	SYSTEM ALARM	LEL 1 SYSTEM NOT FUNCTIONING
59	Em SHUTDOWN 1	SYSTEM ALARM	Em SHUTDOWN 1 SYS NOT FUNCTIONING
60	PRESSURE 1	SYSTEM ALARM	PRESSURE 1 NOT FUNCTIONING
61	PUMP SPEED	SYSTEM ALARM	ROTARY SPEED SYS NOT FUNCTIONING
62	4-20mA CONVRTER	SYSTEM ALARM	4 to 20mA CONVERTER NOT FUNCTIONING
63	BLOCK ANGLE	SYSTEM ALARM	BLOCK ANGLE SYS NOT FUNCTIONING
64	BAIL ANGLE	SYSTEM ALARM	BAIL ANGLE SYS NOT FUNCTIONING
65	ELEVATOR POS	SYSTEM ALARM	ELEVATOR POS SYS NOT FUNCTIONING
66	FLOW SENSOR 1	SYSTEM ALARM	FLOW SENSOR 1 NOT FUNCTIONING
67	LCD DIAL	SYSTEM ALARM	LCD DIAL SYSTEM ALARM
68	DISPLAY	OVERFLOW	DISPLAY OVERFLOW ALARM
69	LOW BRAKE	PRESSURE	LOW BRAKE PRESSURE DETECTED
70	CHECKSUM	ERROR:	MEMORY ERROR - CHECKSUM ALARM
72	MAIN LOAD	LOW BATTERY	MAIN LOAD LOW BATTERY
73	MAIN ANGLE	LOW BATTERY	MAIN ANGLE LOW BATTERY
74	CROWN SAVER 1	LOW BATTERY	CROWN SAVER 1 LOW BATTERY
75	JIB ANGLE	LOW BATTERY	JIB ANGLE LOW BATTERY
76	PANEL RELAY	DETECT SHORT	PANEL RELAY DETECT SHORT CIRCUIT
77	MAIN LD REPEATR	LOW BATTERY	MAIN LOAD REPEATER LOW BATTERY
78	LEVELING	LOW BATTERY	LEVELING SENSOR LOW BATTERY
79	WIND SPEED	LOW BATTERY	WIND SPEED LOW BATTERY
80	RAM1 SIDE A	LOW BATTERY	RAM1 SIDE A SENSOR LOW BATTERY
81	H2S 1	LOW BATTERY	H2S 1 SENSOR LOW BATTERY
82	LEL 1	LOW BATTERY	LEL 1 SENSOR LOW BATTERY
84	Em SHUTDOWN 1	LOW BATTERY	Em SHUTDOWN 1 LOW BATTERY
85	MODBUS SLAVE	MODE SELECTED	MODBUS SLAVE MODE SELECTED
86	PRESSURE 1	LOW BATTERY	PRESSURE 1 LOW BATTERY
87	BLOCK ANGLE	LOW BATTERY	TD BLOCK ANGL LOW BATTERY
88	FLOW SENSOR 1	LOW BATTERY	FLOW SENSOR 1 LOW BATTERY
89	LINE PAY-OUT	LOW BATTERY	PAY-OUT TRANSDUCER LOW BATTERY
153	AUX1 LOAD	ABOVE PRESET	AUX1 LOAD ABOVE PRESET
154	CROWN SAVER 2	ALARM	CROWN SAVER 2 ALARM
160	H2S 2	ABOVE LIMIT	H2S 2 LEVELS ABOVE MAXIMUM LIMIT
161	LEL 2	ABOVE LIMIT	LEL 2 LEVELS ABOVE MAXIMUM LIMIT
162	Em SHUTDOWN 2	*** STOP ***	Em SHUTDOWN 2 ***STOP***
163	PRESSURE 2	ABOVE PRESET	PRESSURE 2 ABOVE PRESET MAXIMUM
164	CROWN SAVER 2	ABOVE THRESHOLD	CROWN SAVER 2 ABOVE THRESHOLD
165	PITCH	ABOVE PRESET	PITCH OVER PRESET MAXIMUM
167	AUX1 ANGLE	ABOVE PRESET	AUX1 ANGLE ABOVE PRESET MAXIMUM
168	AUX1 ANGLE	BELOW PRESET	AUX1 ANGLE BELOW PRESET MINIMUM
173	RAM2	CLOSED	RAM2 IS CLOSED
174	RAM1 SIDE B	CLOSED	RAM1 SIDE B IS CLOSED
178	AUX1 90% OF	PIPE STRENGTH	AUX1 LOAD AT 90% OF PIPE STRENGTH
179	AUX1 90% OF	PRESET	AUX1 LOAD AT 90% OF MAXIMUM LOAD

No.	Alarm Text 1	Alarm Text 2	Menu Alarm Text
195	AUX1 LOAD	SYSTEM ALARM	AUX1 LOAD NOT FUNCTIONING
196	AUX1 ANGLE	SYSTEM ALARM	AUX1 ANGLE NOT FUNCTIONING
197	CROWN SAVER 2	SYSTEM ALARM	CROWN SAVER 2 NOT FUNCTIONING
203	RAM1 SIDE B	SYSTEM ALARM	RAM1 SIDE B SENSOR NOT FUNCTIONING
207	H2S 2	SYSTEM ALARM	H2S 2 SYSTEM NOT FUNCTIONING
208	LEL 2	SYSTEM ALARM	LEL 2 SYSTEM NOT FUNCTIONING
209	Em SHUTDOWN 2	SYSTEM ALARM	Em SHUTDOWN 2 SYS NOT FUNCTIONING
210	PRESSURE 2	SYSTEM ALARM	PRESSURE 2 NOT FUNCTIONING
216	FLOW SENSOR 2	SYSTEM ALARM	FLOW SENSOR 2 NOT FUNCTIONING
222	AUX1 LOAD	LOW BATTERY	AUX1 LOAD LOW BATTERY =
223	AUX1 ANGLE	LOW BATTERY	AUX1 ANGLE LOW BATTERY =
224	CROWN SAVER 2	LOW BATTERY	CROWN SAVER 2 LOW BATTERY
230	RAM1 SIDE B	LOW BATTERY	RAM1 SIDE B SENSOR LOW BATTERY
231	H2S 2	LOW BATTERY	H2S 2 SENSOR LOW BATTERY
232	LEL 2	LOW BATTERY	LEL 2 SENSOR LOW BATTERY
234	Em SHUTDOWN 2	LOW BATTERY	Em SHUTDOWN 2 LOW BATTERY
236	PRESSURE 2	LOW BATTERY	PRESSURE 2 LOW BATTERY
237	BAIL ANGLE	LOW BATTERY	TD BAIL ANGLE LOW BATTERY
238	FLOW SENSOR 2	LOW BATTERY	FLOW SENSOR 2 LOW BATTERY
253	AUX2 LOAD	ABOVE PRESET	AUX2 LOAD ABOVE PRESET
254	CROWN SAVER 3	ALARM	CROWN SAVER 3 ALARM
260	H2S 3	ABOVE LIMIT	H2S 3 LEVELS ABOVE MAXIMUM LIMIT
261	LEL 3	ABOVE LIMIT	LEL 3 LEVELS ABOVE MAXIMUM LIMIT
262	Em SHUTDOWN 3	*** STOP ***	Em SHUTDOWN 3 ***STOP***
263	PRESSURE 3	ABOVE PRESET	PRESSURE 3 ABOVE PRESET MAXIMUM
264	CROWN SAVER 3	ABOVE THRESHOLD	CROWN SAVER 3 ABOVE THRESHOLD
265	PITCH & ROLL	ABOVE PRESET	PITCH AND ROLL OVER PRESET MAXIMUM
267	AUX2 ANGLE	ABOVE PRESET	AUX2 ANGLE ABOVE PRESET MAXIMUM
268	AUX2 ANGLE	BELOW PRESET	AUX2 ANGLE BELOW PRESET MINIMUM
273	RAM3	CLOSED	RAM3 IS CLOSED
274	RAM2 SIDE A	CLOSED	RAM2 SIDE A IS CLOSED
278	AUX2 90% OF	PIPE STRENGTH	AUX2 LOAD AT 90% OF PIPE STRENGTH
279	AUX2 90% OF	PRESET	AUX2 LOAD AT 90% OF MAXIMUM LOAD
295	AUX2 LOAD	SYSTEM ALARM	AUX2 LOAD NOT FUNCTIONING
296	AUX2 ANGLE	SYSTEM ALARM	AUX2 ANGLE NOT FUNCTIONING
297	CROWN SAVER 3	SYSTEM ALARM	CROWN SAVER 3 NOT FUNCTIONING
303	RAM2 SIDE A	SYSTEM ALARM	RAM2 SIDE A SENSOR NOT FUNCTIONING
307	H2S 3	SYSTEM ALARM	H2S 3 SYSTEM NOT FUNCTIONING
308	LEL 3	SYSTEM ALARM	LEL 3 SYSTEM NOT FUNCTIONING
309	Em SHUTDOWN 3	SYSTEM ALARM	Em SHUTDOWN 3 SYS NOT FUNCTIONING
310	PRESSURE 3	SYSTEM ALARM	PRESSURE 3 NOT FUNCTIONING
316	FLOW SENSOR 3	SYSTEM ALARM	FLOW SENSOR 3 NOT FUNCTIONING
322	AUX2 LOAD	LOW BATTERY	AUX2 LOAD LOW BATTERY
323	AUX2 ANGLE	LOW BATTERY	AUX2 ANGLE LOW BATTERY
324	CROWN SAVER 3	LOW BATTERY	CROWN SAVER 3 LOW BATTERY
330	RAM2 SIDE A	LOW BATTERY	RAM2 SIDE A SENSOR LOW BATTERY
331	H2S 3	LOW BATTERY	H2S 3 SENSOR LOW BATTERY
332	LEL 3	LOW BATTERY	LEL 3 SENSOR LOW BATTERY

No.	Alarm Text 1	Alarm Text 2	Menu Alarm Text
334	Em SHUTDOWN 3	LOW BATTERY	Em SHUTDOWN 3 LOW BATTERY
336	PRESSURE 3	LOW BATTERY	PRESSURE 3 LOW BATTERY
337	ELEV POSITION	LOW BATTERY	ELEV POSITION LOW BATTERY
338	FLOW SENSOR 3	LOW BATTERY	FLOW SENSOR 3 LOW BATTERY
360	H2S 4	ABOVE LIMIT	H2S 4 LEVELS ABOVE MAXIMUM LIMIT
361	LEL 4	ABOVE LIMIT	LEL 4 LEVELS ABOVE MAXIMUM LIMIT
362	Em SHUTDOWN 4	*** STOP ***	Em SHUTDOWN 4 ***STOP***
363	PRESSURE 4	ABOVE PRESET	PRESSURE 4 ABOVE PRESET MAXIMUM
374	RAM2 SIDE B	CLOSED	RAM2 SIDE B IS CLOSED
403	RAM2 SIDE B	SYSTEM ALARM	RAM2 SIDE B SENSOR NOT FUNCTIONING
407	H2S 4	SYSTEM ALARM	H2S 4 SYSTEM NOT FUNCTIONING
408	LEL 4	SYSTEM ALARM	LEL 4 SYSTEM NOT FUNCTIONING
409	Em SHUTDOWN 4	SYSTEM ALARM	Em SHUTDOWN 4 SYS NOT FUNCTIONING
410	PRESSURE 4	SYSTEM ALARM	PRESSURE 4 NOT FUNCTIONING
430	RAM2 SIDE B	LOW BATTERY	RAM2 SIDE B SENSOR LOW BATTERY
431	H2S 4	LOW BATTERY	H2S 4 SENSOR LOW BATTERY
432	LEL 4	LOW BATTERY	LEL 4 SENSOR LOW BATTERY
434	Em SHUTDOWN 4	LOW BATTERY	Em SHUTDOWN 4 LOW BATTERY
436	PRESSURE 4	LOW BATTERY	PRESSURE 4 LOW BATTERY
463	PRESSURE 5	ABOVE PRESET	PRESSURE 5 ABOVE PRESET MAXIMUM
474	RAM3 SIDE A	CLOSED	RAM3 SIDE A IS CLOSED
503	RAM3 SIDE A	SYSTEM ALARM	RAM3 SIDE A SENSOR NOT FUNCTIONING
510	PRESSURE 5	SYSTEM ALARM	PRESSURE 5 NOT FUNCTIONING
530	RAM3 SIDE A	LOW BATTERY	RAM3 SIDE A SENSOR LOW BATTERY
536	PRESSURE 5	LOW BATTERY	PRESSURE 5 LOW BATTERY
563	PRESSURE 6	ABOVE PRESET	PRESSURE 6 ABOVE PRESET MAXIMUM
574	RAM3 SIDE B	CLOSED	RAM3 SIDE B IS CLOSED
603	RAM3 SIDE B	SYSTEM ALARM	RAM3 SIDE B SENSOR NOT FUNCTIONING
610	PRESSURE 6	SYSTEM ALARM	PRESSURE 6 NOT FUNCTIONING
630	RAM3 SIDE B	LOW BATTERY	RAM3 SIDE B SENSOR LOW BATTERY
636	PRESSURE 6	LOW BATTERY	PRESSURE 6 LOW BATTERY


4.9 In the Event of System Power Loss

In the event of a rig black out while the Rigsmart System is in use (either while drilling, rig-up, rig-down, or any other time), complete the following steps to avoid potential accidents. By default, if power is lost to the Rigsmart System, the main brakes will engage. The brakes will not be released until power is restored to the Rigsmart system.



WARNING
Potential for Accident

The Rigsmart system may unexpectedly release the brakes if the following steps are not completed correctly.



1. Stop operations.
2. **Chain brake the main brakes.**
(This ensures that the rig's blocks will not move while the power issue is being resolved).
3. Turn off the MAIN POWER to the Rigsmart system at the Power Disconnect.
(Turning off the main power to the Rigsmart system ensures that if the power unexpectedly restores, the Rigsmart system will still be off and the main brakes will still be applied).
4. Troubleshoot and repair the power issues on the rig.
5. After stable power has been restored to the rig, **ensure that the main brakes are still chained down.** Turn on the main power to the Rigsmart system at the Power Disconnect.
(Depending on the alarm condition the Rigsmart system was in before the power loss, the system may release the brakes when power is restored. This is why the rig's main brakes **MUST** be chained down first).
6. Once the operator has assumed control of the rig again, the Rigsmart system needs to be recalibrated.
 - a. Complete a 'First Layer Change' height recalibration.
 - b. If the block height is supplied by a 4-20mA connection to a PLC, a height calibration must be done.
7. Continue operations.

5 Service

5.1 Regular System Maintenance

For the Rigsmart system to operate correctly there are a number of regular system maintenance items that should be tended to on a regular basis. Consistent testing of the system should be worked into the rig's regular schedule to ensure that it is continuously protecting the rig. This maintenance list is a guide only; if the customer's safety program recommends more frequent safety checks, the greater of the two should be observed. For example, if the customer's safety policy is to check the crown saver every tour, the Rigsmart crown saver should be checked at the same time.

Maintenance Item	Description	Frequency				
		Every Day	Weekly	Monthly	On Rig Move	As Required
General						
Load Calibration	Any device used to indicate weight should be returned to Rigsmart Systems annually to ensure proper calibration and functionality.					X (annually)
Visual inspection of equipment	Visual inspection of components, transducers and brackets. Checking for obvious damage.				X	
Wash equipment	If equipment becomes heavily soiled with drilling fluids or mud they should be sprayed off. Make sure all covers are securely closed and lids are tight. Use only a light spray with soap and water. Do not pressure wash with high pressure sprays. No harsh chemicals or diesel fuel should be used.					X
Function Crown Saver	The hardware and software Crown Savers should be tested every day to ensure functionality.	X				
Limit Testing	Test each of the Anti-Collision Limits. Make sure the brakes activate correctly and the limits are placed in the correct positions.		X			
Emergency Shutdown	If equipped, test the Emergency Shutdown to ensure it functions correctly.	X				

Maintenance Item	Description	Frequency				
		Every Day	Weekly	Monthly	On Rig Move	As Required
General						
Elevator Position	If equipped, rotate the top drive pipe handler to ensure the Elevator Position Sensor is working correctly and all micro-dots are being sensed.				X	
Check Safety Cables	Ensure all safety cables on overhead equipment are connected and tight.				X	
Electrical						
Antenna Connection	Apply a moderate amount of dielectric grease to create a watertight seal on the antenna connection and any extension cables or bulkheads. Make sure each connection is tight.				X	
Check Electrical Cables	Check cables for damage, kinks or pinch points.				X	
Replace Batteries	If a transducer's battery has died or the panel displays a 'low battery' warning message, replace the battery in the corresponding component. After replacing the battery, ensure that the lid is greased and closed tightly.					X
Electrical Connections	All electrical cables NOT on the component stand should be opened and a moderate amount of dielectric grease should be applied to create a water tight seal. Make sure to tighten connections when connecting and reconnecting. NOTE: This should NOT be done while drilling, as the brakes will be applied if a connection is broken.				X	
Pneumatic						
Check Hoses	Check hoses for damage, kinks or pinch points.				X	
Air Pressure	The supply pressure tank should be checked to ensure there is a constant supply of at least 90PSI.		X			

Maintenance Item	Description	Frequency				
		Every Day	Weekly	Monthly	On Rig Move	As Required
General						
Pneumatic Filters	All of Rigsmart's pneumatic boxes have air filters in them; these filters should be checked and cleaned.		X			

5.2 The Rigsmart Replacement Exchange System:

1. A customer calls with a valid Rigsmart component serial number. (XXX-XXXX.), and specifies which components need to be replaced. (Example: Panel, Crown Saver, Bail Angle, Elevator Rotation System...etc.).
2. A replacement agreement is then faxed to the customer. The customer is responsible for signing and returning the agreement to Rigsmart Systems. No product will leave Rigsmart Systems until this agreement is signed.
3. The replacement parts are spooled up and tested.
4. Parts are then shipped to the customer. If the system is still within the warranty period, no charges will be applied at this time, unless importing to a country with a value added tax (VAT). If the part's warranty period is expired, the customer is responsible for the cost of freight. A purchase order number will be required.
5. Upon receiving the new parts, the customer can then reuse the same box to package and ship the faulty or damaged components back to Rigsmart Systems.

Service Contact Information

E-mail: service@rigsmart.com
Telephone: +1 780 438 9475
Facsimile: +1 780 438 9477
Address: 4908 97 Street NW
 Edmonton, Alberta
 Canada T6E 5S1

Replacement Agreement – please complete
Between Rigsmart Systems and

Company: Address: City: State/Province: Zip/Postal Code:

Contact Name: Phone: Fax:
--

Serial Number: n/a	Service Order #:
Component(s):	Replacement Value: \$

On behalf of (COMPANY)_____ I hereby request in writing, replacement system component(s) for Rigsmart System (RS#_____). I agree to return the non-functioning component(s) to Rigsmart Systems at the above address within 15 business days of receipt. In the event I fail to return the non-functioning component(s) to Rigsmart Systems within 15 business days – and do not notify Rigsmart Systems, I hereby authorize Rigsmart Systems to charge my account or credit card on file for the cost of the equipment as detailed on this agreement.

I understand this replacement is being provided as a service. Any subsequent costs charged for this replacement due to loss are non-refundable. I also understand that there may be additional fees to repair the component(s) being replaced. If this is a replacement for a known repair please provide a purchase order number in the space below

COMPLETION AND RETURN OF THIS AGREEMENT, AND ACCEPTANCE OF REPLACEMENT EQUIPMENT CONSTITUTES ACCEPTANCE OF THESE TERMS AND CONDITIONS. AS AN AUTHORIZED EMPLOYEE OF YOUR COMPANY, BY SIGNING THIS DOCUMENT IT BECOMES A BINDING CONTRACT.

***Authorized
 Signature:**

***Name:**

Service Tech:

Title:

Title:

***Date:**

Date:

***Purchase Order
 Number:**

**Crane/Rig
 Description**

Fax copy of signed agreement to 1-780-438-9477

***These fields are mandatory. If a Purchase Order Number is not available, please print name in field**

****Note: No equipment shall be shipped until a completed copy is received by Rigsmart Systems****

NOTES:

6 Rigsmart Systems Training- DRILLER SIGN OFF PAGE

Trainer: _____	Date: _____
Company: _____	Rig #: _____

Skill or Task	Page	Date	Trained	N/A
<i>Best Practises</i>	2			
<i>System Description</i>	6			
<i>Normal Operation</i>	5			
<i>Operating Alarms</i>	6			
<i>Using By-pass</i>	N/A			
<i>Raising Derrick Mode</i>	8			
<i>Run Casing Mode</i>	N/A			
<i>System Calibration</i>	N/A			
<i>Full Block Height Calibration</i>	N/A			
<i>Slip & Cut Height Calibration (1st layer change)</i>	N/A			
<i>Simple Block Height Calibration (one point)</i>	N/A			
<i>Bail/Block Angle Calibration</i>	N/A			
<i>Bail and Block Limits</i>	N/A			
<i>Crown and Floor Limits</i>	N/A			
<i>Anti-collision Limits</i>	N/A			
<i>Speed Control Limits</i>	N/A			
<i>Troubleshooting</i>	11			
<i>Battery Replacement</i>	19			
<i>Error Messages and Codes</i>	22			

Name/Position: _____

Signature: _____

Name/Position: _____

Signature: _____

Name/Position: _____

Signature: _____

Name/Position: _____

Signature: _____