



Brake Sentry Manual

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SECTION 1 INTRODUCTION

The Rexcon Brake Sentry is a state-of-the-art, user programmable, stand alone unit designed to monitor press starting and stopping times. The Brake Sentry also has the capability to perform a 90 degree/270 degree or a 70 degree/250 degree stop time test. This test allows the user to not only check the stopping time of the press but also allows the user to see if the counter balance pressures are set correctly. It has an available auxiliary motion output for use with systems that have a need for an additional make and break signal on each start and stop stroke of the press.

The Brake Sentry was developed using some of the newest parts available in the electronics market today. The unit is built around a microcomputer running at 12 MHz and is capable of executing up to one million instructions every second. System

integrity is maintained using a hardware watch dog timer which monitors the microcomputer operation and resets everything if any problems are detected. The microcomputer contains 8k of prom and has a separate non-volatile memory chip capable of storing the user entered parameters for 10 years without power.

Advanced, plug-in I/O modules provide interfaces to the press and the programmable controller. These modules provide 4000 vrms of optical isolation between field devices and the control logic can be quickly replaced. Output modules contain a button fuse to make fuse replacement safe and easy, should it be necessary. The addition of a third output was added to allow for a reset signal to be sent to the press controls on certain type presses.

In order to detect motion (or lack of it) quickly and accurately, the Brake Sentry utilizes a high resolution encoder. Using this encoder, the Brake Sentry can detect movement as fine as 0.09 degrees.

Power for the Brake Sentry is provided by a small footprint, switching power supply. Because a switching power supply generates very little heat, the Brake Sentry runs cooler. This reduces component stress, thereby increasing reliability.

The above mentioned features all combine to make the Rexcon Brake Sentry a very capable and reliable way to monitor the performance of a press's clutch/brake system.

SECTION 2 INSTALLATION

There are a few general rules to be considered when installing any of the machine monitoring devices in the Rexcon family.

The suggestions that follow should always be considered when installing a new device.

Dirt

All Rexcon devices should be housed in NEMA Type 12 Oil-tight enclosures. The micro-electronics in the Rexcon devices, while powerful, are not very tolerant of a dirty environment. It is important that they are not removed from the supplied enclosure. Also, make sure the enclosure remains tightly sealed while in operation, and that the punched holes are located and sealed properly to avoid leakage into the enclosure.

Vibration

The Rexcon devices are intended to be used with machines - and are designed to survive in such an environment. However, Rexcon devices should be installed in the most vibration-free location available. If possible, mount the devices on the control panels located off the machine; rubber shock absorbing mounts are recommended.

Electrical Noise

The micro-electronics that make up Rexcon devices can be highly susceptible to "electrical noise." While every precaution has been taken to avoid noise related problems, there are several installation considerations which can further protect against electrical noise. Noise can enter the Rexcon device in two basic ways - Direct

(through wires) and Radiated (through the air). Methods for avoiding direct noise are discussed in detail in the Wiring Sections which follow. There are several ways to help avoid radiated electrical noise while installing a device. First, relays are a tremendous source of radiated noise - avoid mounting any Rexcon device in or on a panel that has numerous relays. Second, all wires act as antennas so keep them as short as possible. Coils of unused wire (even small ones) can amplify noise to problem causing levels. Finally, the more wires there are the more likely that one of them is radiating a lot of noise - do not use the Rexcon device as a raceway or junction box. Keeping the wires in the enclosure to a minimum (both in length and number) can greatly reduce the risk of radiated noise problems.

SECTION 2.1 MOUNTING THE PROGRAMMER/DISPLAY

The Brake Sentry was designed to be mounted in a press control panel or in a stand-alone Hoffman style box.

The Brake Sentry should be located where it can be easily seen by both the operator and the supervisor.

If mounting in the press control panel, first determine the ideal location on the panel. Ensure that there is sufficient clearance so it does not interfere with other items located in the panel.

If mounting in a stand-alone Hoffman style enclosure, determine the best location on the press that is easily visible and reachable.

In either situation, in order to mount the Brake Sentry, an opening must be cut into the press control panel or stand-alone box. This opening should measure 5.750" X 5.750". Using the Brake Sentry as a template, drill and tap four (4) 8 X 32 holes.

NOTE: Before cutting the opening and drilling and tapping holes, ensure that there is sufficient clearance for the Brake Sentry inside the enclosure.

Once the cutout has been made and the holes are drilled and tapped, mount the Brake Sentry in the opening. Secure the Brake Sentry with #8 x 32 pan head machine screws using either a star washer or lock washer to secure onto the enclosure.

SECTION 2.2 ENCODER MOUNTING

Care must be used when mounting the encoder to the press. It must be connected to the press where it can rotate the full 360 degrees on each press cycle. Also, it must be connected after any control cams to ensure that in case the cam shaft breaks the Brake Sentry would detect the lack of movement and stop the press. This is a very important point to remember.

The second consideration when mounting the encoder has to do with the encoder itself. The encoder specifications call for no more than 80 lbs. of force to be applied to the shaft of the encoder. When connecting the encoder shaft to the press, a flexible coupling is recommended. The diameter of the encoder shaft is 0.3745 inches.

The final consideration is to determine how far away the encoder will be from the Brake Sentry. The length of the encoder cable should not exceed 35 feet.

As each press has a different set of circumstances involved when mounting the encoder, we have come up with several variations.

If there is enough room on the end of the hard cam switch, opposite the chain drive,

this would be considered the ideal situation. (See Figure 2-2) Using Rexcon part number JW1000-1 Mounting Bracket, mount the bracket to the hard cam using the three bolts that hold the end bearing in place. This bracket has been designed to work with most hard cam limit switches.

Double Shafted Hard Cam

If the hard cam has a double shaft, the installation of the encoder is simpler.

Determine the shaft size of the hard cam.

Install a Lovejoy Flexible Coupling that is designed for the shaft size of the hard cam.

Mount an opposing Lovejoy Flexible Coupling on the encoder shaft.

The shaft size on the encoder is 0.375 (3/8").

Remove the three (3) mounting bolts holding the end bearing in the hard cam.

Using Rexcon part number JW1000-1 (Mounting Bracket) mount the bracket in a position that allows easy access to the encoder coupling and connectors. Ensure that the mounting bolts are tightened properly in the end bearing.

Install a Lovejoy Rubber Insert into either one of the Lovejoy couplings. Mount the encoder to the mounting bracket using four (4) #6-32 machine head screws (supplied) with either a star washer or lock washer.

Slide the Lovejoy coupling together and tighten the two (2) Allen head set screws. There is one located in each of the Lovejoy couplings.

Single Shafted Hard Cam

If the hard cam switch is a single shafted style, the mounting of the encoder is somewhat different. Instead of using Lovejoy Flexible Couplings, a Rexcon Adapter Shaft, part number JW1000-2 must be used.

Before trying to install any of the encoder mounting hardware a 1/4 X 20 tapped hole must be placed in the center of the hard cam shaft. This can be accomplished by the following steps. **NOTE: This center position must be drilled in the center of the shaft so the adapter shaft runs concentric to the hard cam shaft.**

1. Using a center finder locate the center of the shaft.
2. Drill and tap a 1/4 X 20 tapped hole to a minimum of 1/2" deep.
3. Clean out any debris left in hole.

Once the drilled and tapped hole has been placed in the center of the shaft, mount the Adapter Shaft to the hard cam shaft using the 1/4 X 20 Allen Head Cap Screw supplied. It is recommended that a thread locking compound is used (such as Loctite Removable Thread Locking Compound #222) to ensure that the adapter shaft does not vibrate loose.

Remove the three (3) mounting bolts in the bearing end cap and mount the Rexcon

Mounting Bracket, part number JW2000-1, and reinstall the mounting bolts.

Carefully slide the encoder shaft into the Adapter Shaft and mount the encoder to the mounting bracket with the #6 X 32 screws (supplied).

Tighten the Allen head set screw in the adapter shaft to ensure that the encoder turns with the hard cam shaft.

NOTE: The mounting hardware for the encoder described above are not applicable in all cases. Alternative mounting methods may be required.

Proceed to the Device Wiring Section.

SECTION 2.3 DEVICE WIRING

In this section the wiring of devices will be detailed. All Rexcon monitoring devices are designed to operate from 120 AC 50/60 Hz. power and use optically isolated I/O modules (AC or DC) for connections to other equipment.

Section 2.3.1 AC POWER CONNECTION

The Rexcon Brake Sentry operates on 85-130 VAC 50/60 hz. The AC power drives a circuit board mounted power supply which in turn provides +5 volts DC to the circuit board. Because this is what powers the sensitive micro-electronics, it is important that the AC power be as noise free as possible. There are some suggestions which can be done to improve the quality of the AC power input to the machine the device is being installed on. Using the AC power from the most convenient point may save some wire, but it may play a part if noise problems develop later. Along those same lines, when AC I/O modules are used, do not take common connections from the device's AC power inputs. If AC connections are needed for I/O modules, run separate wires to the AC source.

SECTION 2.3.2 I/O CONNECTIONS

All connections to the Rexcon Brake Sentry are made through optically isolated I/O modules. The modules are available in several versions including DC Input (White), DC Output (Red), AC Input (Yellow), and AC Outputs (Black). Refer to Appendix A for detailed specifications about the various modules.

The DC modules are polarity sensitive. When wiring devices with two terminals per module, the leftmost of the two terminals is the positive terminal and the right most of the two is the negative or ground terminal.

The Input modules have an LED located on top of the modules to indicate when the module is "ON." The module will go "ON" when voltage is sensed across its two Input terminals. The DC input module's two input terminals are polarity sensitive. The output modules act as switches and also have an LED on top to indicate they are "ON", or in this case Closed. When the LED is on, the output is "ON" and current is allowed to flow between the module's two terminals. The DC output module's two terminals are polarity sensitive. The output modules also have a button type fuse on top.

ENCODER CONNECTIONS

The encoder connections are made using the supplied cable and are wired to a 5 position terminal block labeled P3-1 located in the upper right hand corner of the circuit board. There are four (4) signal wires and a shield which must be connected to the Brake Sentry circuit board from the encoder. The signals that are supplied to the circuit board are (1) Signal A, (2) Signal B, (3) +5 VDC, (4) Ground and (5) Shield.

NOTE: IT IS EXTREMELY IMPORTANT TO MAKE SURE THAT THE WIRES ARE SECURED FIRMLY IN THE TERMINAL BLOCK.

CLUTCH INPUT

The clutch input indicates the current state of the clutch. The clutch status is input through an optically isolated OPTO22 input module. This module should be wired as such that when voltage is applied to the module (switch is closed or active) it indicates that the clutch is (or should be) engaged. The two clutch input line connections are Position 1 & 2 on the 7 position terminal block P4-1 and are labeled as **Clutch In**. This 7 position terminal block is located in the bottom left corner of the circuit board.

MOTION OUTPUT

The Brake Sentry has an auxiliary output available to the user for use in sending a make and break signal to equipment needing this type of signal on each start and stop stroke of the press. This output can be either an AC optically isolated relay or a DC optically isolated relay. The **Motion Output** is wired to Position 3 & 4 of the 7 position terminal block P4-1 which is located in the bottom left corner of the circuit board and is labeled **Motion Output**.

STOP CIRCUIT OUTPUT

The Brake Sentry **Stop Circuit** has two (2) outputs which can be utilized. The standard output used by the Brake Sentry, when a fault condition has been detected, is a **Normally Open** output. This is a N.O. Held Closed contact which is wired into the stop circuit of the press. The Brake Sentry controls the Stop Circuit N.O. contact closure through self checking redundant relays of which the primary relay is a Form B Captive contact. This output signal is wired such that a fault condition will cause the relay to open, stopping current flow between the two lines. The **Stop Circuit Outputs** are connected to positions 5 (N.O.) & 7 (COM.) of the 7 position terminal block P4-1 and labeled **STOP CIRCUIT OUTPUT**.

The second output, **Normally Closed Held Opened**, is intended to be used for signaling peripheral equipment such as a **RED** indicating light. This output signal is wired such that a fault condition will cause the relay to close, sending current flow between the two lines. The **Stop Circuit Outputs** are connected to positions 6 (N.C.) & 7 (COM.) of the 7 position terminal block P4-1 and labeled **STOP CIRCUIT OUTPUT**.

RESET INPUT

The **Reset Input** has two (2) functions which depends on the setting of Switch 2 on Dip Switch 1 (located midway up the left side of the circuit board) and how the unit is

wired. The **Reset Input** terminal connection is located in the 6 position terminal strip P2-1 in the upper left corner of the circuit board.

When Dip Switch 1 Switch 2 is in the "**OFF**" position (UP), the **Reset Input** is intended to be used with an external keyed selector switch so it can be reset under supervisory control or can be reset through an external source by a contact closure.

If Dip Switch 1 Switch 2 is in the "**ON**" position (DOWN), the **ENTER** key on the front face of the Brake Sentry is used for resetting a fault condition.

BYPASS INPUT (Optional)

The Bypass Input is designed to be wired into the Press Mode Selector Switch so that when the press is in **INCH MODE** the Brake Sentry will be in **BYPASS MODE**. This is done so that the nuisance faults associated with setting up a new die are eliminated. When in the **INCH MODE** the Brake Sentry will flash between **BYPASS/Rexcon**. See Figure 2-6 for an exploded view of terminal block P2-1.

CAUTION: When BYPASS is flashing all faults are ignored.

IMPORTANT: BYPASS MODE should never be used or appear in any production mode (i.e.. Single Stroke Mode, Continuous Mode).

PROGRAM INPUT

The Brake Sentry, depending on how the system is wired, determines who has the capability of changing the program.

If the user would like all personnel to have the ability to change the programmed parameters, add a wire jumper between the two (2) terminals labeled **PROGRAM** on terminal block P2-1. This jumper allows all personnel access to the program by simply pressing the **MODE** key.

If you would like supervised control over who has access to program in the system, add a keyed selector switch to the two terminals labeled **PROGRAM** on terminal block P2-1. See Figure 2-6 for an exploded view of terminal block P2-1.

NOTE: IT IS RECOMMENDED THAT THE KEYED SWITCH BE USED FOR THIS APPLICATION.

SECTION 3 OPERATION

The Brake Sentry was designed to be extremely powerful yet easy to use and program. All operator input is done using the four keys on the front face of the panel. Ease of programming the Brake Sentry settings is determined by how the unit is wired.

There are two main modes of operation for the Brake Sentry - **RUN Mode** and **SETUP Mode**. These two modes of operation are explained in detail in the following sections.

3.1 RUN MODE

The **RUN Mode** is used to monitor the press during normal production. How the Brake Sentry is programmed determines whether the Brake Sentry reports Stopping Time/Faults in time or distance.

When first powered on, the Brake Sentry is in **RUN Mode**. The **Run Mode** is used for normal press operation and will display the logo **REXCON** until cycling of the press occurs. Once the press is cycled, the display will show current stop time in milliseconds (**CR=XX.XX**) then thirty (30) seconds later display the safe distance from the nearest pinch point (**SF=XX.XX**) displayed in Time or Distance depending on the set-up parameters. **NOTE: This will be referred to as STOP TIME/SAFE DISTANCE throughout this manual.** If in **Continuous Mode**, the Brake Sentry will only display the information when the press is commanded to stop.

While the press is in **RUN Mode**, the **Stopping Time/Safe Distance** is displayed whenever the press is stopped. If the **Stopping Time/Safe Distance** displayed starts **FLASHING** this is the warning indicating that the brake/clutch on the press is starting to deteriorate.

If an error is detected, the press will stop and display the reason for the error. If the error is a starting time error, "**START ERR**" will be displayed. If the error is a stopping time error, the time it took to stop (**CR=XX.XX**) will be displayed along with a Fault message. (See Appendix A for Error Codes)

While in the **RUN Mode**, there is a sub-mode called **TEST Mode** that can be entered. The following section covers this sub-mode in detail.

3.1.1 TEST MODE

TEST Mode is used for checking the stop time for the press in either the down stroke or the up stroke. It is capable of checking the down stroke at 70° or 90° and the up stroke at 250° or 270°. By automatically checking the up and down stroke, you can determine if your counterbalance pressure is set correctly; this helps determine the average stopping time of the press.

When in the **TEST Mode**, the Brake Sentry will monitor the clutch input line for start of test and will de-energize the **FAULT** relay when the selected degrees of rotation has occurred. It will then display the stopping internal in either time or distance as selected during normal setup.

IMPORTANT: Always start the TEST with the press in the Top Dead Center location.

The position of Dip Switch 1 Switch 1 (See Figure 3-1 for location) determines whether the up/down stroke is set at 70°/250° or 90°/270°.

If Dip Switch 1 Switch 1 is in the **OFF** (Down) position then the Brake Sentry is capable of performing the **Stop Time Test** at the 90°/270°.

If Dip Switch 1 Switch 1 is in the **On** (UP) position then the Brake Sentry is capable of

performing the **Stop Time Test** at the 70°/250°.

To enter the **TEST Mode** perform the following steps:

1. Press both the **UP** and **DOWN** arrow keys simultaneously and hold for three (3) seconds. After three (3) seconds the words **TEST MODE** will be displayed and flashing in the 8 character display.

2. With the words **TEST MODE** flashing in the display

- Press the **UP** arrow key to enter the up stroke test.

OR

- Press the **Down** arrow key to enter the down stroke test.

NOTE: You can only perform one test at a time.

You have 1 minute to perform this test before the Brake Sentry automatically exits the **TEST Mode** and flashes the message "**TOO LONG.**" If this message appears you have to reset the Brake Sentry and enter the **TEST Mode** again if you still wish to run the test.

3. With the press in Single stroke, cycle the press. The Brake Sentry will automatically stop the press for the test selected.

NOTE: If you wish to run the Stop Time Test for the opposite stroke you must re-enter the TEST Mode and select the opposite test of the one previously performed.

4. To exit the **TEST Mode** either after performance of the Stop Time Test or after waiting "**TOO LONG**", depends on how the Brake Sentry is wired.

If wired for a keyed selector switch, turn the key to the **RESET** position and press the **ENTER** button. At that time the Brake Sentry will display the current Safe Distance or Time depending on the set-up parameters.

If wired so that the **ENTER** key is used for **RESET**, press the **ENTER** key. At that time the Brake Sentry will display the current Safe Distance or Time depending on the set-up parameters.

3.2 SETUP MODE

In order to change any of the Brake Sentry settings the unit must first be in **SETUP Mode**.

If the Brake Sentry is wired to a keyed selector switch turn the key to the **SETUP MODE** position and press the **MODE** key on the keypad. At this time, the display will show the words "**START TIME.**" This indicates that the Brake Sentry is in **SETUP Mode**.

If a jumper is installed on the circuit board instead of a keyed selector switch press the

MODE key on the keypad while the press is stopped. At this time the display should be displaying the words "**START TIME.**" This indicates that the Brake Sentry is in **SETUP Mode.**

In **SETUP Mode** the Stop Circuit Output is Turned OFF - stopping the press until the unit is returned to **RUN Mode.**

In the **SETUP Mode**, there are five (5) functions that are programmable. The following paragraphs explain each of these five (5) functions.

START TIME

The **Start Time** setting is the amount of time that the press has to start moving after the clutch engages. If the setting is exceeded before the Brake Sentry detects motion an error message is displayed and the Stop Circuit Output switch is opened. If the start time is exceeded, the message "**START ERR**" will be flashing.

WARNING TIME

The **Warning Time** setting is the amount of time the press has to stop moving after the clutch disengages. If this setting is exceeded the display will flash the actual stopping time. Exceeding the **Warning Time** does not open the fault relay. The **WARNING Time** is used to inform the operator and maintenance that the clutch/brake on the press may need servicing.

FAULT TIME

The **Fault Time** setting is the amount of time the press has to stop moving after the clutch disengages. If this setting is exceeded a fault is flashed on the display and the fault switch is opened to prevent further press cycling. **CAUTION: Two Hand Control or Presence Sensing Devices must always exceed the fault setting distance.**

TIME/DISTANCE

The **Time/Distance** setting instructs the Brake Sentry to display the Stopping Time and Calculated Safe Distance in either **TIME** (milliseconds) or **DISTANCE** (inches).

HOLD FAULT

The **HOLD FAULT** setting instructs the Brake Sentry to either **STORE** or **NOT STORE** the last fault condition. This is done so the supervisor of the unit can require that the person who needs to have the fault reset **MUST** notify them.

3.2.1 SET-UP PROCEDURES

Setting up the Brake Sentry involves the following four (4) steps. Setting Maximum Parameters, Setting Counterbalance pressure, Ensuring that all slop/play is not present on the cam drive mechanism, and the actual setting of the Brake Sentry parameters.

STEP 1

Setting the maximum parameters is used as a starting point to prevent the Brake Sentry from faulting during set-up. In all cases, these settings are adjusted to the actual settings which are dependent upon the type of press and the condition of the clutch/brake.

STEP 2

It is extremely important that the counterbalance pressure be set correctly as it has a direct effect on the stopping ability of the press. If there is no die in the press ensure that the counterbalance pressure is set accordingly.

If there is a die in the press ensure that the counterbalance pressure is set for the weight of the die. By OSHA standards, the weight of the die should be stamped somewhere on the die.

STEP 3

Assure that unnecessary play is not present in the cam drive mechanism. **EXAMPLE:** Chain tension arm for chain drive cam switches, mechanical repairs to shaft driven cam switches.

Excessive play will result in erratic/false stop times which could cause you to have your operator station at an excessive distance from the pinch point.

STEP 4

The final step is setting the actual **START**, **WARNING** and **FAULT** settings. This procedure is covered in detail in the following sections.

NOTE: A Variable Speed Press SHOULD be set up at maximum speed since this will provide the maximum stopping time.

3.2.1.1 SETTING MAXIMUM PARAMETERS

Setting the maximum parameters is the first step in setting up the Brake Sentry. Again, this is done to eliminate all faults during the initial setup.

To set the maximum parameters refer to the following steps.

1. Place the press in the "**INCH**" mode. **NOTE:** With the press in this mode the Brake Sentry may be reading "**BYPASS**" in the 8 character display if this option has been wired.
2. Place the keyed selector switch in the "**SETUP**" position.
3. Press the **MODE** button once. The display should now be reading "**SET STRT**" (Set Start).
4. Press the **ENTER** button to enter the **SET STRT** timing programming section.
5. Press and hold the **UP ARROW** button until the Brake Sentry display reads "**0.999**." You will notice that as you hold the **UP ARROW** button the numbers will

change slowly at first and then gain speed as you continue to hold the button.

6. Once the display reads "**0.999**", press the **ENTER** button. At this time the display will read "**ITS SET.**" This lets you know that the information has been received by the Brake Sentry's memory.

7. Once the display reads "**ITS SET**", press the **MODE**. The display should now read "**SET STRT.**"

8. With the display showing "**SET STRT**", press the **UP ARROW** until the display reads "**SET FAULT.**" You should only have to press the **UP ARROW** once. However, if you are displaying something other than "**SET FAULT**", continue to press the **UP ARROW** until "**SET FAULT**" is displayed. **NOTE: You can also use the DOWN ARROW to move around within the system.**

9. Press the **ENTER** button to enter the **SET FAULT** timing selection area.

10. Press and hold the **UP ARROW** button until the Brake Sentry display reads "**0.650.**" You will notice that as you hold the **UP ARROW** button the numbers will change slowly at first and will gain speed as you continue to hold the button.

11. Once the display reads "**0.650**", press the **ENTER** button. The display will now read "**ITS SET.**" This lets you know that the information has been received by the Brake Sentry's memory.

12. Once the display reads "**ITS SET**", press the **MODE** button. The display should now read "**SET FAULT.**"

13. With the display showing "**SET FAULT**", press the **UP ARROW** until the display reads "**SET WARN**" (SET WARNING). You should only have to press the **UP ARROW** once. However, if you are displaying something other than "**SET WARN**", continue to press the **UP ARROW** until "**SET WARN**" is displayed. **NOTE: You can also use the DOWN ARROW to move around within the system.**

14. Press the **ENTER** button to enter the "**SET WARN**" timing selection section.

15. Press and hold the **UP ARROW** button until the Brake Sentry display reads "**0.600.**" You will notice that as you hold the **UP ARROW** button the numbers will change slowly at first and will then gain speed as you continue to hold the button.

16. Once the display reads "**0.600**", press the **ENTER** button. At the time that you press the **ENTER** button, the display will read "**ITS SET.**" This lets you know that the information has been received by the Brake Sentry's memory.

17. Once the display reads "**ITS SET**", press the **MODE**. The display should now read "**SET WARN.**"

18. With the display showing "**SET WARN**", press the **MODE** button once. The display should now read "**REXCON.**" The Brake Sentry now has all of the parameters set to their maximum readings needed to finish the setup.

3.2.1.2 SETTING START TIME

To set the "**START TIME**" refer to the following steps. This is required so that the Brake Sentry can determine when the Clutch/Brake is not functioning correctly when directed to engage.

1. Start the Main Motor and allow it to attain maximum RPMs.
2. Using the Mode Selector, select the **SINGLE STROKE** position.
3. Cycle press by using the two (2) activation devices.
4. If the Brake Sentry has been wired for a keyed selector switch, place the keyed selector switch to the "**SETUP**" position. If not wired for a keyed switch, skip this step.
5. Press the **MODE** button. The Brake Sentry display should now read "**SET STRT.**"
6. With the display showing "**SET STRT**", press the **ENTER** button. The display should now be reading "**0.999.**"
7. Using the **DOWN ARROW** button, decrease the numeric numbers by 100 milliseconds until it reads "**0.899.**"
8. Press the **ENTER** button. The display should now read "**ITS SET.**"
9. Press the **MODE** button to exit the "**SET STRT**" programming sequence.
10. Cycle press.
11. Continue to repeat steps 1 through 10 decreasing the numeric values by 100 milliseconds until press faults. When the press faults the display will read "**STRT ERR.**"
12. Press the **MODE** button to enter the "**SET STRT**" programming sequence.
13. Press the **ENTER** button so that the previously programmed numbers are shown.
14. Using the **UP ARROW**, increase the numbers by 1/10 of a second. **EXAMPLE: If the last programmed numbers were 0.150, increase to read 0.250.**
15. Press the **ENTER** button to enter this new set of numbers into the Brake Sentry's non-volatile memory. The display should now read "**ITS SET.**"
16. Press the **MODE** button to exit the programming sequence.
17. Record the "**START TIME**" settings in your Electrical Press Inspection Sheet.
18. Cycle the press several times to ensure that there are "**NO START ERROR**" readings.

3.2.1.3 SETTING BRAKE WARNING TIME

Determining the **Brake Warning Time** can be accomplished by one of two (2) ways. Either by using the **TEST** sub-mode of **RUN** or by using the method of removing your hands from the two-hand activation devices to stop the press. The following explains both methods in detail. The method used is determined by the personnel programming the Brake Sentry.

METHOD #1

The first method is the method of removing your hands from the two-hand activation devices.

1. Set the press mode selector switch to the **INCH** mode position.
2. Using the two (2) press activation devices, cycle the press and stop the press at 90 degrees (3 o'clock). The display will now read "**CR=0.XXX**". This is the actual stopping time of the press at 90 degrees.
3. Repeat Step 2 recording a minimum of 20 readings.
4. Using the two (2) press activation devices, cycle the press stopping the press at 270 degrees (9 o'clock). Display will read "**CR=0.XXX**". This is the actual stopping time of the press at 270 degrees.
5. Repeat Step 4 recording a minimum of 20 readings.
6. Using the two (2) press activation devices, cycle the press and stop the press at 360 degrees (Top Dead Center). The display will now read "**CR=0.XXX**". This is the actual stopping time of the press at 360 degrees (Top Dead Center).
7. Repeat Step 6 recording a minimum of 20 readings.
8. Take the highest reading and record it on your Electrical Inspection Record Sheet.
9. Take the highest reading and add 10 percent to that number. **EXAMPLE: The highest stop time = .400. Multiply .400 X .10 = .04. Set "WARN TIME" = .440**
10. With the Brake Sentry keyed selector switch in the "**SETUP**" position, press the **MODE** button to enter the programming sequence.
11. Press the **UP or DOWN ARROW** until the display reads "**SET WARN.**"
12. Press the **ENTER** button.
13. Using the **UP OR DOWN ARROWS**, increase or decrease the numbers to read 10 percent over the highest stop time. In the case of the example in Step 9 you would move the number until the display reads **0.440**.
14. Once the correct numbers are displayed, press the **ENTER** button. At that time the display will read "**ITS SET**" indicating that this information has been stored in the

Brake Sentry's non-volatile memory.

15. Press the **MODE** button. The display will now read "REXCON."

NOTE: The percentage used for setting the "WARNING TIME" is only an example. If the percentage is increased the calculated safe distance will also increase.

METHOD #2

The second of the two (2) methods for setting the Brake Warning Time is by using the sub-mode "TEST" of the "RUN MODE."

As described on page 3-1, the "TEST" Mode is used to check the stopping time of the press at either 90/270 degrees or 70/250 degrees. The actual test is determined by the dip switch setting.

NOTE: Always ensure that the press is at TOP DEAD CENTER prior to performing this TEST.

1. Place the keyed **MODE** selector switch to the Single Stroke mode.
2. Enter the "TEST MODE" by simultaneously holding both the **UP AND DOWN ARROWS** for three (3) seconds. After three (3) seconds the display will read and flash the words "TEST MODE."

NOTE: You have one (1) minute to enter which test you would like to run.

3. Press the **DOWN ARROW** to enter stop time test for the down stroke mode. The setting of the Dip Switch determines whether it stops at 70 or 90 degrees.

NOTE: Once the DOWN ARROW has been pressed, you have 1 minute to cycle the press.

4. Cycle the press. The Brake Sentry will automatically disconnect the signal from the stop circuit in an attempt to stop the press at the angle selected.

5. Record the stop time displayed. (**CR=0.XXX**)

6. Press the **ENTER** button to exit the **TEST MODE**. **NOTE: You must exit the TEST MODE and re-enter if you wish to run more tests.**

7. Cycle press back to **TOP DEAD CENTER**.

8. Repeat steps 2 through 6 and record a minimum of 20 cycles to determine your highest stop time reading in the down stroke direction.

9. Enter the "TEST MODE" by simultaneously holding both the **UP AND DOWN ARROWS** for three (3) seconds. After three (3) seconds the display will read and flash the words "TEST MODE."

NOTE: You have one (1) minute to enter which test you would like to run.

10. Press the **UP ARROW** to enter stop time test for the Up stroke mode. The setting of the Dip Switch determines whether it stops at 250 or 270 degrees.

NOTE: Once the UP ARROW has been pressed, you have one (1) minute to cycle the press.

11. Cycle the press. The Brake Sentry will automatically disconnect the signal from the stop circuit in an attempt to stop the press at the angle selected.

12. Record the stop time displayed (**CR=0.XXX**).

13. Press the **ENTER** button to exit the **TEST MODE**. **NOTE: You must exit the TEST MODE and re-enter if you wish to run more tests.**

14. Cycle press back to **TOP DEAD CENTER**.

15. Repeat steps 8 through 12 and record a minimum of 20 cycles to determine your highest stop time reading in the DOWN stroke direction.

NOTE: If the Stop Time reading varies greatly between the UP Stroke Test and the DOWN Stroke Test, your counterbalance pressure may need to be adjusted.

16. Take the highest reading and record it on your Electrical Inspection Record Sheet.

17. Take the highest reading and add 10 percent to that number. **EXAMPLE: The highest stop time = .400. Multiply .400 X .10 = .04. Set "WARN TIME" = .440.**

18. With the Brake Sentry keyed selector switch in the **SETUP** position, press the **MODE** button to enter the programming sequence.

19. Press the **UP or DOWN ARROW** until the display reads "**SET WARN.**"

20. Press the **ENTER** button.

21. Using the **UP OR DOWN ARROWS**, increase or decrease the numbers to read 10 percent over the highest stop time. In the case of the example in Step 9 above, you would move the number until the display reads **0.440**.

22. After the correct numbers are displayed, press the **ENTER** button. At this time the display will read "**ITS SET**" indicating that this information has been stored in the Brake Sentry's non-volatile memory.

23. Press the **MODE** button. The display will now read "**REXCON.**"

NOTE: The percentage used for setting the "WARNING TIME" is only an example. If the percentage is increased the calculated safe distance will also increase.

3.2.1.4 SETTING BRAKE FAULT TIME

When setting up the Brake Sentry's Brake Fault Time, we will be using a factor of 5 percent above the Brake Sentry's Brake Warning Time that was previously set in 3.2.1.3. The following is how to set the Brake Sentry "**FAULT TIME**."

1. Place the keyed selector switch to the **SET-UP** position.
2. Press the **MODE** button to enter the programming sequence.
3. Using the **UP or DOWN ARROWS**, select the section titled "**SET FAULT**."
4. Press the **ENTER** button to enter the "**SET FAULT**" timing sequence.
5. Using the **UP and DOWN ARROWS**, increase the **FAULT** time to 5 percent above the **BRAKE WARNING TIME** setting. In our example from section 3.2.1.3, we set the **BRAKE WARNING TIME** at 0.440. The **BRAKE FAULT TIME**, using the 5 percent factor, is then set to 0.462.
6. Once you have the correct number showing in the display, press the **ENTER** button. At that time you will see the words "**ITS SET**" display. This is to confirm that the numbers you have selected are entered into the Brake Sentry's non-volatile memory.
7. Record the **Brake Fault Time** on your Electrical Inspection Report Sheet.
8. Press the **MODE** button to exit the programming sequence mode.
9. Place the keyed selector switch back to the **RUN** mode.
10. Press is now ready to be turned over to production.

NOTE: The percentage used for setting the "FAULT TIME" is only an example. If the percentage is increased the calculated safe distance will also increase.

3.2.1.5 SETTING TIME/DISTANCE DISPLAY

Now that the Brake Sentry **START TIME, WARNING TIME and FAULT TIME** have been set, an additional feature of the Brake Sentry can now be entered. This feature tells the Brake Sentry to display the calculated safe distance based on the OSHA formula. What this does for you is tell you in inches, how far the presence sensing device or operator controls must be from the pinch point of the press. To enter the **DISTANCE DISPLAY**, follow the steps listed below.

1. Place the keyed selector switch to the **SET-UP** mode.
2. Press the **MODE** button to enter the programming sequence.
3. Using either the **UP or DOWN ARROWS**, press the buttons until the words "**TIME/DIS**" are displayed.

4. Press the **ENTER** button.
5. Using the **UP or DOWN ARROWS** select the display that reads "**DISTANCE.**"
6. Press the **ENTER** button to enter the **DISTANCE** setting into the Brake Sentry's non-volatile memory. The display will display the words "**ITS SET**" confirming that the **DISTANCE** setting has been entered. Upon exiting the **SET-UP** mode, all stopping times will be converted and displayed into a calculated safe distance display.
7. Press the **MODE** key to exit. "**REXCON**" will be displayed confirming that you have exited the **Programming Sequence Mode**.
8. Press is now ready to turn over to production.

3.2.1.6 SETTING HOLD FAULT

Now that the Brake Sentry **START TIME, WARNING TIME, FAULT TIME and TIME/DISTANCE** have been set, an additional feature of the Brake Sentry can now be entered. This feature tells the Brake Sentry to either **STORE or NOT STORE** the last fault condition. If **STORE** is selected, the unit will not allow the operator to use the method of powering down the equipment to reset the faults. If **NOT STORED** is selected, then the last known fault can be reset by powering down the system. The default, if not programmed is **NOT STORED**.

To set the Rexcon Brake Sentry to store the last fault, follow the steps listed below.

1. Place the keyed selector switch to the **SET-UP** mode.
2. Press the **MODE** button to enter the programming sequence.
3. Using either the **UP or DOWN ARROWS**, press the buttons until the words "**HOLD FAULT**" are displayed.
4. Press the **ENTER** button.
5. Using the **UP or DOWN ARROWS** select the display that reads "**STORE.**"
6. Press the **ENTER** button to enter the **STORE** capability into the Brake Sentry's non-volatile memory. The display will display the words "**ITS SET**" confirming that the **STORE** capability has been entered. Upon exiting the **SET-UP** mode, all faults will require someone with the authorization to reset the fault condition.
7. Press the **MODE** key to exit. "**REXCON**" will be displayed confirming that you have exited the **Programming Sequence Mode**.
8. Press is now ready to turn over to production.

SECTION 4 BRAKE SENTRY TROUBLESHOOTING

4.1 Error Codes

The Brake Sentry display may show any one of seven (7) errors while running under normal conditions. All error messages will be flashing to alert the personnel that something may be wrong.

To reset an error condition, you must first determine what has caused the error and then repair it if possible. Once the error is corrected, obtain the key and turn the **RESET/RUN/SETUP** keyed selector switch to the **RESET** position and press the **ENTER** button. This position is a spring return to center, meaning that the keyed selector switch cannot be left in the **RESET** position.

If the system is not wired for a keyed selector switch, simply pressing the **ENTER** button will reset the system.

The following is the list of the seven (7) error codes and their meaning:

"STRT ERR" (1) Indicates that the press did not begin to move until after the amount of time set in the **"STRT TIME"** was exceeded.

(2) If the press seems to be moving within the preset amount of time, the encoder may not be operating or connected.

"FLASHING" indicates that the press did not stop within the amount **"STOP VALUE"** of time set in the **"WARN TIME."** The actual stopping time will flash for 30 seconds and then revert back to the **SAFE TIME/DISTANCE**. A **FLASHING STOP VALUE** is not required to be **RESET**.

"FLASHING" Indicates that the press did not stop within the amount **"FAULT"** of time set in the **"FAULT TIME."** This indicates that the **"STOP VALUE"** of clutch/brake could be worn. The Brake Sentry must be **RESET** to eliminate this condition.

"SEQ ERR 1" Indicates that the press began to move before the clutch was engaged.

Possible causes are:

1. - Clutch slipping.
2. - Encoder shaft is moving (i.e. by vibration).
3. - Backlash in mechanical linkage.
4. - Excessive play in mechanical linkage.
5. - Clutch I/O module is defective or not connected.

"SEQ ERR 3" Indicates that the press stopped before the clutch became disengaged.

Possible causes are:

1. - Broken encoder wires.

2. - Press actually stopping before clutch disengages.

3. - Mechanical linkages binding.

"SEQ ERR 4" Indicates that the press never stopped prior to the clutch becoming active again.

Possible cause:

1. - Press cycling too fast for **"WARNING"** or **"FAULT"** settings.

"SEQ ERR 5" Indicates that the press never stopped prior to the clutch becoming active again.

Possible cause:

1. - Press cycling too fast for **"WARNING"** or **"FAULT"** settings.

SECTION 5 SPARE PARTS LISTING

The following is a list of spare parts available through Rexcon Controls, Inc. Items that have an asterisk in front of them are items that can be purchased through their respective local distributor:

ITEM	PART NUMBER	DESCRIPTION
1	800-000007	Brake Sentry Motherboard Only
*2	900-000048	Output Relay Fuse (7AMP)
*3	900-000047	Power Supply Fuse (1AMP)
*4	900-000028	Input Module 2.5-28 Volts D.C.
*5	900-000026	Input Module 120V A.C.
*6	900-000030	Output Module 5 - 60 Volts D.C.
*7	900-000027	Output Module 24 - 280 Volts A.C.
8	800-000006	Brake Sentry Optical Encoder
9	800-000004	Brake Sentry Encoder Cable 35'
10	900-000034	Brake Sentry Shaft Extension

11	900-000035	2 PC Direct Drive Bracket
12	900-000001	1/4 X 20 Shock Mounts
*13	800-000010	Brake Sentry Keyed Selector Switch
14	800-000008	Brake Sentry Modified Enclosure Only
*15	900-000036	3/8" Love Joy Coupling
*16	900-000037	3/4" Love Joy Coupling
*17	900-000038	Love Joy Insert