



Overseer Manual

TABLE OF CONTENTS

1. INTRODUCTION PAGE

[1.1 Product Overview](#)

2. INSTALLATION

[2.1 Site Requirements](#)

[2.2 Control/Display](#)

[2.3 Electric Rotating Cam Switch](#)

[2.4 Strain Gauges](#)

[2.5 Standard Mounting](#)

[2.6 Weld Pad Mounting](#)

[2.7 Adhesive Pad Mounting](#)

[2.8 Electrical Connections](#)

[2.9 AC Power](#)

[2.10 I/O Connection](#)

[2.11 Die Protection Inputs](#)

[2.12 Communication Network](#)

[2.13 Rexnet Software](#)

3. OPERATION

[3.1 Overseer](#)

[3.2 Rexnet Software](#)

[3.3 Use](#)

[3.4 Customizing](#)

[4. CALIBRATION](#)

1.1 Product Overview

The Rexcon Overseer is the ultimate machine monitoring device that measures, monitors, and displays tonnage, monitors up to five independent inputs for die protection and provides an office to line monitoring and management software package so that machine and tool wear are reduced which in turns increases operational productivity to help produce a better quality part.

By continuously monitoring machine loads, the Overseer provides operator and supervisors with information about actual load distribution, set-up adjustments and tooling conditions. Also, provides for die protection to save expensive tooling from breakage due to jammed material, material buckling, misfeeds, parts not in position, etc..... All of this information is organized in a fast and efficient manner so the information can be used for future reference.

Operating characteristics and features of the Rexcon Overseer include:

- * Allows parameters to be set independently on 2,4,6, or 8 corners.
- * Provides early detection of tonnage changes for preventive maintenance.
- * Monitors up to four strain gauges at a rate of 2000 times per second checking each reading against user entered high and low tonnage settings.
- * Monitors up to five independent user programmable input probes for die protection.
- * Allows operator input for monitoring downtime.
- * Parts counter for production verification of parts per hour or day and total run.

2.1 Site Requirements

The following are suggestions that should be considered when a new installation of the Rexcon family of machine monitoring devices is being performed.

DIRT: All Rexcon devices are housed in a NEMA TYPE 12 oil-tight enclosure. The micro-electronics in the Rexcon devices are not very tolerant of a dirty environment. It is important that they not be removed from the supplied enclosure and to make sure that the enclosure remains tightly sealed at all times. If holes are punched in the enclosure, they need to be located and sealed so as to maintain NEMA TYPE 12 standards.

VIBRATION: All 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 controls panels located off the machine. Rubber shock absorbing mounts are recommended and are supplied with each unit.

ELECTRICAL NOISE: The micro-electronics that make up the Rexcon family of devices can be highly susceptible to "**ELECTRICAL NOISE**".

While every precaution has been taken in design and manufacture to avoid noise related problems, there are several installation considerations which can further protect against electrical noise.

INSTALLATION

The Rexcon Overseer is comprised of three basic units. A machine tonnage monitoring unit, a die protection unit and a communication network. Each one has components that must be installed. The tonnage monitoring has up to 8 strain gauges and a rotating electric cam switch (If one is not currently present). The die protection unit has up to 5 independent probes that must be mounted and the control/display unit. Cables and wires will need to be installed.

2.2 CONTROL/DISPLAY UNIT MOUNTING

There are three factors to consider when locating and mounting the control/display unit:

The control/display unit should be mounted within sight and reach of the machine operator.

It should be located in an area free from fluids or metal particle contamination.

2.3 ELECTRIC ROTATING CAM SWITCH

The electric rotating cam switch is a 1:1 ratio of ram motion that provides the Rexcon Overseer with the necessary signals that are needed to measure tonnage. Every press should currently have a rotating cam switch. However, if one is not present, we recommend you use Rexcon part number RC80-108-D-SP-X.

As they are other electric rotating cam switches that can be used, we are unable to provide you with installation instruction. Please contact our service department for detail assistants.

The signal that are provided by this unit has two functions:

- * Provides a signal for resetting the strain gauges to zero.
- * Provides a signal to tell the monitor to measure tonnage just as it is increasing and to stop measuring tonnage returns to zero.

2.4 Strain Gauges (installation and calibration)

The strain gauges are the heart of any tonnage monitoring system. Strain gauges work by measuring small amounts of tension and compression applied to the two ends of the cell. Because of the small amount of that they are detecting, the strain gauges must not be mounted in a stressed conditions.

Specific placement of the strain gauges varies from machine to machine with the following factors to be considered:

- * Strain gauges should be mounted in a location that stretches or compresses with the machine operating loads.
- * Select the thinnest cross section of that member on which the strain gauges are to be mounted.
- * Mounting site must have a surface that is flat with 0.020 inches. If surface is irregular or curved, it must be ground flat.
- * They should be mounted in a place where they will not get damaged.

2.5 Standard Mounting

1. Select mounting sites for the strain gauges.

CAUTION: When drilling make sure the holes are at a right angle to the surface. The strain gauge will not work properly if the holes are cocked or angled.

2. Using a #7 drill bit, drill a hole 1/2" deep and tap for a

1/4 X 20 thread.

NOTE: Make sure to scrape the surface to remove any paint or plastic filler that will affect strain gauge readings.

3. Mount the drill fixture, align it, and tighten the screw.
4. Using the drill fixture as a guide, drill four #7 holes.
5. Remove the drill fixture and tap the holes with a 1/4 X 28 tap.
6. Mount the strain gauges and tighten the bolts finger tight.
7. Proceed to Section 2.2 Electrical Connection.

2.6 Weld Pad Mounting

1. Select mounting sites for the strain gauges. (See Figure 2-3)

2. Attach the weld pads (supplied) to a positioning fixture.

CAUTION: The strain gauges must not be subjected to welding temperatures. Use the positioning fixture when welding the pads to the machine. If welding temperatures are applied to the strain gauges, their warranty is voided.

3. Weld the pads to the machine.

4. Make sure that the will withstand a minimum of 50 pounds of shear force.

5. Once the pads are cooled, remove the positioning fixture.

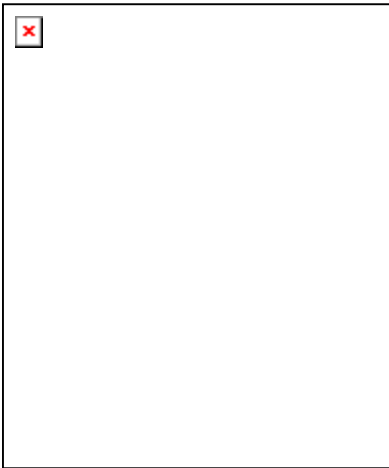


Figure 2-3

6. Mount the strain gauges to the pads using the mounting bolts, tighten finger tight only.

7. Proceed to Section 2.2 Electrical Connection.

2.7 Adhesive Pad Mounting

NOTE: This procedure requires that the press be shut down for a minimum of 24 hours.

1. Fabricate a strain gauge mounting jig with mounting holes exactly like those on the strain links or use a weld fixture. Use the jig or fixture in place of the strain gauge when mounting the pads to the machine. (See Figure 2-3)
2. Select the mounting sites for the strain gauges. (See Figure 2-1)
3. Mount the pads (provided) to the jig making sure that the assembly is straight and tighten the bolts.
4. Sand the paint from the mounting site and clean the pads and mounting site with a solvent such as alcohol, toluene, etc...

CAUTION: The surface where the pads will be mounted must be thoroughly clean. If there is even a thin coat of oil, the pads will not adhere properly.

5. Place the jig/pad assembly on the mounting site. Scribe the pad position on the press.
6. Mix the pre-measured bag of epoxy type cement according to the instruction to the package.
7. Apply an even 1/8" coat of cement to the entire foot of the pads.
8. Clamp the unit firmly on the scribed positions. Pads must be clamped for a minimum of 24 hours.

NOTE: Do not operate machine for a minimum of 24 hours while pads are clamped to machine. Epoxy must have this time to fully cure.

9. Remove the jig from the pads.
10. Mount the strain gauges to the pads finger tight.
11. Proceed to Section 2.2 Electrical Connection.

2.8 Electrical Connections

NOTE: When running cables and wires observe the following precautions:

1. Make all connections as direct as possible: keep cable and wire lengths to a minimum.
2. Keep wires and cables as far away as possible from field generating sources like electric motors, transformers, solenoids, relays, etc...
3. Low voltage signals wires should not run in the same conduit as high voltage wires.
4. Keep wires and cables protected and out of the way of fork lifts, push carts, or foot traffic.

2.9 AC Power Connection:

The Rexcon Overseer operates on 100-120 VAC, 60 Hz. that feeds a power supply that converts this to +5 VDC. This +5 VDC is used to provide power to the sensitive micro-electronics.

NOTE: The AC power must be as noise free as possible.

Connect the AC power leads to the straight through terminal block located on the lower shelf of the Overseer next to the 3 AMP

slow-blow fuse. See Figure 2-X on page 2-xx

NOTE: Some newer devices may have a combination Fuse/Switch installed rather than the conventional 1/4 turn glass fuse holder. If the unit has a Fuse/Switch installed, remember to make sure that it is in the "ON" position.



2.10 INPUT/OUTPUT (I/O) CONNECTION

All I/O connections to the Rexcon Overseer (except Strain Gauges) 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 OUTPUT** (black).

Both **DC** modules are polarity sensitive. If using two wires for the **DC** modules, the leftmost of the two terminals (odd numbers) is the positive terminal and the right terminal (even numbers) is the negative or ground terminal. **12 VDC** power is not supplied with the Overseer. There has to be a separate power supply available.

Both **DC** modules have a **LED** located on the top of the module to indicate that the module is active (voltage is applied).

The **DC** output modules are a fuse protected unit. The fuse is a button type fuse located at the bottom of the module. Please refer to the **SPARE PARTS LIST** for replacement information.

The **AC** modules work on the same principle as the **DC** module. The **AC** modules are capable of handling up to 250 VAC. However, the recommended voltage for this type of application is 120 VAC maximum.

As in the case of the **DC** modules, the **AC** modules have a **LED** located at the top to indicate that a signal is being received or sent. The **AC** output module also has a button type fuse located at the bottom of the module to protect the unit from damage. Please refer to the **SPARE PARTS LIST** for replacement information.

2.11 DIE PROTECTION INPUTS

The Rexcon Overseer uses up to five detection type devices (probes are recommended) to implement the die protection. There are three timed/cam inputs (1-3), one normally open input (4) and one normally closed input (5). (See Wiring Diagram 2-X)

A +12 VDC is recommended for the five die protection devices to insure that no one is injured in case of accidental exposure of bare wiring.

The +12 VDC is applied to terminal #1 and then jumper to the other four odd number (3,5,7 & 9) terminals. This +12 VDC is then transferred to the protection device with the return signal going back to the even numbered terminals (2,4,6,8, & 10). We recommend that a NPN circuit be used. See WIRING DIAGRAM 2-X for a more detailed look at the circuit wiring.

The timed/cam die protection inputs can operate in either of two modes. The timed mode or the cam mode.

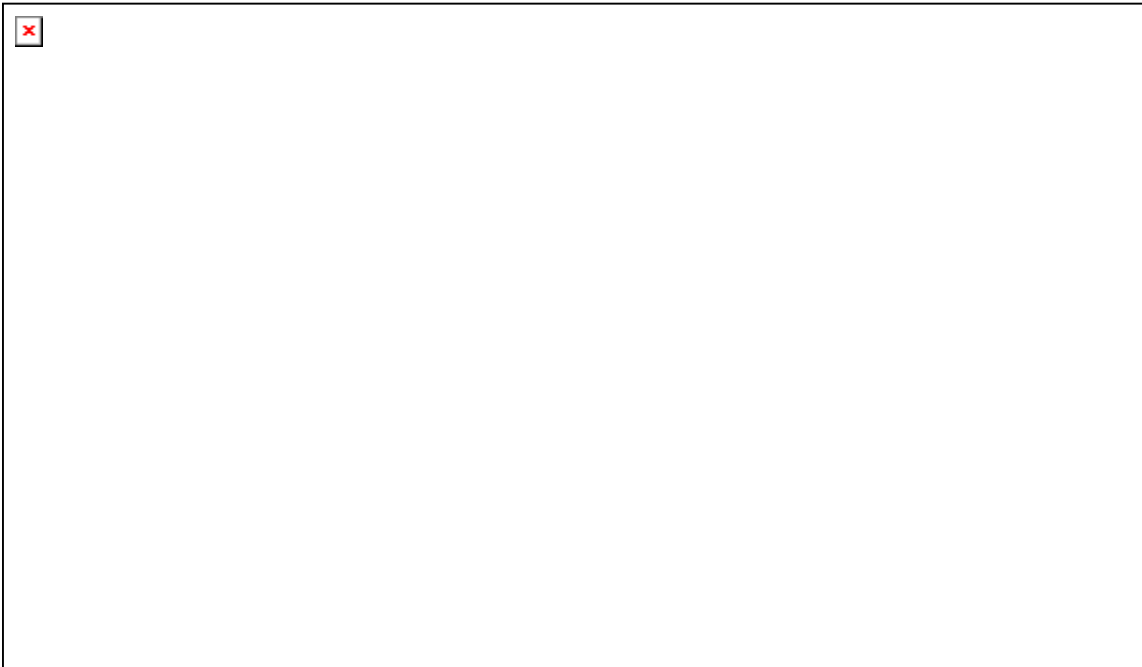


FIGURE 2-X

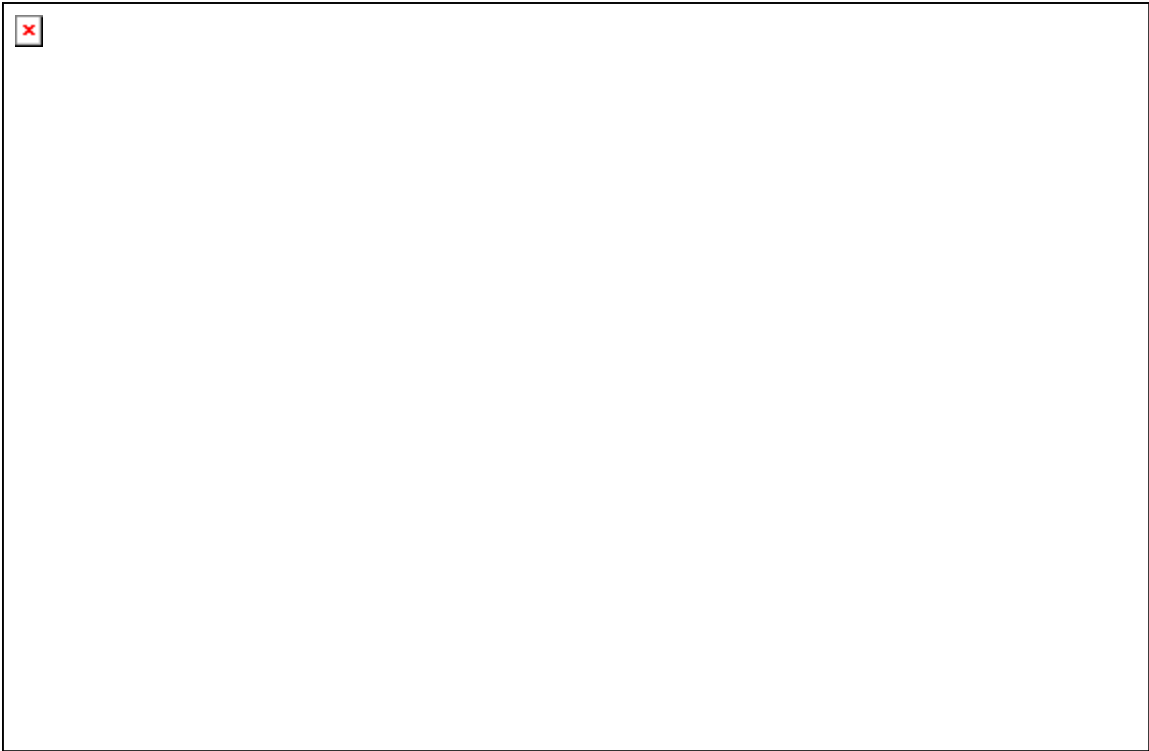


FIGURE 2-X

TIMED MODE

The time mode works with a set "WINDOW" in which the probe must be seen in the "ON" (active) state either just before or during the examine period. The length of the examine period is user definable from 0.001 to 9.000 seconds. For this system to work, you must have a cam switch on the machine. Once the cam switch is made, the examine period will begin. If the probe is not seen as "ON" either at the start of the examine period or during the examine period, a fault signal is immediately sent to the machine controls to shut the machine down. If the probe is "ON" prior to the examine period, a 000 time is reported. If the probe comes on during the examine period, the time that it took the probe to go active is reported.

A typical **TIME MODE** diagram is shown in Figure 2-X.

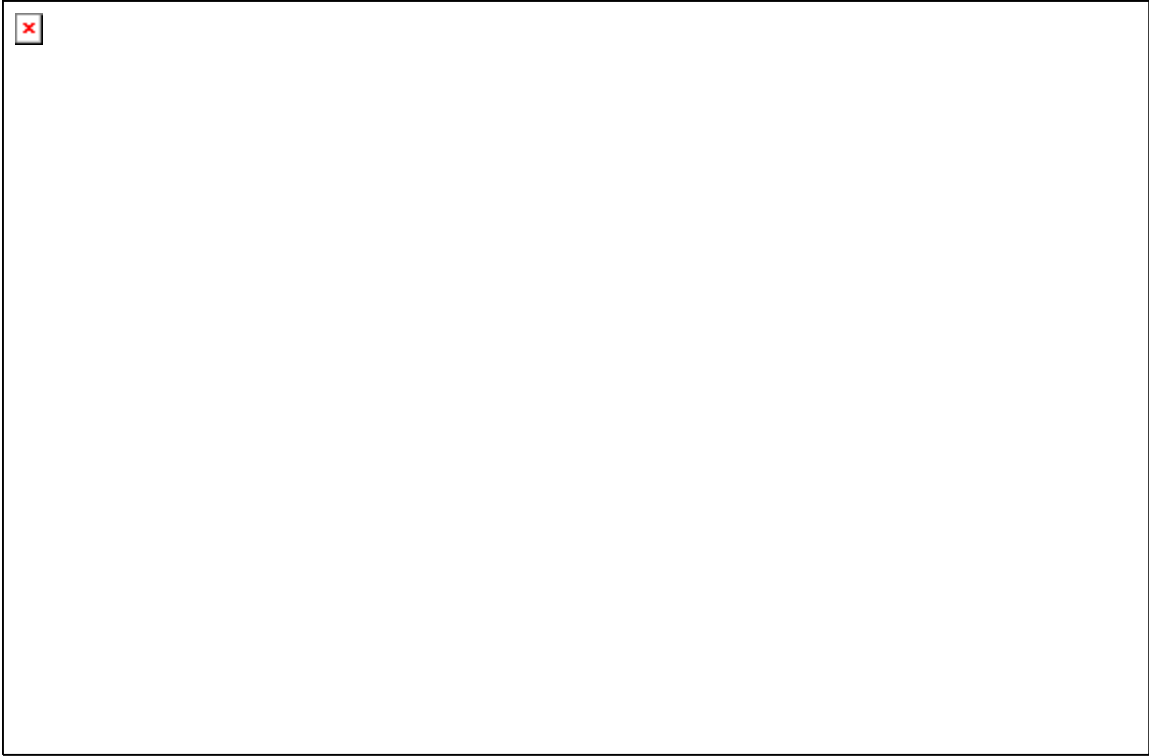
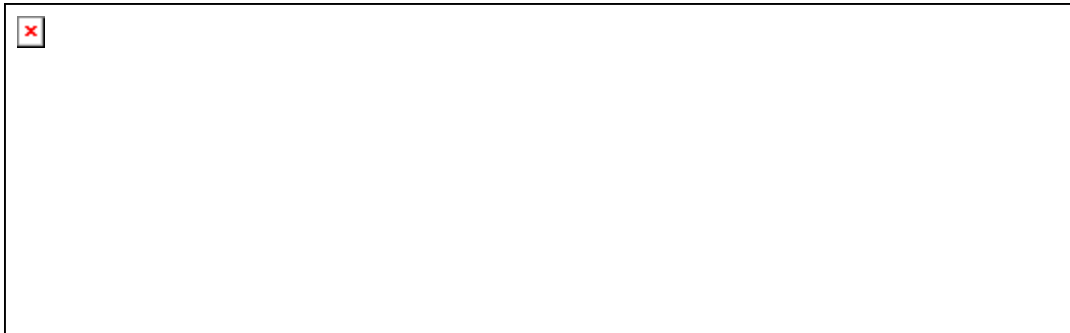


FIGURE 2-X

CAM MODE

In the **CAM MODE**, it works somewhat similar to the **TIMED MODE**, in that there is a window in which the probes are monitored. However, in this case, the window is not user programmable. How it works is when the cam switch is activated, the examine period begins. The examine period remains on until the cam switch is deactivated. If the probe signal is not seen in the active state when the examine period begins or during the examine period, a probe fault is sent immediately to the machine controls to shut the machine down. If the probe is "ON" prior to the examine period, a 000 time is reported. If the probe comes on during the examine period, the time that it took the probe to go active is reported. A typical **CAM MODE** is shown in Figure 2-X.

The Rexcon Overseer provides three outputs that allow a machine to be stopped by the device if a fault condition has been detected. The three separate outputs are **TONNAGE FAULT**, **PROBE FAULTS**, and **DOWNTIME FAULTS**. The three outputs are label on the circuit board **PROBE ERR** for probe faults, **DOWN** for downtime fault, and **FAULT** for tonnage faults. (See Wiring Diagram Figure 2-X)



FI
GU
RE
2-
X

2.12 COMMUNICATION NETWORK

CONFIGURATION

In order for the Rexnet communications to work properly, the network of devices must be set up correctly. The network has been designed for ease of installation, however, some planning must be done to insure that a reliable and expandable configuration is selected. All Rexnet devices attach to the network through what is called a **COM CHANNEL**. A single **COM CHANNEL** may have up to eight devices attached and can have a line length of up to 2000 feet. The basic Rexnet configuration contains only one **COM CHANNEL**, however, if more than eight devices are needed, a Data Concentrator is available to expand the one **COM CHANNEL** to up to 32 **COM CHANNELS**, with each one capable of handling up to eight devices. A typical one **COM CHANNEL** configuration is shown in Figure 2-X and a typical expanded configuration is shown in Figure 2-X.

Each Rexnet device contains two communication connectors. Devices are connected to a **COM CHANNEL** by chaining the devices together and installing a special terminating plug on the last device in the chain. The length of the chain **MUST NOT EXCEED 2000 FEET**.

If using the basic one **COM CHANNEL** configuration, there is only one major concern and that is that the eight devices and the personal computer **DO NOT** exceed 2000 Feet.

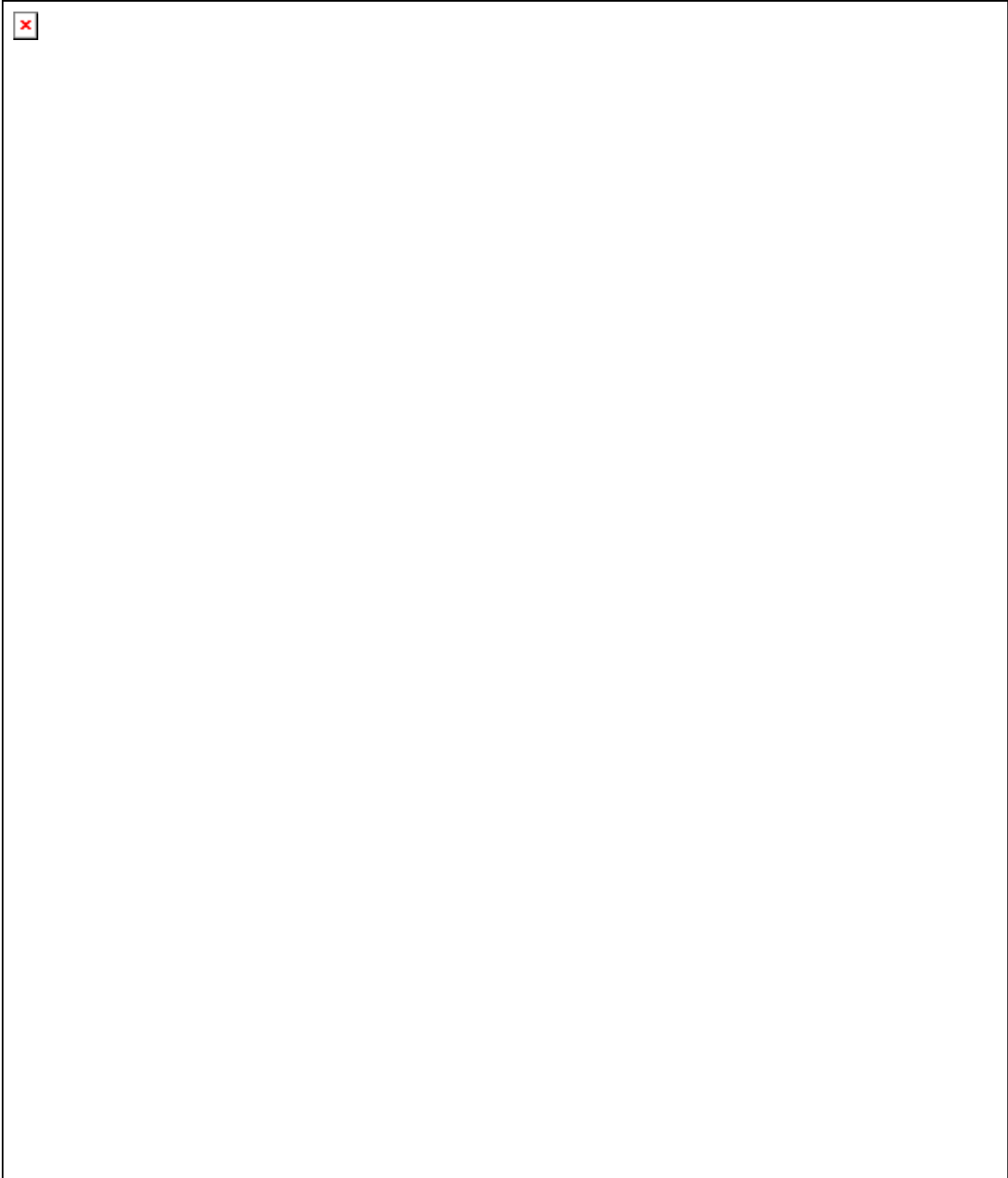


FIGURE 2-X

If using the Data Concentrator to expand the network, there are some additional considerations that should be taken into account. The most critical part of the network is the Data Concentrator. It must be no more than 2000 feet from the personal computer and it should be as close to the majority of the network devices as possible. Remember that a network cable has to be run to the first device on each **COM CHANNEL**.

CABLE CONNECTION

Devices

String the two pair twisted-shielded cable (Belden #9182), to the devices following the standard method of running wires.

Once you have the communication network wiring strung, you now need to make the connections at the devices and the personal computer.

Each Rexnet device board has two communications connection that allow the devices to be chained together. The cable connectors are found in the upper left portion of the circuit board with the top three-positions connector being the input signal and the lower three-positions connector being the output signal.

Connection is done using Phoenix connector Part #1757022 with the wiring being connected so that they match the designation on the circuit board.

If this device is the last in the chain for this COM CHANNEL, it must have a special terminator plug . Both connectors on each device must have a terminal occupying the circuit board connection.

PERSONAL COMPUTER

If the basic one channel configuration is used, a special connector is needed to connect the first device in the chain to the Rexnet Systems communication board in the personal computer. The PC communication board must have a five-position Phoenix Connector part #1757048. The connector must be wired according to the wiring diagram in Figure 2-X.

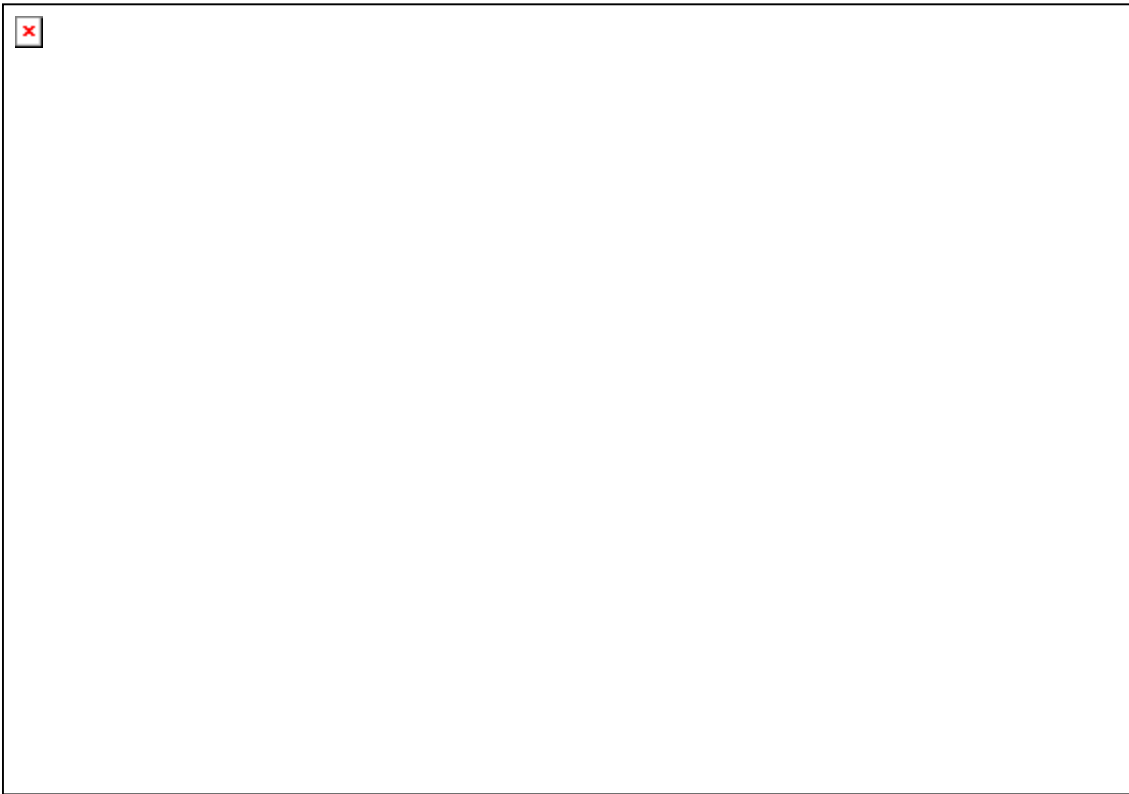


Figure 2-X Rexnet RAC Cable Wiring

NOTE: If the data concentrator is to be used, refer to its manual for instructions on connecting it to the personal computer.

Remember that the last device on a COM CHANNEL needs a special terminator plug installed in the unused communications connector. Both connectors on a Rexnet device should always be occupied either by communication cable or a terminator plug. If an empty connector is found, check the setup again.

ASSIGNING DEVICE ADDRESSES

The final step in setting up the communication network is to assign addresses to the devices. The device address allows the personal computer to distinguish between devices that are connected to the same COM CHANNEL. Each device on a COM CHANNEL must have a unique address. If there are two devices on a COM CHANNEL 1 assigned to address 3, for example, communication on that channel will be disrupted. The addresses are selected using the dip switch located on the main board of all Rexnet devices.

To set the device address, first remove power from the device, and move the switches to the desired positions according to the table below.



After selecting the address, the device will use the new address the next time power is applied. Be sure to record the address setting, COM CHANNEL, (i.e. which machine that device is on) for use in configuring the software on the personal computer.

2.13 SOFTWARE INSTALLATION

The supplied disk contains everything needed to run the Rexnet Overseer. While it is possible to run the Rexnet software from the floppy disk, it is highly recommended that a hard disk be used due to speed and storage considerations.

To install Rexnet on a hard disk, insert the supplied floppy disk in the the A: drive and type:

A:INSTALL

The install program contained on the disk will create a new directory on the hard disk call **REXNET**. It will then copy all the files, contained on the disk, into that directory. Once the files have been copied, the system can be started by typing **REXNET** then "enter" while in the **REXNET** directory.

As the program begins to run, it will read data from three of the files that have been installed on the hard disk. If any of the three files are missing or are damaged, an error message will be displayed on the screen and the program will continue, if possible.

The three files needed to start correctly are:

OVERVIEW.DA3 - This is the main system data files. It is used to save the complete system status from the last time the system was shut down. If this file is damaged or missing, a error message will be display and the user will be ask the question, "**DO YOU WISH TO CONTINUE WITHOUT THE OVERVIEW FILE?**" If the user wishes to continue, press the key **Y** (for yes) and press enter. At this time a new **OVERVIEW.DA2** file will be created. If the user wishes to terminate the program, press the **N** key (for NO) and "enter" and the program will terminate so the status of the overview file can be checked.

SHIFTS.DA3 - This file contains the Start and Stop times for shifts and breaks, if it is damaged or cannot be found, default times will be loaded.

MESSAGE.DA3 - This file contains the Downtime Messages for the system. If this file cannot be located or is damaged, default categories and reasons will be loaded.

On some systems, information may need to be added to the **AUTOEXEC.BAT** file of the personal computer before **REXNET** will run correctly. Refer to Appendix C for more information on this and other customizations to the **REXNET** program.

3 OPERATION

3.1 Overseer Operation

This section deals specifically with using the Overseer from a machine operators position. The front panel of the Overseer is described in detail first, followed by general operation information.

3.1.1 The Front Panel (See Diagram on opposite page)

A - **Four Corner Tonnage Display Windows:** These windows are used to display the last cycle peak tonnage for each of the four corners of the machine.

B - **Tonnage Warning Windows:** These windows give a visual indication of how close the last peak tonnage for a corner came to the corners set point. A tonnage that is halfway in between the High and Low settings for that corner will light only the middle green LED. As the tonnage gets closer to the high set point, the yellow LED and eventually the red LED will light. If the yellow LED and eventually the red LED light below the middle green LED, this indicates that the tonnage is reaching or has reached the low tonnage set point.

C - **PROBE STATUS AREA:** This area indicates the current status of each of the five available probes. The first column (green lights) indicate that a given probe is active. The second column (orange lights), indicates that a given limit switch for a given probe is active. Also, means that the examine period has started. The third column of lights (RED) indicates probe faults.

D - **MESSAGE WINDOW:** The message window is used to display different information depending on what mode it is in at the time. Normal display is the PART COUNTER. If needed to report downtime information, all prompting is done using this window.

E - **LAMP TEST BUTTON:** This button is used to test all the LED's for operation. All LED's will remain lit while button is pressed.

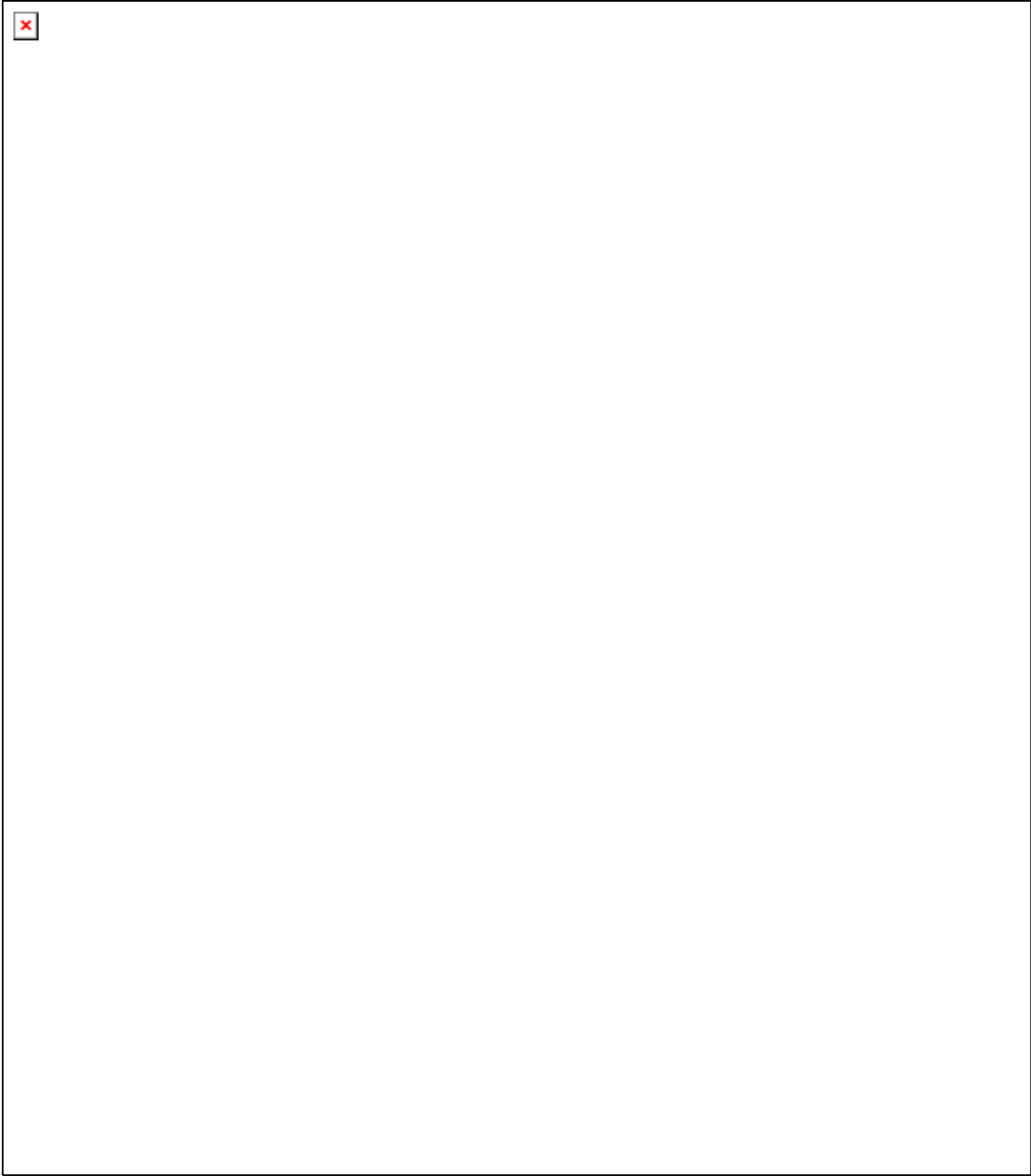
F - **NEXT BUTTON:** This button will toggle the message window between displaying the part count (PC=XXXX), the total peak tonnage (TT) and the down time message menu (DO).

G - **ARROW BUTTONS** (UP and DOWN): This buttons are used to select the downtime message once the down time message menu (DO) is selected or when a downtime message has been requested.

H - **ENTER BUTTON**: This button is used to send the downtime message to the personal computer once the correct message has been selected using the ARROW BUTTONS.

I - **RESET BUTTON**: This button is used to reset a probe fault, if one has occurred. If the message window is displaying Part Count (PC) and no probe fault is indicated, the part count will be reset to 0000.

J - **KEY SWITCH**: The key switch is used to enter SETUP MODE or to clear tonnage faults. To clear Tonnage Faults, turn the key to **RESET** for a moment, then turn it back to **RUN**. To understand the **SETUP** position, read the modes of operation, which follows.



Overseer Front Panel FIGURE 3-1

3.1.2 Overseer Operation

The Rexnet Overseer has two modes of operation, **RUN** and **SETUP**. The two modes of operation can only be selected by using the keys provided to switch between the two. The following is an explanation on how these two modes of operation work.

SETUP Mode - This mode is used to make changes such as dies and coil changes. When the Overseer is placed into the **SETUP** mode, they will be prompted on the message display to enter the reason for being in the **SETUP** mode. The operator will then use the up and down arrows pushbuttons to selected the proper response. Once the proper response is selected, the operator will then press the enter pushbutton to send the message to the personal computer. The reason for this is so that the downtime for machine can be monitored for future reference.

During the setup mode, you are limited to 50 cycles of the machine. The machine will not run more than the predetermined 50 cycles. The reasoning for this is that all the faults are monitored but will not shut the machine down due to this faults. Once 50 cycles are reached, the machine message display will display the message **"RUN"**. If more than 50 cycles are needed for setup, you can place the key switch back to the **"RUN"** mode and then back to **"SETUP"**. This will give you another 50 cycles. However, you must then re-enter the reason for setup message.

Once setup is complete, place the key switch back into the **"RUN"** position. The machine is now ready to assume normal operations.

RUN MODE - This is used during normal machine operation and should have little operator interface. However, the operator has three error conditions that needs to be addressed. They are **PROBE FAULTS**,

TONNAGE FAULTS, and **CYCLE TIMEOUT**. These three error conditions are explained in the following paragraphs.

PROBE FAULTS - This condition is recognized by the Fault LED (RED) in the PROBE STATUS AREA of the front panel (see Figure 3-1, C) being illuminated. If this condition exists, determine and repair what caused this fault to happen. Once the problem has been corrected, press the **"RESET"** button to clear the probe fault condition.

TONNAGE FAULTS - This condition is recognized by the HIGH or LOW LED's (RED) being illuminated in the TONNAGE WARNING WINDOWS of the front panel (See Figure 3-1, B). It only takes one of these HIGH or LOW LED's to be illuminated to caused this condition. If this condition exists, determine and repair what caused this fault to happen. Once the problem has been corrected, insert key into key switch and turn to **"RESET"** then turn by to **"RUN"**. The error condition is now cleared and the machine is ready to go back into production.

CYCLE TIMEOUT - This condition is caused by the machine not operating within a given time interval. This time interval is determined and entered in the personal computer. This condition is recognized because the machine will not operate and a message will be displayed in the MESSAGE WINDOW of the front panel (See Figure 3-1, D) reading, "ENTER DOWNTIME REASON". Select the appropriate downtime message by using the UP and DOWN arrow pushbutton. Once the appropriate downtime message is displayed, press the **"ENTER"** pushbutton to transfer this message to the personal computer. By pressing the **"ENTER"** pushbutton, you not only send the message, but it will also clear the **"CYCLE TIMEOUT"** fault condition. Once the above has been completed, the machine is ready to go back into production.

3.2 Rexnet Software

The section details the operation of the Rexnet Software on the personal computer side. An overview of the program operation is given, followed by a more detailed look at each function.

3.3 OPERATION

The Rexnet Machine Monitoring Software is simple to operate. All program control is done using the ten function keys (F1 through F10) and the four arrow keys. Depending on your personal computer depends on the location of these keys. All possible options are displayed in a menu bar located at the bottom of the screen. By locating the desired menu option and pressing the corresponding function key, the user controls the system. A map of the program is provided to aid in movement through the program. (See Figure 3-2)

The following pages goes into detail of how each individual function and screen works.

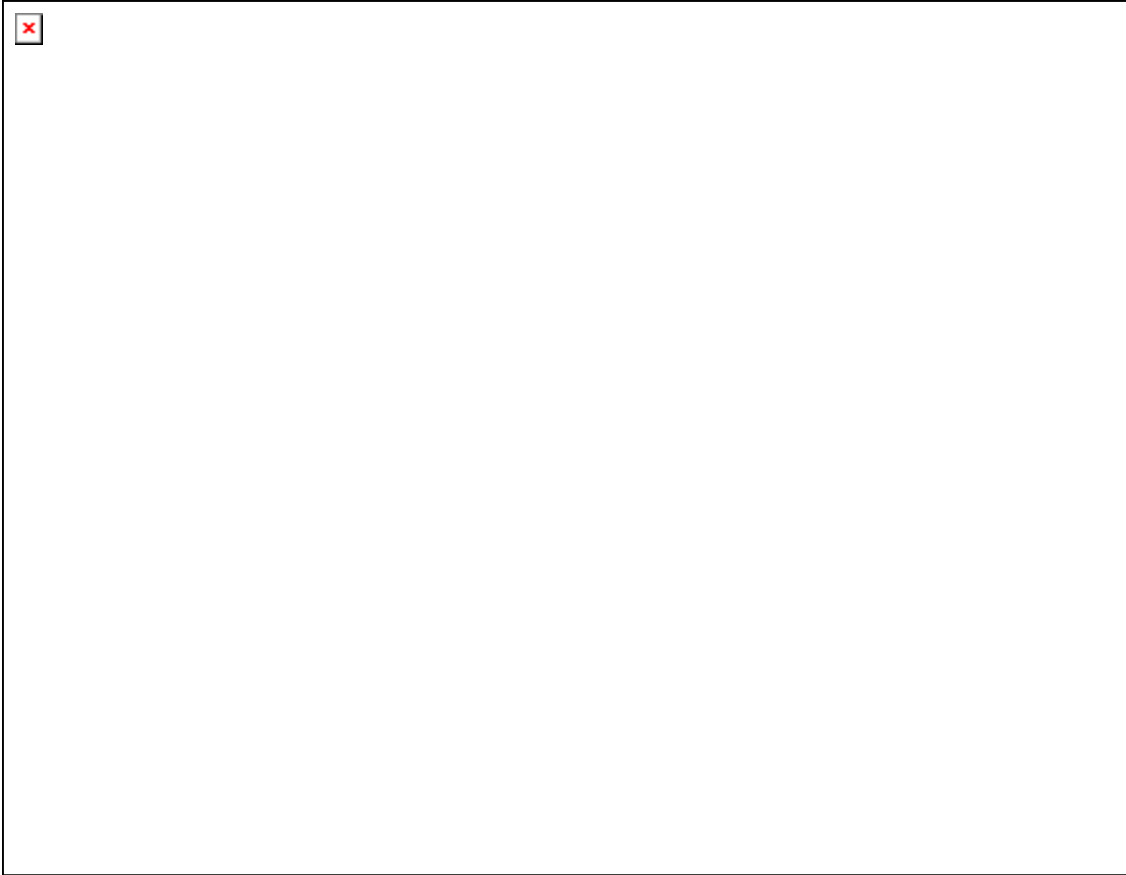


Figure 3-2 Rexnet Software Layout

OVERVIEW SCREEN

This is the first screen to appear after the program is started and is the main screen for the Rexnet System (See Figure 3-3). It is through this screen that the sub-screens are reached. Aside from providing access to the other screen in the program, this screen provides an overview of all machines connected to the Rexnet System. Up to sixteen screens can be viewed on this screen at one time. If there is more than sixteen machines connected to the system, the additional machines may be viewed by using the Up and Down arrows to scroll through the additional machines.

While in the Overview screen, the user may obtain an Overview printout of the machines attached to the system by pressing the function key **F3**.

You can only exit the Rexnet System through the Overview screen. By pressing the function key **F10**, the user can exit the Rexnet program

and return to **DOS**.

NOTE: DO NOT simply turn the computer off or reboot it as this will lead to a loss of data. The program saves the current set-up and status to disk before exiting. **F10 must be used to avoid data loss.**



FIGURE 3-3
Overview
Screen

SETUP COM (FUNCTION KEY F8)

Before the personal computer can communicate with the devices connected to the network, you must first enter the necessary information about the device.

From the **Overview** screen, select **F8 - SETUP COM**. Once this key is press, the Communication Setup screen will appear (See Figure 3-4).

This screen contains all the information about a devices communication settings. There will always be at least one device defined.

The first column of the screen is the **MACHINE NUMBER**. This is the number that you have assigned to the machine that the device is monitoring. (EXAMPLE: **P104**) You are allowed up to four (4) characters to assign a machine number.

The second column of the screen is **COM-CHANNEL** (communication channel). The standard Rexnet System is a one channel system with up to eight devices communicating on this channel. If you have the optional DATA CONCENTRATOR, you will then have four channels of communication and each channel capable of handling up to 8 devices.

The third column of the screen is the **DEVICE ADDRESS**. This is the dip switch settings in each of the eight devices on each **COM CHANNEL**. Each device must have a different dip switch setting for the communication to operate properly.

The final column indicates the **DEVICE TYPE**. This area of the screen is not user changeable. The system will automatically assign a **DEVICE TYPE**, if it is recognized as one of the Rexcon Family of devices, it will assign it a abbreviation of that device name.

Example: REP (Reporter)



Figure
3-4
Communications
Setup
Screen

On the right side of the screen, you will find a four box area that has the same names as the left side. We call this the working area, as this is where any changes you need to make are done.

You will also see an arrow pointed to the machine number. To change from machine to machine, use your Up and Down arrow keys to move between the different machines. If you use your Left and Right arrow keys, you can move between the Machine Number to COM-Channel to Device Address and back. If you need to make a change to one of the areas,

move the highlighted box to the area you want. Simply type in the new information and press **"ENTER"**.

If you are changing the **DEVICE ADDRESS**, or **COM CHANNEL** settings, Rexnet will first check for devices with the same settings. The device is requested to identify itself and the device type area will be updated. If there is already a device with the same settings that you are entering, it will not allowed the new information to be updated. It will flash an **ERROR** message across the right hand portion of the box being displayed.

ADD DEVICE (Function Key F4)

To add a new device to the system, follow the example below.

From configuring the communications network earlier, a new device has been added to Machine #15. Machine #15 devices are all attached to **COM CHANNEL 7**. The next available device address was address 4. Enter the Communication Setup screen and select function key **F4-ADD DEVICE**. After pressing **F4**, the working area of the screen will be cleared and the arrow pointing from the device list will disappear which indicates that a new device is being defined. First enter the new machine number that is going to be monitored. In this example enter **15**, then press **ENTER**. The highlighted area will now move to the **COM-CHANNEL** field. In this example enter **7**, then press **ENTER**.

The highlighted area now moves to the **DEVICE ADDRESS** field. In this example, enter **4** and press **ENTER**. The thing you will notice in the **DEVICE TYPE** area is the abbreviation **UKN**. This stand for unknown, but once the device at the machine is powered up, these area should change to the correct device type. If after power up, this area continues

to read **UKN** you will need to check to insure that the hardware has been setup correctly. If this area changes to the correct abbreviation, the communication setup is complete and the network is ready to operate.

ERASE DEVICE (Function Key F9)

If you need to remove a device from the device list, use the Up and Down arrows to select the device in the working area of the screen. Once you have the correct device selected, press **F9** to erase it. Before it erases it from the system, it will ask for you to answer **Y** for Yes or **N** for NO. If you answer **Y** for YES, the device will be deleted from the list. If you answer **N** for NO, you are sent back to the **COMMUNICATION SETUP** screen without any action being taken.

EDIT SHIFTS (Function Key F6)

One of the main functions of the Rexnet System is to monitor machine downtime. In order to get an accurate downtime recording, it is necessary to know when the machine should be producing parts. The Rexnet System uses a table of shifts to calculate downtime. (See Figure 3-5) To enter or change the shift table, press **F6-Edit Shifts** from the **Overview** screen.

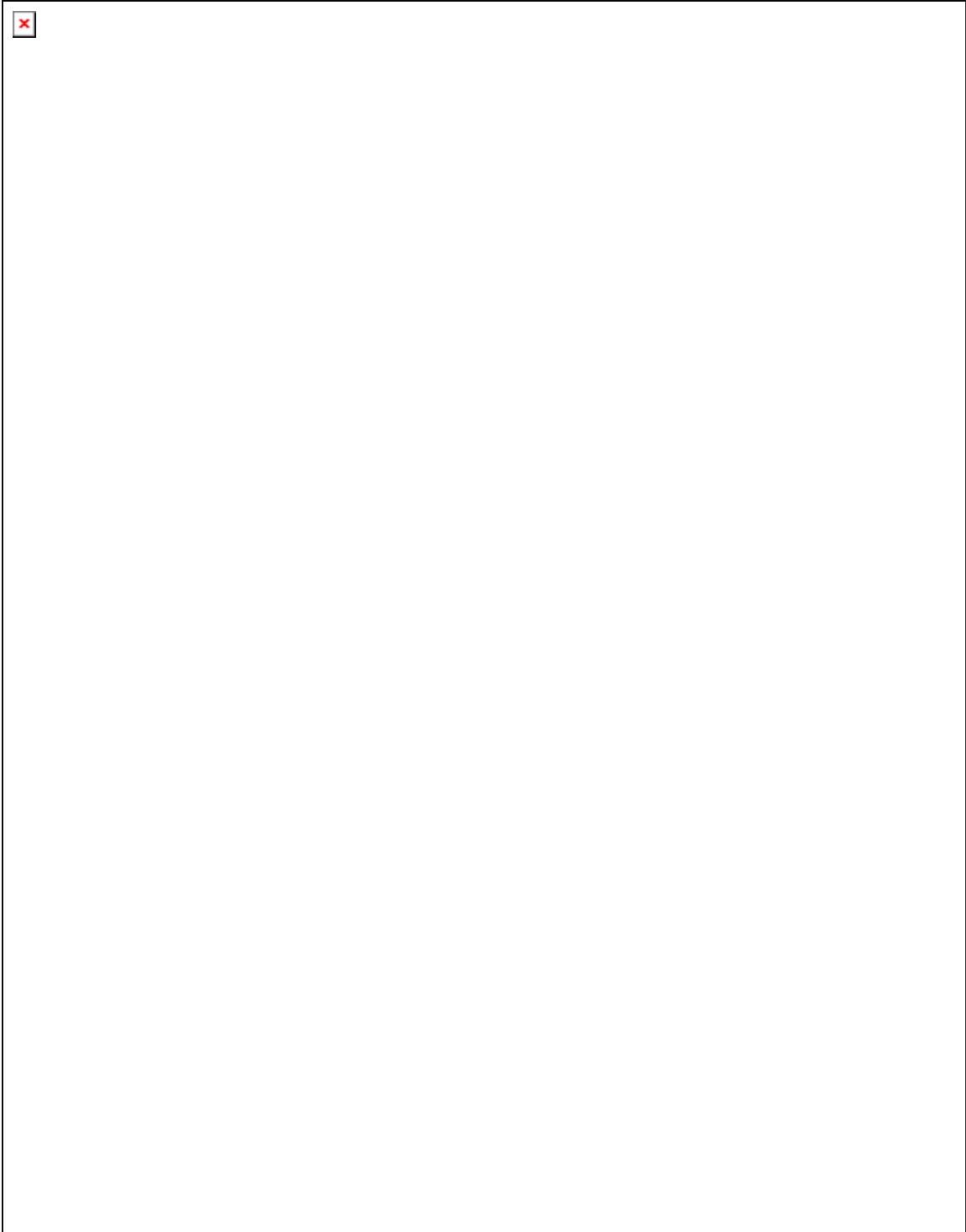


FIGURE 3-5 EDIT SHIFTS SCREEN

The **EDIT SHIFTS** screen allows the user to define up to four (4) shifts of operation each with up to four (4) breaks and a lunch.

It also allows the user to define which shifts, if any, are to run on a given day of the week. To change any value, use the UP, DOWN, LEFT, and RIGHT arrow keys to the desired field to be change and enter in the time or numeric value.

All entries are may in 24 hours mode (Military Time). Times with the hour of zero (0) must be entered with a zero (0) before the colon (:), for example, enter 12:30 am as 0:30 . A break or a shift may be disabled by setting both the START and STOP times for the shift or break to zero (0:00).

Any day can be disabled by removing all shifts for that day. To remove the shifts for that day, us your arrow keys to move the highlighted area to the title **SHIFTS RUNNING**. The numbers in the area indicate which shifts are running. For example, if 12 are in the box, shifts 1 and 2 are running. If 123 are in the box, shifts 1, 2 and 3 are running.

Due to the flexibility design in the system, shifts times can be assigned to other than normal thinking. For example, your shift 1 might have a start time of 23:00 hrs and stop time might be 7:00 hrs. Or, shift 1 might have a start time of 7:00 hrs and a stop time of 15:00 hrs. The user defines this to suit his companies needs.

Shift 4 was design to be used on the weekends when running other than your normal start and stop times. For example, your Saturday and Sunday start time is 8:00 hrs and stop time is 16:30 hrs. Instead of changing your normal shifts, you would enter these times in the Shift 4 segment and then

move the highlighted area to the shift running on Sunday and type in a 4 and then move to Saturday and type in a 4 again. This allows for proper downtime monitoring on odd shifts schedules.

The downtimes will be recorded anytime the program determines, from the shift table, that a machine should be running, but isn't. If a shift will not be working, (i.e. Holiday on a Monday) the program should be shut down, otherwise, the system would keep track of the day as downtime. (**F10 - Shutdown** from the Overview Screen)

In order for the downtime monitoring to work correctly, the system clock on the personal computer **MUST** match the plant time clock. To set the clock, in the personal computer, you must exit the Rexnet System program (**F10 - Shutdown** from the Overview Screen) and refer to your DOS manual on how to set the clock.

NOTE: Shifts that start before midnight but with more hours after midnight are charged to the day they are defined

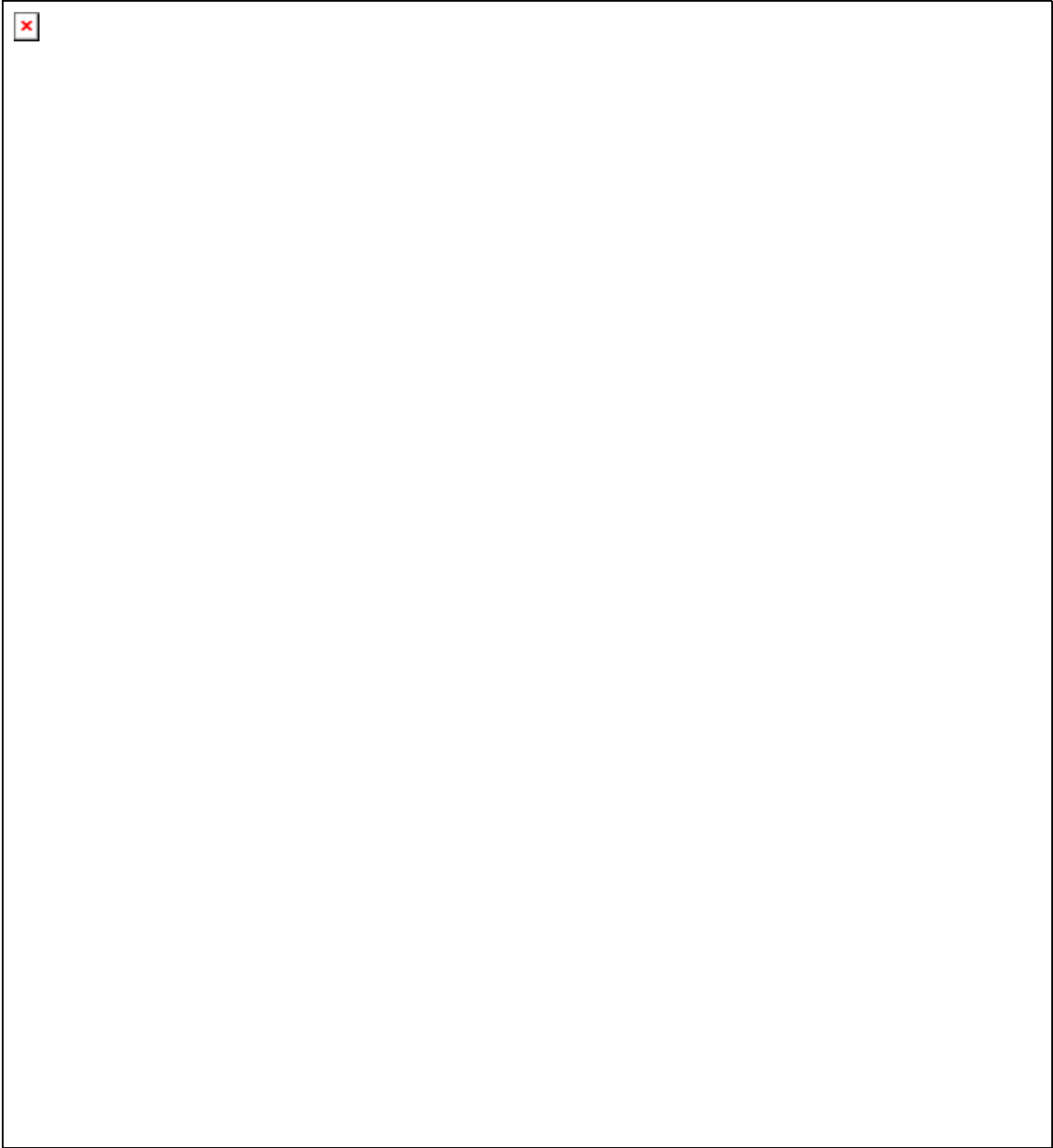
in. If a shift has more than one (1) hour before midnight, the hours after midnight will be charged to the day the shift began on.

SELECT DOWNTIME (FUNCTION KEY F7)

The Rexnet Machine Monitoring System allows the user to configure (define) the downtime messages for the system. The full table of downtime messages consist of nine (9) categories with each category having up to nine (9) reasons. Each category may consist of up to twenty-four (24) characters and each reason may contain up to twenty-four (24) characters.

To edit the Downtime Messages, press the **F7-SELECT DOWNTIME** function key when in the Overview Screen. The Downtime Selection Screen should appear. (See Figure 3-6)

On the Downtime Selection Screen, you have the nine (9) categories listed, in a column, just to the left of the center of the screen. The category highlighted is the one that may be edit at this time. If you wish to edit a different category, you must use the Up and Down arrows to move among the other eight categories. As you move from category to category, you will notice that each one will become highlighted. However, if you look above the column to the right of center, you will notice that there is an area that list **Reasons for category:** and that each category highlighted is also listed just below this title block.



Once you have the category highlighted that you wish to edit, simply use the normal keyboard functions to change the category. If you wish to delete a character, use the Backspace Key on the upper right portion of the keyboard.

Downtime Selection Screen Figure 3-6

To edit the Reasons for a particular category, move the highlighted area to the category you wish to edit and then using the Left and Right arrow Keys to shift to the REASONS column. You can now move the highlighted area up and down, to a particular reason, by using the Up and Down arrow keys and then type your new reason. Again the maximum length of a Reason is twenty-four (24) characters.

Also, on this screen, you will notice a square titled **COLUMN APPEARANCE**. This square is used to show you how the highlighted category will appear on the printed report. The printed reports, use up to two lines of seven characters, on each line, to display each category. (See Figure 3-7 and 3-8)

One important item to remember is that only the first eight (8) categories are used for calculating downtime. The ninth category is used for reasons that do not reflect a true downtime situation. An example of this type of reason would be **"NOT SCHEDULED"**, or **"NO OPERATOR"**.

If you have a printer connected to the personal computer, you can a hard copy of this screen by pressing the **F3-Print Selections** function key. Once all changes are completed, use the **F1-Overview** function key to return to the Overview screen. Pressing the **F1** function key also saves you selections and changes to disk.

MACHINE DETAIL (F1 Function Key)

This screen is where detail information and settings are handled for the machine selected.

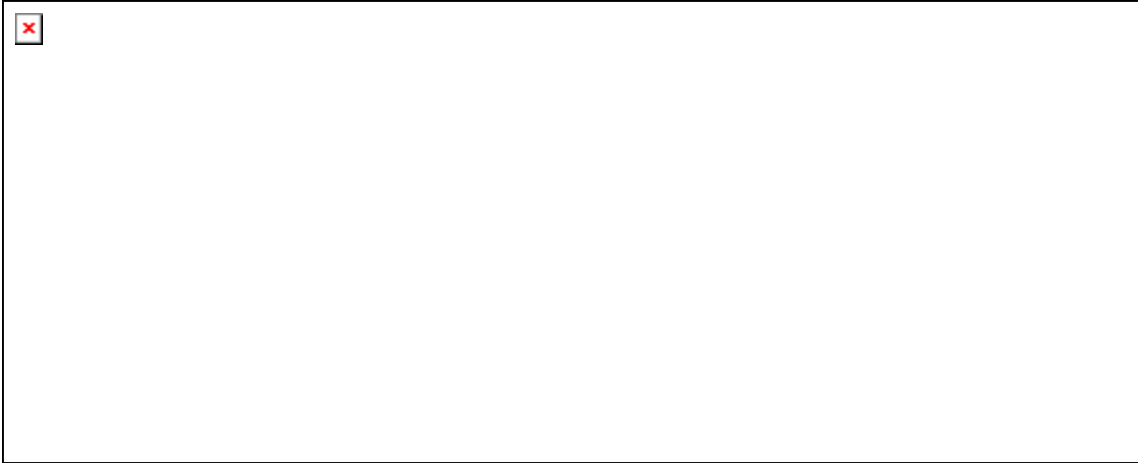
While still on the Overview Screen, use the Up and Down arrow keys move the highlighted area to the desired machine number, and then press the **F1-Press Detail** function key. The machine detail screen for the machine selected will be displayed. The screens that are shown are Figure 3-9, then 3-10. Figure 3-9 is the first screen that will be appear on the screen and will be the first one we discuss in detail.

A description of the screen is as follows:

A - PARTS/CYCLE: Displays the number of parts being produced per machine cycle.

B - STANDARD: Displays the number of parts per hour that the machine should be producing when in production.

C - CYCLE TIME (mins:seconds): Displays the time allowed without a machine cycle before the machine status switches to "IDLE". This display cannot be disabled.



Machine Detail Screen Figure 3-9

D - STOPPED SETTING: Displays the time allowed without the machine cycling before the machine status changes to stopped and the machine is actually halted. If this stop time is exceeded, the machine will not cycle until the operator enters the reason for the downtime. This feature may be disabled by changing the stopped setting to 0:00.

E - BATCH MODE: Displays the mode of operation. This display will display either **LOCKED** or **UNLOCKED**. If the unit is in the **LOCKED** mode of operation, a "**RESET BATCH COUNT**" command must be issued by the computer before the machine is allowed to run. If the unit is in the **UNLOCKED** mode of operation and a **BATCH COUNT** has been entered, the operator must press the **SEND** pushbutton on the Overseer before the machine is allowed to cycle.

F - BATCH SETTING: Displays the number of predefined cycles, then stopping after this number is attained.

G - BATCH COUNT: Displays the current number of cycles since the last "RESET BATCH COUNT" input.

H - % STANDARD: Displays the actual percent of the hourly standard that the machine is currently producing. (Example: 100.00 = 100.00 percent of the standard)

I - PARTS/HOUR: Displays the number of parts per hour based on the part count and the time in the job has been running. This information is updated once a minute.

J - PARTS COUNT: Displays the number of parts per press cycle seen since the last time the stats were reset. The number of parts per hour is setup in the standard screen which will be discussed later in the chapter.

K - CURRENT STOPPAGE: Display the amount of time that the machine has been down during the current machine downtime.

L - CURRENT STATUS: Display the current status of the machine selected. (Example: Running)

M - STATUS: Displays the current status of Probe 1 to 3. Will either display "In Use" or "Unused".

N - SETTING: Used to display and change the probe setting (in seconds) for the probe highlighted. To disable a probe move the highlighted area to the probe to be disabled.

O - TIME: Displays the actual probes times from the last machine cycle. All times are in seconds and if any time is

preceded by a ">" the then actual time was greater than the displayed time.

P - PROBES: Displays the probe number. This block cannot be changed.

Q - LAST RESET: Displays the last time and date that the statistics for the current job on the machine selected was reset. This display is not user definable.

R - JOB NUMBER: Displays the current job number that is assigned and running on this machine.

S - TONNAGE HIGH SETTING: Displays the user definable maximum allowable tonnage on a corner before an over tonnage fault occurs. If the user desires to change this value, move the highlighted box to the corner that desired and type in the new value.

T - HIGHEST LOAD: Displays the highest tonnage recorded since the last time the statistics were reset.

U - HIGH ALARMS: Displays the number of OVER-TONNAGE faults that have occurred since the last time statistics were reset.

V - TONNAGE LOW SETTING: Displays the user definable minimum allowable tonnage on a corner before an under-tonnage fault occurs. If the user desires to change this value, move the highlighted box to the corner that desired and type in the new value.

W - LOWEST LOAD: Displays the lowest tonnage recorded since the last time the statistics were reset.

X - LOW ALARM: Displays the number of UNDER-TONNAGE faults that have occurred since the last time statistics were reset.

Y - AVERAGE LOAD: Displays the average tonnage recorded on a given corner since the DETAIL mode was entered or since the last time the statistics were reset.

Z - LAST LOAD: Displays the actual tonnage recorded on a given corner plus total tonnage of all corners on the last machine cycle.

The Function keys that are available for use on the "Machine Detail" screen are as follows:

F1-OVERVIEW - Used to return to the Overview Screen.

F2-CATEGORY EXPAND - Used to go to the second screen available while in the Machine Detail mode. (See Figure 3-10 for screen)

F3-Print - Prints detailed report to the printer attached to the personal computer.

F4-Reset Batch Count - Resets the batch count to zero.

TAB-MORE - Used to change the function key display area to the next available set of function keys.

F5-WAVE - Used to display the Wave forms for the four corners.

F7-SEND SETUP - Used to send the setup information to the device connected to the machine.

F8-RESET STATS - Used to reset statistics to zero.

F9-RESET JOBS - Used to reset job number.

TAB-MORE - Return the function keys to the original set.

A description of the category expand screen (titled Stats for Machine #XXX) is as follows:

A - Total Run Time: Total run time of the Job Number displayed.

B - Total Down Time: Total down time of the Job Number displayed.

C - Not In Use: Displays the amount of time the machine was not in use.

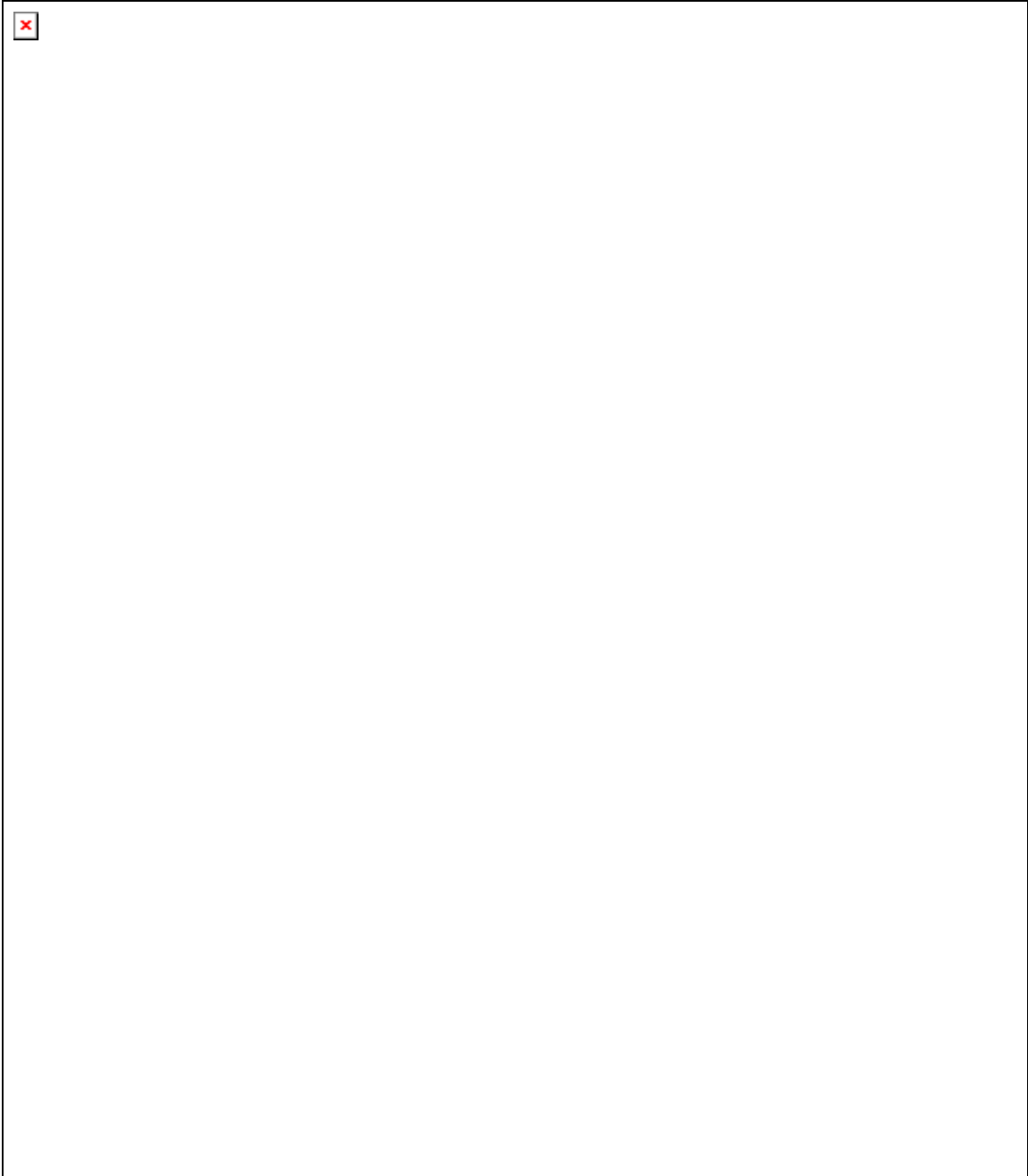
D - Unknown downtime: Displays the amount of time the machine was down due to unknown reasons.

E - Used to display categories that are toggled on that the operator may use to explain downtime at the machine. If they are displayed, they are used for calculating downtime.

F - % of downtime: Displays the percent of downtime per each category listed.

G - Time (DDD HH:MM): Displays the number of days, hours and minutes for each item under the Explanation heading.

(Example: 1 5:30 reads 1 day, 5 hours, and 30 minutes)



Category Expand Figure 3-10

The function keys that are available for use with category expand screen "Stats for Machine #XXX" are as follows:

F1-Detail: Returns the user back to the Machine Detail screen.

F2-Category Expand: Used to expand to the third screen available while in the Machine Detail mode.(See Figure 3-11)

F3-Print Stats: Prints a detailed report to the printer attached to the personal computer, of the information shown on the screen.

If in the second screen (Stats for Machine #XXX) and you wish to toggle downtime Explanations from On to Off, press the function key **F2-Category Expand**. A new screen will appear that displays the downtime messages that the operator sends to the Rexnet Monitoring System when a machine is down. (See Figure 3-11) In this screen there is up to nine (9) downtime categories that have been defined. A description of the Categories for Machine #XXX are as follows (See Figure 3-11):

A - Category: Displays the list of the nine downtime message that have been previously entered for operator use.

B - IN USE: Displays whether a downtime message is usable for the job number listed. This message may be toggled either Yes or No.

The three function keys that are available for use while in the "Categories for machine #XXX are as follows:

F1-Detail: Returns the user back to the Machine Detail screen.

F3-Print Categories: Prints a detailed report to the printer attached to the personal computer, of the information shown on the screen.

F8-Toggle Use: Used to toggle the category highlighted from No to Yes or from Yes to No. If the category is toggle to No, the category will not be displayed in the Stats for Machine screen (See Figure 3-10 for example) and **cannot** be used by the operator.

Press **F1-Detail** to return to the Machine Detail screen and then press **F1-Overview** to return to the Overview screen.

3.4 Customizing Software

There are three (3) customizable aspects of the Rexnet software. They are optional and include the display of the title screen, changing the default time for the screen saver function and changing the default time for the data auto-save function.

To be able to change any one of the three customizable aspects, you first must use a text editor (i.e. EDLIN) and add the three variables to the **AUTOEXEC.BAT** file found in your personal computer.

Refer to your DOS manual on how to use the EDLIN function in DOS or seek help from your MIS department.

Once in the **AUTOEXEC.BAT**, add the following variables:

```
SET REXTITLE=n
```

Where "n" is either 1 or 0. If 1 is set, the title screen will be displayed (default). If "n" is set to 0, the title screen will not be displayed. This setting is included to provide compatibility with some graphic controllers. If the Rexnet software leaves the screen all black or all white when started, reboot your system and enter your text editor and change the setting of REXTITLE to 0, in the **AUTOEXEC.BAT** file. Once the setting is change, you can either reboot your computer, or you can type in **AUTOEXEC** at your computer prompt which will run the **AUTOEXEC.BAT** file again thus issuing the new settings for **REXTITLE**.

```
SET REXSSAVE=n
```

Where "n" is a number from 5 to 255 (default is 15). This number sets the time, in minutes, on how often the program will wait for a keystroke before going into screen saver mode.

```
SET REXASAVE=n
```

Where "n" is a number from 5 to 255 (default is 60). This number sets the time, in minutes, on how often the program will automatically backup the currently loaded configuration and data to disk. All currently loaded jobs are saved to disk during this backup but not individually - only as a group which is available only to the program (not user loaded).

SOFTWARE MAINTENANCE

The Rexnet software is a machine monitoring program that is continually recording information while it is running. Whenever any file backup operations is needed to be performed, the program must be shut down. This should only be done when production is not running. Typically, this would be done on the weekend or a off shift. Never terminated the program during a shift, as the current shift statistics will not be correct when the program is restarted.

There are four main files that are used with the Rexnet software and they are as follows:

REXNET.EXE - This is the main program.

OVERVIEW.DA3 - This is the file that contains the communication setup, machines in operation, jobs in operation, and job statistics.

SHIFTS.DA3 - This is the file that holds the current shift schedule.

MESSAGES.DA3 - This is the file that holds the downtime messages for the system.

REXNET.EXE

This file should be copied from the install disk that comes with the system. This file does not change when in the system running.

OVERVIEW.DA3

This is the most important file to backup at a regular interval due to the fact that it is continually be updated during machine operation. We recommend that it be backed-up at the end of each shift to ensure that if the current file is ever corrupted, the only loss of data would be one shift's worth.

SHIFTS.DA3 and MESSAGES.DA3

This files hold the system information regarding the shift schedule and the downtime schedule, respectfully. This files need only be backed up when changes have been entered into either area. It would be safe to get in the routine of making a copy of these files every week.

There are additional files that hold the shift and daily downtime statistics which are overwritten when the current shifts ends. This files are as follows:

SPREAD0.DA3 - Daily Totals

SPREAD1.DA3 - Shift #1 Totals

SPREAD2.DA3 - Shift #2 Totals

SPREAD3.DA3 - Shift #3 Totals

SPREAD4.DA3 - Shift #4 Totals

Normally, these files are viewed and printed, but since these files change daily, the backup procedure would need to be done daily, if required. **NOTE:** Shift files change when their respective shift ends.

There is another file that is created by the Rexnet system called job files. These files are created when the person, in charge, request that the program save the job that is currently running . The format of these files is: **JOB NUMBER.U##** where **JOB NUMBER** will be the current job number entered on the detail screen. The **U** designates that the file is a job file for an Overseer, and the **##** is a two digit coded number representing the machine number.

EXAMPLE: If job number 405001 is running on machine number 115, the job file will be 405001.U37.

SECTION 4 CALIBRATION

All Rexcon tonnage monitoring devices **MUST** be calibrated before they can be used. This section explains the calibration process. It is necessary to have a tonnage reference device such as a portable load cell system in order to calibrate a Rexcon tonnage monitoring device.

Two things must happen before a device can be calibrated. One is that the device must be in the **INSTALL** mode and the other, is that the strain gauges must be properly install and aligned.

INSTALL MODE

The first step in aligning and calibrating the device is to power up the device and place it in the **INSTALL** mode. The instruction that follow describes this procedure.

1. Open the front cover of the device and located the four position dip switch. Located just left of the center of the circuit board. (See Figure 5-1)
2. Place switch number 4 to the **OFF** or **OPEN** position.
3. Close the front cover and move the key switch to the **SET** position. The device is now in the **INSTALL** mode.

ALIGNING STRAIN GAUGES

After the strain gauges have been installed, the alignment must be checked to insure that they are not under stress due to twisting or uneven surfaces. To check this alignment follow the procedure listed below.

1. The first message you will see is **"Please enter the reason for setup."** Press the **Enter** button twice until the message **"TT=XXX"** (Total Tonnage) is displayed.
2. Now press the **NEXT** button once until the message **"Install"** is displayed. If you accidentally press the **NEXT** button more than once, simply keep pressing it until the message **"INSTALL"** appears again.
3. Once the display reads **"INSTALL"** and the four corner HIGH/GOOD//LOW display lights up, the strain gauges can now be checked and aligned if necessary.
4. The bar graphs for each corner should have the center green LED lit for a properly installed and aligned strain gauge. If the Yellow LED's either above or below the Green LED is lit, you have a borderline installation. If the RED LED is lit, this indicated that the particular strain gauge is improperly installed.

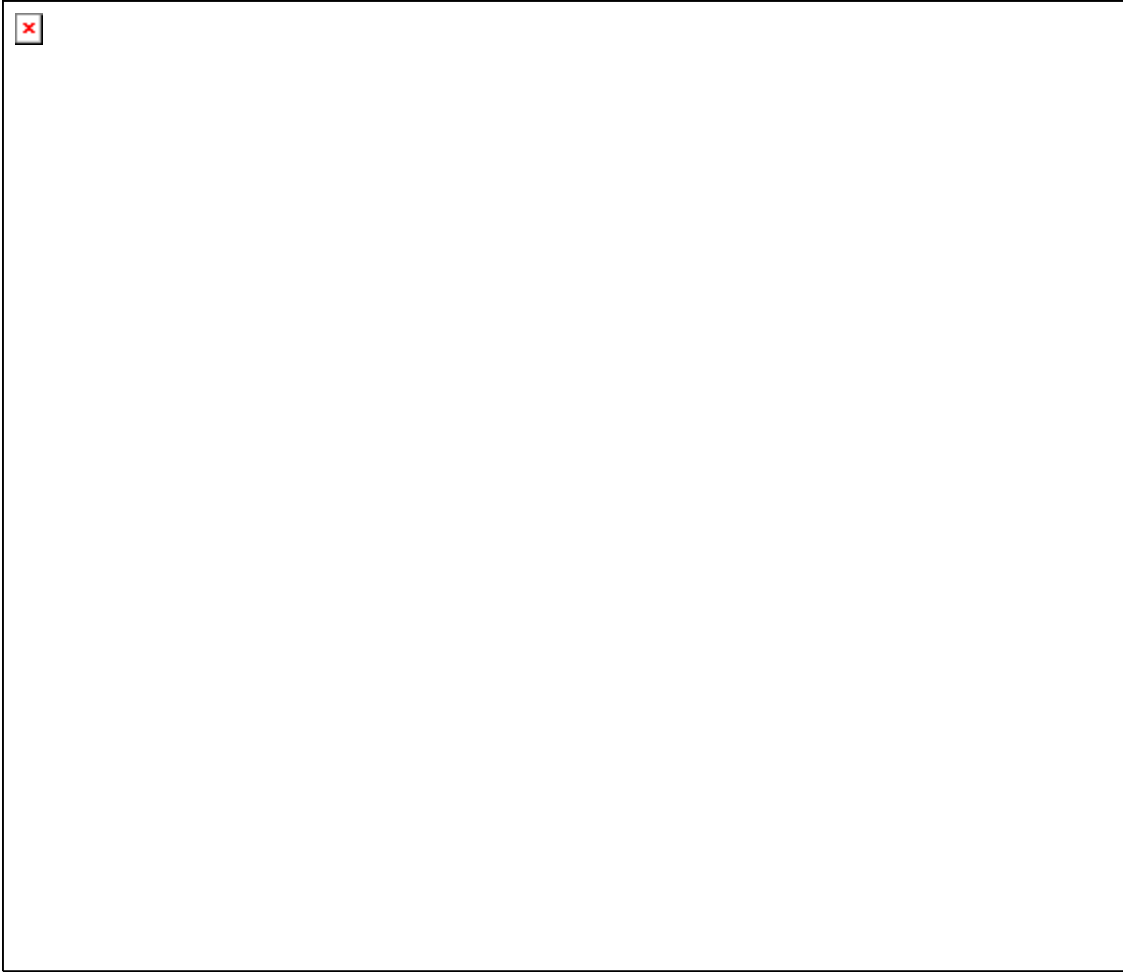


FIGURE 5-1 CIRCUIT BOARD LAYOUT

5. Adjust the necessary strain gauge by loosening or tightening the bolts as need to get the green LED's to light. In some cases, it maybe necessary to shim a particular strain gauge to obtain a green LED reading. Once all strain gauges are aligned, you can now proceed to calibrate the device.

NOTE: If the machine was previously calibrated and you had to re-align the strain gauges, it will be necessary to recalibrate the device again.

CALIBRATING

1. Inch the machine down to **BDC** (Bottom Dead Center) and turn the machine off.

2. Place the portable load cells under the connecting arms to insure even distribution of the load to the machine frame or the tie rods. It may be necessary to place precision parallels under the load cells to bring the load cells with a 1/4" of the ram surface.

(See Figure 5-2)

IMPORTANT: Parallels must be precision and true to size and must be free from oil and grease. Insure bottom side of ram is also clean.

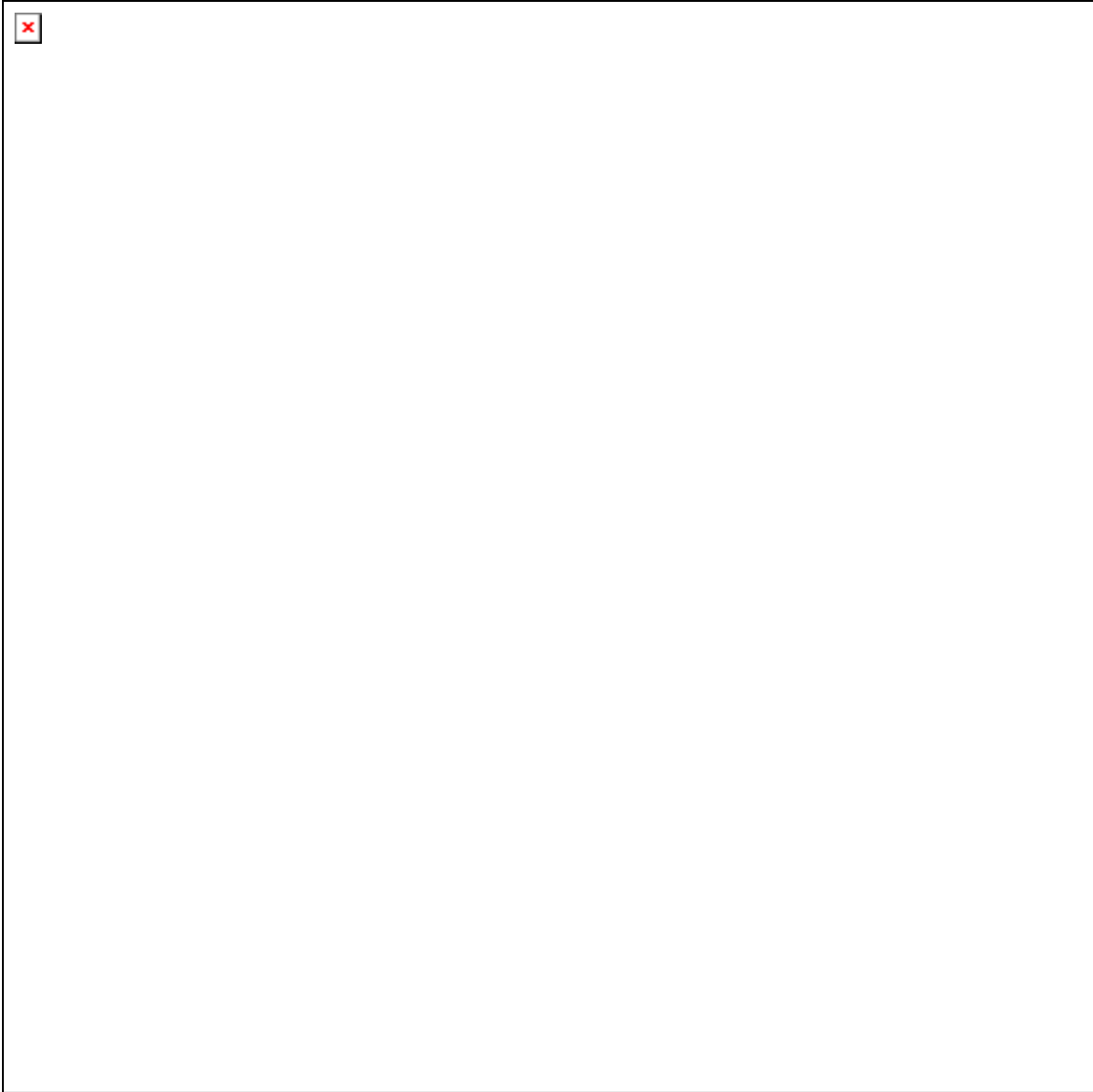


Figure 5-2 Typical Machine Calibration Setup

3. Turn machine power on and cycle machine back to **TDC** (Top Dead Center).

4. Adjust ram down a few thousands of an inch and cycle machine. Continue to adjust the ram down and single cycle machine until contact with the load cells is indicated.

5. Once contact is indicated, continue to adjust ram down a few thousands at a time and single cycle press until the portable load cells indicate approximately 40% of total tonnage capacity of the press. For example: 40% of a 200 ton press would be 80 tons. Each load cells should read 20 tons.

6. Each load cell tonnage reading should be within 3% of each other. If not, it will be necessary to shim the load cells to equally distribute the load between all four load cells.

NOTE: When shims are used, the amount that an area is shimmed relates to the amount that the ram is off in that area and may need separate adjustment.

7. Continue to adjust ram down a few thousands at a time and single cycle press until the portable load cells indicate approximately 75% of total tonnage capacity of the press. For example: 75% of a 200 ton press would be 150 tons. Each load cells should read 37.5 tons.

8. If 75% of total tonnage has been reached but the four corners are not within 3% of each other, re-shim as necessary to equal out the load and adjust ram down again a few thousands and cycle press.

It is important that the tonnage on a corner represent an average operating load. An average load will provide a more accurate calibration than a Too Low or Too High of a load will.

Now that the machine is calibrated you must enter these values into the Rexcon device to calibrate it. The following are the procedures to follow to accomplish this.

1. With the device still in the **INSTALL** mode, press the **NEXT** push button until the message in the window reads "**CAL TONS**". (Calibrate Tons)

2. Press the **ENTER** button. This will blank out three of the four digital readout windows leaving the window labeled **LF** (left front) displaying information.

3. Cycle the machine once and read the tonnage from the portable load cell for the left front corner.

4. Using the **Up** and **Down** arrow keys, enter the value into the Rexcon device. When the value matches the value read from the portable load cells, press the **ENTER** button. The message display should be asking for verification to use the new values. Actual message is "**PRESS ENTER TO CALIBRATE OR NEXT TO CANCEL**".

5. Press the **ENTER** button again. The message window will display the message "**STORED**" for several seconds and then "**CALIBRATION TONNAGE - NEXT=NEXT CORNER - ENTER = STORE VALUE**". This message will continue to scroll across the screen until direction are followed.

6. Press the **NEXT** button to move onto the next corner and repeating steps 4 and 5 until all corners are calibrated.

NOTE: If a corner is not going to be used, set its tonnage to zero (0).

When the **NEXT** button is pressed after the last corner (**RF** - Right Front) has been calibrated, the tonnage display window will go blank and the next message to appear will be "**CAL TONS**". With "**CAL TONS**" being displayed, run a few cycles and check that the tonnage's from the Rexcon device match those on the portable load cells. If any changes need to be made, simply press **ENTER** again to go back into the corner calibration sequence.

If the tonnage's being read from the Rexcon device are accurate, calibration is complete. Before leaving the **INSTALL** mode however, there is one more step that should be taken. The calibration values are stored in the devices memory (even through power outages) and should be written down in case the vales are destroyed for some reason or the device needs to be replaced. It is possible to re-calibrate the device by using the previous numbers.

To see what the current settings are, press the **NEXT** button repeatedly, while still in the **INSTALL** mode, until the message window displays "**VIEW TONS**" (VIEW TONNAGE'S). **VIEW TONS** displays the current calibration tonnage for all four corners. Record these numbers and label them **ORIGINAL CALIBRATION** TONNAGE'S.

Once these numbers are recorded, press the **NEXT** button again and the message window will read "**VIEW CON**" (VIEW CONSTANTS). **VIEW CON** displays an internal CALCULATED CALIBRATION CONSTANT for all four corners. Record these numbers and label them Calibration Constant.

The CALCULATED CALIBRATION CONSTANT may have letters in the three digit display. This is not a display fault. **NOTE:** If a corner is unused, its CALCULATED CALIBRATION CONSTANT is not important and need not be recorded.

EXITING INSTALL MODE

Once all calibration is complete, to take the device out of the **INSTALL** mode complete the following:

1. Open front cover.
2. Return switch 4 to the **ON** position.
3. Close and lock front cover.
4. Move the key switch back to the **RUN** position.

NOTE: If you move the key switch to **RUN** and haven't placed switch 4 back to the **ON** position, you will get an error message that says **"WARNING: CALIBRATION IS STILL ENABLED."**