PROGRAMMING GUIDE

WARNING: DEVIATION FROM THESE INSTRUCTIONS MAY LEAD TO IMPROPER ENGINE/MACHINE OPERATION WHICH COULD CAUSE PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.

This manual is a general programming manual. It does not provide documentation for every possible programming solution due to variations in the equipment at each work site. It is recommended that programming be executed through a PC or Laptop **(SEE APPENDIX A)** because it makes programming much easier. However, it is possible to program directly from the **Exacta 21** keyboard.

Unauthorized use by others to program existing systems is not recommended (password protection should prevent access). Damage to the **Exacta 21** or field equipment could occur as a result of improper programming.

NOTE: This manual provides programming information that enables technicians to understand programming of the Exacta 21 Monitoring and Control System. Technicians using this manual to program the Exacta 21 should be familiar with both the mechanical components operated by the programming and should be familiar with an object oriented programming language.

EXACTA 21 MONITORING AND CONTROL SYSTEM

CONTENTS

EXACTA 21 MONITORING AND CONTROL SYSTEM

1.0 INTRODUCTION

1.1 ABOUT THE CONTROL SYSTEM SOFTWARE

The **Exacta 21** Control System is very flexible and can handle most oil and gas applications including: full site control, AGA calculations, SCADA, and trending.

The **Exacta 21** computers have the following special features: ease of programming, adjustable start and stop delay timers (useful for debounce), Class A, B, C, D and E shutdowns, and a state engine that is useful for start-up and shutdown sequences.

There are three areas where programming occurs: State Engine, Inputs (real or imaginary), and the Shutdown List.

The **Exacta 21** computers are programmed in these areas by connecting to a laptop or PC using the RS232 port and a standard communication package such as Procomm Plus™ or Windows Hyper Terminal™.

Programming can also be done directly from the **Exacta 21** keyboard. When entering names it is much easier to use a PC or laptop since the **Exacta 21** keyboard does not include all alphanumeric keys.

1.1.1 UNDERSTANDING THE BASIC PASSWORD SECURITY SYSTEM

With the basic security system, you will need a password in order to access any of the programming functions. The optional user-based security system is explained in a different document. There are four levels of passwords:

LEVEL 0: Restricted to Altronic Controls personnel or authorized Exacta integrator

LEVEL 1: Full access (restricted from performing uploads)

LEVEL 2: Change setpoints, etc.

LEVEL 3: View only

Passwords must be obtained from Altronic Controls or an authorized **Exacta** integrator. The screens displayed in this manual are those available with a **LEVEL 1** password. If you are granted a different level of password, your screens may appear differently.

> *NOTE: The screens displayed in this manual are those available when using a PC or laptop. If you are using the Exacta 21 keypad and display, you may have to scroll to access all available options.*

1.1.2 HOW TO ACCESS PROGRAMMING MODE

To enter programming mode you must first have a password from Altronic Controls or an **Exacta** integrator.

1. Complete **SECTIONS A1 AND A2 OF APPENDIX A** to connect the **Exacta 21** to a PC or laptop and log on. The Password screen is displayed.

```
Jan 27/07        SXI 11.07G6              6:02 AM


        Access Number:      13463
        Enter Password:     #####




              [E] Enter [C] Clear
```
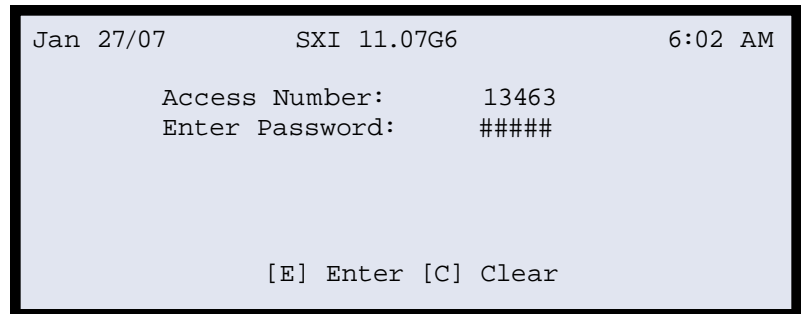
Figure 1-1: Password Screen

2. Type the password and press **ENTER** to advance to the **Program Menu.**

```
Jan 27/07 I10     Program Menu            7:02 AM
              [1] Compressor Menu
              [2] Set Up Menu
              [3] Query Menu
              [4] Printer Reports
              [5] Program Keyboard
              [6] Advanced Program
              [7] AGA Menu
              [9] Control Panel
              [A] Run Mode Test
              [I] Software Version

                   [E] Exit
```
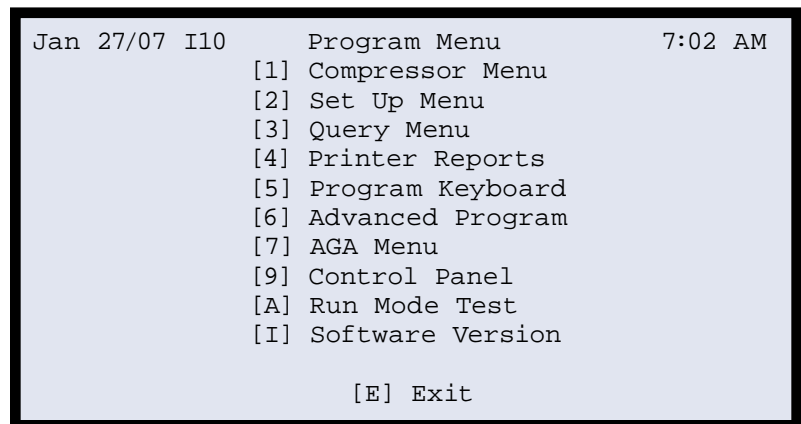
Figure 1-2: Program Menu

All programming functions are accessed from the Program Menu. Most of the programming is done under **[6] ADVANCED PROGRAM**.

1.1.3 HOW TO NAVIGATE THROUGH THE PROGRAM

Choosing:	Results:
[E] EXIT	Goes to last screen or to **ADVANCED PROGRAM** screen
[E] ENTER	Acknowledges keypad entries
[F] FORWARD	Advances through a list of items
[B] BACKUP	Moves up to prior item in a list
[A] UNDO	Undoes the last action
[C] CLEAR	Clears an entire entry
[D] DECIMAL	Inserts a decimal point

The letter designations vary from screen-to-screen, for example **[E]** can mean **EXIT** or **ENTER**. However the meaning is always spelled out beside the letter to avoid confusion.

2.0 CONFIGURING INPUT AND OUTPUT BOARDS

2.1 UNDERSTANDING THE DEVICE ADDRESSING SYSTEM

The first step to programming the **Exacta 21** computer is to understand the architecture of the hardware setup and the addressing of device numbers. The **Exacta 21** has two ports on the bottom. Each port can have up to four Input/Output (I/O) boards linked together in daisy chain architecture. This means that a total of eight boards (any combination of Analog or Discrete boards) may be installed in a conventional system. The diagram below shows a typical layout of an **Exacta 21** control system.
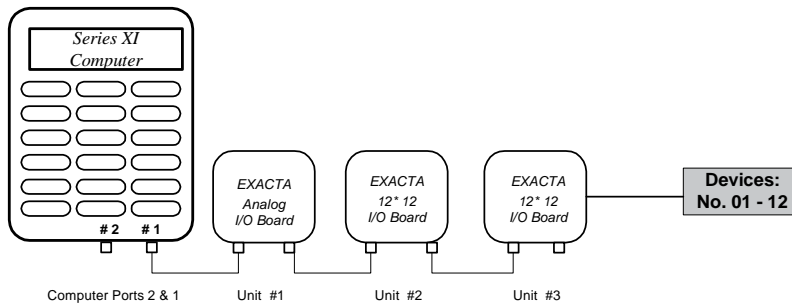
Figure 2-1: Exacta 21 Control System Layout

2.1.1 ADDRESSING EXAMPLE FOR END DEVICES

Figure 2-1 and **Table 2-1** provide an explanation of how an address number is created and how the computer uses this information to find an end device. In the following example, the computer can find device number eight in the third I/O Board by calling it up as **Device 1308**.

Port 1	Unit 3	Device 08
The serial cable connecting the three units is connected to port one. The first digit of the Address Number in this example is one **(1)**.	The computer is accessing the third unit. A maximum of four units can be serially connected from Port 1 and Port 2 and the computer needs to know the order in which the units are connected. The second digit of the Address Number in this example is three **(3)**.	There are 12 inputs and 12 outputs on the third I/O board. The number of devices will change depending on the type of unit. Any of the units may contain more than nine devices so the third part of the Address Number is two digits. The third and fourth digits of the Address Number in this example are zero **(0)** and eight **(8)**.

Table 2-1: Explanation of Addressing for Device 1308

2.2 ABOUT CONFIGURING INPUT/OUTPUT BOARDS

To program a control system, install the I/O cards first. This includes all the analog and discrete I/O cards as well as any imaginary boards (used for programming function blocks). The analog board has 16 configurable inputs (RTD's, TC's, 4-20mA, discrete, voltage, or resistive) and 4 analog outputs (4-20mA). Discrete I/O boards typically have 12 inputs and 12 outputs (all optically isolated).

2.2.1 HOW TO ADD A BOARD

1. From the **Program Menu (FIG. 1-2)**, select **[6] ADVANCED PROGRAM** to bring up the **Advance Program Menu**.

```
Jan 27/07        Advanced Program        7:59 AM
              [1] Install Units
              [2] Program Devices
              [3] Diagnostics
              [4] State Engine
              [5] Latch Signals
              [6] Update Names
              [7] Timers Settings
              [8] Program Analog
              [9] Screen Menu


                  [E] Exit
```

Figure 2-2: Advanced Program Menu

2. Select **[1] INSTALL UNITS** to bring up the **Install Units Main Menu**.

```
Jan 27/07         Install Units          8:04 AM

        Port: 1 Unit: 1 12x12 I/O Board

     [F] Forward        [1] Change Unit #
     [B] Back Up        [2] Change The Type
     [A] Add A Unit     [3] Modify Filters
     [D] Delete A Unit




                  [E] Exit
```

Figure 2-3: Install Units Main Menu

3. Select **[A] ADD A UNIT.**

4. Select **[1] YES** to confirm your choice.

5. Select **[1] YES** again to confirm your selection. **Submenu #1** of **Install Units** will be displayed.

```
Jan 27/07          Install Units          8:04 AM

         Enter Port Number: #
         Range is 1 - 3




     [E] Enter    [B] Backup   [F] Forward
     [C] Clear    [A] Undo     [D] Decimal
```

Figure 2-4: Submenu #1 of Install Units Menu

6.   Enter the **Port Number** of the device that you are adding (if necessary, refer to **SECTION 2.1 Understanding the Device Addressing System**).

7.   Select **[E] ENTER** to bring up **Submenu #2** of the **Install Units** menu.

```
Jan 27/07           Install Units          8:04 AM

         Enter Unit Number: #
         Range is 1 - 4




     [E] Enter    [B] Backup   [F] Forward
     [C] Clear    [A] Undo     [D] Decimal
```

Figure 2-5: Submenu #2 of Install Units Menu

8.   Enter the **Unit Number** of the device you are adding.

9.   Select **[E] ENTER** to bring up the **Select Type Menu.**

```
Jan 27/07           Select Type          8:24 AM
          [1] 12 * 12 I/O
          [2] Output Driver
          [3] Exacta 21 Button PBS
          [4] PBS Key Pad
          [5] 8 * 8 I/O Board
          [6] Smart Analog
          [7] Imaginary
          [8] 24 X 48 1st Unit
          [9] 24 X 48 2nd Unit
          [A] Imaginary Analog

              [E] Exit
```

Figure 2-6: Select Type Menu

10. Select the type of board to be installed.

NOTE: Options [2] through [5] and options [8] and [9] on the Select Type Menu (Figure 2-6) are not currently available for new applications. Option [7] Imaginary is used to add a 'virtual' board. A virtual board is used to program subroutines such as Auto Crank, Auto Slow Down, Post Lube, etc. Imaginary Analog is useful to map analog signals that are accessed through Modbus only.

3.0 NAMING INPUT AND OUTPUT DEVICES

3.1 HOW TO NAME A DEVICE ON THE DISCRETE BOARD

After configuring the input and output boards (See Chapter 2: Configuring Input and Output Boards), the next step in programming the **Exacta 21** is to **Name Discrete Devices and Analog Devices**.

1. From the main **Program Menu**, select **[6] ADVANCED PROGRAM** to bring up the **Advanced Program Menu** (FIGURE 2.2).

2. From the **Advanced Program Menu**, select **[2] PROGRAM DEVICES** to bring up the **Program Devices Menu**. Press **[F] NEXT UNIT** or **[B] PREVIOUS UNIT** to go to the proper I/O board.

```
Feb 1/07          Program Devices          3:01 PM

          Port: 1 Unit: 1 12 X 12 I/O Board

                [F] Next Unit
                [B] Previous Unit
                [1] Modify Devices
                [2] Show Devices




                        [E] Exit
```
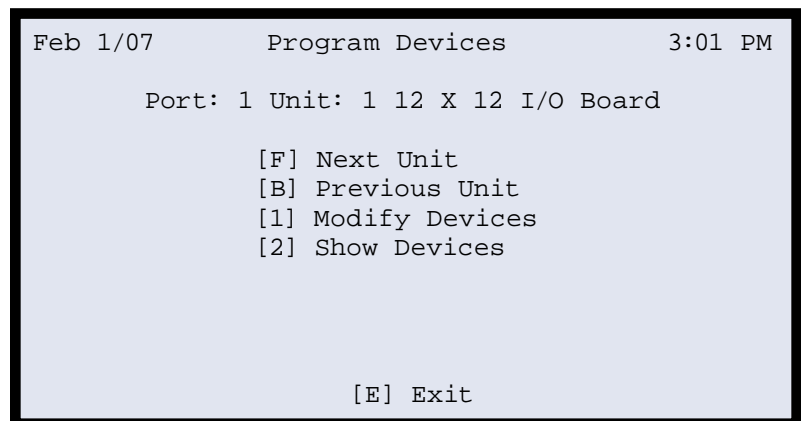
Figure 3-1: Program Devices Menu

3. From the **Program Devices Menu**, select **[1] MODIFY DEVICES** to bring up the **Modify Devices Menu**.

```
Feb 1/07          Modify Devices          3:14 PM

 Dev      Type      Wired Active Filter  Flash
  1    Momentary    NO    Both      0

     [1] Name                [7] Jump
     [2] Type                [8] Copy
     [3] Toggle NO / NC
     [4] Flash Rate          [K] Translate
     [5] Modify Functions    [G] Show Functions
     [6] Enable / Disable    [H] Cross Reference
     [A] Filter              [I] Initialization
        [F] Forward [B] Backup [E] Exit
```
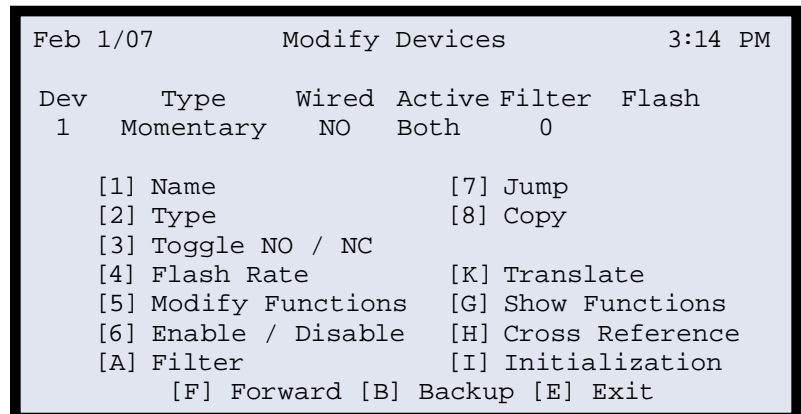
Figure 3-2: Modify Devices Menu

4. From the **Modify Devices Menu**, select **[1] NAME** to bring up the **Change Name Menu**.

```
Feb 1/07            Change Name           3:20 PM

Input:
Output:

            [1] Change Input Name
            [2] Change Output Name




                        [E] Exit
```
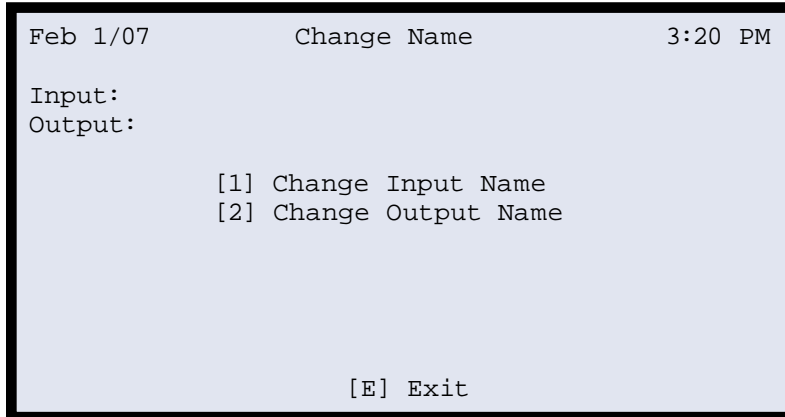
Figure 3-3: Change Name Menu

5. From the **Change Name Menu**, select either **[1] CHANGE INPUT NAME** or **[2] CHANGE OUTPUT NAME** depending upon what type of device. The **Custom Name Screen (FIGURE 3-4)** appears. Enter the name. If you are using the **Exacta 21** keyboard, follow the instructions at the bottom of the screen to enter the letters.

```
Feb 1/07 1          Custom Name           3:24 PM
                  Please Enter Name





   [->,^L] Forw   [<-,^H] Backup  [^I]  Insert
   [^B] Blank     [^C] Undo       [^D]  Delete
```
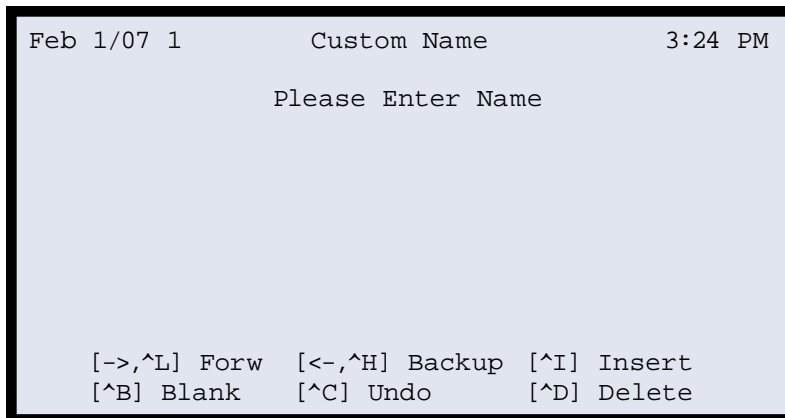
Figure 3-4: Custom Name Menu

> NOTE: While it is possible to enter names using the Exacta 21 keyboard, it can be labor intensive if you have a number of names to enter. It is recommended to use a laptop with Procomm Plus, Windows Terminal, Windows Hyper Terminal, or any terminal emulation program. Refer to Appendix A for instructions to tie into the Exacta 21 computer with a PC or laptop.

3.1.1 MENU OPTIONS FOR NAMING DISCRETE DEVICES

Modify Devices Menu options and their functions:

[1] **NAME**: Used to change input and output names.

[2] **TYPE**: Selects the type of device. The choices are **Momentary**, **Toggle**, and **OneShot**. These only apply to inputs (real or imaginary). The input is split into two levels: the physical state and the program level.

For a hard-wired input, the state is **ON** when the contacts are closed. For an imaginary input, a **TURN ON INPUT** is necessary to turn the state of the input **ON**.

The program level refers to the program lines associated with the input. The **TYPE** determines what happens to the program level whenever the input is turned **ON** or **OFF**.

[1] **MOMENTARY**: The default setting. The program level (programming lines) is activated every time the input is turned **ON** (even if the input is already **ON**). This setting is useful if you want a function repeated at regular intervals. This is done by using a **TURN ON INPUT** command with a start delay, e.g., to turn on **Output 1101 (Beacon)** for one second every ten seconds, the programming in **FIGURE 3-5** could be used.

```
Device 1401 - Beacon Flash
Dev    Type    Wired  Active  Filter   Flash
 5  Momentary  No     Both      0


Type              Device           When Start Stay Stop
Turn On Output  1101 Beacon        Push  0.0
Turn Off Output 1101 Beacon        Push  1.0
Turn On Input   1410 Beacon Flash Push 10.0
```

Figure 3-5: Example of Momentary Toggle

[2] **TOGGLE:** When set to **Toggle**, every time a real input is turned **ON**, it will toggle the program level of the input to the opposite state, e.g., a momentary contact switch could be used as an **On/Off** for a light. Push once to turn on the light. Push a second time to turn the light off. A timer could also be programmed underneath the input to automatically turn the light off. If the timer turns the light off, the momentary switch can be pushed again to turn it back on. If the switch was a regular toggle switch, it would have to be turned off first.

[3] **ONE SHOT:** If the program level is already **ON**, it will not re-initiate the program lines if the state of the input is turned **ON** again. The state of the input must be turned **OFF,** then turned **ON** again to activate the program lines again.

[3] **TOGGLE NO/NC:** Used to change from **NO (Normally Open)** to **NC (Normally Closed)**, dependant on the type of switch.

Momentary Contact or One Shot:

NO: When set to **normally open** all functions under the input set to **when pushed** will be performed when the contacts on the switch close. All **when released** functions will be performed when the contacts open.

NC: When set to **normally closed** all functions set to **when pushed** will be performed when the contacts open and all **when released** will be performed when the contacts close.

TOGGLE: When an input's type is set to **toggle** the level of the input is toggled each time the input turns on. When set to **NO** the contacts must close to toggle the level. When set to **NC** the contacts must open to change the level.

[4] **FLASH RATE:** Flashes the output. The default is **0.5** seconds **ON/OFF**.

[5] **MODIFY FUNCTIONS:** Programs functions **(SEE CHAPTER 8)**.

[6] ENABLE/DISABLE: Enables or disables the input, output, or both.

```
Mar 25/07          Modify Devices          1:44 AM




     [1] Output: Enabled
     [2] Input:  Enabled




                    [E] Exit
```

Figure 3-6: Modify Devices - Enable/Disable Menu

[7] JUMP: Used to **GoTo** a specific device number rather than using the **[F] FORWARD** and **[B] BACKWARD** keys.

[8] COPY: Copies programming commands from another device. When you select **[8] COPY**, the first copy question will appear.

```
Feb 2/07          Modify Devices          1:04 AM

Dev      Type     Wired   Active  Filter  Flash
 1     Momentary   NO      Both     25

In: High Liquid Lev    Out: Run Status to A




         Copy Functions [1] Yes
                        [2] No
```

Figure 3-7: Modify Devices - 1st Copy Question

Choose **[1] YES** or **[2] NO**. If you select **[1] YES**, the computer asks for the **Device To Copy Functions From**. Type the address of the device from which you wish to copy and select **[E]Enter**.

```
Feb 2/07          Modify Device           1:04 AM

Dev      Type     Wired   Active  Filter  Flash
 1     Momentary   NO      Both     25

Device To Copy Functions From:    1101




     [E] Enter  [B] Backup   [F] Forward
     [C] Clear  [A] Undo     [D] Decimal
```

Figure 3-8: Modify Devices - 2nd Copy Question

[I] INITIALIZE: Selects if the device is initialized on start-up or not.

```
Feb 2/07          Modify Devices          1:20 AM

Dev      Type     Wired   Active   Filter  Flash
 2    Momentary    NO      Both      0


         * [1] Initialize On Startup
           [2] Do Not Initialize



                  [E] Exit
```

Figure 3-9: Modify Devices - Initialize Menu

[H] CROSS REFERENCE: Shows all the associated programming lines for a specific device.

[K] TRANSLATE: Moves the input, output, or both to a new location. This option automatically updates all instances of the device in the program to the new device number.

```
Feb 2/07          Modify Device           1:23 AM

Dev      Type     Wired   Active   Filter  Flash
 2    Momentary    NO      Both      0

         I/O Type:[1] Input
                  [2] Output
                  [3] Both



                  [E] Exit
```

Figure 3-10: Modify Devices - 1st Translate Menu

Select the item to be moved and the next menu prompts to choose which device to translate to.

```
Feb 2/07          Modify Devices          1:23 AM

Dev      Type     Wired   Active   Filter  Flash
 2    Momentary    NO      Both      0


      Device To Translate To: 1102



      [E] Enter  [B] Backup [F]Forward
      [C] Clear  [A] Undo   [D]Decimal
```

Figure 3-11: Modify Devices - 2nd Translate Menu

3.2 HOW TO NAME AN ANALOG INPUT DEVICE

A description of the menu options for Analog Board Input Devices can be found in SECTION 3.3.2: MENU OPTIONS FOR NAMING ANALOG INPUT DEVICES.

To Name a New Device:

1. From the main **Program Menu**, select **[1] COMPRESSOR MENU** to bring up the **Compressor Menu**.

```
Feb 2/07          Compressor Menu          1:31 AM


              [1] Configuration
              [2] RPM Menu
              [3] Shutdown List
              [4] Analog Menu
              [5] Hour Meter
              [6] Force Outputs
              [7] Advance Setup
              [9] Calculations



                 [E] Exit
```

Figure 3-12: Compressor Menu

2. From the **Compressor Menu**, select **[4] ANALOG MENU** to bring up the **Analog Menu**.

```
Feb 2/07           Analog Menu             1:33 AM

              [1] Analog Inputs
              [2] Analog Outputs
              [3] PID Control
              [4] Master PID
              [5] Set Master PID
              [6] VI Menu
              [8] Init Analog
              [9] Data Capture


                 [E] Exit
```

Figure 3-13: Analog Menu

3. From the **Analog Menu**, select **[1] ANALOG INPUTS** to bring up the **Analog Inputs Menu**.

NOTE: Another way to access the Analog Menu is through the Advanced Program Menu by selecting [8] PROGRAM ANALOG.

```
Feb 2/07          Analog Inputs              1:36 AM

   Number  Device    Type           Name
      1      1201    4-20mA    Suction Pressure

[1] Change Name        [C] Calibration
[2] Set Sensor Type    [G] Show Functions
[3] Change Device      [D] Move
[4] Set Points         [P] Pyrometer
[5] Programming        [H] Enter Calibration Mode
[6] Span Settings      [K] Exit Calibration Mode
[7] Filter             [I] Freeze / Unfreeze
[8] Show Readings      [j] Force Analog Input
[9] Show Data          [T] Adjust Analog Offset
                       [X] Delete Analog Input
[0] Diagnostics        [Y] Insert Analog Input
[L] Diagnostics Setup



    [A] Select [F]orward [B]ackward [E] Exit
```

Figure 3-14: Analog Inputs Menu

4.   From the **Analog Inputs Menu**, select **[1] CHANGE NAME**. This will bring up the **Custom Name Menu**. Enter the device name.

NOTE: You can use either a PC, Lap Top, or the keyboard to enter the input device name. If using the keyboard refer to Section 3.1.1: How to Input a Name Using the Keyboard.

```
Feb 2/07 1           Custom Name              1:39 AM

               Please Enter Name






    [->,^L] Forw  [<-,^H] Backup  [^I] Insert
    [^B] Blank    [^C] Undo       [^D] Delete
```

Figure 3-15: Custom Name Menu

3.3 HOW TO NAME AN ANALOG OUTPUT DEVICE

A description of the menu options for **Analog Board Output Devices** can be found in **SECTION 3.3.2**.

1. From the **Analog Menu**, select **[2] ANALOG OUTPUTS** to bring up the **Analog Outputs Menu**.

```
Feb 2/07          Analog Outputs          1:46 AM

 Number    Value    Device    Type      Name
   1         0       1201     4-20mA   Governer


 [1] Change Name        [4]  Span Settings
 [2] Change Device      [5]  Show Readings
 [3] Change Type        [6]  Change Value



     [A] Select [F]orward [B]ackward [E] Exit
```

Figure 3-16: Analog Outputs Menu

2. From the **Analog Outputs Menu**, select **[1] CHANGE NAME**. This will bring you to the **Custom Name Menu**. Enter the device name.

```
Feb 2/07 1           Custom Name           1:48 AM

              Please Enter Name




     [->,^L] Forw  [<-,^H] Backup [^I]  Insert
     [^B] Blank    [^C] Undo      [^D] Delete
```

Figure 3-17: Analog Outputs Custom Name Menu

NOTE: You can use either a PC, Lap Top, or the touch pad to enter the output device name. If using the keyboard, refer to Section 3.1: How to Input a Name Using the Keyboard.

3.3.1 MENU OPTIONS FOR ANALOG INPUT DEVICES

```
Feb 2/07          Analog Inputs          1:36 AM

   Number  Device    Type            Name
      1      1201    4-20mA   Suction Pressure

 [1] Change Name       [C] Calibration
 [2] Set Sensor Type   [G] Show Functions
 [3] Change Device     [D] Move
 [4] Set Points        [P] Pyrometer
 [5] Programming       [H] Enter Calibration Mode
 [6] Span Settings     [K] Exit Calibration Mode
 [7] Filter            [I] Freeze / Unfreeze
 [8] Show Readings     [j] Force Analog Input
 [9] Show Data         [T] Adjust Analog Offset
                       [X] Delete Analog Input
 [0] Diagnostics       [Y] Insert Analog Input
 [L] Diagnostics Setup



    [A] Select [F]orward [B]ackward [E] Exit
```

Figure 3-18: Analog Input Menu

[1] CHANGE NAME: Changes input names.

[2] SET SENSOR TYPE: Sets the type of sensor. Once selected, a submenu offers ten sensor types:

- **[0] Not Set**
- **[1] 4-20mA**
- **[2] 0-20mA**
- **[3] TC Type J**
- **[4] TC Type K**
- **[5] RTD**
- **[6] Voltage**
- **[7] Discrete**
- **[8] Resistive**
- **[9] RPM**
- **[A] Mapped**

[3] CHANGE DEVICE: Selects a different device number (address location).

[4] Currently, **Option 4** is not in use.

[5] PROGRAMMING: Adds program function lines **(SEE SECTION 8)**.

[6] **SPAN SETTINGS:** Sets the number of decimals and the units of measure. It may also be used to calibrate devices (this procedure is described in detail in the **Operators Manual**). Once selected, a submenu appears offering six menu choices.

```
Feb 2/07           Span Setting              2:05 AM

   [1] Unit of Measure:   None  Base Unit:
   [2] Decimals:          0
   [3] High:              100   [6] 64348
   [4] Low:               0     [7] 12648



                  [E] Exit
```

Figure 3-19: Span Settings Menu

The six menu choices are:

[1] **UNIT OF MEASURE:** Used to set the unit of measure.

[2] **DECIMALS:** Used to set the number of decimal places.

[3] **HIGH:** Used to set the **High** point for the span settings.

[4] **LOW:** Used to set the **Low** point for the span settings.

[6] **64348:** Used to input the corresponding **Analog to Digital Conversion (ADC)** value for the **High** point.

[7] **12648:** Used to input the corresponding **ADC** value for the **Low** point.

Once **Option [6] or [7]** is selected, a submenu offers four choices:

[1] **HIGH POINT:** This option will set to the highest **ADC** value which is 2^{16} **(65536)**.

[2] **CURRENT READING:** Usually selected to match the span settings. It is the current reading of the end device.

[3] **SPECIFIED VALUE:** Used when the **ADC** value is already known for the end device either through previous calibrations or from past experience with specific end devices.

[4] **NO CHANGE:** Used to exit the submenu with no changes.

[7] FILTER: Used to perform the following functions :

• Set the accuracy (from 1 to 16 bit)

```
Feb 2/07            Filter              3:12 AM


                [1] Accuracy: 16
                [2] Filter:    0   Degree:    0



                    [E] Exit
```

Figure 3-20: Filter - 1st Screen

• Always set filter type to 1

```
Feb 2/07            Filter              3:13 AM


              Enter Filter Type (0 - 1):
                           1


        [E] Enter  [B]  Backup  [F] Forward
        [C] Clear  [A]  Undo    [D] Decimal
```

Figure 3-21: Filter - 2nd Screen

• Select or modify the degree of filter (from 1 to 8)
  ─ the higher the number the greater the filter.

```
Feb 2/07            Filter              3:13 AM


           Enter Filter Degree (0 - 8): 3



        [E] Enter  [B]  Backup  [F] Forward
        [C] Clear  [A]  Undo    [D] Decimal
```

Figure 3-22: Filter - 3rd Screen

NOTE: The Filter option can be useful to help stabilize analog readings in noisy environments. A filter type value of one (1) is filtered; type zero (0) is no filter. Once a filter has been selected the computer will prompt for a degree value from one to eight. The higher the degree of filter selected, the more noise elimination, but the reaction time will be slower. Normally a value of three (3) is selected for all analog devices except temperatures. The filter degree for temperature is usually set to five (5).

[8] SHOW READINGS: Displays the current **ADC** value of the input.

[9] SHOW DATA: This option displays the last **12 ADC** values from an analog input device. Each analog board input is read **16** times per second.

[0] DIAGNOSTICS: This option is is used to diagnose problems with the analog board. It is typically used at the factory.

[C] CALIBRATION: Calibration is used to calibrate the analog input end devices. **SEE SECTION 6.0** for a complete procedure on calibration.

[G] **SHOW FUNCTIONS:** Show Functions shows all of the function lines attached to the input.

[D] **MOVE:** This option is used to move or translate the input to a new location. This option automatically updates all instances of the device in the program to the new device number, except the **PID** inputs (these must be changed manually).

[P] **PYROMETER:** Used to set the analog channel to the default settings for a pyrometer input (type "K" is default).

[H] **ENTER CAL MODE:** This stops the multiplexing of the inputs on the analog board. The selected channel is continuously read. This is typically used to calibrate **RTD's**.

CAUTION: USING "ENTER CALIBRATION MODE" LOCKS THE EXACTA 21 ONTO THE INDIVIDUAL INPUT. A CHANGE IN THE OTHER CHANNELS' INPUT VALUES WILL NOT BE SEEN UNTIL THE TECHNICIAN EXITS CALIBRATION MODE. EXIT CALIBRATION MODE WHEN PROCEDURE IS COMPLETED.

[K] **EXIT CAL MODE:** Returns the analog board to scanning all analog inputs.

[I] **FREEZE/UNFREEZE:** Freeze input locks the input value at the value it is currently at. During calibration, to avoid entering alarms or shutting down the unit, the technician would normally freeze the input being calibrated. **See chapter 6-Calibration in the Operations Guide** for procedure.

CAUTION: "FREEZING" AN INPUT WILL PLACE ALL ALARMS, SHUTDOWNS, PID'S, AND PROGRAMMING ASSOCIATED WITH THE FROZEN INPUT INTO BYPASS MODE. UNFREEZE INPUT WHEN PROCEDURE IS COMPLETED.

[J] **FORCE ANALOG INPUT:** This allows the technician to force the input to a specific value. The value entered is in engineering units. This is used in conjunction with **Freeze**.

[T] **ADJUST AN OFFSET:** This is used to offset the input value in engineering units. A positive offset number will decrease the displayed analog value and a negative offset value will increase the displayed analog value. This feature is typically not used with current design.

[X] **DELETE AN INPUT:** Deletes an analog input.

[Y] **INSERT AN INPUT:** Inserts an analog input.

NOTE: Options [9] SHOW DATA, [D] MOVE, and [P] PYROMETER are only shown on a PC or Laptop, not on the Exacta 21 screen. However, Option [9] is still available from the Exacta 21 keyboard.

3.3.2 MENU OPTIONS FOR ANALOG OUTPUT DEVICES

To access the **Analog Outputs Menu** select **[2] ANALOG OUTPUTS** from the **Analog Menu**. The menu options and their functions for the **Analog Outputs Menu** are explained below.

```
Feb 2/07         Analog Outputs         1:46 AM

Number  Value   Device     Type        Name
   1      0      1201     4-20mA      Governer


   [1] Change Name        [4] Span Settings
   [2] Change Device      [5] Show Readings
   [3] Change Type        [6] Change Value



   [A] Select [F]orward [B]ackward [E] Exit
```
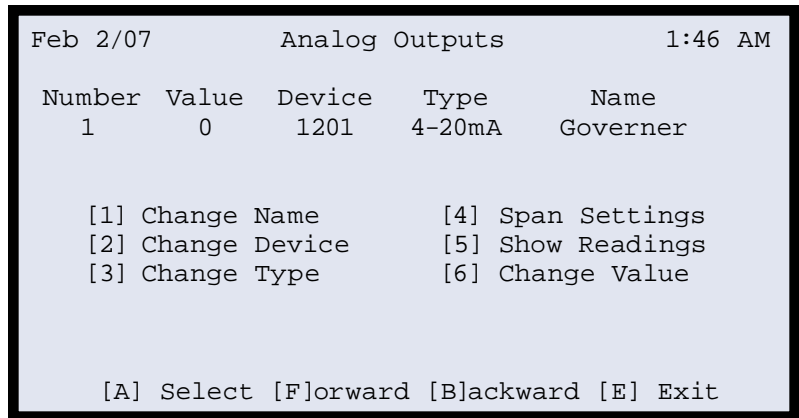
Figure 3-23: Analog Outputs Menu

[1] CHANGE NAME: This option is used to change output names.

[2] CHANGE DEVICE: Used to set the device number.

[3] CHANGE TYPE: Used to change the type of output.
The options are:
- **0-20mA**
- **4-20mA**
- **Not Active**

[4] SPAN SETTINGS: This option is used to calibrate the output device. This procedure is described in detail in the **Operations Guide**.

[5] SHOW READINGS: This option displays the analog value and the **ADC** value.

[6] CHANGE VALUE: This option is used to force a value for the output and is used to test analog outputs only.

4.0 PROGRAMMING RUN MODE SCREENS

4.1 ABOUT RUN MODE SCREENS

The **Run Mode Screen** is displayed when the computer is first turned on. This screen shows important process data and messages. When the computer is displaying the **Run Mode**, the values on the screen are the current readings from the end devices. It is easier to program the **Run Mode Screens** from a PC or Laptop, but it is possible to do so from the keyboard.

4.2 HOW TO PROGRAM RUN MODE SCREENS

1. Go to the **Advanced Program Menu** (SEE FIGURE 2-2, PAGE 11).

2. Select **[9] SCREEN MENU**. This will bring up the **Screens Menu**.

```
Feb 6/07              Screens Menu           1:30 AM


            [1] Display Screens
            [2] Edit Screens
            [3] Test Screens
            [4] Display Char
            [5] Zero Screen Memory



                 [E] Exit
```

Figure 4-1: Screens Menu

3. From the **Screens Menu**, select **[1] DISPLAY SCREENS** to display parameters about the various screen inputs (i.e., analog, RPM, character string).

```
Feb 6/07                 Screen Records                1:32 AM

 X Y Name                       Alignment  Type   Screen   Length
 ----------------------------------------------------------------
 0 3 Suct#1  Disch1  Disch2  JW  RPM Left   String   1        0
 0 6 Main Suct Comp Oil Eng Oil Hour Left   String   1        0
 0 4 Stg 1 Suction Pres             Left    Analog   1        4
10 4 Stg 1 Disch Pres               Left    Analog   1        4
20 4 Stg 2 Disch Pres               Left    Analog   1        4
29 4 Eng Jacket Water Temp          Left    Analog   1        4
35 4 RPM                            Left    Analog   1        4
 0 7 Main Suction Pressure          Left    Analog   1        4
 7 7 Compressor Oil Pres            Left    Analog   1        4
16 7 Compressor Oil Temp            Left    Analog   1        4
23 7 Engine Oil Pres                Left    Analog   1        3
30 7 Eng Oil Temp                   Left    Analog   1        3
35 7 Hour                           Left     Hour    1        5
20 3 Temperatures                   Center  String   2        4
 2 4 Throw #1 Throw #2              Left    String   2        4



                 [1] Next Page [E]xit
```

Figure 4-2: Screen Records - Display Screens Menu

4. Return to the **Screens Menu** and select **[2] EDIT SCREENS** to bring up the **Screen Record Menu**. Change the layout of the screens to suit your needs using the options provided. Descriptions of the options are provided in the following pages. Selecting **[E] Enter** from any of the option screens will return you to the **Screen Records Menu** to either exit or make additional changes.

```
Feb 6/07                    Screen Records                    1:35 AM

 X Y       Name              Unit  Alignment  Type  Screen   Length
 0 3  Suct#1 Disch1 Disch2 JW None      Left   String    1        0

                        [A] Add
                        [I] Insert
                        [D] Delete
                        [1] X and Y
                        [2] Name or Device
                        [3] Alignment
                        [4] Screen
                        [5] Length
                        [6] Unit
                        [7] Test
                        [8] Options
                        [9] Renumber

            [F] Forward [B] Backup [C] Select [E] Exit
```

Figure 4-3: Screen Records Menu

[A] ADD: Use **[A] ADD** to add an entry to the end of the screen records list.

[1]	String	[8]	Shutdown Status
[2]	Analog In	[9]	PID Set Point
[3]	Analog Out	[A]	AGA
[4]	Differential	[B]	Shutdowns
[5]	RPM	[C]	Alarms
[6]	Hour	[D]	Faults
[7]	Shutdown Set	[E]	Counter

Figure 4-4: Add and Inset Menu

When **[1] STRING** (short for character string) is selected from **FIGURE 4-4**, the program will prompt you to enter a string of characters. When one of the other types are selected (e.g., **[2] ANALOG IN**), the program will bring up a list of all available choices. Other menu choices from the **Add and Insert Menu**:

[9] PID SET POINT: This option asks for the device number. You will need a printout of the program to select the appropriate **PID** (or use trial and error). The name will come up once a selection is made.

[A] AGA: When this option is activated the flow in MCF/day will be displayed. The device number must be set to one **(1)** in this case.

[B] SHUTDOWNS: This option shows the current number of shutdowns. Disregard the request for the device number.

[C] ALARMS: Displays the current number of alarms. Disregard the request for a device number.

[D] FAULTS: This option displays the current number of faults. Disregard the request for a device number.

[E] COUNTERS: You will be asked to enter a device number. When a device number is entered, **FIGURE 4-5** will be displayed.

[I] INSERT: This option is used to place the entry at a strategic place in the list of screen records. The new entry will be placed prior to the current record. The options available are the same.

[D] DELETE: This option will delete the current screen record. When this option is selected you will be asked to confirm your choice.

[1] X AND Y: This option allows you to change the **X/Y** coordinates of the screen to the parameters you want.

[2] NAME OR DEVICE: Enter a name if the type was set to **String**. When the type is set to **Analog In**, **Analog Out**, or **Differential**, a list of available choices will come up. For types **Shutdown Set**, **Shutdown Status**, **PID Set Point**, and **Counter**, the device number must be entered.

[3] ALIGNMENT: This option may be set to **Left**, **Right**, or **Center** and is used in conjunction with **[1] X and Y** to set the display position within the screen.

[4] SCREEN: From this option you can change or select the screen that you want the input to appear in. A total of **9** screens are available; however, in most programs, fewer than **8** are used.

[5] LENGTH: This option is used to define the number of spaces to display the data including decimals and the **+/-** sign, but excluding units.

> *NOTE: The screen has the capacity of 40 characters in width with a total of 8 rows. Reserve lines 0 and 1 for the following purposes:*
> - *Line 0 - holds the time and date*
> - *Line 1 - holds shutdown messages*

[6] UNIT: Used to select the unit of measurement for the device. Selecting this option will bring up the **Select Unit Menu**.

```
Feb 6/07          Select Unit          1:39 AM

       [1]*None          [8] Pressure Abs
       [2] Temperature   [9] Pressure G
       [3] Pressure      [A] Hg
       [4] %             [B] H2O
       [5] RPM           [C] Velocity
       [6] MA            [D] H2S
       [7] Volts         [F] Amps


              [E] Exit
```
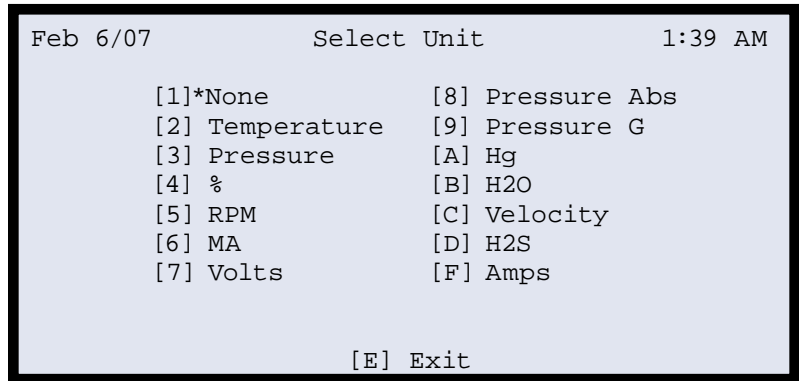
Figure 4-5: Select Unit Menu

[7] TEST: Used to view screen for length and width. Return to the previous options in the **Screen Records Menu** to change the screen layout.

[8] OPTIONS: Used in conjunction with **Latches**. If a screen record is associated with a latch, the record will only appear when the latch is turned **ON**. If this option is set to zero **(0)**, the record will not be associated with any latches.

5. **Menu option [3] TEST SCREENS** from **FIGURE 4-1**: will bring up **Screen 1** from **FIGURE 4-6**. Scroll through the screens by pressing **[F] Forward** or **[B] Backward** on the keyboard.

6. **Option [5] ZERO SCREEN:** Memory will ask you if you are sure before actually deleting all the screen records.

NOTE: Menu Option **[4] DISPLAY CHAR** is used to display all the characters available in **Run Mode Screens**. They are:
! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
[\ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { } ~

4.3 SAMPLE SCREEN LAYOUT AND KEYBOARD
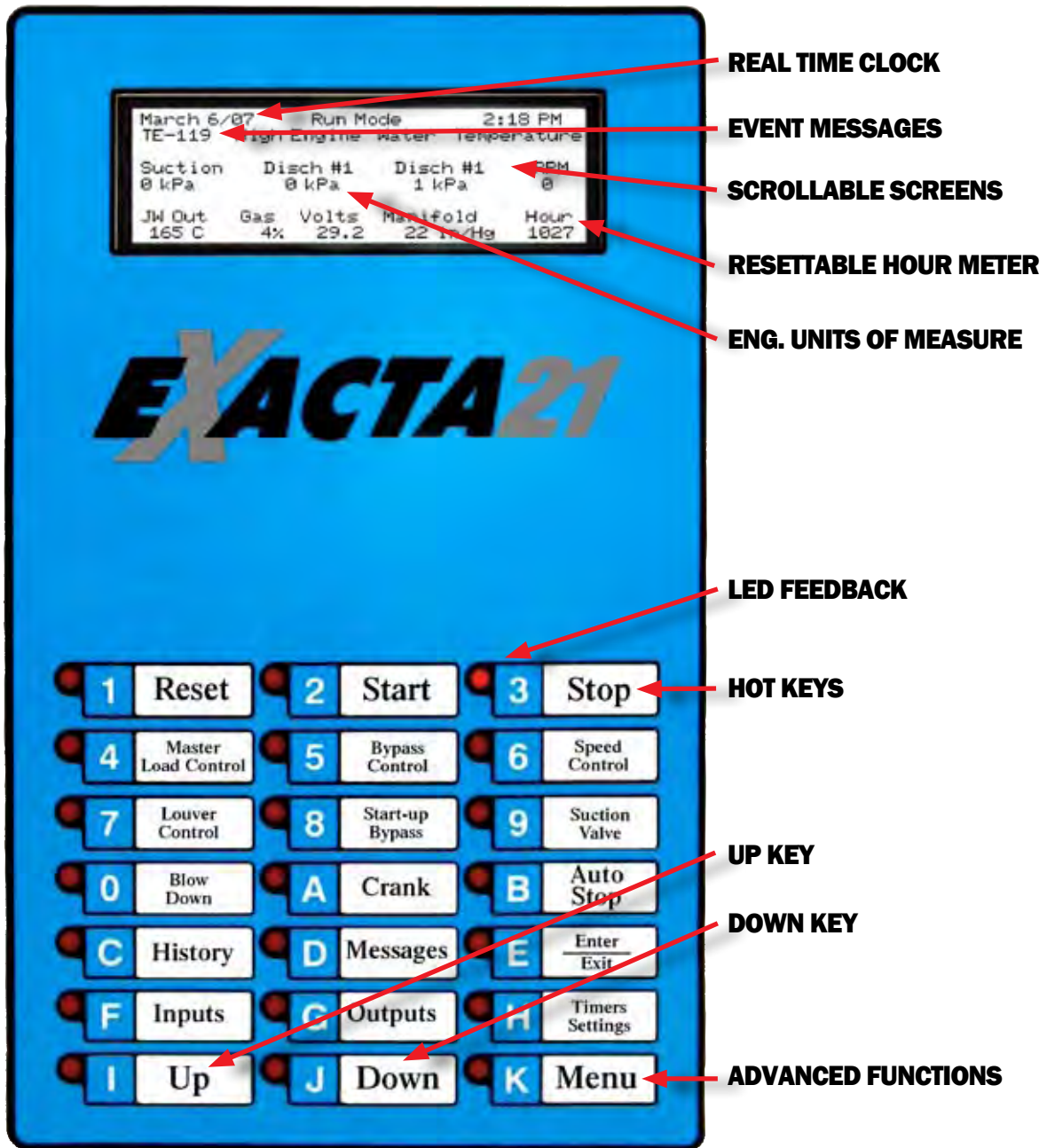
Figure 4-5: Sample Keyboard Layout

4.4 SCROLLING SCREENS IN RUN MODE

Since it is not possible to put all of the information onto the screen at the same time, the computer has the ability to scroll through multiple screens via the **UP, DOWN** and **EXIT** keys. The **UP** key displays the next screen and the **DOWN** key returns to the previous screen. The **EXIT** key will always display the main screen.

The screens shown in Figure 4-6 are samples of the possible data that is shown when scrolling to different screens. The information shown will be dependent on the application requirements and end devices.


```
March 6/07      Run Mode        2:18 PM
Ramping Speed to Minimum Load

 Suction Disch(th2&4) Disch(th1&3) RPM
 1047kpa    2411kpa       7787kpa    1156

JW Out  Gas   Fire   Volts   Manif    Hour
 87C     0%   4.0mA   23V    23"hg      850
```

I — Up   J — Down

```
March 6/07      Run Mode        2:18 PM
Compressor Running

              Process  Temperatures
Suct Stg 1     41C   Disch Stg 1 (2): 141c
Suct Stg 2     49C   Disch Stg 1 (4): 142c
                     Disch Stg 2 (3): 145c
Final:         55C   Disch Stg 2 (1): 140c
```

E — Enter/Exit   I — Up   J — Down

```
March 6/07      Run Mode        2:18 PM
Compressor Running
              Temperature
      Eng Manifold Air:          29C
      Eng JW Out:                29C
      Eng JW In:                 29C
      Eng Oil:                   29C
      Comp Oil:                  29C
```

E — Enter/Exit   I — Up   J — Down

```
March 6/07      Run Mode        2:18 PM
Compressor Running

              Engine Pyrometer
1R: 212C  5R:  203C   1L: 218C  5L: 216C
2R: 218C  6R:  203C   2L: 222C  6L: 208C
3R: 222C              3L: 216C
4R: 206C              4L: 214C
```

E — Enter/Exit

Figure 4-6: Scrolling Screens

5.0 PROGRAMMING TIMERS AND SETTINGS

5.1 TIMERS

Programmable timers are used in the program for items that control time that can be adjusted by the operator of the equipment. Some examples are: **Crank Time**, **Minimum Prelube Time**, **Minimum Warm-up Time**, etc. These may be adjusted from the **Timers & Settings** button (with the proper password).

Here are some fundamental properties of timers:

a) The timer value is used to set the initial value of a timer when it is first activated. Once a timer has been activated, changing the value will not effect the timer until the next time it is activated.

b) A timer can be used in multiple places in a program. Each will act independently and can be used simultaneously, eg: two pumps could be programmed to stay on the same length of time by using the same timer; if one comes on before the other, they will both stay on for the same time period which means the second one will turn off after the first.

c) Timer values can be changed from the **Timers and Settings** button if the timer has been added to the **Timer and Settings** menu. It can always be adjusted from advanced program and selecting **Timers and Settings**.

d) A timer can be given a name which is printed on all reports and used in the **Timers and Settings** menu.

e) All timers are set with a value accurate to **1/10 second**.

f) There are **32** programmable timers.

5.1.1 HOW TO ADD OR EDIT TIMERS

To add or edit timers follow these steps:

1. From the **Advanced Program Menu**, select **[7] TIMERS SETTINGS** to bring up the **Timers Settings Menu**.

```
Feb 7/07      Timers & Settings      4:28 AM
              [1] Timers
              [2] Analog Settings
              [3] Ramps
              [4] Latch Names
              [5] Menu Set Up
              [6] Run Menu
                   [E] Exit
```

Figure 5-1: Timers & Settings Menu

2. From the **Timers Settings Menu**, select **[1] TIMERS** to bring up the **Timers Menu**.

```
Timer    Value     Name
  1      140.0     Comp Prelube Timeout

            [1] Select Timer
            [2] Change Name
            [3] Change Timer Value

[F] Forward [B] Backward [E] Exit
```

Figure 5-2: Timers Menu

NOTE: To scroll through the Timers use [F] FORWARD OR [B] BACKWARD.

From the **Timers Menu** you have the following options:

[1] **SELECT TIMER:** Displays a list of all timers in use.

[2] **CHANGE NAME:** Used to enter a new **Timer** name or edit an existing **Timer** name.

[3] **CHANGE TIMER VALUE:** Used to enter or edit **Timer Values**.

5.2 PROGRAMMABLE ANALOG SETTINGS

Similar to **Timers**, **Programmable Analogs** are used in the program for items such as **Compressor Oil Permissive**, **Minimum Load RPM**, **Warm-up Temperature Permissive**, etc. They may be adjusted from the **Timers & Settings** button with the appropriate password.

Fundamental properties of **Programmable Analogs**:

a) The main feature of **Programmable Analog** settings is the set point that can be adjusted by the operator.

b) This set point can be used in multiple places throughout the programming.

c) The **Timers and Settings** button can be used to change the set point if it has been added to the **Timers and Settings** menu.

d) A minimum and maximum can be set to prevent users going outside a desired range. If the min and max are both set to zero then any value can be entered.

e) A security level can be entered to determine access capability for users.

f) A programmable analog can be given a name which is printed on all reports and used in the **Timers and Settings** menu.

g) There can be up to **40** programmable analogs.

5.2.1 HOW TO ADD OR EDIT ANALOG SETTINGS

To add or edit Analog Settings:

1. From the **Timers Settings Menu (FIGURE 5-1)**, select **[2] ANALOG SETTINGS** to bring up the **Analog Settings Menu**.

```
Num SetPoint Minimum Maximum Security
 1      0       0        0        2
Compr Oil Perm Compressor O Ana In
[1] Select [5] Change Set Point
[2] Change Name [6] Minimum
[3] Select I/O [7] Max
[4] Flags [8] Security
[F] Forward [B] Backward [E] Exit
```

Figure 5-3 Analog Settings

WARNING: IN THE ANALOG SETTINGS OPTIONS, NEVER SET THE [6] MINIMUM VALUE TO GREATER THAN [7] MAXIMUM VALUE BECAUSE THE SETPOINT WOULD BE AN IMPOSSIBLE MATHEMATICAL VALUE. THERE IS NO WAY TO EXIT THIS BLOCK OF PROGRAMMING. THE ONLY OPTION WOULD BE TO POWER DOWN.

The menu options and their functions for the **Analog Settings Menu** are explained below.

[1] SELECT: Displays a list of the current **Programmable Analogs**.

[2] CHANGE NAME: Used to add or modify a **Shutdown** name.

[3] SELECT I/O: Displays a submenu of the types (**Analog In, Differential, PID Setpoint, PID Minimum, PID Maximum**).

[4] FLAGS: Toggles the change in **PID Set Point**. If the **Flag** is set, it will update the **PID Set Point** immediately when the value is changed from the **Timers and Settings** menu.

```
 Num SetPoint Minimum Maximum Security
  1      0       0       0       2
 Compr Oil Perm  Stg  2 Suctio   Diff

         Toggle Change Now Flag


Toggle Change Now:             [1] Yes
                               [2] No
```

Figure 5-4 Flags Menu

[5] CHANGE SET POINT: Used to enter the **Set Point**.

[6] MINIMUM VALUE: Used to enter the **Minimum Value** of a **Set Point**.

[7] MAXIMUM VALUE: Used to enter the **Maximum Value** of a **Set Point**.

[8] SECURITY: Used to set the level of security. **Level 2** is **Operator Access**. This option corresponds to the level of password required to modify the values. A value of zero is the highest level of security and is only available to Altronic Controls personnel or an **Exacta** integrator. Three is the lowest level of security.

2. From the **Analog Settings Menu**, select **[1] SELECT**. Enter the number of the **Programmable Analog** you want to add, or select the number of the **Analog Shutdown** you want to edit.

3. From the **Analog Settings Menu** (FIGURE 5-3), select **[2] CHANGE NAME**. Enter a new **Analog Setting** name or edit a preexisting name. Press **[E] ENTER** to return to the **Analog Settings Menu**.

4. From the **Analog Settings Menu**, select **[3] SELECT I/O**. This will bring up the **Type of Analog Menu** (FIGURE 5-5). From this menu, select the appropriate type (e.g., if **[1] ANALOG INPUT** is chosen, it will bring up the list of all **Analog Inputs**; if **[4] PID SET POINT** is chosen, it will bring up the list of **PIDs**).

NOTE: To scroll through the Programmable Analog one by one, use [F] FORWARD under the Analog Setting Menu. There may be up to 40 Programmable Analog settings - each screen will display up to 10 at a time.

```
Select Type: * [1] Analog Input
                [2] Differential
                [3] Analog Output
                [4] PID Set Point
                [5] PID Out Max
                [6] PID Out Min
```

Figure 5-5: Type of Analog Menu

5. Select the device that you want from the list.

```
Feb 9/07        Select Analog Input        7:24 AM

            [1] Stg 1 Suction Pres
            [2] Stg 2 Suction Pres
            [3] Stg 1 Disch Pres
            [4] Stg 2 Disch Pres
            [5] Compressor Oil Pres
            [6] Compressor Oil Temp
            [7] Compressor Coolant Temp
            [8] Comp Throw #1 Temp
            [9] Not In Use
            [A] Comp Throw #2 Temp
            [B] Comp Throw #4 Temp
            [C] Comp Throw #5 Temp
            [D] Comp Throw #6 Temp

            Select Differential Analog
                  Push Any Key
```

Figure 5-6: Differential Menu

NOTE: If [2] DIFFERENTIAL (See Figure 5-6) is selected, first select the first Analog Input Device. A submenu will prompt for the 2nd Analog Input Device. The second Analog Input Device value is subtracted from the first Analog Input Device value, resulting in the differential value.

5.3 RAMPS

Ramps are used to ramp the setpoint of a **PID** when the **PID** is first turned on. This allows a gradual opening of a valve or ramping speed, etc.

5.3.1 HOW TO ADD OR EDIT RAMPS

1. From the **Timers Settings Menu**, select **[3] RAMPS** to bring up the **Ramps Menu**.

```
   Num   Start   Stop   Period   Security
    1     0.0     0.0     0.0         0

   [1] Select      [4] Start Point
   [2] Change Name [5] Stop Point
   [3] Select Type [6] Time Period
                   [7] Security


   [F] Forward [B] Backward [E] Exit
```

Figure 5-7: Ramps Menu

RAMPS MENU options and their functions:

[1] SELECT: Displays a list of the current **Ramp Settings**.

[2] CHANGE NAME: Used to add or modify the name.

[3] SELECT TYPE: Displays a list of the types of **Ramp Settings**.

[4] START POINT: Used to enter the **Start Point** and brings up the **Start Point Menu**.

[5] STOP POINT: Used to enter the **Stop Point**.

[6] TIME PERIOD: Used to enter the **Time Period**.

[7] SECURITY: Used to set the level of security.

2. From the **Ramps Menu**, select **[1] SELECT**. Enter the number of the **Ramp Setting** you want to edit. Press **[E] ENTER** to return to the **Ramps Menu**. To forward to an unsaved ramp, press the **[F]** button until an unused ramp is found. Use the appropriate options to name and set up the ramp.

3. From the **Ramps Menu**, select **[2] CHANGE NAME**. Enter a new **Ramp Setting** name or edit an existing name. Press **[E] ENTER** to return to the **Ramps Menu**.

4. From the **Ramps Menu**, select **[3] SELECT TYPE**. This brings up the **Select Type Menu (FIGURE 5-8)**.

   Choose the appropriate option from the list that appears: **[1] ANALOG OUTPUT, [2] PID SET POINT, or [3] MASTER PID.**

NOTE: The only one that is currently functional is [2] PID SET POINT.

```
Select Type: *    [0] Not In Use
                  [1] Analog Output
                  [2] PID Set Point
                  [3] Master Set Point
```

Figure 5-8: Ramps Select Type Menu

5. From the **Ramps Menu**, select **[4] START POINT** to bring up the **Start Point Menu**. Select the appropriate **Start Point** from options **[1] SPECIFY A START VALUE, [2] USE CURRENT SET POINT, or [3] USE CURRENT INPUT**.

```
Start: *[1] Specify A Start Value
        [2] Use Current Set Point
        [3] Use Current Input
```

Figure 5-9: Start Point Menu

Start Point Menu options and their functions:

[1] SPECIFY A START POINT: Used to set a specific value for the **Start Point**.

[2] USE CURRENT SET POINT: Used to take the **Set Point** of the **PID** as the **Start Point**.

[3] USE CURRENT INPUT: Used to take the current reading of the **PID** input (process variable) and use it as the **Start Point**. This is the most common selection.

6. From the **Ramps Menu**, select **[5] STOP POINT** to bring up the **Stop Point Menu**. Select the appropriate **Stop Point** from options **[1] Specify A STOP VALUE, or [2] USE CURRENT SETTING**. The most common choice is **[2] USE CURRENT SETTING**, which uses the current **PID Setpoint** as the **Stop Point**.

```
Start: *[1] Specify A Stop Value
[2] Use Current Setting
```

Figure 5-10: Stop Point Menu

NOTE: The ramps are programmed as described and are later accessed in the programming to perform the ramp. The only place where this programming is used is in the PID programming. When [3] TRANSFER is selected in the PID Control Menu (SEE FIGURE 5-11), and the Mode is set to Ramp in the PID setup, the Controller will automatically scan the programming and pick the first PID ramp with the same name and use those ramp parameters to govern the PID. Once the Suction Control PID is turned on in the program (usually once Minimum Load RPM is acheived), the Suction Controller PID setpoint will ramp from the current suction pressure to the Suction Controller setpoint. The other transfer options (Track and Bumpless) will be described in Section 9.0 PID Programming.

```
Feb 12/07                     PID Control                    6:47 AM

Num     Set Point        Mode        Transfer         Input            Output
 5        33psig      Not Active       Ramp      Stg 1 Suction Pres   Suction Valve
Suction Control

                   [1] Change Name           [5] Change Input
                   [2] Change Set Point       [6] Change Output
                   [3] Change Transfer        [7] Set Parameters
                   [4] Activate / De-activate [8] Show Readings


                 [A] Select [F]orward [B]ackward [E] Exit
```

Figure 5-11: PID Control Menu

5.4 LATCHES

Latches are used throughout the program for tests or to determine if a screen entry is displayed, etc. Fundamental properties of **Latches**:

a) The state of a **Latch** is either **On** or **Off**.

b) The state of a **Latch** can be changed by a user either through **Timers and Settings** or through the **Latch Menu** (FIGURE 5-12).

c) The program can also change the state of a **Latch**.

d) All **Latches** will retain their state when power is lost and then restored. This allows an operator to use **Latches** to select options.

e) Each **Latch** can be given a name.

f) There are **32 Latches**.

5.4.1 HOW TO ADD OR EDIT LATCH NAMES

1. From the **Timers Settings Menu**, select **[4] LATCH NAMES**. This will bring up the **Latch Names Menu**.

```
   Num              Name            Latch
    1   Auto Start                   Off

               [1] Select Latch
               [2] Change Name
               [3] Toggle Latch

        [F] Forward [B] Backward [E] Exit
```

Figure 5-12: Latch Names Menu

2. From the **Latch Names Menu**, select **[1] SELECT LATCH**. Select an existing **Latch** from the list that appears.

3. From the **Latch Names Menu**, select **[2] CHANGE NAME**. Enter a new **Latch** name or edit an existing name.

4. From the **Latch Names Menu**, select **[3] TOGGLE LATCH**. Toggle the **Latch** from **On** to **Off** or vice versa.

NOTE: The position (on or off) of the Latch is displayed on the Latch Names screen (FIGURE 5-12).

5.5 GROUPS

Groups are used to set up the menu of items that appear when the **Timers & Settings** button is pushed. This makes it possible to modify the values for **Timers, Programmable Analogs, and Latches**.

5.5.1 HOW TO SET UP GROUPS

1. From the **Timers Settings Menu** (SEE FIGURE 5-1), select **[5] MENU SET UP** to bring up the **Menu Set Up Menu**.

```
Num                Group Name
 1                  Prelube

             [1] Change Name
             [2] Change Items
             [3] Delete

   [F] Forward [B] Backward [E] Exit
```

Figure 5-13: Menu Set Up Menu

NOTE: Option [5] MENU SET UP in the Timers Settings Menu is used to set up the Groups as they appear in the menu when the Timers Settings button is selected on the keyboard.

Menu Set Up Menu options and their functions:

[1] CHANGE NAME: Used to enter a **Group** name.

[2] CHANGE ITEMS: Used to select **Timers or Settings** for a **Group** and brings up the **Select Items Menu** (FIGURE 5-15).

[3] DELETE: Deletes the entire group.

2. From the **Menu Set Up Menu**, select **[1] CHANGE NAME**. Enter the name of the **Group** and press **[E] ENTER** to return to the **Menu Set Up Menu**.

3. From the **Menu Set Up Menu**, select **[2] CHANGE ITEMS** to bring up the **Change Items Menu** (FIGURE 5-14). Select the **Timers and Settings** you want associated with the **Group** you are setting up. This has the effect of adding menu selection items under the **Timers and Settings Menu**.

NOTE: Use the [F] FORWARD or [B] BACKWARD keys to scroll through the list of Timers and Settings.

```
Num  Type            Name
 1  Timer    Comp Prelube Timeout

             [1] Select Item


   [F] Forward [B] Backward [E] Exit
```

Figure 5-14: Change Items Menu

4. From the **Change Items Menu**, select **[1] SELECT ITEM**. This will bring up the **Select Item Menu** options. Select the **Timers** or **Settings** you want for the **Group** from the options in the menu.

```
      Select:
      [1] Timer        [5] PID Max
      [2] Analog       [6] PID Min
      [3] Latch        [7] Blank
      [4] PID SetP



                      [E] Exit
```
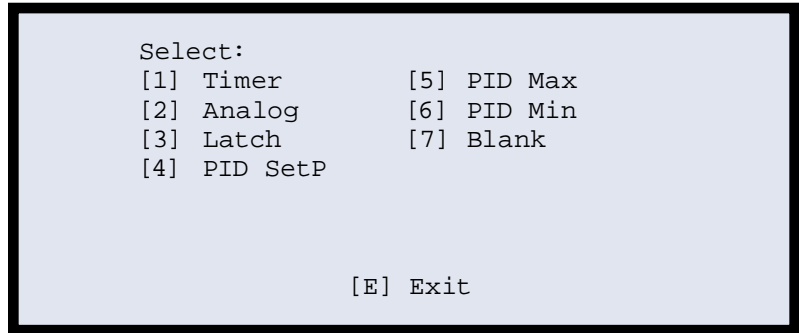
Figure 5-15: Select Items Menu

Select Item Menu options and their functions:

[1] **TIMER:** Selects **Timers** for an item within the **Group**.

[2] **ANALOG:** Selects **Programmable Analogs** for an item within the **Group**.

[3] **LATCH:** Selects **Latches** for an item within the **Group**.

[4] **PID SET:** Selects a **PID** set for an item within the **Group**.

[5] **PID MAX:** Selects a **PID Maximum** for an item within the **Group**.

[6] **PID MIN:** Selects a **PID Minimum** for an item within the **Group**.

[7] **BLANK:** Sets the **Timer** to a blank.

NOTE: A total of 9 Groups can be used. Each Group can have up to 12 Items.

5.6 TIMERS AND SETTINGS

5.6.1 HOW TO ADJUST VALUES FOR TIMERS AND SETTINGS

1. From the **Run Menu**, select the **GROUP** whose **Timers and Settings** you want to adjust.

```
Feb 14/07        Timers & Settings        1:02 PM

             [0] Shutdowns & Alarms
             [1] Prelube
             [2] Load
             [3] Warm Up
             [4] Start Pressures
             [5] Fuel #1 Specs
             [6] Main Valve Control
             [7] Crank
             [8] Fuel #2 Specs

                      [E] Exit
```

Figure 5-16: Run Menu

NOTE: Option [6] Run Menu from the Timers Settings menu brings up the same menu as when the Timers Settings button is selected on the keyboard. This option is used to adjust the value of the Timers and Settings from the Groups previously created (SEE SECTION 5.5.1: HOW TO SET UP GROUPS).

2. To change a value, select the number of the item. For timers or analog set points, type a new value and push **[E] Enter**. For a latch, select the corresponding number to toggle between **ON** or **OFF**.

6.0 PROGRAMMING THE STATE ENGINE

6.1 ABOUT THE STATE ENGINE

The **State Engine** is used to move from the beginning of the start sequence to the compressor run mode. The **State Engine** consists of ten diagrams. A total of 100 states are possible in any combination of diagrams (e.g., 10 diagrams of 10 states each, or 1 diagram with 100 states). Due to the multi-tasking ability, the controller may be operating in numerous states and diagrams at any given time. The ability of the **State Engine** to operate simultaneously in many different states and diagrams makes it a powerful programming feature.

A compressor sequence generally consists of the following states:

0) **Initialize**
1) **Shutdown State-Push Reset to Clear**
2) **OK to Start (waiting for Start Button to be Pushed)**
3) **Pressurize/Depressurize**
4) **Prelubing**
5) **OK to Crank**
6 **Engine Cranking**
7) **Engine Warm Up Cycle**
8) **Compressor Running**

6.1.1 HOW TO PROGRAM THE STATE ENGINE

1. From the **Advanced Program Menu** (FIGURE 2-2), select **[4] STATE ENGINE**. This brings up the **State Engine Menu**.

```
Feb 21/07          State Diagrams          4:01 AM

                 [1] Edit States
                 [2] Show Current States
                 [3] Change State




                      [E] Exit
```
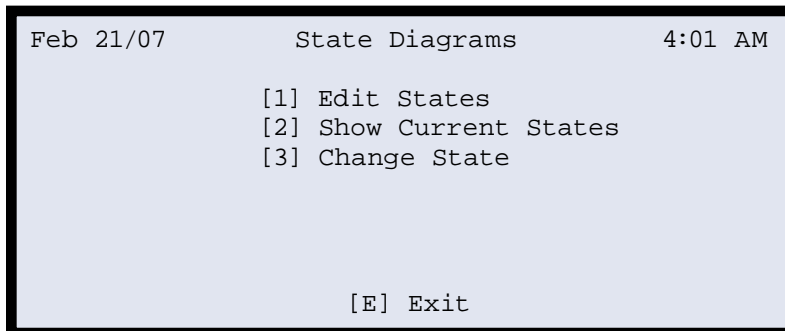
Figure 6-1: State Engine Menu

State Engine Menu options and their functions:

[1] **EDIT STATES:** Used to enter all programming in the **State Engine**.

[2] SHOW CURRENT STATES: Displays the status of the state engine with diagrams from **0** to **9** and the state number of each diagram. For most compressor applications only diagram **0** is used.

NOTE: There are three ways to change from one State to another:
    1) Change State
    2) Goto State
    3) Previous State
These are covered in Programming Functions in Section 8.0.

```
Feb 21/07          Current States          4:41 AM

        0:    1          5:    **
        1:    **         6:    **
        2:    **         7:    **
        3:    **         8:    **
        4:    **         9:    **
              [E] Exit
```

Figure 6-2: Show Current States Menu

[3] CHANGE STATE Forces a change of diagram and state number.

6.1.2 MENU OPTIONS FOR THE STATE ENGINE

1. From the **State Engine Menu (FIGURE 6-1)**, select **[1] EDIT STATES**. This will display the **Edit States Menu**.

```
Feb 21/07          Edit States          4:04 AM

        State: 0          Programmed
               Initializing

            [1] Select State
            [2] Modify State
            [3] Move
            [4] Copy
            [G] Show Functions


       [F] Forward [B] Backup [E] Exit
```

Figure 6-3: Edit States Menu

This screen is showing **State 0**. The message that will be shown for **State 0** is **Initializing**. To select the state you wish to modify or review, either choose **[1] SELECT STATE** and choose the appropriate state or use the **[F] FORWARD** or **[B] BACKUP** keys.

2. Once the desired **State** to be modified is shown, select **[2]**
MODIFY STATE. The **Modify State Menu** will be shown.

```
Device Type   When
   1  Message Push
Initializing
[F]orward   [1] Device   [5] Change Message
[B]ack      [2] Type
[A]dd       [3] When     [7] Parameters
[D]elete    [4] Off
[0] Goto
              Current States        4:41 AM
```

Figure 6-4: Modify State Menu

Select the **Programming Function** you want to modify from the menu.

Enter the appropriate **Programming Commands**.

SEE SECTION 7.1.1, NUMBER 3 for descriptions of options **[F]orward
through [4] Off**.

[5] **Change Message** is used to change the current message name.

[7] **Parameters** is used to display and allow changing of the
parameters associated with the state selected.

3. Refering to FIGURE 6-3.

[3] **Move** is used to move or translate the state to a new location.

[4] **Copy** is used to copy **State** commands from another device

[G] **Show Functions** shows all of the function lines attached to
the selected state.

NOTE: Programming Functions are covered in detail in Section 8.0.

7.0 PROGRAMMING INPUTS AND SUBROUTINES

7.1 ABOUT PROGRAMMING INPUTS AND SUBROUTINES

NOTE: The programming functions used to program a real input address and those used to program a subroutine (imaginary) address are identical.

A subroutine address is created by using an imaginary input address. Creating an imaginary input address is done either by installing an imaginary board and using the addresses associated with that board, or by using an address on an installed board which doesn't have an input device wired to it. On a **12x12 I/O board** there are physically only **12** inputs and **12** outputs and the computer allows programming under inputs **1** through **24**; therefore, inputs **13** through **24** may be used on a **12 x 12 I/O board** for subroutines.

7.1.1 HOW TO PROGRAM INPUTS AND SUBROUTINES

1. From the **Advanced Program Menu (FIGURE 2-2)**, select **[2] PROGRAM DEVICES**. This will bring up the **Program Devices Menu**.

```
Feb 26/07         Program Devices        5:25 AM


          Port: 1 Unit: 1 Smart Analog


              [F] Next Unit
              [B] Previous Unit
              [1] Modify Devices
              [2] Show Devices


                  [E] Exit
```

Figure 7-1: Program Devices Menu

2. From the **Program Devices Menu**, use **[F] NEXT UNIT** and **[B] PREVIOUS UNIT** to go to the appropriate port and unit number (these are not always in sequence). Select **[1] MODIFY DEVICES** to bring up the **Modify Devices Menu**. Use the **[F]FORWARD** and **[B]BACKWARD** keys to scroll to the address you want or use **[7] JUMP** to type in an address.

```
Feb 26/07        Modify Devices          5:27 AM

Dev Type  Number Analog   Input: Stg 1 Suction Pres
 1 Analog    1    4-20ma(10)
        [1]  Name              [7] Jump
        [2]  Type              [8] Copy
        [3]  Toggle NO / NC
        [4]  Flash Rate        [K] Translate
        [5]  Modify Functions  [G] Show Functions
        [6]  Enable / Disable  [H] Cross Reference
        [A]  Filter            [I] Initialization


        [F] Forward [B] Backup [E] Exit
```

Figure 7-2: Modify Devices Menu

3. From the **Modify Devices Menu**, select **[5] MODIFY FUNCTIONS** to bring up the **Modify Functions Menu**. Menu options and their functions are described below.

```
Device  Type   When   Start
  2    Shutdow Push    2.0

[F]orward [1] Device [5] Start Delay
[B]ack    [2] Type
[A]dd     [3] When   [7] Parameters
[D]elete  [4] Off
[0] Goto
```

Figure 7-3: Modify Functions Menu

NOTE: The existing program functions can be displayed on a PC or Laptop by choosing [G] SHOW FUNCTIONS.

[F] FORWARD: Used to navigate forward through addresses or programming lines.

[B] BACKWARD: Used to navigate backward through addresses or programming lines.

[A] ADD: Used to add a line of programming. The two options available are listed below.

> **[1] ADD TO END:** Adds a line of programming after another line of programming.

> **[2] INSERT BEFORE:** Adds a line of programming before another line of programming.

[D] DELETE: Deletes a line of programming.

[0] GOTO: To navigate to the specified line of programming.

[1] DEVICE: Used to enter a **Device**.

[2] TYPE: To select between **Programming Commands**.

[3] WHEN: To select between options **WHEN PUSHED** or **WHEN RELEASED**.

[4] OFF: To set **Off Continue** (SEE SECTION 8.2, NUMBER 4) to either **Yes/No**.

[5] START DELAY: To program a **Start Delay**.

[7] PARAMETERS: To display the parameters of certain functions (i.e., **Analog Test**, **Wait Analog**, etc.).

4. From the **Modify Functions Menu**, select from options **[1] DEVICE** through **[7] PARAMETERS** to make any changes to the line displayed at the top. The line at the top will change to reflect your choices. Use the **[F] FORWARD** and **[B] BACKWARD** keys to scroll through the existing programming lines or use option **[0] GOTO** to go to a specific programming line.

5. From the **Modify Functions Menu**, select **[A] ADD** to add a new line of programming. This selection will bring up the Add Menu.

```
Device  Type   When   Start
  2    Shutdow Push    2.0


   Method Of Adding:
        [1] Add To End
        [2] Insert Before
        [3] Exit
```

Figure 7-4: Add Menu

6. From the **Add Menu**, select either option **[1] ADD TO END** or option **[2] INSERT BEFORE** to place the new programming line in the appropriate place. The **Add to End/Insert Before Menu** is displayed.

```
Feb 26/07       Select Function      5:31 AM
            Select Function Group:

          [1] Output Commands
          [2] Input Commands
          [3] Tests
          [4] LED & Latches
          [5] State Diagrams
          [6] Count Commands
          [7] Analog Commands
          [8] Control Commands
          [9] Compressor
          [A] Other
               [E] Exit
```

Figure 7-5: Add to End/Insert Before Menu

7. From the **Add to End/Insert Before Menu**, select a **FUNCTION GROUP** to choose the type of **COMMAND LINE** you want to insert into your program.

NOTE: The Add to End/Insert Before Menu lists all groups of command lines. Within each group is a list of commands. For more information on programming and command lines See Section 8.0.

8.0 PROGRAMMING FUNCTIONS

8.1 ABOUT PROGRAMMING FUNCTIONS

This section describes how the programming of inputs and the **State Engine** works. Each individual input or state can be programmed to do specific actions. Actions are performed by adding programming lines under an input or state. Each line of programming is referred to as a function line.

8.1.1 FUNDAMENTAL PROPERTIES OF FUNCTIONS:

a) A maximum of **1000** functions can be programmed.

b) Each input or state can have as many functions as are available. It is possible to put all **1000** functions under one input, but there would be none left to be used elsewhere.

c) Functions are either active or not active. A function may perform some action when it is first activated, while it is active and when it is deactivated. This is dependent on the type of function.

d) Inputs can activate a function when the input is turned on (**When Pushed**) or they can be activated when the input is turned off (**When Released**). When the computer is first powered up the **Initialize On Startup** setting for each input will determine if functions are activated immediately for that specific input. If set to initialize on power up the computer will first determine the state of the input and then activate the **When Pushed** or **When Released** functions. No functions are activated if the **Initialization** is set to **Do Not Initialize**.

e) States can activate a function when a state is entered (**When Pushed**) or when the state has been exited (**When Released**). A state must be entered first and then exited before the **When Released** functions are activated. On power up **State 0 Diagram 0** is entered.

f) The sequence of functions is important. Functions are always activated in sequence from top to bottom.

g) Many function types have a start delay and a stop delay. The delay for each function acts independently from any other function. This means that up to **1000** timers can be active at the same time.

h) Delay times are programmed in seconds with an accuracy of **1/10** second.

i) Start Delays have the effect of delaying the action of the function until after the time delay has been completed.

j) Functions with a **Stop Delay** also have a **Stay On** flag setting. If the **Stay On** flag is set to **Yes** the function will stay on until the input or state changes state which will then activate the stop delay. If the **Stay On** flag is set to **No** the stop delay will be activated after the start delay is finished.

k) A parameter called the **Off Continue** flag can be set to either on or off. If set to **Off**, any function that is still in a start delay when any input or state changes state, will be deactivated before the action is performed. If the **Off Continue** flag is **On**, the function delay time will continue and the function will perform its action when the delay is complete.

l) There are function types that perform a test that can affect the action of lines below. Typically function lines that perform a test do not have a start or stop delay. Function lines that are affected by a line above them are indented to show they are affected.

m) Even though function lines are activated from top to bottom in an input or state, the time delays set in each function line can cause the action to be performed in a different sequence.

8.1.2 ACTIVATING A FUNCTION:

There are many parameters that determine when a function will perform it's action and for how long. The **Start Delay**, **Stop Delay**, **Stay On** flag and **Off Continue** flag all affect when the action is performed as well as how long the input or state remains in its current state. The following graph shows the relationship of all these parameters.
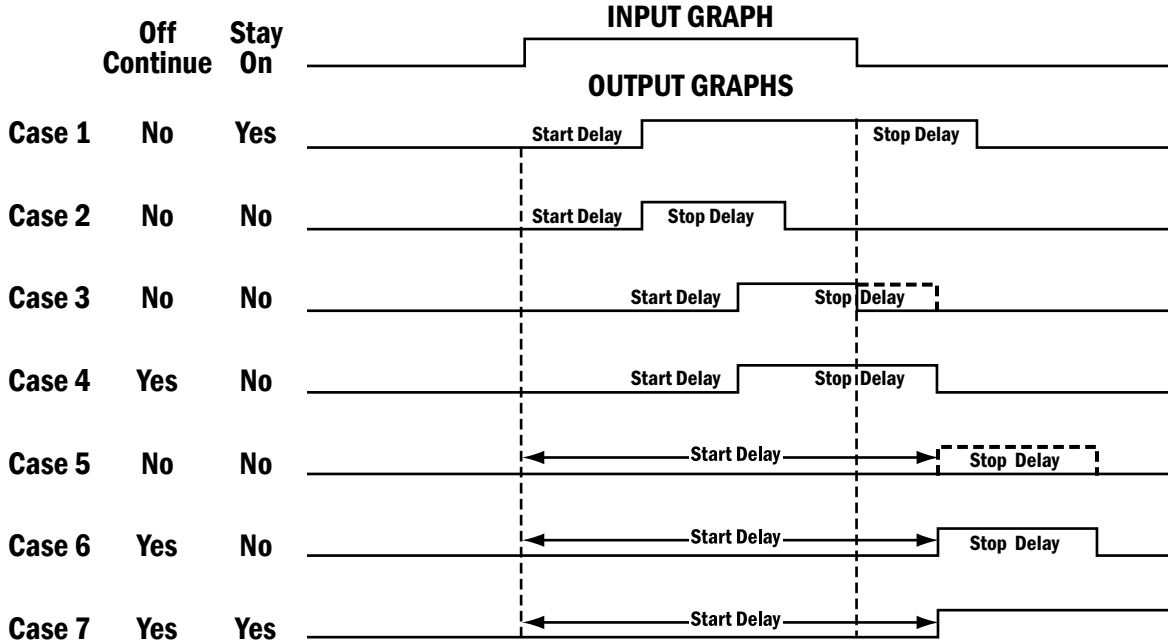
Figure 8.1: Activation Graph

The **Activation Graph** shows when the input changes state, labeled as the **Input Graph**. The transition points are shown as vertical dashed lines. Seven combinations of parameters and timing are shown, labeled as **Cases 1** through **7** with the effect labelled as **Output Graphs**.

Case 1 The **Start Delay** delays the time the output comes on. The output remains on for the period of time the input is on plus the length of time in the **Stop Delay**.

Case 2 The **Start Delay** delays the time the output comes on, but because **Stay On** is set to **No**, the **Stop Delay** determines how long the output remains on (not dependent on length of time **Input** is on).

Case 3 The settings are identical to **Case 2**. However, this example shows that the output gets cut off as soon as the input is turned off because **Off Continue** is set to **No**.

Case 4 **Stay On** is set to **No**, so the **Stop Delay** determines how long the output remains on. **Off Continue** is set to **Yes**, so the output remains on even though the input is turned off.

Case 5 The **Start Delay** keeps the output off for the full length of time that the input is on. The **Off Continue** is turned off, so the output never comes on.

Case 6 The **Start Delay** acts as expected. The **Stop Delay** still determines the length of time the output stays on. Since the **Off Continue** is set to **Yes**, the output gets turned on even though the input is turned off.

Case 7 Turns on the output after a **Start Delay**. The output then remains on until another command is used to turn it off.

8.1.3 FUNCTION TESTS:

Performing a test with a function is one of the most critical parts of understanding how functions are used. The three main types of functions that perform tests are **If**, **Wait** and **While** functions. It is possible to perform combination of tests by using the **And** and **Or** function types. Function tests can also be nested.

Example of how a test would work that includes **ands** and **ors**.

```
If Test 1
    and Test 2
    and Test 3
    or Test 4
    and Test 5
    and Test 6
    or Test 7
    and Test 8
    Function Line 8
    Function Line 9
Block End
```

The above example has **11** functions including the block end. Before Function lines **8** and **9** can be performed either **Tests 1**, **2** and **3** must be true or **Tests 4**, **5** and **6** must be true or **Tests 7** and **8**. Notice how the tests are grouped into **3** groups. The **If** starts the first group with **or test 4** starting the second group and **or test 7** starting the third group. If any one of these groups is true **Functions 8** and **9** will be performed. For a group to be true each test in the group must be true.

The following example shows an **if** statement with an **else**.

```
If Test1
    Function Lines
else
    Function Lines
Block End
```

The following is an example of nested tests.

```
If Test1
    if Test 2
        Function Line 3
        Function Line 4
    Block End
    if Test 5
        and Test 6
        Function Line 7
    Block End
    Function Line 8
    Function Line 9
Block End
```

Notice how the indentation changes with each nest and how the block end affects each line.

The following is the list of tests that can be performed:

1) **Blank**: No test is performed. Will always return a **False**.
2) **Input On**: Is the specified input on?
3) **Input Off**: Is the specified input off?
4) **Input Locked**: Is the input locked (either on or off)?
5) **Input Locked On**: Is the input locked on?
6) **Input Locked Off**: Is the input locked off?
7) **Output On**: Is the output on?
8) **Output Off**: Is the output off?
9) **PID On**: Is the **PID** on (activated)?
10) **PID Off**: Is the **PID** off.
11) **Underspeed**: Is the **RPM** below the minimum **RPM** (**Do Not Use**)?
12) **20 RPM**: Is the **RPM** ≥ **20**.
13) **No Shutdowns**: Will be true if there are no shutdowns preventing the unit from starting.
14) **Compressor Running**: Will return a true if the **Compressor Start** function is activated.
15) **Timer > Zero**: Is the specified timer set to anything other than zero?
16) **Latch**: Is the specified latch set?

The above tests can be performed by any function that uses tests.

Note: When selecting a test, the computer will always ask for an input/output device number first. For tests that do not require an input or output device number, the entry will be ignored and additional information will be requested as required.

8.1.4 ADDING PROGRAMMING FUNCTION LINES:
All programming functions are accessed under **Program Menu** by Selecting **[6] Advanced Program**, **[2] PROGRAM DEVICES**, **[1] MODIFY DEVICES**, **[5] MODIFY FUNCTIONS** and **[2] TYPE**, which displays the **Select Function Group Menu**.

```
Mar 5/07        Select Function        1:26 AM
           Select Function Group:
                [1] Output Commands
                [2] Input Commands
                [3] Tests
                [4] LED & Latches
                [5] State Diagrams
                [6] Count Commands
                [7] Analog Commands
                [8] Control Commands
                [9] Compressor
                [A] Other
                     [E] Exit
```

Figure 8-2: Select Function Group Menu

8.2 COMMON MENU OPTIONS FOR COMMANDS

Several common options found under each of the programming commands are shown on the **Modify Functions Menu**.

```
Device  Type    When    Start
  13    Shutdow Push     5.0


[F]orward [1] Device [5] Start Delay
[B]ack      [2] Type
[A]dd       [3] When   [7] Parameters
[D]elete  [4] Off
[0] Goto
```

Figure 8-3: Modify Functions Menu

[3] **WHEN:** Used to select between **WHEN PUSHED** or **WHEN RELEASED**. **WHEN PUSHED** activates the command line when the input or state is turned on. **WHEN RELEASED** activates the command line when the input or state is turned off.

[4] **OFF:** Short for **Off Continue (Yes/No)**. **SEE SECTION 8.1.1- K**, and **FIGURE 8-1** for an explanation of this option.

[5] **START DELAY:** Delays the time the output comes on.

[7] **PARAMETERS:** Displays the parameters for the line of programming. Usually this is related to the test, if there is one.

8.3   OUTPUT COMMANDS

```
Mar 5/07          Select Function           10:31 AM

                Select Function Type:

            [1] Turn On Output
            [2] Turn Off Output
            [3] Output
            [4] Lock Output
            [5] Flash Output


                   [E] Exit
```

Figure 8-4: Output Commands Menu

[1] TURN ON OUTPUT
Location:	**Output Commands Menu**
Description:	This command will turn on the **Output** and keep it on until another command is used to turn it off. This command line can use a **Start Delay** in it.
Syntax:	**Turn On Output**
Parameters:	**Output Device, Start Delay, Off Continue**
See Also:	**Output**

[2] TURN OFF OUTPUT
Location:	**Output Commands Menu**
Decription:	This command will turn off the **Output**. This command line can use a **Start Delay** in it.
Syntax:	**Turn Off Output**
Parameters:	**Output Device, Start Delay, Off Continue**
See Also:	**Output**

[3]   OUTPUT
Location:	**Output Commands Menu**
Description:	This command will only turn the output on while the input or state is on. This command can be used in conjunction with **OFF CONTINUE: YES/NO** and **STAY ON: YES/NO** to obtain various outcomes. See the activation graph, **FIGURE 8.1**.
Syntax:	**Output**
Parameters:	**Output Device, Start Delay, Stay On, Stop Delay, Off Continue**
See Also:	**Turn On Output, Turn Off Output**

[4] LOCK OUTPUT

Location:	**Output Commands Menu (FIGURE 8-4)**
Description:	This command will lock the state on, lock the state off, or lock in the current state. To get to the menu with these commands select **[4] LOCK OUTPUT** from the **Output Commands Menu** and then select **[8] LOCK POSITION** from the **Lock Output Menu**.

When **[2] LOCK IN ON STATE** or **[3] LOCK IN OFF STATE** is selected from the **Lock Postion Menu** , the **Output** can be turned **On** or **Off** when the lock is released **(Yes/No)**. **[9] LOCK TYPE** toggles between commands **And** & **Or**.

Syntax:	**Lock in Current State; Lock in On State; Lock in Off State**
Parameters:	**Output Device, Start Delay, Stay On, Stop Delay, Off Continue, Lock State, And/Or**
See Also:	**Lock Input**

[5] FLASH OUTPUT

Location:	**Output Commands Menu (FIGURE 8-4)**
Description:	This command will **Flash** an **Output** on and off continuously until this function has been deactivated. The start delay and stop delay control the pulse rate. The start delay is the on time and the stop delay is the off time.
Syntax:	**Flash Output**
Parameters:	**Output Device, Start Delay, Stop Delay,**
See Also:	**Turn On Output**

NOTE: The [9] LOCK TYPE should normally be left in the AND position which forces all the locks (if more than one) to be released before allowing a change in state for the input or output The OR position allows a change in state after any of the locks are released. The lock always remains in place until the input is turned off or the state is changed.

8.4 INPUT COMMANDS

The **Input Commands** are similar to the **Output Commands**.

```
Mar 5/07        Select Function        10:31 AM

          Select Function Type:

          [1] Turn On Input
          [2] Turn Off Input
          [3] Input
          [4] Lock Input

               [E] Exit
```

Figure 8-5: Input Commands Menu

[1] TURN ON INPUT

Location:	**Input Commands Menu**
Description:	This command will turn on the input and keep it on until another command is used to turn it off, or the input itself is turned off. Any functions under the input set to when pushed will be activated. Any that are set to when released will be deactivated.
Syntax:	**Turn On Input**
Parameters:	**Input Device, Start Delay, Off Continue**
See Also:	**Turn Off Input**

[2] TURN OFF INPUT

Location:	**Input Commands Menu (FIGURE 8-5)**
Description:	This command will turn off the input. Any functions under the input set to when released will be activated. Any that are set to when pushed will be deactivated.
Syntax:	**Turn Off Input**
Parameters:	**Input Device, Start Delay, Off Continue**
See Also:	**Turn On Input**

[3] INPUT

Location:	**Input Commands Menu (FIGURE 8-5)**
Description:	This command will only turn the input on while the input or state is on. This command can be used in conjuction with **OFF CONTINUE: YES/NO** and **STAY ON: YES/NO** to obtain various outcomes. See the activation graph, **FIGURE 8.1**.
Syntax:	**Input**
Parameters:	**Input Device, Start Delay, Stay On, Stop Delay, Off Continue**
See Also:	**Turn On Input, Turn Off Input**

[4] LOCK INPUT

Location:	**Input Commands Menu (FIGURE 8-5)**
Description:	This command will lock the state on, lock the state off, or lock in the current state. To get to the menu with these commands, select **[4] LOCK INPUT** from the **Input Commands Menu** and then select **[8] LOCK POSITION** from the **Lock Input Menu**.
	When **[2] LOCK IN ON STATE** or **[3] LOCK IN OFF STATE** is selected, the **Input** can be turned **On** or **Off** when the lock is released **(Yes/No)**. **[9] LOCK TYPE** toggles between commands **AND** & **OR**.
Syntax:	**Lock in Current State, Lock in On State, Lock in Off State**
Parameters:	**Output Device, Start Delay, Stay On, Stop Delay, Off Continue, Lock State, And/Or**
See Also:	**Lock Output**

NOTE: The [9] LOCK TYPE should normally be left in the AND position which forces all the locks (if more than one) to be released before allowing a change in state for the input or output The OR position allows a change in state after any of the locks are released. The lock always remains in place until the input is turned off or the state is changed.

8.5 TEST COMMANDS

The **Test Commands** are used to evaluate conditions and then based on those conditions execute programming lines following the tests. These programming lines are indented to show they belong under the test. The various **Test Commands** are found in the **[3] TESTS MENU**.

```
Mar 5/07        Select Function        10:31 AM

               Select Function Type:
                   [1] If
                   [2] Else
                   [3] Block End
                   [4] Wait
                   [5] While
                   [6] Record
                   [7] And
                   [8] Or
                   [9] RPM Test
                   [A] And Delay
                   [B] Or Delay


                   [E] Exit
```

Figure 8-6: Test Commands Menu

> **NOTE: Whenever a Test Command is used the computer will prompt whether or not to set the NOT FLAG. The NOT FLAG is only set to [1] YES if you want to test if the condition is Not True (False). Normally this flag is set to [2] NO.**

[1] IF

Location: Test Commands Menu

Description: This command tests for an existing condition. If the condition is true, the programming lines below the **If Command** will execute. If false, the lines after the else will be activated.

Syntax:
```
If Test Then
   [Function lines]
else
   [Function lines]
Block End
```

Parameters: Test

See Also: Else, Block End

[2] ELSE

Location: Test Commands Menu

Description: The function lines after the else are activated if the **If** statement is false.

Syntax:
```
If Test Then
   [Function Lines]
Else
   [Function Lines]
Block End
```

Parameters: Conditions required. Boolean expressions.

See Also: If .....Then

[3] BLOCK END

Location: **Tests Menu** **(FIGURE 8-6)**

Description: This command will end the programming under each test.

Syntax: `Block End`

[4] WAIT

Location: **Tests Menu** **(FIGURE 8-6)**

Description: This command will wait for the condition to become true before the programming lines underneath are executed. The **Wait Command** is only performed once in the sequence, unless it is nested inside a **While Test**.

Syntax: `Wait`

Parameters: **Test.**

See Also: **Wait Analog**

[5] WHILE

Location: **Tests Menu** **(FIGURE 8-6)**

Description: This command is always actively testing as long as the **Input** is on (or in the case of **State Programming** the state remains unchanged). When the **While** becomes true, the functions up to the block end are activated. When the **While** becomes false, the functions are deactivated.

Syntax: `While [Test]`

Parameters: **Test.**

See Also: **While Analog, While Diff, While Output**

[6] RECORD

Location: **Tests Menu** **(FIGURE 8-6)**

Description: This command will let the program record a significant event in the **Record History** of the computer. This can be useful for diagnostics.

Syntax: `Record`

Parameters: **Input/Output Device Number, Start Delay, Test**

[7] AND

Location: **Tests Menu** **(FIGURE 8-6)**

Description: This command will test for more than one condition. All conditions must be true before the programming lines below the test are executed. This command is used in conjunction with the If, Wait, or While Commands **(SECTION 8.1.3)**.

Syntax: `And Test`

Parameters: **Test**

See Also: **And Delay, And Count, And Analog**

[8] OR
Location: Tests Menu (FIGURE 8-6)
Description: This command will test for more than one condition. Only one of the conditions must be true before the programming lines below the test are executed. This command is used in conjunction with the **If**, **Wait**, or **While Commands (SECTION 8.1.3)**.
Syntax: `Or Test`
Parameters: Test.
See Also: Or Delay, Or Count, Or Analog

[9] RPM TEST
Location of Command
Location: Tests Menu (FIGURE 8-6)
Description: This command will test for **Greater Than** or **Less Than the Value** of a specified **RPM**. Note: This command only works with **Exacta 21** computers that use the **12X12 I/O** board to monitor **RPM**. **Exacta 21** computers that use modbus to obtain **RPM** should use one of the **Analog Tests** instead of this command.
Syntax: `RPM Test`
Parameters: Test Type [Greater Than or Less Than] RPM Test Value

> *NOTE: Parameters are not shown for the RPM Test. To view them, go into Advanced Programming, go to the appropriate state or device, choose Modify, then go to the RPM Test line.*

[A] AND DELAY
Location: Tests Menu (FIGURE 8-6)
Description: This command will delay the upcoming programmed action resulting from another **Test** evaluating as **True**.
Syntax: `And Delay`
Parameters: Start Delay.
See Also: And, And Count, And Analog

> *NOTE: Parameters are not shown for the RPM Test. To view them, go into Advanced Programming, go to the appropriate state or device, choose Modify, then go to the RPM Test line.*

[B] OR DELAY
Location: Tests Menu (FIGURE 8-6)
Description: This command is used as a conditional statement in conjunction with another **Test Command**. If the **Test Command** evaluates to **False** the **Or Delay Command** causes the program to execute the **Delay** set and then carry out the programming that follows.
Syntax: `Or Delay`
Parameters: Start Delay.
See Also: Or, Or Count, Or Analog

8.6 LED & LATCH (FLAG) COMMANDS

```
Mar 5/07          Select Function          10:31 AM

                Select Function Type:

                [1] KB LED On
                [2] KB LED Off
                [3] LED Special
                [4] KB LED Flash
                [5] Set Latch
                [6] Reset Latch
                [7] Toggle Latch
                [8] Special Latch



                    [E] Exit
```

Figure 8-7: LED & Latches

[1]   KB LED ON
Location:	**LED & Latches Menu**
Description:	This **Keyboard (KB)** command will turn on the **Keyboard LED** of an **Exacta 21** computer and keep it on until another command is used to turn it off. This command line can use a **Start Delay**.
Syntax:	LED On
Parameters:	**LED Number [0 - 21], Start Delay**
See Also:	**KB LED Off, KB LED Special, KB LED Flash**

[2]   KB LED OFF
Location:	**LED & Latches Menu**
Description:	This **Keyboard (KB)** command will turn off the **Keyboard LED** of an **Exacta 21** computer and keep it off until another command is used to turn it on. This command line can use a **Start Delay**.
Syntax:	**KB LED Off**
Parameters:	**LED Number [0 - 21], Start Delay**
See Also:	**KB LED On, KB LED Special, KB LED Flash**

[3]   LED SPECIAL
Location:	**LED & Latches Menu**
Description:	This **Keyboard (KB)** command will turn the **LED** on and then off. This command can be used in conjunction with **OFF CONTINUE: YES/NO** and **STAY ON: YES/NO** to obtain various outcomes **(SECTION 8.1.2)**.
Syntax:	KB LED Special
Parameters:	**LED Number [0 - 21], Start Delay, Stay On, Stop Delay**
See Also:	**KB LED On, KB Off, KB LED Flash**

[4] KB LED FLASH

Location:	**LED & Latches Menu (FIGURE 8-7)**
Description:	This **Keyboard (KB)** command will **Flash** the **LED** on and off. **Start** and **Stop** parameters must be set. **Start** determines length of time (in seconds) that light will be on, **Stop** determines length of time light will be off.
Syntax:	KB LED Flash
Parameters:	**LED Number [0 - 21], Start Delay, Stop Delay**
See Also:	**KB LED On, KB Off, KB LED Special**

[5] SET LATCH

Location:	**LED & Latches Menu (FIGURE 8-7)**
Description:	This command will set a **Latch** to **1**.
Syntax:	Set Latch
Parameters:	**Latch Number, Start Delay**
See Also:	**Reset Latch, Toggle Latch, Special Latch**

[6] RESET LATCH

Location:	**LED & Latches Menu (FIGURE 8-7)**
Description:	This command will reset a latch from **1** back to **0**.
Syntax:	Reset Latch
Parameters:	**Latch Number, Start Delay**
See Also:	**Set Latch, Toggle Latch, Special Latch**

[7] TOGGLE LATCH

Location:	**LED & Latches Menu (FIGURE 8-7)**
Description:	This command will toggle the flag between **1** and **0**.
Syntax:	Toggle Latch
Parameters:	**Latch Number, Start Delay**
See Also:	**Set Latch, Reset Latch, Special Latch**

[8] SPECIAL LATCH

Location:	**LED & Latches Menu (FIGURE 8-7)**
Description:	This is a flexible command that acts like **Options [1] - [3]** on the **LED & Latches Menu**. This function will set a latch to **1** when activated and **0** when deactivated similar to the **Output** function **(SEE 8.1.2)**.
Syntax:	Special Latch
Parameters:	**Latch Number, Start Delay, Stay On, Stop Delay**
See Also:	**Set Latch, Reset Latch, Toggle Latch**

NOTE: When the Keyboard Commands [1] KB LED On — [4] KB LED Flash are selected from the LED & Latches Menu, the computer will prompt for a device number. Devices 0-9 match the keyboard numbers. To select device numbers 10 — 21, use A — K. (The letter A corresponds to device 10, etc.)

NOTE: The current program has 32 latches (flags) that may be set to 1 or 0. The latch has a value of 1 when set and 0 when not set. Examples of appropriate use of latches:

• During the Prelube sequence SET LATCH 1 when the compressor oil pressure is satisfied and SET LATCH 2 when the engine oil pressure is met

• Using If Tests - IF LATCH 1 and LATCH 2 are set then turn Off the Prelube pump.

8.7 STATE DIAGRAMS

State Diagrams are used for **State Programming**. This type of programming is useful when doing complex entry control. There are up to **10 State Diagrams** available (numbered **0-9**), and there are up to **100 States** available per **Diagram** (numbered **0-99**). There are no restrictions on how the **States** are distributed inside the **Diagrams**.

```
Mar 5/07          Select Function          10:31 AM

                Select Function Type:

            [1] Change State
            [2] Goto State
            [3] Previous State


                    [E] Exit
```
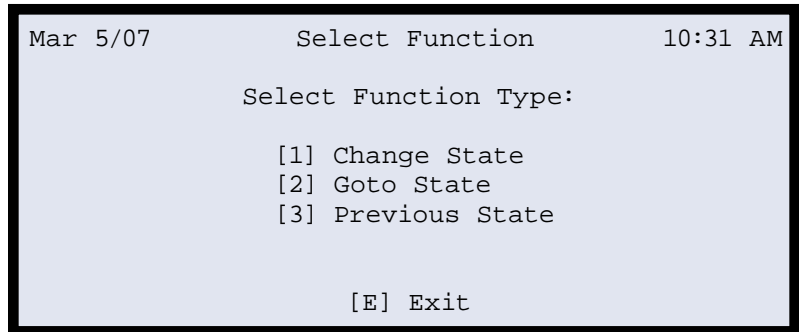
Figure 8-8: State Diagrams Menu

[1] CHANGE STATE
Location:	**State Diagrams Menu**
Description:	This command will change to a new **State** from anywhere in the program.
Syntax:	Change State
Parameters:	**State Diagram Number, State to Change to, Start Delay**
See Also:	**Goto State, Previous State**

[2] GOTO STATE
Location:	**State Diagrams Menu**
Description:	This command will change to a new state only if the program is in the first state of the **Goto Command**. For example, **GotoState 1>2** will only change to **State 2** if the program is currently in **State 1**.
Syntax:	Goto State
Parameters:	**State Diagram Number, State to Come From, State to Go to, Start Delay**
See Also:	**Change State, Previous State**

[3] PREVIOUS STATE
Location:	**State Diagrams Menu**
Description:	This command will return the program to the last state it was in.
Syntax:	Previous State
Parameters:	**State Diagram Number**
See Also:	**Change State, Goto State**

8.8 COUNT COMMANDS

Count Commands are used to: increment, decrement, set, and check counters. There are **20** counters available (numbered **0-19**). The counter options are found in the **Count Commands Menu**.

```
Mar 5/07        Select Function        10:31 AM

                Select Function Type:

                [1] Dec Counter
                [2] Incr Counter
                [3] Count Set
                [4] Count Check
                [5] And Count
                [6] Or Count
                [7] Wait Count
                [8] Transfer Count
                [9] Add Counter
                [A] Subtract Counter



                      [E] Exit
```

Figure 8-9: Count Commands Menu

[1] DEC COUNTER

Location:	**Count Commands Menu**
Description:	This command will decrement the referenced counter.
Syntax:	Dec Counter
Parameters:	**Counter Number, Start Delay**
See Also:	**Incr Counter, Count Set, Count Check, And Count, Or Count, Wait Count, Transfer Count, Add Counter, Subtract Counter**

[2] INCR COUNTER

Location:	**Count Commands Menu**
Description:	This command will increment the referenced counter.
Syntax:	Incr Counter
Parameters:	**Counter Number, Start Delay**
See Also:	**Count Set, Count Check, And Count, Or Count, Wait Count, Transfer Count, Add Counter, Subtract Counter**

[3] COUNT SET

Location:	**Count Commands Menu**
Description:	This command will set the value of the counter to whatever value is entered. This command is often used to set test counters to **0**.
Syntax:	Count Set , Start Delay
Parameters:	**Counter Number, value (number) to set it to, Start Delay**
See Also:	**Incr Counter, Count Check, And Count, Or Count, Wait Count, Transfer Count, Add Counter, Subtract Counter**

[4] COUNT CHECK

Location:	Count Commands Menu **(FIGURE 8-9)**
Description:	This command compares the value of a **Counter** to a chosen value by using the test type is **Less Than**, **Equal To**, or **Greater Than**. A count check is like an **If** test.

Syntax:	`Count Check`
	`   [Function Lines]`
	`else`
	`   [Function Lines]`
	`Block End`

Parameters:	Counter Number, test value (number), and test type (Less than, Less Than or Equal To, Equal To, Greater Than, Greather than or Equal To)
See Also:	Incr Counter, Count Set, And Count, Or Count, Wait Count, Transfer Count, Add Counter, Subtract Counter

[5] AND COUNT

Location:	Count Commands Menu **(FIGURE 8-9)**
Description:	This command compares the value of a **Counter** to a chosen value with the **And Test** **(SECTION 8.1.2)**.
Syntax:	`And Count`
Parameters:	Counter Number, test value (number), and test type (Less than, Less Than or Equal To, Equal To, Greater Than, Greather than or Equal To)
See Also:	Count Set, Count Check, Or Count, Wait Count, Transfer Count, Add Counter, SubtractCounter

[6] OR COUNT

Location:	Count Commands Menu **(FIGURE 8-9)**
Description:	This command compares the value of a **Counter** to a chosen value with the **Or Test** **(SECTION 8.1.2)**.
Syntax:	`Or Count`
Parameters:	Counter Number, test value (number), and test type (Less than, Less Than or Equal To, Equal To, Greater Than, Greater than or Equal To)
See Also:	Count Set, Count Check, And Count,Wait Count, Transfer Count, Add Counter, Subtract Counter

[7] WAIT COUNT

Location:	Count Commands Menu **(FIGURE 8-9)**
Description:	This command compares the value of a **Counter** to a chosen value with the **Wait Test** **(SECTION 8.1.2)**.

Syntax:	`Wait Count`
	`   [Function Lines]`
	`Block End`

Parameters:	Counter Number, test value (number), and test type (Less than, Less Than or Equal To, Equal To, Greater Than, Greater than or Equal To)
See Also:	Count Set, Count Check, And Count, Or Count, Transfer Count, Add Counter, Subtract Counter

[8]   TRANSFER COUNT

Location:	**Count Commands Menu (FIGURE 8-9)**
Description:	This command transfers the value of the **Source Counter** to the **Destination Counter**.
Syntax:	`Transfer Count`
Parameters:	**Source Counter and Destination Counter**
See Also:	**Count Set, Count Check, And Count, Or Count, Wait Count, Add Counter, Subtract Counter**

[9]   ADD COUNTER

Location:	**Count Commands Menu (FIGURE 8-9)**
Description:	This command adds the value of the **Source Counter** to the **Destination Counter** and puts the total in the **Destination Counter**.
Syntax:	`Add Counter`
Parameters:	**Source Counter and Destination Counter**
See Also:	**Count Set, Count Check, And Count, Or Count, Wait Count, Transfer Count, Subtract Counter**

[A]   SUBTRACT COUNTER

Location:	**Count Commands Menu (FIGURE 8-9)**
Description:	This command subtracts the value of the **Source Counter** to the **Destination Counter** and puts the total in the **Destination Counter**.
Syntax:	`Subtract Counter`
Parameters:	**Source Counter and Destination Counter**
See Also:	**Count Set, Count Check, And Count, Or Count, Wait Count, Transfer Count, Add Counter,**

8.9 ANALOG COMMANDS

Analog Commands are similar to **Test Commands**, but are more specific tests for analog values.

```
Mar 5/07           Select Function           10:31 AM

                Select Function Type:

                [1] Analog Test
                [2] Wait Analog
                [3] And Analog
                [4] Or Analog
                [5] While Analog
                [6] While Diff
                [7] If Diff
                [8] Wait Diff
                [9] While Output
                [A] Set Analog Input


                    [E] Exit
```
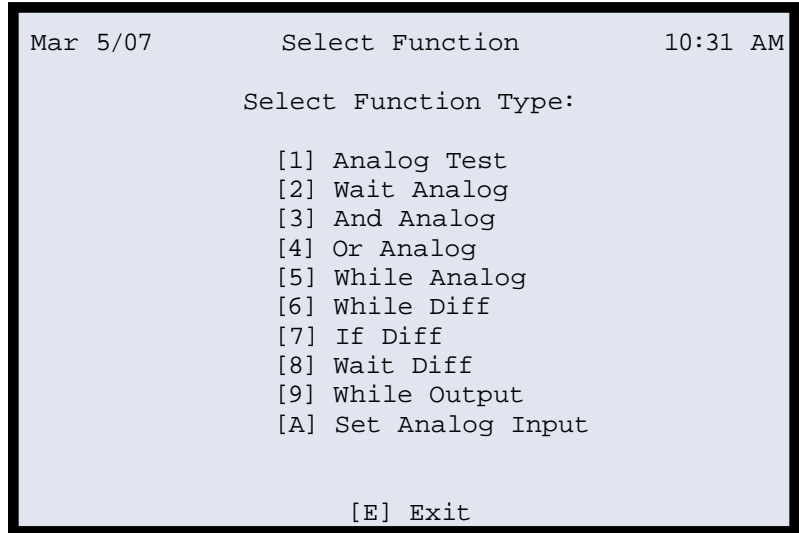
Figure 8-10: Analog Commands Menu

[1] ANALOG TEST
Location: **Analog Commands Menu**
Description: This command tests if an **Analog** value is **Greater Than** or **Less Than** the **Test Value**.
Syntax: `Analog Test`
Parameters: **Analog Input, Test Type (Greater Than or Less Than) and Analog Test Value (number)**
See Also: **Wait Analog, And Analog, Or Analog, While Analog, Set Analog Input, Analog Output, Change Analog**

[2] WAIT ANALOG
Location: **Analog Commands Menu**
Description: This command combines the **Analog Test** and the **Wait Test**.
Syntax: `Wait Analog`
Parameters: **Analog Input, Test Type (Greater Than or Less Than) and Analog Test Value (number)**
See Also: **Wait**

[3] AND ANALOG
Location: **Analog Commands Menu**
Description: This command combines the **Analog Test** and the **And Test (SEE 8.1.2)**.
Syntax: `And Analog`
Parameters: **Analog Input, Test Type (Greater Than or Less Than) and Analog Test Value (number)**
See Also: **And, And Delay, And Count, And Analog**

NOTE: After choosing a GREATER THAN or LESS THAN Test Value, the Analog Test Menu will appear. The options for this menu are:

[1] Adj. Analog Setting: brings up the value choices programmed previously under the Timers & Settings.

[2] Input Set Point: brings up the points values programmed previously under [4] SET POINTS in the Analog Inputs Menu.

[3] Fixed Entry: allows a specific value to be entered. Ensure that the units and span match the selected device.

[4] OR ANALOG
Location: **Analog Commands Menu (FIGURE 8.10)**
Description: This command combines the **Analog Test** and the **Or Test (SEE 8.1.2).**
Syntax: `Or Analog`
Parameters: **Analog Input, Test Type (Greater Than or Less Than) and Analog Test Value (number)**
See Also: **Or, Or Count, Or Delay**

[5] WHILE ANALOG
Location: **Analog Commands Menu (FIGURE 8.10)**
Description: This command combines the **Analog Test** and the **While Test**.
Syntax: `While Analog`
Parameters: **Analog Input, Test Type (Greater Than or Less Than) and Analog Test Value (number)**
See Also: **While, While Diff, While Output**

DIFFERENTIAL TESTS
Location: **Analog Commands Menu (FIGURE 8.10)**
Description: These **Commands Options [6] WHILE DIFF** through **[8] WAIT DIFF** subtract a second analog device from a first analog device and compare the result to a **Test Value** to determine if the **Test** is **True** or **False**. E.g., **(A-B) >= C**.

[6] WHILE DIFF
Location: **Analog Commands Menu (FIGURE 8.10)**
Description: This command combines the **Differential Test** (above) and the **While Test (SECTION 8.5).**
Syntax: `While Diff`
Parameters: **Analog Input, Differential Input, Test Type (Greater Than or Less Than), Analog Test Value (number)**
See Also: **While, While Analog, While Output**

[7] IF DIFF
Location: **Analog Commands Menu (FIGURE 8.10)**
Description: This command combines the **Differential Test** (above) and the **If Test (SECTION 8.5).**
Syntax: `If Diff`
Parameters: **Analog Input, Differential Input, Test Type (Greater Than or Less Than), Analog Test Value (number)**
See Also: **If, If….Then….Else**

[8] WAIT DIFF
Location: **Analog Commands Menu (FIGURE 8.10)**
Description: This command combines the **Differential Test** and the **Wait Test.**
Syntax: `Wait Diff`
Parameters: **Analog Input, Differential Input, Test Type (Greater Than or Less Than), Analog Test Value (number)**
See Also: **Wait, Wait Count, Wait Analog**

NOTE: When using Options [6] WHILE DIFF through [8] WAIT DIFF, the computer will prompt for the first device. When the Analog Differential Menu appears, select any key and a full list of Analog Devices will be displayed. Use [F] FORWARD and [B] BACKWARD to choose the second differential Analog Device.

[9] WHILE OUTPUT

Location: Analog Commands Menu (FIGURE 8.10)

Description: This command compares an **Analog Output** to a **Test Value (Adj. Analog Setting, Input Set Point, or Fixed Entry)**. Ensure that the units and span match the output device.

Syntax: `While Output`

Parameters: Analog Output Test Type (Greater Than or Less Than), Analog Test Value (number)

See Also: While, Output

[A] SET ANALOG INPUT

Location: Analog Commands Menu (FIGURE 8.10)

Description: This command allows a mapped channel with a particular value to be set up.

Syntax: `Set Analog Input`

Parameters: Analog Input, Value

8.10 CONTROL COMMANDS

```
Mar 5/07        Select Function        10:31 AM

               Select Function Type:

            [1] PID On
            [2] PID Off
            [3] PID Manual
            [4] PID Auto
            [5] PID Minimum
            [6] PID Maximum
            [7] Set PID
            [8] In Set PID
            [9] In Set Output
            [A] Set PID Offset
            [B] In->PID Offset



                  [E] Exit
```

Figure 8-11: Control Commands

CONTROL COMMANDS
Location: **Control Commands Menu**
Description: These commands are used to:
  • turn on and off **PIDs**
  • set **PID** to **Auto** or **Manual**
  • change the setpoints of **PIDs**

[1]   PID ON
Location: **Control Commands Menu**
Description: This command turns on or activates the **PID**.
Syntax: PID On
Parameters: **PID Number, Start Delay**
See Also: **PID Off, PID Manual, PID Auto, PID Minimum, PID Maximum, Set PID, In Set PID, Set PID Offset, In->PID Offset**

[2]   PID OFF
Location: **Control Commands Menu**
Description: This command turns off or deactivates the **PID**.
Syntax: PID Off
Parameters: **PID Number, Start Delay**
See Also: **PID On, PID Manual, PID Auto, PID Minimum, PID Maximum, Set PID, In Set PID, Set PID Offset, In->PID Offset**

[3]   PID MANUAL
Location: **Control Commands Menu**
Description: This command puts the **PID** into **Manual** mode. This allows programming to occur without overriding what the operator does.
Syntax: PID Manual
Parameters: **PID Number, Start Delay**
See Also: **PID On, PID Off, PID Auto, PID Minimum, PID Maximum, Set PID, In Set PID, Set PID Offset, In->PID Offset**

NOTE: The program has no control over a PID when in the manual position.

[4]   PID AUTO

Location:	**Control Commands Menu (FIGURE 8-11)**
Description:	This command puts the **PID** into **Auto** mode.
Syntax:	`PID Auto`
Parameters:	**PID Number, Start Delay**
See Also:	**PID On, PID Off, PID Manual, PID Minimum, PID Maximum, Set PID, In Set PID, Set PID Offset, In->PID Offset**

[5]   PID MINIMUM

Location:	**Control Commands Menu (FIGURE 8-11)**
Description:	This command copies the current value of an output and overwrites the **Output Low Limit Option [D]** from the **PID Parameters Menu**.
Syntax:	`PID Minimum`
Parameter:	**PID Number, Start Delay**
See Also:	**PID On, PID Off, PID Manual, PID Auto, PID Maximum, Set PID, In Set PID, Set PID Offset, In->PID Offset**

[6]   PID MAXIMUM

Location:	**Control Commands Menu (FIGURE 8-11)**
Description:	This command copies the current value of an output and overwrites the **Output High Limit Option [F]** from the **PID Parameters Menu**.
Syntax:	`PID Maximum`
Parameter:	**PID Number, Start Delay**
See Also:	**PID On, PID Off, PID Manual, PID Auto, PID Minimum, Set PID, In Set PID, Set PID Offset, In->PID Offset**

[7]   SET PID

Location:	**Control Commands Menu (FIGURE 8-11)**
Description:	This command overwrites the setpoint for a **PID** with a specified value. It is used anytime that a set point needs to be changed to a specific value such as in an auto slow down.
Syntax:	`Set PID`
Parameter:	**PID Number, Set Point Value, Start Delay**
See Also:	**PID On, PID Off, PID Manual, PID Auto, PID Minimum, PID Maximum, In Set PID, Set PID Offset, In->PID Offset**

[8]   IN SET PID

Location:	**Control Commands Menu (FIGURE 8-11)**
Description:	This command takes the current **Analog Input Value** and overwrites a **PID** setpoint.
Syntax:	`In Set PID`
Parameters:	**PID Number, Analog Input, Start Delay**
See Also:	**PID On, PID Off, PID Manual, PID Auto, PID Minimum, PID Maximum, Set PID, Set PID Offset, In->PID Offset**

[9]   IN SET OUTPUT

Location:	**Control Commands Menu (FIGURE 8-11)**
Description:	This command takes the current **Analog Input Value** and overwrites an **Analog Output**.
Syntax:	`In Set Output`
Parameters:	**Analog Input and Analog Output Device Number (the one you want to overwrite)**
See Also:	**Output**

[A] SET PID OFFSET
Location: **Control Commands Menu (FIGURE 8-11)**
Description: This function is the same as **Set PID**, but allows an offset. If a programmable analog is used as the set value, the offset would be added to it.
Syntax: `Set PID Offset`
Parameters: **PID, Value, and the Offset**
See Also: **Set PID**

[B] IN-> PID OFFSET
Location: **Control Commands Menu (FIGURE 8-11)**
Description: This command takes an analog input value, adds an **Offset** with either a positive or negative value, and places it into the setpoint of the specified **PID**.
Syntax: `Set PID Offset`
Parameters: **Analog Input, PID, Offset, Start Delay**
See Also: **Set PID**

8.11 COMPRESSOR COMMANDS

```
Mar 5/07          Select Function         10:31 AM

              Select Function Type:

                [1] Shutdown
                [2] Start Compress
                [3] Stop Compress
                [4] Alarm Reset
                [5] RPM Test
                [6] Analog Output
                [7] Ramp
                [8] Change Analog
                [9] Compressor Page


                    [E] Exit
```
Figure 8-12: Compressor Commands Menu

[1] SHUTDOWN

[2] START COMPRESS
Location: **Compressor Commands Menu**
Description: This command starts timers for **Class B & C Shutdowns,** the hour timer and resets the first in shutdown to zero. This command does not directly start the compressor.
Syntax: `Start Compress`
Parameters: **None**

Note: Shutdown functions are always added automatically by the shutdown and alarm programming.

[3] STOP COMPRESS
Location:	**Compressor Commands Menu** (FIGURE 8.12)
Description:	This command stops the hour timer and turns off the **Run Flag.** This command does not directly stop the compresssor.
Syntax:	`Stop Compress`
Parameters:	**None**
See Also:	**Start Compress**

[4] ALARM RESET
Location:	**Compressor Commands Menu** (FIGURE 8.12)
Description:	This command clears any alarms that are currently in the healthy position. This command is programmed under the **Reset Button** (normally keyboard button number one on an **Exacta 21**) and is ususally linked to a device number.
Syntax:	`Alarm Reset`
Parameters:	**None**

Note: RPM Test only works with Exacta 21 computers that use the 12X12 I/O board to monitor RPM. Exacta 21 computers that use modbus to obtain RPM should use one of the Analog Tests instead of this command.

[5] RPM TEST
Location:	**Compressor Commands Menu** (FIGURE 8.12)
Description:	This command will test for **Greater Than** or **Less Than** the value of a specified **RPM**.
Syntax:	`RPM Test`
Parameters:	**Test Type [Greater than or Less Than] RPM Test Value**

[6] ANALOG OUTPUT
Location:	**Compressor Commands Menu** (FIGURE 8.12)
Description:	This command resets an output to whatever value you want. For example, to close the suction valve set **Analog Output** to **0**.
Syntax:	`Analog Output`
Parameters:	**Analog Output, Analog Output Setting**
See Also:	**Output, Analog Test**

NOTE: Parameters are not shown for the RPM Test. To view them you must go into Advanced Programming, then to the appropriate state or device. Choose Modify, then go to the RPM Test line.

[7] RAMP
Location:	**Compressor Commands Menu** (FIGURE 8.12)
Description:	This command selects a **Pre-programmed Ramp.** This command is executed under **PIDs**.
Syntax:	`Ramp`
Parameters:	**Ramp Period (length of time in seconds)**
See Also:	**Set PID**

[8] CHANGE ANALOG
Location:	**Compressor Commands Menu** (FIGURE 8.12)
Description:	This command adds an **Offset** to an **Analog Output.** It can bump the value up or down by a certain amount (**0 - 100%**).
Syntax:	`Change Analog`
Parameters:	**Analog Output, Offset Value**
See Also:	**Analog Test, Set Analog Input**

[9] COMPRESSOR PAGE

Location:	**Compressor Commands Menu (FIGURE 8.12)**
Description:	This function will cause the computer to dial out with the built in modem and leave a code on a pager. Pager information is set up under **[4] PAGER SET UP** under the **Modem Menu**.
Syntax:	`Compressor Page`
Parameters:	**Start Delay**
See Also:	**Alarm Reset**

8.12 OTHER COMMANDS

```
Mar 5/07          Select Function          10:31 AM

                Select Function Type:

                [1] Message
                [2] Record
                [3] Make Call
                [4] Delay
                [5] Print Report
                [6] Alarm Reset
                [7] Remote On
                [8] Remote Off
                [9] Fuel Pulse
                [A] Compressor Page



                    [E] Exit
```

Figure 8-13: Other Command Menu

[1] MESSAGE

Location:	**Other Command Menu**
Description:	This command will display a **Message** on the **Run Mode Screen** of the **Exacta 21**. The message can also be seen from **Control Panel**. Messages are numbered according to priority, the lower the number, the higher the priority. For example, **Alarm (4) Shutdown (3)**. A **Shutdown** will automatically write a message even if no programming command has been written to do so.
Syntax:	`Message`
Parameters:	**Message Priority**

[2] RECORD

Location:	**Tests Menu (FIGURE 8-6)**
Description:	This command will let the program record a significant event in the **Record History** of the computer. This can be useful for diagnostics.
Syntax:	`Record`
Parameters:	**Input/Output Device Number, Start Delay, Test**

[3] MAKE CALL

Location:	**Other Commands Menu (FIGURE 8-13)**
Description:	This command is used to send a specified code to a pager. The code can be up to seven digits. In addition this command will send the site number, the device number, and then the code to a pager.
Syntax:	`Make Call`
Parameters:	**code, Start delay**
See Also:	**Compressor Page**

[4] DELAY

Location:	**Other Commands Menu (FIGURE 8-13)**
Description:	This command puts in a delay. The function lines below the delay will not be activated until the delay time has occurred.

Syntax:	`Delay`
	   `[Function Lines]`
	`Block End`

Parameters:	**Start Delay**
See Also:	**And Delay, Or Delay**

[5] PRINT REPORT

Location:	**Other Commands Menu (FIGURE 8-13)**
Description:	This command prints a report when a certain event occurs. Reports are numbered **1–8**.
Syntax:	`Print Report`
Parameters:	**Report Number (1–8)**

[6] ALARM RESET

Location:	**Other Commands Menu (FIGURE 8-13)**
Description:	This command clears any alarms that are currently in the healthy position. This command is programmed under the **Reset Button** (normally keyboard button number one) and is usually linked to a device number.
Syntax:	`Alarm Reset`
Parameters:	**N/A**

[7] REMOTE ON

Location:	**Other Commands Menu (FIGURE 8-13)**
Description:	This command gives access to the **Modbus Table**. There are **3** levels of access: 1. **Read Only:** can read from the table, but can't change anything 2. **Read/Write:** can change setpoints through the **Modbus** 3. **Write Always:** will still write to the point. The mode **(Remote On/Local)** does not matter.
Syntax:	`Remote On`
Parameters:	**None**
See Also:	**Remote Off**

[8] REMOTE OFF

Location:	**Other Commands Menu** **(FIGURE 8-13)**
Description:	This command allows any writes from an external modbus master device unless the register is set to write always.
Syntax:	`Remote Off`
Parameters:	**None**
See Also:	**Remote On**

[9] FUEL PULSE

Location:	**Other Commands Menu** **(FIGURE 8-13)**
Description:	This command is used for measuring flow rates from turbine meters.
Syntax:	`Fuel Pulse`
Parameters:	**None**

[A] COMPRESSOR PAGE

Location:	**Compressor Commands Menu** **(FIGURE 8-12)**
Description:	This function will cause the computer to dial out with the built in modem and leave a code on a pager. Pager information is set up under **[4] PAGER SET UP** under the **Modem Menu**.
Syntax:	`Compressor Page`
Parameters:	**Start Delay**
See Also:	**Alarm Reset, Make Call**

9.0 PROPORTIONAL INTEGRAL DERIVITIVE (PID) PROGRAMMING

9.1 PID CONTROL LOOPS

Once all programming functions have been entered, **(SECTION 8.0)**, the next step is to program the **PID Control Loops (Proportional Integral Derivitive)**. There are two types of **PID** programming: **Regular PID** and **Master PID**. **Master PID** will override all other programming set in other **PIDs**.

9.1.1 HOW TO PROGRAM A REGULAR PID:

1. From the **Program Menu** , select **[1] COMPRESSOR MENU**, **[4] ANALOG MENU**, **[3] PID CONTROL** to bring up the **PID Control Menu**.

```
Mar 5/07          PID Control           12:43 PM

Num  Set Point   Mode     Transfer    Input      Output
 1   127psig   Not Active None Stg 2 Disch Pres Speed Setpoint
Speed Control

         [1] Change Name [5] Change Input
         [2] Change Set Point [6] Change Output
         [3] Change Transfer [7] Set Parameters
         [4] Activate / De-activate [8] Show Readings


        [A] Select [F]orward [B]ackward [E] Exit
```

Figure 9-1: PID Control Menu

2. From the **PID CONTROL MENU**, select **[1] CHANGE NAME**. Enter a **PID** name, and hit **[E] ENTER** to return to the **PID Control Menu**.

3. From the **PID Control Menu**, select **[2] CHANGE SET POINT**. Enter the control set point for the **PID** and return to the **PID Control Menu**.

4. From the **PID Control Menu**, select **[3] CHANGE TRANSFER** to choose which transfer method the **PID** should control when it is switched from **Manual** to **Auto** or when the **PID** is first turned on.

   The options of **Transfer** are:

   NONE: starts trying to control to the original **PID** setpoint as soon as the **PID** is on

   TRACK: overwrites the **PID** setpoint as soon as the **PID** is turned on

   BUMPLESS: turns off the **Proportional** part of the **PID** control when the **PID** is first turned on. This helps to make the switch from **Manual** to **Auto** smooth

   RAMP: selects a **Preprogrammed Ramp** from the **Timers and Settings Menu** (this option is only available on the latest verisons of software).

NOTE: The CHANGE TRANSFER method changes in the PID Control menu.

5. From the **PID Control Menu**, select **[4] ACTIVATE/DE-ACTIVATE**. Select the initial mode of the **PID** either **Activated (On)** or **De-Activated (Off)**.

6. From the **PID Control Menu**, select **[5] CHANGE INPUT**. Select the appropriate input.

7. Once you have selected the appropriate **Analog Input** from the list the computer will prompt **Cross PID Control**. Answer **[2] NO**.

8. From the **PID Control Menu**, select **[6] CHANGE OUTPUT**. This will bring up the **Change Output Menu**.

NOTE: The Analog Inputs are displayed in a list. These inputs are whatever Analogs have been previously set up in the program.

```
Mar 5/07               PID Control            12:51 PM

Num  Set Point  Mode    Transfer    Input        Output
 1   127psig  Not Active  None   Stg 2 Disch Pres  Pulsed

                         [1] Analog Output
                         [2] Cascade
                       * [3] Pulsed


                         [E] Exit
```

Figure 9-2: Change Output Menu

There are three options from this menu:

[1] ANALOG OUTPUT: This option will display a list of **Analog Outputs** from which to select. The **Analog Outputs** are whatever **Analogs** have been previously set up.

[2] CASCADE: This option feeds the setpoint out of one **PID** and into another one. The output of the first **PID** becomes the input of the second **PID**.

[3] PULSED: This option is used for slide valve control. Once this option is selected the computer will prompt **Feedback Input**. Answer **[1] YES** if you have a slide valve pot, then choose the appropriate type of input from the **Pulsed Menu**.

```
Mar 5/07               PID Control            12:57 PM

Num  Set Point  Mode    Transfer    Input          Output
 6    8psig   Not Active  None   Stg 2 Suction  Suction Valve

                    [1] Potentiometer Input
                    [2] Counter Input
```

Figure 9-3: Pulsed Menu

If you have selected **[1] POTENTIOMETER INPUT**, **ENTER** the **Potentiometer Channel**. If you have selected **[2] COUNTER INPUT**, **ENTER** the appropriate **Counter** number.

9. From the **PID CONTROL MENU** (FIGURE 9-1), select **[7] SET PARAMETERS**. The Parameter menu options will vary depending upon whether you have previously selected **[2] CASCADE** or **[3] PULSED** in **Step 8**.

9.1.2 CASCADE PARAMETERS

The following description is based on the selection of **[2] CASCADE** (FIGURE 9-2). Enter the desired **PID** parameters as shown in the **Set Parameters Menu** (FIGURE 9-4). These parameters are explained below.

```
Mar 5/07                          PID Parameters                     1:01 PM

[1] Proportional Band:     800.00    [B] Input Low Limit:             0psig
[2] Reset (Min / Repeat):    0.02    [C] Input High Limit:          100psig
[3] Rate (Minutes):         0.200
[4] Action:               Reverse    [D] Output Low Limit:            0psig
                                     [F] OutPut High Limit:         100psig
[5] Dead Band:              0psig    [N] Manual Limit:               Output
[6] Max Deviation:          0psig
[7] Max Dev Device:          1101    [G] Set Point Low Clamp:         0psig
                                     [H] Set Point High Clamp:      100psig
[8] Alpha:                  0.000    [I] SP Manual Ramp Rate:         1psig
[9] Beta:                   0.000
[A] Gamma:                  0.000    [J] Mode:                    Automatic

[P] Hide PID:                 Yes

                            [E] Exit
```

Figure 9-4: Set Parameters Menu

NOTE: Too fast of a response time may cause an unstable response.

NOTE: The best PID loop is when options [1] - [3] are fine-tuned.

NOTE ➜

[1] PROPORTIONAL BAND: This parameter sets the **Proportional** part of the **PID** control **(Gain = 100/Proportional Band)**. The larger the value the slower the response time. Values normally range from as low as **100** to as high as **2000**, but there is no limit on the upper value. Response time is the time required to return the input to its setpoint.

[2] RESET: This parameter sets the integral part of the PID. The larger the number, the smaller the change, and the slower the reaction time.

[3] RATE: This parameter sets the derivative setpoint of the **PID** in minutes. The larger the number, the faster the response time of the control loop.

[4] ACTION: This parameter toggles the control loop between **Direct** or **Reverse Acting** controller.

Direct Acting: This occurs when the process variable is higher than the setpoint and an increased output is required to bring it closer to the setpoint.

Reverse Acting: This occurs when the process variable is below the setpoint and an increased output is required to bring it closer to the setpoint. An increasing output connected to a **Fail Open** valve, will cause the valve to close. The reverse is true on a **Fail Closed** valve.

[5] DEAD BAND: This parameter adjusts the **Deadband** on either side of the control setpoint. Once the input (process variable) has reached its setpoint, the output will remain unchanged until the input strays outside of the **Deadband**.

[6] **MAX. DEVIATION**: This parameter is currently not in use.

[7] **MAX. DEV. DEVICE**: This parameter is currently not in use.

[8] **ALPHA**: This parameter is currently not in use.

[9] **BETA**: This parameter is currently not in use.

[A] **GAMMA**: This parameter is currently not in use.

[B] **INPUT LOW LIMIT**: This parameter adjusts the low limit for the input to the control loop. When the input is below the **INPUT LOW LIMIT**, the **INPUT LOW LIMIT** value will override as the input to the control loop.

[C] **INPUT HIGH LIMIT**: This parameter adjusts the high limit for the input to the control loop. When the input is above the **INPUT HIGH LIMIT**, the **INPUT HIGH LIMIT** value will override as the input to the control loop.

[D] **OUTPUT LOW LIMIT**: This parameter adjusts the low limit for the output from the control loop. The output is not allowed to decrease below the **OUTPUT LOW LIMIT** (except in **MANUAL** mode with the **MANUAL OUTPUT LIMIT** set to **OUTPUT**).

[F] **OUTPUT HIGH LIMIT**: This parameter adjusts the high limit for the output from the control loop. The output is not allowed to increase above the **Output High Limit** (except in **MANUAL** mode with the **MANUAL OUTPUT LIMIT** set to **OUTPUT**.

[J] **MODE**: This parameter toggles the mode for the control loop when the unit is first powered up between **Auto** and **Manual**.

[K] **PULSE UP DEVICE**: This parameter selects the device (usually a solenoid) on a ramp **PID** such as a valve on a screw compressor.

[L] **PULSE DOWN DEVICE**: This parameter selects the device (usually a solenoid) on a ramp **PID** such as a valve on a screw compressor.

[N] **MANUAL OUTPUT LIMIT**: This parameter toggles the **Manual Output Limits** between **Output** and **PID Limit**. This is used to determine the range of the output when the control loop is in the **Manual** mode. When **Output** is selected, an **Output** between **0-100%** can be entered. When **PID Limit** is selected, the **Output** can be set between the **Output Low** and **Output High Limits** (See parameters **[D]** and **1**).

> *NOTE: Options [K], [L], [B], and [C] are normally used only in Screw Compressor applications.*

9.1.3 PULSED PARAMETERS

The menu below appears if **[3] PULSED** is selected **(FIGURE 9-2)**. Enter the desired **PID** parameters as shown in **FIGURE 9-5**. These parameters are explained below.

```
Mar 5/07                   PID Parameters                  1:01 PM

[1] Proportional Band:   400.00    [B] Maximum Pulse:          2.0Sec
[2] Reset (Min/Repeat):    0.03    [C] Cycle Time:           120.0Sec
[3] Rate (Minutes):       0.010
[4] Action:              Direct    [D] Output Low Limit:         1050
                                   [F] OutPut High Limit:        1200
[5] Dead Band:            0kpsg     [N] Manual Limit:           Output
[6] Max Deviation:        0kpag
[7] Max Dev Device:        1101    [G] Set Point Low Clamp:     0kpag
                                   [H] Set Point High Clamp: 14000kpag
[8] Alpha:                0.000    [I] SP Manual Ramp Rate:     1kpag
[9] Beta:                 0.000
[A] Gamma:                0.000    [J] Mode:                   Manual

[K] Pulse Up Device:       1101    [M] Time Proportional:           0
[L] Pulse Down Device:     1101    [O] Unload Multiplier:         0.0

[P] Hide PID:                No
                          [E] Exit
```

Figure 9-5: Set Parameters (pulsed) Menu

NOTE: Options [1] PROPORTIONAL BAND to [3] RATE are not applicable to Pulse parameters.

NOTE: Options [5] - [9], and [A] are not applicable when [3] PULSED has been selected.

[4] ACTION: This option toggles the control loop between a **Direct** or **Reverse Acting** controller.

Direct Acting: This occurs when the process variable is higher than the setpoint and an increased output is required to bring it closer to the setpoint.

Reverse Acting: This occurs when the process variable is below the setpoint and an increased output is required to bring it closer to the setpoint. An increasing output connected to a **Fail Open** valve, will cause the valve to close. The reverse is true on a **Fail Closed** valve.

[B] MAXIMUM PULSE: This parameter determines the maximum length of time for each pulse. It is measured in seconds. Each pulse is normally set for two seconds.

[C] CYCLE TIME: This parameter determines the length of time between pulses. It is measured in seconds. Each cycle is normally set for **15** seconds.

[G] SETPOINT LOW CLAMP: This parameter adjusts the low clamp for the control setpoint of the control loop. If a setpoint that is below the low clamp is entered, the **SETPOINT LOW CLAMP** value will override as the control setpoint for the control loop.

[H] **SETPOINT HIGH CLAMP**: This parameter adjusts the high clamp for the control setpoint of the control loop. If a setpoint that is above the high clamp is entered, the **SETPOINT HIGH CLAMP** value will override as the control setpoint for the control loop.

[I] **SETPOINT MANUAL RAMP RATE**: This parameter adjusts the increment or decrement amount that is used when adjusting the setpoint.

[J] **MODE**: This parameter toggles the mode for the control loop when the unit is first powered up between **Auto** and **Manual**.

[K] **PULSE UP DEVICE**: This parameter selects the device (usually a solenoid) on a ramp **PID** such as a valve on a screw compressor.

[L] **PULSE DOWN DEVICE**: This parameter selects the device (usually a solenoid) on a ramp **PID** such as a valve on a screw compressor.

[M] **TIME PROPORTIONAL**: This parameter is set in proportion to the pulse time. The larger the **Time Proportional** value is the shorter the pulse time is and conversely the smaller the **Time Proportional** value is the longer the pulse time is (up to the maximum pulse length as input above from **[B] Maximum Pulse)**.

[O] **UNLOAD MULTIPLIER**: This parameter sets a multiplier to the pulse time when in **Unload** mode. For example, if the pulse time is calculated to be **1** second for the **PID**, a multiplier of two would increase this pulse time to **2** seconds when in the **Unload** mode.

[P] **HIDE PID**: This parameter toggles between **Yes** and **No**. It determines whether this information will show up on the screen if it has been programmed to a keyboard button. When this is set in the **Yes** position the **PID** will not show up on the operator's screens, thus preventing the parameters from being modified.

9.2 ABOUT THE MASTER PID

The **Master PID** can be used to control up to four **Analog Input** variables simultaneously with up to four **PIDs**. Normally, **Suction Pressure**, **Discharge Pressure**, **Manifold Pressure**, and sometimes **Gas Flow** are used as **Analog Input** variables. For a **Reciprocating Compressor**, the **ByPass Valve** and **Speed PIDs** are used. For a **Screw Compressor**, the **Bypass Valve**, **Speed**, and **Slide Valve PIDs** are used for control.

9.2.1 HOW TO PROGRAM THE MASTER PID

1. From the **Program Menu**, select **[1] COMPRESSOR MENU**, **[4] ANALOG MENU**, **[4] MASTER PID** to bring up the **Master PID Menu**.

```
Mar 5/07             Master PID            1:14 PM

                [1] Set Analog Inputs
                [2] Set PIDs
                [3] Adjust Setpoints
                [4] Show PIDs
                [5] Drawdown Multiplier


                     [E] Exit
```

Figure 9-6: Master PID Menu

2. From the **Master PID Menu**, select **[1] SET ANALOG INPUTS** to bring up the **Analog Inputs Menu**.

```
Mar 5/07             Master PID            1:16 PM

                [1] Stg 1 Suction Pres Low
                [2] Stg 2 Disch Pres High
                [3] Not In Use
                [4] Not In Use



                     [E] Exit
```

Figure 9-7: Analog Inputs Menu

Choose up to **4** inputs from the **Analog Inputs Menu**. Once you have selected the appropriate input, the computer will prompt **Use this Input**. Answer **YES**, then choose from the available list of inputs and select the appropriate one. Once an input is selected, the computer will prompt to select an **Action** of either **[1] HIGH** or **[2] LOW**. Set the **Action** to **HIGH** if the variable normally increases once the compressor is loaded. Set the **Action** to **LOW** if the variable normally decreases once the compressor is loaded.

NOTE: When the Master PID is turned on, it will override the setpoints in the PIDs it is using (e.g., the Bypass PID and the Speed PID). The order that the PIDs are configured is important because it determines the order in which they will be manipulated during the Loading/ Unloading of the compressor. During normal operation only one PID is manipulated in an attempt to maintain the inputs within a setpoint. This is accomplished through the use of the previously configured Offsets and the order in which the controllers are configured to sequence.

NOTE: Most variables are set to [1] HIGH with the exception of Suction Pressure which is set to [2] LOW.

3. Return to the **Master PID Menu** and select **[2] SET PIDS** to bring up the **Set PID Menu**.

```
Mar 5/07            Master PID            1:16 PM



        [1] Bypass Control Reverse
        [2] Speed Control Reverse
        [3] Slide Valve Control Reverse
        [4] Not In Use



                [E] Exit
```

Figure 9-8: Set PID Menu

4. Select the appropriate **ACTION** (**Reverse** or **Direct**).

5. Return to the **Master PID Menu** and select **[3] ADJUST SETPOINTS** to bring up the **Adjust Setpoints Menu**.

```
Mar 5/07            Master PID            1:16 PM


            PV Name        Setpoint    Offset
        [1] Suction Pressure    100        25
        [2] Discharge Pressu   1900       200
        [3] Not In Use
        [4] Not In Use



                [E] Exit
```

Figure 9-9: Adjust Setpoints Menu

6. From the **Adjust Setpoints Menu**, select the number of the input variable to modify. To change the setpoint, place the cursor on the number you want to adjust. Enter the number and hit **[E] ENTER** to accept the new setpoint. Use the same procedure to enter the offset value.

It is very important to understand the offset in order to grasp how the **Master PID** operates. In an example, the **Bypass Control Valve** will react first to try to reach the setpoints for **Suction**, **Discharge**, and **Engine Manifold Pressure**. Once the **Bypass Valve** is at **100%** (fully closed), it adds the offset to the setpoints for the **Bypass PID** (i.e., the current **Suction Setpoint** is **335 kpa**, the **Discharge** is **7030 kpa**, and the **Engine Manifold** is **110 kpa**). The direction of the offset is determined by the **High/Low** setting in the **Analog Inputs Menu**. The **Speed PID** takes control and tries to meet the setpoints of **325 kpa** for **Suction**, **7000 kpa** for **Discharge**, and **100 kpa** for **Engine Manifold Pressure**. If a third **PID** such as **Slide Valve** is used, when maximum speed reaches maximum output, the setpoints would be bumped to **315 kpa** for **Suction**, **7030 kpa** for **Discharge**, and **110 kpa** for **Engine Manifold Pressure**, to avoid the various **Outputs** fighting each other, and to avoid various **Outputs** hunting and trying to control the same variables.

NOTE: The order in which the PIDs are selected is very important. This determines which output will react first to reach the input setpoints. With the Bypass valve listed first, the Bypass valve will act first, then the Speed control. If you want your Bypass valve to close prior to speed ramping up, select the Bypass valve first and Speed second.

NOTE: The Master PID does not normally get turned on until the minimum load RPM has been reached to ensure that the unit won't stall as it starts loading.

←*NOTE*

7.   Return to the **Master PID Menu** and **select [4] SHOW PIDS** to bring up the **Show PIDs Menu** to view which **PIDs** are part of the **Master PID**, the **PIDs** current setpoints, and the current outputs. The * beside the **Bypass Control** shows that this **PID** is currently trying to control. The process variable (in this case **Suction Pressure**) is shown in the second row. In this particular example, the unit is not running, so the setpoints are the original setpoints of the **PIDs** as opposed to the **Master PID** setpoints.

```
Mar 5/07              Master PID              1:16 PM


         PV:
         PID Name        Setpoint     Output
      *  Bypass Control    16.0         0%
         Slide Valve Contro 15.0      L 1.6Secs
         Speed Control     10.8       1400RPM



                        [E] Exit
```

Figure 9-10: Show PIDs Menu

8.   Return to the **Analog Menu** and select **[5] SET MASTER PID** to bring up the **Set Master PID Menu**. This will bring up the same menu as when the **Master PID** button is pressed on the keyboard. Change the setpoints of the input variables as necessary, and turn the **Master PID** on or off as necessary.

```
Mar 5/07              Master PID              1:16 PM


     Mode: Auto                          Off
           PV Name       Setpoint     PV
       [1] Suction Pressur  100kpa    432kpa
       [2] Discharge Press 1900kpa   1666kpa
       [3] Engine Manifold  15.0       11.8

       [E]xit [H]Manual [F]Setpoint [K]PIDs


                        [E] Exit
```

Figure 9-11: Set Master PID Menu

To change the variables, simply select the number of the variable you want to change from the **Set Master PID Menu**, then **Push [F] SETPOINT** and change the setpoint accordingly.

NOTE: When a Suction Control Valve is controlling suction pressure, the Master PID acts as an override. In this case, the setpoint or the Master PID should always be lower than the setpoint for the Suction Control Valve PID setpoint. Similarly, if there is a Discharge Back Pressure Control Valve the Master PID setpoint should always be set higher than the Discharge Control Valve PID setpoint.

10.0 SHUTDOWNS AND ALARMS

10.1 ABOUT SHUTDOWNS AND ALARMS

Exacta 21 Controllers use the **Industry Standard A**, **B**, and **C Classifications**. All **Class Bs** have individual timers and a programmable default setting. Delays can be added to **Shutdowns** to debounce and to eliminate nuisance **Shutdowns**. An unlimited number of **Shutdowns** and **Alarms** can be added on any channel. This includes:

- normal High and Low Shutdowns
- alarms
- differentials
- time delayed Shutdowns
- calculated Shutdowns (i.e. rod loads, oil differential pressure, etc.)

10.2 HOW TO PROGRAM SHUTDOWNS AND ALARMS

1. From the **Program Menu (FIGURE 1-2)**, select **[1] COMPRESSOR MENU** to view the **Compressor Menu**.

```
Apr 1/07        Compressor Menu        2:12 AM


            [1] Configuration
            [2] RPM Menu
            [3] Shutdown List
            [4] Analog Menu
            [5] Hour Meter
            [6] Force Outputs
            [7] Advance Setup
            [9] Calculations


                [E] Exit
```

Figure 10-1: Compressor Menu

2. From the **Compressor Menu**, select **[3] SHUTDOWN LIST**. This will bring up the **Shutdown List Menu**. Refer to **Section 10.3** for a full list of the options available from this menu.

```
Apr 1/07            Shutdowns & Alarms            2:15 AM
Tag:          Name: Stg #1 Low Suction Pres
Dev    Type   Class Mode Wired   Delay Channel   Diff    Set Point
 1    Analog   C     0    LL      NC   0.5 Sec     3         15
                                                           14190
          [A] Add                 [6] Class
          [D] Delete              [7] Class Timer
          [1] Name                [8] Channel
          [2] Tag                 [9] Set Point
          [3] Type                [0] Delay Timer
          [4] Operation Mode      [G] Status
          [5] Wire N/O or N/C     [H] Test
          [M] Move                [J] Relink Functions
                                  [P] Program Functions
            [F] Forward [B] Backup [C] Find [E] Exit
```

Figure 10-2: Shutdown List Menu

3.   From the **Shutdown List Menu**, select **[1] NAME**. Enter the name of the **Shutdown** and return to the **Shutdown List Menu**.

4.   From the **Shutdown List Menu**, select **[2] TAG**. Enter the tag number of the **Shutdown**.

5.   From the **Shutdown List Menu**, select **[3] TYPE**. This will bring up the Type Menu.

```
Apr 1/07              Shutdowns & Alarms              2:15 AM

Tag:                  Name: Stg #1 Low Suction Pres

Dev   Type   Class Mode Wired  Delay Channel   Diff   Set Point
                        [1] Discrete
                        [2] Analog
                        [3] Differential
                        [4] Calculated
                        [5] Out Of Range
```

Figure 10-3: Type Menu

6.   Select the **Type** of shutdown **(REFER TO SECTION 10.4)** from the **Type Menu**.

NOTE: A [High High] or a [Low Low] is a Shutdown, and a [High] or [Low] is an alarm.

7.   Return to the **Shutdown List Menu** and select **[4] Operation Mode**. Select the **Mode of Shutdown**, either **Shutdown** or **Alarm** for a discrete or **Out of Range**; or **High High**, **High**, **Low**, or **Low Low** for an analog, differential or calculated.

8.   Return to the **Shutdown List Menu** and select **[5] N/O N/C**. The default is **N/C** (normally closed). When selected, the controller will prompt **Change To Normally Open?** or **Change to Normally Closed?**, depending on the current state. Select **[1] YES** to change. Select **[2] NO** to leave as is.

NOTE: In most cases, [5] is set to N/C.

9.   Return to the **Shutdown List Menu** and select **[6] CLASS**. Select the **Class of Shutdown** or **Alarm** you want **(REFER TO SECTION 10.3)**.

10. Return to the **Shutdown List Menu** and select **[7] TIMER**. Enter the **Timer** for **Class B** or **C Shutdowns**.

11. Return to the **Shutdown List Menu** and select **[8] CHANNEL**. Select the **Channel** you want the **Shutdown** associated with.

12. Return to the **Shutdown List Menu** and select **[9] SET POINT**. Enter the setpoint for the **Shutdown** or **Alarm**.

13. Return to the **Shutdown List Menu** and select **[0] DELAY**. Enter a **Debounce Timer**.

14. Return to the **Shutdown List Menu** and select **[G] STATUS**. View the current status of the **Shutdown**. If it isn't as expected, return to the **Shutdown List Menu** and make adjustments as required.

15. Return to the **Shutdown List Menu** and select **[H] TEST**. When the **Shutdown** is put in **Test Mode** it starts a bypass **Timer** that will count down from **600 seconds** (**10 minutes**).

THE FOLLOWING OPTIONS ARE ONLY AVAILABLE IN FULL SCREEN MODE FROM A PC OR LAPTOP.

16. From the **Full Screen Shutdown List Menu**, select **[M] MOVE** . Change the order of the **Shutdown List** to suit your needs.

17. From the **Full Screen Shutdown List Menu**, select **[J] RELINK FUNCTIONS**. Reset the links to the channels in the **Shutdowns**.

18. From the **Full Screen Shutdown List Menu**, select **[P] PROGRAM FUNCTIONS**. Add the **Programming Functions** under the **Shutdown**.

NOTE: Adding Programming Functions under Shutdowns from this menu option is seldom used. It is preferable to add functions under Inputs or Subroutines.

10.3 SHUTDOWN LIST MENU OPTIONS

Options available from the **Shutdown List Menu**:

[A] ADD: This adds a **Shutdown** or **Alarm** to the list. The computer will prompt to add the new **Shutdown/Alarm** either to the end of the list or before another entry.

[D] DELETE: This deletes a **Shutdown or Alarm** from to the list.

[1] NAME: Enters a **Name** for the **Shutdown** or **Alarm**.

[2] TAG: Assigns a **Tag** number to a **Shutdown** or **Alarm**.

[3] TYPE: Selects the **Type** of **Shutdown** or **Alarm**.

[4] MODE: Used to select either a **Shutdown** or **Alarm**. The choices available are as follows and depend on the type of **Alarm** or **Shutdown** selected:

Type	Choices
Discrete Range	[1] Shutdown [2] Alarm
Analog Differential Calculated	[1] High High (HH) - High Shutdown [2] High (H) - High Alarm [3] Low Low (LL) - Low Shutdown [4] Low (L) - Low Alarm

[5] NO/NC: Toggles between contacts being either **Normally Open (NO)** or **Normally Closed (NC)**. The default for this position is **NC**. Discrete devices can connect with their contacts normally closed or normally open.

[6] CLASS: Selects the **Class** of alarm or shutdown and controls how the **Shutdown** is armed or reset. Options available:

    [1] NOT IN USE

    [2] CLASS A: Always armed. It must be healthy to clear.

    [3] CLASS B: Armed after starting (**Start Compress** command typically in **State 7**), plus a delay timer. It can be cleared if the compressor is not running or when it is healthy.

[4] CLASS C: Waits until the alarm or shutdown is healthy and the unit is running to become armed (i.e., **Low Suction Pressure**). It can be cleared if the compressor is not running. A maximum timer can also be programmed.

[5] CLASS D: Only armed when the compressor is not running. It must be healthy to be cleared (i.e., **High Slide Valve** on screw compressor).

[7] TIMER: Class Timer is used to enter the delay timer for **Class B** and **C** shutdowns.

[8] CHANNEL: Selects **I/O** channel associated with the shutdown or alarm input. Two channels are required for differentials.

[9] SET POINT: To enter the setpoint for analogs, differentials and calculated Shutdowns to determine the **Shutdown** or **Alarm** point.

[0] DELAY TIMER This is the amount of time after a change from healthy to faulty or faulty to healthy before being recognized. This is also refered to as the Debounce Time.

[G] STATUS: This is either **Healthy** or **Faulty**.

[H] TEST: Used to put the **Shutdown** in **Test Mode**. It sets a **600-second (10 minute)** bypass **Timer**. A better method of going into **Test Mode** is from the front keypad on the unit. This starts a **1200-second** bypass **Timer**.

THE FOLLOWING MENU OPTIONS ARE AVAILABLE FROM THE FULL SCREEN SHUTDOWN LIST MENU:

[J] RELINK FUNCTIONS: Used to re-establish links to channels in the **Shutdowns** after modifications have been made.

[M] MOVE: To change the order of the **Shutdowns** or **Alarms**.

[P] PROGRAM FUNCT: Program Functions is seldom used. It adds **Programming Functions** under the **Shutdown**. However, it is better to add **Programming** under **Inputs** or **Subroutines**.

10.4 TYPES MENU OPTIONS

Type refers to the source type of the **Shutdown** or **Alarm**. The following are the types available:

[1] DISCRETE This is a **Discrete Input**.

[2] ANALOG This is an **Analog Input** (e.g., **Temperature, Pressure, Vibration**).

[3] DIFFERENTIAL This is the difference between two inputs (channels).

[4] CALCULATED This is calculated from one or more inputs.

[5] OUT OF RANGE This determines if the number is **10%** below low calibration or **10%** above high calibration.

EXACTA 21 MONITORING AND CONTROL SYSTEM

11.0 PROGRAMMING THE KEYBOARD

11.1 ABOUT PROGRAMMING THE KEYBOARD

There are **21** programmable buttons on the **Keyboard** located on the front of the **Exacta 21 Compressor Control System**. The program functions of certain keys have been standardized and nine keys are available for customized programming, once the standardized keys have been programmed .
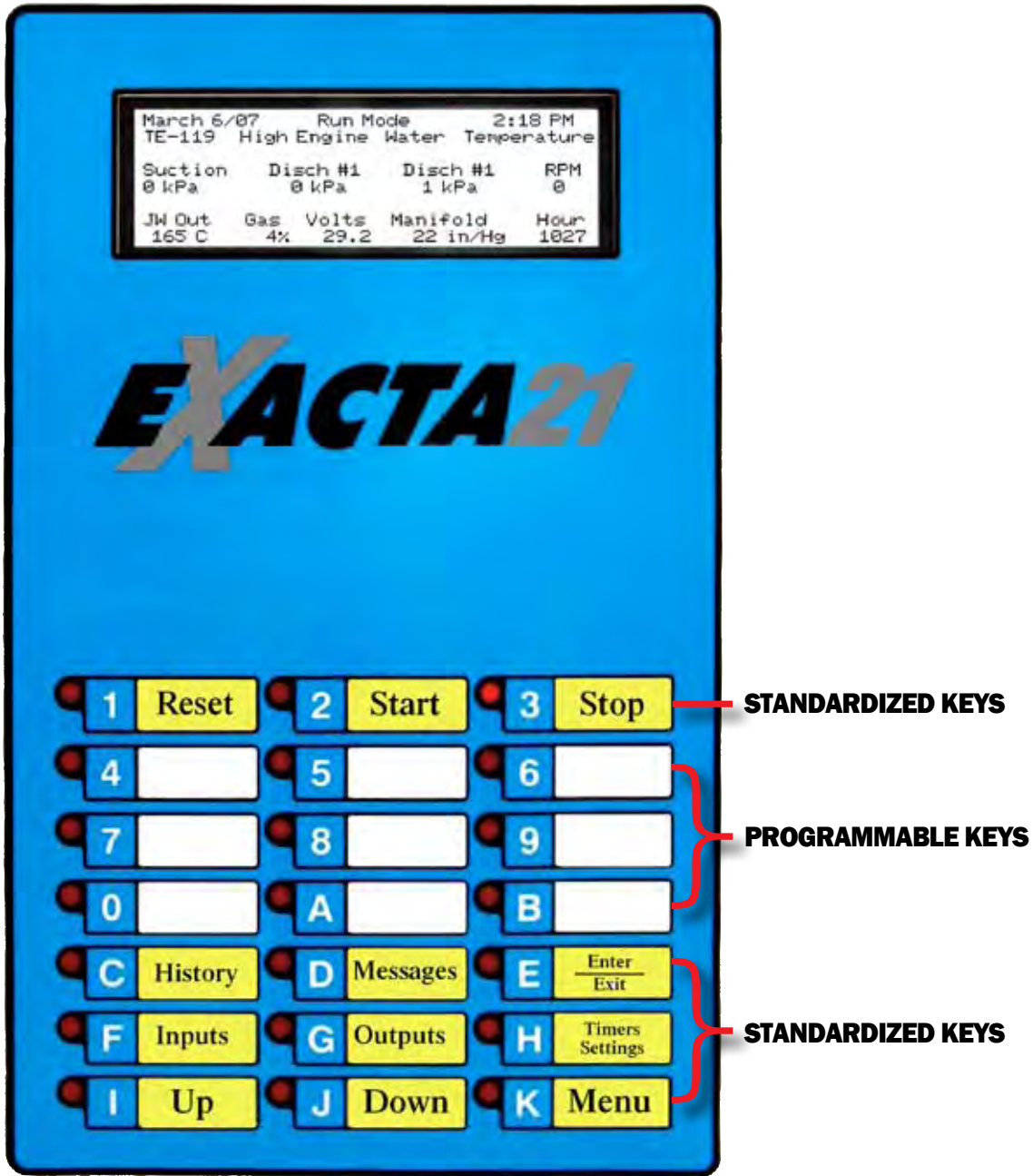
Figure 11-1: Standardized and Programmable Keys

11.2 HOW TO PROGRAM THE KEYBOARD

1. From the **Program Menu (FIGURE 1-2)** select **[5] PROGRAM KEYBOARD** to bring up the **Program Keyboard Menu**.

```
Apr 12/07        Program Keyboard        12:45 AM


                [1] Test Keyboard
                [2] Program Keys




                     [E] Exit
```
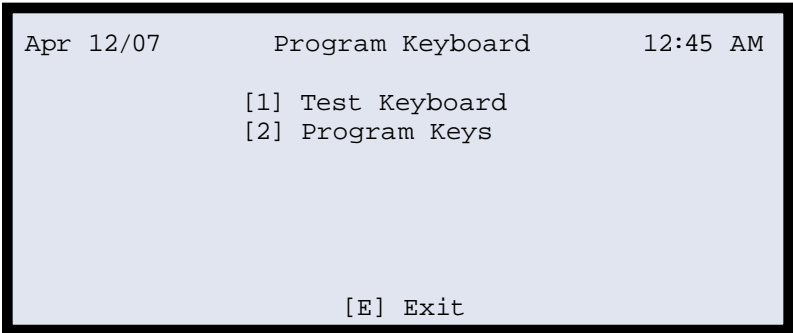
Figure 11-2: Program Keyboard Menu

2. From the **Program Keyboard Menu**, select **[2] PROGRAM KEYS** to bring up the **Program Keys Menu**.

```
Key          Type
  0          Action On Off Test

[F] Forward          [2] Change Type
[B] Back             [3] Change Device
[1] Select Key

                  [E] Exit

```
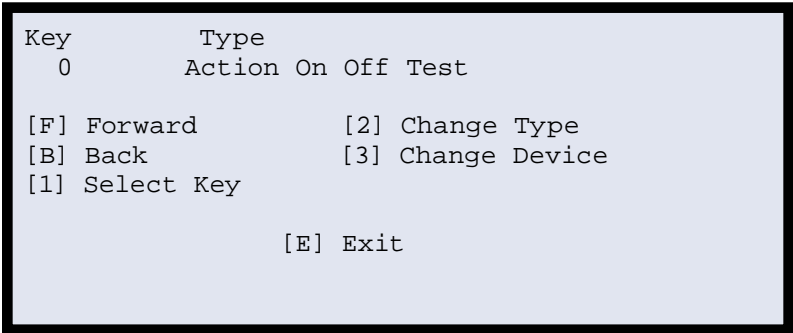
Figure 11-3: Program Keys Menu

3. Use **[F] FORWARD**, **[B] BACK**, and **[1] SELECT KEY** to navigate to the key you want to program.

4. From the **Program Keys Menu**, select **[2] CHANGE TYPE**. This will bring up the first screen of the **Change Type Menu Screens**.
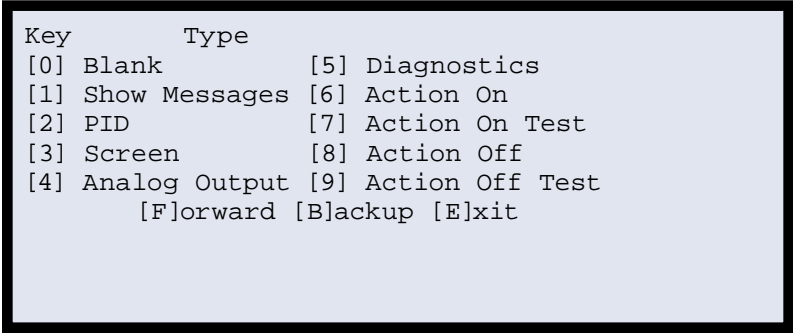
```
Key        Type
[0] Blank          [5] Diagnostics
[1] Show Messages [6] Action On
[2] PID            [7] Action On Test
[3] Screen         [8] Action Off
[4] Analog Output [9] Action Off Test
      [F]orward [B]ackup [E]xit


```

First Screen

```
Key         Type
[0] Blank          [5] Diagnostics
[1] Show Messages  [6] Action On
[2] PID            [7] Action On Test
[3] Screen         [8] Action Off
[4] Analog Output  [9] Action Off Test
        [F]orward [B]ackup [E]xit
```

First Screen

```
Key         Type
[0] Action On Off     [5] Show Outputs
[1] Action On Off Te  [6] Contrast
[2] Momentary Contac  [7] Force Outputs
[3] Record History    [8] Start Button
[4] Show Shutdowns    [9] Timers Settings
        [F]orward [B]ackup [E]xit
```

Second Screen

```
Key         Type

[0] PID Menu
[1] Input Menu



        [F]orward [B]ackup [E]xit
```

Third Screen
Figure 11-4: Change Type Screens

Select the desired action from either the **First**, **Second**, or **Third Screen** as shown above. The action options are described in the following pages.

CHANGE TYPE MENU – FIRST SCREEN OPTIONS:

[0] **BLANK:** This option does not assign a function to the key.

[1] **SHOW MESSAGES:** Displays any messages being written to the screen. It is usually (assigned) programmed to key **[D] MESSAGES**.

[2] **PID:** Used to set up a hot key to change **PID** parameters.

[3] **CHANGE PID:** Appears once **[2] PID** has been selected. Select the **PID** you want. Now **[2] PID** will act as a hot key to make changes to the selected **PID**.

[3] **SCREEN:** Currently not in use.

CHANGE TYPE MENU – FIRST SCREEN OPTIONS: (CONTINUED)

[4]   **ANALOG OUTPUT:** Currently not in use.

[5]   **DIAGNOSTICS:** Currently not in use.

[6]   **ACTION ON:** Turns on the selected device.

[7]   **ACTION ON TEST:** Turns on the selected device, but when the key is pushed, the computer prompts to see if you really want to perform the action or not – **[1] YES** or **[2] NO**.

[8]   **ACTION OFF:** Turns off the selected device.

[9]   **ACTION OFF TEST:** Turns off the selected device, but when the key is pushed the computer prompts to see if you really want to perform the action or not – **[1] YES** or **[2] NO**.

CHANGE TYPE MENU – SECOND SCREEN OPTIONS:

[0]   **ACTION ON OFF:** Toggles the device on or off.

[1]   **ACTION ON OFF TEST:** Turns on the selected device, but when the key is pushed, the computer prompts to see if you really want to turn on or off the device – **[1] YES** or **[2] NO**.

[2]   **MOMENTARY CONT: Momentary Contact** is used to turn on a device only while the key is being pushed. An example would be a **Manual Crank** key. The key would be programmed to turn on a subroutine such as **1402**. The programming under **1402** would turn on the **Crank** solenoid.

[3]   **RECORD HISTORY:** Displays recorded significant events (i.e., **Shutdowns** and **Alarms**). **Option [C]** is normally selected.

[4]   **SHOW SHUTDOWNS:** Displays **Shutdowns** that have occurred.

[5]   **SHOW OUTPUTS:** Displays all the **Discrete Outputs**.

[6]   **CONTRAST:** Adjusts the screen contrast on the front of the **Exacta 21 Compressor Control System**. **Contrast** is also available by selecting **[K] MENU**, so normally this option is not used

[7]   **FORCE OUTPUTS:** Used to test the outputs. It allows the operator to force outputs on or off. Usually assigned to the **[G] OUTPUTS** key.

[8]   **START BUTTON:** Always assigned to key **[2]** on the keyboard. This key has **Pre-Programmed** features specific to the **Start Command** (i.e., the message **Please clear shutdowns and Push Reset** will display when there are still uncleared shutdowns).

[9]   **TIMERS SETTINGS:** Assigns a key to access **Timers Settings** parameters.

NOTE: Action options [6] - [9] on the first screen are used to turn on or to turn off a Pre-Programmed Device number (usually a subroutine such as Stop or Auto Slow Down).

NOTE: Options [7] and [9] are used to prevent accidentally turning a device on or off that is critical to the operation.

CHANGE TYPE MENU – THIRD SCREEN OPTIONS:

[0] **PID MENU:** Brings up a list of all the **PIDs** as long as the **Hide PID** parameter is set to **No**.

[1] **INPUT MENU:** Brings up the **Status Menu**.

```
Key             Type
 8          Input Menu

[F] Forward           [2] Change Type
[B] Back
[1] Select Key


              [E] Exit
```

Figure 11-5: Input Status Menu

```
Apr 12/07    Change Action Device    12:56 AM
Device: 1401
Start Button
             [F] Forward
             [B] Backward
             [A] Add
             [D] Delete
             [E] Exit
```

Figure 11-6: Change Device Menu

NOTE: Selecting any option with the word ACTION in its title or selecting [2] MOMENTARY CONTACT from the Second Screen brings up the Change Device Menu (Figure 11-6). Selecting [3] CHANGE DEVICE allows you to Add or Delete a device number. The device number is always a virtual input (subroutine) such as 1417 [Auto Shutdown]. If a device is already selected, and you wish to change the device number, you must first delete the existing device and then proceed to add the new device.

APPENDIX A

UPLOADING INSTRUCTIONS
DOWNLOADING INSTRUCTIONS
DOWNLOADING REPORTS

A1 REQUIREMENTS AND SETTINGS

REQUIREMENTS

1. A remote computer, either laptop or desktop running **Windows 3.11™**, **Windows 95/98™** or **Windows ME/XP™** with a terminal emulation program such as **Hyperterminal™** or **Procomm Plus™**, or **Windows Terminal™**.

    If not running **Windows**, another communication program such as **Procomm™** is required.

2. An **Exacta 21** to **PC** serial interface cable, **Part #CW1642**.

    The pin-out of this cable is:

Exacta	PC
2 TXD	2 RXD
3 RXD	3 TXD
4 RTS	8 CTS
5 CTS	7 RTS
6 DSR	4 DTR
7 GND	5 GND
8 DCD	– –
9 DTR	6 DSR

3. A **Level 1** password from **Altronic Controls** or your **Exacta 21** integrator (usually owner or distributor only) for uploading/downloading binary files (code) or a **Level 2** password for downloading reports.

EXACTA 21 SETTINGS

To change or check the settings on the **Exacta 21**, follow the steps on .

The **Exacta 21** has one **RS232** and one **RS485/RS482** port located on the bottom of the unit. The **RS232** port is the **9-pin D** connector furthest to the right when looking at the back of the controller. The **RS485** is the **2nd** port from the right when looking at the back of the controller.

This document covers using the **RS232** port to communicate with the **Exacta 21**, which is the most common method. Special procedures and hardware (**RS232/RS485 Convertor**) are required to communicate using the **RS485** port. Please contact **Altronic Controls** or your **Exacta 21** integrator if, for some reason, the **RS232** port cannot be used.

A2 HOW TO SET UP THE PORT AND LOG ON

Before logging on, the settings on the PC's communication port should be configured as follows:

- **19,200 Baud**
- **No Parity**
- **8 Bits**
- **1 Stop Bit**
- **Transfer Protocol X Modem**
- **No software or hardware flow control.**

If needed, the port settings can be changed by following these steps:

1. Press the **[K]** or **<MENU>** key on the **Exacta 21** keyboard.

2. Select option **[1]**, **PROGRAM MODE**, by pressing **<1>**.

3. Enter your password (**Level 2** required) and press **<E>, ENTER**.

4. Choose **[2]**, **SET UP MENU**.

5. Choose either **[2]** or **[3]**, depending on which port you will be logging into.

6. The **Port Settings Screen** will appear, and by pushing the **<F>** on the **Exacta 21** keyboard, you will be asked the following: **DEFAULT SETTINGS? [1] YES or [2] NO**.

```
[0] State: ON      [6] Device: Computer
[1] Baud: 9600     [7] Type: VT100
[2] Parity:None    [8] Display:One
[3] Size: 8        [9] Exacta Link
[4] Stop Bits:1    [A] Test RS232
[5] HS: DTR CTS    [B] Echo Mode
```
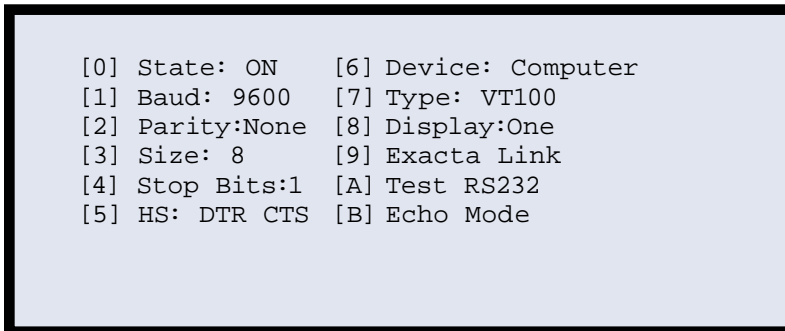
Figure A-2: Port Settings Screen

7. Select **[1] YES** to configure the port to the proper log on settings.

8. Connect the **Exacta 21-to -PC** cable between the two computers, ensuring the cable is oriented properly. One end is marked **To Exacta** the other **To PC**.

K | Menu

1

E | Enter Exit

2

2

3

F

1
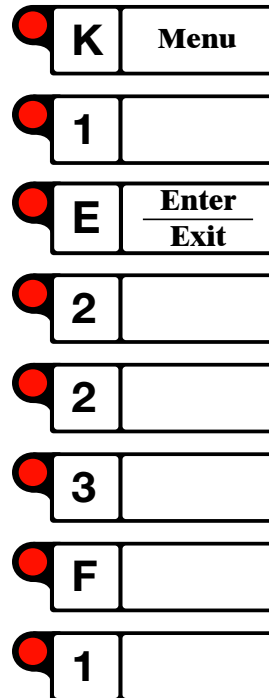
9. Launch the terminal emulation program. Ensure the cable is connected to the correct com port on the PC. Typically **com 1**.

   A. Select **Connect** using: **Direct to Com x** (**x** being the **RS232** port being used).

   B. Set communication parameters to **19200, 8, N, 1, No Flow Control** to match the **Exacta 21**.

   C. Select **Properties**>**Settings**>**Emulation**, and make it **VT100**.

10. On the PC, press **<ENTER>** or **<RETURN> 3** times. The **Exacta 21** splash screen will appear on the PC for a few seconds, changing to **ENTER PASSWORD**. Enter your password and press **ENTER**, the PC will show the **Exacta 21 Program Menu**.

A3 HOW TO DOWNLOAD REPORTS

In order to print reports (e.g., captured data, history, or modbus table), they must first be transferred from the **Exacta 21** to the PC.

1. Connect and log on to the unit from the PC as described above.

2. After entering the password, press **<ENTER>** or **<RETURN>** to display the **Program Menu** on the PC.

3. Choose **[4] PRINT REPORTS**.

4. The next screen gives you the option of which file you want to download.

5. Select the file you want to download:

   [1] Programming

   [2] I/O Summary

   [3] Power Loss

   [4] Record History

   [5] Capture Data (In this case **PRINT CAPTURE DATA** appears; answer **YES** or **NO**. **ARE YOU SURE** appears; answer **YES** or **NO**. You will be asked to select **DATA SET A** or **B**. If **A** is chosen the computer will ask for the shutdown you want to download. The **Print Menu** screen appears **(FIGURE A-3)**.

   [6] Modbus Table

```
[1] Start Print
[2] Port: Download
[3] Mode: CR & LF
[4] Length: 0
```
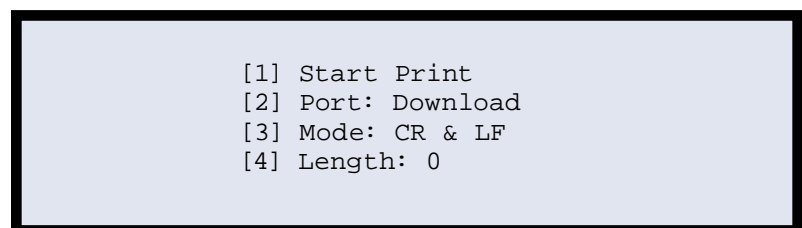
Figure A-3: Print Menu Screen

6. Ensure the **[2] PORT** and **[3] MODE** settings are as shown on the screen **(FIGURE A-3)**.

7. Select **[1] START PRINT**. The message **PRINTING** will be displayed. If **Capture Data** was chosen, **SENDING DATA** will appear.

8. Follow the emulation software's procedures for receiving a **text** file (a pop-up window will appear to show data transfer.)

XModem is the recommended protocol. Give the file an appropriate name, version number and extension. We recommend that **.txt** be used as an extension since this is recognizable by most text viewing and word processing programs.

When **[5] DATA CAPTURE** is selected, the computer gives you a choice between **[1] DATA SET A** (first-in shutdowns) or **[2] DATA SET B** (standard trending data normally set to every **15** minutes). If **[1]** is selected, the list of shutdowns will appear. Choose one and proceed.

SAMPLE DOWNLOAD USING HYPERTERMINAL™

1. After entering the password, press **<ENTER>** to display the **Program Menu**.

2. Select **[4] PRINT REPORTS**.

3. Select the report you would like to print. In this example we will be selecting option **[1] PROGRAMMING**. The screen will change to the **Print Menu Screen** (FIGURE A-3).

4. Option **[2] PORT**, should be set to **DOWNLOAD**. If it requires changing, choose **[2]** until it changes to **DOWNLOAD**. Once this is completed press **<1>** to start printing and the screen will change to **PRINTING**.

5. Position the mouse on the **Transfer Menu**, and select **RECEIVE FILE**. A screen will appear allowing you to select a folder.

6. Click **<BROWSE>** and select the appropriate drive and file folder.

7. Click **<OK>**, then **<RECEIVE>** and type a file name. An appropriate name would be **Sitename-Prog.txt**. After entering the name, press the **<RECEIVE>** button to begin capturing the text to a file. When the capture is complete, the screen will revert to the **Report Menu** screen.

A4 HOW TO UPLOAD BINARY FILES (CODE)

This procedure is used to upload binary files (code) from the PC or laptop to the **Exacta 21**.

1. Connect, and log on to the unit from the PC as described in SECTION A2.

2. After entering the password, choose **[2] SET UP MENU**.

3. Choose **[7] UPLOAD**.

4. Choose **[1] PROGRAMMING**.

5. Answer **[1] YES** to the next two questions displayed. The **Save Calibrations** screen (FIGURE A-4) will be displayed.

NOTE: Hyperterminal's help files are provided at the end of this document for your convenience in the field.

NOTE: Downloads must be initiated within 60 seconds or they will fail.

```
[1] Save Calibrations: [1] Yes
                       [2] No
```

Figure A-4: Save Calibrations Screen

6. Follow the emulation software's procedures for sending a file, choosing the file you want to upload. **XModem is the** recommended protocol.

7. Select a file with an appropriate name, version number and extension. Standard extensions are as follows:

    .txt Reports (Cannot be Uploaded)

    .ep   Exacta Program

    .el   Link file (Modbus)

    .er   Record History

    .ec   Capture File

A5 HOW TO DOWNLOAD BINARY FILES (CODE)

This procedure is used to download programming from the **Exacta 21** to a PC or laptop.

1. Connect, and log on to the unit from the PC as described in **SECTION A2**.

2. After entering the password, choose **[2] SET UP MENU**.

3. Choose **[8] DOWNLOAD**.

4. Choose **[1] PROGRAMMING**.

5. Answer **[1] YES** to the next two questions displayed.

6. Follow the emulation software's procedures for receiving a file, choosing the file you want to download. **XModem is the** recommended protocol.

7. Give the file an appropriate name, version number and extension. Standard extensions are as follows:

    .txt Reports (Cannot be Uploaded)

    .ep   Exacta Program

    .el   Link file (Modbus)

    .er   Record History

    .ec   Capture File

A6 HOW TO LOG ON BY MODEM TO DOWNLOAD REPORTS

An optional modem is available with the **Exacta 21**. This modem allows access to the **Exacta 21** from a remote location. This feature is used for troubleshooting problems with the site, as well as viewing information, uploading and downloading files, and changing some control setpoints (with an appropriate password). Below is a detailed step-by-step procedure for dialing into the sites and downloading the appropriate reports. It is for **Hyperterminal™** which is found in all **Windows 95™** and above operating systems.

1. Run the **Hyperterminal™** program by clicking on the **Windows <START>** button.
2. Move the mouse to the **Program Menu**. A new screen will appear.
3. Move the mouse to the **Accessories Group**, then click on the **Hyperterminal™** file. A screen to enter a name and pick an icon will appear. After one or two seconds, a screen will appear with the file name and number to be dialed.
4. Type a suitable name and press **<OK>** (assign an icon if you wish). A phone number screen will appear.
5. Enter the correct phone number and press **<OK>**.
6. Press **<DIAL>**. A status window appears.
7. Once the call has been connected, the **Enter Password** screen appears. The connection is successful.

A7 HYPERTERMINAL™ HELP FILES

TO SET UP A NEW CONNECTION

1. On the **FILE MENU**, click **NEW CONNECTION**.

2. Type a name that describes the connection, click **THE APPROPRIATE ICON**, and then click **OK**.

3. Enter the information for the call, and then click **OK**.

4. To dial the call, click **DIAL**.

TO CALL A REMOTE COMPUTER

1. On the **File Menu**, click **OPEN**, and then double-click **THE CONNECTION** you want to use.

2. Click **DIAL**.

TO CHANGE THE PORT SETTINGS FOR A MODEM CONNECTION

1. On the **File** menu, click **Open**.

2. Right-click **THE CONNECTION** you want to change, and then click **PROPERTIES**.

3. Click the **CONNECT TO TAB**, and then click **CONFIGURE**.

4. Click the **CONNECTION TAB**.

5. Click **PORT SETTINGS**, and then make the changes.

6. Click **ADVANCED** to change settings such as flow control and error correction.

NOTE: The changes made to the port settings affect only this connection.

TO CHANGE THE SETTINGS FOR MAKING A CALL

1. In the **HyperTerminal** folder, double-click **THE CONNECTION** you want to change.

2. On the **FILE MENU**, click **PROPERTIES**.

3. Click the **CONNECT TO TAB**, and then make the changes.

4. To change settings such as the terminal type, click the **SETTINGS TAB**, and then make the changes.

TO SEND A FILE TO A REMOTE COMPUTER

1. On the **TRANSFER MENU**, click **SEND FILE**.

2. In **FILENAME**, type the path and name of the file to be sent.

3. Click **SEND**.

TO RECEIVE A FILE FROM A REMOTE COMPUTER

1. Use the software on the remote computer to send (download) the file to your computer.

2. On the **TRANSFER MENU**, click **RECEIVE FILE**.

3. Type the path of the folder in which the file is to be stored.

4. In **USE RECEIVING PROTOCOL**, click the protocol the remote computer is using to send your file.

TO SAVE A HYPERTERMINAL SESSION TO A FILE

1. On the **TRANSFER MENU**, click **CAPTURE TEXT**.

2. Type a descriptive file name, or click **BROWSE** to select the path and file name, and then click **START**.

TO ADJUST THE HYPERTERMINAL WINDOW SIZE

1. On the **VIEW MENU**, click **FONT**.

2. In **SIZE**, enter **A POINT SIZE**, using larger numbers to increase the size of the terminal window or smaller numbers to decrease it.

3. To adjust the **HyperTerminal** window to the size of the terminal window, right-click in **THE TERMINAL WINDOW**, and then click **SNAP**.

NOTE: The protocol used to send the file can be changed by clicking on the desired one in PROTOCOL.

A text file can also be sent to a remote computer by clicking SEND TEXT FILE on the TRANSFER MENU.

In most cases, the file-transfer software on the remote computer must be prepared to receive the file.

For more information, contact the administrator of the remote computer.

NOTE: The session text can be sent directly to a printer by clicking the TRANSFER MENU and then clicking CAPTURE TO PRINTER. When the call ends, the text will be sent to the default printer.

APPENDIX B: TYPICAL FLOWCHART

GAS COMPRESSOR CONTROL LOGIC

State 0: Power On
All outputs initialized to power on defaults. **Date** and **Time** are recorded in **Record History**.

State 1: Shutdown
Compressor is shutdown. **Suction** and **Discharge Valves** are closed. **Bypass Valve Open**. All **Class A** shutdowns must be cleared first before the Reset button can be pushed to proceed to **State 2**.

State 2: OK to Start
Waiting for the start button to be pushed. When the start button is pushed, the computer will prompt, **"Is this a Manual Crank or Auto Crank?"**

State 3: Purge/Depressurize
If below the **Purge Set Point**, the computer will prompt **"is it OK to proceed with a purge?"** Purge: **Suction #1** closed, **Discharge Block Valve** closed, **Bypass** closed, open **Purge Valve** for **30 sec**, then **Open Bypass** and **Discharge**. Open **Suction** to **10%** and wait until pressure achieves **70kpa**, then close. **Depressurization** is done with the **Blow Down Valve**.

State 4: Prelube
Prelube both the **Engine** and the **Compressor** with permissives on both. Prelube will happen at the same time as the purge or depressurization. The computer will not go to the next state unless both oil pressures have been achieved and the desired **Suction Pressure** has been reached.

State 5: OK to Crank
In auto crank mode, the computer will crank the engine based on programmable times and set points. In manual mode, the computer will wait for the **Manual Crank** button to be pushed. The computer will not move to the next state until **20 RPM** has been reached.

START SEQUENCE:

**State 0
Power On**

3 Sec

**State 1
Shutdown**

**All Class A Shutdowns cleared
Reset Button Pushed**

**State 2
OK to Start**

**Start
Button**

**State 3
Purge/
Depressurize**

Time

**State 4
Prelube**

**Oil Pressures
Suction Pressure**

**State 5
OK to Crank**

20 RPM

APPENDIX C: EXACTA 21 MENU TREE, PAGE 1

See Programming Menu Tree
- 1 Not Used
- 2 Analog Input
- 3 Cascade
- 2 Cascade
- 3 Pulsed

- 1 Device
- 2 Type
- 3 Read-Write
- 4 Register Number
- 5 Data Format
- 6 Find Register
- 7 Show Register Value
- 8 Set Register Value
- A Add
- D Delete
- I Insert

- 0 Blank
- 1 Show Message
- 2 PID
- 3 Screen
- 4 Analog Output
- 5 Diagnostics
- 6 Action On
- 7 Action On Test
- 8 Action Off
- 9 Action Off Test
- A Backup
- B Exit
- E Forward
- F Forward
- F0 Action On Off
- F1 Action On Off Test
- F2 Momentum Contact
- F3 Record History
- F4 Show Shutdowns
- F5 Show Outputs
- F6 Contrast
- F7 Force Outputs
- F8 Start Button
- F9 Timers Settings
- FF0 PID Menu
- FF1 Input Menu

- 1 Change Name
- 2 Set Sensor Type
- 3 Change Device
- 4 Set Points
- 5 Programming
- 6 Span Settings
- 7 Filter
- 8 Show Readings
- 9 Show Data
- 0 Diagnostics
- A Select
- B Backword
- E Exit
- F Forward
- C Calibrating
- G Show Functions
- D Move
- P Parameter
- H Enter Calibration Mode
- K Exit Calibration Mode
- I Freezer / Unfreeze
- J Force Analog Input
- X Adjust Analog Offset
- Y Delete Analog Input
- Z Insert Analog Input

- 1 Change Name
- 2 Change Devices
- 3 Change Type
- 4 Span Settings
- 5 Show Readings
- 6 Change Value
- A Select
- B Backword
- E Exit
- F Forward

- 1 Change Set Point
- 2 Change Transfer
- 3 Activate / De-activate
- 4 Change Input
- 5 Change Output
- 8 Show Readings
- A Backword
- E Exit
- F Forward

- 1 Set Analog Inputs
- 2 Set PIDs
- 3 Adjust Setpoints
- 4 Show PIDS
- 5 Drawdown Multiplier
- E Exit
- H Auto
- K PIDS
- 1 VI On - Off
- 2 VI Parameters
- 3 Do VI Calculations
- E Exit

- 1 Data Capture Parameters
- 2 First in Shutdowns
- 3 Show Data Capture
- 1 Engine Defaults
- 2 Electric Motor Defaults
- 3 Test Details
- 4 Engine Screens
- 5 Modbus Details
- 6 Display Records
- 7 Edit Records
- Down Load
- Parallel
- RS 232 #2
- RS 232 #1
- CR
- CR & LF

- 1 Suction Channel
- 2 Discharge Channel
- 3 RPM Channel

Middle tier menus

- 0 Force RPM
- 1 RPM Set Up
- 2 Show RPM
- E Exit
- 1 Analog Inputs
- 2 Analog Outputs
- 3 PID Control
- 4 Master PID
- 5 Set Master PID
- 6 VI Menu
- 7 Show Analog
- 8 Init Analog
- 9 Data Capture
- A First Eight
- B Init Mode
- E Exit

- 1 Load Defaults
- 2 Shutdown Devices
- 3 Change Hours
- 4 Suction and Discharge
- 5 Clear SD Functions

- 1 Initialize Modem
- 2 Modem Status
- 3 Set Rings
- 4 Pager Setup
- 5 Dial Out
- 6 Call EXACTA
- 7 AT Menu
- 8 Speed Test #1
- 9 Speed Test #2
- E Exit

- 1 Programming
- 2 Record Info
- 3 Link Data
- 4 Screens
- 5 Capture Data

- 1 Programming
- 2 Record Info
- 3 Link Data
- 4 Screens
- 5 Capture Data

- 1 Modbus Setup
- 2 Modbus Table
- 3 Set Up RS232
- 4 Set Up RS485
- 5 View Data
- 6 Show Link States
- 7 Show Link Data
- 8 Show Out Data
- 9 Send Sample Data

- 1 Tornmont Flow
- 2 Axid Calculation
- 3 Fuel Gas
- 4 Linear Calculation
- 5 Tornmont Oil
- 6 Rod Load Calculation

Bottom tier menus

- 1 Configuration
- 2 RPM Menu
- 3 Shutdown List
- 4 **Analog Menu
- 5 Hour Meter
- 6 Force Outputs
- 7 Advance Setup
- 8 Test Menu
- 9 Calculations
- E Exit

- 1 Set Clock
- 2 Set Up RS 232
- 3 Set Up RS-485
- 4 Set Up Modem
- 5 Report Header
- 6 Security
- 7 Up Load To Exacta
- 8 Down Load From Exacta
- 9 **Communications

- A Display Modes
- B Configuration
- E Exit

- 1 Record History
- 2 Power Loss Times
- 3 Input Levels
- 4 Output Levels
- 5 History Menu

- 1 **Programming
- 2 IO Summary
- 3 Power Loss
- 4 Record History
- 5 Capture Data
- 6 Modbus
- 7 DB Capture
- 8 Data Headings
- 9 Shutdown Setup
- A DB From Report
- B RH From Report

- A Initialize
- B CRC Test
- 1 First In Shutdowns
- 2 Event History
- 3 Capture Data
- 1 Start Print
- 2 Port
- 3 Mode
- 4 Length
- E Exit

- 1 Select Key
- 2 Change Type
- 3 Change Device
- B Back
- E Exit
- F Forward

- 1 Test Keyboard
- 2 Program Keys
- E Exit
- See Page 2

- 1 Compressor Menu
- 2 Set Up Menu
- 3 Query Menu
- 4 Printer Reports
- 5 Program Keyboard
- 6 Advanced Program
- 7 AGA Menu
- 8 Counters
- 9 Control Panel
- A Run Test Mode
- 1 Software Version
- E Exit

APPENDIX C: EXACTA 21 MENU TREE, PAGE 2

Compressor Menu
1 Set Up Menu
2 Query Menu
3 Printer Reports
4 Advanced Program
5 Program Keyboard
6 AGA Menu
7 Counters
8 Control Panel
9 Run Test Mode
A Software Version
E Exit

See Page 1
1 Install Units
2 Program Devices
3 Diagnostics
4 State Engine
5 Latch Signals
6 Update Names
7 Timers Setting
8 Program Analog
9 Screen Menu
A AGA Menu
E Exit

1 Edit Counters
2 Zero All Counters
3 Frequency Count
E Exit

1 Change Unit #
2 Change the Type
3 Modify Filters
4 Add a Unit
5 Backup
6 Delete a Unit
E Exit
F Forward

1 Modify Devices
2 Show Devices
3 Previous Unit

1 Input States
2 Input Levels
3 Output Levels
4 Test Outputs
5 Test Inputs
6 Reset Computer
7 Cross Reference
8 Show Analog
9 System Tests
A Show Messages
B Communications
C Record History
E Exit

1 Edit States
2 Show Current States
3 Change State
E Exit

1 Timers
2 Analog Settings
3 Ramps
4 Latch Names
5 Menu Set Up
6 Run Menu
E Exit

1 Display Screens
2 Edit Screens
3 Test Screens
4 Display Char
5 Zero Screen Memory
E Exit

1 AGA Parameters
2 AGA Channels
3 Test AGA

1 Select Counter
2 Enable - Disable
3 Set Totals
4 Change Name
E Backward
F Forward

1 Name
2 Type
3 Toggle NO-NC
4 Flash Rate
5 Modify Functions
6 Enable-Disable
7 Jump
8 Copy
9 Move
A Filter
B Back
E Exit
F Forward
G Show Functions
H Cross Reference
J Translation
K Translate

1 Test Output
2 Turn of Output
3 Turn of Output
E Exit

1 Show State Info
2 Show Messages
3 Special Test
4 Multiplex Pts
E Exit

1 Select State
2 Modify Functions
3 Move State
4 Copy State
B Previous State
E Exit
F Next State
G Show Functions

1 Select Timer
2 Change Name
3 Change Timer Value

1 Select
2 Change Name
3 Select I/O
4 Select O
5 Change Set Point
6 Minimum
7 Max
8 Security

1 Select
2 Change Name
3 Select Type
4 Start Point
5 Stop Point
6 Time Period
7 Security
B Backward
E Exit
F Forward

1 Select Latch
2 Change Name
3 Toggle Latch
E Exit

1 Change Name
2 Change Items
E Exit
F Forward

1 Shutdowns - Alarm
2 Perishes
3 Crank
4 Post Lubes
5 Warm Up
6 Load Settings
7 Start Pressures

1 X and Y
2 Name or Device
3 Alignment
4 Screen
5 Length
6 Unit
7 Test
8 Options
9 Renumber
A Add
B Block
C Select
D Delete
E Exit
F Forward
I Insert

1 Specify Gravity
2 Pipe Inside Dia
3 Orifice Diameter
E Exit

1 Change Input Name
2 Change Output Name
E Exit

1 Momentary
2 Toggle
3 One Shot
E Exit

See Programming Menu Tree

1 Select Another Device
A Increment and Turn On
B Increment with Delay
E Turn Off and Exit

See Programming Menu

1 Analog Input
2 Differential
3 Analog Output
4 PID Set Point
5 PID Out Max
6 PID Out Min

0 Not In Use
1 Analog Output
2 PID Set Point
3 Master Set Point

1 Specify A Start Value
2 Use Current Setting

1 Use a Show Value
2 Use Current Setting

1 Timer
2 Analog
3 Latch
4 PID Set P
5 PID Max
6 PID Min
7 Blank

1 Select Item
B Backward
E Exit
F Forward

1 String
2 Analog In
3 Analog Out
4 Differential
5 RPM
6 Hour
7 Shutdown Set
8 Shutdown Status
9 PID Set Point
A AGA
B Shutdown
C Alarms
D Faults
E Counter

1 Align Left
2 Align Center
3 Align Right

1 None
2 Temperature
3 Pressure
4 Percent
5 RPM
6 MA
7 VDC
8 Pressure Abs
9 Pressure G
B BTU
C Velocity
D PID
E Amps

1 Same As 2 Name or Device
2 Same As 2 Name or Device

APPENDIX C: EXACTA 21 MENU TREE, PAGE 3

The menu tree contains the following boxes:

Main command box:
1 Turn On Output
2 Turn Off Output
3 Output
4 Lock Output
5 Flash Output
E Exit

Input box:
1 Turn On Input
2 Turn Off Input
3 Input
4 Lock Input
5 External On
6 External Off
7 Input Bypass
E Exit

1 If
2 Else
3 Block End
4 Wait
5 While
6 Record
7 And
8 Or
9 RPM Test
A And Delay
B Or Delay

1 KB LED On
2 KB LED Off
3 LED Special
4 KB LED Flash
5 Set Latch
6 Reset Latch
7 Toggle Latch
8 Special Latch

1 Change State
2 Goto State
3 Previous State
E Exit

1 Dec Counter
2 Incr Counter
3 Count Set
4 Count Check
E Exit

1 ** Analog Test
2 Wait Analog
3 And Analog
4 Or Analog
5 While Analog
6 While Diff
7 If Diff
8 Wait Diff
9 While Output
E Exit

1 PID On
2 PID Off
3 PID Manual
4 PID Auto
5 PID Minimum
6 PID Maximum
7 Set PID
8 In Set PID
9 In Set Output
A Set PID Offset
B In PID Offset
C Set Analog Input

1 Shutdown
2 Start Compress
3 Stop Compress
4 Alarm Reset
5 RPM Test
6 Analog Output
7 Ramp
8 Change Analog

1 Message
2 Record
3 Delay
4 Printer Report
5 Alarm Reset
6 Remote On
7 Remote Off
E Exit

1 Output Commands
2 Input Commands
3 Tests
4 LED & Latches
5 State Diagrams
6 Count Commands
7 Analog Commands
8 Control Commands
9 Compressor
A Other
E Exit

Same as Add to End

Lock box:
1 Lock in Current State
2 Lock in On State
3 Lock in Off State
E Exit

Same Menu as Lock Output

Input states box:
1 Input On
2 Input Off
3 Input Locked
4 Input Locked On
5 Input Locked Off
6 Output On
7 Output Off
8 PID On
9 PID Auto
A Underspeed RPM
B 20 RPM
C No Shutdowns
D Compress Running
F Latch Signal Set

Same as 1 – If Menu

Comparison box:
1 Less Then
2 Less Then and Equal To
3 Equal To
4 Greater Then and Equal To
5 Greater Then

1 Greater Then
2 Less Then

Same as Analog Test

Lists Output Devices

Top box:
1 Adj. Analog Setting
2 Input Set Point
3 Fixed Entry

Same as Greater Then

Bottom command menu:
1 Output Commands
2 Input Commands
3 Tests
4 LED & Latches
5 State Diagrams
6 Count Commands
7 Analog Commands
8 Control Commands
9 Compressor
A Other
E Exit

1 ** Add to End
2 Insert Before
E Exit

0 Goto
1 Device
2 Type
3 When
4 Off
5 Start Delay
6 Parameters
A Add
B Backward
D Delete
F Forward

Same as Menu Tree as Show Above