CA-2PDA
User's Guide

Duplex Controller (Pump-Down)
Analog based Primary Control
Float based Redundant Control

The CA-2PA duplex pump controller accepts an analog input and provides automatic pump-down control of two constant speed pumps.

The CA-2PDA provides simple & reliable pump control based on the excursions of an analog input (e.g. the input from a submersible level transducer). Additionally, the CA-2PDA provides an integral and ingenious float-based redundant control strategy.

The CA-2PDA accepts a 0-10 VDC input. Simple scaling adjustments allow the controller to be field configured for the desired maximum scale. Typical factory ranges are 10', 15', and 20'. The calibrated range spans over a nominal 2-10 VDC input. A loop powered milli-amp transducer (purchased separately) can be used to generate the required analog input. Driving the transducer's output through a 500-ohm resistor to system common produces the VDC input signal.

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Features:

1) 24 VDC input
2) Operator interface:
   a) 4 line X 12 character display
   b) Six pushbuttons (Used to advance the display and set the configuration)
3) Input Scaling: A 4-20 mA input over 500 ohm resistor (provided) produces the nominal 2-10 VDC input signal that correlates to a 0' to full scale excursion (e.g. 0-10)
4) Discrete Outputs
   (Four relays rated 10A @ 240 VAC)
   a) Relay #1 – Pump 1
   b) Relay #2 – Pump 2
   c) Relay #3 – Level Alarm (Selectable – Low Level, High Level or Common Alarm)
   d) Relay #4 – Controller Monitor (Normally energized, opens on any of five alarm conditions)
5) Discrete Inputs
   a) Alarm Acknowledge
   b) Pump Off (Redundant Float-Based Control)
   c) Pump Add (Redundant Float-Based Control)
   d) Alternator – Fixed 1-2
   e) Alternator – Fixed 2-1
      (The alternator automatically advances if neither of the above inputs are active.)
   f) Pump 1 Running (Enables Pump #1 RTM)
   g) Pump 2 Running (Enables Pump #2 RTM)
6) Displays
   a) Debug Displays:
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      ii) Active Inputs
      iii) Active Outputs
   b) Status Displays:
      i) Pump 1 & 2 RTM (Hours)
      ii) Low Level Setpoints (On & Off setpoints)
      iii) Lead Pump Setpoints (On & Off setpoints)
      iv) Lag Pump Setpoints (On & Off setpoints)
      v) High Level Setpoints (On & Off setpoints)
      vi) Process Level (0-11.65' or 0-23.1')
   c) Alarm Displays
      i) Abnormal Level!
      ii) Redundant Control Active!

Important Notes:

1. The setpoint displays (described in the following sections) show both On and Off setpoints. Notice that a small arrow appears to the right of the words 'On' and 'Off'. An upward pointing arrow denotes the higher level setpoint. A downward pointing arrow denotes a lower level setpoint. The operator must ensure that the higher level setpoint is ALWAYS programmed to a value that is greater than the lower level setpoint.
2. When lowering a control band the operator should first change the lower level setpoint (down arrow). When raising a control band the operator should first change the higher level setpoint (down arrow).
3. When changing an operating value the operator must ensure that the setpoint is within the controller's operating range. (Example: Assume that the controller's scale is set for a 0-10' range. While it is possible to set an On setpoint at 12.8 feet it is an impractical adjustment; that setting is out of range.)
4. After adjusting a setpoint the operator should monitor the controller and the station's pumping and alarm activity through a complete lead and lag pumping cycle before leaving the station.

Initialization

On power-up the CA-2PDA displays the following screen[1] =>

```
Level    2.2
More Info▲▼
www.Contegra
CA-2PDA R01
```

The display shows the present wet well level (top line – currently 2.2 Ft) and indicates that more information is available by pressing the UP or DOWN keys (▲▼ respectively).

Pressing the DOWN arrow causes the following display to appear =>

```
HiAlrmStPts
On  ▲  5.0
Off ▼  4.0
Now @  2.2
```

The display shows the High Alarm ON and OFF setpoints. (In this case the HIGH alarm activates when the level rises above 5.0 Ft. and deactivates when the level falls below 4.0 Ft.) The display's bottom line continues to show the present tank level.

Pressing the DOWN arrow once again causes the following display to appear =>

```
LagPmpStPts
On  ▲   4.0
Off ▼   3.0
Now @   2.2
```

The display shows the Lag Pump's On and Off setpoints. (As shown here, the Lag Pump is activated when the level rises above 4.0 Ft. and is deactivated when the level falls below 3.0 Ft.) The display's bottom line continues to show the present tank level.

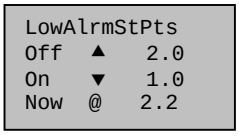
Pressing the DOWN arrow once again causes the following display to appear =>

```
LeadPmpStPts
On  ▲   4.0
Off ▼   3.0
Now @   2.2
```

The display shows the Lead Pump's ON and OFF setpoints. (As shown here the lead pump is activated when the level rises above 3.0 Ft. and is deactivated when the level falls below 2.0 Ft.) The display's bottom line continues to show the present tank level.

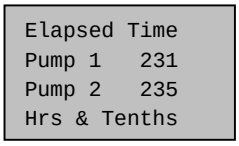
[1] This assumes that the wet well level is below the High Alarm setpoint and that the redundant control float switches are inactive.

Pressing the DOWN arrow once again causes the following display to appear =>



The display shows the Low Alarm's ON and OFF setpoints. (In this case the Low Alarm output is activated when the level falls below 1.0 Ft. and is deactivated when the level rises above 2.0 Ft.) The display's bottom line continues to show the present tank level.

Pressing the DOWN arrow once again causes the following display to appear =>

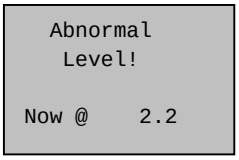


The display shows the pump running time in tenths of hours (the decimal point not shown and must be assumed). In this case Pump 1 has accumulated 23.1 hours and Pump 2 has accumulated 23.5 hours. The RTMs cannot be preset and rollover after 999999 hours. External wiring (e.g. from motor starter aux contacts) is required to enable the pump run time meters.

Alarm Displays

Abnormal Level

An abnormal Level alarm can be generated by either a Low Level or a High Level condition. Whenever an Abnormal Level condition is present, the following display appears. =>



The controller automatically deactivates the alarm display when the alarm condition clears. Additionally, the operator can acknowledge the alarm condition by completing the circuit into controller's Alarm Acknowledge input. (Typically this is accomplished by a normally open pushbutton that completes the circuit into the CAD2PDA [switch provided by others].)

The operator uses the UP and DOWN arrows to review the other status and alarm displays (described above).

Float Control Active

The CA-2PDA is primarily designed as a simple-to-use analog pump controller. As with any control system, various levels of redundancy are often desired or specified. The CA-2PDA has an integral redundant control strategy that accepts one or two float-inputs and provides pump ON and OFF control based upon the float system.

The following screen appears when the Pump Add float closes =>

The float based control strategy operates in parallel with the analog input. Therefore, if either the primary (analog) strategy or the redundant (float based) strategy require a pump, that pump's control output is activated.

The first pump is called into service when the Pump Add float closes. The second pump is called into service only if the Pump Add float remains closed for the LagOn timer period (factory default = 15 seconds).

The controller provides differential control based on **either** an Off Float or an Off-Delay Timer.

The controller automatically senses the presence (i.e. closure) of the Pump Off (i.e. a Normally-Open contact that closes on rising level). In such a case, the controller calls for a pump when the Pump Add float closes and stops all pumping activity when the Pump Off Float opens.

When an Off Float is NOT connected, the controller automatically uses an internal Off-Delay timer to determine that the length of time the pump control outputs are to remain active following the opening of the Pump Add float switch. The Off Delay timer can be field programmed and ranges from 0.00 minutes to 99.99 minutes. However, a factory-set non-adjustable timer that is part of the CA-2PDA's control strategy is provided to limit the maximum off-delay time to 10 minutes. Therefore, although the customer is able to program a value greater than 10 minutes, the CA-2PDA disallows operation beyond the 10-minute limit.

Changing Setpoints

Use the UP & Down arrows to move to the desired setpoint display. (The Lag Pump Setpoint display is used in this example.)

```
LagPmpStPts
On  ▲  4.0
Off ▼  3.0
Now @  2.2
```

The parameters are changed as follows:

1. Press and hold the ESC pushbutton for approximately 3 seconds. A cursor appears in the second line from the top and at the left-most position (i.e. under the letter 'O' in the word On.)

2. If desired, press the RIGHT arrow to advance the cursor to the Off setpoint.

   Or, again if desired, pressing the RIGHT arrow once again causes the cursor to move to the 'Now' line (i.e. the cursor moves to the bottom line of the display).

   Although the cursor moves, the 'Now' line cannot be changed. Therefore, use the RIGHT or LEFT arrow to return to the previous lines (i.e. On or Off setpoints).

3. Position the cursor at the desired setpoint (Off or On) and press OK. If changing the On setpoint, the display changes as shown =>

```
LagPmpStPts
On  ▲+00050
Off ▼   3.0
Now @   2.2
```

4. Use the Right (or Left) arrow to move to the cursor to the digit that is to be changed. (Note that the decimal point does not appear when the value is being changed.)

5. Use the Up and Down arrows to change the value.

6. Press OK to accept the newly programmed value or press ESC to return the previous value.

Caution:

The operator must ensure that the higher level (On) setpoint is ALWAYS programmed to a value that is greater than the lower level (Off) setpoint.

Notice:

The UP and DOWN pushbuttons change function when the controller is placed in the programming mode. Under normal operation the UP pushbutton causes the next higher display to be revealed. Conversely, pressing the DOWN pushbutton causes the next lower display to be revealed. However, when the controller is in the initial stages of the programming mode (i.e. when the cursor is positioned under the 'O' in 'On'.) the UP and DOWN pushbuttons appear to be inoperative. Pressing and releasing the ESC pushbutton can clear this condition. The controller then releases the UP and DOWN pushbuttons so that they roll through the various (active) display screens.

Alternator (First On/First Off)

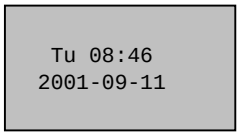
The CA-2PDA contains a First On/First Off (FOFO) automatic alternator. The FOFO alternator operates in a manner that tends to equalize the running time of the two pumps. When additional pumping capacity is required the FOFO responds by starting the pump that has been resting longest. Conversely, when less pumping capacity is required, the FOFO deactivates the pump that has been running longest.

Running Time Meters

The CA-2PDA contains two Running Time Meters (RTMs). The RTMs accumulate time in hours and tenths. The displayed value does not include the decimal point. Therefore the operator must multiply the displayed value by 0.1. A displayed value of 3521 is, in actuality, 352.1 hours. The RTMs cannot be reset and automatically roll-over after 99999.9 hours.

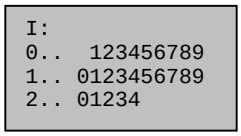
Debug Displays
The CA-2PDA contains five debug and/or configuration displays. Press the DOWN arrow until one of the Debug Displays appears on the screen[2]. The five Debug Displays are as follows:

Time and Date



The screen shows the day of the week (Tuesday) the present time (24 hour clock shows 08:46 AM) and the year, month and day. Press the RIGHT arrow to move to the 'Input' display screen (described below).

Active Inputs



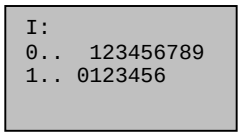
The screen shows the active inputs. (The I: at the top line indicates that this is the Input Display.)

The CA-2PDA is based upon a programmable controller that is capable of accepting additional input & output expansion modules. This screen shows both the inputs that are associated with the CA-2PDA and also those inputs from expansion modules. Since the CA-2PDA does not require the expansion module there is no need to look beyond the display's second line (i.e. Inputs 0:1-8)

An inactive input appears as a dark gray digit on a yellow-green background. An active input appears in reverse print. Therefore an active input appears as a yellow-green digit on a dark gray background.

Pressing the Right Arrow causes the 'Output' display to appear. The Output display is described below.

Active Outputs



This screen shows the active outputs (The O: at the top line indicates that this is the Output Display.)

The CA-2PDA is based upon a programmable controller that is capable of accepting additional input & output expansion modules. This screen shows both the inputs that are associated with the CA-2PDA and possible outputs from additional I/O modules. Since the CA-2PDA does not require the expansion module there is no need to look beyond the display's second line (i.e. Outputs 0:1-4)

An inactive output appears as a dark gray digit on a yellow-green background. An active output appears in reverse print. Therefore an active output appears as a yellow-green digit on a dark gray background. Pressing the Right Arrow causes the 'Memory Marker display to appear. The Memory Marker display is described below.

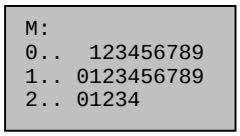
Note:

Pressing the ESC key DOES NOT allow an operator to simulate an input's closure. Rather, pressing the ESC key is the precursor to stopping the control strategy, changing one of the configuration parameters, setting the internal clock or viewing the program's name.

Caution:

Stopping the CA-2PDA's control strategy disables all automatic control (i.e. analog and float based control). Do not press OK to 'Stop' the strategy. Do not confirm that the strategy (i.e. program) should be stopped.

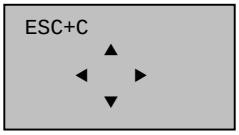
Memory Markers



The Memory Marker screen shows the active memory markers (The M: at the top line indicates that this is the Memory Display.)

This CA-2PDA display is not relevant to the end user. Press the Right or Left arrow to move away from the Memory Marker display.

Function Key



This display allows the factory to provide up to four function keys (if such keys are configured as part of the resident control strategy). The CA-2PDA does not require any such keys. This CA-2PDA display is not relevant to the end user. Press the Right or Left arrow to move away from the Function Key display.

[2] The first debug screen to appear is the last screen to be viewed. The above example assumes that the operator last looked at the clock screen before returning to the other Status Displays.

Changing a Parameter
The CA-2PDA contains five user configurable parameters. Those parameters are:

- Alarm Output (High Alarm Enable)
- Alarm Output (Low Alarm Enable)
- Lag Pump Initialization Delay Timer
- Pump Off Delay Timer
- System Calibration

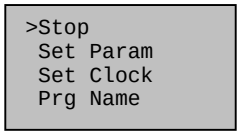
These parameters are described in the following paragraphs.

Alarm Output (High Alarm)

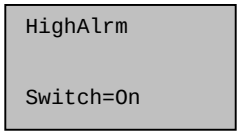
The CA-2PDA's alarm output (i.e. Output #3) can be configured as a low alarm output, a high alarm output or common output (i.e. active on either a low or high alarm). As supplied from the factory, and as described at below, the High Alarm circuitry is active. (As supplied from the factory, only the High Alarm output is active.)

Follow these steps to change the alarm output:

1. Press the down arrow to move down to the Debug Displays (i.e. Time/Date, Active Inputs, Active Outputs, etc) as previously described.
2. Press ESC. The following display appears =>



   This menu is the entry point to stopping the program (see the above Warning), setting a parameter (Set Param), setting the clock (Set Clock) or viewing the program name (Prg Name).
3. Press the Down arrow to move the cursor to Set Param
4. Press OK. The following display appears =>



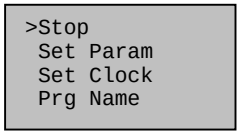
   The top line indicates that this screen enables the High Alarm as the controller's Alarm output. As shown here, the switch is in the On position. Therefore, the controller activates Output #3 when the High Alarm stage is active.
5. To change the switch to the Off position simply press OK. The cursor responds by moving beneath the 'S' in the word 'Switch'
6. Press either the UP or DOWN arrow to toggle the switch to the OFF position.
7. Press OK to accept the changed value or press ESC (before pressing OK) and thus preserve the switch's present position.
8. Placing the switch in the off position has no effect on the controller's display. The switch only effects the controller's alarm output.

Alarm Output (Low Alarm)

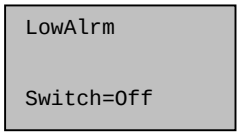
The CA-2PDA's alarm output (i.e. Output #3) can be configured as a low alarm output, a high alarm output or common output (i.e. active on either a low or high alarm). As supplied from the factory, and as shown below, the Low Alarm circuitry is inactive.

Follow these steps to change the alarm output:

1. Press the down arrow to move down to the Debug Displays (i.e. Time/Date, Active Inputs, Active Outputs, etc) as previously described.
2. Press ESC. The following display appears =>



   This menu is the entry point to stopping the program (see the above Warning), setting a parameter (Set Param), setting the clock (Set Clock) or viewing the program name (Prg Name).
3. Press the Down arrow to move the cursor to Set Param
4. Press OK.
5. Press the DOWN arrow once again and the following display appears =>



   The top line indicates that this screen enables the Low Alarm as the controller's Alarm output. As shown here, the switch is in the Off position. Therefore, the controller's output does not activate in the event of a Low Level condition.
6. To change the switch to the On position simply press OK. The cursor responds by moving beneath the 'S' in the word 'Switch'
7. Press either the UP or DOWN arrow to toggle the switch to the On position.

8. Press OK to accept the changed value or press ESC (before pressing OK) and thus preserve the switch's present position.
9. Placing the switch in the off position has no effect on the controller's alarm display. The switch only effects the controller's alarm output.

If only the High Alarm switch is in the 'On' position then the controller's alarm output (Output #3) responds exclusively to a high alarm condition.

If only the Low Alarm switch is in the 'On' position then the controller's alarm output (Output #3) responds exclusively to a low alarm condition.

If both switches are in the 'On' position then the controller's alarm output (Output #3) responds to both a high or low alarm condition.

Lag Initialization Timer

The CA-2PDA contains a lag-pump on-delay timer. The timer precludes the simultaneous activation of the Lead and Lag pump control outputs upon power restoration. The timer is field programmable. The timing period ranges from 0 to 99.9 seconds. The factory default is 15 seconds. Follow these steps to change the delay time:

1. Press the down arrow to move down to the Debug Displays (i.e. Time/Date, Active Inputs, Active Outputs, etc) as previously described.
2. Press ESC. The following display appears =>

```
>Stop
 Set Param
 Set Clock
 Prg Name
```

   This menu is the entry point to stopping the program (see the above Warning), setting a parameter (Set Param), setting the clock (Set Clock) or viewing the program name (Prg Name).
3. Press the Down arrow to move the cursor to Set Param
4. Press OK.
5. Press the down arrow and move to the LgInitTm (Lag Pump Initialization Timer) display shown at the right =>

```
LgInitTm
T  = 15:00s

Ta = 15.00s
```

   As shown here the timer is set for 15 seconds.
6. To change the timer, press OK. The cursor responds by moving beneath the 'tens of units' (e.g. beneath the '1' in the number 15).
7. Press either the UP or DOWN arrow to change the tens of units.
8. Press the Right arrow to move the cursor to the right.
9. Use the Up or Down arrow to change the unit value.
10. Press the Right arrow to move the cursor to the right. (Conversely, press the Left arrow to move the cursor to the left.)
11. Use the Up or Down arrow to change the 1/10ths of seconds value.
12. Press the Right arrow to move the cursor to the right.
13. Use the Up or Down arrow to change the 1/100ths of seconds value.
14. Press OK to accept the change or ESC to cancel the change and thus preserve the previous value.
15. Press ESC to return to the previous display =>

```
 Stop
>Set Param
 Set Clock
 Prg Name
```

16. Press ESC to return to one of the debug displays.
17. Press the Up arrow to move through the status displays.

Pump Off Delay (Single Float Control)

The CA-2PDA contains a unique float-based redundant pump control. The controller provides differential control. Pumps are called into service by the closure of the Pump Add float switch. Pumps are removed from service by the opening of the Pump Off float switch or, if that is unavailable, by the controller's integral pump Off-Delay timer.

If an Off float is not connected, the controller maintains the active pump control outputs until the Pump Add float opens and the Off delay timer completes its timing cycle. At the end of the timing cycle the controller deactivates the internal parallel circuit to the pump outputs and advances the alternator.

Follow these steps to change the pump off-delay timing value:

1. Press the down arrow to move down to the Debug Displays (i.e. Time/Date, Active Inputs, Active Outputs, etc) as previously described.
2. Press ESC. The following display appears =>

```
>Stop
 Set Param
 Set Clock
 Prg Name
```

   This menu is the entry point to stopping the program (see the above Warning), setting a parameter (Set Param), setting the clock (Set Clock) or viewing the program name (Prg Name).
3. Press the Down arrow to move the cursor to Set Param
4. Press OK.
5. Press the down arrow until the following display appears =>

```
OffDelaY
T  =00:30m

Ta = 00:30m
```

   As shown here the timer is set for 00:30 minutes (i.e. 30 seconds).
6. To change the timer, press OK. The cursor responds by moving beneath the 'tens of units' (e.g. beneath the '0' in the number '00').
7. Press either the UP or DOWN arrow to change the tens of units.
8. Press the Right arrow to move the cursor to the right.
9. Use the Up or Down arrow to change the unit value.
10. Press the Right arrow to move the cursor to the right. (Conversely, press the Left arrow to move the cursor to the left.)
11. Use the Up or Down arrow to change the 1/10ths of minutes value.
12. Press the Right arrow to move the cursor to the right.
13. Use the Up or Down arrow to change the 1/100ths of minutes value.
14. Press OK to accept the change of ESC to cancel the change and thus preserve the previous value.
15. Press ESC to return to the previous display =>

```
 Stop
>Set Param
 Set Clock
 Prg Name
```

16. Press ESC to return to one of the debug displays.
17. Press the Up arrow to move through the status displays.

Setting the Controller's Scale

1. Apply the minimum input signal. (Example: Removing a submersible sensor from the media causes the sensor to produce its minimum output.)
2. Measure the voltage developed across the analog input (i.e. measure the voltage [VDC] from 'M' to Terminal I8). This is the MINIMUM input voltage or '**VDC Min'**.
3. Apply the maximum input signal. (Example: Submerging the sensor to the maximum desired depth causes the sensor to produce its maximum output.)

   If fully submerging the transducer is not possible then simply read the following section 'Estimating Full Scale' and return to this section to complete the calibration.
4. Measure the voltage that is developed across the analog input (i.e. measure the voltage [VDC] from 'M' to I8). This is the MAXIMUM input voltage or '**VDC Max'**.
5. Calculate the gain and offset values as follows:

   $$\text{Gain} = \frac{\text{Maximum Scale}}{\text{VDC Max} - \text{VDC Min}}$$

   Offset = -(Gain* VDC Min*100)

   Note: The controller allows a maximum gain of 9.99. Therefore the input signal's span must be somewhat less than 10X the depth of the tank.

   Example: When the input spans a 2 to 6.2 VDC range and the desired scale is 40 feet, the calculated gain is 9.52. This value is approaching the controller's maximum gain.

Example:

Gain = 10'/(9.89VDC-1.87VDC) = 10/8.02

Therefore the Gain = 1.25

*Offset = -1.25*1.87*100*

Therefore the Offset = -234

Given the above calculations, follow these steps to adjust the controller's maximum display scale:

6. Press the down arrow to move down to the Debug Displays (i.e. Time/Date, Active Inputs, Active Outputs, etc) as previously described.
7. Press ESC. The following display appears =>

```
>Stop
 Set Param
 Set Clock
 Prg Name
```

   This menu is the entry point to stopping the program (see the above Warning), setting a parameter (Set Param), setting the clock (Set Clock) or viewing the program name (Prg Name).
8. Press the Down arrow to move the cursor to Set Param
9. Press OK.
10. Press the down arrow until the System Calibration (SysCal) display appears =>

```
SysCal
A = 1.23
B =  -212
Ax=   417
```

    The three variables are as follows:

    A = Gain (Calculated as shown above)

    B = Offset (Calculated as shown above)

    Ax = Present calculated depth
11. To change the gain or offset, press OK. The display changes to show the gain as 01.23. The cursor responds to the key press by moving beneath the 'tens of units' (e.g. beneath the '0' in the number '01.23').
12. Press either the UP or DOWN arrow to change the tens of units.
13. Press the Right arrow to move the cursor to the right.
14. Use the Up or Down arrow to change the unit value.
15. Press the Right arrow to move the cursor to the right. (Conversely, press the Left arrow to move the cursor to the left.)
16. Use the Up or Down arrow to change the 1/10ths of units value.
17. Press the Right arrow to move the cursor to the right.
18. Use the Up or Down arrow to change the 1/100ths of units value.
19. Continue to press the Right pushbutton and thereby move the cursor to the Offset. Again use the pushbuttons to change the gain.
20. Press OK to accept the change or ESC to cancel the change and thus preserve the previous value.
21. Press ESC to return to the previous display =>

```
 Stop
>Set Param
 Set Clock
 Prg Name
```

22. Press ESC to return to one of the debug displays.
23. Press the Up arrow to move through the status displays.

Estimating Full Scale

Typically, when a Contegra's submersible transducer is purchased in conjunction with a CA-2PDA the controller/transducer combination is factory calibrated. However, it may be necessary to calibrate the controller in the field. Additionally, it may be difficult to fully submerge the transducer and thus ensure that the transducer is producing a signal that is indicative of full submergence. In such a case, it is possible to submerge the transducer to some known percentage of submergence and thereafter simply estimate (i.e. calculate) the transducer's output at full submergence.

Follow these steps to calculate the transducer's output basd upon partial submergence.

1. Submerge the transducer to a known depth that is as close to full submergence as possible (let's say 75% of full scale).
2. Measure the voltage (let's call it **% Output**) across the CA-2PDA's terminals 'I8' and 'M'.
3. Estimate/Calculate the maximum output as follows:

$$VMax(est) = \left[\left[\frac{\%\ VDC - 2}{\%\ Scale} \right] X\ 100 \right] + 2$$

Example @ 75% full scale:

$$VDC\ Max\ (est) = \left\lceil \frac{(7.9 - 2)}{75} \right\rceil X\ 100 + 2$$

VDC Max (est) = 9.866 VDC

4. Therefore, as an estimate, use VDC Max = 9.6 in the calculations that are shown in the previous section.

Adjusting the clock:

Follow these steps to change the controller's internal (capacitor backed) clock:

1. Press the down arrow to move down to the Debug Displays (i.e. Time/Date, Active Inputs, Active Outputs, etc) as previously described.
2. Press ESC. The following display appears =>

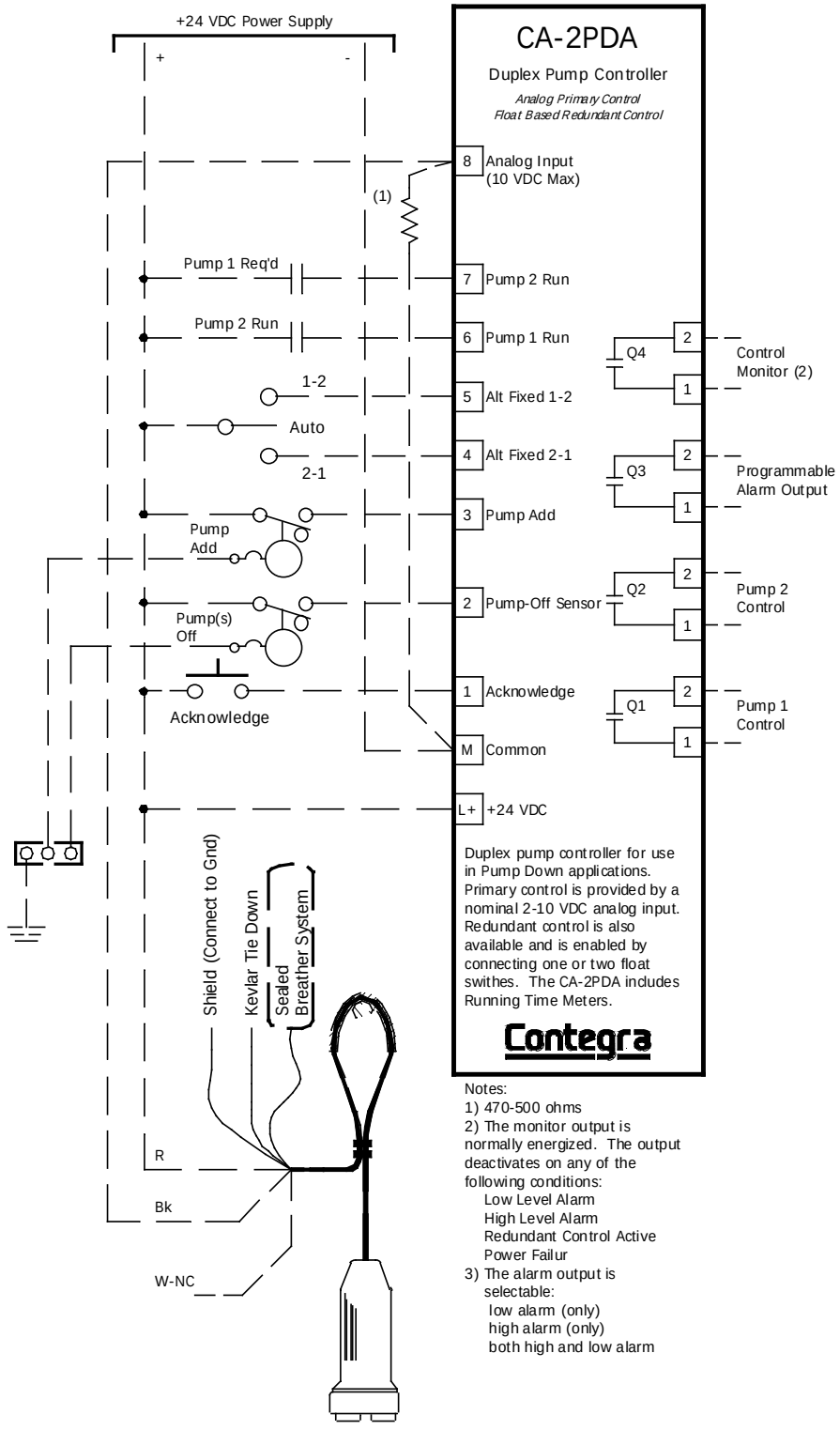
```
>Stop
 Set Param
 Set Clock
 Prg Name
```

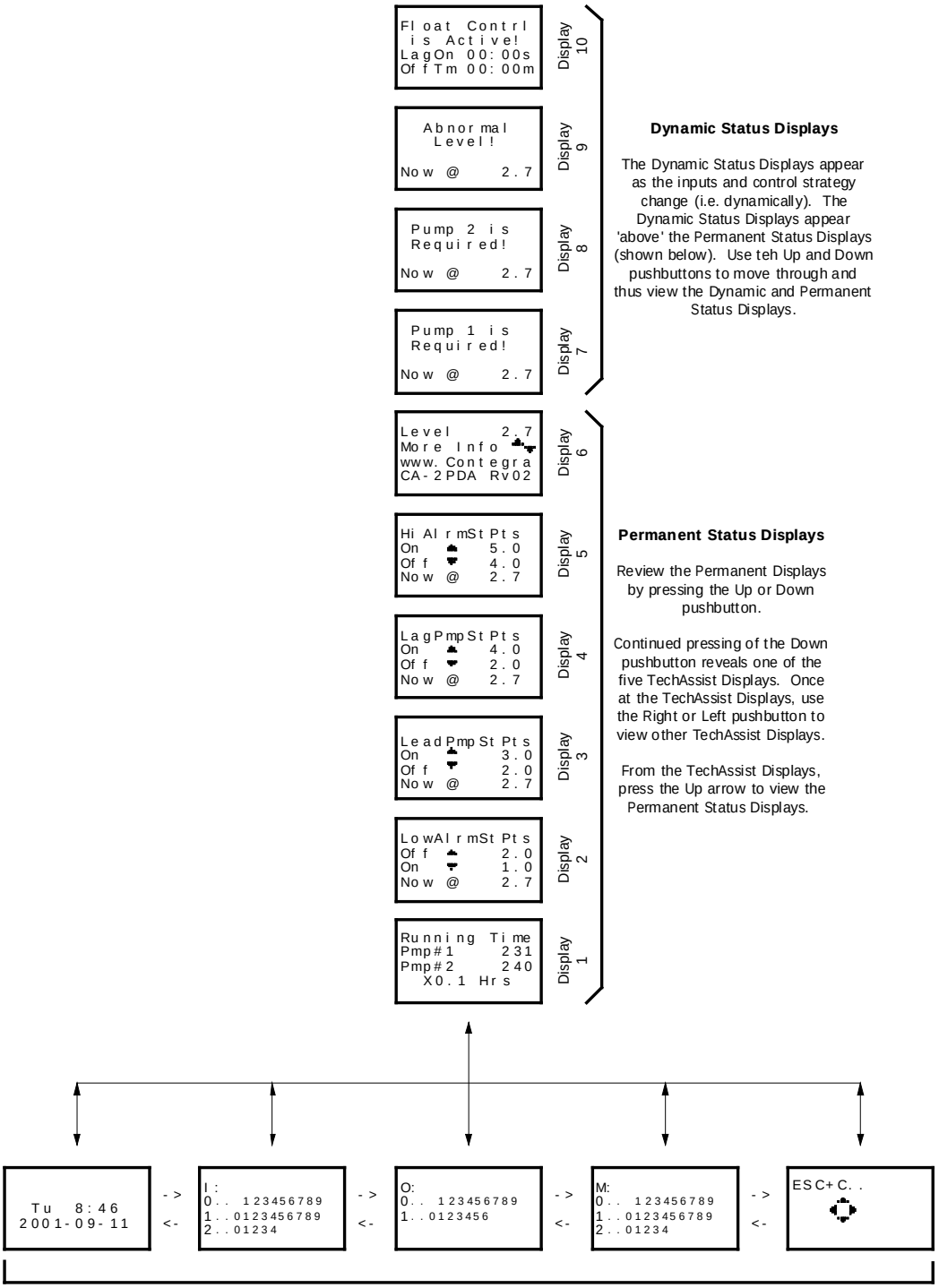
   This menu is the entry point to stopping the program (see the above Warning), setting a parameter (Set Param), setting the clock (Set Clock) or viewing the program name (Prg Name).
3. Press the Down arrow to move the cursor to Set Clock
4. Press OK. The following display appears =>

```
Set Clock
 Tu 08:46
YYYY-MM-DD
2001-09-11
```

   The cursor automatically moves to a position that is beneath the first letter in the day of the week (e.g. in this case, beneath the 'T' in 'Tuesday').
5. Press either the UP or DOWN arrow to change the day of the week.
6. Press the Right arrow to move the cursor to the right.
7. Use the Up or Down arrow to change the hours (tens of units).
8. Press the Right arrow to move the cursor to the right. (Conversely, press the Left arrow to move the cursor to the left.)
9. Use the Up or Down arrow to change the hours (units).
10. Continue using the UP, DOWN Right Left arrows to change the additional parameters.
11. Press OK to accept the change or ESC to cancel the change and thus preserve the previous value.

Connection Diagram





TechAssist Displays

The TechAssist (R) Displays show the present time (Day, Time, Date), Active Inputs, Active Outputs, Internal Memory Usage and Function Keys. (Of these displays the Time, Input and Output displays are most useful for system analysis. Use the Right or Left pushbutton to move between the Techassist Displays. Press the Up pushbutton to return to the Permanent Displays.