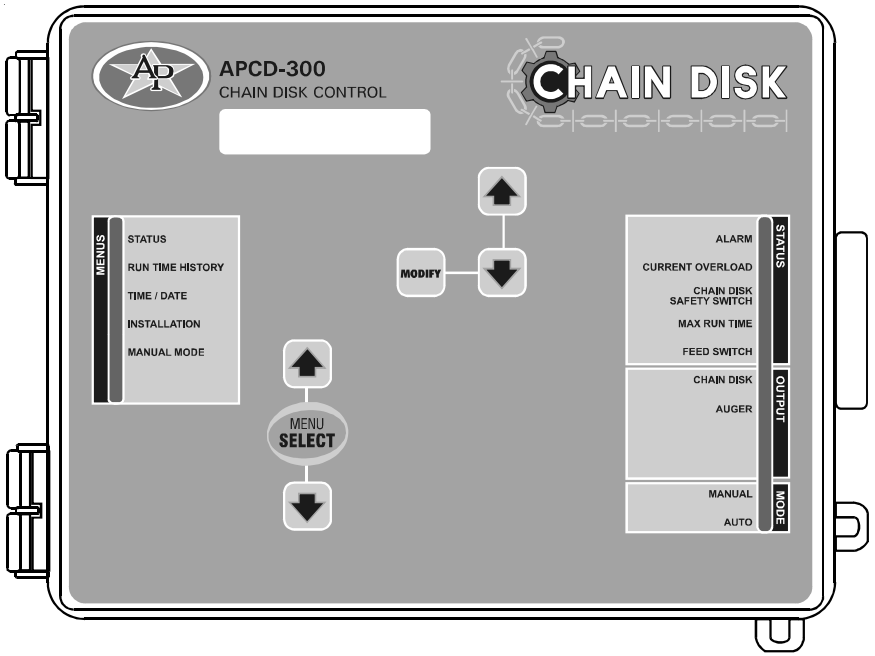
Chain Disk Controller

APCD-300

User's Manual



M 890-00057 rev. 03

PN895-00010 REV. 01

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Thevco

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1. PRECAUTIONS

Although fuses at the input and outputs of the controller protect its circuits in case of an overload or overvoltage, we recommend installing an additional protection device on the controller's supply circuit.

The room temperature where the controller is located MUST ALWAYS REMAIN BETWEEN 32°F AND 104°F (0°C TO 40°C). For indoor use.

To avoid exposing the controller to harmful gases or excessive humidity, it is preferable to install it in a corridor.

DO NOT SPRAY WATER ON THE CONTROLLER

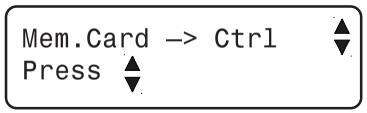
FOR CUSTOMER USE
Enter the serial number located on the side of the controller below for future reference.

Model number: **APCD-300**

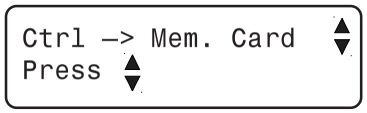
Serial number: _____

6. Use the ADJUSTMENT up- and down-arrow keys to select the proper type of transfer:

MEMORY CARD → CONTROLLER:
To transfer the memory card's content into the controller, select the **"Mem.Card to Control"**. Once it is selected, simultaneously press the ADJUSTMENT up- and down-arrow keys to start the transfer.



CONTROLLER→ MEMORY CARD:
To save the controller's configuration into the memory card, select the **"Control to Mem.Card"** menu. Once it is selected, simultaneously press the ADJUSTMENT up- and down-arrow keys to start the transfer.



7. Once the transfer is over, simultaneously press and hold the MENU SELECT up- and down-arrow keys for 5 seconds to exit the transfer menu, then remove the memory card from the connector as follows:
   - Turn off power to the controller;
   - Open the controller's cover;
   - Remove the card from the connector;
   - Close the cover then reapply power to the controller.

IMPORTANT:

REMOVE THE MEMORY CARD FROM THE CONNECTOR WHEN THE TRANSFER IS OVER!

8. Lock the card's switch ( ) if required.

TRANSFER ERROR

WARNING

The controller will not warn you if the transfer is incorrect. Respect the following rules to make sure the transfer works properly:

- Make sure the card switch is at the unlocked position before transferring a configuration on the card.
- Do not move or hold the card while a transfer is ongoing.

7. MEMORY CARD

The memory card is used to create a backup copy of your controller's configuration. The card is also useful to transfer the configuration of one controller to another controller of the same type.

The switch at the bottom of the card is used to lock or to unlock the card (= locked, = unlocked).

Turn off power each time you open the controller's enclosure. This prevents accidental exposure to areas of high voltage.

TO TRANSFER A CONFIGURATION:

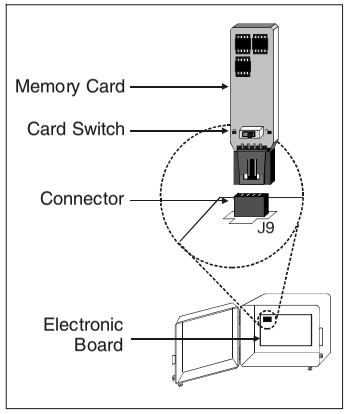
1. Turn off power to the controller.

2. Open the latch and lift the controller's cover.

3. If you are about to copy the controller's configuration on the memory card, make sure the card's switch is at the unlocked position.

4. Insert the card in the J9 connector located on the electronic board inside the controller. Components of the memory card must face down as illustrated.

5. Close the cover then reapply power to the controller. The transfer menu should be shown on screen (if this is not the case, simultaneously press the MENU SELECT up and down-arrow keys for 3 seconds to display this menu).



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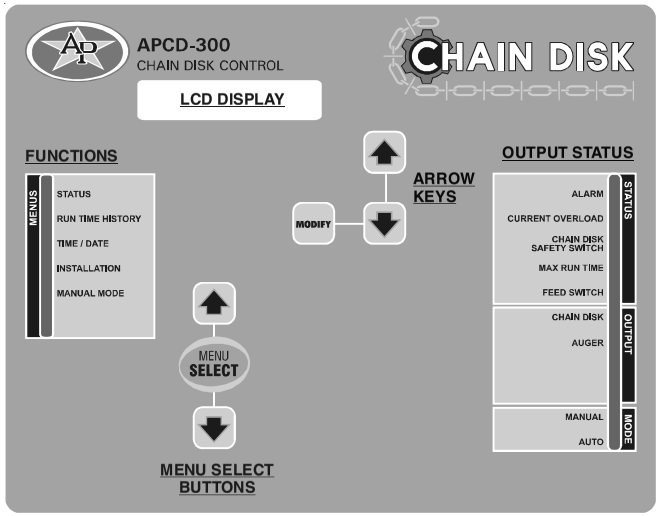
2. TERMS AND SYMBOLS



LCD Display: The LCD display on the left gives the current readings and parameters to be adjusted when you select a function. The three keys at the right of the display are used to edit parameters and step through the display. When the parameters for a given function cannot all be presented at once on the display, arrows are displayed on the right hand side to indicate that additional parameters can be displayed using the arrow keys ▲ ▼. After 4 minutes of inactivity, the display returns to the STATUS display.

Arrow keys: The arrow keys that are located next to the LCD display have 2 purposes. They are first used to step through the parameters that are displayed on the display. They are also used to modify a parameter's value when a parameter flashes on the display.

Menu Select Buttons: These keys are used to select the functions that are located in the main menu.

Adjusting a parameter: Use the arrow keys to select the parameter that needs to be adjusted. Once the parameter is selected, press MODIFY. The parameter then flashes on the display. It can now be adjusted with the arrow keys. Once it is properly set, Press MODIFY once again to validate the new value. If the value does not flash after having pressed the MODIFY, it means that the value is a reading. A reading cannot be modified.

6. TECHNICAL SPECIFICATIONS

Type	**APCD-300**
Main supply fuse F1	F 1A, 250V, fast-blow
Main supply/frequency	230V + 10% -20%, 12A, 50/60Hz
Housing	Plastic casing
Operating temperature	0 to 40°C
Storage temperature	-15 to 50°C
Ambient relative humidity	MAX 95% (non condensing)
Alarm	10mA to 2A, 24 VAC or DC MAX
Chain disk motor	230 VAC / 2HP MAX
Auger motor	230VAC / 1HP MAX 115 VAC / 1/2 HP MAX
Trouble light	500W MAX, 115VAC
Installation category	Categorie II : Overvoltage category
Pollution degree	2
Altitude	Up to 2000m

The room temperature where the controller is located MUST ALWAYS REMAIN BETWEEN 32° AND 104°F (0° AND 40°C). For indoor use.

5.6 ALARMS

The following table shows the possible alarms conditions. When an alarm occurs, the system stops operating until the alarm is acknowledged.

CONDITION	MEANING
CHAIN DISK IS NOT RUNNING	THE CHAIN DISK MOTOR USES LESS THAN 2.0 AMPS
CURRENT OVERLOAD OCCURED	THE CHAIN DISK MOTOR'S CURRENT CONSUMPTION EXCEEDED THE *MAX. CURRENT LIMIT* FOR A TIME PERIOD EXCEEDING THE *OVER CURRENT DELAY*.
MAX RUN TIME OCCURED	THE CHAIN DISK'S RUN TIME EXCEEDED THE *MAX. RUN TIME*. *THIS ALARM CAN ONLY OCCUR IF A PROXY SWITCH SENSOR HAS BEEN ENABLED IN THE INSTALLATION SETUP*.
CHAIN DISK SAFETY SWITCH	THE CHAIN DISK'S SAFETY SWITCH HAS BEEN REACHED.

TROUBLE LIGHT:
It is possible to connect a trouble light to the main controller. This light turns on whenever an alarm occurs. Refer to the wiring diagram enclosed with this manual to connect the trouble light.

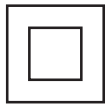
5.6.1 Acknowledging an alarm

- Use the menu select buttons to select the STATUS menu. The current alarm acknowledgment menu is displayed.
- Press MODIFY. The acknowledgment status flashes on the display.
- Press the up-arrow key to acknowledge the alarm then press MODIFY to validate. The alarm is now acknowledged.

Output Status LEDs: The LEDs at the right of the control panel give the status of each output. When the LED is turned on, the output is activated; when the LED is turned off, the output is deactivated. The following table gives the LEDS' meanings:

LED	MEANING
ALARM	TURNS ON WHEN AN ALARM IS DETECTED. **THE CHAIN DISK CONTROL STOPS OPERATING UNTIL THE ALARM IS ACKNOWLEDGED.**
CURRENT OVERLOAD	TURNS ON WHEN THE CHAIN DISK'S CURRENT EXCEEDS THE *MAX CURRENT* LIMIT FOR A TIME PERIOD EXCEEDING THE *OVER CURRENT DELAY* . **THE CHAIN DISK CONTROL STOPS OPERATING UNTIL THE ALARM IS ACKNOWLEDGED.**
CHAIN DISK SAFETY SWITCH	TURNS ON WHEN THE SAFETY SWITCH IS REACHED. **THE CHAIN DISK CONTROL STOPS OPERATING UNTIL THE ALARM IS ACKNOWLEDGED.**
MAX RUN TIME	TURNS ON WHEN THE CHAIN DISK'S RUNNING TIME EXCEEDS THE *MAX RUN TIME*. **THE CHAIN DISK CONTROL STOPS OPERATING UNTIL THE ALARM IS ACKNOWLEDGED.**
FEED SWITCH	TURNS ON WHEN FEED IS DETECTED BY THE PROXY SWITCH. FLASHES DURING THE *FEED SENSOR BYPASS* DELAY.
CHAIN DISK OUTPUT	TURNS ON WHEN THE CHAIN DISK IS OPERATING.
AUGER OUTPUT	TURNS ON WHEN THE AUGER IS OPERATING. FLASHES DURING THE *AUGER'S* DELAY
MANUAL MODE	TURNS ON WHEN THE CHAIN DISK IS ON MANUAL MODE.
AUTOMATIC MODE	TURNS ON WHEN THE CHAIN DISK IS ON THE AUTOMATIC MODE.

SYMBOLS



Double insulation

Caution, risk of danger

3.1 MOUNTING INSTRUCTIONS

Remove the four screws in the front cover and lift the cover. Remove the black caps located on the three mounting holes. Mount the enclosure to the wall using three screws. Be sure the electrical knockouts are at the bottom of the enclosure in order to prevent water from entering the controller. Insert the screws into the mounting holes and tighten. **Fasten the black caps onto the mounting holes.**

3.2 CONNECTIONS

To connect the controller, refer to the wiring diagram enclosed with this user's manual. Use the electrical knockouts provided at the bottom of the enclosure. Do not make additional holes in the enclosure, particularly on the side of the enclosure when using a computer communications module.

- Do not install rigid conduit into electrical knockouts. Only nylon cable glands are permitted for cable or wire fastening.
- A switch or circuit breaker shall be included in the building installation. It shall be in close proximity to the equipment and within easy reach of the operator. It shall be marked as the disconnecting device for the equipment.
- The main supply circuit breaker for feeder motor (L1/L2 POWER IN) shall be 20A.
- Wire gage used for mains supply (L1/L2 POWER IN) and feeder motor shall be at least 12 AWG.
- Separate circuit breaker shall be used for auger motor.
- The mains supply breaker for auger motor shall be 15A.
- Wire gage used for auger motor shall be at least 14 AWG.

ALL WIRING MUST BE DONE BY AN AUTHORIZED ELECTRICIAN AND MUST COMPLY WITH APPLICABLE CODES, LAWS AND REGULATIONS. BE SURE POWER IS OFF BEFORE DOING ANY WIRING TO AVOID ELECTRICAL SHOCKS AND EQUIPMENT DAMAGE.

Safety may be jeopardized if the equipment is used in a manner not specified by the manufacturer.

5.5 MANUAL MODE

This mode allows to manually perform a feed cycle: the chain disk runs up until feed is detected by the proximity sensor. The Manual Mode led is lit when this mode is in use. **Do not forget to select the automatic mode again once the manual feed cycle is completed.**

- Use the menu select buttons to select the **MANUAL MODE** menu.

```
Feed Cycles
Mode:      Auto
```

- Press MODIFY to change the feed cycle mode; use the arrow keys to choose the proper mode (Auto / Start/ Stop). Press MODIFY once again to validate.

  The new mode is validated after an 8 second delay if the user does not press on the Modify button.

5.5.1 Toggle Switch

It is possible to connect a toggle switch to the main board. This switch allows to manually stop the chain disk and auger motors without setting off the *Chain Disk is Not Running* alarm until the next feeding cycle. Refer to the wiring diagram enclosed with this manual to connect the toggle switch.

THE TOGGLE SWITCH **DOES NOT** CUT THE POWER LINES TO THE CHAIN DISK MOTOR. SHUT OFF THE CIRCUIT BREAKER FOR SERVICING AND MAINTENANCE.

10. Max Run Time

The *Max. Run Time* is the maximum allowable running time of the chain disk. Whenever the chain disk reaches this running time, an alarm is set off and the system stops operating until the alarm is acknowledged. The *Max Run Time* can be adjusted from 0 to 4 hours.

```
Max Run Time
        1:30h:m ▲▼
```

11. Time Mode

Select the desired time display format: 12h or 24h mode.

```
Time Mode   12h
                ▲▼
```

12. Shut Down Delay

Once feed is detected by the proximity switch at the end of the line, a delay is launched before stopping the chain disk motor. The bin auger also stops bringing feed into the line over this delay. The shut down delay can be adjusted from 0 to 10 minutes.

```
Shut down delay
      1:00m:s ▲▼
```

13. Change password?

Select "**Yes**" if you wish to modify the controller's password then press the down-arrow key.

```
Change password?
            Yes ▲▼
```

- Press MODIFY. The first two digits of the password flash on the display.

```
EnterNewPassword
**  **  **      ▲▼
```

- The new password must be entered, one number at a time. Use the arrow keys to enter the first number. Press MODIFY to step to the next number. Use the arrow keys to enter the second number, etc.

14. Version

Show the current version of your controller.

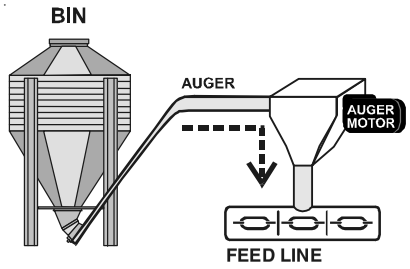
```
APCD-300
Version X.X     ▲
```


4.1 CONTROLLER'S DESCRIPTION

The APCD-300 is an electronic device used to control a chain disk system in livestock buildings. The APCD-300 takes in charge the feed intake from the bin into the feed line and controls the feed distribution process using a proximity sensor (Proxy Switch).

4.2 AUGER'S OPERATION

At the start-up of each feeding cycle, the auger starts bringing feed into the feed distribution line, right after the *Auger's Delay*. The auger's motor is stopped when the feed line is loaded. The following steps describe the whole process.

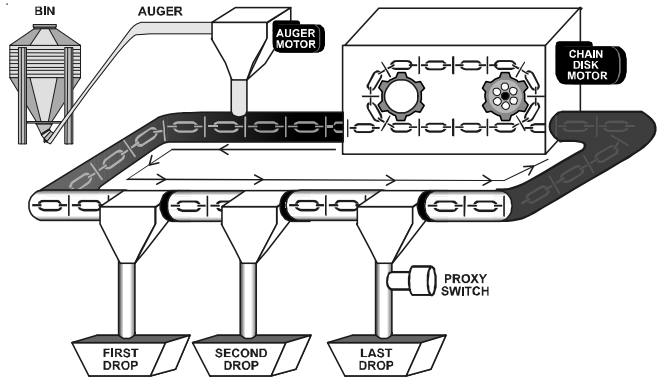


1. The auger's screw brings feed into the feed line;
2. The feed line gets loaded and the chain disk reaches its *Max. Current Consumption*. The auger's motor is then stopped.
3. The chain disk keeps running regularly. Feed evacuates from the feed line.
4. The chain disk motor's current consumption decreases as the feed load decreases. When the current consumption is below *Max Current Consumption - Window Size*, the auger's operation is resumed and feed starts being delivered again into the feed line.

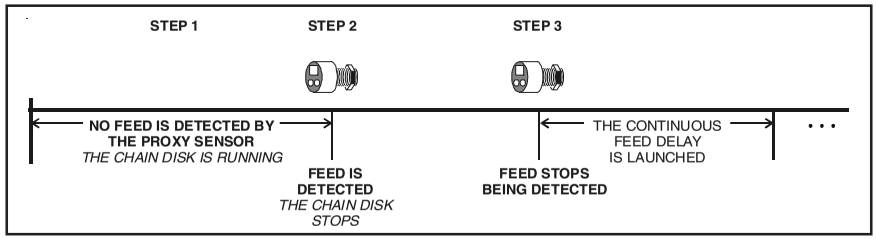
Refer to section 5.4 to set auger's parameters.

4.3 CHAIN DISK OPERATION

The controller has two different ways of operating the chain disk system depending on the location of the Proxy Switch. The proximity sensor can either be located in the last drop or directly mounted on the feed line tube.



OPERATING MODE 1: IF THE PROXY SWITCH IS LOCATED IN THE LAST DROP:



Step 1 The chain disk motor runs continuously when as no feed is being detected by the Proxy Switch;

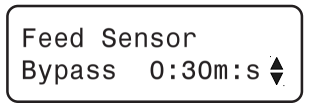
Step 2 The chain disk motor stops when the Proxy Switch detects feed for 5 seconds without interruption. The feed line is now loaded. The controller waits for the feed line to empty.

Step 3 The Proxy Switch stops detecting feed. The *Continuous Feed Delay* is launched. The controller waits for the end of this delay before restarting the chain disk system.

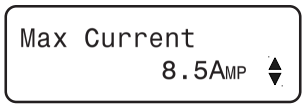
Step 4 The chain disk motor restarts (back to Step 1)

- **If the Proxy Switch is mounted on the feed line tube**
  (Feed Sensor Bypass Delay > 0 second):
  The *Continuous Feed Delay* is the time period that is required to empty the feed line.

5. **Feed Sensor Bypass**
   Delay over which the chain disk runs right after the *Continuous Delay*. Set the bypass delay to 0 second if the Proxy Switch is located in the last drop. The bypass delay can be adjusted from 0 to 30 minutes.

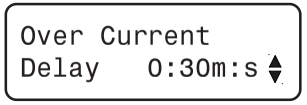
6. **Maximum Current**
   Select the maximum allowable current that can be consumed by the feeder motor. Adjustable from 1 to 14 Amp.

7. **Window Size**
   This is the current difference, below the *Max. Current* , at which the auger motor restarts. The auger motor restarts at*: Max Current - Window Size.* It can be adjusted from 0.5 to 3.0 Amp.

8. **Over Current Delay**
   An alarm is set off when the chain disk motor's current consumption exceeds the *Maximum Current* limit for this delay. The *Over Current Delay* can be adjusted from 30 seconds to 15 minutes.

9. **Auger's Delay**
   The auger starts running when this delay has elapsed, right after the chain disk's start-up (once the *Continuous Delay* has elapsed). Adjustable from 0 to 60 minutes.

5.4 INSTALLATION SETUP

The following section describes how to customize the controller for your particular application. Normally, this setup needs to be done only once.

1. Use the menu select buttons to select the INSTALLATION main menu.

   A password may be required to access this menu.

   By default, the password is set to 6-1-0.

```
Enter password
06  01  00
```

The following parameters are presented below in the order they appear on the display. To modify a parameter, press MODIFY button then use the arrow keys to change it. When you are finished adjusting a parameter, press MODIFY button once again to validate the new value and return to the display mode. Press the down-arrow key to move to the next parameter.

2. **Use Password**

   Select **"Yes"** to enable a password; this password is used to restrict the access to the following menus: Installation, Feed cycles & Manual Mode menus.

```
Use password?
              Yes▼
```

3. **Proxy Switch Status**

   Choose the normal status of the proximity switch relay: Normally Open (NO) or Normally Closed (NC).

```
Proxy Switch
 Normally Open ▲▼
```

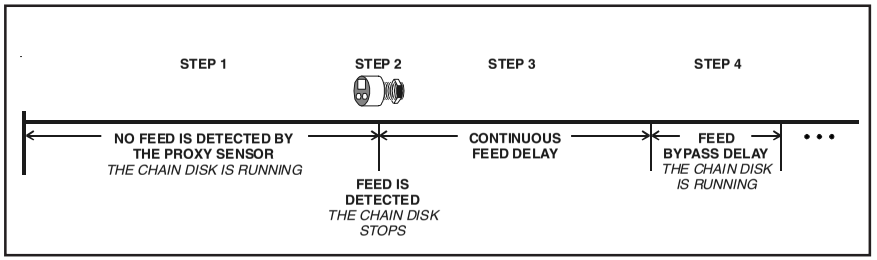
4. **Continuous Feeding Delay**

   The *Continuous Delay* has a different utility depending on the location of the Proxy Switch. In both cases, the delay can be adjusted from 1 minute to 23 h 59 m.

```
Cont. Feeding
Delay     0:30 ▲▼
```

- **If the Proxy Switch is located in the last drop:**
  (Feed Sensor Bypass = 0 second):
  The *Continuous Feed Delay* is the time period that is required before restarting the chain disk once feed stops being detected.

OPERATING MODE 2: IF THE PROXY SWITCH IS MOUNTED IN THE FEED LINE TUBE:



Step 1 The Proxy Switch does not detect feed: the chain disk motor runs continuously;

Step 2 The Proxy Switch detects feed for 5 seconds without interruption: the chain disk motor stops; the feed line is now loaded.

Step 3 The *Continuous Feed Delay* is launched. This delay is required to empty the feed line.

Step 4 Once the *Continuous Feed Delay* has elapsed, the chain disk motor restarts during the *Feed Bypass Delay.*

Step 5 **If feed is detected by the Proxy Switch:** the *Continuous Feed Delay* is relaunched (back to Step 3).

If no feed is detected by the Proxy Switch: the chain disk motor restarts (back to Step 1)

NOTE THAT THE WHOLE FEED DISTRIBUTION PROCESS IS STOPPED WHEN AN ALARM IS ACTIVE!

5.1 CONTROLLER STATUS

This menu indicates the controller's status. The following pieces of information can be displayed:

- The chain disk is in manual mode;
- A countdown before the chain disk stops (shut down delay);
- The current that is consumed by the chain disk's motor.

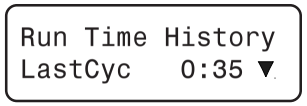
The alarm acknowledgment must also be performed from this menu (refer to section 5.6 for further information about the alarms). The controller automatically returns to this menu after 4 minutes of inactivity.

- Use the menu select buttons to select the STATUS main menu.
- Use the arrow keys to scroll the display.

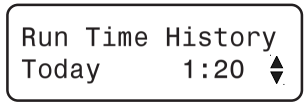
5.2 RUN TIME HISTORY

The APCD-300 keeps a daily history of the chain disk's run times. The run times are kept in memory for the past 6 days.

- Use the menu select buttons to select the RUN TIME HISTORY menu. The total run time of the last cycle is displayed.

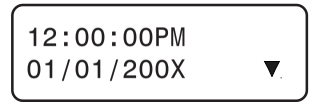


- Use the down-arrow key to scroll the display. The chain disk run times of the past 6 days are displayed.



5.3 SETTING THE TIME & DATE

- Use the menu select buttons to select the TIME / DATE menu. The actual time and date are displayed.



- Press MODIFY. The hours flash on the display. Use the arrow keys to set the hours to the proper value.
- Press MODIFY once again. The minutes flash on the display. Use the arrow keys to set the minutes to the proper value.
- Press MODIFY once again. The seconds flash on the display. Use the arrow keys to set the seconds to the proper value.
- Press MODIFY. The day flashes on the display. Use the arrow keys to set the day to the proper value.
- Press MODIFY once again. The month flashes on the display. Use the arrow keys to set the month to the proper value.
- Press MODIFY once again. The year flashes on the display. Use the arrow keys to set the year to the proper value.