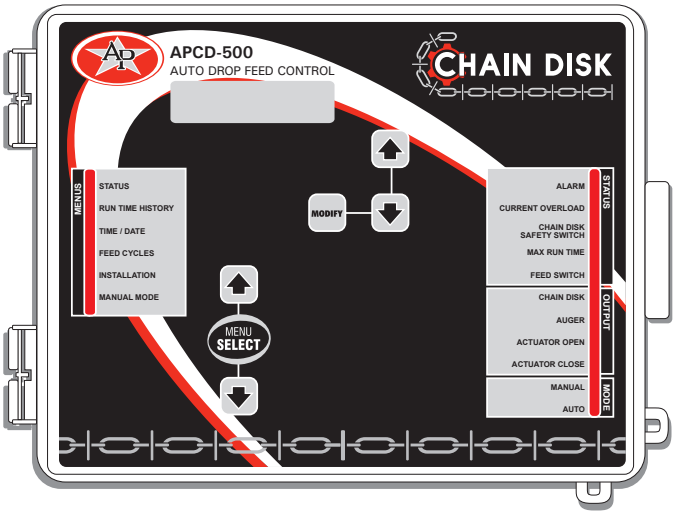
APCD-500

Chain Disk controller

User's manual



Manufacturer
Thevco Electronics
5200, Armand-Frappier
St-Hubert (Qc)
Canada J3Z 1G5

WARNINGS

The warranty can be void if this product is used in a manner not specified by the manufacturer.

Every effort has been made to ensure that this manual is complete, accurate and up-to-date. The information contained in it is however subject to change without notice due to further developments.

TABLE OF CONTENTS

1. INTRODUCTION 5
1.1. Precautions 5
1.2. Symbols of the Manual 5

2. USER INTERFACE 6
2.1. Location of the Controls 6
2.2. Adjusting a Parameter 7

3. MOUNTING INSTRUCTIONS 7
3.1. Mounting the Controller on the Wall 7
3.2. Connections 7

4. CONTROLLER OVERVIEW 8
4.1. Features 8
4.2. Chain Disk System Setups 8
4.2.1. Cascade Setup 8
4.2.2. Independent Chain Disk Systems with a Common Auger 9
4.2.3. Independent Chain Disk Systems with Individual Augers 9
4.3. Feed Distribution Modes 10
4.3.1. Timed Feed Distribution 10
4.3.2. Continuous Feed Distribution 10
4.4. Filling Process 11
4.4.1. Filling Cascaded Chain Disk Systems with Continuous Feed Distribution Mode 13
4.4.2. Filling Cascaded Chain Disk Systems with Timer Mode 15
4.4.3. Filling Independent Chain Disk Systems with a Common Bin Auger using Continuous Feed Distribution Mode 18
4.4.4. Filling Independent Chain Disk Systems with a Common Bin Auger using Timer Mode 20
4.4.5. Filling Independent Chain Disk Systems with Individual Bin Augers Using Continuous Feed Distribution Mode 23
4.4.6. Filling Independent Chain Disk Systems with Individual Bin Augers Using the Timed Feed Distribution Mode 25
4.5. Feed Delivery Process 28
4.6. Feed Cycle 28

5. PARAMETER SETTINGS 29
5.1. Controller Status 29
5.2. Run Time History 29
5.3. Time & Date 30
5.4. Feed Cycle Settings 30
5.5. Run Time Settings 32

5.6. Installation Setup 32
5.7. Manual & Test Modes 37
5.7.1. Manual Filling of the Chain Disk Systems 37
5.7.2. Manual Start / Stop 37
5.7.3. Bypassing a Chain Disk System 38
5.7.4. Manual Dump 38
5.7.5. Toggle Switch 39
5.7.6. Test Mode 39
5.8. Alarms 40
5.8.1. Acknowledging an alarm 40

6. TECHNICAL SPECIFICATIONS 41

7. TRANSFER MENU 42
7.1. Communication Speed 42
7.2. Screen Contrast 42
7.3. Update/Backup with a USB drive 42

ANNEX 1: CORE CARD 44

INDEX 45

1. INTRODUCTION

1.1. Precautions



WARNING: Read and save these instructions!

Safety may be jeopardized if the equipment is used in a manner not specified by the manufacturer. Carefully read and keep the following instructions for future reference.

Although fuses at the input and outputs of the controller protect its circuits in case of an overload or over-voltage, 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). Indoor use only!

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

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not spray water on the controller! In order to clean the control, wipe it with a damp cloth.



Before servicing or cleaning unit, switch power off at service panel and lock the switch disconnecting means to prevent power from being switched accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

1.2. Symbols of the Manual



Warning. Read the following text carefully; it contains important information which, if ignored, may cause the controller to operate improperly.



High Voltage. Hazard of electrical shock. Read the message and follow the instructions carefully.



Pay attention. The following text contains very useful information.



Double insulation.



Both direct and alternating current (AC/DC).



Direct current (DC).



Alternating current (AC).

For Customer Use: Enter below the serial number located on the side of the alarm system and keep this information for future reference.

Model:	APCD-500
Serial number:	_____
Date installed:	_____

2. USER INTERFACE

2.1. Location of the Controls

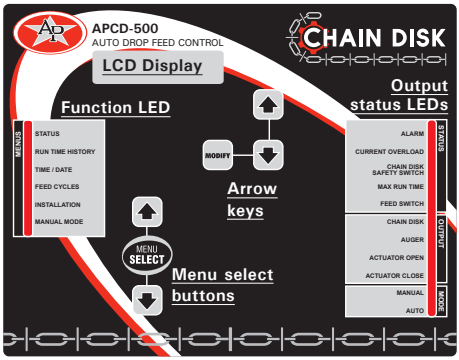
LCD Display — The LCD display on the left gives the current readings and parameters to be adjusted when you select a function. It automatically displays the STATUS menu after 4 minutes of inactivity.

Arrow keys — The arrow keys next to the LCD display are used to scroll down the parameters on screen. They are also used to change the value of the parameters inside editing pop-up menus.

Output Status LEDs — The table below gives the meaning of each output status pilot light :

Function LED — This pilot light shows what function is selected on the main menu.

Menu Select Buttons — These buttons are used to select a function from the main menu.



LED	MEANING
Alarm	Turns on when an alarm is detected. The Chain Disk stops operating until the alarm is acknowledged.
Current Overload	Turns on when the amperage draw of the master Chain Disk exceeds the Max Current limit for the *Overload Delay* or flashes when this situation happens with a slave Chain Disk. Fix the problem and then acknowledge the alarm to restart the system.
Chain Disk safety switch	Turns on when the drive unit of the Chain Disk has reached its safety switch; flashes when this occurs to a slave Chain Disk (APCD-500-S).
Max run time	Turns on when the run time of the Chain Disk exceeds the *Max Run Time* parameter value (only if a proximity sensor is used); flashes when this occurs to a slave Chain Disk (APCD-500-S).
Feed switch	Turns on when the proximity sensor detects feed. Flashes during the Feed Bypass Delay.
Chain disk	Turns on when the master Chain Disk System is running.
Auger output	Turns on when the bin auger is running; flashes during the Auger Delay.
Actuator open	Turns on when the dumps are opened.
Actuator close	Turns on when the dumps are closed.
Manual mode	Turns on when an output is manually controlled.
Automatic mode	Turns on when the automatic control mode is active.

2.2. Adjusting a Parameter

Use the arrow keys to select the parameter that needs to be adjusted. When it is selected, press MODIFY to display the pop-up window for adjusting the parameter. Now, use the arrow keys to modify the parameter's value and then press the MODIFY button again to validate the change.

3. MOUNTING INSTRUCTIONS

3.1. Mounting the Controller on the Wall

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.



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.

- Do not install rigid conduit into electrical knockouts. Only nylon cable glands are permitted for cable or wire fastening.

- The controller has no power-on switch. An external switch or circuit breaker shall be included in the building installation to interrupt power to L and N electric power lines. 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 Chain Disk motor (L1/L2 POWER IN) shall be no larger than 20 A.

- Wire gage used for mains supply (L1/L2 POWER IN) and Chain Disk 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 15 A.

- Wire gage used for Flex-Flo auger motor shall be at least 14 AWG.

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

4. CONTROLLER OVERVIEW

4.1. Features

The APCD-500 controls the feed entry into Chain Disk Systems and the distribution of feed to the animals. When used in combination with APCD-500-S auxiliary units, this controller can control up to 8 Chain Disk Systems.

Due to its great number of options, the APCD-500 controller can suit most Chain Disk setups:

- Timed or continuous feed cycles;
- With or without proximity sensors.
- With or without actuators / air valves to open the drops;
- With commun or individual bin augers;
- With one or multiple Chain Disk Systems;
- With cascade or independent Chain Disk setups.

4.2. Chain Disk System Setups

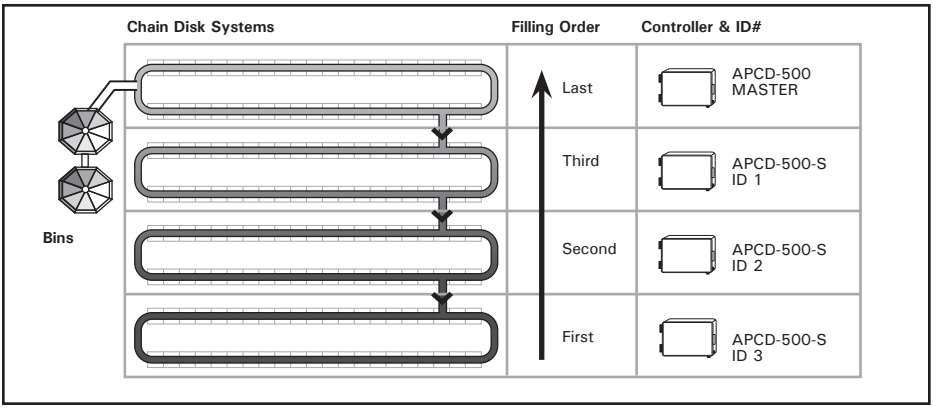
Up to 7 slave units (APCD-500S) can be used to drive additional Chain Disk Systems. These supplementary Chain Disk Systems can share common bin augers, they can be linked together, or they can operate independently one from another. The following section explains the three possible Chain Disk System setups that can be managed by the controller. Refer to the Installation Setup chapter to select your specific Chain Disk System setup.

4.2.1. Cascade Setup

In this setup, all Chain Disk Systems are connected together and share a common bin auger. When this auger starts bringing feed into the Chain Disk Systems, all drive units start running to send feed towards the farthest Chain Disk System (APCD-500-S unit with the highest ID number). When the farthest Chain Disk System is full, the feed fills the preceding Chain Disk System, etc.

Refer to sections 4.4.1 & 4.4.2 to get information about the filling process in this Chain Disk System setup.

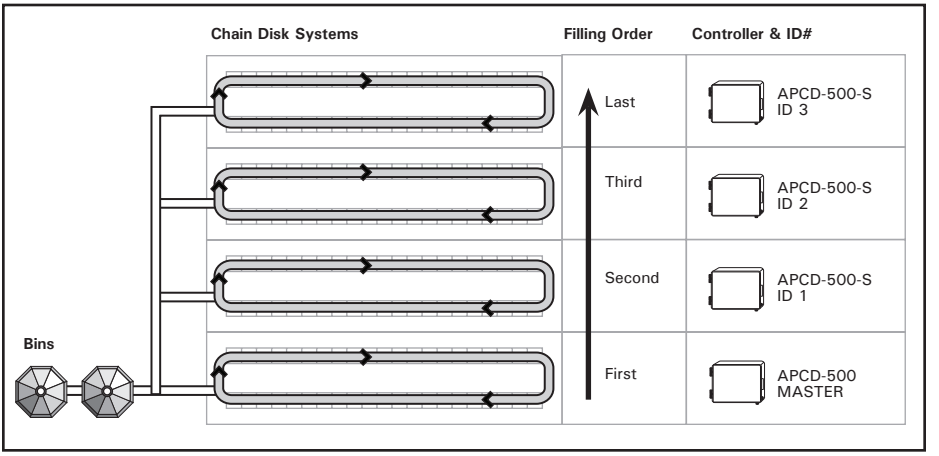
Cascade Setup



4.2.2. Independent Chain Disk Systems with a Common Auger

Independent Chain Disk Systems that share a common bin auger are filled following the numerical order: the master Chain Disk System is filled first, followed by Slave System #1, Slave System #2, etc.

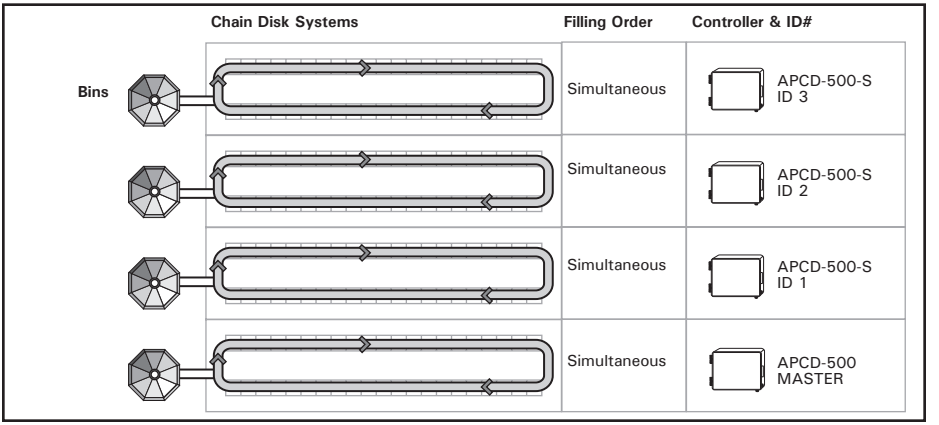
Refer to section 4.4.3 & 4.4.4 to get information about the filling process in this Chain Disk System setup.



4.2.3. Independent Chain Disk Systems with Individual Augers

Independent Chain Disk Systems that all have their own bin auger are being filled simultaneously when a feed cycle starts. Each Chain Disk System filled according to its respective parameter settings.

Refer to section 4.4.4 & 4.4.5 to get information about the filling process in this Chain Disk System setup.



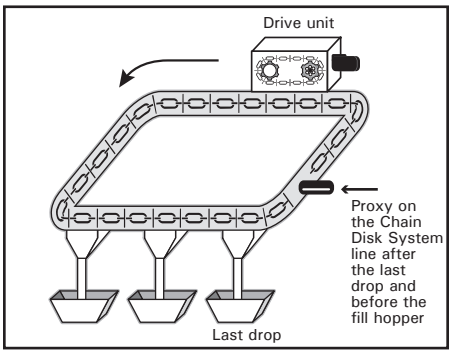
4.3. Feed Distribution Modes

4.3.1. Timed Feed Distribution

When feed is distributed according to a timer, the user chooses at what time the Chain Disk Systems start being filled and at what time feed starts being delivered to the animals. Up to daily 25 feed cycles can be programmed. Refer to section 5.6 to enable the timed feed distribution method.

Location of the optional proximity sensor in timer mode

When feed is distributed according to a timer, a proximity sensor can be used to stop the Chain Disk Systems when feed is detected (see illustration). One proximity sensor must be located at the end of each Chain Disk System.



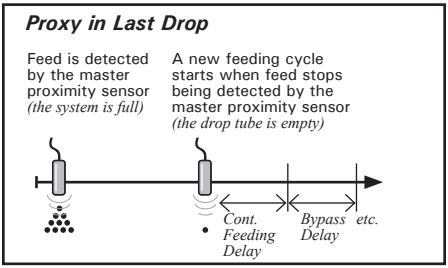
4.3.2. Continuous Feed Distribution

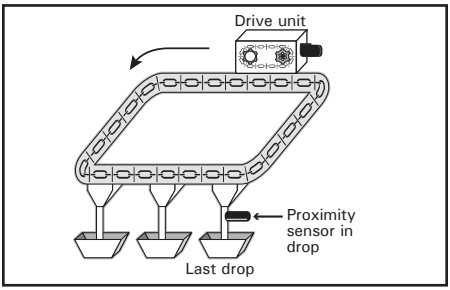
The continuous feed distribution mode ensures the system is always full: the bin auger starts bringing feed into the Chain Disk System as soon as it gets empty. In this operating mode, the proximity sensor can either be mounted in the last drop or on the Chain Disk System line after the last drop and before the fill hopper.

Refer to section 5.6 to specify the location of the proximity sensor.

Continuous Mode — Proximity sensor in the last drop

If a proximity sensor is located **in the last drop** of the Master Chain Disk System, the system is considered as being **full** when the proximity sensor detects feed. Once the system is full, the controller waits for drop tube to empty out before launching a new feed cycle (the drop tubes are considered as being **empty** when the proximity sensor **stops** detecting feed).



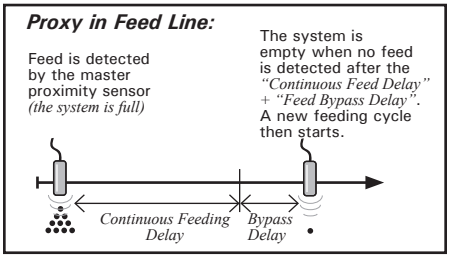


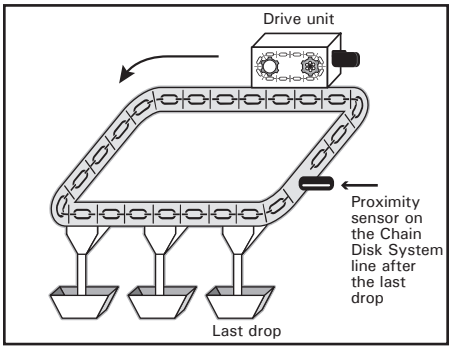
Continuous Mode — Proximity sensor on the Chain Disk System Line after the Last Drop

If the proximity sensor is located on the Chain Disk System line after the last drop, the system is considered as being full when the master proximity sensor detects feed. At that moment, the controller launches the *"Continuous Feed Delay"* (which represents the amount of time required for the animals to eat the feed). When the *"Continuous Feed Delay"* has elapsed, all Chain Disk Systems start running again during the *"Feed Bypass Delay"*.

a) If the master proximity sensor still detects feed after the *"Feed Bypass Delay"*, the controller relaunches the *"Continuous Feed Delay"* and the *"Feed Bypass Delay"* again since the system is not empty yet. This process is repeated up until the master proximity sensor stops detecting feed.

b) If no feed is detected in the master Chain Disk System after the *"Feed Bypass Delay"*, the controller restarts a new feed cycle in order to refill the whole Chain Disk.





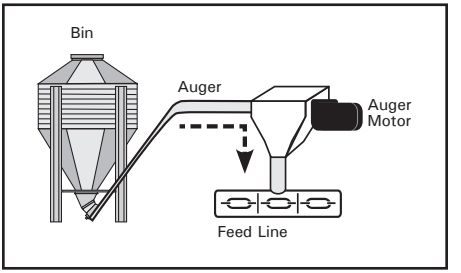
4.4. Filling Process

Operation of the Bin Auger:

At the start-up of each feeding cycle, right after the Auger's Delay has elapsed, the bin auger starts bringing feed into the Chain Disk Systems and stops when the Chain Disk System is full. There are two ways the controller can detect that a Chain Disk System is full:

1. The proximity sensor detects feed for 5 seconds without interruption;

2. The drive unit has been running for the *"Max Run Time"* parameter value (only if no proximity sensor is used).



Chain Disk Overload Protection:

The controller monitors the amperage draw of Chain Disk drive units to prevent overloading the system:

- If the amperage exceeds the limit *"Max Current Consumption"* limit, the controller temporarily shuts down the bin auger while the Chain Disk keeps running in order to discharge the feed. As the feed load decreases the amperage draw also decreases; the bin auger restarts when the current consumption gets lower than the *"Max Current Consumption - Window Size"*.

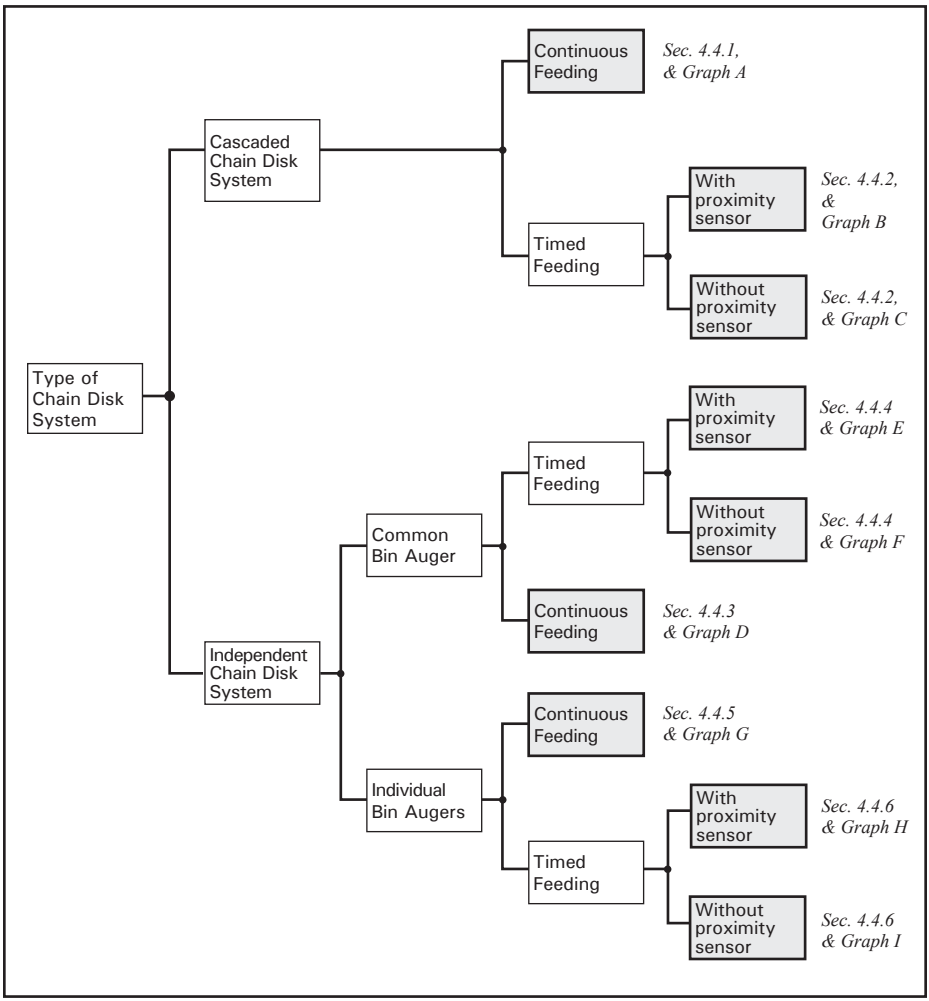
- If the amperage draw gets higher than the *"Critical Current Consumption"* for more than the *"Critical Delay"*, the system stops and will not restart.

Refer to section 5.6 to set the bin auger parameters

NOTE: The whole Chain Disk stops running when an alarm is active!

Filling Process According to the System Setup:

The filling process of Chain Disk System depends on your particular system setup. Locate your particular application setup on the hierarchy tree below and then refer to the proper section of the manual to get explanations about the filling process of the chosen option.



Possible Chain Disk Setup

4.4.1. Filling Cascaded Chain Disk Systems with Continuous Feed Distribution Mode

1. Beginning the Filling Process — The filling process starts at the end of the previous cycle (refer to point 7 below to see when a cycle ends).

2. Emptying the Chain Disk Systems — When the *"Continuous Delay"* has elapsed, the controller activates all drive units during the *"Auger Delay"* to make sure all Chain Disk Systems are empty before bringing new feed.

3. Filling the Farthest Chain Disk System — When the *"Auger Delay"* has elapsed, all drive units keep running and the bin auger starts bringing feed into the Chain Disk Systems. The feed travels through all empty Chain Disk Systems in order to reach the farthest empty Chain Disk System (i.e, the Chain Disk with the highest ID number).

4. The Farthest Chain Disk System is Full — The controller knows the farthest Chain Disk System is full when its proximity sensor detects feed for 5 seconds without interruption. When feed is detected in the farthest Chain Disk System, its drive unit stops and all other Chain Disk Systems keep on running.

5. Filling the Chain Disk Systems One by One — Each time a Chain Disk System gets full, its drive unit stops running and the previous Chain Disk System starts being filled.

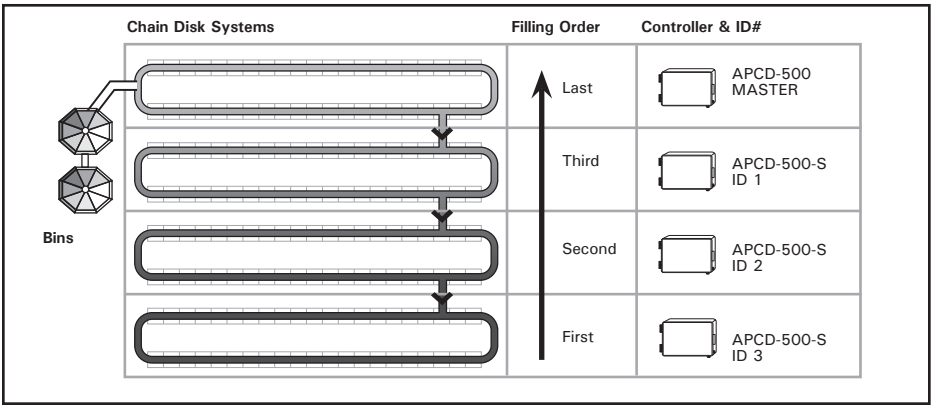
6. The Last Chain Disk System is Full — When the master Chain Disk System is full (last Chain Disk System) all drive units are off and the bin auger stops bringing feed into the system.

7. Next cycle — The next feed cycle starts when the master Chain Disk System gets empty:

a) If the proximity sensor is mounted in the last drop, the next cycle starts when the proximity sensor stops detecting feed.

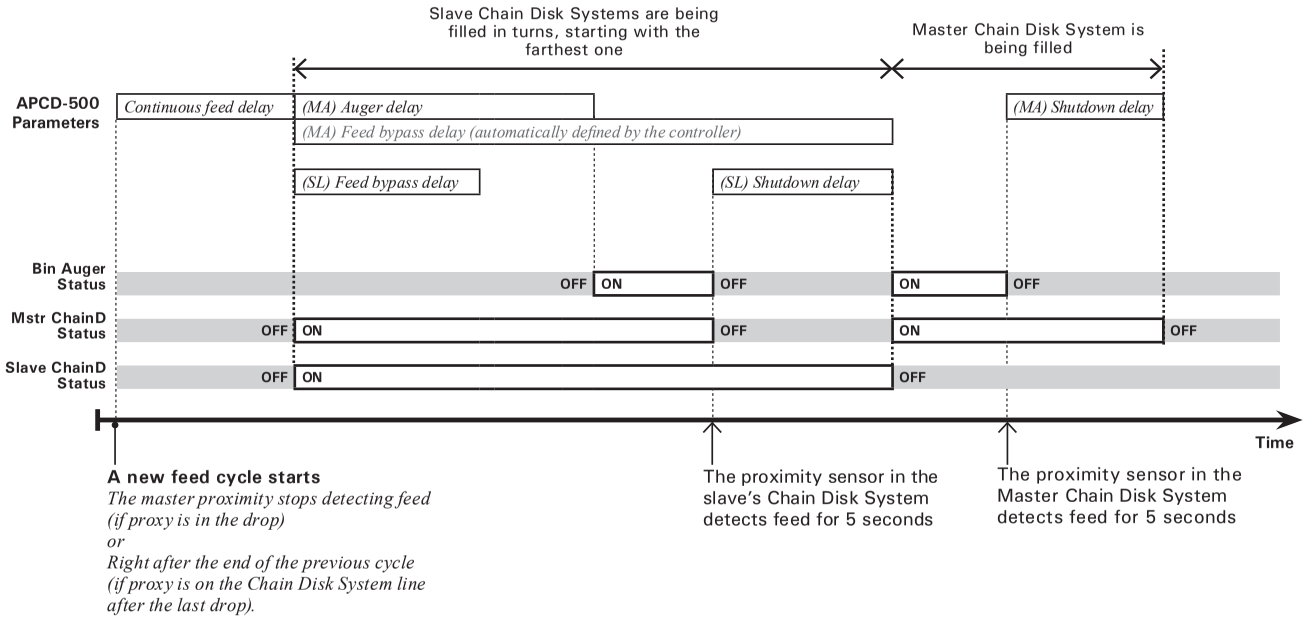
b) If the proximity sensor is located at the end of the Master Chain Disk System, the new cycle starts if no feed is detected after 2 delays: *"Continuous Feed Delay"* + *"Bypass Delay"* (the *"Continuous Feed Delay is* the amount of time required for the animals to eat the feed).

Back to step 1.



GRAPH A

Chain Disk Setup : Cascaded Chain Disk Systems
Feed Distribution Mode : Continuous
Proximity sensor? : Yes



4.4.2. Filling Cascaded Chain Disk Systems with Timer Mode

1. Beginning the Filling Process — The filling process starts at the start-up of a feed cycle (defined by the *"Cycle Time"* parameter).

2. Cleaning the Drops — If actuators are used and the *"Clean Drop"* option is enabled in the **INSTALLATION** menu, the controller opens and closes the drops 3 times in a row to evacuate feed leftovers from the system.

3. Emptying the Chain Disk Systems — To ensure all Chain Disk Systems are empty before bringing new feed, the controller activates all drive units during the *"Auger Delay"*.

4. Filling the Farthest Chain Disk System — When the *"Auger Delay"* has elapsed, all drive units keep running and the bin auger starts bringing feed into the Chain Disk Systems. The feed travels through all empty Chain Disk Systems in order to reach the farthest empty System (i.e., the Chain Disk with the highest ID number).

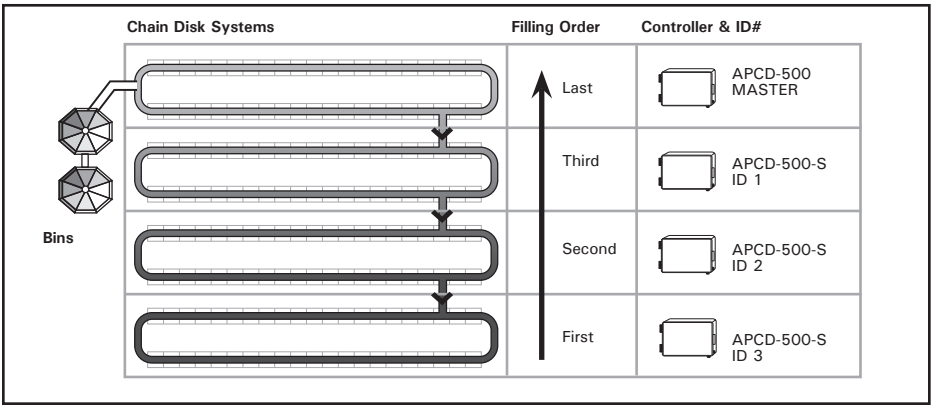
5. The Farthest Chain Disk System is Full

- **If a proximity sensor is used:** the controller knows the Chain Disk System is full when the proximity sensor detects feed for 5 seconds. When feed is detected, the controller stops the feed entry (bin auger), and stops all other drive units; the drive unit of the full Chain Disk System keeps running for the *"Shutdown Delay"* and then stops.

- **If no proximity sensor is used:** if no proximity sensor is used, the controller knows the farthest Chain Disk System is full when the drive unit of this Chain Disk System has been running for its respective *"Run Time"*. The drive unit of this Chain Disk System stops when its *"Run Time"* has elapsed.

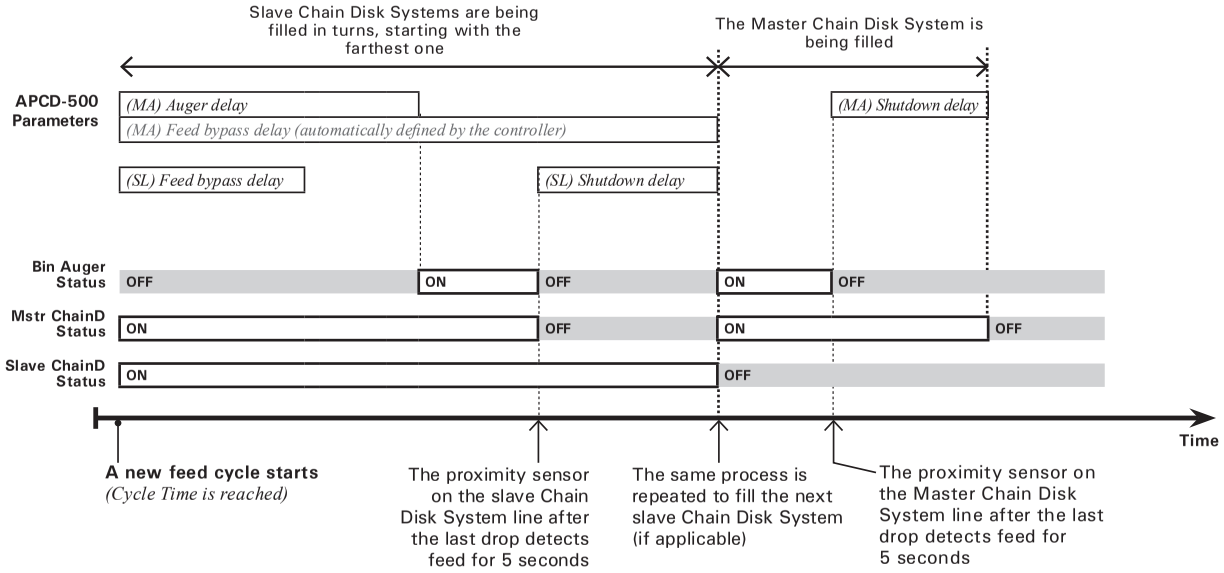
6. Filling the Next Chain Disk System — When the loaded Chain Disk System stops, the drive units of all empty Chain Disk Systems restart, and feed enters once again into the feed lines. Steps 4 and 5 are repeated up until all Chain Disk Systems are full.

7. Feed Dumping — When the Chain Disk system is fully full, feed is ready to be delivered to the animals. Step to section 4.4.



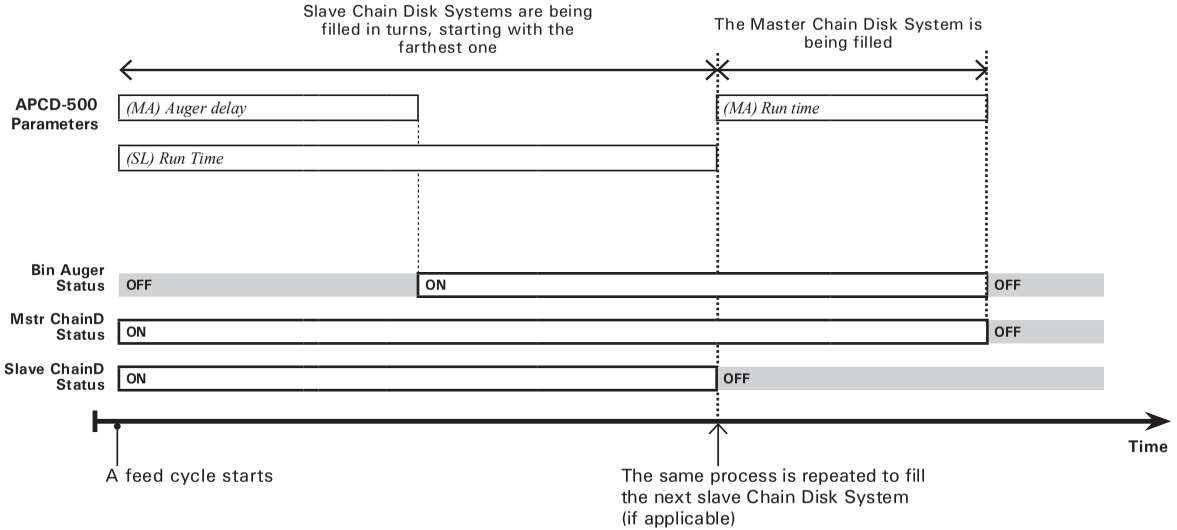
GRAPH B

Chain Disk Setup : Cascaded Chain Disk Systems
Feed Distribution Mode : Timer
Proximity sensor? : Yes



GRAPH C

Chain Disk Setup : Cascaded Chain Disk Systems
Feed Distribution Mode : Timer
Proximity sensor? : No



4.4.3. Filling Independent Chain Disk Systems with a Common Bin Auger using Continuous Feed Distribution Mode

The common bin auger must be connected to the master APCD module!

1. Beginning the Filling Process — The filling process starts at the end of the previous cycle (refer to point 7 below to see when a cycle ends).

2. Emptying the Bin Auger and Chain Disk Systems — When the *"Continuous Delay"* has elapsed, the controller activates all drive units during the *"Purge Time"* and launches the *"Auger Delay"*. When the *"Auger Delay"* has elapsed, the bin auger starts sending feed towards the Chain Disk Systems. Normally, the *"Purge Time"* must be longer than the *"Auger Delay"* to prevent feed from accumulating at the end of the bin auger.

3. Filling the First Chain Disk System — When the *"Purge Time"* is over, all drive units stop except for the first Chain Disk System to be filled: the master Chain Disk System.

4. The Chain Disk System is Full — The controller knows the Chain Disk System is full when the proximity sensor located at its end detects feed for 5 seconds without interruption. When feed is detected, the drive unit of this Chain Disk System stops.

5. Filling the Chain Disk Systems One by One — Each time a Chain Disk System gets full, its drive unit stops running and the next Chain Disk System starts being filled (Chain Disk Systems are being filled in numerical order).

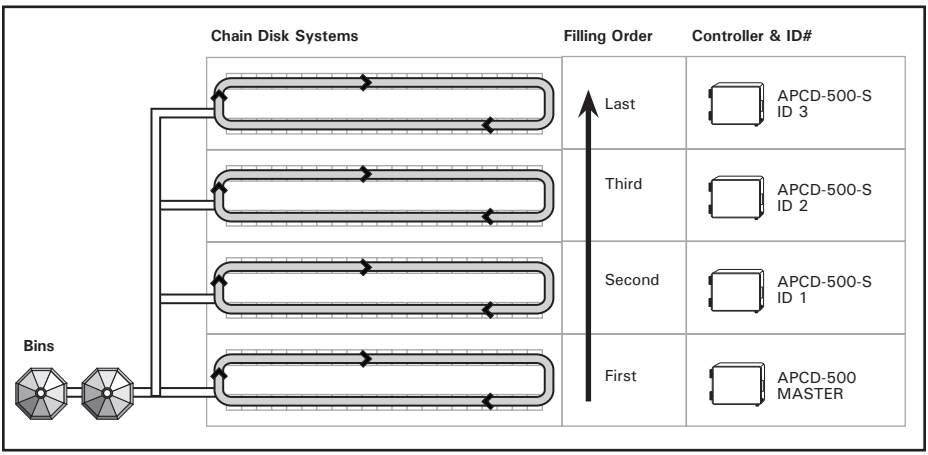
6. The Last Chain Disk System is Full — When the last Chain Disk System is full (i.e., the slave Chain Disk with the highest ID #), all drive units are off and the bin auger stops bringing feed into the system.

7. Next cycle — The next feed cycle starts when the last Chain Disk System gets empty:

a) If the proximity sensor is mounted in the last drop, the next cycle starts when the proximity sensor stops detecting feed.

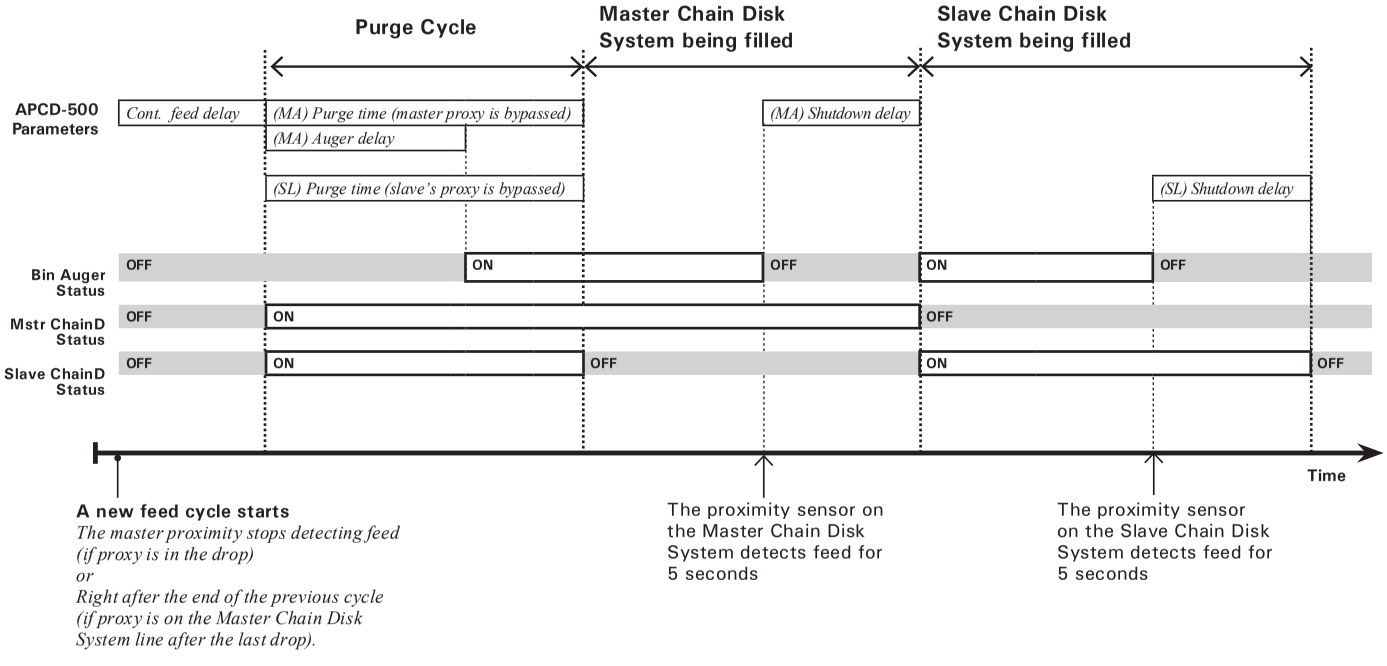
b) If the proximity sensor is on the Master Chain Disk System line after the last drop, the new cycle starts if no feed is detected after 2 delays: *"Continuous Feed Delay"* + *"Bypass Delay"* (the *"Continuous Feed Delay is* the amount of time required for the animals to eat the feed).

Back to step 1.



GRAPH D

Chain Disk Setup : Independent Chain Disk Systems
Bin Auger Setup : Common auger
Feed Distribution Mode : Continuous
Proximity sensor? : With proximity sensor



4.4.4. Filling Independent Chain Disk Systems with a Common Bin Auger using Timer Mode

The common bin auger must be connected to the master APCD module!

1. Beginning the Filling Process — The filling process starts at the start-up of a feed cycle (defined by the *"Cycle Time"* parameter).

2. Cleaning the Drops — If actuators are used and the *"Clean Drop"* option is enabled in the **INSTALLATION** menu, the controller opens and closes the drops 3 times in a row to evacuate feed leftovers from the system.

3. Emptying the Bin Auger and Chain Disk Systems — To ensure the bin auger and Chain Disk Systems are empty before bringing new feed, the controller activates all drive units during the *"Purge Time"* and launches the *"Auger Delay"*. When the *"Auger Delay"* has elapsed, the bin auger starts sending feed towards the Chain Disk Systems. Normally, the *"Purge Time"* must be longer than the *"Auger Delay"* to prevent feed from accumulating at the end of the bin auger.

4. Filling the First Chain Disk System — When the *"Purge Time"* is over, all drive units stop except for the first Chain Disk System to be filled: the master Chain Disk System.

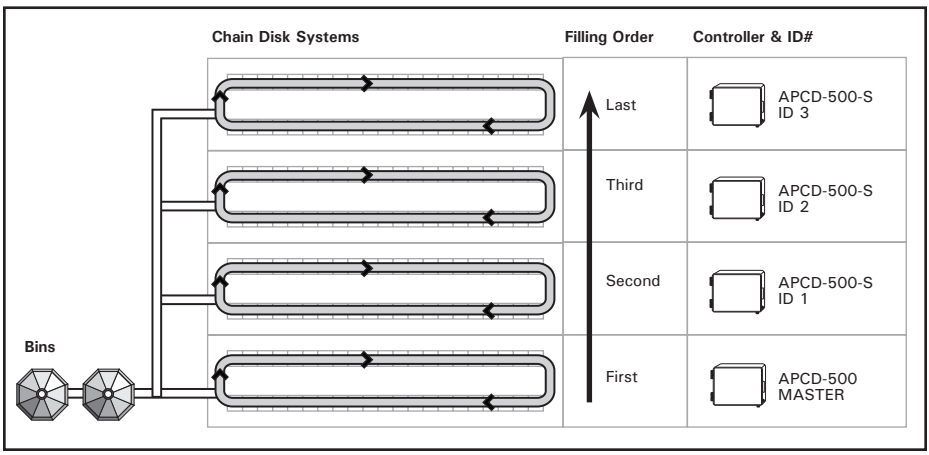
5. The Chain Disk System is Full:

- **If a proximity sensor is used:** the controller knows the Chain Disk System is full when the proximity sensor detects feed for 5 seconds. When feed is detected, the controller stops the feed entry (bin auger) and the drive unit of the loaded Chain Disk System keeps running for the *"Shutdown Delay"* and then stops.

- **If no proximity sensor is used:**
  The controller knows the Chain Disk System is full when the drive unit has been running for its respective *"Run Time"* parameter value. The drive unit of this Chain Disk System stops when its *"Run Time"* has elapsed.

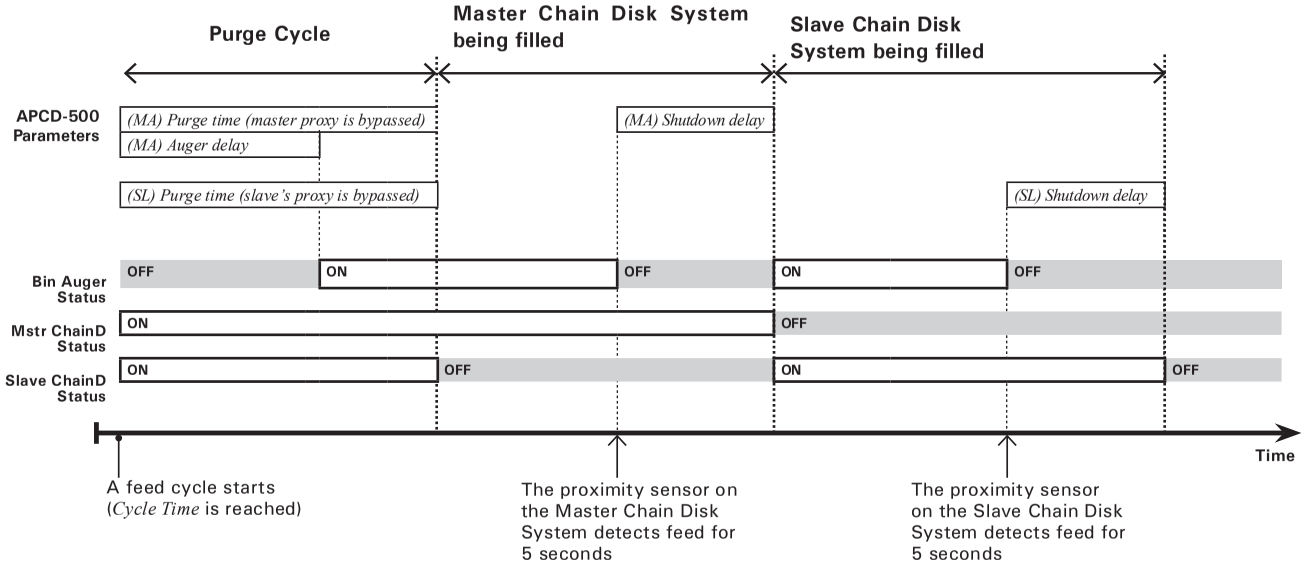
6. Loading Next Chain Disk System — When the loaded Chain Disk System stops, the next empty Chain Disk System starts running and the bin auger starts sending feed towards this Chain Disk System. Steps 4 and 5 are repeated up until all Chain Disk Systems are full.

7. Feed Dumping — When the Chain Disk system is fully loaded, feed is ready to be delivered to the animals. Step to section 4.4.



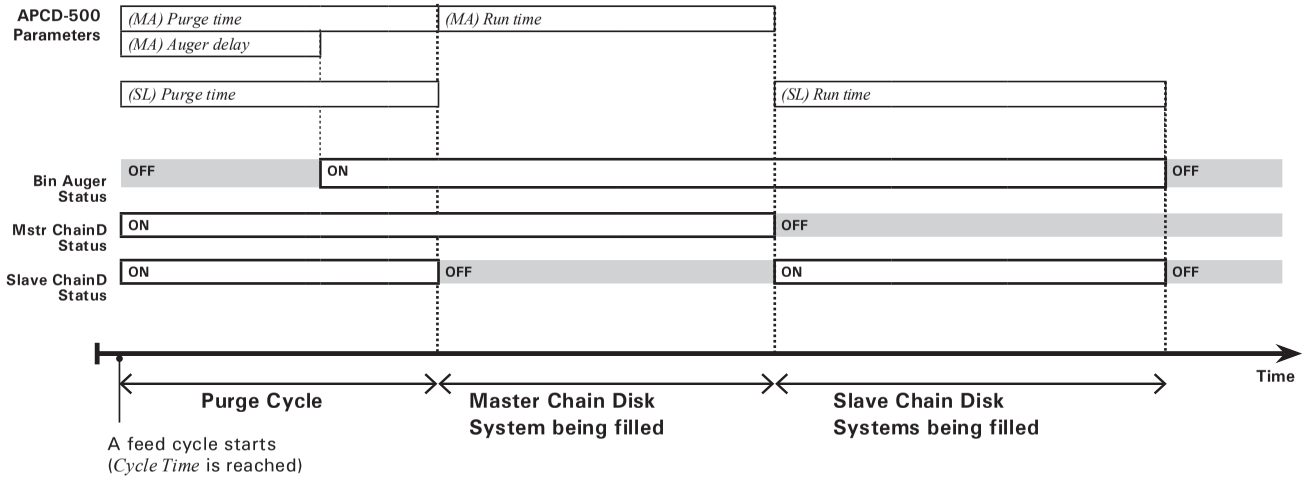
GRAPH E

Chain Disk Setup : Independent Chain Disk Systems
Bin Auger Setup : Common auger
Feed Distribution Mode : Timer
Proximity sensor? : Yes



GRAPH F

Chain Disk Setup : Independent Chain Disk Systems
Bin Auger Setup : Common auger
Feed Distribution Mode : Timer
Proximity sensor? : No, a *Run Time* is used to stop the Chain Disk System



4.4.5. Filling Independent Chain Disk Systems with Individual Bin Augers Using Continuous Feed Distribution Mode

1. Beginning the Filling Process — The filling process starts at the end of the previous cycle (refer to point 6 below to see when a cycle ends).

2. Emptying the Chain Disk Systems — When the *"Continuous Delay"* has elapsed, the controller activates all drive units during their respective *"Auger Delay"* to make sure all Chain Disk Systems are empty before bringing new feed.

3. Filling Chain Disk Systems — When the *"Auger Delay"* of a Chain Disk System has elapsed, all Chain Disk Systems keep running and start being filled by their respective bin auger.

4. A Chain Disk System is Full — The controller knows a Chain Disk System is full when the proximity sensor detects feed for 5 seconds without interruption. When a Chain Disk System is full, its respective drive unit and bin auger stop running.

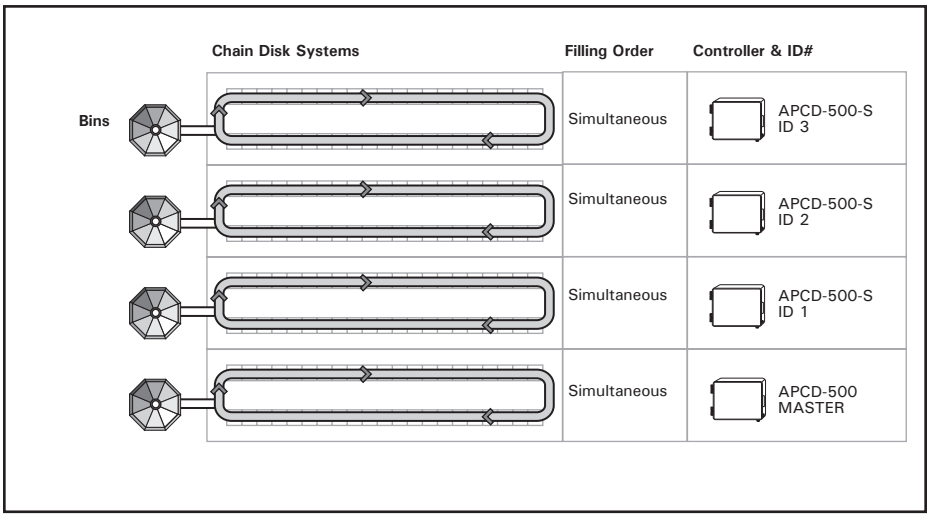
5. All Chain Disk Systems are Full — When the last Chain Disk System is full, all drive units are off and the bin auger stops bringing feed into the Chain Disk System.

6. Next cycle — The next feed cycle starts when the master Chain Disk System gets empty:

a) If the proximity sensor is mounted in the last drop, the next cycle starts when the proximity sensor stops detecting feed.

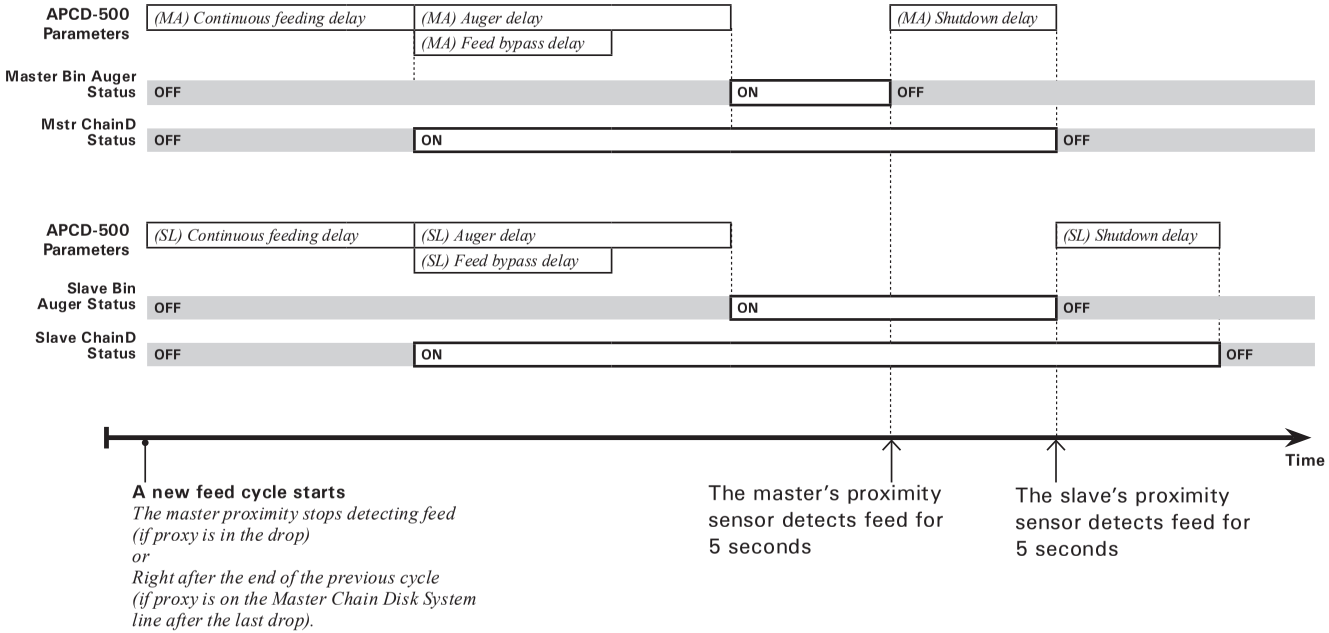
b) If the proximity sensor is located on the Master Chain Disk System line after the last drop, the new cycle starts if no feed is detected after these 2 delays: *"Continuous Feed Delay"* + *"Bypass Delay"* (the *"Continuous Feed Delay is* the amount of time required for the animals to eat the feed).

Back to step 1.



GRAPH G

Chain Disk Setup : Independent Chain Disk Systems
Bin Auger Setup : Individual augers
Feed Distribution Mode : Continuous
Proximity sensor? : Yes



4.4.6. Filling Independent Chain Disk Systems with Individual Bin Augers Using the Timed Feed Distribution Mode

1. Beginning the Filling Process — The filling process starts at the start-up of a feed cycle (defined by the *"Cycle Time"* parameter).

2. Cleaning the Drops — If actuators are used and the *"Clean Drop"* option is enabled in the **INSTALLATION** menu, the controller opens and closes the drops 3 times in a row to evacuate feed leftovers from the system.

3. Emptying Chain Disk Systems — To ensure all Chain Disk Systems are empty before bringing new feed, the controller activates all drive units during their respective *"Auger Delay"*.

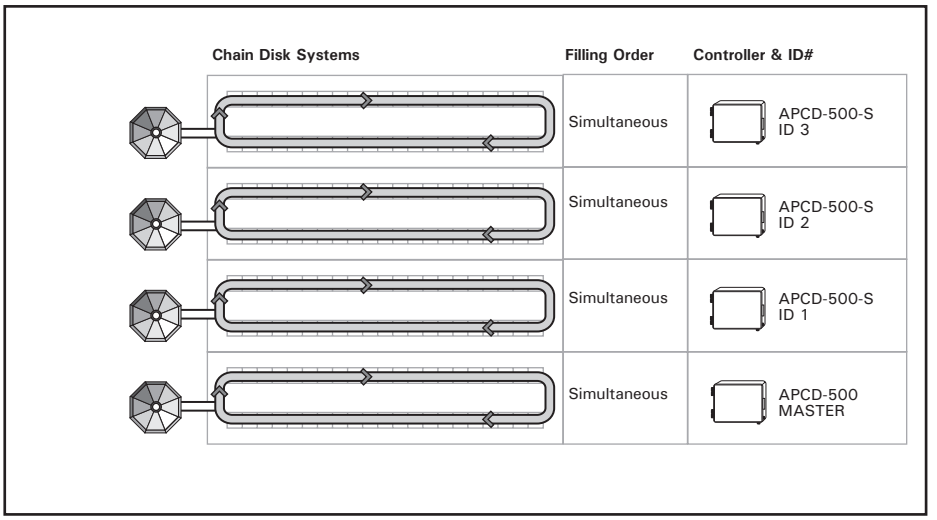
4. Filling Chain Disk Systems — When the *"Auger Delay"* of a Chain Disk System has elapsed, the Chain Disk System keeps running and its respective bin auger starts sending feed towards this Chain Disk System.

5. The Chain Disk System is Full:

• If a proximity sensor is used:
The controller knows a Chain Disk System is full when the proximity sensor detects feed for 5 seconds. When feed is detected, the controller stops the feed entry (bin auger) and the drive unit keeps running for the *"Shutdown Delay"* and then stops.

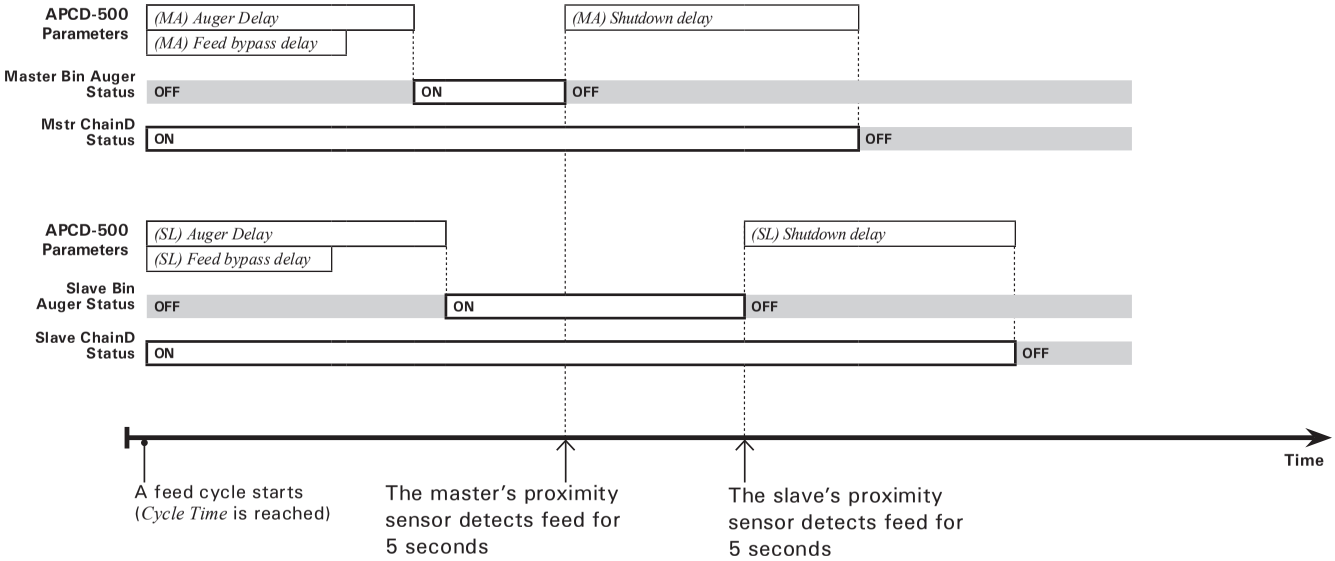
• If no proximity sensor is used:
The controller knows the Chain Disk System is full when the drive unit has been running for its respective *"Run Time"* parameter value. The drive unit of this Chain Disk System stops when its *"Run Time"* has elapsed.

6. Feed Dumping — When the Chain Disk system is full, feed is ready to be delivered to the animals. Step to section 4.4.



GRAPH H

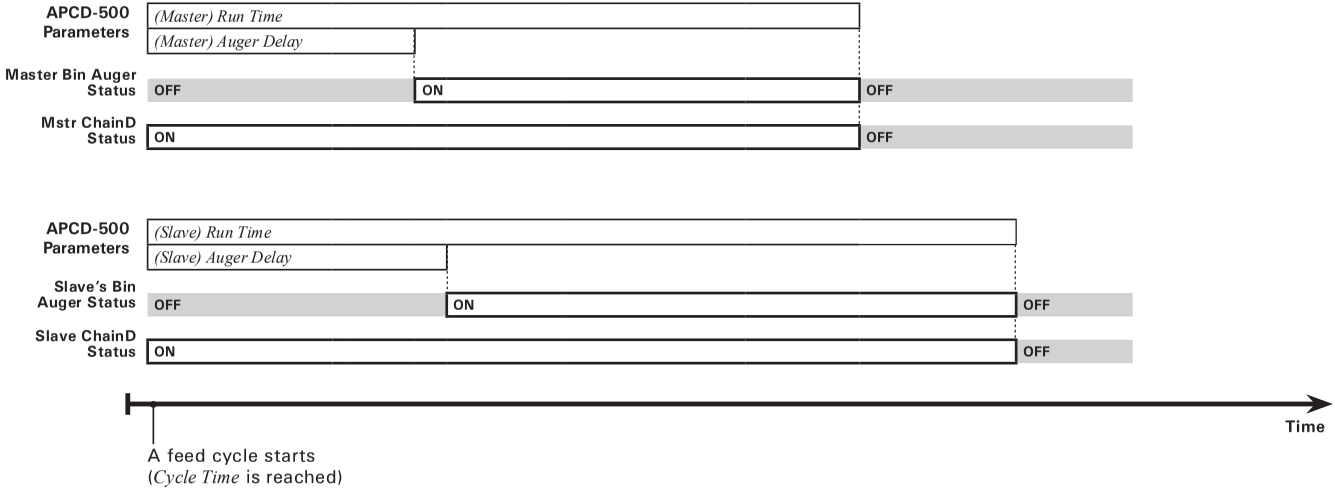
Chain Disk Setup : Independent Chain Disk Systems
Bin Auger Setup : Individual augers
Feed Distribution Mode : Timer
Proximity sensor? : Yes



GRAPH I

Chain Disk Setup : Independent Chain Disk Systems
Bin Auger Setup : Individual augers
Feed Distribution Mode : Timer
Proximity sensor? : No

INDEPENDENT MODE, INDIVIDUAL AUGER, WITH TIMER



4.5. Feed Delivery Process

After the Chain Disk Systems have been filled up, feed is ready to be delivered to the animals. This section explains how feed is dumped by actuators and air valves and how it is being delivered when no actuator/ air valve is used. Note that the actuators and air valves can only be used with the timer-based feed distribution mode and note that their parameters are common to all Chain Disk Systems in use.

Feed Delivery using Actuators:

1. The actuator opens the drops during the opening time.

2. When the opening time has elapsed, the actuator stops moving during the *"Actuator/A. Valve Delay"*;

3. When the *"Actuator/A.Valve Delay"* has elapsed, the actuator fully closes the drops during twice the opening time or until its security switch is reached.

4. End of the feed cycle.

Feed Delivery with Air Valves:

1. The air valve make the dumps open at the *"Dump Time"*;

2. The dumps remain opened during the *"Actuator/A.Valve Delay"*;

3. The air valve make the dumps close after the *"Actuator/A.Valve Delay"* has elapsed.

4. End of the feed cycle.

Feed Delivery without Actuators & Valves:

If no actuator or air valve is used, all feed that enters into Chain Disk Systems directly falls in the feeders while the Chain Disk Systems are being filled. When they are full, the feed gradually decreases in the feeders as the animals eat.

4.6. Feed Cycle

When the feed distribution is done in timer mode, the user must specify the moment at which the Chain Disk Systems must be filled and the time at which feed must be delivered to the animals. Up to 25 feed cycles can be performed each day. Refer to section 5.6 to enable the required number of cycles.

Feed Cycle Start Time:

This is the time at which each feed cycle starts.



The controller automatically adjusts the time at which the feed cycles start and the number of feed cycles in case of a programming error (i.e. if the feed cycles overlap one another or if they exceed 24 hours).

Dump Time:

If actuators or air valves are used, set the time at which the dumps must open. Make sure this dump is performed when all the Chain Disk Systems are full. The dump time should be higher than the *"Start time + Max Run Time"* of all Chain Disk Systems otherwise the controller will automatically redefine this time setting.

Run Time:

If no proximity sensor is used, a run time must be defined. This value represents the amount of time that is required to fill-up each Chain Disk System.

5. PARAMETER SETTINGS

5.1. Controller Status

The STATUS menu shows the ongoing operations of the controller. All alarms situations must also be acknowledged from this menu (refer to section 5.7 for further information about alarms). The controller automatically returns to this **STATUS** menu after 4 minutes of inactivity.

The **STATUS** menu tells you:

- if the test mode is active;
- if the manual mode is active;
- when the next feeding cycle will start;
- when the drive units will stop *(Shut Down Delay)*;
- when the actuator will stop moving;
- when the *Actuator Delay* ends.
- when the *Purge Time* ends.
- when the next dump will be performed;
- what is the amperage draw of each drive unit;

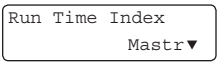
1. Use the menu select buttons to select the **STATUS** main menu.

2. Use the arrow keys to scroll the display.

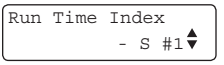
5.2. Run Time History

The controller has an history menu in which the daily run time of the Chain Disk Systems (master and Slave Chain Disk Systems) are logged in for the past 5 days.

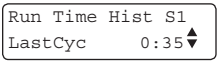
1. Use the menu select buttons to select the **RUN TIME HISTORY** menu.



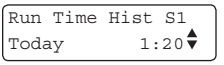
2. Press MODIFY then use the arrow keys to select the desired Chain Disk System (Mstr = master, S#x = slave #x (APCD-500S #x)



3. Press MODIFY once again to access to the run time history of the selected Chain Disk System. The run time of the last cycle performed by this Chain Disk System is displayed.

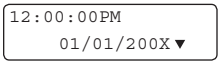


4. Use the down-arrow key to scroll the display. The daily run times of the selected Chain Disk System are displayed for the past 5 days.



5.3. Time & Date

1. Use the menu select buttons to select the **TIME** / **DATE** menu. The current time and date are displayed.



2. Press MODIFY. The hours flash on the display. Use the arrow keys to set them to the proper value.

3. Press MODIFY once again. The minutes flash on the display. Use the arrow keys to set them to the proper value.

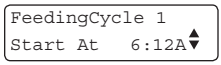
4. Press MODIFY once again. The seconds flash on the display. Use the arrow keys to set the seconds to the proper value.

5. Press MODIFY then proceed in similar fashion to set the date (dd/mm/yyyy).

5.4. Feed Cycle Settings

Refer to section 4.5 & 4.6 to get information on the feed cycles. In addition, a feed cycle worksheet is available to make it easier for you to program your feed cycles (see next page).

1. Use the menu select buttons to select the **FEED CYCLES** menu. **This menu is only available if feed is distributed according to a timer (the continuous feeding mode is disabled in the installation). A password may also be required to access this menu (see sec. 5.6).*



2. Press MODIFY. The start time of the first feed cycle flashes on the display. Use the arrow keys to adjust it to the proper value. Press MODIFY once again to validate.

3. Press the down-arrow key once. The dump time of the first feed cycle is displayed. ** This parameter is available if actuators or air valves are enabled (see sec. 5.6).*

4. Press MODIFY. The dump time of the first feed cycle flashes on the display. Use the arrow keys to adjust it to the proper value. Press MODIFY once again to validate the new value.

5. Press the down-arrow key once. The start time of the second feed cycle is displayed. Proceed in similar fashion to set the start and dump times of all feed cycles in use.



Check Feed Cycles : The controller automatically re-arranges the feed cycles in the case of a programming error. The warning message "Check Feed Cycles" is displayed in that case. The user has to validate the new feed cycle order by scrolling down the whole feed cycle menu. The warning message will then disappear.

Chain Disk System Cycle Worksheet

Feed Cycles	Start Time[1]	Chain Disk System's Maximum Run Time[2]								Full at[3]	Dump Time[4]
		Master Chain Disk	Slave Chain Disk 1	Slave Chain Disk 2	Slave Chain Disk 3	Slave Chain Disk 4	Slave Chain Disk 5	Slave Chain Disk 6	Slave Chain Disk 7		
Ex.	*09:00A*	*01:30*	*00:30*	*00:30*	*n.u.*	*n.u.*	*n.u.*	*n.u.*	*n.u.*	*11:30A*	*11:45A*
Cycle 1	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cycle 2	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cycle 3	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cycle 4	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cycle 5	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cycle 6	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cycle 7	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cycle 8	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cycle 9	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.10	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.11	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.12	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.13	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.14	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.15	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.16	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.17	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.18	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.19	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.20	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.21	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.22	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.23	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.24	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__
Cyc.25	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__	__:__

1. The *"Start Time"* of a cycle cannot overlap the cycle that preceeds (a cycle ends at its respective *"Start Time"* + *"Max Run Time"* + *"Dump Time (if applicable)"*.

2. The *"Maximum Run Time"* parameter value is common to all feed cycles.

3. The time at which all Chain Disk Systems are full corresponds to the *"Start Time"* + *"Max Run Time"* of all Chain Disk Systems.

4. Make sure the dump is performed after all Chain Disk Systems are full. The *"Dump Time"* must only be defined if actuators or air valves are enabled.

5.5. Run Time Settings

The run time parameter represents the time that is required to fill-up each Chain Disk System. It ranges from 00:01 hh:mm to 03:59 hh:mm. Refer to section 4.5 to get information about this parameter.

1. Use the menu select buttons to select the **FEED CYCLES** menu. **This menu is available if feed is distributed according to a timer (i.e., the continuous feeding mode is disabled in the installation) and if no proximity sensor is used. A password may also be required to access this menu (see sec. 5.6)).*

2. Press the down-arrow key in order to select the first run time screen display. This is the *"Run Time"* of the master Chain Disk System.

```
Chain Disk Mstr
Run Time 1:30h:m▲▼
```

3. Press MODIFY and then use the arrow keys to set this parameter to the desired value. Press MODIFY once again to validate.

4. If Slave Chain Disk Systems are used, press the down-arrow key to select the *"Run Time"* of the first slave Chain Disk.

```
APCD-500S #1
Run Time 1:30h:m▲▼
```

5. Press MODIFY and then use the arrow keys to set this parameter to the desired value. Press MODIFY once again to validate.

6. Proceed in similar fashion to set the run time of all Chain Disk Systems in use.

5.6. Installation Setup

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

Enter Password — 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. * *This parameter is available if the "Use Password" setting is set to "Yes".*

```
Enter password
06  01  00
```

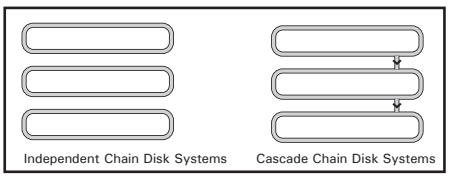
• The following parameters are presented below in the order they appear on the display. To modify a parameter, press MODIFY then use the arrow keys to change it. When you are finished adjusting a parameter, press MODIFY once again to validate the new value and return to the display mode. Press the down-arrow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

# of Slaves — Enter the number of additional Chain Disk Systems in use. Up to 7 Slave Chain Disk Systems (APCD-500-S) can be controlled.

```
# of Slaves
                2▲▼
```

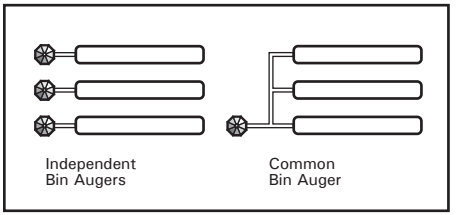
Chain Disk System setup — If Slave Chain Disk Systems are used, select the proper Chain Disk System setup: select Cascade if the Chain Disk Systems are connected together; select Independent if they are separated from one another. **This parameter is available if at least 1 slave Chain Disk is enabled above. Please refer to sections 4.2.1 & 4.2.2 for further information on these 2 setups.*

```
Chain Disk Sys.
Setup       Indep▲▼
```



Common Auger — If independent Slave Chain Disk Systems are enabled above, specify if all Chain Disk Systems have their own bin auger or if they share a common auger. **This parameter is available if at least 1 independent slave Chain Disk System is enabled above.*

```
Use Common auger
              Yes▲▼
```



Proxy Switch — Select *"Yes"* if proximity sensors are used to detect the presence of feed in the system.

```
Use Proxy
Switch?       Yes▲▼
```

Proxy Switch Status — Choose the normal contact status of all proximity sensors in use: Normally Opened (NO) or Normally Closed (NC). **This parameter is available if proximity sensors are enabled.*

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

Feed Sensor Bypass — When a feed cycle starts, some feed leftovers from the previous cycle are likely to remain. The *"Feed Sensor Bypass Delay"* allows ignoring the presence of these leftovers at the beginning of a feed cycle. Set this delay separately for each Chain Disk System in use: Mstr = Master Chain Disk System, S1,= Slave 1, S2,= Slave 2, etc. It ranges from 0 to 30 minutes. ** This parameter is available if a proximity sensor is enabled above and if the system does not use the common bin auger.*

```
Feed Sensor Mstr
Bypass   0:30m:s▲▼
```

Continuous Feeding / Timed Feeding — Select *"Yes"* to use the continuous feeding mode; select *"No"* to use timed feed distribution (see sec. 4.3). **The controller automatically enables the proximity sensor when the continuous feeding mode is enabled.*

```
Continuous
Feeding?      No▲▼
```

Proxy Switch in Drop Tube ? — This parameter tells where the proximity sensor is located when using the continuous feed distribution mode. Select *"Yes"* if it is mounted in the last drop tube to be filled in each Chain Disk System or select *"No"* if it is located on the Chain Disk System line after the last drop and before the fill hopper. * *This parameter is available if the "Continuous feeding" and "Use Proxy" options are enabled.*

```
Prox Switch in
drop tube?    No▲▼
```

Continuous Feeding Delay — This delay is exclusively used in the continuous feeding mode. Depending on the location of the proximity sensor, this delay takes a different meaning (see below). * *This parameter is available if the continuous feeding mode is enabled above.*

1. If the proximity sensor is mounted in the last drop tube to be filled in each Chain Disk System, the *"Continuous Feeding Delay"* tells when to start a feed cycle from the moment the drop tube is empty (no feed is detected in the last drop).

2. If the proximity sensor is mounted on the Chain Disk System line after the last drop and before the fill hopper, the *"Continuous Feeding Delay"* is an estimation of time it will take for the animals to eat the feed.

The main difference between both possibilities is that in the first case, the system is considered as being empty when the proximity sensor stops detecting feed; in the second

case, it is considered empty after a user-defined delay (after Continuous Feeding Delay).

Set the continuous delay to the desired value. (Please refer to section 4.3.2 for further information about the continuous distribution mode).

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

Feed Dump : Actuators / Air valves — Select *"Actua"* to enable feed dumps that are controlled by an actuator; select *"Valve"* to enable feed dumps that are controlled by an air valve; select *"None"* to disable feed dumps. ** This parameter is available if feed distribution is based on a timer (if the continuous feeding mode is disabled above).*

```
Feed dump use
             Actua
```

Clean Drops — This function allows cleaning the drops at the very beginning of each feed cycles: the controller uses the *"Actuator Open Time"* parameter to open and close the drops 3 times in a row in order to evacuate feed leftovers from the system.

```
Clean Drops ?
              Yes
```

Actuator Open Time — This is the amount time required for the actuator to open the dumps. It ranges from 0 to 120 minutes. ** This parameter is available if the actuator is enabled above.*

```
Actuator Open
Time      3:00m:s
```

Actuator / Air Valve Delay — This is the amount of time the dumps remain opened. It ranges from 0 to 60 minutes.

```
Actuator/A.Valve
Delay     3:00m:s
```

Use Act. Security Switch — Select *"Yes"* if the actuator has a security switch. ** This parameter is available if the actuator is enabled above.*

```
Use Act.Security
switch?        No
```

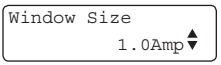
Maximum Current of the Master Chain Disk System — Select the maximum allowable current that can be consumed by each Chain Disk System. This parameter ranges from 1 to 10 Amp. (Mstr = Master Chain Disk System, S1,= Slave 1, S2,= Slave 2, etc.) **See recommended settings on Table 1.*

```
Max Current Mstr
             6.0Amp
```

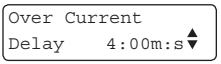
Chain Disk Motor		Recommended Settings				
				Max Current		
Type	Voltage	Recommended number of loops through current sensor	Window size	New blue gearbox (1.5HP or 2HP motors)	Old grey gearbox (2HP motors only)	Critical Amp
Single phase, 60 Hz	208 - 230	1	1.0	6.0	9.0	2 amps over Max Current setting
Single phase, 50 Hz	190 - 230	1	1.0	6.0	9.0	
Three Phase, 60Hz	208 - 230	2	1.5	8.0	9.0	
	460	3	1.0	6.0	7.0	
Three Phase, 50Hz	190	2	1.5	9.0	10.0	
	203	2	1.5	8.0	10.0	
	380	3	1.0	7.0	9.0	

Table 1: Recommended Settings as a Function of Gearbox Type

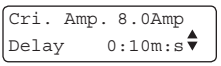
Window Size — This parameter is used to restart a drive unit that was stopped due to an over current condition. The drive unit restarts when its amperage draw becomes lower than its respective *"Max Current Consumption - Window Size"*. The window size is common to all drive units and ranges from 0.5 to 3.0 Amp. **See recommended settings on Table 1.*



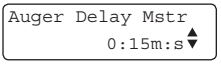
Over Current Delay — An alarm sets off when the amperage draw of a drive unit exceeds its respective maximum current limit for this amount of time. The over current delay is common to all drive units and ranges from 30 seconds to 15 minutes.

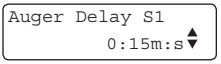


Critical Amperage Draw & Delay — Specify the critical amperage level and the maximum amount of time this level can be maintained before the system stops. The Critical amperage draw ranges from 6 to 15Amp and the delay ranges from 0 to 2 minutes. To prevent damage to the motor and to the electronic components of the controller, we recommend limiting the delay to 4 seconds or less.**See recommended settings on Table 1.*

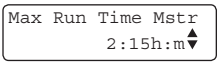


Auger Delay — When a feed cycle starts, the activation of the bin auger is postponed until the end of this delay. This allows emptying the Chain Disk Systems before bringing new feed into the system. If all Chain Disk Systems have their own bin augers, set this delay separately for each Slave Chain Disk System. The auger delay ranges from 0 to 60 minutes.

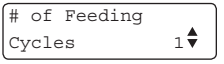




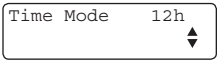
Max Run Time — This is the maximum allowable running time of a Chain Disk System. The controller sounds an alarm when the continuous run time of a Chain Disk System exceeds the *Max Run Time* limit of this Chain Disk System. Set this parameter separately for each Chain Disk System in use (Mstr = Master Chain Disk System, S1,= Slave 1, S2,= Slave 2, etc.). It ranges from 00:01 hh:mm to 03:59 hh:mm.



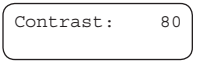
# of Feeding Cycles — Activate the proper number of daily feed cycles. Up to 25 cycles can be activated. ** The controller automatically restrain the number of feed cycles so that no cycle overlaps another. Refer to sec. 5.4 to set the feed cycles.*



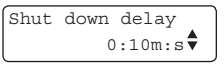
Time Mode — Select the desired time display format: 12h or 24h mode.



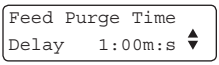
Contrast — Set the contrast of the LCD screen to the desired value (from 10 to 100%).



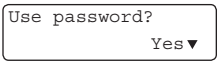
Shut Down Delay — When a proximity sensor detects feed at the end of a Chain Disk System, the controller stops the feed entry (bin auger) and launches the *"Shutdown Delay"* before stopping the drive unit. This delay ranges from 0 to 10 minutes. Set this parameter separately for each Chain Disk System in use (Mstr = Master Chain Disk System, S1,= Slave 1, S2,= Slave 2, etc.) ** This parameter is available if proximity sensors are enabled above.*



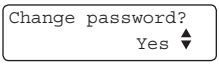
Feed Purge Time Delay — The *"Feed Purge Delay"* is the amount of time required for feed lines to get empty when a common auger is used. Note that the *"Purge Delay"* must be higher than *"Auger Delay"*. Set this parameter to the desired value. * *This parameter is available if many Chain Disk Systems are sharing a common bin auger.*



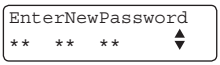
Use Password — Select *"Yes"* to enable a password; this password is used to restrain the access to the Installation and Feed Cycle menus.



Change password? — Select *"Yes"* if you wish to modify the controller's password then press the down-arrow key. **This parameter is available if the password option is enabled above.*

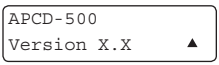


1. Press MODIFY. The first two digits of the password flash on the display.



2. 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.

Version — This is the current version of your controller.



5.7. Manual & Test Modes

The manual mode allows activating manually the actuators, air valves and drive units.

5.7.1. Manual Filling of the Chain Disk Systems

It is possible to fill some Chain Disk Systems without waiting for a feed cycle to start. When this manual start-up is performed, the Manual Mode pilot light turns on and the controllers activates the proper outputs in order to fill up the required Chain Disk System(s) (see the different filling methods in section 4.5.2). The manual filling process ends when the Chain Disk System is full.



If the user manually adds feed to a Chain Disk System while a feed cycle is ongoing, the ongoing cycle will be bypassed and replaced by the manual filling process. When the controller returns to the automatic mode, it will not resume the previous cycle but will wait for the next Dump Time (if applicable). A manual dump can also be performed (see next section). Do not forget to exit from the manual mode when the manual filling process is completed.

1. Use the menu select buttons to select the **MANUAL MODE** menu. **A password may be required to access this menu (see sec. 5.6).*

2. Before enabling the manual filling, select which Chain Disk System must be filled: press the down-arrow key to select the *"Manual Start"* parameter.

```
Manual Start
          Mastr
```

3. Press MODIFY then use the arrow keys to select the Chain Disk System that needs to be filled manually (Master Chain Disk System, All Chain Disk Systems or slave 1-7 Chain Disk Systems). Press MODIFY once again to validate. When the desired Chain Disk System is selected, activate the manual mode as shown in section 5.7.2.

5.7.2. Manual Start / Stop

You can choose to start filling a Chain Disk System or to stop it manually (as explained in previous section).

1. Use the menu select buttons to select the **MANUAL MODE** menu.* *A password may be required to access this menu (see sec. 5.6).*

2. The manual mode status is displayed on screen.

```
Feed cycles
Mode        Auto
```

3. Press MODIFY then use the arrow keys to select the desired status: select *"Start"* to enable the manual mode; select *"Stop"* to stop the Chain Disk system; select *"Auto"* to return to the automatic control mode.

5.7.3. Bypassing a Chain Disk System

If required, the controller can bypass a Chain Disk System (slave or Master Chain Disk System).



If a bypassed slave Chain Disk System shares a common bin auger with other Chain Disk Systems, the bypassed Chain Disk System will still run during the *"Purge Time"* ***at the beginning of each cycle.***

1. Use the menu select buttons to select the **MANUAL MODE** menu. **A password may be required to access this menu (see sec. 5.6).*

2. Press the down-arrow key to select the status menu of the desired Chain Disk System. ** This parameter is available if at least 1 slave Chain Disk System is enabled.*

```
APCD-500  Master
Status Auto/Bypas
```

```
APCD-500S #1
Status Auto/Bypas
```

3. Press MODIFY then use the arrow keys to select the desired status (Auto /Bypass). Press MODIFY again to validate.

5.7.4. Manual Dump

The actuator/air valve can only be activated manually when no drive unit is running. The Manual Mode pilot light flashes while an actuator or air valve is controlled manually.

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

Press the down-arrow key to select the manual mode status of the actuator. ** This parameter is available if the actuator is enabled (see sec. 5.6).*

```
Actuator
Mode:        Auto
```

2. Press MODIFY then use the arrow keys to select the desired status (Auto /Open /Stop/ Close). Press MODIFY again to validate. ** The answer is validated after 8 seconds.*

3. Press the down-arrow key once. The manual mode status of the air valve is displayed. ** This parameter is available if the air valve is enabled (see sec.5.6).*

4. Press MODIFY then use the arrow keys to select the proper status (Auto/Open/ Close). Press MODIFY again to validate.** The answer is validated after 8 seconds.*

5.7.5. Toggle Switch

A toggle switch can be connected to the main board. This switch allows stopping the drive unit of the master Chain Disk System and stopping bin augers manually, without sounding the *Chain Disk is Not Running* alarm until the next feed 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 controller. Shut off the circuit breaker for servicing and maintenance.

5.7.6. Test Mode

The test mode allows simulating the amperage draw of all drive units in order to verify the controller's performances.

1. Use the menu select buttons to select the MANUAL MODE menu.

2. Press the down-arrow key to select the amperage draw display of the drive unit of the master Chain Disk System or of a slave Chain Disk System.

3. Press the down-arrow key to select the amperage draw of the selected drive unit.

4. Press MODIFY then use the arrow keys to set the simulated current consumption. Press MODIFY to validate. * *The answer is validated after 8 seconds.*



Do not forget to exit from the test mode when tests are completed.

5.8. Alarms

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

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 this light.

5.8.1. Acknowledging an alarm

1. Use the menu select buttons to select the **STATUS** menu. The current alarm acknowledgment menu is displayed.

2. Press MODIFY. The acknowledgment status flashes on the display.

3. Press the up-arrow key to acknowledge the alarm then press MODIFY to validate. The alarm is now acknowledged.

Alarm Messages	Meaning
Actuator is not closed	The actuator security switch has not been reached after the *Closing Time* (this type of alarm can only occur if the actuator security switch is enabled).
Actuator is not opened	The actuator security switch is still detected after the *Opening Time* (this type of alarm can only occur if the actuator security switch is enabled in the installation).
APCD-500-S #x comm alarm	Communication is disrupted between the main controller and an APCD-500-S slave module ID# x.
Chain disk is not running	The amperage draw of the master Chain Disk System is lower than 0.5 A.
Current overload	The amperage draw of the master Chain Disk System exceeded its *Maximum Current Consumption* limit for the *Over Current Delay*.
Current overload APCD-500-S #x	The amperage draw of slave Chain Disk ID System # X exceeded the *Maximum Current Consumption* limit for the *Over Current Delay*.
Max run time	The running time of the master Chain Disk drive unit exceeded the *Max.Run Time* parameter value.
Max run time APCD-500-S #x	The running time of slave Chain Disk System ID #X exceeded the *Max.Run Time* parameter value.
Critical Amp	The amperage draw of the master Chain Disk System exceeded its *Critical Amp.* limit for the *Critical Delay*. All Chain Disk Systems stop running when this type of alarm is on.
Critical Amp APCD-500-S #X	The amperage draw of slave Chain Disk System ID # X exceeded the *Critical Amp.* limit for the *Critical Delay*.
Chain disk safety switch	The safety switch of the master Chain Disk System has been reached.
Chain disk safety switch APCD-500-S #X	The safety switch of slave Chain Disk System ID #X has been reached.

6. TECHNICAL SPECIFICATIONS

Type.....APCD-500

Main supply fuse F1..... F1A, 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 Vdc max

Auger motor .....230Vac/1HP max, 115Vac/1/2HP max

Internal contactor.....230Vac / 2HP max

Nema Code Letter: .....A to L max

Full-load amps (FLA): .....13A max

Locked rotor amps (LRA): 170A max



Running a motor with higher ratings could result in potential controller damages and/or fire. If the Nema Code Letter is not available, exclusively use the LRA ratings!

Actuator/Air valve..... 230Vac max, 5A max

Trouble light.....500W max, 115VAC

Installation category.....Category 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 only!

7. TRANSFER MENU

7.1. Communication Speed

1. Simultaneously press and hold the MENU SELECT up- and down-arrow keys for 5 seconds to display the transfer menu.

```
1. MemoryCard -> Control
2. Control -> MemoryCard
3. Update Firmware
4. Save EventBuffer
5. Comm speed
6. Contrast
```

2. Choose **5. Comm Speed** and press MODIFY.

3. Set the communication speed to the right value: select the high speed mode if the controller uses the A-BOX communication system or select the low speed if it uses AGNET.

4. Press MODIFY to validate the new value.

5. Simultaneously press and hold the MENU SELECT up- and down-arrow keys for 5 seconds to exit from the transfer menu.

7.2. Screen Contrast

1. Simultaneously press and hold the MENU SELECT up- and down-arrow keys for 5 seconds to display the transfer menu.

2. Choose **6. Contrast** and press MODIFY.

3. Set the contrast of the LCD screen to the desired value.**The contrast can also be adjusted in the setup menu on some controllers.*

4. Press MODIFY to validate the new value.

5. Simultaneously press and hold the MENU SELECT up- and down-arrow keys for 5 seconds to exit from the transfer menu.

7.3. Update/Backup with a USB drive

The USB drive allows upgrading the firmware or software of your controller. It can also be used to make a backup of your controller settings or to copy these settings on another controller of the same type.

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

1. Turn off power to the controller.

2. Lift the latch to open the front door of the controller.

3. Insert the USB drive in the connector behind the front door.

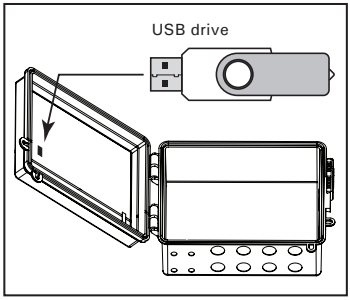


Figure 1 : USB Connector

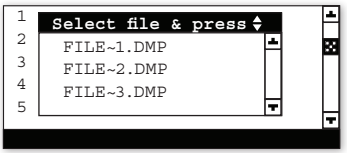
4. Close the front cover and reapply power to the controller.

5. Simultaneously press and hold the MENU SELECT up- and down-arrow keys for 5 seconds to display the transfer menu.

```
1. MemoryCard -> Control
2. Control -> MemoryCard
3. Update Firmware
4. Save EventBuffer
5. Comm speed
6. Contrast
```

1. MemoryCard -> Control

Choose **1. MemoryCard -> Control** and press MODIFY to load a new configuration file into your controller. This transfer will update your controller's software and parameter settings.

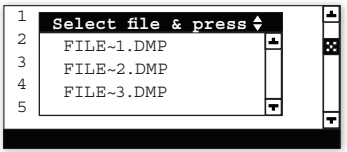


When selecting this option, a list of all configuration files located on the card is displayed (*.DMP files). Select the desired file and then press the ADJUSTMENT up- and down-arrow keys for 5 seconds to start the transfer.

Note that the controller can only read the files that are located at the root of the USB drive. It cannot access any sub-directory!

2. Control -> MemoryCard

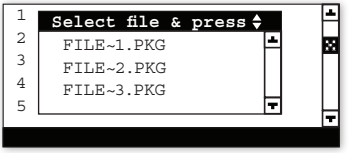
Choose **2. Control -> MemoryCard** and press MODIFY to save your controller settings on the USB drive. The saving process will start as soon as you enter this menu.



The controller will create a new CONTROLLER~1.DMP file at the root of the USB drive. If this file name already exists, it will be saved under a different name ("CONTROLLER~2.DMP" for instance). This way, the controller will never erase a file on the card.

3. Update Firmware

Choose **3. Update Firmware** and press MODIFY to download a new firmware file into your controller. This process will not affect your parameter settings.



When selecting this option, a list of all firmware files located on the USB drive is displayed (*.PKG files). Select the desired file and then press ADJUSTMENT up- and down-arrow keys for 5 seconds to start the transfer.

Note that the controller can only read the files that are located at the root of the USB drive. It cannot access any sub-directory!

4. Save Event Buffer

Choose **4. Save Event Buffer** and press MODIFY to save the event buffer of the controller on your USB card (event.txt).

Simultaneously press and hold the MENU SELECT up- and down-arrow keys for 5 seconds to exit from the transfer menu.

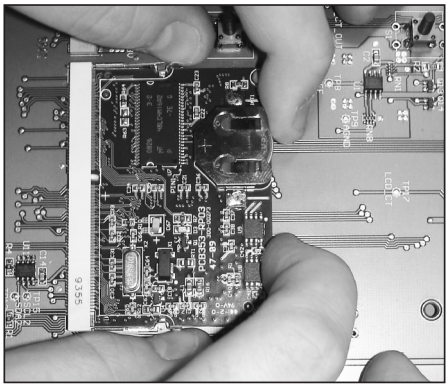
Remove the USB drive from the connector when the transfer is over!

ANNEX 1: CORE CARD

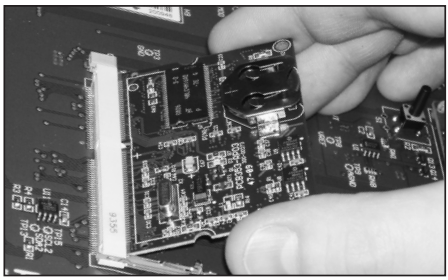
Removing a Core Card:

Before proceeding, switch power off at service panel and lock the switch disconnecting means to prevent power from being switched accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

1. Use your thumbs to move away the two metal arms that are retaining the card. While doing so, lift the card upwards with your index fingers.



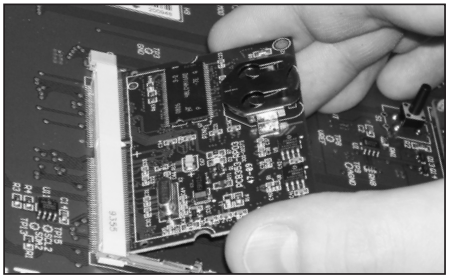
2. Pull the card out of its connector.



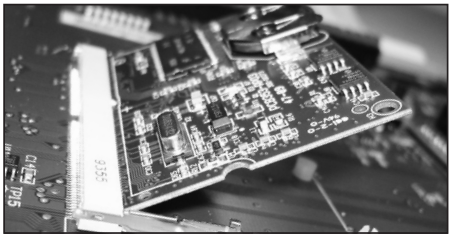
Inserting a Core Card:

Before proceeding, switch power off at service panel and lock the switch disconnecting means to prevent power from being switched accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

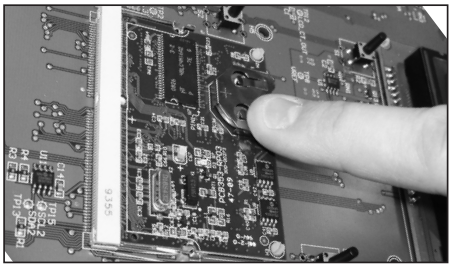
1. Give the card a 45-degree angle before inserting it in the connector.



2. Once it is inserted, the card wil stand at the 45-degree position.



3. Press on the card and make it clip to the main board.



INDEX

A

Actuator / Air valve
- Activation & settings 34
- Actuator status LED 6
- Current actuator status 29
- Dump
  - Manual feed dump 38–39
  - Principle of operation 28
  - Settings 30
- Principle of operation 28
- Security switch 34

Adjusting a parameter 7

Air valve see Actuator/Air Valve

Alarms
- Alarm conditions 40
- Status LED 6

Amperage draw see Chain Disk

Auger see Bin auger

B

Backup 42

Bin auger
- Auger status LED 6
- Principle of operation 11
- Settings 33, 35

Buttons 6

C

Card (Core) 44

Card (Memory) 42

Chain Disk System
- Amperage draw
  - Current status 29
  - Overload protection 11
  - Overload protection settings 34
  - Test mode 39
- Chain disk status LED 6
- Filling Process see Feeder setup
- Manual filling 37
- Run time
  - History 29
  - Max run time 35
  - Run time settings 32
- Safety switch
  - Status LED 6
- Setup
  - Cascade setup
    - Activation 32
    - Feeders' filling process 11, 13–15, 15, 37
    - Setup view 8
  - Independent feeders with 1 auger
    - Activation 32
    - Feeders' filling process 11, 18–20, 37
    - Setup view 9
  - Independent feeders with ind. augers
    - Activation 32
    - Feeders' filling process 11, 23–25, 37
    - Setup view 9

Communication speed 42

Connections 7

Contrast 42

Controller
- Backup 42
- Controller's description 8
- Current status 29
- Location of the controls 6
- Mounting instructions 7
- Status LEDs 6
- Update 42
- Version 36

Core card (replacement) 44

Current consumption see Chain Disk

D

Date 30

Display 6

Drive units see Chain Disk

Dumps see Actuator/ Air valve

E

Electrical specifications 41

F

Feed cycles
- Activation 35
- Feed cycle status 29
- Principle of operation 28
- Programming feed cycles 30
- Warning 30, 37

Feed distribution
Continuous mode
Activation & settings 33
Feed delivery process 28
Feeders' filling process see Feeder setup
Principle of operation 10
Settings 33
Timer mode
Activation 33
Feed delivery process 28
Feeders' filling process see Feeder setup
Principle of operation 10
Programming feed cycles 28, 30
Feeder motor see Chain Disk
Flex auger see Bin auger

H

History 29

I

Installation setup 32–36

K

Keys 6

L

LCD display
Contrast 42
Location 6
LEDs (status) 6
Limit switch see Actuator - Security switch

M

Manual mode
Activation 37
Dumping feed manually 38
Filling the feeders manually 37
Status 29
Status LED 6
Memory card 42
Menu selection 6
Motor see Chain Disk
Mounting instructions 7

P

Parameter adjustment 7
Password
Activation 36
Change the password 36
Enter a password 32
Pilot lights see also LEDs
Trouble light 40
Proximity sensor
Activation & settings 33
Feed switch status LED 6
Location
Settings 33
Visual representation 10

R

Run time
History 29
Max run time
Settings 35
Status LED 6
Run time settings 28, 32

S

Safety switch for Chain Disk
see Chain Disk safety switch
Screen
see LCD Display
Security switch for actuators
see Actuator - Security switch
Slave Chain Disk 8
Activation 32
Speed (communication) 42
Status
Current controller status 29
Status LEDs 6

T

Technical specifications 41
Test mode 39
Status 29
Time
Time and date 30
Time format 35
Toggle switch 39
Transfer menu 42
Trouble light 40

U

Update 42

USB drive 42

V

Valve see Actuator /Electric V.

Version 36

W

Warnings

Check feed cycles 30, 37

M 890-00472 rev.08

PN895-00523 REV.12