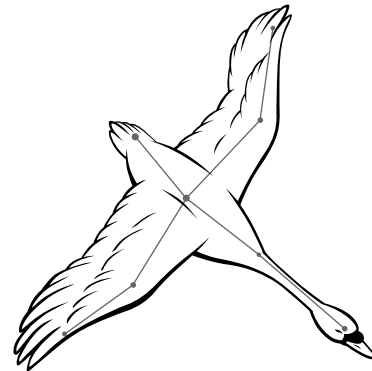# CYGNUS 8PD MANUAL CONTROL UNIT

CHAPTER 7:
THE CYGNUS 8PD
MANUAL CONTROL UNIT

INTRODUCTION

The *Cygnus 8PD Manual Control Unit* provides manual and automated control capabilities for up to eight slide projectors. In addition to the *Cygnus 8PD*, each slide projector requires a *Castor Slide Projector Interface* to convert the safe, low voltage control signals to the higher power requirements of the slide projector.

The *Cygnus 8PD* is also an *Intelligent Controller* and part of the *Universal Theater Control System* (**UTCS**). The *Cygnus 8PD* becomes a key component in a **SMPTE** driven automation system when connected to the *Hercules Central Processor* and the *Aquila Time Code Controller* via the **UTCS** communications network. The system also has manual override capabilities, and can be expanded to include up to 62 other *Intelligent Controllers*. An expanded system can provide automated and manual control for audio, video, room lighting, a star machine, and various special effects projectors.

The *Cygnus 8PD* and the other *Intelligent Controllers* in the **UTCS** are 'smart boxes' that can be periodically updated with newer internal software to enhance and/ or increase their capabilities. These upgrades are done over the **UTCS** network and can be performed by theater personnel. This means the theater can continue to expand without the need for downtime and expensive service calls.

The *Cygnus 8PD* will also accept **ASCII** text commands transmitted via serial communications cable from any computer.

CYGNUS 8PD MANUAL CONTROL UNIT

CYGNUS 8PD FRONT PANEL CONTROLS

The front panel of the *Cygnus 8PD* contains eight control clusters. Each control clusters possesses the following components.

1. The rectangular <AUTO/MAN> button located at the top of the cluster. When pressed, the control cluster toggles between automatic and manual control.

    If the button is brightly lit, it indicates the control cluster is in MANUAL MODE. Turning the knob and/ or pressing the other cluster buttons will operate the slide projector connected to the cluster. Any computer commands issued to the slide projector will be intercepted by the *Cygnus 8PD*, and a 'DEVICE IN MANUAL MODE' message will be sent back to *Hercules*.

    If the button is dim, it indicates the control cluster is in AUTO MODE. Turning the knob and/ or pressing the other cluster buttons will be ignored. Commands issued from computer will through to the associated slide projector.

2. The two round buttons labeled <FWD> and <REV> advance and reverse the slide tray when the slide projector is in MANUAL MODE. The tray will move one position in the appropriate direction for each button press. Pressing both buttons together will issue a PH (PROJECTOR HOME) command and return the slide tray to the zero position.

3. The knob controls the lamp level of the projector when the control cluster is in MANUAL MODE.

CYGNUS 8PD MANUAL CONTROL UNIT

CYGNUS REAR PANEL CONNECTIONS

The *Cygnus 8PD* has ten wedge-shaped, nine pin (**DB9**) connectors on the rear panel. All input and output connections are made here.
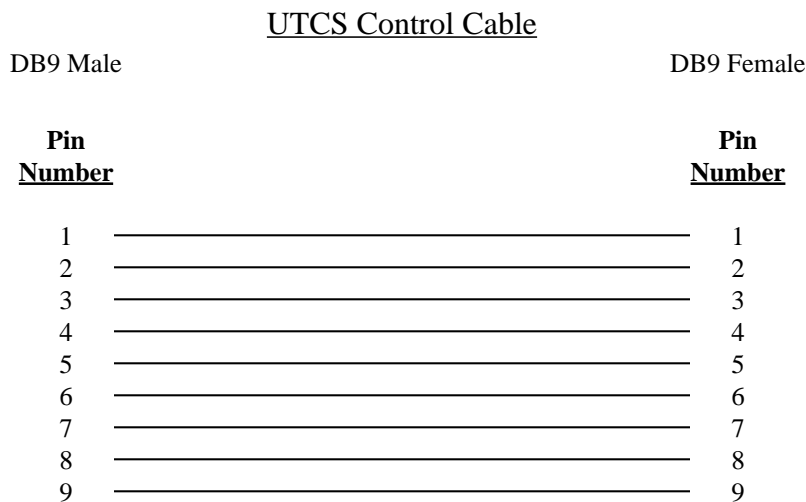
DEVICE INTERFACE CONNECTIONS

A *Castor Slide Projector Interface* may be connected to any of the eight female **DB9** *Cygnus 8PD* control channels vertically mounted on the rear panel. The control channels are labeled '**SP1**' through '**SP8**', and correspond to the similarly labeled rectangular <AUTO/MAN> buttons on the front panel. Activating the front panel controls of any control cluster affects the signals to the associated control channel.

CONTROL CABLE WIRING

Each *Cygnus 8PD* control channel connects to a *Castor* by means of a nine conductor control cable. A male **DB9** connector attaches to the *Cygnus 8PD*. A female **DB9** connector attaches to the *Castor*.

All control cables are wired straight through, with pin 1 on the male end tied to pin 1 on the female end, pin 2 to pin 2, and pin 3 to pin 3, and so on. The pin diagram is illustrated below.

UTCS Control Cable

DB9 Male   DB9 Female

Pin Number		Pin Number
1	———————————————	1
2	———————————————	2
3	———————————————	3
4	———————————————	4
5	———————————————	5
6	———————————————	6
7	———————————————	7
8	———————————————	8
9	———————————————	9

CYGNUS 8PD MANUAL CONTROL UNIT
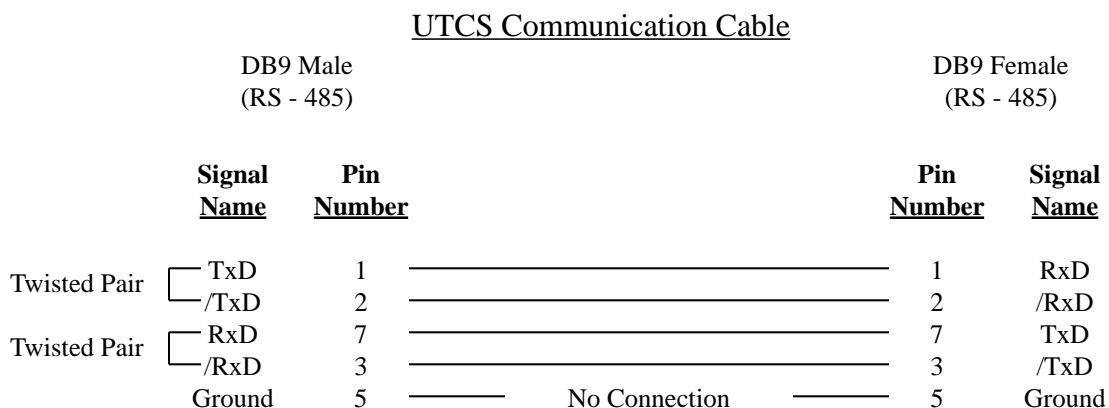
COMMUNICATION NETWORK CONNECTORS

The *Cygnus 8PD* receives commands sent from the *Hercules Central Processor* over the **UTCS** communication network. The communication network can support up to 64 *Intelligent Controllers*, and each *Cygnus 8PD* is the equivalent of two *Intelligent Controllers*. Therefore the *Cygnus 8PD* is given two unique network addresses, or **Unit Numbers**. The **Unit Numbers** are set with internal DIP switches by **ECCS** at the factory and labeled on the rear panel. Typically the *Cygnus 8PD* will be labeled '**Unit 1**' and '**Unit 2**'.

The communication network connectors are located on the *Cygnus 8PD* rear panel. There are two **DB9** connectors, a male and a female, labeled '**UTCS Communication**'. In a typical installation, the male connector will connect towards the *Hercules Central Processor*, and the female will connect towards the next *Intelligent Controller*.

COMMUNICATION CABLE WIRING

All communications are four conductor cables with a male **DB9** connector at one end and a female **DB9** connector at the other.

Communication cables are wired straight through, with pin 1 on the male end tied to pin 1 on the female end, pin 2 to pin 2, pin 3 to pin 3, and pin 7 to pin 7. For optimal performance, the wires should be twisted pairs with one pair on pins 1 and 2 and the other on pins 3 and 7. The pin diagram is illustrated below.

UTCS Communication Cable

	DB9 Male (RS - 485)				DB9 Female (RS - 485)	

	Signal Name	Pin Number			Pin Number	Signal Name
Twisted Pair	TxD	1	————————————————		1	RxD
	/TxD	2	————————————————		2	/RxD
Twisted Pair	RxD	7	————————————————		7	TxD
	/RxD	3	————————————————		3	/TxD
	Ground	5	——— No Connection ———		5	Ground

CASTOR SLIDE PROJECTOR INTERFACE

The *Castor Slide Projector Interface* provides the necessary electronics for the *Cygnus 8PD* to control a standard slide projector such as the Kodak EktaGraphic series. It turns the low voltage control signals from the *Cygnus 8PD* into the higher voltage power signals needed to operate the slide projector. In addition, the *Castor* monitors several projector attributes and relays the information back to the *Cygnus 8PD*.

The *Castor* is used to control the slide projector power, provide lamp dimming, and step the slide tray forward or reverse. When properly attached to the slide projector, the *Castor* can sense when the tray is home (at slide position zero), when the projector is ready to advance or reverse the tray, and when the lamp has failed.

The *Castor* should be placed as close to the slide projector as possible in order to minimize cable length, and maximize lamp life and brightness. Use the following procedure to install the *Castor Slide Projector Interface*.

1. Plug the slide projector power cord into the receptacle on the rear of the *Castor*.

2. Plug the seven pin **Kodak** connector from the *Castor* into the appropriate receptacle on the rear of the projector.

3. Plug the round **DIN** plug from the *Castor* into the appropriate receptacle on the rear of the projector.

    Note: It is very easy to insert this plug incorrectly. Be careful to align the indention in the round metal shroud of the plug with the key of the receptacle to insure correct connection.

    Note: If the projector does not have this connector, then this projector does not have a tray home sense switch. Simply coil the cable and place it aside. Take special note of programming precautions for projectors without home sense capabilities that will be presented later in the manual.

4. Plug the **Castor** power cord into a convenient receptacle.

    Note: The *Castor* and the *Cygnus 8PD* must be on the same electrical power phase to insure that lamp dimming will occur correctly. The easiest way to insure this is to connect the *Castor* and the *Cygnus 8PD* to the same power circuit.

5. Connect the female end of the wedge shaped 9 pin (**DB9**) control cable to the male plug on the rear of the *Castor*. The two screws can be tightened to insure that the cable will not be accidentally pulled out of the *Castor*.

7. In order to control the slide projector with the *Hercules Central Processor*, it must be defined in the theater's *Configuration File*.

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SLIDE PROJECTOR CONFIGURATION

To control a slide projector from with the *Hercules Central Processor*, the projector must be defined in the system *Configuration File*. The **Device Code** and **Device Name** are user-defined. The **Device Type** is type '**SP**'. The **Unit Number** is determined by one of the two **Unit Numbers** assigned to the *Cygnus 8PD*. The **Slot Number** will range from 1 to 4, depending on the *Cygnus 8PD* control channel.

If the *Cygnus 8PD* has been assigned '**Unit 1**' and '**Unit 2**', the possible slide projector unit and slot assignments will be as follows:

Control Channel	Unit Number	Slot Number
SP1	1	1
SP2	1	2
SP3	1	3
SP4	1	4
SP5	2	1
SP6	2	2
SP7	2	3
SP8	2	4

CONFIGURATION FILE EXAMPLE

The following example defines eight slide projectors to a Cygnus 8PD assigned '**Unit 1**' and '**Unit 2**'

```
<ALT>    (N)ew    (O)pen    (S)ave    Save(A)s    (D)elete    (P)rint    (Q)uit Editor
File: HERCMS.CFG
Dvc#   DevCode   Description          Type   Unit# Slot# Branch Bank Scrn Init Max

1      SP1       SLIDE PROJECTOR 1    SP     1     1     0      -    -    0    100
2      SP2       SLIDE PROJECTOR 2    SP     1     2     0      -    -    0    100
3      SP3       SLIDE PROJECTOR 3    SP     1     3     0      -    -    0    100
4      SP4       SLIDE PROJECTOR 4    SP     1     4     0      -    -    0    100
5      SP5       SLIDE PROJECTOR 5    SP     2     1     0      -    -    0    100
6      SP6       SLIDE PROJECTOR 6    SP     2     2     0      -    -    0    100
7      SP7       SLIDE PROJECTOR 7    SP     2     3     0      -    -    0    100
8      SP8       SLIDE PROJECTOR 8    SP     2     4     0      -    -    0    100
9                                            0     0     0      -    -    0    100
10                                           0     0     0      -    -    0    100
11                                           0     0     0      -    -    0    100
12                                           0     0     0      -    -    0    100
13                                           0     0     0      -    -    0    100
14                                           0     0     0      -    -    0    100
15                                           0     0     0      -    -    0    100
16                                           0     0     0      -    -    0    100


EDIT DEVICE CODE - Enter (1-8) alphanumeric characters (spaces are illegal).
 The first character must be alphabetic.
```

CYGNUS 8PD MANUAL CONTROL UNIT

SLIDE PROJECTOR CONTROL AND AUTOMATION

Manual control of the slide projectors is performed through the front panel controls of the *Cygnus 8PD*. Computer control is done through the *Hercules Central Processor*, provided the slide projectors are defined in the system *Configuration File*.

The *Hercules Show Control Software* is capable of controlling many different types of devices., and slide projectors are just one of those device types. The *Cygnus 8PD* tests all commands sent from *Hercules* to the defined slide projectors, and only valid slide projector commands will be executed. Invalid commands will not be executed, and the *Cygnus 8PD* will send an error message to the *Hercules Central Processor*. Any system messages are displayed in the top right section of the *Hercules* screen.

SLIDE PROJECTOR CONTROL

The *Cygnus 8PD* is capable of controlling the following slide projector functions.

        1.   Projector power cycling.

        2.   Lamp brightness and dimming capabilities.

        3.   Slide tray movement forward or reverse.

        4.   Tray home sensing, for slide projectors equipped with home sense switch.

POWER CYCLING FOR SLIDE PROJECTORS

Slide projector power is normally handled automatically by the *Cygnus 8PD*. Whenever a projector is commanded to bring up a lamp or move a tray, the *Cygnus 8PD* will automatically insure that the projector power is activated. The *Cygnus 8PD* will keep the power on as long as the projector is busy, and will keep power on until 60 seconds after the projector has gone quiescent. This automatic power cycling holds true for both automatic and manual operation.

The automatic power cycling feature can be overridden from *Hercules*. The PWRON (POWER ON) command turns the projector power on and keeps it on until a subsequent PWROFF (POWER OFF) command is issued and reactivates the automatic power cycling feature.

CYGNUS 8PD MANUAL CONTROL UNIT

TRAY CYCLING FOR SLIDE PROJECTORS

The *Cygnus 8PD* can forward or reverse a slide tray and find the tray home position from either computer or manual control.

In computer control, the *Cygnus 8PD* receives the PF (PROJECTOR FORWARD), PR (PROJECTOR REVERSE), and PH (PROJECTOR HOME) commands from the *Hercules Central Processor*. In addition, *Hercules* can issue a FS (FIND SLIDE) command to randomly access a slide in any tray position. Slide trays can also be forwarded automatically after the lamp has faded out.

If the slide projector is equipped with a home sense switch, the *Cygnus 8PD* and *Castor Slide Projector Interface* can tell whether or not a tray is in the home, or zero, position. To find the home position while in computer control, a PH (PROJECTOR HOME) command is issued. In manual control, pressing the <PROJECTOR FWD> and <PROJECTOR REV> buttons simultaneously will home the slide projector. The *Cygnus 8PD* will also try to home all slide projectors connected to it when it is first powered on.

If the slide projector does not have a home sense switch, the *Castor* DIN plug is not connected. This results in the *Castor* always thinking the slide tray is in the home position. This causes no operational problems for the system, but may require the operator to manually home the projectors when the system is powered up at the start of the day, and after any power interruptions.

Tray motion sensing is also provided by the *Castor*. The *Cygnus 8PD* tests the ready signal from the *Castor* before attempting to move the slide tray. The *Cygnus 8PD* will move the tray only if the slide projector signals that it is ready. If the projector is not ready, the *Cygnus 8PD* will remember all of the tray commands issued to the projector, and move the tray to the correct location when the projector signals it is ready.

The *Castor* receives a not ready signal from a slide projector with any of the following conditions.

      1.   The slide projector power switch is on the off position.

      2.   The slide projector is not plugged into the *Castor*.

      3.   The slide projector is in the middle of a tray cycle.

CYGNUS 8PD MANUAL CONTROL UNIT

LAMP CONTROL FOR SLIDE PROJECTORS

Under manual control, the *Cygnus 8PD* will set the lamp level according to the position of the lamp control knob on the front panel. Off is fully counter-clockwise and 100% brightness is fully clockwise.

The *Cygnus 8PD* also understands the entire set of lamp commands sent from the *Hercules Central Processor*. The functioning of most of these commands is straight forward, but others invoke automatic features when used with slide projectors. A list of all slide projector commands can be found on the next page.

Some lamp commands, such as LN (LAMP ON), use the '**Limit**' field to set the level that the lamp will ultimately attain. This allows the fade rate and the final lamp level to be set in the same command line.

Other lamp commands, such as #F (DISSOLVE OFF), invoke an automatic slide tray forwarding feature. These commands cause the slide tray to be automatically forwarded after the projector lamp has gone off.

The F#,# (FLASH LAMP) command is a special lamp command available for all lamps. Use this command to flash the slide projector lamp at regular intervals. Both on time and off time are programmable, allowing for flash fades and other unique effects. The effect is not visible unless the lamp is turned on with another lamp command.

Slide Projector Commands (Type SP)

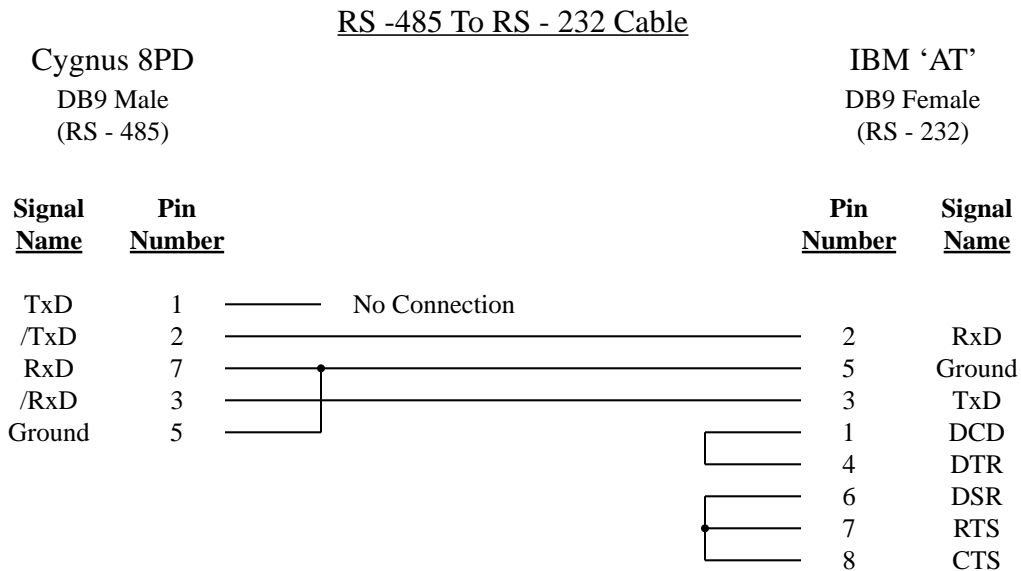| Hercules Command	Command Name	Command Description
#A	# Sec Alternate (0.1 ≤ # ≤ 999.9)	Changes state of lamp (on to off or off to on) in a ramp of # seconds duration.
#D	# Sec Dissolve (0.1 ≤ # ≤ 999.9)	Changes state of lamp in ramp of # seconds duration. Slides are advanced by one tray position at the end of the down ramp.
#N	# Sec Dissolve On (0.1 ≤ # ≤ 999.9)	Lamp dims up in a ramp of # seconds duration to a lamp level of % (**Limit**). Can be used to ramp from one % (**Limit**) to new % (**Limit**).
#F	# Sec Dissolve Off (0.1 ≤ # ≤ 999.9)	Lamp dims down in ramp of # seconds duration. Slides are advanced by one tray position at the end of the down ramp.
#FNF	# Sec Dissolve Off (No Forward) (0.1 ≤ # ≤ 999.9)	Lamp dims down in ramp of # seconds duration. Slides are advanced by one tray position at the end of the down ramp.
FA	Fast Alternate	Changes state of lamp (on to off or off to on) instantly. Slide trays are not advance when lamp turns off.
HC	Hard Cut	Changes state of lamp (on to off or off to on) instantly. Slide trays are not advance when lamp turns off.
LN	Lamp On	Turns lamp on to a level of % (**Limit**).
LF	Lamp Off	Turns lamp off. Slide trays do not advance.
FZ	Freeze	When issued during a lamp ramp, the ramp will freeze at that level. When issued again, the lamp ramp will resume.
PLMP	Pulse Lamp	Triggers ½ second lamp pulse.
F#,#	Flash Lamp #1, #2 (0 ≤ # ≤ 99)	Flashes lamp at regular intervals. **#1** represents 'on' time in system heartbeats; **#2** represents 'off' time in system heartbeats. **F0,0** disables flashing. This command is a layered command. The lamp must be ramped on with another command to see the effect. After the lamp is faded down, a **F0,0** cue must be entered to disable the flash.
FS#	Find Slide # (0 ≤ # ≤ 80)	Access slide in tray position #.
PF	Projector Forward	Advances tray position by one slide.
PR	Projector Reverse	Reverses tray position by one slide.
PH	Projector Home	Turns lamp off. Reverses tray until home sensor is reached, or until tray has been reversed 81 times.
PWRON	Power On	Activates projector power manually.
PWROFF	Power Off	Returns projector power to automatic cycling.

CYGNUS 8PD MANUAL CONTROL UNIT

USING ASCII TEXT COMMANDS TO CONTROL THE CYGNUS 8PD

In addition to using the *Hercules Central Processor* to provide automatic control capabilities for this unit, it is also possible to send **ASCII** text commands from any computer **RS-232** serial port to the *Cygnus 8PD*.

MAKING THE CONNECTION

The **UTCS** communication network connector on the rear panel of the *Cygnus 8PD* is designed for use with an **RS-485** network. An adapter cable must be constructed to connect the computer serial port to the *Cygnus 8PD* **UTCS** communication network connector. This custom cable is available from **ECCS** and the pin diagram is illustrated below.

Note: A normal or null modem serial cable will not work. Attempting to use one may damage both devices.

RS -485 To RS - 232 Cable

Cygnus 8PD		IBM 'AT'
DB9 Male (RS - 485)		DB9 Female (RS - 232)

Signal Name	Pin Number		Pin Number	Signal Name
TxD	1	No Connection		
/TxD	2		2	RxD
RxD	7		5	Ground
/RxD	3		3	TxD
Ground	5		1	DCD
			4	DTR
			6	DSR
			7	RTS
			8	CTS

Note: When connecting the *Cygnus 8PD* to a computer serial port, only one **UTCS** *Intelligent Controller* may be connected at a time. Connecting multiple *Intelligent Controllers* may damage the computer's **RS-232** serial port. The *Hercules Central Processor* must be used to control multiple *Intelligent Controllers*.

SENDING ASCII TEXT COMMANDS

Once the computer **RS-232** port and the *Cygnus 8PD* have been connected, the computer is capable of sending **ASCII** text commands to the *Cygnus 8PD*. Any version of **Windows** or **DOS** that has a terminal program, such as **HyperTerminal**, can be used to send commands to the *Cygnus 8PD*. Commands can be sent in a live mode, by typing them in at the keyboard, or a more elaborate program can be written to send the **ASCII** characters at the appropriate time.

ASCII TEXT COMMANDS

Most **ASCII** text commands are composed of two parts. The first part tells the *Cygnus 8PD* what to do, and the second part lets the *Cygnus 8PD* know which projector(s) are affected. A single command can address one, several, or all of the slide projectors connected to the *Cygnus 8PD*.

Assuming that the *Cygnus 8PD* has been assigned '**Unit 1**' and '**Unit 2**', the single characters that identify the slide projectors are as follows:

Control Channel	ASCII
SP1	A
SP2	B
SP3	C
SP4	D
SP5	E
SP6	F
SP7	G
SP8	H

ASCII TEXT COMMAND LIST

The **ASCII** text characters to be issued to the *Cygnus 8PD* are in the left column. The characters to the left of the colon represent the command issued. The characters to the right of the colon represent the slide projector(s) the command is to be issued to.

Every **ASCII** text command string must be terminated in the **ACSII** 'end of the line' character. This is the <CR> (CARRIAGE RETURN), and is represented by the decimal number 13. If typing the commands from a keyboard using a terminal program, this character is sent by pressing <ENTER> or <CTRL><M> keys. If a program is being written, the <CR> (CARRIAGE RETURN) must be added to the end of the **ASCII** command string.

Hercules Command	Command Name	Command Description
#A:ABCDEFGH	# Sec Alternate (0.1 ≤ # ≤ 999.9)	Changes state of lamp (on to off or off to on) in a ramp of # seconds duration.
#D:ABCDEFGH	# Sec Dissolve (0.1 ≤ # ≤ 999.9)	Changes state of lamp in ramp of # seconds duration. Slides are advanced by one tray position at the end of the down ramp.
#N:ABCDEFGH	# Sec Dissolve On (0.1 ≤ # ≤ 999.9)	Lamp dims up in a ramp of # seconds duration to a lamp level of % (**Limit**). Can be used to ramp from one % (**Limit**) to new % (**Limit**).
#F:ABCDEFGH	# Sec Dissolve Off (0.1 ≤ # ≤ 999.9)	Lamp dims down in ramp of # seconds duration. Slides are advanced by one tray position at the end of the down ramp.
FS#:ABCDEFGH	Find Slide # (0 ≤ # ≤ 80)	Access slide in tray position #.
PF:ABCDEFGH	Projector Forward	Advances tray position by one slide.
PR:ABCDEFGH	Projector Reverse	Reverses tray position by one slide.
PH:ABCDEFGH	Projector Home	Turns lamp off. Reverses tray until home sensor is reached, or until tray has been reversed 81 times.
PWRON:ABCDEFGH	Power On	Activates projector power manually.
PWROFF:ABCDEFGH	Power Off	Returns projector to automatic power cycling.
AUTO	Set System Auto	Sets all projectors to computer controlled operation.
MAN	Set System Manual	Sets all projectors to manual controlled operation.
HOME	Home All Devices	Performs **Projector Home** on all projectors.

CYGNUS 8PD MANUAL CONTROL UNIT

CYGNUS 8PD ERROR MESSAGES

Just like all **ECCS** *Intelligent Controllers*, the ***Cygnus 8PD*** checks all commands received from the ***Hercules Central Processor*** before attempting to execute them. If any problems are detected, command execution is terminated and an error is returned to ***Hercules Central Processor*** to be displayed on the ***Hercules*** screen. The following table lists the possible errors along with explanations of the errors and/ or suggestions to fix the problem.

POSSIBLE ERROR MESSAGES GENERATED BY HERCULES/ CYGNUS 8PD COMMUNICATIONS

Errors and Messages	Meaning	Problem or Solution
no message	The last ***Hercules*** command was good and is being executed.	No problem.
ILLEGAL SLOT	The ***Cygnus 8PD*** **Slot Number** of the device in the last command does not exist.	This is a ***Hercules Configuration File*** problem. Edit the device entry in the ***Configuration File*** and enter the correct slot #.
COMMAND/ UNIT MISMATCH	The last ***Hercules*** command was not valid for the ***Cygnus 8PD***.	This is a *Show File* problem. The programmer is using the wrong ***Hercules*** command.
COMMAND/ DEVICE MISMATCH	The last ***Hercules*** command was not valid for the Device, according to the ***Cygnus 8PD***.	This is a *Show File* problem. The programmer is using the wrong ***Hercules*** command.
ARGUMENT OUT OF RANGE	The last ***Hercules*** command included a numerical argument that is not valid for the ***Cygnus 8PD***.	This is a *Show File* problem. The programmer is using the wrong numerical value in the ***Hercules*** command.
DEVICE IN MANUAL	The last ***Hercules*** command was directed at a ***Cygnus 8PD*** device that is in MANUAL MODE.	The ***Cygnus 8PD*** must be put into AUTO MODE for that device.
COMMUNICATION FAILURE, UNIT #	***Hercules*** could not establish contact with the ***Cygnus 8PD***.	This is a ***Hercules/ Cygnus 8PD*** Communication problem. The ***Cygnus 8PD*** may be powered off. Also could be a bad cable, a bad connection, or a bad communications chip.
CHECKSUM ERROR	The last ***Hercules*** command was garbled.	This is a ***Hercules/ Cygnus 8PD*** Communication problem. Could be a bad cable, a bad connection, or a bad communications chip.