CHYRON

ccdi

Character Generator

Handbook

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Revision E

CHYRON Corporation
5 Hub Drive
Melville, NY 11747
516-845-2000

FCC Rules and Regulations

WARNING

THIS EQUIPMENT GENERATES, USES AND CAN RADIATE RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE INTERFERENCE TO RADIO COMMUNICATIONS. IT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS A COMPUTING DEVICE PURSUANT TO SUBPART B OF PART 15 OF FCC RULES, WHICH ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST SUCH INTERFERENCE WHEN OPERATED IN A COMMERCIAL ENVIRONMENT. OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE INTERFERENCE IN WHICH CASE THE USER, AT HIS OWN EXPENSE, WILL BE REQUIRED TO TAKE WHATEVER MEASURES MAY BE REQUIRED TO CORRECT THE INTERFERENCE.

Canadian RFI Requirement

WARNING

THIS DIGITAL APPARATUS DOES NOT EXCEED THE CLASS A LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS SET OUT IN THE RADIO INTERFERENCE REGULATIONS OF THE CANADIAN DEPARTMENT OF COMMUNICATIONS

LE PRESENT APPAREIL NUMERIQUE N'EMET PAS DE BRUITS RADIOELECTRIQUES DEPASSANT LES LIMITES APPLICABLES AUX APPAREILS NUMERIQUES DE LA CLASSE A PRESCRITES DENS LE REGLEMENT SUR LE BROUILLAGE RADIOELECTRIQUE EDICTE PAR LE MINISTERE DES COMMUNICATIONS DU CANADA.

CODI Limited Warranty

Thank you for purchasing Chyron's CODI product. Please take a moment to complete and return your Product Registration card. This will ensure that you receive the warranty support and appropriate update notifications.

Chyron Corporation ("Chyron") warrants (the "Limited Warranty") to the original buyer ("Customer") that the CODI product ("Product") will be free of defects in materials and workmanship for a period of one year from the date of purchase by the Customer. For associated software, the Limited Warranty applies only to the media upon which it is recorded.

This Limited Warranty covers only those defects which arise in the normal use of the product, and does not apply if (i) the Product was modified or serviced by the Customer or a third party without Chyron's written approval or (ii) the failure is caused by misuse, abuse, electrical fault, accident, improper installation, or misapplication as determined solely by Chyron.

Should this Product fail to be in good working order during the warranty period, Chyron will, at its sole discretion, repair, exchange, or replace the defective Product or component(s) with a comparable Product or component(s) as provided below. The replacement Product or component(s) may be either new or reconditioned (with functionality at least equivalent to the original).

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UNDER NO CIRCUMSTANCES WILL CHYRON BE LIABLE FOR ANY DIRECT, INDIRECT (INCLUDING LOSS OF PROFITS), INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THIS PRODUCT, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY AND EVEN IF CHYRON WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Some States do not allow the exclusion or limitation of liability for consequential or incidental damages, so the above limitations may not apply to all Customers.

To Obtain Warranty Service and Customer Support

- Before returning the Product for repair or replacement, the Customer must first obtain a Return Merchandise Authorization (RMA) number from Chyron's Customer Service Department by calling (516) 845-2132.

- The Customer will be asked to verify that the Product is within the warranty period by providing proof of purchase (e.g., a copy of the invoice).

- The Product should be properly packed and shipped pre-paid to Chyron with the RMA number clearly displayed on the outside of the package and on the accompanying RMA form. Chyron will refuse to accept any package without a valid RMA number.

- For service covered by the Limited Warranty, the repaired or replacement Product will be returned at Chyron's expense to the Customer by UPS Ground or Federal Express. Chyron's normal labor, material, and shipping charges will apply for repairs outside the scope of the Limited Warranty.

Safety Statements

English

Caution - Identifies conditions or actions that could result in improper equipment operation, and/or damage to the equipment or other property.

Warning - Identifies conditions or actions that could result in personal injury.

Antistatic Wrist Strap

Warning: If using an antistatic wrist strap, the grounding cord must contain a 1 meg ohm to 10 meg ohm series isolation resistor.

Chassis Grounding

Warning: The chassis is grounded through the ground conductor of the A/C line cord. To prevent an electric shock hazard, only plug the line cord into a properly grounded A/C wall receptacle, as verified by a qualified installation technician.

Double Pole/Neutral Fusing

Warning: This unit may contain a neutral line fuse.

Fuse Replacement

Caution: For continued protection against fire, replace fuse with the same type and rating.

Power Cord

Caution: Only use the Line Cord which was supplied with the equipment, or a factory approved alternate. Do not use an extension cord.

Power Source

Caution: Equipment may only be operated at the specified line voltage and frequency.

Servicing

Warning: Servicing must only be performed by a qualified Service Technician. The removal of service access panels may expose an individual to hazardous voltages. Line cord should be disconnected before any servicing is performed.

FCC Statement of Compliance

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Français

Mise en garde - Identifie des conditions ou des actions pouvant causer un fonctionnement incorrect du matériel et/ou des dommages au matériel ou à d'autres biens.

Avertissement - Identifie des conditions ou des actions pouvant causer des blessures corporelles.

Bracelet antistatique

Avertissement: Si un bracelet antistatique est utilisé, le fil de mise à la terre doit contenir une résistance isolante série de 1 mégohm à 10 mégohms.

Mise à la terre du chassis

Avertissement : Le châssis est mis à la terre au moyen du conducteur de masse du fil électrique secteur. Pour empêcher tout risque de choc électrique, ne brancher le fil électrique secteur que dans une prise de courant murale mise à la terre correctement et inspectée par un technicien d'installation agréé.

Fusible neutre/bipolaire

Avertissement : Cet appareil peut contenir un fusible secteur neutre.

Remplacement du fusible

Mise en garde : Pour assurer une protection continue contre les incendies, remplacer le fusible par un fusible du même type et ayant la même valeur limite.

Cordon électrique

Mise en garde : N'utiliser que le fil électrique qui a été fourni avec le matériel ou un fil de rechange agréé par l'usine. Ne pas utiliser de rallonge.

Alimentation

Mise en garde : Le matériel ne peut fonctionner qu'à la fréquence et à la tension secteur indiquées.

Réparations

Avertissement : Les réparations ne doivent être effectuées que par un Technicien S.A.V. agréé. Le retrait des panneaux d'accés pour les réparations risque d'exposer la personne les retirant à des tensions dangereuses. Le fil électrique doit être débranché avant toute réparation.

CHYRON Corporation

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Deutsch

Vorsicht - Identifiziert Zustände oder Maßnahmen, die zu unzulänglichem Betrieb des Gerätes führen und/oder das Gerät oder andere Gegenstände beschädigen können.

Warnung - Identifiziert Zustände oder Maßnahmen, die zu Körperverletzung führen können.

Antistatische Armschlaufe

Warnung: Bei der Verwendung einer antistatischen Armschlaufe muß die Erdungsschnur einen in Reihe geschalteten Isolierwiderstand zwischen 1 Megaohm und 10 Megaohm besitzen.

Chassiserdung

Warnung: Das Chassis ist ¸ber den Erdleiter der Wechselstromnetzschnur geerdet. Zur Vermeidung von Berührungsgefahr darf die Netzschnur nur in eine sachgemäß geerdete Wandsteckdose für Wechselstrom gesteckt werden, die von einem qualifizierten Installateur geprüft worden ist.

Zweipol-/Neutralleiterabsicherung

Warnung: Das Gerät kann eine Neutralleitersicherung besitzen.

Auswechseln der Sicherung

Vorsicht: Zur Aufrechterhaltung des Brandschutzes muß die Sicherung durch eine Sicherung des gleichen Typs und der gleichen Größe ausgewechselt werden.

Anschlußschnur

Vorsicht: Es darf nur die mit dem Gerät gelieferte Netzschnur oder ein vom Werk genehmigter Ersatz verwendet werden. Eine Verlängerungsschnur darf nicht verwendet werden.

Stromquelle

Vorsicht: Das Gerät darf nur mit der vorgeschriebenen Netzspannung und Frequenz betrieben werden.

Wartung

Warnung: Die Wartung darf nur von einem qualifizierten Wartungstechniker durchgeführt werden. Das Abnehmen von Wartungsabdeckplatten ermöglicht den Zugang zu lebensgefährlichen Span-

Safety Statements

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Attenzione - Identifica una condizione o un'azione che potrebbe compromettere l'uso corretto dell'apparecchio, e/o provocare danni all'apparecchio stesso o ad altra proprietà.

Avvertenza - Identifica una condizione o un'azione che potrebbe causare lesioni alle persone.

Fascetta antistatica da polso

Avvertenza - Se si usa una fascetta antistatica da polso, il cavo di terra deve essere munito di un resistore d'isolamento in serie con un valore nominale di resistenza compreso tra 1 e 10 megaohm.

Collegamento a massa dello chassis

Avvertenza - Lo chassis è collegato a massa attraverso il filo di terra del cavo di alimentazione in c.a. Per evitare scosse elettriche, inserire la spina del cavo di alimentazione in una presa di rete collegata all'impianto di messa a terra. Rivolgersi ad un tecnico qualificato per verificare la correttezza del collegamento.

Polo doppio/fusibile sulla linea neutra

Avvertenza - Questo apparecchio potrebbe contenere un fusibile sulla linea neutra.

Sostituzione del fusibile

Attenzione - Ai fini di una protezione continuata contro gli incendi, sostituire il fusibile con un altro dello stesso tipo e potenza nominale.

Cavo di alimentazione

Attenzione - Usare esclusivamente il cavo fornito in dotazione con l'apparecchio, o un cavo approvato dalla casa fabbricante. Non usare cavi di prolunga.

Alimentazione

Attenzione - Far funzionare l'apparecchio soltanto alla tensione di linea e alla frequenza specificate.

Manutenzione

Avvertenza - Gli interventi di manutenzione vanno eseguiti soltanto da un tecnico qualificato del servizio assistenza. Rimuovendo i pannelli d'accesso per compiere la manutenzione si potrebbe venire a contatto con tensioni pericolose. Prima di eseguire

CHYRON Corporation

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Español

Precaución: Identifica condiciones o acciones que pueden provocar el uso indebido del equipo o daños al equipo u otros bienes.

Advertencia: Identifica condiciones o acciones que pueden ocasionar lesiones personales.

Brazalete antiestática

Advertencia: Si utiliza una brazalete antiestática, el cordón de puesta a tierra deberá tener una resistencia aislante de 1 mega ohm a 10 mega ohm conectada en serie.

Puesta a tierra del chasis

Advertencia: El chasis se pone a tierra mediante el conductor de puesta a tierra del cable eléctrico de c.a. Para evitar el peligro de una electrocución, conecte el cable eléctrico únicamente a una toma de pared de c.a. puesta a tierra correctamente y verificada por un técnico de instalación cualificado.

Fusible de lÌnea neutral/Doble polo

Advertencia: Esta unidad puede incluir un fusible de lÌnea neutral.

Reemplazo del fusible

Precaución: Para obtener una protección continua contra el peligro de incendio, reemplace el fusible por uno del mismo tipo y capacidad.

Cable de potencia

Precaución: Utilice únicamente el cable eléctrico que se entrega con el equipo, o bien un cable alternativo aprobado por la fábrica. No utilice cables de extensión.

Fuente de energÌa

Precaución: El equipo únicamente debe usarse con el voltaje y la frecuencia especifi-

Safety Statements

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CHYRON CORPORATION/CODI PRODUCT REGISTRATION

Model No._____ Serial No._____ Purchase Date_____
Owner (Name and/or Org.)_____
Address_____ City_____ State_____
Country_____ Zip/Postal Code_____
Contact_____ Telephone_____
Purchased From_____
Address_____ City_____
State_____ Zip/Postal Code_____

PRODUCT APPLICATION:

☐ **Prod./Post Prod.** ☐ **Broadcast** ☐ **Cable TV** ☐ **Corporate Industrial**
☐ **Educational** ☐ **Messaging** ☐ **Information Display** ☐ **Other_____**

Host Computer_____

CHYRON CORPORATION
5 Hub Drive
CS 1901
Melville, NY 11747-9686
Attn. Customer Service

Table of Contents

Section 1 - Features and Applications

Section 2 - Installation & Setup

Section 3 - Sample Screen Set-Up

CODI Programmer's Reference

Section 1 - Features and Applications

1.1 Overview and Features

The CHYRON CODI is a high-speed, high-resolution character generator. The CODI may be used for high quality local and remote information display systems and other video titling applications. The CODI may be used as a stand-alone unit, or multiple CODI's may be used in a multi-point configuration.

CODI's set up in a multipoint configuration allows you to use up to 12 CODI's, all controlled by a single host computer. Each CODI in the string can be set to operate independently of the others. For example, a train terminal may have several different lines, where each line has its own schedule. Each CODI in the string can be set to display one schedule per line. Figure 1-1 illustrates the CHYRON CODI.

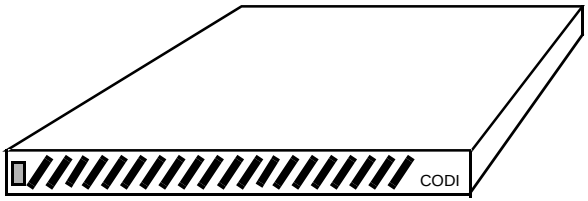

Figure 1-1. The CHYRON CODI

The CODI allows you to generate characters in different fonts, sizes, and colors for character display on a screen. The CODI may generate colored backgrounds using a different color for every scanline pair. In addition, multi-colored logos may be downloaded from the host.

1.2 Features

1.2.1 Technical Features

- Remote serial operation from any computer.
- Baud rates from 300 to 38.4K.
- Fast real-time operation.
- Automatic display sequencing.
- Software-controlled video timing.
- RGB, composite and S-video display capability.
- NTSC, PAL or Pal-M sync generator with genlock.
- Local message/page memory.
- Less than 10 nanoseconds effective pixel resolution.
- Full anti-aliased operation with linear key output.
- On-board composite and S-video keyer.
- High quality composite/S-video (Y/C) encoder.
- 16.7 million color selections.
- Standard eight character colors and eight edge colors.
- Switchable RS-232 or RS-422 port.
- Checksum support.
- XON/XOFF flow control protocol.

1.2.2 Character Generator Features

- User-definable read effects playback; wipe, push, fade, roll and flash.
- Message roll and crawl at various speeds.
- Ability to download host-based fonts and logos.
- Built-in shaded background generator.
- User-definable tab/template fields.

- User-definable character spacing (squeeze and expand).
- Full position and justify control of characters and rows.
- Automatic character kerning.
- Character overlap and tuck.
- Seven fonts standard.
- Variable edges; border, drop shadow, and offset.
- Displayable clock.

1.2.3 Optional Features

- Component RGB output.
- Optional Bitstream® Typeface Library selection, down loadable from the host for an additional 1,500 font styles.
- Logo Compose service.

1.2.4 Video Source and Display

CODI is designed to accept video input from a number of sources. Adjustments to video timing, such as horizontal, subcarrier phase, and key delay can be made through the host software.

When the CODI unit is first powered on, it will display the video input. Any characters generated will be keyed over the video. In order to turn off (disable) the external video, and key characters over the CODI generated background, the Video Blank command (\VB\\) must be sent. Please refer to Section 4 for more information on this command.

1.3 Using the CODI

The CODI's operation is controlled by a host computer. All commands to the CODI are sent in printable ASCII characters (ASCII 32-127). The host computer communicates with the CODI through a serial line. The host sends commands which are made up of "tokens." A "token" is a packet of computer data. The size of a token may vary.

Typically, when the CODI is first installed, you would be at the host computer's keyboard (PC, terminal, minicomputer) keying in CODI commands. As you type the commands, the CODI executes them and produces the desired display. These are the items you would be setting up:

- Colors
- Tabs
- Fonts
- Backgrounds
- Number of messages

CODI commands start with a slash (\). The commands are described in Section 4.

The commands may be set up in packets of various lengths to produce specific results. Regardless of the length of the packet, it is ended with a double slash (\\), which signals an end of command.

A typical CODI screen would be formatted into various tab fields. These tab fields would contain the screen address for the data, and the color and font information. You may change the settings as often as you like until you have achieved the desired display.

Your settings are stored in volatile (erasable) memory; if you turn the CODI off, your settings will be lost. So, if you want to use the data repeatedly, you will want to store them for future use. This is done by uploading (sending) the data to the host for host storage.

The upload operation involves sending each command string individually to the host. This means that you would define the desired color settings, upload them to the host, then define the tab settings, upload them to the host, and so on, until all the configurations are stored. Later, when you need to access the individual configurations, you may download (retrieve) them from the host. You may then change your settings if you wish, and redisplay the data. Uploading and downloading may be done as often as needed.

The CODI can store multiple pages or messages in RAM for subsequent display even when the host computer is disconnected. These messages can be displayed as simple pop-ons or through a variety of read effects.

1.4 Applications

A typical application for CODI would be to update and display one or more fields in a predefined page. The page may consist of tab fields. Each field is assigned a tab number, a location, and additional user-defined information. When the new data are to be displayed from the host computer, they are sent in the form of the tab number followed by the data. The data are simply placed in the tab fields and follow the configurations already set for each field.

1.5 Communications

The operation of the CODI is controlled by setting the communication mode. The communication mode defines how the host computer and the CODI will exchange data. Please refer to Section 4 for more information on how to set the communication mode.

CODI can acknowledge that the last command in the packet has been completed. This is done by having the CODI send an Acknowledge Character (*) to the host computer. The host then knows that the last command was complete, and that it may send additional commands.

1.5.1 Communication Modes

Depending on the mode, CODI will either look for a checksum and verify it, not look for a checksum, send an acknowledge, or not send an acknowledge. The communication mode also controls the operating protocol. The default communication protocol is XON/XOFF.

With the XON/XOFF protocol the CODI sends an XOFF to the host when the buffer becomes full. After the CODI processes enough data and the input buffer is almost empty, it will send an XON character. An XOFF character is a decimal 19, or ASCII Control S. An XON character is decimal 17, or ASCII Control Q (please refer to the Communication Mode Table in Section 4).

There can also be a checksum, which is particularly useful when transmitting data over a noisy line, such as a telephone line. The checksum is used to verify that the data sent from the host is the data received by the CODI. A checksum is followed by a carriage return and a line feed.

The checksum should be sent as five decimal digits. If the checksum does not match the data received, CODI will return an error number to the host. The list of errors in located in Appendix A.

Section 2 - Installation & Setup

2.1 Introduction

The CHYRON CODI enables you to create broadcast quality video titling and graphics using a host computer equipped with an RS-232/RS-422 data communications port. The CODI can be set up as a stand-alone unit, or in a multipoint configuration. This section contains instructions for making the appropriate connections for either configuration. Figure 2-1 provides a general overview of how the CODI interface connections are made.

The terminology used in this section of the manual is commonly used in the United States (ANSI). Please keep this in mind as you are reading this section.

2.2 Equipment Required

- A CHYRON CODI
- A computer with a terminal emulation program (Vterm, Pro-Comm, Cross-Talk) or a terminal
- A Video Monitor capable of accepting a composite, S-video (Y/C), or component RGB interlaced NTSC or PAL television signal
- A serial communication cable:

  1:1 cable to a PC-AT DB-9 (provided)

  9- to 25-pin cable adapter needed for a 25-pin DTE connection.

- A video cable:

  Coax/BNC, S-video, or component RGB cable, as desired.

Component RGB cable..

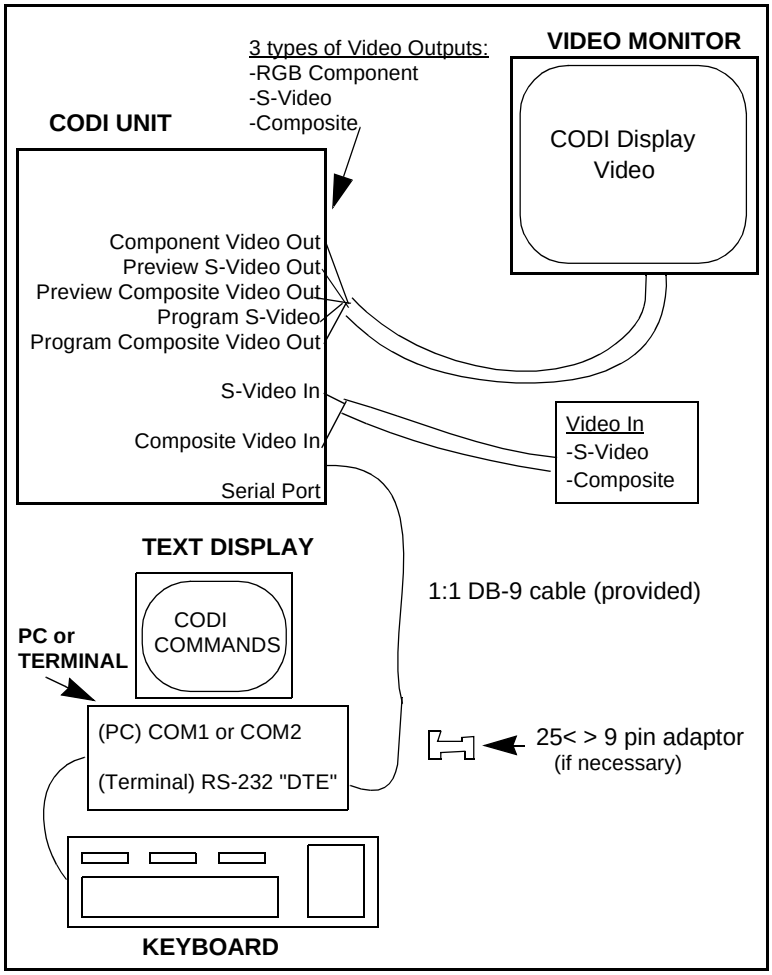

Figure 2-1. General CODI Diagram

2.3 CODI Rear Panel Set Up

The input and output connectors are located on the rear panel of the CODI. Refer to Figure 2-2 for an illustration of the rear panel.

2.3.1 CODI Specifications

Video Inputs	Composite Video S-Video Reference Blank Burst
Video Outputs	Composite Preview S-video Preview Composite Program Key Composite Program S-Video Program RGB with Key Optional
Power Consumption	0.5A @ 120 V 0.25A @ 240 V 50 or 60 Hs Auto Voltage Selected
External Interface	Two GPI Inputs One serial RS-232 or 422, switchable, 38,400 baud max
Environmental	40° - 100° F (5° - 38° C) 5% - 95% Humidity (no condensation)i
Dimensions	Height: 1.75 (4.45 cm) Width: 17" (43.2 cm) Depth: 11" (27.9 cm) Weight: 14.5 lbs. (6.6 kg)

With the above specifications, the unit complies with FCC rules part 15 Subpart J for Class A devices. Designed in accordance with UL 1950, Professional Use Video Equipment.

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2.3.2 Serial Cabling To Host Computer Or Terminal

Since most customers will be interfacing to a PC or to a terminal, the default RS-232 communication mode is described in the paragraphs that follow. The pinout on the CODI serial port is a standard DCE DB-9 serial port. A 1:1 serial cable is provided to interface to a PC-AT -type serial port.

If you are interfacing to a standard 25-pin RS-232 DTE connector found on a computer terminal, older style PCXT computer or a minicomputer, you will need a 9-pin to a 25-pin serial adaptor with a 9-pin male and 25-pin female end.

The 25-pin adapter side connects to the RS-232 terminal or computer. Figures 2-3 and 2-4 illustrate connections to a 9-pin PC-AT type connector and to a 25-pin DTE type connector, respectively.

NOTE

When making your own cables please note that the three-wire interface, TX, RX & GND, does not always work. You might need to wire in the

handshaking signals, DTR, RTS &CTS to enable the proper transmission from a computer or terminal.

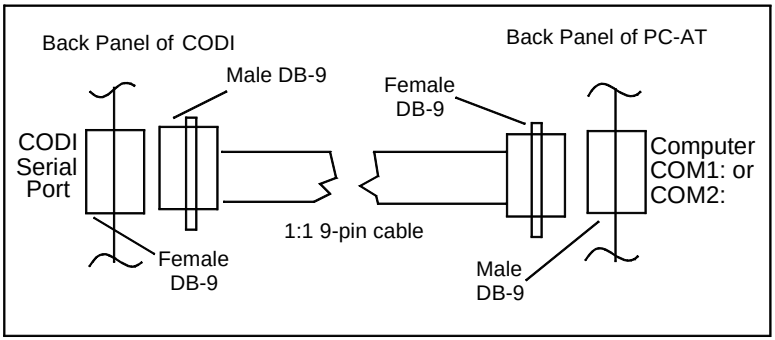

Figure 2-3. RS-232 Cabling with PC-AT or Equivalent

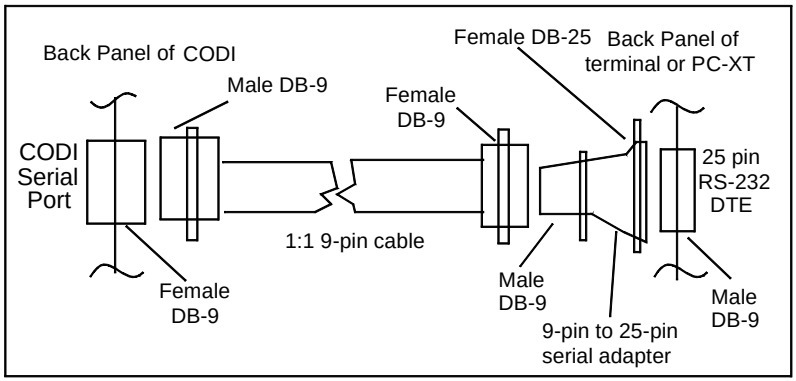

Figure 2-4. RS-232 Cabling with a STD. 25-pin DTE I/F

2.4 CODI Multipoint Communication

CODI's in a multipoint topology communicate through a full duplex data link. There is one primary station (a host) and one or more secondary stations (the CODI's). Data is

only exchanged between the host and a CODI, but not between two CODI's. The CODI's and the host are connected through two shielded twisted wire pairs. One twisted pair is for host transmit data and the CODI receive data. The other twisted pair is for the CODI transmit data and the host receive data. This data link requires EIA-RS422-compliant differential line drivers and receivers. There is no hardware handshaking.

2.4.1 Communication Interface

While in the multipoint mode, the CODI's will not transmit in response to any command that was broadcast to all CODI's on the data link. This is true regardless of the communications mode set up of the command acknowledge, checksum, or **XON/XOFF**. Note that there is no flow control since the **XON/XOFF** is suppressed.

Return error codes are also suppressed. Any command that usually returns data to the host is also suppressed. These commands include Tab Upload (UT), Background Upload (UB), System Status (SS), Self Test (ST), and System Font (SF). When a command is transmitted to a specific CODI on the data link using the SI\##\ prefix, the CODI will respond as usual.

2.4.2 Host Connection

The host computer must have an EIA RS-422-compliant interface. If converting from RS-232 to an RS-422 interface converter, an equivalent to the Black Box Corporation RA-IC107A may be used. This is a data-only full-duplex RS232-RS422 converter. If you are using a PC as the host computer, this converter box must be installed. Please see Figure 2-5 for a diagram.

The CODI RS-422 interface cable is made with the Transmit Data plus and negative from the host connected to the CODI DB-9 connected pin 9 and pin 4, respec-

tively. Receive data plus and negative from the host are connected to the CODI DB-9 connector pins 8 and 2, respectively. Please refer to Figures 2-5 and 2-6 for a diagram of these connections.

Each CODI in the segment should have a unique unit address, which is set by the rotary switches on the CODI's back panel. Address 00 is not available. Please refer to Figure 2-2 for a diagram of the CODI's back panel. The maximum number of CODI's in a multipoint segment is 12. The maximum communication rate is 19,200 bits per second.

The stub lengths (lengths of cable from the CODI to the party line) must be kept as short as possible. This prevents signal degradation. The maximum cable distance is 1,000 feet. To extend beyond this length, range segment repeaters or modems are required.

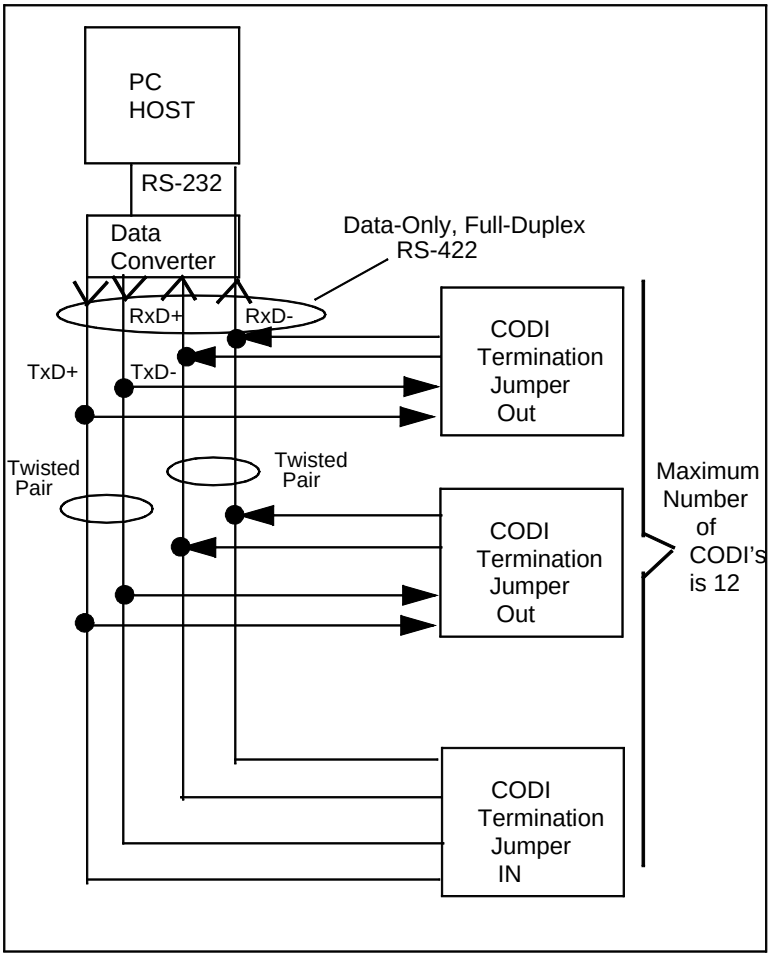

Figure 2-5. CODI Multipoint Configuration; PC Host

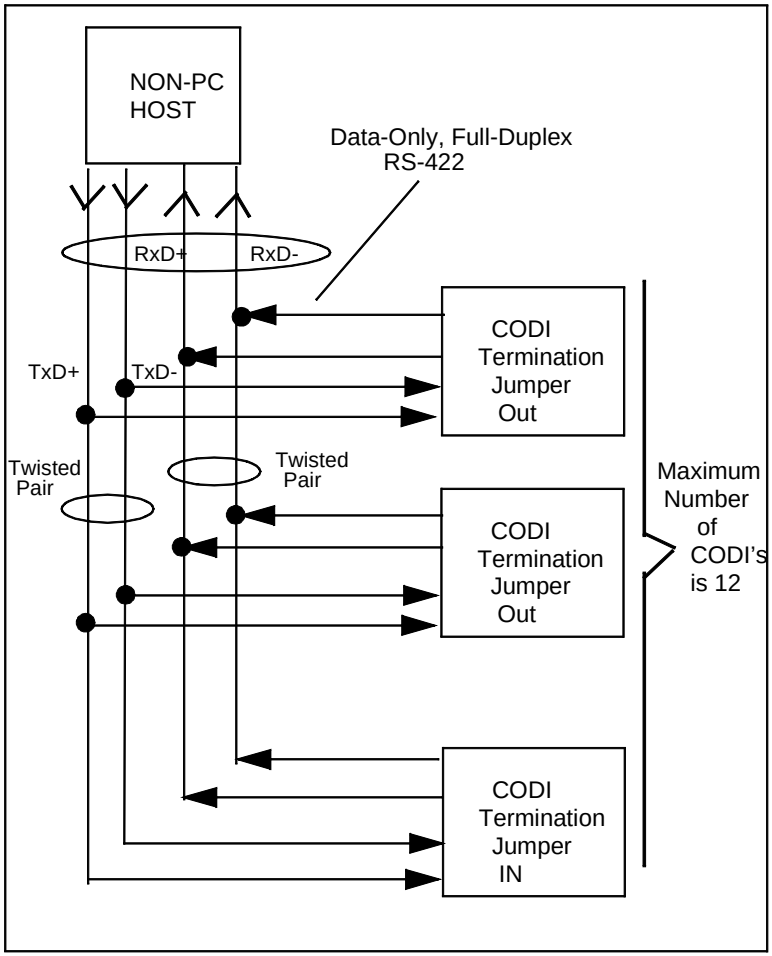

Figure 2-6. CODI Multipoint Configuration; Non-PC Host

2.4.3 Cable Termination

To prevent unwanted signal reflections, the cable must be properly terminated. This is done by setting a 422/485 termination jumper in the IN position on the LAST CODI in the segment. All other CODI's in the segment must

have the termination jumper in the OUT position. If the communication lines are not properly terminated, data loss will occur.

To access the termination jumper, unscrew the four screws used to fasten the CODI's top cover. Remove the top cover, and refer to Figure 2-7 to locate the jumper.

2.4.4 CODI Mode Switches

For CODI's to be in the multipoint communication mode, the unit address must be set to a value other than zero (0). Please note that the serial data rate switch settings for 38,400 bps do not apply. The mode must be set to RS-422, XON/XOFF disabled. There is no hardware handshaking.

2.4.5 Wire Specifications

The communication wire should be shielded, two-twisted pair, 24- gauge, stranded copper conductors (7 x 32) wires. Nominal impedance of the cable should be 100 ohms. Nominal capacitance should not be more than 16 picoFarads per foot (52.5pF/meter). The wire resistance should be no more than 25 ohms per thousand feet. Belden cables trade numbers 8162 and 9729 meet these specifications. For plenum applications, use Belden cable, trade number 89729.

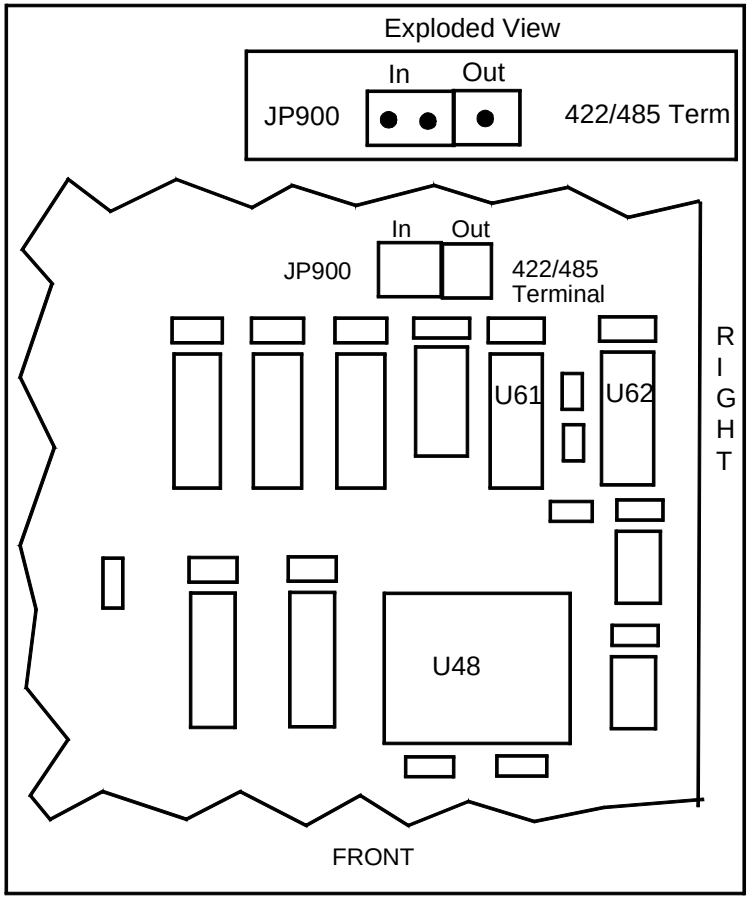

Figure 2-7. CODI Serial Jumper Location; Top View

2.5 Rear Panel Switches

To set the mode switches on the rear panel, press the switch up to turn it on, and down to turn it off. Initially, you must select a communications mode by selecting the baud rate or data rate. The recommended speed is the highest rate your terminal or PC will allow (this is generally 9,600 or 19,200 bits per second).

NOTE

Not all PC's support 19,200 bps. Verify the baud rate on your PC before using.

Other asyncronous Tx/Rx parameters such Data Bits, Stop Bits and Parity are fixed, and are listed below. Your PC or terminal MUST be configured to match these parameters.

- 8 Data Bits
- 1 Stop Bit
- No Parity
- Half Duplex Operation (local display of characters).

The other communication options need not be set at this time, as they can run in default or off mode. Those other options set RS-232 or RS-422 mode, whether XON-XOFF handshake is enabled, or a future syncronous word format is used.

NOTE

No hardware handshaking is supported. You must disable this function on your terminal or computer.

The two rotary dial switches set a unit ID number used for multiple CODI display networks. These switches are normally set to 0-0.

The CODI communication port and operating modes can be selected as shown in Figure 2-8

.

2.6 Video Monitor Hookup

Depending on the type of video monitor you have, there are three video formats tha the CHYRON CODI can provide simultaneously for a PREVIEW (before Keyer) output. These video formats are: composite, S-video (Y/C) and component RGB.

Connect these outputs, PVW VIDEO OUT, PVW S-VIDEO OUT or COMPONENT VIDEO OUT to your display monitor as shown in Figure 2-9.

2.7 Additional Hardware Information

Certain details of the CODI hardware must be clearly outlined in order to minimize problems in interfacing the CODI to your equipment, and to use the CHYRON CODI effectively. The following section provides additional hardware information.

Serial Communications Port and GPI. All GPI functions and Intelligent Interface Commands to/from the CODI are handled by the on board Z85C30 Serial Communications Controller (SCC). The CODI I/O interface supports the ability to change from either RS-232 to RS-422 modes through a change of the SERIAL MODE switch (#4) on the rear panel. No other changes to the CODI unit need to be made; however, a different communications cable has to be connected (see Figure 2-10 for connector diagrams).

CODI Intelligent Interface communications are currently programmed to handle asyncronous word formats only (8 bits/no parity/1 stop).

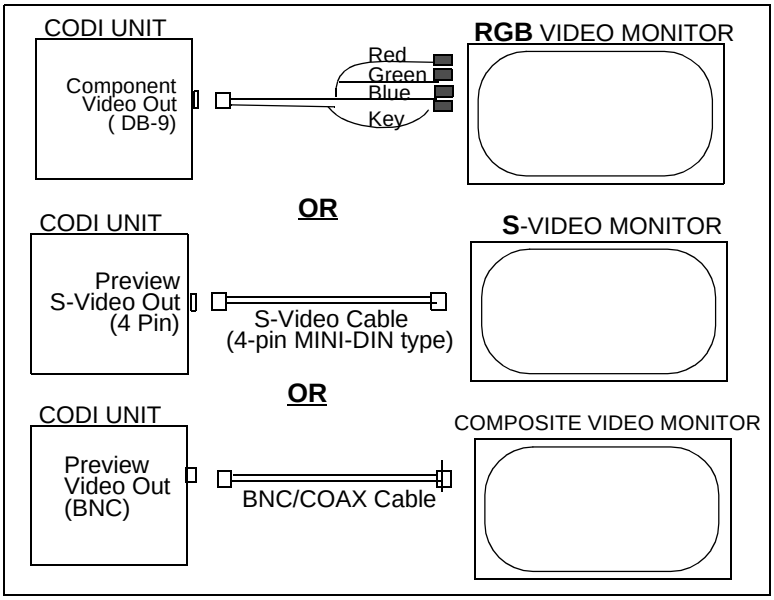

Figure 2-9. CODI Preview Video Formats

General Purpose Interface (GPI). CODI utilizes two General Purpose Interface (GPI) inputs for remote sensing of events or switch closures to trigger user-defined functions. The GPI connector on the rear panel of CODI uses a standard Kodak slide projector remote control cable interface. This is the type found in many AV departments, studios as well as in the home. GPI(1) is equivalent to the FWD button control and GPI(2) is equivalent to the REV button control. A molded pin-compatible cable is also available from CHYRON for custom interfaces.

Connector diagrams of RS-232 and RS-422 configurations are shown in Figure 2-10. GPI information is shown in Figure 2-11.

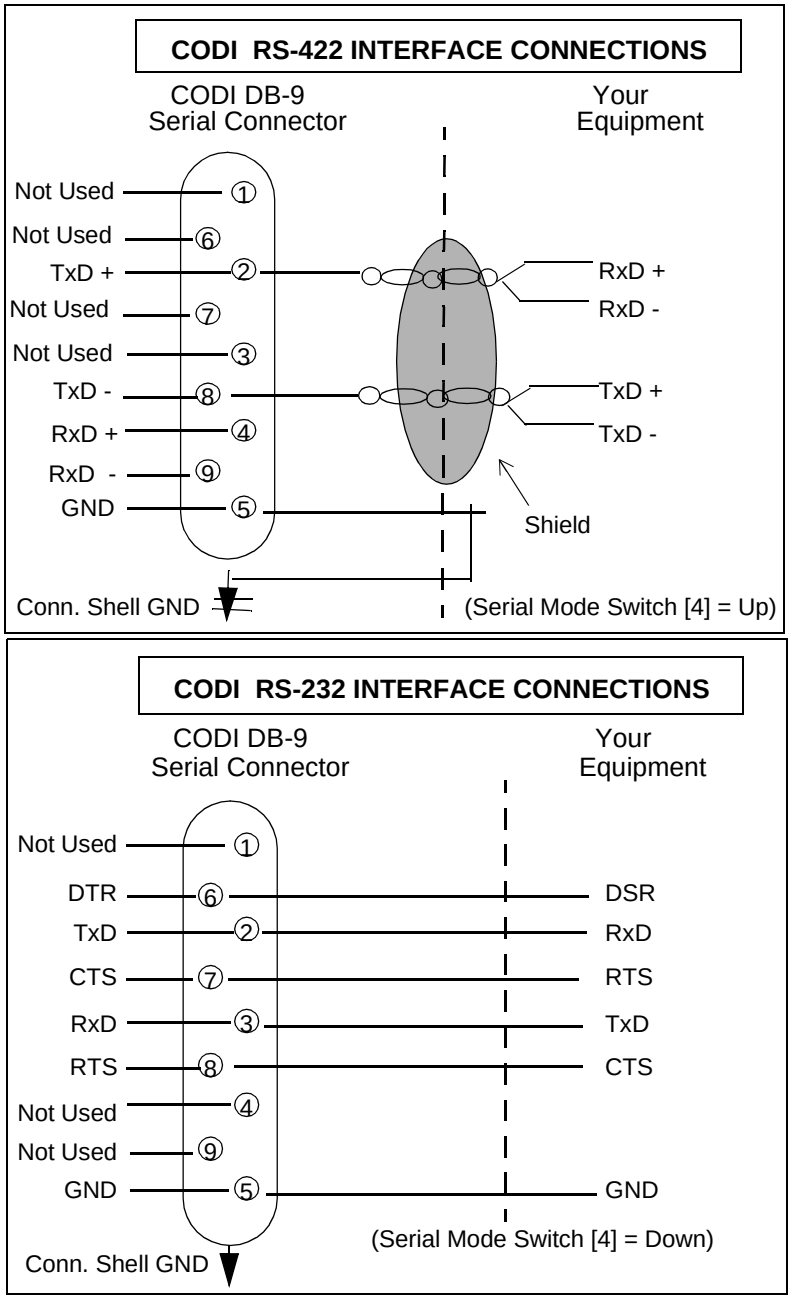

Figure 2-10. RS-232 and RS-422 Configurations

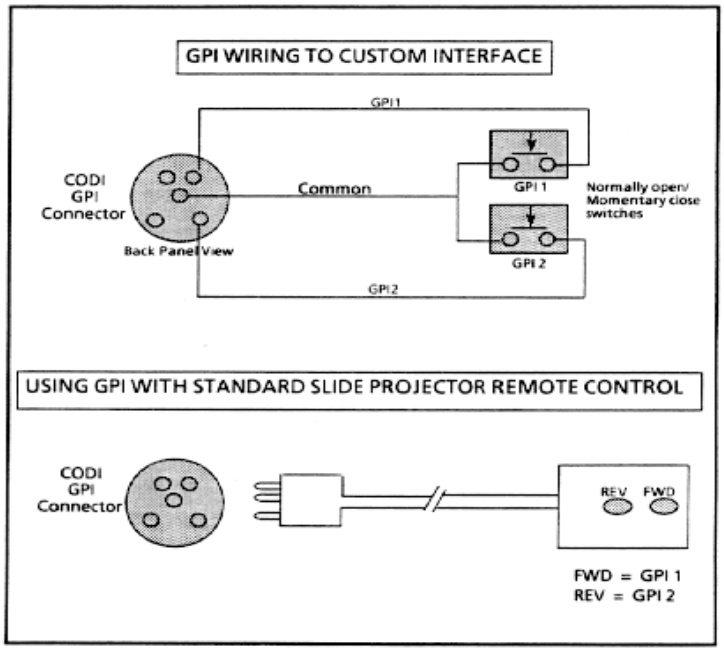

Figure 2-11. GPI Connector Diagram

Video Inputs and Outputs - All CODI video inputs are fixed terminated inside the unit with a standard 75-ohm termination. Should the input video be needed to be routed to multiple pieces of equipment, a Distribution Amplifier (DA) should be used on the video source.

The VIDEO IN and S-VIDEO IN inputs to the CODI are DC-restored to ground (0V) within the CODI unit. This preserves proper black reference to the internal keyer.

All video outputs are driven from a low impedance amplifier with a series 75-ohm output termination delivering a 1V p-p video signal into a 75-ohm terminated load.

Internal Background Scanline Generator - The CODI has an internal background scanline generator that creates smooth, ramped or horizontal pattern color backgrounds to title over. The background scanline generator works on a field pair basis or scanline pairs for each color assignment. Using field pairs of color eliminate the very visible and annoying field flicker of single color scanlines in an interlaced system.

For an NTSC/525 system with 485 active lines, there are 256 possible background color assignments in the background palette. This would cover the full 485 active lines in a 525 system.

In a PAL/625 system with 575 active lines, there are 271 maximum color assignments in the background palette. This provides coverage of 542 active lines which are centered on the screen. The top 8 pairs would have the same color assignment (color 1). The bottom 8 pairs would show the same color assignment (color 271).

During key over live video, the background scanline generator is turned off. The background generator can also be turned off on a pair- by-pair basis, thus allowing a split screen of external video and background, if desired.

2.8 Operation With External Video Equipment

The following paragraphs provide the information needed to interface the CHYRON CODI with the real world environment of multiformity equipment and differing video configurations.

2.8.1 Video Input/Output Formats

The CHYRON CODI can accept and output the following video formats simultaneously:

VIDEO INPUT:	OUTPUT: Preview (before Keyer)	Program (CODI keyed over video)
Composite	Composite + S-Video +RGB	Composite
S-Video	Composite + S-Video + RGB	Composite + S Video

NOTE

PREVIEW refers to composite, component or S-video output before the internal Keyer and PROGRAM refers to composite or S-video output from the internal CODI Keyer.

CODI can accept a Composite Reference Black Burst input for sync and color reference while keying over the S-Video or Composite video inputs.

Component RGB is available as a PREVIEW output only and is not keyed over video internally. An external Component RGB Keyer would be used in this case.

2.8.2 Auto Selection of Genlock Source

To facilitate switching of video inputs and input formats, the CHYRON CODI detects video sync activity on all three inputs: **VIDEO IN**, **S-VIDEO IN** and **REF BLK BURST IN**, and automatically switches and genlocks to the active video input.

Should two or more video inputs be active at any given time, a fixed priority selection scheme chooses which video input to select. The selection priority sequence works as follows:

Highest Priority:	**REF BLK BURST IN**
Next Priority:	**S-VIDEO IN**
Lowest Priority:	**VIDEO IN (Composite)**
No Video in:	**Self Sync/Stand-alone Mod**e

2.8.3 Use of Composite or S-Video Inputs with Reference Black B

While genlocking to Black Burst, the Keyers will still work with S-Video and Composite Video inputs.

NOTE

If you are using a reference black burst and an S-video or composite input for keying, both reference and video inputs must be timed (H-Phased and subcarrier) the same. If they are not, an improper video signal will result on the PGM outputs.

2.8.4 Keying Over Live Video

The CHYRON CODI will key or overlay it's titles and graphics over a composite or S-video input source using it's own internal keyer. Keying to external video is anti-aliased just as characters are anti-aliased to their own internal background. This provides a smooth, linear blend of graphics to an input video source.

The CODI provides a dual composite and S-video keyer that can mix down a Composite Program output signal from an S-video input source. Since it is not possible to get a mixed S-video output from a composite input source, format conversion is necessary.

To view and use the internal CODI PROGRAM Keyer output, connect your monitor or receiving video equipment to the **PGM VIDEO OUT** or **PGM S-VIDEO OUT BNC** or **S**-video connector on the rear panel as shown in Figure 2-12.

Initially, the default (power on state) output mode of the keyer powers-on in VI, or Video Insert mode. This keys CODI graphics on external video.

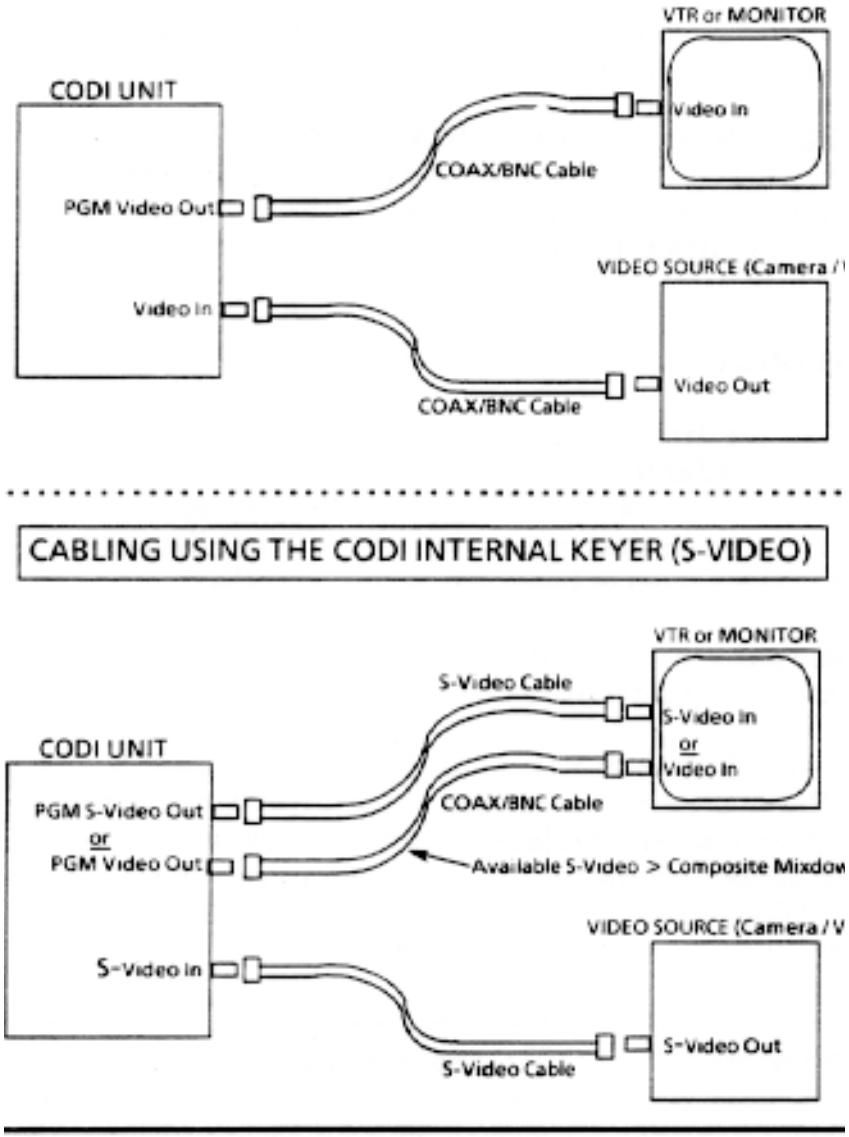

Figure 2-12. CODI Program Keyer Output Connection

In addition to enabling the Keyers, CODI provides the ability to compensate or adjust the delay of the key signal controlling the keyers and the PGM KEY OUT key output on the rear of the CODI unit. Adjusting the key delay is done by using the \VK\{n}\\ command, where {n} represents a number from 0 to 15. A typical key delay value would be in the range of 7 to 9. Each increment or decrement in key delay would be about 20nS or about 1/4 of a pixel.

The **PREVIEW** outputs, **PVW VIDEO OUT**, **PVW S-VIDEO OUT** and **COMPONENT VIDEO OUT** are always enabled such that they display the contents of the CODI Frame Buffer before passing through the internal PROGRAM Keyers.

2.9 Setting CODI Video Phase Timing

Adjusting the Horizontal (H-PHASE) and Subcarrier (S/C-PHASE) Phase is essential to obtaining a proper and usable video signal when genlocked to external equipment or to a master sync reference. This adjustment is necessary when using the internal Keyer or when using an external Switcher or Down Stream Keyer (DSK).

All video phase adjustments can be made remotely by using the serial CODI Intelligent Interface protocol (no screwdrivers needed).

Setting the Horizontal Phase (H-PHASE) adjustment time aligns the CODI Video Sync to match that of the input video source such that CODI graphics are registered properly on the screen and the PROGRAM out sync/burst interval is not corrupted by program video signal. This insures the CODI video and input video arrive at the keyer (internal or external) at the same time.

Subcarrier (S/C-PHASE) or color phase adjustment is required to match the color phase of the CODI Composite or S-Video signal to that of the incoming video signal.

Adjusting subcarrier phase rotates (as viewed on a vectorscope) the encoded CODI color vectors about a 360 degree circle so that the color vectors will match the color phase of the input video signal.

To begin, first adjust the H-phase alignment and then set the S/C-PHASE adjustment.

2.9.1 Horizontal Phase Setting

To set the Horizontal Phase (H-phase) on the CODI:

[ ] 1. Insert your sync reference source into the **VIDEO IN** or **REF BLACK BURST IN** of your CODI.

[ ] 2. Connect CODI **PVW VIDEO OUT** into the video input of the waveform monitor placed at the point where the system should be phased equal.

[ ] 3. Connect the reference sync source into the **EXTERNAL SYNC** input of the waveform monitor (looping through the CODI with a T-connector is not recommended).

[ ] 4. Place the waveform monitor into Internal (INT.) sync mode.

[ ] 5. Using the scope horizontal position control, position the leading edge of Horizontal sync on a major timing mark for horizontal phase reference.

[ ] 6. Place the waveform monitor into External (EXT.) sync mode and observe the timing phase shift the CODI video is offset by from your reference marker.

[ ] 7. Correct the Horizontal Phase shift by issuing one of the following Video Horizontal phase adjust commands to CODI: \VH\+[n]\\,

\VH\-[n]\\ or \VH\[n]\\ . ([n] represents a number between 0 and 255.) \VH\+[n]\\ will adjust the Horizontal phase ahead by relative amounts of [n], \VH\-[n]\\ will adjust the Horizontal phase back by relative amounts of [n] and \VH\[n]\\ will place the Horizontal phase in an absolute position determined by [n].

2.9.2 Subcarrier Phase Setting

To set the Subcarrier Phase (S/C-PHASE) on CODI:

[ ] 1. Insert your reference video source (house reference or signal generator) into the **VIDEO IN** input of CODI.

[ ] 2. Connect the CODI **PROGRAM VIDEO OUT** to the input of the vector scope monitor (verify that it's properly terminated).

[ ] 3. Issue a system test pattern command \SP\3\\ to CODI, in which CODI will display a SMPTE type (No 0 IRE black) video color bar pattern.

[ ] 4. Observe on the vector scope the color bars rotated out of position from their respective position or boxes on the scope graticule.

[ ] 5. Rotate the CODI color vectors back to their proper position by issuing one of the Video Subcarrier adjust commands: \VS\+[n]\\, \VS\-[n]\\ or \VS\[n]\\ . ([n] represents a number between 0 and 127). \VS\+[n]\\ will adjust the S/C phase ahead by relative amounts of [n], \Vs\-[n]\\ will adjust the S/C phase back by relative amounts of [n] and \Vs\[n]\\ will place the S/C phase in an absolute position determined by [n].

2.10 CODI Operation With External Switcher/Dsk

When using an external Keyer, any of the (3) three video formats can be used, Composite, S-Video or Component RGB. These would normally be output from the **PVW VIDEO OUT**, **PVW S-VIDEO OUT**, or the **COMPONENT VIDEO OUT** connectors.

When using the CODI with an external switcher or downstream keyer (DSK), the internal CODI Keyer is bypassed and CODI **PREVIEW** video and **KEY** output are routed straight to the Switcher board or DSK for program mixing. Keying and fading is now the responsibility of the Switcher/DSK.

The **PGM KEY OUT** or the Component **ALPHA/KEY** channel (black colored BNC on the (4) wire Component RGB-K cable assembly) would also be routed along with the CODI **PREVIEW** video to provide the required transparency or Key signal to the external Switcher/DSK. Both the **PGM KEY OUT** and Component **ALPHA/KEY** are linear key signals. The following diagram (Figure 2-13) illustrates the methods of using CODI with an external Switcher or Down Stream Keyer(DSK).

The **PGM KEY OUT** has the ability to be timed or phased accurately with the CODI **PREVIEW** video such that CODI **PREVIEW** and **KEY** arrive at the keyer (internal or external) at the same time. The **PGM KEY OUT** delay is set by using the \VK\{n}\\ command where {n} is 0 to 15, yielding a range of about +/- (2) two pixels. The Component **ALPHA/KEY** channel of the (4) wire Component RGB-K output cannot be adjusted by the \VK\n\\ command.

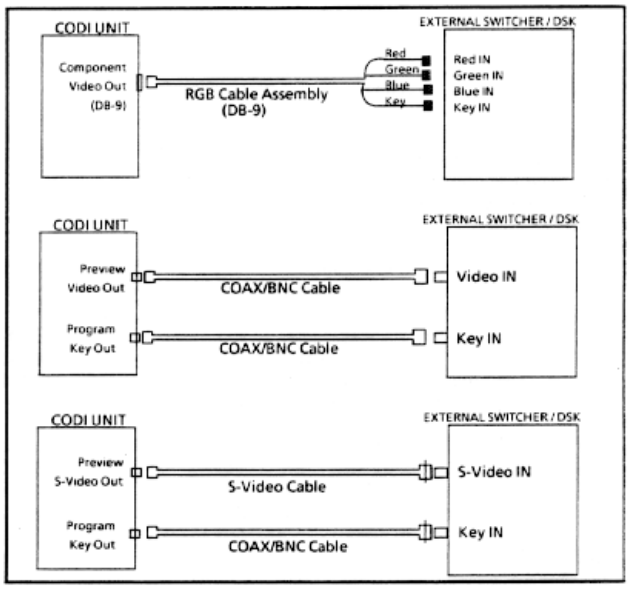

Figure 2-13. Cabling CODI to an External Switcher/DSK

In addition to using the **PREVIEW** outputs, you can connect to the Switcher/DSK the **PROGRAM** video outputs, **PGM VIDEO OUT** or **PGM S-VIDEO OUT**, when the CODI has been issued a \VB\\ command. The \VB\\ command will make **PGM VIDEO OUT** and **PGM S-VIDEO OUT** look identical to **PVW VIDEO OUT** and **PVW S-VIDEO OUT**, thus giving you two outputs to work with. Possibly allowing a Preview and Program feed without using a loop-through cable setup. This will only be available when a \VB\\ command is issued and when using composite or S-video formats. Figure 2-14 illustrates this feature

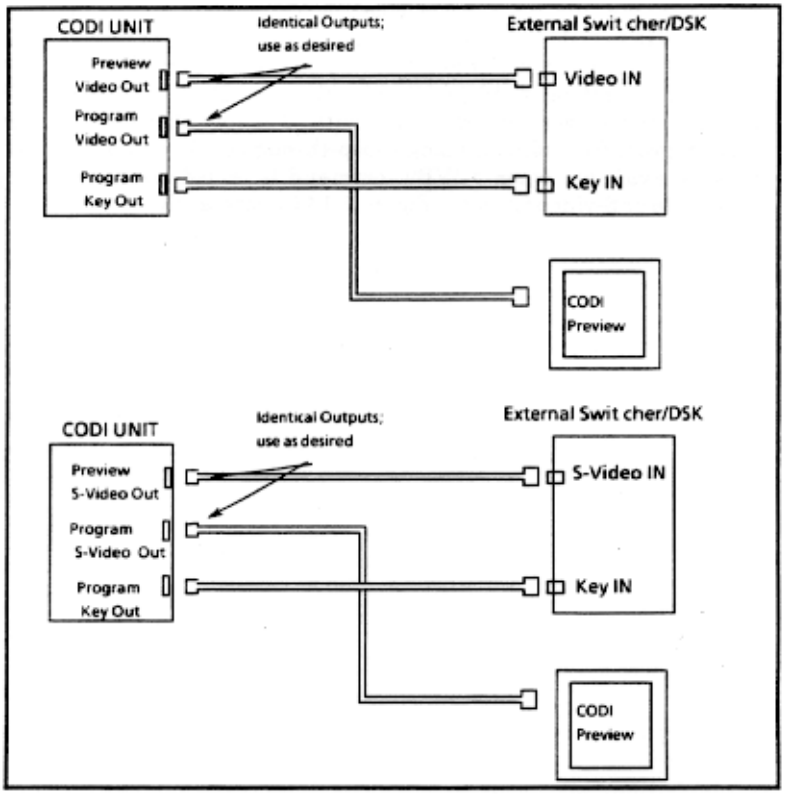

Figure 2-14. Using CODI PGM and PVW Outputs in VB Mode

Section 3 - Sample Screen Set-Up

3.1 Introduction

This section of the manual provides a specific example on how you can set up a screen using CODI commands. The example given is typical of a cable television listing.

The first screen has the heading in font 6, subheading in font 4, and all subsequent listings in font 3. The 12-hour clock is displayed in the lower right-hand corner of the screen. Then, a cut is done to the second screen using a random matrix wipe. The second screen is pushed on from the left to the right.

It is recommended that you practice setting up a screen, sending data and producing different effects. You may use the example given in this section, since it uses the most basic functions.

The messages sent from the host to the CODI are stored in the CODI's volatile memory. Thus, if the CODI is powered off for any reason, all the messages will be lost. Also, if you make a mistake in a command, you will have to resend the entire command string. If you are using a host computer, you have the option of saving the commands in a text file and sending the file to the CODI. If you make a mistake, or need to make changes to the commands, you will only have to edit the text file and resend the file to the CODI. You may set up this example and use it for practice.

NOTE

If you make a mistake when typing the commands on CODI, you must enter a \\. An error message will appear, and then you can begin typing the commands again. Do not use the Backspace or Return keys to delete a mistake.

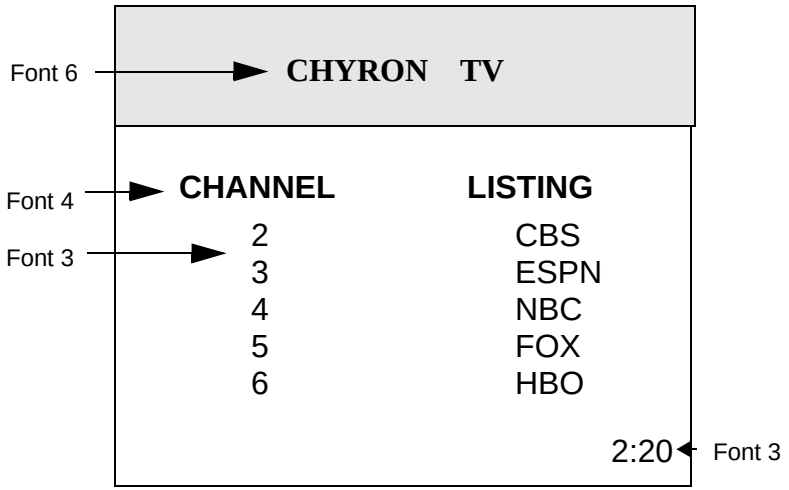

Figure 3-1. Sample Screen 1

(Please go to next page)

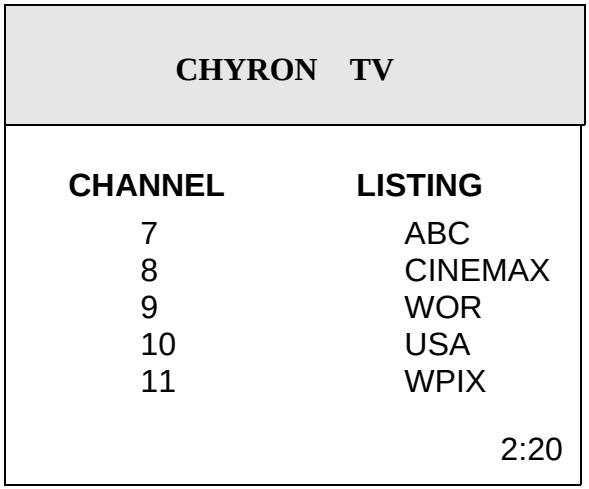

Figure 3-2. Sample Screen 2

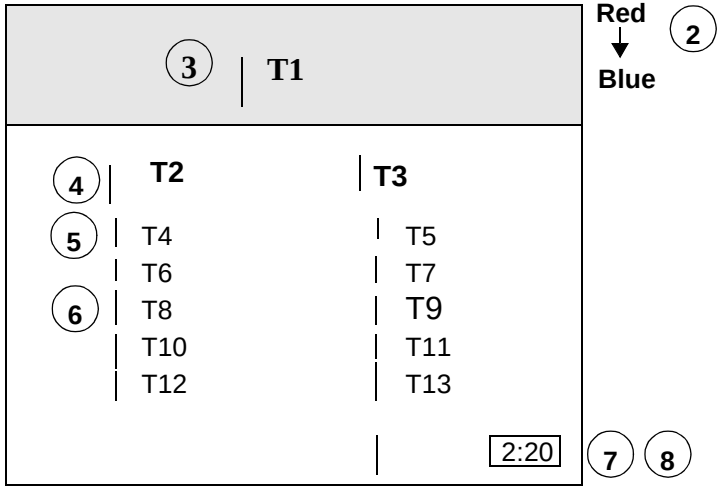

Figure 3-3. Screen Setup

3.2 Step-by-Step Instructions

[ ] 1. \VB\\

Video Blank (turn on background).

[ ] 2. \DB\2\R\1\200\0\0\0\50\0\0\200\0\\

Download shaded background (from red to blue); scan-line 1 is red, scanline 50 is blue.

[ ] 3. \DT\1\160\10\2\6\L\\

Download tab 1 to X position 160, y position 10, color 2, font 6, left-justified.

[ ] 4. \DT\2\50\100\5\4\L\3\400\100\5\4\L\\

Download tab 2 to X position 50, y position 100, color 5, font 4, left-justified.

Download tab 3 to X position 400, y position 100, color 5, font 4, left justified.

These two tabs were set up in the same command. They could have been typed separately.

[ ] 5. \DT\4\110\150\1\3\L\5\420\150\5\3\L\\

Download tab 4 to X position 110, y position 150, color 1, font 3, left-justified.

Download tab 5 to X position 420, y position 150, color 5, font 4, left justified.

These two tabs were set up in the same command. They could have been typed separately.

[ ] 6. Define the remaining tabs as follows:

\DT\6\110\200\1\3\L\8\110\250\1\3\L\10\110\300\1\3\L\12\110\350\1\3\L\\

\DT\7\420\200\1\3\L\9\420\250\1\3\L\11\420\300\1\3\L\13\420\350\1\3\L\\

[ ] 7. \WS\450\400\4\3\HH:MM:SS\1\\

Watch set-up, X coordinate 450, Y coordinate 400, color 4, font 3, with a

12-hour clock display., no A.M. or P.M., and no seconds displayed.

[ ] 8. \WD\\

Watch display.

[ ] 9. \TU\1\ChyronTV\2\Channel\3\Listing\\

\TU\4\2\5\CBS\6\3\7\ESPN\8\4\9\NBC\10\5\11\FOX\12\6\13\HBO\\

These commands send the tab data to the tab fields.

[ ] 10. \TU\4\7\5\ABC\6\8\7\CINEMAX\8\9\9\WOR\10\10\11\USA\12\11\13\WPIX\\

[ ] 11. MS\1\\

Message save as message 1.

[ ] 12. To create the next screen, repeat the command lines in step 10, but change the tab data to "7," "ABC," and so on (refer to Figure 3-2).

[ ] 13. \MS\2\\

Message save as message 2.

Effects:

Random Matrix Wipe, message 1:

ME\MW\1\0\5\5\10\\

Message effect, matrix wipe, message 1, effect 0 (random matrix wipe), 5 X 5 pixel

block, at speed 10.

Push message 2 onto the screen:

ME\PU\2\L\4\\

Push message 2, from the left, at speed 4.

Codi Programmer's Reference

PART 1: Overview

INTRODUCTION

This section provides a reference to the CODI's commands and operations. Each entry provides the command format, an example of how to apply the command and a brief functional description. The reference entries are listed in alphabetical order, under the following categories:

- **Backgrounds**
- **Colors**
- **Event Timer Commands**
- **Flash**
- **Fonts**
- **GPI**
- **Key Commands**
- **Letter Commands**
- **Line Draw Commands**
- **Message Commands**
- **Message Effect Commands**
- **Palette Commands**
- **Page Commands**
- **Row Commands**
- **System Commands**
- **Tabs**
- **Video**
- **Watch Commands**

IMPORTANT

Command fields in upper case are literals and specified as is.
Command fields in lower case require a parameter.
Parameters within square-brackets [ ] are optional.
Parameters followed by "..." means that those parameters within [ ] may be repeated multiple times.

PART 2: Background Commands

The CODI background is arranged in scanline pairs. Each scanline pair may be keyed for either CODI generated background or external video display. When a background scanline pair is keyed for CODI generated background, a CODI background color is displayed from a palette of 16.7 million colors.

An NTSC CODI has 243 displayed scanline pairs (486 scanlines total). The first 243 colors of the background palette are displayed for the 243 scanline pairs. A PAL CODI has 288 displayed scanline pairs (576 scanlines total). However, a PAL CODI only provides for 271 palette entries. Therefore, a modified palette system is used for PAL. The first 9 scanline pairs display the color for background palette entry 1. Scanline pairs 10 through 279 display the background palette entries 2 through 270, respectively. The last 9 scanline pairs display the color for palette entry 271.

The Download Background commands allow you to define the background keyer and palette entry values. These commands allow you to define each background scanline pair color and key individually, or to create a background ramp from a start to an end scanline pair using a start and an end color.

The Upload Background command allows you to upload the current CODI background palette and keyer to the host. The upload data may be saved on the host for future use.

Background Setup (Interactive)

Format: \BS\\

Parameters: none

Return: none

Background Setup Interactive commands are:

Table 1:

Key	Function
<ESC>[A	Up arrow
<ESC>[B	Down arrow
An	Auto-update mode (0=off, 1=on)
Bnnn	Set Blue value (000-255)
C	Copy begin to end scanlines to paste buffer
D	Display paste buffer at begin cursor
E	Index bottom of current background
Gnnn	Set Green value (000-255)
Hnnn	Set Hue value (000-360)
Innn	Set Intensity value (000-255)
Kn	Set Key (0=CODI bkg, 1=ext. video)
M	Match cursor color to background color
Pnnn	Set cursor scanline pair Position
Rnnn	Set Red value (000-255)
Snnn	Set Saturation value (000-255)
T	Index Top of current background
W	Write current background ramp
X	EXit from Background Setup mode
Z	Background Setup Information

Description:

The Background Setup command allows you to interactively setup the color and key of each scanline pair of the CODI background.

A background is made up of any number of color ramps

between a begin and end scanline pair. For NTSC there are 243 displayable scanline pairs, while PAL uses 271 pairs. A ramp between two different colors produces a gradated background palette transition from the begin to the end color. If the begin and end colors are identical, a constant background appears.

The A key allows you to set the auto-update mode while creating background ramps. When the auto-update mode is on, all position and color parameter changes cause the CODI to immediately update the current background ramp on the display. This provides immediate feedback on parameter changes for the ramp. When the auto-update mode is off, the color ramp currently being created is not automatically displayed. The ramp is displayed only when the W key is used to save the current ramp or A is used to set the auto-update mode to “On”. Initially, the auto-update mode is “Off”.

The Background Setup command allows you to create the required background one ramp at a time. The T key selects the begin (top) cursor of the ramp while the E key selects the end cursor. The begin and end cursors are displayed as a white horizontal lines. Select the required cursor and use the arrow keys to move the cursor up or down. Initially, the begin and end cursor are positioned at the top of the display.

The P key allows you to position the current cursor to a specific scanline pair. If you attempt to position the begin cursor after the end cursor, CODI automatically repositions the end cursor to the next scanline pair after the new begin cursor position. Likewise, if you attempt to position the end cursor before the begin cursor, CODI automatically repositions the begin cursor to the scanline pair immediately before the new end cursor.

In addition, the current cursor color and background key may be set using the R,G,B, H,S,I and K keys. The M key will set the current cursor color to match that of the scanline pair it occupies. However, this function does not change the current video key.

The Z key provides the host with the current Background Setup parameter information. Use this information to verify that the begin and end cursor are correctly positioned, and that the correct color and key has been defined.

The uploaded data is defined as follows:

\DB\1\r\g\b\k\r\g\b\k\r\g\b\k\...\\

r = red (0-255)

g = green (0-255)

b = blue (0-255)

k = key (0,1):

0 = display background

1 = display external video

When you have defined the required background ramp, use the W key to save the ramp. A ramp is not permanently saved as part of a background until the W key is used. After the ramp is saved, you may continue to create the next ramp required for the background.

The Background Setup also provides a copy and paste feature. The C key is used to copy the background scanlines between the begin and end cursor to the background paste buffer. The D key is used to display the paste buffer starting at the current begin cursor. This feature allows you to quickly duplicate existing background scanline patterns. You may relocate the begin cursor and paste as many times as you want. The paste buffer is updated only by another C key.

When the background is completed, use the X key to exit the Background Setup mode.

NOTE: You should not be in the Video Only or Video Insert display mode when invoking the Background Setup command. These modes do not display any CODI generated background.

Download Background (HSI)

Format: \DB\mode\H\h\s\i\k[\h\s\i\k...]\\

Parameters: mode = 1 (background loading)
h = hue (0-360)
s = saturation (0-255)
I = intensity (0-255)
k = key (0,1):

0 = display background
1 = display external video

\h\s\i\k parameters repeated NTSC=256, PAL=271

Return: none

Description:

The Download Background (HSI) command in mode 1 is used to specify the color values for each scanline pair. In the HSI format, each scanline pair is defined by a hue, saturation, intensity value and a key. An NTSC CODI has 256 scanline pairs, while a PAL CODI has 271. Therefore, the background download information must consist of 256 NTSC sets of four values (271 sets for PAL).

NOTE: For the PAL CODI, there are 287 active scanline pairs. However, the are only 271 palette entries available. Therefore, palette entry 1 addresses the first 9 scanline pairs while entry 271 addresses the last 9 scanlines pairs. Palette entries 2 through 270 address scanline pairs 10 through 279, respectively.

Download Background (RGB) Mode 1

Format: \DB\mode\R\r\g\b\k[\r\g\b\k...]\\

Parameters: mode = 1 (background loading)
r = red (0-255)
g = green (0-255)
b = blue (0-255)
k = key (0,1):

0 = display background
1 = display external video

\r\g\b\k parameters repeated NTSC=256, PAL=271

Return: none

Description:

The Download Background (RGB) command in mode 1 is used to specify the color values for each scanline pair. In the RGB format, each scanline pair is defined by a red, green, blue value and a key. An NTSC CODI has 256 scanline pairs, while a PAL CODI has 271. Therefore, the background download information must consists of 256 NTSC sets of four values (271 sets for PAL).

Note: For the PAL CODI, there are 287 active scan line pairs. However, the are only 271 palette entries available. Therefore, palette entry 1 addresses the first 9 scan line pairs while entry 271 addresses the last 9 scan lines pairs. Palette entries 2 through 270 address scan line pairs 10 through 279, respectively.

Download Background (RGB) Mode 2

Format: \DB\mode\R\start\r\g\b\k\end\r\g\b\k\\

Parameters: mode = 2 (background create)
start = start scanline for generation (NTSC 1-256, PAL 1-271)
end = end scanline for generation (NTSC 1-256, PAL 1-271)
r= red (0-255)
g = green (0-255)
b = blue (0-255)
k = key (0,1):

0 = display background
1 = display external video

Return: none

Description:

The RGB Download Background command in mode 2 is used for creating a background. Using this command it is possible to ramp from one color to another automatically. In order to do this, you must specify the starting scanline pair and color, and the ending scanline pair and color. The scanlines between the start and end lines are colored with a ramp between the start and end colors. In the RGB format, you must specify the start and end red, green, blue values and key.

NOTE: For the PAL CODI, there are 287 active scanline pairs. However, the are only 271 palette entries available. Therefore, palette entry 1 addresses the first 9 scan line pairs while entry 271 addresses the last 9 scanline pairs. Palette entries 2 through 270 address scanline pairs 10 through 279, respectively.

Download Background (HSI) Mode 2

Format: \DB\mode\H\start\h\s\i\k\end\h\s\i\k\

Parameters: mode = 2 (background create)
start = start scan line for generation (NTSC 1-256, PAL 1-271)
end = end scan line for generation (NTSC 1-256, PAL 1-271)
h = hue (0-360)
s = saturation (0-255)
I = intensity (0-255)
K= key (0,1):

0 = display background
1 = display external video

Return: none

Description:

The HSI Download Background command in mode 2 is used for creating a background. Using this command it is possible to ramp from one color to another automatically. In order to do this, you must specify the starting scanline pair and color, and the ending scanline pair and color. The scanlines between the start and end lines are colored with a ramp between the start and end colors. In the HSI format, you must specify the start and end hue, saturation, intensity values and key. You may define multiple ramps for the background in a single command.

Note: For the PAL CODI, there are 287 active scanline pairs. However, the are only 271 palette entries available. Therefore, palette entry 1 addresses the first 9 scan line pairs while entry 271 addresses the last 9 scanline pairs. Palette entries 2 through 270 address scanline pairs 10 through 279, respectively.

PART 3: Color Commands

CODI can display 256 colors from a complete palette of 16.7 million colors. The first 192 palette entries are used to display the eight character colors. The default character colors with the assigned palette entries are:

Index	ColorPaletteEntries
1	White 0 - 23
2	Magenta 24 - 47
3	Blue 48 - 71
4	Cyan 72 - 95
5	Yellow 96 - 119
6	Green 120 - 143
7	Red 144 - 168
8	Black 169 - 191
192 -253	free

These colors may be changed using the Color Setup or Download Palette commands.

CODI displays high-quality characters through a technique known as antialiasing. When using the Video Blank display mode, CODI automatically generates the proper antialiasing for each color over a CODI generated background. Likewise, when using the Video Insert display mode, CODI automatically generates the proper antialiasing for each color over external video.

The Download Background commands allow you to set the CODI video keyers to display a mix of both CODI background and external video on the same display while using the Video Blank display mode. Since CODI automatically antialiases to CODI background in this mode, characters will not be properly antialiased over the external video part of the display. However, the Color Video and Color Background commands allow you to manually setup the antialiasing of each color to be over external video or CODI background. The only limitation is that a single color may be displayed over either CODI background or external video, but not both. If you need to display the same color over both backgrounds, use the Color Setup or Download Palette commands to set two different colors indexes with the same

palette values. Use the Color Background command to antialias one color index to CODI background and the Color Video command to antialias the second color index to external video.

NOTE: The Color Map command is used to setup the CODI palette for color mapping of CODI multi-colored logos. This command properly antialiases all logo colors to each other.

Color Restore

Format: \CR[\color...]\\

Parameters: color = color index (1-8) to restore (optional)

Return: none

Description:

The Color Restore command is used to restore the default CODI color for the color index specified. If no color parameters are specified, CODI restores all 8 colors to their original palette values.

Upload Color

Format: \UC\index\\

Parameters: mode = upload display index (1-9):
1-8 = upload mode for this color index
9 = upload mode for all colors

Return: \CB\color[\color...]\\

and/or

\CV\color[\color...]\\
color = color index (1-8)

Description:

The Upload Color command uploads the display mode for the specified color to the host. For colors antialiased to CODI background, the system responds with the Color Background command "\CB" followed by the specified color index. When colors are antialiased to external video, the system responds with the Color Video command "\CV" followed by the specified color index. By specifying mode nine (9), the system responds with the color mode of all eight system colors.

Color Select

Format: \Cn\\

Parameters: n = color index (1-8) (default = \C1\\)

Return: none

Description:

The Color Select command allows you to make one of the eight available colors active. After a color has been selected, all characters sent to the CODI are displayed in that color. The default color at the startup is 1 (white).

Color Background

Format: \CB\color [\color...]\\

Parameters: color = color index (1-8)

Return: none

Description:

The Color Background command is used if CODI is displaying text on backgrounds and external video at the same time. This command generates the proper antialias information for displaying one or more colors over a CODI generated background.

NOTE: If you need to use the same color on both CODI generated background and external video, you must setup two different color indexes with the same color values. One color index can be antialiased to CODI background while the other is antialiased to external video.

Color Map

Format: \CM\color1\color2\\

Parameters: color1 = start color index (1-7)
color2 = end color index (2-8)

Return: none

Description:

The Color Map command is used to define which colors in the palette will be used for a multi-colored logo. Multi-colored logos must be purchased directly from Chyron. The parameter color1 identifies the start color index in the CODI palette to store the logo colors. The parameter color2 identifies the end palette entry. The maximum number of colors in a logo is seven. For example, if a logo contained 3 colors and it was to be displayed starting with the color 5, the command would be \CM\5\8\\

Before you can use a logo, the following steps must be performed:

[1]Download the logo file using the Download Font command.
[2]Create the colors for the logo using the Download, Palette or Color Setup command.
[3]Use the Color Transparency command to specify the logo transparency level. You must set the color body AND edge to the same transparency level.
[4]Use the Color Map command to specify the character colors to be used for the logo.

> **NOTE:** Setup the colors before you specify the color mapping. If you setup the colors after mapping, you must re-do the color mapping.
> The colors you map for the multi-colored logos are no longer available for charac-

ters.
You should not display characters using
the logo colors.
Two or more logos may use the same logo colors.

Color Setup (Interactive)

Format: \CS\\

Parameters: none

Return: none

Description:

The interactive Color Setup command enables you to set the colors from the complete palette of 16.7 million colors. You may use the Color Setup command to vary the hue, saturation and intensity of the colors you are using.

By using the Color Setup command, the system displays the HSI model. The model contains three color bars. The first bar represents the hue, the second bar represents the intensity, and third is saturation. Underneath the three bars, the HSI model contains two color boxes.

The first box contains the body color of the character, and the second contains the edge color. At the bottom of the screen there are eight boxes. These boxes represent the eight colors currently loaded. Each item is identified on the display.

Using the number keys, choose the color you want to change.

One (1) represents the left most box while eight (8) represents the right most. The body and edge boxes automatically update to show the color index you choose. Use the <TAB> key to select either the body or edge box. The box you choose is outlined in white. Use the Up and Down arrow keys to select one of the three color bars to change for the selected color.

Each color bar has an arrow showing the current color

setting. The color bar you select has an arrow displayed in white while the other two are grey. Use the Left and Right arrow keys to change the setting of the color bar.

Once you are satisfied with this color, you may change any of the other seven colors. In addition, the color body and edge are changed separately.

Once you are satisfied with all color settings, press the X key to save and exit the Color Setup command. If you wish to exit without saving any of the changes you have made, press the <SPACEBAR> key.

Color Transparency

Format: \CT\color\type\percent[\color\type\percent...]\\

Parameters: color= color index (1-9) (9 = colors 1-8 effected)
type= type of transparency (1,2):

1 = character body
2 = character edge

percent = amount of color which remains visible (0-100)

Return: none

Description:

The Color Transparency command allows you to change the transparency level of one or more colors. This command allows you to specify the color to make transparent, the character body or edge, and the percentage of the color to remain visible. By specifying color nine (9), you can make the transparency level of all eight colors the same in one command.

Color Video

Format: \CV\color[\color...]\\

Parameters: color = color index (1-8)

Return: none

Description:

The Color Video command is used if CODI is displaying text on backgrounds and external video at the same time. This command generates the proper antialias information for displaying one or more colors over external video.

NOTE: If you need to use the same color on both CODI generated background and external video, you must set up two different color indexes with the same color values. One color index can be antialiased to CODI background while the other is antialiased to external video.

PART 4: Event Timer Commands

The Event Timer allows you to display a count up/down timer in any of 21 different display formats. Formats include displaying minutes or seconds to three places, and displaying the hundredths place when the timer is not being updated on the display. In addition, each format may be displayed with leading zeros or leading spaces, and each field may be displayed using any font or color.

The Event Timer Time command allows you to set the start time of the timer. The timer can display hours, minutes, seconds, tenths and hundredths of a second.

The Laps time feature allows you to stop the timer from updating on the display while the timer continues to run in background. When the laps time is no longer required, the CODI can be instructed to continue updating the timer display.

In addition to the 21 display formats, you may create your own display format by repositioning the timer fields to any location on the display. You may add your own titles to describe each of the displayed fields.

Event Timer Setup

Format:
\ES\xaddr\yaddr\color\font\format\mode[\pad\type]\\

Parameters:xaddr = x-pixel address for timer text (NTSC 1-666, PAL 1-776)
yaddr = y-pixel address for timer text (NTSC 0-485, PAL 0-575)
color = text color index (1-8)
font = text font index (1-8)
format = timer format (text):

Table 2:

Hour Formats	Minute Formats	Second Formats
HH:MM:SS.TH	MM:SS.TH	SS.TH
HH:MM:SS.TS*	MM:SS.TS*	SS.TS*
HH:MM:SS.T	MMM:SS.T	SSS.T
HH:MM:SS	MMM.SS	SS
HH:MM:	MMM:SS.TH	SSS.TH
	MMM:SS.TS*	SSS.TS*
	MMM:SS.T	SSS.T
	MMM.SS	SSS

*TS is tenths with a silent hundredths place displayed only when the timer is stopped.

@ = any format preceded by an 'N' character displays digits numerically justified.
*= .TS is tenths with silent hundredths place displayed only when timer is stopped.

Mode= timer count direction (0,1):
0= up counter

1= down counter

pad= pad format (0,1): (optional)
0= pad with zeros (default
1= pad with space
type= lead type (0,1): (optional
0= one lead zero (default)
1= not one lead zero

Return: none

Description:

The Event Timer Setup command is used to specify how the event timer is to be displayed. Before the timer can be displayed, the Event Timer Setup command must be used. There are 21 different timer display formats. The timer digits are normally positioned within each field depending on the digit widths. By preceding the format text with an 'N' character causes the timer digits to be displayed numerically justified. The mode may be set for a count up or count down timer.

NOTES: The CODI limits the font size of any of the timer fields to approximately 1/7 of the total number of screen scanlines in order to produce a flicker-free display. For an NTSC CODI with 486 scanlines, the maximum font height is about 65 scanlines. For a PAL CODI with 576 scanlines, the maximum font height is about 80. The actual font size limits are based on font style and edge type. Using a larger font then those specified may cause a flicker when the digits are updated on the display.

When displaying the Event Timer to the tenths and hundredths place, you may notice a slow down in the normal operation of the CODI.

When the Event Timer is running to the nearest hundredths place (displayed or silent) you may notice a flicker in the timer display. This is a limitation of the CODI.

Event Timer Display

Format: \ED\mode[\timer...]\\

Parameters: mode= display mode (0,1):
0 = disable the timer display
1 = enable the timer display

timer= index to event timer (1-4) (optional)

Return: none

Description:

The Event Timer Display command is used to enable or disable the event timer display. Before the timer is displayed, all setup commands must have been performed. When the timer is enabled, it may or may not be already running. The timer does not begin running until the Event Timer Begin command is issued in mode 1. When the timer display is disabled it may or may not be running. The timer does not stop running until the Timer Begin command is issued in mode 0.

If the timer parameter is not specified, this command operates on the current timer as specified with the Event Timer Index command. If one or more timer parameters are specified, this command operates on only those timers. This allows you to display multiple timers simultaneously.

> **NOTE**: Use the System Status command in mode 1 to read the Event Timer time.

Event Timer Begin

Format: \EB\mode[\timer...]\\

Parameters: mode= run mode (0,1):
0 = stop timer
1 = begin timer
timer= index to event timer (1-4) (optional)

Return: none

Description:

The Event Timer Begin command is used to begin or stop the event timer. If the timer has not yet been displayed using the Event Timer Display command, it will begin running without being displayed. If the timer is displaying the laps time, the current time is updated on the display. If the timer parameter is not specified, this command operates on the current timer as specified with the Event Timer Index command. If one or more timer parameters are specified, this command operates on only those timers. This allows you to start or stop multiple timers at the same time.

It is essential to specify all timers you wish to start or stop in one Event Timer Begin command if you wish all timers to comply together. By using successive commands, no two timers will react simultaneously because of the time it takes CODI to interpret the commands.

> **NOTE**: Use the System Status command in mode 1 to read the Event Timer time.

Event Timer Laps

Format: \EL[\timer...]\\

Parameters: timer = index to event timer (1-4) (optional)

Return: none

Description:

The Event Timer Laps command shows the laps time on the display. However, the timer continues counting. Use the Event Timer Begin command to resume updating the display with the counting timer. This command may be used only if the timer is displayed and running.

If the timer parameter is not specified, this command operates on the current timer as specified with the Event Timer Index command. If one or more timer parameters are specified, this command operates on only those timers. This allows you to display the laps time of multiple timers together.

Event Timer Erase

Format: \EE[\timer...]\\

Parameters: timer = index to event timer (1-4) (optional)

Return: none

Description:

The Event Timer Erase command is used to stop and erase the event timer.

If the timer parameter is not specified, this command operates on the current timer as specified with the Event Timer Index command. If one or more timer parameters are specified, this command operates on only those timers. This allows you to stop and erase multiple timers simultaneously.

Event Timer Time

Format: \ET\hhmmss[th]\\

Parameters: hhmmssth = timer start time to set:
hh = hour (00-99)
mm = minute (00-59)
ss = second (00-59)
th = hundredths of a second (00-99) (optional)

Return: none

Description:

The Event Timer Time command sets the time for the CODI event timer. If the timer tenths and hundredths places are not specified, both are assumed to be zero.

Event Timer Color

Format: EC\field\color[\field\color...]\\

Parameters: field = field to effect (H,M,S,T):

H = hours
M = minutes
S = seconds
T = tenths\hundredths

color = color index (1-8) for field

Return: none

Description:

The Event Timer Color command is used to setup the color for the specified field. The command should be used after the Event Timer Setup command to change the color attribute of any field. Multiple fields may be changed in a single command.

Event Timer Font

Format: \EF\field\font[\field\font...]\\

Parameters: field = field to effect (H,M,S,T):

H = hours
M = minutes
S = seconds
T = tenths\hundredths

font = font index (1-8) for field

Return: none

Description:

The Event Timer Font command is used to setup the font for the specified field. The command should be used after the Event Timer Setup command to change the font attribute of any field. Multiple fields may be changed in a single command.

NOTE: The CODI limits the font size of any of the timer fields to approximately 1/7 of the total number of screen scanlines in order to produce a flicker-free display. For an NTSC CODI with 486 scanlines, the maximum font height is about 65 scanlines. For a PAL CODI with 576 scanlines, the maximum font height is about 80. The actual font size limits are based on font style and edge type. Using a larger font then those specified may cause a flicker when the digits are updated on the display.

Event Timer Position

Format: \EP\field\xaddr\yaddr[\field\xaddr\yaddr...]\\

Parameters: field = field to effect (H,M,S,T):

H = hours
M = minutes
S = seconds
T = tenths\hundredths

xaddr = x-pixel address to display field (NTSC 1-666, PAL 1-776)
yaddr=y-pixel address to display field (NTSC 0-485, PAL 0-575)

Return: none

Description:

The Event Timer Position command is used to setup the X/Y position of a field on the display. Each timer field may be independently positioned anywhere on the display. This command should be used after the Event Timer Setup command to change the x/y position of any field. If this command is used, the field digits are always right justified. In addition, the field delimiter is not displayed. Multiple fields may be changed in a single command.

PART 5: Flash Commands

The Flash commands allow you to setup and flash specified colors. The Flash Setup command specifies the flash color on-time and off-time. The Flash Begin command initiates the color flash. The color continues to flash until the Flash End command is used.

> **NOTE**: Some Message Effect commands will temporarily suspend the color flash while the transition effect is in progress.

Flash Setup

Format: \FS\color\on-time\off-time\tocolor\percent [\color\on-time\off-time[\tocolor\percent...]]\\

Parameters: color= color index (1-8) to flash
on-time= time color is on (NTSC 60/sec, PAL 50/sec)
off-time= time color is off (NTSC 60/sec, PAL 50/sec)
tocolor= color index (1-8) displayed during off-time
percent= percentage of tocolor displayed (0-100)

Return: none

Description:

The Flash Setup command allows you to setup one or more colors to flash. A flash is defined by the duration of the on-time and off-time of the flash color. In addition, you may specify the color to be displayed, and a percent transparency, during the flash off-time. By specifying a zero percentage, nothing is displayed during the flash off-time. If 100 percent is specified, the full intensity of the tocolor is displayed during the off-time. The tocolor and percent parameters are optional fields only for the last flash setup color. If these parameters are not displayed, tocolor=color and percent=0.

You may setup the flash parameters at any time, even if a color is already flashing.

> **NOTE**: If the Color Transparency command has been used to set a transparency level for the tocolor, the percent parameter of the Flash Setup command will be a percentage of that value.

Flash Begin

Format: \FB\\

Parameters: none

Return: none

Description:

The Flash Begin command flashes only the last color set using the Flash Setup command. All other colors are terminated from flashing. Use the Flash Multiple command to flash more than one color at a time.

Flash Multiple

Format: \FM[\color...]\\

Parameters: color = color index (1-8) to flash (optional)

Return: none

Description:

Once the flash parameters have been set up using the Flash Setup command, you may use the Flash Multiple command. When a color parameter is not specified, all colors that have been setup will flash. When one or more colors are specified in the command, each color flashes. Alternatively, you may use the Flash Begin command to flash only the last color setup and to terminate any other flashing colors.

Flash End

Format: \FE[\color...]\\

Parameters: color = color index (1-8) to end flash (optional)

Return: none

Description:

The Flash End command will stop one or more colors from flashing. If no color parameters are specified, all colors that are currently flashing will stop flashing. When one or more colors are specified in the command, only those colors will stop flashing.

PART 6: Font Commands

CODI supports eight fonts simutaneously. Each font displays with a drop shadow edge to the lower right. Many additional fonts may be purchased directly from Chyron.

CODI fonts are sized by scanlines. The height of a font is measured from the top of the capital letter "A" to the bottom of the lower case "g." Therefore, if you were to use a 20-scanline font with capital letters only, the characters would in fact be smaller than 20 scanlines.

Additional fonts may be downloaded to the CODI from the host. This is done using the Download Font command described in this section.

There are four types of edges available for CODI fonts: drop shadow, character offset, border or none. The CODI does not add edges dynamically to a character as they are being displayed. They must be part of the font when the font is downloaded. However, a font edge may be made completely transparent using the Color Transparency command. Custom edges for fonts may also be ordered directly from Chyron.

Download Font

Format: \DF\font\\data

Parameters: font = font index (1-8) to download
data = binary font data

Return: none

Description:

The Font Download command allows you to download a new font to the specified font index. In order to use a font that is different from the default CODI fonts, it must be downloaded. It is suggested that the Acknowledge mode be set before downloading font data so that the host can determine when the CODI has completed any processing of the data downloaded. The Acknowledge mode is set using the System Communication Mode command. If an error occurs while downloading the font, CODI will restore the original default font. This command uses a portion of the available memory within the CODI to save the font data.

Font Select

Format: \Fn\\

Parameters: n= font index (1-8)(default = \F1\\)

Return: none

Description:

The Font Select command allows you to make one of the eight system fonts active. After selecting a font, all characters typed are displayed in that font until a new Font Select command is used. If the font index specified is not loaded, the system responds with an error. The default is font 1.

System Font

Format: \SF\\

Parameters: none

Return: Font n: name, Height: h, Edge: e, Size: s
n = font index (1-8)
name = font name
h = font height
e = edge type (None, Shadow, Border, Offset)
s = edge size

Description:

The System Font command causes the CODI to respond with a list of the fonts currently installed. Each font is described by its font index, font name, height, edge style and edge size. If a font index is not loaded, the system responds “Not Loaded.” If a font index is not loaded but contains one or more downloaded PCX graphic images, the system responds “Graphics Loaded.”

PART 7: GPI Commands

CODI supports four GPI (General Purpose Interface) lines. Each GPI may be setup with a command sequence of up to 1000 characters which is executed when the GPI is triggered. A GPI event may be triggered by one of the following:

[1]A clock event triggered when a preset time occurs. (The clock time is set using the GPI Time command.)
[2]The host using the GPI Begin command.

GPI Setup

Format: \GS\gpi\data\\

Parameters: gpi = gpi index (1-4)
data =CODI characters and commands to display for gpi.
Data may NOT contain the following commands:
\ME\CS = Crawl Setup Command.
\ME\RS = Roll Setup Command.
\DF = Download Font Command.
\DG = Download Graphic Command.

Return:none

Description:

The GPI Setup command configures the CODI for the execution of a GPI event. The GPI setup data may consist of any combination of characters and commands (except for the Crawl Setup, Roll Setup, Download Font, and Download Graphic commands). The total length of the GPI setup data is 1000 characters for each GPI.

GPI Begin

Format: \GB\gpi\\

Parameters: gpi = gpi index (1-4)

Return: none

Description:

The GPI Begin command simulates the activation of a remote GPI. By using this command, the CODI will execute the GPI commands as if a remote GPI had actually occurred.

GPI Time

Format: \GT\gpi\hhmmss[\interval]\\

Parameters: gpi = gpi index (1-4)hhmmss = gpi trigger time (24 hour mode):
hh = hour
mm = minute
ss = second
interval = interval to next gpi trigger time (hhmmss format) (optional)

Return: none

Description:

The GPI Time command allows you to set the time at which a GPI should be triggered. Use the GPI Setup \GS command to setup the CODI commands to be executed when the GPI time is reached. This function does not require that the clock be displayed in order for the GPI to be triggered.

Optionally, you may specify a time interval. This allows you to perform a GPI trigger at each interval starting with the trigger time.

GPI Time Reset

Format: \GR\gpi\\

Parameters: gpi = gpi index (1-4)

Return: none

Description:

The GPI Time Reset command resets the GPI trigger time.

PART 8: Graphic Commands

CODI can display PCX graphic images. The only PCX format supported is 256-color 8-bit images.

The CODI uses a palette that can store 254 colors. Palette entries 0 through 191 are used to display colors 1 through 8. Palette entries 192 through 253 are unused. You assign any number of palette entries to a PCX image, however, using entries 0 through 191 sacrifices character colors. The default palette is:

Index	Color	Palette Entries
1	White	0 - 23
2	Magenta	24 - 47
3	Blue	48 - 71
4	Cyan	72 - 95
5	Yellow	96 - 119
6	Green	120 - 143
7	Red	144 - 168
8	Black	169 - 191
		(192 - 253 free)

Since an 8-bit PCX image may contain up to 256 colors, CODI provides the ability to reduce the number of colors used. An image containing 256 colors may be reduced to use only the 62 colors from palette entries 192 through 253. CODI selects the 62 most used colors of the image, and forces all other colors to use the closest matching RGB values of those 62. If 62 colors is not adequate, some or all of the eight character colors may be sacrificed for the PCX image. For example, 110 palette entries may be used for a PCX image by using palette entries from 144 through 253. However, this sacrifices character colors 7 and 8.

Therefore, you can not use the sacrificed character colors to display characters since they are used for the PCX image.

To display a PCX image on the CODI, the image must first be downloaded. The image is stored in a specified font at a specified

character code. If a character is already defined at the specified position, it will be replaced by the PCX graphic. There are over 180 character positions available for the PCX graphic

Download Graphic

Format: \DG\type\font\key\spalette\npalette[\red\green\blue]\\data

Parameters: type = graphic file type (1):
1 = pcx
font = font index (1-8) to save graphic
key = key in font to use (1-192 except 10=<LF>, 13=<CR>, 17=<XOFF>, 19=<XON>, 127=<DEL>)
spalette = start palette entry for graphic colors (2-253)
npalette = number of palette entries (1-252)

red = red key color (0-255)
green = green key color (0-255)
blue = blue key color (0-255)
data = graphic binary data

Return: none

Description:

The Download Graphic command allows you to download a 256-color 8-bit PCX graphic image to the CODI. The image is stored as a key code in the specified font. The start palette number (spalette) and number of palette entries (npalette) specifies the palette entries that are to be used for displaying the PCX image. Palette entries 0 through 191 are used to display colors 1 through 8. Palette entries 192 through 253 are unused. You assign any number of palette entries to the PCX image. However, using entries 0 through 191 sacrifices character colors. If you select fewer CODI palette entries then there are colors in the PCX image, CODI will automatically reduce the graphic colors to the most used values.

After the PCX graphic image has been downloaded, it can be displayed by sending the specified key code from the specified font. An optional RGB key may be specified in the

command which represents an area of the PCX graphic that is transparent. It is suggested that the Acknowledge mode be set before downloading graphic data so the host can determine when the CODI has completed any processing of the data downloaded. The Acknowledge mode is set using the System Mode command. This command uses a portion of the available memory within the CODI to save the graphic image data.

Graphic Erase

Format: \GE\font\key\\

Parameters: font = font index (1-8) to erase graphickey = key in font to use (1-192 except 10=<LF>,13 =<CR>, 17 =<XOFF>, 19 =<XON>, 127 =<DEL>)

Return: none

Description:

The Graphic Erase command allows you to erase a graphic image that has been previously downloaded using the Download Graphic command. This command frees the CODI memory allocated to save the graphic image data.

Graphic Transparency

Format: \GL\font\key\percent\\ for PCX

\GL\font\key\rgbscale\alphascale\\ for TARGA

Parameters: font = font index (1-8) to erase graphic
key = key in font to use (1-191 except 10=<LF>, 13=<CR>,
17=<XOFF>, 19=<XON>, 127=<DEL>)
percent = amount of color which remains visible (0-100)

Return: none

Description:

The Graphic Transparency command allows you to set the transparency level of a graphic image. When the percent field is set to 100, the graphic is full on. When set to 0, the graphic is not visible.

PART 9: Letter Commands

The Letter commands allow you to reposition or delete any letter on the display. The System Lock mode affects the functionality of the letter position commands. When the System Lock mode is off, only the letter at the cursor position is affected. When the System Lock mode is on, all characters from the cursor position up to the end of the row are affected simultaneously.

Letter Blank

Format: \LB\\

Parameters: none

Return: none

Description:

The Letter Blank command deletes the character at the cursor position.

Letter Up

Format: \LU[\pixels]\\

Parameters: pixels = pixels to push letter up (optional)

Return: none

Description:

The Letter Up command moves the character at the cursor up by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the letter up one pixel. In the Locked mode, all characters to the right of the cursor are also moved up on the row.

Letter Down

Format: \LD[\pixels]\\

Parameters: pixels = pixels to push letter down (optional)

Return: none

Description:

The Letter Down command moves the character at the cursor down by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the letter down one pixel. In the Locked mode, all characters to the right of the cursor are also moved down on the row.

Letter Left

Format: \LL[\pixels]\\

Parameters: pixels = pixels to push letter left (optional)

Return: none

Description:

The Letter Left command moves the character at the cursor left by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the letter left one pixel. In the Locked mode, all characters to the right of the cursor are also moved left on the row.

Letter Right

Format: \LR\[pixels]\\

Parameters: pixels = pixels to push letter right (optional)

Return: none

Description:

The Letter Right command moves the character at the cursor right by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the letter right one pixel. In the Locked mode, all characters to the right of the cursor are also moved right on the row.

PART 10: Line Draw Commands

The Line Draw commands allow you to draw lines on the PC-CODI display. The drawing edge, color, and line size are completely programmable. You may position the drawing cursor to any position on the display, and draw a line to any other position. These commands were desiogned for applications such as real-time audience response systems, etc.

Please note that lines drawn on the display are NOT permanent, and cannot be saved with messages when using the Message Save command. Any PC-CODI command that redraws the display will erase any lines drawn. Therefore, use these commands to provide emphasis to displays that have already been composed.

Draw Color

Format: \XC\[color]\\

Parameters: color = color index (0 - 8) to draw

Return: none

Description:

The Draw Color command specifies the color to be used when drawing. Color 0 is black, or external video.

Draw Edge

Format: \XE\type\\

Parameters: type = edge type for drawing (N, O, B):

N = No Edge
O = Offset Edge
B = Border Edge

Return: none

Description:

The Draw Edge command sets the drawing edge type. The edge color is specified by the color selected using the Draw Color command.

Draw Line (To)

Format: \XL\[+,-] xaddr\[+,-] yaddr\\

Parameters: xaddr = x-pixel address to draw line
(NTSC: 0 - 666; PAL: 0 - 776)

yaddr = y-pixel address to draw line
(NTSC: 0 - 485; PAL: 0 - 575)

Return: none

Description:

The Draw Line-To command draws a line from the current draw cursor position to the specified x,y address, using the current color, size, and edge type. When the xaddr or yaddr is not preceded by a plus (+) or minus (-) sign, the values are absolute. When a sign is used, the draw-to position is relative to the current draw cursor position.

Please note that lines drawn on the display are NOT permanent, and cannot be saved with messages when using the Message Save command. Any PC-CODI command that redraws the display will erase any lines drawn.

Draw Move (To)

Format: \XM\[+,-] xaddr\[+,-] yaddr\\

Parameters: xaddr = x-pixel address of draw cursor
(NTSC: 0 - 666; PAL: 0 - 776)

yaddr = y-pixel address of draw cursor
(NTSC: 0 - 485; PAL: 0 - 575)

Return: none

Description:

The Draw Move-To command moves the draw cursor to the specified x,y address. When the xaddr or yaddr is not preceded by a plus (+) or minus (-) sign, the values are absolute. When a sign is used, the draw-to position is relative to the current draw cursor position.

Draw Size

Format: \XS\size\\

Parameters: size = size of line (1 - 10)

Return: none

Description:

The Draw Size command sets the line size used in Draw operations. The line is drawn using a circular “brush”; this command sets the diameter of the circle. (The circle diameter in pixels is 2 times the Draw Size value.)

PART 11: Message Commands

When a message is composed on the CODI display, it can be saved for later use within the CODI memory. You may save up to 99 messages. When required, saved messages may be displayed using any CODI Message Effect command.

A saved message may also be uploaded to the host. This provides the host with a means of saving a composed CODI message for future use. The host may download a message to the CODI memory as required.

Message Save

Format: \MS\message\\

Parameters: message = message index (1-99) to save

Return: none

Description:

The Message Save command is used to save the current display as a message with a unique message index so that it can be used again. This command saves the message displayed, color palette, background and tab fields. The saved message may be redisplayed at any time using the Message Display command or any of the other Message Effect commands. This command uses a portion of the available memory within the CODI unit to save the message.

Message Display

Format: \MD\message\\

Parameters: message = message index (1-99) to display

NOTE: If message index is specified as 0, the system will display the current message number, then increment the global message number by 1.

Return: none

Description:

Once a message has been saved using the Message Save command, it can be displayed at any time using the Message Display command and specifying the message index. This command updates the CODI display with the saved message, color palette, background and tab fields. Specifying a message index of 0 causes the system to display the current message number, then incrementing the message index by one, as follows:

Assume that there are three message stored in CODI memory.

|*MN|1*| <-- Set Message Number to 1 *(see MN command)*
|*MD|0*| <-- Displays Message 1 (value of Message Number), then increments the Message Number
|*MD|0*| <-- Display Mess. 2, increments Message Number to 3
|*MD|0*| <-- Display Mess. 3, increments Message Number to 4
|*MD|0*| <-- Returns Error (no Message number 4), then resets Message Number to 1

Note that the Message Number can be used with any command that requires a message.

Message Blank

Format: \MB\message\\

Parameters: message = message index (1-99) to erase

Return: none

Description:

The Message Blank command removes a previously saved message from the CODI by specifying the message index. When a message is blanked, the CODI frees the memory allocated.

Message Control

Format:

\MC\iterations\ME\parameters\time[\ME\parameters\time...]\\

Parameters: iterations = number of times for script (0=continuous)
parameters = parameters for message effect to perform
time = pause time between commands
(NTSC 60 counts/second, PAL 50 counts/second)

Return: none

Description:

It is possible to display a series of saved messages automatically using the Message Control command. This command may only use the Fade, Matrix Wipe and Push message effects. The messages may be displayed for a set number of iterations, or continuously if the iterations specified is zero. A continuous message control is terminated by sending a character or command from the host. Each message effect command is separated by a unique delay time to produce the required effect.

> **NOTE:** If the clock and/or timer is displayed, CODI will automatically turn them off for the duration of the effect sequence.

Upload Message

Format: \UM\message\mode\\

Parameters: message = message index (1-99) to upload
mode = upload mode (0,1):
0 = text information only
1 = text, tab, palette, background info

Return:

1.Text:
\DM\message\mode[\xaddr\yaddr\color\font\text...]\\
message = message index (1-99) to upload
mode = upload mode (0,1):
0 = text information only
1 = text, tab, palette, background info
xaddr= x-pixel address of character
yaddr= y-pixel address of character
color= color index (1-8)
font= font index (1-8)
text= row text (max 80 characters)

2.Tabs:
\DT[\tab\xaddr\yaddr\color\font\justification...]\\

tab = tab number (1-99) or name (max 11 chars)
xaddr = x-pixel address of tab field
yaddr = y-pixel address of tab field
color = color index (1-8)
font = font index (1-8)
justification = tab justify (L,LN,R,RN,C,CN):

L = left

LN = left numeric
R = right
RN = right numeric
C = center
CN = center numeric

palette colors (8):

\DP\color\R\rbs\gbs\bbs\rbe\gbe\bbe\res\ges\bes\ree\gee\bee\rms
\gms\bms\rme\gme\bme\color\R\rbs\gbs\bbs\rbe\gbe\bbe\res\ges
\bes\ree\gee\bee\rms\gms\bms\rme\gme\bme...\\
color= color index (1-8)
rbs= red body start (0-255)
gbs= green body start (0-255)
bbs= blue body start (0-255)
rbe= red body end (0-255)
gbe= green body end (0-255)
bbe= blue body end (0-255)
res= red edge start (0-255)
ges= green edge start (0-255)
bes= blue edge start (0-255)
ree= red edge end (0-255)
gee= green edge end (0-255)
bee= blue edge end (0-255)
rms= red mix start (0-255)
gms= green mix start (0-255)
bms= blue mix start (0-255)
rme= red mix end (0-255)
gme= green mix end (0-255)
bme= blue mix end (0-255)

background palette

(NTSC=256, PAL=271):
\DB\1\R\r\g\b\k\r\g\b\k...\\

r= red (0-255)
g= green (0-255)
b= blue (0-255)
k= key (0,1):
0 = display background
1 = display external video

display mode flag:\DD\dmode\\
dmode = display mode (0-65535)

colors(8): \DC\color\R\rbody\redge\gbody\gedge\bbody\bedge
\color\R\rbody\redge\gbody\gedge\bbody\bedge...\\
color= color index (1-8)
rbody= red body color (0-255)
redge= red edge color (0-255)
gbody= green body color (0-255)
gedge= green edge color (0-255)
bbody= blue body color (0-255)
bedge = blue edge color (0-255)

transparency (8):\DL\color\body\edge\color\body\edge...\\
color= color index (1-8)
body= body transparency level (0-255)
edge= edge transparency level (0-255)

color mode flag:

\DZ\cmode\\
cmode = color mode (0-255)

Description:

The Upload Message command sends the message text information for a specified message to the host. The CODI provides the x/y-pixel address, color, font and ASCII

character information for each character in the message text. When using mode 0, only the message text is uploaded. When using mode 1 to upload all message information, CODI also uploads tab, palette, background and transparency data.

Download Message

Format: \DM\message\mode[\xaddr\yaddr\color\font\text...]\\

Parameters: message= message index (1-99) to download
mode= download mode (0,1):

0 = text information only
1 = text, tab, palette, background info

xaddr= x-pixel address of character
yaddr= y-pixel address of character
color= color index (1-8)
font= font index (1-8)
text= message text

Return: none

Description:

The Download Message command allows the user to download a message from the host to a specified message index. The downloaded data always begins with the message text information. This includes the x/y-pixel address, color, font and ASCII character information for each character in the message text. In mode 0, only the message text is downloaded. The CODI saves the tab, palette and background parameters of the current display with the message. In mode 1, the additional tab, palette, and background parameters are also downloaded. Refer to the Upload Message command for the required message parameter formats.

Message Jitter

Format: \MJ\offset\cycles\time\\

Parameters: offset = offset in scanline pairs (1-30)
cycles = number of jitters (1 or more)
time = time for one jitter cycle (2 or more)

Return: none

Description:

The Message Jitter command causes the display to jitter up and down for the specified number of cycles.

Message Number

Format: \MN\number\\ (where ## + 1-199, saved or unsaved)

Parameters: number = global Message Number (range: 1-99)

Return: none

Description:

The Message Number command allows you to set the system variable "message number" to any number between 1 and 99. This command is useful for selecting a pre-specified range of messages for automatic display, etc.

For example, you may have a range of ten messages begining with message number 50, and another ten messages beginning with message number 75. To display the series of messages, send these commands:

\MN\50\\ - sets global message index to 50
\MD\0\\ - displays the first message (#50), then increments
\MD\0\\ - displays next message (#51), increments
(repeat the \MD\0\\ command for all 10 messages.)

When the \MD\0\\ command reaches the end of valid messages, an error message is generated, and the global Message Number is reset to 1.

To display the next series of messages, send these commands:

\MN\75\\ - sets global message index to 75
\MD\0\\ - displays first message (#75), then increments
\MD\0\\ - displays next message (#76), increments

(repeat this command for all 10 messages.)

PART 12: Message Effect Commands

CODI provides several message transition effects. These effects replace the current message display with a previously saved message using a display effect.

There are three basic transitional message effects:

a. Fade
b. Matrix Wipe
c. Push

In addition, CODI supports a Crawl and Roll effect. A Crawl shifts a row of text from left to right across the display at any y-pixel address. A Roll shifts any number of rows of text from bottom to top on the display. Both Crawl and Roll support imbedded font and color changes, and have a feature to pause the effect for a specified time.

Message Effect Cover

Format: \ME\CO\message\direction\speed[\mode]\\

Parameters: message = message index (1-99)
direction = cover direction (U,D):

U = up
D = down
speed= cover speed (1-10)

Table 3:

Speed	NTSC	PAL
1	120 P/S	100 P/S
2	240 P/S	200 P/S
3	360 P/S	300 P/S
4	480 P/S	400 P/S
5	600 P/S	500 P/S
6	720 P/S	600 P/S
7	840 P/S	700 P/S
8	960 P/S	800 P/S
9	1080 P/S	900 P/S
10	1200 P/S	1000 P/S

mode = ease mode (S,E,SE): (optional)
S = ease in at beginning of cover
E = ease out at end of cover
SE = ease at beginning and end of cover

Return: none

Description:

The Cover command covers the current message with the specified message. The Cover message effect uses the background and color palette of the original message while performing the effect.

NOTE: If the clock and/or timer is displayed, CODI will automatically turn them off for the duration of the effect.

Message Effect Hide

Format: \ME\HI\message\direction\speed[\mode]\\

Parameters: message = message index (1-99)
direction = hide direction (U,D):

U = up
D = down
speed = hide speed (1-20):

Table 4:

Speed	NTSC	PAL
1	30 P/S	25 Pixels/Second
2	40 P/S	33 P/S
3	60 P/S	50 P/S
4	120 P/S	100 P/S
5	240 P/S	200 P/S
6	360 P/S	300 P/S
7	480 P/S	400 P/S
8	600 P/S	500 P/S
9	720 P/S	600 P/S
10	840 P/S	700 P/S
11	960 P/S	800 P/S
12	1080 P/S	900 P/S
13	1200 P/S	1000 P/S
14	1320 P/S	1100 P/S
15	1440 P/S	1200 P/S
16	1560 P/S	1300 P/S
17	1680 P/S	1400 P/S
18	1800 P/S	1500 P/S
19	1920 P/S	1600 P/S
20	2040 P/S	1700 P/S

mode = ease mode (S,E,SE): (optional)
S = ease in at beginning of hide
E = ease out at end of hide
SE = ease at beginning and end of hide

Return: none

Description:

The Hide command slides the specified message over the current message. The Hide message effect uses the background and color palette of the original message while performing the effect. The optional mode field may be used to accelerate the hide from a stop to the specified speed and/or decelerate the hide from full speed to a stop.

> **NOTE**: If the clock and/or timer is displayed, CODI will automatically turn them off for the duration of the effect.

Message Effect Peel

Format:\ME\PE\message\direction\speed[\mode]\\

Parameters:message = message index (1-99)
direction = peel direction (U,D):

U = up
D = down
speed= peel speed (1-10):

Table 5: Peel Speed Selections

Speed	NTSC	PAL
1	120 P/S	100 P/S
2	240 P/S	200 P/S
3	360 P/S	300 P/S
4	480 P/S	400 P/S
5	600 P/S	500 P/S
6	720 P/S	600 P/S
7	840 P/S	700 P/S
8	960 P/S	800 P/S
9	1080 P/S	900 P/S
10	1200 P/S	1000 P/S

mode= ease mode (S,E,SE): (optional)
S = ease in at beginning of peel
E = ease out at end of peel
SE = ease at beginning and end of peel

Return: none

Description:

The Peel command peels the current message from the display to reveal the specified message. The Peel message effect uses the background and color palette of the original message while performing the effect.

NOTE: If the clock and/or timer is displayed, CODI will automatically turn them off for the duration of the effect.

Message Effect Pour

Format: \ME\PO\message\speed\\

Parameters: message = message index (1-99)
speed = pour speed (1-10):

Table 6: "Pour" Speed Selections

Speed	NTSC	PAL
1	20.25 sec	28.80 sec
2	18.23 sec	25.92 sec
3	16.20 sec	23.04 sec
4	14.18 sec	20.16 sec
5	12.15 sec	17.28 sec
6	10.13 sec	14.40 sec
7	8.10 sec	11.52 sec
8	6.08 sec	8.64 sec
9	4.05 sec	5.76 sec
10	2.03 sec	2.88 sec

Return: none

Description:

The Pour command pours the specified message onto the display. The Pour message effect uses the background and color palette of the original message while performing the effect.

Message Effect Reveal

Format:\ME\RV\message\direction\speed[\mode]\\

Parameters:message = message index (1-99)
direction = reveal direction (U,D):

U = up
D = down
speed = reveal speed (1-20):

Table 7: Reveal Speed Selections

Speed	NTSC	PAL
1	30 P/S	25 Pix'l/Second
2	40 P/S	33 P/S
3	60 P/S	50 P/S
4	120 P/S	100 P/S
5	240 P/S	200 P/S
6	360 P/S	300 P/S
7	480 P/S	400 P/S
8	600 P/S	500 P/S
9	720 P/S	600 P/S
10	840 P/S	700 P/S
11	960 P/S	800 P/S
12	1080 P/S	900 P/S
13	1200 P/S	1000 P/S
14	1320 P/S	1100 P/S
15	1440 P/S	1200 P/S
16	1560 P/S	1300 P/S
17	1680 P/S	1400 P/S
18	1800 P/S	1500 P/S
19	1920 P/S	1600 P/S
20	2040 P/S	1700 P/S

mode = ease mode (S,E,SE): (optional)
S = ease in at beginning of reveal
E = ease out at end of reveal
SE = ease at beginning and end of reveal

Return: none

Description:

The Reveal command slides the current message off the display to reveal the specified message. The Reveal message effect uses the background and color palette of the original message while performing the effect. The optional mode field may be used to accelerate the reveal from a stop to the specified speed and/or decelerate the reveal from full speed to a stop.

> **NOTE**: If the clock and/or timer is displayed, CODI will automatically turn them off for the duration of the effect.

Message Effect Split

Format: \ME\SP\message\direction\speed[\mode]\\

Parameters: message = message index (1-99)
direction = split direction (U,D):
U = center to up/down
D = up/down to center
speed= split speed (1-10):

Table 8: Split Speed Selections

Speed	NTSC	PAL
1	120 P/S	100 P/S
2	240 P/S	200 P/S
3	360 P/S	300 P/S
4	480 P/S	400 P/S
5	600 P/S	500 P/S
6	720 P/S	600 P/S
7	840 P/S	700 P/S
8	960 P/S	800 P/S
9	1080 P/S	900 P/S
10	1200 P/S	1000 P/S

mode = ease mode (S,E,SE): (optional)
S = ease in at beginning of split
E = ease out at end of split
SE = ease at beginning and end of split

Return: none

Description:
The Split command split the current message horizontally at the center of the display to reveal the specified message. The Split message effect uses the background and color palette of the original message while performing the effect.

NOTE: If the clock and/or timer is displayed, CODI will automatically turn them off for the duration of the effect.

Message Effect Weave

Format:\ME\WE\message\ysize\speed[\mode]\\

Parameters:message = message index (1-99)
ysize = size of the row to weave (NTSC 8-242, PAL 8-286)
speed = weave speed (1-20):

Table 9: Weave Speed Selections

Speed	NTSC	PAL
1	30 P/S	25 Pixels/Second
2	40 P/S	33 P/S
3	60 P/S	50 P/S
4	120 P/S	100 P/S
5	240 P/S	200 P/S
6	360 P/S	300 P/S
7	480 P/S	400 P/S
8	600 P/S	500 P/S
9	720 P/S	600 P/S
10	840 P/S	700 P/S
11	960 P/S	800 P/S
12	1080 P/S	900 P/S
13	1200 P/S	1000 P/S
14	1320 P/S	1100 P/S
15	1440 P/S	1200 P/S
16	1560 P/S	1300 P/S
17	1680 P/S	1400 P/S
18	1800 P/S	1500 P/S
19	1920 P/S	1600 P/S
20	2040 P/S	1700 P/S

mode = ease mode (S,E,SE): (optional)
S = ease in at beginning of weave
E = ease out at end of weave
SE = ease at beginning and end of weave

Return: none

Description:

The Weave command slides alternating rows at the ysize specified from the left and right sides of the display and pushes the current message out and the new message in. The Weave message effect uses the background and color palette of the original message while performing the effect. The optional mode field may be used to accelerate the weave from a stop to the specified speed and/or decelerate the weave from full speed to a stop.

> **NOTE**: If the clock and/or timer is displayed, CODI will automatically turn them off for the duration of the effect.

Message Effect Crawl Setup

Format: \ME\CS\data\\

Parameters: data = text to crawl. Data may also contain:
a.Font Select command \Fn\\
b.Color Select command \Cn\\
c.System Wait command \SW\n\\

where n is wait time (NTSC 60/sec, PAL 50/sec)

Return: none

Description:

The Crawl Setup command configures the CODI text and commands to be used during a crawl. Data that can be used in the Crawl Setup command are characters, Font Select commands (\Fn\\), Color Select commands (\Cn\\), and System Wait commands (\SW\n\\). Any other CODI commands that are imbedded in the crawl data will generate an error response and will be ignored. The crawl data may be up to 4500 characters. This command uses a portion of the available memory within the CODI to save the crawl data.

Message Effect Crawl Begin

Format: \ME\CB\speed\iterations\yaddr\\

Parameters: speed= crawl speed (1-10):

speedNTSCPAL
060 P/S50 Pixels/Second
1120 P/S100 P/S
2240 P/S200 P/S
3360 P/S300 P/S
4480 P/S400 P/S
5600 P/S500 P/S
6720 P/S600 P/S
7840 P/S700 P/S
8900 P/S800 P/S
91080 P/S900 P/S
101200 P/S1000 P/S

iterations = number of crawls to perform (0 = continuous, H = host data).

Yaddr = y-pixel address to crawl data (NTSC 0-485, PAL 0-575)

Return: none

Description:

Once the Crawl data has been setup on the CODI, the Crawl may begin. The Crawl Begin command instructs CODI to shift characters from the right side of the screen to the left. As the characters are shifted off the left side of the screen, new characters are displayed from the right of the screen. The CODI repeats displaying the complete crawl for each iteration specified. If zero iterations are specified, the crawl continues until a new character or command is received from the host. CODI will always complete the last iteration of the crawl when a continuous crawl is terminated.

Since the Crawl is only a single line on the screen, any carriage return characters in the crawl data are translated into space characters.

If iterations is specified as 'H' (Host data), crawl data is supplied directly from the host. The CODI does NOT crawl the Crawl Setup data. (This mode does not require that the Crawl Setup command be used before beginning the crawl.) The host crawl data may contain any imbedded commands as permitted in the Crawl Setup command. The crawl may be terminated by specifying the '\\' character string.

NOTES: If the crawl data is supplied directly from the host, any data previous setup using the Crawl Setup command is erased. You must reset the Crawl Setup data if it will be required for a crawl.

In addition, you must preselect the largest font to be used in the crawl data using the Font Select command. The current font specifies the crawl window size when the Crawl Begin command is used.

If the clock and/or timer are displayed, you must ensure that they are displayed within the static area. If the clock/timer are displayed within the active crawl area, they will crawl with the crawl text.

Message Effect Crawl Erase

Format: \ME\CE\\

Parameters: none

Return: none

Description:

The Crawl terminates after the last iteration of the crawl is completed, or a character or command is received from the host in a continuous crawl. If you do not plan to use the crawl data again, you may erase the crawl data using the Crawl Erase command. This will free the CODI memory allocated to the crawl data which may be used by other commands. Once the crawl data has been erased using this command, you must setup a new crawl using the Crawl Setup command before a new Crawl can be performed.

Message Effect Fade

Format: \ME\FA\message\speed\\

Parameters: message = message index (1-99) to fade onspeed = fade speed (1-7):

Speed	Fade Time
1	16.00 seconds (slowest)
2	8.00
3	4.00
4	2.00
5	1.00
6	0.50
7	0.25 second (fastest)

Return: none

Description:

The Fade message effect will fade the current screen to black and the new message specified will be displayed in its place. The new message is displayed with its saved background and color palette. The Fade command is the only message effect that displays the new message with its saved background and palette.

If the current message is displayed on external video, the message does not fade to black, but to external video. The new message fades in from external video to the new display.

Message Effect Matrix Wipe

Format: \ME\MW\message\type\xsize\ysize\speed[\color]\\

Parameters: message = message index (1-99) to wipe
type = wipe type to perform (0-13):

0 = random order
1 = top to bottom
2 = middle to top and bottom
3 = top and bottom to middle
4 = left to right
5 = middle to left and right
6 = left and right to middle
7 = spiral-out
8 = left to right with a line
9 = top to bottom with a line
10 = diagonal from top-left to bottom-right
11 = diagonal from top-right to bottom-left
12 = diagonal from bottom-left to top-right
13 = diagonal from bottom-right to top-left
14 = multi-diagonal top-left to bottom-right
15 = multi-diagonal top-right to bottom-left
16 = multi-diagonal bottom-left to top-right
17 = multi-diagonal bottom-right to top-left
18 = snake from top-left to bottom-right
19 = snake from top-left to right-bottom
20 = snake from top-right to bottom-left
21 = snake from top-right to left-bottom
22 = snake from bottom-left to top-right
23 = snake from bottom-left to right-top
24 = snake from bottom-right to top-left
25 = snake from bottom-right to left-top

26 = spiral-in
27 = clockwise radar sweep
28 = counterclockwise radar sweep
29 = horizontal blinds
30 = vertical blinds

xsize = x-pixels of wipe block (NTSC 1-666, PAL 1-776)
ysize = y-pixels of wipe block (NTSC 0-485, PAL 0-575)
speed= speed of message wipe (1-10)
color = color index (1-8). Line color for wipe types 8 and 9 only.

Return: none

Description:

The Matrix Wipe message effect causes a new message to be displayed over the current message using one of 30 different matrix wipe effects. The Matrix Wipe speed depends on the wipe block size and effect type specified. You will have to experiment with the block size, type and speed to produce the desired effect. The Matrix Wipe message effect uses the background and color palette of the original message while performing the effect.

NOTE: If the clock and/or timer is displayed, CODI will automatically turn them off for the duration of the effect.

Message Effect Zoom

Format: \ME\ZO\message\direction\speed\steps\\

Parameters: message = message index (1-99)
direction = zoom direction (H,V,HV):
H = horizontal only
V = vertical only
HV = horizontal and vertical
speed= zoom speed (1-10):

Table 10:

speed	NTSC	PAL
1	1.80 sec	2.16 sec
2	1.63 sec	1.92 sec
3	1.40 sec	1.68 sec
4	1.20 sec	1.44 sec
5	1.00 sec	1.20 sec
6	0.80 sec	0.96 sec
7	0.60 sec	0.72 sec
8	0.40 sec	0.48 sec
9	0.20 sec	0.24 sec
10	0.10 sec	0.10 sec

steps = number of zoom steps (1-15)

Return: none

Description:

The Zoom command zooms the display in on the current message, then zooms the display out from the specified message. The Zoom message effect uses the background and color palette of the original message while performing the zoom effect. The background remains unchanged.

Message Effect Push

Format: \ME\PU\message\direction\speed[\mode]\\

Parameters: message = message index (1-99) to push on
direction = push direction (L,R,U,D):
L = leftU = up
R = rightD = down
speed = push speed (1-20):

Table 11: Push Speed Selections

Speed	NTSC	PAL
1	30 P/S	25 Pixels/Second
2	40 P/S	33 P/S
3	60 P/S	50 P/S
4	120 P/S	100 P/S
5	240 P/S	200 P/S
6	360 P/S	300 P/S
7	480 P/S	400 P/S
8	600 P/S	500 P/S
9	720 P/S	600 P/S
10	840 P/S	700 P/S
11	960 P/S	800 P/S
12	1080 P/S	900 P/S
13	1200 P/S	1000 P/S
14	1320 P/S	1100 P/S
15	1440 P/S	1200 P/S
16	1560 P/S	1300 P/S
17	1680 P/S	1400 P/S
18	1800 P/S	1500 P/S
19	1920 P/S	1600 P/S
20	2040 P/S	1700 P/S

mode = ease mode (S,E,SE): (optional)
S = ease in at start of push
E = ease out at end of push
SE = ease at start and end of push

Return: none

Description:

The Push command causes the current message to slide off the display as a new message is sliding into place. The Push message effect uses the background and color palette of the original message while performing the effect. The optional mode field may be used to accelerate the push from a stop to the specified speed and/or decelerate the push from full speed to a stop.

> **NOTE:** If the clock and/or timer are displayed, CODI will automatically turn them off for the duration of the effect.

Message Effect Roll Setup

Format: \ME\RS\data\\

Parameters: data = text data to roll. Data may also contain:

- Font Select command \Fn\\
- System Cursor \SC\0or1\+-X\+-Y\\
  (X can be absolute, or relative [w/+ or - sign]; Y is ignored)
- Tab Typewriter \TT\N\\
- Color Select command \Cn\\
- Row Center command \RC\\
- System Wait command \SW\n\\ where n is wait time (NTSC 60/sec, PAL 50/sec)
- Row Right command \RR\\ **Note:** Y value is ignored.
- Tab Position \TP\N\\

Return: none

Description:
The Roll Setup command configures the CODI text and commands to be used during a roll.

Data that can be used in the Roll Setup command are characters, plus certain commands: Font Select (\Fn\\), Color Select (\Cn\\), Row Center commands (\RC\\), Row Right (\RR\\), System Wait (\SW\n\\), System Cursor (\SC\\), System Kern (\SK\\), Tab Position (\TP\\), and Tab Typewriter (\TT\\).

The Row Center, Row Right and System Wait commands may appear anywhere on a roll data line in order to affect the line. Any other CODI commands that are imbedded in the roll data will generate an error response and will be ignored. The roll data may be up to 4500 characters. This command uses a portion of the available memory within the CODI to save the roll data.

Message Effect Roll Begin

Format: \ME\RB\speed\iterations[\yaddr]\\

Parameters: speed = roll speed (1-5):

SpeedNTSCPAL

060 SL/S50 SL/S
1120 SL/S100 Scan Lines/Second
2240 SL/S200 SL/S
3360 SL/S300 SL/S
4480 SL/S400 SL/S
5600 SL/S500 SL/S

iterations = number of times to roll data

(0 = continuous, H = host data).
yaddr = y-pixel address to roll data (optional)
(NTSC 10-475, PAL 10-565)

Return: none

Description:

Once the roll data has been setup on the CODI, the roll may begin. When the Roll Begin command is issued, the current display is shifted off the top of the screen as the roll data is shifted on from the bottom. The CODI displays the complete roll for each iteration specified. If zero iterations are specified, the roll continues until a new character or command is received from the host. CODI will always complete the last iteration of the roll when a continuous roll is terminated.

If iterations is specified as 'H' (Host data), roll data are supplied directly from the host. The CODI does NOT roll the Roll Setup data. (This mode does not require that the Roll

Setup command be used before beginning the roll.) The host roll data may contain any imbedded commands as permitted in the Roll Setup command. The roll may be terminated by specifying the '\\' character string.

NOTES: If the roll data are supplied directly from the host, any data previous setup using the Roll Setup command are erased. You must reset the Roll Setup data if it will be required for a roll.

The roll yaddr is an optional field and may be used to specify the start scan line of an active roll area of the display. The display above the roll y-pixel address remains static during the roll. If a yaddr is not specified, the roll uses the entire display.

Because of design restrictions in the CODI, there will be a breakup in the character display for the first four scan lines above the specified roll window y-pixel address when using speed 1 or 2. If there are no characters displayed at these scan lines (which is typically the case), this condition will go unnoticed. This condition-does not exist when using speeds 3 through 5.

If the clock and/or timer are displayed, you must ensure that they are displayed within the static area. If the clock/timer are displayed within the active roll area, they will roll with the roll text.

Message Effect Roll Erase

Format: \ME\RE\\

Parameters: none

Return: none

Description:

The Roll terminates after the last iteration of the roll is completed, or a character or command is received from the host in a continuous roll. If you do not plan to use the roll data again, you may erase the roll data using the Roll Erase command. This will free the CODI memory allocated to the roll data which may be used by other commands. Once the roll data has been erased using this command, you must setup a new roll using the Roll Setup command before a new roll can be performed.

PART 13: Palette Commands

The Download Palette command allows you to define the palette values for a character color using HSI or RGB values. The Color Setup command is used to set up the character color palette interactively.

The Upload Palette command allows you to upload the character palette values to the host. The host may save the uploaded palette values for future use.

Download Palette (HSI)

Format: \DP\color\H\hbody\sbody\ibody\hedge\sedge\iedge
[\color\H\hbody\sbody\ibody\hedge\sedge\iedge...]\\

Parameters: color = color index (1-8) to set
hbody= hue body (0-360)
sbody= saturation body (0-255)
ibody= intensity body (0-255)
hedge= hue edge (0-360)
sedge= saturation edge (0-255)
iedge = intensity edge (0-255)

Return: none

Description:

The HSI Download Palette command is used to define the palette values for one or more colors. The command defines the hue, saturation and intensity color values for the character body and edge.

Download Palette (RGB)

Format: \DP\color\R\rbody\gbody\bbody\redge\gedge\bedge
[\color\R\rbody\gbody\bbody\redge\gedge\bedge...]\\

Parameters: color = color index (1-8) to set
rbody = red body (0-255)
gbody= green body (0-255)
bbody= blue body (0-255)
redge= red edge (0-255)
gedge= green edge (0-255)
bedge= blue edge (0-255)

Return: none

Description:

The RGB Download Palette command is used to define the palette values for one or more colors. The command defines the red, green and blue color values for the character body and edge.

Upload Palette

Format: \UP\mode\\

Parameters: mode = upload palette mode (1-9):
1-8 = upload palette for this color index
9 = upload palette for all colors

Return: \DP\color\R\rbody\gbody\bbody\redge\gedge\bedge\\
color= color index (1-8)
rbody= red body (0-255)\
gbody= green body (0-255)
bbody= blue body (0-255)
redge= red edge (0-255)
gedge= green edge (0-255)
bedge= blue edge (0-255)

Description:

The Upload Palette command sends the palette RGB information for a specified color to the host. The system provides both the character body and edge palette information for the specified color. By specifying color nine (9), the system responds with the palette information for all eight system colors.

PART 14: Page Commands

The Page commands provide several editing functions which operate on the current display. Page commands pertain to the entire page or screen.

Page Blank

Format: \PB[\frame]\\

Parameters: frame = frame number to blank (1,2) (optional):
1 = frame 1
2 = frame 2

Return: none

Description:

The Page Blank command erases all characters on the specified page and positions the cursor at the Home position. If no frame number is specified, both frame buffers are cleared.

Page Center

Format: \PC[\direction]\\

Parameters: direction = page center direction (V,H): (optional)
V = center page vertically only
H = center page horizontally only

Return: none

Description:

The Page Center command centers all rows on the screen. When the direction parameter is not specified, this command centers the display both vertically and horizontally. When the direction parameter is specified, the page is center in that direction only.

Page Up

Format: \PU[\pixels]\\

Parameters: pixels = pixels to push up (optional)

Return: none

Description:

The Page Up command moves all characters on the page up by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the page up one pixel.

Page Down

Format: \PD[\pixels]\\

Parameters: pixels = pixels to push down (optional)

Return: none

Description:

The Page Down command moves all characters on the page down by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the page down one pixel.

Page Left

Format: \PL[\pixels]\\

Parameters: pixels = pixels to push left (optional)

Return: none

Description:

The Page Left command moves all characters on the page left by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the page left one pixel. If the new position of a character is left of the screen edge, it is repositioned to be at the left edge.

Page Right

Format: \PR[\pixels]\\

Parameters: pixels = pixels to push right (optional)

Return: none

Description:

The Page Right command moves all characters on the page right by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the page right one pixel.

PART 15: Row Commands

The Row commands provide several editing functions which operate on the current cursor row. CODI provides up to 23 rows on the display at one time.

Row Swap

Format: \RW\direction\\

Parameters: direction = swap direction (U,D):

U = swap current row with row above
D = swap current row with row below

Return: none

Description:

The Row Swap command allows you to swap the position of the cursor row with either the row above or row below the cursor. After the rows are swapped, the cursor remains fixed on the original row position.

Row Color

Format: \RO\\

Parameters: none

Return: none

Description:

The Row Color command changes the color of all characters from the cursor position to the end of the row to the current color. If the cursor is positioned at the first character in the row, the entire row is changed to the current color. Use the Color Select command to set the current color.

Row Font

Format: \RF\\

Parameters: none

Return: none

Description:

The Row Font command changes the font of all characters from the cursor position to the end of the row to the current font. If the cursor is positioned at the first character in the row, the entire row is changed to the current font. Use the Font Select command to set the current font.

Row Blank

Format: \RB\\

Parameters: none

Return: none

Description:

The Row Blank command erases all characters on the cursor row and positions the cursor at the beginning of the row.

Row Center

Format: \RC\\

Parameters: none

Return: none

Description:

The Row Center command centers the characters on the cursor row. After the row is centered, the cursor is repositioned at the start of the row.

Row Up

Format: \RU[\pixels]\\

Parameters: pixels = pixels to push row up (optional)

Return: none

Description:

The Row Up command moves all characters on the cursor row up by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the row up one pixel.

Row Down

Format: \RD[\pixels]\\

Parameters: pixels = pixels to push row down (optional)

Return: none

Description:

The Row Down command moves all characters on the cursor row down by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the row down one pixel.

Row Left

Format: \RL[\pixels]\\

Parameters: pixels = pixels to push row left (optional)

Return: none

Description:

The Row Left command moves all characters on the cursor row left by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the row left one pixel. If the new position of a character is left of the screen edge, it is repositioned to the left edge.

Row Right

Format: \RR[\pixels]\\

Parameters: pixels = pixels to push row right (optional)

Return: none

Description:

The Row Right command moves all characters on the cursor row right by a specified number of pixels. The pixel parameter is optional. If the pixel count is not specified, the command moves the row right one pixel. If the right edge is closer than the specified number of pixels, CODI will ignore the command.

Row Insert

Format: \RI\\

Parameters: none

Return: none

Description:

The Row Insert command allows insertion of a new row at the cursor row. The cursor row and any subsequent rows are moved down by one row on the screen. The inserted row is blank.

Row Expand

Format: \RE[\repeat]\\

Parameters: repeat = iterations for \RE\\ command

Return: none

Description:

The Row Expand command expands the spacing between all characters on the row. The repeat parameter is optional. If the repeat count is not specified, the command expands the character spacing by one pixel.

Row Squeeze

Format: \RS[\repeat]\\

Parameters: repeat = iterations for \RS\\ command

Return: none

Description:

The Row Squeeze command squeezes the spacing between all characters on the row. The repeat parameter is optional. If the repeat count is not specified, the command squeezes the character spacing by one pixel.

PART 16: System Commands

The System commands provide various CODI functions for setting system operating modes and determining the CODI operating status. The following list contains the system commands that will be discussed in this section in the order in which they appear:

- System Acknowledge
- System Cursor
- System Display
- System Execute
- System Home
- System ID
- System Lock
- System Communication Mode
- System Overwrite/Insert Mode
- System Patterns
- System Reset
- System Safe Title
- System Status
- Self Test
- System Update
- System Wait

System Acknowledge

Format: \SA\\

Parameters: none

Return: *<CR><LF>

Description:

The System Acknowledge command is used if the Acknowledge mode has not been set and you wish to know when a command has been completed. To use the System Acknowledge command, send a CODI command followed by the System Acknowledge command. Once the CODI command has been processed, the acknowledge command is processed and the acknowledge character is sent back to the host.

System Cursor (Prompt Channel)

Format: \SC\mode\Xaddr\Yaddr\\

Parameters: mode = cursor display mode (0,1,2):

0 = off (default)
1 = shaded rectangle cursor
2 = outlined rectangle cursor

xaddr= x-pixel address of cursor (NTSC 1-666, PAL 1-776)
yaddr= y-pixel address of cursor (NTSC 0-485, PAL 0-575)

Return: none

Description:

The System Cursor command is used to enable or disable the cursor, to select the cursor type, and to specify its location. If the cursor is enabled, it will be visible on the Prompt Channel output. By default, the cursor is off.

Optionally, the System Cursor command allows you to position the CODI cursor to any x,y position on the display. When the xaddr or yaddr is not preceded by a plus (+) or minus (-) sign, the values are absolute. When a sign is used, the cursor is position relative to the current cursor position. If a character is displayed at the x,y specified, the system automatically aligns to the character.

System Display

Format: \SD[\frame1\frame2]\\

Parameters: frame1 = display frame number (1,2) (optional)
frame2 = work frame number (1,2) (optional)

Return: none

Description:

CODI contains two frame buffers. By default, frame1 is the display and work frame. The second frame buffer is used to build pages, perform message effects, etc. As characters are sent to CODI, they are built and displayed in the first frame buffer. It is possible for CODI to work in one frame buffer while displaying in the other. The System Display command allows you to set the display and work frames.

System Execute

Format: \SE\mode\\

Parameters: mode = system command execute mode (0,1):
0 = display characters (default)
1 = ignore characters

Return: none

Description:

The System Execute command allows you to set the execute mode. In mode 0, characters received from the host are displayed on screen. In mode 1, all characters received from the host are ignored. The default is mode 0.

System Home

Format: \SH\\

Parameters: none

Return: none

Description:

The System Home command places the system cursor in the Home position, or top left corner of the screen.

System Kern

Format: \SK\[+,-]amount\\

Parameters: amount = number of pixels to add or subtract between all characters:

Description:

The System Kern command is used to set a global amount of whitespace to add or subtract between all characters sent to CODI. The amount can be either positive (pixels are added between characters) or negative (pixels are subtracted). To clear the system kern command, use a value of zero.

System Lock

Format: \SL\mode\\

Parameters: mode = lock mode (0,1):
0 = unlocked
1 = locked (default)

Return: none

Description:

The System Lock command allows you to set the lock mode. In the Locked mode, all Letter commands affect the character at the cursor position and all trailing characters on that row. In the Unlocked mode, all Letter commands affect only the character at the cursor. The default is Locked mode.

System Communication Mode

Format: \SM\cmode\\

Parameters: cmode= communication mode (0-7):

Cmode	Acknowledge	Checksum
0	no	no
1	yes	no
2	no	yes
3	yes	yes
4	no	no
5	yes	no
6	no	yes
7	yes	yes

Return: none

Description:

The System Communication Mode command allows you to set the communications parameters of the CODI. In Acknowledge mode, the CODI returns an acknowledge character (*) after each command is processed. In Checksum mode, the CODI required a 5-digit ASCII checksum of each command sent to the CODI. In addition, the CODI adds a checksum onto all data sent to the host.

> **NOTES:** If the checksum mode is enabled, the 5-digit checksum value following each command sent to the CODI is the summation of the ASCII values of each command character except the initial"\" character. If CODI determines that the checksum does not match the command data received, the command is

ignored and a checksum error code 050 is returned to the host. The host may respond by retransmitting the command.

In addition, CODI appends a 5-digit checksum value to all data sent to the host. The host may then verify that there is no error in the data it has received.

Some sample command checksum values are:

Command	Checksum
\SM\1\\	00485
\SM\6\\	00490
\VV\\	00356
\SS\\	00350
\SF\\	00337
\SR\\	00349
\UB\1\\	00476

System Overwrite/Insert

Format: \SO\mode\\

Parameters: mode = overwrite/insert mode (0,1):

0 = insert
1 = overwrite (default)

Return: none

Description:

The System Overwrite/Insert command allowsselection of the Overwrite or Insert mode. In Overwrite mode, new characters overwrite existing characters. In Insert mode, new characters are inserted in front of the character at the current cursor position. The default is Overwrite mode.

System Patterns

Format: \SP\pattern\\

Parameters: pattern = CODI test pattern number (1-22):

Return: none

Table 12: PC-CODI Test Patterns

Number	Pattern
1	Full Field Color Bars
2	Full Field Color Bars Separated
3	SMPTE Bars (simulated)
4	Convergence Pattern
5	Black and White Bars
6	Y----- Ramp, 100 IRE
7	Yellow-Mode Ramp, 100 IRE
8	Blue-Mode Ramp, 100 IRE
9	Modulated Pedestal
10	Reverse Blue Bars
11	Red Field
12	Blue Field
13	Field Square Wave
14	Window/Field Bar
15	10 Step Staircase
16	Production Color Bars
17	Dump Palette Using Bars (RWM)
18	Dump Palette Using Squares
19	B-Y, R-Y Test Pattern
20	Quickfill
21	Background Key Test
22	Video Key Test

Description:

The CODI can display 22 different test patterns. Use the System Pattern command to display one of the patterns.

NOTE: Due to CODI limitations, some test patterns may have idiosyncrasies.

System Reset

Format: \SR\\

Parameters: none

Return: 000*

Description:

The System Reset command performs a reset of the CODI system. All system parameters are reset to their startup (default) settings. All messages, roll, crawl and GPI buffers are erased. The CODI responds by sending the startup message (000*) to the host.

System Safe Title (Prompt Channel)

Format: \SG\mode\Xmin\Ymin\Xmax\Ymax\\

Parameters: mode = safe title function mode (0,1,2):

0 = off (cancels Safe Title Display on Prompt channel)
1 = on (Safe Title on; restricts characters to safe title area)
2 = on (Safe Title on, does not restrict character placement)

Xmin, Ymin = upper left corner of Safe Title area*
Xmax, Ymax = lower right corner of Safe Title area*

* default value for Safe Title area is 80% of active video area. Boundaries for Safe Title area need to be specified only when changing the default value.

Return: none

Description:

This command is used to control the CODI Prompt Channel Safe Title display. The Prompt Channel is a two bit frame buffer that does not display on the Program out channel. As such, it is useful for such displays as the cursor, safe title box, and prompts.

The Safe Title is an area of the screen that is used to guarantee that text places in an area that will be visible on a home television. This means that the monitor used to view the video will not have to underscan. The default value for safe title is 80% of active video. The size and location of the safe title area can be changed.

Normally, the cursor will wrap to the next row when the right edge of safe title is encountered.

Turn On (Display) Safe Title

To display the safe title box, use this command:

\sg\1\\

As the characters are added to the frame buffer, the cursor will wrap to the next row when the right edge of safe title is hit. The left edge of safe title will be where the cursor is located. When the bottom of safe title is hit, the cursor will move to the top left corner of safe title. Note that the cursor can still be positioned anywhere in the frame with the cursor position command.

Turn Off Safe Title

To cancel the safe title display, use this command:

\sg\0\\

Turn On Safe Title, No Clip to Safe Title Margins

This command will display the safe title box, but the cursor will not wrap to the safe title limits. Instead the safe title box can be used as a guide.

\sg\2\\

Change Safe Title Location and Size

The Safe Title size and location can be changed very easily. The format of the commands is like this:

\sg\1\X Min\Y MIN\X MAX\Y MAX\\

The X MIN and Y MIN values mark the upper left corner of safe title. The X MAX and Y MAX values mark the lower right corner of safe title. The values can be absolute or relative. For relative values, precede the number with a plus (+) or minus (-) sign to change the value by that amount.

System Status

Format: \SS[\mode]\\

Parameters: mode = status mode (1) (optional)

Return: a.*(mode not specified):*
color\font\tab\x\y\sm\site\dframe\bframe\ver\\
color = current color index (1-8)
font = current font index (1-8)
tab = last tab number written (1-99)
x = x-pixel address of cursor (NTSC 1-666, PAL 1-776)
y = y-pixel address of cursor (NTSC 0-485, PAL 0-575)
sm= communication mode (0-7):

smAcknowledgeChecksum	
0	no no
1	yes no
2	no yes
3	yes yes
4	no no
5	yes no
6	no yes
7	yes yes

site= Site ID set internally
dframe= current display frame (1,2)
bframe= current build frame (1,2)
message no. = current Global Message Index number
ver= CODI ROM version number (text)
b.*(mode 1)*:

Ccolor\Ffont\Ttab\SBØ\SC sc,x,y\SD dframe,bframe\SE se\SIØØ

\SL sl\SM sm\SO so\SU su\WT wt\ET et\VB \VG Ø1\VH vh

\VK vk\VS vs\MFREE mfree\CFREE cfree\message no.

\VERSION ver\\

color = current color index (1-8)

font = current font index (1-8)

tab = last tab number written (1-99)

sc = cursor mode (0=off, 1=on)

x = x-pixel address of cursor (NTSC 1-666, PAL 1-776)

y = y-pixel address of cursor (NTSC 0-485, PAL 0-575)

dframe = current display frame (1,2)

bframe = current build frame (1,2)

se = execute only mode (0=off, 1=on)

sl = lock/unlock mode (0=unlocked, 1=locked)

sm = communication mode (0-7):

smAcknowledgeChecksum		
0	no	no
1	yes	no
2	no	yes
3	yes	yes
4	no	no
5	yes	no
6	no	yes
7	yes	yes

so	= overwrite/insert mode (0=overwrite, 1=insert)
su	= tab update clip mode (0=off, 1=on)
wt	= watch time in the format HHMMSS.
et	= event timer time in the format HHMMSSTH.
vh	= video horizontal phase (0-255)
vk	= video key delay (0-15)
vs	= video subcarrier phase (0-127)
mfree	= free user memory in bytes
cfree	= largest contiguous memory block free
ver	= CODI program version number (text)

Description:

The System Status command sends the host a string of data describing the current system parameter settings.

NOTE: The System Status command has been updated to provide additional CODI status information using mode 1. However, the original System Status command without a mode specified has remained to maintain compatibility.

System Status Line (Prompt Channel)

Format: \SX\mode\\

Parameters: mode = status line mode (0,1)

0 = turn Status Line off
1 = turn Status Line on

Return: none

Description:

The PC-CODI can display a one or two-line status display on the Prompt channel output. Some of the information can include the current cursor position, current font, and current color. The information displayed in the Prompt area is controlled when PC-CODI is initialized; a Mode switch enables displaying or removing the prompt status line.

The normal position for the Status Line is at the bottom of the screen. When the cursor moves to the bottom of the screen, the Status Line moves to the top of the screen, and vice versa.

Self Test

Format: \ST\\

Parameters: none

Return: n
n = self test results (*,F):
* = system self test passed
F = system self test failed

Description:

The Self Test command invokes a CODI self test. This command may be used if you suspect that the CODI is not operating properly.

System Update

Format: \SU\mode\\

Parameters: mode = tab clip mode (0,1):
0 = do not clip tab field characters (default), adjust characters
1 = clip tab field characters, adjust characters
2 = do not clip, do not adjust characters
3 = clip tab field characters, do not adjust characters

Return: none

Description:

The System Update command allows selection of the clip mode for updating the text within a tab field using the Tab Update command. If mode is set to 0, there is no character clipping. If the mode is 1, characters are clipped when the Tab Update command is used and text will extend into the next tab field or past the right edge of the display.

The System Update command also controls how characters are positioned next to each other (kerned). The default condition is for CODI to adjust each characters position when sent to CODI. If you do not want this to happen, set the system to not adjust characters with either \SU\2\\ or \SU\3\\.

System Wait

Format: \SW\time\\

Parameters: time = time to wait (NTSC 60 counts/second, PAL 50 counts/second)

Return: none

Description:

The System Wait command causes the CODI to do nothing for the specified period. This command is useful for ensuring that the CODI waits for the specified time before performing the next command. A command of \SW\90\\ will cause a wait period of one and a half seconds in NTSC. For PAL, the time specified for the same period would be \75\\.

PART 17: Tab Commands

A tab defines a position on the display, the font and color to be used for text displayed at the position, and the text justification mode. You may define up to 200 tab positions per message. Whenever the cursor is positioned to a tab, the system automatically uses the font, color and justification of the tab.

A tab may be identified by a numeric value (1-200) or by a name (up to 11 characters). Tab names provide a means of describing the tab type or function.

A tab "field" is defined as the area starting at the tab position and ending with either the x pixel end address on the same display row, or the right edge of the display. In the event that no other tabs positions are defined after the specified tab, the right edge of the display is used as the right limit of the tab.

The tab text may be displayed using left, center or right justification within the tab field. Using left justification, text is positioned with the first character starting at the left of the tab field. Center justification centers the tab text within the tab field. Finally, right justification positions the tab text at the right of the tab field.

In addition to left, center and right justification, the tab text maybe numerically justified. Numeric justification is for displaying numeric values in a tab field using the width of the of the widest digit of the tab font.

Download Tabs

Format: \DT\tab \xaddr[,xaddrend] \yaddr \color \font \justification [\tab \xaddr[,xaddrend] \yaddr \color \font \justification...]\\

Parameters: tab= tab number (1-200) or tab name (11 chars)
xaddr = x-pixel address for tab (NTSC 1-666, PAL 1-776)
xaddrend = x-pixel end address for tab (NTSC 1-666, PAL 1-776) (optional)
yaddr = y-pixel address for tab (NTSC 0-485, PAL 0-575)
color = color index (1-8)
font = font index (1-8)

justification = text justification (L,LN,R,RN,C,CN):

L= left
LN= left numeric
R= right
RN= right numeric
C= center
CN= center numeric

Return: none

Description:
You may define up to 200 tab positions on the CODI display. A tab is defined by a tab number or name, x/y pixel address, color, font and justification. Optionally, you may specify the end x pixel address of the tab field. When not specified, the end of the tab field is the next tab or right edge of the display.

The Download Tab command allows you to define one or more tab positions on the display. When using numeric justification, all characters are displayed using the width of the widest digit of the font selected. Any non-digit character displayed in a numeric justified field will also use the widest digit width unless the character has a width that is larger.

Tab Setup (Interactive)

Format: \TS[\mode]\\

Parameters: mode = Tab Setup display mode (0,1): (optional)
0 = message compose display (default)
1 = Tab Setup display

Return: none

Tab Setup Interactive commands are:

Table 13: Tab Setup Interactive Commands

Key	Function
<ESC>[A	Up arrow
<ESC>[B	Down arrow
<ESC>[C	Right arrow
<ESC>[D	Left arrow
<CR>	Move cursor to start of next line
<SPACE>	Move cursor right one space
<BS>	Move cursor left one space
<TAB>	Move cursor to next tab field
+	Increase step of cursor
-	Decrease step of cursor
Cn	Set tab Color index (n = 1-8)
D	Delete tab at the cursor
E	Erase all tabs
Fn	Set tab Font index (n = 1-8)
H	Move cursor Home (top/left of display)
I	Tab Setup Information
L	Set Left justification for tab
LU	Set Left nUmeric justification for tab
Mn	Display mode (n=0 compose, n=1 Tab Setup)
N	Set ceNter justification for tab
NU	Set ceNter nUmeric justification for tab
R	Set Right justification for tab
RU	Set Right nUmeric justification for tab
S	Set tab position at the cursor
T'name'	Set Tab name (max 11 chars)

Table 13: Tab Setup Interactive Commands

Key	Function
X	EXit from Tab Setup mode
Z	Set end of field for last tab accessed

Description:

The Tab Setup command allows you to interactively setup one or more tabs. For each tab you may define an x,y pixel address, color, font, justification and tab name.

The Tab Setup command provides two display modes:--

In mode 0, the message compose screen is displayed while tabs are defined. You may use this mode if you have predefined text displayed and wish to set tabs at the text positions.

In mode 1, a Tab Setup informational screen is displayed. For each tab position, the tab name or number is shown at each tab position in the font and color assigned to the tab. In addition, a tab symbol is used to describe the tab justification. These

symbols are defined as:

<= left justified
>= right justified
><= center justified

In addition, a dot at the midsection of the symbol defines a numeric justified tab. The symbol and name provides a complete description of the tab in this display mode.

You may specify the initial Tab Setup display mode using the optional mode parameter in the Tab Setup command. If a mode is not specified, the default is the message compose display. Use the M key while using the interactive Tab Setup command to switch between display modes.

Use the arrow keys to position the cursor at the required tab position. Use the interactive command keys to set the tab name, color, font and justification.

The I key provides the host with the current Tab Setup parameter information. Use this information to verify that the cursor is at the required position on the display, and that the correct font, color and justification has been defined. The uploaded data is defined as follows:

tab\xaddr\yaddr\color\font\justification
where:
tab= tab number (1-200), name (11 chars) or 0 (none)
xaddr = x-pixel address of cursor
yaddr = y-pixel address of cursor
color = color index (1-8)
font = font index (1-8)
justification = text justification (L,LN,R,RN,C,CN):
L = leftLN = left numeric
R = right RN = right numeric
C = center CN = center numeric

The tab field describes the current tab by number or name. If the tab field is zero, then the cursor is not located at an existing tab.

The S key is used to set a tab position. In mode 0, CODI displays a vertical line the height of the tab font to identify the tab. In mode 1, CODI displays the appropriate tab symbol along with the tab name in the font and color of the tab.

Optionally, the Z key may be used to define the end of a tab field. After setting a new tab, move the cursor right to the end of the tab field and press the Z key. A rectangle appears to outline the tab field.

You may redefine the end of a tab field at any time. Use the <TAB> key to position to the required tab field. Then position the cursor to the right to identify the new end of the tab field.

Press the Z key to define the new field end. If a tab field end is no longer required, position to the tab, move the cursor right one space and press the Z and D keys. CODI removes to tab field rectangle.

When no tab field end is defined, the system assumes that the start of the next tab field on the row will act as the field end. If no other tab field is defined on the same row, then the right edge of the display is the field end.

You may define up to 200 tab positions per message. Use the X key to save and exit the Tab Setup command.

Upload Tabs

Format: \UT\mode\\

Parameters: mode = upload mode (1):
1 = ASCII upload

Return: \DT\tab \xaddr [,xaddrend] \yaddr\color \font \justification [\tab \xaddr [,xaddrend] \yaddr \color \font \justification...]\\

tab = tab number (1-200) or tab name (11 chars)
xaddr = x-pixel address of tab (NTSC 1-666, PAL 1-776)
xaddrend = x-pixel end address for tab (NTSC 1-666, PAL 1-776) (optional)
yaddr = y-pixel address of tab (NTSC 0-485, PAL 0-575)
color = color index (1-8)
font = font index (1-8)

justification = text justification (L,LN,R,RN,C,CN):

L = left
LN= left numeric
R = rightRN= right numeric
C = center
CN= center numeric

Description:

The Upload Tabs command sends the current tab information for all tabs defined to the host.

Tab Position

Format: \TP\tab\\

Parameters: tab = tab number (1-200) or tab name (11 chars)

Return: none

Description:

The Tab Position command positions the cursor to the specified tab field. In addition, the system automatically set the color and font index that has been defined for the tab field. Any text that was displayed at the tab field is erased.

Note that the <TAB> key (ASCII 9) can be used to advance the cursor in sequence from one tab field to the next. However, the text currently displayed at the new tab field is not cleared.

Tab Update

Format: \TU\tab\data[\tab\data...]\\

Parameters: tab= tab number (1-200) or tab name (11 chars)

data = text to display at tab (max 63 characters)

Return: none

Description:

The Tab Update command is used to update the text displayed at the specified tab.

When a Tab Update command is used, you may specify any number of tab fields to be updated. To provide an immediate update of the display for all tab fields, CODI builds the new screen in the non-displaying frame buffer. When all fields have been updated, the display is completely updated showing all updated tab fields.

Tab Erase

Format: \TE\tab[\tab...]\\

Parameters: tab= tab number (0-200) or tab name (11 chars)

Return: none

Description:

The Tab Erase command is used to erase one or more tab definitions. This command effects only the tabs specified.

However, by specifying tab number zero, all defined tabs are erased.

Tab Typewriter

Format: \TT\tabnumber\\

Parameters: number = Tab position to use:

Return: none

Description:

The Tab Typewriter command positions the cursor at the X location of the specified tab number. The cursor is set to the color and font of the specified tab. Note that the Y value of the tab field is not used.

PART 18: Video Commands

The Video commands are used to set the current video display mode. There are six CODI display modes:

a. Video Blank - characters displayed over CODI background.

b. Video Insert - characters displayed over external video.

c. Video Only - external video only.

d. Video Character - keys external video.

e. Video Transparency - sets generated background transparency.

f. Video Window - creates and displays a window.

In addition, the Video Blank mode is used to display a mix of CODI background and external video on the same display. The mixed display is achieved using the Download Background commands.

There are also three Video commands to adjust the CODI video phase timing. The commands are:

a. Video Horizontal Phase.

b. Video Subcarrier Phase.

c. Video Key Delay.

Video Character

Format: \VC\\

Parameters: none

Description:

The Video Character command is used to key external video through CODI characters on a CODI generated background. The external video color is summed with the character color and displayed. If the character color is black, only external video displays through the character.

Video Transparency

Format: \VT\percent\\

Parameters: percent = percentage background transparency (0-100)

Description:

The Video Transparency command is used to set the CODI generated background transparency.

Video Window

Format: \VW\mode\xaddr1\yaddr1\xaddr2\yaddr2\\

Parameters: mode = window mode (0-2):

0 = disable video window
1 = external video window on CODI background
2 = CODI background window on external video

xaddr1 = start x-pixel address of window (NTSC 0-666, PAL 0-776)
yaddr1 = start y-pixel address of window (NTSC 0-485, PAL 0-575)
xaddr2 = end x-pixel address of window (NTSC 0-666, PAL 0-776)
yaddr2 = end y-pixel address of window (NTSC 0-485, PAL 0-575)

Description:

The Video Window command allows the creation of either an external video window on CODI background, or a CODI background window on external video. The window may be positioned anywhere on the display and may be any size. The window is displayed while in the Video Background mode (\VB\\ command). Use mode=0 to disable a window previously defined.

Video Blank

Format: \VB\\

Parameters: none

Return: none

Description:

The Video Blank command will disable external video, and display characters keyed over CODI generated background. All characters are automatically antialiased to the CODI background. If the display is set up with mixed CODI background and external video, use the Color Video command to specify the colors to be displayed over external video. A color may be displayed over either CODI background or external video, but not both.

Video Insert

Format: \VI\\

Parameters: none

Return: none

Description:

The Video Insert command is used to key CODI characters over program video and disable the internally generated background.

Video Only

Format: \VO\\

Parameters: none

Return: none

Description:

Use of the Video Only command allows display of external video only, with CODI generated video blanked. CODI generated characters will still be visible on the preview channel, while the program channel displays only external video.

Video Verify

Format: \VV\\

Parameters: none

Return: none

Description:

The Video Verify command redraws the screen display.

Video Horizontal Phase

Format: \VH\[+-]hphase\\

Parameters: hphase = horizontal phase (0-255).

Use +/- value for relative change (optional)

Return: none

Description:

The Video Horizontal Phase command is used to adjust the horizontal phase. Use the System Status command in mode 1 to read the current horizontal phase value

Video Key Delay

Format: \VK\[+-]delay\\

Parameters: delay = key delay (0-15)

Use +/- value for relative change (optional)

Return: none

Description:

The Video Key Delay command adjusts the key format. A typical key delay value would be in the range of 7 to 9. Each increment or decrement in the key delay is about 20nS or about ¼ of a pixel. Use the System Status command in mode 1 to read the current key delay value.

Video Subcarrier Phase

Format: \VS\[+-]sphase\\

Parameters: sphase = subcarrier phase (0-127).

Use +/- value for relative change (optional)

Return: none

Description:

The Video Subcarrier Phase command adjusts the subcarrier phase. Use the System Status command in mode 1 to read the current subcarrier phase value

PART 19: Watch Commands

CODI contains a real-time clock which can be used to display the time. The CODI clock is also referred to as a “watch.” All clock commands use the Watch prefix to describe the command.

The clock time may be reset using the Watch Time command. The Watch Setup command is used to select the display parameters of the clock. The clock may be displayed in three different formats. In addition, each field may be displayed using any font or color.

In addition to the three display formats, you may create your own display format by repositioning the clock fields to any location on the display. You may add your own titles to describe each of the displayed fields.

Watch Time

Format: \WT\hhmmss\\

Parameters: hhmmss = watch time to set (24 hour mode):

hh = hour
mm = minute
ss = second

Return: none

Description:

The Watch Time command sets the time on the CODI. The time is always specified in a 24 hour format (military time). Therefore, 8 a.m. would be 080000, and 8 p.m. would be 200000.

Watch Setup

Format: \WS\xaddr\yaddr\color\font\format\mode\\

Parameters: xaddr = x-pixel address for watch text (NTSC 1-666, PAL 1-776)
yaddr = y-pixel address for watch text (NTSC 0-485, PAL 0-575)

color = text color index (1-8)
font = text font index (1-8)
format = watch format (text):

Watch Format: @HH:MM:SS
HH:MM
MM:SS
@ = any format preceded by a 'N' character displays digits numerically justified.

Watch Mode = watch mode (0-2):

0 = 24 hour clock
1 = 12 hour clock
2 = 12 hour clock with a.m./p.m.

Return: none

Description:
The Watch Setup command is used to specify how the clock time is to be displayed. Before the clock can be displayed, the Watch Setup command must be used. The clock digits are normally positioned within each field depending on the digit widths. Preceding the format text with an 'N' character causes the timer digits to be displayed numerically justified.

NOTE: CODI supports either a numeric or text value for the format field.

Watch Color

Format: \WC\field\color[\field\color...]\\

Parameters: field = field to effect (H,M,S):

H = hours
M = minutes
S = seconds
color = color index (1-8) for field

Return: none

Description:

The Watch Color command is used to select the color for the specified field. The command should be used after the Watch Setup command to change the color attribute of any field. Multiple fields may be changed with a single command.

Watch Font

Format: \WF\field\font[\field\font...]\\

Parameters: field = field to effect (H,M,S):

H = hours
M = minutes
S = seconds

font = font index (1-8) for field

Return: none

Description:

The Watch Font command is used to select the font for the specified field. The command should be used after the Watch Setup command to change the font attribute of any field. Multiple fields may be changed with a single command.

Watch Position

Format: \WP\field\xaddr\yaddr[\field\xaddr\yaddr...]\\

Parameters: field = field to effect (H,M,S):

H = hours
M = minutes
S = seconds

xaddr = x-pixel address to display field (NTSC 1-666, PAL 1-776)
yaddr = y-pixel address to display field (NTSC 0-485, PAL 0-575)

Return: none

Description:

The Watch Position command is used to set the x/y position of a field on the display. This command should be used after the Watch Setup command to change the x/y position of any field. If this command is used, the field digits are always right justified. Multiple fields may be changed with a single command.

Watch Display

Format: \WD\\

Parameters: none

Return: none

Description:

The Watch Display command displays the clock on screen once the watch setup has been completed.

> **NOTE:** Use the System Status command in mode 1 to read the CODI clock time.

Watch Erase

Format: \WE\\

Parameters: none

Return: none

Description:

The Watch Erase command erases the clock from the display.

Appendix A - Error Codes

If CODI encounters an error during operation, an error number is returned to the host. The host is then responsible for performing the proper operation. All error codes are three digits.

Error Code	Explanation
010	Invalid Character
011	Invalid Command (Major Character)
012	Invalid Command (Minor Character)
013	Invalid Font Index
014	Invalid Color Index
015	Value Out of Range
016	Invalid Option
017	Invalid X -pixel Address
018	Maximum Number of Characters in Row Exceeded
019	Received a Character In System Execute Only Mode
025	Invalid Frame Number
027	Invalid y-pixel address
028	Invalid x-pixel size
029	invalid y-pixel size
030	No Tabs Defined
031	Tab Not Defined
032	Invalid Tab Name/Number
033	No Character to Display in Tab Field
034	Invalid Tab Justification
040	Unable to Save/Read Message
041	Invalid Message Index
042	Bad Message Control Sequence
045	Flash Not Set-Up
050	Bad Checksum
051	Input Buffer Full

Error Code	Explanation
052	Font Not Loaded
053	Invalid Site ID
055	Invalid Type
056	Invalid Format
057	Invalid Mode
058	Invalid Percent
059	Invalid Size
060	Error Setting Up Roll
061	No Data To Roll (Roll Not Setup)
062	Roll Buffer Full
065	Invalid Speed
066	Invalid Iterations
067	Invalid Direction
068	Invalid Time
069	Invalid Key Code
070	Error Initializing Timer/Clock
071	Timer/Clock Displaying
072	Timer/Clock Not Displaying
073	Timer/Clock Not Set-Up
075	Invalid PCX Graphic Type
080	Error Setting Up Crawl
081	No Data To Crawl
082	Crawl Buffer full
085	Invalid GPI Number
086	GPI Buffer Full
090	Time-Out Reading Data from Host
094	Site ID mismatch
095	Error Reading DIP SW1 (Serial Parameters)
096	Invalid Switch Setting for Serial Parameters
000*	Displayed when powered on, followed by a carriage return and a line feed.

Appendix B - Character Codes

Character Code	Character
004	inverted exclamation
005	
006	section mark
007	
008	pound sterling 014
009	
010	<LF> (line feed)
011	cent sign
012	angstrom accent
013	<CR> (carriage return)
014	
015	
016	
017	<XON>
018	
019	<XOFF>
020	[
021	\
022	]
023	

Character Code	Character
023	
024	caron accent
025	
026	circumflex accent
027	
028	tilde accent
029	
030	
031	
032	<SPACE>
033	!
034	
035	#
036	$
037	%
038	&
039	’ (open quote)
040	(
041	)
042	*
043	+
044	’
045	-

Character Code	Character
046	.
047	/
048	0
049	1
050	2
051	3
052	4
053	5
054	6
055	7
056	8
057	9
058	:
059	;
060	"(open double quote)
061	=
062	"(close quote)
063	?
064	@
065	A
066	B
067	C
068	D

Character Code	Character
069	E
070	F
071	g
072	H
073	I
074	J
075	K
076	L
077	M
078	N
079	O
080	P
081	P
082	R
083	S
084	T
085	U
086	V
087	W
088	X
089	Y
090	Z
091	<

Character Code	Character
092	CODI Start of Command
093	>
094	
095	_ (underscore)
096	’(close quote)
097	a
098	b
099	c
100	d
101	e
102	f
103	g
104	h
105	i
106	j
107	k
108	l
109	m
110	n
111	o
112	p
113	q
114	r

Character Code	Character
115	s
116	t
117	u
118	v
119	w
120	x
121	y
122	z
123	{
124	¦
125	}
126	
127	<DEL>
128	a with Polish hook
129	AE diphthong
130	ae diphthong
131	O with bar
132	o with bar
133	E with Polish hook
134	e with Polish hook
135	yen
136	
137	u with Polish hook

Character Code	Character
138	
139	
140	dotless i
141	OE diphthong
142	oe diphthong
143	double acute accent (over)
144	breve accent
145	grave accent
146	dot accent
147	acute accent
148	dot accent (under)
149	A with angstrom
150	a with angstrom
151	double s ligature
152	
153	D with bar
154	d with bar
155	
156	
157	
158	
159	
160	

Character Code	Character
161	
162	dotless j
163‘	L with bar
164	l with bar
165	L.L (catalan)
166	l.l (catalan)
167	cedilla accent
168	
169	dieresis accent
170	macron accent
171	Trademark symbot
172	Copyright symbol
173	Registered symbol
174	degree symbol
175	musical note symbol
176	plus/minus sign
177	divide sign
178	times sign
179	filled circle
180	filled box
181	right arrow
182	left arrow
183	up arrow

Character Code	Character
184	down arrow
185	double open French quote
186	check sign
187	double close french quote
188	hand with pointing finger
189	inverted question mark
190	star symbol
191	

Appendix C - NTSC & PAL Parameters

Parameter	NTSC	PAL
Minimum X Value	1	1
Minimum Y Value	2	2
Maximum X Value	656	756
Maximum Y Value	485	575
Foreground Palette Entries	254	254
Foreground Colors (Millions)	16.78	16.78
Character Colors	8	8
Background Scanline Pairs	256	271
Background Colors (Millions)	16.78	16.78
One Second (Fields)	59.94	50.00
Maximum Character Rows	23	23
Maximum Characters Per Row	80	80
Maximum Messages	99	99
Maximum Tab Positions	200	200
Maximum Width of Character,		
Logo or PCX Graphic in Crawl	352	252
Maximum Height of Character		
Logo or PCX Graphic in Roll or Crawl	242	287
Memory Available (K-bytes)	916	776

Appendix D - Standard Fonts

When the CODI is shipped from the factory, it supports seven fonts which are listed below.

Font Index	Font Description	Font Size/ Scanlines	Edge Type	Edge Direction	Edge
1	5003 Swiss 721	23	Drop Shadow	Lower Right	3
2	5003 Swiss 721	33	Drop Shadow	Lower Right	3
3	5003 Swiss 721	39	Drop Shadow	Lower Right	3
4	5003 Swiss 721	46	Drop Shadow	Lower Right	4
5	5003 Swiss 721	46	Drop Shadow	Lower Right	4
6	5003 Swiss 721	52	Drop Shadow	Lower Right	4
7	5003 Swiss 721	58	Drop Shadow	Lower Right	4
8	Not loaded				

Appendix E - Procomm Plus Example

This appendix contains an example of how to set up and load PROCOMM Plus. Use this example as a guide when you are using PROCOMM Plus, if you experience any problems in communications.

[ ] 1. At the host keyboard, press ALT S to access the PROCOMM Plus set-up.

[ ] 2. Select Protocol Options from the list.

[ ] 3. Select General Options from the sublist.

[ ] 4. In General Options, set Abort XFER if CD lost to No.

[ ] 5. Exit from General Options.

[ ] 6. Select ASCII Options from the sublist.

[ ] 7. Set up the ASCII Options as follows:

Terminal Emulation	**VT/ANSI**
	VT100
Duplex	**HALF**
Software Flow Control	**ON**
Hardware Flow Control	**OFF**
Line Wrap	**ON**
Screen Scroll	**ON**

[ ] 8. Exit from ASCII Options.

[ ] 9. Exit from Protocol Options.

[ ] 10. Select Terminal Options.

[ ] 11. Select Host Mode Options, and select the following:

Auto Baud Detect	**ON**
Connection Type	**DIRECT**

[ ] 12. Exit from Host Mode Options.

[ ] 13. Select Save Options.

[ ] 14. Exit from PROCOMM Plus Set-up.

Downloading Fonts or Logos Using PROCOMM Plus

Once PROCOMM Plus is in operation and the communications parameters have been established, you may download fonts or logos to the CODI. To do this, execute the following steps:

[ ] 1. From the PROCOMM Plus On-Line Emulation mode, type \df\(1-8)\\.

[ ] 1. Press the PG UP key on your keyboard.

[ ] 1. From the Upload Protocols menu, select R for Raw ASCII.

[ ] 1. Enter the path and the filename of the font or logo to load from disk.

You will see the message **UPLOAD IN PROGRESS - PRESS ESC TO ABORT**. When the upload is complete, you will see the contents of the file on the screen. You will also hear a beeping sound twice.

[ ] 1. From the PROCOMM Plus On-Line Emulation mode, type \f\(1-8)\\.

Appendix F - CODI Commands

BACKGROUND

Background Setup

|BS\\

Download Background (HSI)

\DB\1\H\h\s\i\k[\h\s\i\k...]\\

Download Background (RGB)

\DB\1\R\r\g\b\k[\r\g\b\k...]\\

Download Background (HSI)

\DB\2\H\start\h\s\i\k\end\h\s\i\k[\start\h\s\i\k\end\h\s\i\k...]\\

Download Background (RGB)

\DB\2\R\start\r\g\b\k\end\r\g\b\k[\start\r\g\b\k\end\r\g\b\k...]\\

Upload Background

\UB\mode\\

COLOR

Color Restore

\CR\[\color...\]\\

Upload Color

\UC\index\\

Color Select

\Cn\\

Color Background

\CB\color[\color...]\\

Color Map

\CM\color1\color2\\

Color Setup

\CS\\

Color Transparency

\CT\color\type\percent[\color\type\percent...]\\

Color Video

\CV\color[\color...]\\

Download Palette (HSI)

\DP\color\H\hbody\sbody\ibody\hedge\sedge\iedge

[\color\H\hbody\sbody\ibody\hedge\sedge\iedge...]\\

Download Palette (RGB)

\DP\color\R\rbody\gbody\bbody\redge\gedge\bedge

[\color\R\rbody\gbody\bbody\redge\gedge\bedge...]\\

Upload Palette

\UP\mode\\

FLASH

Flash Begin

\FB\\

Flash End

\FE\\

Flash Multiple

\FM\[\color...\]\\

Flash Setup

\FS\color\on-time\off-time\\

MESSAGE EFFECTS

Message effect cover

\ME\CO\message\direction\speed\[\mode\]\\

Message effect hide

\ME\HI\message\direction\speed\[\mode\]\\

Message effect peel

\ME\PE\message\direction\speed\[\mode\]\\

Message effect pour

\ME\PO\message\speed\\

Message effect reveal

\ME\RV\message\direction\speed\[\mode\]\\

Message effect split

\\ME\RV\message\direction\speed\[\mode\]\\

Message effect weave

\\ME\WE\message\direction\speed\[\mode\]\\

Message effect zoom

\\ME\ZO\message\direction\speed\[\mode\]\\

Crawl Begin

\ME\CB\speed\iterations\yaddr\\

Crawl Erase

\ \CE\\

Crawl Setup

\ME\CS\data\\

Fade

\ME\FA\message\speed\\

Matrix Wipe

\ME\MW\message\type\xsize\ysize\speed[\color]\\

Push

\ME\PU\message\direction\speed[\mode]\\

Roll Begin

\ME\RB\speed\iterations[\yaddr]\\

Roll Erase

\ME\RE\\

Roll Setup

\ME\RS\data\\

EVENT TIMER

Event Timer Begin

\EB\mode\\

Event Timer Color

\EC\field\color[\field\color...]\\

Event Timer Display

\ED\mode\\

Event Timer Erase

\EE\\

Event Timer Font

\EF\field\font[\field\font...]\\

Event Timer Laps

\EL\\

Event Timer Position

\EP\field\xaddr\yaddr[\field\xaddr\yaddr...]\\

Event Timer Setup

\ES\xaddr\yaddr\color\font\format\mode[\pad\type]\\

Event Timer Time

\ET\hhmmss[th]\\

FONT

Download Font

\DF\font\\data

Font Select

\Fn\\

Font Restore

\FR\font[\font...]\\

System Font

\SF\\

GPI

GPI Begin

\GB\gpi\\

GPI Time Reset

\GR\gpi\\

GPI Setup

\GS\gpi\data\\

GPI Time

\GT\gpi\hhmmss\\

GPI Writ

\GW\gpi\mode\\

GRAPHIC

Download Graphic

\DG\type\font\key\spalette\npal-
ette[\red\green\blue]\\data

Graphic Erase

\GE\font\key\\e

KEY

Key Stroke

\KS\data\\

LETTER

Letter Blank

\LB\\

Letter Down

\LD[\pixels]\\

Letter Left

\LL[\pixels]\\

Letter Right

\LR[\pixels]\\

Letter Up

\LU[\pixels]\\

MESSAGE

Download Message

\DM\message\mode\xaddr\yaddr\color\font\char

[\xaddr\yaddr\color\font\char...]\\

Message Blank

\MB\message\\

Message Control

\MC\iterations\ME\parameters\time[\ME\parameters\time...]\\

Message Display

\MD\message\\

Message Save

\MS\message\\

Upload Message

\UM\message\mode\\

PAGE

Page Blank

\PB[\frame]\\

Page Center

\PC\\

Page Down

\PD[\pixels]\\

PAGE (Continued)

Page Left

\PL[\pixels]\\

Page Right

\PR[\pixels]\\

Page Up

\PU[\pixels]\\

ROW

Row Blank

\RB\\

Row Center

\RC\\

Row Down

\RD[\pixels]\\

Row Expand

\RE[\repeat]\\

Row Insert

\RI\\

Row Left

\RL[\pixels]\\

Row Right

\RR[\pixels]\\

ROW (Continued)

Row Squeeze

\RS[\repeat]\\

Row Up

\RU[\pixels]\\

SYSTEM

System Acknowledge

\SA\\

System Cursor

\SC\mode[\[+,-]xaddr\[+,-]yaddr]\\

System Display

\SD[\frame1\frame2]\\

System Execute

\SE\mode\\

System Home

\SH\\

System ID

\SI\id\\

System Lock

\SL\mode\\

System Mode

\SM\cmode\\

System Overwrite

\SO\mode\\

System Pattern

\SP\pattern\\

System Reset

\SR\\

System Status

\SS[\mode]\\

System Test

\ST\\

System Update

\SU\mode\\

System Wait

\SW\time\\

TAB

Download Tabs

\DT\tab\xaddr\yaddr\color\font\justification

[\tab\xaddr\yaddr\color\font\justification...]\\

Tab Erase

\TE\tab[\tab...]\\

Tab Position

\TP\tab\\

Tab Setup

\TS\\

Tab Update

\TU\tab\data[\tab\data...]\\

Upload Tabs

\UT\mode\\

VIDEO

Video Blank

\VB\\

Video Horizontal

\VH\[+-]hphase\\

Video Insert

\VI\\

Video Key Delay

\VK\[+-]delay\\

Video Only

\VO\\

Video Subcarrier

\VS\[+-]sphase\\

Video Verify

\VV\\

WATCH

Watch Color

\WC\field\color[\field\color...]\\

Watch Display

\WD\\

Watch Erase

\WE\\

Watch Font

\WF\field\font[\field\font...]\\

Watch Position

\WP\field\xaddr\yaddr[\field\xaddr\yaddr...]\\

Watch Setup

\WS\xaddr\yaddr\color\font\format\mode\\

Watch Time

\WT\hhmmss\\