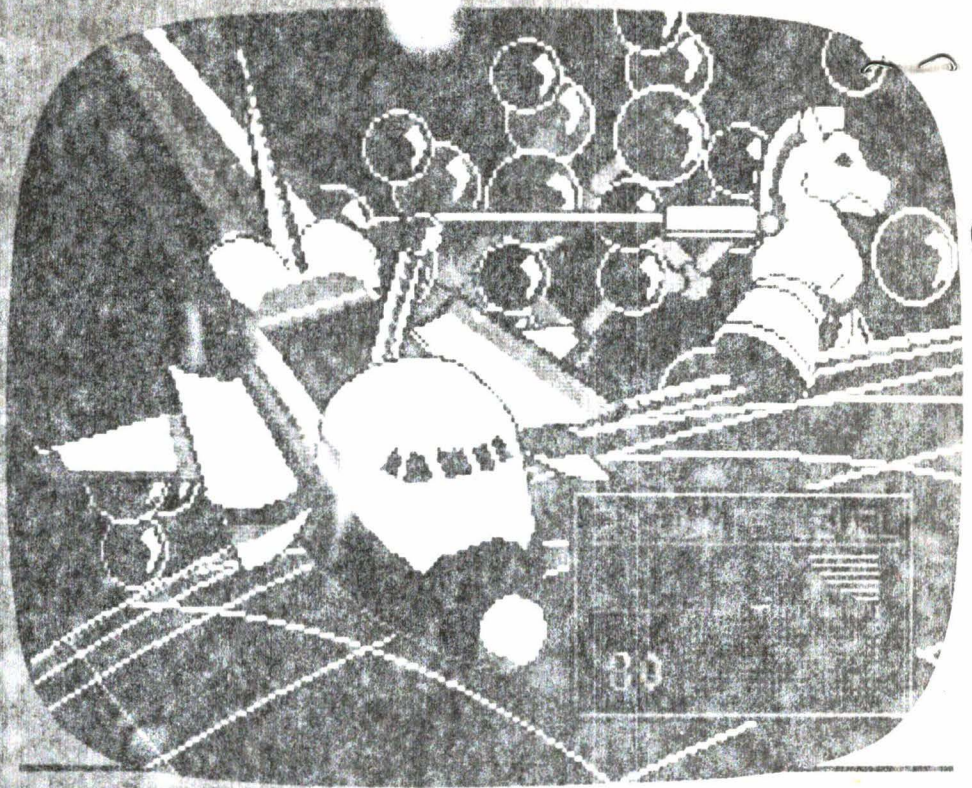


the Norpak Color Raster Display Generator



Introduction

The Color Raster Display Generator, designed and manufactured by NORPAK Limited, is a single circuit card assembly with a 6809 microprocessor interface operating with alphanumeric/geometric software in ROM. The card can be used as a color graphics output device to generate user-originated graphics and text, or to communicate with a database to select and display pages of information. The card contains interfaces for a keypad or keyboard input device, and full-duplex/serial communications. The Telidon alphanumeric/geometric software uses the Picture Description Instruction (PDI) protocol defined in the American AT&T Presentation Level Protocol Videotex Standard, and the Canadian Department of Communications' Technical Note 709, Videotex Presentation Level Protocol: Augmented Picture Description Instructions. These functionally identical documents define the PDI set used by the software to decode user keyboard inputs for computer graphics applications or the database videotex codes.

Videotex is the name for two-way (interactive) public access information services that disseminate information or provide for transactional services from public information suppliers.

Features

- Single card color display controller
- High efficiency 6809 microprocessor
- Telidon alphanumeric/geometric videotex software in ROM
- RS-232-C full duplex serial communication through a card connector **
- Independent transmit/receive baud rates, stop selectable from 75 to 9600 baud, with odd, even or no parity selection
- 200 by 256 by 4-bit high speed raster video RAM
- 8 grey levels (black to white), blinking white and transparent pixel content

- 6 colors: blue, red, magenta, green, cyan, yellow
- 8 character sizes, with a maximum of 20 lines of 40 characters
- RS-170 level RGB video and composite sync outputs through BNC connectors. Flicker free RGB is 524 line, 60 Hz **
- Card connector for optional keypad or keyboard
- ** RS-232 and RS-170 are Electronic Industries Association Standards for Data Communication Interfaces and Performance Standards for Monochrome Television respectively.

Ease of Operation

By virtue of the Picture Description Instruction protocol used in Telidon Systems, images may be created from familiar graphic primitives such as points, lines, arcs and polygons. This same presentation level protocol is recognized as an international videotex standard and forms the kernel of the protocol selected by AT&T for their image communication networks. The use of an 7 bit data format, ASCII standard characters and RS-232-C serial communication, enhances the general purpose nature of the NORPAK display generator.

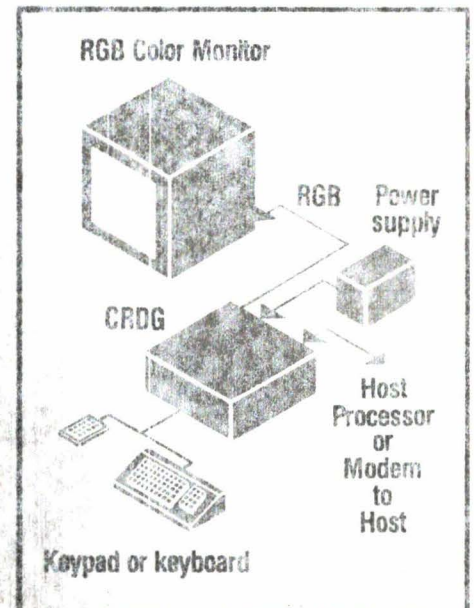
Applications

- display generator for videotex use
- system status output device in a process control environment
- business graphics generation
- student display for educational use. Students can have their own display channel, connected to the instructor's computer
- graphic artists sketchpad
- video games
- low-cost low-resolution (TV) colour graphics display

System Definition

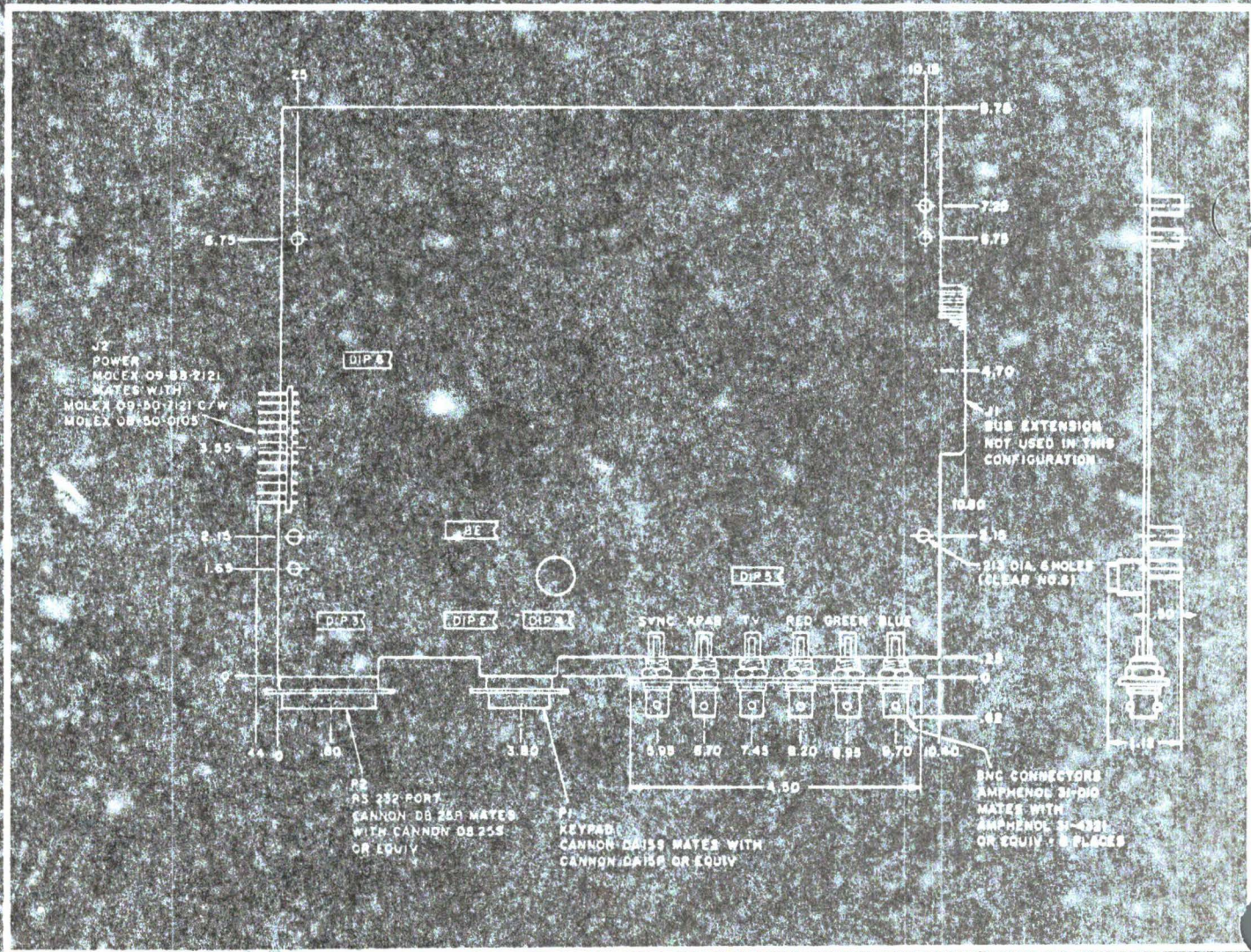
The Color Raster Display Generator is intended for use in business or home systems containing at least an RGB color monitor and a keypad or keyboard, for graphics generation when connected to a host processor, and a communications modem for Telidon videotex data base access.

A keypad or keyboard is required to interact with the database or host computer. In the Telidon videotex mode the user will issue commands to instruct the database to search forward or backward for an index or page of information, display previous index or page, pause, erase or resend current page.



The Basic System

the Norpak Color Raster Display Generator

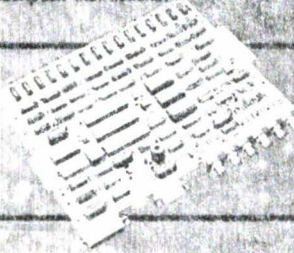


norpak

Satisfy your demand for text and sophisticated graphics

Videotex

Of the several videotex systems in use in North America and Europe, the Telidon system is the most flexible and can more easily accommodate future improvements. It has superior quality graphics and can display charts, maps, and diagrams in much finer detail than other systems. Other systems are character oriented, which restrict displays to fixed-form textual information and rudimentary graphic images. In such techniques, called alpha-mosaic, the image is transmitted as 20 sequential rows 40 characters wide. The alpha-geometric Telidon system uses simple geometric shapes, called primitives, and text characters to define the image, so that the picture is built up in finely detailed areas rather than line by line. The geometric shapes and text characters are described by Picture Description Instructions.



Picture Description Instructions

The PDIs are codes formed from the 7-bit, 128-character ASCII subset and are used to define geometric primitives for video display. They define graphical and textual information in a concise alphanumeric/geometric code set which comprises the primitive identifier, its attribute and numeric location data. The primitive is the graphic shape; the attribute is its colour and whether it is to be drawn in outline or filled, and the text size; the numeric location data defines the screen co-ordinates at which the primitive is to be located.

The defined geometric primitives are summarized below.

- POINT** -sets the drawing point to any position in the display space and optionally draws a dot.
- LINE** -draws a line based on the two given endpoints.
- ARC** -draws a circular arc based on three points; the start point, a point on the arc, and the end point of the arc. A circle results when the start and end points are coincidental and the point on the arc defines the opposite end of the diameter. If only 2 points are transmitted then a circle is drawn in which the end point is assumed to be identical to the first point.
- RECTANGLE** -draws a rectangle based on a specified width and height. The rectangle may be in outline or may be a filled-in area.
- POLYGON** -draws a closed polygon or arbitrary shape specified by the vertices. The polygon may be in outline or may be filled-in area. The maximum number of vertices is limited to 255.
- CONTROL** -provides control over the modes or attributes of the drawing commands.

Block Diagram Description

The block diagram, Figure 1 shows the card functions in simplified form. The microprocessor (6809 μ P) accesses the Monitor Controller, RAM and ROM through the Control/Address/Data Bus. The Monitor Controller produces signals for the RAM address for video refresh, and for video timing (horizontal and vertical sync and blanking). RAM contains the program and display memory and ROM contains the video decoding memory. The video circuit decodes the data signals to provide the RGB video signal outputs.

An Asynchronous Communications Interface Adapter (ACIA) converts the bus parallel data to a serial bit stream for transmission on a serial data line. It also converts received serial data to parallel data for processing in the μ P. Similarly, a Parallel Interface Adapter (PIA) interfaces the keypad or keyboard data before it is applied to the bus.

Keypad/Keyboard

KEYPAD Except for the codes for TV, \square and V (EO, EA and F2) all the codes are echoed locally as entered and displayed as a character, digit or symbol in the bottom left corner of the screen.

The digits 0 to 9 and page movement symbols F, ., (,), // and * are record activated; that is, they are echoed on screen as entered, but are not transmitted through the serial port until \square (Proceed) is entered.

KEYBOARD If a keyboard is used, there is no local echo of the characters. The codes are as defined in 7-bit ASCII and the MSB is zero. Transmissions are character activated; that is, each character is transmitted as its relevant key is pressed.

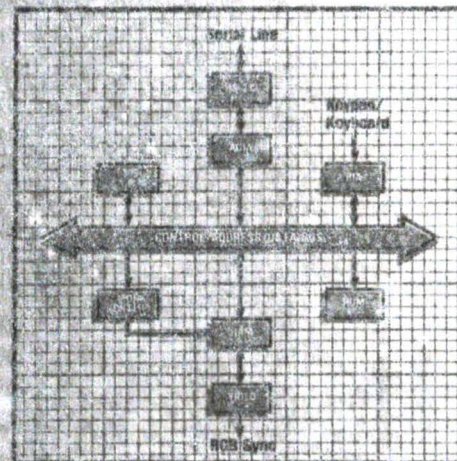
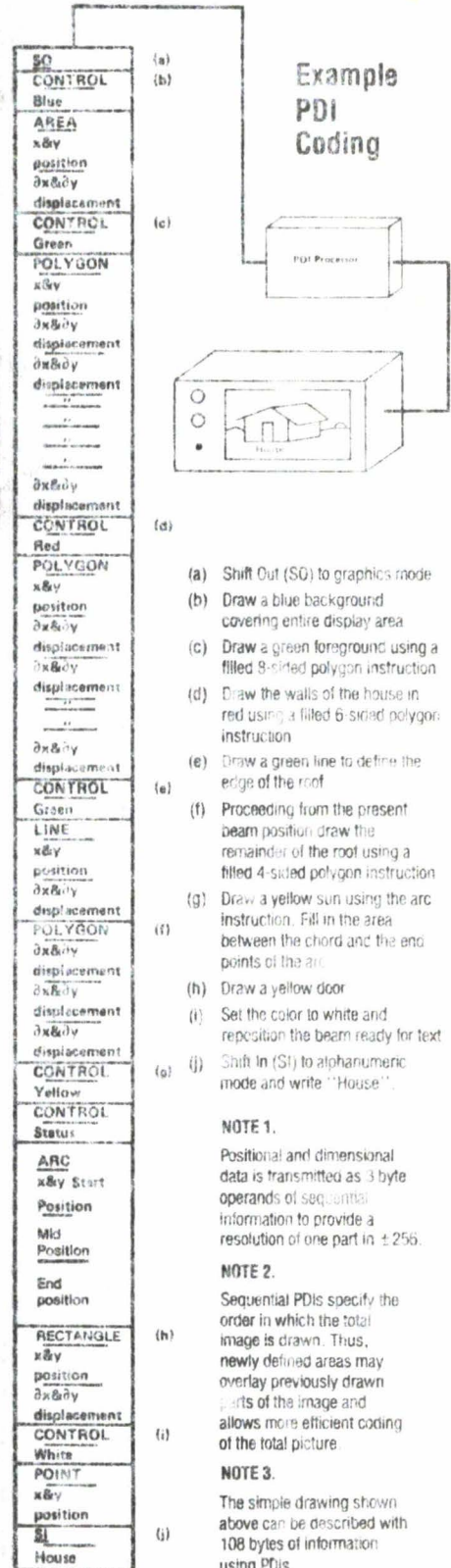


Figure 1
Color Raster Display Generator,
Block Diagram



Operating Environment

The Color Raster Display Generator is designed for a normal business or home operating environment of 10° to 30° C (50 to 104° F) at a humidity of 10 to 95 % non-condensing.

Warranty

All Norpak products are warranted as follows: All products are warranted for a period of three months from the date of shipment or three (3) years from the date of delivery. If there is a defect in any of the products, the purchaser is advised to return the product to the factory for repair or replacement. The warranty period is limited to the original purchaser only. The warranty is void if the product is damaged by accident, misuse, or if the product is used for any purpose other than that intended by the manufacturer. The purchaser must retain shipping charges for the return of the product to the factory. The warranty is void if the product is used for any purpose other than that intended by the manufacturer. The purchaser must retain shipping charges for the return of the product to the factory. The warranty is void if the product is used for any purpose other than that intended by the manufacturer. The purchaser must retain shipping charges for the return of the product to the factory.

The Color Raster Display Generator is designed for a normal business or home operating environment of 10° to 30° C (50 to 104° F) at a humidity of 10 to 95 % non-condensing. The warranty is void if the product is damaged by accident, misuse, or if the product is used for any purpose other than that intended by the manufacturer. The purchaser must retain shipping charges for the return of the product to the factory. The warranty is void if the product is used for any purpose other than that intended by the manufacturer. The purchaser must retain shipping charges for the return of the product to the factory.

Table 1
Connector Pin Functions

PIN (N)	VOLTAGE/SIGNAL
J1 POWER	
1 (11, 17)	+12V 0.5 AMP
8, 9	-12V 0.1 AMP
6, 6, 7	+5V 1.5 AMP
1, 2, 3, 4	GND
P1 KEYPAD/KEYBOARD	
1	DATA BIT 0H (LSB) INPUT
2	2
3	3
4	4
5	5
6	6
7	7
8	DATA BIT 7H (MSB) INPUT
9	STROBE L INPUT
10	NO PULSE
11	GND
12	+5V
13	+12V
14	-12V
15	GND
P2 RS-232C PORT	
ALL LEVELS / RE FA RS-232C	
1	GND
2	TRANSMIT DATA OUTPUT (TX)
3	RECEIVE DATA INPUT (RX)
4	REQUEST TO SEND OUTPUT (RTS)
5	CLEAR TO SEND INPUT (CTS)
6	NOT USED
7	GND
8	DATA CARRIER DETECTED INPUT (DCD)
9, 10, 11	NOT USED
12	NOT USED
13, 14, 15, 16, 17	NOT USED
18	NOT USED
19	NOT USED
20	DATA TERMINAL READY OUTPUT (DTR)
21, 22, 23, 24	NOT USED
25	NOT USED
IC JUMPERS	
0	OUT
1	IN
2, 15, 16	PARITY
3	SPACE
4	MARK
5	EVERY
6	ODD
7	ALL 7 DATA BITS
8	1 STOP BIT
9	0
3	VIDEO
0	60 Hz

• VALUE OF BIT 0 FOR TRANSMISSION
RECEIVE IS NO PARITY

• PARITY FOR TRANSMISSION
AND RECEPTION

Table 2 DIP Functions

DIP 2	
1, 16	RESET
2, 15	RESET L
3, 14	RX DATA L
4, 13	TX DATA L
5, 12	NOT USED
6, 11	NOT USED
7, 10	NOT USED
8, 9	GND
DIP 3	
RS-232C PORT (P2 EXTENSION)	
1	TX
2	RTS
3	RX
4	OH
5	RTS
6	CTS
7	DCD
8	SDCD
9	RTS
10, 15	GND
16	SEL 0 L
DIP 4	
KEYPAD/KEYBOARD	
1	DATA BIT 0H (LSB) INPUT
2	2
3	3
4	4
5	5
6	6
7	7
8	DATA BIT 7H (MSB) INPUT
9	STROBE L INPUT
10	NOT USED
11	GND
12	+5V
13	+12V
14	-12V
15	GND
16	+5V
DIP 5	
ALL LEVELS ARE TTL	
1	A4 COLOR/ GREY
2	A3 BIT 2
3	A2 BIT 1
4	A1 BIT 0
5	BLINK L
6	ALPHA/ GRAPH
7	A5 BLANK H
8	A7 VIDEO L
9-12	GND
13-17	RS IN H
14	RS OUT
15	VS IN H
16	VS OUT

Table 2 (continued)

DIP 6	VIDEO RATES
ALL LEVELS ARE TTL	
1	75
2	500
3	1000
4	1500
5	2000
6	NOT USED
7	RX CLK IN
8, 9	NOT USED
10	RX CLK IN
11, 12	NOT USED
13	1000
14	RX CLK IN
15	500
16	150

Table 3
Coaxial Connector Functions

Connector	Function
RGB	Color signals, 75 ohm, RS-170 (0.7 V)
SYNC	Composite sync signal, 75 ohm, RS-170 (0.5 V), NTSC compatible, no serration or equalization pulses
TV	Not applicable, used only for special monitor (Electroname C50), TTL control lines during Telson mode, low timing TV raster
RFAR	Not applicable, used to control a traffic overlay keying device