



The AES - 85 CRT Control System

*usually use
motorola*

*5x7
(Coin or 7x9
9x13)*

A FAMILY OF PROGRAMMABLE CRT TERMINALS

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1.

GENERAL

The AES-85 CRT terminals are programmable units organized around the AES-80 Microprocessor as the controller. Various functions of the terminals are performed by executing programs stored in the Read Only Memory of the microprocessor. The microprocessor controller permits extreme flexibility in configuring the AES-85 systems. The microprocessor equipped with the appropriate program permits the AES-85 terminals to appear like many different devices, to perform a variety of different functions, to conform to various communication protocols and to interface to any computer.

The AES-85 terminal design is modular. Standard modules can be configured in a number of different ways to meet specific requirements. A range of interface cards are available which permits the easy interfacing of the terminals to synchronous or asynchronous modems, serial or parallel keyboards, card reader/punches, tape readers/punches, tape cassettes, etc.

2.

SYSTEM CONFIGURATIONS

The AES-85 family of terminals consists of three standard units:

- (i) AES-85/1: a single channel stand-alone terminal including control electronics, keyboard, monitor and power supply.

(ii) AES-85/2: a four channel system suitable when a number of terminals are concentrated in the same location. A central control electronic unit drives a cluster of four keyboard-monitor combinations. The four terminals share the same microprocessor and communication line resulting in considerable savings in cost per channel. The unit is modular, the number of channels can be expanded one to four in increments of one.

(iii) AES-85/3: a four channel system, similar to AES-85/2 but with higher quality character display. The main application is for public displays. (Air terminals etc.)

3.

DESCRIPTION OF SYSTEMS

Each system as described in Par. 2 is built up from these basic functional blocks:

- (i) Terminal Controller (TC)
- (ii) Processor
- (iii) Interfaces

The Terminal controller performs the functions of generating and maintaining the display and controlling the cursor. It operates entirely under the control of the Processor. The Processor controls the operation of a unit by communicating with the Terminal Controller (s) and with the interfaces and by executing routines initiated by received data.

The interfaces perform level conversion, character assembly and disassembly and provide control and timing signals for the connected peripherals.

In the following, a description of the basic functional blocks is given.

3.1

TERMINAL CONTROLLER

The Terminal Controller is constructed on one standard AES-PC board, approximately 11" x 12" in size. The TC consists of two functional sub-units as follows:

- (i) Video Sub-unit, consisting of the following circuits:

- Refresh Memory
- Character Generator
- Cursor Generator
- Video Amplifier

The refresh memory is built using MOS RAM memories (2K).

The character generator uses commercially available Read Only Memorys.

- (ii) Register Sub-unit, consisting of the following circuits:

- Processor Interface
- Data in/out registers
- Cursor x-y registers
- Refresh Memory R/W controls
- Cursor address decoding

Various controls. (Refresh ON/OFF, Cursor ON/OFF).

The Terminal Controllers used for the AES-85/1 and AES-85/2 are identical; The Terminal Controller used for AES-85/3 is equipped with a higher resolution character generator.

3.2

PROCESSOR

The processor is constructed on one 11" x 12" PC board. All functions of the AES-85 Terminals are controlled and performed by the Processor by executing programs stored in its Read Only Memory. It is an AES-80 Microprocessor equipped with the required capacity of Read Only Memory and Random Access Memory.

Some salient features of the AES-80 microprocessor are listed here. A detailed description of the microprocessor can be found in the document titled AES-80 Microprocessor Reference Manual.

The AES-80 microprocessor is a byte oriented general purpose processor designed primarily for use in dedicated applications. Its main features can be summarized as follows:

- Instruction memory (ROM) size: up to 4K 12-bit words
(expandable to 64K)
- Data Memory (RAM) size: up to 4K 8-bit words.
- 240 nanosecond instruction time.
- 6 registers
- All modes of 8-bit ALU under software control.
- 16 level automatic push down stack for routine linkage.

-64 basic one word instructions plus 24 arithmetic and logic instructions.

Some features of the AES-80 microprocessor renders it particularly suitable as a processor for a programmable terminal.

-Intermixing of different types of memories. The organization of the microprocessor allows the intermixing of memories of different speeds. This feature enables the use of bipolar, MOS or other type of memories as the speed requirements of specific applications dictates.

-Bus structure. The Terminal controllers and interfaces, being connected to the parallel bus of the microprocessor, can be handled as extensions of the Data Memory.

The microprocessor is supported by extensive software packages. Specifically, a standard Assembler is available which allows programmers to write their microprocessor programs in a symbolic language rather than in machine language, the translation being performed by the Assembler.

A detailed description of the assembler can be found in the document titled AES-80 Microprocessor Assembler Reference Manual.

For developing and checking programs and for trouble shooting a Program Development Console is available.

Each AES-85 terminal has provisions for the connection of a Program Development Console, a description of which can be found in the document titled AES-80 Microprocessor Reference Manual.

3.3

INTERFACES

Any AES-85 terminal can be equipped with a variety of interfaces, to a variety of peripherals and communications lines. Presently, three types of interfaces are available. Other types are developed as the requirements arise:

3.3.1

Synchronous Communications Interface

This module interfaces the processor to synchronous modems. It performs the following functions:

- Acquires character sync on reception of two consecutive sync characters.
- Serializes transmitted characters.
- Assembles received characters.
- Transfers characters to and from the microprocessor.
- Provides data and control signal interface for modems according to EIA RS 232-C.

This interface can operate at speeds up to 9600 bits/second.

3.3.2

Asynchronous Communications Interface

This module interfaces the processor to asynchronous modems. It performs the following functions:

- Generates start and stop bits for transmitted characters.
- Strips the start and stop bits from received character.
- Serializes transmitted characters.
- Assembles received characters.
- Transfers characters to and from the microprocessor.
- Provides data and control signal interface for modems according to EIA RS 232-C.

This interface can operate at speeds up to 2400 bits/second.

3.3.3 Keyboard Interface

This module interfaces the processor to two keyboards. Each keyboard interface is itself equipped with two input/outputs.

- (i) parallel interface for a keyboard within 50 feet.
- (ii) serial interface for a keyboard up to a 1000 feet.

3.3.4 Other Interfaces

Other interfaces for such as: cassettes, ticket printers, and readers are available to meet specific requirements.

4. PERFORMANCE SPECIFICATION

4.1 VIDEO

	AES 85/1	AES 85/2	AES 85/3
Screen size	12"	Note 1	
Character/Line	64 or 80 NOTE 2		48 or 64 NOTE 2
LINES	up to 24 NOTE 2		16
Character Format	5x7 (UPPER CASE CHAR- ACTERS) 5x9 (LOWER CASE CHAR- ACTERS)		7x9 (UPPER CASE) 7x11 (LOWER CASE)
Refresh Rate	60 times/second		
Raster	262 lines non-interlacing		
Video output:	Composite (commercial) Output level: 1V pp min. Output impedance: 75 ohms 5%		
Character Repertoire	96 ASCII		
Cursor	Underline (NOTE 3)		
Number of channels	One	Up to four:	

Note 1: Monitors specified by customer.

Note 2: The various formats are implemented by strapping,
by program or by switches.

A change in format does not necessitate change in the program.

Note 3: Other types of cursor can be implemented as options.

4.2 REFRESH MEMORY OPTIONS

Fully equipped, the refresh memory has 8-bits per character. Six of the eight bits are used to specify 64 ASCII characters. The remaining two bits, under program control, can be used for a number of different purposes.

- 1.) Extending the character repertoire to 96
- 2.) Memory Protection (Split screen)
- 3.) Half tone control
- 4.) Flash control on a character-by-character basis.

4.3 FUNCTIONS

Due to the programmable nature of the terminals, they can execute any functions as specified by the customer. The functions of the terminals are therefore not specified. A list of commonly used functions for which the terminals can be programmed are:

Cursor Controls: SP
 BSP
 CR
 LF↑
 LF↓
 HOME

Erase: Line erase
 Field erase
 Frame erase
 Foreground (unprotected) erase.

Editing: Tab
 Character insert/delete
 Line insert/delete

Transmit: Line
 Field
 Frame

4.4 COMMUNICATIONS

The terminals can be programmed to comply with any specified communications discipline, using either synchronous or asynchronous transmission. Specifically, the terminals can be programmed to emulate completely the IBM 2260/3270 terminals.

The processing of communications including assembly of messages, decoding of controls and addresses, error checking, retransmission, response to polling etc., is completely under program control.

4.5 ENVIRONMENT

Temperature: 10°C - 45°C operating

Humidity: 5% - 95% R.H., no condensation.

4.6 POWER

105 - 125 VAC, 60 Hz

4.7 MECHANICAL

AES-85/1: Constructed as a self-contained table top unit, including electronics, monitors, keyboard and power supply.

AES-85/2: Constructed as a 19" rack mountable unit, using the standard AES card cage. The unit includes control electronics and power supply only.