DISPLAY
TERMINAL
CATALOG

ANN ARBOR
TERMINALS, INC

CREATING NEW IDEAS TO COMMUNICATE

ANN ARBOR TERMINALS, INC

DISPLAY TERMINALS

COMPANY

Ann Arbor is a broad-line manufacturer of CRT display and terminal equipment directed toward the OEM market. Ann Arbor was incorporated in Michigan in 1970, and is wholly owned by its employees. It has delivered over 6000 terminals to date, and is currently delivering at a rate of over 250 terminals per month.

PRODUCTS

Ann Arbor utilizes a building-block approach to its product line. Its products are composed of highly-modular, functionally-partitioned PC boards, each of which is generalized and packed to provide a maximum of function and flexibility. This enables the company to offer an extraordinarily broad line of standard products and options at an economical price.

In addition, this approach enables the company to respond well to "custom" needs. Ann Arbor offers an X-MOD service aimed at the customer's low-volume, minor-change-to-standard-product requirements, and a Q-MOD service aimed at his high-volume, special requirements.

X-MOD SERVICE

Ann Arbor offers its X-MOD service where the customer requires a relatively simple modification to a standard unit and where the quantity required does not economically justify PC redesign, development of production and test fixtures, and preparation of formal product documentation. X-MOD's are accomplished by a technician who orders the closest standard unit from production and modifies it to the customer's requirements.

Q-MOD SERVICE

Ann Arbor offers its Q-MOD service where the customer requires major design changes to an existing product, or a completely new design. Q-MOD's are accomplished by a product engineer who develops and documents the product to the customer's specifications, releases it to production, and monitors the early deliveries to assure that the production test and QA procedures are adequate to assure delivery of a reliable, quality product. A non-recurring engineering (NRE) charge is included in Q-MOD quotations to cover these costs.

ORDERING

Ann Arbor's standard product line offers an enormous number of possible combinations of products and options and multiple options. Some combinations are not available. They are not technically viable or operationally practical. Others are available only in quantity. Purchase orders should be based on factory quotation only.

RECEIVE-ONLY (RO) TERMINALS
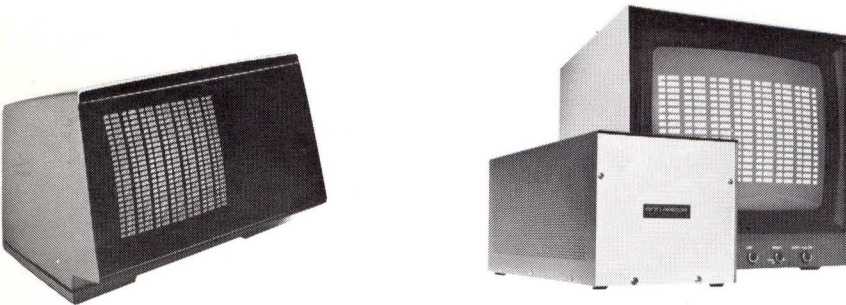
KEYBOARD SEND/RECEIVE (KSR) TERMINALS
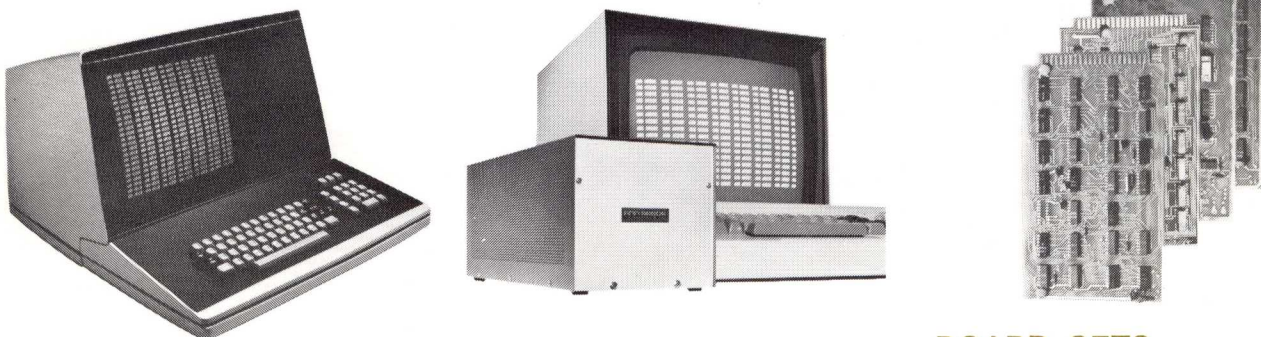
DESIGN III

High-performance desktop model with separable matching keyboard, styled to complement the decor of the most modern surroundings.

SERIES 200

Hard-working, rugged modular concept featuring separately - packaged display electronics, keyboard, and monitor for total versatility in industrial environments.

BOARD SETS

Pre-engineered memory, timing, cursor, and signal conversion functions in easy-to-use PC module form, for the OEM who prefers to package his own terminal electronics.
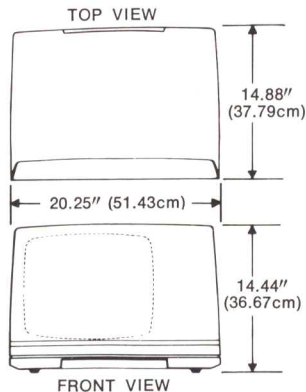
ANN ARBOR TERMINALS, INC

RO TERMINALS
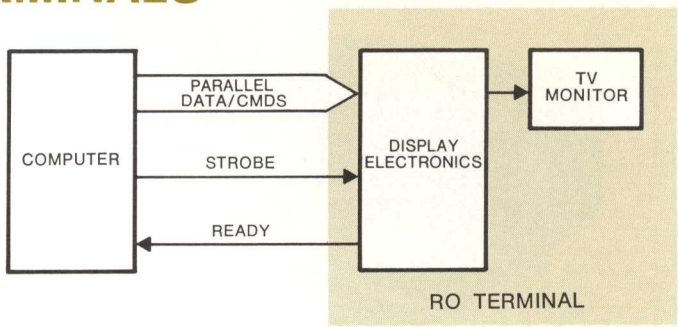
RO MODEL	R1632D	R2440D	R2050D	R1680D	R2480D	R4080D
DISPLAY						
No. chars.	512	960	1000	1280	1920	3200
Chars. x lines	32x16	40x24	50x20	80x16	80x24	80x40
SCREEN						
Size (diag.)	14″	14″	14″	14″	14″	14″
Phosphor	P4	P4	P4	P4	P4	P39
Viewing area	10″x8″	10″x8″	10″x8″	10″x8″	10″x8″	10″x8″
CHARACTERS						
Char. set	64	64	96	64	64	96
Char. code	ASCII	ASCII	ASCII	ASCII	ASCII	ASCII
Char. case	Upper	Upper	Upper/lower	Upper	Upper	Upper/lower
Dot matrix	5x7 dots	5x7 dots	7x9 dots	5x7 dots	5x7 dots	7x9 dots
Dot field	8x12 dots	8x10 dots	10 x12 dots	8x12 dots	8x10 dots	10x13 dots
Size (nom.)	.18″x.27″	.17″x.23″	.15″x.25″	.09″x.22″	.09″x.22″	.09″x.16″
Cursor	Underline	Underline	Underline	Underline	Underline	Underline

OPERATION

The displayed data is stored in and refreshed from an internal refresh memory. The data remains stored and displayed until changed by the data source. The data is written and the cursor positioned under control of the memory address register. Characters enter at the cursor position. The cursor automatically advances after each character entry. Each entry overwrites the character previously displayed at that position; no other data on the screen is affected. Advance of the cursor past the end of a line automatically advances it to the beginning of the next line. Advance of the cursor past the end of the bottom line advances the cursor to the beginning of the top line (Page display) or all lines move up one, the bottom line clears, and the cursor remains in the bottom line (Roll display).

COMMANDS

Erase screen (clear and home)
Carriage return, line feed
Cursor left, right, up, down, and home
Cursor x-y positioning (absolute cursor address)

SWITCHES

S1: ROLL/PAGE

DATA INPUT

7-bit parallel TTL
ASCII-coded
Up to 1600 char/sec asynchronous

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

PHYSICAL

TOP VIEW

14.88″ (37.79cm)

20.25″ (51.43cm)

14.44″ (36.67cm)

FRONT VIEW   SIDE VIEW

Weight:
40 lbs.

Power:
105-125 Vac, 60 Hz

Temperature:
10° to 40°C (operating)
−40° to 70°C (storage)

Humidity:
0-95% non-condensing

OPTIONS

Case Options: Series 200, Board Sets

CR/LF Options: Auto LF on CR, New Line, Hold at EOL

Serial Interface: RS232, 20ma, 60ma, TTL Inputs

Baud Rates: 110, 300, 600, 1200, 1800, 2400, 4800, 9600

Baud Controls: Dual, Switched, Keyed, Split

Parity: Even, Odd, Mark, Space

Character Accent: Blink, Dual Intensity, Reverse Video
X-Y Loading
RO Multidrop
Soft-Copy Add-On
External Sync
Export Models

CAUTION: Some combinations of products and options are unavailable. Others are available only in quantity. Orders should be based on factory quotation only.

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KSR TERMINALS
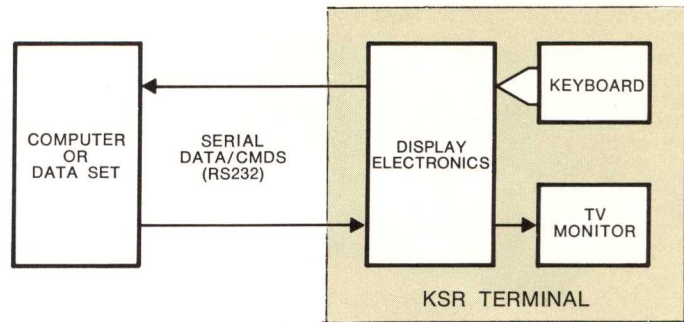
KSR MODELS	K1632D	K2440D	K2050D	K1680D	K2480D	K4080D
DISPLAY						
No. chars.	512	960	1000	1280	1920	3200
Chars. x lines	32x16	40x24	50x20	80x16	80x24	80x40
SCREEN						
Size (diag.)	14″	14″	14″	14″	14″	14″
Phosphor	P4	P4	P4	P4	P4	P39
Viewing area	10″x8″	10″x8″	10″x8″	10″x8″	10″x8″	10″x8″
CHARACTERS						
Char. set	64	64	96	64	64	96
Char. code	ASCII	ASCII	ASCII	ASCII	ASCII	ASCII
Char. case	Upper	Upper	Upper/lower	Upper	Upper	Upper/lower
Dot matrix	5x7 dots	5x7 dots	7x9 dots	5x7 dots	5x7 dots	7x9 dots
Dot field	8x12 dots	8x10 dots	10 x12 dots	8x12 dots	8x10 dots	10x13 dots
Size (nom.)	.18″x.27″	.17″x.23″	.15″x.25″	.09″x.22″	.09″x.22″	.09″x.16″
Cursor	Underline	Underline	Underline	Underline	Underline	Underline

KEYBOARD

Upper/lower case terminals use the Ann Arbor KB300C Keyboard; upper case only terminals use the KB300B Keyboard. See OPTIONS-KEYBOARDS.

OPERATION

The terminal operates in the same manner as a KSR TTY terminal. As the operator strikes each key, its character code is sent to the computer as an asynchronous serial character at the specified baud rate. If the terminal is set for full-duplex, the computer echoes back the character (or an error message) to the terminal's memory, whereupon it is displayed on the screen. If the computer is not programmed for echo-back, the terminal may be set for half-duplex, whereupon the character is fed back into the terminal's memory as it is transmitted. In either case, the incoming data is stored and displayed as described for the RO terminal.
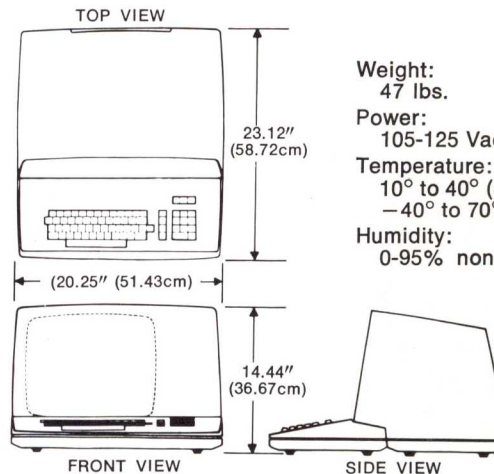
COMMANDS

Erase screen (clear and home)
Carriage return, line feed
Cursor left, right, up, down, and home
Cursor x-y positioning (absolute cursor address)

SWITCHES

S1: ROLL/PAGE
S2: LOCAL/LINE
S3: FULL/HALF DUPLEX

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

PHYSICAL

TOP VIEW
23.12″ (58.72cm)
(20.25″ (51.43cm))
14.44″ (36.67cm)
FRONT VIEW
SIDE VIEW

Weight:
47 lbs.
Power:
105-125 Vac, 60 Hz
Temperature:
10° to 40° (operating)
−40° to 70°C (storage)
Humidity:
0-95% non-condensing

DATA INTERFACE

RS232-compatible
ASCII-coded
Up to 9600 baud asynchronous

OPTIONS

Case Options: Series 200, Board Sets
CR/LF Options: Auto LF on CR, Hold at EOL
Interface: RS232, 20ma, 60 ma, TTL
Baud Rates: 110, 300, 600, 1200, 1800, 2400, 4800, 9600
Baud Controls: Dual, Switched, Keyed, Split

Parity: Even, Odd, Mark, Space
Character Accent: Blink, Dual Intensity, Reverse Video
Batch Transmit
Protected Data
Printer Output
Export Models

CAUTION: Some combinations of products and options are unavailable. Others are available only in quantity. Orders should be based on factory quotation only.
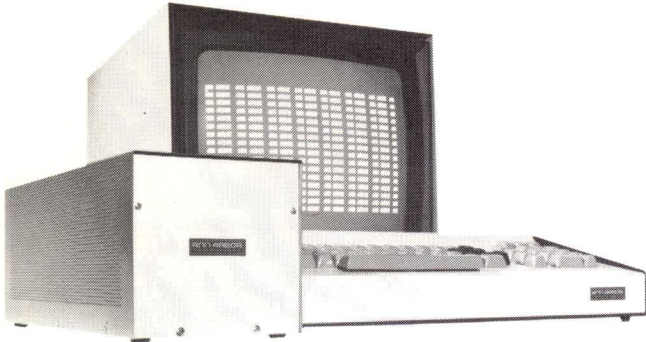
SERIES 200 CASE

All Ann Arbor terminals are available in the Series 200 Controller case. The Series 200 contains the same display electronics as the Design III, packaged for use with free-standing keyboards and monitors. The Series 200 is more rugged and less expensive than the Design III and permits the user greater freedom in tailoring his terminal configuration, keyboard style, and monitor size to his specific application. The Series 200 interface is identical to the Design III, except that a keyboard input connector is added to the KSR units and a video ouput connector to all units. The keyboard input requires 7-bit-parallel ASCII data and a rising-edge strobe at TTL levels. The video output provides R170-compatible composite video capable of driving most commercial TV monitors.


PHYSICAL

TOP VIEW

5.50″ (13.97cm)

15.00″ (38.10cm)

5.75″ (14.60cm)

SIDE VIEW
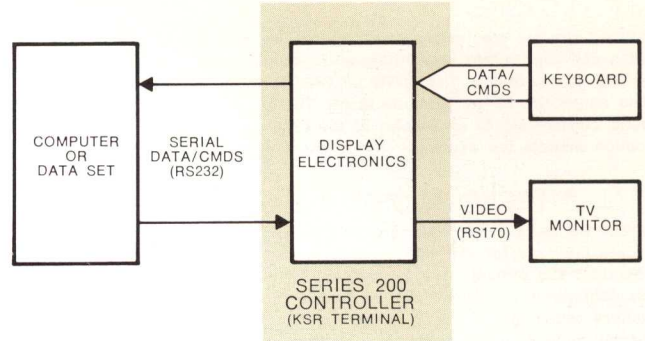
CONNECTOR PANEL
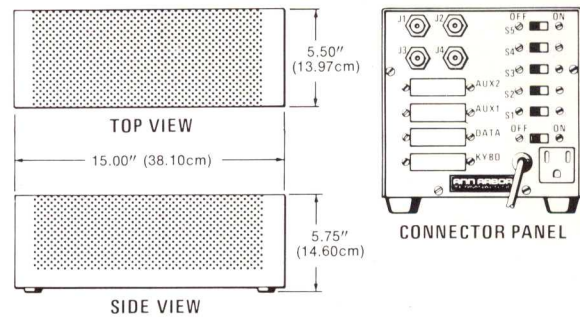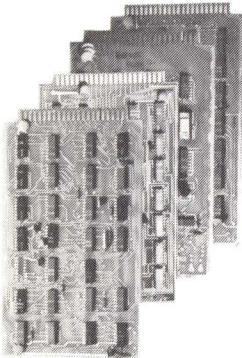
BOARD SETS

All Ann Arbor terminals are available to qualified OEM's as board sets. These are the same printed circuit boards used in the Design III. When interconnected and powered according to documentation supplied, they perform all the functions of the applicable Design III specification. Board sets are supplied in groups of 25 sets minimum of a given model. The typical terminal board set consists of 4 boards: Timing, Memory, Cursor, and Serial. The Timing board generates the raster scan and memory timing for the specified character format, generates the timing for character-addressable memory load, generates the cursor video, and provides for asynchronous input control of memory load. The Memory board stores the full screen of data and generates the composite video for display of the data on the TV monitor. The Cursor board buffers incoming data to memory, holds cursor address, and mechanizes the
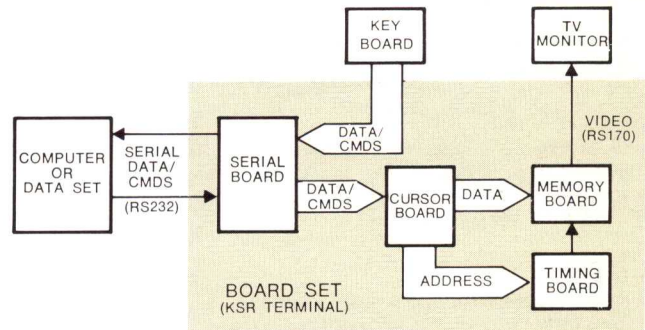
roll/page and command set operations. The Serial board converts incoming serial data to bit-parallel for the Cursor board, converts bit-parallel keyboard data to serial for transmission, and provides gating for local, half-, and full-duplex operation.

PHYSICAL

Size: 4.5″x8″
Spacing: 0.5″, except Memory 1″
Connector: PC edge-card on 4.5″ end
Mating: Dual 22-pin, 0.156″ c-c
Power: ±5, ±12Vdc, ±2%
Accessories: Power Supply

CR/LF OPTIONS

Ann Arbor terminals are factory preset to require both CR- and LF-codes to start a new line before end-of-line, and provide automatic wrap-around to new line at end-of-line. The AUTO LF ON CR option enables automatic line-feed on receipt of the CR-code alone. The NEW LINE option enables automatic carriage-return on receipt of the LF-code alone. The HOLD AT EOL option inhibits the automatic wrap-around at end-of-line.

SERIAL INTERFACE OPTIONS

Ann Arbor serial-data terminals are factory configured with an RS232-compatible interface for use with data sets, couplers, and computer TTY channels that are strapped, or strappable, for RS232. Alternatively, they can be configured for current-loop operation, either 20ma or 60ma, for applications requiring direct TTY replacement and/or high noise immunity. For special applications, the terminals can be provided instead with a TTL-logic-level interface.

BAUD RATE OPTIONS

The terminals are factory preset to one of the following baud rates, specified on order: 110, 300, 600, 1200, 1800, 2400, 4800, 9600 baud. The following baud rates are additionally available on some models: 50, 75, 135, 150, 900, 3600, 7200 baud.

BAUD CONTROL OPTIONS

The baud rate is preset by a jumper on the terminal's Serial board. It can be changed in the field by a qualified technician. The following options are offered for applications requiring easier field-selection. DUAL BAUD provides external-switch-selection between two preset baud rates, specified on order. SWITCHED BAUD provides internal switch selection of all available rates. KEYED BAUD provides keyboard selection of all available rates. SPLIT BAUD is offered for applications that require the terminal to send data at one baud rate and receive at another.

PARITY OPTIONS

The terminals are factory preset to generate either Mark or Even parity on outgoing data, depending on model, and to ignore parity on incoming data. The PARITY option permits specification, on order, of Even, Odd, Mark or Space parity on outgoing data, and parity detection on incoming data with errors displayed as a ?-symbol.

CHARACTER ACCENT

This option enables the characters on Ann Arbor terminals to be displayed with visual accents, to highlight or call attention to them, under command (computer or operator) control. Accents vary on individual models but include blink, dual intensity, and reverse video.

EXTERNAL SYNC

This option enables the video from Ann Arbor terminals to be superimposed on ordinary TV picture video. The terminal takes in either picture video or composite sync from the video source and puts out the same signal with the characters on the screen added to it. Controls are provided to add the full-screen of characters, just the bottom line (window), or none at all. A rotate command allows the successive lines on the screen to be rotated into the window. A manual sync control allows the window to be positioned wherever desired in the program output.

SWITCHABLE 0832

This option enables Ann Arbor 1632 terminals (16 lines x 32 characters) to display, and be operated, as 0832 terminals (8 lines x 32 double-height characters) under command or switch control. The option is particularly applicable to RO's because of the increased viewing range, but can also be applied to KSR's.

EXPORT MODELS

This option enables Ann Arbor terminals to operate to export power and TV standards.

RO SERIAL INTERFACE

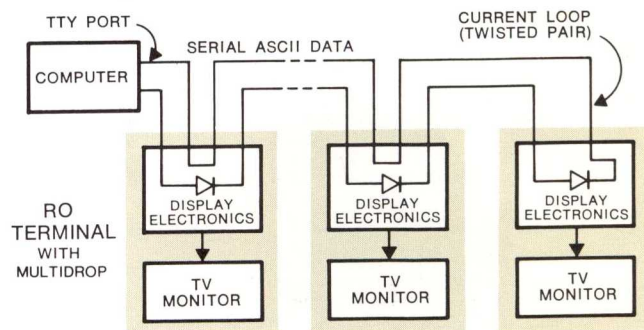This option enables Ann Arbor RO terminals to be written from a bit-serial, instead of bit-parallel, data source.

RO TERMINAL WITH SERIAL INTERFACE
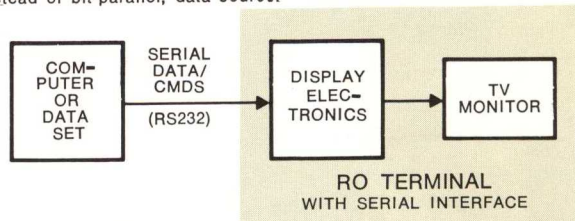
X-Y LOADING

This option enables Ann Arbor RO terminals to be written from a data source that specifies, in parallel, both a character and the x-y position on the screen at which the character is to be displayed.

RO TERMINAL WITH X-Y LOADING
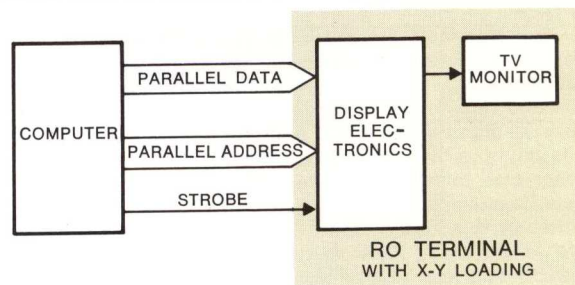
RO MULTIDROP

This option enables up to 64 Ann Arbor RO displays to be remotely addressed and written over a single communications line. The address structure permits selection of one, several, or all of the displays to be written simultaneously.
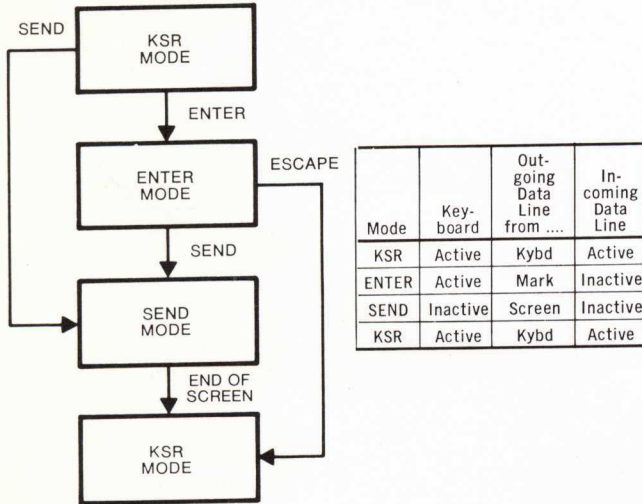
RO TERMINAL WITH MULTIDROP

SOFT-COPY ADD-ON

This option enables Ann Arbor RO displays to be added to existing computer terminals (TTY's, printer terminals, data-storage terminals, other CRT terminals, etc.) for local, remote, or large-screen viewing of the printout.

RO TERMINAL WITH SOFT-COPY ADD-ON
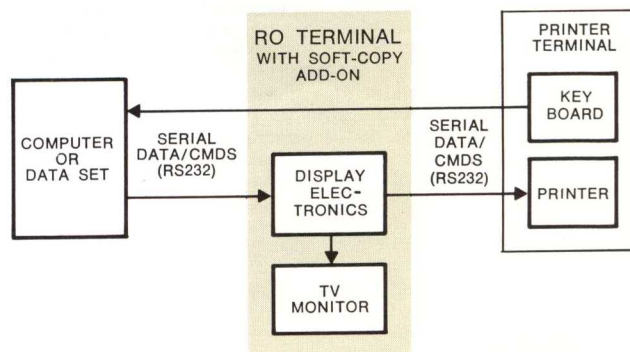
BATCH TRANSMIT

This option adds a screen-transmit capability to Ann Arbor KSR terminals. It enables the operator to write to the screen off-line at typing speed, and then transmit the entry to the computer at high-speed. The terminal is normally in KSR mode, full duplex. The terminal is put into ENTER mode on receipt of the Enter code. The terminal goes off-line; the computer can not interrupt. The operator enters data to the screen and, when finished, puts the terminal into SEND mode by entering the Send code. The terminal goes back on-line, transmits the contents of the screen to the computer and returns to KSR mode. Alternatively, when the operator is finished entering data, he may enter the Escape code which puts the terminal directly into KSR mode without transmitting the contents of the screen. In either case, the computer may read (or re-read) the screen at any time in KSR mode by simply sending (or re-sending) the Send code.

Mode	Key-board	Out-going Data Line from	In-coming Data Line
KSR	Active	Kybd	Active
ENTER	Active	Mark	Inactive
SEND	Inactive	Screen	Inactive
KSR	Active	Kybd	Active

PROTECTED DATA

This option adds a form-filling capability to terminals equipped with Batch Transmit option. It features form generation by operator or computer, protected data-entry with tabulation, and compressed data-transmission. The option enables the operator or computer to set up protected fields on the screen. During ENTER mode, these fields are automatically skipped over; the operator cannot affect them. The operator can terminate entry into an unprotected field, and skip to the beginning of the next, by striking a Tab key. The operator can send and the computer may read, the complete screen or only the unprotected portions.

PRINTER OUTPUT

This option adds an RS232-compatible printer output to terminals equipped with the Batch Transmit option. The option enables the data transmitted from the screen to be steered to either the printer or computer under command control (operator or computer).

TRANSMIT CONTROL OPTIONS

These options are available for use with the Batch Transmit option. They permit the insertion of specified delays and/or control characters into the transmitted data stream. CTS CONTROL enables the start of data transmission to be controlled by a clear-to-send (CTS) input signal. START DELAY enables the start of transmission to be controlled by a preset delay. INSERT STX enables insertion of an STX-code as the first character of each data transmission, and an ETX-code as the last character. INSERT CR enables insertion of carriage return and/or line feed codes into the data transmission at the beginning of each line. CR DELAY enables insertion of a preset delay into the data transmission at the beginning of each line, eg., to allow time for a printer carriage return.

MONITORS

Ann Arbor offers a full line of TV monitors for use with its products. Available screen sizes range from 9- to 23-inches in diagonal to satisfy both near and distant viewing requirements.

OTHER

Ann Arbor offers a full line of accessories for its products, including mating connectors, video cables, RS232 cables, extender boards, and specialized test equipment.
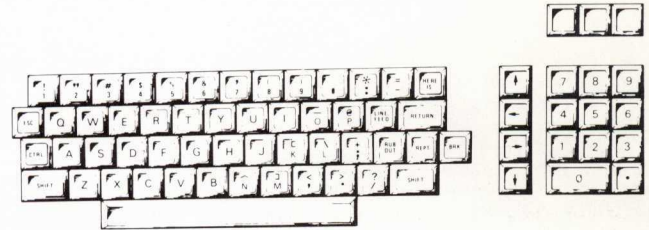
KEYBOARDS

Ann Arbor's keyboards are offered in either of two cases: the Series 200 case, compatible with the Series 200 Controller, or the Series 300 case, compatible with the Design III. Three key layouts (A, B, and C) are available.
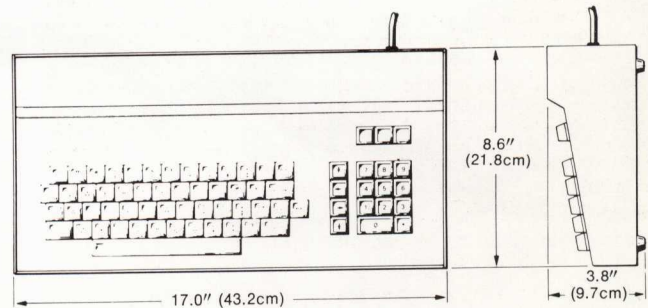
A-LAYOUT
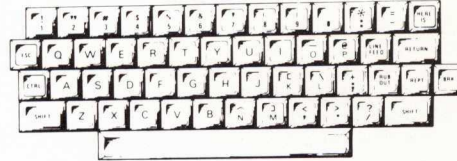
B-LAYOUT

C-LAYOUT


SERIES 200 CASE

8.6" (21.8cm)

17.0" (43.2cm)

3.8" (9.7cm)

DESIGN MODULARITY

The design modularity of Ann Arbor's product line is illustrated below. It starts with a two-board character generator that displays characters in a specified format on the screen of a TV monitor. With the addition of a Cursor board, the character generator becomes Ann Arbor's standard RO terminal. With the addition of a Serial board (and a keyboard), it becomes Ann Arbor's standard KSR terminal. With the addition of a Batch board, it becomes the top of Ann Arbor's line: a KSR with Batch Transmit. All of the options available at the various stages of progression are the result of alternative strappings and/or stuffings of these PC boards.

CHARACTER GENERATOR

RO TERMINAL

KSR TERMINAL

KSR WITH BATCH TRANSMIT
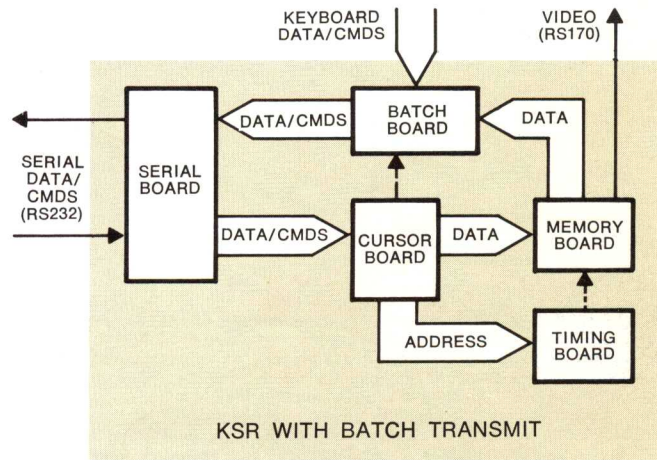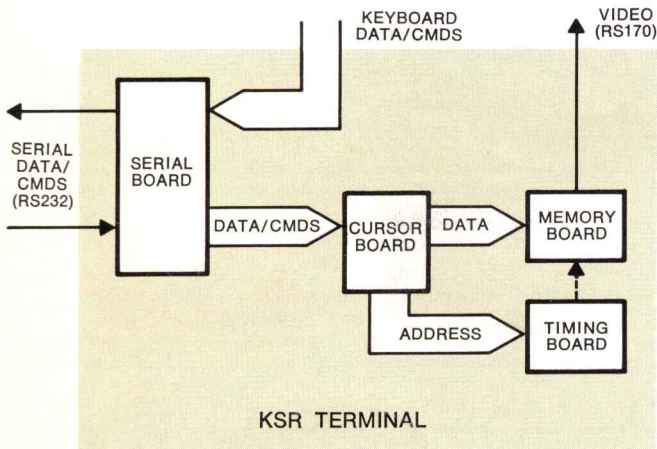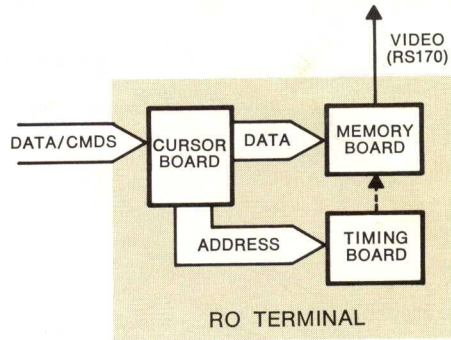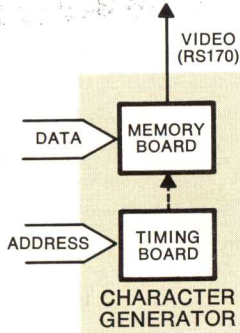
Q-MOD PRODUCTS

Ann Arbor manufactures a number of products, developed to the requirements of specific customers that have not been generalized to be included in its standard product line. A few representative examples are outlined below. If you have a requirement that involves converting digital data into video, the odds are good that Ann Arbor is currently manufacturing something very close to your requirement.

Q101 CONTROLLER
The Q101 Controller provides a burst-loaded RO terminal in a Series 200 case, capable of displaying both alphanumerics and full-graphics in black-and-white or in color. Alphanumerics format is 80 characters x 16 lines. Graphics format is 255 dots horizontal x 192 dots vertical. Data input is bit-parallel TTL, 10 Khz to 1 Mhz asynchronous.

Q102 CONTROLLER
The Q102 Controller provides two burst-loaded 80 x 16-character alphanumeric RO terminals in a single Series 200 case.

Q801 CONTROLLER
The Q801 Controller provides a strip-chart graphics display, with alphanumeric labelling/annotation capability. The graphics data rolls down through the alphanumeric data, from top to bottom on the screen, at rates up to 60 points per second with 8-bit amplitude resolution.

Q1101 CONTROLLER
The Q1101 Controller provides the display electronics for a complete 80x24 character alphanumeric RO terminal on a single PC board.

Q2001 CONTROLLER
The Q2001 Controller provides the display and control electonics for up to 32 complete data-entry/data-editing terminals. The electronics are packaged, one terminal per PC board, in a 19″ relay rack. The terminal keyboards and monitors can be located up to 300′ from the Controller.