

Computer Optics Mark IV Clustered Display System

MANAGEMENT SUMMARY

The Mark IV Clustered Display System (formerly the CO:77 Information Display System) is a direct replacement for the IBM 3270 Information Display System and provides complete software compatibility with the IBM 3270 with respect to line discipline, commands and command-code structure, and addressing sequence. Moreover, the Mark IV systems provide all features and functions that are currently available with the IBM 3270, as well as a few notable enhancements.

The Mark IV system is available as a clustered terminal for either local (computer site) or remote applications combining as many as 32 display units and printers and also as a minicluster with up to 8 devices per system.

The salient features of the Mark IV system include:

- *Display capacity*—The Mark IV offers a choice of three screen sizes: 480, 960, and 1920 characters.
- *System configuration*—The Mark IV can accommodate up to 32 directly attached devices (printers and display units).
- *Printed output*—An upper case printer, rated at 88 cps with a 64-character print set, is available. The printer ➤



The Computer Optics Mark IV Clustered Display System was originally marketed as the CO:77 Information Display System. The system is a plug-compatible replacement for the IBM 3270 Information Display System. Computer Optics is now a division of Four-Phase Systems, which supplies maintenance service to users.

A system of display/keyboard and printer terminals available in local or remote cluster configurations of up to 8 or 32 devices for direct replacement of IBM's 3270 at a considerable cost savings.

Displays are offered in sizes of 480, 960, and 1920 characters. An 88 cps, 132-column upper case printer is available.

Transmission rates range from 1200 bps to 9600 bps using EBCDIC code and SDLC or bisynchronous line disciplines. The systems are compatible with and can utilize all existing IBM software for the 3270.

A remote minicluster system with 4 display/keyboards and a printer rents for approximately \$517 per month, including maintenance, on a three-year lease.

A larger remote system with 24 display/keyboards and 4 printers rents for approximately \$2,038 per month, including maintenance, on a three-year lease.

CHARACTERISTICS

VENDOR: Computer Optics, Incorporated (a division of Four-Phase Systems), Berkshire Industrial Park, Bethel, Connecticut 06801. Telephone (203) 744-6720.

DATE OF ANNOUNCEMENT: May 1973.

DATE OF FIRST DELIVERY: February 1974.

NUMBER DELIVERED TO DATE: Over 4000.

SERVICED BY: Four-Phase.

CONFIGURATION

The Mark IV is offered as either a local or remote system supporting up to 32 devices and as a minicluster system supporting up to 8 devices.

The Model 7271 (remote) and 7272 (local) display systems each incorporate a hard-wired control unit that can accommodate up to 32 devices, including any mix of CRT display units and printers. The control unit provides individual buffering for each device, which can be located at a distance of up to 2000 cable-feet.

The basic control unit for the 7271 and 7272 cluster display systems can accommodate up to eight devices via an integral device adapter. Eight additional devices can be accommodated by each subsequent device adapter, up to a total of four adapters.

Buffer capacity corresponds to screen size of the available display units: 480, 960, or 1920 characters.

The 7271 remote cluster system is connected to a modem via a 40-foot cable. ➤

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- has a print capacity of 132 columns, and accommodates forms up to 16 inches wide.
- *Displayed output*—Clarity and sharpness (resolution) of displayed characters are equivalent to those of the IBM 3270, since both form each character via a 7-by-9 dot matrix. The Mark IV provides two beam intensity levels to highlight important information and beam blanking to mask confidential data for security purposes. The Mark IV display unit can be tilted or pivoted to eliminate glare and to satisfy the viewing convenience of individual operators.
- *Editing*—The Mark IV provides character insertion and deletion.
- *Key entry*—Four keyboard styles that duplicate the IBM 3270 66- and 78-key EBCDIC keyboards are available: typewriter, data entry, and operator console.
- *Communications*—Transmission speeds for the Mark IV range from 1200 to 9600 bps.
- *Software support*—Mark IV systems are compatible with and can utilize all existing IBM software for the 3270.

Computer Optics has recently been acquired by Four-Phase Systems, and is now operating as a division of Four-Phase, which supplies maintenance service to all CO:77 and Mark IV System users.

USER REACTION

In Datapro's 1980 survey of alphanumeric display terminal users, two users of Computer Optics Display Systems responded, representing a total of 315 displays. To supplement this response, Datapro contacted by telephone one additional user, with a total of 16 Computer Optics displays installed. The ratings obtained from these users are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	0	2	1	0	2.7
Ease of operation	1	1	1	0	3.0
Display clarity	0	2	1	0	2.7
Keyboard feel & usability	0	3	0	0	3.0
Hardware reliability	0	3	0	0	3.0
Maintenance service	1	2	0	0	3.3
Technical support	1	0	1	0	**

* Weighted Average based on a scale of 4.0 for Excellent.
**Weighted Average is considered invalid if based on fewer than three responses.

Only one of the users voiced dissatisfaction with the Computer Optics system, stating that plans were under way for replacement of the system within a few months. Problems with the remote printer were specifically mentioned as a cause of dissatisfaction. The low cost of the system was mentioned as an advantage. One user also mentioned that the quality of maintenance had improved since the acquisition of Computer Optics by Four-Phase. □

➤ The 7272 local cluster system contains a channel interface for direct connection (via up to 200 feet of cable) to an IBM System/360 computer, Models 25 through 195, or an IBM

System/370 computer, Models 115 through 195, via a Selector, Multiplexer, or Block Multiplexer channel. The maximum data transfer rate for local operation is 650,000 chars/sec.

TRANSMISSION SPECIFICATIONS

Transmission is half-duplex, synchronous at standard speeds of 2000 or 2400 bits/second or at optional speeds of 9600, 7200, 4800, or 1200 bits/second, using 8-level EBCDIC. The Model 7271 remote terminals employ the IBM Binary Synchronous Communications (BSC) technique and are transmission-compatible with the BSC models of the IBM 3270 Information Display System. The Model 7271 offers SDLC as an option.

The terminals provide an EIA Standard RS-232-C interface and connect to a voice-grade communications facility via a modem. Bell System modems that can be used include the 202 series (1200 bps), 201 series (2400 bps), 208 series (4800 bps), and 209A (7200 and 9600 bps).

DEVICE CONTROL

The Mark IV system operates under the control of the program stored at the computer and provides complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. The Mark IV system responds to and executes the full repertoire of IBM 3270 commands via a hard-wired processor.

Cursor control is functionally the same as in the IBM 3270. The controls position the cursor up, down, left, or right, either step-by-step or repetitively (if the key is held down); the cursor can also be backspaced one character position, moved to the beginning of the next line or the next unprotected data field, tabbed to the beginning of the next unprotected data field, and backtabbed to the beginning of the previous unprotected data field.

Program Function and Program Attention keys, a standard feature of the IBM 3270, are also standard in the Mark IV systems. Each of these keys generates a unique code that is recognized by the controlling software as a specific program request or data identifier. Program Function codes accompany the display data as it is transmitted to the computer, while Program Attention codes are transmitted separately.

The Mark IV system is supported under existing IBM software support for the IBM 3270, which includes the following IBM access methods: BTAM under DOS, DOS/VS, OS, or OS/VS2; TCAM under OS; and VTAM under DOS/VS, OS/VS1, or OS/VS2. The Mark IV system is supported as a display console in a local environment by IBM's DIDOCS or SDS under OS (MFT or MVT). The Mark IV system is also supported for use with the following IBM Program Products: VIDEO/370, DATA/360, IMS, IQF, CICS, and TSO.

COMPONENTS

CRT DISPLAY: A 15-inch (diagonal measurement) CRT is standard. The three standard display arrangements are as follows:

Display model:	8277-1	8277-3	8277-2
Characters/display	480	960	1920
Lines/display:	12	12	24
Characters/line:	40	80	80

A character set of 96 EBCDIC characters, including upper case and lower case alphabets, numerics, and special symbols, is displayed in green against a dark background. Each character is formed by a matrix of 7 by 9 dots.

Beam intensity, via program control, can be switched between normal and bright intensity levels, or the beam can

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► be turned off (blanked). An audible alarm is optionally available.

KEYBOARD: Four EBCDIC keyboards are available, each identical in layout and key arrangement with the equivalent IBM 3270 keyboards. They include a 66-key Typewriter Keyboard, a 66-key Data Entry Keyboard, a 78-key Typewriter Keyboard, and a 78-key Operator Console. All four keyboards feature an N-key rollover feature; the two 78-key keyboards offer 12 programmable function keys.

A separate 10-key numeric pad is optional for use with any keyboard.

PRINTER: The Model 7787-1 dot matrix character printer is available for use with the Mark IV system. The printer is

rated at 88 cps, and contains a 64-character upper case print set. Print capacity is 132 characters/line. Continuous 5-part forms up to 16 inches wide are accommodated, and are advanced via an adjustable tractor.

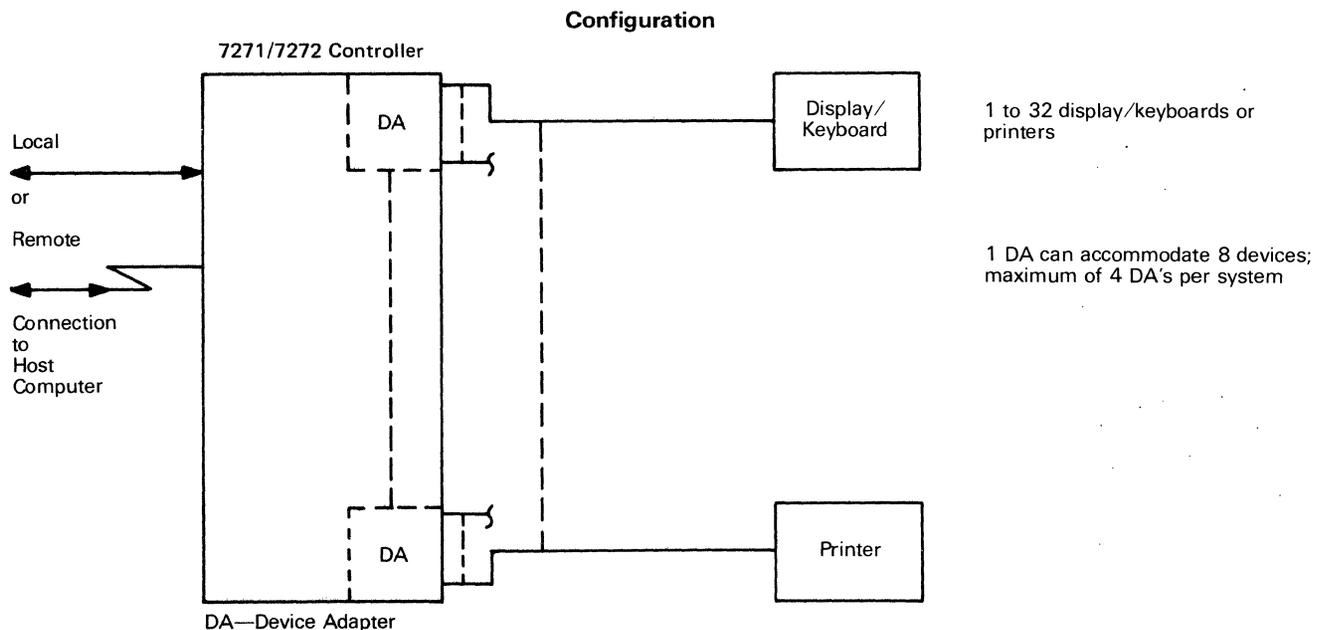
A stand and paper tray, two-channel VFU, and an auto-motor control are optionally available.

PRICING

The Mark IV systems are available for purchase or on a one-, two-, three-year, or 42-month lease, which includes maintenance. A separate maintenance contract is available for purchased systems.

		Monthly Charges*					
		1-Year Lease	2-Year Lease	3-Year Lease	42-Month Lease	Purchase	Monthly Maint.
Control Units & Adapters							
7271	Remote Controller	\$180	\$164	\$156	\$145	\$7,200	\$45
7272	Local Controller	180	164	156	145	7,200	45
7260	Device Adapter (controllers include one Device Adapter for first eight devices)	20	19	18	17	600	10
Display Units & Options							
8277-1	480 Character Display	55	50	48	45	2,115	11
8277-2	1920 Character Display	55	50	48	45	2,115	11
8277-3	960 Character Display	55	50	48	45	2,115	11
7060	Audible Alarm	NC	NC	NC	NC	NC	NC
7377	Upper and Lower Case	2	2	2	1	75	NC
Keyboards							
8630	66-key EBCDIC Typewriter	NC	NC	NC	NC	NC	NC
8631	66-key EBCDIC Data Entry	NC	NC	NC	NC	NC	NC
8632	78-key EBCDIC Operator Console	NC	NC	NC	NC	NC	NC
8633	78-key EBCDIC Typewriter	NC	NC	NC	NC	NC	NC
7636	10-key Numeric Pad	6	6	6	5	250	1
Printer & Options							
7787-1	88 cps Printer	195	182	169	155	5,290	55
7787-5	Stand and Paper Tray	5	5	5	4	180	NC
7787-6	2 Channel VFU	8	7	7	6	280	2
7787-7	Auto-Motor Control	5	5	5	4	180	2

*Includes print-shift maintenance. ■



Computer Optics CO:77 Information Display System



MANAGEMENT SUMMARY

The CO:77 Information Display System is a direct replacement for the IBM 3270 Information Display System and provides complete software compatibility with the IBM 3270 with respect to line discipline, commands and command-code structure, and addressing sequence. Moreover, the CO:77 systems provide all features and functions that are currently available with the IBM 3270, as well as a few notable enhancements.

The CO:77 system is available as a clustered terminal for either local (computer site) or remote applications combining as many as 32 display units and printers and also as a minicluster with up to 8 devices per system.

The salient features of the CO:77 system include:

- *Display capacity*—The CO:77 offers a choice of three screen sizes: 480, 960, and 1920 characters.
- *System configuration*—The CO:77 can accommodate up to 32 directly attached devices (printers and display units). As options, each display unit can accommodate an ID card reader and a light pen.
- *Printed output*—A full-character printer, rated at 275 cps with a 64-character print set, is available. The printer, produced by DATA 100 to Computer Optics specifications, is also available with a 96-character print set including lower-case alphabets, which reduces its rated speed to 187 cps. The CO:77 printer can function as a remote device and can be addressed separately. Local printing can be initiated at the display unit, but printing is executed only upon receipt of a print command from the computer. ➤

A system of display/keyboard and printer terminals available in local or remote cluster configurations of up to 8 or 32 devices for direct replacement of IBM's 3270 at a considerable cost savings.

Displays are offered in sizes of 480, 960, and 1920 characters. Three printers are available: 88 cps, 140 cps, or 275 cps. Other peripherals include a light pen and ID badge reader.

Transmission rates range from 1200 bps to 9600 bps using EBCDIC code and SDLC or bisynchronous line disciplines. The systems are compatible with and can utilize all existing IBM software for the 3270.

A remote minicluster system with 4 display/keyboards and a printer rents for approximately \$650 per month, including maintenance, on a three-year lease.

A larger remote system with 24 display/keyboards and 4 printers rents for approximately \$3,000 per month, including maintenance, on a three-year lease.

CHARACTERISTICS

VENDOR: Computer Optics, Incorporated, Berkshire Industrial Park, Bethel, Connecticut 06801. Telephone (203) 744-6720 or (800) 243-1314 (toll-free).

DATE OF ANNOUNCEMENT: May 1973.

DATE OF FIRST DELIVERY: February 1974.

NUMBER DELIVERED TO DATE: Over 4000.

SERVICED BY: Computer Optics in major cities, and by Pertec Computer Corp. in other U.S. areas.

CONFIGURATION

The CO:77 is offered as either a local or remote system supporting up to 32 devices and as a minicluster system supporting up to 8 devices.

The Model 7271 (remote) and 7272 (local) display systems each incorporate a hard-wired control unit that can accommodate up to 32 devices, including any mix of CRT display units and printers. The control unit provides individual buffering for each device, which can be located at a distance of up to 2000 cable-feet. Each display unit can support a light pen and an ID card reader, which require one light pen and ID card reader adapter for each set of up to eight pens and readers.

The Model 8271 is a minicluster display built around a microprocessor controller and is similar to the larger 7271 and 7272 systems except it supports only up to 8 devices per system. However, it retains all the other features of the 7271 and 7272 including compatibility with the IBM 3270.

The basic control unit for the 7271 and 7272 cluster display systems can accommodate up to eight devices via an ➤

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- ● *Displayed output*—Clarity and sharpness (resolution) of displayed characters are equivalent to those of the IBM 3270, since both form each character via a 7-by-9 dot matrix. Lower-case alphabets are included in the CO:77's 96-character display option. The CO:77 provides two beam intensity levels to highlight important information and beam blanking to mask confidential data for security purposes. The CO:77 display unit can be tilted or pivoted to eliminate glare and to satisfy the viewing convenience of individual operators.
- *Editing*—The CO:77 provides character insertion and deletion.
- *Key entry*—Five keyboard styles that duplicate the IBM 3270 66- and 78-key EBCDIC keyboards are available: typewriter, data entry, and operator console.
- *Communications*—Transmission speeds for the CO:77 range from 1200 to 9600 bps.
- *Software support*—CO:77 systems are compatible with and can utilize all existing IBM software for the 3270.

USER REACTION

In Datapro's 1978 survey of alphanumeric display terminal users, six users responded covering a total of 324 Computer Optics terminals. All those responding were using the terminal as a replacement for IBM's 3270. The combined user ratings are as follows:

	Excellent	Good	Fair	Poor	WA*
Overall performance	2	4	0	0	3.3
Ease of operation	1	5	0	0	3.2
Display clarity	1	5	0	0	3.2
Keyboard feel and usability	0	6	0	0	3.0
Hardware reliability	1	4	1	0	3.0
Maintenance service	2	1	2	1	2.7
Software & technical support	2	0	2	1	2.6

*Weighted Average on a scale of 4.0 for Excellent.

Software and technical support was not rated by one user. All ratings, with the exception of Maintenance service, were up from the 1976 survey; maintenance service dropped slightly. The principal advantages cited remained low cost and compact size. Disadvantages reported were as the ratings indicate, with one user reporting an unacceptable rate of light pen failures. □

- **integral device adapter.** Eight additional devices can be accommodated by each subsequent device adapter, up to a total of four adapters. As an option, devices having 480- or 1920-character buffers can be mixed on the same device adapter via a mixed character buffer (one per device adapter). The 8271 does not require adapters.

Buffer capacity corresponds to screen size of the available display units: 480, 960, or 1920 characters.

The 7271 remote cluster system is connected to a modem via a 40-foot cable.

The 7272 local cluster system contains a channel interface for direct connection (via up to 200 feet of cable) to an IBM System/360 computer, Models 25 through 195, or an IBM System/370 computer, Models 115 through 195, via a Selector, Multiplexer, or Block Multiplexer channel. The

maximum data transfer rate for local operation is 650,000 chars/sec.

TRANSMISSION SPECIFICATIONS

The 8271 can be connected to a multiplexor channel of IBM System 360, or 370; over a communications link to IBM 2701, 2703, 3704, or 3705 Transmission Control Unit or System/3. The 8271 can also be configured as a remote stand-alone system when the controller is replaced by the 6265 microprocessor and one attached display.

Transmission is half-duplex, synchronous at standard speeds of 2000 or 2400 bits/second or at optional speeds of 9600, 7200, 4800, or 1200 bits/second, using 8-level EBCDIC. The Model 7271 and 8271 remote terminals employ the IBM Binary Synchronous Communications (BSC) technique and are transmission-compatible with the BSC models of the IBM 3270 Information Display System. The Model 7271 offers SDLC as an option.

The terminals provide an EIA Standard RS-232C interface and connect to a voice-grade communications facility via a modem. Bell System modems that can be used include the 202 series (1200 bps), 201 series (2400 bps), 208 series (4800 bps), and 209A (7200 and 9600 bps).

DEVICE CONTROL

The CO:77 system operates under the control of the program stored at the computer and provides complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. The CO:77 system responds to and executes the full repertoire of IBM 3270 commands via a hard-wired processor.

Cursor control is functionally the same as in the IBM 3270. The controls position the cursor up, down, left, or right, either step-by-step or repetitively (if the key is held down); the cursor can also be backspaced one character position, moved to the beginning of the next line or the next unprotected data field, tabbed to the beginning of the next unprotected data field, and backtabbed to the beginning of the previous unprotected data field.

Program Function and Program Attention keys, a standard feature of the IBM 3270, are also standard in the CO:77 systems. Each of these keys generates a unique code that is recognized by the controlling software as a specific program request or data identifier. Program Function codes accompany the display data as it is transmitted to the computer, while Program Attention codes are transmitted separately.

The CO:77 system is supported under existing IBM software support for the IBM 3270, which includes the following IBM access methods: BTAM under DOS, DOS/VS, OS, or OS/VS2; TCAM under OS; and VTAM under DOS/VS, OS/VS1, or OS/VS2. The CO:77 system is supported as a display console in a local environment by IBM's DIDOCS or SDS under OS (MFT or MVT). The CO:77 system is also supported for use with the following IBM Program Products: VIDEO/370, DATA/360, IMS, IQF, CICS, and TSO.

CRT DISPLAY: Via a 15-inch (diagonal measurement) CRT. The three standard display arrangements are as follows:

Display model:	8277-1*	8277-3*	8277-2
Characters/display:	480	960	1920
Lines/display:	12	12	24
Characters/line:	40	80	80

*Designated as 9277-X in the 8271 system.

COMPONENTS

A character set of 64 or 96 (optional) EBCDIC characters, including upper case and lower case (optional) alphabets, numerics, and special symbols, is displayed in green against a dark background. Each character is formed by a matrix of 7 by 9 dots.

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► Beam intensity, via program control, can be switched between normal and bright intensity levels, or the beam can be turned off (blanked).

A light pen is available as an option and functionally corresponds to IBM's Selector Pen, a 3270 option. Any one or several alphanumeric or numeric fields of fixed or variable formats can be selected by the pen, which transmits the address of the selected entry to the computer to initiate the programmed function.

KEYBOARD: Any of three keyboard arrangements can be specified: typewriter, data entry (keypunch), or operator console. The keyboards are identical in layout and key arrangement with the equivalent IBM 3270 keyboards, and include a separate group of 12 Program Function keys located to the right of the main keygroup.

A separate 10-key numeric pad is optional for use with any keyboard.

PRINTERS: Three printers are available:

Model 7780 is a full character impact printer providing 132 character positions. The printer is rated at 275 cps for a 60-character EBCDIC print set and at 187 cps for a 96-character EBSCIC print set. The print accommodates

continuous, 5-part, pin-fed forms up to 15¾ inches wide via an adjustable tractor. Horizontal and vertical spacings are 10 char./inch and 6 lines/inch, respectively. Vertical format control is standard and is implemented via a paper tape loop.

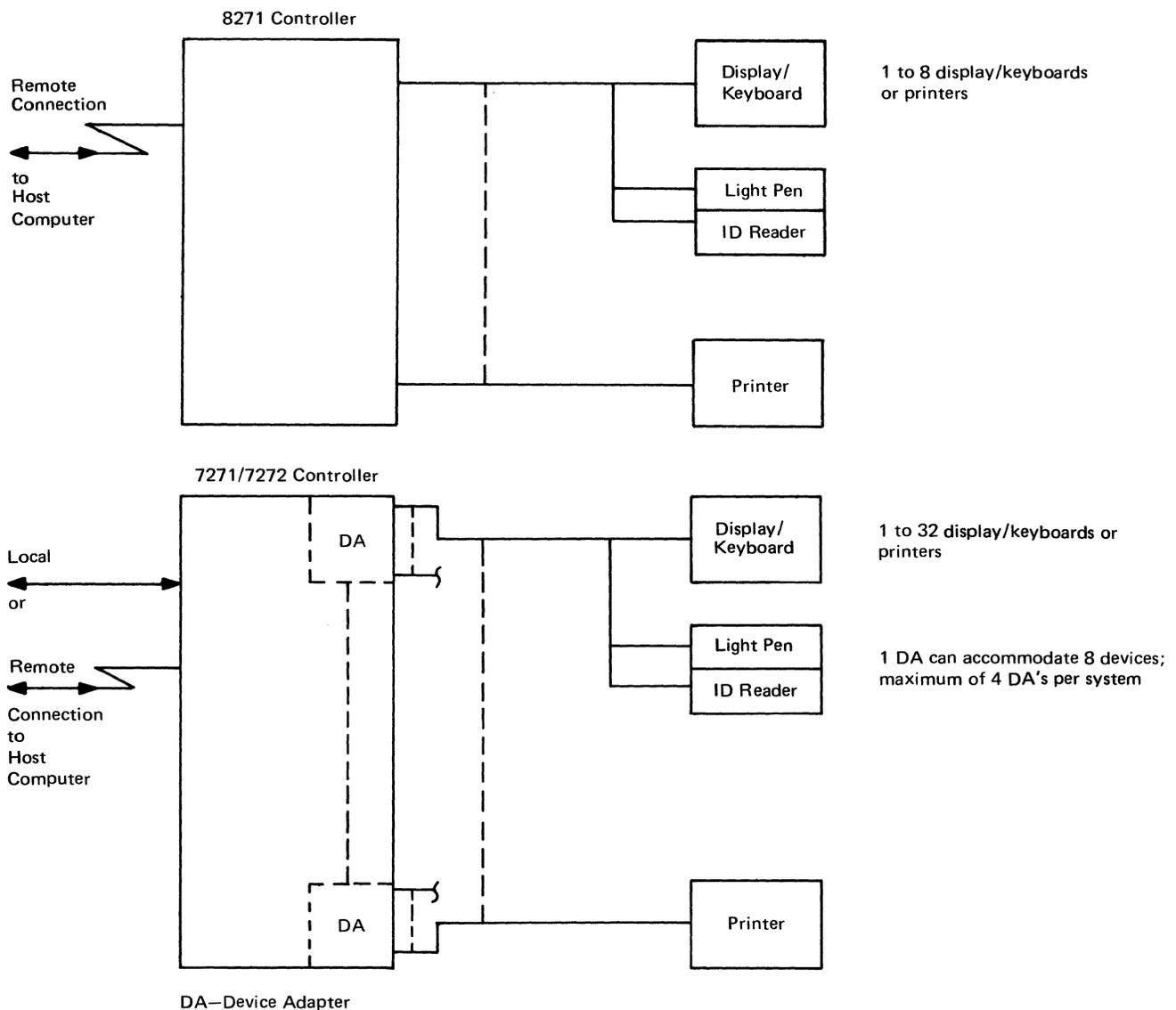
Model 7784 is a full character impact printer providing 132 character positions. The printer is rated at 140 cps for a 64-character EBCDIC print set. The printer accommodates continuous, 5-part, pin-fed forms up to 15¾ inches via an adjustable tractor. Vertical format control is standard IBM 12-channel via a paper tape loop.

Model 7787 is a dot matrix character impact printer providing 132 character positions. The printer is rated at 88 cps for a 64-character EBCDIC print set. The printer accommodates continuous 5-part, pin-fed forms up to 15¾ inches via an adjustable tractor. Vertical format control is standard Teletype 8 channel and is implemented via a paper tape loop.

PRICING

The CO:77 systems are available for purchase or on a one-four- or five-year lease, which includes maintenance. A separate maintenance contract is available for purchased systems. ►

Configuration



Computer Optics CO:77 Information Display System

	Monthly Charges*					Purchase	Monthly Maint.
	1 Yr. Lease	2 Yr. Lease	3 Yr. Lease	4 Yr. Lease	5 Yr. Lease		
Cluster Control Unit & Adapters							
CO:7271 (remote)	\$290	\$265	\$240	\$225	\$212	\$9,600	\$42
CO:7272 (local)	303	278	250	235	221	9,600	42
Device Adapters:							
CO:7260-1; (for devices 1 to 8)	N/C	N/C	N/C	N/C	N/C	N/C	N/C
CO:7260-2 (for devices 9 to 16)	110	100	90	85	80	3,560	12
CO:7260-3 (for devices 17 to 24)	137	125	113	106	100	4,900	12
CO:7260-4 (for devices 25 to 32)	110	100	90	85	80	3,560	12
Transmissions Speed Sequencers:							
CO:7821-2/3; 2,000/4,000 bps, standard	N/C	N/C	N/C	N/C	N/C	N/C	N/C
CO:7821-1/4/5/6; 1,200/4,800/7,200/ 9,600 bps	5	4	4	4	3	350	1
CO:7377 Dual Case (EBCDIC)	5	5	5	5	5	170	N/C
Minicluster Control Unit							
CO:8271-1 (up to 8 devices)	212	193	174	163	153	6,800	26
Transmissions Speed Sequencers:							
CO:8821-2/3 (2,000/2,400 bps standard)	N/C	N/C	N/C	N/C	N/C	N/C	N/C
CO:8821-1/4/5/6 (1,200/4,800/7,200/ 9,600 bps)	5	4	4	3	3	175	1
CO:8377 Dual-Case (EBCDIC)	5	5	5	5	5	170	N/C
Display Units							
For 7271, 7272 Control Units:							
CO:8277-1; 480 characters	55	51	46	44	42	1,900	10
CO:8277-2; 1920 characters	78	71	64	60	57	2,600	10
CO:8277-3; 960 characters	62	57	52	49	47	1,900	10
For 8271 Mini Control Unit:							
CO:9277-1; 480 characters	78	71	64	60	57	2,600	10
CO:9277-2; 1920 characters	78	71	64	60	57	2,600	10
CO:9277-3; 960 characters	78	71	64	60	57	2,600	10
Keyboards							
CO:8630; EBCDIC Typewriter/66 Key	14	13	12	11	10	430	3
CO:8631; EBCDIC Data Entry/66 Key	14	13	12	11	10	430	3
CO:8632; EBCDIC Operator Console	26	24	22	21	20	770	4
CO:8633; EBCDIC Typewriter/78 Key	16	14	13	12	11	470	4
CO:8636; EBCDIC Keypunch/66 Key	16	14	13	12	11	470	4
Printers							
CO:7780-1; 275 cps, upper case	295	270	245	230	216	7,640	60
CO:7780-2; 275 cps, dual case	307	281	253	238	223	7,915	60
CO:7780-5 Vertical Form/Tab Control	8	7	7	6	6	280	2
CO:7784-1; 140 cps, upper case	257	236	212	200	188	6,480	55
CO:7784-2; 140 cps, dual case	264	242	218	205	193	6,715	55
CO:7784-5 Vertical Form/Tab Control	8	7	7	6	6	280	2
CO:7787-1; 88 cps upper case	193	178	160	151	142	5,287	50
CO:7787-5 Stand & Paper Stacker	7	7	6	5	5	250	0
CO:7787-6 2 Channel VFU	9	8	8	7	7	250	3
CO:7787-7 Auto-Motor Control	6	5	5	4	4	100	2
Features							
CO:7225 Mixed Character Buffer	5	4	4	3	3	190	1
CO:7340 Security Keylock	—	—	—	—	—	50	—
CO:7050 Light Pen Adapter (1 per Device Adapter)	10	9	8	8	7	400	0
CO:7350 Selector Light Pen	30	28	25	24	23	1,000	2
CO:7600 Identification Badge Reader	30	27	24	23	22	915	6
CO:7636 Numeric Pad; 12 keys	14	13	12	11	10	425	3

*Includes prime shift maintenance. ■

Computer Optics CO: 77 Information Display System



MANAGEMENT SUMMARY

Computer Optics, a manufacturer of CRT display terminals formed in 1968, has assumed a comparatively low-profile image in the industry. And until May 1973, when Computer Optics announced its first fully compatible IBM replacement terminal, it had not seriously contended for a share of the IBM replacement market. The company's previous products included the CO:70, an ASCII terminal that is no longer in production, and the CO:75, a quasi-compatible replacement for IBM's 2848/2260 Display Station that experienced low market penetration, primarily because it was marketed for text editing applications rather than as an IBM replacement.

The CO:77 Information Display System is a direct replacement for the IBM 3270 Information Display System and provides complete software compatibility with the IBM 3270 with respect to line discipline, commands and command-code structure, and addressing sequence. Moreover, the CO:77 systems provide all features and functions that are currently available with the IBM 3270, as well as a few notable enhancements.

The CO:77 system is available as a clustered terminal for either local (computer site) or remote applications combining as many as 32 display units and printers and also as a minicluster with up to 8 devices per system. No remote stand-alone replacement for the IBM 3275 is currently available, and Computer Optics has no immediate plans to introduce one.

The salient features of the CO:77 system are compared with those of the IBM 3270 system in the following paragraphs.

- *Display capacity*—The CO:77 offers a choice of three screen sizes: 480, 960, and 1920 characters. IBM provides two screen sizes: 480 and 1920. ➤

A system of display/keyboard and printer terminals available in local or remote cluster configurations of up to 8 or 32 devices for direct replacement of IBM's 3270 at a considerable cost savings.

Displays are offered in sizes of 480 char., 960 char. and 1920 char. Two printers are available: 140 cps or 275 cps. Other peripherals include a light pen and ID badge reader.

Transmission rates range from 1200 bps to 9600 bps using ASCII or EBCDIC code and bisynchronous line disciplines. The systems are compatible with and can utilize all existing IBM software for the 3270.

A remote minicluster system with 4 display/keyboards and a printer rents for approximately \$700 per month, including maintenance, on a three-year lease.

A larger remote system with 24 display/keyboards and 4 printers rents for approximately \$3,000 per month.

CHARACTERISTICS

VENDOR: Computer Optics, Incorporated, Berkshire Industrial Park, Bethel, Connecticut 06801. Telephone (203) 744-6720 or (800) 243-1314 (toll-free).

DATE OF ANNOUNCEMENT: May 1973.

DATE OF FIRST DELIVERY: February 1974.

NUMBER DELIVERED TO DATE: Over 2000.

SERVICED BY: Computer Optics in major cities, and by Syntonic Technology, Inc. in other U.S. areas.

CONFIGURATION

The CO:77 is offered as either a local or remote system supporting up to 32 devices and as a minicluster system supporting up to 8 devices.

The Model 7271 (remote) and 7272 (local) display systems each incorporate a hard-wired control unit that can accommodate up to 32 devices, including any mix of CRT display units and printers. The control unit provides individual buffering for each device, which can be located at a distance of up to 2000 cable-feet. Each display unit can support a light pen and an ID card reader, which require one light pen and ID card reader adapter for each set of up to eight pens and readers.

The Model 8271 is a minicluster display built around a microprocessor controller and is similar to the larger 7271 and 7272 systems except it supports only up to 8 devices per system. However, it retains all the other features of the 7271 and 7272 including compatibility with the IBM 3270. ➤

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- ● *System configuration*—The CO:77 can accommodate up to 32 directly attached devices (printers and display units). As options, each display unit can accommodate an ID card reader and a light pen. These configuration rules are identical with those of the IBM 3270, but the CO:77 device adapter accommodates twice as many devices per adapter. A lower limit on the number of devices per adapter is generally conducive to a lower-cost configuration. But even with reduced cost-effectiveness resulting from the larger adapter, the CO:77 is priced substantially below its IBM counterpart. What's more, the CO:77 permits mixing 480- and 1920-character devices on the same device adapter for increased operating flexibility.
- *Printed output*—Computer Optics has significantly enhanced the CO:77's hard-copy capability with respect to that of the IBM 3270. A full-character printer, rated at 275 cps with a 64-character print set, produces copy 4 or 7 times faster than IBM's 66 or 40 cps matrix printers, respectively. The printer, produced by Odec to Computer Optics specifications, is also available with a 96-character print set including lower-case alphabets, which reduces its rated speed to 187 cps. Like its IBM counterpart, the CO:77 printer can function as a remote device and can be addressed separately. Local printing can be initiated at the display unit, but printing is executed only upon receipt of a print command from the computer.
- *Displayed output*—The CO:77 has essentially the same display characteristics as the IBM 3270. Clarity and sharpness (resolution) of the displayed characters are equivalent to those of the IBM 3270, since both form each character via a 7-by-9 dot matrix. Lower-case alphabets are included in the CO:77's 96-character display option. By contrast, lower-case alphabets for the IBM 3270 are available as an RPQ. Like its IBM counterpart, the CO:77 provides two beam intensity levels to highlight important information and beam blanking to mask confidential data for security purposes. Unlike the rigidly-mounted IBM 3270 display unit, the CO:77 display unit can be tilted or pivoted to eliminate glare and to satisfy the viewing convenience of individual operators.
- *Editing*—The CO:77 provides the same editing capability as the IBM 3270; i.e., character insertion and deletion.
- *Key entry*—Six keyboard styles that duplicate the IBM 3270 66- and 78-key EBCDIC and ASCII keyboards are available: typewriter, data entry, and operator console.
- *Communications*—Transmission speeds for the CO:77 range from 1200 to 9600 bps, compared with 1200 to 7200 bps for the IBM 3270. Speeds of 1200 bps and above 2400 bps are optional for the CO:77.
- *Software support*—CO:77 systems are compatible with and can utilize all existing IBM software for the 3270.

The CO:77 system offers users substantial savings over the IBM 3270 system. A bare-bones CO:77 system (without ID card readers, light pens and printers) leases for as much as 37 percent (one-year lease) to as much as 42 percent (three-year lease) below the cost of an IBM 3270 system ➤

- The basic control unit for the 7271 and 7272 cluster display systems can accommodate up to eight devices via an integral device adapter. Eight additional devices can be accommodated by each subsequent device adapter, up to a total of four adapters. As an option, devices having 480- or 1920-character buffers can be mixed on the same device adapter via a mixed character buffer (one per device adapter). The 8271 does not require adapters.

Buffer capacity corresponds to screen size of the available display units: 480, 960, or 1920 characters.

The 7271 remote cluster system is connected to a modem via a 50-foot cable.

The 7272 local cluster system contains a channel interface for direct connection (via up to 200 feet of cable) to an IBM System/360 computer, Models 25 through 195, or an IBM System/370 computer, Models 115 through 195, via a Selector, Multiplexer, or Block Multiplexer channel. The maximum data transfer rate for local operation is 650,000 chars/sec.

TRANSMISSION SPECIFICATIONS

The 8271 can be connected to a multiplexor channel of IBM System 360, or 370; over a communications link to IBM 2701, 2703, 3704, or 3705 Transmission Control Unit or System/3. The 8271 can also be configured as a remote stand-alone system when the controller is replaced by the 6265 microprocessor and one attached display.

Transmission is half-duplex, synchronous at standard speeds of 2000 or 2400 bits/second or at optional speeds of 9600, 7200, 4800, or 1200 bits/second, using 8-level EBCDIC or ASCII (with parity). The Model 7271 and 8271 remote terminals employ the IBM Binary Synchronous Communications (BSC) technique and are transmission-compatible with the BSC models of the IBM 3270 Information Display System.

The terminals provide an EIA Standard RS-232C interface and connect to a voice-grade communications facility via a modem. Bell System modems that can be used include the 202 series (1200 bps), 201 series (2400 bps), 208 series (4800 bps), and 209A (7200 and 9600 bps).

DEVICE CONTROL

The CO:77 system operates under the control of the program stored at the computer and provides complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. The CO:77 system responds to and executes the full repertoire of IBM 3270 commands via a hard-wired processor.

Cursor control is functionally the same as in the IBM 3270. The controls position the cursor up, down, left, or right, either step-by-step or repetitively (if the key is held down); the cursor can also be backspaced one character position, moved to the beginning of the next line or the next unprotected data field, tabbed to the beginning of the next unprotected data field, and backtabbed to the beginning of the previous unprotected data field.

Program Function and Program Attention keys, a standard feature of the IBM 3270, are also standard in the CO:77 systems. Each of these keys generates a unique code that is recognized by the controlling software as a specific program request or data identifier. Program Function codes accompany the display data as it is transmitted to the computer, while Program Attention codes are transmitted separately.

The CO:77 system is supported under existing IBM software support for the IBM 3270, which includes the following IBM access methods: BTAM under DOS, DOS/VS, OS, or OS/VS2; TCAM under OS; and VTAM under DOS/VS, OS/VS1, or OS/VS2. The CO:77 system is supported as a display console in a local environment by IBM's DIDOCS or SDS under OS (MFT or MVT). The ➤

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▷ of equivalent size. For example, a 16-station CO:77 with 1920-character displays and 78-key typewriter keyboards leases for \$1,928 (one-year lease) or \$1,775 (three-year lease) per month. This represents a monthly saving of \$859 or \$1,032 under a one- or three-year lease, respectively. However, the combined costs of light pens and ID card readers drives the monthly cost savings down by \$130 (one-year lease) or \$81 (three-year lease) per 8-station increment. Still further erosion of savings occurs by adding printers. CO's printers are 2 to 7 times faster than IBM's printers for the 3270 system (excluding IBM's faster line printer which is much higher priced), but they also cost from \$61 to \$142 (one-year lease) or \$43 to \$116 (three-year lease) per month more than the IBM printers. By adding a light pen and ID card reader to each of the 16 displays in the above example plus one printer for each group of 4 displays (4 printers), the monthly savings would be whittled down to \$455 or \$131 (one-year lease) or to \$698 or \$406 (three-year lease) per month.

USER REACTION

In Datapro's 1976 survey of alphanumeric display terminal users, 8 users reported on their experience with a total of 188 CO display terminals. The combined user ratings are presented below.

	Excellent	Good	Fair	Poor	WA*
Overall performance	1	6	1	0	3.0
Ease of operation	2	4	2	0	3.0
Display clarity	1	3	4	0	2.6
Keyboard feel and usability	1	3	4	0	2.6
Hardware reliability	3	2	2	1	2.9
Maintenance service	2	1	4	1	2.5
Software and technical support	1	0	3	0	2.5

*Weighted Average on a scale of 4.0 for Excellent.

The principal advantage of the CO:77 cited by the users was, as could be expected, low cost. Most users expressed a satisfaction with a terminal comparable to that of the IBM 3270, but with a significant reduction in cost. Other advantages cited were reliability of the terminal, strong vendor support, and compact size of the equipment. One user, however, expressed some dissatisfaction with the relatively large size of the controller. The only other disadvantage, outside the ratings themselves, mentioned was two users who complained about undesirable screen glare of the display unit. □

▶ CO:77 system is also supported for use with the following IBM Program Products: VIDEO/370, DATA/360, IMS, IQF, CICS, and TSO.

CRT DISPLAY: Via a 15-inch (diagonal measurement) CRT. The three standard display arrangements are as follows:

Display model:	8277-1*	8277-3*	8277-2
Characters/display:	480	960	1920
Lines/display:	12	12	24
Characters/line:	40	80	80

*Designated as 9277-X in the 8271 system.

COMPONENTS

A character set of 64 or 96 (optional) EBCDIC or ASCII characters, including upper case and lower case (optional) alphabets, numerics, and special symbols, is displayed in green against a dark background. Each character is formed by a matrix of 7 by 9 dots.

Beam intensity, via program control, can be switched between normal and bright intensity levels, or the beam can be turned off (blanked).

A light pen is available as an option and functionally corresponds to IBM's Selector Pen, a 3270 option. Any one or several alphanumeric or numeric fields of fixed or variable formats can be selected by the pen, which transmits the address of the selected entry to the computer to initiate the programmed function.

KEYBOARD: Any of three keyboard arrangements can be specified: typewriter, data entry (keypunch), or operator console. The keyboards are identical in layout and key arrangement with the equivalent IBM 3270 keyboards, and include a separate group of 12 Program Function keys located to the right of the main keygroup.

A separate 10-key numeric pad is optional for use with any keyboard.

PRINTERS: Two printers are available:

Model 7780 is a full character impact printer providing 132 character positions. The printer is rated at 275 cps for a 60-character EBCDIC print set and at 187 cps for a 96-character EBCDIC or 64-character ASCII print set. The print accommodates continuous, 5-part, pin-fed forms up to 14-7/8 inches wide via an adjustable tractor. Horizontal and vertical spacings are 10 char/inch and 6 lines/inch, respectively. Vertical format control is standard and is implemented via a paper tape loop.

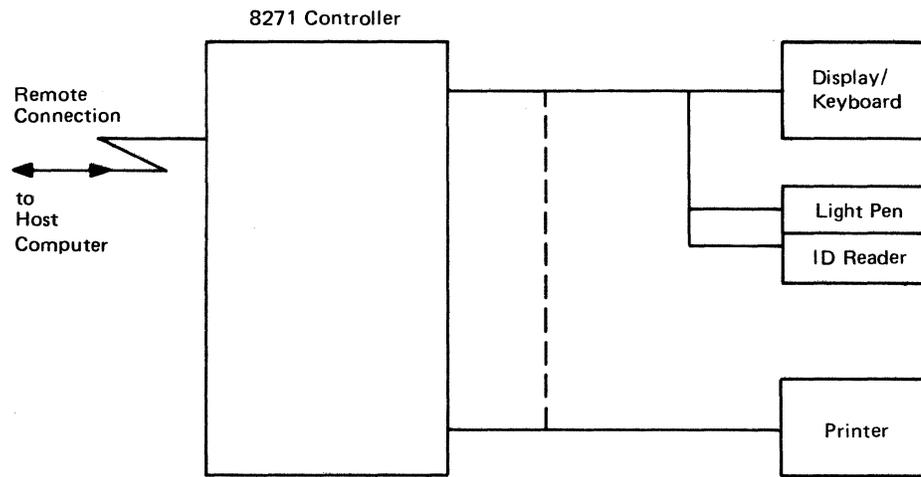
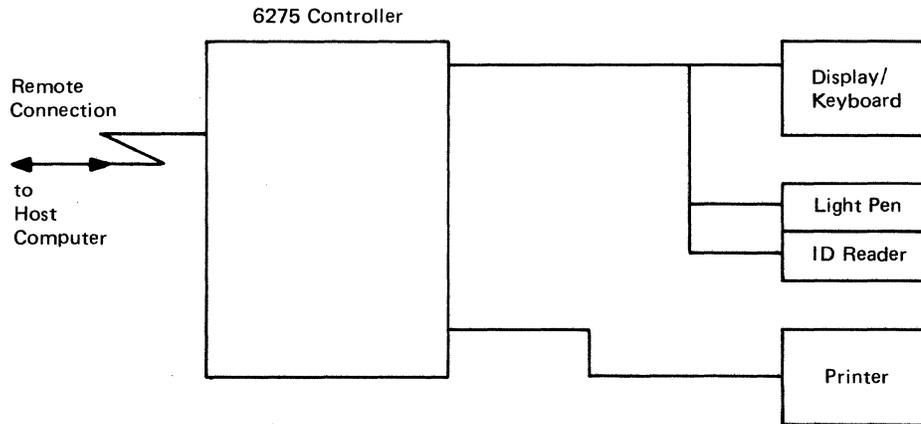
Model 7784 is a full character impact printer providing 132 character positions. The printer is rated at 140 cps for a 64-character EBCDIC or ASCII print set. The printer accommodates continuous, 5-part, pin-fed forms up to 16 inches via an adjustable tractor. Vertical format control is standard two-channel. Punched tape provides multiple-line addressing with each channel.

PRICING

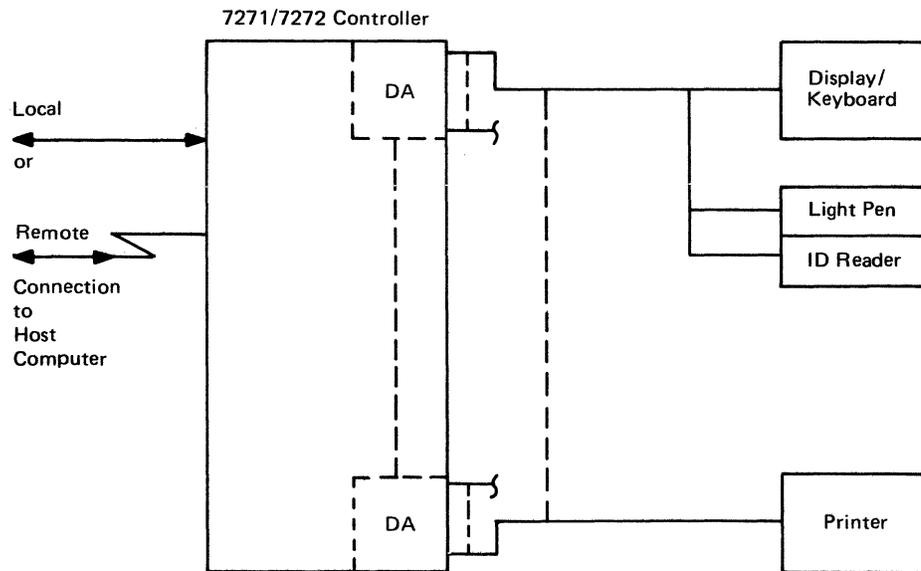
The CO:77 systems are available for purchase or on a one- or three-year lease, which includes maintenance. A separate maintenance contract is available for purchased systems. ▶

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Configuration



1 to 8 display/keyboards or printers



1 to 32 display/keyboards or printers

1 DA can accommodate 8 devices; maximum of 4 DA's per system

DA—Device Adapter

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	Monthly Rental*		Purchase	Monthly Maint.
	1-Yr. Lease	3-Yr. Lease		
Cluster Control Unit & Adapters				
CO: 7271 (remote)	\$290	\$265	\$8,632	\$45
CO: 7272 (local)	295	270	8,632	45
CO: 7260 Device Adapters—				
CO: 7260-1 (for devices 1 to 8)	107	97	3,201	15
CO: 7260-2 (for devices 9 to 16)	107	97	3,201	15
CO: 7260-3 (for devices 17 to 24)	134	122	4,398	15
CO: 7260-4 (for devices 25 to 32)	107	97	3,201	15
Transmission Speed Sequences (2000, 2400 bps std.):				
CO: 7821-1/4/5/6 (1200/4800/7200/9600 bps Character Generator (EBCDIC, ASCII-A, B std.):	6	5	315	1
CO: 7377 Dual-Case EBCDIC	18	16	529	—
Minicuster Control Unit				
CO: 8271 (for up to 8 devices)	212	193	6,100	50
Stand-Alone Controllers—				
CO: 6275-1 (480 character)	285	259	8,425	65
CO: 6275-2 (1920 character)	285	259	8,425	65
CO: 6275-3 (960 character)	285	259	8,425	65
Transmission Speed Sequences (200, 2400 bps std.):				
CO: 8821-1/4/5/6 (1200/4800/7200/9600 bps)	6	5	158	1
Printers				
CO: 7780-1 EBCDIC Printer; 275 cps, upper case	275	250	6,870	80
CO: 7780-2 EBCDIC Printer; 275 cps, dual case	287	261	7,120	80
CO: 7780-3/4 ASCII-A/B Printer; 275 cps upper case	275	250	6,870	80
CO: 7780-5 Vertical Form 1 Tab Control (for any 7780 printer)	8	7	250	3
CO: 7784-1 EBCDIC Printer; 140 cps, upper case				
CO: 7784-2 EBCDIC Printer; 140 cps, dual case	206	188	5,830	80
CO: 7784-3/4 ASCII A/B Printer; 140 cps, upper case	217	198	6,040	80
CO: 7784-5 Vertical Form Tab Control (for any 7748 printer)	206	188	5,830	80
	8	7	250	3
Display Units				
For 7271, 7272 Controllers—				
CO: 8277-1 (480 character)	50	46	1,707	15
CO: 8277-2 (1920 character)	73	66	2,325	15
CO: 8277-3 (960 character)	57	52	1,900	15
For 8271 Controller—				
CO: 9277-1/2/3 (480/1926/960 character)	73	66	2,325	15
Keyboards				
CO: 8630 EBCDIC Typewriter Keyboard; 66 keys	14	13	387	3
CO: 8631 EBCDIC Data-Entry Keyboard; 66 keys	14	13	387	3
CO: 8632 EBCDIC Operator Console Keyboard (not available on 7271)	26	24	690	6
CO: 8633 EBCDIC Typewriter Keyboard; 78 Keys	16	14	421	4
CO: 8634 ASCII Typewriter Keyboard; 66 Keys	14	13	387	3
CO: 8635 ASCII Typewriter Keyboard; 78 Keys	16	14	421	4
CO: 8636 EBCDIC Keypunch Keyboard; 66 Keys	16	14	421	4
Other Features				
CO: 7090 Audible Alarm	6	5	183	1
CO: 7225 Mixed Character Buffer	6	6	170	1
CO: 7340 Security Keylock	NA	NA	87	—
CO: 7350 Selector Light Pen	29	26	897	3
CO: 7050 Adapter for Light Pen (up to 8 devices)	10	9	360	—
CO: 7600 Identification Badge Reader	30	27	821	6
CO: 7636 Numeric Pad; 12 Keys	14	13	383	3

* Includes prime shift maintenance. ■

