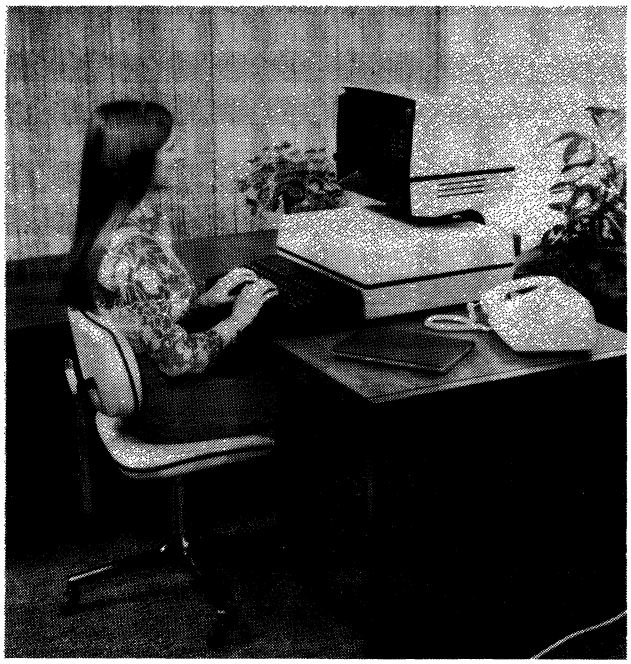
ICC 40+ Data Display System



Plug compatible replacement for Teletype Model 40 or AT&T Dataspeed 40.

Enhancements over the 40 display include additional text editing functions, optional calculator function, additional communications capabilities, and an optional underline feature.

Costs match or are lower than the Bell Dataspeed 40 service if a two-year or longer lease is elected.

MANAGEMENT SUMMARY

The ICC 40+ is a versatile CRT display system designed to meet the needs of business communications. Introduced in July 1974, the ICC 40+ Data Display System is a direct replacement for Teletype's impressive Model 40 which is also available from AT&T as the Dataspeed 40 Service. The "plus" designation implies that ICC's 40+ terminal provides all the capabilities of the Teletype Model 40 *plus* some attractive enhancements.

The ICC 40+ is a stand-alone terminal consisting of three separate units: CRT display monitor, keyboard, and control module. In addition, ICC offers two serial printers that operate at 110 and 240 characters per second. Customers can alternatively supply their own printer and attach it to the 40+ via an optional RS-232C interface.

Not a user-programmable terminal, the ICC 40+ boasts a microprogram-controlled microprocessor (currently an Intel 8008) as a terminal controller. The microprogram (or "firmware") resides in an 8K ROM (read-only memory). An 8K RAM (random-access memory) is used for display memory. Though primarily beneficial to the manufacturer, the state-of-the-art architecture used in the ICC 40+ offers increased operating flexibility, speed, and capabilities over those of conventional hard-wired terminals. The key advantage of microprocessor control is its inherent flexibility, which significantly extends the life of the product by sharply reducing the likelihood of early obsolescence. New features and peripheral devices can be implemented and existing ones deleted simply by changes to the microprogram; this would entail simply replacing the unit's ROM with one containing a microprogram including the new, added, or altered features.

The firmware for the ICC 40+ implements all the key features of the Teletype Model 40, including identical text

CHARACTERISTICS

VENDOR: International Communications Corporation (ICC), 8600 N.W. 41st Street, Miami, Florida 33166. Telephone (305) 592-7654.

DATE OF ANNOUNCEMENT: July 1974.

DATE OF FIRST DELIVERY: Fourth quarter 1974.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: ICC.

CONFIGURATION

The basic 40+ is composed of three discrete modules which include a control module containing a microprocessor with 8K of ROM (read-only memory) and 8K of RAM (random-access memory), a keyboard module, and a display module. The ICC 40+ can be configured as follows:

- **40+K1–a plug-compatible replacement for the Teletype Model 40 or Bell Dataspeed 40.**
- **40+65–compatible with the IBM 2845/2265 Display Station.**
- **40+MPL–a plug-compatible replacement for the Bell Dataspeed 40 operating with the Selective Calling Arrangement (9140).**

Separate interfaces provide connections for a serial printer and an external modem.

TRANSMISSION SPECIFICATIONS

The system operates in either asynchronous or synchronous mode, using ASCII code in all cases, with selectable parity, at speeds up to 3600 bits per second in certain configurations. The modem interface is compatible with EIA standard RS-232C. For all speeds of 1200 bits per second and above, ICC provides optional modems, although any acceptable modem or acoustic coupler may be used. The ICC 40+ can be used in either switched or leased networks or with Digital Data Service. Depending upon the configuration selected, the 40+ family will operate in point-to-point, multi-point, and/or multi-drop environments. Both attended and unattended operation are also supported.

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editing, optional paging and scrolling, cursor manipulation, optional tabbing, optional format protection, and optional printing capabilities. In addition, ICC has added some facilities of its own that can enhance the terminal's operations. These include:

- Additional text editing functions, including word insert and delete functions and a line erase function as standard features.
- An optional calculator function, permitting common arithmetic operations to be performed on designated fields within a displayed format for applications such as typing invoices.
- Additional communications capabilities, including: 1) the option to specify synchronous transmission at 2400 bps as a standard alternative to asynchronous transmission at 1200 bps; 2) optional multistation operation in a polled environment using ASCII line discipline; and 3) an optional send/receive function for interactive operation (as in time-sharing) that automatically switches communications from the transmit mode to the receive mode following message transmission. (However, the ICC 40+ does not currently offer a 1050-bps transmission speed, which precludes its use for Bell System Dataspeed Type 2 Service.)
- An optional underline feature, permitting important data to be displayed with an underscore to alert the operator's attention.

Like its Teletype counterpart, the ICC 40+ provides a self-diagnostic capability implemented by the terminal firmware. This operator-initiated feature probes the terminal logic for failures, which, when located, are identified via operator messages and display patterns. Although some failures can be resolved by the operator, others will require a customer engineer. Indicator lamps (LED's) are used to indicate normal voltage levels.

Modular construction permits the three basic modules of the ICC 40+—the display monitor, keyboard, and logic pack—to be separated. The display monitor can be mounted on a swivel stand of its own.

The basic ICC 40+ is priced about 1.3 times higher than the purchase price of the basic Teletype Model 40 KD (without OEM and quantity discounts) and about 1.1 times higher (under a 1-year lease) than the monthly rental cost of the basic Teletype unit under AT&T's Dataspeed 40 Service. However, the ICC 40+ offers increased operating flexibility and numerous enhancements over its Teletype counterpart. Thus, the higher cost of the ICC 40+ can probably be justified by many users whose needs will be better satisfied by the ICC terminal's added capabilities. What's more, two-year and three-year leases offer reduced monthly rates. ICC's two-year lease is available at the same monthly cost as AT&T's Dataspeed 40 service, while the monthly charge under an ICC three-year lease is still lower.

The ICC 40+ currently can be configured in any of three ways. The 40+K1 is a plug-compatible replacement for either the Teletype Model 40 or the Bell Dataspeed 40, or any of the other Teletype-compatible terminals for basic

Character parity is generated for each keyed character and accompanies the transmitted characters. Parity checking is performed on received data. A character found to be in error is replaced with a special symbol, which is printed and/or displayed on the screen in place of the incorrect character. The 40+65 offers longitudinal redundancy checking (LRC) and automatic retransmission of messages in error, while the 40+MPL has an optional retransmission capability.

DEVICE CONTROL

The 40+ is a stand-alone terminal that features as its nucleus a microprogram-controlled microprocessor, which directs all terminal operations. The microprogram (firmware), which resides in read-only memory (ROM), is divided into five main categories: data entry, which permits formatted and free-form text entry; communications, which permits formatted or selected transmission; format control, which permits user creation of display formats for data entry; local off-line printing, which permits printing a displayed message; and self-diagnostics, which permit system failures to be isolated by exercising the system components. An optional sixth category, available with the 40+K1 Teletype replacement only, permits the user to implement arithmetic functions in his formats by including firmware for addition, subtraction, and multiplication.

Transmission is performed by block, message, or character at user option, depending upon the selected configuration. The entire contents or a selected part of the display memory is transmitted upon operator command. Messages are composed and edited prior to transmission. Send and receive functions can be manually initiated; and the optional send/receive function automatically switches the unit to the receive mode following message transmission to a host computer in either Dataspeed 40-compatible mode. The 40+65 allows significantly more CPU control of operator actions and terminal status.

The cursor may be manually moved in any of four directions: up, down, left, or right. Repetitive operation is provided for these functions. In addition, the cursor can be returned to Home, or to the first character position of the line occupied by the cursor or the next line, and spaced forward or backward. The cursor can also be moved to any character position by a received two- or four-character sequence of cursor commands that correspond to the cursor functions provided by the manual controls or to a line and a column address for direct cursor movement.

Fixed formats can be employed for data entry applications that require the operator to key pertinent data into designated areas within the displayed format. The protected format feature prevents format descriptors from modification, limiting key entry to specified fields within the displayed format (i.e., blank spaces). Only the keyed data is transmitted or cleared when operating with a protected format. Provision is made for entering or transmitting a fixed format when the 40+K1 is selected.

Up to eight functions, including character, word, and line insertion and deletion, line erase, and clear, are offered in various models.

Character and word insertion and deletion affect all data to the right of the cursor up to the end of the line or to the beginning of a protected field; the character function permits the insertion or deletion of a single character for each depression of the insertion or deletion key, whereas the word function permits a complete word or words to be inserted or deleted. The displayed text expands (to the right) for each character entered and contracts for each character deleted. An attempted insertion is inhibited when a line (or variable field) is filled with text, and the operator is alerted.

Line insertion and deletion affect all lines of text from the cursor to the end of display memory or a line occupied by a protected field. An attempted line insertion is inhibited when display memory has been filled with partial or

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interactive communications and time sharing. The 40+65 is compatible with the IBM 2845/2265 Display Station and similar devices for interactive data entry and inquiry response uses. The 40+MPL is a plug-compatible replacement for the Bell Dataspeed 40 operating with a Selective Calling Arrangement (9140) under the 8A1 protocol for message switching applications.

ICC provides its own maintenance service for the 40+ through its nationwide service organization, which consists of more than 70 customer engineers and service points in more than 38 cities.

USER REACTION

Datapro conducted telephone interviews with seven users of the ICC 40+ Data Display System, who reported on their experience with a total of 32 units. Their ratings are summarized below:

	Excellent	Good	Fair	Poor	WA*
Overall performance	5	1	0	1	3.4
Ease of operation	5	2	0	0	3.7
Display clarity	7	0	0	0	4.0
Hardware reliability	3	3	1	0	3.3
Maintenance service	1	5	0	1	2.9

*Weighted Average on a scale of 4.0 for Excellent.

All but one of the users were delighted with the ICC 40+ terminal. The dissenting user gave poor marks to overall performance and maintenance service because the terminal would not emulate a Teletype Model 33 KSR as he had been promised, and to date ICC had not been able to correct the problem.

The users cited reliability, formatting capability, extra features, human engineering, local editing, operating flexibility, and fast hard copy output as key advantages of the ICC terminals.

The users mentioned no prominent disadvantages; but, when pressed, they came up with a few limitations that were not really flaws in the standard product. These included limited transmission speed (2400 bps), inconvenient protocol switching in early models (resolved in new models), unavailability of Burroughs protocol (not a design standard), and static electricity problems caused by early plastic keyboards (since resolved by metal keyboards).

Most of the users we talked with agreed that ICC has been most responsive to their needs and provides good service. And they also agreed that the ICC 40+ is a well-designed terminal with a large number of useful features for its cost. It appears that ICC's acclaimed expertise as an industry leader in the modem field has been passed on to its impressive 40+ display terminals.□

complete lines of data, or when the insertion is attempted into a segment preceding a protected field where all lines are occupied; i.e., the line containing the protected field will not move downward.

The line erase functions erase all displayed data from the position occupied by the cursor to the end of the line. The clear function erases the entire contents (excluding protected fields when the protected format feature is activated) of display memory, beginning at the first character position to the right of the cursor.

Scrolling Memory, an optional feature consisting of one or two additional 1920-character display memory segments that provide storage for a total of 48 or 72 lines of data, is available on all but the 40+65. Data storage is divided into two or three contiguous 24-line segments. By means of the Scroll Up and Scroll Down key functions, any consecutive 24 lines of memory can be displayed at one time; data is moved continuously, one line for each key depression. The Segment Advance key function displays each consecutive 24-line segment of the display memory through successive key depressions. Page numbering is denoted by dots displayed in the left margin.

The 40+K1 and 40+MPL have, as options, a group of extended edit functions which are standard on the 40+65. Horizontal Tab provides a keyboard or computer-controlled tab function. Tap stops are line-independent; i.e., individual tab stops can be located at different positions on each line. When setting Tab stops, all stops are simultaneously set in a column throughout display memory. Clearing of tab stops affects all locations to the right of and below the cursor, and is accomplished with a single depression of the clear key.

Highlight and underline features are optional. These features direct the operator's attention to display information of a critical nature. Highlighting blinks a character or field of data between full and half intensity once every second. Underlining underscores the data as it is displayed. Both functions can be initiated by the operator or host computer.

The optional printer operates in either on-line or off-line mode, depending on the terminal configuration selected. When the printer is operating on-line, all received messages are printed. Because printing is performed from the display memory, the received messages are also displayed. However, the 40+65, which has an individually addressable printer, operates in accordance with its protocol. When operating off-line, the printer is under operator control as a local copy printer. Displayed messages are printed only when the Print Local key is depressed.

COMPONENTS

CRT DISPLAY: The display is a 15-inch (diagonal measurement) CRT with a viewing area 10½ inches wide by 5¾ inches high. The screen is arranged in 24 lines of 80 characters each for a total of 1920 character positions. A character set of up to 127 ASCII characters (99 in the 40+65), including upper and lower case alphabetics, numerics, and special symbols, is displayed in white against a dark background. Characters are formed in a 7-by-9 dot matrix. Lower case alphanumerics such as p, q, g, j, and y are displayed in true lower case via a 7-by-11 dot matrix; the added matrix positions are used to display the lower case descenders. The viewing screen can be tilted vertically through 20 degrees and rotated horizontally through 60 degrees for operator convenience.

KEYBOARD: The typewriter-style keyboard can generate any of 127 ASCII characters, including upper and lower case alphabetics, numerics, specials, and control codes.

PRINTERS: The 40+10 printer operates at 110 characters per second over a print width of 80 columns. Characters are formed by a 5-by-7 dot matrix. Standard 8.5-inch paper rolls can be used. Optionally, the printer can be equipped with a tractor feed mechanism.

The 40+20 serial printer operates at 240 characters per second over a print width of 80 columns or, optionally, 120 columns; a tractor feed mechanism is standard. Fully formed characters, including upper and lower case alphabetics, are printed.

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Alternatively, an interface for a user-supplied Centronics printer is available.

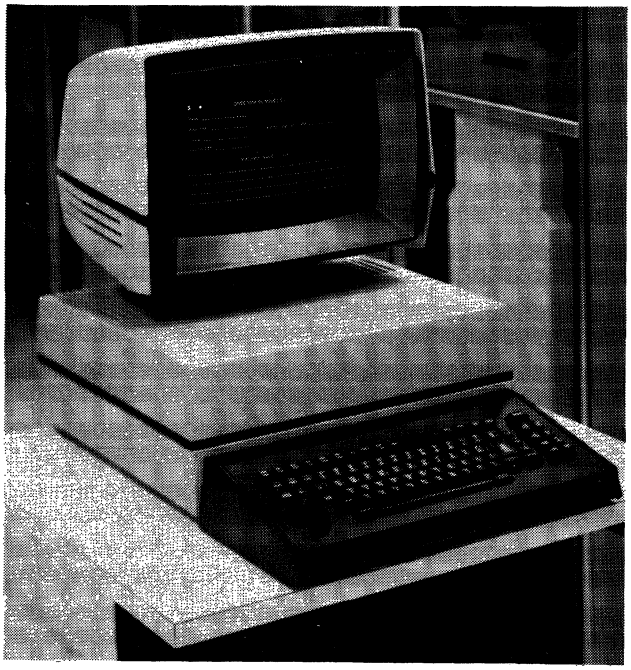
PRICING

The ICC 40+ Data Display System is available for lease or purchase. ICC provides lease terms of one to five years. Lease prices include prime-shift maintenance. A separate maintenance contract is available for purchased units.

	Monthly Rental*				
	1-Year	2-Year	5-Year	Purchase**	Monthly Maint.
Basic 40+ with 1920 char. memory	$140	$125	$81	$3,750	$ 20
Printers (including interface)—					
40+10	60	50	32	1,410	20
40+20, 80 col.	130	117	75	3,320	20
40+20, 120 col.	140	125	81	3,600	20

* Includes prime-shift maintenance.
** Prices are for a quantity of 1; quantity discounts are available.■

ICC System 400



Plug compatible replacements for the Honeywell VIP 7700, UNIVAC Uniscope 100 and 200, IBM 3275 (BSC), and IBM 2265.

Features include format protection, text editing, display highlighting, full cursor controls, communications line monitoring, and optional printed output via an ICC- or user-supplied printer.

Prices range from $4,550 ($150/month, 1-year, including maintenance) to $5,750 ($180/month). ICC offers lease terms up to five years and quantity discounts for purchased units.

MANAGEMENT SUMMARY

ICC introduced itself to the replacement terminal market in July 1974 when it unveiled its first terminal, the ICC 40+, a "plug-compatible" replacement for the Teletype Model 40. In September 1976, ICC expanded its market to include Honeywell, IBM, and Univac terminals with a new "plug-compatible" display terminal, the ICC System 400.

The ICC System 400 has the same attractive styling and physical appearance as the ICC 40+ terminal, but its internal logic supports a different set of functions. It is controlled by an Intel 8080 microprocessor in place of the earlier, less-sophisticated Intel 8008 that controls the ICC 40+ terminal.

In the System 400 combined PROM and RAM storage capacities total 16K bytes, in any combination. The PROM contains the operating and emulation firmware for the ICC 400; the RAM provides one page of display memory, printer buffering, and storage for the Integrated Communications Monitor, a line monitoring feature. Four separate models provide emulation for the different vendor's terminals. The ICC System 400 is available with an optional printer for hard copy output. The user can also provide his own printer or select one of the available printers that ICC OEM's from prominent printer manufactures.

The ICC System 400 is available in two standard screen capacities: 960 or 1920 characters. True lower case alphabetics are displayed. And, like the 40+, the 400's screen can be tilted or swiveled for operator viewing con- ▷

CHARACTERISTICS

VENDOR: International Communications Corporation (ICC), 8600 N.W. 41st Street, Miami, Florida 33166. Telephone (305) 592-7654.

DATE OF ANNOUNCEMENT: September 1976.

DATE OF FIRST DELIVERY: ICC 400 Model 1—October 1976; Model 2—November 1976; Model 3—February 1977; Model 4—October 1976.

NUMBER DELIVERED TO DATE: Over 50.

SERVICED BY: ICC.

MODELS

The ICC 400 is a microprocessor-based, stand-alone display terminal with optional printer that features full functional and protocol compatibility with prominent terminals from leading mainframe vendors. The ICC 400 is currently available in the following four models that differ in compatibility.

- **Model 1—compatible with the Honeywell VIP Series.**
- **Model 2—compatible with the UNIVAC Uniscope 100 and 200.**
- **Model 3—compatible with the IBM 3275 using BSC protocol.**
- **Model 4—compatible with the IBM 2265.**

All models are available with a printer. The terminals can be equipped with a Centronics-compatible parallel printer interface and will accommodate a compatible user-supplied printer.

TRANSMISSION SPECIFICATIONS

Transmission is synchronous or asynchronous, half- or full-duplex at rates up to 9600 bits/second. Transmission parameters including code, speed, format, and protocol are a function of the communications emulation firmware. An EIA RS-232C interface is standard. The terminals can be used on a dial-up facility or leased point-to-point or multipoint arrangement. ►

ICC System 400

venience. Because the 400, like the 40+, is composed of three separate modules, the display screen can be positioned anywhere on the work surface, and the separate keyboard can be arranged for operator convenience.

Many of the functional features of the ICC 40+ are retained in the 400, including full cursor control, format protection, field delimiting, tabbing, text editing, and highlighting. A special feature, not available in the 40+ is the Integrated Communications Monitor; it is extremely useful in pinpointing troubles. This feature displays all character codes transmitted and received so that the user can determine an invalid or missing code or code sequence that may be causing problems. Whats more, the user can "freeze" the screen at any point and take a "snapshot" with the printer.

Printer addressibility, an optional feature, increases operational flexibility by allowing data entry to be performed concurrently with printing of a computer message.

The printers supplied by ICC are a good choice. Both are from prominent vendors, and between the two, they provide a wide range of operating parameters to satisfy a variety of applications. The user can elect to supply his own printer provided that it has a Centronics-compatible parallel interface.

Savings realized with the ICC 400 can be substantial depending on lease terms and quantity purchases. ICC has an excellent reputation as a prominent vendor of modems and its 40+ terminal has received very good user ratings. Whats more, because the ICC System 400 is based on experience gained with an existing terminal, it promises the same field-proven reliability of the ICC 40+.

ICC provides its own maintenance service through its nationwide service organization, which consists of more than 70 customer engineers and service points in more than 38 cities.□

DEVICE CONTROL

The ICC 400 is a microprocessor-based terminal that features an Intel 8080 microprocessor for terminal control. All functions are firmware-controlled. The operating frmware, including control and emulator microprograms, resides in 8K bytes of ROM. An 8K-byte RAM provides buffering for display, printer, and communications line monitoring. A single page of buffering is used for display.

The cursor can be manually moved in any of four directions; up, down, left, or right. Repetitive operation is provided for these functions. In addition, the cursor can be returned to Home, or to the first character position of the line occupied by the cursor or the next line, and spaced forward or backward. The cursor can also be moved to any character position by a received two- or four-character sequence of cursor commands that correspond to the cursor functions provided by the manual controls or to a line and a column address for direct cursor movement.

Fixed formats can be employed for data entry applications that require the operator to key pertinent data into designated areas within the displayed format. The protected format feature prevents format descriptors from modification, limiting key entry to specified fields within the displayed format (i.e., blank spaces). Numeric only or alphanumeric fields can be delimited. Only the keyed data is transmitted or cleared when operating with a protected format.

Character insertion and deletion affect all data to the right of the cursor up to the end of the line or to the beginning of a protected field or end of screen; the character function permits the insertion or deletion of a single character for each depression of the insertion or deletion key. The displayed text expands (to the right) for each character entered and contracts for each character deleted. An attempted insertion is inhibited when a line (or variable field) is filled with text, and the operator is alerted. Line insertion and deletion affect all lines of text from the cursor to the end of display memory but is inactive in Format mode operations to protect format integrity.

The line erase functions erase all unprotected data from the position occupied by the cursor to the end of the line. The clear function erases the entire contents of display memory, beginning at the first character position.

Horizontal Tab provides a keyboard or computer-controlled tab function. Tab stops are line-independent; i.e., individual tab stops can be located at different positions on each line. In the Format mode, the horizontal tab moves the cursor to the beginning of the next unprotected field.

The optional printer operates as a local copy printer to produce a printed copy of the displayed data on command. Printer addressability, an option, enables the printer to be directly addressed by the host computer. With this option installed, the printer can produce a received message concurrent with data entry. The printer is fully buffered and has no delaying effect on operator keying activities.

The terminal can also be used as a communications line monitor to pinpoint troubles during transmission. In this mode, the terminal displays all transmitted or received data, including control codes such as STX or ETX. Received data is underscored to distinguish it from transmitted data. The display can be frozen at any time and a printed copy can be produced for detailed analysis.

COMPONENTS

DISPLAY UNIT: A 15-inch (diagonal measurements) CRT with a viewing area 10½ inches wide by 5¾ inches high. Either of the following two display arrangments are available:

Characters/display:	**960**	**1920**
Lines/display:	**12**	**24**
Characters/line:	**80**	**80**

Three character sets are available: 64, 96, or 127 ASCII characters. The 96- and 127-character sets include upper and lower case alphabetics. Characters are formed by a 7-by-9 dot matrix. Lower case alphabetics such as p. q, g, j, and y are displayed in true lower case via a 7-by-11 dot matrix; the added matrix positions are used to diplay the lower case descenders.

Data is displayed in white. Standard display highlighting features include half and full intensity, zero intensity (blank) reverse video, blinking, and underscore.

The viewing screen can be tilted vertically through 20 degrees and rotated horizontally through 60 degrees for operator convenience.

ICC System 400

KEYBOARD: A 96-key, typewriter-style detachable keyboard. The keyboard can generate any of 127 characters including upper and lower case alphabetics, numerics, and control codes. Options include a 16-key numeric cluster and 16 function keys. Operator lock out of selected keys is standard; system lockout of selected keys is optional.

PRINTERS: Two printers are currently offered: the Okidata CP 110 and the GE TermiNet 120. The Okidata printer is a matrix printer rated at 88 char/second with 80 print positions. The printer features a 64-character set of printable symbols and is available in friction or tractor feed. The GE TermiNet 120 is a full-character, belt printer with adjustable forms tractor. The printer is rated at 120 lines/minute and is available with 80 or 120 print positions. The standard printer is equipped with a character set of 96 printable symbols, including upper and lower case. The GE printer accommodates paper widths of 3 to 12-27/32 inches.

PRICING

The ICC 400 is available for lease or purchase. ICC provides lease terms of one, two, three, four, and five years, which include prime-shift maintenance. A separate maintenance contract is available for purchased units. The monthly maintenance charge is $25 to $30 per terminal, $25 per Okidata printer, and $35 to $40 per GE TermiNet printer. The installation charge is $125 for the initial terminal (without printer) and $40 for each additional terminal. The installation charge for a terminal with printer is $175 for the initial terminal and $75 for each additional terminal. Quantity discounts are available on purchased units only.

	Monthly Charge*			
	1-Year Lease	3-Year Lease	5-Year Lease	Purchase**
400-1 (Honeywell VIP 7700)	$180	$150	$125	$5,750
400-2 (UNIVAC Uniscope 100/200)	170	140	115	5,350
400-3 (IBM 3270, BSC)	160	130	105	4,950
400-4 (IBM 2265)	150	120	100	4,550
Okidata 110 Printer (friction feed)***	100	70	50	1,650
Okidata 110 Printer (tractor feed)***	110	80	60	1,850
GE TerminNet 120 Printer (tractor feed, 80 cols.)***	140	110	90	3,600
GE TermiNet 120 Printer (tractor feed, 120 cols.)***	160	130	110	3,850

*Includes prime shift maintenance.
**Unit quantity price; volume discounts are provided for 10 or more units.
***All printers include buffering and an interface.■