Memorex 1380 Communications Processor

MANAGEMENT SUMMARY

The Memorex 1380 has been, and continues to be, an evolving product. It was originally produced by another manufacturer, with Memorex supporting the sales, service, and financial arrangements for the equipment. Gradually taking over more of the hardware manufacture and software development, Memorex has now reached the point of total in-house support. Rather than adopting a Version I, Version II, etc., approach, Memorex controls the local spare parts inventory and the necessary skill level of support personnel by machine serial number. As of this publication date, the 1380 is limited to IBM 270X emulation.

The Memorex 1380 is controlled by a disk-based operating system called the Network Control Systems (NCS), which provides for all system functions, including intelligent 270X emulation. The latest version of the operating system, Release 2.8, includes enhanced control and monitoring functions, such as front-end polling, data code/protocol conversion, binary synchronous error recovery without host intervention, and support of Flow Control (X-ON/X-OFF) characters that permit interfacing with "black box" devices that access X.25 packet-switching networks such as Canada's DATAPAC network.

An optional program product that can accompany NCS 2.8, Terminal-Initiated Application Switching (TIAS II), permits terminal operators to access various host sub-channels to select one of up to 16 applications resident in the host. It also provides the 1380 with a message facility whereby the 1380 can carry on an on-line dialogue with an individual terminal or broadcast messages to a group of terminals without host assistance. TIAS II supports point-to-point BSC or asynchronous terminals and multipoint IBM 3270-compatible BSC systems. ▷

A programmable front end that in most applications is a functional replacement for IBM 270X/370X communications controllers locally connected to an IBM System/360, System/370, 303X, or equivalent.

A physical maximum of 216 connections is possible with half- and full-duplex modes and synchronous or asynchronous transmission possible. Speeds from 45.5 to 230,400 bps can be accommodated. Memory of 64K is standard and non-expandable.

Up to eight host computer connections are possible, with any four active at a time. At present, the 1380 is limited to 270X hard-wired emulation.

A minimum configuration 1380 equipped with 64K bytes of memory, one channel adapter for host connection, 15 medium-speed communication-line capacity, and one system console sells for $49,023 without maintenance, or rents on a two-year lease for approximately $1,695 per month, including maintenance.

CHARACTERISTICS

VENDOR: Memorex Corporation, Communications Equipment Group, 18922 Forge Drive, Cupertino, CA 95052. Telephone (408) 996-9000.
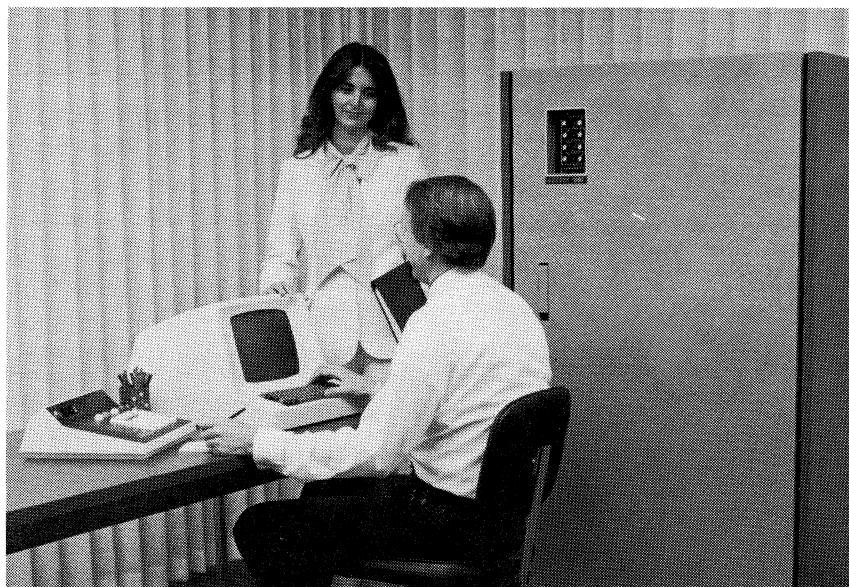
DATE OF ANNOUNCEMENT: 1976.

DATE OF FIRST DELIVERY: May 1976. ▶

Memorex 1380 Communications Processor with attached Control Console and Systems Console (CRT). The Control Console is attached directly to the memory bus and is basically used by field engineers and programmers. The Systems Console is attached to a 1380 communications line port and is primarily for operator use.

Memorex 1380 Communications Processor

▷ Speeds from 45.5 to 230,400 bps are accommodated in half- or full-duplex mode. Presently, asynchronous telegraph speeds of 45.5, 56.9, and 74.2 bps are supported by external loop-current-to-EIA converters, which are included under the Memorex service umbrella. Rates of 45.5, 56.9, 74.2, 110, 134.5, 150, 200, 300, 600, 1050, 1200, 1800, 2000, 2400, 3600, 4800, 7200, and 9600 bps are all supported simultaneously. Generally, internal clocking for rates up to 1800 bps is available for asynchronous operation, but all the listed rates will support asynchronous or synchronous operation.

A unique feature of the 1380 is a built-in flexible disk drive that allows program reloading after a failure without interrupting the host. The disk also supports internal diagnostic capabilities. Other noteworthy features of the 1380 include: automatic polling for multipoint lines, automatic answering, compatibility with AT&T 801 automatic calling units, automatic code and speed recognition (110 to 1200 bps), optional built-in modems, and an optional hard-copy printer.

The installed base of 1380's is in excess of 150 and is international. Forms of X.25 protocol have been implemented in Europe, as have HDLC-like operations.

USER REACTION

In November 1980, Datapro interviewed by telephone two Memorex 1380 users.

One of the users had one 1380 unit, which had been installed for 2½ years. His configuration included 168 asynchronous lines and 8 synchronous lines, which supported a network of about 200 terminals, and a single NAS AS/5-7031 host. His 1380 is being leased from Memorex, which is providing full on-site maintenance service.

This user rated the Memorex 1380 as "excellent" in throughput capability, "good" in hardware reliability, maintenance service, technical support, and overall performance, and "fair" in ease of installation and manufacturer's software. When questioned about the "fair" ratings, he stated that installation took three months, instead of an anticipated one month, because of "bugs" in two RPQ's they had ordered. However, he felt that Memorex has improved its software support since that time. He also reported that although the 1380 had been selected at least in part because of its programmability, programming the unit required the sophistication of a systems programmer, a resource they didn't have. As a result, they have utilized the standard Memorex software. Even with the standard software, he felt that the 1380 requires more user responsibility for software support than IBM equipment does.

The second user had two 1380's, which had been installed for at least three years. The two units each handle 24 lines supporting about 160 terminals, controllers, and remote printers. Each unit is attached to one of two IBM 370's, ▷

▶ NUMBER INSTALLED TO DATE: Over 150.

SERVICED BY: Memorex.

CONFIGURATION

The 1380 Communications Processor is housed in one or two physical cabinets; the number is dependent upon the number and type of lines to be connected, the power requirements, and weight loading. The base 1380 module houses the following: 64K of memory; one to four host channel adapters (each capable of two-channel switch operation, though only one path per switch can be active at a time); up to six adapter bases; the necessary hardware to interface the desired communication facilities; one or two 150-ampere power supplies; a built-in flexible disk; an external systems console for operator monitoring and control; and all the necessary internal electronics to perform the front-end function. The expansion cabinet contains additional interface hardware and adapter bases. All modules are equipped with separate power.

The logical components of the 1380 are:

- Channel Adapters for connection to a byte or block multiplexer channel or selector channel of a local IBM System/360, System/370, 303X, or equivalent. A maximum of four per 1380 are permitted; all four are located in the base module. Any or all adapters can connect through two-channel switches which provide alternate paths by manual selection. Attachment of all four adapters to two-channel switches permits the 1380 to access a maximum of eight computer channels.

- 64K bytes of memory (non-expandable). Error checking and correction are standard. The cycle time is 540 nanoseconds.

- Input/Output Processor to perform high-speed data transfers; it interacts with the host, flexible disk, and memory. Its maximum throughput is 600K bytes per second.

- Communications and Control processor to provide for 256 interrupt levels (16 for internal use and the remaining 240 for external devices).

- Character I/O Bus to handle data transfers from external devices to the Communications and Control Processor on a character-by-character basis.

- Interrupt Signal Generator to initiate data transfers between the Communications and Control Processor and the Character I/O Bus under program control or if an internal fault, system alarm, or time-out occurs.

- Adapter Bases to house the interface bases and line sets for directly connected devices, external modems, internal modems, and autocall interfaces.

- Flexible Disk to store the system generation program as well as various diagnostic routines and logs selected events.

- Control Console, a stand-alone unit containing controls and indicators that allow monitoring and mode control on-line and test debugging off-line.

The minimum configuration for a 1380 is the base module, with associated electronics and power, equipped with at least one channel adapter and one medium-speed Line Adapter Base to support at least one external Systems Control Console. The 1380 can support up to eight individual System Control Consoles. Under an RPQ, the 1380 can also ▶

Memorex 1380 Communications Processor

COMMUNICATIONS LINES HANDLED BY THE MEMOREX 1380

Type of Interface	Transmission Characteristics				LAB/MAB Type	LIB/MIB Type	LI Type	Line Set	Lines per Line Set	Max. No. Lines
	Speed, bps	Timing	Mode	Facility						
External RS-232-C Modem	To 1800	Async.	Half- or full-duplex	Leased or DDD	5411/15/16	5511	5611	5711	1	112
	To 9600	Sync.			5411/15/16	5512	5612	5712	1	112
	110	Async.	Half- or full- duplex		5411/15/16	—	5601	5701	1	192
	300	Async.				—	5602	5701	1	192
	134.5	Async.				—	5603	5701	1	192
	1200, reverse channel	Async.	Half- duplex	202C/D Leased or DDD	5411/15/16	5511	5613	5713	1	112
	To 9600	Bisync.	Half- duplex	Leased or DDD	5411/15/16	5531	5631	5731	1	64
External wideband modem	19.2K	Sync.	Half- or full- duplex	Leased or Switched	5411/15/16	5532	5632	5732	1	40
	40.8K	Sync.			5411/15/16	5532	5632	5732		16
	50K	Sync.			5411/15/16	5532	5632	5732		16
	56K	Sync.			5411/15/16	5533	5633	5733	1	16
	230.4K	Sync.	Half- or full- duplex	Leased or switched	5411/15/16	5534	5634	5734	1	4
Autocall interface per RC-336	—	—	—	DDD	5411/15/16	—	5641	5741	1	96
Integral modems	To 300	Async.	Half- or full-duplex	Leased or DDD	5451	5551	5651	5751	2	192
	134.5 and 600	Async.	Half- or full-duplex	Leased or DDD	5451	5552	5652	5752	2	112

▷ one of which is being used as a backup for the other. The 1380's are being leased from Memorex, which is providing full on-site maintenance service. Plans have already been finalized to replace these 1380's with an IBM 3705 in January 1981.

This user rated the Memorex 1380 as "excellent" in manufacturer's software, "good" in hardware reliability, quality of maintenance, technical support, and overall performance, and "fair" in promptness of maintenance. Since he was not with the company when the 1380 units were installed, he declined to rate ease of installation. He rated promptness of maintenance "fair" because of the long lead times he had encountered (up to 5 months) when additional boards were needed to expand his configuration. He also felt that, because the units were about to be replaced with another vendor's product, Memorex's responsiveness to his needs had somewhat declined.

When asked what advantages he had experienced with the 1380's, he reported that the ability to sit down at the terminal console and program the unit was a noteworthy feature. He had encountered no difficulties in programming the 1380. In fact the only disadvantage he reported is that the cabling is somewhat difficult to install because of the tightness of space in the box. One comment he had for future users was that running of network simulator before installing the network is helpful. ▷

support an additional two channel adapters, increasing the system maximum to six. The base module can support up to six Line Adapter Bases (see accompanying table), one of which must be medium speed (1200 bps) to support the console. When integral modems are used, a Modem Adapter Base is needed, which eliminates two Line Adapter Bases. Therefore, the base cabinet can be equipped with a maximum of two Modem Adapter Bases (each capable of supporting up to 64 lines) and one or two Line Adapter Bases, at least one of which is medium speed. The expansion cabinet can hold up to six Line Adapter Bases or three Modem Adapter Bases, or any combination.

CONNECTION TO HOST COMPUTER: The 1380 is connected to a local host computer via a byte multiplexer channel in the case of a System/360 or via a byte or block multiplexer or selector channel in the case of a System/370.

TRANSMISSION SPECIFICATIONS

The accompanying chart summarizes the capabilities of the 1380 for accommodating various types of communications lines and techniques. The number of combinations of speeds and protocols is too lengthy to list here. Some system maximums are:

4 wideband extended (230.4K bps); or
16 wideband (40.8K, 50K, or 56K bps); or
40 wideband (19.2K bps); or
64 BiSync (1200-9600 bps); or
120 low-speed asynchronous (110-9600); or
216 low-speed asynchronous (110-300 bps). ▶

Memorex 1380 Communications Processor

Overall these two users were reasonably satisfied with the performance of their Memorex 1380's.□

▶ The ability to mix various line types is governed by several factors. First, system throughput is limited to 100,000 bytes per second. Second, there is a finite number of addresses available. Of the 256 interrupts generated by the system, 16 are used internally. The mandatory Medium-Speed Line Adapter Base (to support the systems console) requires 32 addresses, even if the only device attached is a single systems console. Each autocall unit requires one address. Each half-duplex device connected requires one address; each full-duplex device attached requires two addresses. Address utilization is as follows:

Line Type	Addresses Used
Wideband Extended:	
1 to 4 lines (max.)	Contact vendor
Wideband or BSC:	
1st group of 8 lines	16
Each increment of 16 lines	32
64 lines (max.)	144
Medium-speed (including consoles):	
Each group of 16 lines	32
112 lines (max.)	224
Low-speed:	
Each group of 8 lines	8
192 lines	192

SOFTWARE

Memorex currently supports two releases of its Network Control System (NCS) operating system. Both provide all controls and functions necessary to the operation of the system in intelligent 270X emulation mode. Release 2.6.3 provides basic system functions only. Release 2.8 includes a number of additional features, including the ability for front-end polling of specific communications lines to be specified during system generation, and the capability to perform conversions from one data code to another. Release 2.8 also includes a binary synchronous error recovery routine, which allows the 1380 to recover from temporary transmission line errors without host intervention, and a Flow Control routine using the X-ON/X-OFF protocol, which permits the 1380 to interface to "black box" devices that access X.25 public packet switching networks such as Canada's DATAPAC.

Memorex also offers its Terminal-Initiated Application Switching (TIAS II) program product for use with NCS 2.8. TIAS II supports point-to-point asynchronous and BSC terminals and multipoint IBM 3270-compatible BSC terminals, and provides the terminal user with the ability to access any of 16 host applications via simple command codes. Applications are addressed by assignment of various host sub-channels to each application group. Automatic speed detection and code/protocol conversion are included in the TIAS II's services. Under TIAS II, the 1380 may examine the status of all named application sub-channels at any time. TIAS II also provides the 1380 with its own message facility, through which the 1380 operator may carry on an on-line dialogue with a terminal operator or broadcast a message to a group of terminal users.

The 1380 will accept a standard emulation load from a System/360, System/370, or 303X and will support OS, OS/VS1, SVS, MVS, DOS, EDOS, or DOS/VS.

PRICING

The 1380 and all related features can be acquired by purchase or are available under rental and lease plans. The rental plan, after the initial 90-day period, can be automatically extended on a month-to-month basis or cancelled on 30 days' written notice. Leases are available on an initial period of one or two years; after the initial period, the lease can be extended indefinitely for periods of one year or one time for less than a year.

The monthly lease and rental charges shown in the accompanying price list include 24-hours-per-day, 7-days-per-week (excluding holidays) maintenance for equipment located within a 25-mile radius of a Memorex service center. The monthly maintenance charge shown relates to purchased equipment and provides the same service coverage within the 25-mile radius. For equipment located outside the 25-mile radius, a travel charge per service call per month is applied, based upon the distance from the 1380 site to the serving Memorex center. An optional Monthly Travel Charge guarantees unlimited service calls per month for a flat rate also based upon distance. Other maintenance agreements are available. Accruals of lease payments toward purchase are not available as standard, but can be obtained depending upon the system configuration.

Classes for customer education in the software area are provided at a price per student per class as follows:

System Generation and Externals: $300
Basic Programming and Internals: $700

The figures presented in the price list include programming support for emulation mode (NCS) and support for IBM OS, OS/VS1, SVS, MVS, DOS, EDOS, and DOS/VS. Most features listed are also available for overseas applications conforming to CCITT and operating on 50-Hz power.

		Monthly Charges*			
		1-Yr. Lease	2-Yr. Lease	Purchase	Monthly Maint.
1380-02	Processor (includes 64K-byte memory, first channel adapter, and one system console)	$1,590	$1,434	$37,440	$394
5050	Base Expansion	484	430	10,950	70
5080	System Console (additional)	104	92	2,880	12
	Channel Adapter, Type 2:				
5222	Second	176	158	3,360	37
5223	Third	176	158	3,360	37
5224	Fourth	176	158	3,360	37
5250	Two-Channel Switch, max. 4 per system	65	58	1,620	13
5240	Channel Expansion; required if more than one Two-Channel Switch is used	331	288	10,368	NC
5401	Address Expansion	352	315	8,820	70
5405	Line Set Expansion	194	177	5,048	37

Note: All necessary mounting hardware and ancillary items are included at no additional charge.
* Includes 24-hours-per-day, 7-days-per-week maintenance (exclusive of holidays).

Memorex 1380 Communications Processor

Configuration
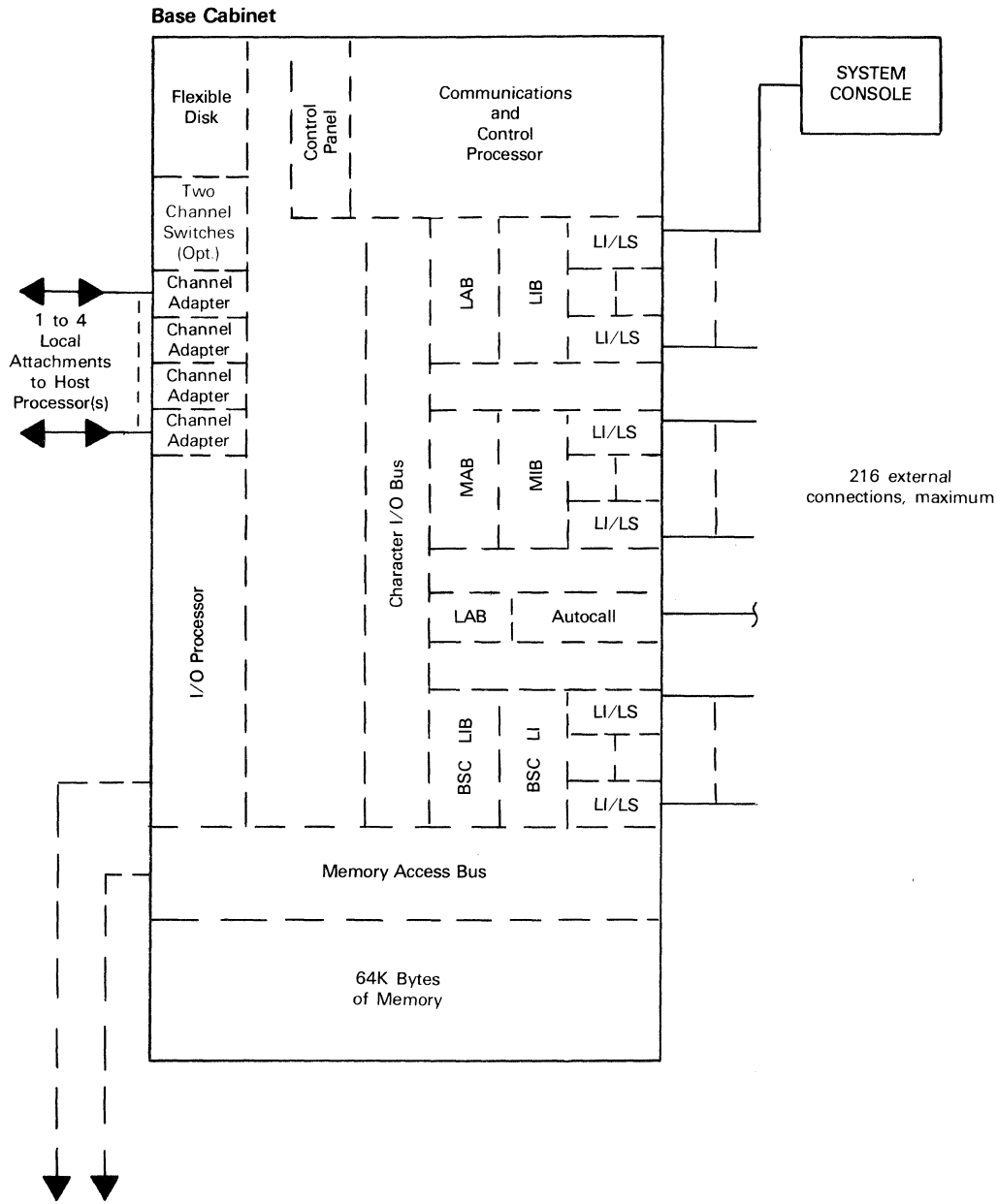
Base Cabinet

To Expansion Cabinet, which contains communications interface hardware and adapter bases only. See accompanying table for characteristics of each adapter.

		Monthly Charges*			
		1-Yr. Lease	2-Yr. Lease	Purchase	Monthly Maint.
5411/5/6	Line Adapter Base	NC	NC	NC	NC
	Line Interface Base:				
5511	Medium Speed	40	36	858	7
5512	Medium Speed, External Clock	44	40	858	11
5531	BSC	152	133	4,000	8
5532	Wideband	272	242	6,300	42
5534	Wideband Extended	331	295	7,300	55
	Modem Interface Base:				
5551	Low Speed	31	27	900	2
5552	Medium Speed	31	27	900	2

Note: All necessary mounting hardware and ancillary items are included at no additional charge.
*Includes 24-hours-per-day, 7-days-per-week maintenance (exclusive of holidays). ∎

Memorex 1380 Communications Processor

		Monthly Charges*			
		1-Yr. Lease	2-Yr. Lease	Purchase	Monthly Maint.
	Line Interface:				
5601	Low Speed ASCII, 110 bps	51	46	1,260	11
5602	Low Speed ASCII, 300 bps	51	46	1,260	11
5603	Low Speed BCD, 134.5 bps	51	46	1,260	11
5604	Low Speed Baudot, 74.2 bps	51	46	1,260	11
5611	Medium Speed, Standard	12	11	605	5
5612	Medium Speed, External Clock	33	31	540	16
5613	Medium Speed, Reverse Channel	22	20	800	5
5631	BSC	28	25	693	5
5632	Wideband	151	134	3,050	24
5633	Wideband V.35	151	134	3,050	24
5634	Wideband Extended	360	322	7,500	72
5641	Autocall	65	59	988	17
5644	Synchronous Clock	19	17	750	2
	Integral Modems—				
5652	1221 LD1	58	53	1,800	3
5653	1221 LD2	58	53	1,800	3
	Line Set:				
5701	Low Speed	5	4	200	NC
5711	Medium Speed, Standard	5	4	110	NC
5712	Medium Speed, External Clock	9	8	288	NC
5713	Medium Speed, Reverse Channel	9	8	288	NC
5731	BSC	8	7	240	NC
5732	Wideband	107	93	2,800	NC
5733	Wideband V.35	107	93	2,800	NC
5734	Wideband Extended	118	103	3,075	NC
5741	Autocall (RS 366)	8	7	240	NC
5751	For 1220 B2 Modem	5	4	120	NC
5752	For 1221 LD1 Modem	5	4	120	NC
5771	New Sync	5	4	120	NC

SOFTWARE

	NCS Release 2.6.3	NC	NC	NC	NC
	NCS Release 2.8	—	75	—	—
	NCS Release 2.8 with TIAS II	—	175	—	—

Note: All necessary mounting hardware and ancillary items are included at no additional charge.
*Includes 24-hours-per-day, 7-days-per-week maintenance (exclusive of holidays).■

Memorex 1380 Communications Processor

MANAGEMENT SUMMARY

The Memorex 1380 has been, and continues to be, an evolving product. It was originally produced by another manufacturer, with Memorex supporting the sales, service, and financial arrangements for the equipment. Gradually taking over more of the hardware manufacture and software development, Memorex has now reached the point of total in-house support. Rather than adopting a Version I, Version II, etc., approach, Memorex controls the local spare parts inventory and the necessary skill level of support personnel by machine serial number. As of this publication date, the 1380 is limited to IBM 270X emulation, but X.25 packet-message protocol, SDLC (IBM's Synchronous Data Link Control), HDLC (ISO's High-level Data Link Control), and NCP (IBM's Network Control Program) equivalents will be available in the fourth quarter of 1978. Advanced Communications Function (IBM's ACF) TCAM and VTAM support will be made available at a later date.

Speeds from 45.5 to 230,400 bps are accommodated in half- or full-duplex mode. Presently, asynchronous telegraph speeds of 45.5, 56.9, and 74.2 bps are supported by external loop-current-to-EIA converters, which are included under the Memorex service umbrella. Rates of 45.5, 56.9, 74.2, 110, 134.5, 150, 200, 300, 600, 1050, 1200, 1800, 2000, 2400, 3600, 4800, 7200, and 9600 bps are all supported simultaneously. Generally, internal clocking for rates up to 1800 bps is available for asynchronous operation, but all the listed rates will support asynchronous or synchronous operation.

The installed base of 1380's is in excess of 100 and is international. Forms of X.25 protocol have been implemented in Europe, as have HDLC-like operations. ▷

A programmable front end that in most existing applications is a functional replacement for IBM 270X/370X communications controllers locally connected to an IBM System/360, System/370, or equivalent.

A physical maximum of 240 connections is possible with half- and full-duplex modes and synchronous or asynchronous transmission possible. Speeds from 45.5 to 230,400 bps can be accommodated. Memory from 64K to 512K, in 32K-increments, is available.

Up to eight host computer connections are possible, with any four active at a time. At present, the 1380 is limited to 270X hard-wired emulation. New hardware and software releases to support NCP, X.25, etc. will be available in the fourth quarter of calendar 1978.

A unique feature of the 1380 is a built-in flexible disk drive that allows program reloading after a failure without interrupt the host computer. The disk also permits internal diagnostic capabilities that users surveyed found impressive.

A minimum configuration 1380 equipped with 64K bytes of memory, one channel adapter for host connection, 15 medium-speed communication-line capacity, and one system console sells for $51,750 without maintenance, or rents on a two-year lease for approximately $1450 per month, including maintenance.

Memorex 1380 Communications Processor with attached Control Console and Systems Console (CRT). The Control Console is attached directly to the memory bus and is basically used by field engineers and programmers. The Systems Console is attached to a 1380 communications line port and is primarily for operator use.

Memorex 1380 Communications Processor

▷ The maximum memory of 512K bytes was originally housed in four separate cabinets; new orders will require only one expansion cabinet, plus the base cabinet, to hold the maximum memory. Future (fourth quarter) machines will be able to accommodate all 512K bytes in the base cabinet. The maximum of 240 physical communications connections could be handled by the base module only or, depending upon the line speed and protocol mix, may require expansion cabinets.

Some noteworthy features of the 1380 include: automatic polling for multipoint lines, automatic answering, compatibility with AT&T 801 automatic calling units, automatic code and speed recognition, optional built-in modems, optional hard-copy printer, and a flexible disk drive for program storage and diagnostics.

A Partitioned Emulation Program package (IBM's PEP) will be available for the 1380 in the fourth quarter of 1978 and will be accomplished in a novel way. As the title indicates, the processor is normally partitioned to accommodate both emulation and NCP modes simultaneously. Memorex proposes to take it one step further and supply two independent processors, sharing only power and cabinetry. This is consistent with the present design, which allows one line at a time to be cut over with minimal interruption of service, a feature favorably cited by many users that Datapro surveyed.

USER REACTION

In April 1978, Datapro conducted a telephone survey of 17 Memorex 1380 users with a total of 32 machines installed. The geographical distribution of installations was from coast to coast within the contiguous 48 states. Business applications included local and federal government, time sharing/service bureau, banking and brokerage, light and heavy industry, power and telephone utilities, education, medical, and insurance. The hands-on experience of these users with the 1380 ranged from two months to two years and averaged 13 months. The host computer population covered in the survey was 30, including 4 IBM System/ 360's, 22 IBM System/370's, and 4 Amdahl processors. The sampling included installations where the 1380 was shared among multiple hosts and also where a single host was connected to multiple 1380's. The average number of communications lines per 1380 was 43. However, the true test is not the number of physical connections possible, but rather throughput, with the mixture of speeds and protocols being the dominant factor (see the accompanying ratings).

In the majority of cases, the 1380 replaced a Memorex 1270 controller; programmability, size, and cost were the major considerations. There were a few instances where the 1380 replaced IBM 370X's and a pair of installations where telecommunications was a new implementation. Because the only 1380 software presently available is a 270X emulation package, the programmability feature should be considered a future benefit.

The primary source of contacts for this survey was the manufacturer. Curiously enough, some of the lowest ▷

CHARACTERISTICS

VENDOR: Memorex Corporation, Communications Equipment Group, San Tomas at Central Expressway, Santa Clara, California 95052. Telephone (408) 996-9000.

DATE OF ANNOUNCEMENT: 1976.

DATE OF FIRST DELIVERY: May 1976.

NUMBER INSTALLED TO DATE: Over 100.

SERVICED BY: Memorex.

CONFIGURATION

The 1380 Communications Processor is housed in up to four physical cabinets; the number is dependent upon memory requirements, number and type of lines to be connected, number of host channel connections, power requirements, and weight loading. The base 1380 module houses the following: 64K to 256K bytes of memory in 32K-byte increments; one or two host channel adapters (each capable of two-channel switch operation, though only one path per switch can be active at a time); up to six adapter bases; the necessary hardware to interface the desired communications facilities; one or two 150-ampere power supplies; a built-in flexible disk; an external systems console for operator monitoring and control; and all the necessary internal electronics to perform the front-end function. The first expansion cabinet contains up to 256K bytes of additional memory and additional interface hardware and adapter bases. The second and third expansion cabinets contain adapter bases and their associated interface hardware only. All modules are equipped with separate power.

Earlier models of the 1380 vary somewhat from the present offering. The primary differences are in power, memory, and method of host connection. The older machines are equipped with 100-ampere power supplies, the newer with 150. Memory modules for older models are 8K-byte capacity; the newer capacity is 32K bytes. Type I Channel Adapters are installed in older equipment and are restricted to a byte multiplexer I/O channel on the host computer. The newer Type II Adapters can be connected to a byte multiplexer, block multiplexer, or selector host channel. Memorex, of course, still supports the older machines, but all new orders will be configured as previously described, and this report is directed to the more recent models.

The logical components of the 1380 are:

● Channel Adapters for connection to a byte or block multiplexer channel or selector channel of a local IBM System/360, System/370, or equivalent. A maximum of four per 1380 are permitted: two located in the base module and two in the first expansion cabinet. Any or all adapters can connect through a two-channel switch, which provides alternate paths by manual selection.

● Memory (ECC solid-state) with a system maximum of 512K bytes: 256K in the base module and 256K in the first expansion module. Minimum memory is 64K bytes, and it is expandable in 32K-byte increments. The cycle time is 540 nanoseconds.

● Input/Output Processor to perform high-speed data transfers; it interacts with the host, flexible disk, and memory. Its maximum throughput is 600K bytes per second.

● Communications and Control Processor to provide for 256 interrupt levels (16 for internal use and the remaining 240 for external devices). ▶

Memorex 1380 Communications Processor

COMMUNICATIONS LINES HANDLED BY THE MEMOREX 1380

Type of Interface	Transmission Characteristics				LAB/MAB Type	LIB/MIB Type	LI Type	Line Set	Lines per Line Set	Max. No. Lines
	Speed, bps	Timing	Mode	Facility						
External RS-232C Modem	To 1800	Async.	Half- or full-duplex	Leased or DDD	5411/15/16	5511	5611	5711	1	112
	To 9600	Sync.			5411/15/16	5512	5612	5712	1	112
	110	Async.	Half-		5411/15/16	—	5601	5701	1	192
	300	Async.	or full-			—	5602	5701	1	192
	134.5	Async.	duplex			—	5603	5701	1	192
	1200, reverse channel	Async.	Half- duplex	202C/D Leased or DDD	5411/15/16	5511	5613	5713	1	112
	To 9600	Bisync.	Half- duplex	Leased or DDD	5411/15/16	5531	5631	5731	1	64
External wideband modem	19.2K	Sync.	Half- or full- duplex	Leased or Switched	5411/15/16	5532	5632	5732	1	40
	40.8K	Sync.			5411/15/16	5532	5632	5732		16
	50K	Sync.			5411/15/16	5532	5632	5732		16
	56K	Sync.			5411/15/16	5533	5633	5733	1	16
	230.4K	Sync.	Half- or full- duplex	Leased or switched	5411/15/16	5534	5634	5734	1	4
Autocall interface per RC-336	—	—	—	DDD	5411/15/16	—	5641	5741	1	96
Integral modems	To 300	Async.	Half- or full-duplex	Leased or DDD	5451	5551	5651	5751	2	192
	134.5 and 600	Async.	Half- or full-duplex	Leased or DDD	5451	5552	5652	5752	2	112

▷ ratings came from users whose names were supplied by Memorex; those users found by Datapro, independently of Memorex, concurred with the mainstream opinion: a positive reaction. Many users were reluctant to assign a firm value for the various parameters, choosing rather to rate them in decimals; e.g., 3.7 instead of Good or Excellent. In this case, the Datapro interviewer evaluated the overall conversation and information supplied and selected an appropriate rating. One user did not wish to rate ease of installation because he was not involved in the effort. Another user declined to rate the manufacturer's technical support, saying that the software was "solid" and he had had no occasion to refer to the documentation. The ratings are summarized below.

	Excellent	Good	Fair	Poor	WA*
Overall satisfaction	8	7	2	0	3.4
Ease of installation	4	9	2	1	3.0
Throughput	14	3	0	0	3.8
Hardware reliability	11	6	0	0	3.6
Promptness of mfr.'s maintenance	7	7	2	1	3.2
Quality of mfr.'s maintenance	5	7	5	0	3.0
Mfr.'s software	8	8	1	0	3.4
Mfr.'s technical support	4	10	0	2	3.0

*Weighted Average on a scale of 4.0 for Excellent. ▷

▶ • Character I/O Bus to handle data transfers from external devices to the Communications and Control Processor on a character-by-character basis.

• Interrupt Signal Generator to initiate data transfers between the Communications and Control Processor and the Character I/O Bus under program control or if an internal fault, system alarm, or time-out occurs.

• Adapter Bases to house the interface bases and line sets for directly connected devices, external modems, internal modems, and autocall interfaces.

• Flexible Disk to store the system generation program as well as various diagnostic routines and logs selected events.

• Control Console, a stand-alone unit containing controls and indicators that allow monitoring and mode control on-line and test debugging off-line.

The minimum configuration for a 1380 is the base module, with associated electronics and power, equipped with at least one channel adapter and one medium-speed Line Adapter Base to support at least one external Systems Control Console. The 1380 can support up to eight individual System Control Consoles. Under an RPQ, the 1380 can also support an additional three channel adapters, increasing the system maximum to seven. The base module can support up to six Line Adapter Bases (see accompanying table), one of which must be medium speed (1200 bps) to support the console. When integral modems are used, a Modem Adapter Base is needed, which eliminates two Line Adapter Bases. Therefore, the base cabinet can be equipped with a maximum ▶

Memorex 1380 Communications Processor

▷ As the ratings indicate, the 1380 compares favorably with competitive offerings. Some notable quotes from the users included: "good; very good; satisfied-to-happy; well satisfied; very happy; and super box." However, the comments were not limited to superlatives. In general, the negative comments related to specific categories or one-time experiences that tended to lower the user's overall satisfaction ratings but were really limited to a particular item or occurrence.

One would expect, considering the evolution of the 1380, that positive and negative comments would correlate with the vintage of the model. This was found to be a false assumption. The only common denominator had to do with local support, which, of course, is defined by geography. Commonality of praise or problems was not found with regard to the users' industry, application, hardware (1380) configuration, or installation date. The inherent inefficiency of processing non-synchronous data was, in some cases, an unacceptable performance degradation, and, in other cases, unnoticeable. In a few installations, the age of the host CPU had a direct bearing on 1380 performance, but only where the 1380 was shared by an older system/360 and a newer System/370.

The high ratings for throughput seem to reflect the users' expertise in tuning the system as much as the design and manufacturing quality of the vendor. One installation was satisfactorily handling six 50K-bps synchronous lines and a large number of point-to-point and dial-up ports, with a mixture of start/stop and synchronous terminals. Another installation had one 230.4K-bps line and a limited number of lower-speed (non-wideband) connections, and the high-speed line had to be carefully monitored or the system degraded. These apparently conflicting experiences can be understood when the hardware and protocols utilized are explained. In the first case, two 1380's were on-line and a spare 1380 was standing by, heavily utilized, but still ready to take over if required. In addition, many of the lower-speed lines were BSC half-duplex, and retries had to wait while the work-horse 50K-bps lines transferred needed data; block length was optimized also. In the second case, the block length was dictated by application, and when the 230.4K-bps line made retries the lower-speed devices sometimes suffered.

The ease of installation category presented an interesting dichotomy of responses. Many users had glowing commentaries on the RPQ's Memorex added to the 1380 for unique business-oriented applications; but a large number of these same users gave a less than glowing rating concerning implementation (primarily because of the time required). Frequently cited complaints had to do with the delivery of expansion hardware and the notification of new software availability.

The hardware lead time is understandable because the total assembly function is now in-house, with all of the attendant in-and-out quality assurance, multiple vendor surveillance, and product-update problems. A giant step was taken to improve hardware deliveries when Memorex announced that it was leasing a new 86,000-square-foot ▷

▶ of two Modem Adapter Bases (each capable of supporting up to 64 lines) and one or two Line Adapter Bases, at least one of which is medium speed. Expansion cabinets can hold up to six Line Adapter Bases or three Modem Adapter Bases, or any combination.

CONNECTION TO HOST COMPUTER: The 1380 is connected to a local host computer via a byte multiplexer channel in the case of a System/360 or via a byte or block multiplexer or selector channel in the case of a System/370.

TRANSMISSION SPECIFICATIONS

The accompanying chart summarizes the capabilities of the 1380 for accommodating various types of communications lines and techniques. The number of combinations of speeds and protocols is too lengthy to list here. Some system maximums are:

4 wideband extended (230.4K bps); or
16 wideband (40.8K, 50K, or 56K bps); or
40 wideband (19.2K bps); or
64 BiSync (1200-9600 bps); or
120 low-speed asynchronous (110-9600 bps); or
240 low-speed asynchronous (110-300 bps).

The ability to mix various line types is governed by several factors. First, system throughput is limited to 100,000 bytes per second. Second, there is a finite number of addresses available. Of the 256 interrupts generated by the system, 16 are used internally. The mandatory Medium-Speed Line Adapter Base (to support the systems console) requires 32 addresses, even if the only device attached is a single systems console. Each autocall unit requires one address. Each half-duplex device connected requires one address; each full-duplex device attached requires two addresses. (The example of 240 low-speed asynchronous attachments is based upon a new Universal Line Set scheduled for availability in the fourth quarter of 1978.) Address utilization is as follows:

Line Type	Addresses Used
Wideband Extended:	
1 to 4 lines (max.)	Contact vendor
Wideband or BSC:	
1st group of 8 lines	16
Each increment of 16 lines	32
64 lines (max.)	144
Medium-speed (including consoles):	
Each group of 16 lines	32
112 lines (max.)	224
Low-speed:	
Each group of 8 lines	8
192 lines (present max.)	192
240 lines (projected max.)	240

SOFTWARE

The 1380 will accept a standard emulation load from a System/360 or System/370 and will support OS, OS/VS1, SVS, MVS, DOS, EDOS, or DOS/VS.

PRICING

The 1380 and all related features can be acquired by purchase or are available under rental and lease plans. The rental plan, after the initial 90-day period, can be automatically extended on a month-to-month basis or cancelled on 30 days' written notice. Leases are available on an initial period of one or two years; after the initial period, ▶

Memorex 1380 Communications Processor

▷ facility primarily devoted to the manufacture of data communications equipment.

Timely software announcements are another problem. Due to the implementation of the mentioned RPQ's, Memorex did not release software developments to its entire marketing organization until each item was proven. Some users found out about various software packages through contact with other users before Memorex was ready to declare overall availability. Memorex considered that these items were still in a test-bed environment.

An additional problem was that users sometimes recognized an application as "almost the same" as one in which they had expressed an interest. Too often, the user failed to realize that even if the launching pad was somewhere above ground zero it was still a new undertaking. Consequently, some users rated ease of installation lower than might be expected because the debugging time exceeded the forecast. An installation advantage frequently mentioned was the ability to cut over one line at a time with minimal interruption of normal service.

A feature given a wide vote of appreciation was the flexible disk. In general, those surveyed were well pleased with the capability for reloading the communications program without disrupting the host and the diagnostic capabilities provided. (System failures are usually due to power fluctuations.) Line tracing and event logging were the primary diagnostics mentioned. Those not excited about the possibilities offered by the disk either hadn't required the features or were not educated as to their built-in benefits.

Memorex deserves praise for the reliability marks, but should ponder the maintenance ratings. To quote one user, "They (Memorex) grossly underestimated the people support required to launch and maintain a viable position in this market." Memorex has recognized this. Current and potential users will be pleased to learn that the data communications function has been elevated to Group status within the corporation and that high-powered marketing, software, and maintenance personnel have been added, with more planned.□

▶ the lease can be extended indefinitely for periods of one year or one time for less than a year.

The monthly lease and rental charges shown in the accompanying price list include 24-hours-per-day, 7-days-per-week (excluding holidays) maintenance for equipment located within a 25-mile radius of a Memorex service center. The monthly maintenance charge shown relates to purchased equipment and provides the same service coverage within the 25-mile radius. For equipment located outside the 25-mile radius, a travel charge per service call per month is applied, based upon the distance 'from the 1380 site to the serving Memorex center. An optional Monthly Travel Charge guarantees unlimited service calls per month for a flat rate also based upon distance. Other maintenance agreements are available. Accruals of lease payments toward purchase are not available as standard, but can be obtained depending upon the system configuration.

A lease may be terminated early by providing 90 days' advance written notice and paying a penalty charge in accordance with the following schedule:

Months Remaining on Lease	Termination Charge, months rental
19-24	5
13-18	4
7-12	3
1-6*	2**

* Also applies during any Lease Term Extension.
**If only one month remains on lease, the termination charge is one month's rental.

Feature removals or model downgrades are not subject to termination charges as long as the monthly charge for the equipment and features remaining under lease is at least 80 percent of the monthly charge under the initial term.

Classes for customer education in the software area are provided at a price per student per class as follows:

System Generation and Externals: $300
Basic Programming and Internals: $700

The figures presented in the price list include programming support for emulation mode (NCS) and support for IBM OS, OS/VS1, SVS, MVS, DOS, EDOS, and DOS/VS. Most features listed are also available for overseas applications conforming to CCITT and operating on 50-Hz power.

Monthly Charges*

		Rental	1-Yr. Lease	2-Yr. Lease	Purchase	Monthly Maint.
1380	Processor (includes 64K-byte memory and one system console)	1,330	1,210	1,100	39,600	265
5050	Base Expansion	540	495	450	16,200	50
5071	Memory Module (32K bytes; includes mounting base)	165	150	135	4,880	21
5080	System Console (additional)	95	88	80	2,880	10
5090	System Console Printer	195	NA	NA	NA	NA
	Channel Adapter, Type 1**:					
5211	First	100	94	85	3,060	15
5212	Second	100	94	85	3,060	15
5213	Third	100	94	85	3,060	15
5214	Fourth	100	94	85	3,060	15

Memorex 1380 Communications Processor

Configuration

Base Cabinet
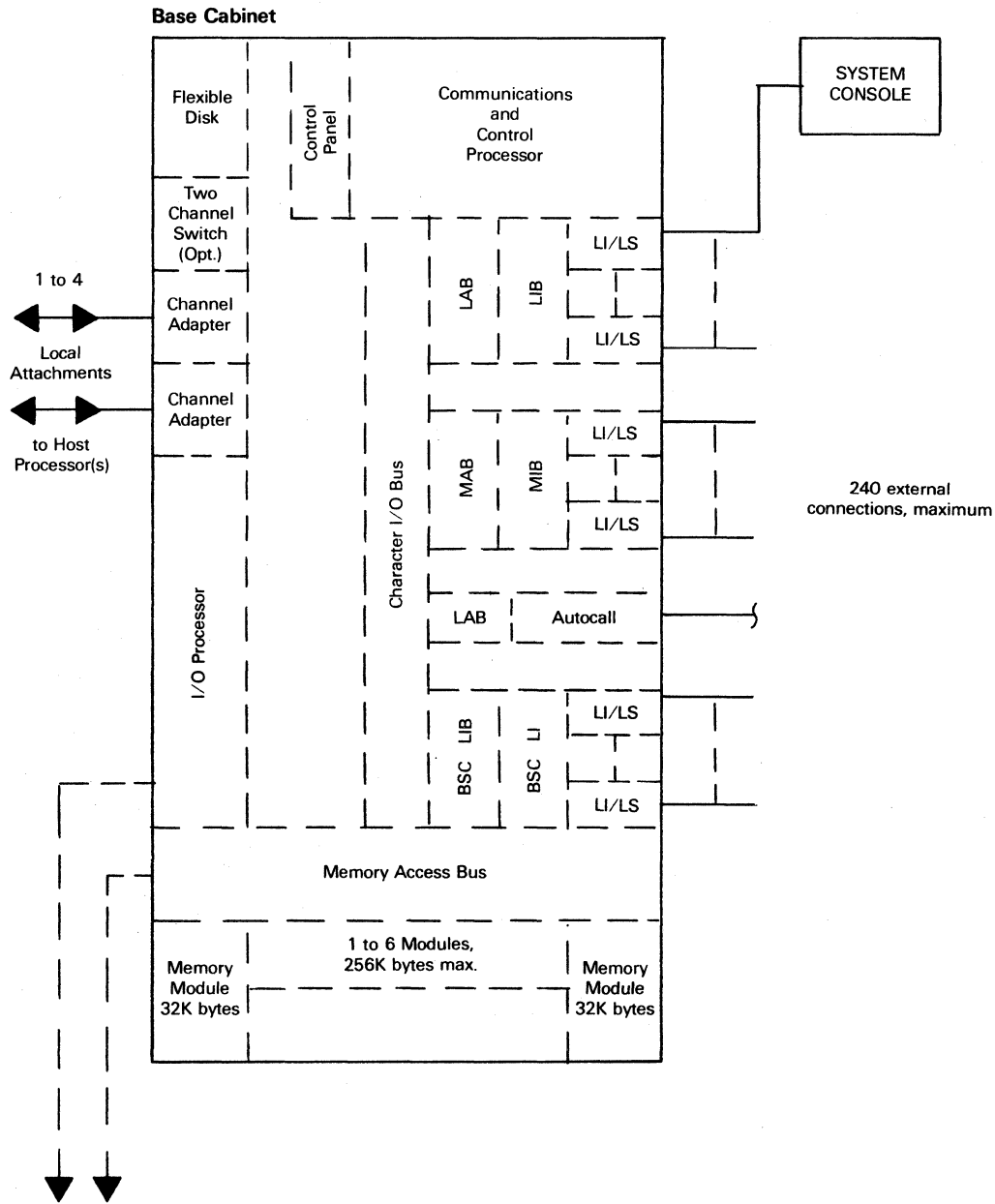
To 1 to 3 Expansion Cabinets; the first can include 1 to 8 memory modules (256K bytes max.), and 1 or 2 channel adapters. The second and third, when required, contain communications interface hardware only. See accompanying table for characteristics of each adapter.

			Monthly Charges*			
		Rental	1-Yr. Lease	2-Yr. Lease	Purchase	Monthly Maint.
	Channel Adapter, Type 2:					
5221	First	180	165	150	5,400	25
5222	Second	180	165	150	5,400	25
5223	Third	180	165	150	5,400	25
5224	Fourth	180	165	150	5,400	25
5250	Two-Channel Switch	60	55	50	1,800	10
5401	Address Expansion	300	275	250	9,000	50
5405	Line Set Expansion	180	165	150	5,400	25
5411/5/6	Line Adapter Base	N/C	N/C	N/C	N/C	N/C
5451	Modem Adapter Base	30	27	24	864	3

JUNE 1978

Memorex 1380 Communications Processor

		Monthly Charges*				
		Rental	1-Yr. Lease	2-Yr. Lease	Purchase	Monthly Maint.
	Line Interface Base:					
5511	Medium Speed	50	45	40	1,440	6
5512	Medium Speed, External Clock	70	65	60	2,160	9
5521	Universal Speed	65	60	55	1,980	9
5531	BSC	55	49	44	1,584	7
5532	Wideband	140	128	116	4,171	17
5534	Wideband Extended	200	183	166	5,976	25
	Modem Interface Base:					
5551	Low Speed**	19	18	16	576	2
5552	Medium Speed	19	18	16	576	2
	Line Interface:					
5601	Low Speed ASCII, 110 bps**	50	45	40	1,440	6
5602	Low Speed ASCII, 300 bps**	50	45	40	1,440	6
5603	Low Speed BCD, 134.5 bps**	50	45	40	1,440	6
5604	Low Speed Baudot, 74.2 bps**	50	45	40	1,440	6
5611	Medium Speed, Standard	10	9	8	288	1
5612	Medium Speed, External Clock	21	20	18	648	3
5613	Medium Speed, Reverse Channel	15	14	12	432	2
5621	Universal Speed	12	11	10	300	2
5631	BSC	21	20	18	648	3
5632	Wideband	70	65	60	2,160	9
5633	Wideband V.35	77	70	64	2,304	10
5634	Wideband Extended	300	275	250	9,000	40
5641	Autocall	77	70	64	2,304	10
5644	Synchronous Clock	24	22	20	720	2
	Integral Modems—					
5651	1220 B2	30	27	24	804	7
5652	1221 LD1	24	22	20	720	3
	Line Set:					
5701	Low Speed**	6	6	5	180	NC
5711	Medium Speed, Standard	6	6	5	180	NC
5712	Medium Speed, External Clock	6	6	5	180	NC
5713	Medium Speed, Reverse Channel	6	6	5	180	NC
5721	Universal Speed	6	6	5	180	NC
5731	BSC	6	6	5	180	NC
5732	Wideband	50	45	40	1,440	NC
5733	Wideband V.35	58	53	48	1,728	NC
5734	Wideband Extended	120	110	100	3,600	NC
5741	Autocall (RS 366)	6	6	5	180	NC
5751	For 1220 B2 Modem	2	2	2	72	NC
5752	For 1221 LD1 Modem	2	2	2	72	NC
5771	New Sync	6	6	5	180	NC

Note: All necessary mounting hardware and ancillary items are included at no additional charge.
* Includes 24-hours-per-day, 7-days-per-week maintenance (exclusive of holidays).
**Not available for new installations.■