Operator's console

Console design and layout of the CHI 2130 provides the first proof of this new system's superiority: The twin goals of *control simplicity* and *access to machine capability* have been achieved to a far greater degree than ever before.
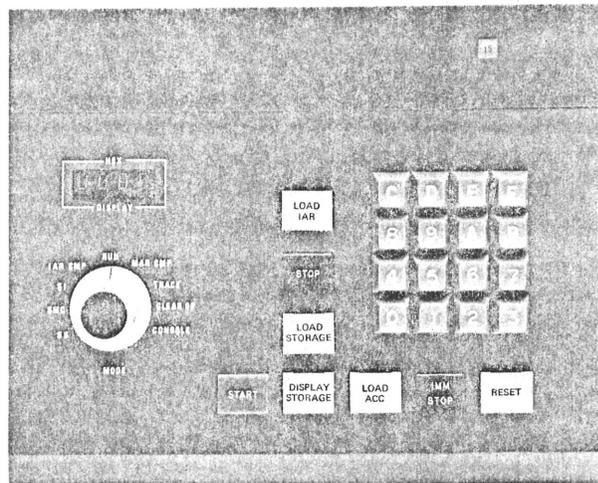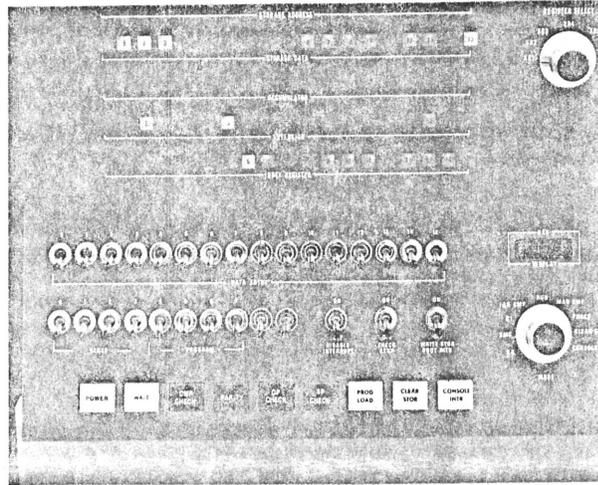
The console is equipped with all standard indicators provided on an IBM 1130. 16 Console Entry Switches are provided as a direct, program-accessible replacement of their equivalent on the 1130.

Using this console, a programmer can perform program debugging, entry of data to memory, and display of memory contents without recourse to Console Entry Switches. A hexadecimal keyboard and switches for loading addresses and data into core simplify console interaction.

The hexadecimal display allows binary to hexadecimal conversion in a fraction of the time required in the 1130. Data entry function is transferred to Hexadecimal Entry by positioning a rotary switch. In this mode, the keyboard and display provide rapid access to the storage address register, memory contents, and the IAR. These can be displayed in the hexadecimal display or changed through the hexadecimal keyboard. This enables fast and precise debugging without any need for binary to hexadecimal translation by the operator.

When the computer is in Run mode, there is always a simultaneous display of accumulator content in both standard binary and in hexadecimal.

Other console features include selectable inspection of all six index registers, memory address stop and instruction address stop controls, and a Video Display Terminal (VDT) for rapid operator interaction. Hard copy from the console is available from either a slave printer to the VDT or a console printer similar to the IBM 1131s.

Other mainframe features

CHI 2130 architecture accomplishes all standard machine operations within the rated 800 nanosecond period. Extended cycles are required only for shifts over 4 bit positions and multiply-divide functions.

The CHI 2130 has six index registers, as compared to the standard three in both 1130 and 1800 systems. These additional registers can be used for high-speed arithmetic computations and data manipulation schemes.

Options available include protected XIO and BSI for re-entrant coding. This feature is essential for real-time operations. The spooling of I/O devices, card, printer, and plotter is also accomplished with this feature. This can increase throughput by utilizing the CPU speed more efficiently. Storage Protect is available in a functional equivalent of the IBM 1800 feature. Sense/Program switches, Mask and Unmask instructions round out the options that emulate 1800 capabilities.

A real-time clock, incremented in ¼ seconds, runs continuously when the system is powered, keeping track of time on a 24-hour day, 365-day year basis.

An Interval Timer permits the interruption of the central processor at periodic intervals. It is program-controlled and can operate on a time base of one millisecond or 1/60th of a second.

CHI 2130 software compatibility

The 2130 is available as a complete hardware analog of the IBM 1130 system. When so configured, the 2130 will run monitors, customer programs, customer engineering diagnostic programs, and cold start cards without any modification whatsoever. This total compatibility extends to peripheral operations, and an extensive line of peripheral equipment is available from CHI to first duplicate and then vastly exceed the throughput capability of the 1130.

A combination of CPU and peripheral options also achieves IBM 1800 compatibility. For most applications, the mainframe functions in a program-for-program equivalent manner. The peripheral options, however, offer expanded utility when 1800-type operation is indicated.

hardware index registers. Overall, the use of hardware registers rather than core memory eliminates one memory cycle on each indexed instruction. In highly indexed programs, this can result in a time saving of as much as one-third during execution. Most compiler-generated programs are highly indexed, and the user will realize considerable advantages over the 1130 with the CHI 2130.

Integrated file adapter

Unique to the CHI 2130 is an Integrated File Adapter. This consists of a control unit located inside the 2130 CPU that is capable of supporting four IBM 2314 (or their equivalent) disc drives. The IFA generates certain data checking patterns for
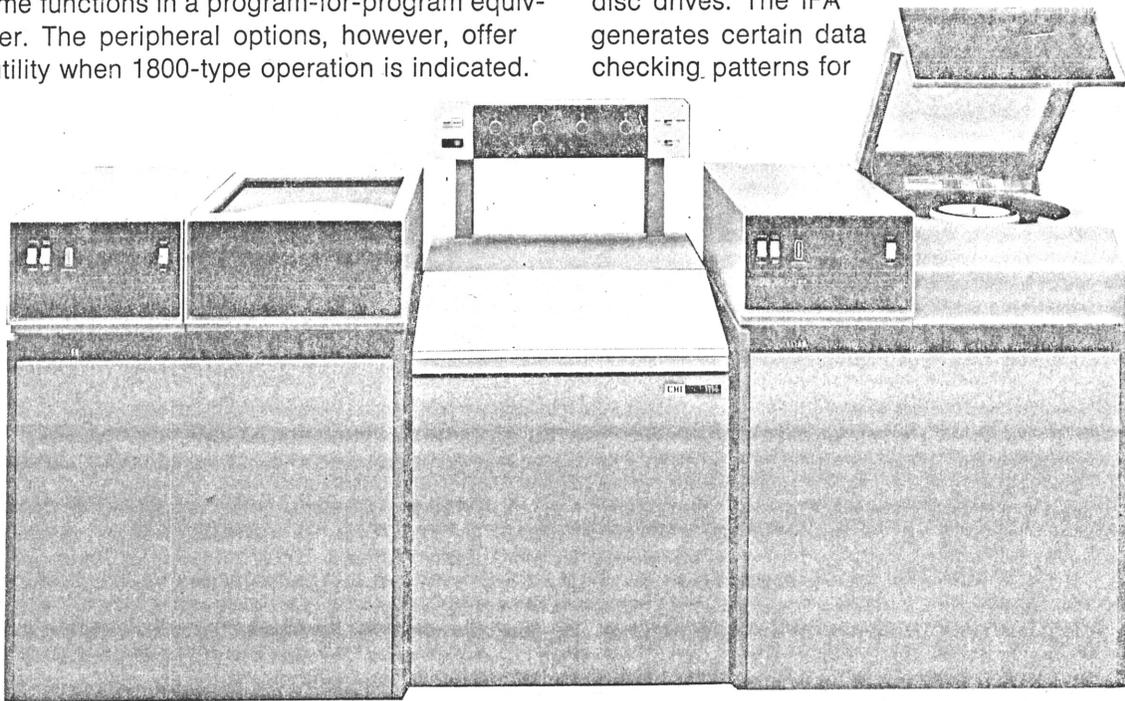
CHI 2130 instruction and index register configuration

There is no difference between CHI 2130 and IBM 1130 instruction sets. Hardware operations are slightly different. In the 1130, the index registers are located in core storage locations 1, 2, and 3. For this reason, indexed instructions require extra core storage cycles. During such a cycle, the core resident index register is fetched from memory just prior to the actual indexing operation. The CHI 2130 provides three hardware (non-core) index registers much the same as in an 1800. Exact compatibility with IBM 1130 index registers has been maintained. By using associative techniques, all memory references to core storage locations 1, 2, and 3 are translated into the

HARDWARE INDEX REGISTER CONFIGURATION
CORE   Hardware

Memory reference instruction

Return to program
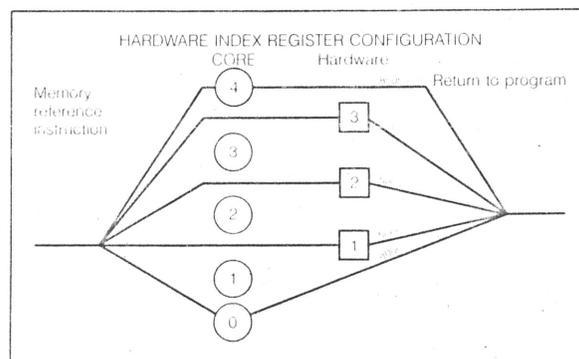
superior data integrity.

Seeking may be overlapped on all four disc drives. Rotational position sensing is used on all four disc drives, minimizing the amount of rotational delay between the time a command is issued and the actual execution of read or write.

The IFA has a 9-bit cylinder address register. This allows the use of 400 cylinder drives if desired. 400 cylinder capability in effect doubles the capacity of each disc drive at a very nominal increase in drive price.

Other IFA features include sector protector, cyclical redundancy, and bit appendage checks. Capability is also provided to transfer data from disc drive to core at the maximum memory cycle time of the CPU, 800 nanoseconds

per 16-bit word. The disc format is arranged so that consecutive sectors are transferred to the 2130 CPU without excessive rotational delay.

Disc packs written under control of IFA are not compatible with those written under control of the CHI 1114 or other IBM 1130 2314 type disc systems.
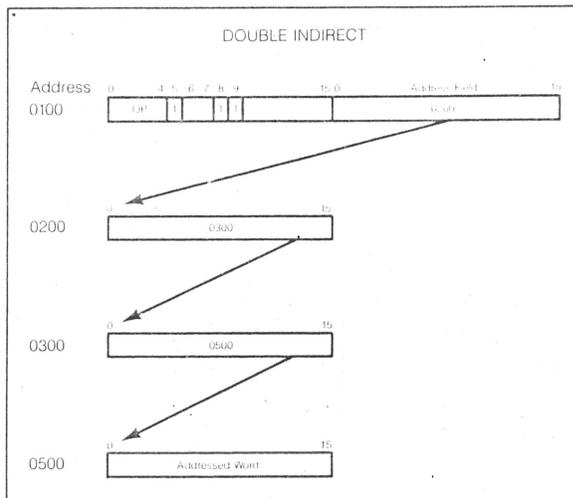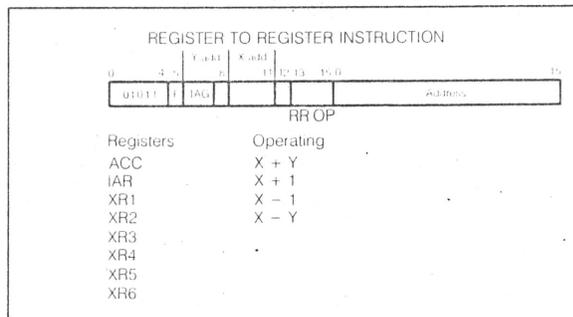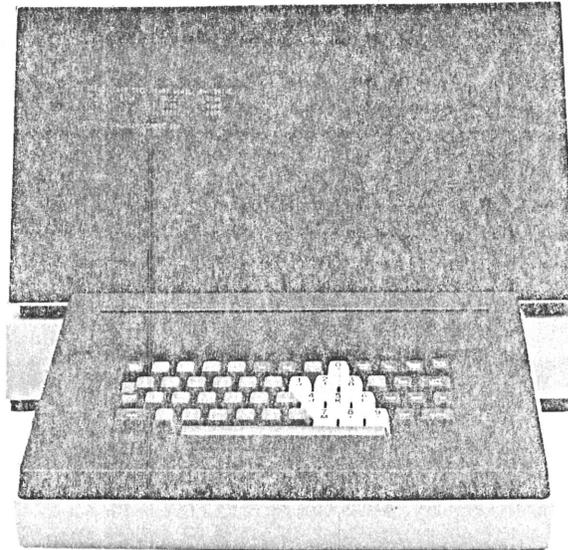
Floating point hardware feature

A comprehensive, in-line floating point feature (FPF) is an available option for the CHI 2130. The FPF combined with the CHI supplied software allows improvement of the floating point execution times by as much as a factor of 100 times. CHI supplies replacement routines for the thirty-five most commonly used routines. These routines replace the LIBFs with actual floating point instructions, thus reducing execution time to a minimum. An additional mode of operation is offered for the CHI FPF in which the eight floating accumulators in the FPF may be used. If the program performs a series of floating point operations this mode can further enhance the CHI 2130's performance. See CHI's FPF brochure for further information.

Console video/keyboard/ typer option

CHI offers two console devices to replace the console keyboard/typer on the IBM 1130. The Console VDT gives fast, reliable, silent operation with the low failure rate typical of electronic hardware. Hard copy attachments to the console VDT give the user the option of a permanent record. A console printer similar to the 1131's is also available.

Processing speed

The CPU has a basic cycle time of 800 nanoseconds. All

REGISTER TO REGISTER INSTRUCTION

RR OP

Registers	Operating
ACC	X + Y
IAR	X + 1
XR1	X − 1
XR2	X − Y
XR3	
XR4	
XR5	
XR6	

DOUBLE INDIRECT

standard machine operations can be accomplished within this period.

CHI 2130 speed can be appreciated when specific operations are compared to other system execution times. IBM 1130 instructions, for example, require a memory cycle time in excess of 3.6 microseconds. Thus, the 2130 is 4.5 times faster than a 3.6 msec 1130 in raw processor speed. The addition of hardware index registers increases this to 9.0 times for each indexed instruction.

The floating Point Hardware Feature can increase this speed multiple to from 10 to 30. These, plus the speed of CHI peripherals, can show total throughput increases of from 2 to 50 times, depending upon the particular application.

Register to register OP code

Registers 4, 5, and 6 are accessible only under control of a new instruction group which has been added to the CHI 2130 basic instruction set. This is the Register to Register (RR) OP Code. In all cases of direct RR operations, there is a total cycle time of 800 nanoseconds. The CHI 2130 RR OPs have the additional capability of using arguments from memory. In those cases, the memory arguments are combined directly with destination register. This gives the unique capability of "immediate" type instructions.

Double indirect addressing

A second level of indirect addressing has been added to the CHI 2130 instruction format. This second level is capable of being post indexed. The result is a capability for direct reference to Fortran arrays through the calling string.

Double indirect with post indexing is a powerful tool that can reduce the execution time of your heavily arrayed Fortran programs significantly.

CHI 1103 printer

Hard copy at 600 lines per minute is provided by the CHI 1103 line printer. This printer is designed for full-time use with the 2130 system and is 100% software compatible with the IBM 1403.

The CHI 1103 accepts single or multiple-part continuous forms up to 19½ inches wide and provides vertical forms control with a 12-channel paper tape reader. The printer mechanism, along with electronics, is housed in a sound-deadening cabinet with hinged top for printer access and hinged front doors for paper supply compartment access.

Specifications include: 600 lpm, 64 character set, 132 print positions, 10 pitch character spacing, 6 or 8 lines per inch spacing, 20 ms/line paper feed rate, 20 inch per second paper slew rate, and superior alignment and position controls.
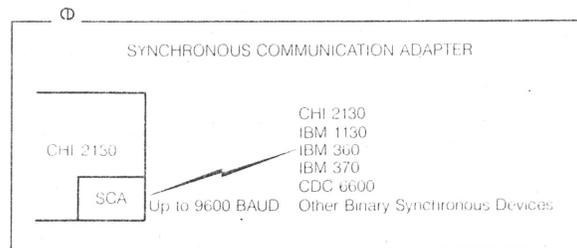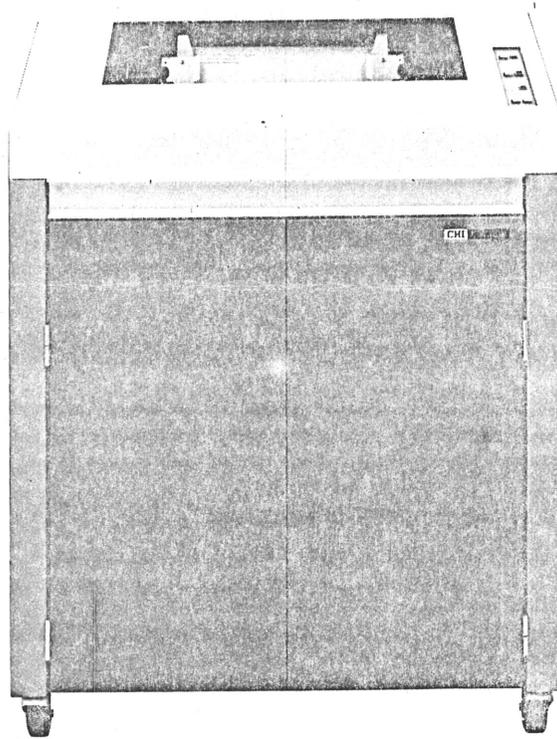
1442 card reader punch

The recommended card peripheral for the CHI 2130 is the IBM 1442 and is rented from IBM by the customer. This equipment operates on the 2130 exactly as it does on an IBM 1130. Cold start procedures can be initiated through the 1442 reader, and it may be tested using standard IBM Customer Engineer Diagnostics when installed in the CHI 2130 system.

2310 type disc

CHI offers a replacement for the integral (Physical 0) disc in the IBM 1131. 512K words of storage, 70 millisecond average seek, and complete compatibility with your existing 2315 packs are three of the many features of this disc drive. Extremely quiet and dependable, the 2310 type disc, the CHI 1105/71, eases conversion to the 2130 and offers the 2130 user compatibility with IBM 1130s.

SYNCHRONOUS COMMUNICATION ADAPTER

| CHI 2130 | SCA | Up to 9600 BAUD | CHI 2130 / IBM 1130 / IBM 360 / IBM 370 / CDC 6600 / Other Binary Synchronous Devices |

Synchronous communications adapter

The CHI 2130 can be equipped with a Synchronous Communications Adapter that is 100% hardware compatible with its functional equivalent on the IBM 1131 CPU. It is used for Binary Synchronous Communication (BSC). The Synchronous Communications Adapter operates in both BSC and STR modes and at speeds up to 9600 Baud. Communication with other 2130s, IBM 1130s, System 360s and 370s, CDC 6600s, and other binary synchronous devices is possible with this feature.

CHI 2103 printer

The CHI 2103 medium-speed line printer is a 300 LPM chain printer that is software compatible with the IBM 1403. Hardware compatibility with the CHI 1103 allows the CHI 2130 user to upgrade his printer speed without conversion. As on the CHI 1103, 132 print positions, 64 character set, variable paper width, and a 12 channel VFU are standard. Optional 48 and 96 character sets are also available. Variation of sets alters the speed of the printer to 400 LPM and 200 LPM respectively. CHI offers software to support the ASCII 64 character set, upper/lower case 96 character set, and 132 print positions.

Storage access channel

The CHI 2130 system can be equipped with up to three functional equivalents of the IBM Storage Access Channel or SAC II. A SAC provides an easy method of attaching standard CHI and IBM peripherals as well as other SAC devices. It also provides a method of attaching an IBM System 7 to the CHI 2130.

Transfer time for the CHI 2130 SAC is 3.2 microseconds per 16-bit words, which is exactly four times the CPU cycle time and one-fourth the rate for devices controlled by integrated adaptors within the CHI 2130 CPU.

Asynchronous communications

CHI offers three modes of Asynchronous Communications: RS 232, Current Loop, and Balanced Line. Local and remote asynchronous devices such as teletypes, video display terminals (VDT), and printers may be attached to the CHI 2130 through the asynchronous communications adaptor. Up to 30 separate adaptors may be installed on the CHI 2130 system in any combination of the three types. Local distances up to 1000 cable feet from the CPU are supported by the balanced line adaptor.

Magnetic tape transports

CHI offers magnetic tape transports for the CHI 2130 computing system with capabilities ranging from 25 IPS to 75 IPS; seven and nine track; and 800 BPI, 1600 BPI, and 800/1600 BPI switchable density. The magnetic tape sub-system for the CHI 2130 includes 10½ inch reels, NRZI or PE mode, and industry compatibility. Both formatted FORTRAN I/O and callable subroutines are available.

Plotter

The CHI 2130 plotter adaptor supports the IBM 1627 models 1 & 2 and the Cal Comp 500, 600, 700, and 900 series plotters.
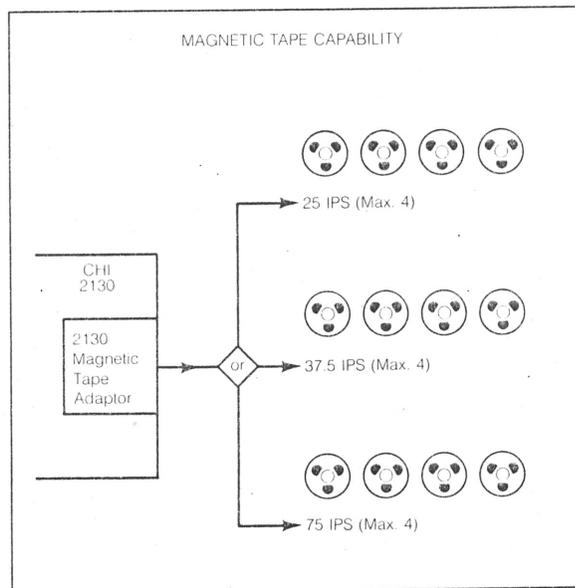
Paper tape equipment

Both photo-electric paper tape readers and 110 character-per-second paper tape punches are available from CHI on the 2130. The reader operates at 300 characters per second and is compatible with the IBM 1134. The punch is IBM 1055 compatible. The CHI 2130 will not IPL from paper tape.

Card readers

The CHI 2101 Card Reader has 1000 card-per-minute read speed and is compatible with the IBM 2501 offered on the IBM 1130. Options for the 2101 include the capability to read marked and/or punched cards or the option to read 51 column cards. This unit gives 2 to 3 times the speed of the 1442, as well as offering increased reliability.

Our home office and main manufacturing plant are in Sacramento, California. Sales and service centers are located in major United States cities. You'll find interested and interesting people in every one of our offices, eager to show you how to save money.

Call us collect, write us a letter, or drop into one of our offices today. It will be the beginning of a most advantageous relationship for your company.

MAGNETIC TAPE CAPABILITY

CHI 2130

2130 Magnetic Tape Adaptor

or

25 IPS (Max. 4)

37.5 IPS (Max. 4)

75 IPS (Max. 4)

X COMPUTER HARDWARE INC.