write music

It is much larger than the registers. Each of the two core-memory cabinets is as large as the computer cabinet.

The basic element of the core memories are tiny rings of ferrite (magnetic iron) arranged in planes with wires running through them. The tiny ferrite cores can be magnetized either "up" or "down". Information is stored as a coded arrangement of a number of the cores. Nine cores can store a "bit" of information and the whole memory has a capacity of 512,000 bits of information.

The ferrite cores are so tiny says technician John Stasiuk that, "they pour them out of salt shakers" and so fragile "if you drop a core, it just distintegrates."

Overflow from the core storage is placed on the magnetic drum storage (four million bytes) or on magnetic discs (almost five billion nine-bit characters), at nine bits to a byte.

The drum is faster than the disc memory. All its information may be transferred to the computer in less than four seconds. The memory consists of a drum rotating at 3600 r.p.m. and two hundred reading "heads". Tiny spots on the drum are magnetized by the heads in locations where they may be later discovered and used as information if desired.

The disc memory can transfer information at the rate of 156,000 characters per second. There is a delay in access because the reading heads must be mechanically shifted to the channel where the information is stored.

Each of the nine disc memories looks like a stack of eleven phonograph records. This stack is rotated at 3600 r.p.m. and the magnetic readers are placed against the twenty surfaces where the information is stored.

Further information may be stored on magnetic tape which is slower still but the tapes may be removed and stacked as a permanent information library. The computing centre has eight tape readers in cabinets, the Hollywood concept of a "computer".

Since computers operate so quickly compared to humans, communication must be indirect. All the input, output and memory equipment is designed to keep the computer operating at all times at the highest speed.

Since no input devices (especially man) can operate at a computer's speed, the information is fed to a high speed memory before it is fed in at high speed.

Output is transfered to a low speed memory, usually in several stages, before it is put in a form man can assimilate. This usually means a printer.

The computing centre printer is an IBM 1403-N1 (the numbers mean nothing). It can print out 1100 132-stroke lines per minute, far faster than you can read. The type is on a high-speed chain and the paper is pressed against the type when the appropriate letter comes along.

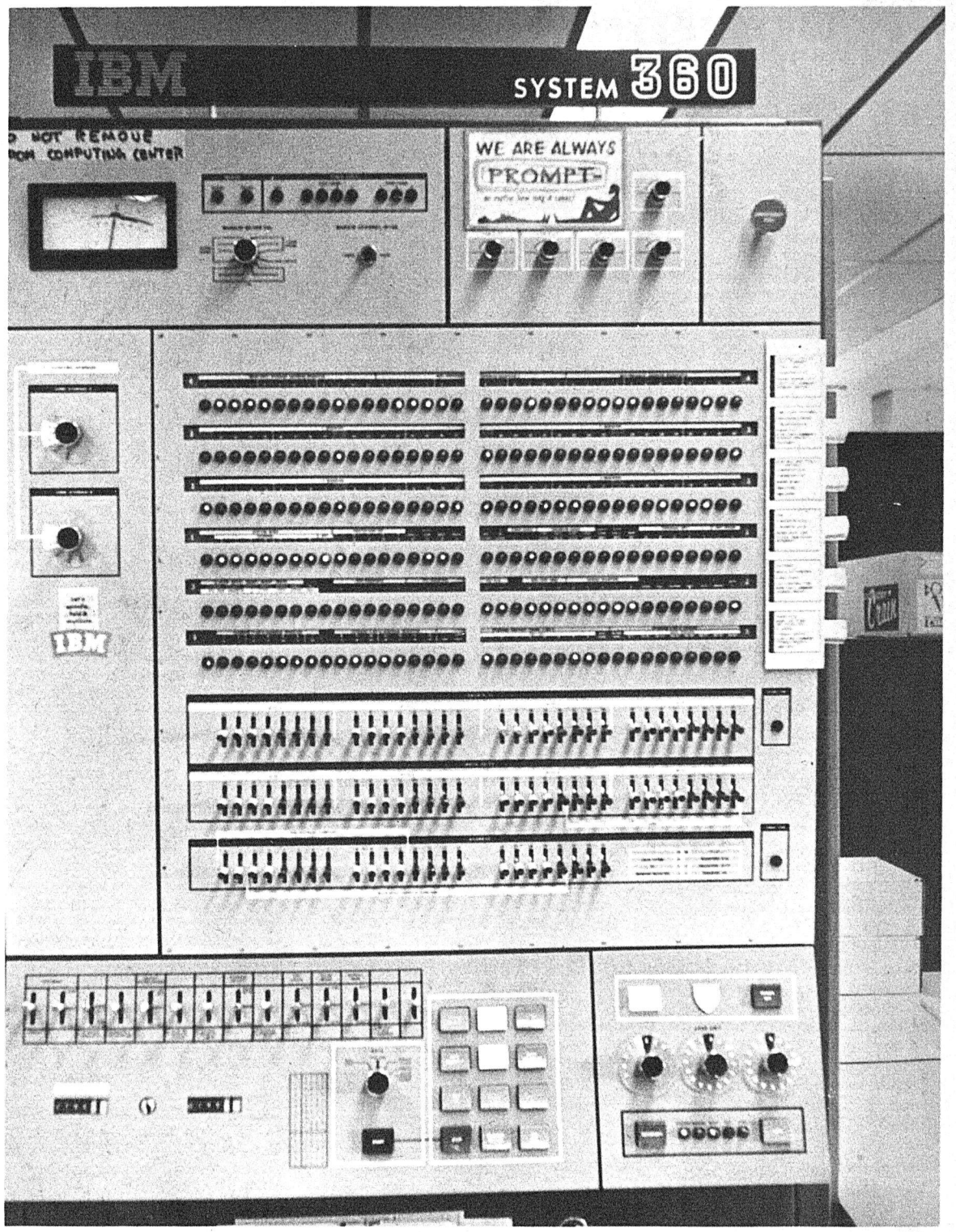
One specialized output devise is the CalComp digital plotter. This is an offline machine (the printer is on-line), since it plots results on paper from computer tape rather than directly from computer memories. It is also the newest piece of equipment and the only one not made by IBM.

The input devices are many and varied. Information may be brought in on cards, to be read by a card reader at 1000 cards per minute. The card reader handles 400,000 cards per day.

Another input is through ordinary telephone lines. Dialing a certain number connects you to the computer. The computer does not encourage conversations because it sends a high-freqency signal over the line and if it does not receive the correct high-frequency reply from a machine at the other end it hangs up.

The computing centre has a user at Montana State University who uses long-distance for transmission of machine-coded problems. He pays the line costs but there is no charge for this service.

In addition to telephones, there are several "hard-line" terminals on campus. These are wired directly to the input of the computer. The terminals are placed in buildings ranging from the education building to the Tory building but most of them are in the physics-computing sciences building. There is a total of 36 terminals on campus.



—Lyall photo

REALLY VERY SIMPLE FOR THOSE WHO KNOW HOW
. . . IBM 360 control consol, with dodads, thingamagigs and whatzits

A computer is only as good as the man in charge

By GLENN CHERITON

There was once a chess match between an American computer and a Russian computer.

American computer technology is superior to Russian computer, but the Russian computer won the game. Supposedly the Russian programmer was a better chess player than the American.

Properly programmed computers can mimic many of the activities of humans, such as playing chess but often any intelligence mirrors that of the programmer rather than the computer.

No one is more derogatory of the intellect and ability of computers than the computing scientists themselves. Their quotes show this.

"There's a lot of vague thinking about computers by people who think a computer can think on its own. It doesn't create ideas."—computing science head Dr. D. B. Scott.

"You'd be surprised at how intelligent people are if you deal with computers for a while. The computer is basically very stupid."

—Dr. J. P. Penny

"No matter what you think a computer can do, it can't."

—Chuck Lyall, grad studies

A programmer can do a variety of things with a computer's capacity for fast, accurate manipulation of numbers and symbols but the computer remains an electronic slave and an adjunct to the programmer.

The future of computers is bright even with their creative limitations. They will get more complex but at the same time physical size will be reduced.

Microminaturization reduces the size of components making possible higher speeds and even greater complexity. The future "new breed" of computers will be able to carry out computations present computers cannot begin to touch. This does not mean computers will be more human.

Dr. J. P. Penny of the computing science department believes there are essential differences between the human brain and computers.

He said, "Words like motivation and imagination mean nothing to a computer."

One more important effect of the new computer technology is computers will become cheaper, more common and more widespread. The day when every person will have his own computer is still a long way off but it is now feasible to have large groups of people using a computer as a part of their work.

Time-sharing of a computer has been tried successfully on many campuses. One person at the Massachussets Institute of Technology is reputed to have a time-sharing computer terminal in his bedroom. Since the computer is operated 24 hours a day, he can work out his ideas with the computer when he thinks of them.

It is now feasible to sell computer time to individuals on the open market and to sell devices which convert a telephone into a computer terminal. This is being done on a small scale now. In a few years it may be done on the same scale as time is sold on long distance telephone.