

HP 3000/IBM 1403 COUPLING EXTENDS SYSTEM UTILIZATION
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SPUR PRODUCTS COPR.

The HP series 33 gives the user the option of a 180-characters-per-second or 400-lines-per-minute dot matrix printer. Series II and III give choices of solid-character printers with speeds of 300, 600 or 1250 lines per minute. Being solid character printers they have advantages over dot matrix printers. However, all three are drum printers which lack operating features and options inherent in chain or train printers.

In fact, a chain or train printer can greatly expand the utilization of any data processing system compared with a drum printer. For example, an operator using a chain or train printer can quickly interchange character sets, and even individual characters, so that a number of fonts (even custom-designed type faces), special symbols, numbers and letters can be selected. Furthermore, printing quality is greatly improved, a factor that also makes it usable for some functions not desirable for a drum printer.

Spur Products Corp. has developed a controller that makes an IBM 1403 printer plug-compatible with the series II and III computers. (Figure 1) It replaces any of the three drum printers offered by H.P. The IBM 1403-2, or -3 or -N1 can be driven. Rated print speed of the -3 and -N1 is 1100 lines per minute, and that of the -2 is 600 lines per minute. Of the five models of 1403 printers available, we selected these three for use with the HP 3000 because they have 132 print positions.

The 1403-series printer was selected for this marriage because it can correctly be called the best item of electro-mechanical equipment ever produced. As such, dependability and versatility also are among its attributes.

A comparison of the operating features can best be understood by comparing the mechanical features of the drum and the chain or train printer:

In the drum printer a cylinder rotating at constant speed has a complete set of printing characters embossed around it at each print position. Hammers strike the desired characters as they rotate into print position. (Figure 2)

While a limited selection of fonts on the drum is available from the manufacturer, the drums cannot normally be changed by the operator. Furthermore, individual characters cannot be changed under any conditions. This not only completely takes away an option available with train or chain printers, but makes it necessary to replace the entire drum if a single letter is worn or broken.

Furthermore, no drum printer has been able to time the impact on the rotating drum at the precise moment that the character is in position. The result is that printed lines are wavy across the page. The HP printers, which actually are made by Dataproducts, are not as bad as some in this regard, but they also will go out of adjustment. Wavy lines discourage the use of the printer for sales solicitation letters or most printed communications that reach the public. Printed communications are often the only media on which the company is judged, so they should have the highest quality possible. It is natural that the 1403 is the standard of the direct marketing industry.

In such applications two other characteristics of the 1403 are definite economic advantages:

1. Paper is slewed from the bottom of one form to the beginning of the next at approximately 80 inches per second.

2. A vertical format unit can enable the paper to be advanced to any pre-selected position, such as slewing from the bottom of one form to the top of the next. The carriage control commands are punched into a paper forms control tape built into the printer.

In a chain or train printer an array of character slugs moves horizontally at constant speed past a set of hammers--one hammer for each print position. In chain printers the slugs are connected and pull each other around a track. In train printers the slugs are not connected and push each other around the track. (Figure 3) The model 1403-2 uses a chain and the 1403-3 and 1403-N1 use trains.

Our respect for the 1403-series printer is so great that we chose it as the printer to be driven by the Spur controller even though it has two marketing disadvantages for us:

1. It has been out of production since 1970. There still are hundreds of thousands around, but the market obviously is not growing, and any manufacturer likes a growing market.

2. Model 1403 printers cost as much as \$30,000, which

is only about \$8,000 less than it cost when it was new. Its cost per printed line is about the same as the latest model IBM printer. Still, you have to wait at least three months for delivery of a reconditioned 1403 that may be 20 years old.

Whenever there is an unusual computer printing job it invariably is done with a 1403. One company uses it to print on mylar for labeling products stored outdoors. The Atomic Energy Commission uses it to print its Nuclear Science Abstracts because it has the print quality that allows the copy to be read after it is reduced photographically and printed by offset lithography. Both the AEC and Stanford Research Institute use it because special chemical and mathematical symbols can quickly be added to the print train. SRI even creates Greek and other foreign letters by overprinting standard characters. In all of these applications, incidentally, the IBM 1403 printer is used with a computer other than an IBM.

The Spur controller is software-compatible with programs supporting the HP 3000 series II or III. To accomplish this while making it possible to permit the operator quickly to interchange character sets it was necessary to incorporate a memory in the controller that makes the formatting adjustments necessary for each type train.

A random access memory enables the operator to table load the memory. To make reprogramming as easy as possible when a single character is changed, the Spur controller memory has positions for 240 characters. Each has a direct relationship to the 240 character positions on the train (normally 48 characters repeated five times around the track for speed in aligning the chracter with the print position).

Optionally, the program can be permanently stored at the factory in programmable read-only memories. When this option is selected three PROMs are included with the controller, one for each of three print trains selected by the user. A front-panel switch enables the operator to change the program when the train is changed. Any number of additional PROMs can be ordered for as many trains as the user plans to use.

Naturally if PROMs are requested the operator is relieved of the problem of programming, but does not have the option of changing the computer language at a later date, which would be possible with table loading.

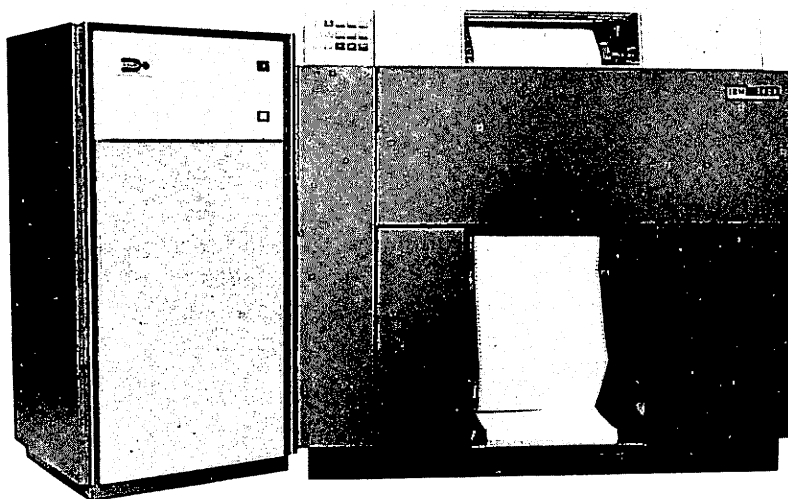
Even without considering the increased use of the system made possible, costs of a 1403 printer and Spur controller system are competitive with similar HP equipment. An HP 2618A printer with a speed of 1250 lpm has a list price of

\$35,400, and the HP controller adds \$1,275 to the total price. An IBM 1403-N1 printer costs somewhere between \$20,000 and \$30,000 and the Spur controller costs \$17,500.

When comparing costs it is important to recognize that an increase in utility affects the comparable economics. If, for example, sales letters now can be printed with a 1403 printer while they previously could not and had to be sent to a service bureau, the comparative costs would have to be redone, especially if the additional printing job can be done when the computer otherwise would be idle.

CONCLUSION

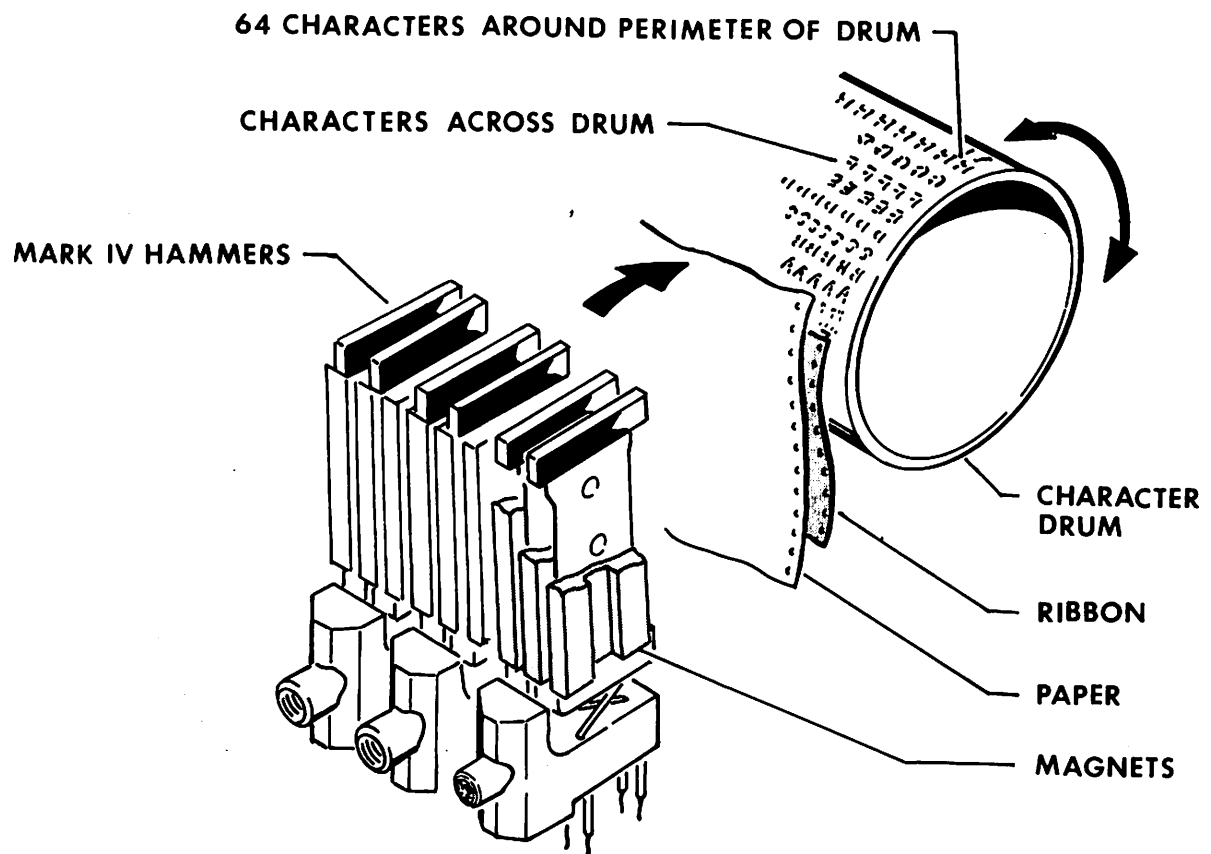
Just as it can truthfully be said that the HP 3000 "ends the computer compromise," so the Spur controller ends the printer compromise. In some ways the printer is the most critical part of the data processing system. It produces the final product of the system. Therefore, its printing quality is the standard by which some unsympathetic boss, not to mention the public, may judge your entire effort. And most important, the printer can be a limiting factor in the variety of jobs that can be done. For these reasons some operators of HP 3000 general systems have welcomed this new product, and many more are expected to join them.



Spur Controller

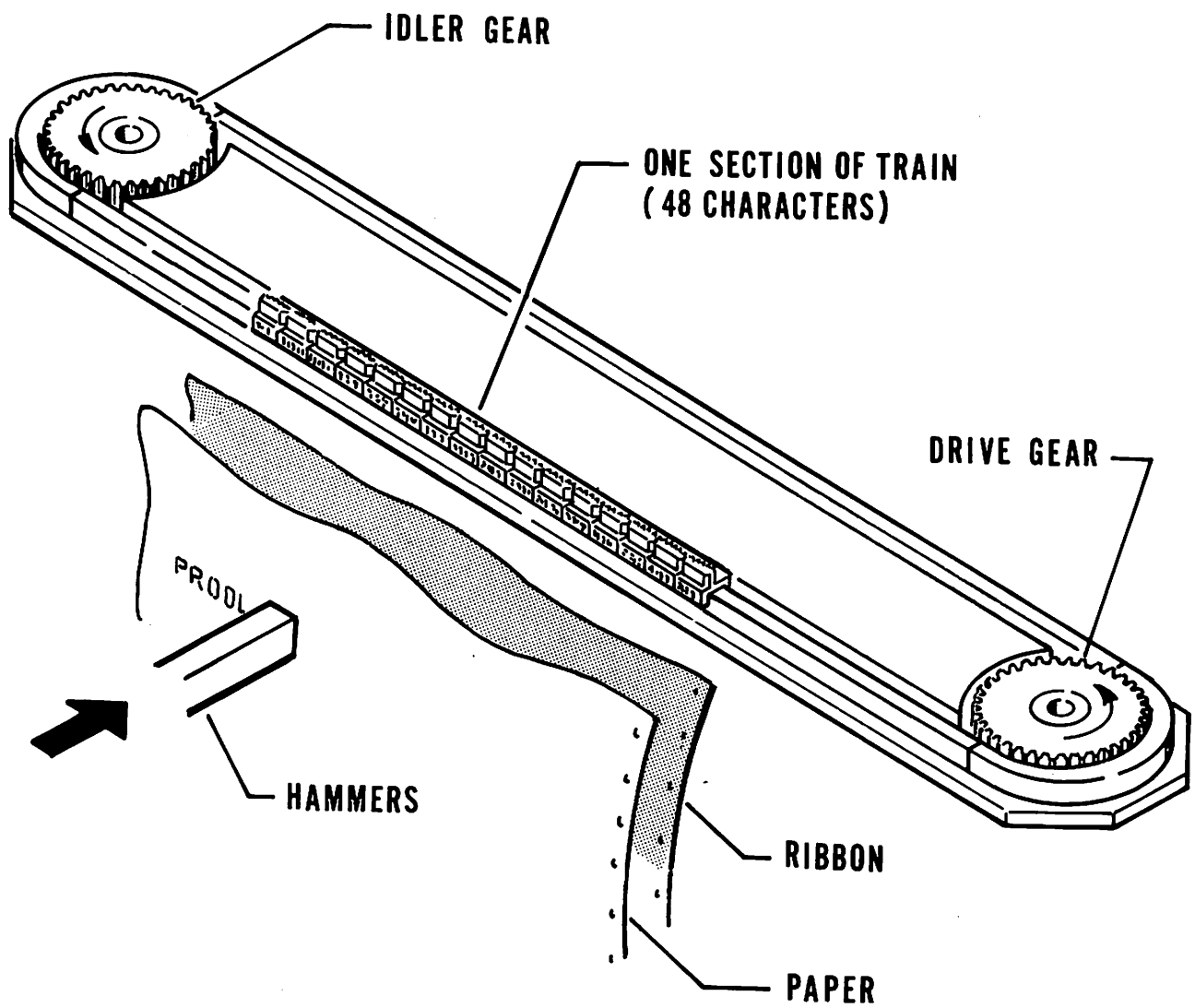
IBM 1403 Printer

FIGURE 1



DRUM PRINT MECHANISM

FIGURE 2



IBM TRAIN PRINTER MECHANISM

FIGURE 3