

the abc's of Teletype equipment



why the need for Teletype[®] equipment

Data.
Facts.
Figures.
Information.
Ideas.
News.
Building blocks of progress.

Man's insatiable need to know has created incredible demands for instant communications.

Keeping data accessible is what Teletype equipment is all about. Helping man span vast distances in seconds. Move critical intelligence to the right place, at the right time.

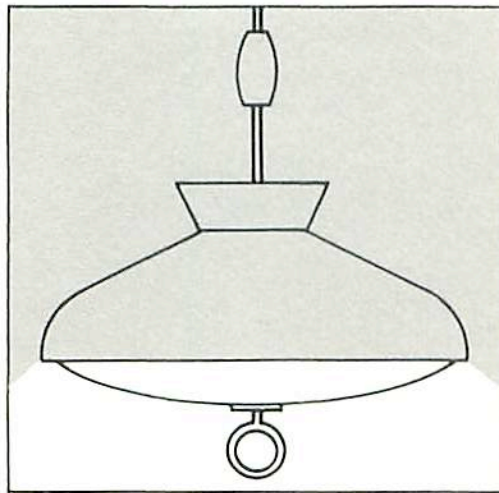
Today, using Teletype terminals, computer resources can be placed at the fingertips of practically anyone. It's problem solving capabilities utilized as simply as making a phone call.

In less time than it takes a secretary to type a letter, insert it in an envelope and apply a stamp—data can be transmitted anywhere in the world, read and even acknowledged using Teletype equipment.

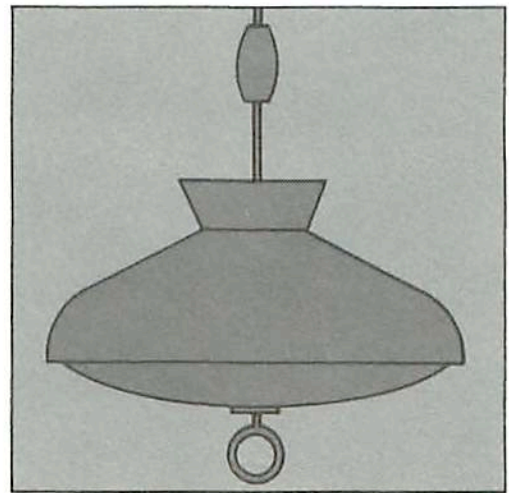
These are the capabilities that companies—large and small—are using to meet the growing complexities of business and to simplify communications problems. On the following pages you'll find how Teletype equipment works, what it consists of, and some interesting ways in which it is being used.

how Teletype equipment works

... a light switch is a good illustration

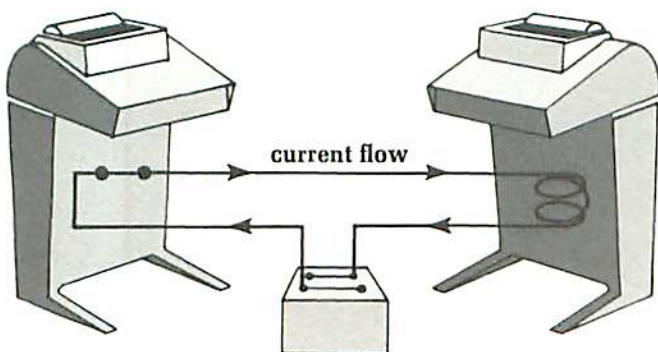


When the light switch is turned on, current flows, causing the lights to go on.



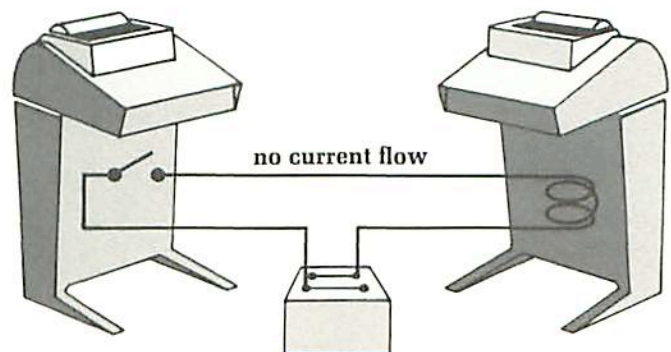
When the light switch is turned off, current stops flowing, causing the lights to go off.

When you depress a key on a teleprinter, current starts to flow (in the form of electrical pulses) to achieve a desired action. The period of time during which current is or is not flowing is fixed. And the machine makes an automatic interpretation of current flow to deliver 1 of 2 predetermined results.



marking and spacing pulses

When current flows, the "signal line" (conductors connecting the two teleprinters) is said to be "marking." A MARKING PULSE is generated when contact is held closed for a fixed period of time.



When contact is opened, no current can flow, so the line is said to be "spacing." A SPACING PULSE is a fixed period of time when the contact is held open.

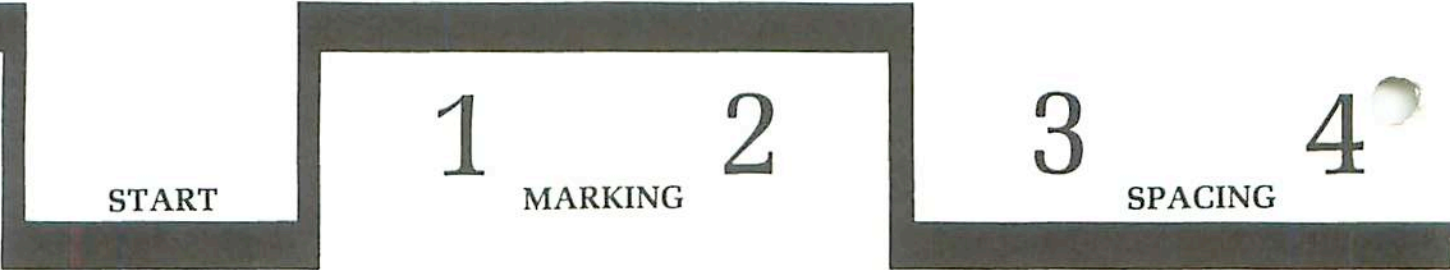
Note: The pulse is a fixed interval of time during which current does or does not flow on the signal line. Data processing people often refer to the pulse as a "bit."

how Teletype equipment works

teleprinter codes

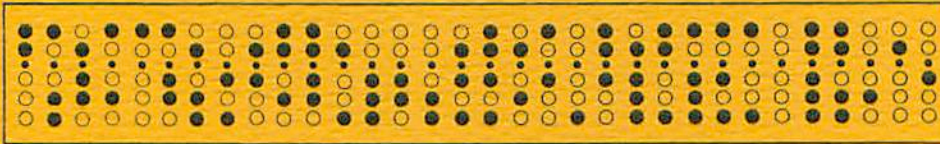
By arranging the "marking" and "spacing" pulses into various combinations, a teleprinter code is established. Pulse combinations represent either a letter, number or other character.

Teletype equipment operates on 5, 6, 7, or 8-level codes. However, the two most frequently used are 5 and 8-level codes; that is, either five bits or eight bits make up a single character.



This is the code combination for transmitting the letter "S" using the 8-level code.

FIGURES	—	?	:	\$	3	!	&	=	8	'	()	.	,	9	0	1	4	BELL	5	7	:	2	/	6	"	BLANK	LETTERS	FIGURES	C. R.	L. F.	SPACE
LETTERS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z						



the five-level code

The 5-level code was devised late in the 19th century by Jean Baudot, an engineer in the French telegraph service. This code is primarily used in various telegraph systems.

With a 5-level code, 32 combinations are mathematically possible. This is extended to 62 available combinations through the use of a SHIFT mechanism on the teleprinter keyboard. Of these, 26 are assigned to the letters of the alphabet, with the rest to numerals, punctuation, and machine control functions such as "carriage return," "space," etc.

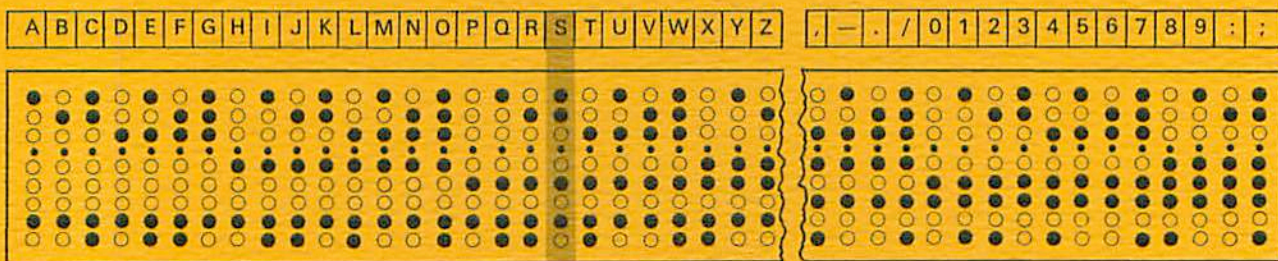
5
MARKING

6
SPACING

7
MARKING

8
SPACING

9
STOP



the eight-level code

Handling computer input/output situations and moving huge quantities of data quickly require a code more flexible than the 5-level code.

This is why most Teletype data terminals now operate on an 8-level code. The first seven levels of this code offer the mathematical possibility of 128 combinations. The eighth level can be used for error detection. (Only a portion of these code combinations are illustrated here). Of the 128 code combinations available, 63 are assigned to the letters of the alphabet, numerals, and common punctuation marks. Most of the remaining combinations represent control functions such as "line feed," "space," etc.

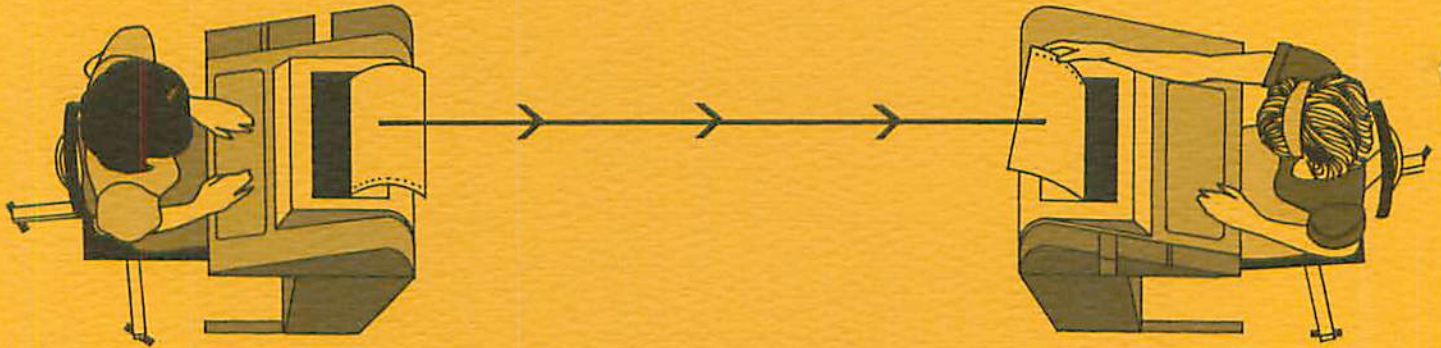
The 8-level code is compatible with the approved American Standard Code for Information Interchange (ASCII). This means these Teletype data terminals are capable of communicating with many computers and other business machines.



sending a message

To send a message on Teletype equipment, the operator simply uses the teleprinter keyboard in the same manner as an ordinary typewriter. By depressing the appropriate character keys, the proper combination of "marking" and "spacing" pulses or bits for each character is sent out with a single stroke. As the operator types each character and produces printed copy at his own terminal, an electrical contact is opening and closing. This causes electrical pulses to be transmitted. The teleprinter converts the mechanical action of typing into electrical pulses automatically.

The receiving printer receives and types out the message, character by character, exactly as sent. It converts the incoming electrical pulses back into printing action automatically, and produces "hard" copy.



how Teletype equipment works

two-way traffic

We've illustrated how data is sent in its simplest form from one Teletype terminal to another—one-way traffic between a transmitting keyboard and a receiving printer. But most Teletype sets have both a keyboard and a printer, and there has to be a way for them to communicate back and forth.

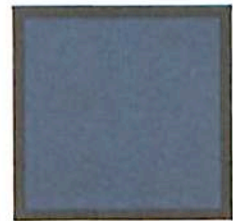
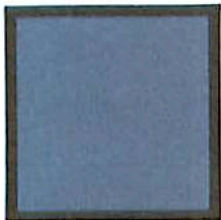
There are two methods: Sharing a single channel, so that one or the other is sending, or using two separate channels. These are referred to as half duplex and full duplex. The half duplex system

provides two-way communications between two teleprinters, but not at the same time. The full duplex system provides two-way transmission and reception simultaneously.

However, since each Teletype set has only one printer, in a full duplex system the operator cannot produce a "local" printed copy during simultaneous operation. If it is necessary to retain a printed copy of the data being transmitted, an auxiliary printer can be added.



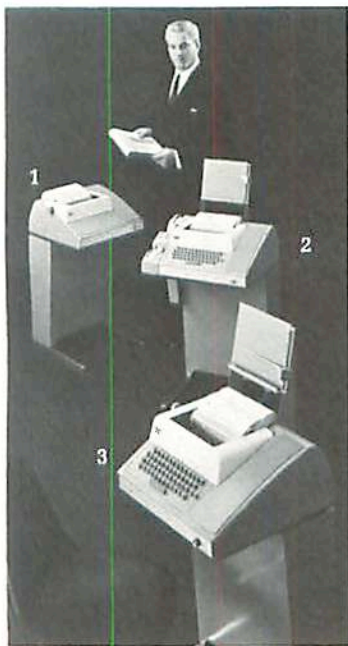
Half duplex provides two-way communications but not simultaneously.



Full duplex provides two-way communications simultaneously.

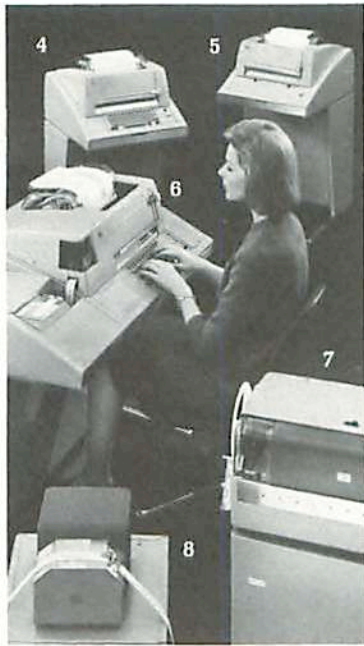
the Teletype equipment line

The full line of Teletype equipment is shown below. Note the modular design of these units which means they are easily adaptable to meeting future needs.



model 32 and 33 series

The 33 series has a 4-row keyboard and operates at 100 wpm using the 8-level ASCII code. The 32 series is similar except it uses the 5-level code and a 3-row keyboard. Shown above: (1) RO (receive-only) set. (2) ASR (automatic send-receive) set. (3) KSR (keyboard send-receive) set.



model 35 series

A rugged, heavy-duty line that has a 4-row keyboard and operates at 100 wpm using the 8-level ASCII code. Shown above: (4) KSR (keyboard send-receive) set. (5) RO (receive-only) set. (6) ASR (automatic send-receive) set. (7) self-contained paper tape punch. (8) self-contained paper tape reader.



Telespeed* equipment

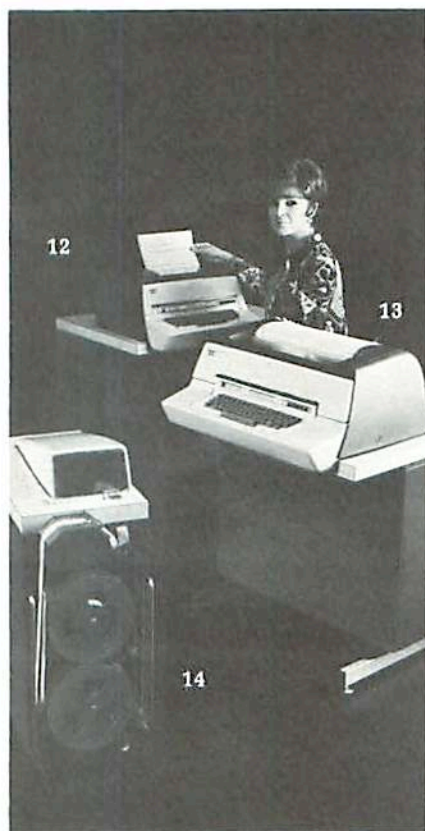
High-speed tape-to-tape equipment used with "data sets" for communications over regular telephone lines. Sends or receives punched paper tape at up to 1,050 wpm. Shown above: (9) sending set. (10) receiving set.

*A trademark of Teletype Corporation.



Inktronic® data terminal

A super-speed, solid state electronic set that prints up to 1200 wpm using the 8-level ASCII code (also available with 5-level code). Characters are formed on the page by electrostatic attraction and deflection. Shown above: (11) RO (receive-only) set.



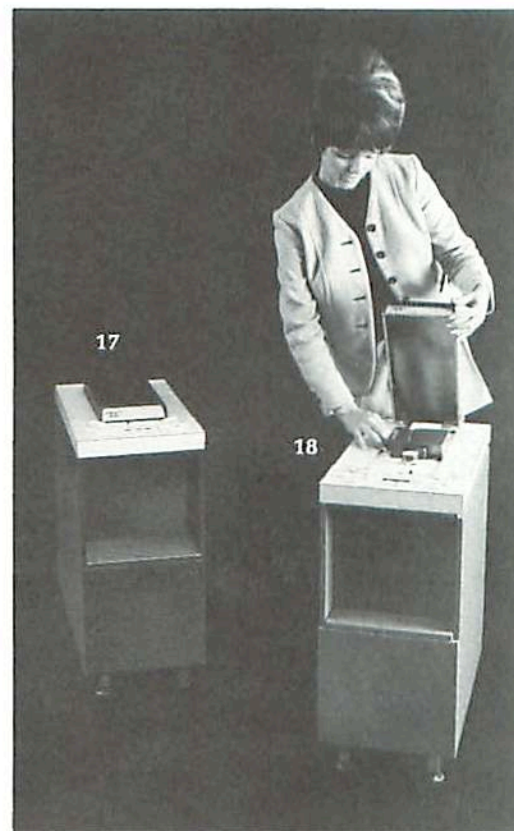
model 37 series

An unusually versatile line that "does it all." Has a 4-row keyboard that generates all 128 characters of the ASCII code. Operates at 150 wpm with upper and lower case printing. Optional 15" wide platen. Shown above: (12) KSR (keyboard send-receive) set, (13) wide platen KSR (keyboard send-receive) set, (14) tape punch and reader module.



model 38 series

Has a 4-row keyboard that generates all 128 characters of the ASCII code. Has a 15" wide pin feed platen that prints a full 132 character line. Operates at 100 wpm. Shown above: (15) KSR (keyboard send-receive) set, (16) ASR (automatic send-receive) set.



magnetic tape data terminals

These units send and receive data at both high and low speeds using cartridges of 1/2" magnetic tape as the recording medium. Can operate on-line at up to 2400 wpm and connect "locally" to lower speed Teletype terminals that use the ASCII code. Shown above are units (17) for operation with model 37 or model 38 terminals, (18) for operation with model 33 or 35 terminals.



building a system

There are four basic terminal components to consider in building your data communication system with Teletype equipment:

Printer

Keyboard

Tape Sender (reader or transmitter)

Tape Receiver (recorder or punch)

Teletype's modular design concept enables you to build the system needed today and refine, add to, or adapt as communication requirements change. Each basic unit complements the other and offers an endless variety of communication capabilities. There are also a number of Teletype "logic" devices that provide precise control of data traffic, unattended operation, error detection, etc. Within the Teletype product line you'll find equipment to meet your speed, code and other system requirements.

a few words about tape

Magnetic tape and punched paper tape equipment provide the data communications system with a number of operational advantages: Automatic transmission and reception. Faster computer input/output. Greater error control. Unattended operation. Greater flexibility. These are but a few of the reasons for the widespread popularity of these code compatible units. Teletype's tape handling capabilities include both magnetic and paper tape terminals.

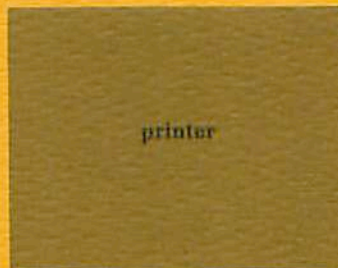
building blocks



Receives (and records) data on tape.



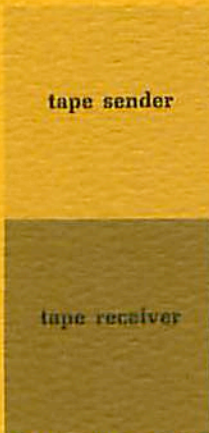
Reads and transmits data which previously has been recorded on tape.



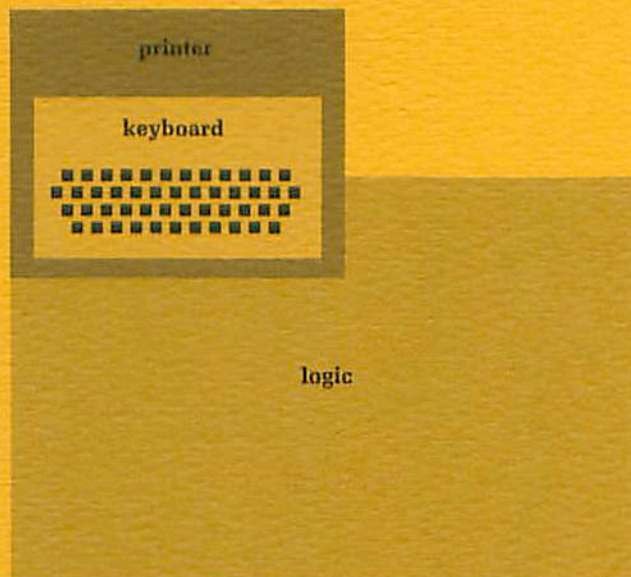
Receives data and prints it out in readable form (hard copy) on a page-width roll of paper. A terminal containing a printer only is sometimes called an "RO set."



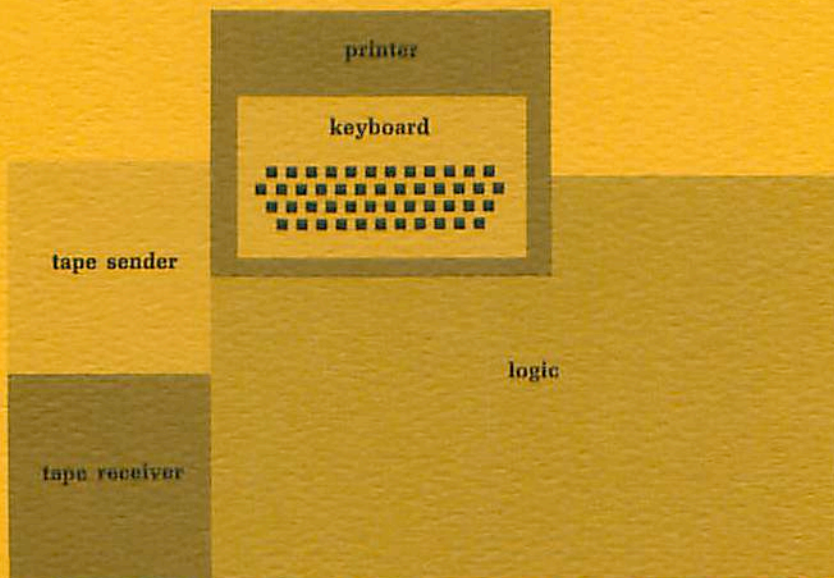
Most are same as standard typewriter keyboards. Allows operator to "talk to" other terminals (or a computer) as well as her own printer and tape unit ("local" operation).



Combination unit can incorporate paper or magnetic tape sending and receiving (input/output) in one self-contained terminal. Sometimes called an "RT set."



Enables operator to "enter" or send data, as well as receive or record it on paper. Logic devices add many sophisticated capabilities. Commonly called a "KSR set."



Complete data station with all of the input/output (I/O) capabilities you need to handle the most complex data communications task. Commonly called an "ASR set."



how Teletype equipment is being used

business planning

Teletype input/output terminals are being used with computers in project planning, sales forecasting, trend analysis and many other time-sharing and real-time data processing applications. Communication networks using Teletype terminals help business communicate between branch offices or factories and warehouse facilities. Providing management with up-to-the-minute data on which to base decisions.

manufacturing

Computer analysis of production, numerical control operations, inventory, work and maintenance schedules are but a few of the ways Teletype equipment is being utilized in manufacturing plants, large and small.

order processing

A variety of companies utilize Teletype equipment for order processing. Sending multiple-page order forms on-line from sales offices to warehouse and manufacturing facilities. Speeding delivery cycles. Simplifying billing, and other aspects of sales operations.

financial analysis

Teletype equipment and computers are helping the financial men of business in many ways. Cost analysis, budgeting, investment planning, accounting, credits and collections and payroll preparation are just a few.

engineering

Teletype terminals are becoming a familiar sight in engineering departments across the country. They are being used in time-sharing systems to solve design problems in electronics, electrical and mechanical systems, and chemical and fluid processes.

marketing

Marketing departments use Teletype sets in time-sharing applications such as project simulation, model building and evaluating risk alternatives.

The application of Teletype equipment is as broad and varied as man's need to communicate. Government, medicine, education, law enforcement, banking, transportation, publishing, are utilizing the capabilities of speed, economy and reliability, inherent in Teletype terminals to meet the ever growing demands of man's need to know. The following pages present a few examples of where Teletype equipment is being applied.



where Teletype equipment is used

insurance companies—One national insurance company has demonstrated a system that will link a multi-processing computer with more than 900 district offices. Teletype ASR sets are used to print out premium information from the district offices, and as tape output equipment for a centralized computer in order to update all premium transactions.

supermarkets—Virtually days were cut off from "order to delivery" time when a group of supermarkets and chain stores automated their centralized ordering system with Teletype equipment.

hospitals—A group of small Kansas hospitals use Teletype equipment to send pathological and radiological tests to a central laboratory, and obtain written analysis faster than ever before. Other hospitals use Teletype machines to improve the handling of daily administrative reports and centralize purchasing of supplies.

steel companies—One major steel producer uses pneumatic tubes to transport steel samples to the laboratory where a computer-controlled analysis is made to determine the precise amount of steel ingredients within the mixture.

The findings are transmitted to Teletype sets at production control centers throughout the plant, assuring that the latest, most accurate information is available for production of quality steel.

automobile manufacturers—In the assembly line of today's leading car manufacturers, Teletype equipment maintains split-second coordination of all assembly points, assuring that the proper parts and accessories arrive where needed, when needed.

space exploration—On every one of our nation's manned spaceflights, Teletype equipment has served as the communications link between the world-wide network of 18 tracking stations and the flight control center.

hotels—Most large hotel and motel chains use Teletype equipment for reservations, to handle administrative details, etc.

brokerage firms—Orders for the purchase or sale of securities from brokerage offices anywhere in the U.S. and Canada can reach the New York Stock Exchange in less than one minute using Teletype equipment.

government agencies—Military and other government agencies depend heavily on Teletype equipment to keep their installations in close touch with Washington. Teletype equipment is also used to aid in the control of air traffic, to collect and disseminate weather information, to gather reports on money flow from federal reserve districts, and to keep a constant check on agricultural conditions.

chemical companies—Teletype equipment bridges the distance between sales and shipping points, substantially reducing the paper work involved in order processing and speeding up customer service.

railroads—Pioneers in the use of Teletype machines, the railroads use them for expediting train movements; dispatching wheel reports, waybills, reservations, instructions; and a host of other applications.

telephone, telegraph and cable companies—These companies provide many services that utilize Teletype equipment. Besides the familiar telegram and cablegram, there are teletypewriter exchange services similar to regular telephone connections, as well as private wire services tailored to meet the needs of individual customers.

oil and gas companies—Producers employ Teletype machines to expedite status reports on new wells, transmit inventory and pipeline flow data, and improve contact with field offices.

police—In both local and interstate law enforcement, Teletype equipment enables the police to exchange information and send "alerts" in order to quickly track down and apprehend suspects.

press associations—Teletype equipment has long been a basic tool in press operations. It provides the means for getting news to all members and client papers simultaneously and fast.

schools and universities—A variety of computer assisted instruction programs are being carried out in primary grades, high schools and universities using Teletype terminals as input/output devices. Algebra, physics, computer science, math, basic reading, spelling and arithmetic are among subjects being taught.

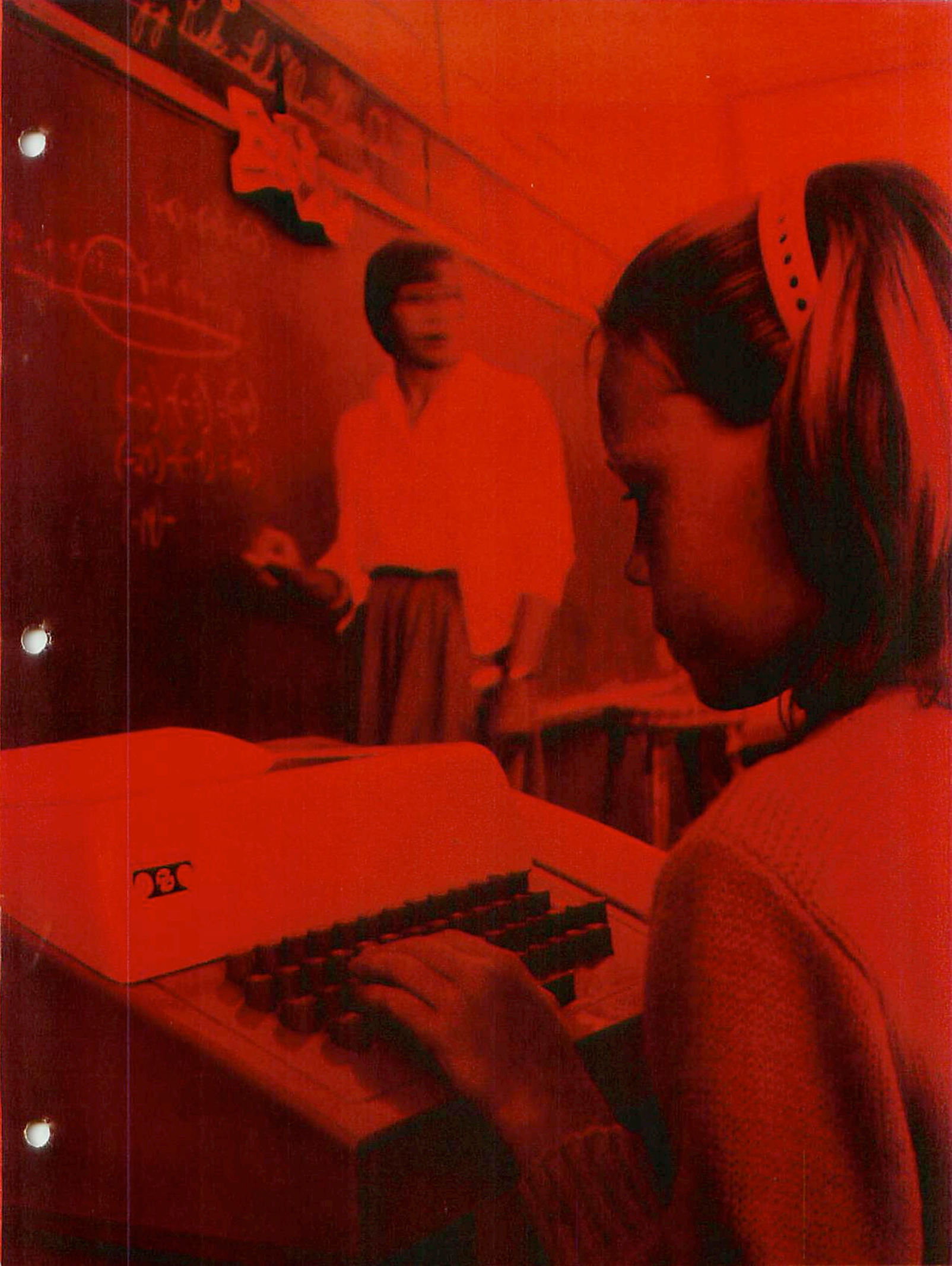
more information

Teletype Corporation continually encourages the correspondence of companies and individuals interested in data communications. For more information about:

leased services featuring Teletype terminals, consult your local communication services company.

purchasing (or general information) about Teletype equipment, contact our Sales Organization at the general offices address listed on the back cover.

When ordering input-output terminals for your DATA PROCESSING SYSTEM, be sure to specify Teletype equipment—your vital communications link.



TELETYPE



TELETYPE CORPORATION

machines that make data move

GENERAL OFFICES: 5555 Touhy Avenue, Skokie, Illinois 60076 • Telephone: 312 982-2000 • TWX: 910-223-3631 and TELEX: 35-4031 (both have 24-hour automatic answering service)

AREA OFFICES:

Chicago Sales—
5555 W. Touhy Ave.,
Skokie, Ill. 60076,
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Product Service—
9930 Derby Lane,
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phone 312 345-7920

Los Angeles Sales—
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City of Commerce, Calif. 90022,
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