In addition, the use of disc further enhances the possibilities when the RBT is used in a stand-alone function. The RBT can then be regarded as a powerful tool for programming purposes. This is reinforced by an extensive software library whose programs can be run in both Fortran and Basic compiler languages.
An added advantage of a disc is that program loading is simplified. Thus an RBT can be used with one remote DP centre that perhaps utilizes an IBM computer; and then with another computer centre which may use a Burroughs, Unidata or C.D.C. computer. This change-over can be effected simply by reading the required program from the disc and loading it into the main store. A few simple instructions typed on the teletype-writer (or VDU keyboard) carries this out.

Meeting customers' requirements
Since the RBT functions are based on the P 800 series of minicomputers, the real control task of the RBT is realized in software. The highly modular approach that has been applied to the software means that it is not difficult to provide special functions for a user. This can be done simply by incorporating a special software package.
Examples of possible special requirements are outlined below. A user in the numerical control field may employ the resources of a large DP centre to calculate a curve on an item to be manufactured on N.C. machines. The program used at the DP centre will probably cause the output to be given in ASCII code. But the end user will want the output from his RBT paper tape punch in a different code — say Friden code. For such a user, the software package necessary for the ASCII to Friden code conversion would be incorporated in the RBT software.
A second example would, be for instance, the checking of a punched paper tape for errors. With the Philips RBT such a user can be offered a simple function whereby a high speed reader, in conjunction with his RBT, can be used to check-out the punched tape.
Many other possibilities in addition to the two already mentioned exist for this extremely flexible system, and a complete software service exists for all users.
In conclusion, it can be said that an RBT based on the powerful P 800 series of minicomputers represents an ideal choice for most users.

General technical data
- Transmission speeds up to 9600 bits/s.
- File structure for magnetic tape, disc, cassette is BOM (Batch Operating Monitor, paper tape oriented), DOM (Disc Operating Monitor), BRTM (Basic Real Time Monitor) and DRTM (Disc Real Time Monitor) compatible.
- Compatible with both:
  IBM 2780, 3780
  Data 100 model 70.

Special data compression and expansion is included as an option.

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BULLETIN

Industrial Data-processing Systems

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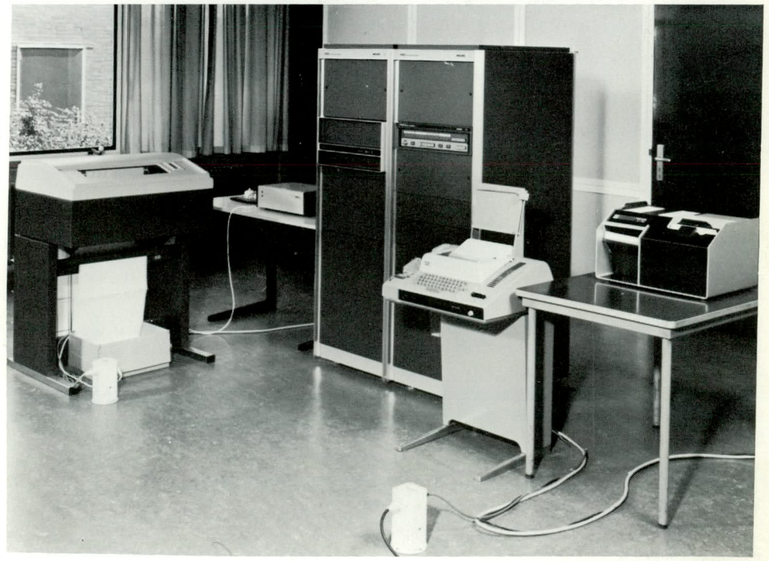
A Remote Batch Terminal solution based on the Philips P 800 series of minicomputers

To provide greater flexibility in application, simplicity of operation and ease of later expansion a Remote Batch Terminal system has been developed based on the P 800 series of minicomputers

Computers and data processing (DP) systems are being applied in ever widening areas of commerce, industry, and education. This has given rise to a greatly increased requirement for more and different types of terminals whereby information can be entered to or extracted from a computer or DP system. These terminals range from simple interactive keyboard/printers (teletype) to powerful Remote Batch Terminals (RBT) complete with various input/output devices.
With the interactive keyboard/printer terminal the operator generally keys-in information to the DP system via his keyboard and any output is printed out on the associated printer. The operating speeds of these types of terminal are relatively slow (in the order of 10 to 30 characters/s). They can be stationed local to their associated DP system, or remote from it. Generally, in the latter case the terminal is connected via a telephone line (switched or direct connection) and modems to the remote DP system. Where more than one remote terminal is connected to a computer it is termed a multi-terminal system.
Today's RBT can have paper tape input/output devices and, in addition, the possibility of connecting any of the following peripheral equipments:
- line printer
- card reader
- digital cassette recorder
- magnetic tape unit
- magnetic disc unit
- visual display unit (VDU) with keyboard.

To provide the required organization at the terminals in systems utilizing a number of high-speed peripherals some intelligence needs to be added to the terminal. In the past this intelligence was created by the use of a hard wired controller. But this has the inherent disadvantage of being relatively inflexible; a solution that is being used increasingly is the micro- or minicomputer. The subject of this bulletin, an RBT based on the powerful range of Philips P 800 series minicomputers, is an example of this solution.

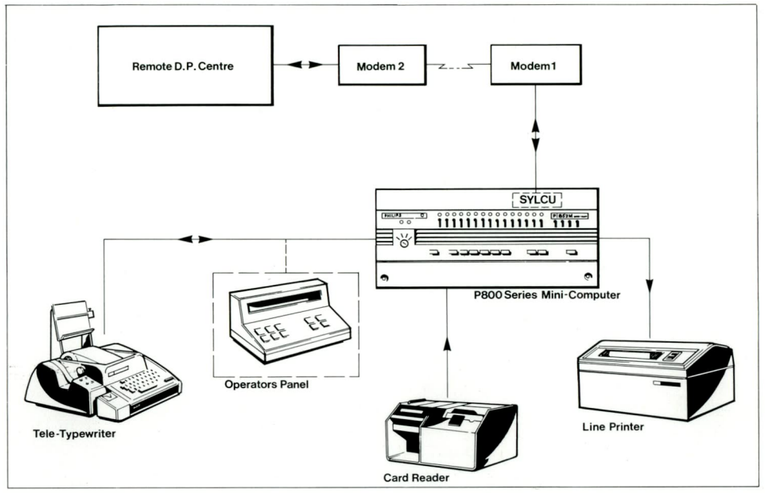


Photograph showing a RBT system installed at a Technical Highschool in The Netherlands. The Terminal has a magnetic disc facility. Students use the installation either as a local data processing system or, as a Remote Batch Terminal to a Burroughs main frame computer.

PHILIPS

Benefits derived from the use of the Philips P 800 minicomputer:

- Highly flexible peripheral interfacing.
- Modular concept applied to both hardware and software to give optimal user solutions.
- Simple operating procedure.
- Changing to a different remote computer requires only simple software changes.
- Stand-alone operation is possible using the P 800 standard software.
- Error check routines built into software simplify fault diagnosis.
- RBT has been used in conjunction with each of the following types of central computer: IBM, Burroughs, Unidata P 1000, and C.D.C.
- Telephone line costs minimized by the use of a disc to condense transfers.



A simple RBT configuration.

Philips RBT based on the P 800 series of minicomputers

Mention was made in the introduction of the relative inflexibility of hard wired controllers used for the task organization of RBT's. To overcome this disadvantage the Philips RBT uses a minicomputer from the P 800 series of Philips minicomputers. This offers greater flexibility in accepting peripheral equipments and there is an extensive software library available.

The RBT function is in fact a software package that enables a minicomputer installation to act as an RBT.
Also available with the P 800 series of minicomputers are standard Synchronous Line Control Units (SYLCU) for interfacing the minicomputer with the modem necessary for line transmission to a remote DP centre. One SYLCU provides half duplex and two provide a full duplex connection.

Simple RBT configuration

An example of a simple RBT configuration is illustrated. In this RBT the card reader can be used for batch input and the results printed out on the line printer. The teletypewriter is used as the operator's control console for job entry etc. Alternatively, a simple operator's control panel with a few buttons and, possibly, an alphanumeric display can be used.
Due to the flexibility of the P 800 series of minicomputers, a number of different types of line printer can be accommodated. Thus a range of line printers with speeds from 200 lines per minute to those with speeds up to 670 lines per minute can be connected.
Similar flexibility is offered for the card readers. These can have speeds which vary from 300 cards per minute to up to 600 cards per minute.
For the teleprinter, a simple ASR 33 is suitable. However, a silent mosaic printer such as the Philips PER 3100 has advantages, or a Visual Display Unit (VDU) with keyboard can be used.
Each of the types of peripheral equipment mentioned above can be fully supported by existing P 800 minicomputer software. So extensions to existing terminals and optimal adaptation to a user's specific requirements can be realized easily and simply.
Since connection with a remote DP centre via SYLCU(s) is a standard hardware feature of the P 800 series of minicomputers, the software driver package that performs the required data communication is the only part of the system that needs to be changed when an RBT is connected to a computer which has different data communications procedures.
Due to the flexibility of the minicomputer software, it is quite possible for an RBT to be connected to one computer centre during a certain part of the day and then to an entirely different computer centre during another part of the day. If the remote connection is made via a public telephone exchange network, all that is needed is that the telephone number of the required computer be dialled.
The fairly basic system shown in the illustration can be extended; paper tape readers and punches can be added as well as digital cassette recorders, magnetic discs and tape units. For each type of peripheral a range can be accommodated so that a user can choose the most suitable speed or performance to suit his exact requirements.

Functioning of the RBT

A simple type of system whose configuration is shown in the illustration can easily be used by the operator. The system is activated by means of program loading. Instructions which define the task to be performed, are then injected via the teleprinter or control panel. After this, the batch information can be read in by means of, for example, the card reader where the information is held on punched cards. This information is then transferred to the remote DP centre when this is free. The processed output returned from the centre to the terminal can be printed out on, for example, the line printer. When the job has been completed a message to this effect can be printed out on the teletypewriter (or shown on the display of the operator control panel).
Various alternative methods of operation are possible. For example, the operator can use a VDU with keyboard to initiate jobs; the VDU being used to display end of job, operator error messages etc. Also, special cards at the beginning of the stack, termed job control cards, can be used to define the particular tasks to be carried out. In this case only a single button on the card reader needs to be pressed in order to initiate the job itself.

Additional benefits derived from RBT software

Apart from the inherent benefits obtained from the minicomputer, the software package can provide additional benefits:

- Off-line working from DP centre. The terminal can operate in the stand-alone mode giving, for instance, a print-out of the card stack on the line printer without using the DP centre.
- Error detection and subsequent alerting of the operator. Immediate measures can then be taken to locate the error and carry out the necessary corrective actions.

The types of error that can be detected are:

- break in the connection with the remote computer
- modem does not function
- card reader stopped

Use of magnetic disc unit

The RBT function can be greatly enhanced by the use of a magnetic disc unit. This acts as an intermediate buffer store and can be used to concentrate data.
If, as each task is completed, it is temporarily stored on the disc cartridge then, at the end of a run, when all the jobs have been stored, the operator can establish contact with the remote DP centre. Whereupon the jobs can be sent to the computer, in an order specified by the operator via his typewriter. Since the jobs are queued and sent one after another, connection time can be kept to an absolute minimum. By using this operational procedure the operator, once having initiated the jobs, can leave the terminal to complete its tasks without the need for further attention.



Students at the Technical Highschool preparing programs which are to be run on the RBT shown in the front cover photograph.