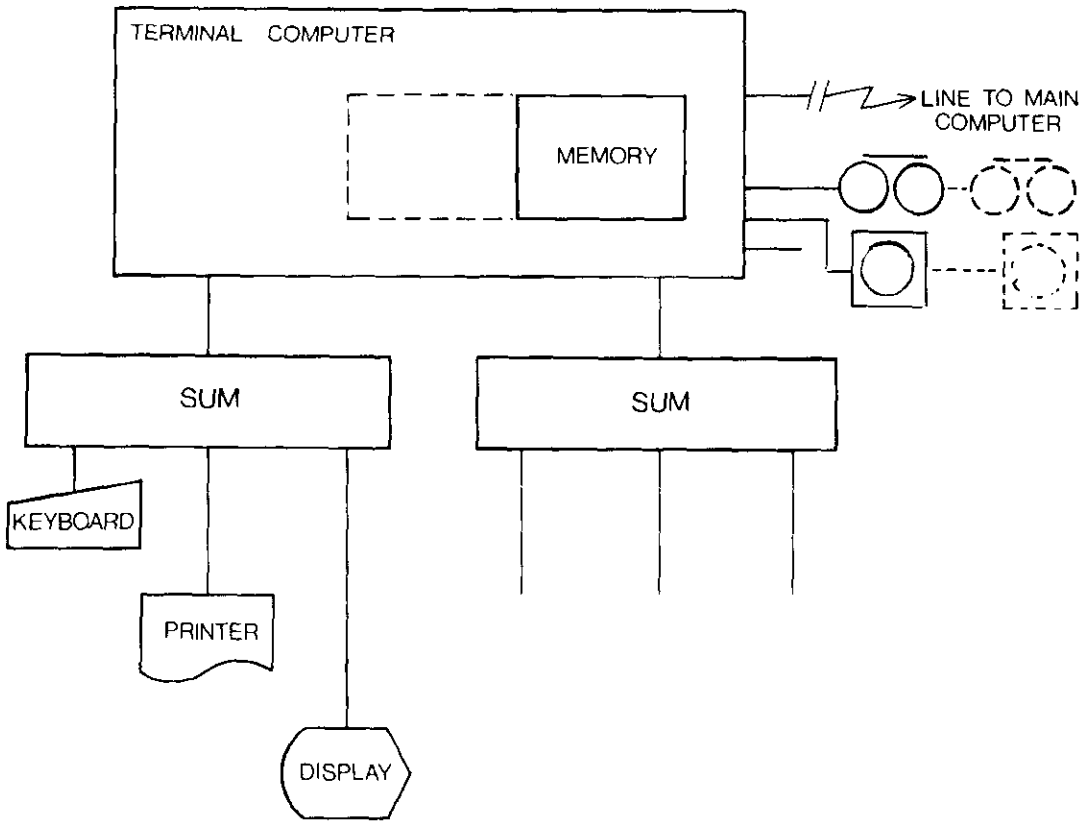
Philips PTS 6000 Systems build-up

The system philosophy of the Philips PTS 6000 Bank Terminal System is based on the following requirements:

- increase efficiency
- increase security
- serve the bank by giving better service to customers
- be reliable
- be easy to service
- fit easily into the normal bank office
- require no special skills for its operation
- adapt easily to the needs of individual banks.

These requirements have to a great degree dictated the design and structure of the system. As a result:

- the system is very modular in its build up; even within the modules there is great freedom for the customer to fulfil his special requirements.
- the system is freely and comprehensively programmable, so that any individual banking application can be implemented.
- the modules are compact and can thus easily be installed in the existing bank offices, without rebuilding, even if the space available is restricted.
- the devices, and thus the whole system, operates in a normal office environment; heat dissipation is at about the level of an ordinary fluorescent lamp, the noise is much less than that of an ordinary typewriter.



The linking of different modular devices

Philips PTS 6000 Systems build-up

– the devices are ergonomically designed; positioning is easily arranged to suit the ease of individual operators, paper handling is reduced, and what is left is easy; the keyboards and printers are very like the office machines that bank staffs are used to, such as calculators and typewriters.

The Philips PTS 6000 Bank Terminal System is made up of a wide range of modular devices, interconnected by plug-in cables to form configurations which will suit any banking application. The diagram shows how different modular devices can be linked together.

There is a choice of terminal computer, and a choice of memory size within the computer. This allows computer capacity to be matched to the particular application, to the volume of business, to the number of different types of transactions to be carried out, and to the number of terminal devices to be served by the terminal computer. Back-up storage allows the system to work off-line as well as on-line. This is a very important option with on-line working since it ensures that no data are lost in the event of a transmission line failure. The design of the working stations, which will comprise keyboards, display devices and/or printers, can be freely chosen best to suit the requirements of individual customers. A wide range of these devices is available – numeric and function keyboards; alphanumeric, function and signal keyboards; teller terminal printers; general terminal printers; 8-lamp signal displays, 288-character graphic displays, etc.

The design flexibility is assisted by the selector units. These are the communication links between the terminal devices, keyboard, printers, etc., and the terminal computer. They also provide the power supplies for the terminal devices and thus reduce the space demands of the latter.

A terminal computer can be shared by two branch offices. This allows a small branch, with possibly too-low a volume of business to make an individual terminal computer economic, to have the same benefits as other, larger branches. The terminal configuration possibilities are in no way restricted, but in this case the selector unit is connected via a telephone line to the terminal computer.

Very often a great deal of data must be printed together in summary form on a regular basis, a daily record of transactions, for example. This requirement can easily be accommodated by means of a line printer connected via a selector unit to the terminal computer.

With a busy bank, carrying out a large number of transactions every day, it may be more convenient to transfer data on-line to the main computer in a format acceptable by the latter. In such a case, the data on cassette in the terminal computer can be transferred by one of the magnetic tape units to standard tape which can physically be transferred to the data processing centre. This is an extremely valuable facility when telephone lines are unreliable or where their number must be kept to the minimum because of their high cost.

With some banks, it is a matter of policy to decentralise customer files. In other cases, the telephone line may be too unreliable, or too expensive, for on-line working to the main computer. In such cases, a disk unit can be connected to the terminal computer at the branch.

The foregoing is a brief review of the systems which can be built up using the Philips PTS 6000 system modules. The possibilities are described in greater detail in the chapter on Working Positions.

The flexibility and adaptability of the Philips PTS 6000 Bank Terminal System ensure that it will meet your bank's present needs.

But what of the future? Banks grow both in their total volume of business and in the variety of transactions they handle. The Philips PTS 6000 system allows for this. Any terminal system can easily be expanded, without any basic restructuring, to meet any possible future needs.

PTS 6000 System Structure

The system philosophy of the PTS 6000 terminal system is aimed at supporting automation to the level that is required for any specific branch office system of

- workstations
- information handling
- processing
- communication

This means that the structure of the system is very open ended and flexible from configurating and performance point of view.

The major components of the PTS 6000 system are

- shared processing and storage capacity
- shared printing
- workstation build-up (workstation modules, dedicated processing and storage capacity)
- internal network (locally and remotely)
- connection to external networks (leased lines/public datanets)

The PTS 6000 system supports two types of internal networks, star and multipoint.

STAR NETWORK: A traditional way of connecting terminals point to point to a computer. This network is characterized as strictly hierarchical, built on shared processing, storage and connection to external networks. The star network can handle locally as well as remotely sited workstations.

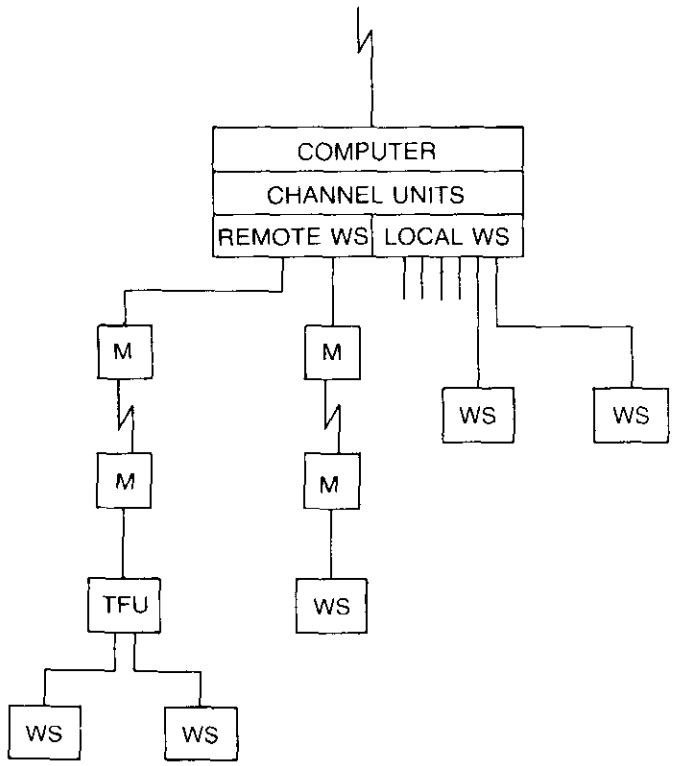
MULTIPOINT NETWORK: Each workstation and computer is connected to one communication line (a bus). It can be characterized as a hierarchical or horizontal multipoint network, which supports distribution of processing and storage capacity as well as shared or dedicated connection to external networks. The multipoint network can handle locally as well as remotely sited workstations.

STAR CONNECTION OF WORKSTATIONS

This connection of workstations is done via selector units (as shown in the figure).

These are the communication links between the workstation modules, keyboards, printers etc and the computer. They also provide the power supplies for some workstation modules and thus reduce the space demands of the latter.

A computer can also be shared by two branches and in this case the selector unit is connected via a communication line to the computer.



PTS 6000 System Structure

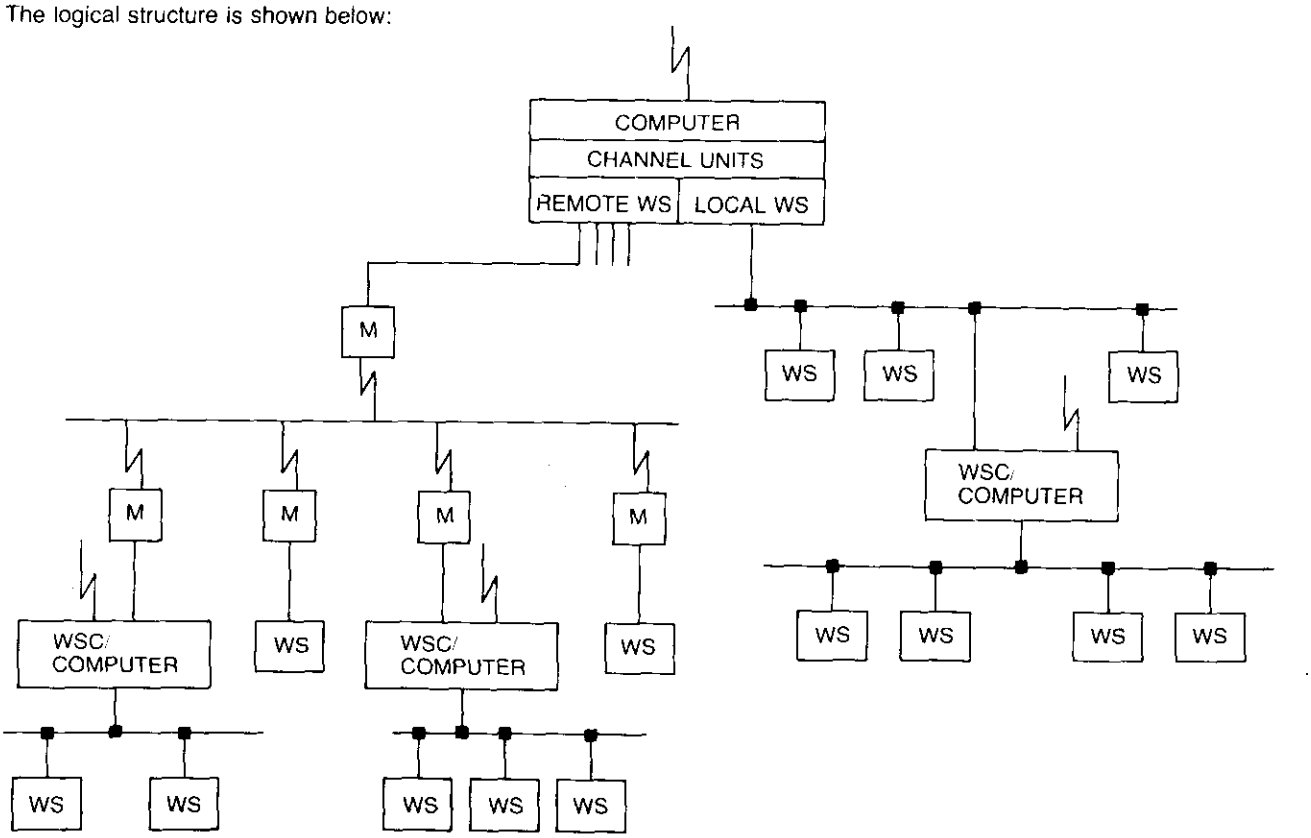
MULTIPOINT CONNECTION OF WORKSTATIONS

The connection principles are parts of an overall workstation architecture.

The features in this architecture can be summarized:

- Distribution of processing capacity
- Connection of a large number of local workstations (LWSI)
- Connection of remotely sited workstations via leased lines or via switched public datanet (RWSI)
- Building up of workstations

The logical structure is shown below:



PTS 6000 System Structure

Interface structure

The communication interface comprises 5 levels:

LEVEL 1: Electrical Interface

- X27 for local workstations (LWSI)
- V24 for remotely sited workstations (RWSI)

LEVEL 2: HDLC Protocol (ISO-DIS 6159-HDLC unbalanced).

The HDLC Protocol handles the data exchange between controller computer and the Main Modules. Data is exchanged on the line in form of frames.

Flag signals are used to separate frames from each other.

Level 2 Protocol (HDLC-protocol) supervises the following functions:

- Initialization or start-up control, begins the process and is used to start transmission in an idle system
- Framing, locates transmission-block beginnings and endings via message-deliminating bit groups.
- Error control, handles the error detection and acknowledges correctly received messages.
- Sequence control, numbers messages to eliminate duplication, identifies lost messages and requests retransmission.
- Flow control, regulates the passage of message across the link.
- Transparency, allows the link to treat all transmitted and received information as a pure data stream.

LEVEL 3: Philips Link Sharing Protocol (PLSP)

As mentioned earlier the HDLC-protocol, level 2, handles the data exchange to and from the Main Modules. However, the Computer must be able to both send data to and to receive data from devices. This multiplexing function is handled by the Philips Link Sharing Protocol, PLSP, which is a subset of X25.

The Link Sharing Protocol also enables individual flow control of the data streams to and from the devices.

These functions are created by exchange of data packets, each containing a logical channel number equal to the device address (3 bytes) and also the control information for the flow control.

The flow control is implemented to prevent a device, connected to a Main Module, to use too big portion of the available capacity so other devices connected to the same Main Module will temporarily be blocked.

Frame build-up.

FLAG, 1 byte. The flag byte (7E Hexadecimal) is generated by the channel unit and the Hexadecimal code 7E = 0111 1110 is built up with six "ones" in a row.

In each data byte sent into the line the channel unit inserts automatically a "zero" bit after each set of 5 "ones".

In this way the Main Module is able to detect whether a flag or a data byte is sent.

ADDRESS field, 1 byte. Address to Main Module

CONTROL field. 1 byte. Identifies the type of the frame. Three types are used.

- Information frames (I)
- Supervisory frames (S)
- Unnumbered frames (U)

INFORMATION field, a variable size field (1-256 bytes). Only used for information frames. The first 3 bytes contain the address of the device (=workstation module) concerned and control information.

FRAME CHECK SEQUENCE (FCS field), 2 bytes. Contains a check sum, (CRC), cyclic redundancy check.

PTS 6000 System Structure

LEVEL 4: Device Drivers

There is one device driver for each type of device connected via the multipoint network *.

Each device has its own unique control table, called Device Work Table.

The data exchange between the Device Drivers and the Link Sharing Protocol, levels 4 and 3 respectively, is handled by the Network Distributor.

LEVEL 5: Application Program

Program Control is entirely application – dependent and varies with each application.

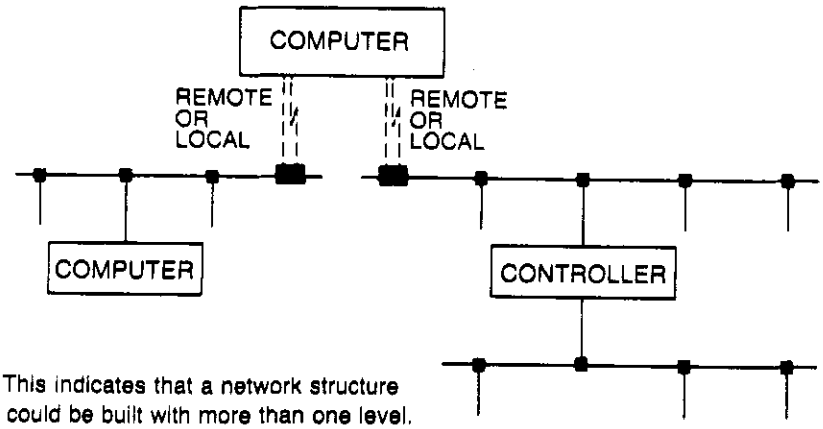
Primary/secondary

At each moment there must be one master of the communication bus—the **PRIMARY**, which is responsible for the control and polling of the line.

A **PRIMARY** is a computer/controller. A computer/controller can also act as a **SECONDARY.**

A workstation (programmable or non-programmable) is always a **SECONDARY**

A computer/controller that is connected to the bus (as a secondary) can also act as a primary towards a new bus in which case however another channel unit is required.



This indicates that a network structure could be built with more than one level.

This also indicates the possibilities of interconnection between computers.

Poll schedule

The communication between the primary and the secondary is made by means of a polling sequence where the primary cyclically polls (asks) the secondaries, whether they have any data to send to the primary. If so, the transmission of data will take place.

The channel unit maintains optimal line usage by dynamically adjusting the polling-rate to match the actual traffic.

- high frequency of traffic
- low frequency of traffic
- no traffic

Each secondary is moved between the lists dynamically depending on its traffic.

When a secondary receives a poll, the primary is given that secondary control over the Data In Line and no other secondary can be polled until the Data In Line is released again. The Data Out Line, however, is used with the other secondaries (full duplex).

If the polled secondary does not respond, it is moved to the "no traffic" polling list.

* However, different line drivers may exist in a system. The line driver for multipoint is labelled DRPL01.

PTS 6000 System Structure

Performance

The total performance of an application system depends on:

- types of workstations
- requirements on response time
- transaction load on the line
- CPU-capacity (i.e the computer used)
- application programs
- disc-handling etc
- line speed if connection via leased lines (RWSI)

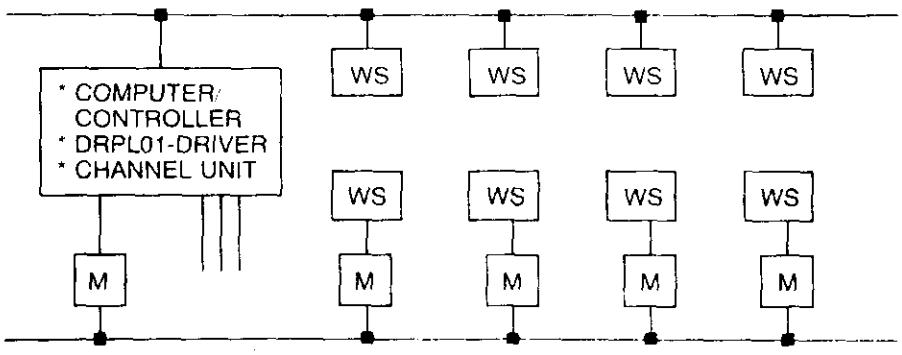
The performance of LWSI in terms of configurating possibilities (number of workstation and CPU-load) has to be calculated.

To estimate the performance of an application system the average transaction type **must be known.**

The average is calculated by taking the average for **all** transaction types and thereby taking care of the frequency of each type.

The parameters needed per **workstation** are
A = number of characters per second (input & echoed)
B = number of lines per second (output)
C = average length of a line (output)

The structure of a system is based on the following components:



The driver (DRPL01) can handle maximum 4 channel units for LWSI and 4 for RWSI.

The limitations of the performance is set by

- The maximum rate of the channel unit
- The CPU-load of the computer/controller
- The echo-response time
- The line speed (for RWSI)

The factors depend on chosen computer/controller and respective channel unit.