

# IBM

Z20-1745-0

**SALES and SYSTEMS GUIDE**

## **Introduction to Operating System/360 Telecommunications Support**

This manual contains an introductory discussion of the telecommunication support provided by Operating System/360. The material can be used both for self-education and for preparing brief introductory presentations.

**Intended for IBM Use**

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**INTRODUCTION**

**to**

**OPERATING SYSTEM/360**

**TELECOMMUNICATIONS SUPPORT**

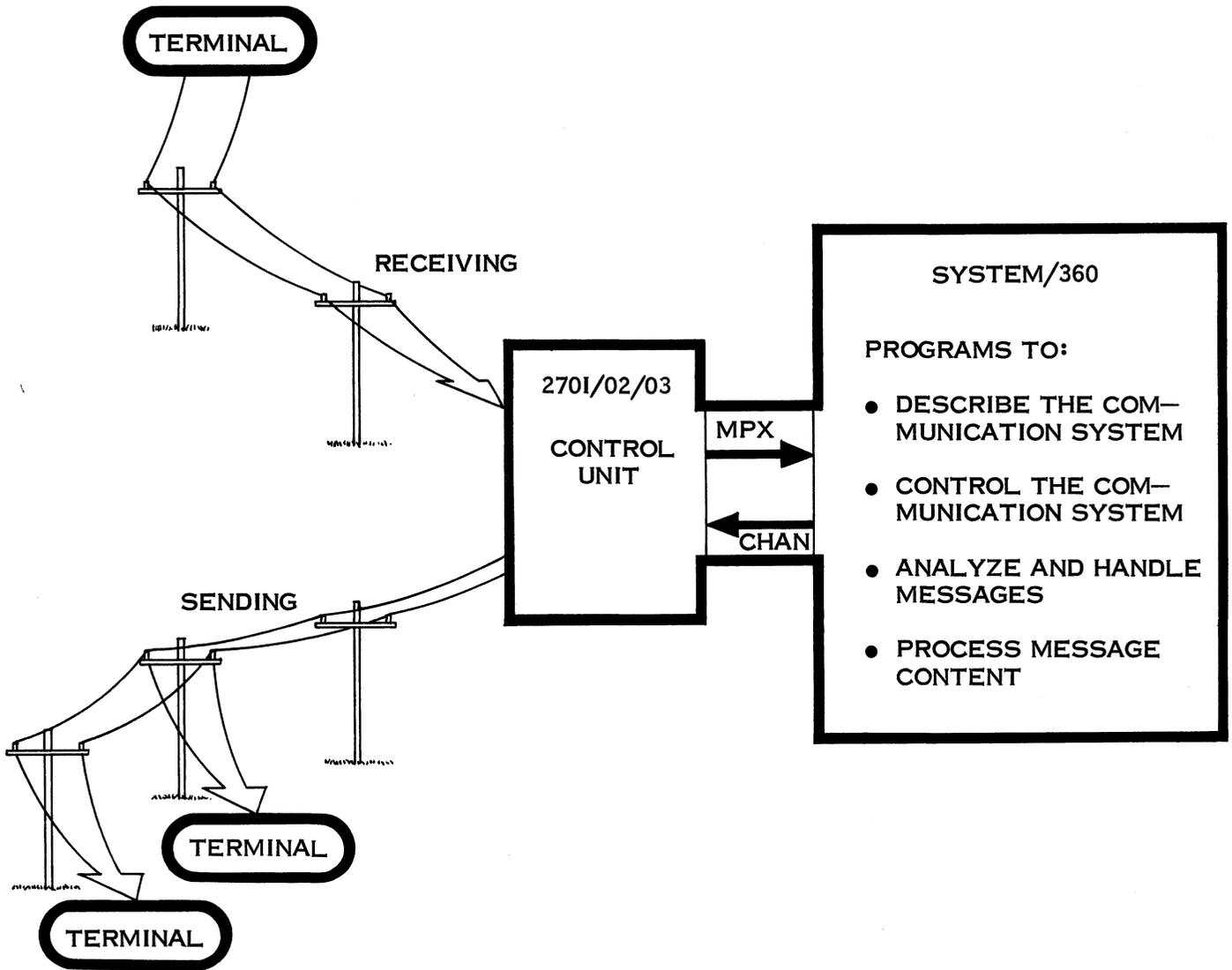
CHART 1: INTRODUCTION TO OPERATING SYSTEM/360  
TELECOMMUNICATION SUPPORT

This is a brief discussion on the Telecommunication Support provided by Operating System/360. The purpose of this material is to:

1. Supply a basic understanding of what is involved in programming a telecommunication system application using Operating System/360.
2. Briefly describe an aid for further understanding.

Following a short discussion on telecommunication systems and their requirements, the two levels of support provided by the Operating System/360 are discussed in terms of what they do and where they are used. A summary of the functions provided is then given, followed by a brief description of QTAM User's Guide — Message Control Task Specification (C20-1640-0).

For detailed information on the telecommunication support supplied by the Operating System/360, the reader is referred to IBM Operating System/360, Telecommunications (C28-6553).



## CHART 2: A TELECOMMUNICATION SYSTEM

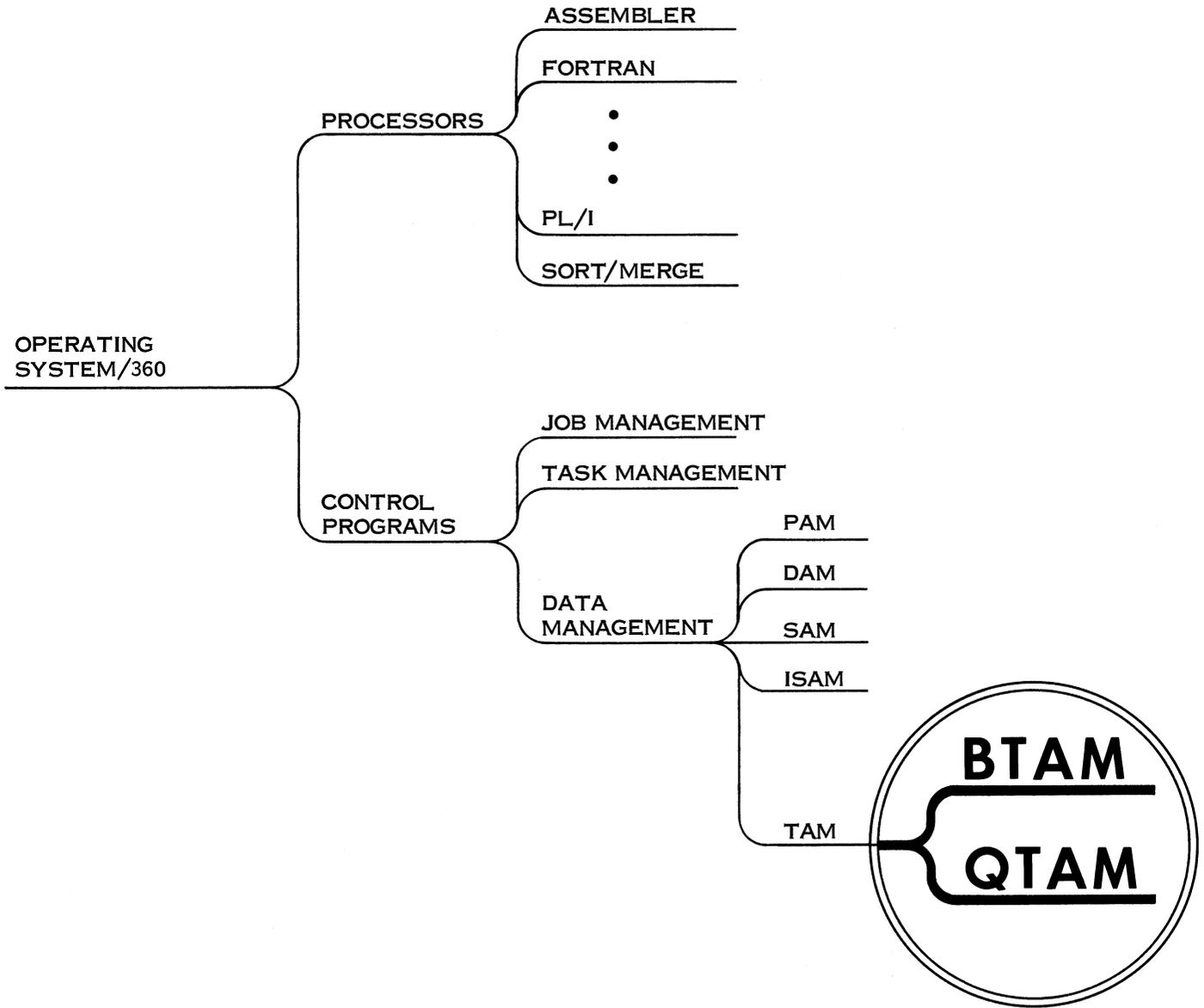
Telecommunication system applications, as described here, are concerned with transmitting information between remote terminal devices and a System/360 central processor via communication lines. Information is transmitted as sequences of characters termed "messages". Each message may be transmitted as one or more message segments. A message consists of a header (information about the message) and text (the data content of the message).

A message transmitted from a remote terminal to a central computer is a received, or input, message. A message transmitted from a central computer to a remote terminal is a sent, or output, message.

Before discussing telecommunication system support programs, let us first list those things necessary for operating a telecommunication system:

- A description of the communication system, including the identification of the terminal devices and communication lines involved.
- A method of controlling the terminals and lines so as to receive and send messages in an orderly manner.
- Analysis of the message headers to determine the functions to be performed on them, such as translation, routing, queuing, etc.
- The ability to process the message text and formulate a reply, if such is the application.

Now we can look into the Operation System/360 telecommunication support for these provisions.



### CHART 3: OPERATING SYSTEM/360

This chart shows the telecommunication support programs with respect to the overall operating system. These programs are provided in the form of access methods under the Data Management portion of the Control Program. The prime function of a Telecommunications Access Method (TAM) is to control the sending and receiving of messages to and from remote terminals.

Telecommunications access methods allow communication lines and terminals to be accessed in much the same manner as other input/output devices. This allows processing programs that access communication lines to have a structure similar to programs that access, say, magnetic tape drives, without the programmer being concerned with the details of communication line control.

There are two levels of telecommunications access methods:

- Basic (BTAM)
- Queued (QTAM)

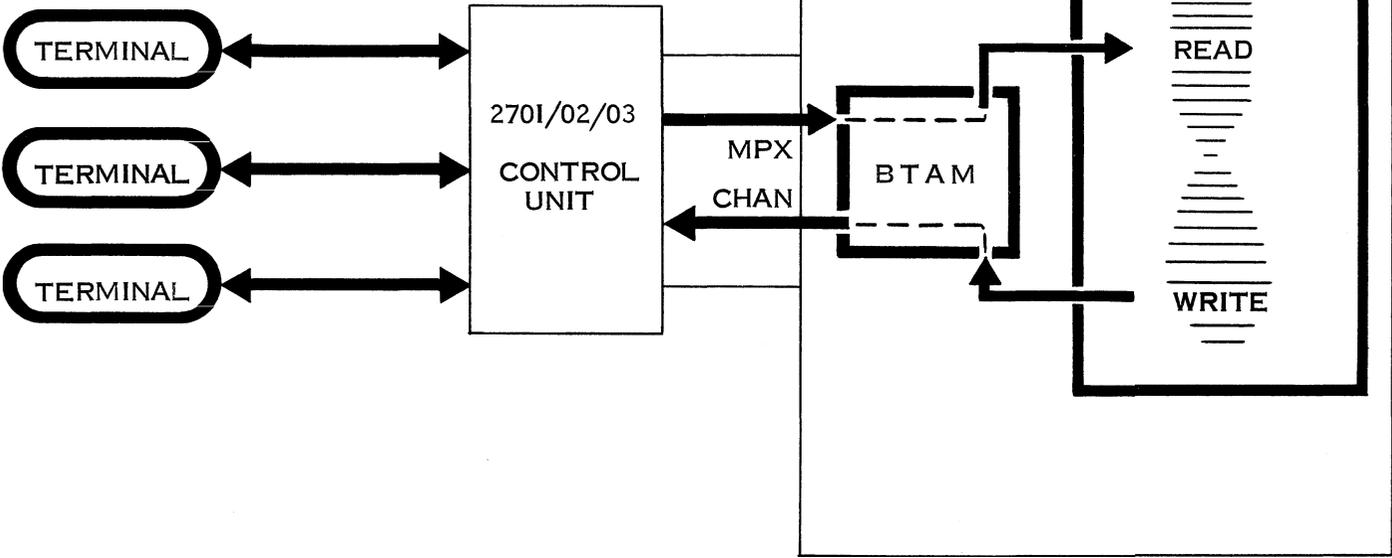
The language used at the BTAM level is READ and WRITE (Read or Write from/to communication lines), while at the QTAM level the language used is GET and PUT (Get or Put from/to message queues). At the QTAM level all functions necessary for handling messages and placing them into queues of messages are provided by the access method.

**THE BASIC  
TELECOMMUNICATIONS  
ACCESS  
METHOD  
—  
BTAM**

CHART 4: THE BASIC TELECOMMUNICATIONS ACCESS METHOD (BTAM)

The BTAM facilities are designed chiefly to provide the basic tools for constructing a telecommunications program. Routines for handling communication lines, terminals, control units, and device-oriented functions are included. This method provides macro instructions that enable a user to read a message segment into the computer and write a message segment out to a terminal device.

SYSTEM/360



## CHART 5: BTAM DATA FLOW

This chart shows an elementary diagram of data flow in a system using BTAM. Shown within the computer System/360 is BTAM and a user-provided program for processing of messages.

When a READ macro is executed within the processing program, BTAM starts polling the specific line. BTAM may continue to poll that line until it receives a message or until every terminal listed for that line has been polled, or it may poll only a specific terminal on that line depending on the READ specification. When a WRITE macro is issued, BTAM addresses a specific terminal on a line and, when that terminal has been "selected", sends the message.

BTAM provides for polling and addressing of terminals, and for sending and receiving of messages. The user may also choose to have BTAM dynamically chain on buffers for incoming messages. Since BTAM provides only those functions described above, the user-provided processing program must provide for such things as:

1. Initiation of polling by use of the READ macro
2. Initiation of addressing by use of the WRITE macro
3. Buffer handling
4. Routing of messages to the proper destination
5. Error checking of messages
6. Code translation, header analysis, time and date stamping, queuing and logging of messages, if required
7. Processing of the data content of the message, as required by the application

**THE QUEUED  
TELECOMMUNICATIONS  
ACCESS  
METHOD  
—  
QTAM**

## CHART 6: THE QUEUED TELECOMMUNICATIONS ACCESS METHOD (QTAM)

Although QTAM is also an access method under the Data Management portion of Operating System/360, two characteristics distinguish it from other access methods:

1. QTAM operates as a "task" within the Operating System, just like other data processing tasks processed by the Operating System. (A task is the unit of work for Operating System/360 consisting of a program routine and data for it to operate on. A batch data processing job, for instance, is broken up and executed as one or more tasks.)
2. A macro language is provided by QTAM with which the desired operation for each particular system can be specified.

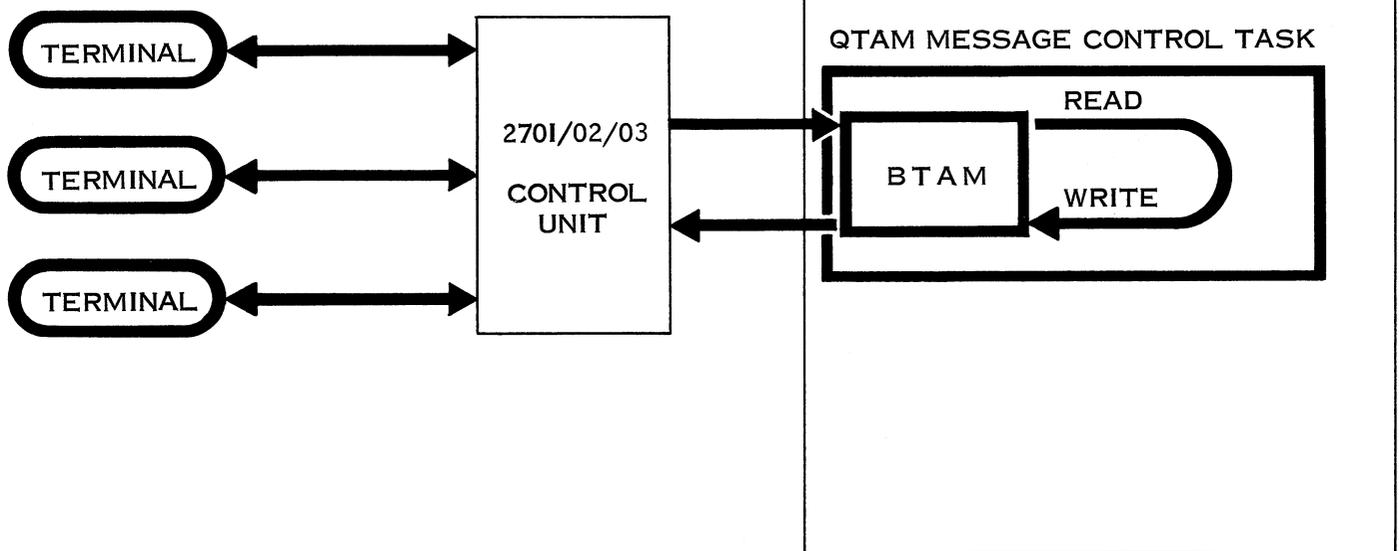
Properly specified, QTAM completely handles all message header analysis, buffering, and sending and receiving of messages, using BTAM as an intermediary for accessing the communication lines.

The QTAM task specified with the provided macro language to perform these functions is referred to as the Message Control Task of QTAM. Reference is also made to Message Processing Tasks — that is, tasks which are user-provided for processing the data content of messages acquired by QTAM, and which are not to be confused with the Message Control Task.

QTAM can handle various specific applications as well as combinations of these applications. In this document the following two applications will be discussed:

- Message-switching application: A message coming from a remote terminal has as its destination another terminal or terminals. This type of message requires no action from a processing program.
- Inquiry application: A message coming from a remote terminal requests action from a processing program, and requires a message (reply) to be sent back to the originating terminal.

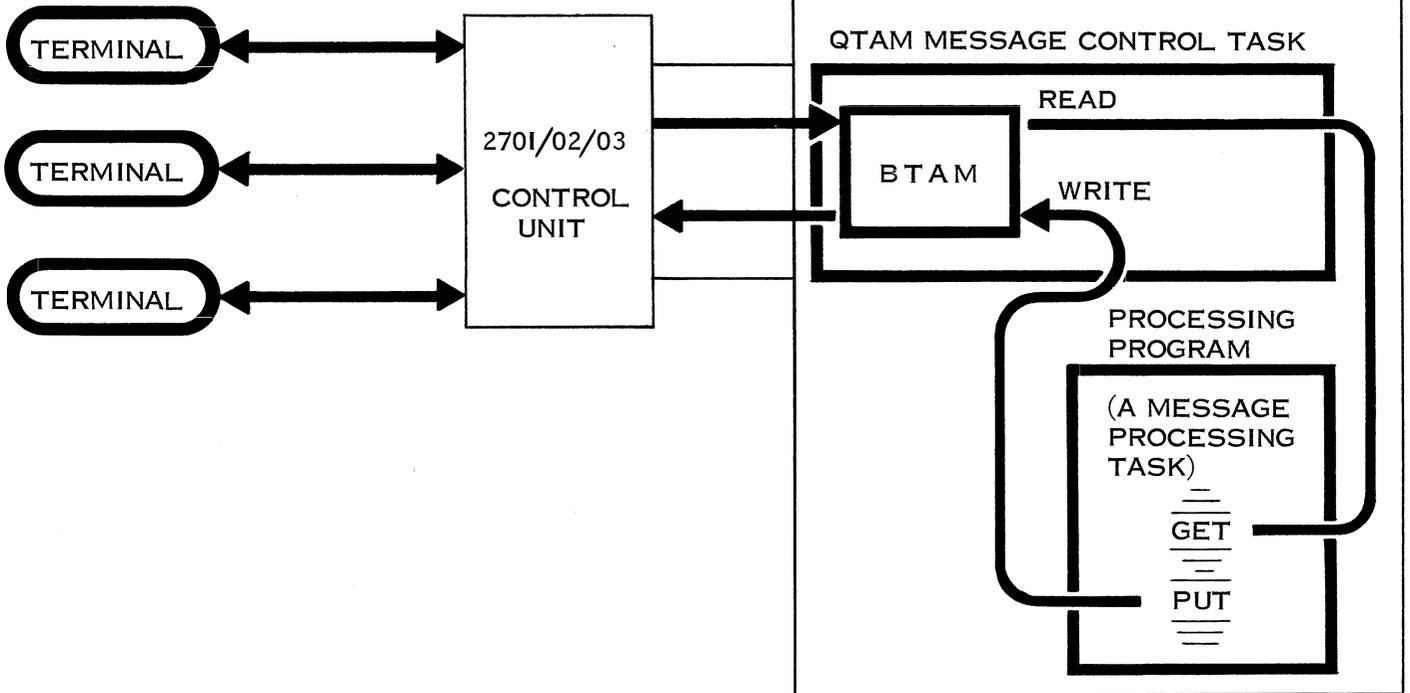
SYSTEM/360



## CHART 7: QTAM MESSAGE-SWITCHING APPLICATION

To handle the message-switching application, only the QTAM Message Control Task is needed. This task automatically issues the READ and WRITE commands to BTAM for polling and addressing of terminals. When a message is brought in from a terminal, the message is routed through header analysis, where such operations as time and date stamping, sequence checking, logging of messages, and source checking occur. The message is then routed to its destination queue, which can be on a direct access storage device or in core storage. When the line with the desired destination terminal becomes free, the message control task automatically brings the message from the queue, addresses the terminal, and sends the message to its destination. As shown, the message-switching application can be completely specified in the Message Control Task.

SYSTEM/360



## CHART 8: QTAM MESSAGE PROCESSING (INQUIRY) APPLICATION

To handle applications that require processing of the message text, the Message Control Task serves as an intermediary between the remote terminals and message-processing programs. It enables the terminals to be referred to indirectly, in much the same way as local input/output devices are referred to, using statements such as GET and PUT.

The Message Control Task treats messages in the same manner as in the message-switching application, except that it routes the messages to processing queues instead of destination queues. The messages wait in these queues until a user-written Message Processing Task issues a GET macro. This macro procures a message from the specified processing queue so that the Message Processing Task can process the message. While processing the message, the Message Processing Task may, like other tasks in the system, use other access methods, such as the Direct Access Method, to access data records on local files. If a reply is to be sent, as it is in an Inquiry application, the message processing task does this by issuing a PUT macro. This macro places the messages into a destination queue. The message control task, when the line is free, addresses and sends the message to the appropriate terminal.

SYSTEM/360

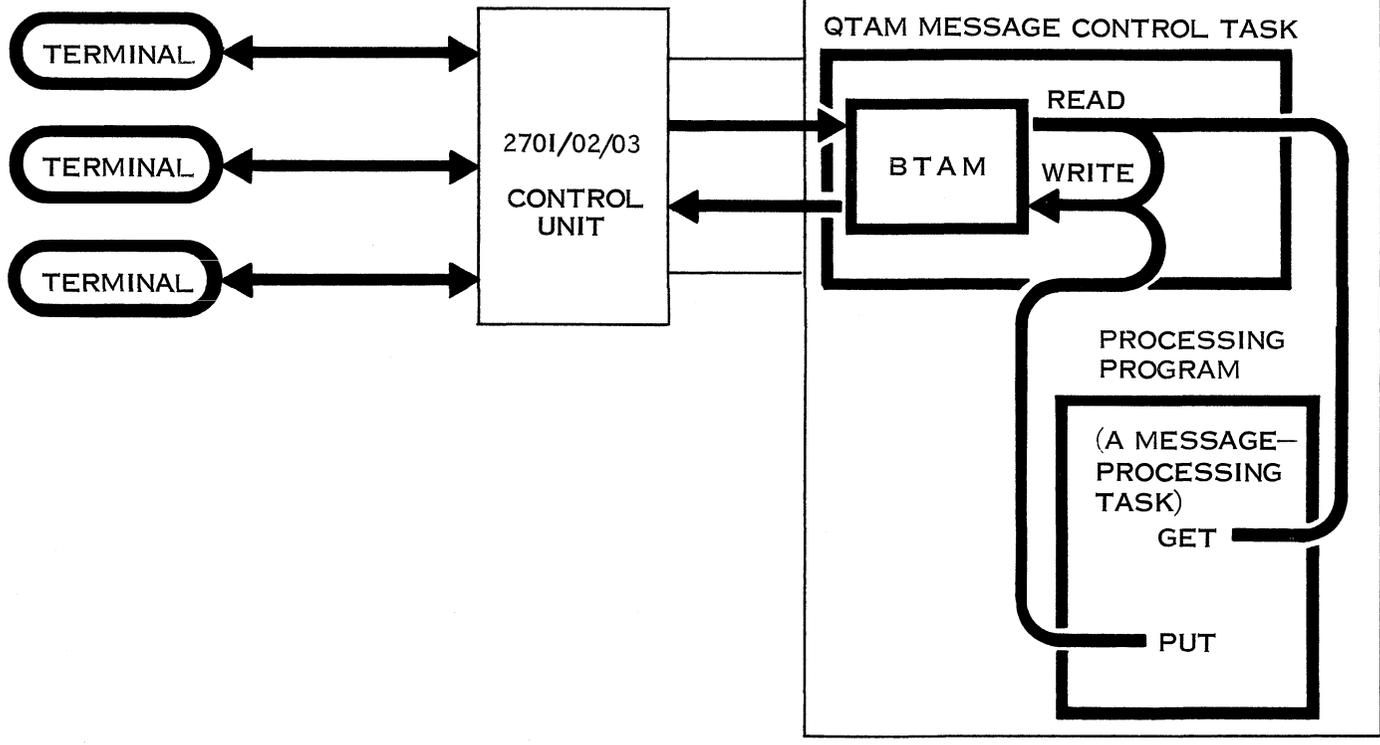
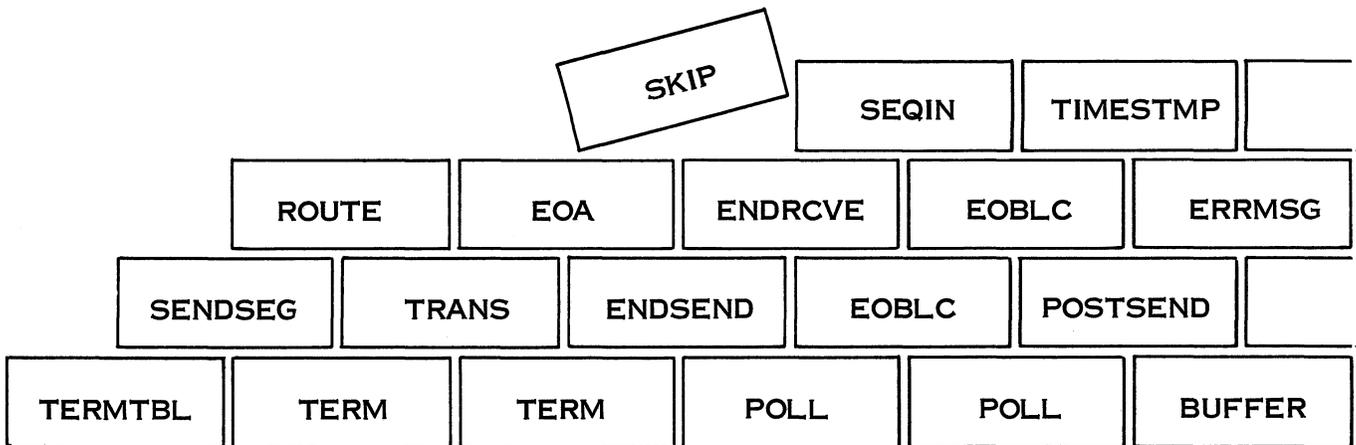
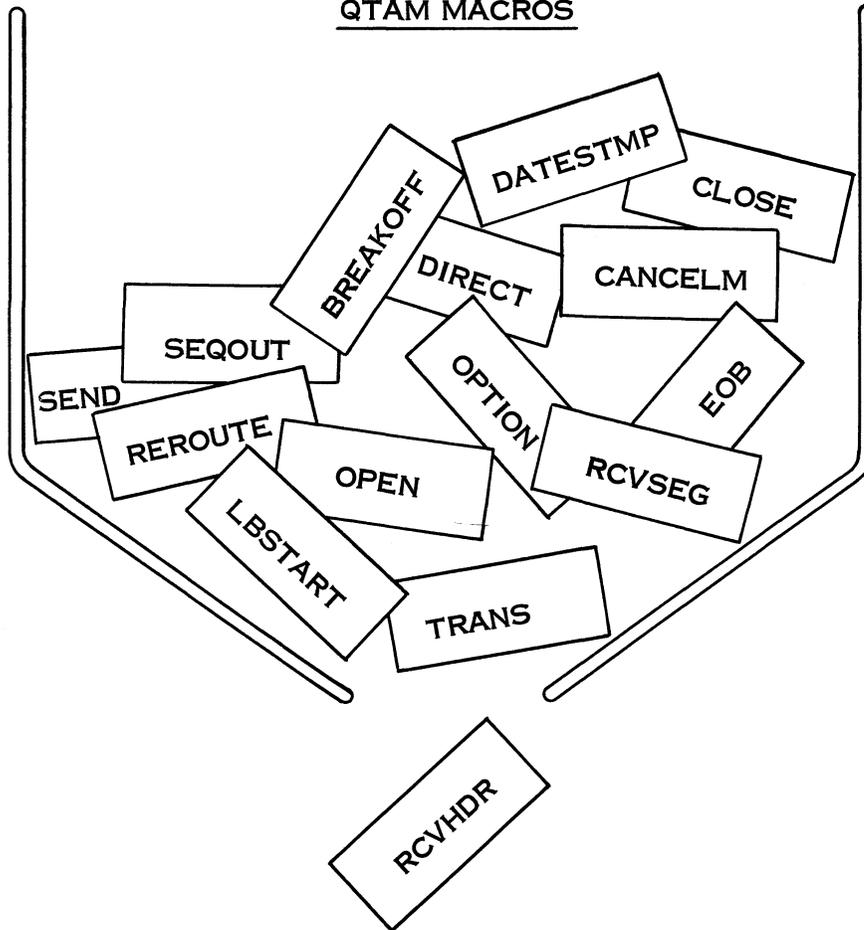


CHART 9: QTAM COMBINATION MESSAGE-SWITCHING AND  
AND MESSAGE-PROCESSING APPLICATION

This chart illustrates that QTAM is capable of handling more than one application with the same Message Control Task. Within header analysis the messages are routed either to a destination queue or to a process queue. In either case, the messages are handled as stated in the previous descriptions.

The QTAM Message Control Task, with the aid of BTAM, polls or addresses the terminals and transmits or receives messages. The Message Control Task, on its own, provides for dynamic buffering and initiation of polling and addressing of terminals. The user, by his ordering of the QTAM macros, can provide for such things as code translation, header analysis, time and date stamping, routing of messages, error checking, and queuing and logging of the messages. This Message Control Task can handle a message-switching application completely. For the Inquiry application, the user must write a program that will become the Message Processing Task using the GET and PUT language.

QTAM MACROS



QTAM MESSAGE CONTROL TASK

## CHART 10: BUILDING A MESSAGE CONTROL TASK FOR QTAM

To simplify and speed the construction of the Message Control Task, a special macro language is provided by QTAM. This language facilitates describing for a communication system the header analysis program, system configuration, buffer length, polling procedure, and editing required for particular applications. Using the macro language, a complete message control program for a Tele-processing application can be described and compiled in days rather than months. As the chart illustrates, the user chooses only the macros needed to build his particular Message Control Task.

<u>BTAM</u>	<u>FUNCTION</u>	<u>QTAM</u>
PROVIDED	POLL TERMINALS AND RECEIVE MESSAGES	PROVIDED
	ADDRESS TERMINALS AND SEND MESSAGES	
	DYNAMIC CHAINING OF BUFFERS FOR INPUT MESSAGES	
NOT PROVIDED	AUTOMATIC INITIATION OF POLLING	
	AUTOMATIC INITIATION OF ADDRESSING	
	HANDLING OF MESSAGE SEGMENTS	
	CODE TRANSLATION	
	ANALYSIS OF MESSAGE HEADERS	
	INSERTION OF TIME/DATE STAMP	
	ROUTING OF MESSAGES	
	ERROR CHECKING AND PROCEDURE	
	QUEUING AND LOGGING	
	PROCESSING OF MESSAGE DATA CONTENT	NOT PROVIDED
	SPECIFICATION AND ORDERING OF QTAM MACROS	

## CHART 11: COMPARISON OF BTAM/QTAM FUNCTIONS

Chart 11 is a summary of the functions provided by BTAM and QTAM. It must be realized that, in general, any communication system requires most of these functions, whether they are provided by an access method or by a user program.

### REFERENCES

- For more detailed information on BTAM and QTAM: IBM Operating System/360, Telecommunications (C28-6553)
- For information on what terminal devices are supported by BTAM and QTAM: IBM Programming Announcement and Product Announcement letters
- For information on incorporating and using QTAM/BTAM within the Operating System: IBM Operating System/360: Control Program Services (C28-6541)
- For estimating core storage required for BTAM and QTAM: IBM Operating System/360: Storage Estimates (C28-6551)

**IBM****Data Processing Techniques****Operating System/360****QTAM User's Guide -- Message Control Task Specification**

The Queued Telecommunications Access Method (QTAM) provides macro instructions for the programming of a communications-based data processing system within the Operating System/360. This book is a compilation of logic flowcharts and explanations designed to instruct the programmer in the coding of a program using QTAM. In a tutorial manner, the reader is led through the necessary decisions and a workbook-like development of the system macro coding on the queued access method level.

**Programming**

CHART 12: QTAM USER'S GUIDE — MESSAGE CONTROL  
TASK SPECIFICATION

To aid in specifying the Message Control Task of QTAM, a manual is available called QTAM User's Guide — Message Control Task Specification (C20-1640). The objectives of this manual are to guide the user in the proper specification of a Message Control Task using QTAM macros without necessarily learning the macro language, and to instruct the user in telecommunication system considerations. The prerequisites for using this manual are:

1. Knowledge of the configuration and application
2. Prepared message formats to be used for the application
3. A general knowledge of System/360 Operating System

The end result of using this guide is a sequence of macro instructions that can be assembled and entered into Operating System/360 as a Message Control Task of QTAM.

The body of QTAM User's Guide consists of a number of flowchart sections designed to instruct the user in the decisions to be made, and when and how to write each QTAM macro. By going through these sections, the user will have properly structured all the necessary coding for a Message Control Task.

The appendices contain a comprehensive sample problem using QTAM and a guide to preparing message header formats for easy and efficient use of QTAM.



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