

**Data
Communications
User's Guide**



Data Communications User's Guide

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This manual replaces and obsoletes the first edition of the VS Data Communications User's Guide (800-1302DC-01) which was prepared for internal use.

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CHAPTER 1 GENERAL INFORMATION

1.1 VS DATA COMMUNICATIONS

Wang's VS computer systems can be configured with varied data communications capabilities that are available with optional hardware and software. Capabilities not included when a VS computer system is initially ordered can be added when data communication needs expand.

Remote Workstations and Printers

Remote workstation/printer support on VS systems is a communications-based capability by which physically remote devices can access a VS computer and appear functionally equivalent to local devices. A multipoint leased communications line and/or a point-to-point leased or switched (dial-up) network may be connected to the VS processor, via a suitable modem and a Model 22V06 Communications Input/Output Processor (IOP), to support the following remote devices:

- Remote cluster controllers
- Standalone remote workstations
- Modem sharing units

The Model 2249V-6 Remote Cluster Controller contains a communications controller with a connector for attachment of a modem. The 2249V-6 unit also contains multiple workstation/printer controllers with six ports for attachment of any mix of Model 2246S Serial Workstations and serial printers.

The Model 2246R Standalone Remote Workstation contains a communications controller with a connector for attachment of a modem. The 2246R workstation also has a built-in printer controller with a connector for attachment of an optional parallel printer. At a remote site where only one workstation and optionally a printer are needed, the standalone workstation is recommended.

For other configuration possibilities, the Model 2247V-4 Modem Sharing Unit (MSU) allows as many as four 2246R workstations (with workstation-attached optional printers) to share a single modem and communications line.

The total number of local and remote workstations must not exceed 32 for the VS processor or 128 for the VS-100 processor; however, the number of communication lines needed to support the remote devices depends upon the desired distribution of the devices. For example, a point-to-point leased line can support a single site; however, that site might have: (1) a standalone workstation and perhaps a printer, (2) an MSU with as many as four

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standalone workstations, each with an optional printer, or (3) a remote cluster controller with as many as six attached devices. A multipoint leased line can support several sites concurrently, and each site might have a remote cluster controller, an MSU, or a standalone workstation. A point-to-point switched line can support several sites, one at a time, not concurrently.

Because there are delays associated with communications lines, remote workstations typically provide slower response times than local workstations. Remote workstation response times are affected by such factors as:

- Line speed (speeds up to 9600 bits per second are supported)
- Number of multidropped workstations and printers on a single communications line
- Frequency of transmission to/from a workstation
- Amount of data sent to/from a workstation
- Amount of data sent to a remote printer

The effect of these interrelated factors on response time cannot be expressed in a simple formula. For example, response time is greatly impacted by the amount of data being transmitted down a multidrop line; however, programs can significantly decrease the amount of data moving down a line -- and thereby improve response time -- by using the VS Read Altered and Rewrite Select commands. The Read Altered command causes only the modified data from a workstation to be transmitted to the VS; the Rewrite Select command allows only selected data to be sent to a workstation screen.

When remote workstations and printers are multidropped from leased lines or configured in point-to-point leased or switched networks, these remote devices can access a centrally located VS processor from widely dispersed locations. A binary synchronous communications protocol ensures reliable communications between the central and remote sites. This Wang-developed remote workstation/printer protocol preserves VS internal codes and includes the cyclic redundancy checking and automatic retransmission features found in the industry-standard 2780, 3780, and 3270 communications protocols.

2780/3780 Emulation

VS 2780/3780 emulation software is available in the TCCOPY program. Chapter 2 in this edition of the VS Data Communications User's Guide describes TCCOPY Version 2.

TCCOPY, in conjunction with a 22V06 Communications Input/Output Processor and a suitable modem, supports point-to-point, half-duplex, batch communications over leased or switched (dial-up) networks. With TCCOPY, a VS computer can communicate with other computers, minicomputers, intelligent terminals, and remote batch terminals that support the IBM 2780 or 3780 protocols. Wang's Word Processing Systems, Office Information Systems, 2200 Computer Systems, and VS Computer Systems have optional 2780 and 3780

communication capabilities for every system; hence, a VS computer can communicate with any of these communications-equipped systems.

VS-to-VS Communications

The VSCOPY program is used for file transfer between two VS computer systems. Chapter 3 in this edition of the VS Data Communications User's Guide describes VSCOPY Version 1.

VSCOPY, like TCCOPY, is used in conjunction with a 22V06 Communications Input/Output Processor and a suitable modem to support point-to-point, half-duplex communications over leased or switched networks.

1.2 THE 22V06 COMMUNICATIONS INPUT/OUTPUT PROCESSOR (IOP)

The Model 22V06 Communications IOP is designed to support a wide range of communications capabilities. This IOP is available in three versions: the 22V06-1 which supports a single synchronous communications line, the 22V06-2 which supports two separate lines, and the 22V06-3 which supports three separate lines. Each line can support an automatic calling unit.

With multiple lines, the 22V06 IOP can concurrently handle the same or different types of communications linking the VS to several remote sites. More than one 22V06 IOP can be used in the system when more than three communications lines are required, so long as there are IOP positions available in the VS chassis.

1.3 MODEMS

A suitable modem is required for each communications line from a 22V06 IOP. A modem (modulator-demodulator) is needed as an interface between an IOP port and a leased or switched telephone line. The modem modulates the IOP's digital signals into a range of frequencies suitable for transmission over telephone lines and demodulates received signals before their transfer to the 22V06 IOP.

For point-to-point or multidrop telephone lines, any RS-232-C or CCITT V.24 compatible synchronous modem can be used. However, modems at both ends of a communications link must be compatible with each other; among other considerations, their clocking rates must be the same. The maximum rate supported for communications using the TCCOPY or VSCOPY programs is 9600 bits per second (bps). The maximum rate for remote workstation/printer communications is 9600 bps also.

For connections up to 40.2 kilometers (25 miles) over private lines, short-haul modems can be used.

For local connections up to 30.5 meters (100 feet) over coaxial cables, a Model 2228N "null modem" (available from Wang Laboratories) can be used. This small, dual-plug device ensures that the pin assignments in the cables and connectors directly linking two systems meet the standards recommended by

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the Electronics Industries Association RS-232-C specifications in the United States and the international CCITT V.24 specifications. When a null modem is used, the 22V06 IOP generates the clocking signal on RS-232-C/V.24 pin 11; the rate can be 2400, 4800, or 9600 bps. Because the Model 2228N null modem has polarity, the "clocking signal plug" should receive the cable from the 22V06 IOP; the other plug should receive the cable from the device that is being locally connected to the 22V06 IOP.

At remote sites where 2249V-6 Remote Cluster Controllers or 2247V-4 Modem Sharing Units are located, each of these devices requires one modem; the workstations and printers plugged into a cluster controller or an MSU do not require modems. If a remote site has a 2246R Standalone Remote Workstation that is not attached to a Modem Sharing Unit, that 2246R workstation requires a modem. The modem at a remote site must be compatible with the modem connected to the 22V06 IOP.

Modems may be rented from telephone companies serving the localities where the 22V06 IOP and the remote devices are installed or, in some countries, the modems may be purchased from any of several independent modem manufacturers. In either case, arrangements with the telephone company may be necessary for connection of a modem to the telephone network. Although the modems for remote sites are ordered and installed independently of the modem(s) obtained for the 22V06 IOP, the modems for remote sites should not be ordered before the compatibility requirements are known.

Ordering of a modem is not the responsibility of a Wang salesperson or customer engineer; also, modem installation is not the responsibility of a Wang customer engineer. Upon request, however, Wang representatives can provide a list of modem manufacturers and suppliers. The list is for convenience only; Wang Laboratories is not affiliated with and does not endorse any modem manufacturer or supplier.

1.4 AUTOMATIC CALLING UNITS

Although a modem is required for each communications line from a 22V06 IOP, use of an automatic calling unit (ACU) is optional. Each port on a 22V06 IOP is uniquely addressable and has two connectors. The RS-232-C/V.24 compatible connector accepts the cable from a modem. The RS-366/V.11 compatible connector accepts the cable from an ACU.

Both the TCCOPY and the VSCOPY programs support use of an ACU that is operationally equivalent to a Bell 801C, Bell 801C L1/2, or Vadic ACU. (See "Responding to the Optional Dial Screen" in Sections 2.3 and 3.3 of this document.) References to particular ACUs does not imply endorsement of particular manufacturers; however, in the 48 contiguous United States, Bell Telephone modems and automatic calling units have become the "standards" for determining the compatibility of equipment from other manufacturers.

CHAPTER 2
2780/3780 BATCH COMMUNICATIONS

2.1 OVERVIEW

The VS 2780/3780 emulation software is accessible via the TCCOPY program, which supports point-to-point, half-duplex batch communications over leased or switched (dial-up) networks. TCCOPY allows VS files or libraries to be transmitted to other systems or terminals that support the IBM 2780 or 3780 protocols; the software also allows the other systems or terminals to send batch data to the VS.

TCCOPY can be operated from the Command Processor Menu or via user-written procedures. If a procedure utilizes the "timer" capability, TCCOPY can be run in background mode.

Parameters other than file, library, and volume names must be specified during TCCOPY initialization because IBM 2780 Data Transmission Terminals and IBM 3780 Data Communication Terminals are remote batch terminals whose input and output devices are a card reader, a printer, and optionally a card punch. These terminals, designed to communicate with each other and IBM 360 and 370 computers, use protocols that have become industry standards supported by many non-IBM host systems and remote batch terminals. The protocols conform to the binary synchronous communications (BSC) procedures originated by IBM to accommodate a broad range of medium-speed and high-speed equipment using a variety of transmission codes and data links.

TCCOPY supports the following standard and optional 2780/3780 protocol features:

- Multirecord blocking
- Cyclic redundancy checking (CRC)
- Automatic extended retransmission
- Wait-before-transmit positive acknowledgment (WACK)
- EBCDIC transmission code set
- Transparent transmission
- Space compression (3780 only)

Also, TCCOPY can be initialized for non-host or host mode. Non-host mode is used when communicating with a host system, and host mode is used when communicating with a remote batch terminal that supports 2780 or 3780 protocol.

When transmitting VS files in non-host mode, TCCOPY automatically reformats the records as 80-column card images to emulate 2780/3780 card reader input to a host. Record reformatting occurs prior to transmitting the "copy"; the records stored on disk are not altered. VS data file records that exceed the 80-byte limit are divided into multiple records with 80 characters

per record; records are padded with blanks, if necessary, to achieve the fixed length. During reception, data normally routed to a 2780 or 3780 printer is sent to either an on-line VS printer or the print spooler, depending on how TCCOPY is initialized. Data normally routed to a card punch on a 2780 or 3780 terminal is stored on disk in consecutive 80-byte records.

For TCCOPY's 3780 emulation, space compression is automatic. The transmitting system represents each group of repeated space characters (63 characters maximum) by a two-character sequence defining the number of compressed (deleted) space characters; the receiving system removes each two-character sequence and reinserts the proper number of space characters. TCCOPY's 3780 space compression feature causes no conflict with the VS Data Management System's compression option for input and output operations. Remember, however, that 3780 space compression is not supported by all sites that support the 3780 protocol. Do not expect to communicate successfully using TCCOPY's 3780 emulation unless the remote site also supports space compression.

The optional host mode allows print and punch files to be sent to a remote 2780 or 3780 terminal without loss of integrity. When initialized for host mode, TCCOPY formats variable-length records with control codes and record lengths that are appropriate for a remote 2780/3780 printer and card punch.

TCCOPY's multirecord blocking capability increases throughput when this feature can be utilized. For the 2780 protocol, the block size is 400 characters (the line buffer capacity of IBM 2780 terminals); for the 3780 protocol, the block size is 512 characters (the line buffer capacity of IBM 3780 terminals). These 400- or 512-byte blocks accommodate both line control characters and data records. If single-record blocking is used, the maximum block size is 80 characters for card reader/punch data streams or 132 characters for printer data streams. When two sites communicate using the 2780 or 3780 protocol, each data block is checked for transmission accuracy by the receiving site before transmission can continue. A line turnaround follows transmission of a data block to allow the receiving site to reply with a control code (either ACK for successful reception or NAK for unsuccessful reception); automatic retransmission follows a NAK unless the retry limit is reached for the data block. By reducing the number of line turnarounds, multirecord blocking improves data throughput.

An IBM 2780 terminal can operate with only one of three code structures: EBCDIC (Extended Binary-Coded Decimal Interchange Code), ASCII (American Standard Code for Information Interchange), or Six-Bit Transcode (Six-Bit Transmission Code). An IBM 3780 terminal can operate with either EBCDIC or ASCII, not both. Thus, 2780 or 3780 terminals equipped for a particular code are not compatible with terminals or host front-end processors equipped for a different code, e.g., an ASCII-equipped 2780 or 3780 terminal cannot encode or decode EBCDIC or transparent-mode ASCII.

TCCOPY supports EBCDIC (not ASCII or Six-Bit Transcode) as the transmission code set since EBCDIC is the native code of IBM 360 and 370 computers. Normally, TCCOPY converts data from ASCII to EBCDIC when transmitting and vice versa when receiving. For transparent mode communications,

the program does not convert data when transmitting or receiving; hence, in some cases, the TRANSL utility may need to be used on received files.

To conform to the 2780 and 3780 BSC protocols, TCCOPY must transmit indexed VS files sequentially; file names and file characteristics are not maintained. Unlike the COPY utility, TCCOPY does not provide user control over the organization of copied files. Both consecutive and indexed files are transmitted as consecutive files. For file transfer between two VS systems, use the VSCOPY program described in Chapter 3.

During initialization, TCCOPY requests the address of the communications port to be used for batch communications. If the specified port is currently in use, TCCOPY displays an appropriate message; otherwise, TCCOPY loads the necessary 2780 or 3780 microcode into the data link processor that controls the specified port.

2.2 REQUIREMENTS

To operate TCCOPY, the VS processor must be equipped with Operating System 3.0 (or later) and a 22V06-1, -2, or -3 Communications IOP. Also, a suitable modem must be attached to each port to be used for batch communications. (See Section 1.3.)

To support TCCOPY's optional auto-call feature, an automatic calling unit (ACU) must be attached to an RS-366, CCITT V.11 compatible connector on the IOP. Auto-call (also referred to as auto-dial) is a useful feature for VS computers that require unattended operation or regularly communicate with many systems via a switched network.

2.3 TCCOPY INITIALIZATION

When the Command Processor Menu is used to run TCCOPY, at least three screens (STREAM, DEFAULTS, and TCDEV) request initializing information before the main menu appears. Two optional initializing screens (DIAL and RCVWAIT), whose appearance is conditional upon responses to the STREAM screen, are normally bypassed.

This section describes the initializing information for the STREAM, DEFAULTS, DIAL, and TCDEV screens. The RCVWAIT initializing information, which is associated with the timer option in the STREAM screen, is described in Section 2.5 because the timer option (unlike the auto-dial option) does not lead to the main menu described in Section 2.4 of this chapter.

Manual operation of TCCOPY provides an understanding of the program flow associated with the main menu and its available functions. The alternative program flow associated with the timer option allows unattended operation of TCCOPY; the main menu does not appear, but all the functions of the main menu plus an additional function are available in the FUNCTION and TIMEOUT screens. (See Section 2.6.)

Responding to the STREAM Screen

Information which applies to the entire TCCOPY session is requested for the following parameters:

- MODE - Identifies the communications protocol. May be 2780 (the default value) or 3780. Space compression is automatic for 3780.
- BLOCKING - Indicates whether multiple record blocks are to be transmitted. YES is the default answer. NO causes single record blocking.
- HOST - Indicates whether host mode is desired. NO (the default answer) causes the 22V06 IOP to emulate a remote batch terminal; non-host mode is appropriate for communications with a host system. YES allows TCCOPY to specify print or punch routing of data to the remote terminal; host mode is appropriate for communications with a remote batch terminal.
- DIALOUT - Indicates whether an automatic calling unit (ACU) is to be used. NO (the default answer) suppresses the DIAL screen. YES is appropriate only if there is an ACU attached to the 22V06 IOP.
- RATE - This parameter may be ignored for a session over a leased or switched network. For a session using a Wang null modem on a cabled connection to a host or terminal, the 22V06 IOP generates a clocking signal on RS-232-C pin 11; the value assigned here determines the signal's rate. The default value is 1 (for 4800 baud or bits per second); other valid values are 0 (for 2400 baud) and 2 (for 9600 baud).
- TIMER - This parameter provides the capability to set a specified length of time for awaiting reception before performing another function. NO (the default answer) suppresses the RCVWAIT screen which requests the time specification. YES is appropriate only when initializing a procedure for unattended operation of TCCOPY.
- RECEIVE - Indicates how all the received files are to be routed. Valid answers are PRINT, PUNCH, or BOTH. (Since a 2780 or 3780 terminal has a printer and an optional card punch as its output devices, the 2780 and 3780 protocols provide codes that distinguish these two types of data streams; the sender's coded data streams are automatically directed to the proper output device at the receiving 2780 or 3780 terminal.) Because VS systems support several printing modes but do not support card punches, the TCCOPY program routes received files according to the response given here. For BOTH (the default answer), TCCOPY separately identifies the two types of received data streams using

the pair of operator-supplied root names from the DEFAULTS screen (which follows the STREAM screen); routing of the two types of files is handled according to the relevant parameters in the DEFAULTS screen. If either PRINT or PUNCH is specified for the RECEIVE parameter, TCCOPY uses a single root name (the appropriate one from the DEFAULTS screen) and all files are handled by a common route.

Responding to the DEFAULTS Screen

This initializing information for received data streams may be altered later, if desired, by using the REDEFINE DEFAULTS option in the main menu. Parameters whose last character is "1" are associated with print data streams, and those whose last character is "2" are for punch data streams, e.g., FILE1 and FILE2. Since default values for the parameters in the DEFAULTS screen are extracted from the user's common usage constants, the default values cannot be documented here. The print/punch stream parameters are:

- FILE1, FILE2 - Indicates the root names by which TCCOPY (with sequence numbers) uniquely identifies the files created from received print/punch data streams.
- LIBRARY1, LIBRARY2 - Identifies the library or libraries for the created files.
- VOLUME 1, VOLUME2 - Identifies the volume or volumes for the created files.
- RECORDS1, RECORDS2 - Indicates the maximum number of records to be initially allocated per file.
- RETAIN1, RETAIN2 - Indicates the retention period for the files.
- RELEASE1, RELEASE2 - Indicates whether unused disk space should be released.
- FILCLAS1, FILCLAS2 - Identifies the file protection class: any valid class defined by VS system security administrators at each installation.
- PRTCLASS - Identifies the print class: any value A through Z, as defined at each installation.
- FORM# - Identifies the print form number: any value 0 through 254.
- PRNTMODE - Identifies the printing mode for the received data files: S = Spool, H = Hold, K = Keep, or O = Online.
- PUNCHREC - Indicates whether punch records are longer than 80 bytes, as may be the case for reception from non-IBM systems.

As stated in a note appearing on the DEFAULTS screen, code translation is performed only on received data that is non-transparent.

Responding to the Optional DIAL Screen

This screen appears only if the DIALOUT parameter in the STREAM screen is set to YES, indicating the auto-dial feature is desired for the session. A TCCOPY user may wish to activate the DIAL screen for communications over a switched network if an ACU is available and the telephone and modem are not close to the VS workstation. The parameters are:

- DIALER - Indicates the ACU type. Valid answers are: 0 (for a Bell 801C or equivalent ACU), 1 (for a Bell 801C L1/2), or 2 (for a Vadic). Note: Due to the wide range of available ACU devices, some testing may be needed to determine the appropriate response for this parameter. See Chapter 1, Section 1.4.
- ADDRESS - This field is ignored for Bell dialers. If a Vadic dialer is used, it may have an address of 0, 1, 2, or 3.
- MODEM - This field also is ignored for Bell dialers. If a Vadic dialer is used, it may support modem addresses in the range from 0 through 14 (decimal).
- NUMBER - The complete dialing sequence must be entered in this field. Beginning in the field's first position, enter the numerals and any asterisk (*) or pound (#) sign that may be required; enter a colon to indicate any dial tone (except the first one) heard when manually dialing. When the complete sequence is shown, press ENTER for the next screen (TCDEV) or PF1 to return to the STREAM screen.

Responding to the TCDEV Screen

There may be as many as three ports per 22V06 IOP and more than one 22V06 IOP in the VS processor; however, there is a uniquely addressable data link processor (DLP) controlling each port. The TCDEV screen requests information for a single parameter:

- DEVICE - Identifies the address of the port (the DLP) which is to control the TCCOPY session.

The valid addresses may be obtained by using the appropriate PF key to invoke "show device status" from the Command Processor Menu and then invoking the "show telecommunication devices" option. Multiport 22V06 IOPs have consecutively numbered ports beginning with a number that is a multiple of 32. For example, if there is one 22V06-3 IOP in a VS processor, its ports have addresses 32, 33, and 34. If there is a second 22V06-3 IOP in the same VS processor, its ports have addresses 64, 65, and 66.

If an invalid address is provided, TCCOPY prompts the operator and awaits a new address. After a valid address is provided, TCCOPY determines

whether the address is already assigned to a session and alerts the operator if another address is required.

After a nonbusy valid address is provided, the message PROGRAM TCCOPY IN PROGRESS appears while TCCOPY awaits a signal that a communications link has been established. If the specified port is locally connected (via a Wang null modem) to a host or a terminal, the DLP immediately receives the necessary signal and alerts the TCCOPY program. Similarly, if the specified port is connected to a leased line, the DLP immediately receives a Data Set Ready signal from the attached modem and alerts the TCCOPY program. On the other hand, if the specified port is attached to a switched network, the desired point-to-point connection must be established by dialing an appropriate telephone number (either manually or via the ACU). Remember that the TCCOPY program cannot proceed until the DLP receives a Data Set Ready signal from the modem attached to the port.

If an ACU is used and this equipment fails to establish a connection because there is a busy signal or no answer, the TCDEV screen displays an appropriate message. The length of time before the ACU abandons its attempt to connect with the remote system depends upon the actual ACU in use. The time may be as long as 30 seconds.

After TCCOPY is initialized and the communications link has been established (if using a dial-up line), the main menu appears.

2.4 THE MAIN MENU

The main menu provides access to the six functions described here and shown in the flow diagram in Figure 2-1. The operator-controlled actions are related to transmission only; reception is automatic. (TCCOPY does not request a file name for reception unless a problem arises, e.g., a bad volume; remember that the DEFAULTS screen supplies information related to creating files from received data streams.)

NOTE:

The message DATA TRANSMISSION IN PROGRESS is displayed during transmission; the message DATA RECEPTION IN PROGRESS is displayed during reception. If a main menu function is activated after the 22V06 IOP begins receiving data but before TCCOPY starts its reception procedure and displays the reception-in-progress message, the activated function is interrupted; however, TCCOPY automatically returns to the interrupted function when reception is completed.

PF1 - TRANSMIT FILE(S) - Causes TCCOPY to branch to the INPUT screen. If only one file is to be transmitted, the INPUT screen requests the file, library, and volume names for the

file and also requests whether translation to EBCDIC should occur before transmission (YES or NO), whether transparent transmission is desired (YES or NO), and what type of data stream is to be transmitted (READER for communications to a host, PRINT or PUNCH for communications to a terminal). After this information is entered and the file transmission is completed, the EOF screen appears; then PF1 is used to transmit another file by recalling the INPUT screen, or PF16 is used to return to the main menu. If an entire library of files is to be transmitted, the INPUT screen provides the alternative of pressing PF2 to cause a branch to the LIST screen. The LIST screen does not request a file name; otherwise, the LIST and INPUT screens are the same. After the LIST screen information is entered and the library transmission is completed, the main menu reappears.

- PF2 - TRANSMIT ONE 80-BYTE RECORD (E.G., SIGN-ON MESSAGE) - Causes TCCOPY to branch to the MESSAGE screen. The MESSAGE screen provides two 40-byte fields into which the desired message can be entered; then the main menu reappears.
- PF3 - CURRENT SESSION SUMMARY INFORMATION - Causes TCCOPY to branch to the STATUS screen, which shows the number of files transmitted, number of files received, number of records transmitted, and number of records received. The ENTER key recalls the main menu.
- PF4 - REDEFINE DEFAULTS - Recalls the DEFAULTS screen (described in Section 2.3) and allows initialized values to be changed. The ENTER key enters the new values and recalls the main menu.
- PF15 - RUN SUBPROGRAM - Causes TCCOPY to branch to the RUN screen, which requests the name of a file to be run as a subprogram. Any program that completes its execution with a RETURN or STOP (or some other normal completion method) may be used. When the subprogram terminates, the main menu reappears. (If the subprogram is cancelled by either the operator or the system, the communications session will be aborted.)
- PF16 - EXIT - Terminates TCCOPY and recalls the Command Processor Menu. (For a dial-up line, also disconnects the line.)

2.5 USING PROCEDURES

The VS Operating System supports a special Supervisor Call (SVC) routine, the "GETPARM" SVC, that solicits and accepts run-time parameter information and also displays and awaits acknowledgment of run-time messages. GETPARM-generated prompts solicit parameter information from the workstation user or from procedure-generated control blocks, and the entered data undergoes verification checks.

TCCOPY, like the VS system utilities, uses GETPARM requests wherever possible. Thus, TCCOPY can be supplied with information for most or all of its parameters using procedures that reduce or eliminate operator intervention. For interested readers, the VS Programmer's Introduction provides a detailed discussion of the Procedure language; Section 2.6 provides a flow diagram and the GETPARMs for TCCOPY.

To write a procedure for unattended operation of TCCOPY, the timer option (one of the STREAM parameters) must be utilized. Also, the auto-dial option must be utilized if the unattended TCCOPY session is to occur over a switched communications line. There are two GETPARMs that correspond to these options: DIAL and RCVWAIT. The DIAL information is described in Section 2.3 of this chapter since the auto-dial option may be useful even during attended operation of TCCOPY. The RCVWAIT information is described here.

Providing the RCVWAIT Information

Although the RCVWAIT screen appears if the TIMER parameter in the STREAM screen is set to YES (indicating that TCCOPY is to wait a specified length of time for file reception before allowing other functions to occur), the timer option is normally used only in a procedure that runs TCCOPY without operator intervention. Information is requested for three parameters, which represent the specified time: HOURS, MINUTES, and SECONDS. If the specified time period elapses without file reception occurring, the TIMEOUT screen appears; otherwise, the FUNCTION screen appears.

Both the FUNCTION and the TIMEOUT screens provide access to seven functions, which are identical on both screens. Furthermore, six of the seven functions are identical to those found on the main menu; the function not available in the main menu but available in FUNCTION and TIMEOUT is:

- PF5 - SET TIMER AND WAIT IN RECEIVE - If activated, this function initiates another waiting period. (If reception occurs during the waiting period, the FUNCTION screen appears when reception is completed; otherwise, the TIMEOUT screen appears.)

The flow diagram in Figure 2-1 summarizes the functions available via the FUNCTION, TIMEOUT, and main menu screens.

NOTE:

When writing procedures, a programmer must remember that FUNCTION and TIMEOUT are GETPARMs, but the main menu is not. Also, remember that the Procedure language uses the first unused pname in a procedure; therefore, be careful when including the RCVWAIT, FUNCTION, and TIMEOUT pnames in a procedure -- only FUNCTION or TIMEOUT, not both, is used after RCVWAIT's specified time period is initiated. See Section 2.7 for sample procedures illustrating unattended and attended operation of TCCOPY.

2.6 TCCOPY FLOW DIAGRAM, RETURN CODES, AND GETPARM REQUESTS

TCCOPY's major branches and GETPARM requests are shown in Figure 2-1. Any uppercase word that is not enclosed in parentheses is a GETPARM parameter-reference-name (prname). These prnames appear in Table 2-1 with their "keywords" (labels for the modifiable fields within each GETPARM); also, the options and default values for each keyword are included as a reference guide for programmers when writing procedures.

The flow diagram should be useful to both operators and procedure writers. The diagram's prnames appear in the TCCOPY displays, e.g., STREAM (the prname for the first GETPARM request in TCCOPY) appears in the display headed by the following message:

```
*** MESSAGE 0002 BY TCCOPY
```

```
                INFORMATION REQUIRED BY PROGRAM TCCOPY  
                TO DEFINE STREAM
```

Below this message, the keywords and default values appear. The operator may alter the default values, if desired, before using the ENTER key to indicate acceptance of the displayed values. After the STREAM characteristics are entered, the next prname (DEFAULTS) and its keywords are displayed.

Return Codes

Information about return codes is also of interest to procedure writers. The return code for normal completion of TCCOPY is 0 (zero). Nonzero codes are returned for abnormal completion.

Any abnormal file status causes a cancellation of TCCOPY and sets the return code to the file status. For example, if file status 97 (length error) occurs, the return code equals 97.

Any communication error reported to TCCOPY by the 22V06 IOP sets the file status to 30. For example, if the IOP detects that the DSR (Data Set Ready) signal has dropped or a DLE EOT (End-of-transmission) control code has been received, the file status becomes 30. Thus, the return code equals 30.

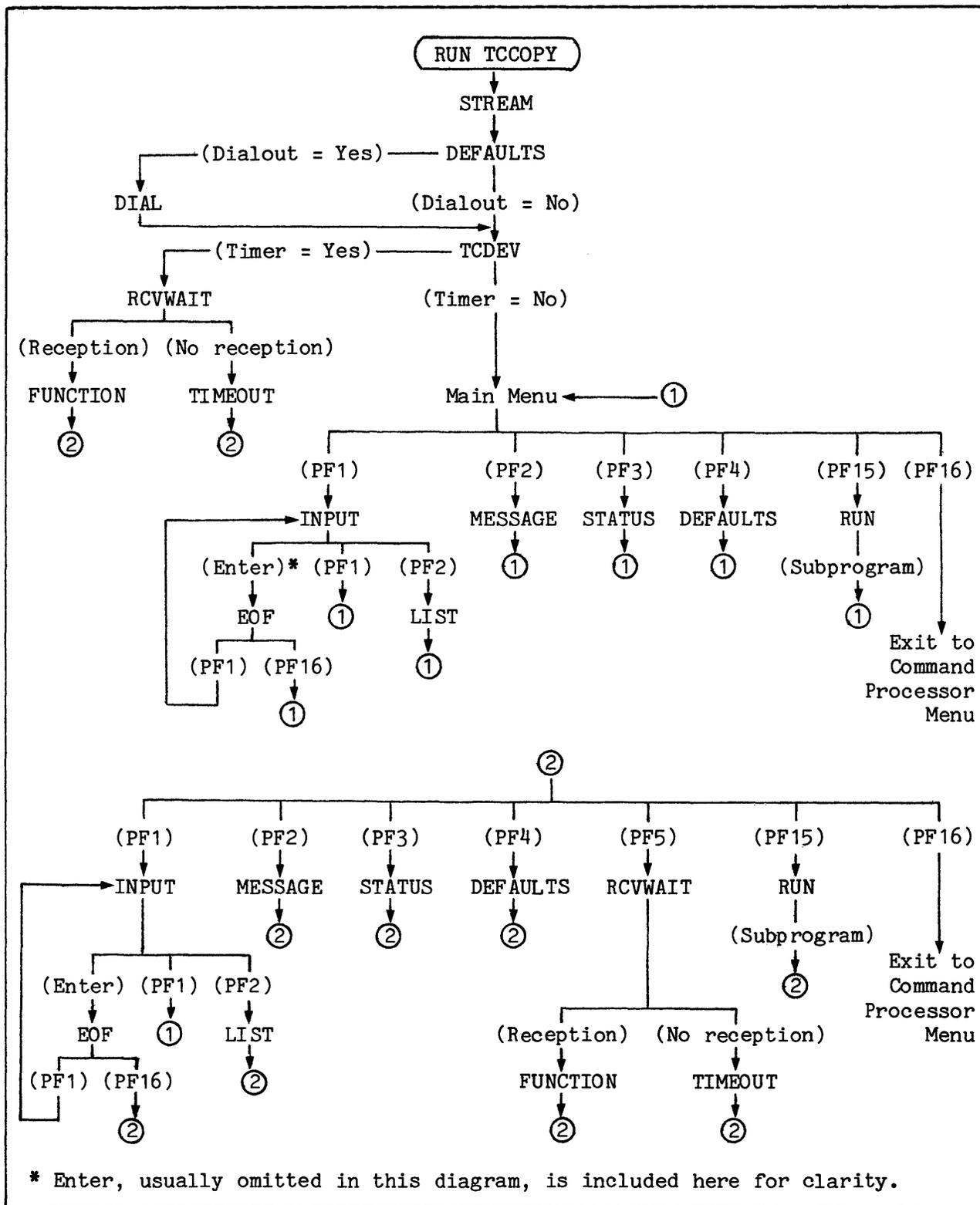


Figure 2-1. TCCOPY Flow Diagram

Table 2-1. TCCOPY's GETPARM Requests

Prname	Keyword	Length	Options	Default
STREAM	MODE	4	2780, 3780	2780
	BLOCKING	3	YES, NO	YES
	HOST	3	YES, NO	NO
	DIALOUT	3	YES, NO	NO
	RATE	1	0, 1, 2	1
	TIMER	3	YES, NO	NO
	RECEIVE	5	PRINT, PUNCH, BOTH	BOTH
DEFAULTS	FILE1	FILE2	4	
	LIBRARY1	LIBRARY2	8	
	VOLUME1	VOLUME2	6	
	RECORDS1	RECORDS2	7	
	RETAIN1	RETAIN2	3	
	RELEASE1	RELEASE2	3	YES, NO
	FILCLAS1	FILCLAS2	1	
	PRTCLASS		1	A through Z
	FORM#		3	0 through 254
	PRNTMODE		1	S, H, K, O
	PUNCHREC	3	YES, NO	
DIAL	DIALER	1	0, 1, 2	0
	ADDRESS	1	0, 1, 2, 3	0
	MODEM	2	0, 1, 2, ..., 14	00
	NUMBER	23	Digits, #, *, or :	
TCDEV	DEVICE	3		
RCVWAIT	HOURS	2	00, ..., 23 (Op. Sys. limit)	00
	MINUTES	2	00, ..., 59 (TCCOPY limit)	00
	SECONDS	2	00, ..., 59	00
FUNCTION	PF Keys *		1=Transmit file(s) 2=Send message 3=Show session status 4=Redefine defaults 5=Set timer & await reception 15=Run subprogram 16=Exit	
TIMEOUT	PF Keys *		1=Transmit file(s) 2=Send message 3=Show session status 4=Redefine defaults 5=Set timer & await reception 15=Run subprogram 16=Exit	

* No keyword - use PF key specification.

(Table continued on next page.)

Table 2-1 (Cont.). TCCOPY's GETPARM Requests

Prname	Keyword	Length	Options	Default
INPUT	FILE	8		
	LIBRARY	8		
	VOLUME	6		
	OPTION1	3	YES, NO (Yes=Translate)	YES
	OPTION2	3	YES, NO (Yes=Transparency)	NO
	OPTION3	6	READER, PRINT, PUNCH (Print/Punch - host mode only)	READER
LIST	LIBRARY	8		
	VOLUME	6		
	OPTION1	3	YES, NO (Yes=Translate)	YES
	OPTION2	3	YES, NO (Yes=Transparency)	NO
	OPTION3	6	READER, PRINT, PUNCH (Print/Punch - host mode only)	READER
	EOF	PF Keys *		1=Transmit another file 16=To FUNCTION or main menu
STATUS	**			
MESSAGE	FIRST40	40		
	LAST40 ***	40		
RUN	FILE	8		
	LIBRARY	8		
	VOLUME	6		

* No keyword -- use PF key specification.

** This GETPARM requests no information.

*** If a message does not exceed 40 bytes, a blank enclosed in quotation marks in the second 40-byte field ensures that no characters from a previously specified message are appended to this message.

2.7 SAMPLE PROCEDURES FOR TCCOPY

User-written procedures can supply information to the TCCOPY program to simplify or eliminate an operator's intervention. Two sample procedures are presented in this section. The first procedure demonstrates how the need for operator intervention can be greatly reduced; the procedure is well-documented with comment statements. The second procedure completely eliminates the need for operator intervention and may be used in background mode; this procedure is also well-documented with comments. Refer to the flow diagram (Figure 2-1) and Table 2-1 in Section 2.6 to supplement the comments in the sample procedures.

Sample Procedure 1

PROCEDURE TCPROC1

*
*
* PROCEDURE: TCPROC1
* CREATED: 06/01/79
* PURPOSE: TO ASSIST AN RJE OPERATOR BY PERFORMING THE REQUIRED
* INITIALIZATION PRIOR TO MANUAL DIAL, SUPPLYING A SIGNON
* MESSAGE (AFTER THE OPERATOR ACTIVATES THE SEND OPTION),
* SUPPLYING THE JCL FILES (AFTER THE OPERATOR INITIATES
* TRANSMISSION OF THE FIRST FILE), AND FINALLY LEAVING THE
* MAIN MENU FOR FURTHER ACTION IF DESIRED.
*

SCRATCH LIBRARY TCRECV ON VOL888
RUN TCCOPY

*
* SET UP INITIAL PARAMETERS: 2780 AND RCV FILE NAMES.
*

ENTER STREAM MODE=2780,HOST=NO,RECEIVE=BOTH
ENTER DEFAULTS FILE1=PRT,LIBRARY1=TCRECV,VOLUME1=VOL888,
FILE2=PUNC,LIBRARY2=TCRECV,VOLUME2=VOL888
ENTER TCDEV DEVICE=64

*
* THE PROCEDURE NOW WAITS FOR THE OPERATOR TO DIAL THE PHONE.
* WHEN THE CONNECTION IS MADE, THE MAIN MENU APPEARS.
* TO SEND THE SIGNON CARD, THE OPERATOR KEYS PF2.
*

ENTER MESSAGE FIRST40="/*SIGNON ID,PASSWORD",
LAST40=" "

*
* THE MAIN MENU REAPPEARS.
* TO SEND THE FIRST FILE, THE OPERATOR KEYS PF1 (THE OTHER FILES ARE SENT
* BY THE PROCEDURE).
*

ENTER INPUT FILE=JCLFILE,LIBRARY=JCL,VOLUME=VOL888
ENTER EOF 1
ENTER INPUT FILE=JCLDATA1,LIBRARY=JCL,VOLUME=VOL888
ENTER EOF 1
ENTER INPUT FILE=JCLDATA2,LIBRARY=JCL,VOLUME=VOL888
ENTER EOF 16

*
* THE MAIN MENU REAPPEARS; THE OPERATOR MAY CONTINUE FROM THIS POINT.
*

RETURN

Sample Procedure 2

```

PROCEDURE      TCPROC
*
*      PROCEDURE: TCPROC
*      CREATED:   06/01/79
*      PURPOSE:   TO AUTODIAL A REMOTE HOST, IMMEDIATELY SEND A SIGNON CARD,
*                WAIT 30 SECONDS FOR ANY QUEUED OUTPUT FROM THE HOST, THEN
*                SEND A JCL FILE AND WAIT FOUR MINUTES FOR OUTPUT TO BE SENT
*                BEFORE ENDING THE SESSION.
*
*                SCRATCH LIBRARY TCRCV ON VOL888
*                RUN TCCOPY
*
*      SET UP INITIAL PARAMETERS: 2780, PHONE NUMBER, AND RCV FILE NAMES,
*                SET TIMER=YES FOR UNATTENDED OPERATION.
*
*      ENTER STREAM      MODE=2780,HOST=NO,DIALOUT=YES,RECEIVE=BOTH,
*                        TIMER=YES
*      ENTER DEFAULTS    FILE1=PRT,LIBRARY1=TCRCV,VOLUME1=VOL888,
*                        FILE2=PUNC,LIBRARY2=TCRCV,VOLUME2=VOL888
*      ENTER DIAL        NUMBER="9:1239999"
*
*      NOTICE THE COLON INDICATES THE DIAL TONE THAT OCCURS AFTER
*      "9" OBTAINS AN OUTSIDE TELEPHONE LINE.
*
*      ENTER TCDEV       DEVICE=64
*
*      NOW THE AUTO-CALL UNIT WILL DIAL THE NUMBER AND AWAIT CONNECTION.
*
*      DO NOT INITIATE A WAITING PERIOD (SET TIMER TO ZERO).
*
*      ENTER RCVWAIT     HOURS=00,MINUTES=00,SECONDS=00
*
*      SEND SIGNON MESSAGE
*
*      ENTER TIMEOUT     2
*      ENTER MESSAGE     FIRST40="/*SIGNON      ID,PASSWORD",
*                        LAST40=" "
*
*      NOW SET THE TIMER FOR 30 SECONDS AND AWAIT REPLY.
*
*      ENTER FUNCTION    5
*      ENTER RCVWAIT     HOURS=00,MINUTES=00,SECONDS=30
*
*      IF TIMEOUT (NO RECEPTION) OCCURS, EXIT AND DISCONNECT LINE.
*
*      ENTER TIMEOUT     16

```

(Continued on next page.)

Sample Procedure 2 (Continued)

```
*
*   IF RECEPTION OCCURS, SEND A JCL FILE.
*
*       ENTER FUNCTION      1
*       ENTER INPUT        FILE=JCLFILE,LIBRARY=JCL,VOLUME=VOL888
*       ENTER EOF          16
*
*   SET THE TIMER FOR 4 MINUTES AND AWAIT A RESPONSE.
*
*       ENTER FUNCTION      5
*       ENTER RCVWAIT      HOURS=00,MINUTES=04,SECONDS=00
*
*   TERMINATE THIS SESSION AFTER RECEPTION OR TIMEOUT OCCURS.
*
*       ENTER FUNCTION      16
*       ENTER TIMEOUT       16
*
*   RETURN
```

CHAPTER 3 VS-TO-VS FILE TRANSFER

3.1 OVERVIEW

VSCOPY is a communications-based program that handles file transfer between two VS computer systems. This program supports point-to-point, half-duplex communications over leased or switched (dial-up) networks. VSCOPY's Wang-developed protocol has several features found in TCCOPY's 2780 and 3780 emulations: cyclic redundancy checking, automatic extended retransmission, and wait-before-transmit positive acknowledgment. Other VSCOPY features differ from the TCCOPY features.

Since all VS processors use ASCII as their native code set, the VSCOPY program (unlike TCCOPY) has no need to translate from ASCII to EBCDIC when transmitting or vice versa when receiving files. More importantly, VSCOPY (unlike TCCOPY) transmits and receives files without changing the characteristics and structure of the original files. A program file transmitted from one VS system to another becomes a "copy" which is executable in the receiving system. A received print file may be printed; an indexed file retains its index information. Moreover, the name of the original file normally becomes the name of the received file although the file is stored in the library specified by the receiving operator.

To transfer files between two VS systems, both systems must be running VSCOPY. In each system, VSCOPY can be operated from the Command Processor Menu or a user-written procedure. Also, a subprogram may be run while executing VSCOPY, but VSCOPY cannot be run in background mode.

Via VSCOPY, messages may be sent from the operator in one system to the operator running VSCOPY in another system. The message capability provides one method of obtaining desired files. In this method, the operator who receives the message initiates the actual file transmission to the other system. Alternatively, by providing a password (if required), "system-1" may request a file from "system-2", and system-2 can transmit the file to system-1 without operator intervention (if the system-2 operator has access rights to the requested file).

3.2 REQUIREMENTS

To operate VSCOPY, the VS processor must be equipped with Operating System 3.0 (or later) and a 22V06-1, -2, or -3 Communications IOP. Also, a suitable modem must be attached to each port to be used for batch communications. (See Section 1.3.)

To support VSCOPY's optional auto-call feature, an automatic calling

unit (ACU) must be attached to an RS-366, CCITT V.11 compatible connector on the IOP. Auto-call (also referred to as auto-dial) is a useful feature for VS computers that regularly communicate with many systems via a switched network.

3.3 VSCOPY INITIALIZATION

When the Command Processor Menu is used to run VSCOPY, at least three screens (STREAM, DEFAULTS, and TCDEV) request initializing information before the main menu appears. An optional initializing screen (DIAL) is normally bypassed since it is appropriate only if the auto-dial feature is desired for communications over a switched network.

Responding to the STREAM Screen

Information that applies to the entire VSCOPY session is requested for the following parameters:

- DIALOUT - Indicates whether an automatic calling unit (ACU) is to be used. NO (the default answer) suppresses the DIAL screen. YES is appropriate only if there is an ACU attached to the 22V06 IOP.
- RATE - This parameter may be ignored for a session over a leased or switched network. For a session using a Wang null modem on a cabled connection to a host or terminal, the 22V06 IOP generates a clocking signal on RS-232-C pin 11; the value assigned here determines the signal's rate. The default value is 1 (for 4800 baud or bits per second); other valid values are 0 (for 2400 baud) and 2 (for 9600 baud).
- PASSWORD - If nonblank, this parameter specifies a password that must be used by the remote VSCOPY program each time a REQUEST function is activated from its main menu. To deactivate the password feature, enter blanks in the six-byte field (which contains the default password XXXXXX); otherwise, the "local" VSCOPY program compares the password in a remote request with the password in this field and denies the request if these words do not match.

NOTE:

When two VS systems are communicating via VSCOPY programs running in each system, either system is remote with respect to the other system. To avoid confusion, this chapter calls the reader's system the local system.

The local system's VSCOPY password, if any, is independent of the remote system's VSCOPY password, if any. The decision to specify a password or

deactivate the feature must be based on the local system's need to protect against unauthorized transmission of its files. Remember that the VSCOPY program does not reveal its initialized password to the remote system when communicating with that system; therefore, any password specified when initializing VSCOPY should be a word previously disclosed via a memorandum or telephone call to an authorized person at the remote site. If the password is not known at the remote site, the remote operator can obtain a file only by activating the MESSAGE function (a main menu function), sending a message indicating the desired file, and waiting for the local operator to initiate transmission of the file. (See Section 3.4.)

Also remember that the local operator's access rights to VS files, in addition to the password, determine whether a requested file can be transmitted to the remote site. If the conditions for successful transmission are not satisfied, the local VSCOPY program automatically sends a message to the remote VSCOPY program and the message is displayed at the remote site.

Responding to the DEFAULTS Screen

This initializing information may be altered later, if desired, by using the REDEFINE DEFAULTS option in the main menu. The information requested by this screen is needed when the local system creates its copies of received files. Default values for the library, volume, and file class are extracted from the user's common usage constants; hence, these default values cannot be documented here.

Normally, the name of the original file (the file received from the remote system) is given to the copy created in the local system; so only the following parameters are necessary:

- LIBRARY - Identifies the library for the created files.
- VOLUME - Identifies the volume for the created files.
- RETAIN - Indicates the retention period for the files (the default value is 000).
- FILCLAS - Identifies the file protection class: any valid class defined by the VS system security administrators at the local site.

Responding to the Optional DIAL Screen

This screen appears only if the DIALOUT parameter in the STREAM screen is set to YES, indicating the auto-dial feature is desired for the session. A VSCOPY user may wish to activate the DIAL screen for communications over a switched network if an ACU is available and the telephone and modem are not close to the VS workstation. The parameters are:

- DIALER - Indicates the ACU type. Valid answers are: 0 (for a Bell 801C or equivalent ACU), 1 (for a Bell 801C L1/2), or 2 (for a Vadic). Note: Due to the wide range of available ACU devices, some testing may be needed to determine the

Chapter 3. VS-to-VS File Transfer

appropriate response for this parameter. See Chapter 1, Section 1.4.

- ADDRESS - This field is ignored for Bell dialers. If a Vadic dialer is used, it may have an address of 0, 1, 2, or 3.
- MODEM - This field also is ignored for Bell dialers. If a Vadic dialer is used, it may support modem addresses in the range from 0 through 14 (decimal).
- NUMBER - The complete dialing sequence must be entered in this field. Beginning in the field's first position, enter the numerals and any asterisk (*) or pound (#) sign that may be required; enter a colon to indicate any dial tone (except the first one) heard when manually dialing. When the complete sequence is shown, press ENTER to get the next screen (TCDEV) or PF1 to return to the STREAM screen.

Responding to the TCDEV Screen

There may be as many as three ports per 22V06 IOP and more than one 22V06 IOP in the VS processor; however, there is a uniquely addressable data link processor (DLP) controlling each port. The TCDEV screen requests information for a single parameter:

- DEVICE - Identifies the address of the port (the DLP) which is to control the VSCOPY session.

The valid addresses may be obtained by using the appropriate PF key to invoke "show device status" from the Command Processor Menu and then invoking the "show telecommunication devices" option. Multipoint 22V06 IOPs have consecutively numbered ports beginning with a number that is a multiple of 32. For example, if there is one 22V06-3 IOP in a VS processor, its ports have addresses 32, 33, and 34. If there is a second 22V06-3 IOP in the same VS processor, its ports have addresses 64, 65, and 66.

If an invalid address is provided, VSCOPY prompts the operator and awaits a new address. After a valid address is provided, VSCOPY determines whether the address is already assigned to a session and alerts the operator if another address is required.

After a nonbusy valid address is provided, the message PROGRAM VSCOPY IN PROGRESS appears while VSCOPY awaits a signal that a communications link has been established. If the specified port is locally connected (via a Wang null modem) to a host or a terminal, the DLP immediately receives the necessary signal and alerts the VSCOPY program. Similarly, if the specified port is connected to a leased line, the DLP immediately receives a Data Set Ready signal from the attached modem and alerts the VSCOPY program. On the other hand, if the specified port is attached to a switched network, the desired point-to-point connection must be established by dialing an appropriate telephone number (either manually or via the ACU). Remember that the VSCOPY program cannot proceed until the DLP receives a Data Set Ready signal from the modem attached to the port.

If an ACU is used and this equipment fails to establish a connection because there is a busy signal or no answer, the TCDEV screen displays an appropriate message. The length of time before the ACU abandons its attempt to connect with the remote system depends upon the actual ACU in use. The time may be as long as 30 seconds.

After VSCOPY is initialized and the communications link has been established (if using a dial-up line), the main menu appears.

3.4 THE MAIN MENU

VSCOPY's main menu provides access to the seven functions described here and shown in the flow diagram in Figure 3-1.

NOTE:

The message DATA TRANSMISSION IN PROGRESS is displayed during transmission; the message DATA RECEPTION IN PROGRESS is displayed during reception. If a main menu function is activated after the 22V06 IOP begins receiving data but before VSCOPY starts its reception procedure and displays the reception-in-progress message, the activated function is interrupted; however, VSCOPY automatically returns to the interrupted function when reception is completed.

- PF1 - TRANSMIT FILE(S) - Causes VSCOPY to branch to the INPUT screen. If only one file is to be transmitted, the INPUT screen requests the file, library, and volume names for the file and also requests whether the name of the file should be transmitted to the remote system (YES or NO). After this information is entered and the file transmission is completed, the EOF screen appears; then PF1 is used to transmit another file by recalling the INPUT screen, or PF16 is used to return to the main menu. If an entire library of files is to be transmitted, the INPUT screen provides the alternative of pressing PF2 to cause a branch to the LIST screen. The LIST screen does not request a file name and does not ask whether file names should be transmitted (transmission of names is automatic); otherwise, the LIST and INPUT screens are the same. After the LIST screen information is entered and the library transmission is completed, the main menu reappears.
- PF2 - TRANSMIT MESSAGE - Causes VSCOPY to branch to the MESSAGE screen. The MESSAGE screen provides two 40-byte fields into which the desired message can be entered; then the main menu reappears in the local system and the message appears on the screen of the remote VS workstation running the VSCOPY program.

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The remote operator must respond by touching the ENTER key before further communication can occur.

- PF3 - REQUEST FILE - Causes VSCOPY to branch to the REQUEST screen. The REQUEST screen allows the local operator to request a particular file from the remote system without intervention from the remote operator; however, successful reception of the file is dependent upon these conditions: (1) the local operator, when responding to the REQUEST screen, must enter the file, library, and volume names of the desired file and also correctly enter the password (if any) required by the remote system and (2) the remote operator must have access rights to the requested file. If these conditions are not satisfied, the remote system automatically sends a message to the local system.
- PF4 - CURRENT SESSION SUMMARY INFORMATION - Causes VSCOPY to branch to the STATUS screen, which shows the number of files transmitted, number of files received, number of records transmitted, and number of records received. The ENTER key recalls the main menu.
- PF5 - REDEFINE DEFAULTS - Recalls the DEFAULTS screen (described in Section 3.3) and allows initialized values to be changed. The ENTER key enters the new values and recalls the main menu.
- PF15 - RUN SUBPROGRAM - Causes VSCOPY to branch to the RUN screen, which requests the name of a file to be run as a subprogram. Any program that completes its execution with a RETURN or STOP (or some other normal completion method) may be used. When the subprogram terminates, the main menu reappears. (If the subprogram is cancelled by either the operator or the system, the communications session will be aborted.)
- PF16 - EXIT - Terminates VSCOPY and recalls the Command Processor Menu. (For a dial-up line, also disconnects the line.)

3.5 RECEPTION-RELATED SCREENS

As indicated in the previous section, the message DATA RECEPTION IN PROGRESS appears on the local workstation screen while reception is active. This message is generated by the local VSCOPY program whether reception was initiated from: (1) the remote VSCOPY's main menu via either PF1 - Transmit file(s) or PF2 - Transmit message or (2) the local VSCOPY's main menu via PF3 - Request file. Once reception is completed, however, the local VSCOPY program may return to the main menu or go to one of the reception-related screens (RCVMSG or DFILE).

The RCVMSG Screen

The RCVMSG (received message) screen appears on the local workstation with an appropriately worded message when: (1) the remote operator has used PF2 (Transmit message) and that message is being displayed locally or (2) the local operator has used PF3 (Request file) but the remote system has denied

the request and automatically generated a message that is being displayed for the local operator.

The local operator must acknowledge an RCVMSG screen by pressing the ENTER key; otherwise, no further communication with the remote system is possible. The ENTER key recalls the main menu to the local workstation.

The DFILE Screen

The DFILE screen does not appear if files are being successfully transferred between two VS systems. When this screen appears, it indicates corrective action is necessary to continue transmission from the remote system. However, if the DFILE screen indicates a required correction that seems inconsistent for VS files, the screen may have occurred because the local VSCOPY program is communicating with either a non-VS system or a VS system that is not currently running the VSCOPY program. In either case, it may be necessary to cancel the VSCOPY program.

3.6 USING PROCEDURES

The VS Operating System supports a special Supervisor Call (SVC) routine, the "GETPARM" SVC, that solicits and accepts run-time parameter information and also displays and awaits acknowledgment of run-time messages. GETPARM-generated prompts solicit parameter information from the workstation user or from procedure-generated control blocks, and the entered data undergoes verification checks.

VSCOPY, like the VS system utilities, uses GETPARM requests wherever possible. Thus, VSCOPY can be supplied with information for several of its parameters using procedures that reduce the need for local operator action, particularly during initialization. For interested readers, the VS Programmer's Introduction provides a detailed discussion of the Procedure language; Section 3.7 provides a flow diagram and the GETPARMs for VSCOPY.

3.7 VSCOPY FLOW DIAGRAM, RETURN CODES, AND GETPARM REQUESTS

VSCOPY's major branches and GETPARM requests are shown in Figure 3-1. Any uppercase word that is not enclosed in parentheses is a GETPARM parameter-reference-name (prname). These prnames appear in Table 3-1 with their "keywords" (labels for the modifiable fields within each GETPARM); also, the options and default values for each keyword are included as a reference guide for programmers when writing procedures.

The flow diagram should be useful to both operators and procedure writers. The diagram's prnames appear in the VSCOPY displays, e.g., STREAM (the prname for the first GETPARM request in VSCOPY) appears as follows:

```
*** MESSAGE 0002 BY VSCOPY
```

```
INFORMATION REQUIRED BY PROGRAM VSCOPY
TO DEFINE STREAM
```

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Below the message, the keywords and default values appear. The operator may alter the default values, if desired, before using the ENTER key to indicate acceptance of the displayed values. After the STREAM characteristics are entered, the next prname (DEFAULTS) and its keywords are displayed.

Return Codes

Information about return codes is also of interest to procedure writers. The return code for normal completion of VSCOPY is 0 (zero). Nonzero codes are returned for abnormal completion.

Any abnormal file status causes a cancellation of VSCOPY and sets the return code to the file status. For example, if file status 97 (length error) occurs, the return code equals 97.

Any communication error reported to VSCOPY by the 22V06 IOP sets the file status to 30. For example, if the IOP detects that the DSR (Data Set Ready) signal has dropped or a DLE EOT (End-of-transmission) control code has been received, the file status becomes 30 and the return code equals 30.

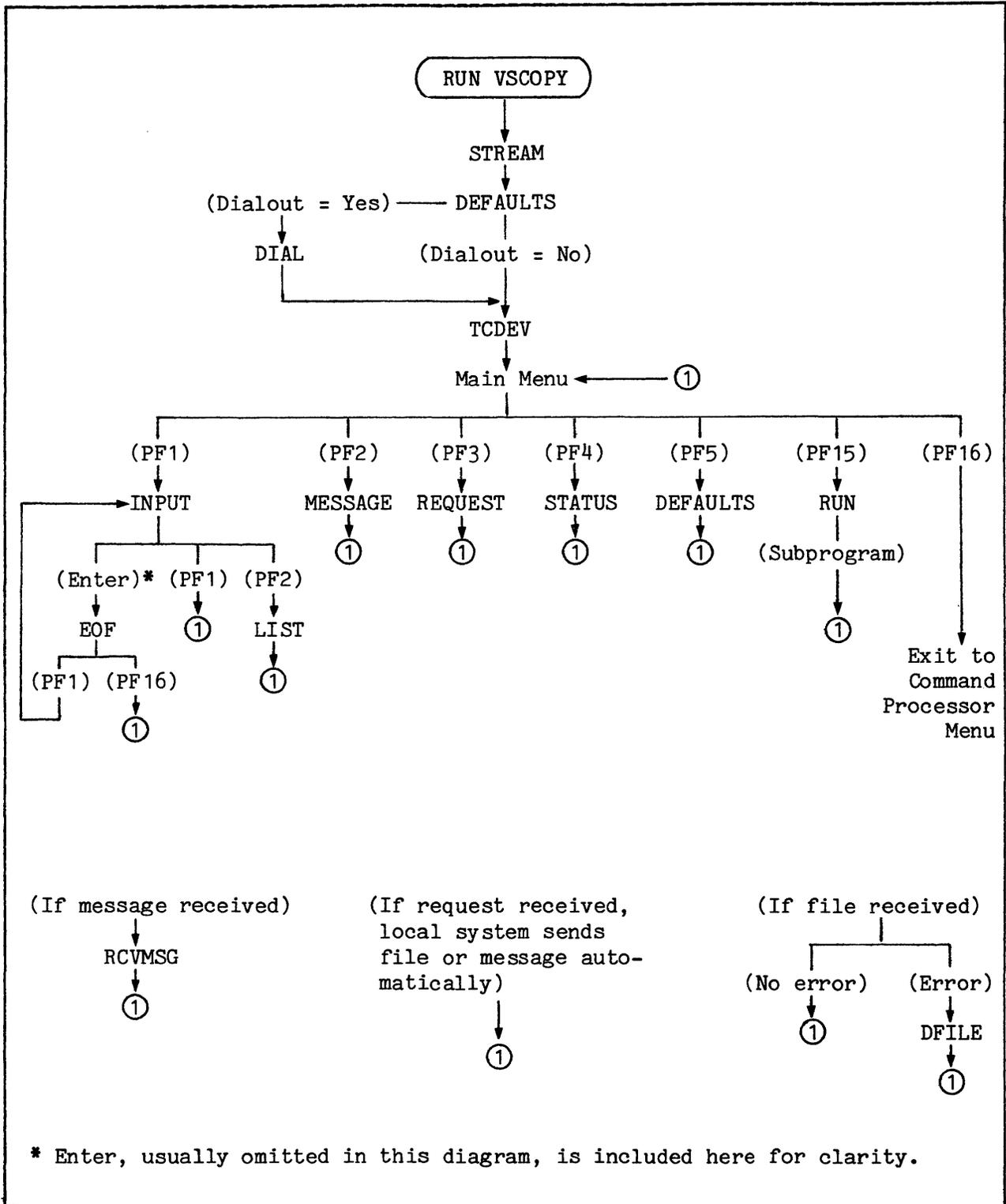


Figure 3-1. VSCOPY Flow Diagram

Table 3-1. VSCOPY's GETPARM Requests

Prname	Keyword	Length	Options	Default
STREAM	DIALOUT	3	YES, NO	NO
	RATE	1	0, 1, 2	1
	PASSWORD	6	Any six characters (all blanks to deactivate)	XXXXXX
DEFAULTS	LIBRARY	8		
	VOLUME	6		
	RETAIN	3		
	FILCLASS	1		#
DIAL	DIALER	1	0, 1, 2	0
	ADDRESS	1	0, 1, 2, 3	0
	MODEM	2	0, 1, 2, ..., 14	00
	NUMBER	23	Digits, #, *, or :	
TCDEV	DEVICE	3		
INPUT	FILE	8		
	LIBRARY	8		
	VOLUME	6		
	NAME	3	YES, NO (Yes=Include name)	YES
LIST	LIBRARY	8		
	VOLUME	6		
EOF	PF Keys *		1=Transmit another file 16=To FUNCTION or main menu	
MESSAGE	FIRST40	40		
	LAST40 **	40		
REQUEST	PASSWORD	6		XXXXXX
	FILE	8		
	LIBRARY	8		
	VOLUME	6		
RUN	FILE	8		
	LIBRARY	8		
	VOLUME	6		

* No keyword -- use PF key specification.

** If a message does not exceed 40 bytes, a blank enclosed in quotation marks in the second 40-byte field ensures that no characters from a previously specified message are appended to this message.

(Table continued on next page.)

Table 3-1 (Cont.). VSCOPY's GETPARM Requests

Prname	Keyword	Length	Options	Default
RCVMSG	***			
DFILE	FORMAT LENGTH RECORDS RETAIN FILECLAS FILOG KEYLEN KEYPOS IPACK DPACK PRTCLASS FORM#	1 4 7 3 1 1 3 4 3 3 1 3	Complete or correct the re- quested file information. Some incompatibility between local and remote systems may be indicated. <u>Note</u> : DFILE is always generated as a respecification (type "R") GETPARM. This always causes a screen transaction and pre- cludes the use of a procedure to handle the condition.	
STATUS	***			

*** This GETPARM requests no information.

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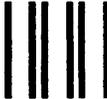
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