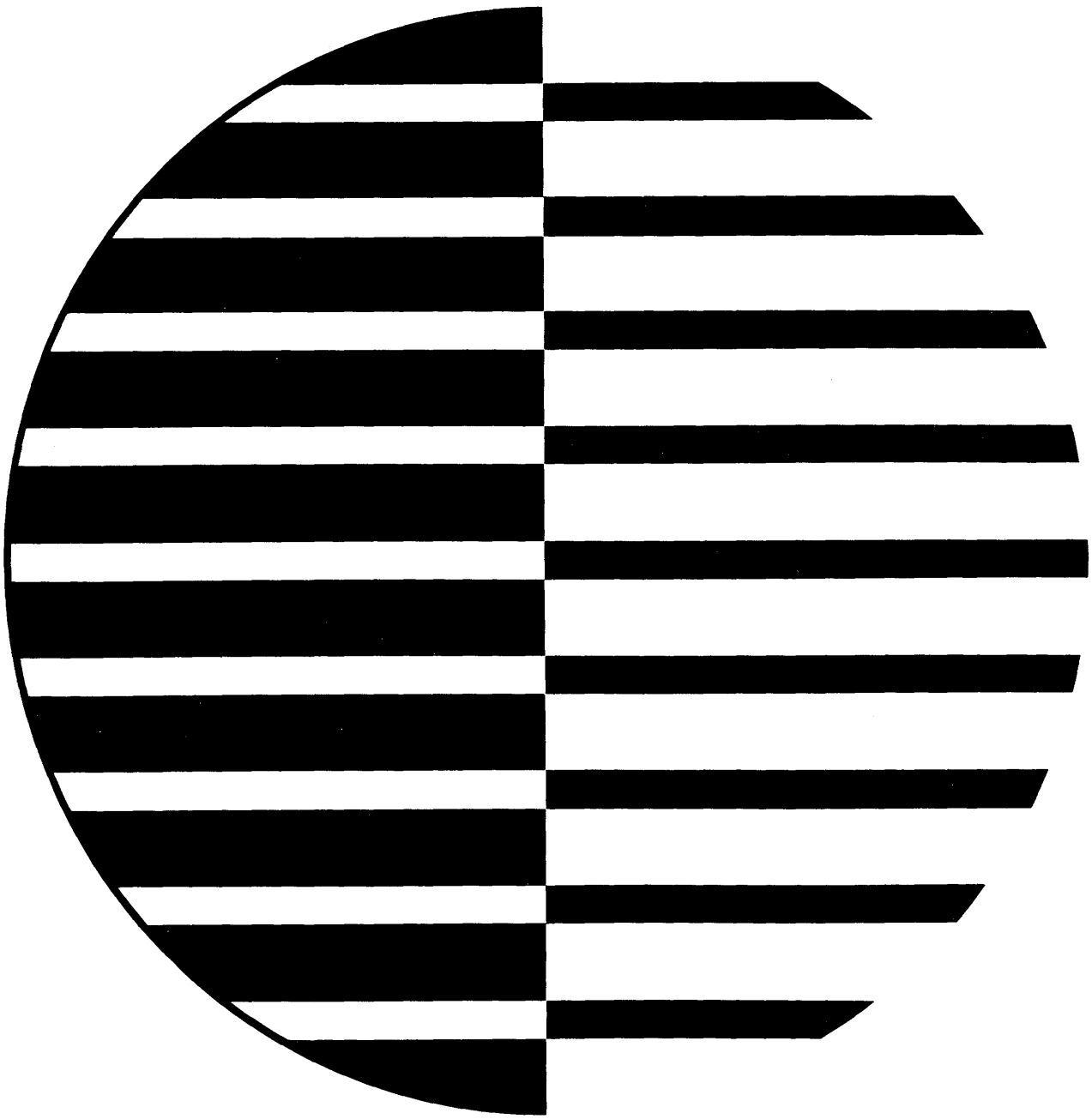
CONTROL DATA®
6400/6500/6600 COMPUTER SYSTEMS
EXPORT/IMPORT 8130 Reference Manual



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CONTENTS

FIGURES

SYSTEM COMPONENTS 1

The 6400/6500/6600 EXPORT/IMPORT 8130 system provides access to central CONTROL DATA®6400/6500/6600 computer systems from multiple terminal stations. Users at remote sites may submit jobs and receive printed output in the same manner as users at the central computer.

EXPORT/IMPORT consists of two basic programs:

- IMPORT, the remote computer resident program
- EXPORT, the peripheral processor resident program

EXPORT/IMPORT 8130 runs under SCOPE Version 3 on the 6400, 6500, and 6600 computer systems. It consists of two separate but dependent programs: The Executive Processor of Remote Tasks (EXPORT) and the Input/Output Monitor for Processing of Remote Tasks (IMPORT). Certain features for remote job processing are included as part of SCOPE Version 3. A familiarity with the SCOPE system is requisite to using this manual.

1.1 EXPORT

EXPORT consists of several overlays, one for handling communications and others for processing data. In addition, several SCOPE system overlays are called as needed. EXPORT communicates with SCOPE input and output routines, which are transient in another peripheral processor (PP), through central memory buffers and flags, and with IMPORT through the data communications facility. EXPORT receives jobs from IMPORT and prepares them for processing under SCOPE. Output data from SCOPE is intercepted by EXPORT and transmitted back to IMPORT.

1.2 IMPORT

The IMPORT program resides in an 8130 remote terminal and communicates with EXPORT over the data communications facility. Card reading and line printing on the buffered I/O channel are overlapped with other processing. Data communication with EXPORT is handled on an interrupt basis. Operator communication is accomplished through the card reader and control panel attached to the 8130. A card-to-printer utility operation can be performed when IMPORT is off-line and not communicating with EXPORT.

1.3 SYSTEM DEPENDENCE

Since EXPORT/IMPORT runs under SCOPE Version 3, any modifications to or restrictions on SCOPE Version 3 must be made with full consideration of EXPORT's requirements on the system. Efficient use of the data communications facility is dependent upon consistently good disk access and the availability of transient peripheral processors.

HARDWARE REQUIREMENTS 2

Since EXPORT/IMPORT is a dependent system under SCOPE, the basic minimum hardware configuration for SCOPE also applies to EXPORT/IMPORT. In addition, certain other equipment is required to provide the data communications facility and its interface with the central computer and the 8130 Remote Terminal.

2.1 CENTRAL COMPUTER

At least one 3266 Communications Terminal Controller (CTC) with a 6681 Data Channel Converter, is required on a separate dedicated 6400 or 6600 Data Channel. Up to eight 311B Data Set Adapters (DSA) may be connected to the CTC. A separate 311B DSA is required for each 201A or 201B DATA-PHONE† Data Set located at the central site. Up to four 6681-3266 CTC combinations may be attached to the computer system; however, each must be on a separate dedicated channel. One peripheral processor (PP) and one control point are dedicated to each active 6681-3266 CTC combination. Figure 1 shows the order in which the minimum hardware configuration is connected.

2.2 REMOTE TERMINAL

The remote terminal consists of a standard 8130 card reader/line printer remote terminal which has the following peripherals attached:

Card reader (100 cards per minute)

Line printer (300 lines per minute)

Data set controller (DSC)

The DSC is attached to the normal channel; the card reader and line printer are attached to the buffer channel of the 8130 Remote Terminal. A maximum of 31 remote terminals is allowed.

†Registered trade mark of AT&T and the Bell System.

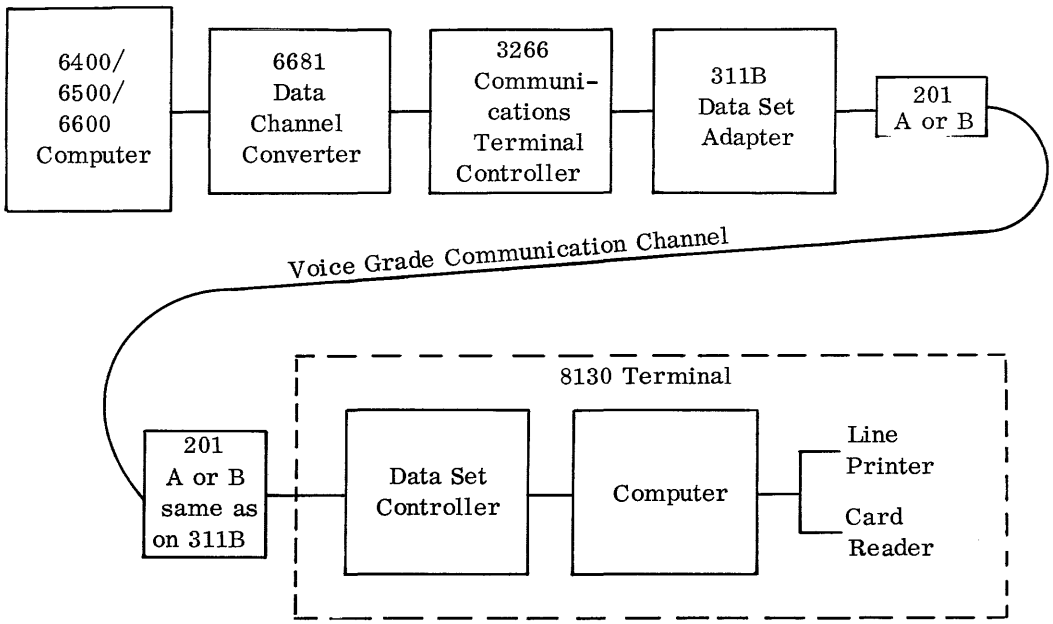


Figure 1 8130 Communication Flow

2.3 COMMUNICATIONS EQUIPMENT

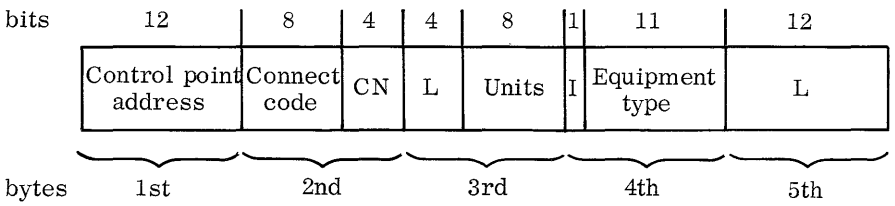
The standard modems used with this system are the AT&T 201A or 201B DATA-PHONE data sets which operate at the nominal data rate of 2000 or 2400 bits per second, respectively. The data set provides the interface between the DSC and the communications line.

The communications line is voice-grade (either manual dial-up or private wire) and is available from a telephone company. Transmission is half duplex over two- or four-wire lines.

201A and 201B DATA-PHONES can be mixed on the same 3266 CTC with either two- or four-wire communications lines. The coding plug options of each 311B DSA must match the features of its corresponding DATA-PHONE; timing should be provided by the data set.

3.1 PREPARATIONS

Before the EXPORT/IMPORT system can be used, entries must be made to the Equipment Status Table (EST) for each of the 3266-6681 combinations attached to the computer system. Care must be taken to determine the unique channel number of each 6681, the controller number (4-7), and how many 311B's are attached to each 3266 CTC. The format of the EST entry is shown below.



Connect code	High-order 8 bits of the connect code for the CTC; high-order octal digit must be (4-7)
CN	Channel number of the 6681
units	311B units attached. A one bit in position 0-7 of the byte indicates that a 311B is attached to a line with the corresponding number. Each 311B takes two of the 16 CTC channels.
I	Equipment interlock bit (1 = lockout)
type	TC in display code (2403_8)
L	Line limit optimization parameter as described below

If all lines on a given CTC are the same, all bits designated L should be zero. To balance the system when 201A and 201B data sets and/or two- or four-wire lines are mixed, different block sizes are needed to keep fast lines operating close to capacity. Since the elapsed time of the communications cycle is fixed, lines with faster data rates and less turnaround time require larger block sizes. The maximum block size sent by EXPORT is determined by the L parameter in the following manner:

Associated Line	EST Bit Number
0	0-1
1	2-3
2	4-5
3	6-7
4	8-9
5	10-11
6	32-33
7	34-35

The two bits associated with each line are used as an index to a table containing the maximum amount of data to be sent in each block. This table of transfer group count (TGC) maximums is found in the Print Processor Overlay (1LX) at MXTTAB and is set to the following values:

```
MXTTAB  161
        137
        133
        109
```

Therefore, by setting bits 4-5 of the EST to 01, a maximum of 137 groups will be sent on line 2. This would be used to balance 201A four-wire data sets with 201A two-wire data sets. The second and third lines of Appendix A show the data maximum rates obtained using this scheme. A 201A two-wire line can be mixed with a 201B four-wire line by putting 11 in the EST bits associated with the two-wire line to limit its block size. Other combinations of lines are not included in the table; if such a system were configurated, other values of MXTTAB could be used to optimize this system.

3.2 JOB NAME AND DISPOSITION

When a job is submitted, the terminal identification (id) replaces the fifth character of the job name. The highest order bit of the disposition code in the File Name/File Status Table (FNT/FST) and the File Environment Table (FET) is set to indicate a remote job.

3.3 SYSTEM DISPLAY PROGRAM

Loading of the EXPORT initialization program is requested by the central operator through the System Display Program (DSD). EXPORT initialization is described in section 5.1.1.

3.4 JOB PROCESSING

Jobs submitted from remote terminals are processed identically to those submitted from the central site. When SCOPE completes the files for a job which has ended, the remote bit in the disposition code field is transferred from the FNT/FST entry for the input file to the FNT/FST entry for all output files. If the remote bit was set, these active output files are ignored for further processing by SCOPE routines. All punched output is diverted to the central site (even when DROP PRINT is requested).

4.1 SIMPLIFIED JOB FLOW

A simplified description of the overall flow for one job is given below showing both input and output for only one terminal. The general input/output functions are identical to those of the READ and OUTPUT packages under SCOPE.

INITIALIZATION

Load IMPORT program deck

Establish DATA-PHONE connections (dial-up only)

Prepare to read cards

Call EXPORT to a control point

INPUT FROM CARDS

Hollerith and binary cards are read by IMPORT

Hollerith cards are converted to display code

Cards are blocked for transmission

Data blocks are transmitted with computed cyclic code attached (6.4.2)

End of information is indicated with the last block

EXPORT reads blocks and checks for transmission error

Trailing blanks are deleted (Hollerith cards) and cards are written to central memory

EXPORT requests SCOPE to write data from central memory to disk

At end of information, input file is released to SCOPE for processing

OUTPUT TO PRINTER

EXPORT scans SCOPE tables for remote files that are ready for output with correct terminal id

EXPORT requests SCOPE to read data from disk to central memory buffers

Repeated blanks and zeros in printer lines are compressed

Compressed print-out is blocked for transmission to IMPORT

Output is transmitted with computed cyclic code attached

End of information is indicated with last block

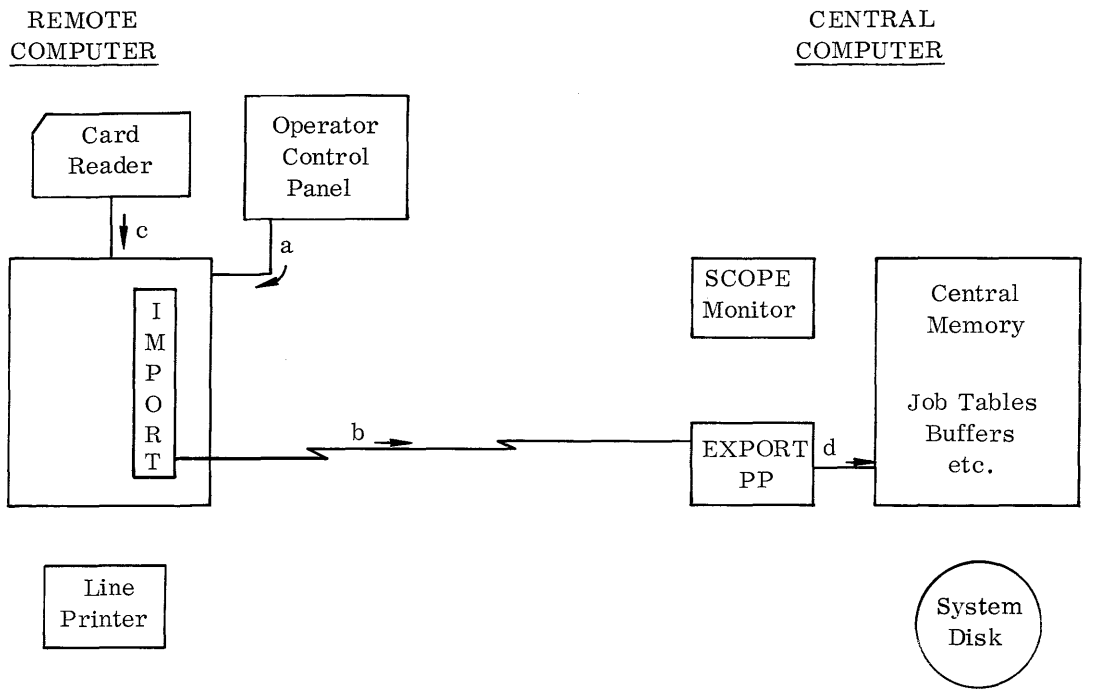
IMPORT checks for transmission error

Print lines are expanded, deblocked, and converted from display to printer code

Lines are printed

4.2 JOB FLOW DIAGRAMS

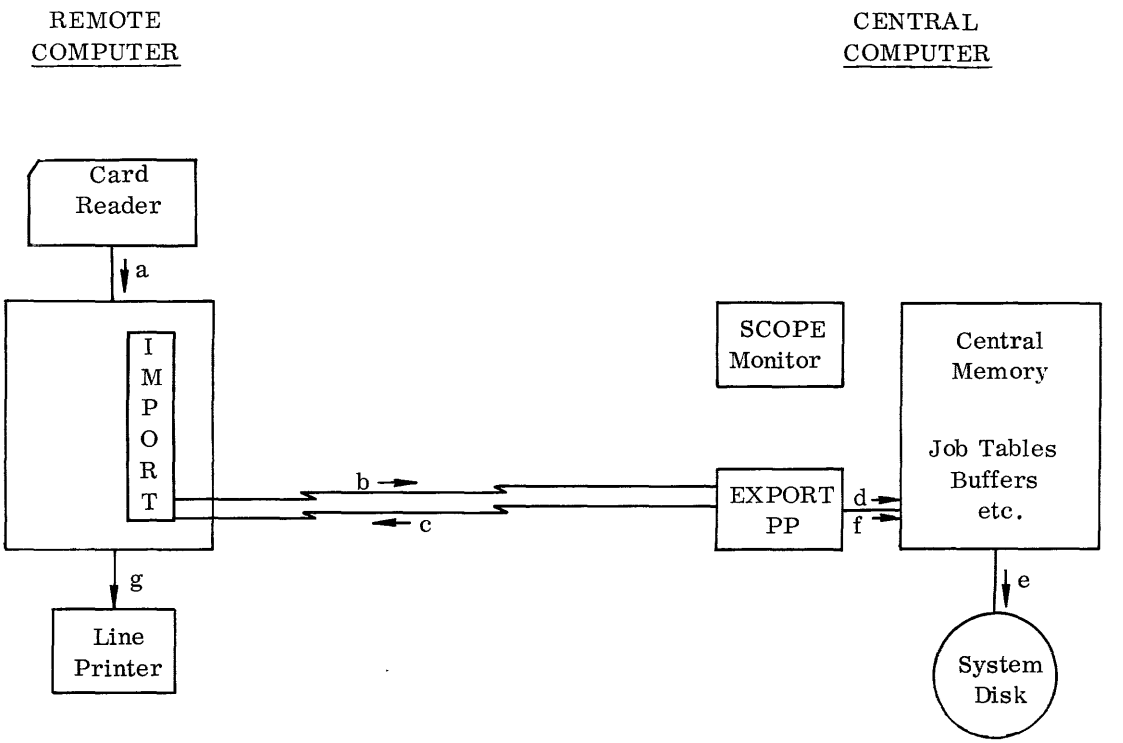
The following diagrams illustrate the flow of data and job control from beginning to end. The diagrams assume that EXPORT has been assigned a control point and loaded into a peripheral processor at the central site and that IMPORT has been loaded into the remote terminal.



IMPORT: Operator presses ALARM RELEASE button when SEND or RECEIVE INDICATOR is lit. (a)
Notifies reader data is available. (b)
Begins to read cards. (c)

EXPORT: Obtains central memory buffer area. (d)

Figure 2 Job Flow, Step 1, Request to Load



IMPORT: Reads job into remote computer. (a)
Transmits data to central site. (b)

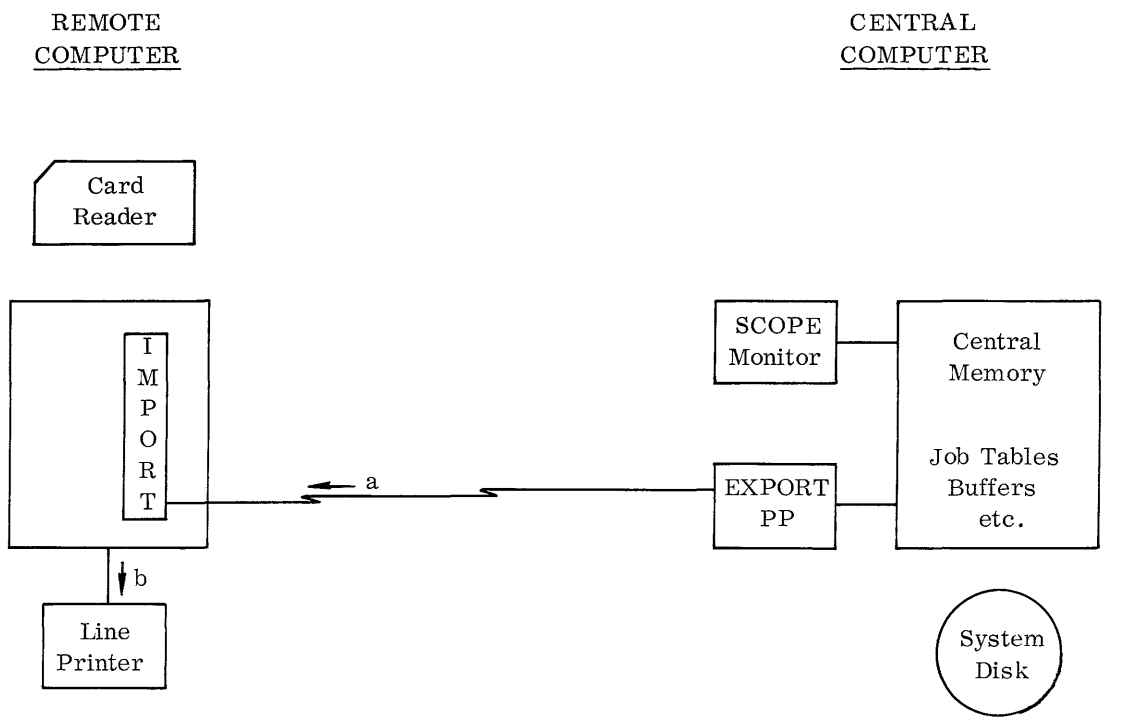
EXPORT: Acknowledges receipt of each block of data. (c)
Transfers data to buffer area in central memory. (d)

SCOPE: Transfers data from buffer area onto system disk. (e)

EXPORT: Records job in job table upon receipt of end of information. (f)

IMPORT: Remote operator is notified of SCOPE job name when job transmission is completed. (g)

Figure 3 Job Flow, Step 2, Load Job

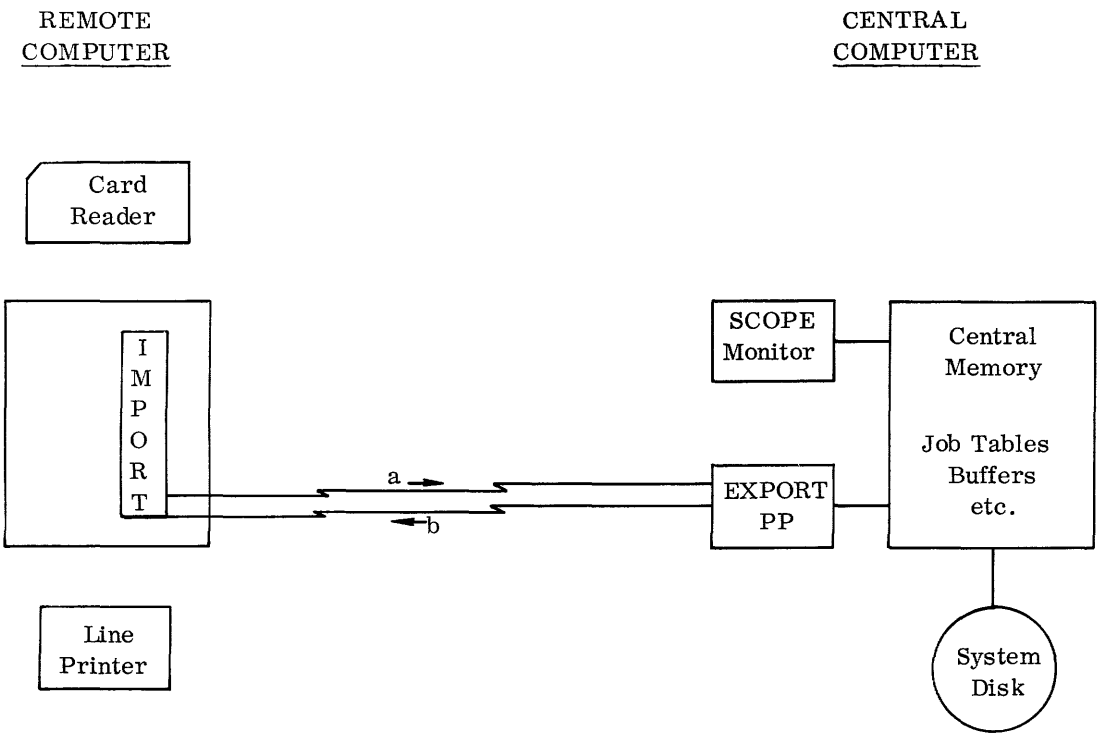


SCOPE: Processes jobs.

EXPORT: Obtains remote job status by monitoring the job table and jobs in memory. Notifies IMPORT of status of jobs, if requested. (a)

IMPORT: Outputs status message to operator. (b)

Figure 4 Job Flow, Step 3, Job Processing

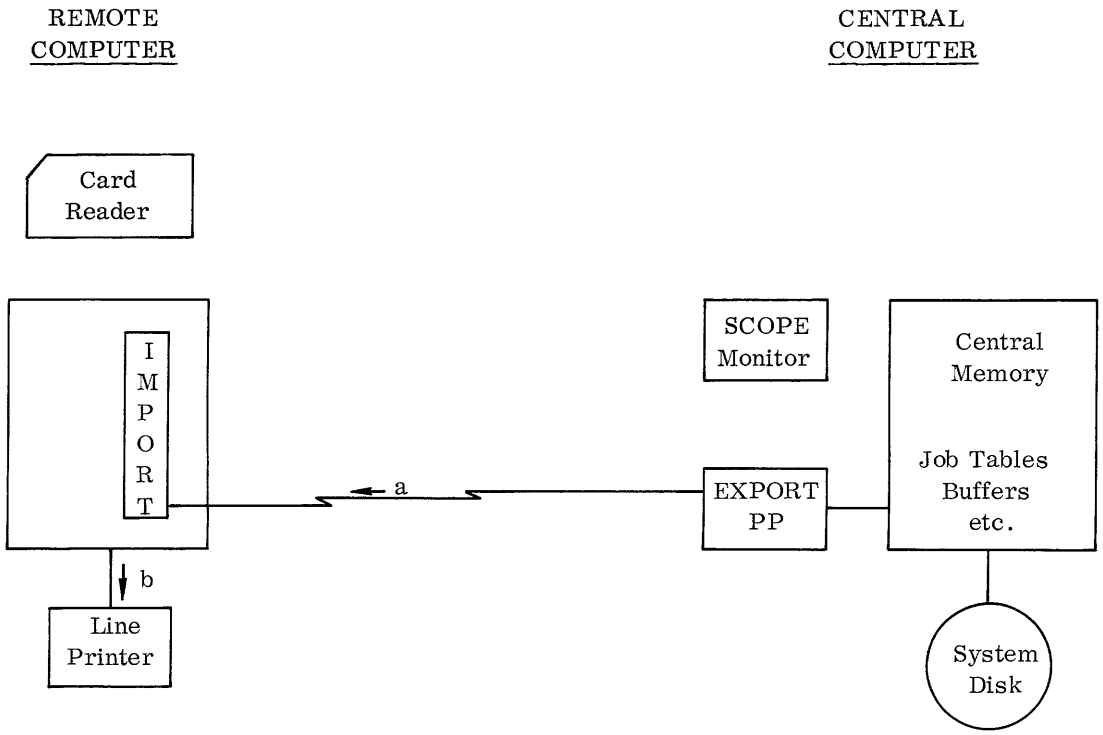


SCOPE: Directs job output data to system disk.

IMPORT: Requests printer output when requested by operator. (a)

EXPORT: Searches job table for job ready for output.
Notifies IMPORT that output is ready. (b)

Figure 5 Job Flow, Step 4, Job Termination



EXPORT: Issues request to transfer output from disk to buffer. Transmits data from buffer to remote site. (a)

IMPORT: Receives data and outputs it to the line printer. (b)

Figure 6 Job Flow, Step 5, Job Output

OPERATOR FUNCTIONS 5

5.1 CENTRAL OPERATOR

The central operator initiates the EXPORT program, monitors the messages on the display console scope, and, if necessary, stops and restores communication through the sense switches.

5.1.1 LOADING EXPORT

To load the EXPORT program, the operator enters a request from the display console keyboard:

n. EXPORT1.

n is the number of an available control point. Normally, EXPORT will be in PP recall until some line for an available CTC is made active.

When EXPORT is called to a blank control point by typing n. EXPORT1, it will periodically (about once per second), check to see if any lines have become active. (A line is active when the remote terminal is dialed in and ready to send or receive.) When an active line is found, the communication terminal controller (CTC) is connected and any additional lines on this CTC can be serviced by this copy of EXPORT. There must be a copy of EXPORT for each active CTC. The additional copies of EXPORT can be called to other blank control points by typing n. EXPORT1.

The following messages may be displayed at the control point area before any lines become active.

NO ACTIVE LINE	EXPORT has tried all lines, but no terminal responded to its status messages. This is the normal idle condition.
NO DSC AVAILABLE	Appears if there is no Equipment Status Table entry for a CTC.
WAITING FOR STORAGE	Appears when EXPORT is waiting for storage before any lines have established communication.
WAITING FOR CHANNEL	Appears when EXPORT is waiting to use a channel to which the lines are connected.

MALFUNCTION ON DSC = x LINE = y CODE = z	Describes hardware problems. x is the EST ordinal of the CTC referenced by EXPORT, y is the line number involved, and z is the numeric error code described in the display messages as x.

5.1.2 DISPLAY MESSAGES

All messages and status information for up to eight lines are displayed in the form:

ℓ. status x

ℓ	terminal id, $A \leq \ell \leq Z$ or $0 \leq \ell \leq 4$ (active), or, line number $0 \leq \ell \leq 7$ (inactive)
status	status indicator
x	special condition indicator

Messages and status information are displayed in two rows at EXPORT's control point in the normal place of the message display. When the line is inactive, the line number appears before the period and POLLING status is present. Otherwise, the terminal id appears. Line status could appear as shown in the following message:

```
0. POLLING   B. STORAGE   J. READ x   D. PRINT x
E. PHONE     F. ERROR y   G. IDLE x    7.
```

These terms are interpreted as follows:

POLLING	Inactive line is being polled (311B attached)
STORAGE	Waiting for storage (central memory buffer space)
READ	Card data being received
PRINT	Printer data being sent
PHONE	Operator has been requested to come to phone
ERROR	Status error y on 6681-3266 Either the hardware is malfunctioning or the EST entry is incorrect.
IDLE	Line is active but not sending data
BAD TID	Flashed when terminal sends a terminal identification which is the same as another line.
(blank)	EST indicates no 311B is attached

x	X	Retransmission requested by IMPORT
	R	Reader data rejected by EXPORT or printer data rejected by IMPORT
	C	Cyclic error detected by EXPORT
	L	Communications lost
	I	Invalid TGC
	1	Communications lost while receiving
	2	Excessive time between words while receiving
	3	Word lost
	4	Excessive time between words while sending
	5	No word request
	6	3266 connect reject

5.1.3 STOP/RESTORE COMMUNICATION

Communication with a particular line (0-7) may be stopped temporarily with the n. ENTL, 1X0. control point request. n is the control point assigned to EXPORT and X is the line number. With this message, the central operator requests the remote terminal operator to come to the phone.

To restore communication, the operator enters:

```
n. ENTL, 2X0.
```

5.1.4 TERMINATE EXPORT

The operator may terminate EXPORT from the display console keyboard by entering:

```
n. DROP.
```

n is EXPORT's control point number. Partially processed print files are returned to SCOPE, to be picked up later by EXPORT; in-process card files are dropped.

5.2 REMOTE OPERATOR

The tasks performed by the 8130 are controlled by the IMPORT program as directed by the remote operator. IMPORT has two operating modes: on-line (communicating with EXPORT) and off-line (a card to printer utility operation). These modes and various options are selected by push buttons on the operator control panel on the front of the 8130 terminal. Only one of the following operations can occur at one time (reading and printing are buffered):

Printing job output or message from EXPORT

Reading job decks or control cards

Card-to-printer utility operation

However, the printing of job output may be suspended temporarily to read a job deck or control cards.

5.2.1 LOADING IMPORT

The following sequence of operations is required to load the IMPORT program:

To load the terminal

- Neutralize all 8092 switches.
- Press the MASTER CLEAR switch.
- Set the card reader switches:

Switch	Position
PAUSE	OFF
AUTO/MAN	AUTO
OFF/ON	ON

- Place the IMPORT 8130 deck in the hopper, with the 12 edge at the front, face down.
- Register the first card by pressing the register switch once.
- Set the MASTER CLEAR/LOAD switch to LOAD.
- Set the RUN/STEP switch to RUN. The deck will load into the 8092 memory. The final value of the P register should be 7500_8.

To run

Neutralize all 8092 switches.

Press the MASTER CLEAR switch.

Set the RUN/STEP switch to RUN.

If the terminal halts, either the deck is mispunched, the cards are out of order, the deck has been misread, or the terminal identification is zero. Check and correct the deck, and re-run it.

If the on-line mode is selected and a dial-up switched network is used for data communications, telephone data connections should be established with the central computer.

5.2.2 CONTROL PANEL

The operator control panel (figure 8), below the main switch and register display panel on the 8130, is used to control IMPORT operation. The panel contains:

2 rotary select switches

7 push buttons

10 indicator lights

The Select Send switch is not used. The Select Receive switch is used to indicate the on-line automatic job printing option. When Select Receive is in the LINE PRINTER position (straight up), the 8130 printer will not stop between output jobs; it will print a job whenever EXPORT sends one. If the automatic option is not desired, the Select Receive switch must be in the OFF position.

The SEND, RECEIVE, and TRANSLATE indicators are mutually exclusive (when one button is pressed, the other two indicators are extinguished). These three indicators are not affected by the ALARM RELEASE button, which clears all other indicators.

When the terminal is communicating with the central site, the SEND light on the 8197 DSC blinks. If both the SEND and RECEIVE lights stay on longer than three seconds, the terminal is probably inoperative.

Instructions for normal operation of the remote terminal are listed below:

INITIATION

A Master Clear followed by a Run initializes the terminal in the mode selected on the operator control panel.

PUSH BUTTONS

SEND or RECEIVE

With the SEND or RECEIVE buttons pressed, IMPORT is ready to communicate with the central site. If the reader does not contain cards, the STOP light will be on. To send a job, load the card deck into the reader with the 12-edge to the front, face down, and register the first card. Place a blank card behind the end-of-file card of the last job to be read.

Press the ALARM RELEASE button to clear the STOP light and initiate reading. If the hopper runs out of cards, the STOP light will come on again. Clear the stacker, put more cards in the hopper and press the ALARM RELEASE button again to permit card reading to continue.

Card reading can be stopped temporarily by pressing the STOP button; it can be continued by pressing the ALARM RELEASE button.

When the last 6,7,8,9 card has been read and the hopper is empty, the STOP light comes on and the status of all jobs in the system is printed. To read more cards, clear the blank card from the read station by pressing register, and then start just as before.

Card reading can be initiated in this manner whether or not printing is in progress. To terminate a job while it is being read in, press the END-OF-MESSAGE button. The ALARM RELEASE, LOCAL TROUBLE, END-OF-MESSAGE, STOP lights and the audible alarm will turn on to signify termination. Clear the card reader and press ALARM RELEASE to resume normal operation.

With the Select Receive switch OFF, printing cannot begin. Turning the Select Receive switch to the LINE PRINTER position initiates printing if any printing jobs are queued at the central site. As long as LINE PRINTER remains selected, jobs are printed as soon as they are completed. To terminate printing at the end of the current job, turn the Select Receive switch OFF. The END OF MESSAGE light will come on to acknowledge the end of the job. Printing can be restarted by turning the Select Receive switch to LINE PRINTER and pressing ALARM RELEASE. Printing can be stopped temporarily by pressing the STOP button on the printer. When the printer is out of paper, it will go to

the Not Ready condition. Any print job can be terminated by pressing the END OF MESSAGE button; printing may be resumed by pressing the ALARM RELEASE button.

TRANSLATE — The TRANSLATE mode can be selected only when other modes have been completed and an END OF MESSAGE is displayed. Hollerith cards are listed; binary cards are ignored. The STOP light and buttons operate the same way as in the send mode. The TRANSLATE mode is terminated when either the SEND or RECEIVE button is pressed.

COME TO PHONE — Pressing the COME TO PHONE button stops communication with the central site. The ALARM RELEASE light turns on and the audible alarm sounds when communication has stopped. The phone used for communications may be used to talk to the central site if a handset is provided. The COME TO PHONE light is cleared by pressing the ALARM RELEASE button. Communication can be restored only by the central operator.

ERROR LIGHTS and ALARMS

In the communications mode, (with the SEND or RECEIVE button pressed), various lights and indicators signify the status of the terminal:

COME TO PHONE and ALARM

The Operator at the central site has stopped communications. Press the ALARM RELEASE button to stop the audible alarm and clear the COME TO PHONE light. Current operation cannot continue until the central operator restores communications.

ALARM, LOCAL TROUBLE, END OF MESSAGE, STOP

An error has been detected in a job card or an operator control card; the operation is terminated. Find the next job in the reader, remove the current job, ready the reader, and press the ALARM RELEASE button to begin sending the next job. Aborting a reader job will produce the same condition.

LOCAL TROUBLE, STOP

A card-read error has occurred. Place the card just read in the reading position, ready the reader, and press the ALARM RELEASE button. If the error persists, a new card may be required.

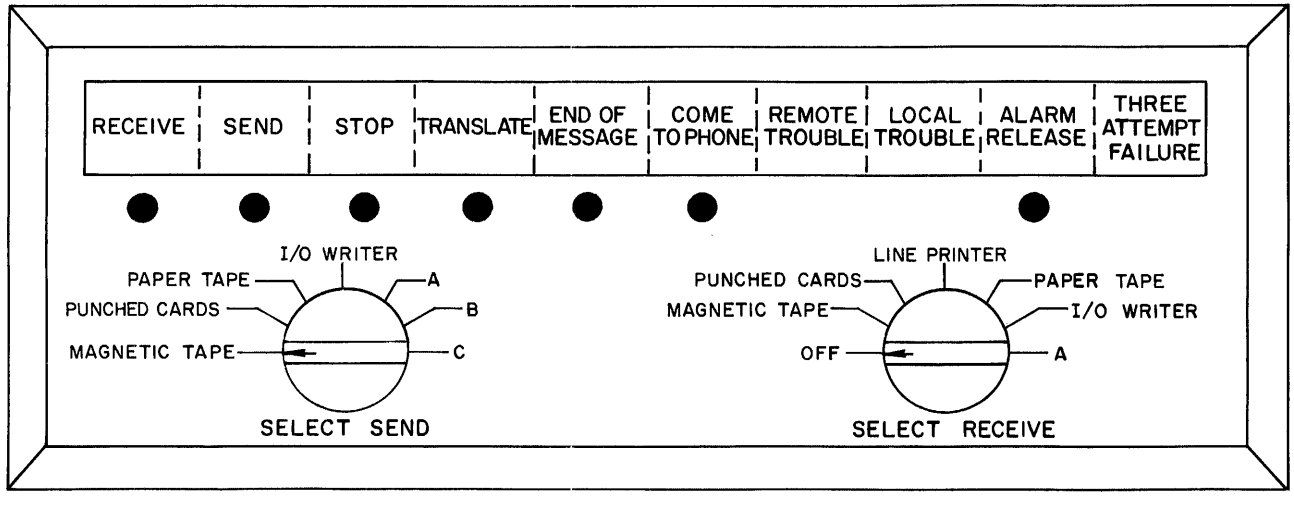


Figure 7 Operator Control Panel

3 ATTEMPT FAILURE

A transmission error has occurred at least three times in succession. Press the ALARM RELEASE button. If the condition persists, hardware or line trouble may be the cause.

END OF MESSAGE

The print job has ended and the LINE PRINTER switch has been turned OFF, or operation has been halted after receiving response to a STATUS request. Turn the LINE PRINTER switch to the LINE PRINTER position and push the ALARM RELEASE button to continue. Otherwise, the END OF MESSAGE button was pressed to terminate the current read or print job. Press the ALARM RELEASE button to continue.

ALARM, REMOTE TROUBLE, LOCAL TROUBLE, STOP, END OF MESSAGE, COME TO PHONE, 3 ATTEMPT FAILURE-

A poll was received when IMPORT was not expecting one. This can occur when line problems exist, when the terminal identification is improper, or when EXPORT has been dropped and brought up again at the central site. A Master clear and run will clear the condition.

STOP

This light will come on when the card hopper is empty.

5.2.3 CARD READER REQUESTS

In EXPORT/IMPORT 8130, requests to the central computer are entered via the card reader. Valid requests and available options are listed below.

Request	Option	Description
DROP		Perform operator drop function if job specified is at a control point. Otherwise release the INPUT file.
DROP	PRINT	Same as above, but also release any output files. The specified job cannot be printed.
NEXT		Print specified job next after the current job is completed.
OUTPUT		Change the destination of output to the central facility.
REPRINT	n	Reprint specified job. If n is specified, backspace print file n sectors, otherwise rewind file; n is octal and must be less than 777_8.
STATUS		Obtain status on specified job. If the job is not specified, obtain status on all jobs for this line.

For each request entered through the card reader, the remote operator must prepare the following cards:

Card	Column	
1	1	*
	2-10	(request)
	11	(option)
2	1	(6th character of job name)
3	1	(7th character of job name)
4	1	(multipunch 6, 7, 8, 9)

Card 1 specifies the request and option chosen. The second card contains the first character of the two-character sequence number assigned by SCOPE to the job. The third card contains the second character. This sequence number is equivalent to the sixth and seventh characters of the job name assigned by SCOPE. Card 4 indicates to IMPORT that these cards constitute a complete and separate job. Several of these four-card jobs may be stacked.

The ALARM, LOCAL TROUBLE, END OF MESSAGE and STOP indicators come on when an invalid request is made. The ALARM RELEASE button must be pressed before reading can continue after an error.

5.2.4 LINE PRINTER MESSAGES

Messages originated by EXPORT are returned for the following reasons:

To identify a job submitted for processing under SCOPE

In response to a STATUS request

In response to any invalid request

The first printer message is returned automatically to identify the job submitted (SCOPE assigns an identifying sequence number in the sixth and seventh characters of the job name). A page eject occurs before the first message and after the last message. EXPORT will not send line printer messages until the remote operator has selected LINE PRINTER on the operator panel.

When printing is interrupted to submit a card reader job, the printer message identifying the new job will not be returned until the interrupted print job is completed.

If printing is interrupted to submit an operator control card request, however, any printer messages generated will be returned before the printer job resumes.

If status is requested, printing does not resume automatically after a response is printed. The operator can read before job printing is resumed or he can continue printing. When the EOM light comes on, the appropriate selection may be made before pushing the ALARM RELEASE button. Reading a job automatically generates status messages for all jobs in the system for the particular terminal; they are printed before the next print job. In this way, the operator can obtain the sequence number of the jobs just read in.

Line printer messages are shown below:

Message	Definition
(job name) IN JOB STACK	The job named has been completely transmitted to EXPORT and is waiting in the SCOPE input job stack to be assigned to a control point.
(job name) AT CP (n) (time) (time limit) (priority)	The job named is at control point n with accumulated central processor time in octal seconds. The time limit and priority are given in octal.
(job name) IN OUTPUT STACK	The job named has been completely processed by SCOPE and is available for transmission to the remote terminal.
(job name) NOT IN SYSTEM	The job named is not in the system or it is not a remote job with the same terminal id as the remote terminal.

The following is an example of a message given when a new job is read in or when the status of all jobs is requested.

```
STATUS AT hh.mm.ss
(job name) AT CP (n) (time) (time limit) (priority)
INPUT          OUTPUT

(job name)     (job name)  (priority)
(job name)     (job name)  (priority)
               (job name)  (priority)
```

The time of day is shown by hh.mm.ss. If the input or output list of jobs produced is too long, ETC will appear at the bottom of the list.

EXPORT/IMPORT EXCHANGE LOGIC 6

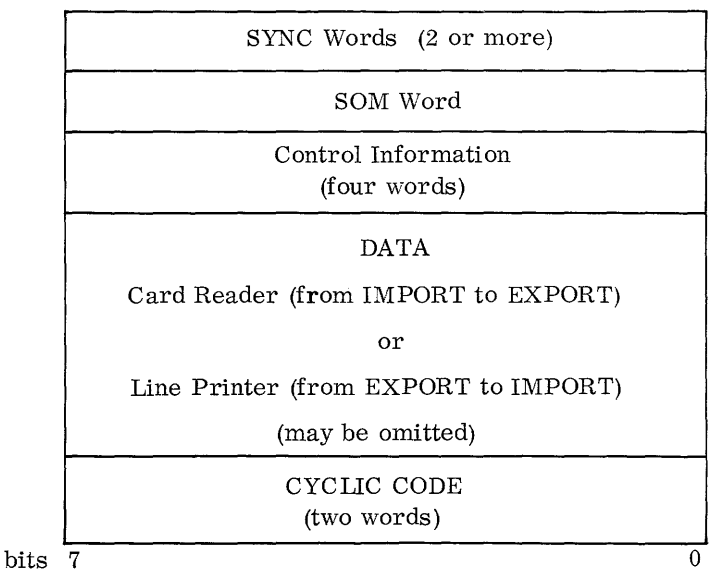
The EXPORT and IMPORT programs communicate through the hardware and communications equipment described in Chapter 2. The equipment is connected serially as shown in figure 1.

6.1 TRANSFER FORMAT

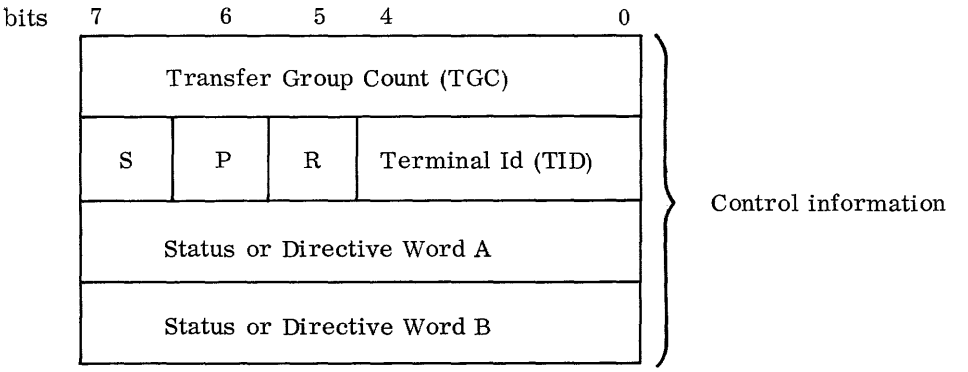
All transfers between EXPORT and IMPORT are grouped into 8-bit bytes or words by the DSA and DSC. Transfers from EXPORT to IMPORT are called status transfers; transfers from IMPORT to EXPORT are directive transfers.

Transmission begins by sending two or more SYNC words to establish and maintain synchronization of the data sets. The first non-SYNC word transmitted is a SOM word, to indicate the start of message. The four words following SOM contain control information which describes the nature of the transfer. If printer or card reader data is included in the transfer, it follows the control words. The last two words in a transfer contain a 12-bit cyclic code word remainder used for error detection.

The basic parts in a transfer are shown below. Only the printer or card reader data part may be omitted.



The nucleus of a transfer is contained in the four words of control information. These words describe and dictate the nature of the transfer. The parameters in these four words are shown below.



$1 \leq TGC \leq 161$

S = Sequence bit (0 or 1)

P = Come-to-phone bit (0 or 1)

R = Data rejected bit (0 or 1)

$1 \leq TID \leq 31$

Transfer Group Count

The transfer group count (TGC) specifies the number of three-word groups (3 x 8 = 24 bits) which follow the TGC, but does not include the two cyclic code words. As shown above the first group is made up of the last three words of control information. When no card reader or line printer data is included with the transfer, the TGC is equal to one. The maximum TGC is 161, which allows for 480 eight-bit words of card or printer data. This represents 640 six-bit characters of data (6.2).

Sequence Bit

The sequence bit is used to sequence consecutive transfers and to request retransmission of a previous transfer in which an error was detected. Section 6.4.4 contains a detailed description of its use.

Come-to-Phone Bit

The come-to-phone bit is set when the operator requests telephone communication. The receiving site acknowledges the request by setting the come-to-phone bit on its next transfer and the central operator is notified by a message on the central display console. The 8130 operator is notified by lights on his control panel. Data transmission stops immediately until the central operator requests its resumption.

Data Rejected

The data rejected bit indicates to the transmitting program that data included in the last transfer cannot be processed because no empty buffer is available. The data must be retransmitted.

Terminal Id

The terminal id field contains the identification number for the remote terminal. This id has a value from 1 to 31 and must be unique for each remote terminal. The value corresponds to the letters A to Z and numbers 0 to 4, which are displayed on the central operator's console to identify a remote terminal.

EXPORT replaces the fifth character of the job name with the id character. All jobs under SCOPE 3 which have the remote bit set in the disposition code field can be identified readily as to terminals. When a dial-up network is used, a one-to-one correspondence is not required between remote 8130's and central 311B's. A job could be submitted on one line and its output received on another line. The terminal id is zero when EXPORT is polling IMPORT.

Status Words

The two status words (A and B) generated by the EXPORT program are included with every status transfer from EXPORT to IMPORT. Status word A contains information about line printer data (transferred from EXPORT and IMPORT); status word B contains information about card reader data (transferred from IMPORT to EXPORT). It is possible for both status words to be zero (when EXPORT is polling). Appendix B explains the status word codes.

Directive Words

The two directive words (A and B) generated by the IMPORT program are included with every directive status transfer from IMPORT to EXPORT. Directive word A contains information about line printer data, directive word B contains information about card reader data. Appendix C contains the directive word codes and their meaning.

6.2 DATA TRANSMISSION

All Hollerith cards and line printer data are transmitted as 6-bit display coded characters; binary cards are transmitted as consecutive 12-bit columns (considered as two 6-bit characters).

Since all transfers between EXPORT and IMPORT are grouped into 8-bit words, four 6-bit characters are packed into three transmission words. This package of four data characters in three transmission words is called a data group. The TGC is one greater than the number of data groups transferred. The relationship between TGC, data groups, Hollerith cards, and binary cards is shown below:

TGC		Data Groups	Hollerith Cards	Binary Cards
1		0	0	0
21		20	1	
41		40	2	1
61		60	3	
81		80	4	2
101		100	5	
121		120	6	3
141		140	7	
161	(maximum)	160	8	4

6.2.1 CARD READER DATA

Display Code

Each Hollerith card is converted to display code by IMPORT and stored as 80 columns in 20 data groups (sixty 8-bit transmission words). All 80 columns are transmitted for each card, including trailing blanks. Consecutive cards are transmitted with no special separation of characters or

words. Thus two cards are stored in 40 data groups. The correspondence between Hollerith code and 6400/6500/6600 SCOPE display code is given in Appendix A of the SCOPE 3.0 Reference Manual, with one exception: the Hollerith code 8-6 will be represented by 00 for transmission. All 64 characters, including blank, can be transmitted from punched Hollerith cards to EXPORT.

Binary

Each binary card consists of two 6-bit fields per column, rows 12-3 comprise the first field and rows 4-9 comprise the second. A four-character data group contains two columns; therefore, 40 data groups are required for an 80 column binary card. As with Hollerith cards, all 80 columns are transmitted. The 789 and 6789 cards are represented by bits in the directive word. Record level information on 789 cards is ignored. Level 00 is assumed.

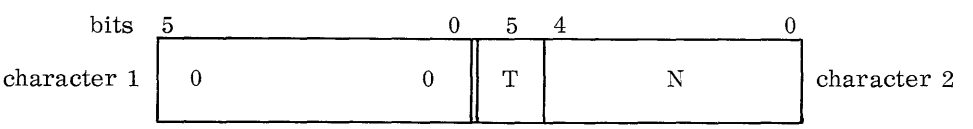
6.2.2 LINE PRINTER DATA

Display Code

Line printer data is received from SCOPE and transmitted to IMPORT in 6-bit display code. A compression scheme is used to represent up to 31 repeated zeros and blanks with two 6-bit characters. Trailing blanks are not transmitted, and the end of transmission is represented by two consecutive 6-bit zeros. Partial print lines are not transmitted.

The correspondence between printer graphics and 6400/6500/6600 SCOPE display code is given in Appendix A of the SCOPE 3 Reference Manual, with one exception: the % graphic (0046) is transmitted as (0001). All 64 characters, including blank, can be transmitted to IMPORT and be printed.

The compressed line printer data format is shown below. When T=N=0, end of transmission is indicated. For T=0, N=1, the % graphic is represented.



T = 0	Compressed zeros
T = 1	Compressed blanks
3≤N≤31	Number of compressed characters.

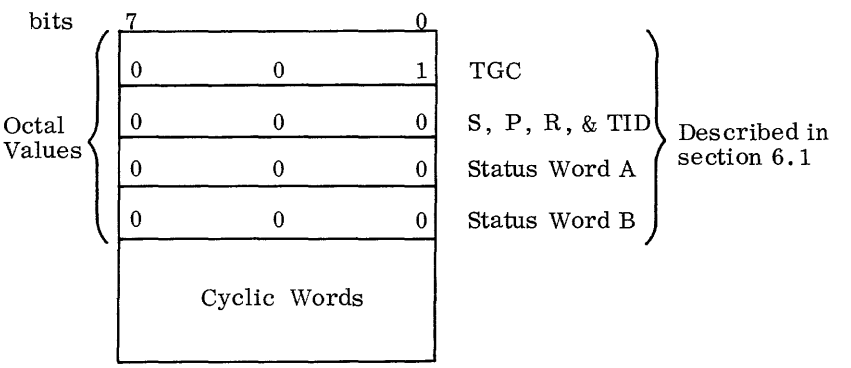
6.3 EXCHANGE PROCEDURES

6.3.1 START-UP

When the IMPORT program is loaded and the on-line (communications) mode is selected, the receive re-synchronization mode of the 8130 DSC is selected. In this mode, the DSC attempts to synchronize with any incoming SYNC words. The DSC signals IMPORT with an interrupt when the first non-SYNC word is received after synchronization has been attained. Therefore, IMPORT simply waits for EXPORT to send its first status transfer.

While the EXPORT program is running, it attempts to communicate with all lines attached to its 3266 Communication Terminal Controller (CTC). The Equipment Status Table (EST) entry for each CTC specifies which lines of the CTC have a 311B and data set attached. EXPORT maintains active/inactive status for each line. Active status means that EXPORT and IMPORT are exchanging transfers currently. When the line is inactive, EXPORT polls the line during each communication cycle. EXPORT sends the polling status transfer and then switches to Receive to wait for the first directive from IMPORT.

If none is received, EXPORT will poll again on the next cycle. The polling status transfer format is shown below:



The first directive transfer from IMPORT will contain the terminal id for the remote 8130. If the id is the same as one for another active line, it will be rejected (EXPORT will keep the line inactive and continue to poll), and the central operator will be notified. When IMPORT continues to receive polling status transfers, the 8130 will HALT. Otherwise, the line will be made active and the terminal id number will be stored by EXPORT. All remote files under SCOPE 3.0 are identified by terminal id number only.

Once the line becomes active, IMPORT will direct the transfer of card reader or line printer data according to selections made by the remote operator.

6.3.2 COMMUNICATION CYCLE

Transfers between EXPORT and IMPORT take place only during the communication cycle. Between cycles, EXPORT performs all other duties. The cycle consists of two transfers for each line — a status transfer and directive transfer. When the cycle begins, a status transfer is sent to all terminals simultaneously. As soon as the end of a transfer is reached, the terminal should respond with a directive transfer. The cycle ends when all the directives have been received.

Usually the TGC's of the status transfers will not be the same so that certain terminals will start sending a directive while others are still receiving a status. In particular, this will occur when one terminal is sending card data while another is receiving printer data. To avoid inefficient operation, it is important that all lines complete their directive transfers at approximately the same time. This is guaranteed in part by two features of the system:

The maximum TGC for status and directive transfers is the same for a given line.

The maximum TGC may be different for lines which operate at different speeds.

Appendix D shows examples of how the communications cycle operates with several lines attached. The processing time between cycles overlaps with the time to switch data sets.

6.3.3 POLLING

When a line (311B) is inactive, EXPORT normally continues to poll that line until a directive transfer is received. After the transfer of data is completed, EXPORT will resume polling until IMPORT sends a directive transfer. EXPORT will begin polling whenever both directive words equal zero, and EXPORT normally would respond with a status transfer with both status words equal to zero. While EXPORT is polling, IMPORT will not send a directive transfer until either bit da7 or db7 (Appendix C) is set. Below are the two conditions which cause EXPORT to begin polling:

- EXPORT sends the end-of-information bit sa5 to indicate the end of a printer job, and the 8130 operator has turned the select receive switch to the OFF position with the RECEIVE indicator lit. IMPORT's next directive words will be zero.
- The stacker of the 8130 Card Reader becomes empty after the 6,7,8,9 card has been read, and the SEND indicator is still lit.

6.3.4 AUTOMATIC SHUTDOWN

When EXPORT is polling, the remote operator may shutdown the 8130 or disconnect the telephone line without disrupting the system. If the 311 at the central computer is not dedicated to one terminal, hanging up will allow another terminal to be dialed in. When all the lines become inactive, EXPORT will stop polling and release the PP to SCOPE and enter PP recall. Periodically, SCOPE will load the EXPORT initialization routine into an available PP and EXPORT will poll all lines once. The central operator may drop EXPORT's control point when all activity has ceased and EXPORT is in recall.

6.4 TRANSMISSION ERRORS

A transmission error occurs when a status or directive transfer is received that does not agree with the transfer that was sent. Either one or both of the following two conditions results in a transmission error.

One or more bits in a transfer are altered

Extra bits are generated or bits are lost

6.4.1 ERROR RESULTS

The following conditions may result from a transmission error:

Missing Transmission

The SYNC and/or SOM words may be lost or altered so that the entire transfer is passed over as noise.

Extra Transmission

Extra bits are generated which appear to be SYNC or SOM words (and possibly additional words) when no transfer was sent.

Wrong Transmission Size

The TGC may be altered, which would appear to make the transfer too long or too short. Since all transfers are variable length, the TGC must be used to determine the length of the transfer and to indicate which words contain the cyclic code. If the TGC is too small, two data words will be interpreted as cyclic code words. If it is too long, words from the next transfer will appear after the cyclic words have been read and they will be interpreted as cyclic code words.

Cyclic Code Error

Normally, when a transmission error occurs, the cyclic code computed by the receiver will not match the cyclic code received at the end of the transfer.

6.4.2 DETECTION PROCEDURE

The primary error detection capability is provided by a software generated 12-bit cyclic code. A 12-bit cyclic code word is continuously generated by a subroutine in the transmitting computer or terminal, and it is appended as the last two words of the transmission. Likewise, the receiving program generates a 12-bit cyclic code which is compared with the cyclic code received. If the two cyclic code words are identical, no errors were detected and the transmission is assumed to be correct as received.

The detection logic is as follows. The data stream can be considered equivalent to a binary polynomial, where the 1's and 0's of data are the coefficients of the terms in the polynomial. The first bit transmitted (high order bit of first word) corresponds to the highest order term of the polynomial. Each cyclic code subroutine divides (exclusive OR) the data polynomial by a fixed 13-bit divisor. At the end of transmission, the 12-bit remainder is appended to the data stream by the transmitting terminal. The receiving program compares the remainder it generated with the remainder transmitted.

When a message is being received, the TGC is used by the receiving program to determine the exact number of words in the transfer. After the last data word is read, the program reads the two cyclic code words.

In some cases, a transmission error is detected apart from the cyclic code check. This arises when analysis of the control data received shows an impossible condition (such as an incorrect terminal id) or an inconsistent request. In such cases, the transmission is treated as though a cyclic code error has been detected.

6.4.3 DETECTION CAPABILITY

The scheme outlined in the previous section provides the following error detection capabilities:

Any odd number of errors

All error bursts of 12 bits or less in length

99.95 percent of all error bursts 13 bits long

99.98 percent of all error bursts longer than 13 bits

An error burst is defined as a pattern of bits for which the length is the number of bits between the first and last errors of the transmission.

This cyclic code protection scheme is highly efficient since only 12 parity bits in two extra words are required for the entire transmission. The two extra bits of each 8-bit word are available for sending useful data thereby increasing the data rate by one-third.

6.4.4 ERROR RECOVERY

Normally, the sequence bit in each status or directive transfer alternates between 0 and 1 with successive transfers. However, when the receiving computer detects a transmission error, it does not switch the sequence bit in its next transfer. In fact, the detecting site retransmits its previous transfer without any change. This action can be interpreted as a negative acknowledgment.

When two successive transfers are received with identical sequence bits, the receiver knows its previous transfer was transmitted incorrectly and will be retransmitted.

Missing or partially received transfers are treated in the following way: Since EXPORT synchronizes all transmissions for all terminals during the communication cycle, it provides for a time-out in the case of a short or partial transfer. EXPORT will request a retransmission.

EXPORT PROGRAM 7

7.1 INITIALIZATION

When the central operator request n.EXPORT1. is entered from the console keyboard, SCOPE loads the EXPORT initialization program (1IX) into an available PP and assigns it to control point n. The Equipment Status Table (EST) is searched for an unassigned Communications Terminal Controller (CTC). If none is available, EXPORT drops from the control point. Otherwise, sufficient central memory field length is requested for overlays and working storage. The EXPORT overlays are read from disk and placed in central memory at EXPORT's control point for rapid accessibility. First, the Communications overlay is initialized for the appropriate channel of the 6681-3266, and the function codes are created as indicated by the EST entry. Polling status transfers are generated for each attached line, and the Communications overlay is loaded.

7.2 OVERLAYS

After initialization is completed, EXPORT processing is handled by several overlays. Control cycles through them, as each one calls the next in succession. The first overlay, which handles all communications with IMPORT, is called Communications (1RX). The Card Processor (1CX) overlay processes all card data (except for control cards) received during the last transfer. The Job and Control Card Processor (1JX) is called to analyze job cards or control cards.

The Request Processor (1EX) overlay handles requests to SCOPE for file manipulation. The status for each line is advanced after miscellaneous activities such as scanning control points, FNT/FST search, and central operator communication are completed. The Print Processor (1LX) overlay formats printer data for subsequent transmission. The Message Processor (1MX) is called in by 1LX whenever job status is sent out to a terminal. When all output buffers are ready for transmission, the Communications overlay is loaded and the cycle repeats.

7.2.1 COMMUNICATIONS (1RX)

The main function of the Communications overlay program is to control simultaneously an output status transfer and a responding input directive transfer with each attached remote terminal. If an attached line is inactive, this output transfer is a polling action.

Exchange Executive

All transfers between EXPORT and IMPORT are handled by the Exchange Executive. All eight lines are operated in rotation, one 8-bit word at a time, every 3.3 or 4.0 milliseconds, depending upon the speed of the data sets. This period (3.3 milliseconds) defines the executive cycle. The activity on each line is determined by the current pointer in a control jump table. All eight positions in the control jump table, one for each line, are executed at least once during each executive cycle.

The output status transfer is sent out first on each line, and then the input directive transfer is received immediately. All outputs are initiated at the beginning of the communications cycle; however, later during the cycle some lines may be in the input phase, or idle, before the output of a long transfer is completed. The executive maintains control until all lines have completed the input phase or the line time-out clock has run out, whichever occurs later. Since all transfers are 8-bit words, PP buffers are packed with three 8-bit words contained in two 12-bit PP words. Each line is processed from the start of output through the end of input. EXPORT allows SCOPE to relocate central memory assigned to its control point during communications, since it is not referenced. As soon as each line completes output, a time-out clock is started for the line, this defines the longest period that EXPORT will wait for a directive transfer before signaling communications is lost. This is a normal situation if the line is inactive and being polled.

Post-Processing Section

Several counts maintained in central memory are updated for each line, such as blocks received, transmitted and rejected, retransmissions and cyclic errors. Also, the current status codes and directive codes are preserved. These statistics are kept in the control point area for EXPORT in the control statement buffer. They can be displayed easily on one of the system scopes if desired.

7.2.2 CARD PROCESSOR (1CX)

The Card Processor overlay has two main functions. The first is to process fully any card reader job data received, and the second is to reallocate PP memory space to make room for the next overlay.

When the first block of card reader data is received, a check is made for control cards, which are not processed by the overlay. Otherwise job data is unpacked from PP memory and written to the proper central memory buffer. When all card reader data has been processed the remaining directive transfers are of two possible types. The first has no data block (TGC = 1).

The second transfer contains a control card sequence. Both are placed in smaller buffers in upper PP memory. This reallocation of buffers frees enough words of PP memory so that the next overlay can be loaded.

7.2.3 REQUEST PROCESSOR (1EX)

The Request Processor overlay performs two main tasks. The first task processes any remaining directives, which includes initialization for a new active line. The second task advances the status of remote jobs and prepares all status transfers except those which include printer data.

Advance Status

The status of each active line is examined and action is taken whenever the current activity on the line cannot continue. Requests are made to SCOPE to keep the central memory unit buffers fully processed. Read requests are issued to fill empty printer data buffers and write requests are issued for full reader data buffers. When printing is completed for a job, a new remote output file is located according to priority. Any remote punch files are diverted to the central site.

Unit Buffer Processing

The unit buffers in central memory are dynamically assigned to active lines which are transmitting either card reader or line printer data. Even though a remote may be actively communicating with EXPORT, unit buffers are not assigned unless a directive indicates that reader data is available or printer data is to be sent. When a unit buffer is needed, the first free one in central memory is selected. If the last unit buffer is released, a request is made to SCOPE to reduce EXPORT's field length. Only if all unit buffers are assigned is a request made to increase EXPORT's field length to acquire an additional buffer.

7.2.4 PRINT PROCESSOR (1LX)

The Print Processor overlay moves printer data from central memory and formats it for transmission to IMPORT. Upper PP memory is divided into eight equal buffers of approximately 320 (decimal) words each. Since transmission involves 8-bit words, each buffer contains approximately 480 transmission words packed into 12-bit PP words.

Complete print lines are moved from central memory and compressed as described in section 6.2.3. When either of two conditions arise — central memory buffer empties or the maximum transfer length is reached — pointers are reset to the end of the last complete line and the transfer length is computed. If the end of information is encountered before the PP buffer is filled, bit sa5 (Appendix B) is set.

If the Print Processor determines that a job status has been requested, it calls the Message Processor; otherwise, the communications overlay is loaded.

7.2.5 JOB AND CONTROL CARD PROCESSOR (1JX)

The 1JX routine is called to analyze job cards and operator control cards when they appear. The Processor Control Card routine interprets all control cards submitted by the remote operator. See Section 5.2.3 for a discussion of control cards. The option name specified on the first card is used to enter the proper processing subroutine. For valid options, bit sb6 (Appendix B) is set in the next status transfer. When the job specified is not in the system or the terminal id is different from the requesting terminal, a message is sent to IMPORT.

7.2.6 MESSAGE PROCESSOR (1MX)

If the print processor overlay senses a request for status of any job, 1MX is called. 1MX searches the FNT/FST and the control-point areas to find the jobs and issues a message describing activity of the jobs. The communications overlay is called then to restart the cycle.

7.3 CENTRAL MEMORY REQUIREMENTS

Central memory at EXPORT's reference address (RA) is comprised of three sections. The first contains pointers and messages to IMPORT. The second contains all of EXPORT's overlays except the initialization program. The field length of EXPORT can vary from 2200_8 to $12,000_8$ words, depending upon the number of active lines. When EXPORT is in recall, it has a field length of 200_8 words. When all lines are inactive, a field length of 200_8 words is required to poll the lines for activity. If any line is active, a minimum of 2200_8 words is needed to load EXPORT from the disk to initiate communication.

The third section, containing the unit buffers for active lines, is variable in length. Each unit buffer has a nominal length of 500_8 words; usually, each active line requires one unit buffer. The unit buffer contains the reader or printer data.

IMPORT PROGRAM 8

8.1 INITIALIZATION

IMPORT is loaded as described in section 5.2.1; operator controls and indicators are described in section 5.2.2.

8.2 OFF-LINE PROCESSING

The off-line utility function of card-to-print is selected when the TRANSLATE button is pressed. The TRANSLATE mode can be selected only when other modes have been completed and END OF MESSAGE is displayed.

Card decks are read from the reader and all the Hollerith cards are listed on the printer. Binary cards are ignored. The LOCAL TROUBLE indicator is lit only for card or line printer error conditions.

Communications with EXPORT will stop when listing begins; this may cause a communications lost condition to be noted at the central site. Normally, however, the utility mode starts when EXPORT is polling.

8.3 EXECUTIVE PROGRAM (EXEC)

The EXEC is the main program of IMPORT 8130. Activities for both operating modes (on-line and utility) of IMPORT are controlled by EXEC. EXEC enters various routines to perform the following tasks:

Read control panel status and set indicators

Update directive control word

Process status control words

Processor printer data and print lines

Read and process card data

Process buffer and peripheral status flags

8.4 DRIVERS AND PROCESSING ROUTINES

The major routines and peripheral drivers are designed to operate independently of any external conditions. When each is called, it is controlled by the buffer status flags and any option flags set by the EXEC, which may be the result of operator requests.

8.4.1 CARD READER DRIVER (RD)

This routine reads Hollerith and binary cards from the card reader via the buffered channel. Cards are read into two 160-character working buffers. The routine exits without reading when STOP is selected or the working buffers are full. Flags are set by the driver to indicate conditions such as:

Reader ready/not ready

Buffer full

Hopper full/empty

Hollerith/binary

7,8,9 or 6,7,8,9 card read

8.4.2 LINE PRINTER DRIVER (PD)

This routine prints variable length lines in printer code up to 136 columns and performs carriage control options. Print lines are taken from a 136-character working buffer. The routine exits without printing when STOP is selected or when the buffer is empty. Flags are set by the driver to indicate conditions such as:

Printer ready/not ready

Buffer empty

Carriage control information is taken from the first print position character, which is blanked out before printing.

Character (print position 1)	8130 Line Printer Carriage Action
1	eject to top of page before printing
0	double-space before printing
all others	single-space before printing

8.4.3 ON-LINE PRINTER DATA PROCESSOR (PP)

This routine processes compressed and packed line printer data from the transmission buffer and fills the working buffer of the line printer driver with a print line in printer code. Full buffers are obtained from the EXEC. Print lines are unpacked, expanded and converted from display code. When a buffer has been processed completely, its status is set to empty.

8.4.4 ON-LINE CARD READER DATA PROCESSOR (CP)

This routine processes card data from the working buffers of the card reader driver and prepares a buffer of card data in the form suitable for transmission to EXPORT. Empty buffers obtained from the EXEC are filled with Hollerith or binary cards. This routine performs conversion to display code and packs data as described in 5.3. A look-ahead is performed for 7,8,9 and 6,7,8,9 cards, before the buffer is released to the EXEC for transmission. Flags are set by this routine to indicate such conditions as: buffer ready, end-of-record, end of information, and binary/display. The group count for the buffer is computed.

8.4.5 INTERRUPT PROCESSOR

Transmission between IMPORT and EXPORT is handled one 8-bit word at a time by the 8130 hardware. When a word is received by or is requested for the DSC, the 8130 program sequence is interrupted and control goes to a special location which starts the interrupt processor. The status of the DSC is checked and either the Receive Data or Send Data routine is entered. When the word is processed, control returns to the program sequence which was interrupted.

8.4.6 RECEIVE DATA ROUTINE

All words of a status transfer from the SOM through the two cyclic code words are handled individually by this routine. The SOM and four control words (6.1) are received and checked for consistency. A retransmission is scheduled for error conditions such as:

Sequence bit did not change

Data rejected bit set

TGC out of range

When the TGC is not 1, a check is made for an empty buffer. If none is available on receipt of the first data word, a data rejected flag is set and the data is ignored. However, the cyclic code is checked for the transfer. A cyclic code routine is entered for every word received after the SOM. If buffer is empty, no transmission error is detected, the buffer status is set to full, and the sequence bits are switched. If data was sent in the previous directive transfer, the buffer status is set to empty.

8.4.7 SEND DATA ROUTINE

All words of a directive transfer from the SOM through the two cyclic code words are handled individually by this routine. All information to be transmitted is generated externally to this routine except for the cyclic code words. A cyclic code routine is entered for every word transmitted. After the last word of control information or data has been sent, the two cyclic words are sent.

8.4.8 OFF-LINE DATA PROCESSING ROUTINE

This routine moves Hollerith card images from the working buffers of the card reader driver (RD) to the working buffer of the line printer driver (PD). The routine exits if the RD buffers are empty or the PD buffer is full. An RD buffer is set to empty when it contains a binary card. Flags set by this routine are: RD buffer empty and PD buffer full.

8.5 DIRECTIVE CONTROL WORD UPDATING

Updating of the directive control words is a continuous process performed in part by many separate routines. The bits in the directive are set and reset by various activities and conditions both internal and external to IMPORT. A working directive control word buffer is available to all routines until a new directive transfer is started, at which time it is frozen and moved to the current directive word buffer. A new working directive is started. In the event of a retransmission, the current working buffer is used again and a new working buffer is not started.

8.6 STATUS WORD INTERPRETATION

As soon as the Receive Data routine (8.4.6) indicates that a new status transfer has been successfully received, selected bits of the status control words (Appendix B) are interpreted as follows:

sa5	The end-of-information bit is ignored unless LINE PRINTER is not selected. Otherwise, the END OF MESSAGE and ALARM RELEASE indicators are lit.
sb7 and sb6	If these bits are both reset and a card block was sent with the last directive transfer, the END OF MESSAGE indicator is lit. This condition will simulate a 6,7,8,9 card read. Any cards read but not sent to EXPORT will be ignored.

APPENDIX SECTION

MIXED LINE COMPARISON

A

Cycle Time (Seconds)	Type	Data Blocks per/min.	TGC (See 6.1)	Total† 8-bit words	Net 6-bit data	Net 6-bit cps
2.29	A-150	26.2	161	498	640	280
2.01	A-8	29.8	161	498	640	318
2.01	A-150	29.8	137	426	544	270
1.68	B-8	35.7	161	498	640	381
1.68	A-8	35.7	133	414	528	314
1.68	A-150	35.7	109	345	436	260

A = 201A

B = 201B

8 = 8 millisecond line turn around time (4-wire) private

150 = 150 millisecond line turn around time (2-wire) dialup

† 18 8-bit word overhead per cycle (SYNC, etc.)

STATUS WORD CODES† B

Status Word A		Status Word B	
bit assignment†		bit assignment	
sa7	Not used, Reserved	sb7	Receiving Job Data
sa6	Printer Data Included	sb6	Control Card Received
sa5	End of Information		
sa4	Priority Status Included		

sa6 Printer Data Included
This bit is set to indicate that EXPORT is sending printer data in this block.

sa5 End of Information
This bit indicates that the last block of printer data has been sent for the current job output file or message. Bit sa7 will indicate when a new printer file is available.

sa4 Priority Status Included
This bit is set to indicate that the job status is to be printed and that the terminal should stop with the END OF MESSAGE bit.

sb7 Receiving Job Data
This bit indicates that EXPORT is currently receiving card reader data for a SCOPE job. This bit is first set to acknowledge the receipt of a correct job card. A job card error is indicated by EXPORT when this bit is not set in the status transfer following the directive transfer which included the job card. If a central memory buffer is not available when a block is received from IMPORT, a retransmission will be requested by setting the data rejected bit. Bit sb7 is reset after the last block has been received.

sb6 Control Card Received
This bit indicates that EXPORT has recognized the first card reader data block as a valid operator control card sequence. As in the case of a job or operator control card error, it is assumed that the next card reader block will be a new first block.

† All bits not assigned are reserved for future use.

DIRECTIVE WORD CODES C

Directive Word A		Directive Word B	
bit assignment†		bit assignment	
da7	Send Printer Data	db7	Reader Data Available
da6	Abort Printer Job	db6	Abort Reader Job
		db5	End of Information
		db4	Display Data Included
		db3	Binary Data Included
		db2	End of Record

da7 Send Printer Data
This bit indicates that IMPORT is currently in the printing mode and requests a block of printer data. If a print buffer is not available when the status transfer with data arrives, a retransmission request will be made by setting the data rejected bit. When bit da7 is first set, EXPORT will request a central memory unit buffer. The buffer will be released when the bit is cleared.

da6 Abort Printer Job
This bit indicates that no additional printer data is desired for the job currently printing. The file will be released by EXPORT.

db7 Reader Data Available
This bit indicates that a deck of card reader data is to be sent by IMPORT. This bit and bit da7 will not be set at the same time. EXPORT will request a central memory unit buffer for reader data. If reader data is included before the buffer is available, a retransmission will be requested by setting the data rejected bit.

db6 Abort Reader Job
This bit indicates that no additional card reader data will be sent for the current job. EXPORT should remove the job from the SCOPE system and release the partial input file.

db5 End of Information
This bit indicates that IMPORT has read a 6,7,8,9 end of information card. The last block of card reader data has been sent for the current reader job. The central memory unit buffer will be released for the job unless bit db7 is set to indicate another job is stacked in the card reader. This bit may accompany bit db2. EXPORT will release the job to SCOPE for processing.

†All bits not assigned are reserved for future use.

db4 Display Data Included
This bit indicates that a block of Hollerith card reader data represented in 6-bit SCOPE display code is included with this directive transfer. From one to eight cards may be included. Section 6.2.1 describes the data format.

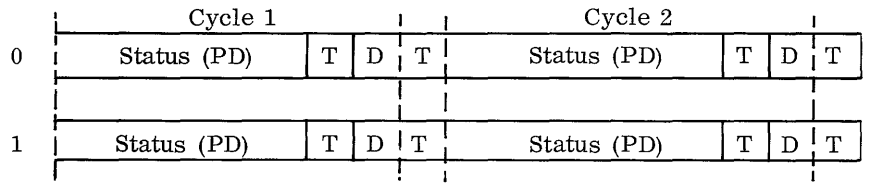
db3 Binary Data Included
This bit indicates that a block of binary card reader data is included with this directive transfer. From one to four cards may be included. Section 6.2.2 describes that data format.

db2 End of Record
This bit indicates that IMPORT has read a 7,8,9 end-of-record card following any data indicated by bits db4 or db3. EXPORT will request SCOPE to write central memory card data to the disk with an end of record indication.

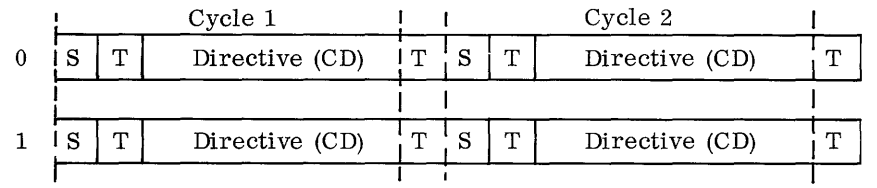
TWO COMMUNICATION CYCLES

D

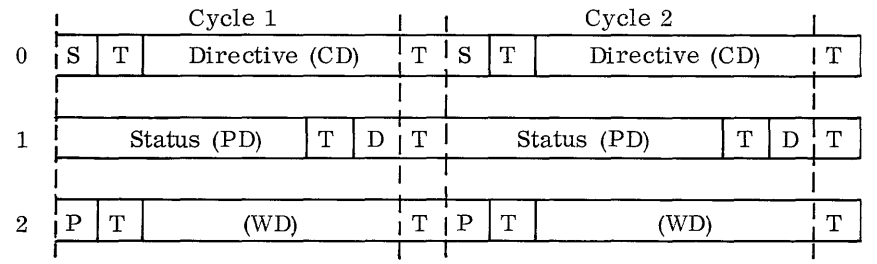
Printer data on two lines:



Card data on two lines:



Card data (line 0), Printer Data (line 1), Polling (line 2):



PD = printer data included

CD = card data included

S = status transfer (no data)

D = directive transfer (no data)

P = polling status transfer

T = time to switch data sets (150 or 8 milliseconds)

WD = waiting for directive

CONTROL DATA
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8130 Reference Manual

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