60494300

CONTROL DATA CORPORATION

NOS/BE 1
INSTALLATION HANDBOOK

CDC® COMPUTER SYSTEMS:
CYBER 170 SERIES
CYBER 70 MODELS 71, 72, 73, 74
6000 SERIES

115

REVISION RECORD

REVISION	DESCRIPTION
A	Original release.
(11-1-75)	
B	Revised to reflect PSR Summary level 420. CYBER LOADER 1.1, COMPASS 3.3, CYBER Record Manager 1.4,
(3-5-76)	FORTRAN Extended 4.6, Sort/Merge 4.4, and BASIC 3.1 are updated. COBOL 5 is a new product with this re-
	lease.
C	Revised to reflect PSR Summary level 430. New features include 844 Factory Format, 844-41/44 Support, 844
(07-18-76)	Expander Support, Job Management and System Control Point enhancements, INTERCOM Restart, and Enhanced
	Station performance improvement. CCP Support Software 1 is replaced by CYBER Cross System 1.1. The op-
	erating system level is now NOS/BE 1.1; CYBER Loader is now version 1.2.
D	Revised to reflect PSR Summary level 439. A new feature, Common Memory Manager, is included. Products up-
(12-3-76)	dated are SYMPL 1.2, COBOL 4.6, Sort/Merge 4.5, CDCS 1.1, QU 3.1, DDL 2.1, DBU 1.1 and COBOL 5.1.
E	Corrects various technical and typographical errors, adds information on CYBER Control Language, 67x tape
(4-25-77)	units, 844 full-track recording mode, programmable format control for 520 printers, and system idle mode; and
	documents the NOS/BE 1.2 System at PSR level 447/446. Page numbering in this manual is changed as follows:
	Material formerly in the introduction is now in part I, part I material is now in part II, and part II material is
	now in part III. This manual obsoletes all previous editions.
F	Corrects various technical and typographical errors and documents the NOS/BE 1.2 system at PSR level 454.
(8-1-77)	
G	Corrects various technical and typographical errors and documents the NOS/BE 1.2 system at PSR level 461.
(12-9-77)	Procedures to deadstart using a 7152 Mass Storage/Magnetic Tape Controller are included.
Publication No. 60494300	

REVISION LETTERS I, O, Q AND X ARE NOT USED

Address comments concerning this manual to:

Control Data Corporation
Publications and Graphics Division
4201 North Lexington Avenue
St. Paul, Minnesota 55112

or use Comment Sheet in the back of this manual.

© 1975, 1976, 1977
by Control Data Corporation
Printed in the United States of America

RELEASE DESCRIPTION

INTERCOM 4 in conjunction with the NOS/BE operating system provides TTY and CRT terminals with time-shared access to CDC CYBER 170, CYBER 70, and 6000 Series computers. Remote batch jobs may be submitted from terminals equipped with a remote card reader and printer, from a remote computer (1700 or 8231) running an IMPORT package, or from a low-, medium-, or high-speed batch terminal. Programs written in the FORTRAN Extended. COBOL, ALGOL, COMPASS, and BASIC languages can be submitted from a remote terminal for execution at control points; the user at the remote terminal can interact with the executing program. Program output can be routed to the line printer and card punch at the central site or to a terminal equipped with line printers or card punches. Through the system permanent file feature, input from a central site magnetic tape or card reader is available to the remote user.

HARDWARE CONFIGURATION

In addition to the minimum hardware required by the NOS/BE system, INTERCOM 4 requires the following equipment for communication and operation.

One of the following:

CRT terminal, model 214-11, 214-12, 217-11, 217-12, 217-13, 217-14, 711-10, 731-12, 732-12, 734 Remote Batch Terminal, 714-10, 714-20, or CYBER 18
or a model 33, 35, or 38 KSR or ASR Teletype terminal, or a 713 Teletype compatible terminal, or a 751 TTY compatible terminal,
or a 1700 or 8231 remote computer running an IMPORT package,
or a 731-10 Low Speed Batch Terminal (LSBT), 732-10 Medium Speed Batch Terminal (MSBT),
or a 733-10 High Speed Batch Terminal (HSBT).

Also: A dedicated multiplexer on a dedicated channel 6671, 6676, 6673, or 6674 (6671 for Teletype and/or CRT terminals; 6676 for Teletype terminals only; 6673 or 6674 for high speed connections to remote computer).
Or: A dedicated 7077 Communications Station on a dedicated channel with a 791 Local Communications Controller (LCC) for Teletypes, XSBTs, and/or CRTs.
Or: A dedicated 2550 Network Processing Unit (NPU) on a dedicated channel for TTY and/or CRT terminals.

Also: Data Sets for communication between the remote terminal and central site: Teletype terminals require 103A Data Sets; CRT terminals require 201A or 201B Data Sets, or CONTROL DATA 358 Transceivers; remote computer and HSBTs require 301B or 303 Data Sets and a TELPAK A communication line, or CONTROL DATA 358 Transceivers. Refer to the Control Data Communications Handbook for specific details of the exact modem strapping option required by INTERCOM 4.

Required Hardware Options

711-10
  Data control 711-102
714-10 or 714-20
  Display (8x80 or 16x80) 714-122 or 714-123
733-10
  Data Set Adapter 733-130
  CRT (16x80 or 18x64) 733-150 or 733-152
731-12
732-12
  Memory increment (8K bytes) 730-100
  Display (16x80) 730-101
731-10
732-10
  Display (16x80) 730-101
  Cyclic Encoder 730-103

117

Hardware Options

Teletype
Paper tape reader/punch
217-11, 217-12, 217-13, 217-14
Card reader: 224-11, 12, 13, or 14
Line printer: 222-11, 12, 13, or 14
711-10
Memory option (16x80 screen) 711-100
Character printer 711-120 or 711-21
714-10
Display (8x80 or 16x80) (up to 8 additional) 714-122 or 714-123
Character printer (up to 3) 711-120 or 711-121
731-10
732-10
Card punch/reader (66/330 cpm) 730-104
Memory increment (if additional peripherals are used beyond the basic L/MSBT card reader and line printer) 730-100
733-10
Card reader (one additional) 733-120
Line printer (up to three additional) 733-110
Card punch 733-101
Memory increment (if additional peripherals are used beyond the basic HSBT, single card reader and line printer) 733-140

INTERCOM has been tested in an environment containing controlware bearing the following part numbers:

731-12		LSBT	66129100
731-10		LSBT	66185300
732-10		MSBT	66129200
733-10		HSBT	66152800
7091	LCC	0ZA	66020700
7091	LCC	0ZB	66200100
7091	LCC	0ZF	66244000
7091	LCC	0ZD	66234900
7091	LCC	0ZJ	66235000
7091	LCC	0ZH	66292500
7091	LCC	0ZL	66292200
7091	LCC	0ZN	66292100

RELEASE MATERIALS

INTERCOM Version 4 release material consists of a magnetic tape (PL12) containing the INTERCOM program library as file one.

NOTES AND CAUTIONS

Mode 4 Sequence Bit Processing in 1M1

For synchronous Mode 4 terminals, the INTERCOM 1M1 driver checks the sequence bit on the station address word of responses to all display Mode transmission. This is additional validity testing not done by previous INTERCOM drivers.

It has been empirically discovered that some Mode 4 CRT terminals work properly in all respects except that they do not properly process the sequence bit; generally, they send a zero sequence bit in all transmissions to the 6000 computer. This problem is a terminal malfunction, a loose wire, or bad hardware card. Such terminals may work properly under pre 4.2 systems but will undergo endless retransmissions of one of the first two WRITES to the CRT screen under Version 4.2 and subsequent systems. Should this retransmission be observed regularly when a particular terminal connects, hardware support personnel should check the sequence bit (bit 24) in the station address word.

Line Skipping on 714 Nonimpact Printer

When column 80 is reached, an INTERCOM-generated line skip occurs. 714 nonimpact printers have a photo cell switch set at column 80 to skip a line. Thus, when input lines exceed 79 characters, output is double-spaced. If this is not desirable, the site customer engineer should be requested to move the photo cell switch beyond column 80.

ERROR Processing on the 711/714

On the 714, the ERR enable/disable switch should be set to ENABLE. On the 711, the ERR disable jumper should not be present. This allows the controller to give an ERR response both to writes to nonexistent stations, and to invalid messages in general.

Character Set Support

The IP.CSET Display Code character set selection affects INTERCOM only with respect to 63-or-64 character set selection. The BCD and ASCII printer character set default and O26/O29 keypunch code default selections affect only the remote batch terminals. How it affects each one is described in each terminal's reference manual.

In addition to the IP.CSET display code character set selected, INTERCOM allows users to select extended (95/256) character sets for communication with a mode 3 type terminal. These sets are described in the INTERCOM Reference Manual.

2XPPU Speed (CDC CYBER 170 only)

When INTERCOM is run at 2XPPU speed (IP.PPS2X=2) with a 6676 multiplexer, model F 6676 must be used.

Limitations and System Considerations

1. The following NOS/BE commands are not allowed as direct INTERCOM commands, although they are allowed as part of a job created through EDITOR to be submitted subsequently for batch execution. REQUEST is allowed only for an automatically assigned allocatable device.

   CKP, DMPECS, RESTART, LOAD, LIBLOAD, SLOAD, CMLOAD, ECSLOAD, EXECUTE, NOGO, RPACK, LABEL, PAUSE, ADDSET, LABELMS, and VSN.

   These commands should be given an access level of 7777B when a deadstart tape is made.

2. When the CONNECT command (or CONNEC call) is used, the specified data is routed to or from the terminal each time the file is read or written. When simultaneous operations are to be performed, no more than one file should be connected to a terminal for interactive operations at any time.

3. PASSWRD can be run while INTERCOM is up; normally, however, it should not be done as INTERCOM users may experience poor response to LOGIN, SEND, SITUATE while PASSWRD is running. This may also cause file security problems.

4. Teletype operation via the 791 LCC differs from Teletype operation via the 6671 or 6676 multiplexer.

   8-bit data is not currently supported on Mode 3 (TTY) devices connected to the LCC. Improperly formatted paper tape input to the LCC may cause the TTY to be inoperative.

GENERAL PROCEDURES

Installation of a complete INTERCOM system requires establishing installation parameters and installing from the INTERCOM OLDPL. The card deck described later can be run at the central site to install INTERCOM. FORTRAN Extended and COMPASS must be installed before INTERCOM can be installed.

INSTALLATION PARAMETERS

To configure the INTERCOM system for a particular installation:

- Parameters in the INTERCOM common deck INTCOM may be changed to affect the characteristics of INTERCOM.
- An equipment status table (EST) entry must be established for each multiplexer dedicated to INTERCOM.
- In CMR, a multiplexer table must be defined which contains subtables for each multiplexer dedicated to INTERCOM.
- The installation deck must contain an assembly for each variant of the low speed multiplexer driver required.
- Certain tables within 1CI, 1QP, and 3TT can be set to control use of selected commands.
- Parameters in the EDITOR common decks IPFTN and IPCOM may be changed to affect the characteristics of EDITOR.
- Parameters in the multiuser job common decks MUJCOM and CMUJCOM may be changed to affect the characteristics of multiuser jobs (particularly EDITOR).

INTERCOM COMMON DECK SETTINGS

Release values are shown in the following list of INTERCOM parameters for the common deck INTCOM present on PL12. If these parameters are to be changed, the cards containing the proper code with the CEQU macro should be placed after an *INSERT INTCOM.43 directive and inserted into the first update record of the deck PL12I. Alternate tested values are shown in parentheses.

A cross-reference listing showing the routines that reference each INTCOM and IGSCOM symbol may be found in Part III.

IP.IACES CEQU 11

An 11-bit field contains the user table access field and user permission bits. This value must be the same as the value for IP.IACES (refer NOS/BE IPARAMS in this section). The entire 11 bit field is used to determine if a user has access to a specific utility or routine. The setting of IP.IACES determines how many bits, right justified are to be used as the access level. The remaining bits (11-IP.IACES) are used as permission bits.

User access level is an octal integer (range 0 to (2** IP.IACES)-1) and is contained in the user table after the user logs in. User's access level must be greater than or equal to the command's access level in order to use a command.

Permission bits form a mask constant (range 0 to (2**(11=IP.IACES))-1). Each bit which is set in the command's permission-bit mask must also be set in the user's permission-bit mask in order for the user to use the command.

1AJ and LOADER check permission bits and access levels for commands found in the NUCLEUS Entry Point Name Table.

A program in a library, specifically the Entry Point Name Table entry in the NUCLEUS library, has an 11-bit permission bits/access level value. In addition, only this type of command verb has associated with it one additional bit indicating whether the entry is control-card-callable. In the EPNT entry, bits 14-4 contain the permission bits and access level required; bit 3 contains the control-statement-callable bit (0 = not control statement-callable). 1AJ checks bit 3 for all control statements.

EDITLIB allows definition of permission bits and access levels via the SETAL directive or the AL parameter of the ADD and REPLACE directives. This value is not access level; it is a 12-bit value combining permission bits (upper 11-IP.IACES bits), access level (bits IP.IACES-1), and control-card-callable (bit 0). The upper 11 bits of this value are the required permissions and access level found in bits 14-4 of the EPNT entry.

During a PASSWRD run, a user's permissions and access level are defined via the A=acclevl parameter. This value is an 11-bit octal number combining permission bits and access level. No control card-callable value is associated with the user's acclevl value.

IP.IACES may be given any value between 0 and 11. If IP.IACES = 0, then the entire field is permission bits. If IP.IACES = 11, then the entire field is access level.

Example:

1. IP.IACES = 6

2. EDITLIB run with directives
```
SETAL (FILES, 201)
SETAL (ASSETS, 407)
```

3. PASSWRD run with directives
```
ADD U=USER1, P=PASS1, A=2
ADD U=USER2, P=PASS2, A=302
ADD U=USER3, P=PASS3, A=3077
ADD U=USER4, P=PASS4, A=1515
ADD U=USER5, P=PASS5, A=0712
```

4. As the result of the preceding installation, the following relationships exist.

COMMAND	PERMISSIONS ASK	ACCESS LEVEL	PERMISSIONS REQUIRED
FILES	1	0	0
ASSETS	2	3	1

USER	PERMISSIONS ASK	ACCESS LEVEL	PERMISSIONS GRANTED
USER1	0	2	NONE
USER2	3	2	0,1
USER3	30B	77B	3,4
USER4	15B	15B	0,2,3
USER5	7	12B	0,1,2

	FILES	ASSETS
USER1	P0	P1, AL
USER2	ALLOWED	AL
USER3	P0	P1
USER4	ALLOWED	P1
USER5	ALLOWED	ALLOWED

USER X COMMANDS ALLOWED

Pn = Denied because user lacks permission n
AL = Denied because user access level too low

IP.IBBMN CEQU 24

Minimum number of (small) buffers needed once remote batch activity has been initiated.

IP.IBBMX CEQU 36

Maximum number of (small) empty buffers needed once remote batch activity has been initiated.

IP.ID CEQU 1

If one, the INTERCOM user id is used as the default permanent file id by commands STORE, FETCH, and DISCARD. If zero, the permanent file id must be specified by the INTERCOM user.

IP.IDFL CEQU 55000B

Default field length assigned to a user's program when the user has not entered a field length (EFL).

IP.IFC CEQU 700 MILLISECONDS OF DELAY FOR FIRST CHARACTER

When the 1M1 driver completes a transmission to a CRT device, it assumes that the terminal will receive the message, that the line will turn around, and that the 6000 will receive the first input character from the terminal within IP.IFC milliseconds. The driver will consider the terminal to have not responded (to have timed-out on the transmission) if no response of any type is detected within this interval. About 700 milliseconds should be adequate for most installations.

IP.IGCON CEQU 0

Maximum number of 1700/274 Graphics console entries in Console Reservation Table; should be set to zero if Graphics is not defined in the system. IP.IGCON has a maximum possible value of 24.

IP.IGS CEQU 0 (1)

If one, 1700/274 Graphics is defined as existing within the system; if zero, 1700/274 Graphics is not present in the system.

IP.IHEAD CMICRO 0, (CONTROL DATA INTERCOM 4.5)

Header output by 1IM when a remote terminal dials into the INTERCOM system.

IP.IIBMN CEQU 12

Minimum number of (small) empty buffers needed when no remote batch activity has been initiated.

IP.IIBMX CEQU 18

Maximum number of (small) empty buffers needed when no remote batch activity has been initiated.

IP.IM2DW CEQU 80D

Default screen width in characters for mode 2 terminals (see Port Definition Entries for mode 2 terminal list). This value should be $10D \leq x \leq 80D$.

IP.IM2DS CEQU 1120D

Default screen size in characters for mode 2 terminals (80x14). This value should be $20D \leq x \leq 2047D$.

IP.IM3DW CEQU 72D

Default line length in characters for mode 3 terminals (see Port Definition Entries for mode 3 terminal list). This value should be $10D \leq x \leq 132D$.

IP.IM3DS CEQU 4095D

Default page size in characters for mode 3 terminals. This value should be $20D \leq x \leq 4095D$.

IP.IM4DW CEQU 50D

Default screen width in characters for mode 4 terminals (see Port Definition Entries for mode 4 terminal list). This value should be $10D \leq x \leq 80D$.

IP.IM4DS CEQU 1000D

Default screen size in characters for mode 4 terminals (50x20). This value should be $20D \leq x \leq 1280D$.

IP.IND CEQU 3

Maximum number of active INTERCOM drivers (of any type) allowed in the system simultaneously. It should never exceed six.

IP.ISFL CEQU 2500B

Default swap-in field length for INTERCOM. The swap-in field length is the amount of memory requested to swap in an INTERCOM command.

IP.IWT CEQU 7B TIMED-OUT PORT DELAY

When the 1M1 driver has timed-out without getting any response from a hardwired or dedicated mode 4 (200 UT protocol) terminal a number of times consecutively, it assumes that the terminal is inoperative; this means either powered-down, broken, or nonexistent, or that somehow the communication link with that terminal is down. In this situation, the driver does not waste processing time trying to communicate with the terminal but marks it "timed-out" and attempts to communicate with it periodically on the assumption that it may come up at any time. The frequency with which the driver attempts communication with timed-out ports is proportional to IP.IWT and is usually on the order of once every few minutes.

At a computer site where the communication lines are not reliable and where operative terminals time-out frequently, IP.IWT should be set to 1 (one) or in extreme cases 0 (zero) to allow 1M1 to test timed-out ports more frequently. Unless good ports are frequently not being polled due to being timed-out, it is recommended that this parameter be unaltered.

IP.IMXL3 EQU 700

Maximum number of data characters which can be contained in a single Teletype data transmission from the 2550 Front-End to the central site system. IP.IMXL3 must be greater than or equal to the TTY TIP parameter /TTYIBL described in the CCP 1.0 Installation Handbook. This parameter must not exceed 2043.

IP.IMXL4 EQU 1280

Identical to the preceding IP.IMXL3 description except it applies only to mode 4 transmission; the relevant mode 4 TIP parameter is /MD4IBL.

IP.LP4C CEQU 1

Defines the type of mode 4C printer in use. 0 = impact printer, 1 = non-impact printer.

IP.MALOC CEQU 4000B

A 12-bit octal value defining the allocation style for files created by a multiuser job. Bit 11 always is set to one to indicate that a permanent file device is requested. The bits indicating the allocation style are bits 5-0. This value is placed in the File Name Table entry generated for new multiuser job files, in byte C.FALLOC.

IP.MPRIT CEQU 4000B

Maximum priority to be assigned to an output file diverted by INTERCOM. This priority will be assigned to any file of 100B PRUs (1 sector).

IP.PRIX CEQU 3777B (7000B)

Nonzero indicates the priority given to input files read from remote site. If zero, priority will be taken from Job card.

IP.SNIFL CEQU 22000B

Initial field length for a SIGNON job. IP.SNIFL is an invariant parameter.

IP.SNOTL CEQU 600

Time limit for jobs entering system through 274IGS.

IP.SNOFL CEQU 60000B

If nonzero, maximum field length (RFL or MEM) allowed for a job entering the system through 274IGS.

IP.TSL CEQU 10B

Default time limit in seconds for execution of a user's program, if the user has not entered a time limit (ETL).

IP.1LX CEQU 1

If 0, no remote batch is allowed. No CM buffers are reserved.

If 1, one copy of 1LX is called to support all remote batch terminals. One CM buffer is reserved.

When IP.1LX is greater than one, it must equal the number of copies of 1LX that can be active. This number of CM buffers will be reserved. One copy of 1LX is called for each 6671 driver with batch terminals, and one copy for each LCC and 2550 equipment with batch terminals.

NOS/BE IPARAMS SETTINGS

These parameters must be set at *INSERT IPARAMS.15 when NOS/BE is installed (deck PL1AD).

IP.IACES CEQU 11D

Defines the number of bits in the access level, for use by 1AJ and LOADER. This value must be the same as that specified for the INTERCOM parameter IP.IACES. .

IP.ILCMD CEQU 1

If set to 1, the last word in the user table will store the last command entered by each user for display on the DSD Q display. If 0, it will not be used for this purpose.

IP.IUSID CEQU 2RAJ

Defines the first user id available for assignment by the program PASSWRD. The value of this parameter is determined by the number of high-speed multiplexers with subtables defined in the system and the number of hardwired remote batch or mode 2 terminals defined in the system. The high-speed multiplexers use two ids per 6673 or 4 ids per 6674, starting with user id AJ. The hardwired remote batch terminals and mode 2 terminals use one id per terminal.

This user id is the lowest available to be assigned an interactive user. Every remote high speed batch terminal connected to the system must have its own terminal id assigned to it.

IP.1M1 CEQU 1

Should be zero if the system has no 6671 or 6676 multiplexers; otherwise, should be nonzero.

IP.1WB CEQU 1

Should be zero if the system has no 6673 or 6674 multiplexers; otherwise, should be nonzero.

IP.1ZZ CEQU 0

Should be zero if system has no LCCs; otherwise, should be nonzero.

A cross mapping of referencing routines and all symbols in IPARAMS (IPTEXT) may be found in part III.

EST ENTRY

The EST table, established when deck PL1AI is run to install NOS/BE must contain an entry for each multiplexer dedicated to INTERCOM. The channel referenced in this entry must be dedicated to the INTERCOM multiplexers on that channel. For nonallocatable equipment, the EST uses the EST macro which has been modified as follows:

type EST parameters (of the form key = value)

Macro parameters used by INTERCOM:

type	DC for 6671, YC for 6676, SC for 6673 or 6674, CS for 791, FE for 2550
CH=	Channel for multiplexer or 7077 Communication Station or 2550 Front End
EQP=	Equipment number for multiplexer or 7077 SAC/CSM I/O channel for 791 or 255_ Front End
MOD=	OFF if off, otherwise do not use
MUX=	Index to INTERCOM multiplexer table

A typical EST entry might appear as follows:

```
*I  EST.1

DC   EST  CH=3,EQP=5,MUX=MUX1-T.ITABL
```

This entry notifies the multiplexer driver that a 6671 with equipment number 5 is on channel 3, and the index to the multiplexer subtable for this 6671, and T.ITABL is the beginning of the multiplexer table.

Typical EST entries for two LCC 791s on SAC/CSM channels 0 and 1 connected to a 7077 connected to channel 4 would appear as follows:

```
CS   EST CH=4,EQP=0,MUX=MUX1-T.ITABL
CS   EST CH=4,EQP=1,MUX=MUX2-T.ITABL
```

CONFIGURATION PARAMETERS (INTERNAL TO CMR)

This parameter defines the length of the INTERCOM multiplexer table. It must be set at *INSERT CMRIP.1 when NOS/BE is installed. The default value is:

```
L.ITABL   CEQU   19
```

This parameter should be changed to reflect the size of the multiplexer table for each installation. The length of the table can be determined from the following formula:

```
L.ITABL = 2+2*N76+N71+N71PORTS+2*N73+2*N74+2*N91+N91PORTS+N50+N50PORTS
```

N76	number of 6676 multiplexers dedicated to INTERCOM
N71	number of 6671 multiplexers dedicated to INTERCOM
N71PORTS	total number of 6671 ports defined
N73	number of 6673 multiplexers dedicated to INTERCOM
N74	number of 6674 multiplexers dedicated to INTERCOM
N91	number of 791s
N91PORTS	total number of 791 ports defined
N50	number of 2550s
N50PORTS	total number of 2550 ports defined

CMR MULTIPLEXER TABLE

The CM resident INTERCOM multiplexer table is used by INTERCOM to provide data on the hardware configuration of the installation and to record parameters. It consists of two dedicated parameter words and one or more subtables assigned to the multiplexers serviced by INTERCOM.

The first two words of the multiplexer table, the parameter words, start at location T.ITABL in CMR. They are already assembled into CMR. The subtables follow the parameter words in any order convenient to the installation. The first subtable must be defined at *INSERT MUX.1 when NOS/BE is installed. Each subtable has a relative pointer in the EST entry for that multiplexer. The upper bound of the multiplexer subtable may not extend beyond 7777B.

For the 2550, Port 0 must be empty and baud rates must be specified in descending order for ports.

CMR MULTIPLEXER SUBTABLE GENERAL FORMAT

Each multiplexer subtable contains one macro to define the type of multiplexer, followed by one macro for each port defined on that multiplexer if a 6671, 2550, or a 791. The address of the macro describing the multiplexer is the same address used in the EST entry defining that multiplexer. A subtable for a 6671 multiplexer might be defined as follows:

```
MUX1    MUX71    4
        TMB4A
        TMA4A
        TM3
        TM3
```

When a 6671 multiplexer or 2550 Front End is configured, it is advisable to place the highest speed terminals on the lowest ports and to place any empty ports at the high number port positions. Thus, the 6671 and 2550 should be configured 9600 baud terminals first, then 4800 baud terminals, then 2400 and 2000 baud terminals, then TTYs, then empty ports. The MUX71 macro port count parameter can be set to exclude the empty ports and increase driver efficiency. This saving is especially important when a driver is to support both a 6671 and a 6676.

A subtable for the 6673/6674 multiplexer might be defined as follows:

```
MUX4    MUX73    (0,3),(01,02)
```

The multiplexer is defined with terminals attached to ports 0 and 3, and also with graphics consoles 1 and 2 defined on port 0.

MULTIPLEXER DEFINITION ENTRIES

INTERCOM recognizes four types of multiplexers, the 6671, 6676, 6673 and 6674, and two types of communications subsystems, the 791 (LCC) and 2550 (NPU). They are defined with the following macros:

MUX71	Number of ports
MUX76	Number of ports, baud rate
MUX73	(p0,p1),(gc01, . . . ,gc16)
MUX74	(p0, . . .p3),(gc01, . . . ,gc36)
MUXLCC	Number of ports
MUX2550	Number of ports

The parameter, number of ports, indicates the highest number port+1 which INTERCOM is to service on that multiplexer for a 6671, 6676, 2550 and 791. The parameters, pi, are the port numbers which INTERCOM is to service on that multiplexer for the 6673 and 6674. The parameters, gci, are the 274 graphics console numbers which INTERCOM is to service on that

multiplexer for the 6673 and 6674. Only one multiplexer may be defined with graphics consoles, and up to six graphics consoles may be specified for each port on that multiplexer. In the two digit graphics console number, the first digit indicates the port number, and the second digit the graphics console number on that port.

A 6671 with ports 0, 1 and 3 attached to data sets should be defined as:

```
MUX71    4
```

A 791 with ports 0, 1, and 3 attached to data sets should be defined as:

```
MUXLCC   4
```

A 2550 with ports 1, 2, and 5 attached to modems should be defined as:

```
MUX2550   6
```

The MUX73, MUX74, and MUX76 macros generate all multiplexer subtable entries necessary to completely define those multiplexers. For the 6671, 2550 and 791, port definition entries should follow to define each individual port on the multiplexer. Example of a MUX table entry follows:

```
MUX76   24,300      (24 ports at 300 baud)
```

Baud rate parameter can be 110, 150, or 300. 300 baud is the maximum rate for any TTY on a 6676 multiplexer.

PORT DEFINITION ENTRIES

Currently, five types of ports are recognized by the CMR macros for a 6671 multiplexer. They are defined with the following macros:

TM3	Mode 3 terminal. Teletype model 33, 35, or 38, or CDC 713.
TMB4A	BCD mode 4A terminal. CDC 214, 217, 73X-12, or 200 User Terminal.
TMA4A	ASCII mode 4A terminal. CDC 214, 217, 73X-12, 200 User Terminal, or 711 Model A/B.
TM4C	Mode 4C terminal. CDC 711 Model C/D, or 714.
EMPTY	Empty port (not serviced by INTERCOM).

Seven types of ports are recognized by the CMR macros for a 791. They are defined with the following macros:

TM3	Mode 3 terminal. Teletype model 33, 35, or 38, or CDC 713.
TMB4A	BCD mode 4A terminal. CDC 214, 217, 73X-12, or 200 User Terminal.
TMA4A	ASCII mode 4A terminal. CDC 214, 217, 73X-12, 200 User Terminal, or 711 Model A/B.
TM4C	Mode 4C terminal. CDC 711 Model C/D, or 714.
TM4	Any mode 4 terminal. CDC 214, 217, 73X-12, 200 User Terminal, 711 Model C/D, or 714.
TM2	Mode 2 terminal. CDC 731-10, 732-10, or 733-10.
EMPTY	Empty port (not serviced by INTERCOM).

Six types of ports are recognized by the CMR macros for a 2550. They are defined with the following macros:

TM3	Mode 3 terminal. Teletype model 33, 35, or 38, or CDC 713. The mode 3 automatic speed recognition option may be used by the 2550 only.
TMB4A	BCD mode 4A terminal. CDC 214, 217, 73X-12, or 200 User Terminal.
TMA4A	ASCII mode 4A terminal. CDC 214, 217, 73X-12, or 200 User Terminal.
TM4C	Mode 4C terminal. CDC 711 Model C/D, or 714.
TM4	Any mode 4 terminal. CDC 214, 217, 73X-12, 200 User Terminal, 711 Model C/D, or 714.
EMPTY	Empty port (not serviced by INTERCOM). 2550 port 0 must be empty.

The TM4 macro allows any mode 4 terminal to dial into a 791 port, and INTERCOM automatically determines the specific terminal type from the site address.

The port definition macros immediately follow the macro for the corresponding multiplexer. Each macro defines one port, beginning with port 0 as the first entry, the second is port 1, and so on. All ports through the highest to be serviced by INTERCOM on that multiplexer must be defined. Thus, if the number of ports parameter on the MUX71 macro is 10B, then 8 port definition macros must follow even though some may not be used. Unused ports should be defined with the EMPTY macro.

Port definition macros without parameters indicate that the ports are servicing normal dial-up telephone circuits. Site addresses for dial-up mode 4 terminals are assumed to be 1 for the TMA4A macro, 0 for the TMB4A macro, and 2 for the TM4C macro. It is possible also to define hard-wired connections by adding parameters to any mode 4 terminal macro (except TM4) or to a mode 3 port on a 2550 as described below.

LINE SPEEDS AND HARD-WIRED TERMINALS

Any of the terminal macros may be used to specify different line speeds by adding a parameter to the macro. Omission of the parameter indicates 110 bps for mode 3 terminals, 2000 bps dial-up for mode 4 terminals, and 50000 bps for mode 2 terminals. Addition of the HW parameter causes INTERCOM to assume that the terminal is hard-wired. Mode 2 and wideband terminals are always hard-wired. Mode 3 terminals on a 2550 may be either hard-wired or dial-up. All other mode 3 terminals are dial-up. It is possible to define 4800 bps dial-up on 2550 ports.

```
TMxxx    line-speed
```

where line-speed may be the following for each terminal type:

TM3	110, 150, 300 (also 600 and 1200 for the 2550)
TM3	* (The asterisk defines automatic-speed-recognition of a 110, 150, or 300 bps terminal. This option is used only by the 2550.)
TMx4x	2400, 4800, 9600.
TM2	2400, 4800, 9600, 50000.

MULTIDROP LINES

Any of the mode 4 terminal macros may be used to define multidrop (party-line) configurations by adding parameters to the macro call. The general form is:

```
TMx4x    line-speed,(sa0,sa1, . . .sa11),HW
```

A list of site addresses indicates the port is to service a multidrop line to which terminal at those site addresses may be connected. Up to 12 site addresses, 0 to 13B, may be specified in any order. Omission of the site address list causes INTERCOM to assume site address 0. The site address list will not be processed if the line speed parameter is omitted. For example, a BCD Mode 4A port with a 2400 bps party line with six possible site addresses might be defined as follows:

```
TMB4A    2400,(5,1,0,10,11,6),HW
```

MULTISTATION TERMINALS

The mode 4C terminal macro, and the general mode 4 macro, may be used to define multistation terminals by adding parameters to the macro call. The general form is:

```
TMx4x    line-speed (site-address-list),(sa1,sa2, . . . sa11),HW
```

A list of station addresses indicates the terminal has several CRT stations to be serviced. Printer stations must not be specified in the macro call. Up to 9 station addresses, 1-3, 5 7, 11-13B, may be specified in any order. Station addresses 4, 10B, 14B, are reserved for printer stations. Omission of the station address list causes INTERCOM to assume station address 1. The station address list is not processed for mode 4A terminals.

For example, a mode 4C port with three site addresses on a 4800 bps line, each of which may have four station addresses might be specified as follows:

```
TM4C     4800,(0,5,2),(6,1,2,9),HW
```

In this case, each site is assumed to have the identical station configuration.

PORT DISTRIBUTIONS FOR LOW SPEED MULTIPLEXERS

The chart indicates the hardware limitations for each low-speed multiplexer configuration. These limitations show the maximum number of mode 4 ports that can be defined and the maximum number of mode 3 ports that can be defined. Each mode 4 port can be a party-line port and support more than one terminal.

For each hardware configuration, the chart indicates the best estimates of what the software will support satisfactorily. Under heavy loads, terminals may suffer some degradation.

Multiplexer Configuration	Hardware Limits		Software Limits			
			2000–2400 bps	4800 bps	9600 bps	
One PPU	Mode 4	Mode 3	Mode 4	Mode 4	Mode 4	Mode 3
6671	16		16	16	2-4	
		16				16
2X6671	32		28-32	Not Supported	Not Supported	
	16	16	14-16	Not Supported	Not Supported	16
		32				32
6676		64				64
2X6676		128				100-128
6671+6676	16	64	16	10-12	Not Supported	64†
		80				80

† The number of 110 baud lines that can be supported on the 6676 is a maximum of 25 to 40 if any 4800 baud lines are defined for the 6671. The greater the number of ports used on the 6671, the fewer that can be used on the 6676. In fact, if all 16 ports are used on the 6671 and any are run at 4800 baud, the 6676 will not be serviced. If either 2400 or 4800 baud mode 4 terminals are on the 6671 and 300 baud mode 3 terminals are on the 6676, fewer than 25 ports are supported on the 6676.

DRIVER TYPE SELECTION

Each hardware channel to be serviced by INTERCOM low speed is processed by a single dedicated PPU. The INTERCOM low-speed driver assembles differently depending on the channel multiplexer and terminal configuration. Depending on the system, it may be necessary to have more than one variant of the driver assembled in the system since INTERCOM low-speed may be supporting more than one channel.

A *DEFINE directive is required for each type of driver to be assembled.

The *DEFINE directive, the configuration supported by the variant, and the PPU program name of the variant are indicated in the following table where C represents a CRT, T a TTY; 71 is a 6671 and 76 is a 6676. S represents a special stimulator communication variant.

Directive	Configuration	PPU Name
*DEFINE,CT71	One or two 6671s; CRT terminals with speeds up to 2400 bps (BCD and/or ASCII) or One 6671; CRT terminals with speeds up to 4800 bps (BCD and/or ASCII). TTYs as well as CRT terminals may be on 6671 ports.	1Z2/8Z2
*DEFINE,CT7176	One 6671 and one 6676. 6671 has CRT terminals with speeds up to 4800 bps and may also have TTY ports. 6676 has TTY ports.	1Z3/8Z3
*DEFINE,T76	One or two 6676s; each multiplexer has TTYs only.	1Z6/8Z6
*DEFINE,CT96	One 6671; lowest four ports of multiplexer are supported and may have TTYs or CRT terminals with speeds up to 9600 bps.	1Z7/8Z7
*DEFINE,ST76	1 simulated 6676, TTYs only; variant only communicates with software simulation programs SIP/VSM/1VG.	1Z8/8Z8

With one exception, given the *DEFINE directive, the driver will be assembled for the maximum number of multiplexers that can be supported by that variant. Initialization code within the driver will set internal tables to reflect the actual configuration. For example, the T76 driver is assembled to support two 6676 multiplexers. If this variant is called to support a channel with only one 6676, it will initialize properly to handle this situation. The exception is 1Z3/8Z3, the variant which drives both a 6671 and a 6676 on the same channel. If either mux is down, or logically OFF in the EST, and out of service, a driver variant for the single multiplexer is required. Sites with a configuration which includes a channel shared by a 6671 and a 6676 should install three driver variants in order to drive either or both multiplexers. These variants are:

```
1Z3/8Z3     *DEFINE,CT7176
1Z2/8Z2     *DEFINE,CT71
1Z6/8Z6     *DEFINE,T76
```

Two CRT terminal drivers (1Z2 and 1Z3) will initialize to process terminals at either a 2400 bps rate or a 4800 bps rate as is necessary.

Note that 1M1 cannot support two 6671s on a single channel if any of the ports must be driven at 4800 bps.

Parameters IP.CTCT, IP.CTCT4, and IP.CTCT9 indicate the maximum number of ports active. The parameter for the fastest line speed is used in determining the maximum for each driver variant. This number is doubled if the driver is running at 2XPP speed, which requires a restriction that two times this maximum is less than 73B (77B-SLOTRAN) if the driver is to be run at 2XPP speed with CRTs.

The *DEFINE,CT71 directive for the low-speed driver is located near the end of the PL12I installation deck.

For each additional variant of the low-speed driver required, the following sets of cards must be inserted in PL12I at the positions designated by comments contained in that deck (see Installation Procedures).

Let x represent the driver type, such as T76 or T7176 (see Driver Type Selection).

In the control statement record, insert:

```
UPDATE(P=NEWPL,C=x,Q)  UPDATE DRIVER x
COMPASS(I=x,S=IPTEXT,S=PPTEXT,S=SDDTEXT,L=0)  ASSEMBLE DRIVER x
```

And as an input record to the above, insert

```
*IDENT x
*DEFINE x
*COMPILE 1M1
=CWEOR,0
```

The UPDATE deck name for the low-speed driver is 1M1; however, each variant of the driver produced will have a different name of the form 1Zx where x is a number indicating the terminal mix supported by that driver as indicated in the table under driver type selection. Similarly, the driver's primary overlay, 8Zx, will have a name indicating the terminal mix supported. An additional overlay, 9Z1, is present in all driver variants.

When INTERCOM is first initiated, the INTERCOM initialization routine, 1I1, initiates the drivers as dictated by the multiplexers defined in the EST and the port definitions defined in the multiplexer subtables. If all equipments (multiplexers) on a channel are turned off when INTERCOM is initiated, no driver is initiated to service that channel; however, the multiplexer subtables for all of the equipment will be examined and initialized by 1I1.

The user should make certain that only one EST entry points to each multiplexer subtable whether the equipment is on or off.

Installation deck PL12I also will compile the relocatable multiuser job subroutines (deckname MUJSUBS). Deck PL12E will not add them to the running system for reasons of size and expected infrequency of use. MUJSUBS always must be included on the COMPILE file, however, when EDITOR is compiled and loaded, so that references to the muj subroutines from EDITOR are satisfied. If a full UPDATE is done, the subroutines are included on the COMPILE file. If an UPDATE,Q is done and the EDITOR is to be modified, the UPDATE input must include a *COMPILE MUJSUBS. (EDITOR does not use FTNMUJ or COBOMUJ, the decknames for the FORTRAN Extended and COBOL muj preprocessors.)

After the password files are established and the time has been initialized, INTERCOM should be brought up at control point zero with the console type-in INTERCOM. The INTERCOM system is then ready to service remote terminal users.

COMMAND TABLE STRUCTURE (1CI OVERLAY 2CS — COMMON DECK COMTBL)

Prior to INTERCOM installation, release values in the command table in 2CS may be changed or a new command or multiuser-job entry may be added. The command table is split into four parts based on the length of the command name. New entries should be inserted at the following locations.

1- or 2-character name	*I,COMTBL.12
3- or 4-character name	*I,COMTBL.35
5- or 6-character name	*I,COMTBL.58
7-character name	*I,IN40844C.14

The four command types each have an entry-definition macro as follows:

COM2CC Defines a command processed by 2CC.

MUJ Defines a multiuser job.

COM1LX Defines a remote-batch command processed by 1LX.

REMOTE Defines a command which manipulates queue files or executing jobs.

A command-definition entry has the general form:

name MACRO parameters

where name is the command name, such as, ON, and MACRO is one of the above macro names.

COM2CC MACRO

The COM2CC macro defines a command which is processed by an independent routine in overlay 2CC. Format:

name COM2CC L=l, P=p, B=b, MP=mp, ADDR=ad

l
- YES = user must be logged in to use this command
- NO = user need not LOGIN if at a hardwired terminal
- Default = YES

p
- YES = command may be used while in a pause state
- NO = command may not be used while in a pause state
- Default = NO

b
- YES = command allowed only at a batch terminal
- NO = command allowed from any terminal type
- Default = NO

mp maximum number of parameters which may follow command verb; Range 0-5. If MP is specified, even MP=0, parameters in the input line are counted. If the number of parameters exceeds mp, the line is rejected as a format error. Do not specify MP when commands contain parameters over 7 characters or for commands such as MESSAGE for which parameters are meaningless.

ad 2CC address (routine name) where this command is processed. If the AD parameter is omitted, a routine with the same name as that of the command is assumed.

MUJ MACRO

The MUJ macro defines a multiuser job. A corresponding entry must be made in muj table of 1QP. F rmat:

name	MUJ ORD1QP=ord
ord	1QP MUJ ordinal. EDITOR=1, HELLO7=2; others should proceed sequentially from 3

COM1LX MACRO

The COM1LX macro defines a command processed by 1LX, and controls parameter processing for the command. Format:

name	COM1LX B=b, P=p, MP=mp, ORD1LX=ord, PRE=pre, POST=post, MU=mu
b	Same as for COM2CC, except default =YES
p	Same as for COM2CC
mp	Same as for COM2CC
ord	1LX command ordinal. An entry must be added at installation to 1LX's jump table for each new COM1LX command.
pre	address (name) of 2CC subroutine which does preprocessing (prior to extraction and validation of equipment mnemonic) for this command.
post	address (name) of 2CC subroutine which does postprocessing (after equipment validation but before passing directive to 1LX) for this command.
mu	minimum unit mnemonic for which command is valid. ALL < CR < CP < LP.

COM1LX Notes

Either PRE or POST may be specified, but not both. If neither is specified, only the directive ordinal and the equipment number is passed to 1LX. Refer to the IMS for further information.

REMOTE MACRO

The REMOTE macro defines commands which manipulate the user's queue files and execution jobs, specifically the commands DROP, KILL, DIVERT, EVICT, and PRIOR. Adding such an entry requires modifications to the 2CC routine REMOTE. Anyone contemplating this course should consult the IMS.

MUJ TABLE STRUCTURE (1QP)

Each multiuser job as defined in the command table of 2CS also must be defined in the muj table of 1QP, MUJTABL. The position of an entry in MUJTABL is defined as the 1QP muj ordinal. Entries are made with the macro MUJTBL, at *B 1QP.599.

MUJTBL name,fl,swpin,swpout,editor

name	Name of the muj
fl	Field length of muj (actual value)
swpin	Delay, in 1CI cycles (depends on IP.TICI, released for 1/2 second), between discovery of need to swap in the muj and actual entry into the scheduling queue. This value increases response time to muj requests (when the muj is swapped out) but allows requests to accumulate; so that when the muj is in, it is more likely to process multiple users. Maximum of 4095.

swpout — Delay, in 1CI cycles, between discovery of need to swap out muj and actual swap out. A high value setting essentially dedicates the muj at a control point.

editor — 1 muj EDITOR
0 otherwise

The parameters swpin, swpout, and editor may be null, and default values 1, 0, and 0, respectively, are assumed.

TBL ASSEMBLY OPTIONS

Ten TBL command ordinals (14-23) are reserved for users to add routines to TBL. To add a routine with entry point xxx and command ordinal 14, change the fourteenth entry of TBL table TABLE to:

```
CON     xxx
```

The TBL command ordinal is an index into ICPLIB. TBL tests bits 0 and 1 of table ICPLIB (12-bit entries) to determine if checks should be made for the calling program. If bit 0 is set, the calling program is a system library program. If bit 1 is set, the calling program is at an INTERCOM control point.

Table Changes and Release Settings

Changes to the tables in routines 2CS, 1QP, and TBL should be included in the UPDATE record at the directive */ADD CORRECTIONS HERE in installation deck PL12I. The following list shows the release values and UPDATE identifiers.

```
*    MUJTABL FOLLOWS.  ALL DEFINED MUJ=S ARE INCLUDED.  THEY MUST      1QP     594
*    PHYSICALLY OCCUR IN THE SAME ORDER AS THEY DO IN 1SJ=S TABLE.     1QP     595
*                                                                      1QP     596
MUJTABL  BSS     0                    DEFINE BEGINNING OF TABLE       1QP     597
         MUJTBL  EDITOR,40000,0,2,1                                    1QP     598


VERB12   EQU     *                                                    COMTBL  2
                                                                      COMTBL  3
C        COM1LX  P=NO,MP=0,ORD1LX=17B                                 COMTBL  4
E        COM1LX  P=NO,MP=1,ORD1LX=14B,PRE=END                         COMTBL  5
G        COM1LX  P=YES,B=NO,MP=1,ORD1LX=3,PRE=GO                      COMTBL  6
GO       COM1LX  P=YES,B=NO,MP=1,ORD1LX=3,PRE=GO                      COMTBL  7
H        COM2CC  L=NO,P=NO,B=YES,MP=2                                 IN40844K 7
M        COM2CC  L=NO,P=YES,B=NO,ADDR=MESSAGE                         COMTBL  9
ON       COM1LX  P=NO,MP=1,ORD1LX=1                                   COMTBL  10

R        COM2CC  L=NO,P=NO,B=YES,MP=2,ADDR=READ                       COMTBL  12
                                                                      COMTBL  13
VERB34   EQU     *                                                    COMTBL  14
                                                                      COMTBL  15
BSP      COM1LX  P=NO,MP=2,ORD1LX=10B,MU=CP,POST=BSP                  COMTBL  16
CRT      COM2CC  L=NO,P=NO,B=YES,MP=1                                 IN41257  4
DMP      COM2CC  L=YES,P=NO,B=NO,MP=2                                 COMTBL  18
DROP     REMOTE  P=YES,MP=1,REMORD=0,SUBORD=1                         COMTBL  19
EFL      COM2CC  L=YES,P=NO,B=NO,MP=1                                 COMTBL  20
END      COM1LX  P=NO,MP=1,ORD1LX=14B,PRE=END                         COMTBL  21
ETL      COM2CC  L=YES,P=NO,B=NO,MP=1                                 COMTBL  22
KILL     REMOTE  P=NO,MP=1,REMORD=0,SUBORD=0                          COMTBL  23
LOCK     COM2CC  L=NO,P=YES,B=NO,MP=1                                 COMTBL  24

OFF      COM1LX  P=NO,MP=1,ORD1LX=2                                   COMTBL  26
READ     COM2CC  L=NO,P=NO,B=YES,MP=2                                 COMTBL  27
REP      COM1LX  P=NO,MP=2,ORD1LX=13B,MU=CP,POST=REPEAT               COMTBL  28
REW      COM1LX  P=NO,MP=1,ORD1LX=11B,MU=CP                           COMTBL  29
RFL      COM2CC  L=YES,P=NO,B=NO,MP=1,ADDR=EFL                        COMTBL  30
RTN      COM1LX  P=NO,MP=2,ORD1LX=12B,MU=CP,POST=RTN                  COMTBL  31
SUP      COM1LX  P=NO,MP=1,ORD1LX=15B,MU=LP                           COMTBL  32
TAPE     COM2CC  L=YES,P=YES,B=NO,MP=1                                IN40844C 13

WAIT     COM1LX  P=NO,MP=1,ORD1LX=4                                   COMTBL  35
                                                                      COMTBL  36
VERB56   EQU     *                                                    COMTBL  37
                                                                      COMTBL  38
```

```
CONTIN      COM1LX   P=NO,MP=0,ORD1LX=17B                                    IN40844B  5
DEFINE      COM1LX     P=NO,MP=5,ORD1LX=5,MU=CP,PRE=DEFINE                   COMTBL   41
DIVERT      REMOTE     P=NO,MP=4,REMORD=3,SUBCRD=1,CP=PARM3,MO=ALL           COMTBL   42
EDITOR      MUJ        ORD1QP=1                                              COMTBL   43
EVICT       REMOTE     P=NO,MP=2,REMORD=1,SUBORD=0,QP=PARM2,MQ=ALL           COMTBL   44
HELLO7      MUJ      ORD1QP=2                                                S402580   3

                                                                            COMTBL   47
LGIMORD     EQU      *              FWA OF LOGIN ENTRY                      IN41353   5
LOGIN       COM2CC                    DUMMY ENTRY - ONLY NAME USED         COMTBL   49
LGOTORD     EQU                    FWA OF LOGOUT ENTRY                     IN41353   6
LOGOUT      COM2CC                 DUMMY ENTRY - ONLY NAME USED            IN41353   7
                                                                            COMTBL   50
PRIOR       REMOTE     P=NO,MP=3.REMORD=2,SUPORD=0,QP=PARM3,MO=OUTPUT       COMTBL   51

REDUCE      COM2CC     L=YES,F=NO,B=NC,MP=1                                  COMTBL   53
REVERT      COM2CC     L=NO,P=NO,B=YES,MP=1                                  COMTBL   54

SAVEFL      COM2CC     L=YES,P=NO,B=NO,PF=1                                  COMTBL   56

SWITCH      COM2CC     L=YES,P=YES,B=NO,MP=1                                 COMTBL   58
                                                                            COMTBL   59
VERB7       EQU      *                                                       COMTBL   60
                                                                            COMTBL   61

COMMENT     COM2CC     L=NO,P=YES,B=NO                                       COMTBL   63


MESSAGE     COM2CC     L=NO,P=YES,B=NO                                       IN40844C 14
                                                                            COMTBL   66
TBLEND      EQU      *              LWA+1 OF TABLE = LWA OF VERB7 SECTION   COMTBL   67
```

EDITOR INSTALLATION PARAMETERS

EDITOR uses two common decks, IPFTN (FORTRAN) and IPCOM (COMPASS), to contain installation parameters. Generally, a change to one common deck requires a corresponding change to the other. With the exception of arrays which must be dimensioned for FORTRAN in common deck IPFTN, the values of installation parameters are not defined in IPFTN. IPFTN merely allocates storage for these definitions. The definitions are DATA statements in the BLOCK DATA subprogram IPFILL.

IPCOM contains EQUs which define the installation parameters. Since many parameters are of such a nature that a change in one implies a change of another, a dependency chart is included below to aid the installation.

Summary of the steps to be taken to change an EDITOR installation parameter:

1. Change the DATA statement in IPFILL or the EQU in IPCOM, or both, as indicated by the parameter description.
2. Consult the dependency chart for any dependent installation parameters that require change, and change them as in step 1.
3. Consult the dependency chart for dimensions of arrays in IPFTN. If they are affected, change them as indicated in the table, Array Dimensions in IPFTN.

Additionally, EDITOR has the following installation parameter defined in common deck INTCOM.

```
IP.FTNTS    CEQU    0    Makes the installation default compiler FTN, OPT=0
                    1    Makes the installation default compiler FTN Time-Sharing
```

Any changes which cause the size of the EDITOR to increase may require an increase in the field length defined for EDITOR in the MUJTABL for 1QP. The following list shows the release values and UPDATE identifiers for IPFILL, IPCOM, and IPFTN.

IPCOM

```
* THE FOLLOWING SYMBOLS MUST BE DEFINED FIRST, SINCE THEY ARE USED TO          IPCOM    3
* DEFINE OTHER SYMBOLS BELOW                                                   IPCOM    4
 NPRUS      EQU     2           NUMBER OF PRUS IN EDIT FILE *WINDOW*          I410095  3
 NTBSMAX    EQU     10          MAX. NUM. OF TAB SETTINGS ALLOWED             I410095  4
 NSINDEX    EQU     20          SIZE OF EDITFIL INDEX                         I410079  1
* INSTALLATION PARAMETERS                                                      IPCOM    86
*  SEE ALSO- ADDITIONAL PARAMETERS DEFINED AT VERY BEGINNING OF IPCOM          IPCOM    87
 NBBS       EQU     2           NUMBER OF BIG BUFFERS                         IPCOM    88
 NSBB       EQU     257         SIZE OF BIG BUFFER (WITHOUT FET)              I410095  5
 NPBS       EQU     3           NUMBER OF POOL BUFFERS                        IPCOM    90
 NUSERS     EQU     30          MAXIMUM NUMBER OF ATTACHED USERS              IPCOM    91
 NEDFETS    EQU     10          MAXIMUM NO. OF EDIT FILE FETS                 IN40815  42
 NUAS       EQU     3           NUMBER OF USER AREAS                          IPCOM    93
 NSUA       EQU     JOPRU+NPRUS*64                                            IN40815  43
* EXCLUDES THE TAB POSITIONS, THE INDEX, AND THE RJLNKS AREA)                  IPCOM    95
 NSRJLNK    EQU     10          SIZE OF RU LINKAGE AREA                       IPCOM    97
 NUASIZE    EQU     JRULNKS+NSRJLNK                                           IN40815  44
*                                                                             IPCOM    98
*   DEBUG OPTION - IF DEBUG EQU 1, DEBUGGING CODE IS ASSEMBLED                IPCOM    99
 NDEBUG     EQU     0           NO DEBUGGING CODE                             IPCOM    100
```

IPFILL

```
C    IMPORTANT NOTE - THE VALUE OF THE FOLLOWING VARIABLES IS DEPENDENT       IT30062  31
C    ON THE VALUE OF THE INSTALLATION PARAMETER NPRUS -                       IT30062  32
C              NSUA,                                                          IT30062  33
C            JTABS, UNDXHDR, JINDEX, JRJLNKS                                  IT30062  34
C    IF NPRUS IS NOT EQUAL TO ONE, THE FOLLOWING MODIFICATIONS MUST BE        IT30062  35
C    MADE.  FOR EACH OF THE VARIABLES LISTED ABOVE, ADD                       IT30062  36
C      THE VALUE (NPRUS-1)*64.                                                IT30062  37
         DATA JTEXT1/0/,JTEXT2/2/,JFLAGS1/4/,JFLAGS2/5/,JPBW/6/,JLNBUF/17/,  IN40815  741
        X JCPRU/69/,UTABS/197/,JNDXHDR/199/,JINDEX/200/,JRJLNKS/220/          IN40815  742
         DATA NLINE/6L000100/,NINCR/10/,NUAS/3/                               EDITOR   4251
         DATA NBBS/2/,NPBS/3/,NUSERS/30/,NEDFETS/10/,                         IN40815  746
        X       NSUA/197/,NSINDEX/20/,NSRJLNK/10/,NTBSMAX/10/,XNPCENT/0.9/,   IN40815  747
        X       NUASIZE/230/,NPRUBUF/128/                                     IN40815  748
C    SEE NOTE ABOVE IF NPRUS IS CHANGED.                                      IT30062  38
         DATA NPRUS /2/                                                       I410095  8
         DATA NTABFTN/1L;/,NTBSFTN/1/,NCHFTN/72/,                             EDITOR   4254
        X       FTNTABS/0007000000000000000E/                                 EDITOR   4255
         DATA NTABCOM/1L;/,NTBSCOM/3/,NCHCCM/72/,                             EDITOR   4256
        X       COMTABS/0013002200440000000B/                                 EDITOR   4257
         DATA NTABCOB/1L;/,NTBSCOB/5/,NCHCCB/72/,                             EDITOR   4258
        X       CCBTABS/0010001400200024O030B/                                EDITOR   4259
         DATA NTABALG/1LS/,NTBSALG/5/,NCHALG/72/,                             IT30125  1
        X       ALGTABS/0007001200150020O023B/                                EDITOR   4261
         DATA NCHBAS/150/                                                     IN41370  113
         DATA NTABCEF/1L;/,NTBSDEF/1/,NCHDEF/72/,                             IV3147   4
        X       DEFTABS/0007000000000000000B/                                 IV3147   5
```

```
C     THIS COMMON DECK CONTAINS ALL INFORMATION CONCERNING THE FORMAT OF      IPFTN     3
C     THE EDITOR COMMON AREA (ECA) AND INSTALLATION PARAMETERS                IPFTN     4
C     THIS STATEMENT DEFINES THE EDITOR COMMON AREA                           IPFTN     8
C     ALL OF THE CELLS IN COMMON BLOCK /ECA/ ARE FILLED BY (ECAFILL)          IPFTN     9
      COMMON /ECA/ MLRROR,MEM(1),MRA,                                         IN40815   5
     X MPTR1,MPTR2,MCNT,                                                      IPFTN     11
     1 MICI,MCASE,MSTATE,MCASE2,MSTATE2,MUNMBR,MOASUB,MEFPTR,MACTN,                    6
     2 MCMPLT,MTEBCNT,MTEB(52),MBBMA(2),MPBMA(3),MBBS(526),MPBS(384),         I410095   1
     3 MEDFST(80),MMUJTBL(159),MPBWD,MBBWD,MUAS(690)                          IN40815   7
     X,IEDFET,ITPRUS,IWDSWRT,IUFRUS                                           IN40815   8
C     NUMBERS OF WORDS IN USER AREA (RELATIVE TO ZERO)                        IPFTN     37
      COMMON/IPFTN/ JTEXT1,JTEXT2,JFLAGS1,JFLAGS2,JPBW,JLNBUF,JCPRU,          IPFTN     38
     X JTABS,JNDXHDR,JINDEX,JRJLNKS                                           IPFTN     39
C     NUM. OF WDS IN EDIT FILE WINDOW- INITIALIZED AT BEGINNING OF EDITOR     IPFTN     62
      COMMON /IPFTN/ NPRUBUF                                                  IPFTN     63
C     INSTALLATION PARAMETERS                                                 IPFTN     64
      COMMON/IPFTN/ NLINE,NINOR,NBBS,NP8S,NUAS,NUSERS,                        IN40066   1
     X NSUA,NSINDEX,NSRJLNK,NTBSMAX,XNPCENT,NPRUS,NUASIZE,NEDFETS             IN40815   12
C     (FORTRAN) FORMAT                                                        IPFTN     67
      COMMON/IPFTN/ NTABFTN,NTBSFTN,NCHFTN,FTNTABS(1)                         IPFTN     68
C     (COMPASS) FORMAT                                                        IPFTN     69
      COMMON/IPFTN/ NTABCCM,NTBSCOM,NCHCOM,COMTABS(1)                         IPFTN     70
C     (COBOL) FORMAT                                                          IPFTN     71
      COMMON/IPFTN/ NTABCOB,NTBSCOB,NCHCOB,COBTABS(1)                         IPFTN     72
C     (ALGOL) FORMAT                                                          IPFTN     73
      COMMON/IPFTN/ NTABALG,NTBSALG,NCHALG,ALGTABS(1)                         IPFTN     74
C     (BASIC) FORMAT                                                          IPFTN     75
      COMMON/IPFTN/                NCHBAS                                     IPFTN     76
C     DEFAULT FORMAT                                                          IPFTN     77
      COMMON/1PETN/ NTABDEF,NTBSDEF,NCHDEF,DEFTABS(1)                         IPFTN     78
```

In this table, -* in the Range column indicates where a parameter has essentially no absolute upper limit. The installation determines the practical upper limit based on considerations such as EDITOR size and expected number of users.

Parameter Name	Defined In IPFILL	Defined In IPCOM	Description	Range	Release Value
NLINE	X		Default first line number for CREATE, EDIT, RESEQ	6L000001 to 6L999999	6L000100
NINCR	X		Default line number increment for ADD, CREATE, EDIT, RESEQ	1-999998	10
NUAS	X	X	Number of user area buffers	1-* Large number decreases response time if there are many users	3
NBBS	X	X	Number of big buffers (used for EDIT, SAVE, RUN)	1-* Increase if many EDITs, SAVEs, RUNs anticipated	2
NPBS	X	X	Number of pool buffers. Each is 64*NPRUS words	2-* Increase when heavy file modifications or long text lines expected, generally NPBS≥NUAS	3
NUSERS	X	X	Maximum number of users simultaneously using EDITOR	1-* Vary with expected usage of EDITOR	30

Parameter Name	Defined In IPFILL	Defined In IPCOM	Description	Range	Release Value
NPRUS	X	X	Number of 64-word PRUs in one block in edit file If NPRUS is larger than 12D, EDITOR will not use the CMU hardware, regardless of the setting of NOS/BE 1 installation parameter IP.CMU.	1-* Large number decreases response time for commands which process large files, but it also increases amount of central memory required for EDITOR by 64 words for each pool buffer and 64 words for each user area buffer	2
NSUA	X	X	Size of user area; must be modified in IPFILL if NPRUS is changed. NSUA=69+ 64*NPRUS. Size does not include portion of user area used for tabs, return jump links, and edit file index	133-*	197
NUASIZE	X	X	SIZE OF USER AREA including areas for tabs, return jump links and edit file index.	133-*	230
NPRUBUF	X		Number of words in one edit file block. Must be 64*NPRUS	64-*	128
JTABS	X		Number of word in user area which holds tab values; must be modified in IPFILL if NPRUS is changed. JTABS= 69+64*NPRUS	131-*	197
JNDXHDR	X		Number of index header word in user area; must be modified in IPFILL if NPRUS is changed. JNDXHDR= JTABS+(NTBSMAX+4)/5	132-*	199
JINDEX	X		Number of first word in edit file index in user area; must be modified in IPFILL if NPRUS is changed. JINDEX= JNDXHDR+1	133-*	200
JRJLNKS	X		Number of first word in return jump link area in user area; must be modified if NPRUS is changed. JRJLNKS= JINDEX+NSINDEX	153-*	220
NSINDEX	X	X	Number of index entries for each user's edit file	1-* Increase for editing very large files	20
NTBSMAX	X	X	Maximum number of tab settings permitted by FORMAT command	1-509 Must be > NTBSFTN, NTBSCOM, NTBSCOB, NTBSALG, NTBSDEF	10
XNPCENT	X		Percent to which each block of user's edit file is filled by EDIT (Padding factor)	.01-1.00 Decrease if heavy file modification is expected	.90

Parameter Name	Defined In IPFILL	IPCOM	Description	Range	Release Value
NTABFTN	X		FORTRAN tab character	1LA-1L;	1L;
NTABCOM	X		COMPASS tab character	1LA-1L;	1L;
NTABCOB	X		COBOL tab character	1LA-1L;	1L;
NTABALG	X		ALGOL tab character	1LA-1L;	1L$
NTABDEF	X		Default tab character	1LA-1L;	1L;
NTBSFTN	X		Number of FORTRAN tabs defined	0-509	1
NEDFETS	X	X	Number of FETs used to attach a user's editfile.	1-*	10
NTBSCOM	X		Number of COMPASS tabs defined	0-509	3
NTBSCOB	X		Number of COBOL tabs defined	0-509	5
NTBSALG	X		Number of ALGOL tabs defined	0-509	5
NTBSDEF	X		Number of Default tabs defined	0-509	1
NCHFTN	X		Maximum no. of characters in FORTRAN line	1-510	72
NCHCOM	X		Maximum no. of characters in COMPASS line	1-510	72
NCHCOB	X		Maximum no. of characters in COBOL line	1-510	72
NCHALG	X		Maximum no. of characters in ALGOL line	1-510	72
NCHDEF	X		Maximum no. of characters in default format	1-510	72
NCHBAS	X		Maximum no. of characters in BASIC line		150
FTNTABS	X		Consecutive stream of bits, each 12 define a tab position for FORTRAN format. Must be ascending order	1-511 (each tab)	000700000000000000B
COMTABS	X		Same as above, for COMPASS	1-511	001300220044000000B
COBTABS	X		Same as above, for COBOL	1-511	001000140020002400 30B
ALGTABS	X		Same as above, for ALGOL	1-511	000700120015002000 23B
DEFTABS	X		Same as above, for Default format	1-511	000700000000000000B
NSBB		X	Size of big buffers used for EDIT, SAVE, RUN (does not include FET)	64-* Increase for very large files	157
NDEBUG		X	Flag controls debugging mode. (See also Multi-user Job Installation Parameter MDEBUG)	0 = off 1 = on	0

EDITOR Array Dimensions in IPFTN

Array Name	Usage	Array Dimension
FTNTABS	FORTRAN tabs	(NTBSFTN+4)/5
COMTABS	COMPASS tabs	(NTBSCOM+4)/5
COBTABS	COBOL tabs	(NTBSCOB+4)/5
ALGTABS	ALGOL tabs	(NTBSALG+4)/5
DEFTABS	Default tabs	(NTBSDEF+4)/5
MMUJTBL	Storage needed by muj subroutine tables	4*NUSERS + NBBS + 10 + NUAS + 6* (NPBS+1)
MUAS	User area buffers	NUAS* (size of full user area) where:
	May never exceed 4095 decimal	(size of full user area) (NTBSMAX+4)/5 + NSINDEX +1 + NSUA + NSRJLNK Note: NSRJLNK should not nave to be changed by an installation
MBBS	Big buffers	NBBS*NSBB + NBBS*6
MPBS	Pool buffers	NPBS*64*NPRUS
MBBMA	Big buffer management area	NBBS
MPBMA	Pool buffer management area	NPBS

EDITOR Dependency Chart

If changed	Check parameters in IPFILL and/or IPCOM	and arrays in IPFTN
NLINE		
NINCR		
NUAS		MMUJTBL,MUAS
NBBS		MBBS,MBBMA
NPBS		MPBS,MPBMA,MMUJTBL
NUSERS†		MMUJTBL
NSINDEX	JRJLNKS	MUAS
NTBSMAX	JNDXHDR,JINDEX,JRJLNKS	MUAS
XNPCENT		
NTABFTN		
NTABCOM		
NTABCOB		
NTABALG		
NTABDEF		
NTBSFTN	NTBSMAX, FTNTABS	FTNTABS
NTBSCOM	NTBSMAX, COMTAABS	COMTABS
NTBSCOB	NTBSMAX, COBTABS	COBTABS
NTBSALG	NTBSMAX, ALGTABS	ALGTABS
NTBSDEF	NTBSMAX, DEFTABS	DEFTABS
NCHFTN		
NCHCOM		
NCHCOB		
NCHALG		
NCHDEF		
NCHBAS		
FTNTABS	NTBSFTN	FTNABS
COMTABS	NTBSCOM	COMTABS
COBTABS	NTBSCOB	COBTABS
ALGTABS	NTBSALG	ALGTABS
DEFTABS	NTBSDEF	DEFTABS
NSBB		MBBS
NDEBUG		MDEBUG††
NPRUS	JTABS,JNDXHDR,JINDEX, JRJLNKS,NSUA	MPBS,MUAS

† When NUSERS is increased, the user should also consider changing the size of the TERMIN and TERMOUT tables in the muj subroutine MUJSUBS. See INTERCOM 4 Multi-User Job Capability Programming System Bulletin under the heading Changing Size of TERMIN and TERMOUT.

†† See Multi-User Job Installation Parameters

EDITOR DEBUG CODE

If EDITOR encounters hardware and/or software problems, a diagnostic printout is produced. If the problem is considered fatal, all EDITOR users are detached. The content of the diagnostic printout depends on the error encountered and the setting of NDEBUG. In any event, the diagnostic printout should accompany any PSR relating to a MUJ SYSTEM ERROR. See also MDEBUG below.

MULTI-USER JOB INSTALLATION PARAMETERS

The multi-user job (muj) subroutines use two common decks, MUJCOM and CMUJCOM. Both contain storage allocation for an array, ECSBUF. The MUJCOM deck in FORTRAN code contains a DIMENSION statement; the CMUJCOM deck in COMPASS code contains a BSS statement. This array is used by the muj peripheral processor routines, FAD, to read information from Extended Core Storage (ECS). Array length must be (n*64+1) central memory words. The value of n may be selected by the installations, depending on the expected use of ECS for storage of user swap files (if ECS is used, n should be at least 2) and on the number of local files allowed for an INTERCOM user. As a guide, n may be increased by one for each 20 local files allowed per user. The upper limit for n is dependent on the amount of storage used for the ECS buffer in the muj, and the size of the swap buffer in FAD.

The peripheral processor routine FAD contains two parameters relevant to allocation of space for ECSBUF. ECSBFLN (near FAD.659) is a COMPASS EQU instruction. It must be equated to the number of central memory words in the ECSBUF array. SWAPBF (near FAD.650) is a table FAD uses to read the ECSBUF array into PP memory. The value of ECSBFLN, and thus the size of the ECSBUF array in MUJCOM and CMUJCOM, must not be greater than 1+ (length of SWAPBF)/5.

Symbol MDEBUG in common deck CMUJCOM controls muj debugging code (0=off, 1=on). It should be set to 1 if the EDITOR installation parameter NDEBUG is set to 1.

In the routine MUJFILL, the two constants NACOUNT and THRSHLD control the accounting of muj time. The value of NACOUNT determines how frequently the accounting information for a muj is obtained from the system and distributed to users attached to the muj. NACOUNT is the maximum number of user switches performed on any given user before accounting is done. Accounting is always performed on user exit from the muj. NACOUNT must be set greater than or equal to 1 and defaults to 50 decimal. The value of THRSHLD determines the minimum number of CP seconds accumulated before accounting is posted to the user. As THRSHLD is set to smaller values, accounting is more accurate, overhead is increased, and THRSHLD has more meaning. THRSHLD defaults to 5 decimal.

INSTALLATION PROCEDURES

Installation job decks PL12I and PL12E may be obtained from the Installation Decks program library, using the procedure outlined in part I, section 1 of this document.

Deck PL12I assembles the released program library adding the created binary to the PL tape as supplemental files. The release tape does not contain assembled binary. Deck PL12E uses EDITLIB to enter the binary created by deck INTCM1 into the running system. Deck PL12I requires modification if the single default low speed driver type is not the correct variant or multiple low-speed driver types are desired. If the hardware configuration does not include at least one 6671 or 6676 (for example, LCC only system), assembly of the low-speed multiplexer driver can be avoided by including an =DEFINE NO1M1 directive in the input record to the update of the installation deck PL to secure job PL12I.

Deck PL12O, applicable only in the user library method of installation, allows regeneration and replacement of absolute overlays in the user library plus creation of a new PL12 tape.

With deck PL12I, one variant of the PP multiplexer low-speed driver is produced which drives mode 4 terminals and Teletypes on the 6671 multiplexer.

Deck PL12E suggests CM residency for selected PP routines. Sites having ECS may wish to move some of these PP routines to ECS by employing the method discussed in the System ECS Resident Routine and Library portion of part II, section 1. Once PL12E has been run, job DST3 can be run to capture a deadstart tape containing INTERCOM. Decks PL12E and DST3 need not be run if the user library installation process is being followed.

However, for installation with a 6673 or 6674, overlays 2WB, 3WB, 4WB, and 5WB (WB-drive) should be CM resident; otherwise, the response time for the high-speed terminals (especially with interactive graphics consoles) is adversely affected.

No INTERCOM PP programs are required to be CM resident; however, in the interest of product performance, installation jobs PL12E and DST1 contain EDITLIB MOVE directives to force 3TT and its overlays; 1CI and two of its overlays, 1QP, 1BR, and the wideband driver overlays to CM residency. This group of routines and overlays involves 5500 octal words. Based on the site configuration, legitimate directives may be made from EDITLIB comment statements within job deck PL12E to increase CM residency by 1000 octal words.

INTERCOM in an idle state uses 1300 octal words for multiplexer tables and minimum empty buffer chains.

LCC PROGRAMS

The INTERCOM LCC initializer uses the LCC multiplexer subtables to determine which variants of the LCC programs to load before the LCC driver is brought up. INTERCOM assumes the proper variants are available on the system library and are disk-resident. The following table indicates the names of the LCC programs that the LCC initializer searches for.

LCC Memory Size	8K
Mode 2 ports only defined	0ZD
Mode 3 ports only defined	0ZF
Mode 4 ports only defined	0ZH
Modes 2 and 3 ports defined	0ZJ
Modes 2 and 4 ports defined	0ZL
Modes 3 and 4 ports defined	0ZN

In addition, the LCC autoload program 0ZA and LCC autodump program 0ZB must also be available on the system library and be disk-resident.

All these programs are available in binary format as part of a separate release of the LCC programs. They may be added to the running system using the following job:

```
Job statement.
EDITLIB(SYSTEM)
7/8/9
READY(SYSTEM,OLD)
REPLACE(*,INPUT)
COMPLETE.
ENDRUN.
7/8/9
Binary decks of LCC programs
6/7/8/9
```

NPU PROGRAMS

The INTERCOM 2550 Front End NPU initializer uses the NPU multiplexer subtables to determine which variants of the NPU programs to load before the NPU driver is brought up. INTERCOM assumes the proper variants are available on the system library and are disk-resident. The following table indicates the names of the NPU programs that the NPU initializer searches for.

Mode 3 ports only defined 0F3

Mode 4 ports only defined 0F4

Modes 3 and 4 ports defined 0F7

In addition, the NPU autodump program 0F0 must also be available on the system library and be disk-resident.

All of these programs are available as part of a separate release library for CCP 1 that includes the NPU programs. NPU binaries may be added to the running system using the following job:

```
Job statement.
EDITLIB(SYSTEM)
7/8/9
READY(SYSTEM,OLD)
REPLACE(*,INPUT)
COMPLETE.
ENDRUN.
7/8/9
Binary decks of NPU programs 0F0, 0F3, 0F4, 0F7.
6/7/8/9
```

Section 23 of this part describes CCP 1 installation in detail.

MUJ SYSTEM ERRORS

INTERCOM multi-user jobs (for example, EDITOR), upon encountering hardware and/or software errors, produce diagnostic dumps. These dumps contain a header MUJ SYSTEM ERROR xx. This message is sent to the system dayfile and to each user currently using the muj. Values of xx less than 50 indicate error conditions encountered by the system muj subroutines; values 50 or greater denote errors detected by the multi-user joo itself.

Number	Issued By	Error
0	REKOVER	System error, such as Operator Drop, Mode Error, or PP abort
1	USER	User area lost internally
2	SERVICE	User area lost internally
3	SERVICE	Bit KWCOM should not be set for this value of MMACT (FATAL)
4	SWAPOK	Error (from CIO) on last user area swap
5	SWAPOK	Illegal CIO function code on last user area swap (FATAL)
6	SWAPOK	User area lost on swap-out (FATAL)
7	SERVICE	CIO error code on terminal output
8	not used	
9	USER	Muj returning user area not assigned to it. (User error) (FATAL)
10	USER	Invalid ACTN code sent by muj (User error) (FATAL)
11	USER	Invalid information from IQP
12	USER	Internal logic error
13	USER	A non-ready user was marked as ready
14	LUNSRCH	Logical unit number was specified in call to USERFO, but corresponding file was not declared on muj PROGRAM statement (User error) (FATAL)
15	not used	
16	USER	Muj is returning user not assigned to it. (User error) (FATAL)
17	USER	User's files cannot be returned when user leaves muj
18	SERVICE	User area lost internally
50	SYSERR	One of various EDITOR errors. Refer to dump to determine which routine called SYSERR
51	SYSERR	Same as 50, except EDITOR debugging code is on

PASSWORD FILE CREATION

Access to the INTERCOM system is controlled by passwords. The user must specify a valid password to log in to the INTERCOM system. Two types of passwords exist:

Restricted passwords: When he logs in, the user must specify a valid user-name associated with the given password. The installation defines valid user name/password combinations. A user id (two alphanumeric characters) is assigned by the PASSWRD utility, and it is permanently associated with the user name/password. This user id is assigned from a pool of available user ids; it is marked as available again only when the user name/password is deleted.

Unrestricted passwords: The user may specify any user name when he logs in; the user-name is not validated. However, when a user first logs in under a given user-name, a user id is associated by the LOGN utility with that user name/password combination. Thereafter, this user id is associated with the user name/password combination, until the user name/password is deleted from the system.

Through the INTERCOM routine PASSWRD, the installation defines valid restricted user name/password combinations and valid unrestricted passwords and accounting values to be associated with the user name/passwords or passwords. PASSWRD must be called from a data deck submitted to the central site as a batch job. The routine creates two permanent files (or edit existing files). One file, with the permanent file name INTERCOMPASSWORDS, contains all unrestricted passwords, all restricted user name/passwords, and all accounting information. The other file, with the permanent file name INTERCOMUNRESTRICTED, contains a bit map defining assigned user ids; it also contains all unrestricted user name/password combinations. Installations with many users should:

- Instruct users of unrestricted passwords always to use the same character string for user-name when logging in.
- Make use, on a regular basis, of the editing facilities in PASSWRD to delete all unrestricted user-names, and so on, freeing user ids.

While a user is in the process of logging in, he is assigned a temporary id. Temporary ids begin with a special character.

The following deck structure can be used to run the PASSWRD routine, creating a password permanent file:

```
Job statement.
PASSWRD.
7/8/9
NEW
ADD
.
.
.
6/7/8/9
```

The following deck structure can be used to modify existing password permanent files:

```
Joo statement.
PASSWRD.
7/8/9
OLD
ADD or
DEL
.
.
.
6/7/8/9
```

This mode of PASSWRD operation updates the existing permanent files by adding new or deleting old entries. If both files do not exist, a PF ERROR=12B aborts the run.

To protect against unauthorized modification of the password files, the PASSWRD utility requests permission from the console operator before any modifications are made.

Between the NEW (or OLD) card and the 6/7/8/9 statement appear the parameter statements which specify the new entries or the editing requirements. After a NEW statement, only ADD parameter statements may appear; after an OLD statement, either ADD or DEL parameter statements may appear. The ADD statement creates a new entry, or replaces an old entry which has the same user name/password. The DEL statement deletes one or more entries. The NEW statement may be used to delete existing files entirely and to construct new ones.

The format for an ADD parameter statement is:

```
ADD U=username,P=password,F=flength,T=time,A=acclevl,N=nfiles
```

username — User name (1 to 10 alphanumeric characters) must be specified for restricted passwords; it must be blank or omitted for unrestricted passwords.

password — Password (1 to 10 alphanumberic characters) must be specified. It must be the only unrestricted password of this name defined by the installation. If it is restricted, it must be the only user name/password of this particular combination defined by the installation. (If the password or user name/password have been previously defined, the ADD card will function as a replace.)

flength — Maximum field length available to the user (1 to 6 octal digits). If blank or omitted, 60000 octal CM words are assumed. This value may not exceed IP.MFL.

time — Time limit for user's session (1 to 4 octal digits, also defines the maximum ETL for individual jobs). If blank or omitted, 500 octal seconds are assumed.

acclevl — Access level/permission bits for the user ($0\text{-}3777_8$ range). This value defines which programs the user can access. If blank or omitted, an access level of 5_8 is assumed (dependent on IP.IACES setting in common deck INTCOM).

nfiles — Number of files this user is permitted to attach as local files at any one time (1 to 2 octal digits). If blank or omitted, 24 (octal) files are allowed. This value may not exceed 76_8.

All parameters start after column 4 on the ADD and DEL statements. They may be specified in any order and should be separated by delimiters (special characters).

The DEL statement is used to delete one or more entries from one or both of the permanent files. It has two formats:

```
DEL U=username,P=password

DEL I=id
```

username — May take three forms: 1 to 10 alphanumeric characters, blank, or the character string *NAMES. If the first form is used, the user name/password combination (restricted or unrestricted) is deleted; and the user id becomes available. If the second form is used, all entries in the two files with the given password is deleted. All user ids associated with these entries will become available; the password will no longer be defined. The third form may be used only if the specified password is unrestricted. All entries in the unrestricted password file with the given password will be deleted, and the associated ids will be made available. The password will still be defined.

password — Password to be processed. Whether an unrestricted password is deleted or not depends on the username parameter. If password is *NAMES, all user-names for all unrestricted passwords are deleted from the permanent files; and the user ids for these user-names become available. The unrestricted passwords will still be defined.

id — User id; may be used as a shorthand notation to specify the user name/password associated with this user id. The given user name/password entry (restricted or otherwise) is deleted and the user id becomes available. If the password is unrestricted, it will still be defined.

SCED INSTALLATION PARAMETERS

When a multi-user job which uses SCED is installed, default parameter values in SCED should be changed to reflect the requirements of the COBOL program involved. A value should be changed by deleting the default definition macro call and replacing it with a call to the SCED macro with the new parameter value. All macros are required.

Example:

```
*D      SCED.233        deletes MAXUSR parameter
        MAXUSR 10       replaces MAXUSR with new value
```

The SCED macro (parameter) calls are described in detail in the INTERCOM 4 Multi-User Job Capability Reference Manual.

Parameter	Default Value	Line to Replace
MAXUSR	30	SCED.233
USAREA	2,214	SCED.234
NUMINT	40	SCED.235
DEFBUF	———	No parameters No need to replace
OUTBUF	4,45 4,144	SCED.237, SCED.238

VERIFICATION PROCEDURE

INTERCOM is brought to control point zero when INTERCOM is entered at the console after the operator has entered the time.

The verification procedure cannot proceed unless a permanent file has been established containing the user passwords.

The following sample from an interactive terminal session indicates if INTERCOM is installed correctly. The underlined characters are typed by the user.

```
CONTROL DATA INTERCOM
DATE     11/21/75
TIME     09.27.22.

PLEASE LOGIN
LOGIN

ENTER USER NAME- THOBBIE

            ENTER PASSWORD-


11/21/75        LOGGED IN AT 09.28.46.
                WITH USER-ID D3
                EQUIP/PORT 47/04
COMMAND- SITUATE


    USERS WITH SAME PASSWORD
 D3-THOBBIE
    OTHERS
 B6-HALLA          ER-IPRICE          FL-ALL155
 FM-ALL156         BC-OPS             FI-TAYLOR
 F3-ZEE            BA-4800BAUD        BB-4801BAUD
 BD-HSBT           BE-MSBT            GU-SVLANX
 GY-CHESLEY        HN-EBROTH          G4-JGM
    BATCH TERMINALS
AS-200UT       AU-200UT       AV-200UT

AF-XSBT        AG-XSBT
COMMAND- ASSETS


ASSETS OF D3 AT 09.30.11.
EQUIP/PORT          47/04
FILE QUOTA             20
FILES IN USE            0
MAX FL            0077700
TIME LIMIT           7000
CP TIME              .164
COMMAND- ETL,100

COMMAND- MAP,ON

COMMAND- ASSETS

ASSETS OF D3 AT 09.31.00.
EQUIP/PORT          47/04
FILE QUOTA             20
FILES IN USE            0
MAX FL             077700
TIME LIMIT           7000
ETL                  0100
MAP                    ON
CP TIME              .174
COMMAND- FILES

NONE
COMMAND- LOGOUT

CPA             .198 SEC.        .198 ADJ.
SYS TIME                        1.159
CONNECT TIME       0 HRS. 5 MIN.
11/21/75   LOGGED OUT AT 09.31.49.
```

```
////    *IDENT SN1SHAR
////    *INSERT LID.1
                LID STP
                LID   MF1
                LID   C60
////    *DELETE CMR.1601
                DATA  1
///     *INSERT ECSCOM.0
        IP.CMPID  CMICRO 10,(C175)
///     *INSERT IPARAMS.15
        IP.C176   CEQU    0
        IP.MECS   CEQU   6008
        IP.819    CEQU    0
        IP.MPPU   CEQU   20D
        IP.ACNT   CEQU   1
///     *INSERT CMRIP.1
        HOSTID    CMICRO ,(MFF)
        IP.SYSE   CMICRO 10,( 03/27/78-)
***     */        REPLACE THE FOLLOWING CARD  /D SYSE.2 TO HAVE THE DATE BUILD
***     */        AS      IP.SYSE     CMICRO 10,(  DATE   )
        IP.VER    CMICRO 10,( 4JB3/R6B )
***     */        REPLACE THE FOLLOWING CARD  /D VER.2 TO HAVE THE SYSTEM VERISI
***     */        AS        IP.VER      CMICRO 10,( VERSION )
        IP.SYSL1  CMICRO 20,( N82-  CYB175-SN1  )
        N.RBR     CEQU   22D
        L.FNT     CEQU   3000B
        L.EST     CEQU   1208
        L.ITABL   CEAU   225D
        IP.SLIB   CMICRO ,AMRL175
***     *INSERT ECSCOM.0
        IP.ELIB   CEQU   1258
//      *INSERT ECSBUF.1
                  ECSBUF 24,ODP
                  ECSBUF 16
                  ECSBUF 16
//      *INSERT MUX.1
         MUX7     MUX71   148
                  EMPTY
                  TMA4A  4800,,HW          FE  RM 2S114
                  TMA4A  2000             CW  482-4947
                  TMA4A  2000             AP  482-4944
                  EMPTY
                  EMPTY
                  EMPTY
                  EMPTY
                  EMPTY
                  EMPTY
                  EMPTY
                  EMPTY
        MUX4      MUX74  (0,1,2,3),(01,11,21)
        MUX6      MUX76  38,300
        MUX5      MUX76  38,300
        FE137     MUX2550    750
                  EMPTY                          CLA00   00
**      */   CLASS 01-07 ARE RESERVED FOR 9600 BAUD
```

```
            TMA4A   9600,(1,2),HW           CLA01   01   GRAPHICS
            TMA4A   9600,(1,2),HW           CLA02   02   2S
            EMPTY                           CLA03   03
            EMPTY                           CLA04   04
            EMPTY                           CLA05   05
            EMPTY                           CLA06   06
            EMPTY                           CLA07   07
****    */  CLASS 08-0F ARE RESERVED FOR 4800 BAUD
            TM4     4800,,(1,2,3,5)         CLA08   08   482-4137 STATIO
            TM4     4800                    CLA09   09   482-4818
            TMA4A   4800,(1),HW             CLA0A   10   RM 2S114
            TMA4A   480C,(1),HW             CLA0B   11   ADL 3N268
            TM4     4800                    CLA0C   12   482-4150
            TMA4A   4800,(1),HW             CLA0D   13
            EMPTY                           CLA0E   14
****    */  CLASS 10-1F ARE RESERVED FOR 2400/2000 BAUD
            TM4                             CLA0F   15   482-4151 201C MODE
            TM4                             CLA10   16   482-4194
            TM4                             CLA11   17   482-4110
            TM4                             CLA12   18   482-4193
            TMA4A   2400,(1),HW             CLA13   19   RM 2S114
            TM4                             CLA14   20   482-4765
            TM4                             CLA15   21   482-4942
            TM4                             CLA16   22   482-4946
            TM4                             CLA17   23   482-4941
            TM4                             CLA18   24   482-4702
            TM4                             CLA19   25   482-4943
            TM4C    2000,1,(1,2,3)          CLA1A   26   482-4945  714
            EMPTY                           CLA1B   27
            EMPTY                           CLA1C   28
            EMPTY                           CLA1D   29
            EMPTY                           CLA1E   30
            EMPTY                           CLA1F   31
***     */  CLASS 20-27 ARE RESERVED FOR 1200 BAUD
            EMPTY                           CLA21   33
            EMPTY                           CLA22   34
            EMPTY                           CLA23   35
            EMPTY                           CLA24   36
            TM3     1200,HW                 CLA25   37   ADL
            EMPTY                           CLA26   38
            EMPTY                           CLA27   39
***     */  CLASS 28-2F ARE RESERVED FOR 600 BAUD
            EMPTY                           CLA28   40
            EMPTY                           CLA29   41
            EMPTY                           CLA2A   42
            EMPTY                           CLA2B   43
            EMPTY                           CLA2C   44
            EMPTY                           CLA2D   45
            EMPTY                           CLA2E   46
            EMPTY                           CLA2F   47
***     */  CLASS 30-UP ARE RESERVED FOR 300/110 BAUD
            TM3     300,HW                  CLA30   48   I/O COUNTER
            TM3     *                       CLA31   49   482-4100
            TM3     *                       CLA32   50   482-4101
            TM3     *                       CLA33   51   482-4102
```

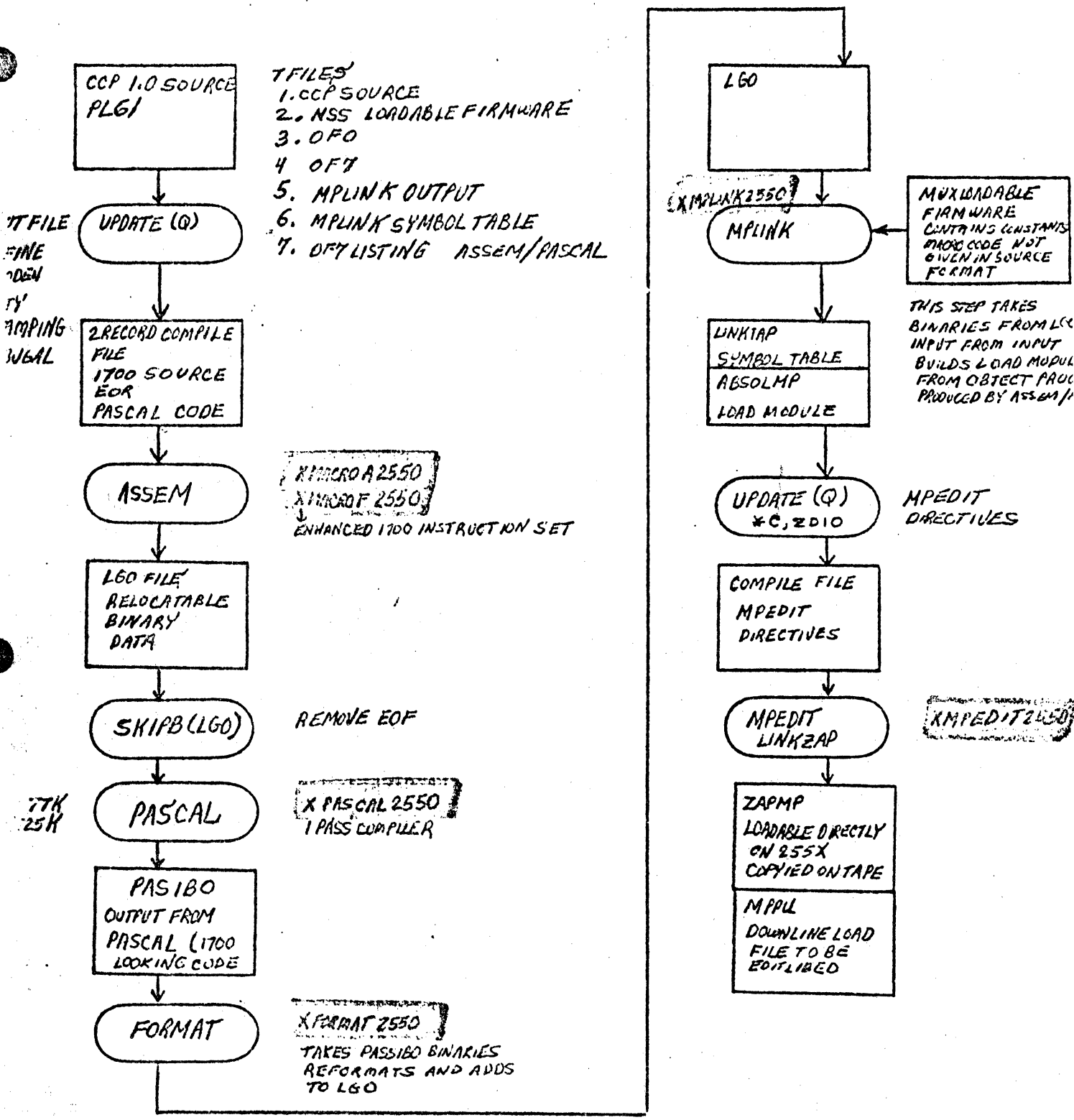
```
            TM3     *                       CLA34   52   482-4103
            TM3     *                       CLA35   53   482-4104
            TM3     *                       CLA36   54   482-4105
            TM3     *                       CLA37   55   482-4106
            TM3     *                       CLA38   56   482-4107
            TM3     *                       CLA39   57   482-4108
            TM3     *                       CLA3A   58
            TM3     *                       CLA3B   59
            TM3     *                       CLA3C   60
            TM3     *                       CLA3D   61
            TM3     *                       CLA3E   62
            TM3     *                       CLA3F   63
            TM3     *                       CLA40   64
            TM3     *                       CLA41   65
            TM3     *                       CLA42   66
            TM3     *                       CLA43   67
            TM3     *                       CLA44   68
            TM3     *                       CLA45   69
            TM3     *                       CLA46   70
            TM3     *                       CLA47   71
            TM3     *                       CLA48   72
            TM3     *                       CLA49   73
             TM3     300,HW                  CLA4A   74
    FE215    MUX2550   580
            DUP  0=10,1
            EMPTY
            TM4                     CLA010  482-4112
            TM4                     CLA011  482-4065
            TM4                     CLA012  482-4066
            TM4                     CLA013  482-4712
            DUP   0=20,1
            EMPTY
            TM3     *               CLA035  482-4191
            TM3     *               CLA036  482-4192
            TM3     *               CLA037  482-4067
            TM3     *               CLA038  482-4068
            TM3     *               CLA039  482-4069
//    *INSERT CHR.2167
              ECSLABEL  754
              ECSPART  LINK,3,10,1
              ECSPART  C175,1,120
            ECSPART  SN90,1,120
              ECSPART  C175,2,300
            ECSPART  SN90,2,170
//    *INSERT EST.1
    YC      EST    CH=21,EQP=0,MUX=MUX5-T.ITABL,MOD=OFF
            EST    ESTO=2
    FE      EST    CH=5,EQP=7,MUX=FE137-T.ITABL
    FE      EST    CH=6,EQP=7,MUX=FE215-T.ITABL,MOD=OFF
    YC      EST    CH=4,EQP=7,MUX=MUX6-T.ITABL,ESTO=4
    DC      EST    CH=4,EQP=6,MUX=MUX7-T.ITABL,ESTO=5
     SC     EST    CH=26,EQP=7,MUX=MUX4-T.ITABL,ESTO=6
           EST     ESTO=7
     DS     EST    CH=10B,EQP=7
     CR     EST    CH=11B,EQP=4
```

```
        LQ        EST     CH=11B,EQP=6,MOD=OFF
        CR        EST     CH=12B,EQP=3
        CP        EST     CH=12B,EQP=5,MOD=OFF
        LR        EST     CH=12B,EQP=7,MOD=OFF
        LS        EST     CH=12B,EQP=1,MOD=OFF
        LT        EST     CH=12B,EQP=2,MOD=(OFF,PFC)
        LR        EST     CH=12B,EQP=6,MOD=(OFF,PFC)
        LQ        EST     CH=21B,EQP=5,MOD=OFF,EC=A9
        CC        EST     CH=30,EQP=4,MOD=OFF,ESTO=30B
        CC        EST     CH=1,EQP=0,MOD=OFF
        CC        EST     CH=33,EQP=0
        CC        EST     CH=32B,EQP=0,MOD=OFF
        CX        EST     MOD=OFF,MUX=1
        CC        EST     CH=1,EQP=3,MOD=OFF
       ED         EST     CH=22,EQP=5
                  EST     ESTO=40B
       NT         EST     CH=27B,EQP=0,UNIT=0,UNITS=3,MOD=(ATS,ON,GCR)
       NT         EST     CH=27B,EQP=0,UNIT=3,UNITS=2,MOD=(ATS,OFF)
       MT         EST     CH=27B,EQP=0,UNIT=5,UNITS=2,MOD=(ATS,OFF)
       NT         EST     CH=(24,13),EQP=0,UNIT=0,UNITS=3,MOD=(BID,MTS),ESTO=50B
       MT         EST     CH=(24,13),EQP=0,UNIT=3,UNITS=5,MOD=(BID,MTS)
       AZ         EST     NAME=844A,CH=(00,02),UNIT=0,ESTO=60,VSN=844A,SN=PFQSET,
       ,MOD=(PF,QUE,SHAR),EQP=0
       AZ         EST     NAME=844B,CH=(00,02),UNIT=1,EQP=0,VSN=844B,SN=PFQSET,NF
       ,=7000,MASTER=(PF,Q,SCR),MOD=(PF,QUE,MD,SHAR)
       AZ         EST     NAME=844C,CH=(00,02),UNIT=2,EQP=0,VSN=844C,SN=PFQSET,MO
       ,D=(PF,SHAR,QUE)
       AZ         EST     NAME=844D,CH=(00,02),UNIT=3,EQP=0,VSN=844D,SN=PFQSET,MO
       ,D=(PF,QUE,SHAR)
       AZ         EST     NAME=844E,CH=(00,02),UNIT=4,EQP=0,VSN=844E,SN=PFQSET,MO
       ,D=(PF,QUE,SHAR)
       AZ         EST     NAME=844F,CH=(00,02),UNIT=5,EQP=0,VSN=844F,SN=PFQSET,MO
       ,D=(PF,QUE,SHAR)
       AZ         EST     NAME=844G,CH=(00,02),UNIT=6,EQP=0,MOD=(SHAR,IDLE,FREE)
                EST    ESTO=70B
       AZ         EST     NAME=844H,CH=23,UNIT=0,MOD=(IDLE,FREE),TYPE=F,EQP=0
       AZ         EST     NAME=844I,CH=23,UNIT=1,EQP=0,MOD=(IDLE,FREE),TYPE=F
       AY         EST     NAME=844J,CH=20,UNIT=2,MOD=(SYS,PF,MD),SN=SYSSET,NF=700
       ,0,MASTER=SYS,VSN=844J,TYPE=F,EQP=0
       AY         EST     NAME=844K,CH=23,UNIT=3,EQP=0,MOD=(IDLE,FREE),TYPE=F
                  EST      ESTO=77
       AY         EST     NAME=844L,CH=23,UNIT=7,MOD=(IDLE,FREE),TYPE=F,EQP=0
                  EST     ESTO=101
       AY         EST     NAME=844M,CH=(00,02),UNIT=17,EQP=0,MOD=(IDLE,FREE,SHAR)
       AY         EST     NAME=844N,CH=(00,02),EQP=0,UNIT=27,MOD=(IDLE,FREE,SHAR)
       AY         EST     NAME=844P,CH=(00,02),EQP=0,UNIT=37,MOD=(IDLE,FREE,SHAR)
       AY         EST     NAME=844Q,CH=(00,02),EQP=0,UNIT=47,MOD=(IDLE,FREE,SHAR)
       AY         EST     NAME=844R,CH=(00,02),EQP=0,UNIT=57,MOD=(IDLE,FREE,SHAR)
/////  *INSERT RBR.1
        844A      RBR     COUNT=3232
        844A      RBR     COUNT=3232
        844B      RBR     COUNT=3232
        844B      RBR     COUNT=3232
        844C      RBR     COUNT=3232
        844C      RBR     COUNT=3232
```

```
        84[illegible]      RBR    COUNT=3232
        84[illegible]      RBR    COUNT=3232
        844E      RBR    COUNT=3232
        844E      RBR    COUNT=3232
        844F      RBR    COUNT=3232
        844F      RBR    COUNT=3232
        844G      RBR    COUNT=3232
        844G      RBR    COUNT=3232
        844H      RBR    COUNT=3232
        844H      RBR    COUNT=3232
        844I      RBR    COUNT=3232
        844I      RBR    COUNT=3232
        844J      RBR    COUNT=3232
        844K      RBR    COUNT=3232
        844L      RBR    COUNT=3232
        844M      RBR    COUNT=3232
        844N      RBR    COUNT=3232
        844P      RBR    COUNT=3232
        844Q      RBR    COUNT=3232
        844R      RBR    COUNT=3232
///     *COMPILE CMRTEXT,CWEOR1
///     *COMPILE CMR
///     *COMPILE CWEOR2.CWEOR3
***     */ THERE ARE    169 CORRECTION CARDS INCLUDING THIS COMMENT.
```

151

CCP COMMUNICATIONS CONTROL PROGRAM 1.0 (PL61)
CYBER CROSS SYSTEM V1.1 (PL50)



RELEASE DESCRIPTION

The CDC CYBER Cross System executes under NOS/BE to provide support for the CDC CYBER 18 minicomputer and the 2550 series of host communications processors. The CDC CYBER Cross System is composed of the following:

Component	Implementation Language
PASCAL Compiler	PASCAL
Format Program	FORTRAN Extended
PASCAL Cross-reference Program	PASCAL
Macro Assembler	COMPASS
Macro File	Assembly
KRONTXT	COMPASS
Micro Assembler	FORTRAN Extended
Library Maintenance Program	FORTRAN Extended
Link Editor	PASCAL

The CDC CYBER Cross System supports the generation of load modules which may be executed on a CDC CYBER 18 minicomputer or a 2550 communications processor.

HARDWARE CONFIGURATION

The CDC CYBER Cross System requires a minimum of 77000 octal words of central memory for installation and execution. If the 125K PASCAL compiler and 135K PASCAL Cross Reference Program are to be installed, 135000 octal words of central memory are required. With this exception, the minimum configuration is the same as for NOS/BE as described in part II, section 1.

RELEASE MATERIALS

CDC CYBER Cross System is released on release tape PL50, the structure of which follows:

File Number	Record Number	File Content		File Type
1	1	UPDATE Program Library		PL
2	1	Format Program	(FRMT)	ABS
2	2	KRONTXT	(KRONTX1)	OVL
2	3	Macro Assembler	(ASSEM)	OVL
2	4	Macro File	(SMAC17)	OVL
2	5	Micro Assembler	(MASSEM)	ABS
2	6	Library Maintenance Program	(MPLIB)	ABS
3	-	(empty)	-	-
4	1	PASCAL Compiler (77K)	(PASCAL)	OVL
5	1	PASCAL Cross Reference Program (77K)	(PASXREF)	DATA
6	1	Link Editor	(MPLINK)	OVL
7	1	Edit	(MPEDIT)	OVL
8	1	PASCAL Compiler (125K)	(PASCAL)	OVL
9	1	6000 PASCAL Compiler	(PASBN01)	OVL
10	1	PASCAL Cross Reference Program (135K)	(PASXREF)	DATA

File 9 contains the binary of the 6000 PASCAL compiler, required for compiling the PASCAL compiler and the Link Editor, and for compiling and executing the PASCAL cross-reference program.

PASCAL ORGANIZATION

The PASCAL compiler is organized in a file structure. The components of the compiler are records on the file. The first record of the file acts as a main overlay program and controls loading and execution of the other records. Because of this file structure, the PASCAL compiler cannot be entered into a library via EDITLIB, but must be cataloged as a permanent file (PASCAL). The PASCAL file structure follows:

Record	Name	Function	Implementation Language
1	POSYS	Controls processing	COMPASS
2,3	PASCAL	Compiles programs	PASCAL
4	SYMIO	Performs disk I/O	COMPASS
5	ERRMSS	Table of error messages	Text
6,7	PASDMP	Prints object code listing	PASCAL

PASCAL COMPILER SYMBOL TABLE PAGE SIZE

The number of entries per symbol table page in the released source of the PASCAL compiler is 1024. Execution field length for this compiler is approximately 77000 octal CM words. For large compilations, increasing the number of entries per symbol table page reduces compilation time dramatically. To generate a PASCAL compiler for installing CCP, the page size is increased to 4096, which causes the compiler to require 125000 octal CM words. Generation of a 125K compiler is accommodated as a CDC CYBER Cross System installation option (see Installation Procedure). The minimum recommended page size for any use of the PASCAL compiler is 128. Page size may be altered by changing the compiler source as follows:

```
*DELETE    DPAS1175.1
  PAGSIZE=nnnn,          (nnnn = page size - 1 = 4095 for CCP)
*DELETE    DSYM1175.1
PAGSIZE    EQU    nnnn          (nnnn = page size = 4096 for CCP)
*C  DPASCAL, SYMIO
```

PASCAL CROSS REFERENCE PROGRAM TABLE SIZE

If the PASCAL cross reference program is run against a CCP compilation (standard CCP installation jobs do not do so), the following table size modification should be made:

```
*DELETE        XREF.4
  P = 4001
*DELETE        XREF.26,27
OCCURRENCE:        CLASS 30000 OF PACKED RECORD
                                LNO: 0..30000
```

This change increases the execution field length requirement for the cross reference program to 135000 octal central memory words. A 135K cross reference program can be generated using a CDC CYBER Cross System installation option (see Installation Procedure).

INSTALLATION PROCEDURE

Job decks PL50I, PL50C, and PL50V may be obtained from the installation deck program library using the procedure outlined in part I, section 1 of this document.

The installation jobs function as follows:

PL50I — Updates the program library with modifications to produce a new program library tape including binary files. If PL50I is extracted from the installation deck program library with CCP defined (refer to part I, section 1), a 125K version of the PASCAL compiler and a 135K version of the cross reference program are produced and written on files 8 and 10, respectively, of the new PL50. The PAGSIZE and XREF modifications, however, are not included on the new program library file (file 1) of PL50. If job PL50I is extracted without CCP defined, 77K versions of the PASCAL compiler and cross reference program are produced and written on files 4 and 5, respectively, of the new PL50. PL50I requires a field length of 135000 octal words to compile the 125K PASCAL and 135K PASXREF and 77000 octal words to compile the 77K versions. Defining CATALOG causes job PL50I to catalog the new PL50 binaries as permanent files from which they may be executed. The CATALOG option is sensitive to the CCP symbol such that if CCP is defined, a 125K PASCAL and a 135K PASXREF are cataloged; if CCP is not defined, 77K versions are cataloged.

PL50C — Catalogs the CDC CYBER Cross System binaries from PL50 as permanent files from which they may be executed. Defining CCP causes the 125K PASCAL compiler and 135K cross reference program to be cataloged. Not defining CCP catalogs 77K versions of PASCAL and PASXREF. If PL50I is run with CATALOG defined, PL50C is not required.

Because the PL50 installation jobs do not enter program binaries into libraries, the DSTn jobs are not applicable.

RELEASE DESCRIPTION

Version 1 of the Communication Control Program (CCP) is the software and loadable controlware that supports the 2550 Host Communications Processor (HCP) as a front end to INTERCOM 4.5 on CDC CYBER 170, CYBER 70, and 6000 series computers. The CCP binary load modules reside in the NOS/BE operating system PPU library so they can be loaded into the 2550 by INTERCOM.

The release tape consists of the CCP source program file (which includes Post Link Editor initialization directives), Multiplex Subsystem (MSS) object text file, two binary load files, two intermediate files, and a print file.

CCP installation creates a CCP downline load module that looks like a PPU binary. The load module is named 0F3, 0F4, or 0F7 and is installed via EDITLIB in the operating system. To create the load module, the following procedures are necessary:

- Create permanent files which contain the CCP source program file, MSS controlware object text file, and MPEDIT object text file.
- Generate a local load module. The CCP 1 release tape does not contain the utilities needed to generate the load module. These utilities are provided by the CDC CYBER Cross System described in that section; they are programs that execute in the operating system environment, producing object code that executes in the 2550. The CDC CYBER Cross System consists of a PASCAL compiler, MACRO assembler, MICRO assembler, Link Editor, and Post Edit program. The CCP local load module is created by processing the CCP source file and MSS object file through the CDC CYBER Cross System. The processing of these files consists of compilation, assembly, and link editing that results in a local load module (refer to CDC CYBER Cross System General Information Manual).
- Generate a downline load module. The CCP local load module file and Post Link Editor initialization directives are used as inputs to the Post Link Editor, MPEDIT, which initializes CCP tables and generates the CCP downline load module. Up to three CCP downline load modules may be created. 0F3 supports mode 3 (TTY) terminals, 0F4 supports mode 4 (200 UT) terminals, and 0F7 supports both mode 3 and mode 4 terminals.

  Install each CCP downline load module via EDITLIB.

The Bootstrap Dump program must also be generated and installed as a downline load module. It appears as a PPU binary named 0F0 when it has been installed.

The following description provides information needed to install CCP on the NOS/BE operating system. This section assumes the CDC CYBER Cross System package has been installed as described in that section. Information needed for source code modification is included.

RELEASE MATERIALS

Release materials consist of one 7- or 9-track system standard label magnetic tape. The PL61 tape has the following contents:

File Number	File	Format
1	CCP source program file	UPDATE sequential program (including MPEDIT inilibrary format tialization directives)
2	MSS loadable firmware	CDC CYBER Cross System object object textlibrary file format
3	Dump Bootstrap	Downline load file 0F0
4	Downline load file	Downline load file 0F7
5	ABSOLMP	Output from MPLINK
6	SYMTAB	Symbol table output from MPLINK
7	Print	ASSEM and PASCAL listing of 0F7

HARDWARE CONFIGURATION

The minimum hardware configuration to build CCP 1 requires a job field length of 77,000 octal words while running NOS/BE. (Running PASCAL with a field length of 77K requires a long time to run on a busy system; using the 125K version is much faster.)

CCP HARDWARE REQUIREMENTS

The minimum equipment configuration required to execute the CCP consists of the following:

- 1 2550-2 Host Communication Processor includes:
  - 1 Multiplexer Loop Interface Adapter
  - 1 Loop Multiplexer
  - 1 Cyclic Encoder board
  - 1 CDC CYBER Communications Coupler
- 1 32K memory unit with 2550-2 processor
- 1 Communications Line Adapter from any of the following:
  - 2560-1 Synchronous CLA
  - 2561-1 Asynchronous CLA

FCO Level

The following field change orders (FCO) are applicable to CCP 1.

Equipment Number	FCO Number
AA109-A01 through AA109-A03	DS14374
AA109-A01 through AA109-A03	DS14377
DK106-A01 through DK106-A04	DM00503
DW108-A01 through DW108-A04	DM00502
DW108-B01 through DW108-B04	

NOTES AND CAUTIONS

The communications line adapter slots in the loop multiplexer should be assigned in order of decreasing line transmission speeds. For example:

9600 bps line	Slot 1	(leftmost slot)
9600 bps line	Slot 2	
3400 bps line	Slot 3	
300 bps line	Slot 4	
150 bps line	Slot 5	

INSTALLATION PARAMETERS

Parameters that may be adjusted during the creation of CCP software load files are:

1. MPEDIT constants
2. CCP PASCAL source constants
3. UPDATE DEFINE directives used during compile file creation
4. CCP or BOOTDUMP macro assembler source constants

The following charts list the installation parameters, together with acceptable and default values. Numeric values preceded with a $ are given in hexadecimal.

All statements for types 1 and 2 end with a semicolon and may be followed by a comment which is preceded by a right arrow and followed by a down arrow.

The syntax for items of type 1 and 2 is as follows:

name = value; comments

There are no column restrictions.

The syntax for items of type 4 is as follows:

EQU name(value) comments

The following are MPEDIT constants.

Card Identifier	Name	Description	Acceptable Values	Default Value	Comments
ZD10.232	/J1CORESIZE	Core memory size of NPU	/CS32K = (32K) /CS48K = (48K) /CS64K = (64K)	/CS48K	Core size must be less than or equal to the actual physical core size.
ZD10.212	/C4LCBS	Number of lines that can be configured	1 - 127	127	1. Memory space must be large enough to accommodate. See Config. Aid 1. 2. CLA addresses cannot be greater than C4LCBS. 3. Must be equal to installation parameter C4LCBS.
CC10038.16	/B0MT1	Minimum number of small data buffers	1 - n See Config. Aid 2	50	
ZD10.185	/MD4IBL	Max Mode 4 input block length - (characters)	1 - n	1280	Reference INTERCOM - IP.IMXL4 parameter
CC10046.498	/TTYIBL	Max TTY input block length - (characters)	1 - n	100	Reference INTERCOM - IP.IMXL3 parameter
ZD10.205	/C6CCC	Coupler connect code	$C, $D	$C	$C for primary coupler $D for expansion coupler
CYCLE NO. 1	/CYCLE	Source File Cycle Number (for identification purposes only)	0 - $FF	$1	
CC10022.116	G0LFSTRIP	If true, extra line feeds on TTYs are suppressed Card format is: G0LFSTRIP :=/TRUE;	/TRUE /FALSE	/FALSE	Requires PSR IN41615 in INTERCOM

The following is a CCP PASCAL source file constant.

Card Identifier	Name	Description	Acceptable Values	Default Value	Comments
CONST.26	C4LCBS	Maximum number of lines that can be configured	1-127	127	1. Core size must be able to accommodate number of lines specified. 2. Must be the same as installation parameter /C4LCBS. 3. Must be greater than or equal to number of lines defined in INTERCOM mux subtable.

The following is a CCP or BOOTDUMP macro assembler source constant.

Card Identifier	Name	Description	Acceptable Values	Default Value	Comments
BOOTDUMP.95	CEQUIP	Coupler connect code for BOOTDUMP	$C, $D	$C	1. $C for primary coupler 2. $D for secondary coupler 3. Must be the same as installation parameter ZD10.205 in MPEDIT constants.

The following UPDATE DEFINE names are used during the UPDATE that produces the CCP compile file. The DEFINEs select CCP software modules. These DEFINE directives must be specified for compile file generation of both CCP source and MPEDIT directives.

Reference: UPDATE Reference Manual

Name	Description	Acceptable Values	Default Value	
DBUGALL	If defined, build in Debug Aids	DBUGALL or omitted See Config. Aid 1	DBUGALL	(In Installation deck PL611)
		NOTE DBUGALL must be defined if Test Utilities Package (TUP) is to be used.		
STAMPING	If defined, buffer stamping (another debug aid) will be invoked	STAMPING or omitted See Config. Aid 1	omitted	
TTY	If defined, the TTY Terminal Interface Package (TIP) will be included for terminal types 1, 2, 3 and 4	TTY or omitted See Config. Aid 1	TTY	
MODE4	If defined, the MODE4 TIP will be included for terminal types 5, 6, 7, and 8	MODE4 or omitted See Config. Aid 1	MODE4	

CONFIGURATION AIDS

1. Memory Space Requirements

The following lists the 2550 memory space required for available software:

Feature	Words (Decimal)
Basic software (required)	25000
Debug Aids	2400
TTY Terminal Driver	2400
Mode 4 (Terminal Driver)	3600

If buffer stamping is invoked, one word must be set aside for each potential buffer of the smallest allocated size. Since the smallest buffer size is 8 words, an upper bound on the memory space required for buffer stamping can be found with the following formula.

memory required for buffer stamping =

(memsize - (10752+tip+debug))/9

where

memsize = 32768 if 32K version is installed
= 49152 if 48K version is installed
= 65536 if 64K version is installed

tip = 1280 if TTY terminal driver is installed
= 1920 if mode 4 terminal driver is installed

debug = 1280 if debug aids are installed
= 0 otherwise

The space left over is used for line tables, terminal tables, and dynamic buffer allocation. Guidelines for the utilization of this space are:

Type	Words per Line	Words per Terminal
Teletype	42	65
Mode 4 interactive	42	75
Mode 4 batch	42	830

The above figures are approximations only; exact memory utilization is a function of block size, line speed, and so on.

NOTE

Do not configure a 2550 for more than it can accommodate, or serious degradation of throughput will occur. Observe that the 2550 configuration is specified via both CCP 1 and INTERCOM installation parameters.

2. Buffer Pool Selection

Buffer pools must be specified correctly to accommodate terminal tables, work lists, system protocol messages and data without forcing extreme amounts of dynamic pool adjustments.

Buffer pools should be specified using the following notation:

A. Maximum number of TTY terminals active at one time

B. Maximum number of terminals configured

C. Number of buffers (at 26 characters per buffer) required for the average TTY message

Small data buffer pool =

(A x C) or B, whichever is larger _____

\+ 20

TOTAL = _____

INSTALLATION PROCEDURES

The NOS/BE Installation Deck Program Library contains five decks to be used in the installation of CCP 1. In addition, deck PL50I and/or PL50C must be run to install the CDC CYBER Cross System as permanent files to be used in generating CCP 1.

PL61I1 This deck updates the CCP 1 source library and makes the NEWPL a permanent file. It then copies the remaining files to disk and makes them permanent files to be used by other jobs in the build process. Installation parameter changes or source code changes should be made here.

Before the following jobs are run, PL61I1 must be run.

PL61I2 This job builds a new bootstrap dump binary to replace the one cataloged by job PL61I1.

PL61I3 This job builds new CCP 1 downline load modules. The following definitions apply when extracting this job from the Installation Deck Program Library.

0F3	Build the TTY only version of CCP
0F4	Build the MODE4 only version of CCP
0F7	Build the TTY and MODE4 version of CCP
CCP64	Build the 64K version of CCP 1

/J1CORESIZE must be changed also

PL61I2 and PL61I3 may be run concurrently. It is necessary to run these jobs only if there are changes to the appropriate module.

This job is set up to run with a field length of 125K. If it is necessary to run in 77K, the RFLs must be changed.

The downline load file on the release tape contains the 48K 0F7 version of CCP. When the new PL61 is rewritten in job PL61I4, the downline load file, ABSOLMP, SYMTAB, and PRINT is replaced with the version built in job PL61I3. If more than one version of CCP 1 is to be maintained, job PL61I3 must be run again for each version, making appropriate changes to permanent file names.

PL61I4 This job creates a new PL61 from the permanent files created by the previous jobs. If ULIB is defined during the extraction of this job, it then enters the bootstrap dump (PPU0F0) and the downline load file into a user library called CCPLIB for subsequent capture by DST1.

PL61E This job enters PPU0F0 and the downline load module from the PL61 tape into the system PP library. DST2, DST3, or DST4 may be used to capture the resultant system.

CORRECTIVE CODE

When corrective code for CCP 1 is issued, it is necessary to generate a new system. The method of incorporation of these updates into the CCP is dependent on the type of update. The updates can be categorized as follows:

Source updates (including MPEDIT Initialization directive updates)

MPEDIT Initialization Directive updates only

Modifications to CCP source programs are in UPDATE format. The corrective code should be added to its associated UPDATE deck. After the modifications have been incorporated into the source deck and a new source file created, an updated system can be generated using the decks in step 3 and step 4 of the installation procedures.

VERIFICATION PROGRAMS

The verification of the CCP can be divided into the verification of system generation and the verification of the online system.

System Generation

In order for the 2550 system to run properly, the CCP must complete the system generation procedures error free. Each phase of building the system must finish processing with no errors before the next procedure is initiated. The NOS/BE 1 programs which can detect errors during system generation include: UPDATE, MACRO Assembler, PASCAL Compiler, Library Maintenance, Link Editor, and Post Edit Program. The reference manuals listed below should be consulted for the identification and explanation of specific types of errors.

UPDATE Reference Manual

MACRO Assembler Reference Manual

PASCAL Reference Manual

CDC CYBER Cross System Version 1 Link Editor and
Library Maintenance Programs Reference Manual

As released, the CCP should complete system generation without errors. If the installation parameters are modified with care and the restrictions on them adhered to, errors should not occur while building the CCP.

Online System

See the INTERCOM Verification procedure.

INTERESTING PSR'S/FEATURES

1. IN41549 - Errors FTN with TS option
2. F7020 - NOS/BE system idle feature
3. F4600 - CCL feature
4. F7520 - Enhanced carriage control support
5. S3131 - CYBER 170 features (no hang PPU)
6. NW109 - Remove large buffer support
7. FEAT60 - LCC Mode 4 support
8. IN41657 - CYBER graphics slowdown
9. IN40844 - 1CI restructure
10. NW105 - 2550 front end support
11. IN41282 - Readjust barrel/low speed driver
12. IN401097 - Add check for disconnect in TTY input state
13. IN40928 - Request disconnect when 40 input buffers exist without CR
14. NW107 - INTERCOM restrat
15. IN41845A - Intermixing of batch and interactive buffers.
16. IN41545 - 1LX speed up code - capability of one copy of 1LX per EST entry
17. IN41596 - 1LX speed up code - define 200 word CM holding buffer
18. IN41941/IN42008/Multiple 1596 responses - Miscellaneous restart (5LX) at level 430
19. CC10091 - Allow PE before SOM 2550/CCP/711 See SIM S095
20. F7240 - Support of HW TTYs, 600, 1200, 4800 baud dial up on 2550 - Note change of macros
21. IN41731 - Purges IN411400 - Bad define of HELLO7 MUJ
22. IN41596G - Corrects several 5LX restarts
23. IN42084 - Correct multidrop sequence bit processing
24. IN42153 - Yank IN41817 - caused driver hang (1M1) when multidrop terminals defined
25. IN41783 - Page not working on CYBER graphics terminals - major mod to 3TT
26. IN41826 - 1M1 9600 baud varient - Force BUFCHK and ASBUFR processing
27. IN42109 - Fix PJT full of 1IM calls
28. IN42005 - Change calling sequence to 1IM - Effects 1AJ/1PD - Fix banner pages piling upon powered down terminals
29. IN41796 - Users logged out following NPU halt
30. IN41887 - Cause 1CI to call 1MH instead of 1QF for all jobs being evicted from tape previewing display (1QF BMR-7376)

31. IN42163 - MES repeats operator msgs random times.
32. IN41998 - Remove access level checking from 1CI - now done in 1AJ. Remove deny macro
33. IN42041 - Do not allow AUTS to be discarded during inoperative processing final fix IN41898
34. IN42020 - MUJ error 51
35. IN42141 - MUJ error 80
36. IN42147 - MUJ error 84/SCED
37. IN41404A - MUJ error 50
38. IN41931 - MUJ error 44
39. IN48086 - 1M1 could dropout with channel assigned
40. IN42222 - 2550 terminals going to sleep - unable to relog in. See SIM S124
41. IN48114 - 2550 function 20 timing - See SIM S123
42. IN42186 - 3TT/1FE timing - Spurious send index characters. Could affect menuing
43. IN42077 - Timing (1M1) 4800 baud terminals
44. IN41887 - Insure ASBUF gets called at frequent intervals
45. F7830 - Code to support R5 product set (list of files feature)
46. NB0900 - LISTCID - words 25-33 clobbered on restart dump
47. NB1226 - LISTCID - dump number gets reset on D/S recovery. Could lose LISTCID dumps
48. IN42145 - 10F BMR FNT/10F timing

WORTH NOTING

1. Problem exists where 3TT could overwrite word zero-login combined with multiple BKSP - see PSR IN42255. Under investigation.

2. Interactive and dayfile msgs mixed (more commonly referred to as COPYL problem) NTBF - Inherent in the design of LID. See PSR IN42255.

3. LML hangs in ASBUFR caused by local card reader emulator. NTBF in standard INTERCOM. Do have local fix. See PSR IN42254.

4. IN41998 deleted features, deny command, etc. Passed on to design team. See IN42252.

5. Insufficient null char at 300 baud. NTBF. Most sites hardcode number of rubouts dependent upon local requirements. Ideal fix rubout command - No room in UT. Santa Ana is investigating special casing 300 baud TTY's.

6. Core fill problem. Three cases:

   A. Zero fill - Modem turned off at multiplexor side, 6671 believes valid character. Believed to be fixed by IN40988/IN41097 - request disconnect when 40 input buffers without intervening CR.

   B. Banner fill/powered down terminals. Believed fixed by IN42005.

   C. Emulator problems. Example: emulator looping sending 80 blanks and a CR. NTBF - see IN42137.

7. 2550 filling CE error file - Some thoughts on the subject:

   A. CML 2.1 corrects formatting and reporting problems of earlier versions. It does not address the problem of excessive input to HPA.

   B. CML 2.2 which is scheduled along with NOS/BE R4 (L373) will include options to throw away and eliminate selective input to HPA. This should noticeably cut down the run and print time of HPA.

   C. The real problem of flooding the error log with 2550 entries remains under investigation at Santa Ana. Possible solutions to the problem include:

      1. Re-evaluating entries currently recorded.
      2. Thresholding certain entries.
      3. Suggesting operational procedures to minimize entries.
      4. Periodically purging entries from error file.

8. Bad port on 2550/LCC causes offed line with no way of operator turning back on. Believed to be resolved in R4 (L373) with LINSTAT utility. See PSR IN42048/49.

9. Core fill problem: See maxcore parameter in LBR.

10. Editor aborts on mass storage limit. Passed on to design team, would be difficult to fix.

11. Menuing (application paints screen - operator fills in blanks) not supported. This amounts to ASKII 128 support. This will be given special consideration in future release enhancements.

12. Problems randomly with 2550-100 ports going to sleep. Occurs when INTERCOM sends multiple consecutive 7000 codes to emulator. Believed to be emulator problem. Non-standard code does exist - will not be made standard.

13. Line problems on 6671, could take drastic steps in 1M1.

A. Bump retry count to 77B.
B. Loop on loss of carrier on hardwired line.

14. Problems with 2CC special commands within procedure file. Example: Read,lfn. This is partially resolved with IN41998. The problem remains under investigation.

15. Problem with the 751 terminal during an on-line print operation at 1200 baud. When printing on line display to oprinter, the printer gets behind due to the mechanical speed of the carriage return. As a result, a check printer message is displayed by the 751 controlware and printer data is lost. This amounts to a special case of the rubout count problem. There is nothing in any INTERCOM documentation stating support of an on-line print capability on a mode 3 terminal. The problem is under investigation by the terminal people at Roseville.

16. As a result of the barrel adjustment code put out under ident IN41282 several sites have reported timing problems with an overloaded low speed driver. This has been resolved by the following PSR's: IN41826, IN42077, IN41887. If all else fails a site can vary the constant at IN41286.109 in 1M1.

17. 2550/CCP memory requirements remain questionable. Conflicting information exists in the redbook configurator, IHBK, SAB (L451) and SRB (L461). While we are trying to force a 65K minimum under the premise of successor product requirements, we are still installing 32 and 48K varients. One must note that these memory sizes are intended to be utilized in a degraded mode only.

18. Non-support of half duplex asynchronous lines up to 9600 baud on CCP/2550. This requires changes to both INTERCOM and CCP. A package is available in QSS form thru the Systems Division.

19. The redbook states that option 711-102 is not supported by INTERCOM and the NOS/BE IHBK states that this option is required by INTERCOM. In reality, the option is supported by INTERCOM and is highly recommended because without it, the user would have to manually clear the display between each input.

20. DFA is unable to downline load different 2550 memory sizes of the same varient. This is caused by the load modules having the same name. The problem remains under investigation.

21. 1FE will strip FX function codes coming in as data. The problem falls into the category of non-support of menuing. A local fix is available to interested parties.

22. 2550-100 and 6671 do not require ring indicator, whereas CCP does, that is, modems may have to be restrapped when bringing a terminal over to a 2550/CCP configuration.

23. Support of 4800 baud dial up terminal was removed with rewrite of low speed driver in level 376. This code can be reactivated by:

A. Redefine macros allow definition of 4800 baud dial up on 6671/LCC.
B. Disable 1I1 check for 4800 dial up. Both 6671/LCC.

24. The following are recommendations for configuring placement of ports on the 6671/2550:

A. 6671 - high speed ports on low end (port 0). This is because ports are handled in a round-robin basis on the low speed driver.
B. 2550 - Leftmost loop MUX slot - ports are serviced left to right.

25. We only support the 751 terminal in a block mode as long as the user appends appropriate STX and ETX characters within his data. This is not necessary with other equivalent terminals. The problem is under investigation at Roseville.

DUMP REQUIREMENTS/DEBUGGING

1. Required supporting documentation

   A. Core dumps

      1. J dump if applicable (especially system aborts)
      2. Low core 0-20K (PJT) (JDT)
      3. INTERCOM buffer area word 16 bytes 2/3 to byte 0/100B
      4. PPU's you may want to step PPU's until required routines appear (1CI/1LX/1BR/1FE/1ZZ/1Z*/0FA/0ZZ)

   B. Corresponding listings as appropriate. Especially where local mods.

   C. Corresponding dayfile segments if applicable.

   D. CE error file (norms/HPA output) if applicable.

   E. Sample terminal output if applicable.

   F. Individual multiplexors (if applicable):

2550/CCP	LCC	LOW SPEED
NPUDUMP	LCCDUMP	P REGISTER OF PPU (UJN*)
	DAYFILE RESPONSES	IS 2550-100 RUNNING

   G. Sample configuration/IPARAMS/build decks/local mods/PSR level+

   H. Any analysis would be appreciated.

   I. Any history concerning problem.

2. Individual terminal problems

   A. Physical attributes of terminals

      1. Is it polling?
      2. Is the emulator running or did it take a nap?
      3. Do I have a carrier/What is the condition of the modem?
      4. Do I appear to be looping in a restransmission?
      5. Is the problem limited to single stream (card read/printing)?
      6. Any error lights/error conditions reported at terminal?

   B. Check if line

      1. Off - port entry - try restarting.
      2. Inoperative - Wait for communications reestablished msg. Word 10 UT.
      3. Disconnected - please login msg - may be momentary line problem or problem at local site.
      4. Are the driver words moving

         a) Terminal locked out of low speed barrel.
         b) Deadlock situation driver/1LX

      5. 2550/LCC line/stream state.

C. Are all terminals down/How does this terminal being down affect other terminals. Note: If problem is limited to one terminal mention in dumps.

D. Can you restart terminal without affecting other terminals?

1. Reautoload emulator
2. Autologout (only when drastic)

3. In general:

A. What are the running conditions (heavy load/production/installation test)

B. Can the problem be reproduced, do you have a theory on reproducing the problem? Can problem be limited to particular routines?

C. What has changed recently, in particular, what has changed since last working level?

1. PSR level (what was added?)
2. Increased load
3. New hardware/reconfiguration multiplexors/modems/terminals/emulators. (new controlware)
4. Do you know the contents of your deadstart tape/production EDITLIBS?

D. Are all switches thrown right (2550). It may help to make checklist when working.

E. Can the problem be tied to hardware? Cross reference CE error file/individual site logs.

F. Is anyone doing any unknown maintenance. Never reconfigure on the fly.

G. Be alert to physical signs. Point out when reporting problem.

1. Time of day/Can you correlate with other problems?
2. B display - Is obvious msg flashing, CPU hung in loop, job hung at control point?
3. A display - Obvious/pertinent dayfile msgs, is PPMTR (clock) running?
4. M display - Conditions of channels/any particular routines involved. Any particular job involved.
5. Are other subsystems involved/affected? Example: LOADPF someones got the storage move flag.
6. Is any particular user/terminal involved? What is unique to this user/terminal?
7. If something is overwritten, does it look familiar? Example: XJ package, address within INTERCOM buffer area, known data.
8. Could the problem be operational? Example: No next packages, outstanding tape requests, scheduling - large jobs saturating CM, powering down terminals/panic mode at a terminal.

4. Tricks

   A. Build in trap code. Get problem ASAP before required information is covered up.

      1. ZJN *, JP *, PAUSE statements (FTN programs)
      2. In core counters, AOD, AOM, thresholds
      3. System step mode. (Note this will change timing)
      4. Overwrite known (harmless) areas in core.

         a) Circular buffer response list
         b) System header CM word 32
         c) INTERCOM header

      5. Issue dayfile msgs to track flow. Particularly helpful in RCL condition, routine may be called twice to do same thing (5LX).

   B. Make routine CM resident (change while in core).

5. Where to get help

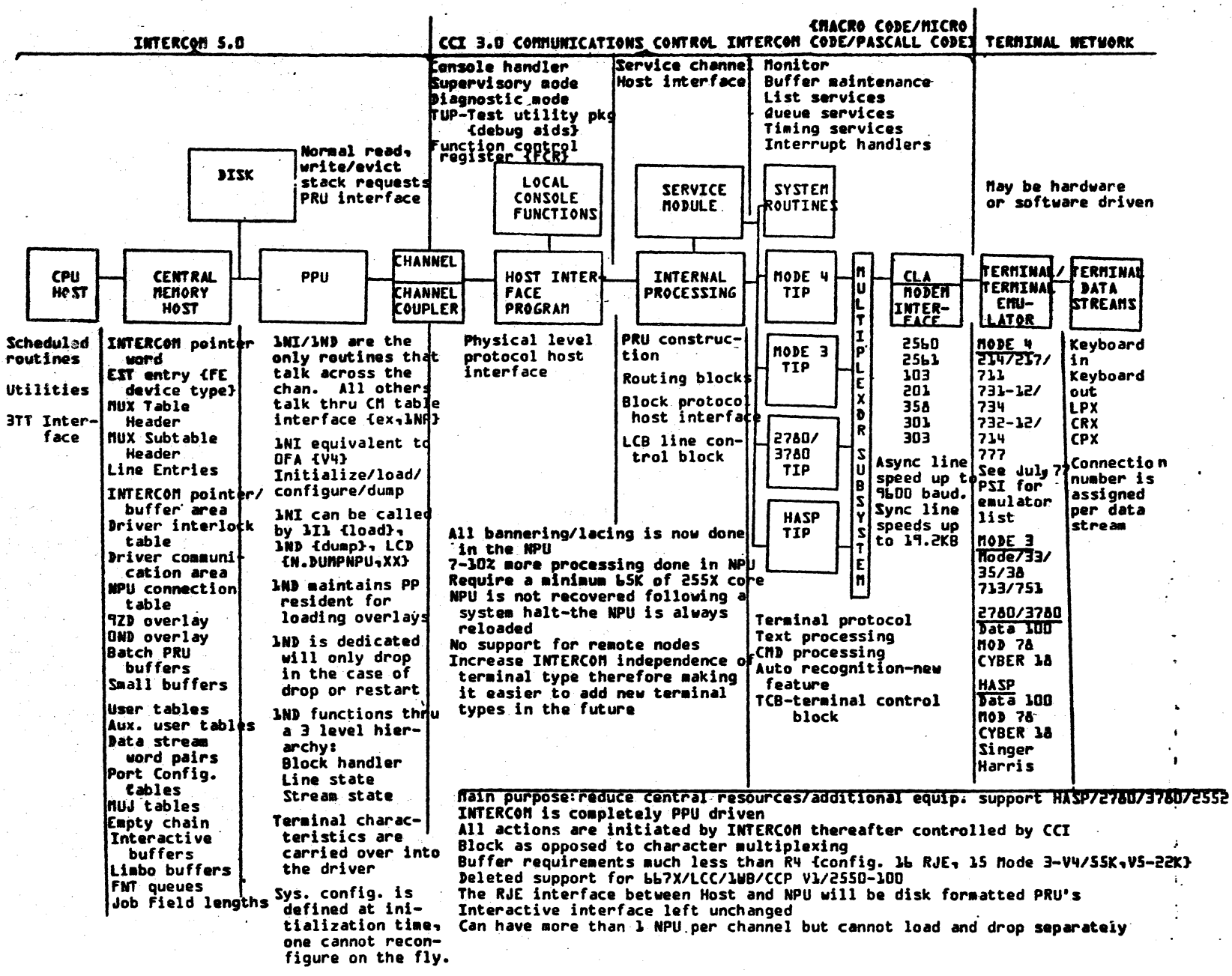
   A. Associates - Discuss problem with other people. You may talk your way into a solution to your problem. This pertains to both analysts/CE organizations.

   B. Operators/Users - Sometimes they are aware of more than usually given credit. You may want to solicit information via SYSBULL. Anyone encountering this problem please report to operations/ support group.

   C. Talk to other sites - Particularly those with equivalent environments/configurations. You may find you are not alone with your problem.

   D. PSR Summaries/Software Information Memos/PSI Articles/PSD Feature Notes/History Files on program libraries/Data Base Information on BCC's

   E. Call your friendly Field Support analyst (ARH/SVL)


INTERCOM 5.0
CCI 3.0 COMMUNICATIONS CONTROL INTERCOM CODE/PASCALL CODE
(MACRO CODE/MICRO
TERMINAL NETWORK
Console handler
Supervisory mode
Diagnostic mode
TUP-Test utility pkg (debug aids)
Function control register (FCR)
Service channel Host interface
Monitor
Buffer maintenance
List services
Queue services
Timing services
Interrupt handlers
DISK
Normal read, write/evict stack requests PRU interface
LOCAL CONSOLE FUNCTIONS
SERVICE MODULE
SYSTEM ROUTINES
May be hardware or software driven
CPU HOST
CENTRAL MEMORY HOST
PPU
CHANNEL
CHANNEL COUPLER
HOST INTER-FACE PROGRAM
INTERNAL PROCESSING
MODE 4 TIP
MODE 3 TIP
2780/ 3780 TIP
HASP TIP
MULTIPLEXOR SUBSYSTEM
CLA MODEM INTER-FACE
TERMINAL/ TERMINAL EMU-LATOR
TERMINAL DATA STREAMS
Scheduled routines
Utilities
3TT Inter-face
INTERCOM pointer word
EST entry (FE device type)
MUX Table Header
MUX Subtable Header
Line Entries
INTERCOM pointer/ buffer area
Driver interlock table
Driver communi-cation area
NPU connection table
7ZD overlay
0ND overlay
Batch PRU buffers
Small buffers
User tables
Aux. user tables
Data stream word pairs
Port Config. tables
MUJ tables
Empty chain
Interactive buffers
Limbo buffers
FNT queues
Job Field lengths
1NI/1ND are the only routines that talk across the chan. All others talk thru CM table interface (ex, 1NF)
1NI equivalent to OFA (V4)
Initialize/load/ configure/dump
1NI can be called by 1I1 (load), 1ND (dump), LCD (N.DUMPNPU,XX)
1ND maintains PP resident for loading overlays
1ND is dedicated will only drop in the case of drop or restart
1ND functions thru a 3 level hier-archy:
Block handler
Line state
Stream state
Terminal charac-teristics are carried over into the driver
Sys. config. is defined at ini-tialization time, one cannot recon-figure on the fly.
Physical level protocol host interface
PRU construc-tion
Routing blocks
Block protocol host interface
LCB line con-trol block
2560
2561
103
201
358
301
303
Async line speed up to 9600 baud. Sync line speeds up to 19.2KB
MODE 4
214/217/
711
731-12/
734
732-12/
714
777
See July 77 PSI for emulator list
MODE 3
Mode/33/
35/38
713/751
2780/3780
Data 100
MOD 78
CYBER 18
HASP
Data 100
MOD 78
CYBER 18
Singer
Harris
Keyboard in
Keyboard out
LPX
CRX
CPX
Connection number is assigned per data stream
All bannering/lacing is now done in the NPU
7-10% more processing done in NPU
Require a minimum 65K of 255X core
NPU is not recovered following a system halt-the NPU is always reloaded
No support for remote nodes
Increase INTERCOM independence of terminal type therefore making it easier to add new terminal types in the future
Terminal protocol
Text processing
CMD processing
Auto recognition-new feature
TCB-terminal control block
Main purpose:reduce central resources/additional equip. support HASP/2780/3780/2552
INTERCOM is completely PPU driven
All actions are initiated by INTERCOM thereafter controlled by CCI
Block as opposed to character multiplexing
Buffer requirements much less than R4 (config. 16 RJE, 15 Mode 3-V4/55K,V5-22K)
Deleted support for 667X/LCC/1WB/CCP V1/2550-100
The RJE interface between Host and NPU will be disk formatted PRU's
Interactive interface left unchanged
Can have more than 1 NPU per channel but cannot load and drop separately

Decks removed for PL14 {INTERCOM V5}

FHBCOM	1M1COM	CWE0R2	1GS	1XP	0FA
ACNNH	1M2COM	1GSCOM	1GJ	1LX	1FE
DCNNH	1MICOM	GBJ	2GJ	1WB	LINSTAT
FANNH	1M1	GEJ	1GR	0ZZ	DUMPLCC
IANNH	CWE0R1	GES	CWE0R3	1ZZ	CWE0R5

Inserted routines PL14 {INTERCOM V5}

1NI	1ND	1DI	1NP	INTRST	DUMPNPU {Relocated}

Changed routines {PL1A}

PPSYS/SCPTEXT/PPTEXT	TEXT changes
IRCP	2552 device type
DSD	@ display/INTERCOM command
CMR	Configuration Macros
ROUTE	{ROUTE HN, IC=TRANS}

Changed routines {PL1B}

RWE	Access different word in UT

NEW ROUTINES: INTERCOM V5

1ND	INTERCOM V5 network driver for NPU
2ND	INTERCOM V5 driver input command processor
3ND	INTERCOM V5 driver input command processor
4ND	INTERCOM V5 input/output command processor
5ND	INTERCOM V5 driver output command processor
6ND	Batch support routines
7ND	Driver support routines
8ND	Limbo processors and system support
9ND	Driver termination routines
0ND	Driver control tables
1NI	INTERCOM V5 network driver initializer
2NI	Load
3NI	Configure
4NI	Dump
1NP	INTERCOM V5 network processor
2NP	Batch command processing
3NP	Driver request processing
4NP	LOCAFILE and diverted file processing
5NP	Disconnect/recover processing
6NP	Batch command cracker
1DI	INTERCOM V5 driver overlay loader
0D	2551 down line load files
0D0	Micro memory
0D1	Mode 3 only
0D2	Mode 4 only
0D3	Modes 3 and 4
0D4	2780/3780
0D5	2780/3780 + Mode 3
0D6	2780/3780 + Mode 4
0D7	2780/3780 + Mode 3 + Mode 4
0D8	HASP
0D9	HASP + Mode 3
0DA	HASP + Mode 4
0DB	HASP + Mode 3 + Mode 4
0DC	HASP + 2780/3780
0DD	HASP + 2780/3780 + Mode 3
0DE	HASP + 2780/3780 + Mode 4
0DF	HASP + 2780/3780 + Mode 4 + Mode 3
0DZ	BOOTSTRAP DUMP ROUTINE

0E	2552 Down Line Load Files
0E0	Micro memory
0E1	Mode 3 only
0E2	Mode 4 only
0E3	Modes 3 and 4
0E4	2780/3780
0E5	2780/3780 + Mode 3
0E6	2780/3780 + Mode 4
0E7	2780/3780 + Mode 3 + Mode 4
0E8	HASP
0E9	HASP + Mode 3
0EA	HASP + Mode 4
0EB	HASP + Mode 3 + Mode 4
0EC	HASP + 2780/3780
0ED	HASP + 2780/3780 + Mode 3
0EE	HASP + 2780/3780 + Mode 4
0EF	HASP + 2780/3780 + Mode 4 + Mode 3
0EZ	BOOTSTRAP DUMP ROUTINE

INTERCOM V4 and INTERCOM V5 Differences — by S. R. Morgan

The purpose of this article is to point out some of the differences that will exist between INTERCOM V4 and INTERCOM V5. For discussion purposes the report will be divided into two areas:

1. New Features INTERCOM V5
2. Differences INTERCOM V4/V5

New Features INTERCOM V5

1. Support of 2780/3780 terminals and the emulators of these terminals.

2. Support of HASP multi-leaving work stations.

3. Support of Mode 3 (asynchronous) line speeds up to 9600 baud.

4. Support of Mode 4 and HASP line speeds up to 19.2 KB.

5. Support of the 2552.

6. Support of transparent data (EBCDIC-256) on remote batch devices for HASP/2780/3780 terminals. The data is treated as 8-bit characters and is blocked and deblocked without regard for card lengths, carriage control, print line width.

7. Support of auto baud detect for hardwired Mode 3 terminals up to 300 baud.

8. Support of auto terminal detect to allow any site to dial into a given line (assuming the proper CMR mux configuration is specified). For example, any Mode 4 terminal can dial into a port without regard to Mode 4A, 4C, ASCII, or BCD. Also if CMR is correctly set up there is no restriction on the site address. The same is true for HASP and 2780 or 3780. INTERCOM 5 cannot tell the difference between 2780 and 3780. The only restriction is that Mode 4 and BI-SYNC terminals cannot dial into the same port. The user must push the SEND key or its equivalent to allow the 255X to determine the terminal type.

9. A BLOCK command is available for defining the buffer size of a HASP terminal. Legal values are 400 or 800. For those terminals which allow up to 800 characters per buffer, the BLOCK command should provide enhanced performance.

10. The central operator can now initiate an INTERCOM RESTART by console type-in. This can be used if the operator believes INTERCOM is not working and would like to get dumps without deadstarting the system.

Differences INTERCOM V4/V5

1. For INTERCOM 5, when the 255X determines that a line is malfunctioning it will notify the INTERCOM driver. The driver will then turn off the line and issue a flashing message at the central console. The line will be automatically turned back on after an installation defined period of time. If the line is still not operational, the operator will again be notified.

   With INTERCOM V4, no notification is given, but a utility is provided to display line status. The utility gives the central operator the chance to turn a line back on.

2. The READ,LFN command, DEFINE command, and the ROUTE control statement have been modified to allow for specification of transparent data for HASP/2780/3780. This change is completely upward compatible such that past usage is unchanged.

3. The LW parameter has been added to the DEFINE command to allow specification of the synchronous terminal line width.

4. The DSD Q display has been modified to provide additional information. This includes the User Table address and connected/disconnected line status. Also if the central console is in unprotected mode both logged-in and unlogged-in User Table entries are shown.

5. Support of the 667X, 7077/791 (LCC), 6673/4 (Wide Band), and CCP V1.0 support of 2550 has been dropped from INTERCOM V5.

6. There will be some differences in the processing of job card errors under INTERCOM V5. Under INTERCOM V4 job card errors are reported to the terminal and no output file is generated. Under INTERCOM V5 the terminal will be notified but an output file is generated.

7. The processing of level 17 EOR, BI-SYNC EOF, and HASP end of stream are different between INTERCOM V4 and V5.

Currently under INTERCOM V4 an EOR level 17 is treated as an end of file. With INTERCOM V5 it will be treated as an end of record.

BI-SYNC terminals are not able to recognize 6-7-8-9 cards, so a new type of EOF has been identified for these types of terminals only. It is a /*EOI.

HASP terminal support is such that once a card reader is started it will remain "hot" such that any cards placed in the reader are immediately read without further user type-ins. To prevent a HASP terminal from automatically reading cards the /*EOS card may be read through the card reader. Also the END,CRn may be used to terminate the stream.

8. Inoperative processing is different from INTERCOM V5. To indicate to the 255X that the terminal which was inoperative is now functioning again the terminal operator must enter the SEND key or its equivalent. With INTERCOM V4 no key-in was necessary.

9. The processing of a Mode 4A ASCII terminal is different. Under INTERCOM V4, to enter a blank line the user entered one blank plus the SEND key. For INTERCOM V5 two blanks must be entered plus the SEND key. Also, when one wants to do a page turn, under INTERCOM V4 the user could enter any character plus the SEND key. For INTERCOM V5 the user must enter a blank and the SEND key, any other character(s) will be sent to the host for processing.

10. INTERCOM 5 does not set an absolute maximum screen size for batch output mode 4 devices. Thus the screen size as entered on the SCREEN command should not be larger than the physical size of the terminal otherwise errors will occur. In INTERCOM 4 an installation parameter specified a maximum screen size for batch output to mode 4 devices.

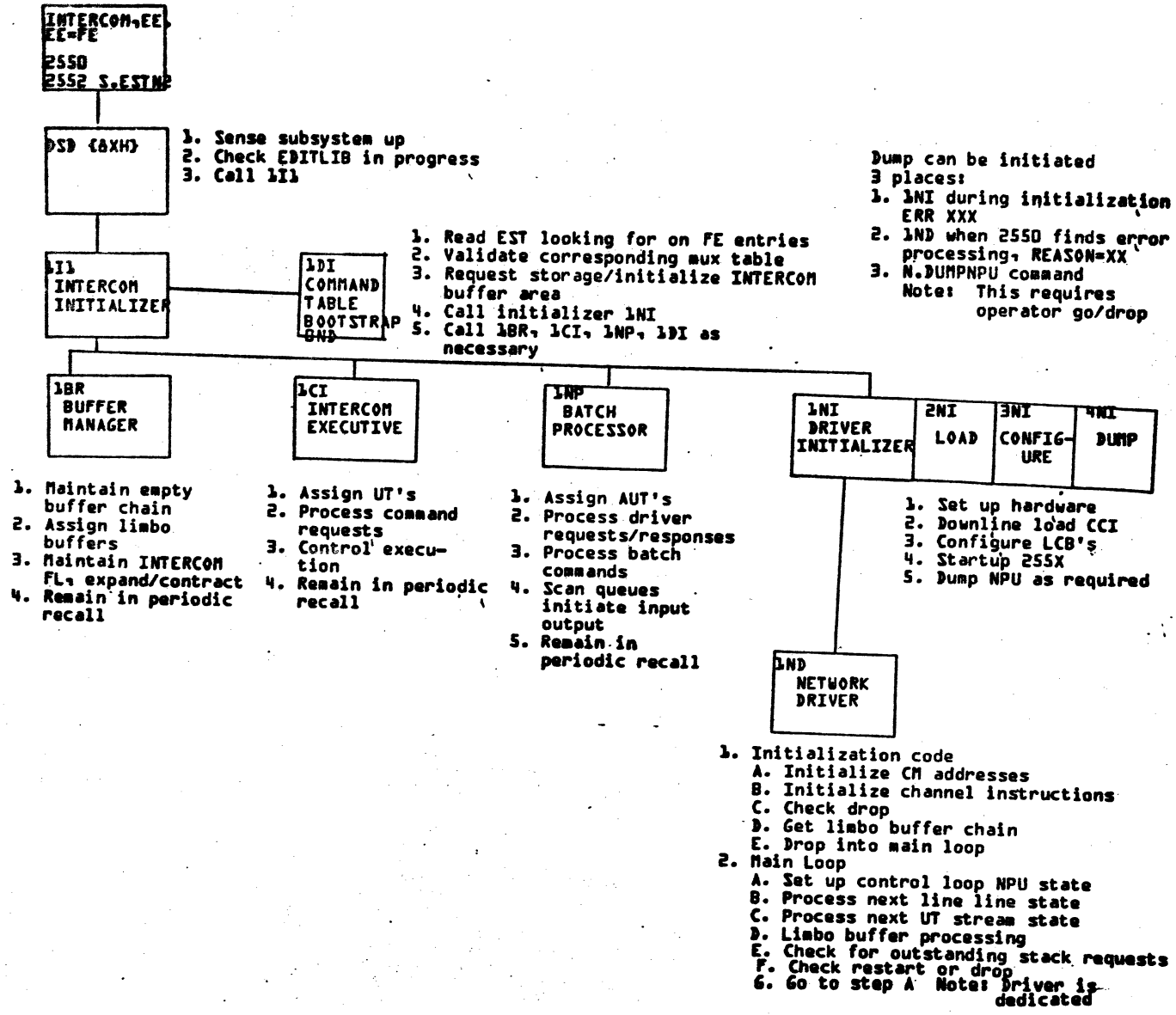
11. There is no ASCII-95 printing at a Mode 4C printer.

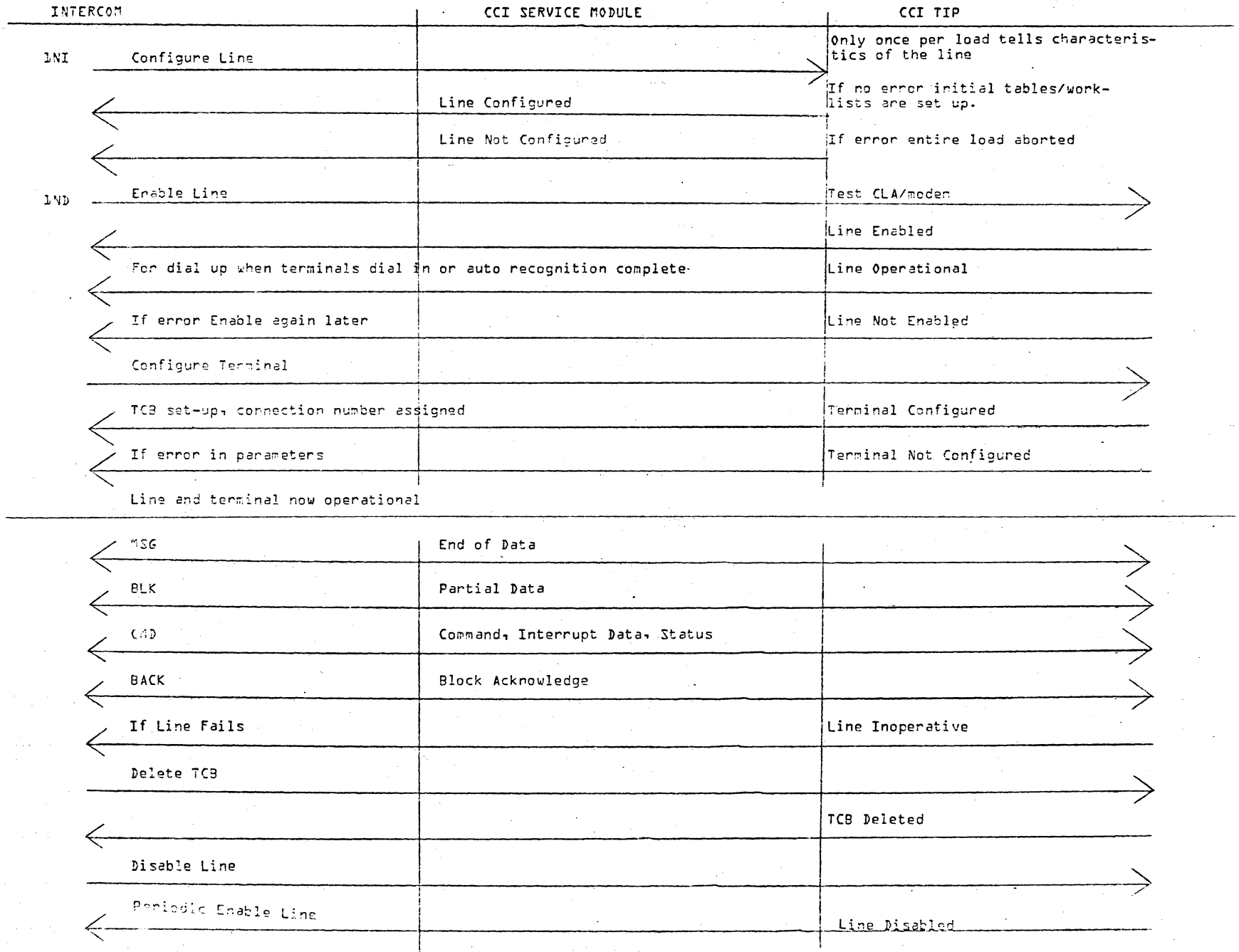
12. Multiplexor port definition macros differ from INTERCOM V4 to INTERCOM V5.

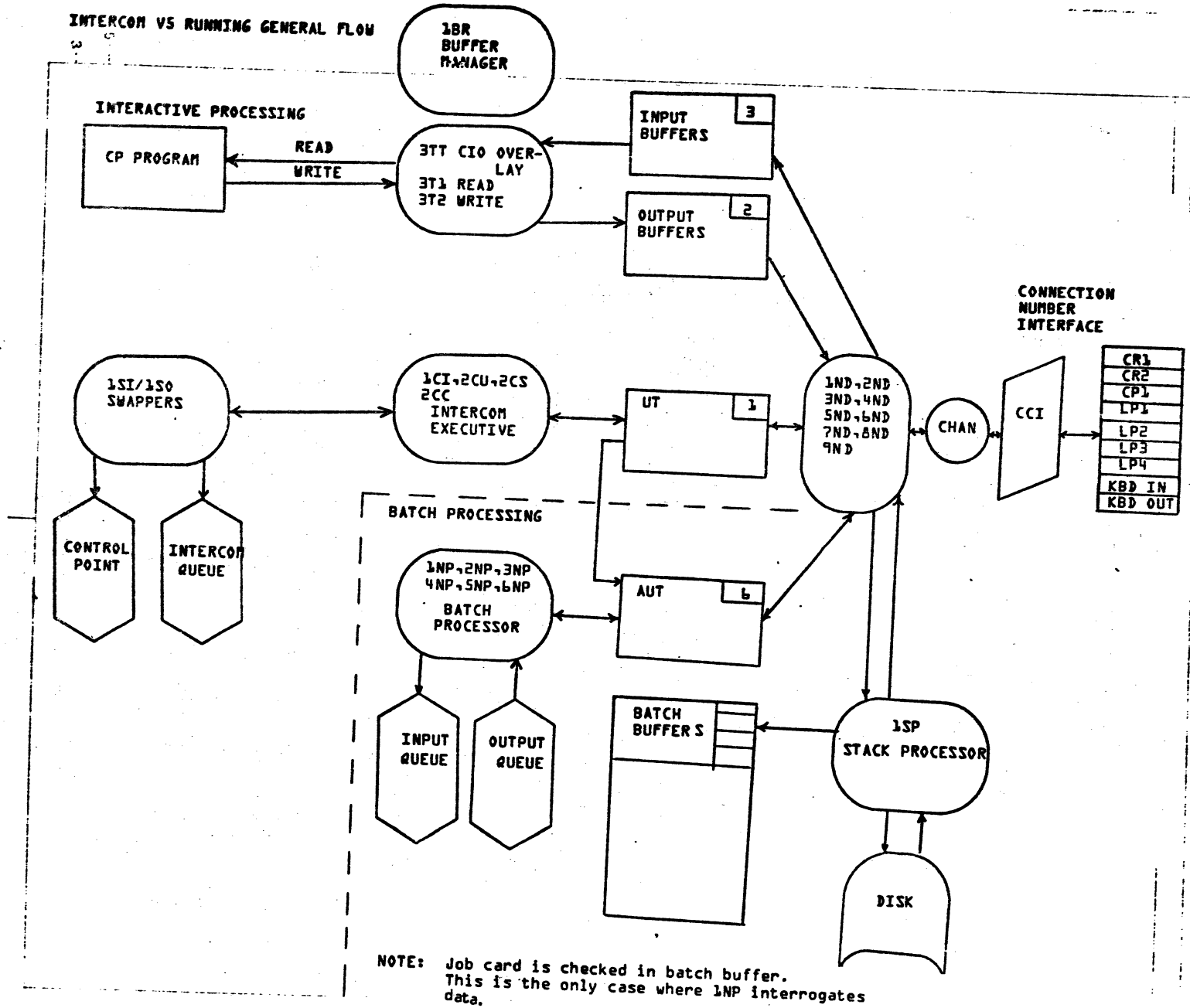
13. Installation parameters will change when going from INTERCOM V4 to INTERCOM V5.

14. INTERCOM V5 will require a minimum configuration of 65K of 255X core. In the minimum configuration only mode 3 and mode 4 terminals can be run. It is recommended that 81 or 98K of core be used for support of all terminal types (mode 3, mode 4, HASP, and 2780/3780).

15. Reduced "Host" resources can be expected in V5 over V4. This includes PP activity and CM usage.

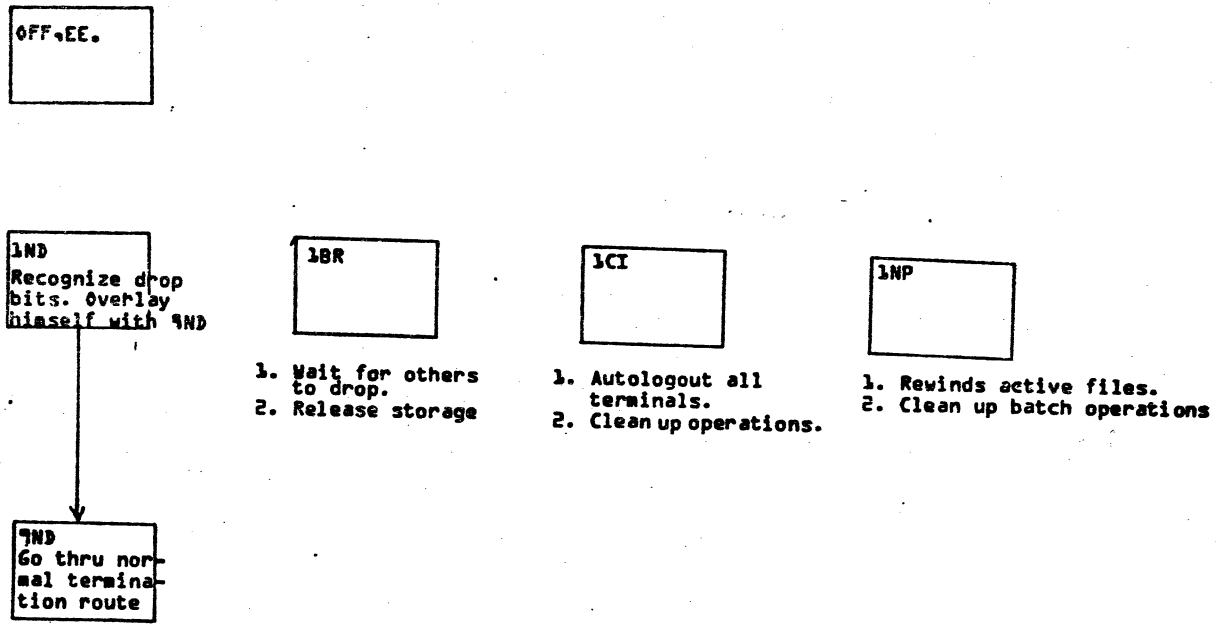

INTERCOM,EE,
EE=FE
2550
2552 S.ESTNP
2SD (8XH)
1. Sense subsystem up
2. Check EDITLIB in progress
3. Call 1I1
1I1
INTERCOM
INITIALIZER
1DI
COMMAND
TABLE
BOOTSTRAP
1. Read EST looking for on FE entries
2. Validate corresponding mux table
3. Request storage/initialize INTERCOM buffer area
4. Call initializer 1NI
5. Call 1BR, 1CI, 1NP, 1DI as necessary
Dump can be initiated
3 places:
1. 1NI during initialization ERR XXX
2. 1ND when 2550 finds error processing, REASON=XX
3. N.DUMPNPU command
Note: This requires operator go/drop
1BR
BUFFER
MANAGER
1. Maintain empty buffer chain
2. Assign limbo buffers
3. Maintain INTERCOM FL, expand/contract
4. Remain in periodic recall
1CI
INTERCOM
EXECUTIVE
1. Assign UT's
2. Process command requests
3. Control execution
4. Remain in periodic recall
1NP
BATCH
PROCESSOR
1. Assign AUT's
2. Process driver requests/responses
3. Process batch commands
4. Scan queues initiate input output
5. Remain in periodic recall
1NI
DRIVER
INITIALIZER
2NI
LOAD
3NI
CONFIG-
URE
4NI
DUMP
1. Set up hardware
2. Downline load CCI
3. Configure LCB's
4. Startup 255X
5. Dump NPU as required
1ND
NETWORK
DRIVER
1. Initialization code
A. Initialize CM addresses
B. Initialize channel instructions
C. Check drop
D. Get limbo buffer chain
E. Drop into main loop
2. Main Loop
A. Set up control loop NPU state
B. Process next line line state
C. Process next UT stream state
D. Limbo buffer processing
E. Check for outstanding stack requests
F. Check restart or drop
G. Go to step A Note: Driver is dedicated


INTERCOM
CCI SERVICE MODULE
CCI TIP
INI
Configure Line
Only once per load tells characteristics of the line
Line Configured
If no error initial tables/worklists are set up.
Line Not Configured
If error entire load aborted
ENB
Enable Line
Test CLA/modem
Line Enabled
For dial up when terminals dial in or auto recognition complete
Line Operational
If error Enable again later
Line Not Enabled
Configure Terminal
TCB set-up, connection number assigned
Terminal Configured
If error in parameters
Terminal Not Configured
Line and terminal now operational
MSG
End of Data
BLK
Partial Data
CMD
Command, Interrupt Data, Status
BACK
Block Acknowledge
If Line Fails
Line Inoperative
Delete TCB
TCB Deleted
Disable Line
Periodic Enable Line
Line Disabled



NOTE: Job card is checked in batch buffer.
This is the only case where 1NP interrogates data.

INTERCOM V5


OFF.EE.
1ND
Recognize drop bits. Overlay himself with ¶ND
1BR
1. Wait for others to drop.
2. Release storage
1CI
1. Autologout all terminals.
2. Clean up operations.
1NP
1. Rewinds active files.
2. Clean up batch operations
¶ND
Go thru normal termination route
1. Wait for outstanding stack requests to complete
2. Check on outstanding UT requests.
3. Set user tables disconnected
4. Issue driver termination message
5. Clear driver up flag
6. Release hardware channel
7. Exit to R.IDLE

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS

The Terminal Systems Development Division will soon be releasing Mode 4 support through the 7077/791 local communications controller. With the introduction of Mode 4 support on the LCC, it is conceivable that the requirement may arise to interface non-CDC equipment which emulates the 200 user terminal into CDC higher-level processors. There exists the possibility that other vendors' terminals may not operate correctly in this environment even though no problems are encountered when using CDC 200 user-type terminals. This article is intended to help answer many of the questions that may arise, as well as to point out some of the peculiarities and potential problem areas when working with this protocol. Additionally, the PSD support function at TSDD will be available to provide consulting services to any vendor whose terminal is experiencing interface problems as mentioned previously.

A proper presentation of Mode 4 requires first of all, clarifying the differences between Mode 4, Mode 3, and Mode 2, as well as the various versions of Mode 4 protocol.

A protocol as related to data communications refers to a set of procedures for control of information as it flows over a data link to a station and eventually a specific device. The procedure defines the various data elements and message components and describes the ways they may be structured in the various message types. Within the constraints of a specific protocol is provided therefore, the framework within which products with similar features can co-exist on the same data communications link and maintain consistent operation. Although the terminals supported by a particular protocol may have a wide range of capabilities and features, it is possible for them to operate together, provided they retain compatibility of required system characteristics, examples being:

- Signaling rate
- Mode of transmission
- Communications network interface
- Unique device control codes
- Exact timing relations, if appropriate

Data communication protocols are structured to allow the use of defined elements within these characteristics and from this definition, derive their unique features and characteristics; hence, Mode 2, Mode 3, and Mode 4.

Mode 2 protocol will only support synchronous lines which are point-to-point, full-duplexed and non-switched. The transmission flow will be two-way simultaneous at line speeds from 2400 bits per second (bps) to 50K bps. Current products supporting this protocol include the 731-10, 732-10, and 733-10 batch terminals.

Mode 3 protocol supports asynchronous lines of speeds of 110-300 bps which are point-to-point, two-way alternate (half-duplexed) and may be either switched or non-switched. This protocol is intended to support Model 33/35 teletypes (ASR and KSR) and the CDC 713 CRT terminal.

Mode 4 protocol which consists of variants 4A, 4B, and 4C, supports two-way alternate synchronous lines with the following line characteristics:

1) Line speed of 600-9600 bps point-to-point, half-duplexed switched
2) Line speed of 1200 bps to 9600 bps point-to-point - 2-wire or 4-wire non-switched
3) Line speed of 1200 bps to 9600 bps multi-drop - 2-wire or 4-wire non-switched

The Mode 4A variant of Mode 4 protocol is the procedure for exchange of data between a CDC 200 user terminal and/or products emulating the 200 UT and a data source. The unique feature of this variant is the selection of peripherals with pre-defined codes in the message text. It is this variant which will be dealt with in this article.

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS (cont'd)

Mode 4B protocol exists to permit the exchange of data between a data source and CDC 216-type terminals. The distinguishing feature of this procedure is that devices have unique address.

Mode 4C protocol is primarily the attempt at an overall corporate standard for Mode 4. It defines areas previously undefined or defined differently for certain implementations. It also eliminates major conflicts with ANSI standards and has expanded capabilities to cover the foreseeable requirements for the future.

Current Control Data terminals employing Mode 4 protocols include:

TERMINAL	PROTOCOL
714 Multi-Station	Mode 4B/C
214-XX BCD	Mode 4A
200 UT BCD	Mode 4A
217-XX BCD	Mode 4A
711-10	Mode 4B
731-12 LSBT	Mode 4A
732-12 MSBT	Mode 4A
200 UT ASCII	Mode 4A
734-1	Mode 4A

With this background serving to clarify the significance of the term protocol and its employment by CDC, it is possible to investigate in more depth Mode 4A 200 UT protocol and to point out some of the more obvious occurrences that generate problems when utilizing this line communication procedure.

The 200 UT can receive six types of messages. It is capable of sending four types of messages, where we have ten unique message types. The 200 UT responds (sends) only after receiving a message, so the computer communicating with the 200 UT must initiate all transmission. One exception to this is when the POLL switch is in WAIT position. If in a POLL WAIT, an acknowledge is transmitted. If a READ RESPONSE becomes available at a later time, it is transmitted without waiting for a POLL. A CRT message will be transmitted when the operator sets the SEND key (a poll must previously have been received).

The following message types are received by the 200 UT:

A. POLL
B. ALERT
C. WRITE
D. RESET WRITE
E. CLEAR WRITE
F. DIAGNOSTIC WRITE

The following message types are transmitted by the 200 UT:

A. ACKNOWLEDGE
B. REJECT
C. ERROR
D. READ

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS (cont'd)

The general format of messages is as follows (in octal):

026	
026	-4 SYNC CODES
026	
026	
001	- SOH (Start of Header)
16X-17X	- Site Address
140, 141, 160 or 161	- Station Address and Sequence Bit
	- Control Code
	- Data (0-1040 words)
003	- ETX (End of Text)
XXX	- MPC (Message Parity Character)

All control information in the messages is always received with odd parity.

005	- POLL
007	- ALERT
* 021	- WRITE
* 014	- RESET WRITE
* 022	- CLEAR WRITE
006	- ACKNOWLEDGE
030	- REJECT
025	- ERROR
* 020	- DIAGNOSTIC WRITE
* 023	- READ

* The WRITE, RESET WRITE, CLEAR WRITE, DIAGNOSTIC WRITE and READ messages may contain data. The block of data is followed by an E1, E2, E3, or E4 (preceding the ETX), specifying what is to be done with the data or from where to solicit the next block of data.

In the WRITE messages, E1, E2, E3, and E4 have the following meaning:

E1 - Display the message on the CRT

E2 - Print the message on the printer

E3 - Request card read data to be sent from the 200 UT

E4 - Start of text indicator when operating in LINE MODE ON DISPLAY

In the READ message, they have the following meaning:

E1 - This block contains operator-composed data (from CRT keyboard).

E2 - /1/ If cards were being read (if last WRITE contains E3 requesting cards to be read), E2 indicates 'all cards have been read, hopper is empty, card is jammed, or light-dark check error occurred'. It is treated generally as a card reader not ready condition.

/2/ If printing was being done (if last WRITE contained an E2 request), E2 indicates the printer is not ready, and write message with print data must be re-sent.

E3 - /1/ If cards were being read, E3 indicates card reading can continue.

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS (cont'd)

/2/ If printing was being done, E3 indicates printing can continue.

Note that E codes are, in fact, character pairs consisting of an ESCAPE CODE (ESC) and the function to be performed.

Description of Message Types Received by 200 UT

1. POLL - This is a fixed-length message which is sent to the 200 UT to determine its status and to receive data.

2. ALERT - This is a fixed-length message which is sent to the 200 UT to sound its audible alarm without destroying any CRT data being composed.

3. WRITE - This is a variable length message which is sent to the 200 UT and may or may not contain data. It is used to:

   a. send display data to 200 UT
   b. send print data to 200 UT
   c. request card data from 200 UT

4. RESET WRITE and CLEAR WRITE - These act the same as WRITE, but are intended for CRT - keyboard communication, allowing the computer to control placement of output data onto the CRT screen.

5. DIAGNOSTIC WRITE - Used only for maintenance.

Description of Message Types Sent by 200 UT

1. ACKNOWLEDGE - This is a fixed-length message sent by the 200 UT to acknowledge successful receipt of an ALERT, WRITE, RESET WRITE or CLEAR WRITE, and in a special case, to a POLL (if POLL switch is in WAIT position and no data ready to send).

2. REJECT - This is a fixed length message sent by the 200 UT to indicate rejection of a previously received message in the following situation:

   a. A POLL is received, but the SEND key has not been activated or an automatic read request has not been initiated (by a WRITE).

   b. The display controller is busy at the time of receipt of the WRITE, RESET WRITE, or a CLEAR WRITE code.

3. ERROR - This is a fixed-length message sent by the 200 UT to indicate unsuccessful receipt of the last message from the computer. Errors include:

   a. Illegal or unrecognized conditions detected after the correct site address.

   b. Character and/or message parity error.

   c. The modem carrier was removed before the ETX.

   d. A WRITE message was received and did not end with an escape and an E1, E2, or E3.

4. READ - This is a variable-length message sent by the 200 UT in response to a POLL if read request is active. It may or may not contain data. The READ message may contain:

   a. display data (entered via keyboard), or

   b. card read data, and/or

   c. status concerning printer or card reader.

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS (cont'd)

The following table indicates the possible 200 UT responses to each computer original message:

	Computer Sends	200 UT Sends
1.	POLL	*ACK, REJECT, ERR, or READ
2.	ALERT	ACK or ERR
3.	WRITE, RESET WRITE, or CLEAR WRITE	ACK, REJECT, or ERR
4.	DIAGNOSTIC WRITE	REJECT or READ

A null response can occur (timeout) which indicates that either the HLP request was not received by the terminal, or the terminal response was lost through transmission error.

* ACK sent in response to POLL only when POLL switch in WAIT position.

Message Sequence Bit

The 200 UT provides for the reception of a message sequence bit (0 or 1) in each write message which is merely echoed back in each response message. The computer may toggle this bit between 0 and 1 on each WRITE message it sends, allowing it to determine if a message was actually received properly by the 200 UT in certain error conditions which would otherwise be ambiguous - computer would not know whether to re-send a block of data at the risk of repeating a block or to not send, risking the dropping of a block (see later discussion of error recovery).

Sequence Bit Rules

1. The 200 UT saves the sequence bit (0 or 1) from the WRITE, CLEAR WRITE, and RESET WRITE message if and only if its response to the write message is an 'ACK'.

2. The 200 UT includes the currently saved sequence bit (0 or 1) in all messages it sends back to the computer (READ, ACK, ERR, and REJ messages).

The sequence bit is bit 2^4 in the station address byte.

To maintain consistent performance of devices using Mode 4A 200 UT protocol requires complete understanding of the operation of the terminal features as they relate to the communication procedures as well as proper handling of data formats and control methods. What follows are observations concerning those topics which are not explicitly understood and, therefore, exist as potential problem areas when programming or operating within the confines of this protocol.

Commencing with the input operations of the card reader, several observations may be made concerning card formats and processing. Major areas of concern include code sets, special end-of-record and end-of-file cards, card buffer lengths, and card-reader-not-ready conditions.

Code set is a very special problem for the programmer. Particular customers may use keypunches to punch their hollerith cards which do not necessarily comply to Control Data standard code set for terminals. To alleviate this problem, every character should first be printed on a sheet of paper. Perform this procedure by assigning a unique definition for punch configuration which will define each character. Because of additional variables on print drums, code set can be a serious problem when programming a terminal. Try to stay as close as possible to CDC standards when defining the code set for your terminal. Observation and conformity with the code set on the higher-level processor should also be considered when defining the code set.

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS (cont'd)

In addition to code set, card input can also create problems if job structures are not interpreted correctly. A case in point would be the processing of 7/8/9 end-of-record card and 6/7/8/9 end-of-file card by CDC CYBER or 6000 HLP software.

Whenever an EOR or EOF card is detected by the card reader, this code must be expanded to look like an escape character and then the character for EOR or EOF. Always remember that one character in will result in two characters out. This may seem insignificant, but before this EOR or EOF card was read, all cards were kept on an even word boundary of 80 characters. Now this would result in 81 characters being generated and would cause possible confusion when examining data within memory.

Card buffer lengths can be problematic as a result of the fact that 200 UT protocol does not allow card compression going to the higher-level processor. This protocol also needs twelve cards in a block or a not-ready condition to force the cards to be sent to the higher-level processor. The requirements of the card reading function are:

1) Twelve cards are always read or X number of cards with a not-ready condition.

2) These cards are not sent to the HLP until the HLP writes an E3 to the card reader.

3) If the HLP writes an E3 and the card reader is not ready, the terminal will produce (in the data portion of the message) an escape with an E2 in the next message sent back to the HLP.

To help understand this procedure, observe the following diagram of the normal protocol procedure for reading cards.

	HLP	
MSG1	WRITE-E3 →	Request reader data
MSG2	← ACK	200 UT acknowledges
MSG3	POLL →	POLL to get reader data
MSG4	← READ	Read 12 cards or data or until not ready
MSG5	WRITE-E3 →	Request reader data
MSG6	← ACK	200 UT acknowledges
MSG7	POLL →	Get next 12 cards of data or until not ready
MSG8	← READ	Read data

The read response on the last message from the card reader could either be a 2-character read containing an ESCAPE and E2 or a data buffer containing from 1 to 12 cards with ESCAPE and E3. Other significant conditions to be aware of when doing card operation include:

1) If the HLP detects a job card error in the first 12 cards, the terminal will load 12 more cards, but the HLP will not write an E3 to the terminal. To empty the 12 cards loaded in the terminal requires a manual release condition for the terminal.

2) To use the card reading capability most efficiently should you load cards while transmitting cards to the HLP.

3) An illegal hollerith code should be masked or altered to reflect a legal character. A question mark (?) character is normally used.

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS (cont'd)

4) Binary cards are not allowed to be transmitted on the standard 200 UT protocol.

5) A card buffer is not released until the HLP writes an E1, E2, E3, or E4 to the terminal.

The code set is also one of the major features to be aware of when performing printer output with 200 UT protocol. Code set and compression of blanks and zeros are the primary areas of caution when printing.

Compression of blanks and zeros are sent from the HLP to the terminal. The terminal must look at these characters which are always preceded by an ESCAPE and decompress them.

The compression codes for INT BCD, EXT BCD, and ASCII transmission are similar but not identical. For a complete table of the differences, please refer to the reference manuals for 200 UT devices.

The print drum on your specific printer could present a problem if the characters do not match the customer's requirements. The printer message is sent down from the HLP as a normal data message ending with an ESCAPE and E2. Any errors encountered during the transmission of the print message will cause the data not to be printed. The normal print message ending with ESCAPE and E2 will be answered with either an acknowledge or error. If the message is error-free, it is answered with an ACK, if not an ERR. After the print message is sent, the HLP will POLL the terminal to determine if the printer was ready or not ready. An example of the printer flow is:

	HLP	
MSG1	WRITE E2 →	Send data to 200 UT addressing the printer
MSG2	← ACK	200 UT acknowledges
MSG3	POLL →	POLL to get status
MSG4	← READ - E3 or E2	200 UT sends back E3 to indicate printer ready, E2 to indicate not ready
MSG5	WRITE E2 →	Send data to 200 UT addressing the printer
MSG6	← ACK	200 UT acknowledges
MSG7	POLL →	POLL to get status
MSG8	←	200 UT sends E3 to indicate ready, E2 to indicate not ready

The keyboard and display are generally quite basic and cause few problems for the programmer in relation to protocol procedures. The one detail that is worth pointing out is the LINE MODE feature. The LINE MODE feature is the capability to protect previously entered or response data from being altered. Generally, the display/keyboard will be either 50 characters X 20 lines or 80 characters X 13 lines. When using LINE MODE, you must have a special symbol to denote the beginning of the input field on a display. If the hardware allows more than 80 characters on a line, you could place the special symbol on the beginning or end of the line. If the hardware only gives the ability of 80 characters per line, you must trail the special symbol one line behind and wipe out the character previously displayed in that position. Another restriction to observe when using LINE MODE occurs when attempting to re-send a full screen of data. If the data does not begin at the top of the screen, you will lose one character. This is a very rare occurrence, but worth making note of.

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS (cont'd)

When sending data from the keyboard to the HLP, compression is not used. When receiving data from the HLP, again no compression will be present. The normal keyboard flow is:

		HLP	
MSG1	POLL →		Check if keyboard has a message for input
	← READ EL		READ (if SEND or ETX key depressed)
MSG2	WRITE EL →		Writes message on display, then unlocks keyboard
	← ACK		200 UT acknowledges

In examining the message sequences for the devices comprising a 200 UT-type device, it should be noted that error recovery occurs in one of two ways. If the input message has received the site address and the message is in error beyond this character, the terminal will answer back with an ERROR message. If the terminal finds an error with the site or before the terminal re-syncs and does not answer the message, thus allowing the host processor to time out and re-try the message. When data is being transferred to and from the terminal, the error process is checked with the station address. The way the terminal treats a station address is if the message is a write answered with an acknowledge, you reply with the same station address as was sent in the write. All other messages are answered with the previous station address. See the previous discussion on Bit Sequencing for further clarification of this method.

The following examples demonstrate how this procedure operates for various error conditions on write operations. If a write message is received incorrectly by the terminal, the data source retransmits.

	Transmitted Message	Station Address	Response Message	Station Address
Message 1	Write	161	Acknowledge	161
Message 2	Write	141	Acknowledge	141
Message 3	Write	161	Acknowledge	161
Message 4	Write	141	Error	161
Message 5	Write	141	Acknowledge	141

If the data source fails to receive a response correctly, another message (station poll or alert) may be transmitted in an effort to determine the status of the preceding write message. This new message may use either of the station addresses. If the original write message is received correctly, the response to the second transmission supplies the original station address. In the following example, the acknowledge message response to the write message marked with the * is assumed to have been destroyed by a line error.

	Transmitted Address	Station Address	Response Message	Station Address
Message 1	Write	161	Acknowledge	161
Message 2	Write	141	Acknowledge	141
Message 3	Write	161	Acknowledge*	161
Message 4	Poll	141 or 161	Reject	160
Message 5	Write	141	Acknowledge	141

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS (cont'd)

Assuming the line error destroys the error response (*), the data source transmits a poll message to determine status. An alternate address in the reject message response informs the data source of the error condition in the previous write. Retransmission is then the normal procedure.

	Transmitted Message	Station Address	Response Message	Station Address
Message 1	Write	161	Acknowledge	161
Message 2	Write	141	Acknowledge	141
Message 3	Write	161	Error *	141
Message 4	Poll	141 or 161	Reject	140
Message 5	Write	161	Acknowledge	161

The preceding information has been intended to offer some insight into potential areas for problems when doing card input, printer output or keyboard input/output. In support of these functions, the following general comments concern additional cautions to be observed when programming or operating a terminal using Mode 4A 200 UT protocol.

- The manual release feature will free the terminal up and do error recovery restart. The restart is accomplished by clearing all internal pointers in the terminal and re-syncing the communications line.
- Depressing the interrupt key stops all reading and printing from the host processor, and permits a message to be entered from the CRT. This tells the reader not to send any more card buffers and to hold back the reply of printer ready or not ready to the host processor. An exception to this occurs, however, if the card or printer response ends with an E2 code. In this instance, intervention is overridden.
- A sync code should never be inserted between the end of text (ETX) and message parity character (MPC). The host processor must regard the byte following the ETX as the MPC. Note that the MPC could have the same bit pattern as the sync.
- Any sync code that appears after the start of header (SOH) and before the message parity character (MPC) should be discarded.
- When the card reader is sending a 12-block sequence of cards to the host processor, the reader should be reading the next 12 cards to refill the buffer.
- When reading cards, the host processor will always write an E3 to the terminal. The terminal, if it is not ready with card input, should respond with a read containing an E2. A poll-reject sequence should be avoided or the not-ready condition will never be output as an error message.
- During a POLL operation, there could be data after the control code (E codes) and before the end of text (ETX). An error should not be output in this case.
- A print line can be longer than 136 characters; if so, truncation is performed.

TERMINAL SUBSYSTEMS

MODE 4 (200 UT) INTERFACE SPECIFICATIONS (cont'd)

- When operating with certain modems (e.g., CDC 358 transceivers), be very careful when turning the line around. If in the software, a request to send is dropped too soon after you have put the last character on the line, you may clear the line before the character has been received on the other end of the transmission line.

- Timing considerations should be known and adjusted to. Some modems for terminals capable of simulating the 200 UT require, for instance, the output of a pad of characters behind the message parity character (MPC) to insure reception of the MPC at the remote end.

In conclusion, this article has attempted to introduce the idea of protocol, define its application to CDC products, and present the flow of Mode 4A protocol while covering some of the major problem areas to be observed when implementing the procedure. Protocol is the major consideration in communication and as such, a confusing subject to many who are required to work with it. In future issues of the PSI Excerpts, information such as that contained in this article will be presented on related subjects, such as Mode 4C and IBM 2780 protocols, devices that utilize these procedures, and special considerations when implementing and utilizing these methods.

CDC-CYBER 70/6000

2550 HCP NOTES

MANUALS AND INFORMATION

A general description of the 2550 Host Communication Processor appeared in the January, 1975 PSI Excerpts on Page 73-1. This same information plus configuration information is contained in the 2550 Series Host Communication Processor Product Description, 201-038, which is available from LDS.

Manuals for the Communication Control Program (CCP) Support Software, sometimes referred to as the Cross System are also available from LDS. These manuals are listed in the Software Availability Bulletin and in the February PSI Excerpts Page 74-25.

The following preliminary manuals will be available as noted. They can be ordered from R. D. Wyatt, STA0PS.

PUBLICATION --NUMBER--	DESCRIPTION	AVAILABILITY
74641200	Site Preparation Manual	Existing
74700700	Synchronous CLA 2560 -1/2/3	Existing
74700900	Asynchronous CLA 2561-1	Existing
74700500	2550 Hardware Reference Manual	Existing
74701200	2550 CCP Software Reference Manual SCOPE/KRONOS	June, 1975
74701300	2550 Users Guide	June, 1975
74701400	2550 Operators Console Manual	June, 1975
74700800	2550 Hardware Installation Manual	June, 1975

SCOPE/INTERCOM FRONT END - CCP REL 1.0

SCOPE/INTERCOM Front End and the CCP Release 1.0 software to provide support for Mode 3 and Mode 4 terminals on the 2550 will be released with SCOPE 3.4.4.

Features

The following new features are accommodated:

A. Mode 3, Mode 4A, and Mode 4B/C terminal support via the 2550.

B. Mixed mode support -- provided that neither protocol modes nor BCD and ASCII are mixed on the same line.

C. Automatic terminal speed recognition for Mode 3 terminals so different types of Mode 3 terminals may dial into a single 2550 port. (Autospeed recognition limits of 110, 150, or 300 bits for this release.)

D. Automatic terminal recognition for Mode 4A and Mode 4B/C terminals such that any Mode 4 terminal may dial into a single 2550 port.

E. Selective load and drop of individual INTERCOM drivers.

F. Individual autoloading and autodumping of 2550's driven by the same driver.

G. CE error file entries for specified 2550 responses.

CDC CYBER 70/6000

2550 HCP NOTES (Cont'd)

Specific terminals supported via the 2550 driver are:

1. Mode 3: 713, TTY33, TTY35, TTY38, or equivalent.

2. Mode 4A: 217, 200UT, 73X-12, 734-1, or equivalent. (BCD and ASCII).

3. Mode 4B/C: 714 and 711-10 multi-station with on-line character printers as batch output devices, or equivalent. (ASCII only).

Dial up Mode 4 terminals are identified by their site address, where:

Site 0 indicates Mode 4A BCD

Site 1 indicates Mode 4A ASCII

Site 2 indicates Mode 4B/C

Maximum station configuration is assumed:

The 2550 driver supports multi-drop configurations for Mode 4A and 4B/C terminals as well as multi-station configurations for Mode 4B/C terminals. Up to 12 drops with site address 160-173_8 are allowed on any line. Each site of a Mode 4B/C line may have up to 12 stations with station addresses 141-154_8. Station address 140_8 is reserved for the address of the site controller. Station addresses 141-143_8, 145-147_8, and 151-153_8 are assumed to be CRTs. Station addresses 144_8, 150_8, and 154_8 are assumed to be character printers.

Performance

The performance of INTERCOM in terms of response time, terminal throughput and number of terminals supported is expected to remain unchanged.

Size

The size of the INTERCOM areas in CM is expected to be unchanged. The Sunnyvale Development Center may show slightly increased usage of the small buffer area if both a 2550 and a 7077-791 (LCC) are configured. This is not a normally expected configuration.

General Description

One PPU driver, 1FE, can drive up to two 2550s on the same channel. Each channel, configured with a 2550, requires a separate 1FE driver.

There is only one version of the 1FE driver. It supports Mode 3, Mode 4, or both modes simultaneously.

Up to 255 terminal devices may be supported by each 2550. The following are defined as terminal devices.

1. Each Mode 3 terminal e.g., TYY.

2. Each Mode 4A terminal e.g., 200UT including controller and all of its peripherals is one device.

3. Each Mode 4C CRT.

4. Each Mode 4C printer.

Any mix of devices is allowed. There could be up to 128 TTYs (one per line) or up to 216 CRTs and 39 character printers supported on just two Mode 4C hardwired multi-site multi-station

CDC CYBER 70/6000

2550 HCP NOTES (Cont'd)

lines. Or any combination of Mode 3, Mode 4A, and Mode 4C devices are permitted as long as only one mode is configured per 2550 line.

The driver communicates with the 2550 by transferring blocks of information to/from the 2550. The information can be data (BLK, MSG), commands (CMD) that change or report a change in the state of the 2550 software/hardware, data or command block acknowledgements (BACK), or data stream control blocks (BREAK, RESET, TERMINATE).

The driver, 1FE, is loaded by the PPU 2550 initializer, 0FA. 0FA loads the 2550 software by sending binary code across the the 6000 CYBER channel. 0FA then configures the 2550 lines before calling 1FE. 1FE then enables 2550 lines and, when the lines become operational, configures the 2550 for terminal devices on the lines.

1FE logs SEFAP messages for the 2550. 1FE can also initiate a dump of the 2550 by calling the initializer 0FA. 0FA dumps the 2550 memory and registers, in display code, to an OUTPUT file.

The SCOPE 3.4 6612 console operator can initiate loading or dumping of any 2550, even if it shares a channel with a second 2550.

Initializer Overview

The initializer is a PPU program that performs four basic functions:

1. Autoload of CCP software into the 2550.
2. 2550 line configuration.
3. Autodump of 2550 core and registers.
4. Limited 2550 diagnostics.

0FA is the primary initializer overlay. It can be called by the 2550 driver, 1FE, by 1I1, and by LCD as a result of an operator initiated 2550 dump. 0FA is the routine that initiates 1FE. It also communicates with 1FE while the driver is working.

Driver Description

The driver is a PPU program that transfers data between INTERCOM and the 2550. 1FE is the primary driver overlay. It is called by the 2550 initializer 0FA as a result of operator initiation of INTERCOM.

The driver transfers data between the buffer area of INTERCOM and the 2550 memory. The transfer requires 1FE communication with the 2550 software, CCP.

The CCP software package varies with the 2550 line configuration. The Mode 3 version is called 0F3, the Mode 4 version is 0F4, and the mixed mode version is 0F7.

The driver begins communication with CCP only after the 0FA initializer has loaded the required version of CCP software into the 2550. When starting 2550 service, the driver immediately communicates with CCP via the block protocol since the initializer started block protocol before passing control to the driver.

Support Routines

1I1 modifications include calling 0FA to initialize the 2550, reserving space before the INTERCOM small buffer area for 2550 connection tables, and 2550 mux subtable verification.

CDC CYBER 70/6000

2550 HCP NOTES (Cont'd)

When the operator enters the DSD command to start service for a 2550, DSD calls 1I1. 1I1 searches the EST for the 2550 mnemonic FE, verifies that entry, and calls 0FA.

1I1 reserves connection table space before the INTERCOM small buffer area for each FE device in the EST. Space is reserved for the FE device even if the EST entry is 0FF or if its mux table pointer is zero. 1I1 reserves the space when the INTERCOM system is first brought up.

1I1 verifies the 2550 mux subtable line entries in the same way it verifies LCC line entries. The principle difference is that only Mode 3 and Mode 4 entries are allowed and auto-baud is allowed for Mode 3. 1CI modifications include initialization of the User Table (UT) driver words for newly acquired 2550 UTs.

1BR modifications include searching the EST for the 2550 FE mnemonic to display and drop 2550 drivers.

Routines that access the line width field in the UT are modified to allow for the line-length-changed bit. These include TBL, the INTERCOM drivers, and any other routines that access the UT line length field. The line-length-changed bit tells 1FE when to send a Set Screen Width command to CCP.

Routines that access the port number field in the UT are modified. These include 1CI, 1LX, the INTERCOM drivers, and other routines that access the UT port number field. The port number field is modified to accommodate up to 256 ports. It was previously large enough for only 64 ports.

Table Changes

Changes to the following tables are required:

1. Equipment Status Table (EST)
2. INTERCOM User Table (UT)
3. Mux Subtable Header
4. INTERCOM Connection Table (CT)
5. INTERCOM Driver Communication Area (DCA)

The EST change is the addition of the FE mnemonic to designate 2550 equipments. The FE EST entry is created with the EST macro by designating channel, equipment number, and an ordinal pointing to the mux subtable header.

The User Table modifications include initialization of the driver words to 2550 format by 1C1, expansion of the port number field to allow 256 lines, and addition of the line-length-changed bit to the line length field.

A mux subtable header must be created for the 2550. It is generated by a new CMR macro. The connection table (CT) is a new INTERCOM table that allows the 1FE driver to convert block protocol connection numbers to User Table addresses. The CT also contains block sequence numbers used for each connection.

Mode 3 mux subtable line entries are changed to permit auto speed recognition by the 2550. The mux table header is changed for selective load/drop of drivers.

CDC CYBER 70/6000

2550 HCP NOTES (Cont'd)

Direct Connection to Terminals

On the 2550, it is possible to connect terminals within 50 feet of the 2550 directly to the CLA without the use of modems. To do this, special cables are required. The equipment for these cables are:

Asynchronous	-	XA 135A
Synchronous	-	XA 132A

CDC CYBER 70/6000

2550 MEMORY REQUIREMENTS FOR CCP 1.0

The following pages contain instructions for estimating the 2550 memory requirements to run CCP 1.0. These numbers are based on the following assumptions:

2550

Large data buffers = 64 words.
Small data buffers = 10 words.

HOST

Back response takes 200 MS.
Output after input takes 2 seconds.
Block serial number limit = 1.

TTY - Interactive

Block length in and out = 60 characters.
Next input following an output starts in 2 seconds.

MODE-4 Interactive

Block length in = 60 characters.
Block length out = 100 characters.

MODE-4 Batch

Block length in and out = 1100 characters
Multi-drop batch terminal buffer requirements are the same for each terminal as if it were on a single point line.

Total Number of Terminals

These figures will not be accurate if the total number of terminals is less than 20.

This is followed by an example of memory requirements for a typical site. This example assumes that we want the debug facility and that we will have 30 lines with:

5	30	CPS TTY's
9	15	CPS TTY's
6	10	CPS TTY's
2	1200	CPS Mode 4 Interactive Terminals
6	300	CPS Mode 4 Interactive Terminals
4	600	CPS Mode 4 Batch Terminal

It also assumes that we require that service not be degraded 95% of the time.

For anyone desiring memory requirements for other buffer sizes, block length, etc., there will be an interactive Fortran program available from Field Support. Memory sizes for specific cases can also be obtained from Sunnyvale Field Support.

CDC CYBER 70/6000

2550 MEMORY REQUIREMENTS FOR CCP 1.0 (Cont'd)

MEMORY REQUIREMENTS FOR CCP 1.0

		WORDS
1.	FIXED REQUIREMENTS	
	Includes Base, CCP, one CYBER Coupler, MUX Subsystem software	20,000
	On-Line Diagnostics (includes local console I/O)	5,000
	Debug Programs may be added (optional) 2400 WORDS	_____
2.	ADDITIONAL HOST COMMUNICATIONS	
	If optional CYBER Coupler (2558-1) is included add 53 WORDS	_____
3.	TERMINAL INTERFACE PACKAGES (TIPS)	
	COMPLEX (e.g., Mode 4) 3600 WORDS - per seperate TIP.	_____
	AVERAGE (e.g.,) 3000 WORDS - per seperate TIP.	_____
	SIMPLE (e.g., TTY) 2400 WORDS - per seperate TIP.	_____
4.	TABLES (RELATIVE TO TERMINAL SUPPORT)	
	1. LINES - 42 WORDS X number of lines (ports)	_____
	2. Terminals - 17 WORDS X max number of TTY terminals	_____
	33 WORDS X max number of Mode 4 term	_____
	(configured (attached) concurrently; include dedicated and dial-up)	
5.	CODE SET TYPES (NON-ASCII) USED	
	128 WORDS X number of 6 bit code sets	_____
	160 WORDS X number of 7 bit code sets	_____
	224 WORDS X number of 8 bit code sets	_____
	(ASCII is base code set and included in Item 1 above)	
	SUB-TOTAL =	_____

MEMORY REQUIREMENTS FOR DATA BUFFERS

6. Fill in the N column with the number of active terminals for each type in Table 1.

7. For each terminal type multiply the N column by the X column and put this number in the S1 column.

8. Add the S1 column.

CDC CYBER 70/6000

2550 MEMORY REQUIREMENTS FOR CCP 1.0 (Cont'd)

TABLE 1

Terminal Type	Line Speed Char/Sec	N	$\bar{X}$	S1
TTY	30		27	
TTY	15		34	
TTY	10		37	
Mode 4 Interactive	1200		14	
	600		15	
	300		17	
	250		18	
Mode 4 Batch	1200		542	
	600		641	
	300		686	
	250		691	
			TOTAL	

9) Fill in the N column in Table 2 as in Table 1.

10) For each terminal type multiply the number in the N column by the number in the V column and enter the number in the S2 column.

11) Add the S2 column.

TABLE 2

Terminal Type	Line Speed Char/Sec	N	V	S2
TTY	30		730	
	15		674	
	10		631	
Mode 4 Interactive	1200		1423	
	600		1436	
	300		1470	
	250		1478	
Mode 4 Batch	1200		45100	
	600		37000	
	300		31650	
	250		30400	
			TOTAL	

CDC CYBER 70/6000

2550 MEMORY REQUIREMENTS FOR CCP 1.0 (Cont'd)

12) Compute the square root of the total of S2 _____.

13) Multiply the square root of S2 by the number in the F column of Table 3 that corresponds to the confidence factor - Q - desired. Q represents the percentage of time that service will not be degraded due to lack of buffers.

TABLE 3

Q	F	S3
99.9%	3.09	
99.0%	2.33	
95.0%	1.65	
90.0%	1.28	
70.0%	0.52	

Note: There should be only one entry in the S3 column above.

14) Add this number to the total of S1 obtained in Step 8. This is the total buffer space required. _____

15) Add:

Number of lines	x 16	_____
Number of TTY terminals	x 17	_____
Number of Mode 4 Terminals	x 33	_____
TOTAL		_____

Subtract this number from 3600 _____

16) Add to the subtotal obtained at the end of Step 5 to the greater of the numbers obtained in Steps 14 and 15.

This is the total memory requirement. _____

CDC CYBER 70/6000

2550 MEMORY REQUIREMENTS FOR CCP 1.0 (Cont'd)

MEMORY REQUIREMENTS FOR CCP 1.0

		WORDS
1.	FIXED REQUIREMENTS	
	Includes Base, CCP, one CYBER Coupler, MUX Subsystem software	20,000
	On-Line Diagnostics (includes local console I/O)	5,000
	Debug Programs may be added (optional) 2400 WORDS	2,400
2.	ADDITIONAL HOST COMMUNICATIONS	
	If optional CYBER Coupler (2558-1) is included add 53 WORDS	
3.	TERMINAL INTERFACE PACKAGES (TIPS)	
	COMPLEX (e.g., Mode 4) 3600 WORDS - per seperate TIP	3,680
	AVERAGE (e.g.,) 3000 WORDS - per seperate TIP	
	SIMPLE (e.g., TTY) 2400 WORDS - per seperate TIP	2,400
4.	TABLES (RELATIVE TO TERMINAL SUPPORT)	
	1. LINES - 42 WORDS X number of lines (ports) x30 =	1260
	2. Terminals - 17 WORDS X max number of TTY terminals x20 =	340
	33 WORDS X max number of Mode 4 term x12 =	396
	(configured (attached) concurrently; include dedicated and dial-up)	
5.	CODE SET TYPES (NON-ASCII) USED	
	128 WORDS X number of 6 bit code sets	
	160 WORDS X number of 7 bit code sets	
	224 WORDS X number of 8 bit code sets	
	(ASCII is base code set and included in Item 1 above)	
	SUB-TOTAL =	35,396

MEMORY REQUIREMENTS FOR DATA BUFFERS

6. Fill in the N column with the number of active terminals for each type in Table 1.

7. For each terminal type multiply the N column by the X column and put this number in the S1 column.

8. Add the S1 column.

CDC CYBER 70/6000

2550 MEMORY REQUIREMENTS FOR CCP 1.0 (Cont'd)

TABLE 1

Terminal Type	Line Speed Char/Sec	N	$\bar{X}$	S1
TTY	30	5	27	135
TTY	15	9	34	306
TTY	10	6	37	222
Mode 4 Interactive	1200	2	14	28
	600		15	
	300	6	17	102
	250		18	
Mode 4 Batch	1200		542	
	600	4	641	2564
	300		686	
	250		691	
			TOTAL	3357

9) Fill in the N column in Table 2 as in Table 1.

10) For each terminal type multiply the number in the N column by the number in the V column and enter the number in the S2 column.

11) Add the S2 column.

TABLE 2

Terminal Type	Line Speed Char/Sec	N	V	S2
TTY	30	5	730	3650
	15	9	674	6066
	10	6	631	3786
Mode 4 Interactive	1200	2	1423	
	600		1436	
	300	6	1470	8820
	250		1478	
Mode 4 Batch	1200		45100	
	600	4	37000	148000
	300		31650	
	250		30400	
			TOTAL	173166

CDC CYBER 70/6000

2550 MEMORY REQUIREMENTS FOR CCP 1.0 (Cont'd)

12) Compute the square root of the total of S2 416.13459.

13) Multiply the square root of S2 by the number in the F column of Table 3 that corresponds to the confidence factor - Q - desired. Q represents the percentage of time that service will not be degraded due to lack of buffers.

TABLE 3

Q	F	S3
99.9%	3.09	
99.0%	2.33	
95.0%	1.65	686.62207
90.0%	1.28	
70.0%	0.52	

Note: There should be only one entry in the S3 column above.

14) Add this number to the total of S1 obtained in Step 8. This is the total buffer space required. 4044

15) Add:

Number of lines	30 x 16	480
Number of TTY terminals	20 x 17	340
Number of Mode 4 Terminals	12 x 33	396
TOTAL		1216

Subtract this number from 3600 2384

16) Add to the subtotal obtained at the end of Step 5 to the greater of the numbers obtained in Steps 14 and 15.

This is the total memory requirement. 39,440

CDC CYBER 70/6000

6671/6676 EMULATOR - 2550-100 EMULATION MODULE

Introduction

The 2550-100 Emulation module is a controlware program that resides in a CDC 2550-2 Host Communication Processor. In conjunction with the Host Communications Processor, it performs the multiplexing function between the host computer and remote communications terminals. As such, it emulates the 6671 and/or 6676 Data Set Controllers that previously performed this function and causes the Host Communications Processor to appear to both the host computer operating system and to the communications lines as though it were a data set controller. The 2550-100 fully emulates from one to four 6671's, or a combination of these types of data set controllers. The 2550-100 controlware module is limited: (1) to sequentially emulating a maximum of four data set controllers; and (2) to terminating a maximum of 128 circuits (the capacity of a 2550-2 Host Communications Processor).

This product is primarily intended for new Network Operating System users. It will allow N.O.S. customers to begin using the 255X series communications products very early in the NOS product life thus avoiding the requirement that 6671 and 6676 Data Set Controllers be used on an interim basis until the advanced data communications software (NAM, RBF, etc.) under NOS is available to operate with the 255X equipment. As a fallout, this product may also find application in some new and current KRONOS and SCOPE/INTERCOM installations.

This software is not compatible with the CCP Release 1 software and it will not drive local peripherals. In the situation where the CYBER 170/CYBER 70/6000 customer is using a non-standard operating system, the interface with and proper operation of the 2550-100 cannot be guaranteed. In such situations, review of the specific Data Set Controller driver within the operating system will provide the user with an indication as to possible usability of the Emulation Module controlware. If the driver(s) is (are) identical to those within standard NOS 1., KRONOS 2.1, or INTERCOM 4.2 under SCOPE 3.4, it is probable that the 2550-100 will interface without difficulty. However, in no case will CDC guarantee operation of the 2550-100 with any non-standard operating system.

Availability

The 2550-100 will be available for delivery beginning in July, 1975. Applicable documentation will accompany the product.

CAUTION: While the 2550-100 will be available in June, 1975, all other required products availabilieies must be determined prior to customer commitment. See COS for information regarding product availabilities.

Media and Supporting Documentation

The 2550-100 6671/6676 Emulation Module controlware is delivered to the customer on a magnetic tape cassette. Accompanying documentation will include a Reference Manual and User's Guide covering the subject module.

Installation and Maintanence

The user will load the 2550-100 module by use of its loader routine and the magnetic tape cassette driver. During the initial loading process the user will enter all communications line and emulated Data Set Controller(s) parameters using the Configurator program and Communications Console. The parameterized system is then written to the tape cassette in order to facilitate the program reload process.

User changes to previously defined table parameters will be accomplished using the Configurator program (off-line) which will initially list the table entries on the Communication Console, as read from the cassette; allow table modification via the Console keyboard; and rewrite the modified table parameters back to the magnetic tape cassette.

CDC CYBER 70/6000

6671/6676 EMULATOR - 2550-100 EMULATION MODULE (Cont'd)

Configuration

Configuration rules when using the 2550-100 Emulation Module controlware are straightforward and are found below:

1. Base Product Requirements

   1 ea 2550-2 Host Communication Processor

   1 ea 2550-100 6671/6676 Emulation Module

   1 ea Communication Console - This requirement may be fulfilled by any of the following:

   1 ea 1711-4, -5, 17-13-4, -5, Teletypewriter or,

   1 ea 713-10 Conversational Display Terminal with 711-100 memory Expansion and, optionally, 713-120 non-Impact Printer or,

   Customer supplied equivalent product with RS232C interface connector.

2. Dual PPU Interface

   If the 2550-2 and 2550-100 are required to interface to a second PPU on the host computer the 2558-1 Communication Channel Coupler must be added to the configuration.

3. Circuit Interfaces

   A. 2560-1 Synchronous Communications Line Adapter

   Determine the total number of synchronous (voice grade 2000, 2400, 4800, and 9600 bps) circuits (local and remote) to be interfaced. Divide the total by 2, and round up, if necessary. The result will define the quantity of 2560-1 Synchronous Communication Line Adapters required.

   B. 2561-1 Asynchronous Communications Line Adapter

   Determine the total number of asynchronous (110 to 600 bps) circuits (local and remote) to be interfaced. Divide the total by 2, and round up, if necessary. The result will define the quantity of 2561-1 Asynchronous Communications Line Adapters required.

   NOTE: Each terminated synchronous and asynchronous circuit required a Communications Line Adapter interface cable available from Control Data.

4. Communications Line Expansion Modules

   To determine if Communication Line Expansion modules (2556-X) are required, and if so, how many, use the following.

   A. Sum the total circuits to be connected as determined in 3.A and 3.B above.

   B. Refer to the following table:

If sum is greater than	but less than	these units are required
1	33	no 2556 units required
32	65	2556-2 is required
64	97	2556-2 and 2556-3 are required
96	129	2556-2, 2556-3, and 2556-4 are required
128		Maximum line termination capacity of a single 2550-2 has been exceeded.