INTERCOMM

BTAM TERMINAL SUPPORT GUIDE

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BTAM Terminal Support Guide

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PREFACE

Intercomm is a state-of-the-art teleprocessing monitor system of SDA, executing on the IBM System 360/370 family of computers and operating under the control of IBM Operating Systems (MFT, MVT, VS1, MVS). Intercomm monitors the transmission of messages to and from terminals, concurrent message processing, centralized access to I/O files, and the routine utility operations of editing input messages and formatting output messages, as required.

This manual describes the terminal-dependent considerations and specifications required for teleprocessing devices supported by the Intercomm BTAM Front End, using the BTAM or GRAPHICS access methods.

For an installation using Intercomm's Generalized Front End (GFE) interface in the Intercomm BTAM Front End, the capability of supporting nonstandard Front End configurations (nonsupported programmable terminals, nonsupported hardware and Front End devices, TSO devices, etc.) is provided via user-written routines. Facilities and installation procedures for GFE are detailed in Generalized Front End Facility.

For a TCAM installation, a message control program (MCP) must be written by the user to interface with Intercomm. Extended TCAM Support allows the Intercomm BTAM Front End to access TCAM queues via GFE. Facilities and installation procedures for Extended TCAM Support and Basic TCAM Support are described in the TCAM Support Users Guide.

For an installation using VTAM/SNA, Intercomm is defined as a VTAM application program that controls the execution of application subsystems which process transactions originating from SNA terminals. Facilities and installation procedures for VTAM/SNA are described in the SNA Terminal Support Guide.

The reader is assumed to have familiarity with Intercomm. In particular, the following manuals are to be referenced in conjunction with this publication:

- Basic System Macros
- Installation Guide
- Operating Reference Manual
- System Control Commands

Back End terminal-dependent specifications are required for the Edit, Output and Message Mapping Utilities. Applicable information is found in the Utilities Users Guide and Message Mapping Utilities.

The IBM OS/VS BTAM SRL manual (GC27-6980) is required for detailed descriptions of the following:

- DCB parameters: CODE, MODE, LERB, etc., when referenced under coding of the Intercomm LINEGRP macro
- ASMTRTAB macro parameters for specifying transmission code translate tables (to/from EBCDIC), when not supplied by Intercomm or the terminal vendor
- DFTRMLST specifications for switched line devices, polling lists, etc.

For all devices, study of vendor documentation (component descriptions) is recommended; specifically, operational and coding considerations (idles, control characters, polling, etc.) should be examined.

The IBM OS/VS BTAM Logic manual (SY27-7246) is necessary to evaluate software compatibility of remote CPUs.

A Users Review Form is included at the back of this manual. We welcome recommendation, suggestions and reactions to this or any Intercomm publication.

INTERCOMM PUBLICATIONS

GENERAL INFORMATION MANUALS

Concepts and Facilities

Planning Guide

APPLICATION PROGRAMMERS MANUALS

Assembler Language Programmers Guide

COBOL Programmers Guide

PL/1 Programmers Guide

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BTAM Terminal Support Guide

Installation Guide

Messages and Codes

Operating Reference Manual

System Control Commands

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Autogen Facility

ASMF Users Guide

DBMS Users Guide

Data Entry Installation Guide

Data Entry Terminal Operators Guide

Dynamic Data Queuing Facility

Dynamic File Allocation

Extended Security System

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BTAM TERMINAL SUPPORT SPECIFICATIONS

The Intercomm Front End processes the line control functions, monitors and communicates with all network terminals, receives and sends messages, provides automatic queuing functions, checks validity, performs security checking and accomplishes appropriate code translation.

Intercomm operates in conjunction with one or more Front End teleprocessing interfaces to process the line control functions for the system. A mixed configuration of VTAM, TCAM and BTAM (or Graphics) terminals may be used.

Specifications of the teleprocessing interfaces in use are made via the TPMOD parameter of the SPALIST macro. For the BTAM Front End, the global &BTAM must be SETB to 1 in the Back End table SETGLOBE. For VTAM or TCAM, additional global specifications are defined in the applicable manuals.

For an installation using the Intercomm BTAM (or Graphics) teleprocessing interface, the line and terminal control programs of Intercomm are conditionally assembled and specified via tables.

1.1 TERMINAL NETWORK CONFIGURATIONS

Once the configuration of terminals in the network is selected, the user must:

1. Define a set of global specifications for the BTAM Front End, indicating the hardware operating environment, and then assemble and linkedit all associated Intercomm modules. This step is performed at installation time and need only be repeated if new terminals with different hardware characteristics are installed or the global specifications are changed. Once assembled, the BTAM Front End contains program logic for an installation's particular network of terminal types.

2. Code, assemble and linkedit the Front End Network Table via Intercomm macros, specifying the network configuration and the hardware operating characteristics during execution; that is, terminal identifiers, polling sequences, time-control values, etc. This step is performed at installation time and need not be repeated, unless changes are required in the network configuration, or new terminals are added.

3. Code, assemble, and linkedit the Back End tables: the Device Table (PMIDEVTB), the Station Table (PMISTATB), and the Broadcast Table (PMIBROAD), as appropriate.

4. Linkedit Intercomm. (Assembly of the ICOMLINK macro provides a linkedit structure.)

5. Define the network lines in the Intercomm execution JCL, as described in the Operating Reference Manual.

Support for each terminal is defined individually in this manual by device group or type. Within the descriptions, comments and specific implementation considerations are accompanied by figures delineating global and table coding specifications for individual device types, listing both Front End and Back End macros. Sample coding for Intercomm-supported terminals is available in the member BTSAMP on INT.SYMREL.

1.2 THE FRONT END MODULES

The BTAM Front End is conditionally assembled to include program logic only for specific line control procedures and error recovery processing, according to the terminal types defined in a particular network configuration. Conditional assembly is controlled by two members on the Intercomm libraries, ENVIRON and SETENV. For most terminals, the line handlers are BLHIN and BLHOT (for leased lines) or BDIAL (for dial-up lines). Exceptions to this are given explicitly.

The member ENVIRON is a nonexecutable module that consists of a set of system globals for all possible combinations of network configurations (terminal types and features) supported by Intercomm. ENVIRON is contained on the Intercomm source module library (standard naming convention INT.SYMREL). The ENVIRON member is shown in Appendix A.

The member SETENV is a user-modified member containing SETA, SETB, and SETC Assembler specifications for the various globals contained in ENVIRON. SETENV is coded to generate the Front End program logic and the Intercomm linkedit using the ICOMLINK macro. SETENV statements are set by the user to customize the Front End to the installation's particular configuration.

This member is released (on INT.SYMREL) as shown in Appendix B. A full description of the generalized feature specifications and required settings for SETENV is provided in Appendix C. After installation, this member must be customized to the user's installation as described below.

When the user's network requirements have been determined, the member SETENV must be defined. This is accomplished through the following sequence:

1. Review ENVIRON. Determine values for required globals and general system features for the installation.

2. Set the values for the required globals in the member SETENV (defaults illustrated in Appendix B may be used). To include support for a terminal or feature, use the SETA, SETB or SETC statement, as appropriate.

   To suppress support for a terminal or feature, omit the global from SETENV or set it to 0. SETENV options should be kept at a minimum, since specifying unnecessary SETENV options creates a larger Intercomm BTAM Front End.

3. Once the settings are determined, update SETENV via IEBUPDTE, using the CHANGE statement, or create SETENV using the REPL statement. Typical JCL is illustrated below:

```
//          EXEC  LIBE,P=INT,Q=LIB
//LIB.SYSIN  DD    *
./    CHANGE NAME=SETENV
             .
             .
             added/changed global settings
             .
             .
/*
```

4. After updating the member SETENV reassemble the Front End modules, as described in the Installation Guide. Lists of Front End module groups to reassemble are shown in Appendix D.

5. Certain support modules are shared between the BTAM and VTAM Front Ends and are released with the capability to support both. If VTAM support is not required, then the member SETGLOBE should be modified to set &VTAM to 0.

   The shared support modules, as listed in Appendix E, should then be reassembled.

Assembly of the member BLHIN also generates the BTAM System Parameter List (ENTRY BTSPA), containing entry points to BTAM Front End tables, and constants defining the control terminal, separator character, statistics areas, etc.

If any IBM APARs are applied to BTAM macros, the required Front End modules, plus all optional Front End modules, and special terminal-related modules included in the Intercomm linkedit, must be reassembled.

IBM BTAM processing modules (IGG019MA, etc.) are not truly Link Pack eligible. Each BTAM region should therefore contain its own version of these modules.

1.3 THE NETWORK DEFINITION TABLES

The Front End network definition specifications are contained in one member, a user-named Network Table. The Front End Network Table consists of one main Network Configuration Section and three subsidiary sections, the Device Table Section, the Polling List Table Section, and the Translate Table Section. These four Sections are discussed separately in the subsections below. Figure 1 illustrates the coding of the Network Table.

In cases where the network is small, the Network Table may be combined with the Front End Verb Table in the CSECT BTVRBTB.

In this case, the BTVERB macros must precede the Network Table definitions and be delimited by a PMISTOP macro. Also, the CSECT name must be BTVRBTB.

Intercomm's BTAM Front End Network Table may be dynamically validated using the BTVERIFY module to check the interrelationship of lines and terminals, and to insure that the Front End modules have been assembled to support terminals and options therein indicated.

BTVERIFY is called once during startup by the Front End module BTAMLINE, and may, therefore, be placed in the startup overlay. Once the Front End is operational, BTVERIFY can be removed from the Intercomm linkedit. (It should be included in the linkedit again whenever the Network Table is changed.) If possible, errors are dynamically corrected. BTVERIFY writes messages indicating all detected or possible errors. If the error prevents Intercomm from operating, an Abend 599 is issued, canceling Intercomm execution.

In addition, BTVERIFY tests whether the Front End modules BMH000, BLHIN, TPUMSG and BTAMLINE have been assembled with the proper SETENV options. BTVERIFY tests for IBM2741, UNIVAC, BUFFERS, BACKSPC, BISYNC, GRAPH, DIALUP, CONVER and IDLES, as appropriate. If an error in Front End assembly is detected, an error message is written to the CPU console, and an abend is issued.

```
FESAMPTB CSECT
L274     LINEGRP DDNAME=LIN2740,NUMLN=1,UNIT=2740,BUFNO=2,BUFL=100
L226     LINEGRP DDNAME=LIN2260,NUMLN=1,UNIT=2260,BUFNO=4,BUFL=300
*
         BLINE   LGNAME=L274,UNIT=IBM2740,TRSTBL=T2740
         BTERM   TERM=NYC01,CONV=YES,DEVIND=0,QNUM=1,HARDCPY=YES,     @
               TPUP=YES
         BLINE   LGNAME=L226,UNIT=IBM2260,NUMAC=2,POLLIST=POLL2260,   @
               TRSTBL=TRS2260
         BTERM   TERM=CRT01,DEVIND=1,QNUM=2,POLL=2050,CRT=YES,TPUP=YES
         BLINE   UNIT=CNT1050
         BTERM   TERM=CNT01,DEVIND=2,QNUM=3,CONTROL=YES,TPUP=YES
         PMISTOP
*
         BDEVICE TERMTYP=IBM27401,OP1=82,IDLES=10,BACKSP=YES
         BDEVICE TERMTYP=IBM2260,OP1=0E,EXTCHR=2
         BDEVICE TERMTYP=CNT1050
*
POLL2260 POLLIST OPENLST,L226L1,EXTNAM=(CRT01),CTCHAR=(2050)
*
T2740    EQU   *
         ASMTRTAB RF40,SD40
TRS2260  EQU   *
         ASMTRTAB RSCI,SSCI
FESAMPTB CSECT
         ENTRY BTVTBEND
BTVTBEND EQU   *                REQUIRED NETWORK TABLES DELIMITER
         END
```

Figure 1. Sample BTAM Network Table

1.3.1 Network Configuration Section

The Network Configuration Section specifies the exact network associating line groups with lines and the terminals accessible on those lines, defining terminal identifiers (five-character names), and the requirements for generating BTAM control blocks. It is coded using the LINEGRP, BLINE and BTERM macros. A PMISTOP macro must be coded following the last BTERM to signify the end of the terminal table. If the first BLINE does not immediately follow the last LINEGRP, a PMISTOP must also be coded immediately after the last LINEGRP.

The LINEGRP macro defines BTAM DCBs and associated pointers to specific BLINE line groupings. One LINEGRP macro is coded for each line group consisting of one or more lines using the identical line protocol and transmission code (if binary synchronous). The first LINEGRP macro generates the entry BTAMDCBS.

Among the DCB parameters defined by the LINEGRP are BUFL, BUFNO and BUFTK, which specify the line buffer pools. If buffer pools are defined, dynamic buffering is assumed. However, for operating systems under which dynamic buffering cannot be used (such as MVS, VM370), Intercomm controls the buffer pools itself. In this case, a buffer length must be specified large enough for the longest possible message (for start/stop lines) or maximum segment length (for bisync lines).

The BLINE macro generates a BTAM DECB, plus an extension for Intercomm control areas. One of the parameters coded in the BLINE macro identifies the line group to which the line belongs. The code generated establishes the necessary addressability to the appropriate line group DCB. One BLINE macro is coded for each transmission line. All BLINEs referencing the same LINEGRP must be coded as a group. For switched lines, a maximum of 99 lines may constitute a line group. The first BLINE macro generates the entry DECBS.

A label for the BLINE is automatically generated, consisting of the LGNAME parameter, followed by L, followed by the occurrence number of the BLINE, relative to one. This label is referenced by the POLLIST macro.

The BTERM macro generates an Intercomm control area containing terminal-dependent specifications, such as identifier, device table index, queue index, alternate terminal, etc. One BTERM macro is coded for each terminal. An index to the BTERMs is also generated to perform an efficient binary search by terminal name when required. For leased lines, all BTERMs associated with a specific line must be coded together immediately after the BLINE definition. For switched lines, a maximum of 255 BTERMs may constitute the terminal pool to be associated with a group of lines referencing the same LINEGRP (DCB).

The Network Configuration Section macros must be coded in a specific sequence. Figure 2 illustrates the required sequences of macros. The sequence of the BLINE and BTERM macros is closely related to execution JCL defining actual unit addresses for each line (local terminal).

If more than 1000 BTERM (or BTERM and LUNIT/LCOMP) macros are defined, the global values (released as 1000) in FEMACGBL must be reset to the maximum number of defined devices. This will allow sorting of the greater number of devices for the terminal indices (FEINDX and STATINDX). Additionally, use of Assembler H and/or a larger region size may be required for the assembly step.

```
LINEGRP
LINEGRP
  .
  .      all LINEGRP macros
  .
LINEGRP
PMISTOP  (optional line group definitions delimiter)

BLINE
BTERM    a point-to-point leased line

BLINE
BTERM
BTERM    a multipoint leased line; one line with up to 255
BTERM    terminals accessed via that line.
  .
  .
  .
BTERM



BLINE
BLINE
BLINE    {a group of dial-up lines, which reference one DCB (LINEGRP)
BTERM    {and are associated with a pool of terminals which are
BTERM    {accessed via those lines; the maximum definitions for one
BTERM    {switched line group consists of up to 99 lines, accessed
  .      {by a pool up to 255 terminals.
  .
  .
BTERM

PMISTOP         End of Terminal Table (required)
```

Figure 2. Macro Sequence in BTAM Network Configuration Table

1.3.2 Device Table Section

The Device Table is a required table generated by a series of BDEVICE macros, specifying terminal hardware characteristics, and is referenced by BTERM macros. One BDEVICE macro must be coded for each type of device in the system, but may be referenced by more than one BTERM. The first BDEVICE macro generates the entry DEVTABL. A maximum of 255 BDEVICE macros may be coded.

1.3.3 Polling List Table Section

The Polling List Table is optional, and consists of an entry for each polled (multipoint/multidrop) line in the system. One POLLIST macro to define a terminal list must be coded for each polled line (an IBM DFTRMLST macro is generated). A polling sequence may be repeated up to eight times for a particular terminal on a specific line. The maximum number of entries in a polling list is 31 for nonauto-poll lines. Each BLINE macro specifying a polled line references a specific (unique) POLLIST macro.

1.3.4 Translate Table Section

The Translate Table is an optional table which provides transmission code conversion to/from EBCDIC, as generated by the BTAM ASMTRTAB macro, or an Intercomm- or vendor-supplied module/macro, defining constants to copy into the table. BLINE macros for terminal types requiring message translation reference the particular translate table entry required. (Certain manufacturers supply their own translate tables or macros. The tables must be coded as input first and then output. If no output table is defined, a PMISTOP must be coded to indicate the omission.)

1.3.5 Terminal Compatibility Considerations

Teleprocessing devices from other vendors which are claimed to be hardware-compatible with devices supported by the Intercomm BTAM Front End must be defined to Intercomm as the supported device. Hardware- or plug-to-plug-compatibility implies that the device uses the same line protocol as the supported device. Line protocol involves not only the same transmission procedures (channel programs), but also end-to-end and data link control characters. To determine compatibility, compare vendor documentation on transmission procedures with the IBM OS/VS BTAM (and BTAM PLM) descriptions of Start/Stop (Asynchronous) or Bisync support (as applicable) for the similar device. Then study the Intercomm support section for that device for descriptions of processing features and macro parameter definitions.

Nonstandard device processing may be defined via various macro parameters. These include definition of poll and addressing (selection) values (BTERM macro) and polling lists (POLLIST macro) for leased lines, and terminal lists (IBM DFTRMLST macro) for switched lines. (See specific device specification tables.) Data link (message framing) control characters for output messages which are not inserted automatically by the applicable channel programs may be defined via the BDEVICE macro, STCHAR (and CTCHAR), ENDCHAR and LAST parameters. The BDEVICE macro, EXTCHR parameter defines the number of input message starting characters to delete before the message is queued for processing (scanned for a verb). Other facilities, such as idles and

backspace processing for unbuffered devices, locked verb processing, CRT and conversational message flow processing, may also be used to handle nonstandard device processing. However, imbedded message formatting characters such as ESC sequences for field definition or output device control should be processed within the user's subsystem. Message Mapping may also be used to process messages if device characteristics are defined via MMU macros (see Message Mapping Utilities).

The Translate Table used for a compatible device which does not transmit in EBCDIC is of particular importance. The table may be vendor-supplied, Intercomm-supplied, or may be generated by using the IBM ASMTRTAB macro (see OS/VS BTAM). For compatible devices using a Binary Synchronous line protocol, the CODE parameter for the Intercomm LINEGRP (DCB) macro must also be coded, as described for the IBM DCB macro in OS/VS BTAM.

For devices having internal switches to set the transmission code to be used, the switch settings must match the code used in the Translate Table. For example, even-parity ASCII is standard for Teletype-compatible (start/stop) devices. For devices transmitting in EBCDIC, Intercomm provides an input Translate Table (called TRAN3270) to convert lower case to uppercase. (See IBM 3270 terminal description.)

For all devices, all input message ending characters except EOB and EOT (CR, X-OFF, DC3, etc.) must translate to EOB/ETB (X'26'). For the applicable device, such input message ending characters must also be recognizable by the transmission control unit.

1.3.6 The Control Terminal

Intercomm requires that one terminal in the system be designated as the control terminal for administrative and security functions. Intercomm allows administrative messages to be routed to that terminal and system- or user-designated transactions to be entered only from that terminal. For example, the system closedown commands, NRCD and IMCD, may be entered only from the control terminal.

Intercomm will not operate in Live Mode without an operational control terminal. The control terminal may be any BTAM leased line terminal or a component of a VTAM logical unit if SNA is also being used. The CPU console may be used as a control terminal and may be defined to either the BTAM Front End or the VTAM Front End but not both. An alternate device may be specified, should the primary control terminal become nonoperational; however, the alternate must be of the same type as the original. That is, if the primary control terminal is a BTAM terminal, then the alternate must also be BTAM, and likewise, if the primary control terminal is a VTAM logical unit component, then so must the alternate. For further discussions on defining the control terminal to Intercomm as a VTAM logical unit component see SNA Terminal Support Guide.

Defining the control terminal to Intercomm as a BTAM terminal requires the following procedures:

1. To identify the control terminal to all Front End and Back End programs, the terminal identifier must be coded identically in the following specifications:

   - BTERM TERM=control-terminal-id
   - SETENV &CNTL SETC 'control-terminal-id'
   - SPALIST CCNID=control-terminal-id

   The Intercomm standard default control terminal-ID is CNT01.

2. Additional BTERM specifications identify the control terminal:

   - CONTROL=YES
   - ALT=alternate-terminal-id (optional)
   - QNUM must be unique; a dedicated queue is required

3. To restrict a verb to the control terminal only, code SECUR=YES on the BTVERB macro for that verb in the Front End Verb Table.

1.3.7 Adding a New Terminal

The following steps must be performed to add a terminal to an existing network:

1. If the added terminal is a new device type, review the terminal specifications in this manual and add applicable global setting statements for that terminal type in SETENV. Then, reassemble and linkedit the appropriate modules. This adds all necessary code to support the new device type. If no additions or changes are made to SETENV, this step may be bypassed.

2. For each added terminal, the following macros may have to be added or updated in the network definition tables:

   - BDEVICE
   - ASMTRTAB (or COPY translate-table-module)

- LINEGRP: If the terminal is a new device type, or the number of DCBs (line groups) of an existing device type is to be increased, code a LINEGRP macro. If a line is added to an existing line group, the LINEGRP macro NUMLN parameter must be changed to specify the new occurrence of lines associated with the group (DCB).

- BLINE: If the terminal is a new device type, or is defined for a new line of an old device type, a BLINE macro must be coded. If a line is added to an existing line group, it must be the last BLINE for the group.

- BTERM: A BTERM macro must be coded for all new terminals. If a terminal is added to an existing line, the BTERM should be the last in the associated BLINE group.

- POLLIST: If the new terminal is to be polled, and it is on a new line, a POLLIST macro must be coded. If the new terminal is to be polled, and it is on an existing line, add the terminal-ID to the EXTNAM parameter, and its polling address to the CTCHAR parameter of the existing POLLIST macro for the line (unless General Poll is used).

After the macros have been added or updated, the network definition tables must be reassembled and linkedited.

3. Code, assemble and linkedit the Back End Station (PMISTATB), Device (PMIDEVTB) and Broadcast (PMIBROAD) tables to reflect the new terminal.

4. Update the Intercomm linkedit and execution JCL, as required.

1.4 TERMINAL QUEUES

Terminal queues are used to hold messages waiting for transmission to a terminal due to a "line busy," "terminal busy," or "terminal nonoperational" condition. Terminal queues (often called Front End queues) may contain messages queued for a specific terminal, a specific line, a specific line group, or any user-defined association.

1.4.1 Shared Queues and Dedicated Queues

A Front End terminal queue is defined via the QNUM parameter of the BTERM macro, which associates the terminal with a particular queue. A maximum of 32767 queues may be defined. A queue may be shared or dedicated. A shared queue is used for more than one terminal; that is, more than one BTERM macro may have the same QNUM

value. A dedicated queue is associated with a single terminal; that is, a unique value is coded for the BTERM macro QNUM parameter. Dial-up and leased point-to-point terminals, the control terminal, and the CPU console require dedicated queues. Dedicated queues eliminate intercept queue processing. Terminals defined as CRT=YES may not share a queue with terminals defined as CRT=NO or HARDCPY=YES.

Terminals should be associated with dedicated queues, minimizing processing time and allowing use of the QHLD, QRLS and FLSH system control commands.

A dedicated queue may be:

- Held, to allow the terminal to perform input, via the QHLD system control command.
- Released, to allow held output to be once again transmitted, via the QRLS system control command.
- Flushed, to remove one or all messages from the queue, via the FLSH system control command.

When a queue is held, output remains in the queue until it is released. When a queue is flushed, output messages are lost and may have to be recreated.

It is important to note that, if a terminal is put down and assigned an alternate, then current and future messages queued for the terminal after it has been put down will be put on the alternate terminal's queue for transmission to the alternate terminal. Issuing any of the above commands on the alternate terminal's queue will also affect messages for the down terminal.

1.4.2 Defining Terminal Queues

The terminal queues are defined in the BTAMSCTS CSECT. This member defines all terminal queues, including the Front End intercept queues for messages to nonoperational terminals using shared queues. The BTAMSCTS CSECT consists of a series of SYCTTBL macros that define message queues (core and/or disk). For this special use of the SYCTTBL macro, the required parameters to be coded are:

- TYPE=BTAM specifies Front End queue
- BLRI=F FIFO queuing required
- NUMCL=n number of messages to be queued in core
- DFLN=disk-queue-ddname-for-overflow
- PCEN=n percentage of disk queue to be allocated

and the optional parameter:

- PRYMSGS={n} number of priority messages to be queued in core
  {0}

A PMISTOP macro must define the end of the table. Disk queues should be shared among two or more terminals. A PCENSCT macro should be coded following the PMISTOP macro to check overflow disk queue percentage allocations. Figure 3 illustrates a typical BTAMSCTS CSECT and the associated required queue definition SYCTTBL label conventions. The required label BTAMOUTQ must be associated with the first terminal queue and is referenced by the BTERM macro with QNUM=1.

The terminal queues are accessed via the Intercomm queue management routines. The two intercept queues must be defined even if all terminals have dedicated queues. A maximum of 50 different disk queues may be defined. All disk queues must be formatted prior to use. This may be done using the off-line utility CREATEGF, discussed in the Operating Reference Manual.

```
BTAMSCTS  CSECT
          ENTRY  BTAMOUTQ
          ENTRY  INTQB,INTQA
*                   INTERCEPT QUEUES
INTQA     SYCTTBL TYPE=BTAM,BLRI=F,DFLN=BTAMQ,NUMCL=2,PCEN=20
INTQB     SYCTTBL TYPE=BTAM,BLRI=F,DFLN=BTAMQ,NUMCL=2,PCEN=10
*                   FRONT END QUEUES
OUT1      SYCTTBL TYPE=BTAM,BLRI=F,DFLN=BTAMQ,NUMCL=2,PCEN=10
BTAMOUTQ  EQU    OUT1
*
OUT2      SYCTTBL TYPE=BTAM,BLRI=F,DFLN=BTAMQ,NUMCL=2,PCEN=10
OUT3      SYCTTBL TYPE=BTAM,BLRI=F,DFLN=BTAMQ,NUMCL=2,PCEN=10
OUT4      SYCTTBL TYPE=BTAM,BLRI=F,DFLN=BTAMQ,NUMCL=2,PCEN=10
          PMISTOP
*                   END OF OUTPUT QUEUES
          PCENSCT
          END
```

Figure 3. Sample BTAMSCTS

1.5 TERMINAL FACILITIES

Intercomm provides many terminal control facilities through the use of system control commands. System control commands are available to display or change the status of the BTAM terminal network. System control commands, including entry formats and implementation procedures are documented in System Control Commands.

Other terminal control facilities are described in the following subsections.

1.5.1 Polling

A facility is available to dynamically start and stop terminal input for all BTAM leased lines. The system control commands STPL (start polling) and SPPL (stop polling) are used to control terminal input. The commands STLG and SPLG are used for starting and stopping line groups. The commands STLN and SPLN are used for starting and stopping specific lines within the line groups, while the commands TPUP and TDWN are used to control specific terminals on a line.

Leased line terminals may be defined by the vendor as point-to-point (no polling) or multipoint (multidrop), which requires hardware recognition of polling and addressing (selection) characters. Terminals for which Intercomm supports polling are indicated by the presence of the BLINE macro, POLLIST parameter, and BTERM macro, POLL parameter in the associated terminal specification tables in this manual. The user is responsible for determining the actual characters to be defined (hardwired in the device).

1.5.2 Backspace Correction Facility

Data is transferred from some unbuffered terminals (such as Teletypes, the IBM 2740 Model 1 or the IBM 2741) to the CPU on a byte-by-byte basis. To allow terminal operators to correct typing errors without retyping and retransmitting erroneous messages, the BTAM Front End provides a software backspace-correction facility. This optional facility, which can be invoked on a device-type basis, allows either a terminal-generated backspace value (via the Backspace Key, vendor-defined for that device) or a user-defined graphic symbol to function as a logical backspace character.

When a typing error has been made, the terminal operator depresses the backspace key (or enters the user-defined backspace symbol) enough times to backspace (logically or actually) over the earliest mistyped character, and then retypes the message from that point. The remainder of the message must be completely retyped.

In the following example, an asterisk represents a terminal backspace key depressed or a user-defined backspace symbol:

```
SEND, THE*IS IS A SND**ENDBACK MSG
```

This message looks as follows after the Front End corrects it:

```
SEND, THIS IS A SENDBACK MSG
```

The backspace correction facility is implemented by:

1. Coding BACKSP=YES in the BDEVICE macro for that device type.

2. Setting the global in SETENV:

```
&BACKSPC  SETB 1
```

3. Modifying the input Translate Table for the device type so that the backspace character translates into a X'BB'. (This is the only character recognized by the Backspace Correction facility.) This can be done using an ORG statement as shown below:

```
ORG   input-translate-table-label+X'backspace-value'
DC    X'BB'
ORG
```

where 'backspace-value' represents the value generated by the terminal backspace key, or the user-defined backspace symbol, as it is received from the terminal before translation.

1.5.3 Idle Insertion Facility

Many unbuffered hard copy terminals, such as Teletypes or the IBM 2740, require that idle characters (X'17') be included in outgoing messages following NL, CR, LF and TAB control characters. These idle characters ensure that the terminal has time to perform the operation specified by the preceding control character before receiving the next data character.

An optional Front End facility is provided which reformats outgoing messages, on a device-type basis, and inserts the necessary idles. This facility is implemented by specifying:

1. IDLES=YES or IDLES=number on the associated terminal's BDEVICE macro. This parameter specifies the number of idles to be inserted following NL, LF, CR, CRLF, CRNL, or TAB control characters, or, if YES is coded, 15 will be inserted.

2. The global in SETENV requesting the idles feature.

```
&IDLES  SETB 1
```

Idles are inserted (before translation) only if none are already present. An application program may, therefore, place the correct number of idles for NL, CR, LF, and TAB in the original message to save the reformatting overhead. (See vendor documentation.) Other messages to the same device type that do not include idles are still reformatted.

1.5.4 Alternate Terminal Processing

The user has the option of specifying primary and alternate terminals. If the primary terminal becomes nonoperational, messages directed to that terminal are automatically placed on the alternate terminal's queue. If an alternate terminal is not designated, the messages are routed to the intercept queue (for shared queues only) or held on the down terminal's queue until the primary terminal is again operational.

An alternate terminal may be specified via the ALT parameter of the BTERM macro. The alternate must be of the same device type (as specified in the BDEVICE macro TERMTYP parameter). The TDWN system control command ATD subparameter can be used to dynamically override the BTERM macro ALT designation.

1.5.5 Automatic TPUP Facility

The Automatic TPUP Facility automatically reactivates a terminal that is put down due to I/O errors. If a terminal for which the Automatic TPUP Facility is specified goes down due to an I/O error, the terminal is brought back up after a user-specified time interval. The purpose of this feature is to allow a time period during which any transient terminal or line errors may quiesce, and reduce the amount of operator intervention required. The feature may be disabled dynamically at any time by issuing a TDWN command from another terminal.

To implement Automatic TPUP:

1. Code the time interval via the BDEVICE macro, UPINTV parameter, which specifies the number of minutes to wait before Intercomm issues an internal TPUP for the terminal.

2. Code AUTOUP=YES on the BTERM macro for each terminal to be automatically reactivated after unrecoverable I/O errors have occurred.

3. All BTERMs on the same line (control unit) should have the same UPINTV specified.

4. Automatic TPUP for switched line auto-answer terminals is meaningless as the calling terminal is disconnected after an I/O error.

1.5.6 Optional WRITE Commands

Certain devices may require the use of different write op codes at different times. For IBM 2260 locals, for instance, either a write-at-line-address or a write-erase can be used.

An outgoing message to the Front End may specify use of an alternate WRITE opcode via its message text. This allows elimination of the write-erase during parts of a conversation with a terminal, specification of line addressing, etc.

The BDEVICE macro defines the primary and alternate opcodes (DEVWROP1, DEVWROP2). The value of the first byte of outgoing message text determines which of the two op-codes is used. If the first byte is equal to the value specified in DEVOPIND, this byte is replaced with the value specified in DEVINDRP; DEVWROP2 is used as the opcode. If not, the byte is left unmodified and DEVWROP1 is used. (See BDEVICE macro, OP2, OP2IND and OP2RPL parameters.)

For IBM 3270 locals the correct WRITE op code is automatically produced depending on the write command in the first position of the output message text. This ensures compatibility with messages destined for remote 3270's and does not require the coding of the OP2, OP2IND or OP2RPL parameters on the BDEVICE macro.

1.5.7 Conversational Mode Terminals

A user may optionally define terminals and verbs as conversational. If a conversational verb arrives from a conversational terminal, the terminal is quiesced (removed from the polling list), and further input is ignored until a message has been written back to the terminal. This prevents a terminal from having more than one input message begin processing at one time. A time-out message is issued to the terminal if the subsystem to which the verb was directed does not respond within a specified time. The time limit for each verb is defined in the Front End Verb Table, a nonzero time limit indicating a conversational verb. If a response does come back from the subsystem before the specified interval expires, the time-out is canceled.

This facility is implemented as follows:

1. Set the &CONVER global in SETENV (reassemble Front End)

```
&CONVER SETB 1
```

2. Code CONV=YES in the BTERM macro for all terminals for which this processing is desired.

3. Code the BTVERB macro, CONV parameter, with the time-out value for the conversational verb; the recommended value is a few seconds greater than the TCTV for the associated subsystem.

If conversational mode is used in conjunction with the CONVERSE facility, the time interval specified for the verb should be slightly larger than the time interval passed from the application program to CONVERSE.

Conversational mode processing controls input messages only. The response to a conversational verb from a conversational terminal may be in the form of multiple output messages.

1.5.8 CRT Processing

For interactive terminals which receive messages on a display screen rather than in hard copy form, output message transmission must be controlled to prevent a displayed message from being immediately written over by succeeding messages.

If CRT processing is specified, the RLSE command must be invoked (either by the operator or internally by a subsystem) to allow the message currently displayed to be replaced by a succeeding one, if any. Thus, one-in, one-out message processing is forced for that terminal.

This feature is implemented by coding CRT=YES on the BTERM macro for the terminal. The facility is not supported for any switched line terminals except those using the Teletype line protocol (TTY,DS40).

A subsystem may permit an output message to a CRT to be overwritten by a subsequent message without requiring any intervening response from the operator. This can be accomplished by queuing the RLSE command (as mentioned above), a FECMRLSE, or by using a FESEND option when queuing the original message.

The output message for which overwriting is permitted can be queued by a FESEND call from the application using a third parameter. The third parameter is an option word, and the first byte of this word is set to indicate whether a subsequent output message from the same subsystem thread is to be released, as follows:

Value	Specification
blank or X'00'	Do not release next output message (default)
C'R'	Release next output message.

The second, third and fourth bytes should be set to blanks or X'00'. For further details, see the applicable Intercomm Programmers Guide.

1.5.9 Front End Acknowledgement and Status Messages

Messages (with an FC prefix) are generated within the Front End to respond to Front End commands and to record changes in terminal status. These messages are sent to the terminal on which the command was entered, or the control terminal, as appropriate. If a command was generated from the Back End, a message may be sent to the control terminal.

1.5.10 Segmented Input Processing

Bisync devices transmit messages in segments of the size of the line buffer hardware in the device (that is, the control unit). For a remote 3270 CRT, for example, even though the terminal has an I/O buffer of 480 or 1920 characters, only 256 of those characters may be transmitted from the line buffer in response to one READ. In this case, such message segments are accumulated until an end-of-message or end-of-transmission indicator is received. For other bisync devices, this segment accumulation is optional, as it may be desirable to queue each segment as a separate message. Segment accumulation may be forced or prevented for a device type by a SETENV global or a BDEVICE parameter. If segment accumulation is specified, the SETENV global &MAXINLN specifies the maximum message length that can be generated before input is halted. (Refer also to the LINEGRP macro, BUFNO and BUFL parameters.)

When segments are not accumulated, segmented input queuing via the DDQ facility may be requested, as described in Dynamic Data Queuing Facility.

1.6 BTAM FRONT END USER EXITS

Several user exits are provided within the Intercomm BTAM Front End to allow installation-dependent processing. Exits are invoked with a CALLIF macro. Standard linkage conventions are used. The registers are set as indicated on entry. The routines must save and restore their caller's registers and must be quasi-reentrant if they give up control to the Dispatcher.

Any applicable Intercomm macro may be issued in the exit routine. All routines execute as subroutines of the associated line handler, except as indicated. Lengthy processing should be avoided in the line handler subroutines, as it delays line activity.

The system DSECTs for the BTERM and BLINE are PTRDSECT and PLNDSECT, respectively. They may be assembled into a user-written assembler language subroutine by COPY statements. Because the first part of the BLINE (PLNDSECT) expansion is a BTAM DECB, the USING statement for the BLINE must specify USING IECTDECB,r. A DSECT for the DECB is automatically generated within the copied PLNDSECT by use of the IBM macro IECTDECB. This macro may be used alone, if the entire PLNDSECT is not needed.

1.6.1 BLHIN User Exit--USRXIN

A USRXIN user exit routine is called by BLHIN after message assembly and before message header completion to allow modification to the message header or reallocation of the message in a new area. This is a point in the BLHIN program logic which is used by all BTAM line handlers. See SNA Terminal Support Guide for the equivalent user exit in a VTAM Front End environment. Although the verb may be changed, if the BTVERB options HDR3270, LOCKEXE, RLSE or AUTOLOK were coded for the original verb, they still apply to the input message. Only the MSGHUSR and MSGHLEN message header fields may be changed. However, if the HPRTY option (BTVERB macro) is coded for the original verb, MSGHUSR is subsequently set to C'P'.

The USRXIN exit routine is called by BLHIN with the following register parameters:

1. Register 4 contains address of input message
2. Register 10 = A(BTERM)
3. Register 11 = A(BLINE)

1.6.2 BTSEARCH User Exit--USRBTLOG

A USRBTLOG user exit is called by BTSEARCH after the verb is verified, and if the verb is invalid or is a fast message switch terminal-ID.

The USRBTLOG exit routine is commonly used to make an additional log entry (MSGHLOG=X'F1') by capturing all input messages as they are entered (after translation). The USRBTLOG exit routine may be used to inspect the message only; neither modification nor reallocation is allowed. (A sample USRBTLOG to log input messages is provided on SYMREL.)

Register 1 points to a parameter list which contains the address of the input message (message header, followed by message data). If the terminal is locked to a verb, that verb is already inserted into the beginning of the message data (followed by the system separator).

The address of the associated BTERM, and the address of the associated BLINE are in registers 10 and 11, respectively, at entry to the exit routine. Logging may thus be limited to one or several terminals only, or a specific line type only, based on terminal name or BLINE indicators.

The released USRBTLOG exit may also be called by the VTAM Front End (registers 10 and 11 point to the LCOMP and LUNIT areas, respectively, of the input device).

1.6.3 BLHIN/BLHOT User Exit--USRECRY

A USRECRY user exit routine is called by BLHIN or BLHOT prior to error recovery logic for I/O errors and for IBM 3270 error sense/status messages. It is called for each error retry attempt. The USRECRY exit routine may inspect the DECB (at the beginning of the BLINE) to determine the cause of the error and may force an immediate TDWN by setting the PTRWRERR field (a one-byte binary value) in the BTERM for the terminal in error to the maximum number of errors permitted plus one. (Refer to the BDEVICE macro MAXERR parameter.) PTRWRERR is the only field that may be modified by the exit routine. A sample USRECRY that snaps BLINE, BTERM, IOB and buffers is on INT.SYMREL.

Register 1 points to a parameter list containing A(BLINE) and A(BTERM).

1.6.4 BMH000 User Exit--INQEXIT

An INQEXIT user exit routine is called by BMH000 prior to queuing the input message for the Back End via MSGCOL. INQEXIT may be used to inspect, modify, reallocate or free the message. If the exit routine is coded to modify the message, only the MSGHTID, MSGHRSC, MSGHRSCH and MSGHUSR fields may be modified. If the message is freed by the exit routine, the parameter list should be set to zero.

Register 1 points to a parameter list containing the address of the input message.

To execute as a line handler subroutine, INQEXIT requires synchronous input queuing specified by coding SYNCIPQ=YES on the BDEVICE macro.

1.6.5 TPUMSG/BDIAL User Exit--USRTDWN

A USRTDWN user exit routine is called by TPUMSG during terminal TDWN processing. It is called after alternate terminal and poll list reorganization processing, but before resetting terminal indicators and error statistics recording. The exit is also called from BDIAL for start/stop switched terminals at disconnect time. The exit routine may be used to gather statistics on TDWN/disconnect processing for applicable terminals.

Register 1 points to a parameter list which contains the address of the associated BTERM, which may be examined, but not altered, by the exit routine.

1.6.6 TPUMSG User Exit--USRTPUP

A USRTPUP user exit routine is called by TPUMSG after terminal TPUP processing is completed. The routine is called for both internal and external TPUP processing and for all terminal types. The exit routine may be used to gather statistics on TPUP requests.

Register 1 points to a parameter list containing the address of the associated BTERM, which may be examined, but not altered by the exit routine.

Chapter 2

THE IBM 3270 DISPLAY SYSTEM

Both the remote (leased line only) and local IBM 3270 Video Display Systems are supported by the Intercomm BTAM Front End.

This chapter describes Intercomm-related requirements and the operation of Intercomm-supplied software for use with the IBM 3270 Display System.

2.1 SUPPORTED COMPONENTS

Components of the IBM 3270 Display System supported are:

- IBM 327x Control Units (leased and local)
- IBM 3275 Controller (leased line only)
- IBM 327x Display Stations
- IBM 328x Printer Series
- Selector Pen
- Operator Identification Badge Reader
- IBM 129 Card Reader/Punch Attachment (local and remote)
- IBM System/34 in 3270 Emulation Mode

The GTE IS7800 is compatible with IBM 3270 support.

2.2 TRANSLATION REQUIREMENTS

For EBCDIC, Intercommm provides a table to translate lowercase letters to capital letters (for input only). The table is required for 3270 terminals with typewriter keyboards. To use this table, COPY TRAN3270, preceded by an equate statement and followed by a PMISTOP macro, must be coded in the Translate Table Section of the Front End Network Table as follows:

```
symbol    EQU   *
          COPY  TRAN3270
          PMISTOP
```

where symbol is the label specified in the TRSTBL parameter of the BLINE macro.

If transmission is not in EBCDIC, the TRSTBL parameter must specify the label of an ASMTRTAB macro coded by the user. In this case, both input and output translate tables are required. The CODE parameter of the LINEGRP macro must also be coded.

2.3 ATTENTION IDENTIFICATION PROCESSING FACILITY

Each 3270 Program Attention key causes a unique hardware-generated Attention Identification (AID) character to be transmitted. If AID conversion is coded for the terminal, this character is analyzed and the corresponding user-defined data string is prefixed to the input data from the terminal (if any). Optionally the user-defined data string can replace the input data from the terminal.

An Attention Identification Table (ATTIDTBL) is created by coding AIDGRP macros, which define the AID values to be processed. The AIDGRP parameter of the BDEVICE macro references one of the AIDGRP macros in the ATTIDTBL. This AIDGRP macro, in turn, associates each AID character to be converted with an AIDDATA macro. An AIDDATA macro defines the actual data string to be inserted into the input message, or to replace the incoming text. An AID Data Table (AIDDATA) is created by coding the AIDDATA macros. Thus, the usage of Program Attention keys can be made variable among terminals, depending upon the BDEVICE macro referenced by a specific 3270 BTERM macro. If a BDEVICE references no AIDGRP macro, the search of the ATTIDTBL is bypassed. The AIDTRAN parameter of the BTVERB macro can also be used to force the bypass of AID processing for a particular verb.

The user may code the AIDGRP and AIDDATA tables as a separate member or include them in the Front End Network module. The format in either case is as shown below:

```
AIDGRP ...      First AIDGRP generates the CSECT ATTIDTBL
  .
  .
AIDGRP  ...     Last AIDGRP
PMISTOP ...     PMISTOP required after last AIDGRP
AIDDATA ...     First AIDDATA generates the CSECT AIDDATA
DC              Optional DC instructions immediately following each
  .             AIDDATA macro to build the data string
  .
DC
AIDDATA ...     Last numbered AIDDATA macro
AIDDATA END     This must be the last AIDDATA macro coded; PMISTOP
                automatically generated
END
```

2.4 MESSAGE FORMATTING AND EDITING

2.4.1 Input Message Formats

An input message from a 3270 CRT display terminal is passed to the application subsystem (or the Message Mapping or Edit Utilities) in one of two formats. This depends on whether or not the AID value or cursor address are of use to the application.

If the AID value and cursor address are not desired for a particular application, HDR3270=NO may be specified, or the HDR3270 parameter may be omitted from the associated BTVERB macro. The following is an example of the input format without the AID value and cursor address:

intercomm header verb$data.....@

where $ represents the system separator character, and @ represents an EOB character (end of message).

If either the AID value or cursor address (referred to as the 3270 header) is to be included with the message, HDR3270=YES must be coded in the associated BTVERB macro. The following is an example of an input message with the 3270 header:

intercomm header verb$AIDa/CURcc/data@

where:

- $ represents the system separator character.
- / represents a NL.
- @ represents an EOB character.
- a represents the AID value in hexadecimal.
- cc represents the cursor position bytes in 3270 notation. If the AID is for an input message that does not contain a cursor address (that is, no data has been read), a dummy cursor address of X'4040' ("home") is provided.

In both cases the format of "data" depends on whether or not the terminal is operating with formatted screen capabilities (that is, with SBA addresses transmitted).

2.4.2 Output Message Format

The 3270 output message format is to be constructed with a five-character sequence (c, wcc, sba address) immediately following the Intercomm Message Header, as follows:

ITEM:	Intercomm Message Header	c	wcc	sba	text@
SIZE IN BYTES:	42	1	1	3	variable

where:

- c represents the Write command (F1, F5, 7E).
- wcc represents the Write Control character.
- sba represents the Set Buffer Address command, followed by a two-character screen address.
- @ represents the EOB character (X'26').

This sequence may be provided in a message fully formatted by an application subsystem. In this case the MSGHVMI in the message header must be set to X'67' before the message is passed to FESEND. Messages prepared by the Message Mapping Utilities are fully formatted, and include this sequence. If the message is formatted by the Output Utility, the CTCHAR parameter value coded for the associated BDEVICE macro is inserted by the Front End, unless a report is used with the ITEM macro, COMM and WCC parameters specified.

2.4.3 Back End Requirements

The following modules are required for 3270 terminal-dependent use of the Edit and Output Utilities:

- EDIT3270
- OUT3270--required if Output Utility formatting is used, or a message with VMI=X'57' has New Line characters in the text to be transmitted to a CRT.
- PMIVMI56--required if the Output Utility is to process VMI=X'56' messages.

These modules are described in the Utilities Users Guide.

2.5 OPERATOR BADGE READER SUPPORT

Input from an IBM 3270 Badge Reader attachment may be processed by using the 3270 Attention Identification coding facility (see Section 2.6) for the associated 3270 display station. An AIDGRP macro may be coded specifying CARD as the AID value, and pointing to an AIDDATA string that specifies the verb for the subsystem which is to process the Badge Reader input. The verb must be followed by the system separator in the AIDDATA string. The verb (and separator) is prefixed to the Badge Reader data in the message. The processing subsystem must test whether the 3270 Header is present in the message.

2.6 COPY FACILITY

The Copy Facility is used to copy the contents of one 3270 buffer to another 3270 buffer. It is invoked by entering a COPY system control command from any terminal in the network, or from a subsystem. If the receiving buffer is a printer, alternate methods of performing the "new line" and "end copy" functions may be specified. If both the sending and receiving buffers are on the same control unit of a remote cluster, an additional facility of "selective data copy" is given. The Copy Facility should be used to copy only buffers of the same size, that is, the same Model number. Copy from a CRT to a CRT or printer which has a smaller buffer size (3440 to 1920, for example) is not supported.

For 3270-compatible terminal configurations (such as the Teletype Dataspeed 40/4), which cluster CRTs via several mini-cluster controllers attached to a master controller, the Copy Facility may not function due to hardware incompatibility.

2.6.1 Implementation and Operating Procedures

The COPY verb can be entered from a terminal, requested by a subsystem or invoked by 3270 Program Attention key AID processing. If it is to be requested from a terminal, the associated BDEVICE macro, COPYRSP parameter, must be coded to specify if an acknowledgement message is desired, and if so, whether the message is to be sent upon completion, or while the COPY is in progress. The default value, COPYRSP=COMPL, causes the message to be issued upon completion of the COPY. CTCHAR and ENDCHAR processing are not performed for a COPY operation.

The COPY verb must be defined via a BTVERB macro to allow processing of the COPY transaction by the COPYSS subsystem.

2.6.2 COPYSS User Exit (COPYEXIT)

A user exit routine may be called by COPYSS to allow the user to determine whether or not a copy request should be processed, and/or to change the sending or receiving terminal IDs in the message text. The exit must be named COPYEXIT. The COPYEXIT routine must be resident, or in the same overlay as COPYSS and must be reentrant and use standard linkage conventions. It is called by COPYSS with the address of a parameter list containing A(terminal-id) of the from-terminal and A(terminal-id) of the to-terminal in Register 1.

The exit routine must place a return code in register 15, upon return to COPYSS, as follows:

0--Perform Copy

nonzero--Do not Perform Copy

Error messages are the responsibility of the user.

2.6.3 Installation

The following is required to install the 3270 Copy Facility:

1. Add the COPY verb to the Verb Table and the COPYSS subsystem to the Subsystem Control Table, as described in System Control Commands.

2. Code the COPYRSP parameter in the BDEVICE macro for all terminals that may issue a COPY command.

3. Assemble and link BTVRBTB, Network Definition and INTSCT tables.

4. Assemble user exit routine (COPYEXIT), if coded.

5. Include all affected modules and the COPYSS subsystem in the linkedit of Intercomm.

2.7 Alternate Buffer Support

3270s with alternate buffers are supported through the use of the ERASE-WRITE-ALTERNATE command. It is, however, the responsibility of the user to be aware of which buffer is being written to.

The alternate buffer size is specified to the BTAM Front End, using the BDEVICE macro ALTBUF parameter. If this parameter is not specified, then output messages specifying erase/write alternate (X'7E') are rejected by the Front End.

The Output Utility and MMU also support the use of an alternate buffer: the alternate buffer specifications are given on a DVMODIFY extension to the STATION macro in the Station Table.

The DVMODIFY macro ALTBUF, BUFFRSZ and LINESZ parameters are used to specify the alternate buffer size and the alternate line size (if different from the standard line size). ALTBUF=YES must be coded on the DVMODIFY macro to indicate that the specifications are for an alternate buffer (not an override of the standard sizes). See Message Mapping Utilities and Utilities Users Guide for further details on formatting messages to be written to the alternate buffer.

2.8 Local and Remote 3270 Compatibility

3270 remotes have as the first output message text character a write command (as discussed in Section 2.4.2). This command is not used in output to local 3270s, as part of the data stream, but indicates the type of output operation to be placed in the DECTYPE field of the DECB. To ensure compatibility in Back End processing between locals and remotes, the Front End examines the command code in the data stream, and generates the correct I/O sequence for locals. Thus the OP2, OP2IND and OP2RPL parameters of the BDEVICE macro are not used; the OP1 parameter should be coded as X'02' (default).

2.9 FRONT END ASSEMBLY SPECIFICATIONS

For IBM 3270 support, after appropriate update of the member SETENV, the following Front End members must be conditionally assembled and linkedited:

BLHIN
BLHOT
BTSEARCH
BMH000
BTAMLINE
TPUMSG
BSTAT2
ERRSTMSG (remote devices only, LKED only)
ERRSTATS (if ERRSTAT=YES coded on any BLINE/BTERM)
BTVERIFY (if table verification desired)

2.10 REMOTE (LEASED LINE) TERMINALS

2.10.1 Polling

Intercomm supports both specific and general poll of remote 3270 clusters. Polling sequences for a line are defined in the POLLIST macro, which has two parameters whose functions depend on the type of poll in use, as follows:

Parameter	Definition	General Poll	Specific Poll
EXTNAM	Defines the TID to correspond the entry to its associated BTERM	TID of only one terminal from each control unit being polled	TID of each terminal being polled
CTCHAR	Defines the polling sequence for that terminal entry	Value coded indicates control unit only	Value coded must be identical to the POLL parameter of the corresponding BTERM

Thus, specific poll requires an EXTNAM entry in the POLLIST for each terminal to be polled, CRT or printer. General poll is more efficient and is recommended over specific poll as the EXTNAM can be any CRT on the cluster, with CTCHAR containing only general poll characters. Refer to POLLIST macro specifications in Figure 4.

For a 3275 configuration, since there is only one CRT and one printer attached to a control unit, both the BTERM POLL parameter and the POLLIST CTCHAR parameter contain general poll characters. The printer is not to be coded in the POLLIST. Figure 5 describes coding for the 3275.

Since a polling list can have up to 31 entries, a heavily used terminal or a terminal used only for short messages (without formatted screens) may be listed more than once to provide faster response time. This priority scheme lends itself particularly to using specific poll for all terminals on a 327x control unit. However, specific poll entries for some of the terminals may be intermixed with general poll entries for the control unit. In this case, the printer does not have to be specified in the polling list.

2.10.2 Multidrop Lines

Intercomm supports multidrop 3270 leased lines where more than one remote 3270 control unit is accessed on the same line. Also, 3275 and 3271 (or 3274 or 3276) control units can be intermixed on one line. The connecting data sets/modems (and, in some hardware-compatible systems, also the control units), installed by the vendor must be specifically for multidrop operation. The POLLIST macro should specify only general poll for each control unit.

Each control unit must have a unique polling and addressing (selection) code as specified in the POLL parameter of the BTERM macro. The BTERMs for each terminal within a cluster must have unique device addresses (also specified in the POLL parameter), but only within the specific control unit to which they are attached. If all ports in a cluster control unit do not have connected terminals, the device address defined in each BTERM macro POLL and ADDR parameter must correspond to a connected terminal.

(To test the correspondence, enter a message from each connected terminal. If the correspondence is not exact, an error message is issued to the control terminal for each incorrectly defined 3270 terminal. Another test can be made by using the GOOD MORNING message (if USRSTART is included). Define all the terminals on the multidrop line in the broadcast group TOALL. After Intercomm system initialization, determine which terminals did not receive the message.)

AUTOUP processing should be specified via the BTERM and BDEVICE macros. TPUP/TDWN system control commands with the CU parameter should be used for multidrop lines, rather than STLN and SPLN commands. (See System Control Commands)

2.10.3 Coding Specifications

Figure 4 lists parameters applicable to remote 3270 terminals. A sample mixed configuration (local and remote 3270s) coding is provided in Figure 8.

Figure 5 lists parameters applicable to remote leased line 3275s. Figure 6 shows sample table entries for a remote 3275 with printer and CRT. If a printer is attached to a 3275 display station, the BTERM macro for the CRT must be immediately followed by the BTERM macro for the printer. If no printer is attached, or a separate BTERM for the printer is not desired, do not code SPEC=YES in the associated BDEVICE macro. In this case, define only CRT-related parameters in the BTERM and BDEVICE macros. Two BDEVICE macros must be coded if separate BTERMs for the CRT and printer are coded, and in this case SPEC=YES must be coded on both.

Section 2.13 describes restrictions when using the IBM System/34 in 3270 Emulation Mode. Otherwise, the system (and attached terminals) are defined to Intercomm as a remote 3270 controller.

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
&IBM3270	SETB	1
&BISYNC	SETB	1
*&BUFFERS	SETB	1 if printers also used
*&CONVER	SETB	1 if CONV=YES on any BTERM
&MAXINLN	SETA	4095 - increase if large buffered CRTs used
LINEGRP	DDNAME	DD-statement-reference
	UNIT	3270
	OPTION	BISYNC
	NUMLN	n (number of associated BLINEs)
	BUFL	n (264 recommended)
	BUFNO	n (if BUFL=264, use 2 x no. of BLINEs)
	*MODE	refer to DCB description in OS/VS BTAM
	*CODE	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
	*EROPT	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM3270
	OPTION	BISYNC
	NUMAC	5
	AUTO	YES (Autopoll used in POLLIST macro)
	POLLIST	POLLIST-macro-label
	*TRSTBL	translate-table-label (required for ASCII and typewriter keyboards)
	*POLTM	n (if AUTOLST polling used); 0 (if AUTOWLST polling used)
	*ERRSTAT	YES (if I/O Error statistics to be accumulated)
	*ERRTCNT	n maximum number I/O errors to be recorded
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	POLL	five specific polling characters with format: ccccddddenq where: cc=control unit polling address; dd=specific device address (even if general poll used in the POLLIST); enq=2D (for EBCDIC), 05 (for ASCII)
	ADDR	five addressing characters with format: sssssddddenq where: ss=control unit selection address; dd=specific device address; enq=2D (for EBCDIC), 05 (for ASCII)
	CRT	YES (if CRT); NO (if printer)
	*HARDCPY	YES (required for printer)
		*=Optional

Figure 4. Remote IBM 3270 Specifications (Page 1 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
BTERM (cont.)	*CONV	YES (for conversational processing)
	*TPUP	YES (if on-line at startup); NO (if not)
	*AUTOUP	YES
	*ALT	alternate terminal-ID
	*ERRSTAT	YES (if I/O error statistics to be accumulated)
BDEVICE	TERMTYP	IBM3270
	OP1	82
	EXTCHR	3
	STCHAR	0227 (STX,ESC)
	CTCHAR	COMM+WCC+SBA sequence (start print bit must be 1 in WCC for printer)
	*ENDCHAR	printer specification (19=EM; 15=NL)
	*CHPS	n (required for printer)
	*AIDGRP	n (for CRT)
	*COPYRSP	COMPL/INPROG/NO (for CRT)
	*UPINTV	n (if AUTOUP=YES coded in BTERM)
	*MAXERR	n (default=3) maximum retries after I/O error
	*ALTBUF	n size of the alternate buffer (if available)
POLLIST	list-type	AUTOLST or AUTOWLST
	line	LINEGRP-macro-label+L+relative BLINE macro offset
	EXTNAM	terminal-ID list (code last ID twice). Each entry must be paired with a CTCHAR parameter entry. The last entry must be coded twice. For specific polling, EXTNAM is the TID of each terminal being polled. For general poll, EXTNAM is a TID of only one terminal from each control unit being polled.
	CTCHAR	polling characters for terminal-ID list. Each CTCHAR entry corresponds to an entry in the EXTNAM list. The last entry must be 5 EOT characters (X'37' if EBCDIC, X'04' if ASCII). Other entries are specific or general poll characters, as follows: ccccddddenq--specific poll. Must match POLL parameter on the BTERM for each corresponding EXTNAM list TID entry. If specific poll entries are used for CRTs, entries for printers must be also listed, and at the end of the POLLIST ccccgpgpenq--general poll for control unit only, where: gp=7F if EBCDIC, 22 if ASCII If general poll is used, do not code specific poll entries for printers.
*=Optional		

Figure 4. Remote IBM 3270 Specifications (Page 2 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
label	EQU COPY PMISTOP or label	* translate table for typewriter keyboards TRAN3270 ASMTRTAB	non-EBCDIC translate table parameters
STATION	TERM *ALT IOCODE	terminal-ID alternate-terminal-ID (3,IBM3270[,DVMODIFY-macro-label]) CRT; (2,IBM3270P[,DVMODIFY-macro-label]) printer
DEVICE	TYPE CRT BUFSIZE LEN FIRST EOB CHAR *EOT	IBM3270 (for CRT); IBM3270P (for printer) YES (for CRT); NO (for printer) 1920 (standard buffer size for 3270 devices) 80 (standard line length for 3270 devices) NO NO NL YES (default)
*DVMODIFY	*BUFFRSZ *LINESZ *ALTBUF *NOLINES *HARDCPY	n (override buffer size) n (override line length) YES (if overrides are for an alternate buffer); NO (default) n (max lines for logical page size--printer only) YES (for printer only)
*=Optional		

Figure 4. Remote IBM 3270 Specifications (Page 3 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
&IBM3270	SETB	1
&BISYNC	SETB	1
*&BUFFERS	SETB	1 if printer attached
*&CONVER	SETB	1 for conversational processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	3270
	OPTION	BISYNC
	NUMLN	n (number of associated BLINEs)
	BUFL	n (264 recommended)
	BUFNO	n (if BUFL=264 2 x no. of BLINEs)
	*MODE	refer to DCB description in OS/VS BTAM
	*CODE	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
	*EROPT	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM3270
	OPTION	BISYNC
	NUMAC	5
	AUTO	YES (Autopoll used in POLLIST macro)
	POLLIST	POLLIST-macro-label
	*TRSTBL	translate-table-label (required for ASCII and typewriter keyboards)
	*POLTM	n (if AUTOLST polling used); 0 (if AUTOWLST)
	*ERRSTAT	YES (if I/O error statistics to be accumulated)
	*ERRTCNT	n maximum number I/O errors to be recorded
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	POLL	five polling characters with format ccccgpgpenq, where: cc=control unit polling address; gp=7F (EBCDIC-General Poll), 22 (ASCII-General Poll); enq=2D (EBCDIC), 05 (ASCII)
	ADDR	five addressing characters with format sssddddenq, where: ss=control unit selection address; dd=40 (EBCDIC), 20 (ASCII); enq=2D (EBCDIC), 05 (ASCII)
*=Optional		

Figure 5. Remote IBM 3275 Specifications (Page 1 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
BTERM (cont.)	CRT	YES (if CRT); NO (if printer)
	*HARDCPY	YES (required for printer)
	*CONV	YES
	*TPUP	YES (if on-line at startup); NO (if not)
	*AUTOUP	YES
	*ALT	alternate-terminal-ID
	*ERRSTAT	YES (if I/O error statistics to be accumulated)
BDEVICE	TERMTYP	IBM3270
	OP1	82
	EXTCHR	3
	STCHAR	0227 (STX,ESC)
	CTCHAR	COMM+WCC+SBA sequence (Start Print bit must be 1 in WCC for printer)
	*ENDCHAR	printer specification (19=EM; 15=NL)
	*CHPS	n (required for printer)
	*SPEC	YES if BTERMs for both CRT and printer defined
	*AIDGRP	n (for CRT)
	*COPYRSP	COMPL/NO (for CRT)
	*UPINTV	n (if AUTOUP=YES coded in BTERM)
	*MAXERR	n (default=3) maximum retries after I/O error
	*ALTBUF	n size of the alternate buffer (if available)
POLLIST	list-type	AUTOLST or AUTOWLST
	line	LINEGRP-macro-label+L+relative BLINE macro offset
	EXTNAM	terminal-ID list (last ID coded twice)
	CTCHAR	general poll characters for corresponding EXTNAM--same as BTERM POLL operand. Last CTCHAR must be 5 EOTs. Refer to Figure 5-5 for detail description. Do not put printer in POLLIST.
label	EQU	* translate table for typewriter keyboards
	COPY	TRAN3270
	PMISTOP	
	or	
label	ASMTRTAB	non-EBCDIC translate table parameters
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,IBM3270[,DVMODIFY-macro-label]) CRT; (2,IBM3270P[,DVMODIFY-macro-label]) printer
		*=Optional

Figure 5. Remote IBM 3275 Specifications (Page 2 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
DEVICE	TYPE	IBM3270 (for CRT); IBM3270P (for printer)
	CRT	YES (for CRT); NO (for printer)
	BUFSIZE	1920 (standard buffer size for 3270 devices)
	LEN	80 (standard line length for 3270 devices)
	FIRST	NO
	EOB	NO
	CHAR	NL
	*EOT	YES (default)
*DVMODIFY	*BUFFRSZ	n (override buffer size)
	*LINESZ	n (override line length)
	*ALTBUF	YES (if overrides are for an alternate buffer); NO (default)
	*NOLINES	n (max lines for logical page size--printer only)
	*HARDCPY	YES (for printer only)
		*=Optional

Figure 5. Remote IBM 3275 Specifications (Page 3 of 3)

```
R327    LINEGRP DDNAME=LIN3275,NUMLN=1,BUFNO=2,BUFL=264,                @
              OPTION=BISYNC,UNIT=3270
        BLINE LGNAME=R327,POLLIST=P3270,TRSTBL=T3270,                   @
              NUMAC=5,OPTION=BISYNC,UNIT=IBM3270,AUTO=YES,POLTM=600
        BTERM TERM=SYS01,POLL=40407F7F2D,QNUM=1,TPUP=YES,               @
              CONV=YES,DEVIND=0,ADDR=606040402D,CRT=YES
        BTERM TERM=SYS02,POLL=40407F7F2D,QNUM=2,TPUP=YES,               @
              CONV=NO,DEVIND=1,ADDR=606040402D,HARDCPY=YES
        PMISTOP
        BDEVICE TERMTYP=IBM3270,EXTCHR=3,OP1=82,STCHAR=0227,            @
              CTCHAR=F5C3114040,SPEC=YES                          (CRT)
        BDEVICE TERMTYP=IBM3270,EXTCHR=3,OP1=82,STCHAR=0227,            @
              CTCHAR=F5C8114040,CHPS=40,SPEC=YES,ENDCHAR=19
                                                              (Printer)
P3270   POLLIST AUTOLST,R327L1,EXTNAM=(SYS01,SYS01),                    @
              CTCHAR=(40407F7F2D,3737373737)

T3270   EQU   *
        COPY  TRAN3270
        PMISTOP
```

Figure 6. Sample Table Coding for a Remote IBM 3275 with CRT and Printer

2.11 LOCAL TERMINALS

Since only one read or write operation can be active per IBM 3270 local line group, the line group is logically treated as a multidrop line. Thus, there must be one LINEGRP for each BLINE.

If various models of IBM 3270 locals are defined on the same line group, a BTERM macro for the largest buffered device must be the first BTERM following the BLINE; subsequent BTERMs may be in any sequence. A line with only printers defined must be specified as write-only.

The LINEGRP macro, READYQ parameter, may optionally specify the address of a user routine to receive control when a local terminal is powered on. (See the DCB description in IBM's OS/VS BTAM.)

Figure 7 details the required globals and macro parameters to describe 3270 local terminals. Figure 8 illustrates table entries for a remote and local 3270 configuration.

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
&IBM327L	SETB	1 local 3270
*&BUFFERS	SETB	1 if printer attached
*&CONVER	SETB	1 for conversational processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	327L
	*OPTION	BTAM (default)
	NUMLN	1
	*READYQ	user-routine label; 0 if no user-routine provided (default)
	*EROPT	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM3270L
	*OPTION	BTAM (default)
	*TRSTBL	translate-table-label (required for ASCII and typewriter keyboards)
	*ERRSTAT	YES to accumulate I/O error statistics
	*ERRTCNT	n maximum I/O errors to be recorded
	*WRTONLY	YES if only printers are defined on the line
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	CRT	YES (if CRT); NO (if printer)

*=Optional

Figure 7. Local IBM 3270 Specifications (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
BTERM (cont.)	*HARDCPY	YES (required for printer)
	*ALT	alternate terminal-ID
	*TPUP	YES (if on-line at start-up); NO (if not)
	*AUTOUP	YES
	*CONV	YES
	*ERRSTAT	YES (if I/O error statistics to be accumulated)
BDEVICE	TERMTYP	IBM327L1 (for Model 1); IBM327L2 (other models)
	CTCHAR	COMM+WCC+SBA output control sequence (Start Print bit must be 1 in WCC for printer)
	*AIDGRP	n (for CRT)
	*CHPS	n (required for printer)
	*ENDCHAR	printer specification (19=EM; 15=NL)
	*UPINTV	n (if AUTOUP=YES coded in BTERM)
	*MAXERR	n (default=3) maximum retries after I/O error
	*COPYRSP	COMPL/INPROG/NO (for CRT)
	*ALTBUF	n size of the alternate buffer (if available)
	*OP1	02 (write operation code--default)
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,IBM3270[,DVMODIFY-macro-label]) CRT; (2,IBM3270P[,DVMODIFY-macro-label]) printer
label	EQU	* translate table for typewriter keyboards
	COPY	TRAN3270
	PMISTOP	
	or	
label	ASMTRTAB	non-EBCDIC translate table parameters
DEVICE	TYPE	IBM3270 (for CRT); IBM3270P (for printer)
	CRT	YES (for CRT); NO (for printer)
	BUFSIZE	1920 (standard buffer size for 3270 devices)
	LEN	80 (standard line length for 3270 devices)
	FIRST	NO
	EOB	NO
	CHAR	NL
	*EOT	YES (default)
*DVMODIFY	*BUFFRSZ	n (override buffer size)
	*LINESZ	n (override line length)
	*ALTBUF	YES (if overrides are for an alternate buffer); NO (default)
	*NOLINES	n (max lines for logical page size--printer only)
	*HARDCPY	YES (for printer only)

*=Optional

Figure 7. Local IBM 3270 Specifications (Page 2 of 2)

```
BNETWORK CSECT
R327     LINEGRP  DDNAME=R3270,NUMLN=1,BUFNO=2,BUFL=264,                    @
               OPTION=BISYNC,UNIT=3270
L327     LINEGRP  DDNAME=L3270,NUMLN=1,UNIT=327L
         BLINE    LGNAME=L327,UNIT=IBM3270L,TRSTBL=T3270
         BTERM    TERM=WAL01,DEVIND=2,TPUP=YES,CRT=YES,QNUM=1
         BTERM    TERM=WAL02,DEVIND=3,TPUP=YES,CRT=YES,QNUM=2
         BTERM    TERM=WAL03,DEVIND=4,TPUP=YES,HARDCPY=YES,QNUM=3
         BLINE    LGNAME=R327,POLLIST=P3270,TRSTBL=T3270,                  @
               NUMAC=5,OPTION=BISYNC,UNIT=IBM3270,AUTO=YES
         BTERM    TERM=SYS01,POLL=404040402D,QNUM=4,TPUP=YES,              @
               CONV=YES,DEVIND=0,ADDR=606040402D,CRT=YES
         BTERM    TERM=SYS02,POLL=4040C1C12D,QNUM=5,TPUP=YES,              @
               CONV=NO,DEVIND=1,ADDR=6060C1C12D,HARDCPY=YES
         PMISTOP
         BDEVICE  TERMTYP=IBM3270,EXTCHR=3,OP1=82,STCHAR=0227,            @
               CTCHAR=F5C3114040                              (Remote CRT)
         BDEVICE  TERMTYP=IBM3270,EXTCHR=3,OP1=82,STCHAR=0227,            @
               ENDCHAR=19,CTCHAR=F5C8114040,CHPS=40       (Remote Printer)
         BDEVICE  TERMTYP=IBM327L2,AIDGRP=1,OP1=02,                       @
               CTCHAR=F5C3114040                               (Local CRT)
         BDEVICE  TERMTYP=IBM327L2,AIDGRP=2,OP1=02,                       @
               CTCHAR=F5C3114040                               (Local CRT)
         BDEVICE  TERMTYP=IBM327L2,OP1=02,                                @
         CHPS=66,ENDCHAR=19,CTCHAR=F5C8114040        (Local Printer)
*
P3270    POLLIST  AUTOLST,R327L1,EXTNAM=(SYS01,SYS02,SYS02),              @
         CTCHAR=(404040402D,4040C1C12D,3737373737)
*
T3270    EQU   *
         COPY  TRAN3270
         PMISTOP
         AIDGRP   1,PF1=3,PA2=1,CLEAR=4
         AIDGRP   2,PF1=2,PA2=3,CLEAR=4
         PMISTOP
         AIDDATA  1,'SNBK,GENERATED BY PA2 of BTERMS WITH                 @
               DEVIND=2'
         AIDDATA  2,'SNBK,GENERATED BY PF1 OF BTERMS WITH                 @
               DEVIND=3'
         AIDDATA  3,'SNBK,GENERATED BY PF1 OR PA2 OF BTERMS WITH          @
               DEVIND OF 2 OR 3, RESPECTIVELY'
         AIDDATA  4,'RLSE'
         AIDDATA  END
BNETWORK CSECT
         ENTRY BTVTBEND
BTVTBEND EQU   *
         END
```

Figure 8. Sample Table Coding for Remote and Local IBM 3270s.

2.12 IBM 129-3270 CARD DATA RECORDER ATTACHMENT

The IBM 129-3270 attachment is supported as an extension of standard 3270 support.

The 129-3270 attachment is a modified 129 Card Data Recorder which emulates a 3277 Model 1 CRT when reading cards and emulates a 3284 or 3286 Model 1 printer when punching cards. It is supported in either local or remote leased 3270 configurations. The 129-3270 attachment is described in the IBM publication IBM 3270 Information Display System Custom Feature Description: 129-3270 Attachment (RPQ 8T0093).

The IBM 129 can be used in either card read mode or card punch mode. To change modes, a manual procedure is required. Mode changes are indicated to Intercomm via the system control commands R129 and P129 (for read mode and punch mode, respectively). The device must be physically ready for the specified mode before the command is issued.

2.12.1 Read Mode

Reading is initiated when the idle device is made ready physically (that is, cards loaded and the READ button depressed), and the 129 is set to read mode implicitly at startup or explicitly by the R129 command.

This command causes the 129 output queue (which must be dedicated) to be held, and is effective immediately if the output queue is empty, or is delayed automatically until the current output message is punched or flushed. (The user is informed of the result if the command is entered from a terminal.) Once the R129 command is accepted, future output is held in the queue. The 129 device then reads cards until its buffer is full (six cards in unformatted mode). The entire buffer content is then transmitted and queued as a single message on the basis of the verb in the message, or a locked verb (which is recommended).

To continue reading cards, the 129 requires that a dummy WRITE be sent to the device with a WCC indicating keyboard restore. The dummy WRITE is done by Intercomm, unless the last buffer contained an EM character as a message ending character. The EM character (11-1-8-9 punch) is used by Intercomm as a logical end-of-file. The 129 gives the EM character special significance; it forces an immediate buffer full condition and ends the input data stream. If the formatted read device feature is in use, the EM must be punched in a column within a read field.

2.12.2 Punch Mode

To punch, the 129 must be made ready physically (with blank cards loaded and the FEED pressed), and the P129 command must be requested by a subsystem or entered from a terminal.

The P129 command releases the output queue. Any held output in the queue is punched; future output is punched as it is queued.

The 129 retains its operating mode until changed via R129 or P129 commands. Even if the 129 is turned down by the operator or Intercomm (for an I/O error), the operating mode is retained.

2.12.3 Error Recovery

Error recovery is handled by an Intercomm-supplied user exit routine, USRER129. (The user may replace USRER129 with a specialized routine, if necessary. See comments in its source listing.)

If either a card jam (EC--equipment check) or a not-ready condition (IR--intervention required) is detected, the Intercomm-supplied user exit routine USRER129 is CALLIFed, which allows three Intercomm retries before turning the terminal down "due to I/O error."

In the case of a read error, an end-of-file message is sent to the subsystem to which the terminal is locked, indicating that the terminal will be turned down. The message is in the format:

verb$*EOT@

where:

- $ represents the system separator.
- @ represents the EOB character.
- verb represents the locked verb.

No message is sent if the terminal is not locked. No message is sent if the error occurs during punching.

If the terminal was turned down, a TPUP must be entered at a terminal by the 129 operator (or generated by AUTOUP). In the case of a read jam, the application must check for duplicate punched cards between this buffer and the last it received before the jam. In the case of a punch jam, the operator must check for duplicate punched cards.

2.12.4 Installation Procedures

1. Add global settings and code Front and Back End table macros, as defined in Figure 9. (Refer also to remote and local 3270 tables in Figures 4 and 7.)

2. Define a dedicated terminal queue for each 129. (The queue hold/release facility requires dedicated queues.)

3. Add verbs R129 and P129 to the Front End Verb Table.

4. Assemble Front End modules affected by 129 support:

   BLHIN
   BLHOT
   BMH000
   BTSEARCH
   BTAMLINE
   TPUMSG

5. Include the module USRER129 in the Intercomm linkedit if 129-oriented error processing is desired. The user may supply a special-purpose version of USRER129. The Intercomm-supplied module must be resident.

Figure 9 outlines the coding requirements for 129/3270 devices. Figure 10 illustrates sample table entries for 129/3270 devices.

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
&IBM129	SETB	1 IBM129/3270 Support
&BUFFERS	SETB	1 hard copy device (local and remote)
&IBM327L	SETB	1 if local configuration in use
&IBM3270	SETB	1 if remote configuration in use
&BISYNC	SETB	1 if remote configuration in use
LINEGRP	DDNAME	DD-statement-reference for 3270 line group
	UNIT	327L (local); 3270 (remote)
	OPTION	BTAM (local); BISYNC (remote)
	NUMLN	n
	*BUFNO	n (remote)
	*BUFL	n (remote)
	*READYQ	0 or user-routine-label (local only)
	*EROPT	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
	*MODE	refer to DCB description in OS/VS BTAM (remote)
	*CODE	refer to DCB description in OS/VS BTAM (remote)

*=Optional

Figure 9. 129/3270 Attachment Specifications (Page 1 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM3270L (local); IBM3270 (remote)
	OPTION	BTAM (local); BISYNC (remote)
	*TRSTBL	translate-table-label
	*NUMAC	5 (remote)
	*AUTO	YES (remote)
	*POLLIST	POLLIST-macro-label (remote)
	*POLTM	n (remote)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n (must be dedicated queue)
	HARDCPY	YES
	*TPUP	YES (if on-line at startup); NO (if not)
	*AUTOUP	YES
	*ALT	alternate-terminal-ID
	*POLL	five polling characters with format ccccddddenq (remote)
	*ADDR	five addressing characters with format as in POLL parameter (remote)
	*LOCK	verb
BDEVICE	TERMTYP	IBM129L (local); IBM129R (remote)
	OP1	see 3270 local or remote specifications
	CHPS	n
	*EXTCHR	3 (remote)
	*CTCHAR	COMM+WCC+SBA Sequence (Start print bit in WCC set to 1)
	*STCHAR	0227 (STX,ESC) (remote)
	*ENDCHAR	punch specification (19=EM, 15=NL)
	*UPINTV	n (if AUTOUP=YES in BTERM)
*POLLIST (remote)	list-type	AUTOLST or AUTOWLST
	line	LINEGRP-macro-label+L+relative BLINE macro offset
	EXTNAM	terminal-ID list (last ID coded twice)
	CTCHAR	polling characters followed by string of five EOTS (see remote 3270 specifications)
label	EQU	* translate table for typewriter keyboards
	COPY	TRAN3270
	PMISTOP	
	or	
label	ASMTRTAB	non-EBCDIC translate table parameters
*=Optional		

Figure 9. 129/3270 Attachment Specifications (Page 2 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and(or) Comment
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,IBM3270,DVMODIFY-macro-label)
DEVICE	TYPE	IBM3270 Define DEVICE for 3270 CRTs, override with a DVMODIFY macro for the 129
	CRT	YES
	BUFSIZE	1920
	LEN	80
	FIRST	NO
	EOB	NO
	*EOT	YES (default)
	CHAR	NL
DVMODIFY	BUFFRSZ	480
	*LINESZ	80
	HARDCPY	YES
*=Optional		

Figure 9.. 129/3270 Attachment Specifications (Page 3 of 3)

```
***REMOTE 129***
          BLINE UNIT=IBM3270,POLLIST=P3270,...(other 3270 parms)
          BTERM TERM=CRT01,CRT=YES,...(other parms for CRT)
          BTERM TERM=PRT01,HARDCPY=YES,...(other parms for printer)
          BTERM TERM=PCH01,HARDCPY=YES,TPUP=YES,                          @
                DEVIND=relative-bdevice-for-129,                          @
                QNUM=relative-sycttbl-for-129-dedicated-queue,            @
                POLL=4040C2C22D,ADDR=6060C2C22D,                          @
                LOCK=verb-of-129-input-subsystem              (optional)
          ...Other BLINEs & BTERMs
*     BDEVICE FOR REMOTE 129
          BDEVICE  TERMTYP=IBM129R,EXTCHR=3,OP1=82,CHPS=20,ENDCHAR=19,    @
                STCHAR=0227,CTCHAR=F5C8114040       (WCC=Start Print only)

*     POLLIST WITH 129 ADDED (NOTE PRINTER MUST BE IN LIST ALSO)
P3270     POLLIST  AUTOLST,R327L1,EXTNAM=(CRT01,PRT01,PCH01,PCH01),       @
                CTCHAR=(404040402D,4040C1C12D,4040C2C22D,3737373737)

***LOCAL 129***
          BLINE UNIT=IBM3270L,...(other 3270 parms)
          BTERM TERM=CRT01,CRT=YES,...(other parms for CRT)
          BTERM TERM=PRT01,HARDCPY=YES,...(other parms for Printer)
          BTERM TERM=PCH01,HARDCPY=YES,TPUP=YES,                          @
                DEVIND=relative-bdevice-for-129,                          @
                QNUM=relative-sycttbl-for-129-dedicated-queue,            @
                LOCK=verb-of-129-input-subsystem              (optional)
*     BDEVICE FOR LOCAL 129
          BDEVICE  TERMTYP=IBM129L,CHPS=20,ENDCHAR=19,OP1=02,             @
                CTCHAR=F5C8114040                  (WCC=start print only)
```

Figure 10. Sample Table Coding for 129/3270 Terminal Configurations (Local and Remote Leased Line)

2.13 IBM System/34 in 3270 Emulation Mode

The System/34 may be genned with the IBM 3270 Emulation Mode software (see IBM Manual SC21-7703), and defined to Intercomm as a remote 3270 cluster controller (see section 2.10). The following are hardware and software restrictions on using this configuration:

- Control unit addresses C1/61 and 50/F0 not supported
- No screen can contain more than 127 input fields
- Screen wrapping (from row 24 to row 1) not supported
- An attribute with MDT on may not be immediately followed by another attribute
- COPY processing not supported (at controller level); use local copy function
- Do not use broadcast message processing or unsolicited message switching
- Do not sysgen the System/34 float feature (for signing on to 3270 emulation): message responses and AID processing will be unpredictable
- Interactive Communications Feature (see IBM manual SC21-7751) software must be active in System/34 before any device can sign on to 3270 emulation. If inactive, a poll will result in a time-out and control unit (line) down condition
- Use TDWN,TPU.....,CU or SPLN command to disable Intercomm communication with System/34 before deactivating ICF
- Do not use AUTOUP processing for devices which only sign on to 3270 emulation sporadically (causes error recovery overhead).

Chapter 3

OTHER IBM SYSTEMS

This chapter describes Intercomm BTAM support of IBM (and IBM-compatible) equipment other than the 3270. The following topics are discussed:

- The IBM Console (IBM 1052 or IBM 3215) as the control terminal
- The IBM 2260 Display System
- The IBM 2740 Terminal
- The IBM 2741 Communication Terminal
- The IBM 2770 Data Communication System
- The IBM 2780 Terminal
- The IBM 1030 Data Collection System
- The IBM 1050 System
- The IBM 3735 System
- The IBM 7770 System
- Remote CPU and data collection/RJE device support

3.1 THE IBM CONSOLE AS THE CONTROL TERMINAL

The CPU console (IBM 1052 or 3215) can function as the Intercomm control terminal.

The following steps are required for installation in a BTAM Front End:

1. Update the member SETENV to accommodate the device type.
2. Reassemble Front End modules affected by CPU console support:

   BMH000
   BTAMLINE
   STAERTRY
   BLHIN
   CNT01MOD

3. Include the member CNT01MOD in the Intercomm linkedit.

4. Code Front End and Back End tables as defined in Figure 11.

5. Add the terminal name to the Broadcast Table group 'TOALL'.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&CNT1050	SETB	1
*&BACKSPC	SETB	1 if backspacing feature in use
LINEGRP	not required	
BLINE	UNIT	CNT1050
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n (must be unique; dedicated queue required)
	*CONTROL	YES (required if used as control terminal)
	TPUP	YES
	*AUTOUP	YES if desired
	*ALT	alternate-terminal-ID
BDEVICE	TERMTYP	CNT1050
	*UPINTV	n if AUTOUP=YES coded in BTERM
	*BACKSP	YES if backspace processing desired (1052 only)
STATION	TERM	terminal-ID (same as for BTERM)
	IOCODE	(3,IBM1050)
	*ALT	terminal-ID (same as for BTERM ALT parameter)
DEVICE	TYPE	IBM1050
	LEN	n (maximum=122)
	CHAR	NL
	*EOB	YES (default)
	EOT	NO
	BUFSIZE	n (maximum number of lines x LEN value)
*=Optional		

Figure 11. CPU Console Specifications (IBM 1052 and 3215)

3.2 IBM 2260 DISPLAY SYSTEM

The Intercomm BTAM Front End supports the remote and local IBM 2260 Display System. Components of this system are:

- IBM 2260 Display Station (Models 1 and 2)
- IBM 2848 Control Unit in Remote or Local Configurations

- IBM 2265 Remotes
- IBM 1053 Remote and Local printer attachment

3.2.1 Hardware-Compatible Devices

The following devices are supported as IBM 2260 hardware-compatible:

- Burroughs TC500 as a Remote 2260 (see Section 3.2.3)
- Bunker Ramo local 2200 series (see Section 5.1 for remote support)

All 2260 Front End, Back End and installation considerations apply. Specific device-related variations are detailed in the coding specifications for that terminal.

3.2.2 Installation Procedures

1. Update the member SETENV.
2. Reassemble the following Front End modules:

   BLHIN
   BLHOT
   BTAMLINE
   BMH000
   TPUMSG
   GRAPHICS--to include GAM macros (if local terminals are in use)

3. Code the Front End and Back End tables as defined in Figure 12. See Figure 13 for the 2265 remote, and Figure 14 for the remote and local 1053 printer.
4. If local terminals are in use, include GRAPHICS (for local 2260/1053 terminals) in the Intercomm linkedit.

For the line addressing feature on a local 2260 CRT, use the OP2IND parameter of the BDEVICE macro; the OP2 and OP2IND must be assigned a code of X'00'. If the OP2IND signal byte is not detected as the first byte of text, a write-erase operation is issued. If it is detected, a write-at-line address operation is issued and the second byte of the message is considered to be the line number. OP2RPL may be any value, as it is not transmitted.

For remote 2260/1053/2265 terminals, the STX line control character is provided by BTAM on all output messages and may not be provided by the user (do not code STCHAR=02). General poll for a remote 2260/2848 display system is not supported.

Support for the 2265 remote is similar to the 2260 remote. Therefore, reference should also be made to the 2260 description for installation considerations. Figure 13 lists the table coding requirements. (See Figure 12 for polling and translate table definitions.)

Coding for support of IBM 1053 local and remote printers as IBM 2260 Display System components is specified in Figure 14. Refer also to the installation procedures and table coding for 2260 CRTs (Figure 12).

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&IBM2260	SETB	1 required for remote
&GRAPH	SETB	1 required for local
*&CONVER	SETB	1 for conversational processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	2260 (local and remote)
	OPTION	GRAPH (local); BTAM (remote)
	NUMLN	n (remote); 1 (local)
	*BUFNO	n (remote only)
	*BUFL	n (remote only)
	*EROPT	refer to DCB description in OS/VS BTAM (remote)
	*LERB	refer to DCB description in OS/VS BTAM (remote)
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM2260 (local and remote)
	OPTION	GRAPH (local); BTAM (remote)
	*BUFL	240/480/960 (local only)
	*TRSTBL	translate-table-label (remote)
	*NUMAC	2 (remote only)
	*POLLIST	POLLIST-macro-label (remote only)
	*POLTM	n (remote)
	*AUTO	NO default; auto-poll not used (remote)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	*CRT	YES

*=Optional

Figure 12. IBM 2260 Local and Remote CRT Specifications (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BTERM (contd.)	*TPUP	YES
	*AUTOUP	YES
	*ALT	alternate terminal-ID
	*CONV	YES
	*POLL	two-character polling sequence ccdd, where: cc=control unit poll character dd=device address (remote only)
BDEVICE	TERMTYP	IBM2260 (remote and local)
	OP1	0E
	EXTCHR	2 (remote only)
	*CRLF	NO (defaults to New Line)
	*OP2	00 (local only)
	*OP2IND	00 (local)
	*OP2RPL	see text preceding this figure (local)
	*UPINTV	n if AUTOUP=YES in BTERM
	*MAXERR	n (default=3) maximum I/O error retries
*POLLIST	list-type	OPENLST or WRAPLST
	line	LINEGRP-macro-label+L+relative-BLINE-macro-offset
	EXTNAM	terminal-ID list
	CTCHAR	polling characters for terminal-ID list. Each CTCHAR corresponds to a terminal in the EXTNAM list and is in the two-character form ccdd, where: cc=control unit poll character; dd=device address
label	EQU	* translate-table for remote 2260/2265
	ASMTRTAB	RSCI,SSCI
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,IBM2260)
DEVICE	TYPE	IBM2260
	CRT	YES
	LEN	40/80
	BUFSIZE	240/480/960
	FIRST	NO
	*CHAR	NL (default)
	EOB	NO (local); YES (remote)
	EOT	NO
*=Optional		

Figure 12. IBM 2260 Local and Remote CRT Specifications (Page 2 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&IBM2260	SETB	1 remote 2265
*&CONVER	SETB	1 for conversational processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	2260
	*OPTION	BTAM (default)
	NUMLM	n
	BUFNO	n
	BUFL	n
	*EROPT	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM2260
	*OPTION	BTAM (default)
	NUMAC	2
	POLLIST	POLLIST-macro-label
	TRSTBL	translate-table-label
	*POLTM	n
	*AUTO	NO (default-autopoll not used)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	POLL	2 polling characters in the form ccdd, where: cc=control unit poll character; dd=device address
	CRT	YES
	*ALT	alternate terminal-ID
	*CONV	YES
	*TPUP	YES
	*AUTOUP	YES
BDEVICE	TERMTYP	IBM2260
	OP1	OE
	EXTCHR	2
	*CRLF	NO (defaults to new line)
	*UPINTV	n if AUTOUP=YES in BTERM
	*MAXERR	n (default=3) maximum I/O error retries
*=Optional		

Figure 13. IBM 2265 Specifications

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&IBM2260	SETB	1 (remote 1053s)
&GRAPH	SETB	1 (local 1053s)
&BUFFERS	SETB	1 hard copy device in use (remote only)
LINEGRP	DDNAME	DD-statement-reference
	UNIT	2260
	OPTION	GRAPH (local); BTAM (remote)
	NUMLN	n (remote); 1 (local)
	BUFNO	n (remote only)
	BUFL	n (remote only)
	*LERB	refer to DCB description in OS/VS BTAM (remote)
	*EROPT	refer to DCB description in OS/VS BTAM (remote)
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM2260 (remote and local)
	OPTION	GRAPH (local); BTAM (remote)
	*BUFL	240/480/960 (required for local only)
	*NUMAC	2 (required for remote only)
	*POLLIST	POLLIST-macro-label (required for remote only)
	*TRSTBL	translate-table-label (remote only)
	*POLTM	n (remote)
	*AUTO	NO (remote)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n (should be dedicated)
	HARDCPY	YES
	*POLL	required for remote (see Figure 12)
	*ALT	alternate-terminal-ID
	*TPUP	YES
	*AUTOUP	YES
	*CONTROL	NO (default)
BDEVICE	TERMTYP	IBM1053
	OP1	OE
	*CHPS	14 (required for remote only)
	*CRLF	NO (defaults to New Line)
	*STCHAR	15 (New Line--force message to next line)
	*UPINTV	n if AUTOUP=YES in BTERM
	*MAXERR	n (default=3) maximum I/O error retries
*=Optional		

Figure 14. IBM 1053 Printer Specifications (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(2,IBM1053)
DEVICE	TYPE	IBM1053
	CRT	NO
	LEN	40/80
	BUFSIZE	480/960
	*FIRST	YES (default)
	*CHAR	NL (default)
	EOB	NO (local); YES (remote)
	EOT	NO
*=Optional		

Figure 14. IBM 1053 Printer Specifications (Page 2 of 2)

3.2.3 Burroughs TC500

Burroughs has developed a means of interfacing the TC500 to IBM 360/370 computers. A few basic data transmission characteristics common to the Burroughs TC500 and the IBM 2260 Display System terminal make this possible.

The type of line needed for transmission must be an unconditioned full duplex line (four wire-FCC type 3002), operating in half duplex mode. If the line is not operating in half duplex, information on the line is lost and time-outs result.

Although the TC500 can operate in either a four-wire (leased line) or a two-wire (switched line) environment, it can only be supported by Intercomm as a remote 2260 over four-wire leased lines. It is possible for 2260s to communicate with the CPU in a local environment. However, the transmission characteristics of this environment are different from those of the Burroughs TC500. Therefore, the TC500 cannot be installed directly on the multiplexor channel or installed on 2701s in a direct connect mode.

The TC-2260 hardware set should be used. (This should be checked with Burroughs and determined by the user.)

Installation requirements are similar to IBM 2260 remote leased line devices as specified in Figure 12. Figure 15 lists table coding requirements. The SPEC parameter of the BDEVICE macro must be coded as YES to indicate that this is a 2260-compatible device. The POLLIST,

STATION, DEVICE and translate table coding is the same as for the Remote IBM 2260.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&BURROS	SETB	1
&IBM2260	SETB	1
*&CONVER	SETB	1 (for conversational processing)
LINEGRP	DDNAME	DD-statement-reference
	UNIT	2260
	*OPTION	BTAM (default)
	NUMLN	n
	BUFNO	n
	BUFL	n
	*EROPT	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM2260
	*OPTION	BTAM (default)
	NUMAC	2
	POLLIST	POLLIST-macro-label
	TRSTBL	translate-table-label
	*POLTM	n
	*AUTO	NO (default)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	CRT	YES
	*TPUP	YES
	*AUTOUP	YES
	*ALT	alternate terminal-ID
	*CONV	YES
	POLL	two-character polling sequence (see Figure 12)
BDEVICE	TERMTYP	IBM2260
	OP1	0E
	SPEC	YES (required)
	EXTCHR	2
	*CRLF	NO (defaults to New Line)
	*UPINTV	n if AUTOUP=YES coded in BTERM
	*MAXERR	n (default=3) maximum I/O error retries
*=Optional		

Figure 15. Burroughs TC500 Specifications

3.3 IBM 2740 MODEL 1 AND MODEL 2

The Intercomm BTAM Front End supports the unbuffered IBM 2740 Model 1 on switched, leased point-to-point, and leased multipoint (if the station control feature installed) lines. The buffered IBM 2740 Model 2 with the station control feature is supported on leased point-to-point and multipoint lines. The station control feature means that polling and addressing is required for terminal communication. The Record Checking feature is not supported: each input segment is processed as a separate message.

Both auto-answer and auto-call terminals are supported on switched lines. A unique terminal-ID must be transmitted from an auto-answer terminal, when the connection is established by dialing the CPU (see BTERM macro DILID parameter). The Transmit Control feature for the 2740 Model 1 on a switched line is not supported.

The following procedures are required for installation:

1. Update the member SETENV and reassemble the required BTAM Front End modules and the following:

   ERRSTATS--if Model 2 terminals in use
   BDIAL--if dial-up terminals are in use
   BTVERIFY--if included in the Intercomm linkedit

2. Code the Front End and Back End tables as illustrated in Figure 16.

3. If the Model 2 terminal, or the Model 1 with Station Control feature is used, code polling parameters for the BLINE and BTERM macros.

4. There are three different transmission codes for IBM 2740 terminals. Code the appropriate translate table using the ASMTRTAB macro.

5. Include in the Intercomm linkedit:

   BDIAL--if dial-up terminals are in use
   ERRSTATS--if Model 2 terminals in use

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&IBM2740	SETB	1 required for leased
&DIALUP	SETB	1 required for switched
*&IDLES	SETB	1 for idles processing for Model 1
*&BACKSPC	SETB	1 for backspace processing for Model 1
*&CONVER	SETB	1 for conversational processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	2740 (Models 1 & 2 and dial-up)
	*OPTION	BTAM (default-all)
	NUMLN	n
	BUFNO	n
	BUFL	n
	*EROPT	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM2740 (Model 1 leased); IBM27401 (Model 2 leased); DIAL2740 (for dial-up--Model 1)
	*OPTION	BTAM (default-all)
	*ERRSTAT	YES (Model 2 leased)
	TRSTBL	translate-table-label
	*POLLIST	POLLIST-macro-label (leased--if Station Control used)
	*NUMAC	1 (leased--if polling)
	*AUTO	YES (if auto-poll)
	*POLTM	n (if open list); 0 (if wrap list) leased
	*BUFTM	n (Model 2)
	DIALTRM	dial-up
	FIRSTRM	dial-up
	*ACALL	dial-up
	*ANSWER	dial-up
	*ANSLIST	dial-up (if ANSWER=YES coded)
*=Optional		

Figure 16. IBM 2740 Specifications (Page 1 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n (must be dedicated for dial-up)
	HARDCPY	YES (leased)
	*POLL	n (required for Model 2; also required for leased Model 1 if Station Control feature installed.)
	*TPUP	YES (leased)
	*AUTOUP	YES (leased)
	*ALT	alternate terminal-ID
	*CONV	YES
	DILID	ID received from terminal when answering a call (dial-up)
	*ACALL	dial-up--if terminal can be called
	*CINTVL	dial-up--if ACALL=YES coded
	*PHONE	dial-up--if terminal can be called
	*ERRSTAT	YES (recommended for Model 2 leased)
BDEVICE	TERMTYP	IBM27401 (Model 1); IBM27402 (Model 2); D2740B (dial-up)
	OP1	82 (leased line); 02 (dial-up)
	*CHPS	14 (Model 2)
	*CRLF	NO (default)
	*IDLES	10 or YES (Model 1)
	*BACKSP	YES (Model 1)
	*EXTCHR	1 (leased Model 2, and Model 1 if Station Control used.)
	*UPINTV	n (if AUTOUP=YES in BTERM)
	*STCHAR	
	*MAXERR	n (default=3) maximum I/O error retries for leased; maximum number READ time-outs before disconnect for dial-up
Translate Table	ASMTRTAB	parameters appropriate to transmission code used
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,IBM27401) Model 1; (3,IBM27402) Model 2

*=Optional

Figure 16. IBM 2740 Specifications (Page 2 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
DEVICE	TYPE	IBM27401 (Model 1) or IBM27402 (Model 2)
	CRT	NO
	*FIRST	
	CHAR	NL
	LEN	80 or 120
	*BUFSIZE	120/248/440 (Model 2)
	EOB	NO
	EOT	YES (leased); NO (dial-up)
*=Optional		

Figure 16. IBM 2740 Specifications (Page 3 of 3)

3.4 IBM 2741 COMMUNICATION TERMINAL

The IBM 2741 terminal is supported on both leased point-to-point and switched (dial-up) lines. The line handler is PMI2741.

The following processing considerations should be noted for the 2741 terminal:

- Backspace delete feature may be requested.
- Idles processing must be requested.
- All messages should be transmitted using the ATTN (break) key, which puts the terminal in receive mode. This does not apply if the BLK2741 feature is used for dial-up terminals (see below).
- If the ATTN (break) key is depressed without transmitting data, queued messages are sent; otherwise, the terminal is reset for further input.
- Transmission of queued output messages takes priority over a read.
- Conversational processing is forced if the CONV parameter is coded on the BTVERB macro of the input verb.
- Every output message to the terminal is automatically preceded by a New Line control character (and nine idles) to force the message to the beginning of the next line.

- The terminal interrupt feature is supported. That is, if the terminal operator depresses the ATTN key while the terminal is printing, printing of the message terminates. Additional output messages are written before the terminal is returned to input (keyboard unlocked) state.

3.4.1 Dial-Up 2741

Dial-up support recognizes each physical terminal based on an identifier which must be entered when the terminal calls the CPU. This is specified via the BTERM macro DILID parameter.

If the ID received from the terminal is invalid, the terminal operator is notified by an error message. Up to four retries are permitted. If the ID is valid, but the terminal is already connected on another line, the operator is notified by a message.

If the terminal is not active, after a valid connection is established, it is automatically put up. If a TDWN is issued while the terminal is connected, an immediate disconnect occurs on completion of the current I/O operation. At connect time, queued output messages are transmitted before input can be received.

The BLINE macro ANSWER parameter must be coded YES. Only auto-answer is supported by BTAM for the 2741. Switched line auto-call parameters are not applicable to this terminal. For the BLINE macro, the ANSLIST and CALLIST parameters are not to be coded.

For dial-up terminals, the BTERM macro BLK2741 parameter may be coded YES to provide message blocking based upon use of the carriage return and ATTN keys, as follows:

- If the terminal operator depresses the carriage return key at the end of a line (NL EOT transmitted--X'1537'), the message is held in storage and appended to any previous input message.

- If the terminal operator depresses the ATTN key at the end of a line, "End of Message" (EOT only) is signaled and that message (appended to any previously accumulated messages) is directed to the appropriate subsystem.

While message blocking is being performed, no output messages are written. If the line is disconnected while blocking is being performed, all message segments must be retransmitted.

BLK2741=NO indicates that either the carriage return or the ATTN key is to be interpreted as end-of-message.

3.4.2 Installation Procedures

1. Update the member SETENV and reassemble the following Front End modules:

   BTAMLINE
   BLHIN
   BLHOT
   BMH000
   TPUMSG
   PMI2741

2. Code the Front End and Back End tables, as defined in Figure 18.

   Do not define buffers for the LINEGRP macro, as an input area is acquired for each read. The length of the area is set to 128 (line-length rounded to next doubleword) via a local global (&BUFSZ) in PMI2741.

3. Include the module PMI2741 in the Intercomm linkedit. PMI2741 has a local global, &DEBUG, which, if set to 1, produces a Snap 113 to dump the save/work area, BLINE, BTERM, and the message area (except when executing a Write Disconnect for a switched line). To implement this feature, set the global on in PMI2741 and reassemble and linkedit the module.

4. There are three different transmission codes for IBM 2741 terminals. Code the appropriate translate table using the ASMTRTAB macro. Figure 17 provides suggested translate table modifications; adjust the ORG values according to the translate code used.

```
TR2741   DS    0F                  INPUT TRANSLATE TABLE
         ASMTRTAB RF41
         ORG   TR2471+X'5D'
         DC    X'BB'               ZAP BS TO INTERCOMM BACKSPACE
         ORG
TS2741   DS    0H                  OUTPUT TRANSLATE TABLE
         ASMTRTAB SD41
         ORG   TS2741+X'26'
         DC    X'5E'
         ORG   TS2741+X'37'
         DC    X'5E'               ZAP EOT AND EOB TO IDLES
         ORG
```

Figure 17. IBM 2741 Translate Table Modifications

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&IBM2741	SETB	1 if leased line
&DL2741	SETB	1 if dial-up line
&DIALUP	SETB	1 if dial-up line
&CONVER	SETB	1 conversational processing to be used
&IDLES	SETB	1 idles feature in use
*&BACKSPC	SETB	1 if backspacing feature used
LINEGRP	DDNAME	DD-statement-reference
	UNIT	2741
	NUMLN	n
	*OPTION	BTAM (default)
	*EROPT	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM2741 (leased line); DIAL2741 (dial-up)
	*OPTION	BTAM (default)
	TRSTBL	TR2741 (translate-table-label)
	DIALTRM	n (dial-up)
	FIRSTRM	terminal-ID of first subordinate BTERM macro (dial-up)
	ANSWER	YES (dial-up)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n (must be unique for dial-up)
	HARDCPY	YES
	DILID	ID coded in EBCDIC that is sent from terminal (dial-up)
	*ALT	alternate terminal-ID
	*TPUP	YES (if on-line at startup); NO (if not)
	*BLK2741	YES if message blocking feature (logical) to be used (dial-up)
TR2741	EQU	* IBM 2741 TRANSLATE TABLE
	ASMTRTAB	refer to Section 3.4.2 (Number 4)
BDEVICE	TERMTYP	IBM2741 (leased line); DIAL2741 (dial-up)
	OPl	06 (for dial-up); 82 (for leased line)
	IDLES	YES (or 10)
	*CRLF	NO (default)
	*BACKSP	YES (if logical backspace feature in use)
	*MAXERR	n (default=3) maximum I/O error retries
*=Optional		

Figure 18. IBM 2741 Specifications (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,IBM2741)
DEVICE	TYPE	IBM2741
	BUFSIZE	n (maximum number lines in one message times 120)
	LEN	120
	FIRST	NO
	*CHAR	NL (default)
	*EOB	YES (default)
	EOT	NO
	CRT	NO
*=Optional		

Figure 18. IBM 2741 Specifications (Page 2 of 2)

3.5 IBM 2770 DATA COMMUNICATION SYSTEM

The Intercomm BTAM Front End supports IBM 2770 and IBM 3780 device configurations on leased point-to-point and multipoint lines. The 3780 must be defined to Intercomm as a 2770.

3.5.1 Device Control Characters

For multipoint lines, component polling and selection (addressing) characters are provided by the POLL and ADDR parameters in each BTERM macro. Polling parameters must be coded for the associated BLINE macro. For point-to-point lines, component selection may be provided in the Front End tables via the STCHAR parameter of the BDEVICE macro (code one per component) or inserted when the message is formatted in the Back End (when only one BTERM defined). For the latter case, code only STCHAR=02 to provide the STX value with which all output messages must begin.

Escape (ESC) control sequences for a printer or CRT (IBM 2265) component must be inserted in the Back End when a message is formatted.

3.5.2 IRS Processing

If the global &IRS is set to 1 in the SETENV, Interchange Record Separator processing is forced for input messages. This means that input formatting is performed if (card-image) records are shortened for input transmission by use of the IRS control character. Such records (up to 80 characters) are low-order padded with blanks to expand them to 80 character records. Up to a maximum of six records in one message are expanded. Each 80-character record in the resultant input message is separated by a New Line (X'15') character.

3.5.3 Segmented Message Processing

Standard bisync terminal processing specifies that input blocks (1 block=1 transmission buffer) are to be accumulated until receipt of an ETX indicates end-of-message. The accumulated message is then queued for the appropriate subsystem. However, if it is desired that each input block (of up to 128 or 256 characters) be queued as a separate message, set the global &BSCSGMT to 1 in SETENV and re-assemble BLHIN. This feature then applies to all 2770 input processing. (CRT components may not be used.) Message segment position is indicated by the MSGHQPR field in the Intercomm message header, and should be tested by the processing subsystem for header, detail, or final segment, or full message indication. This feature is not available if there are any remote 3270 terminals defined in the network.

3.5.4 Installation Procedures

Installation procedures for 2770 devices are as follows:

1. Update the member SETENV and reassemble the required BTAM Front End modules and BTVERIFY (if included in Intercomm linkedit).

2. Code Front End and Back End tables as outlined in Figure 19.

There are no special linkedit considerations.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&IBM2770	SETB	1
&BISYNC	SETB	1
&BUFFERS	SETB	1
*&BSCSGMT	SETB	1 suppress segmented input collection
*&IRS	SETB	1 if input Interchange Record Separator processing desired
*&DUALCOM	SETB	1 if point-to-point dual communication interface between 2770 and 2780 in use
LINEGRP	DDNAME	DD-statement-reference
	UNIT	2770
	OPTION	BISYNC
	NUMLN	n
	BUFNO	n (2 x number of BLINEs if BUFL=136 or 264)
	BUFL	136 (or 264 if Extended Buffer used)
	*CODE	refer to DCB description in OS/VS BTAM
	*MODE	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
	*EROPT	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM2770
	OPTION	BISYNC
	*NUMAC	4 (if multipoint line)
	*POLLIST	POLLIST-macro-label (if multipoint line)
	*BUFTM	n
	*TRSTBL	translate-table-label(if transmission in USASCII)
	*POLTM	n (if multipoint line)
	*AUTO	YES (if multipoint)
	*WRTM	n
	*WRTONLY	YES (if only write to terminal)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	*HARDCPY	YES if component device not a CRT NO if component device is a CRT
	*CRT	YES (if component device is a CRT)

*=Optional

Figure 19. IBM 2770 Specifications (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BTERM (contd.)	*POLL	if multipoint: four-character sequence in the form ddddccenq, where: dd=alphabetic terminal poll character (upper case--coded twice); cc=component select character; enq=2D (EBCDIC); 05 (ASCII)
	*ADDR	if multipoint: same as POLL except dd value coded in lower case
	*TPUP	YES (if on-line at start-up); NO (if not)
	*AUTOUP	YES (if desired)
	*ALT	alternate terminal-ID
	*LOCK	verb
BDEVICE	TERMTYP	IBM2770
	OP1	82
	*CRLF	NO (default)
	*CHPS	n (if component not CRT)
	STCHAR	02 (STX) or 0227xx where xx is the component select character (DC1/DC2/DC3) if point-to-point
	*EXTCHR	0 (default--STX bypassed automatically)
	*UPINTV	n (if AUTOUP=YES in BTERM)
	*MAXERR	n (default=3) maximum I/O error retries
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,IBM2770)
DEVICE	TYPE	IBM2770
	*CRT	YES (if component is a CRT)
	LEN	n
	BUFSIZE	n (128/256/512)
	FIRST	NO
	*CHAR	NL (default)
	*EOB	YES (default)
	EOT	NO
*=Optional		

Figure 19. IBM 2770 Specifications (Page 2 of 2)

3.6 IBM 2780 TERMINALS

The Intercomm BTAM Front End supports the IBM 2780 on leased point-to-point and multipoint lines. The switched 2780 is supported as a remote CPU (see Section 3.11).

3.6.1 Input Message Processing

Two facilities are available for processing input segments: segment accumulation; and deblocking of each segment into card image messages. These two features are mutually exclusive.

Segment accumulation processing is performed if the global &BLK2780 is set on; otherwise each segment is queued as a separate message. Deblocking of each segment for card input messages is performed if the global &RDR2780 is set on. In addition, if the global &EM is also set on, short length card input is processed (that is, EOM is tested). Otherwise, each segment is divided into 80-character messages. If deblocking is invoked, the terminal should be locked to a verb, so that each card does not need to start with a verb and system separator. EOFMSG processing may also be specified via the BTERM macro EOFMSG parameter.

3.6.2 Output Message Processing

Two character ESC sequences for printer control at the beginning of a message must be inserted in the Back End coding via the user subsystem when creating the output message or via Output Utility report coding (ITEM macro CODE=254)

3.6.3 Installation Procedures

Installation procedures for leased IBM 2780 support are as follows:

1. Update the member SETENV and reassemble the required Front End modules. Reassemble the following modules if included in the Intercomm linkedit:

   BTVERIFY
   ERRSTATS

2. Code the Front End and Back End tables as outlined in Figure 20.

3. There are no special linkedit considerations.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&IBM2780	SETB	1
&BISYNC	SETB	1
&BUFFERS	SETB	1
*&DUALCOM	SETB	1 if point-to-point dual communication interface between 2770 and 2780 in use
*&RDR2780	SETB	1 if deblocking of card reader input
*&EM	SETB	1 if EOM feature in use for short length input card segments
*&BLK2780	SETB	1 for segmented input accumulation
LINEGRP	DDNAME	DD-statement-reference
	UNIT	2780
	OPTION	BISYNC
	NUMLN	n
	BUFNO	n (2 x number of BLINEs if BUFL=408)
	BUFL	n (408 recommended)
	*CODE	refer to DCB description in OS/VS BTAM
	*MODE	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
	*EROPT	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM2780
	OPTION	BISYNC
	*TRSTBL	translate-table-label (if transmission not in EBCDIC)
	*NUMAC	3 (if multipoint)
	*AUTO	YES (if polling)
	*POLLIST	POLLIST-macro-label (if multipoint)
	*POLTM	n (if polling)
	*WRTONLY	YES (if no card readers)
	*BUFTM	n
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	HARDCPY	YES
	*TPUP	YES
	*AUTOUP	YES (if desired)
	*ALT	alternate terminal-ID
*=Optional		

Figure 20. Leased IBM 2780 Specifications (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BTERM (contd.)	*POLL	three-character sequence (if multipoint)
	*ADDR	three-character sequence (if multipoint) For ADDR and POLL values code in transmission code of the device in the sequence described in the OS/VS BTAM.
	*EOFMSG	YES (if end-of-input message desired)
	*LOCK	verb (if EOFMSG=YES)
BDEVICE	TERMTYP	IBM2780
	OP1	82
	CHPS	
	*UPINTV	n (if AUTOUP=YES coded in BTERM)
	*CRLF	NO (default)
	*CTCHAR	n
	STCHAR	02 (STX); or 0227 plus component select sequence if desired (point-to-point)
	*EXTCHR	1
	*MAXERR	n (default=3) maximum I/O error retries
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,IBM2780)
DEVICE	TYPE	IBM2780
	*CRT	NO (default)
	LEN	80 (card punch) or 80/120/144 (printer)
	BUFSIZE	n (400=maximum)
	FIRST	NO
	CHAR	NL (printer); NO (card punch)
	*EOB	YES (default); NO (if more than one record per message)
	EOT	NO
*=Optional		

Figure 20. Leased IBM 2780 Specifications (Page 2 of 2)

3.7 IBM 1030 DATA COLLECTION SYSTEM

The IBM 1030 is supported on leased point-to-point and multidrop lines. Installation procedures are standard. Figure 21 outlines the coding specifications.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&IBM1030	SETB	1
LINEGRP	DDNAME	DD-statement-reference
	UNIT	1030
	*OPTION	BTAM (default)
	NUMLN	n
	BUFNO	n
	BUFL	n
	*LERB	refer to DCB description in OS/VS BTAM
	*EROPT	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM1030
	*OPTION	BTAM (default)
	NUMAC	1
	POLLIST	POLLIST-macro-label
	*POLTM	n (if AUTO=NO)
	TRSTBL	ASMTRTAB-macro-label
	*AUTO	YES
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	POLL	dd device-identifier-character
	TPUP	YES
	*LOCK	verb
BDEVICE	TERMTYP	IBM1030
	OP1	02
	EXTCHR	1 delete EOA
	*NUMCOL	n (number of Badge Reader Columns)
*=Optional		

Figure 21. IBM 1030 Data Collection System Specifications

3.8 IBM 1050 DATA COMMUNICATION SYSTEM

Intercomm BTAM Front End supports the IBM 1050 on leased and dial-up (1052 input only) lines.

Installation procedures are standard. For switched lines, reassemble and include BDIAL in the Intercomm linkedit. Figure 22 lists the coding specifications.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&IBM1050	SETB	1 1050 system in use (leased)
*&DIALUP	SETB	1 if dial-up
*&BACKSPC	SETB	1 if backspace feature in use (1052)
*&IDLES	SETB	1 if idles feature in use (1053)
LINEGRP	DDNAME	DD-statement-reference
	UNIT	1050
	*OPTION	BTAM (default)
	NUMLN	n
	BUFNO	n
	BUFL	n
	*EROPT	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	DIAL1050 for dial-up; IBM1050 for leased line
	*OPTION	BTAM (default)
	TRSTBL	translate-table-label
	NUMAC	2 (leased)
	POLLIST	POLLIST-macro-label (leased)
	*POLTM	(leased and switched)
	*AUTO	leased
	*WRTONLY	leased
	*WRTM	leased
	*RDONLY	leased
	ANSWER	dial-up
	DIALTRM	dial-up
	FIRSTRM	dial-up
	ACALL	dial-up
	*ANSLIST	dial-up (required if ANSWER=YES)
*=Optional		

Figure 22. IBM 1050 Data Communication System Specifications (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n dial-up requires dedicated queue
	POLL	two-character poll sequence ddcc, where: dd=terminal identifier; cc=input component identifier
	ADDR	two-character address sequence in same form as POLL, for output component selection (leased)
	HARDCPY	YES (leased)
	*ALT	alternate terminal-ID
	*TPUP	YES
	*LOCK	verb
	DILID	required for dial-up
	POLLSEQ	(see POLL/ADDR) dial-up
	*CINTVL	dial-up
	*ACALL	dial-up
	*PHONE	dial-up
BDEVICE	TERMTYP	IBM1050 for leased; DIAL1050 for dial-up
	OP1	02
	*CRLF	NO (default)
	EXTCHR	1 (leased and switched)
	*CHPS	14 (leased)
	*MAXERR	n (default=3) maximum I/O error retries (leased); maximum Read time-outs (switched)
	*STCHAR	
	*IDLES	n (1053 printer component)
	*BACKSP	YES (1052 keyboard)
*=Optional		

Figure 22. IBM 1050 Data Communication System Specifications (Page 2 of 2)

3.9 IBM 3735 TERMINALS

The IBM 3735 is supported for switched lines by the Intercomm BTAM Front End. The line handler is PMI3735S.

Only auto-call (CPU dials terminal) processing is supported. The PHONE parameter (the telephone number) and ACALL=YES must be coded for each 3735 BTERM. The CINTVL parameter of the BTERM macro defines the interval between calls. A terminal is not called if it is not active.

If the operator is still in the process of entering data when the terminal is called, the terminal does not answer the dial (in local mode). In this case, the terminal is called once more after at least one-fourth the normal time interval specified via the BTERM macro CINTVL parameter has expired. If still no answer, the terminal is put down. The 3735 answers only when the terminal operator finishes data input and puts the terminal into communicate mode.

When a called terminal does not have any data to transmit, and there is no data to be sent from the CPU to the IBM 3735, a terminate-communicate message is sent and the terminal is disconnected, leaving it in local mode.

A message compression routine (OUT3735), two on-line subsystems (FDPSEND and CPUIDSND), and a utility program (FDPLOAD) are provided in conjunction with 3735 support. Additional table coding is required, as discussed below.

3.9.1 Input Message Processing

Intercomm support of the IBM 3735 switched point-to-point terminals involves the following application program considerations. Application subsystems receive messages logically deblocked, that is, each message ending with X'26' constitutes a logical message. The application program might write each message temporarily to a data set without any processing until it receives an end-of-file message in the form "Verb,EOF". This message is automatically sent by PMI3735S to denote to the application program that the 3735 has sent an EOT. If the terminal is put down via TDWN command while reading message segments, the request will not be recognized until all reads are completed.

This application program logic is recommended because if at any time during transmission there was an unrecoverable I/O error and the line had to be disconnected (disabled), the IBM 3735 would reset its internal disk to the very beginning of the data it was in the process of transmitting, rather than retransmitting the block at which transmission failed.

If transmission fails during reading from the terminal, that is, if any unrecoverable I/O error occurrs, the application program is sent the message "Verb,ABORT". When an application program receives such a message to indicate that the read operation was aborted, the application program does not need to process the input it received from the terminal during that transmission; the IBM 3735 retransmits all the data when reconnected.

The IBM 3735 BTERM must always be locked to a verb. If a BTERM is not locked to a verb, a pseudo verb, '3735', is appended to the input message before queuing. This provides the facility to handle input in more than one way. That is, the input can be routed to more

than one subsystem or routine depending on terminal ID or message content. To use this facility, a subsystem for the verb '3735' must be coded and included with the linkedit.

3.9.2 Output Message Processing

OUT3735 is an on-line routine which is used to compress messages going to a 3735 terminal. Compression is done by field. Fields are separated by FS characters (X'1C'), which are inserted either by the user processing subsystem or by the Output Utility via its report tables.

To use the Output Utility to insert the FS characters, ITEM macros with an item code of 254 or 255 and DATA=(X'1C') must be coded following each ITEM macro for a data field, as for example:

```
ITEM FROM=10,TO=20,CODE=5
ITEM CODE=254,FROM=21,TO=21,DATA=(X'1C')
```

The routine is called from the Front End module BMH000 before transmission of the message to the terminal, and is normally resident in the transient overlay region. If the resultant message is longer than 478 characters, it is broken up by PMI3735S into 476-byte segments (plus start and ending characters) for output transmission.

If all output queued for a terminal is successfully transmitted, a terminate-communicate message is sent by PMI3735S as the last message from the CPU, which forces the IBM 3735 operator to revert to Local Mode. The Local Mode light on the IBM 3735 console indicates to the IBM 3735 operator that the terminal has completed receiving data which can now be printed out. If output was being sent to the IBM 3735, and the line has to be disabled due to an unrecoverable I/O error, a terminate-communicate message is sent and the terminal is immediately put down.

3.9.3 Special Subsystem Support

FDPSEND is a subsystem which is used to send FDPs to any one or to all 3735 terminals. A table of specific FDPs and associated terminals, FDPTABL, must be coded by the user. The message that activates FDPSEND may be sent by the user subsystem or may be entered from the control terminal, as follows:

```
FDPS[$LIST][${tpuid}]@
           [ {ALL  }]
```

where:

- $ indicates the system separator character.
- @ indicates the end of message sequence.

- LIST specifies that the FDPs associated with the specified terminal (or with all terminals) are to be listed, rather than actually being sent. If LIST is omitted, the FDPs are actually sent.

- tpuid indicates a specific 3735 terminal ID. The default is ALL terminals.

FDPLOAD, a utility program, converts FDP members in a PDS into a BDAM data set, which is used by the FDPSEND subsystem. The member names of the FDPs, coded by the user and preloaded to the PDS, must be FDP00nnn, where nnn is a three-digit decimal number from 001 to 157. Each FDP must start with four caret marks (DC 4C'<') to indicate to the line handler that the output is an FDP. The first block of the BDAM data set contains control information, as follows: the first two bytes contain the maximum number of FDPs in the data set (in binary); the remainder of the block contains up to 158 three-byte binary numbers, each of which represents the starting RBN of the associated FDPs in the data set, or zero, if none is loaded with that number.

The following JCL is required to run the FDPLOAD utility:

```
//LOADFDP   JOB...
//JBSTEP    EXEC    PGM=FDPLOAD,PARM='NFDP=nnn'
//STEPLIB   DD      DSN=INT.MODREL,DISP=SHR
//SYSPRINT  DD      SYSOUT=A,DCB=BLKSIZE=multiple-of-133
//SYSLIB    DD      DISP=OLD,
//                  DSN=fdp-pds-name
//FDP000    DD      DCB=(DSORG=DA,BLKSIZE=476,RECFM=F),
//                  SPACE=(476,(xxx,yy)),DISP=(,KEEP),
//                  DSN=loaded-fdp-data-set-name,UNIT=uuu,
//                  VOL=SER=vvvvv
```

where NFDP=maximum number of FDPs, between 1 and 157.

CPUIDSND is a subsystem which is used to send a list of CPU IDs defined by the user in the table CPUIDTBL to any one or to all 3735 terminals. The message that activates CPUIDSND should be entered from the control terminal, as follows:

$$\text{CPUD}\left\{\begin{array}{c}\${tpuid}\\ \underline{\text{ALL}}\end{array}\right\}@$$

3.9.4 Installation Procedures

1. BTVERB macros must be coded for the FDPSEND and CPUIDSND subsystems. For example:

```
FDPSEND   BTVERB  VERB=FDPS,SSCH=000,SSC=P,EDIT=NO
CPUIDSND  BTVERB  VERB=CPUD,SSCH=000,SSC=C,EDIT=NO
```

2. SYCTTBL macros must be coded for the subsystems. For example:

```
FDPSEND   SYCTTBL  LANG=RBAL,SBSP=FDPSEND,OVLY=nn,
                   SUBH=000,SUBC=P,DFLN=queue-ddname,
                   PCEN=xx,BLRI=F,NUMCL=2,MNCL=2,
CPUIDSND  SYCTTBL  LANG=RBAL,SPSP=CPUIDSND,OVLY=nn,
                   SUBH=000,SUBC=C,DFLN=queue-ddname,
                   PCEN=xx,BLRI=F,NUMCL=2,MNCL=2
```

   These subsystems should not be resident. For FDPSEND, NUMCL should be at least 2, and MNCL should be no greater than 2. The FDPSEND subsystem should not be in the same overlay group as the Output Utility.

3. An FDPTABL must be coded. The FDPTABL defines the terminals eligible to receive FDPs and specifies the associated list of FDPs which are to be transmitted. Each list of associated FDPs starts with a halfword giving the number of FDPs in the list. The table is coded as a separate CSECT and must be either resident or included in the same overlay group as the FDPSEND subsystem. The table is coded as follows:

```
FDPTABL   CSECT
          DC      CL5'tpuid',AL3(FDPLST01)
          .
          .
          DC      CL5'tpuid',AL3(FDPLSTnn)
FDPLST01  DC      Y((FDP01E-FDP01S)/2)      number of fdps in list
FDP01S    DC      AL2(fdp1,fdp2,...,fdpn)   list of fdp numbers
FDP01E    EQU     *                         delimits 1st entry assoc-
          .                                 iated with first tpu
          .
FDPLSTnn  DC      Y((FDPnnE-FDPnnS)/2)      last entry
FDPnnS    DC      AL2(fdp1,fdp2,...,fdpn)
FDPnnE    EQU     *
          END
```

A maximum of 254 different IBM 3735 terminal-IDs (tpuid) may be specified. An FDP list may contain no more than 157 FDP numbers. A tpuid may appear only once. More than one tpuid entry may point to the same FDP list.

4. A CPUIDTBL must be coded. This table gives the terminal names and lists of CPU IDs to be sent to each terminal. Each list of CPU IDs begins with a halfword giving the length of the list. The table is coded as a separate CSECT and must be either resident or included in the same overlay group as the CPUIDSND subsystem. The table is coded as follows:

```
CPUIDTBL    CSECT
            DC      CL5'tpuid',AL3(CPULST01)
            .
            .
            .
            DC      CL5'tpuid',AL3(CPULSTnn)
CPULST01    DC      Y(CPU01E-CPU01S)        length of id list
CPU01S      DC      AL2(cpuid),AL1(FS)      CPU id followed by FS
            .
            .
            .
CPU01E      EQU     *
            .
            .
            .
CPULSTnn    DC      Y(CPUnnE-CPUnnS)        last entry
CPUnnS      DC      ...
            .
            .
            .
CPUnnE      EQU     *
FS          EQU     X'1C'                   field separator character
            END
```

where:

- cpuid is an allowable CPU ID; may be up to 15 characters (30 hex digits). Each must be delimited by a field separator.
- FS is the field separator character (X'1C').

Any number of entries may be coded. A tpuid may appear only once in the table. More than one entry may point to the same cpuid list.

5. In addition to the required Front End modules, the following modules must be assembled and linkedited:

```
FDPSEND
FDPTABL
CPUIDSND
CPUIDTBL
OUT3735
PMI3735S
```

6. A DD statement with the DDNAME FDP000 must be added to the Intercomm execution JCL for the BDAM data set containing the loaded FDPs. Also code DCB=DSORG=DA.

Figure 23 gives coding specifications for the IBM 3735. Do not code BUFL or BUFNO in the LINEGRP macro.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&DIALUP	SETB	1
&IBM373S	SETB	1
LINEGRP	DDNAME	DD-statement-reference
	UNIT	373S
	OPTION	BISYNC
	NUMLN	n
	*MODE	refer to DCB description in OS/VS BTAM
	*CODE	refer to DCB description in OS/VS BTAM
	*EROPT	refer to DCB description in OS/VS BTAM
	*LERB	refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM373S
	OPTION	BISYNC
	DIALTRM	n
	FIRSTRM	terminal-id
	ACALL	YES
	*TRSTBL	translate-table-label
BTERM	TERM	terminal-id
	DEVIND	
	QNUM	n (must be unique)
	*LOCK	verb
	*TPUP	YES
	*AUTOUP	
	PHONE	
	HEXID	
	CINTVL	n
	ACALL	YES
	DILID	
BDEVICE	TERMTYP	IBM373S
	OP1	8E
	STCHAR	02
	*UPINTV	n
STATION	TERM	terminal-ID
	*ALT	alternate-terminal-ID
	IOCODE	(3,IBM3735)
DEVICE	TYPE	IBM3735
	LEN	130
	BUFSIZE	476
	*CRT	NO (default)
	*FIRST	YES (default)
	*CHAR	NL (default)
	*EOB	YES (default)
	*EOT	YES (default)
*=Optional		

Figure 23. Switched IBM 3735 Specifications

3.10 IBM 7770 AUDIO RESPONSE UNIT

The IBM 7770 Audio Response Unit on switched lines is supported under the Intercomm BTAM Front End. The line handler is PMI7770S. A feature is available by which an operator can call from any telephone to receive output messages queued for that terminal without having to input a verb, specified via the BLINE macro WRTONLY parameter.

3.10.1 Canned Messages

Input-output operations are normally started by issuing a READ INITIAL (READ TI). However, if a canned message is to be sent upon dial-up connection, a WRITE INITIAL (WRITE TI) followed by a READ CONVERSATIONAL (READ TT) must be executed. To accomplish this, the ANSLIST parameter of the BLINE macro must point to a parameter list for the canned message coded in the Front End Network Table, after the network configuration tables. For example, if ANSLIST=CANNED is specified, the canned message is coded in the following form:

```
CANNED   DS    OH
         DC    Y(MEND-MSTART)
MSTART   DC    X'message in hex-chars'
MEND     EQU   *
```

3.10.2 Application Programming Considerations

If a subsystem is to write messages to the 7770, it must use the MSGHUSR field of the message header to specify the operations to be performed by the line handler. MSGHUSR is a one-byte field which may be set to a value X'00' through X'FF' to indicate the number of times the message is to be repeated, or to indicate other operations as follows:

MSGHUSR Value	Operations
X'00'	Write and disconnect
X'4C' (=C'<')	Write and then read
X'5B' (=C'$')	Write conversational, messages to follow
X'5C' (=C'*')	Write and disconnect
X'FF'	Repeat the message until the caller hangs up

X'4C' (write and then read) may be used in conjunction with the &REPET77 global in SETENV to permit the operator to request retransmission of a message. If X'4C' is specified, and the operator replies (within the hardware time-out limit) with the message repeat character specified via &REPET77, the message is transmitted again. Otherwise processing continues normally.

The text portion of all messages passed to the line handler must be preceded by two silence characters (X'00'). These are appended automatically if specified in the BDEVICE macro, STCHAR parameter.

3.10.3 Installation Procedures

1. Update the member SETENV and reassemble the Front End modules.

2. Code the Front End macros as outlined in Figure 24. Do not define BUFNO or BUFL for the LINEGRP macro, as an input area is acquired for each read by PMI7770S.

3. The Intercomm TRAN3270 table or a user-supplied input Translate Table may be used to convert lowercase characters to uppercase. The Translate Table must be followed by PMISTOP. There is no output Translate Table for the IBM 7770. However, the user may code an output Translate Table which converts all valid codes to themselves and converts all invalid codes to the silence character (X'00'). In this case, the output Translate Table should immediately follow the input Translate Table without an intervening PMISTOP.

4. The Intercomm interregion SVC is required. (See the Operating Reference Manual.)

5. The following modules must be included in the Intercomm linkedit:

   - PMIZPDEB--This routine alters the DEB address and uses the following parameter list:

```
PARMLIST DS    0F
         DC    C'INT'
         DC    A(DCB-addr)
         DC    A(channel-end-appendage)
         DC    A(DDM)
```

   - IGG019YX--The IBM 7770 channel end appendage

- IGG01977—IBM 7770 DDM
- PMI7770S--Line Handler for the IBM 7770

  Within PMI7770S, the local global, &BLKSIZ, is declared. This variable defines the maximum buffer size for a read operation. The value of &BLKSIZ is 104, which may be changed by replacing the card at sequence number 00004000 with a SETA for the appropriate size.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&DIALUP	SETB	1
&IBM7770	SETB	1
&REPET77	SETC	c code the character to be used for repetition requests by the terminal operator.
LINEGRP	DDNAME	DD-statement-reference
	UNIT	7770
	NUMLN	n number of associated BLINEs
	*OPTION	BTAM (default)
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	IBM7770
	*OPTION	BTAM (default)
	*TRSTBL	translate-table-label
	FIRSTRM	
	DIALTRM	
	ANSWER	YES
	*ANSLIST	canned-message-address
	*WRTONLY	YES to receive queued output only
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n dial-up requires dedicated queue
	LOCK	verb
	TPUP	YES or NO. If TPUP=NO is specified, the terminal does not have to be explicitly locked to a verb. A LOCK command may be issued prior to bringing up the terminal with a TPUP.
BDEVICE	TERMTYP	IBM7770
	OP1	82 (this is a dummy value not used)
	STCHAR	0000 (two silence characters)
*=Optional		

Figure 24. IBM 7770 Specifications

3.11 REMOTE CPU SUPPORT

Remote CPUs, the IBM 360/370 and data collection/RJE devices are supported as a terminal using standard Bisync leased (BSC1) or switched (BSC2) point-to-point line protocol. The switched 2780 is also supported as a switched CPU. Communication is possible with these devices for data transmission or as interactive terminals, provided they are software-compatible with IBM BTAM support for Bisync line protocol devices. The line handlers are BSCLEASE for leased CPU devices and BSCDIAL for switched CPU devices (and the switched 2780).

Hardware features supported for switched lines include auto-call (automatic or manual dialing) and automatic answering. Calling of terminals may be controlled by a combination of BLINE and BTERM parameters and the TPUP/TDWN system control commands. Calling of devices with output queued (if the terminal is active) takes precedence over issuing a READ Initial to wait for a terminal to dial. Manual answering and modems which do not provide the data tone are not supported for switched lines. Leased line CPU configurations are point-to-point.

Both transparent and non-transparent modes are supported for either type of line. Segmented message processing is also supported for both types of lines (specified via the BDEVICE macro parameter BSCSGMT). TPUP/TDWN commands are supported. For switched lines, TDWN forces an immediate disconnect of a connected device. When a connection is established via automatic answering, a terminal which is down is automatically brought up via an internally-generated TPUP. However, a terminal which is down is not called by the CPU, even though output messages are queued, until an external TPUP is issued.

3.11.1 Message Format

Standard Intercomm message format is used for both input and output. However, consideration must be given to the creation of transparent output. Transmission is performed in transparent mode only if the first byte of text in the output message is a DLE control character. Therefore, a user generating transparent output must cause insertion of the DLE by one of the following:

- The subsystem creating the output
- The Output Utility (ITEM macro CODE=254 in the Report)
- The first byte of the BDEVICE macro, STCHAR parameter specified as DLE.

3.11.2 End-of-Transmission Message

If the terminal is used as a data transmission device and is locked to a verb, the subsystem may be notified of an end of input condition via a special message of the following format:

verb$*EOT@

where $ represents the system separator character and @ represents an EOB (end-of-message) character.

This facility can be specified at assembly by coding EOFMSG=YES and LOCK=verb on the BTERM macro, or at execution time with the LOCK verb, using the EOF parameter. If this facility is requested, the EOF message is also generated if a permanent I/O error occurs and/or the terminal or line is put down (whether or not any messages were read and previously queued for the associated subsystem).

3.11.3 Disconnect After One or More Turnarounds

Normally, a switched line connection is not broken until three EOTs are sent and received with no intervening exchange of data, so that the connection is maintained as long as there is data to be transmitted in either direction. (Delay between each EOT exchange can be requested by coding the BUFTM parameter for the associated BLINE as a non-zero value. This allows time for a response to input to be queued.) However, a terminal can be restricted to one line-turnaround (that is, one EOT received or sent per connection) by coding ONETURN=YES on the BTERM macro. The terminal remains up after disconnect if EOT exchange processing completes successfully. The switched IBM 2780 responds to EOT with a read time-out, which is ignored; processing is performed as if an EOT has been received.

3.11.4 Reverse-Interrupt Transmission

The system control command RVRS is provided to determine when the next Read is to transmit an RVI (reverse interrupt) in place of the standard acknowledgment for text received. This is a bisync line control convention which requests the remote terminal to stop sending data and to send an EOT as soon as possible. The RVRS verb specifies the terminal which has priority output queued, and causes that terminal to be flagged.

For a leased line device when the EOT is received, queued output is transmitted before another read is issued. For switched lines, all lines in the line group which are receiving data from remote terminals continually check for an RVI request. A line detecting an RVI request transmits an RVI to the terminal currently sending input; processing

continues to be normal until an EOT is received. At this point the terminal flagged for priority output is checked to determine if another line in the line group is already connected to it. If not, and if the connected terminal is not the device flagged for priority output, it is disconnected. The flagged terminal is then called for transmission of output. (ACALL=YES must be specified in the BTERM.)

3.11.5 Leased Line User Exit--USRBSCEX

A user exit routine is called by the leased line handler (BSCLEASE) at certain decision points to allow the user to override standard I/O error actions. The exit can use Intercomm system macros and can call any Intercomm service routine. If placed in transient overlay, it must observe restrictions on CALLs to other transient overlay modules. In general, keep processing brief, as the line is inactive while the exit is in control. A return code is placed in Register 15. Reason codes, return codes and actions are described in Figure 25. If no exit is defined or if a return code of zero is issued by the user exit, the standard Intercomm action is taken. The exit must be named USRBSCEX, and is called by BSCLEASE with the following parameter list:

```
F'reason-code'
A(BLINE)
A(BTERM)
A(Intercomm message)
```

- reason-code is a fullword binary number identifying the decision point. See Figure 25.

- BLINE, BTERM specifies addresses of BLINE and BTERM macro expansions in the BTVRBTB for this line, which are described by the DSECTs PLNDSECT and PTRDSECT, respectively.

- Intercomm message specifies, if writing text, the address of the Message Header followed by the text being written. Parts of the Message Header are modified; a copy of the original header can be found at the address contained in the HDRLIST field of the BLINE.

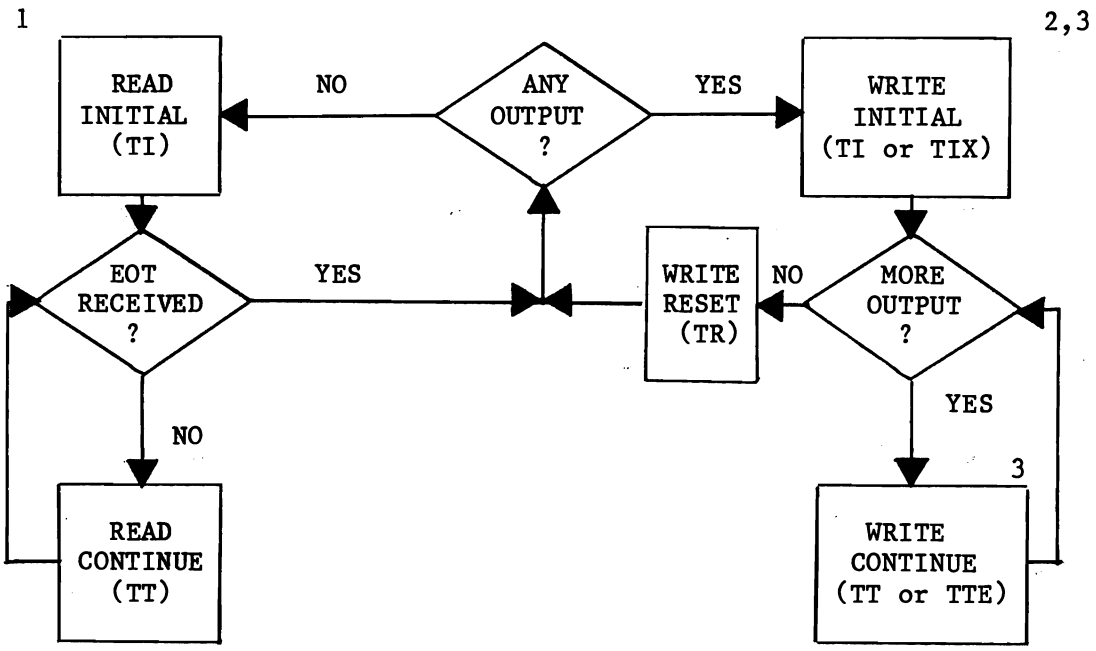
3.11.6 Line Handling for Remote CPUs

Normal bisync point-to-point line handling is performed using BTAM. Figures 26 and 27 are schematics showing the logic of the line handler relative to BTAM, giving the type of BTAM reads and writes used. These determine the channel programs with which the remote teleprocessing programs must be compatible.

These figures are not complete flowcharts. They are included only to make it possible for users to evaluate the software compability of Remote CPUs. (Refer to BTAM PLM.)

Reason Code	Decision Point	Return Codes	Actions
0	Unrecoverable Read or Write I/O error -- retry limit reached	0	Standard action: send EOT, issue read initial, dispatch RESETPL to be done 30 seconds later in case remote station takes no action. If no write to be restarted when RESETPL done, read initial is issued; line remains idle.
		4	Same as standard action except the RESETPL dispatch interval is overriden by a value (in timer units) returned in register zero. If zero is returned, no dispatch is done.
		8	Send EOT and put the line down with SPLN.
4	Data check on write text channel program --usually due to bad characters in non-transparent message.	0	Issue PMIWTO BT073I EXCP COND ID=02....; take SNAP 54; flush message in error.
		4	Rewrite message. Write done from original message area pointed to by the fourth parameter passed to USRBSCEX.

Figure 25. BSCLEASE User Exit Decision Points



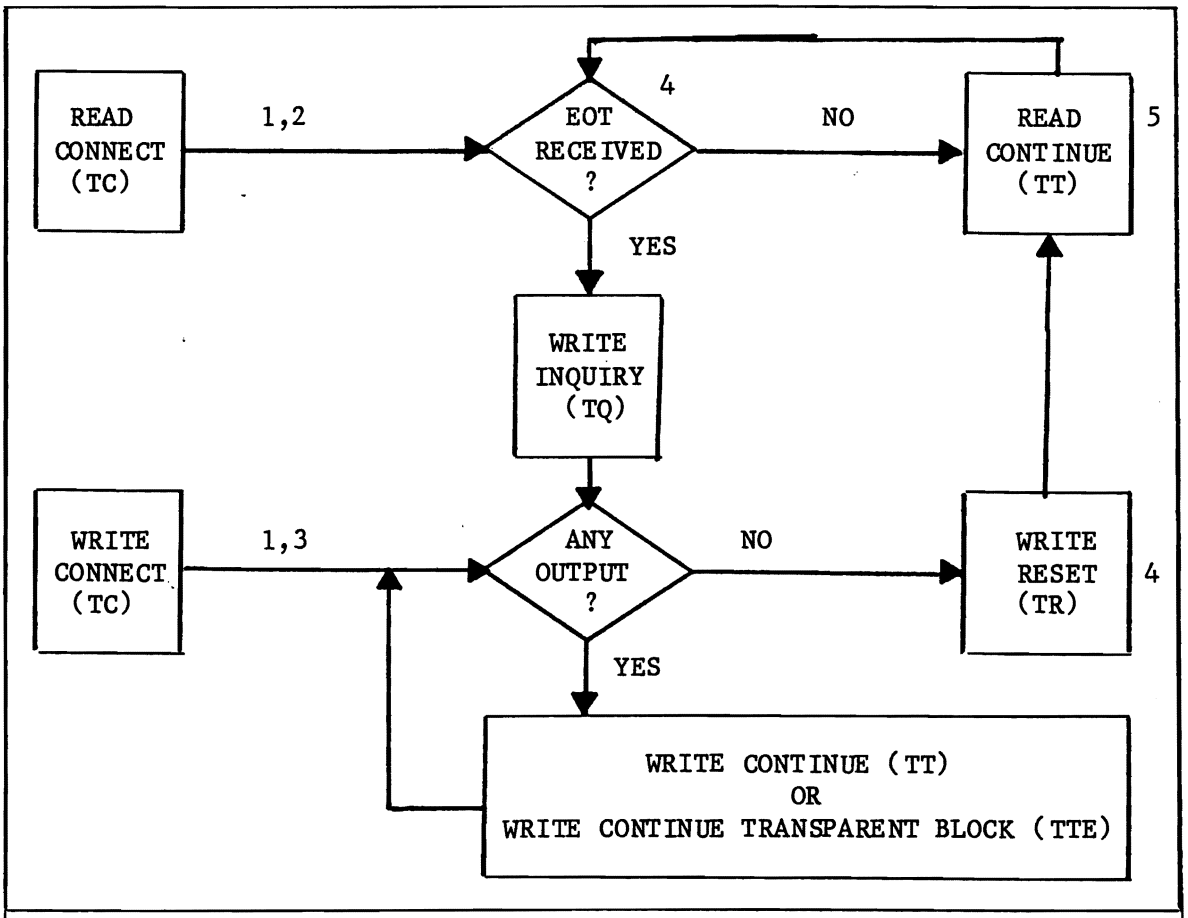
NOTES:

1. When output is queued for transmission, a RESETPL is issued to cancel a READ initial which has not begun reading text.

2. If the Intercomm CPU is defined as the SLAVE station (see LINEGRP coding), the WRITE TI may fail to gain control of the line. In this case, output is postponed and a READ TI is issued.

3. If a DLE (X'10') appears as the first byte of the output text, a WRITE TIX or WRITE TTE is issued.

Figure 26. Leased BISYNC Line Handling (BSCLEASE)



NOTES:

1. The connection is established either by calling or answering.

2. When Intercomm answers a call from a remote terminal, a unique ID must be received to identify the terminal.

3. When Intercomm dials a remote terminal, manual or automatic dialing is a line (not terminal) function.

4. If three EOTs are received with no intervening data transfer, a WRITE Disconnect (TD) is issued. If the terminal is restricted to one turnaround, a WRITE TD is issued: if answering, after one EOT is received and all output has been sent; or if dialing, after an EOT is sent and an EOT is received. Receipt or transmission of DLE-EOT always causes disconnection.

5. Under certain circumstances, this may be a Read Interrupt (TRV) to send an RVI request.

Figure 27. Switched BISYNC Line Handling (BSCDIAL)

3.11.7 Installation Procedures

1. Update the member SETENV and reassemble the following Front End modules:

   BLHIN
   BTAMLINE
   BMH000
   TPUMSG
   BSCDIAL for switched CPU
   BSCLEASE for leased CPU
   USRBSCEX (if coded)

2. Code the globals and macros as outlined in Figure 28. Coding sequences differ for switched and leased lines as noted below.

   - LINEGRP macros

     -- Separate line groups are required for different transmission codes. Transparent and non-transparent may be mixed within one line group. Lines with different transmission speeds may be mixed within one line group.

     -- For switched lines, auto and manual dial may be mixed within one line group.

   - BLINE/BTERM macros

     -- For switched lines, all BLINEs must be coded contiguously for a given line group (that is, with no intervening BTERMs) and followed by the pool of BTERMS accessing those lines. ANSWER=YES and ANSLIST (see DFTRMLST below) must be coded only if Intercomm can answer a call from the device. All BTERMs accessing the same line must use the same transmission speed.

     -- For a leased line, each BLINE must be followed by exactly one BTERM.

3. For a switched line DFTRMLST macro referenced by ANSLIST on BLINE, the following parameters are to be coded:

   SWLST,AN,n,,m,idsent-ACK0,(id-rcvd-ENQ),...

   where n is the maximum length of id-rcvd-ENQ plus 1, and m is the length of idsent-ACK0 (minimum=2). The idsent value is optional; ACK0 must be coded. ENQ is X'2D' in EBCDIC and Six-Bit Transcode, X'05' in USASCII. (See also BLINE macro, IDSENT parameter.)

The parameters userlength, controlvalue, and userdata are not permitted.

A unique id-rcvd is to be coded for each terminal calling any line referencing this terminal list. The id-rcvd value corresponds to the BTERM macro DILID parameter, and is used to identify the terminal. (If there is only one terminal, code ENQ alone.) The values idsent and id-rcvd must be coded in the transmission code of the line. ACK0 is X'1070' in EBCDIC, X'1030' in USACSII, X'1020' in Six-Bit Transcode.

For a complete discussion of DFTRMLST macro, SWLST format and switched bisync IDs, see OS/VS BTAM.

4. Include the following modules in the Intercomm linkedit.

   BSCDIAL (if switched lines used)
   BSCLEASE (if leased lines used)
   USRBSCEX (if leased line user exit coded)
   ERRSTATS (if ERRSTAT=YES coded for any BLINE or BTERM)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&BSCDIAL	SETB	1 for switched CPU
&DIAL360	SETB	1 for switched CPU
&BSCLEAS	SETB	1 for leased CPU
&IBM360	SETB	1 for leased CPU
*&DIL2780	SETB	1 for switched 2780
LINEGRP	DDNAME	DD-statement-reference
	UNIT	SYNC
	OPTION	BISYNC
	NUMLN	n number of associated BLINEs
	BUFL	n length of maximum message segment
	BUFNO	n
	MODE	leased only--Refer to OS/VS BTAM: (IBC,CNTRL)--Remote CPU is the slave (default) (IBC)--Remote CPU is the master
	*CODE	if transmission not in EBCDIC--refer to DCB description in OS/VS BTAM
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	DIAL360 switched; IBM360 leased
	OPTION	BISYNC
*=Optional		

Figure 28. Remote CPU Specifications (Page 1 of 4)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BLINE (contd.)	*ERRSTAT	YES if count of I/O errors to be maintained
	*ERRTCNT	n maximum line errors to count if ERRSTAT=YES
	*TRSTBL	ASMTRTAB-macro-label; code if not EBCDIC transmission
	*NOETX	DISCARD or QUEUE (default) (leased only)
	*ANSWER	YES if auto-answer used. (switched)
	*ANSLIST	list--normally, one DFTRMLST per line group is used, though a list may be shared by line groups using the same transmission code. Required if ANSWER=YES is coded. (switched)
	*POLTM	(m,s) length of time to await a call before next scan for output. (switched)
	*BUFTM	n length of time (in timer units) to wait between EOT exchanges, or code 0 if no wait to be issued. (switched)
	*DIALTRM	n number of terminals in BTERM group accessible to this line. (required for switched)
	*FIRSTRM	tidnm first BTERM accessible in the BTERM group. (required for switched)
	*ACALL	YES for automatic dialing; NO for manual dialing. (switched)
	*IDSENT	idsent-ACK0 code only if callers must distinguish line answering call. (switched)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n should be unique
	*TPUP	YES (leased) NO (switched)
	*AUTOUP	YES (leased); NO (switched)
	*ERRSTAT	YES if count of I/O errors to be maintained
	*CONV	NO CONV=YES not allowed for Remote CPUs
	*CONTROL	NO CONTROL=YES not allowed.
	*EOFMSG	YES request End-of-transmission message.
	*LOCK	verb required if EOFMSG=YES
	*ONETURN	YES connection broken after one turnaround; NO connection broken after three consecutive turnarounds with no intervening data transfer. (switched)

*=Optional

Figure 28. Remote CPU Specifications (Page 2 of 4)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BTERM (contd.)	*ACALL	YES required if terminal can be called. If coded, IDRCVD and IDSENT must also be coded. (switched)
	*IDRCVD	id-ACK0 terminal-id transmitted from the terminal in response to id-ENQ when calling the terminal. More than one may be used (code as a list). (switched)
	*IDSENT	id-ENQ sent when calling remote terminal to request id. Normally, id-ENQ is the same for all terminals, and may be ENQ alone. Required for the first BTERM in the group; all others default to it. (switched)
	*PHONE	phone-number used to call this terminal if any line in the line-group has auto-dial capability (ACALL=YES in BLINE). (switched)
	*CINTVL	n number of seconds to wait before issuing next call to terminal to read input when no output queued. Activated only when terminal is active (TPUP issued). Code 0 if terminal only to be called when output is queued. Do not code if ACALL=NO. (switched)
	*DILID	id ending in ACK0 received from the terminal when answering a call. ID-ENQ is actually received; since this can default to the first (or only) IDRCVD if ACALL=YES, it must end in ACK0 for consistency (code only ACK0, if only one BTERM defined). Required if ACALL=NO is coded. (switched)
	*RDFIRST	YES code only if READ always to be issued first before a WRITE when terminal is called, whether or not output is queued. (Terminal must be placed in 'bid' (transmit) status before connection is made.) (switched)
	*CRT	NO (default) required
BDEVICE	TERMTYP	DIAL360 for switched; IBM360 for leased.
	OP1	04
	STCHAR	1002 output always transparent; 02 output never transparent
	EXTCHR	1
	*ENDCHAR	output message ending character(s) for all messages.
*=Optional		

Figure 28. Remote CPU Specifications (Page 3 of 4)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BDEVICE (contd.)	*LAST	NO code if only ENDCHAR-value to be used as message ending control character(s).
	*MAXERR	n (default=3) maximum I/O error retries
	*BSCSGMT	YES each input block is queued as a message; NO (default) input blocks are accumulated until receipt of an ETX or EOT before queuing a message (discarded if I/O errors or line/terminal put down).
	*UPINTV	n if AUTOUP=YES coded in BTERM
	SYNCIPQ	NO (default) queue subsystem input asynchronously: dispatch thread to log and queue input later, acknowledge last block. This mode provides fast response to remote station, but response is returned before logging and queuing is verified. (leased only) YES queue subsystem input synchronously: log and queue input, then if queuing successful, acknowledge last block; if queuing fails, return EOT instead of positive acknowledgement. If input message is not valid, that is, no verb in message or fast switch, positive acknowledgement is returned. This mode of input queuing provides high integrity--message is not acknowledged until logged and queued--but may incur delays in responding to remote station, particularly if the subsystem specifies synchronous logging. (leased only)
Translate Table	label	ASMTRTAB translate table macro parameters; if transmission not EBCDIC
STATION	TERM	tid (same as BTERM terminal-ID)
	IOCODE	(3,IBM360)
	*ALT	
DEVICE	TYPE	IBM360
	LEN	n (line-length if used as interactive terminal)
	*CRT	NO (default)
	*BUFSIZE	n (maximum message length)
	FIRST	NO
	CHAR	NL (or value appropriate to the device)
	*EOB	YES (default)
	EOT	NO
*=Optional		

Figure 28. Remote CPU Specifications (Page 4 of 4)

Chapter 4

TELETYPE TERMINALS

Teletype terminals, such as the ASR 33/35, Dataspeed 40 Models 1 and 2, and hardware-compatible terminals, are supported. Teletype terminals are supported using BTAM TTY line protocol. For leased lines, the line handlers are BLHIN and BLHOT. For switched lines, the line handler is BDIAL.

The following Intercomm terminal facilities are supported for Teletypes:

- CRT message processing
- Conversational message processing
- Buffer Mode (switched)
- Backspace Correction
- Idles
- Auto-answer (switched)
- Auto-call (switched)
- Ready messages
- Dedicated queues (required)
- Idles processing
- Locked verb processing

  If the terminal is locked to a verb, a null message (only message end character) is acceptable input, except when establishing a connection for a switched line. If the terminal is not locked to a verb, a null message is ignored and, if CRT=YES is coded in the BTERM, the READ is reissued. Otherwise, queued output messages are written before another READ is issued.

- System control commands

  --RLSE

  At connect time for a dial-up terminal, before beginning transmission of new data (requests) to Intercomm, enter the RLSE command to determine if any messages are queued for the terminal. For terminals defined with CRT=YES, the RLSE command must be used to receive more than one message at the terminal.

- Field Separator Characters

  The Edit Utility recognizes CRLF (carriage return/line feed) and NL (new line) characters as field separator characters, in addition to the system separator. Insertion of CRLF or NL as a line-ending character by the Output Utility is controlled by the DEVICE macro, CHAR parameter.

4.1 SWITCHED TELETYPE TERMINALS

The following subsections apply specifically to switched teletype terminals. Special features for a peripheral device, such as paper tape input, are also described.

Additional details applicable to Dataspeed 40 support are given in Section 4.3.

4.1.1 Auto-Answer/Auto-Call

A switched Teletype terminal may be defined as auto-answer and/or auto-call, depending on connection hardware (dial/answer modems). Both terminal configurations are supported on the same line.

- Auto-Answer

  A terminal defined as auto-answer dials the CPU, which answers automatically. Auto-answer is specified via the BLINE macro ANSWER, ANSLIST, DIALTRM and FIRSTRM parameters, and the BTERM macro, DILID parameter. The ANSLIST parameter points to a DFTRMLST macro, coded by the user. The ridseq value in that macro must end in WRU (ENQ) to request a hardware-transmitted terminal-ID. Or, the ridseq value may request a keyed sign-on code with a message such as ENTER ID.

- Auto-Call

  A terminal defined as auto-call automatically answers a call initiated from the CPU. Auto-call is specified via the BTERM and BLINE macro, ACALL parameters. Additionally, CINTVL (time between calls), HEXID, and PHONE parameters must be coded in the BTERM macro for each auto-call terminal. The HEXID and PHONE parameters are inserted into a DFTRMLST macro expansion generated at assembly. The HEXID must end with the end-of-message character transmitted from the terminal.

A TDWN system control command for a connected terminal causes a disconnect when the current I/O operation completes. A subsequent TPUP command must be issued to reactivate an auto-call only terminal. Whenever a connection is established for an auto-answer terminal (by dialing CPU), the terminal is automatically turned up, even though a TDWN may have been issued for the terminal.

4.1.2 Establishing a Connection

A switched-line teletype terminal must identify itself at connect time before message transmission can begin. The terminal-ID, which must terminate with a message-ending character, may be generated by the terminal hardware (via answer-back circuitry) or may be entered at the terminal by the operator.

All auto-answer terminals accessible by a specific line receive the same terminal-ID inquiry request (ridseq) defined via the BLINE macro, ANSLIST parameter. BDIAL translates the received TID to EBCDIC and searches the associated BTERM group for a match to a DILID parameter value. The terminal group search starts with the terminal defined by the FIRSTRM parameter, and continues through the number of terminals requested by the DIALTRM parameter. If no match is found, the terminal is disconnected and an error message is sent to the control terminal.

When the terminal-ID is not automatically generated, several different BTERM and BDEVICE macros can be defined describing one terminal, but with different operating characteristics, different DILID values, and different output message start and end characters. Once a terminal is connected, attempts to establish a connection by another terminal on another line using the same DILID are rejected (terminal disconnected) and an error message is issued.

If only one terminal is to be associated with a line, terminal-ID verification may be bypassed by coding IDVER=NO for the BLINE macro. In this case, at least a message-ending character must be sent in response to the ANSLIST ridseq. However, an operator-id code (if a locked terminal), or any acceptable message, may be transmitted. Physically, more than one terminal may dial in at different times on an id-bypass line, but logically the terminal will always be associated with the BTERM pointed to by the FIRSTRM parameter. Therefore all terminals which may use the line must have the same characteristics as defined by that BTERM macro and the associated BDEVICE macro. If several id-bypass lines are coded for one line group, each must point to a different BTERM within the associated terminal group for output message routing specification. For such lines, FLUSH=YES should also be coded for the BLINE macro so that when a new connection is established, unrelated queued output resulting from a previous connection will be flushed. This line group configuration is particularly useful for hunt-group telephone wiring when all terminals are the same type and/or when they are locked to a single subsystem for dedicated processing such as paper tape input. Additionally, one or more other lines in the group may request verification (IDVER=YES--default) and have several associated terminals for processing in an unlocked state.

For each BLINE, the CALLIST parameter must point to an IBM DFTRMLST macro coded by the user. This provides a standard Ready

Message to the terminal operator indicating that message transmission from that terminal may begin. A message such as the word READY, or just the letter R, or some indicative control character can be used. The value coded must end with the control character X-ON.

For special processing, an alternate callist may be coded via the BLINE macro ALTCALL parameter. Transmission of the Ready Message coded in an IBM DFTRMLST macro pointed to by this parameter must be specifically requested by a user subsystem by placing a character X in MSGHUSR of the proceeding output message header. Such an alternate callist may be used to allert a terminal operator to special processing, such as responding to an error message, or can be used to turn on a peripheral device such as a paper tape transmitter or printer. Alternate callist processing is turned off on completion of the next successful read from the connected terminal, thereafter the standard Ready Message referenced by the CALLIST parameter will be used, unless a new request for alternate processing is received. If ALTCALL is coded, FLUSH=YES should also be coded so that when a new connection is established, any queued output messages which might contain an undesirable alternate request will be flushed. If ALTCALL is not coded, an output message MSGHUSR=X request will be ignored.

For each auto-call terminal, the validation of the called terminal-ID (BTERM HEXID parameter) is performed by BTAM, and is required. Auto-call terminals should be equipped with answer-back hardware to automatically transmit the terminal-ID at connect time. Otherwise, an operator must stand by to enter the terminal-ID when a call is received. No attempt to call a terminal is made on one line if the terminal is already connected to another line. After connection is established, Intercomm automatically sends the following message to the called terminal:

(CR)(NL) INTERCOMM CONNECTED (CR)(NL)(X-ON)

Idles (X'17') are included in the message between CR and NL. In some terminals, the characters X-ON and X-OFF are equivalent to DC1 and DC3, respectively.

BTERM macros for auto-call terminals can be specified TPUP=YES to force an immediate attempt to establish connection on completion of startup. Otherwise, no attempt to establish connection is made until a TPUP for the terminal is issued. After that, the retry interval (CINTVL) is in effect unless TDWN is issued. If an existing CINTVL expires while a connection is in effect, a new CINTVL is established after the existing connection is terminated.

Write-only terminals (specified WRTONLY=YES in the BDEVICE macro) are only called when a message is queued. Therefore, write-only auto-call terminal processing may be inhibited by issuing a TDWN for the terminal. After the connection is established for a write-only terminal, all queued messages are transmitted and the terminal is automatically disconnected.

4.1.3 Disconnection

Some Transmission Control Units, such as the IBM 270x and the Memorex 1270, have a hard-wired READ time-out for Teletype devices of about one-third to one-half of a minute. Once the Ready Message (CALLIST) is sent to the terminal, the operator only has that limited time to start transmitting a message. In unbuffered mode (where the characters are transmitted as they are typed), the operator has only that time to begin or continue keying each character in the message. To prevent the READ time-out from causing a disconnect, the READ is reissued up to the number coded for the MAXERR parameter in the associated BDEVICE macro (default is 3). The number of retries to code versus the time-out factor (hardwired or programmable) in the TCU is at user discretion, based on operator efficiency, time required to compose input messages and traffic volume.

To disconnect a terminal, the operator should transmit a disconnect character (EOT), which clears the line immediately. If the terminal operator inadvertently disconnects the terminal, or hangs up without sending EOT, the line may be hung until the READ retry sequence is completed. To prevent this, a TDWN for the disconnected terminal from an active terminal causes disconnection when the outstanding READ times out. When the line is free, the operator can reestablish the connection.

A subsystem may request a disconnect by placing a character B in MSGHUSR of the message header for the output message after which disconnect is to be executed. After that message is transmitted, the terminal will be automatically disconnected without operator action. The message text accompanying the disconnect request should explicitly inform the operator of the end of the terminal session. This is necessary in case transmission is interrupted before the oprator receives the message, so that on re-establishing connection a premature disconnect, caused by requeuing of the message, will not alarm the operator. This problem may be circumvented by coding FLUSH=YES for the associated BLINE macro.

If a write I/O error occurs, the line is disconnected after MAXERR retries, and the terminal is put down. If AUTOUP=YES is coded for an auto-call terminal, after a WRITE error occurs, connection is reestablished after the UPINTV or CINTVL expires (whichever is greater). However, a TPUP for this terminal immediately overrides the UPINTV expiration time and the terminal is called when a line is available.

If a terminal was dynamically locked to a verb via the LOCK command, it is automatically unlocked when it is disconnected.

4.1.4 Buffer Mode

Users of switched Teletype (or compatible) terminals under BTAM frequently deal with long streams of input punched on paper tape as one

message. The user may not be able to allocate storage and processing logic to treat the whole stream. To solve this problem, a Buffer Mode of operation may be used. In this mode, the user defines buffers in a buffer pool (via the BUFNO and BUFL parameters in the LINEGRP macro), not necessarily of message length size. As each buffer is filled, a message is created. The next buffer is then filled with the next part of the data. Data transmission is not stopped or delayed during this process. Thus, initial segments of the input may be queued as a message, and even processed, while more data is being received. (Buffer mode for the terminal is ended if a terminal disconnect character is received or a READ time-out occurs.)

Buffer mode may be dynamically initiated by a special transaction input from the terminal:

BF CR/LF 0

where: BF is the transaction message, CR/LF is generated by depressing the return key and 0 represents the sign-off character XOFF

This message must translate to a hexadecimal value of 'C2C60D1526'.

Permanent Buffer mode may be specified via the BTERM macro, BUFMODE=YES parameter. If the input stream is larger than the buffer, it is segmented; otherwise, it is treated as a full message.

If Buffer Mode is used, only one BLINE per LINEGRP should be defined. The Automatic Queuing of Segmented Input Messages feature of the Dynamic Data Queuing Facility should be used to process segmented input.

4.1.5 Installation Procedures

Installation procedures for switched Teletype terminals are as follows:

1. After setting appropriate SETENV globals, the required BTAM Front End must be reassembled. Also reassemble BTVERIFY, if included in the Intercomm linkedit.

2. Code the Front End and Back End tables, as outlined in Figure 29, for switched Teletype terminals (ASR 33/35). For Dataspeed 40 Model 1 and 2 terminals, see Section 4.3.

3. For ASR 33/35 and hardware-compatible devices, a translate table must be provided because most Teletype terminals use an ASCII transmission code (with even parity). This table may be vendor-defined for hardware-compatible terminals. Verify that all possible input message-end characters (CR, XOFF, ETX, etc.) are not only recognizable by the transmission control unit, but also translate to an EOB (X'26'), except for the disconnect character, which must translate to EOT (X'37').

4. Reassemble and include BDIAL in the linkedit.

Both auto-answer and auto-call terminal configurations are supported on the same line. More than one line with only auto-call, or only auto-answer, or mixed, terminals may be supported under the same LINEGRP. In this case, all BLINE macros referring to the same LINEGRP (up to 99 lines) must be coded together. Each group of BLINE macros must be followed by all BTERMs for all terminals that may access Intercomm via that line group. Thus, all of these terminals may call in on, or be called by, any of the lines in the BLINE group. The FIRSTRM pointed to by the first BLINE must be the first BTERM in the BTERM group. However, delimiters within the terminal group may be imposed via the required BLINE macro, FIRSTRM and/or DIALTRM parameters. Lines with different transmission codes and different transmission speeds may be coded in the same line group. Up to 255 BTERMs may be associated with one line group.

Dial-up terminals require a dedicated queue specified via the BTERM macro, QNUM parameter. Hard copy buffered-device processing is not required. Terminals which are CRTs with an attached printer print received messages at line speed as the CRT buffer is filled and displayed. The line handler does not regain control until the transmission is completely printed.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&DIALUP	SETB	1
*&BACKSPC	SETB	1 if desired
*&IDLES	SETB	1 if needed (see vendor documentation)
*&CONVER	SETB	1 if CONV=YES in any BTERM
		*=Optional

Figure 29. Switched Teletype (ASR 33/35) Specifications (Page 1 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
LINEGRP	DDNAME	DD-statement-reference
	UNIT	DTTY
	*OPTION	BTAM (default)
	BUFNO	n
	BUFL	n length each buffer: minimum-line-length plus 4 (round up to doubleword)
	NUMLN	n number of BLINEs associated with this LINEGRP
BLINE	LGNAME	label-of-associated-LINEGRP-macro
	UNIT	DIALTTY
	*OPTION	BTAM (default)
	ANSWER	YES (if any terminal calls CPU); NO (if all terminals are auto-call)
	*ANSLIST	label-of-DFTRMLST-macro with ID inquiry sequence (required if ANSWER=YES)
	CALLIST	label-of-DFTRMLST-macro to provide indicator to terminal operator that message input may begin
	TRSTBL	translate-table-label
	DIALTRM	n number of BTERMs associated with this BLINE
	FIRSTRM	terminal-ID of first BTERM for this line in associated BTERMs list
	*ACALL	YES (if CPU dials any terminals)
	*IDVER	NO (bypass terminal-id verification); YES (default - perform id verification)
	*ALTCALL	label-of-DFTRMLST-macro with alternate callist to that coded for CALLIST
	*FLUSH	YES (flush queued messages at new connection); NO (default-transmit queued messages)
BTERM	TERM	terminal-ID
	*ALT	alternate-terminal-ID
	DEVIND	n
	QNUM	n (must be dedicated)
	DILID	terminal-ID coded in EBCDIC (must be unique)
	*TPUP	YES (auto-call terminals only--allows connection attempt at startup)
	*AUTOUP	YES (auto-call terminals only)
	*CRT	YES
	*CONV	YES
	*ACALL	YES required if terminal can be called
	*CINTVL	seconds--time interval between calls (required if ACALL=YES)
	*PHONE	telephone number used to call terminal
	*HEXID	ID sent by called terminal--code in terminal transmission code (ASCII), if ACALL=YES
	*BUFMODE	YES (for permanent buffer mode)
	*LOCK	verb
		*=Optional

Figure 29. Switched Teletype (ASR 33/35) Specifications (Page 2 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BDEVICE	TERMTYP	DIALTTY
	OP1	02
	*IDLES	YES (or number)
	*BACKSP	YES if backspace correction to be done
	*STCHAR	CRLF or NL as appropriate, to force output messages to beginning of next line
	*ENDCHAR	
	*UPINTV	n (if AUTOUP=YES is coded in BTERM)
	*WRTONLY	YES--if write-only device (only receives output from Intercomm)
	*CRLF	YES only if DEVICE macro has CHAR=CR
	*MAXERR	n (3=default) number of retries after a READ time-out
	*LAST	NO (if ENDCHAR value coded, which must be the only message-ending character)
Translate Table	label	EQU * ASMTRTAB RCT2,SCT2 (ASR33/35) or COPY vendor-supplied-translate-table
STATION	TERM	terminal-ID as coded in BTERM
	IOCODE	(3,TELETYPE)
	*ALT	
DEVICE	TYPE	TELETYPE
	LEN	80 (or nonstandard length defined by vendor)
	BUFSIZE	n (screen size, if CRT)
	*CRT	YES
	EOT	NO (unless required by vendor's terminal)
	EOB	YES (unless message end character provided by ENDCHAR in BDEVICE)
	CHAR	CR or NL as appropriate to device.
	FIRST	YES (if message to start with value requested by CHAR parameter, otherwise code NO. Note that FIRST value is inserted only if message is formatted by OUTPUT.)
*=Optional		

Figure 29. Switched Teletype (ASR 33/35) Specifications (Page 3 of 3)

4.2 LEASED (POINT-TO-POINT) TELETYPE TERMINALS

The Intercomm BTAM Front End supports Teletype ASR 33/35 and compatible terminals on nonswitched, uncontrolled point-to-point lines. The line handlers are BLHIN and BLHOT. Support for leased line Teletypes is accomplished through modification of the IBM switched Teletype (TWX) DDM, IGG019MP. A simulated dialing sequence to establish connection is effected (except under MVS) by the Intercomm member, TTYSVC. Therefore, the CPU SYSGEN for leased teletype lines must specify switched TTY (TWX) terminals. Hardware-compatible devices are generally supported. However, support for special TTY equipment on dedicated lines is not necessarily available and must be evaluated individually.

Additional details applicable to Dataspeed 40 support are given in Section 4.3.

4.2.1 Message Format

Standard Intercomm message format is used for output. For input, one or more PAD characters, followed by a SOM (start-of-message) control character, must precede the input message. The PAD characters can be anything except SOM or X-OFF. The first PAD character can be SOM, if desired, because the first PAD character is dropped by a 'prepare' command.

The SOM value is the ASCII SOH control character and must translate to X'81'. The first input buffer is scanned for the first SOM, deleting the PAD characters and the SOM. If no SOM is found in the first buffer, the message is rejected and the terminal is notified via an error message.

4.2.2 Supported Intercomm Features

The following are differences in features which are also supported for switched Teletype devices:

- Conversational message processing: Recommended to allow subsystem response to input. Conversational message processing is forced for Front End error messages such as 'REJECTED SOM...', and 'NO VERB FOUND...', and the 'NO OUTPUT QUEUED' response to the RLSE command.

- Ready Message: When a read is issued by BLHIN, a message is sent to the terminal to signal that message transmission from the terminal may begin. The message is specified by a DFTRMLST macro coded at label LTTYID in BLHIN and may be

modified to suit user installation requirements. It must end with the control character X-ON. The default value is four characters:

(CR) (LF) * (XON)

4.2.3 Startup

At startup, BTAMLINE normally dispatches a read to all terminals. For leased line Teletypes, however the read is bypassed to allow a broadcast message to be sent. Therefore, leased TTY terminals (except read-only terminals) must be included in the Broadcast Table group TOALL to force writing of a start-up message. After the "GOOD MORNING" message is issued, the terminals are held in idle mode. At this time, it is not possible to write any more output until some input is received.

4.2.4 Installation Procedures

1. After setting the appropriate globals in member SETENV, the following Front End modules must be reassembled:

   BTAMLINE
   BLHOT
   BTSEARCH
   BLHIN
   BMH000
   BTVERIFY (if included in linkedit)
   TPUMSG

2. In addition to the modules to be reassembled above, the following modules must be processed:

   - LOPENMOD

     This module is called by the Intercomm version of the LOPEN macro (LOPENMAC) to issue the disable/enable for a leased Teletype line at startup and during error recovery processing. The module calls IECTLOPN for all other devices including switched teletypes. The module must be included in the Intercomm linkedit and must be resident.

   - TTYSVC

     This is the "ARM-SEEKING" SVC. At DCB open time, this SVC must be issued to set on the "ARM-SEEKING" bit in the (dial- up generated) UCB control block for a leased teletype line. This simulates completion of a dialing

sequence. To use this SVC: set &TTYSVC in SETENV to the desired SVC number; change the CSECT name and USING statements in TTY SVC to correspond to the number in SETENV; then reassemble and load the member TTYSVC to SYS1.SVCLIB. The SVC is written to be Type III and functions as Type I, II or III, without change (except the USING and CSECT name statements).

The member TTYSVC cannot be used in MVS. BTAMLINE has been modified to branch around the code that issues the SVC.

- IGG019MP--Intercomm Private Copy

The Intercomm private copy of IGG019MP is loaded by BTAMLINE from STEPLIB (or JOBLIB) before a BTAM open for any TTY line is issued. This technique allows leased TTY support to be IBM release-independent. If it is desired that IGG019MP be Link Pack Area resident, the private version must be made part of SYS1.SVCLIB (replacing the IBM-released module). It is entirely compatible with dial-up Teletype support. The module must be reassembled with the following linkedit attributes: LIST, LET, RENT, DC, OL and XREF.

Under VS1 and MFT, due to execution of 'LOAD', the Intercomm private version of IGG019MP must be put on SYS1.SVCLIB to eliminate load of the IBM version. Then, an I/O Supervisor GEN and a system re-IPL must be run, before the private version may be used for Intercomm.

IGG019MP differs from the IBM version in that a read op code of X'15' has been defined to circumvent the switched teletype read time-out problem. The channel program produced is:

Command Code	Meaning
01	WRITE ID sequence (LTTYID/DS40ID)
06	PREPARE monitors line for input (use of this command drops the first PAD character and prevents a read time-out)
02	READ data

This channel program cannot be used for switched Teletype devices because there is no way to prevent an operator from forgetting to disconnect the terminal and thus tying

up the line, which prevents other terminals from using that line.

3. Intercomm provides the translate table LTTYTRTB for leased Teletype devices. This table translates even parity (start/stop) ASCII to and from EBCDIC. It may be used for hardware-compatible terminals using the same transmission code. Whether using LTTYTRTB, or a vendor-supplied table, however, make sure that all input message-ending characters translate to an EOB (X'26'). This is required because more than one key (RETURN, ATTN, SEND, ENTER) may be used on the device to signal end of message, or an end of message character may be keyed at the terminal as part of the message before transmission is begun. For hardware-compatible devices, make sure that whatever message-ending characters are transmitted are also recognizable by the transmission control unit.

4. Code the Front End and Back End tables as outlined in Figure 30.

   Only one terminal (BTERM) on a line (BLINE) is allowed, though multiple leased lines (mixed Teletype ASR 33/35 and Dataspeed 40) per LINEGRP are possible.

   If a mixed network of dial-up and leased Teletypes is used, the LINEGRP macros for the leased lines must be coded before those for switched, to ensure that the private Intercomm copy of IGG019MP is used.

5. When using a programmable transmission control unit (TCU) such as a 370x, it may be necessary to code DIAL=NO in the IOGEN for the leased TTY line and, depending on the modem used, code DUPLEX=FDX (4-wire), or DUPLEX=HDX (2-wire). In the modem, set on the 'permanent carrier' switch, if it is available.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&LTTY	SETB	1
&TTYSVC	SETC	'xxx' xxx is the assigned SVC number for the TTYSVC (set to X'013' if running under MVS)
*&BACKSPC	SETB	1 for backspace processing
*&IDLES	SETB	1 for idles processing
*&CONVER	SETB	1 conversational processing is recommended
*=Optional		

Figure 30. Leased Teletype (ASR 33/35) Specifications (Page 1 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
LINEGRP	DDNAME	DD-statement-reference
	UNIT	LTTY
	BUFNO	n
	BUFL	n
	NUMLN	n
	*OPTION	BTAM (default)
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	TELETYPE
	TRSTBL	LTTYTRTB
	*OPTION	BTAM (default)
	*RDONLY	YES (if read-only line)
	*WRTONLY	YES (if write-only line)
BTERM	TERM	terminal-ID
	*ALT	alternate terminal-id
	DEVIND	n
	QNUM	n (must be dedicated)
	TPUP	YES
	*AUTOUP	YES
	*CONV	YES (recommended, except for RDONLY)
	*CRT	YES (except for RDONLY)
	*LOCK	verb
BDEVICE	TERMTYP	LTTY
	OPl	06
	*CRLF	YES (if DEVICE macro has CHAR=CR)
	*STCHAR	CRLF or NL (code in hexadecimal, to force output message to beginning of next line)
	*IDLES	YES or number (if needed)
	*BACKSP	YES (if backspace processing desired)
	*UPINTV	n (if AUTOUP=YES coded in BTERM)
	*ENDCHAR	(if desired)
	*MAXERR	n (default=3) maximum I/O error retries
	*LAST	NO (if ENDCHAR value coded, and that value must be the only message-ending character)
Translate Table	LTTYTRTB	EQU * Intercomm LTTY translate table COPY LTTYTRTB
STATION	TERM	terminal-ID
	IOCODE	(3,TELETYPE)
	*ALT	
*=Optional		

Figure 30. Leased Teletype (ASR 33/35) Specifications (Page 2 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
DEVICE	TYPE	TELETYPE
	LEN	80 (or nonstandard length defined by vendor)
	BUFSIZE	n (screen size, if CRT)
	*CRT	YES if desired
	EOT	NO (unless required by vendor's terminal)
	EOB	YES (unless message end character provided by ENDCHAR in BDEVICE)
	CHAR	CR or NL as appropriate to device.
	FIRST	YES (if message to start with value requested by CHAR parameter, otherwise code NO. Note that FIRST value is only inserted if message is formatted by OUTPUT.)
*=Optional		

Figure 30. Leased Teletype (ASR 33/35) Specifications (Page 3 of 3)

4.3 TELETYPE DATASPEED 40 MODELS 1 AND 2

Teletype Dataspeed 40 Models 1 and 2 terminals are supported by Intercomm. This section discusses additional special considerations and requirements for these terminals.

The following Dataspeed 40 terminal types are supported on switched or leased lines:

- Model 1
- Model 2 with half duplex (HDX) data link modem
- Model 2 with full duplex (FDX) data link modem

Full duplex line protocol is not supported by BTAM, so messages may be transmitted only in one direction at a time.

BDIAL, the line handler for the switched Teletype Dataspeed 40 1/2, supports the nonstandard use of EOT as a normal input message-ending character for the Model 1 and the HDX Model 2. To signal disconnect for these terminals, use DLE EOT. For the FDX Model 2, EOT indicates disconnect, whereas a DC3 (X-OFF) should be used as a message-ending character when the terminal is in Batch Mode.

4.3.1 Back End Considerations

The following outlines Dataspeed 40 support by the Edit, Output and Message Mapping Utilities and the Autogen Facility.

- Edit

  The Edit Utility accepts Horizontal Tab (HT) as a field separator character, which is required for input from formatted screens. (See the Utilities Users Guide.)

- Output

  Use of Output Reports to produce formatted screens is supported by coding ESC sequence control characters. (See the Utilities Users Guide.)

- Message Mapping

  MMUDDMT is the Dataspeed 40 DDM module required for input and output mapping. To provide formatted screen compatibility with IBM 3270 terminals, values have been added to LOGCHARS. (See Message Mapping Utilities.)

- Autogen

  Formatted screen maps may be created at Dataspeed 40 terminals which are compatible for 3270 terminals. (See the Autogen Facility Users Guide.)

4.3.2 Message Start and Ending Characters

The BDEVICE macro, STCHAR, CTCHAR and ENDCHAR parameters may be coded to provide message start and ending characters for output messages to the terminal. These are appended to the message by the Front End before the message is queued for transmission (that is, before translation). Since Dataspeed 40 terminals are scrolling (infinite row) devices, STCHAR=15 (New Line) should be coded to force every output message to start at the beginning of a new line. An ESC H or ESC R sequence inserted at the beginning of the message during Back End processing is acted upon following the NL. If a value is coded for CTCHAR, it is only appended to messages generated by the Front End and is, therefore, optional. The hexadecimal equivalents for FF (Form Feed--tractor feed printers only), DC2 (turn printer on), or DC4 (turn printer off), may be coded for STCHAR or CTCHAR, but the idles required for FF and DC2 slow down transmission time and increase storage requirements. Therefore, it is better to add such control sequences on an as-needed basis in the Back End. This is also true for ESC J and ESC R sequences.

The message-ending character should be appended in the Front End with the ENDCHAR parameter rather than via the Back End because receipt of ETX or EOT affects the state (turnaround) of the terminal and data set (modem). (See the State Diagram in the Pocket Reference Guide for the terminal in use.) To provide consistency for the terminal operator, all messages should end with the same sequence. Coding ESC ETX (X'2703') or ESC EOT (X'2737') means that the message-ending character is acted upon, but does not appear on the display. (See Figure 31, terminal option 6b.) Message-ending characters generated by the Back End are dropped before message transmission. (See Basic System Macros, BDEVICE macro, LAST parameter.)

4.3.3 Idles Processing

Idles for all messages to Dataspeed 40 terminals are automatically inserted by the module OUTDS40. Idles are inserted after message control characters are appended. The number of idles required for each Dataspeed 40 terminal type and operation, based on the BDEVICE macro Dataspeed 40 and CHPS (characters-per-second line speed) parameter specifications, have been established according to values defined in the Dataspeed 40 Pocket Reference Guide for the appropriate terminal.

Idles are not inserted for the following:

1. After ESC 2, which is not supported
2. If user-coded during message processing
3. After ETX, even though Option 18c (feed out 16 lines of paper after receipt of ETX) may be selected for the terminal

A fixed number of idles is generated for the following controls, regardless of line speed:

Control	Number of Idles
HT	2 time to tab 80 characters at 120 CPS
ESC@	2 time to tab 80 characters at 120 CPS
FF	20 feed up to eight lines of paper

These values are based on a maximum required at 1200 BAUD line speed. DC2 (turn on printer) has no effect on the Model 1; therefore, no idles are generated if DS40MOD=1 is coded in BDEVICE. To reduce transmission time and core usage, idles required for message start

control combinations (such as, ESC R DC2) are inserted after the last control character. Double-line feed on printers is not supported. If FF (Form Feed) is coded, but the printer is not tractor-feed, or the FORMS switch is not on, form feed is treated as NL at the terminal, so 20 may not be enough idles for the NL.

4.3.4 Dataspeed 40 Terminal Options

Recommended option settings for Dataspeed 40 terminals are shown in Figure 31. When a multiple choice is available for an option, all settings not listed are to be set off.

Option No.	Model and Protocol	Comments
1b	All	SSI printer interface
3	All	Indicates line speed (user option)
4b	All	Reverse channel not supported by BTAM
5a	All	Reject received NULL
5d	All	Accept received CR
5e	All	Reject DELETE (idle)
5h	2-FDX, 2-HDX	Accept DC1 (X-ON)
5j	2-FDX, 2-HDX	Accept DC3 (X-OFF)
6b	All	Perform but do not display all ESC sequences
7a	All	Do not display error character
8b, c, e, h	All	ETX and EOT function as input message-ending characters
9a	All	Highlight delimiters not sent
10c	All	LF (NL) sent as line-ending sequence (required for the Message Mapping Utilities)
11a	All	Recommended

Figure 31. Recommended Option Settings for Dataspeed 40 Terminals (Page 1 of 3)

Option No.	Model and Protocol	Comments
11b	2-FDX	Use only if ETX is acceptable as message ending character in Batch mode.
12b	All	FORM ENTER in local
13g	All	(Required) Only transmit unprotected data. Only Option 13g is supported. The Edit and Message Mapping Utilities cannot edit input ESC sequences. HT (horizontal tab) and NL recognized as field separator characters in addition to system separator. If terminal is mainly used in Batch Mode with multi-line (multi-field) input data, Option 27a (see below) may be more desirable; home cursor automatically before transmit when SEND key depressed in Batch Mode.
17c	All	(Required) 80-column printer
18a	1,2-HDX	No paper feed out on disconnect (required for leased lines)
18b	All	May be used for switched
18c	All	Not recommended
19c	All	Required
19d, e, f	2-FDX, 2-HDX	Indicates character set (user option)
20a	All	Single line feed on printer
21-25	All	Use factory-wired default
27b	All	Start sending from cursor position in Batch Mode (see Option 13g)
28a	All	Required for switched
28b	1, 2-HDX	Required for leased
29a	All	Recommended (user option)
38b	2-FDX, 2-HDX	Recommended

Figure 31. Recommended Option Settings for Dataspeed 40 Terminals (Page 2 of 3)

Option No.	Model and Protocol	Comments
39b	2-FDX, 2-HDX	Forms feed off. 39a may be chosen if printer has tractor-feed and Form Feed control is used in message.
40a	2-HDX	Go Receive on sending CR in S/R mode
41a	2-FDX, 2-HDX	If 103-type data set
41b	2-FDX, 2-HDX	If 202-type data set
42a	2-FDX, 2-HDX	Required (even-parity)
43a	2-FDX, 2-HDX	Required (one stop bit)
44a	2-FDX, 2-HDX	Enable EIA
45b	2-FDX, 2-HDX	Disable Current Loop
46a	2-FDX	103-type Data Set (switched only)
46b	2-HDX	202-type Data Set (switched only)
46a	2-HDX	Required for leased
47a	2-FDX, 2-HDX	Required
49a	2-FDX, 2-HDX	Required

Figure 31. Recommended Option Settings for Dataspeed 40 Terminals (Page 3 of 3)

4.3.5 Terminal Operation Considerations

There are differences in the operation of the three Teletype Dataspeed 40 terminal types (Model 1, Model 2-HDX, Model 2-FDX, on switched or leased lines) in Send/Receive mode and in Batch Mode. The Dataspeed 40 terminal operator must therefore understand:

1. The STATE diagram of each terminal, as defined in the respective Pocket Reference Guide.

2. The effect of the message-ending characters used on the state of the terminal.

Send/Receive (S/R) mode is the Dataspeed 40 conversational mode and should generally be used for Teletype operation, that is, for transmission of short messages. Batch Mode should be used for preparation and transmission of multi-line data and for transmission of data from a formatted screen.

Figure 32 provides specific operational considerations for the Dataspeed 40 terminals, listing various functions and the applicable modes and terminal types.

Function	Mode	Model-Line*	Comments
Establishing a connection	S/R RECEIVE	All-S	Before a connection can be made, terminal must be in S/R RECEIVE mode. Then dial computer or answer call. When keying the terminal-ID, backspacing may not be used.
		All-L	Terminal switched on and placed in this state before Intercomm start-up.
	S/R SEND	2-HDX-S	After connection is made and the 'request id' message is received, depress SEND key before keying terminal-ID. If the 'request id' message ends with an EOT, depressing SEND key is not necessary.
READY message	All	All-S	Be aware of the time-out duration after READY message received at terminal, and the number of times READY is reissued before automatic disconnect.
SEND key	S/R	2-HDX	If SEND key is not lighted, it must be depressed before starting to key in any message. This occurs if a non-conversational verb is transmitted, and no output messages are queued; only the READY message is received (terminal remains in S/R-RECEIVE). Enter RLSE command to receive the delayed response, if one is expected.
*S=Switched, L=Leased; default is both			

Figure 32. Dataspeed 40 Terminal Operation Considerations (Page 1 of 4)

Function	Mode	Model-Line*	Comments
RETURN key	S/R	1	Depressing RETURN key positions cursor to beginning of line, and then transmission begins. Using CURSOR BACK key does not send backspace, so line may be edited before transmission. Only one line may be sent. Keying of one-line message may be done only when S/R and RECEIVE lights are illuminated.
Backspace Character	S/R	2-HDX 2-FDX	Backspace character is transmitted when CURSOR BACK key depressed. Cursor also positioned back one character position for error correction. Occasionally, depressing the key before beginning to key significant data will prevent READ time-out until operator is ready to transmit data on a switched line.
Message Control Characters	S/R	1-S	Using DC2/DC4 as message framing characters on a switched line is not supported.
		1-L	DC2 may serve as the PAD character, if DC4 is recognizable by the TCU as a message-ending character.
	Both	All-L	Do not send DLE EOT on leased line terminal. DLE assumed to be significant data.
	Batch	2-FDX	DC3 recommended as input message-ending character.
		1, 2-HDX	EOT recommended as input message-ending character.
*S=Switched, L=Leased; default is both			

Figure 32. Dataspeed 40 Terminal Operation Considerations (Page 2 of 4)

Function	Mode	Model-Line*	Comments
Clearing the screen	Batch	All	Terminal must be in Batch Mode (LOCAL illuminated). Home the cursor (depress HOME key), depress CLEAR key. If protected fields are displayed and clearing them is desired, depress FORM ENTER before CLEAR, then release FORM ENTER. CLEAR only clears from the present cursor position to the end of memory.
S/R to Batch Batch to S/R	Both	2-HDX-S 2-FDX-S	To change from S/R to Batch Mode and back without causing an accidental disconnect, do not depress the LOCAL key. Depress or release the S/R key as appropriate.
Cursor	Batch	All	If the cursor is positioned after the message-ending character, or the message-ending character is omitted, depressing the SEND key causes transmission to occur from the cursor position until the end of memory. In this case, depress the INTRUPT key to stop transmission. This causes a READ time-out (no message-ending character received) and loss of the message. Wait for the READY message (CPU ready to READ again), then retransmit the message correctly.
READ time-out test	Batch	All-S	If time is required to format an input message in Batch Mode, and the a READ time-out may have occurred, do the following after keying the message-ending character: 1. Depress CURSOR TAB key (position to next line/unprotected area). 2. Depress S/R key (switch to S/R mode).
*S=Switched, L=Leased; default is both			

Figure 32. Dataspeed 40 Terminal Operation Considerations (Page 3 of 4)

Function	Mode	Model-Line*	Comments
Read time-out Test (contd.)			3. Wait for receipt of next READY message. 4. Release S/R key (switch back to Batch). 5. HOME cursor and position (CURSOR TAB) to beginning of input data. 6. Depress SEND key.
*S=Switched, L=Leased; default is both			

Figure 32. Dataspeed 40 Terminal Operation Considerations (Page 4 of 4)

4.3.6 Subsystem Design Considerations

Subsystems should incorporate the hardware functions of the Dataspeed 40 terminal into the design of messages for input and output, as described below. Certain facilities and restrictions apply to the use of the Message Mapping, Edit or Output Utilities. For additional details, refer to the appropriate Intercomm manual.

4.3.6.1 General Restrictions

The following restrictions should be observed:

- Form Feed (FF) control should not be embedded in a message. Each Form should be a separate message.
- Vertical Tab is not supported and is treated as NL by the terminal.
- Unless the Message Mapping or Output Utilities are used, each line of output data (screen format) must be delimited by a NL.
- Fields defined in MMU Maps and Output Utility Reports may not wraparound from one line to the next.

4.3.6.2 Formatted Screen Input Processing

For operator convenience, every screen format or map used for inputting data should begin on the first line of the first memory segment. The following considerations apply:

- Entering Fields

  -- If a field is not completely entered, the TAB key may be depressed to delimit the field, and to position the cursor at the next unprotected field.

  -- If a field is completely entered, the CURSOR TAB key must be used. The HT character is automatically generated at transmission time.

  -- If a field is not to be entered at all, the TAB key must be used. An HT symbol is generated to indicate omission of the field. The cursor skips to the next unprotected field.

- Tabs

  Tab set ESC sequences may be coded as initial values in a format. Tab Clear (ESC 2) is not supported. Tabs may be cleared by transmitting another format.

- Unprotected Fields

  -- If the beginning of the first line is not an unprotected field, the operator must position the cursor at the first unprotected field, before transmitting the message. Otherwise, the terminal generates a Horizontal Tab character to position itself at the first unprotected field, which is not acceptable for verb processing. However, on leased terminals, this HT byte prefix can serve as the PAD character, and therefore positioning of the cursor may be omitted.

  -- Every unprotected field in a format must be delimited by a protected field (at least one blank), except at the end of a line, as noted below. All unused areas of the format must also be protected.

  -- A line may not end with an unprotected field unless it is the last input field in the format, or if the next line begins with another unprotected field. In this case, the NEW LINE key must be used to position the cursor to the next field at the beginning of the next line. If the TAB key is used, both an HT and a NL is generated, which is not acceptable.

-- If an unprotected field ends a line, and is filled through column 80, a NL character is automatically generated as a field delimiter.

- Protected Fields

  -- Every format containing protected fields must end with an ESC X (ATTRIB=UAN) sequence to unprotect the rest of the screen.

  -- The NEW LINE key may not be depressed to position the cursor in a format if the first field on the next line is protected. If it is, the NL, followed by a tab character, is transmitted, indicating absence of the next field, which is undesirable.

4.3.6.3 Entering Positional/Keyword Data on a Blank Screen

To enter keyword or positional data on a blank screen, each field may be delimited by the system separator character, or each field may be entered on a separate line, delimited by depressing the NEW LINE key. TAB may not be used on a blank screen.

If the Message Mapping Utilities are used, fields may be delimited by the values defined via the SEGMENT macro or in LOGCHARS.

4.3.6.4 Output of New Data Fields to an Existing Format

If the subsystem is using the Message Mapping Utilities, use the data-only request. Otherwise, the subsystem must format the message by coding an ESC H at the beginning of the message, and delimiting each complete field with an ESC @. This causes the new data to replace the old. If a pair of ESC @ characters are used to indicate absence of data for a field, the old data remains displayed in that field. Using an HT instead of the second ESC @ will cause the old data to be cleared. Use of ESC @ (HT) is correct only if every unprotected field is delimited by a protected area.

4.3.7 Installation Procedures

4.3.7.1 Switched Lines

The following considerations are specific to installing Dataspeed 40 Model 1/2 switched Teletype terminals, in addition to the general switched Teletype installation procedures defined in Section 4.1.

1. Code the Front End and Back End tables, as illustrated in Figure 33.

   For the BDEVICE macro CHPS parameter, n indicates the line speed (characters-per-second transmitted) of the terminal. This value is approximately the BAUD rate divided by 10. The following may be coded:

CHPS	BAUD Rate	Comments
10	110	Model 2--FDX only
15	150	Model 2--FDX only
30	300	Model 2--FDX only
60	600	Model 2--FDX & HDX
105	1050	Model 1 only
120	1200	All models
240	2400	Model 2--HDX & FDX
480	4800	Model 2--HDX & FDX

2. After the member SETENV is updated, using the ICOMLINK macro to create an Intercomm linkedit deck will automatically generate an INCLUDE for OUTDS40 and MMUDDMT (if MMU=YES is also coded for ICOMLINK). Both modules must be resident. They are not eligible for the link pack area.

3. To implement support for processing by the Edit, Output, and Message Mapping Utilities and the Autogen Facility, the terminal type of DS40 must be coded on the STATION macro IOCODE parameter and the DEVICE macro TYPE parameter.

4. A translate table, DS40TRDM, is provided. It is the monocase ASCII translate table for Dataspeed terminals, and also translates all input message ending characters to EOB (except EOT). It expects even-parity (start-stop) ASCII transmission code.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&DS40	SETB	1
&DIALUP	SETB	1
*&BACKSPC	SETB	1 if 40/2 used in S/R mode
*&CONVER	SETB	1 if any BTERM has CONV=YES
LINEGRP	DDNAME	DD-statement-reference
	UNIT	DTTY
	BUFNO	n (2 times number of associated BLINEs)
	BUFL	n (average message length, 96-136)
	NUMLN	n (number of associated BLINEs)
	*OPTION	BTAM (default)
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	DIALTTY
	TRSTBL	DS40TR
	*OPTION	BTAM (default)
	ANSWER	YES or NO
	*ANSLIST	See Figure 29. The ANSLIST ridseq sequence must end with an ENQ (X'40') character if answer-back hardware is used.
	CALLIST	See Figure 29.
	DIALTRM	n number of BTERMs associated with this BLINE
	FIRSTRM	terminal-ID of first BTERM for this line in associated BTERMs list
	*ACALL	YES if any terminal can be called from CPU
	*IDVER	NO (bypass terminal-id verification); YES (default-perform id verification)
	*ALTCALL	See Figure 29.
	*FLUSH	YES (flush queued messages at new connection); NO (default-transmit queued messages)
BTERM	TERM	terminal-ID
	*ALT	alternate-terminal-ID
	DEVIND	n
	QNUM	n (must be dedicated)
	DILID	terminal-ID coded in EBCDIC (must be unique)
	*TPUP	YES (auto-call terminal only-allows connection attempt at start-up)
	*AUTOUP	YES (auto-call terminal only)
	*CONV	YES
	CRT	YES (required if device not receive-only printer)
	*ACALL	YES (required if terminal can be called)
	*CINTVL	sec. time interval between calls (required if ACALL=YES is coded)
	*PHONE	telephone number used to call terminal
	*HEXID	code in ASCII--ID sent by called terminal
	*LOCK	verb
*=Optional		

Figure 33. Switched Teletype Dataspeed 40 Specifications (Page 1 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BDEVICE	TERMTYPE	DS40
	OP1	02
	CHPS	n (line speed--see Section 5.14.7 for values)
	STCHAR	15 (New Line, or as desired)
	*CTCHAR	(for Front End messages)
	ENDCHAR	03 (ETX, or other value as desired - see DS40 Pocket Guides)
	*BACKSP	YES (if 40/2 used in S/R mode)
	*UPINTV	n (if AUTOUP=YES in BTERM)
	*EXTCHR	0 (default)
	*WRTONLY	YES (if terminal is receive-only printer)
	*IDLES	0 (default)
	*CRLF	NO (defaults to New Line)
	DS40MOD	1 or 2 (default) model number
	DS40MS	n number of memory segments (1/2/3) 0 if receive-only-printer (ROP)
	DS40NL	YES if CRT with printer, or ROP NO if CRT alone
	*DS40BUF	YES (if receive-only printer is buffered)
	*DS40FDX	YES if 40/2 FDX; NO if 40/2 HDX or 40/1
	*DS40FAS	YES (if full ASCII character set terminal or 132 print position printer)
	*LAST	NO (default for DS40) ENDCHAR value is only message ending character transmitted.
	*MAXERR	n (3=default) number of READ time-outs allowed
Translate Table	DS40TR	EQU * Intercomm DS40 translate table COPY DS40TRDM
STATION	TERM	
	*ALT	
	IOCODE	(3,DS40) for CRT or (2,DS40,DVMODIFY-macro-label) for ROP
DEVICE	TYPE	DS40
	BUFSIZE	1920
	LEN	80
	FIRST	NO
	EOB	NO
	EOT	NO
	*CHAR	NL (default)
	CRT	YES
*=Optional		

Figure 33. Switched Teletype Dataspeed 40 Specifications (Page 2 of 3)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
*DVMODIFY	*NOLINES	n (maximum number lines in one message-unbuffered ROP only)
	*LINESZ	132 ROP with 132 print positions
	*BUFFRSZ	n code only if buffered ROP
	HARDCPY	YES
*=Optional		

Figure 33. Switched Teletype Dataspeed 40 Specifications (Page 3 of 3)

4.3.7.2 Leased Lines

All general installation and operation considerations described for leased teletype (LTTY) also apply to the Teletype Dataspeed 40 Model 1 and 2 terminals on leased lines. This section describes additions and exceptions to the general leased Teletype support.

- Message Format: The major exception is for input messages; only one PAD character is required (any value; dropped by the 'prepare' command), and no SOM characters are required. The SOM message start scan in BLHIN is bypassed for Dataspeed 40 terminals.

- Ready Message: When a read is issued by BLHIN the following message, coded in even-parity ASCII in a DFTRMLST macro at the label DS40ID, is sent to the terminal:

  (NL) (NL) READY (NL)

  Appropriate idles (X'FF') are also coded in the message. This message in BLHIN may be changed by the user, if desired.

- Initialization: The terminal should be on and in S/R (Receive) state before Intercomm system initialization is begun. Otherwise, a write I/O error of the GOOD MORNING (start-up) message (add the terminal to the 'TOALL' broadcast group) will cause the terminal to be put down, requiring a later TPUP to activate the line.

The following additional considerations apply:

- The module OUTDS40 must be included in the Intercomm linkedit.

- If the Message Mapping Utilities are used, MMUDDMT must be included in the Intercomm linkedit.

- The translate table DS40TRDM is provided to translate even parity (Start/Stop) ASCII to and from EBCDIC.

Figure 34 gives coding specifications for Leased Teletype Dataspeed 40 terminals.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&DS40	SETB	1
&LTTY	SETB	1
&TTYSVC	SETC	'xxx' assigned SVC number; '013' if MVS
*&BACKSPC	SETB	1 (if 40/2 used in S/R mode)
*&CONVER	SETB	1 (if BTERM has CONV=YES)
LINEGRP	DDNAME	DD-statement-reference
	UNIT	LTTY
	*OPTION	BTAM (default)
	BUFNO	n (2 times number of associated BLINEs)
	BUFL	1936 (BUFL and BUFNO omitted if all lines are WRTONLY)
	NUMLN	n (number of associated BLINES)
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	TELETYPE
	TRSTBL	DS40TR
	*OPTION	BTAM (default)
	*WRTONLY	YES (if terminal is receive-only printer)
BTERM	TERM	terminal-ID
	*ALT	alternate terminal-ID
	DEVIND	n
	QNUM	n (must be dedicated)
	CRT	YES (except if receive-only printer)
	TPUP	YES
	*AUTOUP	YES
	*CONV	YES (recommended)
BDEVICE	TERMTYP	DS40
	OP1	06
	CHPS	n line speed--see Section 5.14.7 for values.
	STCHAR	15 New Line, or as desired
	*CTCHAR	if desired for Front End messages
	ENDCHAR	03 (or other value--see Figure 5-19)
	*BACKSP	YES if 40/2 used in S/R mode
	*EXTCHR	0 (default)

*=Optional

Figure 34. Leased Teletype Dataspeed 40 Specifications (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BDEVICE (contd.)	*UPINTV	n if AUTOUP=YES in BTERM
	DS40MOD	1 or 2 (default) model number
	DS40LTY	YES sets LTTY read op code
	DS40MS	n number of memory segments (1/2/3) 0 if Receive-only-printer (ROP)
	DS40NL	YES if CRT with printer, or ROP NO if CRT alone
	*DS40BUF	YES if ROP is buffered
	*DS40FDX	YES if 40/2 FDX
	*DS40FAS	YES if full ASCII character set terminal, or 132 print position printer
	*IDLES	0 (default)
	*CRLF	NO (default)
	*MAXERR	n (3=default) maximum I/O error retries
	*LAST	NO (default for DS40) ENDCHAR value is only message ending character transmitted.
Translate Table	DS40TR	EQU * Intercomm DS40 translate table COPY DS40TRDM
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,DS40) CRT or (2,DS40,DVMODIFY-macro-label) ROP
DEVICE	TYPE	DS40
	BUFSIZE	1920
	LEN	80
	FIRST	NO
	EOB	NO
	EOT	NO
	CRT	YES
	*CHAR	NL (default)
DVMODIFY	*NOLINES	n (maximum number lines in one message - unbuffered ROP)
	*LINESZ	132 (ROP with 132 print positions)
	*BUFFRSZ	n (code only if buffered ROP)
	HARDCOPY	YES
		*=Optional

Figure 34. Leased Teletype Dataspeed 40 Specifications (Page 2 of 2)

Chapter 5

MISCELLANEOUS TERMINAL SUPPORT

This chapter discusses support of various miscellaneous terminals. The following devices are discussed:

- Bunker Ramo 2200 Series
- Sanders 620
- Sanders 720
- Ultronics 7700
- Uniscope 100
- Wiltek 300
- Western Union Plan 115A
- AT&T 83B3 Selective Calling Stations

5.1 BUNKER RAMO 2200 SERIES REMOTE AND LOCAL

The Bunker Ramo 2200 leased line remote and local series is supported. The local 2200 series is supported as a local 2260 device. (See Section 3.2.) The line handler for Bunker Ramo remote 2200 series terminals is BUNKRAMO. The line handler for local 2200 series terminals is GRAPHICS. Bunker Ramo also has 3270-compatible terminals which must be defined as an IBM 3270 (see Chapter 2).

Installation procedures are as follows:

1. Check that the Bunker Ramo I/O macros and replacement DDMs are available on the IBM system libraries.

2. Update the member SETENV, and reassemble the required Front End modules and:

   BUNKRAMO for remote 2200 series
   GRAPHICS for local 2200 series

3. Code the Front End and Back End tables as outlined in Figure 35.

4. Translate table must be supplied by the vendor (BRTRAN macro).

5. Refer to vendor documentation for coding of the BTERM POLL and ADDR parameters and the polling list.

6. Include the following modules in the Intercomm linkedit:

   BUNKRAMO for remote 2200 series
   GRAPHICS for local 2200 series

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&BKRAMO	SETB	1 remote terminals
&BKRMLCL	SETB	1 local terminals
&GRAPH	SETB	1 local terminals require graphics support
*&CONVER	SETB	1 for conversational processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	BKRO
	NUMLN	n
	OPTION	BTAM (remote); GRAPH (local)
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	BKRAMO
	OPTION	BTAM (remote); GRAPH (local)
	POLLIST	Polling-list-label (remote only)
	TRSTBL	translate-table-label (Note that input X'03' and X'04' must translate to X'26'.)
	NUMAC	2 (remote)
	BUFL	n (local only)
	*AUTO	YES (if auto-poll used)
	*POLTM	n (remote)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n (local terminals require a dedicated queue)
	ADDR	(remote only--see vendor documentation)
	POLL	(remote only--see vendor documentation)
	*TPUP	YES
	*ALT	alternate-terminal-ID
	*CONV	YES
		*=Optional

Figure 35. Bunker Ramo 2200 Remote/Local Specifications
(Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BDEVICE	TERMTYP	BKRAMO (for remote); BKRMLCL (for locals)
	OP1	02
	*CRLF	NO (default)
	EXTCHR	1 (remote only)
	*CTCHAR	A0 (remote control unit address)
	*STCHAR	(required for local terminals)
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,BKRAMO)
DEVICE	TYPE	BKRAMO
	CRT	NO
	LEN	
	BUFSIZE	
	FIRST	
	CHAR	NL
	EOB	YES (remote); NO (local)
	EOT	NO
*=Optional		

Figure 35. Bunker Ramo 2200 Remote/Local Specifications (Page 2 of 2)

5.2 SANDERS 620 TERMINAL

The Sanders 620 terminal (including the hard copy attachment) on remote multidrop lines is supported if vendor-supplied BTAM interface macros are available. Standard installation procedures apply. Figure 36 lists the coding requirements.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&SAND620	SETB	1
&BUFFERS	SETB	1 for hard copy attachment
*&CONVER	SETB	1 for conversational processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	S620
*=Optional		

Figure 36. Specifications for Sanders 620 and 620 with Hard Copy Attachment (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
LINEGRP (contd.)	*OPTION	BTAM (default)
	NUMLN	n
	BUFNO	n
	BUFL	n (200 recommended)
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	SAND620
	*OPTION	BTAM (default)
	TRSTBL	translate-table-label (see vendor documentation)
	NUMAC	2
	POLLIST	POLLIST-macro-label
	*AUTO	
	*POLTM	
	*BUFTM	1800 (if hard copy attachment used)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	POLL	(two-character polling sequence)
	*CRT	YES
	*HARDCPY	YES (for hard copy attachment); else NO
	*CONV	YES
	*TPUP	YES
BDEVICE	TERMTYP	SAND620; SAND620H (for hard copy attachment)
	OP1	82
	EXTCHR	4
	*CRLF	NO (default)
	*STCHAR	
	*CHPS	30 (hard copy attachment only)
STATION	TERM	terminal-ID
	*ALT	alternate terminal-ID
	IOCODE	(3,SAND620)
DEVICE	TYPE	SAND620
	CRT	YES; NO-if hard copy attachment
	LEN	80
	BUFSIZE	1024
	FIRST	NO
	CHAR	NO
	*EOB	YES (default)
	*EOT	YES (default)
*=Optional		

Figure 36. Specifications for Sanders 620 and 620 with Hard Copy Attachment (Page 2 of 2)

5.3 SANDERS 720 REMOTE AND LOCAL TERMINALS

Remote and local Sanders 720 terminals are supported. Vendor-supplied special BTAM interface macros and a Translate Table must be available for Front End assemblies. Standard installation procedures apply. For local terminals, the line handler is GRAPHICS, which must be assembled and included in the Intercomm linkedit. Figure 37 lists the coding requirements.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&SAND720	SETB	1 (local and remote)
&GRAPH	SETB	1 (for local terminals only)
*&CONVER	SETB	1 for conversational processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	S720
	OPTION	BTAM (remote); GRAPH (local)
	NUMLN	
	BUFNO	(remote) (if BUFL=200, then 14 times NUMLN)
	BUFL	(remote) (200 recommended)
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	SAND720
	OPTION	BTAM (remote); GRAPH (local)
	TRSTBL	translate-table-label (vendor supplied)
	NUMAC	2 (remote and local)
	POLLIST	POLLIST-macro-label (remote)
	*AUTO	(remote)
	*POLTM	(remote)
	BUFL	512 (local)
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	POLL	(remote and local) (two-character polling sequence)
	*CRT	YES
	*CONV	YES
	*TPUP	YES
	*LOCK	(remote)
BDEVICE	TERMTYP	SAND720
	OP1	82 (for remote)
*=Optional		

Figure 37. Remote and Local Sanders 720 Specifications (Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BDEVICE (contd.)	STCHAR	required for local; optional for remote
	*CRLF	NO (default)
	EXTCHR	4 (remote)
	*OP2	(local)
	*OP2IND	(local)
	*OP2RPL	(local)
STATION	TERM	
	*ALT	
	IOCODE	(3,SAND720)
DEVICE	TYPE	SAND720
	CRT	YES
	LEN	84
	BUFSIZE	2688 (84 x 32 lines)
	FIRST	NO
	CHAR	NL
	*EOB	YES (default)
	*EOT	YES (default)
*=Optional		

Figure 37. Remote and Local Sanders 720 Specifications (Page 2 of 2)

5.4 ULTRONICS 7700 VIDEOMASTER

The Ultronics 7700 (GTE 7100-7700 Series) terminal on remote multidrop lines is supported. The GTE 7100 is a single terminal; the GTE 7700 is a control unit supporting up to eight terminals. Standard installation procedures apply, as outlined in Chapter 1. Figure 38 lists the coding requirements.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&ULTRON	SETB	1
*&CONVER	SETB	1 for conversational processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	7700
	OPTION	BTAM
	NUMLN	
	BUFNO	
	BUFL	
	*EROPT	refer to BTAM SRL DCB description
	*LERB	refer to BTAM SRL DCB description
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	ULT7700
	OPTION	BTAM
	TRSTBL	translate-table-label
	NUMAC	
	POLLIST	POLLIST-macro-label
	*AUTO	
	*POLTM	
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	POLL	
	HARDCPY	NO
	*ALT	
	*CONV	
	*TPUP	
	*LOCK	
BDEVICE	TERMTYP	ULT7700
	OP1	
	*CRLF	NO
	EXTCHR	
	*CTCHAR	
	*STCHAR	
*=Optional		

Figure 38. Ultronics 7700 Specifications

5.5 UNISCOPE 100 TERMINAL

The Uniscope 100 terminal is supported if the extended BTAM code and the Uniscope DDM is supplied by UNIVAC. Standard installation procedures apply. Figure 39 lists the coding requirements.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&UNIVAC	SETB	1
&BUFFERS	SETB	1 for hard copy device
LINEGRP	DDNAME	DD-statement-reference
	UNIT	UNIV
	OPTION	BISYNC
	NUMLN	n
	BUFNO	n
	BUFL	n
	CODE	USASCII
	MODE	(,CNTRL)
	EROPT	N
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	UNIVAC
	OPTION	BISYNC (if synchronous Uniscope 100s are in use, LINEGRP must specify OPTION=BISYNC and BLINE must specify OPTION=BTAM)
	TRSTBL	translate-table-label
	NUMAC	13
	AUTO	YES
	POLLIST	polling-list-label (see vendor documentation)
	POLTM	
	*WRTM	for hard copy attachment
	*BUFTM	
BTERM	TERM	terminal-ID (a BTERM for a hard copy attachment must immediately follow the BTERM for the associated scope)
	DEVIND	n
	QNUM	n
	POLL	three-character sequence in the form RID,SID,DID (see vendor documentation)
	*CRT	YES
	*HARDCPY	YES (for hard copy attachment)
	*ALT	
	*TPUP	YES

*=Optional

Figure 39. Uniscope 100 Specifications
(Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BDEVICE	TERMTYP	U100; U100H (hard copy attachment)
	OP1	02 (scope); 0E (printer)
	*CRLF	NO (default)
	CHPS	required for hard copy attachment
	EXTCHR	4
	*OP2	06 if 'BEL' option desired
	*OP2IND	5B
	*OP2RPL	00
	*CTCHAR	5B1B851B810000000000 ('BEL' option for Front End messages)
Translate Table	label	EQU * Univac table supplied by Intercomm COPY UNVTRST
*=Optional		

Figure 39. Uniscope 100 Specifications
(Page 2 of 2)

5.6 WILTEK 300 TERMINAL

The Wiltek 300 is supported on switched lines. The line handler is PMIWILT, which must be assembled and included in the Intercomm linkedit. A special Translate Table is hand-coded in PMIWILT. Otherwise, standard installation procedures apply. Figure 40 lists the coding requirements.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
&WILTDIL	SETB	1
*&CONVER	SETB	1 for conversational processing
*&BACKSPC	SETB	1 for backspace processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	WILT
	OPTION	BISYNC
	NUMLN	
	*CODE	refer to BTAM SRL DCB description
	*MODE	refer to BTAM SRL DCB description
*=Optional		

Figure 40. Wiltek 300 Specifications
(Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	WILTDIAL
	OPTION	BISYNC
	DIALTRM	
	FIRSTRM	
	SHORTID	YES
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n (must be dedicated)
	PORTS	
	PHONE	
	*CINTVL	n
	*ACALL	YES
	*ALT	
	*CONV	
	*TPUP	
	*LOCK	
BDEVICE	TERMTYP	WILTDIAL
	OP1	82
	*CRLF	NO (default)
	*CTCHAR	
	*STCHAR	
	*BACKSP	YES for backspace processing
*=Optional		

Figure 40. Wiltek 300 Specifications
(Page 2 of 2)

5.7 WESTERN UNION PLAN 115A

WU PLAN 115A terminals on leased multipoint lines are supported. Standard installation procedures apply. Figure 41 outlines the coding requirements for WU PLAN 115A terminals.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
*&CONVER	SETB	1 for conversational processing
*&BACKSPC	SETB	1 for backspace processing
*&IDLES	SETB	1 for idles processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	115A
	OPTION	BTAM
	NUMLN	
	BUFNO	
	BUFL	
	*EROPT	refer to BTAM SRL DCB description
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	TELETYPE
	*OPTION	BTAM
	TRSTBL	translate-table-lable
	NUMAC	2
	POLLIST	POLLIST-macro-label
	*AUTO	NO
	*POLTM	n
	*WRTM	n
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	TPUP	YES
	HARDCPY	NO
	*ALT	
	*CONV	YES
	*CRT	NO
	*AUTOUP	YES
	POLL	two-character sequence Xdd, where: X=X'17' for all terminals; dd=terminal identifier
	ADDR	two-character sequence ccdd, where: cc=circuit call code; dd=terminal identifier
BDEVICE	TERMTYP	TELETYPE
	OP1	82 (Write TIR-required)
	CRLF	YES
	*EXTCHR	
	STCHAR	40 (space character-required)
	*IDLES	
	*BACKSP	

*=Optional

Figure 41. WU PLAN 115A Specifications
(Page 1 of 2)

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
Translate Table	label	EQU * ASMTRTAB RCT1,SCT1
POLLIST	list-type	OPENLST or WRAPLST
	line	LINEGRP-macro-label+L+relative-BLINE-macro offset
	EXTNAM	terminal-ID list
	CTCHAR	polling characters for terminal-ID list. Each CTCHAR corresponds to a terminal in the EXTNAM list and is in the two-character form defined for the POLL parameter of the associated BTERM
STATION	TERM	
	*ALT	
	IOCODE	
DEVICE	TYPE	
	CRT	NO
	LEN	n
	BUFSIZE	n
	FIRST	NO
	CHAR	CR
	EOB	YES
	EOT	NO
*=Optional		

Figure 41. WU PLAN 115A Specifications (Page 2 of 2)

5.8 AT&T 83B3 SELECTIVE CALLING STATIONS

The AT&T 83B3 terminal is supported on leased lines. Standard installation procedures apply. Figure 42 lists the coding requirements.

Global/ Macro	Operation/ Parameter	Setting/Value and (or) Comment
*&CONVER	SETB	1 for conversational processing
*&IDLES	SETB	1 for idles insertion
*&BACKSPC	SETB	1 for backspace processing
LINEGRP	DDNAME	DD-statement-reference
	UNIT	83B3
	*OPTION	BTAM (default)
	NUMLN	n
	BUFL	88
	BUFNO	n
	*LERB	refer to BTAM SRL DCB description
	*EROPT	refer to BTAM SRL DCB description
BLINE	LGNAME	LINEGRP-macro-label
	UNIT	ATT83B3
	*OPTION	BTAM (default)
	NUMAC	2
	POLLIST	POLLIST-macro-label
	TRSTBL	translate-table-label
	*POLTM	n
	*WRTONLY	
BTERM	TERM	terminal-ID
	DEVIND	n
	QNUM	n
	HARDCPY	YES
	POLL	two-character Transmitter Start Code
	ADDR	two-character Call Directing Code
	*ALT	alternate terminal-ID
	*TPUP	YES
	*AUTOUP	YES
	*CONV	YES
	*LOCK	verb
BDEVICE	TERMTYP	ATT83B3
	OP1	82
	*CRLF	NO (default)
	*IDLES	n
	*BACKSP	YES
	STCHAR	OD2517 (CR LF LTRS)
Translate Table	label	EQU *
		ASMTRTAB RCT1,SCT1

*=Optional

Figure 42. AT&T 83B3 Specifications

Appendix A

ENVIRON

```
*****************************************************************************
*                  FRONT END (BTAM/TCAM GLOBAL TABLE                        *
*****************************************************************************@
          REQUIRED GENERALLY FOR BTAM/TCAM FRONT END
        GBLA  &CLDWAIT      CRT FLUSH-MSG INTERVAL IN CLOSEDOWN
        GBLC  &CNTL         CONTROL TERMINAL NAME
        GBLA  &FEPRTY       FRONT-END PRIORITY
        GBLA  &MAXINLN      BISYNC-INPUT MESSAGE MAXIMUM LENGTH
        GBLC  &SEPCHAR      SYSTEM SEPARATOR CHARACTER                       @
          GENERAL DEVICE INFORMATION
        GBLB  &BUFFERS      BUFFERED HARDCOPY DEVICES PRESENT
        GBLB  &CONVER       SOME CONVERSATIONAL TERMS PRESENT
        GBLB  &BISYNC       BINARY SYNC TERMINALS IN USE
        GBLB  &BACKSPC      BACKSPACE CORRECTION DESIRED
        GBLB  &IDLES        UNBUFFERED TERMINALS NEED IDLES
        GBLB  &DDQ          SEGMENTED INPUT/OUTPUT DDQS PRESENT
        GBLB  &GFE          TCAM/GENERALIZED FRONT END INTERFACE             @
          TERMINALS SUPPORTED AND SOME OF THEIR FEATURES
        GBLB  &IBM3270      3270 REMOTE SUPPORT
        GBLB  &IBM327L      3270 LOCAL SUPPORT
        GBLB  &IBM129       IBM 129/3270 CARD PUNCH ATTACHMENT
        GBLB  &CNT1050      OS CONSOLE
        GBLB  &IBM2260      IBM 2260 REMOTE
        GBLB  &GRAPH        GRAPHICS ACCESS METHOD (LOCAL 2260)
        GBLB  &BURROS       BURROUGHS 2260 REMOTE
        GBLB  &IBM2740      IBM 2740 LEASED
        GBLB  &DIALUP       DIALUP TERMINALS PRESENT
        GBLB  &IBM2741      IBM 2741 LEASED
        GBLB  &DL2741       IBM 2741 DIAL-UP
        GBLB  &IBM2770      IBM 2770 LEASED
        GBLB  &BSCSGMT      2770 SEGMENTING OPTION DESIRED
        GBLB  &IRS          INTER RECORD SEPARATOR FOR 2770
        GBLB  &DUALCOM      DUAL COMMUNIC. INTFACE ON 2701
        GBLB  &IBM2780      IBM 2780 LEASED
        GBLB  &RDR2780      IBM 2780 CARD-READERS ON SYSTEM
        GBLB  &EM           END-OF-MSG CHARACTER IN USE FOR 2780
        GBLB  &BLK2780      ACCUM 2780 I/O UNTIL EOT BEFORE QUEUEING
        GBLB  &IBM1030      IBM 1030 SUPPORT
```

(continued)

```
GBLB  &IBM1050      IBM 1050 LEASED LINE
GBLB  &IBM373S      IBM3735 DIAL-UP
GBLB  &IBM7770      IBM7770 DIAL-UP
GBLC  &REPET77      REPEAT 7770 MESSAGE REQUEST
GBLB  &BSCDIAL      BISYNC SWITCHED LINE CPU SUPPORT
GBLB  &DIAL360      SWITCHED IBM 360
GBLB  &DIL2780      DIAL-UP 2780
GBLB  &BSCLEAS      LEASED BISYNC CPU SUPPORT
GBLB  &IBM360       LEASED IBM 360
GBLB  &LTTY         LEASED LINE TELETYPE
GBLC  &TTYSVC       ASR 33/35 POINT TO POINT-SVC (NON-MVS)
GBLB  &DS40         TELETYPE-DATASPEED 40 LEASED/DIAL-UP
GBLB  &BKRAMO       BUNKER RAMO REMOTE
GBLB  &BKRMLCL      BUNKER-RAMO LOCALS
GBLB  &SAND620      SANDERS 620
GBLB  &SAND720      SANDERS 720
GBLB  &ULTRON       ULTRONICS TERMINALS
GBLB  &UNIVAC       UNIVAC TERMINALS
GBLB  &WILTDIL      WILTEK DIAL-UPS
GBLB  &DATA100      DATA 100
GBLB  &SPCLTTY      SPECIAL LEASED P TO P
GBLB  &SIMTTY       SIMULATED LEASED-LINE TTY (NCIC)
```

Appendix B

DEFAULT SETENV

The member SETENV is a user-modified member containing SETA, SETB, and SETC Assembler specifications for the various globals contained in ENVIRON. SETENV is coded to generate the Front End program logic and the Intercomm linkedit using the ICOMLINK macro. SETENV statements are set by the user to customize the Front End to the installation's particular configuration.

This member is released as shown in Appendix B. A full description of the generalized feature specifications for SETENV is provided in Appendix C. During installation, this member must be customized to the user's network configuration to be supported by Intercomm.

```
*************************************************************************
*                  FRONT END (BTAM/TCAM) GLOBAL SETTINGS                *
*************************************************************************

&CLDWAIT SETA  10            10 SECOND CRT FLUSH INTERVAL
&CNTL    SETC  'CNT01'       SET CONTROL CONSOLE NAME TO CNT01
&FEPRTY  SETA  2             DEFAULT FRONT-END PRIORITY
&MAXINLN SETA  4095          INPUT MESSAGE MAXIMUM LENGTH
&SEPCHAR SETC  '6B'          SET SEPARATOR CHARACTER TO COMMA
&BUFFERS SETB  1             HARD-COPY BUFFER PROCESSING
&CONVER  SETB  1             CONVERSATIONAL PROCESSING DESIRED
&BISYNC  SETB  1             BISYNC TERMS PRESENT
&BACKSPC SETB  1             BACKSPACE CORRECTION DESIRED
&IDLES   SETB  1             IDLES PROCESSING REQUESTED
&DDQ     SETB  0             NO DDQ SEGMENTED INPUT PROCESSING
&GFE     SETB  1             GENERALIZED FRONT END
&IBM3270 SETB  1             IBM 3270 REMOTE SUPPORTED
&IBM327L SETB  1             IBM 3270 LOCAL SUPPORTED
&IBM129  SETB  0             NO IBM129/3270 DEVICES
&CNT1050 SETB  1             CPU CONSOLE (1052/3215) USED
&IBM2260 SETB  1             IBM 2260 REMOTES SUPPORTED
&GRAPH   SETB  0             NO GRAPHICS LINES
&BURROS  SETB  0             NO BURROUGHS TERMINALS
&IBM2740 SETB  1             IBM 2740 SUPPORTED
&DIALUP  SETB  1             DIALUP TERMINALS BEING USED
```

(continued)

```
&IBM2741 SETB  1             LEASED 2741 TERMINAL SUPPORT
&DL2741  SETB  1             IBM 2741 DIAL-UP TERMINAL SUPPORT
&IBM2770 SETB  1             IBM 2770 SUPPORTED
&BSCSGMT SETB  0             NO 2770 SEGMENTED INPUT ACCUMULATION
&IRS     SETB  0             NO IRS PROCESSING TO BE DONE
&DUALCOM SETB  0             NO 2701 DUAL COMMUNICATION PROCESSING
&IBM2780 SETB  1             IBM 2780 LEASED SUPPORTED
&RDR2780 SETB  0             2780 CARD READER ATTACHMENT NOT SUPPORTED
&EM      SETB  0 NO EOM FEAT. FOR SHORT LEN. INPUT CARD SEGMENTS-2780
&BLK2780 SETB  0             NO 2780 SEGMENTED INPUT ACCUMULATION
&IBM1030 SETB  0             NO IBM 1030 TERMINALS
&IBM1050 SETB  0             NO IBM 1050 TERMINALS
&IBM373S SETB  0             NO IBM 3735 (SWITCHED) TERMINALS
&IBM7770 SETB  0             NO IBM 7770 TERMINALS
&REPET77 SETC  'D5D6D9C5D7C5E3'    REPEAT MSG CODE                IBM7770
&BSCDIAL SETB  1             SWITCHED BISYNC CPU LINES SUPPORTED
&DIAL360 SETB  0             NO DIAL-UP CPU SUPPORT DESIRED
&DIL2780 SETB  1             DIAL-UP 2780 SUPPORT
&BSCLEAS SETB  1             LEASED-BISYNC CPU SUPPORT REQUIRED
&IBM360  SETB  1             LEASED CPU SUPPORT IS REQUIRED
&LTTY    SETB  0             NO TELETYPE POINT TO POINT
&TTYSVC  SETC  '013'         ASR 33/35 POINT TO POINT-SVC
&DS40    SETB  1             DATASPEED 40 TERMINALS IN USE
&BKRAMO  SETB  0             NO BUNKER RAMO REMOTES
&BKRMLCL SETB  0             NO BUNKER RAMO LOCALS
&SAND620 SETB  0             NO SANDERS 620 TERMINALS
&SAND720 SETB  0             NO SANDERS 720 TERMINALS
&ULTRON  SETB  0             NO ULTRONICS TERMINALS
&UNIVAC  SETB  0             NO UNISCOPE TERMINALS
&WILTDIL SETB  0             NO WILTEK TERMINALS
&DATA100 SETB  0             NO DATA 100 TERMINALS
&SPCLTTY SETB  0             NO SPECIAL LEASED TTY SUPPORT
&SIMTTY  SETB  0             NCIC NOT IN SYSTEM
```

Appendix C

SETENV GENERALIZED FEATURE SPECIFICATIONS

Variable Symbol	Symbol Type	Code	Description
&BACKSPC	SETB	0	Software backspacing delete feature not requested.
		1	Software backspacing delete feature requested by one or more BDEVICE macros specifying BACKSP=YES.
&BISYNC	SETB	0	Binary Synchronous terminals not in use.
		1	Binary Synchronous terminals in use (for example, 3270 remotes, 2770s, leased 2780s), with exception of remote CPUs.
&BSCDIAL	SETB	0	Bisync Dial-up Line not used.
		1	Bisync Dial-up Line used.
&BSCLEAS	SETB	0	Bisync Leased Line Remote CPUs not used.
		1	Bisync Leased Line Remote CPUs used.
&BUFFERS	SETB	0	No leased-line hard copy buffered devices used within the system.
		1	One or more leased-line hard copy devices used within the system by one or more BTERM macros specifying HARDCPY=YES.
&CLDWAIT	SETA	n	This symbolic variable provides the interval (in seconds) between consecutive messages flushed to CRT devices during closedown. This is a required global.
&CNTL	SETC	c	This symbolic variable supplies the Intercomm terminal-ID of the Intercomm Control Terminal. This variable has been preset to 'CNTOl'. (Refer to the BTERM macro, CONTROL parameter.) The code setting this symbol must be identical to that assigned to the SPALIST macro, CCNID parameter. This is a required global.

(continued)

Variable Symbol	Symbol Type	Code	Description
&CONVER	SETB	0	Conversational feature not requested.
		1	Conversational terminal feature requested by one or more BTERM macros specifying CONV=YES.
&DDQ	SETB	0	Dynamic Data Queuing Facility not used.
		1	Dynamic Data Queuing Facility in use to gather and queue segmented input messages.
&DIALUP	SETB	0	No dial-up (Start/Stop) terminals present within the system.
		1	One or more dial-up (Start/Stop) terminals defined within the system.
&FEPRTY	SETA	n	This symbolic variable defines the BTAM Front End priority in the range of 0 (highest) to 3 (lowest) for the multitasking Dispatcher. This is a required global.
&GFE	SETB	0	Generalized Front End Facility not in use.
		1	Generalized Front End Facility in use. (Required for Extended TCAM.)
&GRAPH	SETB	0	No graphic terminals present within the system.
		1	One or more graphic terminals used by one or more LINEGRP macro instructions specifying OPTION=GRAPH.
&IDLES	SETB	0	Idles Insertion feature not requested.
		1	Idles Insertion feature requested by one or more BDEVICE macros specifying IDLES=YES or IDLES=number.

(continued)

Variable Symbol	Symbol Type	Code	Description
&MAXINLN	SETA	n	This symbolic variable defines the maximum input message length for leased bisync terminals (not remote CPUs), which transmit a message in segments of line buffer length. It is used to control runaway input due to terminal hardware failure resulting in repeated segments, or no end-of-message signal being transmitted.
&SEPCHAR	SETC	c	This symbolic variable supplies the Intercomm system separator character. This has been preset to '6B' (a comma). The code setting this symbol must be identical to that assigned to the SPALIST macro SEP parameter. This is a required global.

Appendix D

BTAM FRONT END MODULES

Required Modules	Function
BLHIN	Input Line Handler (Leased) and Facility Processing
BLHOT	Output Line Handler (Leased) and Facility Processing
BMH000	Message Handler
BSTAT2	Statistics Display Processing
BTAMLINE	Front End Initialization and Closedown
BTSEARCH	Transaction Routing Module
ERRSTATS	Error Statistics Accumulation
QUEUEMOD	Terminal Message Dequeuing
TPUMSG	Front End Command and Error Processing
PMIBTSTR	BTAM Startup

Optional Modules	Function
BTVERIFY	Table Verification Module
BDIAL	Dial-up Line Handler (Start/Stop)
BSCDIAL	Dial-up Line Handler (Bisync)
BSCLEASE	Leased CPU-CPU Line Handler
BSEGMOD	DDQ Segmented Message Processing
CNT01MOD	CPU Console Interface
GRAPHICS	Graphics Access Method Line Handler

Appendix E

SHARED BTAM/VTAM FRONT END SUPPORT MODULES

Module	Function
OUT3270	3270 - Output Formatting
FEMSG	Front End Error Messages
FECMD	Front End Command Routing
INTVRB00	Transaction Verification Module
PMIEXTRM	Terminal ID Lookup
CLOSDWN3	Intercomm Closedown Processing
BLHSTRC	LTRC (BTAM Line and VTAM LU) Trace Command
TALLY	GPSS TALY Command

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