38707800

CONTROL DATA CORPORATION

# CONTROL DATA®
# 6676-B/C/E/F
## TTY MULTIPLEXER

## HARDWARE REFERENCE MANUAL

New features, as well as changes, deletions, and additions to information in this manual are indicated in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

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# PREFACE

This manual gives the programming codes and operating characteristics of the 6676-B/C/E/F TTY Multiplexer and Standard Option 10294-1. It is assumed that the reader is acquainted with the programming (especially I/O formats) and operating characteristics of the 6000 Series computer system (see 6400/6500/6600 Computer Systems Reference Manual). This manual does not contain engineering hardware information. The following Control Data publications contain hardware maintenance information for the 6676-B/C/E/F TTY Multiplexer.

| TITLE | PUBLICATION NUMBER |
|---|---|
| 6676-B/C/E/F TTY Multiplexer Customer Engineering Manual | 38706100 |
| Input/Output Specifications Manual | 60045100 |

NOTE

If the software driver for the 6676 outputs a 7000 code after a 6000 code, and if 134.5 baud terminals are communicating via switched networks with the 6676, a software delay of at least 150 milliseconds is required between the output of the 6000 disconnect code to the 134.5 baud ports in the 6676 and the output of the 7000 code. This situation should not exist unless the same software driver is used for both the 6676 and the 6671 Data Set Controller. The 7000 code is required by the 6671 to enable the Data Terminal Ready signal, thereby enabling telephone connections to be made. A 7000 code is not required by the 6676.

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## SECTION 1

# INTRODUCTION

The CONTROL DATA® 6676-B/C/E/F TTY Multiplexer interfaces as many as 64 low-speed remote terminals (i.e., 110 bits per second or 110 Baud) to a Control Data 6000 Series computer system. The multiplexer is designed for remote terminal communications with a large central computing facility. The multiplexer and its software package allow an immediate contact between the terminal and the computer. This permits maximum on-line access to the central computing facility. The user can then write routines, debug programs, establish files, or modify existing data from the remote terminal any time he chooses, without requesting scheduled time at the central facility. The remote terminal may be located adjacent to the computer or several thousand miles away, wherever a telephone line connection is available.

Figure 1-1. illustrates a remote system utilizing teletypewriters. This remote system consists of a 6676-B/C plus its modems (DATA PHONE* Data Set 103), interfacing as many as 64 ASR-33 Teletypes to a 6000 Series or a CYBER 70 Series computers. The 6676-E/F operates with the 6000 or CYBER 70 Series computers also, but in addition, communicates with the CYBER 170 Series computers. If a telephone line is not available, an optional interface (Teletype Loop Adapter) permits driving the teletype lines without modem interfaces (the Teletype Loop Adapter is available on an individual quotation basis). Additional Baud rates are available with the incorporation of Standard Option 10294-1. (Refer to Section 3).

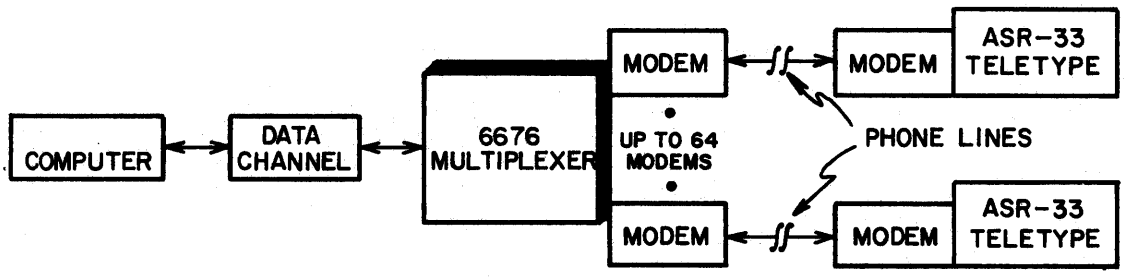



Figure 1-1. Typical 6000 Series Computer/6676-B/C/E/F Relationship

*Registered trademark of Bell System

## DATA TRANSFER RATE

The 12-bit data word transmission between the data channel and the multiplexer is at a 1MHz rate. This rate permits input/output of a 64-word block in 64 $\mu$sec. The 8-data-bit serial character transmission, plus data control pulses, between the multiplexer and the terminal, is 110 bits per second (baud). This speed is such that, with a terminal active, the multiplexer requires an input operation every 100 ms or Lost Data may occur. Because of the terminal I/O rate, the multiplexer can tolerate a maximum of 100 ms between sequential output data blocks. An option kit, available on an individual quotation basis, provides a second baud speed, and either a 10 or 11-bit character length.

## CAPABILITIES

DATA TRANSFER MODE

The multiplexer can operate in half-duplex mode, and/or full-duplex mode, or both. In half-duplex mode (denoted block mode), data transfer between the multiplexer and the terminals proceeds in only one direction (either receive or transmit) at a time. In full-duplex mode (denoted character mode), data transfer between the multiplexer and the terminals can proceed in both directions simultaneously.

DUAL CHANNEL CONTROL

An optional interface (available on an individual quotation basis), permits control by a second 6000 Series data channel. This second data channel can be from the same computer system or from a completely separate computer system.

# SECTION 2
# DESCRIPTION AND OPERATION

## PHYSICAL DESCRIPTION

The multiplexer is contained in a standard Control Data Type B cabinet and can be installed in any area that meets 6000 Series computer requirements. It offers no environmental restrictions other than normal cleanliness, air circulation, and accessibility.

| | |
|---|---|
| Cabinet Dimensions | |
| Height | 56-7/8 inches |
| Width | 42 inches |
| Depth | 20-1/2 inches |
| Cabinet Weight | 850 pounds |
| Cabinet Power Requirements | 400 cycle, 208 volts, 3 phase, 925 VA<br>60 cycle, 120 volts, 1 phase, 209 VA |
| Cabinet Cooling Requirements | 3620 BTU/hr |
| Operating Temperature | 60° to 80° F |

## FUNCTIONAL DESCRIPTION

Figure 2-1 is a functional block diagram of the multiplexer. The block diagram shows the lines that connect the data channel and the multiplexer, and the major circuits of the multiplexer.

DATA CHANNEL ←→MULTIPLEXER

Data transfer between the data channel and the multiplexer must be via data blocks. These blocks contain from one to sixty-four 12-bit data words. Each 12-bit data word may contain a data character in the lower eight bits, while the remaining four bits contain I/O control bits or unused bits. During output operations the programmer must generate the I/O control bits; during input operations the multiplexer generates the operation control status bits.

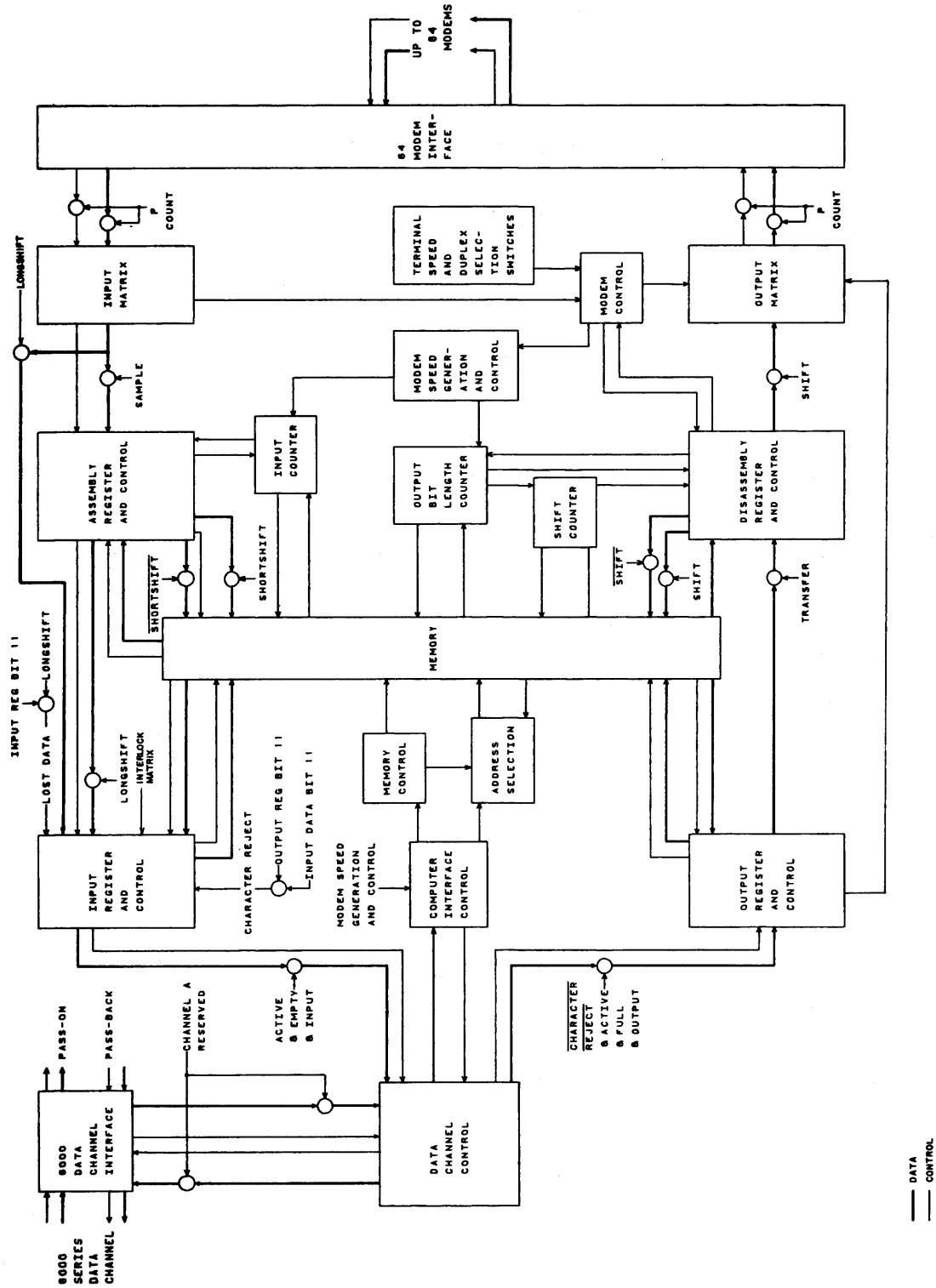



Figure 2-1. Multiplexer Block Diagram

MULTIPLEXER←→MODEM TERMINALS

Data transfer between the multiplexer and the terminals is via serial 8-bit characters plus start and stop bits for each character. The multiplexer associates each data word in the data block with one of the 64 terminals. The multiplexer transfers data word 0 to and from terminal 0, data word 1 to and from terminal 1, and so on. This format applies regardless of the number of terminals available or that require service.

MEMORY

The multiplexer utilizes a 64-word, 56-bit core storage memory for buffering data to and from the data channel and terminals. The memory word bits are divided into six sections:

1) Output buffer
2) Serial output disassembly
3) Control
4) Serial input assembly
5) Input buffer
6) I/O status

Each memory word is assigned to a particular terminal. Memory word 0 receives data words from and for terminal 0, memory word 1 from and for terminal 1, and so on. The buffered memory allows the multiplexer to output to some terminals, and simultaneously receive input from other terminals or the same terminal. For example, the output disassembly memory section can be performing an output to terminals 0 through 10, and the input assembly memory can be performing an input from terminals 60 to 63, while both input and output are operating on terminals 30 to 42.

FUNCTION CONTROL

To initiate a data transfer with a remote terminal, the Peripheral Processor Unit (PPU) must select the multiplexer via a function select code. A function select code contains an Equipment code and a Function code which designate equipment and multiplexer operating modes. Upon receipt of a function code, the multiplexer generates an Inactive signal to the computer and enables the operating mode requested. Upon successfully selecting the multiplexer and an operating mode, the multiplexer is ready for an input, output, or status operation.

OUTPUT

Upon successfully selecting output mode via a function select code, the PPU activates the data channel of the multiplexer and transfers a block of data words to the multiplexer. The multiplexer stores the data block in its output buffer memory section. After completing the block storage, the multiplexer prepares the terminals which require an output for a transmit operation.

Upon receipt of a signal indicating terminal readiness, the multiplexer begins a memory transfer. The memory transfer consists of transferring the lower eight bits (data character) and bit 11 for each terminal from the output buffer section to the output disassembly section, provided the disassembly section of the terminal is empty. If the disassembly section is not empty, the transfer for that terminal must wait for a later memory cycle. During this memory transfer, the multiplexer also transfers a start bit to the terminal if bit 11 (Output Required) is set.

Following the start bit transmission, the multiplexer begins the serial bit transmission of the character. This operation consists of transmitting a bit to each terminal before the next bit is transmitted. A character for a terminal is first read from the disassembly memory section. Then the multiplexer shifts the highest-order bit to the modem and left-shifts the remaining bits as it writes them back into the disassembly memory section. The multiplexer continues this shift for each of the terminals and appends the two stop bits to the character.

The multiplexer is ready for another data block after the transfer of the previous data block from the output section to the output disassembly section is accomplished. The multiplexer can store a data block in the output memory section while the preceding data block is in the output disassembly memory section. If the multiplexer receives a data word for a terminal when the output memory section of the terminal is full, the multiplexer performs a pseudo-accept of the new data word and sets the Character Reject status bit. (A pseudo-accept will not allow a new word to destroy the word presently stored in memory.)

INPUT

Upon successfully selecting input mode via a function code, the PPU activates the multiplexer channel. Upon receipt of the Active signal the multiplexer immediately transfers the first word of the data block from the input memory section to the Data Channel. The data block contains as many as sixty-four 12-bit words which contain an eight-bit data character and the I/O status bits for each active terminal. Prior to the block transfer, the multiplexer performs an assembly operation with the active terminals.

The assembly operation consists of assembling the serial data bits from the active terminals and storing the data characters in memory. The assembly section scans for a bit from each terminal before scanning for the next bit. Upon completeing a character assembly for a specific terminal, the multiplexer transfers that portion of the assembly section to the lower eight bits of the input buffer section of that terminal and sets bit 11 of the input buffer section. The assembly section continues assembling and transferring characters as long as serial data from the terminals is available (even if the input memory section contains data).

If the multiplexer completes assembly of a data character when the input memory of the terminal section is full, the multiplexer writes the new data character into memory (destroying the previous character) and sets the Lost Data I/O control bit.

Upon receipt of an input function selection followed by an Active signal, the multiplexer transfers as much as a 64-word data block from the input memory section to the data channel. The block may contain assembled data characters and characters containing zeroes. The zero containing characters may have the I/O status bit set. Valid data characters are detected by examining bit 11 of each input data word.

STATUS

Upon successfully selecting status mode via a function code, the PPU activates the multiplexer channel. Upon receipt of the Active signal, the multiplexer immediately transfers one 12-bit status word to the data channel.

## 6676 I/O OPERATION TIMING PROBLEM

Due to the one microsecond cycle time of the memory, the delays involved in pass on networks and 75' cable lengths, it is recommended that the 6676 be limited to either first or second equipments on a channel. If the 6676 is placed third, the delays involved in pass on will exceed the one microsecond cycle time of memory. The 6676 will hang the channel on the last word of a 100 word input to the computer or will run at half speed.

## OPERATION

The multiplexer is entirely program controlled, and requires no operator intervention during normal operations. Ordinarily, multiplexer power is on when system power is on. However, multiplexer power can be turned off or on at any time by the circuit Breaker 1 (CB1) switch in the cabinet.

## CONTROLS AND INDICATORS

The multiplexer controls and indicators consist of the cabinet controls and indicators and those on the multiplexer control panel.

### CABINET CONTROLS AND INDICATORS

Circuit Breaker Indicator

The Circuit Breaker indicator lights when the 400 cycle circuit breaker trips or when it is in the Off position.

Thermostat Bypass Indicator

The Thermostat Bypass indicator lights when the Thermostat Bypass switch is in the On position.

Temperature Warning Indicator

The Temperature Warning indicator lights when the temperature of air entering the cabinet exceeds 80°, when a blower fails, or a blower does not provide sufficient air.

High Temperature Indicator

The High Temperature indicators lights when the temperature in the cabinet exceeds 110°. The 400 cycle circuit breaker trips when the High Temperature indicator lights.

CB1 Switch

The CB1 switch turns on 400 cycle power to the power supply. In the Off position the Circuit Breaker indicator is lit.

Thermostat Bypass Switch

The Thermostat Bypass switch lights the Termostat Bypass indicator and bypasses the equipment thermal protection.

CAUTION

With the Thermostat Bypass switch in the On position, the multiplexer does not have thermal protection. It is recommended that the multiplexer be operating in this condition only in an emergency.

### CONTROL PANEL

Figure 2-2 illustrates the multiplexer control panel.

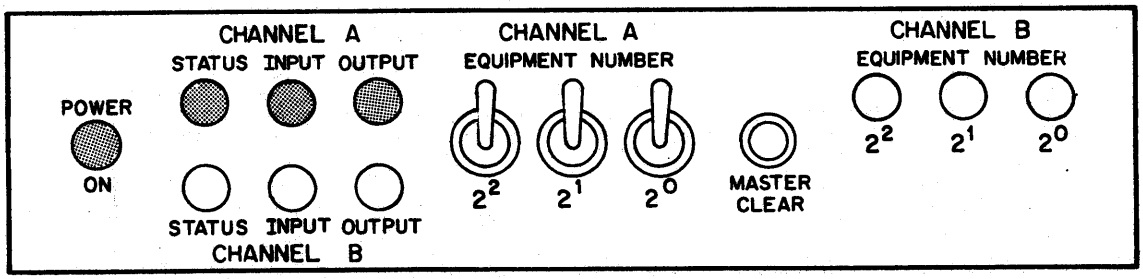



Figure 2-2. Single Access Multiplexer Control Panel

NOTE

The indicator lights and equipment select switches for the second channel (B) are provided for but not installed.

Equipment Number Switches

The Equipment Number switches determine the equipment number which the multiplexer recognizes.

Master Clear Switch

The Master Clear switch generates a clear pulse to the multiplexer circuits and memory. This switch should not be used when the multiplexer is under program control because it will cause the PPU to hang-up.

Select Status Indicator*

The Select Status indicator lights upon receipt of a Select Status Request (X002) function code.

Select Input Indicator*

The Select Input indicator lights upon receipt of a Select Input (X003) function code.

Select Output Indicator*

The Select Output indicator lights upon receipt of a Select Output (X001) function code.

*Note: These operations are normally performed too fast for these indicators to light. However, they will light if the multiplexer is hung-up in any of these operations.

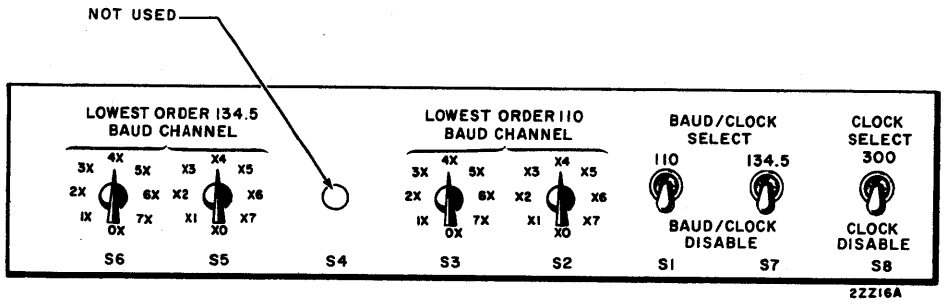



Figure 2-3. Optional Baud Switch Panel*

NOTE

The following restriction applies when setting the 134.5 and 110 baud switches, S5/S6 and S2/S3, respectively; because X0 is not translated as a 1 microsecond signal. If the 134.5 baud switch setting is at specifically X0, where X is any number from 0 through 7, do not set the 110 baud switch setting at X1 through X7. For example, is S5/S6 is set to 20, S2/S3 must be set to 30 or greater. Violating the restriction will cause the clocks for both baud rates to be simultaneously enabled which will result in data errors. If S5/S6 is set to 21, S2/S3 can be set to any number higher than 21. The selection of 0X on switches S3 and S6 is also not translated and can enable both baud rate clocks, resulting in data errors. Therefore, the 0X setting should not be used.

*Used on Standard Option 10294-1.

## SECTION 3

# PROGRAMMING

## FUNCTION SELECT CODES

Function select codes recognized by the multiplexer will select the multiplexer and initiate one of three operating modes. Table 3-1 contains a short description of function codes. The X prefix of each function select code must coincide with the Equipment Select switch setting. Function code selection does not disable the multiplexer from transferring output data characters from memory to the terminals, or input data characters from the terminals to memory.

TABLE 3-1. MULTIPLEXER FUNCTION CODES

| OCTAL CODES | DESCRIPTION |
|---|---|
| X001 | Select Output |
| X002 | Select Status Request |
| X003 | Select Input |

Upon receipt of a function code, the multiplexer generates an Inactive to the PPU when bits 9 through 11 of the function code correspond to the setting of the Equipment Select switch. The multiplexer does not respond when the above condition is not present (e.g., function codes bits 9 through 11 do not match Equipment Select switch setting). After generating an Inactive, the multiplexer enables the selected operating mode (i.e., Output, Status Request, or Input).

SELECT OUTPUT (X001)

Receipt of a Select Output function code (X001) enables the multiplexer to accept a data block from the data channel. This data block can contain a maximum of 64 data words. (See the word format descriptions for a sample of an output word.)

STATUS REQUEST (X002)

Upon receipt of a Status Request function code (X002), the multiplexer transfers a 12-bit status word to the data channel input lines. This Status Request function code must be followed by an input operation in order to examine the status bits. (See the word format descriptions for the specific bit assignments of the status word.)

SELECT INPUT (X003)

Receipt of a Select Input function code (X003) enables the multiplexer to transfer a data block to the data channel. Receipt of an Active (Activate Channel instruction) enables the multiplexer to immediately transfer a data block to the data channel. (See the word format descriptions for an input word sample.)

## WORD FORMATS

The multiplexer communicates with the PPU via a 12-bit data word. A 12-bit data word either contains an 8-bit character (which the multiplexer receives from or transfers to the terminal) and control bits (which indicate input/output conditions within the multiplexer) or status bits, as is the case with a status word.

OUTPUT WORD FORMAT

Figure 3-1 illustrates the output word format required by the multiplexer during data transfers with the Data Channel.

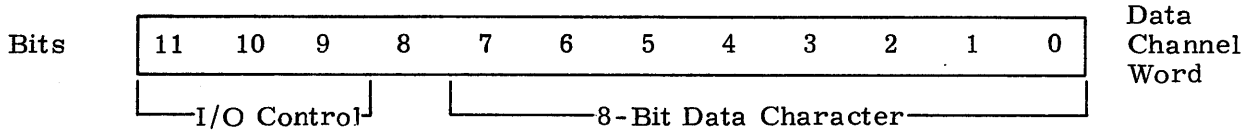



Figure 3-1. Output Word Format

Eight Bit Data Character (4XXX)

Bits 0 through 7 of the data channel word contain the 8-bit character. When enabled, the multiplexer performs a serial transfer of the 8-bit character (bit 1 first) to the modem terminal. Bit 0, when used, is transferred last as the parity bit.

I/O Control

Bits 8 through 11 of the data channel word are I/O control bits. These bits, in various combinations, act as a flag for data characters or disconnect the modem. Table 3-2 gives a short description of each octal code. Note that only Output Required (4XXX) can contain a data character in the lower eight bits of the data channel word.

TABLE 3-2. I/O CONTROL OCTAL CODES

| OCTAL CODE | DESCRIPTION |
|---|---|
| 6000 | Disconnect Modem |
| 4XXX | Output Required |

Disconnect Modem (6000): Bits 10 and 11 of a data channel word, when set, enable termination of data connection between the multiplexer and the remote terminal. The programmer should set bits 10 and 11 of a data channel word to deactivate a terminal.

NOTE

The data word which utilizes this disconnect feature should not contain a data character, as the data transfer terminates and that data character is lost.

Output Required (4XXX): Bit 11 of a data channel word, when set, indicates bits 0 through 7 of the word contain a data character. The programmer should set this bit when the multiplexer is to transfer a data character to the modem.

INPUT WORD FORMAT

Figure 3-2 illustrates the input word format utilized by the multiplexer during data transfer with the data channel.

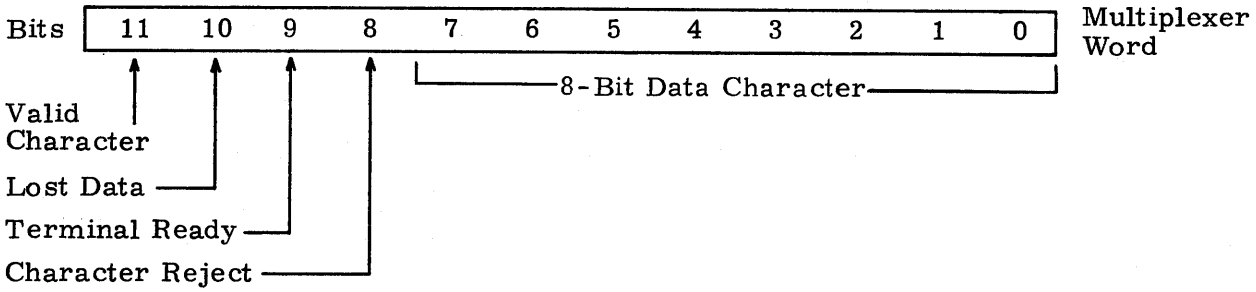



Figure 3-2. Input Word Format

Eight Bit Data Character

Bits 0 through 7 of the multiplexer word contain the 8-bit data character. The multiplexer assembles the character from serial data (bit 1 first) received from the modem. Bit 0, when used, is transferred last as the parity bit.

Character Reject

Bit 8 of the multiplexer word, when set, indicates the multiplexer did not accept an output data word because memory was full. This control bit sets if a data channel output word was pseudo-accepted and discarded because the output buffer memory for that terminal was full. The multiplexer clears this control bit after transferring the input word to the PPU.

Terminal Ready

Bit 9 of a multiplexer word, when set, indicates a connection exists between the terminal and the modem; i.e., the modem Interlock signal is present. This control bit is clear when a terminal is deactivated.

Lost Data

Bit 10 of a multiplexer word, when set, indicates the PPU failed to perform an input operation within the prescribed time limit; therefore, one or more data words were lost. When a terminal is active, the PPU must perform an input operation within 5 ms after Input Required (status bit 1) sets. The multiplexer clears this control bit when transferring the input word to the PPU.

Valid Character

Bit 11 of an input word, when set, indicates bits 0 through 7 contain a data character. The multiplexer sets this bit after assembling a complete data character from an active terminal.

STATUS WORD FORMAT

Status provides a means by which the PPU can determine the condition of the multiplexer. To determine the multiplexer status, the PPU issues a Status Request function select code (X002), followed by an input operation. Figure 3-3 gives the format of the multiplexer status response word.

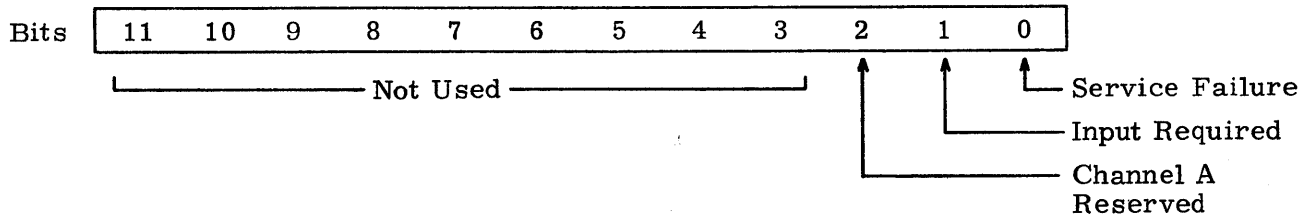



Figure 3-3. Status Response Word

Service Failure (0001)

Status bit 0 sets when the PPU fails to perform an input operation within 100 ms after Input Required (status bit 1) sets. Service Failure does not indicate that any data has been lost, but indicates the possibility of Lost Data. The multiplexer clears status bit 0 upon receipt of a Select Input function code.

Input Required (0002)

The multiplexer requests an input operation when status bit 1 is set. The Input Required (0002) status bit is a clock function which sets when 95 percent of a character time has elapsed. The character rate of terminal 0 determines the period of the clock. The input operation requested by the status bit should follow within 5 ms or Lost Data may occur.

Channel A Reserved (0004)

The multiplexer is reserved by PPU A when status bit 2 is set. In a single access multiplexer system, this status bit is always set. If the multiplexer has the optional Dual Access Interface, this status bit sets when PPU A has control of the multiplexer.

## PROGRAMMING CONSIDERATIONS

STATUS

The multiplexer has two types of status available: equipment status via a Status Request function code; and operation control status via the input data words. The equipment status consists of Service Failure and Input Required. The operation status consists of Valid Character, Lost Data,and Terminal Ready indications for input operations, as well as Character Rejected indications for output operations.

OUTPUT STATUS CHECK

To obtain complete status of an output operation, an input operation must follow the output operation. The terminal for which an output character has been rejected will have bit 8 set in the next input word from that terminal; e. g. , when an output character to terminal 10 (word 10 of the output block) is rejected, the next input block will have bit 8 set in word 10.

DATA BLOCK LENGTH

For multiplexer installations which control less than 64 terminals, the input/output data block length can be a function of the terminals available. For example, if a multiplexer only controls 16 terminals, the I/O data blocks need only be 16 words if the terminals are consecutively numbered starting with terminal 0. However, the data block

must be of sufficient size to accommodate all terminals in the system or Lost Data will occur; i.e., it is impossible to work with ten terminals if the system has thirty. The multiplexer considers all data transfers to start at terminal 0.

OUTPUT TIMING

The multiplexer is capable of accepting a 64-word output data block from the Data Channel in 64 μsec (1 μsec/word). The complete output, including disassembly and transfer, requires an additional 100 ms. If the multiplexer receives a new data word before the preceding word is transferred to the disassembly section, the new word is lost and Character Rejected (bit 8) sets in the next input word. Because of these output timing restrictions, it is recommended that each output block be followed by an input block in which bit 8 is checked.

INPUT TIMING

The multiplexer is capable of transmitting a 64-word data block to the Data Channel in 64 μsec (1 μsec/word). The time required for the multiplexer to assemble a complete input code from a terminal is 100 ms. After assembling a character, the multiplexer transfers it to the input buffer section.

With a word assembled and status bit 1 set (status bit 1 is a clock that sets when 95 percent of a character time has elapsed), an input to the data channel must be activated within 5 ms or the word may be lost. This results in Lost Data for the corresponding word.

I/O OPERATION

A PPU I/O operation will suspend the terminal servicing operations that commence with the Activate Channel instruction. The Disconnect Channel instruction completes the I/O operation. It is essential that the I/O operation be kept as short as possible. After an input or output operation, the channel must disconnect before any further operations can take place.

## PROGRAMMING EXAMPLE

Figure 3-4 is a flow chart of a multiplexer servicing routine. The sample program is included as an aid to understanding the multiplexer operations. Programming the multiplexer is similar to programming other peripheral equipment. A typical order of programming steps is:

1) Status (determine if multiplexer requires service)
2) Output (output data to terminals)
3) Input (input data plus I/O control bits for terminals)

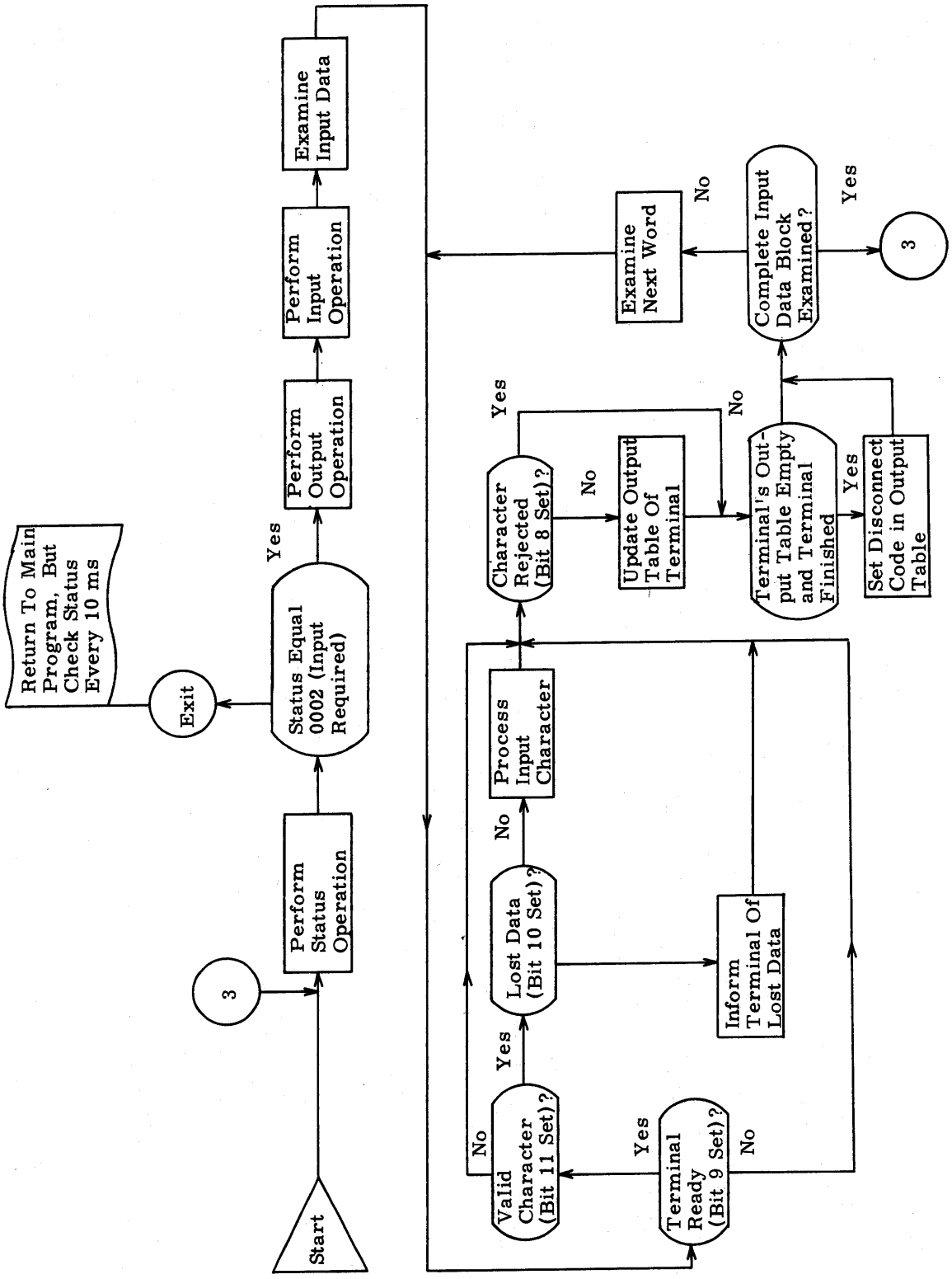



Figure 3-4. Sample Multiplexer Servicing Routine

## SYMBOL DATA

Table 3-3 contains the 8-level American Standard Code for Information Interchange (ASCII) character set. This character set is utilized by a 6676/8-level teletypewriter communications system.

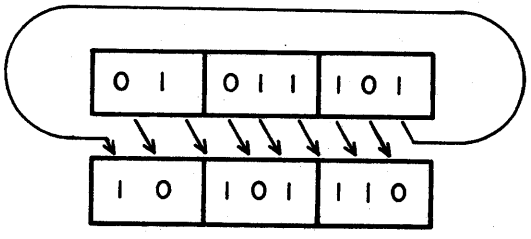
TABLE 3-3. ASCII CHARACTER SET

| CODE | CODE (INCL ODD PARITY) | CHARACTER | CODE | CODE (INCL ODD PARITY) | CHARACTER |
|---|---|---|---|---|---|
| 000 | 200 | NULL | 035 | 235 | $S_5$ |
| 001 | 001 | SOM | 036 | 236 | $S_6$ |
| 002 | 002 | EOA | 037 | 037 | $S_7$ |
| 003 | 203 | EOM | 040 | 040 | SPACE |
| 004 | 004 | EOT | 041 | 241 | ! |
| 005 | 205 | WRU | 042 | 242 | " (quotes) |
| 006 | 206 | RU | 043 | 043 | # |
| 007 | 007 | BELL | 044 | 244 | $ |
| 010 | 010 | $FE_0$ | 045 | 045 | % |
| 011 | 211 | H. TAB | 046 | 046 | & (and) |
| 012 | 212 | LINE FEED | 047 | 247 | ' (apostrophe) |
| 013 | 013 | V. TAB | 050 | 250 | ( |
| 014 | 214 | FORM | 051 | 051 | ) |
| 015 | 015 | RETURN | 052 | 052 | * |
| 016 | 016 | SO | 053 | 253 | + (plus) |
| 017 | 217 | SI | 054 | 054 | , (comma) |
| 020 | 020 | $DC_0$ | 055 | 255 | - (hyphen) |
| 021 | 221 | X-ON | 056 | 256 | . (period) |
| 022 | 222 | $TAPE^{AUX}_{ON}$ | 057 | 057 | / |
| 023 | 023 | X-OFF | 060 | 260 | 0 (zero) |
| 024 | 224 | $TAPE^{AUX}_{OFF}$ | 061 | 061 | 1 (one) |
| 025 | 025 | ERROR | 062 | 062 | 2 |
| 026 | 026 | SYNC | 063 | 263 | 3 |
| 027 | 227 | LEM | 064 | 064 | 4 |
| 030 | 230 | $S_0$ | 065 | 265 | 5 |
| 031 | 031 | $S_1$ | 066 | 266 | 6 |
| 032 | 032 | $S_2$ | 067 | 067 | 7 |
| 033 | 233 | $S_3$ | 070 | 070 | 8 |
| 034 | 034 | $S_4$ | 071 | 271 | 9 |

TABLE 3-3. (Cont'd)

| CODE | CODE (INCL ODD) PARITY) | CHARACTER | CODE | CODE (INCL ODD PARITY) | CHARACTER |
|---|---|---|---|---|---|
| 072 | 272 | : (colon) | 120 | 320 | P |
| 073 | 073 | ; (semicolon) | 121 | 121 | Q |
| 074 | 274 | < | 122 | 122 | R |
| 075 | 075 | = (equal) | 123 | 323 | S |
| 076 | 076 | > | 124 | 124 | T |
| 077 | 277 | ? | 125 | 325 | U |
| 100 | 100 | @ | 126 | 326 | V |
| 101 | 301 | A | 127 | 127 | W |
| 102 | 302 | B | 130 | 130 | X |
| 103 | 103 | C | 131 | 331 | Y |
| 104 | 304 | D | 132 | 332 | Z |
| 105 | 105 | E | 133 | 133 | [ |
| 106 | 106 | F | 134 | 334 | \ |
| 107 | 307 | G | 135 | 135 | ] |
| 110 | 310 | H | 136 | 136 | ↑ |
| 111 | 111 | I | 137 | 337 | ← |
| 112 | 112 | J | 140 | | |
| 113 | 313 | K | ↓ | Not Used | |
| 114 | 114 | L | 173 | | |
| 115 | 315 | M | 174 | 174 | ACK |
| 116 | 316 | N | 175 | 375 | ALT. MODE |
| 117 | 117 | O | 176 | 376 | ESC |
| | | | 177 | 177 | RUB OUT |

An end-around shift of the bits in the data character occurs within the multiplexer. For example, to output ASCII code $256_8$ (a period, including odd parity) to a teletypewriter, the code, $135_8$, must appear in the output table of the program.



## STANDARD OPTION 10294-1

This option allows the TTY Multiplexer to communicate with remote terminals at 300 baud (bits per second) and 134.5 baud. The option does not affect the 110 baud operation of the Multiplexer.

### Character format for 134.5 baud

Each output data character transmitted from the computer must have the character stop bit, a "1" in the lowest bit position. (Figure 3-5)

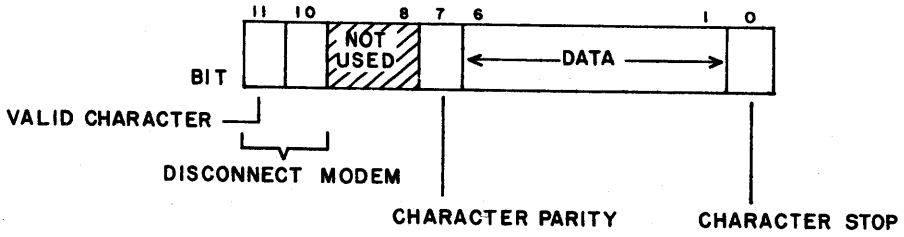



Figure 3-5. Output Character Format - 134.5 Baud

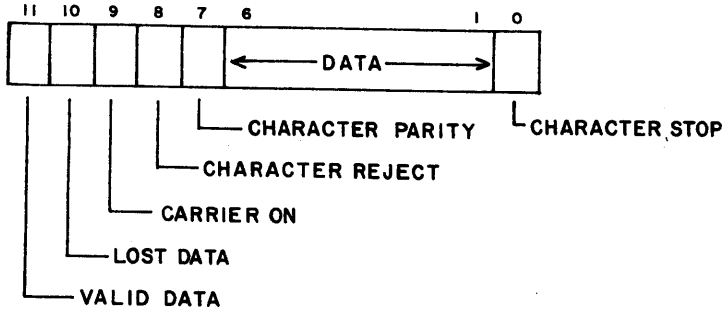



Figure 3-6. Input Character Format - 134.5 Baud

A long space (break) signal can be transmitted from the computer to a 134.5 baud terminal by sending consecutive codes of 4000. Generally, a 200 millisecond space and three consecutive 4000 characters constitutes a break signal. Likewise, a long space signal transmitted by a 134.5 baud terminal can be detected by the computer. The lowest order bit in each character will be a logical zero whenever a long space signal is transmitted or received.

Character format for 300 baud

The format for 300 baud is the same as that for 110 baud, as seen by the processor. Use of the long break signal at 300 (or 110) baud is not possible.

# COMMENT SHEET

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