KSR/RO

CONTENTS

INTRODUCTION

The 43 line of terminals provide economical data communications for computer time-sharing and terminal-to-terminal systems at an operator-selectable 10 or 30 char/sec (110 or 300 bps) over half or full-duplex, switched-network or point-to-point private-line facilities.

Significant features of the 43 line include compatibility with existing 33 and 35 terminal communications procedures and system-software, operator-selectable half or full-duplex operation, automatic-answer capability, multi-copy, dot-matrix, impact printing, full-ASCII upper and lower-case entry and print-out capability, responsive solid-state keyboard, compact size, built-in diagnostics, and a variety of interfaces designed to meet the needs for digital, analog, voltage and current interfacing.

The 43 printer is available in a pin-fed version which, in addition to its ability to produce an original and up to 2 copies of business form print-outs, can also produce print-outs with up to 132 characters per line, without exceeding the standard 8-1/2 by 11 inch paper size after the feed-hole margins have been torn off. This is accomplished by printing 13 char/in on forms which are 8-1/2 inches long and 12 inches wide. This permits "wide" printouts to be made on standard paper, with a savings in filing effort.

43 printers are also available in friction feed versions, to accommodate plain-paper print-outs. Both the friction and pin fed versions feature operator and on-line left and right margin set and clear, to provide un-attended as well as operator attended formatted print-out capability.

The 43 solid-state keyboard, in addition to the standard Shift and Control keys, includes a Caps Lock key to permit upper case letters to be entered without having to unlock to enter numerics, and a Repeat key for repeating any ASCII character or control. Key touch is similar to that of a good quality office typewriter.

Built into the overall 43 design is provision for a number of interfaces to allow the terminal to be coupled to a variety of standard data sets and OEM designed devices, or to modular-type telephones.

Also part of the design are a number of diagnostics that enable the rapid isolation of troubles, if and when they occur, to the remote device, the communications facilities, or to one of the 5 main components in the 43, which are made highly modular for easy field replacement and minimum down-time.

This technical reference provides the system and terminal operator and on-line operation facts that support these and other features of the 43 line.

SYSTEM DESCRIPTION

Computer Time-Sharing

Half-Duplex or Echoplexed
Full-Duplex Operation Over
Private-Line Facilities

```
[43]                    [43]
[43] ─── Computer ───   [33]
[43]                    [35]

[43]                    [43]
[43] ─── Switched   ─── [33]
[43]     Network        [35]
```

Half-Duplex or Echoplexed
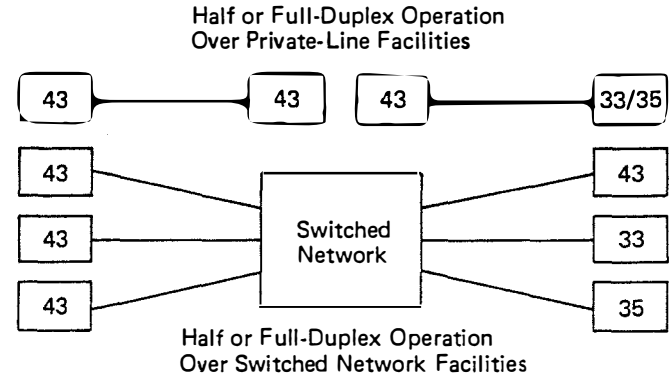Full-Duplex Operation Over
Switched-Network Facilities
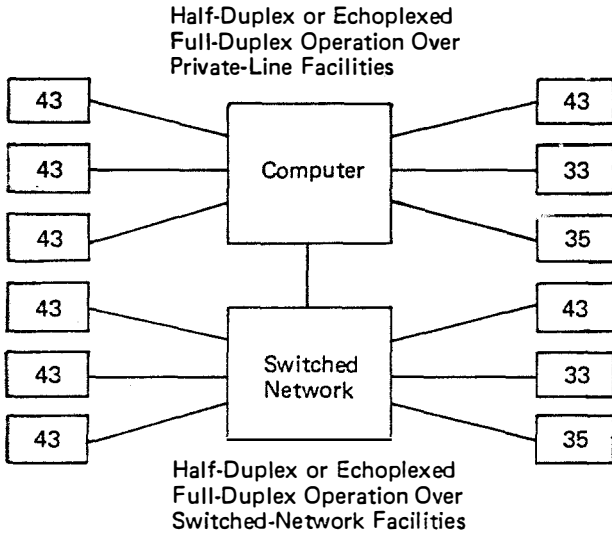
As illustrated above, 43 terminals can be used in computer time-sharing systems, whether private-line, switched-network or a mixture of both of these facilities. They can be operated in a half or full-duplex mode and can be echoplexed in the full-duplex mode. Half-duplex operation permits alternate entry and reception of data to and from the computer. Full-duplex operation permits simultaneous entry and reception of two different sets of data, or permits data that is sent to the computer to be returned (echoplexed) to the terminal, as well as received by the computer, as a method of assuring the terminal operator that the data successfully reached the computer.

As shown, the system can include 33, 35 and 33-compatible terminals, as well as 43 terminals, since all can be served by similar, if not identical, software.

Also in many systems, it is possible, for different terminals to operate at different speeds. This would allow 43 terminals to be added and used at their higher 30 cps speed without requiring the replacement of existing lower speed 10 cps terminals.

Terminal-to-Terminal

Half or Full-Duplex Operation
Over Private-Line Facilities

```
[43]───────[43]  [43]───────[33/35]

[43]                       [43]
[43] ─── Switched   ─────  [33]
[43]     Network           [35]
```

Half or Full-Duplex Operation
Over Switched Network Facilities

43 terminals can be used for basic terminal-to-terminal data communications over point-to-point or switched-network facilities, in the half or full-duplex mode, to permit alternate or simultaneous sending and receiving between terminals in the system.

As shown, the system can include 35, 33 and 33-compatible terminals because the communications procedures are very similar and because the 43 can be switched by the operator from 300 to 110 bps to match the bit rate of 33 and 35 terminals.

SYSTEM OPERATION

Computer Time-Sharing

In many switched-network computer time-sharing systems the operator of a terminal desiring to use the computer first establishes a voice connection with the computer, via an associated phone or similar calling unit, and then switches to the data mode, on hearing an answering tone from the computer, to establish a data connection with the computer.

By contrast , the connection is typically always established in a point-to-point private-line computer time sharing system. All that is generally required is a means of getting the computer's attention whenever the terminal operator desires to use the computer. (Several characters, which would otherwise be ignored, could be sent from the terminal for this purpose, for example.)

In either type of system, authorization data is then normally exchanged between the terminal operator and the computer, after which the operator is permitted to enter data into the computer for processing.

Terminal-to-Terminal

In a switched-network terminal-to-terminal communications system, the operator at a terminal desiring to send to another terminal first establishes a voice connection with the desired receiving terminal via an associated phone or similar calling unit. If the sending and receiving terminals are both attended and phone-equipped the operators would typically talk before switching to the data mode. If the receiving terminal is either unattended or not equipped with a phone it typically completes the connection and automatically switches to the data mode as a result of being in an automatic-answer mode.

Once the data connection has been established between the sending and receiving terminals, either may actually send to the other, but normally the call originator sends first. Also, by switching from the normal half-duplex mode to full-duplex, both terminals may simultaneously send data to the other, if desired. This has the advantage of allowing two sets of data to be sent at the same time on the same connection, but has the disadvantage of preventing either operator from either seeing or obtaining a printed copy of the data being sent from their terminal.

If both terminals are attended and equipped with a phone, the operators may talk after as well as before the data connection has been established, by switching back to the talk mode.

With point-to-point private-line instead of switched-network facilities, there may or may not be a need to establish a connection between two terminals prior to either sending to the other. Typically the connection is established at all times and either terminal can send to the other by merely beginning to send.

TERMINAL DESCRIPTION

43 terminals are presently available in KSR
(Keyboard Send-Receive) and RO (Receive-Only)
configurations, comparable to model 33 and 35
KSR and RO configurations. The KSR configura-
tion permits data to be entered and printed, entered
and printed while being sent, or received and
printed. If operated in the full-duplex mode, data
can be entered and sent while other data is being
received and printed, but entered data cannot be
printed while being sent. The RO configuration
permits data to be received and printed.

Both KSR and RO configurations are available with
a variety of interfaces to permit them to be coupled
to the variety of systems described earlier, and also
to permit them to be incorporated into OEM de-
signed systems and terminal configurations. In-
cluded are TTL-Serial, 103-type Built-In Modem,
EIA-RS232/DC-20 to 60 ma, and Dual (Line +
Auxiliary)EIA/DC interfaces which permit the 43
to be coupled to 103, 113 and 212 type data sets,
to telegraphic type circuits, to OEM designed hard-
ware, and to modular type telephones.

TERMINAL OPERATION

General

Operation of any 43 terminal is simple and straight-
forward. The following paragraphs describe typical
terminal operation and operator and on-line controls
and indicators for KSR and RO configurations with
a 103 interface and with other than a 103 interface.
Also included are mode diagrams for each of these
configurations which show all possible ways in
which the configuration can be operated via opera-
tor and on-line controls.

Operation of a KSR with a 103-Type Built-In Modem Interface

Typical Operator Procedures

(Assumes power on and associated phone on-hook
when DATA or AUTO ANSW lit)
If LOCAL/TALK, DATA or AUTO ANS is lit, the
other two cannot be lit

To Originate a Call:
    Depress LOCAL/TALK if not lit
    Take phone off-hook
    Listen for dial tone and dial
    Listen for ringing followed by tone or talk
        If tone heard, depress DATA
        If no tone, talk and depress DATA when agreed
    Put phone on-hook
    Be sure DATA is lit (may flash first)
    Begin sending (or receiving) data

To Manually Answer a Call:
    LOCAL/TALK must be lit prior to call
    Take phone off-hook when it rings
    Talk and depress DATA when agreed
    Put phone on-hook
    Be sure DATA is lit (may flash first)
    Begin receiving (or sending) data

To Automatically Answer a Call:
    Depress AUTO ANS if not lit
    DATA lights when phone rings
    Reception begins

To Interrupt Remote Sender:
    Depress INTRPT (briefly lights)
    Reception should stop
    If remote operator present
        Transfer from Data to Talk
    If no remote operator present
        Wait for instruction from remote device
        or disconnect

Function key indicators: LOCAL TALK | DATA | AUTO ANSW | INTRPT | ALARM | PRINTER TEST | ON-UP PARITY OFF-DN | HALF-UP DUPLEX FULL-DN | 30-UP CPS 10-DN

Keyboard (top row): ESC | ! 1 | @ 2 | # 3 | $ 4 | % 5 | ^ 6 | & 7 | * 8 | (9 |) 0 | _ − |] + | BACK SPACE | ~ `

Second row: DC1 Q | ETB W | ENQ E | DC2 R | DC4 T | EM Y | NAK U | HT I | SI O | DLE P | [= | RETURN | ! \ G S

Third row: CAPS LOCK | SOH A | DC3 S | EOT D | ACK F | BEL G | BS H | RS J | VT K | FF L | : ; | " ' | }] " { [S

Fourth row: SHIFT | SUB Z | CAN X | ETX C | SYN V | STX B | SO N | FS M | < , | > . | ? / | SHIFT | LINE FEED

Bottom row: CTRL | (space bar) | REPT | DELETE | NUL
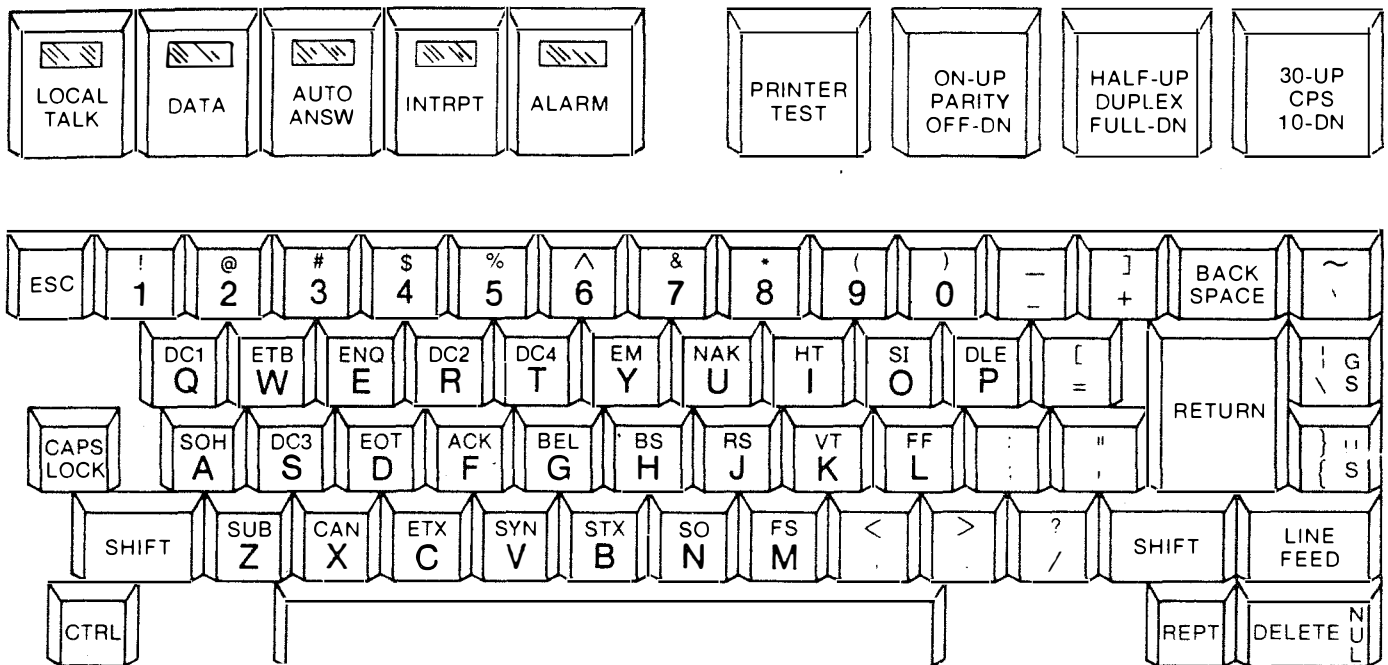
To Transfer from Data to Talk:
Take phone off-hook
Send data stating talk desired
Depress LOCAL/TALK when agreed and talk

To Disconnect:
If DATA lit
Depress LOCAL/TALK or AUTO ANSW key or send EOT
If LOCAL/TALK lit
Put phone on-hook

To Set Margins (in DATA or LOCAL/TALK mode)
Enter on the keyboard:
ESC x (lower-case X)
As many SPs as there are spaces to the desired left-hand margin†
ESC l (lower-case L)
As many SPs as there are spaces to the desired right-hand margin†
ESC r (lower-case R)
RETURN
Margins have now been set to allow printing to begin at the left-hand margin and end 1-character ahead of the right-hand margin (e.g. if margins are set at 10 and 70 on the print-position scale, a 60-character line has been allowed for, beginning with the first character at 10 and ending with the last character at 69).

To Clear Margins (in DATA or LOCAL/TALK)
Enter on the keyboard:
ESC x (lower-case X)
This clears margins and also moves the print-head to the left-most location

To Perform Analog Loop-Back Test:
Depress LOCAL/TALK if not lit
Keyboard ESC > (ALARM flashes)
Depress DATA   (DATA lights)
Observe that characters entered with teleprinter in half-duplex mode print double

To Perform Digital Loop-Back Test:
Originate call to remote tester (as described earlier)
Receive ESC < (ALARM flashes)
Receive test data (which is echoplexed back to sender)
Receive ESC = (ALARM stops)
Obtain results of test in DATA or LOCAL/TALK mode as desired or required

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†The print-head pointer points to the position where the next character will be printed only after a 1-second delay in motion (due to the printer's last character visibility feature).

Operator & On-Line Controls & Indicators for a
KSR with a 103-Type Built-In Modem Interface

LOCAL TALK   Lit if in LOCAL/TALK mode†

Puts terminal in LOCAL/TALK mode:

  Permits off-line operation

  Permits phone to be used
  to originate or manually answer a call

    to talk

    to establish a data connection

  Causes disconnect if:

    in DATA mode

    phone on-hook or no phone

or Causes transfer from data to talk mode if

    in DATA mode

    phone off-hook

  Removes effect of received interrupt

  Removes either loop-back

DATA   Lit if in DATA mode†
    (May flash before lighting)
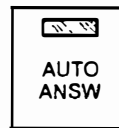
Puts terminal in DATA mode:

  Permits data to be sent or received

  Disables phone

or Puts terminal in AUTO ANSW mode if:

  Call connection not established

  Carrier not received within 20 sec

AUTO ANSW   Lit if in AUTO ANSW mode†

Puts terminal in AUTO ANSW mode:

  Puts terminal in DATA mode
  on receipt of call (after 1-ring) if:

    phone on-hook or no phone

    carrier received within 20 sec

  Prevents phone from being used
  to originate or manually answer a call

  Causes disconnect if:

    in DATA mode

    phone on-hook or no phone

or Causes transfer from data to talk mode if:

    in DATA mode

    phone off-hook

    received carrier turns off

  Removes effect of received interrupt

  Removes either loop-back
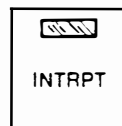
INTRPT   Lit if interrupt (200 ms state 0) received
    (Bell rings)

If depressed when not lit:

  Sends interrupt (250 ms state 0)
  (to halt transmission from remote device)

If depressed when lit:

  Removes effect of received interrupt

  Turns off indicator

---

† If LOCAL/TALK, DATA or AUTO ANSW key
is lit, the other two are not lit. i.e. the terminal
can only be in one of these three modes at any
one time.

ALARM

Lit when:

Flashes during:

Paper out
or low

Either
loop-back

Cover up

PRINTER
  TEST
depressed

Paper Out or Low
(Pin or Friction Fed Printer, respectively):

Lights ALARM & rings bell

Puts terminal in LOCAL/TALK mode:

on receipt of 8 NLs if in DATA mode
& if pin-fed printer

immediately if in AUTO ANSW mode

Prevents entry into DATA or AUTO ANSW mode

Cover Up:

Lights ALARM

Prevents sending or receiving if in DATA mode
(without causing disconnect)

Puts terminal in LOCAL/TALK mode if in
AUTO ANSW mode

Prevents entry into DATA or AUTO ANSW mode

Bell Rings:

7 spaces ahead of and at right-hand margin if
print-head moving right

at left-hand margin on entry or receipt of backspace

on receipt of interrupt (200 ms state 0)

on paper out or low

PRINTER
TEST

On if held down, off if up

Puts terminal in LOCAL/TALK mode

Causes entire character set to be continuously
printed (as shown below)

ON-UP
PARITY
OFF-DN

Detector on if up, off if down
Depress to lock down, again to release
(Does not affect sent parity)

If on:

Causes terminal to print symbol ■ on receipt of
character with even vertical parity error

If off:

Causes terminal to print character received
regardless of its parity

HALF-UP
DUPLEX
FULL-DN
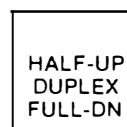
In half-duplex mode if up,
full-duplex if down
Depress to lock down, again to release

Half-Duplex mode:

Permits terminal to send or receive,
but not both at same time

Causes terminal to print characters and obey
controls sent from keyboard

Full-Duplex mode:

Permits terminal to send and receive,
both at the same time

Causes terminal to ignore characters
and controls sent from keyboard
(unless being echoplexed in full-duplex)

Prevents CTRL plus RETURN function

30-UP
CPS
10-DN
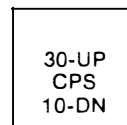
30 char/sec if up, 10 if down
Depress to lock down, again to release

If up:

Causes terminal to send and receive at 30 char/sec
(300 wpm) (300 bit/sec)

If down:

Causes terminal to send and receive at 10 char/sec
(100 wpm) (110 bit/sec)

```
■ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
■ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
```

**Operator & On-Line Controls & Indicators for a KSR
with a 103-Type Built-In Modem Interface (Cont'd)**

```
CAPS
LOCK
```
On if down, off if up
Depress to lock down, again to release

Permits keyboard entry of upper-case letters without
having to use SHIFT and without having to unlock
CAPS LOCK to enter unshifted characters such as
numbers

```
SHIFT
```
On if held down, off if up

Permits keyboard entry of shift-position characters

```
CTRL
```
On if held down, off if up
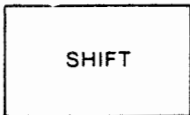
Permits keyboard entry of shift-position controls

```
RETURN
```
If depressed with CTRL key:

Causes return and line feed
(except in full-duplex mode)
without sending on-line controls

```
REPT
```
On if held down, off if up

Causes character and on-line control keys depressed at
the same time as the REPT key to be repetitively sent
until released

(Power)

On if LOCAL/TALK, DATA or AUTO
ANSW lit

Power off:

Disables terminal

Permits phone to be used
to originate or manually answer a call

Causes disconnect if:

in DATA mode

phone on-hook or no phone

or Causes transfer from data to talk mode if:

in DATA mode

phone off-hook

Removes effect of received interrupt

Removes either loop-back

Power on:

Enables terminal

Puts terminal in AUTO ANSW mode

Clears margins

Moves print-head to left-most location

Keyboard Entry of Control	When in DATA mode Sends Control	Transmission† or Reception of Control in DATA mode or Entry of Control in LOCAL/TALK mode
LINE FEED	NL	Feeds paper up 1-line
RETURN	CR	Moves print-head to left-hand margin
BACK SPACE / BS	BS	Moves print-head 1-character left or rings bell if at left-hand margin
BEL		Rings bell
ESC		Prevents character that follows from being printed
ESC l (lower-case L)		Sets left-hand margin at print-position
ESC r (lower-case R)		Sets right-hand margin at print-position
ESC x (lower-case X)		Clears margins Moves print-head to left-most location
ESC m (lower-case M)		Permits print-head to proceed past left or right margin, once
ESC w (lower-case W)		Feeds paper up 1-line Moves print-head to left-hand margin

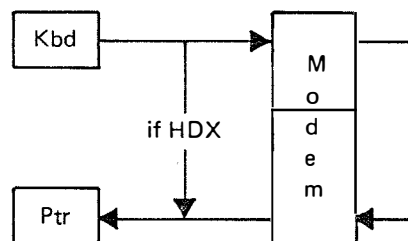| Keyboard Entry of Control	When in LOCAL/TALK mode	When in DATA mode Sends Control &
ESC >	Flashes ALARM Puts terminal into analog loop-back after DATA depressed	Flashes ALARM Causes disconnect if phone on-hook or no phone or causes transfer to data mode if phones off-hook Puts terminal into analog loop-back if phone on-hook or no phone
ESC <	Flashes ALARM Puts terminal into digital loop-back Auto'ly goes to DATA mode on call receipt, but DATA not lit Permits off-line operation during loop-back until DATA depressed, which causes received data to print as well as be looped back	Causes no action
ESC =	Stops ALARM Removes either loop-back	Stops ALARM Removes either loop-back

Reception of Control	When in DATA mode
ESC <	Flashes ALARM Puts terminal into digital loop-back Disables keyboard except for ESC =
ESC =	Stops ALARM Removes either loop-back
Interrupt (200ms state 0)	Lights INTRPT Disables keyboard Rings bell
EOT 2 sec state 0 450ms car'r off ESC >	Puts terminal in AUTO ANSW mode if phone on-hook or no phone
or character other than CR when print-position at right-hand margin	Moves print-head to left-hand margin Feeds paper up 1-line Puts control or character and others that follow into printer buffer until print-head reaches left-hand margin, at which time printer operates at 47 cps until buffer empty (no rec'd data lost)

Analog Loop-Back

Digital Loop-Back
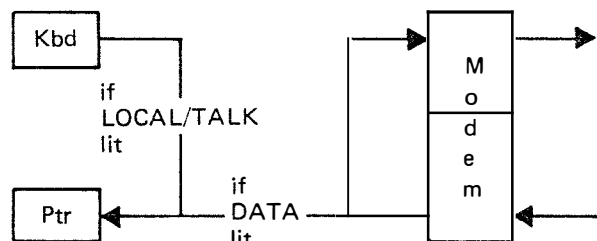
† No action occurs if transmitted when terminal in full-duplex mode (unless being echoplexed)

Mode Diagram for a KSR with a 103-Type
Built-In Modem Interface

The diagram that follows shows all of the possible
ways in which a KSR terminal with a 103 interface
can be operated via operator and on-line controls.
It includes modes and mode changes described earlier
under operator and on-line controls, plus additional
possibilities which may be of interest.

For ready reference relative to the mode diagram, the
following brief descriptions are included:

In the LOCAL/TALK mode the LOCAL/TALK key
is lit ▼ and the phone is either off-hook or on-hook.
If off-hook, a talk connection has been (or is about
to be) established with a remote device. If on-hook,
the terminal is disconnected (and is possibly being
used for off-line operation).

In the DATA mode the DATA key is lit ▼, a data
(send/receive) connection has been established with a
remote device, and the phone is on-hook (preferably)
or off-hook. While in this mode receipt of interrupt
(200ms state 0) prevents further sending from the
terminal (but does not prevent reception) until the
INTRPT key is pressed. (Depression of the key at
other times sends 250ms state 0 to halt the remote
device when it is sending.)

In the AUTO ANSW mode the AUTO ANSW key is
lit ▼, the phone is on-hook and the terminal auto-
matically switches to the DATA mode on receipt
of a call (after 1-ring).

▼ Whenever the LOCAL/TALK, DATA or AUTO
ANSW key is lit, the other two are not. Also, if
any one of these keys is lit, power in on.

A talk connection is established with a remote device
in the LOCAL/TALK mode either by lifting the phone
and dialing or by hearing ringing and lifting the phone.
If a tone is then heard, in either case, the DATA key
should be depressed and will establish a data connection.

Otherwise this can be done if and when agreed to
during the talk connection. As shown on the mode
diagram it is also possible to revert to a talk con-
nection from a data connection.

A data connection is established (after a talk con-
nection) if both the terminal and the remote device
turn on carrier within 20 sec of each other. At the
terminal this is done by depressing DATA or by an
automatic transfer from AUTO ANSW to DATA.
(Normally whichever location answers the call turns
on carrier first.)

A word of caution: In several cases the mode diagram
will appear to be incorrect when compared to the
operation of an actual terminal. This is because the
mode diagram does not show the intermediate steps
that the terminal goes through en route from one
mode to another, nor does it show the time required
(sometimes up to 4 sec) to change modes. (Timing
is shown for typical situations in the next section).
Therefor, when observing an actual terminal wait
several seconds to be sure that the mode arrived at
is the final one.

Also, the mode diagram assumes that both the
terminal and remote device phones are on-hook or
off-hook together (or at most within 4 sec of each
other) in order to carry out the mode changes
shown.

Mode Diagram for KSR with 103 Interface

Follow heavy arrows for typical call origination & disconnect sequence (start at heavy circle).

Diagram does not show loop-back modes.

Diagram assumes that both terminal and remote phones are on-hook or off-hook together (or at most within 4 sec of each other).

D = Depress
S = Send
R = Receive

Mode ──▶ DATA S or R

Communications Capability (if any)

Phone On-Hook or No Phone

Phone Off-Hook

DATA S or R*

DATA S or R*

• Take phone off-hook

• Put phone on-hook

• R – 200 ms state 0

• D – INTRPT

• R – 200 ms state 0

• D – INTRPT

• R – carrier off >450ms

DATA R only*

• Take phone off-hook

• Put phone on-hook

DATA R only*

• D – DATA & R – carrier on (or vice versa) within 20 sec

• D – AUTO ANSW
• Turn power on
• D – DATA & R – carrier on (or vice versa) not within 20 sec

LOCAL/TALK†
Talk or Tone

AUTO ANSW
Talk or Tone

Connected

Disconnected

R – call (rings once) & R – carrier on within 20 sec

• R – EOT
• R – 2 sec state 0
• R – carrier off >450ms
• D – AUTO ANSW

• R – call, take phone off-hook

• Put phone on-hook
• Put phone on-hook

LOCAL TALK†

• Take phone off-hook

• Put phone on-hook

LOCAL TALK†
Dial or Busy Tone

• Dial & connect

• Dial & Connect

• D – DATA
• D – AUTO ANSW
• Turn power on

• D – DATA
• D – AUTO ANSW
• Turn power on

AUTO ANSW

• Take phone off-hook

• Put phone on-hook

AUTO ANSW
Dial or Busy Tone

(A)
• D – LOCAL/TALK
• D – PRINTER TEST
• Raise cover
• Turn power off
• Remove paper
• Low paper (friction feed printer)

(B)
• R – 8NLs after paper out (pin feed printer)
• D – LOCAL/TALK
• D – PRINTER TEST
• Turn power off

*Raising cover prevents sending or receiving (without causing disconnect or mode change)

†Cannot leave LOCAL/TALK mode if cover up, paper out or low or power off. Power off also prevents off-line operation of terminal & turns off LOCAL/TALK light, but does not prevent phone operation

Operating Sequence Diagrams for a KSR
with a 103-Type Built-In Modem Interface

The following diagrams show the sequence of events that occur at the originating and answering locations for
the type of communications assumed by each diagram.

Diagram I

Diagram I assumes a 43 terminal at both the originating and answering location and an operator present at the
originating location but not at the answering location.
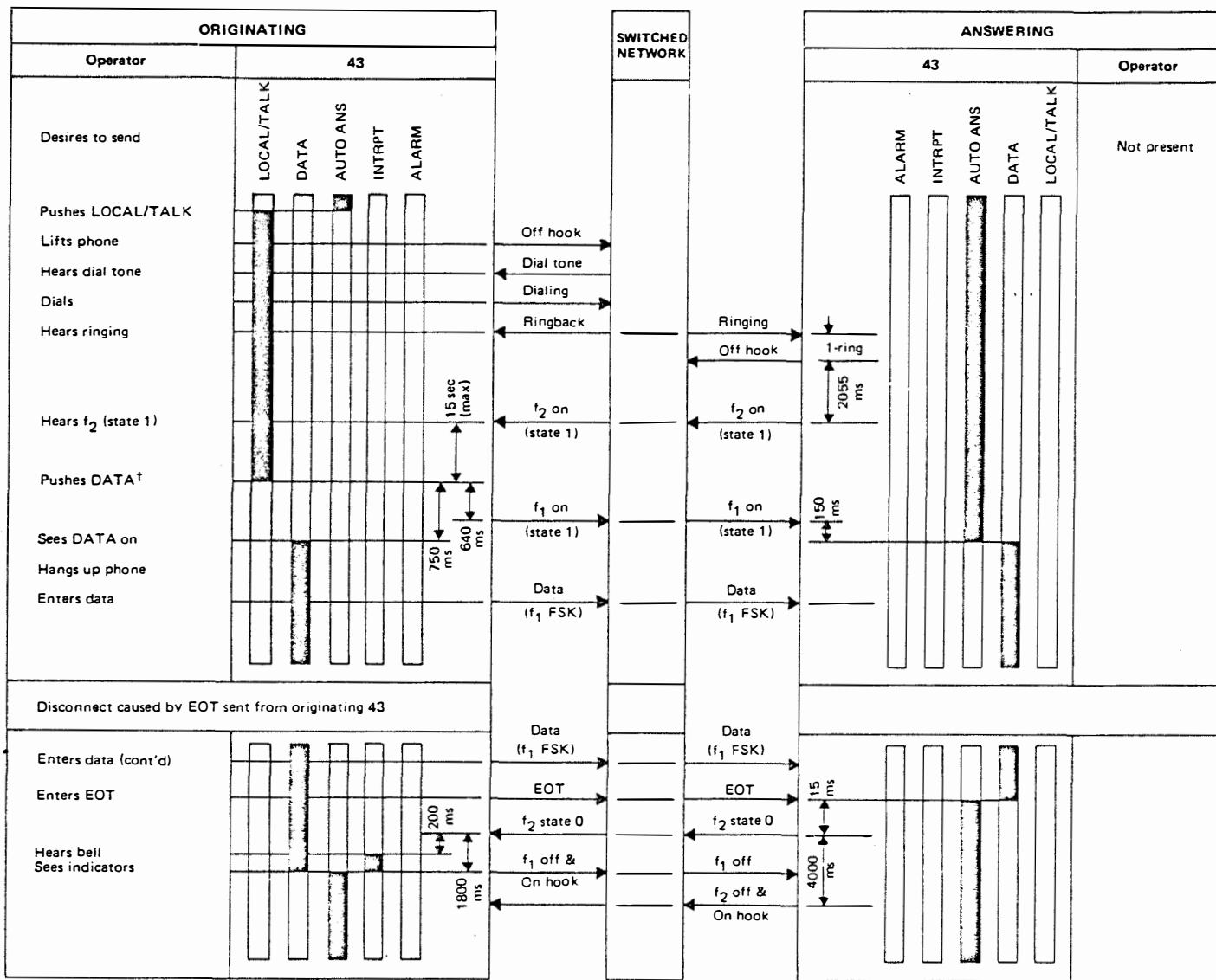
†can be done after ringing has begun if f_2 (state 1) is received within 20 sec

The key to reading these diagrams is to read across the diagram before reading down the diagram. Also, realize that time passes as you read down the diagram. In a sense, the diagram gives you the ability to view the activities at the originating and answering locations at the same time.

ORIGINATING		SWITCHED NETWORK	ANSWERING	
Operator	43 (LOCAL/TALK, DATA, AUTO ANS, INTRPT, ALARM)		43 (ALARM, INTRPT, AUTO ANS, DATA, LOCAL/TALK)	Operator

Disconnect caused by carrier fail

Operator	43	SWITCHED NETWORK	43	Operator
Enters data (cont'd)		Data (f$_1$ FSK) →		
		f$_2$ off car'r fail f$_1$ off & On hook	← Data (f$_1$ FSK)	
Sees indicators	450 ms	← f$_1$ off f$_2$ off & On hook	450 ms	
Retries call				

Disconnect caused by a paper out at the answering 43

Operator	43	SWITCHED NETWORK	43	Operator
Enters data (cont'd)		Data (f$_1$ FSK) →		8 lines of data
	200 ms	f$_2$ state 0	← f$_2$ state 0	4000 ms
Hears bell		f$_1$ off & On hook	← f$_1$ off	
Sees indicators				
Stops data entry	1800 ms	f$_2$ off ←	f$_2$ off & On hook ←	
Pushes LOCAL/TALK				
Lifts phone		On hook →		
Hears dial tone		Dial tone		
Dials		Dialing		
Hears ringing		← Ringback	Ringing →	
Does not hear f$_2$				
Hangs up phone		On hook →	Ring off →	

Operating Sequence Diagrams for a KSR with a
103-Type Built-In Modem Interface (cont'd)

Diagram II

Diagram II differs from the first in that it assumes an operator present at the answering as well as the originating location.

†can be done before f_2 (state 1) is heard if it is received within 20 sec

ORIGINATING							SWITCHED NETWORK		ANSWERING						
Operator	43								43						Operator
	LOCAL/TALK	DATA	AUTO ANS	INTRPT	ALARM				ALARM	INTRPT	AUTO ANS	DATA	LOCAL/TALK		

Answering operator desires to disconnect — originating operator pushes LOCAL/TALK

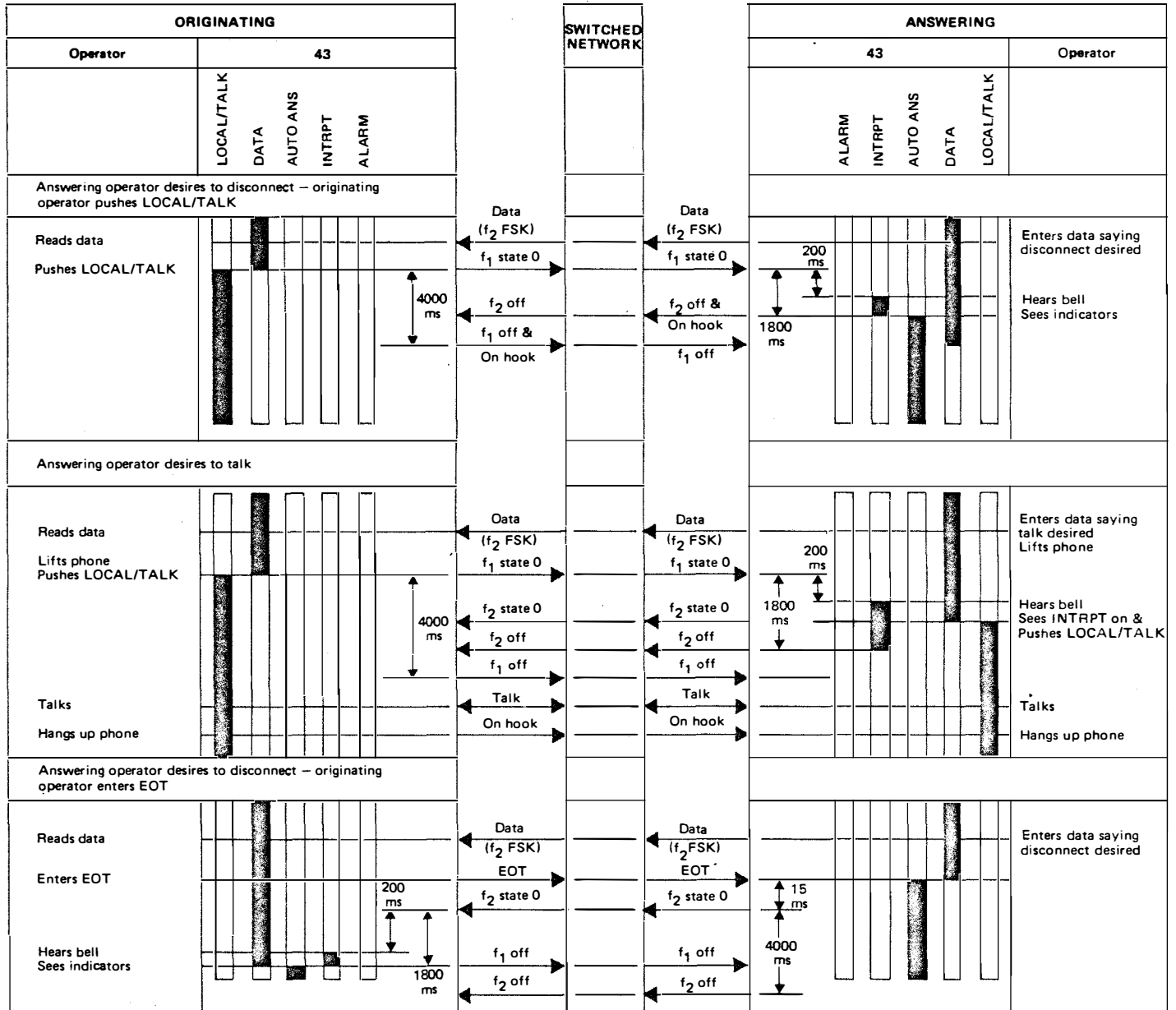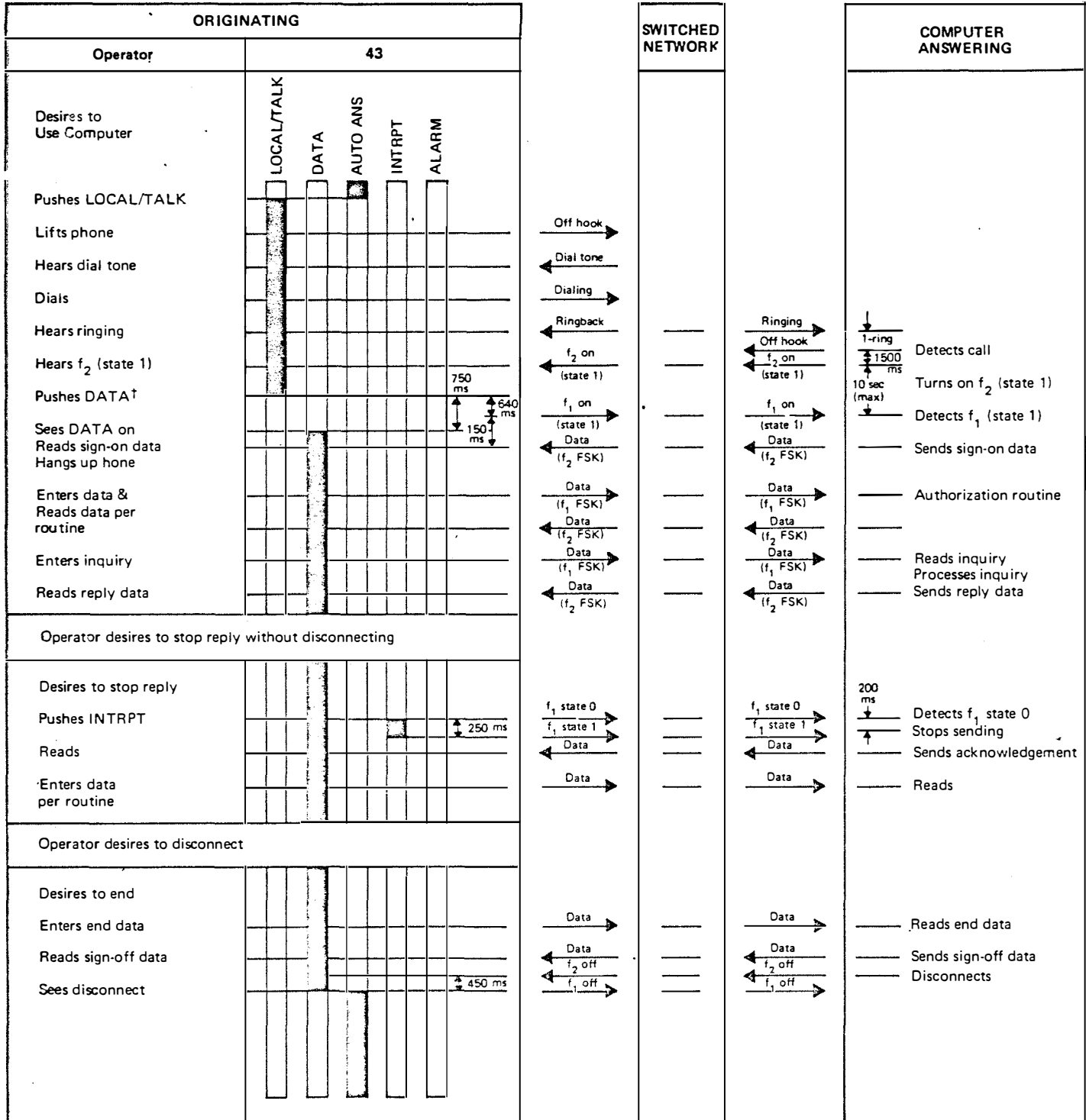Originating Operator:
- Reads data
- Pushes LOCAL/TALK

Signals: Data (f₂ FSK) → f_1 state 0 → ; 4000 ms ; f_2 off ; f_1 off & ; On hook

Answering side: Data (f₂ FSK); f_1 state 0; f_2 off & On hook; f_1 off; 200 ms; 1800 ms

Answering Operator:
- Enters data saying disconnect desired
- Hears bell / Sees indicators

Answering operator desires to talk

Originating Operator:
- Reads data
- Lifts phone / Pushes LOCAL/TALK
- Talks
- Hangs up phone

Signals: Data (f₂ FSK); f_1 state 0; 4000 ms; f_2 state 0; f_2 off; f_1 off; Talk; On hook

Answering side: Data (f₂ FSK); f_1 state 0; 200 ms; 1800 ms; f_2 state 0; f_2 off; f_1 off; Talk; On hook

Answering Operator:
- Enters data saying talk desired / Lifts phone
- Hears bell / Sees INTRPT on & Pushes LOCAL/TALK
- Talks
- Hangs up phone

Answering operator desires to disconnect — originating operator enters EOT

Originating Operator:
- Reads data
- Enters EOT
- Hears bell / Sees indicators

Signals: Data (f₂ FSK); EOT; f_2 state 0; 200 ms; 1800 ms; f_1 off; f_2 off

Answering side: Data (f₂ FSK); EOT; f_2 state 0; 15 ms; 4000 ms; f_1 off; f_2 off

Answering Operator:
- Enters data saying disconnect desired

**Operating Sequence Diagrams for a KSR with a
103-Type Built-In Modem Interface (cont'd)**

Diagram III

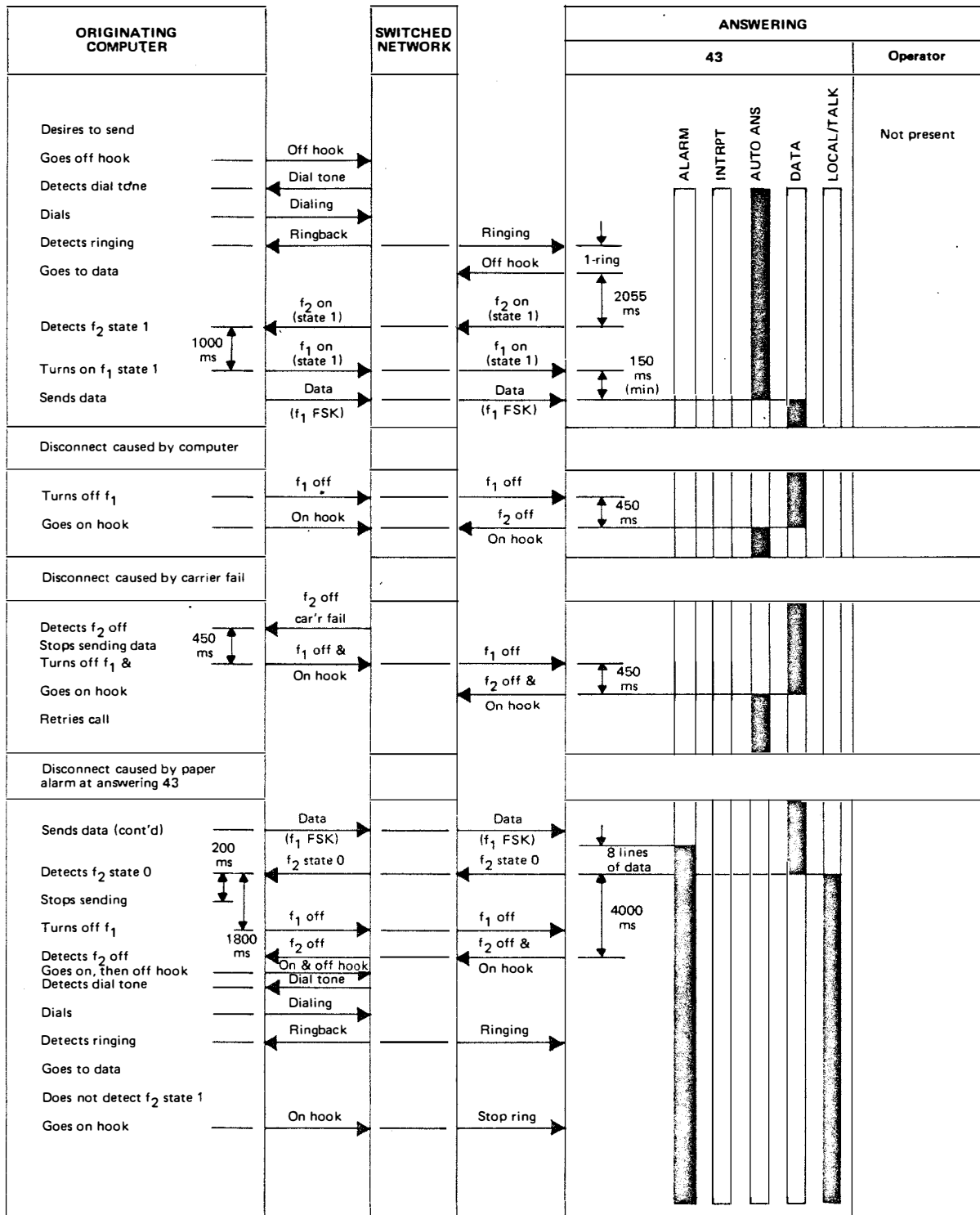Diagram III assumes a 43 terminal and an operator at the originating location and a computer at the
answering location.

ORIGINATING		SWITCHED NETWORK		COMPUTER ANSWERING
Operator	**43** (LOCAL/TALK, DATA, AUTO ANS, INTRPT, ALARM)			

Operator	43 signals	Switched Network		Computer Answering
Desires to Use Computer				
Pushes LOCAL/TALK	LOCAL/TALK	Off hook →		
Lifts phone		← Dial tone		
Hears dial tone				
Dials		Dialing →		
Hears ringing		← Ringback	Ringing →	1-ring — Detects call
Hears f_2 (state 1)		← f_2 on (state 1)	← Off hook / f_2 on (state 1)	1500 ms
Pushes DATA†	750 ms			10 sec (max) — Turns on f_2 (state 1)
Sees DATA on	640 ms / 150 ms	f_1 on (state 1) →	f_1 on (state 1) →	— Detects f_1 (state 1)
Reads sign-on data		← Data (f_2 FSK)	← Data (f_2 FSK)	— Sends sign-on data
Hangs up phone				
Enters data & Reads data per routine		Data (f_1 FSK) →	Data (f_1 FSK) →	— Authorization routine
		← Data (f_2 FSK)	← Data (f_2 FSK)	
Enters inquiry		Data (f_1 FSK) →	Data (f_1 FSK) →	— Reads inquiry / Processes inquiry
Reads reply data		← Data (f_2 FSK)	← Data (f_2 FSK)	— Sends reply data

Operator desires to stop reply without disconnecting

Desires to stop reply		f_1 state 0 →	f_1 state 0 →	200 ms
Pushes INTRPT	INTRPT 250 ms	f_1 state 1 →	f_1 state 1 →	— Detects f_1 state 0 / Stops sending
Reads		← Data	← Data	— Sends acknowledgement
Enters data per routine		Data →	Data →	— Reads

Operator desires to disconnect

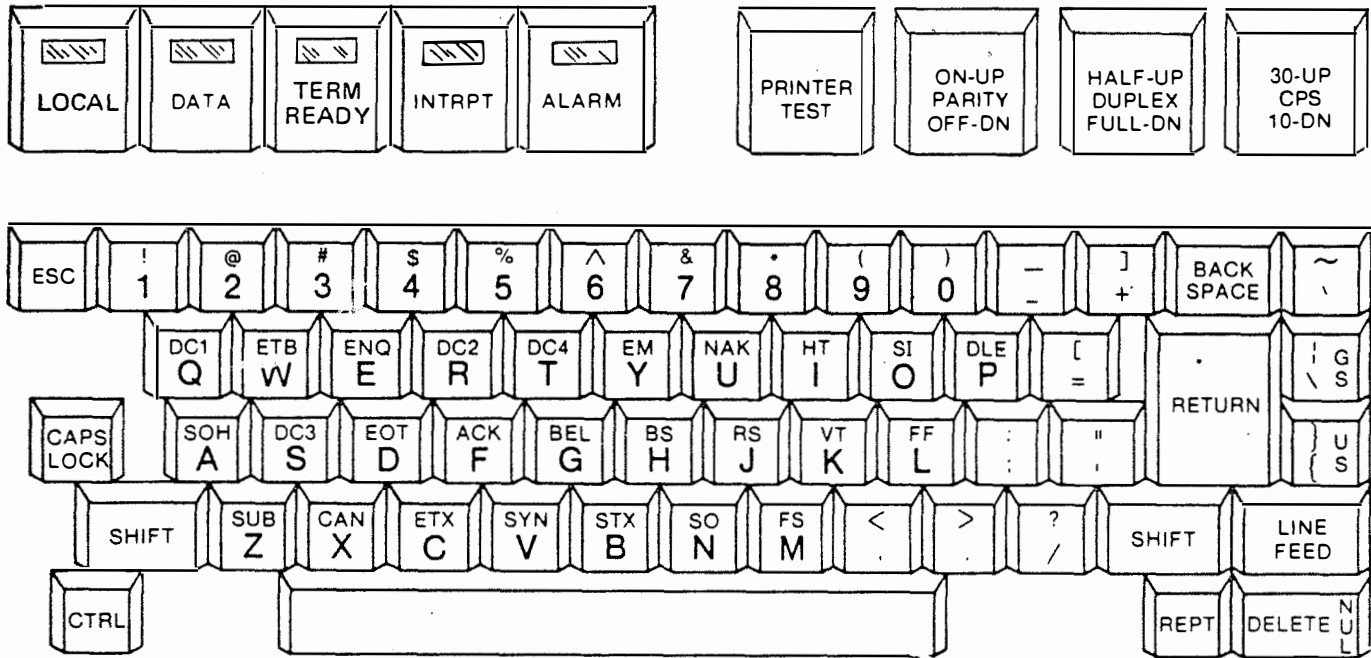|				
Desires to end				
Enters end data		Data →	Data →	— Reads end data
Reads sign-off data		← Data / f_2 off	← Data / f_2 off	— Sends sign-off data
Sees disconnect	450 ms	← f_1 off →	← f_1 off →	— Disconnects

†can be done before f_2 (state 1) is heard if it is received within 20 sec

Diagram IV

Diagram IV assumes a computer at the originating location and a 43 terminal without an operator at the answering location.

ORIGINATING COMPUTER	SWITCHED NETWORK	ANSWERING		
		43		Operator

Timing/signalling diagram columns (ORIGINATING COMPUTER | SWITCHED NETWORK | ANSWERING 43 with ALARM, INTRPT, AUTO ANS, DATA, LOCAL/TALK | Operator: Not present):

ORIGINATING COMPUTER		SWITCHED NETWORK	ANSWERING
Desires to send			
Goes off hook	Off hook		
Detects dial tone	Dial tone		
Dials	Dialing		
Detects ringing	Ringback	Ringing	
Goes to data		Off hook	1-ring
			2055 ms
Detects f_2 state 1	f_2 on (state 1)	f_2 on (state 1)	
	1000 ms	f_1 on (state 1)	f_1 on (state 1)	150 ms (min)
Turns on f_1 state 1			
Sends data	Data (f_1 FSK)	Data (f_1 FSK)	
Disconnect caused by computer			
Turns off f_1	f_1 off	f_1 off	450 ms
Goes on hook	On hook	f_2 off	
		On hook	
Disconnect caused by carrier fail			
Detects f_2 off	f_2 off car'r fail		
Stops sending data	450 ms	f_1 off	450 ms
Turns off f_1 &	f_1 off & On hook	f_2 off & On hook	
Goes on hook			
Retries call			
Disconnect caused by paper alarm at answering 43			
Sends data (cont'd)	Data (f_1 FSK)	Data (f_1 FSK)	8 lines of data
	200 ms	f_2 state 0	f_2 state 0	
Detects f_2 state 0			
Stops sending			4000 ms
Turns off f_1	f_1 off	f_1 off	
	1800 ms	f_2 off	f_2 off &	
Detects f_2 off	On & off hook	On hook	
Goes on, then off hook	Dial tone		
Detects dial tone			
Dials	Dialing		
Detects ringing	Ringback	Ringing	
Goes to data			
Does not detect f_2 state 1			
Goes on hook	On hook	Stop ring	

**Operation of a KSR with an
EIA or TTL Interface**

LOCAL	DATA	TERM READY	INTRPT	ALARM		PRINTER TEST	ON-UP PARITY OFF-DN	HALF-UP DUPLEX FULL-DN	30-UP CPS 10-DN

Keyboard layout:

| ESC | ! 1 | @ 2 | # 3 | $ 4 | % 5 | ^ 6 | & 7 | * 8 | (9 |) 0 | — _ |] +' | BACK SPACE | ~ \ |

| | DC1 Q | ETB W | ENQ E | DC2 R | DC4 T | EM Y | NAK U | HT I | SI O | DLE P | [= | . RETURN | \ G S |

| CAPS LOCK | SOH A | DC3 S | EOT D | ACK F | BEL G | BS H | RS J | VT K | FF L | : ; | " ' | | U S |

| SHIFT | SUB Z | CAN X | ETX C | SYN V | STX B | SO N | FS M | < , | > . | ? / | SHIFT | LINE FEED |

| CTRL | | | | | | | | | REPT | DELETE N U L |

Typical Operator Procedures

(Assumes power on and an associated data set and phone equipped with LINE & DATA keys) (If LOCAL, DATA or TERM READY lit other two are not)

(Assumes phone on-hook when DATA or TERM READY lit)

To Originate a Call:

Depress TERM READY if not lit

Depress LINE (on phone) if not already

Take phone off-hook

Listen for dial tone & dial

Listen for ringing followed by tone or talk

If tone heard, depress DATA*

If no tone, talk & depress DATA* when agreed

Put phone on-hook

Begin sending (or receiving) data

To Manually Answer a Call:

LOCAL must be lit prior to call

Depress LINE (on phone) if not already

Take phone off-hook when it rings

Talk & depress TERM READY & DATA* when agreed

Put phone on-hook

Begin receiving (or sending) data

To Automatically Answer a Call:

Depress TERM READY if not lit

DATA (on terminal) lights when phone rings

Reception begins

---

*(on phone)—causes DATA on terminal to light (may flash before lighting) when connection established.

To Interrupt Remote Sender:

    Depress INTRPT (briefly lights)

    Reception should stop

    If remote operator present:

        Transfer from data to talk

    If no remote operator present:

        Wait for instruction from remote device or disconnect

To Transfer from Data to Talk:

    Take phone off-hook

    Send data stating talk desired

    Depress LINE (on phone) when agreed & talk

To Disconnect:

    If DATA (on terminal) lit:

        Depress LOCAL or TERM READY or send EOT

    If DATA (on terminal) not lit:

        Put phone on-hook

To Perform Analog Loop-Back Test:

    Depress LOCAL if not lit

    Keyboard ESC > (ALARM flashes)

    Depress DATA (on phone) (DATA lights)

    Observe that characters entered with terminal in half-duplex mode print double

---

†The print-head pointer points to the position where the next character will be printed only after a 1-second delay in motion (due to the printer's last character visibility feature).

To Perform Digital Loop-Back Test:

    Originate call to remote tester (as described earlier)

    Receive ESC< (ALARM flashes)

    Receive test data (which is echoplexed back to sender)

    Receive ESC = (ALARM stops)

    Obtain results of test in DATA or LOCAL mode as desired or required

To Set Margins (in DATA or LOCAL mode) enter on the keyboard:

    ESC x (lower-case X)

    As many SPs as there are spaces to the desired left-hand margin†

    ESC l (lower-case L)

    As many SPs as there are spaces to the desired right-hand margin†

    ESC r (lower-case R)

    RETURN

    Margins have now been set to allow printing to begin at the left-hand margin and end 1-character ahead of the right-hand margin (e.g. if margins are set at 10 & 70 on the print-position scale, a 60-character line has been allowed for, beginning with the first character at 10 and ending with the last character at 69).

To Clear Margins:

    Enter on the keyboard:

        ESC x (lower-case X)

        This clears margins and also moves the print-head to the left-most location

Operator & On-Line Controls & Indicators for KSR with an EIA or TTL Interface

| LOCAL | Lit if in LOCAL mode†

Puts terminal in LOCAL mode:

    Permits off-line operation

    Turns off TR/DTR (*–see next page)

    Removes effect of received interrupt

    Turns off AL* & DL*

| DATA | Lit if in DATA mode†

Indicates when data can be sent or received

| TERM READY | Lit if in TERM READY mode†

Puts terminal in TERM READY mode:

    Turns on TR/DTR* & permits terminal to enter DATA mode when DR/DSR*, CTS* & CD* turn on

    Turns off TR/DTR* for 50 ms if DATA lit

    Removes effect of received interrupt
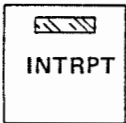
    Turns off AL* & DL*

| INTRPT | Lit if interrupt (200 ms state 0) rec'd (Bell rings)

If depressed when not lit:

    Sends interrupt (250 ms state 0)
    (to halt transmission from remote device)

If depressed when lit:

    Removes effect of received interrupt

    Turns off indicator

---

†if LOCAL, DATA or TERM READY lit, other 2 are not

| ALARM | Lit when: Flashes during:

    Paper out   AL* or DL* on
    or low

    Cover up

    PRINTER TEST depressed

Paper Out or Low
(pin & friction feed printer, respectively):

    Lights ALARM & rings bell

    Puts terminal in LOCAL mode:

        after receipt of 8 NLs if in DATA mode & if pin-feed printer

        immediately if in TERM READY mode

    Prevents entry into DATA or TERM READY mode

Cover Up:

    Lights ALARM

    Prevents sending or receiving (without turning off TR/DTR*)

    Puts terminal in LOCAL mode if in TERM READY mode

    Prevents entry into DATA or TERM READY mode

Bell Rings:

    7 spaces ahead of and at right-hand margin if print-head moving right

    at left-hand margin on entry or receipt of backspace

    on receipt of interrupt (200 ms state 0)

    on paper out or low

| PRINTER TEST | On if held down, off if up

    Puts terminal in LOCAL mode

    Causes entire character set to be continuously printed (as shown below)

■ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
■ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

| ON-UP
PARITY
OFF-DN | Detector on if up, off if down
Depress to lock down, again to release
(Does not affect sent parity) |

If on:

Causes terminal to print symbol ■ on receipt of
character with even vertical parity error

If off:

Causes terminal to print character received
regardless of its parity

| HALF-UP
DUPLEX
FULL-DN | In half-duplex mode if up,
full-duplex if down
Depress to lock down, again to release |

Half-Duplex mode:

Permits terminal to send or receive, but not
both at same time

Causes terminal to print characters and obey
controls sent from keyboard

Full-Duplex mode:

Permits terminal to send & receive, both at
the same time

Causes terminal to ignore characters and controls
sent from keyboard (unless being echoplexed in
full-duplex)

Prevents CTRL plus RETURN function

| 30-UP
CPS
10-DN | 30 char/sec if up, 10 if down
Depress to lock down, again to release |

If up:

Causes terminal to send and receive at 30 char/sec
(300 wpm) (300 bit/sec)

If down:

Causes terminal to send and receive at 10 char/sec
(100 wpm) (110 bit/sec)

| CAPS
LOCK | On if down, off if up
Depress to lock down, again to release |

Permits keyboard entry of upper-case letters without
having to use SHIFT and without having to unlock
CAPS LOCK to enter unshifted characters such as
numbers

| SHIFT | On if held down, off if up |

Permits entry of shift-position characters
on keyboard

| CTRL | On if held down, off if up |

Permits entry of shift-position controls on
keyboard

| RETURN | If depressed with CTRL key:
Causes return & line feed
(except in full-duplex mode)
without sending on-line controls |

| REPT | On if held down, off if up |

Causes character and on-line control keys depressed at
the same time as the REPT key to be repetitively sent
until released

(Power)
On if LOCAL, DATA or
TERM READY lit

Power Off:

Disables terminal

Turns off TR/DTR*

Removes effect of rec'd interrupt

Turns off AL*

Power On:

Enables terminal

Puts terminal in TERM READY mode

Clears margins

Moves print-head to left-most location

---

*on interface:
TR/DTR = (Data) Terminal Ready
DR/DSR = Data (Set) Ready
CTS = Clear To Send
CD = Carrier Detect
AL = Analog Loop
DL = Digital Loop

Operator & On-Line Controls & Indicators for
KSR with an EIA or TTL Interface (Cont'd)

Keyboard Entry of On-Line Control	When in DATA mode Sends Control	Transmission† or Reception of Control in DATA mode or Entry of Control in LOCAL mode
LINE FEED	NL	Feeds paper up 1-line
RETURN	CR	Moves print-head to left-hand margin
BACK SPACE	BS	Moves print-head 1-character left or rings bell if at
BS		left-hand margin
BEL		Rings bell
ESC		Prevents character that follows from being printed
ESC l (lower-case L)		Sets left-hand margin at print-position
ESC r (lower-case R)		Sets right-hand margin at print-position
ESC x (lower-case X)		Clears margins Moves print-head to left-most location
ESC m (lower-case M)		Permits print-head to proceed past left or right margin, once
ESC w (lower-case W)		Feeds paper up 1-line Moves print-head to left-hand margin

Keyboard Entry of Control	When in LOCAL mode	When in DATA mode Sends Control &
ESC >	Flashes ALARM Turns on AL*	Flashes ALARM Turns on AL*
ESC <	Flashes ALARM Turns on DL* Goes to DATA if DR/DSR*, CD* & CTS* turn on, but DATA does not light Permits off-line operation until DATA lights & rec'd data is printed	Causes no action
ESC =	Stops ALARM Turns off AL* & DL*	Stops ALARM Turns off AL* & DL*

†No action occurs if transmitted when teleprinter in full-duplex mode (unless being echoplexed)

Reception of Control	When in DATA mode
ESC <	Flashes ALARM Turns on DL* Disables keyboard except for ESC =
ESC =	Stops ALARM Removes either loop-back
Interrupt (200ms state 0)	Lights INTRPT Disables keyboard Rings bell
EOT	
DSR, CTS, CD or DR off > 450 ms	Puts terminal in TERM READY mode
ESC >	
or character other than CR when print-position at right-hand margin	Moves print-head to left-hand margin Feeds paper up 1-line Puts control or character and others that follow into printer buffer until print-head reaches left-hand margin, at which time printer operates at 47 cps until buffer empty (no rec'd data lost)

Mode Diagram for KSR with an EIA or TTL Interface

The diagrams that follow show all of the possible
ways in which a KSR terminal with a TTL or an EIA
interface can be operated via operator and on-line
controls. It includes modes and mode changes de-
scribed earlier under operator and on-line controls
plus additional possibilities which may be of interest.

For ready reference relative to the mode diagrams,
the following brief descriptions are included:

In the LOCAL mode the LOCAL key is lit† and TR/
DTR* is off. Possibly the terminal is being used for
off-line operation.

In the DATA mode the DATA key is lit†, TR/DTR*
is on, and a data (send/receive) connection has been
established with a remote device. While in this mode
receipt of interrupt (200ms state 0) prevents further
sending from the terminal (but does not prevent
reception) until the INTRPT key is depressed.
(Depression of the key at other times sends 250ms
state 0 to halt the remote device when it is sending.)

In the TERM READY mode the TERM READY key
is lit†, TR/DTR is on and the terminal will switch to
the DATA mode when DR/DSR*, CTS* & CD*
turn on.

†Whenever the LOCAL, DATA or TERM READY
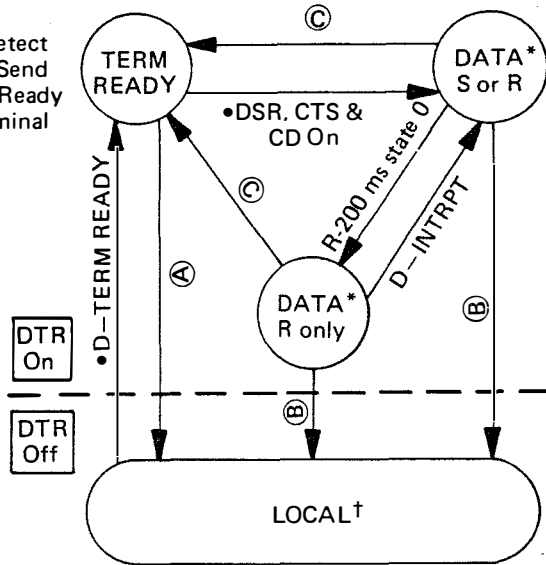key is lit, the other two are not.

*Leads on TTL or EIA interface (note on previous page)

Mode Diagram for KSR with EIA Interface

D = Depress
S = Send
R = Receive

Interface leads:

CD = Carrier Detect
CTS = Clear To Send
DSR = Data Set Ready
DTR = Data Terminal Ready

TERM READY

DATA* S or R

•DSR, CTS & CD On

DATA* R only

•D−TERM READY

DTR On

DTR Off

R-200 ms state 0

D−INTRPT

Ⓐ Ⓑ Ⓒ

LOCAL†

Ⓐ
•D−LOCAL
•D−PRINTER TEST
•Raise cover
•Turn power off
•Remove paper
•Low paper (friction feed printer)

Ⓑ
•R−8 NLs after paper out (pin fed printers)
•D−LOCAL
•D−PRINTER TEST
•Turn off power

Ⓒ
•DSR off > 450 ms
•CTS off > 450 ms
•CD off > 450 ms
•D−TERM READY
•R−EOT
} { Either Turns Off DTR for 50 ms

*Raising cover prevents sending or receiving (without turning off DTR or changing mode)

†Cannot leave LOCAL mode if cover up, paper out, or power off. Power off also prevents off-line operation of KSR & turns off LOCAL light

Mode Diagram for KSR with TTL Interface

D = Depress
S = Send
R = Receive

Interface leads:

DR = Data (Set) Ready
TR = Terminal Ready

TERM READY

DATA* S or R

•DR On

DATA* R only

•D−TERM READY

TR On

TR Off

R-200 ms state 0

D−INTRPT

Ⓐ Ⓑ Ⓒ

LOCAL†

Ⓐ
•D−LOCAL
•D−PRINTER TEST
•Raise cover
•Turn power off
•Remove paper
•Low paper (friction feed printer)

Ⓑ
•R−8 NLs after paper out (pin fed printers)
•D−LOCAL
•D−PRINTER TEST
•Turn off power
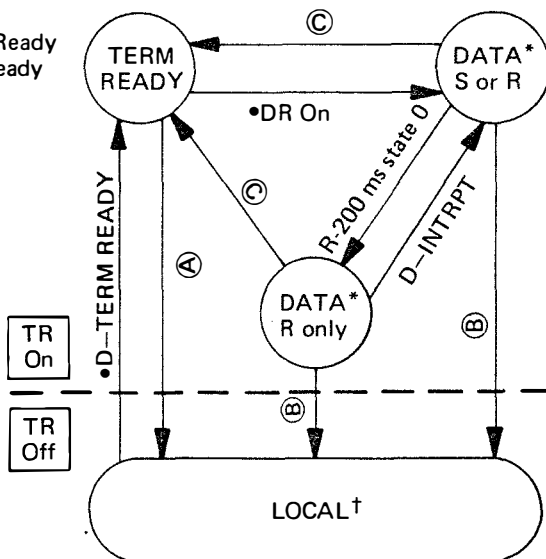
Ⓒ
•DR off > 450 ms
•D−TERM READY
•R−EOT
} { Either Turns Off TR for 50 ms

*Raising cover prevents sending or receiving (without turning off TR or changing mode)

†Cannot leave LOCAL mode if cover up, paper out, or power off. Power off also prevents off-line operation of KSR & turns off LOCAL light

Operation of a KSR with
DC-20 to 60 ma Interface
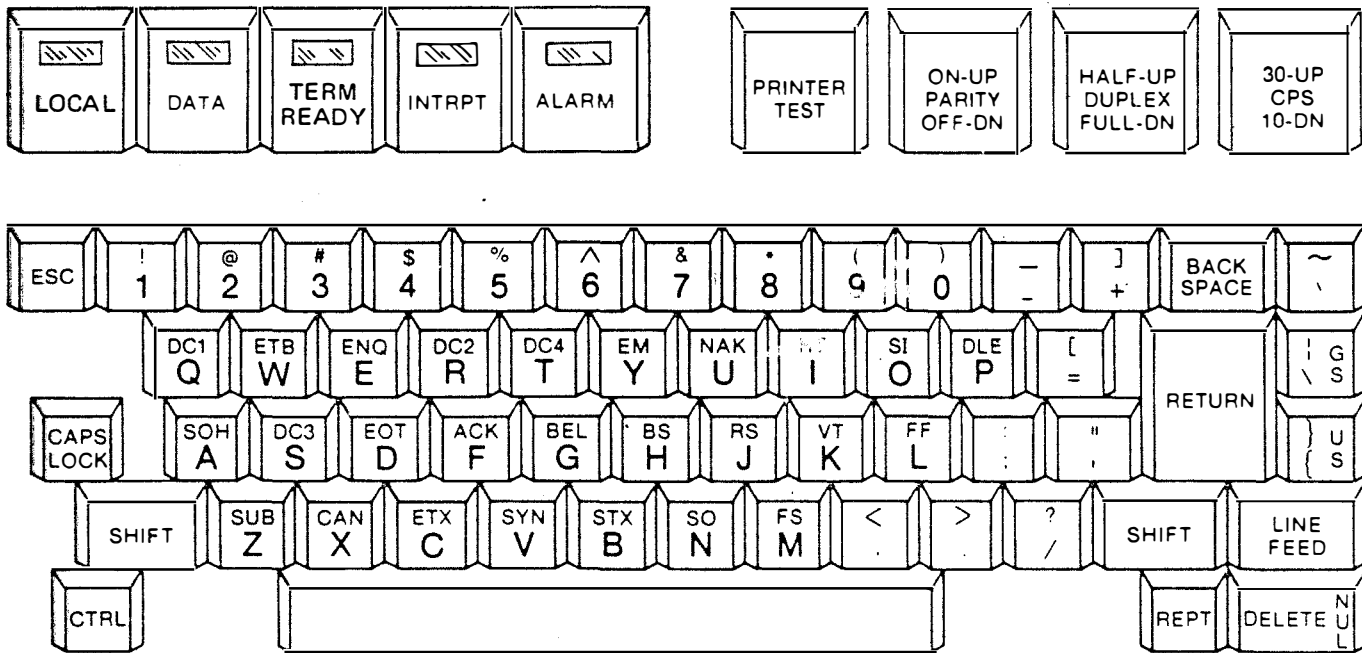
Typical Operator Procedures

To Send or Receive:

Depress TERM READY if not lit

Be sure DATA is lit

Begin sending or receiving data

To Interrupt Remote Sender:

Depress INTRPT (briefly lights)

Reception should stop

If remote operator present:

Send data explaining interrupt

If no remote operator present:

Wait for instruction from remote device
or disconnect

To Disconnect:

Depress LOCAL or send EOT

---

†The print-head pointer points to the position
where the next character will be printed only after
a 1-second delay in motion (due to the printer's
last character visibility feature).

To Set Margins (in DATA or LOCAL mode)
enter on the keyboard:

ESC x (lower-case X)

As many SPs as there are spaces to the
desired left-hand margin†

ESC 1 (lower-case L)

As many SPs as there are spaces to the
desired right-hand margin†

ESC r (lower-case R)

RETURN

Margins have now been set to allow printing to
begin at the left-hand margin and end 1-character
ahead of the right-hand margin (e.g. if margins are
set at 10 & 70 on the print-position scale, a 60-
character line has been allowed for, beginning
with the first character at 10 and ending with the
last character at 69).

To Clear Margins:

Enter on the keyboard:

ESC x (lower-case X)

This clears margins and also moves the
print-head to the left-most location

**Operator & On-Line Controls & Indicators for
KSR with DC-20 to 60 ma Interface**

| LOCAL | Lit if in LOCAL mode† |

Puts terminal in LOCAL mode:

Permits off-line operation

Removes effect of received interrupt

Turns off AL*

| DATA | Lit if in DATA mode† |

Indicates when data can be sent or received

| TERM READY | Lit if in DATA mode† |

Puts terminal in DATA mode
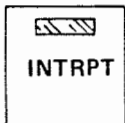
| INTRPT | Lit if interrupt (200ms state 0) rec'd (Bell rings) |

If depressed when not lit:

Sends interrupt (250ms state 0)
(to halt transmission from remote device)

If depressed when lit:

Removes effect of received interrupt

Turns off indicator

| PRINTER TEST | On if held down, off if up |

Puts terminal in LOCAL mode

Causes entire character set to be continuously
printed (as shown below)

---

†Either LOCAL is lit or DATA & TERM READY
are lit

ALARM	Lit when:	Flashes during:
	Paper out or low	AL* on
	Cover up	
	PRINTER TEST depressed	
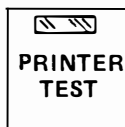
**Paper Out or Low
(pin & friction feed printer, respectively):**

Lights ALARM & rings bell

Puts terminal in LOCAL mode:

after receipt of 8 NLs if in DATA mode
& if pin-feed printer

Prevents entry into DATA mode

Cover Up:

Lights ALARM

Prevents sending or receiving without
removing from DATA mode

Prevents entry into DATA mode

Bell Rings:

7 spaces ahead of and at right-hand margin if
print-head moving right

at left-hand margin on entry or receipt of
backspace

on receipt of interrupt (200ms state 0)

on paper out or low

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
```

| ON-UP PARITY OFF-DN | Detector on if up, off if down
Depress to lock down, again to release
(Does not affect sent parity) |

If on:

Causes terminal to print symbol ■ on receipt of character with even vertical parity error

If off:

Causes terminal to print character received regardless of its parity

| HALF-UP DUPLEX FULL-DN | In half-duplex mode if up,
    full-duplex if down
Depress to lock down, again to release |

Half-Duplex mode:

Permits terminal to send or receive, but not both at same time

Causes terminal to print characters and obey controls sent from keyboard

Full-Duplex mode:

Permits terminal to send & receive, both at the same time

Causes terminal to ignore characters and controls sent from keyboard (unless being echoplexed in full-duplex)

Prevents CTRL plus RETURN function

| 30-UP CPS 10-DN | 30 char/sec if up, 10 if down
Depress to lock down, again to release |

If up:

Causes terminal to send and receive at 30 char/sec (300 wpm) (300 bit/sec)

If down:

Causes terminal to send and receive at 10 char/sec (100 wpm) (110 bit/sec)

| CAPS LOCK | On if down, off if up
Depress to lock down, again to release |

Permits keyboard entry of upper-case letters without having to use SHIFT and without having to unlock CAPS LOCK to enter unshifted characters such as numbers

| SHIFT | On if held down, off if up |

Permits entry of shift-position characters on keyboard

| CTRL | On if held down, off if up |

Permits entry of shift-position controls on keyboard

| RETURN | If depressed with CTRL key:

Causes return & line feed
(except in full-duplex mode)
without sending on-line controls |

| REPT | On if held down, off if up |

Causes character and on-line control keys depressed at the same time as the REPT key to be repetitively sent until released

(Power)
On if LOCAL, DATA or TERM READY lit

Power Off:

Disables terminal

Removes effect of rec'd interrupt

Turns off AL*

Power On:

Enables terminal

Clears margins

Moves print-head to left-most location

---

*on interface:

AL = Analog Loop

Operator & On-Line Controls & Indicators for
KSR with DC-20 to 60 ma Interface (Cont'd)

Keyboard Entry of On-Line Control	When in DATA mode Sends Control	Transmission[†] or Reception of Control in DATA mode or Entry of Control in LOCAL mode
LINE FEED	NL	Feeds paper up 1-line
RETURN	CR	Moves print-head to left-hand margin
BACK SPACE	BS	Moves print-head 1-character left or rings bell if at left-hand margin
BS		
BEL		Rings bell
ESC		Prevents character that follows from being printed
ESC l (lower-case L)		Sets left-hand margin at print-position
ESC r (lower-case R)		Sets right-hand margin at print-position
ESC x (lower-case X)		Clears margins Moves print-head to left-most location
ESC m (lower-case M)		Permits print-head to proceed past left or right margin, once
ESC w (lower-case W)		Feeds paper up 1-line Moves print-head to left-hand margin

Reception of Control	When in DATA mode
ESC <	Flashes ALARM Disables keyboard except for ESC =
ESC =	Stops ALARM Removes either loop-back
Interrupt (200 ms state 0)	Lights INTRPT Disables keyboard Rings bell
EOT	Puts terminal in LOCAL mode
ESC >	
or character other than CR when print-position at right-hand margin	Moves print-head to left-hand margin Feeds paper up 1-line Puts control or character and others that follow into printer buffer until print-head reaches left-hand margin, at which time printer operates at 47 cps until buffer empty (no rec'd data lost)

Keyboard Entry of Control	When in LOCAL mode	When in DATA mode Sends Control &
ESC >	Flashes ALARM Turns on AL*	Flashes ALARM Turns on AL*
ESC <	Flashes ALARM Goes to DATA, but DATA does not light Permits off-line operation until DATA lights & rec'd data is printed	Causes no action
ESC =	Stops ALARM Turns off AL*	Stops ALARM Turns off AL*

[†]No action occurs if transmitted when teleprinter in full-duplex mode (unless being echoplexed)

Operation of an RO

RESET	PRINTER TEST	▧ TERM READY	▧ DATA	▧ ALARM
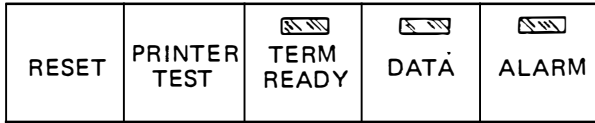
Operator & On-Line Controls & Indicators for an
RO with a 103-Type Built-In Modem

RESET

Puts RO in TERM READY mode:

Causes return & line feed without sending
on-line controls

Turns off ALARM light if alarm condition has
been removed

Puts RO in DATA mode on receipt of call if:

phone on-hook or no phone

carrier received within 20 sec

plus (A)

PRINTER TEST

on if held down, off if up

Causes entire character set to be continuously
printed (as shown below)

plus (A)

(A)

Causes disconnect if:

in DATA mode

phone on-hook or no phone

or Causes transfer from data to talk if:

in DATA mode

phone off-hook

rec'd carrier turns off

Removes loop-back

▧ TERM READY

Lit if in TERM READY mode
(See RESET for related control)

▧ DATA

Lit if in DATA mode

Indicates when data can be received

▧ ALARM

Lit when:

Paper out or low

Cover up

PRINTER TEST depressed

Paper Out or Low
(pin or friction feed printer, respectively):

Lights Alarm

Prevents entry into DATA or TERM READY
mode

plus (A) after receipt of 8 NLs if pin feed printer

Cover Up:

Lights ALARM

Prevents entry into DATA or TERM READY
mode

Prevents receiving in DATA mode
(without causing disconnect)

Bell Rings:

7 spaces ahead of & at right margin if print-head
moving right

At left margin on receipt of BS

On receipt of interrupt (200 ms state 0)

On paper out or low

■ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
■ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

Reception of Control	When in DATA mode
ESC <	Flashes ALARM
	Puts terminal into digital loop-back
ESC =	Stops ALARM
	Removes either loop-back
Interrupt (200 ms state 0)	Lights INTRPT Disables keyboard Rings bell
EOT	
2 sec state 0	Puts terminal in TERM READY mode if phone on-hook or no phone
450 ms car'r off	
ESC >	
or character other than CR when print-position at right-hand margin	Moves print-head to left-hand margin Feeds paper up 1-line Puts control or character and others that follow into printer buffer until print-head reaches left-hand margin, at which time printer operates at 47 cps until buffer empty (no rec'd data lost)

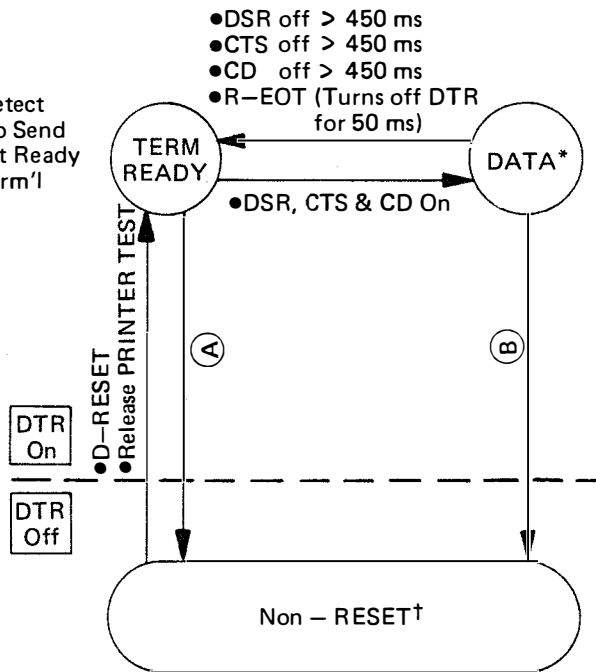| Reception of Control	When in DATA mode
NL	Feeds paper up 1-line
CR	Moves print-head to left-hand margin
BS	Moves print-head 1-character left or rings bell if at left-hand margin
BEL	Rings bell
ESC	Prevents character that follows from being printed
ESC l (lower-case L)	Sets left-hand margin at print-position
ESC r (lower-case R)	Sets right-hand margin at print-position
ESC x (lower-case X)	Clears margins Moves print-head to left-most location
ESC m (lower-case M)	Permits print-head to proceed past left or right margin, once
ESC w (lower-case W)	Feeds paper up 1-line Moves print-head to left-hand margin

Mode Diagram
for RO with 103 Interface
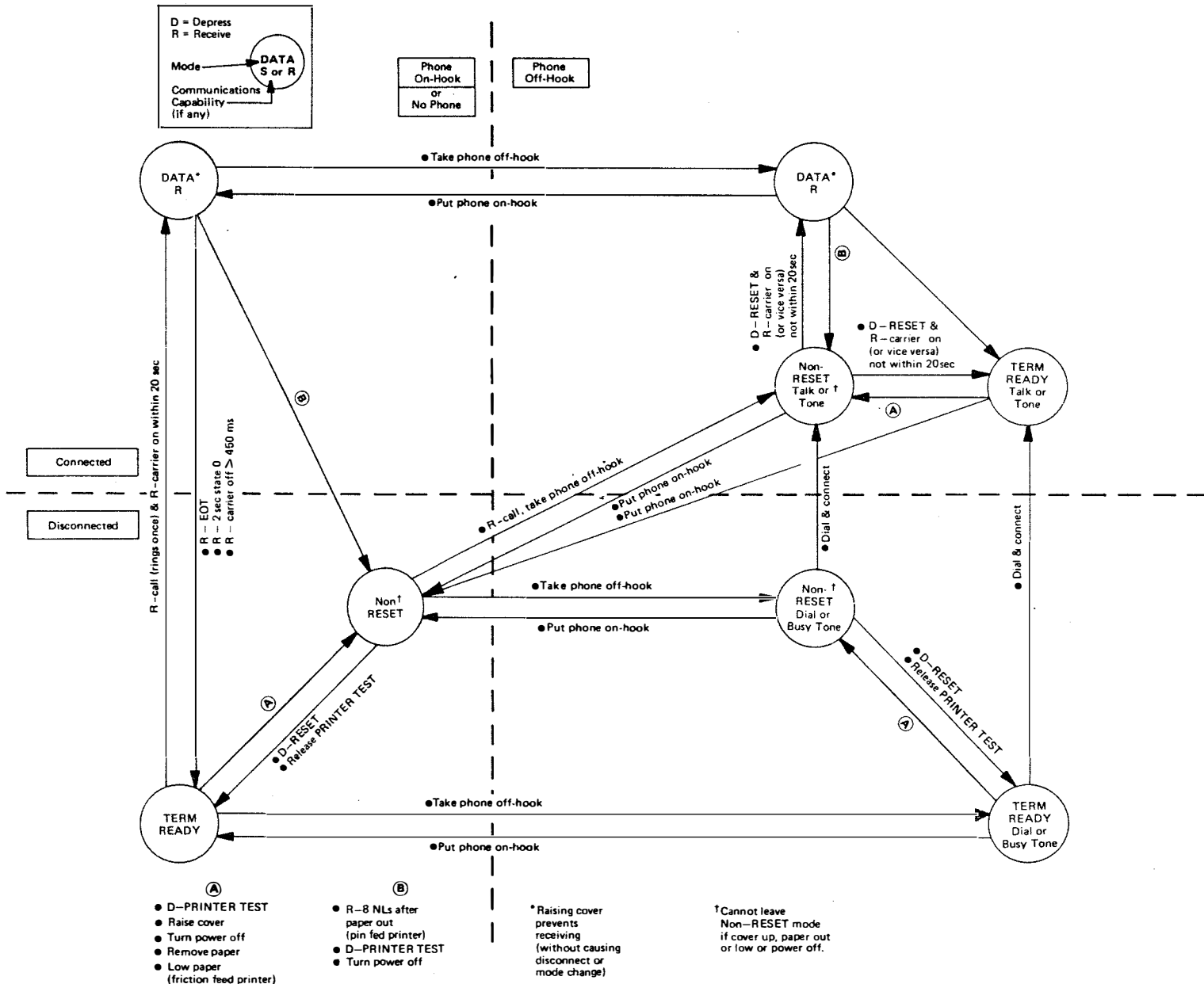
Operator & On-Line Controls & Indicators for
RO with EIA or TTL Interface

```
┌─────────┐
│ RESET   │
└─────────┘
```

Puts RO in TERM READY mode:

Causes return & line feed without sending
on-line controls

Turns off ALARM light if alarm condition
has been removed

Turns on TR/DTR* & permits terminal to enter
DATA mode when DR/DSR*, CTS* & CD*
turn on

Turns off TR/DTR* for 50ms if DATA lit

```
┌─────────┐
│ PRINTER │
│ TEST    │
└─────────┘
```
On if held down, off if up

Causes entire character set to be continuously
printed (as shown below)

Removes effect of received interrupt

Turns off TR/DTR*

```
┌─────────┐
│ ▨▨▨     │
│ TERM    │
│ READY   │
└─────────┘
```
Lit if in TERM READY mode
(See RESET for related control)

```
┌─────────┐
│ ▨▨▨     │
│ DATA    │
└─────────┘
```
Lit if in DATA mode

Indicates when data can be received

```
┌─────────┐
│ ▨▨▨     │
│ ALARM   │
└─────────┘
```
Lit when:

Paper out or low

Cover up

PRINTER TEST depressed

Paper Out or Low
(pin & friction feed printer, respectively):

Lights ALARM

Prevents entry into DATA or TERM READY mode

Turns off TR/DTR* after receipt of 8 NLs if pin
feed printer

Cover Up:

Lights ALARM

Prevents entry into DATA or TERM READY mode

Prevents receiving in DATA mode
(without turning off TR/DTR*)

Bell Rings:

7 spaces ahead of & at right margin if print-head
moving right

At left margin on receipt of BS

On receipt of interrupt (200 ms state 0)

On paper out or low

---

*On RO Interface:
TR/DTR = (Data) Terminal Ready, DR/DSR = Data (Set) Ready, CTS = Clear To Send, CD = Carrier Detect

Reception of Control	When in DATA mode
NL	Feeds paper up 1-line
CR	Moves print-head to left-hand margin
BS	Moves print-head 1-character left or rings bell if at left-hand margin
BEL	Rings bell
ESC	Prevents character that follows from being printed
ESC l (lower-case L)	Sets left-hand margin at print-position
ESC r (lower-case R)	Sets right-hand margin at print-position
ESC x (lower-case X)	Clears margins Moves print-head to left-most location
ESC m (lower-case M)	Permits print-head to proceed past left or right margin, once
ESC w (lower-case W)	Feeds paper up 1-line Moves print-head to left-hand margin

Reception of Control	When in DATA mode
ESC <	Flashes ALARM Turns on DL*
ESC =	Stops ALARM Removes either loop-back
Interrupt (200 ms state 0)	Lights INTRPT Rings bell
EOT	Puts terminal in TERM READY mode
450 ms car'r off	Puts terminal in TERM READY mode
ESC >	Puts terminal in TERM READY mode
or character other than CR when print-position at right-hand margin	Moves print-head to left-hand margin Feeds paper up 1-line Puts control or character and others that follow into printer buffer until print-head reaches left-hand margin, at which time printer operates at 47 cps until buffer empty (no rec'd data lost)

**Mode Diagram
for RO with
EIA Interface**

D — Depress
R — Receive

Interface
leads:

CD — Car'r Detect
CTS — Clear To Send
DSR — Data Set Ready
DTR — Data Term'l
Ready

●DSR off > 450 ms
●CTS off > 450 ms
●CD off > 450 ms
●R—EOT (Turns off DTR
for 50 ms)

TERM READY

DATA*

●DSR, CTS & CD On

D—RESET
●Release PRINTER TEST

Ⓐ

Ⓑ

DTR On
DTR Off

Non — RESET†

Ⓐ
●D—PRINTER TEST
●Raise cover
●Turn power off
●Remove paper
●Low paper
(friction feed printer)

*Raising cover
prevents
sending or
receiving
(without turning
off DTR or
changing mode)

Ⓑ
●R—8 NLs after
paper out
(pin fed printer)
●D—PRINTER TEST
Turn power off

†Cannot leave
Non-Reset if
cover up,
paper out or low
or power off.

**Mode Diagram
for RO with
TTL Interface**
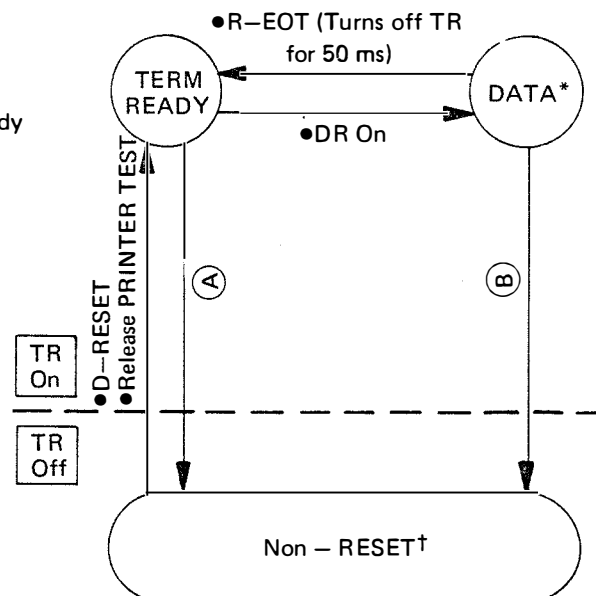
D — Depress
R — Receive

Interface
leads:

DR = Data
(Set) Ready

TR = Terminal
Ready

●R—EOT (Turns off TR
for 50 ms)

TERM READY

DATA*

●DR On

D—RESET
●Release PRINTER TEST

Ⓐ

Ⓑ

TR On
TR Off

Non — RESET†

Ⓐ
●D—PRINTER TEST
●Raise cover
●Turn power off
●Remove paper
●Low paper
(friction feed printer)

*Raising cover
prevents
sending or
receiving
(without turning
off TR or
changing mode)

Ⓑ
●R—8 NLs after
paper out
(pin fed printer)
●D—PRINTER TEST
Turn power off

†Cannot leave
Non-Reset if
cover up,
paper out or low
or power off.

Operator & On-Line Controls & Indicators for
RO with DC-20 to 60 ma Interface
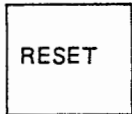
RESET

Puts RO in TERM READY mode:

Causes return & line feed without sending
on-line controls

Turns off ALARM light if alarm condition
has been removed

Puts terminal in DATA mode

PRINTER
TEST   On if held down, off if up

Causes entire character set to be continuously
printed (as shown below)

Removes effect of received interrupt

Removes terminal from DATA mode

TERM
READY   Lit if in DATA mode

DATA   Lit if in DATA mode

Indicates when data can be received

ALARM

Lit when:

Paper out or low

Cover up

PRINTER TEST depressed

Paper Out or Low
(pin & friction feed printer, respectively):

Lights ALARM

Prevents entry into DATA or TERM READY mode

Removes terminal from DATA mode after
receipt of 8 NLs if pin feed printer

Cover Up:

Lights ALARM

Prevents entry into DATA mode

Prevents receiving without removing from
DATA mode

Bell Rings:

7 spaces ahead of & at right margin if print-head
moving right

At left margin on receipt of BS

On receipt of interrupt (200 ms state 0)

On paper out or low

*On RO Interface:
TR/DTR = (Data) Terminal Ready, DR/DSR = Data (Set) Ready, CTS = Clear To Send, CD = Carrier Detect

Reception of Control	When in DATA mode
NL	Feeds paper up 1-line
CR	Moves print-head to left-hand margin
BS	Moves print-head 1-character left or rings bell if at left-hand margin
BEL	Rings bell
ESC	Prevents character that follows from being printed
ESC l (lower-case L)	Sets left-hand margin at print-position
ESC r (lower-case R)	Sets right-hand margin at print-position
ESC x (lower-case X)	Clears margins Moves print-head to left-most location
ESC m (lower-case M)	Permits print-head to proceed past left or right margin, once
ESC w (lower-case W)	Feeds paper up 1-line Moves print-head to left-hand margin

Reception of Control	When in DATA mode
ESC <	Flashes ALARM Turns on DL*
ESC =	Stops ALARM Removes either loop-back
Interrupt (200 ms state 0)	Lights INTRPT Rings bell
EOT	Puts terminal in Non-RESET mode
450 ms car'r off	Puts terminal in Non-RESET mode
ESC >	Puts terminal in Non-RESET mode
or character other than CR when print-position at right-hand margin	Moves print-head to left-hand margin Feeds paper up 1-line Puts control or character and others that follow into printer buffer until print-head reaches left-hand margin, at which time printer operates at 47 cps until buffer empty (no rec'd data lost)

(This space for notes)

COMPONENT DESCRIPTIONS

The 43 KSR terminal consists of 5 main components: keyboard, printer, logic, interface unit and power supply. An RO consists of all of these except the keyboard. In both configurations all components are housed in a single table-model cabinet.

The 43 keyboard most closely matches the keyboard of the Model 40 line of terminals and the keyboard of newer-style electric keyboards with regard to character locations, key size, and key touch. Most used ASCII control locations closely match those found on 33 and 35 terminals, since the 43 will be used mainly in systems presently using those type of terminals

The full ASCII, dot-matrix, impact printer is available in a friction and a pin feed type, to accommodate plain-paper print-outs and to accommodate fanfolded form and/or 132 column print-outs, respectively.

The logic is contained on a single circuit card located along the inside bottom of the cabinet. The interface unit is another circuit card located in the rear (bustle) of the teleprinter cabinet, as is the power supply.

The features of 43 teleprinter and its components are summarized on the next page, for ready reference.

43 Features

General

10 or 30 char/sec (110 or 300 bps) KSR & RO operator selectable on KSR

Interface: TTL-Serial,
103-type Built-In Modem,
EIA-RS232/DC-20 to 60ma, or
Dual (Line+Aux.) each EIA/DC

Half or Full-Duplex Operation on KSR, operator selectable

Manual or Automatic-Answer of incoming calls on KSR†, operator selectable. Auto answer on RO†

KSR Switches to Auto Answer†
Term'l Ready‡ or Local‡ on Disconnect
RO switches to Term'l Ready†‡ or Non-Reset‡

Disconnect on EOT or do not

Generate Even Vertical Parity or 8th bit always state 1

Analog (KSR) and Digital (KSR & RO) Loop-Back Tests† and Printer Test

Only 5 main components

Compact (KSR or RO): 5-1/2" H, 18" W, 21-1/2" D, 30 lbs

115 VAC @ 50/60 Hz 75 W max.
10 ft 3-wire power cord included

Keyboard (not on RO)

Typewriter format: Model 40 design and touch
Often-used ASCII controls located as on Model 33

Generates 128 ASCII characters and controls

N-Key Rollover: 8-character burst buffer

Caps Lock, Back Space, Repeat, Return,
Line Feed, Shift and Control Keys

Controls and Indicators

KSR Controls: Local†‡ or Local/Talk†, Data†,
Auto-Answer† or Term'l Ready†‡ Interrupt, Printer Test, Parity On/Off, Half/Full Duplex and 10/30 cps

KSR Indicators: Alarm, interrupt, mode, test and power on

RO Controls: Reset and Printer Test

RO Indicators: Term'l Ready, Data and Alarm

---

†with Built-In Modem
‡with EIA or TTL interface
‡with DC interface

Printer

Prints 4 x 7 dot-matrix upper and lower-case characters via 9-wire print-head

Print wires are spring-driven, magnetically-held, and electrically released for minimum power consumption

Prints 94 ASCII characters plus ■ for control SUB. Does not print DEL nor character after ESC

Prints ■ on receipt of even parity error instead of printing received character or performing received control, or prints or performs regardless of parity, KSR & RO, operator selectable on KSR

Distinguishes between zero and alpha O by printing zero narrower than O or by printing slash on either zero or O

Friction Feed: Prints up to 72 or 80 char/line at 10 char/in & 6 line/in on standard 400 ft 8-1/2-in wide rolled paper

Pin Feed: Prints up to 72, 80 or 132 char/line at 13 char/in & 6 line/in on pin-fed fan-folded forms 8-1/2-in long, 12-in wide

Impact prints an original and 1 (friction fed) or up to 2 (pin fed) copies

Left and Right Margin Set and Clear, operator (KSR) and on-line controllable

Characters not sent when in half-duplex mode (KSR) if printer at right margin (controls are sent)

Characters received at right-hand margin can be either not printed or printed after causing automatic return & line feed, to accommodate occasional garbled line-ending sequences in received data

64-character Received Data Buffer: Timing characters not required for return & line feed or multiple back space

47 char/sec print-out rate when data waiting in buffer

Multiple lines feed at 30 line/sec

Automatic disconnect on paper-out after 8 received NLs

Last Character Printed Visible after 1-second delay in printing

Bell rings before & at right margin & on receipt of BEL

Print-position indicator scale

Paper Guide and Supply Holder

Cartridge-loaded print-ribbon, continuously inked

Options (chosen via switches inside 43)

Distinguish Between Zero and Oh by Printing	
zero narrower than oh	431a^F
slash on zero	431b
slash on oh	431c

Elect option 431a for most applications. Options 431b and c are for systems that require the zero or oh, respectively, to be slashed, and where the absence of the slash would cause data to be misread.

Maximum Line Length				
Pin Fed	132 char/line			432a^F
Friction or Pin Fed Ptr	80 char/line			432c^F
	72 char/line	centered	yes	432d
			no	432b

Speed (RO only)			
30 cps	436a^F
10 cps	436b

KSR speed is changed on keyboard.

For most applications, elect option 432a for pin fed printers and option 432c for friction fed printers.

Options 432b and d permit pin and friction fed printers to match traditional teleprinter print-line lengths. Option 432a cannot be elected for a friction fed printer.

Disconnect on EOT	
yes	433a^F
no	433b

Elect option 433a for most applications, to disconnect or turn off TR/DTR for 50 ms on EOT (End of transmission)

Send Even Vertical Parity (not on RO)	
yes	434a^F
no	434b

If the system does not use even vertical parity and it is desired to generate bit 8 of all characters and controls sent from the terminal as a state 1 (mark), elect option 434b.

Print ■ on receipt of even parity error instead of printing received character or performing received control (RO only)	
yes	437a^F
no	437b

This choice on KSR is made on the keyboard.

Automatic Return & Line Feed at Right-Hand Margin	
yes	435a^F
no	435b

Elect option 435a for most applications to prevent loss of data due to occasional garbled line ending sequences in received data.

EIA/Current
See Interfaces

No option is elected. EIA/Current interface wired at connector per desired interface.
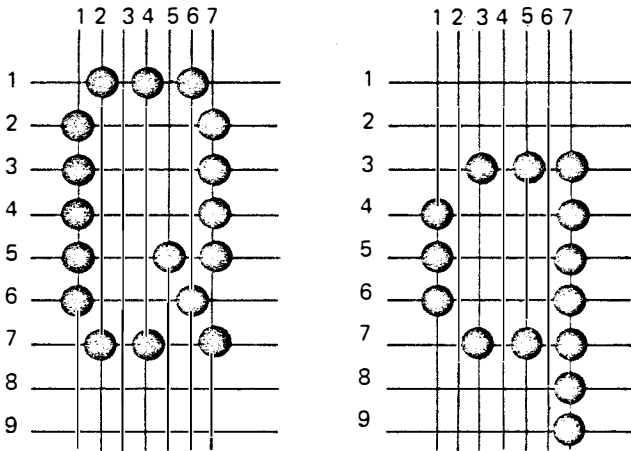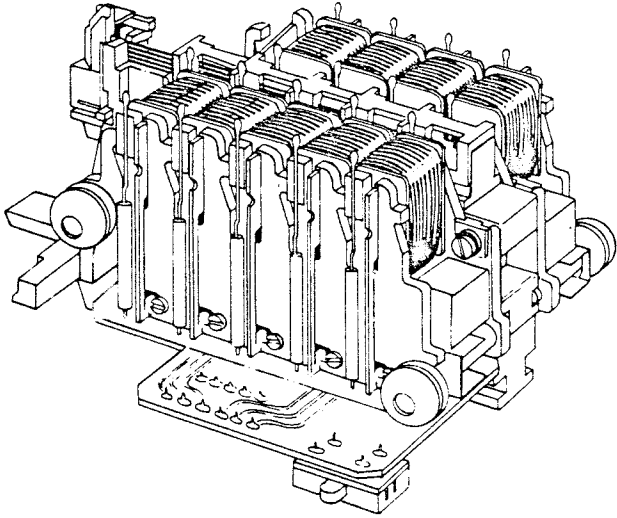
^{F}indicates the option activated at the factory
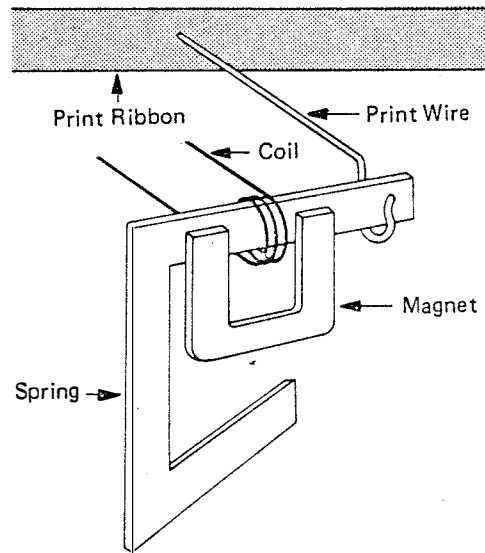
COMPONENT OPERATION

Printer

The 43 printer component prints characters via a dot-matrix method that utilizes a single column of print wires to produce impact printing. It does not consume large amounts of electrical power while printing. This is because the print wires are spring driven, magnetically held and electrically released, rather than selenoid driven and retracted.

Below is a representation of two characters printed by the 43 printer as an illustration of the dot-matrix method of printing used.

The left-hand character is an upper-case Q, the right-hand a lower-case q. As shown, the printer prints the characters by impacting a column of wires up to 7 at a time and up to 7 times in a row, depending on the character being printed.

After each character is printed, a lead screw moves the print-head containing the wires to the next print-position.

On a friction feed printer printing at 10 char/in, the dot columns are slightly further apart than they are on a pin feed printer printing at 13 char/in.

Driving these 9 print wires is a print head consisting of 9 basic units, 5 on the left and 4 on the right, as illustrated above.

Below is a greatly exaggerated and simplified illustration of one of the 5 print units on the left.

The C shaped part is spring steel and is twisted and held by the magnet as shown. When operated, an electrical pulse in the coil cancels the effect of the magnet on the spring, allowing the spring to push the print wire into the print ribbon and onto the paper as indicated by the arrow. The coil does not move with the spring but allows it to move between preset stops within the coil core.

To make up the print head, 5 of these units are merged with 4 left-handed versions of the same mechanism to produce a column of 9 print wires.

TECHNICAL FACTS

Code

ASCII							
Controls		**Characters**					
NUL	DLE	SP	0	@	P	`	p
SOH	DC1	!	1	A	Q	a	q
STX	DC2	"	2	B	R	b	r
ETX	DC3	#	3	C	S	c	s
EOT	DC4	$	4	D	T	d	t
ENQ	NAK	%	5	E	U	e	u
ACK	SYN	&	6	F	V	f	v
BEL	ETB	'	7	G	W	g	w
BS	CAN	(	8	H	X	h	x
HT	EM	)	9	I	Y	i	y
NL	SUB	*	:	J	Z	j	z
VT	ESC	+	;	K	[	k	{
FF	FS	,	<	L	\	l	¦
CR	GS	-	=	M	]	m	}
SO	RS	.	>	N	^	n	~
SI	US	/	?	O	_	o	DEL

BITS

NUL	- Null	BS	- Back Space	DLE	- Data Link Escape	CAN	- Cancel
SOH	- Start of Heading	HT	- Horizontal Tab	DC1	- Device Control 1	EM	- End of Media
STX	- Start of Text	NL	- New Line	DC2	- Device Control 2	SUB	- Substitute
ETX	- End of Text	VT	- Vertical Tab	DC3	- Device Control 3	ESC	- Escape
EOT	- End of Transmis'n	FF	- Form Feed	DC4	- Device Control 4	FS	- Field Separator
ENQ	- Enquiry	CR	- Carriage Ret.	NAK	- Negative Acknowledge	GS	- Group Separator
ACK	- Acknowledge	SO	- Shift-Out	SYN	- Synchronous	RS	- Record Separator
BEL	- Bell	SI	- Shift-In	ETB	- End of Trans'n Block	US	- Unit Separator

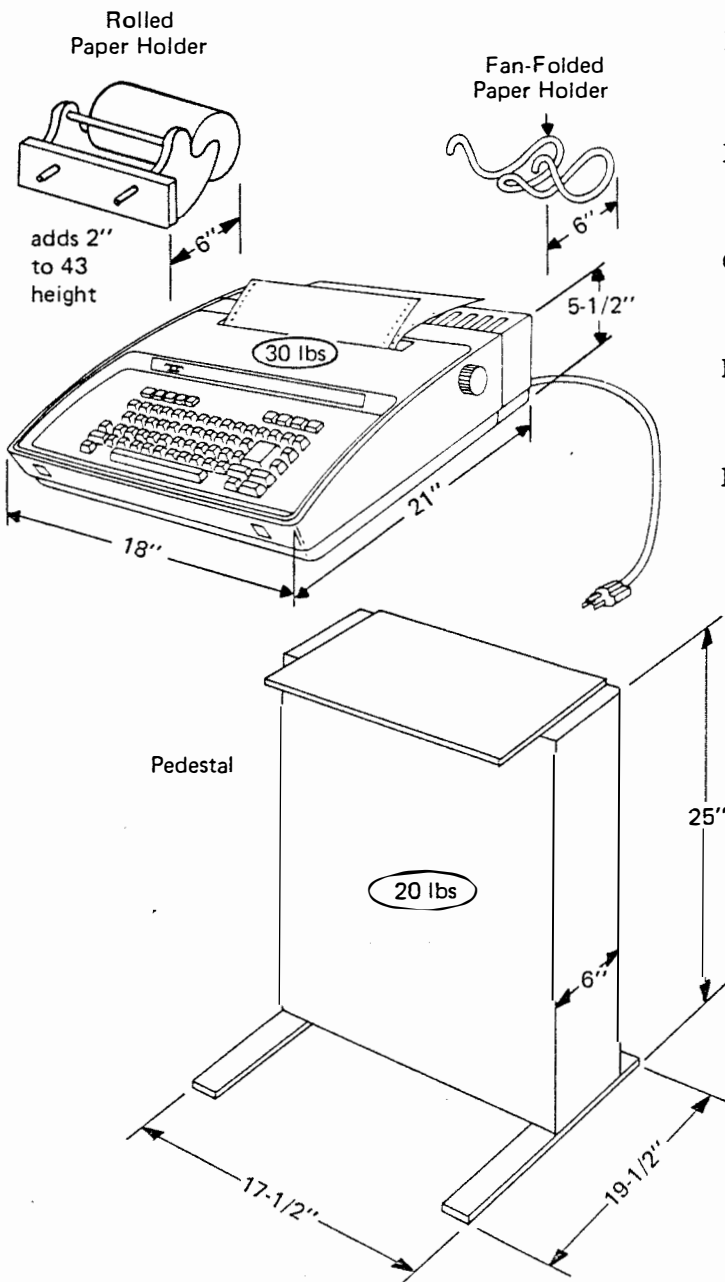SP - Space   DEL - Delete

Terminal Vocabulary

Keyboard Vocabulary:

All 128 ASCII characters & controls can be sent from the 43 keyboard.

Printer Vocabulary:

95 characters can be printed. This includes 94 of the 96 characters shown on the ASCII code chart plus the symbol ■ , which is printed on receipt of the control SUB and on receipt of a character or control with an even parity error if parity is detected.

Physical Facts

Rolled
Paper Holder

Fan-Folded
Paper Holder

adds 2"
to 43
height

30 lbs

5-1/2"

21"

18"

Pedestal

20 lbs

6"

25"

17-1/2"

19-1/2"

Environmental Requirements

Temperature

Storage: - 40 to 140°F

Operating: 40 to 110°F

Relative Humidity

Storage & Operating: 2 to 95%
(non-condensing)

Altitude

Shipping: Sea level to 50,000 ft

Operating: Sea level to 10,000 ft

Electrical Requirements

115 VAC @ 50/60 Hz 75 W Max

Routine Maintenance

Once per year

Operator's Manual
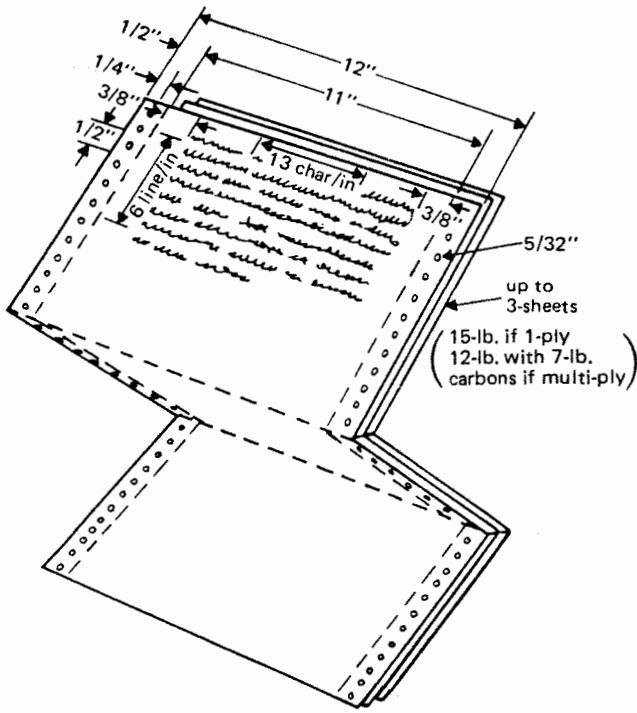
999-300-126

Print Ribbon

430035

Reliability

Maximum of 3 troubles per every 100 terminals per month
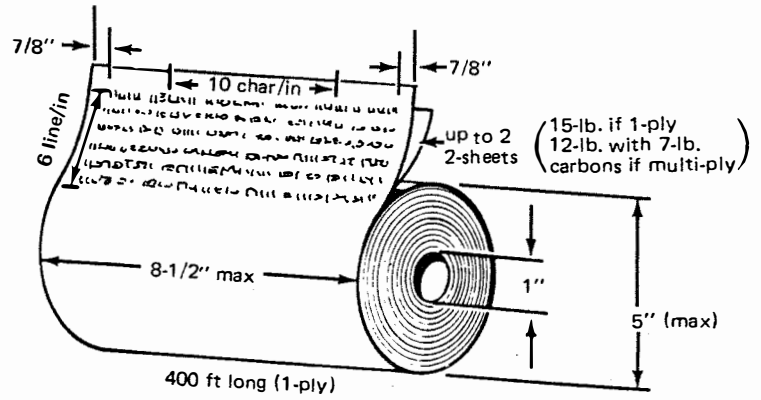
2000 hr print-head life
5 million character print-ribbon life

Paper & Printing Specifications

Pin-Fed
Fan-Folded Forms

Friction-Fed
Rolled Paper

SENT AND RECEIVED DATA

Applies to SEND and RECEIVE leads on TTL, EIA and DC interfaces
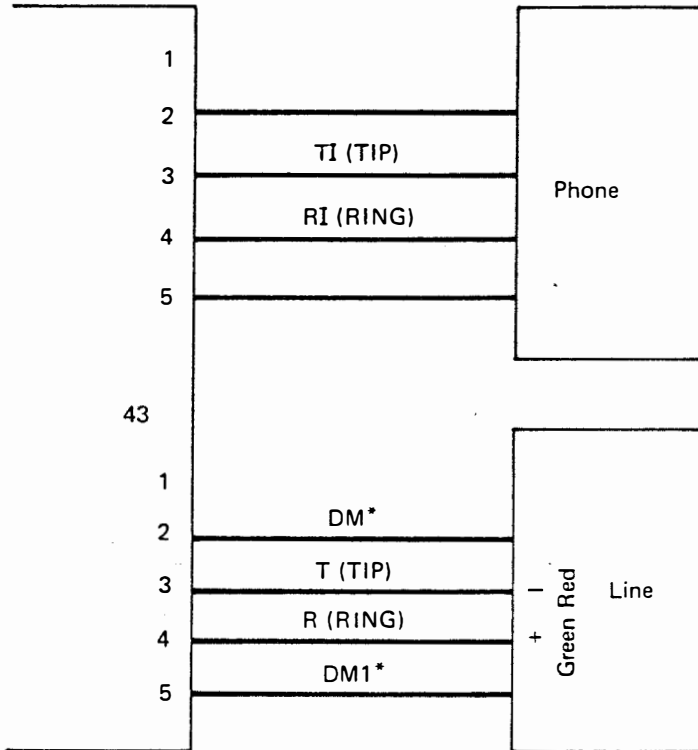(Shown here to avoid repetition elsewhere.)

(Shown is a perfect waveform for the ASCII character M with even vertical parity)

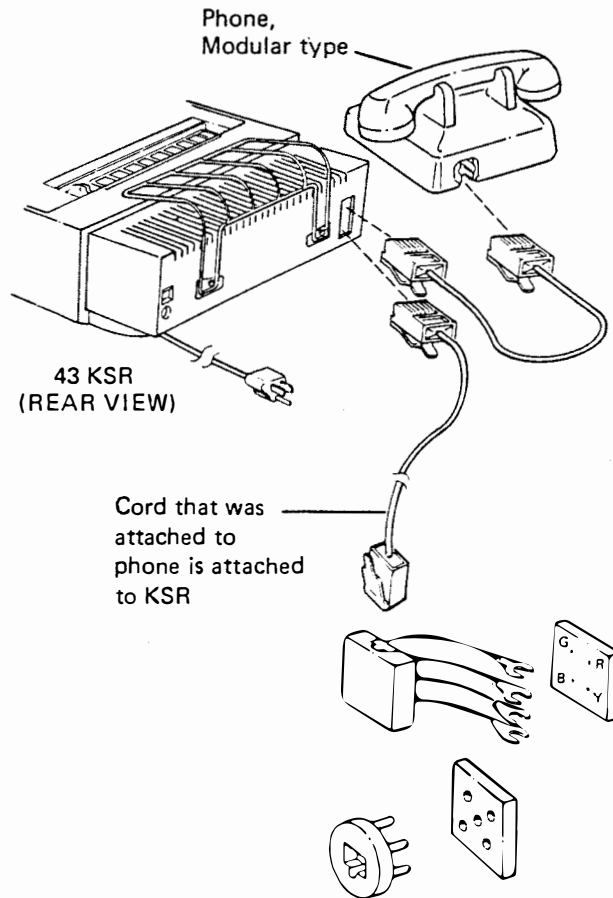The parity (8th) bit is sent in state 1 if even parity is not generated

103-TYPE BUILT-IN MODEM INTERFACE

Interface Pin Assignments

Physical

1

2

TI (TIP)

3

RI (RING)   Phone

4

5

43

1

2   DM*

3   T (TIP)

4   R (RING)

5   DM1*

Green   Red   Line

\- +

*control leads for line exclusion on key telephones .

FSK (Analog) Interface	Sent when 43 Originating	Sent when 43 Answering
	f1	f2
State 0 (space)	1070 Hz	2025 Hz
State 1 (mark	1270 Hz	2225 Hz

Phone, Modular type

43 KSR (REAR VIEW)

Cord that was attached to phone is attached to KSR

G. ·R
B· ·Y

FCC Registration No. AT793C-70162-DT-E

Ringer Equivalence 0.3

Ringer Type A

DUAL (LINE + AUXILIARY) INTERFACE
Both
EIA-RS232/DC-20 to 60 ma
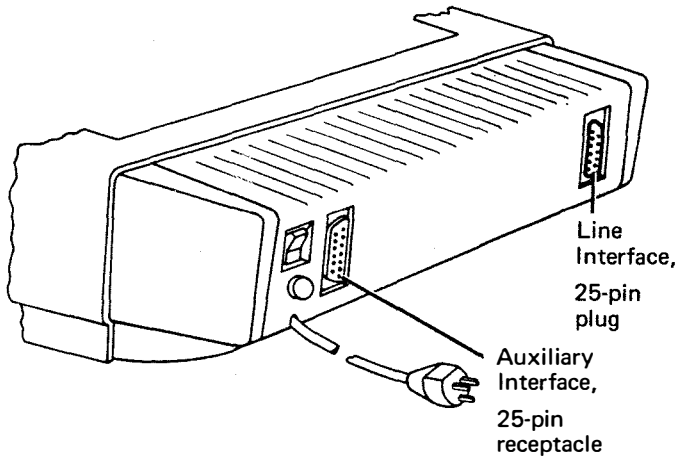
Physical

Line Interface, 25-pin plug

Auxiliary Interface, 25-pin receptacle

Electrical

EIA (RS232)	
State 0 (space) On	+3 to +25 VDC
State 1 (mark) Off	−3 to −25 VDC
Non-EIA Portion		

AL	On	+3 to +25 VDC
	Off	−3 to −25 VDC
PO	On	+2.5 to +5.0 VDC
	Off	+0.0 to +0.4 VDC
DC	Undefined	

Line Interface

A mating 25-pin receptacle connector
is available from:

	Body	Pins	Shell
Teletype:	145913	173716	186727
Amphenol:	17-304-01	17-763-02	—
Cannon:	—	—	239-13-99070

A mating 25-pin EIA cable
(receptacle on 1 end, plug on other end)
is available from Teletype:

7 ft — 408065	25 ft — 408067
12 ft — 408066	50 ft — 408068

Auxiliary Interface

A mating 25-pin plug connector
is available from:

	Body	Pins	Shell
Teletype:	341977	173715	341873
Amphenol:			
Cannon:			

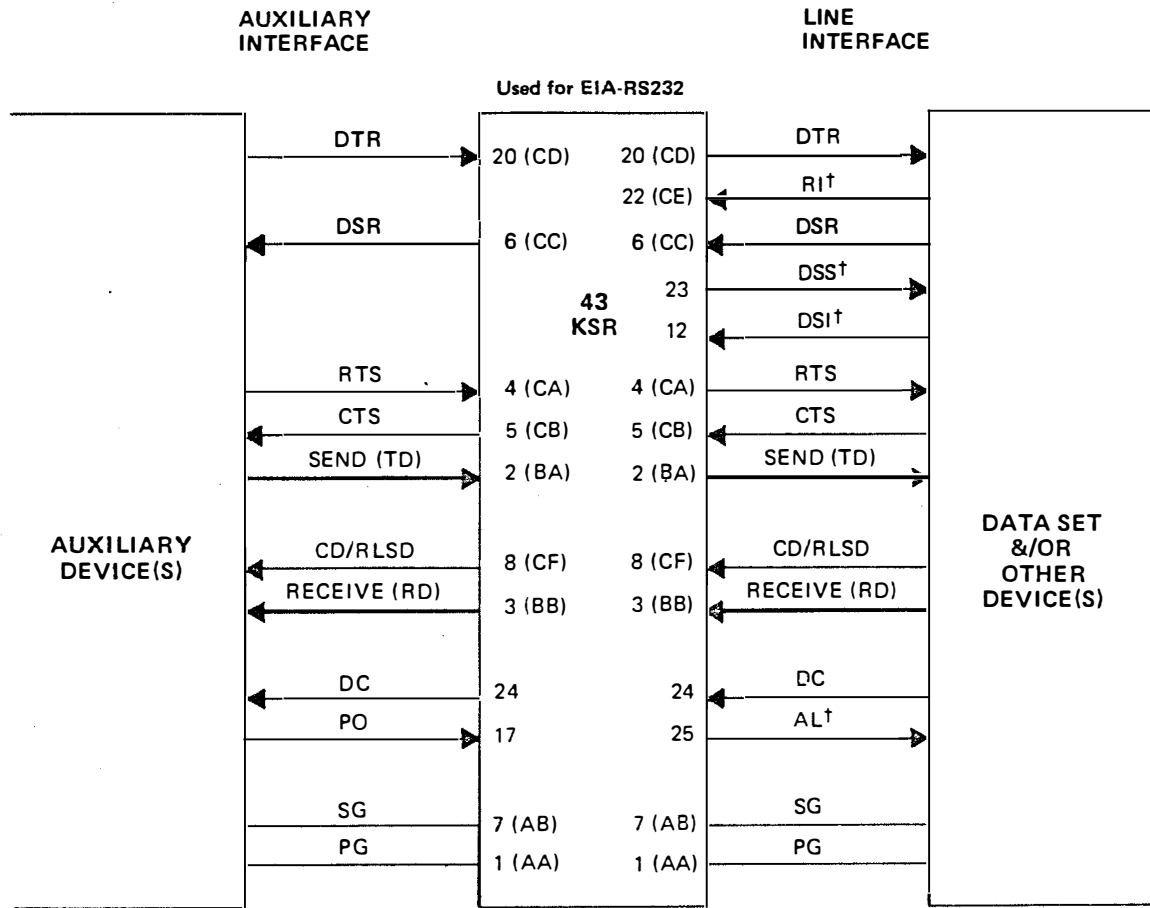| Current (20/60 maDC)	
State 1 (mark)	20/60 maDC*
State 0 (space)	0 maDC

*20 to 60 maDC at 5 to 130 VDC.

Send & Receive leads connect to separate,
non-inductive, optically-isolated + to −
circuits inside the 43.

Send circuit generates & receive circuit
accepts current on-off telegraphic signal
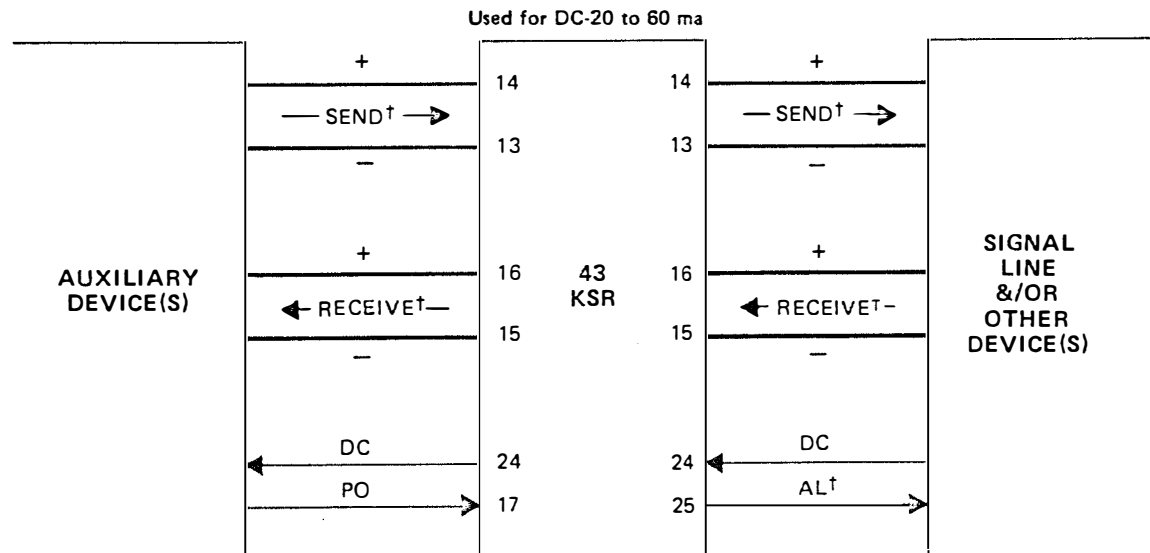from externally supplied 20/60 maDC.

Receive circuit input resistance is
approximately 50 ohms.

Pin Assignments

Pin Assignment Descriptions

Pin Assignments

AUXILIARY
INTERFACE

LINE
INTERFACE

Used for EIA-RS232

AUXILIARY DEVICE(S)		43 KSR		DATA SET &/OR OTHER DEVICE(S)
DTR →	20 (CD)		20 (CD)	DTR →
			22 (CE)	RI† ←
DSR ←	6 (CC)		6 (CC)	DSR ←
			23	DSS† →
			12	DSI† ←
RTS →	4 (CA)		4 (CA)	RTS →
CTS ←	5 (CB)		5 (CB)	CTS ←
SEND (TD) →	2 (BA)		2 (BA)	SEND (TD) →
CD/RLSD ←	8 (CF)		8 (CF)	CD/RLSD ←
RECEIVE (RD) ←	3 (BB)		3 (BB)	RECEIVE (RD) ←
DC ←	24		24	DC ←
PO →	17		25	AL† →
SG	7 (AB)		7 (AB)	SG
PG	1 (AA)		1 (AA)	PG

For limited—EIA applications connect pins 5, 6 & 8 (& possibly 20) together to permit operation

Used for DC-20 to 60 ma

AUXILIARY DEVICE(S)		43 KSR		SIGNAL LINE &/OR OTHER DEVICE(S)
+	14		14	+
— SEND† →	13		13	— SEND† →
—				—
+	16		16	+
← RECEIVE† —	15		15	← RECEIVE† —
—				—
DC ←	24		24	DC ←
PO →	17		25	AL† →

For Full-Duplex current-loop applications connect pins 2 & 6 on auxiliary interface together and connect pins 3, 4, 5, 6 & 8 on line interface together.

For Half-Duplex current-loop additionally connect pins 14 & 15 together on line interface.

†Certain KSRs either do not have this pin or do not perform the associated function.

Pin Assignment Descriptions

AUXILIARY INTERFACE

LINE INTERFACE

Used for EIA-RS232

DTR (Data Terminal Ready) — Off turns off line interface DTR

DSR (Data Set Ready) — On if KSR in LOCAL mode or if line interface DSR, CTS & CD on.

RTS (Request To Send) — On prevents 43 KSR from sending answer-back

CTS (Clear To Send) — On if KSR power on

SEND (TD) (Transmit Data) — Turn on until varied per sent data.

CD (Carrier Detect)/RLSD (Received Line Signal Detector) — On if KSR Power on

RECEIVE (RD) (Receive Data) — Off until varied per received data

DC (Device Control)‡ — Not defined. Connected only to line interface DC.

PO (Printer On-Off)‡ — Off prevents print-out of data except keyboard entered.

SG — Signal Ground

PG — Protected Ground

DTR (Data Terminal Ready) — Off if KSR in LOCAL mode or auxiliary interface DTR off. Turns off for 50 ms if EOT received or TERM READY depressed when in DATA mode. Also affected by paper supply & tests.*

RI† (Ring Indicator) — On causes KSR to send answer-back if DTR, DSR, CTS & CD on

DSR (Data Set Ready) — On puts KSR in DATA mode if DTR, CTS & CD on. ⧧

DSS† (Data Speed Selector) — Off or on, respectively, indicates selection of 10 or 30 cps on KSR

DSI† (Data Speed Indicator) — Off or on, respectively, switches KSR to 10 or 30 cps

RTS (Request To Send) — On/Off on late/early design KP when power on.

CTS (Clear To Send) — On puts KSR in DATA mode if DTR, DSR & CD on. ⧧

SEND (TD) (Transmit Data) — On if KSR in LOCAL or TERM READY mode. Off if in DATA mode until varied per sent data.

CD (Carrier Detect)/RLSD (Received Line Signal Detector) — On puts KSR in DATA mode if DTR, DSR & CTS on. ⧧

RECEIVE (RD) (Receive Data) — Turn on when KSR in LOCAL or TERM READY mode. Turn off when KSR in DATA mode until varied per received data.

DC (Device Control)‡ — Not defined. Connected only to auxiliary interface DC.

AL† (Analog Loop-back)‡ — Turns on when ESC > entered on keyboard.*

SG — Signal Ground

PG — Protected Ground

Used for DC-20 to 60 ma

SEND — Turn on until varied per sent data

RECEIVE — On until varied per received data

DC (Device Control) — Not defined. Connected only to line interface DC.

PO (Printer On-Off) — Off prevents print-out of data except keyboard entered.

SEND — On until varied per sent data

RECEIVE — Turn on until varied per rec'd data

DC (Device Control) — Not defined. Connected only to auxiliary interface DC.

AL† (Analog Loop-Back) — Turns on when ESC > entered on keyboard.*

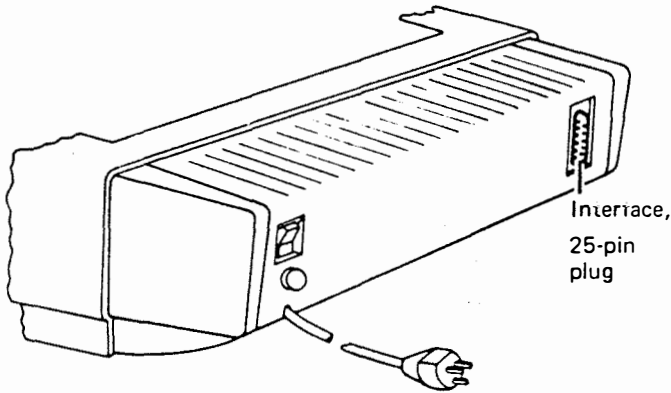*See mode diagram & operator & on-line controls for additional detail

†Certain KSRs either do not have this pin or do not perform the associated function

‡Non-EIA

⧧Off > 450ms switches KSR from DATA to TERM READY mode

EIA-RS232/DC-20 to 60 ma

Physical

Interface, 25-pin plug

A mating 25-pin receptacle connector
is available from:

	Body	Pins	Shell
Teletype:	145913	173716	186727
Amphenol:	17-304-01	17-763-02	—
Cannon:	—	—	239-13-99070

A mating 25-pin EIA cable
(receptacle on 1 end, plug on other end)
is available from Teletype:

7 ft — 408065	25 ft — 408067
12 ft — 408066	50 ft — 408068

Electrical

EIA (RS232)	
State 0 (space) On	+3 to +25 VDC
State 1 (mark) Off	−3 to −25 VDC
Non-EIA Portion	

AL	On	+3 to +25 VDC
	Off	−3 to −25 VDC
PO	On	+2.5 to +5.0 VDC
	Off	+0.0 to +0.4 VDC
DC	Undefined	

Current (20/60 maDC)	
State 1 (mark)	20/60 maDC*
State 0 (space)	0 maDC

*20 to 60 maDC at 5 to 130 VDC.

Send & Receive leads connect to separate,
non-inductive, optically-isolated + to −
circuits inside the 43.

Send circuit generates & receive circuit
accepts current on-off telegraphic signal
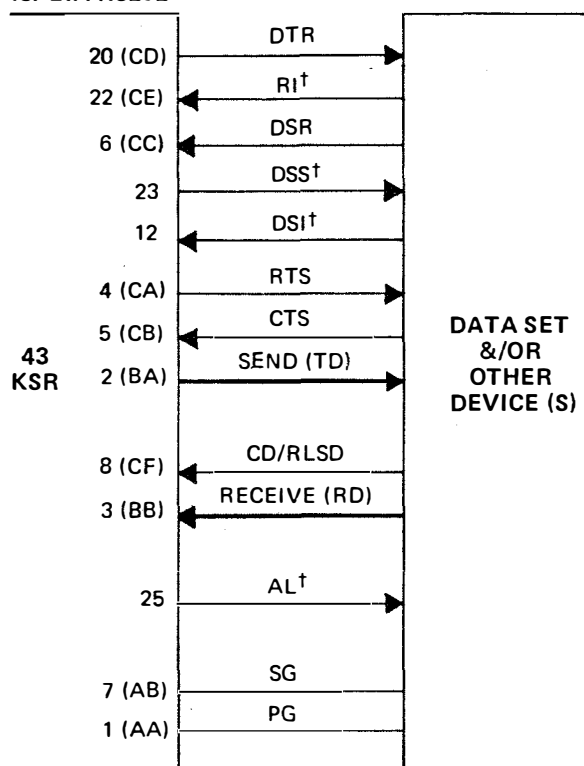from externally supplied 20/60 maDC.

Receive circuit input resistance is
approximately 50 ohms.
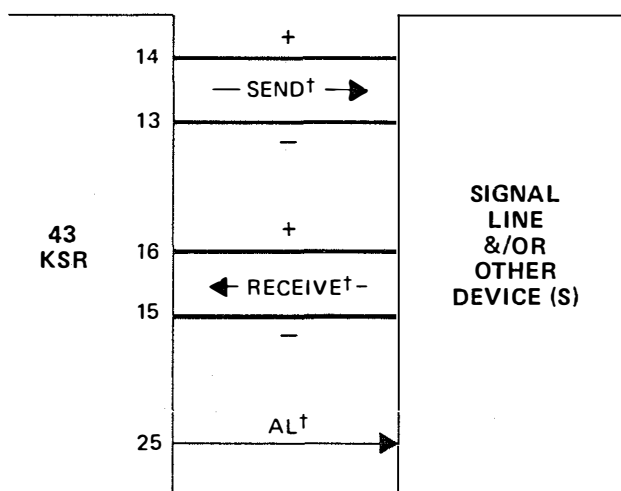
Pin Assignments

Pin Assignment Descriptions

Pin Assignments

for EIA-RS232

43 KSR		DATA SET &/OR OTHER DEVICE (S)
20 (CD)	DTR →	
22 (CE)	← RI†	
6 (CC)	← DSR	
23	DSS† →	
12	← DSI†	
4 (CA)	RTS →	
5 (CB)	← CTS	
2 (BA)	SEND (TD) →	
8 (CF)	← CD/RLSD	
3 (BB)	← RECEIVE (RD)	
25	AL† →	
7 (AB)	SG	
1 (AA)	PG	

For limited—EIA applications connect pins 5, 6 & 8 (& possibly 20) together to permit operation

for DC-20 to 60 ma

43 KSR		SIGNAL LINE &/OR OTHER DEVICE (S)
14	+	
13	— SEND† → —	
16	+	
15	← RECEIVE† − —	
25	AL† →	

For Full-Duplex current-loop applications connect pins 3, 4, 5, 6 & 8 together

For Half-Duplex current-loop additionally connect pins 14 & 15 together

Pin Assignment Descriptions

for EIA-RS232

DTR (Data Terminal Ready) — Off if KSR in LOCAL mode. Turns off for 50 ms if EOT received or TERM READY depressed when in DATA mode. Also affected by paper supply & tests.*

RI† (Ring Indicator) — On causes KSR to send answer-back if DTR, DSR, CTS & CD on

DSR (Data Set Ready) — On puts KSR in DATA mode if DTR, CTS & CD on‡

DSS† (Data Speed Selector) — Off or on, respectively, indicates selection of 10 or 30 cps on KSR

DSI† (Data Speed Indicator) — Off or on, respectively, switches KSR to 10 or 30 cps

RTS (Request To Send) — On/Off on late/early design KSR when power on.

CTS (Clear To Send) — On puts KSR in DATA mode if DTR, DSR & CD on.‡

SEND (TD) Transmit Data) — On if KSR in LOCAL or TERM READY mode. Off if in DATA mode until varied per sent data.

CD (Carrier Detect)/RLSD (Received Line Signal Detector) — On puts KSR in DATA mode if DTR, DSR & CTS on.‡

RECEIVE (RD) (Receive Data) — Turn On when KSR in LOCAL or TERM READY mode. Turn Off when KSR in DATA mode until varied per received data.

AL† (Analog Loop-back)‡ — On when ESC > entered on keyboard.*

SG — Signal Ground

PG — Protected Ground

for DC-20 to 60 ma

SEND — On until varied per sent data

RECEIVE — Turn On until varied per rec'd data

AL† (Analog Loop-back) — On when ESC > entered on keyboard.*

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*See mode diagram & operator & on-line controls for additional detail

†Certain KSRs either do not have this pin or do not perform the associated function
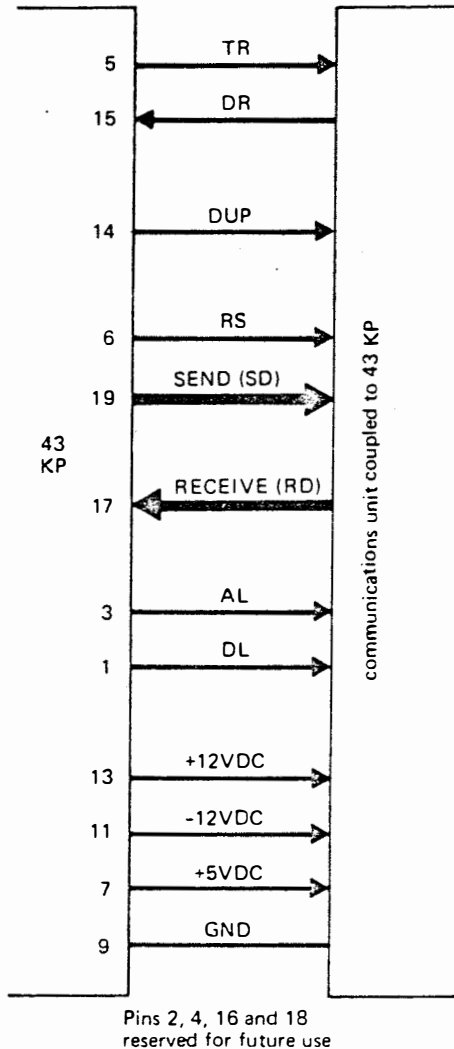
‡Non-EIA

‡Off > 450ms switches KSR from DATA to TERM READY mode

TTL-SERIAL INTERFACE

The TTL (Transistor-to-Transistor Logic) interface is provided via a low power 74LS04 Schottky Hex. Inverter plus a 7417 Hex. Buffer having the electrical characteristics shown in the table on the next page.

Interface Pin Assignments


```
       TR
  5  ───────────────►
       DR
 15  ◄───────────────
       DUP
 14  ───────────────►
       RS
  6  ───────────────►
       SEND (SD)
 19  ═══════════════►
43 KP                  communications unit coupled to 43 KP
       RECEIVE (RD)
 17  ◄═══════════════
       AL
  3  ───────────────►
       DL
  1  ───────────────►
       +12VDC
 13  ───────────────►
       -12VDC
 11  ───────────────►
       +5VDC
  7  ───────────────►
       GND
  9  ───────────────
```

Pins 2, 4, 16 and 18
reserved for future use

TR (data Terminal Ready) — Off if KP in LOCAL mode, on if in TERM READY or DATA mode. Receipt of EOT or depression of TERM READY in DATA mode turns off TR for 50 ms. Also affected by paper supply & tests.*

DR (Data set Ready) — On puts KP in DATA mode if TR on. Off > 450 ms switches KP from DATA to TERM READY mode.

DUP (Duplex) — Off if KP in half-duplex mode, on if in full-duplex; if supplied with +5VDC.

RS (Request to Send) (late design KPs) — Grounded.

SEND (SD) (Send Data) — Off if KP in DATA mode, then varies per sent data

RECEIVE (RD) (Receive Data) — Must be off if KP in DATA mode, until varied per received data.

AL (Analog Loop-back) — On if ESC > entered on keyboard.

DL (Digital Loop-back) — On if ESC < entered on keyboard in LOCAL mode or received in DATA mode.

+12VDC (235 ma max) ⎫
-12VDC (110 ma max) ⎬ all on if power on
+ 5VDC (55 ma max) ⎭

GND (Ground) — Logic ground

*See mode diagram & operator & on-line controls for additional detail.

Electrical Characteristics

TTL Interface	Electrical Characteristics	
	From 43 (Drivers)†	To 43 (Terminators)‡
State 0 (Space) On	0 to 0.4VDC	0 to 0.7VDC
	8 ma max @ 0.4VDC	-0.36 ma max @ 0.4VDC
State 1 (Mark) Off	2.4 to 5.25VDC	2 to 5.25VDC
	-0.4 ma max @ 5.25VDC	0.020 ma max @ 2.4VDC

† Maximum capacitive load per driver = 50 pf

‡ An open circuit to a terminator is considered a state 1
  State 0-to-1/1-to-0 propagation time = 20 ns

Physical

The TTL interface connector is a 20-pin receptacle. A mating 20-pin ribbon-cable plug connector is available from:

Teletype: part number 341802
3M: catalog number 3428-1002
Berg: catalog number 65483-001

Attached cable should be limited to 2 feet