1.0 SUMMARY.

DISPLAY FORMAT.  80 characters x 40 lines
SCREEN.        1¼" diagonal, P39 phosphor
VIEWING AREA.  10" x 8"
CHARACTER SET. 96 character ASCII (upper/lower case)
CHARACTER SHAPE. 7x9 dot matrix in 10x13 dot field
CHARACTER SIZE. .09 x .16 nominal
CURSOR.  Underline

KEYBOARD.  Upper/lower case TTY with separate cursor and numeric pads

OPERATING MODES.  KSR operation

COMMAND FUNCTIONS.  Erase screen
Line feed, Carriage return
Cursor left, right, up, down, home, and x-y positioning

SWITCH FUNCTIONS.  Roll/Page
Local/Line
Full/Half Duplex

DATA INTERFACE  RS232 compatible

SIZE.  Per outline dimensions
WEIGHT.  49 lbs.
POWER.  105-125 Vac, 60 Hz, 110w
TEMPERATURE.  10° - 40°C (operating)
               -40° - 70°C (storage)
HUMIDITY.  0-95% non-condensing

AVAILABLE OPTIONS.  
CR/LF Options:  Auto LF on CR, New Line
Interface:  RS232, 20ma, 60ma, TTL
Baud Rates:  110, 300, 600, 1200, 1800, 2400, 4800, 9600
Export Model
2.0 DISPLAY. See Summary.

Refresh Memory. The displayed data is refreshed from an internal memory. The data remains stored and displayed until changed by the data source.

Refresh Rate. 30 Hz.

3.0 KEYBOARD.

Keyboard Layout.

Cursor Control. Cursor return, line feed, left, right, up, down, and home functions are provided on individual keys.

Screen Erase. Actuating the Control- and L-keys erases the screen.

Break. Holding down the BRK-key causes the outgoing data line to hold at the spacing level if the terminal is on-line.

Repeat. Holding down any key for greater than 1/2 sec. causes the key code to repeat at approx. 15 char/sec.

TTY Lock. Locks keyboard into Model 33 TTY code set. Push to lock, push to release. Key is lighted when locked.
4.0 KSR OPERATION. The terminal operates in the same manner as a KSR teletype terminal. As the operator strikes each key, its character code is sent to the computer as a start/stop synchronized serial character at the specified baud rate.

If the terminal is set for full-duplex (S3 ON), the computer echoes back the character (or an error message) to the terminal's memory, whereupon it is displayed on the screen. This is the usual mode of operation. If the computer is not programmed for echo-back, the terminal may be set for half-duplex (S3 OFF), whereupon the character is fed back into the terminal's memory as it is transmitted.

In either case, the incoming data are stored and the cursor positioned under control of the memory address register. Characters enter at the cursor position. The cursor automatically advances after each character entry. Each entry overwrites the character previously displayed at that position; no other data on the screen are affected. Advance of the cursor past the end of a line automatically advances it to the beginning of the next line.

4.1 COMMANDS. Eight command characters are provided. They operate on the memory address register to effect the specified cursor movement. They do not affect data displayed on the screen (except FF). They are not stored in memory.

Erase Screen (FF): Moves the cursor to the first character position of the top line and clears the screen.

Carriage Return (CR): Returns the cursor to the first character position of the line in which it is located.

Line Feed (LF): Moves the cursor one line below its present position. If in bottom line, the cursor moves to same position in the top line (PAGE operation), or all lines move up one line, (ROLL operation).
Back Space (BS): Moves the cursor one character position to the left. If in the first character position of the line, the cursor moves to the last character position of the line above.

Cursor Home (VT): Moves the cursor to the first character position of the first line. The displayed data are unchanged.

Cursor Right (HT): Moves the cursor one character position to the right. If the last character position of the line, the cursor moves to the first character position of the next line.

Cursor Up (SO): Moves the cursor one line above its present position. If in the top line, the cursor moves to the same position in the bottom line.

Cursor Address (SI): The cursor may be moved to an absolute x-y position on the screen by entering the three-character string: SI-CPC-CPL. The CPC-code moves the cursor horizontally to the specified character position within the line. The CPL-code moves the cursor vertically to the specified line. The permitted values of CPC and CPL are shown in the code tables.

4.2 SWITCHES.

S1 Switch: This switch selects either PAGE or ROLL operation for the display.

OFF (Page operation): Advance of the cursor past the end of the bottom line advances the cursor to the beginning of the top line. Used for display/update of tabular data.

ON (Roll operation): Advance of the cursor past the end of the bottom line moves all lines up one line. The bottom line clears and the cursor remains in the bottom line. The top line is lost. Used for display of textual data, listings, and other continuous printout.

S2 Switch: This switch selects either LOCAL or ON-LINE operation for the terminal.

OFF (Local operation): Data line disconnected. Keyboard output to display only. Used for test.

ON (On-line operation): Data line connected. Normal operation.
S3 Switch: This switch selects either HALF- or FULL-duplex operation for the terminal.

OFF (Half-duplex operation): Keyboard output to display and data line. Display input from keyboard and data line.

ON (Full-duplex operation): Keyboard output to outgoing data line. Display input from incoming data line.

5.0 INTERFACE.

5.1 DATA CONNECTOR. Provides RS232-compatible interface. Interfaces with couplers, data sets, and computer teletype channels that are strapped or strappable for RS232.

Data Input (SDI): ASCII-coded serial data, 10- or 11-unit code, start/stop synchronized. (See sample waveform drawn below for letter "Y" with even parity.) The terminal responds to the ASCII subset shown in the INPUT CODE table; it ignores all others.

[Diagram of waveform]

Data Output (SDO): ASCII-coded serial data, 11-unit code, start/stop synchronized. The data output line is normally at MARK. The terminal transmits an 11-unit burst, as above, following each key entry.

Parity: The parity bit, b7, is ignored on input. It is transmitted at MARK.

Data Rate: Factory preset to one of the following rates: 110, 300, 600, 1200, 1800, 2400, 4800 or 9600 baud. Specify on order.
Caution: For operation above 2400 baud, the following pad characters are required on input:

4800 baud:
- One (1) NUL-code after issuing FF-command.

9600 baud:
- Two (2) NUL-codes after issuing FF-command.
- One (1) NUL-code after causing screen to roll, in ROLL mode.

Request-to-Send Output (RTS):
- Tied to SPACE level

Data-Terminal-Ready Output (DTR):
- Tied to SPACE level

Input Signal Levels:
- RS232 compatible
- Mark (1): -3V to -25V
- Space (0): +3V to +25V

Output Signal Levels:
- RS232 compatible
- Mark (1): -6.0V ± 10% into 3K ohm load
- Space (0): +3.5V ± 10% into 3K ohm load

Connector:
- Cinch DB-25S, or equivalent

Pin Assignments:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Circuit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>AA</td>
<td>Protective Ground</td>
</tr>
<tr>
<td>2</td>
<td>SDO</td>
<td>BA</td>
<td>Transmitted Data</td>
</tr>
<tr>
<td>3</td>
<td>SDI</td>
<td>BB</td>
<td>Received Data</td>
</tr>
<tr>
<td>4</td>
<td>RTS</td>
<td>CA</td>
<td>Request to Send</td>
</tr>
<tr>
<td>7</td>
<td>COMM</td>
<td>AB</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>20</td>
<td>DTR</td>
<td>CD</td>
<td>Data Terminal Ready</td>
</tr>
</tbody>
</table>
.NN SERIAL INTERFACE OPTIONS. Ann Arbor serial-data terminals are factory configured with an RS232-compatible interface for use with data sets, couplers, and computer TTY channels that are strapped, or strappable, for RS232. Alternatively, they can be configured for current-loop operation, either 20ma or 60ma, for applications requiring direct TTY replacement and/or high noise immunity.

.01 RS232 INTERFACE. This is Ann Arbor's standard KSR interface. For details see 203NNN Terminal specification.

.02 20ma INTERFACE. This option replaces the RS232 Interface with a 20ma current-loop interface for direct teletype replacement. With this interface, the MARK and SPACE levels are represented by current rather than voltage. Current normally flows in the loop (MARK). Codes are transmitted by interrupting the current flow (SPACE). The DATA CONNECTOR Specification is changed as follows:

**Data Input Loop (SDI+/SDI−):** Current changes are sensed by the diode portion of an input opto-isolator.

**Data Output Loop (SDO+/SDO−):** Resistance changes are generated by the transistor portion of an output opto-isolator.

**Loop Power:** The loops must be powered, i.e., normal MARK current caused to flow, externally. The Ann Arbor terminal does not provide means for powering the loops.

**Input Signal Levels:**
- Mark (1): 20ma ± 4ma
- Space(0): 0ma + 1ma, −0ma
- Input Impedance: 50 ohms nominal; 75 ohms max.

**Output Signal Levels:**
- Mark (1): 50 ohms nominal; 75 ohms max.
- Space(0): 60K ohms nominal
- Applied Voltage: 35 volts max.

**Pin Assignments:**

Note: For half-duplex operation, jumper pin 3 to pin 9 on mating connector.

Because of installation complexities, use of this interface is recommended only if an RS232 interface is unavailable. All couplers and data sets provide an RS232 interface; most computer teletype channels can be strapped for RS232. If it is necessary to use this interface, we recommend it be installed only by qualified engineering personnel.
.03 60ma INTERFACE. Same as 20ma Interface, except:

Input Impedance: 17 ohms nominal; 25 ohms max.
Output Impedance (MARK): 17 ohms nominal; 25 ohms max.
Output Impedance (SPACE): 20K ohms nominal.
Signal Levels: MARK (1): 60ma nominal ± 12ma
               SPACE(O): 0ma nominal + 1ma, - 0ma

.14 PARITY OPTION. Ann Arbor serial-data-terminals are factory preset to transmit parity at Mark, and to ignore parity on incoming data. This option permits specification, on order, of Even or Odd parity on outgoing data. It does not provide parity (or framing error) detection on incoming data with errors.

.98 BAUD ____. Ann Arbor serial-data terminals are factory-preset to one of the following baud rates: 110, 300, 600, 1200, 1800, 2400, 4800, 9600 baud. Specify on order. Note: The baud rate is preset by jumpers on the terminal's Serial Board. It can be changed in the field by a qualified technician.

.97 DUAL BAUD _____. This option provides external-switch-selection between two specified baud rates. The rates are factory preset (by Serial Board jumpers) to any two of the available rates. Specify on order. The S4 switch selects between the two rates: OFF selects the lower rate, ON selects the higher rate.

.96 SWITCHED BAUD. This option provides internal-switch-selection of all available baud rates, by means of a DIP-switch on the terminal's Serial Board. Switch positions 2-4-6-8 select the data I/O baud rate. Switch positions 1-3-5-7 select the OFF-position baud rate (if DUAL BAUD option is ordered). The switch is factory set to 4800 baud.

```
<table>
<thead>
<tr>
<th>Switch Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  3  5  7</td>
</tr>
<tr>
<td>2  4  6  8</td>
</tr>
<tr>
<td>Baud Rate</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>0  0  0  1</td>
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<td>1  0  1  0</td>
</tr>
<tr>
<td>0  1  1  0</td>
</tr>
<tr>
<td>1  1  1  0</td>
</tr>
<tr>
<td>110</td>
</tr>
<tr>
<td>300</td>
</tr>
<tr>
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</tr>
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</tr>
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</tr>
<tr>
<td>2400</td>
</tr>
<tr>
<td>4800</td>
</tr>
<tr>
<td>9600</td>
</tr>
</tbody>
</table>
```

- 1 = on  0 = off