

## **Bryans Old Computers**

Lear Siegler, Inc.

#### The Manual

Here is the manual with all gifs on one page.

## ADM-3A features

- Teletypewriter compatible
- 12-inch rectangular screen with large easy-to-read characters
- Choice of 12- or 24-line display with full 80-character lines.
- 59-key keyboard designed to office teletypewriter layout, and containing all teletypewriter data and control keys.
- Switches at front panel and on logic board permit easy selection of performance features.
- Optional numeric keypad
- RS-232C and current loop computer interfaces (switchable).
- RS-232C extension interface for printer, recorder or daisychained terminals.
- Full/half duplex asynchronous operation
- Switchable communication rates, 75 to 19200 baud.
- Switchable character format
- Optional automatic "Answer Back" capability
- Generates all 128 USASCII character codes
- Displays 64 characters or, optionally, 95 upper/lower case characters.
- Data entry on progressive lines, top to bottom, or on bottom line, with upward page scroll
- Complete cursor control, including direct cursor addressing.
- · End-of-line audible tone
- Selectable automatic NEW LINE
- Compact size
- Modular construction for minimum upkeep and easy maintenance.



# We'd like to introduce you to the ADM-3A display terminal....

Your ADM-3A is a character-oriented CRT data terminal, designed by Lear Siegler for video terminal applications and for direct replacement of electromechanical devices (e.g., teletypewriters) in a wide range of asynchronous data communication systems.

It is unique among data terminals, combining extensive performance capabilities and broad flexibility with highly simplified operation and maintenance.

To ensure that you obtain full benefit from this remarkable terminal we're providing this Operator's Handbook. It contains all you'll need to know to install your terminal, connect it into your system, select the performance features that match your system, and to operate the terminal. We've also included easy-to-follow instructions for routine adjustments and maintenance.

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#### SECTION ONE ADM-3A SPECIFICATIONS

#### DISPLAY

#### Screen

12-inch (diagonally measured) rectangular CRT with P4 white phosphor and etched non-glare surface.

#### **Display Format**

Standard: 960 characters, 12 lines of 80 characters Optional: 1920 characters, 24 lines of 80 characters

#### Character Set

Generated: 128 ASCII characters (upper and lower case, numeric, punctua-

tion and control)

Displayed: Standard - 64 ASCII characters (upper case, numeric, punctuation)

Optional - 95 ASCII characters (upper and lower case, numeric,

punctuation)

#### Character Generation

5 x 7 dot matrix, .18" high x .075" wide

#### Cursor (switch - selectable)

Reverse block character homing to upper left of screen; or double underline, homing to lower left of screen.

#### Data Entry (switch - selectable)

When in the cursor mode, new data enters on progressive lines, top to bottom. With the cursor mode off, data is entered on the bottom line of the screen. Line feed causes upward scrolling of entire display with top-of-page overflow when the bottom line is full.

#### Refresh Rate

60Hz to 50Hz, dependent on an internal switch set to match power line frequency.

#### **KEYBOARD**

59-key solid-state keyboard designed similar to a tele typewriter and containing the following keys:

47 alphanumeric keys

RETURN LINE FEED(1)

RUB HERE IS SHIFT

(Cursor)

CTRL (Control)

BREAK CLEAR

REPT (Repeat)

ESC (Escape)

Space Bar

#### COMMUNICATIONS

#### Computer Interface

EIA standard RS-232C and 20mA current loop (switch selectable)

#### **Extension Interface**

Extension RS-232C port for interfacing serial asynchronous auxiliary device (e.g., hard copy printer, magnetic tape recorder or additional data terminals).

Optionally, the extension port is available with both RS-232C and 20mA current loop interface.

#### Communication Rates

75, 110, 150, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200 baud (switch selectable)

#### Send/Receive Modes

Full duplex and half duplex (switch selectable)

#### Word Structure

Total word length is switch selectable to 9, 10 or 11 bits consisting of the following:

7-bit data word

1 start bit 1 or 2 stop bits

8th bit - parity, odd or even

OR forced to 1 or 0

OR

8th bit suppressed

#### PHYSICAL AND ELECTRICAL

#### Dimensions

13.5" high x 15.6" wide x 20.2 deep

#### Weight

32 pounds

#### **Power Consumption**

80 watts @ 115 Vac ± 10% 50Hz or 60Hz, switch selectable Optional 230 Vac

#### **Operating Environment**

5° to 55°C (41° to 122°F), 5-95% relative humidity, without condensation

## SECTION TWO ADM-3A INTERACTIVE DISPLAY TERMINAL A Quick Primer

The ADM-3A is an interactive display terminal — a device used to enter, display and send information to a computer, and to receive and display information from the computer.

#### ADM-3A versus the Teletypewriter

In early-generation computer systems, electromechanical teletypewriters were the most popular data terminal. The operator entered information by typing at a keyboard. The data characters were simultaneously transmitted to the computer and mechanically printed on paper. Data from the computer was received and printed by the teletypewriter.

#### CRT terminals represent a better solution.

Like a teletypewriter, the ADM-3A has a keyboard at which the operator enters information. But instead of mechanically printing the information, the ADM-3A displays it electronically on a CRT similar to a TV screen, eliminating the noise and mechanical failures associated with earlier devices.

#### The ADM-3A offers many advantages:

It's Faster. Data can be entered as fast as the operator can type, and be received at up to 1920 characters per second.

It's Quiet. The noise of mechanical printing has been silenced forever.

It's Much More Dependable. The ADM-3A contains no moving parts except the keyboard which has been proven reliable to the tune of over 20 million failure-free keystrokes. And the ADM-3A circuitry is all solid-state, contained on a single printed circuit board.

With all this going for it, the ADM-3A represents a modern solution to today's data entry and display requirements — a more efficient, dependable terminal geared to the needs and convenience of you, the operator.

#### How the ADM-3A Works

To understand how the ADM-3A works, think of it as comprising the five functional elements illustrated in Figure 1.

The Keyboard is arranged like a standard teletypewriter. It contains alphabetic and numeric characters, punctuation, symbols, cursor control keys, and some

special keys for system control. Each time a key is typed, the keyboard generates a unique electronic code which represents that character to both the ADM-3A display and the computer. The character code goes directly to the ADM-3A Input/Output Channel where it is transmitted to the computer and, in half-duplex operation, echoed back to the ADM-3A for display.

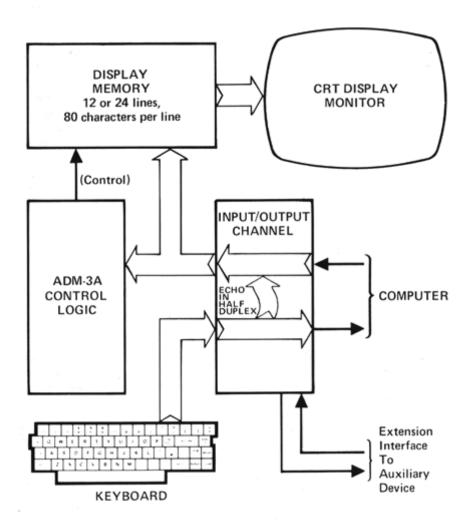


Figure 1. ADM-3A Block Diagram

The Input/Output Channel is the link, or interface, which handles the flow of data in both directions between the ADM-3A and the computer. In half-duplex operation, the I/O Channel also routes all data typed and transmitted back to the ADM-3A Display Memory and Control Logic to be displayed on the screen.

The I/O Channel includes the Extension Port for communications with an auxiliary device.

The Display Memory receives data character codes from the I/O Channel and stores the codes for display. (These codes may originate at the ADM-3A keyboard or the computer.) The Display Memory holds 12 or 24 lines of 80 characters each.

The CRT Display Monitor is similar to a television screen. All data in the Display Memory is continuously displayed on the CRT screen by a silent electronic beam. In the ADM-3A the rectangular screen measures 12 inches diagonally and displays the 80-character lines with large, clear letters, numbers and symbols.

The ADM-3A Control Logic is the section that interprets control codes originating at the ADM-3A keyboard or at the computer, and directs the action indicated by the control code. As does the Display Memory, the Control Logic receives its input from the ADM-3A I/O Channel.

#### NOTE

In order for any data to be displayed or any control code (such as line feed, backspace, etc.) to be executed by the ADM-3A, it must appear on the data input lines of the ADM-3A I/O Channel. In the half-duplex mode, the echo features causes all data typed to be displayed and all control codes to be executed automatically. In full-duplex operation, data and control codes entered at the keyboard will be displayed and executed ONLY IF THEY ARE ECHOED BACK BY THE COMPUTER OR A MODEM.

#### A Choice of Interfaces

The ADM-3A's input/output channel contains two industry-standard interfaces for compatibility with nearly all computers and communications systems. Depending on the type of interface required, the user can select by a front panel

switch either the 20mA current loop or EIA standard RS-232C interface. This choice allows the ADM-3A to be cabled directly to the computer in local installations, or to communicate via telephone data lines to a distant computer using popular types of modems or acoustic couplers.

#### Selectable Transmission Rates

To meet the varied transmission rate requirements of a variety of computer interfaces, telephone data lines and modems, the ADM-3A can operate at 75, 110, 150, 300, 600, 1200, 1800, 2400, 4800, 9600 or 19200 baud. The operator can select the desired rate, and change it at any time, by setting switches at the front panel.

#### Operation

Half Duplex. In this mode, the ADM-3A can send and receive information to and from the computer. As each character is typed it is transmitted to the computer and simultaneously echoed back from the I/O Channel for display on the ADM-3A screen.

**Full Duplex.** The ADM-3A can transmit and receive information in both directions simultaneously in full-duplex operation. Characters are transmitted as they are typed, but are displayed only on reception. Display of characters typed in full-duplex is usually accomplished by the computer or modem echoing the characters back to the terminal.

A switch on the ADM-3A front panel allows the operator to switch between full duplex and half duplex modes.

#### The Cursor

When the Cursor Mode switch is on, the cursor appears as a bright block. If the cursor is positioned over a character, the character appears in reverse image. The cursor indicates the data entry point. Data may be entered anywhere on the display through the use of a full set of incremented and absolute cursor control functions.

After Power-On or a CLEAR operation, data entry will commence at the first character position on the top line of the display. As the last character in the top line is entered, the cursor will advance to the first position in the next lower line (if AUTO NL is on). When the last line in the display is filled, the cursor will return to the first position on the bottom line and the entire display will scroll upward one line.

The operator may position the cursor anywhere on the display via four incremental functions; the Return key, the Home cursor function and the load-cursor sequence, all of which are non-destructive to the data over which the cursor may be moved. The cursor may be moved along a given line, either forward or backward, one

character position at a time. The backspace function will have no further effect once the first position on the line is reached. If the cursor is advanced beyond the 80th position, using the forespace function, it will proceed to the first position on the next lower line.

The cursor may be moved upward one line at a time, using the upline function. When the top line is reached, the upline will have no further effect. The downline function will cause the cursor to move downward one line at a time, until the bottom line is reached. Additional downline operations from the bottom line will cause the display to scroll upward one line at a time. The Line Feed key has the same effect as the downline function.

Cursor positioning is available using the Return key or the Home function. Return causes the cursor to proceed to the first character position of the current line. Home causes the cursor to proceed to the top left character position on the display. The cursor may be positioned (or addressed) anywhere on the display using a four-key sequence consisting of the ESC key, followed by the EQUAL key (=), then two successive key-codes representing the desired row and column positions, respectively. The aboslute cursor position code chart is shown in the back of this manual. All full-range cursor operations are available to the remote computer by transmitting the appropriate codes.

When the cursor mode switch is OFF, the cursor is represented as a double underline. As characters are typed, the cursor moves from left to right across the display. At this setting data is always entered on the bottom line of the display.

Entering data on the last character position on the line, or typing the Line Feed key will cause the entire screen of displayed data to scroll upward one line. When the display scrolls due to data entry, the cursor will re-position to the first character position on the bottom line. When the Line Feed key is hit, the cursor will remain in the same character position as before.

#### Numeric Keypad

The optional numeric keypad consists of 14 keys arranged in calculator format for faster entry of numerical data. These keys electrically parallel the standard numeric keys and generate identical character codes.

#### Copy Printing, Data Recording, Terminal Daisychaining

The ADM-3A contains an extension RS-232C (or optional RS-232C/20mA current loop) interface for connecting an auxiliary device such as a hard copy printer, magnetic tape unit or an additional ADM-3A terminal.

#### Automatic "Answer Back"

The Automatic Answer Back option provides terminal identification and allows the ADM-3A to respond to the ENQ character from the computer.

# SECTION THREE INSTALLATION AND PREPARATION FOR USE

#### AFTER PACKING

It is recommended that you save the original shipping carton and all packing materials to prevent damage should you wish to transport or ship the terminal.

Carefully inspect your ADM-3A for signs of damage during shipping. The terminal has undergone stringent quality inspections and operational tests prior to shipping; it left the factory in perfect operating condition.

If the unit is damaged, notify the carrier immediately. Save the damaged shipping container as evidence for inspection by the carrier.

Only the consignee may register a claim with the carrier for damage during shipment. However, Lear Siegler Data Products will cooperate fully with the customer should such action be necessary.

#### ENVIRONMENT AND MOUNTING

The ADM-3A is designed to operate in a wide range of environmental conditions:  $41^{\circ}$  to  $122^{\circ}$ F ( $5^{\circ}$  to  $50^{\circ}$ C), 5% to 95% relative humidity without condensation.

The unit is designed to sit on a table or desk top, or any other suitable hard, flat surface.

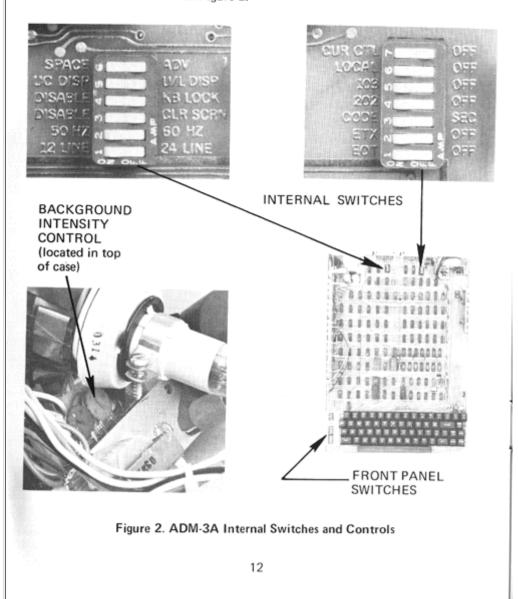


In cold climates, care should be exercised to allow the temperature of the terminal to equalize with room temperature before removing the unit from the shipping carton; this will prevent moisture from condensing on a cold terminal exposed to warm air.

Avoid operating the unit on a soft surface, such as carpeting, which would obstruct the flow of cooling air up through the bottom of the chassis. This could result in overheating and damage to the unit.

#### INTERNAL SWITCH SETTINGS

Thirteen toggle-type switches located inside the ADM-3A case on the printed circuit board are used to select various terminal operating characteristics. These switches are set at the factory during pre-shipping checkout according to operating parameters specified by the customer when ordering the terminal. Only the parameters listed on the Ordering Form packed inside the shipping carton have been selected at the factory. Any required switch setting changes should be made before attempting to operate the terminal. Locations of the internal switches are shown in Figure 2.



## WARNING

Always disconnect the AC power cord from the power source before opening the ADM-3A case to access any internal component.

Switch functions are described below:

#### SPACE - ADV

In SPACE position, selects destructive cursor. Pressing the space bar or receiving a space code ALWAYS overwrites the display memory location with a space code and advances the cursor.

In ADV position, selects non-destructive cursor between a Return and subsequent Line Feed only; the cursor may be advanced but a space code does not overwrite display memory locations. The space code is destructive between a Line Feed and the next Return.

#### UC DISP - U/L DISP

In UC DISP position, allows display of upper case characters only. Lower case codes are transmitted as such but are converted to upper case for display.

In U/L DISP position, allows display of upper and lower case characters if the terminal is equipped with the Upper/Lower Case option.

#### DISABLE - KB LOCK

In DISABLE position, prevents locking of keyboard.

In KB LOCK position, allows keyboard to be electrically disabled (locked) by control codes from computer.

#### DISABLE - CLEAR SCREEN

In DISABLE position, prevents clearing of displayed information except by executing repetitive line feeds.

In CLEAR SCREEN position, allows computer to clear ADM-3A screen by transmitting a control code (CTRL Z).

#### 50Hz - 60Hz

Selects 50Hz to 60Hz display refresh rate; must be set to correspond with input power frequency.

#### 12 LINE - 24 LINE

If terminal is equipped with 24-line display option, this switch may be used to select 12 or 24 line display.

On terminals with standard 12 line display this switch must be set to the 12 LINE position.

#### CUR CTL/OFF

In CURSOR position, the terminal has full-range cursor control and page-format data entry. Cursor control includes upline (CTRL/K), downline (CTRL/J), forespace (CTRL/L), backspace (CTRL/H), and it also includes direct cursor addressing by line and position (x, y) coordinates from the computer. Thus, data can be entered at any position on the display from both the keyboard and the computer. Normal data entry is page-formatted, commencing at the first position of the top line (home). At the bottom line, Line Feed causes upward scrolling of the entire display so that subsequent data entry is on the bottom line.

In OFF position, the terminal has limited cursor control, and data is always entered beginning at the first position of the bottom line (home). Upward scrolling of the entire display presents a new bottom line for data entry at end-of-line. Cursor control is limited to downline (Line Feed) and backspace (CTRL/H).

LOCAL - OFF

103 - OFF

202 - OFF

These three switches are used to select ADM-3A operation for one of the following methods of interfacing to the computer: (1) without modems (direct, local connection), (2) with 103-type modems, or (3) with 202-type modems. The appropriate switch is set (left position) according to the connection method used; the other two switches must be set to the OFF positions.

Setting the LOCAL switch causes line CA (Request to Send) to rise and fall with each character transmitted.

The 103 and 202 switches are used only when the RS-232 switch is enabled.

Setting the 103 switch holds CA high for full-duplex operation.

Setting the 202 switch enables 202-type operation using the secondary channel or turnaround code to change the direction of data over the primary data channel (half-duplex operation).

#### CODE - SEC CHAN

This switch is active only with the 202 switch (described above) in the on position. It is used to select the method of line turnaround for half-duplex operation with 202-type modems.

In SEC CHAN position, enables line turnaround using the secondary channel. 202 modem operation is summarized in the back of this handbook.

The CODE position, allows line turnaround control by a turnaround code transmitted over the primary data channel. The turnaround code may be either ETX or EOT, as selected by the switches described below.

ETX - OFF EOT - OFF

One of these two switches is set to the on (left) position to select the line turnaround code for primary channel operation with 202-type modems. (See CODE -SEC CHAN switch description.) With 202 and CODE selected, one of these switches must be on and the other off; with 202 and SEC CHAN selected, or 202 off, both the ETX and EOT switches must be set to the OFF positions.

#### FRONT PANEL SWITCHES

Twenty toggle-type switches for selecting the primary terminal operating characteristics are accessible from the ADM-3A front panel without opening the case or removing power to the unit. To gain access to these switches, remove the screw securing the identification plate on the left side of the keyboard and remove the ID plate.

It is recommended that you check the positions of these switches before operating the terminal for the first time. Switch functions are described below:

#### BIT 8-0 - 1

This switch has effect only with the DATA-7 - 8 switch in the 8 position.

In BIT 8-0 position, bit 8 is forced to a zero value.

In the 1 position, bit 8 is forced to a one value.

#### PARITY - INH

In PARITY position, the bit following the 7 - or 8 - bit data word is a parity bit (parity enabled).

In INH position, no parity bit will be generated (parity inhibited). The bit following the data word will be the (first) stop bit.

#### STOP - 1 - 2

In STOP-1 position, one stop bit is generated.

In the 2 position, two stop bits are generated.

#### DATA-7 - 8

In DATA-7 position, 7-bit data word length is selected.

In the 8 position, 8-bit data word length is selected. (The 8-bit word consists of the standard 7-bit data word plus an 8th bit forced to one or zero according to the setting of the BIT 8-0-1 switch.)

#### PARITY - ODD - EVEN

This switch has effect only with the PARITY — INH switch in the PARITY position.

In PARITY - ODD position, selects odd parity.

In EVEN position, selects even parity.

#### LC EN - UC

In LC EN position, the Shift key is fully operational allowing generation of both upper and lower case character codes.

In UC position, only upper case alphabetic characters will be generated regardless whether or not the SHIFT key is held down. The SHIFT key remains operational for all non-alphabetic keys.

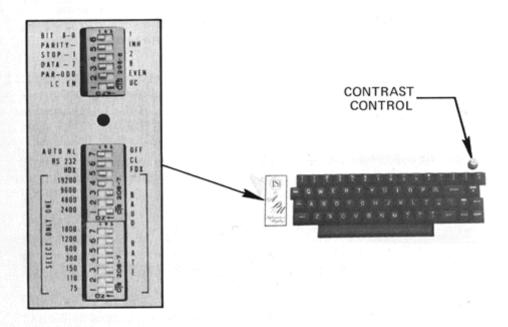


Figure 3. ADM-3A Front Panel Switches

#### AUTO NL - OFF

In AUTO NL position, typing in the 80th character position will automatically cause the cursor to move to the first position of the next line. If data was being entered on the bottom line, the entire display scrolls upward, presenting a new (bottom) line for data entry. The operator continues typing on the next new line.

In OFF position, the automatic New Line function is disabled. Continued typing at the 80th character position transmits each new character and changes the 80th character on the display.

#### RS-232 - CL

In RS-232 position, selects RS-232C communications at the MODEM (computer) interface connector on the rear panel.

In CL position, selects 20mA current loop communications at the MODEM interface connector.

#### HDX - FDX

In HDX position, selects half duplex operation. Characters typed are transmitted and automatically echoed back from the ADM-3A I/O Channel for display.

In FDX position, selects full duplex operation. Characters typed are displayed only if echoed back by the computer or modem.

#### Communication Rate Switches

19200 9600 B 4800 A 2400 U 1800 D 1200 600 R 300 A 150 T 110 E	These switches are used to select the send/ receive rate for data communications with the computer and auxiliary device.  Setting one switch to the left-hand (BAUD RATE) position selects the associated rate.
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#### NOTE

Only one BAUD RATE switch may be selected (left position) at a time.

#### DISPLAY CONTROL

#### Contrast

The Contrast control is located to the right of the keyboard on the ADM-3A front panel. It is used by the operator to adjust brightness of the display for optimum readability. The Contrast knob is turned clockwise to increase display brightness, counterclockwise to decrease brightness.

#### **Background Intensity**

A Background Intensity potentiometer is located inside the ADM-3A case on the circuit board in the top of the case. (See Figure 2.) Background intensity is adjusted at the factory before the terminal is shipped and should not require re-adjustment prior to using the terminal.

WARNING

Because the Background Intensity control must be adjusted with the ADM-3A case open with power on, it should be performed only by qualified service personnel.

#### ON/OFF Switch

The power ON/OFF switch is located on the ADM-3A rear panel. Allow approximately 20 seconds for the unit to warm up. If the cursor switch is in the CURSOR position, the cursor should appear in the upper left corner. It is in the OFF position, the cursor will be at the bottom left.

### INTERCONNECTION AND TURN-ON PROCEDURE

- With the ON/OFF switch in the OFF position, plug the ADM-3A power cord into the proper AC power outlet.
- Connect the interface cable from the computer or modem to the MODEM interface connector on the ADM-3A rear panel.
- Connect the interface cable from the auxiliary device (if present in your system) to the AUXILIARY interface connector on the ADM-3A rear panel.
- Check the settings of all front panel switches to verify that the terminal is set up for proper operation in your system. Make switch setting changes if necessary.

- Set the ON/OFF power switch on the ON position.
- Allow approximately 20 seconds for the unit to warm up. The cursor should appear near the bottom of the screen.

If the cursor does not appear, adjust the Contrast control on the front panel for proper intensity.

#### NOTE

If the Full-Duplex mode is selected, typing at the keyboard will not display characters unless echo-back is provided by the computer or modem.

#### SECTION FOUR KEYBOARD OPERATION

The ADM-3A keyboard allows the operator to generate and transmit to the computer and/or auxiliary device all 128 USASCII character codes.

#### Displayable Characters

In the standard ADM-3A, 64 characters are displayed on the screen (upper case alphabet, numbers, and most symbols and punctuation). When a non-displayable lower case character is typed, the proper lower case code is transmitted but the character is displayed as upper case.

If your terminal contains the Upper/Lower Case Display feature, 95 characters will be displayed (upper and lower case alphabet, numbers and all punctuation and symbols).

#### NOTE

Typing at the keyboard always generates codes which are transmitted; however, in order for characters to be displayed and control codes to affect the ADM-3A display codes must be echoed back to the ADM-3A display memory and control logic, either by the computer (FDX) or the ADM-3A I/O Channel (HDX).

All display actions described in the key descriptions that follow assume the generated codes are echoed.

#### Special Function Keys

In addition to the displayable character keys, the ADM-3A keyboard contains a number of other keys for various terminal and system control functions. Use of these keys is described below:

#### RETURN Key

The code generated by this key moves the cursor to the first character position of the present line.

If the front panel SPACE-ADV switch is in the ADV position, the space code is non-destructive after typing the RETURN key; that is, the operator or computer can space over data on the line without overwriting each character with a space. The space bar remains non-destructive following a RETURN function until a LINE FEED code is generated.



#### LINE FEED Key

When the cursor control switch is in CURSOR position, the code generated by this key causes the cursor to move downward one line. The display remains stationary until the bottom line is reached. Then the key causes the entire display to scroll upward one line, leaving the cursor positioned on the next (new) bottom line. LINE FEED does not return the cursor to the first character position of the new line.

When the switch is in the OFF position, all data entry is on the bottom line. LINE FEED causes the entire display to scroll upward one line, leaving the cursor positioned on the next (new) bottom line.

#### SHIFT Keys

Either of the two SHIFT keys is held down while typing another key to generate upper case alphabetic characters or to generate the character shown in the upper portion of a typed key.

#### NOTE

Setting the "LC EN — UC" switch under the front panel ID plate to the UC position causes upper case alphabetic characters to be generated with or without the SHIFT key depressed. The SHIFT key remains operational for all non-alphabetic keys.

#### RUB (Rubout) Key

This key (typed while holding down the SHIFT key) transmits a non-displayable Rubout code (ASCII DEL) to the computer. The cursor is not advanced and the character code stored in the ADM-3A display memory is not overwritten.

The Rubout function is normally used to tell the computer that a previous character should be deleted.

The lower case RUB key transmits/displays an underline.

#### REPT (Repeat) Key

This key can be held down while pressing a displayable character key to repeat the character at a rate of 12.5 per second. (If the terminal is operating at a baud rate that will not permit 12.5 cps transmission, the repeat rate is reduced to the transmission rate.)

#### Space Bar

The Space Bar is considered a displayable character key.

Pressing the Space Bar causes the ASCII code for a space to be transmitted and stored in the ADM-3A display memory and a blank space to appear on the screen. (For the only exceptions see RETURN Key, page 15.)

#### CTRL (Control) Key

This key, when held down while typing another key, modifies the code pattern of the typed key. The code is forced to one of two control code columns on the ASCII Code Chart (Inside back cover).

Of the 32 control code combinations possible from the keyboard, four may be used to effect actions within the ADM-3A:

Backspace (CTRL/H). Each time the H key is typed while holding down the CTRL key, the cursor moves non-destructively one character position to the left. the CTRL/H backspace code is transmitted to the computer. CTRL may be used in conjunction with the Repeat key.

**Bell (CTRL/G).** Sounds the audible beep in the ADM-3A and transmits the CTRL/G bell code.

Return (CTRL/M). Duplicates the function of the RETURN key.

Line Feed (CTRL/J). Duplicates the function of the LINE FEED key.

Clear Screen (CTRL/Z). Duplicates the action of the SHIFT + CLEAR keys.

Upline (CTRL/K). Each time the K key is typed while holding down the CTRL key, the cursor moves non-destructively to the same character position in the line immediately above the current one, and the code is transmitted to the computer. When the top line is reached, no further action takes place on the display. (The ADM-3A must be in the cursor mode.)

Forespace (CTRL/L). Each time the L key is typed while holding down the CTRL key, the cursor will advance non-destructively to the next character position on the current line, and the code is transmitted to the computer. If the cursor is on the 80th position on a line, a forespace operation will cause the cursor to move to the first column of the next lower line. If the cursor is on column 80 of the bottom line, a forespace will cause the cursor to move to the first character position on that line, and the display to scroll upward one line. (The ADM-3A must be in the cursor mode.)

Home (CTRL/HOME). Depressing the HOME key in conjunction with the CTRL key will cause the cursor to move to the first column on the top line, and the code to be transmitted to the computer. (The ADM-3A must be in the cursor mode.)

Lock Keyboard (CTRL/O). Electrically locks (disables) the ADM-3A keyboard, preventing any further keyboard activities. The keyboard can only be unlocked by a control code from the computer, or by switching power to the terminal off, then on again.

#### ESC (Escape) Key

This key transmits to the computer an ASCII escape code, the function of which is dependent on the computer. This key also initiates the load-cursor sequence when followed by an equal sign (= Code 075g).

#### **CLEAR Key**

Typing the CLEAR key while holding down the SHIFT key clears the entire screen to spaces. (This function may be the internal CLEAR SCREEN — DISABLE Switch).

#### **HERE IS Key**

If your terminal is equipped with the Automatic Answer Back feature, typing this key transmits an identification message (stored in the ADM-3A in a special memory) to identify your terminal and alert the computer that a message is to follow.

In terminals without Automatic Answer Back capability, this key has no function.

#### BREAK Key

This key activates the standard teletypewriter Break function, normally used to interrupt an incoming message.

#### NOTE

The Break function is sustained as long as the BREAK key is held down. Holding the key down for an extended period may cause the computer to disconnect from your terminal.

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## SECTION FIVE PROGRAMMING THE COMPUTER

The computer to which the ADM-3A is interfaced has full control over the terminal. All control functions which are possible from the ADM-3A keyboard, plus a few additional functions, can also be executed from the computer.

The computer controls the ADM-3A by transmitting the appropriate ASCII codes. Displayable character codes will be displayed, and valid control codes will be recognized and acted upon.

#### Remote CTRL Functions

The remote computer can perform the following control functions:

Backspace BS (CTRL/H). Moves the cursor non-destructively one character position to the left.

Forespace FF (CTRL/L). Moves the cursor non-destructively one character position to the right.

Upline VT (CTRL/K). Moves the cursor upward one line. No action will occur if the cursor is on the top line of the display.

Line Feed LF (CTRL/J). Moves the cursor down one line to the same character position on the next line. If the cursor is already on the bottom line, Line Feed causes the entire display to move upward one line, dropping the cursor to the new bottom line.

Home RS (CTRL/HOME). Places the cursor in the first character position of the top line (Cursor Mode ON) or of the bottom line (Cursor Mode OFF).

Load Cursor (ESC =) The next two characters following the ESC = key represent the absolute line & column (y and x) coordinates which are used to position the cursor. See the Operator's Quick Reference in the back of this handbook for character representation of the coordinate values. If the cursor is set to a protected location, it will be advanced to the first unprotected position after the address.

Bell BEL (CTRL/G). Sounds the audible beep in the ADM-3A.

Return CR (CTRL/M). Moves the cursor non-destructively to the first character position of the present line.

**Lock Keyboard SI (CTRL/O).** Electrically locks the ADM-3A keyboard, disabling all keyboard functions.

Unlock Keyboard SO (CTRL/N). Unlocks the ADM-3A keyboard, restoring all keyboard functions.

Clear Screen SUB (CTRL/Z). Clears all character positions in the ADM-3A display memory and clears the screen to blank spaces. (This function may be disabled by the internal DISABLE — CLEAR SCREEN switch.) Duplicates the action of the SHIFT + CLEAR keys.

The Reference Table in the back of this handbook shows the actual binary codes generated by the ADM-3A and used for computer control of the terminal.

#### SECTION SIX ADM-3A INTERFACES

The ADM-3A has two rear panel interface connectors for communication with the remote computer and with an auxiliary device. The connectors are attached to the ADM-3A main circuit board and are accessible through cutouts in the terminal case. Both connectors are standard EIA-type 25-pin connectors.

Figure 5 illustrates the relationship of the two ADM-3A interface channels.

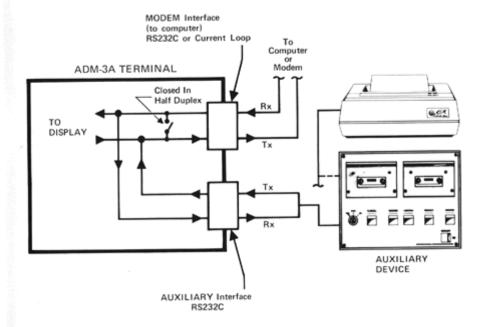


Figure 5. ADM-3A Interfaces

#### Computer Interface

The computer interface connector is labeled "MODEM". The RS-232 — CL switch on the ADM-3A front panel selects either RS-232C or 20mA current loop communications through this channel. Table 2 lists the pins and signals for both interface configurations.

The computer interface channel is connected directly to the keyboard and ADM-3A display memory. Each key typed generates an ASCII code which is immediately transmitted. All displayable character codes received from the computer are stored and displayed on the ADM-3A screen. In the half-duplex mode, the ADM-3A computer interface echoes each data character back for display.

#### RS-232C Extension

The EXTENSION interface connector is intended for connecting an auxiliary device such as a printer into the ADM-3A computer communication loop. It is a standard RS-232C channel which essentially parallels the main computer channel. As an option, the extension interface is available with both RS-232C and 20mA current-loop (optional) lines. The extension interface uses the same connector type and signal/pin configuration as the computer interface.

All information transmitted by the auxiliary device to the ADM-3A is displayed and transmitted to the computer.

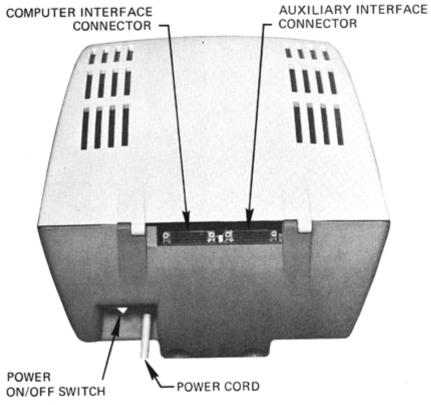


Figure 6. ADM-3A Rear Panel

Table 1. Interface Connector Signal/Pin List

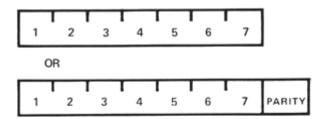
SIGNAL NAME	BELL SYSTEM CODE
Frame Ground Transmit Data Receive Data Request to Send	AA BA BB CA
Clear to Send Data Set Rdy Signal Ground	CB CC AB
Sec XMIT Data Sec Recv. Data	CF SA SB
(BIPOLAR) Current Loop Transmitter (BIPOLAR)	CD
	Frame Ground Transmit Data Receive Data Request to Send Clear to Send Data Set Rdy Signal Ground Carrier Detect Sec XMIT Data Sec Recv. Data Current Loop Receiver (BIPOLAR) Current Loop Transmitter

#### WORD STRUCTURE

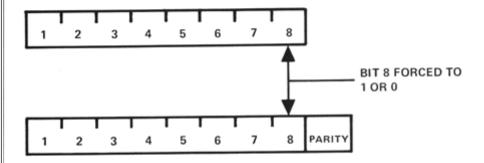
#### Data Character Format

The ADM-3A uses USASCII (United States of America Standard Code for Information Interchange). USASCII is a 7-bit code. But because many of the computers and other devices to which the ADM-3A may be interfaced use 8-bit words (plus parity or without parity), the ADM-3A offers a wide choice of word formats selectable by the user.

The data character may be 7 bits in length, plus or without an optional parity bit generated on transmission:

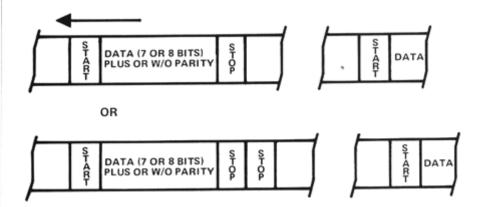


The data character may be 8 bits in length, plus or without the optional parity bit. In the case of 8-bit characters, bit 8 is always forced to 1 or 0 as selected by the user.



#### Transmission Format

The ADM-3A uses asynchronous transmission. This means each character is transmitted as a complete, self-contained message consisting of the data character (see above) with or without parity, preceded by a start bit and followed by one or two stop bits.



When the start bit is received, a clock signal is initiated to clock in the remainder of the word. The one or two stop bits are used to signify the end of the word and terminate the receive clock.

Generally, transmission rates of 110 baud and lower use two stop bits, and rates of 150 and higher use one stop bit.

#### SECTION SEVEN CARE OF THE ADM-3A

Your ADM-3A is as easy to care for as an electric typewriter. Just give it a light cleaning from time to time and it will remain as attractive as it is functional.

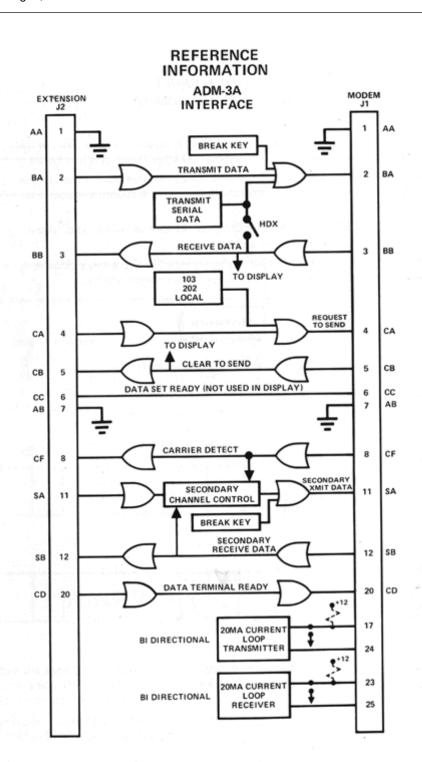
Lightly dust the unit using a brush or soft, damp, lint-free cloth. Paper towels are fine. Conventional spray cleaners may be used for stubborn smudges and fingerprints.

DO NOT USE PETROLEUM-BASE CLEANERS such as lighter fluid. These could harm the plastic or painted surfaces.

AVOID wiping dust or lint into the keyboard area. If using a spray cleaner, prevent excessive spraying which could run down between the keys.

WARNING

Use care to avoid spilling any liquid into the keyboard or ventilation openings. If this should happen, immediately disconnect the power cord and external interface cables, and phone Lear Siegler, Inc., Electronic Instrumentation Division.



#### 202 MODEM OPERATION

#### 202-type modems provide two transmission channels:

- A primary channel, high-speed transmission in only one direction at a time
- A secondary channel, low-speed control signal.

From the ADM-3A, all data transmissions take place over the primary channel. The secondary channel is used only for control of the direction of data over the main channel.

#### LINE TURNAROUND METHODS

ADM-3A operation using both of these methods is described below:

#### CODE TURNAROUND

a. The ADM-3A initializes in the RECEIVE MODE. (CA MARK, SA MARK). If remote end initializes as a sender or becomes a sender: CF ON TURNS SA ON

To switch the ADM-3A to XMIT mode, the remote end MUST send the selected code (ETX or EOT); the ADM-3A waits for CF to go to the marking state before moving to the XMIT mode. CA goes ON, SA goes OFF.

The move back to RECEIVE mode is accomplished simply by the receipt of the selected code from the keyboard. CA goes OFF and SA goes ON.

 Reset the ADM-3A to the initial RECEIVE state. <u>SHIFT CLEAR</u> must be depressed to insure CA is reset <u>OFF</u>.

NOTE: If remote end initializes as a receiver and requires ADM-3A to be a sender first, communication cannot occur. CRT has no way of manually initializing as a sender.

#### SECONDARY CHANNEL OPERATION

This method uses the state of secondary channel lines to determine the direction of data over the primary channel.

- a. The ADM-3A initializes in RECEIVE mode (CA MARK, SA MARK). The ADM-3A is dependent on SB for Sent-to-Receive line control, and on CF for Receive-to-Send line control.
- If remote end initializes as a receiver, and it is required that the CRT initially be the sender, secondary channel SB shall be set <u>ON</u> from the remote end.

SB (DETECTED) ON TURNS CA ON

Send

SA MAINTAINED OFF

Mode

- c. If it is required that the remote end initially be the sender, and the CRT initially be a receiver.
  - CF (DETECTED)  $\underline{\text{ON}}$  TURNS SA  $\underline{\text{ON}}$  , AND SB/SA BUSTBACK OCCURS WITH NO INTERVENTION FROM THE OPERATOR.
- d. The ADM-3A goes from <u>Receive</u> (CA <u>OFF</u>, SA <u>ON</u>) to Send (CA <u>ON</u>, SA <u>OFF</u>) upon detection of SB <u>OFF</u>.
  - The ADM-3A goes from <u>Send</u> (CA <u>ON</u>, SA <u>OFF</u>) to Receive (CA <u>OFF</u>, SA <u>ON</u>) upon detection of SB <u>OFF</u>.

#### ADM-3A BINARY CODES

		GRAPHIC CHARACTER SET							
BITS	BITS	0	1	2	3	4	5	6	7
4321	765	000	001	010	011	100	101	110	111
0000		NUL	DLE	SP	0	0	Р		р
0001		SOH	DC1		1	А	a	a	q
0010		STX	DC2		2	В	R	b	,
0011		ETX	DC3	*	3	с	s	c	s
0100		EOT	DC4	\$	4	D	т	đ	t
0101		ENQ	NAK	%	5	Ε	U		u
0110		ACK	SYN	8	6	F	v	1	v
0111		BEEP	ETB	,	7	G	w	9	w
1000		BS	CAN	-	8	н	×	h	×
1001		нт	EM	)	9	1	Υ	1	v
1010		LF	SUB		:	J	z	i	z
1011		VT	ESC		:	к	-{	k	{
1100		FF	FS	,	<	L	1	1	:
1101		CR	GS	-		м	1	m	}
1110		so	RS		>	N	Λ	n	~
1111		SI	US	1	,	0	-	0	DEL

CODE	ASCII MNEMONIC	FUNCTION IN ADM-3A
CTRL/@	NUL	
CTRL/A	SOH	
CTRL/B	STX	
CTRL/C	ETX	Available as secondary channel line turn- around code for 202 modern operation
CTRL/D	EOT	
CTRL/E	ENQ	Initiates ID message in terminals with automatic "Answer Back" option
CTRL/F	ACK	
CTRL/G	BEL	Sounds audible beep in ADM-3A
CTRL/H	BS	Backspace (Cursor ←)
CTRL/I	HT	1 les 5 est 10 mm 13
CTRL/J	LF	Line Feed (Cursor ↓)
CTRL/K	VT FF	Upline (Cursor ↑) Forespace (Cursor →)
CTRL/L CTRL/M	CR	Return
CTRL/N	SO.	Unlock Keyboard
CTRL/O	SI	Lock Keyboard
CTRL/P	DLE	and the fact of
CTRL/Q	DCI	
CTRL/R	DC2	
CTRL/S	DC3	
CTRL/T	DC4	
CTRL/V	NAK	
CTRL/V	SYN ETB	
CTRL/W	CAN	
CTRL/X CTRL/Y	EM	I
CTRL/Z	SUB	Clear Screen
CTRL/L	ESC	
CTRL/\	FS	I
CTRL/ )	GS	I
CTRL/A	RS	Home
l .	ı	

Control Codes

Executable only from computer.

(Generated by holding CTRL key while typing the corresponding key shown in col-umns 4 and 5.)

Displayable in standard ADM-3A

Displayable with ADM-3A Upper/Lower Case Display feature.

## **OPERATOR'S QUICK REFERENCE GUIDE**

Y or X	ASCII	CODE	Х	ASCII	CODE	Х	ASCII	CODE
1	Space	040	28	;	073	55	V	126
2	1	041	29	<	074	56	W	127
3	".	042	30	=	075	57	X	130
4	#	043	31	>	076	58	Y	131
5	\$	044	32	?	077	59	Z	132
6	%	045	33	@	100	60	[	133
7	&	046	34	Α	101	61	\	134
8		047	35	В	102	62	]	135
9	(	050	36	С	103	63	^	136
10	)	051	37	D	104	64	-	137
11		052	38	E	105	65	,	140
12	+	053	39	F	106	66	а	141
13	,	054	40	G	107	67	b	142
14		055	41	н	110	68	С	143
15		056	42	1	111	69	d	144
16	/	057	43	J	112	70	e	145
17	ø	060	44	K	113	71	f	146
18	1	061	45	L	114	72	g	147
19	2	062	46	M	115	73	h	150
20	3	063	47	N	116	74	i	151
21	4	064	48	0	117	75	j	152
22	5	065	49	P	120	76	k	153
23	6	066	50	Q	121	77	1	154
24	7	067	51	R	122	78	m	155
25	8	070	52	S	123	79	n	156
26	9	071	53	Т	124	80	О	157
27	:	072	54	U	125			

Lear Siegler, Inc. ADM-3A
age last updated 4/00 Yould you like more information? Got a question? An answer? Email me at <a href="lsi2@decoyaventek.com">lsi2@decoyaventek.com</a> . (Remove the spambot "decoy" to send mail.)
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