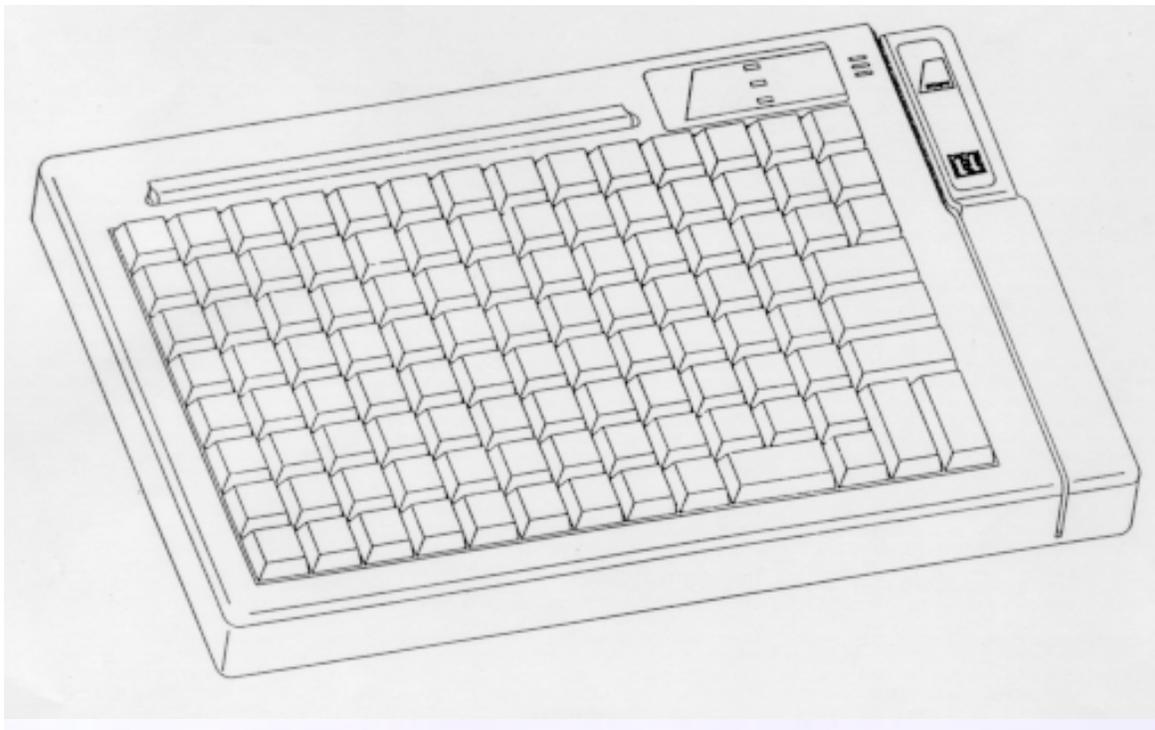# SERIES 500 POS KEYBOARD

PROGRAMMING & USER'S GUIDE

ultimate technology

SERIES 500 QUICK REFERENCE GUIDE
to
KEY PROGRAMMING

To Program a Primary Key

1. Swipe Programmer's Card through Mag Card Reader.
2. Type 00 on the numeric keypad on the Series 500 Keyboard.
3. Press the key on the Series 500 Keyboard that you wish to program.
4. Type the desired key sequence on the AUX (PS/2) keyboard.
5. Press the "ENTER" key next to the numeric keypad on the Series 500 Keyboard.
6. To program additional keys go to Step 3 and repeat process.
7. To exit programming mode type 0099 on the numeric keypad on the Series 500 Keyboard or swipe Programmer's Card through Mag Card Reader.

To Program a Secondary Operation Key

1. Swipe a Programmer's Card through Mag Card Reader.
2. Type 01 on the numeric keypad on the Series 500 Keyboard.
3. Press the key on the Series 500 Keyboard that you want to program.
4. Type the desired key sequence on the AUX (PS/2) keyboard.
5. Press the "ENTER" key next to the numeric keypad on the Series 500 Keyboard.
6. To program additional keys go to Step 3 and repeat process.
7. To exit programming mode type 0099 on the numeric keypad on the Series 500 Keyboard or swipe Programmer's Card through Mag Card Reader.

To Program a Secondary Operation Access Key*

1. Swipe Programmer's Card through Mag Card Reader.
2. Type 00 on the numeric keypad on the Series 500 Keyboard.
3. Press the key on the Series 500 Keyboard to be used as the Secondary Operation Access Key.
4. Type 6 on numeric keypad on the Series 500.
5. Press the "ENTER" key on the Series 500 Keyboard.
6. To exit programming mode type 0099 on the numeric keypad on the Series 500 Keyboard or swipe programmer's Card through Mag Card Reader.

A Secondary Operation Access Key provides access to the secondary level of each key as programmed in the Series 500 Keyboard.

Please Refer to the Programming and User's Guide for other Programmable Functions.

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LIST OF TABLES

FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE
STATEMENT

NOTICE

This equipment complies with the limits for a Class A computing device in accordance with the specifications in Part 15 of FCC rules which are designed to minimize radio frequency interference in the installation; however, there is no guarantee that radio or television interference will not occur in any particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on while the radio or television is on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the radio or television receiving antenna

- Relocate the keyboard with respect to the receiver

- Move the keyboard away from the receiver

If necessary the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio/TV Interference Problems". This booklet is available from the U.S. Government Printing Office Washington, DC 20402. Order stock number 004-000-00345-4.

SCOPE

This user's guide provides the information and procedures needed to install, operate and program your Series 500 POS Keyboard. Differences in models and optional features are described in this manual, where applicable. It is suggested that the entire manual be read before attempting installation or programming. If assistance is needed that is beyond the coverage provided in this guide, please contact Customer Service:

Ultimate Technology Corporation
100 Rawson Road
Victor New York, 14564
Phone: (800) 349-0546
Fax: (585) 924-1434

SPECIAL NOTE

When this publication was written, every effort was made to ensure that information in this document was complete, accurate, and up to date. Ultimate Technology Corporation assumes no responsibility for errors beyond its control. Ultimate Technology Corporation also cannot guarantee that changes in software and equipment made by other manufacturers, and referenced in this guide, do not effect the applicability of the information in this manual. If assistance is needed, please contact Customer Service at the address or phone number given above.

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT OPEN KEYBOARD ENCLOSURE WHEN KEYBOARD IS CONNECTED TO SYSTEM.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

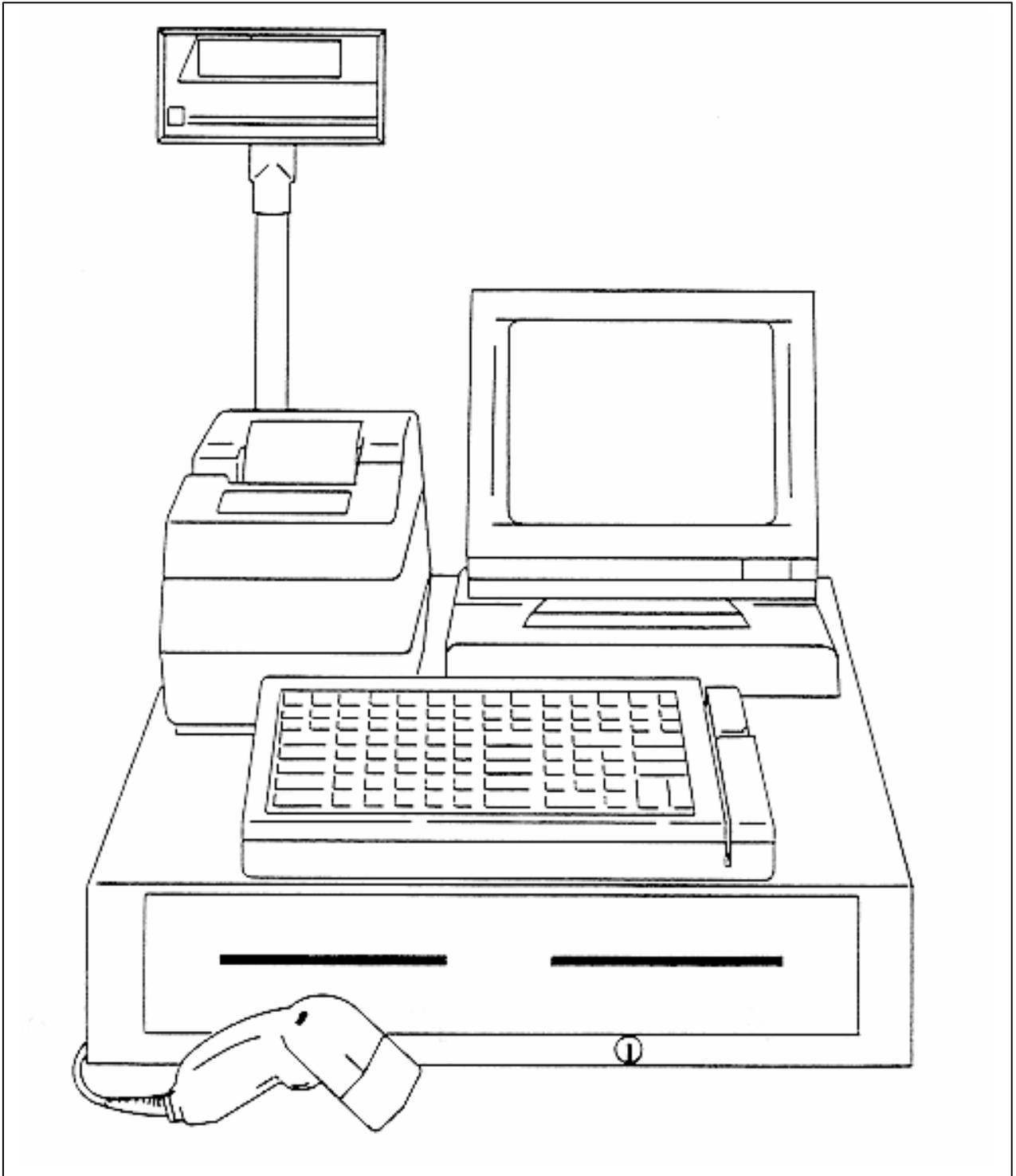WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THE KEYBOARD TO RAIN OR MOISTURE.

Figure 1. Typical Point-of-Sale station with standard QWERTY Series 500 keyboard

PRODUCT INFORMATION

MODEL DESCRIPTION

Series 500 POS Keyboards are point-of-sale (POS) keyboards designed for use with a PC or ASCII terminal. These keyboards have total flexibility in keyboard layout coupled with an extensive programming capability. Each keyboard contains a built-in magnetic stripe reader (MSR), two serial ports, two cash drawer status ports, a main keyboard port, and an auxiliary keyboard port. The Series 500 POS Keyboard provides both the hardware and firmware interfaces necessary to fully integrate a modular "open system" POS workstation when attached to a PC or terminal, and connected with a printer, cash drawer and display of the users choice.

FEATURES

CHOICE OF KEYBOARD TYPES
- Full travel, standard size keys - up to 112 keys
- Full travel, compact size keys - up to 144 keys
- Flat panel (micro motion), standard size - 112 keys
- Flat panel (micro motion), compact size - 144 keys

All key locations are available
permanently printed or re-legendable. Full travel keycaps have removable plastic covers for re-legending. Flat panel membrane versions are re-legendable by use of interchangeable overlays.

Standard keyboard configurations
including QWERTY and typical POS layouts are available. Custom configurations of any number of keys are also available.

FULLY USER PROGRAMMABLE
- Local (PC Keyboard)
- Remote (from Host)
- Download (Cloning)

All keys can be reprogrammed to output
any code. Single wide, double wide, and quad keys can be placed anywhere on the keyboard. Spacers are available for unused key locations.

BUILT-IN MAGNETIC STRIPE READER
- 2 track, 3 format
- Programmable for prefix, suffix, separators and audible annunciation

MAGNETIC STRIPE CARD CONTROLLED SECURITY
- Keyswitch optional

TWO CASH DRAWER PORTS
- Status monitoring
    - Autosend (Unsolicited)
    - Polling (Solicited)
- Optional cash drawer firing

AUX PC KEYBOARD PORT
- For data entry when full alphanumeric capability is needed
- For programming key codes (local method)
- For keyboard port compatible peripherals (bi-directional)

TWO RS232 PORTS
- Serial peripherals
- Main communications port when used as a terminal
- Hardware and software handshaking
- Selectable baud rates (300 bps - 57.6 Kbps)

32K NVRAM BUILT-IN
- 2048 16 character memory locations
- Control totals
- Other purposes

THREE LED INDICATORS
- User programmable

BUILT-IN AUDIBLE BEEPER
- Programmable
- Selectable tone and duration

BUILT-IN DIAGNOSTICS
- Self test

OPTIONAL PEDESTAL MOUNT

SPECIFICATIONS

DIMENSIONS
- Depth - 8 Inches
- Width - 13 Inches
- Height - 3 Inches

WEIGHT
- 3.5 pounds (avg)

ELECTRICAL
- 135 - 185mA at 5VDC (supplied from host)
- 3-volt lithium battery (battery backup for memory data retention when host source voltage removed)

ENVIRONMENT
- Storage temperature -20° to 70°C (-68° to 158°F)
- Operating temperature 0° to 50°C (32° to 122°F)

APPROVALS
- FCC Class A
- UL recognized
- UL recognized (Canada)

SERVICE AND WARRANTY

Series 500 POS Keyboards come with a one-year parts and labor warranty. Assistance and customer service is always available from Ultimate Technology Corporation's Customer Service representative. If the dealer or your service provider cannot answer your question or provide satisfactory service, please call our sales and technical support department. When calling for assistance or service information, please have available the model number, part number and serial number of the keyboard. This information is found on a decal located on the bottom of the keyboard.

If the keyboard needs to be returned to a repair facility, please use the original packing material and shipping carton. It is recommended that one set of packing material be retained for this purpose.

The address and telephone numbers to be used for assistance, service, and warranty information is:

Ultimate Technology Corporation
100 Rawson Road
Victor, New York 14564
Phone: (800) 349-0546
Fax: (585) 924-1434

INSTALLATION

UNPACKING AND INSPECTION

1. Examine the exterior of the shipping carton for signs of abuse or damage that may have occurred during transport. Report all evidence of damage or abuse to shipper and dealer.

NOTE

If any damage may have occurred during transport, examine keyboard and accessories carefully before performing any set-up procedures. Return damaged keyboards to the dealer. See Service paragraph.

---

2. Open top of shipping carton and carefully remove the keyboard and accessories.

3. Remove shipping retainers and protective covers from the keyboard and accessories.

NOTE

Retain a set of shipping retainers, protective covers, and the shipping carton. Use these items whenever keyboard is to be shipped.

---

4. Inventory and inspect the keyboard and other accessories listed below for damage.

- Keyboard
- One 8-foot cable (determined by configuration ordered)

    Part No. CAB20133 - 5 pin DIN keyboard cable for AT & PC/XT, Data General
    or
    Part No. CAB20137 - 6 pin Mini DIN keyboard cable for PS2, TVI9070
    or
    Part No. CAB20134 - 8 pin modular keyboard cable for IBM 3151

- Secure Magnetic Card
- Programmer's Magnetic Card
- Series 500 POS Keyboard Programming & User's Guide

EXTERNAL CONNECTIONS

As required by the hardware configuration, connect the keyboard to its host computer and other peripheral devices as shown in Figures 2 and 3. Note that the specific use for each connector on the keyboard is marked adjacent to each connector. Depending on the make and model of the user's equipment, the following cables and/or adapters may need to be supplied by the user to complete the installation:

Standard 6-foot cable, 6-Pin Modular to 6-Pin Modular - UTC Part No. CAB20137 or equivalent

Keyboard adapter 2-Inch, 5 Pin DIN Male to 6-Pin Mini DIN Female - UTC Part No.900-0839 or equivalent

Keyboard adapter 12-Inch, 5 Pin DIN Female to 6 Pin Mini Din Male - UTC Part No. 901-5009A or equivalent

DRAWER JUMPER CONNECTIONS (PRINTER FIRED)

As shown on Figure 3, the Series 500 Keyboard has two status cash drawer ports. Each port is selectable by use of the jumper connector located next to the MAIN keyboard connector. This jumper connector is used to make the keyboard compatible with the different printer and cash drawer connections required by various manufacturers.

Jumper pin set A and B is used with cash drawer 1: pin set C and D is used with cash drawer 2. Installing the jumper on the B (drawer 1) and D (drawer 2) side of the connector causes the status signal from the cash drawer to be applied on pin 2 of the related cash drawer port. Installing the jumper on the A (drawer 1) and C (drawer 2) side of the connector causes the status signal from the cash drawer to be applied on pin 6 of the related cash drawer port which allows pin 2 to be used to open the drawer. Shown below are the pin connections for the cash drawer ports for each position of jumper. Identified by an "X" are the jumper setting used with typical Epson and Ithaca Peripheral devices.

PRINTER 1, 2 PINOUTS DRIVER 1, 2	DRAWER 1, 2 JUMPER ON A OR C SIDE	DRAWER 1, 2 JUMPER ON B OR D SIDE
1 - SOLENOID GND	1 - SOLENOID GND	1 - SOLENOID GND
2 - SOLENOID GND/STATUS +	2 - SOLENOID GND	2 - STATUS +
3 - STATUS GND	3 - STATUS GND	3 - STATUS GND
4 - SOLENOID +	4 - SOLENOID +	4 - SOLENOID +
5 - SOLENOID GND	5 - SOLENOID GND	5 - SOLENOID GND
6 - NO CONNECTION	6 - STATUS +	6 - STATUS +
EPSON	X	
ITHACA PERIPHERALS SERIES 50,60		X

Main RS232
Port

Aux RS232
Port

Bar Code Scanner

Cash Drawer 1
(Driver)
Port *In*

CAB20138

Receipt Printer
Cash Drawer
Port 1 & 2

Cash Drawer 1
(Driver)
Port *Out*

Cash Drawer 1

Cash Drawer 2
(Drawer)
Port *In*

CAB20138

Cash Drawer 2
(Drawer)
Port *Out*

Cash Drawer 2

Drawer Type
Jumpers

Main KB Port

CAB20133 *or* CAB20137 *or* CAB20134

PC *or* Terminal

Aux KB Port

Adapter (optional)

PS2 Type KB

Figure 2. Typical keyboard external connections

| AUX KB | MAIN KB | D...C 2 B...A 1 | DRAWER 2 | DRAWER 2 | DRAWER 1 | DRAWER 1 | AUX RS232 | MAIN RS232 |
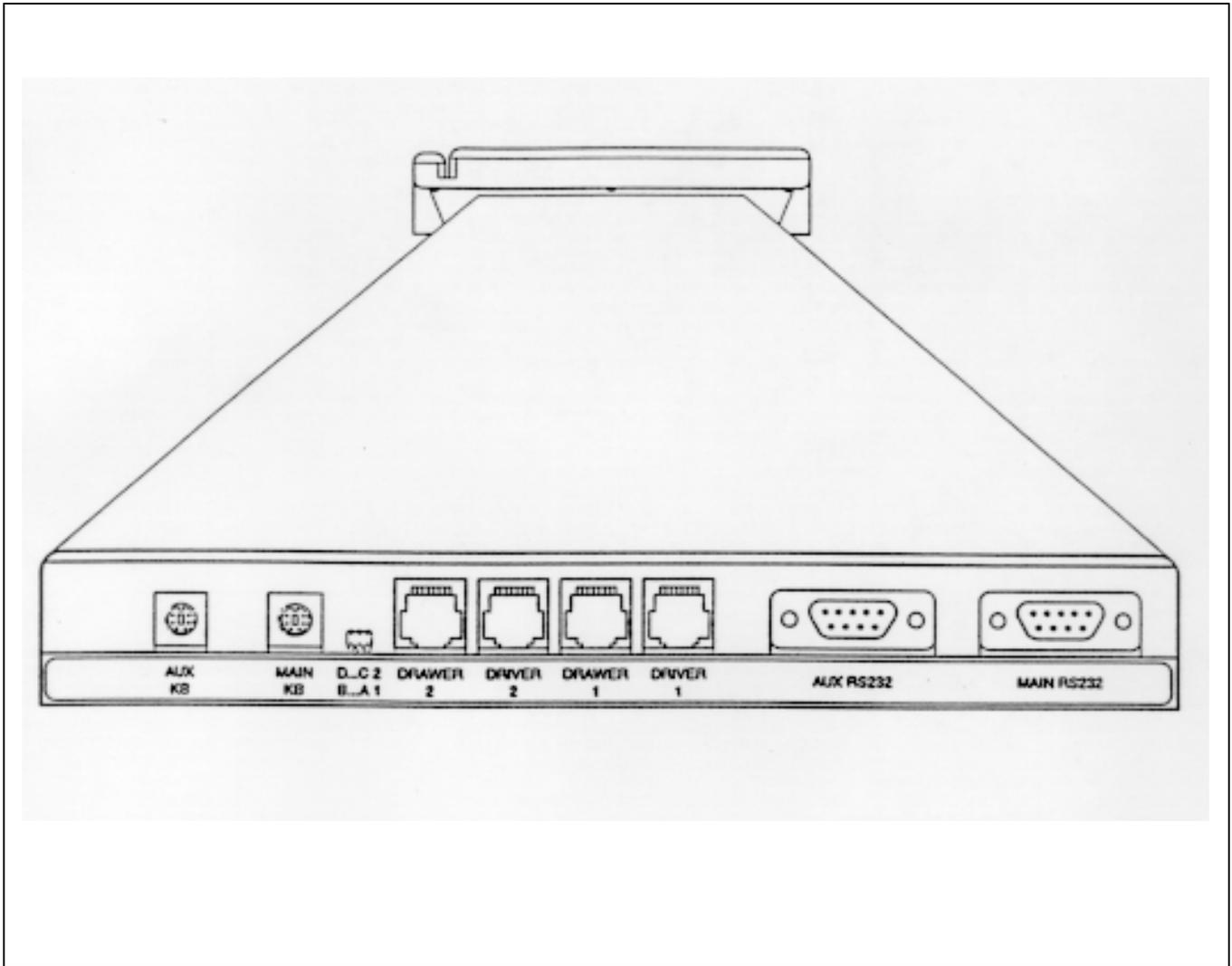
Figure 3. Keyboard external connectors - rear view

OPERATION

CONTROLS AND INDICATORS

Operating controls and indicators on the Series 500 Standard QWERTY Keyboard are shown in Figure 4 and described in Table 1. Because most Series 500 POS Keyboards are customized to match the user's needs, keyboard layouts and the function of the keys may vary widely from the one shown in Figure 4. Although the location of keys may differ among keyboard and types of keyboards, the function of the controls and indicators described in Table 1 pertain to all keyboard types. The operator should become familiar with the controls, indicators and other operating features of the keyboard. For typical keyboard layouts of other Series 500 POS Keyboards, refer to Appendix A.
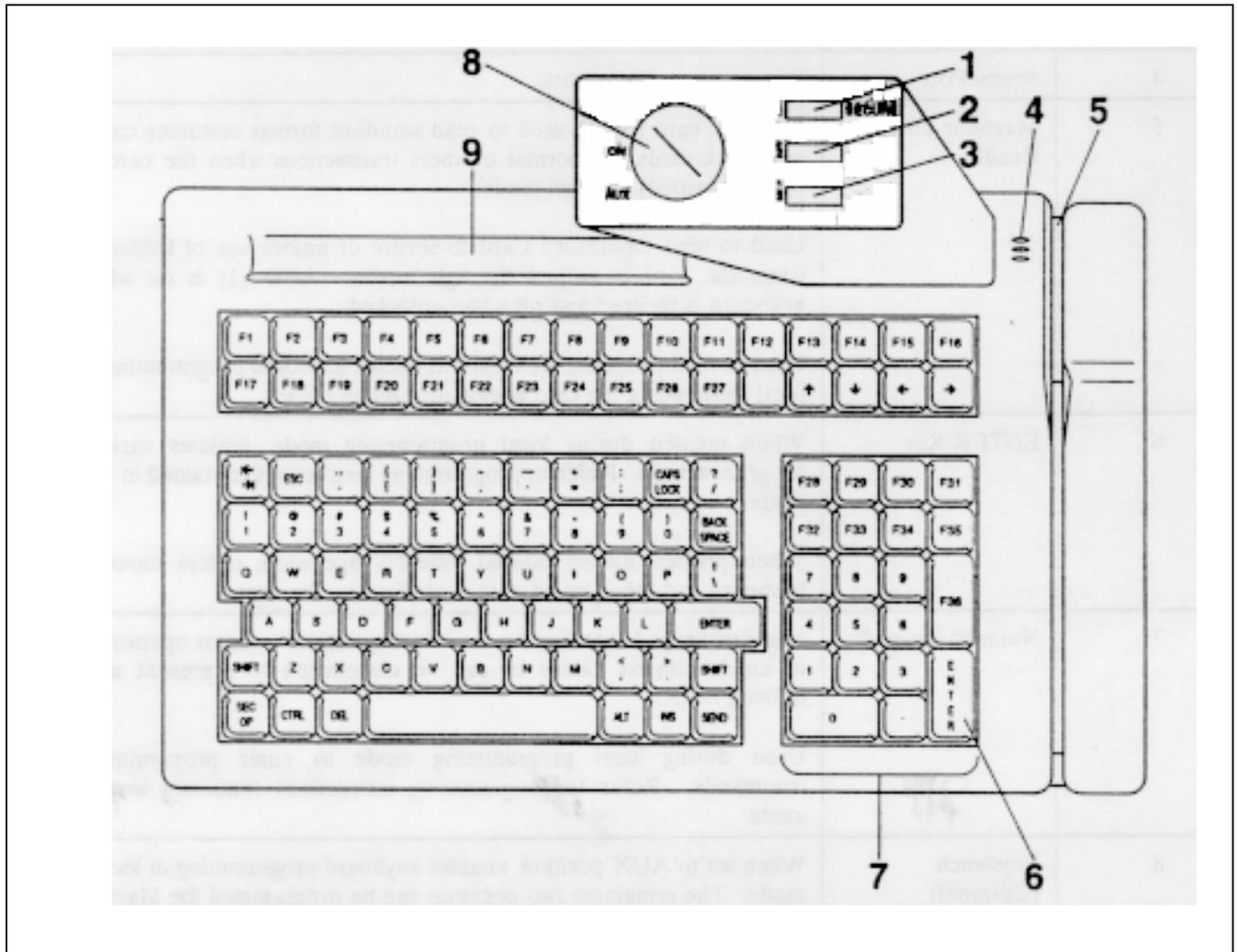
Figure 4. Series 500 POS keyboard - typical controls and indicators

Table 1. Series 500 POS Keyboard - Typical Controls and Indicators
(See Figure 4)

Index No.	Name	Function
1 through 3	Light Emitting Diode (LED) Indicators	LED (1) SECURE - When on, indicates keyboard is secured(locked); when off, indicates keyboard is unlocked. LED (2) When on, indicates keyboard is in CAP LOCK mode. LED (3) When on, indicates keyboard is in NUM LOCK mode. When in local programming mode - the status (on or off) of LEDs varies depending on status of programming. Refer to programming instructions contained in this guide.
4	Sound Port	Beeper annunciator port.
5	Magnetic Stripe Reader	Magnetic card reader used to read standard format customer credit and bank cards for normal business transactions when the card is passed (swiped) through reader. Used to read Operator's Card to secure or unlock use of keyboard when the card is swiped through reader. LED (1) is on when keyboard is secured and off when unlocked. Used to read Programmer's Card to enable keyboard programming in local mode when the card is swiped through reader.
6	ENTER Key	When pressed during local programming mode, initiates various program actions. Refer to programming instructions contained in this guide. When pressed during normal business operation, enters numeric keyboard and other keyed data as defined by the user.
7	Numeric Keypad	Numeric keypad that may be used during normal business operations to enter numeric values or can be customized to represent user defined items. Used during local programming mode to enter programming commands. Refer to programming instructions contained in this guide.
8	Keyswitch (Optional)	When set to AUX position, enables keyboard programming in local mode. The remaining two positions can be programmed for Macros and/or security locking. Refer to programming instructions contained in this guide.
9	Pen/Pencil Holder	Storage location used to hold user's pens or pencils.

All Other	User Defined Keys	User defined keys programmed by user/developer.

PROGRAMMING

PROGRAMMING KEYBOARD OPERATING PARAMETERS

The operating parameters of the keyboard can be configured (programmed) remotely from the host computer or locally at the keyboard. Keyboard programming in the remote mode sets the keyboard parameters as commanded by the host computer input applied at the main communications port. Selection of the local programming mode enables keyboard parameter setup locally at the keyboard. Note that all keyboards come from the factory programmed with a default set of parameters.

LOCAL MODE PROGRAMMING - FUNCTION CODES AND DEFAULT SETTINGS

A summary of all keyboard parameters programmable in the local mode, their assigned Function Codes and factory default settings are given in Table 2.

FUNCTION CODE	PARAMETER	DEFAULT SETTING (XXh = Hex Code In ASCII)	REMARKS
	Table 2. Local Mode Programming Function Codes and Default Settings		
00	Program Keyboard Primary Keys	See default	Used to program primary keys on Series 500 Keyboard. The keys can be programmed to have primary and secondary levels of function. The primary function is activated when only the designated key is pressed. The secondary function is activated when both the Sec Op key and designated key are pressed simultaneously. Use Function Code 01 to program secondary key functions.
01	Program Keyboard Secondary Keys	See default	See remarks above.
02	Copy Primary Keys to Secondary Keys		Used to copy primary key code into key secondary position.
08	Enable/Disable Magnetic Stripe Reader (MSR) Tracks	Channels 1,2 enabled	The magnetic card reader can read three formats of information, two at any one time, on standard format cards. This function is used to select which tracks on the MSR are enabled and/or disabled.
09	MSR Beep Configuration	Beep on good and bad read	Useful for indicating a good or bad reading when card swiped through reader.
10	MSR Channel 1,3 Prefix	% (25h) for format 1 ; (3Bh) for format 3	Used to send a prefix before the magnetic card channel.

Table 2. Local Mode Programming Function Codes and Default Settings			
11	MSR Channel 1,3 Field Separator	^ (5Eh) for format 1 = (3Dh) for format 3	Used to send a field separator between fields of the magnetic card channel.
12	MSR Channel 1,3 Suffix	?<CR> (3Fh,0Dh) for both format 1 and 3	Used to send suffixes after the magnetic card channels.
13	MSR Channel 3 Account Separator	: (3Ah) for format 3	Used to send an account separator on the magnetic card channel.
14	MSR Channel 2 Prefix	; (3Bh) for format 2	Used to send a prefix after the magnetic card channel.
15	MSR Channel 2 Field Separator	= (3Dh) for format 2	Used to send a field separator between fields of the magnetic card channel.
16	MSR Channel 2 Suffix	?<CR> (3Fh,0Dh) for format 2	Used to send a suffix after the magnetic card channel.
17	MSR Bad Read Track 1,3	M1!<CR> (4Dh,31h,21h, 0Dh)	Used to send a key sequence to the host computer upon a bad magnetic card read.
18	MSR Bad Read Track 2	M2!<CR> (4Dh,32h,21h, 0Dh)	Used to send a key sequence to the host computer upon a bad magnetic card read.
19	MSR Sending	Send any track	Used to send MSR data if one or both tracks are good. 0 = send any track; 1 = send if both tracks are good.
20	RS232 Port 0 Baud Rate	9600 Baud Rate	Used to select a baud rate for Port 0. Baud rates available are: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 and 57600.
21	RS232 Port 0 Stop Bits	2 stop bits	Used to select number of stop bits, 1 or 2, used with Port 0.
22	RS232 Port 0 Parity	No parity	Used to select parity used with Port 0. Selections available are: no parity, odd parity or even parity.
23	RS232 Port 0 Handshaking	Both	Used to select method of handshaking used with Port 0. Selections available are: none, CTS/RTS, XON/XOFF or both.

Table 2. Local Mode Programming Function Codes and Default Settings			
24	RS232 Port 0 Word Length	User defined	Used to change the word length, 7 or 8 bits, of the data at Port 0.
25	RS232 Port 0 Prefix	None	Used to place a prefix before the packet of data before it is sent out of the keyboard Main Port. (This function is inactive if Port 0 is the main port.)
26	RS232 Port 0 Suffix	<CR> (0Dh)	Used to place a suffix after the packet of data before it is sent out of the keyboard Main Port. (This function is inactive if Port 0 is the main port.)
30	RS232 Port 1 Baud Rate	9600 Baud Rate	Used to select a baud rate for Port 1. Baud rates available are: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 and 57600.
31	RS232 Port 1 Stop Bits	2 stop bits	Used to select number of stop bits, 1 or 2, used with Port 1.
32	RS232 Port 1 Parity	No parity	Used to select parity used with Port 1. Selections available are: no parity, odd parity or even parity.
33	RS232 Port 1 Handshaking	Both	Used to select method of handshaking used with Port 1. Selections available are: none, CTS/RTS, XON/XOFF or both.
34	RS232 Port 1 Word Length	User defined	Used to change the word length, 7 or 8 bits, of the data at Port 1.
35	RS232 Port 1 Prefix	None	Used to place a prefix before the packet of data before it is sent out of the keyboard Main Port.
36	RS232 Port 1 Suffix	<CR> (0Dh)	Used to place a suffix after the packet of data before it is sent out of the keyboard Main Port.
38	Keyswitch Position 1 MAKE	No output	Used to program the MAKE codes of the keyswitch. When the key is turned into position 1, the switch can send macros and/or perform an internal secure (lock).
39	Keyswitch Position 1 BREAK	No output	Used to program the BREAK codes of the keyswitch. When the key is turned out of position 1, the switch can send macros and/or perform an internal secure (lock).
40	Keyswitch Position 2 MAKE	No output	Used to program the MAKE codes of the keyswitch. When the key is turned into position 2, the switch can send macros and/or perform an internal

Table 2. Local Mode Programming Function Codes and Default Settings			
			secure (lock).
41	Keyswitch Position 2 BREAK	No output	Used to program the BREAK codes of the keyswitch. When the key is turned out of position 2, the switch can send macros and/or perform an internal secure (lock).
42	Keyswitch Position 3 MAKE	No output	Used to program the MAKE codes of the keyswitch. When the key is turned into position 3, the switch can send macros and/or perform an internal secure (lock).
43	Keyswitch Position 3 BREAK	No output	Used to program the BREAK codes of the keyswitch. When the key is turned out of position 3, the switch can send macros and/or perform an internal secure (lock).
44	Keyswitch Polling	User defined	Allows the user to poll for keyswitch 1,2, or 3 MAKE/BREAK codes. Two options are available: 0 = unsolicited mode in which codes are sent whenever the keyswitch is rotated, or 1 = solicited mode in which codes are sent only when a B7 command is executed.
45	Drawer 1 Open	D1+ (44h,31h,2Bh)	Used to set up a unique sequence of keys so host computer can determine if drawer 1 is open or closed.
46	Drawer 1 Closed	D1- (44h,31h,2Dh)	Used to set up a unique sequence of keys so host computer can determine if drawer 1 is open or closed.
47	Drawer 2 Open	D2+ (44h,32h,2Bh)	Used to set up a unique sequence of keys so host computer can determine if drawer 2 is open or closed.
48	Drawer 2 Closed	D2- (44h,32h,2Dh)	Used to set up a unique sequence of keys so host computer can determine if drawer 2 is open or closed.
49	Poll/Unsolicited Cash Drawer Status	Unsolicited	Allows the user to poll for cash drawer status, instead of sending it each time it changes state, open or closed. Two options are available: Send on change or transition, or send only with poll command CDCONT.
70	Indicator Lights Mode	Command mode of operation	Used to select if the CAPS (2) and NUM (3) LOCK indicators function in the same manner as a PC. Two options are available: PC mode or Command mode (Lights Command). Note that in the PC mode control of the indicators will be transferred to other higher priority commands if applied.

Table 2. Local Mode Programming Function Codes and Default Settings

71	Enable/Disable Key Clicks	On	Enables or disables audible key clicks. 0 = off; 1 = on
80	Define Left Shift Key	Key 44 See illustration in Appendix D	If auxiliary keyboard connected to the Series 500 Keyboard is other than a standard 101 or 102- key keyboard, used to define where the AUX keyboard SHIFT keys are located. Refer to Appendix D.
81	Define Right Shift Key	Key 57 See illustration in Appendix D	Same as Function Code 80 above.
82	Define Left Control Key	Key 58 See illustration in Appendix D	If auxiliary keyboard connected to the Series 500 Keyboard is other than a standard 101 or 102-key keyboard, used to define where the AUX keyboard CONTROL keys are located. Refer to Appendix D.
83	Define Right Control Key	Key 64 See illustration in Appendix D	Same as Function Code 82 above.
84	Define Left Alternate Key	Key 60 See illustration in Appendix D	If auxiliary keyboard connected to the Series 500 Keyboard is other than a standard 101 or 102-key keyboard, used to define where the AUX keyboard ALTERNATE keys are located. Refer to Appendix D.
85	Define Right Alternate Key	Key 62 See illustration in Appendix D	Same as Function Code 84 above.
86	Programming Mode Enter Macro	None	Reserved for future use.
87	Lock Mode Enter Macro	None	Reserved for future use.
90	Send System Log	None	Used to read the Series 500 Keyboard system log at the main port. For detailed information about retrieving the system log data, refer to the Maintenance Section of this manual.
91	Main Port Select	Port 0	Used to select either the main keyboard port or main RS232 port as the main communications port.
96	Set Secure Mode	None	Used to toggle between secure or unsecure mode.
97	Default Keyboard	None	Used to reset Series 500 Keyboard to all programmed default settings.
98	Download Keyboard	None	Once a Series 500 Keyboard has been programmed, the parameters can be copied (cloned) from the source keyboard to other keyboards. This feature saves time and reduces errors when programming more than

Table 2. Local Mode Programming Function Codes and Default Settings			
			one keyboard. It is also useful for remote keyboard setup and when making changes in key codes. To download keyboard settings, refer to the procedure given at the rear of the Programming Section in this manual.
99	Exit Program Mode	None	Used to terminate the programming mode. When activated, causes all programmed changes to be saved and the keyboard to do a warm boot. Exiting programming mode can also be accomplished by swiping the Programmer's card.

LOCAL MODE PROGRAMMING INSTRUCTIONS

To program the Series 500 Keyboard in the local mode proceed as follows:

1. Swipe the Programmer's card supplied with the keyboard in the magnetic stripe reader (MSR). For Series 500 Keyboards equipped with the optional 3-position keyswitch adjacent to the LED indicators, set the switch to the AUX position and enter **882** on the keyboard numeric keypad.

2. All LED indicators turn on and the keyboard enunciator beeps three times.

3. After step 2 is complete, LED indicator (1) will flash continuously to indicate that the keyboard programming mode is active.

4. For a summary of the parameters that can be programmed in the local mode, refer to Table 2 preceding.

5. Follow the instructions given in Table 3 for the applicable Function Code(s) to program the keyboard for the desired parameter(s). Note that sequence of instructions provided in Table 3 is in Function Code numerical order.

6. When programming is complete, exit the local programming mode by typing **99** on the Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position. This returns the keyboard to normal operation.

NOTE

Some programming options may not be activated until the keyboard is re-powered.
Serial port communication selections --
Function Codes 10-24; 30-34; 91;

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation Normal Indication Remarks
00 01 Program Primary Key Functions (00) and Secondary Key Functions (01)	NOTE The keys can be programmed to have primary and secondary levels of function. The primary function is activated when only the designated key is pressed. When programming the secondary operation keys, do not press the Sec Op Key. *The secondary operations access key (Sec Op Key) provides access to the secondary level of each key as programmed in the Series 500 Keyboard.* 1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter Function Code 00 for primary key function or 01 for secondary key function. **LED (2) turns on.** 2. At the Series 500 Keyboard, press the key to be programmed. See Table 4 - Local Mode Programming Key MAKE/BREAK Codes and Extended Functions for detailed steps. **LED (2) flashes.** 3. At the auxiliary keyboard, press the desired key or type the desired key sequence. Note that the maximum number of key codes is limited to 24 - this is equivalent to approximately 12 key strokes. If the Series 500 Keyboard beeps and LED (2) turns off while entering key codes at the auxiliary keyboard, you have exceeded 24 key codes. Repeat steps 1 through 3. 4. At the Series 500 Keyboard, press **ENTER**. **LED (2) stops flashing.** 5. Repeat 2 through 4 for next key to be programmed. 6. Exit programming primary/secondary key functions by pressing 00 on the Series 500 Keyboard numeric keypad. 7. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-

Function Code(s)	Operation Normal Indication Remarks
	position keyswitch, move switch out of the AUX position.
02 Copy Primary Key Functions to Secondary Key Positions	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter Function Code **02.** **LED (2) turns on.** 2. At the Series 500 Keyboard, press the designated key to copy its primary function into the secondary position. 3. Repeat 2 for next key to be programmed 4. When completed, press **ENTER**. **LED (2) turns off.** 5. Program the next function code or exit programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position. **Note:** A Sec Op Key or Sec Op Lock Key must be programmed in the primary function mode in order to use secondary function codes.
08 Enable /Disable Magnetic Stripe Reader (MSR) Tracks	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter Function code **08.** **LED (2) turns on.** 2. At the Series 500 Keyboard numeric keypad, enter the applicable number (1 through 6) to select the MSR track configuration per list below. **1** = Channel 1 enabled **2** = Channel 2 enabled **3** = Channel 3 enabled **4** = Channels 1 and 2 enabled* **5** = Channels 2 and 3 enabled **6** = All channels disabled **LED (2) turns off.** 3. Program the next function code or exit the local programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

Function Code(s)	Operation	Normal Indication	Remarks
	Note: Disabling all format tracks will not disable the secure or programming operations.		

09
Magnetic Stripe Reader (MSR) Beeper
	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter Function code **09**.
	
	LED (2) turns on.
	
	2. At Series 500 Keyboard numeric keypad, enter the applicable number (1 through 4) to select magnetic stripe reader beeper operation per list below.
	
	    1 = beep on good read for all enabled tracks
	    2 = beep on bad read for all enabled tracks
	    3 = beep on good or bad read of enabled tracks*
	    4 = no beep on good or bad reads
	
	LED (2) turns off.
	
	3. Program the next function code or exit the local programming mode by entering 99 on Series 500 Keyboard numeric keypad followed by **ENTER** or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.		

10 **11** **12** **13** Magnetic Stripe Reader (MSR) Channel 1,3 Prefix (10) Field Separator (11) Suffix (12) Account Separator (13)	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter applicable Function Code **10, 11, 12 or 13.** **LED (2) flashes.** 2. At the auxiliary keyboard, press the desired key or type the desired key sequence. Note that the maximum number of key codes that can be entered is limited to 24 - this is the equivalent to approximately 12 key strokes. 3. At the Series 500 Keyboard, press **ENTER**. **LED (2) turns off.** 4. Program the next function code or exit programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping		If the Series 500 Keyboard beeps and LED (2) turns off while entering key codes at the auxiliary keyboard, you have exceeded 24 key codes. Repeat steps 1 and 2.

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation	Normal Indication	Remarks
	the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.		
14 **15** **16** Magnetic Stripe Reader (MSR) Channel 2 Prefix (14) Field Separator (15) Suffix (16)	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter applicable Function Code **14, 15, or 16**. **LED (2) flashes.** 2. At the auxiliary keyboard, press the desired key or type the desired key sequence. Note that the maximum number of key codes is limited to 24 - this is equivalent to approximately 12 key strokes. 3. At the Series 500 Keyboard, press **ENTER**. **LED (2) turns off.** 4. Program the next function code or exit programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.		If the Series 500 Keyboard beeps and LED (2) turns off while entering key codes at the auxiliary keyboard, you have exceeded 24 key codes. Repeat steps 1 and 2.
17 **18** Magnetic Stripe Reader (MSR) Channel 1,3 Bad Read (17) Channel 2 Bad Read Macro (18)	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter applicable Function Code **17 or 18**. **LED (2) flashes.** 2. At the auxiliary keyboard, press the desired key or type the desired key sequence. Note that the maximum number of key codes is limited to 24 - this is equivalent to approximately 12 key strokes. 3. At the Series 500 Keyboard, press **ENTER**. **LED (2) turns off.**		If the Series 500 Keyboard beeps and LED (2) turns off while entering key codes at the auxiliary keyboard, you have exceeded 24 key codes. Repeat steps 1 and 2.

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation Normal Indication Remarks
	4. Program the next function code or exit programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

19
MSR Send
	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter applicable Function Code **19**.
	
	LED (2) turns on.
	
	2. At the Series 500 Keyboard numeric keypad, enter the applicable number (0 or 1) per list below to select MSR data from one or both good tracks.
	
	       0 = send any good track*
	       1 = send only if all enabled tracks good
	
	3. Program the next function code or exit programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

20 or 30
Comm (RS232)
Main Port 0 (20)
AUX Port 1 (30)
Baud Rate
	1. While in programming mode, at the Series 500 keyboard numeric keypad, enter Function Code **20** (Port 0) or **30** (Port 1).
	
	LED (2) turns on.
	
	2. At Series 500 Keyboard numeric keypad, enter the applicable number (1 through 9) to select baud rate per list below.
	
	    1 = 300 6 = 9600*
	    2 = 600 7 = 19200
	    3 = 1200 8 = 38400
	    4 = 2400 9 = 57600
	    5 = 4800
	
	LED (2) turns off.
	
	3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

Table 3. Local Mode Programming Instructions - Continued
Note: *Default Settings

Function Code(s)	Operation Normal Indication Remarks
21 or 31 Main Port 0 (21) AUX Port 1 (31) Stop Bits	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **21** (Port 0) or **31** (Port 1). **LED (2) turns on.** 2. At Series 500 Keyboard numeric keypad, enter the number of stop bits (1 or 2) per list below. 1 = one stop bit 2 = two stop bits* **LED (2) turns off.** 3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.
22 or 32 Main Port 0 (22) AUX Port 1 (32) Parity	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **22** (Port 0) or **32** (Port 1). **LED (2) turns on.** 2. At Series 500 Keyboard numeric keypad, enter the applicable number (0, 1 or 2) to select type of parity per list below. 0 = none* 1 = odd 2 = even **LED (2) turns off.** 3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation Normal Indication Remarks
23 or 33 Main Port 0 (23) AUX Port 1 (33) Handshaking	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **23** (Port 0) or **33** (Port 1). **LED (2) turns on.** 2. At Series 500 Keyboard numeric keypad, enter the applicable number (0, 1, 2 or 3) to select handshaking per list below. 0 = None 1 = CTS/RTS 2 = XON/XOFF 3 = Both* **LED (2) turns off.** 3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.
24 or 34 Main Port 0 (24) AUX Port 1 (34) Word Length	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **24** (Port 0) or **34** (Port 1). **LED (2) turns on.** 2. At Series 500 Keyboard numeric keypad, enter the applicable number (7 or 8) to select word length per list below. 7 = 7 data bits 8 = 8 data bits **LED (2) turns off.** 3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation Normal Indication Remarks

25 or 35
Comm (RS232)
Main Port 0 (25)
AUX Port 1 (35)
Prefix
	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter applicable Function Code **25** (Port 0) or **35** (Port 1).
	
	        LED (2) flashes.
	
	2. At the auxiliary keyboard, press the desired key or type the desired key sequence. Note that the maximum number of key codes is limited to 24 - this is equivalent to approximately 12 key strokes.
	
	    If the Series 500 Keyboard beeps and LED (2) turns off while entering key codes at the auxiliary keyboard, you have exceeded 24 key codes. Repeat steps 1 and 2.
	
	3. At the Series 500 Keyboard, press **ENTER**.
	
	        LED (2) turns off.
	
	4. Program the next function code or exit programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

26 or 36
Comm (RS232)
Main Port 0 (26)
AUX Port 1 (36)
Suffix
	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter applicable Function Code **26** (Port 0) or **36** (Port 1).
	
	        LED (2) flashes.
	
	2. At the auxiliary keyboard, press the desired key or type the desired key sequence. Note that the maximum number of key codes is limited to 24 - this is equivalent to approximately 12 key strokes.
	
	    If the Series 500 Keyboard beeps and LED (2) turns off while entering key codes at the auxiliary keyboard, you have exceeded 24 key codes. Repeat steps 1 and 2.
	
	3. At the Series 500 Keyboard, press **ENTER**.
	
	        LED (2) turns off.
	
	Program the next function code or exit programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

38	1. While in programming mode, at the Series 500 Keyboard

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation Normal Indication Remarks
39 **40** **41** **42** **43** Keyswitch Position 1 MAKE (38) Keyswitch Position 1 BREAK (39) Keyswitch Position 2 MAKE (40) Keyswitch Position 2 BREAK (41) Keyswitch Position 3 MAKE (42) Keyswitch Position 3 BREAK (43)	numeric keypad, enter applicable Function Code **38, 39, 40, 41, 42 or 43.** **LED (2) flashes.** 2. At the auxiliary keyboard, type the desired MAKE OR BREAK key sequence shown below and /or desired key sequence. Note that the maximum number of key codes is limited to 24 - this is equivalent to approximately 12 key strokes. <882>001 = To enter into secure mode or MAKE <882>002 = To exit out of secure mode or BREAK If the Series 500 Keyboard beeps and LED (2) turns off while entering key codes at the auxiliary keyboard, you have exceeded 24 key codes. Repeat steps 1 and 2. 3. At the Series 500 Keyboard, press **ENTER**. **LED** (2) turns off. 4. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

44
Poll Keyswitch
	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function **Code 44**.
	
	LED (2) turns on.
	
	2. At Series 500 Keyboard numeric keypad, enter the applicable number (0 or 1) to select polling method per list below.
	
	    0 = Send on change or transition
	    1 = Send only with poll command B7
	
	LED (2) turns off.
	
	3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation Normal Indication Remarks

45
46
47
48
Drawer 1
Open (45)
Closed (46)
 	
Drawer 2
Open (47)
Closed (48)
	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter applicable Function Code **45, 46, 47** or **48**.
	
	          LED (2) flashes.
	
	2. At the auxiliary keyboard, press the desired key or type the desired key sequence. Note that the maximum number of key codes is limited to 24 - this is equivalent to approximately 12 key strokes.
	
	      If the Series 500 Keyboard beeps and LED (2) turns off while entering key codes at the auxiliary keyboard, you have exceeded 24 key codes. Repeat steps 1 and 2.
	
	3. At the Series 500 Keyboard, press **ENTER**.
	
	          LED (2) turns off.
	
	4. Program the next function code or exit programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

49
Poll/
Unsolicited
Cash Drawer Status
	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **49.**
	
	          LED (2) turns on.
	
	2. At Series 500 Keyboard numeric keypad, enter the applicable number (0 or 1) to select status method per list below.
	
	        0 = Send on change or transition
	        1 = Send only with poll command CDSTATUS
	
	          LED (2) turns off.
	
	3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation Normal Indication Remarks

70
Indicator LED
Mode (70)
	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **70**.
	
	        LED (2) turns on.
	
	2. At Series 500 Keyboard numeric keypad, enter the applicable number (0 or 1) to select LED mode of operation.
	
	        LED Mode
	
	        0 = Command mode of operation*
	        1 = PC mode of operation
	
	        LED (2) turns off.
	
	3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

71
Enable/Disable
Keyboard Key
Clicks (71)
	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **71**.
	
	        LED (2) turns on.
	
	2. At Series 500 Keyboard numeric keypad, enter the applicable number (0 or 1) to select key click mode of operation.
	
	        Key Click Mode
	
	        0 = off
	        1 = on*
	
	        LED (2) turns off.
	
	3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

Function Code(s)	Operation Normal Indication Remarks
80 **81** Define Position of Left SHIFT Key (80) and Right SHIFT Key (81)	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter Function Code **80** or **81**. **LED (2) flashes**. 2. At the auxiliary keyboard, hit the left **SHIFT** key if programming Function Code 80 or right **SHIFT** key if programming Function Code 81. 3. At the Series 500 Keyboard, press **ENTER**. **LED (2) turns off.** 4. Program the next function code or exit programming mode by entering **99** on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.
82 **83** Define Position of Left CONTROL Key (82) and Right CONTROL Key (83)	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter Function Code **82** or **83**. **LED (2) flashes**. 2. At the auxiliary keyboard, hit the left **CONTROL** key if programming Function Code 82 or right **CONTROL** key if programming Function Code 83. 3. At the Series 500 Keyboard, press **ENTER**. **LED (2) turns off.** 4. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.
84 **85** Define Position of Left ALTERNATE Key (84) and Right ALTERNATE Key (85)	1. While in programming mode, at the Series 500 Keyboard numeric keypad, enter Function Code **84** or **85**. **LED (2) flashes.** 2. At the auxiliary keyboard, hit the left **ALTERNATE** key if programming Function Code 84 or right **ALTERNATE** key if programming Function Code 85. 3. At the Series 500 Keyboard, press **ENTER**. **LED (2) turns off.** 4. Program the next function code or exit programming mode by entering **99**

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation Normal Indication Remarks
	on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.
90 Dump System Log	This is a command used to read out the Series 500 Keyboard system log data at the main port. For detailed information about retrieving the system log data, refer to the Maintenance Section of this manual.
91 Main Port Select	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **91**. **LED (2) turns on.** 2. At Series 500 Keyboard numeric keypad, enter the applicable number (0 or 1) to select LED mode of operation per list below. 0 = Keyboard Port 0 is main 1 = RS232 Port 0 is main **LED (2) turns off.** 3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position. **Note:** Must re-power Series 500 Keyboard in order to activate function code.
96 Set Secure Mode	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **96** **LED (2) turns on.** 2. At Series 500 Keyboard numeric keypad, enter the applicable number (0 or 1) to select override secure mode of operation per list below. 0 = not secure 1 = secure **LED (2) turns off.** 3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

Table 3. Local Mode Programming Instructions - Continued
*Note: *Default Settings*

Function Code(s)	Operation Normal Indication Remarks

97
Default Keyboard
	1. While in programming mode, at Series 500 Keyboard numeric keypad, enter Function Code **97**.
	
	LED (2) turns on.
	
	2. At Series 500 Keyboard numeric keypad, enter the applicable number (0 or 1) to select mode of default operation per list below. Note selection of 1 below resets the Series 500 Keyboard to all programmed default key and port settings.
	
	       0 = Exit default mode
	       1 = Default mode
	
	3. Program the next function code or exit programming mode by entering 99 on Series 500 Keyboard numeric keypad or by swiping the Programmer's card. If using the optional 3-position keyswitch, move switch out of the AUX position.

98 Download	Once a Series 500 Keyboard has been programmed, the parameters can be copied (cloned) from the source keyboard to other keyboards. This feature saves time and reduces errors when programming more than one keyboard. It is also useful for remote keyboard setup and when making changes in key codes. This command is used to initiate the download of keyboard settings as described in the procedure given at the rear of the Programming Section in the this manual.
99 Exit Program Mode	Used to terminate the programming mode. When activated, causes all programmed changes to be saved into non-volatile RAM and the keyboard to do a warm boot. Exiting programming mode can also be accomplished by swiping the Programmer's card.

LOCAL MODE PROGRAMMING
KEY MAKE/BREAK CODES AND EXTENDED FUNCTIONS

There are two scan codes assigned to each key, one for when the key is depressed (MAKE code) and the other for when the key is released (BREAK code). Generally, all keys are programmed to output both MAKE and BREAK codes. The SHIFT, CONTROL and ALTERNATE keys are always programmed to output MAKE and BREAK codes so that the system can tell if the key is being held down. Other programming commands are provided in the local programming mode to enable the user to customize the keyboard output.   These commands entered at the Series 500 Keyboard numeric keypad are summarized in Table 4. Some typical programming examples using these commands follow the table.

Table 4. Local Programming Commands For Key MAKE/BREAK And Extended Functions

SERIES 500 KEYBOARD NUMERIC KEYPAD NO.	DESCRIPTION
0	Aborts changes to macros.
1	Defines where the output of MAKE codes end and BREAK codes start. Prior to this command, all codes are sent when the keys are pressed (MAKE codes). After command, all codes are sent when keys are released (BREAK codes).
2	Defines where repeating function of keys start. After command, all keys repeat code when keys are held down past repeat time.
3	This command overrides PC settings for key. Key sends code as typed on BREAK.
4	This command overrides PC setting for repeat. Key sends code as typed on MAKE and BREAK.
5	This command removes all BREAK codes from the macros except for SHIFT, CONTROL and ALTERNATE keys.
6	**NOTE: Only available in 00 and 01 commands.** Defines the position of a key on the Series 500 Keyboard. Note that a Sec Op Key must be defined on the Series 500 Keyboard to enable programming of secondary-level key codes.
7	**NOTE: Only available in 00 and 01 commands.** Defines the position of a Sec Op Lock Key on the Series 500 Keyboard.
9	Used to erase the macro from the primary and/or secondary key position.

EXAMPLE 1.

This example programs where the Series 500 Keyboard MAKE codes end and BREAK codes start using the "A" key.

1. Place the Series 500 Keyboard in local programming mode.

2. At the Series 500 Keyboard numeric keypad, enter 00 or 01.

3. At the Series 500 Keyboard, press the key to be programmed.

4. At the auxiliary keyboard, press and hold the "A" key.

5. At the Series 500 Keyboard numeric keypad, enter 1.

6. At the auxiliary keyboard, release the "A" key.

7. At the Series 500 Keyboard, press ENTER to complete programming of the key.

8. Repeat steps 3 through 7 to program another key.

9. To exit the programming mode, enter 00 99 at the Series 500 Keyboard numeric keypad.

EXAMPLE 2.

This example programs the Series 500 Keyboard to start repeat mode of key using the "A" key.

1. Place the Series 500 Keyboard in local programming mode.

2. At the Series 500 Keyboard numeric keypad, enter 00 or 01.

3. At the auxiliary keyboard, press and hold the "A" key.

4. At the Series 500 Keyboard numeric keypad, enter 2.

5. At the auxiliary keyboard, release the "A" key.

6. At the Series 500 Keyboard, press ENTER to complete programming of the key.

7. Repeat steps 3 through 7 to program another key.

8. To exit the programming mode, enter 00 99 at the Series 500 Keyboard numeric keypad.

EXAMPLE 3.

This example programs a Sec Op Key on the Series 500 Keyboard.

1. Place the Series 500 Keyboard in local programming mode.

2. At the Series 500 Keyboard numeric keypad, enter 00 or 01.

3. At the Series 500 Keyboard, press the key to be programmed.

4. At the Series 500 Keyboard numeric keypad, enter 6 (Sec Op) or 7 (Sec Op Lock).

5. At the Series 500 Keyboard, press ENTER to complete programming of the key.

6. Repeat steps 3 through 5 to program another key.

7. To exit the programming mode, enter 00 99 at the Series 500 Keyboard numeric keypad.

EXAMPLE 4.

This example erases the macro from the primary and/or secondary key position on the Series 500 Keyboard.

1. Place the Series 500 Keyboard in local programming mode.

2. At the Series 500 Keyboard numeric keypad, enter 00 (for primary keys) or 01 (for secondary keys).

3. At the Series 500 Keyboard, press the key to be erased.

4. At the Series 500 Keyboard numeric keypad, enter 9.

5. Repeat steps 3 and 4 to erase another key.

6. To exit the programming mode, enter 00 99 at the Series 500 Keyboard numeric keypad.

PROGRAMMING IN REMOTE MODE

Programming in the remote mode requires the use of a supplemental program that is run on the host computer. If using an IBM PC or compatible computer as the host, use program supplied by Ultimate Technology Corporation when programming the keyboard. To load and use the program, follow the instructions supplied with the program.

REMOTE MODE PROGRAMMING MACROS AND COMMAND SUMMARY

Refer to Table 5 for details about the commands and MACROS used when programming the keyboard. A summary of the commands and their assigned Function Codes (OP Codes) and mnemonic follows:

Note: OP Codes are single 8 bit entities in hexadecimal.

OP Code A0 - Key Macro Download Command (MACROK)
OP Code A1 - Macro Suffix/Prefix Download Command (MACROP)
OP Code A2 - Macro Rate Of Delay Command (SNDDLY)
OP Code A3 - Communications Setup Command (COMMP)
OP Code A4 - 40 Character Note Field (NOTES)
OP Code A5 - Define Shift, Control, Alternate Keys (SPCDGF)
OP Code A6 - Key Click (CLICKED)
OP Code A7 - Read Database Register (NVBDRD)
OP Code A8 - Write Database Register (NVBDWR)
OP Code A9 - Clear Database Register (NVBDCLR)
OP Code AD - Absolute Row/Column (RAWED)
OP Code AE - Secure Keyboard (SECURE)
OP Code AF - Ignore Everything To Carriage Return (COMMENT)
OP Code B0 - Indicator Light Command (LIGHT)
OP Code B1 - Beeper Activation Command (BEEPON)
OP Code B2 - Send Data to Port Command (SENDP)
OP Code B3 - Send Error Information Command (RDERROR)
OP Code B4 - Commit Changes to Memory (COMMIT)
OP Code B5 - Reset Keyboard Command (RESET)
OP Code B6 - Keyswitch Send (KSSND)
OP Code B7 - Keyswitch Poll Command (KSSTATUS)
OP Code B8 - MSR Send (MSRSND)
OP Code B9 - Enable/Disable Card Reader Command (CARDED)
OP Code BA - Card Good/Bad Read Annunciation Command (BEEPRD)
OP Code BB - Cash Drawer Status Command (CDCONT)
OP Code BC - Cash Drawer Open/Close Command (CDSTATUS)
OP Code BD - Auxiliary Keyboard ON/OFF Command (PORTE)
OP Code BE - Send Keyboard Parameters Command (VERSION)
OP Code BF - Send Keyboard Macros Command (GETSET)

NOTE

Always apply the COMMIT command (OP Code B4) after programming the keyboard remotely to save the changes in the NVRAM. Failure to use the COMMIT command after making programming changes will result in the loss of the changes the first time power is removed from the keyboard.

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT
A0	**MACROK** Download all key macros for Series 500 Keyboard. Refer to Table 6 for further explanation.	**COMMAND: A0krcCxDx.......<CR>** A0　　= Op Code k　　　= P to program Primary key 　　　　= S to program Secondary key 　　　　　Missing means program both 　　　　　Primary and Secondary Keys r　　　= row in ASCII c　　　= column in ASCII Cx　　= Low nibble of hex value Dx　　= High nibble of hex value 　　　　　Where x = 0-9, A-F <CR>　= terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT

A1	**MACROP**
	
	Download macros for prefix/suffix.
		COMMAND: A1aCxDx.......<CR>
		
		A1 = Op Code
		a = macro to load in ASCII
		          range A-Z listed below
		Cx = key number
		          (refer to Appendix D)
		Dx = key number
		          (refer to Appendix D)
		<CR> = terminate command (0D hex)
		
		A = AUX serial port prefix
		B = AUX serial port suffix
		C = keyswitch 1 make
		D = keyswitch 1 break
		E = keyswitch 2 make
		F = keyswitch 2 break
		G = keyswitch 3 make
		H = keyswitch 3 break
		I = mag 1, 3 prefix
		J = mag 1, 3 suffix
		K = mag 1, 3 field separator
		L = mag 2 prefix
		M = mag 2 suffix
		N = mag 2 field separator
		O = cash drawer 1 closed
		P = cash drawer 1 open
		Q = cash drawer 2 closed
		R = cash drawer 2 open
		S = bad read track 1-3
		T = bad read track 2
		U = account separator 1-3
		V = main serial port prefix
		W = main serial port suffix

		ACKNOWLEDGEMENT: NONE

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT
A2	**SNDDLY** Determines rate of delay in milliseconds for sending macros. This command used when interfacing with slow systems.	**COMMAND: A2CxDx<CR>** A2 = Op Code Cx = hex value for low nibble Dx = hex value for high nibble Range = 00 - FF; Where 00 is no delay and each increment in count equals 10 mS <CR> = terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT

A3	**COMMP**
	
	Communications setup for selecting ports, baud rate, word length, stop bits, parity, and method of handshaking.
		COMMAND: A3Pbbbbbwsph\<CR\>
		
		A3 = Op Code
		P = destination port for load
		bbbbb = baud rate
		W = word length 7 or 8 bits
		s = number of stop bits 1 or 2
		p = parity odd, even, or none
		h = handshaking
		\<CR\> = terminate command (0D hex)
		
		Port:
		    0 = main; 1 = AUX
		Baud rate:
		    00300, 00600, 01200,
		    02400, 04800, 09600,
		    19200, 38400, 57600
		Word length:
		    7 or 8
		Stop bits:
		    1 or 2
		Parity:
		    O = odd, E = even, N = none
		Handshaking:
		    H = CTS/RTS, S = XON/XOFF,
		    B = both, N = none
		
		ACKNOWLEDGEMENT: NONE

A4	**NOTES** Used to enter up to 40 characters of notes into RAM. Useful for recording keyboard version and date, etc.	**COMMAND: A4xxxx-xxxx\<CR\>** A4 = Op Code xx = Note (max of 40 Characters) \<CR\> = terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT

A5	**SPCDEF**
	
	Define where SHIFT, CONTROL, and ALTERNATE keys are located on auxiliary keyboard.
		COMMAND: A5xCxDx<CR>
		
		A5 = Op Code
		x = 1 right shift
		       = 2 left shift
		       = 3 right control
		       = 4 left control
		       = 5 right alternate
		       = 6 left alternate
		Cx = key number
		        (refer to Appendix D)
		Dx = key number
		        (refer to Appendix D)
		<CR> = terminate command (0D hex)
		
		ACKNOWLEDGEMENT: NONE

A6	**CLICKED** Turns keyboard key audible click on or off.	**COMMAND: A6x<CR>** A6 = Op Code x 0 = off 1 = on <CR> = terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**

A7	**NVBDRD**
	
	Read a database register.
		COMMAND: A7hhhm<CR>
		
		A7 = Op Code
		hhh = 3 character address representing the register to read range "000" to "7FF" in ASCII
		m = mode to read in
		       0 = string mode up to null
		       1 = raw mode
		       read as CxDx (16 bytes)
		<CR> = terminate command (0D hex)
		
		ACKNOWLEDGEMENT: NONE

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT
A8	**NVBDWR** Write a database register.	**COMMAND: A8hhhxx..x<CR>** A8 = Op Code hhh = 3 character address representing the register to write xx = data to write in ASCII or CxDx pairs (16 bytes max.) <CR> = terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**
A9	**NVBDCLR** Clear all database registers.	**COMMAND: A9CLR<CR>** A9 = Op code CLR = required for failsafe operation <CR> = terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**
AD	**RAWED** Puts keyboard in row and column mode used for diagnostics.	**COMMAND: ADx<CR>** AD = Op Code x 0 = user codes 1 = row and column <CR> = terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**
AE	**SECURE** Used to lock keyboard from remote location.	**COMMAND: AEx<CR>** AE = Op Code x 0 = unsecured 1 = secured <CR> = terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT
AF	**COMMENT** Use when notes or comments are to be placed in the download file. All data is ignored up to the carriage return <CR>.	**COMMAND: AFxxxx-xxxx<CR>** AF = Op Code xx = Comments <CR> = terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**
B0	**LIGHT** Provides on/off control for keyboard light emitting diode (LED) indicators. PC mode for NUM and CAP Lock lights is default.	**COMMAND: B0Lx<CR>** B0 = Op Code L = lamp x = on/off <CR> = terminate command (0D hex) L: 0, 1, 2, 3, P in ASCII, where 0 = all. P is used for PC emulation of NUM and CAPS Lock x: PC mode 1 = on; 0 = off **ACKNOWLEDGEMENT: NONE**

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT

B1	**BEEPON**
	
	Controls pitch and duration of beep. If valued for pitch (p) and duration (d) omitted when command activated.
		COMMAND: B1pd\<CR\>
		
		B1 = Op Code
		p = pitch in Hz
		d = duration in milliseconds
		\<CR\> = terminate command (0D hex)
		
		pitch (Hz) in ASCII
		     0 = 500 5 = 880
		     1 = 2000 6 = 1320
		     2 = 220 7 = 1760
		     3 = 440 8 = 2640
		     4 = 660 9 = 3520
		duration (mS) in ASCII
		     0 = 1000 5 = 500
		     1 = 100 6 = 600
		     2 = 200 7 = 700
		     3 = 300 8 = 800
		     4 = 400 9 = 900
		
		ACKNOWLEDGEMENT: NONE

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT

B2	**SENDP**
	
	Sends data to selected port: main serial port, auxiliary serial port, or auxiliary keyboard port.
		COMMAND: B2p...........<CR>
		
		B2 = Op Code
		p = data destination port
		<CR> = terminate command (0D hex)
		
		p:
		     0 = serial port 0 (main)
		     1 = serial port 1 (auxiliary)
		     2 = keyboard port 0 (main)
		     3 = keyboard port 1 (auxiliary)
		     4 = cash drawer 1 fire
		     5 = cash drawer 2 fire
		
		Where data can be ASCII or CxDx (high and low nibble hex value) type.
		
		ACKNOWLEDGEMENT: NONE

B3	**RDERROR** Sends all error information to main port for output.	**COMMAND: B3<CR>** B3 = Op Code <CR> = terminate command (0D hex) Sends all error log information contained in the non-volatile memory (NVRAM) out the main port. **ACKNOWLEDGEMENT: NONE**

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT
B4	**COMMIT** Writes programming changes to the NVRAM. Always apply the COMMIT command after programming the keyboard to save the changes in the NVRAM. Failure to use the COMMIT command will result in the loss of the changes the first time power is removed from the keyboard.	**COMMAND: B4<CR>** B4　　= Op Code <CR>　= terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**
B5	**RESET** Resets keyboard after downloading configuration. On receipt of this command the unit does a warm boot.	**COMMAND: B5RST<CR>** B5　　= Op Code <CR>　= terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**
B6	**KSSND** Used to select when keyswitch 1, 2 or 3 MAKE/BREAK codes are sent. Two options are available: unsolicited mode where codes are sent whenever the keyswitch is rotated, or solicited mode where codes are sent only when a OP Code B7 command is received.	**COMMAND: B6<CR>** B6　　= Op Code x　　　A = unsolicited 　　　　B = solicited <CR>　= terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**
B7	**KSSTATUS** Send keyswitch MAKE/BREAK codes in current keyswitch 1, 2 or 3 position.	**COMMAND: B7<CR>** B7　　= Op Code <CR>　= terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT
B8	**MSRSND** Use to send magnetic card reader track data for any one good track or if both tracks are good.	**COMMAND: B8x<CR>** B8 = Op Code x A = send any good track 　 B = send if both tracks are good <CR> = terminate command (0D hex) **ACKNOWLEDGEMENT: NONE**
B9	**CARDED** Enables or disables tracks on magnetic card reader.	**COMMAND: B9c<CR>** B9 = Op Code c = track selection <CR> = terminate command (0D hex) Track selection: A = track 1 on B = track 2 on C = track 3 on D = track 1 and 2 on E = track 2 and 3 on F = all tracks off **ACKNOWLEDGEMENT: NONE**

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT
BA	**BEEPRD** Selects magnetic card read annunciation mode.	**COMMAND: BAp<CR>** BA = Op Code p = annunciation mode select <CR> = terminate command (0D hex) Annunciation selection: A = beep on good read B = beep on bad read C = beep on good and bad read D = no beep Annunciation beep frequency for good read is 2000 Hz and for a bad read is 500 Hz. **ACKNOWLEDGEMENT: NONE**
BB	**CDCONT** Determines when cash drawer status is sent; on demand or when a change occurs.	**COMMAND: BBp<CR>** BB = Op Code p = selection control <CR> = terminate command (0D hex) Selection Control: A = send on change or transition B = send on poll command "BC" **ACKNOWLEDGEMENT: NONE**

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT
BC	**CDSTATUS** Send cash drawer macros for open and closed drawer.	**COMMAND: BCp<CR>** BC = Op Code p = selection control <CR> = terminate command (0D hex) Selection control: A = cash drawer 1 macros B = cash drawer 2 macros C = cash drawer 1 and 2 macros **ACKNOWLEDGEMENT:** Send back Macros for request.

BD	**PORTE**
	
	Disables all data applied from the selected port.
		COMMAND: BDpx<CR>
		
		BD = Op Code
		p = port
		    0 = serial 0 main
		    1 = serial 1 AUX
		    2 = keyboard main
		    3 = keyboard AUX
		x = selection control
		    1 = enable data
		    0 = disable data
		<CR> = terminate command (0D hex)
		
		ACKNOWLEDGEMENT: NONE

Table 5. Remote Programming Mode Commands - Continued

OP CODE (HEX)	MNEMONIC/DESCRIPTION	COMMAND/ACKNOWLEDGEMENT
BE	**VERSION** Sends software version, engineering number, and keyboard type parameters.	**COMMAND: BE\<CR\>** BE = Op Code \<CR\> = terminate command (0D hex) **ACKNOWLEDGEMENT:** **BEnnnnnvvvvkkkkx-x\<CR\>** BE = Op Code nnnnn = engineering number vvv = software version kkkk = keyboard type installed x-x = notes (maximum of 40 characters)
BF	**GETSET** Sends each key macro, all keyboard communication parameters. Keeps sending until all data has been transferred. Structure of data is in load command format (MACROK).	**COMMAND: BF\<CR\>** BF = Op Code \<CR\> = terminate command (0D hex) **ACKNOWLEDGEMENT:** **BF...............\<CR\>**

101/102-KEY KEYBOARD - KEY CODE IDENTIFICATION

As shown in Appendix D, a specific Key Code number is assigned for each of the keys on the standard 101/102 key keyboard. These key code numbers are decimal numbers not ASCII values. Use of key code numbers provides a more positive way for identifying a specific key than using its name. Different keyboard types may have different names assigned to the same key, but the key code is the same for that position. For example, on the 101/102-key keyboard shown in Appendix D, key code 31 identifies the "A" key. Assignment of different key codes to keys that produce the same scan codes or have similar functions is done so that like keys can be used for other functions. For example, the left and right ALTERNATE keys are assigned key codes 60 and 62, respectively.

PROGRAMMING KEY MAKE/BREAK CODES

There are two scan codes assigned to each key, one for when the key is depressed (MAKE code) and the other for when the key is released (BREAK code). Generally, all keys are programmed to output both MAKE and BREAK codes. The SHIFT, CONTROL and ALTERNATE keys are always programmed to output MAKE and BREAK codes so that the system can tell if the key is being held down. Refer to Appendix D for a list of the scan codes associated with the typical 101/102-key keyboard. Table 6 below summarizes the commands used to program key MAKE/BREAK functions in the remote programming mode. Some typical examples of MAKE/BREAK code programming are given following the table.

Table 6. Remote Programming Commands For Key MAKE/BREAK Codes

REMOTE PROGRAMMING COMMAND	DESCRIPTION
!	Defines where the output of MAKE codes end and BREAK codes start. Prior to this command, all codes are sent when the keys are pressed (MAKE codes). After this command, all codes are sent when keys are released (BREAK codes).
@	Defines where repeating function of keys start. After this command, all keys repeat code when keys are held down past repeat time.
#	This command overrides PC settings for key. Key sends code as typed on BREAK.
$	This command overrides PC setting for repeat. Key sends code as typed on MAKE and BREAK.
^	Defines the position of a Sec Op Key on the Series 500 Keyboard. Note that a Sec Op Key must be defined on the Series 500 Keyboard to enable programming of secondary-level key codes.
&	Defines the position of a Sec Op Lock Key on the Series 500 Keyboard.
(	Used to define left SHIFT key MAKE code.
)	Used to define left SHIFT key BREAK code
[	Used to define left CONTROL key MAKE code.
]	Used to Define left CONTROL key BREAK code.
{	Used to define left ALTERNATE key MAKE code.
}	Used to define left ALTERNATE key BREAK code.
-	Shorthand for BREAK code of previous CxDx key.
CyDx	Key number for hex code of xy is xy in range 00 to 7F.

EXAMPLES OF REMOTE PROGRAMMING FOR KEY MAKE/BREAK CODE

EXAMPLE 1.

This example programs a key located at the top left-hand corner of the keyboard (row 1, column A) as a primary key that outputs the scan code for lowercase "z" on MAKE and BREAK.

1. Use the data in Appendix D to find the key code number for the "Z" key on the 101/102-keyboard. The "Z" key code number = 46 (decimal).

2. Convert key code 46 (decimal) to its hexadecimal equivalent. The key code = 2E hex.

3. Programming command = A0krcCxDx<CR> = A0 P 1 A CED2!-<CR>

        WHERE: A0   = Op Code (1 byte hexidecimal)
                       k   = P to program Primary key
                                     S to program Secondary key
                       r   = Row in ASCII
                       c   = Column in ASCII
                       Cx   = Low nibble of hex value
                       Dx   = High nibble of hex value
                                     Where x = 0-9, A-F
                       !   = start BREAK code phase of key
                       -          = BREAK code of previous key
                 <CR> = terminate command (0D hex)

EXAMPLE 2.

This example programs the key at top left-hand corner of keyboard (row 1, column A) as a primary key that outputs the scan code for uppercase "Z" on MAKE and BREAK.

1. Use the data in Appendix D to find the key code number for the "Z" key on the 101/102-keyboard. The "Z" key code number = 46 (decimal).

2. Convert key code 46 (decimal) to its hexadecimal equivalent. The key code = 2E hex.

3. Programming command = A0krc(CxDx)<CR> = A0 P 1 A (CE D2 ! -) <CR>

    Parameters same as shown for example 1, except () = left shift MAKE and left shift BREAK

EXAMPLE 3.

This example programs the key at top left-hand corner of keyboard (row 1, column A) as a primary key that outputs the scan code for lowercase "z" on MAKE only.

1. Use the data in Appendix D to find the key code number for the "Z" key on the 101/102-keyboard. The "Z" key code number = 46 (decimal).

2. Convert key code 46 (decimal) to its hexadecimal equivalent. The key code = 2E hex.

3. Program command = A0krcCxDx@<CR> = A0 P 1 A CE D2 @ <CR>

    Parameters same as shown for example 1, except @ = output on MAKE only.

EXAMPLE 4.

This example programs key at top left-hand corner of keyboard (row 1, column A) as a primary key that outputs the scan code for uppercase "Z" on MAKE only.

1. Use the data in Appendix D to find the key code number for the "Z" key on the 101/102-keyboard. The "Z" key code number = 46 (decimal).

2. Convert key code 46 (decimal) to its hexadecimal equivalent. The key code = 2E hex.

3. Program command = A0krc(CxDx)@<CR> = A0 P 1 A (CE D2) @ <CR>

    Parameters same as shown for example 1, except @ = output on MAKE and () = left shift MAKE and left shift release.

EXAMPLE 5.

This example programs key at top left-hand corner of keyboard (row 1, column A) as a primary left SHIFT key that outputs the scan code for MAKE and BREAK.

1. Use the data in Appendix D to find the key code number for the left SHIFT key on the 101/102-keyboard. The "Left SHIFT" key code number = 44 (decimal).

2. Convert key code 44 (decimal) to its hexadecimal equivalent. The key code = 2C hex for MAKE and AC hex for BREAK.

3. Program command = A0krcCxDx!CxDy<CR> = A0 P 1 A CC D2 ! CC DA <CR> or
   A0 P 1 A (!) <CR>

Parameters same as shown for example 1.

EXAMPLE 6.

This example programs key at top left-hand corner of keyboard (row 1, column A) as a primary key that outputs the string "abCd" for MAKE.

1. Use the data in Appendix D to find the key code numbers for the A, B, C and D keys on the 101/102-keyboard. The key code numbers for the A, B, C and D keys = 31, 50, 48 and 33, respectively.

2. Convert key codes 31, 50, 48 and 33 to their hexadecimal equivalents.   The key codes = 1F, 32, 30 and 21, respectively.

3. Program command = A0krcCxDxCxDx(C^xD^x)CxDx<CR> =
   A0 P 1 CF D1 C2 D3 (C0 D3) C1 D2 <CR>

   Parameters same as shown for example 1, except () = left shift MAKE and BREAK.

   This command sends the MAKE code for the "ab"; MAKE code for the left SHIFT; MAKE code for "C"; then BREAK code for the left SHIFT followed by the MAKE code for the "d".

EXAMPLE 7.

This example programs key at top left-hand corner of keyboard (row 1, column A) as a primary key that outputs the scan code "left CONTROL a" for MAKE and BREAK.

1. Use the key code data in Appendix D to find that the key code number for the "A" key.   The key code = 31.

2. Convert key code 31 to its hexadecimal equivalent. The key code = 1F hex.

3. Program command = A0krc[CxDx!]<CR> = A0 P 1 A [CF D1 !] <CR>

   Parameters same as shown for example 1, except [] = left CONTROL key MAKE and BREAK and ! = define where BREAK code start.

   This command sends the MAKE code for the left CONTROL; MAKE code for the "a" when pressed; then after release of the key the BREAK for the left CONTROL. This allows more keys to be typed in while the PC is under the influence of CONTROL. The ! causes all codes remaining in the key macro to be sent on release of the key.

COPYING KEYBOARD SETUP DATA (CLONING)

Once a keyboard has been programmed, the parameters can be copied from the source keyboard to other keyboards. This feature saves time and reduces errors when programming more than one keyboard. It is also useful for remote keyboard setup and when making changes in key codes. Downloading of keyboard parameters can be done using one of two methods. The first method is initiated by using the **GETSET** command (Table 5) issued from the host. This sends all setup data such as baud rate, key codes and macros to the main port of the keyboard in command format.

The second method is performed in the local programming mode with the source and target keyboards connected together. This method can only be used when the main ports are configured as RS232 type ports. To use this method proceed as follows.

1. Connect a cable, UTC Part No. CAB20135 or equivalent, and external 5-volt power adapter, UTC Part No. CAB20136 or equivalent to the source and target Series 500 Keyboards as shown below. Schematics showing the pin and signal data for the cable and power adapter are provided in Appendix B.
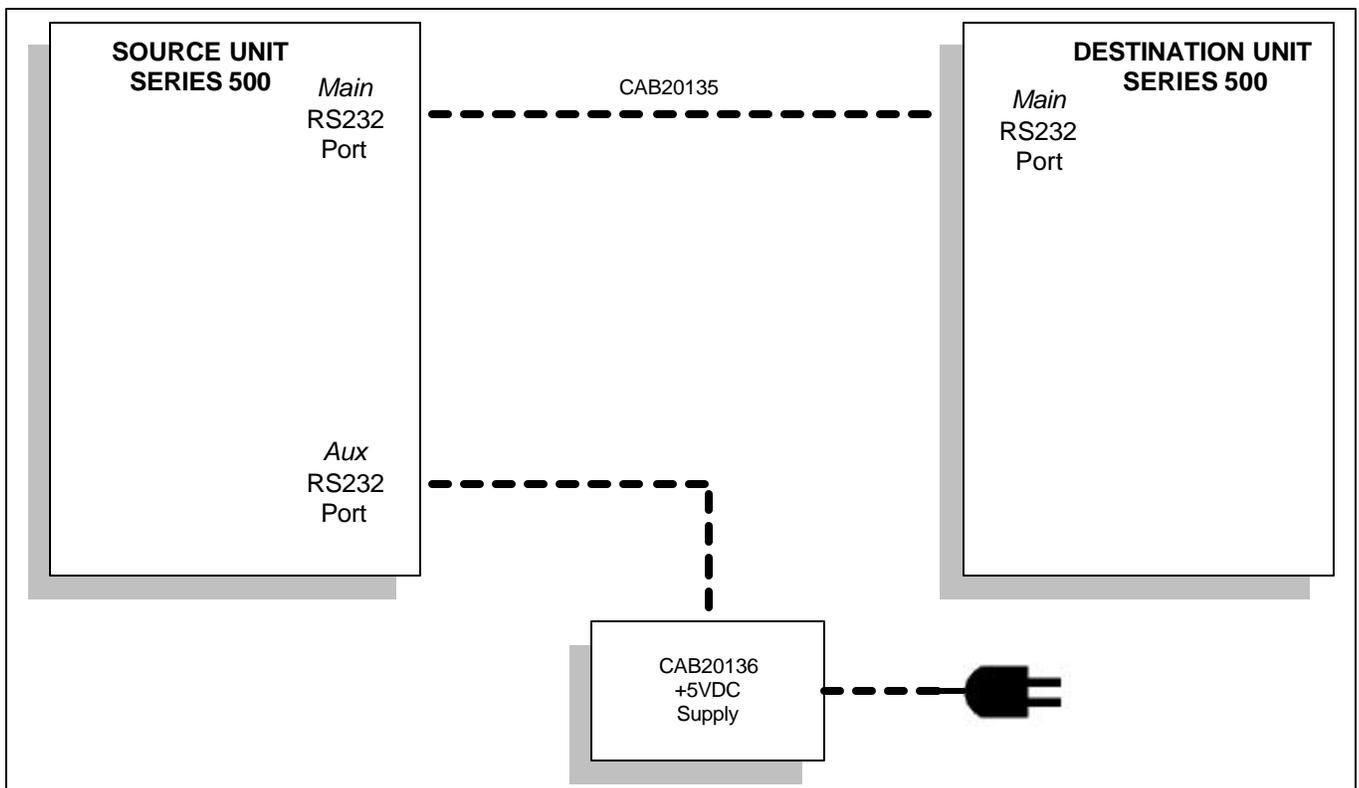
Figure 5. Keyboard downloading connection diagram

2. At the source keyboard, swipe the Programmer's card in the magnetic stripe reader (MSR). For keyboards equipped with an optional 3-position keyswitch adjacent to the LED indicators, set the switch to the AUX position, then enter **882** at the numeric keypad.

3. All LED indicators turn on and the keyboard enunciator beeps three times.

4. At the source keyboard numeric keypad, enter **98**.

5. Exit the local programming mode by typing **99** on the source keyboard numeric keypad or by swiping the Programmer's card. For keyboards equipped with an optional 3-position keyswitch, move the switch out of the AUX position. This returns the keyboard to normal operation.

6. Repeat steps 1 through 5 for next target keyboard or disconnect equipment.

OPERATOR'S AND PROGRAMMER'S MAGNETIC CARDS

Operator's and/or Programmer's magnetic cards are available for purchase from Ultimate Technology Corporation should the need for replacement or customized cards be required.

SYSTEM LOG

The Series 500 POS Keyboard maintains a system log to monitor and record both external and internal operating events. When Function Code 90 is entered at the keyboard, this system log data is transferred via the keyboard main port to a terminal/PC for monitoring or for capture as a data file. Refer to Table 2 for instructions needed to initiate Function Code 90.

MAINTENANCE

The Series 500 POS Keyboard requires minimal routine maintenance. However, reasonable care of the keyboard will extend its life. The following precautions and routine maintenance actions are recommended.

PRECAUTIONS

- Do not drop keyboard or allow it to be subjected to impact.

- Keep liquids away from keyboard.

  Thin liquids, such as water, spilled into the keyboard may cause permanent damage. If you spill a thin liquid into the keyboard, disconnect it from the system. Turn it over and allow to drain. Allow to dry for 24 hours, then reconnect to system. If it does not work, consult a qualified service technician. The keyboard may need to be repaired or replaced.

  If you spill heavy or thick liquids into the keyboard, consult a qualified service technician. The keyboard may need to be repaired or replaced.

CLEANING

Cleaning the keyboard is the most important action the user can perform. The frequency of cleaning is dependent on the environment.

- Wipe the exterior with a soft cloth as needed. Do not use cleaning products as they may discolor or damage the finish.

- Use a can of compressed air as used for servicing computer components to remove any dust that has accumulated on the keyboard or between the keys.

KEY LEGEND CHANGE
3/4 AND 5/8-INCH FULL TRAVEL KEYBOARDS

NOTE

A full line of keycaps or relegendable tops is available for purchase from Ultimate Technology Corporation in a variety of colors and with legends customized to the users specifications.

The key legends for full travel keyboards can be changed by one of two methods depending on the type of keys installed on the keyboard. For keys with legends permanently printed on the keys, the entire keycap can be changed by placing a flat head screwdriver under the existing key and applying an upward pressure to aid in pulling off the key top, then push on the new key. The legends for keyboards with relegendable keys tops are changed by removing the dear top portion of the key, replacing the existing legend tab with a new one, then replacing the clear top.

KEY LEGEND CHANGE - FLAT TACTILE MEMBRANE

NOTE

Legend sheets customized to the users specifications are available for purchase from Ultimate Technology Corporation.

The key legends for flat tactile membrane keyboards are printed on a single legend sheet that can be changed by pulling up and removing the access panel on the left side of the keyboard case. No tools are required. With the access panel removed, slide out the existing legend sheet. Slide the new legend sheet under the seal, then replace the access panel making sure that it fits securely into the base.

BATTERY REPLACEMENT

The keyboard contains a 3-volt lithium battery replaceable with Panasonic Part No. 884-0316, Eveready Part No. 729-6010, Duracell Part No. 737-0439, or equivalent. Under normal use of the keyboard, this battery typically has a 5-year life. To replace the battery, proceed as follows:

WARNING

Never try to disassemble, recharge, or short circuit battery. Never expose batteries to excessive heat.

Keep batteries out of the reach of children. If battery should accidentally be swallowed, contact a doctor immediately.

Never try to disassemble or modify any battery, or battery pack, for use in the keyboard.

Always dispose of used batteries in a proper and environmentally safe manner. If necessary, used batteries may be returned to Ultimate Technology Corporation for proper disposal.

```
┌─────────────────────────────────────────────────────┐
│                                                     │
│                    CAUTION                          │
│                                                     │
│    Replacement of the battery may result in the need to reprogram │
│    the keyboard.    For programming instructions, refer to the    │
│    programming section of this manual.              │
│                                                     │
└─────────────────────────────────────────────────────┘
```

1. Disconnect keyboard from system.

2. Turn keyboard over to gain access to 5 screws that secure the base of the keyboard case to the top. Remove the 5 screws.

3. Turn keyboard upright. Gain access to the battery by lifting the top portion of the keyboard assembly from the base and placing it and the attached extended cable/connectors in front of the base.

4. Remove existing battery.

5. Making sure to observe correct polarity, install a new 3-volt lithium battery in the keyboard using one of the approved replacement batteries listed below, or an equivalent. Note that sweat and oil can prevent a battery's terminals from making electrical contact. To avoid this, wipe both sides before installing battery.

> Panasonic, Part No. 884-0316
> Eveready, Part No. 729-6010
> Duracell, Part No. 737-0439

6. Make sure that the cable/connectors are making good contact, then position the top of the keyboard assembly on the keyboard base. Turn the keyboard over and secure top of the keyboard to the base by installing the 5 screws.

7. Connect keyboard to system.

8. Dispose of the used battery in an environmentally safe manner. If necessary, the battery may be returned to the Ultimate Technology Corporation at the address shown below for proper disposal.

> Ultimate Technology Corporation
> 100 Rawson Road
> Victor, NY 14564

APPENDIX A
SERIES 500 POS STANDARD KEYBOARD LAYOUTS
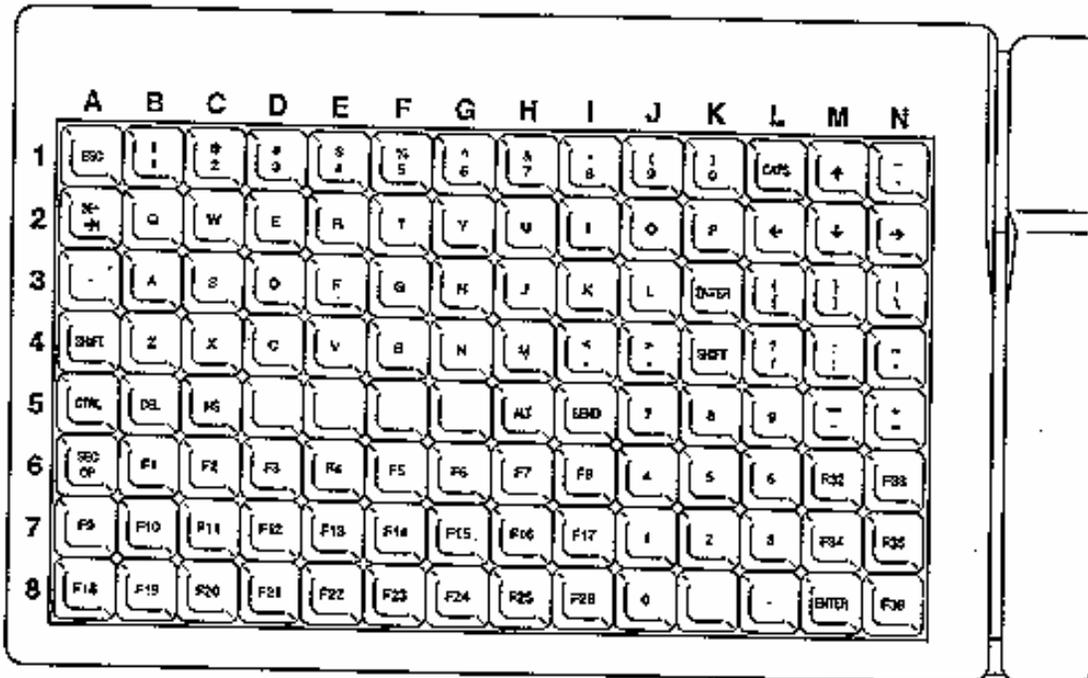
112 Key 3/4-Inch Standard Layout
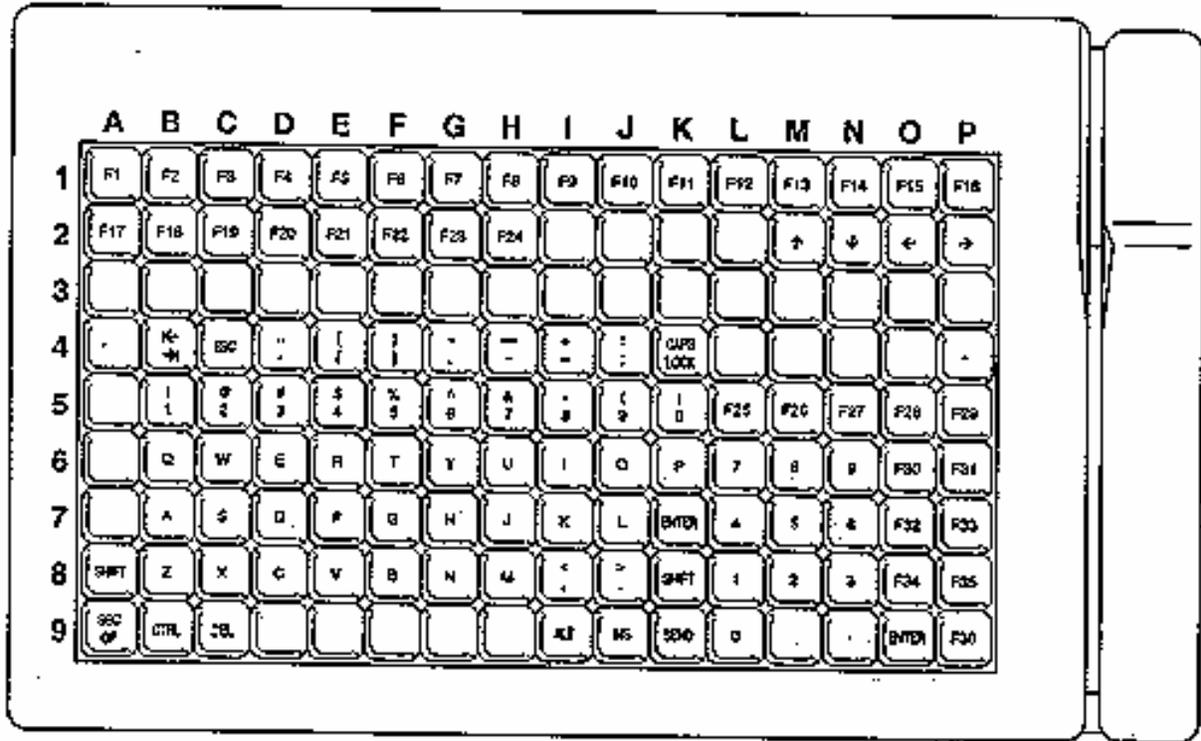
144 Key Compact 5/8-Inch Size and Flat Panel Membrane Standard Layout
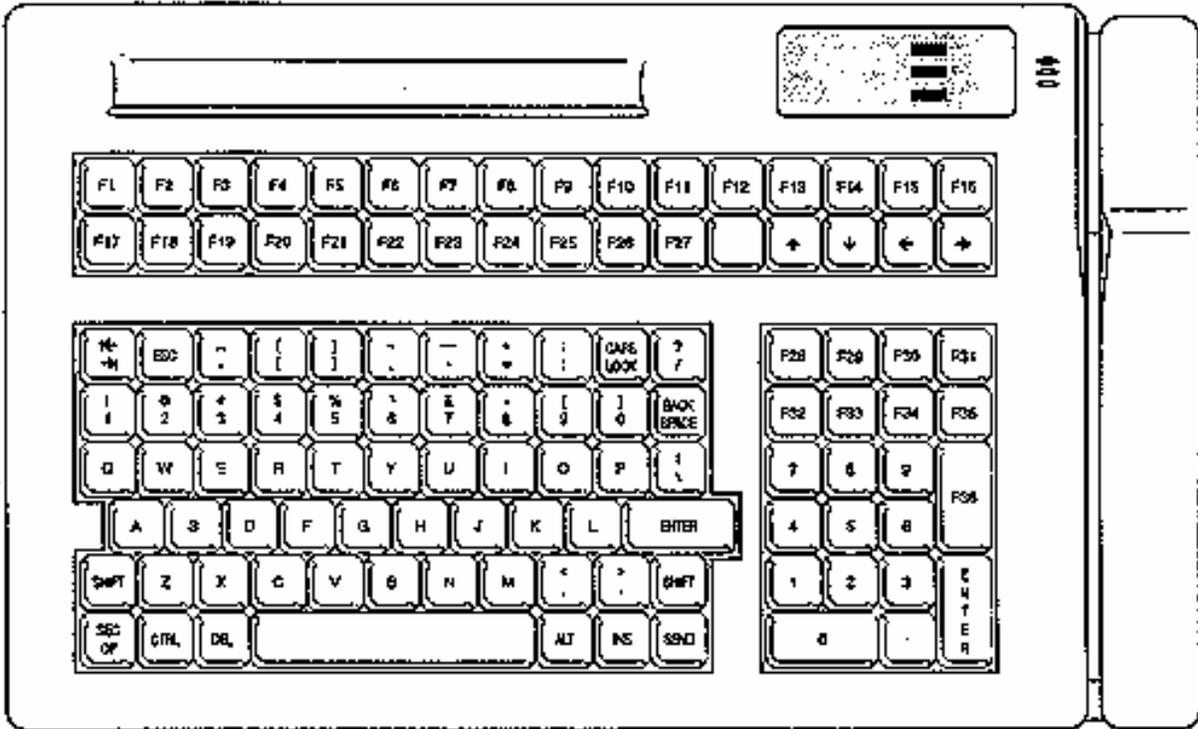
Compact 5/8-Inch QWERTY Layout

APPENDIX B
KEYBOARD CABLE/CONNECTOR DATA

BACK CONNECTOR PINOUTS

MAIN RS232 DB9 FEMALE
1 N/C
2 TXD OUT
3 RXD IN
5 GND
6 N/C
7 CTS IN
8 RTS OUT
9 +5 VDC IN/OUT

AUX RS232 DB9 MALE
1 N/C
2 RXD IN
3 TXD OUT
5 GND
6 N/C
7 RTS OUT
8 CTS IN
9 +5 VDC IN/OUT

KEYBOARD MAIN
1 DATA
2 N/C
3 GND
4 +5 VDC IN/OUT
5 CLOCK
6 N/C
KEYBOARD AUX
1 DATA
2 N/C
3 GND
4 +5 VDC IN/OUT
5 CLOCK
6 N/C

ADAPTER CABLE PINOUTS

CAB20135 CLONE CABLE

DB9 MALE		DB9 MALE
1	1	
2	3	
3	2	
4	4	
5 .....GND..........	5	
6	6	
7	8	
8	7	
9 .....+5VDC......	9	

CAB20136 POWER ADAPTER

DB9 FEMALE
1
2
3
4
5 SIGNAL GROUND
6
7
8
9 +5VDC @ 500mA

APPENDIX C
ASCII CHARACTER SET

00	Ctrl-@ (NUL)		30	0		60	'
01	Ctrl-A (SOH)		31	1		61	a
02	Ctrl-B (STX)		32	2		62	b
03	Ctrl-C (ETX)		33	3		63	c
04	Ctrl-D (EOT)		34	4		64	d
05	Ctrl-E	(ENQ)	35	5		65	e
06	Ctrl-F	(ACK)	36	6		66	f
07	Ctrl-G (BEL)		37	7		67	g
08	Ctrl-H (BS)		38	8		68	h
09	Ctrl-I	(HT)	39	9		69	i
0A	Ctrl-J	(LF)	3A	:		6A	j
0B	Ctrl-K (VT)		3B	;		6B	k
0C	Ctrl-L	(FF)	3C	<		6C	l
0D	Ctrl-M (CR)		3D	=		6D	m
0E	Ctrl-N (SO)		3E	>		6E	n
0F	Ctrl-O (SI)		3F	?		6F	o
10	Ctrl-P	(DLE)	40	@		70	p
11	Ctrl-Q (DCI)		41	A		71	q
12	Ctrl-R (DC2)		42	B		72	r
13	Ctrl-S	(DC3)	43	C		73	s
14	Ctrl-T	(DC4)	44	D		74	t
15	Ctrl-U (NAK)		45	E		75	u
16	Ctrl-V (SYN)		46	F		76	v
17	Ctrl-W (ETB)		47	G		77	w
18	Ctrl-X (CAN)		48	H		78	x
19	Ctrl-Y (EM)		49	I		79	y
1A	Ctrl-Z	(SUB)	4A	J		7A	z
1B	Ctrl-[	(ESC)	4B	K		7B	{
1C	Ctrl-\	(FS)	4C	L		7C		
1D	Ctrl-]	(GS)	4D	M		7D	}
1E	Ctrl-^	(RS)	4E	N		7E	~
1F	Ctrl-_	(US)	4F	O		7F	DEL
20	Space		50	P			
21	!		51	Q			
22	"		52	R			
23	#		53	S			
24	S		54	T			
25	%		55	U			
26	&		56	V			
27	'		57	W			
28	(		58	X			
29	)		59	Y			
2A	*		5A	Z			
2B	+		5B	[			
2C	,		5C	\			
2D	-		5D	]			
2E	.		5E	^			
2F	/		5F	_			

APPENDIX D
101/102-KEY KEYBOARD KEY NUMBER
TO SCAN CODE CROSS REFERENCE
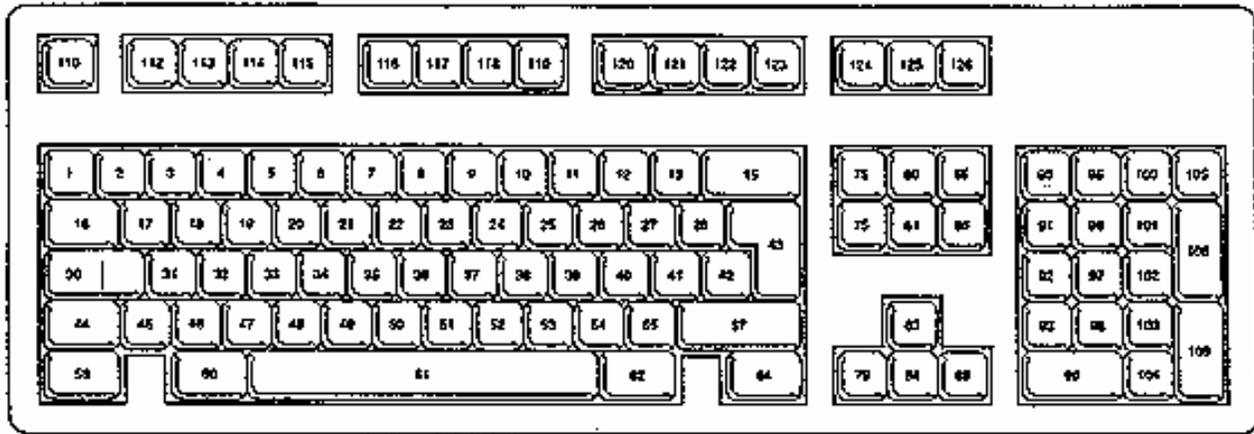
102-Key Keyboard Key Number Position Layout

KEY NUMBER (Decimal)	KEY NUMBER (Hexadecimal)	LEGEND	SCAN CODE		
			SET 1	SET 2	SET 3
1	01	`	29/A9	0E/F0 0E	0E/F0 0E
2	02	1	02/82	16/F0 16	16/F0 16
3	03	2	03/83	1E/F0 1E	1E/F0 1E
4	04	3	04/84	26/F0 26	26/F0 26
5	05	4	05/85	25/F0 25	25/F0 25
6	06	5	06/86	2E/F0 2E	2E/F0 2E

KEY NUMBER (Decimal)	KEY NUMBER (Hexadecimal)	LEGEND	SCAN CODE		
			SET 1	SET 2	SET 3
7	07	6	07/87	36/F0 36	36/F0 36
8	08	7	08/88	3D/F0 3D	3D/F0 3D
9	09	8	09/89	3E/F0 3E	3E/F0 3E
10	0A	9	0A/8A	46/F0 46	46/F0 46
11	0B	0	0B/8B	45/F0 45	45/F0 45
12	0C	-	0C/8C	4E/F0 4E	4E/F0 4E
13	0D	=	0D/8D	55/F0 55	55/F0 55
15	0F	Backspace	0E/8E	66/F0 66	66/F0 66
16	10	Tab	0F/8F	0D/F0 0D	0D/F0 0D
17	11	Q	10/90	15/F0 15	15/F0 15
18	12	W	11/91	1D/F0 1D	1D/F0 1D
19	13	E	12/92	24/F0 24	24/F0 24
20	14	R	13/93	2D/F0 2D	2D/F0 2D
21	15	T	14/94	2C/F0 2C	2C/F0 2C
22	16	Y	15/95	35/F0 35	35/F0 35
23	17	U	16/96	3C/F0 3C	3C/F0 3C
24	18	I	17/97	43/F0 43	43/F0 43
25	19	O	18/98	44/F0 44	44/F0 44
26	1A	P	19/99	4D/F0 4D	4D/F0 4D
27	1B	[	1A/9A	54/F0 54	54/F0 54
28	1C	]	1B/9B	5B/F0 5B	5B/F0 5B
29	1D	\	2B/AB	5D/F0 5D	5C/F0 5C
30	1E	Cap Lock	3A/BA	58/F0 58	14/F0 14
31	1F	A	1E/9E	1C/F0 1C	1C/F0 1C
32	20	S	1F/9F	1B/F0 1B	1B/F0 1B
33	21	D	20/A0	23/F0 23	23/F0 23
34	22	F	21/A1	2B/F0 2B	2B/F0 2B

KEY NUMBER (Decimal)	KEY NUMBER (Hexadecimal)	LEGEND	SCAN CODE		
			SET 1	SET 2	SET 3
35	23	G	22/A2	34/F0 34	34/F0 34
36	24	H	23/A3	33/F0 33	33/F0 33
37	25	J	24/A4	3B/F0 3B	3B/F0 3B
38	26	K	25/A5	42/F0 42	42/F0 42
39	27	L	26/A6	4B/F0 4B	4B/F0 4B
40	28	;	27/A7	4C/F0 4C	4C/F0 4C
41	29	'	28/A8	52/F0 52	52/F0 52
42	2A	No Key on 101 keyboard	2B/AB	5D/F0 5D	53/F0 53
43	2B	Enter	1C/9C	5A/F0 5A	5A/F0 5A
44	2C	Left Shift	2A/AA	12/F0 12	12/F0 12
45	2D	No Key on 101 keyboard	56/D6	61/F0 61	13/F0 13
46	2E	Z	2C/AC	1A/F0 1A	1A/F0 1A
47	2F	X	2D/AD	22/F0 22	22/F0 22
48	30	C	2E/AE	21/F0 21	21/F0 21
49	31	V	2F/AF	2A/F0 2A	2A/F0 2A
50	32	B	30/B0	32/F0 32	32/F0 32
51	33	N	31/B1	31/F0 31	31/F0 31
52	34	M	32/B2	3A/F0 3A	3A/F0 3A
53	35	,	33/B3	41/F0 41	41/F0 41
54	36	.	34/B4	49/F0 49	49/F0 49
55	37	/	35/B5	4A/F0 4A	4A/F0 4A
57	39	Right Shift	36/B6	59/F0 59	59/F0 59
58	3A	Left Control	1D/9D	14/F0 14	11/F0 11
60	3C	Left Alternate	38/B8	11/F0 11	19/F0 19

KEY NUMBER (Decimal)	KEY NUMBER (Hexadecimal)	LEGEND	SCAN CODE		
			SET 1	SET 2	SET 3
61	3D	Space bar	39/B9	29/F0 29	29/F0 29
62	3E	Right Alternate	E0 38/E0 B8	E0 11/E0 F0 11	39/F0 39
64	40	Right Control	E0 1D/E0 9D	E0 14/E0 F0 14	58/F0 58
75	4B	Insert	E0 52/E0 D2	E0 70/E0 F0 70	67/F0 67
76	4C	Delete	E0 53/E0 D3	E0 71/E0 F0 71	64/F0 64
79	4F	←	E0 4B/E0 CB	E0 6B/E0 F0 6B	61/F0 61
80	50	Home	E0 47/E0 C7	E0 6C/E0 F0 6C	6E/F0 6E
81	51	End	E0 4F/E0 CF	E0 69/E0 F0 69	65/F0 65
83	53	↑	E0 48/E0 C8	E0 75/E0 F0 75	63/F0 63
84	54	↓	E0 50/E0 D0	E0 72/E0 F0 72	60/F0 60
85	55	Page Up	E0 49/E0 C9	E0 7D/E0 F0 7D	6F/F0 6F
86	56	Page Down	E0 51/E0 D1	E0 7A/E0 F0 7A	6D/F0 6D
89	59	→	E0 4D/E0 CD	E0 74/E0 F0 74	6A/F0 6A
90	5A	Num Lock	45/C5	77/F0 77	76/F0 76
91	5B	Keypad Home	47/C7	6C/F0 6C	6C/F0 6C
92	5C	Keypad ←	4B/CB	6B/F0 6B	6B/F0 6B
93	5D	Keypad End	4F/CF	69/F0 69	69/F0 69
95	5F	/	E0 35/E0 B5	E0 4A/E0 F0 4A	77/F0 77
96	60	Keypad ↑	48/C8	75/F0 75	75/F0 75

KEY NUMBER (Decimal)	KEY NUMBER (Hexadecimal)	LEGEND	SCAN CODE		
			SET 1	SET 2	SET 3
97	61	Keypad 5	4C/CC	73/F0 73	73/F0 73
98	62	Keypad ↓	50/D0	72/F0 72	72/F0 72
99	63	Keypad Insert	52/D2	70/F0 70	70/F0 70
100	64	Keypad *	37/B7	7C/F0 7C	7E/F0 7E
101	65	Keypad PgUp	49/C9	7D/F0 7D	7D/F0 7D
102	66	Keypad →	4D/CD	74/F0 74	74/F0 74
103	67	keypad PgDn	51/D1	7A/F0 7A	7A/F0 7A
104	68	Keypad Delete	53/D3	71/F0 71	71/F0 71
105	69	Keypad -	4A/CA	7B/F0 7B	84/F0 84
106	6A	Keypad +	4E/CE	79/F0 79	7C/F0 7C
108	6C	Keypad Enter	E0 1C/E0 9C	E0 5A/E0 F0 5A	79/F0 79
110	6E	Escape	01/81	76/F0 76	08/F0 08
112	70	F1	3B/BB	05/F0 05	07/F0 07
113	71	F2	3C/BC	06/F0 06	0F/F0 0F
114	72	F3	3D/BD	04/F0 04	17/F0 17
115	73	F4	3E/BE	0C/F0 0C	1F/F0 1F
116	74	F5	3F/BF	03/F0 03	27/F0 27
117	75	F6	40/C0	0B/F0 0B	2F/F0 2F
118	76	F7	41/C1	83/F0 83	37/F0 37
119	77	F8	42/C2	0A/F0 0A	3F/F0 3F
120	78	F9	43/C3	01/F0 01	47/F0 47
121	79	F10	44/C4	09/F0 09	4F/F0 4F
122	7A	F11	57/D7	78/F0 78	56/F0 56
123	7B	F12	58/D8	07/F0 07	5E/F0 5E

KEY NUMBER (Decimal)	KEY NUMBER (Hexadecimal)	LEGEND	SCAN CODE		
			SET 1	SET 2	SET 3
124	7C	Print/SysRq	E0 2A/E0 37 E0 B7/E0 AA	E0 12 E0 7C/E0 F0 7C E0 F0 12	57/F0 57
125	7D	Scroll Lock	46/C6	7E/F0 7E	5F/F0 5F
126	7E	Pause/Break	E1 1D/45 E1/ 9D C5	E1 14 77 E1 F0 14 F0 77	62/F0 62

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