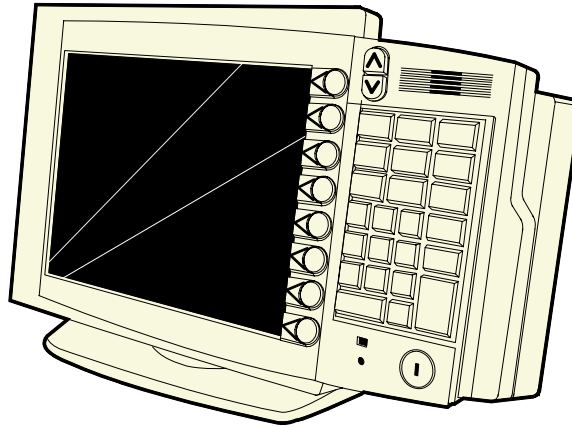


NCR RealPOS™ 5953 USB DynaKey™

Release 2.1

User Guide



2006

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Issue B

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Address correspondence to:

Manager, Information Products
NCR Corporation
2651 Satellite Blvd.
Duluth, GA 30096

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Preface

Safety Requirements

Caution: This device should only be powered by a power source which meets Safety Extra Low Voltage (SELV) and LPS (Limited Power Source) requirements per UL1950, IEC 950, and EN 60 950. The power source must be certified by the appropriate safety agency for the country of installation.

Audience

This manual is written for hardware installer/service personnel, system integrators, programmers, and field engineers.

Table of Contents

Chapter 1: Overview

Introduction	1-1
Compatibility	1-2
Features	1-2
Controller Board	1-2
Multi-Color Power LED	1-3
Keylock Positions	1-4
External Standard PC Keyboard Connector	1-4
Special <i>PC Setup</i> Keypad Layout.....	1-5
Three-Track MSR or Two-Track JIS MSR.....	1-5
Speaker.....	1-5
Integrated 2 x 20 Customer Display	1-5

Chapter 2: Site Preparation

Physical Environment	2-1
Operating Range.....	2-1
Storage Range	2-1
Transit Range	2-1
Electrical Requirements	2-2
Power Consumption	2-2
Cable Length Limitations	2-2
Dimensions	2-3

Chapter 3: Hardware Installation

Introduction	3-1
Serial Number Location.....	3-2
Cable Connector Access	3-3
Mounting Options	3-3
Installing a USB DynaKey	3-4

Installing a Remote Table Top USB DynaKey (5964-K032)	3-4
Installing an Integrated Customer Display (5972-F040)	3-6
Installing a Checkstand Mounted DynaKey	3-11
Installing a 5953-K023 Checkstand Mount	3-11
Powering Up	3-15
Special Keypad Mode	3-15
Normal Operating Mode	3-18
Screen Saving Feature	3-19

Chapter 4: Programming

Firmware	4-1
USB DynaKey Capabilities	4-1
FPGA Firmware Defaults	4-2
Unique POS Capabilities	4-2
NCRUsbKeyboardCtl HID usages	4-2
Programmable Key Matrix	4-4
Configurable Key Click Tone	4-8
NCR Platform Software Components	4-9
NCR USB DynaKey Control Parameterization Registry Values	4-11
NCR USB DynaKey Control Data Capture Registry Values	4-12
12.1-Inch USB DynaKey Video Drivers	4-15

Chapter 5: 5953 USB DynaKey Migration

Overview	5-1
Discussion	5-3
LCD 800x600 High-Bright Long-Life Color	5-4
LCD Interface	5-4
Touch option	5-4
Hot Plug	5-5

POS-Checkout Style Keyboard.....	5-5
Double-High / Double-Wide Keys.....	5-6
Keyboard Programmability	5-7
Keylock	5-8
Key Click.....	5-8
Error Tone.....	5-8
MSR	5-8
Scanner port	5-9
Additional ports	5-9
Power LED	5-9
Fingerprint Sensor	5-9
Smartcard Reader	5-10
Key Re-mapping Registry Manipulation Tool.....	5-11

Chapter 6: Hardware Service

Safety Requirements.....	6-1
Problem Isolation Procedures.....	6-2
Troubleshooting Table.....	6-2
Servicing the DynaKey Module.....	6-5
Disassembling the DynaKey	6-5
Removing the Remote Table Top Mount.....	6-6
Removing the Back Cover.....	6-7
Removing the MSR.....	6-8
MSR Cleaning Cards.....	6-9
Removing the Speaker Assembly	6-9
Removing the Controller Board	6-10
Removing the LCD	6-12
Removing the Keypad.....	6-14
Removing the Keylock Adapter Assembly	6-15
Replacing the Keylock assembly.....	6-16
Re-Assembling the DynaKey.....	6-16

Controller Board.....	6-17
Connector Identification.....	6-17
Connector Pin-Out Information	6-18
DVI Connector.....	6-18
Powered USB Connector.....	6-19
USB Connectors.....	6-20
Cables.....	6-21
DVI to DVI.....	6-21
Powered USB (12 V) to 2 x 4 Locking Connector	6-21
DVI to CHAMP.....	6-21
DynaKey Cleaning Procedures	6-22
Cleaning the Glass.....	6-22

Revision Record

Issue	Date	Remarks
A	Aug 2002	First issue
B	Dec 02	Updated Programming Chapter with firmware interface information

Radio Frequency Interference Statements

Federal Communications Commission (FCC)

Information to User

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense.

NCR is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by NCR. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user. The user is cautioned that changes or modifications not expressly approved by NCR may void the user's authority to operate the equipment.

Canadian Department of Communications

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectriques édicté par le ministre des Communications du Canada.

Voluntary Control Council for Interference (VCCI)

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Declaration of Conformity

Manufacturer's Name	NCR Corporation
Manufacturer's Address	NCR Corporation Retail Systems Group – Atlanta 2651 Satellite Boulevard Duluth, GA 30096-5810
Type of Equipment	Information Technology Equipment
Model Number	Class 5953
Electrical Ratings (Input)	12 V dc, 2.0 A

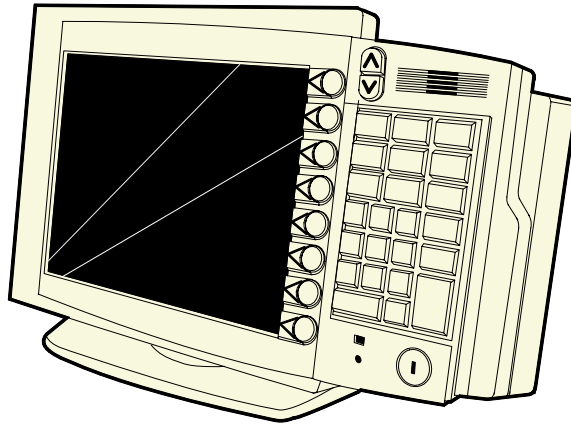
NCR Corporation, 1700 South Patterson Boulevard, Dayton, OH 45459, USA, declares that the equipment specified above conforms to the referenced EU Directives and Harmonized Standards.

EU Directive	Harmonized Standard(s)
89/336/EEC (EMC)	EN 55022 EN 55024
73/23/EEC (Low Voltage)	EN 60 950: A1 + A2 + A3 + A4 + All

Director of Quality Assurance
NCR Corporation
Retail Products & Systems – Atlanta
2651 Satellite Boulevard
Duluth, GA 30096-5810

European Contact:
International IP Counsel
206 Marylebone Road
London, NW1 6LY, England

Chapter 1: Overview



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Introduction

The NCR RealPOS 5953 USB DynaKey™ is a Point-of-Sale (POS) keyboard with a built-in 12.1-inch flat panel Liquid Crystal Display (LCD). Unique to the DynaKey is a set of *ATM-style* keys (*DynaKeys*), which are located beside the display. The functions of these keys change depending on the software application appearing on the LCD.

Also included is an optional Keylock or Fingerprint recognition, a 3-track ISO or 2-track JIS Magnetic Stripe Reader (MSR), a speaker, and 3 USB Type A connectors for external devices.

The speaker volume is controlled by software.

The 5953 interfaces with the host terminal via two cables.

- Powered Universal Serial Bus (USB) for data and power
- Digital Visual Interface (DVI) cable for video

Compatibility

The USB DynaKey is designed for the following terminals:

- NCR 7452 (Release 4.0 or later)
- NCR 7456

Features

- DVI Communications - industry standard video communications
- USB Communications - Three Type A connectors for external devices
- Field Programmable Gate Array (FPGA) - Controls the Keylock, Speaker, LED, MSR, and Keypad. It communicates to the host terminal through the USB Hub.
- 12.1-Inch active-matrix (TFT) color LCD - SVGA, 800 x 600, 262,144 colors
- Multi-color power status LED
- Keylock
- Three-track ISO MSR and JIS two-track MSR (optional)
- Speaker (separate from the PC speaker)
- Scanner interface (USB)
- Integrated 2 x 20 Customer Display (optional)
- Integrated keypad

Controller Board

The Controller Board contains a Field Programmable Gate Array (FPGA) and configuration Flash memory. Except for video, all communications from the 5953 to the host terminal are through the Universal Serial Bus (USB) hub.

Multi-Color Power LED

On the face of the USB DynaKey is a multi-color power LED. The status and condition indicated by the LED are shown as follows.

Status	Condition
Green	DynaKey power on
Orange*	LCD in standby mode (or see note below)
Red	FPGA reporting an error condition
Flashing (red/green)	DynaKey keypad in <i>PC Setup</i> mode (See Special Keypad mode in Installation)
Off	DynaKey powered off

Note: The LED may also be orange for a few seconds on power-up before display is active.

Keylock Positions

The USB DynaKey includes a standard NCR Keylock, accessible through the FPGA.

There are four positions: Exception, Locked, Retail, and Supervisor. They are explained in the following table.

Abbreviation	Position	Description
Ex	Exception	Used by the customer or service representative to perform low level programming such as workstation diagnostics, configuring the workstation, or loading the workstation.
L	Locked	Used to lock keyboard input to prohibit use of normal functions.
R	Retail	Used when performing normal retail mode functions.
S	Supervisor	Used by the supervisor to provide highest level of workstation control in cases such as refunds and running totals.

External Standard PC Keyboard Connector

An external keyboard can be connected to the 5953 through one of the external USB ports. This permits alphanumeric entry via a standard computer keyboard. Data is simply passed through to the host via the Powered USB connector.

Special PC Setup Keypad Layout

On power-up, the operator can switch the DynaKey into an alternate keypad layout that can be used with many PC BIOS setup and configuration routines. The alternate layout contains keys such as ESC, TAB, END, "+", "-" and arrow keys which are not available in the normal keypad layout. The alternate layout allows the operator to configure a PC without an external alphanumeric keyboard. (See the *Installation* chapter.)

Three-Track MSR or Two-Track JIS MSR

The 5953 includes an optional integrated International Organization for Standardization (ISO) three-track analog MSR head or a two-track JIS MSR head.

Speaker

The 5953 includes a built-in speaker. By default, it sounds key clicks, but it can be programmed to sound tones under control of the application program. The speaker is tied to the speaker control of the host terminal so that whenever the terminal speaker sounds, so does the 5953 speaker.

Integrated 2 x 20 Customer Display

The Model 5953 supports an optional integrated 2 x 20 VFD customer display. The display is installed using the 5964-K032 Remote Table Top Mount and the 5972-F040 Integrated Post Mount.

Chapter 2: **Site Preparation**

Physical Environment

Operating Range

Condition	Range
Temperature	5° to 45°C
Relative Humidity	10% to 90% (Non-condensing)
Atmospheric Pressure	3000 meters (max.)

Storage Range

Condition	Range
Temperature	-10° to 50°C
Relative Humidity	10% to 90%

Transit Range

Condition	Range
Temperature	-40° to 60°C (One week max.)
Relative Humidity	5% to 95%

Electrical Requirements

	Voltage	Tolerance	Current (Max)
5953 Module (from Host)	+12 V Supply Voltage	±10%	1600 mA
External USB Port	+5V	±5%	500 mA
External USB Port	+5V	±5%	500 mA
External USB Port	+5V	±5%	500 mA
Fingerprint Board (Optional)	+5V	±5%	100 mA

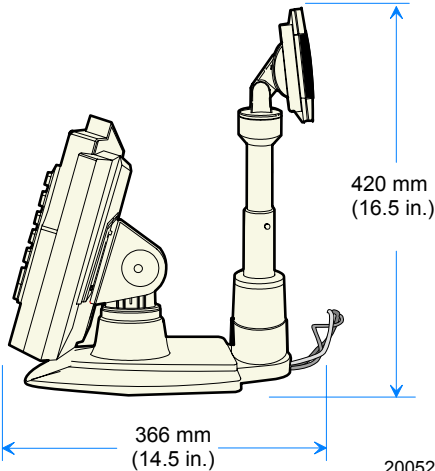
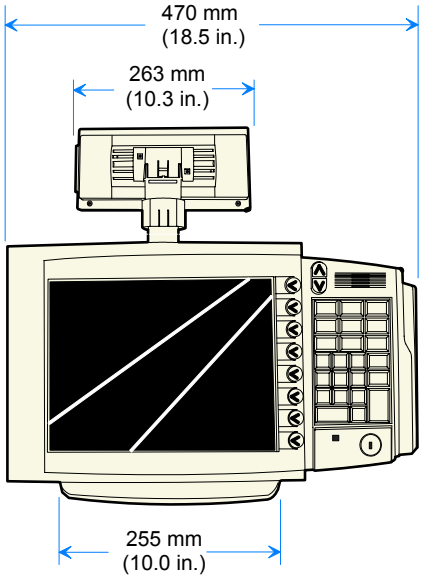
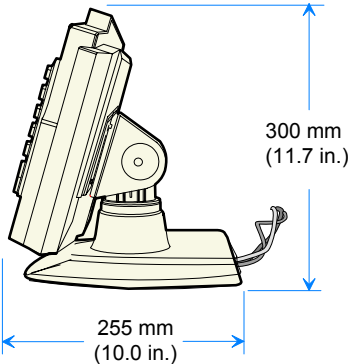
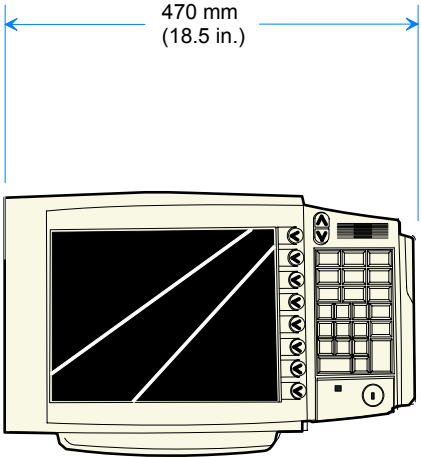
Power Consumption

	Typical	Maximum
5953 Module	16.0 W	19.2 W

Cable Length Limitations

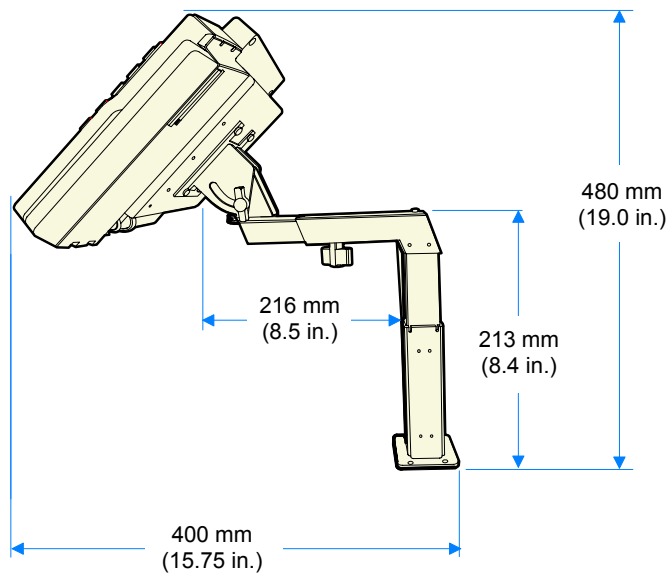
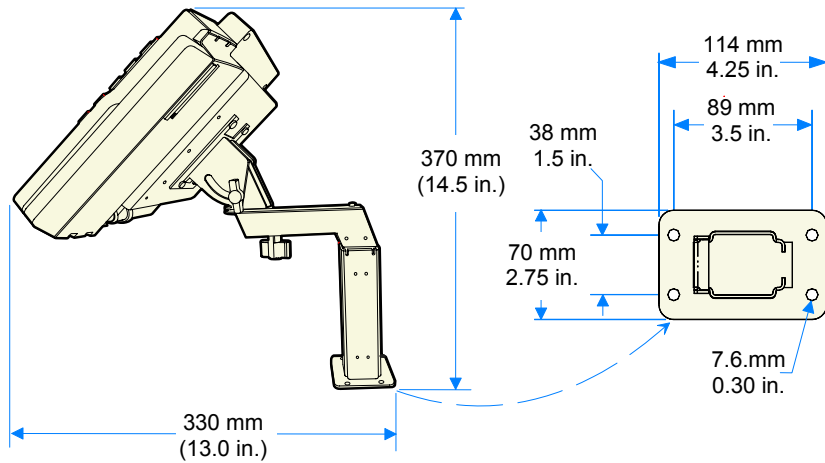
Configuration	Length
Connected to a host terminal	4 m (13 ft)

Dimensions

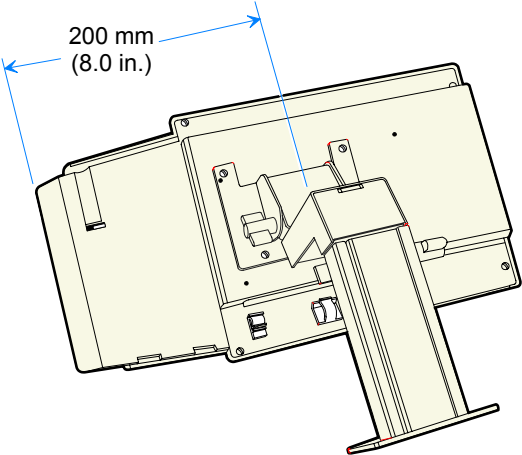
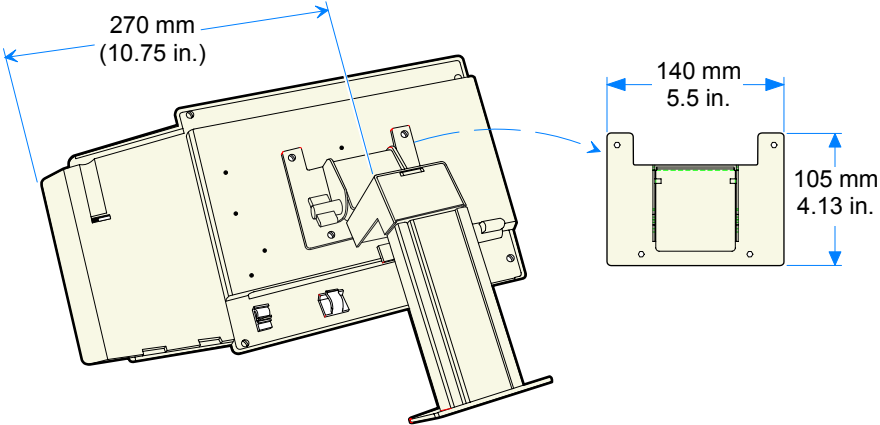


5953-K023 Checkstand Mount

The Checkstand Mount is fully adjustable between the minimum and maximum dimensions that are illustrated below. The DynaKey can also be rotated right and left of center (shown) by approximately 90 degrees, as well as tilted from a vertical position to approximately 45 degrees (shown).



There are two positions to install the post to the back of the DynaKey.



Chapter 3: Hardware Installation

Introduction

Caution: This device should only be powered by a power supply source which meets Safety Extra Low Voltage (SELV) and LPS (Limited Power Source) requirements per UL1950, IEC 950, and EN 60 950. The power source must be certified by the appropriate safety agency for the country of installation.

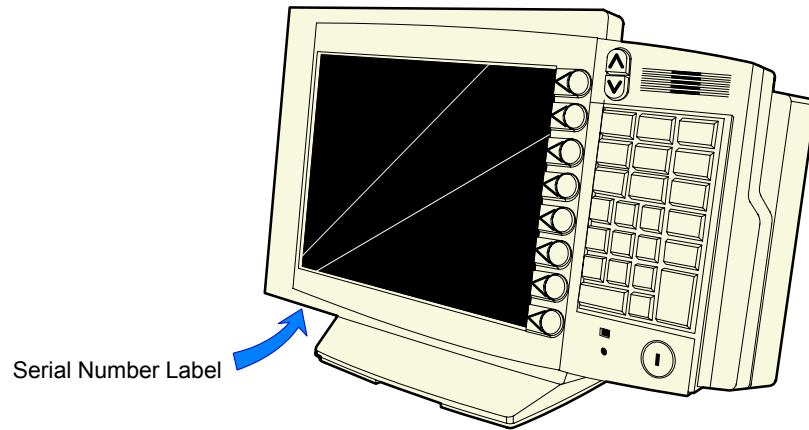
Caution: Use a grounding strap when installing this feature.

The DynaKey is fully assembled at the factory. This section describes:

- Serial number locations
- Cable Connector Access
- Mounting Options
- Installing a USB DynaKey
- Installing an Integrated Customer Display
- Powering Up
- Screen Saving Features

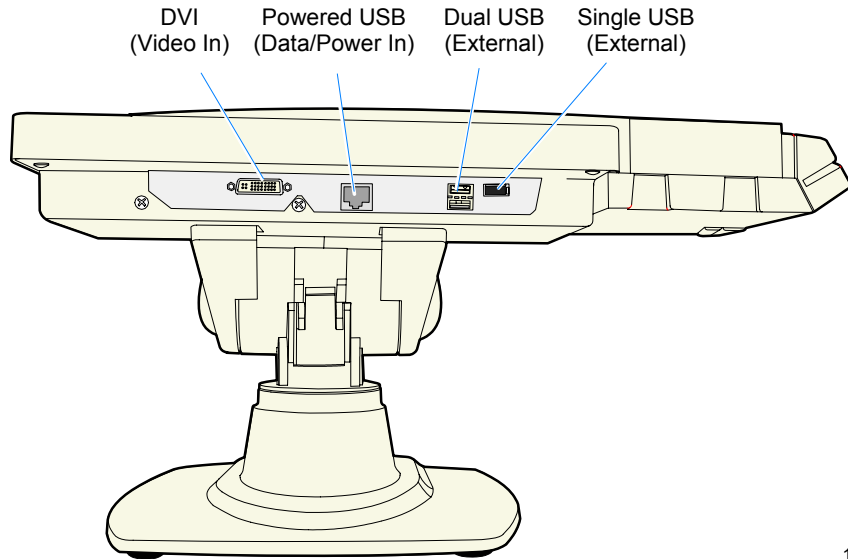
Serial Number Location

The serial number is located on the bottom edge of the DynaKey module.



Cable Connector Access

The cable connectors are located on the bottom of the 5953 assembly. Tilt display to access the cable connectors.



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Mounting Options

The 5953 USB DynaKey can be installed various configurations:

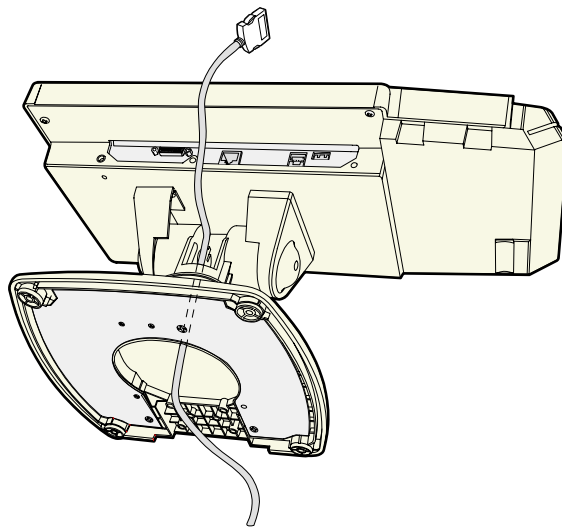
- 5964-K032 Remote Table-top Mount
- 7401-K533 Wall Mount
- 5952-K024 Checkstand Mount w/Base
- 5953-K023 Checkstand Mount

Installing a USB DynaKey

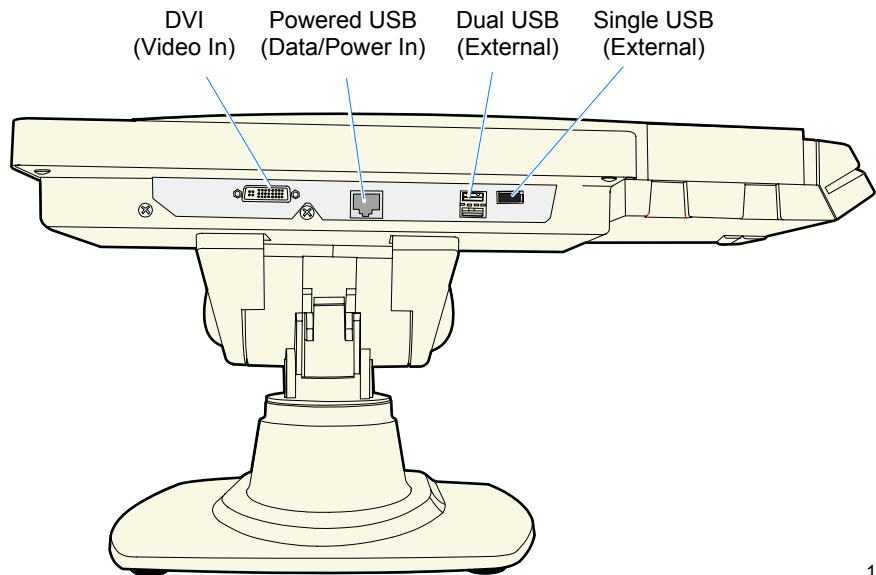
Installing a Remote Table Top USB DynaKey (5964-K032)

This section discusses how to install the USB DynaKey hardware configurations. See the terminal Hardware User's Guide for specific procedures about how to connect the USB DynaKey to the host terminal.

1. Route the Powered USB Cable and DVI Cable down through mount and out the back of the base.

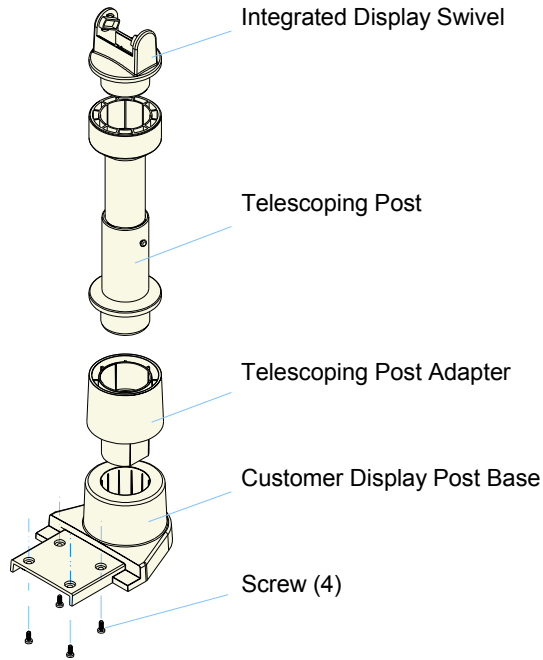


2. Connect the cables to the DynaKey.
 - Connect the terminal DVI cable to the DynaKey DVI connector.
 - Connect the terminal Powered USB cable to the DynaKey Powered USB connector.
 - Connect external USB devices to the DynaKey USB connectors (optional).

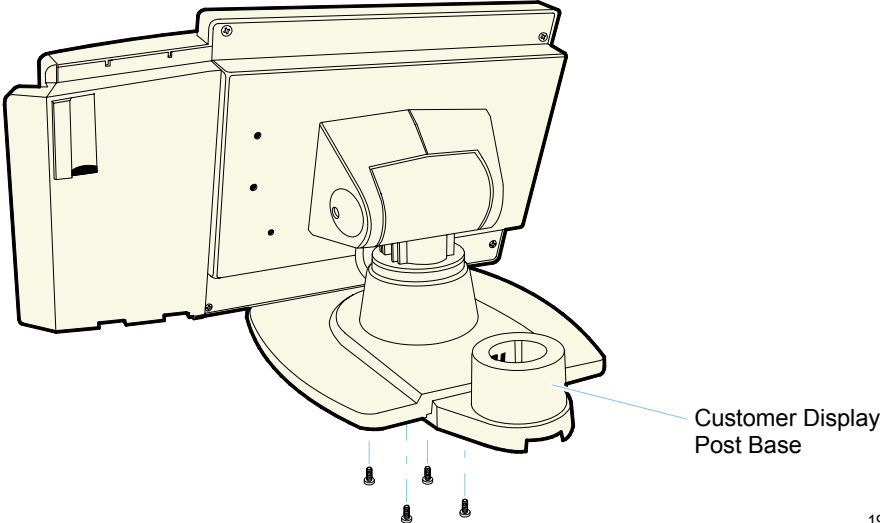


Installing an Integrated Customer Display (5972-F040)

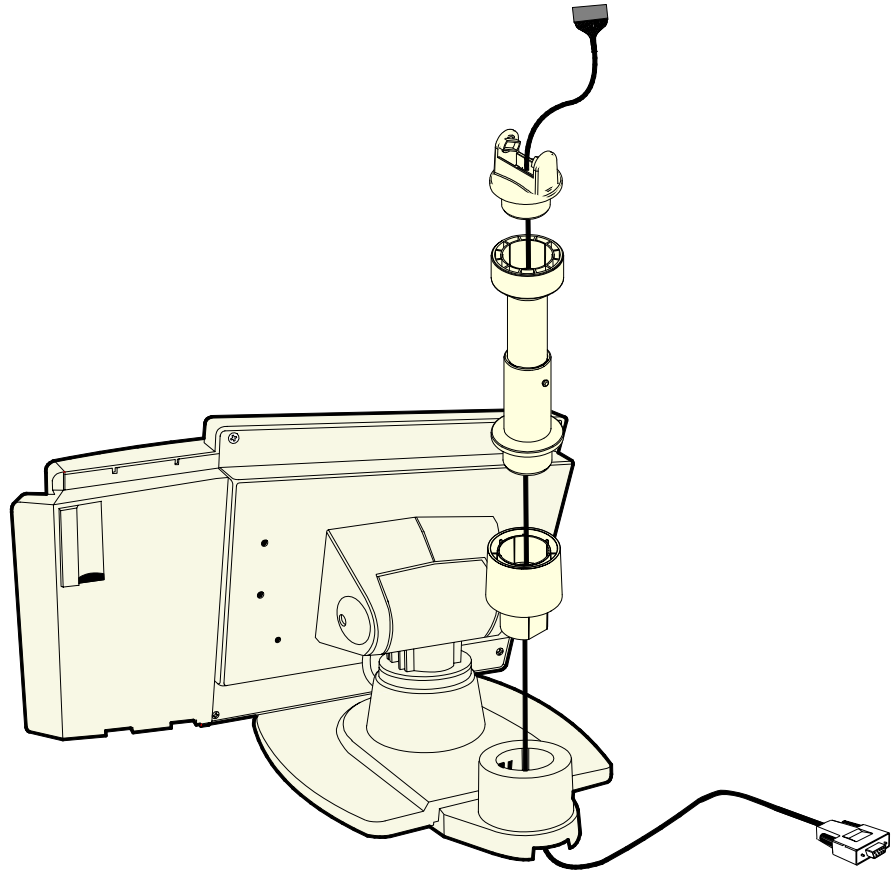
The Integrated 5972 2 x 20 Display is mounted to the 5953 using feature 5972-F040.



1. Install the Customer Display Post Base. Secure it with screws (4).



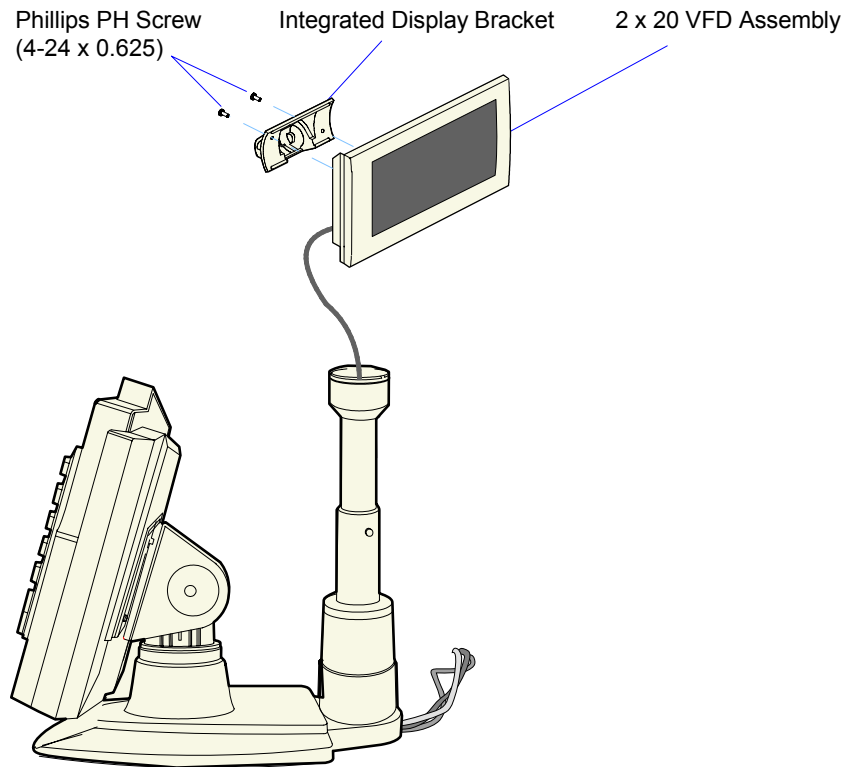
2. Route the cable (display connector end) up through the mount components as shown below. This is a tight fit and the connector has to be angled in order to make it through the openings. Use care to not damage the wires.



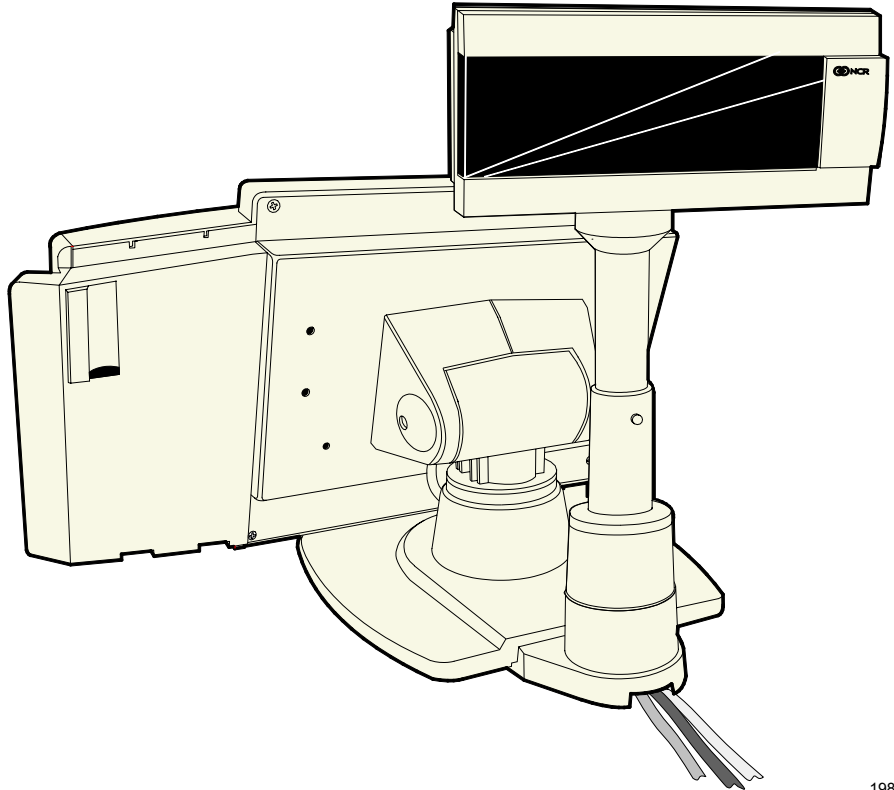
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3. Assemble the post components.

4. Connect the cable to the display module.
 - a) Remove the Integrated Display Bracket (2 screws).
 - b) Connect the cable to the 2 x 20 VFD Assembly.
 - c) Replace the Integrated Display Bracket.



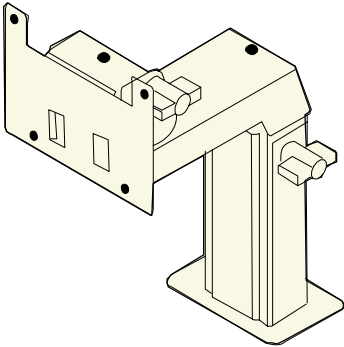
5. Install the Customer Display assembly onto the base of the table top mount.



6. Connect the Customer Display Cable to a Powered RS-232 connector on the host terminal.

Installing a Checkstand Mounted DynaKey

The 5953 USB DynaKey supports the 5953-K023 Checkstand Mount



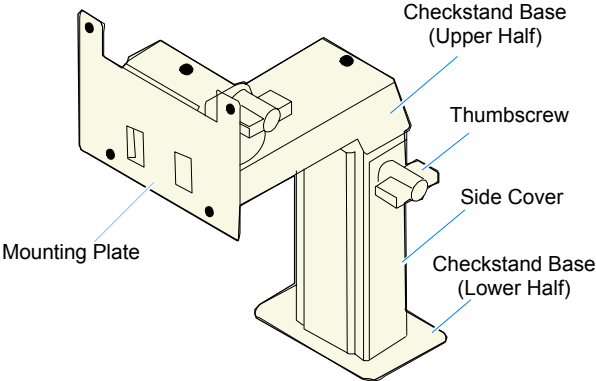
5953-K023 Checkstand Base

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Installing a 5953-K023 Checkstand Mount

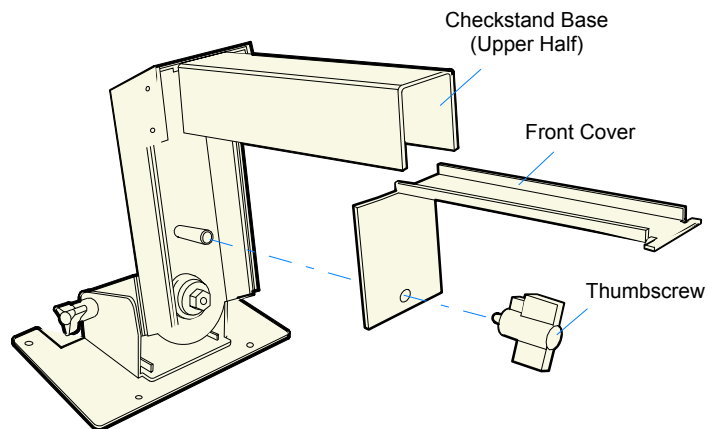
Note: The cable(s) for the USB DynaKey can be routed through the Checkstand Base

1. Loosen the Thumbscrew on the side of the Checkstand Base and then slide the upper half of the Checkstand Base out of the lower half of the Checkstand Base.

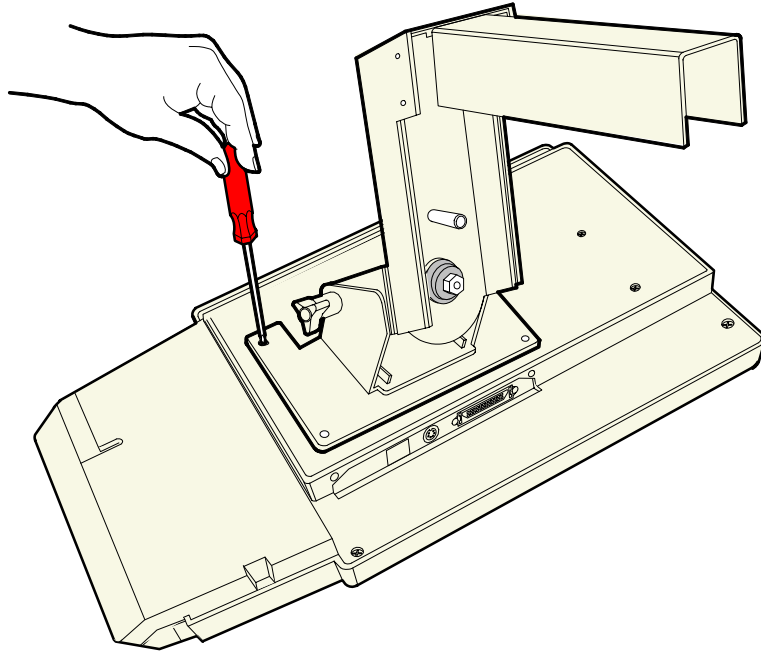


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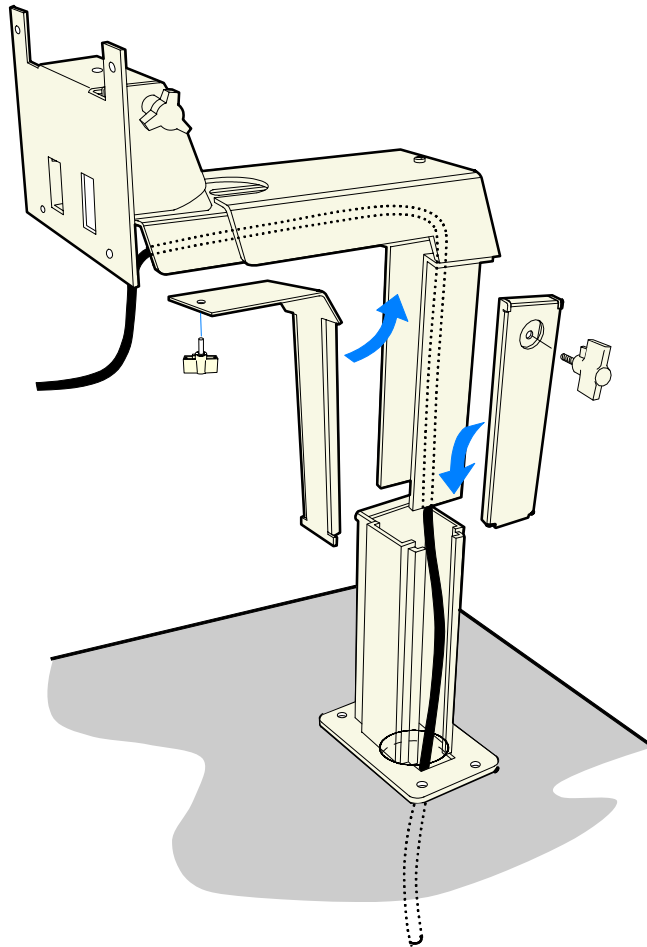
2. Slide the Side Cover off the lower half of the Checkstand Base.
3. In the desired location on the countertop drill four 6 mm (0.25 in.) holes for the mounting bolts and one 38 mm (1.5 in.) hole for the DynaKey cable(s). Use the Checkstand Base as a template for locating the holes.
4. Bolt the Checkstand Base (Lower Half) to the countertop.
5. Remove the Thumbscrew and the Front Cover from the Checkstand Base (Upper Half).



6. Screw the Checkstand Base onto the back of the DynaKey (4 screws).



7. Route the cables through the upper half of the Checkstand Base. Install the Thumbscrew and the Front Cover. Be sure to leave enough slack in the cables to permit easy tilting of the DynaKey.



8. Plug the LCD cable into the DynaKey.
 - Optional - Plug a scanner cable into the DynaKey.
 - Optional - Plug a PC-compatible keyboard cable to the DynaKey.

9. Route the cable(s) through the upper half of the Checkstand Base and install the Thumbscrew and the Front Cover. Be sure to leave enough slack in the cable(s) to permit easy tilting of the DynaKey.
10. Route the cable(s) into the lower half of the Checkstand Base and through the countertop.
11. Slide the Side Cover onto the lower half of the Checkstand Base.
12. Slide the upper half of the Checkstand Base into the lower half of the Checkstand Base and tighten the Thumbscrew.

Powering Up

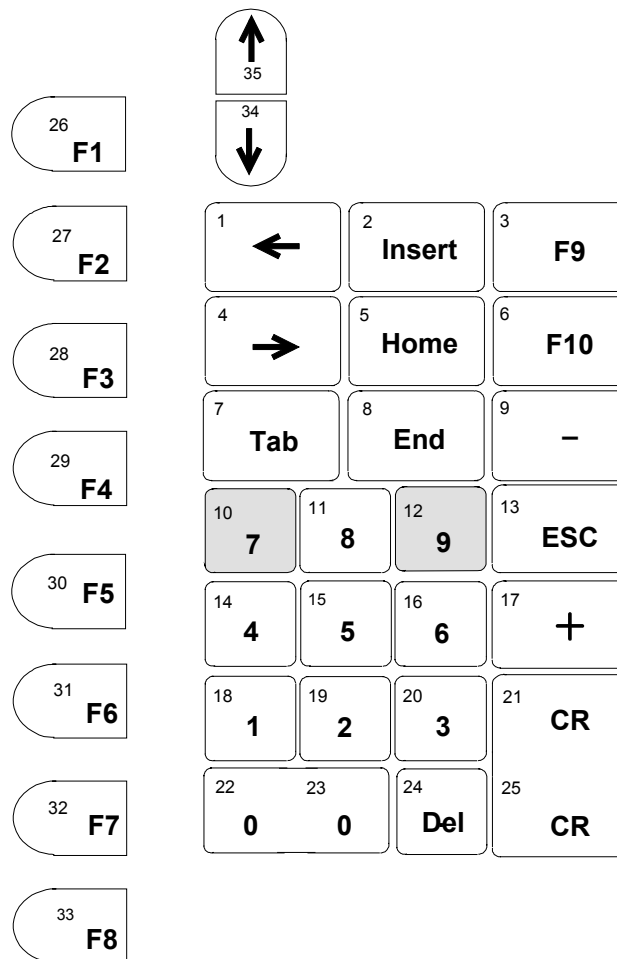
This section describes how to power up the system and the initial checkout procedures after all hardware has been installed.

1. Plug the terminal AC Power Cord into an AC power source.
2. Turn the Keylock on the DynaKey to the *Ex* position.
3. Power on the system.

Special Keypad Mode

The BIOS setup routine requires keys that are not present in the regular DynaKey keypad layout (such as the ESC and End keys). Although the DynaKey has a PC keyboard port, a PC keyboard may not be readily available to the operator. To use the DynaKey to run setup routines, you can place the DynaKey into a special alternate layout mode that replaces the normal layout of the keypad and function keys. To enter the special *Setup Keypad Mode*, proceed as follows:

1. Power up the system.
2. After the memory test completes, hold down key number *10* and key number *12* simultaneously. Make sure both keys are held down together. The *10* and *12* keys must be the first two keys pressed after a power on. If any other keys are pressed first, pressing the *10* and *12* keys simultaneously will **not** put the DynaKey into the *Setup Keypad Mode*. The status LED flashes red/green to indicate that the keypad entered the *Setup Keypad Mode*.



Note: Numeric keypad is shown in *calculator* layout.

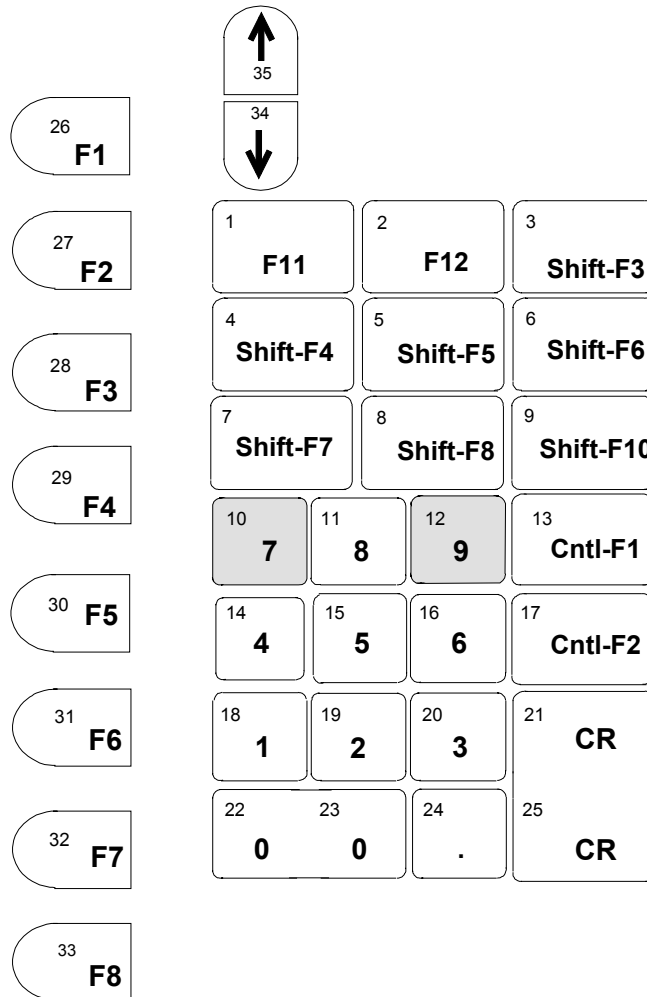
All unlabeled keys are non-functional in *Setup Keypad Mode*. Ignore any *stuck key* error messages displayed as a result of the keys being held down.

3. Press the [F2] key to put it into the BIOS configuration routine.
4. Use the special keypad layout to run the system's BIOS Configuration routine.

Note: The DynaKey *Setup Keypad Mode* is provided simply as a convenience feature. If you prefer not to use this mode, simply connect an external keyboard to one of the DynaKey USB ports to use for system configuration.

Normal Operating Mode

After setup and configuration, the keyboard can be reset to exit the *special keypad mode*. This is done by power cycling the DynaKey, or pressing the 10 and 12 keys simultaneously. This puts the keyboard back into its normal operating mode as shown. Usually keys 22 - 23 and 21 - 25 are capped together by default.



Note: Numeric keypad is shown in *calculator* layout.

Screen Saving Feature

The display has a time-out function that causes the display to go blank after several minutes of inactivity. The screen saving feature is controlled by NCR platform software integrated into the 5953 drivers.

Note: If your screen saver is active and the Keylock is in the *L* position, you may need to put the Keylock into another position to un-blank the LCD.

When a key is pressed to return the display from screen saver mode, the resulting keystroke is passed to the application by default. See the *Programming* chapter for information on how to program the controller for proper panel OFF/ON sequencing.

Chapter 4: Programming

Firmware

USB DynaKey Capabilities

The NCR USB DynaKey is a multifunction device comprised of several functions, including a keyboard switch matrix and a speaker. Both of these functions are controlled by a single field programmable gate array (FPGA).

The keyboard matrix translates between a key switch physical location and the key data reported to the host PC. This matrix is programmable. The matrix may be replaced in whole or in part, permitting any key to be mapped to any function.

The FPGA has the ability to sound a short chirp whenever a key is pressed, providing auditory feedback to an operator of the keyboard. This auditory feedback is optional. The FPGA may be configured to make the sound or not to make the sound, depending on the particular application.

The FPGA has no static memory and thus cannot retain any settings after power loss. Thus, each time the system to which this keyboard is connected is powered-up, or any time the keyboard is connected to a powered system, the FPGA must be informed of any pertinent settings. This function is an ActiveX/COM control (*NCRUsbKeyboardCtl*) that provides a mechanism by which the keyboard features of “key click sound” and “key translation matrix” can be set.

The keyboard firmware is standard USB compatible keyboard firmware with added extensions for POS-specific functions.

The keyboard supports the following minimum standard PC keyboard capabilities:

- System Reset (Control-Alt-Delete)

The keyboard has additional capabilities unique to the POS environment. The keyboard firmware supports the following POS functions:

- Programmable keyboard matrix
- Configurable key click tone

FPGA Firmware Defaults

During USB initialization all USB devices are required to enumerate. Each device reports its data and ID to the host where the Host USB driver sends the report to the corresponding USB Device Driver.

Power Up and Reset POS Default Conditions:

- Default keyboard matrix configuration
- Calculator style numeric keypad configuration
- Num Lock On.

Unique POS Capabilities

The keyboard firmware supports the following POS-specific extensions to the standard PC firmware:

- Programmable Key Matrix
- Configurable Keyclick Tone
- NCR Platform Software Components

NCRUsbKeyboardCtl HID usages

NCRUsbKeyboardCtl employs industry standard and NCR Proprietary HID Usage interfaces to exercise the keyboard control programming capability of the firmware. The NCR Proprietary usages are contained in the following table:

Table 1: NCR Proprietary HID Usages

Usage	Hexadecimal Value
HID_USAGE_PAGE_NCR_MISC	0xFF8F
KEYLOCK	0x01
KEYBOARD_TONE	0x02
KEYBOARD_MAP	0x03
KEY_CLICK_INFO	0x11
ERROR_TONE	0x12
TONE FREQUENCY	0x21
TONE DURATION	0x22
TONE VOLUME	0x23
KEY_MATRIX_USAGE	0x31

The report descriptors as emitted by the HID device should be consulted as the authority for the format of the reports. Software should access fields using report descriptor-based techniques and should not assume that all revisions of the product use identical report descriptors. The following provides interpretation information for these reports.

Keylock hardware HID interface: The keylock reports its positions as HID *buttons*. The positions are assigned as follows:

- Button 1 = Ex
- Button 2 = L
- Button 3 = R
- Button 4 = S.

Tone hardware interface: The ErrorTone usage collects a tone output report that sounds an immediate tone. The KeyClick usage collects a tone output report that sets the sound made for a key click. The units for *Duration* are milliseconds. The volume is a value between *Logical_Minimum* (silent) and *Logical_Maximum* (greatest volume). The tone is an index from Table 2: *Note Numbers and Frequencies*.

The MSR interface: The MSR conforms to the USB HID standard for MSRs as described in the HID Usage Tables for POS, Ver 1.02, see <http://www.usb.org/developers/hidpage.html#pos>.

The Key Matrix: The Key Matrix report contains an overlay for the keyboard look-up table. It is organized in *FPGA Offset* order, and contains pairs of 8-bit usages, one pair per key position. Values of zero produce no usage report. Two different usages produce two simultaneous usages being reported. The number of positions is given by the report descriptor.

Programmable Key Matrix

The keyboard matrix is completely programmable, translating between a key switch physical location and the key data reported to the host PC. Through this keyboard provision, you can switch the numeric keypad layout from the default calculator layout to a telephone layout by organizing the keyboard matrix to mimic either mode of operation.

Note: If you change the numeric keypad layout, you must also physically remove and swap the key caps on the first and third rows of the keypad. The key codes for the numeric keypad are identical to the IBM PS/2, 101-key keyboard.

Double-high/Double-wide Keys

Several keys on the keyboard can accept optional keycaps that cover two keys to produce double-high or double-wide keys. When you press a double-high or double-wide keycap, the keyboard firmware sends the keycode for both keys. When usages are the same, only one keycode is sent. Using the programmable key matrix feature, the keyboard matrix can be programmed to support double-high or double-wide keys by specifying the same key code for both key locations supported by the key cap.

Keyboard Matrix for 5953 USB DynaKey

The keyboard matrix comprises a list of key numbers and respective positions within the keyboard translation table. The default keyboard map for the 5953 USB DynaKey (Product ID 0x0321) is as follows:

Sorted by Offset							Sorted by KeyNumber						
X	Y	FPGA Offset	Key No.	Usage 1	Usage 2	System Function	X	Y	FPGA Offset	Key No.	Usage 1	Usage 2	System Function
0	0	0	32	0	40	F7	3	0	48	1	0	44	F11
0	1	2	33	0	41	F8	2	1	34	2	0	45	F12
0	2	4	6	E1	3E	LSh+F6	2	0	32	3	E1	3C	LSh+F3
0	3	6	17	E0	3B	LCtl+F2	0	7	14	4	E1	3D	LSh+F4
0	4	8	16	0	5E	6	0	5	10	5	E1	3E	LSh+F5
0	5	10	5	E1	3E	LSh+F5	0	2	4	6	E1	3F	LSh+F6
0	6	12	0	0	0		4	7	78	7	E1	40	LSh+F7
0	7	14	4	E1	3D	LSh+F4	1	5	26	8	E1	41	LSh+F8
1	0	16	0	0	0		1	2	20	9	E1	43	LSh+F10
1	1	18	0	0	0		6	7	110	10	0	5F	7
1	2	20	9	E1	43	LSh+F10	4	4	72	11	0	60	8
1	3	22	13	E0	3A	LCtl+F1	1	4	24	12	0	61	9
1	4	24	12	0	61	9	1	3	22	13	E0	3A	LCtl+F1
1	5	26	8	E1	41	LSh+F8	6	6	108	14	0	5C	4
1	6	28	0	0	0		5	4	88	15	0	5D	5
1	7	30	0	0	0		0	4	8	16	0	5E	6
2	0	32	3	E1	3C	LSh+F3	0	3	6	17	E0	3B	LCtl+F2
2	1	34	2	0	45	F12	6	5	106	18	0	59	1
2	2	36	0	0	0		7	4	120	19	0	5A	2
2	3	38	21	0	58	Enter	2	4	40	20	0	5B	3
2	4	40	20	0	5B	3	2	3	38	21	0	58	Enter

Configurable Key Click Tone

The FPGA has the ability to sound a short chirp whenever a key is pressed, providing auditory feedback to an operator of the keyboard. This auditory feedback is optional. The FPGA may be configured to make the sound or not to make the sound, depending on the particular application.

USB DynaKey Tone Frequencies

The frequency is transmitted to the FPGA as a *Note Number*. Note numbers are equivalent to specific frequencies. The note number sent to the FPGA is selected by rounding the requested frequency to the nearest frequency number given by the table of Note Numbers (**N**) and Frequencies (**freq**) listed in the following table.

Table 2: Note Numbers and Frequencies

Note	N	freq	N	freq	N	freq	N	freq	N	freq	N	freq
A	0	28	24	110	48	440	72	1760	96	7040	120	28160
Bb	1	29	25	117	49	466	73	1865	97	7459	121	29834
B	2	31	26	123	50	494	74	1976	98	7902	122	31609
C	3	33	27	131	51	523	75	2093	99	8372	123	33488
Db	4	35	28	139	52	554	76	2217	100	8870	124	35479
D	5	37	29	147	53	587	77	2349	101	9397	125	37589
Eb	6	39	30	156	54	622	78	2489	102	9956	126	39824
E	7	41	31	165	55	659	79	2637	103	10548	127	42192
F	8	44	32	175	56	698	80	2794	104	11175		
Gb	9	46	33	185	57	740	81	2960	105	11840		
G	10	49	34	196	58	784	82	3136	106	12544		
Ab	11	52	35	208	59	831	83	3322	107	13290		
A	12	55	36	220	60	880	84	3520	108	14080		
Bb	13	58	37	233	61	932	85	3729	109	14917		

Note	N	freq	N	freq	N	freq	N	freq	N	freq	N	freq
B	14	62	38	247	62	988	86	3951	110	15804		
C	15	65	39	262	63	1047	87	4186	111	16744		
Db	16	69	40	277	64	1109	88	4435	112	17740		
D	17	73	41	294	65	1175	89	4699	113	18795		
Eb	18	78	42	311	66	1245	90	4978	114	19912		
E	19	82	43	330	67	1319	91	5274	115	21096		
F	20	87	44	349	68	1397	92	5588	116	22351		
Gb	21	92	45	370	69	1480	93	5920	117	23680		
G	22	98	46	392	70	1568	94	6272	118	25088		
Ab	23	104	47	415	71	1661	95	6645	119	26580		

Note: The frequency f is given by the equation : $f \approx 27.5 \times 2^{\frac{N}{12}}$

This table provides the full set of frequencies defined, however the hardware itself may not generate all of these frequencies, and the frequencies actually generated may not exactly match any of the frequencies listed. Lower frequency numbers produce lower tones, and higher frequency numbers produce higher tones.

NCR Platform Software Components

NCR provides three platform software components for configuring the keyboard: the NCR USB DynaKey Control, the Set USB Key Matrix application and the Set USB Key Clicks application.

NCR USB DynaKey Control

NCRUsbKeyboardCtl is an ActiveX control that contains a method for setting the key clicks *SetClicks*, and a method for downloading the key translation matrix information, *SetKeyMatrix*.

The *SetClicks* method examines all currently-enumerated HID devices, finds those with a Vendor-ID equal to NCR's assigned Vendor ID (0x0404). Among all qualified devices found, each device is searched for a KEY_CLICK_INFO feature report that contains *Volume*, *Frequency*, and *Duration* usages. When a matching device is found, that device's product ID (PID) is used to locate keyclick values within the Registry. The values found in the registry are sent to the device in the KEY_CLICK_INFO feature report.

Each time *SetClicks* is invoked, it reads *Volume*, *Frequency*, and *Duration* keyclick parameters from the registry. If these parameters are not found in the registry, default values are written to the registry, and these default values are used. This causes the registry to contain the values most recently sent to NCR HID KeyClick devices.

The default values for *Volume*, *Frequency*, and *Duration*, *SetUsbKeyClick* are 15, 1318, and 16, respectively.

The *SetKeyMatrix* method examines all currently-enumerated HID devices, finds those with a Vendor-ID equal to NCR's assigned Vendor ID (0x0404). Among all qualified devices found, each device is searched for a KEYBOARD_MAP feature report that contains an array of KEY_MATRIX_USAGE usages. When a matching device is found, that device's PID is used to locate Key Matrix entries in the Registry. If no Key Matrix values are found for that specific PID, no Key Matrix download is performed.

For each KEYBOARD_MAP device located, *SetKeyMatrix* creates a full default keyboard matrix that duplicates the factory-default matrix of the specific product located. Next, the registry is read for replacement values within the Keyboard Matrix. All registry values found in the appropriate registry key are replaced within the default matrix. Finally, the full key matrix as modified by registry values is sent to the keyboard using the KEYBOARD_MAP feature report.

NCR USB DynaKey Control Parameterization Registry Values

Program Parameterization Registry values appear under the registry key: [HKEY_LOCAL_MACHINE\SOFTWARE\NCR\USBKeyboard\PID_0321\]

Table 3: Key-Value Definitions

Keyword ¹	Value (Decimal numbers)	Default	Registry
KeyClick\frequency ²	A frequency between 27Hz and 42192 Hz	1760	DWORD
KeyClick\volume ²	A value between 0 and 15	15	DWORD
KeyClick\duration ²	A number of milliseconds (0 - 1023) the sound should be produced	23	DWORD
KeyMatrix\keynumber ³	A single keyboard <i>usage</i> to be installed for <i>keynumber</i>	per key matrix section for PID_0321	DWORD

¹Keywords are not case sensitive.

²The Keywords *frequency*, *volume*, and *duration* and their values as sent to the keyboard tone device are written to the registry. This enables a systems management program to determine current keyclick settings.

³The *keynumber* value name is a decimal number that must be one of the possible key numbers for the designated product. For example, "SetKeyboardKeyEntry(0321)" requires the registry contain a key named HKLM\Software\NCR\USBKeyboard\PID_0321\KeyMatrix, and under this key there must be one or more values with names "1" through "128" that correspond to the key numbers.

NCR USB DynaKey Control Data Capture Registry Values

NCR Data Capture Registry values appear under the registry key:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\NCR\NCRUsbKeyboardCtl\DataCapture]
"DcapControl"="10 (Hex destination(s): 1=DCap App, 2=Debugger,
4=File; 10/20/40 for immediate)"
"DcapFile"="C:\\NcrDataCap.log"
"DcapFileMax"="0 (Max KB of data cap file)"
"DcapMask"="00000003 (Hex mask of events to capture)"
"DcapTime"="1F00 (Hex time option(s): 100=m:s, 300=h:m:s,
700=m/d h:m:s; 800+digits=millisec; 1000=threadid)"
"DcapVersion"="1.1.3"
"DcapLinePrefix"="NCRUsbKeyboardCtl "
```

Set `DcapMask` to `0x01` to receive only Error messages. Set to `0x02` or higher receives all messages.

Set USB Key Matrix Application

SetUsbKeyMatrix is a Windows application for the Desktop O/S versions (Windows 98se, Windows 2000) that uses the *NCRUsbKeyboardCtl* control to set a keyboard matrix map. The application operates as a memory-resident background process for a duration that may be specified on the command line. If no duration is specified, the application remains resident until terminated by user action. **While resident, the application receives device-attachment notifications for HID devices, and when these are received, invokes the *NCRUsbKeyboardCtl* control to set the keyboard matrix map.**

Command-line parameters may include a value for the runtime duration. If specified, the application remains resident only for the requested duration. This permits the application to be used only during defined events such as system start-up, and after which the application will no longer remain resident in memory. The command-line parameters may also specify that a background memory-resident instance of the application should be terminated. In this case, the application only terminates the background instance, and does not remain resident itself or invoke the control to set the keyboard matrix map.

SetUsbKeyMatrix may be launched “by hand” using the Windows **Start > Run** option, or any equivalent shortcut technique (desktop, quick-launch pad, menu). If started in this manner, the command line can optionally contain strings of the form “keyword{= value}”, where *keyword* is one of the defined parameters, and *value* is an optional numeric value to be applied to that key.

The following table gives the available command-line parameters.

Table 4: Command-line Parameters

Keyword ¹	Value (Decimal numbers)	Value
Close	Close any background session found	n/a
runtime	A number of seconds to remain resident, waiting for additional devices to initialize.	0 = indefinitely

¹ Keywords are not case sensitive, and may be abbreviated to 3 or more characters.

Set USB Key Clicks Application

SetUsbKeyClick is a Windows application for the Desktop O/S versions (Windows 98se, Windows 2000) that uses the *NCRUsbKeyboardCtl* control to set keyclick tone parameters. The application operates as a memory-resident background process for a duration that may be specified on the command line. If no duration is specified, the application remains resident until terminated by user action. **While resident, the application receives device-attachment notifications for HID devices, and when these are received, invokes the *NCRUsbKeyboardCtl* control to set key click tone parameters.**

Command-line parameters may include a value for the runtime duration. If specified, the application remains resident only for the requested duration. This permits the application to be used only during defined events such as system start-up, and after which the application will no longer remain resident in memory. The command-line parameters may also specify that a background memory-resident instance of the application should be terminated. In this case, the application only terminates the background instance, and does not remain resident itself or invoke the control to set keyclick parameters.

SetUsbKeyClick may be launched “by hand” using the Windows **Start > Run** option, or any equivalent shortcut technique (desktop, quick-launch pad, menu). If started in this manner, the command line can optionally contain strings of the form “keyword{= value}”, where *keyword* is one of the defined parameters, and *value* is an optional numeric value to be applied to that key.

The following table gives the available command-line parameters.

Table 5: Command-line Parameters

Keyword¹	Value (Decimal numbers)	Value
close	Close any background session found	n/a
runtime	A number of seconds to remain resident, waiting for additional devices to initialize.	0 = indefinitely

¹ Keywords are not case sensitive, and may be abbreviated to 3 or more characters.

12.1-Inch USB DynaKey Video Drivers

When using 12.1 displays or any other displays driven off the C&T 69000 chipset, it is recommended that the video drivers for the 69000 be used. These drivers are available on NCR software CD D370-1111-0100 (previously, G370-0830-0000). Drivers and installation instructions are available on this software CD for Win. 3.1, Windows 95, Windows NT 4.0 and Windows 2000. Drivers are not needed for DOS.

Chapter 5: 5953 USB DynaKey Migration

Overview

The NCR RealPOS 5953 USB DynaKey is a replacement for its predecessor, the 5953-Wedge (PS/2) DynaKey, with features and advantages not present in the older product. This chapter is a discussion of those features with some explanation of the advantages.

- Powered Universal Serial Bus (USB) for data and power
- Digital Visual Interface (DVI) cable for video

The NCR RealPOS 5953 USB DynaKey improves on its predecessor by taking advantage of features of the Digital Visual Interface (DVI) and Universal Serial Bus (USB) to increase flexibility and connectivity.

The major advances are:

- Standard Liquid Crystal Display (LCD) interface
- Full keyboard re-programmability
- Added general-purpose connectivity via on-board port
- Flash-programmable firmware
- Future expandability for fingerprint sensor module and smartcard reader

There are also minor technical improvements, primarily a benefit for systems integrators. One example is the ability for host software to detect the presence or absence of the MSR, Keylock, and Glide Pad.

Another example is the use of standard USB protocols throughout and even standard USB HID device classes where such device standards exist. The design helped develop an additional standard in the case of the MSR. Use of such standards eases the job of systems engineers and integrators.

Discussion

The NCR 5953 DynaKey Operator Interface contains an LCD display and a set of keys in a physical configuration that has been found useful to retailers. The keyboards have additional features, some optional, that add value to the retail environment. The following table lists these features in a comparison chart of the two DynaKey models. Following the table are paragraphs that more fully explain the jargon.

Feature	5953 Wedge	5953 USB
Color 800x600 High Bright, Long Life LCD	Yes	Yes
LCD Interface	NCR Proprietary	Industry Standard DVI
Touch Option	Yes	Future Option
Hot Plug	No	Yes
<i>POS-Checkout</i> style keyboard	Standard PS/2 with 35 keys; 8 <i>DynaKey</i> 13 <i>capable</i>	Standard USB HID with 35 keys; 8 <i>DynaKey</i> 13 <i>capable</i>
Double-High / Double-Wide Keys	Firmware Detected, limited keys	Fully Programmable
Keyboard Programmability	Fixed, limited	Fully Programmable
Keylock	4 position wedge	4 position USB Human Interface Design (HID)
Key Click	Yes, programmable	Yes, programmable
Error Tone	Yes, wedge	Yes, USB HID
MSR	3 track Wedge	3 track Standard USB HID
Scanner port	RS232, limited, pre-	See <i>General Purpose USB</i>

Feature	5953 Wedge	5953 USB
	qualified scanners	<i>Ports</i> section
Power LED	Yes	Yes
Additional ports	No	Three General Purpose USB ports for Scanner and/or any USB 1.1 compliant device.
Smartcard Reader	No	Possible Future Option (not currently planned)
Fingerprint sensor	No	Planned USB module replaces Keylock

LCD 800x600 High-Bright Long-Life Color

The NCR 5953 DynaKey has an 800x600 High-Bright, Long-Life Color LCD panel. The USB and Wedge versions of the DynaKey employ similar panels with similar visibility and endurance characteristics.

LCD Interface

The NCR 5953 Wedge DynaKey was designed at a time when an industry standard for LCD connections had not yet emerged, and therefore used an NCR proprietary interface. The 5953 USB DynaKey has been designed with the now-standard DVI interface, which allows the use of more industry-standard parts.

Touch option

The WEDGE DynaKey is available with an optional touch-screen interface. A touch option is planned, but not yet available, for the USB DynaKey.

Hot Plug

The NCR 5953 USB DynaKey is *hot-pluggable*. That is, both the DVI and USB connections may be disconnected and the DynaKey replaced without removing power from the terminal. The Wedge DynaKey cannot be removed or replaced without removing power from the terminal.

POS-Checkout Style Keyboard

The greatest difference between the NCR Wedge DynaKey and the USB DynaKey is the communications between the keyboard and the host computer. The Wedge DynaKey communicates using the PS/2 communications protocol, which is bit-serial and operates at approximately 25Kbps. The USB DynaKey uses the USB 1.1 protocol, which is a newer and different bit-serial protocol that operates at either 1.5 or 12Mbps. The keyboard operates at 12Mbps.

Furthermore, each of these protocols includes a software layer. The PS/2 software layer is very simplistic, and presents a challenge when adding additional capabilities beyond the keyboard itself. All the added devices, such as MSR, Keylock, tone, and scanner are implemented as *wedge* devices. That term means that these devices are *wedged* into the keyboard data stream and must spoof their way past the O/S to transfer data. This technique, though widespread, can have problems, and is not standardized.

The USB software layer is standardized and richly defined. It supports multiple simultaneous channels of communications, and allows additional capabilities to be added without negative impact.

Furthermore, USB defines several levels of standards, including a standard for Human Interface Devices. This standard specifies behavior for many devices that are widely used in the computer industry, and allows proprietary extensions to be added for those devices that are less widely used. NCR's keyboard includes both fully standard HID devices, such as the keyboard itself and the MSR, and less-widely used and thus customized HID devices such as the Keylock and Error Tone.

The USB DynaKey implements a standard seven-port USB Hub internally, which provides independent connectivity to the several functional sections that comprise the DynaKey.

Both USB and Wedge NCR DynaKeys include keys that accept customer-specified key caps and labels. For example, one customer may wish to include buttons for *DEPT*, *CLASS*, and *SKU* on his keyboard. A different customer may have no use for these keys, but may want *TIRES*, *BATTERIES*, and *ACCESSORIES* on specific keys. Capable keys provide for this customization.

Double-High / Double-Wide Keys

With capable keys you can put caps over pairs of plungers, resulting in larger keys. On a standard keyboard, the space bar, the *Enter*, *Tab*, *Delete*, *Shift*, *Control*, and *Alt* keys are all wider than the rest. These keys are implemented with one or two plungers, but they cannot be modified for different functionality. On NCR keyboards, the capable keys may be capped in pairs. Key caps are available that cover two plungers, either *double-high* or *double-wide*.

When two keys are capped individually, the keyboard firmware must detect each one as a different key, and must send different messages to the host computer to indicate that different keys were pressed. When the same two keys are capped together, the firmware must know this and send only one message. With the 5953 Wedge DynaKey, this is accomplished by using firmware that senses both plungers and the time lag between the plungers. If adjacent plungers are pressed within a certain interval, then the firmware only sends one of the two. Which one it sends is fixed, and the time lag is fixed. Thus, although this method works, it is subject to occasional error due to small mechanical tolerance problems. It is also somewhat limited in flexibility.

With the 5953 USB DynaKey, the keyboard is fully programmable. Two keys that are capped together can be programmed to literally *be* the same key. (Duplicate messages are discarded.) Thus there is no limit to the flexibility, and no problem can be induced by the same minor mechanical problems experienced with the 5953 Wedge DynaKey.

Keyboard Programmability

The 5953 Wedge DynaKey includes the ability to select whether the keypad should be *telephone* or *calculator* style. This is implemented with a simple toggle that selects which layout is used. No other programming is available.

The 5953 USB DynaKey includes full programmability of the keyboard. Each and every key can be re-assigned as desired, only limited by the capabilities of a standard USB-HID keyboard. Based on registry entries, a program on the PC sends a complete keyboard layout matrix to the keyboard firmware. From that moment on, the firmware will send the newly assigned keys over the USB connection. No translation software is required in the host PC.

New key values are assigned using registry entries. This means a DynaKey can be replaced in the field without any extra programming steps. Once the terminal has been set up with key assignments, a replacement DynaKey will automatically receive the programmed key assignments. Key assignments are sent from the registry whenever an NCR USB DynaKey is connected to the PC, whether at power-on or hot-plugged.

Each key can be programmed to be a dead key, one single key, or a two-key combination. Most keys will be single key values. However some keys may be programmed as a two-key combination. For example, the combination of *Shift* and *F1* key values may be used to provide compatibility with the 5953 Wedge DynaKey. A *double-zero* key is another potential use for this feature. Any combination of up to two key values may be assigned to a single plunger on the keyboard.

The registry values can be managed using a simple text editor along with the O/S supplied registry editor. Alternatively, a GUI utility (non-supported) is available for visually manipulating the key assignments in the registry. See the Key Re-mapping *Registry Manipulation Tool section* for more information.

Keylock

Both Wedge and USB DynaKeys include a 4 position keylock. In the Wedge DynaKey it is an every-unit-item (EUI), whereas in the USB DynaKey, the keylock can be optional if required, as a SCER. The Wedge DynaKey implements the keylock as a PS/2 wedge device. The USB DynaKey implements the keylock as a separate HID device. Because USB is designed for plug-and-play (PnP), the presence or absence of the keylock is easily detected by the host software.

In both DynaKeys, placing the key in the *L* (locked) position disables the keyboard. In the Wedge DynaKey, the MSR and the external scanner port are disabled. In the USB DynaKey, the MSR and the external USB ports are disabled.

Key Click

Both Wedge and USB DynaKeys provide a small speaker that can be used to make a key click sound. The exact sound made for key clicks is programmable in both devices, and the sounds available are comparable.

Error Tone

Both Wedge and USB DynaKeys incorporate the ability for host software to evoke an error tone using the key click speaker. The capabilities are comparable.

MSR

Both Wedge and USB DynaKeys provide an optional 3-track MSR in either ISO or JIS head configurations. The Wedge DynaKey cannot detect if the MSR is present, and even if it could, has no way to indicate that information to the host computer.

The USB DynaKey implements the MSR as a separate USB HID device, conforming to the published HID standard for MSR devices. As with the keylock, the PnP feature of USB communications makes it a simple matter for the host computer and thus the customer's application to be aware of the presence or absence of the MSR.

Scanner port

The Wedge DynaKey contains an NCR-proprietary RJ-45 connection for RS-232 based scanners. This port has several technical limitations, and a limited subset of NCR scanners are qualified.

The USB DynaKey has no RJ-45 connector for RS-232 scanners. But see *Additional Ports*, below.

Additional ports

The Wedge DynaKey has no additional ports beyond the Scanner port.

The USB DynaKey provides three standard *self-powered* USB ports. These connections allow a USB scanner, or for that matter, any standard USB device to be connected through the DynaKey to the host computer.

Power LED

Both the Wedge and USB DynaKeys have an LED that indicates when power is present.

Fingerprint Sensor

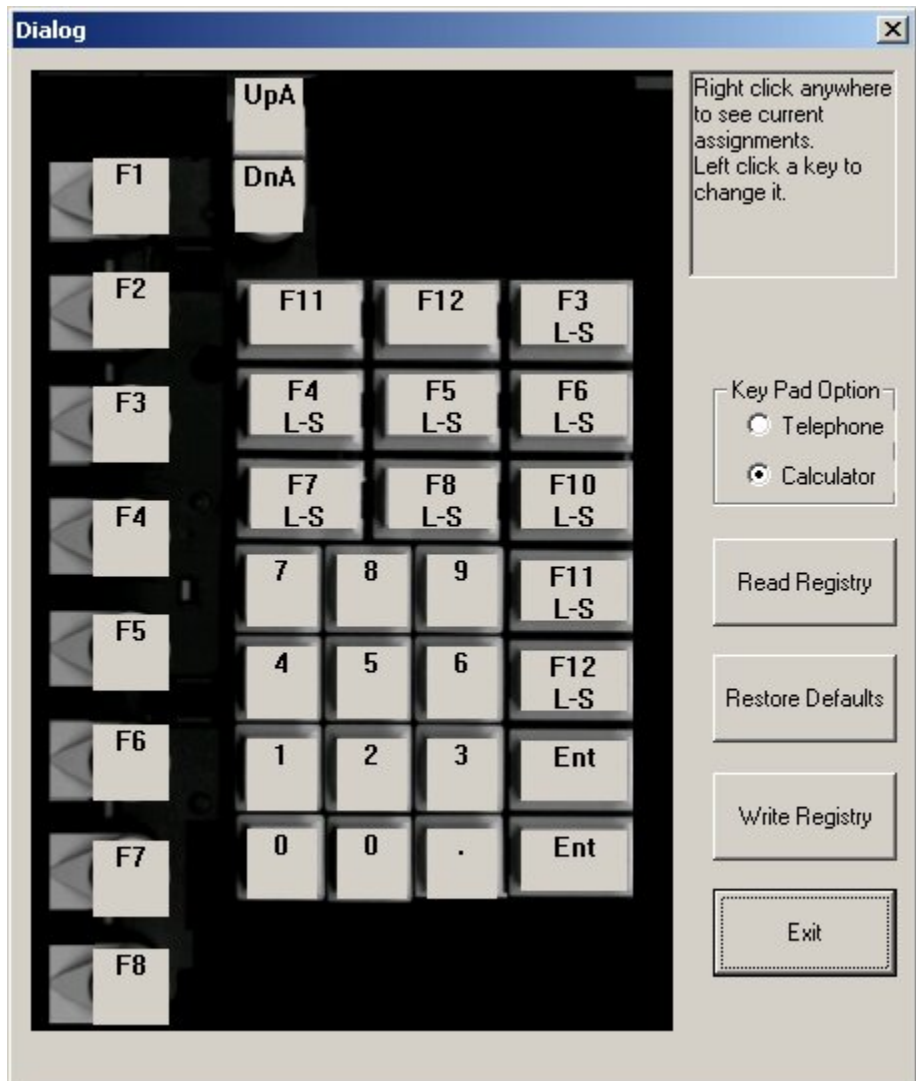
The USB DynaKey has been designed to accommodate a fingerprint sensor module. This module replaces the keylock module, and operates as another independent USB device through the internal hub. The Wedge DynaKey does not have this capability.

Smartcard Reader

The USB DynaKey has been designed to accommodate an external or internal Smartcard reader that connects through USB. An external USB Smartcard reader can be connected to one of the available external USB ports. There is currently no integrated Smartcard reader available or planned, but an extra internal USB port makes an integrated reader possible.

Key Re-mapping Registry Manipulation Tool

A GUI Active-X control for Windows is available (though non-supported by NCR) to simplify manipulation of the DynaKey keyboard re-mapping registry entries. Below is a screen shot of the GUI with the right mouse button clicked to show the current key assignments.



A common need is toggling the keypad number layout between *telephone* and *calculator* style, so a special button is available for that function.

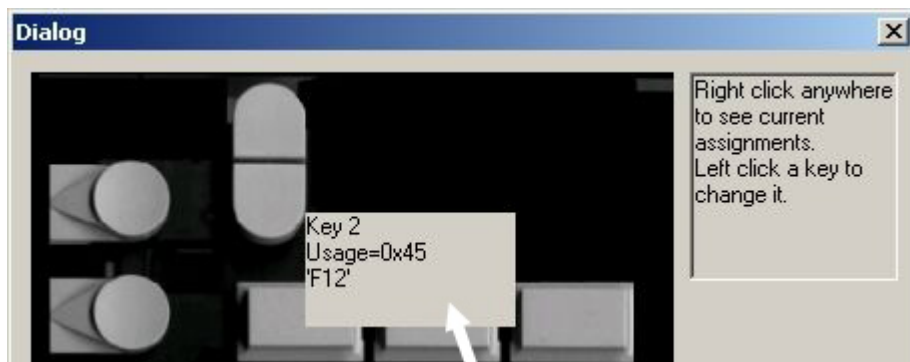
The values currently stored in the Registry for NCR 5932 USB DynaKeys can be retrieved by clicking the **Read Registry** button. The only values stored in the registry are the values that are non-default.

All of the keys can be restored to default values with the **Restore Defaults** button.

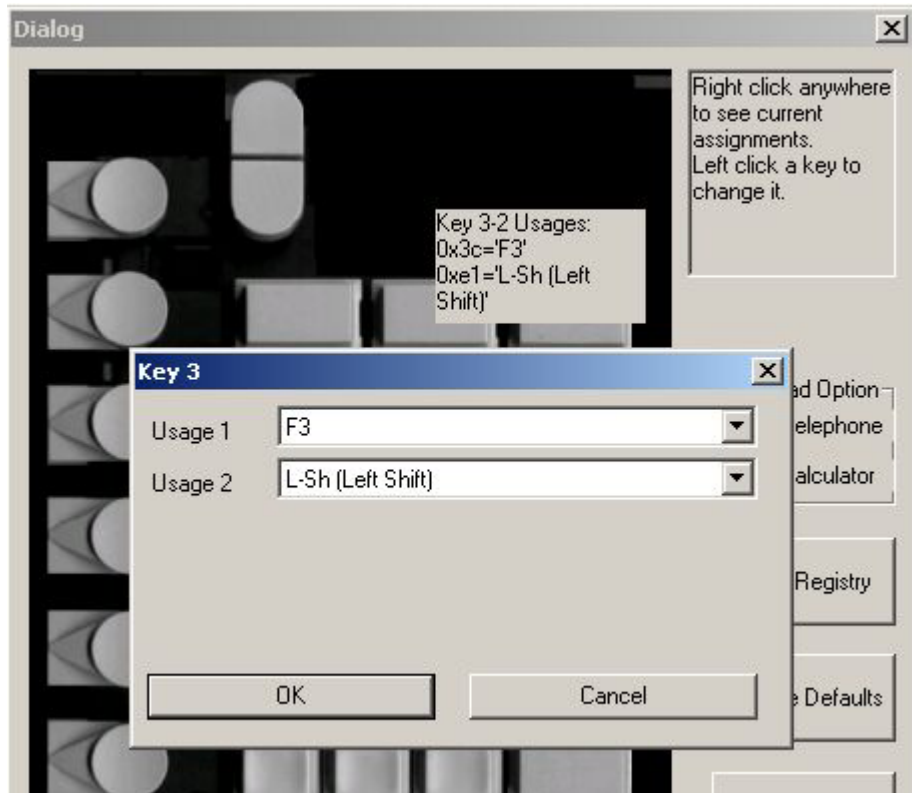
After assigning new values to keys or restoring default values, the values have not yet been used to replace the current values stored in the registry. The new values may be written to the registry using the **Write Registry** button. This is the only action that actually causes the registry to be written. All other actions are held in program memory for display on the GUI.

The **Exit** button exits the control. If the **Exit** key is pressed without pressing the **Write Registry** button, then no modifications are saved.

Hovering over an individual key brings up the information about that key. In this example, the mouse is hovering over the middle key, and the dialog is displaying the NCR Key number (2 in this case), the USB usage currently assigned (0x45), and the system translation of the usage (F12).



Clicking on an individual key enables the *Key Number and Usage* dialog box. The current assignments are shown and two new key usages may be selected from the drop down boxes. Once selected, the new value can be assigned using the **OK** button. In the illustration below, the top right key (Key number 3) has been clicked, and is showing a combination of two usages, which will result in system translation to *(left)Shift-F3*.



Chapter 6: Hardware Service

Safety Requirements

Carefully follow these safety requirements before servicing the USB DynaKey.

Warning: The DynaKey LCD contains hazardous voltages and should only be serviced by qualified service personnel.

Warning: Before servicing the equipment plug your safety strap into a proper grounding outlet. Failure to do so could damage the equipment.

Caution: Before servicing the USB DynaKey, power down the terminal or PC and disconnect the terminal AC power cord. Disconnect the cables from the workstation.

Caution: To protect the internal circuitry from damage, unplug the AC power cord and then momentarily press the power switch ON to drain the power supply capacitance.

Caution: The power supply cord is used as the main disconnect device. Ensure that the socket outlet is located/installed near the equipment and is easily accessible.

Attention: Le cordon d'alimentation est utilisé comme interrupteur général. La prise de courant doit être située ou installée à proximité du matériel et être facile d'accès.

Problem Isolation Procedures

NCR offers both on-site and mail-in service for the NCR RealPOS 5953 USB DynaKey. Before calling for service or mailing in your unit for repair, step through the problem isolation procedures below to make sure the DynaKey module is in need of repair. Also, your answers to these questions may speed the servicing of your DynaKey.

Troubleshooting Table

The following table provides general troubleshooting tips for the DynaKey. If you experience a problem with your DynaKey, please explore the possible solution options in this table before replacing any component in the system.

Symptom	Probable Cause	Solution
DynaKey keypad not working	Keylock in <i>L</i> position	Turn Keylock to another position
	Keyboard not powered	Possible shorted condition. Power for USB devices is controlled by a USB distribution switch.
Some keys on the DynaKey keypad not working	DynaKey is in <i>PC Setup</i> mode (LED is flashing red/green)	Power cycle the system.
	DynaKey <i>hot plugged</i> into terminal with terminal powered on.	Re-boot the system
External Keyboard not working	Keylock in <i>L</i> position	Turn Keylock to another position
	Keyboard plugged into workstation	Plug keyboard into DynaKey Controller Board
	Keyboard not powered	Possible shorted condition. Power for USB devices is controlled by a USB distribution switch.

Symptom	Probable Cause	Solution
Speaker not working	Speaker harness not connected	Connect speaker harness to DynaKey Controller Board.
MSR not working	MSR card not oriented properly	Ensure that magnetic stripe on card is <i>up</i> when swiped.
	MSR harness loose or broken	Ensure that the MSR harness is securely fastened to the DynaKey Controller Board, and that none of the wires have pulled loose from the connector.
Scanner not working	Scanner not powered	Possible shorted condition. Power for USB devices is controlled by a USB distribution switch.
LCD Dim/Contrast too Light or Dark	Unit is <i>cold</i>	Wait 15 minutes for unit to reach operating temperature before measuring brightness or contrast. Do not expose the unit to operating temperatures below 5 degrees C.
	Unit is in direct sunlight	For best display quality, keep the unit out of direct sunlight or other bright light sources.
Lines in LCD Display	Internal LCD harness loose	Re-seat the LCD harness at the DynaKey Controller Board and LCD ends.
	Bent pin in external LCD cable	Check both ends of the LCD cable for bent pins. Fix or replace cable.

Symptom	Probable Cause	Solution
No display (Green LED)	Internal LCD cable loose	Re-seat the LCD harness at the DynaKey Controller Board and LCD ends.
	Internal backlight harness loose	Ensure that the backlight harness is securely fastened to the DynaKey Controller Board
No display (orange LED)	7452/7453/PC: Unit in <i>standby</i> mode (screen blank)	Return unit from standby as required by application. Ensured Keylock not in <i>L</i> position.
	PC or workstation not turned on.	Turn PC or workstation ON
	Cables loose	Ensure all cables are securely fastened

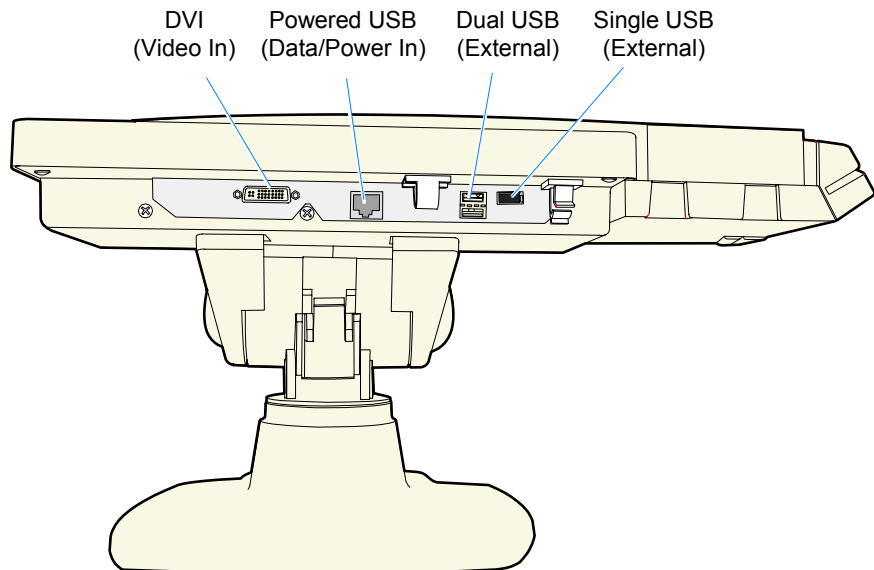
Servicing the DynaKey Module

This section provides detailed instructions on to how to disassemble the DynaKey.

Warning: Only properly trained personnel using proper grounding procedures should service the DynaKey. Personal injury could occur, or the DynaKey may be damaged.

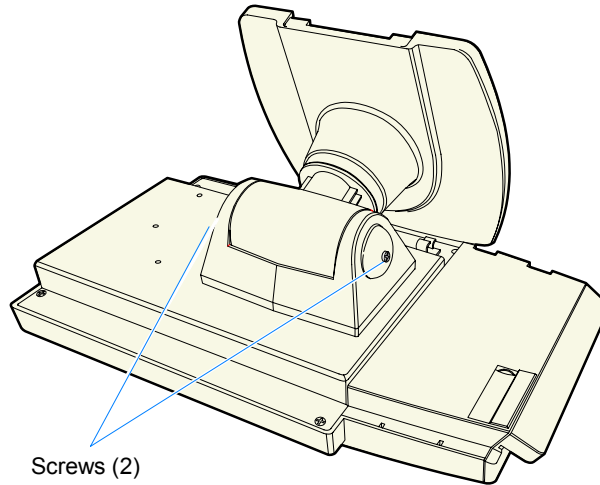
Disassembling the DynaKey

1. Disconnect the external cable(s).



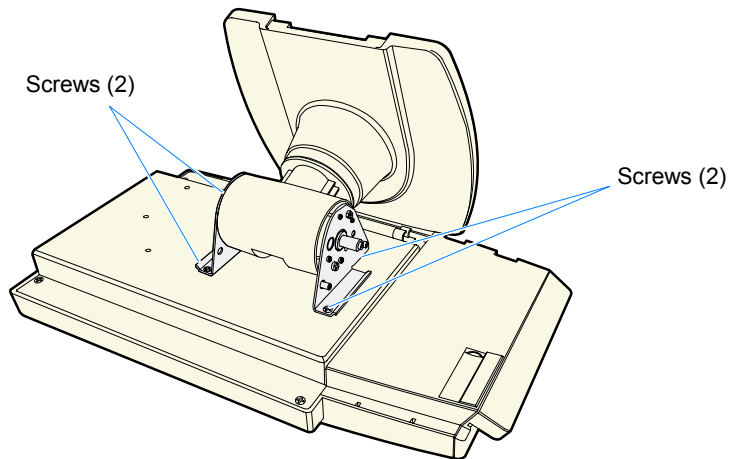
Removing the Remote Table Top Mount

2. Remove the Left and Right Housings from the mount (one screw on each side).



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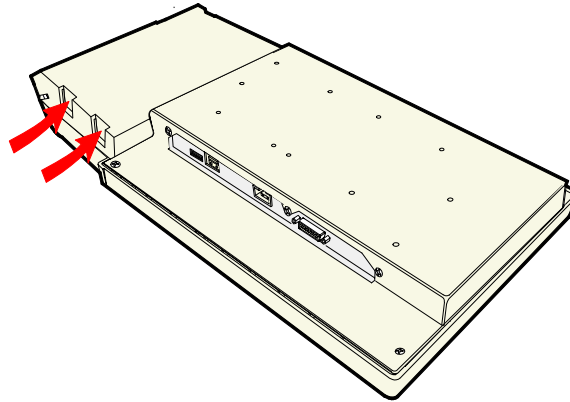
3. Remove the screws (4) that secure the Remote Table Top Mount to the DynaKey module.



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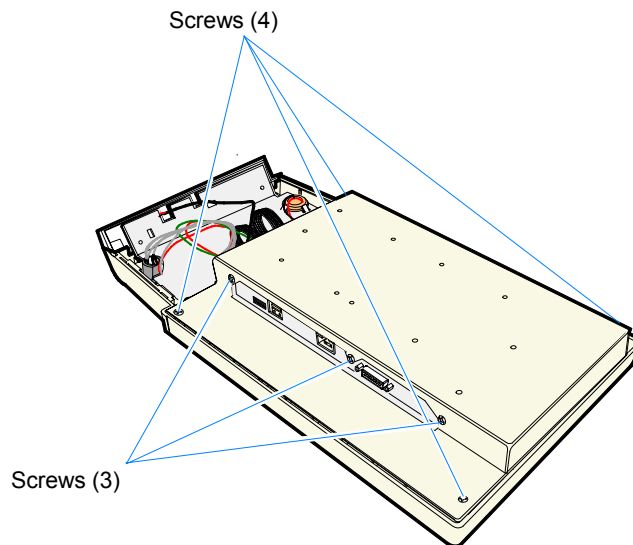
Removing the Back Cover

4. Remove the Access Cover by applying pressure on the release tabs and then lifting up.



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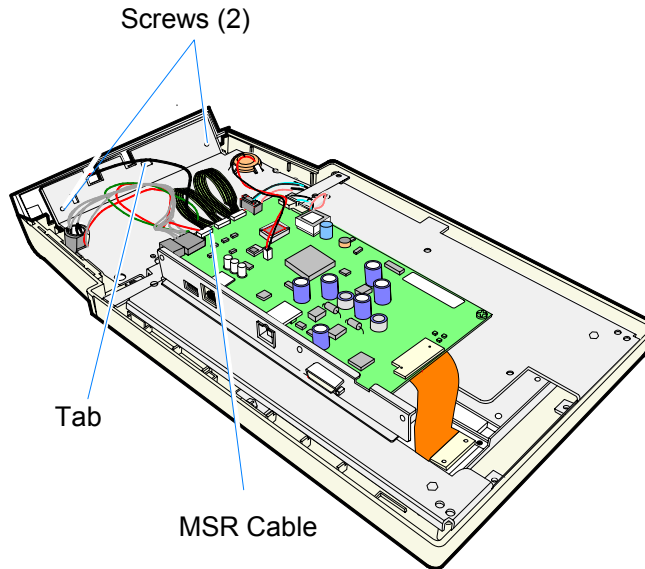
5. Remove the (7) screws that secure the Back Cover and remove the cover.



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Removing the MSR

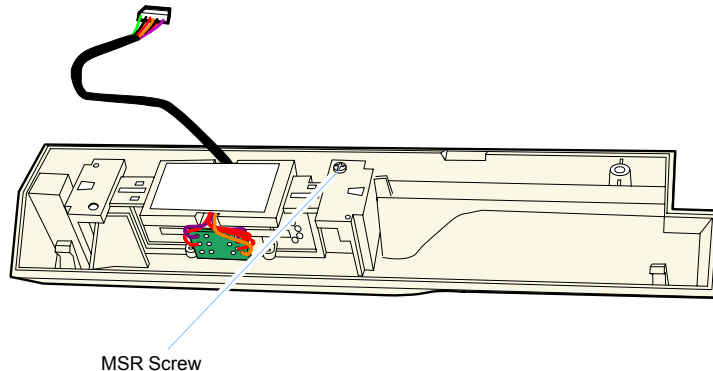
6. Disconnect the MSR Cable (J1) from the Controller Board.
7. Remove the screws (2) that secure the MSR assembly.
8. Push the plastic latching tab down and remove the MSR assembly.



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9. Remove the screw that secures the MSR module.

Note: When reassembling the MSR, notice there are actually two screws used to mount the MSR. One was removed in the previous step (7).



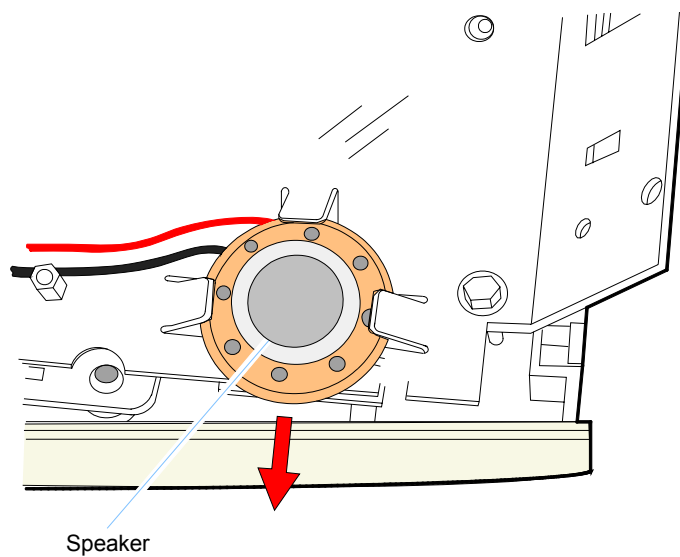
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MSR Cleaning Cards

Part	Part Number
MSR Cleaning Card, Dry	998-0052929
MSR Cleaning Card, Wet	603-9004998

Removing the Speaker Assembly

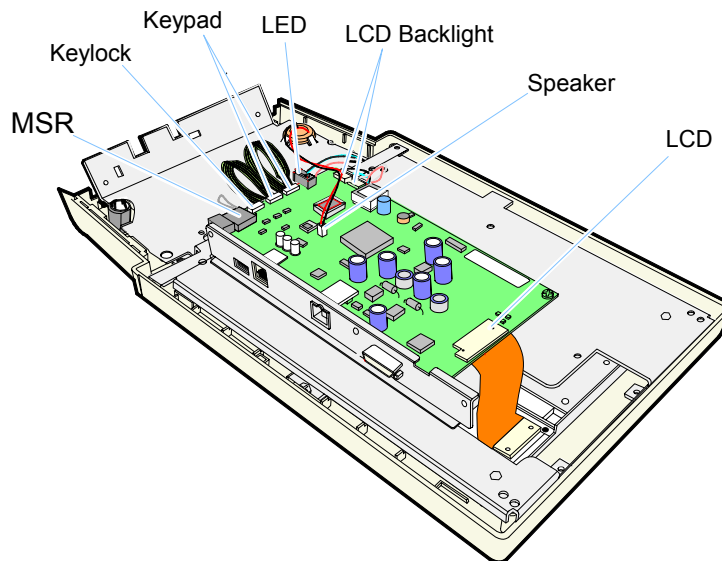
10. Disconnect the speaker cable from Controller Board.
11. Slide the speaker out of the metal fingers on the LCD Bracket.



Removing the Controller Board

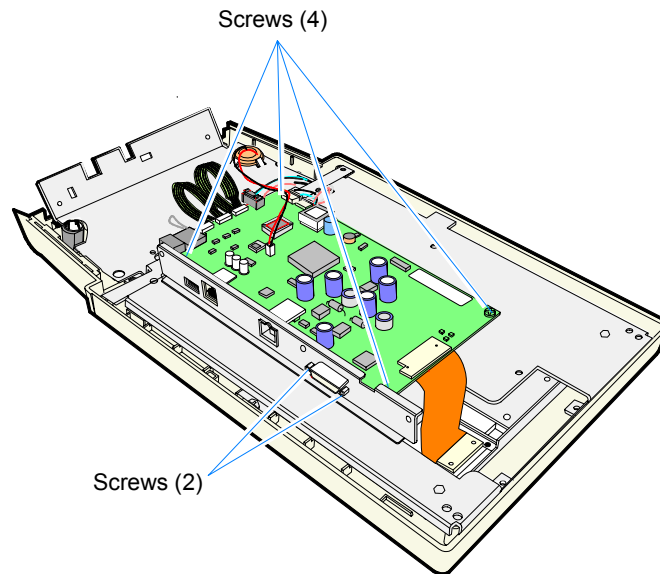
12. Disconnect the cables on the Controller Board.

- LCD Backlight Connectors
- LCD Connector
- Speaker Connector
- LED Board Connector
- Keypad Connectors
- MSR Connector
- Keylock Connector



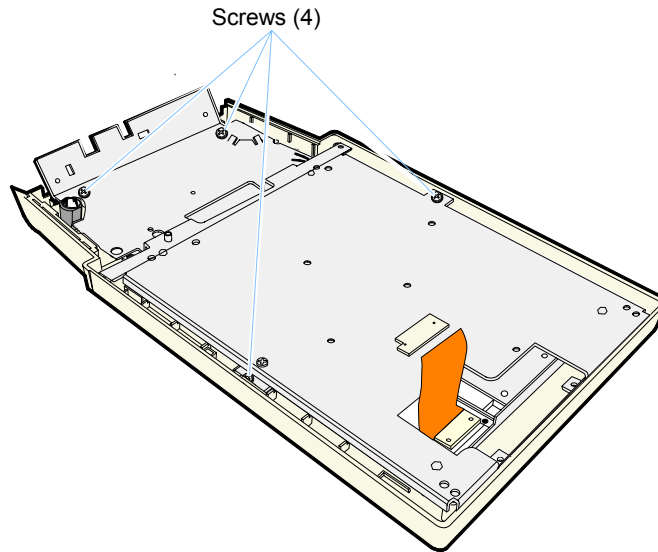
13. Remove the screws in the Controller Board and in the Connector Bracket (6 screws).
14. Remove the board.

Note: Verify all are cables free and out of the way prior to removal.



Removing the LCD

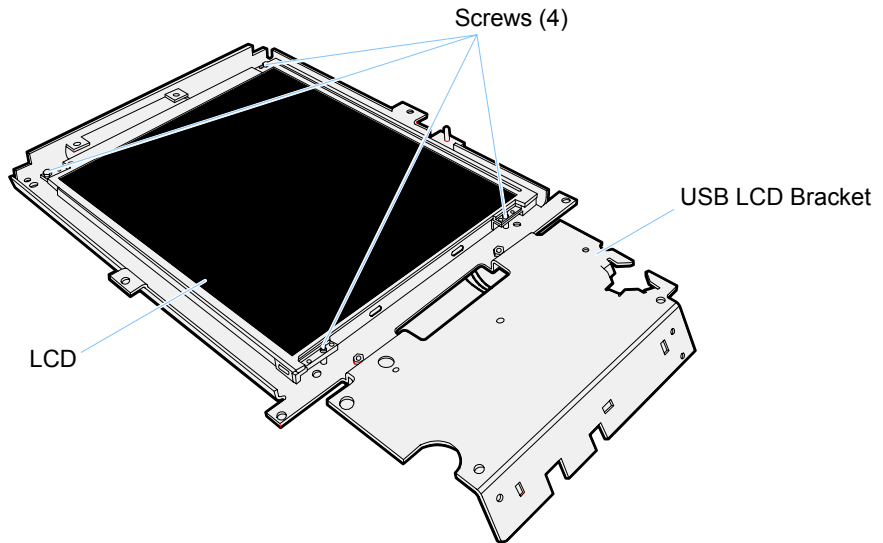
15. Remove the screws (4) that secure the LCD Bracket to the Front Bezel.



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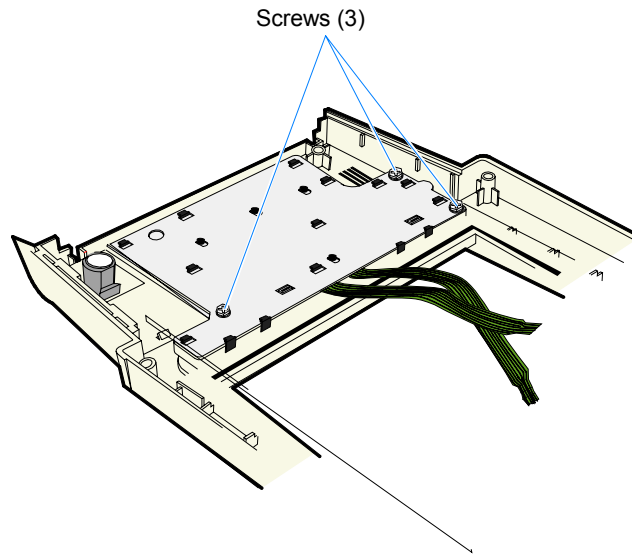
16. Remove the LCD Bracket Assembly. Verify that all cables are free before removing the LCD bracket.

17. Remove the screws (4) that secure the LCD to the LCD Bracket.



Removing the Keypad

18. Remove the screws (3) that secure the Keypad to the Front Bezel.

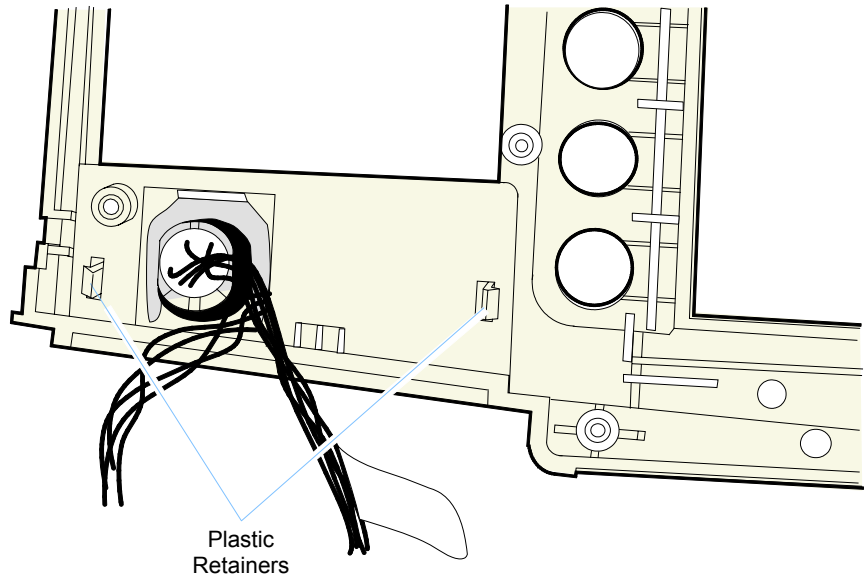


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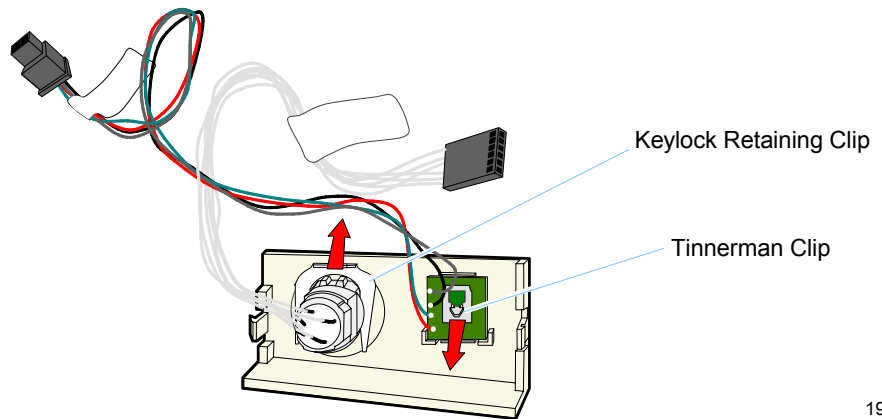
19. Remove the keypad.

Removing the Keylock Adapter Assembly

20. To Remove Keylock assembly, squeeze the plastic retainers and push the Keylock assembly out the front of the unit.



21. Remove the Keylock by prying the Retaining Clip off with a small screwdriver.
22. The LED Board can be removed by prying off the Tinnerman Clip.



19925

Replacing the Keylock assembly

1. Align the tabs and snap into place.
2. Carefully route the wires through the bezel.

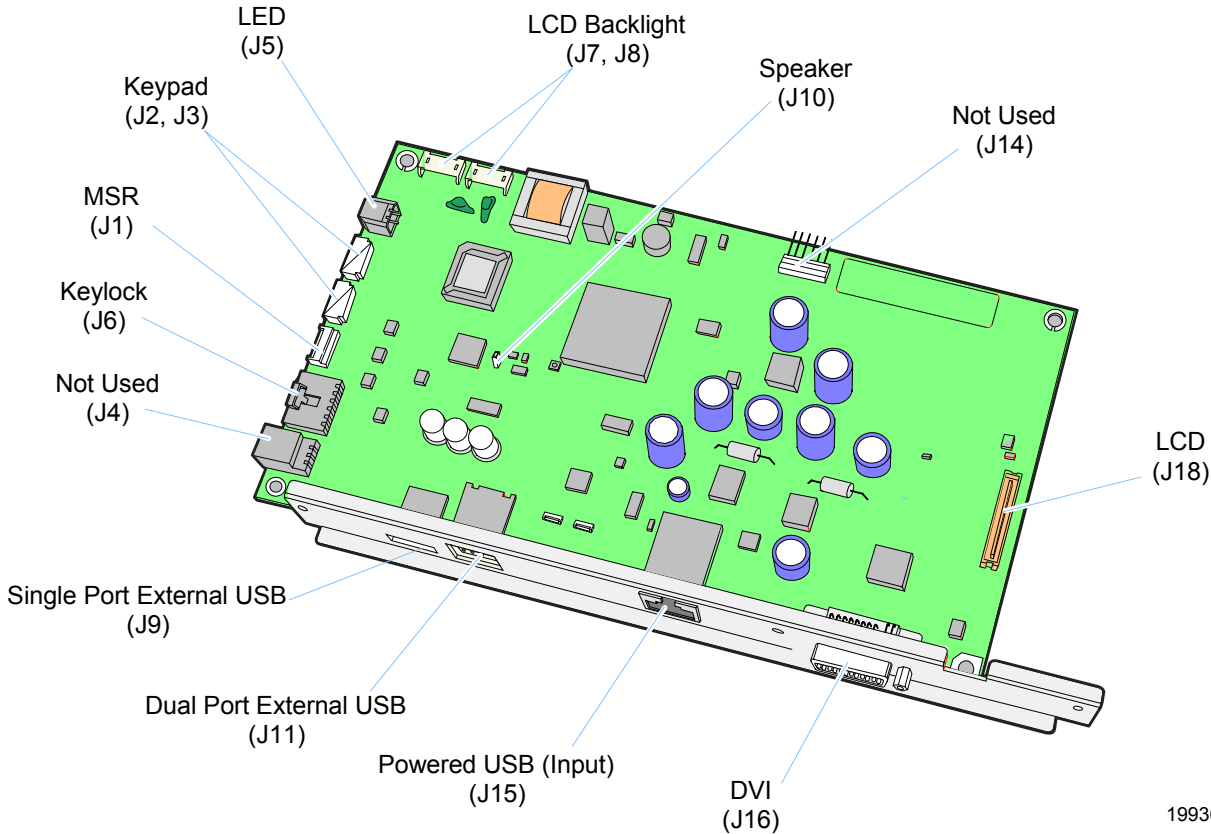
Re-Assembling the DynaKey

To re-assemble the DynaKey module, use the reverse order of the previous procedures. In addition, check the following:

1. Before closing the cabinet, check the LCD to make sure there are no fingerprints or lint particles on it.
2. Make sure the cables are routed properly before closing the cabinet.

Controller Board

Connector Identification



Connector Pin-Out Information

DVI Connector

Pin	Symbol	Description
1	CH2-	½ of Channel 2 differential pair
2	CH2+	½ of Channel 2 differential pair
3	GND	TMDS Data 2/R Shield Ground
4	N/c	Unused 2 nd DVI Link
5	N/c	Unused 2 nd DVI Link
6	DDC_CLK	DVI DDC Clock
7	DDC_Data	DVI DDC Data
8	n/c	No connection
9	CH1-	½ of Channel 1 differential pair
10	CH1+	½ of Channel 1 differential pair
11	GND	TMDS Data 1/3 Shield Ground
12	n/c	Unused 2 nd DVI Link
13	n/c	Unused 2 nd DVI Link
14	+5V	Power for DDC EEPROM
15	GND	Ground
16	LVHPDET	Hot Plug Detect
17	CH0-	½ of Channel 0 differential pair
18	CH0+	½ of Channel 0 differential pair
19	GND	TMDS Data 0/5 Shield Ground
20	n/c	Unused 2 nd DVI Link

Pin	Symbol	Description
21	n/c	Unused 2 nd DVI Link
22	GND	TMD5 Clock Shield Ground
23	CLOCK+	½ of Clock differential pair
24	CLOCK-	½ of Clock differential pair
25 (C1)	ENAVDDMAG	Magna ENA_VDD
26 (C2)	TFT_SEL2	Magna Panel ID2
27 (C3)	TFT_SEL1	Magna Panel ID1
28 (C4)	TFT_SEL0	Magna Panel ID0
29 (C5)	GND	Ground
30	GND	Ground

Powered USB Connector

Pin	Symbol	Description
1	GND	+12V Return
2	GND	USB Ground
3	+12V	+12V Power
4	DATA+	USB Data+
5	+12V	+12V Power
6	DATA-	USB Data-
7	GND	+12V Return
8	+5V	USB Power
Shell	FRAME	Frame Ground

USB Connectors

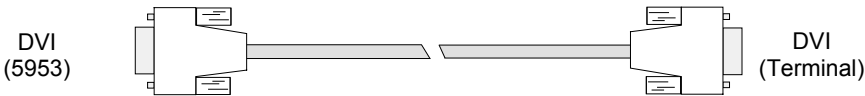
Pin	Signal Name	Typical Wiring Assignment
1	VBUS	Red
2	D-	White
3	D+	Green
4	GND	Black
Shell	Shield	Drain Wire

Cables

DVI to DVI

497-0422831 - 1.0 m
(1416-C723-0010)

497-0422832 - 4.0 m
(1416-C723-0040)

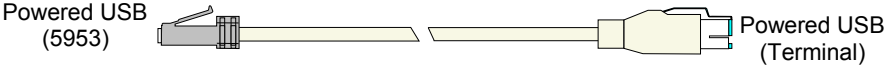


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Powered USB (12 V) to 2 x 4 Locking Connector

497-0424838 - 1.0 m
(1416-C757-0010)

497-0424839 - 4.0 m
(1416-C757-0040)

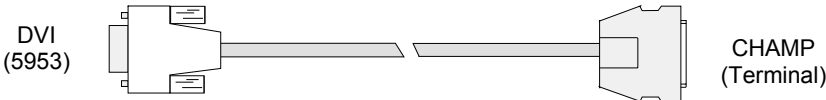


20059

DVI to CHAMP

497-0423054 - 1.0 m
(1416-C729-0010)

497-0423055 - 4.0 m
(1416-C729-0040)



20060

DynaKey Cleaning Procedures

NCR keyboards are designed for general retail applications. These products are resistant to spills and dust. However, these products are not spill proof or dust proof.

To maintain proper keyboard operation, users should prevent water, beverages, or cleaning agents from being introduced into the keyboard during storage, operation, or cleaning.

To clean your keyboard, use the following procedures:

1. Turn off power to your workstation.
2. Unplug keyboard cable from your workstation.
3. Spray liquid cleaner (such as window cleaner spray or a product designed for cleaning office computer equipment) onto a soft cloth to wipe the keys and housing clean. *Do not spray liquid cleaners directly onto the keyboard.* Let the keyboard dry completely before reusing.
4. Use either a *canned air* type office supply product or a small vacuum to remove dust or foreign objects from between the keys.

Cleaning the Glass

1. Spray an ammonia-based glass cleaner on a soft cloth and gently wipe the glass screen clean.

Warning: Do not use any other types of cleaners such as vinegar, solvents, or degreasers. These can damage the screen.

2. Wipe the screen and edges dry.
3. Allow the glass and screen edges to completely dry before using the unit.
4. When cleaning has been completed, plug in the keyboard cable and power on the workstation.

Index

—5—

- 5953 DynaKey
 - Table-top mount, 3-5
- 5953-K023 Checkstand Mount
 - installing, 3-11
- 5953-K023 Table Top Mount, 2-4

—C—

- Cable Length Limitations, 2-2
- Cables
 - DVI to CHAMP, 6-21
 - DVI to DVI, 6-21
 - Powered USB, 6-21
- Checkstand Mount
 - installing, 3-11
- Cleaning the Glass, 6-22
- Compatibility, 1-2
- Configurable Keyclick Tone, 4-8
- Connecting to the Host, 3-4
- Connector Panel Access, 3-3
- Connector Pin-Out
 - Information, 6-18

—D—

- Dimensions, 2-3

- Disassembling the DynaKey, 6-5
- Double-high/Double-wide Keys, 4-4
- DynaKey Cleaning, 6-22

—E—

- Electrical Environment, 2-2

—F—

- Features, 1-2
- Firmware, 4-1
- FPGA (field programmable gate array), 4-1
- FPGA Firmware Defaults, 4-2

—I—

- Integrated Customer Display
 - installing, 3-6

—K—

- Keyboard Matrix for 5932 USB DynaKey (PID 0x0320), 4-5
- Keylock
 - positions, 1-4
- Keylock Positions, 1-4

—M—

MSR Cleaning Cards, 6-9
Multi-Color Power LED, 1-3

—N—

NCR Platform Software
 Components, 4-9
NCR USB DynaKey Control, 4-9
NCR USB DynaKey Control
 Data Capture Registry, 4-12
NCR USB DynaKey Control
 Parameterization Registry
 Values, 4-11
NCRUsbKeyboardCtl, 4-12, 4-13
NCRUsbKeyboardCtl HID
 usages, 4-2
NCRUsbKeyClickCtl, 4-9

—O—

Operating Range, 2-1

—P—

Physical Environment, 2-1
Power Consumption, 2-2
Problem Isolation Procedures,
 6-2
Programmable Key Matrix, 4-4
Programming, 4-1
 USB DynaKey Capabilities, 4-1

—R—

Remote Table Top Mount
 installing, 3-4

—S—

Screen Saving
 unblinking the LCD, 3-19
Screen Saving Feature, 3-19
Serial Number Location, 3-2
Service and Repair, 6-1
Servicing the DynaKey Module,
 6-5
Set USB Key Clicks
 Application, 4-13
Set USB Key Matrix
 Application, 4-12
SetUsbKeyClick, 4-13
SetUsbKeyMatrix, 4-12
Speaker, 1-5
Special Keypad Mode, 3-15

—T—

Table Top Mount, 2-4
Troubleshooting Table, 6-2

—U—

Unique POS Capabilities, 4-2
USB DynaKey Capabilities, 4-1
USB DynaKey Tone
 Frequencies, 4-8