NMB HI-TEK CORPORATION

# PC-83 and PC-84

## IBM® Plug Compatible Keyboards

# Keyboard Specifications

These specifications are subject to change without notice

# PC-83

## 1.0 SCOPE

This document is a product specification for defining HI-TEK's PC-83 IBM® Plug Compatible keyboard, HI-TEK Part Number 200550, a product that is designed to meet the low profile DIN standard.

This keyboard utilizes the Series 725™ Low Profile single station keyswitch as the basic switching mechanism.

## 2.0 MECHANICAL

### 2.1 Outline dimensions

2.1.1 PC-83 Keyboard. Figure #1.

### 2.2 Array configuration

2.2.1 Keyboard keycap and character layout. Figure #2

### 2.3 Materials

2.3.1 Enclosure
Molded polystyrene foam. UL Flammability Rating 94 HB.

2.3.2 Keycaps
Polyester thermoplastics. UL Flammability Rating 94 HB.

2.3.3 Printed circuit board
.062 thick CEM-1 with 1 oz. copper on both sides. UL Flammability Rating 94 VO.

2.3.4 Switch housing
Molded polyphenylene oxide thermoplastic. UL Flammability Rating 94 VO.

2.3.5 Switch plunger
Molded acetal thermoplastic. UL Flammability Rating 94 HB.

2.3.6 Spring
302 or 304 stainless steel

2.3.7 Contacts
Spring temper phosphor bronze with gold alloy inlay

2.3.8 Stiffener panel
Cold rolled steel

2.3.9 Bottom plate
Cold rolled steel

### 2.4 Finishes

2.4.1 Enclosure
Exterior surface is filled, sanded and painted with base coat and spatter coat medium texture with Sherwin & Williams Polane Driftwood F63A40.

2.4.2 Spring
Non-metallic coating

2.4.3 Stiffener panel
Painted with primer and semi-gloss black enamel, epoxy or urethane based paint.

2.4.4 Bottom plate
Painted with semi-gloss black enamel, epoxy or urethane based paint.

2.4.5 Keycap colors
Functional keys — Gray
HI-TEK color code: 900 (equivalent to Borg Warner color T33309).

Data keys — White
HI-TEK color code: 880 (equivalent to Borg Warner color T22061).

Nomenclature (legend) color — Black
HI-TEK color code: 010 (equivalent to Borg Warner color T4500).

2.4.6 Keycap texture
Mold Tech 1055-3

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2.5 Individual Switch Specifications

2.5.1 Keyswitch movement (Total travel)
.140 ±.020 inch (3.56 ±.5mm)

2.5.2 Operating movement (Travel to make)
.070 ±.020 inch (1.78 ±.5mm)

2.5.3 Operating force

2.5.3.1 Momentary action 2.0 ±0.5 oz. (57.1 ±14.2 grams)

2.5.3.2 Space bar 3.0 ±0.5 oz. (85.6 ±14.2 grams)

2.5.4 Feel
Basic switch has a linear feel.

2.5.5 Wobble
Lateral movement will not exceed .020 inch (.5mm) in either axis.

2.5.6 Life
100 million cycles

2.6 Legends

Helvetica — .180 high
Helvetica rounded - .100 high
Sublimation printed. Black color.

2.7 Keycap shapes
Keycaps are on .75 inch centers in both horizontal and vertical directions. The side profile is shown in Fig. 3.

## 3.0 FUNCTIONAL

Model PC-83 Keyboard

3.1 Auto repeat
When a key is pressed for 0.5 second or longer, the keyboard will continuously output the character at the rate of once every 0.09 seconds. The following keys do not auto repeat.

A. Scroll Lock
B. Caps Lock
C. Num Lock
D. Ctrl
E. Shift

3.2 Locking functions
The keyboard does not provide any locking features. This is a function of the software in the computer. When the following keys are pressed, corresponding LED's in the keycap are alternately turned on and off each time the key is pressed and released:

A. Num Lock
B. Caps Lock

If either of the above keys are depressed after the "CTRL" key has been depressed and held down, the LEDs will not toggle.

When the keyboard is reset by pressing CTRL, ALT and DEL keys, the LED's are turned off.

3.3 Multikey rollover:
The keyswitches are electrically connected in an X-Y matrix as shown in Figure #4. When multiple keys are depressed at the same time, the keyboard will correctly output the codes for these keys in the same order that they were depressed, with the following exception: When three keys which form three corners of a rectangle in the X-Y matrix are depressed consecutively and held down, the output code for the last key depressed is locked out. When one of the first two keys which formed the 3-key rectangle is released, the code for the last key depressed will be output.

3.4 Software debounce:
Multiple entry due to contact bounce is avoided. This task is accomplished by the internal 8049 or 8749 microprocessor under software control.

3.5 Buffering
The keyboard will buffer up to 30 characters if the computer is not ready to receive more information. If the computer holds the data line low, then the keyboard will store the keystrokes in its own internal buffer until the data line is brought high again. The stored key codes are then output in the correct order of entry.

3.6 Input-output data logic level:

Data input and output is standard TTL logic level. Output will drive 3 standard TTL loads. Input loading is 1000 ohms.

3.7 Reset

A single level of -.5 to +.6 V.D.C. on the reset line for 50 milliseconds or more will reset the keyboard.

3.8 Keyboard self test

The keyboard has a self test feature. This self test feature performs the following tests:

(1) Tests the microprocessor RAM for bad memory cells.

(2) Scans the switch matrix searching for shorted switches.

The keyboard response to the self test is as follows:

(1) A hex code of AA is transmitted to the computer if the keyboard passes the self test feature.

(2) If a shorted switch is detected, the scan code of the shorted switch is transmitted back to the computer.

The keyboard self test feature will be initiated when the keyboard has received an "FF" code from the computer.

3.9 Minimum key depression time

The key must be depressed for a minimum of 15 milli-seconds for data entry.

3.10 Output code

Each time a key is depressed or released, the keyboard transmits a code to the computer. This code is called a scan code.

The keys on the keyboard are assigned arbitrary key position numbers as shown in Figure 5. These numbers are for reference only and DO NOT appear on the keycaps of the keyboard. Also, these numbers do not necessarily coincide with the numbers marked on the top of the keycaps. Again, they are arbitrary assignments for reference only.

When a key is depressed, the keyboard outputs a scan code corresponding to the key position number. Scan codes are shown in Figure 6.

When the key is released the keyboard adds 80 hex to the key positions number and outputs this code to the computer. There is no auto repeat on key up, therefore the key up scan code is output only once. The timing diagram is shown in Figure 7. The least significant bit is transmitted first.

## 4.0 ELECTRICAL

4.1 Contact system

SP ST normally open (Form A)

4.2 Input Voltage

4.75 to 5.25 V.D.C.

4.3 Input current

500 milliamperes maximum

4.4 Case ground

Bottom plate of case is electrically tied to minus (common) of power supply.

4.5 Keyboard connection

See Connection Diagram of Figures 8 and 9.

## 5.0 ENVIRONMENTAL

5.1 Temperature

5.1.1 Operating: +32 °F to +122 °F (0 °C to +50 °C)

5.1.2 Storage: -40 °F to +131 °F (-40 °C to +55 °C)

5.2 Relative humidity

0 to 95 percent

5.3 Corrosive atmosphere

The keyboard is designed to withstand the following concentrations of corrosive gases:

| | |
|---|---|
| Hydrogen Sulfide | $H_2S$ 5.0 Micrograms per cubic meter |
| Sulphur Dioxide | $SO_2$ 1,300 Micrograms per cubic meter |
| Ozone | $O_3$ 250 Micrograms per cubic meter |

5.4 Vibration

Mil-Std-810 B, Method 514, procedure x per paragraph 4.5.1.3, curve "AY" of figure 514.1 VII. Omit resonance search and dwell. Test in three perpendicular planes. From 5-200-5 Hz for one hour in each plane.

5.5 Shock

A keyboard that is hard mounted in a rigid carrier which protects the keys and electrical leads shall withstand a 40 g, 1/2 sine, 10 ms duration shock in each direction along the three mutually perpendicular axis.

5.6 Electro-magnetic compatibility

The keyboard has been tested for and has passed the EMI requirements of a class B device.

5.7 Electrostatic discharge

The keyboard has been tested for resistance to damage from electrostatic discharge by an independent testing agency. The keyboard withstood repeated ESD of up to 25KV. (Ref. Test Report TR413445)

5.8 Keycap abrasion and wear resistance

Keycaps were exposed to an eraser loaded to 2 ozs. being wiped cross the keycap legend. The printed keycaps were cycled in parallel with standard two shot keycaps. Deep grooves ( $\approx$ .005") were worn on the two shot legends before there was any noticeable wear on the printed keycap legends.

5.9 Keycap legends — Resistance to hand lotions

After extensive testing of printed keycaps exposed to Jergens hand lotion and Oil of Olay at 50 °C, it was determined that hand lotions had no adverse effects on the printed legends.

# PC-84

1.0 This supplement is a product specification for HI-TEK's PC-84 IBM® plug compatible keyboard, HI-TEK Part Number 200557. This product is designed to meet the low profile DIN standard. Any deviation from the PC-83 specifications will be noted below.

## 2.0 MECHANICAL

2.1 Outline Dimensions

2.1.1 PC-84 keyboard. Figure #10

2.2 Array Configuration

2.2.1 Keyboard keycap and character layout. Figure #11

## 3.0 FUNCTIONAL

Model PC-84 Keyboard

3.3 X-Y matrix for the PC-84 is shown in Figure #12

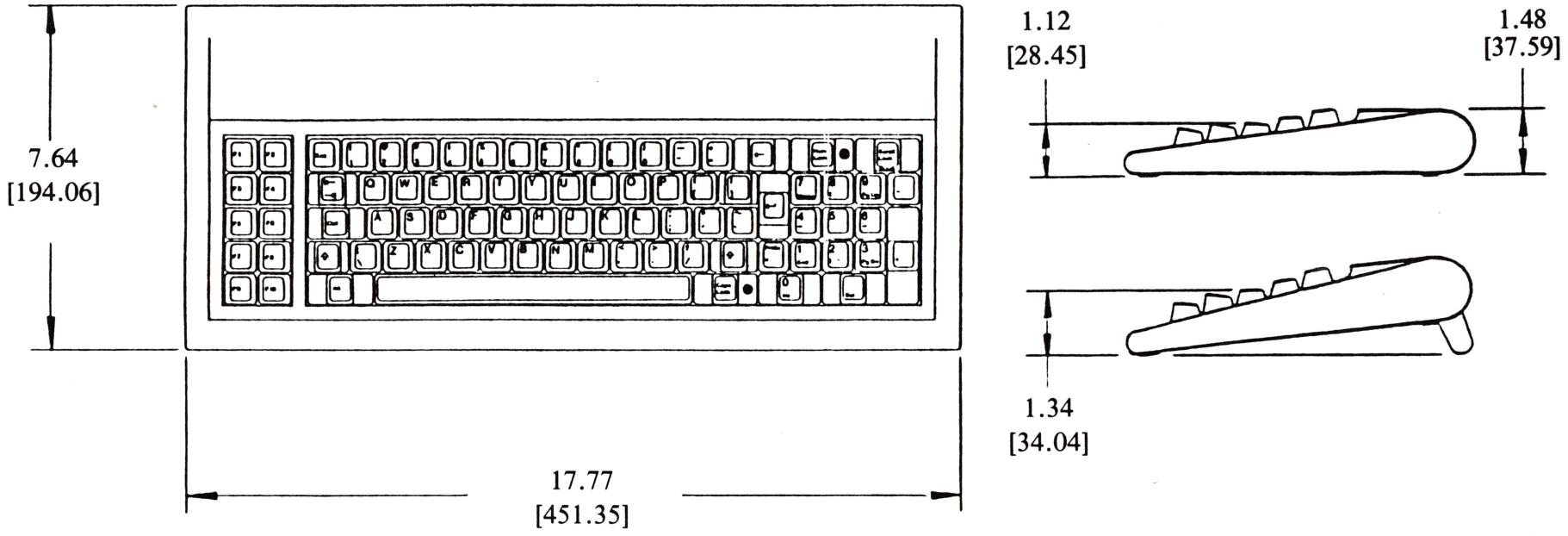
3.10 Output Code

The keys on the PC-84 keyboard are assigned arbitrary key position numbers as shown in Figure #13. The scan codes for the PC-84 are shown in Figure #14.

# FIGURE 1

OUTLINE DIMENSIONS

PC-83

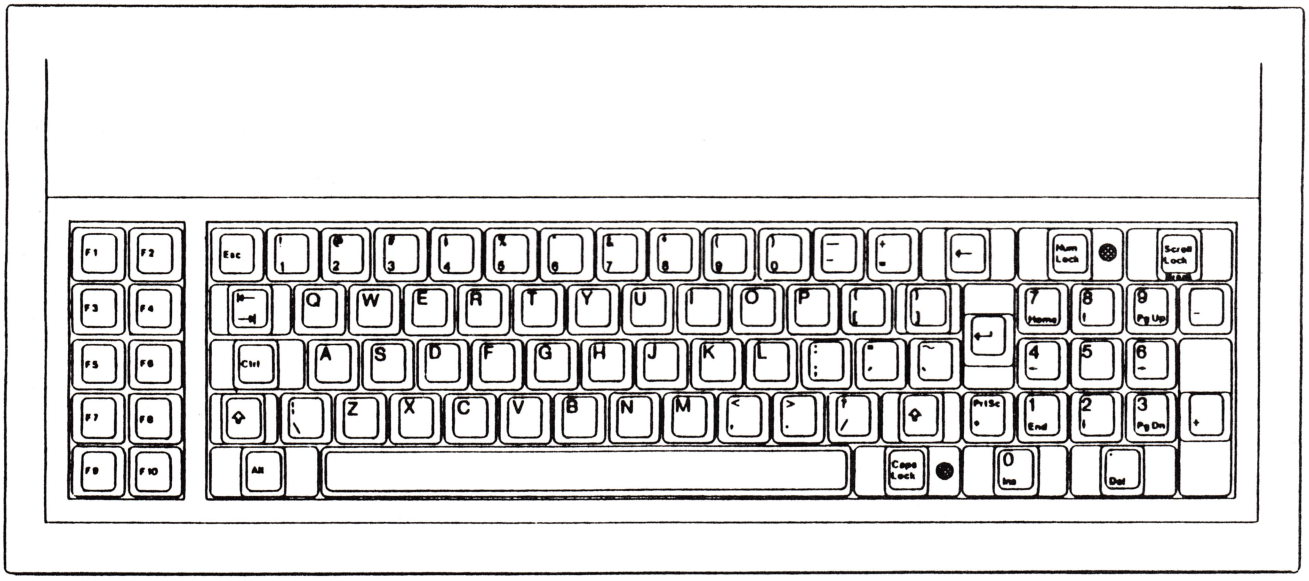



DIMENSIONS IN [ ] ARE IN MILLIMETERS

# FIGURE 2

ARRAY CONFIGURATION

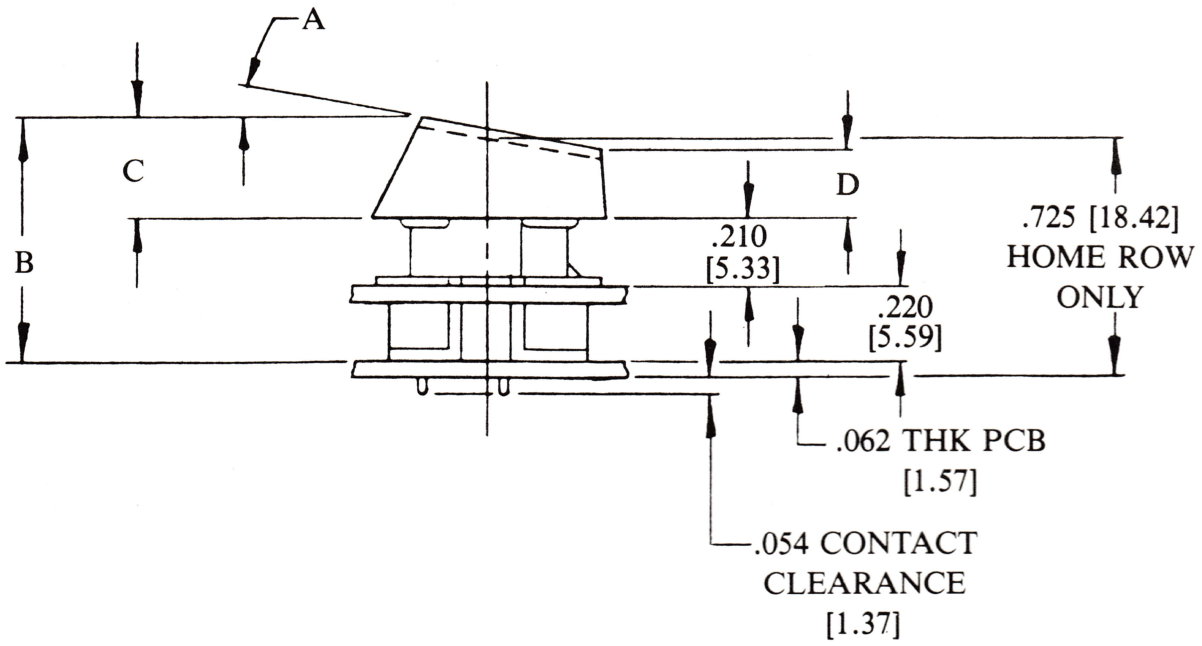
PC-83



# FIGURE 3

SPECIFICATIONS, SERIES 725

PC-83 and PC-84



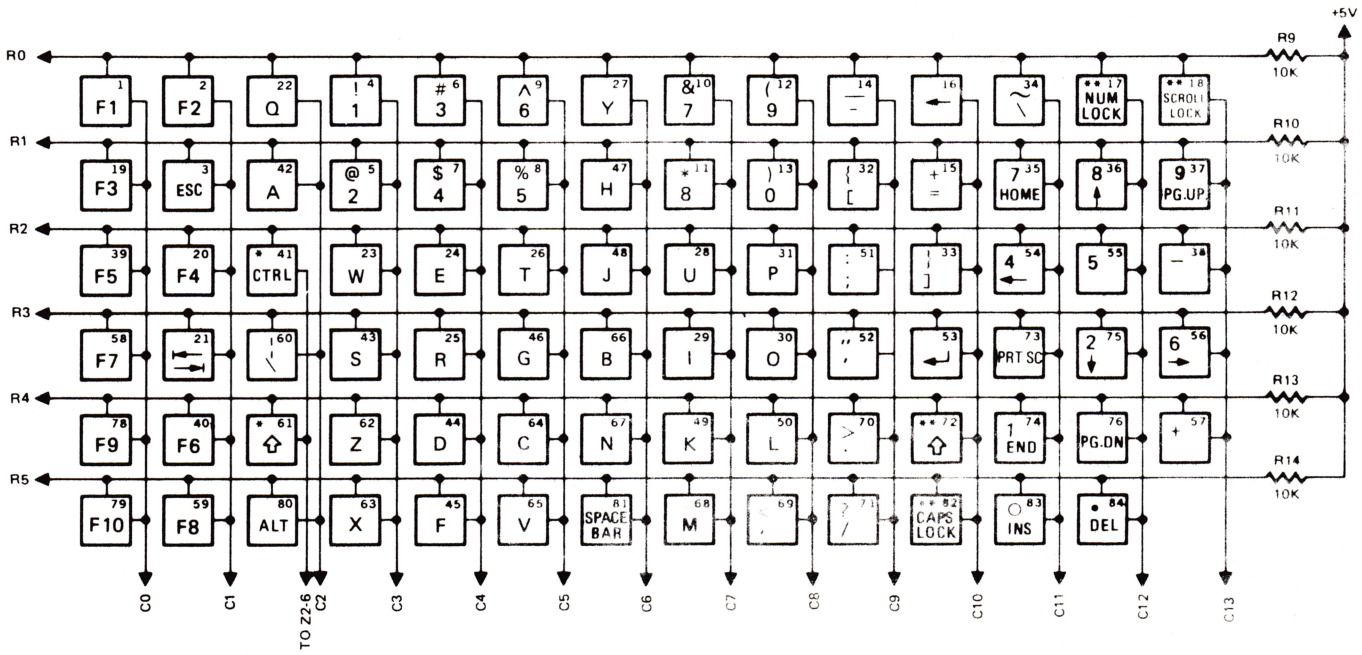

DIMENSIONS IN [ ] ARE IN MILLIMETERS

| | SERIES 725 DIMENSION TABLE | | | | | METRIC [MM] | | |
|---|---|---|---|---|---|---|---|---|
| | DIM / ROW | A | B | C | D | B | C | D |
| | S/B | 18° | .825 | .400 | .230 | 20.96 | 10.16 | 5.84 |
| | 1 | 18° | .825 | .400 | .230 | 20.96 | 10.16 | 5.84 |
| HOME ROW | 2 | 10° | .725 | .300 | .200 | 18.42 | 7.62 | 5.08 |
| | 3 | 5° | .725 | .300 | .250 | 18.42 | 7.62 | 6.35 |
| | 4 | 0° | .785 | .360 | .360 | 19.94 | 9.14 | 9.14 |
| | 5 | 0° | .785 | .360 | .360 | 19.94 | 9.14 | 9.14 |

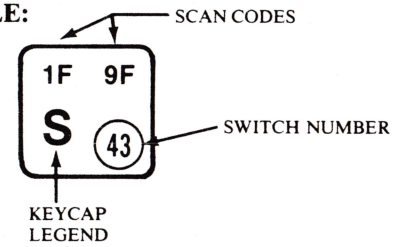
# FIGURE 4

X-Y MATRIX

PC-83



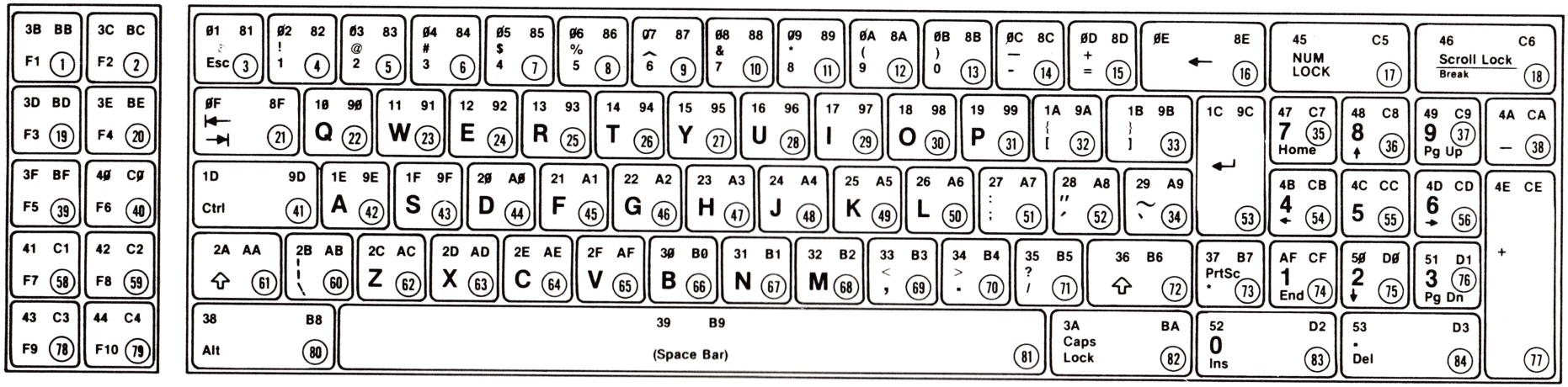
**EXAMPLE:**




# FIGURE 5

SWITCH LAYOUT

PC-83



# FIGURE 6

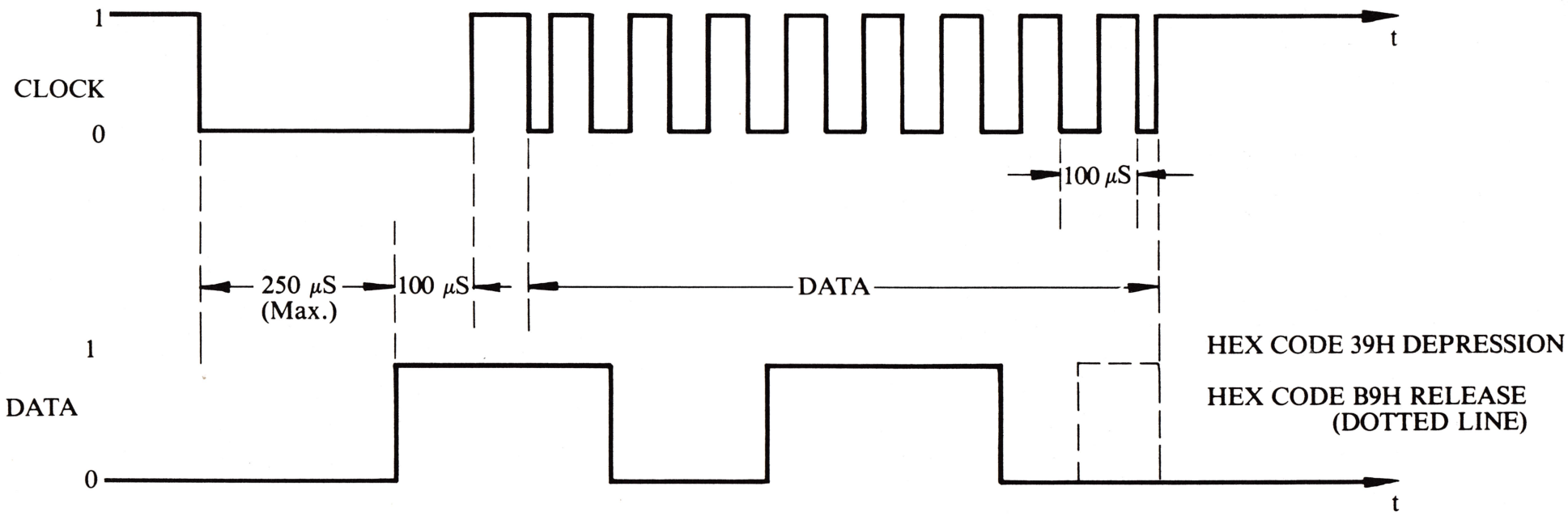
PC-83 CODE CHART

| Switch | Desig. | Down | Up | Switch | Desig. | Down | Up | Switch | Desig. | Down | Up |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | F1 | 3B | BB | 29 | I | 17 | 97 | 57 | NOT USED | | |
| 2 | F2 | 3C | BC | 30 | O | 18 | 98 | 58 | F7 | 41 | C1 |
| 3 | Esc | 01 | 81 | 31 | P | 19 | 99 | 59 | F8 | 42 | C2 |
| 4 | ! 1 | 02 | 82 | 32 | { [ | 1A | 9A | 60 | ¦ \ | 2B | AB |
| 5 | @ 2 | 03 | 83 | 33 | } ] | 1B | 9B | 61 | ⇧ | 2A | AA |
| 6 | # 3 | 04 | 84 | 34 | ~ ` | 29 | A9 | 62 | Z | 2C | AC |
| 7 | $ 4 | 05 | 85 | 35 | 7 Home | 47 | C7 | 63 | X | 2D | AD |
| 8 | % 5 | 06 | 86 | 36 | 8 ↑ | 48 | C8 | 64 | C | 2E | AE |
| 9 | ^ 6 | 07 | 87 | 37 | 9 Pg Up | 49 | C9 | 65 | V | 2F | AF |
| 10 | & 7 | 08 | 88 | 38 | — | 4A | CA | 66 | B | 30 | B0 |
| 11 | * 8 | 09 | 89 | 39 | F5 | 3F | BF | 67 | N | 31 | B1 |
| 12 | ( 9 | 0A | 8A | 40 | F6 | 40 | C0 | 68 | M | 32 | B2 |
| 13 | ) 0 | 0B | 8B | 41 | Ctrl | 1D | 9D | 69 | < , | 33 | B3 |
| 14 | _ - | 0C | 8C | 42 | A | 1E | 9E | 70 | > . | 34 | B4 |
| 15 | + = | 0D | 8D | 43 | S | 1F | 9F | 71 | ? / | 35 | B5 |
| 16 | ← | 0E | 8E | 44 | D | 20 | A0 | 72 | ⇧ | 36 | B6 |
| 17 | Num Lock | 45 | C5 | 45 | F | 21 | A1 | 73 | PrtSc * | 37 | B7 |
| 18 | Scroll Lock / Break | 46 | C6 | 46 | G | 22 | A2 | 74 | 1 End | 4F | CF |
| 19 | F3 | 3D | BD | 47 | H | 23 | A3 | 75 | 2 ↓ | 50 | D0 |
| 20 | F4 | 3E | BE | 48 | J | 24 | A4 | 76 | 3 Pg Dn | 51 | D1 |
| 21 | ⇤ / ⇥ | 0F | 8F | 49 | K | 25 | A5 | 77 | + | 4E | CE |
| 22 | Q | 10 | 90 | 50 | L | 26 | A6 | 78 | F9 | 43 | C3 |
| 23 | W | 11 | 91 | 51 | : ; | 27 | A7 | 79 | F10 | 44 | C4 |
| 24 | E | 12 | 92 | 52 | " ' | 28 | A8 | 80 | Alt | 38 | B8 |
| 25 | R | 13 | 93 | 53 | ↵ | 1C | 9C | 81 | Spacebar | 39 | B9 |
| 26 | T | 14 | 94 | 54 | 4 ← | 4B | CB | 82 | Caps Lock | 3A | BA |
| 27 | Y | 15 | 95 | 55 | 5 | 4C | CC | 83 | 0 Ins | 52 | D2 |
| 28 | U | 16 | 96 | 56 | 6 → | 4D | CD | 84 | . Del | 53 | D3 |

# FIGURE 7

TIMING DIAGRAM

PC-83 and PC-84

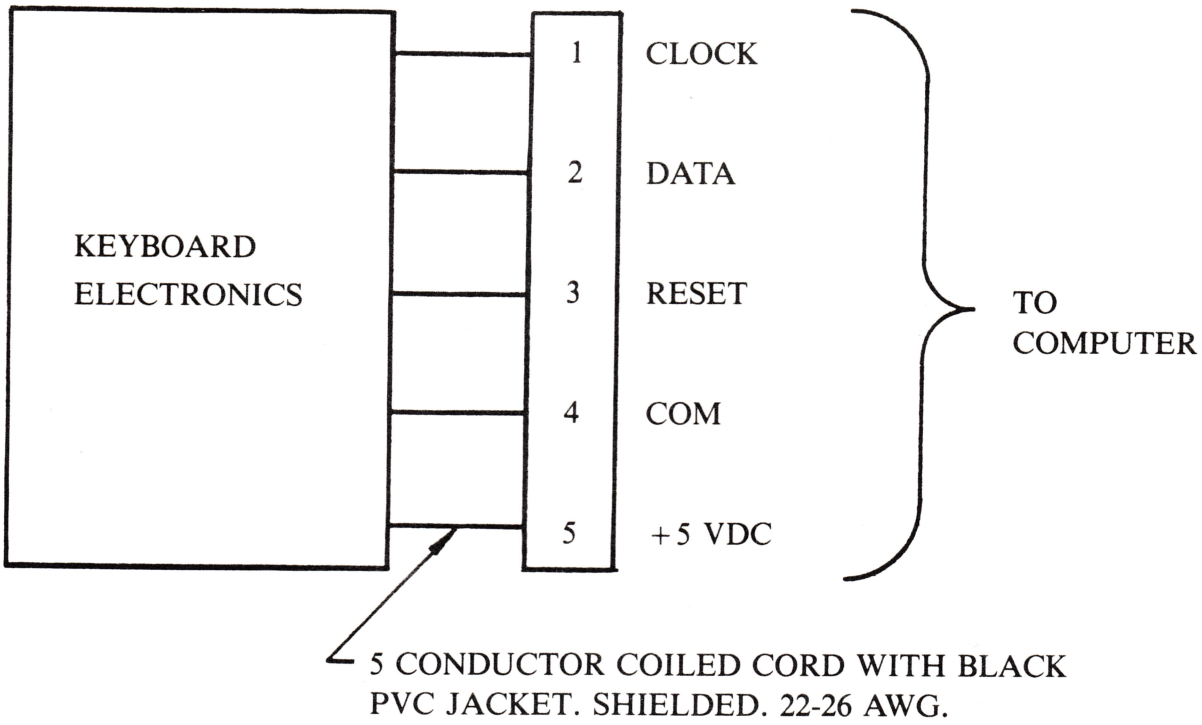



IBM® PC COMPATIBLE WAVE FORMS

EACH DIVISION EQUALS 100 μSEC

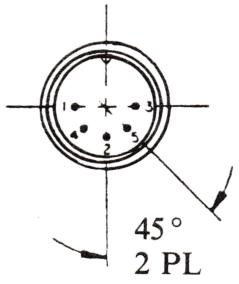
# FIGURE 8

PC-83 and PC-84




# FIGURE 9

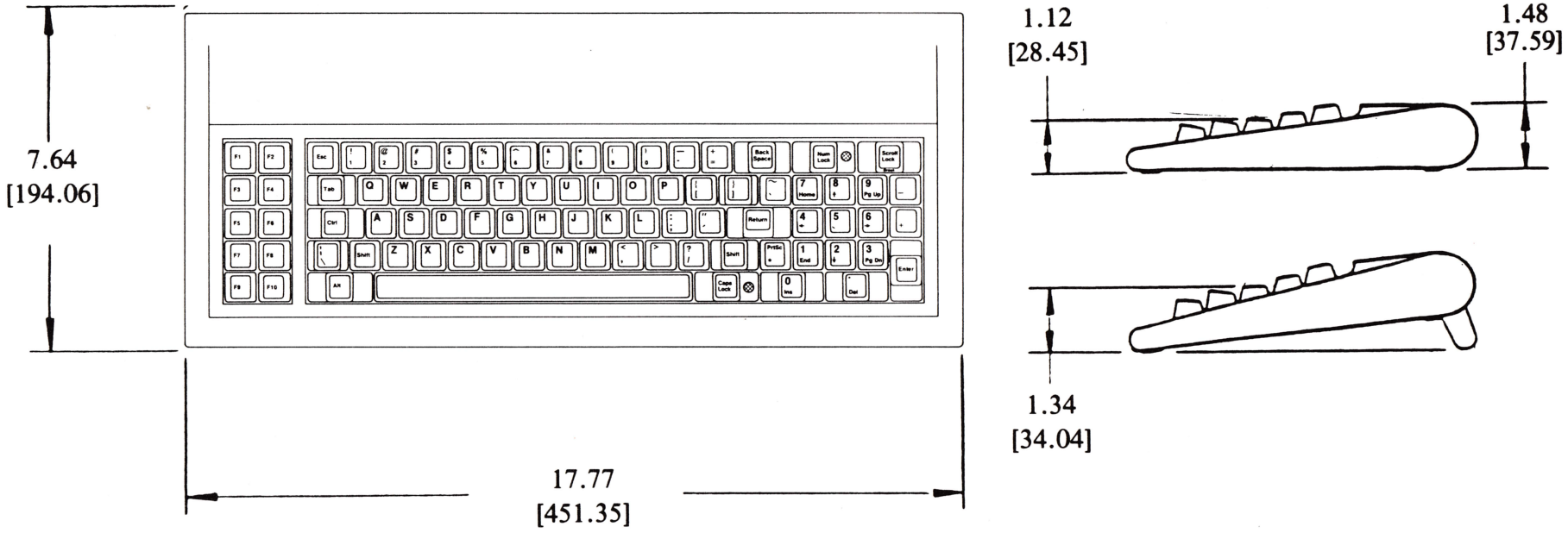
PC-83 and PC-84




KEYBOARD CONNECTOR TO MATE WITH DIN STYLE 5 PIN
AT 180° FEMALE CONNECTOR.
(REF. SWITCHCRAFT P/N 57NC5F OR EQUIV.)

# FIGURE 10

OUTLINE DIMENSIONS
PC-84

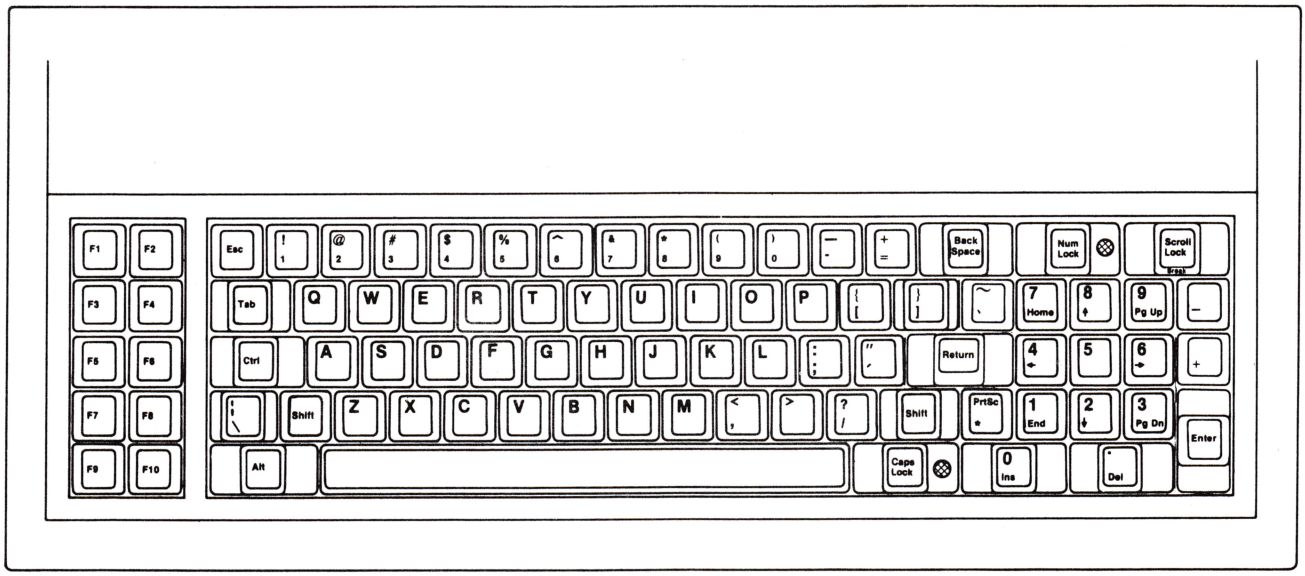



DIMENSIONS IN [ ] ARE IN MILLIMETERS

# FIGURE 11

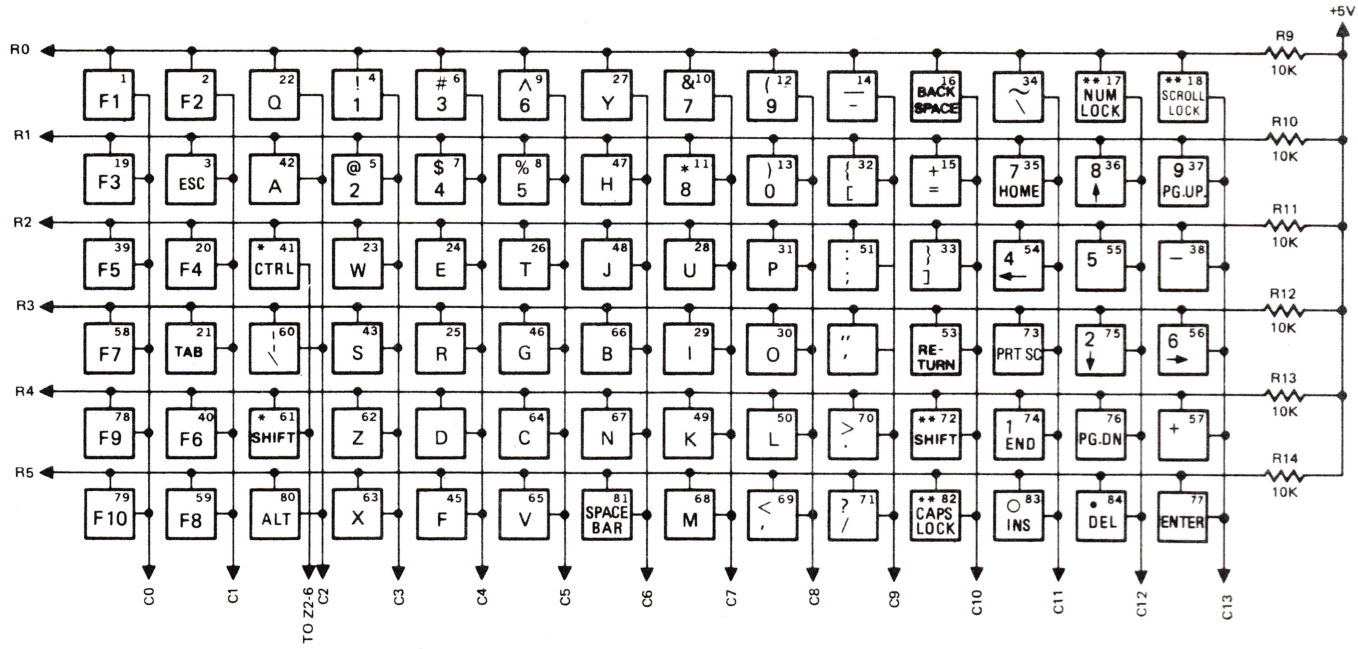
ARRAY CONFIGURATION

PC-84

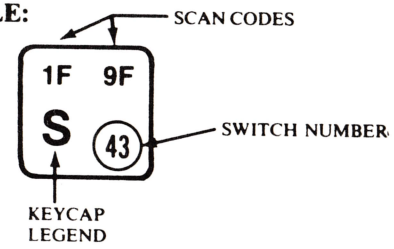


# FIGURE 12

X-Y MATRIX
PC-84

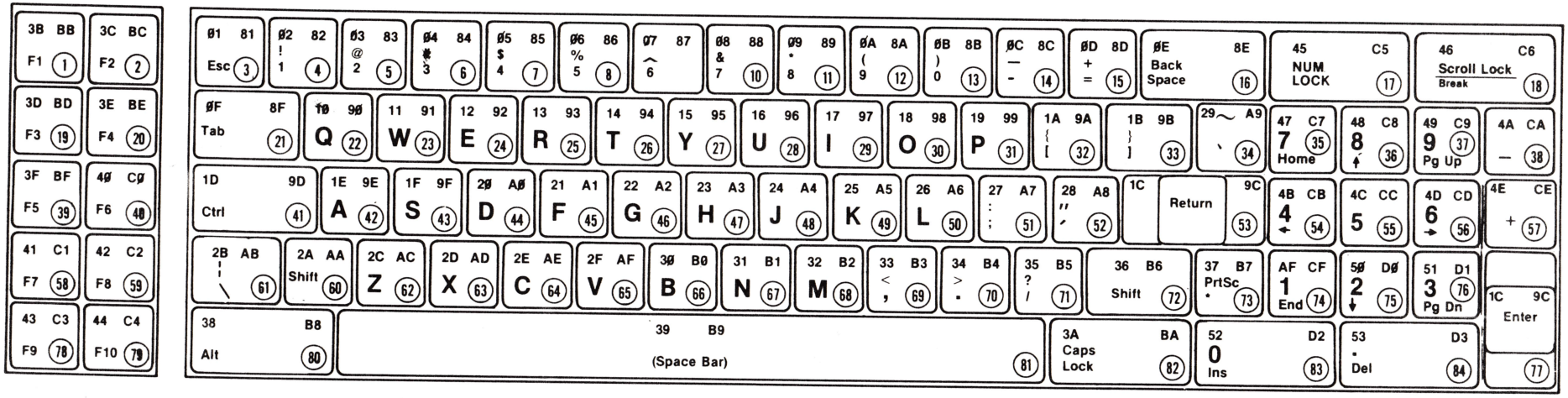


**EXAMPLE:**




# FIGURE 13

SWITCH LAYOUT
PC-84



# FIGURE 14

PC-84 CODE CHART

| Switch | Desig. | Down | Up | Switch | Desig. | Down | Up | Switch | Desig. | Down | Up |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | F1 | 3B | BB | 29 | I | 17 | 97 | 57 | + | 4E | CE |
| 2 | F2 | 3C | BC | 30 | O | 18 | 98 | 58 | F7 | 41 | C1 |
| 3 | Esc | 01 | 81 | 31 | P | 19 | 99 | 59 | F8 | 42 | C2 |
| 4 | ! 1 | 02 | 82 | 32 | { [ | 1A | 9A | 60 | Left Shift | 2A | AA |
| 5 | @ 2 | 03 | 83 | 33 | } ] | 1B | 9B | 61 | \| \ | 2B | AB |
| 6 | # 3 | 04 | 84 | 34 | ~ ` | 29 | A9 | 62 | Z | 2C | AC |
| 7 | $ 4 | 05 | 85 | 35 | 7 Home | 47 | C7 | 63 | X | 2D | AD |
| 8 | % 5 | 06 | 86 | 36 | 8 ↑ | 48 | C8 | 64 | C | 2E | AE |
| 9 | ^ 6 | 07 | 87 | 37 | 9 Pg Up | 49 | C9 | 65 | V | 2F | AF |
| 10 | & 7 | 08 | 88 | 38 | — | 4A | CA | 66 | B | 30 | B0 |
| 11 | * 8 | 09 | 89 | 39 | F5 | 3F | BF | 67 | N | 31 | B1 |
| 12 | ( 9 | 0A | 8A | 40 | F6 | 40 | C0 | 68 | M | 32 | B2 |
| 13 | ) Ø | 0B | 8B | 41 | Ctrl | 1D | 9D | 69 | < , | 33 | B3 |
| 14 | — - | 0C | 8C | 42 | A | 1E | 9E | 70 | > . | 34 | B4 |
| 15 | + = | 0D | 8D | 43 | S | 1F | 9F | 71 | ? / | 35 | B5 |
| 16 | Back Space | 0E | 8E | 44 | D | 20 | A0 | 72 | Right Shift | 36 | B6 |
| 17 | Num Lock | 45 | C5 | 45 | F | 21 | A1 | 73 | PrtSc * | 37 | B7 |
| 18 | Scroll Lock / Break | 46 | C6 | 46 | G | 22 | A2 | 74 | 1 End | 4F | CF |
| 19 | F3 | 3D | BD | 47 | H | 23 | A3 | 75 | 2 ↓ | 50 | D0 |
| 20 | F4 | 3E | BE | 48 | J | 24 | A4 | 76 | 3 Pg Dn | 51 | D1 |
| 21 | Tab | 0F | 8F | 49 | K | 25 | A5 | 77 | Enter | 1C | 9C |
| 22 | Q | 10 | 90 | 50 | L | 26 | A6 | 78 | F9 | 43 | C3 |
| 23 | W | 11 | 91 | 51 | : ; | 27 | A7 | 79 | F10 | 44 | C4 |
| 24 | E | 12 | 92 | 52 | " ' | 28 | A8 | 80 | Alt | 38 | B8 |
| 25 | R | 13 | 93 | 53 | Return | 1C | 9C | 81 | Spacebar | 39 | B9 |
| 26 | T | 14 | 94 | 54 | 4 ← | 4B | CB | 82 | Caps Lock | 3A | BA |
| 27 | Y | 15 | 95 | 55 | 5 | 4C | CC | 83 | 0 Ins | 52 | D2 |
| 28 | U | 16 | 96 | 56 | 6 → | 4D | CD | 84 | . Del | 53 | D3 |

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