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**Title:**

# Keyboard RC700/RC850
# Description

RCSL 42-i1905

A/S REGNECENTRALEN
af 1979

**Keywords:**

RC700, RC721, RC722, RC850, keyboard.

**Abstract:**

This manual contains a functional description and specification for the keyboard used for the RC700 and the RC850 systems.

(30 printed pages)



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# 1. GENERAL DESCRIPTION 1.

The keyboard used with RC700 and RC850 is a selfcontained unit supplied from +5 Volt through the interconnection cable.

When used with RC850 the interface is a serial interface and when used with RC700 it is a parallel interface. The output from the keyboard may be a position code or an ASCII code. The ASCII code may be defined in the keyboard program or it may be specified by a separate custom PROM. ASCII code is normally used together with parallel interface.

Switches or straps on the board select the different modes for interface and code.

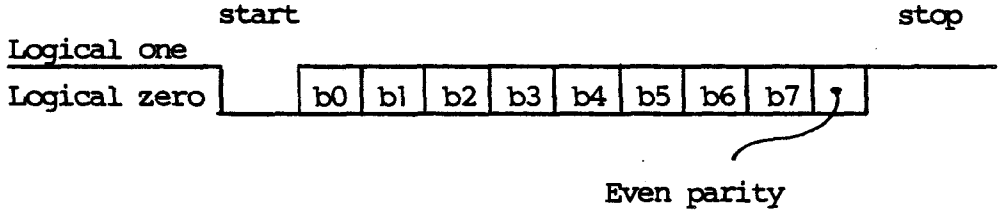
## 1.1 Environmental Specification 1.1

| | |
|---|---|
| Power: | |
| Voltage | 4.75 to 5.25 Volt |
| Current | 700 mA max. |
| Operating temperature | 0-50°C |
| Storage temperature | -20-70°C |
| Humidity | 0-95%, non condensing |

## 2. SERIAL INTERFACE 2.

When serial interface is selected, data are transferred to and from keyboard in the following format:

| | |
|---|---|
| Number of start bits | 1 |
| Number of stop bits | 1 to ∞ |
| Number of data bits | 8 |
| Number of parity bits | 1 (even parity) |
| Bit rate | 300 bps |
| Full duplex mode | |
| No control signals | |
| Signal levels | Low power shottky *) |
| Logical one | 2.5 to 5.0 V |
| Logical zero | 0.0 to 0.4 V |



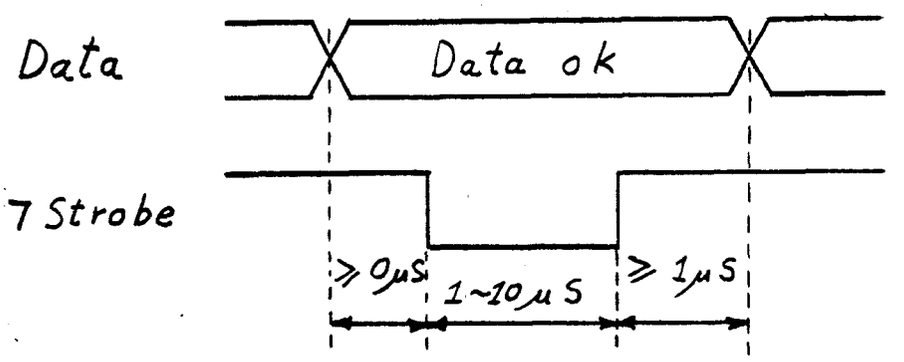

*) Low power schottky mentioned in this manual is specified the following way:

| | | | |
|---|---|---|---|
| Input | | | |
| High-level input voltage | 2.0 | Volt | min. |
| Low-level - - | 0.8 | - | max. |
| High-level - current | 20 | µA | - |
| Low-level - - | -0.4 | mA | - |
| Output | | | |
| High-level output voltage | 2.4 | Volt | min. |
| Low-level - - | 0.5 | - | max. |
| High-level - current | -0.4 | mA | max. |
| Low-level - - | 8 | - | min. |

## 3. PARALLEL INTERFACE 3.

When parallel interface is selected, data are transferred from the keyboard in the following format:

| | |
|---|---|
| Number of output lines | 8 |
| Number of output strobes | 1 |
| Signal levels | Low power shottky |
| Logical one | 2.5 to 5.0 V |
| Logical zero | 0.0 to 0.4 V |
| Data lines | Positive logic |
| Strobe | Negative logic |



## 4. INPUT/OUTPUT CONNECTOR 4.

The input/output connector is a 2 x 13 pin connector with 0.1 inch spacing between the pins and 0.1 inch spacing between the two rows.

The connector may be of the following type:

AMP type 102162-6 or
3M - 3493-1003

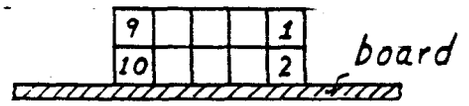

Pin layout.

| Pin No | Signal |
|---|---|
| 1 | Parallel out 0 |
| 2 | - 1 |
| 3 | - 2 |
| 4 | - 3 |
| 5 | - 4 |
| 6 | - 5 |
| 7 | - 6 |
| 8 | - 7 |
| 9 | 0 Volt |
| 10 | No connection |
| 11 | - - |
| 12 | - - |
| 13 | - - |
| 14 | - - |
| 15 | - - |
| 16 | - - |
| 17 | - - |
| 18 | 0 Volt |
| 19 | No connection |
| 20 | +5 Volt |
| 21 | -,Strobe/Serial out *) |
| 22 | +5 Volt |
| 23 | Serial in |
| 24 | No connection |
| 25 | - - |
| 26 | - - |

*) The signal is:
-,Strobe in parallel mode and
Serial out in serial mode

## 5. BELL/CLICK CONNECTOR 5.

The keyboard is supplied with a bell/click connector which connects the keyboard to a switch, a potentiometer and a loudspeaker. The circuit diagram for the circuits on the keyboard and the components supplied to the connector are shown in fig. 1.




Pin layout.

The connector may be of the following type:

AMP type 102162-1
3M - 3491-1003

When control A is high, a signal at approx. 2.2 kHz is sent to the loudspeaker. This is the bell function.

When control B is high, a signal at approx. 1.6 kHz is sent to the loudspeaker if the switch is on.

This makes the click function. This is activated in approx. 3.5 msec.

The potentiometer controls the signal amplitude for both functions.

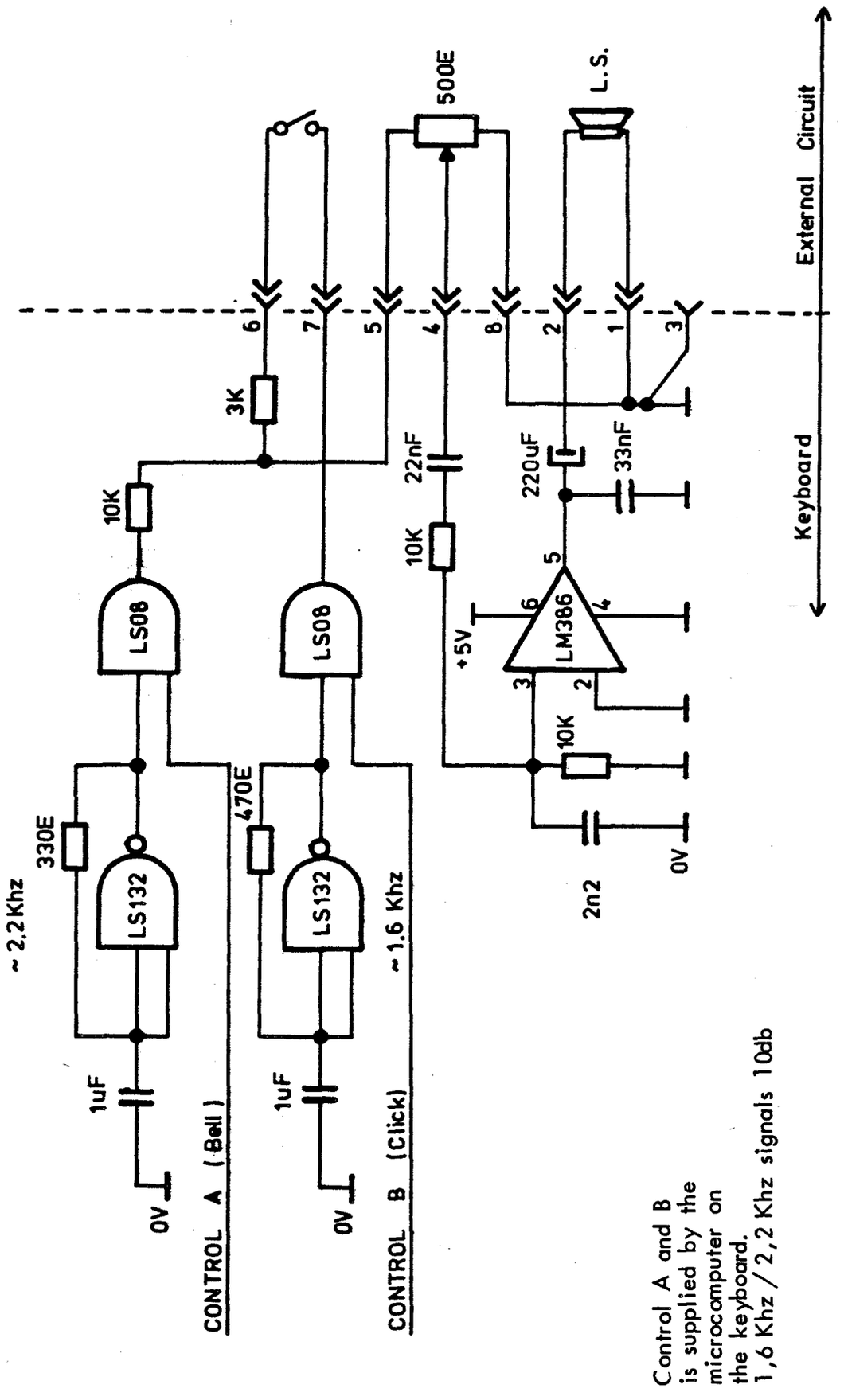



Fig. 1. Bell and Click function
Circuit diagram

## 6. SERIAL COMMUNICATION 6.

Chapter 1 shows the format used when communicating between the keyboard and the host, when serial communication is selected.

### 6.1 Initializing the Keyboard 6.1

In serial mode the keyboard may be initialized. For each keyposition on the keyboard, the key will deliver a predefined binary code when pressed. For keys like shift and lock it may be wanted to get an output signal too, when the key is released. This output code must be initialized. The maximum number of keys with such a double code is 15.

Before initializing the double code keys, the double key pointer internally in the keyboard must be reset. This is done by sending the following sequence to the keyboard:

| | | |
|---|---|---|
| byte | 1 | D5 Hex |
| - | 2 | C0 - |
| - | 3 | FF - |
| - | 4 | FF - |

Then it is possible to initialize 1 to 15 double keys using the following sequence for each key:

| | | |
|---|---|---|
| byte | 1 | C0 Hex |
| - | 2 | Key position number |
| - | 3 | Release code from key |

Example:

The keyboard receives the following sequence:

| | | |
|---|---|---|
| byte | 1 | C0 Hex |
| - | 2 | A0 - |
| - | 3 | B3 - |

The result is that the key with the key code number A0 (see fig. 2) is initialized to be a double code key with the release value B3 Hex. Input codes not mentioned here or in the appendices should be ignored.

## 6.2 Serial Output from the Keyboard 6.2

Fig. 2 shows the output code for keys when pressed. Adding on the release code does not change the output code for the key when pressed.

## 6.3 Keyboards LED's etc 6.3

The keyboard may be supplied with a number of LED's (light emitting diodes) which may be turned on and off using one of the following commands. The audio circuit (bell function) is used the same way.

command 1

| b7 | | | | | | | b0 |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 5 | 4 | 3 | 2 | 1 | 0 |

byte code LED number

command 2

| b7 | | | | | | | b0 |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 11 | 10 | 9 | 8 | 7 | 6 |

byte code LED number

command 3

| b7 | | | | b3 | | | b0 |
|---|---|---|---|---|---|---|---|
| 1 | 0 | Ø | Ø | A | Ø | 13 | 12 |

byte code LED number

audio circuit

A logical one in the LED number position shown, turns an LED mounted in that position on. A logical zero turns it off.

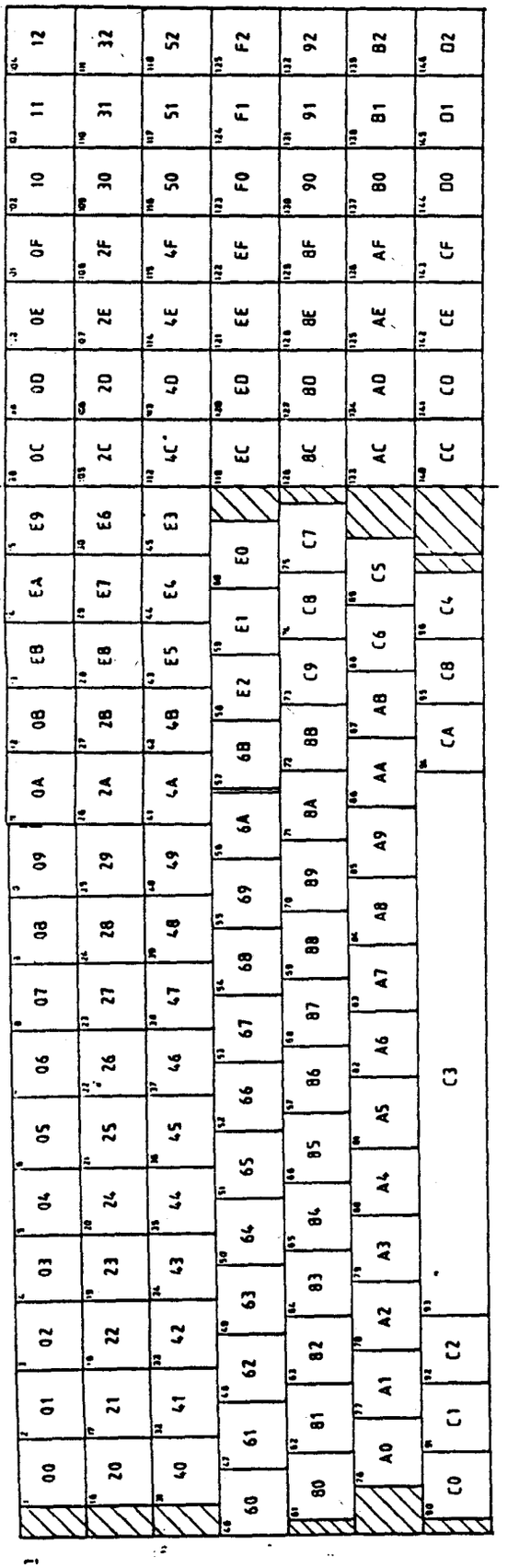



Figure 2: Output code, serial mode .

Output code for keyboard in serial mode, values in HEX code.
Output code is transmitted from the keyboard, when the key is pressed.

Audio is controlled by command 3 bit 3. Setting bit 3 to one turns control A (bell) on as described in chapter 5 and shown in fig. 1.

The different lamp positions are shown in fig. 3. A lamp may be placed hardware-wise in any of the number positions shown. Only one lamp may be used for each number.

Example:

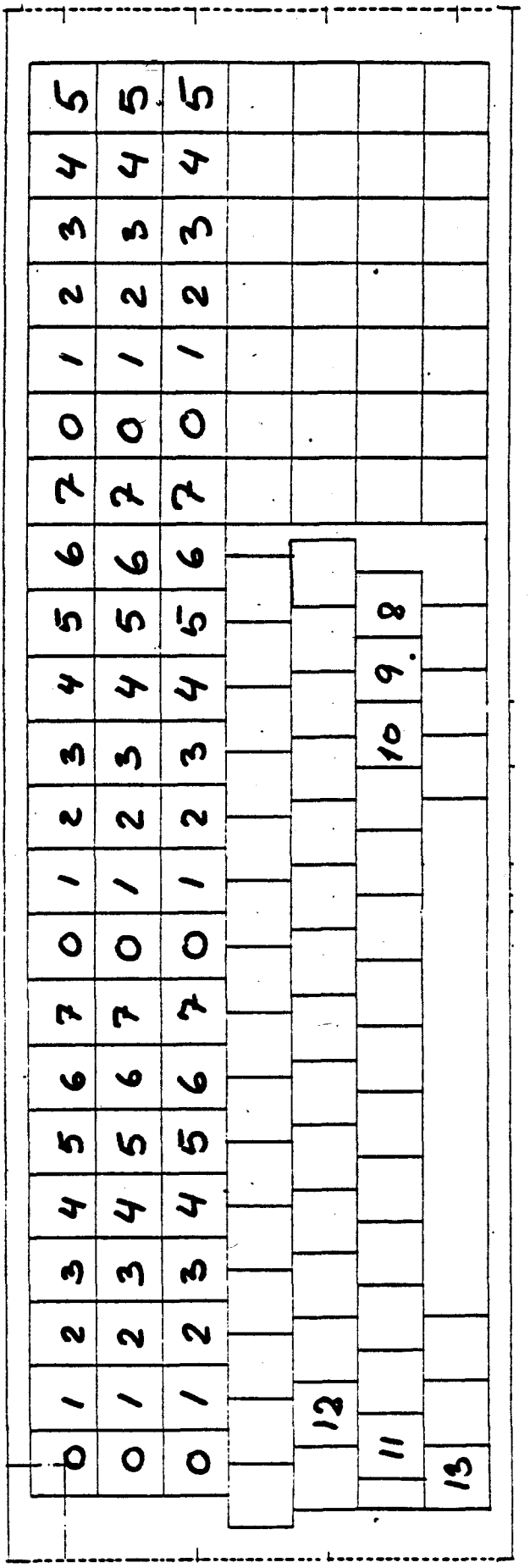
The byte 81 Hex selects command 3 and sets LED number 12 to light. When this byte is sent, an LED in the position marked 12 in fig. 3 is lighting. The byte 80 Hex turns it off again.

## 6.4 Auto-Repeat Function 6.4

When a key is pressed, a character containing the output code is sent as shown in section 6.2. If a key is pressed for more than 0.7 sec. the auto-repeat function starts. This function is shown in fig. 4.

The auto-repeat function is not wanted for all the keys. The keys with output code 60 Hex, 80 Hex, 81 Hex, A0 Hex, C6 Hex, C0 Hex, C1 Hex, CB Hex and C4 Hex are normally made without auto-repeat. As the keyboard is made using a microprocessor, it is possible to change the program in the keyboard and remove the auto-repeat from other keys.

Whenever a character is sent, the control A (click) is on for approx. 3.5 msec. Using the circuit shown in fig. 1, an acoustic signal is generated whenever the a key is activated on the keyboard.




Positions with the same numbers are controlled together, but only one LED may use the same number

Figure 3: LED positions layout.

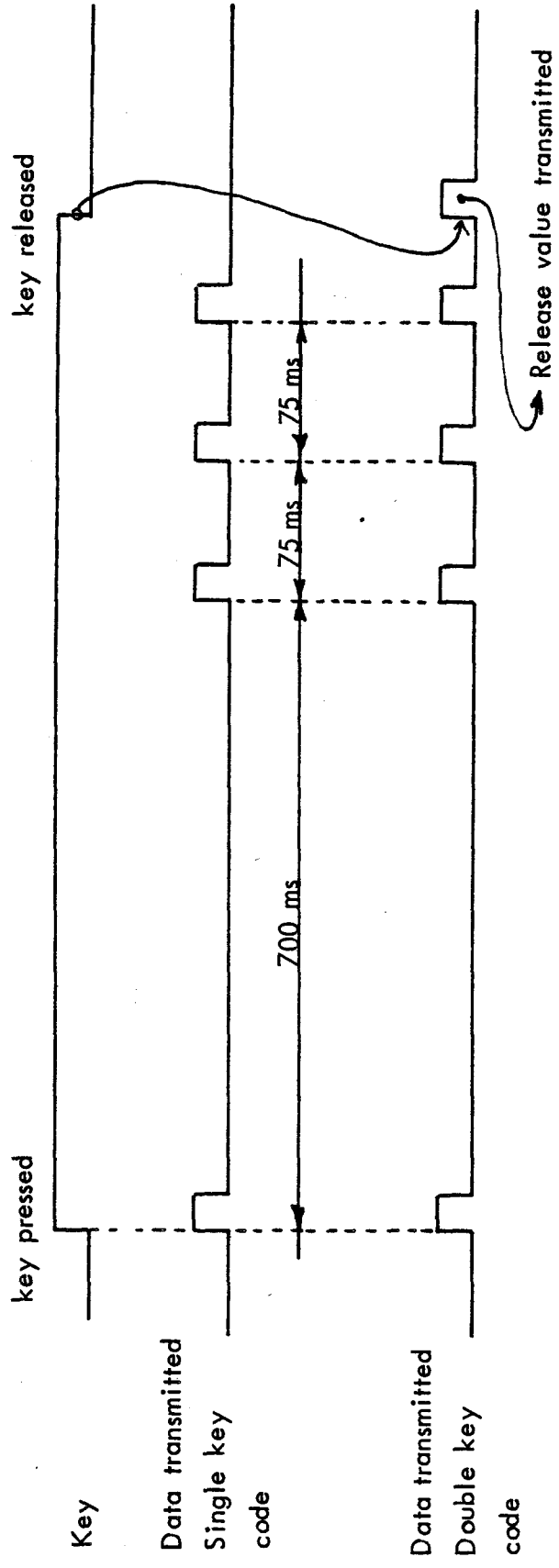



Figure 4: Auto-repeat function.

## 7. PARALLEL COMMUNICATION 7.

Chapter 3 shows the output signals when parallel communication is selected.

### 7.1 Internal ASCII Table 7.1

Fig. 5 shows the output from the different keys. The two hexadecimal numbers show the value when shift is not pressed (normal) and when pressed (shift).

The alphalock key is supplied with a red light showing when the keyboard is in alphalock mode. In this mode the shift value is selected for those keys which in the figure are marked with an X. The other keys are not effected by the alphalock key.

When the CTRL key is pressed and another key is pressed too, the output from this key is between 00 Hex and 1F Hex. This means that the 3 most significant bits are set to zero.

### 7.2 External ASCII Table 7.2

The keyboard is supplied with socket for an extra PROM (2716), which may contain another ASCII table, than the one shown in fig. 5. A strap selects this PROM which the user has to program.

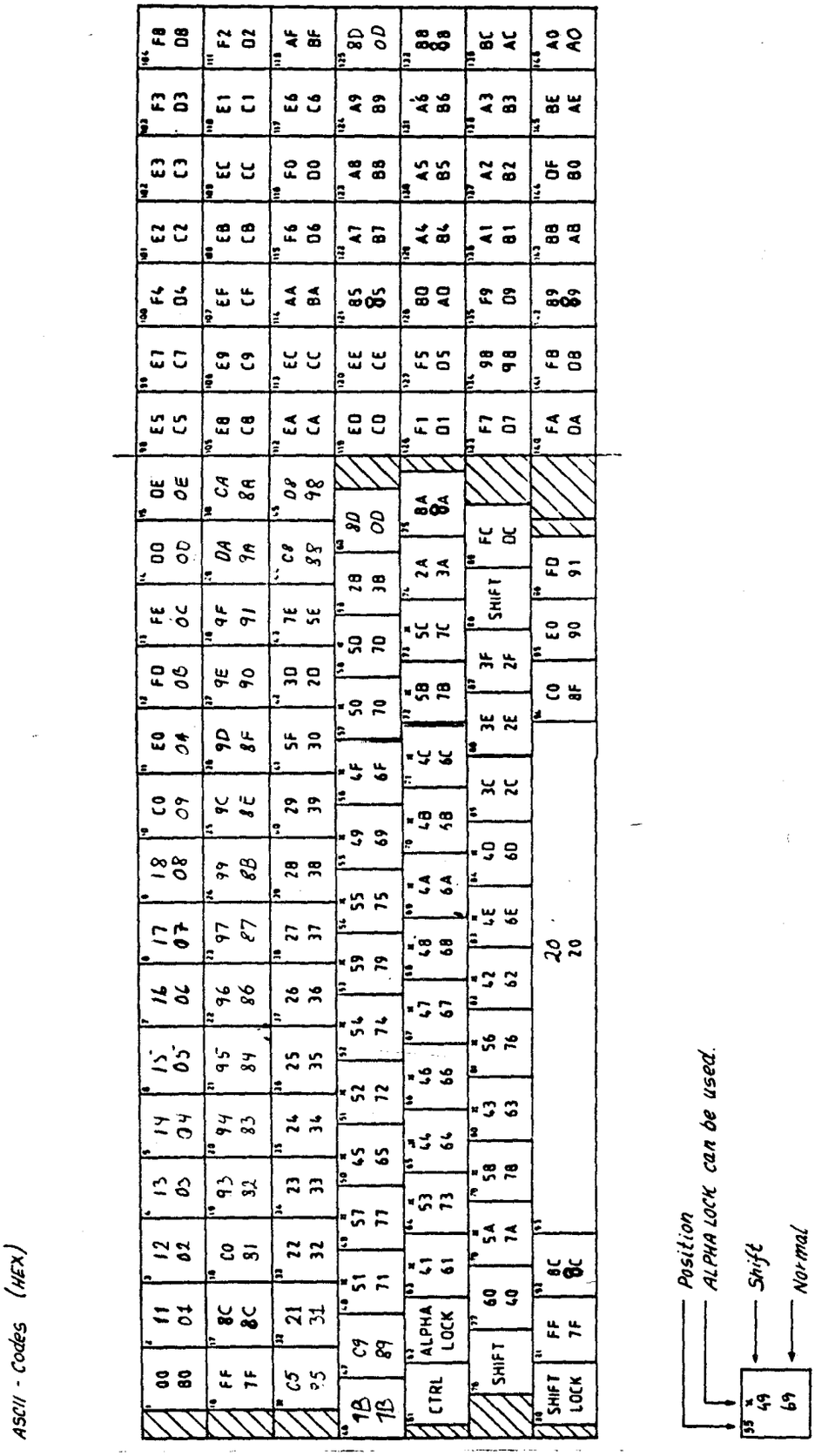



Figure 5: ASCII output.

## 8. KEYBOARD LAYOUTS 8.

The keyboard is supplied in many layouts and in many nationalities.

The following 3 figures show some of the more often used versions.

In some situations it is wanted to change the nationality of the keyboard simply by changing a number of keytops.

The keyboard may also be supplied in a short version (without numeric block). This is shown in fig. 9.

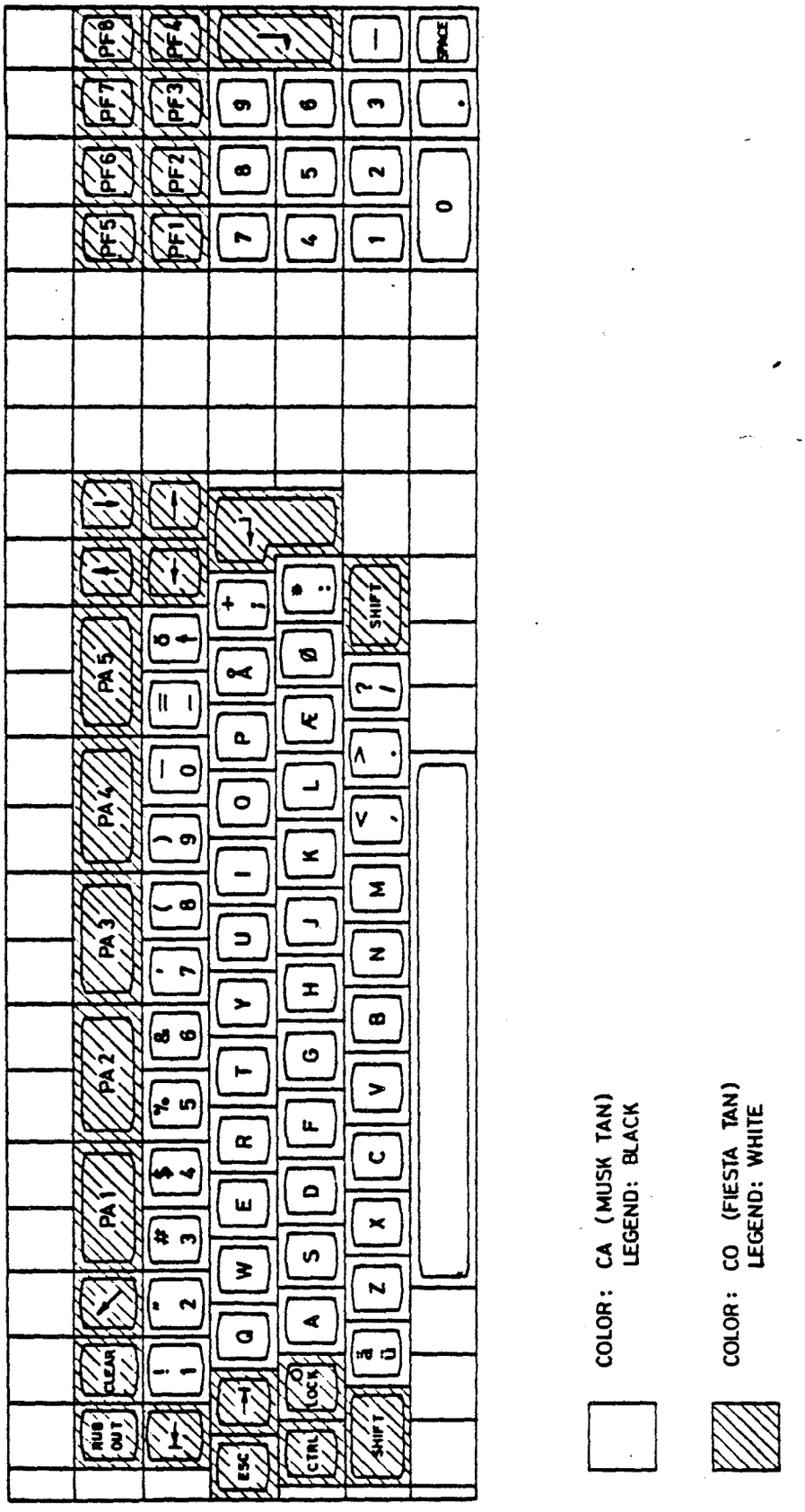



Figure 6: RC700 Keyboard, Danish.

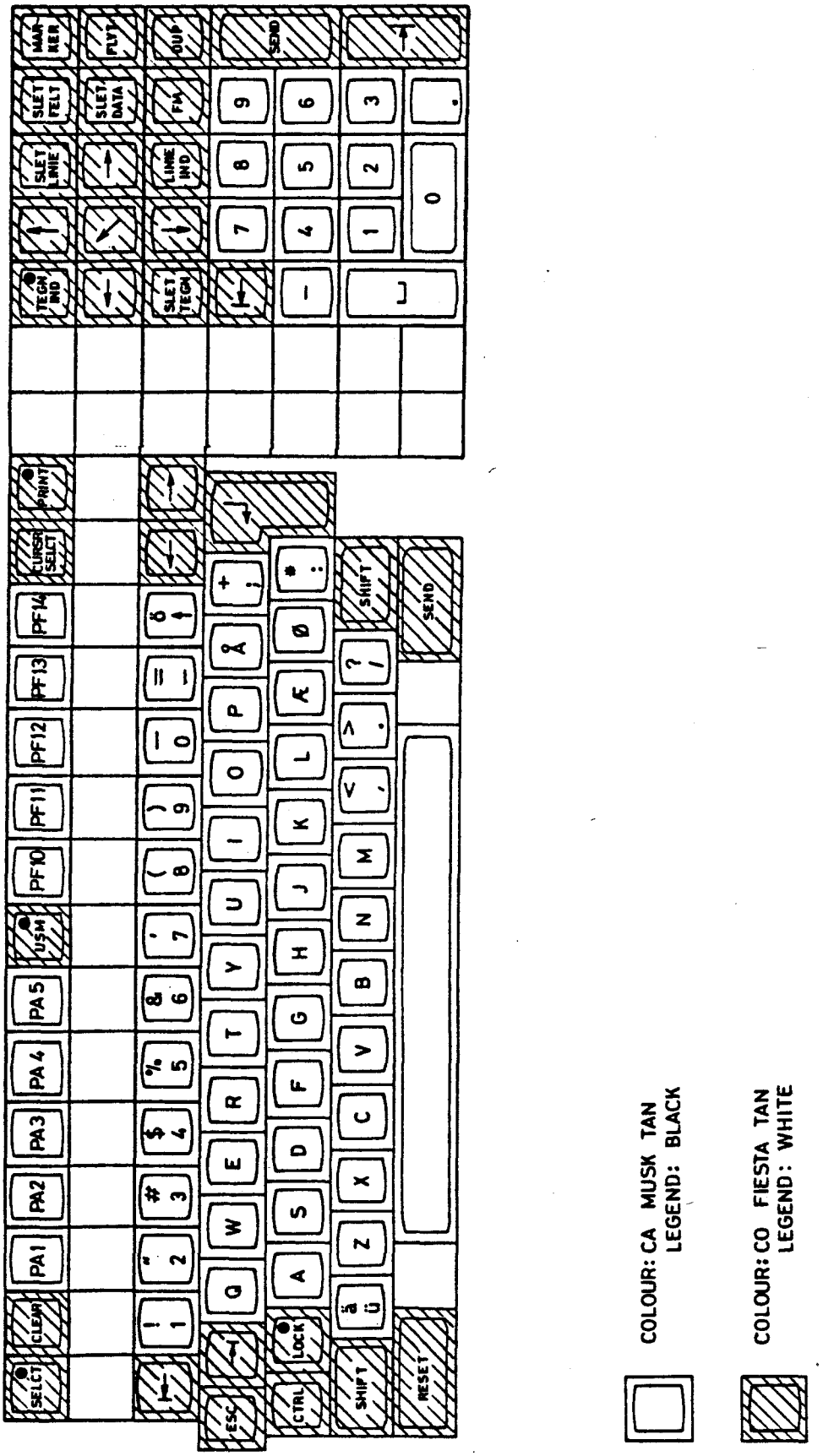



Figure 7: RC855 Keyboard, Danish.

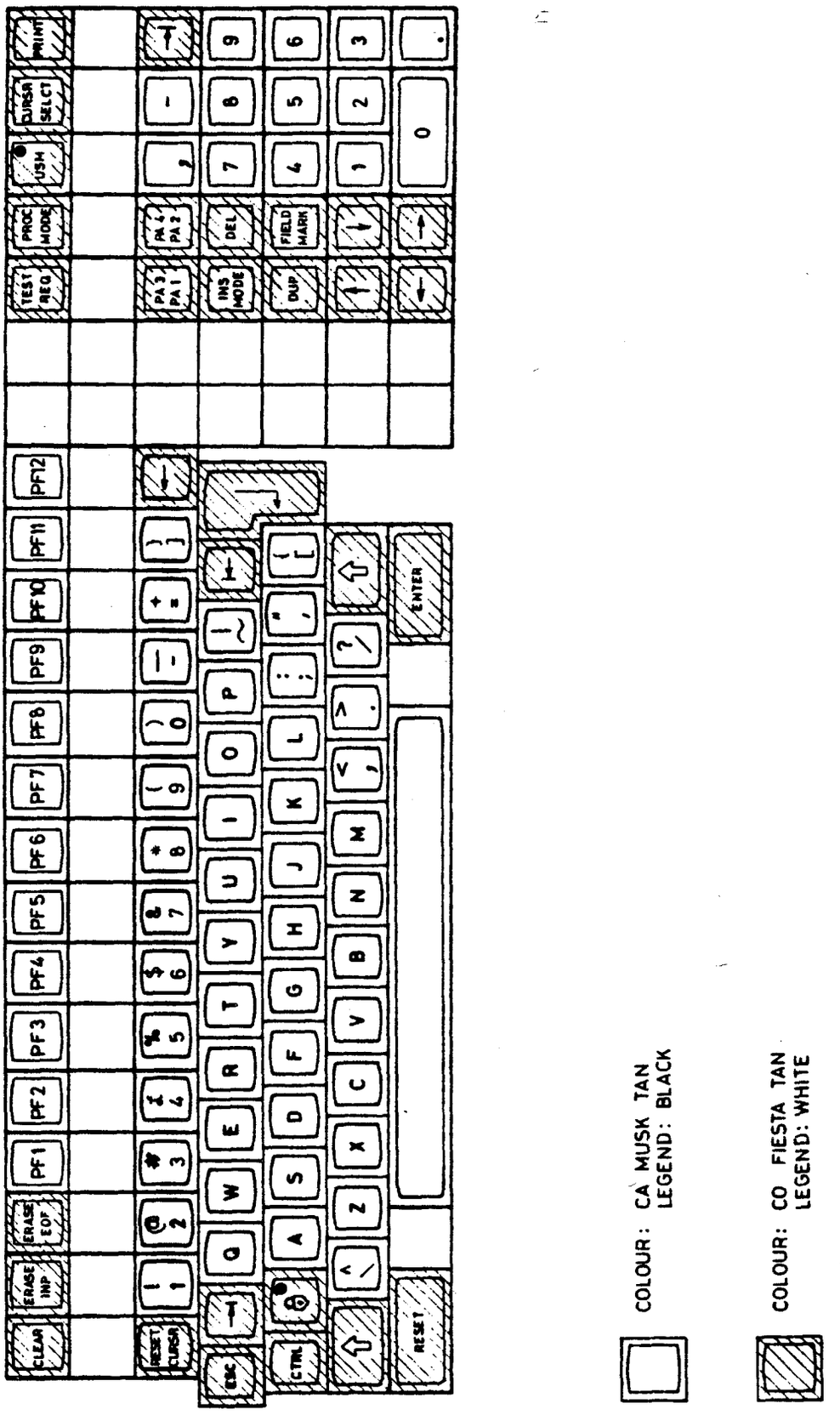



Figure 8: RC855 Keyboard, ITT3297, UK-ASCII.

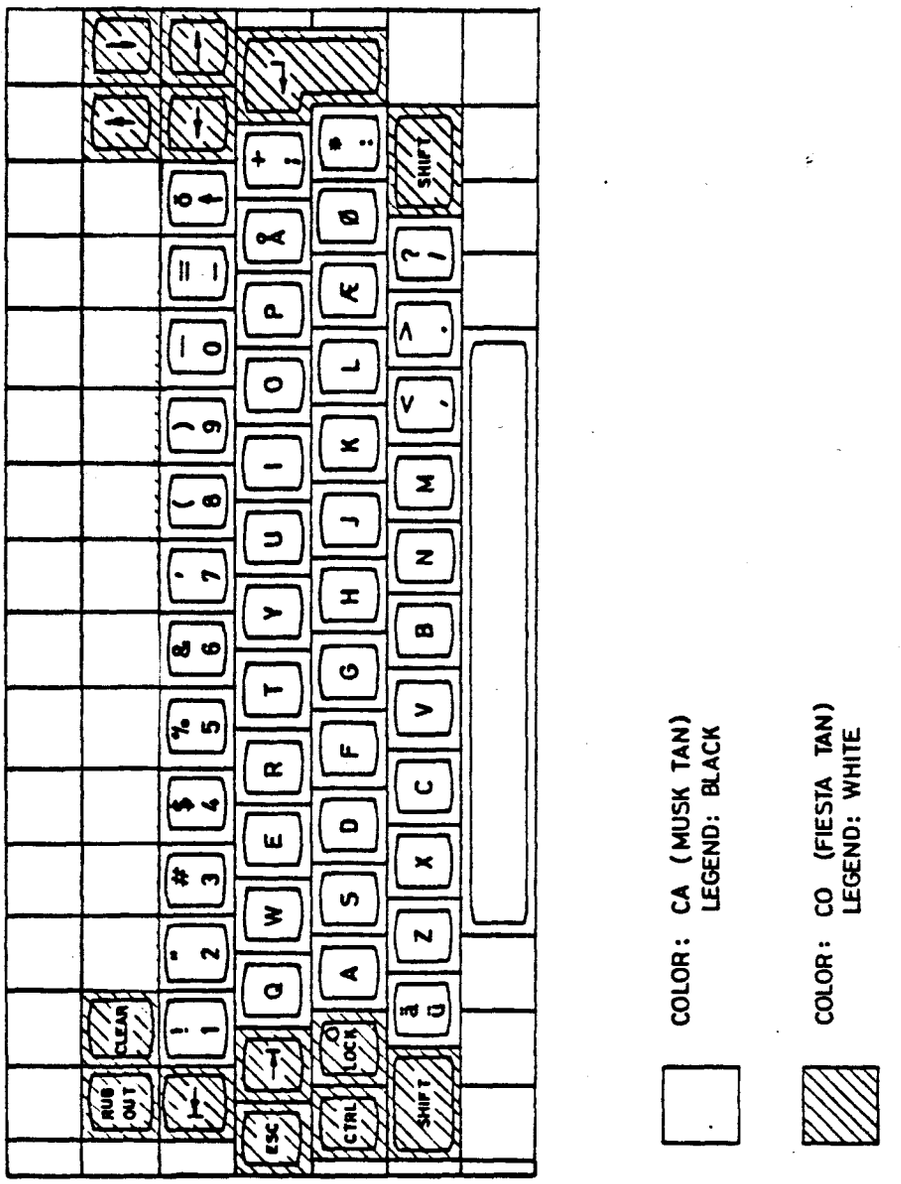



Figure 9: RC700 Keyboard, Danish, short version.

## 9. MECHANICAL OUTLINE 9.

Figs. 10 and 11 show the main mechanical outline for the keyboards.

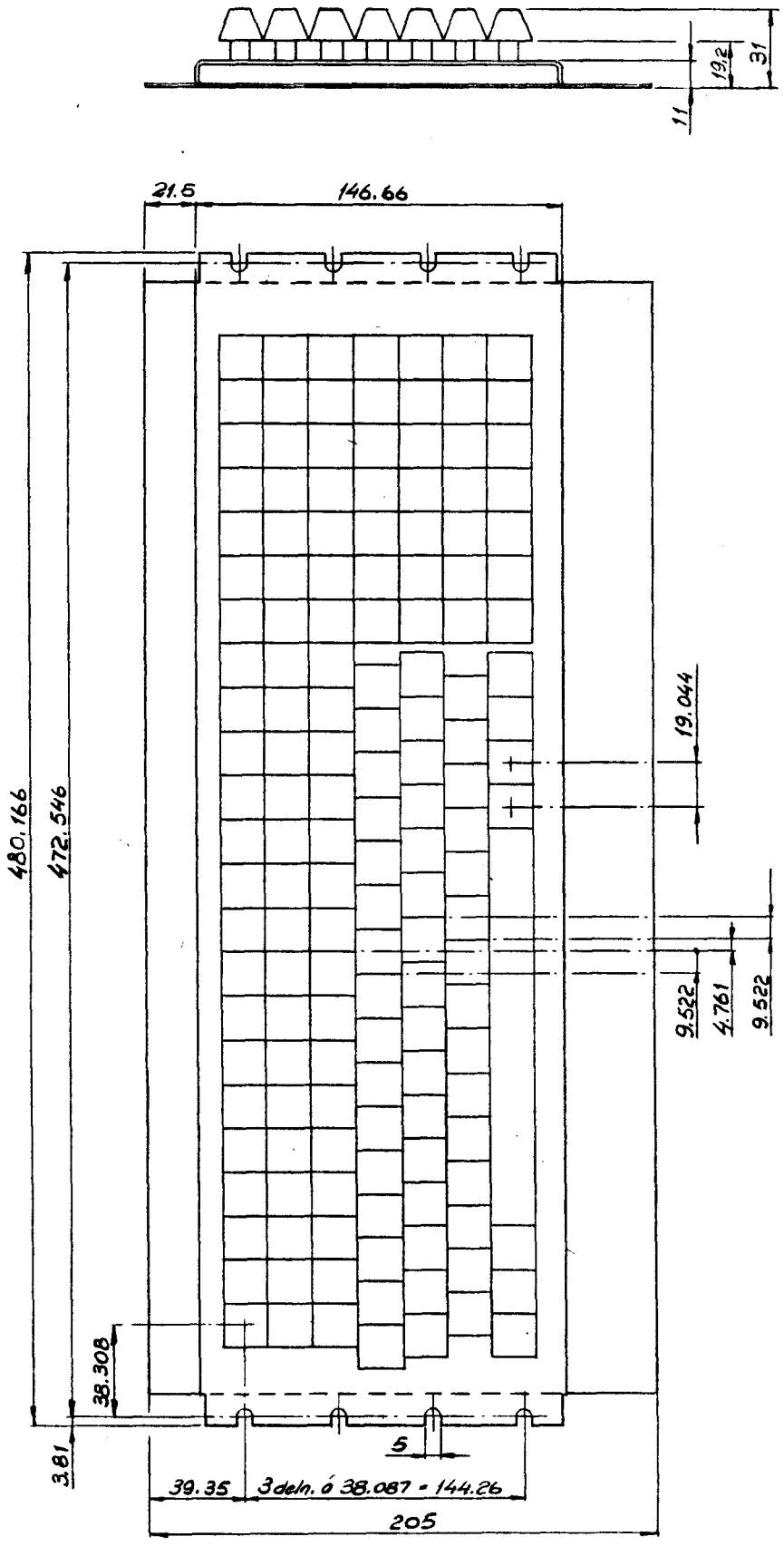



Figure 10: Mechanical outline, long version.

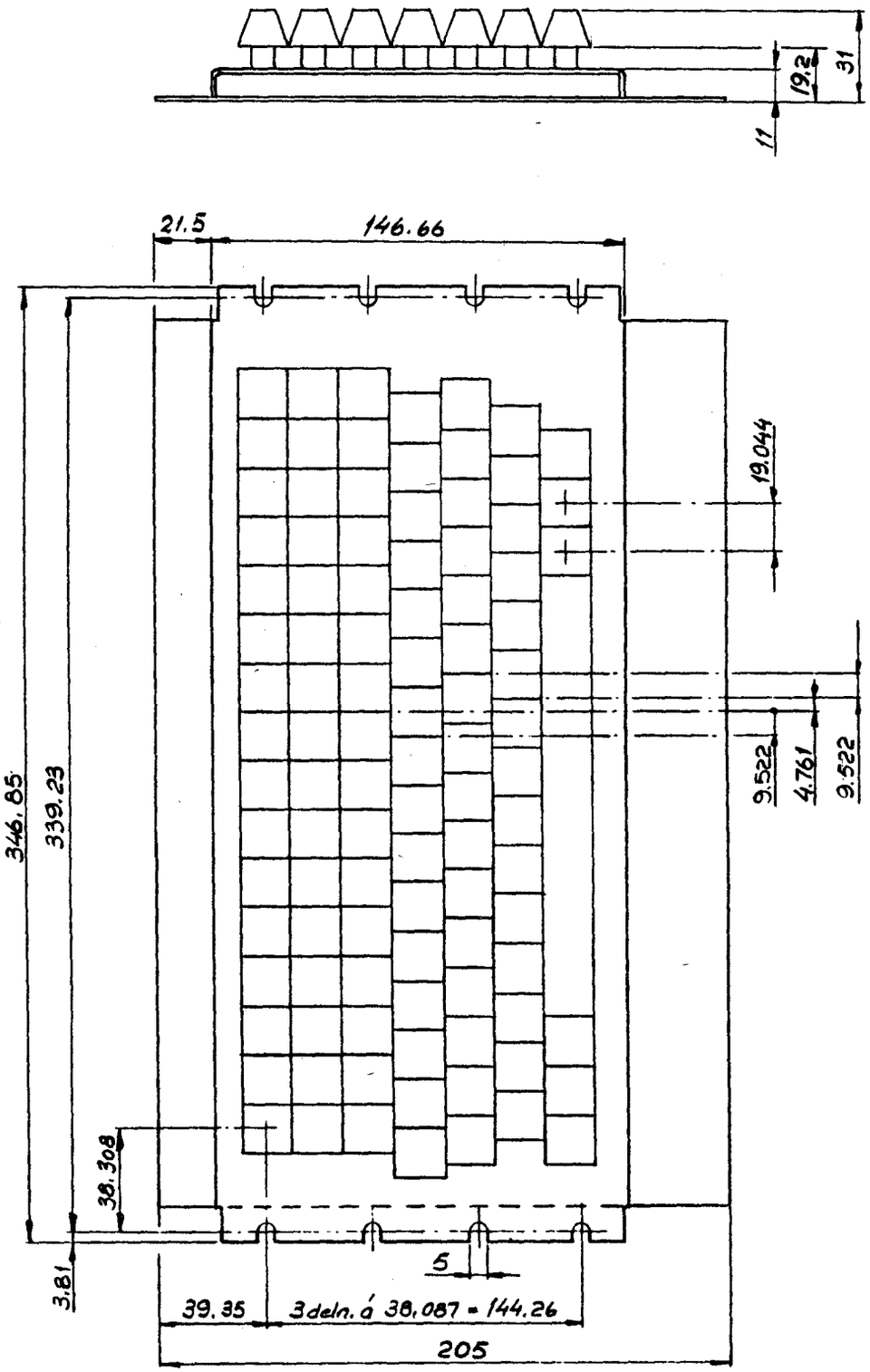



Figure 11: Mechanical outline, short version.

## A. KEYBOARD IDENTIFICATION A.

The following identification function (ID function) is not implemented on the keyboard first delivered to RC Computer. The function is to be used only when serial mode of operation is selected. The ID function works the following way:

The Keyboard is equipped with 8 dip switches, the setting of which the host computer is able to read. The switches may carry information about the nationality of the keyboard layout etc.

The switches may be read sending a READ SWITCHES command to the keyboard. Then the keyboard returns the switchsetting. To be sure that the switchsetting is read, and not an operator pressing a key, the program ignores the keys for a time period when the switches are read. See fig. 12.

The READ SWITCHES command is: E0 Hex

The reply is:

| 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|
| S7 | S6 | S5 | S4 | S3 | S2 | S1 | S0 |

Bit 0 = logical one when switch 0 (S0) is on and logical zero when switch 0 is off, etc.

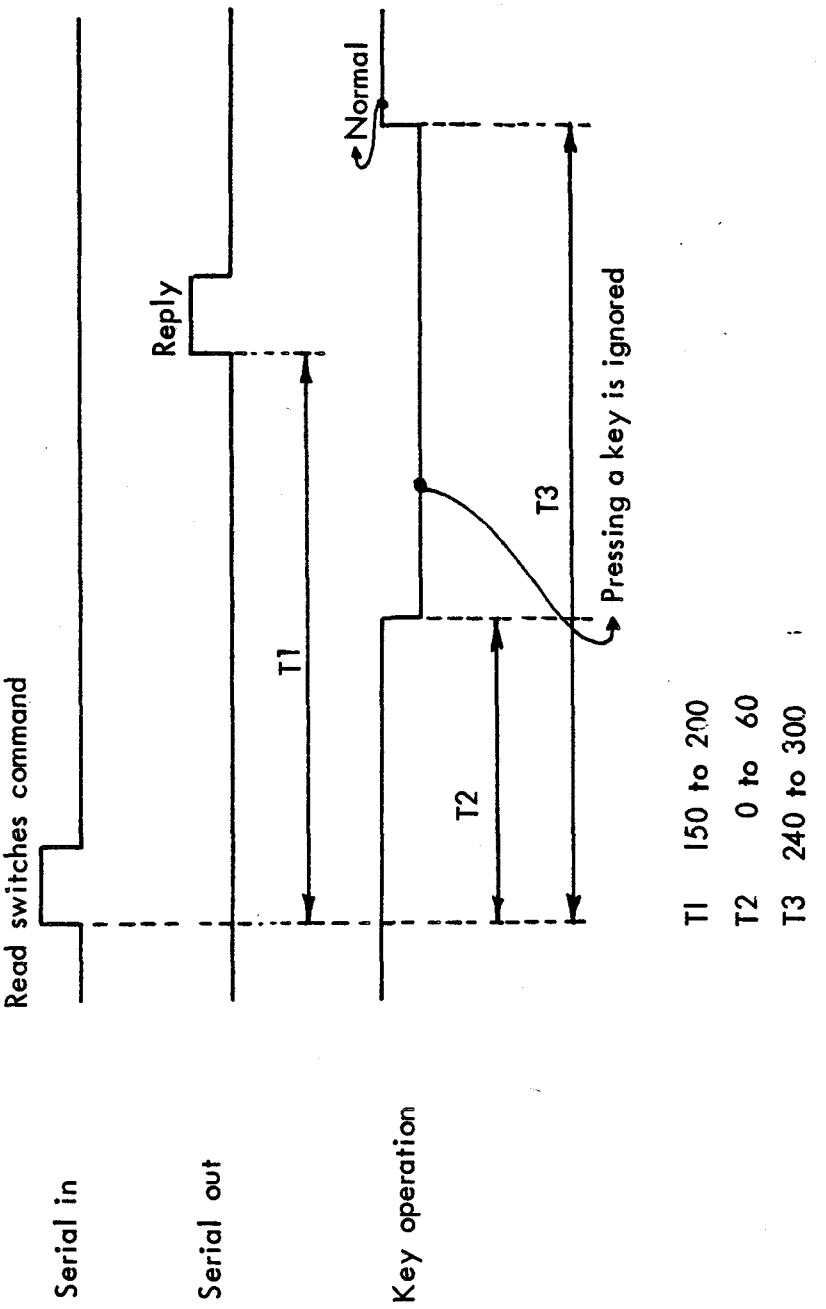



Figure 12: Timing requirements for READ SWITCHES command.

RETURN LETTER

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