brother®

# P-touch
# SERVICE MANUAL

## MODEL: PT-210E (For Europe)

MECHANISMS & ELECTRONICS

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# PREFACE

This publication is a service manual covering the specifications, theory of operation, disassembly/
reassembly procedure, and troubleshooting of the Brother PT-210E. It is intended for service personnel and other concerned persons to accurately and quickly provide after-sale service for our PT-210E.

To perform appropriate maintenance so that the machine is always in best condition for the customer, the service personnel must adequately understand and apply this manual.

This manual is made up of three chapters.

**CHAPTER I. SPECIFICATIONS**

**CHAPTER II. MECHANISMS**

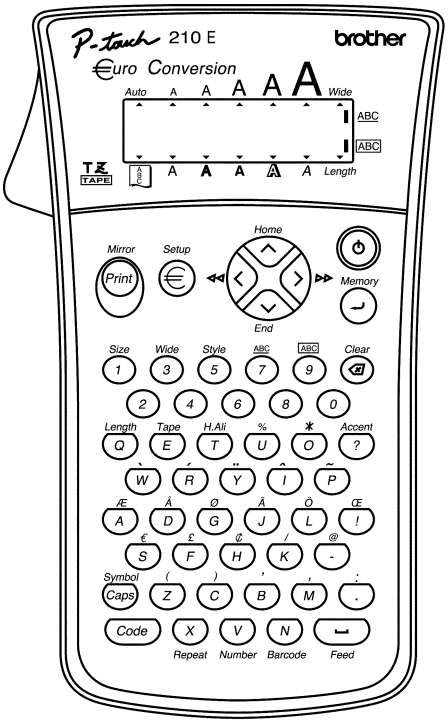
**CHAPTER III. ELECTRONICS**

Note: This service manual of the P-touch (PT-210E) describes only different parts from the each part of the service manual (No. 5V2065BE0) which was published before. We omit the same parts with that of PT-220 and describe the effect of it in contents. When you find the omitted parts, please refer to the service manual of that model.

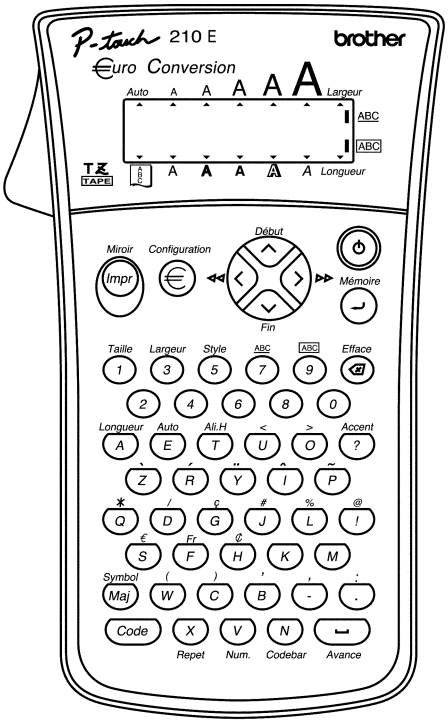
# P-touch PT-210E (For Europe)

## Mechanical Part

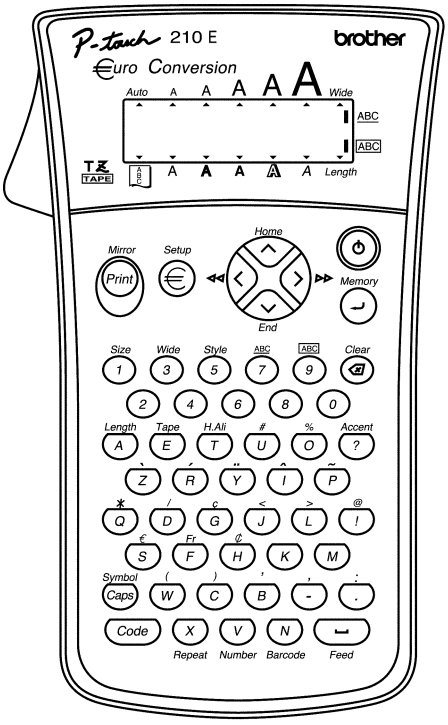
## CONTENTS



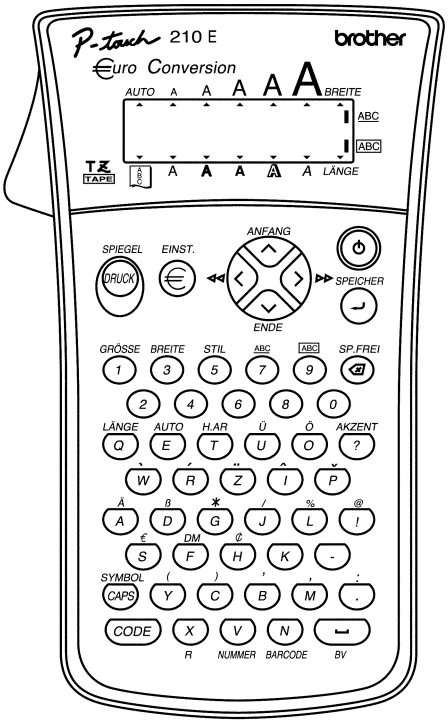

UK




FRENCH




BELGIAN




GERMAN

**Fig. 1.1-2 Key Arrangement**

## 1.2 ELECTRONICS SPECIFICATIONS

### 1.2.1 Character Generator

| | | |
|---|---|---|
| (1) Internal characters | U.K./ FRA/ BEL/ GER | 240 |
| (2) Internal font | HELSINKI | |
| (3) Print buffer capacity | 99 characters | |
| (4) Phrase memory capacity | 300 characters | |

### 1.2.2 Power Supply

| | |
|---|---|
| (1) Power supply | Driven by 6 batteries<br>Optional AC line adapter (9.5VDC, 1.3A) available |
| (2) Battery type | 6 alkaline batteries (LR6) |
| (3) Service life of batteries | Will last through one tape cassette, and then some. (at room temperature and normal humidity) |
| (4) Automatic power off | Yes<br>(If the machine remains unused for approx. 5 minutes, it automatically powers itself off.) |

(5) Battery indication

1) Battery weak detection

When using dry cell batteries, if the battery voltage is detected to be 6.4 V or less at the A/D terminals of the CPU twice in succession during printing, the “battery weak” status comes into effect.

2) Battery empty detection

When using dry cell batteries, if the battery voltage is detected to be 6.2 V or less at the A/D terminals of the CPU twice in succession during printing, the “battery empty” status comes into effect.

# P-touch PT-210E (For Europe)

## Electronic Part

## CONTENTS

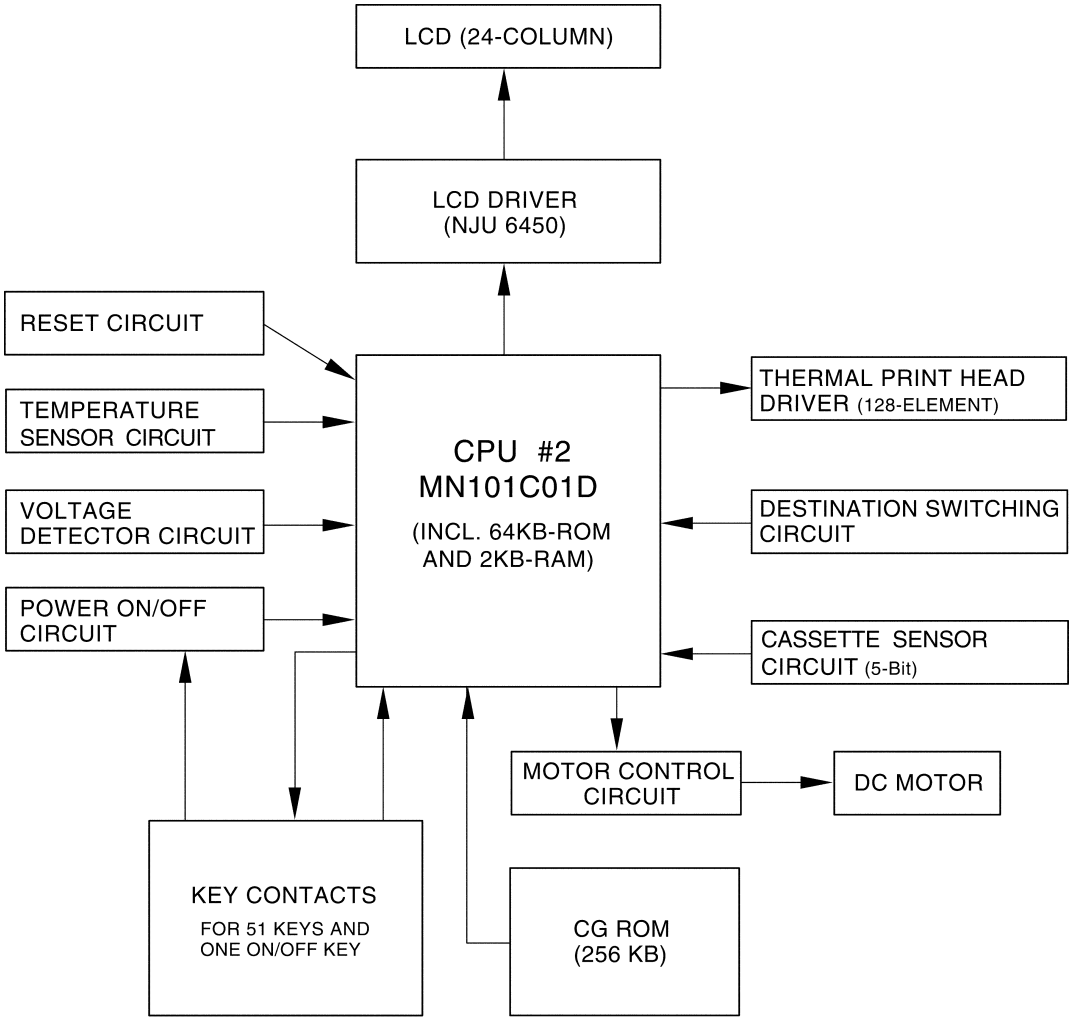



**Fig. 3.2-1 Block Diagram of Main PCB**

### 3.2.2 CPU

The CPU (MN101C01D) is an 8bit microprocessor produced by the CMOS silicon gate process, which integrates a 64 kilobyte ROM and a 2048 byte RAM.

### 3.2.3 Key Contacts Matrix

[1] Key contacts matrix

On the main PCB is a key contacts matrix that is a set of 51 carbon-printed key contact patterns. Each contact pattern has a pair of electrodes.

The rubber 51 key is made of high-impedance silicon rubber. As shown in Fig. 3.2-2, each key on the rubber 51 key consists of a key top, rubber spring, and conductive paint which functions as a switching element.

If a particular key is pressed, the conductive paint of the key short-circuits the paired electrodes carbon-printed on the main PCB.

Fig. 3.2-3 shows a timing chart and waveforms of key scanning by the CPU. Ports P30 through P36 on the CPU produce a series of key scanning pulses. Every scanning pulse is in low impedance for 1 ms while active and in high impedance while inactive. Ports P40 through P47 act as input ports which receive key statuses.

The CPU scans the key contacts matrix every 10 ms. If the CPU reads the same data at an input port two successive times, it interprets the state as the key being pressed; if the CPU reads the same data six successive times, it interprets the state as the key being released. The input mode of this keying system is 2-key roll-over and 3-key lock-out.

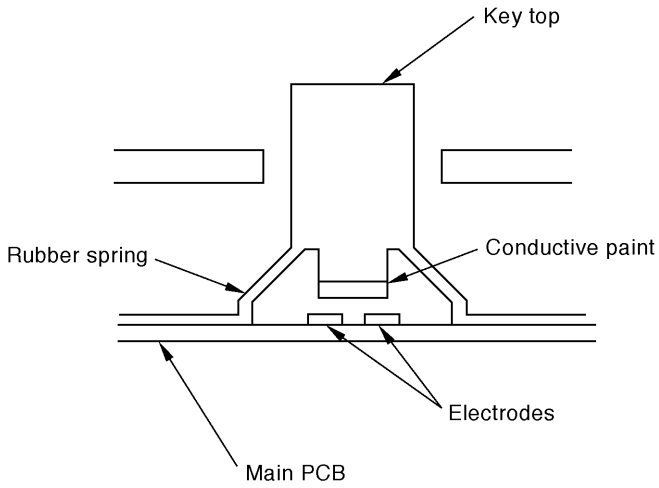



**Fig. 3.2-2 Detailed Mechanism of a key**

[2] Solder points

Fig. 3.2-4 shows a circuit diagram relating to the keyboard and solder points. Solder points 1 through 5 are connected to satisfy the specification of PT-210E.

| Solder points | Specification |
|---|---|
| No point soldered | England |
| Point 1 soldered | France |
| Point 2 soldered | Belgium |
| Point 3 soldered | Germany |

Solder points A through H are reserved for future use for the thermal head ranking.

The CPU reads the solder point status once during powering-on to confirm the specification.

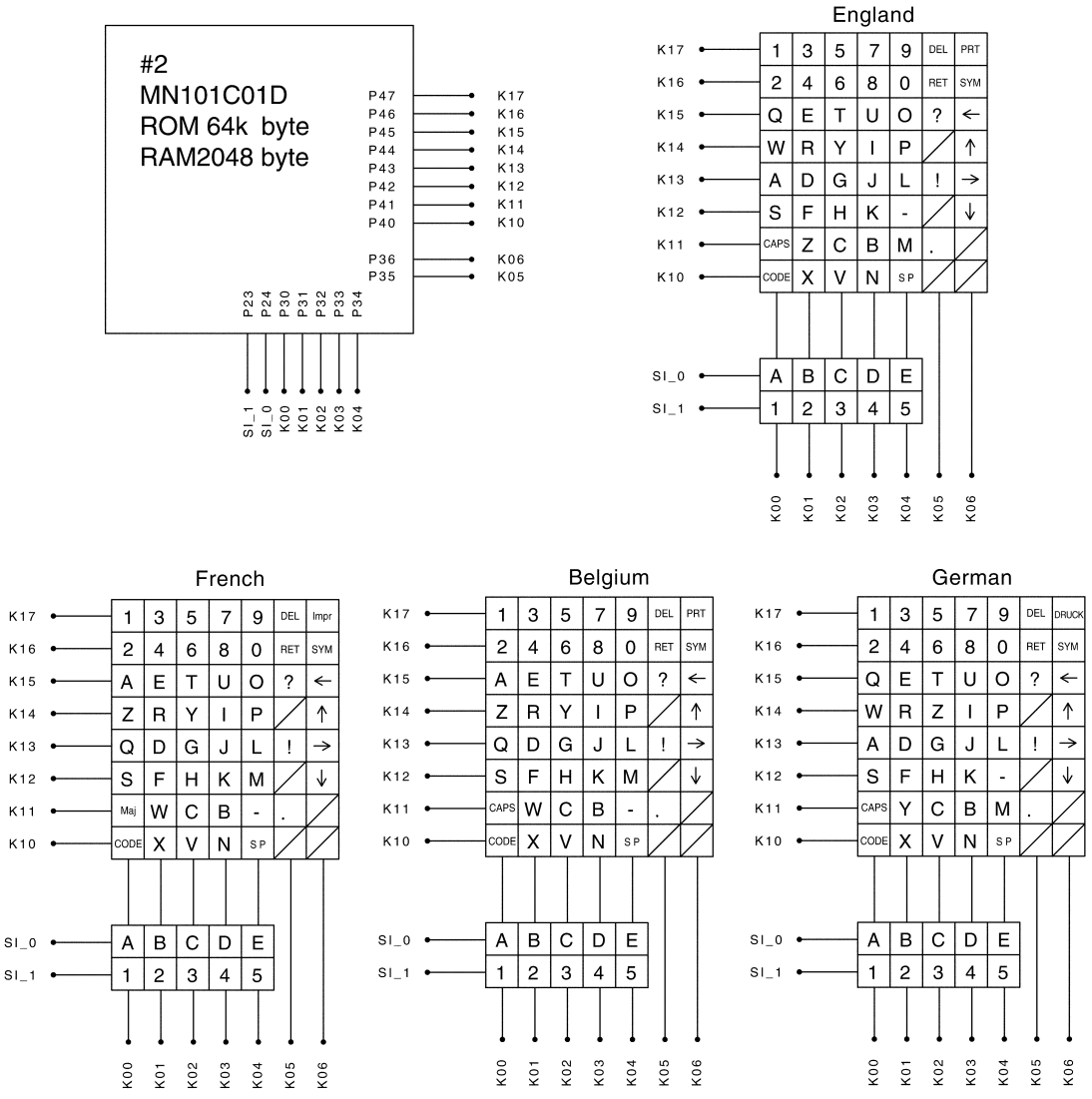



**Fig. 3.2-4 Keyboard and Solder Points**

### 3.2.4 Power ON/OFF Circuit and Power Saving Circuit

[1] Power ON/OFF circuit

Fig. 3.2-5 shows a circuit diagram of the power ON/OFF key. The CPU processes the ON/OFF key state in a sequence quite different from other keys although it is on the keyboard.

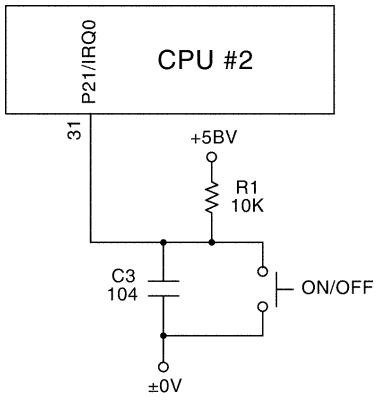



**Fig. 3.2-5 Power ON/OFF Circuit**

If you press the ON/OFF key, the signal $\overline{IRQ0}$ interrupts the CPU on P21. Then, the CPU switches P21 to the input port and enters the process which eliminates the chattering part in the signal $\overline{IRQ0}$.

Powering-on sequence (See Fig. 3.2-6.)

1) Interrupted by $\overline{IRQ0}$, the CPU starts the chattering elimination program module.

2) If P21 is Low for 10 ms, the CPU recognizes the ON/OFF key as being pressed and then transfers the control to the main program module. If P21 is High, the CPU interprets the input as a noise and waits for the next $\overline{IRQ0}$.

3) Even if releasing the ON/OFF key makes a chattering noise so as to generate $\overline{IRQ0}$, the CPU interprets the signal as a noise for 10 ms (between ③ and ④) and then transfers the control to the main program module.

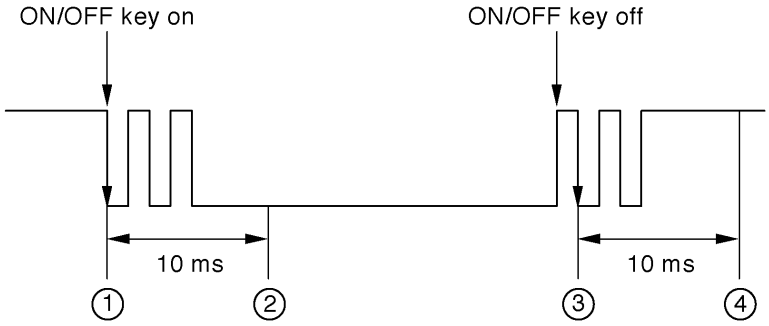



**Fig. 3.2-6 Powering-on and-off Sequence**

### 3.2.7 Voltage Detection Circuit and Temperature Sensor circuit

Fig. 3.2-12 and Fig. 3.2-13 (See next page) show the voltage detection circuit and the ambient sensor circuit, which are composed of a resistor combination.

[1] Voltage detection circuit

This circuit, which is composed of divider resistors R10 and R11, steps down the power source VAD fed from batteries or the AC adapter output and feeds the output to the A/D input port PA1 on the CPU. According to the drive source voltage, the CPU determines the optimum head drive power.

At power ON:

- If the voltage level of the VAD rises over approx. 15.4V, the CPU immediately shuts down the power.
- If the voltage level of the VAD drops below approx. 6.9V, the CPU immediately shuts down the power.

During non-printing:

If the voltage level of VAD drops below approx. 6.9V, the CPU immediately shuts down the power.

During printing:

- If the voltage level of the VAD rises over approx. 15.4V, the CPU displays message Ⓐ below and immediately shuts down the power.
- If it drops even more, below approx. 6.4V, the CPU displays the message Ⓑ below to warn you of a low battery after completion of printing.
- If it drops even more, below approx. 6.2V, the CPU interrupts the printing and displays the message Ⓒ below to warn you of a very low battery.
- If it drops below approx. 6.0V, the CPU immediately shuts down the power.

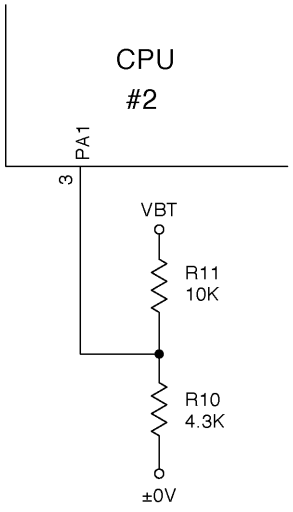



**Fig. 3.2-12 Voltage Detection Circuit**

### 3.2.8 Oscillation Circuit

Fig. 3.2-14 shows the oscillation circuit.

This circuit contains an oscillator and generates an oscillation at 20 MHz which act as the CPU basic clock. The CPU divides this into half (10 MHz) to synchronize its internal operations.

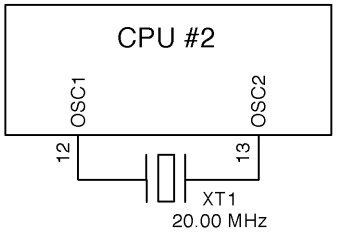



**Fig. 3.2-14 Oscillation Circuit**

### 3.2.9 Reset Circuit

Fig. 3.2-15 shows the reset circuit. If the +5BV drops abnormally, this circuit prevents the CPU from operating erroneously.

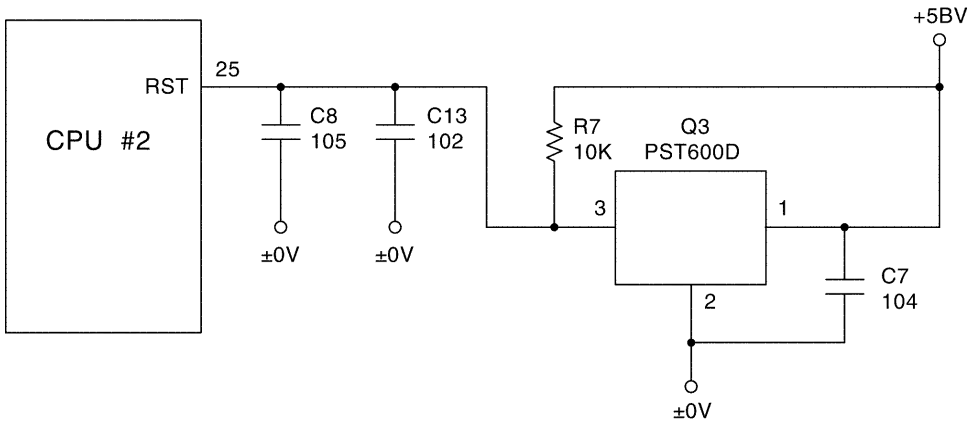
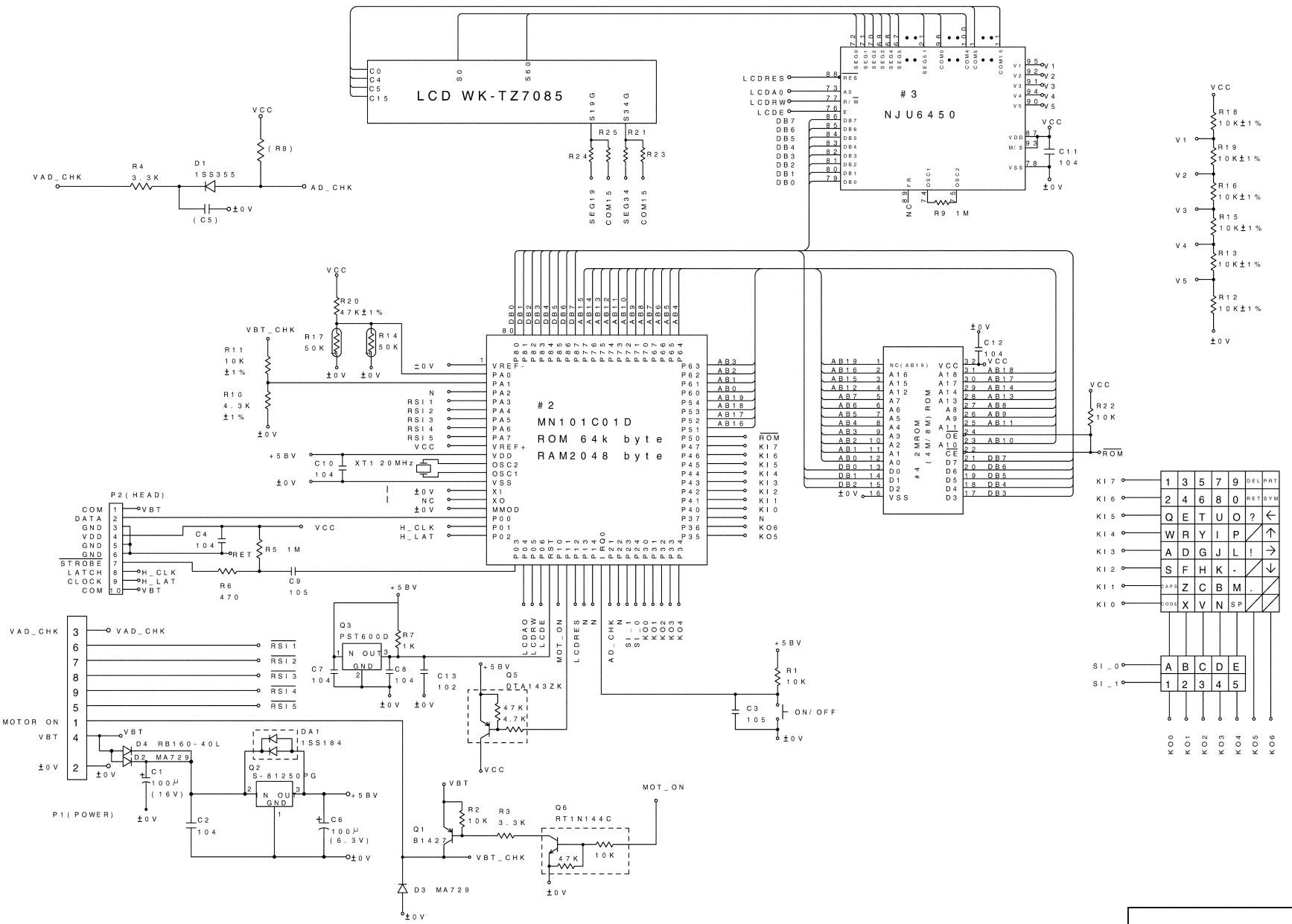



**Fig. 3.2-15 Reset Circuit**




**Main PCB Circuit Diagram**

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