# Model-1210 series thermal printer circuit and case design guide

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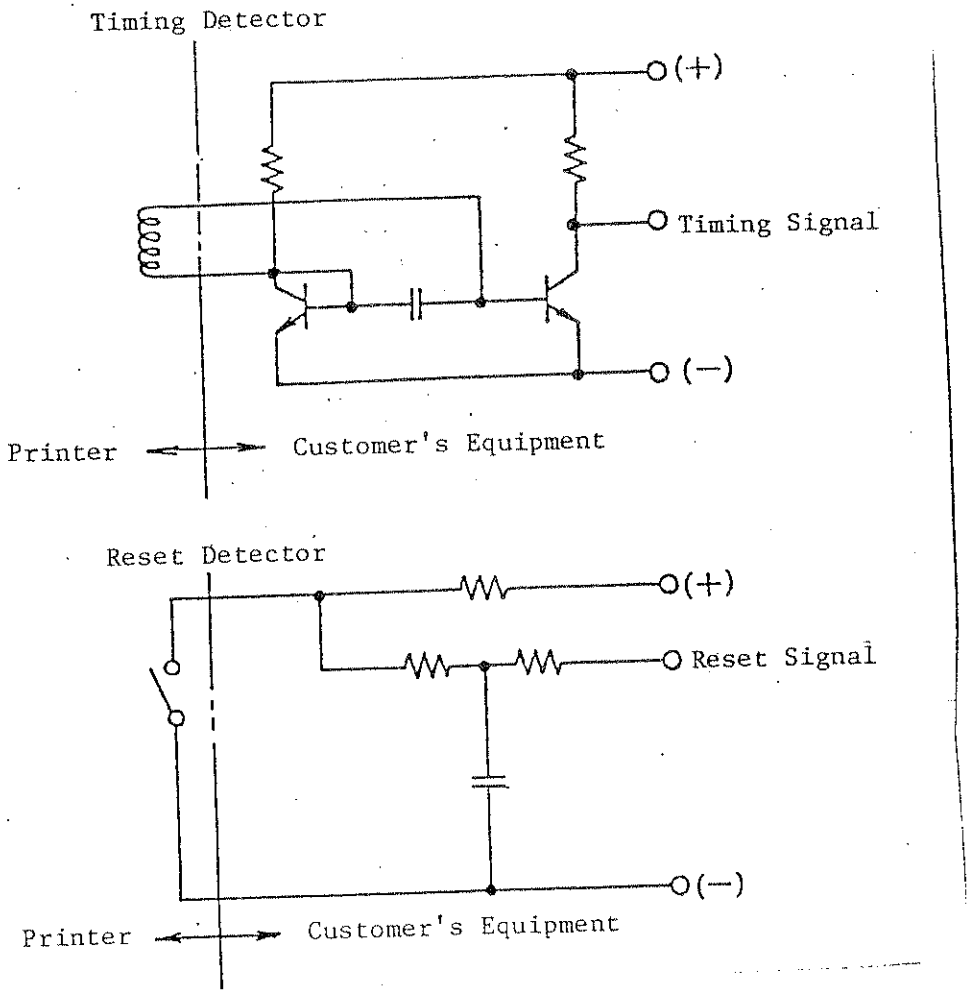
1. Detectors

1) Waveform Shaping Circuits:

Timing Signal and Reset Signal must be obtained from the output of Timing Detector (constituted by the tachometer generator) and that of Reset Detector (constituted by the mechanical switch) via a waveform shaping circuit, respectively.

① [Examples of Shaping Circuit]



② Special IC containing the waveform shaping circuit for Timing Detector:

The waveform shaping circuit for Timing Detector is contained in a pulse width control IC (LB-8700) which will be described later. For the connection of this IC, refer to Par. 3 "Setting of Pulse Width."

2) Noise Prevention:

The waveform shaping circuits and the IC to receive Timing and Reset Signals must be protected against external noise to avoid malfunction.

Noise prevention may be actualized by using designed circuit or software means.

Detection of levels for each waveform-shaped signal can positively be carried out by applying pulses of 20 s or less in width several times. Both the highest and lowest levels are measured for each signal.

2. Head

1) Range of Operating Energy:

Proper print density can be obtained only when the operating energy is situated within the range given in Par. 2.3 - 6) of the Specifications in relation to terminal voltage and ambient temperature. The lower limit of the energy range is determined by print density and the upper limit, by the longevity of the

head. Care must be taken not to apply greater energy than the upper limit value.

A special pulse width control IC (LB-8700) is available to ensure that proper operating energy be applied in relation to terminal voltage and ambient temperature.

2) Ranks:

There are two ranks: B and C in the head. Par.2.3. -4) of the Specifications gives the distinction between the ranks in the form of ranges of resistance values. These resistance values can be used as the basis on which to determine the width of energizing pulse in relation to the operating energy range.

The rank can be determined to be B or C by the use of Terminals Nos. 1 and 2: electrical continuity between Terminals Nos. 1 and 2 corresponds to Rank C and discontinuity, to Rank B. This can be used for changeover between operating energy ranges, for example.

3) Idle Printing:

Idle printing, i.e., feeding power to the head without thermal sensitive paper being in position, is prohibited.

4) Protection:

Voltage drop in the LSI power supply, motor locking due to foreign matters entering the motor mechanism during printing and other phenomena may result in continuous energizing of the head. Such danger must be eliminated by providing a protective circuit or

other appropriate means.

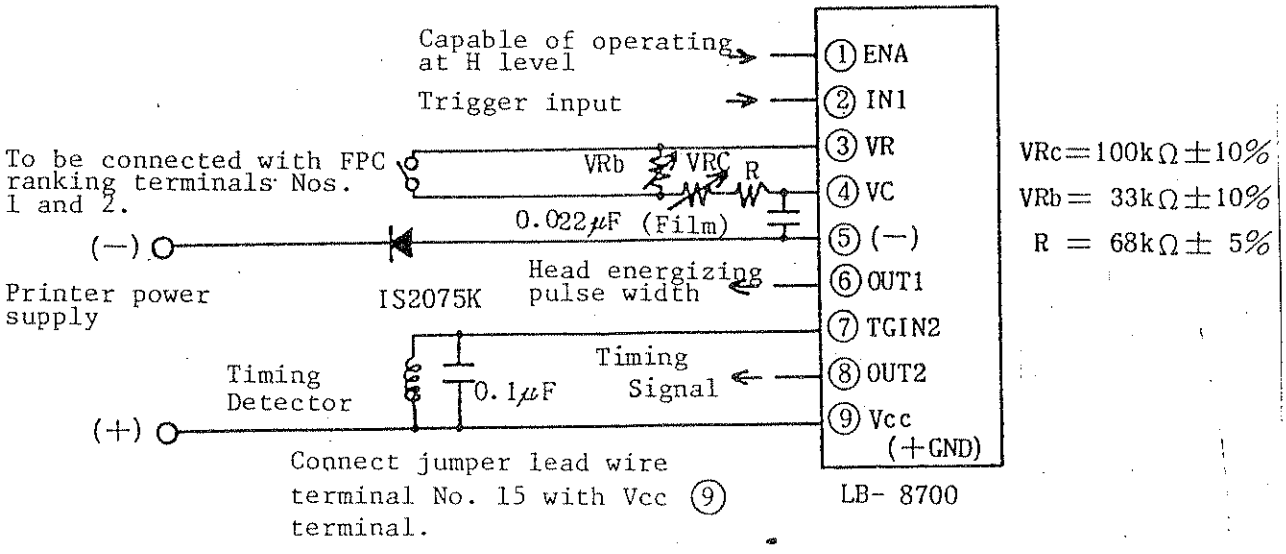
5) Head Driver IC:

It is advisable that a 9-channel drive circuit fabricated in the form of IC (LB-1248) be used as head driver.

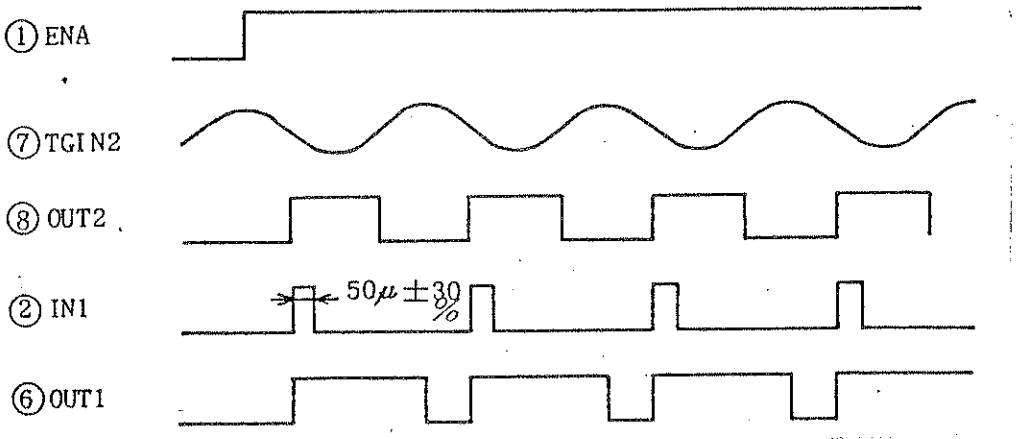
3. Setting of Pulse Width

The width of pulses fed to the thermal elements must be set to a predetermined value so as to ensure proper print density irrespective of voltage and temperature changes. To meet this requirement, a special pulse width control IC (LB-8700) is available.

1) Example of Connection (with the printer and circuit):



2) Timing:




3) Pulse Width Setting Procedures (in the case of using LB-1248 as head driver):

(1) Setting by means of measuring instrument:

① Set the ambient temperature to 20°C. (Strict observance needed.)

② Set the printer power supply voltage to 5.00 ± 0.01V.

③ Pulse IN1 (Terminal No. 2) at 50μs ± 30%.

④ Set OUT1 (Terminal No. 6) to the following value by means of measuring instrument:

Rank C: Adjust VRc to establish 1.09-1.21ms. (This operation requires VRb to be short-circuited between both ends.)

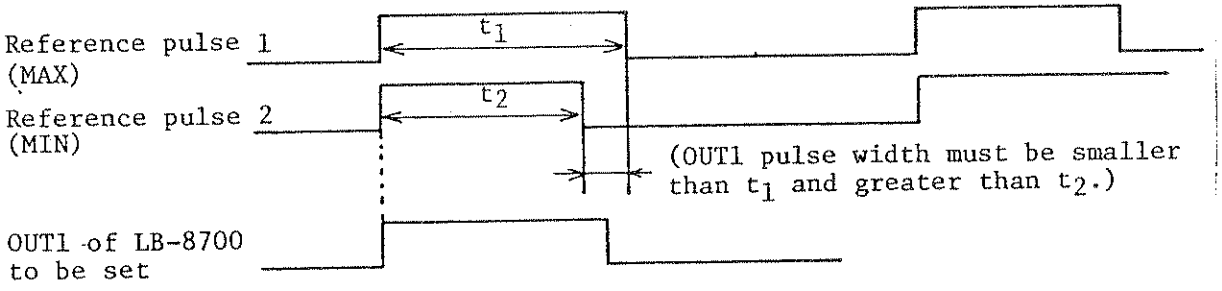
Rank B: Adjust VRb to establish 1.18-1.30ms.

(Be sure to follow the order of: Rank C --- Rank B.)

(2) Setting by use of reference circuit (the operation being possible at room temperature of 20 $\pm \frac{10}{5}$°C without necessity of use of measuring instrument):

① Principle:

Two LB-8700's are used as reference circuit: the one is set to the minimum pulse width and the other, to the maximum; adjustment is then carried out so that the output pulse of the LB-8700 to be set is not narrower than the MIN reference pulse and not wider than the MAX reference pulse. Strict observance of 20°C temperature and use of measuring instrument are required only for setting the reference circuit.




A reference circuit is used to indicate, by a lamp, for example, that the width of OUT1 pulse has become smaller than $t_1$ and greater than $t_2$. Use of measuring instrument is not needed, and the setting operation is possible at room temperature.

② Setting the reference pulses:

Supply voltage : 5.00 $\pm$ 0.01V

Ambient temperature: 20°C (strict observance needed)

Under these conditions, set the reference pulses as

follows:

| | MIN (reference pulse 2) | MAX (reference pulse 1) |
|---|---|---|
| Rank B | 1.20ms | 1.28ms |
| Rank C | 1.11ms | 1.19ms |

(The allowable range of reference pulse width is narrower than that in Item 3) - (1) because of compensation for ambient temperature.)

A reference circuit(SC-87 Board)for the setting of pulse width based on the above-mentioned principle is available to supply customers.

4) Simplicity of Setting of Pulse width

It is possible to omitt the adjustment of Rank C, when the variable resistor VRb is repraced with the fixed resistor and the pulse width of Rcnk B is established by using the volume control VRc.

In this case VRb must be the fixed resistor with value of 8.2 KΩ± 5%.

(1) Setting by means of measuring instrument:

① Set the conditions same as 3) - (1) - ①②③
② Open the circuit between both ends of VRb.
③ Adjust VRc to establish 1.08ms - 1.18ms for Rank B.
④ Adjustment for Rank C is not required.

(2) Setting by means of reference circuit mentioned above.

① Set the reference pulses as follows:

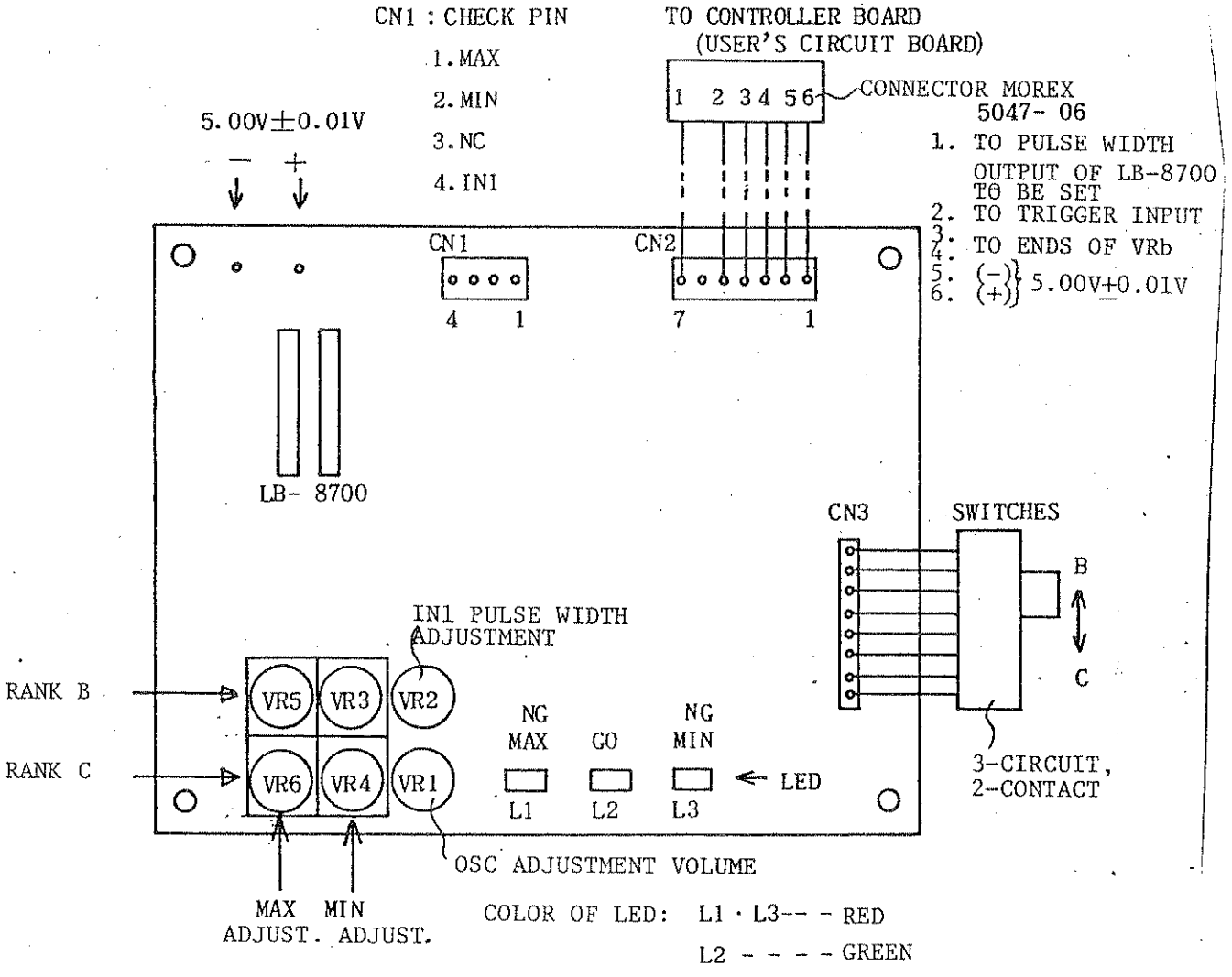
| | MIN | MAX |
|---|---|---|
| Rank B | 1.10 | 1.16 |
| Rank C | 1.00 | 1.10 |

( The conditions are same as 3)-(2)-② )

② The reference pulses of rank C is used for varification.

4. Reference Circuit for Setting of Pulse Width (SC-87 Board)

1) Layout (Top View)



2) Reference Setting Procedure for SC-87 Board:

① Apply 5.00 ± 0.01V and maintain the temperature at 20°C.

② Adjust VR1 so that the cycle time of the CHECK PIN-4 output is about 10ms.

③ Adjust VR2 so that the CHECK PIN-4 pulse width is 50μs.

④ Put the switch in Rank-C position, and set MIN and MAX by means of VR4 and VR6.

⑤ Put the switch in Rank-B position, and set MIN and MAX by means of VR3 and VR5.
MIN and MAX is confirmed by using of CHECK PIN - 1 and 2.

3) How to Use:

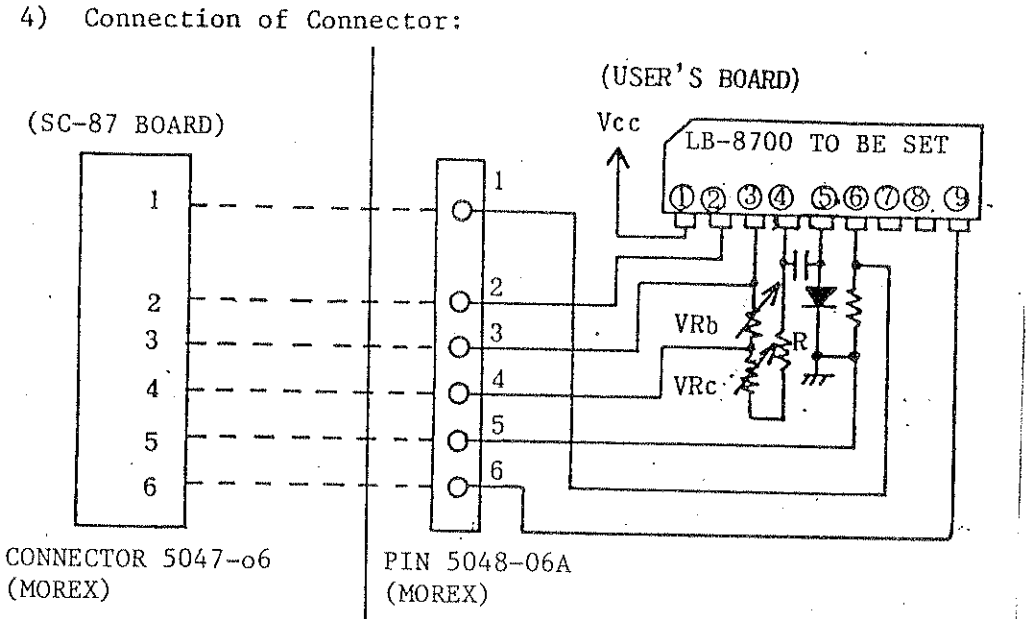
① At the stage of design, determine the layout of PIN 5048-06A on the Controller Board in the manner corresponding to the layout of Connector 5047-06.

② Couple Connector 5047-06 to PIN 5048-06A.

③ Establish the pulse width for Rank C and then for Rank B using the volume controls VRc and VRb on the Controller Board so that L2 of the LED lights up at 5.00 ± 0.01V, 20 $\pm \frac{10}{5}$°C.

④ Incase that VRb is fixed resistor with value of 8.2k + 5% , Adjustment of the pulth width for rank B is required, but not for rank C.

4) Connection of Connector:




5) Notes:

① SC-87 Board does not fit to the Controller Board of certain designs. Consultation in details is needed.

② The operating temperatures of SC-87 Board and the Controller Board must always be the same.

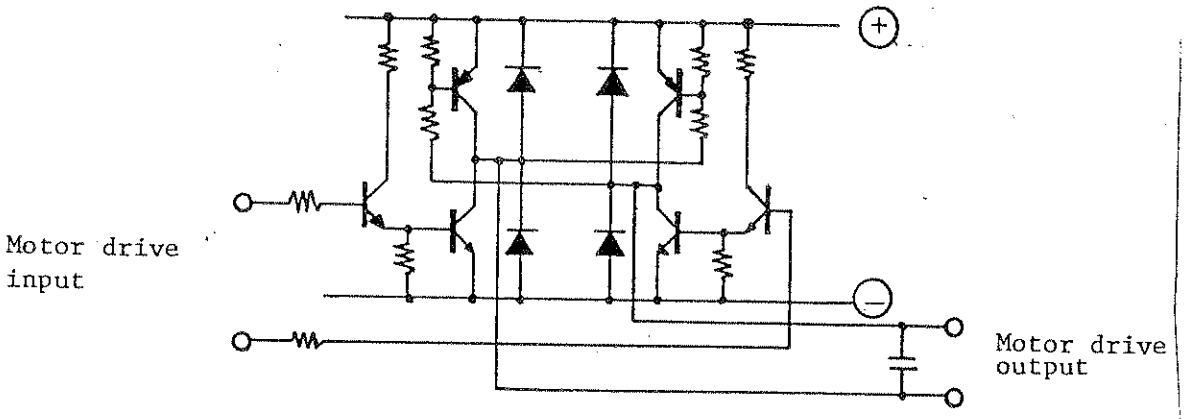
③ When installing SC-87 Board, be sure to set the Controller Board ENA Terminal (No. 1) at the H level.

④ Be sure to check reference setting on the customer equipment side prior to using SC-87 Board.

⑤ The settings or reference pulse values given above cannot be used when LB-1248 is not employed as head driver, that is, only the combined use of LB-8700 and LB-1248 permits the energy range given in Par. 2.3 - 6) of the Specifications to be respected.

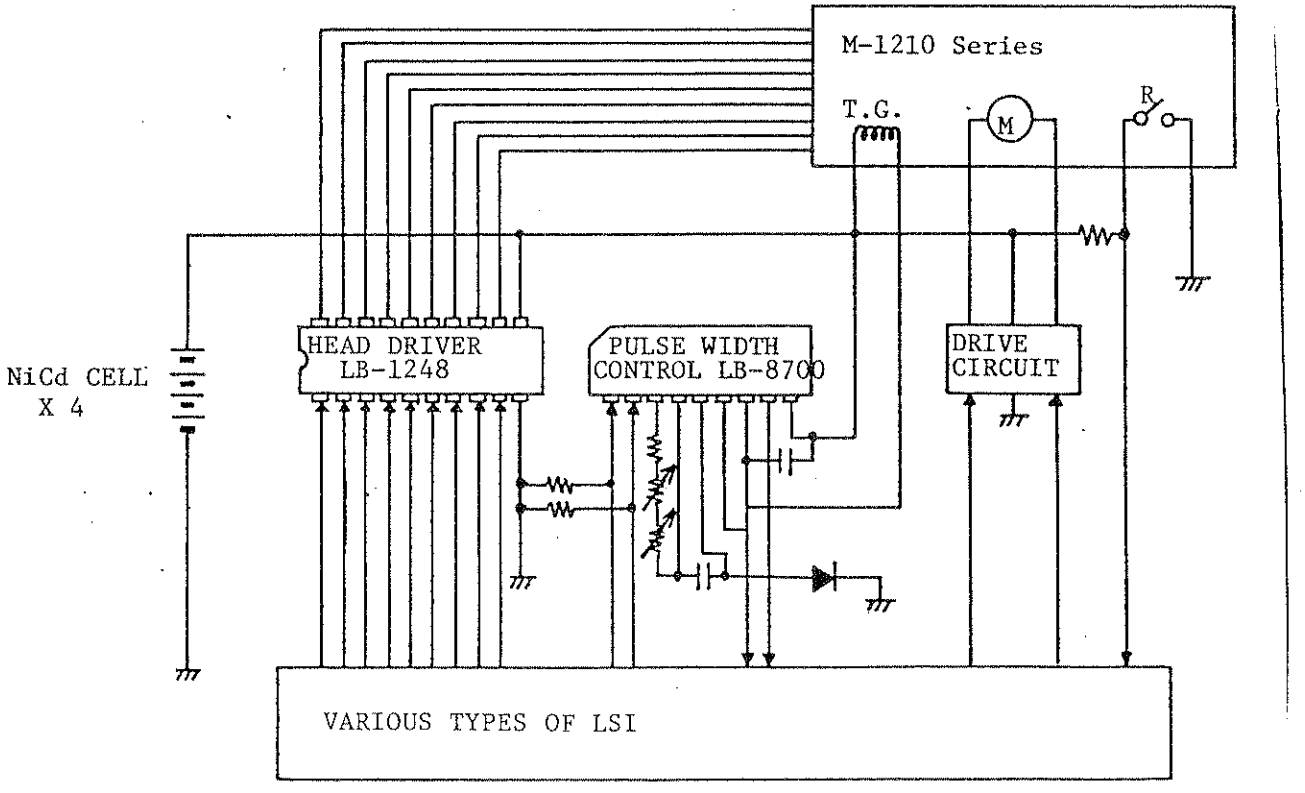
5. Motor

1) Example of Drive Circuit:




Basically the motor drive circuit should be such a transistorized one as that shown above.

6. Example of Connection for M-1210 Series



7. Abnormality

Drop in electric cell capacity, abnormal load and the like may result in malfunction of the printer, leading to continuous feeding of power to the head and/or motor. It is essential to prevent this continuous power feeding and return the carriage to the stand-by position as soon as such abnormality arises.

Abnormality detection can be carried out by:

① Detection of the time of generation of Timing and Reset Signals;

② Detection of supply voltage;

③ Detection of stoppage of LSI's function; etc.

The actions to be taken in such case are as follows:

① Stop power feeding to the head and/or motor;

② Immediately return the carriage to the stand-by position by removing foreign matters constituting the abnormal load or recharging the nickel/cadmium cells as the case may be; etc.

8. Thermal Sensitive Paper

Be sure to employ the product indicated in Par. 2.2 of the Specifications.

9. Installing of Printer

Refer to Par. 2.11 "Principal Dimensions" and Par. 2.12 "Basic Design of Casing," the Specifications.

10. Design of Paper Inlet Section and Paper Holder

Comply with the indications given in Par. 2.11 "Principal Dimensions," the Specifications.

11. Paper Cutter

Improper selection of the position and/or angle of the paper cutter may hinder the paper feeding and/or printing operation. In designing the paper cutter, see to it that the paper outlet angle be $60\ ^{+0^\circ}_{-20^\circ}$ as indicated in Par. 2.11 of the Specifications. (For more information on the angle, length and other dimensions, contact us.)

12. Other Points of Casing Design

1) The casing must be so designed that the gear trains at both sides of the printer be protected against the entering of foreign matters.
2) The printer must be so fixed that its vibrations be not transferred to the casing resulting in noise generation. (For example, use soft elastic materials at the three mounting parts.)
3) To minimize noise, it is preferable that the areas of the openings in the casing such as the paper outlet be as small as possible.