EURO RECEL S.A. SPAIN — Manufactured in Madrid — FLIP

RECEL S.A. Manufactured in Madrid — SYSTEM III

LITE BOX UNIT

OUTPUT REGISTER

SWITCH CODE

SWITCH CODE

PLAY BOARD UNIT

PROGRAM UNIT

SYSTEM III

SIMULATOR

┌─── MR. OPERATOR ───┐

We recommend you to read this manual carefully in order to obtain maximum performance and efficiency from the "SYSTEM III" simulator ∅94-63∅.

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┌──────────────── REPRESENTATIVES IN ────────────────┐
│                                                     │
│  Aruba, Neth. Ant.    France           Portugal     │
│                                                     │
│  Australia            Holland          South Africa │
│                                                     │
│  Austria              Hong Kong        Sweden       │
│                                                     │
│  Belgium              Hungary          Switzerland  │
│                                                     │
│  Brazil               Italy            United Kingdom│
│                                                     │
│  Canada               Japan            United States│
│                                                     │
│  Colombia             Lebanon          West Germany │
│                                                     │
│  Denmark              Norway           Yugoslavia   │
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│  España               New Caledonia                 │
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┌──────────────── LOCAL REPRESENTATIVE ────────────────┐
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┌──────────────────────── NOTE ────────────────────────┐
│                                                       │
│  RECEL S.A. reserves the right to change whatever     │
│  specification of its product that it sees fit        │
│  without prior notification.                          │
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│  RECEL S.A. assumes no responsibility as to the use   │
│  of the information contained in this manual.         │
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INTRODUCTION

The Simulator Ø94-630 is a piece of equipment which, apart from carrying out with accuracy all the functions of an electronic SYSTEM III Pinball and following the same time sequence as on the pinball game itself, also performs TESTS and SIMULATIONS to be used by the Supervisory and Maintenance technicians of the mentioned pinball games.

This equipment allows the START UP and ANALYSIS of the game, as well as automatic TROUBLE SHOOTING, showing the function that is at fault by means of indications on the displays and using the special TEST programs.

CONTENTS

SECTION 1

DESCRIPTION OF THE SYSTEM

1.1 GENERAL

The Simulator Ø94-630 contains basically all the parts that go to make up an electronic Pinball game, plus a bank of program memories.

The equipment is provided with a Master Unit, the same as those on the System III electronic games; a Control Panel equivalent to the Playfield on any model of game, as well as the Lite Box of a single or four player game; plus a Memory Bank which allows for the installation of 16 different programs that can be extended and selected.

These programs can be game programs or special programs prepared for automatic Testing and Checking purposes, allowing you to obtain a more rapid and accurate diagnosis than using merely conventional systems.

The Simulation system Ø94-630 is functionally divided into the following parts :-

  a) Power Supply Board
  b) Master Unit
  c) Lite Box
  d) Playfield
  e) Memory Bank
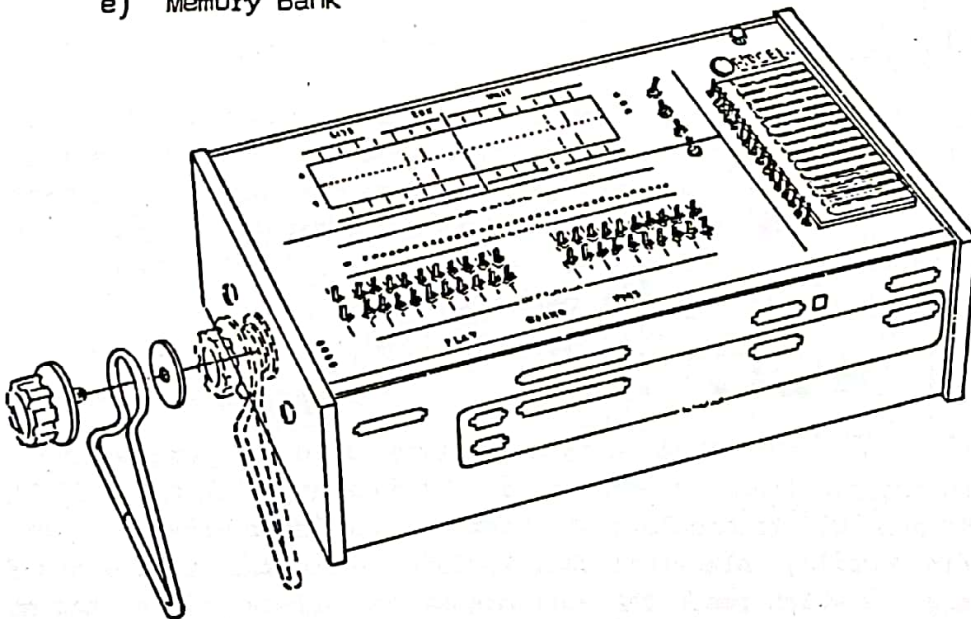
a)   Power Supply Board

This provides the same tensions as the power supply board fitted in each machine, and these tensions are accessible via the connectors situated on the back of the equipment. The format and order of the pins on these connectors, is also identical to that used on the System III Pinball games and therefore the various parts of the machine can be connected at these points: Cabinet, Playfield, Lite Box and Display Control Unit.

1	12	1	12	1	10	1		11
(PA) CABINET		(PB) PLAY BOARD		(PC) LIGHT BOX		(DD) DISPLAY	(DE) CONTROL	

POWER SUPPLY
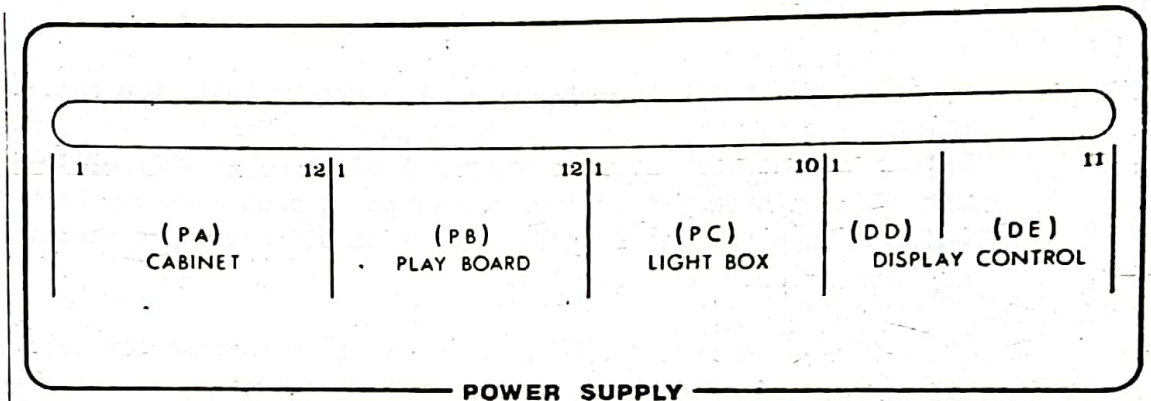
Fig. 1.1

b)   Master Unit

Function-wise this unit is identical to the master unit in any machine, and with the connectors for the playfield, display control, mini-printer, expansion and game memory, which are easily accessible from the outside, you can adopt various configurations working with the internal parts as required (lite box, playfield, programs) and the external parts that you intend to check and repair.

c)   Lite Box

This works as a substitute in all its functions for the lite box of any machine and therefore, contains the functions equivalent to the display control unit and all the displays, LEDs and lamps situated in the lite box of the machine. The external connection, compatible pin by pin with the M6 connector on the display control unit, makes it possible to connect it to any master unit under test.

d)   Playfield

This section contains a complete set of all the switches situated in the playfield and cabinet of the machine, plus two switches which make it possible to simulate the state of the Power Play destined for the playfield coils; also this unit includes individual indicators for all the signals which reach the multiplexer and driver unit on the machine, from the master unit.

The external connection wire, which is compatible with the MA connector on the multiplexer and driver unit, makes it possible to connect this section to the actual master unit of the Simulator itself, or to an external unit or machine.

e)   Memory Bank

This assembly incorporates the buffers, interfaces and switches required to select from 1 to 16 programs situated within, and this number can be increased with additional external modules.

The fact that it can be externally connected, makes it possible to apply the memory bank to the actual simulator, or to external master units, in test or repair phases.

To select the program memory, you should activate the relevant switch lever, towards the left (ON). The order of preference for the program selectors is from top to bottom, and should two of the levers be activated, only the first one according to this order of preference will be effective.

On Figure 1.2 you can see the way the memory sockets are placed in relation to their relevant switches.

From the points mentioned above, you can appreciate how the simulator can substitute function-wise and on the workbench, all and each of the equivalent parts to be found in the machine.

The following sections describe how to start up the system with or without external units:

2.2   GAME SIMULATION

2.3   MASTER UNIT

2.4   LITE BOX

2.5   PLAYFIELD
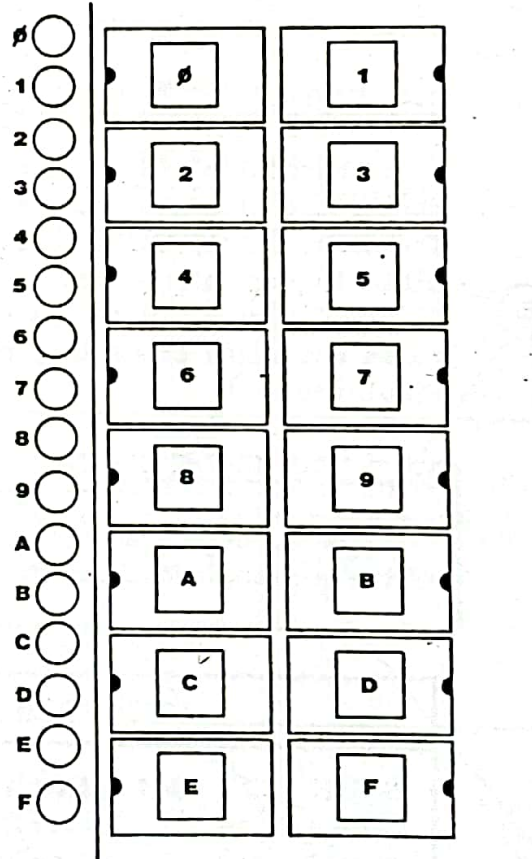
Fig. 1.2

1.2 OPTIONS

There are various options currently available for use with the Simulator Ø94-630. These consist essentially, of special programs and the interface required for practical application.

A. EPROM 1702A Comparator
B. HEXADECIMAL Keyboard
C. EPROM Programmer
D. Match Number, Display Control and Multiplexer-Driver Interface

1.3 PHYSICAL DESCRIPTION

The basic hardware of the Simulator Ø94-630 is comprised of: a cabinet, a power supply board, a master unit, an indicator, control and program stock unit, a control panel and a system for connecting up external units.

This basic hardware is described and represented in the following paragraphs and figures.

1.4 CABINET AND POWER SUPPLY BOARD

The cabinet is compact in design and thanks to the rotating supports, the Simulator can work with the front panel tilted at any angle. The power supply board is equipped with a selector which makes it possible to work at nominal tensions of either 125 or 220 V A.C. and at 50 or 60 cycles. Both the selector (125 or 220) and the protection fuses and mains connector, are to be found on the back panel of the Simulator.

1.5 UNITS IN THE SYSTEM

The functions and reference codes for the units which go to make up the system, are shown on the following table :

DESCRIPTION	REFERENCE
MASTER UNIT for Simulation System and Printer Connector	095-210
PLAYBOARD, LITE BOX and PROGRAM UNIT and 6 Digit Display Connector	094-030
INTERFACE for External 6 Digit Displays	094-134
EXTERNAL PRINTER Connector	094-133
POWER SUPPLY Connector for External use	094-130
TRANSFORMER UNIT	094-703
-20 Volts Power Supply Board	094-132
Loudspeaker	034-013

1.6 CONTROLS, CONNECTORS AND INDICATORS

In the following figures and tables you will find the various connectors, indicators and controls which go to make up the system.
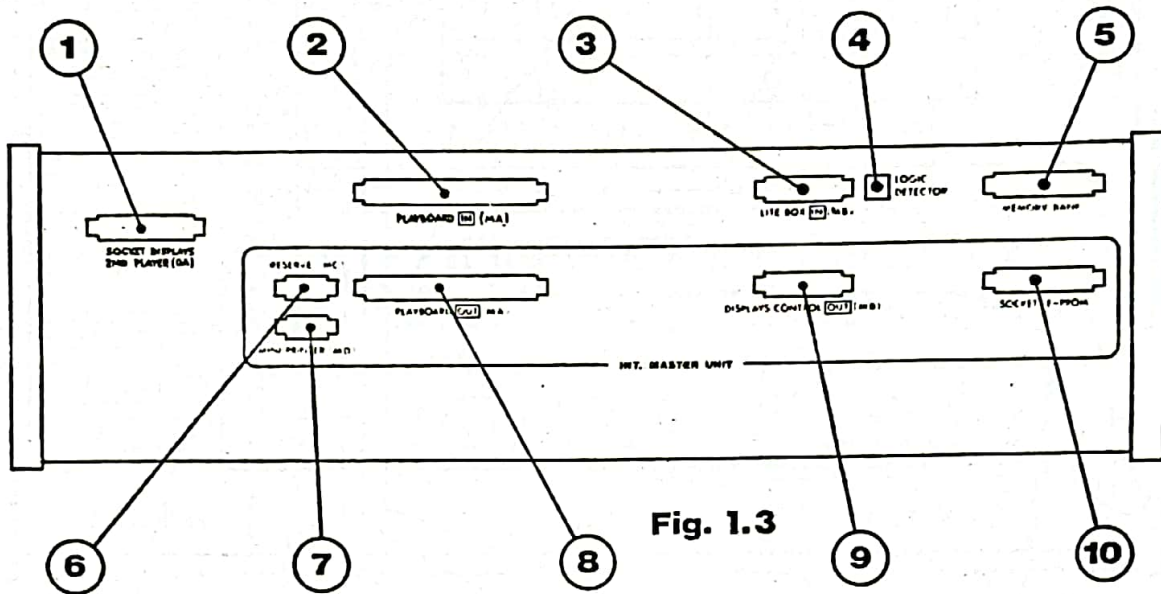

Fig. 1.3

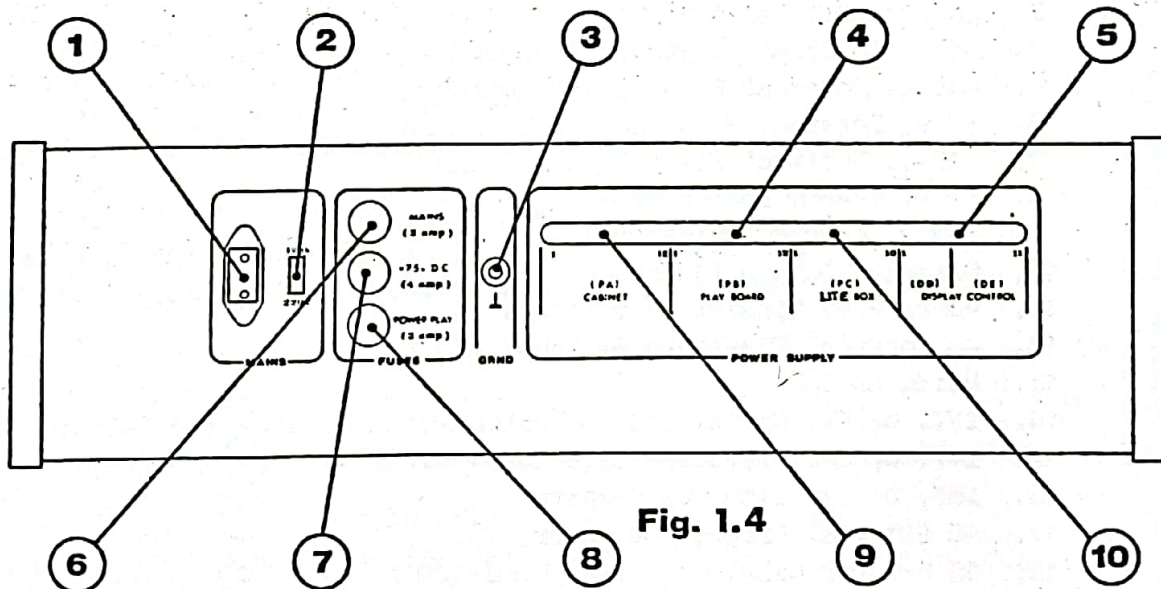|			
1.	Socket – 2nd Player Display	6.	Reserve
2.	IN Playboard	7.	Mini-printer
3.	IN Lite Box	8.	OUT Playboard
4.	Logic Detector Connector	9.	OUT Display Control
5.	Memory Bank	10.	Socket for E-PROM

Fig. 1.4

1.	Mains Plug	6.	Mains Fuse (2 amp)
2.	Mains Selector	7.	+7.5 v. DC Fuse (4 amp)
3.	GRND	8.	Power Play Fuse (3 amp)
4.	Ext. Playboard Connector	9.	Ext. Cabinet Connector
5.	Ext. Display Control Connector	10.	Ext. Lite Box Connector

1-5
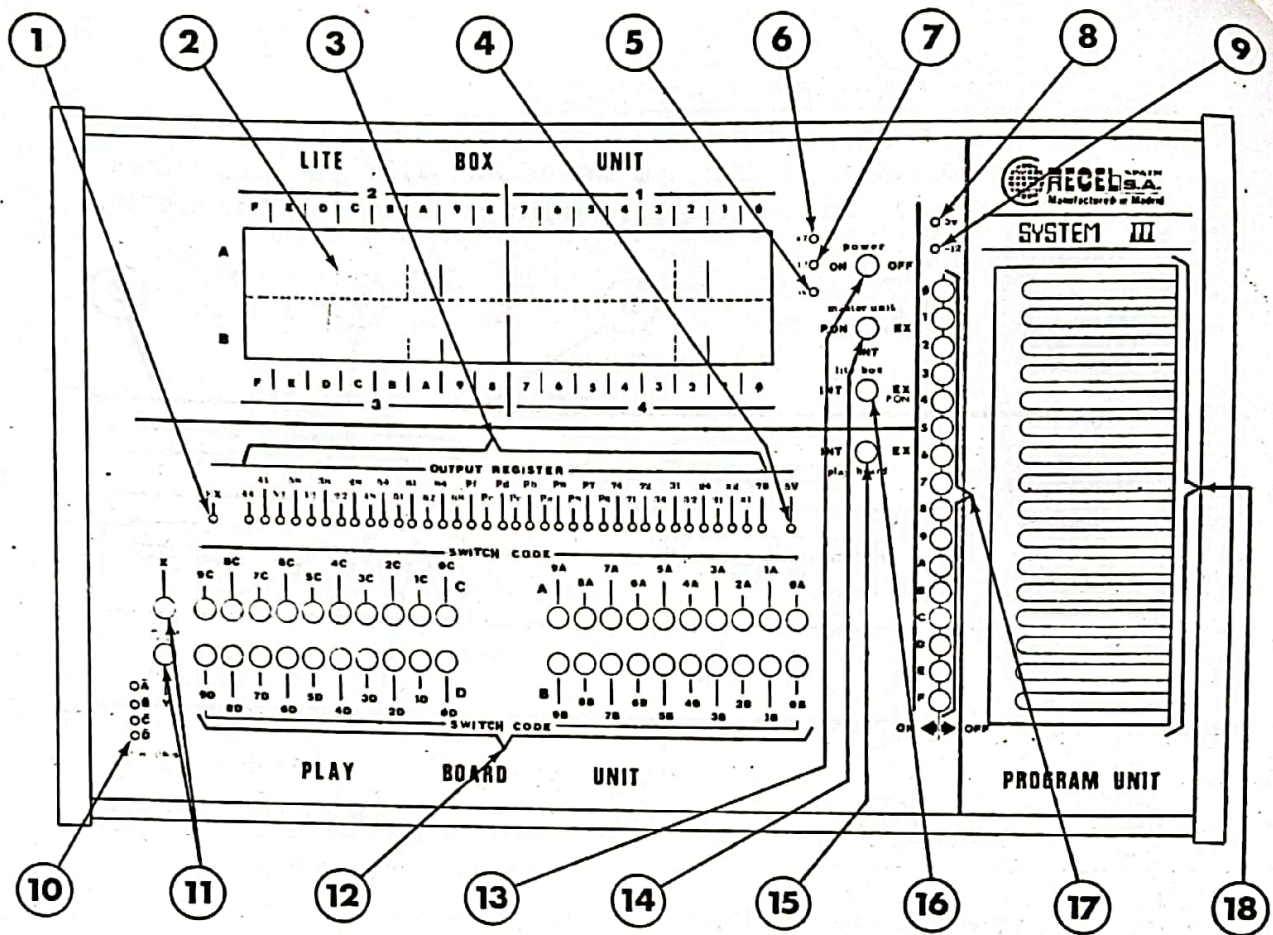
Fig. 1.5

1. Indicator for future use
2. Lite Box Display (see Fig. 1-6)
3. Output Register Indicators
4. +5 v. Internal Playboard Indicator
5. +15 v. Internal Power Supply Indicator
6. +7 v. Internal Power Supply Indicator
7. −12 v. Internal Power Supply Indicator
8. +5 v. E-PROM Indicator
9. −12 v. E-PROM Indicator
10. Scanning Switch Indicator
11. Power Play Simulation Switches
12. 40 Internal Playboard Switches
13. Mains Switch
14. INT. or EX. Master Unit Selector and Power On Reset Pulser
15. INT. or EX. Playboard Selector
16. INT. or EX. Lite Box Selector
17. 16 Internal Program Selector
18. 16 Program Labels
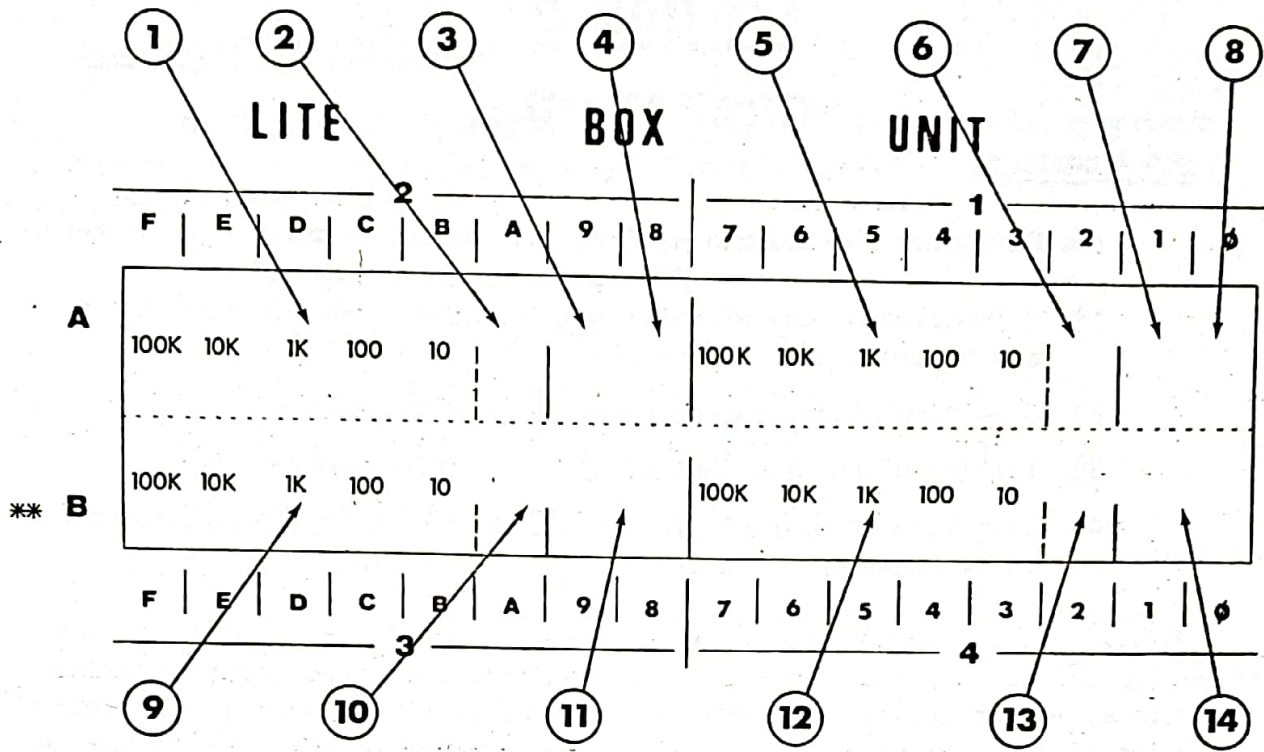
Fig. 1.6

1. 2nd Player's Score Display
* 2. 2nd Player Indicator
3. Match Number
4. Ball in Play
5. 1st Player's Score Display
* 6. 1st Player Indicator
7. Extra Ball
8. Free Play
9. 3rd Player's Score Display
* 10. 3rd Player Indicator
11. Reserve
12. 4th Player's Score Display
* 13. 4th Player Indicator
14. Credit (the Ø column = tens; the 1 column = units)

* NOTE:

   ① = Selected

   ② = In Play

   ④ = 1 Million Points

   ⑧ = Handicap

** The decimal points in all 16 Line-B displays are the indication of each one of the 16 scanning times.

SECTION 2

OPERATION

2.1   GENERAL

The Simulator Ø94-630 can perform the following basic operations :

1) Simulation of any Pinball game, without connecting up with any external part or unit.

2) Game simulation, including external parts or units.

3). Testing of parts or units, with automatic indications.

4) Execution of special programs, intended for applications within or outside of the SYSTEM III.

N.B.:   In order to facilitate the handling and interpretation of the various indications of our Simulator in its different applications, we supply with each program recorded on EPROM memory, a description of its operations, as well as a card which when placed over the — switch panel and LEDs of the simulator, makes it possible to quickly — identify the various functions within the program in question.

Under Fig. 2.1 we have reproduced a model of the type of card mentioned under the previous paragraph.
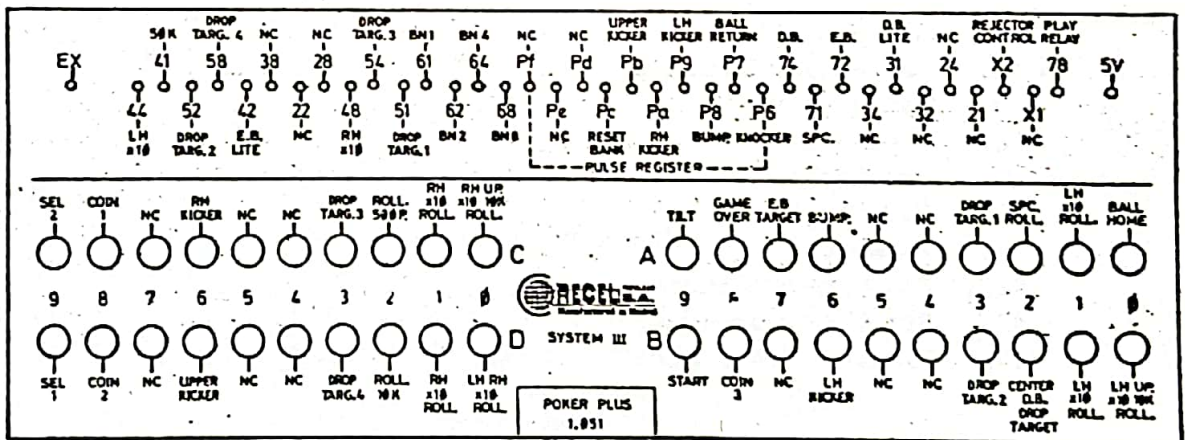
Fig. 2.1

ABBREVIATIONS

BN : BONUS	NC : NOT USED
COIN : COIN REJECTOR	RH : RIGHT
DB : DOUBLE BONUS	ROLL : ROLLOVER
EB : EXTRA BALL	SEL : ADJUSTMENT BUTTONS
EX : EXPANDER	(Inside Front Door)
LH : LEFT	SPC : SPECIAL

2.2   GAME SIMULATION

The Simulator carries out this operation without being connected up to any external unit.   The operator should follow the steps laid down below :   (Fig. 2.2)

a)   Set the POWER switch to OFF.

b)   Plug in the connecting wires.

c)   Set the "MASTER UNIT" selector to INT.

d)   Set the "LITE BOX" selector to INT.

e)   Set the "PLAY BOARD" selector to INT.

f)   With the relevant switch select the game program to be simulated.

g)   Place the program card over the control panel (Play board).

h)   Check that the correct tension has been selected (125 or 220 v.).

i)   Place the POWER switch to ON.

As from this moment the Simulator is functioning and will start by carrying out the Self-Check routine, producing the same indications and sounds as any machine.

Once the Self-Check routine has been completed the Simulator is ready to start to "play" and will carry out all the functions that you would find in the model of game that is being simulated, whilst the Play Board follows the instructions given and the relevant actions are shown on the Lite Box.

The Self-Check routine starts afresh each and every time that the power is cut off and reconnected to the Simulator, or whenever the MASTER UNIT is switched to P. ON.
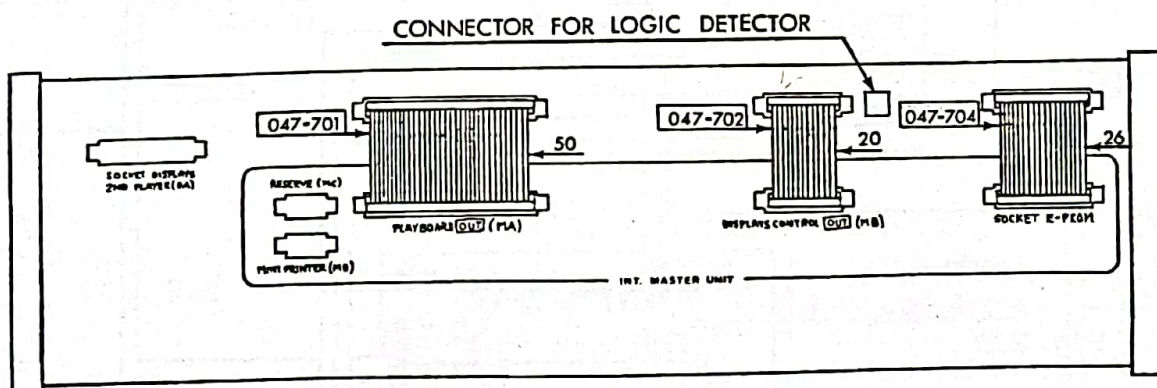
Fig. 2.2

2.3 EXTERNAL MASTER UNIT

In this operation the Simulator becomes a complete Pinball game on the work-bench, thereby making it possible to carry out quickly and efficiently operations to check and repair master units under test.

The connection of the memory bank in the simulator to the external master unit is optional, and depends on the type of checking or other operations that you wish to carry out on the unit under test.

The operator should follow the steps shown below: (Fig. 2.3)

a) Place the POWER switch to OFF.

b) Connect the power input of the external unit to the internal power supply connector of the simulator (LITE BOX "PC") (master unit).

c) Connect the external unit's output corresponding to the play board (50 core flat wire) to the internal playboard connector (PLAY BOARD IN "MA").

d) Connect the external unit's output corresponding to display control (20 core flat wire) to the internal lite box connector (LITE BOX IN "MB").

e) Optionally you can remove the game memory from the unit to be tested and in its place connect a 24 core flat wire to the Memory Bank connector and then select the program that you wish to carry out.

CONNECTOR FOR LOGIC DETECTOR

10 PIN CONNECTOR

047-705

24   OPTIONALLY

047-707

20

047-706

50

047-802

7

GRND FOR OSCILLOSCOPE

MASTER-UNIT

8 PIN CONNECTOR

EPROM SOCKET

Fig. 2.3

f) Place the "MASTER UNIT" selector to EX.

g) Place the "LITE BOX" selector to INT.

h) Place the "PLAY BOARD" selector to INT.

i) Place the POWER switch to ON.

As from this moment the system is converted into a complete ma-chine and quite independently of the program selected, will carry out the Self-Check routines.

Once the Self-Check routines are completed, the selected program will be carried out automatically.

2.4 EXTERNAL LITE BOX (Complete)

In this operation the simulator works as a complete Pinball game with the exception that the indications are shown on an external lite box.

The operator should adopt the following procedure: (Fig. 2.4)

a) Set the POWER switch to OFF.

b) Connect the power input of the external unit (complete lite box), to the internal power supply connector of the simulator ("DD - DE"). (Display control "DD - DE").

c) Connect up the input from the external unit (20 core flat wire from the display control) to the internal master unit connector (Display control OUT).

Fig. 2.4

d) Set the "MASTER UNIT" selector to INT.

e) Set the "LITE BOX" selector to EX.

f) Set the "PLAY BOARD" selector to INT.

g) Set the POWER switch to ON.

## 2.5 EXTERNAL PLAY BOARD (Complete)

In this operation the Simulator will carry out all the functions of a Pinball with the exception of its internal PLAY BOARD unit, which will be substituted by the external play board connected in each case.

The operator should follow the steps given below: (Fig. 2.5)

a) Set the POWER switch to OFF.

b) Connect up the power input from the external unit (play board) to the internal power supply connector of the simulator (PLAY BOARD "PB").

c) Connect up the input of the external unit (50 core flat wire) to the connector corresponding to the output of the internal master unit (PLAY BOARD OUT "MA").

d) Set the "MASTER UNIT" selector to INT.

e) Set the "LITE BOX" selector to INT.

f) Set the "PLAY BOARD" selector to EX.

g) Set the POWER switch to ON.
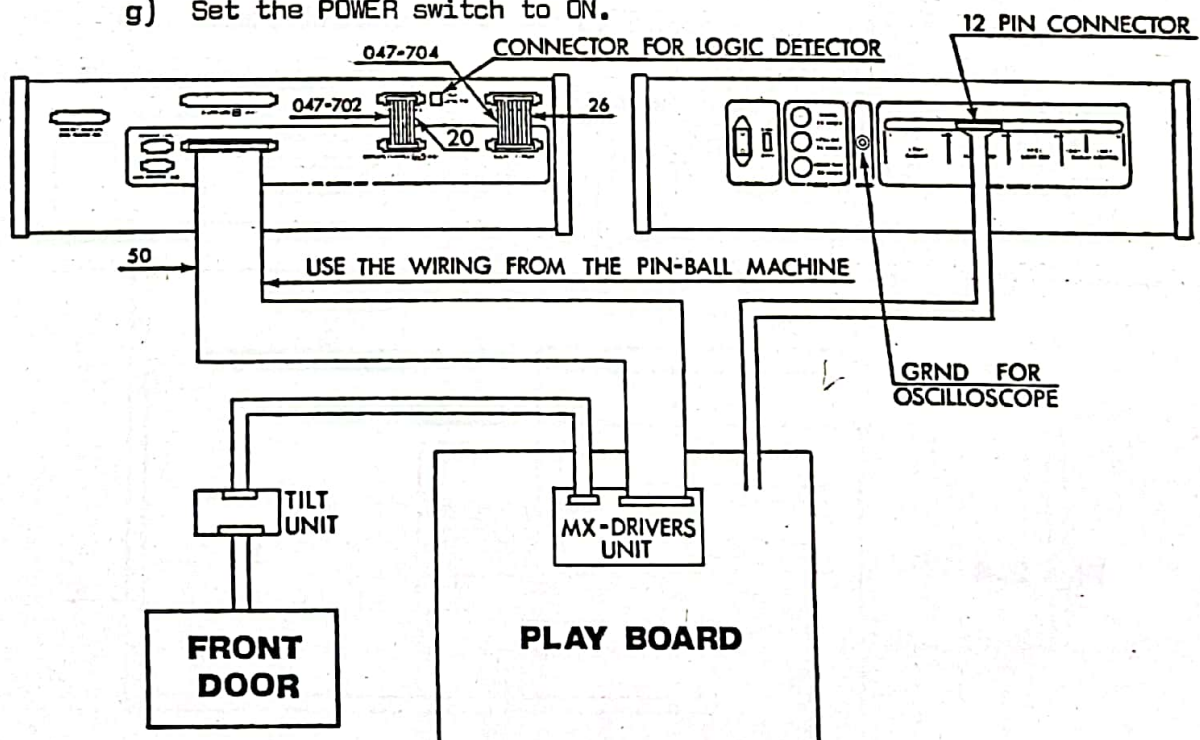
Fig. 2.5

2.6 EXTERNAL 6 DIGIT DISPLAYS

This function is performed by the Simulator at the same time as the representation of the 2nd Player on the INTERNAL LITE BOX, that is to say as long as no EXTERNAL LITE BOX is connected to the Simulator.

The operator should follow the steps shown below: (Fig. 2.6)

a) Set the Simulator in any of the previously mentioned functions (2.2, 2.3 or 2.5).

b) Connect the EXTERNAL 6 Digit Display Unit 095-105 (26 core flat wire) to the Simulator at the 2nd Player Display Socket (DA).

c) Set the POWER switch to ON.

As from this moment the external 6 digit display unit is functioning in parallel with the representation of the 2nd Player on the INTERNAL LITE BOX, and therefore the indications will be identical at all moments between these two.
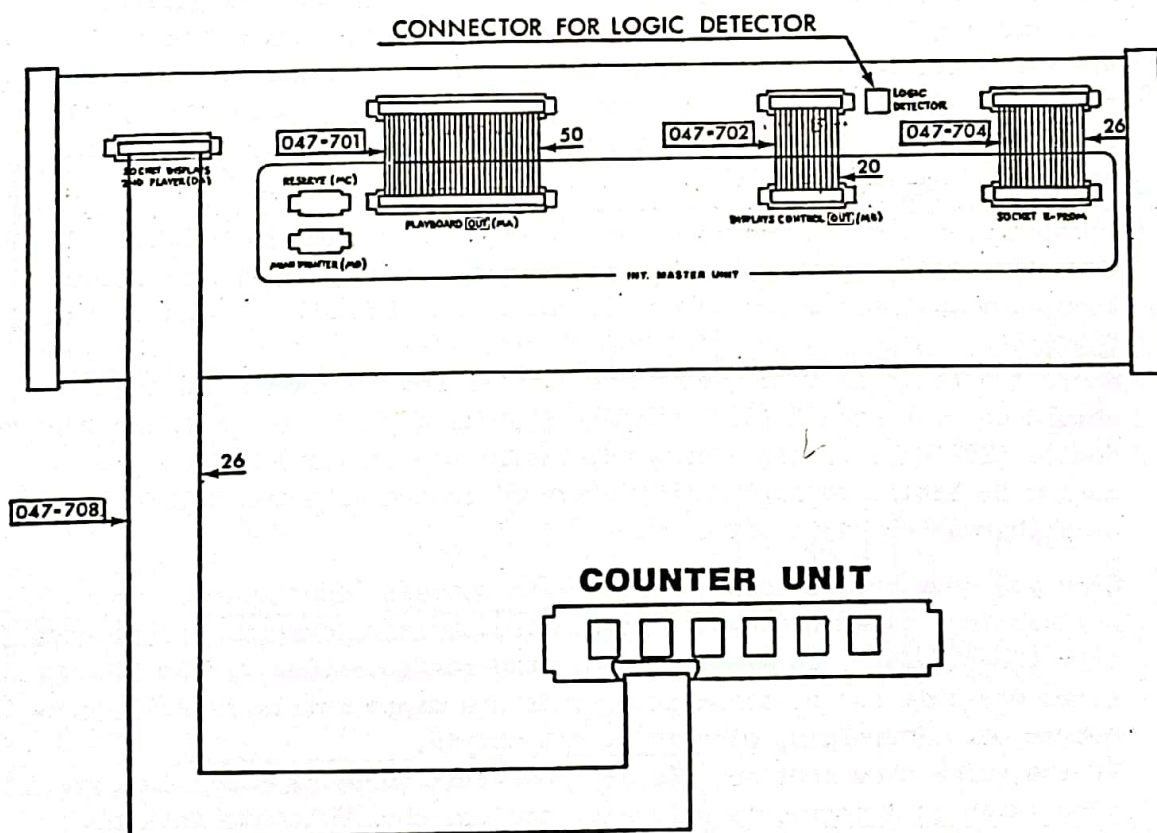
Fig. 2.6

2.7 DRIVERS AND MULTIPLEXER

In order to check and repair the Driver/Multiplexer units on System III games, you will require the following elements :

1. Test programme 28/100
2. 50 core flat tape cable with triple connector (optional)
    Ref. 047-706
3. Diode matrix Ref. 094-136
4. Driver connection 094-135

All the indications of faults will be legible on the 2nd player displays.

Proceed as follows :

a) With the simulator switched off, carry out the various connections as shown in the Figure on page 2.8.

b) Select the test programme 28/100.

c) Activate the switches, (except x, y - POWER PLAY).

d) Switch on the simulator and wait until it has finished the Self-Check routine.

e) Connect the 50 core flat tape cable to the test unit. The Simulator will now start to send out a rhythmical sound (this indicates that via the Multiplexer, the equipment is reading the switch configuration and that this is not the same as the standard matrix configuration which is connected up at the next step). The normal indication will be 9 -   (9 to F).

f) Connect up the diode matrix as shown on the Figure on page 2.8. If the matrix reading is correct, the Simulator will give out a quicker tone, and if the reading is not correct, then it will continue with the initial sound, showing on the display -X-Y-Z-; X shows the time where the fault is to be detected; Y gives the configuration that should be read; and Z shows the configuration read. Furthermore the faulty time will remain addressed, during the indication, thereby making it easier to detect the faulty component with the help of an oscillograph or logic detector.

g) Once you have carried out step (f) with success (confirmed by the quicker tone given out by the simulator), this quicker tone indicates that the simulator is now trying to read configuration "$\emptyset$" in all the times and this is not possible because the diode matrix is still connected up. Therefore, disconnect the matrix.
    If the quick tone continues, this means that there is a bit in some time which is incorrectly activated and you should locate this bit
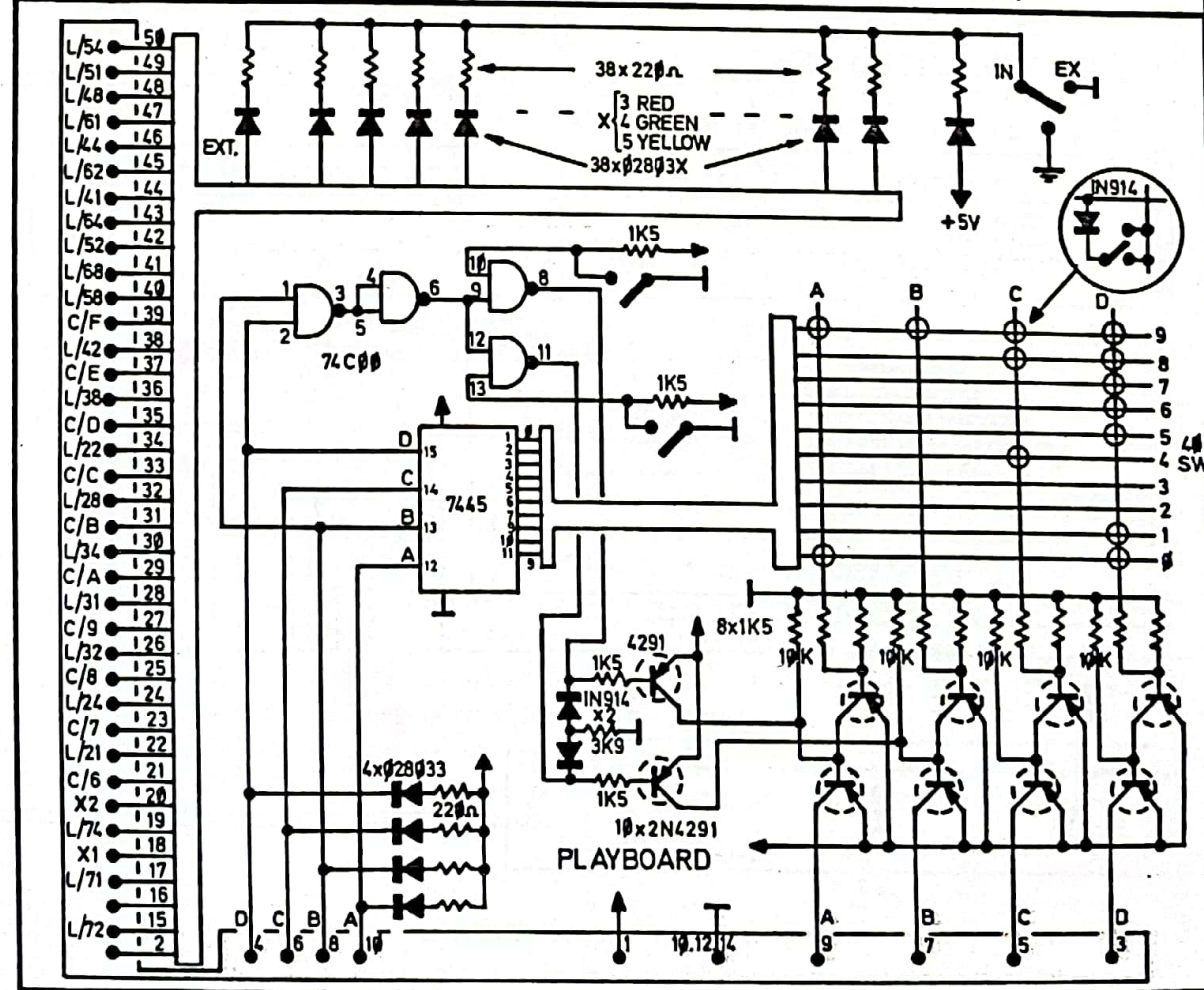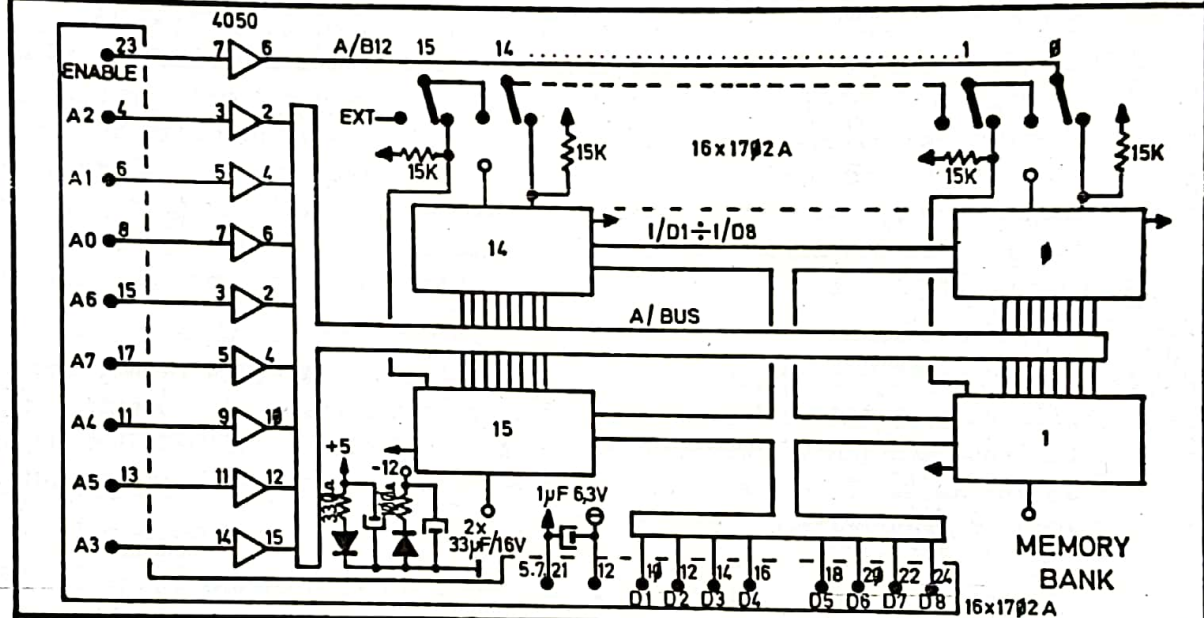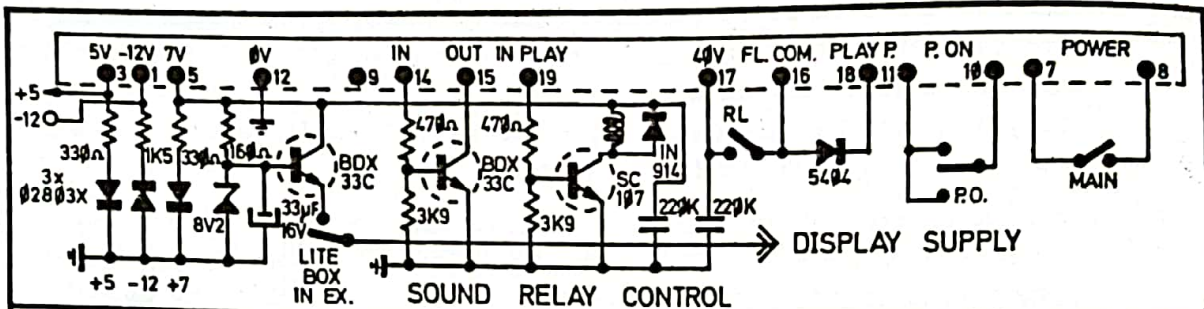
using the logic detector or oscillograph. You can also see the exact
fault in areas 12 or 14 (instant reading of playfield contacts, or
playfield contact state), as in these areas you will be able to see the
time and switch that is activated. If when you disconnect the diode ma-
trix, the tone has changed and you now have two alternating sounds,
when you can pass on to the next stage.

h) Connect up the driver interface as shown on the figure below. Activate
the switch on unit 094-135 to the right (standing position). If the
alternating sounds stop, pass on to the next step. If they do not stop,
there is a fault in the 40 v. read-out circuit, or else there is a
shorted driver. If the fault is to be found in the drivers, the inter-
face LED will be lit up; turn the switch back to the centre position,
disconnect the interface and look for the shorted driver with the logic
detector (by measuring the output from the connector, all will show OPEN,
except the driver that is "on" or shorted). If the fault is to be found
in the read-out circuit (chip 74C02), locate the bad part by means of the
logic detector or oscillograph (in this case the interface LED will be
off).

i) Checking all the drivers. If any of the drivers is not working, the test
will stop at this point sending impulses to the driver in question (to fa-
cilitate its identification), and will then indicate which of the drivers
is at fault. If all are working correctly, the cycle will be completed
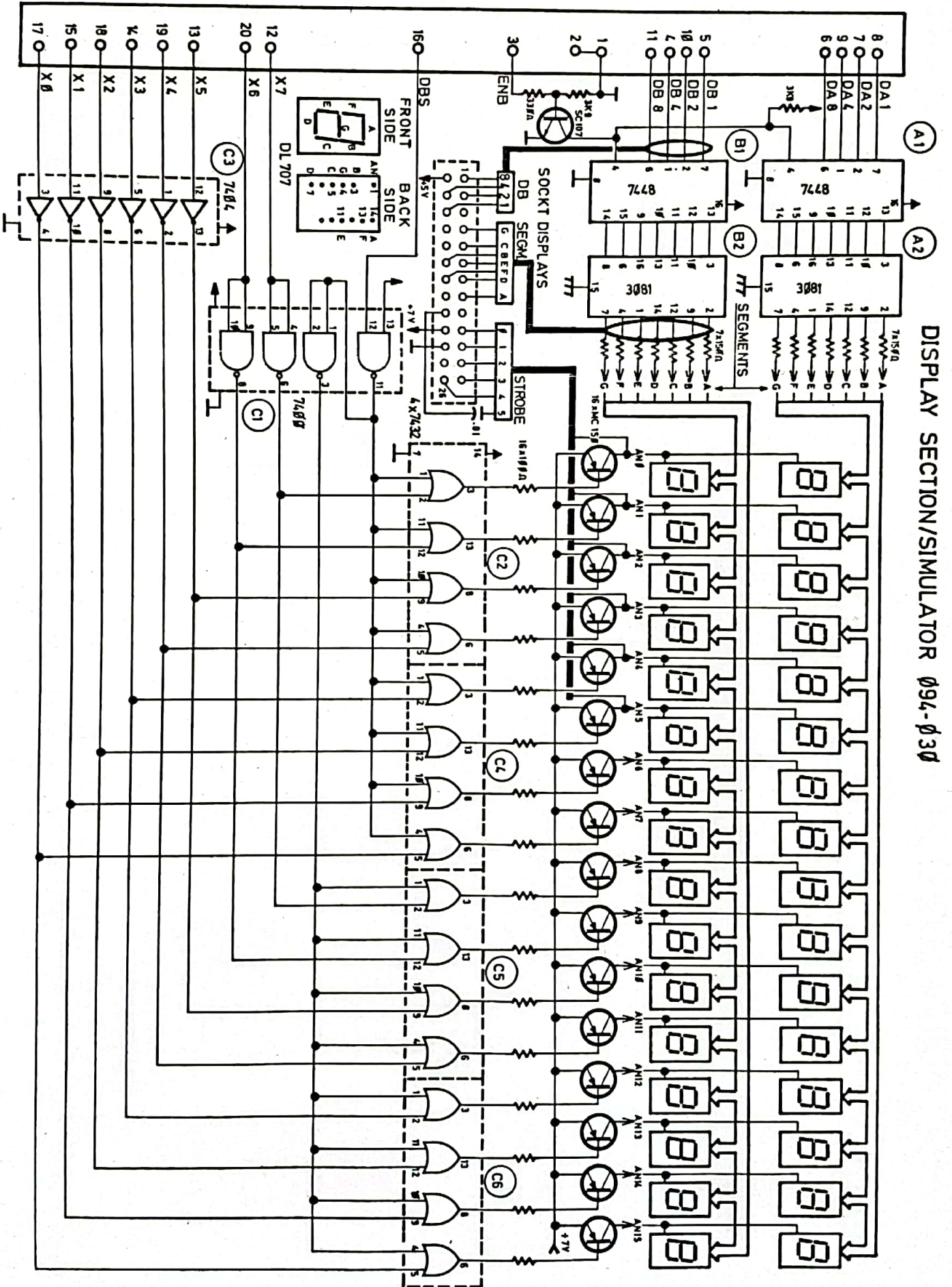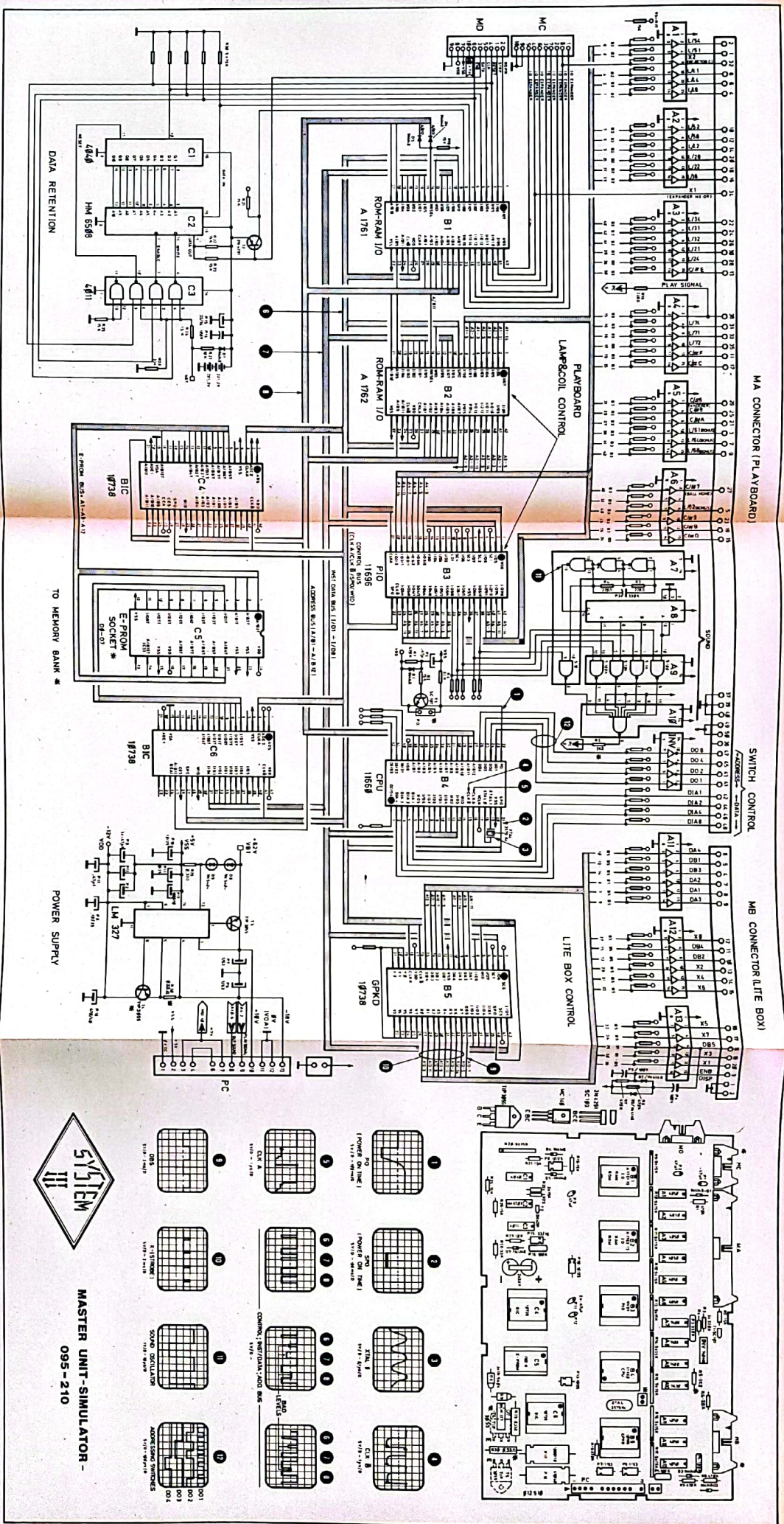and the original sound will start up again.

CONNECTOR FOR LOGIC DETECTOR

047-702   047-704

12 PIN CONNECTOR

20
26

047-706   50
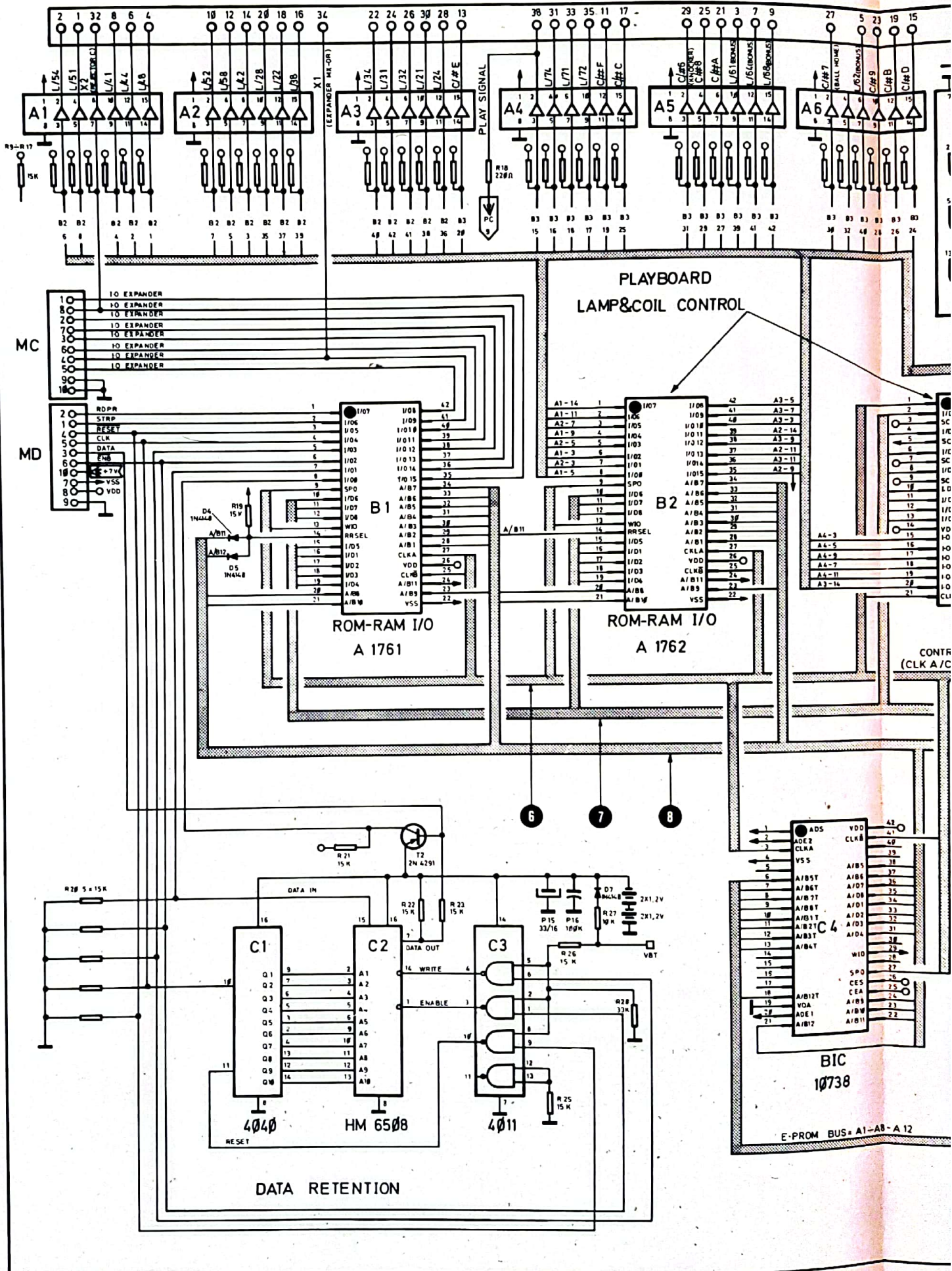
EARTH FOR
OSCILLOSCOPE

094-136

1

094-135
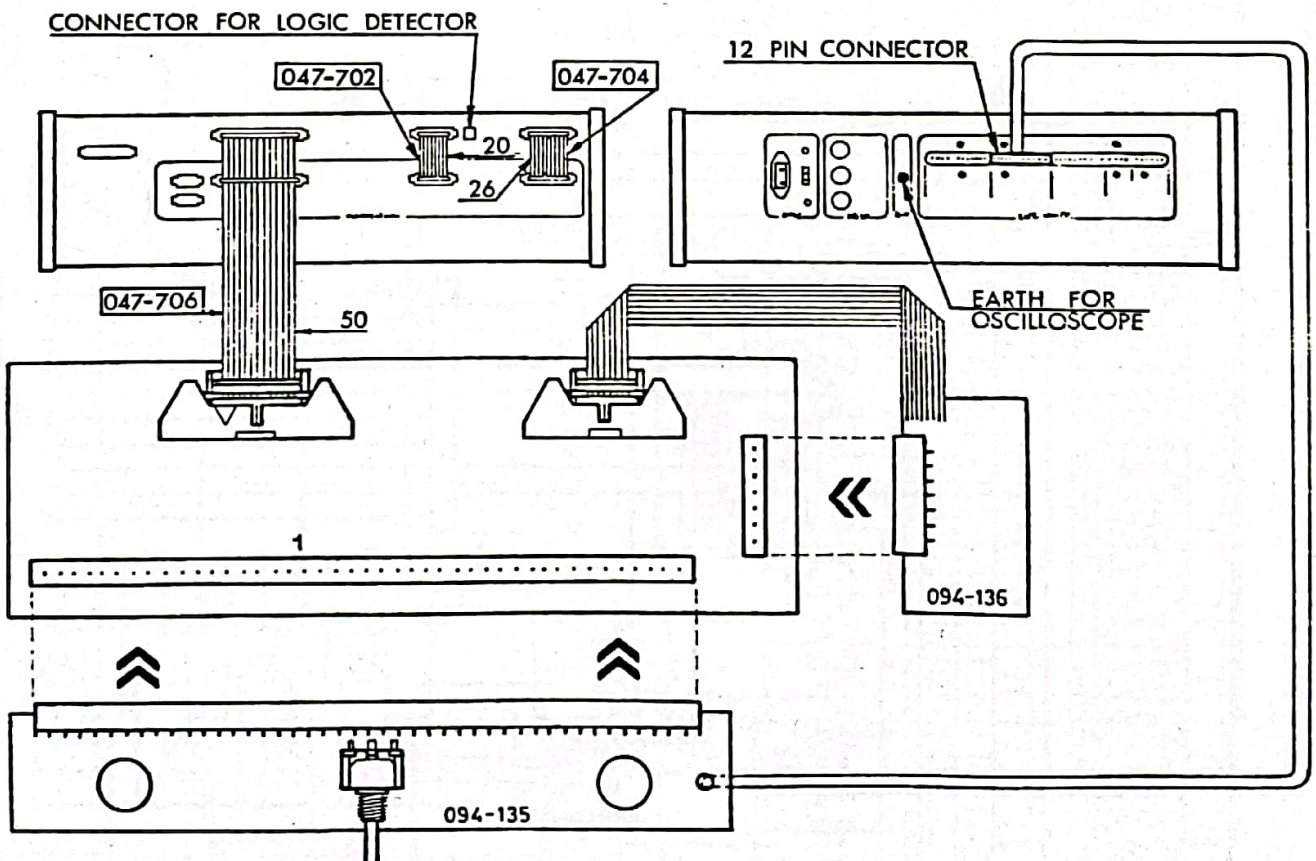
POWER / MEMORY BANK / PLAYBOARD / SIMULATOR Ø94-Ø3Ø

DISPLAY SECTION/SIMULATOR Ø94-Ø3Ø

LITE BOX IN (MB)

MA CONNECTOR (PLAYBOARD)

PLAYBOARD LAMP&COIL CONTROL

ROM-RAM I/O A 1761

ROM-RAM I/O A 1762

DATA RETENTION

C1 4040
C2 HM 6508
C3 4011
C4 BIC 10738

E-PROM BUS: A1-A8-A12

SWITCH CONTROL
←ADDRESS— ←DATA→

MB CONNECTOR (LITE BOX)

LITE BOX CONTROL

PIO
11696
CONTROL BUS
(CLK A / CLK B̄ / SPO / WIO)

CPU
11660

GPKD
10738

INST DATA BUS (I/D1 ÷ I/D8)

ADDRESS BUS (A/B1 ÷ A/B 12)

E-PROM
SOCKET *
D0÷D7

BIC
10738

POWER SUPPLY

TO MEMORY BANK *
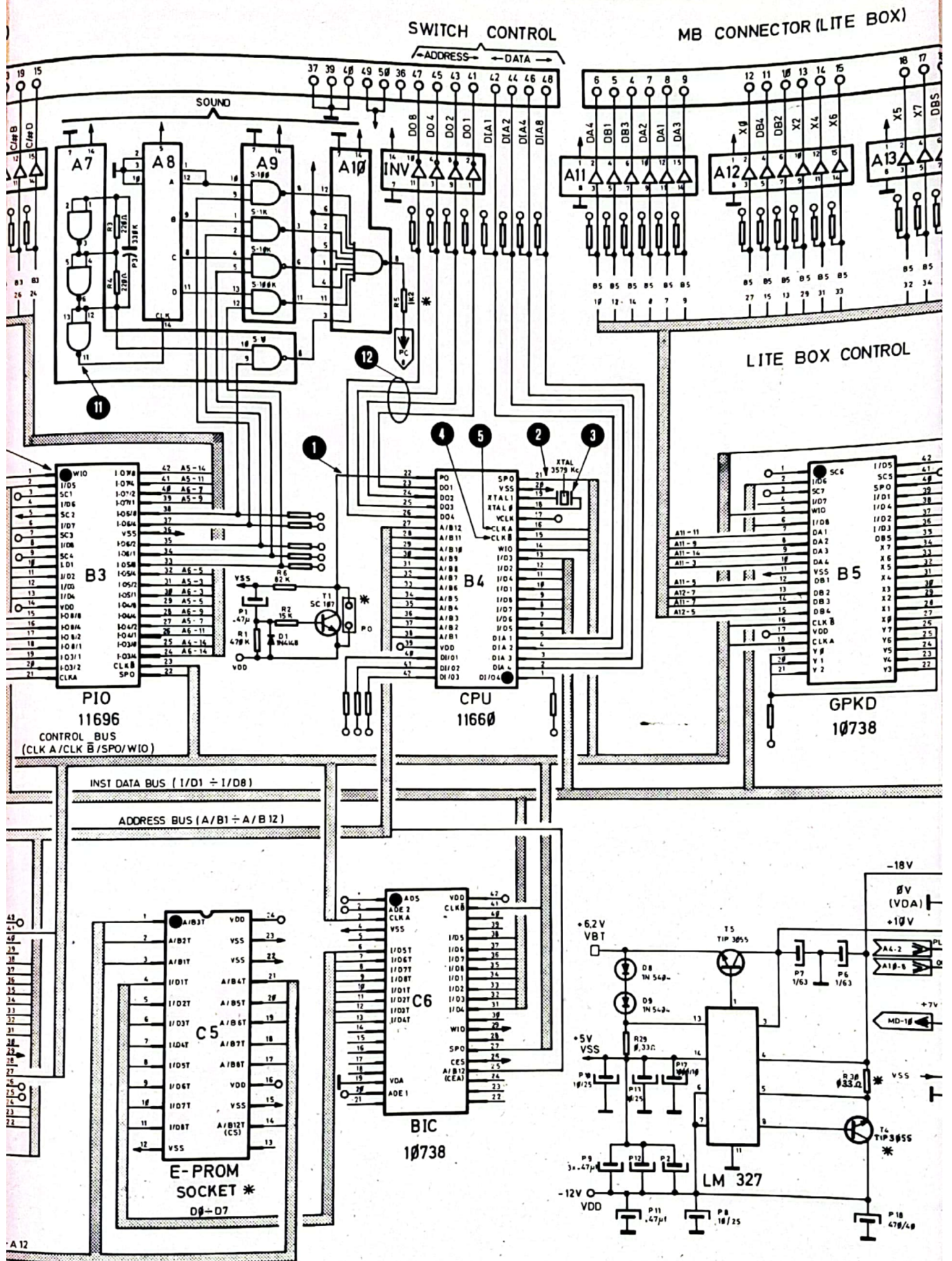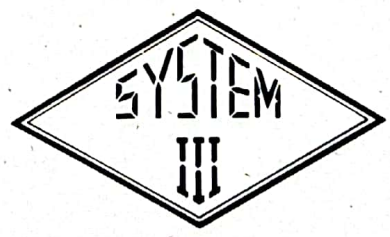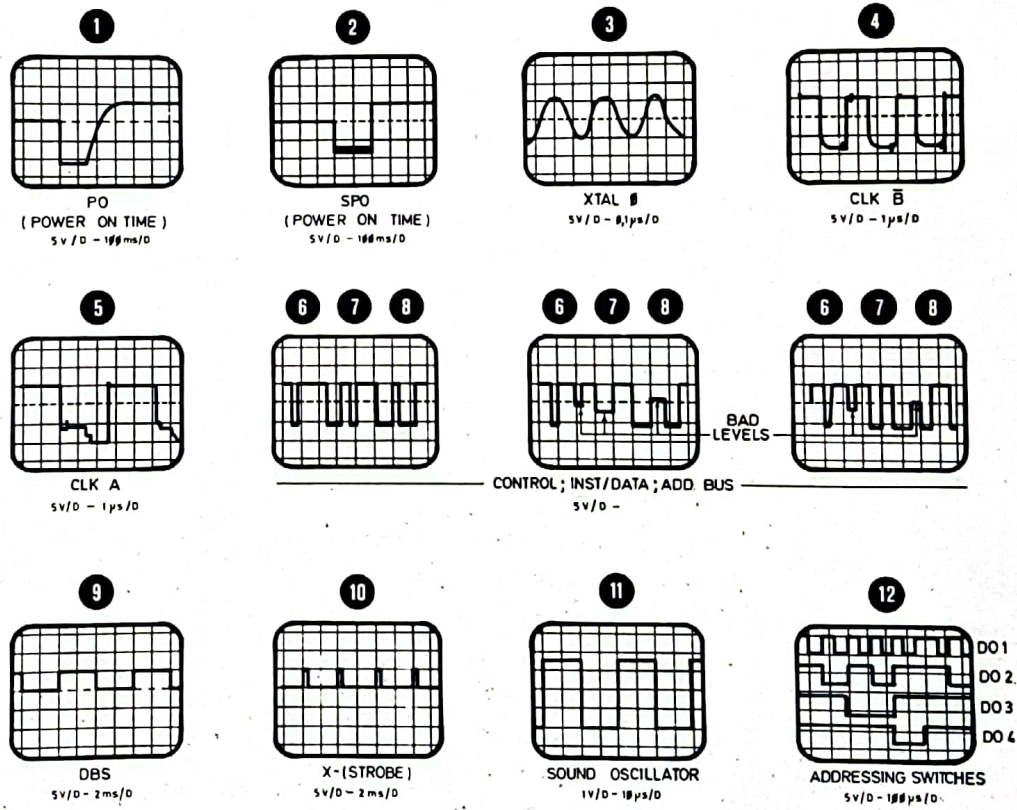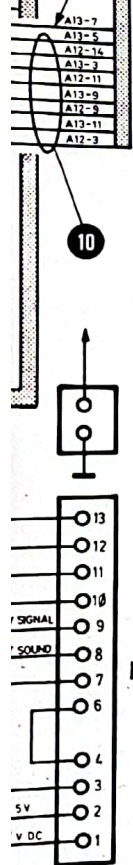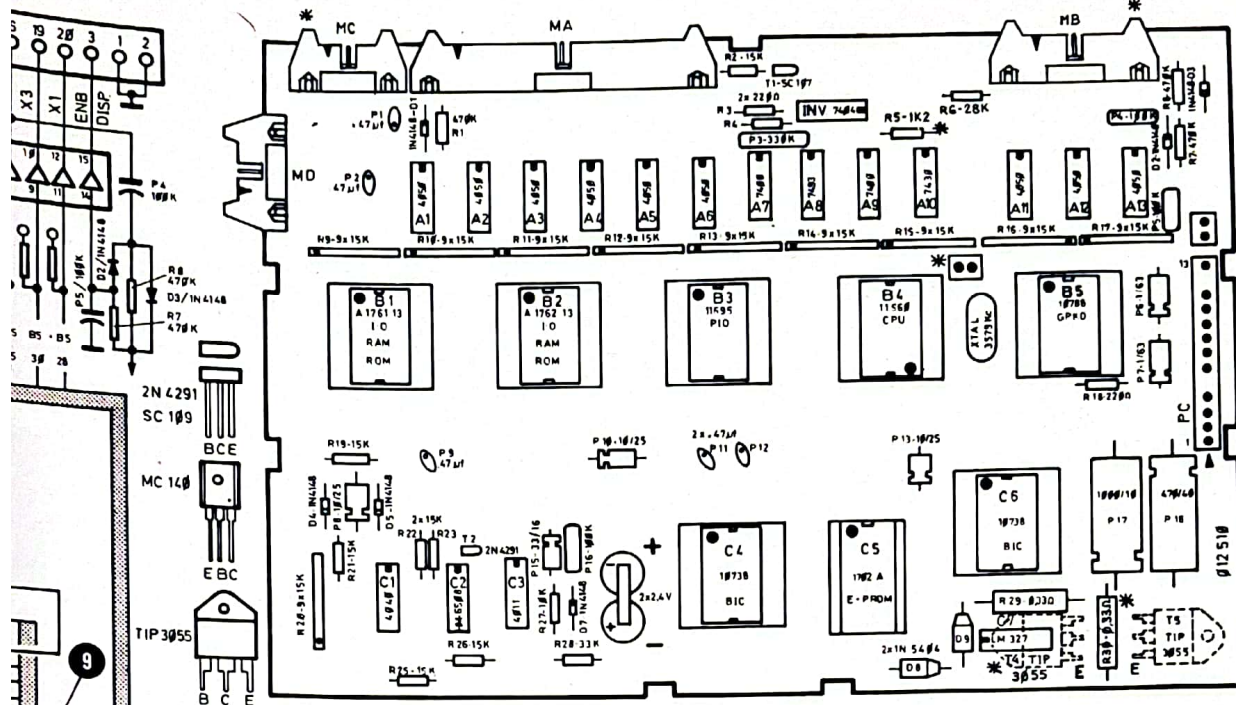
MASTER UNIT - SIMULATOR -
095 - 210