# Instruction Manual
# and Technical
# Manual
# for
# "Future World"

**SERVICE MANUAL « FUTURE WORLD »**

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# PART I

# INSTRUCTION MANUAL

# I. INSTALLATION

Assemble the game as follows:

1. Bolt legs to the cabinet (use special bolts in coin box).

2. Gently extract electric cable and place it in the proper cavity, checking that non-skid knot is there.

3. Remove the elastic band that secures the light board and lift it to a vertical position. During this operation make sure that the cable is not crushed between the parts. The same care has to be used when disassembling so as not to squeeze the cables between the parts.
The light boad has an automatic coupling that keeps it in a vertical position to ease the assembly of the 4 bolts. Always make sure that the automatic coupling is securely into operation. Open light board and fasten it to the cabinet with the 4 bolts and washers in the coinbox.

## VISUAL INSPECTIONS

On all games there are certain items that should be checked after shipment. These are visual inspections which may avoid some time consuming service work later. Minor troubles caused by abusive handling in shipment are unavoidable.
Cable connectors may be loosened, switches (especially tilt switches) may go out of adjustment.
Plumb bob tilt switch should always be adjusted after game is set on location

1. Check that cabinet cable is connected to the light board cable.

2. Check for any wires that may have become disconnected.

3. Check that cables are clear of all moving parts.

4. Check that there are no tin residue of foreign material due to loose solder between contacts or on the connectors.

5. Check wires for proper soldering. Cold solder connections may not show up in the factory inspection, but vibrations in shipment may break contact.

6. Check that all fuses are making good contact.

7. Check wiring of transformer to correspond to location voltage.

8. Check and adjust tilt switches sensitivity as follows:

a. Plumb bob tilt switch (tilt 1)
   Adjust the length of plumb bob tilt according to desired sensitivity.

b. Rail tilt and ball (tilt 1)
   Insert ball in the guide, check that the ball rolls free closing contact when the cabinet is raised.

c. Shockproof tilt (tilt 2)
   There are 2:
   the 1st. near plumb bob tilt, the 2nd. near coin chutes.

   Adjust contact distance to desired sensitivity.

## II. GENERALE GAME OPERATION

1. Place ball into hole, plug in line cord.
Score displays are set to zero, display for max. score shows the highest score ever obtained (to obtain zero follow instructions, chapter V). « Credit » display shows remaining credits.

2. « Game over » light is lit. If « tilt » light is lit check the adjustment of tilt contacts which should be open.

3. Check that the machine properly accepts coins and advances corresponding credits (see chapter V).
Remember that the machine should not accept any coin when turned off or if the number of credits has reached the programmed max. (see chapter V).

4. If, after ignition, all displays were to alternate figures 6 and 9, it will be necessary to make some controls, since the data in storage memory, will be of no value. This is very likely to happen, if the machine was switched off for many weeks.
If, on the contrary, it has been recently used, and shows alternatively figures 6 and 9 it could well be that the battery or its input circuits are out of order.
When newly starting the machine re-programming will be necessary (see chapter V.).

5. Press « Credit » button - « GAME OVER » and possibile « TILT » lights should be turned off.

a. 1st player warning light should be lit.
b. Lamp showing 1st player in game will light up.
c. Credits will be decreased by one point.
d. Playfield is ready and the ball ejected from the hole.

6. Each new pressure on « Credit » button will decrease the bumper of credits and increase indication of numbers of players in game.
7. Maximum number of credits which can be required is 4.


## GENERAL REMARKS ON THE GAME

1. The number of balls to be played for each game is regulable (see chapter V).
2. The ball won during the game is immediately thrown in again.

3. The games won while playing for combinations accomplished or for achievement of winning scores are immediately awarded.

4. The games won by exceeding the maximum score (regulable) are awarded at the end of the game.

5. At the end of the game, the match lamp comes on (if programmed) and a game is awarded to each player having the last two figures of score equal to the match number. The games won are awarded only if the number of maximum credits (regulable) is not reached.

6. At the end of the game, the player (or players) who has got the superbonus win, is indicated by the winkling of the corresponding lights.

7. When just one player is playing, the dropping targets do not get up again when the ball is lost.

8. The secret score (Mistery score) is casual, and is ranging from 5,000 to 50,000 points. The highest scores (40,000 - 50,00 points) are displayed by special sound effects.

## III. BOOK-KEEPING FUNCTIONS

« Meter display » button is designed to help operators perform certain accounting fuctions such as the number of coins dropped and number of total plays.
The operator will know these data at any time.
For this purpose he will have to open the coin chute door and push the SELF TEST/METER/PROGRAMMING button.

1st. player display will show total coins in left coin chute.

2nd. player display will show total coins in right coin chute.

3rd. player display will show total coins in central coin chute.

4th. player display will show total plays.
Max. score display will show total replays.
Same data can be obtained using special print-out unit.
For this purpose, it will be necessary to connect the print-out to the special connector placed inside the cabinet on the right hand side.
Press « Stampa » button on the printer.
All displays and lamps will be turned off and a coupon will be printed as the sample below:

```
FUTURE WORLD
SERIAL N. 000
WINNED G 000006
PLAYED G 000013
COINS 1 000003
COINS 2 000002
COINS 3 000000
```

At the end of the printing the machine is ready for a new game.


## IV. GAME ADJUSTMENT

Once the machine has been set up, it is ready to play.
It is, however, advisable to carry out a general inspection in order to make sure that all parts work correctly.
For this purpose there is a « self test » program which is activated each time the « SELF TEST/METER/PROGRAMMING » button is pressed.


## TEST THEORY OF OPERATION

1. Press button once.
« Match » display will show test number (01).
This test verifies book-keeping functions as in chapter III.

2. Press button again.
« Match » display will show test number (02). This test checks all displays.

Automatically the digit displays will go from 0, 1, 2 etc. to 9 and repeat continuously. Use this test to check if some digit segments have been damaged.

3. Press button again.
« Match » display will show test number (03). This test checks that all contacts are correct.
For this purpose it will be necessary to manually close all playfield contacts and those of the cabinet one at the time. Refer to the following list to check that the closed contact number is on « Credit » display.
Each time the contact is closed a power up tune will be played by the loud-speaker.

### CABINET CONTACT LIST

00 meter display button
01 Plumb bob tilt « Roll ball »
02 Shock proof tilt, « Slam tilt »
03 « Credit » button
04 Coin chute 1 (left hand side)
05 Coin chute 2 (right hand side)
06 Coin chute 3 (Centre)

### PLAYFIELD - CONTACT LIST

16 Outhole
17. Left kicker switch
18. Right kicker switch
19. Bottom inside right hand rollover
20. Bottom outside right hand rollover
21. Bottom inside left hand rollover
22. Bottom outside left hand rollover.
23. Left channel button.
24. Left channel button.
25. Left channel button.
26. Left channel button.
27. Left channel button.
28. Left channel button.
29. Moving target.
30. Moving target
31. Moving target.
32. Moving target

33. Moving target
34. Moving target.
35. Center left hand contact.
36. Side hole
37. Right hand canal.
38. Center right hand contact.
39. Center bumper.
40. Top left hand bumper.
41. Top right hand bumper.
42. Top right hand target.
43. Top right hand target.
44. Top right hand target.
45. Top hole
46. Top left hand contact.

4. Press button again.
« Match » display will show test number. (04).
This test checks that all pilot lamps are working properly.
All lamps except those fix will flash ON and OFF about 3 times per second.

5. Press button again.
« Match » display will show test number. (05).
This test checks all solenoids.
These are activated in sequences from 1 to 20 and corresponding number will be

shown on « Credit » display.
4 tunes (sounds) correspond to number 21, 22, 23, and 24.


## LIST OF SOLENOIDS (table 4)

01 Left kicker
02 spare
03 spare
04 coin lockout
05 spare
06 right kicker
07 central bumper
08 left bumper
09 right bumper
10 top hole
11 out hole
12 knocker
13 target bench
14 side hole
15 spare
16 spare
17 spare
18 spare
19 spare
20. Flipper relay
21. Sounds - Tune 1 (sharp)
22. Sounds - Tune 2
23. Sounds - Tune 3
24. Sounds - Tune 4 (low)


At this point all the functional tests are finisced. Press again SELF TEST/METER/ PROGRAMMING BUTTON to set the machine for a new game.

## V. PROGRAMMING

Games are factory programmed according to their destination.
Programming elements may however be changed following procedures below.
It is assumed that such procedures will be left to the technicians.
Wrong programming could be the cause of malfunction.
To verify or to change programming proceed as follows:

1. Open light board with game-up.

2. Press « PROGRAMMING ENABLE » button on the upper left hand side of CPU circuit.

3. Close light board without turning power off.

4. Press « SELF TEST/METER/PROGRAMMING » button in coin chute.
« Match » display will show test number (06). The number of balls per game can be programmed.
Display « credit » will show the programmed number.

To change program use « Credit » button.
5. Press self test button.
« Match » display will show present test number (07).
« Match » can be programmed. Such possibility can be includer or excluded by pressing « Credit » button.
CREDIT DISPLAY
— 00 excluded match.
— 01 included match

6. Press « self test » button again.
« Match » display will show test number (08). Now the type of wins upon reaching winning score can be programmed.
(With matches excluded, the number of credits is not increased but book-keeping function meters are equally up-dated).
Pressing « Credit » button, the following possibilities are available:


CREDIT DISPLAY

    — 00 SUPERBONUS
    — 01 ONE REPLAY
    — 02 BONUS BALL


7. Press « self test » button.
« Match » display will show present test number (09).
Max. number of replays can be programmed. « Credit » display shows present programmed number.
By pressing « credit » button programming is changed from 10 to 60.

8. Press « self test » button.
« Match » display will show the present test number (10).
Now it is possible to program the type of win awarded upon exceeding maximum score.
« Credit » button shows present programmed number.
Press « credit » button to change programming from 0 to 3.


— Display credit = 00 SUPERBONUS
— Display credit = 01, 1 replay
— Display credit = 02, 2 replays
— Display credit = 03, 3 replays.

9. Press « self test » button.
Match display will show test number (11).
The « weight » value of the coins accepted by coin chute 1 can be programmed (see table 1).
« Credit » display will show the present programmed value which can be changed by pressing « credit » button from 0 to 15.

10. Press « self test » button.
« Match » display will show number of test (12).
Number of additional credits can be programmed by introducing the con into coin chute n° 1 (see figure 1). Go on as shown at point 9, to change programming from 0 to 15.

11. Press « self test » button.

« Match » display will show the test number (13).

The « weight » (value) of the coins accepted by coin chute 2 can be programmed (see figure 1). Go an as shown at point 9 to change programming from 0 to 15.

12. Press « self test » button.

« Match » display will show test number (14).

Number for additional credits can be programmed by introducing the coin in coin chute n° 2. Go on as shown at point 9.

13. Press « self test » button.

« Match » display will show test number (15).

The « weight » (value) of the coins accepted by coin chute 3 can be programmed. Go on as shown at point 9.

14. Press « self test » button.

« Match » display will show test number (16).

The number of additional credits can be programmed by introducing the coin into coin chute n° 3. Go on as shown at point 9.

(see chapter VII: programming examples).

15. Press « self test » button.

« Match » display will show test number (17). Programming 1st. game variation. By operating on the « credit » button, it is possible to select one of the following two possibilities:

Display credit = 00 Regular game for 5 balls.

Display credit = 01 the game starts with the first row of lit lamps for 3 balls.

16. Press « self-test » again.

« Match » display will show test number (18). It is possible to program the second game variation. By operating the credit button, it is possible to select one of the following possibilities:

— Display credit = 00 when hitting lit special a SUPERBONUS.

— Display credit = 01 when hitting lit special a REPLAY.

— Display credit = 02 when hitting lit special a BONUS BALL.

— Display credit = 03 when hitting lit special 50,000 points.

17. Press « self-test » button again.

« Match » display will show test number (19).

18. Press « self test » button.

« Match » display will show test number (20).

19. Press the « self-test » button.

« Match » display will show test number (21).

It is possible to program the performance of melodies by pushing the credit button.

— Display credit = 00 melodies excluded

— Display credit = 01 melodies included

20. Press « self test » button.

« Match » display will show test number (22). On the « Highest score » display the maximum score obtained is reported. Push the credit button if zero setting is desired.

21. Press « self test » button.

« Match » display will show test number (23).
« Credit » display shows 1st. winning score (hundreds of thousands and tens of thousands). To change in acton « credit » button until the new whished score has been reached.

22. Press « self test » button.
« Match » display will show test number (24).
« Credit » display shows second winning score (sse point 21).

23. Press « self test » button.
« Match » display will show test number (25).
« Credit » displays shows third winning score (see point 21).

24. Press « self test » button.
Display shows book-keeping functions (see chapter III).
To clear meters press « credit » button.

Press « self-test » button again.
The machine is now ready to play.

## VI. ROUTINE MAINTENANCE ON LOACTION

The purpose of this chapter is to give a general line to follow, so as to maintain the machine in proper operation.
The operations shown have to be carried out each time one operates on the machine, even when on power-up.

1. Follow first 5 tests as shown in chapter IV to check the correct operation of each flipper component.

2. Carefully check that securing screws of electronic boards do not work loose. Same
— Check bumpers the rod.

3. Playfield (upper side)
— Check and, if necessary, tigthen the screws of the rubber post.
— Check the conditions of the rubber rings and, if necessary, change them. (remember to check the adjustment of contacts each time the rubber rings are replaced).
— Carefully clean playfield. Do no use highly caustic cleaners.

4. Playfield (lower part).
— Check flipper assembly (tie rod, pin joints and contacts)
— Check bumpers tie rod.
— Check contact adjustments.
— Check wiring harness to avoid tractions on the wires and obstacles to the moving parts.

5. Check and adjust tilt sensitivity.
Remember: an effective periodic maintenance greatly improves flipper life time and avoids the possibility of damages.

## VII. GENERAL INFORMATION

The purpose of this instruction Manual is to help operators perform several simple procedures such as installation, maintenance, and game adjustments.
For more complicated problems more detailed procedures are available in the

Technical Instruction Manual.


## COINS/CREDITS PROGRAMMING EXAMPLES

This game can be programmed for whatever combination of coins and credits. one has only to take into account the following data:
— The weight (value) of the coins can range from 0 to 15.
— The number of credits relevant to each coin can be changed from 0 to 15.
— Possible ratios of coin values:
    a) 1-2-5 or
    b) 2-5-10 or
    c) 5-10-15 or has to be adapted to such ratio

Example n° 1:
1 DM = 2 credits
2 DM = 5 credits (1 x 2 DM or 2 x 1 DM)
5 DM = 14 credits (1 x 5 DM or 2 x 2 + 1 DM or 3 x 1 DM + 2 DM or 5 x 1 DM).

Programming:
                Test 11 = 1
                Test 12 = 2
                Test 13 = 2
                Test 14 = 5
                Test 15 = 5
                Test 16 = 14

In this case the coin chute n° 1 shall accept 1 DM coins and coin chute n° 2 shall accept 2 DM coins.
Coins chute n° 3, shall accept 5 DM coins.

Example n° 2:
1 FR = 1 credit
2 FR = 3 credits (2 x 1 FR) (1 creit allowance)

Programming:
                Test 11 = 1
                Test 12 = 1
                Test 13 = 2
                Test 14 = 3
                Test 15 = 4
                Test 16 = 6

In this case coin chute n° 1 shall accept 1 FR coins. Coin chutes n° 2 and n° 3 are not provided.

Example n° 3:
1 FR = 0 credits
2 FR = 1 credit (2 x 1 FR)
5 FR = 3 credits (5 x 1 FR) (1 credit allowance).

Programming:
                Test 11 = 1
                Test 12 = 0
                Test 13 = 2
                Test 14 = 1

Test 15 = 5
Test 16 = 3

It has to be pointed out that in this case coin chute n° 1 has to accept 1 FR coins and coin chutes n° 2 and n° 3 cannot be installed.

Example n° 4:
5 P = 1 credit (1 x 5 P)
10 P = 2 credits (2 x 5 P or 1 x 10 P)

Programming:

Test 11 = 5 or 1
Test 12 = 1 or 1
Test 13 = 10 or 2
Test 14 = 2 or 2
Test 15 = 15 or 3

In this case the coin chute n° 1 shall accept 5 P coins - coin chute n° 2 shall accept 10 P coins.

**VERY IMPORTANT:** Position from 11 to 16 have always to be programmed regardless the number of installed coin chutes.

Interface board
Feeder board

CPU board

3rd Player
display

Ball to play
match-display
Credit display

4th Player
display

Transformer
« knocker »
« Roll ball » tilt

Credit button

« Self test »
button

Slam tilt
Plumb bob tilt
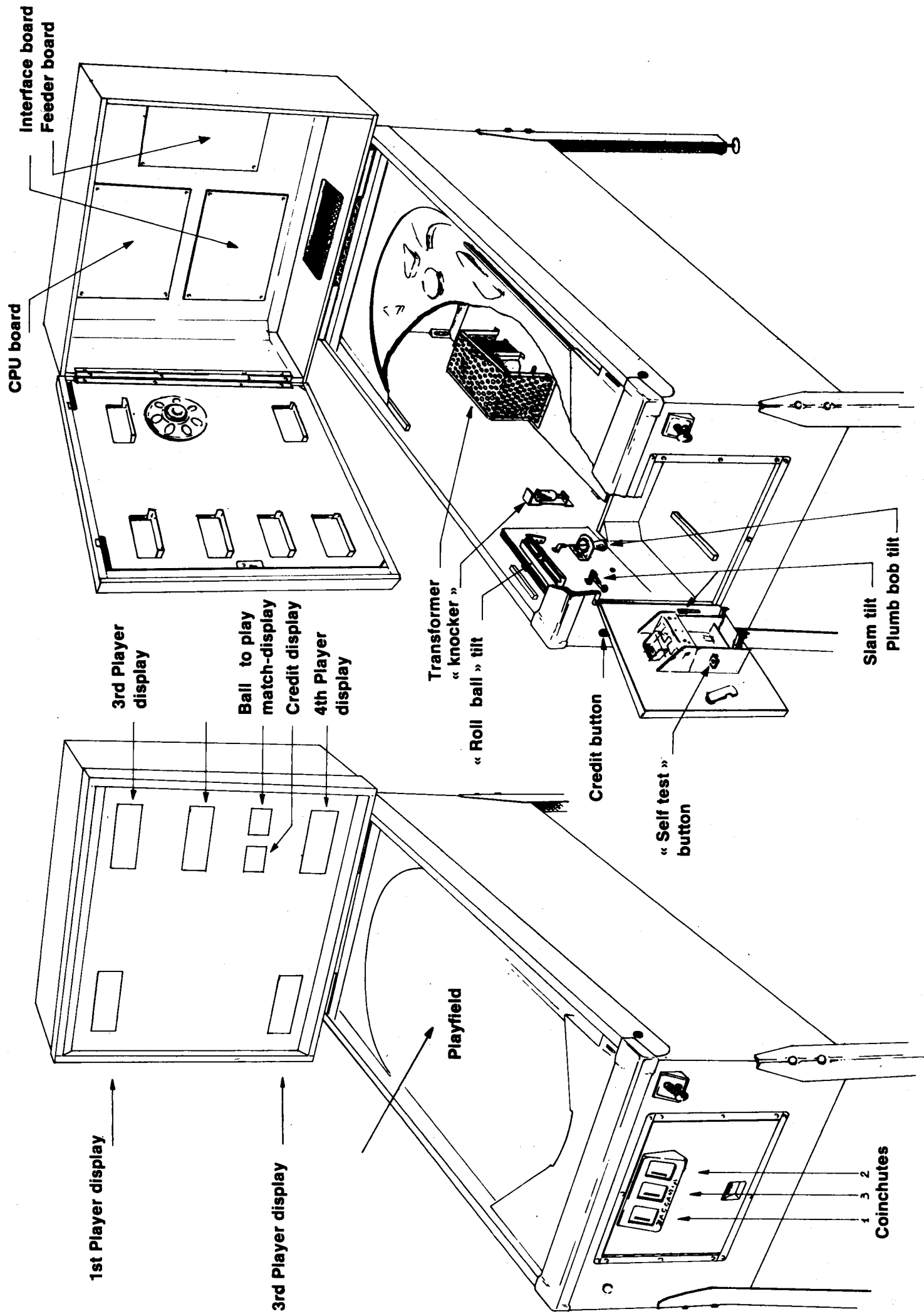
1st Player display

3rd Player display

Playfield

Coinchutes

1   3   2

# CONTACT ARRANGEMENT



## TABLE 2

### CABINET CONTACT LIST

00 Selftest/meter/programming (button)
01 Plumb bob tilt « ROLL BALL »
02 Slam tilt
03 Credit button
04 coin chute 1 (left side)
05 coin chute 2 (right side)
06 coin chute 3 (centre)

### PLAYFIELD - CONTACT LIST

16 Outhole
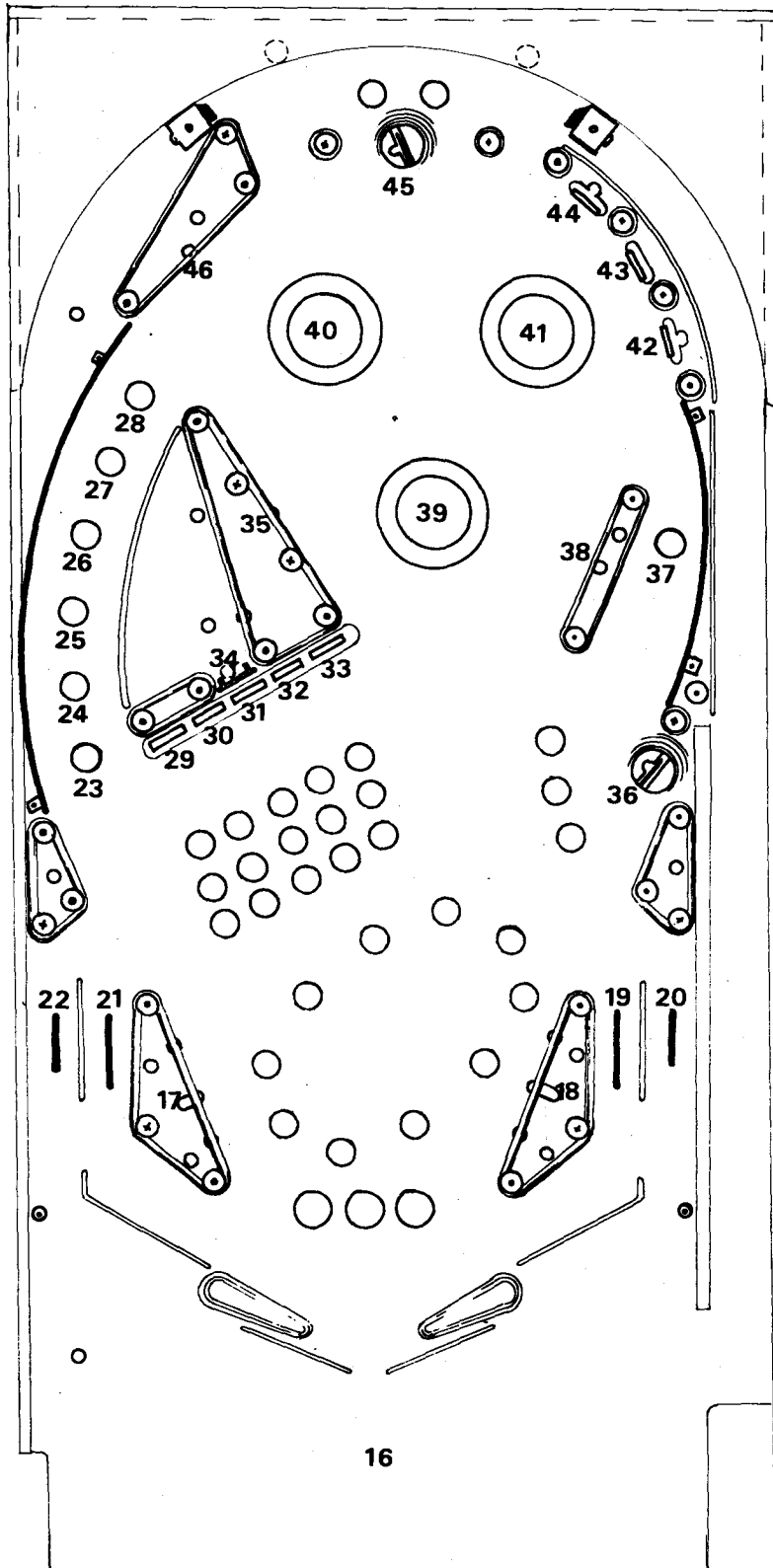17. Left kicker switch
18 Right kicker switch
19. Bottom inside right hand rollover
20 Bottom outside right hand rollover
21 Bottom inside left hand rollover
22 Bottom outside left hand rollover
23 Left channel button
24 Left channel button
25 Left channel button
26 Left channel button
27 Left channel button
28 Left channel button
29 Moving target
30 Moving target
31 Moving target
32 Moving target
33 Moving target
34 Special target
35 Center left hand contact
36 Side hole
37 Right hand canal
38 Center right hand contact
39 Center bumper
40 Top left hand bumper
41 Top right hand bumper
42 Top right hand target
43 Top right hand target
44 Top right hand target
45 Top hole
46 Top left hand contact

## LAMP ARRANGEMENT

### TABLE 3

+ 01 Bonus ball
02 Left channel button
03 Left channel button
04 Left channel button
05 Left channel button
06 Left channel button
+ 07 Game over
+ 08 Match
  10 Special
  11 Bumpers
  13 credit
  14 target table lamp
  15 « W » lamp
  16 « O » lamp
  17 target table lamp
  18 target table lamp
+ 19 superbonus
+ 20 superbonus
  21 « R » lamp
  22 « L » lamp
+ 23 Ball to play
  24 Left channel button
  25 Mistery score
  26 Bonus ball
  27 Centre hole
  28 target table lamp
  29 bonus x 2
  30 bonus x 3
  31 bonus x 5
  33 bonus 1,000
  34 bonus 2,000
  35 bonus 3,000
  36 bonus 4,000
  37 bonus 5,000
  38 bonus 6,000
  39 bonus 7,000
 .40 bonus 8,000
  41 bonus 9,000
  42 bonus 10,000
  44 « D » lamp
  45 target table lamp
+ 47 player in game « 1 »
+ 48 player in game « 2 »
+ 49 player in game « 3 »
+ 50 player in game « 4 »
+ 51 tilt
  52 left top hole x 2
  53 target table lamp
  54 right top hole x 3

57 target table lamp
58 target table lamp
59 target table lamp
+ 60 players « 1 »

+ Lamps in light board
++ In light board as well

## SOLENOID LIST
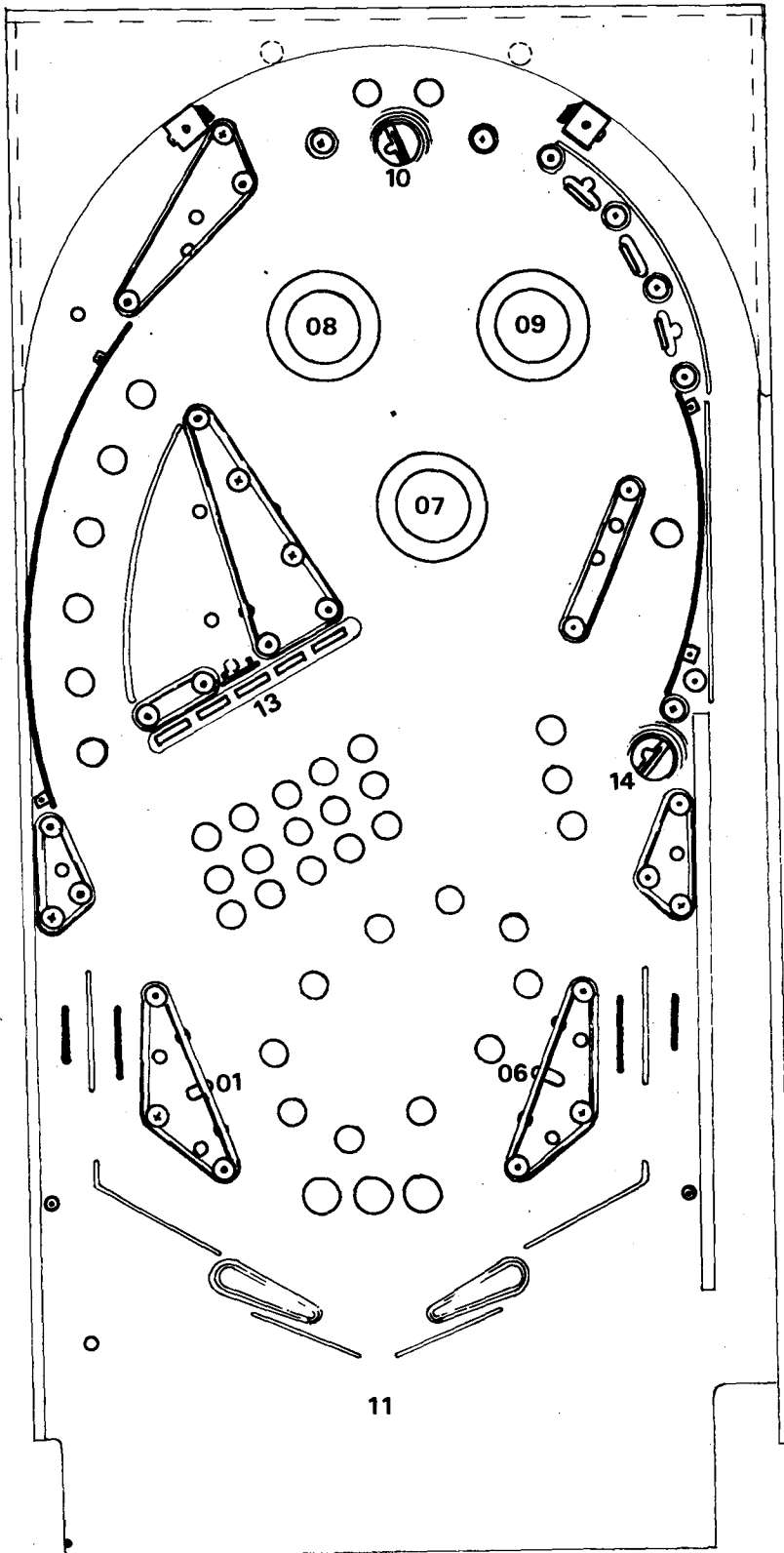


### TABLE 4

01 left kicker
03 spare
04 coin lockout
05 spare
06 right kicker
07 central bumper
08 left bumper
09 right bumper
10 top hole
11 out hole
12 knocker (in the box)
13 target table
14 side hole
15 spare
16 spare
17 spare
18 spare
19 spare
20 flipper relay

# PART II

# TECHNICAL INSTRUCTION

# BLOCK DIAGRAM

**Display 1**

+ 200 V.d.c.
+ 50 V.d.c.
+ 10,5 V.d.c.
+ 7,5 V.d.c.
+ 5 V.d.c.

**N from tranformer**

**Display 2**

+ 12 V.d.c.

− 5 V.d.c.

**Display 3**

**CPU board**

**Display 4**

| CLOCK GEN. | PROCESSOR | 5 K PROM. |

REAL TIME CLOCK GEN.

**Display 5**

rows

**REFRESH LOGIC**

5 K R.A.M.

1/0

**Display 6**

columns

contacts

**Interface board**

**Decode logic**

64 SCR

20 darlington

**To lamps**

**To solenoids**
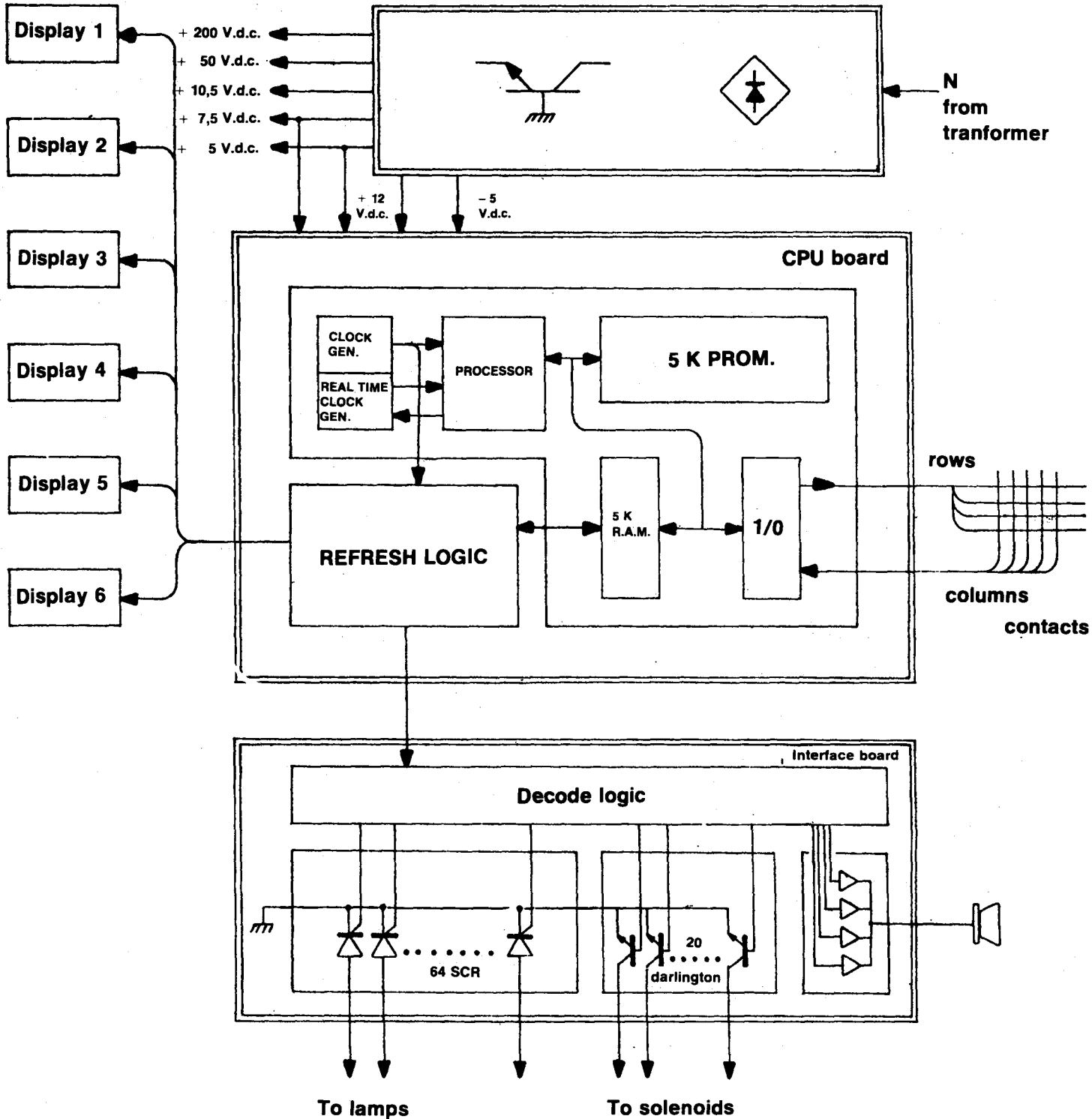
# I. TROUBLESHOOTING

## LAMPS (insert test number 04)

| POSITION | FIXED LAMPS | CONTROLLED LAMPS | |
|---|---|---|---|
| | | ONE OR MORE LAMPS | ALL LAMPS |
| ALWAYS OFF | 1. Check fuse F3 on the feeder.<br><br>2. Check for 7.5 Vac on feeder.<br><br>3. Check for 7.5 Vac on feeder CN1 connector.<br><br>4. Check mains fuse (near the transformer). | 1. Check the lamp.<br><br>2. Check connections.<br><br>3. Connect lamp exit wire from interface board. If the lamp is lit, replace the board. | 1. Check fuse F3 on the feeder.<br><br>2. Check for + 7.5 VRM voltage on the feeder.<br>3. Replace interface board. |
| ALWAYS ON | NORMAL | 1. Check connections to find short circuits.<br><br>2. Replace interface board. | 1. Replace interface board. |
| GLOWS DIM | 1. Check for 7.5 Vac on feeder.<br><br>2. Check for mains voltage and tranformer connection. | 1. Check for + 7.5 VRM voltage on feeder.<br><br>2. Check for mains voltage and connection of the transformer. | |

**DISPLAY: (insert test number 02)**

| POSITION | ONE DISPLAY | ALL DISPLAYS |
|---|---|---|
| **OFF** | 1. Check connections and flat-cable connections.<br><br>2. Check for + 5 Vdc + 170 Vdc on display board.<br><br>3. Replace display. | 1. Check fuse F1.<br><br>2 Check for + 5 Vdc + 170 Vdc on feeder board.<br><br>3. Replace CPU board. |
| **INCORRECT DISPLAYS** | 1. Check connections and flat-cable connections.<br><br>2. Replace display. | 1. Check connections of the CPU board output flat-cable.<br><br>2. Replace CPU board. |
| **GLOWS DIM OR EXCESSIVE** | 1. Check for + 170 Vdc on feeder and if it is not possible to adjist it, replace the feeder board. | |

## SOLENOIDS (insert test n° 05)

| POSITION | ONE OR MORE | ALL |
|---|---|---|
| **NEVER ACTUATED** | 1. Check connection.<br><br>2. Check fuse F2 on the feeder.<br><br>3. Check for + 50 VRM on the feeder.<br><br>4. Check for 43 Vac voltage on CN1 connector on the feeder.<br><br>5. Ground for one second the output wire of the interface board solenoid.<br>If the solenoid is activated replace the board. | 1. Check fuse F2 on the feeder.<br><br>2. Check for + 50 VRM on feeder.<br><br>3. Check for 43 Vac voltage on connector CN1 of the feeder.<br><br>4. Replace the interface board. |
| **ALWAYS ACTUATED** | 1. Check connections to single out possible short circuits.<br><br>2. Replace the interface board. | 1. Replace the interface board. |
| **INSUFFI-CIENTLY ACTIVATED** | 1. Check connections.<br><br>2. Ground for a moment the output wire of the interface board.<br>If the solenoid is regualarly activated, replace the board. | 1. Check for + 50 VRM on the feeder.<br><br>2. Check for 43 Vac voltage on the feeder connector.<br><br>3. Replace the feeder. |

## CONTACTS (insert test 03)

| POSITION | ONE OR MORE CONTACTS | ALL CONTACTS |
|---|---|---|
| INOPERATIVE | 1. Check that the contact is normally open (be careful when contacts are in parallel).<br><br>2. Check operation by directly bridge connecting the input wires on the contact.<br><br>2.A. If in this way the contact is activated, replace the diode and make sure that there are no short circuits.<br><br>2.B. If the contact is not yet activated, check the connection up to connectors CN8 or CN9.<br><br>3. Insulate the contact wires and make sure that there are no short circuits with other wires.<br><br>4. Replace CPU board. | 1. Replace CPU board. |

## III. CONNECTOR CARD FOR « FUTURE WORLD »

## INPUT / OUTPUT POSITION ON THE CONNECTORS

## FEEDER BOARD

| CONNECTOR | PIN | WIRE COLOUR | SIGNAL |
|---|---|---|---|
| CN1 | 1 | Red | 165 Vac 0.2 A |
| » | 2 | Red | 165 Vac 0.2 A |
| » | 3 | Blue | 43 Vac 10 A |
| » | 4 | Blue | 43 Vac 10 A |
| » | 5 | White | 7.5 Vac 15 A |
| » | 6 | Green | 7.5 Vac 15 A |
| » | 7 | Yellow | 10.5 Vac 3 A |
| » | 8 | Yellow | 10.5 Vac 3 A |
| » | 9 | Brown | 10.5 Vac 0.5 A |
| » | 10 | brown | 10.5 Vac 0.5 A |
| » | 11 | Black | 17 Vac 0.5 A |
| » | 12 | Black | 17 Vac 0.5 A |
| » | 13 | White | 7.5 Vac 15 A |
| » | 14 | Green | 7.5 Vac 15 A |
| CN2 | 1 | White-black | GND |
| » | 2 | — | |
| » | 3 | Blue-green | 7.5 Vac cabinet fixed lamps |
| » | 4 | Brown-red | 7.5 Vac cabinet fixed lamps |
| » | 5 | — | |
| » | 6 | Light blue-red | +50 VRM common for all the solenoids in the cabinet |
| » | 7 | Brown-yellow | |
| » | 8 | Blue-white | CABINET-PLAYFIELD INTERCONNECTIONS |
| CN3 | 1 | Green-yellow | FOR FLIPPER CONTROL |
| » | 2 | Brown-yellow | |
| » | 3 | Blue | 7.5 Vac cabinet fixed lamps |
| » | 4 | Yellow | 7.5 Vac cabinet fixed lamps |
| » | 5 | Brown-green | + 7.5 VRM common for all controlled playfield lamps |
| » | 6 | Violet-white | +50 VRM common for playfield solenoids |
| CN4 | 1 | Blue | 7.5 Vac light board fixed lamps |
| » | 2 | Yellow | 7.5 Vac light board fixed lamps |
| » | 3 | Red-White | +7.5 VRM common light board controlled lamps |
| » | 4 | Light blue-violet | +12 VRM common for loudspeaker |

| CONNECTOR | PIN | WIRE COLOUR | SIGNAL |
|---|---|---|---|
| CN5 | 1 | Black | GND |
| » | 2 | Red | +   5 Vdc |
| CN6 | 1 | White | −   5 Vdc |
| » | 2 | Blue | +   5 Vdc |
| » | 3 | Red | + 12 Vdc |
| » | 4 | Green | + 7.5 VRM |
| » | 5 | Black | GND |
| » | 6 | Yellow | +170 Vdc |

## CPU BOARD

| CONNECTOR | PIN | WIRE COLOUR | SIGNAL |
|---|---|---|---|
| CN7 | 1 | Yellow | +170 Vdc |
| » | 2 | Black | GND |
| » | 3 | Green | + 7.5 VRM |
| » | 4 | Red | + 12 VRM |
| » | 5 | Blue | +   5 Vdc |
| » | 6 | White | −   5 Vdc |
| CN8 | 1 | White-grey | Printer - RX+ |
| » | 2 | Yellow-grey | Printer - RX− |
| » | 3 | White-black | Printer - TX− |
| » | 4 | Brown-grey | Printer - TX+ |
| » | 5 | — | |
| » | 6 | White | Contacts - line 0 |
| » | 7 | — | |
| » | 8 | — | |
| » | 9 | — | |
| » | 10 | Green-blue | Contacts - column 0 |
| » | 11 | Yellow-green | Contacts - column 1 |
| » | 12 | Orange-white | Contacts - column 2 |
| » | 13 | Brown-orange | Contacts - column 3 |
| » | 14 | Black-violet | Contacts - column 4 |
| » | 15 | Green-violet | Contacts - column 5 |
| » | 16 | — | |
| » | 17 | Pink-white | Contacts - column 6 |
| » | 18 | Orange-yellow | Contacts - column 7 |

| CONNECTOR | PIN | WIRE COLOUR | SIGNAL |
|---|---|---|---|
| CN9 | 1 | — | |
| » | 2 | — | |
| » | 3 | Red | Contacts - line 2 |
| » | 4 | Yellow | Contacts - line 3 |
| » | 5 | Black | Contacts - line 4 |
| » | 6 | Green | Contacts - line 5 |
| » | 7 | — | |
| » | 8 | — | |
| » | 9 | — | |
| » | 10 | Grey-white | Contacts - column 0 |
| » | 11 | Black-white | Contacts - column 1 |
| » | 12 | Red-green | Contacts - column 2 |
| » | | | |
| » | 13 | Black-yellow | Contacts - column 3 |
| » | 14 | Black-orange | Contacts - column 4 |
| » | 15 | Red-Yellow | Contacts - column 5 |
| » | 16 | Brown-violet | Contacts - column 6 |
| » | 17 | Yellow-violet | Contacts - column 7 |
| » | 18 | □ | |

## INTERFACE BOARD

| CONNECTOR | PIN | WIRE COLOUR | SIGNAL |
|---|---|---|---|
| CN13 | 1 | — | |
| » | 2 | □ | |
| » | 3 | Orange-Light blue | coin lockout |
| » | 4 | — | |
| » | 5 | — | |
| » | 6 | — | |
| » | 7 | Green-grey | knocker |
| CN14 | 1 | Blue-green | left flap (left kicker) |
| » | 2 | Yellow-green | right flap (right kicker) |
| » | 3 | Green-white | Left bumper |
| » | 4 | Brown-white | outhole |
| » | 5 | Orange-white | right bumper |
| » | 6 | Red-green | centre bumper |
| » | 7 | Orange-yellow | top hole |
| » | 8 | — | |
| » | 9 | White-black | side hole |
| » | 10 | Black-green | target field |
| » | 11 | — | |
| » | 12 | Brown-green | flipper relays |

| CONNECTOR | PIN | WIRE COLOUR | SIGNAL |
|---|---|---|---|
| CN15 | 1 | — | |
| » | 2 | — | |
| » | 3 | Violet-green | left canal lamp |
| » | 4 | □ | |
| » | 5 | Orange-white | left canal lamp |
| » | 6 | Orange | left canal lamp |
| » | 7 | Brown-yellow | left canal lamp |
| CN16 | 1 | Orange-violet | left canal lamp |
| » | 2 | — | |
| » | 3 | Brown-sky-blue | bumpers lamp |
| » | 4 | — | |
| » | 5 | pink-green | special lamp |
| » | 6 | □ | |
| » | 7 | — | |
| » | 8 | — | |
| » | 9 | — | |
| » | 10 | Grey-green | « L » lamp |
| » | 11 | Grey-black | « O » lamp |
| » | 12 | Blue-white | « W » lamp |
| » | 13 | Blue | lamp (double bonus lamp) |
| » | 14 | Yellow-green | credit lamp |
| » | 15 | White | bonus x 5 lamp |
| » | 16 | Orange-green | bonus x 2 lamp |
| » | 17 | Red-white | left canal lamp |
| » | 18 | Black-red | target field lamp |
| CN17 | 1 | Green-white | target field lamp |
| » | 2 | — | |
| » | 3 | — | |
| » | 4 | Blue-green | « Mistery Score » lamp |
| » | 5 | Pink-white | bonus ball lamp |
| » | 6 | Pink | bonus x 3 lamp |
| » | 7 | Red-violet | bonus 7 lamp |
| » | 8 | □ | |
| » | 9 | Violet-white | bonus 1 lamp |
| » | 10 | Brown-grey | bonus 6 lamp |
| » | 11 | Yellow-grey | bonus 2 lamp |
| » | 12 | Pink-brown | target field lamp |
| » | 13 | Pink-yellow | target field lamp |
| » | 14 | Blue-grey | target field lamp |
| » | 15 | Yellow-blue | bonus 9 lamp |
| » | 16 | Black-blue | bonus 10 lamp |
| » | 17 | Pink-blue | « D » lamp (arrow 5 lamp) |
| » | 18 | Red-grey | bonus 8 lamp |

| CONNECTOR | PIN | WIRE COLOUR | SIGNAL |
|-----------|-----|-------------|--------|
| CN18 | 1 | Orange-grey | target field lamp |
| » | 2 | Blue-violet | Bonus 5 lamp |
| » | 3 | Violet | top hole  x 2 lamp |
| » | 4 | Brown-green | bonus 4 lamp |
| » | 5 | Brown | target field lamp |
| » | 6 | Brown-blue | Bonus 3 lamp |
| » | 7 | — | |
| » | 8 | Violet-black | 20,000 point lamp |
| » | 9 | Green-black | « R » lamp |
| » | 10 | □ | |
| » | 11 | — | |
| » | 12 | Orange-yellow | target field lamp |
| » | 13 | Yellow-white | top hole x 3 lamp |
| » | 14 | — | |
| » | 15 | — | |
| » | 16 | Green-yellow | target field lamp |
| » | 17 | — | |
| » | 18 | — | |
| CN19 | 1 | — | |
| » | 2 | Black-red | loud speaker |
| » | 3 | light blue | bonus ball lamp |
| » | 4 | — | |
| » | 5 | — | |
| » | 6 | — | |
| » | 7 | — | |
| » | 8 | — | |
| » | 9 | Blue-white | player 1 up lamp |
| » | 10 | Red-yellow | ball to play lamp |
| » | 11 | — | |
| » | 12 | □ | |
| » | 13 | Black-grey | super bonus lamp |
| » | 14 | Black-white | super bonus lamp |
| » | 15 | — | |
| » | 16 | White | can play 4 lamp |
| » | 17 | Blue-pink | game over lamp |

| CONNECTOR | PIN | WIRE COLOUR | SIGNAL |
|---|---|---|---|
| CN20 | 1 | — | |
| » | 2 | Black-orange | player 3 up lamp |
| » | 3 | Violet-white | match lamp |
| » | 4 | Black-green | tilt lamp |
| » | 5 | — | |
| » | 6 | Black-yellow | player 2 up lamp |
| » | 7 | — | |
| » | 8 | — | |
| » | 9 | yellow | can play 2 lamp |
| » | 10 | — | |
| » | 11 | Green-white | player 4 up lamp |
| » | 12 | — | |
| » | 13 | — | |
| » | 14 | □ | |
| » | 15 | Green | can play 1 lamp |
| » | 16 | Red | Can play 3 lamp |
| » | 17 | — | |
| » | 18 | — | |

# DISPLAY DRIVER BOARD

Display 1
Display 2
Display 3
Display 4
Display 5
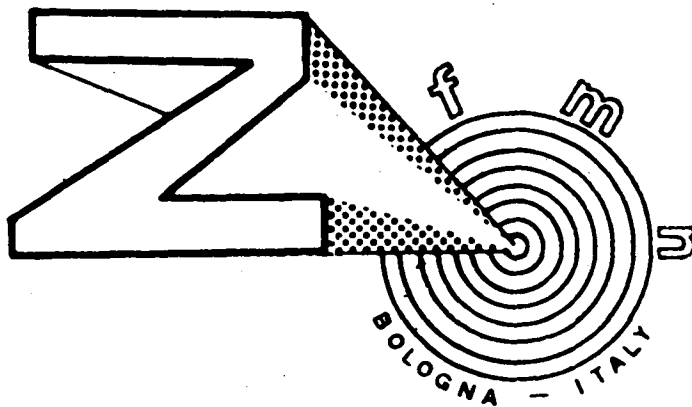Display 6
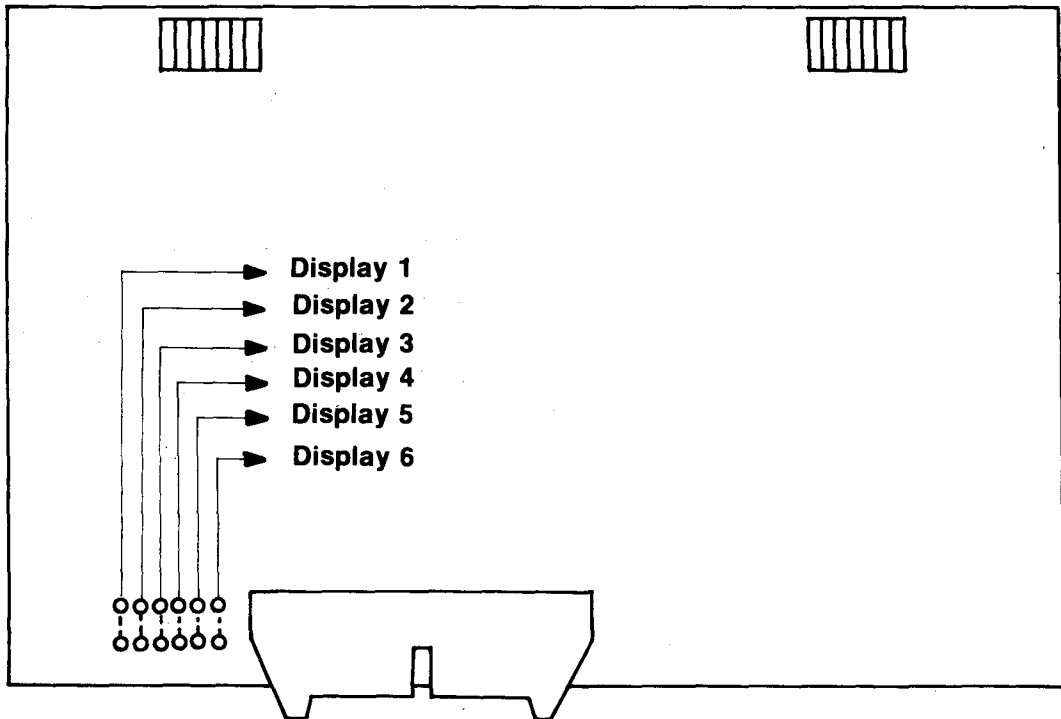
LINKERS:

DISPLAY 1 = 1st PLAYER DISPLAY
DISPLAY 2 = 2nd PLAYER DISPLAY
DISPLAY 3 = 3rd PLAYER DISPLAY
DISPLAY 4 = 3rd PLAYER DISPLAY
DISPLAY 5 = HIGHEST SCORE DISPLAY
DISPLAY 6 = BALL TO PLAY / CREDIT DISPLAY


THE « DRIVER DISPLAY BOARD » IS VALID FOR ALL THE DISPLAYS, AND CAN BY USED BY PLUGGING THE PIN INTO THE DESIRED POSITION (SEE DRAWING).
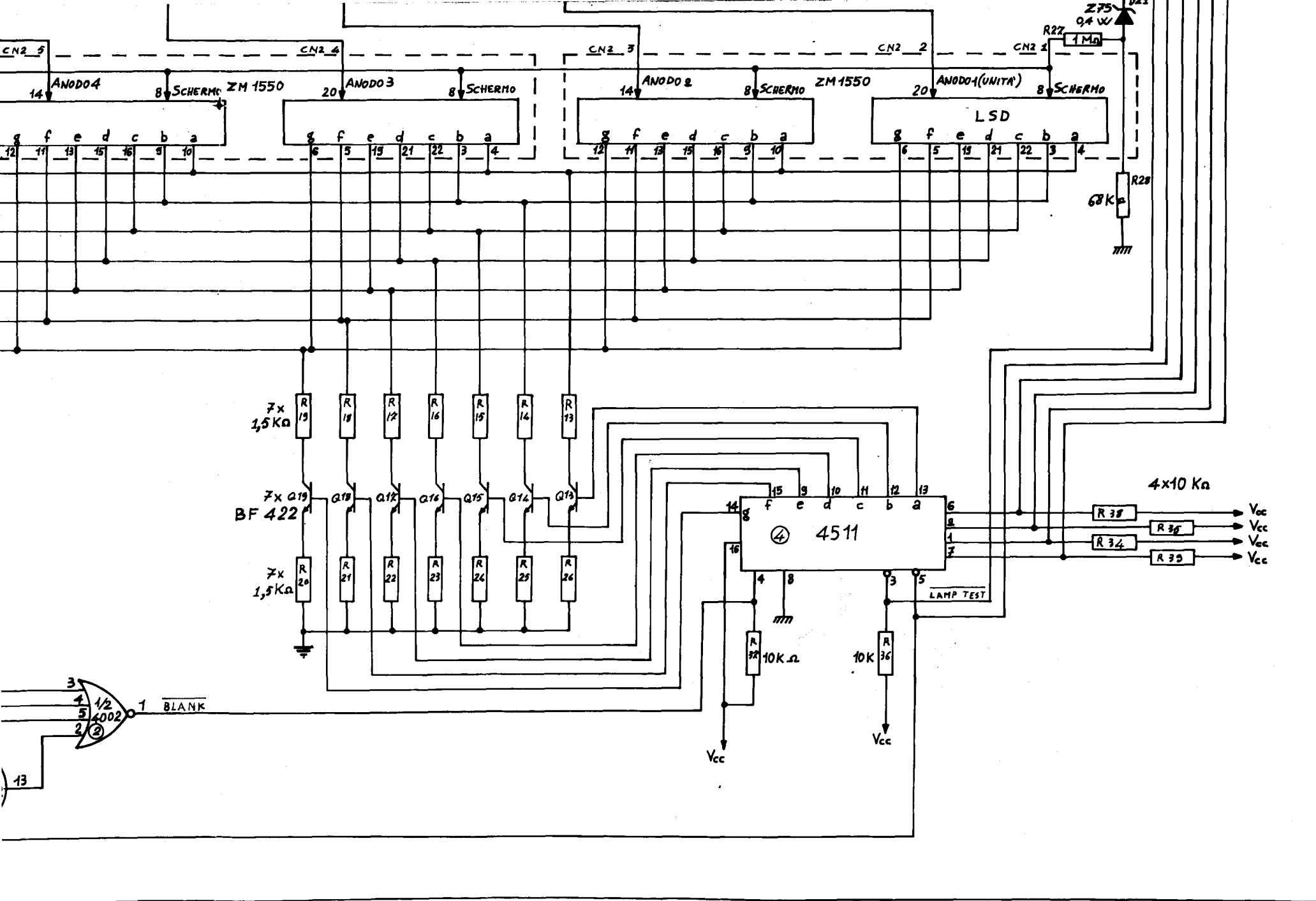
# F.LLI ZACCARIA S.n.c.

### di Zaccaria Marino - Franco - Natale

## COSTRUZIONI GIOCHI D'ATTRAZIONE

Via Armaroli, 15 - 40012 CALDERARA DI RENO (Bo) Italy
Telefono (051) 72.23.81 / 82 con ricerca automatica
Telex 51524 INTERCON

CN2_5  CN2_4  CN2_3  CN2_2  CN2_1

Z75
0,4 W

R27
1 MΩ

14 ANODO4   8 SCHERMO  ZM 1550   20 ANODO3   8 SCHERMO   14 ANODO2  8 SCHERMO  ZM 1550   20 ANODO1(UNITA')  8 SCHERMO

LSD

g f e d c b a    g f e d c b a    g f e d c b a    g f e d c b a

12 11 13 15 16 9 10   6 5 19 21 22 3 4   12 11 13 15 16 9 10   6 5 19 21 22 3 4

R28
68 KΩ

7x
1,5 KΩ   R19  R18  R12  R16  R15  R14  R13

4x10 KΩ

7x  Q19  Q18  Q17  Q16  Q15  Q14  Q13
BF 422

14  g f e d c b a    15 9 10 11 12 13

④ 4511

16   6
R31  R30
R34
R35

Vcc
Vcc
Vcc
Vcc

7x
1,5 KΩ   R20  R21  R22  R23  R24  R25  R26

4   8        3   5
LAMP TEST

R32
10 KΩ    10K  R36

3
4  1/2
5  4002
2  ②   1  BLANK

Vcc        Vcc

13

Schematic (rotated): display decoder / anode driver board

ANODO 3 · ZM 1550 · 8 SCHERMO · ANODO 4 · 8 SCHERMO · ANODO 5 · ZM 1550 · ANODO 6 (CENTRALINO di MISL.) · 8 SCHERMO · MSD

CN2 4 · CN2 5 · CN2 6 · CN2 7 · CN3 2

Diodes: D2, D3, D4, D5, D6 — 1N4003
Transistors: BF 422, BF 423 (Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12)
Resistors: 100 KΩ (R4, R6, R8, R10, R12), 10 KΩ (R3, R5, R7, R9, R11)

D6　1N4003　D5　1N4003　D4　1N4003　D3　1N4003　D2　1N4003

CN2 7　CN2 6　CN2 5　CN2 4

ANODO 6 (CENTINAIA DI MIGL.)　ANODO 5　ANODO 4　ANODO 3

14　8 SCHERMO　ZM 1550　20　8 SCHERMO　14　8 SCHERMO　ZM 1550　20

MSD

g f e d c b a　g f e d c b a　g f e d c b a　g f e d c

12 14 13 15 16 9 10　6 5 19 21 22 3 4　12 14 13 15 16 9 10　6 5 19 21 22

CN3 2 6 5 4 3 2 1

7x 1,5KΩ　R19 R18 R17 R16

7x Q19　BF 422　Q18 Q17 Q16

7x 1,5KΩ　R20 R21 R22 R23

3
4　1/2
5　4002　1　BLANK
2　②

9
11　1/2
12　4002　13
10　②

Dimensioni e scostamenti per le quote libere

# ZACCARIA

COD. 1B 1311/   SCHEMA ELETTRICO   1B1111/0
SCHEDA INTERFACCIA

**Left side — top section (IC 6, 4724):**

R19  CR26  12  CN 16
R20  CR25  11  CN 16
R24  CR27  18  CN 16
R22  CR45  1   CN 17
R55  CR51  16  CN 18 / 13 CN 18
R54  CR35  14  CN 19 / 17 CN 18
R56  CR15  10  CN 20 / 9 CN 18
R21  CR8   10  CN 16
R23  CR42  10  CN 19
R25  CR24  17  CN 16
               4  CN 17

Vcc  16
12
11
10
9
7
⑥ 4724
13  6
14  5
15  4
8

Vcc
R6
519  10
C12
1KpF

**Left side — bottom section (IC 5, 4724):**

R31  CR23  5   CN 17
R30  CR28  8   CN 18
R58  CR50  12  CN 18 / 15 CN 16
R57  CR33  16  CN 16
R28  CR9   6   CN 17
R29  CR46  15  CN 16
R27  CR7   11  CN 19
R26  CR41

Vcc  16
12
11
10
9
7
⑤ 4724
13  6
14  5
15  4
8

Vcc
R5
520  9
C10
1KpF

**Right side — top section (IC 2, 4724):**

R41  CR2   16  CN 20
R40  CR37  7   CN 18 / 16 CN 18
R35  CR36  4   CN 20
R61  CR31  3   CN 18
R42  CR19  5   CN 18
R43  CR36  13  CN 18 / 1 CN 19
R44  CR1   12  CN 20
R45  CR18  5   CN 20 / 11 CN 18
             13  CN 17

Vcc  16
12
11
10
9
7
② 4724
13  6
14  5
15  4
8

Vcc
R2
523  6
C4
1KpF

**Right side — bottom section (IC 1, 4724):**

R48  CR47  1   CN 20 / 16 CN 18
R53  CR34  12  CN 17
R47  CR40  3   CN 19
R46  CR52  6   CN 20
R52  CR17  2   CN 17 / 2 CN 20
R49  CR6   11  CN 20
R51  CR16  3   CN 17
R50  CR10

Vcc  16
12
11
10
9
7
① 4724
13  6
14  5
15  4
8

Vcc
R1
524  5
C2
1KpF

C11  C12  C13  C14  C15  1KpF

Electronic schematic diagram showing four 4724 integrated circuits (labeled 8, 7, 6 on the left and 4, 3, 2 on the right) with 4050 buffers, resistors, and CR diodes connecting to various CN connectors. Labels include "LAMPADE GRUPPI", "LAMPADE SINGOLE", "C103YY", "BRX62", and signal lines S17, S18, S19, S21, S22, S23.