ZACCARIA®



MANUALE D'ISTRUZIONI

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INSTALLATION

ASSEMBLING

Assembling should be done as follows:

1. Bolt legs to the cabinet (use special bolts in coin box).
2. Gently extract electric cable and place in the proper cavity, checking that non-skid knot is there.
3. Remove the elastic strip 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 light board has an automatic coupling that keeps it in a vertical position, to ease the fitting of the 4 bolts with the relevant washers, that can be found in the coin box too.

VISUAL INSPECTIONS

On all games there are certain points that should be always checked after transport.
Same are visual inspections which may be helpful to avoid some time consuming service work later.
Minor damages caused by rough handling during the transport are practically unavoidable.
Cable connectors may be loosened, switches (especially tilt switches) may loose their proper adjustment.
Especially the plumb bob tilt switch should always be adjusted after game is set on location.

1. Check whether cabinet cable is connected to the light board cable.
2. Check for any wires that may have become disconnected.
3. Make sure that the cables do not obstacle the moving parts.
4. Check that all fuses are making good contact.
5. Check whether the transformer is connected for the proper main voltage.
6. Check and adjust the sensitivity of tilt contacts as follows.
   A. Plumb bob tilt switch.
   Adjust the plumb bob tilt length according to the required sensitivity.
   B. Rail tilt and ball.
   Put the ball into the rail and check whether it moves properly and closes the contact when the cabinet is raised.
   C. Shockproof tilt
   There are two:
   The first one near plumb bob tilt, the second one near coin chutes. Adjust contact distance to desired sensitivity.

GENERAL GAME OPERATION

1. Put one the ball into the bottom hole
   Connect voltage and start the game.
2. The «GAME OVER» lamp is lit
3. Check whether the machine accepts properly the coins and increments the relevant credits. Please keep in mind that the machine shall not accept any coins when turned off or if the number of credits has reached the max. programmed amount.
4. If after having started the game the GAME OVER lamp is lit, it is necessary to carry out some control functions, because the data stored in the battery memory, are not valid anymore. If the game has been disconnected for many weeks, this is very likely to happen.
   If on the other hand the machine has been recently used, and the GAME OVER lamp blinks, it is possible that the battery or its reloading circuit are out of order.
   In any case, before starting the machine it is advisable to reprogram it.
5. Act on credit push-button. The «GAME OVER» lamp shall extinguish.
   A. First player lamp shall be lit.
   B. The credits are decreased by one.
   C. «BALLS TO PLAY» lamp shall be lit.
   D. The playfield is ready and the ball is ejected from the hole.
6. Each time the credit push-button is operated, the number of credits is decreased by one and the number of players is updated.
7. The max. number of credits available is four.

ROUTINE MAINTENANCE ON LOCATION

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. Carefully check that securing screws of electronic boards do not work loose as well as all connectors of the plate.
   — Check and if necessary tighten 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 not use highly caustic cleaners.
2. Playfield (lower part).
   — Check flipper assembly (tie rod, pin joints and contacts).
   — Check bumpers.
   — Check contact adjustments.
   — Check wiring harness to avoid stresses on the wires and obstacles to the moving parts.
3. Check and adjust tilt sensitivity.
   Remember: an efficient periodic maintenance greatly improves the pintable lifetime and avoids the possibility of damages.

NOTE

Games are factory programmed, according to the special requirements of their designation. The main programming elements may be changed, however, by following procedures below.
We remind you that these procedures shall be performed EXCLUSIVELY by skilled technicians, because wrong programming could cause malfunctions.

GENERAL TECHNICAL INFORMATION

To avoid that any cause (battery discharged or others) causes the loss of the data stored in RAM C-MOS, and thus the failure of the pintable, the basic program contains some typical programmings (to replace the switches that had been used with the precedent series).
When the microcomputer notes that the programming data of RAM C-MOS do not apply anymore, recall one of the 8 lists of typical programming (see table I).
For the CHOICE OF THE TYPICAL LIST, that will be called in case of necessity, the DIP SWS. 1, 2 and 3 are used, that are mounted on the C.P.U. board (see figure 1).
On the sound board there are 2 trimmers provided for the separate tuning of the max. volume of sounds and talking.
For the final tuning of the loud-speaker volume, both for sound and for talk, there is a potentiometer provided, that is located inside the cabinet on the right side of the door.

To operate on the «TESTS» with the pintable in GAME OVER position, on the door there is an «ADVANCE-RETURN» switch with central rest position (or 2 push-buttons, of which one «ADVANCE» and the other one «RETURN»). By acting on «ADVANCE» at each control the tests progress 1 by 1 from 0 through 37 and then again 0, 1, 2 etc. When pushing again «RETURN», each time the test number is decreased by one (contrary to what happens with «ADVANCE»).
The test number is indicated on the 2 figures of the «BALLS TO PLAY» display (see fig. 2). To leave the test, and return thus to GAME OVER, it is sufficient to stop and then start again the game, or to push ADVANCE or RETURN until the display shows 00.
To clear the «accounting» tests or in any case to amend the programming tests, it is necessary that SW n. 4 on the C.P.U.-board (see fig. 1) points to ON (PROGRAM), and then call the test to be changed, and act on the «CREDIT» push-button. After having cleared or programmed the test, to return in GAME OVER condition and thus to be able to play, call test 00 and then put SW n. 4 in OGG (GAME) position.
If the SW n. 4 has not been reset, and you are still in ON (PROGRAM) condition with the 00 (GAME OVER) test, there will be a buzzing sound and the TILT lamp will be blinking, to inform on the anomalous condition that doesn't allow to use the game.

IMPORTANT:

Please be advised that, as from our pinball mod. PINBALL CHAMP '82 onwards, few instructions must be observed when-ever the battery or RAM 6514 or RAM 5514 are replaced, or if changes to the program written in RAM (coin mechanism programming, ball programming) are made. This is to make sure that the machine accepts the programming:

1) Switch the machine off; remove RAM 6514 or 5514 in position IC 4 from its socket (under the battery on the left).
2) Insert RAM 6514 again; switch the machine on. Whatever programmed on RAM has been completely cancelled through operations 1. and 2.
3) Start programming by setting switch N. 4 in ON position.
4) Set tests N. 6-7-8-9 to zero with START button.
5) All the other tests (from N. 10 to N. 37) must be programmed again completely, although the test concerned is already in position. As an example: when reached position 11, 01 (which corresponds to the programming required) appears. In spite of this, go on with tests 02-03 ect., until coming back to position 01.
6) When the programming is completed, set switch N. 4 in OFF position again.
7) Switch off and on the machine: if GAME OVER lamp is lit everything is OK; if it is flashing repairing is required.

TESTS

Now we are going to analyse the technical performances in a detailed manner, starting with the self-test function, followed by the accounting functions and eventually the various programming functions.

SELF TEST

DISPLAY (Test n1). By this we check optically the proper operation of the display (5 groups of 8 figures each covering a total of 40 figures). The 5 groups are the the following: **1st player display; 2nd player display; 3rd player display; 4th player display; HIGHEST SCORE TO DATE display or DISPLAY CREDIT, TIME BONUS and BALLS TO PLAY.** When this test is entered, all the figures show the same numbers, starting, with «0» that immediately becomes «1» then «2» and so on until «9»; then they restart at «0» and so on.
By acting on CREDIT push-button the 8 figures of each display indicate 8 numbers in continuous succession.
Example: 7 6 5 4 3 2 1 0
8 7 6 5 4 3 2 1

CONTACTS: (Test n. 2). By this test function it is possible to check the proper operation of the 64 INPUT contacts numbered from 00 through 64. When this test is entered, on the 2 figures of the CREDIT display appears the "closed" contact highest in number, and after having opened it, follows the number of the closed contact next in order. If none of the 64 contacts is "closed" no number is indicated. Under these circumstances it is possible to check whether all the contacts work properly, by closing them one by one and making sure that each time the corresponding number appears on the special display provided.
For the numbering of contacts see fig. 4.

LAMPS (Test n. 3). All the «piloted» lamps, that have been divided into two groups, are lit and extinguished alternatively at regular intervals. Check whether there are any lamps that are not operative.

SOLENOIDS (Test n. 4). All the solenoids (coils) are energized in sequence from 1 through 24. The number of the energized solenoid appears on the CREDIT display in that very moment.
NOTE THAT EACH SINGLE PINTABLE MODEL MAY USE ONLY PART OF THE 24 AVAILABLE SOLENOIDS.
In the test all the solenoids are treated in the same way (either used or not), and thus on the CREDIT display the numbers of all the 24 possible solenoids are indicated. Those that are not operative and are missing do not cause any effect (mechanical noise).
The number of employed solenoids is indicated on fig. 6.

SOUND AND TALKING (Test n. 5). This test serves to hear the various sounds and phrases programmed for the model and to check whether they are correct; in the same time on the CREDIT display appears the number of the sound or of the phrase being executed.

ACCOUNTING FUNCTIONS

TIME (Test n. 6). Same contains the accounting data relevant to the time (minutes) of pintable operation (1st player display), to the actual duration of the game (minutes) 2nd player display), the total number of TILT (3rd player display) and to the average duration of games (4th player display). The average duration of games is expressed in minutes, and is determined by the ratio between the play time and the number of games that have been played.
The above accounting functions can be cleared simultaneously, by keeping pressed the CREDIT push-button for about 5 seconds, provided SW 4 n. 4 on the C.P.U. boards is on ON (PROGRAM).

TAKINGS (Test n. 7). The number of coins collected by the first coin chute (on the left side) is indicated on the 1st player display. The number of coins collected by the second coin chute (on the right side) is shown on 2nd player display. The 3rd player display accounts for the number of coins introduced into the third coin chute (the central one). On the 4th player display the number of «service» games is reported, that is those games obtained by pressing the «SERVICE» push-button that is located inside the door on the left side.
NOTE THAT THE «SERVICE» PUSH-BUTTON DOES NOT CHANGE THE NUMBER OF CREDITS, BECAUSE IT ENTERS DIRECTLY FROM 1 THROUGH 4 GAMES, AND ALSO THE ELECTROMECHANICAL COIN COUNTE IS NOT AFFECTED.
To clear it, SW n. 4 on the C.P.U. board (see figure 1) shall be in position ON (PROGRAM), and then act on the CREDIT push-button for about 5 seconds.

WINNINGS (Test n. 8 and 9). Test n. 8 indicates the winnings listed per types, that is: on the 1st player is indicated the overall quantity of games that have been played (the addition of the paid games, the won ones and the SERVICE games).
On the 2nd player display appear the won games.
On the 3rd player display one can see the number of won balls. Finally the 4th player display shows the quantity of awarded SUPERBONUSES.
— The test n. 9 shows how the winnings have been obtained.
The 1st player display indicates how many times the HIGHEST SCORE has been exceeded (NORMAL if test 18 is programmed with 00, RANDOM if test 18 is programmed with 01).
The 2nd player display shows the number of winnings obtained with winning scores.
The 3rd player display shows the number of winnings obtained with SPECIAL 1. Finally, on the 4th player display appears the number of winnings obtained with SPECIAL 2.
To clear the winnings, SW n. 4 shall be in position ON (PROGRAM); then enter test n. 8 and act on the CREDIT push-button for about 5 seconds; then enter test n. 9 and again press the CREDIT push-button for about 5 seconds.

SERVICE (Test. n. 10) Test 10 indicates:
- Total number of tilt n. 2 on 1st player display (play tilt)
- Total number of credits cancelled by tilt n. 2, on 2nd player display.

COINS (Tests n. 11, 12, 13, 14, 15, 16). To meet the requirements due to the various types and values of coins used in the different countries, a highly sophisticated method for programming the cost of one «credit» (one game) has been adopted. The main features of this method are:

a) the possibility of giving one credit with several coins,

b) same number of allowances if the value of the introduced coins is the same, regardless of their number and type,

c) the possibility of establishing a cost per credit that differs from the value of the various coins.

To achieve proper programming of the cost of one credit, when allowances shall be granted, it is necessary to keep in mind that the cost ratio between the more expensive credit and the less expensive one shall be less than «2».
The tests 11, 13 and 15 shall be given the unit «value» of the coins that can be introduced respectively into coin chute n. 1 (on the left side), coin chute n. 2 (on the right side) and coin chute n. 3 (in the middle).
Do not forget that the coins shall be introduced into the 3 coin chutes in GROWING ORDER. The coin with the lowest value shall be introduced into the first coin chute, to the second coin chute can be assigned a coin of the same or higher value than the first one.
The third coin chute shall receive the coin that has or higher or at least the same value as the coin introduced into the second coin chute.
The tests, 12, 14 and 16 shall be programmed with the number of credits to be given to each coin introduced respectively into coin chutes 1, 2 and 3.
If several coins are needed to get one credit, it is necessary to program 00.
The coin attributed to the third coin chute, shall have the same or higher value than the cost of one credit. (The figure to be programmed on test n. 16 shall be equal to or higher than 1).
THE UNIT VALUE OF COINS IS THE FIGURE OBTAINED BY DIVIDING THE ACTUAL VALUE OF THE COINS BY THE MAX. COMMON DIVISOR.

Example: 10 p; 50 p;: 10 = 1+5
100 L.; 200 L.; 500 L.: = 1+2+5

As a further guidance for the operators on Table II some actual coin chute programming examples are reported, that are used for some European countries.

HIGH SCORE (Test n. 17, 18 and 25). There exists the possibility to choose among 2 different types of H.S.: NORMAL (Test 18 = 00) and RANDOM (Test 18 = 01). NORMAL H.S. represents the max. score value achieved by one player. When this score is exceeded by one or more players, it is replaced by the score obtained by the player who has totalled the highest score. The players that follow shall exceed the new H.S. value to have their winning score recorded.
RANDOM H.S. on the contrary consists of a casual score, ranging within an area of 12.000.000 points, that is set forth at the beginning of each game.
The minimun value is given by the figure programmed with test 17, and that can range from 00.000.000 through 99.900.000
The same test is used to program a NORMAL H.S. at the beginning, when the pintable is installed, or in any case to clear or change the existing H.S. value. To do so, press several times the CREDIT push-button, if slow progressing is required, otherwise keep it pressed for fast progress. To change the initial value of Random H.S. it is necessary that SW4 on the C.P.U. board is in ON (PROGRAM) position, while it may be both on ON (PROGRAM) or OFF (GAME) to change the initial value of NORMAL H.S.
The player who exceeds the NORMAL or RANDOM H.S. wins the prize established by the programming of test n. 25, with the following possibilities:

Test 25 = 00 = no win
01 = 1 replay
02 = 2 replays
03 = 3 replays
04 = 1 superbonus

Both test 18 and test 25 require SW n. 4 to be in ON (PROGRAM) position to change their programming, and then it is necessary to press the CREDIT push-button.

FOR NORMAL H.S., THE WIN IS AWARDED ONLY TO THE PLAYER WHO OBTAINS THE HIGHEST SCORE, EVEN WHEN THE PLAYERS EXCEEDING THE PRESET HIGHEST SCORE VALUE ARE MORE THAN ONE.
IN THE CASE OF RANDOM H.S. THE WIN IS GIVEN TO ALL THE PLAYERS WHO EXCEED THE PRESET H.S. VALUE.

MAX CREDIT (Test n. 19). Same represents the max. number of credits that can be recorded before the coin chute locking mechanism is released, thus preventing further introduction of coins. Same represents also the figure beyond which the credits are not icreased anymore because of any won games. It is programmable from 10 through 30 by acting on the CREDIT push-button, provided SW4 is set on ON (RANDOM).

BALLS (Test n. 20). Same represents the number of balls that are available during each game. It can be programmed from 01 through 02 by acting on the CREDIT push-button while SW4 shall be on ON.

MATCH (Test n. 20). Match is the possibility to award one replay to the player or to the players, who have managed to get a score on their display the two right end figures correspond to those of MATCH (see figure 2). If it is programmed with 00, it is excluded, while if the programmed figure is 01, it is connected. To change the programming act on the CREDIT push-button. SW n.4 shall be set ON (PROGRAM).

WINNING SCORES (Test n . 22, 23, 24 and 26). There are three scores, that can be programmed within a range from 0.00 through 99.900.000, respectively with tests 22, 23 and 24. The player or the players who exceed one or more (max. 3) winning scores, are awarded a prize as determined on test n. 26, for each exceeded winning score.
The scores programmed with 0,0 to are not enabled (they do not award any, win even when test 26 is programmed for wins). The test n. 26 determines the type of win at each winning score limit, that can be chosen among:

Test 26 = 00 = non win
01 = 1 bonus ball
02 = 1 replay
03 = 1 superbonus
04 = 2.000.000 points

For the programming of these tests it is necessary that SW n.4 is on ON (PROGRAM), and then act on CREDIT push-button.
For the scores (test 22, 23, 24) push repeatedly the CREDIT push-button to progress 1 by 1 (corresponding each to 100.000 points). When the button is kept pressed, the progress is fast.

SPECIAL 1 (RED SPECIAL) (Tests 27 and 33). Difficulty can be adjusted for obtaining the special, by using test 33 properly. This way the number of functions necessary to light the special lamp, can be varied.

00 = Enter RED SPECIAL canal 6 times
01 = Enter RED SPECIAL canal 4 times
02 = Enter RED SPECIAL canal 3 times
03 = Enter RED SPECIAL canal 2 times

For adjustement or changes, act on CREDIT button when SW 4 is ON (PROGRAM).
Test 27 determines the type of win to be awarded when the Special target is hit while corresponding lamp is lit.

00 = no win
01 = 1 bonus ball
02 = 1 replay
03 = 1 superbonus
04 = 4.500.000 points

For adjustment or changes, act on CREDIT button when SW 4 is ON (PROGRAM).

SPECIAL 2 ORANGE SPECIAL (Test 28, 34). Difficulty can be adjusted for lighting the "orange special" lamp by modifying test n. 34.

00 = Hit targets bank 4 times
01 = Hit targets bank 3 times
02 = Hit targets bank 2 times
03 = Hit targets bank 2 times

Test n. 28 determines the type of win to be awarded when the orange Special target is hit while the corresponding lamps is lit.

00 = no win
01 = 1 bonus ball
02 = 1 replay
03 = 1 superbonus
04 = 1.000.000 points.

For adjustment or changes, act on CREDIT button when SW 4 is ON (PROGRAM)

BACKGROUND SOUND AND ATTRACTION SOUNDS (Test 29). Background sound is to be adjusted when on play, attraction sounds when in GAME OVER.

00 = Sound disconnected, attractions connected
01 = Sound connected, attractions connected
02 = Sound disconnected, attractions disconnected
03 = Sound connected, attractions disconnected

COIN METER (Test n. 30). Same is an electromechanical impulse meter, to be connected with the circular 8-way connector located in the cabinet and that the «UNIT VALUE» of the coins introduced into 3 coin chutes.
It is never modified by the wins or the service games (obtained throught the SERVICE push-button). The game can be played regularly both with connected and cut-off coin meter, if the test it programmed with 00. Note that the impulse meter is programmed with 00. Note that the impulse meter is always operatin regardless of the type of programming used for test 30.
To program or to change, act on CREDIT push-button, provided SW 4 is in ON (PROGRAM) position.
The impulse meter and relevant wiring are available upon request.

GAME TIME BONUS (Test n. 31). After having used the available balls (see test 20 + possible winned balls), it is possible to get a game time extention that may range from a minimum of 10 seconds to a maximum of 99 seconds, determined by the play of the last normal ball. This time is indicated by 2 digits in the center of the HIGHEST SCORE TO DATE display (see figure 2). Upon play time ezpiry, all the controis are stopped, and thus the ball to play runs straight to the hole.
If the test has been programmed 00, the game is terminated normally (game time bonus excluded), while with 01 programming game time bonus is connected. To program or change, act on CREDIT push-button, provided SW 4 is in ON (PROGRAM) position.

BONUS BALL NUMBER VARIATION (Test 32). Maximum number of possible bonus balls, while one ball on play, is determined.

00 = 1 bonus ball
01 = 3 bonus ball
02 = 3 bonus ball
03 = 3 bonus ball

To program or change, act on CREDIT push-button, provided SW 4 is set on ON (PROGRAM).

RIGHT KICKER variant (Test 35). BALL RETURN lamp can be adjusted changing test 35:

00 = Enter "Kicker" canal 4 times
01 = Enter "Kicker" canal 3 times'
02 - 03 = Enter "Kicker" canal 2 times

To program or modify, act on credit push button when SW 4 in ON (Program)
Note: Tests 36 and 37 are not utilized on "POOL CHAMPION".

PAY OUT On request, a token payout with relevant cup may be connected with the machine (KE 0037 optional).
The pay out operates when scoring SUPER BONUS programmed in the relevant win tests.

SELF TEST

N. TEST	FUNCTION	N. FUNCTION IN TEST	DESCRIPTION
01	Test Display	/	1° All the displays show equal figures that follow each other 0,1,2,....9,0 and so on. 2° By keeping the «CREDIT» push-button pressed, the displays show numbers in sucession.
02	Contact test	88	Number of closed contact
03	Lamp test	/	All the piloted lamps are continuously lit and extinguished.
04	Solenoid test	88	The solenoids (from 1 through 24) are energized one after another. The figure indicates the energized solenoid. When it is operative it must be perceived.
05	Sound and talking test	88	Sounds and works are repeated one after another. The figure indicates the sound and the phrase being executed.

ACCOUNTING

N. TEST	FUNCTION	DESCRIPTION	HOW TO CLEAR
06	Duration	Player 1 display = Time of pintable operation (minutes) Player 2 display = Game time (minutes) Player 3 display = Total number of tilt Player 4 display = Average game duration expressed in minutes	With SW4 on ON (PRO GRAM) push-button about 5 sec.
07	Takings	Player 1 display = Coins in coin chute 1 Player 2 display = Coins in coin chute 2 Player 3 display = Coins in coin chute 3 Player 4 display = SERVICE games	With SW4 ON act on CREDIT push-button abt. 5 sec.
08	Wins	Player 1 display = Games played in total Player 2 display = Won games Player 3 display = Won balls Player 4 display = Won superbonus	With SW4 ON act on CREDIT push-button for abt. 5 sec.
09	Wins	Player 1 display = H.S. is exceeded Player 2 display = Winning scores are exceeded Player 3 display = Special 1 Player 4 display = Special 2	With SW4 in ON act for about 5 seconds on CREDIT button.
10	Service	Player 1 Display = Total number of Tilt 2 Player 2 Display = Credit number cancelled by Tilt 2	With SW4 in ON act for about 5 seconds on CREDIT button.

PROGRAMMING

N. TEST	FUNCTION	PROGRAMMED VALUE	DESCRIPTION	DATA FOR THE PROGRAMMER
11	Coin value 1st coin chute.	from 01 to 10	Value of the coins for the 1 st coin chute (at the left side close to the hinge).	Whit SW4 on ON act on CREDIT-push-button.
12	Coin credits 1st coin chute.	from 00 to 15	Credits per each single coin introduced into the first coin chute.	
13	Coin value 2nd coin chute.	from 01 to 10	Value of the coins for the 2nd coin chute (at the right side, close to the key).	
14	Coin credits 2nd coin chute	from 00 to 15	Credits per each single coin introduced into the second coin chute.	
15	Coin value 3rd coin chute	from 01 to 10	Value of the coin for the 3rd coin chute (in the center).	
16	Coins credit 3rd coin chute	from 00 to 15	Credits per each single coin introduced into the third coin chute	
17	High-Score initial value	from 00.0 to 99.9	When test 18 is programmed with 00, initial NORMAL H.S. is programmed. If test 18 is programmed 01, the min, RANDOM H.S. is programmed.	NORMAL H.S. can be preset also in Game-over (SW4 in OFF), RANDOM H.S. can be preset only in PROGRAM SW4 in ON). Push CREDIT keep pushed for fast progress.

Segue: **PROGRAMMING**

N. TEST	FUNCTION	VALUE PROGRAMMED	DESCRIPTION	DATA FOR THE PROGRAMMER
18	High Score types	00 01	NORMAL H.S. or max. scores achieved by one player. RANDOM H.S. or casual scores that may change at the beginning of each game.	With SW4 on ON act on CREDIT-push-button.
19	Max credits	from 10 to 30	Max number of credits beyond which coin chutes are locked, and no won games are attributed anymore	Act on CREDIT pusch-button with SW4 on ON
20	Balls	from 01 to 07	Balls per play	Act on CREDIT pusch button with SW 4 on ON
21	MATCH	00 01	Match exluded (no wins) Match connected (1 Replay)	Act on CREDIT pusch-button with SW4 on ON
22	1st winning scores	from 00.0 to 99.9	1st winning score, which awards the win programmed on test n.26 when exceeded. 00,0 = no win	With SW4 on ON act stepwise on CREDIT push-button for slow progress. For fast progress keep it pressed
23	2nd winning scores	from 00.0 to 99.9	2nd winning score wich awards the win programmed on test n. 26 when exceeded. 00.0 = no win	
24	3rd winning scores	from 00.0 to 99.9	3rd winning score which awards the win programmed on test n.26 when exceeded, 00.0 = no win.	
25	Wins with HIGH SCORE	00 01 02 03 04	No win 1 Replay 2 Replay 3 Replay 1 Superbonus	With SW4 on ON act on CREDIT push-button
26	Wins with scores (see test 22, 23, 24)	00 01 02 03 04	No win 1 Bonus Ball 1 Replay 1 Superbonus 2.000.000 points	With SW4 on ON act on CREDIT push-button
27	Wins with Special 1 "Red Special"	00 01 02 03 04	No win 1 Bonus Ball 1 Replay 1 Superbonus 4.500.000 points	With SW4 on ON act on CREDIT push-button
28	Wins with Special 2 "Orange Special"	00 01 02 03 04	No win 1 Bonus Ball 1 Replay 1 Superbonus 1.000.000 points	With SW4 on ON act on CREDIT push-button
29	Background sound and attraction sounds	00 01 02 03	Sound disconnected, attractions connected Sound connected, attractions connected Sound disconnected, attractions disconnected Sound connected, attractions disconnected	With SW 4 on ON act on CREDIT push-button
30	Coin meter	00 01	Normal operation both with excluded and with connected impulse meter When impulse meter is disconnected the pin table cannot be used	With SW4 on ON act on CREDIT push-button
31	Game Time Bonus	00 01	«Game time bonus» disconnected Count down connected	With SW4 on ON act on CREDIT push-button
32	Bonus Ball number variation	00 01 02 03	1 bonus ball 3 Bonus Balls 3 Bonus Balls 3 Bonus Balls	Press CREDIT button when SW4 is ON
33	Red Special	00 01 02 03	Enter RED SPECIAL canal 6 times Enter RED SPECIAL canal 4 times Enter RED SPECIAL canal 3 times Enter RED SPECIAL canal 2 times	Press CREDIT button when SW4 is ON
34	Special 2 ORANGE	00 01 02 03	Hit targets bank 4 times Hit targets bank 3 times Hit targets bank 2 times Hit targets bank 2 times	Press CREDIT button when SW4 is ON
35	Right kicker	00 01 02-03	Enter "Kicker" canal 4 times Enter "Kicker" canal 3 times Enter "Kicker" canal 2 times	Press CREDIT button when SW4 is ON
36	Not used			
37	Not used			

IMPORTANT: With SW4 in ON (PROGRAM) position, the pintable cannot enter a game, even though there may be credits available, and the machine is in GAME OVER condition. A buzzer and the blinking of the TILT lamp indicate anomalous condition.

TROUBLE SHOOTING

CONDITION	CAUSE	REMEDY	NOTES
The game cannot be started	– No voltage available	–	
	– Plug is off	Plug in	
	– The 3-way connector (CN-«line») of the feeder rack is not connected	Connect	
	– Mains fuse burned	Replace	If they burn again, this means that there is a short circuit
	– The 9-way connector (CN «Ja») on the feeder rack disconnected	Replace	
	– Mains switch open	Close	
	– Connetor (CN 1) on feeder and connectors (CN «J1»-«J2»-«J3») on feeder rack disconnected	Connect	
	– Voltage change over not or insufficiently connected	Correct	The voltage change over unit contains also the mains fuse
All stationary lamps are not lit	– Fuse F2 on the feeder rack thrown out.	Replace	Shall not be more than 20A; if it is thrown out again there is a short-circuit
	– CN J1-J2-J3 connector not connected	Plug in	
	– Electric wire disconnected	Connect	
All the piloted lamps are not operating	– 5 VRM is not available	Fuse F3 (15A) on Power-board is burned	Test carefully with tester
	– The connector between C.P.U. and the interface is disconnected	Tighten the loose connectors	
	– Interface (CN 16) feeding connector is not plugged in		
	– The connectors of the lamps on Interface (CN. 18-19-20-21-22) are not connected		
	– The connectors at the feeder board output are disconnected (CN 2-3-4)		
	– At the C.P.U. input and at the interface 5,6 V d.c. are missing	Fuse F2 (5A) is burned and shall therefore be replaced. If it is thrown out again, there is a short circuit. Replace feeder board.	
	– C.P.U. is always cleared	Replace feeder and then replace C.P.U.	
	– Others	Replace interface	
All displays are extinguished.	– + 170 V d.c. is missing because fuse F1 (1A) is burned. Or high voltage regulator is damaged. Or high voltage regulator safety circuit is actuated.	Replace the fuse. Check with the tester whether the high-voltage feeder operates. When safety device is actuated, try to disconnect the displays. If the feeder operates at 170 V this means that on the displays there exists a short circuit. To restore +170 V it is necessary to stop the pintable and then to start it again	
	– At C.P.U. –input +5,6 V is missing	Check and if necessary replace the F2 (5A) fuse on the feeder board	
	– CN 14 or all connectors of displays are disconnected	Plug in connectors	
	– Display damaged		
	– C.P.U. damaged		
On all the displays wrong figures are appearing	– Cable damaged	Replace the cable	
	– C.P.U. damaged	Replace C.P.U.	
One or more figures on one or more displays are wrong.	– Display damaged		
	– Cabel damaged		
All figures are too bright	– +170 V feeder damaged	Replace the feeder board	
All the solenoids do not work	– 39 VRM input is missing	Reset the fuse . If it is thrown out again there is a short circuit.	
	– CN 17 connector is not plugged in	Plug in the connector	
	– Interface damaged	Replace the Interface	
	– C.P.U. damaged	Replace the C.P.U.	
One or more solenoids do not work	– Coils burned	Replace coil and the relevant Darlington	
	– Darlington burned	Replace the Darlington and check the diode on the coil.	
	– Electric wires loose	Connect the loose wires	
	– The fuses under the playfield have been thrown out	Reset the burned out fuses	
One or more solenoids are always energized	– Interface-board damaged	Replace the Interface-board	
	– C.P.U. damaged	Replace the C.P.U. board	
	– Short circuit		
All the contacts remain inactive	– CN 10-11 connectors are loose	Plug in	
	– C.P.U. is damaged	Replace C.P.U.-board	

CONDITION	CAUSE	REMEDY	NOTES
One or more contacts do not work	– Loose wires – Interrupted or loose – Contact oxydized	Connect all the loose wires Reset the diode Clean the contact	
One or more contacts are wrongly read	– The contact wires are short circuited and also with respect to the lamp and solenoid wires – Diode contacts are short circuited – C.P.U. is damaged	Eliminate the short circuit Replace the short circuited diode Replace C.P.U.	
All sounds and words are missing	– The loudspeaker is not connected or damaged – Loudspeaker potentiometer cut off – CN 6 connector (Sound board) disconnected – 5 V d.c. feeding voltage is missing – +12 V d.c. feeding voltage missing – +5 V d.c. feeding voltage missing – Sound and talk board damaged	Connect, if necessary replace Replace another one having similar features Plug in the connector Replace fuse F4 (1A) on the feed board, if burned Replace fuse F2 (5A) on the feed board, if burned If +5 V d.c. are missing, but +12 V d.c. are available, replace the regulator 78H05 Replace the sound and talk board	

VERY IMPORTANT. Never connect or disconnected the connectors while the game is running

The game is supplied with a special plug to connect a print-out unit that is very useful to print on paper all the most important accounting functions, as well as the serial number of the game.
Hereafter a fac-simile print out.
The same plug is to be used also for the coin meter.

STARS PHOENIX

SERIAL N 1532
WINNED G 000000
PLAYED G 000003
COINS # 1 000003
COINS # 2 000003
COINS # 3 000003
****

CONNECTOR CARD FOR STARS PHOENIX

INPUT/OUTPUT POSITION ON THE CONNECTOR
FEEDER BOARD

CONNECTOR	PIN	WIRE COLOUR	SIGNAL
POWER Board			
CN1	→	□	—
»	1	Red	165 Vac 0,3 A
»	2	Red	165 Vac 0,3 A
»	3	Brown	10 Vac 0,5 A
»	4	Brown	10 Vac 0,5 A
»	5	Yellow	10,5 Vac 6 A
»	6	Yellow	10,5 Vac 6 A
»	7	Blue	43 Vac 5 A
»	8	Blue	43 Vac 5 A
»	9	White	6,5 Vac 15 A
»	10	White	6,5 Vac 15 A
»	11	Green	6,5 Vac 15 A
»	12	Green	6,5 Vac 15 A
CN2	→	□	—
»	1	—	—
»	2	Black	GND
»	3	—	—
»	4	Violet	+39 Vrm common for al the solenoid in the cabinet
»	5	Pink	Cabinet - Playfield interconnections
»	6	White	For flipper control
CN3	→	□	—
»	1	White	Cabinet - Playfield interconnections
»	2	Pink	For flipper control
»	3	Brown	+5Vrm common all controlled playfield lamps
»	4	Brown	+5 Vrm common all controlled playfield lamps
»	5	Violet	+39 Vrm common for playfield solenoids
»	6	—	—
CN4	→	□	—
»	1	—	—
»	2	Brown	+5 Vrm common light board controlled lamps
»	3	Violet	+ 39 Vrm common for head solenoids
»	4	—	—
CN5	→	□	—
»	1	Orange	Flipper Relay
»	2	Black	GND
»	3	Black	GND
»	4	Red	+ 5,6 Vdc
»	5	Red	+ 5,6 Vdc
»	6	White	Power Failure
»	7	Black	GND
»	8	Yellow	170 Vcc
»	9	Black	GND
»	10	Green	— 5 Vdc
»	11	Red	+ 5,6 Vdc
»	12	Blue	+ 12 Vdc
SOUND Board			
CN6-T	→	□	—
»	1	Black	GND
»	2	Green	— 5 Vdc
»	3	Red	+ 5,6 Vdc
»	4	Blue	+ 12 Vdc
CN6-C	5	Yellow-grey	Output Sound e Speech
»	6	Violet-White	Output Sound e Speech
C.P.U. board			
CN9	→	—	—
»	1	Yellow	170 VCC
»	2	Black	GND
»	3	White	Power Faillure
»	4	Red	+ 5,6 VDC
CN10	1	Orange-Yellow	Printer -RX+
»	2	Yellow-Grey	Printer -RX-
»	3	White-Pink	Printer -TX-
»	4	Black-Pink	Printer -TX+
»	5	—	—
»	6	White	Contacts-row Ø
»	7	Grey	Contacts-row 1

CONNECTOR	PIN	WIRE COLOUR	SIGNAL
CN10	8	—	—
»	9	—	—
»	10	Grey-white	Contacts - column Ø
»	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	—	—
»	17	Brown-violet	Contacts - column 6
»	18	Yellow-violet	Contacts - column 7
»	19	—	—
»	20	—	—
CN11	1	—	—
»	2	—	—
»	3	Red	Contacts - row 2
»	4	Yellow	Contacts - row 3
»	5	Black	Contacts - row 4
»	6	Green	Contacts - row 5
»	7	Blue	Contacts - row 6
»	8	—	—
»	9	—	—
»	10	Grey-white	Contacts - column Ø
»	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	—	—
»	19	—	—
»	20	—	—

INTERFACE Board

CN16	→	□	—
"	1	Black	Gnd
"	2	Red	+ 5,6 Vdc
"	3	Black	GND
"	4	Orange	Flipper Relay
CN17-C	→	□	—
"	1	White-Pink	Knocker
"	2	Red-White	Coin mechanism coil
"	3	Yellow Pink	Token dispenser
CN17-P	4	Violet White	
"	5	Yellow-White	
"	6	Brown-White	
"	7	Blue-White	
"	8	Green-White	
"	9	Brown-Green	
"	10	Red-Green	
"	11	Orange-Yellow	
"	12	Orange-White	
"	13	Brown-Yellow	
"	14	Grey-White	
"	15	Black-White	
"	16	Black-Green	
"	17	Yellow-Grey	
"	18	White-Pink	
"	19	Red-White	
"	20	Yellow-Pink	
"	21	Violet-White	
"	22	Yellow-White	
"	23	White-Brown	
"	24	Blue-White	
"	25	—	—
CN18	1	Yellow-white	
"	2	Light blue	
"	3	Blue-Yellow	
"	4	Light green-Grey	
"	5	White-Pink	
"	6	Brown-Pink	
"	7	Orange-Grey	
"	8	Green-Violet	
"	9	Orange-Yellow	
"	10	Green-White	
"	11	Red-White	
"	12	Orange-Light green	
"	13	White	
"	14	Brown	
"	15	Red-Blue	
"	16	Orange-Violet	
"	17	Blue-Grey	
"	18	Red-Black	
"	19	Blue-Orange	
"	20	Blue-White	

CONNECTOR	PIN	WIRE COLOUR	SIGNAL
CN19	1	Pink	
"	2	Orange-White	
"	3	Brown-Light green	
"	4	Red-Violet	
"	5	—	
"	6	Brown	
"	7	Brown-Orange	
"	8	Violet-Pink	
"	9	Yellow-Grey	
"	10	Green-Blue	
"	11	Brown-Yellow	
"	12	Violet	
"	13	Blue-Violet	
"	14	Black-Grey	
"	15	Black-Blue	
"	16	Blue-Pink	
"	17	—	
"	18	Yellow-Pink	
"	19	Black-Pink	
"	20	Yellow-Green	
CN20	1	Yellow-White	
"	2	Light blue	
"	3	Brown-Blue	
"	4	Light green-Grey	
"	5	White-Pink	
"	6	Brown-Pink	
"	7	Orange-Grey	
"	8	Light green-Violet	
"	9	Yellow-Orange	
"	10	Green-White	
"	11	Black-Violet	
"	12	White-Brown	
"	13	—	—
"	14	Blue-Yellow	
"	15	Blue-Red	
"	16	—	—
"	17	—	—
"	18	—	—
"	19	—	—
"	20	—	—
CN21	1	—	—
"	2	—	—
"	3	—	—
"	4	—	—
"	5	—	—
"	6	—	—
"	7	—	—
"	8	—	—
"	9	—	—
"	10	—	—
"	11	—	—
"	12	—	—
"	13	—	—
"	14	—	—
"	15	—	—
"	16	—	—
"	17	—	—
"	18	—	—
"	19	—	—
"	20	—	—
CN22	1	—	—
"	2	Blue-White	
"	3	Brown-Violet	
"	4	Black-Orange	
"	5	Red-Yellow	
"	6	Black-Yellow	
"	7	Violet-White	
"	8	Green	
"	9	Violet-Pink	
"	10	Black-White	
"	11	Red-Grey	
"	12	Yellow	
"	13	Black	
"	14	Yellow-Violet	
"	15	Grey-White	
"	16	Red-green	
"	17	Red	
"	18	Blue	
"	19	Green-Blue	
"	20	—	—

Printer service optional	A	Red	43 Vac
»	B	Black	43 Vac
»	C	Yellow-violet	Column 7
»	D	Grey	Row 1
»	E	Orange-Yellow	Printer RX+
»	F	Yellow-grey	Printer RX—
»	G	White-pink	Printer TX—
»	H	Black-pink	Printer TX+
J4	1	Brown	Electric wier
»	2	Yellow	Service socket
»	3	Red	Service socket
»	4	Yellow-green	Electric wier
»	5	Red	43 Vac
»	6	Black	Electric filter
»	7	Light blue	Electric wier
»	8	Black	43 Vac
»	9	Blue	Electric filter

TAV. I

Programmi base - Basic programs - Programmes de base - Grundprogramme

N° test	ITALIA 1			ITALIA			GREAT BRITAIN			FRANCE			DEUTSCH.			BELGIQUE			JUGOSLA.			U.S. A.		
	SW			SW			SW			SW			SW			SW			SW			SW		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
	on	on	on	off	on	on	on	off	on	off	off	on	on	on	off	off	on	off	on	off	off	off	off	off
	—			—			—			—			—			—			—			—		
11	01			02			01			01			01			01			01			01		
12	00			01			00			00			01			00			01			01		
13	02			05			02			05			02			04			02			01		
14	01			03			01			03			03			02			02			01		
15	02			05			5			10			05			04			02			01		
16	01			03			3			07			07			02			02			01		
17	500			750			750			750			750			750			750			750		
18 High score	0			1			0			0			0			0			0			0		
19	15			15			15			15			15			15			15			15		
20	03			03			03			03			03			03			03			03		
21	1			1			1			1			1			1			1			1		
22	150			300			300			300			300			300			300			300		
23	400			600			600			600			600			600			600			600		
24	000			000			000			000			000			000			000			000		
25	1			1			1			1			1			1			1			1		
26	1			2			2			2			2			2			2			2		
27	2			2			2			2			2			2			2			2		
28	1			1			1			1			1			1			1			1		
29	1			1			1			1			1			1			1			1		
30	0			0			0			0			0			0			0			0		
31	1			1			1			1			1			1			1			1		
32	1			1			1			1			1			1			1			1		
33	1			1			1			1			1			1			1			1		
34	1			1			1			1			1			1			1			1		
35	1			1			1			1			1			1			1			1		
36	—			—			—			—			—			—			—			—		
37	—			—			—			—			—			—			—			—		

TAV. II **ACTUAL PROGRAMMING EXAMPLES**

NATION	EMPLOYED COINS	COST OF CREDITS	FIRST COIN		SECOND COIN		THIRD COIN		Multiplication factor imp. count. (coin count.)
			Value Test 11	Credits Test 12	Value Test 13	Credits Test 14	Value Test 15	Credits Test 16	
ITALY	1 coin m. = 100 £	2x100 = 1 Pl.	01	00	01	00	02	01	x 100 £
	2 coin m. = 100 £	3x100 £ = 1 Pl.	01	00	01	00	03	01	
	1 coin m. = 100 £ 2 coin m. = 200 £	2x100 £ = 1 Pl. 1x200 £ = 1 Pl.	01	00	02	01	02	01	x 100 £
		3x100 £ = 1 Pl. 1x200 £ = 1 Pl. +1x100 £ =	01	00	02	00	03	01	x 100 £
	1 coin m. = 200 £	1x200 £ = 1 Pl.	01	01	01	01	01	01	x 200 £
	2 coin m. = 200 £	3x200 £ = 2 Pl.	02	00	02	00	03	01	x 200 £
ENGLAND	1 coin m. = 10 p 2 coin m. = 50 p	1x10 p = 1 Pl. 1x50 p = 6 Pl.	01	01	05	06	05	00	x 10 p
		2x10 p = 1 Pl. 1x50 p = 3 Pl.	01	00	05	03	05	03	x 10 p
BELGIUM (AUSTRIA) (HUNGARY)	1 coin m. = 5 FRS 2 coin m. = 10 FRS	2x5 FRS = 1 Pl. 1x10 FRS = 1 Pl.	01	00	02	01	02	01	x 5 FRS
		3x5 FRS = 1 Pl. 1x10 FRS = 1 Pl. +1x5 FRS	01	00	02	00	03	01	X 5 FRS
FRANCE (DANM.) (SWEDEN)	1 coin m. = 1 FR 2 coin m. = 5 FR 3 coin m. = 10 FR	2x1 FR = 1 Pl. 1x5 FR = 3 Pl. 1x10 FR = 7 Pl.	01	00	05	03	10	07	x 1 FR
WEST. GERM. (SWITZERL.)	1 coin m. = 1 DM 2 coin m. = 2 DM 3 coin m. = 5 DM	1x1 DM = 2 Pl. 1x2 DM = 5 Pl. 1x5 DM = 14 Pl.	01	02	02	05	05	14	x 1 DM (FS)
		1x1 DM = 1 Pl. 1x2 DM = 3 Pl. 1x5 DM = 7 Pl.	01	01	02	03	05	07	x 1 DM (FS)
YUGOS.	1 coin m. = 5 DIN 2 coin m. = 10 DIN	1x5 DIN = 1 Pl. 1x10 DIN = 2 Pl.	01	01	02	02	02	02	x 5 DIN
		2x5 DIN = 1 Pl. 1x10 DIN = 1 Pl.	01	00	02	01	02	01	x 5 DIN
SWITZERL.	1 coin m. = 1 FS 2 coin m. = 2 FS	1x1 FS = 2 Pl. 1x2 FS = 5 Pl. 5 FS = 14 Pl.	01	02	02	05	05	14	x 1 FS
		1x1 FS = 1 Pl. 1x2 FS = 3 Pl. 5 FS = 7 Pl.	01	01	02	03	05	07	X 1 FS

FIG. 1

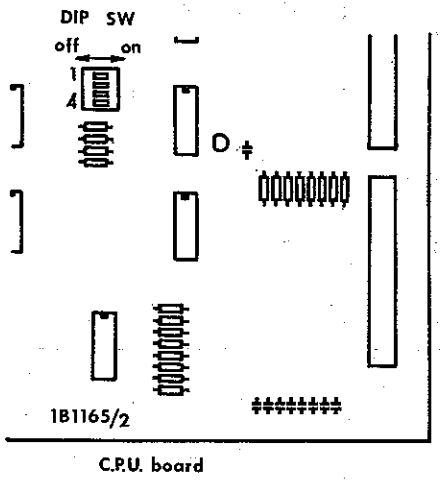
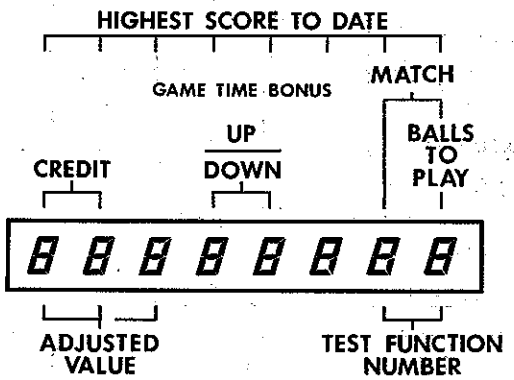
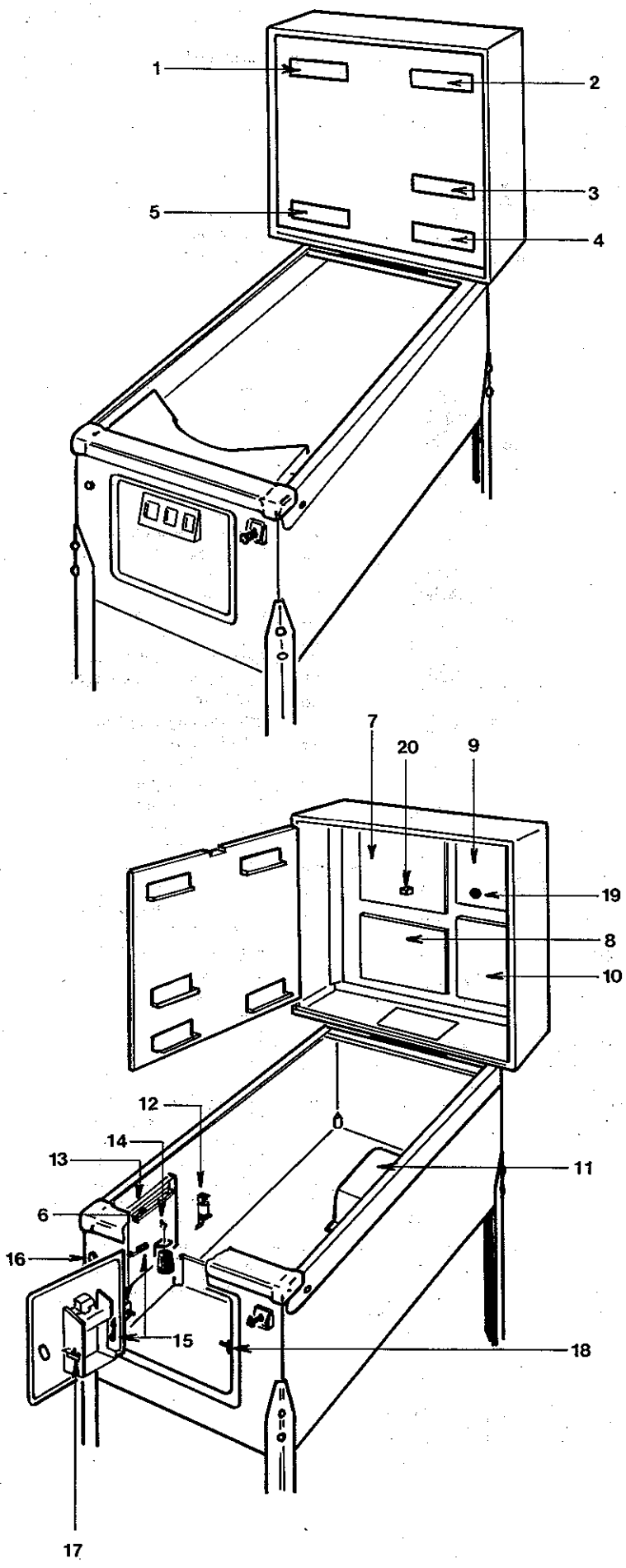

DIP SW
off
on
1
4
1B1165/2
C.P.U. board

FIG. 2


HIGHEST SCORE TO DATE
GAME TIME BONUS
MATCH
UP
DOWN
CREDIT
BALLS TO PLAY
ADJUSTED VALUE
TEST FUNCTION NUMBER

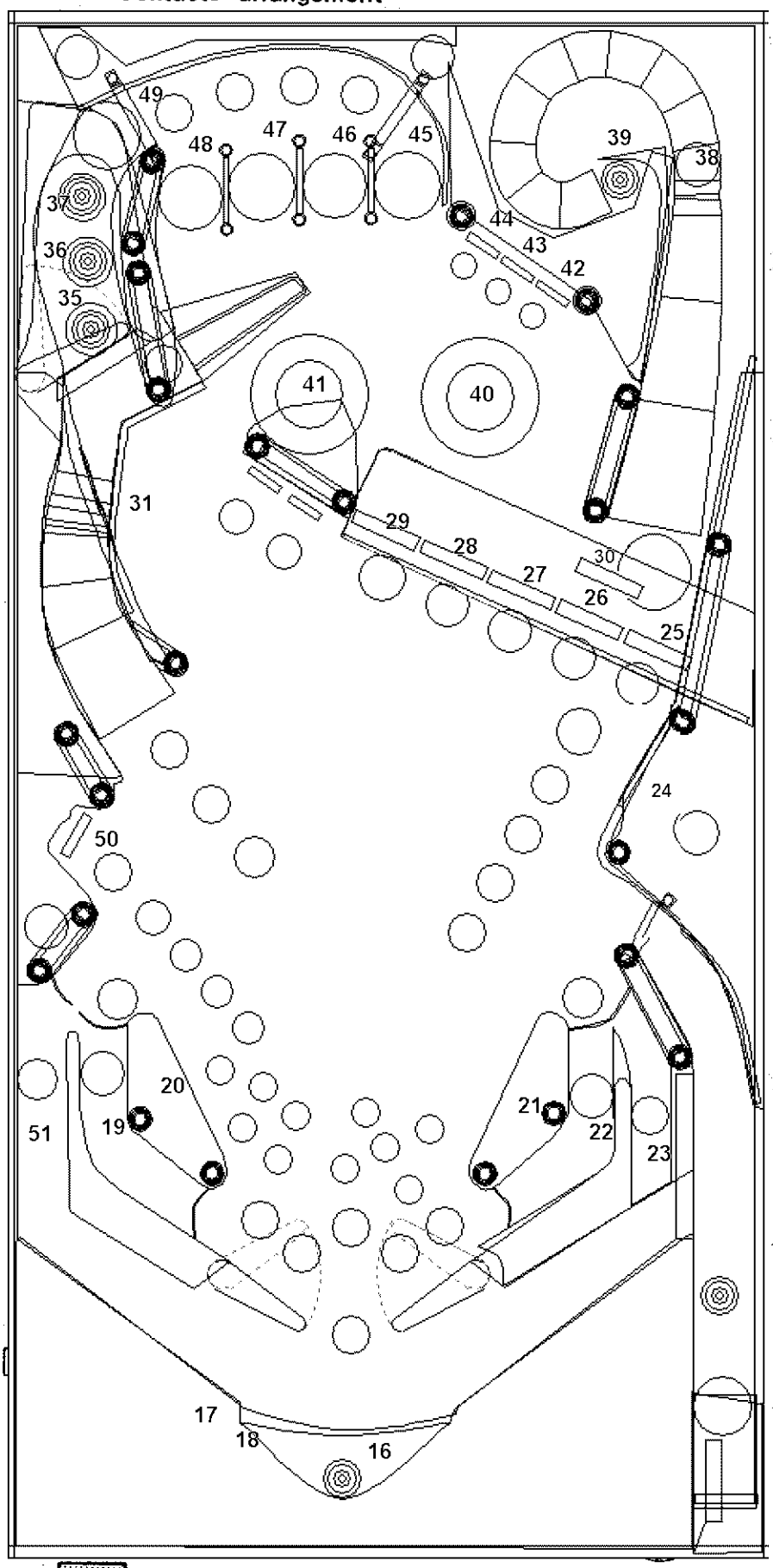
ASSEMBLY DRAWING



1. 1st player display
2. 2nd player display
3. Credit display
   Display ball to play
   Match
   Game time bonus
   Highest score display
4. 4th player display
5. 3rd player display
6. Service button
7. C.P.U. board
8. Interface board
9. Sound board
10. Power board
11. Transformer
12. Knocker
13. Roll ball tilt
14. Bob tilt
15. Antichoc tilt
16. Credit button
17. Advance & return test
18. General vol.
19. Maximum sound vol.
20. Dip switch

FIG. 4

Contacts arrangement

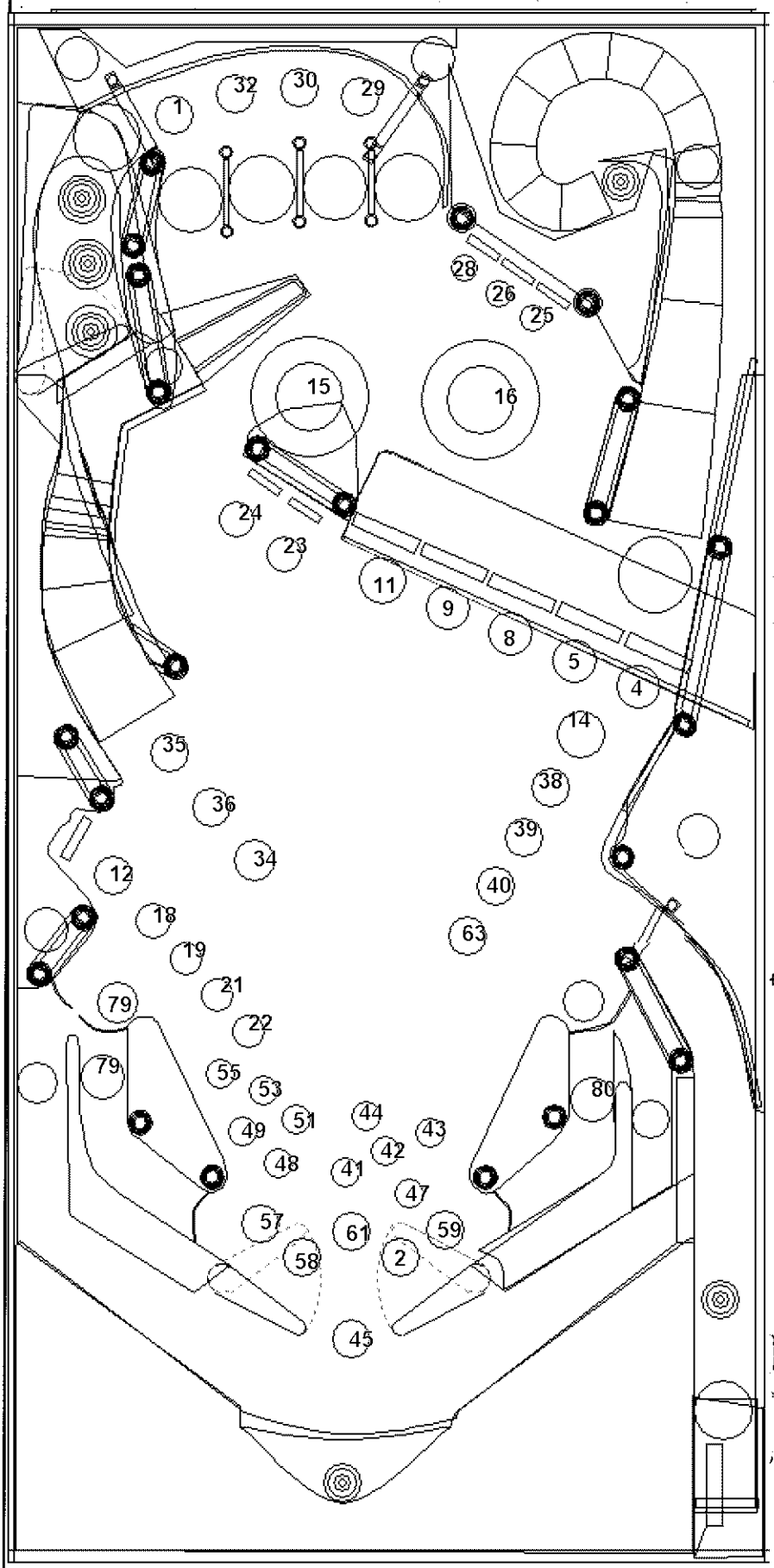


Inside the cabinet contacts

Contact Number	Description
00	Advancement test
01	Return test
02	Tilt 2
03	Credit Service
04	Coin Switch 1
05	Coin Switch 2
06	Coin Switch 3
07	—
08	—
09	Credit
10	Tilt
11	Factory burn test
12	—
13	—
14	—
15	—
16	Out hole
17	Ball Trough Left
18	Ball Trough Rightt
19	Left Inlane
20	Left Slingshot
21	Right Slingshot
22	Right Inlane
23	Right OutLane
24	Standup Leaf
25	Flip up Target (Far Right)
26	Flip up Target (Right)
27	Flip up target (Center)
28	Flip up target (Left)
29	Flip up target (Far Left)
30	Stand up
31	Stand up under left ramp
32	Stand up by C Insert
33	Stand up by B Insert
34	Left Ramp, Left Exit
35	Left Ramp, Bottom Hole
36	Left Ramp, Middle Hole
37	Left Ramp,Top Hole
38	On Right Ramp (Spiral)
39	Spiral Ramp bottom
40	Right Pop Bumper
41	Left Pop Bumper
42	'Jumper Holes' Right
43	'Jumper Holes' Center
44	'Jumper Holes' Left
45	Rt Entry to 'Game' Rollovers
46	Right 'Game' rollover
47	Center 'Game' rollover
48	Left 'Game' rollover
49	Left Entry to' Game' Rollovers
50	Orange Special
51	Left OutLane

FIG. 5

Lamp arrangemnt

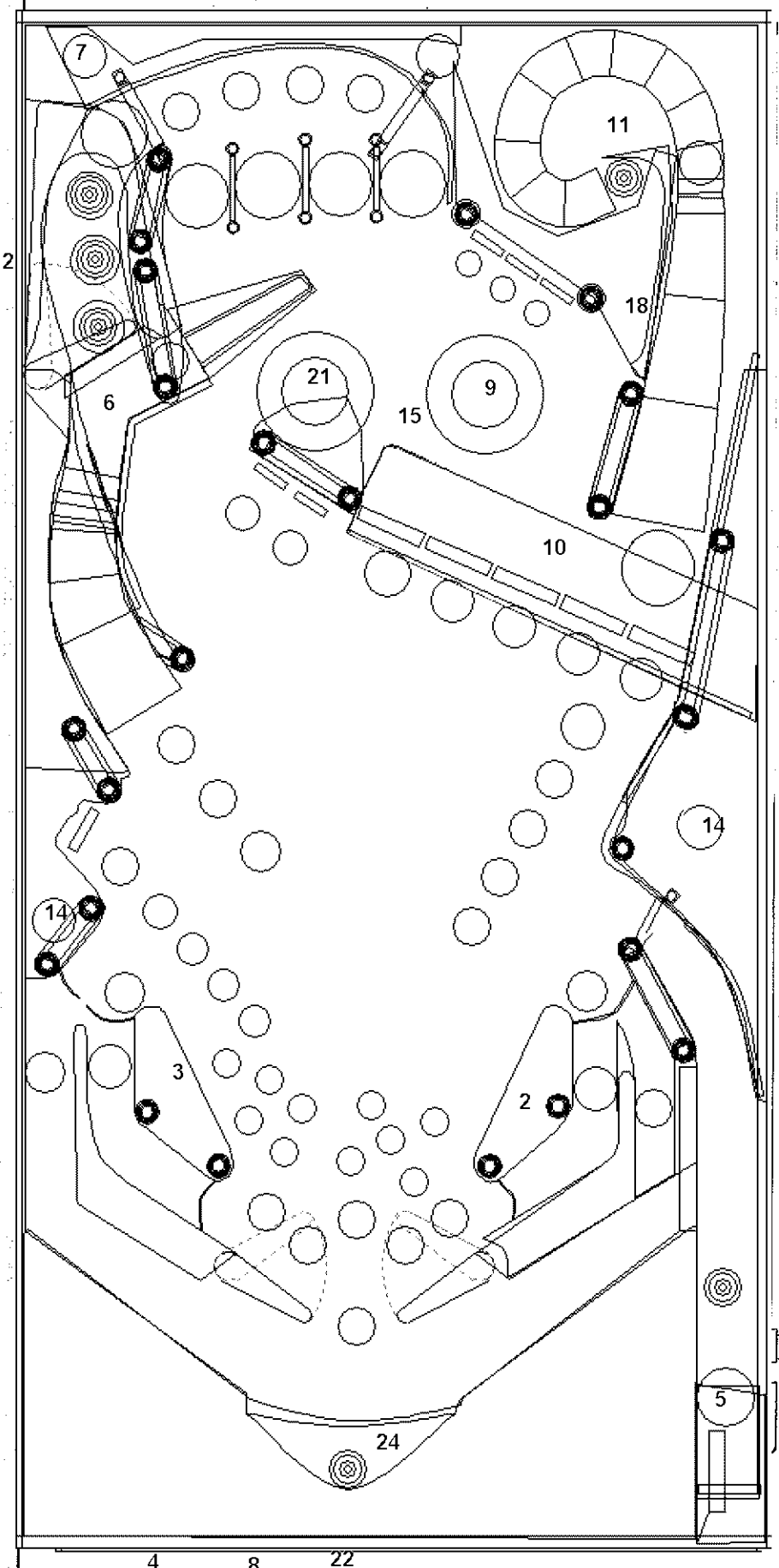


Lamp	Description	Drive n° SCR
1	G in GAME	80
2	Bonus - 60x	66
3	Ball return	67
4		78
5	Flip Up 4	70
6	Game Over	68
7	Tilt	65
8	Flip Up 3	72
9	Flip Up 2	71
10		76
11	Flip Up 1	77
12		75
13	Match	74
14	Red Special (5 of 5)	73
15	Flip Up 5	79
16		69
17	Ball to play	8
18	300,000 (Orange Special)	45
19	200,000 (Orange Special)	35
20	Flipper Relay	64
21	100,000 (Orange Special)	54
22	50,000 (Orange Special)	44
23	C (in ABCD inserts)	26
24	B in ABCD	63
25	Jumper Holes - Right	18
26	Jumper Holes - Center	27
27	Credit	9
28	Jumper Holes - Left	53
29	'E' in Game	17
30	M in Game	62
31	Up Game Time Bonus	7
32	A in Game	36
33	Not Used	43
34	Advance Orange Special	61
35	Advance Red Special	15
36	300,000 (under Advance Red Special)	16
37	1st lighting effect head	25
38	Red Special (4 of 5)	33
39	Red Special, middle (3 of 5)	34
40	Red Special (2 of 5)	52
41	Bonus - 1	23
42	Bonus - 2	24
43	Bonus - 3	5
44	Bonus - 4	51
+ 45	Bonus Ball 1	6
46	Not Used	41
47	Bonus - 5	59
48	Bonus - 6	13
49	Bonus - 7	31
50	2nd lighting effect head	14
51	Bonus - 8	60
52	Not Used	42
53	Bonus - 9	32
54	Not Used	50
55	Bonus - 10	49
56	Super Bonus	3
57	Bonus - 20x	21
58	Bonus - 40x	4
59	Bonus - 80x	40
60	Can Play 1	22
61	10,000 (By Bonus X)	58
62	Can Play 2	12
63	Red Special, bottom (1 of 5)	30
64	UNK	39
65	UNK	57
66	Can Play 3	2
67	Can Play 4	11
68	UNK	48
69	UNK	20
70	UNK	38
71	UNK	56
72	Down Game Time Bonus	10
73	Not Used	37
74	UNK	29
75	UNK	47
76	Bonus Ball 2	28
77	Highest Score	1
78	Bonus Ball 3	19
79	A in ABCD	46
80	D in ABCD	55

+ : head lamps
+ + : head and playfield lamps .

FIG. 6

Solenoid arrangemnt

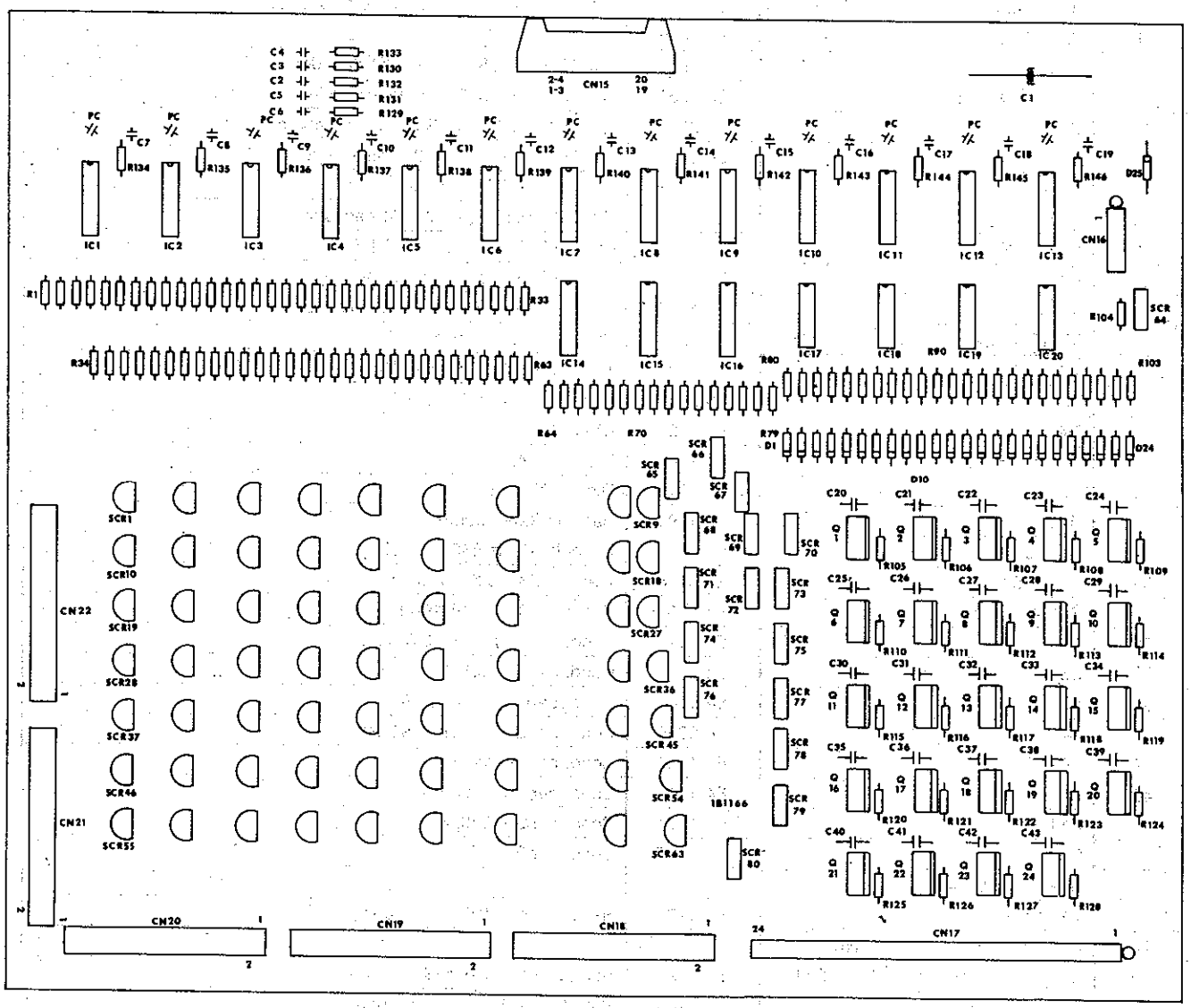


Sol n°	Description	Drive (dar-lington)
01	Flasher – PF Backboard	5
02	Right Sling	14
03	Left Sling	9
04	Coin Door	20
05	Ball Trough/ Shooter Lane	4
06	Kicker (Under Left Ramp)	13
07	Upper Left Flasher	3
08	Knocker	15
09	Right Pop Bumper	19
10	Flip Up Target Release	7
11	Saucer Eject / Spiral Ramp	18
12	Left Ramp Diverter	8
13		6
14	Lower Flasher (Left & Right)	17
15	Insert Flasher – Between Pops	12
16	Insert Flasher	2
17		1
18	Insert Flasher – Rt Ramp Entrance	22
19		21
20		11
21	Left Pop Bumper	23
22	Token Dispenser	10
23	Insert Flasher	16
24	Outhole	24

N°	RIFERIMENTO	CODICE	DESCRIZIONE
3	CN10 CN11	E7 1981	CNN 20 vie MTAS 4-826379-0 maschio
4	CN8 CN12 CN14	E7 1351	CNN 20 vie flat cable maschio
5	IC9	E6 1668	C.I. 2650 A-1 MOS 8 bit M. Proc.
6	IC23	E6 1227	C.I. 2101 AL-4 MOS 256×4 RAM
7	IC5	E6 1910	C.I. 2114 L MOS 1K×4 RAM
8	IC4	E6 3378	C.I. 5114 C MOS RAM
9	IC19	E6 1014	C.I. 4001 BP CMOS quad nor gate
10	IC28	E6 1394	C.I. 4002 BP dual 4-in nor gate
11	IC37	E6 1016	C.I. 4011 BP CMOS quad 2-in nand gate
12	IC31	E6 1228	C.I. 4012 BP CMOS dual 4-in nand gate
13	IC27 IC35 IC36 IC41	E6 1230	C.I. 4028 BP CMOS 10f10 decoder
14	IC6 IC10 IC11 IC33	E6 1231	C.I. 4042 BP CMOS quad D latch
15	IC15 IC21	E6 1995	C.I. 4040 BP CMOS 12 stage binary count
16	IC29 IC30	E6 1015	C.I. 4069 BP CMOS hey inverter
17	IC32	E6 1883	C.I. 4556 CMOS Ic dual 10f4 decoder
18	IC18 IC24 IC25	E6 1055	C.I. 40097 BP CMOS 3 stage non inverter buffer
19	IC8	E6 3365	C.I. 74HC00 TTL MOS quad 2-in nand gate or
		E6 1134	C.I. 74LS00 TTL quad 2-in nand gate
20	IC13	E6 1177	C.I. 74LS14 TTL hey Schmmit trigger
21	IC 17	E6 1432	C.I. 74LS156 TTL dual 10f4 decoder
22	IC16 IC22	E6 1433	C.I. 74LS157 TTL quad 2-in MPX
23	IC20	E6 1131	C.I. 74LS161 TTL sync. binary count.
24	IC14	E6 1788	C.I. 74LS393 TTL dual 4 bit binary count
25	IC7 IC12 IC26 IC34 IC38 IC39 IC40	E6 1225	Seven transistor array C.E.
26	TR1 TR2 TR3	E5 1438	Transitore silicio BC 548 NPN
27	TR4	E5 1290	Transitore silicio BC 337 NPN
28	D4	E5 1299	Diodo 1N 5400
29	D1 D2 D5÷D9	E5 1009	Diodo 1N 4003
30	D3	E5 1011	Diodo 1N 4148
31	BATT	E1 1396	Batteria 3,6V 100mA
32	SKIC 9	E7 1245	Zoccolo 40 vie 540 AG 11D
33	SKIC1 SKIC2	E7 3236	Zoccolo 28 vie 528 AG11D
34	SKIC4	E7 3080	Zoccolo 18 vie 518 AG11D
35	C1	E4 1118	Cond. elettr. 100uF 16VL vert.
36	C5	E4 1100	Cond. elettr. 10uF 16VL orr.
37	PC	E4 1005	Cond. ceram. 0,1uF 50VL
38	C4	E4 3095	Cond. ceram. 10KpF 50VL NPO
39	C6÷C13	E4 1159	Cond. ceram. 1kpF
40	C2	E4 1513	Cond. ceram. 470pF 50VL
41	C14	E4 1381	Cond. ceram. 220pF
42	C3	E4 1906	Cond. 10pF 50VL
43	R2÷R9-R25-R42÷R53-R102-		
	R112÷R117	E3 1171	Resist. 10K 1/4W 5% carbone
44	R10÷R21 R24 R35 R39 R40		
	R54÷R69 R74÷R93 R103÷R111	E3 1023	Resist. 5K6 1/4 W 5% carbone
45	R26÷R34 R41	E3 1164	Resist. 2K2 1/4 W 5% carbone
46	R37 R70÷R73 R94-R101	E3 1170	Resist. 1K 1/4W 5% carbone
47	R22 R23	E3 1392	Resist. 680 1/4W 5% carbone
48	R36	E3 1269	Resist. 390 1/4W 5% carbone
49	R1	E3 1409	Resist. 100 1/4W 5% carbone
50	R38	E3 3094	Resist. 22 1/2W 5% carbone
51	R118	E3 1194	Resist. 22K 1/4 W 5% carbone
52	XTAL 1	E1 1743	Quarzo 6MHZ HC 18/U
53	DIP 1	E9 1356	Dip switch 4 vie
54	LED 1	E5 1542	Led rosso FLV 110 (FLV 117)
55	IC2	E6 3221	Memoria B 2764 MOS 8192×8 EPROM
56	IC1	E6 1962	Memoria B 2532 MOS 4096×8 EPROM
57	IC1 (programmata)	EB 1141	Memoria B 2532 MOS 4096×8 EPROM tipo Pool Champion N. 1
58	IC2 (programmata)	EB 1142	Memoria B 2764 MOS 8192×8 EPROM tipo Pool Champion N. 2

Hb TAV. XV

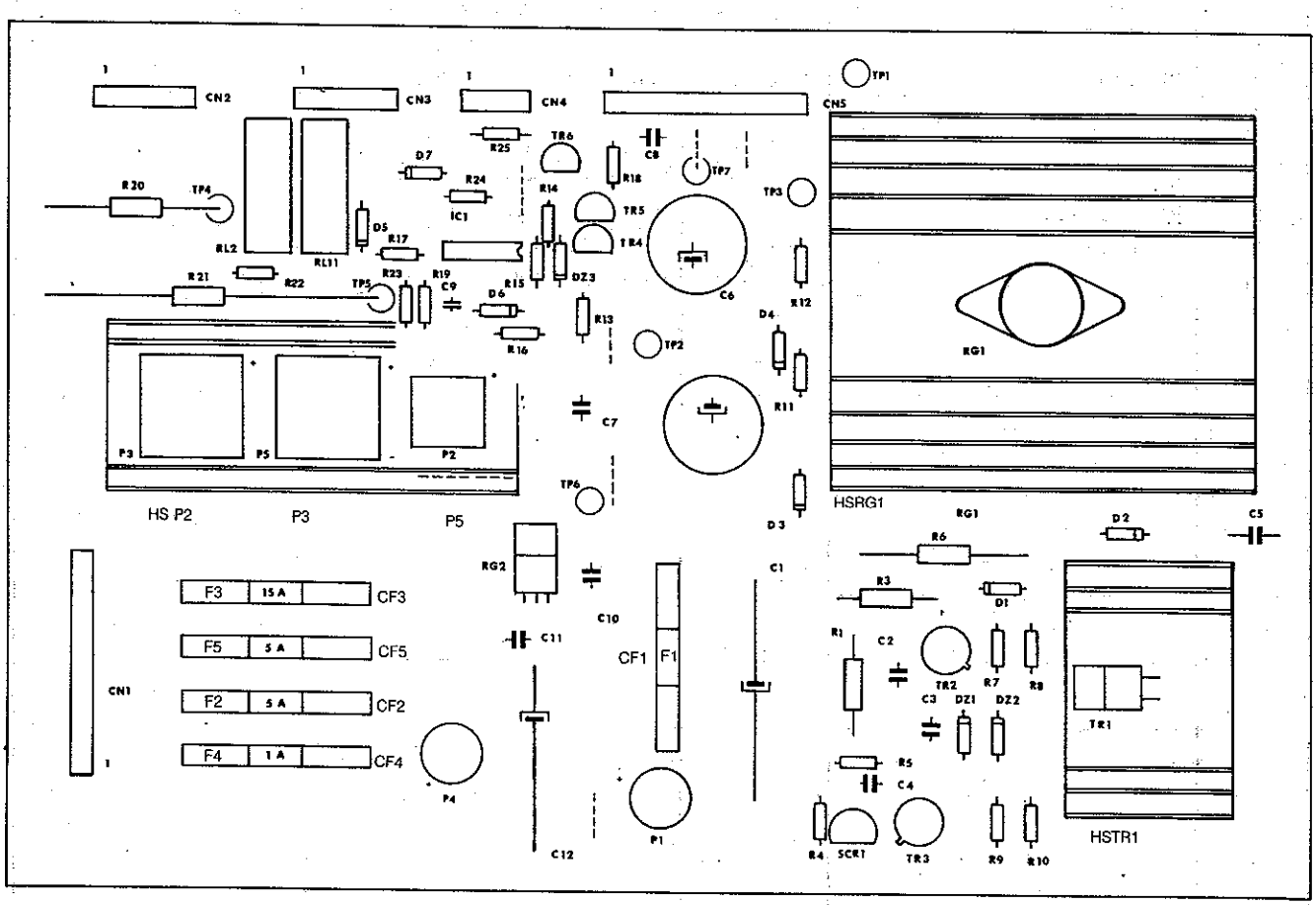
-EC 0181-SCHEDA INTERFACCIA



N°	RIFERIMENTO	CODICE	DESCRIZIONE
1	PC 1B 11 66	E1 2156	Scheda circuito stampato 1B 11 66
2	CN16	E7 1980	CNN 4 vie MTA maschio 640 383-4
3	CN17	E7 1982	CNN 12 vie MTA 640 383-12 maschio
4	CN18 ÷ CN22	E7 1981	CNN 20 vie MTIS 4-826379-0 maschio
5	CN15	E7 1351	CNN 20 vie Flat cable maschio
6	IC1 ÷ IC13	E6 1236	C.I. 4724 BC MOS 8 bit abb. latch
7	IC17 ÷ IC20	E6 1301	C.I. 7407 TTL hex buffer
8	IC14 IC15 IC16	E6 1215	C.I. 4050 BP CMOS hex
9	D1 ÷ D24	E5 1009	Diodo 1N 4004
10	D25	E5 1299	Diodo 1N 5400
11	SCR1 ÷ SCR63	E5 1249	SCR 2N 5060 PNPN 0,8A 30V
12	SCR64	E5 1217	SCR BF 422 NPNP
13	SCR65 ÷ SCR80	E5 1863	SCR C 106 Y1 PNPN 4A 200V
14	Q1 ÷ Q24	E5 1218	Transitore BD 649 NPN Darlinghton 10A 100V
15	PC	E4 1005	Cond. ceram. 0,1uF 50VL
16	C2 ÷ C19	E4 1159	Cond. ceram. 1KpF 50VL
17	C1	E4 1118	Cond. ceram. 100uF 50VL
18	C20 ÷ C43	E4 1260	Cond. poliest. 2,2KpF 100VL
19	R129 ÷ R146	E3 1170	Resist 1K 1/4W 5% carbone
20	R1 ÷ R79 R104	E3 1164	Resist. 2K2 1/4W 5% carbone
21	R80 ÷ R103	E3 1268	Resist 150 1/4W 5% carbone
22	R105 ÷ R128	E3 1269	Resist 390 1/4W 5% carbone

Hc **TAV. XVI**

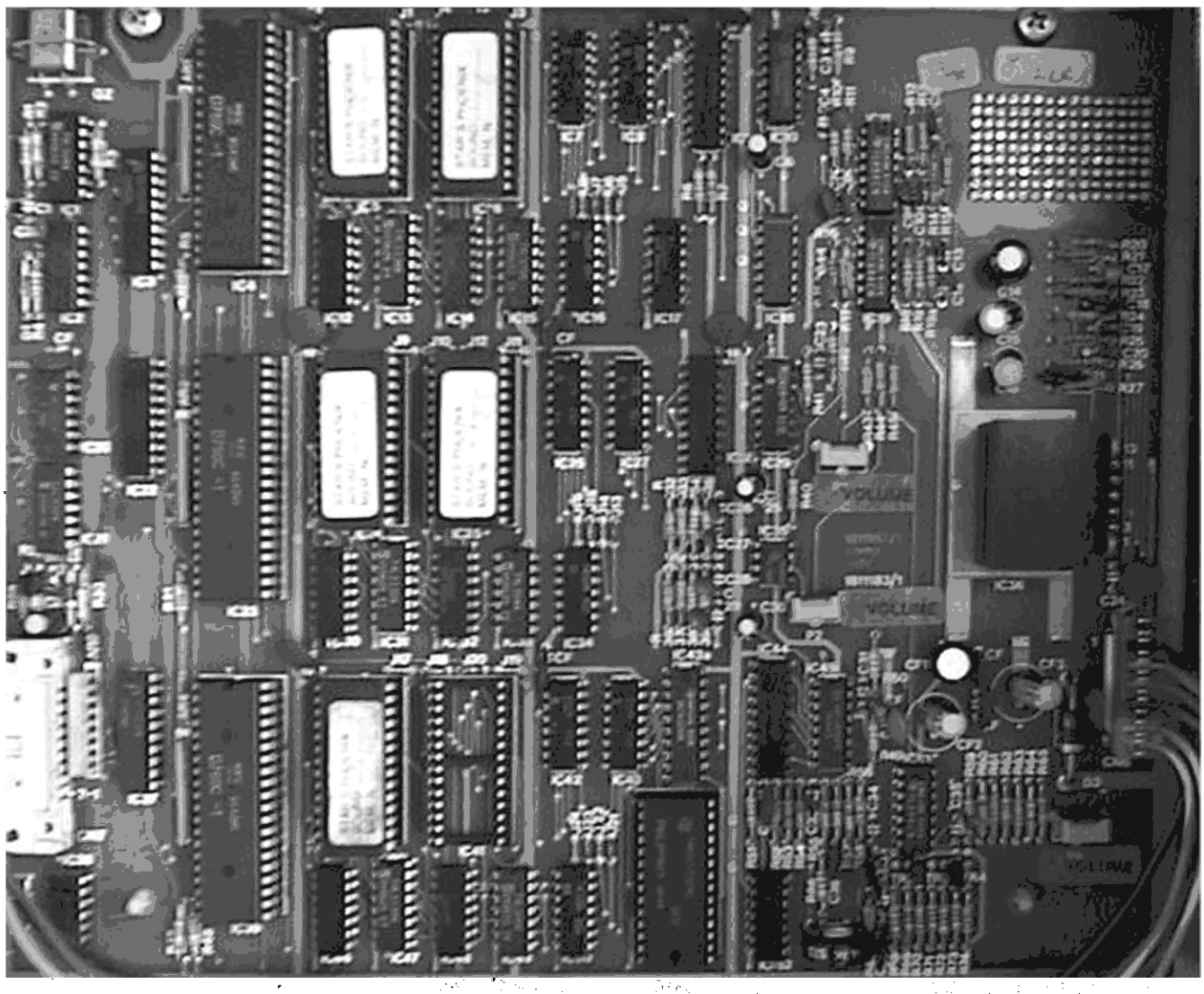
~EC 0179~SCHEDA ALIMENTATORE



N°	RIFERIMENTO	CODICE	DESCRIZIONE
1	PC 1B 11 67/0	E1 2157	Scheda circuito stampato 1B 11 67/0
2	CN1 CN5	E7 1982	CNN 12 vie MTA1-640 383-2 maschio
3	CN3 CN2	E7 1983	CNN 6 vie MTA1-640 383-6 maschio
4	CN 4	E7 1980	CNN 4 vie MTA 1-640 383-4 maschio
5	RG1	E6 1238	Regolatore di tensione +5V 5A 78H05KC
6	RG2	E6 1648	Regolatore di tensione - 5V 1A 7905UC
7	P1	E5 1274	Ponte rettificatore 400V 1A W04
8	P5	E5 1105	Ponte rettificatore 200V 10A KBPC 1002
9	P3	E5 1994	Ponte rettificatore 50V 25A KBPC 25005
10	P2	E5 1471	Ponte rettificatore 50V 8A KBPC 8005
11	P4	E5 1233	Ponte rettificatore 50V 1A W005
12	TR1	E5 1271	Transitore 2N 3585 NPN (2N 3584)
13	TR2-TR3	E5 1272	Transitore 2N 3439 NPN (2N 3440)
14	TR4-TR5-TR6	E5 1290	Transitore BC 337 NPN
15	D1-D2-D3	E5 1009	Diodo 1N 4004
16	D4-D5-D6-D7	E5 1539	Diodo 1N 4003
17	DZ1-DZ2	E5 1220	Diodo zener 75V 0,4W BZX 79c75
18	DZ3	E5 1996	Diodo zener 5,6V 0,4W BZX 79c5V6
19	IC1	E6 1803	C.I. LM 339 Linear quad comparator
20	SCR1	E5 3006	SCR MCR 100-5
21	C1	E4 1284	Cond. elettr. 100uF 350VL orr.
22	C2 C3	E4 1060	Cond. poliest. 10KpF 400VL
23	C4 C8 C11	E4 1005	Cond. ceram. 0,1uF 50VL
24	C6 C6/	E4 1979	Cond. elettr. 10000uF 16VL orr.
25	C5 C7 C10	E4 3079	Cond. poliest. 0,33uF 50VL
26	C9	E4 1903	Cond. elettr. 1uF 16VL vert.
27	C12	E4 1026	Cond. elettr. 1000uF 25VL orr.
28	R1	E3 1282	Resist. 100K 1W 5% carbone
29	R3	E3 3072	Resist 22K 4W 5% carbone
30	R4	E3 1166	Resist. 220 1/4W 5% carbone
31	R5	E3 3038	Resist. 2,2, 1/4W 5% carbone
32	R5*	E3 3037	Resist. 1R 1/4W 5% carbone
33	R6 R20	E3 1659	Resist 47 3W 5% carbone
34	R7 R11 R14 R15 R16 R18 R23 R24	E3 1170	Resist. 1K 1/4W 5% carbone
35	R8 R19	E3 1171	Resist. 10K 1/4W 5% carbone
36	R9	E3 1165	Resist. 4K7 1/4W 5% carbone
37	R10	E3 1167	Resist. 100K 1/4W 5% carbone
38	R12	E3 1269	Resist. 100 1/4 W 5% carbone
39	R13 R22	E3 1267	Resist. 1,5K 1/4W 5% carbone
40	R.17	E3 1163	Resist. 470 1/4W 5% carbone
41	R.21	E3 1263	Resist. 680 10W 5% carbone
42	R 25	E3 3220	Resist. 2,2 1W 5% carbone
43	CF1 ÷ CF5	E8 1401	Clips per fusibile 6,3 × 32 C.S.
44	F1 F4	E8 1365	Fusibile 6,3 × 32 1A
45	F2 F5	E8 1439	Fusibile 6,3 × 32 5A
46	F3	E8 1441	Fusibile 6,3 × 32 20A
47	HSRG1	E9 1278	Dissipatore 41/100/B
48	HSTR1	E9 1279	Dissipatore 17/40/C
49	HTP2 HSP3 HSP5	E9 3310	Dissipatore 17/100/D
50	HS TR3	E9 1280	Dissipatore ML61 TO5
51	RL1-RL2	E9 0155	Relè V 23027 B 13 A101
52	R15	E3 1039	Resist. 560 1/4W 5%
			NOTA: R5 è in parallelo a R5*

Hd TAV. XVII

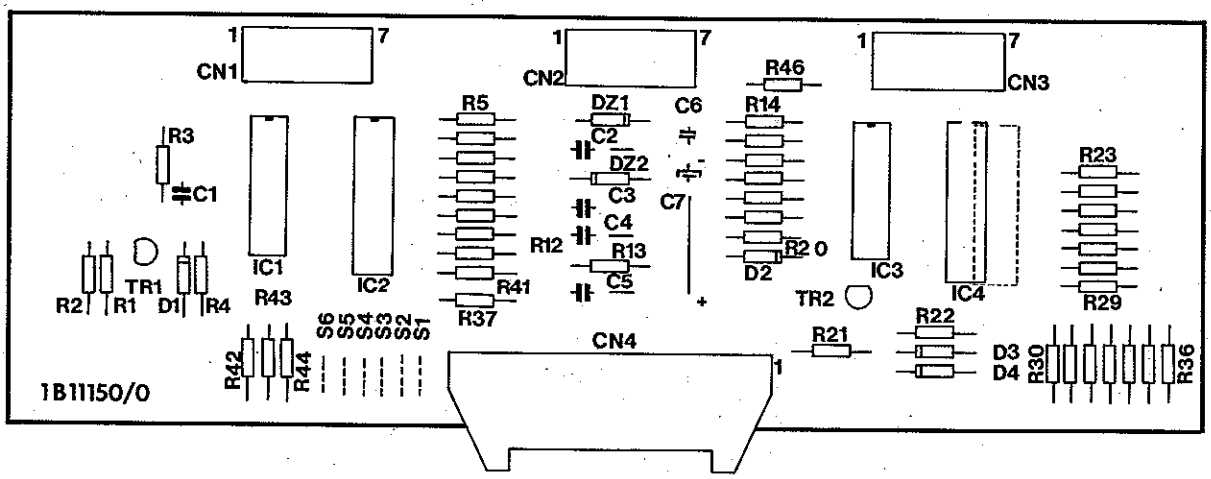
~EB 1106~ SCHEDA SUONO PARLATO ASS. SENZA MEMORIE
~EC 1045~ SCHEDA SUONO PARLATO ASS. CON MEMORIE



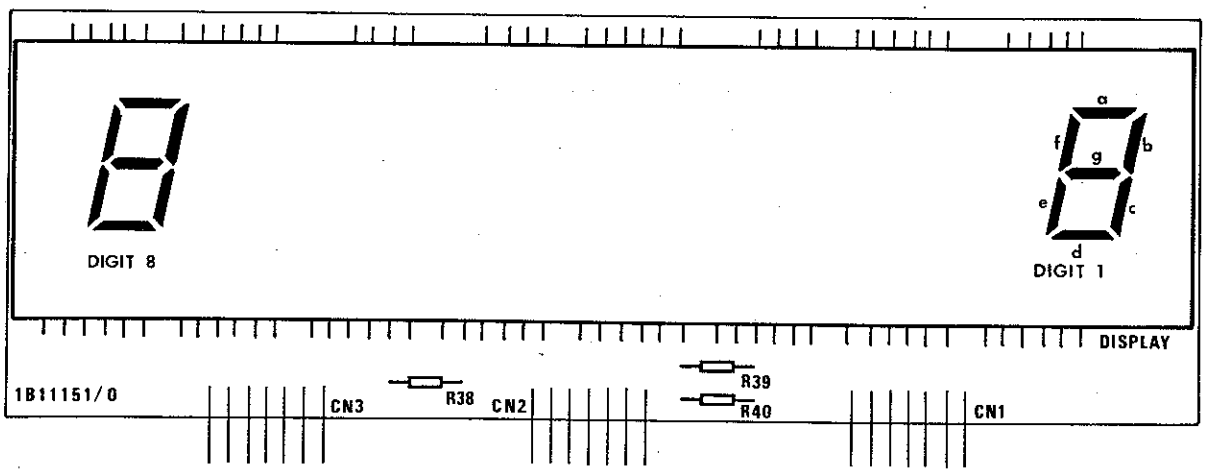
He TAV. XVIII

~EC 0330~ VISUALIZZATORE 8 CIFRE CON SCHEDA PILOTAGGIO

~EB 0256~ SCHEDA DI PILOTAGGIO VISUALIZZATORE 8 CIFRE



~EB 0257~ SCHEDA VISUALIZZATORE 8 CIFRE



N°	RIFERIMENTO	CODICE	DESCRIZIONE
1	PC 1B 11 150/0	E1 2264	Scheda circuito stampato 1B 11 150/0
2	IC1	E6 1236	C.I. 4724
3	IC2	E6 3337	C.I. 6510
4	IC3	E6 1235	C.I. 4511
5	IC4	E6 3338	C.I. 2823 (2823 o MC3491)
6	R1	E3 1417	Resist. 3K9 1/4W 5% carbone
7	R2	E3 1195	Resist 15K 1/4W 5% carbone
8	R3	E3 1163	Resist 470 1/4W 5% carbone
9	R4/R14/R15/R16/R17/R18/R19/R21		
	R22/R42/R43/R44	E3 1171	Resist 10K 1/4W 5% carbone
10	R5/R6/R7/R8/9/R10/R11/R12/R30		
	R31/R32/R33/R34/R35/R36	E3 1447	Resist. 330K 1/4W 5% carbone
11	R13	E3 3301	Resist 27K 1/2W 5% carbone
12	R20	E3 1170	Resist. 1K 1/4W 5% carbone
13	R23/R24/R25/R26/R27/R28/R29	E3 1408	Resist. 27K 1/4W 5% carbone
14	R37	E3 1035	Resist. 56K 1/4W 5% carbone
15	R41	E3 1452	Resist. 150K 1/4W 5% carbone
16	D1/D2/D3	E5 1011	Diodo 1N 4148
17	D4	E5 1009	Diodo 1N 4004
18	DZ1	E5 1220	Diodo zener 75V
19	DZ2	E5 1219	Diodo zener 33V
20	TR1/TR2	E5 1438	Transistore BC 237 o 2N 3909 o BC 548
21	C1	E4 1257	Cond. ceram. 100pF
22	C2/ C6	E4 1004	Cond. poliest. 0,1uF 250VL
23	C3/C7	E4 1005	Cond. ceram. 0,1uF 50VL
24	C5	E4 1399	Cond. poliest. 10nF 250VL
25	C7	E4 1903	Cond. elettr. 1uF 16VL
26	CN4	E7 1351	CNN 20 vie Flat cable maschio
27	CN1/CN2/CN3	E7 1377	CNN 7 vie CIS vert. 163680/5
28		A2 4467	Occhielli 22 × 40
29		A6 5323	Squadretta fissaggio visualizzatore
30		A2 5299	Vite M3 × 8
31		A2 4132	Dado M3
32		A2 4161	Rondella dentellata Ø3
33			Ponticello passo 7,5
34	R5 ÷ R12		Sostituibili con SIP 8 + 1 330K
35	R30 ÷ R36		Sostituibile con SIP 8 + 1 330K
36	R14 ÷ R19		Sostituibile con SIP 6 + 1 10K

N°	RIFERIMENTO	CODICE	DESCRIZIONE
1	P.C. 1B 11 151/0	E1 2265	Scheda circuito stampato 1B 11 151/0
2	R38/39/40	E3 1036	Resist. 1M 1/4W 5% carbone
3	DSP	E5 3333	Visualizzatore 8 cifre Philips monob.
4	CN1/CN2/CN3	E7 1347	Strip 7 vie CIS 163740/5

F.LLI ZACCARIA S.n.c.

di Zaccaria Marino - Franco - Natale

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