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FOR INSTALLATION QUESTIONS, CALL:

KITKORP

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GAMATRON
MANUAL

(INSTALLATION)

GAMATRON is a conversion kit for Bally standard body solid state pinball machines with the normal Bally size backbox.

The kit contains:

- 1 - Playfield with harness
- 1 - Backglass
- 1 - Pinstar Sound Memory board (PSM board) with two cables attached. One is plugged in board; one is soldered onto board.
- 4 - #44 lightbulbs
- 4 - Light sockets
- 10 - Screws (2 sizes)
- 6 - Red gels
- 1 - Sheet black plastic "O" and solid rectangles
- 1 - Set of cabinet decals, including left & right back box and left & right cabinet
- 6 - Richco printed circuit board mounts
- 1 - Red wire with terminal on each end
- 1 - 2 wire harness with connector
- 1 - 4 wire harness with connector. 2 wires are attached to volume control
- 1 - Ribbon cable with 40 pin connectors on each end (cable is plugged into Pinstar Sound Memory board. This is one of two cables attached to PSM board)
- 1 - Approximately 6 feet of wire for installation of "O" lights next to 6 digit score readouts
- 3 - Pinballs
- 2 - Heavy duty cabinet flipper switches
- 2 - 3 inch leg levelers to replace 2 inch levelers on rear legs (IMPORTANT)
- 1 - 8 amp slo blo fuse for F4 of Power Supply Board
- 1 - Ball shooter tip
- 1 - Manual (Installation) & 1 Manual (Operation)
- 3 - Extra Score Cards

The exclusive United States and Canadian distributor for GAMATRON is

KITKORP
2250 Elmhurst Road
Elk Grove Village, IL 60007
312-228-0451

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Hereafter the Pinstar Sound Memory Board may be referred to as "PSM board".

NOTE

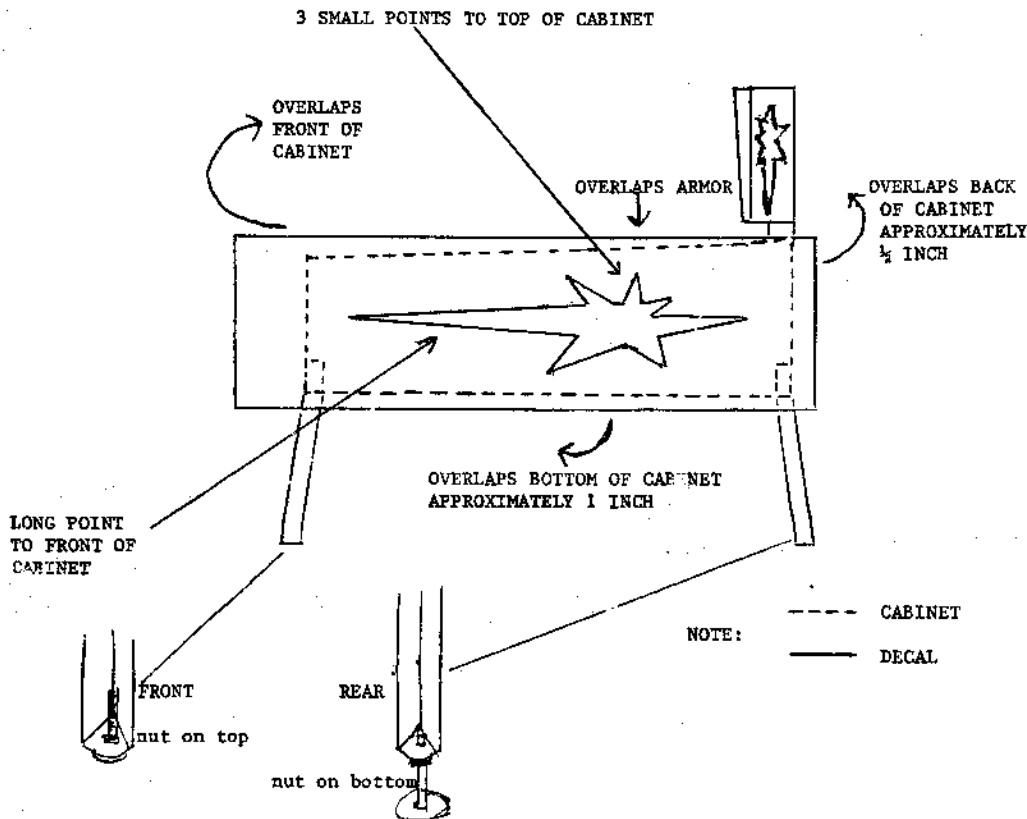
The printed circuit boards in the pinball game you are converting must work 100%.

Have your distributor test all printed circuit boards before starting the conversion to GAMATRON.

IMPORTANT

Check to see if the GAMATRON glass fits and aligns with the score readouts in your old game before starting the conversion. There are a couple of games that the GAMATRON glass will not fit.

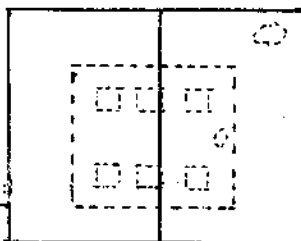
ILLUSTRATION 1



IMPORTANT!!!

Adjust leg levelers so game has maximum slant. Camatron is designed to play at $5\frac{1}{4}$ degrees of slant. Bally cabinets have $3\frac{1}{4}$ degrees of slant.

Operating with too little slant changes the play of the game drastically. IT WILL DECREASE EARNINGS.



CABINET DECALS OVERLAP FRONT OF CABINET AND MEET IN MIDDLE OF FRONT

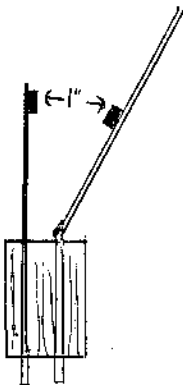


ILLUSTRATION #2

FLIPPER SWITCHES

BEFORE INSTALLATION

Bend long blade approximately 30 degrees or so that there is about 1 inch between contact points. Also be sure contact points are aligned when tightening switch to cabinet

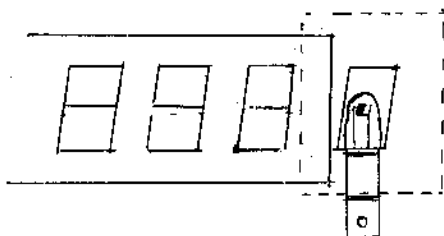


ILLUSTRATION #3

Align FILAMENT of lamp to center of score digits (6 digit games)

MPU BOARD

ILLUSTRATION 4

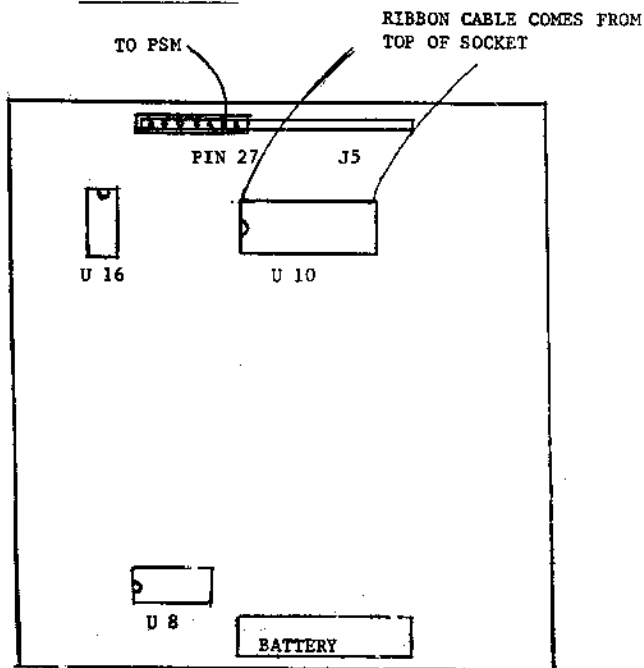
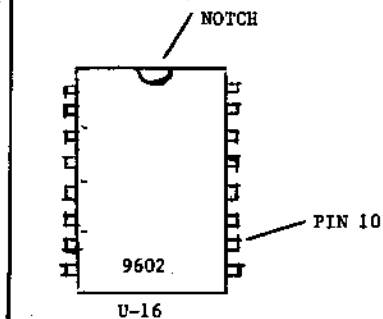
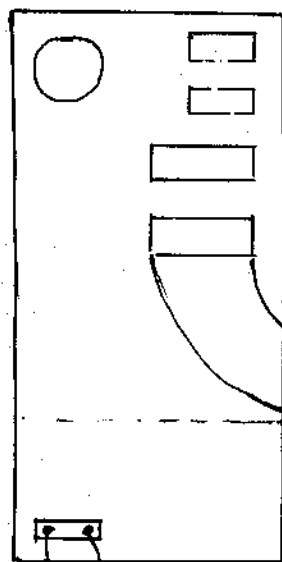


ILLUSTRATION #5
PSM BOARD



RIBBON CABLES COME FROM
BOTTOM OF SOCKET

GAMATRON INSTALLATION INSTRUCTIONS

A. GAME PREPARATION

1. Before you start to convert your old game, BE SURE your pinball game WORKS 100%. Run it through the self-test. If you are not sure, have the boards tested on a Bally or Stern test fixture made for this purpose. Many old games did not use all the components on the printed circuit boards (such as driver transistors on the Solenoid Driver Board), but GAMATRON requires that all printed circuit boards work 100%. Be sure all cables are intact, the coin switches are working, tilt mechanisms are OK, etc. Before you proceed, UNPLUG THE GAME. In addition, if the playfield glass is badly scratched, replace it.

2. Unplug and remove the old playfield. Remove the playfield hold-down brackets from the underside of the playfield. Save the brackets and screws. You will need them later. Vacuum out the inside of the cabinet and remove old debris.

3. Part of the old game's left wood support for the playfield may have to be sawed out to clear GAMATRON drop target bank. From the front of the cabinet measure 17" and 26", marking each of these measurements. Cut out the wood support between these marks. This piece usually can be knocked out easily with a hammer and chisel.

4. Remove the old backglass. Take off the black plastic channels around the sides and the silver channel along the bottom. Save these for a later step.

5. Disconnect the Bally sound board and remove the wires from the speaker, OR disconnect the chimes. In addition, disconnect the KNOCKER.

6. Wash down the game cabinet thoroughly, including the backbox. Paint the backbox outside BLACK. Also, paint black the top three inches of the INSIDE of the game cabinet (this will show above the new playfield when it is installed).

NOTE: If you are using paint other than spray paint (such as acrylic latex, which we do not recommend), you may have to prepare the cabinet surface with a DEGLOSSER which removes the gloss from glossy enamel paint. Otherwise the new paint may not stick. Deglosser is available at any hardware or paint store.

Let the paint dry before proceeding.

7. Apply the decals to the backbox. The long point of the star should point up. Two decals are supplied for each side of the backbox. These should overlap the top, bottom and back of the backbox. We suggest that you staple these overlapping parts to the backbox.

8. Remove the legs and ball shooter. Take one of the two long

cabinet decals supplied. Position it so that the long point of the star points towards the front of the game, and the three small points, point up. Position the side decal so that the bottom of the decal overlaps the bottom of the cabinet by about 1-2 inches and the back by about 1/2 inch. This way the top of the decal will overlap the side armor at the correct angle to cover all parts of the cabinet. Remove the backing and apply decal (see illustration 1). Repeat this procedure with the cabinet decal for the other side. You may want to wet down the sides of the cabinet with some slightly soapy water or plain water first, so that you can easily move the decal around. Once it's positioned correctly, squeegee the water out. Use an X-acto knife or sharp razor blade and trim the decal around the side armor, coin door, and ball shooter hole.

We suggest you STAPLE the overlapping edges of the decal to the underside and back of the cabinet. Re-install the ball shooter.

9. Find the two new 3-inch leg levelers (casters). Put these into the BACK legs of the game. Turn them all the way UP and re-install. Turn the levelers on the front, all the way DOWN and re-install on the game. The game front should be as low as possible and the back as high as possible. The nut on the front leg levelers should be above the leg bottom and the nut on the rear leg levelers should be under the leg bottom. (See illustration 1.)

10. Find the two NEW heavy-duty cabinet flipper switches and replace the OLD cabinet flipper switches. The old flipper switches are not adequate for GAMATRON'S high-powered flippers. Before installing the flipper switches, bend the long blade such that it is approximately 30 degrees from the short blade which should remain straight. (This will leave approximately an inch between contact points.) The "pre-bend" before installation insures that the proper pressure will be applied to the button for correct player "feel" (see illustration 2).

11. Install the new ball-shooter tip.

B. BACKGLASS AND BACKBOX

1. Lay the new backglass face down on a work surface. Find the five red rectangular transparent plastic pieces (called "gels"). Use a damp lint free soft cloth or paper towel to wipe the "gels" and backglass windows to remove dust and static electricity. Don't use anything but water to clean the gels as the red dye will smear or come off.

2. Using narrow clear tape (Scotch "Magic" tape or something similar), tape a red "gel" over each of the score display openings on the backglass. TAPE ALL FOUR SIDES OF EACH GEL TO SEAL THEM. THERE ARE SIX GELS; YOU WILL ONLY NEED FIVE. WASH YOUR HANDS FIRST AS GREASE, ETC. WILL ADHERE TO THE TAPE AND SHOW ON THE BACKGLASS.

3. FOR GAMES WITH SEVEN-DIGIT DISPLAYS: The windows for the score displays on the new backglass are longer than the windows on the old backglass. You will need to cover the space at the right end. (Be

sure the red gels are already in place.)

To do this, find the plastic rectangular piece with the black squares and zeroes. Cut out four of the black squares. Carefully scotch tape each one over the right end of each window, so only the score display is visible through each window. Trim off excess so plastic squares don't overlap the edges of the windows.

FOR GAMES WITH SIX DIGIT DISPLAYS: Find the four lamp sockets, screws, and green wire provided. Screw a lamp socket to the right of each of the four score displays. Put new lamps into the sockets you have just installed, being sure to align the filament of the light bulb (not the bulb itself) in the exact center of the score digit (see illustration 3). These will be used to underlight "dummy" zeroes. Wire each of the lamps to the nearest general illumination sockets inside the backbox door, using short pieces of the green wire provided, and running the wire through the score display cutouts in the backbox door.

Find the plastic piece with the black squares and cut out FOUR of the squares with zeroes. Use a very small piece of tape and tape a zero to the right end of each of the score display windows. These are "dummy" zeroes and will be backlit with added lamp sockets. Once you have installed the new lamp sockets, come back and adjust the "dummy" zero so that it lines up with the other digits in the display. Tape the top and bottom of each plastic so that each piece fits completely within the window. Realign the lamp if necessary so the filament illuminates the center of the zero.

Disconnect and remove 1st player-up, 2nd player-up, 3rd player-up and 4th player-up lights. Knock out and remove light shields around these lights. (Some games will not have these lights.)

Finally, find connector J1 on the MPU board. Remove wires, WITH PINS ATTACHED, in positions 1 through 6. Move each of these wires DOWN one space on the connector so that these wires now occupy positions 2 through 7. If there are wires only in positions 1 through 5, move them to occupy 2 through 6. If there are wires in positions 1 through 7, remove the wire in 7 and tape it with electrical tape; it is not used.

On the Ball in Play display, find the wire in position 8 and remove it. Tape it up with electrical tape. Remove the wires, WITH PINS ATTACHED, at positions 4, 5, 6, and 7 and move them over one to occupy positions 5 through 8. Find the wire with different type connectors at each end. Plug one end into position 4 of the Ball in Play display, and the other end into connector J1 on the MPU at position 1.

4. On the inside of the backbox door, disconnect the wires to the following lights: High Score to Date; Ball in Play; Match; and coin 1, 2, 3, and 4 lights. Rewire these sockets to general illumination lights.

Replace all the general illumination lamps in the backbox with new

lamps for a fresher look.

C. ELECTRONICS PREPARATION

1. Mount the Pinstar Sound-Memory board (PSM board) on the left inside of the backbox to the left of the MPU using the board mounts provided. Mount it with the flat capacitor at the TOP and the two connectors at the BOTTOM.
 2. Remove the 6800 microprocessor IC from the socket at U9 on the MPU board. Plug it into the UPPER 40-pin socket on the PSM board. Be sure that the notch at one end of the IC lines up with the notch in the 40-pin socket. Be careful not to bend any pins as you remove it from the MPU board or plug it into the PSM socket.
 3. Carefully cut and lift pin 10 of the 9602 IC at U16 on the MPU board (see illustration 4). Unplug and remove the IC at U8 near the battery. This is a RAM, designated as 5501 or 5101. Unplug and remove all the old game ROMS or EPROMS in sockets U1 through U6.
 4. Remove fuse at F4 on rectifier board and replace with 8 amp slo blo fuse (included in kit).
 5. Unscrew and remove the protective cage around the transformer and set it aside. On the transformer, between terminal 5 and 7, there is a jumper wire. Clip this or unsolder it and remove it. Unsolder the wire from terminal 5 and solder it to terminal 9. Between terminals 9 and 11, solder in a jumper wire. Reinstall the protective cage. This gives the solenoids a greater voltage and makes the playfield action more lively. Your game may already be wired this way but check it to be sure.
 6. Take the wire from the PSM board with the 7-pin connector. Plug this into the MPU connector J5 (at the top of the MPU), all the way at the left end, so that the wire goes to pin 27 of J5 (see illustration 2). J5 may have 32, 33, or 34 pins, so be careful.
 7. On the MPU connector J3, remove the wire at pin 3, and SPLICE into the wire at pin 2 on the same connector J3.
 8. Find the harness that has a black and a red wire with a 6-pin connector at one end and stripped ends at the other. This is the PSM connector J1. Plug one end into the PSM board at J1 with the red wire to the left (see illustration 3). Take the red wire and SPLICE the stripped end into the wire at pin 12 of MPU connector J4. Take the black wire and splice it into the wire at pin 19 of MPU connector J4. This provides 12 volts to the PSM board.
 9. Find the harness with 4 wires, a 9-pin connector at one end, and two free wires plus a volume control pot at the other end. Plug the connector into the PSM board. Run the wires through the backbox into the game cabinet. Solder the wire ends onto the speaker in the game.
- If there is no speaker in the game, you will have to provide an 8-OHM

speaker and mount it in the game. Cut a large hole for the speaker and cover it with a grill. Mount the speaker. Mount the volume pot with a cable tie near the front of the game.

TIPS: Don't substitute the large hole and grill with a bunch of holes drilled into the cabinet. This reduces the sound quality and reduces volume. You will also get much better sound if you use a decent car speaker in place of the original game speaker. The better the speaker, the louder and better the sound; adequate car speakers sell for about \$10 each.

10. Plug one end of the ribbon cable into the microprocessor socket (U9) on the MPU so that the cable goes up from the socket (see illustration 5).

11. Find the playfield hold-down brackets that you saved, and mount them onto the GAMATRON playfield. Mounting locations are factory spotted.

Drop the playfield into the cabinet. Pull the cables up through the backbox and plug the connectors into the boards as designated. NOTE: There are two different connectors on the cable to the rectifier board. Plug in whichever fits; cover the other connector with tape.

12. On the GAMATRON cable, find the loose wires that have the ORIGINAL GAME colors: grey, grey-black, and grey-red. Then go to the Lamp Driver Assembly connector J2 (NOT the Gamatron cable J2) and find the following wires: the wire at pin 11; pin 10; and pin 21. Remove each wire, WITH THE PINS, one at a time, and plug them into these loose wires as follows:

Take the wire from pin 11 (WITH THE PIN STILL ATTACHED) and plug it into the connector at the end of the loose grey wire. Take the wire from pin 10 WITH THE PIN, and plug it into the connector of the loose grey-black wire. Lastly, take the wire from pin 21, WITH THE PIN, and plug it into the connector of the loose grey-red wire. These connectors should plug into each other neatly. Insulate the connectors with electrical tape. Pin 11 goes to Game Over light. Pin 10 goes to Tilt light. Pin 21 goes to Shoot Again light. NOTE: some games have an inexpensive connector at J2 with no removable pins. In this case, you'll have to clip the connectors off all the loose wires and SPLICE THEM TOGETHER instead of plugging them.

Disregard the remaining two wires.

13. On the GAMATRON cable, find the loose red, blue, yellow-red, and brown-yellow wires. Then, go to the game Solenoid Driver board and find the following wires from the original game connector J2 (NOT the Gamatron cable J2): pin 1, 2, 7, and 8. Remove these wires WITH THE PINS, one at a time, and connect as follows: J2 pin 1 into the connector on the red wire; pin 2 into the connector on the blue wire; pin 7 into the connector on the yellow-red wire; and pin 8 into the connector on the brown-yellow wire. Insulate these connectors with electrical tape. NOTE: some games have an inexpensive connector at

J2 with no removable pins. In this case, you'll have to clip the connectors off all the loose wires and SPLICE THEM TOGETHER instead of plugging them.

14. Set the MPU board dip switch settings. Recommended settings are shown on the following chart. NOTE: Dip switches MUST be set and bookkeeping and scores MUST be zeroed before game will operate properly.

15. Double check your connections before powering the game up. Drop the THREE balls into the game, and power up. Some of the solenoids will activate until all three balls are in the outhole, when it will go into the attract mode. You MUST now clear ALL bookkeeping functions for proper functioning of game and score readouts (Use SW. 33 on MPU to clear).

Put the black plastic and silver metal extrusions on GAMATRON backglass. Older games use 3/16" glass, and newer games used 1/8" glass. The GAMATRON backglass is 1/8". If the game you are converting has 3/16" glass, put tape around edges so that the extrusions fit tight.

16. Set score-to-beat levels (replay levels), including high score-to-date. Use the switch on the coin door to set these, same as the old Bally game. Recommended settings are as follows.

RECOMMENDED SETTINGS

3 BALL 5 BALL

1st Level 850,000 1,400,000

2nd Level NR NR

3rd Level NR NR

High Score
to Date 1,200,000 2,000,000

Recommended Free Play percentage is 17 to 25%. If all same adjustments are per recommendation and game is at proper slant, clean, etc., the game should play

within this range. Raising or lowering the Score to Beat is recommended over changes of features (MPU switch settings). If your Free Play percentage does not fall in this range you should recheck your game for malfunctions, MPU switch settings and slant, and if necessary raise or lower the Score to Beat. For VERY low skill locations, move the outlane adjustment post to narrow the opening into the outlanes. This will increase play time and Free Play percent. A very low skill location would be defined as when the percentage of extra balls (bookkeeping #13) is less than 7% of the total balls played (bookkeeping #12). 10% is average, 13% is high. Above 13% indicates not enough slant on game or dirty game (game becomes more liberal as it gets dirty) or VERY high skill players (a rarity).

SWITCH ASSIGNMENT

						ON	OFF
32	WOW	WOW	NR	*	NR	X	
31	Award	NR	*	NR			X
30	Multiplier - Reset or Leave After Drain				NR		X
29	WOWS - Per Game or Per Ball						X
28	Coin Chute #3						X
27							X
26							X
25							X
24	Missile 1-2 kites W/Balls				X		
23	In Lane Not Used						X
22	Reset Summer - Reset or Leave After Drain				NR		X
21	Add 10% Replay				NR		X
20	Credit Display				X		
19	Maximum Credits						X
18							X
17							X
16	High Game To				X		
15	Date Features (NR) *						X
14	Background Sound						X
13	Tie R & O return lanes						X
12	Coin Chute #2						X
11							X
10							X
9							X
8	Maximum Add-A-Balls						X
7	Ball Per Game						X
6	High Score Feature				X		
5	Add-A-Ball (Memory)						X
4	Coin Chute #1						X
3							X
2							X
1							X

ABOVE SETTINGS HAVE MATCH FEATURE (ADD 10% REPLAY) TURNED OFF (DIP SW. 21)