

# ONTARGET

Gottlieb

TECHNICAL NEWSLETTER

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## DROP TARGETS

### PART II

#### DROPPING COILS

To replace a dropping coil the bank must be removed from the game. Disconnect the bank's Molex plug and remove the back plate as previously discussed. It is recommended that the brackets on the back of the bank be left screwed to the playfield, ensuring target alignment with the playfield slot upon re-installation. Unscrew the two playfield screws on the opposite side and remove the bank.

Unsolder the wires from the faulty coil. The securing nut under the coil must be removed because the screw in the drop coil is molded to the coil and cannot be removed.

With the back plate and the target of the defective coil removed, loosen the coil nut with an 11/32" wrench. After extracting the coil, remove the armature by carefully removing the wire retaining clip. Install both on the new coil. When soldering the wires to the new coil, be sure the diode is positioned correctly and is not defective.

Reassembly of the bank is the reverse of the above procedure. If the back plate brackets were removed or

loosened from the playfield, the targets must be aligned in the playfield slot before

the four securing screws are tightened. With the targets in the up position, there should be approximately a 1/32" clearance between the targets and the front of the slot. Check the spacing at each end of the target bank.

(continued on p. 2)

TARGETS	COILS	COIL NO.	RESISTANCE	FUSE
3*	1	A-18102	9 OHMS	1 AMP
4	1	A-18318	6.7 OHMS	2 AMP
5	1	A-17891	3.3 OHMS	2 AMP
7	2	A-18102	9 OHMS	2 AMP

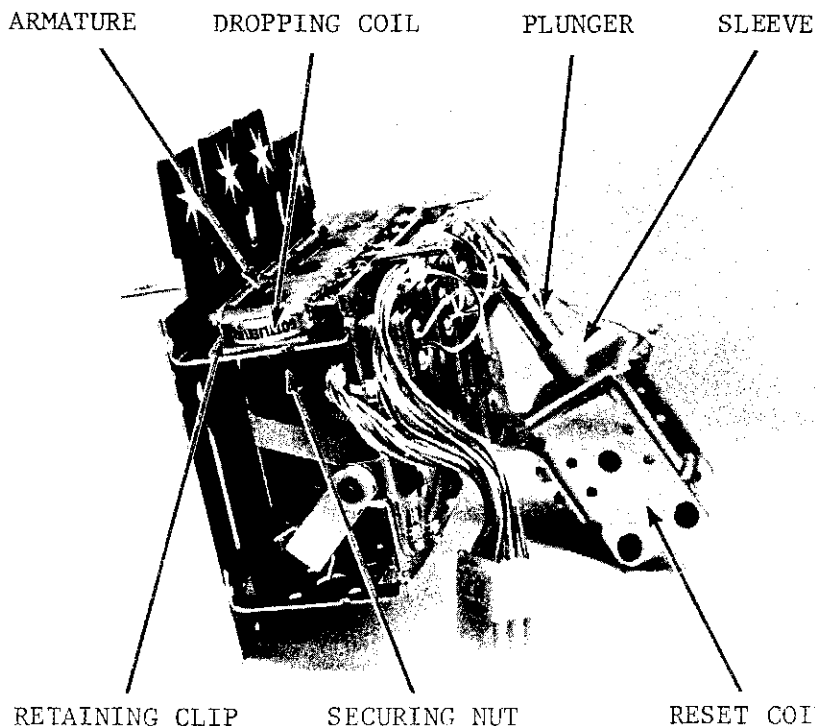
All fuses are Slo-Blo

\* Used in a four bank frame

Spring from target arm to frame: A-517

Spring from target arm to target: A-18995

Dropping coil: A-18642



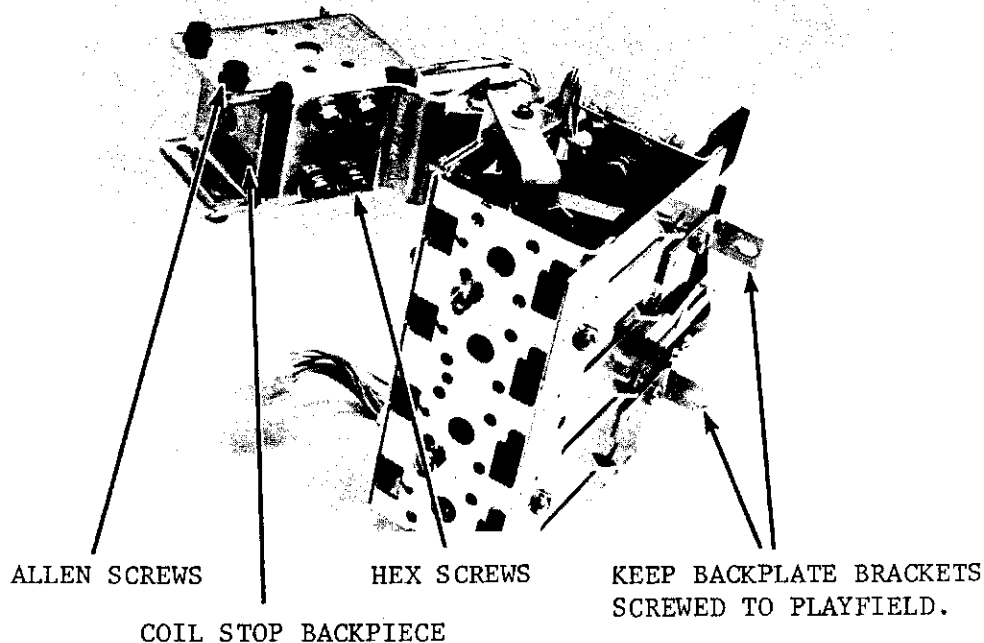
# DROP TARGETS

(continued from p. 1)

## THE RESET COIL

To remove the bank reset coil, unsolder the wires and unscrew the four slotted hex-head screws. A screwdriver may be used, but a 1/4" socket driver is recommended for better tightened screws. Remove the four allen-headed screws using a 9/64" wrench and work off the coil-stop backpiece. Withdraw the coil and examine the plastic sleeve for signs of melting or cracks and replace if any are found. Be certain the diode on the new coil is positioned correctly. Insert the new coil and push the coil stop tightly against the coil and replace the allen-head screws.

Two adjustments must be made before the coil housing screws are fully tightened. First, the plunger stroke is adjustable by moving the coil. Hold in the plunger against the coil stop. The targets should be slightly past their reset position, but the lip on the lower end of the targets must not touch the frame. Finally,



make certain that the plunger moves freely within the coil. Proceed to tighten the four hex screws.

## MISCELLANEOUS

Switches pressing too hard against the target arm could prevent the target from dropping smoothly and completely. Adjust the switches for slight overtravel. Keep the target shanks lightly coated with White Lube and add a drop of light oil (10 Wgt.) to the pivot

points of the reset bar when necessary. If the pivot rod should ever be removed (such as to replace a target arm), be sure that the wire spring located at one end does not fly free and that it is replaced correctly when the rod is re-inserted.

## VIDEO AID

A toll free number for Gottlieb video game assistance is now available for use (except Illinois residents). Call 800-323-1114 for technical assistance from 8:00 a.m. - 4:30 p.m. CST. For Illinois residents, call 312-562-7400 and request technical assistance for video games.



D. Gottlieb created the first flipper game in November 1947. It was called HUMPTY DUMPTY and had six flippers. Two sets of three flippers were

each operated by a single solenoid through connecting linkage. The inventor of the flipper was Gottlieb designer, Harry Mabs.

MAILING LIST: Get ON TARGET every month by sending your name and mailing address to:

ON TARGET  
GOTTLIEB AMUSEMENT GAMES  
165 W. LAKE STREET  
NORTHLAKE, IL 60164

# Auxiliary Lamp Driver Board

The Auxiliary Lamp Driver Board, introduced in the game Time Line, is the newest addition to System 80 circuitry. Its controlled or free-running sequential lamp strobing enhances the attract and game play modes of our games. The circuit controls ten MPS-U45 transistors (Q1-Q10) which sequentially drive up to 30 #44 lamps (three lamps per transistor maximum). Strategically positioned lamps in the lightbox or on the playfield can create great lighting effects.

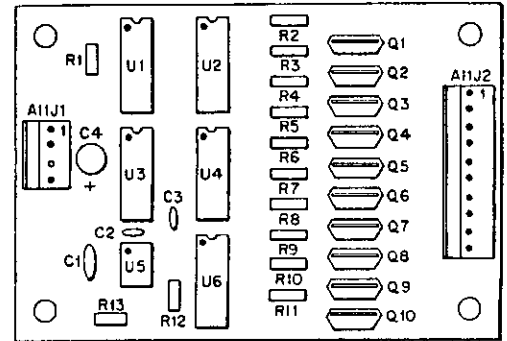
An LM555 (U5), used as an astable multivibrator, generates a nine hertz frequency. The nine hertz frequency is gated into a 7490 decade counter (U3) through U1 (Pin 2), a 7400 NAND gate. An

external control can enable or disable the driver circuitry at Pin 1 of U1. A logic low on Pin 1 will turn off the lamp strobing. If no external signal is used, as in Time Line, the 3K pull-up resistor on Pin 1 provides a logic hi to U1, enabling the driver circuitry.

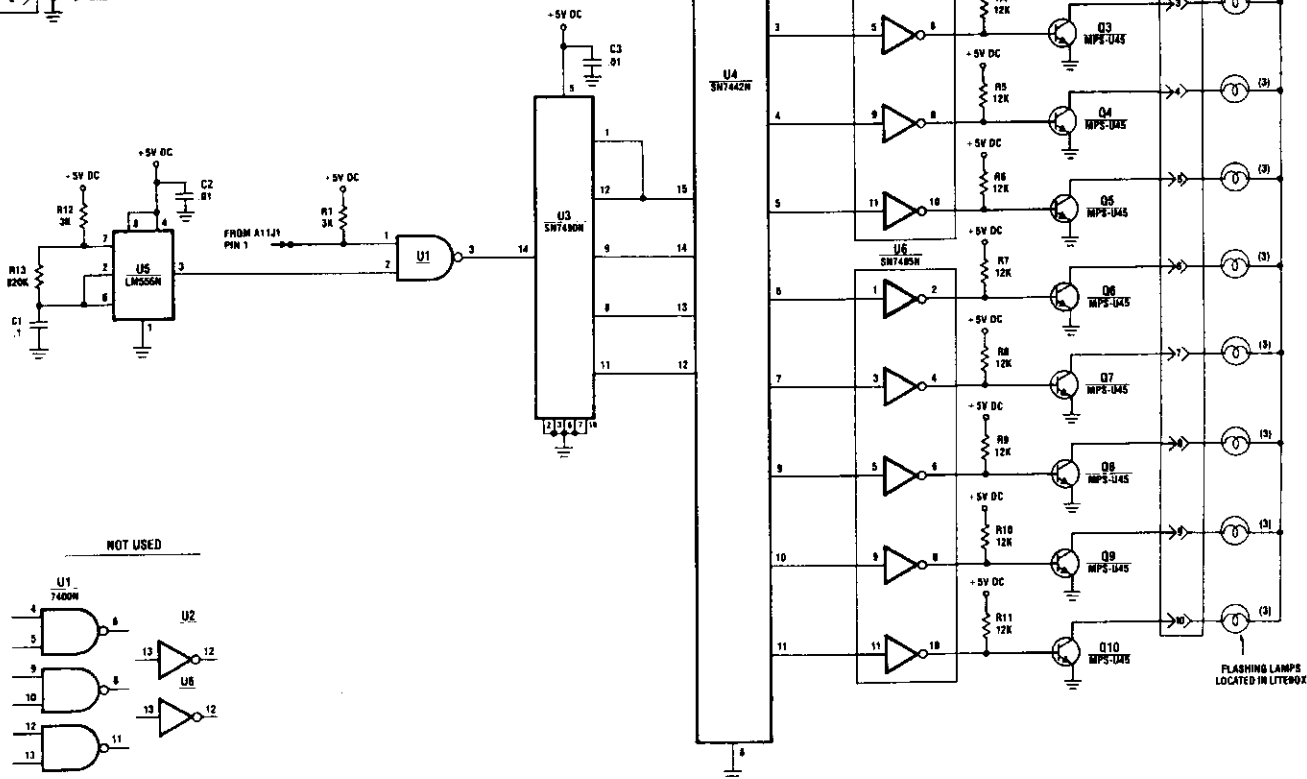
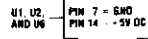
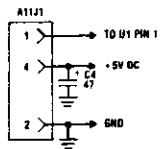
The nine hertz signal is then applied to Pin 14 of U3, the 7490 decade counter. A BCD count is then produced at Pins 12 (1 bit), 9 (2 bit), 8 (4 bit) and 11 (8 bit).

The 7442 4-line to 10-line decimal decoder (U4) receives the BCD count and generates a low logic pulse at the output

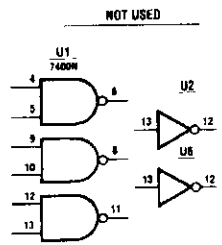
respective to the BCD count. The 7405 (U2) inverts the pulses to provide .11 second positive going pulses sequentially to the bases of the driver transistors.



COMPONENT DIAGRAM



FLASHING LAMPS LOCATED IN LIGHTBOX



AUXILIARY LAMP DRIVER BOARD  
SCHEMATIC

# "FORCE II" Pinball Tips

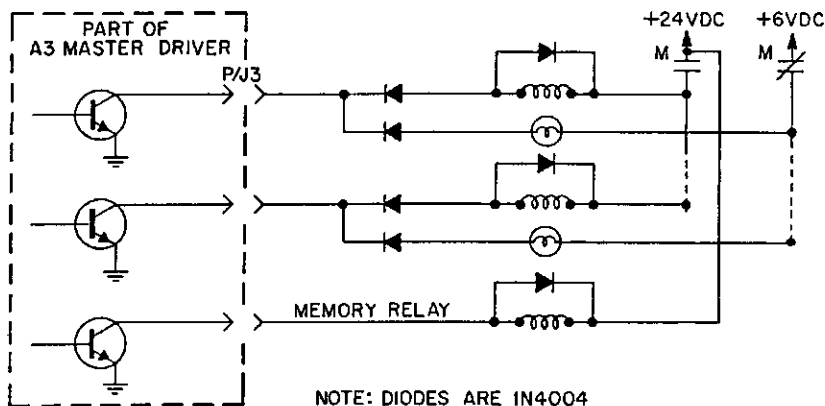
Force II controlled playfield features go beyond the capacity of the system driver board. The combination of a diode network and the memory

relay (M) allows Force II to use individual driver transistors to control both drop target dropping coils (for memory recall) and playfield lamps. The dropping coils operate at 24 VDC, and the lamps operate at 6 VDC.

When individual drop targets are dropped due to memory recall or when spotted during game play, the M relay is energized. This closes the +24 VDC contact and opens the 6 VDC contact. The appropriate driver transistor is then

triggered to pulse the dropping coil. Otherwise, the 6 VDC contact is closed and playfield lamps become lit, dependent on game play.

The lamps are protected by a 1N4004 diode in series. This prevents 24 VDC current from passing through the lamps when the M relay becomes energized. The 1N4004 in series with the dropping coil isolates the 6 VDC from the coil and clamping diode. Refer to the Force II game manual, page 12.



## Next Month:

**POP BUMPERS:** Theory of operation utilizing the pop bumper driver board; general troubleshooting and repair of pop bumpers and the driver boards.

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**ON TARGET**

Gottlieb Amusement Games  
165 W. Lake Street  
Northlake IL 60164