

ON TARGET

Gottlieb

TECHNICAL NEWSLETTER

VOLUME 2 ISSUE 3

MARCH, 1981

FLIPPERS

Electrical flipper operation is shown in Figure I. All contacts are shown in attract mode positions. During game play, the Game Over Relay (Q)* energizes and closes the Q contact (dashed lines). When a player presses the flipper button, the 24 VDC voltage generates a current that passes through the end-of-stroke switch and the low resistance windings of the flipper coil (direction indicated by dark line). The plunger is pulled into the coil core with the end-of-stroke switch contacts opening approximately 1/16" before full plunger stroke. The 24 VDC is now applied to the full winding, increasing the current (direction indicated by dashed line). This protects the coil from burn-out when the flippers stay energized. Poor flipper power or a high burn-out rate for coils may result if the end-of-stroke switch is not adjusted as mentioned above.

When a tilt condition occurs, the Tilt relay* is energized. Subsequently,

* Game Over and Tilt relays controlled by system control board. See game manual.

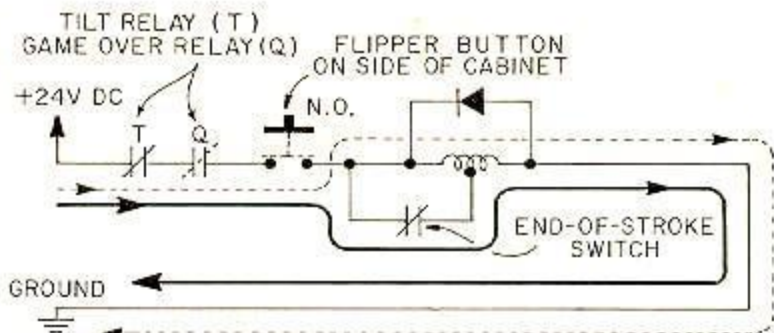


FIGURE I.

the T contact opens, deactivating the flippers.

Flipper coils and their ratings are listed on page 4. The 1N4004 diode across the flipper coil suppresses any transient voltage spikes developed when the flipper button switch opens.

FLIPPER REPLACEMENT

(Refer to Figure II)

1. Lift playfield and secure with bracket.
2. Loosen both socket head cap screws with a 5/32" allen wrench.
3. Slowly pull flipper shaft assembly away from flipper unit and playboard.
4. Unscrew pan head screw holding flipper to flipper shaft.
5. Pull flipper from shaft.
6. Remove rubber ring from defective flipper and install on a new flipper.
7. Align and press new

flipper down on the flipper shaft pin.

8. Screw and tighten pan head screw to flipper.
9. From the playfield top, insert the flipper shaft assembly through the flipper unit.
10. Align and hold flipper on playfield for proper position.
11. Tighten both cap screws.

FLIPPER COIL REPLACEMENT

1. Lift playfield and secure with bracket.
2. Unsolder the wires from the three coil terminals. Note the wire-to-terminal connections of the end-of-stroke switch, the diode, the ground wire (GRN/YEL 54), and the wire leading to the flipper button. See Figure II illustration.

(continued on p. 2)

FLIPPERS

(continued from p. 1)

- Remove the coil stop bracket by unscrewing the two hex screws with a 1/4" hex nut driver or a regular screwdriver.
- Pull the coil away from the plunger assembly.
- Pull the plastic sleeve out of the bad coil and insert it into the new coil.
- Slide the new coil onto the plunger assembly, insuring that the spring washers slide over the plastic sleeve.
- Replace and screw the coil stop bracket into place.
- Solder the wires and diode to their proper terminals.

Figure III is a flipper assembly occasionally used when flippers are positioned in the upper portion of the playfield where lack of space does not permit the flipper assembly of Figure II. The end-of-stroke switch is screwed to the playboard and positioned so that the flipper lever arm opens its contacts during flipper activation.

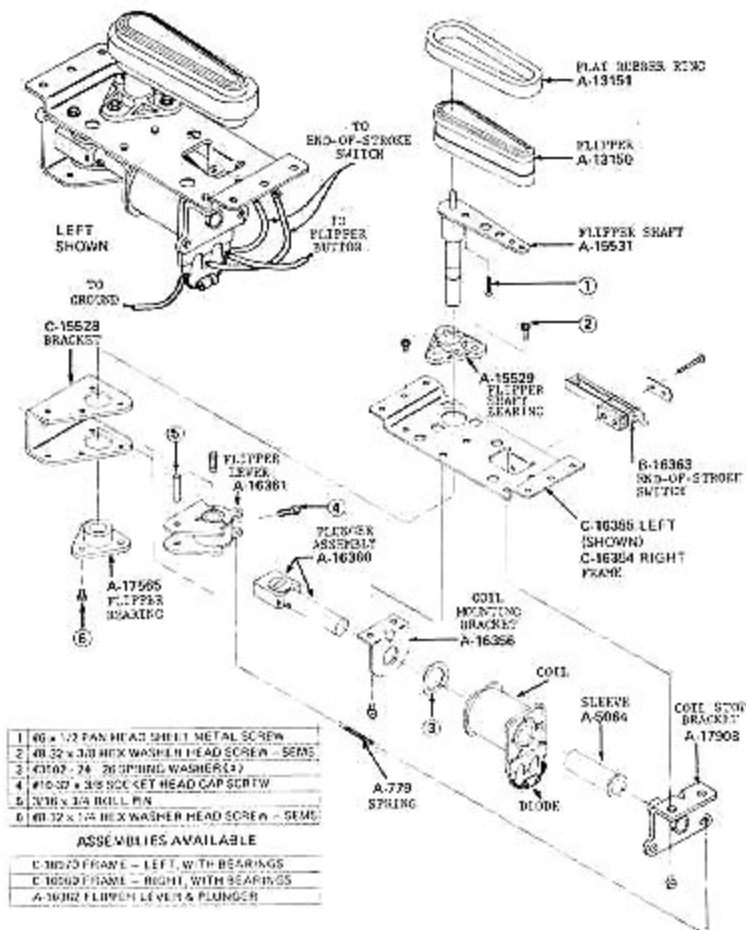


FIGURE II. BASIC FLIPPER ASSEMBLY

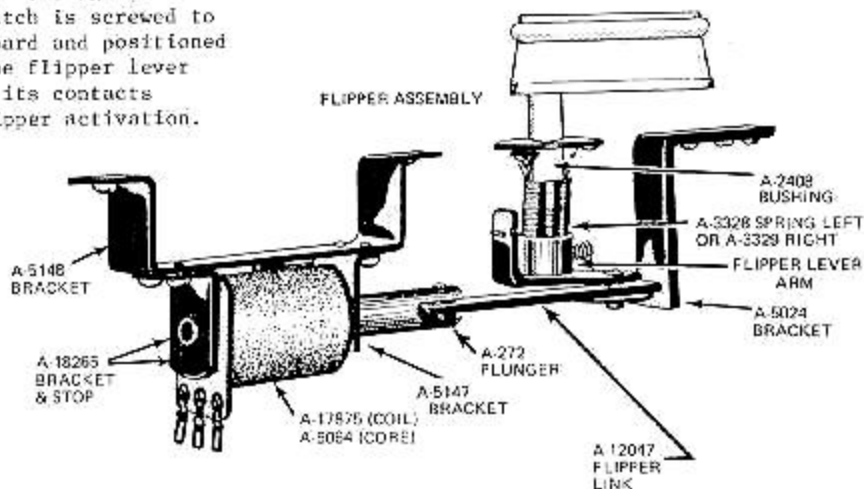


FIGURE III. ALTERNATE FLIPPER ASSEMBLY

SOLENOID COILS

PART NUMBER	GENERAL USAGE *	RESISTANCE (ohms)	NUMBER OF TURNS	WIRE GAUGE	WRAPPER COLOR
A-1496	kicker rubbers pop bumpers	2.95	635	#23	Yellow
A-5194	gong	4.5	780	#24	Blue
A-5195	knocker, hole kicker	12.3	1305	#26	White
A-16570	hole kicker, outhole	15.5	1450	#27	Green
A-17875	flippers	2.8/40.0	560/1100	#24/31	Yellow
A-17891	5 bank reset	3.35	650	#22	White
A-18102	3 bank reset, 7 bank reset uses 2	9.0	1430	#24	Red
A-18318	4 bank reset	6.7	1130	#24	Orange
A-19300	ball kicker	7.8	1075	#25	Orange
A-20095	super flipper	1.55/35.5	450/900	#22/31	Red

RELAY COILS

A-16890	Q, T, and coin lockout relays	231.0	4000	#35	Orange
A-17564	gate relay	156.0	1400	#34	White
A-18642	memory/ drop targets	58.0	1590	#33	White

* Coils may vary from game to game. Check game manual for exact coil usage.

Normally, all coils are powered by +24 VDC.

GOTTLIEB COIL CHART

In the past, many operators have commented that Gottlieb does not provide enough information on its coils. Hopefully, the following coil information chart will aid all operators with quick and proper coil replacement.

Next Month:

ROTO UNITS: Theory of operation and how to make repairs and adjustments.

VIDEO SERVICE: Service tips on Gottlieb's video game, New York-New York.

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Gottlieb Amusement Games
165 W. Lake Street
Northlake IL 60164