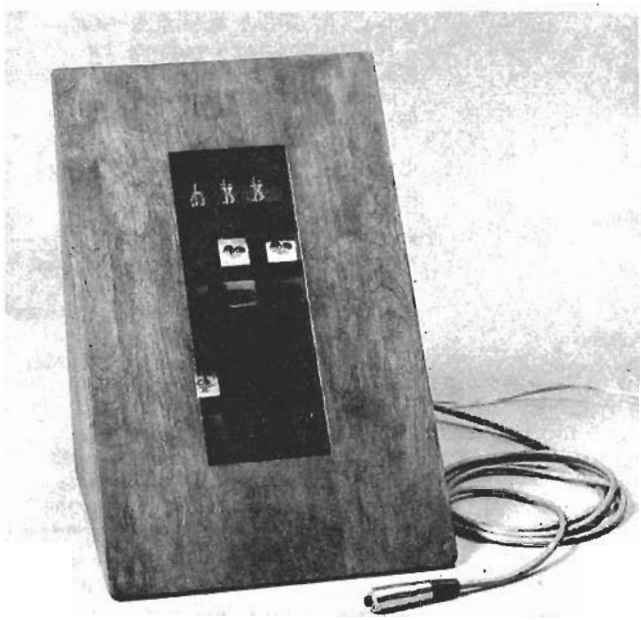
Build This Electronic Slot Machine



Here's a device that will make a nice addition to your den. It has, in addition to the display symbols, a 3-digit readout of the running tabulation of all winnings

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ANYONE LOOKING FOR A UNIQUE AND CHALlenging project will find this Electronic Slot Machine well worth the time and energy. Costing only $50 to $60 for parts, this digital project yields a form of entertainment that few people have access to.

One of the primary considerations in designing this project was that it must lend itself entirely to those of us endowed with vast quantities of natural laziness. This being the case, the arm that is normally pulled to initiate a "play" is replaced with a remote pushbutton switch. The numerical readout of an internal accumulator keeps a running tabulation of all winnings and automatically decrements each time the PLAY pushbutton is depressed.

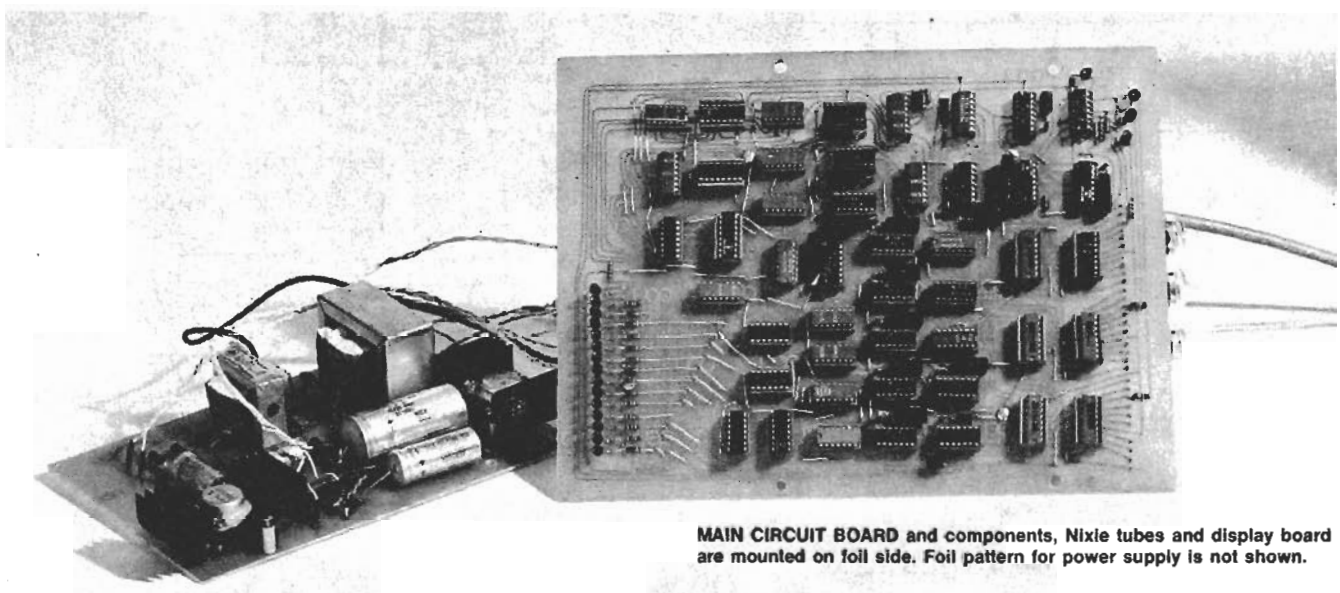
The actual display consists of 35-mm slides (unmounted) of whatever object you wish to use. The standard display symbols used in slot machines are: cherries, oranges, plums, bells, and the word jackpot. Also watermelons, lemons, genies, and others are often used. The slides are arranged in 3 columns of 5 slides each. Each slide is mounted over an individual lamp for illumination.

To start, a RESET pushbutton located on the back panel is depressed. This presets the numerical readout to a count of 10. With the slot machine reset, a PLAY lamp located above the display-symbols lights and a play cycle can be initiated by depressing the PLAY pushbutton. During the play cycle, one slide in each column lights sequentially—one slide in the first column, then one slide in the second column and finally, a third symbol in the last column. At this point, if the combination of symbols results in a payoff, the numerical readout is incremented accordingly. The PLAY lamp lights automatically to enable another play cycle.

When the power is first turned on, the digital circuitry quickly assumes a quiescent state and the readout displays some large number. It is necessary to clear the accumulator and preset a count of 10 by depressing the RESET pushbutton.

How it works

Referring to the block diagram shown in Fig. 1 and the complete schematic shown in Fig. 2, the RESET pushbutton



MAIN CIRCUIT BOARD and components, Nixie tubes and display board are mounted on foil side. Foil pattern for power supply is not shown.

triggers reset one-shot IC3. The output of the reset one-shot clears the up-down counters IC42, IC43 and IC44. The accumulator is comprised of these three up-down counters. The readout is now 0-0-0. The output of the reset one-shot triggers one-shot (IC4) to generate a delay, which insures that the accumulator is reset before the payoff sequence is initiated. The trailing edge of the delay-pulse triggers a payoff one-shot (IC34) that gates ten pulses into the up-down counters, setting the accumulator to 0-1-0. Each time a play cycle is completed, the accumulator is decremented by 1. After the RESET pushbutton is depressed, ten play cycles can be completed with no payoffs before a 0-0-0 is displayed and the play cycle is disabled.

With the slot machine reset, the PLAY lamp is on and the PLAY pushbutton can initiate a play cycle when depressed. The PLAY pushbutton triggers IC1. The output of IC1 enables five other circuits. Simulating a coin being played, IC1 decrements the accumulator by one count, resulting in a readout of 0-0-9. The three wheel-spin one-shots (IC9, IC10 and IC11) are also triggered at this time. The wheel-spin one-shots allow the display to give the appearance of spinning wheels. The time duration is set so that they stop in sequence, each being on longer than the previous one by a few seconds.

The oscillator enable one-shot (IC2) enables IC8-a, which allows the pulses to enter the three decade counters IC12, IC13 and IC14. These counters have their decoded outputs connected to the odds-determining gates IC18 to IC21. The gates are wired to give a predetermined number of chances for each display symbol to light. The output of the oscillator enable one-shot also dis-

PARTS LIST, MAIN BOARD

All resistors are 1/4-watt, 10%, unless otherwise noted

R1, R4, R13–R27, R35, R43—1,000 ohms
R2—10,000 ohms
R3, R5—33,000 ohms
R6, R7, R11—20,000 ohms
R8—300 ohms
R9—1100 ohms
R10—13,000 ohms
R12—27,000 ohms
R28—3900 ohms
R29, R30, R32—12,000 ohms
R31—17,000 ohms
R33—36,000 ohms
R34—130,000 ohms
R36—15,000 ohms
R37, R39, R41—240,000 ohms
R38, R40, R42—510 ohms
C1, C10, C11—100 μF, 6 V, electrolytic
C2, C3, C7–C9, C14, C15, C16—220 μF, 6 V, electrolytic
C4, C5—10 μF, 6V, electrolytic
C6, C18—1.6 μF, 6V, electrolytic
C12, C13—150 μF, 6V, electrolytic
C17—2.2 μF, 35 V, electrolytic
Q1–Q19—2N3417 or equivalent
IC1–IC5, IC9–IC11, IC31–IC37, IC40—74121 monostable multivibrator
IC6, IC20, IC22–IC25—7410 triple 3-input NAND gate
IC7, IC8, IC18, IC19, IC21, IC26–IC30, IC41—7400 quad 2-input NAND gate
IC12–IC14, IC39—7490 decade counter
IC15–IC17—7442 BCD-to-decimal decoder
IC38—7430 8-input NAND gate
IC42–IC44—74192 synchronous decade up/down counter
IC45–IC47—7441 BCD-to-decimal decoder
Lamps 1–16—6-volt miniature, Sylvania, G-E, Hudson, Tung-Sol type 328, 337, 345, 380 or 381
Display tubes 1–3—0-9 type Nixies
Misc.—35-mm slides, cabinet, printed circuit board, lamp display board, hardware, two pushbutton switches.

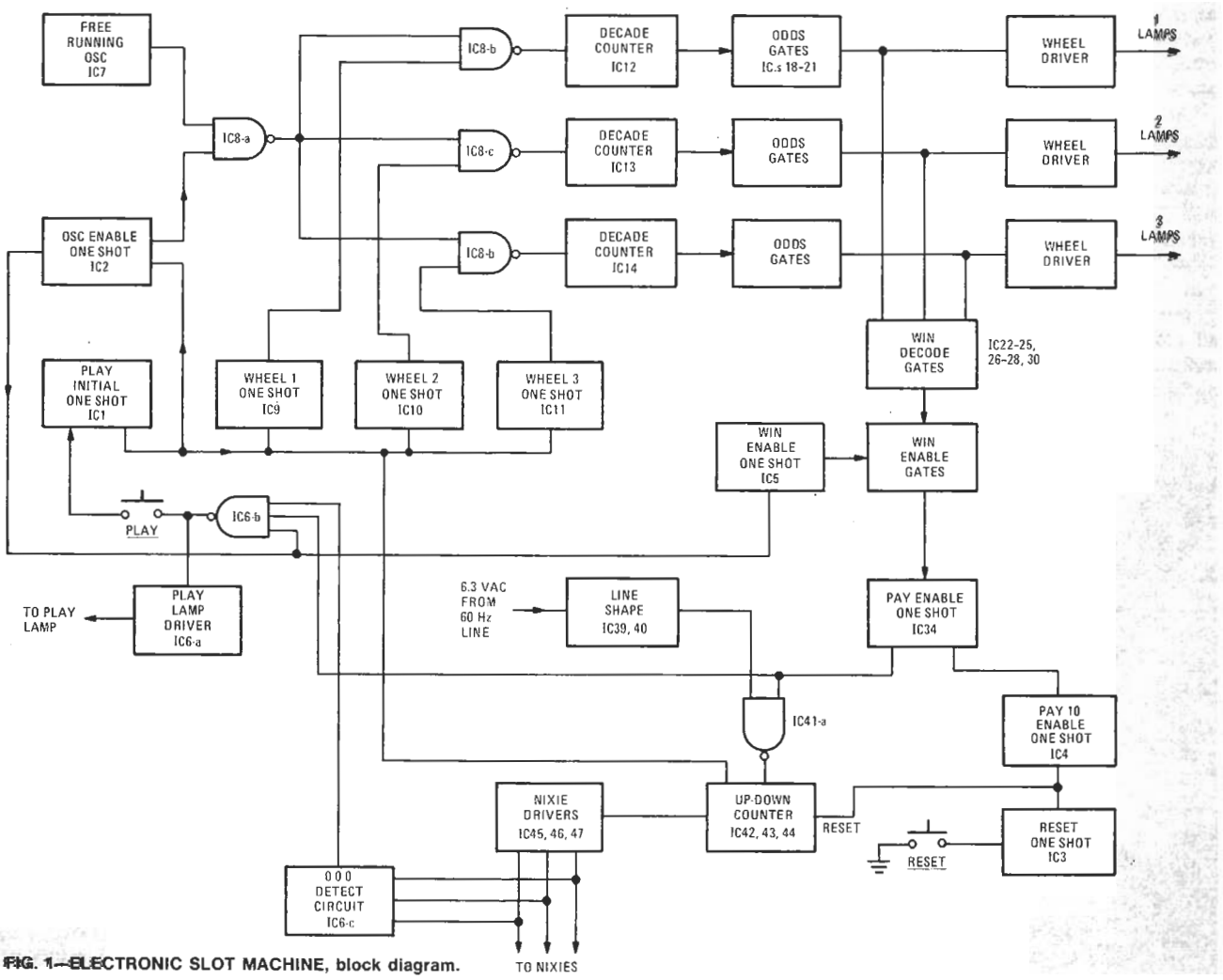


FIG. 1—ELECTRONIC SLOT MACHINE, block diagram.

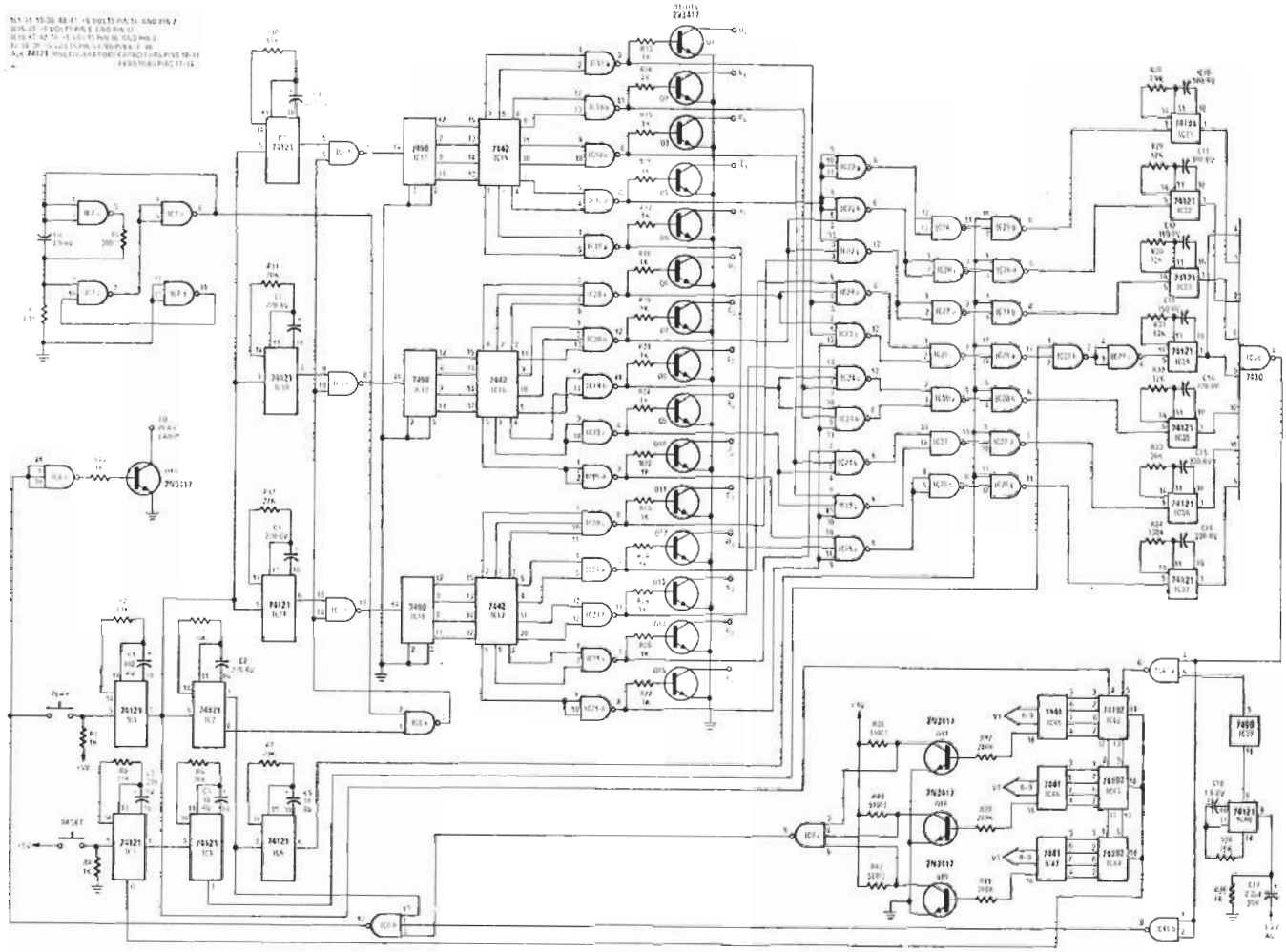


FIG. 2—THE COMPLETE SCHEMATIC. Numbers inside boxes in Fig. 1 refer to the IC's in this diagram.

TABLE I

Payoff	Wheel 1	Wheel 2	Wheel 3	Odds Out of 1000 Chances
2	Cherry	not Cherry	not Cherry	200
5	Cherry	Cherry	not Cherry	60
8	Cherry	Cherry	Cherry	18
10	Orange	Orange	Orange	12
10	Orange	Orange	Jackpot	6
15	Lemon	Lemon	Lemon	8
15	Lemon	Lemon	Jackpot	4
20	Bell	Bell	Bell	4
20	Bell	Bell	Jackpot	2
100	Jackpot	Jackpot	Jackpot	2

ables the PLAY lamp to indicate that a cycle is in progress and the PLAY push-button will have no effect if depressed.

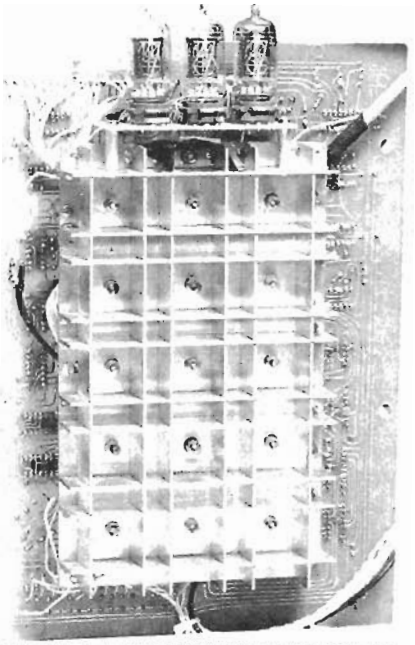
The outputs of the odds gates feed the inputs of gates IC22-IC25, IC26-IC28 and IC30. These gates determine if a winning combination is displayed after the wheels have stopped. On the trailing edge of the oscillator enable output, the win-gate enable IC5 is triggered to generate a narrow strobe pulse that enables all the win combination lines to see if any winning combination exists. If there is no winning combination, the PLAY lamp will light and the machine will be ready for a new cycle to be initiated. If a winning combination does exist, the appropriate number of pulses are gated into the accumulator.

Construction

Construction is straight-forward. The main circuit board (Fig. 3) is assembled first. Over one hundred jumpers are to be installed, as shown in Fig. 4. This number could have been reduced by using a double-sided circuit board, but the added cost and effort did not justify its use. After all the jumpers are in place, install the IC sockets or Molex type pins, then mount the components. The power supply may be laid out on a separate PC board or in spare places in the cabinet. Mount the regulator and pass transistor on small heat sinks for cooling.

The display can be fabricated from whatever materials are available. I used a PC board because it is sturdy and easy to work with. After piecing the display together in egg-carton fashion with the squares the size of 35-mm slides, holes are drilled in the center of each square through the back panel to accommodate the lamps. The lamps can then be press-fitted into the holes and the flanges soldered to the foil of the back panel, eliminating all wires connecting to the common supply bus of the lamps. When all circuits are wired it is ready to test. First check the power supply output voltages before connecting it to the main circuit board. If all voltages check out, then connect the power supply to the machine and check its operation. If the same combination repeats numerous times, it may be necessary to alter the values of the oscillator components slightly. They are C6, R8 and R9. The payoff rates are adjusted with the timing resistors as described previously.

The payoffs are shown in Table I along with the corresponding odds. The payoffs are the same as many real



MAIN CIRCUIT AND DISPLAY BOARD, foil side view.

machines while the odds are far better. Due to the large value tolerances in electrolytic capacitors such as those used for the payoff one-shots, resistors R28-R34 will have to be changed to obtain the payoffs listed in the table. (A variation of 20-30% from the capacitance values listed is not uncommon.) In addition to the payoff one-shots, the wheel one-shots and oscillator enable one-shot (IC9, IC10, IC11 and IC22, respectively) may also need to be fine-adjusted to obtain a satisfactory pulse duration.

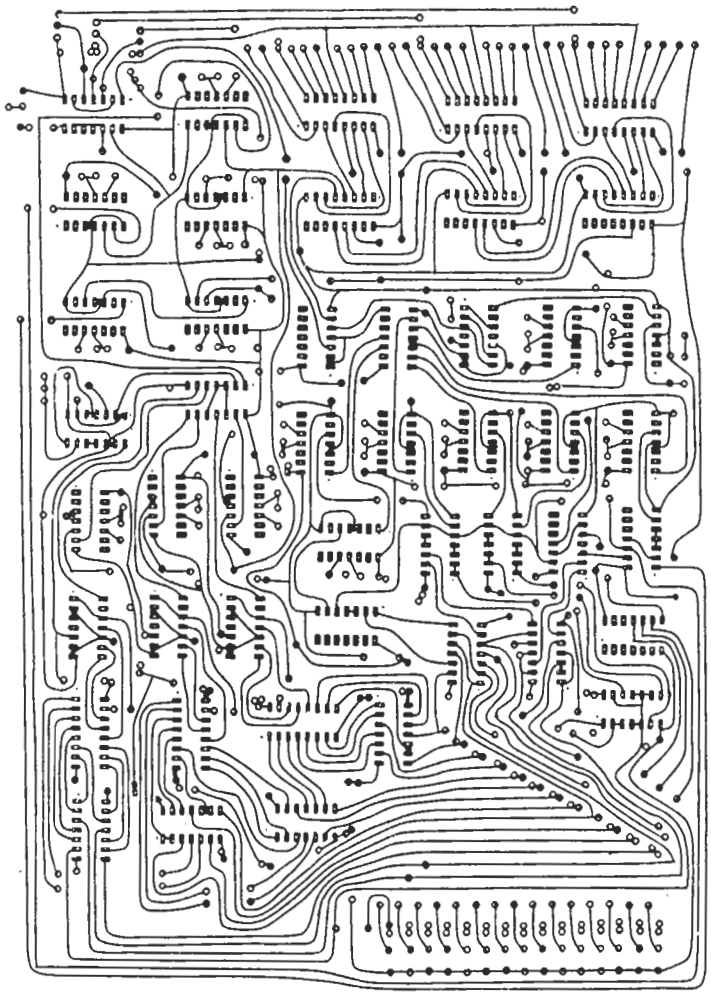
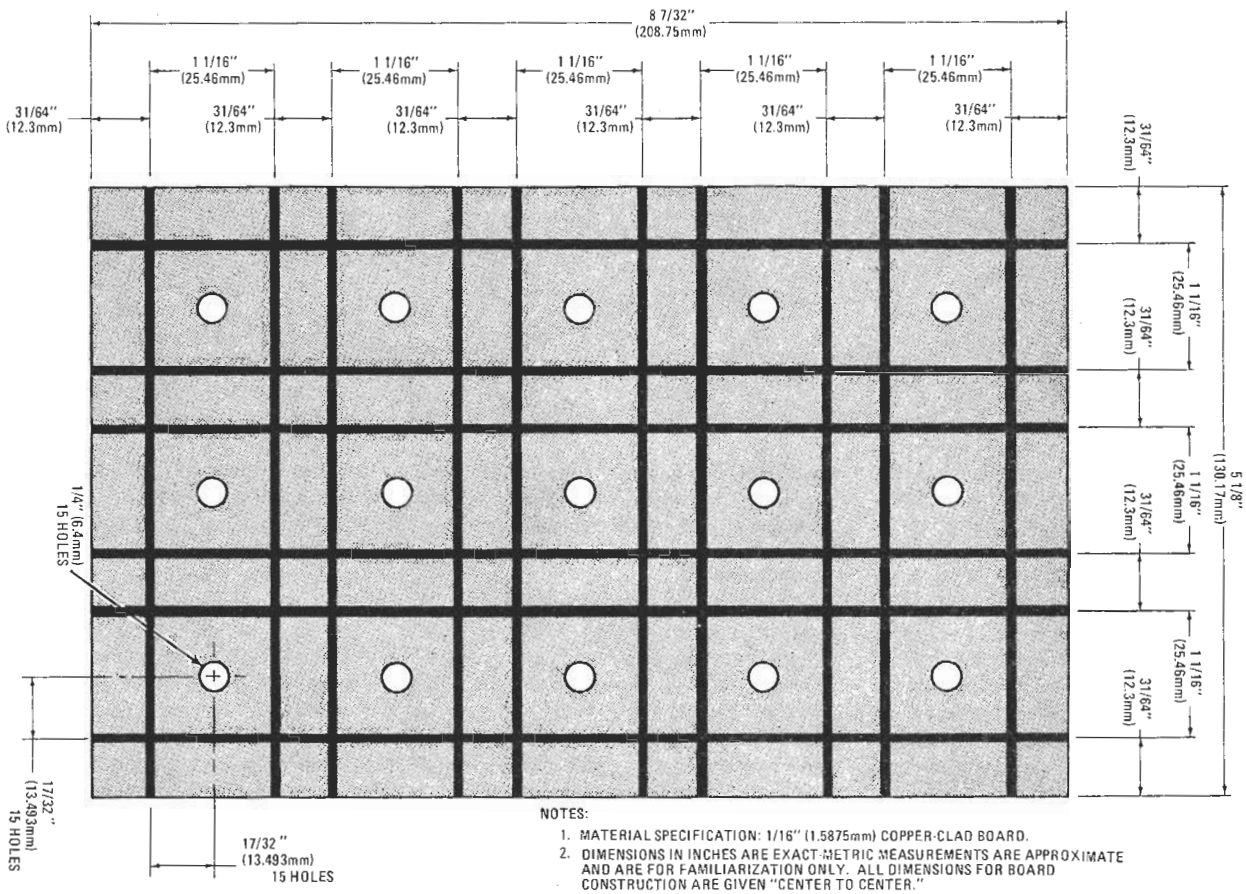


FIG. 3—PRINTED CIRCUIT LAYOUT for the Electronic Slot Machine, shown half size.



THE DISPLAY AND LAMP BOARD.

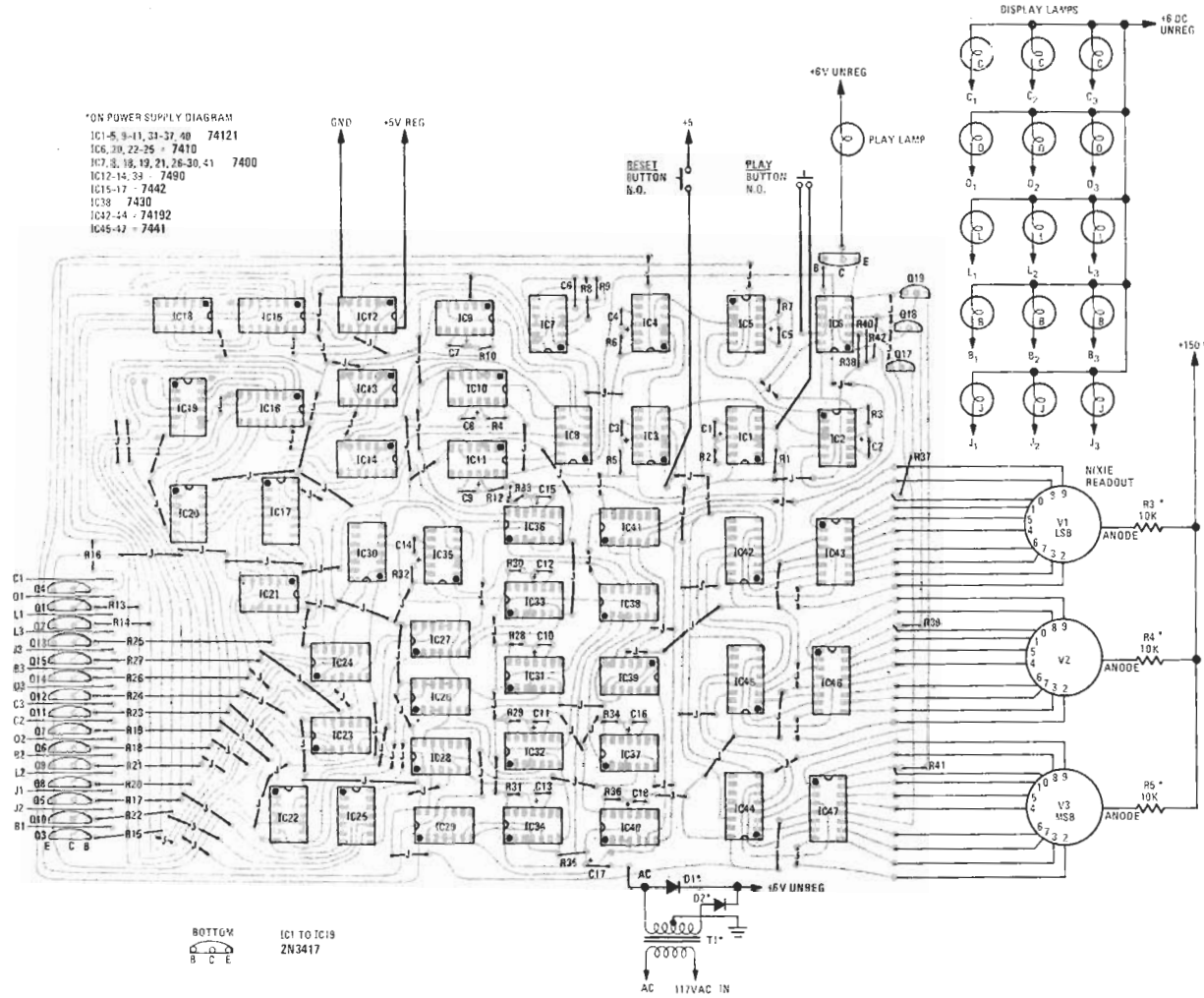


FIG. 4—THE BOARD LAYOUT, showing jumpers and leads to components mounted on panel.

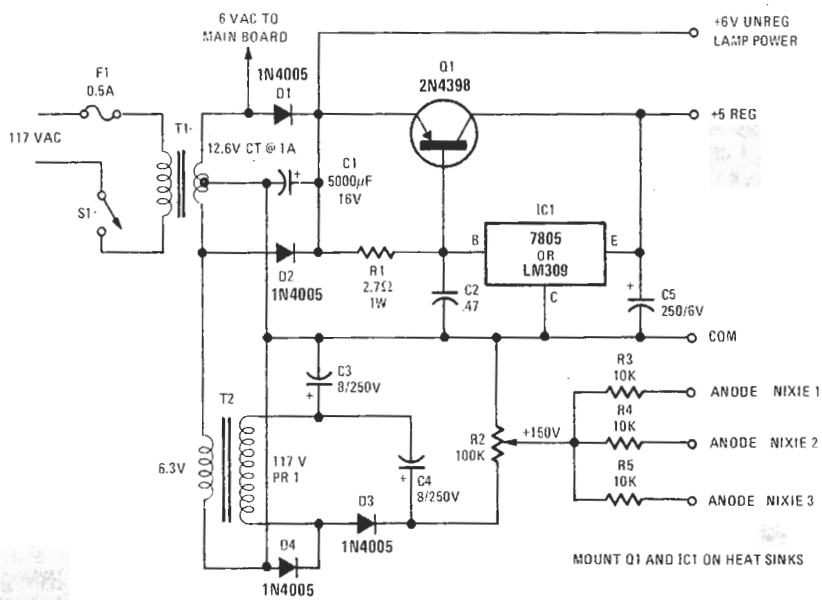


FIG. 5—THE POWER SUPPLY circuit.

PARTS LIST, POWER SUPPLY

R1—2.7 ohms, 1 W
R2—100,000 ohms, 1/2 W pot (fixed resistors may be substituted)
R3–R5—10,000 ohms, 1/4W
C1—5,000 μF, 16 V, electrolytic
C2—0.47 μF, 50-V disc
C3, C4—8 μF, 250 V, electrolytic
C5—250 μF, 6 V, electrolytic
IC1—7805 or LM309, 5 V, 1A voltage regulator
D1–4—IN4005 or similar
Q1—PNP 2N4398 or equivalent
F1—fuse, 1/2 A
S1—SPST power switch
T1—transformer, 12.6 V center tapped, 1 A
T2—transformer, 6.3 V, 0.6 A

To check the payoffs it is necessary to trigger the payoff one-shots manually or the play cycle would have to be initiated many times. The one-shots are triggered by momentarily applying a ground to pin 5 of the circuit to be tested and observe the accumulator to note the payoff. Simply increase the resistor for more counts or decrease for less.

The remote PLAY switch should be located no more than a few feet from the machine. Use grounded shielded cable because of the normally high input of the play one-shot.

The schematic shows a potentiometer on the high-voltage output. This control is used to set the brilliance of the display tubes. Adjust it for minimum setting needed to prolong the life of the tubes. After the control is set, it can be replaced with fixed resistors if desired.

Many extra features can be added, such as a lamp to indicate a jackpot, or an audible alarm to indicate a jackpot or any payoff. A mechanical arm can be constructed or a slot to accept coins could be made, which would cause a play cycle each time a coin was deposited. A word of caution on the use of coins: it is illegal to gamble in most states and a heavy fine or imprisonment could result if the slot were used for other than hobby purposes. **R-E**