A READER BUILT IT

An Electronic Game of Chance

If you have recently bought some surplus computer boards and are wondering what to do with all the transistors, diodes and resistors on them, then this project should provide the perfect answer. As well as being an intriguing device in its own right, understanding it will provide an interesting exercise in simple logic circuitry.

Over the years the "Reader Built It" pages have described a number of electronics games. Most of these had one common theme; the person actually plays the machine, possibly exercising a certain amount of skill, and wins or loses accordingly.

In this respect the following electronic game is different; it does not depend on the skill of the player. It is simply a game of chance which appears to be quite unpredictable. It is more like a conventional poker machine, with the important exception that the whole operation is completely electronic.

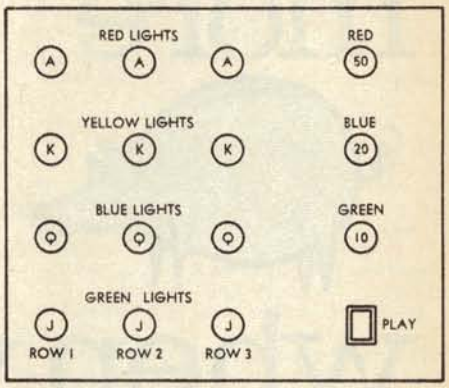
The layout of the console is shown in the drawing. On the left-hand side are 12 coloured lamps, arranged in three vertical rows of four lamps each. On the right-hand side are three lamps in a vertical row, with a "play" switch underneath them.

To operate the machine the player simply presses the "play" button. The lamps in each vertical row on the left-hand side will flicker sequentially for about five seconds, then one lamp in each row will light permanently, forming a lamp pattern, eg, yellow, yellow, and red.

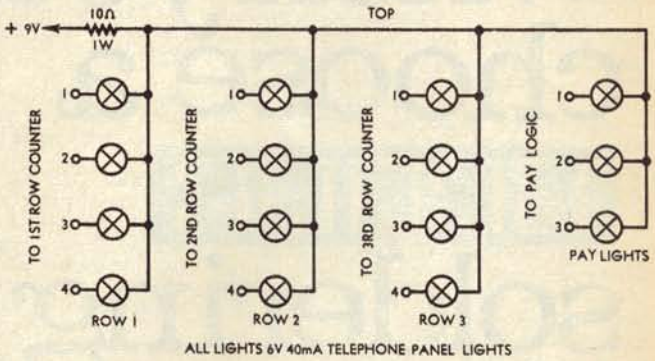
If the combination is a paying one (which this one is) one of the lamps in the right-hand row will light. (The blue lamp in this case.)

The circuit functions as follows: Transistors Tr1 and Tr2 form a monostable pair with, in their "at rest" condition, Tr2 conducting and Tr1 cut off. Associated with the two halves of the monostable are two driver transistors, Tr3 and Tr4. These control current from the nine volt rail to the remaining two major sections of the system: a pay logic circuit and three multivibrator/counter networks.

With Tr2 conducting, the base of Tr3 is pegged to the negative supply rail and Tr3 is cut off. Thus none of the multivibrator counter circuits can function.



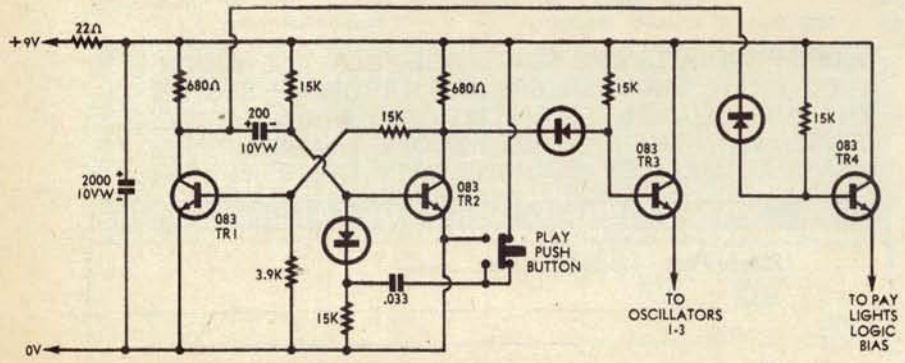
Layout of the display panel. The lamps on the left may be coloured and/or designated by playing card names, as indicated.



Wiring connections for the panel lamps. The numbers refer to the output connections on each of the three multivibrator/counter circuits.

LIGHT CONNECTIONS

The first part of the system comprises a monostable pair, Tr1 and Tr2, together with two switching transistors Tr3 and Tr4. These latter connect the 9V rail to one or other of the two major sections.



TRIGGER MONOSTABLE AND DRIVER OUTPUTS

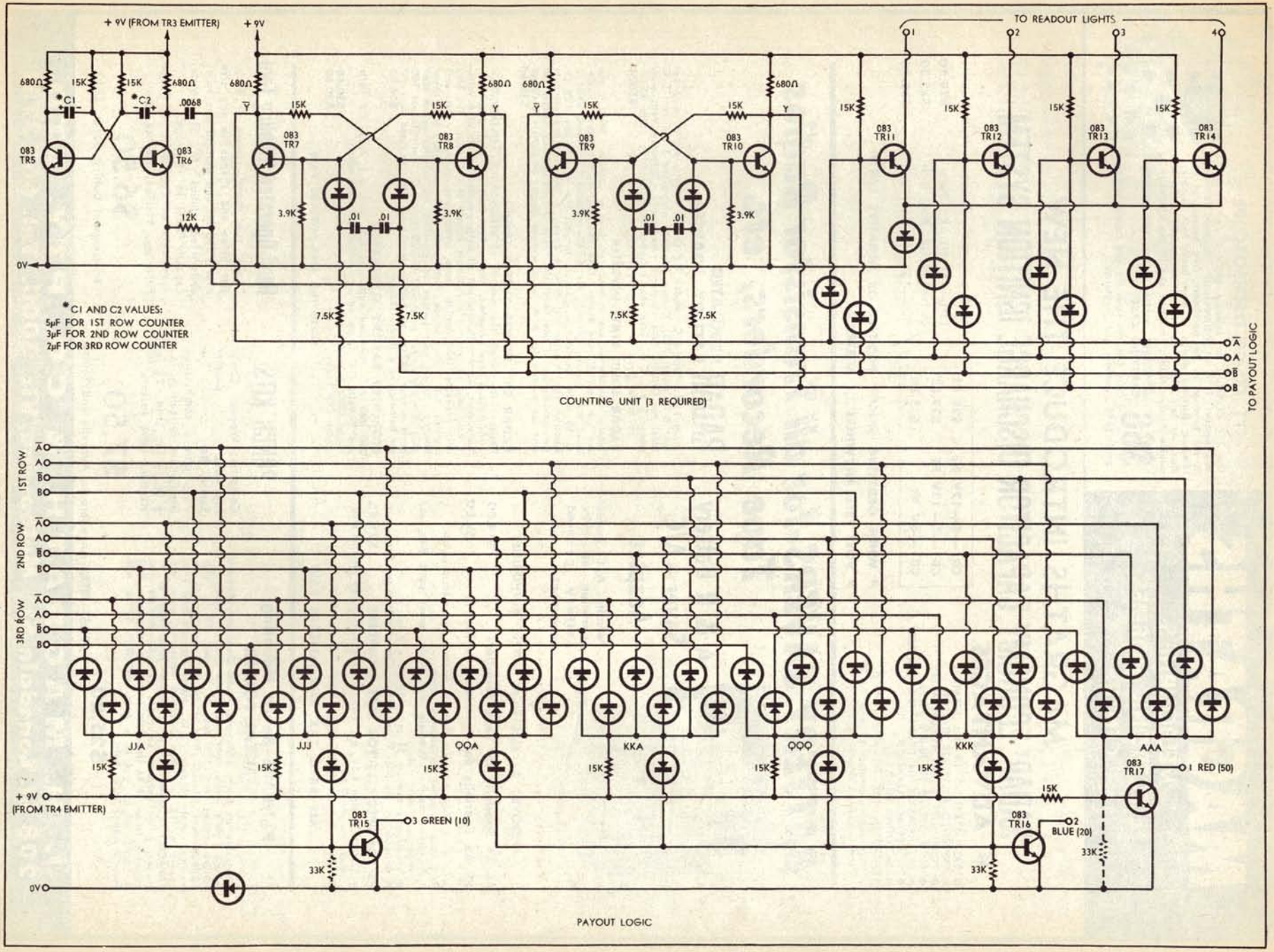
When the play button is pressed, the .033uF capacitor, previously connected to the positive supply rail, is connected to the negative rail. By reason of the polarity to which it has been charged it will now apply a negative pulse to the base of Tr2, cutting it off and switching Tr1 into the conducting mode.

With Tr2 cut off, Tr3 conducts and effectively connects the nine volt supply rail to the three multivibrator/counter circuits. These are represented by a single circuit. Tr5 and Tr6 being the multivibrator circuit and Tr7-8-9-10 the counter circuits. As indicated on the circuit, each multivibrator operates at a different rate.

The four transistors 7, 8, 9, and 10 function as a two-stage ring counter and the operation of this is such that, at any one time, two of these will be conducting and two will be cut off. Transistors Tr11-12-13-14 and their associated diodes form a series of AND gates which conduct only when a particular

(Continued on page 87)

The main portion of the circuit is shown overleaf. The upper section shows the multivibrator/counter circuit (3 off) and the lower section the pay logic circuitry.


+ 9V (FROM TR3 EMITTER)
+ 9V
TO READOUT LIGHTS
1
2
3
4
680Ω
15K
*C1
*C2
.0068
083 TR5
083 TR6
083 TR7
083 TR8
083 TR9
083 TR10
083 TR11
083 TR12
083 TR13
083 TR14
12K
3.9K
.01
7.5K
0V
*C1 AND C2 VALUES:
5μF FOR 1ST ROW COUNTER
3μF FOR 2ND ROW COUNTER
2μF FOR 3RD ROW COUNTER
COUNTING UNIT (3 REQUIRED)
TO PAYOUT LOGIC
1ST ROW
2ND ROW
3RD ROW
JJA
JJJ
QQA
KKA
QQQ
KKK
AAA
083 TR15
083 TR16
083 TR17
33K
+ 9V (FROM TR4 EMITTER)
3 GREEN (10)
2 BLUE (20)
1 RED (50)
PAYOUT LOGIC

A READER BUILT IT . . . continued

pair of counter transistors are cut off. Thus, when Tr7 and Tr9 are both cut off, the base of Tr11 will no longer be pegged down to the negative rail. Tr11 will thus be forward biased by the 15K resistor to the positive rail, will conduct, and the lamp in its collector circuit will light.

With each succeeding pulse from the multivibrator the combination will change and a different lamp will be lit. When the multivibrator stops, the last lamp alight will remain alight. Thus each of the three rows of lamps will have one lamp alight.

By nominating certain patterns as paying combinations the system could finish at this stage, provided the user was content to refer to a list of such combinations after each play. Since this can be something of a chore, the next stage was provided to sense any paying combination and indicate it by means of a single lamp. In fact three lamps are provided, each one indicating a different pay "value".

There are seven paying patterns in this machine, as follows:

LIGHTS	PAY LIGHTS
1. Red, Red, Red	Red – 50 points
2. Yellow, Yellow, Yellow	Blue – 20 points
3. Blue, Blue, Blue	Blue – 20 points
4. Yellow, Yellow, Red	Blue – 20 points
5. Blue, Blue, Red	Blue – 20 points
6. Green, Green, Green	Green – 10 points
7. Green, Green, Red	Green – 10 points

To do this I arranged a system of AND and OR gates fed by the output pulses from the three multivibrator/counter combinations. Transistors Tr15-16-17, with the associated diodes, perform this function. There are two OR functions associated with Tr15, four with Tr16, and none with Tr17.

(Editorial note: We have shown, dotted, a 33K resistor from base to emitter of Tr15-16-17. The presence of this resistor will ensure that the transistor remains properly cut off under all temperature conditions.)

PARTS LIST

37 083 transistors
91 diodes
RESISTORS
20 680
13 3.9K
12 7.5K
3 12K
42 15K
ALL ABOVE OBTAINABLE FROM COMPUTER BOARDS.
1 22ohm 1W
1 10ohm 1W
CAPACITORS
12 .01uF 100V capacitors
3 .0068uF 160V capacitors
1 .033uF 100V capacitors
1 5uF 12 VW
2 3uF 12 VW
2 2uF 12 VW
1 200uF 12 VW
1 2000uF 25VW
MISCELLANEOUS
15 grommets
9in case with sloping front panel
1 push button NO and NC contacts
1 240V 3A toggle switch
15 6V 40mA lamps

The unit was built in a 9in sloping panel box, the globes being held in with rubber grommets and coloured with felt tipped pens. All the circuitry was built on veroboard, three pieces each 7¾in long being cut from a 4in wide strip. The first board accommodates the monostable and drivers and the first row multivibrator and counter. The second board mounts the second and third row multivibrators and counters, and the third board the paying logic and counters.

To keep down the cost I used transistors, diodes, and resistors from obsolete computer boards available from advertisers in this magazine. In fact, the whole unit was designed around parts removed from these boards.

The whole unit runs off 9V and takes approximately 250mA of current continuously. I ran the prototype off batteries but a suitable power supply off the mains could be used with adequate filtering to prevent the monostable reacting to line transit.

(Submitted by Mr R. Scott, 46 Sandgate Road, Wallsend, NSW 2287.) ■

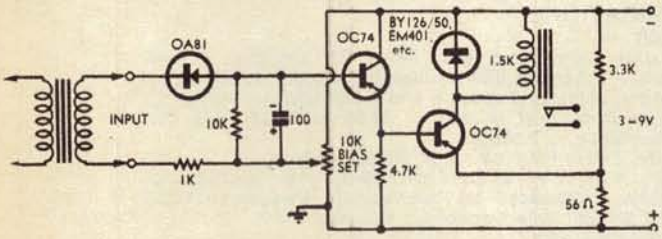
NOTES & ERRATA

PLAYMASTER 130 HEADPHONE AMPLIFIER (January 1971): The original mains cord earthing could allow the amplifier case to become "live" if the board becomes cracked. To forestall this, the mains cord earth should be taken directly to the case at the "record" output socket.

AUSTRALIAN TV STATIONS (January 1971): The list of NSW TV stations should be amended by the addition of: Richmond-Tweed ABRN 6-H, RTN 8-H.

Voice control for transmitter

Thinking of building a VOX system for that mobile transmitter? Here is a design which is so simple there is no excuse for not trying it.



As shown, the circuit is suitable for a positive chassis system. For a negative chassis system NPN transistors could be substituted.

The simple circuit shown here has proved to be very satisfactory. It uses only a few inexpensive components, is simple to make, and requires very little space.

It is a simple two stage direct coupled amplifier employing a couple of transistors which happened to be available. Other, similar types should be equally suitable. The diode in the input circuit rectifies the audio signal and charges the 100uF capacitor in the base circuit of the first transistor. Assuming a reasonably low impedance for the input circuit, this capacitor will charge quite rapidly.

The 10K pot in the first transistor base circuit provides variable forward bias and functions as a threshold control. It is set just below the point where the relay will pull in so that a small signal from the voice circuit will trigger the system. When the user stops speaking, the relay holds in until the charge on the 100uF capacitor leaks away through the parallel 10K resistor. It cannot discharge through the input circuit due to the diode.

The relay was a sensitive type with a coil resistance of 1500 ohms. The diode shown connected across it is to minimise inductive spikes which may damage the transistor.

(This article was originally submitted several years ago, by Mr C. S. of Bordertown, South Australia. We have no way of knowing whether Mr C. S. is still at the original address but, if he cares to contact us, we will be happy to pay him his contributor's fee.)