

## Dial your scores into a two-player, double-digit scoreboard

**G**AMES in which the scores for individual players must be kept are a popular pastime. Not so popular is the usual search for paper and pencil needed for keeping the score. The Electronic Scorekeeper described here eliminates the search so you can get right to the game. As designed, the Scorekeeper can keep score for two players up to a maximum count of 99. However, with a couple of simple modifications, the number of players and the count range can be increased as desired. The circuit uses readily available and inexpensive TTL devices and seven-segment numeric LED displays.

**About the Circuit.** Since the circuit for each player is identical, only the circuit for player A is shown in Fig. 1. Player B's circuit connects to the pin-6 output of gate *IC1B*. Integrated circuits *IC4* and *IC5* and display *DIS2* make up a conventional 0-to-9 units decade counter whose carry output at pin 8 of *IC4* is fed to a similar tens counter made up of *IC2*, *IC3*, and *DIS1*. Seven-segment displays *DIS1* and *DIS2* are common-anode LED types.

The count for the circuit shown in Fig. 1 can easily be increased as desired simply by adding extra decade counters. When the additional decade counters

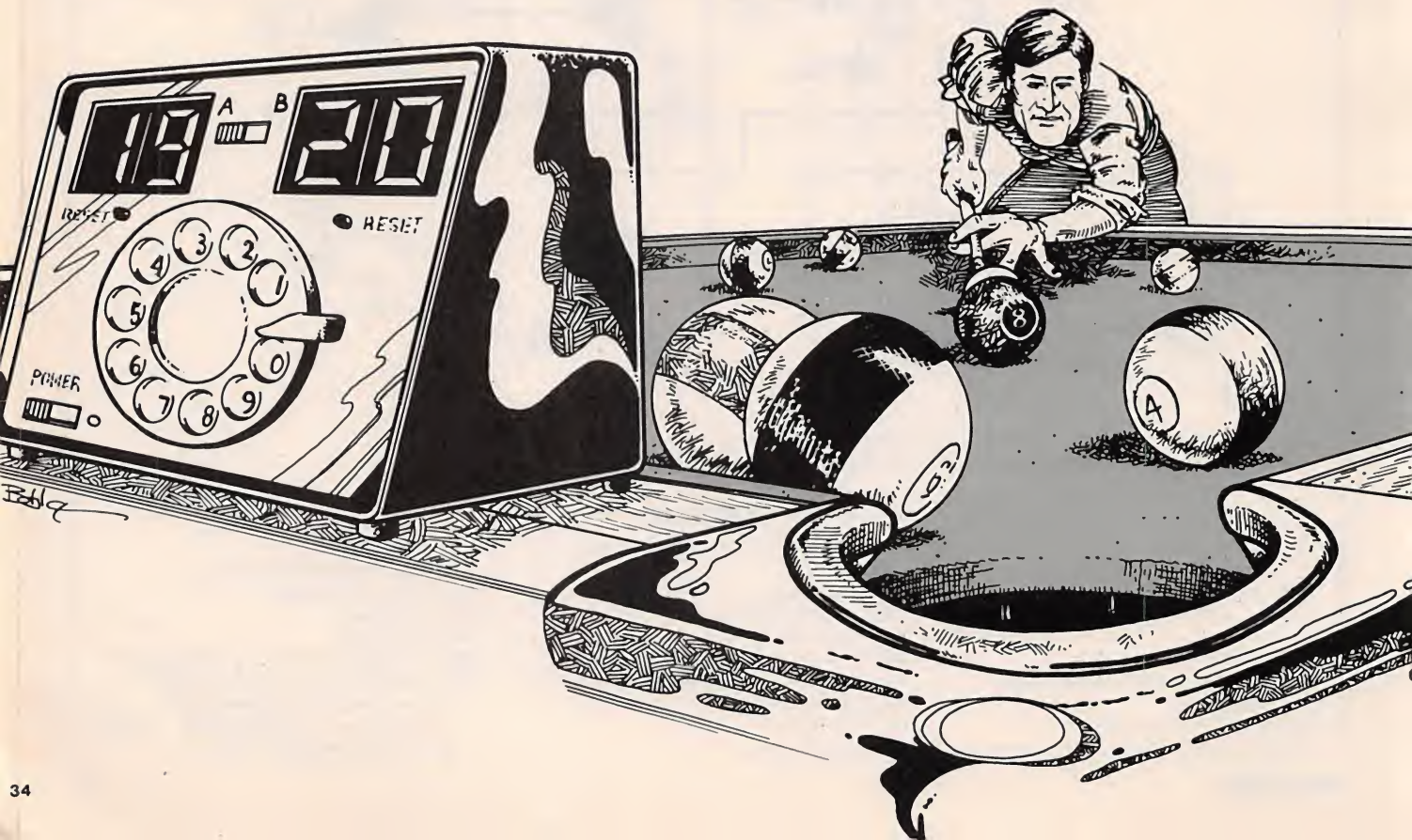
are used, the input of each successive counter is connected to the carry output of the preceding counter and the RESET lines are connected in common.

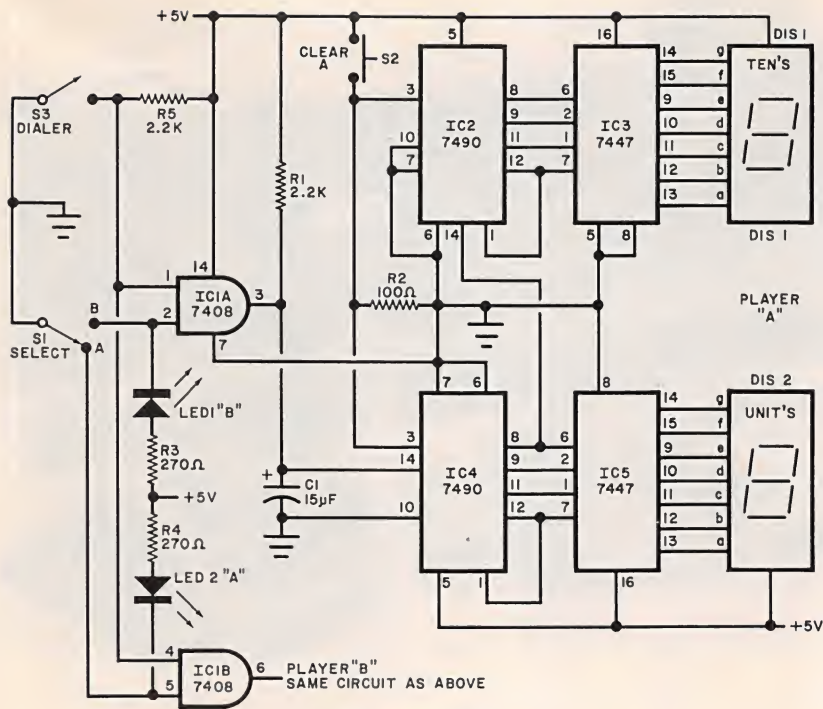
Both decade counters shown in Fig. 1 are set to zero by operating CLEAR push-button switch *S2* to momentarily raise the reset-to-zero (RST) input at pin 3 of *IC2* and *IC4* to high and then back to ground as the switch is released and pulldown is accomplished by *R2*. When *S2* is pressed and released, both *DIS1* and *DIS2* should display zeros.

SELECTOR switch *S1* permits the person keeping score to choose between player A and player B for score display

# Electronic Scorekeeper for Recreation Rooms

BY JOSEPH FORTUNA





### PARTS LIST

- C1—15- $\mu$ F, 15-volt electrolytic
- DIS1, DIS2—Common-anode 7-segment LED display
- IC1—7408 quad AND gate
- IC2, IC4—7490 decade counter
- IC3, IC5—7447 BCD-to-7-segment decoder
- LED1, LED2—Any discrete red LED
- R1, R5—2200-ohm,  $\frac{1}{2}$ -watt resistor
- R2—100-ohm,  $\frac{1}{2}$ -watt resistor
- R3, R4—270-ohm,  $\frac{1}{2}$ -watt resistor

- S1—Dpst switch
- S2—Normally open pushbutton switch
- S3—Telephone dialer-switch mechanism (see text)
- Misc.—Duplicate circuit for player B; regulated 5-volt, 1-ampere dc power supply; perforated or printed-circuit board and hardware; suitable enclosure; sockets for ICs (optional); machine hardware; hookup wire; solder; dry-transfer lettering kit; etc.

Fig. 1. Schematic shows scorekeeping circuit for only one player.

and incrementing. When the player-A position is selected, pin 5 of IC1B is grounded and held low, causing LED2 for player A to come on. At this time, the output of IC1B is low and the gate is disabled. Hence, the player-B decade counters will not operate.

Pin 1 of IC1A and pin 4 of IC1B are made high by pullup resistor R5, and mechanical DIALER switch S3 is connected from ground to this common point. (A surplus mechanical telephone-dial switch assembly can be used for S3 to allow you to conveniently "dial in" the score updates. Alternatively, you can substitute an ordinary normally open pushbutton switch for this operation, but it will have to be operated for each and every unit increment in the scoring.)

Operating S3 shorts the common IC1A pin-1 IC1B pin-4 point to ground the same number of times selected on the DIALER. As the DIALER is operated, IC1A turns on and off with each closure of S3. This generates one or more input

pulses, depending on the DIALER number selected, for player A's decade counter. (This assumes S1 is set to A; operation is identical for player B, except that S1 must be set to B.) Every time the IC4 units decade overflows at the tenth pulse from IC1A, the carry output from IC4 toggles the IC2 decade counter.

The circuit in Fig. 1 can be expanded to keep score for more than two players, as shown in Fig. 2. Note here that separate player LEDs are not used. Using the AND gate and truth table shown, you can design further switching to increase the number of players beyond the three shown in Fig. 2.

**Construction.** Since component layout is not critical, you can use just about any wiring technique that suits you. Perhaps most convenient is a printed-circuit board of your own design, but perforated board and Wire Wrapping is equally suitable. In either case, it is recommended that you use sockets for the ICs.

Once you have assembled and checked the circuit, mount it in an enclosure so that the two pairs of displays can easily be viewed. Mount the LEDs and switches, including the DIALER mechanism, on the top of the enclosure. Finally, use a dry-transfer lettering kit to label the switches and LEDs according to function.

Power for the Scorekeeper can be obtained from any regulated 5-volt dc supply capable of delivering 1 ampere or more of current.  $\diamond$

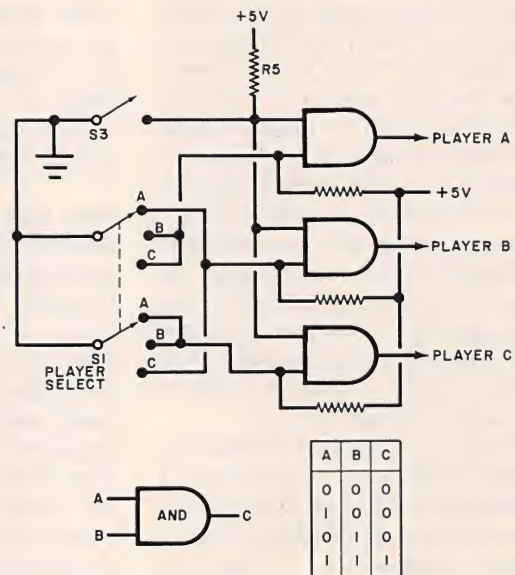


Fig. 2. Circuit for over two players.