

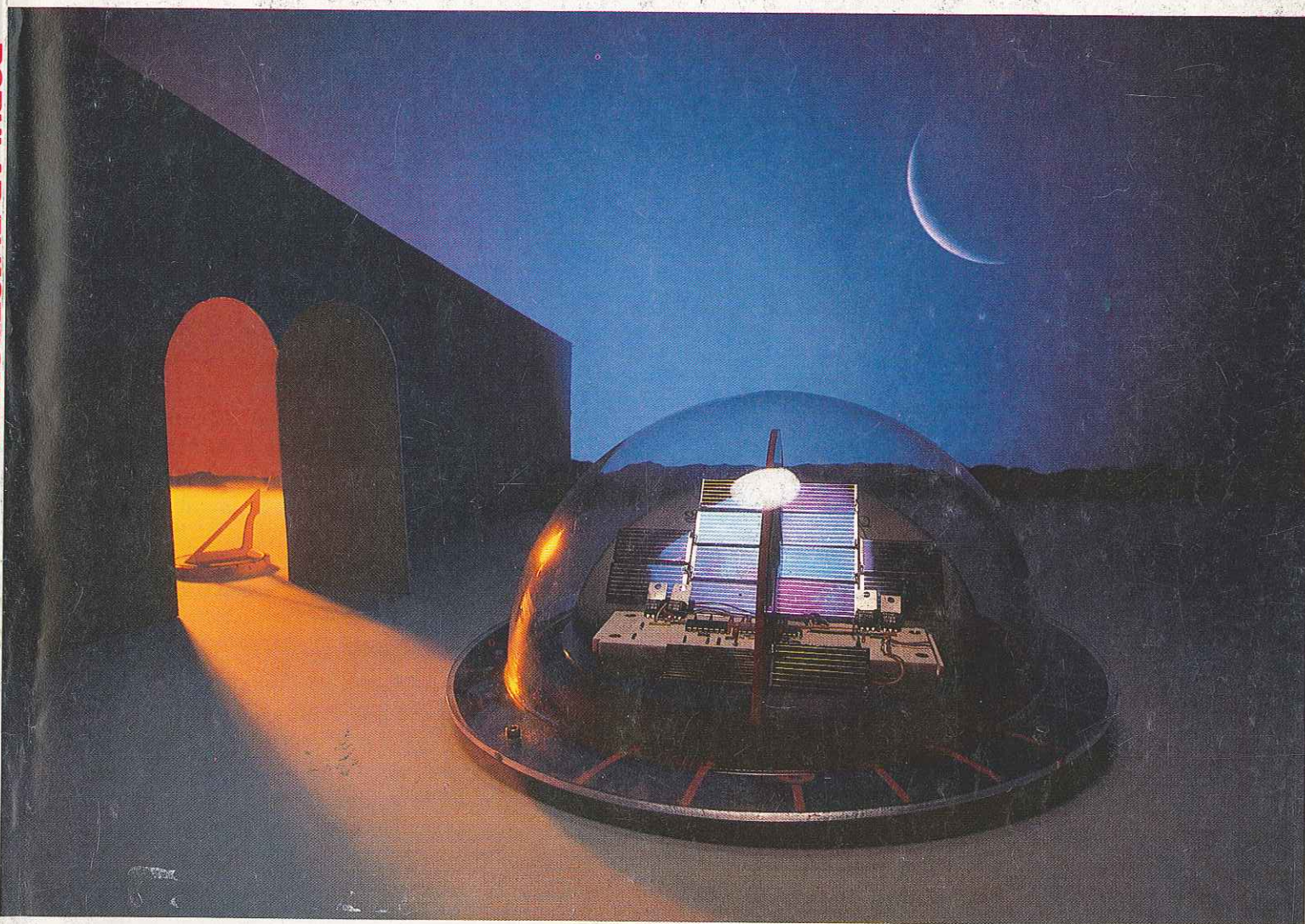
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MARCH 1980/95¢

Car Stereo Rating Standards
A Computerized Combination Lock
Planning a Home Electronics Workbench

Build a Solar-Powered Sundial

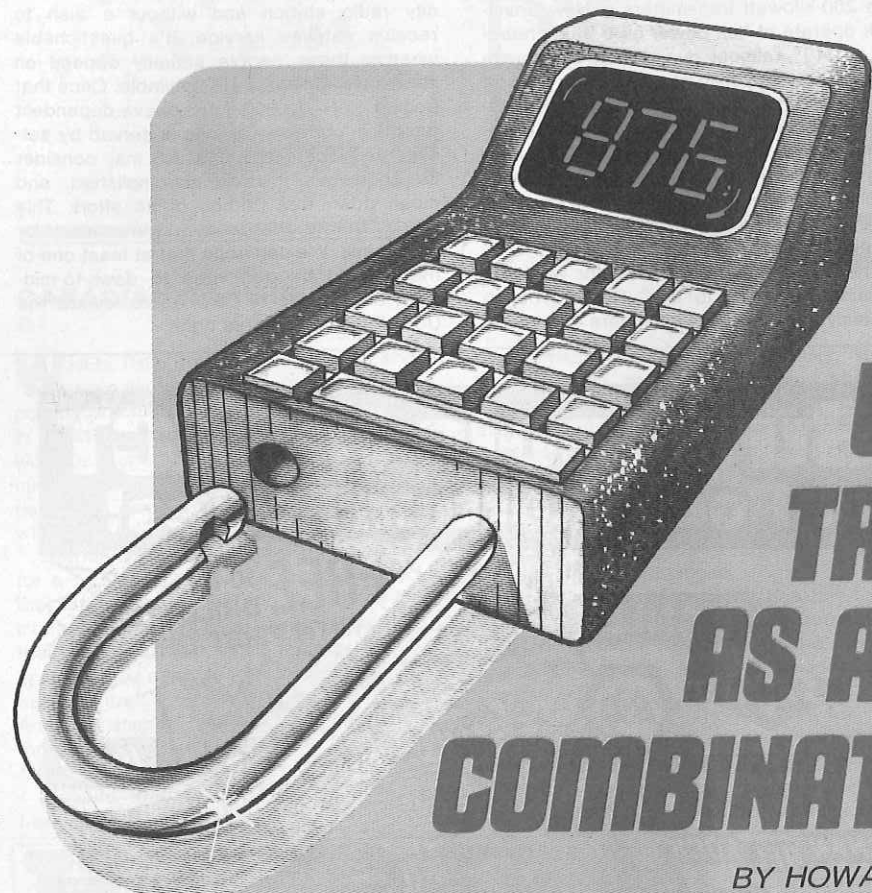


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Pioneer SR-303 Reverberation Amplifier
Rowen SA2 Stereo Power Amplifier
Harrard GT350ap Record Player



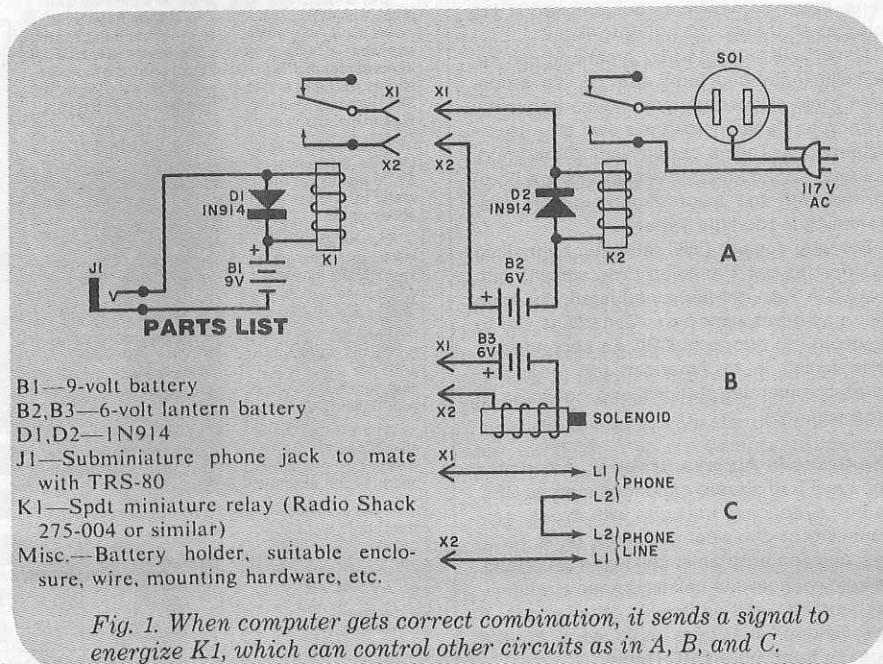
USE YOUR TRS-80 AS A COMBINATION LOCK

BY HOWARD BERENBON

Program plus simple circuit control doors, appliances, and telephone lines

IF YOU own a TRS-80 microcomputer, here is a very simple control application that will enable it to "guard" electrically operated devices such as lights, radio or TV receivers, the telephone line, or a spare-parts cabinet with an electric lock. Although breaking the combination would be very difficult, accessibility of control lines from the computer would leave the system vulnerable to a determined intruder. So where the ultimate in security is required, the foregoing problem should be addressed.

The TRS-80 combination lock program allows you to enter a unique numerical sequence into your computer. When that combination is entered again later, the program activates the TRS-80 cassette remote control plug. A simple external circuit (Fig. 1) connected to this plug then triggers the electric lock circuit. The external control circuit remains



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Level "A" Specifications

Explorer/85's Level "A" system features the advanced Intel 8085 cpu, an 8355 ROM with 2k deluxe monitor/operating system, and an 8155 ROM-I/O—all on a single motherboard with room for RAM/ROM/PROM/EPROM and S-100 expansion, plus generous prototyping space.

(Level "A" makes a perfect OEM controller for industrial applications and is available in a special Hex Version which can be programmed using the Netronics Hex Keypad/Display.)

PC Board: glass epoxy, plated through holes with solder mask

• I/O: provisions for 25-pin (DB25) connector for terminal serial I/O, which can also support a paper tape reader

• provision for 24-pin DIP socket for hex keypad/display

• cassette tape recorder input... cassette tape control output... speaker output... LED output indicator on SOD (serial output) line... printer interface (less drivers)... total of four 8-bit plus one 6-bit I/O ports • Crystal Frequency: 6.144 MHz • Control Switches: reset and user (RST 7.5) interrupt... additional provisions for RST 5.5, 6.5 and TRAP interrupts onboard • Counter/Timer: programmable, 14-bit binary • System RAM: 256 bytes located at F800, ideal for smaller systems and for use as an isolated stack area in expanded systems... RAM expandable to 64k via S-100 bus or 4K on motherboard



registers... single step with register display at each break point... go to execution address. Level "A" in the Hex Version makes a perfect controller for industrial applications and can be programmed using the Netronics Hex Keypad/Display.

Hex Keypad/Display Specifications

Calculator type keypad with 24 system defined and 16 user defined keys. 6 digit calculator type display which displays full address plus data as well as register and status information.

Level "B" Specifications

Level "B", provides the S-100 signals plus buffers/drivers to support up to six S-100 bus boards and includes: address decoding for onboard 4k RAM expansion select-able in 4k blocks... address decoding for onboard 8k EPROM expansion select-able in 8k blocks... address and data bus drivers for onboard expansion... wait state generator (jumper select-able), to allow the use of slower memories... two separate 5 volt regulators.

Level "C" Specifications

Level "C" expands Explorer's motherboard with a card cage, allowing you to plug up to six S-100 cards directly into the motherboard. Both cage and cards are neatly contained inside Explorer's deluxe steel cabinet.

Level "D" Specifications

Level "D" provides 4k or RAM, power supply regulation, filtering decoupling components and sockets to expand your Explorer/85 memory to 4k (plus the original 256 bytes located in the 8155A). The static RAM can be located anywhere from 0000 to EFFF in 4k blocks.

Level "E" Specifications

Level "E" adds sockets for 8k of EPROM to use the popular Intel 2716 or the TI 2516. It includes all sockets, power supply regulator, heat sink, filtering and decoupling components. Sockets may also be used for soon to be available RAM IC's (allowing for up to 12k of onboard RAM).

Order A Coordinated Explorer/85 Applications Pak!

Experimenter's Pak (SAVE \$12.50)—Buy Level "A" and Hex Keypad/Display for \$199.90 and get FREE Intel 8085 user's manual plus FREE postage & handling!
Student Pak (SAVE \$24.45)—Buy Level "A," ASCII Keyboard/Computer Terminal, and Power Supply for \$319.85 and get FREE RF Modulator plus FREE Intel 8085 user's manual

By Netronics
 ASCII/BAUDOT
 STAND ALONE

Computer Terminal COMPLETE FOR ONLY \$149.95

The Netronics ASCII/BAUDOT Computer Terminal Kit is a microprocessor-controlled, stand alone keyboard/terminal requiring no computer memory or software. It allows the use of either a 64 or 32 character by 16 line professional display format with selectable baud rate, RS232-C or 20 ma. output, full cursor control and 75 ohm composite video output.

The keyboard follows the standard typewriter configuration and generates the entire 128 character ASCII upper/lower case set with 96 printable characters. Features include onboard regulators, selectable parity, shift lock key, alpha lock jumper, a drive capability of one TTY load, and the ability to mate directly with almost any computer, including the new Explorer/85 and ELF products by Netronics.

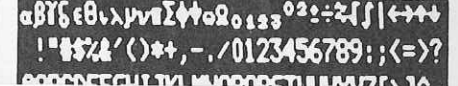
The Computer Terminal requires no I/O mapping and includes 1k of memory, character generator, 2 key rollover, processor controlled cursor control, parallel ASCII/BAUDOT to serial conversion and serial to video processing—fully crystal controlled for superb accuracy. PC boards are the highest quality glass epoxy for the ultimate in reliability and long life.

VIDEO DISPLAY SPECIFICATIONS

The heart of the Netronics Computer Terminal is the microprocessor-controlled Netronics Video Display Board (VID) which allows the terminal to utilize either a parallel ASCII or BAUDOT signal source. The VID converts the parallel data to serial data which is then formatted to either RS232-C or 20 ma. current loop output, which can be connected to the serial I/O on your computer or other interface, i.e., Modem.

When connected to a computer, the computer must echo the character received. This data is received by the VID which processes the information, converting to data to video suitable to be displayed on a TV set (using an RF modulator) or on a video monitor. The VID generates the cursor, horizontal and vertical sync pulses and performs the housekeeping relative to which character and where it is to be displayed on the screen.

Video Output: 1.5 P/P into 75 ohm (EIA RS-170) • **Baud Rate:** 110 and 300 ASCII • **Outputs:** RS232-C or 20 ma. current loop • **ASCII Character Set:** 128 printable characters—



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TABLE I—LEVEL-I BASIC PROGRAM

```

0100 PRINT "TRS-80 COMBINATION LOCK"
0110 PRINT "FOR LEVEL I BASIC"
0120 PRINT
0130 PRINT "COPYRIGHT (C) 1979 BY HOWARD BERENBON"
0140 PRINT
0150 PRINT "ENTER MODE (1) LOAD NEW COMBINATION"
0160 PRINT TAB(11);"(2) ACCESS COMBINATION LOCK"
0170 INPUT A
0180 IF A=1 THEN 210
0190 IF A=2 THEN 270
0200 GOTO 150
0210 PRINT "LOAD NEW COMBINATION"
0220 PRINT "ENTER UP TO 6 DIGITS PER VARIABLE"
0230 PRINT "IN THE FORM: X,Y,Z"
0240 INPUT X,Y,Z
0250 PRINT "COMBINATION LOADED"
0260 GOTO 150
0270 CLS
0280 PRINT "ACCESS MODE"
0290 PRINT
0300 PRINT "ENTER COMBINATION"
0310 N=5
0320 INPUT U,V,W
0330 N=N-1
0350 IF (X=U) * (Y=V) * (Z=W) THEN 380
0360 GOTO 550
0380 GOSUB 600
0390 INPUT #A
0500 PRINT "NO ENTRY"
0510 GOTO 510
0550 IF N=0 THEN 500
0560 PRINT "RE-ENTER"
0570 GOTO 320
0600 PRINT "OPEN"
0610 RETURN
    
```

TABLE II—LEVEL-II BASIC PROGRAM

```

0100 PRINT "TRS-80 COMBINATION LOCK"
0110 PRINT "FOR LEVEL II BASIC"
0120 PRINT
0130 PRINT "COPYRIGHT (C) 1979 BY HOWARD BERENBON"
0140 PRINT
0150 PRINT "ENTER MODE (1) LOAD NEW COMBINATION"
0160 PRINT TAB(11);"(2) ACCESS COMBINATION LOCK"
0170 INPUT A
0180 IF A=1 THEN 210
0190 IF A=2 THEN 270
0200 GOTO 150
0210 PRINT "LOAD NEW COMBINATION"
0220 PRINT "ENTER UP TO 25 CHARACTERS"
0230 PRINT "LETTERS AND/OR NUMBERS"
0240 INPUT A$
0250 PRINT "COMBINATION LOADED"
0260 GOTO 150
0270 CLS
0280 PRINT "ACCESS MODE"
0290 PRINT
0300 PRINT "ENTER COMBINATION"
0310 N=5
0320 N=N-1
0330 INPUT B$
0340 IF A$ <> B$ THEN 550
0360 GOSUB 600
0370 INPUT #-1.A
0500 PRINT "NO ENTRY"
0510 GOTO 510
0550 IF N=0 THEN 500
0560 PRINT "RE-ENTER"
0570 GOTO 320
0600 PRINT "OPEN"
0610 RETURN
    
```

activated until the TRS-80 RESET pushbutton is depressed.

Software. Programs for the lock combination are illustrated for Level-I and Level-II BASIC. The Level-I program (Table I) permits up to 18 digits to be used for the combination. After running the program, the computer will request a mode entry. Entering a "1" allows the loading of a new combination. The entry is in the form: x, y, z, with entry limited to 6 digits per variable. Entering a "2" will allow access to the entry mode for operating the control circuit. As an example, assume that, for x,y,z, we use 19034,001,1705 the two commas being required to separate the variables. If the size of the combination is limited to 12 digits and variables x and y are filled with 6 digits each, a 0 must be entered for variable z. Thus, a correct entry might be 190340,170501,0.

After the access mode is entered, the program is locked into that mode. Now the correct combination will activate the control circuit, and OPEN will be displayed on the monitor screen. If there is an error in entry, the program will print RE-ENTER, calling for re-entry of the combination. After five unsuccessful attempts to match the stored combination, the program will print NO ENTRY and loop

at line #510. Depress the BREAK key to return to READY.

The Level-II version allows entry of numbers and letters for the combination and is limited to 25 characters. After the program is loaded, you are requested to select the mode (1 or 2). To enter a new combination, type a "1." Entering a "2" will allow access to the entry mode for operating the control circuit. The combination of 25 characters (using no commas) or less can be entered. An example of a suitable combination is: 19034ABCDEFXYZ.

As before, the program locks into the access mode once it is entered. Entering the correct combination will activate the control circuit, and OPEN will be displayed on the monitor screen. If there are errors in entry, the Level-II program behaves exactly as does the Level-I version.

Hardware. The remote control plug from the TRS-80 cassette interface is inserted into jack J1 shown in Fig. 1. When the correct combination is entered, relay K1 will be activated. The contacts of K1 can be used to control a wide variety of other circuits as the examples in Fig. 1 show.

In example A, relay K1 is used to activate a relay with a higher power rat-

ing (K2) to control lighting or appliances connected to SO1. In example B, a solenoid (K3) is used to create a computer-activated door lock. The plunger of the solenoid then operates the latch on the door of a room or safe.

For a phone lock, example C, the normally open contacts of K1 are connected in series with L1 of the phone. (Note: Any connection made to the phone line must be approved by your local telephone company.) The phone will be totally inactive when this circuit is connected. When the correct combination is entered and the signal is received from the computer, the phone will be connected to the line as in normal use. This arrangement is most useful if one phone is left active for receiving incoming calls, and extension phones are controlled by the computer lock.

The examples given serve only to demonstrate how the TRS-80 combination lock program might be applied. Any device or system that can be relay-controlled can be kept under security by the program. If means can be developed for attaching a remote keypad (with secure leads) to the TRS-80 to allow entry of the combination, the computer could be kept in the secured area. The program would then represent a sophisticated electronic locking system. ◇

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