Radio-Electronics

RADIO COMMUNICATIONS FOR ALL

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Radio-Electronics

THE MAGAZINE FOR NEW IDEAS IN ELECTRONICS

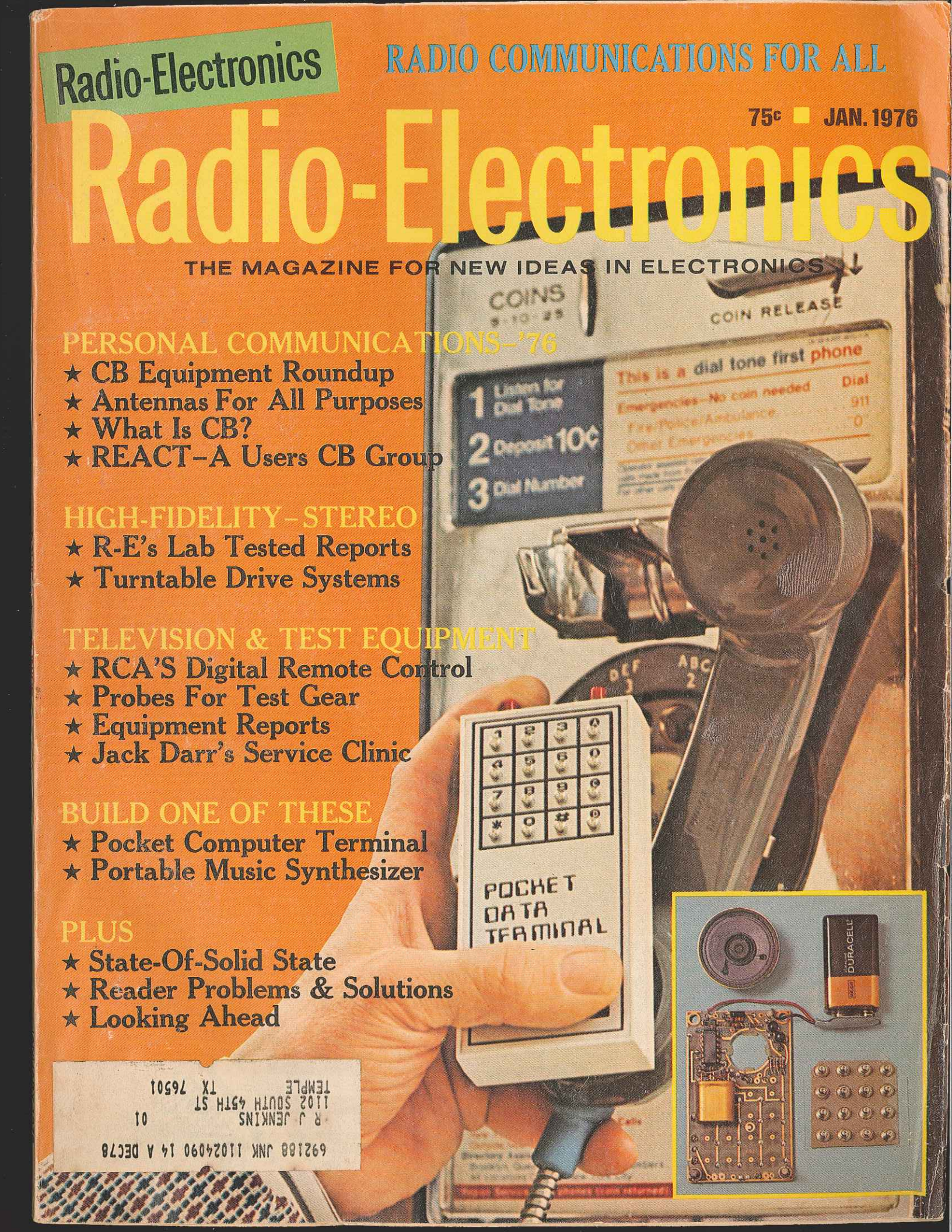
PERSONAL COMMUNICATIONS–'76
★ CB Equipment Roundup
★ Antennas For All Purposes
★ What Is CB?
★ REACT–A Users CB Group

HIGH-FIDELITY–STEREO
★ R-E's Lab Tested Reports
★ Turntable Drive Systems

TELEVISION & TEST EQUIPMENT
★ RCA'S Digital Remote Control
★ Probes For Test Gear
★ Equipment Reports
★ Jack Darr's Service Clinic

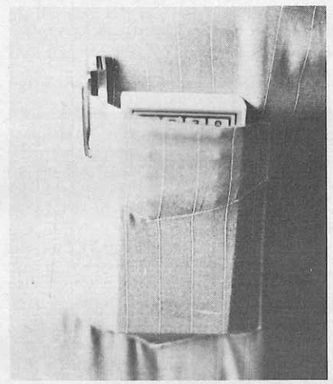
BUILD ONE OF THESE
★ Pocket Computer Terminal
★ Portable Music Synthesizer

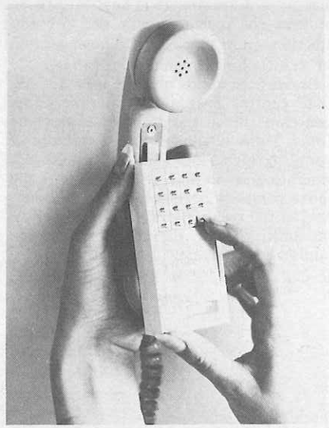
PLUS
★ State-Of-Solid State
★ Reader Problems & Solutions
★ Looking Ahead

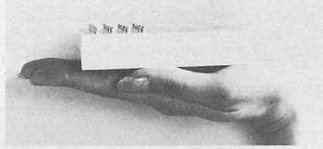


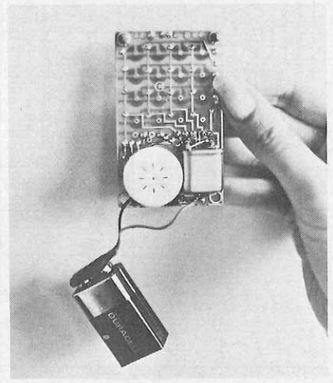
Use it to access a computer with a sound input, and with the optional plug-in memory, it can automatically dial a 7-digit telephone number.

Build This









Pocket Data Terminal

by CHARLES EDWARDS

THE POCKET DATA TERMINAL IS A HAND-sized unit that produces all the 16 digits of the standard *Touch-Tone** format. It generates, with a crystal controlled LSI integrated circuit, the eight *Touch-Tone* frequencies used by the telephone company. They are used, two frequencies at a time, to identify which one of 16 buttons (four more than on a standard *Touch-Tone* telephone) is being pressed.

Its uses as a telephone dialer or control unit are many—only a few of them can be described here. With the Auto-Dial plug-in memory—to be described next month—it can be used to dial any 7-digit telephone number automatically in less than one second, at the touch of a button. As more computers are adapted to sound input, it will become more useful as a means of computer access. (To operate as a true data terminal, the computer with which it is working must be equipped with a Synthetic Voice Generating Interface. These are around in only limited numbers today, so the PDT's main use along that line is in the future.)

The device does have many other uses that make it extremely valuable today. You can use it to dial any number (your telephone answering service for example) that you call frequently or in a hurry. If you are working with a computer that has to be dialed up every time you use the terminal, program the computer's number into the PDT's Auto-Dial memory to save time and distraction.

Give one to your elderly parents or grandparents so that in an emergency they can just hold it to the phone and call you without dialing, eliminating the possibility of a wrong number. (Make sure you try this ahead of time because not all phone lines are equipped to handle *Touch-Tone* dialing signals.) Older people whose eyesight may be poor and manual dexterity low will find it convenient and useful. Persons subject to heart attacks, strokes, epileptic seizures, etc., may find a PDT with the doctor's number programmed into it a life saver. (Tape a dime to the back of the unit for use in a phone booth.)

A store clerk could keep a Data Terminal handy, programmed with the number of the police department, to use in case of a holdup or similar emergency. The burglar alarm in your house or business can be connected to activate the PDT and call the police automatically.

Even without the Pocket Data Terminal's Auto-Dial option, the unit is handy to have around as a *Touch-Tone* generator. You can use it for a wide variety of

* Trademark of American Telephone and Telegraph Co.

applications, for instance, as an automatic and unduplicatable door key. Mount a small microphone at the point of entry and decode a series of tones to unlock the door. With proper decoders, the PDT can be used to operate a relay for almost any purpose. An example: to generate control tones to program a tape to control several slide projectors. Press 1, then press # to turn on a projector; press 2, then # to turn on projector 2. Press 1 then press * to turn off projector 2, etc.

Amateur radio operators will find it useful for controlling mountain-top repeaters. A series of tones from the keyboard could be used for repeater entry and for any function, from turning AC power on and off to switching antennas.

Besides the more obvious uses and remote control possibilities, an interesting case came up in the author's home. The *Touch-Tone* telephone quit working; it would receive calls OK but would not generate tones to dial out with. It took the phone company a week to get to the problem. In the meantime we dialed out without difficulty with the PDT, held to the handset microphone.

How it works

The Pocket Data Terminal (Fig. 1) consists of a two-of-eight coded keyboard, which drives the MOS *Touch-Tone* generating chip, IC1.

The output of IC1 goes to an audio amplifier, consisting of Q1 and Q2 (Fig. 2) which drive a small speaker. The two-of-eight code from the keyboard determines the divider mode of the programmable dividers in the tone generator chip. The on-chip oscillator is crystal controlled, generating very stable frequencies, accurate to ± ½%; well within the specification of

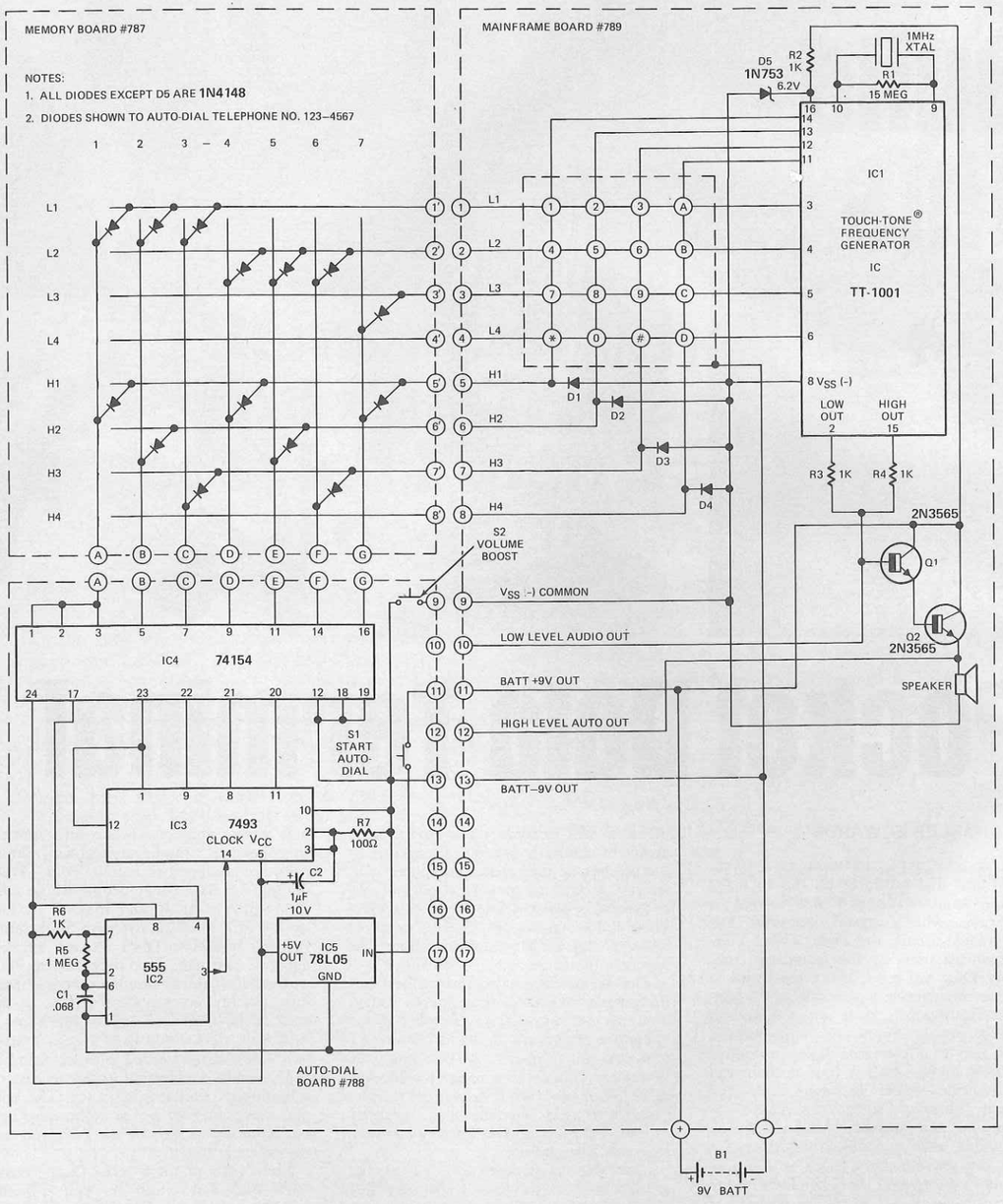
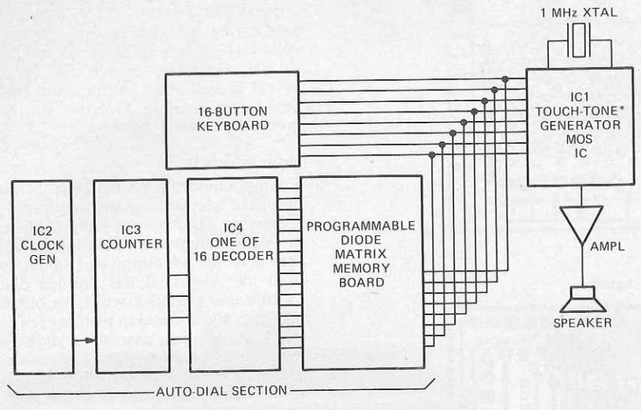


FIG. 2—POCKET DATA TERMINAL contains five IC's and three double-sided circuit boards.



*TRADEMARK OF AMERICAN TELEPHONE AND TELEGRAPH CO.

FIG. 1—POCKET DATA TERMINAL uses a MOS Touch-Tone frequency generator IC.

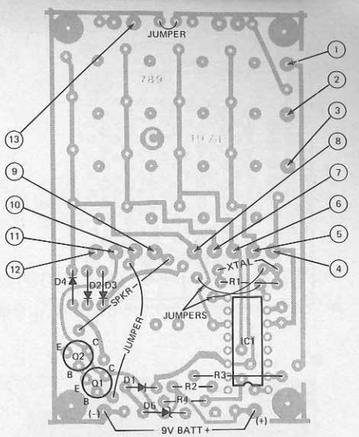
± 1.5% of most *Touch-Tone* receivers, including those used at the telephone company's main offices.

On the Auto-Dial option (board No. 788, Fig. 2) IC2, a 555 oscilator, is set to operate as a system clock with its frequency set by selecting R5. The output of IC2 clocks the input of IC3, a 4-bit binary-to-binary-coded decimal (BCD) output counter. The four-line BCD outputs of IC3 go to the inputs of IC4, a BCD to one-of-16 decoder. The outputs of IC4 go low one at a time, starting with pin 1, as the BCD information on the input of IC4 ascends in BCD value.

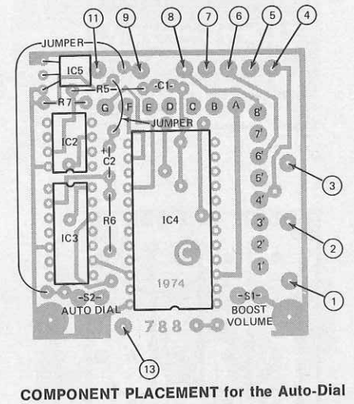
Only every other output of IC4 is used, which provides the required interdigit timing period. This is equal to the tone-on time, regardless of the frequency of IC2, the clock generator. IC2's frequency should be set so each output of IC4 is low for a period of a minimum of 40 milliseconds and could be typically set for 60-70 ms. At 70 ms, a complete 7-digit telephone number will still be outputed in less than one second.

Outputs 1, 2, and 3 of IC4 are tied together to provide a 180 to 240-ms first digit to make sure that a radio transmitter is up to full output when using the Pocket Data Terminal with a two-way radio. If a 40 to 70-ms long first digit is desired, simply cut the trace from pin 2 to 3 of IC4.

The outputs of IC4 are routed through board No. 3, the Memory plug-in card. The position of the diodes on the Memory card determine which of the two-of-eight inputs to the *Touch-Tone* generator chip IC1 will be pulled low in what order. IC1 is available for $11.00 postpaid within USA from Tel-Tek Electronics, P. O. Box 562, Belmont, California 94002. Order part No. TT-1001. (Refer to Part Two



COMPONENT PLACEMENT for the mainframe circuit board.



COMPONENT PLACEMENT for the Auto-Dial circuit board.

All resistors are ¼ watt, 10% unless noted
R1—15 megohms
R2, R3, R4, R6—1,000 ohms
R5—1 megohm, 5%
R6—1,000 ohms

C1—.068 µF monolithic
C2—1 µF, 10 V electrolytic

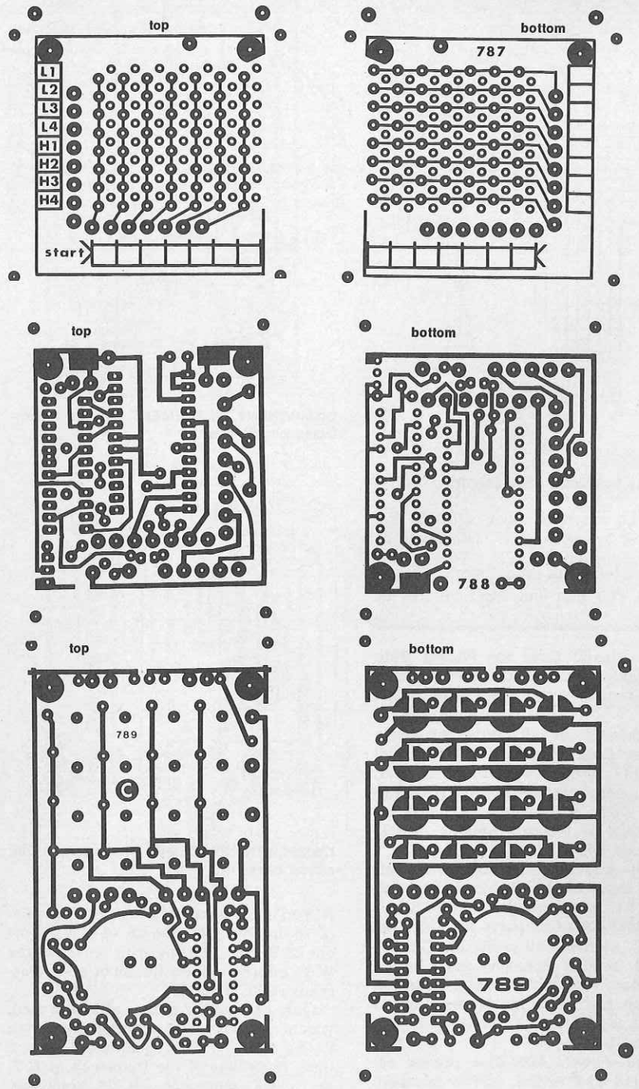
IC1—TT-1001 *Touch-Tone** Frequency Generator Integrated Circuit available for $11.00 postpaid within USA from: Tel-Tek Electronics P. O. Box 562, Belmont, California 94002. Order Part TT-1001.
IC2—555 timer
IC3—7493 TTL
IC4—74154 TTL
IC5—78L05 Regulator

D1, D2, D3, D4, D6–D19—1N 4148
D5—IN753 6.2 V. Zener diode,
Q1, Q2—2N3565

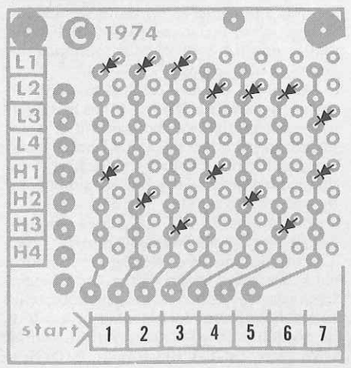
XTAL—1.00 MHz Quartz crystal
MISC—pins, sockets, 9V alkaline battery, battery connector, speaker, PC boards, plastic case with keyboard, wire, solder

*Trademark of American Telephone and Telegraph Co.

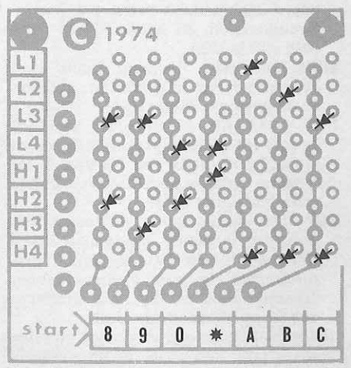
The following parts may be ordered from: Executive Devices, 740 South Locan Avenue, Fresno, California 93727.
PC–789—Mainframe PC Board. Drilled epoxy-glass with plated-through holes. $5.95 postpaid within USA.
PC–788—Auto-Dial PC Board. Drilled epoxy-glass with plated-through holes. $5.95 postpaid within USA.
PC–787—Memory PC Board. Drilled epoxy-glass with plated-through holes. $5.95 postpaid within USA.
CA–700—Plastic Case for Pocket Data Terminal, including keyboard buttons and hardware. $7.95 postpaid within USA.
PDT–700K—Kit of all parts for basic Pocket Data Terminal. Includes all parts, TT-1001, IC, PC Board, speaker, XTAL, case and keyboard (less battery). Does not include any parts for Auto-Dial or Memory options. $39.95 postpaid within USA.
PDT–700—Above basic Pocket Data Terminal assembled and tested (less battery). $49.94 postpaid within USA.
ADO–700K—Kit of all parts for Auto-Dial option. Includes all parts, all IC's, PC board, smaller speaker, push button switches, pins and sockets. Does not include any parts for Memory board (required, see below). $24.95 postpaid within USA.
ADO–700—Above Auto-Dial option assembled and tested. $34.95 postpaid within USA.
MEM–700K—Kit of parts for Memory board. Includes PC board, pins for interconnection, all diodes. $6.95 postpaid within USA.
MEM–700—Above Memory board and programed for any 7-digit number. $9.95 postpaid within USA.
PDT–1000K—Kit of all parts and PC boards for basic Pocket Data Terminal including all parts and PC boards for Memory options (less battery). $69.96 postpaid within USA.
PDT–1000—Assembled basic Pocket Data Terminal including assembled Auto-Dial option and Memory option preprogramed to any 7-digit number (specify with order) (less battery). $89.95 postpaid within USA.
181–423—Heavy duty sewn-edge carrying case with belt loop. $5.95 postpaid within USA.
(California residents add sales tax)



FOIL PATTERNS of double-sided boards. Memory (top), Auto-Dial (center) and mainframe (above) boards are shown 80% full size.



MEMORY BOARD shown programmed to dial 1234567.



MEMORY BOARD shown programmed to dial 890*ABC.

next month for information on programming the Memory card.)

Switch S1 (Auto-Dial) is pressed and held during auto-dialing and supplies +5 volts to IC2, IC3 and IC4 via IC5, a 9V to 5V regulator. Switch S2 (volume boost) is used either during Auto-Dial or keyboard operation to boost the audio output level when required.

How to use it

Simply hold the Pocket Data Terminal up to the telephone or two-way radio microphone. To start the Auto-Dial, press the right button on top and hold it down; then press the left button and hold it down until the Auto-Dial has finished dialing (within one second it will have outputed all seven digits stored in memory). To use the keyboard for control or data entry purposes it is only necessary to press each button as required. Press firmly and listen to the tones produced as you use the keyboard.

If the data are not being received at the other end of the phone line, the level being transmitted may be low; check for maximum acoustic coupling to the microphone; be sure the nickel-plated eyelet on the rear of the Pocket Data Terminal is centered on and is in good contact with the handset microphone; be sure the unit is parallel with and flat against the microphone. If more audio level is required because of a bad or noisy telephone line, simply hold down the top right button while using the keyboard. This gives a boost in audio level output. No on-off switch is required, because there is no battery drain when no tones are being generated. The unit will work with any *Touch-Tone* telephone or any dial-type telephone that is connected on a *Touch-Tone* telephone line.

Because of the compactness of the unit and the fact that the keyboard contacts are etched into the main frame PC board, and since making double-sided plated-through holes is beyond the capabilities of most home constructors, it is recommended that the unit be built using only pre-fabricated PC boards. A set of PC boards, as well as a complete set of parts, is available from Executive Devices, 740 South Locan Avenue, Fresno, CA 93727. See the Parts List for information on ordering complete kits or parts or assembled units.

Next Month: Detailed construction information—how to build the plug-in Auto-Dial option that enables the Pocket Data Terminal to remember and automatically dial a 7-digit telephone in less than one second at the touch of a button.

NO DC VOLTAGE

I can't get any DC voltage on the plate of the video amplifier tube in this Bradford CMAT-89243. Nothing on the picture tube cathodes either.—S.E.

Its probably an open winding in the "service transformer" that feeds DC to both the video output plate and the picture-tube cathodes. Check this. If it is open, you can get an exact duplicate from the J.W. Miller Co. Something like their no. 7600 or no. 7602 ought to do very well.

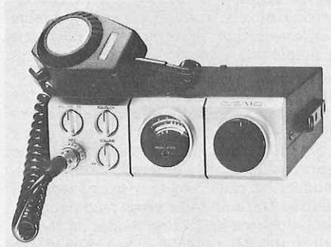
CB Equipment Roundup

New features and new performance to meet the increased demand for CB.

JOHNSON Messenger 130A

PACE Sidetalk 1000B

PEARCE-SIMPSON Cougar 23B



CRAIG model 4104

by HERB FRIEDMAN

GOOD TIMES OR BAD, IF YOU HAVE A PRODUCT that most everyone wants or needs—like the proverbial mousetrap—you have a hot item. Citizens band has proven, in just the last few months, to be the better mousetrap the electronics industry needed. With color TV sales way down and hi-fi equipment just sitting on shelves waiting for customers, the CB sales have kept many a store in business, not to forget a manufacturer or two. Fact is, some CB manufacturers are running six months behind in deliveries; in some parts of the country you go on a waiting list to get a specific type of mobile antenna, and some "hot" transceivers are just about unavailable if you don't have good relations with a local distributor.

What brought about the sudden surge in CB sales is a whole separate story concerning license fees, court decisions, unbelievable stupidity by the EIA regarding Class-E service, an insane FCC restructuring proposal for Class-D service, and the realization by many that it was now or never for them and CB—with or without a license. All these factors came together at the same time and when the smoke cleared, a whole new CB market emerged; a thundering herd rushing for CB licenses at the rate of 100,000+ applications a month.

Equipment

There are so many people buying CB transceivers that the industry, which was moving towards the high-ticket "gold plated specials", has turned on a dime and settled on a more or less average price range of about $150 to $200, and most of the new equipment falls into this price range.

Of course, not everyone is producing two or three models for the "average price range". There are many lines from well known brands that range from basic budget-models with not too much in the way of features and performance to high-performance SSB/AM models with several steps in between. For example, Pearce-Simpson goes from a *Pussycat 23* at $170.95 to the deluxe *Guardian 23* at $379.95 in five steps—adding performance and features at each step. E. F. Johnson, Cobra (Dynascan), Lafayette and Radio Shack are just a few of other well known brands that offer progressively upgraded transceivers. And when you start to search for unusual features such as a modulation meter, or microphone gain control, you'll find other broadly-based feature/performance lines from Midland, Courier and Teaberry.

But if you look at both the broad lines, and the transceivers from manufacturers with just two or three models, you'll find most of what's available falls in the "average" $150 to $200 price range; and much of the performance will be similar. In many instances the price differential represents operating convenience features. In the "average" price range the models appear to be built on a basic package: a 23-channel transceiver with volume and squelch controls and moderate receiver selectivity. Generally, the only "extra" feature is a remote speaker jack.

As the model is upgraded, any or all of the following features might be added to the basic package: A PA speaker output and selector switch, a noise blanker, an S/RF-output meter, a tone control, a modulation meter, a microphone gain control, a speech compressor (talk power booster), etc., etc., etc. Rarely will you find one model with all possible features, but most of the standard brands will have at least one specific model with those features *you* consider most important. In addition to the previously mentioned brands, "average" priced models are also available from such well-known labels as E. F. Johnson, Royce, Pathcom, Browning, Hy-Gain, Robyn and Pace. And it seems that almost weekly a whole host of new brands and labels appear on the CB market.

The Johnnie-come-latelies are primarily in the "average" price area for that's where most of the sales are: few enter the low cost budget priced range close to $100 or the higher priced specialty and SSB/AM market. It's sort of like the early days of auto stereo tape players where every dealer stocked the best profit item for a given time: few gave any thought to repair parts for these here-today-gone-tomorrow brands. If it had the right "average" price it could be sold. CB is much like that today, and often you'll find an unknown "average" priced transceiver offers less performance and features than that of a similarly priced well known model.