

THE WORLD SCANNER REPORT

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A Journal of VHF-UHF Scanner Technology & Engineering

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THE YEAR OF THE INTERFACE - 1992

Wow, is this ever going to be the year of the interface! Since last issue, I built and tested the *RW Systems Model SC-2 Interface Kit* and was spellbound by its simplicity and ease of operation! It worked perfectly the first time power was applied; no stupid mistakes or developer's oversights to contend with as we Hackers often have to face! Ecstasy had hardly subsided when I went for broke to test Datametrics, Inc. Computer Aided Scanning system. Once again, I was launched into the stratosphere, though not for the same reasons as RW Systems's interface. The two are as different as night and day; neither comes out as a clear winner; and either one is capable of opening up a whole new dimension to your scanning. Read about each one elsewhere in this issue.

Roll your own Scanner/Computer Interface? Sure, why not? You'll not be able to copy Datametrics and RW Systems interfaces for two reasons: (1) each is a proprietary design which would be dishonest to copy in the first place, and (2) the developers included one or more hard-programmed chips in their designs to thwart the efforts of would-be copy cats. However, "Professor Peabody" and his able assistant "Sherman" have spent the last three months working up a real whopper of a do-it-yourself interface that we'll serialize over this and the next couple of issues. The "WSR" may offer more do-it-yourself interfaces in the future. The bottom line is this: no matter your experience, ability or inclination, we will present or introduce a scanner/computer interface that will be just about right for your needs and desires. Rumors persist that Radio Shack is going to introduce a scanner with a computer interface. I have no reason to bet on it yet, but it's probably a matter of time.

SCHEMATIC DIAGRAM FROM LAST MONTH'S SERIAL DATA INTERCEPTOR/DECODER

Space wasn't available last month for the schematic diagram of HB Tech's Serial Data Interceptor/Decoder described on page 2. That circuit and article was aimed at technicians and engineers who need to understand the data flow between the PRO-2004/5/6's CPU and the LCD Display Driver chip. This is not a project for casual hobbyists, but it will save the thousands of dollars' cost of a logic analyzer which is otherwise needed to intercept and decode the serial data flow out of the scanner's CPU. The schematic diagram that wasn't given last month is on page 8 this month with no further ado. It's a cost effective tool developed by HB Tech in their design of a scanner/computer interface. If you have any questions about the circuit or how it works, I will be happy to forward your inquiry to HB Technologies.

WHAT'S UP FOR 1992?

1992 is the Year of the Interface but it doesn't mean that scanner/computer interfaces are all you're going to see here in the "WSR". Far from it. Let me give you a sneak peek at what might lay ahead.

A *CELLULAR PHONE/TRUNKED CALL FOLLOWER* just might be around the corner. Know how you can be listening to a hot 'n spicy cell phone or SMR trunked conversation one minute only to find it gone the next? Well, several companies have come out with data readers that show what frequency to which that cellular phone conversation was handed off. In some instances, these gizmos can actually change the receiver's frequency to follow suit. This type of equipment was designed for law enforcement agencies with a cost to match at \$2500 and up. Comes now an interesting little digital circuit that can do pretty much the same thing at a cost of under \$200. A small circuit board goes between the EXTERNAL SPEAKER jack of your scanner and a serial port of your computer. The circuit's logic pretty much does everything for you, including print an interpretation of the control data on the computer's screen. I understand that it will also control certain AOR scanners to follow cellular phone calls as they are handed off from one cell to another! This unit is now under evaluation and will be discussed in future issues. If interested, study up on cellular and trunked SMR radio systems so you can be ready. I say "trunked systems", too, because self-respecting and law-abiding scannists don't bother to monitor cellular conversations, but there's every reason and lawful right to monitor the 800 MHz trunked systems, and this unit just might work for that purpose, too!

Continuous Tone Coded Squelch Systems (CTCSS) are nothing new but scannists are becoming more and more interested in applying CTCSS-decode capability to their scanners. CTCSS is a pretty slick concept that can add a new dimension to the capabilities of your monitoring post. We will rehash the CTCSS mods given in Vol-2 of my SCANNER MODIFICATION HANDBOOK and cut some new turf in this interesting side action of scanning! Read my Vol-2 again and/or contact the following company for info on their CTCSS products if you want to be prepared for what's to come:

COMMUNICATIONS SPECIALISTS, INC.
426 WEST TAFT AVENUE
ORANGE, CA 92665.4296
800-854-0547 & 714-998-3021

A REMOTE CONTROLLER FOR THE PRO-2004/5/6 & other scanners has long been on the hobbyist's want list. A basic

version of my Remote Controller appeared in my column of a recent issue of MONITORING TIMES and will appear again here in a future issue for those who don't get MT. "Prof Peabody" has a full function Remote Controller that will be presented in a coming issue. The thing about Remote Controllers is that you can't parallel a bundle of wires from the scanner's keyboard to a remote switch unit. The scanner's CPU will lock up if it's done like that. We will show you the right way later this year.

What else? To tell all would take the fun and surprise out of it, but still on our print schedule after the bugs are worked out include an SSB Adaptor for the PRO-2004/5 & /6 and certain other scanners; more shortwave receiver mods; back to radio basics (hints, tips, kinks, etc); AND we're saving plenty of room for new products, techniques and ideas which will appear from time to time. Space is also reserved for what YOU want that we might have overlooked. This is one special, unique characteristic of the "WSR": we're open to new ideas; we're flexible; and we can turn on a dime to suit yours and our needs.

WHAT ELSE?

We got a deal on that "cheap" IBM computer I requested last month, thanks to Mike Schriber, who found a bargain of a 640-k XT with a 40-Mb hard drive. Obviously, the XT is more of a learning tool but I've learned enough to get serious about a more powerful computer with laser printer capabilities to see the "WSR" into the end of 1992. All things in good time, but the wheels are in motion.

Also in the plan is to set up a computer bulletin board service (BBS) to serve your needs for speedy replies, info and answers to your questions. For this, we need a third phone line which is proving difficult to get at this time, but we hope to overcome that obstacle sooner than later. At worst case, we'll set up a part time BBS for the evening and night hours to serve you better. Watch coming issues for an announcement of the phone number and schedule.

SCANNER/COMPUTER INTERFACES AT LAST! A Review of Two

RW SYSTEMS MODEL SC-2

I am pleased to offer an evaluation of a most effective and potent computer interface for the PRO-2004, PRO-2005 & PRO-2006 scanners. First, here are the SC-2's PLUSes:

- + Works with virtually any computer that has a serial port, RS-232 compatible; i.e., universal.
- + Special software not required; works with most any standard telecom (modem) program, but a modem is not used. Four wires in a cable 25-ft long or less connect between the computer's serial port (TxD, RxD, RTS and ground) to the interface. The cable is not difficult to make up if you don't have one.

- + Two-way operation: programs frequencies into the scanner; collects data from the scanner.

- + Four modes of operation are available: (1) Downloads (programs) 1 to 400 frequencies at a time into the scanner; [A 400-ch download takes about 9-minutes, max] (2) A limited activity log uploads a record of active frequencies from either the SCAN or SEARCH mode to the computer's review buffer; [you can transfer this record to a data base!] (3) Quickly uploads contents of the scanner's memory, 1 to 400 chan, into the computer's buffer memory. [You can transfer this record to a data base!] (4) Manually change channels to be monitored from the keyboard.

- + Easy to master and use; very little to memorize.

- + Programming the scanner via the Interface is similar to sending an ASCII file to a BBS.

As an example, a partial file to be sent could be configured something like this:

Sym	Data	Comments
@	001	>starting channel
*	0158.9700	>local gendarmes
*	0275.8000	>military air freq
^	0000.0000	>reserved
*	1284.6000	>amateur radio repeater
^	0162.4000	>NOAA Weather
*	0146.8800	>amateur radio net

Where "@" precedes the starting channel (001) to be programmed; "*" precedes the 8-digit frequency to be programmed; "^" precedes a frequency to be programmed and LOCKED OUT. Therefore, with minimal manipulation, your data base of scanner frequencies can be used to program the scanner.

- + Ignores all ASCII text except numbers preceded by one these three characters: @ * ^ Therefore commentary & text in the data base are irrelevant.

- + Professional (Mil-Spec appearing) printed circuit board with a solid and thorough electronic design!

- + Interface is compatible with most mods, but see below.

- + Does not interfere with normal use of scanner.

- + 1-yr warranty on parts & proper operation

Continuing to tell it like it is:

- Available only as a kit excluding cable and wiring. Requires 1-2 hours to assemble the PCB with its six IC chips and handful of parts. Requires another 2-4 hours to install in scanner. Another hour may be needed to fabricate the cable between the computer & interface.

- Documentation & directions are adequate, but not great.

- With exception of LOCKOUT, the RW Systems interface does not accept custom programming such as MODE (AM/NFM/WFM), DELAY, PRIORITY etc. These custom program functions must be manually set as needed.
- The interface draws about 225-ma from the scanner's AC/DC power supply which increases heat accumulation within the scanner. I recommend powering the scanner with a +12v @ 1-amp external power supply anyway; otherwise, there could be long term problems caused by the extra heat in the scanner, *especially if other mods have also been done*. An external DC power supply will nullify this potential liability!
- The Interface has a custom programmed microprocessor chip and two PAL chips. This means that replacement/repair parts might not be available if the supplier were ever to elope to Mexico with his secretary.
- The interface might not be compatible with speed modifications where the Clock Resonator has been replaced with a crystal. (For sure, in my PRO-2004.)
- Some "of the variables in your telecom program may have to be "played with" such as Tx Line Delay (.4-sec), but this results from the slowness of the scanner; not a fault in the Interface.
- For the PRO-2004, -2005 & -2006 only; no others

The SC-2 Interface Kit is available for \$100.00 from: RW SYSTEMS; PO BOX 910043; SAN DIEGO, CA 92191. When you inquire or order, please mention that you heard about the Interface from Bill Cheek via the "WSR"!

In conclusion, I like the SC-2 Interface despite any real or imagined shortcomings. I highly recommend it to those scannists who are technically inclined and those who are patient & methodical in their work. If you are not able to build and install it yourself, I can do it for you. The SC-2 Interface kit is also available from COMMtronics Engineering for the same price as from the developer.

DATAMETRICS, INC. COMPUTER AIDED SCANNING SYSTEM

There is a night & day difference between RW Systems interface and that from Datametrics! So different, in fact, that this one just might be for you if you see some shortcomings in RW Systems' unit. As before, here's the scoop just exactly the way it is:

- + Professional preassembled/finished printed circuit board; nothing to assemble or fabricate; only a cable is required; commonly available.
- + Exceptionally easy to install; (PRO-2005/6); no holes to drill; no soldering; no cutting; no fuss, muss or mess. The interface PCB plugs into CN-501, an existing connector. Two wires from the interface clip to easily identified spots on the main board of the scanner. A ribbon cable from the interface is routed out the rear

of the scanner; the plastic case goes back on over the ribbon cable at the end of which is a DB-25 connector for the cable that goes to the computer's parallel output port. (LPT1, LPT2, etc). Installation time should not require over 5-10 minutes!

- + Software permits user to control the scanner from the computer keyboard for SCAN, SEARCH & MANUAL functions. SCAN channels and SEARCH ranges are easily defined from the computer keyboard.
- + Software contains an easy-to-use data base manager for frequency management; virtually any number of files of 1 to 1000 channels per file can be generated for various program needs.
- + Two-way operation: programs frequencies into the scanner; collects data from the scanner. (see below)
- + Downloads (programs) up to 400-channels at a time into the scanner in less than 10-mins.
- + External data base frequency files can be imported into the Datametrics data base.
- + Menu-driven software includes full monitoring display, digital spectrum display and system editor. (See Fig-1)
- + Comprehensive, professionally prepared manual includes detailed instructions, screen displays and references.
- + Established company experienced with interfaces for radios; well known for their control program/interface for ICOM R-71A & R-7000 receivers.
- + Does not interfere with normal use of scanner.
- + 30-day return privileges if not satisfied.

Continuing to tell it like it is:

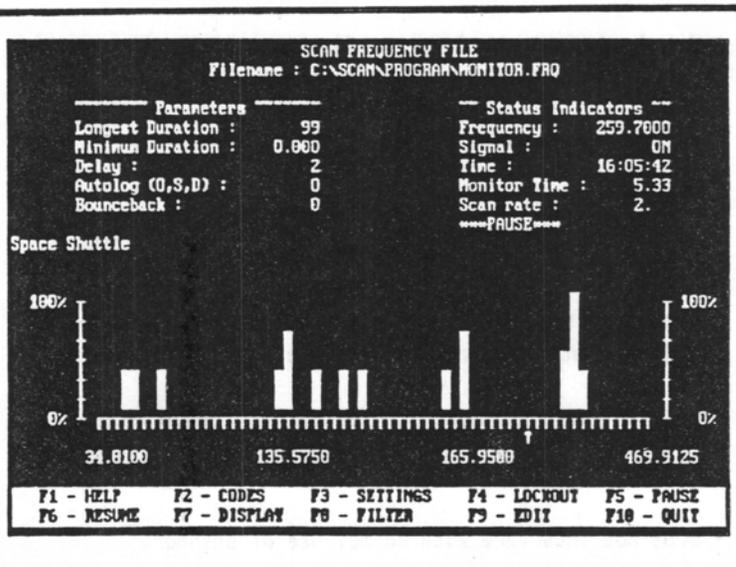
- Works ONLY with an IBM PC/XT/AT/clone w/360-k RAM (or 640-k for full channel capacity).
- Very slow SCAN & SEARCH speeds when under software control, i.e, about 1-2 channels or steps per second.
- Does not actually "control" or "read" most of the scanner's operations; instead software emulates control of the scanner; places it in the PRGM mode and then performs various programmable functions from software. Hard to describe and not materially important except that scanner sends no information back to the computer other than SQUELCH breaks. The software uses its own memory and the SQUELCH break information to pace the scanner in software-controlled SCAN, SEARCH & MANUAL emulations. The effect is reduced speed of operations.
- Software intensiveness means more to learn and more "behind the scenes" effort to achieve mastery and simplicity of operation. No problem with time.

- Supported by Datametrics to work ONLY with the PRO-2006 (However, there is no functional reason why it can't also be installed and operate as specified with the PRO-2005. Should also work with the PRO-2004 except that installation will be more complicated due to mechanical differences of the PRO-2004.

- Not inexpensive

The SC-2 Interface Kit is available for \$350.00 from: Datametrics, Inc.; 2575 S. Bayshore Dr, Ste 8A; Coconut Grove, FL 33133. When you inquire or order, please mention that you heard about the Computer Aided Scanning System from Bill Cheek via the "WSR".

Fig 1 - Frequency Scan Screen



I like the Datametrics system and highly recommend it to those who don't have the time or expertise for technical work. It also comes with recommendations for those who perform radio comms traffic studies & analyses on limited budgets where scanners are a part of the job. It is capable of logging and compiling some very impressive charts, bargraphs, and reports on comms activities in your area. In this sense, the Datametrics system can be called a "communications data logger." Operating it resembles being in the cockpit of an aircraft. It's fun!

CONCLUSION & SUMMARY: I just love products like those from RW Systems and Datametrics which make my job easy! I like them both, but am hard pressed to choose a favorite; they're just too diverse and different, like a pickup truck and a touring car. The only difference in this case is that you don't want BOTH; one or the other will do nicely. But then where one may not be right for you, the other one just could be perfect! In any event, either one drops 400-channels into your PRO-2004/5/6 with minimal drudgery and to my way of thinking, that's the most important function of an interface. "Professor Peabody" now tells you what he thinks.....

**DO-IT-YOURSELF FEATURE PRESENTATION
::: THE FATMAN COMPUTER INTERFACE ::: Part 1**

By: "Professor Peabody"

Greetings Fellow Scanner Fans! Here's another project for your hacking addictions: a computer interface with a remote control keyboard for the PRO-2004/5/6 scanners and which might be adaptable to other scanners that have a keyboard similar to the Radio Shack models.

Before we get into the juicy meat of this project, let's discuss computer interfaces and what they can do. A top-of-the-line functional interface will have all controls and functions of the scanner visually simulated on the computer screen to make you feel right at home operating the scanner from a computer. The interface should monitor all controls, functions, events and activities that occur in the scanner; everything that happens should generate data to be passed back to the computer. There should also be a menu of user controls to select or reject specific data that gets passed to the computer. In summary, the ideal interface will be an extension of the scanner's controls and operating panel for computer supervision and rule over everything that happens in the scanner. This describes a very sophisticated interface that's totally worthless without corresponding sophisticated software. Big bucks and a steep learning curve are prerequisite before you can even flip a switch.

Questions: would you really use all those functions and options from a computer keyboard? Do you care how many times a particular frequency is active over a period of time? What is the use of a "map" of the birdies in your radio? How about a spectrum chart of all active freqs in a range? Heck, I could go for all this stuff but on a limited budget, it's tough to have it all.

One justification for the big bucks is the feature of data transfer to the computer for temporary or long term storage. Some mods like the Search & Store Module can do little more than store a bunch of active frequencies in the scanner's permanent memory. There's no good way to process that info without an interface, short of writing it all down and manually entering it into the computer.

It becomes a matter of WHAT we want versus HOW MUCH we are willing to pay. It is not a high priority for my computer to operate and log data from the scanner. It could be fun; don't get me wrong, but is not important. Not everyone wants all the same finer things in Life, but we all want to breathe and eat for starters. The point I'm about to make for interfaces is that we all WANT to have the computer program the scanner for us! Anything else that the interface can do is so much icing on the cake and to each, his own. The vital thing for me is for the interface to permit a computer to program the 6,400 channels in my PRO-2005. You see, twice now, I have accidentally shorted out the +5v Memory Retention Battery circuit which wiped out the entire sixteen Blocks of memory in each instance! I'm pretty good at programming the keyboard BUT it takes better than an hour to do one

400 channel Block. After that I'm wiped out mentally from intense error correcting and concentrating. Then it takes 15 more nights of programming at one Block a night.

Have you thought about doing Doc's 64-Block, 25,600-Chan Extended Memory? I have, but the idea of hand programming all that memory only to lose it by a stupid mistake once gave me a violent rash of hives. Now I will reconsider because that data can be slam-dunked into memory in about 2-hrs. Huh? Well, I am about to show you a mod that's on a par with Doc's multi-thousand channel memory mods and more exciting. It's inexpensive and does not require any custom programmed microprocessors, PALS or PROMS. Reconfiguring for extra functions is a cinch but I'm getting way ahead of myself. Here's the deal:

Necessity, the mother of invention, with a slim budget for a prime mover, drove me to design a thrifty interface to program my scanner for me. I only recently got into computers, so I didn't want any weird or sophisticated software that would take forever and a month of Sundays to learn how to use. Eureka! My Fatman interface might cost upwards of 75 bucks if you bought everything from scratch at full retail price, but depending on what's in your junkbox, the cost could be a lot less. With my Fatman Scanner/Computer Interface, you can load up 400 channels of error-free frequencies, complete with DELAY, LOCKOUT and desired MODE settings in under six minutes!

An Overview of the Fatman

Ok, we're eating up space and there's a long way to go, so here's an overview of the project, followed by a parts list, resource list and a schematic for those who want to get started right away. We'll conclude the Fatman next month with a verbal wrap up, alignment and operating procedures. This project is a hackers delight so use care in its construction and be neat. It pays off.

There are 5 unique parts to this project, one of them optional: Remote Controller Keypad. The remote keypad and interface were designed for complementary operation because some parts for one are common to the other. Why a remote keypad? Well, obviously you wouldn't want to program your scanner from across the room but how about just operating it in total comfort while sitting in your stratolounger, all kicked back? Sometimes the best place to put your scanner isn't always where you would like to operate it. And then some of us have clubs for fingers that don't fit the tiny buttons on the keyboard. The Remote Controller keyboard can be made as big as you like with plenty of space between the keys. So the Remote unit has a value, but leave it out if you don't want it.

The five parts of this project are:

- #1 Keyboard Interface; simple & easy
- #2 Computer Interface; hairy, but fun
- #3 Code Converter; tedious but rewarding
- #4 Software (don't panic; just your data base)
- #5 Remote Keypad (optional)

The Computer Interface connects to the computer's printer port instead of an RS-232 serial port. This expels the need for a telecom program; a regular database program will "print" data to the interface and fool the computer into thinking it's feeding a printer. The database thinks it's sending frequency records to a printer but actually only ASCII codes go to the interface and code converter which translates the ASCII inputs to coded outputs needed by the keyboard interface to simulate scanner keypresses during programming. My FATMAN is used with an IBM clone machine but it can probably work with any machine that sends ASCII characters to a printer.

Only one small mod is done to the scanner; the Keyboard Interface and a DB-9 connector to accept a cable from the FatMan Computer Interface which can be in a project box of your choosing and budget and located anywhere between the computer and the scanner. The printer cable from your computer's parallel port connects to the input of the FATMAN. You can use a printer A-B switch if you will be programming and printing a lot; otherwise moving the printer cable as needed will be fine. An additional benefit of the interface is that the database program can print a paper record of what's in the scanner's memory. Additions and changes can be pencilled on the printout; entered back into the database; then in a relative flash, painlessly loaded into the scanner. You can nurse on a can of your favorite beverage and watch the blinking LEDs on the interface. I am an LED freak and went wild with them but they were necessary for testing and debugging. If you want to save space and parts, LEDs can be omitted but they add to the show when you invite friends over to see your latest toy. The light show is impressive!!

Some of the CMOS chips may not be available locally, but if you use IC sockets, you can start wiring the circuits while you wait for the big brown delivery truck. The DB-9 connector was installed on the rear panel of the scanner just above the BNC connector. Admittedly, the drilling and reaming of the hole in the chassis was a job but once done, the hard part was over. The rest is fun. Of course, the DB-9 connector and a short pigtail can just hang out the back of the radio from a round hole drilled in the chassis. This same connector is also the hookup point for the full function Remote Controller.

KEYBOARD INTERFACE

The Keyboard Interface must go inside the scanner and as close to the Keyboard connector as possible. Use a Radio Shack experimenter board, cut to size, small as possible.

The thirteen output wires of the Keyboard Interface are easily connected to the scanner, but the method differs between the PRO-2004 and the PRO-2005/6 as shown below. The 13 wires from the Keyboard Interface to the scanner's keyboard MUST be as short as possible.

PRO-2005/5 ONLY: To attach the circuit to the scanner's keyboard connector (CN-501) in the PRO-2005/6, cut in half a 28 pin wirewrap socket so you have two separate 14

pin rows. Save one half for a spare. Pull out one pin of the other half to leave a row of 13 pins. Insert this row of pins into the keyboard connector, CN-501, by pushing down and inward on the connector pins with the interface pins. (The pin of CN-501 closest to the metal chassis side wall is Pin 1. Pin 13 is at the opposite end of that row.) Then solder the 13 wires from the Keyboard Interface onto the 13 exposed pins. This is a handy, non-invasive way to tie into the keyboard matrix.

PRO-2004 ONLY: The 13 wires from the Keyboard Interface must be soldered to the row of visible and easily accessed 13 solder spots on the back side of the scanner's keyboard. The BLACK wire on end of the row is Pin 13, so the opposite end is Pin 1. In lieu of this, you could follow that wire bundle up to where it connects to the Logic/CPU Board, PC-3, and devise some way of slipping a custom connector into the exposed holes of CN-502. These holes are non-standard spaced at about 2mm apart, so you're on your own for a fit at CN-502.

COMPUTER INTERFACE

Build the Computer Interface into a project box for best results. It need not and really should not go inside the scanner because of its size. You'll need room in the scanner for other mods from time to time. Special considerations are not needed for this part of the project, but if I were you, I'd do your chip layout and wire planning on paper first. You'll have to use point-to-point wiring, so make it easy on yourself. There will be two trimmer potentiometers so put them where they can easily be accessed later for alignment. You can go hog wild with the LEDs or not as you see fit. Perhaps the best advice I can give here is to use DB-9 and DB-25 connectors for output and input, respectively. Locate these chassis-type connectors on the rear of the project box for out of sight, out of mind results. If you don't want to bother with connectors, you can run permanently wired 9-conductor and 25-conductor shielded cables out the rear of the box with suitable connectors on the ends of each cable, DB-9 to the scanner and DB-25 to the printer port of your computer.

A note on power consumption; all IC chips are CMOS, so the current drain is very low. With no LEDs turned on I measured 1 ma of current. With the LEDs enabled, it drew 25 ma which is still miserly. I am very aware of the limitations of the onboard power supply but this project can still be easily powered from the radio. An external supply can be used but it must be +5 volts only. The pulse levels between the computer and radio must be .5v.

The cable to the computer can be flat ribbon or bundled as shielded 25-conductor. The cable to the scanner should be shielded 9-conductor. Radio Shack used to have excellent 9 & 25 cond cables, 278-775 & 278-776, but these have been discontinued and stocks may be sold out by now. Shielded cables are highly recommended for obvious reasons. The length of each cable should be 5-ft or less, but a little longer will probably be ok.

CODE CONVERTER

This is a ROM, Read Only Memory. You program it yourself so it's actually a PROM. Ordinary switching diodes are used to set up the program. You don't even have to know what you're doing if you follow the schematic diagram. The PROM or code converter is an 80 address by 5 bit memory. The lower 32 addresses are not used so I left out the chips but most of the upper 48 addresses are used to output codes. I'll explain the technology of this next month in the wrapup, so just build it according to the diagram for now and include space for it in the project box that will also house the Computer Interface.

SOFTWARE

The necessary software can be an ordinary database or even a word processor program. Any program that can send an ASCII file to a printer should work. I use a shareware database called FILE EXPRESS that's great for beginners but I will assume that you know how to use your database and how to print files. Next month, you'll learn how to operate the Fatman by "printing" a frequency file to it.

FATMAN PARTS LIST

CKT
SYMB QUAN DESCRIPTION

Keyboard Interface Primary Parts

U1,2	2	74HC4051 8 channel analog multiplexer
R1-6	6	Resistors, 10-k, 1/4-watt
C1-8	8	Capacitors, 0.1-uF, monolythic or tantalum
D1-8	8	Silicon Switch Diodes; 1N4148 or 1N914
J1	1	DB-9 Connector; female; RS #276-1538
PC	1	Multipurpose board; RS #276-150
P1	1	28-pin Wirewrap IC Socket; RS #276-1983

Computer Interface Primary Parts

U1	1	74HC374 Octal D-Type Flip Flop
U2	*	See under Code Converter below
U3	1	74HC244 Octal Buffer
U4,5	2	74HC123 Dual One Shot Multivibrator
U10-12	3	74HC04 Hex Inverter
U8	1	74HC08 Quad AND Gate
U6,7	2	74HC32 Quad OR Gate
U9	1	74HC4066 CMOS Switch
VR1,2	2	Trimmer Pot; 500-k 10 turn precision
R1-16	16	Resistors, 47-k, 1/4-watt
R17,18	2	Resistors, 10-k, 1/4-watt
R19-34	16	Resistors, 1-k, 1/4-watt
C1,2	2	Capacitors, 0.001-uF disk
C3	1	Capacitor, 1.0-uF, tantalum
C4	1	Capacitor, 2.2-uF, tantalum
S1	1	Switch, toggle; SPST
J1	1	DB-25 Connector; female; RS #276-1548
J2	1	DB-9 Connector; female; RS #276-1538
LEDs	15	Light Emitting Diodes, your choice

Code Converter (U-2, in Computer Interface above)

- U2d 1 74HC138 3 to 8 line Decoder
- U2a-c 3 74HC4514 4 to 16 Decoder with latch
- D1-44 44 1N4148 or 1N914 signal diodes
- C1 1 Capacitor, 0.1-uF, monolythic or tantalum

Remote Keypad:

- U1-4 4 74HC148 Priority Encoder
- U5,6 2 74HC20 Dual 4 input NAND gate
- U7 1 74HC32 Quad 2 input OR gate
- U8 1 74HC86 Quad Exclusive OR gate
- S1-29 29 Switches; push button, n.o.
- R1-29 29 Resistors, 47-k, 1/4-watts
- R30 1 Resistor, 1-k, 1/4-watt
- C1 1 Capacitor, 0.1-uF, monolythic or tantalum
- LED 1 Light Emitting Diode, choice

REMOTE KEYPAD WILL BE PRESENTED IN A FUTURE ISSUE. IT IS INDEPENDENT OF THE "FATMAN" BUT PLUGS INTO THE KEYBOARD INTERFACE IN LIEU OF THE COMPUTER INTERFACE. THESE PARTS NOT NEEDED FOR THIS PROJECT.

===== ANTENNA & PREAMPLIFIER TESTS =====

By: Bill Bowers

I tested some antennas and preamps. The purpose of the test was to find the most effective omni-directional antenna and preamp for my location. I am in a rural region about 50 miles from any transmitter. Local police, Highway Patrol and sheriff offices are located in all directions around me so I needed an omni-directional antenna, and overload was not a factor!

Antennas tested:

ICOM AH-7000 PRESSLER ARA-900 AUSTIN's "THE FERRET"

Preamps tested:

IDC-WBA-1500 WI-COMM L-A75M
AUSTIN-FERRET preamp RADIO SHACK #15-1117 coax amp

I mounted two antennas on opposite ends of the garage on 10' roof mount poles and ran equal lengths of Belden 9913 coax to a DALWA-CS201 two-position antenna switch. Then I searched for a signal on one antenna, and switched back & forth for comparisons. This was done in 50, 150, 450 & 800-900 MHz ranges. This procedure was repeated for many combinations. All antennas and preamps were good in the bands up through 450 MHz but in the 800-900 MHz range, there was a clear winner. The best combination for the 800-900 MHz range for my location was the ICOM AH-7000 with the WI-COMM L-A75 preamp.

After the winner was determined, I repeated the tests and compared it to all other set-ups. In many cases, there were weak signals in the 800-900 MHz range found with the AH-7000/L-A75 that when switched to any other combination produced no readable signal at all. P.S. Anyone want to buy an ARA-900 or Austin-Ferret CHEAP?!

ED NOTE: Thank you, Bill. Your tests were very scientific and proper, especially for the hobby scene. Now keep an eye out for the J.I.M. M-75 & M-100 preamps. These two are superb and might beat the WI-COMM hands down!

===== PRO-26 MODS =====

By: William R. Young

As a charter subscriber, I'm learning a lot from WSR and am not so reluctant to dig into the radio gear as I have been. I've used a PRO-26, 4-ch crystal controlled handheld for several years, and there were some things that needed a change; the DELAY (not needed), the SCAN rate, and the lengthy time it takes to charge the batteries.

The combination of R66 and C64 control the DELAY time. I removed C66, which eliminated the DELAY; it also caused the MANUAL channel selection to be unstable. Instead of the 1-2-3-4 sequence, selection was random. A 4.7-uf capacitor in place of C64 enabled the MANUAL selection to work with no noticeable delay in the SCAN mode.

Replacement of C63 with a .1-uf tantalum capacitor caused an almost 5-fold increase in the scan rate. Replacement of R70 with a 33 ohm 1/4 watt resistor doubled the charge rate of the NiCad batteries. I've used the mod'd scanner for several days now and it works great. Keep up the good work with WSR! *[Ed Note: Thank YOU on both counts!]*

===== NEW HANDHELD ICOM R-1 HAS FLAWS =====

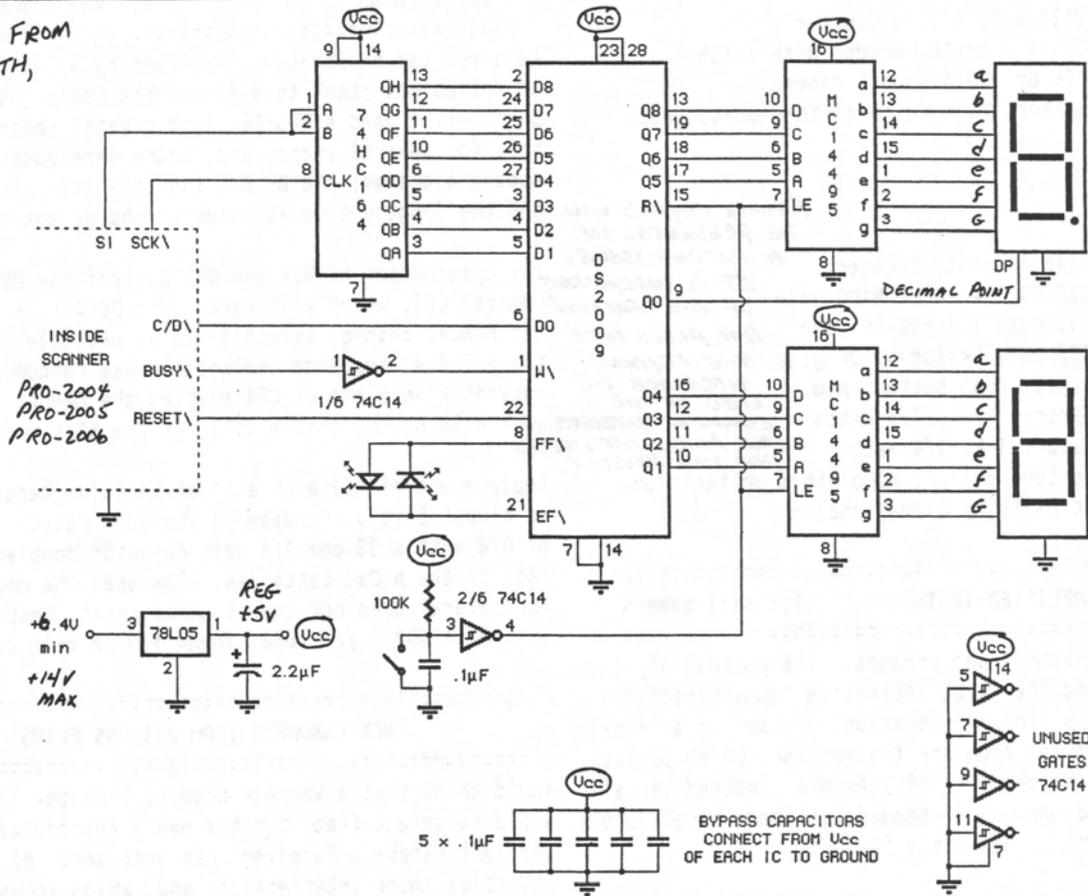
You'd think that a whopper product from the likes of ICOM would be defect-free, but the newly introduced R-1 DC-to-Daylight Handheld Receiver has some sort of a bug that resembles image interference, and which shows itself as two clones of the desired signal at 150 KHz on either side of the desired signal. This might not be a problem in the MANUAL or SCAN modes because you'd simply not run across those "images" unless you programmed them. It can render the SEARCH mode effectively useless, however! If this problem is as widespread as it seems to be, I can't understand why ICOM released the R-1. In any event, a service shop (RayComm) in England has come up with a fix. USA hobbyists have been sending their R-1's over the pond to have this problem remedied to the tune of \$100 or so plus shipping & currency conversions.

Not having an R-1 with which to work and test, I can only make an educated guess as to the nature of the problem and any remedy, however I have studied the Service Manual for the R-1 and have reached a conclusion about a remedy. There is a decided weakness in FL-1 on the DETA board; it is much too wide for good AM operation in the first place but it might also be defective to the extent that it allows spurious & extraneous out of band signals to pass. Replacement of FL-1 with a quality 455 KHz IF filter will remedy the "image" problem, not to mention Adjacent Channel Interference problems down in the shortwave bands!

I am now looking for an R-1 on which to finalize this and other possible modifications. I will offer a substantial discount to the first three people who send me an R-1 for this remedial service. If not successful, there will be no charge and the R-1 will be returned in a condition equal to or better than when received. Inquire. 73/bc

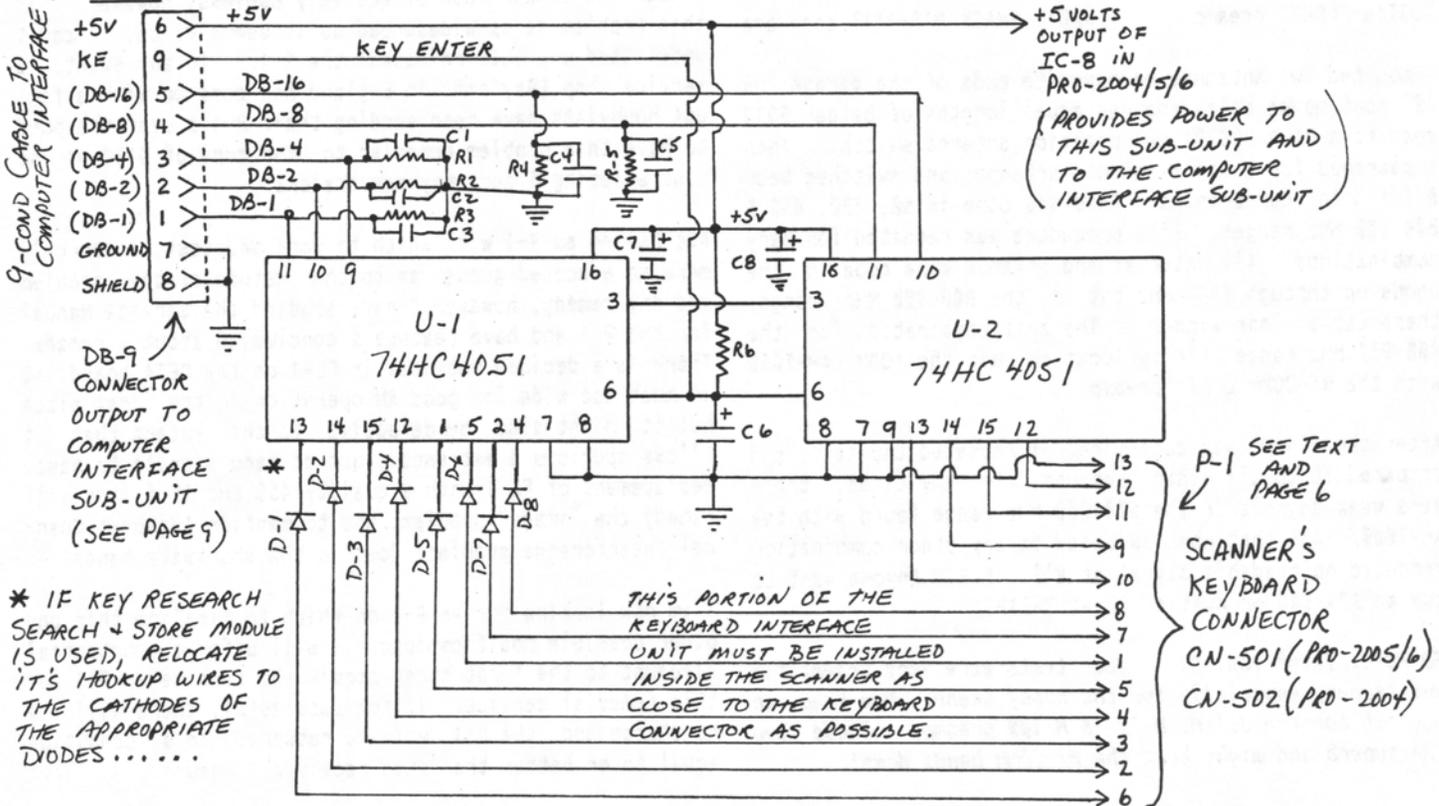
SCHEMATIC DIAGRAM FOR HB TECHNOLOGIES' SERIAL DATA INTERCEPTOR/DECODER

CONCLUDED FROM
LAST MONTH,
VINIO



NOTE: BUILD THIS UNIT INSIDE SCANNER.

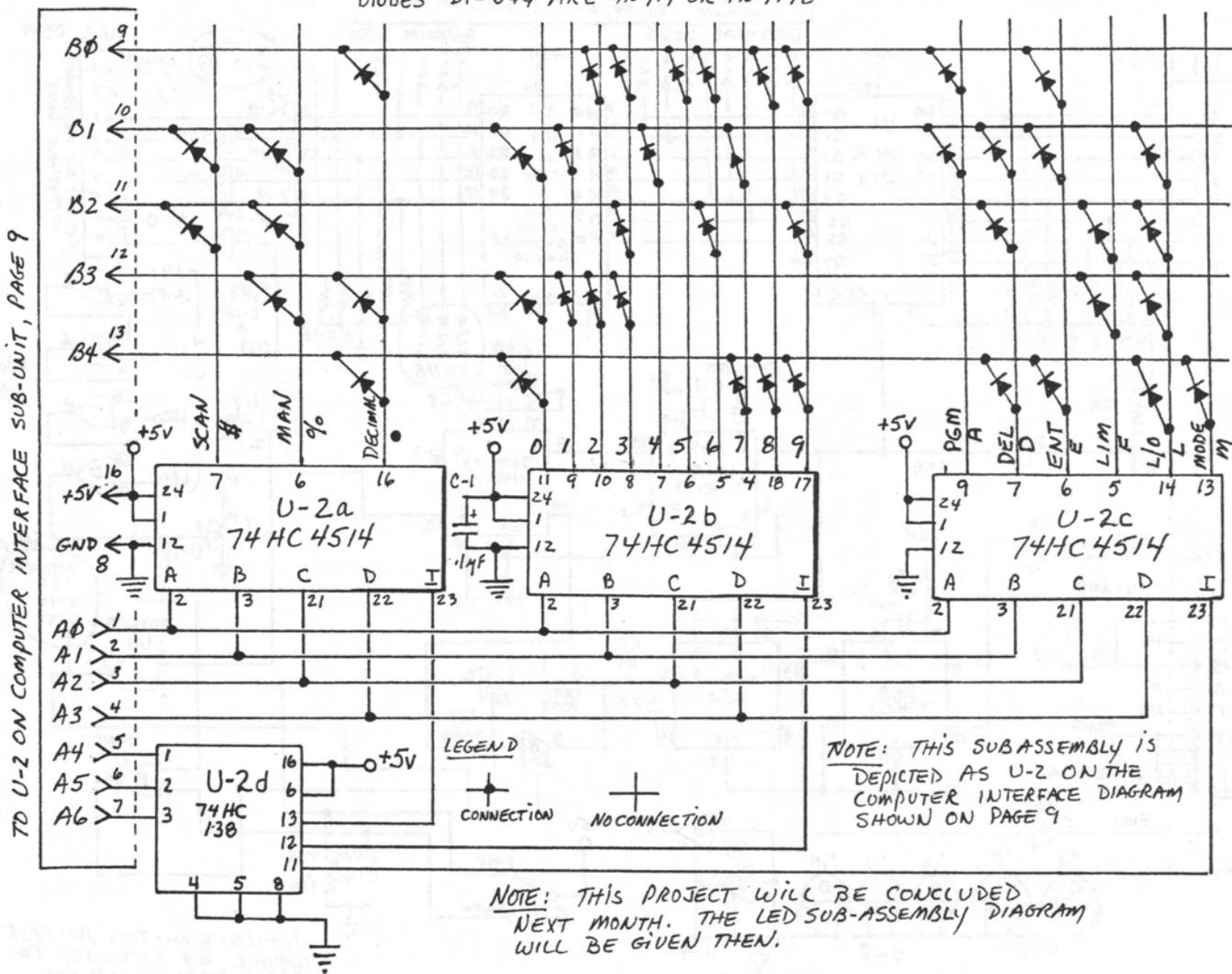
J-1 SCHEMATIC DIAGRAM FOR FATMAN KEYBOARD INTERFACE SUB-UNIT



SCHEMATIC DIAGRAM FOR FATMAN CODE CONVERTER SUB-UNIT

R:1:920429(1)

DIODES D1-D44 ARE 1N914 OR 1N4148



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