THE YEAR OF THE INTERFACE - 1992

Now, 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' 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 for two reasons: (1) each is a proprietary design of a scanner/computer interface. 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 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 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
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/S & /S 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:

<table>
<thead>
<tr>
<th>Symb</th>
<th>Data</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>@</td>
<td>@001</td>
<td>starting channel</td>
</tr>
<tr>
<td>*</td>
<td>0158.9700</td>
<td>local gendarmes</td>
</tr>
<tr>
<td>#</td>
<td>0275.8000</td>
<td>military air freq</td>
</tr>
<tr>
<td>^</td>
<td>0000.0000</td>
<td>reserved</td>
</tr>
<tr>
<td>~</td>
<td>1264.5000</td>
<td>amateur radio repeater</td>
</tr>
<tr>
<td>@</td>
<td>0162.4000</td>
<td>NOAA Weather</td>
</tr>
<tr>
<td>*</td>
<td>0146.5800</td>
<td>amateur radio net</td>
</tr>
</tbody>
</table>

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.

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- 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 scanists 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 ON-581, 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 PRM 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.

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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 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 scanner 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 450-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........
Have you thought about doing Doc's 64-Blok, 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 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.

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)

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**THE WORLD SCANNER REPORT** (c) 1991-2; V2N1 - January, 1992; Page 5
These have been discontinued for obvious reasons. The length of each cable should be 5-ft or less, but a little longer will probably be ok.

**COMPUTER INTERFACE**

Build the Computer Interface into a project box for best results. It need not really be 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 you were to 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 to the computer. DB-9 to the scanner and DB-25 to the printer port of your computer.

A note on power consumption; all logic 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**

<table>
<thead>
<tr>
<th>CXT</th>
<th>SYMB</th>
<th>QUAN</th>
<th>DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Keyboard Interface Primary Parts</strong></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>U1,2  2  74HC4051 8 channel analog multiplexer</td>
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<td></td>
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<td>R1-6  6  Resistors, 10-Ω, 1/4-watt</td>
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<td></td>
<td></td>
<td>C1-8  8  Capacitors, 0.1-µF, monolithic or tantalum</td>
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<td></td>
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<td>D1-8  8  Silicon Switch Diodes; 1N4148 or 1N914</td>
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<td></td>
<td>J1    1  DB-9 Connector; female; RS #276-1538</td>
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<td>PC    1  Multipurpose board; RS #276-150</td>
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<td>P1    1  28-pin WIREWRAP IC Socket; RS #276-1983</td>
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<td>U1    1  74HC374 Octal D-Type Flip Flop</td>
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<td></td>
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<td>U2    4  See under Code Converter below</td>
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<td></td>
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<td>U3    1  74HC244 Octal Buffer</td>
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<td></td>
<td>U4,5  2  74HC123 Dual One Shot Multivibrator</td>
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<td>U10-12 3  74HC04 Hex Inverter</td>
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<td></td>
<td>U8    1  74HC88 Quad AND Gate</td>
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<td>U6,7  2  74HC32 Quad OR Gate</td>
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<td></td>
<td>U5    1  74HC4066 CMOS Switch</td>
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<td></td>
<td>VR1,2 2  Trimmer Pot; 500-Ω 10 turn precision</td>
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<td></td>
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<td>R1-16 16  Resistors, 47-Ω, 1/4-watt</td>
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<td></td>
<td>R17,18 2  Resistors, 18-Ω, 1/4-watt</td>
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<td>R19-34 16  Resistors, 10-Ω, 1/4-watt</td>
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<td></td>
<td>C1,2  2  Capacitors, 0.001-µF disk</td>
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<td></td>
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<td></td>
<td>C3    1  Capacitor, 1.0-µF, tantalum</td>
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<td></td>
<td>C4    1  Capacitor, 2.2-µF, tantalum</td>
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<td></td>
<td>S1    1  Switch, toggle; SPST</td>
</tr>
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<td></td>
<td>J1    1  DB-25 Connector; female; RS #276-1548</td>
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<td></td>
<td>J2    1  DB-9 Connector; female; RS #276-1538</td>
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<td>LEDs  15  Light Emitting Diodes, your choice</td>
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</tbody>
</table>
were weak signals in the

After the winner was determined,

with the

compared it to all other set-up.

U5, 6 2 74HC28 Dual 4 input NAND gate

U7 1 74HC32 Quad 2 input OR gate

U8 1 74HC86 Quad Exclusive OR gate

Switches: push button, n.o.

Resistors, 47-k, 1/4-watts

Capacitor, 0.1-uF, monolythic or tantalum

Remote Keypad:

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-ATSM

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-AT5 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-AT5 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. H-75 & H-100 preamps. These two are superb and might beat the WI-COMM hands down!

THE WORLD SCANNER REPORT" (c) 1991-2; V2N1 - January, 1992; Page 7
SCHEMATIC DIAGRAM FOR HB TECHNOLOGIES' SERIAL DATA INTERCEPTOR/DECODER

CONCLUDED FROM LAST MONTH, VINIO

SCHEMATIC DIAGRAM FOR FATMAN KEYBOARD INTERFACE SUB-UNIT

NOTE: BUILD THIS UNIT INSIDE SCANNER.

J-1

SCHEMATIC DIAGRAM FOR FATMAN KEYBOARD INTERFACE SUB-UNIT

+5V KE

DB-9 CONNECTOR OUTPUT TO COMPUTER INTERFACE SUB-UNIT (SEE PAGE 9)

* IF KEY RESEARCH SEARCH + STORE MODULE IS USED, RELOCATE ITS HOOKUP WIRES TO THE CATHODES OF THE APPROPRIATE DIODES.....

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SAN DIEGO, CA 92196-2478

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+ What's Up for 1992?
+ Review of the RW Systems SC-2 Scanner/Computer Interface
+ Review of Datametrics Computer Aided Scanning System
+ The FatMan Do-it-Yourself Scanner Computer Interface Project, Part 1
+ Modifications for the PRO-26
+ New ICCP R-1 Has Bugs; Possible Remedy

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