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☹ LAST ISSUE OF 1994 ☺

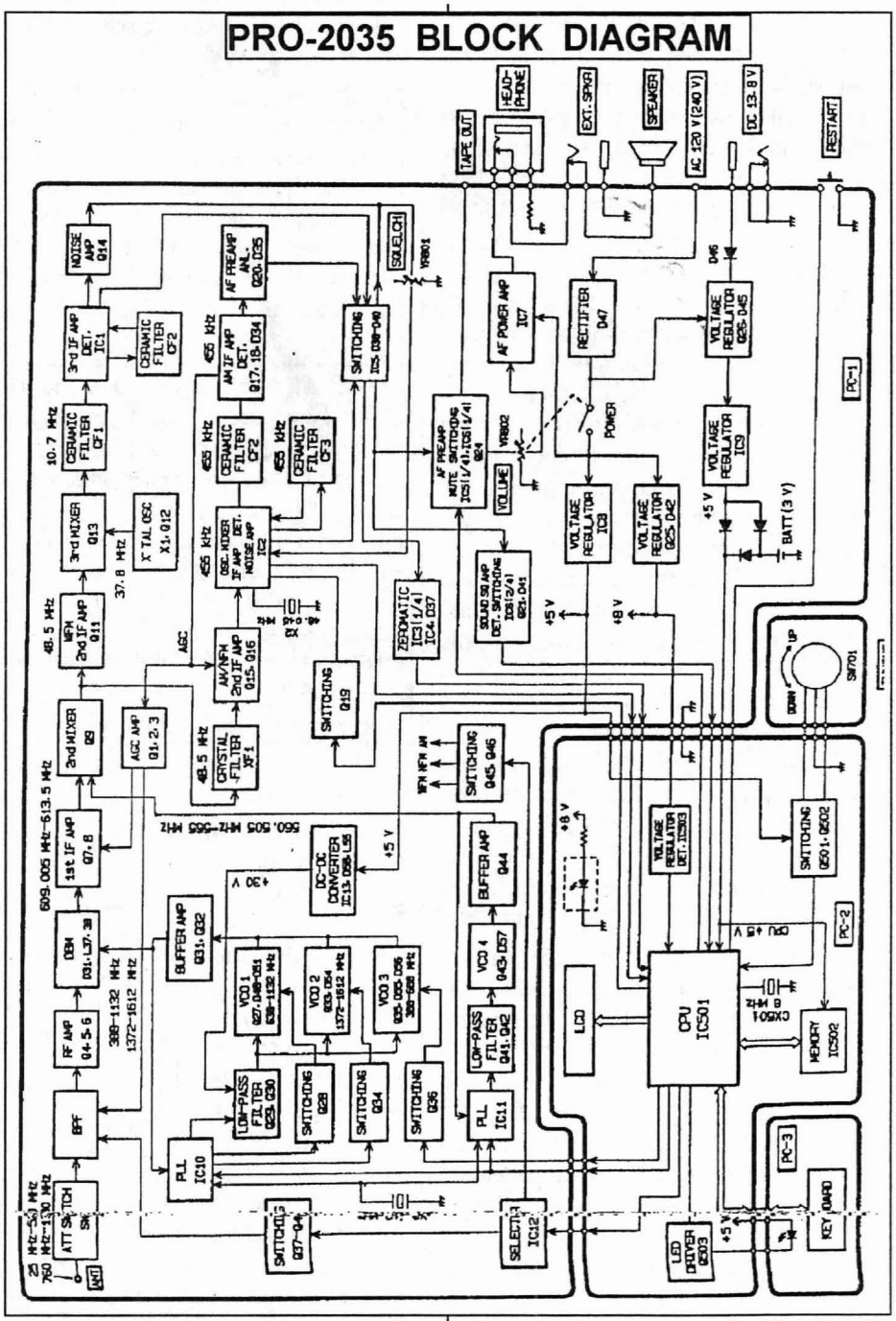
Some subscriptions are now expired with this ***final issue for 1994***. Renew right away to assure uninterrupted delivery of the first issue of 1995! Check your mail label, if it says ***Expires: 11/30/94***, then this issue will be your last until you renew. It is anticipated that V5N1 will be released in the first week of January, so if budgets are in a pinch, you have until then to get things nailed down. As continues to be our custom, if you want to renew but have to delay on account of a slim budget, simply tell us and we'll send the next issue automatically and you can have through January, 1995, to cough up. Those who do not plan to renew can also receive the next issue by asking for it and telling us why the decision not to renew.

PRO-2035 IS HOT !

And I told you a little last month about the one in my long, bony fingers! Now I have more to tell you, thanks to the slick new Service Manual now in my paws. It's a tough decision which one I'd rather have in my hands, the scanner or the Service Manual, so I gave up and took 'em both! By the way, I and a few other lucky ones got our Service Manuals for the usurious price of $1.$\frac{60}{}$ apiece! No kidding, but apparently others got in too late and reported something to the effect of $13 ea.

Gosh, I don't know where to start first! My cup of information runneth over profusely. Well, let's start with the Block Diagram shown to the right. You PRO-2004/5/6 aficionados will want to compare your block diagrams with that of the PRO-2035 to assure yourselves that the electronic design remains much the same. This is very important in the big picture of scanner hacking because almost all my mods for the PRO-2004/5/6 will apply to the PRO-2035!

PRO-2035 BLOCK DIAGRAM



PRO-2035 FACTS & FIGURES

Lets talk some hard core facts & figures about the PRO-2035 for starters. Remember that ***baby-poop green backlight*** I told you about last month? Well, the color hasn't changed, but my opinion has! That backlight is not an electroluminescent panel like in the PRO-2004/5/6! Turns out, there are nine bright green LED's behind the LCD Display to provide the backlighting! This is good news when you consider the cost and time to replace an EL panel after the sucker has worn out. LED's don't wear out, you see. So why did they

pick GREEN LED's? Well, probably because red backlight doesn't contrast very well; yellow can be too bright for good vision at night; and blue LED's remain too expensive and probably too low intensity. One of these days, I will rip into the back of that LCD display and see about possibilities of exchanging those green weenies with blue LED's. At about $2.50 ea, the $15 cost to get rid of that sick green might be worth it.

MEMORY in the PRO-2035 is a 28-pin, surface-mount SRAM chip (IC-502) organized as 8k x 8 for 64-k total. Guess what! This almost certainly makes our extended memory mods a reality! You could use a 32k x 8 (256-k) SRAM to yield 4,000 channels in 4-Blocks of 1,000 each. Better still, a 128k x 8 (1-M) chip will yield 16,000 channels in 16 Blocks of 1,000 each.. Since I haven't done the memory mod yet, I can only speculate, but if the 400-ch PRO-2004/5/6 used a 2k x 8 (16-k) SRAM for its memory, then 4-times that memory capacity in the PRO-2035 for but 2½ times the number of channels should produce some interesting results. Memory enthusiasts will recall how the PRO-2004/5/6 store Scan Bank and Priority Channel settings on board the CPU's ROM. The PRO-34 and 37 stored the Delay and Lockout settings in CPU ROM as well. Therefore, one might speculate that the PRO-2035's CPU doesn't store ***any*** of the custom settings, thanks to the excess of outboard memory. I'll know and report more on this in early '95 when I've had a chance to rip into my PRO-2035 with great vigor.

A **SPEEDUP** seems possible in the PRO-2035 by replacing CX-501 (8-MHz) with a 10-MHz quartz microprocessor crystal. This will yield a 25% speed boost at the cost of a commensurate reduction of the DELAY time. Such a speedup might also eliminate the PRO-2035 from contention in other high performance mods. Crystal speedups are always a compromise, unlike diode speedups in the PRO-2004/5/6 which involved no compromise that we could ever determine.

No more simple **DIODE/RESISTOR SOUP-UPS** like in the days of old! The keyboard addressing scheme no longer uses diodes in the matrix to set program variables. In fact, there appear to be no firmware program variables whatsoever in this design. Adding insult to injury, the keyboard matrix does not appear very interesting at all; not in the conventional sense, anyway. Forget any quick and dirty *add-a-diode* or *clip-a-resistor* mods for the PRO-2035. Ain't gonna happen.

The ***LOGIC/CPU Board is readily accessible***, however! It's almost as easy as the old PRO-2004; not quite. You'll need some instructions if you're not comfortable with ripping scanners apart. So here's what ya do:

1. Disassemble the PRO-2035 as follows: Remove external AC or DC power before launching the invasion. Remove the four screws that hold the front panel to the chassis; disconnect all cables that go from the front panel to various places around the receiver. Disconnect the black ground wire from the main chassis.

NOTE: Memory will be lost if and when CN-502 is disconnected from the main receiver board for more than a few seconds. If this is not acceptable, you can leave CN-502 plugged in with the understanding that the Memory Battery will be providing "keep alive" power to the Logic/CPU board and therefore carries the risk of serious damage if you aren't sure of what you're doing. One little ZAP and the party's over! Disconnect CN-502 if there is any doubt.

2. Remove the four screws that hold the metal shield over the Logic/CPU Board and carefully lift up and remove the shield. Remove the two remaining screws that hold the Logic/CPU Board to the front panel. Now comes the only tricky part: the board is held tight to the front panel by virtue of that white 15-pin connector, CN-503, much in the same fashion that secures the PRO-2005/6 Logic Boards in their front panels. You will have to "jiggle" and work the board up and off the 15 male pins of the Keyboard PCB underneath. You can slip a flat-blade screwdriver under the Logic Board to assist matters with some gentle prying. Just be careful and patient as you work the board up and off the pins below.

BETA TESTERS WANTED

Procedures and necessary extra software have been developed by which the PRO-2035 can be interfaced to the CE-232 or HB-232 Interface. If you own BOTH the scanner and an interface and would like to participate in the *beta test* at no cost, contact me via the ***Hertzian Intercept BBS*** where the files and instructions can be made available to you. The beta test is not conducted by mail; strictly by BBS and timely reports are expected.

CONNECTIONS TO THE LOGIC/CPU BOARD

This process is harder to ruminate about than to perform. When the Logic/CPU Board is free, note how adjacent to CN-503 are fifteen unused, plated-thru holes that scream for a purpose! I suggest you insert and solder a 15-pin strip of "pin-line" sockets to facilitate EASY connection of the Interface wiring. The metal shield has to be "nibbled" or notched out about ¼" to leave room for this strip before it can be reinstalled, and DO reinstall it when you're done. It's there for a good reason. Any number of other things may later connect to CN-503, including Search & Store modules; Remote Controllers; and even computer interfaces! There is no sense in soldering anything directly to CN-503, nor mechanically inserting pins into it when there is the convenience of those holes adjacent to the connector. A strip of pin-line sockets will make future work in this area a piece of cake. When the 15-pin pin-line strip socket has been soldered in place next to CN-503, insert a second strip of 15 Pin Line sockets into the first, males to females. This one becomes your removable "plug" for whatever future purposes you may have in mind or come to mind later.

CE-232/HB-232 Interface works with the PRO-2035 to a limited extent. It is unfortunate that the almighty dollar has to do all the driving these days, but one hardware difference between the PRO-2035 and its honorable predecessors is the LCD Driver was moved on board the CPU where the data between CPU - LCD driver can not be accessed. Thus the ***CE-232/HB-232 Interface*** will not function with the PRO-2035 as a 2-way controller like for the PRO-2004/5/6. While this is a decided disadvantage, the CE-232 and HB-232 can still (***easily***) be made to ***AutoProgram*** and ***Keyboard Control*** the PRO-2035! If you stop to consider how long it will take to hand-program those 1,000 channels from that miserable front panel of the PRO-2035, you'll see where the CE-232 Interface is still a strong

plus. Limited tests so far show that the CE-232 can ***AutoProgram*** the scanner at a rate of about 70-ch/min or about 15-mins for a full 1,000-ch program. Believe me, it would take you days to do it by hand.

The Analog Section (main receiver) of the PRO-2035 has so few changes that I recognize it like the back of my hand. Virtually all the mods we've developed for the PRO-2004/5/6 for this section will apply directly to the PRO-2035. These analog or general application mods include the following:

MOD-4 Squelch: The PRO-2035 reverted back to the PRO-2004/5 design and eliminated the bilateral switch upgrade that was evident in the PRO-2006. The Squelch feedback resistor is not 100-k (R-157) which may eliminate any need to monkey around in this area. My Squelch seems OK and I've not been tempted to mess with it yet. I suppose you could emulate the bilateral switch enhancement of the PRO-2006, but best advice is to leave this area alone for now.

MOD-5 Better Tape Audio might be worth a look later, but the existing TAPE REC circuit looks fine.

MOD-6/33 AutoTapeRecorder Switch is a definite "to do". The circuit of MOD-6 in Vol-1 of my book has been superseded by MOD-33 in Vol-2, the design of which remains valid. The connection point for the AutoTapeRec switch in the PRO-2035 will be at IC-2, Pin 13. NOTE: Start with a high value of resistor to the base of the AutoTapeRec switch and decrease it a value at a time until the switch performs flawlessly. A good starting point will be 100-k with a final value of around 33-k to 47-k probably being optimum. Refer to the below circuit as a guide.

The idea behind my AutoTapeRec Switch is to offer an affirmative trigger for a tape recorder to start when there is a signal and to stop when there is not. The Squelch gate is what offers this pure logic, after all, when SQ is set, there is nothing to record, and when SQ is open, there's a signal! The concept of VOX (voice activated recorders) is nice in principle, but oftentimes there is noise present in a TAPE REC jack even though the SQ is set. This noise can trigger a VOX recorder.....uncouth! The below AutoTapeRec Switch will work with most any scanner ever made provided you connect it to the proper SQuelch Gate location. This has been extensively discussed in back issues of the WSR and will not be repeated here.

MOD-8 Headphone Audio continues to be a good hack. In the PRO-2035, jumper R-228 (270-Ω) with a low value resistor of about 5-33Ω, or so.

MOD-9 Disable the Beep can be vital to the preservation of your nerves (*or your spouse's*). For a permanent disable, clip the brown wire that goes to Pin 1 of CN-3. To selectively disable the Beep, insert a SPST switch between the wire cuts. For remote control of the Beep from a ***CE-232/HB-232 Interface***, connect one of the User Switches (AA-DD) to the wire at CN-3, Pin-1. Then CTRL+F(n) where n=1-4, enables or disables the Beep at will.

MODs 10-11 apply without comment.

MODs 12-13 are long superseded by **MODs 25-26 S-Meter** which will work just wonderfully in the PRO-2035! There isn't a lot of space inside the front panel in which to install LED's, but the new microLEDs might offer opportunity for a slick looking S-Meter! The basis of an S-Meter for your PRO-2035 remains unchanged from the PRO-2004/5/6 series, thanks to the "extra" IF strip for AM mode and for developing the receiver's AGC function. The tap for input to the S-Meter detector is at the cathode of D-34 at T-8. The below diode detector circuit is the main requirement for either an analog or LED S-meter. Build it and connect it as shown. Attach the S-Meter of your choice to the output. The S-Meter circuits are well covered in Vol-2 of my book and cannot be repeated here.

NOTE: This S-Meter detector circuit below is good ONLY for the PRO-43, PRO-2004/5/6, and PRO-2035. An S-Meter for all other scanners has been adequately covered in a back issue of the ***"WSR"***.

MOD-14 Shortwave Interface for SSB detection is still a good bet and very easy to accomplish in the PRO-2035. You can tap the 455 KHz IF output at the cathode of D-34 at T-8, or maybe better still at the junction of CF-4, C-153, and R-135 where the signal is a lot weaker and perhaps better for the shortwave receiver.

MOD-16 Extended Memory was discussed earlier in this article and is a definite probability. More later.

MOD-23 Search & Store modules from Key Research Co. May or may not work well with the PRO-2035. There may be less of a need for them anyway since the PRO-2035 has a Search & Store of its own. Best to check with Key Research Co. on this one.

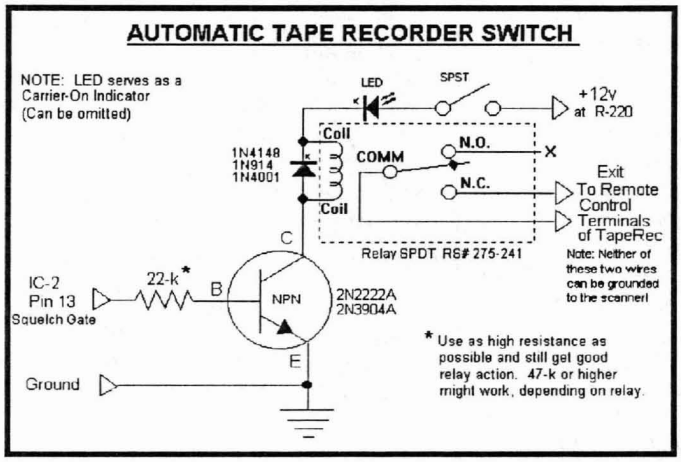
MODs 25-26 S-Meter discussed above

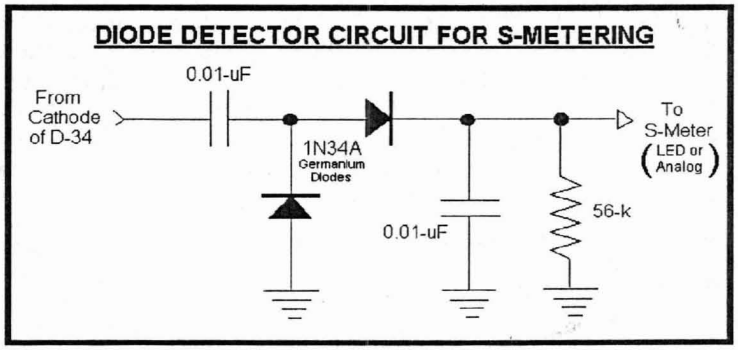
MOD-27 Center Tune Meter remains unchanged. The signal tap is at TP-2 or Pin 9 of IC-2.

MOD-28 KMBC - future discussion

MOD-29 Extended Delay will require some revision (minor) and will be presented in a future article.

MOD-30 Event Counter Radio Shack discontinued the *event counter module* and so this hack is rather moot. Maybe a good idea to beg them to bring it back?





MOD-31 CTCSS Decoder (TS-32P) from Communications Specialists Co at (800) 854-0547 remains a viable and useful hack for the PRO-2035. There may be some ways to really exploit the power of CTCSS by using the TS-32P in conjunction with one of **Professor Peabody's** *unpublished* enhancements for it. You'll have to ***beg*** him to finish it up, I guess. He thinks you guys don't like him anymore.....

MOD-32 Carrier On Indicator is an old standby. No comment necessary.

MOD-33 ATRS - already discussed

MOD-34 Shielding gets a change of design, thanks to Miller-Stephenson's lack of desire to sell to the public and to the defects that plague their sprayers. Spray shielding no longer recommended. Instead, use heavy duty aluminum foil glued to the inside surfaces of the plastic cases of the scanner. See back issues.

MOD-43 SCA Detector should work just fine in the PRO-2035 but the procedure will require a new diagram & approach. Watch for a future article.

MOD-44 Data/Tone Squelch is just as hot as ever and will work fine. Hookup will differ a little and so will be discussed in a future article.

Unnumbered MODs for the PRO-2004/5/6 that appeared here in the WSR will be discussed in future articles as they apply and as I have a chance to review and test them. For example, Professor Peabody's AutoTagger and AutoCrystalSwitch might be sure-fire winners. We'll see.....

ADD A HOLD FUNCTION TO RADIO SHACK'S FREQUENCY COUNTER

EDITOR's INTRO: *This information comes from Pat Richard of Michigan who sent me a file that got misplaced. I pieced the info together from various sources and offer it here:*

Ground TP-17, simple as that. In the schematic, TP-17 is at U3, Pin-1, connected to +5V thru a 47k resistor. On the circuit board, TP-17 is on the display side, just right of the lower-right corner of the IC. Ground spots are the three non-tinned points in the large area of metal about 1/4 inch below and to the right. TP-17 is the tinned pad next to a chip resistor marked '473' for 47k. A momentary, n.o., SPST push button switch can be used to ground TP-17 thru a 1k resistor! Drill a small hole to mount the switch just above the plastic depression so you can push the button with your right thumb. A small toggle switch will fit if you want an indefinite HOLD function.

Speaking of frequency counters, I found the following user's perspective on one of the computer networks:

From: Andrew Porrett Thu 25 Aug 94
To: All
Subj: Frequency Counters

Hi folks, I saw this recent exchange, and thought I'd add my own observations. If it sounds like a sales pitch, I'm sorry, but it ain't. Just my experiences with my unit. I hope some of you find it informative. There are several brands with various features, so do your homework.

From SJ> I know that RS's Freq counter is relatively new but is it a good buy for the modest person only looking for something to help find the freqs for radio at hotels, etc? I just want to use it with my scanner, so far...because if I want to do something else, I can use my friends one, but only for something major..he really gets NERVED.

Bill Cheek replies> *Unfortunately, even VERY GOOD lab counters are not suited for grabbing hot new freqs out of the air. The hundred dollar models won't be any better, that's for sure.*

If you are close enough, and if the nearby transmitter stays keyed long enough and doesn't overmodulate the carrier, then it is possible to get a freq reading on the counter. But I can assure you that you will make 100-attempts for every one successful intercept.....if that. Is it worth it? You tell me. - Bill

Andrew Porrett responds:

The first frequency counter I owned was a Startek SK 1350. It's was fairly basic 1-1000 MHz unit, whose only extra feature was a hold switch.

With this unit, I had to watch the counter display random counts until the target started transmitting. At that point, I could either try to memorize seven digits, or hit the hold switch real fast.

While it did work, it was a pain. When the target transmitted, the display varied somewhat (*hey, that's what happens when the signal isn't real strong and you can't stand right beside that security guard while holding up a counter*). Unfortunately, a bouncing display looks like a random display with no signal present. By the time I decided that the counter was counting the target's transmission, and reach for the hold switch, the target stopped transmitting.

Also, the accuracy of the count was directly related to the strength of the signal reaching the counter. As I moved further away from the transmitter, the count would drop lower and lower. Alas, the counter gave no indication of signal strength, so it was often impossible to know if I'd snagged the real thing or junk.

I'm not familiar with the Radio Shack counter, but I imagine that it would perform in a manner similar to what I've described above.

I took the original counter back to the retailer and traded up to a Startek ATH-15 counter, rated at 1-1500 MHz. This unit has greater sensitivity, a signal strength bar graph and an auto trigger and hold feature (ATH).

With ATH enabled, the display freezes in the absence of a local signal. As long as a signal is present, the counter counts. When the signal stops, the unit auto-presses the hold button for you.

The trigger level for the ATH function is adjustable, and when set properly, virtually guarantees that the device will only produce accurate counts. Weak signals, which could produce incorrect results, won't start the unit counting.

This means you can put the counter in your pocket, wait for a transmission, and then check the display later.

I took a vibrator out of an old pager and installed it in the counter, and now the whole thing vibrates when it counts (*another warranty shot to hell*). For stealth counting, I'll usually wear the counter on my belt (oh yeah, added a belt clip too), with a long T-shirt covering it. With this setup, I can stand right next to my victim and wait until I get a buzz.

The bar graph is nice too. It gives a highly visible indication that a nearby transmitter has keyed up. The longer the bar, the better the count. The graph also lets you estimate the transmitter output power, as well as showing background RF levels.

Frequency counters often have more than one counting speed. This is the length of time it takes the counter to calculate and display the frequency. The Startek has several gate times, ranging from 0.08 to 6.6 seconds. Longer gate times give less frequent updates, but more accurate displays. They can be used to calibrate a transmitter to within ten hertz (display shows xxx.xxxxx MHz).

A gate time of 0.31 seconds will update the display about three times per second, and is accurate to within 1 KHz (display shows xxx.xxx MHz). This is the setting I use most, as it allows the ATH to latch any voice transmission, but rejects brief noise bursts.

The fastest gate time of 0.08 seconds is used in conjunction with the ATH feature to catch very fast transmissions (usually computer generated). I have used this mode to snag short data bursts coming from our local law enforcement vehicles. The display is only accurate to 10 KHz (display shows xxx.xx MHz), but you can just round up to the next standard frequency.

I've also used this super-fast count-and-hold mode to watch our Tropez cordless phone handiest keep in touch with the base unit. Every 13 seconds, the two units have a *very* brief chat to make sure that they're still in range. If you separate them too much, they start peeping until you reunite them.

The main question asked by those who are interested in acquiring a frequency counter is "how far away will it pick up a signal?". This ability is affected by the quality of the unit, the antenna you use, the radiated power of the target, the frequency being used, and the amount of background RF noise.

I normally use the rubber ducky antenna that came with my Pro-43. It seems to do an OK job. The bar graph likes it better than my other portable antennas.

In metropolitan areas, the counter is being bombarded by dozens of high powered AM/FM/TV/paging transmitters. This severely degrades the counter's range. I find that trying to snag signals in downtown Toronto is a waste of time, just too much RFI. Outdoors, anyway. I haven't tried snagging security in a downtown hotel. Maybe there'd be (a lot) less RFI inside the building, and the counter could work it's magic.

IF YOU PLAN TO HUNT FREQUENCIES IN AN RF INFESTED METROPOLITAN AREA, YOU MAY BE WASTING YOUR MONEY ON A FREQUENCY COUNTER.

Pretty opinionated, eh? Well, it's just an opinion. Feel free to disagree. Luckily, I live by the city limits, in an area with medium RF levels. In this area, I had the following results:

Transmitter	Freq	Distance
cordless phone	49 MHz	2 in
Tropez cordless	926 MHz	9 in
cellular phone	830 MHz	7 ft
4 watt handheld	418 MHz	> 20 ft
fire truck	155 MHz	> 100 ft
police cruiser	408 MHz	> 100 ft
locomotive	161 MHz	> 300 ft
FM broadcast	101 MHz	>2000 ft

The manual that came with the counter claims much better distances for the lower powered devices. They must have tested them in the middle of nowhere. Or maybe my antenna sucks. Also, I think that most counters have poor sensitivity at the low and high ends. From 100 to 500 MHz, they're probably great. At 30 or 800 MHz, you'll notice a sensitivity drop.

Keep in mind that those figures above are my distances for bang-on, accurate readings. As distances increase, you can make a counter display less accurate, but still useful numbers. For instance, if your counter is getting a somewhat degraded signal and displays "451.1039", the true frequency is probably a bit higher, so get your scanner searching 451 - 453 MHz. That's about a three second loop on a '43. You'll nail it the next time they talk.

Sometimes you can use "social engineering". One time, I walked up to a mall security guard and said "I just bought this, but I don't know if it works. Would you help me?" He was really nice and keyed the mike. He wanted to see how the strange little black box worked.

If you manage to pull this off, keep your counter a couple of feet away from the transmitter to avoid any possibility of damaging the counter's front end. The same applies to your expensive scanner.

To wrap up, the first unit I tried was fine when *I* could control the transmitter. When someone else did the talking, I watched a lot of meaningless random numbers. If I was lucky, I'd get some steady numbers. If I was truly blessed, I'd hit the hold switch before those random numbers started up again.

The second unit is what a counter should be. I turn it on and it does the work. It tells me when that that idling CN locomotive down the block hammers the neighborhood on 161.415 MHz. Probably talking to the dispatcher. Sure enough, he's starting to roll.

I guess you get what you pay for. I used to have a double conversion scanner, but now I know better. Same with counters.

ED wrap-up: *I liked Andy's "social engineering" approach, didn't you? ☺ Anyway, rumor has it that the StarTek company was launched by the dude who used to run Optoelectronics. Clearly they know how to make frequency counters but they don't get as good press as Optoelectronics who seems to advertise everywhere. For more information:*

StarTek International
398 NE 38th St; Ft. Lauderdale, FL 33334
(305) 561-2211 Orders & Information
(800) 638-8050 Orders Only
(305) 561-9133 FAX

Please*....when you contact suppliers recommended by the* ***WSR****, mention* ***where*** *you read about them. As you know, we don't accept advertising, but it helps our credibility to have vendors know us. Oftentimes, vendors are willing to give or lend products to us for review here in these pages. Understandably, we cannot afford to buy a sample of everything out there.....so remember that vendor cooperation with us is vendor cooperation with YOU....which counts!* ***Please tell vendors when we mention them.***

PERCON CORP. NEW PRODUCT SPEC SHEET

Product Name: SPECTRUM

Description: **SPECTRUM is a frequency database with over 3 Million records. Data is extracted from the FCC Master Frequency Database. The Database includes records for Police, Fire, Hospitals, Businesses, State and Local Governments, Airlines, utilities, Hotels, Theme Parks, Taxis, Freight Companies, Phone Companies, and much more. Frequencies range from DC to Daylight.**

Field Description: **Fields include: Frequency, Call sign, Radio Service Code, Class of Station, DBA Name, Transmitter City/County/State, Transmitter Latitude and Longitude, and Number of Mobiles for Vehicle, Marine, Air, Portable and Pagers.**

Program Description: **SPECTRUM comes as a complete system, which requires no installation and setup. The program is executed from the CD-ROM. The program allows the user to extract data for display to screen in a Browse Screen, or to 132 column printed reports. Data can be extracted by a Frequency in a State, Call sign in a State, DBA Name in a State, Radio Service Code in a City, all Frequencies in a County, or all Frequencies in a City. The user is prompted for all required search parameters. The program is extremely easy to use and is suitable for entry-level scanner enthusiasts and power users.**

System Requirements: The system requires a 386 Processor or above, CGA, EGA, or VGA video display, a minimum of 2 Meg of Hard Disk, CD-ROM drive, and a printer (capable of 132 columns for reports).

Database File Format: The database is in a dBase III, IV, or FoxPro Compatible file format.

Price: The price for a single unit is $29.95. Shipping for UPS Blue (Second day) is $7.50.

PerCon Corporation
4906 Maple Springs / Ellery Rd
Bemus Point, NY 14712
(716) 386-6015 Fax (716)386-6013

FROM THE READERS

From: Stan Palen, King George, VA:

Enclosed is my order for the 2006 computer interface kit. You met my price threshold.

In my shop I repair watches and have two other places I sit. One is my desk and the other is this computer. In order to control my scanner I brought out three lines from my 2006 keyboard to bring out the scan button and the up arrow to jump past things I don't want to hear. I have this on a pigtail that reaches all workstations.

A remote for this would be neat, but a lot harder. Just something some other people might be interested in.

The pins coming off the keypad are 7 and 10 for up arrow and 5 and 10 for scan. A momentary switch for Radio Shack does the job nice. Also since the switches are 1-1/2 inches apart it is easy to get the right one. Keep up the good work!

ED Reply: *Depending on how you did that remote, you could have set yourself up for big time trouble. Do you know that the pins on the scanner's keypad go directly to the CPU? Yup! The slightest twinge of static or noise* ***could*** *smoke that expensive and hard-to-replace CPU. A real "remote" unit isn't that much harder to do than you've already done. Just involves a 4066 CMOS Bilateral switch to do the internal switching when triggered by an external switch arrangement, much as you now do. I'll write it up into an article soon. Several people have asked for scanner 'remote controllers'.*

SMART COMPUTER BUYING

From: H. Dragonetti; Townville, SC:
Hi, wow I never knew computers were such fun and hard to learn.

ED: *Hell, I could have told you that! Remember the old saying, "No pain, no gain." Hard learning is good learning.*

The computer I wrote you about is an old IBM compatible machine. It's a 286-16 MHz, 1MB RAM-EGA, 40MB hard drive, 1.2 MB floppy with 3 1/4 and 5 1/4" drive inputs, serial port, parallel port. I just had a board put in for a joystick and mouse. Now let me tell ya that most of what I just wrote (above) is still Greek to me. The next thing I plan to do is to get the 1 MB RAM up to at least 4 MB RAM. What do you think about this?

ED: *No, Henry,* ***no!*** *Don't spend a dime more than you have to on that old clunker! Hey, she's a jewel for her age and a wonderful teething ring for you, but don't spend a buck on it! You'll find good uses for it later as a stand-alone controller for a scanner or for something else that doesn't require a lot of computer power. Instead, save your shekels; watch the ads; and invest in a modern Windows™ machine after you know what you're doing. Very powerful 486 machines with SVGA, 4-Mb RAM, and 400-Mb hard drives can be had for $1500 or less! Really!*

Do you know of any programs out in the market place that I can buy that can store scanner frequencies? With four or more scanners and new frequencies coming out every day, it's hard to keep track of things. I picked up a Pro/File program at Radio Shack and tried to use it to store frequencies, but promptly lost them. I tried to look up my problem in the Pro/File manuals but they were too heavy to pick up.

ED: *I know.....I know. You are on the steep part of your learning curve right now where even remembering how to turn the damn thing off is a monumental chore, much less turn it back on. Still, I advise patience and spending NO MONEY until you've reached a working knowledge level. Give it another 3-mos, and use ONLY shareware for the time being. Tell ya what....YOU send ME a high density disk in a mailer with some stamps for return postage and I'll load the sucker up for you with utilities and things to keep busy with as you're learning what the hell's going on with these newfangled computing machines.*

You know sometimes a computer can make a person's self esteem go "CTRL-ALT-DEL." I got *DOS For Dummies*, and now I'm working my way up to dummy, dah! I wish I could have found *DOS for Idiots*! Well, I'll let you go with only two questions. I know you are a very busy person. I still envy people like you that are smart in electronics and computers. As well as any animal that has more hair than me. Say "Hi" to Cindy for me; I'll say "ESC" for now.

ED: *Two questions? I just saw* ***one****. But I can answer more for you. Some folks say MS-DOS is dead; some say not. Doesn't matter because the truth is that no one is developing any great programs for DOS anymore. Windows is where the action is and where you probably need to be. Now don't get me wrong, because we Windows users also use the hell out of DOS. The best of both, see?*

Now your 286-16 is not capable of running Windows, regardless of what you've been told. DON'T TRY IT! Instead, hang loose until you and the good woman feel right about investing in a decent machine, and I can tell you on no uncertain terms that it's a 486/33 or better! So wait! Now one thing you ***could*** *spend a buck on is the MS-DOS upgrade to 6.2 or 6.22, which is worth it! The on-line HELP is great. At any prompt just type HELP followed by the DOS command with which you need help and bingo! (Ex:* **C:\help copy***) MS-DOS 6.2 or 6.22 are worth it, but DO NOT use the "DoubleSpace" or "DriveSpace" feature. Never mind why not; just don't.*

One fantastic Windows program that will handle much of your present and future needs is Microsoft ***Works For Windows,*** *an integrated cluster of word processor, database manager, and spreadsheet, plus utilities, all of which are learnable and more than adequate for even small businesses, not to mention avid hobbyists. Your need for a frequency program would be readily resolved by MS-WORKS, you see....and you'd get so much more at the same time! Ask me more questions and we'll make a running column for computer assistance, especially related to radio and scanning. First, we gotta get you up to speed, so ask away. Make me think!* ☺

From: J. P. Lynn; Chula Vista, CA I enjoy your column on letters with scanner problems and your answers. And, it goes without saying that the most interesting part is the modifications, no matter how large or small.

ED: *I keep thinking we've invented everything that can be invented, but then something new pops up. Hang loose!*

From: Dino Papas, Leavenworth, KS

I'm still anxiously awaiting the Macintosh version of software to run a CE-232! I would buy one immediately (if not sooner...) if it were available. (Supposedly Optoelectronics is working on a version for their interface). Keep up the great work!

ED: *I'm not a developer and I don't know Macintoshes from Oranges, but* ***Ron Mansfield & Associates*** *had a Mac program under development for the CE-232: FAX (818) 790-2369 or write to: 448 Knight Way, La Canada, CA 91011.*

From: Tony Thornton, Mise, MS

Dear Mr. Cheek: I just started subscribing to the WSR. It's great! I also ordered all the back issues and can't wait 'till they arrive so I can read them all. But, on to the reason for my letter. Mr. Paul Alpiser wrote asking about a DPL/DSC Decoder and a Morse Code Decoder. I don't know of any DPL/DSC Decoder's in the $150.00 price range that he mentioned, but a company here in my state, MFJ Enterprises, Box 494, Miss. State, MS 39762 (800) 647-1800 has a nice CW Decoder #MFJ462. It decodes RTTY, ASCII, CW & AMTOR.

More From: Tony Thornton, Mise, MS
Dear Cindy & Bill: Thank you for the excellent publication that you produce. I hope you don't think bad of me for using first names, but after getting & reading four years of back issues, I feel that we are friends and on a first name basis. If not, please forgive me...but on to my comments.

ED: *Everything will be just fine so long as you do not call us "late for dinner" nor by our middle names, David & Petunia. Those are fighting matters.*

After reading V1N1 through V4N9 I can say that I am very happy to have found something to read that is 99% scanner related. After all, computers are the future of scanning so I do not consider the computer-related columns to be anything but more scanner info and improvements to scanners and the hobby.

I don't have a computer at the moment (not one that works anyway...lightning ☹), but am in the process of getting back on line. Ignore the computer complaints, as much as you can stand anyway.

I've reviewed several complaints and think that the people that wrote them just need to start their own magazine if they are rich. If not, they should shut up. Ten times as much info in "*Monitoring Times*"? I think that they need to take and compare the **WSR** and "*Monitoring Times*" and see which has the most usable scanner info. Color pictures?! The cover is color but the rest is not. That pretty cover doesn't help me with any projects. The color rear cover advertisement doesn't help anyone except maybe Icom or whomever to sell overpriced equipment. Don't get me wrong, I read "*MT*" and "*Pop-Com*" but I know ahead of time most equipment reviews will be positive and most of the scanner articles will be only of limited use, compared to the **WSR**. And, as you have stated before, it's your publication! I like it!! The way it is!! Just charge more and have more pages (a semi-joke!)

After all this aimless rambling, do you believe that I have not used any of your information except for that copper pipe dipole antenna (great, works great!) After listening to a satellite talk show host go on for three years about how wonderful an Icom R-100 was, I purchased one. It's a great quality piece of equipment, but as you stated early in the **WSR**, it's not a true scanner and too expensive a risk hacking around in. The service manual alone is $45.00! So I am in the process of selling it and getting a PRO-2006 and a PRO-43. (Lots of PRO-2006s left around in small town Radio Shacks around my fairly thin populated state.) So as for my views on the **WSR**, keep on as you are. Make the improvements as you see the need and direction. After reading four years worth of the **WSR** over this past weekend, any changes that you made were improvements and any you make in the future will only add to the quality and desirability of the **WSR** to it's readers that understand it's true use and direction. I like your politics, I like the way you tell it like it is. So keep up the same outstanding work as you have in past issues.

A little about me, I'm 39 years old, been disabled (Chrohns Disease) for ten years, listen to short-wave, watch satellite TV, have a scanner on 24 hours a day, have a wife and two kids. By the time V4N10 arrives I will have a PRO-2006 and a hot soldering pencil! Thank you for your publication.

ED: *Thanks for your positive feedback and welcome to the WSR. I have never been one to mince words nor to run from a fight. I can't tell you how many times I've saluted "the bosses" with middle-finger held high and subsequently rode off into the sunset leaving behind perfectly good jobs and fringe benefits. Actually, I am a very mild-mannered sort, even tempered, and rather easy to get along with until those qualities are perceived as a weakness by some Town Bully type. God, Country, Motherhood, and hot apple pie are the reinforcement steel of my foundations, though I have no religious preference; and I've voted Republican about as often as Democratic over the years. Ma passed away 13 years ago, but Cindy mothered two great kids now under my wing and she bakes a mean apple pie. Various hobby &* ***business leaders*** *and individuals think I need psychological help. I mentioned this to my analyst who* ***agreed****. (Time for a new analyst....) Some people love me; some hate me, but that's balanced by mutual feelings. Mostly I stand for oppressed minorities, and those who can't find enough to eat to survive. When the herd goes one way, I go the other, sometimes off a cliff, but so what? Free-fall is exciting.....*

I believe a Free Society requires three basic commodities to assure its Freedom: Transportation, Self Defense, Communications. I can't walk and chew tobacco at the same time, so I have to focus on one, which happens to be communications, of which radio is just one little facet. Me, I'm really nobody special. I just walk through Life ***with*** *respect and* ***without*** *fear ☺. I believe that a feller who won't stand for something will fall for anything, but you can't stand if your knees wobble with fear. Oh, I stand for kids and education, too. I have no clue but what I might come this way again sometime. If I do, the only way I'll find a better world is if our kids make it better. But you and I both know they won't do it unless we teach them how. There's a saying that floated around a few years ago that seems an appropriate note on which to end this chat:* ***"We did not inherit the world from our parents; rather*** *we* ***borrowed it from our children."*** *And there's another:* ***"Life has meaning only in the struggle. Triumph or defeat is in the hands of the gods.... So let us celebrate the struggle."*** *-Swahili Warrior Song-. If you like the WSR and what I stand for, perhaps it is because you see yourself in a mirror and you like what you see. If you like yourself, then all is well, despite the tests and challenges Life has thrown upon you. Eh?*

From: J. Mathias, Clifton, NJ: I think I may have figured out why so many people have problems with parts orders through their local Radio Shack. It's not simply that the people at the local store are the problem. The people at the National Parts Center, have been screwing up as much as the stores.

Case in point! I ordered 2 spare IC-8's for the PRO-2006. Before I printed the order out, I called the Parts Center on

their 800 line, verified the part number, price, shipping and sales tax. Used their nomenclature, part number and prices when I fired up the old PC & did up the order letter. What I got was 2 parts in a plastic bag with a computer label that identified them as something NOT listed in my service manuals for the PRO-2006, the PRO-43 or the Frequency Counter, although it resembled IC-9 a bit!

So I called Tandy, told them what happened and the lady agreed they sent me the wrong number. she gave me an RMA # and said to send 'em back, they'd ship me what I wanted. I told her I also needed some other parts and she said to include them in a letter with the return, and to make sure I put the RMA someplace prominent on the order letter, so they wouldn't screw up. Naturally, I had the lady verify the part #'s and prices again.

The shipment arrived today -- I must admit they did send two IC-8's this time. But they shorted me one item, because (when I called to find out why) I "*didn't send enough money*". It seems Tandy lost the letter that explained what I wanted, and didn't apply a credit (for the two wrong items sent) to the total of the order (which was the 2 IC-8's I still needed and the other new parts I wanted). Instead, they processed a refund check (generously for twice the amount it should have been) for the two returned parts and "shorted" my order one item because I didn't include payment for the two IC-8's along with sales tax on that amount.

Now I knew what was supposed to be in the order and how much it cost. If this had been ordered thru a store, the person who unpacked the order probably wouldn't have known what the customer REALLY wanted and stashed away the stuff for the customer. When the customer came in and asked a salesperson for the IC-8's, no one could have found them and a short-fused customer would have left "railing on" about the stupid salesperson.

So the moral is, NEVER order parts thru your local store, call Tandy/Fort Worth direct yourself. Make sure you verify the part numbers and prices not only with your manual but with the Tandy order-taker. And still brace yourself for errors to occur! Since parts ordered at the local store would include your paying for shipping as well as any local sales tax (same as when you order them yourself direct from Forth Worth) and involving the people at your local store introduces lots of margin for additional errors, misplaced orders and who-knows-what-else and makes it take longer to actually get your mitts on the parts you need, it makes little sense to order any other way than direct from Fort Worth (800-442-2425 8AM-6PM Central Time) yourself!

BTW, if you call the Parts Center, ask for June, she is the person I spoke with today and she caught on to what had happened right away and seems to be an all-right person to deal with for future parts orders! Normally, I'd send this compliment in to the supervisor, but I suspect in this case, it might result in Tandy firing all the people involved with the orders I sent in that went a bit awry!

ED: *Unrelated to the subject of your astute observation, it pays to scope out the needed parts first. In the case of your IC-8's for the PRO-2006, they're available as generic parts in every RS store as* ***7805*** *regulators, cat #276-1770 at $1.19 each. There was no need to special order those puppies, but yeah, I get your drift and have advised hackers for years to order direct from Tandy National Parts. Personally, I can't recall ever having a problem with the Ft. Worth Headshed, but I'm sure they're capable of failure, too. You liked* ***June****; one of my favorites is* ***Janet****. She's so good that all you have to do is say, "I need three of those* ***dealy-bobs*** *next to IC-301...." and she'll say, "Oh, you mean three X-301's?" "Yes, ma'am!".*

From: J. Rommelt, Williamsport, PA

In the 1995 Radio Shack catalog, page 30, an option is available for the PRO-2036 (Uniden 890 XLT): **CTCSS Squelch Decoder**. *For monitoring services using tone squelch on shared channels - programmable so you only hear desired service*. Can the PRO-2006 be modified to do this?

ED: *In a word, no. But, yes, in a roundabout way that's a lot more costly and complicated. Call Automated Industrial Electronics, (803) 532-9256 for one set of possibilities, and Communications Specialists (800) 854-0547 for a different approach. Refer to MOD-31 in Vol-2 of my book for details of this last alternative which is the cost effective way to do it.*

Can the JIM 75 pre-amp be modified with some type of low loss bypass so you don't have to disconnect the pre-amp when it is turned off to get signal through?

ED: *Practically speaking, no. If that's what you wanted to do, the M-100 model would have been the correct choice. Such a modification could be done, but I'm afraid it would ruin the qualitative aspects of the preamp.*

Does the Icom R-7100 do a better job at receiving than the PRO-2006? Is the Icom R-7100 worth $1400.00? Could the difference in the Icom R-7100 and the 7100A (which has the 800-900 MHz deleted) be just a microprocessor chip? Can you take the chip that belongs to the R-7100 and put it in the R-7100A and then have a no gap radio? If so, what is the part number?

ED: *The R-7000/7100/7100A* ***are*** *better receivers than the PRO-2006 like a Rolls Royce is a better car than a Ford. In my opinion, the $1000 difference is not worth it, notably when a little work can make a PRO-2006 run circles around the Icom. I can't attest to the difference between the 7100 and the 7100A, but most likely it is the CPU and if so, most likely a replacement with a 7100 version would do the trick. However, I don't know this to be the case. I don't hack the Icom rigs, so it's not likely that I'll be the one to make the discovery.*

Is it possible to design a 45 MHz directional beam antenna for cordless phone reception? Would it pull signals in from a further distance than a vertical antenna?

ED: *Yes to both....Yagi-Uda designs are found in most any ham radio book.*

What would be the best antenna for receiving cordless phones in the 902-928 MHz range (mobile and base)? How about a directional beam antenna for receiving cordless phones in the 902-928 MHz range? I would like to max out the range of my 900 MHz cordless phone.

ED: *Conventional Yagi-Uda antennas become ineffectual above 800 MHz, though I suppose at 900 MHz, it could still be done. The wavelength at 900 MHz is 0.333 meters or a tad over a foot. ¼λ stubs would be 3-4 inches long and so other things like boom diameter and element thickness become super*

critical as dimensions shrink. Other techniques are better, but beyond the scope of anything short of a major, feature article here. Scannists are not overly excited about the roll-your-own types of antennas. Ham radio antenna books will offer great designs for 902-928 MHz and I shall refer you to those resources for the time being.

I take it that the Rubber Ducky Antenna (on the handset) and the compact metal antenna (on the base) are a compromise. ***ED:*** *Somewhat, but less so at 900 MHz than 49 MHz.* Is it possible to put a BNC chassis jack on the base and run low loss coaxial cable to the outside and up to the peak of the roof to the antenna? ***ED:*** *Yes, but a TNC connector is preferred over a BNC at those frequencies.* Would it be a good idea to shield the plastic case with aluminum foil? ***ED:*** *No, I think not in the case of 900 MHz.* Would it be a good idea to ground the base? ***ED:*** *Not especially, but there would be no harm in it.* How do I increase the transmitting power output from base and handset? ***ED:*** *You don't, not at 900 MHz.* Is it possible to use some type of transmission amplifier on both the base and handset? ***ED:*** *Not unless you found something expressly made for that band, or studied the ham books for power amplifier techniques at 900 MHz. Sorry for the brevity on these Q&A, but 900 MHz transmitting is well out of our scope here.*

Is there any way to modify a scanner to receive spread-spectrum? ***ED:*** *No.* What frequencies do wireless FM intercoms (that plug into an AC wall outlet) communicate on? ***ED:*** *100-KHz current carrier or 49 MHz Part 15.* What frequencies do wireless phone jack systems work on? These systems plug into an ac wall outlet and transmit the phone signal on the electrical wiring so you can add an extension anywhere you have an outlet. ***ED:*** *Sounds like VLF current-carrier, typically 100 KHz.*

PROFESSOR PEABODY WRAPS UP LOOSE ENDS -CORRECTS ERRORS-

Greetings Scannerfans, my gourd went soft with another bonehead error on you unsuspecting folks. A very nice fellow, Gary Mumma, logged on to the ***Hertzian Intercept BBS*** and discovered a fatal flaw in my ***Burst Filter*** that was added to the ***AutoTagger*** circuit. Please haul out your ***WSR***, July '93, **V3N6** and turn to **pg 7.** At the top left of the page find Figure 2. Look at the line of text directly above Figure 2 and find the place where it says "*oneshot, U1 Pin 2 REF V2N6 July 1992 WSR.*"

Cross out Pin 2 and replace it with Pin 1. This will correspond with the Figure 2 text that refers to Pin 8 of the 74HC132 that connects to Pin 1 of the 74HC123 of the ***AutoTagger***. Next, add a note inside of the Figure 2 box that states "Pin 2 of 74HC123 is now connected to +5 volts or pin 16 of the 74HC123". Please take note that the changes to the 74HC123 are only needed if you are using the ***Burst Filter*** with the ***AutoTagger*** circuit. But I recommend the use of the ***Burst Filter*** along with the ***AutoTagger*** as it adds a tenfold increase in performance of the ***AutoTagger***.

Finally, Gary asks about the squelch input from the PRO-2005/6 scanners and if it is the same for the ***Burst Filter*** Pins 1 & 2. **Yes!** The burst filter needs a digital low or zero volt input for more than one second to activate Pin 8 of the 74132 which will go high until the squelch closes and then Pin 8 will drop low to activate the ***AutoTagger*** which will cause the key closure of the "LOCKOUT" function.

As a final note in my text of the ***Burst Filter*** V3N6, I mention Gates A,B,C, and D as doing this or that. Well to clarify what's going on here, when I originally sent in the article to the ***WSR*** my schematic was broken down to individual gates for better understanding. To make the circuit easier to build, Bill put it into a block diagram mode as it would be while hooking up things to the actual IC chip. There's nothing wrong with this but you now have to refer to a data book showing the gates, to be able to read along with my text. I guess all writers have to put up with the quirks of their editors, heh, heh.....

While we're on the subject of corrections, open **V4N6** and look on Pg 1 to the schematic of the ***AutoCrystalSwitch***. Notice in the upper left-hand corner of the circuit box there is a block with the nomenclature "PRO-2005/6 CPU" and it's pretty much blank. Well, the purpose of reprinting the circuit was to show how the ***ACS*** should be hooked up to the CPU pins in a generic sense. There is a circuit diagram inside of the CPU representation which did not make the papers so to speak. My intention was to show how the **ACS**

to show how the *ACS* could be hooked up to any scanner CPU as long as the hacker did his or her homework and looked to see how the internal circuitry was laid out. The gate circuitry is pretty much the same in all CPUs and as long as you make similar connections from your CPU to the *ACS* you should have no problems at all. If you're not sure of the hookup, then try this before you disconnect anything. Turn off power but have the radio plugged into its power source and make sure it has a backup battery installed if it needs one. Connect the black or minus lead of your DC voltmeter to chassis and use your red meter lead to carefully probe both crystal connection pins on the CPU. One of the CPU pins should read a much higher voltage than the other. The higher voltage pin should be connected to the junction of the two crystals and the resistor but the resistor is already a part of the scanner. It's there to ensure startup of the oscillator. Another one is not needed or recommended.

The "missing" circuit inside CPU block in the schematic is reproduced below and would you please take a second and draw it in for your future reference.

Well, I have to go and dig into my bunker as my humble editor will be barking at me and lobbing hand grenades.

ED replies to the Prof: *Yo, Prof, what's happening, man? You sho'nuff went soft on me. Must be all that overtime you're putting in these days! I can't for the life of me, figure out what you meant in the column to the left 'cuz you never sent me a CPU diagram nor indicated that you wanted one printed. Or I lost it, if you did. Send me one line you want it and I'll put it in. Now I did redraw your schematics to show actual hardware wiring paths because that makes it a lot easier for the guys 'n gals who don't know much about this stuff to just do the job and t'heck with makes the sucker tick. It ain't many like you & me who want to know HOW it works. And those that do can always get a data sheet.*

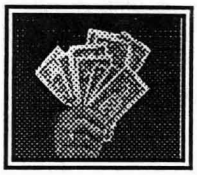
WINDOWS 95 COMING!

I am now free to tell you that I have been beta testing Microsoft's "*Chicago*" (now called **Windows 95**) operating system for the last several months. Wow! All you Windows™ haters and lovers just hang on to your hats because ***something good is coming down to forever change the way we use our personal computers!*** Space left here doesn't allow me to tell you much about **Windows 95**, but I can advise you to be on the lookout for a full entitlement *Pre-Release version* to come out on or about the New Year, priced at $30. The Full Release version is expected to cost around $100 and be available 30-60 days thereafter. Believe me, boys & girls, **Windows 95** is all about our favorite subject: Radio!

You can do some mighty slick things with **Windows 95** that are either not possible under MS-DOS or are difficult and not fun. Stay tuned!

WANT TO SAVE SOME BUX?

No, of course not, ☺ but if you did, you'd want to scope out the ***bright pink 'coupon'*** enclosed with this and last month's ***WSR***. There a whopper of a sale going on for the hot ***CE-232 Scanner-Computer Interface*** that's good until midnight, Christmas Eve (12/24/94). No, the CE-232 is not being closed out. We just made up a bunch of Kits & Assembled/Tested boards for the Christmas Rush. Doing things in volume like that **saves $$$** that can be passed on to you.



The CE-232 is a full ***2-way controller*** and data acquisition system for the ***PRO-2004/5/6*** scanner series, and a potent 1-way Keyboard Controller/***AutoProgrammer*** for a variety of other scanners, including the new PRO-2035, PRO-2022, PRO-43, PRO-37, PRO-34, and probably quite a few more. Explicit and very detailed assembly & installation instructions are available for the above scanners and we'll be happy to work with you on the more popular scanners that are not listed. Inquire.....

Technical support is offered on the ***Hertzian Intercept BBS*** and we stick with you until success! Most people are successful the first time out; the rest do fine with our superb tech support on the first one or two contacts.

The CE-232 is an unparalleled labor reducer that adds immeasurable value to the arts and sciences of scanning. Potent 3rd party support from PerCon, (FCC Database on CD-ROM) and Intercept Technologies (VADER) combine with the CE-232 to make an immensely powerful, affordable communications center that can fit on your desktop. See the back issues of the WSR and sales brochures for details! Or call (619) 578 9247, 1:30pm-5:30pm

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HAPPY NEW YEAR

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