V1N2: February, 1991

THE WORLD SCANNER REPORT A Journal of VHF-UNF Scanner Technology & Engineering

Published at: COMMtronics Engineering; PO BOX 262478; San Diego, CA 92196 Copyright (c) 1991 (All Rights Reserved) \$4.00

FEEDBACK FROM VIN1

It's too soon to really tell for sure, but judging from the feedback available so far, YOU appear to like the *WSR* well enough to come back for more, and much, much more is what you're going to get! If you liked VIN1, you'll be in ecstasy after a few issues!

Personally, I wasn't satisfied with V1N1, but accepted its shortcomings as indicators for improvement to come. It will probably be several months before I become comfortable with the overall scheme of things here. In the interim, I expect you to let me know what you like and what you don't like. I will be throwing a wide variety of material at you until I gain a strong sense of direction that will appeal to the majority. But then, that's one of our strong points anyway, diversity and flexibility!

WHAT CAN YOU DO?

Make sure we have a filled in subscription blank from you! There are several areas on the sub blank that I take very seriously. One is the Types of Equipment in your monitoring station. That alone tells me a lot of what you want to read about. Another area of significant meaning to me is your Career/Profession. That tells me something about the level on which I can communicate to you the technology of radio. Another important area on the sub blank is the Years of Experience that you have in various aspects of radio. This gives me a good idea of what you know and what you don't know. So, if we don't have a completed sub blank from you, please send one as soon as possible. It's kind of like a vote. We tend to rationalize that a single vote doesn't count for much, but the majority of voters get their way in our society.

There are other benefits of the information contained on the sub blanks. For example, now I can tell you that 65% of our readers own a Realistic PRO-2004, PRO-2005 or a PRO-2006. Some 6% own a BC-760%LT, while 38% own some kind of a Bearcat scanner. Catch my drift here? What you own, operate and list on the sub blank is your vote! Keep us updated with your scanner equipment inventory!

YOUR SUBSCRIPTION NUMBER AND EXPIRATION DATE

These are necessary evils, of course, for computer handling of the drudgery that would otherwise make us think twice about publishing this newsletter. The numbers are always printed on the top line of the mailing label. PLEASE, mention your subscription number in any correspondence with us. Forget how complicated that number can be, because the part we're both interested in is the 4-digit number just to the LEFT of the decimal point. The batch of numbers to the right of the decimal point is for internal stuff like housekeeping and might change a time or two before we settle on something permanent. The computer will find things much faster than we can without a number. Never fear, though: YOU are not a number to us here; only to the computer! Even I am a number to this wretched computer! But it has to be that way.

The expiration date is clearly evident on your mailing label, too. Though it is fairly obvious in meaning, here's an example: say yours is, "91.12". That means your subscription expires in December, 1991, which is the last issue you'll receive without a renewal. "91.06" means June, 1991, will be your last issue. Be sure to renew as early as possible to avoid interrupted delivery!

FEEDBACK FROM THE READERS

Henry Dragonetti of South Carolina writes, "Great job on the first issue of the NSR Now I have a question for you: What happened to the 520 MHz - 760 MHz missing band in the PRO-2005 and how can I get it back?"

Editor's Reply: Well, Henry, nothing "happened" to that band. The designers purposefully left it out, not only in the PRO-2005, but also in its predecessor, the PRO-2004 and its successor, the PRO-2006. There are two reasons for this: (1) 520-760 MHz is the UHF Television Broadcast band, Ch-22 to Ch-62. The designers figure self-respecting scannists are not interested in monitoring television audio in their scanners. (2) The most important reason is technical, though. You see, scanners have to operate with internally generated frequencies, which if within the detection range of the receiver, would result in "birdies" galore. Since the UHF Television Band is not of great interest to the scanning hobby, the designers purposefully made the innards of the PRO-200x work inside that "useless" band. For example, the 1st IF section of the PRO-200x operates in the range of 607-612 MHz. Other pertinent sections of the PRO-200x operate within 559-563 MHz and others around 636 MHz. Even if we could liberate 520-760 MHz, (which we can't yet), it would be so chock full of interference, noise, birdies and gunk that it would be worthless. 520-760 MHz is inaccessible in most other scanners as well, probably for the same reasons. If that band were included anyway, product reviews would be rather negative and sales would be impacted. Thank you for your interesting question and kind encouragement! /BC

Steven Rogovich of Virginia writes, "I am interested in <u>antennas</u> for handheld scanners; upgrading to improve reception. I hear there are many available; but where from?"

Editor's Reply: Another good question! There are several sources for you to check out. Bob Grove of Grove Enterprises has developed an improved antenna for handheld scanners. CRB Research carries one that I hear is excellent, and Russell Industries makes a wide line of antennas for handheld radios of all sorts, types and kinds, from CB to scanner to Ham. So check out all three: /BC

CRB RESEARCH BOOKS PO BOX 56 COMMACK, NY 11725

GROVE ENTERPRISES, INC. 140 DOG BRANCH RD BRASSTOWN, NC 28902 704-837-9200

(Please turn to page 2)

RUSSELL INDUSTRIES, INC. PO BOX 508; 3000 LAWSON BLVD CONSIDE, NY 11572 516-536-5000

Harry Abery, Jr. of Connecticut asks about "tracking systems for trunked 800 MHz systems, etc...."

Editor's Reply: Harry, we're treading on dangerous ground here. It seems that the Electronic Communications Privacy Act (ECPA) of 1986 forbids the interception of data and communications control signals altogether. Therefore, any market for the hardware about which you ask would tend to be illegitimate and therefore either non-existent or else under cover. I don't know of anything right off, but in a related area, I understand there are some systems and software designed to help covert operators track cellular mobile telephone calls as they are switched from one cell to another. Hell, trunked radio systems aren't so different, and it is possible that data tracking systems can be interchangeable to an extent. I will keep an ear peeled and report on anything of substance that comes to light. At the moment, I understand the cellular tracking device costs around \$2,500, so it wouldn't be within the reach of the casual scannist. /BC

Clarence Wilken of Illinois wants "tech tips on scanner repairs, modifications to marine and commercial radios, cellular phones, and cordless phones and older scanners such as the BC-250....."

Editor's Reply: No problem on the technical tips and stuff on repairing scanners. I don't think we will branch too far off into marine and commercial radios, however, and darmed little on telephones, be they cordless or cellular. For one thing, I don't know a beck of a lot about the innards of cellular phones and it would be as illegal as bank robbing to monkey around with them. There are two problems with us getting into modifying the older scanners. One is that there's darmed little that can be done to them anyway, especially in the digital department, and as for the analog (RF/AF) sections, I would need the Service Manual and a clear schematic diagram in order to assess any potential there. Service Manuals and schematics for the older scanners are tough, if not downright impossible to obtain. I am not about to go to the time, trouble and expense of even trying to obtain this stuff for the older scanners when there's hardly a market anymay. I would be glad to evaluate the BC-25# and any other older scanner for modification potential, but I'll leave it up to YOU to acquire for me the schematic diagrams and the Service Manual first.

Cordless phones are so elementary that we could explore them fully in just one issue of "THE WORLD SCANNER REPORT" at the risk of irritating about 90% of our readers, so we won't do that. You can improve the performance of any cordless phone by extending the length of its antenna! Just unscrew the old one, and screw in or adapt a longer one. If you are technically inclined, get the Service Manual for the cordless phone, and give its transmitter a good tuneup using a nearby field strength meter as an indicator. You could also use a scanner with an S-Neter to indicate the results of adjusting the transmitter coils. Those coils should be tweaked with the desired antenna in place and fully extended. With a good peak alignment and a longer antenna, you should be able to double or triple the range of your cordless phone. Just keep in mind that it may be illegal to do this! /BC

Jerry Prus of New York writes, "Doc, I'a delighted to hear from you again! Please put as much 11-meter (CB) info into the *WSR* as you can without getting into any trouble. Good luck!"

Editor's Reply: Greetings, Jerry! You were a long time subscriber to my old ELEVEN METER TIMES & JOURNAL. In fact, I found an old SASE from you laying around here that hadn't been used, so I employed it to send you the WSR announcement. Good to hear from you again after all these years! I do plan to work in a little CB material, notably since 36% of our readers are CB'ers. It won't be much nor too bandy like the EMTJ used to be, but I'll see what we can do! /BC

Richard Triller of Depew, New York asks for material on "reducing electrical interference, notch filters, scramblers & DVP/DES; measuring signal loss in cables, filters, couplers, and reducing interference from "birdies" from a neighbor's scanner."

Editor's Reply: Now, Richard, you pinpointed some nice targets that we will deal with in the coming months. For the time being, keep an eye out for the availability of my next book, the SCANNER MODIFICATION HANDBOOK, Vol-2, which will deal with some of these issues in extraordinary detail. I'll let you know when the book is available as I plan to sell autographed copies at my facility. For now, let's take a quick look at neasuring signal loss in scanner accessories such as cables & peripheral devices; a grand project for the casual and dedicated scannist alike. You can buy some awfully expensive equipment to do this or, you can use a scanning receiver with an S-Meter at little or no expense. Mhat? Your scanner doesn't have an S-Meter? Right; most don't. I have developed three excellent S-Meters for the PRO-2004/5/6 and possibly some other scanners and these will be featured in my new book as well. It's most unfair for me to dwell on material in advance of the book coming out, but rest assured that we'll deal heavily with S-meters in the coming months! Meanwhile, how do you employ an S-meter to measure signal loss in coax cable, for example? Easy! Take a reading from the S-meter with a reference signal; then change out the coax cable and take another reading. The stronger of the two indicates the better or less lossy coax! Apply the same principle with other peripherals such as antennas, antenna switchers, preamps, etc. Huch more later! /BC

A PREAMPLIFIER FOR SCANNERS THAT ACTUALLY WORKS!

JAPAN INFORMATION MEDIUM (J.I.M.) has recently introduced four low noise, wideband preamps to Hobby Radio, the M-100, M-75, M-50 and the M-200. All four actually work to the extent that the scanner can receive much better under certain conditions with them than without them. The J.I.M. preamps are made in Japan and apparently distributed by a sole supplier in England, the only source that I have managed to locate at this time. For further information including prices and availability, contact:

> Mr. Mike Devereux Nevada Communications 189 London Rd; North End Portsmouth, Hampshire, England PO2 9AE Telephone: (0705) 662145

"THE WORLD SCANNER REPORT" (c) 1991

V1H2 - Page 2

I have tested and evaluated the J.I.M. M-100 and M-75 low noise, wideband GaAsFET preamplifiers. Both units come in sturdy, attractive dark metal cases. There's a good "feel" to them and they work! Here's the lowdown.

JIM M-100

Designed especially for transceivers, the M-100 has an RF-sense bypass relay that makes it suitable to work in line with a transmitter. Of course, the M-100 can be used in receive-only The bypass relay has another very useful situations, too. function besides for transmitting; it allows the preamp to be turned off for non-amplified reception! The heart of the M-100 is a gallium arsenide field effect transistor (GaAsFET) for high gain and a very low noise figure over its bandwidth of 24 MHz-2150 MHz.

The M-100 can be powered by an internal 9-v battery or any external 12 vdc source, such as an AC/DC adaptor or standard automotive power. The M-100 sports a variable Gain Control for a range of -10 dB to +20 dB. The On/Off switch is on the Gain Control. A standard female BNC connector is on the top of the preamp for simple connection of the antenna, and a male BNC connector is on the bottom for easy connection to the scanner; no adaptors or special fittings required for most scanners. The M-100 has a Bandpass Filter switch for selection of two filters plus a straight-through non-filtered position. A small LED indicates when the preamp is turned on. Specifications of the JIM M-100 are as follows:

Frequency Range:

Band Pass Filter (A):	225 MHz to 1500 MHz
Band Pass Filter (B):	108 MHz to 185 MHz
Non Filtered (C):	24 MHz to 2150 MHz
Gain: 10 stanta and and	-10 dB to +20 dB, adjustable
Noise Figure:	2 dB, approx
Input/Output Impedance:	50 ohas
Transmit frequency range:	24 MHz to 500 MHz
Transmit power limits:	5 watts, max; 100 mW, min
Current consumption:	as svillense ymy fillte ei W
Internal 9v battery:	90-sa
External 12v supply:	105-ma
Size:	80an H x 59an W x 30an D
Weight:	118g/3.88oz, without battery
-	

The JIM M-100 is functional for all amateur (and land mobile) handheld transceivers with up to five watts output and for all VHF/UHF scanners. The current drain from the battery is rather high and will run a battery down in short order, so several spare batteries for field operations are a must. Any AC/DC adaptor rated at 12v/100-ma will work fine to conserve battery usage where AC power is available. Other external DC is ok, too.

The adjustable Gain Control allows the M-100 to be used for an Attenuator as well as an amplifier which is an ideal feature for some receivers that can be easily overloaded.

I did not test the M-100 with a transmitter so I can't offer an opinion there. In a word, it worked very well for receiving purposes. Using my Turbocharged PRD-2004, there were many signals received from distances of 100-150 miles with full quieting that

were either marginal or not detectable at all without the M-100 in line. Effects of intermod and strong signal overload were nonexistent for the most part, but this was due, at least in part. to the relative immunity of the PRO-2004 to these demons. The same M-100, when connected to my PRO-34 created a host of objectionable side effects and interference, though reception was notably improved under certain conditions.

I don't know if this applies to all M-100's or just my test unit. but there is a substantial insertion loss (6 to 10 dB) in my unit in the OFF or bypass mode. This is probably due to the conventional relay used in the M-100, and it's a simple fact that VHF/UHF signals do not like to go through relay contacts. A special RF relay would add substantially to the otherwise moderate cost, however, and the insertion loss is easily overcome with the Gain Control.

The M-100 is useful for handheld and base scanners alike, but the male BNC output connector presents a minor problem for base scanners unless the preamp is connected directly to the rear of the scanner where it is not very handy to operate. I fabricated a special patch cable with a regular male BNC connector on one end for the scanner and a female BNC connector at the other end for the output of the preamp. This allows the M-199 to be placed near the front of the scanner for easier operation of the Gain and Band Pass Filter controls. On the whole, and considering limitations, side effects and disadvantages, the J.I.M. M-100 is a welcome addition to my monitoring post. It allows me to hear stations so far away that it's impossible to hear them without the preamp. That says something.

JIN M-75

The M-75 is probably the better deal for scannists who have no use for transmitting. The M-75 does not have an RF Bypass Relay like the M-100, but otherwise is identical in performance and specifications. It costs less, but looks and performs the same as the M-100, with one notable exception. Since there is no RF Bypass Relay, when the unit is turned off, signals cannot get through, therefore it must be turned ON at all times the scanner is in operation. Current drain is a little less in the M-75 at 70-ma. The Band Pass Filters, the Gain Control and the internal electronics are otherwise the same as in the M-100, so the non-bypass liability can be acceptable given the lower cost of the unit. Like the M-100, the M-75 really works, often dramatically, providing signals with full quieting from well beyond 100 miles.

JIM M-50

I have not seen this unit; only a press release and a photo. It does not appear to have a gain control nor the Band Pass Filters, and the specified bandwidth is 25 MHz to 1300 MHz. It would appear that the M-50 is GaAsFET based, so its performance should be better than nothing under some conditions.

JIM M-200

I have not seen this unit, either, but a press release says the M-200 is a base station version of the M-75! If equal in all other respects, this could be the unit to watch for!

"THE WORLD SCANNER REPORT" (c) 1991 V1H2 - Page 3

EDITOR'S NOTE: It seems that everybody and his brother has a preamplifier on the market for scanners now. You have to BEWARE since there is a lot of high technology that has to go into what seens to be just a simple preamp. Preamps for shortwave radios are old hat and can be fabricated by the greenest novice, but the story is totally different for VHF-UHF receivers! Gain is not so important as LOW HOISE and wide BANDWIDTH! Most of the preamps I have seen offered on the domestic USA market do not appear to be worth your time and money. I have tested a few to confirm this suspicion. I can, without hesitation, say that the JIM M-100 and H-75 preamps perform well beyond my minimum expectations for scanner preamps! I wish I could offer you a domestic source to obtain them, but NEVADA COMMUNICATIONS appears to be the sole outlet. Many readers might be reluctant to trade with a foreign country, but NEVADA is one of England's largest radio facilities and all my dealings with them have been favorable. MEVADA COMMUNICATIONS accepts Visa and Master Cards for payment, but your card company will charge currency exchange fees on top of the actual purchase amount. I do not plan to stock these preamps because of high inventory and purchase costs, but if there are enough of you readers who want one of these units, I will consider accepting special orders and then place a single quantity order. Contact me if interested. I cannot quote prices at this time, but expect something like \$175 for the M-200; \$150 for the M-100; \$125 for the M-75; and \$100 for the M-50, though these are nothing more than guesses at this time.

A SHOOTOUT BETWEEN THE PRO-2005 AND THE AR-3000 by "Professor Peabody"

Rocky and Bullwinkle may be old and graying but I'm still around and deep into scanners now. It was with great expectations and enthusiasm for a new toy that I eagerly awaited the arrival of an AR-3000 to my station. Ripping and tearing open the box, I found a small, lightweight scanner with a sloped front and a gray paint job on a plastic case. I used a digital multimeter (ohameter) to see if the paint was conductive as an RFI shield, but to my dismay it was not. Modern radios such as the PRO-2005 and the AR-3000 are so sensitive that strong local signals can penetrate the plastic cases into the RF section and run totally amok causing havoc. Somehow the AR-3000 was less sensitive to local signal interference. I plugged it into power and turned it on. Then without looking at the manual, I pushed buttons, cranked dials and twisted knobs to determine if it could be intuitively operated.

Hopelessly mired down with no idea as to how it worked, I resorted to the manual. Keyboard operation is complicated and cumbersome. As I loaded in 90 active military freqs I made about 40 mistakes. With practice correcting the mistakes, I got a little better at it. Now able to scan through some freqs I found it to be very sensitive. Signals on the PRO-2005 that were very weak or barely audible on AM were loud and clear on the AR-3080. Scanning with an earphone, I found an annoying clickety-clack every time a new channel was scanned through. I surmised that not enough internal shielding permitted data transfers around the microprocessor to make noise spikes in the RF section. Not good. In the SEARCH MODE, the same thing happened. The SCAN/SEARCH rate is up to 20 ch/sec. Large gaps in frequency, approximately 20 MHz caused the microprocessor to slow down and increase the acquisition time, whereas my PRO-2005 zips along at 30 ch/sec and doesn't hesitate

to acquire weak signals. (My PRO-2005 is supercharged with a PRO-2006 CPU at 18 MHz.) Even at 45 ch/sec, it doesn't fail to lock onto weak signals. Why is the AR-3000 so slow?

The AR-3000 has 400 memories which is sufficient for most scanning needs. More memory channels can be added by computer control and storage, but the radio's memory is organized into four banks of 100 each and they are not linkable. So you're limited to working with 100 channels at a time. If you're accustomed to or need mega memory, there will be a serious problem.

Audio in the AR-3000 was another drawback. The PRO-2005 has an upward facing speaker and it uses the cabinet as a speaker box so decent sound is heard. With both radios tuned to the same broadcast FM station the PRO-2005 clearly had better audio than the bottom firing AR-3000.

Both radios suffer from a too wide AM/NFM IF section. Adjacent channel interference is noticeable on both. A look inside the AR-3000 reveals three horizontally stacked boards in a shelf arrangement. Very difficult to modify anything. The PRO-2005 can be easily modified as there is plenty of space for mod boards and all can be accessed with a minimum of difficulty. So if you wanted to change the 455 KHz IF filters for better selectivity, it can be done quite nicely on the PRO-2004/5/6. Virtually impossible in the AR-3000.

A nice feature in the AR-3000 is a programmable attenuator for each channel. The PRO-2005 has a most inconvenient rear mounted slide switch that allows a flat 10 db of attenuation. 100 KHz to 30 MHz, AM reception in the AR-3000 is compromised by the aforementioned IF filter. You can easily listen to two stations at the same time. A programmable or even a manual selectable wide/narrow IF switch would be very appropriate for this radio. In CW or sideband mode, a narrow filter is used with very good results. While searching the HF bands you can't change modes from AM to sideband, for example, without reentering the search parameters and restarting from the band edge. Very annoying...but again, the AR-3000 is still very sensitive on the HF bands, but lacks the selectivity on AM. The Radio Shack DX-440 blows the AR-3000 away in performance. So, the AR-3000 is an ok scanner, with problems, but is a mediocre shortwave receiver. The question is, "Is this radio worth \$1,000?" I think not! Is it state of the art? In my opinion, no. You might be better off spending the extra \$600 on a real shortwave receiver and buying a JIM M-100 or M-75 preamp for your PRO-2004/2005/2006 scanner.

As a final note, the friendly and helpful people on the phone at Ace Communications, which sells the ADR line of scanners, offer a 25 day money back guarantee. I took them up on it and returned the AR-3000. Till we meet again: "Professor Peabody".

EDITOR'S NOTE: In all fairness to ACE Communications and to the AR-3000 scanner, I think one person's perspective does not convey the whole story. I know very little about the AR-3000, but what I do know suggests that it was designed to operate with assistance of a computer. I doubt that its capabilities and performance can be fully appreciated by strictly manual operation. So far, only one of our readers actually owns an AR-3000, but maybe he will contribute another perspective for you. How about it, Bill Fox?

"THE WORLD SCANNER REPORT" (c) 1991 VIN2 - Page 4

ACCESSING THE LOGIC/CPU BOARD OF THE PRO-2005 & PRO-2006

If you are a serious hacker and own either a PRO-2005 or a PRO-2006, you will need to crawl inside that intimidating front panel sooner or later. Whether you want to speed up the scanner; add 6,000 channels of extra memory, or install some LEDs, jacks or switches in the front panel, you are simply going to have to yank that circuit board from its mounting place inside that front panel. At a glance, the process appears to be most fearsome to the casual observer. It really isn't so bad, however, and here's how you do it. Keep this section handy as the months go by, because I'd like to not repeat it again and there will be a number of modifications for the PRO-2005/6 which will require access to the front panel. In future projects, I will refer you back to the procedure below for the steps to get that Logic/CPU Board out of it's secure domain to where you can meddle with it.

- Disconnect the PRO-2005 from AC or DC power. Remove the top 1. and bottom cases from the chassis.
- Disconnect all wires and cable bundles that go from the front panel assembly to the main circuit board.

HOTE: there are six (6) cable bundles & connectors to be disconnected from the top side of the scanner, and one cable bundle & connector on the bottom side of the scanner.

HOTE: if you do not wish to lose what has been programmed into memory, this operation can still be safely done as further described, except be sure the Henory Retention Battery is good and left in its compartment on the rear of the scanner. Furthermore, do not disconnect the large 15-pin connector & cable bundle, CH-3. Leave it connected to the Main Board, but go ahead and disconnect all other cable connectors.

Disconnect the two ground straps that go from the Logic/CPU Board to the bottom side of the scanner chassis.

NOTE: All cable connectors and ground straps will disconnect from the main circuit board; NOT from the Logic/CPU Board.

- 3. Remove four (two on each side) countersunk machine screws from the sides of the front panel that secure it to the main chassis. Gently, pull the front panel assembly away from the scanner until it comes free.
- 4. Desolder from the chrome metal shield the small bare ground wire that goes to the area by the VOLUME control. Desolder it at the chrome metal shield and push this wire out of the way.
- 5. Remove the six small screws that secure the Logic/CPU Board inside the front panel.
- Face the inside of the front panel placed in an upright position, and locate the white 13-pin connector (CN-501) at the upper left corner of the printed circuit board. This connector doesn't have any wires and doesn't look like a connector at first, but that's what it is. Place a small flat blade screwdriver under that connector and gently pry upward. The entire Logic/CPU Board will slip up from the plastic front panel and come loose in your hands. Handle the board by its edges or by the chrome metal shield only and lay the Logic/CPU Board aside near the scanner chassis. It will be just fine.

7. Desolder the chrome metal shield at six places around the printed circuit board and lift it up and off the board.

HOTE: This is not complicated, and is fairly easy to do with a medium wattage soldering iron. Apply upward pressure with your fingers while the shield is heated at each leg. As the solder melts, that leg of the shield will slip upward and pop free.

This completes the steps required to remove the Logic/CPU Board from its mounting location inside the front panel. You may have to perform this procedure many times throughout your ownership of the PRO-2005/6. You might as well get confortable with it. To reinstall the Logic/CPU Board into the front panel, simply reverse the process given above. Here are a few concerns for the reversal that need to be highlighted as follows:

- After you've resoldered the six metal legs of the chrome Α. shield back to the printed circuit board, don't forget to resolder that bare ground wire from the VOLUME CONTROL area back to the chrome metal shield. While you're at it, make sure that this ground wire does not touch any of the pins of the VOLUME CONTROL. Bend it slightly, if necessary.
- Β. Be careful when slipping the Logic/CPU Board back onto the pins of Connector CN-501. Make sure they line up before exerting any downward pressure.
- As the Logic/CPU Board is pressed back down onto CN-501, keep с. an eye on the front panel to ensure that the SOUND SQUELCH and DIMMER controls protrude through their respective holes without binding up. Also observe the SOUND SQUELCH LED to ensure that it is aligned with its hole in the front panel.

GET THE SERVICE MANUAL FOR YOUR SCANNER!

Just as you wouldn't attempt to change a flat tire on your car without a jack and a lug wrench, you better not monkey around in your scanner (or other electronic equipment) unless you have the Service Manual for your guide! I rarely bother to even look around inside a scanner unless I have the Service Manual handy. Another thing is even more certain: I won't bother to assist or guide you with some technical aspect of your equipment unless YOU and I both have a copy of the Service Manual! Now that's all there is to it; I am adamant; ornery, and persnickety when it comes to not having the Service Manual.

I emphasized this need throughout both my SCANNER MODIFICATION HANDBOOKS and will continue to do so here. A Service Manual is an essential tool for your technical excursions around the real estate of your equipment. It is vital and necessary, so don't pooh pooh it away simply because getting one involves a little time and minor expense. You went to time and expense to get your scanner, now didn't you? The Service Manual is every bit as important as the scanner itself. Unless you will absolutely never take the case off. I may relent in that instance. If you ever need my assistance in a technical matter involving your scanner and any of my books or articles here, it will usually be freely given on the condition that you have the Service Manual and if I don't have one, that you send me a clean, clear copy of yours. Also, I will not ordinarily render a professional opinion of the modifiability of a given scanner unless we both have a copy of the

"THE WORLD SCANNER REPORT" (c) 1991 VIN2 - Page 5

Service Manual. Here is a list of the manuals currently in my files, so you need not bother sending one of these:

PR0-2006	PR0-2024	PRD-32	BC-400XLT
PRO-2005	PR0-2022	PRO-31	BC-560XLT
PR0-2004	PR0-2021	PRD-34	BC-200/205XLT
PR0-2003	PR0-2020	PR0-2002	BC-760/950XLT

Please don't confuse the Service Manual with the Owner's Manual, which doesn't help me help you whatsoever. We both need the Service Manual and here is where you can get them:

BEARCAT (UNIDEN) 6345 CASTLEWAY COURT		REGENCY ELECTRONICS, 7707 RECORDS ST	INC.
INDIANAPOLIS 317-842-0280	IN 46250	INDIANAPOLIS 317-545-4281	IN 46226

TANDY NATIONAL PARTS (REALISTIC) UNIDEN CORPORATION OF AMERICA 900 E. NORTHSIDE DR FT. WORTH TX 76106 800-442-2425 & 817-870-5600

UNIDEN CUSTOMER SERVICE 9900 WEST POINT DRIVE INDIANAPOLIS IN 46259 317-842-1036 & 800-428-5340

ICOM AMERICA, INC. 1777 PHOENIX PKWY; SUITE 201 ATLANTA 6A 30349 404-000-0000

ICOM AMERICA, INC. 2112 - 116th NE BELLVIEW WA 98094 206-454-7619

KENWOOD USA CORPORATION 2201 E. DOMINGUEZ ST LONG BEACH CA 90801 213-639-9000 / 213-639-7140

ACE COMMUNICATIONS (AOR) 10707 E. 106th STREET INDIANAPOLIS IN 46256 808-445-7717 & 317-842-7115

DYNASCAN CORPORATION (COBRA) 6469 W. CORTLAND CHICAGO IL 60635 312-889-8870 & 800-262-7222

UNIDEN/REGENCY PARTS DEPARTMENT 9900 WEST POINT DRIVE INDIANAPOLIS IN 46250 317-842-1036 & 800-428-5340

INDIANAPOLIS IN 46250

317-842-0280 & 800-428-5340

6345 CASTLEWAY CT

ICOM AMERICA, INC. 3150 PREMIER DR; SUITE 126 IRVINE TX 75063 214-550-7525

ICOM CANADA, INC. 3871 - #5 ROAD RICHMOND, BC, CANADA V6X 2T4 กกก-กกก-กกกก

YAESU-MUSEN USA 17210 EDWARDS ROAD CERRITOS CA 99791 213-494-2700

FOX TECHNOLOGY/MARKETING, INC. 4518 TAYLORSVILLE RD DAYTON OH 45424 513-236-3591

These are all the companies and addresses that I have available for the scanner manufacturers at the present time. If you have knowledge of other afgrs

or error corrections for the above, your input will be highly appreciated. I keep and maintain an extensive data base of the entire Hobby Radio Industry in which the above is only a tiny part. I do not know where to get Service Manuals for scanners from defunct companies such as J.I.L., Tennelec, Fairmate, etc. If you have information of this nature, it would be appreciated. I will be printing considerable Source and Supply information over the coming issues, so your input is always valuable!

TRICKS, HINTS, TIPS & KINKS DEPARTMENT

THE RIGHT TOOLS FOR THE JOB: Radio Shack and other electronic suppliers offer a wide line of electronic tools and supplies to help you in your hacking and surgical efforts. They don't carry everything that you might need from time to time, however. There is another excellent source for special purpose tools that I'd like to tell you about: DENTAL SUPPLY FIRMS! Say what?

Well, yes, dental tools can have superior application to the electronic hacker! How about that little mirror the dentist shoves into your mouth? Excellent for peeking around inside your scanner where you can't see very well! Then, perhaps best of all, are those poky things that hurt like hell that the dentist uses to scrape the plaque off your teeth! I don't know what they're called, but those tools are sure great for scraping solder flecks from circuit boards and they're excellent for cutting circuit traces on PC board! Dental plaque scrapers have a super sharp scraping edge and come in a variety of shapes, sizes and styles, with neat little crooks, bends and zig-zags so that you can reach just about any elusive corner in your scanner!

Another neat dental tool is TWEEZERS! Yeah, I know, you can buy tweezers just about anywhere, but they're all worthless. Dental tweezers have a superior feel to them and a superior grip! Then there are surgical scalpels; you know, the sharp knives they use to cut your gums with. Also in a variety of styles and shapes, surgical scalpels come with a permanent handle and disposable blades. You can buy one or two handles and a variety of blades, some curved one way, some the other; some straight and some diagonal. These surgical scalpels are superior to "xacto" knives and much, much sharper! They'll not only split a hair, but also will split the split hair! You can use 'em to slice warts and moles if you can't find anything to cut in your scanner! If you're a serious hacker, it might behoove you to pay a visit to your local dental supply company and ask to see their hand tools!

PANEL LIGHTING FAILURE IN THE PRO-2004/5/6/21/22: Much to av chagrin, about a year ago, I observed the blue backlighting in the LCD Display of my PRO-2004 to be getting dimmer and dimmer with the passage of time. I had no idea, initially, of the cause, and was somewhat intimidated about the prospects of looking into it. The manner in which I had installed a number of modifications in my PRO-2004 pretty much made it a total hassle to get to the inside of the LCD/Display Board where the backlight was located. Finally, a few months ago, the backlight went out altogether. That motivated me to find out why.

Right off, I ordered a brand new plastic front panel for the PRO-2004 and then redesigned the physical installation scheme of all my modifications so that things could be accessed better. That necessitated tearing down the scanner to bare bones and practically rebuilding everything back up from the ground floor. Turned out to be a rewarding project, but back to the subject. Once I was able to remove the LCD/Display Board from inside the front panel, one cause of the backlight failure was obvious: a quantity of metal filings had collected over the years around the oscillator transformer, T-701. Residual magnetism had polarized those particles which eventually shorted out the transformer terminals and therefore caused the backlight to go out.

A good cleaning job got rid of the metal particles, but to my dismay, the backlight, though restored, was still very, very dim. Circuit tests and analysis didn't disclose any other problem, so I reasoned the fault to be a weak "Electroluminescent Panel", a rectangular, flat slip of plastic that fits behind the glass LCD Display unit. This EL Panel appeared to contain some sort of chemicals sealed within the plastic and two wires protruded from the end of the panel. A quick check of the Service Manual yielded the part number and I ordered one from Tandy's National Parts Center in Ft. Worth, Texas. Replacement of the new EL Panel resulted in a normal brilliance of the backlighting again!

Since then, I have encountered several other PRO-2004's and now a PRO-2005 with very dim backlighting. Replacement of the EL panels restored the brilliance to normal. I have also talked with another scanner technician, Bob Whiston, of Colorado, who had independently determined the same problem and repair of these EL Panels. We think that the chemical compound probably weakens with age and use and requires periodic replacement. There does seem to be a connection with age of the units. So, the bottom line is that your PRO-2004, 2005, 2006, 2022, 2021 or any other with a backlight for the LCD Display will probably require a new EL Panel at some time or another. Replacement is not difficult, but first you have to have the part which can be ordered from Tandy National Parts Center in Ft. Worth, the address and phone number of which are given elsewhere in this issue. Have a credit card handy and give the person to whom you speak the following info for your rig:

SCANNER	CAT NO.	PART NUMBER	PART DESCRIPTION	CKT SYMBOL
PR0-2004	20-119	GE-85D-6067	Electroluminescense	EL-701
PRO-2005	20-144	6E-88D-7738	Electroluminescent	EL-501
PR0-2006	20-145	6E-88D-7738	Electro Luminescent	EL-501
PR0-2022	20-127	GE-88D-7809	Electroluminescent	EL-501
PR0-2021	20-113	6E-85D-6067	Electro Luminescence	EL-1

These EL panels cost around \$11 or so, a bit steep, but there are few alternatives. As your scanner ages, it might be a good idea to order a couple for spares, just in case. Anyway, now that you have a replacement part, what to you do with it? Well, you'll have to access the LCD Display unit, which usually means removing

"THE WORLD SCANNER REPORT" (c) 1991

VIN2 - Page 7

something from inside the front panel. With the PRO-2004, -2022 and 2021, the procedure is rather self-evident. In the PRO-2005 and 2006, the instructions are given elsewhere in this issue.

Once you can see the LCD Display unit, you'll see a cream colored flat, rectangular plastic card that fits in a pair of grooves behind the LCD Display unit. There will be two wires, usually white and orange, that come off this plastic card and solder to the nearby circuit board. Desolder those two wires and let them hang free. This plastic EL Panel is sort of cemented on the wire end to the LCD Display module. The cemented seal has to be broken first, best done with a sharp blade and then the EL Panel will slide right out. The new one goes in the same way; (new cement not necessary), resolder the two wires; reinstall the LCD Board back into the front panel. The backlighting will be fully restored and should last for another couple of years or so, depending on how often you use your scanner!

The question arises as to why LEDs or some other more reliable backlighting scheme wasn't used? Current drain is the most likely reason, I think. My tests indicate that these EL Panels and their driver circuits draw around 20-mA at the most. A single LED, which offers practically no light, will draw that auch or more! So the several LEDs that would be required for adequate lighting would draw a lot more current than the EL Panel for the same amount of light. The same reasoning underlies why incandescent panel lamps were not used; current drain, not to mention a distinct unreliability of incandescent bulbs. The EL Panel seems like the best of several evils, but shame on them for being so age/failure prone!

Do any of you Readers have a suggestion for a low current, bright backlighting scheme for the PRO-200x and PRO-202x scanners?

ANOTHER DIFFERENCE BETWEEN THE PRO-2005 and PRO-2006

Back in May, 1990, when the PRO-2006 arrived, I gave its schematic diagram a cursory comparison with the PRO-2005's and determined that the two were essentially the same radio. The few differences I spotted right off were the CPU, IC-501, and the Clock Resonator,

CONFIDENTIAL SUBSCRIPTION ORDER: Please print clearly	V1N2	01/24/91 SUBSCRIPTION RATES & ORDER BLANK V1N2
NAME:		PAYABLE IN US FUNDS ONLY Check Items DOMESTIC RATES; (CANADA +10%) OTHER FOREIGN Desired
STREET:		Single copy, per issue \$4.00 \$4 surf/\$5 Air
CITY: STATE: ZIP:		1991 (6 mos,Jan-June) \$15.00 \$17 surf/\$22 Air 1991 (1 yr) Jan-Dec \$25.00 \$30 surf/\$38 Air
PHONE: () ANT ENCLOSED:	\$	1991-92 (2 yrs) \$45.00 \$55 surf/\$70 Air HAKE ANY REMITTANCE PAYABLE TO: "COMMITRONICS ENGINEERING"
THE BELON QUESTIONS ARE OPTIONAL BUT WILL HELP US HELP YO		List what you want in this newsletter; subjects, topics, etc
VHF-UHF Amateur CB Shortwave	Professional	
Scanning? Radio? Radio? Listening? Career/Profession	Radio?	
Or Occupation:		
List the make & model of your scanners and other radio eq :	uipment:	
1		
List the make & model of any computer equipment you own/o : :	perate:	Enclose a #10 S.A.S.E. and one loose extra stamp if you need other information or a personal reply!

CX-501. All other circuits appeared to be identical.

"THE WORLD SCANNER REPORT" (c) 1991

V1#2 - Page 8

SCANNER MODIFICATION HANDBOOK CORNER

Well, they still are virtual twins, and the CPU & Clock remain the essential difference but more has come to light now. I have since found a tiny LMOS bilateral switch chip, IC-10, positioned between Pins 12 & 14 of IC-2. The Service Manual does not offer much of any info on IC-10, though it is shown on the schematic diagram and in the Parts List as a TC4S66F. IC-10 is in the general location where the well known Squelch Improvement, MOD-4, is made to the PRO-2004/5/6 as well as many other radios! The presence of IC-10, a tiny surface mounted chip in the PRO-2006 eluded me for a time until I performed the Squelch Improvement for a client and the circuit board patterns just didn't match up with what I was familiar. Sure enough, the PRO-2006 is a little different in this area compared to the PRO-2004 & 2005.

This new IC-10 is a bilateral switch that is triggered by the scanner's MUTE function, an internal signal that silences the speaker when SQUELCH is set and/or when the unit is SCANning or SEARCHing. I really haven't figured out why the designers put it in there as a new addition for the PRO-2006, but it doesn't seem to be of any consequence if eliminated for the Squelch Improvement (MOD-4). The approach to MOD-4 for the PRO-2006 will be a little different, though, so refer below to the SCANNER MODIFICATION HANDBOOK CORNER for details of how to handle it.

You can hunt for this IC-10 in the PRO-2006 all day long and never find it! It's hidden away on the bottom side of the main circuit board just underneath and slightly forward of IC-2. IC-10 is hardly bigger than a resistor, and in fact, looks somewhat like those tiny chip resistors around the vicinity. IC-10 has five pins, In, Out, Ground, + Power, and a trigger to switch it on and off. It is nothing more than a switch, though. In practice, IC-10 switches R-152 in and out between Pins 12 & 14 of IC-2. When the receiver is muted, IC-10 is turned off to open the path between Pins 12 & 14 of IC-2. When the Squelch breaks and sounds come out of the speaker, IC-10 switches on to connect R-152 between Pins 12 & 14. In the PRO-2004, -2005 and other scanners, there is a permanent, unswitched connection via a resistor between Pins 12 & 14, so the value of IC-10 remains unclear. One thing is certain: IC-10 in the PRD-2006 is not an important change.

No Change - see last month, VIN1 PRO-2004:

MOD-4: Improving Squelch Action: PRO-2004/5/6

PR0-2005: No Change - see last month, VIN1

- PR0-2006: A bilateral LMOS switch has been found to exist between Pins 12 and 14 of IC-2. Therefore the procedure to improve the Squelch action will differ a little from that for the PRO-2004 and -2005. There are several approaches, but I suggest the one as follows:
- (A) Using a small, narrow tipped diagonal cutting pliers, snip Pin 14 of IC-2. This will be done from the top side of the main receiver board. Snip Pin 14 halfway between the body of IC-2 and the plane of the circuit board where it is soldered. Gently bend upward the cut pin at the body of IC-2 to separate the cut.
- (B) Solder a pair of flexible, fine hookup wires to the cut ends of Pin 14, IC-2.
- Solder a 150-k to 200-k trimmer potentiometer to the hookup (0) wires installed in (B) above. Adjust the trianer pot for desired squelch "tightness". HOTE: if the trim pot has three leads, solder one hookup wire to its middle lead and the other wire to either end lead.
- NOTE: The above approach is probably the best one if you can find a way to mount the trimmer pot so that it doesn't interfere with anything. If you are good at microsurgery, you might be able to solder the trim pot directly to the cut ends of Pim 14, IC-2! That would be a classy job and involve no mires!

Another way you could do MOD-4 to your PRO-200 is to angle a dental plaque scraper in through the hole in the chassis below IC-2 and slit the circuit trace that goes to Pin 14 from IC-10. Then from above, solder a 200-k trim pot directly to Pins 14 and 12 of IC-2. Just beware that this method effectively removes IC-10 from the circuit whereas the first method above retains IC-10 in circuit and active for some as yet unknown purpose. In other words, I have done it both ways and really can't tell any differences yet. (The purpose of IC-10 is rather mysterious.)

COMMTRONICS ENGINEERING WORLD SCANNER REPORT	1967
PO BOX 262478	UINO I TAN
SAN DIEGO, GA 92190-2478	910124
1975 G yri Las-Dec \$25,40 200 con11528 44	CATE: \$3787.84
	1 1636LONE THE
	FIRST CLASS MAIL
	Scan bat Scan Radio? Radio? Radio?
	a stand of the
	"Doc"
Kellyzasz	DA