

THE WORLD SCANNER REPORT

A Journal of VHF-UHF Scanner Technology & Engineering

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SORRY FOR THE DELAY THIS MONTH

A heavy workload fraught with problems galore and with enumerable distractions resulted in the WSR going to press late this month. Please accept my apology and sincere efforts to not let it happen very often. For the future, let me restate our minimum guarantee of 8-pages per issue and 10-issues per year. Given our small size and an ever present need to earn the bread & butter, it is conceivable that the WSR might not go to press for a given scheduled month. If this should ever be the case, we'll simply give up our scheduled bi-month issue of May-June or Nov-Dec. The bottom line is that a minimum of 40-pages and five issues will be released each half year, or an appropriate auto-extension made to affected subscriptions sufficient to meet the minimum subscription guarantee. As it is, we try to exceed the minimum for most issues. The point here is that if you should miss an issue, relax and don't panic; more than likely it will either be late OR made up in a bi-month issue. Obviously, as we grow, we'll have to become more rigid in scheduling and planning, and we are preparing for growth right now!

NEW WAY OF COMMUNICATING WITH US NOW AVAILABLE!

We have a rigid and arduous schedule that does not afford hobby-related chit-chat by phone. Given the nature of my work: *writing and technical labor*, I can ill afford to be unpredictably distracted & jolted out of focus like the telephone can do. Distraction & lack of focus cause inferior products. I am loathe to pass off anything less than my very best. So, it's difficult & almost impossible for me to be available by telephone. Client business is not included in this policy, but since I come and go at all hours, the telephone is just not the BEST for me. I have long supported MAIL as the best medium of routine communications. I go overboard to answer all mail, but even that has become time consuming. So I have devised another and very unique forum for hobby, business or most any other need to get in touch with me: a Computer Bulletin Board, BBS, known as the Hertzian Intercept!

Midnite- 6:00am, Pacific Time: (619) 578-9247

Effective immediately, you can reach my BBS daily between the hours of *midnight - 6:00am, Pacific times*. The phone number is (619) 578-9247 for ONLY the stated hours. At other times, this number is for business ONLY and is connected to an answering service. First time callers to the BBS have 20-mins to answer the easy log-on questions and to leave a personal and/or introductory message. You won't have many privileges for the first session, but approval & upgrade of your security status will normally be made within 24 hours, after which you'll have 60-mins

per day and access to most of the message and file areas.

To access my Hertzian Intercept BBS, you need a computer, a modem and a telecom or terminal program that is capable of running the modem to communicate with other computers via telephone lines. The parameters of my BBS are: 2400, 1200 & 300 baud; 8 data bits; 0 parity, and 1 stop bit (8N1). When you call the BBS during its active hours my computer will answer with a CONNECT message followed by a message saying "*Press Escape Twice to Enter the BBS*". Do so and wait 30-sec for the BBS to load after which you'll be greeted with the name of the BBS and a short list of questions, mostly technical so my BBS can match the needs of your computer. After you've completed the questionnaire and selected a password, you'll be accepted for 20-mins of limited operations. At that point and if I were you, I would go straight to the *(M)essage* area from the Main Menu and leave me a message. You can snoop around later if there's time. So press *(M)* to start the message base and at the prompt, select *(A)rea* followed by a *(6) for E-Mail to SysOp*. Then select *(P)ost A Message* at the next menu, whereupon you'll see a message form with your name in the FROM: line. Enter *SYSOP* or my name (*Bill Cheek*) on the TO: line, followed by one or two words for the subject of your message. (Hello; Question; Business; Help; etc). Then answer *(Y)es or (N)o to Change Anything?* after which you'll be presented with a message screen. Write your message, and when completed, punch your ENTER, RETURN or Carriage Return key *once or twice* to prompt the self-explanatory menu. If all is well, press *(S)ave your message*. You can then look around the BBS for the remaining time left.

One quick way to leave me a message after answering the questionnaire is to press *(L)og Off* which will take you to the closing menu. Select *(L)ease Message to SysOp First* which will accomplish the same thing as above, except that after you've saved your message, you'll be automatically disconnected. It is quick and efficient that way, however. Unless I am out of town or sick, I will answer all messages left in either manner within 24-hours. When you call back, you'll see where there is "*mail in your mailbox*". Using this BBS is relatively intuitive and not at all difficult. Even if you are a greenhorn at computer networking, give it a try.

I am a greenhorn too, and not at all a BBS expert. Since the Hertzian Intercept is so new and I am so green, you won't find a huge library of files or message bases, but you will find information and a pleasant roundtable which will grow with time. You will find this a quick, neat and timely way to communicate with me, whether your need is business, hobby or just to get acquainted. There will also be others there who share our interests in radio!

INTERFACE BBS 24-HRS/DAY: (619) 297-7733

NOTE FOR URGENT NEEDS! My BBS will be part-time until I can get a 3rd phone line put in, which will be another 2-3 months. If my part time hours of *midnight to 6:00am* are not convenient, there is a local full-time BBS to which mine is linked. You can call the **INTERFACE BBS at (619) 297-7733** which operates very much like mine as described. After you've logged on, go to the MESSAGE BASE similar to above and select under AREAS, either the **San Diego Scanner Conference**, or the **San Diego Shortwave Conference**, both of which are direct linked to my BBS. While these two conferences are public, I receive any messages left there several times per day. Address any messages to me as: **Bill Cheek**. Likewise, any messages I post there will be available at the INTERFACE BBS several times a day, which like I said, is open 24-hours a day.

My Hertzian Intercept BBS is a member of the FidoNet, my address of which is **1:202/719.2** so if you are affiliated with any local FidoNet BBS's in your area, we can send & receive semi-private NetMail via that medium as well as public messages on the Shortwave/Scanner Echo. I am also on the GEnie Information Service, address "**W.CHEEKSR.1**".

PRESS RELEASE A CELLULAR TELEPHONE MONITOR

E-Systems Melpar Div introduced CELLTAP, a versatile, compact cellular radio monitoring system, in July at the National Technical Investigators' Association exhibition held in Washington, D.C.

Designed for law enforcement professionals, the CELLTAP system is a compact dialed number recorder and monitoring system, which can be used at a fixed location or as a battery-powered portable unit. CELLTAP is intended for monitoring and recording cellular telephone signaling activity (such as off-hook, on-hook, and dialed numbers) and for monitoring or recording audio. The CELLTAP system can exploit multiple cellular channels with additional PC expansion cards & receivers.

The software supplied with the CELLTAP system provides user-friendly operation with menu and function key driven commands. The data collected by the system is stored on the PC compatible computer's hard disk drive, along with the time and date in a format appropriate for standard data base programs. The standard format allows data to be sorted & analyzed, and then, using the resulting data, provides the means for an operator-generated report.

The compact size of CELLTAP allows a number of packaging options. For example, a 2-channel system that includes a notebook style PC and microcassette recorders fits in a standard 5-inch briefcase, while a 16-channel system occupies just 17.5 inches of rack space.

EDITOR'S NOTE: The price of a basic CELLTAP system without a computer is around \$2,500. Now see the next article for a cellular decoder that's well under \$200!

ECONOMICAL CELLULAR DATA DECODER NOW AVAILABLE!

Cellular Mobile Telephone control channel and voice channel data can now be economically detected, decoded & displayed with most any kind of a computer that has a serial port capable of 9600 baud! Decode continuous data from a control channel as well those "bzzzt's" on the voice channels: hand-off freqs, power changes, phone numbers & more! The Digital Data Interpreter (DDI) from CCS of Milwaukee, WI, comes as a kit of parts containing a professionally produced & etched printed circuit board and all parts to mount thereon. The user provides only a project box in which to install the completed board; IC sockets (recommended but not essential); a power supply or DC Adaptor and a serial communications cable with a DB-9 connector on one end for the DDI and an appropriate DB-9 or DB-25 to match the serial output connector of the computer. A modem is not necessary but a telecom or terminal program is required to read, display and store the decoded cellular data in the computer. A capture buffer can record and store decoded data for future use. Such programs include TELIX, PROCOMM, EASYCOM, 121, ASCII EXPRESS, TO TELECOM, DATALINK, and many, many more.

The DDI connects to a scanner or other cellular receiver with ease via a mini coax or shielded mic cable. The shield of the cable goes to receiver ground while the center conductor connects via a 1-uF capacitor to the "high" lug of the SQUELCH control in most scanners; otherwise to the audio output pin of the receiver's NFM Discriminator chip. The "high" lug of the SQUELCH is eminently suitable for the PRO-2004/5/6, PRO-34/37 and PRO-2022, and should also be just fine for most other scanners. CCS suggests using the EXT SPKR jack for AOR scanners, specifically the AR-2500 which was the test bed for the DDI. This is worthless in Realistic scanners for good reason! The PRO scanners have built-in voice-band filters in the audio sections which serves to limit out-of-voice band signals, including CTCSS tones and high baud rate data signals! Apparently, AOR scanners are not so well filtered. CCS is investigating this matter of best installation points and should have current findings available at time of order or inquiry for information.

The DDI requires two wires for 12-v DC power; two wires for connection to the scanner and a 9-conductor serial cable to most any kind of computer with a serial or COMM port. The DDI runs at 9600 baud, 8-data bits, 0 or no parity and 1 stop bit (8N1). Assembly of the DDI's PCB is not difficult, maybe requiring a couple of hours or so if all parts and materials are on hand. Don't be concerned about mounting the PCB in a project box until it has been checked and operated for a while to ensure proper operation. Most any DC Adaptor rated at 12-volts @ 100-ma or more will suffice for power needs.

Operation of the DDI is routine, though mastering the control codes will take a little time. Control of the DDI is exclusively from the computer's keyboard. The Operating Guide could be better and more explanatory, but a little practice will make most aspects perfectly clear.

The DDI has many modes and variances of operation, but two main or basic modes; control channel data and voice channel data. It may not be widely known that short data bursts are sent on voice channels to control some aspects of the mobile telephone, among these are the handed-off freqs, power level control, ID & registration codes & more. Every so often, a short "bzzzt" will be heard on cellular voice channels. These are the data bursts, whereas on the control channels, there is almost a continuous stream of data, too lengthy and varied to discuss here. Suffice it to say for now that the DDI can fill a screen with decoded data from a busy control channel so fast that it can't be read as the data scrolls off the screen in a continuous stream. One of the more pertinent uses of the DDI is to find the new frequency when a cellular conversation is "handed off". Law enforcement personnel will appreciate this capability when a drug dealer is about to announce the drop point as a frequency hand-off takes place. The new frequency is decoded from that momentary "bzzzt" and displayed on the computer's monitor. As soon as that channel goes dead, reprogram the scanner with the indicated frequency to resume unabated monitoring.

The Digital Data Interpreter Kit and instructions are available from: CCS; PO Box 11191; Milwaukee, WI 53211

CAVEAT: The ECPA of 1986 makes it unlawful to intercept cellular telephone conversations including computer data communications, so the DDI probably can be used legally only by authorized law enforcement, telephone industry and maintenance personnel. Check with an attorney if in doubt about the legality of your application.

SCANNER FREQUENCY MANAGEMENT - Part I

by Perry Joseph, President, DataFile Inc.

About the Author: Perry Joseph is a programmer who specializes in custom database applications. His company, DataFile, Inc., has recently introduced a frequency management system for IBM and compatible computers. (See VIN9P8). In a series of articles, he will discuss his techniques for frequency management, from simple record keeping to custom database management and finally, the creation of ProScan. You can write to Perry in care of DataFile, P.O. Box 20111, St. Louis, Missouri, 63123 or through Genie BBS, address "P.Joseph."

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Scanning & monitoring the VHF-UHF spectrum can be a totally consuming hobby at times, but keeping track of hundreds or thousands of those "nameless numbers" can be a real chore, and a migraine headache. Well, if yours is a ten channel scanner, skip the rest of this article; I'd hate to clue you in on an obscene nightmare.

In my early days of scanning, my monitoring pleasure was limited by a handful of crystals. Frequency Management, to me, consisted of a short list typed on a sticker stuck to the 10-channel radio. No problemo!

Then I stepped up to a 200 channel programmable scanner, only to learn that new challenges and the obscene nightmare were created. Forget the sticker scheme! I got real smart and wrote up a tentative list, entered the frequencies into the radio and then typed out the final list while praising the Almighty for having given me the intestinal fortitude to take Typing 101. This, however, proved not to be the total solution. And the obscene nightmare woke me up in a cold sweat.

Programmable scanners offer something crystal radios did not; the ability to reprogram the radio without having to open the box and change crystals. In my first year of owning 200 channels, I changed the frequencies a half dozen times or more. I edited the original frequency sheets by crossing out old entries and writing in new ones, producing a frequency list which looked more like a crib sheet. Eventually, I had to retype these untidy lists. The recurring obscene nightmare gave me insomnia.

Aha! I plopped back down in front of the typewriter and concocted a blank form sheet with the necessary headers and column lines and then photocopied it for continual use. Now my mess looked organized. The list always looked great as long as I didn't change anything. But of course, changing frequencies on a scanner is about as synonymous as fish swimming in water. The obscene nightmare turned ugly.

The advent of programmable scanners produced an anomaly. Trading frequency lists with other enthusiasts became the "in thing". Now that we didn't have to buy crystals, trying out new channels was as easy as punching buttons. The idea was to exchange each other's frequency lists and try to pick up on new frequencies. The anomaly occurred when considerable amounts of time were sucked up as I pored over others' lists looking for duplicates and errors. Using a pencil to check off list entries was arcane and tedious. On top of that, it was like looking for a needle in a haystack to locate a specific frequency in a list of hundreds. My list, organized by channel no, made it easy to find licensee names when using the list with the scanner. However, when comparing my list with others, a lot of drudgery would have been easier if I had been able to sort my list, say to frequency order, to match the other guy's. The obscene nightmare offered no relief in sight.

Then I got hell-bent-for leather to really get organized. I got me a stack of 3" x 5" index cards and a card box to hold them all and set about to create a card for each channel. Each card represented a single channel and had detailed data including the frequency number, user name, type of user, etc. Making sure the channel no. appeared in the top corner of each card, I could easily flip through them to find, edit, add or delete a channel record. I even used tabbed dividers to partition the cards into sets of twenty. Although this system worked reasonably well, I could not reorganize the records without physically shuffling the cards or preparing a duplicate set of cards in a different order. I also did

not like losing the benefits of a typed list. The card file system offered better organization but was not as fast as being able to scan a sheet of paper and my typing looks much better than my handwriting. By this time, not only could I see the obscene nightmare, but I began to taste and smell it, too.

If it weren't for computers (and Bill Cheek showing us how to put thousands more channels into our scanners), I would probably still be using the card file system today. In my next column, I will tell you how I went from card files to computers and how the obscene nightmare was beaten into submission.

MODIFYING THE PS-90 SEARCH & STORE MODULE - MOD-23b

By: "Professor Peabody"

EDITOR'S NOTE: The Search & Store Modules were introduced as MOD-23 in Vol-1 of my Scanner Modification Handbook. In my opinion, the S & S Modules for the PRO-2004/5/6 by Key Research Co, are the next best thing to peanut butter & jelly. The PS-90 SEARCH & STORE module automatically and hands-off finds & stores into regular channel memory up to 255 frequencies while you're at work, asleep or on vacation. MOD-28, the Extended Delay Module, works in harmony with the Search & Store Modules by eliminating their greatest weakness; an occasional hangup due to very short signal bursts which come and go before the Search & Store cycle can be completed. See my SMH Vol-2 and WSR V1N6P7 for the details of that potent improvement to the S&S modules. Now we continue as "Prof Peabody" does a little more hacking to his Power Search & Store Module to eliminate what is perhaps its only other weakness. If you're not acquainted with Key Research Co and their products, inquire to: PO Box 846; Cary, NC 27512-0846

400-CH STORAGE FOR THE PS-90

Hello again scanner fans! This month I bring to you a modification to a modification. The Key Research Co. POWER SEARCH & STORE module PS-90 offers unattended capturing & storage of up to 255 freqs and is one of the most effective and potent scanner mods around. It is very popular in the serious scanning community. I have one which works great, but I thought it was kind of weird that the PS-90 would only store 255 freqs before it auto-stopped. Well, this Inquiring Mind checked out the innards of the PS-90 and found five chips and a bunch of parts. Four of the chips had the markings obliterated but one was still readable. It's the only 16-pin chip on the board; a 40103 CMOS 8 bit Presettable Down Counter. The PS-90's 8 DIP switches preset the number of channels to be stored, and when the down-count hits 0, a zero detect signal is generated to the rest of the circuit and tells it to stop storing freqs. $2^8 - 1 = 255$ for you techies.

The PS-90 module allows a maximum of 255 storage counts before it shuts down operation. I couldn't see the logic of 255 channels in a 400-channel scanner like my PRO-2005 so I added another counter for 9 bits to permit a program of more than 255 channels to be stored: $2^9 - 1 = 511$

My PRO-2005/PS-90 can now store up to 511 freqs. What? Only 400 channels in a block you say? Right on, but my circuit allows the PS-90 to be programmed for *any amount less than 511 channels, too*, including 400 exactly! The PS-90's operation remains the same otherwise.

Find Pin 1 of the 16-pin IC and then flip the board over. Verify Pin 1 again; then cut the trace about 1/8" away from Pin 1. Remove a slight bit of the trace so a cross connection is not made. Then fabricate the circuit shown in Fig-1 on a piece of perf board. If you are half good and know what you're doing, "dead bug" the new circuit right on the PS-90 board and use 30-gauge wirewrap wire to make the circuit connections.

My simple circuit consists of a 4060 Counter and a 74HC00 NAND gate connected into the PS-90 with five wires. Solder my 5-volt wire to Pin 16 of the 40103. Solder my ground wire to Pin 8 of the 40103. Solder Pin 8 of my 74HC00 chip to an end lug of the SPDT switch. Solder a wire from the middle lug of the switch to Pin 1 of the 40103. Solder a wire from the remaining end lug of the switch to the cut trace that formerly went to Pin 1 of the 40103. Solder a wire from Pins 1 & 2 of my 74HC00 to Pin 9 of the 40103. Don't forget the 2.2-uF bypass cap from +5v to ground. I had problems with noise and glitches on the 5-volt line because there are no bypass caps on the PS-90 module. While you're at it, I recommend that you solder a 0.1-uF bypass capacitor directly to pins 7(-) and 14(+) of each of the other IC's on the PS-90. Anything between 0.1-uF and 1.0-uF make good bypass caps. The SPDT switch is included so you can switch back to original operation anytime you wish.

To operate the new circuit with the switch in the EXTRA mode, just consider it a 9th DIP switch with a value of 256. Then program the existing DIP switches to a binary number of about 144. This will add up (256 + 144) to 400 but you might want to put in a slightly lower number, say 140, to make sure a SEARCH & STORE operation doesn't go past channel 400 and rewrite over the first few channels that were already stored. To operate the PS-90 as designed by the manufacturer, just put the new switch into the NORM mode and set the DIP switches as desired. And there you have it; otherwise all other functions of the S&S module are unchanged. Remember to observe the polarity of any capacitor that you install if it has such. Also, use minimum heat when soldering to the ICs and be quick about it, but don't be nervous; you'll do just fine.

-Prof. Peabody-

UNIDEN BC-855XLT CELLULAR RESTORATION

NOTE: It is unlawful to intercept cellular telephone signals. Although the procedure described herein will restore the missing cellular bands, base and mobile, to the BC-855XLT, you can receive the CMT base band without modifying anything by just tuning the image frequencies at 21.600 MHz higher than the factory-deleted ranges. On the BC-855XLT, the image band is 894.010 - 915.600 MHz, though reception might be a little fuzzy and less clear.

Neither COMMtronics Engineering nor the "WORLD SCANNER REPORT" assumes responsibility for damages or other liability resulting from attempting to duplicate this procedure. It is possible that this modification may void your warranty.

TOOLS NEEDED: Phillips screwdriver, wire cutters, 1/4 or 1/2 watt resistor, 10-k, a small soldering pencil and small gauge, rosin core solder.

Disconnect the power cord and with the bottom edge of the scanner facing you, turn it over on a soft surface to avoid scratching, and proceed as follows:

1. Remove the five Phillips-head cabinet screws and carefully separate the cabinet.
2. Grasp the speaker plug (not the wires), and carefully pull the plug from its socket. Lay the two cabinet halves side-by-side.
3. Refer to Figure 2 and find the fifth jumper in a row at the top of the right-hand circuit board. Cut JV-209 at its midpoint and curl the cut ends apart so they can not touch anything, including each other.
4. Solder one end of the 10-k resistor to the cathode of diode D201. Solder the other end of this resistor to the cut end of JV-209 that's closest to the center area of the board; do not use excessive heat. If the jumper comes loose from beneath the board, it will reattach if you hold it still as the solder cools.
5. Plug in the A/C power cord; turn the scanner ON and press **MANUAL : 880. : ENTER** in order. If 880.000 appears in the Display, the effort was a success; otherwise ERROR will be displayed as usual. The speaker is disconnected, so audio will not be heard.
6. Snip off and remove excess wire from the resistor leads; plug the speaker connector back in place; reassemble the cabinet. If factory service is ever required, the resistor may be removed and the jumper lead resoldered.

Technical Discussion: In the simplest analysis, a ground is connected to the CPU, IC-201 Pin 10, via jumper JV-209 which places a 0-v (low) at Pin 10 to block the cellular coverage. Clip JV-209 to remove the ground and apply +5v (high) to Pin 10 via the isolation 10-k resistor to program the CPU to cover the cellular bands. The cathode of D-201 is a handy source of +5v.

DOUBLING THE MEMORY CHANNELS IN THE BC-855XLT ??

I cannot swear to this procedure, but an examination of the schematic diagram suggests that 50-channels in the BC-855XLT may have been deliberately blocked at the factory. A pinout of the CPU shows a 100-ch memory if Pin 9 is raised from ground to +5v. It will not be difficult to gain 50 more channels if this is correct.

Referring to the above cellular restoration procedure, find the jumper wire immediately to the LEFT of JV-209, the one that was clipped. This will be JV-208 which also must be clipped. Solder one end of another 10-k resistor to the cathode of diode D201. Solder the other end of this resistor to the cut end of JV-208 that's closest to the center area of the board; do not use excessive heat.

Test the scanner for memory channels 51-100. Some reports have it that the unit will be locked up when first turned on after the memory mod. If so, disconnect the unit from all power for a short time and try again. No harm will come from this procedure, and if all else fails, you can always remove the resistor and resolder the clipped jumper, JV-208. *Please let me know of your results.* /bc

THE CARPET LOOP II

A HIGH PERFORMANCE INDOOR SHORTWAVE ANTENNA

by David Moisan

INTRODUCTION: Many shortwave listeners can't put up an outdoor antenna because of location, infirmity or an unyielding landlord. These hobbyists have few choices: a short random wire or an active antenna. Neither choice is adequate for the serious listener. Active antennas are expensive, apt to generate as much noise as signal, and are prone to overload. Random wires are cheap and easy, but are unpredictable performers. Both subject the receiver to intermod, spurious signals and other trash.

The Carpet Loop II is an ideal upward step for the SW listener who wants better than a random wire but not the risk of an expensive dice roll for an active antenna. The Carpet Loop II has two components: a tuner and the antenna loop fashioned from 5-conductor rotator cable available from Radio Shack. The tuner, a giant L-network, couples the antenna to the radio.

While NO antenna can give a cheap receiver sensitivity, selectivity, or dynamic range it never had, the Carpet Loop II will help you get the last ounce of performance from your radio. I once used a random wire which had severe problems with a local AM station on 1230 KHz 2-mi away. Intermod was all over the 9 to 12 MHz band. With my Carpet Loop, which then was just the cable, the nasty interference almost vanished and signals were stronger. I built the tuner later for even better results. If you're an avid SWL stuck in an apartment, the Carpet Loop may be for you. It's cheap: maybe \$25 in parts from Radio Shack but less if you shop around or dig through your junkbox. It's an excellent first project for the budding SWL.

CARPET LOOP II PARTS LIST

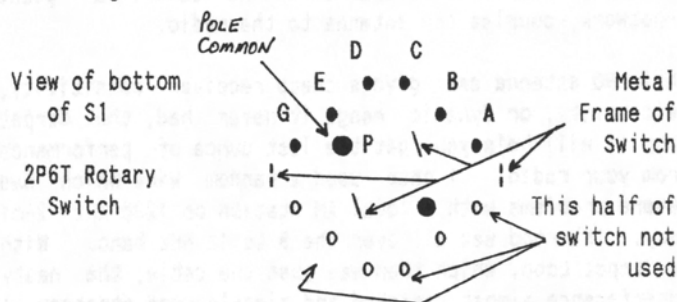
S1	1 pole 6 position rotary switch	RS 275-1386
C1	365 pf variable capacitor	(see text)
S2	SPST switch	your choice
D1,2	1N914 silicon switching diodes	RS 276-112
J1,2	6-position terminal strip	RS 274-357
Misc	5-cond rotator cable (see text)	RS 15-1201
	Metal enclosure, spade lugs, connector, coax cable	

HOW THE CARPET LOOP II WORKS: Refer to the drawings in Figure 3. S1, C1, and the antenna cable connected to J1 and J2 form a large L-network; when S1 is switched between positions A through F, and C1's capacitance is varied, the impedance of the antenna system changes. When S1 and C1 are adjusted for best signal, the impedance between antenna and receiver is matched. D1 & D2 offer protection against static discharges and strong signals. The G position of S1 grounds the antenna when not in use. S2 disconnects the ground from the antenna, making the antenna a random wire.

BUILDING THE TUNER: With the exception of C1, all parts for the tuner are readily available from Radio Shack. C1, the 365-pF variable capacitor, can be salvaged from an old radio or purchased from a specialty or general electronics supply. There are no critical parts in the tuner; as long as S1 has at least six positions, it will do. D1 and D2 can be most any silicon diode. Select an enclosure that's big enough to comfortably install all the components.

The choice for J3, the jack to the receiver, depends on what connector your radio uses for an external antenna. I used an SO-239 (RS #278-201); you could also use a TV antenna terminal strip (RS#274-663).

- 1) Mount the components on the enclosure you'll be using--all wiring is point to point. I suggest mounting J1 and J2 on opposite sides, S1 and C1 on top, and J3 on the other end of the enclosure.
- 2) Wire S1 to J1 and J2. If you use the Radio Shack 2P6T rotary switch, you'll be using just one of the poles. The diagram of the back of switch is below:



WIRE THE TUNER AS FOLLOWS: If you use Radio Shack's terminal strip, you will need to drill a hole in the cabinet to pass the wires through from inside. Use a rubber grommet to keep the wires from fraying.

S1 term	--to--> J1 term	J1 term	--to--> J2 term
G	#1 ----->	#1	S1,G
E	#2	#2	# 6
D	#3	#3	# 7
C	#4	#4	# 8
B	#5	#5	# 9
A	--to--> J2#10 ----->	S1,A	--to--> #10

The above represents the *internal* wiring of the switch to J1 and J1 to J2. The rotator cable antenna wiring from J1 to J2 is shown in Figure 3 on page 8.

- 3) Install and wire up C1. Connect one terminal of C1 to the P terminal on S1. Connect the other end to J3. If using an SO-239 or phono jack, connect to the center conductor. If using screw terminals, connect to terminal #1 on J3.
- 4) Connect the G terminal on S1 to one lug of S-2. Connect the other lug of S-2 to the ground shell of J3 or to the ground shield if coax, or to terminal #2 if screw terminals.
- 5) Connect D1 and D2 in reverse polarity across the terminals of J3.

This completes construction of the tuner.

ANTENNA CONSTRUCTION: While other kinds of multiconductor cable can be used, the best for standard use is the 5-conductor rotator cable mentioned in the parts list. This cable can easily withstand being stepped on; more importantly, the cable is easily managed and uniform in layout which enhances performance. It's also easier to wire than phone cable.

When routing the cable, start at the receiver and go around the room--or the house--and back to the radio. Corners are easily made with this flat cable by folding the cable at a 90° angle, just like folding paper.

WIRING THE CABLE TO THE TUNER: You should have the two ends of the cable next to the tuner. Split the wires 2-3 inches; strip the ends and solder spade lugs on all the wires. With the rotator cable, mark the silver conductor. Connect the wire to the tuner using Figure 3.

GROUNDING: Run a wire--preferably a large one--from the ground terminal on the tuner (or a mounting screw on the SO-239 connector if you're using one) to a suitable ground such as a cold water pipe; I grounded my tuner with a short length of RG-58 coax connected to a baseboard heater via an alligator clip. Connect the tuner to your receiver; it's ready for use!

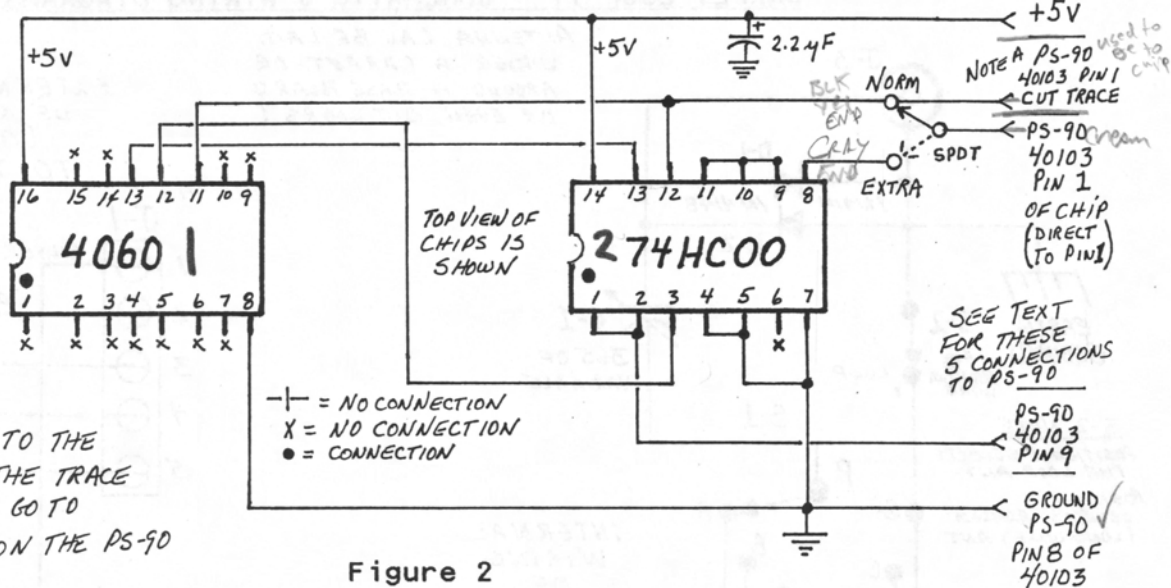
USING THE CARPET LOOP II: It's easier to use than to talk about: Tune the receiver to a desired frequency. Adjust S1 and C1 (or the antenna trimmer on the radio) for strongest signal. That's it. The Carpet Loop II is an inexpensive, easily built, high performance antenna that can work in almost all apartments.

FATMAN COMPUTER INTERFACE CORRECTIONS

No serious errors have appeared in the FATMAN computer interface yet, but there are a few omissions that should be marked on your back issues for future reference:
V2N1P9: Mark "+5v & Pin 14" at U-10a and draw a ground at U-10a, Pin 7. V2N1P10: Mark "+5v" by the terminal at Pins 6 & 16 of U-2d. V2N2P11: Mark "+5v & Pin 14" at U-11a and draw a ground at U-11a, Pin 7. Also: Mark "+5v & Pin 14" at U-12a and draw a ground at U-12a, Pin 7. Sorry for any inconvenience caused by these omissions.

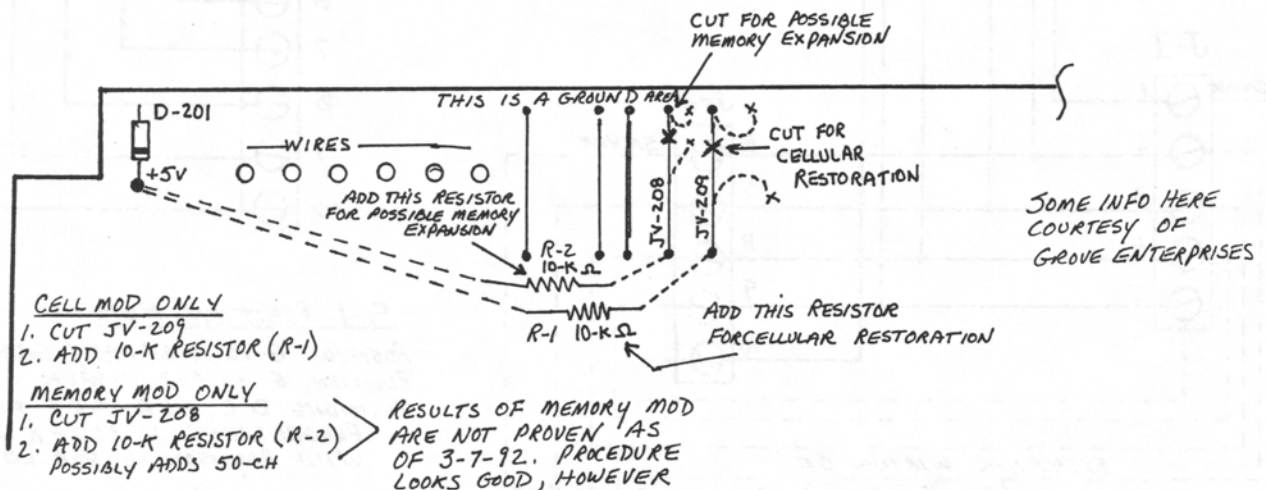
Figure 1
400-CH STORAGE CIRCUIT FOR THE PS-90 SEARCH & STORE MODULE

MOUNT THIS SIMPLE CIRCUIT ON OR NEAR YOUR PS-90 SEARCH & STORE MODULE.



NOTE A
THIS POINT CONNECTS TO THE OPPOSITE SIDE OF THE TRACE CUT THAT USED TO GO TO THE 40103 - PIN 1 ON THE PS-90

Figure 2
CELLULAR RESTORATION !!
and maybe DOUBLING THE MEMORY CHANNELS IN THE BC-855XLT ??



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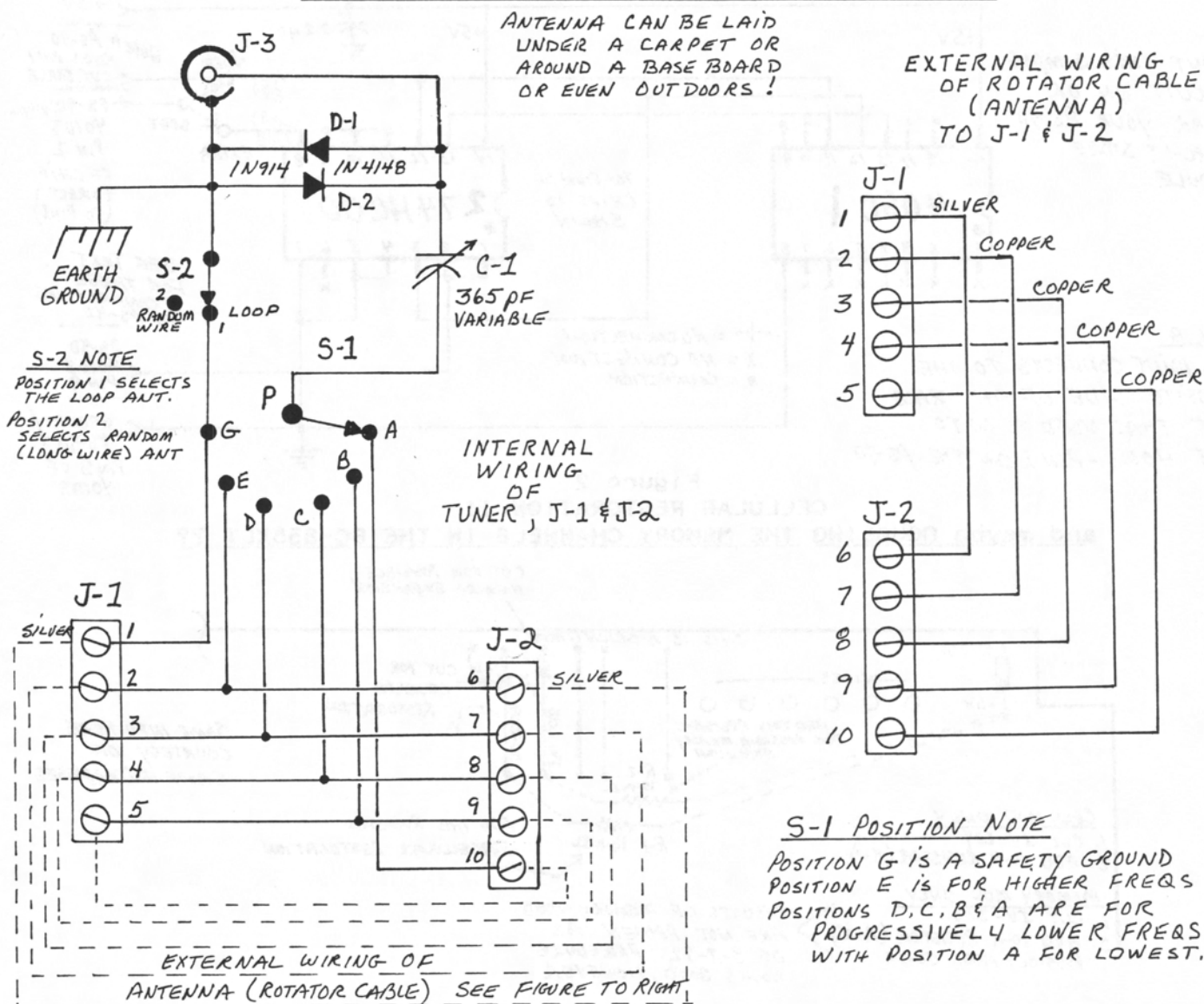
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Figure 3
CARPET LOOP II - SCHEMATIC & WIRING DIAGRAMS



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