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SUPERSNOOP SURVEILLANCE DEVICE
 ~ The Saga Concludes ~

The last three issues of the WSR softened you up for this month's exciting conclusion to an integrated, all-purpose RF device that can be used for anything from a baby monitor, to a listening device, to a high quality surveillance bug for authorized agencies and operatives.

V5N6 gave you the SuperSnoop Microphone; V5N7 presented the SuperSnoop Amplifier; and V5N8 offered the SuperSnoop Transmitter; each in useful, standalone circuits that could find ready uses for many purposes.

Comes now the integrated version of all three super circuits into a unitary system that can be nothing more than a "toy" or

conversation piece with which to impress family, friends, and neighbors, to a mother of a listening device as a part of your perimeter security.

The last three issues of the WSR gave all the gory details of each circuit, so I'll dispense with repetition here, and instead get right into the meat 'n taters of the below circuit and explain the features and differences that may exist from the individual circuits.

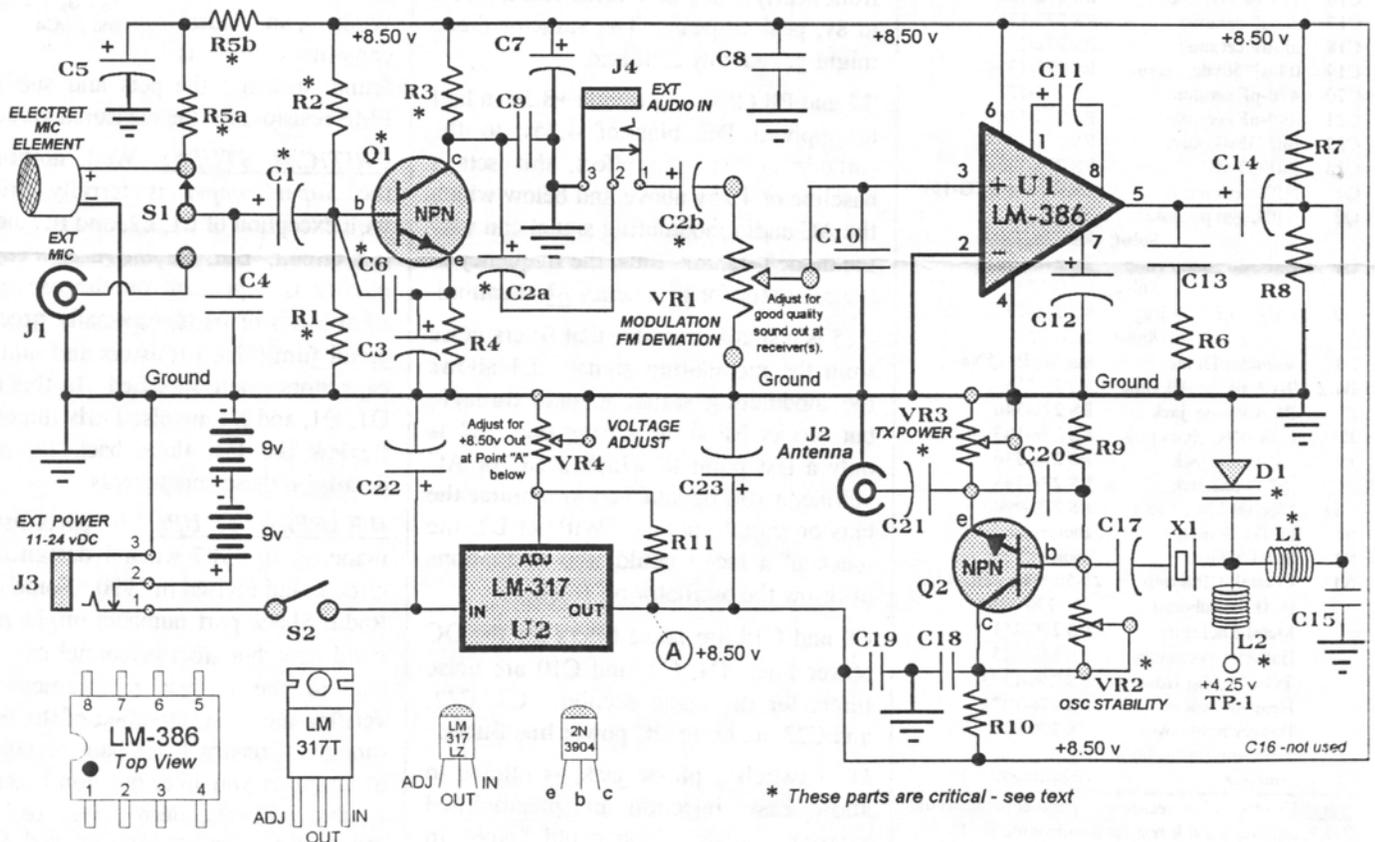
THE POWER SUPPLY stands out from the three previous projects. Each of the 3 sections in the below circuit are designed to run from regulated +8.5 volts provided from U-2, an adjustable 3-port regulator. (Some parts values will differ from the last 3-mos because of the 8-volt design.) U2 can be the common LM-317T (large TO-220) or the less common LM-317LZ (tiny TO-92). There is no real need for

the large LM-317T other than it is commonly available, even from Radio Shack. The tiny LM-317LZ is available from DigiKey and other parts houses.

The power supply is designed to accept a range of input DC and to regulate the output to a fixed, stable +8.5 volts.

Input power can be as simple as two 9-v batteries wired in series as shown, for 18v input, or, via J-3, you can connect a DC Adapter or power supply of any level from 11 to 24 volts or so. Not critical! Current drain is about 15-25 mA. The two 9v batteries permit extended portable operation, since U2 will provide a smooth 8.5v output until the batteries decay to about 5.5v each, or effectively dead! Cool, huh? J3 is a switched 1/8" phone jack that auto-disconnects the internal batteries when an external DC supply is plugged into J3.

HIGH QUALITY MULTI-PURPOSE SURVEILLANCE DEVICE



* These parts are critical - see text

SURVEILLANCE PARTS LIST

Ckt Sym	Value/Description	Radio Shack or Other Cat No
R1	4.75-k, PMF	TRW RN-60D-4751
R2	49.1-k, PMF	TRW RN-60D-4912
R3	3.92-k, PMF	TRW RN-60D-3921
R4	100 PMF	TRW RN-60D-1000
R5a	6.81-k PMF	TRW RN-60D-6811
R5b	6.19-k, PMF	TRW RN-60D-6191
R6	10 ohm. carbon.	RS 271-1301
R7	10k, PMF	TRW RN-60D-1002
R8	10k, PMF	TRW RN-60D-1002
R9	10k, PMF	TRW RN-60D-1002
R10	221-ohm	TRW RN-60D-2210
R11	220-ohm carbon	RS 271-1313
VR-1	100-k trim-pot	RS 271-284
VR-2	10-k trim-pot, precision	RS 271-343
VR-3	1-k trim-pot, precision	RS 271-342
VR-4	5-k trim-pot	RS 271-281
C1	22-uF/16vdc, tant	RS 272-1437
C2	22-uF/16vdc, tant.	RS 272-1437
C3	220-uF/35vdc elec	RS 272-1017
C4	.001uF ceramic disk	RS 272-126
C5	100-uF/10vdc, tant.	surplus store
C6	220-pF, ceramic	RS 272-124
C7	470-uF/35vdc elec	RS 272-1018
C8	0.1-uF/50vdc ceram	RS 272-135
C9	.02-uF/50vdc	RS 272-1066
C10	100-pF ceramic	RS 272-123
C11	1-uF/35vdc tant.	RS 272-1434
C12	22-uF/16vdc tant.	RS 272-1437
C13	.05-uF ceramic	RS 272-134
C14	220-uF/35vdc elec	RS 272-1017
C15	100-pF ceramic	RS 272-123
C16	100-pF ceramic	RS 272-123
C17	.01-uF ceramic	RS 272-131
C18	.01-uF ceramic	RS 272-131
C19	0.1-uF/50vdc, ceram	RS 272-135
C20	470-pF ceramic	RS 272-125
C21	.001-uF ceramic	RS 272-126
C22	1-uF/35vdc tant.	RS 272-1434
C23	1-uF/35vdc	RS 272-1434
Q1	NPN, low noise	2N3904 or ECG-199
Q2	NPN, gen purpose	2N2222A
U1	LM-386 Audio Amp	RS 276-2009
U2	LM-317T Volt Reg	RS 276-1731
D1	Varactor Diode	See WSR V5N8
B1,2	9-v Battery, Alkaline	RS 23-553
J1	RCA Phono jack	RS 274-346
J2	Fem BNC chass jack	RS 278-105
J3	1/8" Phone jack	RS 274-246
J4	1/8" Phone jack	RS 274-246
Mic	Electret Mike Elem	RS 270-090
S1	DPDT Switch	choice
S2	SPST Switch	choice
X1	Crystal, CB Synth	23-50 MHz - HC-11/u
	PCB Breadboard	RS 276-1395
	Metal Enclosure	RS 270-251
	Battery Connectors	RS 270-325
	TO-220 Mtg Hdwe	RS 276-1373
	Heat sink comp	RS 276-1372
	Battery hold down	RS 270-326
	Misc nuts, bolts, hdwe.	
	Antenna	(fabricated)

Note: Use two 15-K resistors in parallel to substitute R-5A, and use a 5.6-k resistor to substitute R-5B

(continued from Page 1)

Any other differences in this integrated system fall into one of three categories:

1. to accommodate +8v power
2. to accommodate convenience
3. to enhance performance

For example, the SuperSnoop Mic of V5N6 was designed for a nominal 3v, but 8.5v requires different values of some parts. In a word, the SuperSnoop Mic of V5N6 was redesigned for the needs of this month's integrated project.

There are other differences in the transmitter circuit. Note trimmers VR2 and VR3 that replace the 4.7-k & 330-Ω resistors in last month's transmitter? You can go with the fixed resistors, if you like, but the trimmers will allow you to optimize the transmitter for best overall operation. VR3 optimizes output power while VR-2 optimizes the stability of the oscillator. Once the trimmers are set, you can measure them and use fixed resistors close to the measured values.

The Audio Power Amplifier isn't appreciably changed from V5N7, but you will note R7 and R8 this month that require a little explaining. You see, U1 puts out a whopper of an audio signal to "deviate" or modulate the oscillator by varying the bias on Varactor diode, D1. But this is an AC signal that can vary from nearly 0 to 3 or 4 volts, RMS, and 6 to 8v, peak-to-peak. The varactor diode might get terribly confused.

R7 and R8 (10-k ea), divide +8.5v in half to apply a DC bias of 4.25v to the cathode of D1. In effect, this sets a baseline of 4.25v above and below which the AC audio modulating signal can vary the diode bias, and thus, the frequency of the oscillator for Frequency Modulation!

C15 is a small capacitor that filters noise from the modulating signal. L1 allows the modulating signal to pass through, but blocks RF from getting out. L2 is only a test point to which a DC or AC voltmeter can be attached to monitor the bias or signal voltage. Without L2, the touch of a meter could stop oscillations or throw the oscillator off frequency.

C8 and C19 are noise filters for the DC power line. C4, C9, and C10 are noise filters for the audio section. C7, C22, and C23 are brute DC power line filters.

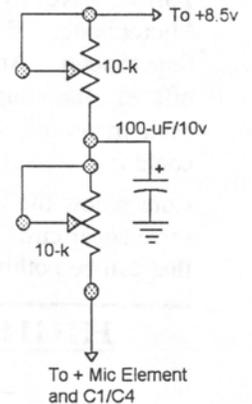
J4, a switched phone jack, is offered to allow easy injection of preamplified external signals. You could "pipe" in

line-level audio from some other source, thereby bypassing the built-in mic and preamp. This is a convenience feature, and if not desired, leave it out, and eliminate C2b. Connect the (-) side of C2a directly to the top of VR1.

Likewise, J1 and S1 are convenience features to allow easy connection of an external mic or other low-level audio signal. Leave them out, if you want.

R5a, R5b, and C5 are for the purpose of dividing and filtering the +8.5v line to produce an idealized DC power for the electret mic element. These components are fairly critical for optimal operation and probably should not be changed. If you use a different mic element, then the circuit might need to be altered. You could experiment with the following circuit to determine an ideal combo:

Wire two 10-k trim pots as shown to the right, and a capacitor between them. Sub this circuit for R5a, R5b, and C5. Experiment with settings of the trim pots until ideal settings are found. Start with each pot set to about 6-kΩ and go from there. When an ideal combination is



found, measure the pots and sub fixed PMF resistors for the measured values.

CRITICAL STUFF: Well, nothing in the *SuperSnooper* is terribly critical, with exception of L1, L2, and the electret mic circuit. But, the *fine razor's edge of quality* is dependent on the use of the right kinds of parts, especially precision metal film (PMF) resistors and tantalum capacitors where specified. In this light, D1, Q1, and X1 are also fairly important. Review the last three back issues for details on these components.

WRAPPING IT UP: The parts list was made up in 1987 when I designed this circuit, and revised in 1990. Some of the Radio Shack part numbers might not be valid now, but store personnel can guide you to the correct replacements. I verified the most important of the bunch, though. Construct this baby as small or as large as you like, but don't get into trouble with the dern thing, ok? This sucker works.....gooodoo! Maybe too good. ☺

UPGRADE LINKALL DISPLAY PROJECT

By William Manganaro

Designer of LinkAll series memory controllers

A LITTLE BACKGROUND



Every now and then I like to sit down at the computer and write about things I think would be practical and useful to the electronics and scanner hobbyist. I don't write as much as I

used to and when I do it's usually about electronic systems relating to amateur rocketry. That's a whole different story.

Anyway, I guess I am sort of the Howard Hughes of electronics in a sense that I usually keep things to myself and nobody can figure out exactly what it is I do. Well what the heck! I guess I will break character here and share with you a hardware upgrade that is simple to build and will make your life easier while scanning the airwaves.

I am talking about an upgrade for the LINKALL display. What the heck's that, you ask? The LINKALL is a small easy to install **memory controller board** that makes Extended Memory in the PRO-2004/5/6 and maybe other scanners, much easier to use and manage.

ED: See V2N7, V3N6, and V3N7 for past articles and information about LINKALL. If you installed my 6,400-ch or 25,600-ch Extended Memory Mods in your PRO-2004/5/6 or PRO-2035/2042, the LINKALL might be just for you!

My buddy, Mark Persson, and myself developed it because we felt there was a need for it in the scanner community and we wanted to fill that void.

Those who own a LINKALL of any type can benefit from this upgrade. LINKALL uses a bank of LED's to indicate memory block number and status information. The binary format displayed on the LED's is simple and effective, not to mention space efficient, but the fact of the matter is that binary can be confusing, especially if you have a 6 bit LINKALL. Now you can replace these block number LED's with a digital display that indicates the block number in a plain easy to read decimal format.

There are 4 versions of LINKALL. The first is the original 4 bit design. The second is a modified 4 bit design made into a 6 bit design. The third and fourth designs are the new LINKALL Models 4 and 6 which have all

the features of the first two with added functions. Models 4 and 6 also feature a highly integrated design in contrast to the older 13 chip designs. This upgrade is compatible with all LINKALLs.

Before we get into details of how to build or install the display, let's get into a few details of the circuit itself and its operation.

CIRCUIT DESCRIPTION: Please refer to the schematic as we go through the various circuits. There is not much to this so it should go quick. Let's talk about the address inputs A0-A5. The LINKALL uses these address lines to sort of break up the extended memory in your scanner into smaller usable blocks of memory. The A0-A5 lines from the LINKALL control or address the most significant bits of the extended SRAM memory chip in your scanner. Each discrete address value from the LINKALL is called a Block and is normally displayed using a bank of 4 or 6 LED's depending on your model.

There are 400 channels associated with each Block value. The 4 bit LINKALL controls 16 Extended Memory Blocks and the 6 bit version controls 64 Blocks. A Block address from LINKALL enters EPROM U1. This EPROM is the heart of the circuit and acts as a digital code converter. It converts the raw binary data into BCD (B)inary (C)oded (D)ecimal. Code conversion is accomplished using a lookup table method.

The address input to U1 is used to point to a particular memory location in the EPROM that holds the 2 digit BCD equivalent of the address value. The BCD format from U1 representing the raw binary data value uses the upper and lower 4 bits of each output byte to represent the values of 0-9. Therefore we can represent a value from 00-99 with one byte of data; more than we need since the maximum value into the EPROM will be 63 for a 6 bit LINKALL.

The EPROM output goes to U2 and U3, 74LS47 BCD-to-7-segment display decoder/drivers to drive our displays. The displays are 7 seg common anode (CA) type displays with active low drive on each segment. Note that I did not include pin numbers on the schematic, **only signal definitions**, on the schematic diagram in the display part of the circuit. This gives you the option to use any size display you need as long as it is **common anode** type. The resistors limit the current in each segment. The other input to the circuit is the POLARITY input which is used to compensate for LINKALLs that use negative logic to drive it's LED display. Older

type LINKALLs use active low drive while the newer Model 4 or 6 use active high drive.

Tying POLARITY and point A to 5 volts makes the display compatible with older type LINKALLs with 4 bits. If your older type LINKALL is a 6 bit model then the POLARITY input gets connected to 5 volts while point A gets grounded. Connecting POLARITY and point A to ground makes the display compatible with the new Model 4 or 6. The remaining inputs are + 5 volts DC main from the scanner and ground. That does it for the circuit description. Simple right?

CIRCUIT CONSTRUCTION: The circuit is not critical since operation is completely static. There is not much room inside your scanner for the display board so you may have to put in a small enclosure and mount it outside the scanner if you're not very creative. You can use point to point wiring or wire wrap techniques.

Follow the schematic carefully and clearly label each wire lead into the display board for connection inside the scanner. If you use the display module with an older type 4 bit LINKALL then connect the POLARITY input to 5 VDC and point A (see schematic) to 5 VDC. (An old style LINKALL is 6 inches long.)

If you use the display module with an older type LINKALL that has been modified to a 6 bit then connect the POLARITY input to 5 VDC and point A (see schematic) to ground.

If it is going to be used with the newer Model 4 or 6, then connect POLARITY and point A inputs to ground. (The new type of LINKALL is 4 inches long.) When completed, there should be 8 wires for input to the scanner if you are building the display module for a 6 bit LINKALL; otherwise there will be 6. Make the wires long enough from the display box so that they may be connected inside the scanner. Also protect the integrated circuits from electrostatic discharge when handling. A grounded soldering iron and ESD strap to ground would be ideal when constructing the display board.

LINKALL UPGRADE PARTS LIST

U1	2716 (programmed EPROM) see address below for availability
U2-3	74LS47
R1-2	100-k Ω 1/4-w
R3-16	220 Ω 1/4-w
C1-2	1 uF/16v (most any type will do)
DISP1	7-seg digital display, common anode
DISP2	7-seg digital display, common anode
Wire	
Enclosure	
	One 24 pin IC socket
	Two 16 pin IC sockets
	connectors (as needed/desired)

MOD-30 EVENT COUNTER BACK IN STOCK!

Radio Shack brings back in their 1996 catalog, the electronic counting module that was the heart of my *MOD-30 Event Counter* in Vol-2 of the Scanner Mod Handbook. RS# 277-302NP @ \$16.99. This item had been discontinued for a time, much to the chagrin of our hackers.

RADIO SHACK TOOKIT

A jeweler screwdriver set #64-1961QW is on sale this month for \$7.⁹⁹. Contains hard to find small Phillips, slot and nut drivers, hex keys, torque bar and a case. Very handy for the compleat hacker.

20 MHz OSCILLOSCOPE FOR \$100 ?

Radio Shack's 1996 catalog pg 125, sports a 20 MHz Oscilloscope for \$100. The catalog says "available Nov 30, 1995" but as of Jan 1, 1996, the "ProbeScope" still wasn't in the stores. RS personnel say "anytime now". Well, this one looks like a real hotdawg, so keep an eye out.

Basically, **ProbeScope** is just a small probe with an LCD display module on its side, but (and get this!), it also plugs into a COMport on a PC to turn the display into a huge oscilloscope.

ProbeScope comes with Windows and DOS software on disk, probe and cable, to allow a laptop or desktop PC to view waveforms and voltages on the monitor; and to store, and print them. **ProbeScope** also has a digital voltmeter mode of operation. Sounds *coooooo!*

Readers will recall from the back issues were we presented Radio Shack's and AGA Associate's PC Interface Multimeters (V5N3). Believe me, these kinds of tools are awesome for the shack and shop, so the coming **ProbeScope** should be no exception. Regular o'scopes start at \$500. They're also big, bulky, and not the easiest instruments to operate.

The **ProbeScope** should be ideal for many electronics bench needs from audio and stereo up through RF at CB frequencies or thereabouts. Lots of scanner uses and especially digital applications! Maybe even useful in a home-brew spectrum analyzer !!

O'scopes have long been priced out of reach of most hobbyists but are standard fare on the serious electronics bench. **ProbeScope** could open doors for you!

PRO-2006's & PRO-43's STILL AVAILABLE!

That 's right! From Canada, where these fine, cellular-capable scanners are still legal. There appears to be no Customs or legal hassles for private mail order deals, according to US scannists who have purchased so far. Prices are great!

PRO-2006: ≈US\$379 (CAN\$529)

PRO-43: ≈US\$360 (CAN\$499)

Durham Radio, the Canadian supplier says that supplies of the PRO-2006 and PRO-43 may be limited, so early orders are advised. They are not sure if supplies can be replenished. For more info:

DURHAM RADIO

350 Wentworth St. East, Unit 7

Oshawa, Ontario CANADA L1H 7R7

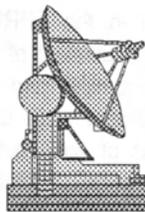
Voice: 905-436-2100 FAX: 905-436-3231

Email: durhamnet.com

FREE S&H (regular ground) until end of January '96. Fast UPS also available.

ED Note: Foreign shopping is not a complex matter anymore, especially from Canada. You may wish to check with your credit card company in advance to ensure they will honor the transaction, and to verify exchange rates and currency conversion fees, if any.

PRO-2035 CELLULAR MODIFICATION !



They said it couldn't be done, and they're right, sort of. You cannot pop the case of a PRO-2035 and clip or add a diode to unleash the cellular bands. They're not there.

You can, however, yank the micro-processor chip from the Logic/Display/GPU board and replace it with one for the *European PRO-2035* for full coverage of the 800 MHz spectrum! Replacing that wretchedly tiny surface mount 100-pin chip is a lot easier said than done, however! But it is "doable"...

The timid and faint of heart have a much more lucrative option, however. Just replace the entire Logic /Display/CPU board with the *European* version by disconnecting a few cables; removing four screws, etc, and be done with it in a matter of minutes. No sweat!

So where do we get a European CPU or Logic Board for our PRO-2035's? I should think one likely source to be the

equivalent of Tandy's National Parts Center in Europe, but so far, I've been unable to locate that facility. However; there is a hot little company in England making a good name for itself by being up to date and johnny-on-the-spot with all the latest in scanning and short-wave listening technologies.

Javiation, and its proprietor, Jonathan Clough, have limited quantities of both the CPU and the Logic Board for the *compleat PRO-2035*. Latest known prices are as follows:

GRE-9410 CPU £ 35.00 or
PRO-2035 Logic Board £ 89.00

Javiation is a wide spectrum supplier to the hobby radio market, so visit their WWW homepage and order a catalog:

Javiation, Jonathan Clough
Carlton Works, Carlton Street,
BRADFORD, BD7 1DA; UK

Voice: (+44 1274 732146)

Fax: (+44 1274 722627)

Email: info@javiaton.demon.co.uk

CompuServe: 100117,535

WorldWideWeb HomePage:

<http://www.demon.co.uk/javiation/>

ED NOTE: I asked Jonathan about delivery and availability. He replied:

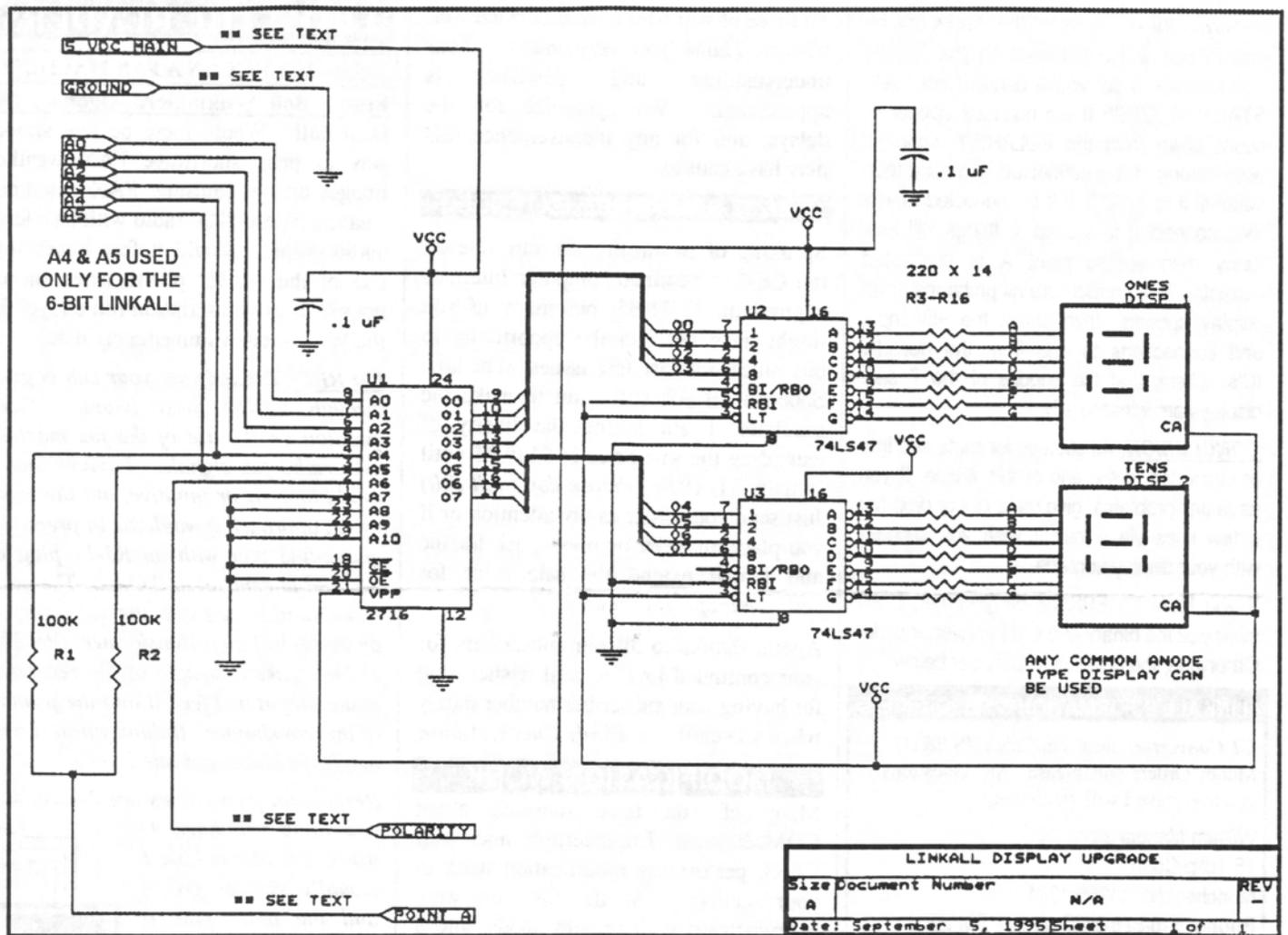
"The PRO-2035 is no longer available here in Europe as it did not meet European EMC standards and could not be imported into Europe after the 1st January 1996. Any imported prior to that date can be sold until gone but as far as I am aware RS have not brought any in for 6 months or longer. As such I am not sure how long spares such as CPU's, (boards), etc will remain available."

ED: I asked Jonathan about the new *PRO-2042* and cellular possibilities.

I suspect the '2042 is the same as the '2035, ie CPU differences. The PRO-2042 also failed EMC testing so is not approved. I had assumed that RS brought the PRO-2042 out for 2 reasons (at least); one to answer the US critics with regard to PRO-2035 deficiencies and at the same time manufacture to a standard that would comply with European EMC standards. Seems I was wrong. As to whether it will eventually arrive I can't say.

The only "RS badged" base (scanner) to pass EMC testing is the PRO-2039, and that had to have its BNC socket removed-only antenna socket is via the telescopic one that screws into the top."

CONCLUSION: A European CPU or Logic Board will put cellular in your PRO-2035 without compromise.



DISPLAY HOOK UP: Always disconnect AC power from the scanner when removing the cover. Observe ESD precautions. You will have to drill a hole through the back of the scanner to feed the wires from the display module to the inside of the scanner. You may even want to add a connector to the back of your scanner and feed the signals through it. This will make things look more professional.

Lets start with the address lines A0-A5 into the display module. Since we will no longer be using the Block display LED's on the front panel of the scanner, this might be a convenient place to remove wires and connect to the A0-A5 inputs. If you are using this display upgrade, you MUST NOT use the original LED's for Block display. It's one or the other. Use info below as your guide. Remove the LED drive wires one at a time from the front panel LED's and connect as follows:

A0	---	to	---	LED1 DRIVE	----->>>>	rightmost	Block LED	
A1	---	to	---	LED2 DRIVE				
A2	---	to	---	LED3 DRIVE				
A3	---	to	---	LED4 DRIVE				
A4	---	to	---	LED5 DRIVE	**			
A5	---	to	---	LED6 DRIVE	**	----->>>>	leftmost	Block LED

** indicates only for 6 bit LINKALL.

NOTE: The key word here is left and rightmost Block LED's. Please don't include the status LED

NOTE: LED drive refers to the lead on the led that is driven by the LINKALL module address output inside your scanner. The other lead on the LED is a *common* and no connection should be made to it. A way to identify the LED *commons* is physically look at the LED wiring. If you see a common wire bus bridging each LED, these are not the wires to remove and connect to the display module. If you have an ohmmeter you can buzz the wires to the LED 's to identify the *common*.

DO NOT disconnect the drive wire to the STATUS LED; it will be used. The unused LED's can be used for other purposes. Now the last two connections: power and ground inputs. If you have a PRO-2005/6 then you can pick up the main +5v from CN3 Pin 2. If you have a PRO-2004, then you can pick up the +5v from CN504 Pin 5. The +5v connections may have to be spliced into an existing wire. The ground can be picked up from any shielded can or box in the scanner.

If you are installing a new LINKALL **and** this display you may want to still use the LED's in addition to the digital display. In this case the

A0-A5 of the display inputs can be connected in parallel with the address inputs of the SRAM IC you are installing. In other words, the LINKALL will be driving the address inputs of the SRAM IC as well as the address inputs of the Display Upgrade module. The corresponding wiring would be as follows:

Display Input	SRAM IC address Inputs
A0	----- A11
A1	----- A12
A2	----- A13
A3	----- A14
A4	----- A15 *
A5	----- A16 *

* Only apply to a Model 6 LINKALL with 128K x 8 SRAM

OPERATION: If all went well and you wired everything correctly it's time to power up! Due to the increased current demands of the LED display, the internal power transformer may not handle this to well. You may want to use an external 12 VDC 1A power pack compatible with the scanner in place of directly plugging your scanner into the AC outlet. Plug in your power pack and connect it to the DC input of your scanner.

Turn the scanner power on. Switch the LINKALL into manual mode and reset to the Home Block or Block 0. A zero should be

displayed. Next, increment the Blocks one by one to see if the numbers on the display make sense. If so, you're done. If not, well, START BUZZIN!!! If the numbers appear to count down then the POLARITY signal is wired wrong. If it is connected to ground then connect it to 5 VDC. If it is connected to +5v then connect it to ground. If things still look funny then ensure point A is connected correctly. This should cure all problems. If no display appears, then check the +5v input and connections to and from the decoder IC's. Check that the anodes of the 7 seg. displays are wired to +5v.

CONCLUSION: All sources for parts and info are included at the end of this article. If you have any problems, give me a call or drop me a few lines via e-mail. I wish you success with your display upgrade.

If you have an EPROM programmer, I will send you the binary of the U1 converter code. Otherwise, the chip is available per below.

LINKALL INFORMATION & RESOURCES

U1 Converter: \$8.00 (includes US S&H)
Money Orders only please. Any Questions you may have I will gladly help.

William Manganaro
15 Tulip Court

Moriches, NY 11955-1901

Phone: 516-878-8697 (after 7 PM EST)

E-mail: 73510.2374@compuserve.com

Compuserve: 73510,2374

Scanner Modification Services & LINKALL
Information; Send for catalog of services.

Mark Persson
1369 Lombardy Blvd.
Bay Shore, NY 11706

All Parts for project.

DigiKey Corp.
701 Brooks Ave. South
P.O. Box 677
Thief River Falls, MN 56701-0677
(800) 344-4539

ADMIN NOTES FROM CINDY

Some wondered what happened to your last two issues for 1995. In a nut shell, we've had a few health and other crises that threw us into a real tailspin. As I have told some on the phone we don't guarantee that any issue will come out on a specific day of the month, but we do guarantee 5 issues for a half-year sub, 10 issues for a one-year sub, and 20 issues for a 2-year sub.. FYI:

V5N8 was mailed on 12/8/95

V5N9 expected mailing on 1/17/96.

V5N10 expected mailing on 1/31/96

To those of you who have expressed well wishes, *Thank you very much.* Your understanding and patience is appreciated. We apologize for the delays, and for any inconvenience this may have caused.

CE-232 SALE PRICE EXTENDED

Speaking of inconvenience, our sale on the CE-232 Scanner/Computer Interface expired on 12/31/95, but many of you might have not had the opportunity to buy since our last few issues were late. Soooooo.. if you still want to make the purchase, I am taking the liberty of extending the sale price of **\$149.95** until January 31, 1996. (Please don't tell Bill) Just send your order to my attention or if you place an order by phone, ask for me and I will extend the sale price for you.....*our special readers!*

Again, thanks to all our subscribers for your continued loyalty, well wishes, and for having your subscriber number handy when you call! *Cindy Cheek, Admin*

MODIFICATION WORK

Many of you have inquired about COMMtronics Engineering and Bill Cheek performing modification work to your scanner. At the time we were overwhelmed with repairs, mods, and a host of other work and could not take on any more. However, we are happy to report that we can now perform some technical services again. We have **discontinued repair work**, but can modify clean, neat and basically unaltered radios. Estimated costs for most commonly requested mods include:

*Restore Cellular to base and handheld scanners, (restorable models only) ea:	\$ 50.00
*MOD 16a: 6,400, 12,800 or 25,600 memory channels w/6 switches, ea:	\$250.00
*MOD 16: 1,600, 3,200 or 6,400 memory channels w/4 switches, ea:	\$175.00
*Install CE-232 internal to your radio, ea:	\$100.00
*Install CE-232 in external metal box (you wire scanner), ea:	\$100.00
*2 nd & additional scanners wired/tested at same time for CE-232, ea:	\$ 85.00
Return UPS-ground Shipping & Handling for base scanners, ea:	\$ 15.00
Return UPS-ground Shipping & Handling for handheld scanners, ea:	\$ 10.00
* Exact specs depends on your scanner.	

If you are interested in other modifications not listed above, please inquire. In any case, if you would like us to perform "magic" on your radio, you can contact us by any of the several ways shown at the top of Page 1.

FROM THE READERS

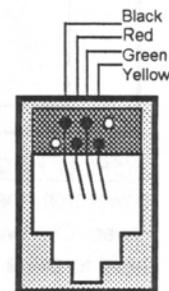
WEATHER FAX ON A FAX MACHINE?

From: Bob Senkmaier, Algonac, MI

Dear Bill: Would there be any simple way to print shortwave FAX weather images on my Samsung FAX machine? I have a Yaesu 8800 radio with line level audio output. Could it feed tones into one of the 4-color phone wires in my house? Is my subscription run out yet for the WSR - renew immediately if so.

ED REPLY: *Cindy sez your sub is good through V5N10 (next issue). Good question on the use of the fax machine with radio fax signals. I doubt that it would be easy or intuitive, but the way I would approach it would be to prepare a phone-line pair with an RJ-11 plug on one end to connect to the fax. The other end should be fed with the secondary of an audio isolation transformer, (RS 273-1374). Take a sample of the receiver's audio output and feed it into the primary of the transformer. (I think you will need amplified audio, not line level.)*

Residential phone lines are 2-wire, so if you think you have 4-wires, one pair is Line 1 (usually red & green) and the other pair is Line 2 (yellow & black). Traditional 4-wire flat phone cable for two lines uses the middle two wires for Line 1 and the outer two wires for line 2. This applies to the RJ-11 modular jacks and plugs, too. The above diagram shows the pinout of a female jack:



FEMALE RJ-11
FRONT VIEW

Then make sure a fax signal is on the radio and mess around with starting the fax machine. That's where you're on your own, because I don't use that kind of a fax and don't have the foggiest idea of what it takes to manual start and stop receive fax sessions.

If you are going to mess around with fax and phone lines much, I'd recommend Radio Shack's Phone Line Tester, 43-104 that takes the guesswork out of line polarity, showing: **correct, reverse, or not operational.** The Radio Shack book, **INSTALLING TELEPHONES**, 62-1060 is full of good information, too, and is highly suggested for wannabee phreakers, line specialists, and radioists who need to tap phone stuff..

SURGE & SPIKE PROTECTION

From: Brian O'Brian, Sterling Heights, MI
 Bill, I've called your BBS a couple of times and per your request for suggestions for articles, I have a strong desire to understand voltage protection or surge protection. What device is it and how does it work? Thanks

ED REPLY: 'Nuther good question. You're really asking about protection against voltage surges, transients or spikes, and EMI/RFI, and it would take a book to do these subjects real justice. In fact, there are entire books! I may do a future article, but let the basics suffice for now. Surge, transient, and EMI protection for computer and radio equipment is an important issue!

A surge is a "slow" but "lengthy" increase or rise in line voltage. Note how the lights momentarily dim when you turn on a powerful motor in your house? That's a dip, but a surge is much the same thing, except opposite. Surges last anywhere from a few milliseconds to a second or more, and can be 10%-100% of the normal line voltage. Surges are dangerous to all electronic equipment and difficult to prevent or protect. Surges are usually caused by accidents or heavy industrial machinery in the neighborhood, but solar and geomagnetic disturbances can also cause them..

Transients or spikes are extremely short, picoseconds to microseconds in duration, and very high in strength, sometimes several thousand volts or

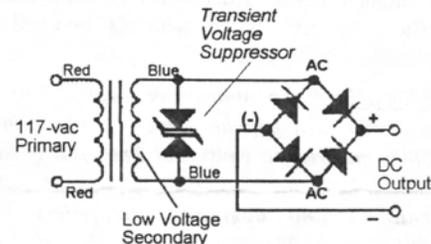
more! You cannot perceive transients like sometimes with surges. They come and go without your ever knowing it. Transients are caused by distant and nearby lightning strokes; certain kinds of heavy machinery; arc welders; and there are unknown causes. Transients are not especially dangerous because almost all electronic equipment has some protection, enough to minimize the effects, but transients can rip through solid state equipment and wreak havoc.

Radio Frequency Interference and Electromagnetic Interference is more or less continuous; rarely dangerous; usually manmade; and typically causes annoying performance in radio receivers. Special techniques are required to eliminate it, both at the source as well as at the receiving end.

Most variety and hardware stores sell 6-outlet "surge and spike protectors" and I suppose these work, especially for spikes. Unless you're willing to go to great expense and trouble, surge protection is elusive and uncertain. Read all the fine print on any such protectors you buy.

Transient and spike protection is cheaply and readily available in the above mentioned 6-outlet strips and in a variety of other forms. Just a coiled line cord will knock a transient from dangerous to tolerable levels. Capacitors across the lines can shut spikes to safe levels. A special kind of zener diode called a metal oxide varistor (MOV) is a very effective guard against

spikes. MOVs are being replaced by apparently even more effective devices called TransSorbs or transient voltage suppressors. (TVS). There are several ways to install TVS, one shown as MOD-11 in Vol-1 of my Scanner Mod Handbk. Since TVS's come designed for a specific operating voltage, you have to be sure to order the right kind for the desired circuit. Protection for a secondary circuit of a 117-vac power transformer that steps the voltage down to 12-vac before converting it to DC, would look something like this, using a single TVS:



AC POWER SUPPLY PROTECTION
 PRO-2004/5/6 and PRO-2035/2042

The above TVS, for most base scanners should be rated at about 20-volts breakdown. The DigiKey part number would be P6KE20CAGICT-ND and costs under a buck in low quantities.

Filters to prevent RFI/EMI emissions are available from DigiKey, but most electronic equipment is fairly well filtered already. The 6-outlet protector strips mentioned above pretty well stop EMI/RFI from entering or leaving through the power lines.

Surge protection is tough and we'll save that for another time, but again, the 6-outlet strips may help a lot.

CONFIDENTIAL SUBSCRIPTION ORDER: Please Print Clearly!		Subscriber No. _____	01/10/96 SUBSCRIPTION RATES & ORDER BLANK	VEN09
NAME: _____		USA RATES shown: Canada add 25%; Other Foreign +50%-Air		
STREET _____		BACK ISSUES ONLY Single copy 1 ea \$ 5.00 s		
CITY: _____ STATE: _____ ZIP: _____		1991-94: any one year set-----10 ea \$30.00 s		
Work Ph: (____) _____ - _____ Career or Home Ph: (____) _____ - _____ Profession		1991-92: first two years, set-----20 ea \$40.00 s		
TYPE OF SCANNERS >> & Other Radios >>		1993-94: second two years, set-----20 ea \$40.00 s		
METHOD OF PAYMENT >> <input type="checkbox"/> Check <input type="checkbox"/> Cash <input type="checkbox"/> M.O. <input type="checkbox"/> Visa <input type="checkbox"/> MstCard <input type="checkbox"/> COD (+\$8.50)		1991-94: all four years, set-----40 ea \$75.00 s		
Credit Card _____		World Scanner Report CURRENT SUBSCRIPTIONS		
Acc't No: >> _____		First or second Half Year --- 5 ea \$20.00		
Name of Issuing Bank _____		One Year --- 10 ea \$35.00 s		
Expiration Date: _____ / _____ / _____		Two Years --- 20 ea \$65.00 s		
Signature Required (for credit card purchases)		BOOKS & OTHER PRODUCTS		
X _____		Scanner Mod Hndbk, Vol-1: \$17.95 + \$4.00 S&H *		
What else to tell us?		Scanner Mod Hndbk, Vol-2: \$17.95 + \$4.00 S&H *		
US FUNDS PAYABLE TO: COMMtronics Engineering		Ultimate Scanner (Cheek3): \$29.95 + \$4.00 S&H *		
		Scanners & Secret Frequencies: \$19.95 + \$4.00 S&H *		
		* Canada US\$9 S&H; Other Foreign US\$11 S&H; all add extra for Air		
		CE-232 Interface Kit: \$194.95 + \$5 S&H; All Foreign add \$10-surf \$ SALE!		
		Hertzian Intercept BBS Subs: \$8/mo \$15/3-mo \$25/6-mo \$40/yr \$75/2-yr		
		HOBBY RADIO BUYER'S DIRECTORY \$14.95 ppd. surf		
		Callf addresses: add 7.25% sales tax to all orders except subscriptions		
		TOTAL THIS ORDER: --->>		

ROLL YOUR OWN COMPUTERS?

From: Anthony Heneghan, Marion, IL

Dear Bill: I am very interested in the roll your own computer. A detailed article would be best for those who want to get on with it. A detailed article is my first choice, and a series of articles would be my second choice.

From: George Kupraszewicz, Detroit, MI

Dear Mr. Cheek, In response to your article on "speaking of computers: Roll your own?" in V5N7 in the WSR, I would like to see and read several articles written on the subject. This includes on where to get the computer together other than from Radio Slick and Computer Town. The articles should include where to get service manuals and other computer information. Thank you.

ED REPLY: To Anthony & George: Turns out, this IS a popular topic! I have some other material to churn out first. But if you want a head start, I wrote a 4-part series on building and upgrading computers for "Monitoring Times", Nov, Dec, Jan, & Feb issues. After I get the fallout from that series, I'll spruce it up for the WSR here.

WHINES-GRIPES-ACCUSATIONS

From: David Corwin, Greenport, NY

Bill, Thanks for the return of the balance of my subscription to the WSR. You asked why I was not satisfied. Well! I am trying to figure out whether you are all hype or there is some substance to any of your claims. I have not read any of your books so I will reserve judgment. I must again say I am disappointed in the *World Scanner Report*. I have seen one other rather long message on the *Internet* that pretty much articulated my complaints.

The two issues I received had virtually nothing of value except schematics of a listening device that was cloaked in secrecy. The promise was that the microphone and amplifier circuit was going to be tied in to a

scanner at some point in a later issue. Similar circuits have been published in *Popular Electronics*. Nothing new here. The story reputed to have been written by a woman about her husband's devotion to RF monitoring-so what. There just wasn't anything there. The schematics of the circuits could not be followed because of the poor quality of the reproduction. You have got to be kidding about the *World Scanner Report* and its value. The latest issue of *Monitoring Times* had modifications to restore two scanners. This is supposed to be your forte. I will look forward to the issue you are sending at no cost maybe it will change my mind.

ED REPLY: I doubt this issue will change your mind and I am not inclined to try, because I am from a very unique school of two-way people. One-way people "diodes" turn me off. I don't want their patronage. I can't afford it! Accusations, attitudes, and sniping can go somewhere else, where proprietors build the cost of fiddles and shrinks into their prices to cover the "cost".

I will address some of your potshots for the benefit of our loyal 2-way readers who are supportive of what we do and why we do it. First, value...it's in the eye of the beholder. The WSR has value for many people, but if you see none, keep your money. I don't want it. I can't please all the people all the time; just some people some of the time.

The articles by Janet Cravens were of general interest, perhaps none to some, but clearly appealing to the wives of many of our subscribers. I never guarantee each article to please everyone. Some people liked Mrs. Craven's articles, but those who didn't, certainly understood that not everything in every issue is supposed to be of special interest.

The reproduction of our schematics is always of readable quality. It's possible the post

office destroys some copies, and perhaps our quality control drops off once in a while and escapes attention. We are always happy to replace inferior or postal-damaged issues. Notable that you didn't ask...

What you saw on the *Internet* was from a rabble-rousing trouble-maker, green with envy of my accomplishments and position in the community. He shoots in the blind with no concern for truth or for what is fair and right. He is a 32nd Degree Snotball who would welcome you for an ally. The poor fellow's demeanor is utterly without merit.

My "listening device" has never appeared in print anywhere, and there is nothing close to it in terms of quality that has ever been published, as far as I am aware.

Thanks to the LAW, "restoring" scanners is a thing of the past. There is only a handful, anyway, that ever had cellular possibilities, and they have ALL been covered in the press, most here. Cellular hacking is gone and this is NOT a cellular-hack newsletter, anyway.

Whether I am hype or substance is something to which I never make claim or allusion. Others decide that for themselves. You are welcome to make your own judgment.

WHAT DOES THE FUTURE HOLD?

Professor Peabody returns next issue with a series of interesting hacks and improvements. A couple of mods for the PRO-26 are in the offing. Maybe the PRO-62. We will continue with the series of Technical Descriptions of the PRO-2004/5/6 and PRO-2035/2042 series. But folks, I gotta tell ya, scanners mods and hacks are becoming fewer and farther between. We've pushed the envelope about as far as it can go.

I don't mean for that to sound sinister; it's not. But it does mean that the focus and the slant of the WSR has to take a little change of course. Scanning and all of radio, for that matter, are on the brink of change. Hobby Radio is changing. But there is excitement in the wind. More on that soon. TIME TO RENEW?

1/16/96 - 2:01 PM - The "World Scanner Report" © 1991-96; Volume 5, No 9; Page 8



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CE-232 INTERFACE SALE EXTENDED UNTIL 01/31/96

IN THIS ISSUE

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FIRST CLASS MAIL

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SOME RENEWALS COMING DUE SOON - CHECK YOUR LABEL

- † Super Snoop Surveillancer Unit- The Exciting Conclusion!
- + MOD-30 Radio Shack Event Counter back in stock! ~ RS Toolkit on sale
- + RS 20 MHz Oscilloscope Coming Soon!
- + PRO-2006 & PRO-43 still available! (Yes!)
- † Resource info on Durham Radio, Inc.
- + PRO-2035 Cellular Modification (Yes!) ~ Resource info on Javiation, Inc.
- † Upgrade LINKALL Project - Numeric Block Display!
- + CE-232 Sale Extended for WSR Subscribers
- † WeatherFax on a fax machine? ~ Surge & Spike Protection
- † Whines-Gripes-Accusations ~ What does the future hold in store?

