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AN EDITORIAL POSITION

My writing isn't as philosophical like it was when I was younger. Maybe I needed to see my opinions in print and it didn't hurt when people agreed with them. Now I don't give much of a hoot. I am comfortable with a few opinions and convictions now. On the other hand, the "WORLD SCANNER REPORT" is on a rising star, having survived its first year. Perhaps it would be proper to share with you some of my foundations and to set an editorial slant for the next couple of years. Bear with me for a page, after which we'll get on with hacking and having fun!

Family and consanguinity with my Creator are #1 on my list but these are personal and would bore you to tears. You may be interested in my belief and support of a Free World headed by a Free and Strong North America. The apparent dissolution of communism suggests Freedom may soon ring around the world. Maybe the "Millennium" has arrived. But I don't trust it. Not yet, anyway.

As a child of the 50's, I saw the USSR's Nikita Kruschev on TV addressing the United Nations. He pointed a long, bony finger straight into the camera AT ME and snarled that I and MY children would live under his red flag. Kruschev's word directed the course of my Life, because I reared my five children on Patrick Henry's battle cry: "Give Me Liberty or Give Me Death." And so it is, we Cheek's are freeborn men and women and we will die free; whether sooner or later, doesn't matter. Given a choice of only one, Freedom or Peace, we choose Freedom. Amen.

I believe there to be three essential & vital ingredients to the preservation of Social and Individual Freedom:
Right to Keep and Bear Arms   (Defense)
Right to Move Self & Goods   (Transportation)
Freedom of Speech   (Communication)
These emulate the components of the most highly evolved living entity on earth: the Human Body's antibody/immune system (defense); motor control system (transportation); and the circulatory/nourishment & brain/nervous systems (communication). We would do well to emulate nature's success if we are to remain free and highly evolved!

While others combat erosion of our rights of defense and transportation, my vocation keenly focuses on the arts and sciences of communications; particularly writing and radio. One cannot do it all, but "in union, there is strength". I think communication is the most potent attribute of a highly evolved, free spirit. Freedom of Speech means to me: effective, complete, efficient, detailed, timely, and accurate communications by which is conveyed what may be the most important commodity in the Universe: _knowledge_. The pen versus the sword?

Radio communications is one of mankind's most important developments of the modern era and will likely remain so until telepathy and ESP replace it. The "WORLD SCANNER REPORT" is a contribution to the advancement of the science and art of RECEIVING, which, you see, is exactly one half of the process of communication and not any less important than transmitting. Alas, receiving is the forgotten half more often than not, and especially so beyond the worlds of passive shortwave listening and scanning. WE KNOW HOW IMPORTANT RECEIVING is, but the emphasis seems on transmitting: i.e., few listeners in a world of talkers.

Radio mfgrs seem ever behind the times on this scene as technology creeps its way down to the consumer level. There are good reasons for this, but the vacuum that exists between the head end of high technology and the hobby radio level creates a bona fide position that I can fill and thereby be of unique service to both the SUPPLY and the DEMAND ends of the market.

I really like what I am doing here: being at the service of others and having fun at it at the same time. To be active in the preservation of a Free Society; to convey information and knowledge; to help others acquire and amass knowledge; and to facilitate others' pleasure and enjoyment are what I was put here to do. If monitoring offers you not only entertainment and pleasure, but also knowledge, security, and a sense of being in the life blood of your community, then you and I are playing in harmony to the Cosmic Maestro's symphony.

It's conceivable that our radio skills can save lives; be inestimable assets to partisan resistance teams against a foreign aggressor (God forbid); enable us to render aid to our communities in event of hurricane, tornado, earthquake or conflagration. This total concept is what the "WSR" and I are all about. The vehicle for what we do is fun, pleasure and amusement, but our objectives are deadly serious in a most deadly game. Forces lurk, even now, that would deprive us of our liberty if given half a chance. Eternal vigilance is the price of Freedom, but damnit, are we bargain hunting here? En garde!   73/bc

DO-IT-YOURSELF FEATURE PRESENTATION
::: THE FATMAN COMPUTER INTERFACE :::
Concluded from last month   By: "Professor Peabody"

This month wraps up the FatMan Computer Interface with a technical discussion of each part followed by operating, setup & alignment procedures and concluding with needed schematic diagrams and then a discussion of the optional separate and independent REMOTE CONTROL.

FATMAN KEYBOARD INTERFACE

This is the easiest circuit to explain as it's only two 74HC4051 chips. A binary code from the FatMan Computer Interface (or Remote Control unit) appears at the DB1, DB2, DB4, DB8 & DB16 inputs and a Key Enter (KE) pulse goes low which enables the 4051's and closes two CMOS switches inside the chips to simulate the action of a keypress on the scanner's key board. The diodes offer isolation from the keyboard to the circuit and must not be omitted. The 10-k resistors and the .1-uF caps add noise suppression and pull down the CMOS chip inputs to ground when nothing is plugged into the DB-9 connector. This small board MUST go inside the scanner as close to the scanner's Keyboard Connector as possible. See pg-8 of last month's "WSR" for illustration and details.

COMPUTER INTERFACE

Eight data bits from the computer come in via the DB-25 connector, Pins 2-9, and are latched in an octal latch, U-1, by the STB signal. The data then go to the Code Converter, shown as "U-2" on pages 9 & 10 last month. This data comes out of the Code Converter as the B0-B4 signals. The codes are then applied to buffers at U-3 and sent on to the keyboard interface. The STB signal is delayed 10-usec by U-4a and then stretched by U-4b. Pulse stretching is necessary to closely emulate a press of the scanner's keys. The widened pulse goes to an OR gate, U-7, and on to a buffer, U-3, to become the KEY ENTER (KE) pulse. The delay ensures that the Code Converter has enough time to accurately process the ASCII codes to Interface codes needed to program the scanner. The STB signal also creates two other signals needed to handshake with the computer. STB is applied to U-5a and outputs a high BUSY signal which tells the computer to wait and not send data until it goes low. When BUSY goes low, U-5b triggers to output a 10-usec ACK pulse to acknowledge the received data and ask the computer for another byte. Now this all works very fine but each character is processed whether the interface uses it or not. You see, along with numerical data can also come spaces and other irrelevant characters & printer commands that we don't want to be processed by the Code Converter. The process could be slowed appreciably, when we want turbo-SPEED!!!

That's where other circuitry comes into play. The L9-L13 signals are fed to an OR gate circuit to detect all data zeros. U-6a, b, c & d are zero detectors. This is great because unwanted data are coded to be processed as zeros. Desirable data will put a high or a "1" at the output of

U-6, Pin 11, which goes on to the inverter U-10, and puts a "1" to the OR gate U-7, Pin 2. A "1" then comes out of U-7, Pin 3, to prevent the KEY ENTER signal from going low that would normally cause a keypress at the scanner. At the same time U-6, Pin 11 sends a "0" to U-7, Pin 4 that removes a "1" from the output at Pin 6 of U-7. This removes the "1" from the control gate of U-9, Pin 13, that shuts off the CMOS gate and removes 5 volts from the 500-k trimmer that is used to set the BUSY pulse width. Then the ZERO DETECT is sent to the inverter U-10, Pin 1, to come out inverted as a "1" and which goes on to the AND gate U-8, Pin 1. This in conjunction with a "1" on U-8, Pin 2 from the switch being in the FAST mode creates a "1" at the output of U-8, Pin 3 which now puts a "1" at the control pin of U-9, Pin 5, that turns on the CMOS switch and puts +5v to the 1-k resistor (R-19) & changes the time constant of the 1-shot U-5a. This shortens up the time the BUSY pulse is at a "1", which in turn causes the interface to process useless data faster. When a desired byte of data comes in, the ZERO DETECTOR detects it and reverses the control pins of the CMOS switches and puts a longer time constant into the "1" shot U-5a that slows down the data transfer to the scanner. So the interface constantly flips back and forth during programming to slow down for good data and speed up for unwanted data. A 25% increase in speed is realized by the speedup circuit. Set the switch to the SLOW position and watch the LEDs for activity and listen for the scanner's beeps when a keypress is actuated. You will note a lot of time with no beeps, meaning no programming is going on. This is wasted time which is munched by the speedup circuit. The SLOW function of the switch is used for initial setup and alignment of the interface. Later, it can be left in the FAST position for TURBO speeds.

A PRO-2006 CPU is installed in my PRO-2005 with two Clock crystals that can be switched. The stock 12 MHz rock gives 30-ch/sec and a 16 MHz crystal provides 40 ch/sec. A faster crystal also shortens the programming time by the same percentage that the SCAN speed is increased. So if you want max program speed, use a faster crystal and align the Interface for this speed. If then used at the slower scanner speed the radio won't program at all and just gives an error to mean, "What are you doing, Chester?" The FatMan will work with all PRO-2004/5/6 scanners at whatever CPU speed mod may be installed.

It bugged me when my Search & Store Module (MOD-23b) wouldn't work with the stock PRO-2005 CPU and a 10 MHz. crystal. That's why I had two crystals in there: a stock 7.37 MHz rock for the S & S module and a 10 MHz rock for speed. So, if properly aligned, the FATMAN will work at most any speed and give 100% error free data programming.

CODE CONVERTER

Here's a fun circuit: a do-it-yourself, Programmable Read Only Memory, (PROM). Instead of a hard-programmed chip with a special proprietary code, you build it in the privacy of your inner sanctum. Add or remove ordinary, cheap switching diodes to program this baby. Yes, a

little work here, but you don't have to understand EPROMs and have a $750 EPROM programmer. The Code Converter is an 80 address by 5 bit memory. The FatMan does not use the lower 32 addresses, so I left out two 4514 chips that would normally be for the first 32 addresses, but most of the upper 48 are used to send codes to the scanner.

A 7-bit ASCII character from the computer enters on the A0 through A6 input lines. A single output from U-2a,b or c goes high and forward biases a column of diodes in the matrix. As the anode of each diode is pulled high it also pulls the corresponding B0 thru B4 outputs high and a specific code goes to the Keyboard Interface in the scanner to emulate a key stroke. The lower 4 bits of addressing is put to all three decoder chips U-2a, b & c, but it's U-2d that selects which one of the decoder chips will be on. Note the outputs of U-2d, y2, y3 & y4 (pins 11-13) are used but y0 & y1 (pins 14-15) are not. These are for the missing two chips for the lower 32 addresses. There are five 47-k resistors (R10-14, p9, V2N1) to grnd at the outputs of the Code Converter. These resistors pull the output levels to a low when the diodes are off. This is very important for two reasons. (1) CMOS inputs cannot float or be unconnected. (2) The ZERO-DETECT always looks for zeros to speed up the action. I added two extra functions that are not needed for programming but can be used to put the radio into MANUAL at Ch-1 for instance; a good example of how to add functions.

The two missing decoders mentioned above would be for addresses 0 to 15 and 16 to 31. The first address of U-2a is 32 at Pin 11, which is not used; address 36 at Pin 7 is the first one used followed by address 37 at Pin 6 and then address 46 at Pin 16 (only 3 address outputs of U-2a are used). The actual address number equates to the binary number of the incoming ASCII code. I used the $ symbol to represent the SCAN function. So when the $ symbol comes into the Code Converter, address 36 (Pin 7) goes high and turns on the two diodes tied to outputs B1 and B2. B0, B3 and B4 stay low, so the binary output will be 0-0-1-1-0. B0 is the rightmost and B4 is the leftmost bit: B4-B3-B2-B1-B0.

Table 1
CODE CONVERTER OUTPUT LINE CODE

```
BINARY CODE BITS--> B4    B3    B2    B1    B0
DECIMAL VALUE-----> 16     8     4     2     1

             B4 B3 B2 B1 B0        Decimal Values
EXAMPLE:      0  0  1  1  0  =  0 + 0 + 4 + 2 + 0  =  6
```

Given the code 00110 with B1 and B2 at a "1" state, add the binary weights to get 6. (11111 = 31). See Table 2 for scanner keys versus binary numbers and note that a 6 corresponds to the SCAN function. This is how the FATMAN converts ASCII to the code for programming. All other programming functions are decoded in the same manner. It's also how the Remote Control converts a remote key to a scanner key through only 8 wires. This way you don't need 30 wires to operate 29 key functions.

Table 2
ASCII-TO-SCANNER KEY CODE TRANSLATION

From Computer				Scanner Keypress	Code Converter		
	<--To U-2 Interface-->			Result At		<-- B0-B5 Output-->	
ASCII CHAR	ASCII CODE	BINARY CODE		KEY	INTERFACE CODE	BINARY CODE
=====	=====	========		=========	=========	=======
$	36	00100100		SCAN	6	00110
%	37	00100101		MANUAL	14	01110
.	46	00101110		. (decimal)	25	11001
0	48	00110000		0	26	11010
1	49	00110001		1	10	01010
2	50	00110010		2	9	01001
3	51	00110011		3	13	01101
4	52	00110100		4	2	00010
5	53	00110101		5	1	00001
6	54	00110110		6	5	00101
7	55	00110111		7	18	10010
8	56	00111000		8	17	10001
9	57	00111001		9	21	10101
A	65	01000001		PROGRAM	3	00011
D	68	01000100		DELAY	22	10110
E	69	01000101		ENTER	19	10011
F	70	01000110		LIMIT	12	01100
L	76	01001100		LOCKOUT	30	11110
M	77	01001101		MODE	16	10000
			/	< SPEED	0	00000
			/	< UP ARROW	4	00100
Not programmable			/	< L/O RVW	7	00111
from computer as			/	< PRIORITY	8	01000
presently			/	< DOWN ARROW	20	10100
configured in			\	< RESET	23	10111
the Code Converter			\	< STEP	24	11000
			\	< CLEAR	27	11011
Can be used by the			\	< DIRECT	28	11100
Remote Controller...			\<	MONITOR	31	11111

11, 15 & 29 not used

ALIGNMENT/ADJUSTMENT

Alignment is easy with just two trimmer potentiometers. Set both trimmers to maximum resistance and set the Interface to the SLOW mode. *Set the scanner to an empty 400-ch Block or unimportant Banks for test and alignment, else what's there will be overwritten.* Send a data file to the scanner (see the Software Section below) and you should see something happening on the LCD Display followed by an ERROR flag. Don't worry, this is correct. The KEY ENTER pulse is just too long. Slowly reduce the resistance of the PULSE WIDTH trimmer and you should see some meaningful frequencies appear on the Display and be stored. Continue adjusting the trimmer until the ERROR warning appears again. This is the minimum width of the KEY ENTER pulse. Turn the trimmer one half turn in the other direction and the ERROR should disappear. If not, turn a little more. Once the ERROR flag disappears, the trimmer should be set one half turn more from this point.

Slowly adjust the BUSY trimmer toward minimum resistance.

The beeps will increase in frequency and the numbers will appear faster on the display. Keep turning until the ERROR flag appears again. Turn back now until the ERROR disappears and continue for another half turn. That's it for the alignment!

Select the FAST MODE and watch the numbers fly! But watch carefully for errors as indicated on the display. If there are any, select the SLOW MODE and increase the BUSY length slightly; then select the FAST MODE and try it again. If errors still arise, go to SLOW MODE and increase the PULSE WIDTH trimmer slightly and try again. When things finally seem ok, CLEAR the test Block to all zeros and start the database at the beginning and watch as all 400 channels are programmed in the FAST mode. If no errors are seen in 400 channels, CLEAR the Block and test it again. Repeat this for at least five more times to make sure the pulse widths are set properly. You are setting the pulse widths for maximum speed and absolutely no errors. After playing and having fun, shut everything off for at least two hours or overnight. Then power up the computer and scanner and as fast as you can, load up a database and reprogram your test Block and check again for errors. If none found, that's great. You're done. If errors creep in, go back to SLOW MODE and make slight adjustments as described above. I have found that when the scanner is cold, the circuits may be a bit sluggish. This last adjustment will compensate for temperature variations. Of course, if you first adjust the circuit in a 95-degree room and four months later, program a Block in a 65-degree room, readjustment may be necessary. But this is normal. Make the adjustment when it's cold for worst case needs, and it should be the final one.

SOMETHING TO REMEMBER: A peculiar thing about CMOS ICs is that the internal gates can be turned on by voltages at the inputs and outputs without +5v power at the supply pins! So follow the below sequence when hooking up and disconnecting the FatMan from the computer and scanner. (1) With the scanner OFF, connect FatMan to the scanner. (2) Turn the scanner ON. (3) Insert the DB-25 connector into the computer's parallel printer port. When finished programming, (1) remove the printer connector first and then (2) remove the DB-9 connector from the scanner. No damage has ever occurred to my computer or scanner but avoid any conditions where live signals can go to the Interface when it is not powered up The Interface will not be powered up if it is not connected to the scanner and/or when the scanner is turned OFF! Use Caution!

SOFTWARE

Software for the FatMan can be a simple ordinary Database Manager, Word Processor; even a Text Editor, for that matter, or a Spreadsheet. Any program that can send an ASCII file to a printer should work, though databases are obviously best suited for frequency management. I use a shareware database called FILE EXPRESS which is great for beginners but I will assume that you know how to use your database or other software and how to print files. The computer operates the FatMan as if it were a printer.

A unique requirement here is that the frequency file to be sent to the Interface must have a certain layout that will be simplified from a normal frequency record. It should not be difficult to generate this simplified file from your regular frequency management file.

For maximum utility and reference value, your database or other frequency file should have a minimum of four Fields, Categories or columns: *Channel #; Frequency; Special Programming Codes and Comments*. You may have as many as you like, but the scanner requires only two to four different Fields, depending. An example of the layout of a frequency database is given in Table 3. It has ten Fields of data or information for optimal use.

Table 3
TYPICAL FREQUENCY MANAGEMENT DATABASE FIELDS

#	NAME OF FIELD	No. CHRS	DESCRIPTION OF FIELD
A.	Wild Card Code:	1-5	Misc codes (FatMan!)
B.	Block #:	2	# Extended Memory Block
C.	Channel #:	3	Scanner Channel Number
D.	Frequency:	9	Frequency, 0158.9725 (MHz)
E.	Type Code:	4	Fed, State, LocGov, Business
F.	I.D. Code:	4	Police, Security, Sports,
G.	Location Code:	3	City, county or region
H.	Comments:	25-50	Self explanatory
I.	Special Code:	1-5	Misc code requirements
J.	Sequence/Record #:	3-4	Consecutive number of entry

Explanation of Table 3

A. The Wild Card Code is not often used, but to have a Field previously defined for it when you need it can be very useful. The FatMan Programming Codes can go here perhaps, or in (I).

B. Block Numbers are required for those scanners where Extended Memory is installed, such as the 6,400-Ch or 25,600-Ch modifications. Not necessary for scanners with stock 400-ch memory.

C. This is the memory channel number of where a freq is to be stored in the scanner.

D. This Field is the frequency in MHz, in the format xxxx.xxxx with four decimal places for good measure. Don't forget the . (decimal point) in the frequency as the scanner requires it for entry. The frequency should appear in the file as it would normally be entered from the keyboard.

E. Type Code defines the general nature of the frequency or user of that frequency. Example: FEDG for federal gov't; STAT for State Government; LOCG for Local Gov't; MILT for military; RAIL for railroads, etc.

F. I.D. further defines the frequency or user of that frequency. Example: POLC for police; SPRT for

Sports; BUSN for business; EMRG for emergency; MEDC for medical; SECI for security, investigators, etc.

G. Location code for the city, county or region of the user of that frequency. Example: SDG for San Diego; RVR for Riverside; LAX for Los Angeles; MEX for Mexico, etc.

H. Comments are your own description of that frequency, it's users, call signs, repeater info, etc.

I. Special or misc codes for certain operations like culls & sorts, etc. Can be used for the FatMan, etc.

J. Unique sequence or consecutive record number, assigned to each entry so that the entire database can be sorted back to its original order when desired.

NOTE: Your frequency file can have as many Fields or Categories per record as you like; the only limit is what your software permits, and so the ten Fields described above are only an example; you can have more. The FatMan Interface will ordinarily use only TWO of the above Fields so study your particular software for ways to cull or separate the unneeded Fields from the ones required by the FatMan. Most databases and spreadsheets can do this.

The FatMan will require certain letter codes to be sent with frequency data in order to PROGram a channel and advance to the next channel; and make MODE, DELAY, and other desired settings. In the above Table 3, you could use either (A) or (J), or in some instances BOTH, to hold and store the necessary FatMan programming codes. Note that only UPPER CASE is recognized by the FatMan. Lower case is ignored by the Code Converter. Table 4 shows the codes that will be most often used by the FatMan:

Table 4
COMMON SCANNER KEY & PROGRAMMING CODES

A = PROGRAM	$ = SCAN	1 = 1	6 = 6
E = ENTER	% = MANUAL	2 = 2	7 = 7
D = DELAY	L = LOCKOUT	3 = 3	8 = 8
M = MODE	. = decimal	4 = 4	9 = 9
F = LIMIT		5 = 5	0 = 0

I made the PROGRAM key to be represented by an A for "Advance" to make it easier to remember. The (M) MODE key (for NFM/WFM/AM) has to be entered the same number of times (1 or 2) as you would have to hit it to get a desired mode by programming from the keyboard. The SCAN ($) and MAN (%) keys can be used to put the scanner in these modes after programming. The LIMIT key (F for FREQ) is used to load the ten SEARCH LIMITS in the PRO-2004/5/6. So, all you have to do is enter the key codes just as you would be from the keyboard. An example of programming LIMIT SEARCH is given in Table 7.

Your database or other software will have a means to print a file and/or parts of a file. This is how we get the information to the scanner. Your primary file may be

rather detailed like that shown in Table 3, but you have to cull, select or trim that file so that it resembles the middle two columns of Table 5. After the file has been sorted into a desired order, print it to a printer to see how it looks. Dates, headers, page no's, COMMENTS etc, have to be removed from the part to be printed to the scanner, because any numbers or upper case letters (EDMALF$%) will be processed by the FatMan at the wrong time and generally foul things up. So remove all the extra stuff and print it once to be sure. Now disk store a copy of the smoothed file with a name that makes sense, such as DOWNLOAD.TXT or DATADUMP.TXT etc. You might want to add one thing to the first line of your special download file: (A1A). This will put the scanner into the PROGRAM mode no matter what it was doing and preset Ch-1 ready to be programed. Of course, you can select another channel as a starting point, too. (A41A, etc)

Table 5
SAMPLE FATMAN CHANNEL PROGRAM

*	|<--Send This Data Only-->|	*
		PROGRAM	
CH	FREQUENCY	CODES	COMMENTS
===	==========	==========	=========================
		A1A	See text
1	0155.8500	EDA	Police
2	0046.4600	EDA	Fire
3	0255.4000	EDMMA	Military
4	0162.5500	EDLA	Weather
5	0146.2900	EDLA	Ham Radio
6	1286.1275	EA	Ham Radio
7		LA	Lockout

Don't send this data to the scanner

In this example, (A) from Table 4 sets the PRGM function and advances the channel number from the present one to the next to ready it for programming. At Ch-3, (M) appears twice to set the mode to AM from the default of NFM. In Ch-4, (L) sets LOCKOUT so the weather channel is skipped when SCANning. Same with ch-5. If you want to lockout empty channels (Ch-7 above) just put "LA" in the PROGRAM CODE field with nothing in the frequency field.

You will not ordinarily want to send channel numbers to the scanner once it is positioned to the desired starting channel number. This will only slow things down and/or create errors if not handled properly. So remove the CHAN Field before "printing" to the scanner. On the other hand, channel numbers CAN be included with the download if an "A" is inserted between the CHAN field and the frequency. Remember, the scanner is programmed by simulated keypresses, so whatever your fingers do can also be done by the computer. See Table 6 for an example if you want to send channel numbers to the scanner along with the rest of the data (except COMMENTS, of course):

When consecutive channels are to be programed, it is best to send ONLY Frequency and Codes to the scanner since CH# is not needed and can only slow things down. The thing

to understand here is the FINGER sequence of programming which must be emulated by the computer. Using the line for Ch-1 in Table 6 as an example, you would have to press: PRGM: 1 : PRGM : 155.85 : ENTER : DELAY : PRGM. The computer will do the same thing with the sequence: A : 1 : A : Ø155.85ØØ : E : D : A

Table 6
SAMPLE FATMAN PROGRAM WITH CHANNEL NO's

			A
1	A	Ø155.85ØØ	EDA
2	A	ØØ46.46ØØ	EDA
4	A	Ø162.55ØØ	EDLA
6	A	1286.1275	EA
7	A		LA

When a scanner Program File is working properly, you can go on to set up separate files for many 4ØØ-Ch Blocks, groups, or configurations, each with unique title, Block number, date, etc. Customize to your liking. You could have a blank template database for a Block of frequencies and then clone as many as you need (16, 64 or ?) with names such as BLOCKOO.FRQ; BLOCKO1.FRQ, etc. Otherwise, the main program might not sort the Blocks in numerical order the way you're used to seeing them. I found this out by accident so you won't have to. Also, don't sort your main databases unless each record has a Sequence Number. Store the original database and then rename it as something to play with to get the hang of it. I had to reenter a whole database after sorting because it got all screwed up and couldn't be restored to the original order. You can avoid this by adding a separate Field for SEQUENCE #, and then assign a consecutive number to each record after it is in the order you like. For 4ØØ-Ch groups, the CHAN # Field may suffice for this purpose.

A different database can be made to load up the ten LIMIT SEARCH banks with the upper and lower limits by using the A and the F keys in a manner as shown in Table 7:

Table 7
PROGRAMMING LIMIT SEARCH BANKS

PRGM	FREQUENCY	PRGM	FREQUENCY
A1F	Ø869.ØØØØ	EDF	Ø895.ØØØØE
A2	Ø144.ØØØØ	EF	Ø148.ØØØØE
A3	Ø225.ØØØØ	EF	Ø250.ØØØØE
A4	ØØ46.61ØØ	EF	ØØ47.ØØØØE

Finger press example of first line above:

PRGM : 1 : LIM : 869.Ø : ENTER : DELAY : LIM : 895.Ø : ENTER

In the first line "A1F" is used to put the scanner into PROGRAM mode then enter the frequency LIMIT mode in SEARCH BANK #1. The "E" enters the frequency, then "F" changes the display to the upper LIMIT and then it is entered. The next line advances to SEARCH BANK #2 and then enters the frequencies as before.

Operation of the FATMAN is very friendly because it uses ASCII text. Great things could be ahead because simple, homegrown BASIC programs can easily be written to operate the scanner and provide some useful operating tools. You programmers out there should get busy on writing some good software and share it with us. Hint-hint-hint!

REMOTE CONTROLLER UNIT

We're now at the final and optional stage of the project. The Remote Controller is a handheld, 29-function keypad on one end of a shielded 9 wire cable. The 29 keys are arranged in an order to emulate the scanner's keypad. I built mine for maximum comfort while operating my radio and it has since become a major addition to my station. It is second in necessity only to my JIM M-1ØØ preamp.

I try to employ common IC chips in most of my projects, instead of custom programmed or exotic and hard-to-find stuff. I find it very annoying to get all heated up on a project and then discover that a chip is very costly or requires a catalog search that only Indiana Jones could undertake. So, I will knowingly design a circuit with four chips that could be replaced with one PLA or an EPROM. Only a minority of hobbyists would be able to program them, though. This takes us to the Remote Control Unit conclusion of the FatMan project.

At the heart of the circuit are the four 74HC148 Priority Encoder chips. They are cascaded so that only one input at a time will cause only one output to change. The GS outputs, Pin 14, are ANDed together at U6b to develop the KEY ENTER signal that is sent to the Keyboard Interface in the scanner which makes the CMOS switches simulate key presses. KE also lights an LED to show that a key was successfully processed. The AØ, A1 and A2 signals are encoded for the proper binary number to be sent to the Keyboard Interface. At the top of the schematic under each named key is the decimal equivalent of each key.

Let's use the 9 key as an example. The decimal number of the 9 key is 21 which converted to binary is 1Ø1Ø1. The bit weight of 1 is the rightmost digit. So when the 9 key is pressed three things happen: the KE LED lights; the binary number 1Ø1Ø1 appears on the five datalines and is sent to the Keyboard Interface; and the KEY ENTER signal goes low (zero) to enable the dual 4Ø51's in the Keyboard Interface to turn on the correct CMOS switches and emulate a keypress action. All this happens at the same time so there will not be a time lag when a Remote Key is pressed. *SWITCH NOTE: Cheap momentary push-button switches are not recommended!* Radio Shack carries such switches but they're noisy and bouncy. Also, 3Ø of the little suckers are costly. However, I found a better switch, actually a computer type, with no bounce or noise and very low cost! Made by PANASONIC and sold by DIGIKEY, part numbers P8ØØ6S thru P8Ø16S, this series comes in varying styles & sizes. See the DIGIKEY catalog for your choices before you buy. At 21-23 cents apiece they're a bargain. Get a few extra for spares, just in case. DIGIKEY PHONE (8ØØ) 344-4539.

The Remote cable terminates at a DB-9 female connector just like the Computer Interface. Wiring is the same, too. Note that Pin 8 is a spare for any extra function you may want. Wiring errors/blown chips are about the only nasty ambushes in store for the unwary, so standard CMOS construction & wiring care will minimize trouble. Faster CPU clock crystals may cause the Remote Unit to not operate properly. A PRO-2006 CPU is planted in my 2005 with a 16 MHz crystal to go 40 cps. I tried 18 MHz for 45 cps warp-speed but the CPU wouldn't respond to Remote Key commands. I replaced the 16 MHz rock and it worked fine. Before the CPU was replaced, 10 MHz worked just fine with the Remote but not the Search and Store module. Speed is the only known incompatibility. You're strongly warned against crystals above 16 MHz in the PRO-2006 or above 10 MHz in the PRO-2004/5.

CLOSING NOTE: If you want only the Remote Controller and not the FatMan Computer Interface, then you need only the Remote Unit and the Keyboard Interface. If you want the FatMan Interface, but not the Remote Unit, then you need just the Keyboard Interface and the Computer Interface. If you want both, so much the better! The Remote Unit plugs into the same DB-9 on the rear of the scanner as the Computer Interface. Obviously, you can't use both at the same time, but then who'd want to?   Prof. Peabody

[EDITOR'S WRAPUP: Compliments and thanks to the good Professor for his fine article and design. I can imagine the hours of design, testing, debugging and writing this project must have required. We probably owe the Prof's wife and children a round of applause, as well, for their patience and support. And, thank YOU READERS for your patience and support! Many of you may not be interested in this extensive of a project right now, though I see when many will undertake this venture someday. The info will be waiting for when you're ready. Subsequent issues will contain hints and updates on the FatMan to make Life easier when you feel the time is right. Interfaces for scanners are here to stay and are not going to go away!

The FatMan looks like a real "hairy" project, but after careful review and editing, my conclusion is that its bark is worse than its bite. You see, it's mostly an external project; very little hacking and invasion of the scanner required. The part that resides in the scanner (Keyboard Interface) is simple and virtually fool-proof! The external Computer Interface Unit and/or Remote Unit are not the simplest circuits in the world, but the fact that they're outside the scanner counts for a lot! This means minimal risk of damage to the scanner! You can take your time, days if you like, without tying up your valuable scanner! The FatMan may be an ideal project for the PRO-2004/5/6 scannist who is a fair hand at hacking and circuit building. In closing the FatMan Project, let me direct your attention to the bonus page 12 in this issue for a System Block Diagram that shows how it all goes together. The Professor and I will provide limited technical support for those who take the plunge and run into snags. If you're not in the mood for the FatMan,

perhaps the RW Systems' or Datametrics' Interfaces, as reviewed last month, might be for you. If none of these are appealing, stay tuned; two or three more interfaces may be introduced in the coming months. Hopefully, there will be something for everyone in due time.   73/bc]

REVIEW OF ICOM 2SRA & 4SRA from GEnie Information Systems
Radio RoundTable BBS; page 200   Category 4, Topic 32
Message 152   Mon, Nov 04, 1991 at 22:21 EST
By: Stuart Logan, N7QYJ   (Edited for clarity/brevity)

Many folks waited expectantly for the ICOM R-1 wideband receiver and were very disappointed by it's deservedly bad reviews. There is an alternative wideband receiver; also an ICOM which has nearly the same number of channels and costs less. It has TWO receivers in one case and is the only wideband pocket receiver to support CTCSS tone squelch! Perhaps the biggest extra that you get is a 2 meter or 70 cm amateur radio in the deal as well. This radio is the ICOM 2SRA (144 MHz) or 4SRA (440 MHz).

Only slightly larger than the SAT series from which the R-1 is derived, these rigs have two receivers in a single chassis! One is the ham transceiver; 2-m or 70 cm. The 2SRA's ham receiver covers 138-174 MHz (Rx) allowing full receiver coverage of the VHF public service bands. The 2nd receiver is a wideband scanner with 50-905 MHz. It supports AM, NFM, & WFM, including FM radio & TV audio. This scanner side has 61 channels and one search bank. The transceiver section has 31 channels plus a search bank. Each also has a VFO which you can use as a scratch area or for storage. Tuning steps include 5, 10, 12.5, 15, 20, 25, 30, or 50 khz.

The LCD (the best I've seen) shows operating frequencies, S-meter, T-squelch, channel #, etc. The display may be backlit for 5 seconds or will remain on until you turn it off. The 2SRA and 4SRA have top-mounted volume & squelch controls. Also top-mounted is a tuning knob that changes freq in the VFO & search modes, and channel in the scan mode. Clocks are built-in which can turn the rigs on or off as well as display the time. CTCSS tone squelch is available in both radio's, allowing you to blank intermod & unwanted co-licensee's. The rig comes with a 1000 mAh battery pack (BP-84). The initial shipment contained the wrong battery pack and dealers are authorized to exchange for the correct battery to your radio. An 'empty' pack is available that allows use of NiCad or alkaline batteries. Scanning is supported in an 'up' or 'down' configuration. Delay (approx 2 sec) cannot be shut off. The keyboard & PTT switch can be locked out. A red/green LED indicates when the radio receives or transmits. An oddity about the SRA series is that each has two antennas! The ham transceiver has the appropriate single band BNC antenna. The wide-band receiver has an antenna with a 1/8" male plug on the end. Despite the strange connector, tests convinced me this antenna performs as well as any other. Also top-mounted are a 1/8" speaker/mike & earphone jack and a DC jack to charge/power the rig. The transceiver is capable of 1.5 to 5 watts output depending on battery or externally provided power. The rigs come with belt

clip, wrist strap, wall charger, and rain cap. A number of accessories are available such as a desktop charger that will quick charge the battery pack in an hour.

In a head-to-head comparison with an AR-1000XC, the 2SRA more than held it's own in all areas, despite the use of band-specific antennas on the AR-1000XC. The 2SRA has a smorgasbord of features not available in other handheld scanners. Needless to say, the 2SRA blows the R-1 away. If you appreciate a dual receiver with a transmitter, CTCSS Squelch, wide band scanner & want others to ask why your radio has 2 antennas, check out the ICOM 2/4SRA.

ICOM W2A   The 2/4SRA is a superb stand alone scanner if you don't have an amateur radio license. If you are a ham, the 2/4SRA's sister, the W2A, has many of the same features and the plus that it's a 2/70 DUAL BANDER. A drawback is fewer channels. The W2A is not advertised as a wideband rig but a simple keyboard sequence unlocks much the same coverage as the 2/4SRA. Check out this new series before the government legislates it into oblivion!

REVIEW OF ALINCO DJ-X1   from GEnie Information Systems
Radio RoundTable BBS; page 200
Category 4, Topic 32
Message ---   Fri Nov 22, 1991 at 00:14 EST
By: Stuart Logan, N7QYJ   (Edited for clarity/brevity)

ALINCO, known in the USA for amateur radio products, has announced their first scanner receiver. Dubbed the DJ-X1, this handheld scanner is expected to be released this year in Europe. The unit has the same 4.3" x 2.1" x 1.5" chassis as their recently introduced DJ-F1(4)T amateur radios. One of the more innovative features of this family of radios is how the battery pack slides (full-length) on to the back of the rig! A 700 mAh NiCad pack and a 6-AA cell pack are available. In Europe, the DJ-X1 will come standard with the dry cell pack. Configuration & availability in the US market have not been disclosed. Here are the specs for the European version:

    Modes: AM, FM Narrow, FM Wide
    Steps: 5,9,10,12.5,20,25,30,50,100 KHz
    Antenna: 50 ohm wideband/BNC
    Weight: 13.2 oz
    Conversion: AM/FM Triple Conversion
    Sensitivity: NBFM -8db (12db SINAD)   (????/ED)
                 AM -2db (10db S/N)   (????/ED)
    Current Drain: 24 mA
    Freq. Coverage: 500 KHz - 1.3 GHz
    Channels: 100 in banks (bank size not specified)

As reviewed in a leading Japanese radio magazine, this radio has "sensitivity far better than its obvious rivals". Stay tuned for more on another R-1 alternative.
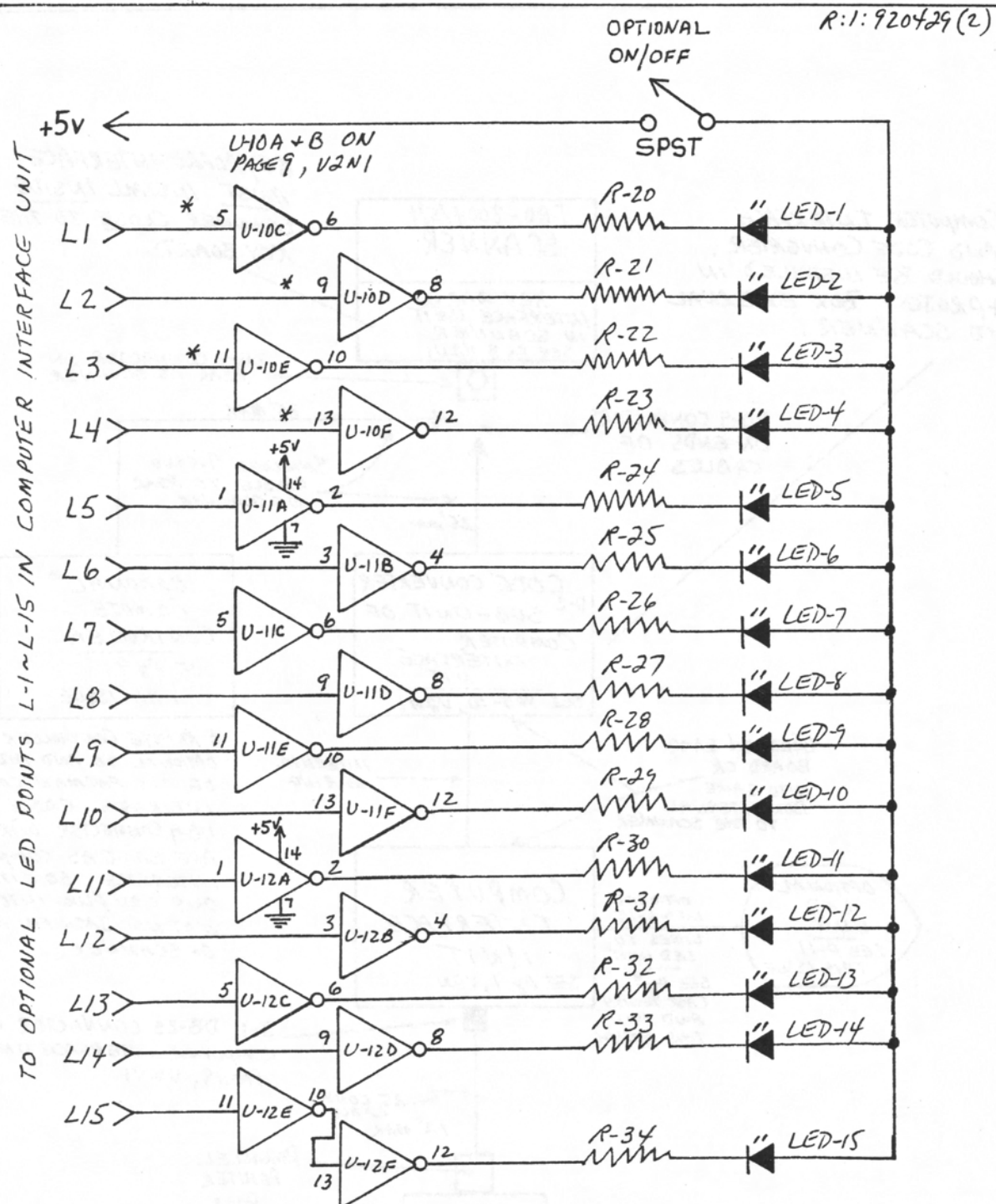
=
      THE MAIL BOX WITH QUESTIONS FROM THE READERS
=
Dear Bill: Merry Christmas and Happy New Year. My wife gave me a Uniden Bearcat BC-170. I use it with a GRE

Super Converter II that I got from CRB Research Books, which brings 800 MHz down to 400 MHz. In your Scanner Modification Handbooks, Vols 1 & 2, you talk about the BC-950XLT, 200/205XLT and 760XLT. I would like to know why there isn't any info on the BC-170? I will look for any information you can give me in the "WORLD SCANNER REPORT". Thanks again Bill, you are a never-ending source of information.   Take care, H.B. Dragonetti

EDITOR'S REPLY: Thank you; I sure hope to never end the flow of information, that's for sure. If I do, it will be because either I am dead or the government found some reason to take me away from the Monitoring Scene! So far, so good on both counts. Henry, I can't possibly work on and develop specific mods for every "Tom, Dick & Harry" scanner that comes on to the scene. I have to confine my attentions to the more popular units and those which offer good capabilities in the first place. This excludes MOST scanners from my immediate attention right off the bat. I have neither the time nor the resources to check out the wide variety of scanners now available. I've never seen a BC-170; nor do I have a Service Manual for it in my files. If you peruse the back issues of the "WSR", you will see where I include retrofit data for as many scanners as I can. This is possible mostly from the Service Manuals that I have on file. If you will procure and send me a copy of the BC-170 Manual, I will sure include it for future mods as best as I can. 73/bc

Dear Mr. Cheek: I enjoyed reading the "WSR" the past year and look forward to the 1992 issues. I have two questions about my PRO-34 scanner. I am pleased with this scanner except for an annoying problem that has frequently developed. I have reread my back issues of "WSR" and have not seen evidence of anyone else with the the same problem. Four times in the past two years I have had to disassemble my PRO-34 to fix this recurring problem. The problem is that it takes an increasing amount of effort (pressure) when I press a button on the keyboard, for a number or function to appear on the LCD and the beep to sound. The most frequently used buttons; SCAN, MANUAL, 1, 0 and 5 are the first to stop working properly. Over a short period of time (several weeks) the problem gets progressively worse and finally the entire keyboard is inoperative, no matter how hard I press the buttons. I checked to make sure the "Key Lock" switch is in the "off" position. The only solution I have found to fix this problem is to disassemble the scanner and rub the area of the logic PC Board (that is directly under the keyboard buttons) with cleaner/degreaser. The scanner will then work like new for another four to six months. I do not abuse the scanner. It is either at home or secured to a mobile bracket when in my car. I store the scanner in a carrying case when not in use. I am curious as to what controls the memory storage of the frequencies in the PRO-34. I have had unpredictable results with memory storage the times I have disassembled to scanner to fix problems or make modifications. I have lost the 200 channel memory after having the scanner disassembled for only 25 minutes.

OPTIONAL
ON/OFF

R:1:920429 (2)

+5V ←

SPST

U-10A + B ON
PAGE 9, V2N1

L-1~L-15 IN COMPUTER INTERFACE UNIT

TO OPTIONAL LED POINTS

L1 > * 5 U-10C 6   R-20   " LED-1
L2 > * 9 U-10D 8   R-21   " LED-2
L3 > * 11 U-10E 10   R-22   " LED-3
L4 > * 13 U-10F 12   R-23   " LED-4
         +5V 14
L5 > 1 U-11A 2   R-24   " LED-5
         7
L6 > 3 U-11B 4   R-25   " LED-6
L7 > 5 U-11C 6   R-26   " LED-7
L8 > 9 U-11D 8   R-27   " LED-8
L9 > 11 U-11E 10   R-28   " LED-9
L10 > 13 U-11F 12   R-29   " LED-10
         +5V 14
L11 > 1 U-12A 2   R-30   " LED-11
         7
L12 > 3 U-12B 4   R-31   " LED-12
L13 > 5 U-12C 6   R-32   " LED-13
L14 > 9 U-12D 8   R-33   " LED-14
L15 > 11 U-12E 10
         13 U-12F 12   R-34   " LED-15

REFER TO PAGE 9, V2N1, FOR
L-1 THRU L-15 CONNECTION POINTS

* IF LED UNIT NOT DESIRED, BE SURE
TO TIE U-10, PINS 5, 9, 11 & 13 TO
GROUND, SINCE U-10A AND B ARE
REQUIRED — SEE V2N1, PAGE 9

R-20 THRU R-34 ARE NOT
CRITICAL, MAY BE 1-K
TO 4.7K. LED TYPES
AND COLORS ARE YOUR
CHOICE, BUT T-1 SIZE
IS SUGGESTED. MIX OF
RED, GREEN, YELLOW + ORANGE
MAY BE NICE

© - 1992

OPTIONAL

	DRAWN	DATE	World Scanner Report V2N2
PROJECT			SUPPLEMENTARY PAGE 11
LED UNIT - COMPUTER INTERFACE	CHECKED	DATE	COMMtronics Engineering
FATMAN COMPUTER INTERFACE	APPROVED	DATE	PO BOX 262478
			San Diego, CA 92196-2478

COMPUTER INTERFACE AND CODE CONVERTER. SHOULD BE INSTALLED IN A PROJECT BOX EXTERNAL TO SCANNER.
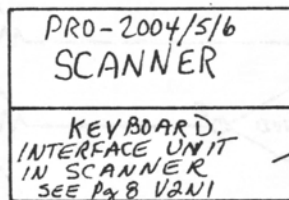
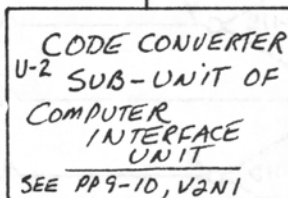KEYBOARD INTERFACE MUST INSTALL INSIDE SCANNER CLOSE TO THE KEYBOARD.

PRO-2004/5/6 SCANNER

KEYBOARD INTERFACE UNIT IN SCANNER SEE Pg 8 V2N1

DB-9 CONNECTOR ON REAR OF SCANNER

DB-9 CONNECTORS ON ENDS OF CABLES

25' MAX

SHIELDED 9-COND CABLE TO REAR OF SCANNER

25' MAX

CODE CONVERTER U-2 SUB-UNIT OF COMPUTER INTERFACE UNIT

SEE PP 9-10, V2N1

OPTIONAL * REMOTE CONTROLLER SEE Pg 9 THIS ISSUE

* REMOTE CONTROLLER IS OPTIONAL TO AND INDEPENDENT OF THE FATMAN COMPUTER INTERFACE. CABLE AND DB-9 CONNECTOR WIRING ARE SAME AS COMPUTER INTERFACE, SO EITHER ONE CAN PLUG INTO THE MATING JACK ON REAR OF SCANNER.
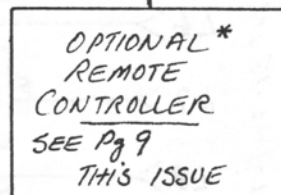
BUILT ON SAME BOARD OR INTO SAME BOX EXTERNAL TO THE SCANNER

INTERNAL WIRING

OPTIONAL LED UNIT SEE P-11 THIS ISSUE
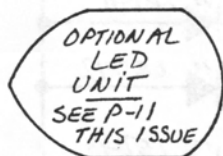
OPTIONAL L-1 ~ L-15 LINES TO LED UNIT SEE Pg 9 LAST MONTH AND P-11 THIS MONTH.

COMPUTER INTERFACE UNIT SEE Pg 9, V2N1
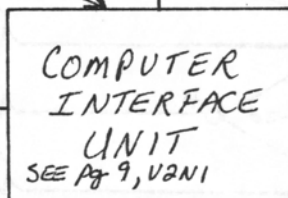
J-1, DB-25 CONNECTOR ON COMPUTER INTERFACE UNIT PAGE 9, V2N1

25 COND CABLE 12' MAX

PARALLEL PRINTER PORT

VIRTUALLY ANY COMPUTER

DRAWN	DATE	World Scanner Report V2N2 SUPPLEMENTARY PAGE 12
CHECKED	DATE	COMMtronics Engineering PO BOX 262478 San Diego, CA 92196-2478
APPROVED	DATE	
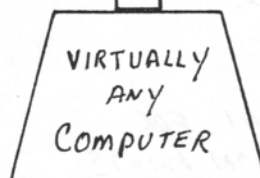
PROJECT

FATMAN COMPUTER INTERFACE
SYSTEM BLOCK DIAGRAM

* NOTE: A 47-K RESISTOR GOES FROM EACH * POINT TO +5V AS SHOWN ON PIN 10 OF U-1 THRU U-4. TOTAL OF 29 REQUIRED. DESIGNATED AS R-1 THRU R-29

SEE PAGE 12 THIS ISSUE

SPEED PRGM SCAN L/O RVW PRI Limit MANUAL MODE ENTER DELAY RESET STEP DECIMAL CLEAR DIRECT LOCK OUT MONITOR

R-1 R-9 R-15 R-23

+5V

U-1 74HC148   U-2 74HC148   U-3 74HC148   U-4 74HC148

+5V

K.E. LED
R-30 1-K

+5V

U-5A 74HC20   U-5B   U-6A 74HC20   U-8C   U-6B

C-1 .1

U-8A 74HC86   U-8B   U-7D   NO CONNECT

U-7A 74HC32   U-7B   U-7C NO x CONNECT   U-8D   KE

CABLE SHIELD

SHELL OF DB-9

DB-1   DB-8   DB-2   DB-16   DB-4

USE ANY REASONABLE LENGTH OF SHIELDED 9-COND CABLE AND TERMINATE WITH A DB-9 PLUG TO MATE ON RADIO

POWER 5 VOLTS   KEY ENTER   GROUND   SPARE

CABLE SHIELD

9-PIN DB-9 CONNECTOR TO KEBOARD INTERFACE IN SCANNER

SEE BOTTOM OF PAGE 8 LAST MONTH.

I was careful not to hit the "Reset Button". Other times the scanner has been apart for almost two hours and after reassembly I was surprised to find the 200 channel memory was retained. Obviously, it is a real pain to reenter the 200 frequencies. I would like to avoid reprogramming the next time I have to work on the scanner.

Is the memory storage related to how long the scanner is apart and disconnected from the power supply or does memory storage depend on if the various connectors (CN1, CN101, CN102,) are disconnected or if the Logic PC Board is disconnected from the Linear PC Board (CN2, CN103)? Thank you for your time in answering my questions. Sincerely, Doug Michaels

EDITOR'S REPLY: Good questions! Evidently, the conductive rubber keypad of your PRO-34 is deteriorating at a slow rate, or some form of pollution is oxidizing the metallic contacts on the PCB. Either one would be caused by an environmental factor in your operating area, possibly a higher than normal concentration of ozone or other aerosol or gaseous contaminants. The PCB should be good for a long time to come with periodic cleaning as necessary. The rubber keypad should be replaced right away, though, since either it is severly contaminated or possibly defective with contaminants from manufacture. Order the keypad from Tandy National Parts, 800-442-2425, for the PRO-34, Cat # 20-135, part #GE-84D-5283. Polish the contacts on the PCB with a pencil eraser and swab with alcohol. Allow to thoroughly dry before replacing the keypad since alcohol can also destroy rubber. That's about all I can think of relative to that problem.

Memory in the PRO-34 is something else. I have had clients ship me their PRO-34's without a battery pack and then the units sat in my shop for a week before I got into them, and lo! Memories intact! The keep-alive voltage for the SRAM memory chip is provided by a huge

electrolytic capacitor, C-4, on the Logic/CPU Board which, under normal CMOS drain, is sufficient to retain memory for weeks, more than likely. When you invade the unit and solder around here and there, or touch various spots, it is possible to short C-4 or prematurely drain it, and POOF goes the memory. You'll have to use great care to avoid tampering in any area between the anode of D-3 & C-4 to the CPU and SRAM chips, which means MOST of the Logic/CPU Board. Use the schematic diagram in the Service Manual to trace the areas just mentioned. The mere act of tearing the scanner down is not sufficient to cause memory loss. I've had removed PCB's on my bench for days without losing memory. Other times, it's been zapped in a second. Use care. 73/bc

Dear "Doc": I would like to do the Modest Memory Upgrade as described in "WSR" V1N7, Aug 1991, pp 2-3. My question is: if I have, for example, Ch-13 "locked out" of the original 16k SRAM, when I switch in the new SRAM, will channel 13 be locked out there also? This question would apply to DELAY, MODE, RESET, 40 for example, or are the extra commands independent of each other in each SRAM. I thank you in advance. Bob Horvath

EDITOR'S REPLY: Depends on whether you're doing this mod to a PRO-2004/5/6 or ANY other radio! You didn't say. The PRO-2004/5/6 series stores virtually all custom settable data in the SRAM chip along with the channel & freq data. Hence Ch-13 locked out in one Block won't be locked out in another. All other scanners store this custom data in the RAM on board the CPU, which can't possibly know the stock Block of channels from an extended Block; hence all Ch-13's would be locked out. The PRO-2004/5/6 does store PRIority CH # and selected or locked out Scan Bank data in the CPU's RAM, so those functions will be common to all Memory Blocks. No Big deal. Most all other scanners store ONLY freq & Ch # in the memory chip and all other settings in the CPU RAM. The PRO-2004/5/6 are exceptional exceptions here. 73/bc

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IN THIS ISSUE

FIRST CLASS MAIL