NRD 525 - CMH-532 RS232C
SERIAL COMMUNICATION PROTOCOL

Thank for your purchasing the RS-232C Interface Unit CMH-532.
Connection of the CMH-532 to the NRD-525 allows external setting of receiving frequencies, mode, etc.
If the serial N°. marked on the rear panel of your NRD-525 happens to be any of BR36071 through BR36120, the ROM in the CPU unit (CDC-353) must be repalced. In that case, please contact a nearby JRC dealer or JRC branch.

1-Composition

The unit consists of the followings, please check the content of the package against the following list :

- RS-232C interface unit CMH-232 : 1
- Cable H-6ZCJD00141 : 1
- PCB pulling metal piece : 2
- Output connector(with 12 solderless terminals) :1

2-Specifications

(1)Signal level : RS-232C
(2)Baud rate : 300 or 1200 bauds
(3)Character composition : 8 bits without parity with 1 stop bit
(4)Control items : Receiving frequency, mode bandwidth, AGC,attenuator, re-write of memory channels.
(5)Items of receiver-status : frequency, attenuator, memory channel number.

3-Installation

Befor starting work, extract the power cable for the NRD-525. Do not remove other units unless necessary.

(1) Remove the upper cover, refferring to « Fig.9-1 Removing Covers » i the instruction manual for NRD-525.
(2) (2)Remove the CMH-632 Data I/O unit , reffering to « Fig. 9-2 Removing Unit » in instruction manual for NRD-525 .
(3) Using J45 (10 Pins) and J46 (12 Pins) on the data I/O unit and P45 and P46 on the interface unit, connect these two PCB's. In doing so, do not forget to fix pacers (plastic).(See Fig. 1.).

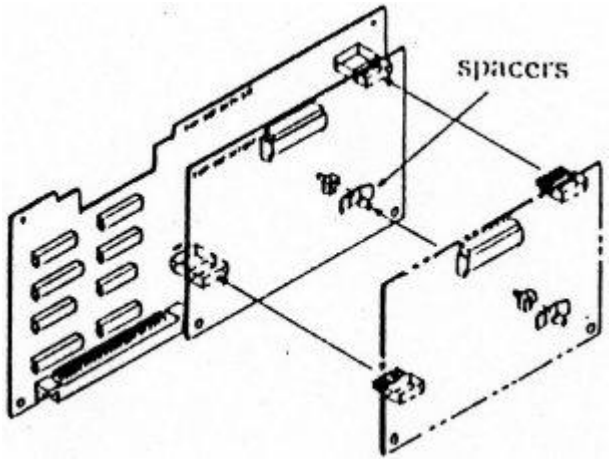

Fig.1

(4) When the two PCB's have been securely connected, put the data I/O unit to the original position by pushing it along the rail. If it is not inserted sufficiently, the unit may fail to work du to improper contact.

NEVER APPLY FORCE TO THE INTERFACE UNIT (CMH-532).

(5) Connect the cable H-6ZCJD00141 as shown in Fig . 2.

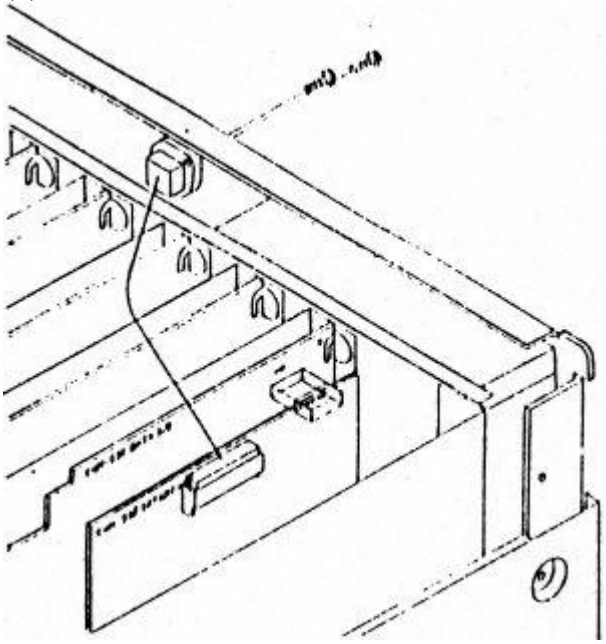

Fig. 2

(6) When installation is over, the signals shown in table 1 are applied to the RS-232C connector pins at the rear of the NRD-525 :

1 -> -12V
2 -> SG
3 -> +12V
4 -> DR
5 -> CS
6 -> RD
7 -> ER
8 -> RS
9 -> SD
10 -> RTTY*

*RTTY is the output from the CMH-530 RTTY demodulator unit (optional). It has the RS232C signal level.

4-Connection to an external device

Connection to an external device varies with the specifications of external device. Table 2 shows a typical example of connection. Referring to this figure, prepare a cable suitable for the specifications of the device. If the RS-232C connector for the external device is a standard 25-pins connector, connection shown in Table 2-(a) can be easily accomplished with the use of a specially designed cable H-6ZCJD00140(optional).

Connections shown in table 2-(b) through Table2(d) requires the change of wires.

Table 2(a)
RS-232C handshake with terminal
2(SG) <-> 1(SG)
9(SD) <-> 3(RD)
6(RD) <-> 2(SD)
8(RS) <-> 5(CS)
5(CS) <-> 4(RS)
4(DR) <-> 20(ER)
7(ER) <-> 6(DR)

Table 2(b)
RS-232C no handshake with terminal
2(SG) <-> 1(SG)
9(SD) <-> 3(RD)
6(RD) <-> 2(SD)
8(RS) 4(RS) *
5(CS) - 5(CS) *
4(DR) - 6(DR) *
7(ER) - 10(ER) *
* User definition

Table 2-(c)
RS-232C handshake with MODEM
2(SG) <-> 1(SG)
9(SD) <-> 2(SD)
6(RD) <-> 3(RD)
8(RS) <-> 4(RS)
5(CS) <-> 5(CS)
4(DR) <-> 6(DR)
7(ER) <-> 20(ER)

Table 2-(d)
RS-232C no handshake with MODEM
2(SG) <-> 1(SG)
9(SD) <-> 2(SD)
6(RD) <-> 3(RD)
8(RS) 4(RS)*
5(CS) 5(CS)*
4(DR) 6(DR)*
7(ER) 20(ER)*
*User definition.

5-Selection of Baud Rate

Each time the numerical key 8 is pressed with the MEMO switch depressed, 300 bauds and 1200 bauds is selected by turns. Accordingly, the vaccum fluorescent display indicate 300 and 1200 by turn.

CAUTION !

- The clock or frequency cannot be changed while the baud rate is indicated. Also, the frequency cannot be changed with the timing control or UP/DOWN switch.
- To clear the indication press CLR switch, or press the FREQ, CHANNEL, CLOCK/TIMMER, SCAN or SWEEP switch according to your purpose.

6-Control commands

Each of the commands used to control the NRD-525 consists of one-byte code, indicating the control item(contents of control), and argument(1-8 bytes) peculiar to each control item. (Some codes are not used). As an argument, the ASCII Code « 0 » through « 9 » are used.

The control items are as follows :
« A » Argument : 1 byte
Selects on/off attenuator.
Argument « 0 » : Attenuator off
Argument « 1 » : Attenuator on
Argument « 2 » « 9 » : Data error
for example a string « A1 » is sent to turn on the attenuator.

« B » Argument : 1 byte
Selects bandwidth.
Argument - Bandwidth
« 0 » : WIDE
« 1 » : INTER
« 2 » : NARR
« 3 » : AUX
« 4 » to « 9 » : Error
If a string « B2 » is sent to the receiver when optional filter in not mounted, an error occurs and this control data is ignored by the receiver.
To set INTER, string « B1 » is sent.

« C » Argument : 3 bytes
Sets the receiver memory channel N°.. The argument specifies the digit of 100, 10, and 1 in that order. If any of the channel N°. 200999~is specified, data error occurs and this control data is ignored. To set the channel N°. 123, a string « C123 » must be sent. Leading 0 cannot be omitted to make a correct command string.

« D » Argument : 1 byte
Sets the mode (type of emission).
The relation between the argument and the modes ar as follows.
Argument - Mode
« 0 » : RTTY
« 1 » : CW
« 2 » : USB
« 3 » : LSB
« 4 » : AM
« 5 » : FM
« 6 » : FAX
« 7 » to « 9 » : Error
To set AM, a string « D4 » is to be sent.

« F » Argument : 8 bytes
Sets the receiving frequency
The 8-byte argument specifies the digits of 100 MHz to 10 Hz of receiving frequency. If the frequency control data falls out of the receivable range, error occurs.
If a frequency data greater than 100 MHz is to be sent to the receiver with VHF/UHF converter (CMK-165), the digit of 10 Hz of synthesizer can be set but is not indicated.
To set 14.250 MHz, a string « F01425000 » must be sent. Leading 0 cannot be ommitted to make a correct command string.

« G » Argument : 1 byte
Selects AGC.
The relation between the argument and AGS ar as follows.
Argument - Mode
« 0 » : SLOW
« 1 » : FAST
« 2 » : Off
« 3 » to « 9 » : Error
To set FAST, a string « G1 » must be sent.

« E » Argument : 1 byte
Sets on-off of external control (RECEIVE MODE).
The argument « 1 » turns on RECEIVE and argument « 0 » turns offr RECEIVE. If an external controller once send a string « H1 » to the NRD-525, it can be controlled by the controller with use of control commands. To externally control NRD-525, « H1 » are to be given to the NRD-525 first. If RECEIVE has been turn on, the vaccum fluorescent display on the NRD-525 indicates « REMOTE » and the led for LOCK is lit. Then, all the key switches, PBS control, BFO control and tuning control excepting the DIMMER and RIT switches on the panel of the NRD-525 are electricaly locked. However, the tuning control works as the RIT control if the RIT switch is turned on.

Every time « H1 » is sent to the receiver, the data which indicating present receiver status(frequency, mode, bandwidth, AGC, attenuator,memory channel N°.) are sent back once to the controller.

Thereafter, the data of controlled item are sent back. However, if the channel is set, the data of all items are sent back. Fore example, if « H1 » is given to the receiver, when the settings of the receiver are the frequency 14.25 MHz, channel N°. 123 CH, mode USB, AGC FAST, ATT OFF, and bandwidth AUX, the data arr sent back according to the following format
« C123 », CR -> Channel N° 123 CH
« D2 », CR -> Mode USB
« G1 », CR -> AGC FAST
« A0 », CR -> Attenuator OFF
« B3 », CR -> Bandwidth AUX
« F01425000», CR -> Frequency 14.25 MHz
If setting has been done individually, the data of each item are sent back.

If RECEIVE is turned off, the indication of "REMOTE" on the vacuum fluorescent display disappears and the LOCK LED goes out. In this status, external control cannot be done. (Control data from an external unit are ignored by the receiver even when it is received.) RECEIVE-off (on) is performed by sending the data of "H0" "H1") from an external unit to the NRD-525 receiver.

« I » Argument : 1 byte
Sets on-off of the TRANSMIT MODE.
The argument "1" turns on TRANSMIT.
When it is turned on, "REMOTE" is indicated on the vacuum fluorescent display. At the same time, the receiver-status at that time are sent back to the controller. The data which indicating receiver-status are output according to the following two cases :

(1)If TRANSMIT is turned on, the data similar to those given when RECEIVE is turned on are sent back.
(2)While TRANSMIT is turned on, only the data regarding changed item are sent back, when the frequency, mode, bandwidth, AGC, attenuator or channel number is changed with the operation of the receiver panel.

The argument "0" turns off TRANSMIT. Then, the indication of "REMOTE" on the vacuum fluorescent display disappears, and the subsequent data is not output. TRANSMIT-off (on) is performed by sending the data of "I0" ("I1") to the receiver.

If TRANSMIT is turned on while RECEIVE is on, the TRANSMIT mode ensues.

7. Character Display of RTTY Signal

If you intend to receive RTTY signal by using optional RTTY demodulator unit CMH-530, it is available to display decoded signal on a screen of an external device (such as CRT terminal) by the following manner.

(1) Cut the jumper-pattern [3] of the CPU unit CDC-353.
(2) Set the baud rate of the external device to 300, or 1200 bauds, conforming to the baud rate of the RS-232C interface unit (CMH-532).

Code converted RTTY signal (ASCII) is output from SD terminal of the RS-232C connector by the above disposition. (However, it is available only when the mode of the receiver is set to "RTTY".)

Therefore, you can make a hard copy by a printer, and display characters on CRT terminal, simultaneously.

If the control data "H1" or "I1" are sent from the external device to the receiver-side, during RTTY data are output on RS-232C line, the data of RTTY signal and the data of receiver status (frequency, mode, bandwidth, AGC, ATT, channel number) are mixed. Therefore, the following care is to be taken, when making a control program.
(1) Avoid sending control data, during RTTY reception.
(2) Process the mixed data at external device side.

Demodulated output of RTTY signal is delivered to the pin #10 (RTTY) of RS-232C connector as shown in table 1.

If the signal is processed (synchronize control, serial-parallel conversion, code conversion, etc) by an external device (personal computer, etc), the following applications may be useful :

(1) RTTY reception, other baud rate than 45.45, or 50 bauds.
(2) ARQ, or FEC mode signal reception of SITOR (Simplex Teletype Over Radio), or AMTOR (Amateur Teletype Over Radio.)
(3) Decoding and displaying Morse codes. (Pick up the Morse tone by the Mark or Space filter in the RTTY demodulator CMH-530 and process the signal appears on pin 10 of this unit by the personal computer).

For enabling above applications, you may need sufficient knowledges on signal format which you wish to receive as on hard and software of personnal computer. Furthermore, you may need sufficient programming capability.

Thanks to T. KIMURA - Marketing Section II International Sales Department II JAPAN RADIO CO LTD - ASAKA TXWIN TOWER (MAIN 5, 6 FL.) 17-22, AKASAKA 2-CHOME MINATO-KU, TOKYO 107, JAPAN who faxed this document to JM GIRARD ORVAULT(NANTES) FRANCE, 18 th January 1994.

Thanks to gilt@well.com <gilt@well.com> for missing paragrph.

N*ote from JM GIRARD*

As the « Cable H-6ZCJD00141 » of my NRD 525 was losed, I replace the circular connector at the rear pannel by a SUB-D 9pins (require some mechanical modifications).

To avoid transmission of noise between my computer and the receiver I use sheilded cable and SUB-D metal case connector in this configuration :

Connections :

No noise transmitted !

SUBD 9 pins	SUBD 25 pins	NRD 525 Rear panel SUBD 9 pins	CMH532 board
		1	1
		2	2
		3	3
		4	4
		5	5
3	2	6	6
		7	7
		8	8
9	3	9	9
			10
	Sheild	Sheild	

NRD525 & Universal M1000 decoder (rec. radio. shortwave)
I have a Japan Radio NRD- 525 receiver which has two optional filters in the Narrow and Aux positions. In the Narrow spot, I have a CFL- 233 filter (1000 Hz) which I use for most RTTY signals. The AUX position has a CFL- 232 (500 Hz) filter which is used for CW and SITOR. I had for several years used a Universal M1000 decoder card. When I purchased a new Acer Pentium computer, the card wouldn't work with it. I spoke to Universal and the manufacturer, but no one could figure out how to make it work. Well, I have gone for about two years without a decoder. For Christmas, my wife gave me a Universal M- 450 reader so now I'm back in business reading digital signals.
Now here's the rub --- my 1000 Hz filter and, to a lesser degree, my 500 Hz filter seem to be much narrower. A SITOR signal (170 Hz shift) will not fit through my 1000 Hz window; I can tune the mark space across it but can't get the whole signal to come through that filter. I used to be able to tune SITOR with the 500 Hz filter and 850Hz shift RTTY through the 1000 Hz but not now. Does anyone have ideas about what has happened and how I might fix it?
[Max Shelhorse ,Atlanta, GA]

My 525 is no spring chicken, and a friend has my older one (from 86), that was one of the first, and neither is showing any signs of anything like you seem to be having. If you can't get the 170 shift Sitor through a 1K filter, something is set wrong or defective. Is the Passband tuning set center?? I can do 170 shift on my 500hz filter on my 525 and on the 300 on my 515! On the 1K filter, I can do 850 easy, I can ALMOST do it on the 600 (more like 1k) filter on my 515. Make sure your notch filter is off, and you might want to check and see if you can understand any SSB at all on the 1K filter, I used it a couple of times to listen to SSB with the PBS kicked off to one side, it sounded horrible, but I could just make it out. If you find you have everything set right, but still have problems, I pull the cards out, tighten up the "tracks", and reseat them. Sometimes, this solves a "mystery" problem.
[barry, bumologist@ pipeline. com]

An excellent post.
I've not much to add but wanted to 2nd the info re your not being able to do the narrow shifted decode with the 1000hz filter.
When the radio/ filter setup is working properly the 1000hz filter is actually too wide for the crowded marine Sit A/ B trans so you definitely have another problem.
As for the M1000, not to mention the later M1200, one can pretty much forget getting consistent & correct workings on any p/ c who's cpu is anything more than a 486dx- 33mhz. I also found that the cpu had to be Intel made. I even tried mine, a M1200v2, with a AMD 486 cpu & it did not like it at all. About the only mode that would work, with a faster cpu, was FAX. I've seen where others, mostly they were selling their decoders, said the M1200/ 1000 would work in Pentium machines but that's just not the case. However since a 'no- frills' 486 can be picked up for next to nothing it's no big deal these days.
Also, since you say its been awhile, a great source for hf utility info is the "Worldwide Utility News" web site, http:// www. wunclub. com/
[Al, no@ spam. here]

Are the JRC: s any good? (rec. radio. shortwave)
I have an NRD- 525 that's a real good receiver (now). I had to do a lot of work on it first, however. The ESKA accessories are real good. The roofing filter helps with interference when strong signals are nearby. I don't use the AM detector in the receiver, I use the ESKA phase lock AM board for AM. Nice audio. Noise blanker works well if the interference is of the type theblanker can find (pulse type of high amplitude). I changed the AGC attack times to be greater, this helps with pops normally heard.
Most of the problem with bad audio in the NRD receiver is due to BFO getting into the IF. This happens in the synthesizer board where the BFO and synthesizer signals are both generated. There's leakage there. I put a couple of chokes and
capacitors and this helped quite a bit. The bad hiss you hear about is caused by noisy IF amplifiers. The ESKA phase lock
board with a second set of filters fixes this. A lot of work, but now the receiver is real good. I'd put it up against any other.

Along with the NRD- 525 that I wrote about, I also have 2 Harris receivers (RF- 590, RF-550), a SAIT MR1411 maritime receiver and several older surplus receivers. Here's the difference that I find between the hobby receivers and professional models: The professional models I've seen don't have noise blankers (at least not standard), passband tuning or notch filters. Sometimes these hobby features can mean the difference. The NRD is more sensitive than the pro models, and has a tracking preselector that isn't standard on the pro models.
And as I said sometimes the hobby add ons can pull a signal out that the pro models can't. Several times the NRD has been able to pull a signal out that the pros can't. [John Reed jtreed@ poncacity. net]

Yes... I have to agree with John... the ESKA mods really improve this receiver. I've done side by side comparisons with a lot of radios, including Collins and Racal, and the modified 525 has always done better. I always listen to AM signals using USB or LSB, depending on where adjacent channel interference is, and the audio quality is great. Tuning is no problem since the PLL locks on to the carrier as soon as I get close. I'm not familiar with the BFO leakage problem, but I'm always looking for additional improvements to make. John, can you share the details of your modifications in this respect?
Anyone else out there who has 525 mods to share with the group? I hear that one of the inductors on the IF board, L2 I think, causes leakage around the filters. I'm going to look into relocating it or shielding it. What filters do you like? I have the JRC 1.8 kHz filter, but I find it's a little tight for voice, and usually use 4 kHz bandwidth.
[" Joe Schreiber" jschreiber@ adelphia. net]

First let me say I am enjoying this thread! Now this is what should take place on this list.... as opposed to some of the other stuff that goes on here.... but anyway... I have a profssional JRC radio. I can't compare it to a Drake because I haven't owned one in a while. I do own many other radios. Nothing compares to a good professional receiver... nothing. I wonder why some people will send in $1000 for a commercial (hobby) radio when they could buy a late model professional model (regardless of brand name) for a little less? I still buy "hobby" radios but I always keep at least one pro model for serious DXing. I live on the Gulf Coast... with a little effort one can find good JRC NRD- 92s/ 93s, Racal 6790s, Mackays, etc. for less than $500! (From tankers upgrading radios). Now true not everyone lives near shipping. But there are other ways to get the pro models at $700 to $1000. (Usually from someone who lives near the coast who
paid only $200 to $500 for them).

I know, I know... customer support and all that... what if it breaks... etc. If you're worried about that then you may never hear that weak utility signal that only a Professional radio can dig out. I love buying the commercial radios and playing with them for a while.
But when it comes time to monitor the weak signal from that helicopter on a rescue mission in the north Atlantic from my location in Texas.... only a pro will do.
Not exactly on topic..... I just wonder why anyone would spend $1500 on a commercial radio when they could spent half that much and get a late model professional radio. The difference is amazing. Just my 2 cents.
[jerev@ my- deja. com]

I have some rather sensitive receivers including R390A, R71E and R75. I have also some experience with the NRD515, NRD525 and the AOR AR7030. I do agree with you that these receivers do not need preamplifiers if you are living in a city. But when I use 1000 meter beverages in a rural location 20 kilometers from the city center I really need some amplification. A sensitivity of less than 0,4 uV AM is not enough when you are listening in ful daylight for transatlantic stations. It is so quiet that you need another 15 dB froma very low noise amplifier to hear those graveyard stations from the States. I have attenuators on my R75 and R71 but the signal handling capacity is so great that you never need them. I think the R75 has a +20dBM 3rd order IP without the preamplifier!
[Gert Nilsson, gert. nilsson@ mbox305. swipnet. se]

I worked with commercial JRC equipment the past ten years and I can't praise is enough for equipment reliability,
documentation and absolute ease of use... I'm sold on JRC! However, like you I have heard many bad comments about their crop of semi- professional shortwave receivers. I still have not had an opportunity to get one to use to form my own
conclusions so I can't properly discuss them.
Drake equipment comes nowhere near the quality in construction, documentation and ease of use that I have experienced with commercial JRC equipment. My R8B is going back to the shop for the third time and I am fed up with it! Don't anyone tell me that Drake "Got everything right" with this receiver. Based upon my experiences with the R8B, I don't think I will ever buy another Drake product in my lifetime --- what remains of it.
I think Drake has received unfair acclaim. It seems one individual in particular has agressively pushed it by advertising and reviewing it unfairly probably more because of a tiff with JRC that anything else (in my opinion). Many newcomers have been influenced by the adverts and perputate the myth of the R8B--- sure it sounds a lot better than that clunker they started out with and it does cost over it's easy to understand why they think it's better! $1000---
I have privately discussed the problems of the R8B at length with many of the RF engineering types that frequent this newsgroup but I have rarely seen them post their disatisfactions--- some went so far as to partially rebuild the receiver to get it to work properly! Maybe the time has come TO POST THE SHORTCOMINGS OF THE DRAKE SHORTWAVE RECEIVERS and maybe they will make better equipment as a result.
I really have nothing positive to say about the R8B as a COMMUNICATIONS RECEIVER. I will say that the audio sounds nice--- but that's after I bought a pair of speakers for $100. I like the notch but I notice that it drifts on mine and has to be re- adjusted periodically.
The frequency entry keypad location and the rubbery buttons are simply a pain in the ass to use. Gosh... the front panel layout hasn't change since they came out with this gear--- even the amateur 2 meter rig is the same! The sync detector works OK but the one on my 2010 seems to be just as good and doesn't take 4 or 5 seconds to lock. The biggest bug are the spurs that haunt the R8B througout it's coverage. On some ranges for 100's of kHz there are S- 3 spurs--- don't tell me you don't got

them as Drake knows about them and they have quicky mod that doesn't really solve the problem--- they have to redesign the receiver to eliminate them! The 'rotary switch' tuning mechanism already failed on mine and I hardly use the knob! I said enough--- now it's your turn.
Based upon what I've read on this newsgroup I wonder, maybe Grundig can make the R8B better; I suspect the SW- 8 will be.
[Sincerely, "King Pineapple" craigseuf@ hotmail. com]

To continue the thread, I have used every Drake since the SPR4 and all of the semipro JRC radios from the 515 forward. These have all been USED, not just plugged in and twiddled with. With the ability to choose any of the radios, I have picked the Drake R8A and R8B as the best for DX and SWL purposes and general listening. I also can compare them to the WJ- 1000 and Collins 2050 on a real 6 everyday basis. I run the Drakes with an Alpha Delta DX Ultra inverted V antenna and a splitter. The Drakes work very well, they have caused NO problems and have shown results every bit as good (and in some cases better) than the NRD 535D and NRD 545 (which I only kept 3 months). I have also run an ICOM R75 against them and it is very nice but not the radio that the Drake R8B is.
Service on previous R7s and R7As have shown that Drake service, should you need it, is very good.
As for your omment that the NRDs seem to need mods to achieve their top performance, the only Drake I have modified is a Gilfer Modified R7 which is loaded with all the toys. the R8B just does not need it. By the way, my R8B has about 1000 hours on it and the R8A has been run over 2000 hours.
"McAllister Bryant" bryant@ sohobusiness. com[]