

IMPROVING A WINNER: MODIFICATIONS AND UPGRADES FOR THE JAPAN RADIO NRD-525

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When introduced in 1986, the NRD-525 was promoted by the Japan Radio Corporation as "*The New NRD-525...You'll Find the Difference the More You Use it*". Although radically different in concept and construction from its predecessor the NRD-515, the NRD-525 found rapid acceptance in the hobby community and became many DXers' dream receiver. Perhaps the ultimate compliment was given by reviewer Larry Magne when he stated "...It must be said that the NRD-525 is as close to the optimum shortwave listener's receiver as is in existence."¹

Why then a compendium of improvements and modifications to the "perfect receiver"? Because nothing manmade exists that cannot be made better! DXers have had six years to discover the NRD-525's faults and blemishes and a few wrinkles have become noticeable on an otherwise pretty face.

Some serious DXers flogged their NRD-525s more than others, and pushed the receiver to the limits. In the process they developed a "true love-hate" relationship. John Bryant, writing in *Proceedings 1989* stated "...So that's about it on the 'down side'. Do I like my \$1200 aluminum and plastic Bearcat? Can you read English— I hate the darn thing! But just a minute...ask me if I love it! Is the sky blue?"²

There are many radio hobbyists who are quite content with their bone-stock NRD-525. Its features and performance more than satisfy, and just the thought of removing the receiver's cover sends a chill up their spine. For others, however, real enjoyment of their radio begins where the factory design leaves off.

Are you in this latter category? If so, this collection of modifications and improvements for the NRD-525 should be of interest. Areas to be addressed include the IF/RF stages, selectivity, AGC, S-meter, ergonomics, and miscellaneous improvements. Some modifications are critical or at least highly desirable for serious DXing, such as the selectivity improvements. Others, like the area of ergonomics, are a matter of individual taste.

PRECAUTIONS

Anyone seeking to modify their NRD-525 should be aware that the receiver contains a vast amount of surface-mount devices (SMDs), large-scale integrated circuits (LSIs), and discrete components. The modular boards are densely packed. If you are not experienced with this type of construction and the precision soldering needed, seek qualified help. Bear in mind that many of these modifications will void your receiver's warranty. **Any modifications to your receiver are done at your own risk.**

The *NRD-525 Service Manual* is a virtual necessity for repairs or modifications. If you do not already own it, you will find the cost (approximately \$30.00 US) well worth the investment. One source for the NRD-525 manual is Universal Radio Inc.³

RF/IF STAGES

WIDE-BAND I.F. NOISE: The characteristic audible hiss generated in the NRD-525 has been the subject of much discussion. Larry Magne calls this the result of "selectivity distribution compromises," and it is attributed to "noticeable filter blowby" by David Newkirk in an *Enjoying Radio* article⁴. In other words, poor I.F. board component layout and minimal inter-stage isolation causes the constant background hiss of the NRD-525. It is an annoying characteristic that reduces intelligibility of weak DX signals. The problem is a complex one with no simple solutions; to eliminate the hiss at its source would require a complete redesign of the I.F. stage.

Fortunately, the wide-band noise is greatly reduced when the receiver is tuned in LSB or USB. It is generally accepted that the NRD-525's sideband mode audio quality far surpasses its AM reception qualities. Many DXers find the NRD-525 more *sensitive* in AM, however.

A roll-off of the treble component of the hiss is suggested by John Tow in *DX Ontario*⁵. The addition of a 470 pf capacitor between pins 1 and 2 of IC5 on the IF/AF Amp Board (CAE-182) will reduce frequencies above 6 kHz. Similar effects can be accomplished with audio filters such as the Datong FL-2 and FL-3, or with external speakers like the Yaesu SP-102 which incorporates passive, switchable audio filters.

SYNCHRONOUS DETECTION: The best (and most expensive) solutions to the hiss problem are those which bypass the noise-producing sections of the I.F. entirely. These commercial products are: the ESKAB⁶ Phase-Locked AM Board, the Sherwood Engineering⁷ SE-3 Phase-Locked AM Product Detector, and the Multi-band AM Pickup (MAP) by Kiwa Electronics⁸. All three improve upon the NRD-525's stock synchronous detector in addition to solving the I.F. noise dilemma. The end result is better audio quality.

ESKAB's board is a modification kit which connects to the NRD-525's mother board, the CFH-36 I.F. filter board, and the CAE-182 IF/AF amp board. In the United States the PLAM kit is sold by Radio West⁹. In addition to removing white noise, ESKAB's kit provides the low distortion benefits of PLL synchronous detection and improved selectivity from extra IF filters. Completely contained within the receiver, the PLAM accessory is controlled by the NRD-525's noise blanker wide-narrow control. It is available in three configurations and price levels, depending on the combination of filters chosen. This ESKAB modification kit has been well received among NRD-525 owners. It was reviewed in *Proceedings 1989*.

Sherwood Engineering's SE-3 Phase-Locked AM Product Detector has been available since the early 1980s for use with Drake receivers and the JRC NRD-515. To use the SE-3 with the NRD-525, it is necessary to convert the DC OUT jack on the receiver's back panel to an I.F. output. This change can be done by the technically-competent NRD-525 owner, or by Sherwood Engineering for \$39.00. The SE-3 is an outboard audio device that offers similar performance to ESKAB's PLAM kit; however, operation is more complex due to additional controls. It includes other sound-shaping features such as a 5 kHz audio notch, high frequency boost and roll-off controls. The SE-3 was reviewed in the 1984 *World Radio TV Handbook*¹⁰ and the 1990 *Passport To Worldband Radio*¹¹.

Unlike Sherwood's SE-3 and the ESKAB PLAM kit, the Multiband AM Pickup (MAP) by Kiwa Electronics requires no receiver modification (and works with all 455 kHz IF receivers). A "clip-on" direct pickup intercepts the IF signal from the CAE-182 IF/AF Amp Board. Like the SE-3, it is an outboard device. The receiver's IF signal exits the NRD-525 at the IF stage and never returns to the radio. Unlike the SE-3 and the ESKAB unit, the MAP's synchronous detector is of the *enhanced carrier* variety; although not as effective as a PLL type for combatting selective-sideband fading, it excels with weak DX signals and offers greater tuning flexibility.¹² The MAP adds additional selectivity by cascading up to six quality ceramic IF filters in the signal path. A tone "tilt" control, low distortion audio amplifier and built-in speaker round out the MAP's other major features.

Kiwa Electronics reports that a "MAP II" is planned. The new unit will include two different switchable synchronous detectors (one which supports selectable sideband capability), and audio filtering with variable bandwidth, notch, and Q (selectivity). The MAP II will also support the new style Collins mechanical filters (very compact in size; excellent specs). Owners of current MAP units will be able to purchase an upgrade kit to take advantage of the improvements. Contact Kiwa Electronics for more information.

The ESKAB synchronous detection kit for the NRD-525 costs approximately \$300 to \$400, depending on configuration with the optional filters. The Sherwood SE-3 is priced at \$399, and the Kiwa Electronics MAP is \$360.

Readers interested in a detailed look at the various forms of synchronous detection are referred to the article "Synchronous Detection" by Craig Siegenthaler in *Proceedings 1990*.

RF/IF GAIN: Boosting the gain of a receiver as sensitive as the NRD-525 is a double-edged sword. While signal levels may indeed be increased, you run the risk of degrading dynamic range and producing spurious responses. The DXer should carefully evaluate the results of any modifications made in this area.

Chuck Bolland suggests the replacement of R49 on the CFL-205 board as a method to increase the gain of the first local amplifier. He recommends a 5 Ω value replace the 33 Ω resistor. R49 is a surface mount device; use another SMD resistor if available. Otherwise, a 1/8 watt size will work well.

Chuck has also experimented with the replacement of the stock 2SK125 JFET devices used as the RF amplifier. He reports that Motorola (or Siliconix) U310 JFETs offer better gain on the higher frequencies, and have comparable gain to the stock components on lower frequencies. The two 2SK125 transistors are designated as TR2 and TR3 on the CFL-205 board, and are located under metal shielding.

The BYPASS function of the NRD-525 can give slightly higher signal levels in some situations, provided the receiver location is not in an "RF alley". Otherwise, RF blocking may occur and actually degrade reception. Without the bandpass filters activated, total shortwave spectrum energy as high as 200-500 millivolts can be present at the receiver's RF amplifier¹³. For those who crave even additional sensitivity, Chuck Bolland has forwarded the following modification discovered by George Lechner of Vienna, Austria. It gives more gain in the NRD-525's BYPASS mode:

Find resistors R35, R36, and R37 on the CFL-205 board. These three components form a shunting circuit in the BYPASS line. Solder a jumper wire across R35 and R36 so that they are both bypassed. Cut the track in front of R37, isolating it from the rest of the circuit.

SELECTIVITY

The quality of the IF filters found in the stock NRD-525 indicate they were not high on the JRC engineers' priority list. The shape factors and ultimate rejection of the stock 2.0 and 6.0 kHz ceramic filters are surprisingly "average" for this \$1200 receiver.

Two optional filters can be fitted to the NRD-525 for a total of four IF bandwidths. A number of possibilities besides the optional Japan Radio CFL-series filters are available to the NRD-525 owner. However, modification to the CFH-36 filter board is required.

Collins filters are widely known for their superior shape factors and high quality; Universal Radio sells and installs them for \$169.95. George Zeller, who has the good fortune to own both a NRD-525 and an ICOM R-9000, comments: *The stock 525 filters are pedestrian at best. For this reason, I do not recommend that anybody own a stock model 525. The 2.9 kHz Collins filter turns this radio from an overpriced scanner into an outstanding DX rig. I love this filter! It is wide enough to crunch QRM way over 90% of the time. I know that the filter is expensive, but all 525 owners should install one at once if they do not have one already. Let me put this another way. Unless a DXer plans to install one of these filters, the 525 should not be purchased!*

Once the good filters are installed, the 525 actually outperforms the R-9000 in this area. Unlike the R-9000, all 525 filters can be selected in any non-FM mode. They can be operated with a tunable BFO for ECSS if desired; the R-9000 lacks this capability. I have said enough about this. The first mod to any 525 must be the installation of some Collins filters.

The 1.9 kHz Collins filter is also a good choice for difficult DX situations. John Bryant and I have the 1.9 kHz filter installed in our NRD-525s, and have found it to be THE choice of filters for international mediumwave DXing. It is strictly a filter for tuning in ECSS or SSB/CW mode, however. Other Collins filters available besides those mentioned above are 1.2 kHz and 3.8 kHz filters.

ICOM's excellent FL44A crystal filter (2.4 kHz) can also be installed in the NRD-525. At nearly \$200 it is an expensive filter, but it requires little modification to the CFH-36 filter board. I find the FL44A filter provides more intelligible audio and better rejection characteristics than the stock 2.0 kHz ceramic filter. When installed in the AUX position (FL6), the FL44A's input and output pins are connected by very short (1/8-1/4") jumper wires to capacitors C60 and C61 respectively. Four small holes need to be drilled in the circuit board to allow the filter's pins to pass through, and the circuit trace that runs beneath resistor R65 needs to be rerouted to ground so it's not in the way of the FL44A's input pin. The filter's mounting studs are a near-perfect fit on the CFH-36 board.

Sherwood Engineering offers what appears to be an excellent series of filters at a good price for the NRD-525. Their "CN" models are 15-pole crystal filters available in 14, 8, 6, and 4.5 kHz bandwidths for \$79.00 each; a 400 Hz CW filter costs \$179.00 (call Sherwood to confirm current pricing). Shape factor of these filters is stated to be 1.3 to 1. Sherwood Engineering will install these filters for \$20.00. In addition, for \$39.00 they will perform a number of IF filter board modifications that result in a typical 15 db improvement in filter ultimate rejection.

Universal Radio sells a Murata 4.0 kHz filter for \$59.95 (installed). This filter is sold as a higher quality replacement for the stock 6.0 kHz version.

David Clark has provided information on Pühler Electronic in Germany¹⁴. They provide a number of filter modifications for the NRD-525. This firm may be a source more suited to European DXers, since Peter Pühler of Pühler Electronic requires that all modifications be installed by his firm.

All filters mentioned so far are second IF filters for the 455 kHz IF of the NRD-525. ESKAB of Sweden offers a useful trio of IF filters for the first and second IFs. The bandwidth and ultimate rejection of the stock pair of crystal filters (FL1) and the ceramic filter (FL2) on the CFH-36 IF filter board is improved considerably by the ESKAB replacements.

The stock FL1 filters permit a 68 kHz wide (-60 db) swath of frequencies to pass through the first IF stage, while the stock FL2 filter also leaves a gaping hole of 36 kHz (-40 db). The combination of the ESKAB replacement filters results in a much better bandwidth of 6 kHz (-6 db) and 12 kHz (-40 db) at the output of FL2. John Tow states in his *DX Ontario* article that this modification alone is worth a 5 db improvement in the signal-to-noise ratio, and selectivity in all filter positions is improved. One drawback to this modification is reduced performance from the noise blanker circuit. The combination of FL1 and FL2 replacement filters is in the \$85.00 price range through ESKAB.

AGC AND S-METER

AUTOMATIC GAIN CONTROL: This is another area of the NRD-525's design that has received strong criticism. Predictably, there is no consensus on exactly what is wrong with the AGC response; preferences in AGC are very subjective.

In the author's opinion, "hard-core" DXers tend to prefer rapid AGC attack and release times. They are willing to endure the peaks and valleys of fast AGC response in order to squeeze the last bit of intelligibility out of a weak AM signal. Fast attack and release times lessen the chance of receiver audio blanking from strong noise pulses, leaving more opportunity to catch a critical word or two during a DX station's identification.

This is the philosophy behind Craig Siegenthaler's NRD-525 AGC modification published in the "Tips And Techniques" section of *Proceedings 1989*¹⁵. Both the AGC attack and release times are shortened by replacing these capacitors on the CAE-182 IF/AF amp board with the following values: C75 1.0 μf ; C77 0.1 μf ; C80 .22 μf ; and C102 μf (all polarized tantalum caps). This modification affects both slow and fast AGC constants.

Many SWBC enthusiasts will prefer a modification that accomplish the opposite effect, however. John Tow, in his *DX Ontario* article, suggests the following changes which are easy to implement: replace resistors R103 and R104 on the CAE-182 board with 10K Ω values (1/8 watt or less), and solder a 1.0 μf tantalum capacitor across pins 4 and 5 of IC9. To further slow the attack and release times, John recommends replacing C77 with a .22 μf tantalum capacitor, or a 2.2 μf value for even less speed.

ESKAB offers an AGC modification for the NRD-525, and it is a recommended option for those who install ESKAB's Phase-locked AM (PLAM) synchronous detector kit. Their modification is contained on two small circuit boards that attach piggy-back style to the CAE-182 board. ESKAB's AGC kit is available at a discount if the PLAM kit is purchased at the same time.

S-METER: No differing opinions here! All DXers agree that the NRD-525's stock bar-graph S-meter is about as jumpy as a grasshopper on an August afternoon. Most NRD-525 owners would prefer a traditional analog meter which gives useful information about relative signal strengths. The following circuits of increasing complexity describe three methods of adding an external S-meter to the NRD-525.

A NO-FRILLS S-METER: John Bryant suggests this straight-forward addition, originally developed by Dwayne Jones of Universal Radio. By tapping the AGC voltage on Test Point #3 of the CAE-182 IF/AF Amp Board, a 100ma meter can indicate relative signal strengths. John used miniature 50 Ω coax cable (RG-174) for routing the signal outside of the NRD-525 to the meter, via a RCA jack on the receiver's rear panel. The shield of the coax is attached to the ground buss (wide boarder) adjacent to Test Point #3.

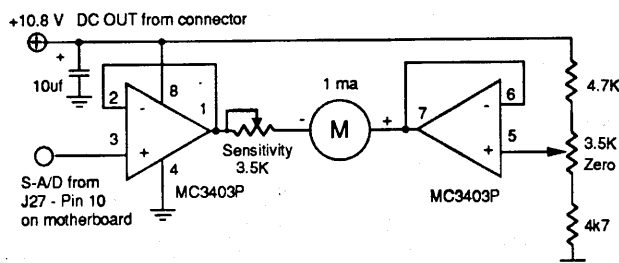
A 1K Ω trimmer potentiometer between the meter's terminals aid in zeroing the meter movement (no signal condition). Other values may work better for the meter you use. The voltage from the center conductor of the coax feeds the wiper of the trimmer, and one of the other two trimmer terminals is attached directly to the positive (+) terminal of the meter.

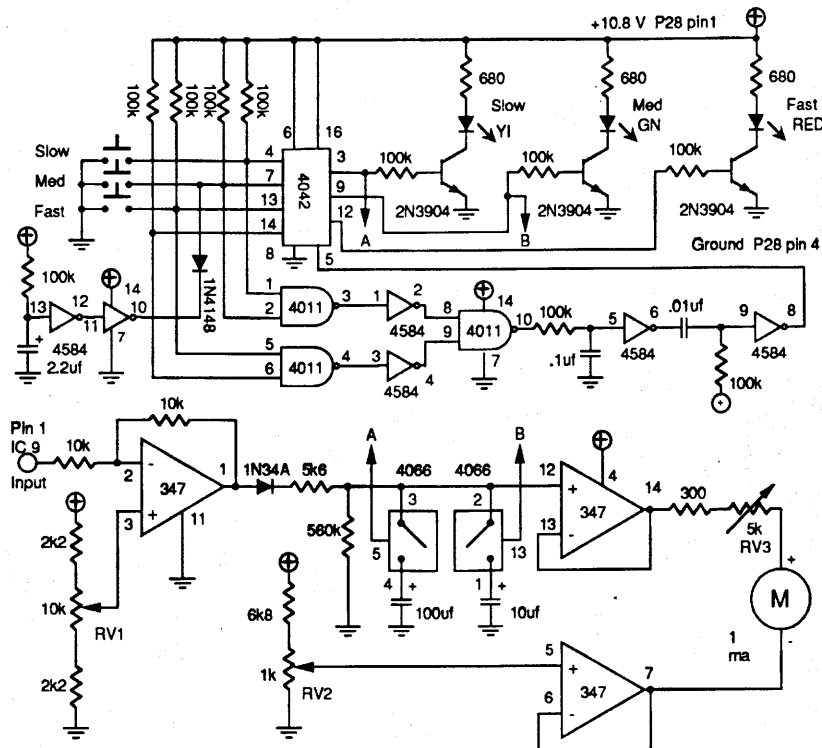
John mounted his meter upside down to show needle deflection to the right as the signal increases in strength. He recommends a large meter be chosen for the S-meter to aid readability.

A ONE CHIP S-METER: This circuit is courtesy of Paul Lannuier of JRC-New York, via Chuck Bolland. Paul states it was designed by a member of the JRC 1st Engineering Department.

The single integrated circuit (a quad op-amp) may be one of the following ICs: Fairchild U3403PC, Motorola MC3403P, National Semiconductor LM3403N, Texas Instruments MC3403N or NJM3404.

The attachment point which provides the AGC signal is pin 10 of J27 on the motherboard. This is at the base where the CAE-182 circuit slots are located. For the 10.6 volts DC power, the DC OUT jack on the rear panel of the NRD-525 can be used, or tap circuit points such as pin 1, J32 or pin 1, J34 on the motherboard. Calibration for sensitivity and meter zeroing is done with the 3.5K Ω potentiometers. If the needle goes off-scale for medium strength signals, add resistance to the line from the circuitry to the meter.





A VERSATILE S-METER FOR THE NRD-525: Craig Siegenthaler of Kiwa Electronics is the author of this flexible circuit. I have used his design for over two years and can attest to its excellent performance. Its usefulness is greatly enhanced by the selection of a large, easy-to-read meter movement and calibration to industry standard S-units.

This circuit can provide three levels of dampening to drive the analog meter. It is designed around a quad bi-fet op-amp such as a LF347 or TLO-74. Only three sections are used; the unused section should have its input pins grounded. The upper half of the schematic is the control logic to drive the CMOS FET switches which add or subtract capacitance to dampen the metering signal.

The meter used should have a 1 milliamp full-scale display. DC power is provided by the receiver with V+ connected to P28, pin #1 and ground to P28, pin #4 on the CAE-182 IF/AF Amp Board. The input to the S-meter circuit connects to IC9, pin #1 on the CAE-182 board.

To calibrate the meter, first set the RV controls to midpoint. Disconnect the antenna, and set the receiver's RF gain control to maximum. Adjust RV2 until the meter movement just begins to deflect upwards. At this point RV1 and RV3 should not require much adjustment past their midpoint settings. Adjust RV1 until it, too, just starts to deflect the meter's needle upward. Connect the antenna and tune to a strong MW station. Adjust RV3 for a similar upscale reading. Readjustment of RV1 and RV2 will be required to tune the meter so it will respond to low and high level signals.

A more accurate calibration can be performed with a RF signal generator having a precision attenuator and 50 Ω output. Terminate the generator with 50 Ω, set the frequency to mid band (example: 8 MHz), and connect it to the receiver's antenna input. The meter can now be calibrated according to the following standard signal levels adopted by the IARU (International Amateur Radio Union):

	Vrms at 50 Ω		Vrms at 50 Ω
S-meter	(0-30 MHz only)	S-meter	(0-30 MHz only)
S9 + 40db	5 mV	S6	6.3 mV
S9 + 30db	1.6 mV	S5	3.2 μV
S9 + 20db	500 μV	S4	1.6 μV
S9 + 10db	160 μV	S3	0.8 μV
S9	50 μV	S2	0.4 μV
S8	25 μV	S1	0.21 μV
S7	12.5 μV		

Most receiver manufacturers except Japan Radio Company have adopted these signal levels as the S-meter standard. The two NRD-525 radios Craig tested show 100 μ V as the S9 signal level. Also, neither receiver developed AGC voltage below S2 to S3 levels. This means it is impossible to calibrate the S-meter accurately below that point (the stock bargraph meter cannot be properly calibrated for low level signals, either).

My external S-meter, built to Craig's design, uses a surplus Hewlett-Packard meter 3-1/2" in width. After the S-meter was calibrated I created a new faceplate for it with rub-down lettering on thin white cardboard. Slipped behind the meter's needle, the faceplate markings accurately show signal levels to the industry standard.

The three selectable dampening settings of this circuit are very helpful. "Fast" gives an good indication of polar flutter conditions, or the true extent and rate of signal fading. "Medium" is the normal setting that approximates most receivers' S-meter characteristics. The "slow" setting smooths out level variations—even drastic changes—to give an average reading.

ERGONOMICS

Larry Magne, in his White Paper review, generally lauds the ergonomics of the NRD-525. However, those who have DXed with the receiver on a regular basis have found a number of faults. These become increasingly annoying after long hours in front of the receiver, such as during DXpeditions or "all nighters."

CONTROL KNOBS: In *Proceedings 1989*, John Bryant reported making numerous operator errors while DXing due to the too subtle "pointer" which indicates knob position on the NRD-525's eight small function control knobs (Volume, IF Shift, etc.). John tried painting the knob valley and pointer a bright fluorescent color, but the best fix was found at his local office supply store. Adhesive backed, 1/2" diameter round labels make excellent position indicators when cut in half. These "half moon" pieces are stuck on the front of a knob so that the straight edge is vertical *with the knob in its usual position*. Even in low light, there is no missing the fact that some control is out of its normal setting.

KEYPAD CONTROL: For those NRD-525 owners dissatisfied with the radio's stock keypad control, I described one possible solution in detail in *Proceedings 1990*¹⁶. This article illustrates the construction of a remote keypad controller for easier, quicker entry of frequencies, memories, bandwidths, mode, and tuning rate. Electronically, the controller is simply a collection of SPST momentary switches that parallel the action of the NRD-525's stock keypad and other pushbuttons. It is made from a "recycled" handheld calculator, and attached to the receiver via a shielded cable (similar to the NRD-515's optional keypad).

FINE TUNING THE NRD-525'S TUNING KNOB: John Bryant is quite fond of some of the old WWII receivers that had a folding or sliding bar built into the tuning knob. The could be slid or unfolded beyond the circumference of the knob, exposing a "finger hole". Because of the longer radius provided by the outboard hole, this device gave great fine tuning control and at the same time allowed very rapid dial "twirling."

Why not do the same thing for the NRD-525? After several false starts, John developed a strip of 1/16" thick by 1-1/8" wide by 2-5/8" long acrylic plastic (Plexiglas® or similar) with a 3/4" finger hole in the end. He attached the strip to the front of the knob with a couple pieces of tough hook fastener material (Radio Shack part #64-2360). This material makes for a very tight bond, but allows removal of the tuning accessory when needed. The dimensions of the plastic bar are critical as the bar must be short enough not to hit the table top on the down swing, and yet long enough to get the finger hole past the circumference of the knob.

John comments that this single, simple modification has made a great difference in the enjoyment of bandscanning with the NRD-525.

ANOTHER TUNING KNOB TRICK: If you know a competent machinist it is possible to *manufacture* an improved tuning knob for the NRD-525. The improvement comes in the form of a free-spinning finger detent in the tuning knob, which rotates separately from the knob itself. The finger detent takes the form of a "cup" that rotates easily on a ball bearing race within the new knob. Ask your machinist to create the knob from a material called black Delrin®. The stock tuning knob cannot be modified to incorporate a free-spinning detent because it is hollow (and will warp if filled with acrylic resin . . . I tried). The new knob retains the original indexed metal backplate (outer skirt).

Diagrams for the knob's exact dimensions are not given here, as the details will vary depending on the manufacturing equipment available and the skill and ingenuity of your machinist. Give him (or her!) the stock tuning knob as a guide. (Note: the knob removes from the optical encoder shaft with a *metric* Allen wrench.)

Granted, a free-spinning finger detent in a tuning knob is a small matter, but it's that kind of attention to detail that adds up to make a professional-level receiver. It *does* make a difference when bandscanning for long stretches at a time. This feature should have been built into the NRD-525 in the first place. My receiver now tunes like a dream, with no finger "drag" as the knob rotates.

MISCELLANEOUS

EXTENDER BOARD: Many adjustments to the NRD-525 modular boards are difficult or impossible without the Japan Radio CMH-365 Extender Board. This accessory plugs into the motherboard and effectively extends the circuit board under test, above and beyond the chassis and case. This provides access to trimmer capacitors, variable resistors, etc. while the receiver is powered up. Unfortunately, the CMH-365 Extender Board is expensive—nearly \$170.

Terry Palmersheim¹⁷ in Washington has located a source for the hard-to-find connectors used on the NRD-525 and the CMH-365 Extender Board. He has successfully built a substitute extender board for the receiver, at much lower cost than the JRC extender. Terry has offered to supply parts for anyone seeking to build their own extender board for their NRD-525. Contact Terry for current availability and prices.

CROSS MODULATION PROBLEMS: The designers of the NRD-525 wanted to protect their creation from static charges with a fail-safe system. To do this they used diodes in the front end on the CFL-205 board ahead of any integrated components. Unfortunately, while doing an excellent job of protecting the receiver, the diodes have a tendency to conduct when a broadbanded antenna or longwire is connected. These diodes can cause cross modulation in the NRD-525, and the problem can only be eliminated by removing the diodes. Chuck Bolland indicates that only two diodes need to be disconnected to accomplish this (desolder the "HF IN" side of diodes CD1 and CD3 on CFL-205). If you decide to sell your NRD-525 in the future, the diodes can be easily replaced. To give continued protection, Chuck recommends that a gas-discharge device such as the Transitrap be inserted into the antenna line just before the receiver.

Besides the Transitrap, another method of voltage limiting the antenna input is to connect a NE-2 neon bulb and a 10K Ω resistor between the center terminal and ground of the SO-239 connector on the NRD-525's rear panel. The bulb and the resistor are in parallel to each other. This method is suitable for 50 Ω inputs on other makes of receivers.

INTERFERENCE FROM THE RS-232 COMPUTER INTERFACE: Some NRD-525 owners have reported that the DC to DC converter on the optional CMH-532 interface causes interference to the receiver. Paul Lannuier of Japan Radio suggests the connection of a .01 μ f capacitor (50wv film) between TR101 and TR102 on the CMH-532 board. It's been confirmed that the connection of the converter output common line to ground potential is effective to reduce noise, also.

AUXILIARY FILTER SWITCH: Elton Byington has discovered a simple modification for preserving the 12 kHz wide audio bandwidth even when an optional filter is fitted to the AUX slot. The only parts required are a SPDT toggle switch and some hookup wire.

Remove the CFH-36 IF filter board from the receiver. Cut three pieces of wire, each 8" long. Solder one end of each wire to point A, point B, and point C (remove jumper W1). Connect the wire from point C to the center pin of the switch. Connect the wire from point A to one of the remaining two pins, and connect the wire from point B to the other pin on the switch.

Elton notes that these are not signal carrying leads, so the arrangement of the leads is not especially critical. The wires can be routed over the top of the card cage and out the left-rear top of the receiver's case, or a bracket may be fashioned to let the paddle of the switch protrude from a ventilation slot on the cover.

Position the switch to "B" and you'll connect the accessory filter when the radio's bandwidth setting is AUX. When the switch is in the "A" position the accessory filter is bypassed, allowing the 12 kHz bandpass through to the detector.

On those occasions when a shortwave station is really in the clear, or when listening to a local broadcast station, the added bandwidth makes for very pleasant audio. The radio's LINE OUT jack also benefits from the change.

Elton has used this modification for several years without problems. It can be easily removed if the receiver is sold or returned to stock condition.

STATIC KNOCKOUT: Chuck Bolland had the unfortunate experience of an excessive static charge destroying a sensitive integrated circuit in his NRD-525. When this happens, the receiver has unique symptoms: no sensitivity between 400 kHz and 12.999 MHz. Only local stations will be heard in this range. When tuning higher than 12.999 MHz, sensitivity will be normal. If you suspect this has occurred to your receiver, Chuck advises that the following items on the CFL-205 board be replaced, one at a time: IC1 (HD74LS1450 or ECG 74LS145); TR1 (2SA1162-Y or ECG 2409); TR2 (2SK125 or Motorola U310, two each). It is likely that the problem will be corrected with just the replacement of IC1. In any case, the time and few dollars spent on these parts is considerably less than repair or replacement of the board by JRC.

THE JRC NRD-535D: At the time this edition of *Proceedings* went to press, the new Japan Radio Co. NRD-535 had been on the market for a number of months. It is worth noting briefly the major differences and

similarities between the NRD-525 and the NRD-535 receivers. The NRD-535 is sold as the "NRD-535D" in North America for approximately \$1690.

An ECSS mode (synchronous detection), a variable bandwidth control (BWC) and a tuning rate and resolution of 1 Hz are the most important improvements in the new receiver. However, the NRD-535D's notch and Passband Tuning controls *are not* operable in ECSS mode.

The lackluster AGC characteristics of the NRD-525 have been retained in the NRD-535D. Also present is the identical IF filter line-up as found in the NRD-525D (unfortunately!), with the addition of a 1000 Hz crystal filter.

The engineers behind the NRD-535D seem to have solved the audio hiss problem of the NRD-525, according to reports from early purchasers.

A thorough review of the NRD-535D in the July 1991 *DX Ontario* bulletin ended with the author concluding that this new receiver was more suited to the utilities DXer¹⁸. Time will tell whether the new NRD-535D is an improvement over the NRD-525 or merely *different*, in the eyes of SWBC DXers.

FINAL COMMENTS

For years the "three S's" have been the basic yardstick to measure receiver performance: Stability, Sensitivity, and Selectivity. Unfortunately for the serious DXer, the stock NRD-525 is lacking in the critical area of selectivity. The NRD-525 owner is strongly encouraged to consider adding one or more quality IF filters as the first step to improving his or her receiver.

In retrospect, it seems like many modifications in this compendium might be termed *personalizations*. Each DXer has a slightly different expectation of performance from his NRD-525. It is hoped that the information presented here has given you ideas on how you can "improve a winner."

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