

situation could be marginally improved. But when it came to delivering bass punch and sock, the new Carnegie was very effective, leading the way on most occasions. *The Sheffield Drum Record* was the tie-breaker. The Carnegie 2 conveyed the sheer feel of the kick drum more convincingly, and did very well at allowing the rest of the drums in the set to appear without major dynamic restrictions. Some transients impacted my chest with more force than with the other cartridges.

If I have a concern with the Carnegie 2, it's the dark balance it presented in my test set-up. The 2's performance is the KC-200's exact opposite: While the KC-200 has a brash air, and a seeming willingness to take chances with sonic obstacles, the Carnegie 2's demeanor is tidy. The spectral balance does not favor the high end, and, therefore, appears to give off a relatively serene and subdued impression.

It's a puzzle. All the ingredients for greatness are there—speed, clarity, definition, dynamics—yet the integration comes off with a loss in exuberance. I couldn't shake the feeling of wanting more, even though the piecemeal impression was very favorable. I wanted the Carnegie to break out and cut loose with more attack, openness, depth, and drama. It was like

being at a party where everyone is polite and cordial: pleasant, but not exciting.

I must mention that, in many instances, I welcomed this seemingly calm, collected presentation. And I admit that, to a degree, this earnestness appealed to me. These are benefits of omission, not excesses of addition, aka colorations. The Carnegie 2 will very likely please the classical contingent because it impresses during the more tumultuous sessions. Compared with the two other models reviewed here, I think the Carnegie 2 could do better on inner detailing and present a more expansive soundstage.

Let me remind you that at \$850, the Carnegie 2 is the lowest-priced cartridge in this survey. Be sure to audition it carefully; it certainly has enough going for it to be considered seriously.

Conclusion

In conclusion, I would like to encourage you to stay tuned for the second half of this survey. Three more very important cartridges—the Monster Cable Sigma Genesis 2000, Jeff Rowland Design Group Complement, and Spectral Reference—have yet to go through their paces. It is only at that time that all of the results can be viewed from the same perspective. **S**

DAY SEQUERRA FM BROADCAST MONITOR

Larry Greenhill



Day Sequerra FM broadcast monitor

FM stereo analog tuner with digital frequency display. Usable sensitivity: 5dBf mono, 15dBf stereo. 50dB stereo quieting sensitivity: 12dBf mono, 34dBf stereo without noise reduction. Capture ratio: 0.75dB. Selectivity: 100dB alternate channel, 15dB adjacent channel. S/N ratio at 65dBf: 75dB mono, 75dB stereo. Stereo THD at 50dB quieting: 0.15% at 1kHz, 1.55% at 10kHz. Ste-

reo separation: 50dB at 1kHz. SCA rejection: 65dB. AM suppression: 100dB; 19 and 38kHz products: -70dB. Power Consumption: 85W. Dimensions: 19" EIA rack faceplate, chassis 16" W x 14" D x 6" H. Shipping weight: 55 lbs. Price: \$9500. Approximate number of US dealers: 12. Used with the Day Sequerra FM Urban Antenna, price: \$285. Manufacturer: Davidson-Roth Corporation, P.O. Box 95707, Hoffman Estates, IL 60195. Tel: (312) 843-1797.

Before discussing the Day Sequerra Broadcast Monitor FM tuner, one point needs to be made. Although Richard Sequerra built and marketed the original 1973 Sequerra Model I FM tuner, he no longer has any involvement with this product. David V. Day, president of Davidson-Roth, purchased all rights to the tuner in 1984, and immediately set about redesigning it to improve its field reliability, performance, and sonics. He has succeeded admirably, but not without a commensurate increase in the tuner's price (\$6000 in 1984) that originally led JGH to name it "the Rolls-Royce of solid-state tuners" (Vol.3 No.7, p.11). The Day Sequerra Broadcast Monitor, now commanding a lofty \$9500 asking price, is the flagship product of the Davidson-Roth Corporation.

The Broadcast Monitor, as its name implies, is being marketed as a pro FM studio tuner for FM stations, where its large 48-pound chassis, sophisticated oscilloscope display options, and very high price might be more easily justified than in the home. Yet many units, I understand, are sold overseas to well-heeled European and Japanese audiophiles. The tuner's price does set it apart in a field where *Stereophile's* top ratings have gone to the \$649 Onkyo T-9090 II. Only 18 out of the 117 FM tuners listed in the October 1988 *Audio* "Industry Bible" issue break the \$1000 barrier, and only one other tuner, the Klimo Ertanax, lists for anything near the Day Sequerra's \$9500 suggested retail.

JGH's 1973 reservations are still very reasonable: what FM signal could justify the Sequerra's sky-high price? Even today, only 58 of the 360 stations in our Tri-State New York, New Jersey, and Connecticut area offer classical or jazz programming,¹ as listed in the 11th edition of Bruce Elving's handy *FM Atlas and Station Directory* (available for \$9.95 from Gilfer Associates, 800-Gilfer-1). One might argue that the introduction of CDs has led to a noticeable improve-

¹ Rock fanciers are poorly served by FM stations in general, due to what I understand from a colleague in the radio industry is the almost universal practice of dubbing tracks from LP or CD on to convenient but mid-fi 8-track tape cartridges for broadcasting. (Did you notice that in *Good Morning Vietnam*, Robin Williams was curing up the discs on Garrard 301s fitted with SME 3009 II tonearms? A nice touch of authenticity, but a reminder that not all progress is in a forward direction.)

—JA

ment in FM station sonics, no longer vulnerable to stylus deterioration or vinyl decay. In fact, two of my favorite classical stations (WNCN and WQXR) have vastly improved their sound in the past five years. Would the new, redesigned Day Sequerra Broadcast Monitor change JGH's original hard verdict on this product?

The Heritage

The new Day Sequerra Broadcast Monitor comes from a very respectable lineage, based on the Sequerra Model I and, before that, the Marantz 10B. DAS reviewed the 10B (Vol.10 No.5) and found the unit's 1964 RF performance lacking when compared to present-day tuners. Engineers Richard Sequerra and Sidney Smith, who originally designed the Marantz 10B FM tuner, created the Model I in 1973 as a cost-no-object tuner to improve upon the 10B's performance, sonics, and function. This tuner was then (and is now!) an engineering *tour de force*: 5000 separate parts, 22 circuit boards, hundreds of tests and adjustments during manufacture. Sequerra accurately called it "five different instruments on a single chassis," because the unit's oscilloscope served as an FM broadcast-band panoramic spectrum analyzer, signal tuner, and internal and external vector analyzer of audio signal amplitude, separation, and phase.

Best of all, the Sequerra Model I's distinctive styling set it apart from every tuner made before or since. The Sequerra design team took the best glass faceplate, black masking, and rear illumination styling from McIntosh, and pushed the cosmetics one step further. The 'scope face was fashioned into a flat, square shape and set into the center of the unit's faceplate. Three different sets of illuminated graticules were overlaid to suit the 'scope function chosen. The digital frequency counter and the switch indicators were illuminated in an intense red light.

Sequerra himself added to the Model I's mystique, often personally promoting the tuner at audio shows of the '70s. Like some irascible genius, he could be found chain-smoking and pacing in front of his "dream tuner," haughtily defending its cost-no-object features. He proved that the Model I, attached to a simple 300 ohm

dipole, could draw better FM audio sound than any other tuner at the show. Despite the grandstanding, these demos were undeniably impressive. Slightly more than 800 Sequerra tuners were sold in the 1970s, during the heyday of high end, despite the fact that this tuner was as expensive as the top-of-the-line amplifiers then marketed by Mark Levinson or William Johnson.

Having purchased the rights to the Model I, Day, a former director of Northrop Corporation, immediately began to redesign it, using his considerable expertise in RF technology. He introduced new manufacturing approaches, using the most stringent milspec assembly techniques. Over 200 component, wire routing, and layout changes were made. The original audio detector, subject to distortion, was replaced with a newer Fairchild-based Travis-Smith circuit. The local oscillator in the mixer assembly was stabilized with varactors, providing long-term drift of less than 25kHz. Better power-supply regulation for the tuning varactor was carried out. Inside, many capacitors in the signal path were bypassed, and the grounding scheme was altered. One circuit board, whose proximity of traces led to intermittent problems on humid days, was totally remade. Day also bettered the original tuner's cosmetics, improving the light distribution and indicator blocking, and removed the Sequerra Corporation "S" from the power-on pushbutton. He upgraded the mechanical switch damping and faceplate construction.

For the most part, however, Day preserved the circuit design set down 17 years ago by Sequerra and Smith. He maintained all the external glamor of the product, including the rack-mount handles and 19" EIA front, the black glass faceplate, the red-bordered 4.5" oscilloscope screen, the unique panoramic spectrum-analytic display mode (which shows 2MHz of the FM band centered on the chosen frequency), and the twin rows of six illuminated square pushbuttons on each side that frame the front panel. The back panel still features a terminal strip for the antenna connection, a common item in *ca* 1970 FM tuners.

Despite Day's production upgrades, manufacturing the Broadcast Monitor is still a bear. The finished unit contains 18 circuit boards, 640 resistors, 411 capacitors, 83 diodes, 61 ICs, 75 bipolar transistors, 24 FETs, 21 LEDs, 37 potentiometers, and 81 fixed inductors. Total time to assemble the tuner runs about 130 man-

hours, followed by 90 man-hours of testing and alignment. Ninety-three separate adjustments are made during alignment. All in all, it takes a month to make each Broadcast Monitor. Day shipped about 50 units last year.

Davidson-Roth warranties the tuner for five years and pays shipping one way for repairs. The warranty program's success depends on a nasty, thorough, 200-hour "shakedown cruise" in the form of a computer driven burn-in. This quality-control approach, which includes a three-page "production traveler packet," came from the defense industry. The production traveler packet also requires a minimum of 25 sign-off steps. The final sign-off procedure requires the tuner to pass six pages of stringent performance benchmarks, called Acceptance Test Procedures (ATP). Costly? Sure, just ask the Pentagon.

Features

The 32-page owner's manual gives the best thumbnail sketch of the Day Sequerra's design, which employs a "superheterodyne FM receiver consisting of two RF subsystems, a Stereo Multiplex Decoder subsystem, an instrument type X-Y oscilloscope display subsystem, RF frequency counter, and the requisite high and low voltage power supplies." The tuner also features a mono switch, interstation and stereo-only muting, high blend, and a Dolby-B decoder. The built-in oscilloscope functions by switch selection as a combined signal strength/multipath and center-tuned indicator, and gives a vector analysis of mono or stereo audio signals. The 'scope has auxiliary inputs to test other audio equipment.

No, there are no presets, no remotes, and no, there is no selectable IF bandwidth. The Broadcast Monitor has a fixed 260kHz, medium-selectivity bandwidth, just as the Marantz 10B had. Instead of the rows of numerical preset keys found on so many of today's digital synthesis tuners, the Broadcast Monitor has one simple tuning knob. As far as the owner is concerned, there are two key functional features: analog tuning and the unique oscilloscope display.

The lucid, well-written manual spends 10 of its 32 pages explaining the proper use of the tuner's oscilloscope display. As one selects a given function by pushbutton, vertical hatched lines called graticules are illuminated bright red against a jet-black background. For the "Pano-

ramic Display," four vertical lines are spaced on the horizontal "X axis" to match 400kHz gradations on the RF spectrum being shown. The horizontal tick marks on these lines allow one to actually measure signal strength, set at 15dBf, 25dBf, 65dBf, 95dBf, and 115dBf, for a 100dB dynamic range!

Switching to "Tuning Display," the vertical lines are now spaced at 75kHz intervals, so that one can see if the signal trace exceeds the FCC-specified ± 75 kHz frequency modulation of the carrier (called overmodulation). As the signal is modulated, the scope trace instantly expands as the music level increases. The same horizontal tick marks again allow for signal-strength measurements. One can also use the width of the signal trace to determine multipath.

The third option, "Tuner Vector," allows for a quasi-Lissajous display of the stereo effect. A mono signal or an announcer center-stage on a stereo channel appears as a single vertical line; stereo music with good separation appears as scribbled traces expanding upward like a bouquet of flowers.

Circuit Refinements

The Broadcast Monitor uses a no-feedback "thermal stability circuit" in the RF front end to stabilize the local oscillator. This is a major improvement over the earlier Sequerra tuner, whose detector could drift, leading to significant increases in distortion. The new circuit consists of a transistor with a varistor with a complementary and opposite temperature-compensation curve. The Broadcast Monitor does not contain an AFC circuit. Day believes excessive AFC may cause undesirable effects on performance in an all-out tuner.

Analog tuning is an important design feature of the Broadcast Monitor. Most tuners now produced for the audio market utilize digitally synthesized tuning. Looking over past issues of *Stereophile*, approximately 10 of the 55 tuners reviewed (original Sequerra Model 1; Bogen TP-100; HK TU-905; McIntosh MR-78; McIntosh MR-80; Magnum/Dynalabs FT-101; Marantz 10B; Onix BWD1; Onkyo T-22; Quad FM4; and the Tandberg TP-3001) used analog tuning. Interestingly enough, Don Scott's list of his top 7 FM tuners (Vol.9 No.3, p.80) includes three analog-tuned units. DAS is skeptical about the inherent value of a tuning method; the quality of the audio output is all that matters (Vol.9 No.3).

Day, on the other hand, believes that digital tuning may have some inherent limitations in a cost-no-object tuner. Digital tuners must tune in set increments, which may be as large as 50kHz. If they slip out of alignment during shipping or use, those fixed 50kHz increments can be off from the assigned station frequencies by a substantial amount, and the owner can do little to tune closer. Using the Broadcast Monitor oscilloscope, one can fine-tune to within 100Hz of the station's center frequency. Day measured Total Harmonic Distortion (THD) on stereo signals, using a tuner in the factory. THD climbed from 0.06% to 0.20% as the tuner was moved 30kHz from the center of the FM signal. He believes that moving even 100Hz off center frequency can have major effects on channel separation and soundstage. For him, accurate tuning is like setting the optimum VTA for a cartridge.

Performance

Performance data was gleaned from the "Performance Data Record" created during the alignment and final test procedure of the individual Broadcast Monitor (Unit #1815) under review. These tests were conducted right on the factory bench, not in a screen room. The data on these sheets were compared with the performance of one of the finest tuners reviewed in *Stereophile*, the McIntosh MR-80 (Vol.9 No.3, p.92) by DAS. In most areas, the Day Sequerra tuner kept up with the Mac. The Broadcast Monitor's stereo test data show that 37dBf (at 75 ohms) are required for 50dB quieting; the Mac required only 34dBf (at 300 ohms) to yield the same quieting. Stereo separation for the Broadcast Monitor showed 49.2dB at 1kHz, almost equal to the MR-80's 50dB figure.

In one performance domain, however, Mac was king. The McIntosh's 60dB of adjacent-channel selectivity far surpassed the Broadcast Monitor's 15dB performance. The Broadcast Monitor has only one, rather broad, IF bandwidth. Distortion at 1kHz, measured at the signal level to make 50dB of quieting, measured 0.2%; this figure fell to 0.1% if the signal increased to 65dBf. This level of distortion does not quite equal the MR-80's 0.07%.

Tuning the Broadcast Monitor was a totally new experience. Instead of a linear dial or presets, I used the digital frequency counter while watching the scope's panoramic display. The scope's screen holds a large amount of vis-

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Tuning the Broadcast Monitor was a totally new experience. Instead of a linear dial or presets, I used the digital frequency counter while watching the 'scope's panoramic display. The 'scope's screen holds a large amount of vis-

ual information in a form that is instantly and intuitively usable. One sees four or five FM signals spread across a 2MHz spectrum. Each station's signal shows whether it is broadcasting in stereo and whether SCA sidebands are being used. The relative and absolute signal strength of each signal can be easily judged. The Panoramic Display showed groups of these stations as "pips" like mountain peaks whose slopes constantly vibrate. WNCN's SCA sidebands could be easily seen as auxiliary peaks on each side of the main signal's pip. The 400kHz spacing of the graticules makes identification of alternate and adjacent-channel signals an easy task. Tuning in any one station is accomplished by simply rotating the single tuning knob until the signal's peak lines up with the center graticule. Then one switches the 'scope over to its "tuner display" mode and centers the signal trace (a thin horizontal line) between the two 75kHz graticules. It takes far less time to tune in a station than to describe this process, and, once learned, it is never forgotten. Words cannot express how much easier, more satisfying, and more accurate it is to tune a Broadcast Monitor than some of the newest digital tuners with their rows of presets.

I listened most to a handful of classical and jazz stations in the New York area, including my favorite New York Classical programming (WQXR, WNCN, and WNYC), as well as a good jazz station (WJAZ, Stamford, CT). I also tuned in one "DX" station, WALK, from Patchogue, Long Island (over 100km away from me on the FM Atlas Map). I selected WALK because the Broadcast Monitor's 'scope display showed WALK's signal to be approximately 20dBf, slightly below the tuner's rated 50dB quieting point. The signal was moderately noisy, as would be predicted, but still delivered a stereo musical signal with good separation.

I was not prepared for what I heard from the Broadcast Monitor. WNCN's musical programming emerged from a completely silent background, was effortless, and filled the room. My Quad ESL-63s imaged with a solidity I've heard best on vinyl records, and easily centered male announcers between the speakers. The voice had normal timbre, not exaggerated or tubby. Orchestral music was spread across a wide soundstage, and showed great depth of field. The "vector display" assured me that the signal had great separation and little multipath. I was lucky enough to pick up a performance of

Copland's *Rodeo*, and heard the entire "Bronco Roundup" section. (I know this piece well; it has been one of my reviewing warhorses.) The bass was fast, solid, and had none of the warmth or artificial fullness I had heard on lesser tuners. WNCN, showing prominent SCA sub-peaks on the 'scope display, gave no evidence of SCA "birdies" even with the amplifier volume cranked. WJAZ and the much more distant WBGO played jazz with a liveliness and tempo, clarity and smoothness I had missed for a very long time. Day was correct: slight mistuning affects the sweet spot (best separation and imaging), just like changing the VTA for a cartridge. Both WNCN and WJAZ passed the Ivor Tiefenbrun "foot-tapping" test.

But then again, I had given the Broadcast Monitor my best shot. The tuner fed my Levinson ML-7 preamp via Randall Research interconnect cables. I used a Threshold Stasis III driving Quad ESL-63s via Monster Cable. The FM signal came from a high-gain (12.5dB greater than a dipole), nine-element Yagi Channel Master Stereo Probe 9 antenna with rotor clipped to my chimney. The rotor control was placed right on the shelf next to the tuner. The tuner and antenna pulled in 55 stations, 33 of very high quality, with the antenna array pointing South (to Manhattan). I also used a Day Sequerra Urban Antenna, an indoor unit I had mounted vertically in the basement. I picked up fewer signals (50 stations, 25 acceptable quality), but the tuner still produced the same musical sonics I'd heard with the rooftop array. This basement test is a tribute to Day's new indoor antenna and to the Broadcast Monitor alike.

But even this tuner has limitations. Its single wide IF bandwidth, responsible in part for its gorgeous sonics, meant that I had occasional difficulties in picking out one station from a nest of adjacent-channel transmitters. I found clusters of signals grouped 200kHz apart which appeared like a mountain range on the panoramic display. Only one or two signals could be coaxed out of a nest of four signals. One group clustered around 106MHz (105.9, 106.1, and 106.3). A second group sat a bit higher in frequency (106.7, 106.9, and 107.1). I suppose that tuners with much greater adjacent-channel selectivity would be needed to extract all four stations from these highly cluttered areas on the FM band. One could turn to the Denon TU-800 (Vol.11 No.5, p.110) and its 50dB adjacent-channel selectivity.

Conclusions

Should you sell the ranch for this tuner? Clearly, the unit's styling, panoramic display, multiple 'scope functions, and the superb audio output place the Day Sequerra Broadcast Monitor in a class by itself. David Day has done a remarkable job of redesigning this 1973 product, while adding his own critical contribution: reliability and improved sonics. For this reviewer, I know of no other audio component that possesses the sheer glamor of the Broadcast Monitor. Alas, its styling, ergonomics, and its remarkable sonics have set a very high standard for reviewing other FM tuners.

Even so, the sky-high price tag cannot be ignored. With *Stereophile* top-rating other tuners, like the Onkyo T-9090 II (Vol. II No. 5, p.112), at less than 10% of the Broadcast Monitor's price, I would be hard pressed to justify

this product unless cost is no object, or you *must* have the very best. Some may justify the ownership of a Broadcast Monitor as an investment, and I'm certain that the tuner will hold its resale value over the years, probably outlasting its owner in years of stable operation.

There are two other alternatives. Davidson-Roth Incorporated will totally upgrade a Sequerra Model I for \$2800. Considering that the used market lists a Sequerra for about \$2000, it means getting a fully guaranteed, operational, reliable Broadcast Monitor for \$5000. The other approach is to purchase the company's new Studio Tuner (\$3300), which features three selectable IF bandwidths, dual mono construction, phase inverter switch, and a Dan D'Agostino-designed, balanced audio output circuit. Look for a review of that product in a future issue. **S**

HAFLER IRIS REMOTE-CONTROL PREAMPLIFIER

John Atkinson



Hafler Iris preamplifier

Solid-state preamplifier with one phono input (MM/MC switch-selectable), seven line-level inputs, two tape loops, one external processor loop, and IR remote control. Specifications: Frequency response: 20Hz-20kHz ± 0.1 dB (phono), 20Hz-20kHz ± 0.1 dB (line). Line-stage bandwidth: 6Hz-150kHz, -3dB, into 10k ohms. Input impedance: user-adjustable, 47k ohms in parallel, with user-selectable capacitance, 220pF as supplied (phono MM), user-adjustable, 100 ohms as supplied (phono MC), 20-28k ohms (line). Output impedance: 316 ohms (main), 2150 ohms (tape-out).