

Equipment Profiles

JVC 4VR-5446 Four-Channel Receiver



MANUFACTURER'S SPECIFICATIONS

FM TUNER SECTION IHF Sensitivity: 2.0 μ V. THD: Mono, 0.5%; Stereo 0.8%. S/N: 65 dB. Selectivity: 65 dB. Capture Ratio: 2 dB. AM Suppression: 50 dB. Image Rejection: 55 dB. I.F. and Spurious Rejection: 80 dB. Stereo Separation: 35 dB.

AM TUNER SECTION Sensitivity: 30 μ V (200 μ V/M, internal antenna). S/N: 50 dB. Selectivity: 30 dB. Image Rejection: 45 dB. I.F. Rejection: 50 dB.

AMPLIFIER SECTION Power Output: 22 watts/channel (quadraphonic); 44 watts/channel (stereo, "strapped mode"). IHF Power Bandwidth: 20 Hz to 30 kHz. Rated THD: 0.5%. Rated IM: 0.8%. Frequency Response: 20 Hz to 20 kHz \pm 1 dB. Input Sensitivity: Phono low, 3 mV; high, 1.5 mV; Aux 1, 2 and Tape Mon., 200 mV. Tone Control Range (rear channels): \pm 10 dB at 100 Hz and 10,000 Hz. S.E.A. (multiple tone controls) Center Frequencies (front channels only): 40 Hz, 250 Hz, 1 kHz, 5 kHz and 15 kHz. S.E.A. Range: \pm 12 dB at frequencies listed. Hum and Noise: Phono low, 70 dB; high, 65 dB; Aux 1, 2 and Tape Play, 75 dB. Low Filter: -10 dB @ 50 Hz. High Filter: -10 dB @ kHz.

GENERAL SPECIFICATIONS. Power Consumption: 280 watts (maximum). Dimensions: 20 in. W x 6 $\frac{3}{8}$ in. H x 15 $\frac{3}{8}$ in. D. Weight: 34 $\frac{1}{2}$ lbs. Price: \$599.95.

It seems altogether appropriate that the first quadraphonic receiver with completely *built-in* CD-4 demodulator circuitry to be reviewed by AUDIO is this JVC unit. (Last month's Kenwood 6340 had a slide-in demodulator.) After all, Japan Victor Company must be credited with the development of the "discrete" form of four-channel records, known in this country as Quadradiscs. After a late start, the number of

Quadradiscs available is on the upswing, and many manufacturers are now marketing equipment capable of demodulating the complex information contained in these discs and separating it into four channels of program information.

The Model 4VR-5446, shown in the photo above, is one step below the highest priced, highest powered 4-channel receiver made by JVC and is one of several which include the built-in CD-4 feature. The massive gold and blacked-out front panel has enough controls and features to delight the most demanding four-channel enthusiast. At the lower left, a rugged power ON-OFF switch is surrounded by a remote control plug (which is removed when an optionally available remote control "joystick plus master volume control" accessory is used) and a pair of headphone jacks (one for front channels, one for rear). The speaker switch does double duty, choosing main, remote or both sets of speakers and switching to the "strapped" amplifier mode for higher-powered two-channel operation, if desired. The adjacent mode switch chooses mono, stereo, discrete four-channel and a pair of matrix decode positions. If the switch is placed in the DISCRETE 4-CHANNEL position, demodulation of CD-4 records takes place automatically. If an SQ record is played with the mode switch still in the CD-4 position, sensing circuits substitute the proper matrix circuitry for this kind of decoding. Alternatively, the mode switch can be placed in MATRIX 1 which closely corresponds to SQ decoding, while the MATRIX 2 position is intended for QS (Regular Matrix) or E-V encoded discs.

Two tape monitor switches come next, followed by a program selector switch, low and high cut filter switch, an S.E.A. switch which enables you to add segmented tonal effects to recordings, the usual loudness switch, a dual-concentric volume control (one section for front channels, the other for rear channels), a dual-section concentric balance control (again, for front and rear), and separate bass and treble controls for the rear channels.

The upper right section of the panel contains five slide controls, each of which controls the tonal response of one segment of the audio spectrum. JVC calls this feature S.E.A.

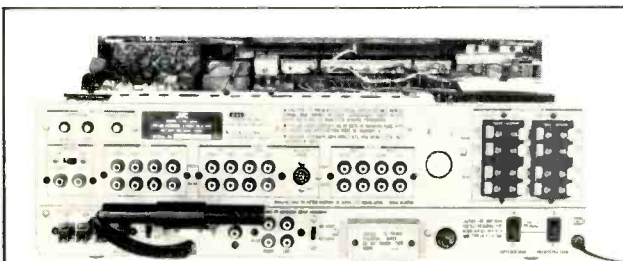


Fig. 1—View of back panel.

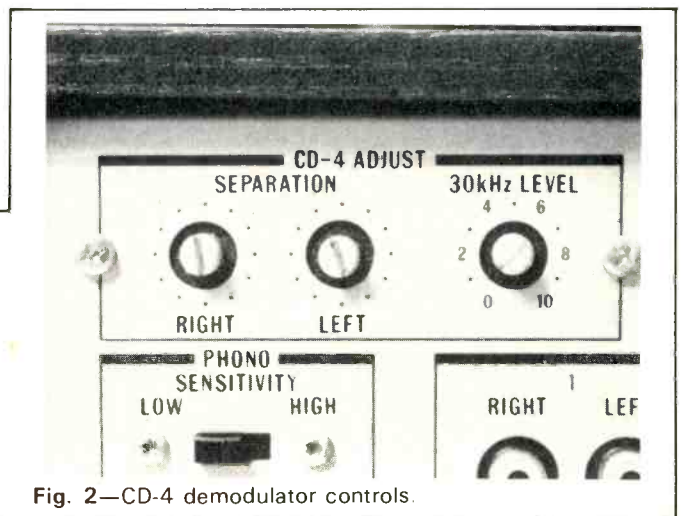


Fig. 2—CD-4 demodulator controls.

(for Sound Effects Amplifier) and it constitutes a miniature "graphic equalizer" similar in performance to separate accessory units sold by other manufacturers. More about S.E.A. and how it works later. A large tuning knob, coupled to an effective flywheel, moves the well-illuminated dial pointer across the well-calibrated AM and FM dial scales, above which are a series of illuminated words which indicate program source, mode, reception of an FM stereo broadcast and the fact that a CD-4 record is being played. The CD-4 indication is larger than the rest and lights up in bright yellow. A pair of illuminated tuning meters (signal strength and center-of-channel) at the extreme left completes the front-panel layout.

The back-panel layout of this receiver is shown in Fig. 1, and a closeup of three important new controls, located at the upper left of the rear panel is shown in Fig. 2. These three controls adjust the CD-4 demodulator so that it works optimally with the phono cartridge of your choice. Of course, a cartridge capable of response to 45,000 Hz or so is required. A 7-in. test record, recorded at 45 rpm, is supplied with the receiver and provides the necessary tones to enable you to adjust CD-4 circuitry for best separation and proper carrier level, since this may vary from cartridge to cartridge. Once adjusted, these controls need not be touched again unless a new cartridge is employed at some future date. Phono input jacks are associated with a slide switch which selects the two phono input sensitivity levels. The required jacks for AUX and both TAPE MONITOR circuits are centrally located on the back panel, as is a DIN socket to fit stereo tape recorders equipped with a DIN connector. Antenna connections as well as speaker connections (enough for eight speakers—two full quadraphonic sets) are made by means of short-proof spring-loaded terminals which permit you to slip the stripped end of a wire in a small hole when the terminal is depressed. Antenna terminals include 300-ohm and 75-ohm connections as well as external AM. Just below the ferritebar antenna are five more jacks. One of these is an FM-detector output jack, intended for future connection of a quadraphonic FM adaptor, if and when the FCC approves a system for discrete quadraphonic broadcasting. The other four jacks will accept the four signals reconstituted from such an adapter, so that you don't have to use up one set of "tape in" jacks for this purpose. A little slide switch adjacent to these jacks will provide the necessary "circuit interruption" point. For the moment, this switch comes with a locking plate to prevent its accidental use. One switched and one unswitched A.C. receptacle and a line fuseholder complete the back panel layout.

Circuitry

An internal view of the chassis is shown in Fig. 3. Considering the amount of circuitry contained in the 4VR-5446, the layout is amazingly neat and orderly. Circuit-board modules are screened with complete parts identification, corresponding to schematic symbols for ease of servicing. The only module that is not detailed in the schematic is the CD-4 demodulator board itself—and who can blame JVC for wanting to protect their licensing arrangement with other manufacturers? The front-end has an FET r.f. amplifier, while two IC's are used together with ceramic 10.7 MHz filters in the i.f. section. Stereo multiplex decoding is accomplished by a single 14-pin dual in-line IC. All tuner functions are arranged on a rather large, single p.c. board, onto which is mounted the shielded front-end. Matrix decoding circuitry uses discrete parts, and there is no logic or gain riding for either the MATRIX 1 or MATRIX 2 switch positions. Tone controls (both the simple bass and treble used for the rear channels and the multiple S.E.A. arrangement used for the front channels) are of the feedback type, and dual positive

and negative voltage supplies of 30 volts d.c. are used to power the pure complementary symmetry, direct-coupled output stages of all four power amplifier sections. An electronic protection circuit activates a relay in the event of overloads and also provides a turn-on delay to prevent popping sounds from being heard at turn-on.

FM Performance

Although the emphasis in this receiver is obviously placed on its four-channel flexibility and capability, FM performance proved to be consistently better than claimed by the manufacturer, as shown in Fig. 4. IHF sensitivity on the unit tested was 1.8 μ V while ultimate S/N reached a level of -67 dB for all input levels above 20 microvolts or so. Harmonic distortion (in mono) reached a low of 0.3%.

Capture ratio, measured at 100 μ V, was 1.5 dB while AM rejection at the same input level was 65 dB. Alternate channel selectivity measured close to 70 dB as opposed to the 65 dB claimed.

THD for stereo FM at mid frequencies measured 0.6%, and a plot of distortion for both mono and stereo at all audible frequencies is shown in Fig. 5 along with stereo FM separation. Muting on this receiver was adjusted for an input signal level of about 10 μ V—a bit high for our taste, but very positive in its action with no audible transitional effects.

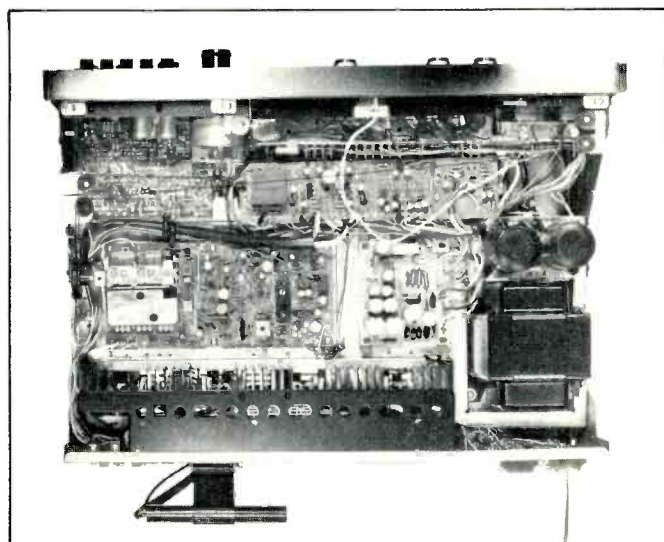


Fig. 3—Internal view of chassis.

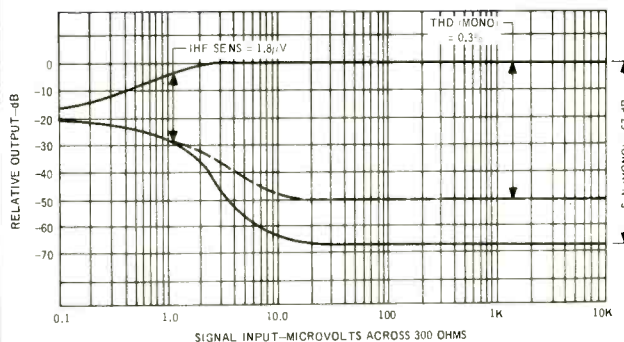


Fig. 4—FM characteristics.

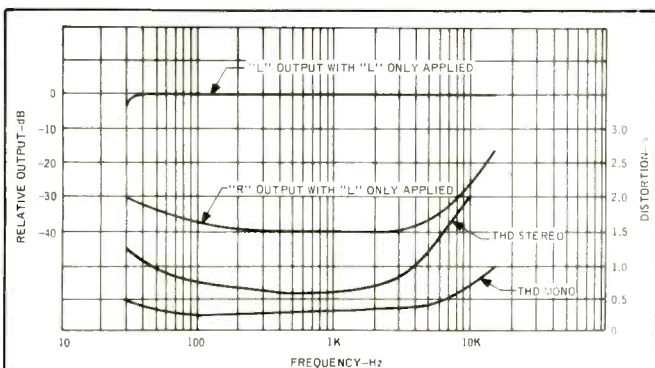


Fig. 5—Separation and distortion characteristics.

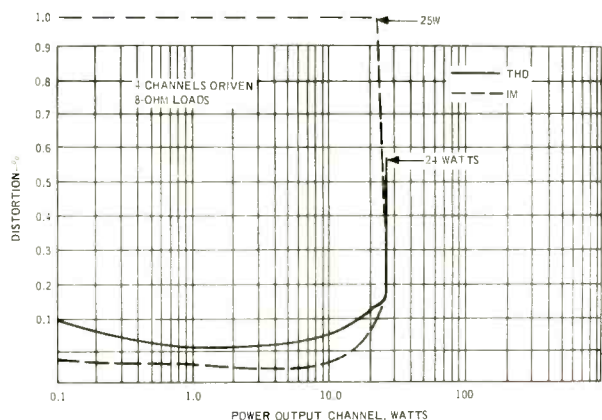


Fig. 6—THD and IM characteristics at 1kHz.

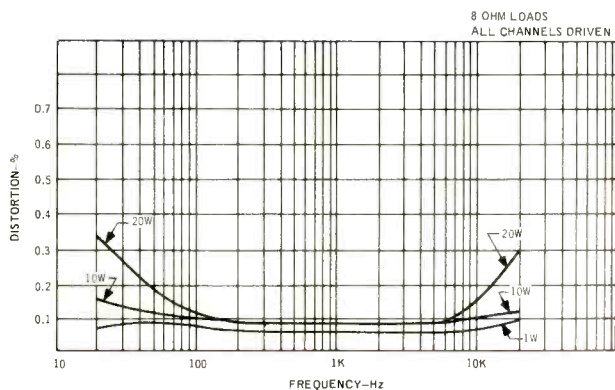


Fig. 7—Distortion vs. frequency at various power output levels.

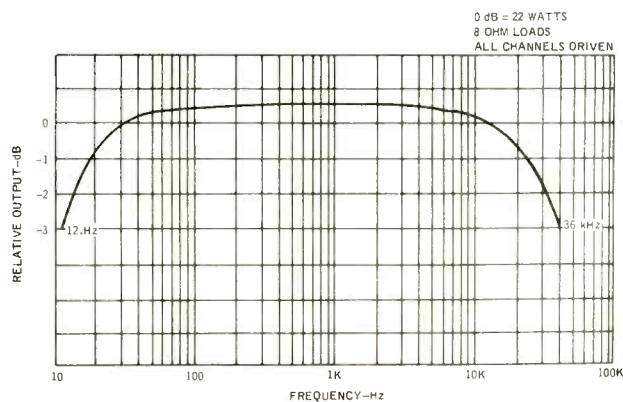


Fig. 8—Power bandwidth.

Amplifier Measurements

At rated output (22 watts per channel, with all four channels driven), harmonic distortion reached 0.2% while rated THD of 0.5% occurred at an output of 24 watts per channel. IM distortion, under the same conditions of measurements, reached 1.0% at 25 watts of power output per channel and remained well below 0.1% for all power output levels below 20 watts. Results of these measurements are shown in Fig. 6.

JVC claims only 20 watts per channel for this receiver if all frequencies from 20 Hz to 20,000 Hz are considered, but that claim, too, is somewhat conservative, as can be seen from the graphs of Fig. 7. At the 20 watt level, THD at 20 Hz and 20 kHz measured 0.24% and 0.3% respectively. In the strapped mode (not plotted graphically), maximum power per channel at mid-frequencies measured 48 watts for rated distortion of 0.5%. Power bandwidth is shown in Fig. 8.

Tone control range for the back channels is plotted in Fig. 9, while the multiple tone control arrangement of the front channels can provide the degrees of tonal adjustment plotted in Fig. 10.

Listening Tests

Since our laboratory is now equipped with a separate CD-4 demodulator (also made by JVC) and a full-logic separate SQ decoder, this provided us with good reference points from which to judge the four-channel performance of the 4VR-5446 in both matrix and discrete modes. To begin with, the built-in CD-4 demodulator of the receiver works fully as well as the separately available demodulator from that firm. We tried cartridges from JVC (their model 4MD-20X), Audio-technica (their AT15S) and experimental models of CD-4 cartridges from Shure and Pickering. All of them performed satisfactorily and apparently had enough 30 kHz output to be well within the range of adjustment of the "carrier adjust" control on the back of the receiver. As suggested by JVC, we did find it necessary to readjust separation controls for each cartridge, though the amount of adjustment was very slight. Residual noise heard when playing CD-4 records is still a bit higher than one expects in stereo, but this is probably more a problem of the software which keeps getting better all the time. As for separation, you just can't beat CD-4, and most of the records now available take full advantage of that fact.

By comparison, the MATRIX 1 and MATRIX 2 settings, when used to play SQ or other matrixed discs come off second best, since the 4VR-5446 has no built-in logic or gain riding circuitry. In fact, even the MATRIX 1 position, which is supposed to be used with SQ encoded discs, sounded to us as though it's decoding coefficients were *not quite* those recommended by SQ proponents. The four-channel effects were there, alright, but instrument directionality was different from that observed using a bona fide SQ decoder with dual logic included. In other words, we detected not just *decreased* localization, but altered instrument locations. Bear in mind that if you did not have other decoding equipment with which to compare these results, you'd probably never know the difference, since in every case, instrument location is a product of the imagination of the record producer or recording engineer in the first place and is often quite arbitrary.

As for the usual things we listen for, power output was clean and quite adequate for our medium efficiency air-suspension systems in a room measuring about 15 feet by 20 feet. We were able to overdrive the amplifier sections, but only at levels that most listeners would deem far too loud for the listening room in which we played the receiver. Because of the tricky requirements of four-channel balancing, we did not particularly like the dual volume control/dual

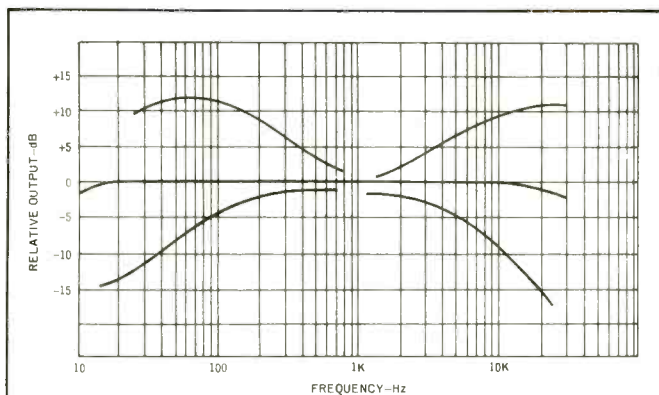


Fig. 9—Rear channels tone control range.

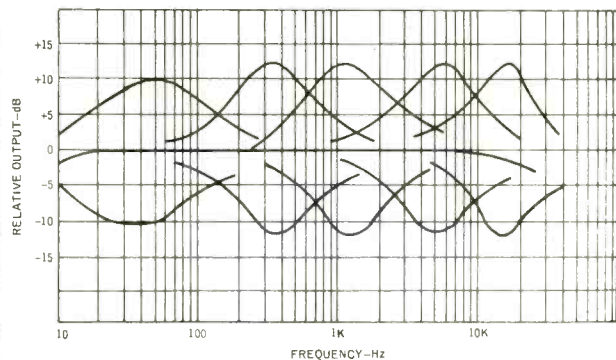


Fig. 10—Control range of 5-section "S.E.A." feature on front channels.

balance control arrangement on the 4VR-5446. These controls, as well as the tone controls, have nice "click-stops" for easy repeatability, but the clutch arrangement between front and rear sections makes it a little difficult to offset these sections in attempting to balance the levels of front and rear to suit our listening position. In other words, front-to-rear balance (most often required in typical four-channel listening situations) is accomplished by the settings of front and rear volume controls, which are concentrically mounted, while left/right balance is done by another pair of concentrically mounted controls. In the absence of a "joystick" type of balance control (which is included on the available remote control option), an easier-to-use arrangement would have been a front-rear balance control and a master volume control concentric to a left-right overall balance control. No more knobs, but an easier arrangement for the consumer to use. While it may be argued that settings need be made only at the outset, the fact is that we found different settings required when listening to CD-4 compared with four-channel tapes or matrix records.

FM performance was every bit as good as we would have expected from the lab-measured results, although stereo switching threshold might have been set a bit lower. Currently, stereo is received only if incoming signals are above 20 microvolts in strength which limited our number of logged stereo transmissions to about 15 out of the 46 usable signals received.

Overall gain of the receiver remains constant when switching from the four-channel mode to the stereo or strapped mode. Incidentally, because of the particular paralleling approach used by JVC in "strapping" the amplifiers, the instruction booklet cautions against using speakers of less than 8 ohms if the receiver is to be used for two-speaker

stereo setups. In the four-channel mode, of course, any impedance from 4 ohms to 16 ohms will be satisfactory.

JVC's S.E.A. tone control system, supplied for the front channels only in this receiver, is effective in tailoring the response to the needs of the speakers or room acoustics. However, since it is only provided for front channels in this model, we would recommend leaving all the five levers in the "flat response" position if you're going to be listening to "matrix" quadraphonic discs through this receiver. The separation afforded by matrix discs when no logic circuitry is provided can be upset if extreme tonal compensation is inserted in part of the spectrum for the front channels without similar tonal compensation inserted for the rear channels. Under those circumstances, instruments have a way

of "drifting" as they play up and down the musical scale.

At just under \$600.00, the JVC 4VR-5446 is representative of many current receiver designs which pack lots of four-channel circuitry into a single chassis together with moderate power output when compared with stereo-only receivers costing considerably less. If the very most sophisticated in matrix technology or huge amounts of power are what you desire, you may have to wait a while, opt for one of the higher-powered, more expensive all-in-one receivers (such as JVC's 4VR-5456) or build your system of separate components (also more expensive). But if CD-4 and matrix reproduction in a single-unit, reasonably-priced receiver is what you're after, the 4VR-5446 will most certainly provide you with good reproduction.

Leonard Feldman