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AKAI GX-F90 STEREO CASSETTE DECK

Manufacturer's Specifications

Frequency Response: 25 Hz to 17 kHz, 25 Hz to 17.5 kHz with CrO₂ tape, 25 Hz to 21 kHz with metal tape

Harmonic Distortion: 0.6 percent for 1 kHz at meter zero with metal tape.

Signal/Noise Ratio: 62 dB with metal tape.

Erase: 70 dB.

Input Sensitivity: Mike, 0.25 mV; line, 70 mV.

Output Level: Line, 410 mV; head-
phone, 100 mV into 8 ohms.

Flutter: 0.03 percent wtd. rms, 0.08 percent wtd. pk.

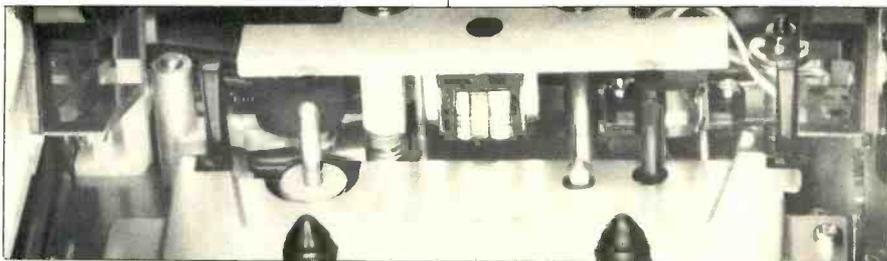
Tape Speed: Within ± 0.5 percent.

FF & RWD Times: 60 S with C-60.

Dimensions: 17.3 in. (440 mm) W x 4.1 in. (105 mm) H x 14.6 in. (370 mm) D.

Weight: 21.6 lbs. (9.8 kg).

Price: \$675.00.



The Akai GX-F90 cassette deck provides excellent performance and has many features of interest, including three long-life heads, fluorescent bar meters, and a logic/solenoid system. The front panel is an attractive brushed aluminum with black designations. There are separate push-button switches for *Memory*, *Repeat*, *IPLS* (Instant Program Location System), *Cal Tone*, *MPX Filter*, *Dolby NR*, and *Monitor*, *Tape* or *Source*. Each of these has a green light which immediately answers any question about deck status. Use of IPLS allows fast winding to the beginning or end of a particular selection, with automatic stop at that point. *Cal Tone* injects a 400-Hz tone for record calibration to ensure accurate Dolby tracking. There are also similar buttons for resetting the counter and ejecting a cassette, and a larger

one for power on-off. There are two rotary switches with bar knobs for *Timer Start (Rec-Off-Play)* and *Tape Selector*, which has an adjacent illuminated window to show *LN*, *LH*, *CrO₂* or *Metal*.

Eject causes the cassette carrier to move out and tilt down. The door/cover can be removed to facilitate any maintenance tasks. The light-touch tape-motion buttons are logic controlled with substantially any change in mode allowed — including adding record while in play, going into record from fast wind, etc. The *Rec Mute* is right in the same line, as are *Rec Cancel* and the *Peak/VU* meter-mode switches. With the exception of *Stop*, all of the transport control buttons are illuminated: Yellow for the two wind functions, green for *Play*, red for *Rec* and *Rec*

Mute, and orange for Pause. This nice feature is made even better with Play flashing when in Pause, rewinding with Repeat or winding with IPLS, and Rec Mute flashing when it is in operation — each one "saying" what must be done next to return to the previous mode. Rec Cancel is an unusual feature that will be of definite use to some. If you begin recording what you don't want, a push of this one button puts you back at the start in Rec and Pause, ready for another try.

The Peak/VU switch selects the dynamics of the bar-graph meters, and there are handy status lights to make certain the user doesn't get confused. The bar segments are a light blue up to meter zero and a sort of light brown from there up to the maximum of +8. The Dolby-level reference is at +4 dB. There are two segments for each level step, 24 sets in all, with single-dB steps from -3 to +8 dB, where the best resolution is needed. The peak-level calibration is 7 dB lower than that for VU, which is actually a very good idea because then the maximum meter indications will be about the same for both meter modes. There are dual-concentric level pots for both mike and line, allowing mike-line mixing. The knobs are of a good size and have clear indices, and the friction is just right for making single-channel adjustments.

The screwdriver-adjust, center-detent record-calibration pots are just below the level pots, and the mike phone jacks are just to the right. Use of the left-channel mike jack only will feed that signal to both channels. The knob of the output pot is small, but it is adequate for controlling the level to the headphones and to line out. The line in/out phono jacks are on the rear panel, as is a socket for the optional remote control. Access to the interior was gained with the removal of the steel top and side cover, securely held in place with several machine screws — a touch of quality. The soldering on the p.c. boards was generally very good with little flux residue. The large signal p.c. board, just

Table 1—Record/playback responses (-3 dB limits).

| Tape Type | With Dolby NR | | | | Without Dolby NR | | | |
|----------------|---------------|------|--------|------|------------------|------|--------|------|
| | Dolby Lvl | | -20 dB | | Dolby Lvl | | -20 dB | |
| | Hz | kHz | Hz | kHz | Hz | kHz | Hz | kHz |
| Maxell UD-XL I | 30 | 7.2 | 31 | 17.0 | 30 | 7.3 | 31 | 19.3 |
| BASF Studio II | 30 | 7.2 | 29 | 18.0 | 30 | 7.1 | 29 | 20.0 |
| TDK MA-R | 30 | 12.8 | 29 | 20.3 | 30 | 12.8 | 29 | 20.5 |

Table II—Signal/noise ratios with IEC A and CCIR/ARM weightings.

| Tape Type | IEC A Wtd. (dBA) | | | | CCIR/ARM (dB) | | | |
|----------------|------------------|-------|------------|-------|---------------|-------|------------|-------|
| | W/Dolby NR | | Without NR | | W/Dolby NR | | Without NR | |
| | @DL | HD=3% | @DL | HD=3% | @DL | HD=3% | @DL | HD=3% |
| Maxell UD-XL I | 62.0 | 65.0 | 53.4 | 56.4 | 61.5 | 64.5 | 51.3 | 54.3 |
| BASF Studio II | 63.0 | 65.0 | 54.7 | 56.7 | 62.5 | 64.5 | 52.5 | 54.5 |
| TDK MA-R | 63.9 | 66.4 | 55.3 | 57.8 | 63.0 | 65.5 | 52.5 | 55.0 |

above the logic board, had all parts identified, including adjustments. Interconnections were made mostly with wirewrap, with some direct soldering and some multi-pin connectors. There were three fuses in clips on the power supply p.c. board. The dual-solenoid, two-motor drive system was judged to be of good construction. The large power transformer was surrounded by a shield, and it and other components were well supported within a rigid chassis frame.

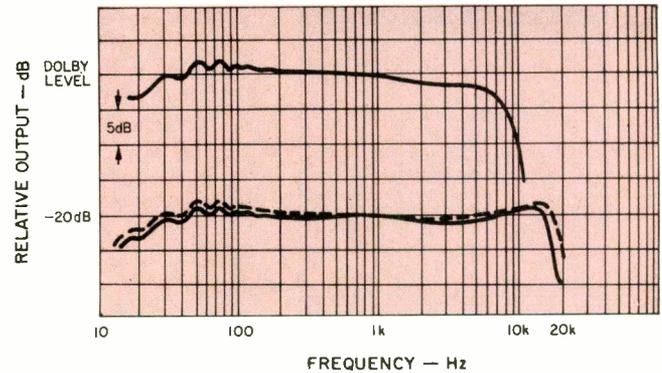


Fig. 1—Frequency responses with and without (---) Dolby NR using TDK AD tape.

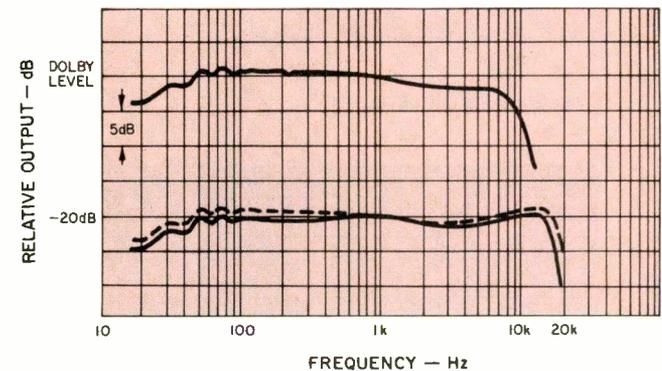


Fig. 2—Frequency responses with and without (---) Dolby NR using Maxell UD-XL II tape.

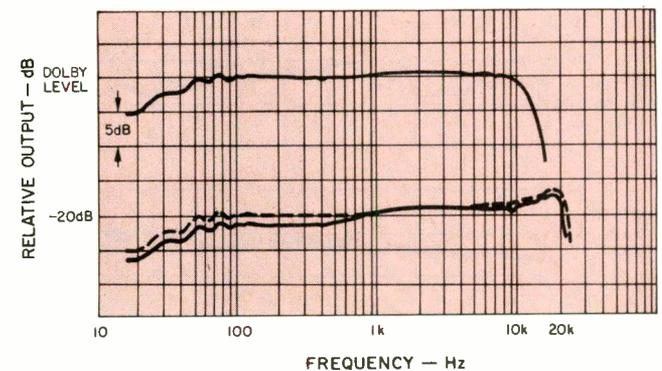


Fig. 3—Frequency responses with and without (---) Dolby NR using Ampex MPT tape.

The Akai GX-F90 cassette deck has many useful features and very good to excellent performance in every area.

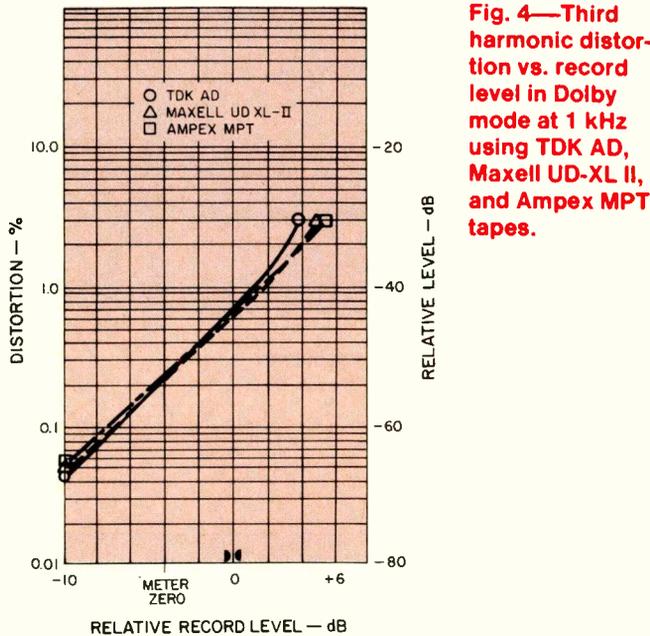


Fig. 4—Third harmonic distortion vs. record level in Dolby mode at 1 kHz using TDK AD, Maxell UD-XL II, and Ampex MPT tapes.

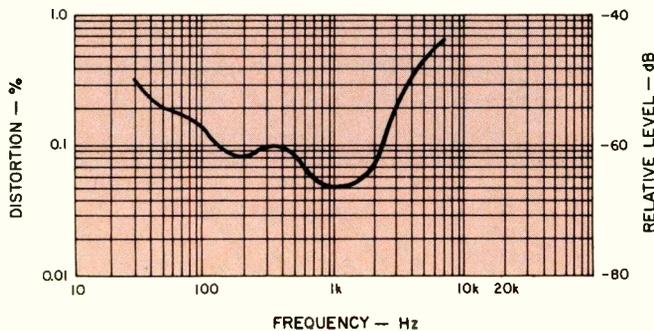


Fig. 5—Third harmonic distortion vs. frequency in Dolby mode at 10 dB below Dolby level using Ampex MPT tape.

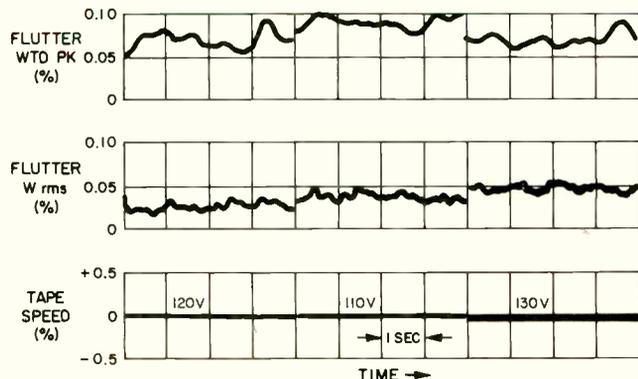


Fig. 6—Tape play speed vs. line voltage and wtd. rms and wtd. pk. flutter, three trials each.

Performance

The first step in the testing was to check the GX-F90 with standard alignment tapes. With both equalizations (120 and 70 μ S), responses were very good at the lower frequencies but were down 3.5 to 4 dB at the highest frequencies. Tape play speed, on the other hand, was very accurate: 0.05 percent slow at most. The level indications on the meters were both within a dB of the standard. Pink noise and a 1/3-octave RTA were used, as usual, for fast surveys of a large number of possible formulations for use in testing. Akai is to be praised for listing both recommended tapes and the standard reference tapes they use for setting up the deck. I found very close agreement with their list although my tapes for test (TDK AD, Maxell UD-XL II and Ampex MPT) were not their reference tapes. Figures 1 to 3 and Table I show the swept-frequency response results with and without Dolby NR, both at Dolby level and at 20 dB lower. With the AD and UD-XL II tapes, there appeared to be a possible influence from the drooping play response mentioned earlier, including the little saddle (droop) around 4 kHz, 1.5 dB at most. The responses with the metal tape are different, being elevated slightly from about 1 kHz out. Nonetheless, all of these results are quite good, and if the deck had bias trim, the responses could have been made smoother, gaining better Dolby tracking.

The 400-Hz (441 Hz actual) calibration tone had about 0.8 percent THD, quite acceptable for the purpose. With Maxell UD-XL II tape, the record calibration pots had a range of adjustment of about ± 5 dB. With a 10-kHz test tone, there was a 70-degree phase discrepancy between tracks — typical for the combination head design used. There were 25 degrees of phase jitter, better than most cassette decks. The output polarity was in phase with the input signal. The multiplex filter was 3 dB down at 16.1 kHz, and it was a good 34.8 dB down at 19 kHz. With a 1-kHz test tone, erasure was greater than 80 dB, and separation was 43 dB. Crosstalk was down at least 60 dB, with larger and more desirable figures at times. Erasure of the metal tape at 100 Hz was greater than 70 dB, very good performance. Bias in the output during recording was very low, though there were some beat notes at the very highest frequencies of the swept test tone used for the responses.

HDL₃ (the level of third harmonic distortion) was measured for a 1-kHz tone from 10 dB below Dolby level to the point where the distortion reached 3 percent for each of the three tapes (Fig. 4). The curves are quite linear, with just a slight upward curving at the distortion limit. The 0.05 percent distortion figure at -10 dB shows that there was very low distortion in the electronics, as well as in the magnetic process. The signal-to-noise ratios with both IEC A and CCIR/ARM weightings were measured with and without Dolby NR, and the excellent results are shown in Table II. HDL₃ was also measured over a range from 30 Hz to 7 kHz with Ampex MPT tape at 10 dB below Dolby level (Fig. 5). The results are excellent in the mid-frequencies, and the increases at the frequency extremes are less than with many recorders.

Input sensitivities were 0.23 mV for mike and 65 mV for line, both a little bit better than spec. The input overload points were very high: 56.9 mV for mike and 30 V for line, where waveform rounding first appeared. The output clipped at +18.1 dB relative to meter zero. The two sections of both input level pots tracked within a dB from maximum down about 60 dB, excellent performance. The output pot tracked within a dB down about 45 dB. The 100-mV headphone drive to 8 ohms was fine for most

The GX-F90 has three heads, fluorescent bar meters, and a logic-controlled solenoid transport system.

phones, though the volume was on the low side with an AKG 600-ohm set. The line outputs were 414 mV, and they dropped just slightly (to 410 mV) with the IHF 10-kilohm load.

In VU mode, the bar-graph meters had a response time of 240 mS, slightly fast, and there was no overshoot. In Peak mode, the response times were substantially to IEC Standard 268-10, actually being slightly fast: Only 2 dB down with a 3-mS burst, where the standard calls for -4 ± 1.0 dB. The fall time was 1.0 second, slightly short for easy reading. All of the scale calibrations were exactly accurate, from -20 dB to +8 dB, much better than most meters. The meter response was not polarity sensitive in either mode, and the increased level from a sine wave with d.c. offset (or a single-polarity peak, if you will) was correctly shown. This is additional evidence of excellent design by Akai.

The speed characteristics of the GX-F90 were also impressive. The tape speed at 120 V was one of the most accurate ever measured. Variations with time were very low, and there was just a slight lowering of speed at 130 V. There were the expected variations in flutter with trial and cassette, but typical figures were 0.035 percent wtd. rms and 0.075 percent wtd. pk., certainly better than most decks. Wind times averaged 69 seconds with a C-60, which is over spec, but still fast enough. Run-out to stop time was 2 S, and any change in transport mode was made in 1 second or less.

In-Use Tests

Tape loading and unloading was simple and convenient, and

there was easy access for maintenance, especially with the door/cover removed. It was a distinct pleasure to use the Akai deck with the many helpful status lights, particularly the flashing *Play* and *Rec Mute* buttons, calling attention to what needed to be done. Setting record levels accurately was quite easy with the good pots and the peak/VU metering. Everything was completely reliable, including IPLS and timer-start functions. The trilingual owner's manual provided sufficient detail in most respects, but the text was confusing on the use of peak metering. There was also a reference to "occasional motor lubrication," which is not as clear as, say, "every XXXX hours of operation."

Record/playback listening was done first with pink noise as a source, and then several records, which included Haydn's *Symphony No. 59* and Bach's *Suite No. 2*, both with Marriner and the Academy of St. Martin in the Field, Diahann Carroll with the Ellington Orchestra (Orinda Records), and the Maxell samplers. The results were really very good, but it was possible to detect some dulling with the noise source and TDK AD and Maxell UD-XL II and some brightening with Ampex MPT. With the music, changes were more subtle, but there were some similar indications, mostly with the vocal by changes in presence. Record, pause, and stop noises were very low, just detectable at times.

Overall, the Akai GX-F90 deck has many useful features and very good to excellent performance in every area. It is most worthy of comparison to any of the other decks in its price range.

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