Prying apart a portable audio player

ree after $65 rebate with free shipping. That's the deal that routed a refurbished Sandisk Sansa M250 from Newegg to my front door last summer. I suspected it would make a fine Prying Eyes patient, and, as it turns out, I was right. Let's see what's inside, shall we?

The system's "brains" consist of an ARM9-based and USB2-support-inclusive Telechips TCC770. The Sansa M250's built-in microphone for voice recording and subsequent playback likely harnesses the CPU's ADPCM (adaptive-differential-pulse-code-modulation)-audio-codec support.

The Sansa M250 embeds a single battery-backed, 16-Mbit Elite Semiconductor M12S16161A SDRAM, supplementing the 64 kbytes of SRAM within the Telechips TCC770. Among other functions, the SDRAM probably acts as a "shadow" for the direct execution of system code that the NAND-flash memory stores.

Above the SDRAM and an intermediary piece of cushioning foam are two 1-Gbyte Samsung K9K8G08U0M NAND-flash-memory devices on a double-sided daughter-card. This modular arrangement gives Sandisk the flexibility to leverage a common primary-PCB design across multiple Sansa M200 family proliferations—having 512-Mbyte, 1-Gbyte, and 4-Gbyte capacities—and to source NAND-flash memories in multiple IC-density, architecture, and supplier variations.

Texas Instruments' TLV320AIC-23B two-channel codec—that is, ADC and DAC—with headphone amplifier is another notable IC in this design; however, the player doesn't fully harness the chip's 24-bit maximum per-channel sample size and 96-kHz peak sample rate.

The Sansa M250 uses the Philips (now NXP Semiconductors) TEA5767HN FM radio IC for playback only—that is, the Sandisk unit offers no support for live recording and later listening. The lack of a discrete antenna embedded within the Sansa M250's plastic case probably indicates the use of the headphone wire for this function.

The Telechips TCC770 advertises limited-codec image-decoding support: JPEG pictures and MPEG-4 Simple Profile video clips. The Sansa M250 collateral makes no mention of image-file capabilities; then again, the unit's 128×64-pixel monochrome LCD wouldn't really do them justice, anyway.