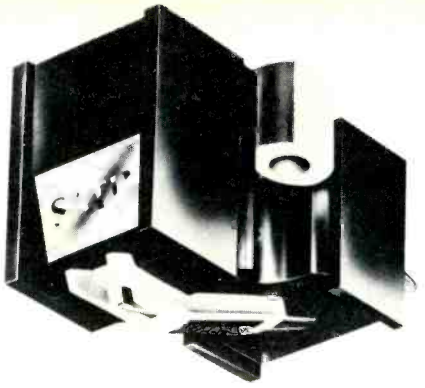
Satin M-18BX Moving-Coil Phono Cartridge



MANUFACTURER'S SPECIFICATIONS
Type: Moving coil.
Stylus: Diamond, 0.1 x 2.5 mils (Shibata).
Cantilever: Beryllium.
Tracking Force: 0.5 - 1.5 grams.
Output Level: 1.2 mV ±2 dB at 1 kHz (5 cm/sec rms 45°).
Frequency Range: 10 Hz - 40 kHz.
Crosstalk at 1 kHz: 30 dB.
Impedance: 16 ohms.
Load Impedance: 30 to infinite ohms.
Compliance: 20 x 10^{-6} cm/dyne.
Weight: 9.5 grams.
Replacement Stylus: 18-NBX.
Price: $350.00.
U.S. Distributor: Osawa & Co. (U.S.A.), Inc., 521 Fifth Ave., New York, N.Y. 10017.

Satin Co., Ltd., of Kyoto, Japan, introduced the first moving-coil cartridge that did not require a pre-preamp or a transformer, but instead could be inserted directly into the phono input jacks of most preamps. The Satin cartridge is a true moving-coil cartridge without the use of rubber or iron in its construction. Only the coil oscillates in the magnetic field. The cantilever pivot is fixed at one point (similar to that in a cutting head), and the cantilever does not rotate around its axis.

The amount of voltage produced by a moving-coil cartridge is wholly dependent on the size of the coil, the strength of the magnet, and the travel distance of the coil in the magnetic field. The Satin M-18BX has an aluminum ribbon coil (pancake form) made from an extremely thin aluminum ribbon which permits more turns of aluminum wire in a limited space. This also brings the weight of the coil to a relatively low level. This very light coil moves in a 250-micron gap in which the anisotropic Alnico 9 magnetic structure concentrates a magnetic flux density of 15,000 Gauss (average magnetic flux density in a moving-coil cartridge is about 2000 Gauss). The amount of coil movement is controlled by an electro-dynamic damping system.

The current Satin M-18BX cartridge has been improved over the version originally available. The improvement consists of a continuous outer ring-loop of berryllium-copper alloy surrounding the aluminum ribbon coil, which loop is grounded so as to act as a shorted turn to increase damping of the high frequencies, thus reducing the brightness. This feature is known as electromagnetic damping.

It is a rare moving-coil cartridge where the user can replace the stylus assembly without returning the cartridge to the factory for this work. The Satin M-18BX stylus assembly is held in place by a magnetic force, thus permitting easy replacement of the stylus assembly by the user.

This cartridge is designed to work into a load impedance ranging from 30 ohms to infinity. This low impedance is advantageous because it permits the use of longer phono cables and cable capacitance is less critical.

The body of the Satin M-18BX is physically large and cannot be mounted in a universal cartridge shell, such as the Audio-Technica Model AT-N, because there is no room to move the cartridge forward when adjusting the cartridge for correct overhang. However, the cartridge mounts easily in the Technics cartridge shell whose front lip is about 3.5 to 4 mm high.

The cartridge pins are smaller than usual, thus it is necessary to either pinch the existing shell jacks to a smaller opening or replace the four wires with those supplied with the cartridge. Otherwise, the original shell wire jacks will be too loose for effective contact.

It is advisable, because of the heavy magnetic flux, to use turntables whose platter is made of nonferrous metal, otherwise the ferrous platter will pull down on the cartridge, resulting in a greater and uncontrolled tracking force.

As is our practice, measurements are made on both channels, but only the left channel is reported. During the test period, the average temperature was 74° F ± 1° (23.3°C) and the relative humidity 71 per cent ± 3 per cent.

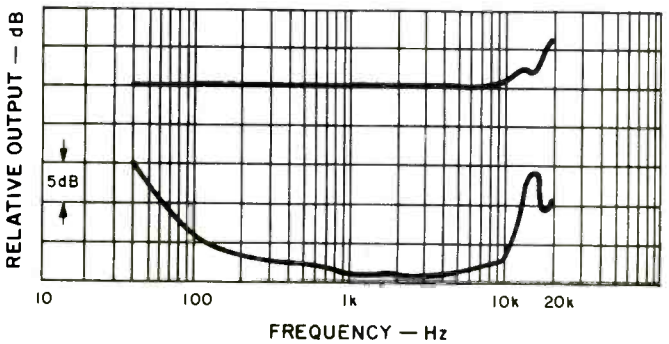
Frequency response, using the Columbia STR-100 test record and our reference tone arm, an Audio-Technica AT-1009, mounted on a Technics SP-10 turntable, is flat within 1 dB from 40 Hz to 7 kHz, rising slowly to +7 dB at 20 kHz. This peak is probably due to the tip mass resonating with the compliance of the test-record vinyl. Checking the 20 to 40 kHz response, we noted that there was sufficient rise at 30 kHz to work efficiently with a CD-4 demodulator for CD-4 record playing. Since CD-4 is in a quiescent state, we did not investigate this aspect of the cartridge. Separation over the audio range was quite good, being 24.25 dB at 1 kHz, 23 dB at 10 kHz, 15 dB at 15 kHz, and 20.5 dB at 20 kHz. The optimum tracking force for the cartridge we tested was 1.4 grams and the optimum anti-skating force was 2.25 grams. Because of its low impedance, capacitance appeared to have no noticeable effect. Square waves show a very fast rise time and a single cycle of substantial overshoot that quickly dies out, leaving a reasonably good square wave. The square wave indicates that there is a high frequency resonance of about 30 kHz.

There are a number of preamplifiers available today that do not have enough phono input sensitivity to be able to accept the rather low voltage (0.78 mV or 780 μV) from the Satin M-18BX. In such instances, we recommend the use of the Verion Type-S step-up transformer to supply the necessary voltage for the phono input stage. We have tested this combination and find it to be superb, with no apparent loss of sound quality. We have found the Verion transformer to be one of the best cartridge transformers available today.

The following test records were used in making the reported measurements: Micro-Acoustics TT-2002; Shure TTR-103, TTR-109, TTR-110, TTR-115; Columbia STR-100, STR-112, STR-120, SQT-1100, JVC TRS-1005, TRS-1007; Deutsches HiFi No. 2; Nippon Columbia Audio Technical Records (PCM) XL-7004-6.

Wt. 9.39 g; d.c. res. 14.75 ohms; ind. 9.3 μH; opt. tracking force 1.4 g; opt. anti-skating force 2.25 g; output 0.22 mV/cm/sec; IM dist. (4:1) + 9 dB lateral, 200/4000 1.1 per cent, +6 dB vertical, 200/4000 3.2 per cent; crosstalk (using Shure TTR-109) -30 dB; ch. bal. 0.5 dB; trackability: high freq. (10.8 kHz pulsed) 30 cm/sec, mid-freq. (1000 + 1500 Hz lateral cut) 25 cm/sec, low freq. (400+4000 Hz lateral cut) 24 cm/sec;

Fig. 1 — Frequency response and separation.



Deutsches HiFi No. 2 300-Hz test bands tracked to 86 microns (0.0086 cm) lateral at 16.20 cm/sec at +9.66 dB level and 55.4 microns (0.00554 cm) vertical at 10 cm/sec at +5.86 dB level. Arm-cartridge resonance +4.25 dB at 6.8 Hz.

The Micro-Acoustics TT-2002 test record was used to check for tracking and transient ability. The Satin M-18BX cartridge had no difficulty in playing all tracking ability bands, including one with the highest level a modern stereo cutter head can record. However, the sound of a small bell appeared to be a bit too bright. The stereo percussion levels check the cartridge for both vertical and lateral tracking ability. The computer-generated high, low, and high/low mixed frequencies presented no problem to this cartridge in terms of transient ability.

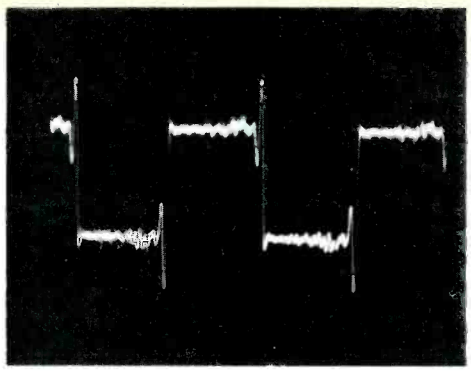


Fig. 2 — Response to 1-kHz square wave.

The Shure Audio Obstacle Course Era III was a challenge inasmuch as the musical bells were tracked only to level 4 (+10 dB), after that the definition was lost. The violin became strident after level 4. Both the sibilance and bass drum tests were passed at all levels without difficulty. With the newer Shure Era IV Obstacle Course, the Satin M-18BX cartridge sound became strident with some breakup apparent at level 5 (+12 dB) for the bells, flute, and harp and flute. The sound lost definition after level 3 (+8 dB) of the flute and bells, but passed the harp bands at level 5. These results indicate that the Satin M-18BX cartridge is able to track just about any record and that it has a good transient response.

Listening Tests

Our listening tests are performed both prior to actual laboratory tests and after all tests have been completed. When we first listened to the Satin M-18BX cartridge, we were amazed at the transparency that caressed our ears — truly unexpected. This was one of the most transparent sounds we have ever heard. Sonic clarity was excellent, as was the bass response. Even on extended listening, the cartridge still did not appear to impart sound or coloration of its own to the music.

The cartridge has a rising high end, as seen in the frequency response curve, and in view of this, we would caution users about combining the cartridge with speakers having an extended or rising high frequency response. However, we did not experience too bright a sound in our listening tests.

Records that are moderately to highly warped may be difficult to play since the cartridge has a very small clearance between the record and the cartridge body and, of course, cyclic rubbing of the cartridge and record can be quite annoying.

Cueing this and many other cartridges is difficult because the stylus tip is not readily visible. The record listening public would be ever grateful to the cartridge manufacturers if they would all mold an easily visible vertical center line on the front of the cartridge as well as on the head shell front. This line would assist in centering the cartridge on the shell and, most importantly, would be helpful in placing the non-visible stylus in the correct groove or band space when playing a record beyond band one.

The equipment used for the listening evaluation included a Technics SP-10 turntable with the Audio-Technica AT-1009 tonearm, Technics SP-10, Mark II turntable with its EPA-100 tonearm, Crown IC-150A preamplifier, a pair of Crown DC-300A amplifiers, each used in the monophonic mode, a pair of stacked Duntech DL-15B speakers for each channel, and a Columbia SQL-400A SQ decoder. A Platter Pad was used on one turntable, and the speakers were connected to the amplifiers with Polk Audio high definition, low distortion speaker cables terminated with an RC network.

A rigorous listening evaluation was conducted utilizing the specific records listed below as well as some of the records listed in previous reports. The records in themselves are excellent and were chosen to evaluate the capabilities of the Satin M-18BX cartridge to reproduce all manner of recorded sound as well as high levels without adding anything of its own to the music.

Stereo

Walter Carlos: *Switched On Bach* — Columbia MS-7194.
Pavarotti: *Hits from Lincoln Center* — London OS-27577.
Elgar: *Violin Concerto*, Chung, London Philharmonic Orchestra, Soli — London CS-7064.
Brahms: *Symphony No. 3 in F. Major, Variations on a Theme of Haydn*, The Cleveland Orchestra, Maazel — London CS-7095.
Liszt: *Les Preludes; Prometheus; Festklange, Vol. 2*, London Philharmonic Orchestra, Solti — London CS-7084.
Stravinsky: *Oedipus Rex*, London Philharmonic Orchestra, Solti — London OSA-1168.

Direct to Disc

Lee Ritenour: *Gentle Thoughts* — JVC Direct Disc V1DC-1-E.
Lee Ritenour: *Sugar Loaf Express* — JVC Direct Disc V1DC-2.
(Both the above are super direct-to-disc recordings that should be heard by all audiophiles. They are available at most major record stores as well as audio stores.)
Virgil Fox: *The Fox Touch, Vol. 2* — Crystal Clear CCS-7002.
The Third: *Take the A Train* — Toshiba LF-95001.
Vivaldi: *Vivaldi Tricentennial* — Sonic Arts Laboratory Series No. 8.
Mozart: *The Joy of Mozart* — Sonic Arts Laboratory Series No. 9. (The above three discs are distributed by Audio-Technica.)

Quadraphonic — SQ

Chicago: *Chicago VIII* — Columbia PCQ-33100.
Earth, Wind & Fire: *Spirit* — PCQ-34241.
Anthony Newman: *Organ Orgy* — Columbia MQ-33268.

Pulse Code Modulation

Le Gaillard: *Les Clavecinistes Francais* — Denon OG-7003-ND.
Invitation to the Pop Classical Music, Vols. 1 & 2 — Denon SX-7004/5.

Digital to Analog

Holst: *Suites Nos. 1 & 2; Handel: Royal Fireworks Music;* Bach: *Fantasia in G*, The Cleveland Symphonic Wings, Fennell — Telarc Digital 5038. (Although this is not the first digitally recorded symphony, this disc, which is being distributed by Audio-Technica, is the first to be released commercially; Crystal Clear was the first commercial company to record a symphony digitally and used the Stockham/Soundstream system. This is a good digital-to-analog recording, with only a few nits to pick — a lack of some highs, the bass drum tuned too high at 36 Hz, and some coarseness to the sound. However, in general, there is some great sound on this disc and, in particular, the impact of the bass drum is very good.)

Conclusion

Anyone desiring a moving-coil phono cartridge without the expense of a pre-preamp, head amp, or a step-up transformer (so long as their preamp has sufficient sensitivity), should seriously consider obtaining the Satin M-18BX for inclusion in their audio system. *B.V. Pisha*