

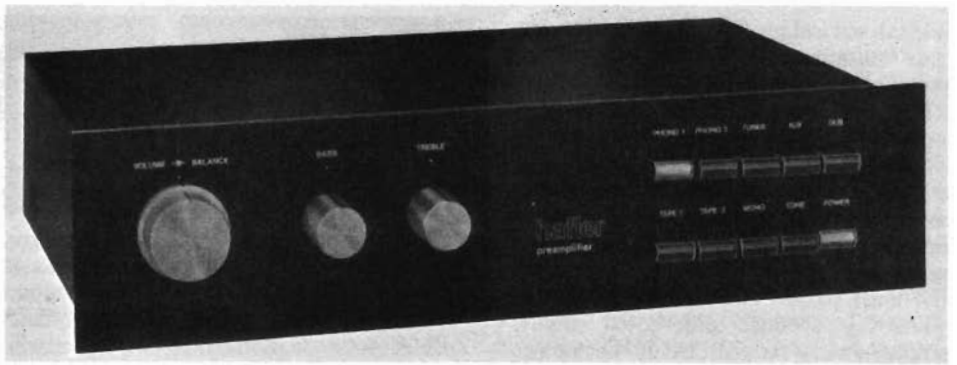
# Kit Report

by WALT JUNG  
and DAVID VORHIS

**M**OST TAA READERS will have heard by now of the DH-101, the new solid state preamp which is the first product of the David Hafler Co., (5817 Roosevelt Ave., Pennsauken NJ 081209). David Hafler is well known for his many previous contributions to audio, and is perhaps best known for his early association with Dynaco. At Dynaco, founder Hafler produced a number of audio products which were important and valuable to the home constructor, because they made high performance audio more affordable, and easily accessible to many.

The component audio market appears today to be definitely headed away from the lower cost, home built kit, which makes the DH-101 (available both wired and in kit) a very important product. It will be welcomed not only by the audiophile who enjoys the craft aspects of audio, but also by those pursuing better sound quality. As it turns out, the DH-101 represents a heretofore unavailable combination of performance and price in a kit at \$200. The wired version is \$300.

The DH-101's somewhat spartan packaging is evident in *Fig. 1*, a front panel view. The large concentric knobs are for VOLUME and BALANCE; the two smaller knobs are ganged BASS and TREBLE controls. The pushbutton switches at the right select the operating modes. With them one chooses either magnetic PHONO inputs one or two, TUNER, AUX and two TAPE inputs. A



*Fig. 1. Front panel view of the DH-101 preamplifier.*

DUB mode interconnects the play outputs and record inputs of two tape decks, even while another source is being auditioned. A MONO button sums the two stereo channels, and feeds the signal to both (line) outputs. The TONE button activates the tone controls, and the POWER switch powers the preamp as well as two of the four AC outlets. The remaining two outlets are "on" whenever the preamp is plugged in.

The DH-101 has two tape outputs, and one line (high level) output per stereo channel. The high level signal path can also be broken by removing a rear panel jumper, for external patching of an equalizer (or other similar processing equipment). Finished in black enamel the unit is 13 3/4" wide, 3 1/4" high and 8 1/2" deep, and weighs eight pounds.

## CIRCUIT DESCRIPTION

The DH-101 circuit employs the *Fig. 2* functional arrangement. All active circuitry, with the exception of the power supply components, is contained on a single large etched circuit card, visible in

*Fig. 3*, which is supported by the three front panel controls.

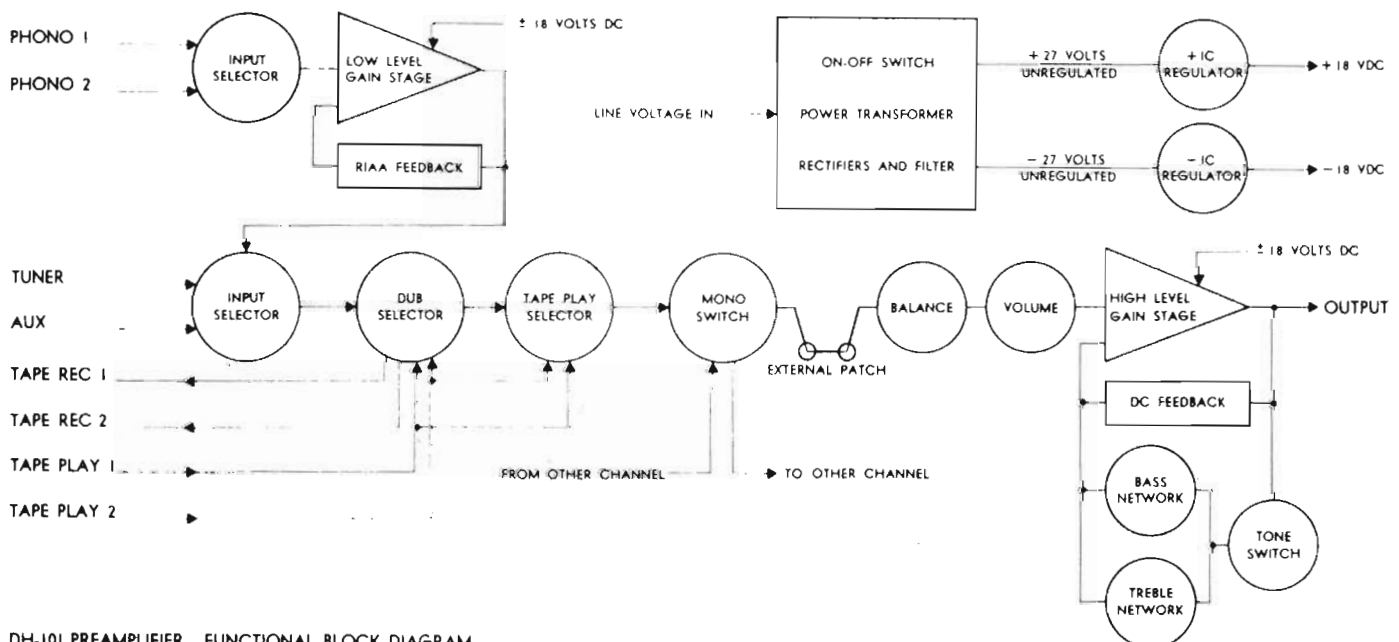
Also evident from this photo: the total absence of ICs in the signal paths of the DH-101. The power supply, contained within the corner shielded compartment, uses complementary IC regulators. The audio circuits themselves utilize discrete, highly sophisticated push-pull complementary transistor stages.

With the help of functional diagram *Fig. 2* let's follow a signal from a phono input to line output. The DH-101 phono circuit's push-pull input stage operates in complementary fashion with a push-pull output stage to lower signal distortion.

The DH-101 employs an equalization curve which is actually a hybrid of the old RIAA and the new Sept. 1976 IEC recommendation, which has a low end rolloff below 20Hz. (See the *Letters section*, this issue, for RIAA and IEC values table under the *Jung/Lipshitz interchange*.—Ed.) For comments on this curve see below, under performance.

Gain of the phono circuit is 34dB at 1kHz, and frequency response is specified to be within plus or minus 0.5dB of the RIAA standard, from 40Hz to 15kHz. Input capacity of the circuit is rated as 250pF, but may be optimized for in-

*Fig. 2. Functional diagram of the preamp.*



DH-101 PREAMPLIFIER FUNCTIONAL BLOCK DIAGRAM

dividual cartridges by alteration of the input capacitance. The resistive component of the input impedance is 47k.

The equalized, high level phono output from the phono preamp appears at the switching array, and when selected, this (or another) high level signal appears at the tape output and across the balance control. Volume level is adjusted thereafter, and the signal is applied to the high level output amplifier.

This is a dual differential input, complementary output circuit. Distortion of this (and the phono circuit) is quite low, and over most of the frequency range is near, or below, residual levels. Tone control equalization is accomplished within the feedback path, by the BASS and TREBLE controls and their associated components. The BASS control provides plus and minus 12dB of range (at 50Hz) with a movable turnover frequency characteristic. The TREBLE control provides plus and minus 10dB of range (at 20kHz), with a shelving type characteristic.

Gain of the high level section is rated as 20dB, with a frequency response of +0, -25dB from 20Hz to 20kHz.

The DH-101 circuitry is powered by a pair of 18V regulators. The full wave rectifier operates from a power transformer which can be strapped for 100-

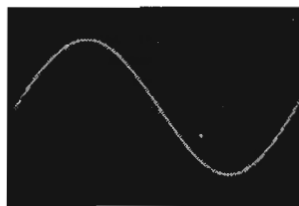


Fig. 5A. THD, phono in to tape out, 9V rms @ 20kHz.

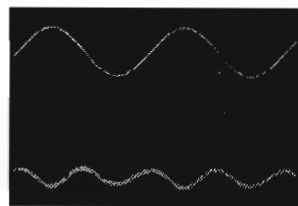


Fig. 5B. THD, phono to tape out, 3V rms @ 20Hz [top]. Distortion products of approx. 0.01% [bottom].

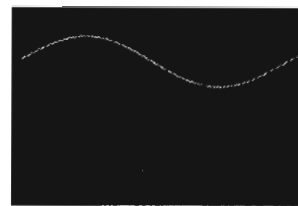


Fig. 5C. THD, phono to tape out, 3Vrms @ 50kHz [top]. Distortion products of approx. 0.02% [bott.].

120V, 200-240V, and for 50 or 60Hz sources. A single front panel LED indicates power "on." The unit's electrical specifications are summarized in Table 1.

## CONSTRUCTION

The DH-101 reviewed by TAA was assembled from a kit which is really quite straightforward. Construction time was just about four hours, although the manufacturer estimates the typical time as more like six hours.

Mechanical assembly is quirk free, with no serious problems. I had a minor interference between one of the power supply filter capacitors and the chassis lip, but this was solved by carefully orienting and elevating the capacitor.

The only circuit board assembly the

builder does is the power supply, the main board being supplied pre-wired and pre-checked. Personally I'd enjoy such a kit more if it were built from the ground up, but I do recognize the value of having the board shipped as checked out. Most of the wiring is interconnection. This is aided considerably by wire labels. A large foldout pictorial is the guide.

Anyone who can make a good solder joint should be able to successfully construct the DH-101. No adjustments of any kind are necessary before turn on. The TAA kit version worked immediately, with all modes functional.

## ELECTRICAL PERFORMANCE

On the bench, we put the DH-101 through a series of electrical tests for

TABLE 1: Electrical Specifications

### PHONO PREAMP SECTION

Type: Discrete transistor (no integrated circuits)  
 Rated output: 3 volts, 10 Hz to 100 kHz  
 Maximum output: 7 volts, 20 Hz to 20 kHz  
 Total Harmonic Distortion: Less than .0006% @ 1 kHz and 3 volts out  
 Slew rate: 12 volts per microsecond  
 Phono overload: 180 mV @ 1 kHz; 1.8V @ 20 kHz  
 Phono cartridge interaction at 20 kHz: unmeasurable  
 Hum and noise: "A" weighted 86 dB below 10 mV, 1 kHz input  
 Frequency response: Complies with RIAA specification 40 Hz to 15 kHz  $\pm$  0.5 dB  
 Hi-pass filter: In accordance with proposed RIAA revision (IEC publication 98, Amendment No. 4, Sept 1976)  
 Gain: 34 dB @ 1kHz  
 Input impedance: 47 k $\Omega$  in parallel with 250 pF  
 \*Input capacity can be modified to conform with cartridge requirements. Above value must be added to capacity of connecting cables to determine total cartridge load.

### TONE CONTROL SECTION AND HIGH LEVEL AMPLIFIER

Type: Discrete transistor (no integrated circuits)  
 Rated output: 3 volts, 10 Hz to 100 kHz  
 Maximum output: 7 volts, 10 Hz to 100 kHz  
 Total Harmonic Distortion: Less than .001% , 20 Hz to 20 kHz at rated output  
 Slew rate: 12 volts per microsecond  
 Rise time: 2 microseconds  
 Hum and noise: "A" weighted 90 dB below 10 mV  
 Frequency response:  $\pm$  0.5 dB, 20 Hz to 20 kHz  
 Gain: 20 dB  $\pm$  1 dB  
 Input impedance: Greater than 25 k $\Omega$   
 Bass control: Type: Moving inductor, 100 Hz to 20 kHz  
 Amount:  $\pm$  12 dB @ 50 Hz  
 Treble control: Type: Moving capacitor, 20 kHz to 20 kHz  
 Amount:  $\pm$  10 dB @ 20 kHz

### GENERAL SPECIFICATIONS

Number of semi-conductors: 28 transistors, 2 integrated circuit power supply regulators, 4 diodes, 1 LED  
 Inputs: Two phono, tuner, auxiliary, two tape recorders  
 Outputs: Two tape (buffered) and one program  
 Provision for patching in external equipment  
 Controls: Volume, balance, bass, treble, tape dubbing, input switching, mono-stereo, tone control engage, power on-off  
 Intermodulation distortion: At normal levels of operation, IMD, whether SMPTE or CCIF, from phono input to preamplifier output is below the residual of currently available instruments  
 AC voltage: 100-120 200 220 240, 50 60 Hz  
 Power consumption: 3.5 watts  
 AC convenience outlets: 2 switched, 5 amp continuous, 72 amp surge; 2 unswitched, 5 amp continuous

FIG. 4

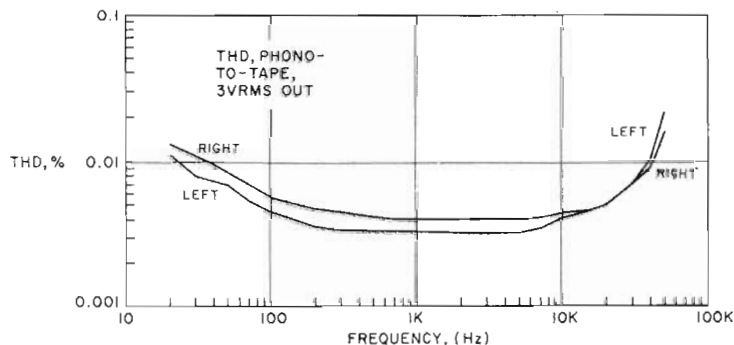


Fig. 4. THD, phono-to-tape, 3V rms out.

FIG. 6

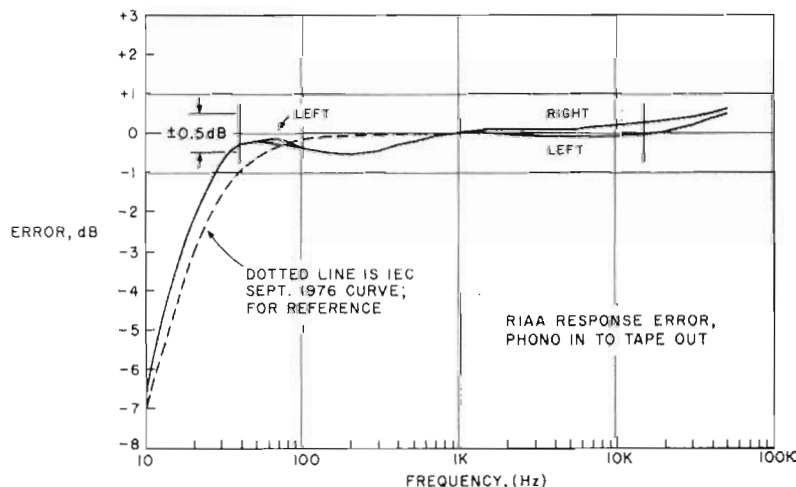


Fig. 6. RIAA response error, phono in to tape out.

distortion, noise, frequency response, and other matters discussed in this section.

### Phono Section

The makers claim very low harmonic distortion for both the phono and high level sections. In fact, in a supplementary note supplied with the kit the manufacturer states that under most conditions the distortion will be the residual of the measuring instrument.

The phono channels' distortion at the rated 3V output, checked at the TAPE output jacks, is plotted in *Fig. 4*. Over most of the frequency range the distortion is below 0.005 per cent, rising only at the frequency extremes. At low frequencies it appears that the distortion increase might be due to open loop gain limitations. At the high end the finite drive current available for the RIAA network causes the distortion rise.

At most frequencies and levels, the DH-101 phono section can be considered virtually distortionless. *Fig. 5* illustrates this fact with a few 'scope photos of typical outputs. *Fig. 5A* is a clean 9V rms level 20kHz sine wave, which shows the excellent linearity and freedom from HF distortion. The distortion which does occur at the frequency extremes is shown in *5B* and *5C*, which were taken at 20Hz and 50kHz, respectively.

The distortion rating for the DH-101

phono section for a 1kHz 3Vrms condition is listed as less than 0.0006 percent. I believe this must either be a simple misprint, and the Hafler people really mean 0.006 percent (a test which it passes). If they do in fact mean to claim THD products of 0.0006 percent, we have a semantics problem. You cannot measure this level of THD on a conventional analyzer (even if it is itself that clean), because of the DH-101's noise level, which referred to 3V, puts a distortion-plus-noise-floor at about -90dB, or about 0.003 percent (with respect to a 3V output level).

The frequency response or RIAA error of the DH-101 phono section was measured through a precision inverse RIAA network, and is plotted in *Fig. 6*. The measured results are compared to both the RIAA standard, and the 1976 IEC amendment. Deviation from true RIAA response is the difference from an ideal 0dB horizontal line, while deviation from the IEC curve is the difference between the measured curves and the IEC standard, shown dotted.

As you can see, the DH-101 falls between these two different equalization standards. Ed Gately, Hafler president, states that the intent of this "hybrid" curve is to give the general rolloff of the IEC curve, but with a closer adherence to the RIAA curve above 20Hz. The net-

work does this exactly.

However this intermediate equalization is (at least in our sample) achieved at the expense of a response dip of 0.5dB at 200Hz. This might raise the question for some audiophiles of *which* type of frequency response error will be more (or readily) apparent, a 0.5dB error at 200Hz (the DH-101 curve), or 0.5dB "error" at 50Hz (new IEC versus RIAA).

The IEC amendment LF rolloff doubtless has merit, in reduced woofer cone flap, IM distortion, and other related problems. I question the wisdom of casting the IEC curve in "concrete" as a standard for general recommended use, however, at least without an optional bypass for the user. It is highly unlikely that recordings will ever be made with a complementary LF boost. Many are now made with a 50Hz rolloff (to compound the problem).

Some will doubtless argue that a 20Hz, -3dB rolloff is inaudible. But is this *really* high fidelity? The result may be inaudible on speakers that roll off at 70 or 100Hz, but is evident on a good, powerful sub-woofer. The difference is in the visceral impact, and this is part of hi-fi, too, at least from my viewpoint.

My comments on this part of the DH-101 equalization curve are not intended to be a criticism of the fact that it is "near IEC" versus RIAA, but rather that the user really has no option in the matter. I

feel the DH-101 would be a more attractive and valuable preamp, were the low end rolloff defeatable. Further comments on the rolloff's audibility are below.

Fig. 7 is a series of square wave transient response oscillograms illustrating the frequency response of the phono section in another manner. These were taken at a nominal 2V (or less) p-p preamp output level, through the inverse RIAA network, with the square wave bandwidth limited to 60kHz. Fig. 7A and 7B, at 20 and 100Hz, most clearly show the LF rolloff. It is subtly evident in 7C (1kHz). Fig. 7D, an expanded scale photo at 1kHz, shows the response deviation with greater sensitivity.

Generally speaking, if the frequency response of the phono circuit were exactly flat, the top of this square wave would be a ruler-straight line. Deviation from the ideal flat response can be used as a qualitative indicator of the error, and will indicate both the relative frequency of error and whether the error is one of excessive or insufficient gain, at that frequency.

However, it is difficult if not impossible to read accurate quantitative information from this sort of single waveform picture, due to the limited resolving power of the technique, as well as the practical limitations involved in generating a perfect RIAA inverse equalized square wave. (Such a wave is still hypothetical, of course.) The purpose of these photos is only to show that there is a correlation between this time domain view, and the previous frequency response measurement.

At high frequencies such as 10kHz, the time domain response (as presented here) no longer gives a direct indication of the error, as Fig. 7E demonstrates. The 10kHz square wave has passed through the DH-101, after being inverse equalized with a 60kHz bandwidth limit. The frequency response rolloff indicated here by the 6 $\mu$ S risetime is really that of the 60kHz bandwidth limit, not the DH-101, which actually shows a slightly rising response characteristic with frequency (Fig. 6).

The remaining phono section performance measurements are summarized in Tables 2-4. I measured gain very close to 35.2dB in both channels, slightly more than the rated 34dB (Table 2). The overload figures (Table 3) are slightly lower than would be expected, most likely due to the higher gain (which of course, lowers the overload point). Nevertheless the measured numbers are still excellent, particularly the 20kHz levels.

Phono section hum and noise measurements uncovered a problem which may present difficulty to some users. I said earlier that the phono circuits' hum level varied not only between

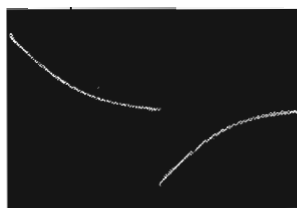


Fig. 7A. Transient response, phono-to-tape. Through precision inverse RIAA equalizer; 60kHz bandlimit. 20Hz, 0.5V/cm V; 5mS/cm H.



Fig. 7B. Transient response, phono-to-tape. Through precision inverse RIAA equalizer; 60kHz bandlimit. 100Hz, 0.5V/cm V; 1 $\mu$ S/cm H.



Fig. 7C. Transient response, phono-to-tape. Through precision inverse RIAA equalizer; 60kHz bandlimit. 1kHz, 0.5V/cm V; 100 $\mu$ S/cm H.



Fig. 7D. Transient response, phono-to-tape. Through precision inverse RIAA equalizer; 60kHz bandlimit. 1kHz, 0.2V/cm V; 100 $\mu$ S/cm H.



Fig. 7E. Transient response, phono-to-tape. Through precision inverse RIAA equalizer; 60kHz bandlimit. 10kHz, 0.5V/cm V; 10 $\mu$ S/cm H.

channels, but also between phono inputs one and two. This made little sense until I discovered this hum was being picked up in the unshielded leads from the phono inputs to the selector switches, one of which is about two inches from the power transformer (see Fig. 3). The S/N between all four possible input path conditions varied between about -79dB and -65dB, unweighted. The best measurement demonstrates that the DH-101 is capable of excellent S/N. The worst proves this S/N can be easily wrecked by hum pickup in the 10-12 inch unshielded leads.

The Table 4 measurements were taken after three conductor shielded leads were installed to try to cure this hazard, but this only partially reduced the hum. Phono

two is quieter in both channels, by a fair margin. Note that "A" weighting, when applied, sharply reduces these differences, since it greatly reduces the level of the hum producing the differences.

Since most of the other performance parameters of this preamp are in the good to excellent category, it seems a shame that some shielded cabling, and/or perhaps different layout could not have been used. With the input selector switch so close to the power transformer, it may be difficult to produce consistently low hum levels for input path conditions, at least to the -80dB level of which the circuit appears to be capable.

### High Level Section

The high level section harmonic distortion

FIG 8

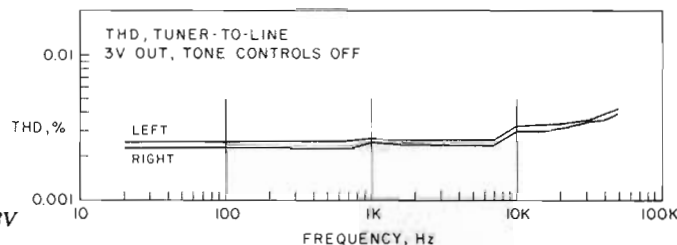


Fig. 8. THD, tuner-to-line, 3V out, tone controls off.

TABLE 2  
Gain (dB @ 1kHz)

|            | Right | Left  |
|------------|-------|-------|
| Phono      | 35.25 | 35.2  |
| High Level | 18.9* | 18.8* |

\*See text on low gain comments.

TABLE 3  
Phono overload

| Freq. | Right | Left  |
|-------|-------|-------|
| 1kHz  | 0.18V | 0.18V |
| 20kHz | 1.55V | 1.55V |

TABLE 4  
Phono S/ N\*  
(dB re 10mV @ 1kHz)

|        | Right |       | Left |     |
|--------|-------|-------|------|-----|
|        | 1     | 2     | 1    | 2   |
| Unwtd  | -68   | -76   | -72  | -76 |
| A Wtd. | -89   | -88.5 | -89  | -90 |

\*See text on Phono 1 vs. Phono 2S/ N.

curve shown in Fig. 8 is dominated either by noise or analyzer residual distortion. The excellent curves were taken at the rated 3V level, with the tone controls OFF. For those who may suppose such a graph is irrelevant because it *seems* to show nothing, I would suggest that every preamp needs this very important "nothing" indicating extremely low TH-D at supersonic frequencies, as well as 1kHz.

We had a distortion problem initially in our DH-101 sample, traced to a bad BALANCE/VOLUME control. Fig. 9A is a picture of the distortion produced by this control, taken with the control entirely out of the circuit, at a -20dB level. Note that the distortion is low, but definitely measurable. A good control is shown in Fig. 9B, and its "distortion" products consist mainly of noise and generator residual. The Hafler company has been aware of this problem (which occurred on some units) and quickly furnished a replacement control.

The Fig. 10 waveform photos illustrate the transient response of the high level section. Figs. 10A and 10B are taken with the tone controls OFF, and at the noted levels. 10A shows the extended LF response, evident by the low tilt of a 20Hz square wave. Fig. 10B is a 20V p-p output level at 10kHz, showing that no slew limiting is evident at any rated level. Bandwidth is indicated by the risetime, and is about 80kHz. We also verified this by a sine wave frequency response check.

Slew rate of the DH-101 is rated as 12V/μs, but this cannot be directly verified, since the small signal bandwidth of the circuit will be reached before the power bandwidth.

Fig. 10C shows some subtle tone control circuit effects on transient response. Even with the controls centered at what should be a nominally flat setting, we see a small HF response bump. This most obvious in the 100Hz photo (10C), but also in the 10kHz photo where the risetime speeds up in the ON condition.

For the ON tone control conditions, the ranges of the BASS and TREBLE controls are summarized in Table 5.

High level S/N of the DH-101 is summarized in Table 6, with a more than 90dB S/N referred to 1V, "A" weighted.

The high level section's gain (Table 2) is slightly lower than the rated 20dB, because the replacement BALAN-

CE/VOLUME control was slightly below the nominal impedance.

## LISTENING TESTS: Walt Jung

Unfortunately during my listening test of the DH-101 portions of my system got sick. Consequently, it is presently undergoing surgery and my listening comments are necessarily brief and incomplete.

I especially sought to pinpoint the relative audibility of the DH-101's 20Hz rolloff in phono frequency response. Before my things went sour, I observed

that if my MG-II loudspeakers were played alone (minus subwoofer), there seemed to be no apparent lack of bass. However, MG-II's aren't noted for rattling windows with low bass output either, so their reproduction alone is not a sufficient yardstick to judge bass below 50Hz.

With my common bass horn system (C.W. Phillips, "The Wooden Monster," Audio, Oct. 1965) frequencies down to about 30Hz can be reproduced with power: windows rattle, dishware will walk, and the generally realistic "feel" of low bass is attained. Comparing the sound through the DH-101 and this woofer,

## DIRECT-TO-DISC RECORDING: A progressive step backward.



Recording has come a long way since Edison and Berliner. But not all of the changes have meant progress. A case in point is the introduction of tape recording... a not unmixed blessing.

Granted that tape has advantages of portability, cost savings, ease of editing, and versatility. Its freedom has permitted recordings to be made that would otherwise have been impossible.

But freedom has its price. And the tape medium has serious limits of dynamic range, frequency response, noise and distortion that restrict the potential of the modern stereo phonograph record.

Proof of this audible difference is immediately evident when one listens critically to a well-made direct-to-disc

recording where the performance is captured directly on the master disc...uninterrupted, unimpeded. Without the intervention of tape, a remarkable clarity of sound issues forth.

But you'll also hear something more than just superb sound...the evident dedication of all concerned for quality at every stage of the record's production, from performance to pressing. Everyone is "up". An attitude too easily lost in taped performances that "can be fixed in the remix."

Direct-to-disc is demanding of everyone. Unforgiving because it is so revealing. And to the listener it can be an experience fully satisfying in its own way as the concert hall.

Don't deny yourself the pleasure.



**audio-technica**  
INNOVATION □ PRECISION □ INTEGRITY

AUDIO-TECHNICA U.S., INC., Dept. 78AM, 33 Shiloh Avenue, Fairlawn, Ohio 44131

The following direct-to-disc recordings are available from Audio-Technica (\*New Listing):

UMBRELLA • ROUGH TRADE Live! DD-1 • NEXUS Ragtime Concert DD-2 • ZIMBALIST Violin Sonatas Philip Frank, Violin, Bernard Frank, Piano DD-3 • BIG BAND JAZZ Rob McConnell & the Boss Brass (2 record set) DD-4 \$21.95 • CANADIAN BRASS QUINTET Bach, Purcell, Jelly Roll Morton DD-5 • TORONTO CHAMBER ORCHESTRA Boyd Neel Mozart Program DD-6 • BIG BAND JAZZ, VOL. 2 Humber College Jazz Ensemble DD-7 • TORONTO CHAMBER ORCHESTRA, Boyd Neel J. S. Bach Program DD-9 SONIC ARTS • PIANO FIREWORKS, Russell Stepan Chopin Program (2 record set) SA-LS1 \$21.95 • THE PIANO, David Montgomery Beethoven, Brahms, Schubert, others SA-LS2 • SCHUMANN "PAPILLIONS", David Montgomery Also Liszt, Chopin (Binaural Recording) SA-LS5 • FOUR-HANDED PIANO RAGS, David Montgomery & Cecil Lytle The Entertainer, Kitten on the Keys, 7 others SA-LS6 • WOOFERS, TWEETERS & ALL THAT JAZZ, Jazz and sound effects (Binaural Recording) SA-LS7 • VIVALDI TRICENTENNIAL, Ohmaya & The Cremona Chamber Ensemble Opus 8, No. 1; Opus 2, No. 2; Opus 3, No. 11 SA-LS8 • THE JOY OF MOZART, G. Cleve & Mozart Festival Orch., Symphony #36; Divertimento for Strings SA-SL9 TELARC • THE GREAT ORGAN AT METHUEN, Michael Murray Widor, Vierne, Dupre, Karg-Elert, Marcello. TEL-5036 RCA/RVC (All RCA/RVC are 45 RPM except as noted) • STOCKHAUSEN: Zyklus, NODA: Eclogue Sumire Yoshihara, Masami Nakagawa RDC-1 • TOKYO VIVALDI ENSEMBLE, Beatles Medley, Vivaldi Concerto in E, Op. 8, No. 1 RDC-2 • "TRACKIN' Lew Tabackin Quartet RDC-3 • BEETHOVEN "Appassionata" Piano Sonata Ikuyo Kamiya at the Bosendorfer "Imperial" RDC-4 • WARREN SMITH & TOKI, Sax & Percussion RVL-8501 • WARREN SMITH & MASAMI NAKAGAWA Flute & Percussion RVL-8502 • AUDIO SYMPHONY Orchestral Demonstration 33-1/3 RPM Conventional Recording RVL-1

All single records are \$14.95 retail; 2-record albums are \$21.95. Records are available at most Audio-Technica high fidelity dealers and fine record stores, or write to us for current title list and ordering information.

# Kit Report

Hafler DH-101

with the same signal through a flat phono stage, one hears a change in the character of bass reproduction. A large bass drum (in this case: M. Rosenthal, Monte Carlo Opera Orch., Offenbach's *Gaite Parisienne*, EMI ASD3311) comes across sounding smaller and somewhat flat. However, this same drum (through a wideband preamp) will nearly lift you out of your seat. It is literally awesome. With the DH-101 rolloff you still hear the sound's edge and attack, but the gut-thumping impact and overall envelope seems watered down.

In perspective, I think this says that if you are an all-out, no-holds-barred bass freak you may not favor the 20Hz rolloff of the DH-101. For those with more modest systems on the bass end; that is, speakers which roll off at 50Hz or above, you will probably never notice it, and there will be no apparent loss of information.

*Because of Walt's system breakdown, we asked David Vorhis to give us his reactions to the DH-101's sound. Vorhis did not see Jung's text before his listening tests nor did he and Jung discuss the unit.* —Ed.

## LISTENING TESTS

David Vorhis

I WAS NATURALLY skeptical about the Hafler given my long preference for tube preamps. But I must admit that it has a smooth, coherent, musical sound that is simply remarkable considering its \$200. price tag.

I was able to use the Hafler for only a few days and so could not compare it with a wide variety of other preamps. However, I gave it a critical listen within my own system and compared it at length to my own preamp. The latter is a scratch-built tube phono stage (cascode) that is the most accurate and satisfying I have heard.

I was thus surprised, to say the least, to

TABLE 5  
Tone control range  
(dB @ 50Hz and 20kHz)

|        |        |       |
|--------|--------|-------|
| BASS   | +14.3; | -15.6 |
| TREBLE | +12.;  | -16.2 |

TABLE 6  
High Level S/ N  
(dB re 1V out, vol. @ unity gain)

|         |       |       |
|---------|-------|-------|
|         | Right | Left  |
| Unwghtd | -82.3 | -85.3 |
| A Wghtd | -90   | -90   |

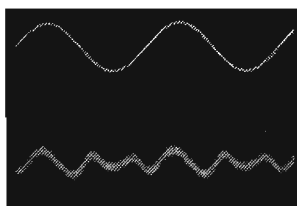


Fig. 9A. Volume/ balance control distortion. Bad control. [Centralab] 3Vrms in, 1kHz, 20dB attenuation. THD approx. 0.015%, Top: output. Bott.: distortion.

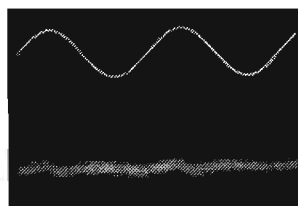


Fig. 9B. Volume/ balance control distortion. Good control. [CTS] 3Vrms in, 1kHz, 20dB attenuation, THD approx. 0.004%, Top: output; Bott.: distortion.



Fig. 10A. Transient response, high level, tuner-to-line. [Tone controls off], 20Hz, 0.5V/ cm V; 5mS/ cm H.

find the Hafler surpassed my reference unit in several respects. Most important: the Hafler DH-101 has the most accurate and the most convincing spatial characteristics I have ever observed. It has the unique ability to create a three-dimensional space and to position instruments within that space with startling realism.

I want to emphasize that this characteristic is not just a sense of ambience or depth nor is the sound plane merely recessed. One can literally pinpoint individual instruments and determine relative distances between sound images.

My tube amp can do this almost as well from the midrange on ou, but the bass is another story. The Hafler manages to reproduce bass with the same spatial precision as it does the higher frequencies, which contributes significantly to the overall focus of the preamp.

The Hafler also surpasses my tube preamp in "transient quickness." It seems to respond faster to sudden changes in input voltage while the tubes react more

slowly, resulting in a softer, rounded quality.

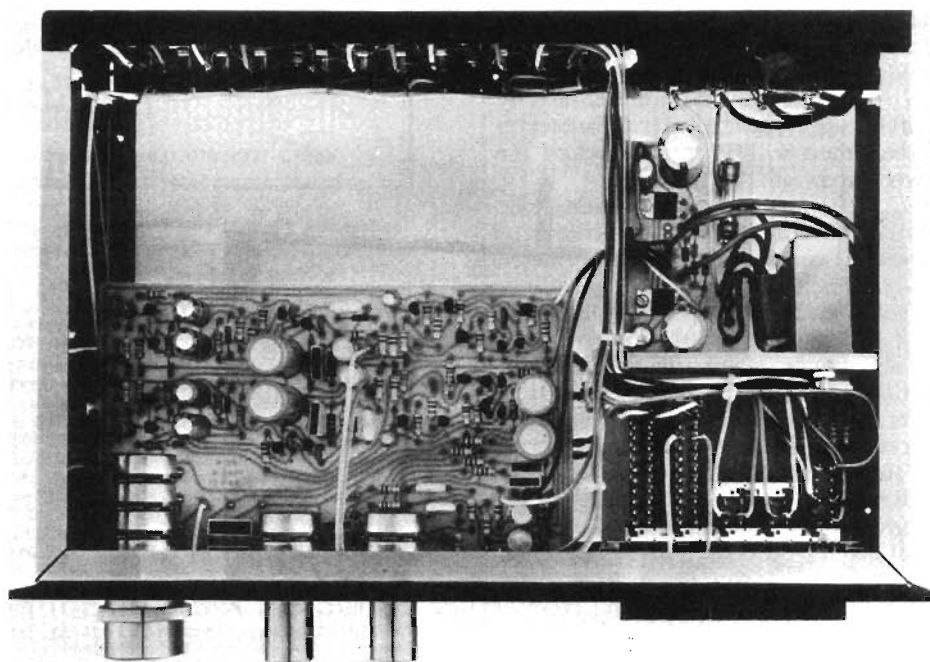
However, the preamps are about equal in "musical definition," a term I use to describe a component's ability to extract information from a musical signal. In other words, both preamps are able to follow the undulations of live music with great accuracy.

The only area where the Hafler has superior detail is in the mid- to upper bass. In fact, the bass is marvellously tight and detailed, the best I have heard on my Fried H speakers. Unfortunately, it loses impact at the very lowest frequencies due to the subsonic filter.

I wish Hafler had included a switch to bypass this filter. It is so frustrating to have such excellent bass detail when the very lowest frequencies are rolled off. Perhaps the company could supply instructions on how to bypass the filter internally.

The DH-101's musical definition suffers a bit during orchestral climaxes. While my tube amp gets louder and louder

Fig. 3. Interior view, top of the assembled DH-101 preamp.







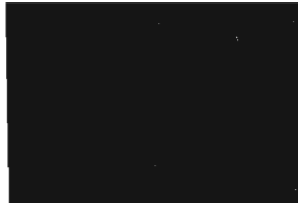
*Fig. 10B. Transient response, high level, tuner-to-line. [Tone controls off]. 10kHz, 5V/cm V; 10uS/cm H.*



*Fig. 10C. Transient response, high level, tuner-to-line, with tone controls OFF versus ON. Tone controls centered, 2V p-p out. 100Hz, Top: off; Bott.: on.*



*Fig. 10D. Transient response, high level, tuner-to-line, with tone controls OFF versus ON. Tone controls centered, 2V p-p out. 1kHz, Top: off; Bott.: on.*



*Fig. 10E. Transient response, high level, tuner-to-line, with tone controls OFF versus ON. Tone controls centered, 2V p-p out. 10kHz, Top: off; Bott.: on.*

during such climaxes, the Hafler becomes slightly frazzled—its clarity is clouded and its upper mid-range projection (see below) becomes more aggravating. On anything less than an extreme climax, though, the Hafler actually has more impressive dynamics than my tube amp.

In my opinion the high level stage has excessive noise. This noise is loud enough to be audible throughout my listening room, although it seems to be masked by record noise when music is playing. Perhaps I am over-reacting to the noise level because my own high level stage (a simple volume control) is dead silent, but I do find it to be an unnecessary distraction.

The DH-101 is neutral over most of its range, but it does have a minor projection

in the upper mid-range. This produces a slightly bright, coarse quality and a minor discontinuity between the mid-range and upper treble. The effect is similar to what I have observed in most solid-state equipment but of a sharply reduced magnitude. The Hafler is so clean and open that a deficiency such as this is more prominent than it would be in most other preamps.

Although not related to the sound, I also have some user comments which may be of interest. The unit has no turn-on or turn-off transients. The pushbutton switches are easy to use and quiet but I still prefer toggles and rotary controls. The tone contrls are not very effective but they can be switched out. Last of all, the

input flexibility is excellent.

Given the price of the Hafler kit, what more can I say? The preamp is a tremendous bargain and its sound quality is excellent in nearly all respects. The question that comes to my mind is why other manufacturers, with their space age technology and "state of the art" circuitry, have been unable to accomplish something similar before?

## SUMMARY: Walt Jung

I am impressed with the DH-101, particularly in view of its sensible price. This carefully thought out unit wrings a lot of performance from modest, no-frill componentry.

## KIT REPORT: Hafler DH-101

*Continued from page 39*

From an electrical performance viewpoint, there is little which can be criticized about the DH-101. The only general performance area which could possibly be interpreted as less than excellent is the hum which appears with some phono inputs, and this can be improved if the user wants to do some extra shielding.

My comments on the IEC rolloff should be interpreted as one particular user's viewpoint. Not everyone has a subwoofer, and the sonic differences are somewhat subtle. For many the presence of this rolloff may be more of a virtue than a detriment.

To my mind, this preamp is an outstanding value, if one is interested in the best sound for the money, and no functional frills. It will doubtless become a new standard for the kit builder, and a reference preamp for many. If you are in the market for a new preamp, you probably cannot go wrong with it.

My hat is off to David Hafler and Ed Gately for bringing such a fine product to the audiophile market in kit form. I look forward with genuine anticipation to their future offerings.

## MANUFACTURER'S COMMENT:

Thank you for a very fine review. It is comforting to have an authority of Walt Jung's stature confirm the results of one's labors.

We would like to comment that Walt's unit was one of the first shipped, and the mechanical interference he noted during construction has long since been taken care of.

In regards to having switchable RIAA/IEC equalization, the mono switch can be de-activated as a mono switch and arranged to parallel a 470 $\mu$ F non-polarized capacitor across C5. This lowers the high pass filter action from 20Hz to 10Hz.

Again, thanks for a fine review.  
Edward Gately, *President,*  
*The David Hafler Co.*