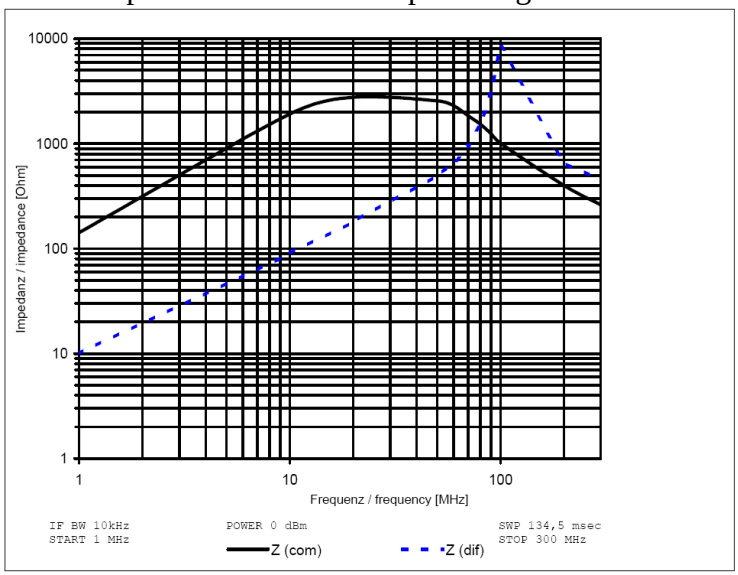
Technical Details CFA-1:

- Amplifier Type:

  The CFA-1 is an analog Transistor Amplifier with MOSFETs as the power transistors. The parameters are set digitally by I²C-Bus. This interface is switched off during normal operation (play back) so that the audio signal is not affected negatively. Transmission of data occurs to the control system (IC) during switching channel selection, volume control, etc. Such activities are literally disturbances, anyway. In this case, the level of disturbance due to digital signals is negligible. During play back there are no disturbing control signals. Further, the whole display is set to sleep-mode after a short time-out. (Idle)

- Special features:

  All inputs are decoupled by current compensating choke inductors. These wideband chokes damp the HF signals from 1MHz to over 300MHz, but yet pass through the asymmetrical input signals unaffected. Even the Ground pins of Cinch connectors are HF decoupled with current compensating choke inductors.



The circuit board is developed following innovative methods (MCC) having layer stacks with Prepreg thickness of 50µm and decoupling of power supply according to design rules of Dirks (Ref: Published in professional journal „Elektronik Praxis“, Title „die Leiterplatte 2010“). These measures ensure the least impedance of power planes (< 1Ohm up to 1GHz). The result is a very stable circuit system which is exceptionally immune to HF interference. Indirectly, this also has positive effects in LF circuits too. Even the LF Transistors are not inactive in HF range. This is due to the fact that, at very high frequencies the LF Transistors act as Diodes – in other words as rectifiers – and thereby demodulate the HF signals. Such demodulation products are to be found in LF signals too – a clear case.

The phase shifter for the bridge output stages and also the power output stages are implemented as C-Current feedback stages – A circuit topology for very fast amplifiers.

The output stages themselves are designed with puristic points of view. No stage with high-gain feedback exists for the back coupling of the signal (no all around feedback coupling). Of course, this causes distortion but primarily K2. Finally, it has to be stated that the power amplifiers are MOSFET Drain followers (with bipolar transistors - collector followers). This signifies that the Drain Pin of the Power-MOSFET (with bipolar transistors - collector follower) is connected to the output and not Source Pin (bipolar> emitter) as in a conventional design. Nevertheless, the output stages are still thermally stable and result in tonal advantages.

C-Current feedback also has advantages in the clipping characteristics. Like in the vacuum tube circuits, this circuit topology has a gentle clipping behaviour. We call this "Smooth Clipping" and results in an extremely pleasant sound (one knows this with vacuum tube amplifiers). According to our opinion, this transistor amplifier sounds like a vacuum tube amplifier, however, with the advantages of the transistor, controlled and precise.

Together with the “HORN Manufaktur”, we participated at the „fattura peccioli ad alta definizione“ from 6th to 7th April 2008 and carried out demonstrations. The CFA-1 with HORN Speakers MAESTOSO is an extremely successful combination – dynamic, clear, deep filling, warm and with high resolution! To put in words of Mr. Steinfadt, “greatest pleasure to my ears”. ☺.

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- C-Current Feedback

Since sometime around 1994, the largest manufacturers of analog ICs like Analog Devices, Burr Brown, TI or Linear Technology produces Op-Amps with current feedback. Each company publicises their Op-Amps in different aspects. Burr Brown introduces their Op-Amps as „Operational Amplifiers against GHz”. Linear Technology boasts as „Stable with any load“and Analog Devices refers to this circuit topology as „Stable with high capacitive loads“. I am also aware of these advantages. I design and build such amplifiers since 1986. But now I deploy output transistors ad current amplifying elements. The Industry inserts an emitter follower as current amplifier and a buffer at the output and therefore requires a capacitor to limit the bandwidth of open-loop gain. They also have “all around” feedback. I don’t need these measures. Hence C-Current Feedback. The C is for Crayon.

- An exceptional RIAA Pre-Amplifier:

The phono amplifier consists of 3 stages. The input amplifies is a discrete pre-amplifier stage designed with low-noise NPN and PNP Transistors symmetrically. It has a gain of 31 dB in Moving Coil mode and 20 dB in Moving Magnet mode.
The second stage is a passive RIAA Equalization Network with 0.1% Resistors and 2% SMD ECHU Plastic Film Capacitors from Panasonic. This passive network is matched against the output impedance of the first stage and the input impedance of the output and buffer stage. The deviation of amplitude is +/- 0.2dB from 25 Hz to 20 KHz.
The third stage is designed around the integrated Operational Amplifier AD825 from Analog Devices. Die gain is 24dB und the upper cut-off frequency is 100 KHz.
This pre-amplifies is not sensitive to the impedance of the pick-up connected to it.

Capacitors in the feedback between the first and the third stage serve as subsonic filter. The lower cut-off frequency in MC-Mode is approx. 10 Hz and in MM-Mode approx. 6 Hz.
The maximum input voltage is 37 mV RMS @ 1 KHz for MM and 13 mV RMS for MC as the phono stage of this application has to be content with 18V supply. However, it should be mentioned here that the level of the IC for volume control and channel selection is only 2V and actually is the limiting part.
The gain of the phono amplifier can be adjusted to a maximum of 28 dB in steps of 2dB (see User Manual). This is indeed sufficient even for MC Pick-ups with a very low output voltage.

- Input Selector, Tone und Volume control:

Here we use an integrated circuit (IC) from ST Microsystem. The volume can be adjusted in 1 dB steps with this device. The range of volume is from 0 (Mute) to 80. The volume level 0 or Mute reflects the maximum damping of the IC (min. 80dB, max. 100dB). The range of control is 79dB.
The tone control consists of 3 stages i.e. Bass, Middle und Treble. These frequency bands can be varied to +/- 14dB in 2dB steps by Software. (see User Manual – Personal Settings).
The Balance control can also be achieved 1dB steps with software. Please read the User Manual for detailed information.
The possibility to adjust the Loudness is also integrated into Software. This adjustment can be enabled or disabled in Setup (Personal Settings). This adjustment is switched off for volume settings over 46. At volume settings less than 46, the Bass and Treble are each raised by 2 dB. At volume settings less than 38, the Bass and Treble are each raised by 4dB. It is worth mentioning here once again that the Loudness function is switched off for volume settings from 46 to 80. There is no interaction of the signal from this point onwards. (Loudness is purely a Software function here). It is our opinion that this function is very inconspicuous. If this function is switched off, one notices the missing tone only at very low volume.

➢ Operation with buttons and Remote Control

The control system is programmed in such a manner that only the most necessary functions such as channel selection, volume control and Standby On/Off are available for daily usage. All other functions such as amplifier matching, tone control, balance key delay, MM or MC and loudness is more or less hidden in „Setup“ (Personal Settings) This feature, in our opinion makes the operation of our amplifier very easy and comfortable. All the functions are clearly explained in the User Manual.
The backlight and the display will be switched off after approx. 18 sec. If any button is pressed, this activates the display and the backlight.

➢ Power regulator for the small signal amplifier:

There are no linear power regulators in this amplifier. We only use cross regulators. Liner regulators hold the voltage stable and have low output impedance up to a maximum of 20 KHz for very good regulators. Beyond this, the internal resistance of the regulator rises. In addition, the problem of Ground Bounce results due to the phenomenon of constant voltage. This means that the current varies according to the load and change of signal. This change of current results in the change of voltage at signal ground which in turn acts as interference to the passing analog signal. This effect especially the circuits with high gain (Phono). The advantage of our cross regulator is that the current is held at a constant level. The voltage stabilizes a cross regulator. The current distributes among the amplifier circuit and the cross regulator freely according to Kirchhof’s Law according to the driving signal. The current through the signal ground remains the same. Therefore it produces less interference at the signal ground. The tone is much more clear. Comparative tests have confirmed this result.

➢ Power Supply

A switch mode power suppply from Switzerland is used as the power source. The main advantages are the lower weight, the regulated voltage and a very favourable efficiency. Years of research with power amplifiers have brought the advantages of a regulated power supply to the light of the day. Our trials started with circuits with 50Hz transformers and linear regulators. The tonal qualities were easily recognaized. The result was more authenticity in tone. The next step was to do the tests with switching power supplies. With initial fears, we were aware of the reputation of such power supplies among the audiophiles, but yet we made a bold step of using this type of power supplies. The results were the same effects. Therefore we continued to use this type of power supplies in our amplifiers. The advantages are clearly understood by our ears.

- No Blop-Noise in spite of not using Relays for Speakers:

  The switching noise is prevented by a soft-start circuit of the power supply for the output stages. The powering up process of the power supply is controlled by software and also the channel switching (Fade Out & Fade In).

- P.S.:

  The behaviour of transistors in HF range (Diode) is described under “Special Features”
  It is a big misconception to believe that vacuum tube amplifiers don’t have this behaviour. Certainly, the vacuum tubes also demodulate the HF signals. I have experienced this myself. A call to my cell phone could be heard loud and clear from speakers in spite of that the cell phone was on a table 5 meters away from the vacuum tube amplifier. Why shouldn’t the vacuum tubes demodulate? They are used over decades and even used today as HF transmitters and receivers. EM-Interference is also an important factor.