Ingram Engineering MPA685

Dual-channel Microphone Preamplifier

It takes a lot these days to set a boutique mic preamp apart from the crowd. Does Ingram's flagship design have what it takes?

HUGH ROBJOHNS

Ingram Engineering, 'boutique' manufacturers based in Atlanta in the USA, currently produce three mic preamps: the MPA201, the MPA681 and the flagship model reviewed here, the MPA685. All are hand-made, and all use the same basic amplifier technology, which comprises transformer inputs and outputs with discrete, JFET-based gain stages.

Design & Construction

The MPA685 is a dual-channel preamp housed in a 2U, rackmounting case, which extends a considerable 355mm behind the rack ears. Internally, there's lots of open space between the three circuit boards, which comprise a linear power-supply module mounted centrally at the rear, and two individual preamp channel boards mounted towards the front and carrying the front-panel controls. Custom Sowter 1196 input transformers are mounted on raised daughterboards above each preamp PCB, and Jensen output transformers are bolted to the case floor behind the two preamp boards. The power supply provides higher than usual rail voltages to the analogue electronics, and is designed to ramp up and down slowly to avoid nasty power on-off thumps, but the side-effect is that the unit takes a few minutes to stabilise when powered up. There are no ventilation slots in the case, and although the device runs noticeably warm there's no practical issue with heat at all.

Each preamp board carries mostly discrete, full-size components, although there are a couple of AD706 bipolar op-amps too. The main gain stages are provided by three Ingram-designed OA101 'gain blocks', which are fully compatible with API's 2520 and Jensen's 990 discrete op-amp gain modules. These feature a minimal-component, discrete design combining a J-FET differential input stage with a Class-A bipolar transistor output stage. The design is based on the work of Dr Marshall Leach of Georgia Institute, and ensures an excellent transient response with negligible transient intermodulation. The main preamp output circuitry is based around a pair of discrete bipolar transistor stages driving the Jensen JT-11-DMCF 1:1 output transformers.

Construction and wiring are to very high standards throughout, including high-quality components such as Panasonic HE Series and Nichicon Fine Gold electrolytic capacitors; polypropylene and metallised polyester non-electrolytic capacitors; low-noise, one percent Vishay, Dale RN55 and RN60 Resistors; and Goldpoint and ETI noiseless level-control potentiometers.

The rear panel carries the ubiquitous IEC mains inlet with an integral fuse-holder, and the unit accepts only a fixed input voltage (in the case of the review model, 230V AC). To either side are the audio input and output connections, with microphone inputs on three-pin XLRs. The outputs are presented on both male XLR and quarter-inch TS sockets, and a ground-lift switch is provided on each channel to isolate the XLR's pin 1 from the chassis ground if there's a need to break ground loops. On the review model, the ground-lift switches had been connected to the input

XLRs in error, something I raised with the manufacturers. They confirmed that a production batch had been incorrectly wired and that this fault had gone undetected until I found it. I am assured that the assembly notes and quality-control processes have now been improved, but it would obviously be worthwhile checking for this fault if you are considering purchasing an MPA685 (fixing this wiring error is trivially simple). The quarter-inch output socket is 'floating' (ie. ungrounded) with respect to the chassis earth, so it can be used either as a balanced or unbalanced feed, depending on the cable wiring. The maximum output level is a very generous +29dBu (for 0.1 percent THD).

The front panel of the MPA685 is quite busy, but the chicken-head rotary controls are well spaced out, with clear white-on-black panel legends. The whole thing looks quite retro, thanks to the knobs set in their separate oval legends, with the chunky mains toggle switch and associated big green power lamp separating the two sets of channel controls.

Each channel is equipped with a 'Direct Inject' input via an unbalanced TS quarter-inch socket wired in parallel, and there's a second socket to provide a link/thru output. The socket sleeve connections of both are grounded directly to the chassis, and the input impedance is 1MΩ (in parallel with anything connected to the loop/thru socket). Next to these sockets is a four-way input switch that selects the DI input in favour of the rear-panel microphone input in its extreme left setting, and then three different microphone input impedances in the other positions. The MPA685 can be specified with either a low or high range of impedances and the review model came with the higher set, offering 600Ω, 1.5kΩ and 2.5kΩ options (the low-impedance version provides 60Ω, 200Ω and 600Ω settings instead, and employs a different input transformer). The impedance switch essentially alters the loading resistors on the secondary winding of the input transformer.

Next on the panel is a pair of toggle switches to select phantom power (the status of which is indicated by a blue LED) and invert output polarity. The gain is set with a 24-position Goldpoint rotary switch. This is scaled from -11 to +12 with a 'zero' position at the centre. An overload LED is also provided, which illuminates when the total harmonic distortion (THD) reaches about one percent. The manual advises increasing the gain control until the LED flashes infrequently on peaks, and then backing off the gain control by one step (providing a 2dB headroom margin) to maximise the total dynamic range. The progression into overload is relatively gentle, and occasional flashes of the overload LED aren't a complete disaster!

"Thanks to its ability to accommodate quite hot line-level signals, it's easy to send a guitar DI track from your DAW's line-level output to one of the preamp's input channels, set the output level, and route that via the unbalanced output to a guitar amp."

Interestingly, the gain switch provides either gain or attenuation, depending on its position, to ensure that the preamp is always operating with the best possible signal-to-noise ratio and dynamic range at all settings. In the negative positions, it is applying up to 24dB of input attenuation and all the gain stages operate with fixed gains to provide optimal signal-to-noise ratios. In the positive positions, it adjusts the amount of amplification provided by the second gain stage over a 41dB range. In combination, then, the gain control provides a 65dB adjustment range, and the step sizes vary from about 2dB around the middle positions to about 6dB at the extremes.

However, what's more practically relevant is the actual gain that's applied to an input signal. The actual numbers vary slightly with different input-impedance settings, but with the control set to its zero point during my tests, the overall gain through the unit was 34 and 35 dB, for the medium and high settings respectively, and 29dB for the low-impedance setting. The maximum gain available in the medium and high impedance settings was 75dB, give or take 1dB, while the lowest impedance mode offered close to 70dB gain. At the minimum settings, the gain was about 9dB. With the gain control at the minimum setting and in high-impedance mode, the maximum input level was +20dBu. The gain range for the DI input was from +4dB to +69dB, with +28dB at the zero mark. »

Ingram Engineering MPA685 $2425

PROS

- Impressive sound, with the specs to back it up.
- Huge gain range.
- Input impedance options.
- High-quality DI inputs with thru sockets.
- Transformer floating outputs.
- Re-amping capability.

CONS

- Grounded DI link-thru sockets might cause ground-loop problems.
- Windt Hummer test revealed potential ground-loop problems.
- Expensive.

SUMMARY

An unusual two-channel preamplifier offering a very clever gain structure, comprehensive I/O facilities, and appealing retro styling.

I found the frequency response of this preamp stretched from about 8Hz to over 75kHz at the -3dB points, with only minimal bandwidth variations for different impedance settings, but the Direct Input's bandwidth extended considerably higher. The maximum output level while maintaining less than 0.1 percent THD was +28dBu, and the overload LED came on for one percent THD at about +30dBu. At all realistic signal levels, distortion was well below 0.005 percent. All of the specification measurements were made using an Audio Precision test system, and they agreed very closely with Ingram's published figures. The only one that appeared to differ significantly was the signal-to-noise ratio figure, where I achieved 115dB. However, Ingram's figure relates to 'input referred noise', which means that they took into account the gain being applied. Doing the same with my measurements, our figures agreed precisely, at -124dBu.

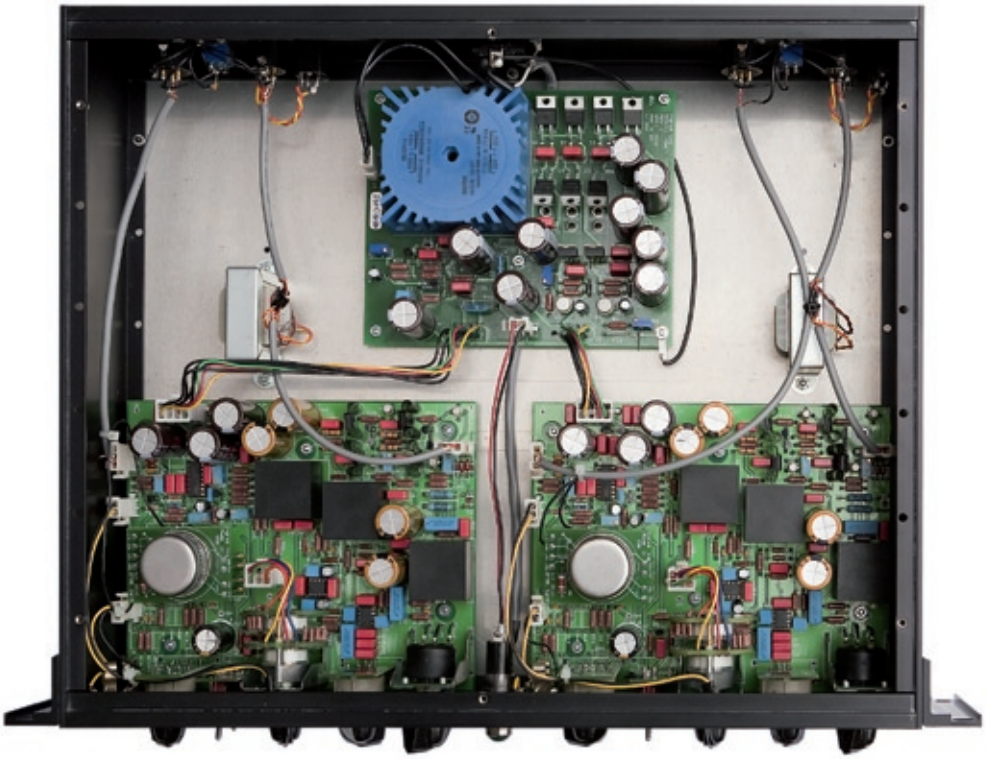
With the gain control set to the zero position (35dB gain) the mains-hum components were all below -100dBu, with the strongest elements being at 100 and 200Hz — a fine result. However, the Windt Hummer test revealed that the MPA685 was prone to ground currents, with the 50Hz element rising from about -120dBu to -75dBu. At high-gain settings, the ground-loop hums became very audible.

An adjustable high-pass filter is controlled with another rotary switch, offering a first-order (6dB/octave) slope turning over at either 140 or 70Hz (-3dB points). A third position bypasses the filter coupling capacitors to provide a completely DC-coupled internal signal path.

The final rotary is a continuously adjustable output-level control, scaled from 0 to 10, to enable the output signal level to be adjusted as necessary for the following equipment. The mid-way point applies about 8dB of output attenuation, and it can be used to fade the signal all the way out, if required.

In Use

The MPA685 is an impressive microphone preamp, with all of the qualities I associate with discrete electronics running on high-power rails: a confident ease in handling big transients, a tangible sense of the massive headroom, and a very low noise-floor. Given the cost of this unit, I compared it with my long-term reference preamps, a GML 8304 and a Focusrite ISA428 Mk I. Both use discrete, class-A electronics, but the former is transformerless and very clean and transparent, while the latter imposes a subtle Neve-esque transformer richness. The MPA685 sound character sits slightly closer to the Focsurite in some ways, thanks to its use of transformer coupling, but it still has much of the transparency and precision of the GML when used with a sensible gain structure. It's certainly not sterile or bland, though.



The custom Sowter input transformers can be seen on the lower two PCBs in this picture, and the Jensen output transformers are bolted to the chassis just above these boards. All this iron lends a richness to the MPA685's sonic character.

Driving the gain stage a little harder and backing off the output control allows a useful degree of 'edge' to be introduced, with the transients being crushed and the distortion building in a musically appealing way. However, finding the gain sweet-spot to achieve this can be fiddly: take it too far and it becomes nasty and inconsistent, while not far enough sounds like a mistake when the odd transients crack. But, with care, it can be a useful party-piece.

Although the review model is described as the high-impedance version, the impedance options aren't really very high in the grand scheme of things, and 2.5kΩ is not that unusual. Many classic and modern preamps offer 5kΩ and some go much higher, providing 10, 18 or even 30 kΩ. Higher impedances demand less output current from the microphone, and in most cases that means they deliver a more accurate sound. Conversely, lower impedances challenge the microphone more and, particularly with dynamic mics and those with output transformers, tend to introduce significant tonal and dynamic changes. Different microphones react in unpredictable ways, but often the sound becomes thicker and slightly more intimate-sounding, with more body, more warmth and more coloration. These characteristics can be good or bad things, depending on the circumstances, of course, and I tend to look on impedance switching as a form of EQ lottery — you don't know what you're going to get, but it's fun playing anyway. The MPA685's gain doesn't change much between the high- and mic-impedance settings, but the gain control needs to be advanced a couple of extra steps when using the lowest impedance setting, to ensure a level-matched comparison.

Thanks to the Goldpoint gain switches, it's very easy to match gain settings between the two channels for stereo applications. This makes it practical to use the MPA685 as a make-up gain stage for a passive mixer or, given its ability to handle line levels, to add some subtle transformer character to a mix.

The inclusion of DI inputs makes it easy to record a DI feed from a guitar while

simultaneously using the second channel to capture the sound of its miked-up cabinet in the studio. However, although I didn't have any issues during the review, I remain slightly concerned that the link-through sockets share the preamp's chassis ground. The reason is that a guitar amp in a studio is likely to be powered from a different mains socket to the preamp's, and connecting the two chassis grounds directly together via the guitar cable could easily lead to ground-loop hums. I'm surprised Ingram Engineering took this approach in an otherwise superbly thought-out product.

Interestingly, this potential problem doesn't manifest when using the MPA685 as a re-amper. Thanks to its ability to accommodate quite hot line-level signals, it's easy to send a guitar DI track from your DAW's line-level output to one of the preamp's input channels (via the transformer-coupled mic input or the direct 'Hi-Z' DI input), set the appropriate output level, and route that via the unbalanced output to a guitar amp in the studio. The second channel can then be used to handle the signal from a mic placed in front of the cabinet and send it back to the DAW. However, because the unbalanced output socket is derived from a floating (ie. ungrounded) transformer output, there is absolutely no risk of a ground loop if the preamp is used in this mode.

When used as a DI, I found that the MPA685 had more than enough gain for my passive Washburn five-string bass — the gain control was mostly below the -5 setting — but the sound was very clean and accurate, with superb transients and a full bottom end. With so much gain on hand, I can't imagine running out of steam with any passive guitar, even those with low-sensitivity piezo-electric pickups. However, with some of the active basses I've encountered, turning the level down enough might prove more of a challenge!

Verdict

Overall, this is a well-made preamp with buckets of gain and a cleverly optimised gain structure that maximises its technical performance at all gain settings. Indeed, the technical performance is excellent, and the sound character is an appealing blend of neutral transparency with a hint of iron richness and ultra-fast transients sitting within a vast headroom. I have some slight reservations about the grounding arrangements from a practical (rather than a safety) perspective, but in a well-designed studio there shouldn't be any issues. In every way — visual styling, constructional reliability, feature-set flexibility, technical performance, and sound quality — this is an extremely attractive preamp, and well worth auditioning if it falls within your budget. ///

Alternatives

There are plenty of options when it comes to high-quality mic preamps, from the likes of **Neve**, **GML**, **Millennia**, **Grace Design**, and **Schoeps**. Their characters vary from the very clean to the obviously coloured, and to decide which suits your needs it's well worth auditioning before buying.

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Addendum to Sound on Sound Review *Windt Hummer Test Notes*

The MPA685 with stock factory configuration uses unbalanced DI input with DI common connected to ground. This configuration provides the most protection against electric shock due to ground faults with equipment that is connected to the MPA685. Power amplifiers are arguably most prone to ground faults, and since the DI loopthrough has the most probability of being connected to a power amplifier, the MPA685 stock configuration is configured to provide the most safety.

Sound on Sound's review unit was configured as a stock unit with DI input common connected as described above. This works perfectly in well designed studios, and did work fine for Hugh Robjohns during his evaluation. While Hugh had no issues, he pointed out that there is the potential for audible hum to be introduced under certain conditions and his Windt Hummer test confirmed this potential. [1]

While we have consistently received only good reports about performance using the DI and loopthrough of the stock MPA685 configuration, we have also had special requests from select customers for transformer coupling of the DI input in order to impart subtle transformer characteristics to this path. This feature has the added benefit of providing immunity to ground loop hum. For those whose primary goal is guarding against the potential for ground loop hum, we offer the following options, which include our recommended internal MPA685 DI transformer:

1. Use an internal DI input isolation transformer, installed inside the MPA685 chassis at the factory. This solution provides the best combination of sound quality and technical performance of any available DI solution.
2. Keep the power amplifier head on the same power strip as the MPA685 while routing the speaker wires from the control room to the speaker in the tracking room or an isolation booth.
3. Use an external isolation transformer on the DI signal, then, run the DI signal to the isolation room where the power amplifier and speaker are located. Contact Ingram Engineering for recommended vendors and part numbers.

For those that choose the internal isolation transformer option, the MPA685 is configured at the factory to use excellent quality transformers that fully isolate the instrument and power amplifier from the MPA685. The solution is available upon request when ordering. Contact Ingram Engineering for information about ordering this option.

References:

1. An Easily Implemented Procedure for Identifying Potential Electromagnetic Compatibility Problems in New Equipment and Existing Systems: The Hummer Test
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