# DA1008 AND DA2016

## DISTRIBUTION AMPLIFIERS

OPERATING AND MAINTENANCE MANUAL



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## DESCRIPTION

The DA1008/2016 output stage is capable of driving 600 ohm loads directly to +26dBm with total freedom from crossover distortion, high inherent linearity, 100dB open loop gain and 50MHz gain bandwidth product make this an ideal device for highest quality audio distribution. The absence of Transient Intermodulation Distortion may be detected by the smooth effortless high frequency output capability, the absence of the harsh, raspy sound typical of IC amplifiers driven to full output at high frequencies and the freedom from increasing harmonic distortion vs. frequency. A minimum of 40dB of loop gain is available for 100: 1 distortion reduction even at 20kHz.

## INPUT

Input audio feeds a unity gain balanced differential input buffer stage (A1), which presents 30,000-ohm bridging impedance to the source. The input network is protected by clipping diodes (Dl-D4) from over voltage inputs and bypass capacitors (C3 and C4) for RF protection. A balance Potentiometer (R7) allows setting a precise null for common mode hum inputs. The second half of Al monitors the differential voltage appearing across the input terminals of the input buffer IC to detect clipping. The input clip LED on the front panel will light if audio inputs in excess of +26dBm peak.

## OUTPUTS

Audio from the input buffer feeds eight output level adjusts potentiometers. Output stage gain is set for approximately 24dB so that for normal unity gain operation the audio taper pots are at 12 o'clock and provide a smooth, high-resolution adjustment. More or less gain can be provided by changing only the value of Rx1 (R21-R81), see Modifications.

+26dBm output level Distribution Amplifiers (-1 and -2 models) omit the current boost stage components shown on the schematics (Q10, Q11, Q12, Q13, R13 and R18 in output 1). R13 and R18 are replaced with jumpers.

### Transformer Outputs, +26dBm:
### DA1008-1, DA2016-1

The outputs of A2, A4, A6 and A8 are AC coupled to the output transformer primaries. The coupling capacitor prevents small DC offsets at the IC output from biasing the transformer and causing low frequency distortion. Transformer winding resistance and IC current limiting protect the outputs in the event of an accidental output short.

**Active Balanced Outputs, +26dBrn**
**DA1008-2, DA2016-2**

An additional equal and out of phase output is provided by unity gain inverters A3, A5, A7 and A9 driven from the outputs of A2, 4, 6 and A8. Since the output summation across the load results in 6dB of additional level, the first stage gain is reduced proportionately to maintain the level set potentiometer near 12 o'clock for unity gain operation. Both outputs are capacitor coupled to the load and protected by 150-ohm current limiting resistors in each line. Since both Hi and Lo outputs are driven, neither output terminal should be grounded. Unbalanced loads may be driven from either the Hi or the Lo output with reference to ground.

## MONITORING

An attenuated output sample from each channel is routed through a 9 pin connector P2 to the Power Supply and Monitor board. The output is sampled at the transformer primary by Rl 10 and Rl 11 (Channel 1) or on the output side of the protection resistors in differential output units by Rl 12 and Rl 11.

## POWER SUPPLY AND MONITOR BOARD

## MONITOR AND METERING

Monitor inputs from the amplifier boards are applied to analog multi-plexers A8 (output group A) and A9 (group B) through connectors P5 and P6 respectively. The multi-plexer outputs are summed and applied to a two-channel headphone amplifier (A4) designed to individually drive the tip and ring of stereo headphones. A front panel level control adjusts headphone output. The phone output is designed to drive 600 ohm or higher headphones but will drive low impedance phones at reduced level without damage.

The multi-plexer output also drives the meter circuits through calibration pot R8. Additional sections of A4 form an active full wave rectifier with switchable gain. The front panel meter calibration switch allows 0 VU meter readings with nominal output levels of +4, +8 or +18 dBm sine wave. The three colors, 12 segment, three quad comparators A5, A6, and A7 drive peak reading LED meter display.

Pressing the front panel SCAN marking which actuates a zero motion switch mounted behind the panel on the display board makes selection of the desired output for monitoring and metering. This switch gates on oscillator A10 that drives the binary counter all to select one of 16 inputs applied to A8 and A9. Al 2 and AB drive the numeric readout.

## POWER SUPPLY

Dual power transformers are connected out of phase and thoroughly shielded to minimize radiated hum fields. Split primaries allow use on 115 or 230 VAC, 50/60 Hz. Primary bypass capacitors and a secondary Metal Oxide Varistor provide line transient protection. Adjustable regulators A2 and A3 provide +/- 18 VDC outputs set by trimpots Rl and R6 respectively. These regulators are adjusted to +/- 20 VDC for +30 dBm output models. Zener diodes CR3 and CR5 reduce the regulated voltage to +/- 15 VDC for amplifier A4. A regulated +6 VDC supply and a zener-derived -6 VDC output operate the logic section.

## INSTALLATION

## MOUNTING

Optional rack mount brackets, P/N 21181-1 are available for your DAs. These aluminum extrusions are mounted under the two truss head screws on either side near the front. Tighten these screws securely. Your DA mounts in 1-3/4 inches (I RU) of rack space.

Your DA may be desk mounted on its' non-slip suction cup feet and left out for everyone to see since it is so pretty. You can also stack DAs on top of each other. We don't recommend stacking over 30 high on a desk unless you are over 8 feet tall.

## WIRING

The AC ground wire can cause a ground loop with your station ground. If you are sure your station ground will provide adequate protection to personnel in case of an AC line short to chassis, a 3 to 2 AC adapter can be used to isolate the power line ground. We recommend that the adapter be removed and the power line ground reconnected prior to any service work requiring removal of the station ground from the chassis.

The four inch silver bearing copper strap, which you are, of course, using for your station ground is not going to fit around the #6 chassis ground screw on the DA rear panel. Run the strap to within a few inches of the chassis and jump to the chassis ground with shield braid.

Audio inputs and outputs should be connected using the rear panel labels as a guide. Hi outputs are all in phase with each other and in phase with the Hi inputs. The fanning strips are Kulka part number 649A22 and extras are available from our parts and accessories department. For convenience, the fanning strips may be easily cut into shorter input or output sections.

**CAUTION:** Active balanced output (DA1008-2, DA2016-2, ) has active drivers for both Hi and Lo output terminals. DO NOT GROUND either Hi or Lo terminals. To drive an unbalanced (one side grounded) load, connect it between Hi and GND terminals and let the Lo terminal float. Two separate 600 ohm unbalanced loads can be driven from each output without interaction by connecting one between Hi and GND and the other between Lo and GND. The two loads thus driven will be out of phase with each other.

**ADJUSTMENTS:**

The individual output levels of each channel are controlled by the screwdriver adjust potentiometers accessible through the front panel. These adjustments are located nearly flush with the panel to provide easy accessibility but good protection from lurking "knob twiddlers". A front adjustment pot controls the Headphone output.

The meter calibration switch can set the 0 VU indication to +4, +8, or +18 dBm equivalent sine wave output. In the +18 position the top meter segment (+6) indicates the typical clipping point of the output stage and the meter functions as a headroom indicator.

The common mode adjustment pot on the amplifier board (R7) is factory set for a 80dB null at 60Hz. If disturbed, it can be readjusted by applying a common mode 60 Hz input to Hi and Lo inputs together referenced to ground and renulling R7. The null typically drops to 40dB at 20kHz due to slightly unequal roll offs in the input bypass capacitors.

Trimpots R1 and R6 on the Power Supply and Monitor Board adjust the +/- regulated supply voltages. These pots should be set for equal supply voltages of 18VDC measured at the connectors P2 or P3. Note: +30dBrn output Distribution Amplifiers require that these voltages be accurately set to +/- 20VDC.

The meter calibration pot R8 is adjusted by setting an accurate +4dBm output level with an independent audio voltmeter and accurate 600 ohm load and adjusting R8 for 0 VU meter indication.

**MODIFICATIONS**

To increase gain by 10 dB, change R1 1 (R21 to R81) to 56 ohms (transformer output units) or to 150 ohms (differential output units).

For 220 VAC operation, remove jumper J1 and J3 on the Power Supply board and add jumper J2.

**Note:** Different types of attachment plugs or line cords may be required for connection to alternate supply voltages.

## Specifications

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|---|---|
| **OUTPUTS LEVELS:** | DA2016/DA1 008-1 or 2 +26dBm |
| **DISTORTION:** | .001% typical, 20 to 20kHz |
| **FREQUENCY RESPONSE:** | +/-.25dB 30 to 20,000 Hz |
| **NOISE:** | -100dBm EIN 20Hz to 20kHz |
| **HUM REJECTION:** | 80 dB common mode, 60 to 12011z |
| **CROSSTALK:** | 70dB Minimum @ 1kHz |
| **INPUT IMPEDANCE:** | Balanced differential inputs 30k ohm bridging |
| **GAIN:** | 24dB, front panel screwdriver adjustable |
| **POWER:** | 115/230 VAC +/- 10%, 47-63 Hz. |
| **SIZE:** | Inches (mm) 17(432) W x 1.75(44.5) H x 10.5(267) D; 15 lb. (7Kg) |
| **METERING:** | Electronic SCAN switching, 12 segments, 3 color, peak reading LED, VU indicator, 0 VU selectable to +4, +8, or +1 8dBm by front panel switch, LED channel indicator. |
| **HEADPHONE OUTPUT:** | 20-volt p-p output to 600-ohm phones, 30mW output to low impedance phones |
| **MOUNTING:** | Suction feet for non-slip desk mounting. Rack mount system 21075-501 mounts two units in one rack. |
| **CONNECTORS:** | High density screw terminal barrier blocks. Fanning strips supplied for easy installation. |

**MODELS:**

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|---|---|---|---|
| DA1008-1 | 1 x 8 | Transformer balanced outputs | +26dBm output |
| DA1008-2 | 1 x 8 | Active balanced outputs | +26dBm output |
| DA2016-1 | Dual I x 8 | Transformer balanced outputs | +26dBm output |
| DA2016-2 | Dual 1 x 8 | Active balanced outputs | +26dBm output |