Modifications to Extron ADA 6 Component for use as a 1-10 MHz distribution amplifier

Note: the Extron ADA 6 300MX appears to be the same design with the addition of a 1x6 sync channel, and the ADA 6 300MX HV appears to be the same with the addition of separate 1x6 Horizontal and Vertical sync channels. The ADA 4 300MX appears to be the same with two outputs per bank rather than three. These modifications should be readily adaptable to those models, as well.

Modifications to Extron ADA 6 Component for use as a 50 Ω, 1/5/10 MHz distribution amplifier:

1. Replace 3x 75 Ω input resistors with 50 Ω resistors (SMD 1206).
   On the ADA 6 Component PC board, these are R37-R39.
   NOTE: one may want to parallel two or all three inputs internally to give a 1x12 plus 1x6 or a 1x18 configuration. In that case, use only as many 50 Ω resistors as there are separate inputs. Removing the unused input BNC connectors may avoid future mishaps. Fill the empty rear panel holes with hole plugs.
   NOTE ALSO: To use the modified unit to buffer the output of an oscillator that is not rated to drive 50 Ω, such as the HP 10811 or 10544, other values of input termination can be used — 1k Ω in the case of the 10811/10544, which would require 1.111k Ω terminating resistors (taking into account the existing 10k Ω input bias return resistors, which are in parallel).

2. Replace 3x 100µF input capacitors with 100nF NP0 ceramics.
   On the ADA 6 Component PC board, these are C42, C44, and C45.
   NOTE: this change is recommended, but optional. One should generally use the unit in DC-coupled mode to keep the noise from the CLC409 input bias current as low as possible at low frequencies. When AC coupling is required, it will generally be beneficial to limit the input to the HF band.
   Alternatively, remove SW1 and replace the 100 µF coupling cap with a wire.

3. Replace 18x 75 Ω output resistors with 50 Ω resistors (SMD 1206).
   On the ADA 6 Component PC board, these are R13-R30.

4. Install a 100nF (0.1µF) NP0 ceramic capacitor in series with each new 50 Ω output resistor, to limit the LF bandwidth of the output signals and prevent feeding LF noise into the loads.
   NOTE: it is tempting to put one cap between the CLC409 and the 3 output resistors. However, that would compromise the port-to-port isolation below the cutoff frequency set by the capacitor. So, either install all 18 capacitors or install none. This change is highly recommended, but optional.

5. Remove 6x 2N3904.
   On the ADA 6 Component PC board, these are Q1-Q6.
   NOTE: the circuit Extron used subjects these transistors to potentially damaging reverse E-B voltage on signal peaks when set to normal (low) gain, and may cause distortion if the junction breaks down. Further, most 1/5/10 MHz DA applications call for an input of ~ +13dBm, in which case the CLC409 does not have enough headroom to use the high-gain mode. So, it is best to remove these possibly troublesome parts before they have a chance to cause problems. (Alternatively, one can leave the transistors in and remove the 274 Ω resistors at their emitters.) This change is highly recommended, but optional.

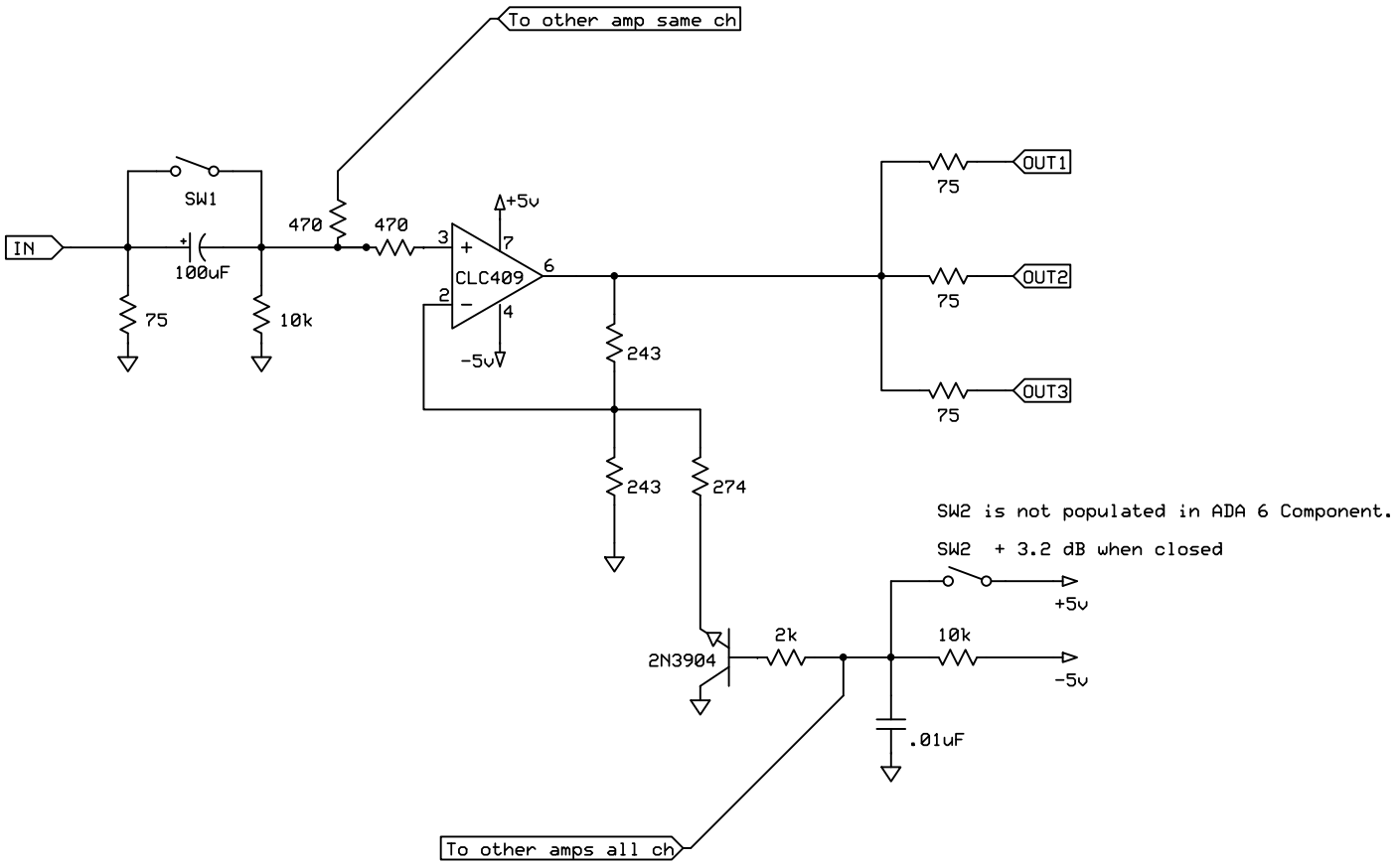
6. Replace the plain IEC power input connector with 0.5A common-mode power line filter
   (panel cutout 20x27mm).
   NOTE: here is one place where bigger is not better. Higher-current filters have less inductance, and therefore do not perform as well as one with a lower current rating. This change is recommended, but optional.

Performance of the modified ADA 6 Component as a 1/5/10 MHz DA (YMMV):

Several units modified as above have been tested and each amplifier drives 3x 50 Ω loads to ~ +13dBm (~ 1 Vrms) with harmonics <-65dBc and about 1 dB of headroom. **Note** that this requires peak currents of ±85 mA from the CLC409s, which are rated for output currents of ±60 mA "for maximum reliability" (also note that the guaranteed minimum current limit value of the CLC409 is ±50 mA). Thus, for optimum performance, 50 Ω loads should be limited to two per amplifier IC (i.e., two per bank of three outputs). This may not be an issue in many applications, because the reference inputs of many instruments and other devices are higher than 50 Ω (often, ~ 1k Ω).

Residual phase noise of < -165dBc at 10 MHz was observed on the modified units.
Adjacent-output isolation (same bank of three) was > 30dB. Non-adjacent-output isolation was > 90dB.

 Revised 11/18/15

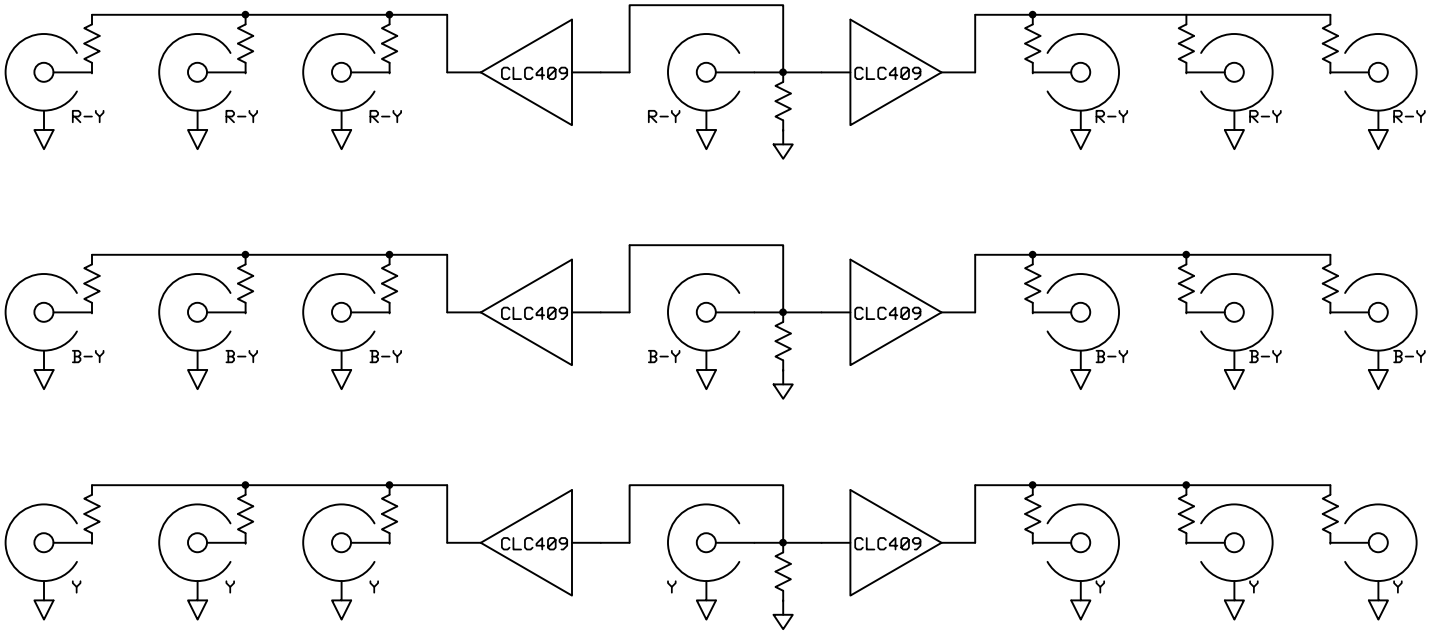


Schematic represents 1/6 of unmodified ADA 6 Component. Power supply not shown.

Some modifications are recommended for use as a 1/5/10 MHz distribution amplifier.

Extron ADA 6 Component		
rev.1 130522 (model name) rev.2 130719 (SW2 comment)		
C. Steinmetz		1/22/06

There are 6 banks of three outputs,
each fed by one CLC409 opamp



NOTE: AC-coupled input
switching not shown

Extron ADA 6 Component		
Block Diagram		
C. Steinmetz		