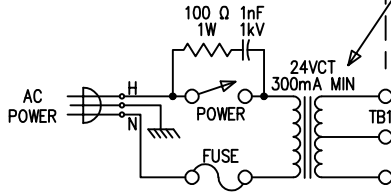


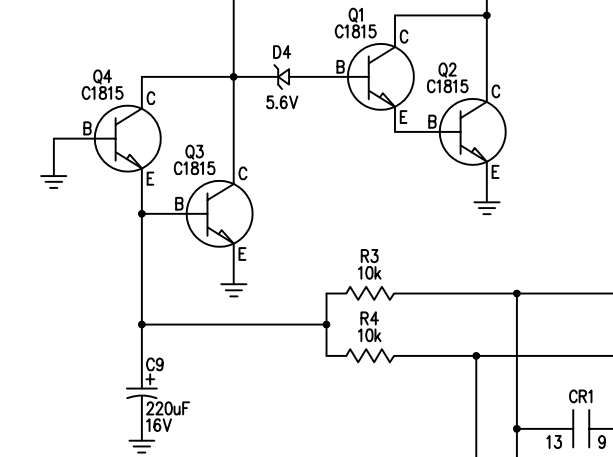
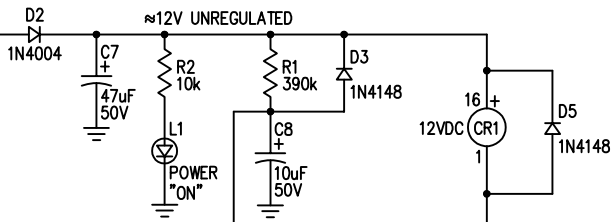
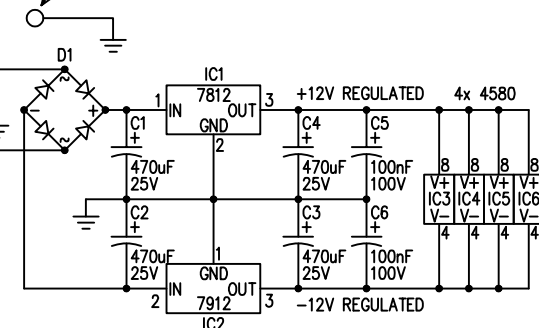
THE RC SNUBBER IS DEPICTED BELOW JUST AS SHOWN ON THE CIRCUIT BOARD SILKSREEN



TO AVOID GROUND LOOPS, THE CASE MAY BE EARTHED, BUT THE CIRCUIT GROUND MIGHT BE ISOLATED FROM EARTH; THIS DEPENDS ON THE SELECTED CASE AND THE CIRCUIT BOARD MOUNTING METHOD.

PARTS IN DASHED OUTLINE ARE NOT PART OF THE KIT

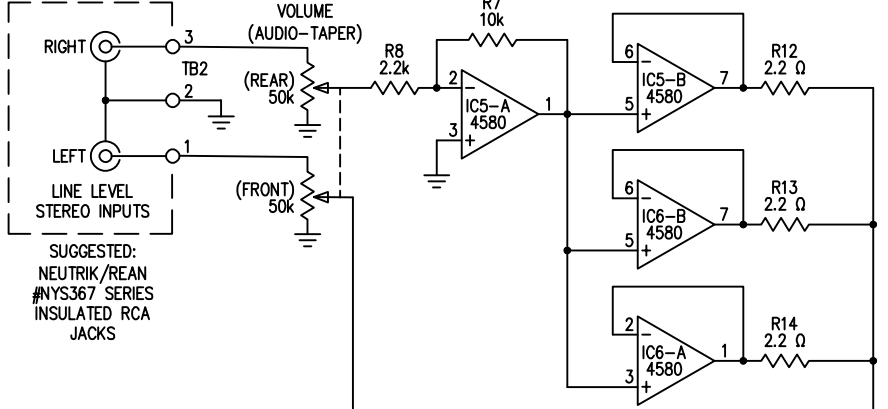
SUGGESTED TRANSFORMER: TALEMA #62052 OR 62053
CIRCUIT BOARD MOUNTING HOLE ADJACENT TO TB1



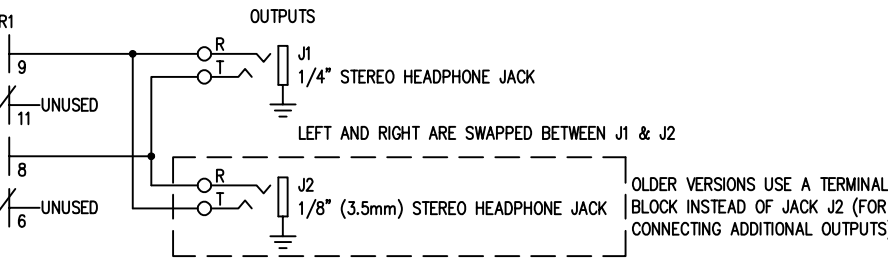
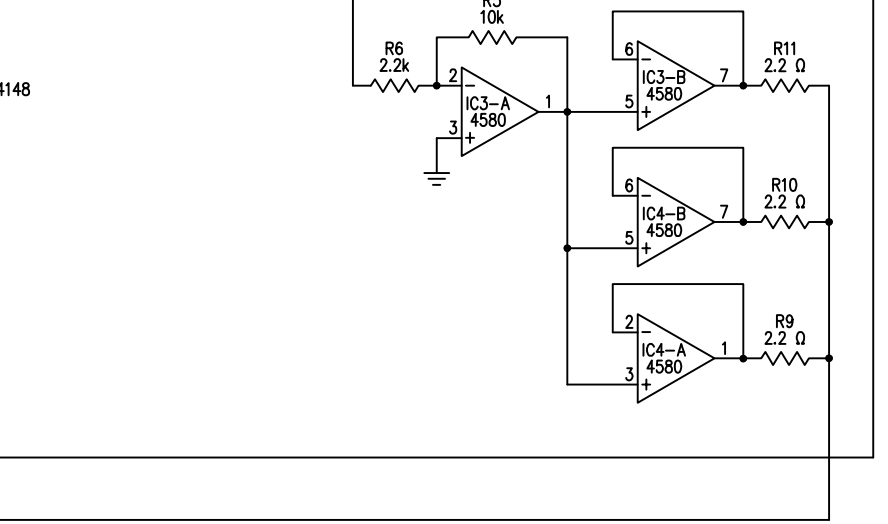
EACH CHANNEL. NOTE THAT THE SINGLE INVERTING AMPLIFIER STAGE PROVIDES THE LOWEST NOISE AND DISTORTION, AND THE INVERSION IS NOT AUDIBLE. THE 4580 OP-AMP IS OPTIMIZED FOR USE IN AUDIO APPLICATIONS.

- THIS IS AN UNOFFICIAL DOCUMENT, NOT PROVIDED BY THE KIT MAKER OR THE CIRCUIT DESIGNER.
- COMPONENT DESIGNATIONS, e.g. IC1, R8, C5, J2, ETC; ARE NOT PRINTED ON THE ACTUAL CIRCUIT BOARD AND ARE NOT ACCORDING TO THE KIT PRODUCER; THEY WERE ASSIGNED AT THE TIME THIS DRAWING WAS CREATED, AND ARE ONLY CONSISTENT WITH THE ASSOCIATED CIRCUIT BOARD LAYOUT DRAWING.

PARTS IN DASHED OUTLINE ARE NOT PART OF THE KIT



SUGGESTED: NEUTRIK/REAN #NYS367 SERIES INSULATED RCA JACKS



CONVENTIONALLY, 'TRS' (TIP-RING-SLEEVE) HEADPHONE CONNECTORS THE TIP 'T' FOR THE LEFT SIGNAL AND THE RING 'R' FOR THE RIGHT SIGNAL

OLDER VERSIONS USE A TERMINAL BLOCK INSTEAD OF JACK J2 (FOR CONNECTING ADDITIONAL OUTPUTS)

- NOTES:
- PORTIONS OF THE CIRCUIT EXTERIOR TO THE CIRCUIT BOARD ARE NOT INCLUDED IN THE KIT, OR SPECIFICALLY RECOMMENDED BY THE KIT MAKER OR ORIGINAL CIRCUIT DESIGNER. THESE ARE SHOWN TO ILLUSTRATE HOW TO CONNECT THE CIRCUIT BOARD TO EXTERNAL CIRCUITRY.
 - THE BI-POLAR (+/- 12V) POWER SUPPLY IS USED ONLY BY THE 4580 OP-AMPS.
 - SECONDARY 12V POWER SUPPLY FROM D2 & C7 IS USED ONLY BY THE POWER "ON" LED (L1) AND THE TIME DELAY RELAY CIRCUIT.
 - THE TIME DELAY RELAY CIRCUIT PERFORMS TWO TASKS. FIRST, THE R1, C8, D3, D4 COMPONENTS PROVIDE A TIME RELAY FUNCTION WHICH KEEPS THE HEADPHONE OUTPUT JACKS DISCONNECTED FROM THE AMPLIFIER DURING THE 1 SECOND POWER-UP PERIOD. ON POWER-UP, C8 CHARGES THROUGH R1 UNTIL THE VOLTAGE ON C8 IS HIGH ENOUGH TO CAUSE ZENER DIODE D4 TO CONDUCT BACK TO THE DARLINGTON TRANSISTOR PAIR Q1 & Q2, WHICH TURNS THEM ON AND ALLOWS THE SECONDARY 12V POWER TO ENERGIZE THE CR1 RELAY COIL; THIS CLOSES THE NORMALLY OPEN RELAY CONTACTS, CONNECTING THE AMPLIFIER OUTPUTS TO THE HEADPHONE JACKS. ON POWER-OFF, D3 ASSURES AN IMMEDIATE OPENING OF RELAY CONTACTS BEFORE THE BI-POLAR POWER SUPPLY VOLTAGE SAGS AND THE AMPLIFIER STOPS WORKING. SECOND, THE R3, R4, C9, Q3, Q4 COMPONENTS FORCE THE TIME DELAY CIRCUIT TO DE-ENERGIZE THE CR1 RELAY, DISCONNECTING THE HEADPHONE OUTPUT JACKS FROM THE AMPLIFIER IN THE EVENT THAT A DC SIGNAL, OR DC COMPONENT OF AN AC SIGNAL, IN EXCESS OF ABOUT 0.8V IS PRESENT AT THE OUTPUT OF THE AMPLIFIER ON EITHER OR BOTH CHANNELS. THIS IS TO PROTECT THE HEADPHONE SPEAKER ELEMENTS FROM DAMAGE IF A DC INPUT IS APPLIED, OR IF THE AMPLIFIER FAILS IN SUCH A WAY AS TO PRODUCE A SIGNIFICANT DC COMPONENT TO THE OUTPUT; THE ENTIRE AMPLIFIER IS DC COUPLED, SO AMPLIFICATION OF DC SIGNALS IS POSSIBLE.
 - THE AMPLIFIER INPUT IS INTENDED FOR 'LINE LEVEL' AUDIO SIGNALS. AFTER ATTENUATION BY THE 'VOLUME' CONTROL, THE AMPLIFIER'S FIRST STAGE PROVIDES A GAIN OF ABOUT 4 (INVERTED). THIS DRIVES THE THREE ASSOCIATED BUFFER AMPLIFIERS, WHICH PROVIDE CURRENT GAIN BUT NOT VOLTAGE GAIN. THE THREE BUFFER OUTPUTS ARE COMBINED VIA THE 2.2 OHM RESISTORS INTO THE FINAL AMPLIFIER OUTPUT SIGNAL; THE SAME APPLIES TO

HA-PRO2 (VERSION 4 PCB) STEREO HEADPHONE AMPLIFIER SCHEMATIC DIAGRAM