The Compleat™ Hybrid Linestage

The Compleat™ Hybrid Linestage is a high quality preamplifier kit based on Alan Kimmel's ST-70 driver circuit mod using the "Mu Stage" concept. This Mu Stage has met with immediate success and all our customers who have built the ST-70 Mod are raving about its sound. The circuit is called a "Mu Stage" because the gain of the stage is very close to the mu (amplification factor) of the tube. This gain is achieved by fixing a constant voltage across a fixed plate resistance and thereby creating a constant current (well, almost constant). This in turn causes the plate resistor to obtain an AC or dynamic resistance much larger than its ohmic value. Actually, the circuit has been designed so that the total gain is adjustable just by selecting between a few resistors. We have created our hybrid Mu Stage by replacing the pentode current source with a n-channel HEXFET™ mosfet. The mosfet provides a lower output impedance than the pentode and there are no screen and filament voltages to deal with. The constant current source operation of the circuit provides many benefits of which a few are: the triode tube circuit is able to operate in a much more linear fashion; it reduces the triode tube's susceptibility to B+ voltage fluctuations (B+ regulation not really needed); and the circuit exhibits a very low output impedance (50-100ohms typical). This new hybrid design is non-inverting.

A wide variety of tubes can be used with this design including the 6DJ8, 6922, 12AU7 and the 7308. We have selected the 12AU7 as our preference of triode tube because of its very linear transfer characteristics, low noise capability, and moderate amplification factor. Tom Tutay has turned us onto the 5814 and the 5963 (Phillips/Sylvania preferred) as a few other good candidates. The 12AU7 provides an open-loop gain of approximately 25dB. The 6DJ8/6922 triode can also be used in the circuit if more gain is required, however it may provide too much gain (~30dB) for many applications. The 6FQ7 is another good choice providing an open-loop gain of approximately 25dB. All of the tubes mentioned above can drop directly into the circuit, however the 12AU7 requires a couple of jumper wire and resistor changes to operate at a filament voltage of 6 volts and bias the circuit properly. And of course the linestage can be adjusted for lower gains of approximately 2dB or 12dB by selecting the feedback resistors.

I am often asked how the Hybrid Linestage sounds. This preamp's sound falls somewhere in between that of a classic tube preamplifier and a high quality class-A solid-state preamp. The Hybrid Linestage has a very detailed but natural sound, superb bass (it doesn't possess that bloated upper mid-bass characteristic of classic tube preamp designs), and an incredible timbral accuracy throughout the midrange and upper octaves. The Hybrid has the detail and pinpoint imaging of a solid-state preamp while retaining that vacuum tube "warmth" in the mid-to-upper octaves. This is the best I can explain it!

ALAN KIMMEL HYBRID LINESTAGE

The Compleat™ Hybrid Linestage is a great kit for beginners. Most components mount on the circuit board so there is minimal point-to-point wiring. The linestage is two (2) completely separate channels located on a single 9" x 10" circuit board. There is one tube/mosfet combination per channel. Each channel has its own B+ rectification and filter capacitance. Motorola high speed rectifier diodes are used in the B+ supply. The power transformer is housed in a separate chassis and is connected to the preamplifier through an umbilical cord. The power transformer enclosure uses an IEC connector so you can try out your favorite power cord(s). High quality components are used throughout the design including an FR-4 grade circuit board with solder plated 2oz. copper foil, your choice of vacuum tubes from various manufacturers (tube dampers included free with purchase), WIMA polypropylene capacitors, and the Holco metal film resistors. Also available is the option of using the Hovland MusiCap polypropylene film and foil capacitors and the super high quality, low inductance and low noise Caddock MK132 film resistors.

The Hybrid Linestage includes: 4-input capability (CD, Tuner, Aux/Phono, Tape, etc.), a 30 secound delay mute feature at turn on, and can be configured for either a record-out connection or two identical outputs. The basic linestage (LINE-1A) is supplied with Vampire M1F RCA jacks, Kimber Kable OFC hookup wire, and a Alps potentiometer for the level control. Input selection is accomplished via a high quality Grayhill rotary switch. The deluxe linestage (LINE-1B) is supplied with Cardas RCA jacks, a Grayhill 24-position stepped attenuator for the level control using Holco 1% metal film resistors. For the ultimate linestage, try some Kimber Silver Hookup wire, and the MusiCap/Caddock upgrade.

The all aluminum preamp chassis measures 3.5"h x 12"w x 10"d, is black, with a brushed and silkscreened front panel. The power supply chassis measures 3.5"h x 7"w x 7"d.

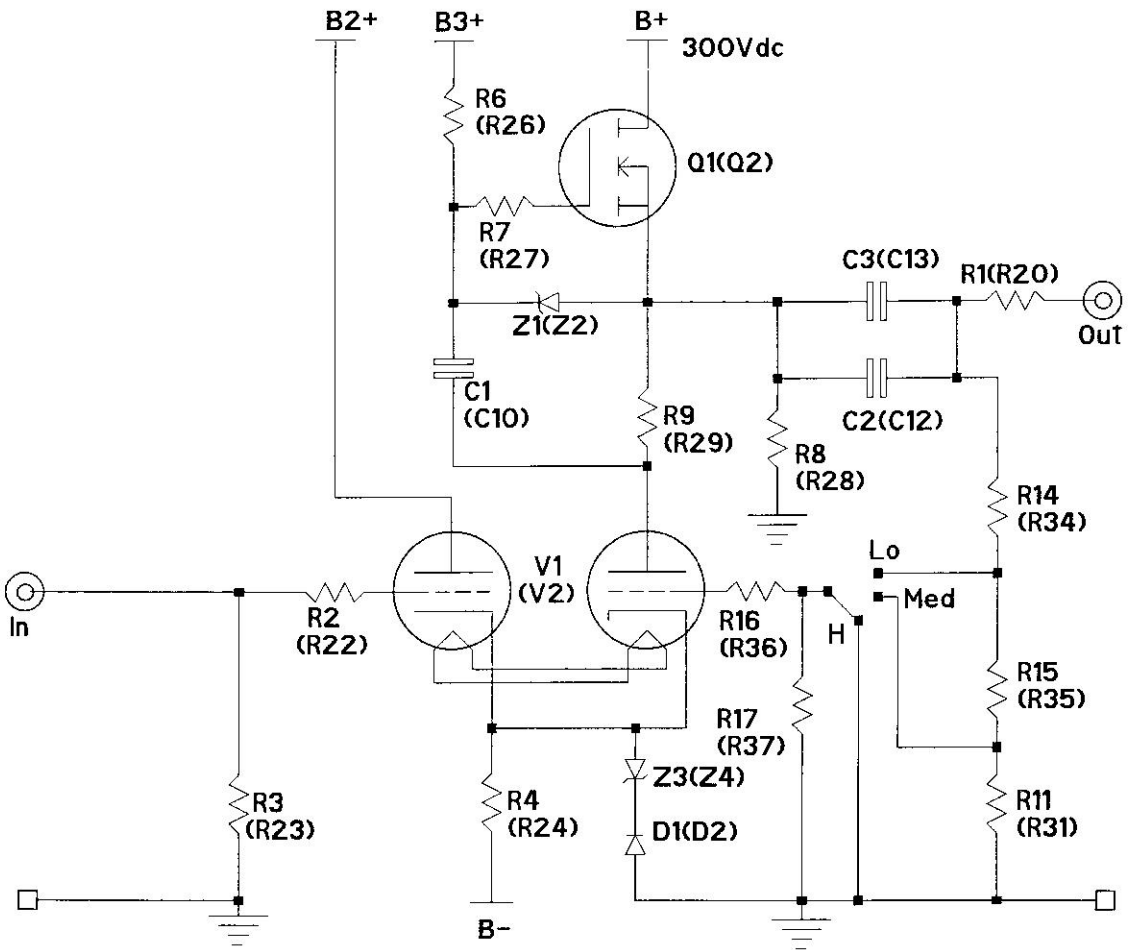
The Hybrid Linestage's total gain is adjustable and can be set via jumpers for low (~2dB), medium (~12dB), and high gain. The highest gain setting would correspond to approximately that of the tube's mu factor. This option provides you with the capability to adjust the gain according to your system's needs whether it be a phonostage that needs a little more gain, or an efficient speaker/amp combination that needs less gain.

With the Welborne Labs Compleat™ Hybrid Linestage, you can build a complete line-level preamplifier for well under $800 having all of the sonic characteristics of preamps costing 5 times as much.

CAT NUMBER	DESCRIPTION	PRICE
LINE-1A	One Basic Linestage with Alps/Vampire, less tubes	$795.00
LINE-1B	One Deluxe Linestage with Grayhill Attenuator/Cardas, less tubes	$895.00
LINE-1C	Hovland MusiCap/Caddock Resistor Upgrade	$145.00
6FQ7-M	MAZDA 6FQ7 NOS (one pair)	$ 60.00
12AU7-LN	RAM Labs Low Noise 12AU7 (one pair)	$ 60.00
12AU7-G	Golden Dragon Low Noise 12AU7 (one pair)	$ 52.00
6DJ8-LN	RAM Labs 6DJ8 Low Noise (one pair)	$ 60.00
6DJ8-G	Golden Dragon Low Noise (one pair)	$ 74.00
6922-LN	RAM Labs 6922 Low Noise (one pair)	$ 60.00
6922-SOV	SOVTEK 6922 (one pair)	$ 14.00
5814	Phillips/JAN 5814 (one pair)	$ 16.00
5963	Sylvania 5963 (one pair)	$ 16.00

ALL 'LINE' CATALOG NUMBERS QUALIFY FOR OUR DISCOUNT PROGRAM
For example: the LINE-1A with RAM low noise 12AU7s is $726.95 with discount!

ALAN KIMMEL HYBRID LINESTAGE



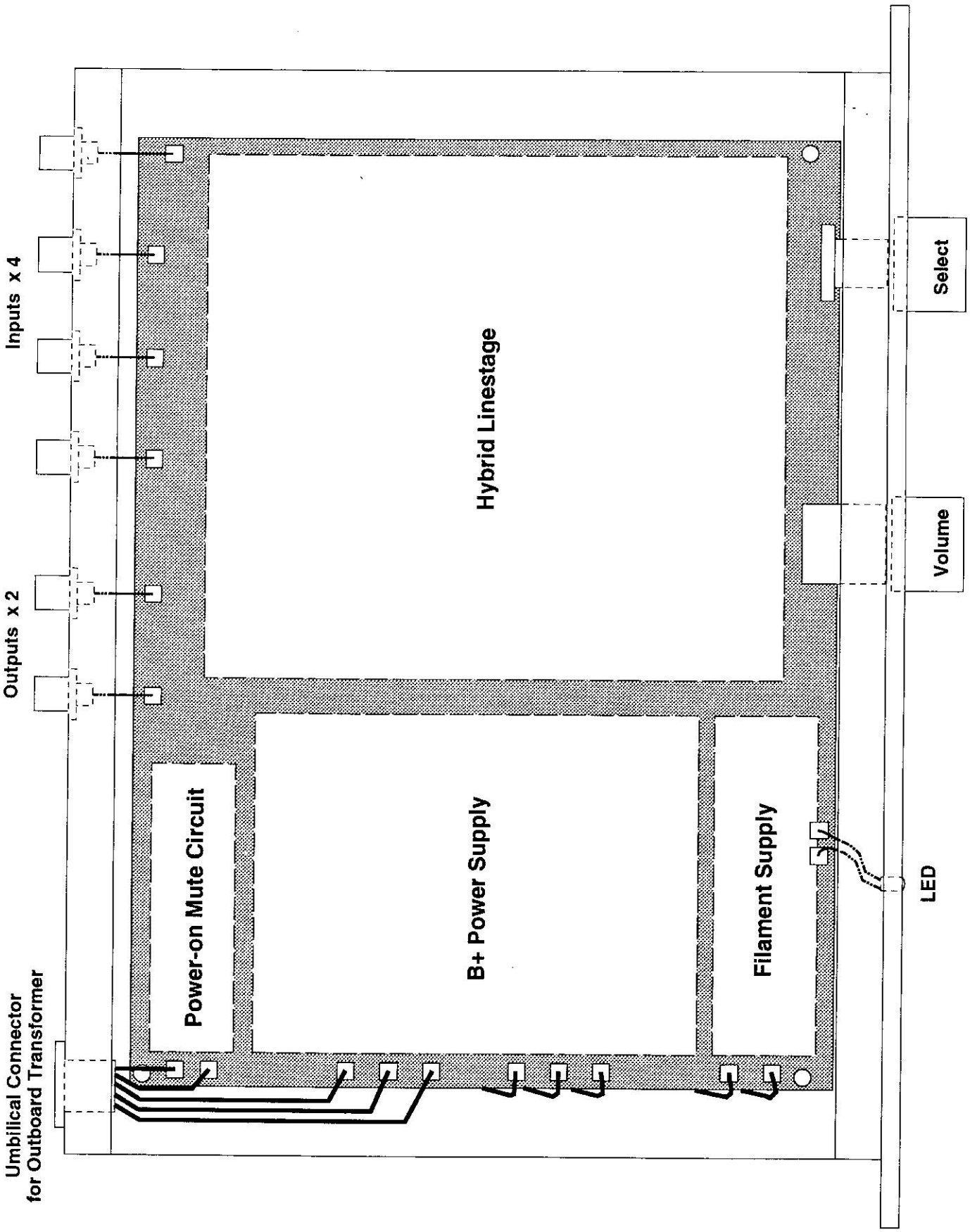
Compleat
Hybrid Linestage

designed by

Alan Kimmel
Welborne Labs
1994/95

Right Channel Shown
( ) Left Channel

ALAN KIMMEL HYBRID LINESTAGE



Photos
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HYBRID LINESTAGE CARD

The Hybrid Linestage Card is the original design from 1993 (see photo on page B3). We now offer it as a circuit card module that can be used to build a preamp from scratch using our PS-4 supply, or dropped into an existing chassis as an upgrade. Unlike the Compleat™ Hybrid Linestage kit, the hybrid card is a fixed gain circuit, with the gain determined by the tube chosen. A wide variety of tubes can be used with this design. We have selected the 6FQ7 as our preference of triode tube because of its very linear transfer characteristics, low noise capability, and moderate amplification factor. The 6FQ7 provides a gain of approximately 25dB. The 6DJ8 triode can also be used in the circuit if more gain is required, however it may provide too much gain (~30dB) for many applications. The 12AU7A is another good choice providing a gain of approximately 25dB. All of the tubes mentioned above can drop directly into the circuit, however the 12AU7A requires a couple of jumper wire and resistor changes to operate at a filament voltage of 6 volts and bias the circuit properly.

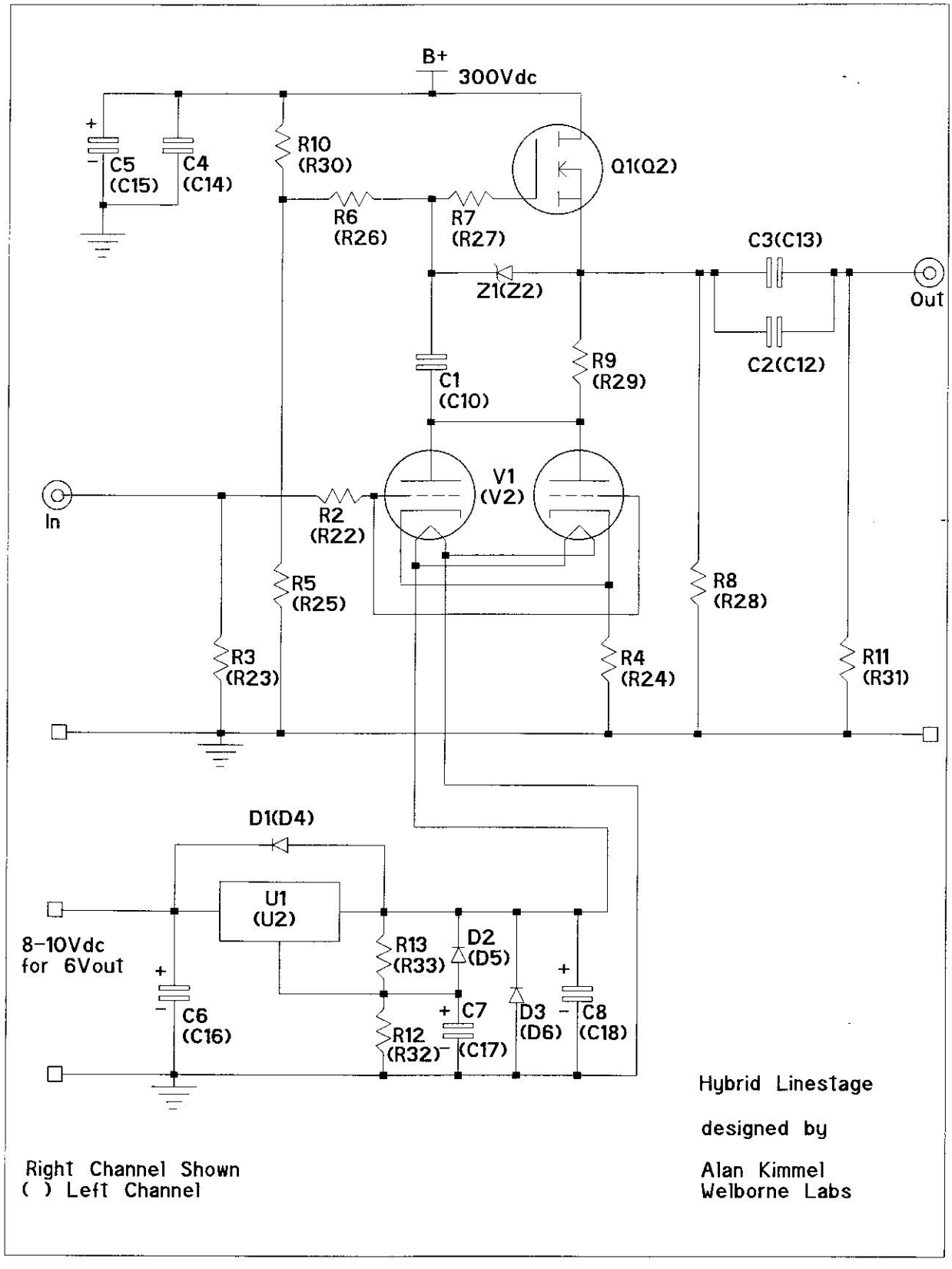
The Hybrid Linestage Card is two (2) completely separate channels located on a single 4" x 6" circuit board. There is one tube/mosfet combination per channel and both sections of each tube operate in parallel. Each channel has on-board B+ capacitance and its own DC filament voltage regulator circuit. High quality components are used throughout the design including an FR-4 grade circuit board with solder plated 2oz. copper foil, RAM Labs tested and graded vacuum tubes (tube dampers included free with purchase) or the Golden Dragons, WIMA polypropylene capacitors, and Holco metal film resistors. Also available is the option of using the MIT MultiCap polypropylene capacitors and the super high quality, low inductance and low noise Caddock MK132 film resistors.

Starting with the Welborne Labs Hybrid Linestage Card, and adding a power supply, associated controls, connectors, and enclosures, you can build a complete linestage preamplifier for well under $700 having all of the sonic characteristics of preamplifiers costing 5 times as much. The Hybrid Linestage has a very detailed but natural sound, superb bass, and an incredible timbral accuracy throughout the midrange and upper octaves. If you like tube preamps, you'll want to try this one.

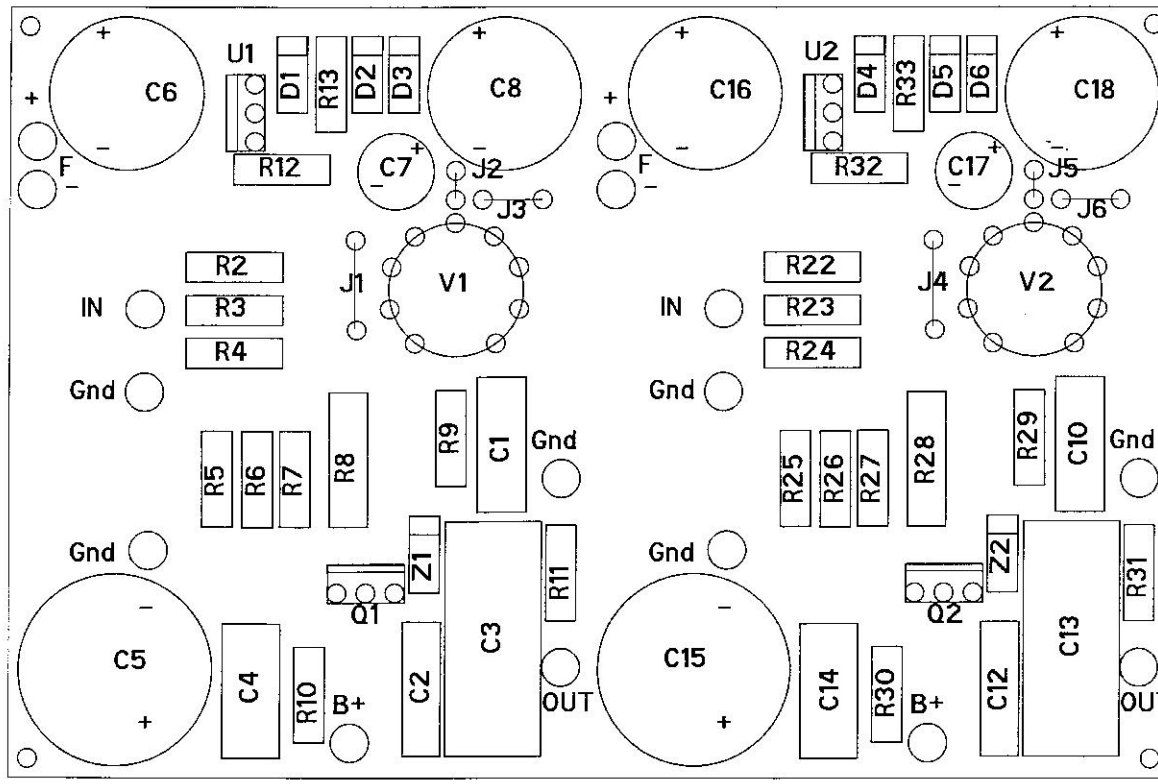
CAT NUMBER	DESCRIPTION	PRICE
HYB-1A	One stereo linestage card less tubes	$ 115.00
HYB-1B	One stereo linestage card with Caddock/MIT Upgrade, less tubes	240.00
HYB-1C	Circuit Board Only (Stereo)	22.00
6FQ7-LN	RAM Labs Low Noise 6FQ7 (one pair)	$ 52.00
6FQ7-M	MAZDA 6FQ7 NOS (one pair)	$ 44.00
12AU7-AA	RAM Labs Low Noise 12AU7 (one pair)	$ 36.00
12AU7-G	Golden Dragon Low Noise 12AU7 (one pair)	$ 52.00
6DJ8-AA	RAM Labs 6DJ8 Low Noise (one pair)	$ 54.00
6DJ8-G	Golden Dragon Low Noise (one pair)	$ 74.00
6922-SOV	SOVTEK 6922 (one pair)	$ 14.00

ALL 'HYB' CATALOG NUMBERS QUALIFY FOR OUR DISCOUNT PROGRAMS

ALAN KIMMEL HYBRID LINESTAGE CARD



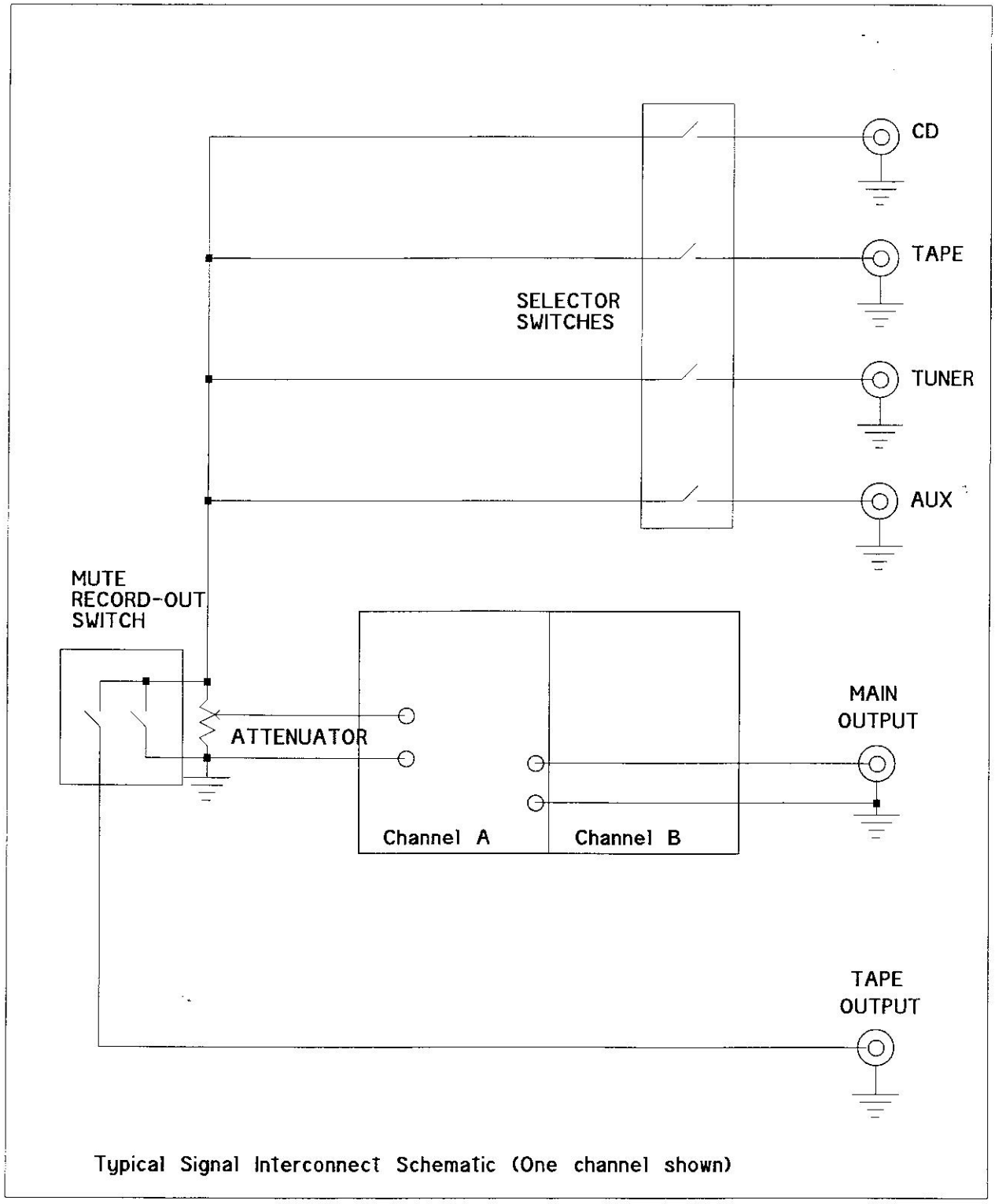
ALAN KIMMEL HYBRID LINESTAGE CARD



Parts List

R2,R7,R22,R27	100ohm	1/2 watt 1% mf resistor (Caddock)
R3,R23	330kohm	1/2 watt 1% mf resistor (Caddock)
R4,R24	1.00kohm	1/2 watt 1% mf resistor (Caddock)
R5,R10,R25,R30	221kohm	1/2 watt 1% mf resistor (Caddock)
R6,R26	10.0Mohm	1/2 watt 1% mf resistor (Caddock)
R8,R28	33kohm	2 watt 5% metal oxide resistor (Caddock)
R9,R29	6.8kohm	1/2 watt 1% mf resistor (Caddock)
R11,R31	1.00Mohm	1/2 watt 1% mf resistor (Caddock)
R13,R33	750ohm	1/2 watt 1% mf resistor (6 volt filament)
R12,R32	2.74kohm	1/2 watt 1% mf resistor (6 volt filament)
C1,C10	.022uf/630V	WIMA polypropylene capacitor (MIT)
C2,C12	.01uf/630V	WIMA polypropylene capacitor
C3,C13	1.0uf/250V	WIMA polypropylene capacitor (MIT)
C4,C14	.1uf/400V	WIMA polypropylene capacitor (MIT)
C5,C15	68uf/450V	Panasonic low impedance electrolytic
C6,C8,C16,C18	2200uf/35V	Panasonic low impedance electrolytic
C7,C17	100uf/63V	Panasonic low impedance electrolytic
D1,D2,D3,D4,D5,D6	1N4002	100V/1A diode
Z1,Z2	1N4742	12V/1W zener diode
Q1,Q2	IRF710 or IRF712	International Rectifier mosfet
U1,U2	LT1085CT	Linear Technology voltage regulator
V1,V2	6FQ7 or 6DJ8 or 12AU7	Medium-mu triodes
	misc	Audiovalve tube sockets, heatsinks, FR-4 printed circuit board

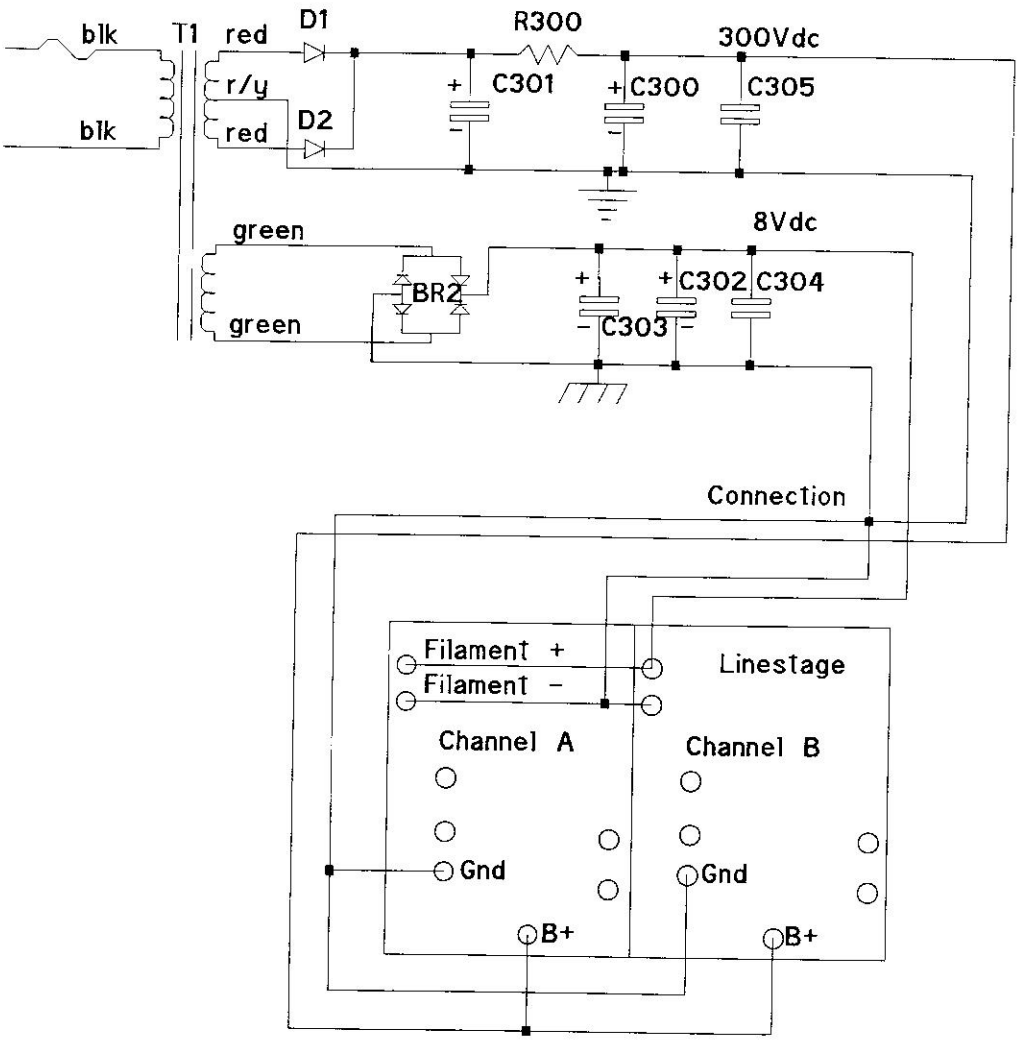
( ) Indicates parts upgrade



Typical Signal Interconnect Schematic (One channel shown)

PS-4

Phono and Linestage Power Supply



Example Power Supply Connections