A STEREO BALANCED TRANSFORMER INPUT MICROPHONE PREAMP

By Ross Giles

Live tape recordings offer the audio amateur a fascinating opportunity to become actively involved in their avocation. I have been using a tube-type Revox G36 for a number of years now with excellent results. Apart from the musical enjoyment, the tapes provide an important reference source for testing equipment.

The G36 has its own internal microphone preamp but it is unbalanced, having only a signal and ground line input to a tube grid without a transformer. This has caused problems in the past with radio frequency interference (RFI) from dimmers and the like getting into the audio lines. These problems are much worse when I must use long cable runs. The problem prompted me to build a balanced input preamp, bypassing the ones in the G36. It can also be used to drive the line input of most solid-state, reel-to-reel and cassette decks.

In the balanced input arrangement the microphone signals within two signal lines of the cable are out of phase with each other. Any interference induced in the cable is in phase on both wires and is therefore cancelled. The amount of cancellation is, of course, limited in practice.

The transformer specified in this project has a common mode rejection ratio (CMRR) of 85dB at 1kHz. This is further reduced by the cable used. I recommend the Neglex Quad 2534, but other cables made by companies such as Belden, are also good. It is basically a matter of price and personal preference in the "sound" of a particular cable.

The type of microphone used is also important. A "thin, slightly tizzy" sounding microphone such as some modern condenser types would probably match the Neglex 2534, which has a nice full midrange, but not brilliant highs. On the other hand, an old tube microphone from the 1950s might sound slightly dull and require a cable with more top end.

The transformers I originally used were of Australian manufacture and are no longer available. I wrote to Jensen Transformers for an alternative and they kindly provided me with their type JE-115K-E.

This device comes with some impressive specifications. With the recommended secondary termination only (150k), the frequency response is −0.25dB at 20Hz and −0.06dB at 20kHz. The maximum input level at 20Hz is −2.5dBu (dBu = dB ref. 0.7746V RMS) for 1% THD, and +10dBu at 50Hz. These frequencies are given because the transformer saturates first at low frequencies.

The JE-115K-E has both magnetic and Faraday shields. With the 150k load, the

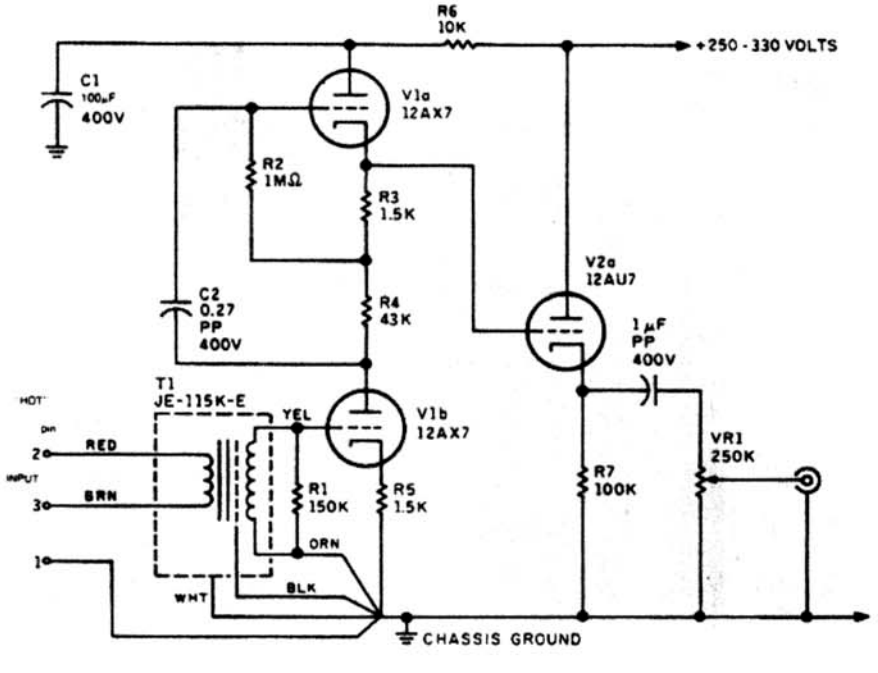

FIGURE 1: Schematic of one channel of the microphone preamp.

PARTS LIST

Resistors

R1	150k
R2	1M
R3, 5	1.5k
R4	43k
R6	10k
R7	100k
VR1	250k pot

All resistors are ½ W metal film except the pot.

Capacitors

C1	100µF, 400V electrolytic
C2	0.27µF, 400V polypropylene
C3	1µF, 400V polypropylene
V1a, b	12AX7, ECC83
V2a	½ 12AU7/ECC82
T1	Jensen JE-115K-E ($57.55 each from Jensen Transformers, 10735 Burbank Blvd., N. Hollywood, CA 91601.)

A suitable separate power supply for this project is the Waldron crossover supply (*TAA* 3/79), available from Old Colony, #KK-7.

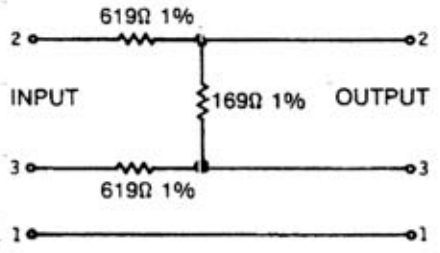

FIGURE 2: Recommended minimum loss pad to maintain 150Ω source impedance toward the microphone amp and approximately 1400Ω input impedance toward the microphone. This can be built inside a Switchcraft S3FM male-female 3-pin adapter.

input impedance is 1.4k at midband frequencies, maintaining above 1k in the range 26Hz to 14kHz.

In *Fig. 1*, I have given the Cannor wiring used by Australian broadcasting stations. In the USA this might be different with pin 3 hot instead of pin 2. Swapping the red and brown from T1 will change the microphone phase 180°.

We have a number of choices available for front-end topology. I prefer the one proposed by Christopher Paul in *TAA* 2/85. The 6DJ8 seems to be the preferred tube at the moment. However I still prefer the 12AX7/ECC83.

The output stage uses half of a 12AU7, ECC82, a medium mu dual triode, as a cathode follower. This tube has a nice solid sound which I find suitable in this application. The values I found by experimentation. The preamp will work with voltages between 250 and 330V DC. [*The higher voltage is better for dynamic range and distortion.—Ed.*] Mine is supplied from the Revox.

I constructed the preamp using tag strip. I find this technique satisfactory for prototyping. It is cheap, almost as quick as etched circuit board mounting, and as long as the layout is okay, just as satisfactory. The prototype was built in a die-cast aluminum box with the external supply connected via a large 4-pin Cannon type connector.

I use PZM type microphones when I am doing direct stereo recordings. These are mounted on 12" square perspex (acrylic) sheets. I have found thick cardboard an effective alternative. The inexpensive PZMs sold by Radio Shack give good results also. This setup can be used to record orchestras through jazz bands. I have even used it to record rock bands when recording kick drums or Marshall

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Stereo Mike Preamp

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stacks, and radio drama, with good results.

I have used these preamps in a modern multi-track studio. Bypassing the console preamp at the channel insert return, they have given excellent results especially when recording guitar.

If overloading from the input source occurs, connect a pad to the input. Switchcraft packages such pads (or, the case only) in double ended Cannon-type housings. A 20 or 15dB pad is handy (*Fig. 2*). The pads I use are 15dB premade with Z_{in} 150Ω and Z_{out} 150Ω. I do not have them handy and no longer have the data, since I loaned my reference book to a friend. □