How to use the LS509 based GS3010 Hybrid

APPLICATION NOTE

INTRODUCTION

The GS3010 class A hybrid incorporates the well known and established LS509 amplifier, four capacitors, and two selectable bias resistors. All that is required for a fully functional class A system is the addition of a microphone, volume control, gain control, MPO control and receiver.

CIRCUIT DESCRIPTION

The GS3010 allows for easy and fast implementation of a class A system into a hearing instrument.

The hybrid is comprised of the LS509 class A amplifier and all necessary external components. The electrical parameters of LS509 class A amplifier are specified in the LS509 Data Sheet, document no. 510-12.

The basic, minimum components configuration of the system is presented in Fig. 1.

Stage A of the LS509 in the GS3010 hybrid configuration allows for 28 dB maximum gain assuming approximately 3.9 kΩ resistance of the microphone and 100 kΩ external potentiometer. The 47 nF input capacitor provides AC coupling between microphone and input stage of the LS509 amplifier and establishes the corner frequency at 868 Hz. Both ends of the capacitor are accessible for easy corner frequency adjustment. The output of preamplifier A has a 5.6 kΩ resistor for simple interfacing with the next amplifier - stage B.

The stage B preamplifier is set up in a similar configuration to stage A, whereas stage B would typically be used as a volume control stage.

The output stage of the LS509 is a current drive class A . The pair of Schottky diodes used for symmetrical clipping are connected to pad 7 via 0.1 µF AC coupling capacitor. The MPO adjustment resistor should be connected as per Fig. 1.

The bias current in the transducer can be adjusted by changing the value of the emitter resistor. The transducer current can be calculated as a ratio of the fixed reference voltage on pad 5 (28.5 mV typ.), and the emitter resistor.

The on-chip 125 Ω emitter resistor, R_E and additional two resistors R1 and R2 (58 Ω and 98 Ω) on the hybrid allow for a simple jumper/connection arrangement to adjust the transducer bias current of the receiver to the optimal setting specified by the receiver manufacturer.

Jumpers between pads	Bias current
no jumper	225 µA
10 to 18	520 µA
11 to 17	725 µA
10 to 11 to 17	1 mA

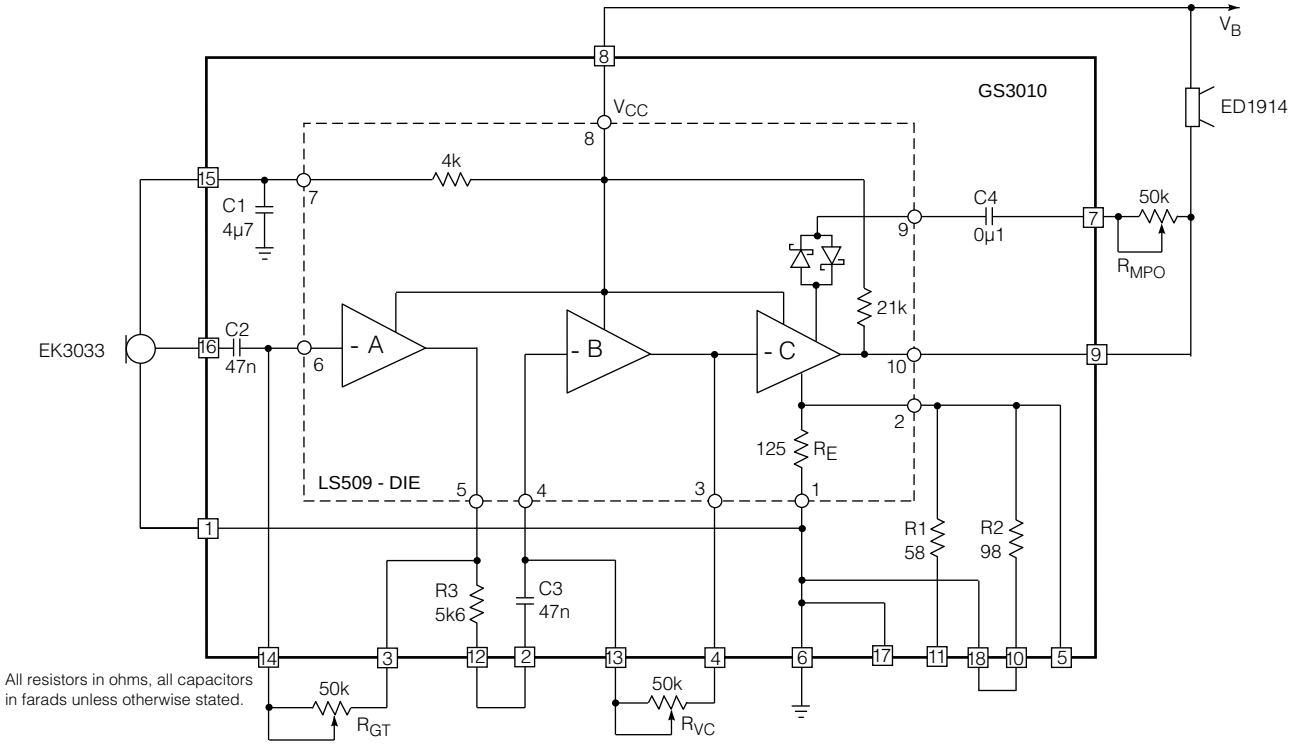

Fig. 1 Typical Hearing Instrument Application

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Very few external components are required for the system to operate as an efficient class A amplifier. However, the hybrid has been designed to give the manufacturer the flexibility of adjusting parameters by placing external capacitors and resistors around the desired pads. Fig. 2 shows a possible application circuit utilizing the stage A as a telecoil preamplifier.

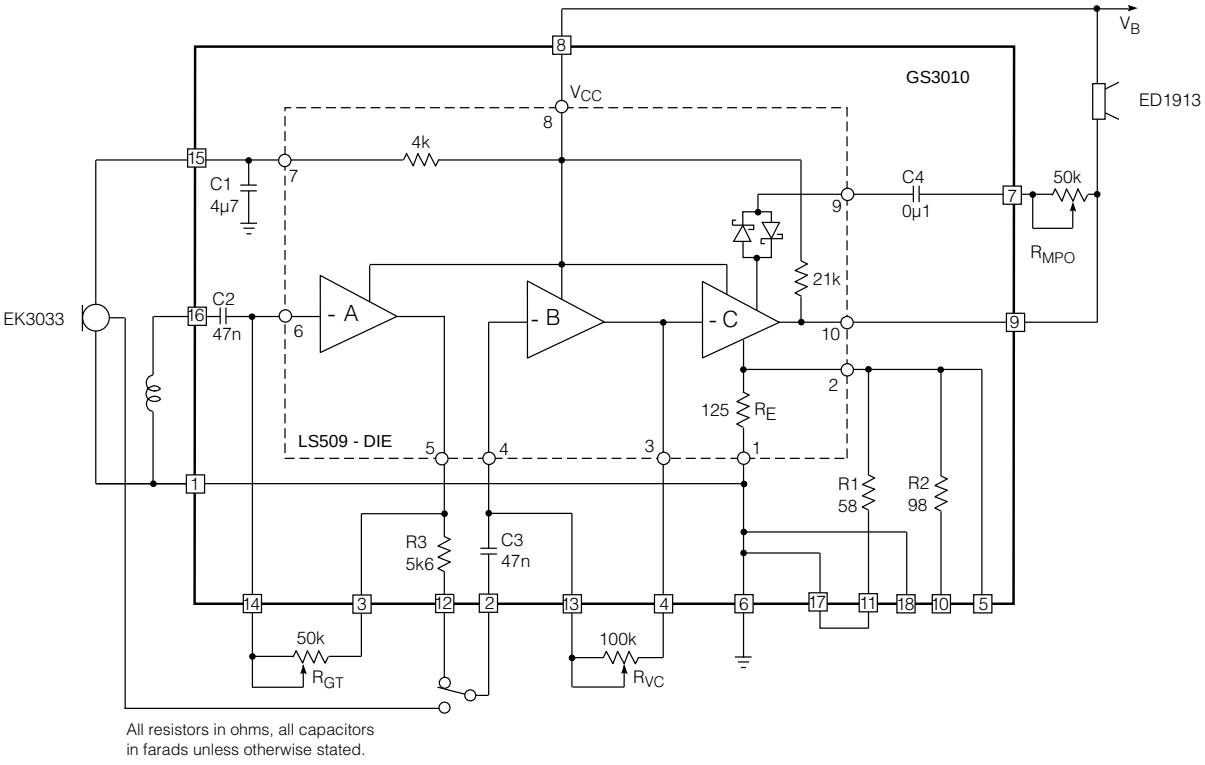

Fig. 2 Typical Hearing Instrument Application with Telecoil

ASSEMBLY DIAGRAM

The assembly diagram shown in Fig. 3 depicts the typical hearing instruments application presented in Fig. 1. The assembly diagram of the circuit utilizing the stage A as a telecoil preamplifier is presented in Fig. 4.

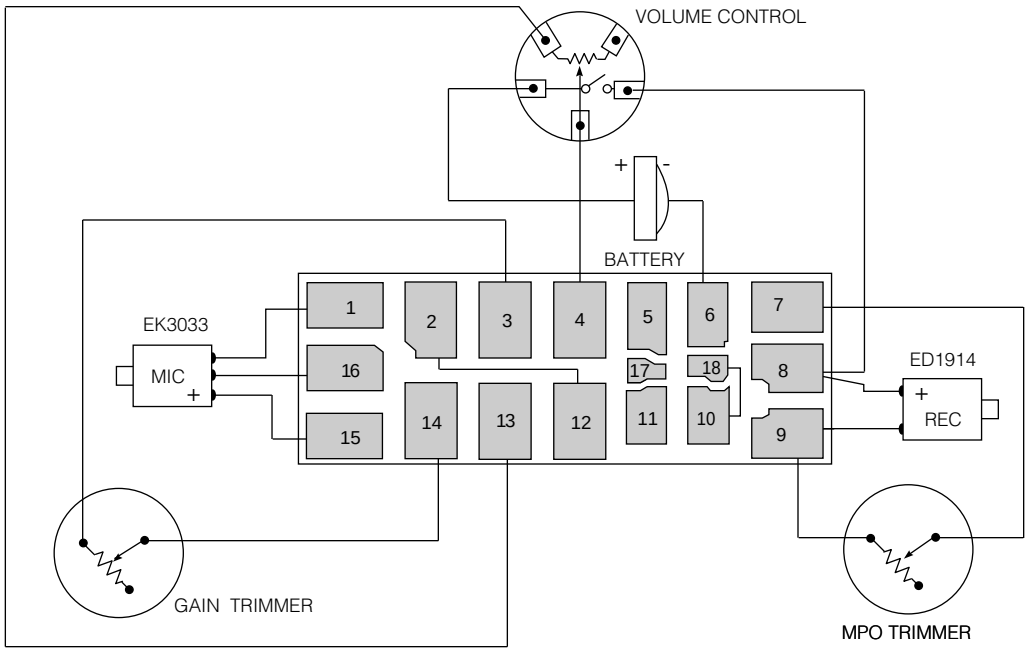

Fig. 3 Typical Assembly Diagram

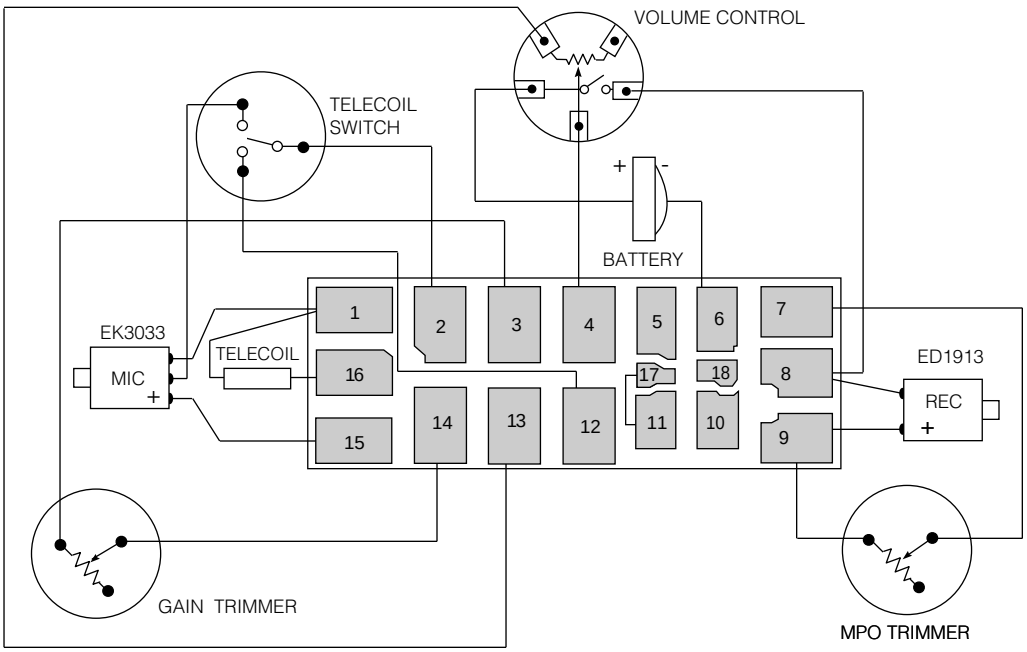

Fig. 4 Typical Telecoil Assembly Diagram

REVISION NOTES:
Receiver change in Figure 3