

# Personal Cassette Amplifier

A budget-priced 2W amplifier adds a speaker to cassette players.

R. S. Powell

Many car owners like to listen to music of some form while driving, be it from a car radio or cassette. Unfortunately car cassette players are either expensive or unreliable and tend to attract thieves. This article describes the construction of a simple little amplifier which may be used with a personal cassette player to enable tapes to be played in the car.

An amplifier of this type can be easily hidden, and the cassette player may be removed when one leaves the car. This simple system offers a low cost solution to providing in-car music with the added advantage that personal cassette units are less renowned for damaging tapes than cheap car players.

The amplifier can of course be used in a wide variety of other applications.

## The Amplifier

The basic circuit for the amplifier is shown in Fig. 1. This may be used in either of two ways:

- 1) The circuit may be used with two resistors connected to the amplifier input — one to each channel of the stereo output from the player, as shown in Fig. 1; alternatively,
- 2) Two of the circuits may be used to provide stereo by omitting R1 from each

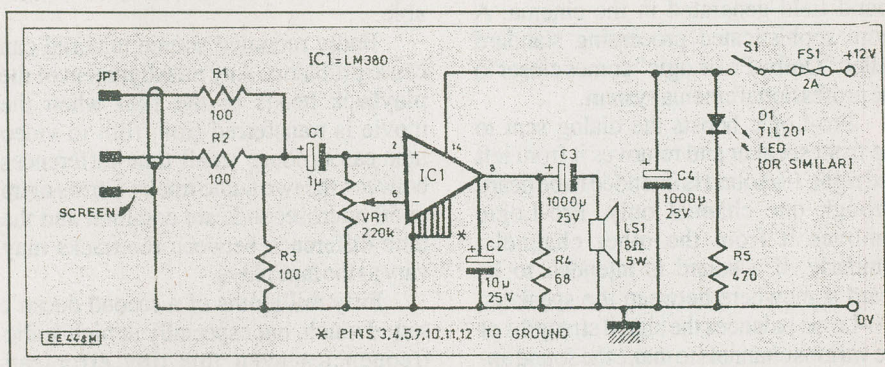
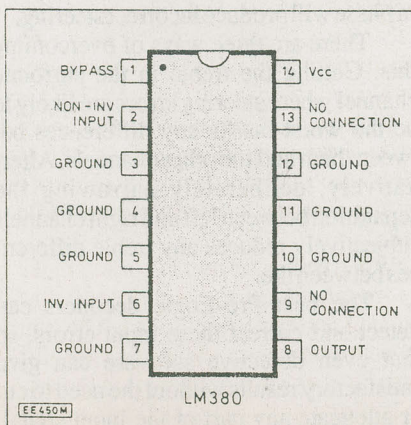


Fig. 1. Complete circuit diagram for the Personal Cassette Amplifier and below, pinout of the LM386 power amp IC.



amplifier and connecting one circuit to each output channel. A dual-gang potentiometer should then be used for the volume control.

## Circuit

The LM380 will deliver about 2 Watts into an eight ohm speaker, which is perfectly adequate for reasonable volume levels, even at highway speeds. The actual circuit is very simple; R1, R2 and R3 constitute a passive mixer, forming a single signal from the left and right channels. As the headphone output usually matches impedances between 32 ohms and 11 kilohms, values of 100 have been chosen



# Parts List

## Resistors

R1 .....(see text)  
 R2,R3 .....100  
 All 1/4W, 5%

## Potentiometer

VR1 .....220K log. (see text)

## Capacitors

C1 .....1 $\mu$  tantalum  
 C2 .....10 $\mu$ elect. 25V  
 C3,C4 .....1,000 $\mu$ elect. 25V

## Semiconductors

D1 .....TIL201 LED (or similar)  
 IC1 .....LM380 amplifier

## Miscellaneous

JP1 .....stereo jack plug  
 FS1 ..... 2A inline fuse and holder  
 LS1 ..... 8ohm 5W speaker  
 Veroboard, 16 strips by 28 holes,  
 shielded stereo lead, connecting wire,  
 etc.

for R1 to R3. The signal developed across R3 is amplified by the LM380. VR1 varies how much signal is sent to the inverting input and hence determines the gain. The output is fed to the speaker via the capacitor C3.

One should note C2 and R4 which are different from values usually used with the LM380. R4 helps prevent distortion and replaces the usual Zobel network, while C2 has been increased to 10 $\mu$  for the same reason.

Capacitor C4 is a decoupling capacitor and should be 1000 $\mu$  or more to stabilize the supply for the amplifier. The circuit will run from the car battery (or any other DC supply of 12 to 18V at about 500mA) and an LED indicates when the circuit is turned on. A short length of shielded cable should be used to link the amplifier input to a jack plug for the head-phone socket on the cassette unit.

## Construction

The unit is easily constructed on Veroboard as shown in Fig. 2. Note that pins 3, 4, 5, 7, 10, 11 and 12 of the LM380 are all grounded to help form a heatsink for

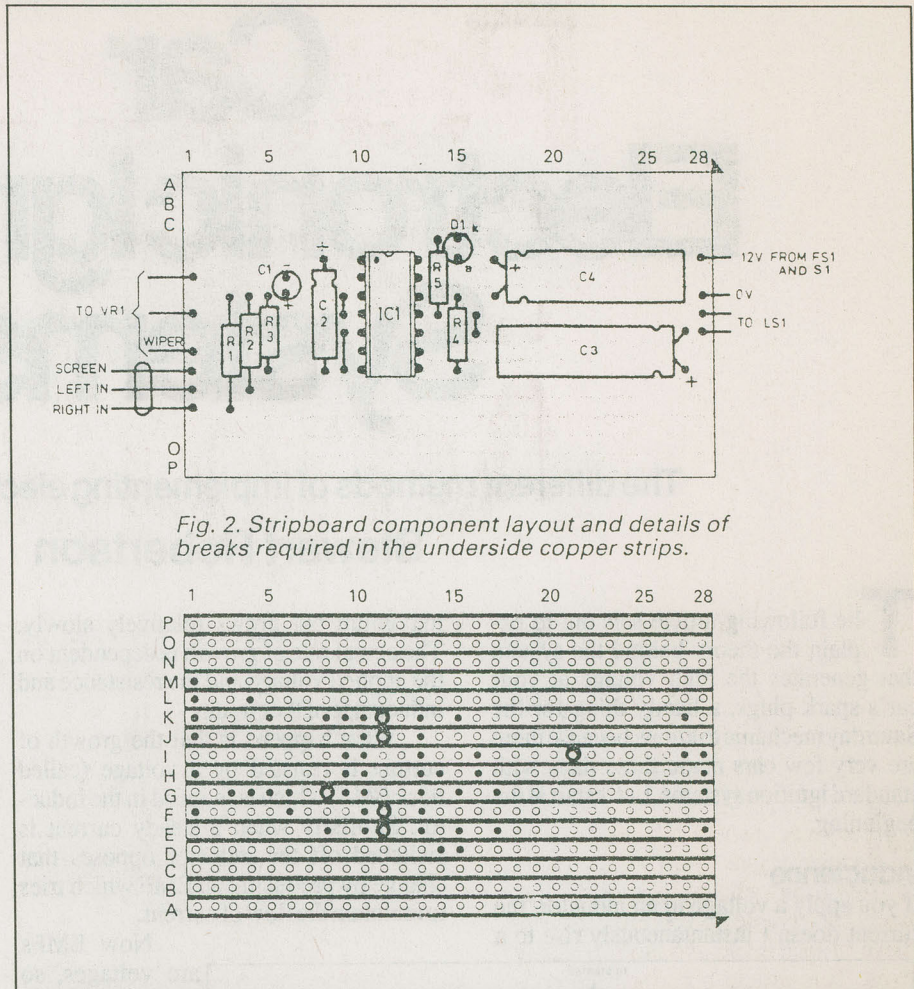


Fig. 2. Stripboard component layout and details of breaks required in the underside copper strips.

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this IC. For stereo, two such boards may be produced, omitting R1 from each. Take care to solder the capacitors the correct way around, and for the inexperienced constructor the use of an IC socket is recommended.

A reasonable length of shielded cable should be connected to the amplifier and terminated in a stereo 3.5mm plug suitable for the cassette unit in use. The only controls are the on/off switch and volume control, along with the on indicator LED if this is required. Remember the circuit should be powered via an in-line fuse as with all electrical circuits in the car. A two amp fuse as normally used with a car radio will do.

When fitting the unit into the car take care to check if the speaker(s) are grounded and if so which lead. The unit may be mounted in a plastic box, or, for example, in a console unit within the car. The author's unit is mounted behind the car-radio blanking cover along with an LCD clock unit. From the outside there is

no visual indication of any audio apparatus within the car which is ideal in helping prevent would-be thieves from even attempting to enter the car.

## Using the Amplifier

Once the amplifier has been fitted into the car, a small bracket to hold the cassette unit can be made by bending the end of a short length of metal rod and screwing this against a flat surface in the car. The author's unit mounts nicely on the car console.

The cassette player may be powered by ordinary batteries but a good alternative is to use rechargeable nickel cadmium cells. These rechargeable batteries are adequate for even long journeys. If one is concerned at the idea of the batteries running flat in the middle of a tape a simple circuit may be built to power the unit from the car battery using an LM317M. Details of such a circuit are readily available most suppliers catalogs give details. ■