Make yourself heard with our

LOUD HAILER

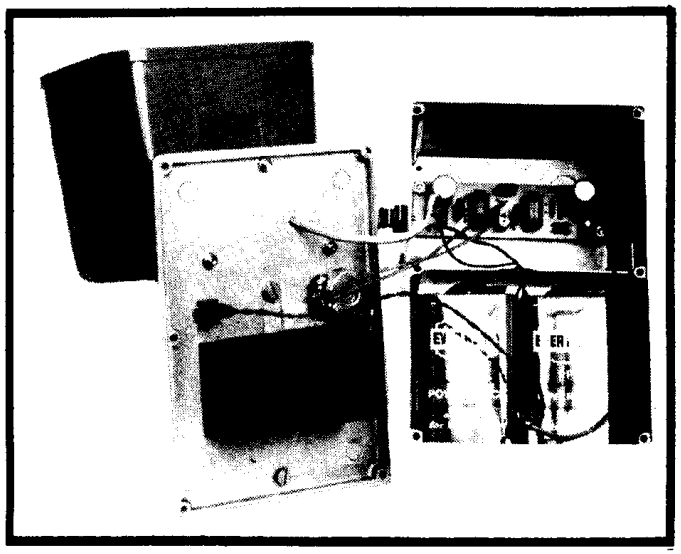
"COME IN NUMBER SIX" is the call heard at boating lakes, however you need large lungs and good health to shout as loud as the professionals. A simpler way for electronics enthusiasts is to build our Loud-Hailer, guaranteed to make you heard above the general noise at fetes, street parties, etc. Most commercial designs are expensive and need to be held up like a megaphone, ours is cheap and can be used in a variety of ways. The electronics and batteries, complete with speaker, are separate from the microphone — this enables you to hold the heavy part in one hand at a comfortable position, and talk through the microphone. You can also hand the microphone to some other person or even conduct an interview!

The diecast box used makes the unit impervious to 3 inches of water if placed on the ground, and the stick-on rubber feet stop it scratching the paint, if placed on a car bonnet or roof. When held in the hand the volume control can be operated with a thumb (to prevent acoustic feedback), also if the microphone used has no on/off switch the unit's switch can be used. In fact acoustic feedback with our system is not a great problem, as the microphone can be up to 100 feet from the loudspeaker!

Design

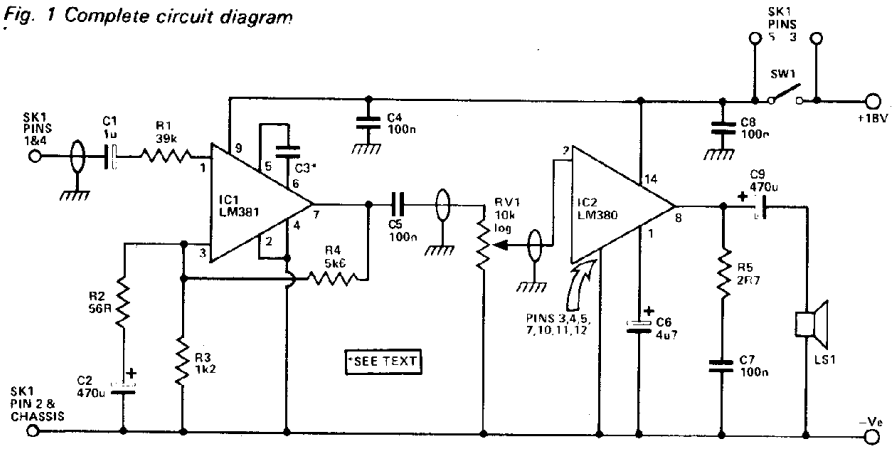
A low impedance microphone was used for a couple of reasons, firstly you can use far longer cable without noise and hum pickup. Second reason is that virtually all cassette recorders are supplied with low impedance microphones, so most of our readers will have one!

The first prototype used 12V as a supply, the final version (shown here) uses 18V. Power output is about 3W at 18V, and if run off a car battery (12V) will give out 2W — still quite loud. A socket can be fitted for external power source if needed with a changeover switch. The output of 3W may not seem very much, but the HDB4 speaker specified is very efficient, and sounds very loud!



Internal view of the completed loud hailer. Note foam to hold batteries in place

Fig. 1 Complete circuit diagram



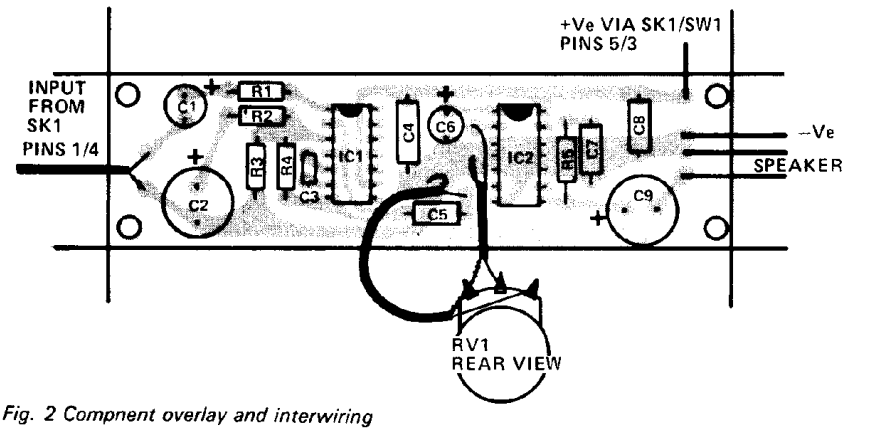


Fig. 2 Compnent overlay and interwiring

Construction

The microphone we used (Eagle DM82), and most others, is fitted with 3.5 and 2.5 mm jack plugs — these are changed for a 180° 5 pin din plug, this is to stop earthing problems with miniature jack sockets. Pin connections (for plug and socket) are as follows: Pins 1 and 4 live microphone connection. Pin 2 screen of microphone and equipment earth. Pins 3 and 5 used for remote on/off on microphone switch.

Toggle switch SW1 is connected across pins 3 and 5, to act as another on/off control if your microphone has no switch (or you want to use very long single screened cable). Screening is important, pin 2 on the din socket is shorted to the earth tag on the socket. The input screen is also taken to the board input, the output screen from the LM381 is looped, via the earthy end of RV1, to the input screen of the LM380 ie: back to itself. RV1 itself is not earthed separately, just bolted tight to the case. This might seem strange to Hi-Fi boffins, but prevents instability in the circuit — we know because we did it!

The rest of the construction is reasonably straightforward. A large piece of foam is glued to the lid, to prevent the batteries from rolling around inside the box. Finishing touch is a clip for the microphone.

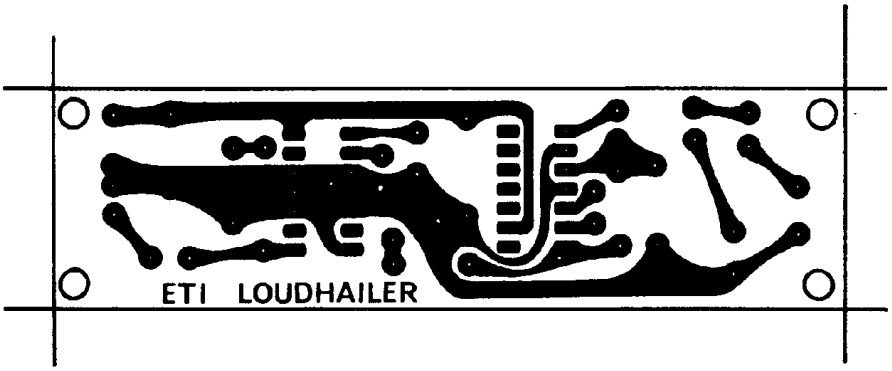


Fig. 3 PCB pattern (105mm x 30mm)

HOW IT WORKS

The LM381 is a dual low noise preamplifier – only half is used in this application. Most of the compensation network is inside the chip, hence the low parts count outside! Resistors R4 and R5 provide negative input bias current, and establish the dc output level at one-half the supply voltage.

Gain is set by the ratio of R4 to R2 which in this design is 100. C2 establishes the low frequency –3dB point, the value of 470µF used stops the system sounding "boomy". For more bass C2 can be reduced to 100µF.

High frequency roll off is set by C3, with the DM82 no capacitor was needed. With a condenser electret microphone 100pF was required to reduce the high frequency gain, so if you use a different type C3 can be varied between 10pF and 100pF for best response.

C1 reduces the effect of 1/f noise currents at low frequencies.

The output of the LM381 passes through C5 and RV1 to the LM380 general purpose power amp. R5 and C7 act as a Zobel network on the output to stop instability, when driving reactive loads (like P.A. horn speakers!).

PARTS LIST

RESISTORS All 1¼w 5% except where stated

R1	39k	R4	5k6
R2	56R	R5	2R7 ½w 5%
R3	1k2		

CAPACITORS

C1	1uO 25v
C2, 9	470u 16V
C3	See text
C4, 5, 7, 8	100n polyester
C6	4u7 16V

POTENTIOMETER
RV1 10k log rotary

SEMICONDUCTORS
IC1 LM381
IC2 LM380

SWITCH
SW1 Subminiature SPST

LOUDSPEAKER & MICROPHONE
LS1 Eagle PA type HDB4
Microphone Eagle DM82

CASE & HANDLE
Diecast box 171 x 121 x 106mm (509-743)
Handle 107 x 12.7 x 27.4mm (509-917).

MISCELLANEOUS
5 pin din plug and chassis socket (180°), PCB to pattern, nuts, bolts, spacers, etc. Screened wire, knob, foam, microphone clip. Batteries (2 x PP9) and connectors, 4 stick-on feet and connecting wire, etc.

BUY LINES

Most parts are readily obtainable from mail order, or your local component shop. Numbers in brackets on parts list are Doram stocknumbers, the handle may be difficult from other suppliers. The loudspeaker and microphone both came from Eagle, HDB4 and DM82 respectively, if any difficulty phone Eagle at 01-902 8832 and ask sales distribution for your nearest stockist.

Total cost of construction should be about £25, which is at least half the commercial price of a similar unit.