

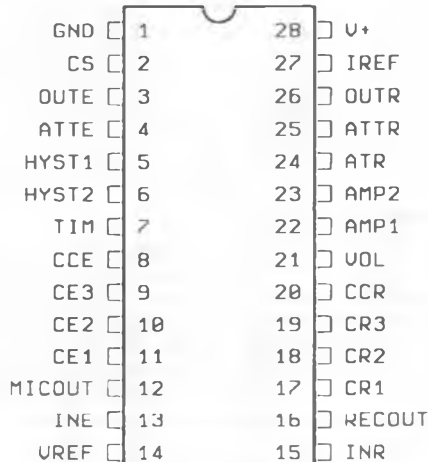
HANDSFREE

ADVANCE DATA

- NOISE/SPEECH DISCRIMINATION IN EMIS-
SION AND RECEPTION
- INTEGRATED SIGNAL GAIN COMPRESSOR
IN BOTH MODES
- PROGRAMMABLE ATTENUATORS IN BOTH
MODES
- ADAPTED TO ACOUSTIC PARAMETERS OF
ALL CABINETS
- LOW OPERATING VOLTAGE 2.5V
- LOW OPERATING CURRENT 2.1mA
- CHIP SELECT BETWEEN HANDSFREE AND
MONITORING MODES

DESCRIPTION

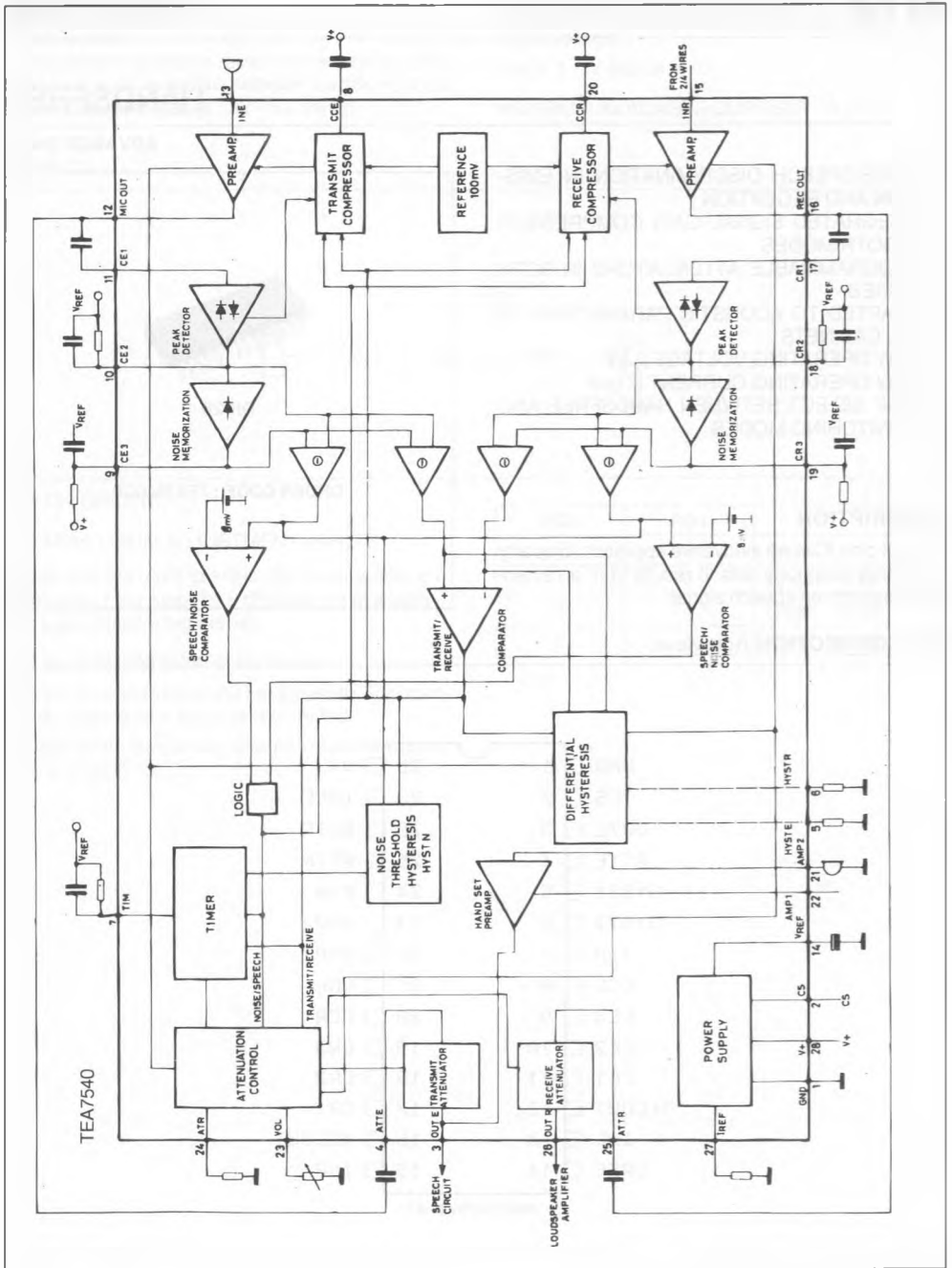
This 28 pins IC is an innovative approach to quality handsfree telephone sets. It results from an extensive research on speech signal.

PIN CONNECTION (top view)


H88TEA7540-01



BLOCK DIAGRAM



PIN FUNCTION

N°	Name	Function
1	GND	Ground
2	CS	Chip Select
3	OUTE	Transmit Attenuator Output
4	ATTE	Transmit Attenuator Input
5	HYST1	Transmit Channel Hysteresis
6	HYST2	Receive Channel Hysteresis
7	TIM	RC Timer
8	CCE	Time Constant of the Transmit Signal Compressor
9	CE3	Transmit Noise Memorisation
10	CE2	Transmit Peak Detector
11	CE1	Transmit Rectifier Input
12	MICOUT	Transmit Signal Compressor Output
13	INE	Transmit Signal Compressor Input
14	VREF	V ₊ /2
15	INR	Receive Signal Compressor Input
16	RECOU	Receive Signal Compressor Output
17	CR1	Receive Rectifier Input
18	CR2	Receive Peak Detector
19	CR3	Receive Noise Memorisation
20	CCR	Time Constant of the Receive Signal Compressor
21	VOL	Volume Control
22	AMP1	Handset Preamplifier Power Supply
23	AMP2	Handset Preamplifier Input
24	ATR	Attenuation Value
25	ATTR	Receive Attenuator Input
26	OUTR	Receive Attenuator Output
27	IREF	Reference Current Source
28	V+	

FUNCTIONAL DESCRIPTION

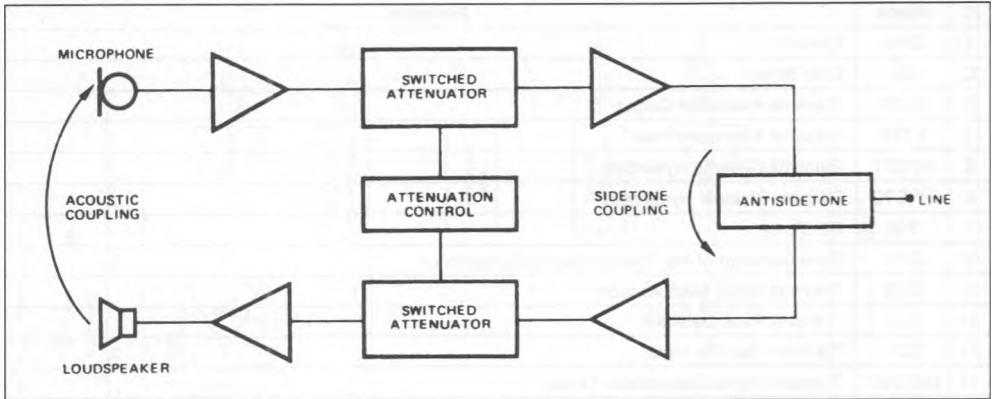
SWITCHED ATTENUATORS

Fig. 1 represents a block diagram of a handsfree subset with attenuators in signal mode. To prevent the system from howling, the total loop gain, including acoustic feedback through the housing and sidetone coupling, must be less than 0dB. For this purpose, two switched attenuators are inserted in each mode (emission and reception). The attenua-

tion is shifted from one mode to the other, resulting from the speech level comparison between each way.

To prevent the circuit to switch continuously in one way, the operation of the IC must be fully symmetrical in both ways. This involves signal comparison, attenuation value.

Figure 1.



GAIN COMPRESSORS

In TEA7540, two signal compressors are inserted in each mode before the signal comparison, so the signal coming from each end has the same level (100mV peak), the losses in each way (for instance losses resulting from the line length in receiving mode) are compensated and the signal comparison is fully symmetrical. The time constant of each signal compressor is fixed by an external capacitor, but the gain of the compressor decreases 100 times more quickly than it increases to prevent from noise increasing between words. The compressing depth is 38dB.

BACKGROUND NOISE DISCRIMINATION

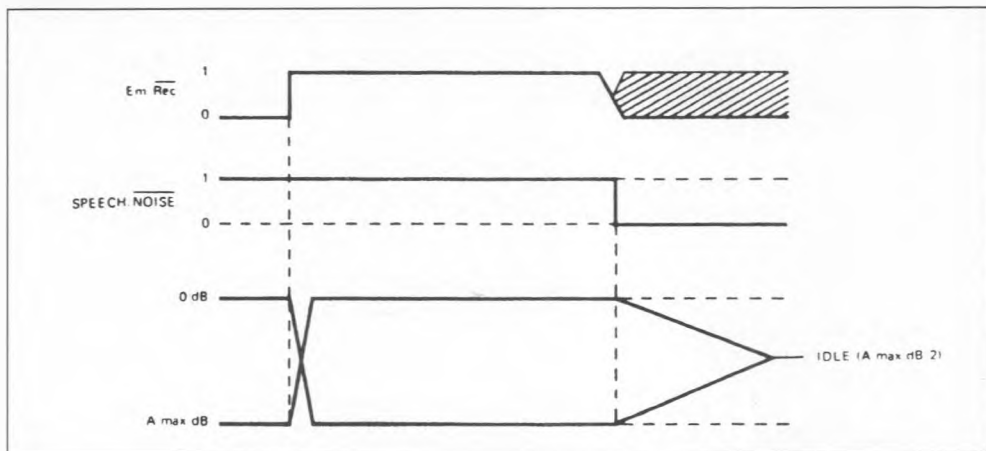
An additional feature provided in TEA7540 is background noise level discrimination in each way. The IC stores the background sound level with a long time constant (3 to 5 seconds depending on an external RC) and compares it with the incoming signal in order to distinguish a useful signal (speech)

from the background noise. This background noise memorisation is also used to compensate the noise in each mode before signal comparison : the noise level in each mode is subtracted from the incoming signal before the comparison. So a very high noise level in one mode cannot trouble the comparison between the useful signals.

The result of the comparison manages the attenuators in the following way :

- The maximum attenuation is switched on the mode where the speech signal is the lowest. The maximum attenuation is fixed by two external resistors (maximum 52dB). The time constant of the switch is fixed by the timer via an external capacitor.
- When neither party is talking both attenuators are set to a medium attenuation. Thus each mode is in idle mode. The time constant of the switch from active mode to idle mode must be long enough to prevent from switching to idle mode between two words (see fig 2). This time constant is fixed by an external RC.

Figure 2.



TEA7540 OPERATION

TEA7540 is powered through an external shunt regulator (for instance the shunt regulator of the monitor amplifier TEA7531) or an external zener diode. It can work at a very low voltage (2.5volts) over the circuit and it has a low current consumption (2.1mA). It's also possible via the chip select pin (CS) to put

the handsfree function in standby to use the circuit in monitoring mode with the handset microphone.

TEA7540 is designed to work with all kinds of microphones, including Electret.

TEA7540 also handles the handset microphone signal (AMP2) when the system is set to normal conversation mode (AMP1).

Figure 3 : Application Diagram.

Example of high range telephone set using TEA7540.

