

USES OF ASSISTIVE LISTENING DEVICES

AN AUDIO CASSETTE

REG.NO.M9223

**AN INDEPENDENT WORK SUBMITTED IN PART FULFILMENT
FOR FIRST YEAR M.Sc (SPEECH & HEARING) TO THE UNIVERSITY OF
MYSORE.**

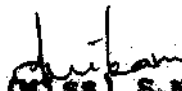
ALL INDIA INSTITUTE OF SPEECH AND HEARING: MYSORE - 570006.

MAY 1993

CERTIFICATE

This is to certify that this Independent Project entitled: USES OF ASSISTIVE LISTENING DEVICES: AN AUDIO CASSETTE is the bonafide work in part fulfilment for the degree of Master of Science (Speech and Hearing) of the student with Reg.No.M9223,

Mysore
1993


Dr. (Miss) S. Nikam
Director
All India Institute
of Speech & Hearing
Mysore-6.

CERTIFICATE

This is to certify that the Independent Project entitled : USES OF ASSISTIVE LISTENING DEVICES: AN AUDIO CASSETTE has been prepared under my supervision and guidance.

Mysore.
1993.


Dr. (Miss) S. Nikam.
GUIDE

DECLARATION

I hereby declare that this independent Project entitled: USES OF ASSISTIVE LISTENING DEVICES: AN AUDIO CASSETTE. is the result of my own study under the guidance of Dr. (Miss) S.Nikam, Prof, and HOD, Department of Audiology, and Director, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier to any University for any other Diploma or Degree.

Mysore

1993

Reg.No.:M9223

DEDICATED TO
MUMMY
DADDY
&
MY ACHIEVEMENT WATCHERS

ACKNOWLEDGEMENTS

I convey my sincere thanks to Dr. (Miss) S.Nikam, Prof, and HOD of Audiology, AIISH, Mysore, for her valuable guidance and encouragement.

I would like to thank Dr. (Miss) S.Nikam, Director, AIISH, Mysore for permitting me to take up this project.

My thanks to Miss. P. Manjula, Mrs. Hemakrishna for this help and guidance.

I am indebted to my parents, sisters and my achievement watchers for their love, affection, support and encouragement.

My heartfelt thanx to all my friends for sharing my burden and for their constant help and support.

My gratitude to Mr.M.V.Govindarajan, and the Library staff for their help.

Akka for all the hard work and trouble you have taken thanx a ton.

TABLE OF CONTENTS

	<u>Page NO.</u>
I Prologue -	1
II Types of technologies -	5
III. Varieties of Assistive	13
listening devices -	
IV Epilogue -	45
V. Bibilography -	47

PROLOGUE

We are living in an age of speed and epoch making inventions. New inventions and discoveries from far and near are taking the people forward.

This is trite even for the hearing-Impaired people. Varieties of sophisticated and modernised hearing aids and assistive devices which have invaded the market today, hold in store a future full of sound for them.

The sensation of hearing is an indispensable aid for successful communication. It plays a vital role in the development of speech and language. Hearing usually functions in-coordination with other senses like, vision, touch, taste and smell. Visual and tactile sensations compensate for the loss in hearing sensation in hearing-impaired individuals. The advent of hearing aids gave a new hope for individuals with residual hearing.

A hearing aid is an aid which amplifies the environmental sounds including speech. The usefulness of the hearing aid depends on many factors like degree of hearing loss, type of hearing loss, preference of the patient etc.

Its of maximum use to individual with mild and moderate degree of hearing loss with good speech discrimination. But

for individuals with severe and profound hearing losses and with poor speech discrimination abilities its of aot much use. Though there are provisions for modifications in the hearing aid. They cannot depend on auditory mode alone, visual and tactile sensations are helpful here.

Therefore, to stilt the need of these people sensory aids which use either auditory, visual or tactual modalities or a combination of the three have been developed in recent years. They are the "ASSISTIVE LISTINING DEVICES" (ALD). Hearing aid is also an assistive listening device.

The term assistive listening device applies to all systems designed to improve the communication ability of hearing-impaired persons or to alert them to the presence of environmental sound. ALDs are designed to solve problems that hearing aids don't handle *well* listening in noise, in reverberative areas or from a distance (Kaplan, 1987).

Zelski (1985) "Asaistive devices are products designed to solve one or more specific listening problems created by a hearing loss". He grouped them as (1) listening devices, eg, personal ALDs and group ALDs which use auditory made only (2) Telephone devices example TTYs (3) Alert/alarm devices of vibroalam smoke alarm, etc.

Virtually everyone including persons with normal hearing can use assistive devices,

Signal-to-noise ratio is improved by placing a remote microphone as close to the sound source as possible. The signal enters the microphone at essentially the same intensity level at which it is spoken and is then processed so that energy is not lost during transmission to the listener's ears. Noise and other unwanted signals in the environment travel through the air to reach the microphone of the assistive listening system and thus lose energy in the process-

In personal hearing aid microphone is placed on the head or the body, here it is equidistant from speech and noise. Both desired and undesired signals might reach the hearing aid microphone at the same intensity level or speech intensity level may be lower than that of noise resulting in unfavourable signal-to-noise ratio and poor speech understanding. Listening through a hearing aid from a distance can be difficult even when environmental noise is minimum. As speech travels through the air from its source to the hearing aid microphone, the attenuation of the signal affects the short, soft high frequency sounds more than it does the stronger, low frequency sounds.

Therefore, speech is too soft for comfortable listening and is also distorted. With assistive listening devices with remote microphone distant listening is better facilitated.

Not all assistive listening devices are auditory. Visual and vibrotactile systems, used by hearing-impaired people who cannot benefit from amplification through the auditory mode, include alerting devices like flashing lights or vibrators which provide awareness of important environmental sounds, telecommunication devices for deaf (TDD) which make telephone communication possible through visual channel and closed caption decoder which has made TV accessible to millions of hard of-hearing people.

TYPES OF AIDS

All assistive listening devices use are of the four technologies: frequency modulator, infrared, hardware connections or Induction loop.

1. Frequency Modulation (FM)

Most FM signals are received by a radio receiver which is connected to a television set. The speech is received by the radio receiver and then sent to the television set. The FM receiver works by the list of frequencies. The signal is amplified and then delivered to the user via earphones or listener's hearing aid. Some systems interface with hearing aids, few others use earphones. Some have the precision of using their aids with direct audio input or FM. Some FM aids can be ordered with direct audio input and some later model aids can be retrofitted. The neckloop is a small loop of wire worn around the user's neck. It is attached to the FM signal from the receiver and the neckloop is picked up by the hearing aid. The neckloop is a conductor,

type of loop interface, is a flat, hearing aid shaped device connected to the FM receiver end worn against the mastoid bone. Electromagnetic energy radiating from the induction loop of the silhouette is received by hearing aid telecoil.

Hearing aid fitted with "boot" a special adaptor allows for direct electrical connection of FM receiver and hearing aids amplifier either completely or partly by-passing the aids microphones. When by passed environmental noise is less intense than the FM signal.

Federal communication commission rules allow the use of eight widebands and 32 narrow-band FM channels for communication purpose.

FM transmission is an excellent choice for large areas especially outdoor applications, because the signal can be transmitted upto 300 feet. Also used as an interpersonal device, talker using the transmitter and the listener using the receiver.

FM systems provide excellent fidelity, because of their low distortion and broadband frequency response. Their signal strength is usually sufficient to help persons with profound losses and many FM receivers are adjustable to accommodate different degrees and configurations of hearing loss.

2. Infrared:

In infrared systems, as with FM, the signal is picked up by a microphone positioned close to the source, modulated onto a carrier wave and transmitted through the air. The carrier wave is infrared light rather than a radiofrequency. The listener wears an Infrared receiver, which demodulates the speech and delivers it to the ear through the earphones or through a personal hearing aid via a neckloop or direct:

Infrared transmitters vary in power, number of light-emitting diodes and in directionality of light transmission. Eg. A small infrared system used for TV listening uses 6 to 12 diodes that transmit in a highly directional pattern. Infrared receivers are universal and can be used with any infrared transmitter.

They are generally used for large area amplification and have TV use. Large area systems can provide fidelity compared to FM at similar cost, but generally with signal strength. It must be used indoors and might be affected by direct sunlight or incandescent light.

Small infrared transmitters used for TV, connect to microphone that attach to the TV loudspeaker. These are relatively inexpensive.

These represent the oldest type of assistive listening device. Such systems require a direct electrical connection in the form of a coil between the sound source and the listener. These are used for TV and radio listening and for interpersonal communication in such settings as dinners, small conferences etc. A microphone has to be placed close to the lip of the talker,

Some hard-wired listening devices use a direct connection to a TV or radio via the set's earphone jack. A direct connection produces better signal fidelity, but it also bypasses the set's loudspeaker making it impossible for others to hear the TV or radio at the same time.

Some hard-wired systems consist of a microphone connected by a long cord to a listener's hearing aid via direct audio input or neck loop. Signal intensity is controlled with the aid's volume control.

Such microphones can be worn on the clothes, kept on a table or passed to talkers and are called "self wiring" introduced by Vaughn and Lightfoot (1983).

Other hard wired systems feature the remote microphone connected by a long cord to an amplifier attached to ear-phones or to the person's hearing aid.

Limitation: Restricted mobility. Otherwise, they can provide same benefits as the IK device for interpersonal communication. When used with an amplifier, it can provide considerable signal strength and good fidelity. Major advantage is their relatively low cost.

4. Induction loop:

The heart of this system is the "loop" or coil of wire that surrounds the space to which amplified sound is to be delivered. An electromagnetic field containing all the speech information emanates from the coil into the area it encloses. This is picked up by the telecoil of the hearing aids and passed to the receiver as electromagnetic energy. The receiver of the aid converts this energy back to sound. Any size area from a chair to a large auditorium can be looped. It can be permanently installed *or* portable.

A loop system *is* relatively inexpensive and easy to install. Special receivers are not needed because the telecoil is the actual receiver.

Disadvantages:

1. Spillover: a magnetic field generated in one room can be received by a telecoil in a horizontal or vertically adjacent room. Stronger the loop system, further the signal will travel.
2. Fluorescent lights and other sources of magnetic energy might interfere with speech signal by introducing noise into the system.
3. Telecoils are weak or inefficiently positioned, then poor reception of magnetically induced signal,
4. Hearing aid frequency response characteristics in microphone and telecoil modes often can differ significantly.

5. Telephone aids:

A variety of telephone amplifiers include; telephone handsets prewired with internal amplifiers, battery powered units that are intermodular telephones between the handsets and base unit, battery powered portable amplifiers that attach directly to the telephone receiver. Prewired handsets, modular units and some portable amplifiers can be used with the unaided ear or with the hearing aid via microphone or telecoil,

Two types of portable telephone amplifiers:

- A) Magnetic to acoustic type designed for use with telephone receivers that provide strong magnetic fields,
- b) Acoustic to magnetic type used with telephones that lack strong magnetic field.

6. Visual and vibrotactile devices:

Hearing-impaired people who cannot use the telephone with any type of amplifier must rely on TDDs. TDDs have typewriter keyboards and LED visual displays. All TDDs are portable and can operate either with batteries or with line voltage.

Limitation: is that both parties must have devices. For people who cannot benefit from TV listening devices, close captioned decoders can be used. Decoder allows the viewer to read captions on the TV screen while viewing.

Alerting devices are the door bells, telephone ringer the alarm clock and the smoke detector.

A flash light or vibrator may be attached to the devices senior so that the individual is alerted when a

given sound occurs. In addition to visual and tactile alerting systems, auditory devices for monitoring the telephone ringer, for which a more audible loud gong or low pitch signal can be substituted.

With most alerting systems which are powered either by batteries or by line current, the monitored signal is transmitted via FM carrier to a receiver in another room, where it will activate a flashlight or vibrator when a remote sound occurs.

In addition there are vibrotactile and visual receivers that hearing-impaired persons can wear on their wrists.

VARIETIES OF ASSISTIVE LISTENING DEVICES

They can be grouped as follows:

- I. Alerting Devices and systems.
- II. Auditory trainers/personal FM systems.
- III. Direct-audio-input hearing aids/systems.
- IV. Personal amplifiers.
- V. Public address - Type assistive listening systems.
- VI. TDDTY systems.
- VII. Telecaption decoders
- VIII. Telephone amplifying devices.
- IX. Television listening systems/devices,
- X. Vibrotactile aids and devices.

I. Alerting Devices and Systems;

1) Ring Indicator: A visual alerting device that signals

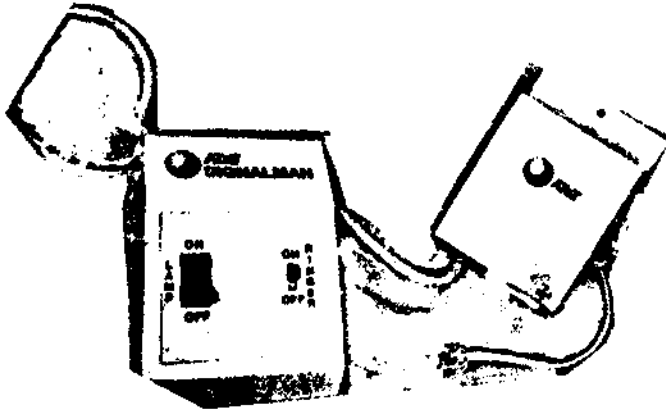
when a telephone rings. It is plugged into a wall outlet and its suction cup to the phone.

A lamp in the indicator flashes when telephone rings, whether lamp switch is off or on. Lamp capacity is 100 watt.



American Communications MFG Corp. East Hartford , CT.

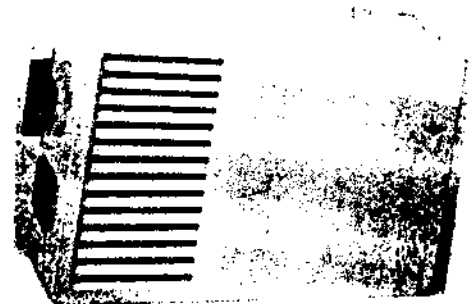
2) AT&T Signyman control unit: Signals the telephone ring-



ing by flashing any corded house lamp with an on-off switch (200 watts maximum). Options allow to phone to ring normally, to flash a light or calls both signal and light. It can be installed in any room with a modular jack.

3) AT&T Toneringer: has 3 volume settings and on-off switch

It concentrates energy of the phone ring to a frequency range easily heard by persons with hearing losses. It mounts on a wall or table top in conjunction with most modular phones.



'T' adaptor provides signal with traditional ring.

AT&T National Special needs Center, Parsippany, N.J.

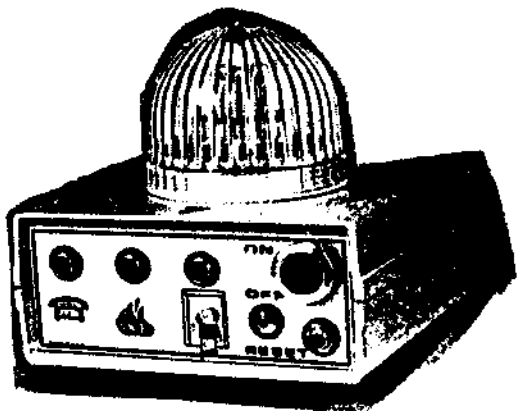
4) Concept-1: Visual alerting system and burglar alarm has two devices. Model ATA sonic transponder which attaches to the door or window and Model SR-1 sonic receiver



plugged to the electrical outlet. Transponder converts vibrations into loud, sonic beep tone and transmits to the sonic receiver. A lamp plugged to sonic receiver will light up or will flash to door knocks, telephone ringing or smoke alarm sounding.

Camp Labs Division of Grace Industries Inc. Fredonia, PA,

5) Alert machine; is sensitive only to door knock, telephone ringing and smoke alarm. Unit is



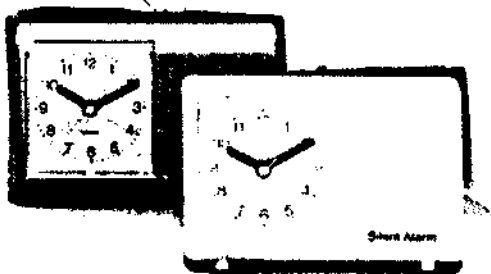
plugged to any Ac outlet and a small, separate signal device is attached to the door knob (no wire connections). The machine differentiates between and reacts particularly to each events.

Strobe light on the top flashes and front panel lights indicate which event is occurring.

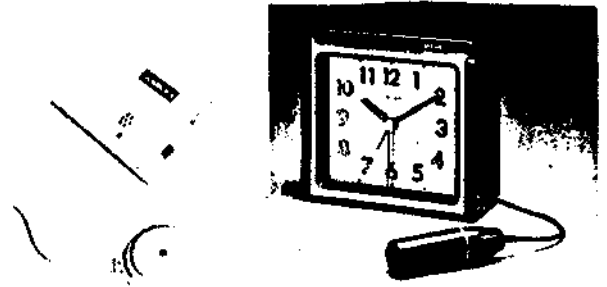
Computer Accessories Company, Port Washington, NY.

6) Silent alarm portable vibrating clock: Measures 3 3/4" X 2 1/2".

The vibrator clipped to a pillow case awakens the user at a preset time and operates on 1 "A" alkaline battery.



- 7) Combination clock/strobe light kit: has a light weight compact strobe light which produces 90 flashes per minute to awaken the deaf persons. A 6-foot power line cord plugs the strobe directly to the clock/timer.



- 8) Suto- digital vibrating alarm clock kit: is a digital clock, when used with a heavy duty bed vibrator awakens the user. The model has a 24 hour memory alarm, auto/power switch and 4 receptacles to accommodate a vibrator and or a lamp.



- 9) Electro alarm clock: A portable wake alarm clock with attached pillow vibrator features, woodtone finish, large luminous face and powered by 1 'c' type cell.



- 10) Baby siller alarm kit: Work through electrical wiring circuit of homes - no wiring needed. It has a

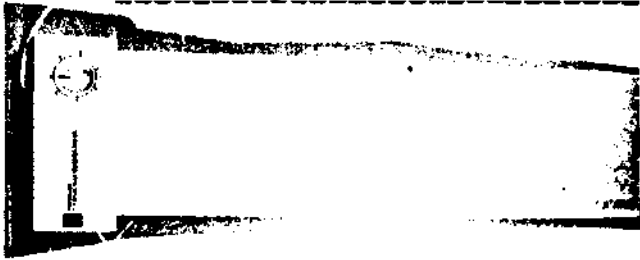


a transmitter placed in child's room; receiver placed in parents room and a light activator placed near ^{the} receiver

activates a lamp to alert when child is calling.

HALHEN Company, Inc, Long Island City, NT.

11) Vibrating bid board(PA-VB 900): 35" long slips between



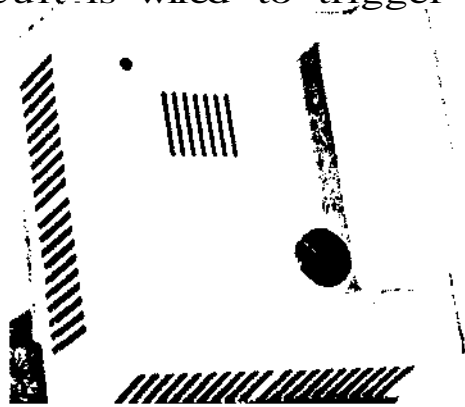
the mattress and box spring,

It can be used as a a waken-
ing/alerting device or can

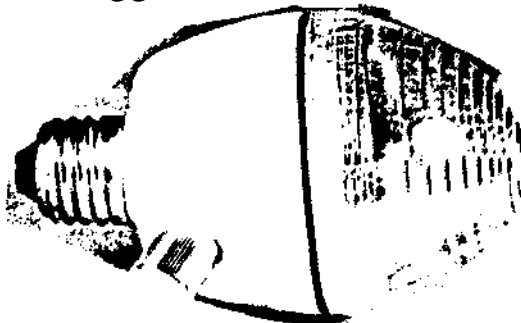
be switched to a mode where

a 60 minute timer relaxes tensed muscles.

12) Smoke detector (GT -71OCS): With strobe and AC/DC hard-wired relay circuit, is a photo electric residential smoke detector. Relay circuit is wired to trigger additional strobes or bed vibrator.



13) Egg strobe (DJ-EGG1) has an Edison base and fits



standard lamps and bulb sockets.

It has variable speed. When

used with clock timer, it acts

as a wakeup signaler. It is waterproof and available in blue, red, green, yellow and clear. Cost is low.

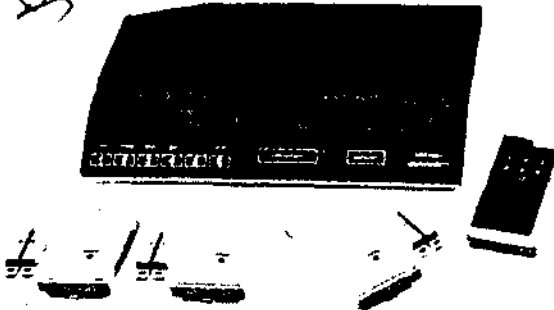
Hare Mechantile Ltd. Div. HAC of America, Inc, Kalamazoo, MI.

- 14) Visual alarms alert hearing-impaired persons in case of fire, burglary or intrusion.

Julian A McDermolt Corp.
Queens, NY.

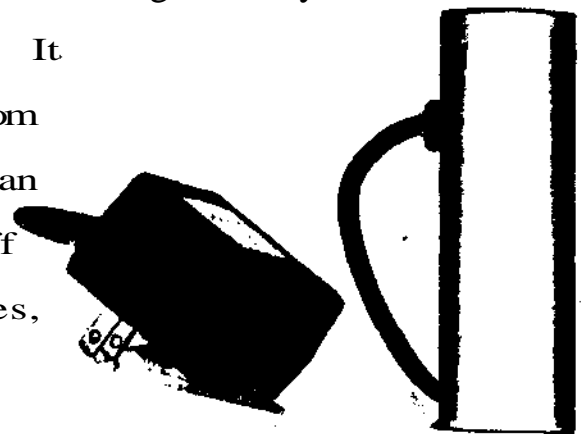


- 15) Keep safer security system: is a wireless, compact, flash-light security system for hearing-impaired persons.



It is affordable and easy to install (with a screw driver).

- 16) PCI Sentry. Bed vibrator AC- 108: Plugs to any monitor, lamp or special alarm clock. It provides gentle vibrations from a low voltage source and has an automatic temperature shut-off switch. Fits under mattresses, pillows or a lounge chair.



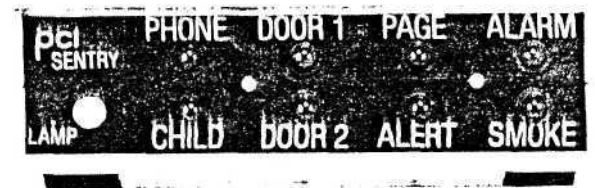
17) **PCI sentry telephone monitor AC-100:** Monitors telephone



line for ring signal. Hook-up is with direct connect or pick up coil.

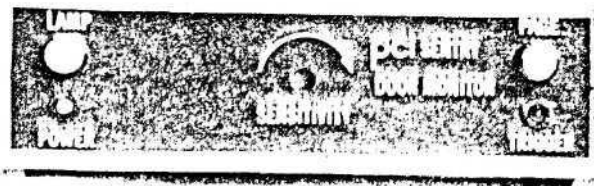
18) **PCI sentry central receiver AC-101:** visually displays

an event occurred on its front panel. Eg. Telephone ring, door bell, smoke alarm child monitoring etc. Household



lamp connected to the receiver flashes simultaneously.

19) **PCI sentry door monitor AC-102:** Monitors front or rear



doors apartment speaker or buzzer. It wires into existing doorbell system or separate push button.

Precision Controls, Inc, Haskell, NJ.

20) **Silent page:** Wireless, battery operated. It has a

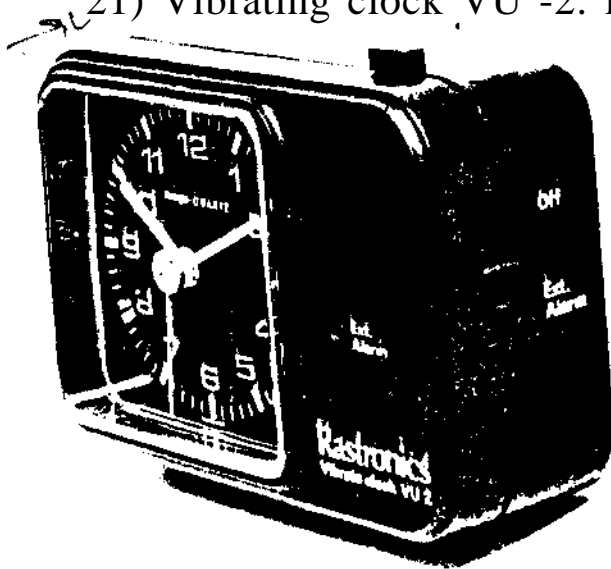


sensory-transmitter and wrist worn receiver. The transmitter detects a specified sound and sends coded radio signal to the receiver which then vibrates.

Sound source is known by a coded light on the receiver. It can be used to monitor doorbells, telephones, infants in cribs, alarm clocks and smoke alarms. Effective range is 100 feet.

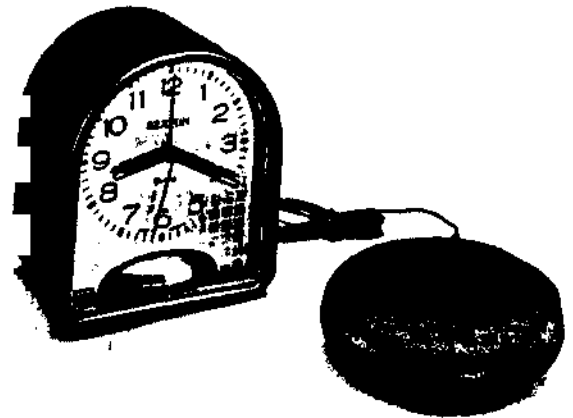
Quest Electronics, Ocanomowoc, WI.

21) Vibrating clock VU -2: is a portable quartz clock, and easy to install. It can be used alone or connected to an external alarm. Allows the user to wake to the vibration of the bed.



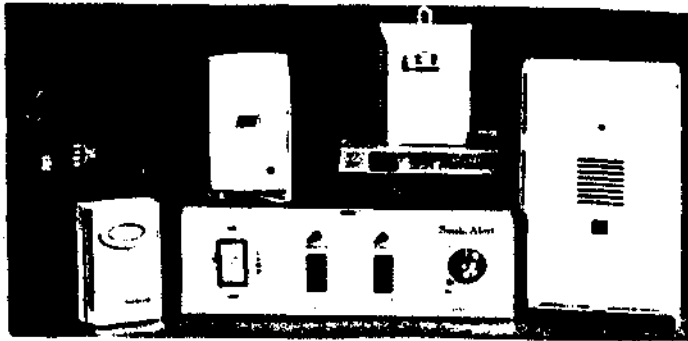
Rastronics USA, Inc, Mountain side, NJ.

22) Alarm clock: has a "vibrator pod" that awakens with a ringing bell or pillow vibration at preset time. It features quartz mechanism and glow-in-the dark hands and is battery operated (IC-Cell)



Rexton, Inc, Bensenville, IL,

23) Sonic alerting system: A wireless system has three

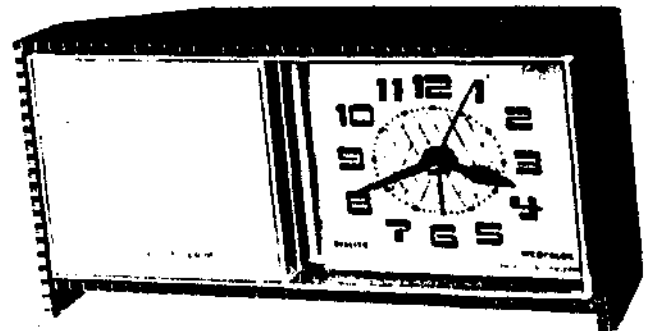


parts: 1. Central control unit, 5 types of sensors, and remote receives. Control unit receives signals from sensors and flashes different signal via a

lamp/bed vibrator (to each signal). Sensors signal baby crying, phone ringing, door bell, smoke alarm, burgular alarm. Remote receivers plugged into wall outlets flash lights in different patterns.

Sonic Alert, Pontiac, MI.

24) Moonbeam electric alarm clock: (22108) has a silent flashing light and delayed buzzer alarm. Also has a woodgrain case and gold - tone lighted dial, sweep second hand and alarm indicator.



Westclox Division of General Time Corp. Norcross, GA.

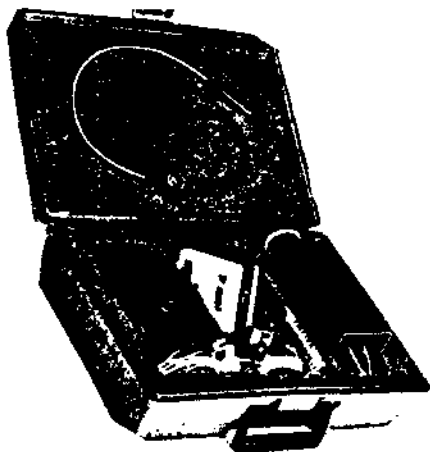
25) PS-IIA-WPW Flashing alert: has a 70,000 candle power xenon



flash tube delivering 1-2 flashes per second for telephone rings, widely used in quite zones like hospitals, libraries, broadcast studios, and for hearing-impaired persons.

II. Auditory trainers/personal FM systems:

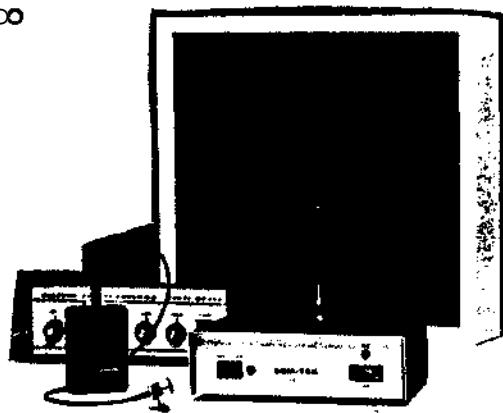
- 1) SCompanion AT-72 kit - A FM system featuring miniature



FM receiver and transmitter operating in 72 m Hz to 76 m Hz band and used with personal hearing aids.

- 2) Omni-2000 PM: System has a wireless mike that relays

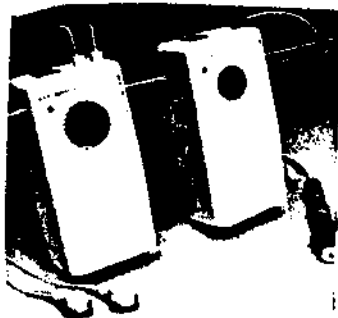
user's voice via a pocket radio transmitter to AC powered receiver/transmitter. Sound is fed to the speaker, which maintain constant signal, about 12 dB above normal voice level. The system has



Comtek M-72 LS transmitter, microphone, CB-48 attenuator adaptor cable, NBC 92 R battery charger, NC9-110 battery, MR-72 receiver and Ms 203 amplifier.

Audio enhancement, St.Louis, MO.

- 3) Earmark series 3 FM: Wireless binaural, 2-channel auditory



trains features on-the-air performance testing, computerized calibration and testing for customising individual needs.

Earmark satellite - an FM wireless, monaural, 1 channel trainer has hearing aid interface option.

Earmark, Inc, Hamden, CT.

4) Model EB-40: Auditory/speech trainer, desk type.



pseudobinaural for individual use. It has 'CA' circumaural headset or type 'U' under-the-chin loop with 2 detachable insert receiver.

EB-41: Trainer is desk type, binaural unit for individual use. It has two headsets.

EB-42: is same as EB-41 except for 'CA' headset, 2 band held, accessory microphones and carrying case.

EB-43: Master trainer, is desk type and binaural unit for individual use. It has continuously variable speech filter and adjustable output limiter. It has 'CA' circumaural headset or 'U' type under-the-chin loop with insert receiver.

Eckstein Bros, Inc, Hawthorne, CA.

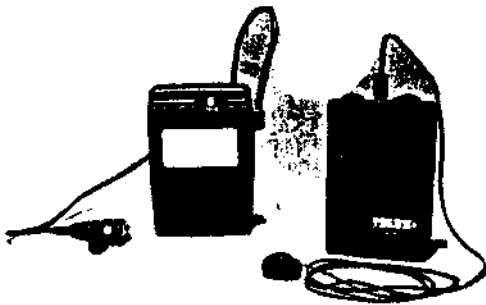
- 5) Personal FM system: Has PE 475 R FM receiver which can be used, hearing aid only or as a combination of hearing aid/FM and is worn by the student.

PE 475 FM transmitter with lapel microphone is worn by teacher. Equipment can be used indoors or outdoors.



Phonic Ear Inc, Mill Valley, CA.

- 6) Sound enhancement system, a broadband, multiple channel



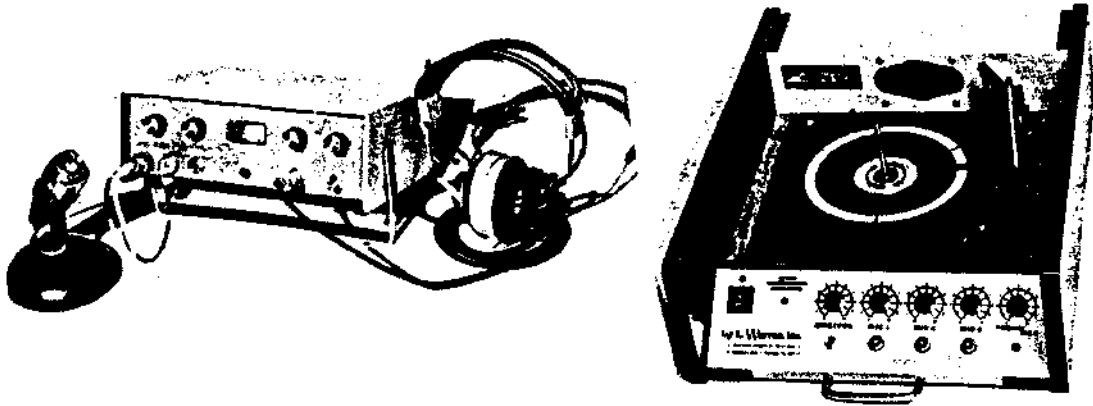
FM system with tunable personal receivers help hearing-impaired persons in 'noisy environment.' Institutional base-station transmitter and personal beltpack

transmitter make the system usable indoors or outdoors.

Picture shows TW-6 FM Beltpack transmitter and the AAR-1 personal FM receiver.

Telex communications, Inc, Minneapolis, MN

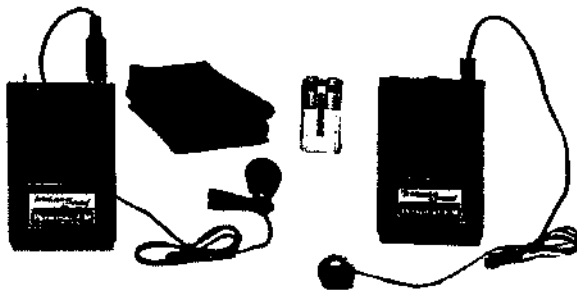
- 7) Model D-1 s/s gated compression speech amplifier with microphone and dynamic receiver headset has 1 headset 4 listening station, left-right volume control and audio loop induction for homes, offices.



Model T-4 s/s are designed for classrooms, auditoriums, meeting rooms has 20 private listening stations, left-right ear volume controls, dynamic receiver headsets. Output 140 dB.

J.L.Warren, Inc, Chicago, IL.

- 8) Personal FM system is wireless and allows complete mobility. Distant listening possible as background noise is reduced. Talker wears lapel microphone and transmitter. Listener uses receiver and earphone. Range is 100-150 feet and applicable for classrooms, small group meetings/ auditoriums.



Williams Sound Corp, Minnetonka, MN

III. Direct-audio input hearing aids/Systems:

1) Direct - audio - input: hearing aids available include the



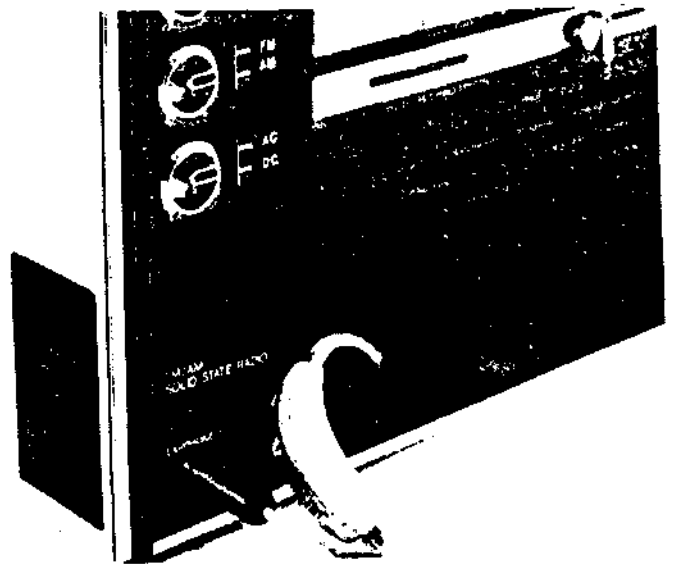
135PP AGC-I

135 pp AGC-I behind-the-ear aid, designed for severe-to-profound hearing losses. The audio-input system facilitates CROS and Bi-CROS fittings in addition to a wide variety of applications.

GN Danavox, Inc, Eden Prairie, MN

2) The Maico behind-the-ear: direct-audio-input hearing aids

all are available in two audio-input versions for direct connection to radio, television, tape recorders, etc, and to auditory trainers. The MBE version allows wearer to receive the microphone signal and/or external input.



Maico Hearing Instruments, Minneapolis, MN

IV. Personal amplifiers:

1) Pocketalker : Light compact, portable listening device designed



to increase specific sound levels without disturbing other persons. Powered by standard 9 volt batteries, it can be connected TV, radio or used for one to one conversations.

Background noise is eliminated and voice enhanced when used in public places like restaurants.

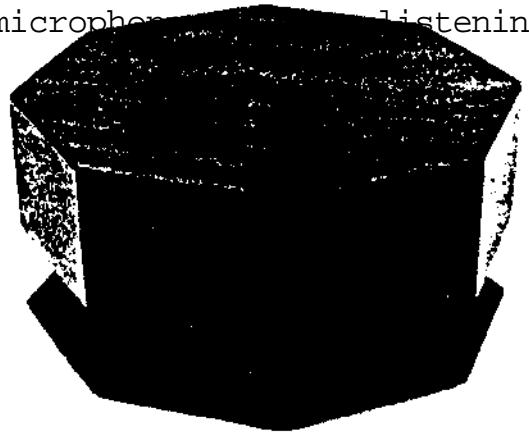
Optional neck loop telecoil allows hearing aid users to amplify selected sounds.

The system has amplifier, microphone, 9 volt battery, TV listening kit, wide-range earphone and carrying case.

AT&T National special needs Center, Passippany, NJ.

2) Conference mate, remote 360° microphone listening when used with com-tek FM

personal system. Placed on desk, table or hard surface, the mate with M-72 transmitter picksup signals within 15 ft, or



more and transmits upto 100 ft, to PR-72b receiver.

It is battery powered. Since wireless, can be used in conjunction with personal hearing aids.

Audio enhancement, St.Louis, MO

3) Conference microphone: Highly directional device made



for use in group meetings, conferences, court rooms etc. It focuses on one speaker/sound source and picks up and transmits sounds with less noise and more clarity.

It can be used monaurally or binaurally. It can be worn with direct-audio-input hearing aids by an audio shoe.

Phonak/Phonic Ear, Inc, Feldmeiker,CA
Switzerland and Mill Valley.

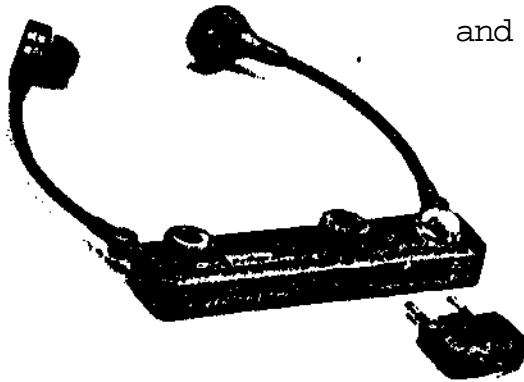
4) Hearing pen: a fountain pen shaped device measuring 5" in length and 1/2" in dia. used to amplify sounds and voices in public places like churches, theater. Particularly designed for part-time use by persons with mild-moderate hearing loss. It can be carried in shirt or suit pocket. It has a soft, flexible eartip for conducting amplified sound into the ear. Volume control



and on-off switch are also present. It produces high frequency average gain of 33 dB, frequency range of 520 Hz - 5700 Hz.

RCI Inc, Central Village, CT.

5) Conferette/C₂: is a combined stereo-personal amplifier



and infrared receiver. Frequency

range is 50 Hz-10,000 Hz.

and electrical gain of

60 dB. It features dis-

penser adjustments for

balance, low cut and

microphone sensitivity and uses rechargeable battery.

Siemens Hearing Instruments, Inc, Piscataway, NJ.

6) Hand held microphone: has ultra sensitive directional

microphone with a 6 foot cord and is

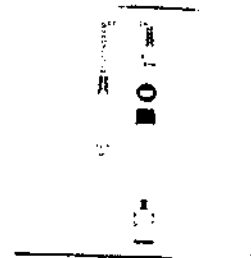
compatible with Danavox series (115,

125, 775) hearing aids. It is hand

held or clipped to clothing. It

increases speech intelligibility during meeting, seminars,

lectures and in automobiles.



7) Airphones stereo amplifier: (HAL-5870) are used in place

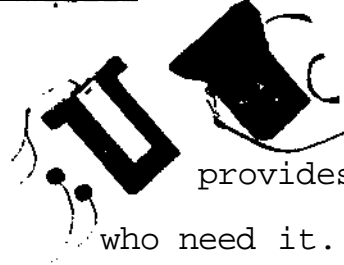
of most airline headphones.



It drives most walkman type sets or induction loops or direct input.

HARC Mechantiles Ltd,, Div. HAC of America Inc,
Kalamazoo, MI.

8) Personal TV amplifier (2375) enables TV sound to be at



normal level for normal hearing persons and

provides amplification for those who need it. Mic pick-up is attached by an adhesive pad, and operates on 1 std. size penlite battery.

Lecturaid (2552) useful In lecture halls, classrooms, theaters, meetings, TV listening. It has left-right volume controls, 2 separate microphones and amplifier channels for stereophonic sound with light earphones and comes in a carry case.

HALHEN Company, Inc, Long Island City, NY.

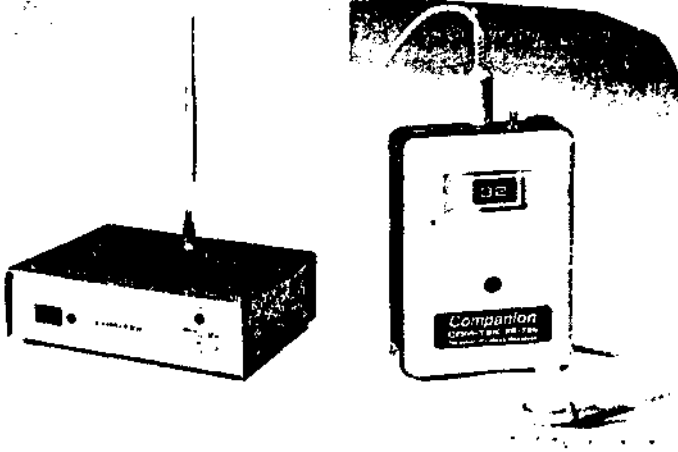
9) Panasonic WH01 Personal amplifier a penshaped portable



device has directional microphone for improved communication in noisy areas. It can be hand held, attached to clothing or used on flat surfaces by fold-out pedestal. Variable SPL and tone controls present. Hearing, Services, Inc/Panasonic Hearing Instruments, Hopkins, MN

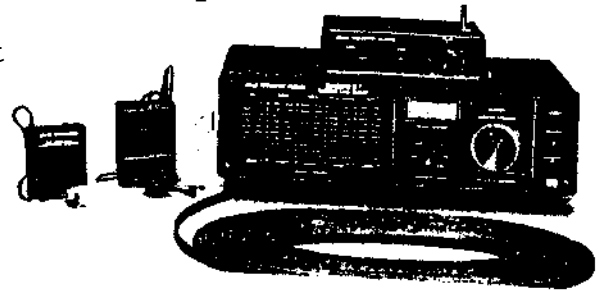
V. Public address-type assistive listening devices:

- 1) Communciation centre is an RF base station sound system for church, theatre, auditorium. Components are base station transmitter and personal receiver.



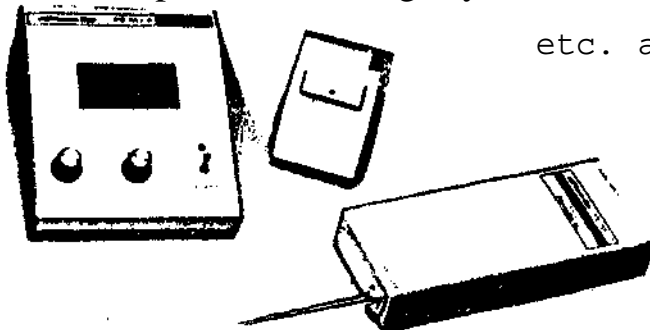
Audio enhancement, St.Louis, MO..

- 2) Superloop II - wide area (500 foot perimeter) induction loop ALS. It Was 5 input mixer, interface for existing PA system and wireless microphone.



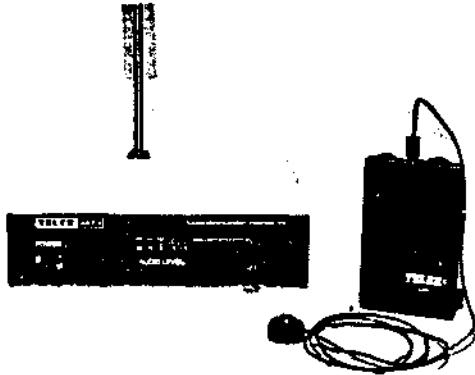
Oval window Audio, Yarmouth, M.E.

- 3) FM special hearing system- is for auditoriums, churches etc. and has PE 551A audio control, PE 555R receiver. PE 551T transmitter.



Phonic Ear, Inc, Mill Valley, CA.

4) WAIX infrared professional sound system uses master



transmitter which covers about 4000 square feet and slave transmitters needed for each additional 4000 square foot coverage. Receivers are either stethoscope or lanyard type.

Unex, Westford, MA.

5) Personal PA/FM broadcasting system: a wireless PM

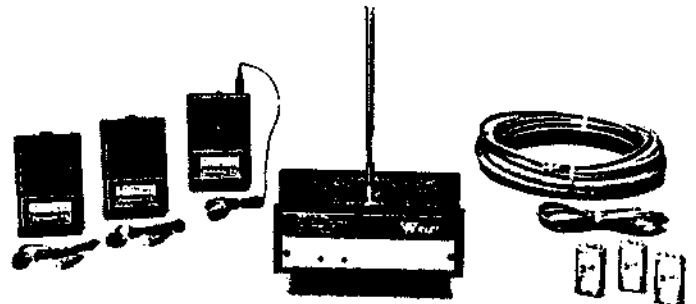
system broadcasts desired sounds using FM receiver and earphone or neckloop.

Range is 300-500 feet.

For smaller buildings,

body pack transmitter

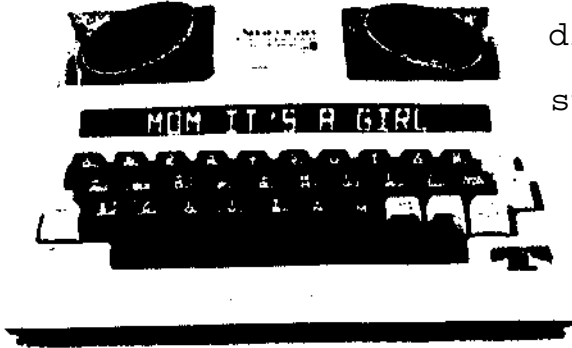
can be used with the transmitter.



Applications: Churches theatres, auditoriums and court rooms.

VI. TDD/TTY systems;

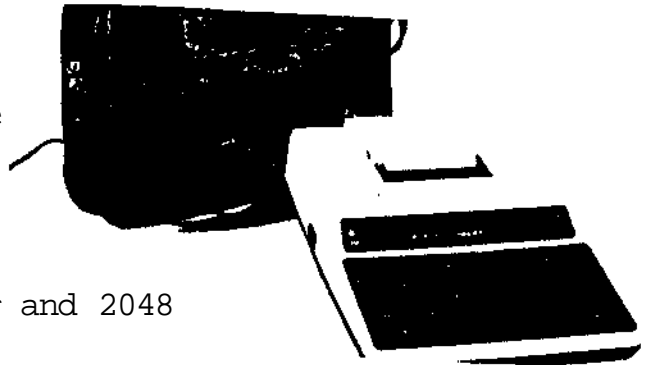
- 1) LUV 1 TDD has large 1/2" tall letters in 16-character display. Lightweight unit with standard typewriter keyboard.



PC /DC or battery operated.

American Comimmications MFG Corp, Cast Hartford, CT.

- 2) AT&T memory printer series TDDs include MP20 MP20D and MP 400. Each has a 4 row typewriter style keyboard, fluorescent display with blinking cursor, built-in printer and 2048 character memory.



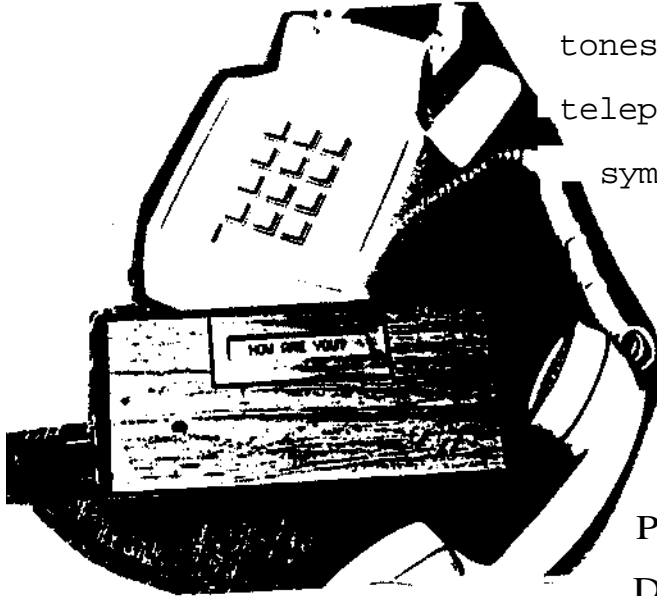
AT&T Parsijpany, NJ.

- 3) Porta- printer plus: Models MP-20 and MP-40 are 20x40 character display and printing TDDs respectively. They feature, 5 buffer memory, answering machine and pre-printed text.



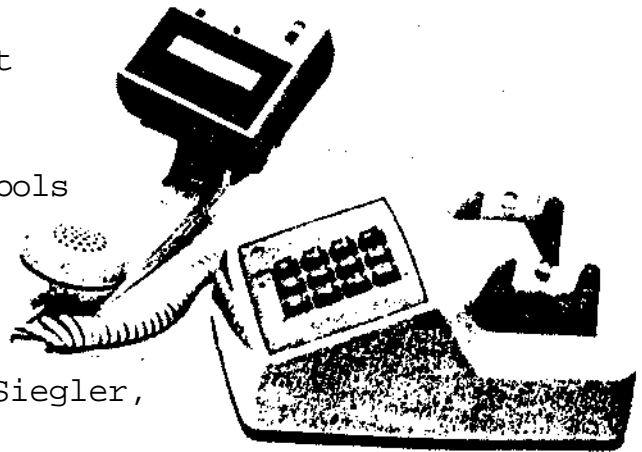
KROWN Research Inc, Culver City, CA.

- 4) Echo -2000 a small, hand-held device that changes the tones made by a standard touch tone telephone into letters, numbers, symbols and words.



Palmetto Technologies Inc,
Duncan SC.

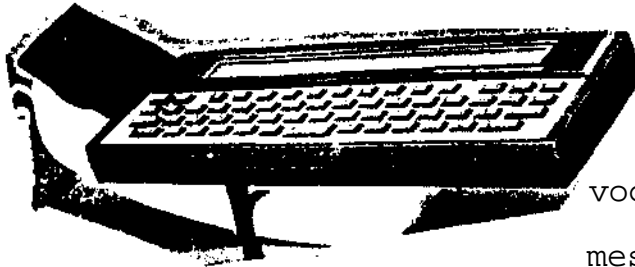
- 5) Talk tone TDD: portable device held in place over the receiver of telephone by an elastic strap. It converts the tones into letters, numbers or symbols. Messages appear on the screen of the device.



Auditone, Div, of Lear Siegler,
Inc Phoenix, AZ.

- 6) Lifestyle personal communicator: is a portable device **with Several function. It can be used as a TDD,**

scientific calculator and alarm clock. It provides

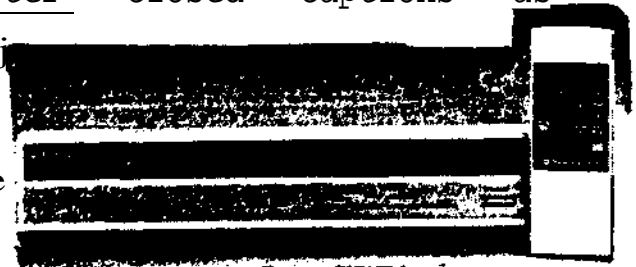


preprogrammed voice synthesizer (1700 word vocabulary) and stores 253 messages. Typewriter style

keyboard and single line (40 character) LCD present Indirect telephone connection to the units (built in) acoustic coupler or direct connection by connecting the unit with standard modular telephone jack. Spoken messages are typed and many words can be typed with a single key stroke.

VII. Telecaption decoders;

- 1) Telecaption II adapter: closed captions as easy-to-read text on any television screen. Also available on cable TV, and video movies.



It has a capacity of 181 channels and connects to black and white or color TV.

National Captioning Institute, Falls Church, VA,

VIII. Telephone amplifying devices;

- 1) Tel pet: telephone amplifier, that slips on and off a receiver. It features an adjustable volume control and 401 size N battery needed.



American Overseas trading Corp. New Orleans, LA.

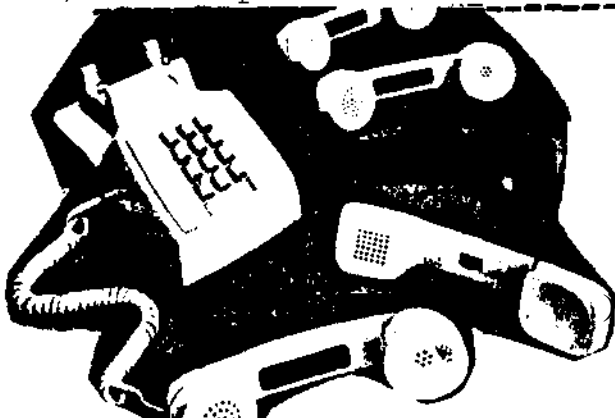
- 2) Portable amplifier: amplifies incoming telephone conversations by 30%. Its useful at home, in the office and noisy environments.

It works with/without hearing aid, with inductively coupled hearing aids or fits securely to most telephone handsets.

AAA battery needed.

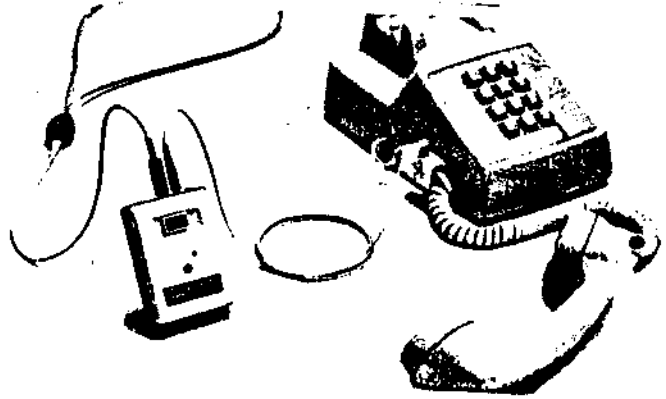


- 3) AT&T amplification handsets; amplify the volume of incoming voice by 30%. An adjustable volume control present.



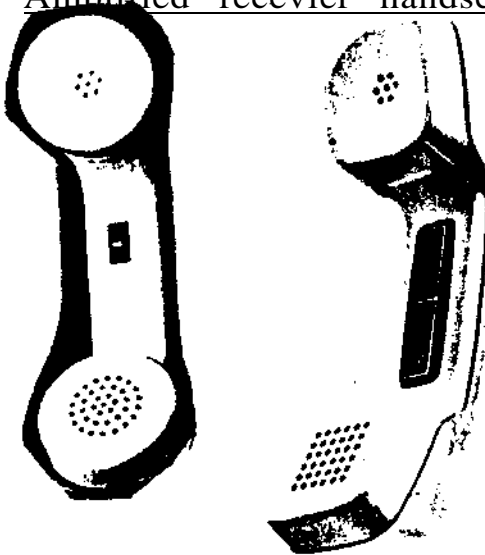
AT&T National, Special needs Centre, Parsippany, NJ.

- 4) Com-tek TA-100 Telephone adapter with AT-72 option kit. It provides binaural listening with enhanced frequency response and additional amplification.



Audio enhancement, St. Louis, MO.

- 5) Amplified receiver handsets: replace modular and non-modular type phones and can be used with rotary or push button telephones.

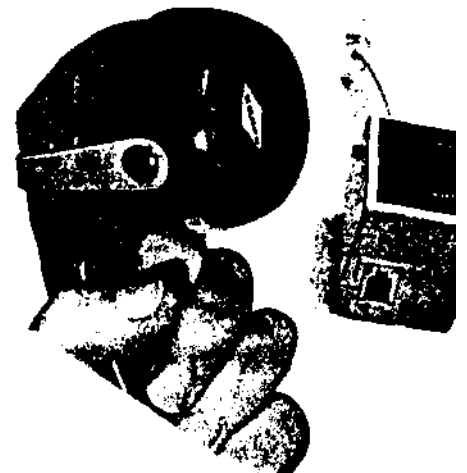


Set 2533 (left) has fixed volume control recommended for household use where everyone is hearing-impaired.

Set 2534(right) has variable volume control bar.

Volume returns automatically to normal level when telephone is replaced on its base.

- 6) Nuvox portable telephone amplifier: amplifies sounds without an hearing aid. It has a adjustable volume



control that attaches to any phone. It weighs 40 unces and battery operated.

HALHEN company Inc. Long Island City, N.Y.

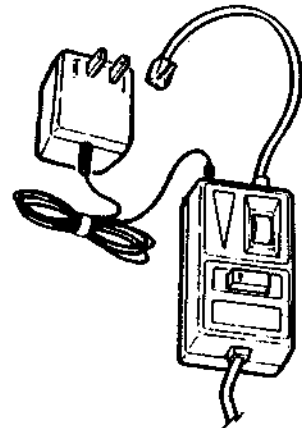
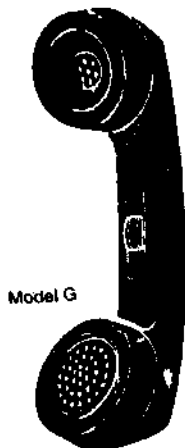
7) TA- 80 Telephone amplifier: has an elastic band for easy



attachment to a telephone receiver. It has a 'off' switch. An MI-2 inductor unit is connected to TA-80 for binaural reception. TA-80 is also used to enhance TV, radio and cassette listening.

Rastronics USA Inc, Mountain Side, NJ

8) Stratone 507 model G is an amplified handset with volume control, Televox industries, Canoga Park, CA.

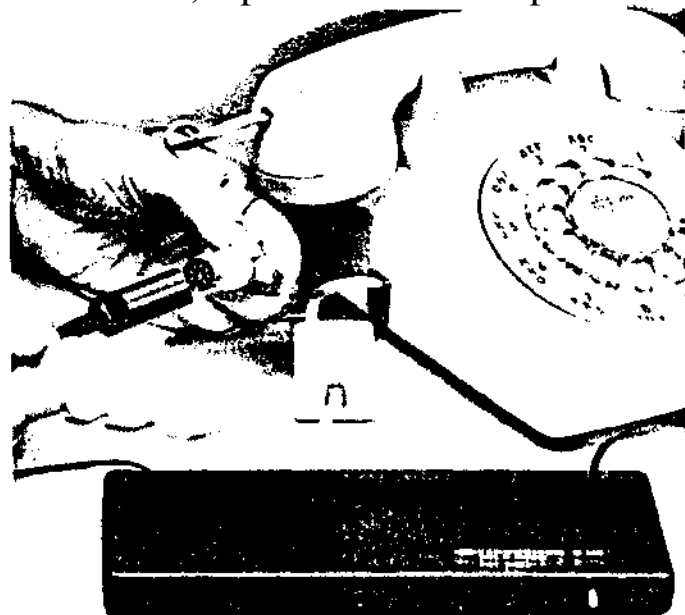


- 9) Phonear: a sound amplifying device for hearing aid wearers with a telephone switch. It is attached to telephone handset by its elastic strap.



Phonic ear Inc, Mill Valley, CA

- 10) Sennheiser S1460 TV and telephone transmitter: has a transmitter, microphone connections, special modular phone connector and receiver.

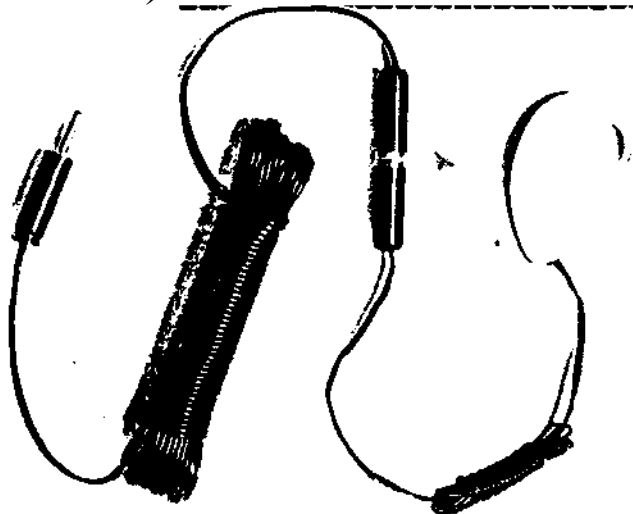


Siemens Hearing Instruments

Inc , Union, NJ

IX Television Listening Systems:

- 1) TV and Radio inductor Kit: Ideal for TV or radio listening



without interference of room noise or other's talking. It is used with an ear-level hearing aid equipped with "I" switch. It has an inductor plate (earhook shaped) a connecting cable one of which

plugs into the inductor plate and the other end into the TV or radio.

HALHEN company Inc, Long Island City, NY.

- 2) HAC-2301 silhouette Inductor designed to fit behind the ear. It has 5 foot cord with mono-miniplug and fits most output jacks on TVs and radios.

HARC-Meawtile, Ltd.
Div. HAC of America/ inc.
Kalamazoo, MI

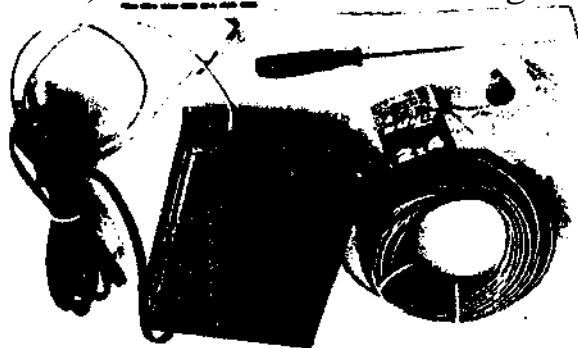


- 3) Nady IR-H/H system a cordless infrared stereo/mono-transmitter/head receiver system with microphone adapter. It amplifies audio for the wearer.

Nady Systems, Inc, Oakland, CA



- 4) Minicon small telemagnetic loop system provides the user of 't' coil hearing aid with comfortable/ disturbance free TV listening, Eliminating poor room acoustics. Transmission strength upto 30 feet. It is

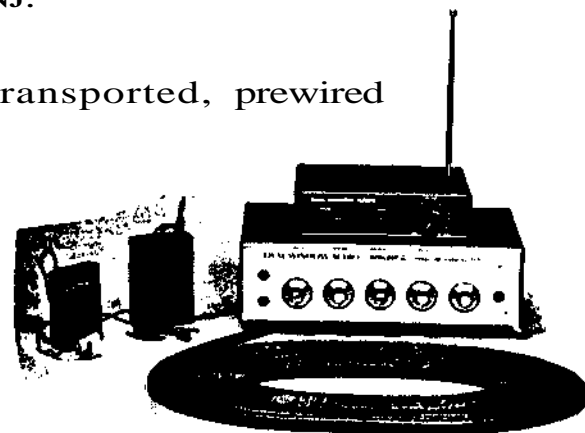


plugged into a standard 110 volt wall outlet and a single wire from it runs under the carpet.

Oticon Corporation, Somerset, NJ.

- 5) Miniloop II: Complete, easily transported, prewired induction-loop AL system with wireless microphone. Applications in classrooms, meeting areas and TV listening.

Oral window Audio, Yarmouth, ME



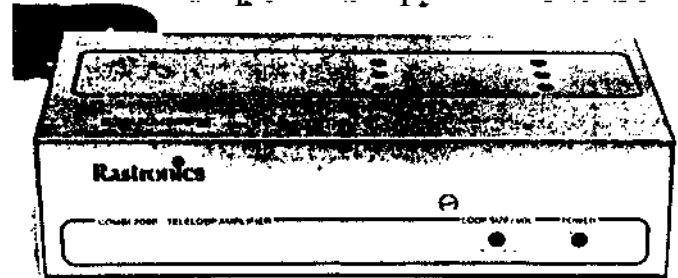
6) Mini-teleloop type TS-100V: has an adjustable volume



control. The unit is easy to operate, lightweight and portable and used with hearing aid & 'T' position. Applications for TV, radio and stereo listening.

7) Combi 2000 teleloop system has an extra sensitive microphone. amplifier floor loop. Microphone can be

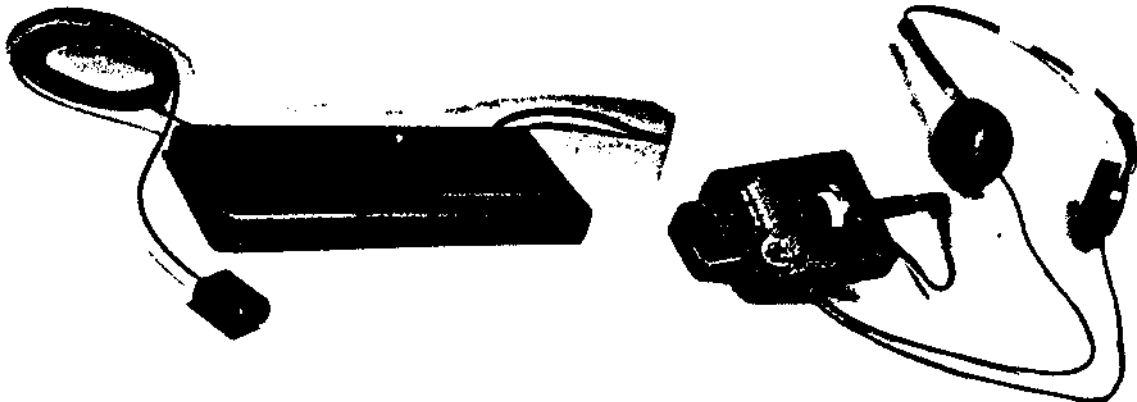
directly placed on the sound source or hooked directly to a TV or radio



with additional microphone. This helps the listener to hear conversations even when hearing aid is in "I" position.

Rastronics USA, Inc, Mountainside, NJ.

8) Personal infrared listening system: provides clear TV

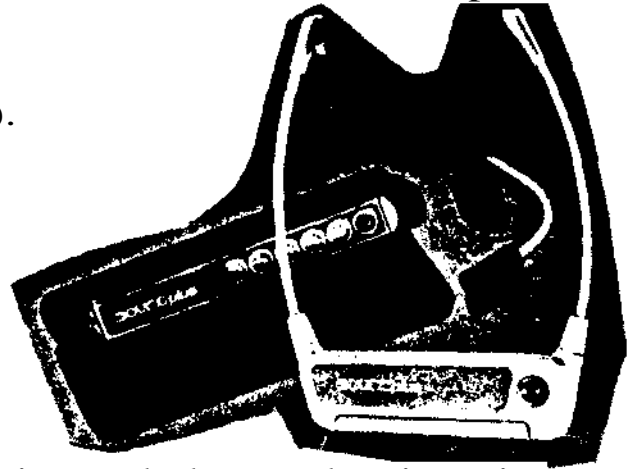


and radio listening via infrared light. It has a transmitter and one/more receivers.

Siemens Hearing Instruments, Inc, Piscataway, NJ,

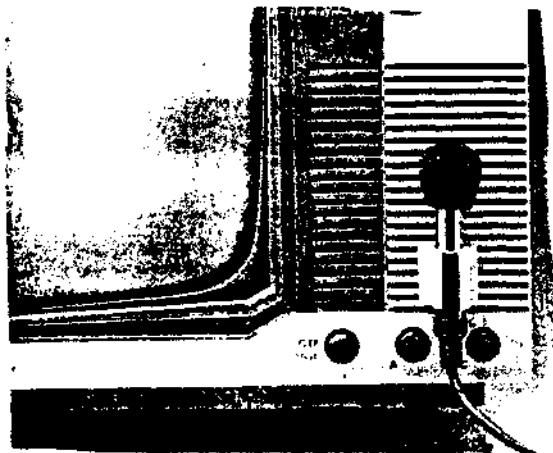
- 9) Sound plus infrared ALD has a transmitter microphone, and wireless receiver (lanyard or stethoscope).

System provides superior listening capability: upto 112dB SPL.



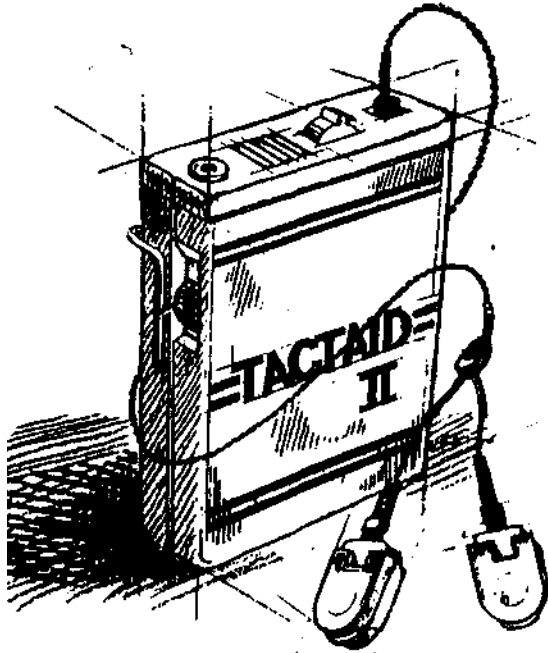
- 10) Pocket talker: amplifier is used by unplugging the microphone and attaching it to a 10' extension cord. A plastic, self adhesive clop is attached to TV loudspeaker. Adjustable volume control present.

Williams Sound Corp,
Minnetonka, MN



X. Vibrotactile aids and devices:

- 1) Tactaid- II -A wearable, 2 channel vibrotactile aid for profoundly deaf, converts speech and environmental sounds into vibrations. Pocket sized, 4.2 ounce case contains processing electronics, an internal microphone, T-coil, an input jack for use with FM trainers, rechargeable batteries and system controls. 2 skin vibrators can be worn on the sternum or on the wrist.



Battery charger and optional external tie-clip microphone also present. With patented automatic noise suppressor that eliminates background noise.

Audiological Engineering Corp. Somerville, MA

- 2) TC-1600 multichannel electro-tactile communication system:

a wearable, high resolution, full spectrum tactile sensory aid for severe and profound hearing losses. It provides 16 channels of frequency information by means of a tactile stimulating belt worn around the waist.

Tacticon Corporation, Concord, USA.

EPILOGUE

Assistive listening devices, their types and varieties present Under each type have been described here. The use of each of the assistive listening device has been individually presented briefly. The assistive devices can improve communication in noisy, reverberative situations or where distance is a factor. They are generally used in conjunction with hearing aids to supplement hearing. Assistive devices can substitute visual communication for auditory when necessary by monitoring sounds visually and/or vibrotactilly.

Progress in any field results in modernization and sophistication of that field. Progress in the field of rehabilitation in audiology has resulted in the manufacture of more and more modernized and sophisticated aids necessary for overcoming the hearing handicap. As a result many varieties of hearing aids and assistive devices are manufactured to meet the needs of the hearing-impaired persons.

This is true in Western countries but in India, 'assistive listening devices' is still to gain widespread usage.

This project was undertaken, to increase awareness of the varieties of assistive listening devices that are available in the market today, the services they offer and how popular they are in Western countries. These systems are not used in India, due to a number of reasons and the important reason being the economic condition. But a few of the less costly and more useful aids can be used in therapy clinics and educational centres thereby facilitating the deaf and the hearing-impaired persons to enjoy sounds and to overcome communication barrier.

BIBLIOGRAPHY

- Buyer's guide to assistive **listening** and alerting (1985) ;
Hearing Journal April 1985, Vol.38, No. 4,
26-52.
- Buyer's guide to assistive devices (1967). Hearing
Journal May 1987, Vol, 40, No.5, 31-60.
- Indu , V. (1985) : Assistive listening devices for the deaf;
A **review**. An unpublished Independent
Project submitted as a part fulfilment of
First Year M.Sc. , (Speech and Hearing),
to the University/of Mysore.
- Kaplan, H. (1987): Assistive devices for the **hearing-
impaired**, *The Hearing Journal*, 1987, Vol.40,
13-15.
- Robert, F,K. Zelski (1985): What are assistive **listening**
devices, *Hearing Instrum ents*, 1985, Vol. 36,
No. 2, 12-13,
- Vaughn,G.P. , **Lightfoot**, R.K. , and Gibb, S. G. (1983): Assis-
tive listening devices - Part-III: Space.
ASHA, 1983, Vol.25, 33-39.