

**MADSEN** Midimate

**Midimate 622**  
**Clinical/Diagnostic Audiometer**

User Manual

Doc no. 7-25-9000/09  
Part No. 7-25-900

**CE**  
0459



**otometrics**  
MADSEN · AURICAL · ICS

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**Technical support**

Please contact your supplier.

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# 1. GENERAL INFORMATION

## 1.1 INTRODUCTION

The MIDIMATE 622 is the second member of the new generation of audiometers from GN Otometrics, which started with the Midimate 602. This dual-channel clinical/diagnostic audiometer features a unique multi-lingual menu-driven display and five user-programmable test setups for optimal operating efficiency during daily routine examinations. New features incorporated into the MIDIMATE 622 include, amongst others, data interface, 1 dB attenuator resolution, ipsilateral masking, and simultaneous presentation of stimulus and masking binaurally.

*Introduction to the  
MIDIMATE 622*

State-of-the-art technology has enabled GN Otometrics to produce a compact lightweight instrument not only capable of performing the standard battery of tests but also featuring many other advanced and innovative facilities.

All these features have been incorporated into a strikingly simple user-friendly and ergonomic design, which makes operation fast, easy and efficient. Silent electronic rotary frequency and attenuator controls have been provided for optimal operator convenience and comfort while the hearing level control and the interrupter bar have been arranged to accommodate both left- and right-handed users.

*Human Engineering*

In addition, GN Otometrics has developed a completely new attenuator which permits totally clickfree operation over the entire attenuator range.

*Clickfree  
Attenuators*

Simple and logical multilingual menu-driven dialogue makes the MIDIMATE 622 easy to learn and easy to use. Working with a menu-driven display is uncomplicated: the upper line simply prompts the operator to select one of the options from the lower line by pressing the appropriate softkey. In this way, you can rapidly set up tests and then alter them as required. Furthermore, up to five test setups may be preprogrammed for instant one-key retrieval of your most frequently used test setups. The display itself is easily readable under any lighting conditions and from any viewing angle thanks to state-of-the-art LCD technology.

*Menu-Driven  
Display*

In addition to a complete patient communication and monitoring system with talk-over and talk-back facilities, patient response may also be audible, if desired, enabling the operator to concentrate visually on the patient.

*Patient  
Communication*

The MIDIMATE 622 is fitted with an RS232C serial data interface as standard, enabling data transfer to and from a computer, entry of a patient identification number, and printout of audiograms.

*RS232C Data  
Interface*

MateBaseI, GN Otometrics's own audiological software, is supplied free of charge with the audiometer, permitting patient identification and audiometric measurement data to be transferred to a PC for subsequent processing, printout and storage. To communicate data from the MIDIMATE 622 to MateBaseI, version 2.0 or higher is required.

*MateBaseI*

*Printout Facility*

All instruments with software versions 3.0 and higher are equipped with an internal memory for printing out test data in audiogram form directly to an external printer, or to ZODIAC 901, GN Otometrics's Middle-Ear Analyzer. In the latter case, printout will be performed on either the analyzer's own built-in printer or on an external printer depending on how the analyzer is configured.

The MIDIMATE 622 has been designed and built in accordance with GN Otometrics' customary high standards of quality and reliability. The robust plastic cabinet ensures that the audiometer will endure the wear and tear of daily life while the utilization of CMOS technology ensures low power consumption and heat levels as well as long life and easy servicing.

---

## 1.2 ABOUT THIS MANUAL

---

The MIDIMATE 622 OPERATION MANUAL consists of 14 chapters and 4 appendices giving technical specifications, a schematic overview of the audiometer's procedures, a list of available test setups and a detailed list of printout setup options. Chapter 5, Operating In Test Mode, gives the first-time user a quick and easy-to-read guide enabling the operator to rapidly acquaint himself with the instrument. Being a menu-driven system where a number of user instructions appear on the instrument's display, the MIDIMATE 622 is easy to operate and easy to use.

*Manual Conventions*

All screen instructions are reproduced as far as possible as they appear on the display, and are printed in a box to resemble the actual display:

<b>Freq.</b>	<b>Air</b>	<b>L:Tone</b>	<b>Air</b>	<b>R:NBN</b>
<b>1000 Hz</b>	<b><u>C/P/W</u></b>	<b>100 dB</b>	<b><u>On/Off</u></b>	<b>115 dB</b>

**MENU**

Command keys on the instrument's keyboard are printed in boxes in the margins and in capital letters, bold script and underlined if in the text, e.g. **MENU**.

*Key Words in Margins*

In addition to keyboard commands, the margins contain "key words" corresponding to the text and listed under a subject index at the end of the manual.

If you have any questions or suggestions with regard to the MIDIMATE 622 or this manual, please do not hesitate to contact us directly at the following address:

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DK-2630 Taastrup, Denmark.

Telephone: +45 45 75 55 55  
Telefax: +45 45 75 55 59  
www.otometrics.com



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## 1.3 TEST CONDITIONS

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The ambient noise conditions for audiometric tests should be less than 30 to 40 dBA SPL. In most cases an audiometric silent booth is recommended (especially for speech audiometry) but may not always be necessary.

*Silent Booth*

If the patient to be tested is to be located next to the audiometer, ensure that the display and control panel are not visible to the patient.

---

## 1.4 STANDARDS

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The MIDIMATE 622 complies with the following standards for audiometers:

EN 60645-1, -2  
ANSI S3.6

The MIDIMATE 622 and this manual are CE-marked according to the Medical Devices Directive 93/42/EEC.



The MIDIMATE 622 is marked with this symbol to indicate compliance with Type B requirements of EN 60601-1.



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## 1.5 SAFETY

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This operation manual contains information and warnings which must be followed to ensure the safe performance of the MIDIMATE 622. Local government rules and regulations, if applicable, should also be followed at all times.

Special note should be made of the following:

MIDIMATE 622 is marked with this symbol when it is important that the user refers to associated warnings given in this manual.



Any PC connected to the MIDIMATE 622 must comply with the requirements of IEC 950 "Safety of information technology equipment, including electrical business equipment".

## **1.6 SERVICE AND REPAIR**

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Service and repair of electromedical equipment should only be carried out by the equipment manufacturer or by authorized representatives.

The manufacturer reserves the right to disclaim all responsibility for the operating safety, reliability and performance of equipment serviced or repaired by other parties.

## 2. INSTALLING THE MIDIMATE 622

### 2.1 UNPACKING AND INSPECTION

The MIDIMATE 622 is shipped in its own custom-made carton together with this Operation Manual, a Packing Specification and standard accessories. Please do **NOT** dispose of this carton in case the instrument needs to be returned to your distributor for service or repair.

*Unpacking*

If the shipping carton is visibly damaged, ask the carrier's agent to be present when the instrument is unpacked. If the instrument is damaged or fails to operate, please notify the carrier and your distributor immediately. The distributor will arrange for the repair or replacement of the instrument without waiting for the claim against the carrier to be settled.

*Inspection*

Please check that all accessories are complete and intact (referring to the enclosed **Packing Specification**).

*Packing  
Specification*

### 2.2 STORAGE AND SHIPMENT

To protect the instrument and accessories during storage or shipment always use the best packing available. If it is necessary to return the instrument to your distributor or to the factory for repair, use the original shipping cartons.

*Storage & Shipment*

When shipping the MIDIMATE 622, please remember the following:

1. Seal shipping container securely.
2. Mark container **FRAGILE** to ensure careful handling.
3. In any correspondence, please refer to the instrument by model and serial number.

Always store the Midimate 622 in a clean, dry environment and never leave the power on when left in an enclosed container!

**CAUTION!**

### 2.3 INSTALLATION

Site the instrument in a well-ventilated location away from sources of heat.

*Siting*

Connect the headset, the bone conductor, the patient response handswitch, and any optional accessories to their respective connectors on the Connection Panel located on the rear of the instrument (see Fig.1).

*Connections*

Note that the headphone jacks are color-coded: blue is for left, and red for right. The plugs on the Connection Panel for both headphones (Phones) and Free Field (FF) are clearly marked L for Left and R for Right.

*Connection To External Printer*

For printout, connect external printer or ZODIAC 901 Middle-Ear Analyzer to RS232C serial data interface port. Use one of the following cables:

External printer:	serial printer cable
8-71-420	
ZODIAC 901:	9/9 serial data interface cable
8-71-340	

Please refer to Figure 4 for further details re printer connections.

*Baud Rate 9600*

Note that Baud rate must be set at 9600 for communication with ZODIAC 901 (please refer to section 10.3 for further details).

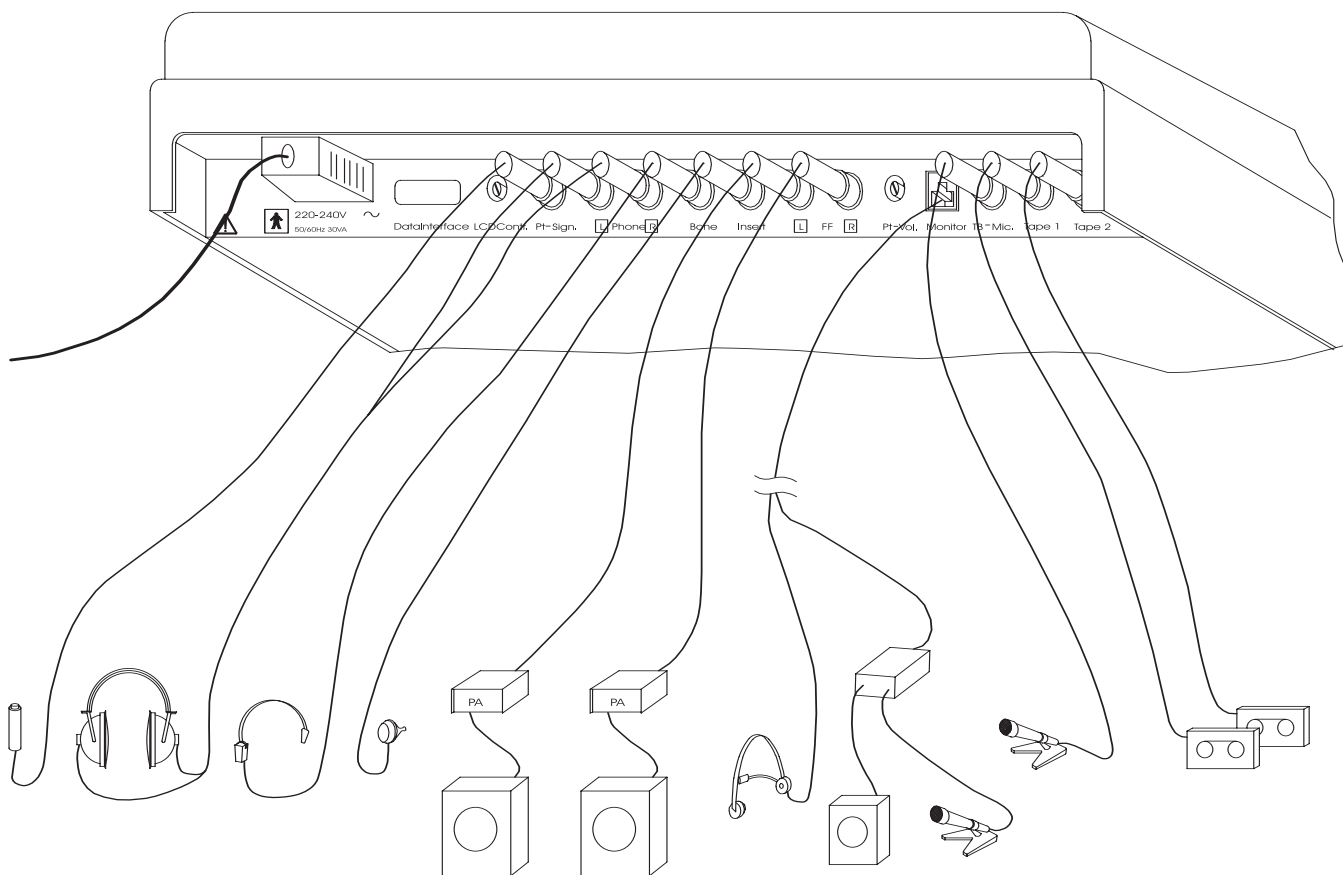
*PLEASE READ BEFORE*



Before connecting the power cord, please make sure that the voltage from the electrical outlet matches the voltage shown on the identification label on the base of the audiometer (refer to page 8 for information on changing voltage setting or fuses).

**WARNING!:** Operating at the wrong voltage may blow the fuses!

Plug the supplied power cord into the receptacle marked "Power" on the back of the audiometer.



*Mains Connection*

Plug the power cord directly into a three-wire, protective ground, AC power outlet. If an extension cord is required, only use a cord with a three-prong connector.

*Fig. 1. Midimate 622 Connection Panel.*

**WARNING!**  
Chemical cleaning agents containing ammonia or alcohol will  
damage the cabinet and display.  
**DO NOT USE ABRASIVE CLEANERS! t**

**WARNING!**  
Before replacing a fuse or changing voltage, first switch off  
instrument and disconnect from mains power supply!



## 2.4 CARE AND MAINTENANCE

### Cleaning

The MIDIMATE 622 requires no preventive maintenance. However, it is recommended that the following guidelines be observed.

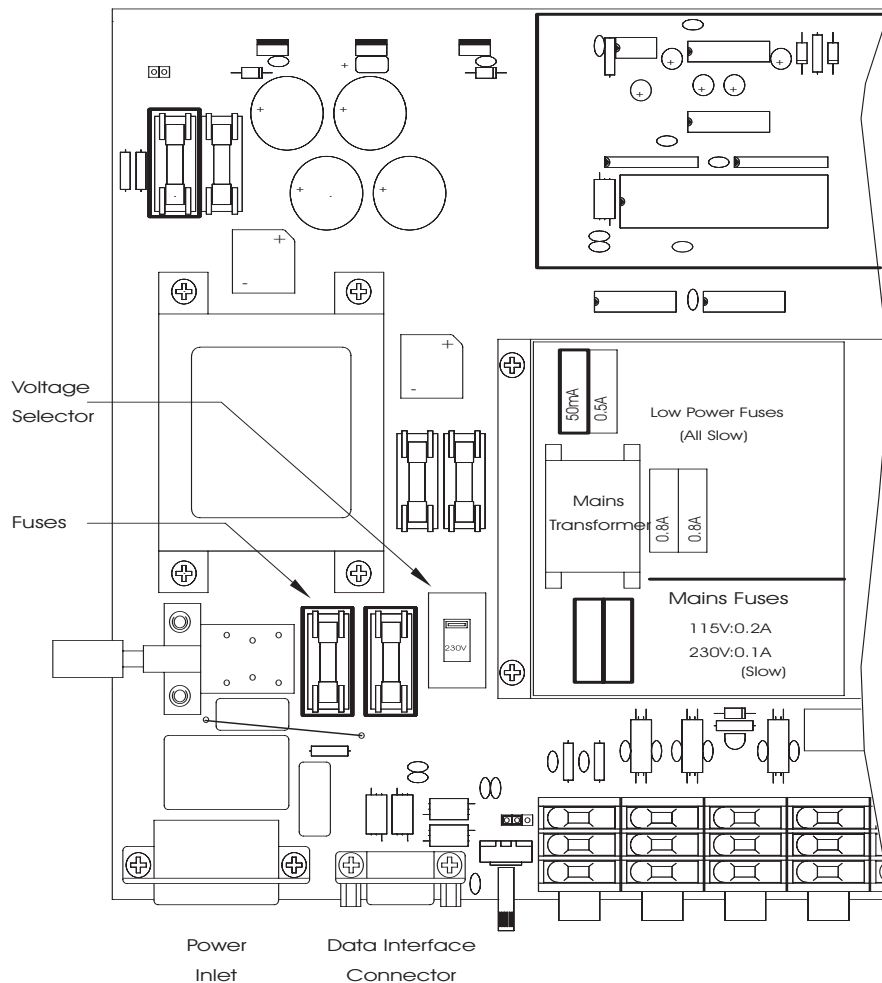
The instrument should be kept clean and as free of dust as possible:

- Remove dust using a soft brush and take special care to dislodge any accumulations of dirt on or around the pushbuttons on the front panel.
- To clean the cabinet and the front panel, use a soft, slightly damp cloth with a small amount of mild detergent on it. Do not allow any moisture inside the instrument!
- To clean the display, use a dry cloth or soft brush. Note that the display is laminated for maximum readability and must therefore be treated with care.

### Display

### Dust Cover

If your MIDIMATE 622 has been supplied with the optional plastic dust cover,



you should keep the instrument covered at all times when it is not in operational use.

However, the instrument should **NOT** be left switched on with the dust cover in place, as this may cause severe overheating and damage to the instrument. Do not expose the instrument to direct sunlight and keep it well-ventilated at all times to prevent overheating.

**CAUTION!**

The earphones are in constant contact with your patients so care should be taken to ensure that they are kept clean. Just wipe them regularly with a moist cloth. Likewise, the eartip of the masking insert phone should be wiped regularly, and replaced at frequent intervals. There are no special requirements for disposal of the rubber eartip. The bone vibrator (conductor) should also be wiped clean periodically.

If you use the E-A-RTONE 3A insert earphones, note that the standard yellow foam insert tips are disposable, and therefore should not be cleaned and reused. There are no special requirements for disposal of the insert tips.

To replace a fuse or to change voltage, please refer to next page.

To replace a fuse or to change voltage:

- Switch off the instrument and disconnect from mains.
- Remove the two Phillips screws at the back of the top panel
- Tilt the top panel forwards and remove.
- The voltage selector is located next to the power switch (see Fig.2). 115 V or 230 V may be selected.
- Two identical fuses are located beside the voltage selector (see Fig.2). The amperage of the fuses varies according to the voltage, see below:

Voltage	Fuses	Type	Dimensions
115 V	200 mA	Slow Blow	5 x 20 mm
230 V	100 mA	Slow Blow	5 x 20 mm

*Fig. 2. Voltage Selector & Fuses Inside Midimate 622.*





## 3. GENERAL DESCRIPTION

### 3.1 GENERAL

Unlike most other audiometers, the MIDIMATE 622 has no switches for selecting fundamental parameters nor potentiometers for calibration of inputs and patient communication/monitoring functions. Instead these parameters are selected using the control panel together with the display while the conventional potentiometers on the rear panel are largely replaced by electronic level controls.

Test parameters are either preprogrammed and stored in nonvolatile memory (where stored information is retained when the power supply is cut off) to be subsequently accessed from the Select User Test menu, or are selected by pressing Keys 1 to 5. As you press these “softkeys”, the audiometer responds by displaying different options for your selection. The resulting test setup is erased on pressing **MENU**. However, if you enable the “programming” function and select parameters in the same way, you will be given the option of saving these parameters in the memory as one of the User Tests.

*Test Setup and  
Preprogrammed  
Tests*

It is easier to understand how the test setup process functions if you visualize it as a series of different levels like a mathematical tree (please refer to Figure 3 on next page). You can use the softkeys to move down through the different levels of the setup process and the **MENU** button to jump back to the top of the selection tree and then switch from one branch of the tree to the other.

*The Selection Tree*

The Connection Panel is located on the rear of the instrument (see page 4 for installation). In addition to connections, there are two white potentiometers—one marked PT to control the level of the audible patient response and the other for adjusting the display contrast.

*Rear Panel*

### 3.2 FRONT PANEL LAYOUT

The front panel layout has been designed for maximum ergonomic efficiency irrespective of whether the operator is left- or right-handed. It has been subdivided horizontally into 3 parts: the lower is for the manual controls used during testing and is called the OPERATION subpanel, the central part is the CONTROL subpanel, the upper part is the DISPLAY subpanel.

*Front Panel*

The CONTROL subpanel is further subdivided into 3 sections: the central section is designated “Select” (see next page) and the 2 sections on either side are designated “Level”. The latter contain pushbuttons which access electronic level controls for the various speech test inputs (left) and patient-operator communication (right) with the levels shown on the display. These electronic controls replace the old potentiometers and are used in conjunction with the rotary control knobs thus preventing accidental alteration of preselected levels.

*The Control Panel*

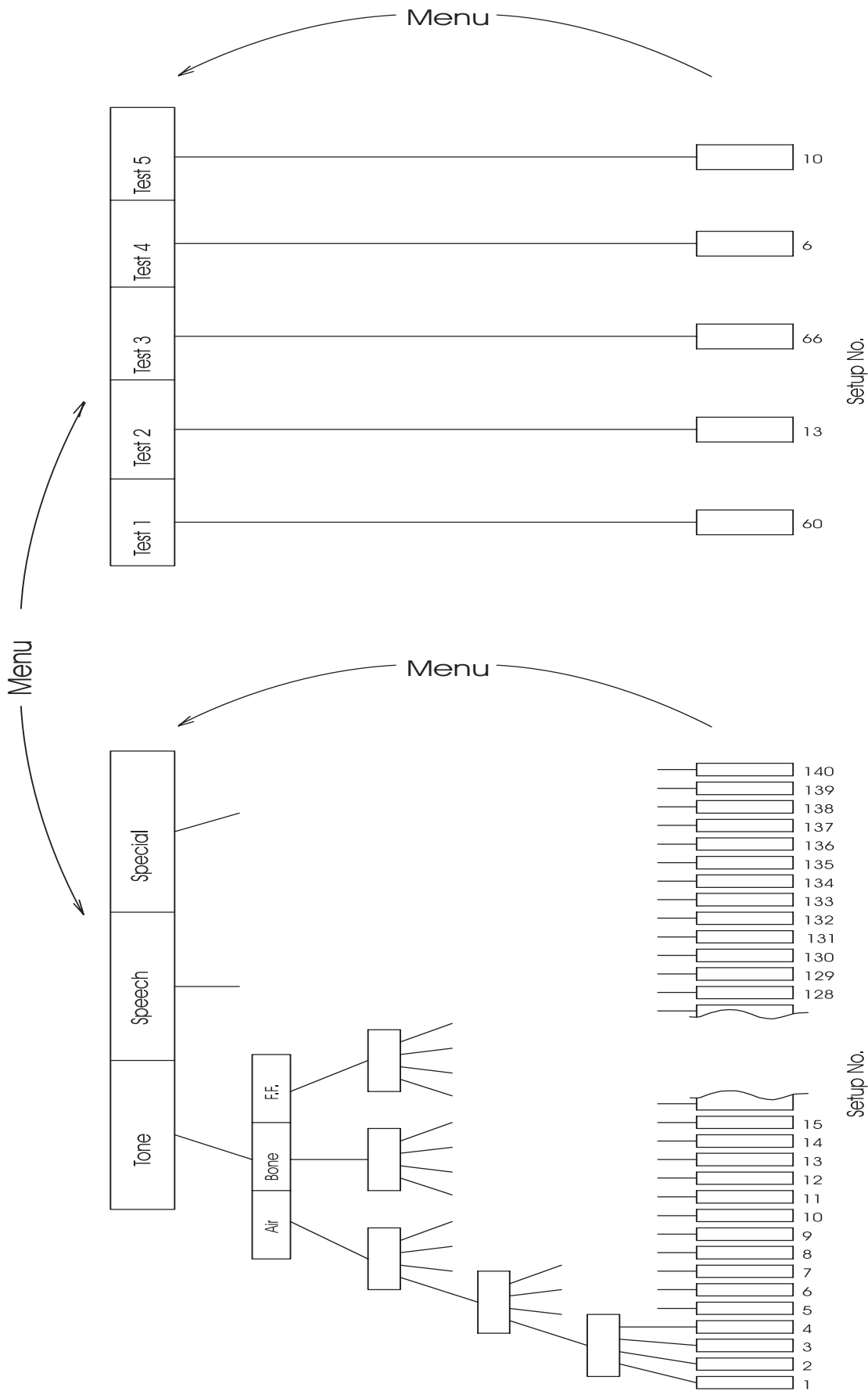


Fig. 3. The Selection Tree

However, note that the Talk Over button is located in the OPERATION panel because, in addition to its function as a Level control, pressing this button interrupts any stimulus signal being presented to the patient in order to permit talk over.

*Talk Over*

The section marked "Select" contains 5 "softkeys" and the Menu button. Softkeys are buttons which perform different functions in different contexts. Key 3 also functions as the Option key accessing whichever Options menu is available for any given test (e.g. Hearing Level Lock, Patient Signal).

*The Select Panel*

The OPERATION panel comprises three rotary control knobs for controlling Frequency, Hearing Level and Masking Level, the red Interrupter bar and four pushbuttons for Reverse, Talk Over, Extended Range and L/R Shift.

*The Operation Panel*

---

### 3.3 FRONT PANEL CONTROLS

---

Pull out drawing at the back of this manual for itemized diagram of the MIDIMATE 622 front panel (Fig. 4) and read the following description of the individual controls and indicators.

*See Front Panel Diagram at Back of This Manual (Fig. 4)*

1. Red light indicating patient response.
2. Green light indicating the administration of a stimulus to the patient (Pure Tone Audiometry). Also functions as a VU meter in Speech Audiometry.
3. 2 x 40 character Liquid Crystal Display (LCD) that not only indicates test parameters and readings but also permits communication between the operator and the audiometer.
4. Red light indicating that Extended Range HL has been enabled; this LED also flashes when the audiometer is busy printing out (versions 3.0 and later).
5. Green light indicating instrument has been switched on.
6. Rotary control knob for setting masking level during testing. May also be used as a potentiometer control when adjusting levels of input sources and patient communication functions.
7. Pressing this pushbutton displays the Monitor Level visually as well as a percentage of Range. Level can then be adjusted by turning any of the rotary control knobs-level is set electronically preventing accidental alteration.
8. Pressing this pushbutton displays the Talk-Back Level visually as well as a percentage of Range. Level can be adjusted as for Monitor.
9. When Hearing Level is at its maximum output intensity, pressing this pushbutton will extend the range by up to 25 dB.
10. This pushbutton automatically switches all selected parameters from the left to the right channel and vice versa.

*Pt. Response LED*

*Stimulus LED*

*Display*

*Ext. Range HL LED*

*Power LED*

*Masking Level*

*Monitor Level*

*Talk Back*

*Ext. Range HL*

*L/R Shift*

<i>Menu</i>	<b>11.</b> This pushbutton returns you to the top of the selection tree displaying either the Select User Test Menu or the Select Function Menu depending on which “branch” of the tree has been previously selected.
<i>Tone Switch/ Interrupter</i>	<b>12.</b> Presents stimulus tone via preselected channel or interrupts tone if in Reverse mode (see #15).
<i>Hearing Level</i>	<b>13.</b> This knob increases or decreases the stimulus intensity in 1 or 5 dB steps within the permitted range at any given frequency. May also be used as a potentiometer control when adjusting levels of input sources and patient communication functions.  The H.L. knob is also used together with the Frequency knob for entering the Patient I.D. number.
<i>Softkeys 1-5</i>	<b>14.</b> Used for selecting test parameters from the bottom line of the display. Key 3 also functions as the Option Key for accessing Options Menus.
<i>Reverse</i>	<b>15.</b> Reverses the function of the Tone Switch changing it to an Interrupter. Used mainly in speech audiometry to interrupt taped input. Pressing <b>MENU</b> cancels this mode.
<i>Talk Over</i>	<b>16.</b> This pushbutton accesses the Talk Over mode and interrupts the presentation of stimulus permitting communication with the patient. The Talk-Over Level in dB is displayed for the purposes of adjustment (as in Monitor Level above).
<i>Tape 1</i>	<b>17.</b> Tape 1 is an input for either a tape recorder or a CD player for use in speech audiometry as a stimulus channel. This pushbutton accesses the potentiometer control for adjusting level by turning any of the 3 grey rotary knobs in the Operation section.
<i>Tape 2</i>	<b>18.</b> Tape 2: as Tape 1 above except that it is used as an optional masking channel.
<i>Microphone</i>	<b>19.</b> Pressing this pushbutton enables adjustment of the microphone sensitivity as with the other input sources (#17/18 above).
<i>Frequency</i>	<b>20.</b> Rotary control knob for setting frequency during testing. May also be used as a potentiometer control when adjusting levels of input sources and patient communication functions.  The Frequency knob s also used for entering the Patient I.D. number.

---

### 3.4 SOFTKEYS

---

<i>Softkey Defined</i>	A softkey may be defined as a key whose function changes depending on context as opposed to a so-called “dedicated” key whose function is always the same. The MIDIMATE 622 has 5 softkeys located under the display in the center of the front panel.
<i>Softkey 3</i>	Softkey 3 is not only a softkey but is also dedicated as Option Softkey in Test Mode, i.e. pressing Softkey 3 during Test Mode accesses whatever options are available during any particular test.

During setup, these keys select the options shown on the lower line of the display.

*In Setup Mode*

During operation in test mode, the softkeys control supplementary functions as described in section 5.1.4.

*In Test Mode*

### 3.5 START-UP

1. Connect the following to the rear panel: headset, patient response handswitch, bone conductor.
2. Plug the mains cable into the power socket on the rear panel and then connect the audiometer to the mains.
3. Switch on the MIDIMATE 622 by depressing the power switch (located on the right side of the instrument).

**NOTE!** As there can be a click emitted from the headphones or free-field loudspeakers when switching on the instrument, ensure that headphones are not being worn at power-on.

**NOTE!**

4. The power LED illuminates and the following displays appear in rapid succession as the audiometer runs an automatic self-test and then loads Test 1 (which here is the factory default test). Any of the first 4 displays may be “frozen” by holding down Softkey 1.

Power-Up Test completed

MIDIMATE 622 Version : 3.x

Calibrated (YYMMDD) : 980311 By: xyz  
Reference : ANSI S 3.6 / ANSI S 3.6

(Tone, Air, Left, Mask : Air, NBN)  
\* \* \* Test Retrieved \* \* \*

Freq.	Air	L: Tone	Air	R : NBN
1000 Hz	C/P/W	20 dB	On/Off	20 dB

The self-test checks the system memory and the calibration memory. When completed, User Test 1 is loaded and you are ready to begin testing 5 seconds after switching on the audiometer!

*Self-test*

**NOTE !** No warm-up time is necessary - you can begin testing as soon as User Test 1 is loaded

*No warm-up time necessary!*

If the self-test fails or displays a specific error, call your distributor right away and report exactly what was displayed. Note that calibration memory errors do not prevent operation-error will be shown on display whenever that location is accessed!

Audiometric examinations may be divided into two separate phases, the Setup Phase and the Test Phase. Likewise, the Midimate 622 operates in two corresponding modes:

*Setup Mode*

- Setup Mode (Selection of the appropriate test parameters)

*Test Mode*

- Test Mode (Performance of the actual audiometric test)

Setup is performed either by following a decision tree or simply by selecting one of the five preprogrammed tests. The following chapter describes the different setup possibilities in detail.

## 4. TEST SETUP

### 4.1 GENERAL

There are two setup modes:

- Preprogrammed (User) Tests
- Manually selected Tests

Pressing **MENU** while in Setup Mode, toggles between these two modes.

**MENU**

The audiometer will remain in the same setup mode until the user toggles to the other mode by pressing **MENU**.

### 4.2 SELECTING A PREPROGRAMMED TEST

1. Press **MENU** once or twice until the following text appears on the display:

**MENU**

<b>Select User Test:</b>				
<b>Test1</b>	<b>Test2</b>	<b>Test3</b>	<b>Test4</b>	<b>Test5</b>

2. Press one of the five keys below the display to select the corresponding test.
3. When a button is pressed the setup sequence is shown briefly, e.g. (Tone, Air, Left, NBN). Viewing time may be prolonged by holding the button down.
4. The audiometer now enters Test Mode, ready to operate.

When power is turned on, the audiometer automatically enters the test setup defined as Test 1.

The factory defaults for the 5 preprogrammed tests are as follows:

*Factory Defaults*

Test 1: Tone, Air, Left, Mask: Air, NBN (1000 Hz, 20 dB, Continuous Tone)

Test 2: Tone, Bone, Mask: Air, NBN (1000 Hz, 20 dB, Continuous Tone)

Test 3: Speech, Air, Left, Tape, Mask : Air, SN (20 dB)

Test 4: Vacant

Test 5: Vacant

These preprogrammed test setups may be easily changed-please refer to chapter 11.

## 4.3 MANUAL TEST SETUP

Composing a specific test is performed by means of selections from a series of menus.

During menu selection, the upper line always displays the function in question while the lower line shows the possible options that may be chosen.

In order to make the audiometer setup more logical, a specific setup sequence is always followed.

### *Setup Sequence*

The sequence is: Function, Output, Stimulus Side, Input, Masking (i.e. Channel 2 available).

### *Default Settings*

In Manual Setup Mode, parameters such as Frequency, Intensity, Masking (both on/off and intensity), and Stimulus Type are preset to default settings which are specified in section 4.3.2.

The choices available in each step are always restricted so as to comprise only relevant items. For example, in pure tone audiometry, speech noise will not appear as a valid masking source.

The selection sequence is condensed whenever possible. For example, if Left+Right stimulus is selected, questions about masking will be omitted.

### *Maximum 5 Selections*

As can be seen from the general form of the setup, the maximum number of selections before a test is fully programmed is 5.

In each step of the setup sequence, the previously selected parameters are displayed on the upper line of the display.

### **MENU**

In the course of performing the setup sequence, cancellation can be accomplished by simply pressing **MENU** which returns the display to the Select Function Menu.

There are a total of 137 different Test Setups available, any of which may be saved as a preprogrammed test. Refer to chapter 11, Test Setup Programming for further details. All 137 available test setups are listed in Appendix C.

### 4.3.1 EXAMPLE OF TEST SELECTION

### **MENU**

Press **MENU** once or twice until the following text appears on the display:

<b>Select Function:</b>			
<b>Tone</b>	<b>Speech</b>	<b>Special</b>	<b>Patient</b>

### **Softkey 1**

Press Softkey 1 below "Tone" in order to select pure tone audiometry.

A new menu will now appear on the display:

<b>(Tone) Output ?:</b>		
<b>Air</b>	<b>Bone</b>	<b>F.F</b>



The operator now has the option of choosing transducer.

Press Softkey 1 under “Air” to select Headphone Output and the display will now change to the following:

**Softkey 1**

<b>(Tone,Air) Stimulus Side ?:</b>		
<b>Left</b>	<b>Right</b>	<b>L+R</b>

Press Softkey 2 under “Right” to select Right ear testing.

**Softkey 2**

The next display will be:

<b>(Tone, Air, Right) Masking ?:</b>			
<b>No Mask</b>	<b>Air</b>	<b>Ipsi</b>	<b>Bin. S+M</b>

The user may now choose output. Press Softkey 1 under the text “No Mask” to omit masking.

**Softkey 1**

Setup has now been completed and the next display will show the whole setup as well as the setup number, before entering the Test Mode.

<b>(Tone, Air, Right, No Masking)</b>			
<b>***</b>	<b>Ready for Testing</b>	<b>***</b>	<b>6</b>

After a short while the test setup will appear:

<b>Freq.</b>	<b>Air</b>	<b>R:Tone</b>
<b>1000 Hz</b>	<b>C/P/W</b>	<b>20 dB</b>

Run Test Mode as described in the next chapter.

Press **MENU** to revert to Setup Mode.

**MENU**

### **4.3.2 DEFAULT SETTINGS IN MANUAL TEST SETUP MODE**

With reference to the above example of manual test setup, please note:

1. If NBN had been selected for masking, the following display would have appeared:

<b>Freq.</b>	<b>Air</b>	<b>R:Tone</b>	<b>Air</b>	<b>L:NBN</b>
<b>1000 Hz</b>	<b>C/P/W</b>	<b>20 dB</b>	<b>On/Off</b>	<b>20 dB</b>

Pressing Softkey 4 gives the following display:

**Softkey 4**

<b>Freq.</b>	<b>Air</b>	<b>R:Tone</b>	<b>Air</b>	<b>L:NBN</b>
<b>1000 Hz</b>	<b>C/P/W</b>	<b>20 dB</b>	<b>On/Off</b>	<b>20 dB</b>

Although masking has been selected during the setup procedure, it is still necessary to “switch” it on by pressing Softkey 4, i.e. the default setting for masking is “Off”. Note too that 20 dB is the default intensity.

*Stimulus Types* 2. Under Air are the 3 stimulus types available in this test: C, P and W, which stand for Continuous, Pulsing and Warble. C is underlined meaning that Continuous tone is the default setting.

**Softkey 2**

Pressing Softkey 2 moves the cursor to the next letter enabling the user to select stimulus type.

*Tone Switch*

As stated in section 4.3, parameters such as Frequency, Intensity, Masking (both on/off and intensity), and Stimulus Type are preset to default settings. The status of the Tone Switch also varies from test to test-in Pure Tone Audiometry, it is defaulted to "Off", Normal Mode, i.e. a tone is presented when the Tone Switch is pressed. In Speech Audiometry, the Tone Switch is in Reverse Mode and functions as an interrupter, i.e. a tone is presented continuously unless interrupted.

The default settings are as follows:

Tone Audiometry	Air:	1000 Hz, 20 dB, Masking off, Tone Switch off
	Bone:	1000 Hz, 20 dB, Continuous Tone, HL Lock off, (Audible) Patient Signal on
	FF:	1000 Hz, 20 dB, Tone off, Warble Tone
Speech Audiometry		Reverse on, Air off, 20 dB
Special Tests	SISI:	20 dB, 1000 Hz, 5 dB increments
	Fowler:	1000 Hz, 20 dB
	Stenger:	1000 Hz, 20 dB, Tone Switch off, Continuous Tone
	Rainville:	1000 Hz, 20 dB, Tone Switch off

*5 dB Resolution Default*

**NOTE:** For all tests, attenuator resolution defaults to 5 dB. Please refer to page 26 for information on how to select 1 dB resolution.

## 5. OPERATING IN TEST MODE

In Test Mode, the Midimate 622 behaves similarly to a conventional audiometer with dedicated controls, except for the Softkey functions.

This chapter will describe the operation of the instrument in both pure tone and speech testing as well as describe the controls in detail.

---

### 5.1 FRONT PANEL CONTROL FUNCTIONS

---

In this section the function of each separate operator control is explained. Please refer to the fold-out drawing of the front panel at the back of the manual.

For the purposes of description, the operation functions may be divided into four separate groups:

1. Controls for operating the instrument as a standard audiometer.
2. Controls for patient communication and monitoring.
3. Pushbuttons that together with the display perform the function of conventional potentiometers.
4. Softkeys.

In addition, there are two conventional potentiometers on either side of the rear panel for adjusting the level of the audible patient response signal and for adjusting the contrast of the display.

---

#### 5.1.1 OPERATING CONTROLS

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##### **Hearing Level**

This rotary knob controls the stimulus intensity in 1 or 5 dB steps within the permitted range at any given frequency. Turn to the left to decrease level and to the right to increase level. Level may be read off the lower line in the center of the display.

# 13

This knob may also be used as a potentiometer control during sensitivity adjustments of Input levels.

*Potentiometer*

When "Patient" is selected from the Select Function Menu, this knob displays numerals and symbols for entering the patient's I.D. number.

*Patient I.D.  
Number Entry*

##### **Masking Level**

This rotary knob controls the Masking level in 5 dB steps when masking is selected. Turn to the left to decrease level and to the right to increase level. Level may be read off on the right of the display.

# 6

- Potentiometer* In Left+Right stimulus situations, this knob controls the Right stimulus Hearing Level. It may also be used as a potentiometer control during sensitivity adjustment of input levels.
- Frequency**  
 # 20 This rotary knob controls frequency in pure tone audiometry. Each click of the knob increases or decreases the frequency by one increment (the ranges are listed below).  
 Turn to the left to decrease and to the right to increase frequency. Frequency may be read off the lower line on the left of the display.
- Patient I.D. Number Entry* When "Patient" is selected from the Select Function Menu, this knob is used for selecting numerals and symbols when entering the patient's I.D. number.
- Potentiometer* This knob may also be used as a potentiometer control during sensitivity adjustments of Input levels.  
 Range for Phone and Free Field: 125 - 8000 Hz.  
 Range for Bone Vibrator: 250 - 6000 Hz.
- Tone Switch**  
 # 12 This bar presents stimulus tone via preselected channel or interrupts tone if the audiometer is in Reverse mode (see below). The interrupter bar controls attenuator output.  
 Tone-On indication is displayed on the green stimulus LED to the left of the display.
- Reverse**  
 # 15 This button toggles the Tone Switch between Tone Switch mode and Interrupter mode. Used mainly in speech audiometry to interrupt taped input.
- Left/Right Shift**  
 # 10 Pressing this button while in Test Mode changes the stimulus to the opposite ear, if possible. If masking is selected, this signal will be shifted too.  
 If Left+Right is selected, only the HL settings will be exchanged.
- Change Masked Ear in Bone Conduction Tests* In bone conduction tests with Air masking, pressing this button changes the routing of the masking signal from the right ear to the left ear, and vice versa. A click will be heard each time the masking signal is changed.
- Menu**  
 # 11 This pushbutton returns you to the top of the Selection Tree displaying either the Select User Test Menu or the select Function Menu depending on which "branch" of the Selection tree has previously been selected. Pressing this pushbutton toggles between the two menus.
- MENU** Always press **MENU** to exit Test Mode.

**Extended Range**

This function is primarily for safety purposes. It ensures that the maximum SPL presented to the patient will not exceed approximately 110 dB SPL, unless separately enabled by the operator.

# 9

This button enables presentation of high level intensities. When enabled, the Ext. Range LED on the display panel will light up.

Change of frequency or function automatically disables the extended range.

Preprogrammed tests cannot contain intensity settings beyond the limits defined by the Ext. Range function.

Without the Ext. Range function enabled, the maximum intensities in dB HL for the various transducers are listed below:

Hz	Phone / Insert Phone	Bone	F.F.
125	70	-	80
250	90	45	80
500	100	60	80
750	100	60	80
1000	100	70	80
1500	100	70	80
2000	100	70	80
3000	100	70	80
4000	100	60	80
6000	100	55	80
8000	80	-	80

When the audiometer is busy printing out to an external printer or to ZODIAC 901, the Ext. Range LED on the display panel will flash constantly (not applicable in version 3.2 and higher).

*Ext. Range LED  
Flashes During  
Printout*

## **5.1.2 PATIENT COMMUNICATION & MONITORING CONTROLS**

**Talk Over**

Pressing this button accesses the Talk-Over Mode interrupting the presentation of stimulus and permitting communication with the patient.

# 16

This pushbutton also displays the Talk-Over Level in dB for the purposes of adjustment.

The display will show the level presented to the patient directly in dB HL and this level may be changed by turning any of the rotary knobs.

Adjust the Talk-Over Level so that it is comfortably audible for the patient.

The selected level will be stored, even after the audiometer has been powered off.



The display will show a bar-graph indicating the position of the “Tape 1 Potentiometer” while at the same time the Stimulus LED will function as a VU meter indicating tape signal level.

*Stimulus LED  
as VU Meter*

Turn any of the rotary knobs to change the sensitivity.

Adjust the sensitivity to 0-VU on the Stimulus LED (peak indication may exceed 0-VU occasionally).

The sensitivity level is set electronically thus preventing accidental alteration and it remains as adjusted even after power is switched off.

### **Tape 2 Level**

Tape 2 is an auxiliary masking channel.

# 18

When this button is depressed, Tape 2 input sensitivity can be adjusted for either a tape recorder or a CD player.

The display will show a bar-graph indicating the position of the “Tape 2 Potentiometer” while at the same time the Stimulus LED will function as a VU meter indicating signal level (even though Tape 2 is a masking channel).

*Stimulus LED  
as VU Meter*

Turn any of the rotary knobs to change the signal level.

Adjust the sensitivity to 0-VU on the Stimulus LED (peak indication may exceed 0-VU occasionally).

---

## **5.1.4 SOFTKEYS**

---

The pushbuttons numbered 1 to 5 are designated softkeys because the function of these buttons changes according to the different modes of the instrument as well as the different tests.

*Softkeys*

In the Setup Mode, these pushbuttons select the options shown on the lower line of the display. Please refer to 4. Test Setup for further details.

In the Test Mode, the softkeys control supplementary functions as described on the next page.

### **Softkey 2**

In pure tone audiometry, this button controls the Stimulus signal mode. The mode selected is indicated by the cursor (underscore) on the display just above the pushbutton.

*Pure Tone Test*

The available modes are:

- C = Continuous Tone Signal
- P = Pulsed Tone Signal
- W = Warble Tone Signal

Pressing Softkey 2 while in pure tone testing changes the Stimulus signal mode.

**Softkey 2**

In Free Field pure tone audiometry, Warble is default-selected.

*SISI Test* During the SISI test, this key toggles between 1 & 5 dB intensity modulation.

**Softkey 4**  
In Test Mode, Softkey 4 is used to switch masking on and off. The current mode is indicated by a cursor.

*Patient I.D. Entry*  
**Softkey 5**  
In Setup Mode, Softkey 5 can be used to select Patient (I.D. # entry) from the Select Function Menu.  
Please refer to chapter 13 for further details concerning Patient I.D. entry.

**5.1.5 OPTION SOFTKEY**

**Softkey 3**  
Pressing Softkey 3 while in Test Mode presents the available options for that test currently selected on the display.

**ATTENTION!**  
**NOTE:** If HLL-Off or PTS-Off is displayed, then these optional functions are both **ON** and can be disabled by pressing the appropriate softkey. And vice versa. Remember that the Options Menu is displaying whatever options are available and **NOT** the status of these functions!

The following options exist from the Options Menu (no Power-On Options enabled):

**Options Menu:**  
1.5s On 1 dB Datrf. HLL-Off PTS-On

When the Printer Function has been enabled, Datrf. changes to Store:

**Options Menu:**  
1.5s On 1 dB Store\* HLL-Off PTS-On

When User-programming has been enabled, Store Changes to Progr.

**Options Menu:**  
1.5s On 1 dB Progr.\*\* HLL-Off PTS-On

*Printer Function*  
**Store**  
\*This option is only present when printout has been enabled. (See 10. Power-On Options for details about enabling printout).

*Printer Menu*  
The purpose of this option is to enable the user to store the current threshold for subsequent printout. However, if the softkey is held down for longer than 0.8 seconds, the Printer Menu appears enabling previously stored data to be cleared, viewed or printed out.

*Printer Menu*  
Holding down Softkey 3 accesses the Printer Menu:

**Printer Menu:**  
Clr-L Clr-R View Plot Clr-All



**Clr-L:** Pressing Softkey 1 clears (erases) all data for the left ear (Air, BC, F.F.).

**Softkey 1**

**Clr-R:** Pressing Softkey 2 clears (erases) all data for the right ear (Air, BC, F.F.).

**Softkey 2**

**Clr-All:** Pressing Softkey 3 clears (erases) all data for the both ears (Air, BC, F.F.).

**Softkey 5**

**NOTE! Definition of a new patient I.D. number automatically performs the Clr-All function.**

**Plot:** Pressing Softkey 4 starts audiogram printout (Air, BC, F.F.). Printout format is predefined during setup as a power-on option. Note that the Ext. Range LED lights up during printout to indicate “busy” status.

**Softkey 4**

**View:** The view function shows the thresholds stored for the selected ear and transducer. Press **L/R Shift** to change ear, and use the rotary knob to display all frequencies. To change transducer, the relevant test setup must first be accessed.

**L/R Shift**

Air and bone conduction thresholds are always printed out on the same audiogram (if there is one). Consequently, if separate audiograms are required for air and bone, data must first be printed out and cleared before starting an examination with the new transducer.

*AC & BC  
Thresholds On  
Same Printout*

If an extra printout is required, repeat **PLOT**.

**PLOT**

MIDIMATE 622 has sufficient memory to store Air, Bone and F.F. data for both ears. As specified above, threshold data for both ears may be erased via the Clr-All function, or by entering a new Patient I.D.

*To Clear Memory*

Please refer to chapter 14 for further details about the printout function.

*Printout Function*

**Progr.**

\*\*This option is only present when user-programming has been enabled. (See 10. Power-On Options for details about enabling user-programming.)

*User-Programming*

The purpose of this option is to enable the user to store the current Test Setup as one of the preprogrammed tests.

After setting up the desired test, press the Option Softkey to display the Options Menu and then Softkey 1 (Progr.) to initiate a new display:

**Softkey 1**

<b>Programming User Test !</b>	
<b>Continue</b>	<b>Quit</b>

If Softkey 5 (Quit) is selected, the system reverts to Test Mode.

*Quit*

If Softkey 1 (Continue) is selected, the next display will inquire which test number is to be used for the current test setup.

*Continue*

<b>Select Program No.:</b>				
<b>Test1</b>	<b>Test2</b>	<b>Test3</b>	<b>Test4</b>	<b>Test5</b>

After selecting one of the 5 test numbers, the current test parameters will be saved in the non-volatile memory, replacing any previous test defined under this number. The display will indicate the test has been saved as the selected User Test and the instrument automatically reverts to Test Mode.

All settings including the HL levels, Frequency, Tone Switch/Interrupter mode, etc., may be stored in a non-volatile memory in the audiometer (i.e. they are stored even after the power supply is cut off).

### Data Transfer

#### **Softkey 3**

Access the Options Menu by pressing Softkey 3.

#### *Datrf.*

Pressing Datrf. (data transfer) while in Test Mode saves all measuring parameters in a local buffer. The buffer's contents may be transferred to a PC via the data interface. Please refer to chapter 13 for further details about the data interface.

#### *1.5 Sec Minimum Tone Presentation*

### 1.5s On/1.5s Off

Selecting this option gives a *minimum* 1.5 second stimulus or interrupt when pressing the Tone Switch.

#### *1/5 dB Resolution*

### 1 dB/5 dB Resolution

This option is available at any time in Test Mode.

#### **Softkey 3**

Access the Options Menu by pressing Softkey 3.

#### **Softkey 2**

Softkey 2 toggles between 5 dB and 1 dB attenuator resolution.

#### *Hearing Level Lock*

### HLL-On/HLL-Off

This option is only available when both attenuators are active.

#### **Softkey 3**

Access the Options Menu by pressing Softkey 3.

#### **Softkey 4**

Pressing Softkey 4 in the Options Menu toggles the Hearing Level Lock.

Turning the HL knob while the lock is on will change the Hearing Level in both channels maintaining the required interval between stimulus and masking levels. The level will continue to change in this way until one of the channels reaches the upper or lower limit, whichever is relevant.

The Masking Level control may be used to change the interlock interval.

#### *Patient Signal*

### PTS-On/PTS-Off

Pressing Softkey 5 while in the Options Menu will toggle the audible patient response signal in the monitor phone from on to off and vice versa.



The level of the audible patient response signal may be adjusted by a potentiometer located on the rear panel of the instrument and labelled Pt.

#### **MENU**

The display returns automatically to Test Mode after approximately 5 seconds. Press **MENU** to exit immediately.

---

## 5.2 PURE TONE TESTING

---

This section gives a short description of how to operate the MIDIMATE 622 Diagnostic Audiometer for both air and bone conduction and free-field threshold measurements using pure tones.

For a more comprehensive treatment of this subject, please refer to 6. PURE TONE AUDIOMETRY.

---

### 5.2.1 AIR CONDUCTION THRESHOLD MEASUREMENTS

---

1. Plug the headphones, patient microphone, patient response signal and monitor headset (or Talk-Over microphone) into their respective connectors on the rear panel (see Figure 1 on page 4).
2. Connect the MIDIMATE 622 to the mains.
3. Switch on the instrument by pressing the power switch on the right side panel.
4. After the power-up test has been completed, the audiometer will automatically access User Test 1. Proceed with this preprogrammed test or press **MENU** to access any other User Test or press **MENU** again to access the Select Function Menu and set up your own test as described in 4. Test Setup.

**MENU**

Ensure that Air has been selected as Output. Threshold testing normally commences at 1000 Hz in the better ear and continues with the higher frequencies.

*Air Output*

5. Place the patient in sound cabin, if available. Ensure that the patient is facing away from the audiometer.
6. Instruct the patient in usage of Patient Response Handswitch and/or microphone and fit headphones ensuring that the red phone is on the right ear.
7. Proceed with test starting with the better ear.
8. If the difference between the two ears is greater than 40-60 dB, repeat the test using masking. Softkey 4 toggles masking on/off.

**Softkey 4**

---

### 5.2.2 BONE CONDUCTION THRESHOLD MEASUREMENTS

---

1. Plug the headphones, patient microphone, patient response signal, bone conductor, insert phone and monitor headset (or Talk-Over microphone) into their respective connectors on the rear panel.
2. Connect the MIDIMATE 622 to the mains.
3. Switch on the instrument by pressing the power switch on the right side panel.

**MENU**

4. After the power-up test has been completed, the audiometer will automatically access User Test 1. Proceed with this preprogrammed test or press **MENU** to access any other User Test or press **MENU** again to access the Select Function Menu and set up your own test as described in 4. Test Setup.

*Bone Output*

Ensure that Bone has been selected as Output. Threshold testing normally commences at 1000 Hz in the better ear and continues with the higher frequencies. It is essential that masking be used in bone conduction tests (refer to 6.4 and 6.5).

*Masking Required*

5. Place the patient in sound cabin, if available. Ensure that the patient is facing away from the audiometer.
6. Instruct the patient in usage of Patient Response Handswitch and/or microphone and fit headphones ensuring that the red phone (right) covers the ear to be masked. The other earphone is placed on the temple region to leave the test ear uncovered.
7. Fit the bone conductor to the mastoid arranging the headband so that it does not come into contact with the headset.
8. Proceed with test (refer to 6.4 to 6.6 for further details).

*Insert Phone*

**NOTE:** In cases where the masking intensity required in one ear is very high and, therefore, it is impossible to make an accurate threshold measurement for bone conduction in the other ear, an insert phone is recommended. An insert phone produces less bone conduction than a normal TDH 39 phone. Please refer to section 6.6 for further details.

---

### 5.2.3 FREE-FIELD PURE TONE TESTING

---

Free-field pure tone audiometry is primarily used when testing children owing to their dislike of wearing headphones.

1. To perform a threshold test in free field, connect the optional power amplifiers and loudspeakers to the left and right channel connectors on the rear panel of the instrument. Set up the loudspeakers in the sound cabin with the left and right channels facing correctly.
2. Connect the MIDIMATE 622 to the mains.
3. Switch on the instrument by pressing the power switch on the right side panel.
4. After the power-up test has been completed, the audiometer will automatically invoke User Test 1. Proceed with a preprogrammed test if you have one for free field or press **MENU** again to access the Select Function Menu and set up your own test as described in 4. Test Setup.

Select F.F. for output and then select ear:

*Select F.F.*

<b>(Tone)</b>	<b>Output ? :</b>
<b>Air</b>	<b>Bone F.F.</b>

Choosing F.F. in pure tone audiometry automatically selects warble tone as the stimulus signal.

*Warble Tone  
Stimulus*

5. Place the patient in the sound cabin facing away from the audiometer and ensure that the left and right speakers are facing the corresponding ears. If no sound cabin is available, ensure that there is a minimum of ambient noise otherwise this form of testing is of no value.
6. Instruct the patient in usage of Patient Response Handswitch and/or microphone.
7. Proceed with test (refer to 6.7 for further details).

---

## 5.3 SPEECH TESTING

---

This section gives a short description of how to operate the MIDIMATE 622 Diagnostic Audiometer for speech tests.

Either live voice or prerecorded speech from a tape recorder or CD player may be employed for speech audiometry using one or both channels.

*Live Voice or  
Tape/CD Input*

The audiometer has connections for both microphone or tape/CD enabling you to read out loud or play back word lists for threshold and discrimination determination.

*Word Lists*

Live voice investigations should only be carried out with the patient in a sound cabin since the patient must not hear the Audiologist's voice directly.

*Sound Cabin  
Required*

For a more comprehensive treatment of this subject, please refer to 7. SPEECH AUDIOMETRY.

**NOTE:** Selecting Speech automatically puts the Tone Switch in Reverse mode (Interrupter).

*Interrupter Mode*

---

### 5.3.1 INTRODUCTION TO SPEECH AUDIOMETRY

---

A great many combinations of test parameters are available in speech audiometry as the following outputs are available:

<b>(Speech) Output ? :</b>
<b>Air      Bone      F.F.</b>

and the following inputs:

<b>(Speech, Bone) Input ?:</b>
<b>Tape (CD)      Micr.</b>

and the possibility of either ipsilateral or contralateral masking with White Noise, Speech Noise or external noise. If Bone or F.F. is selected, then masking via insert phone is also available.

---

### 5.3.2 SPEECH AUDIOMETRY WITH LIVE VOICE SIGNAL

---

With a live voice signal it is possible to perform either threshold measurements or discrimination tests and to present the stimuli via Air, Bone or Free Field. Please refer to sections 7.1 and 7.2 for details concerning threshold measurements and discrimination testing in speech audiometry.

1. Plug the headphones, patient microphone, patient response signal, bone conductor and monitor headset (or Talk-Over microphone) into their respective connectors on the rear panel.
2. Connect the MIDIMATE 622 to the mains.
3. Switch on the instrument by pressing the power switch on the right side panel.
4. After the power-up test has been completed, the audiometer will automatically access User Test 1. Proceed with this preprogrammed test if suitable or press **MENU** to access any other suitable User Test or press **MENU** again to access the Select Function Menu and set up your own test as described in 4. Test Setup.

Output may be Air, Bone or even Free Field but **Micr.** must always be selected as input.

#### **MICROPHONE**

5. Adjust microphone level by reading from the word list while at the same time pressing the **MICROPHONE** pushbutton and turning one of the rotary knobs so that the stimulus level on the Stimulus LED deflects up to 0 VU. See 5.1.3 on page 20 for detailed description.

6. Place the patient in sound cabin facing away from the audiometer.

#### **L/R SHIFT**

7. Instruct the patient to repeat the words he hears and test each ear in turn (using **L/R Shift**).

Refer to section 7.3 for further details on live voice testing.

---

### 5.3.3 SPEECH AUDIOMETRY WITH PRERECORDED SIGNAL

---

With a prerecorded signal it is possible to perform either threshold measurements or discrimination tests and to present the stimuli via Air, Bone or Free Field. Please refer to sections 7.1 and 7.2 for details concerning threshold measurements and discrimination testing in speech audiometry.

1. Plug the headphones, patient microphone, patient response signal, bone conductor and monitor headset (or Talk-Over microphone) into their respective connectors on the rear panel.
2. Connect the tape recorder or CD player to the socket marked Tape 1 on the rear panel. If masking with a prerecorded signal is to be used, connect the signal to the socket marked Tape 2.
3. Connect the MIDIMATE 622 to the mains.

4. Switch on the instrument.
5. After the power-up test has been completed, the audiometer will automatically access User Test 1. Proceed with this preprogrammed test if suitable or press **MENU** to access any other suitable User Test or press **MENU** again to access the Select Function Menu and set up your own test as described in 4. Test Setup. Output may be Air, Bone or even Free Field but **Tape (CD)** must always be selected as input.
6. Start playback unit with calibration signal and adjust input level by pressing the appropriate **TAPE** pushbutton and turning one of the rotary knobs so that the stimulus level on the Stimulus LED deflects to 0 VU. See 5.1.3 on pages 22 and 23 for a more detailed description.
7. Place the patient in sound cabin facing away from the audiometer.
8. Instruct the patient to repeat the words he hears and test each ear in turn (using **L/R Shift**).

**MENU****TAPE 1/2****L/R SHIFT**

Refer to section 7.4 for further details on testing with prerecorded signals.

---

### 5.3.4 FREE-FIELD SPEECH AUDIOMETRY

---

Free-field testing is often employed in speech audiometry when testing children as many children dislike wearing headphones. Testing for threshold or speech discrimination is as described above for live voice and tape/CD except for the following:

- A pair of (optional) power amplifiers and loudspeakers must be connected to the sockets marked FF Left and Right on the rear panel and set up in the sound cabin so that the stimulus channel faces the left ear and the masking channel faces the right.
- F.F. must be selected as output from the following display:

<b>(Speech) Output ? :</b> Air      Bone      F.F.
---

Please refer to section 7.6 for further details on free-field testing in speech audiometry.

---

## 5.4 SPECIAL TESTS

---

The MIDIMATE 622 Diagnostic Audiometer is capable of performing the following special tests:

- Short Increment Sensitivity Index (S.I.S.I Test)
- Fowler's Alternate Binaural Loudness Balance Test
- Stenger Test



- Rainville Test

The first three tests use air conduction as output, so set up the audiometer and arrange the patient as previously described in 5.2.1 on page 23. For Rainville, set up as described in 5.2.2 on pages 24 and 30.

**SOFTKEY 3**

All four tests are accessed from the Select Function Menu. Press Softkey 3 to access the following menu:

<b>Select Special Test:</b> <b>SISI    Fowler    Stenger    Rainv.</b>
---

Select test. Only the S.I.S.I requires further selection (Stimulus side) while selecting any of the other tests accesses the test setup required automatically and enables you to start testing immediately.

---

### 5.4.1 S.I.S.I. TEST

---

1. Select SISI and the following is displayed:

<b>(Special, SISI, Air) Stimulus side ? :</b>  <b>Left    Right</b>
---

2. Select Left as ear to be tested first and the following screen appears:

<b>Freq.    SISI (A) L:Tone    Score: 0( %)</b> <b>1000 Hz    1-5dB    20 dB    Pres.: 0 Stop</b>
--

*HL 20 dB Over  
Threshold*

3. HL intensity is default set at 20 dB but should be set at 20 dB over the patient's threshold for frequency to be tested (normally starting at 1000 Hz).

4. Explain to the patient that he will hear a continuous tone and that the intensity will be increased for a very short time (200 ms) once every fifth second. Ask the patient to press the patient signal each time he hears a change in the stimulus tone.

**TONE**

5. To demonstrate, set the Hearing Level at an intensity that can easily be heard, ensure that the modulation increment is set at the default 5 dB and press the **TONE SWITCH** to initiate the test.

**ATTENTION!**

**NOTE:** The 5 dB modulation increment is for demonstration purposes only as it should be easy for the patient to perceive the intensity changes - neither presentation nor score counter is activated when 5 dB is selected. The S.I.S.I. Test itself should always be conducted with 1 dB modulation!!

**SOFTKEY 5**

6. After the patient has been instructed and has practiced sufficiently, stop the test by pressing Softkey 5.

**SOFTKEY 1**

7. Reset by pressing Softkey 1.



8. Press Softkey 2 to change modulation increment to 1 dB and initiate test by pressing Tone Switch again.

**SOFTKEY 2**

The MIDIMATE 622 will now automatically count the number of presentations to the patient and stop after 20 presentations. The counter after "Pres." indicates the number of presentations while the counter after "Score" indicates each time the patient presses the patient response button correctly. Score as a percentage of presentations is also displayed in parentheses.

*Modulation  
Increment Cannot  
Be Heard In Monitor  
Headset!*

9. Press Softkey 5 to interrupt the test. You may then choose whether to reset or continue the test.

**SOFTKEY 5**

10. Press **MENU** to exit the S.I.S.I. Test and return to the Select Function Menu. Please refer to section 8.1 for further details on this test.

**MENU**

**NOTE** that any alteration to either HL or Frequency will reset the test with the result that the Tone Switch must be pressed again to restart!

*Press Tone Switch  
to Restart*

---

#### 5.4.2 FOWLER' S TEST

---

1. Select Fowler from the Select Special Test Menu and the following display appears (Special, Fowler, Air, L + R, No Mask):

**SOFTKEY 2**

Freq.	Air	L:Tone	Air	R:Tone
1000 Hz	ABLB	20 dB	ABLB	20 dB

2. Ensure that the patient is wearing the headphones correctly, i.e. with the red phone on the right ear.

3. Press Tone Switch to initiate the alternating presentation sequence.

**TONE**

4. Press **MENU** to exit.

**MENU**

Please refer to section 8.2 for further details on this test.

---

#### 5.4.3 STENGER TEST

---

1. Select Stenger from the Select Special Test Menu and the following display appears (Special, Stenger, Air, L + R, No Mask):

**SOFTKEY 3**

Freq.	Air	L:Tone	Air	R:Tone
1000 Hz	C/P/W	20 dB		20 dB

2. Ensure that the patient is wearing the headphones correctly, i.e. with the red phone on the right ear.

3. Set HL for the better ear at a level 10 dB above threshold and 10 dB below threshold for the poorer ear.

*Hearing Level*

**TONE**

4. Press Tone Switch to initiate test and pure tones will be introduced simultaneously to both ears.

**MENU**

5. Press **MENU** to exit.

Please refer to section 8.3 for further details on this test.

---

#### 5.4.4 RAINVILLE TEST

---

The Rainville Test is used to determine the bone conduction threshold for one ear without testing the other ear.

1. Follow steps 1-3 and 5 as described in 5.2.2 on page 24.

**SOFTKEY 4**

2. To invoke this test, access the Select Special Test menu and press Softkey 4. This setup routes pure tone signal in the stimulus channel to the right earphone, and selects narrow-band noise to the bone conductor in the masking channel. The following display appears:

Freq.	Air	R:Tone	Bone	NBN
1000 Hz	C/P/W	20 dB	On/Off	20 dB

3. Place the right earphone on the ear to be tested and the bone conductor on the mastoid bone behind the ear.

**TONE**

4. Adjust HL to desired level and press Tone Switch to initiate test.

**MENU**

5. Press **MENU** to exit the Rainville Test and return to the Select Function Menu.

Please refer to section 8.4 for further details on the Rainville Test.

## 6. PURE TONE AUDIOMETRY

### 6.1 AIR CONDUCTION THRESHOLD MEASUREMENTS

Pure tones for threshold measurements are selected by the frequency switch, the digital display showing the frequency selected. In addition, the following functions are available via the softkeys:

- Continuous, Pulsing and Warble Tones (Softkey 2)
- Masking On/Off (Softkey 4)
- Via Options Menu (Softkey 3):
  - 1.5 second minimum tone presentation (Softkey 1)
  - 1 dB / 5 dB Resolution (Softkey 2)
  - Data Transfer or Printout (Softkey 3)
  - HL Lock On/Off (Softkey 4)
  - Audible Patient Response Signal On/Off (Softkey 5) .

The test normally starts at 1000 Hz in the better ear and continues with the higher frequencies. Then the test is continued on 750-500-250 and 125 Hz. The same is repeated for the opposite ear. If the difference between the two ears is more than 55-60 dB, the test should be repeated using masking.

### 6.2 THE NEED FOR MASKING

The need for masking in air conduction tests may be explained as follows:

In addition to providing air conducted sound to the outer ear canal, the moving-coil earphone also presents a vibrating mass in contact with the head. The earphone behaves like a bone vibrator and will conduct sound through the skull.

If the air conduction intensity in the earphone is 40-60 dB, it may be expected that the earphone will also convey bone-conducted sound to the skull at a level corresponding to approximately 0 dB. In relation to the two ears, the attenuation or loss through the skull is negligible (only 2-3 dB). In certain circumstances, therefore, the patient may respond to a pure tone signal applied by the earphone to one ear whereas it is actually being heard in the opposite ear by bone conduction. The application of masking as described ensures that the untested ear is not confused with the tested ear. On the assumption that the nature of the patient's hearing loss is unknown, the masking routine is essential.

### 6.3 AIR CONDUCTION THRESHOLD MEASUREMENTS WITH MASKING

To enable Masking, select the following from the Select Function Menu: Tone, Air, Left and the following display will appear:

<b>(Tone, Air, Left) Masking ?:</b>			
<b>No Mask</b>	<b>Air</b>	<b>Ipsi</b>	<b>Bin.S+M</b>

From this display you can select three different routings for masking:

1. Air: This selection permits contralateral masking with Narrow-Band Noise at a default level of 20 dB in the selected ear. Narrow-Band Noise is automatically selected since it is the only valid masking source in pure tone audiometry:

<b>Freq.</b>	<b>Air</b>	<b>L:Tone</b>	<b>Air</b>	<b>R:NBN</b>
<b>1000 Hz</b>	<b>C/P/W</b>	<b>20 dB</b>	<b>On/Off</b>	<b>20 dB</b>

2. Ipsi: This selection mixes Narrow-Band Noise masking together with the stimulus signal in the selected ear (default intensity 20 dB). Notice the arrow to the left of NBN indicating that the masking signal is mixed with "Tone" in the left earphone:

<b>Freq.</b>	<b>Air</b>	<b>L:Tone</b>	<b>←:NBN</b>
<b>1000 Hz</b>	<b>C/P/W</b>	<b>20 dB</b>	<b>On/Off 20 dB</b>

3. Bin.S+M: This selection permits simultaneous presentation of stimulus and masking binaurally. The output levels for stimulus and masking can be adjusted independently, but the levels in each earphone are equal. As can be seen from the following display, Narrow-Band Noise is again automatically selected:

<b>Freq.</b>	<b>Air</b>	<b>_:Tone</b>	<b>←:NBN</b>
<b>1000 Hz</b>	<b>C/P/W</b>	<b>20 dB</b>	<b>On/Off 20 dB</b>

#### **Softkey 4**

For all masking methods, turn on Masking using Softkey 4.

For contralateral Masking, follow the following procedure:

Find the threshold for N.B. Noise by means of Masking Level knob. When threshold has been found, set Masking Level to a value 15 dB higher than the threshold. Without masking, re-establish the threshold for the pure tone. Turn on masking again. Repeat the presentation of the tone at the level found to be the threshold. If the patient can hear the tone with the masking on, this is his true threshold. If the patient is unable to hear the tone, increase the stimulus level in channel 1 for the pure tone in 5 dB steps until the tone can be heard, by means of the HL knob.

Next increase masking intensity by 5 dB, and again present the tone. If the tone cannot be heard, increase tone intensity until the tone can be heard. Continue in this fashion until an increase of masking intensity does not have any influence on the threshold for the pure tone. When this occurs the true threshold for the pure tone has been determined.

## **6.4 BONE CONDUCTION TESTS**



### **WARNING!**

The bone conductor cable is not to be removed or tampered with while it is connected to the MIDIMATE 622. Either disconnect the bone conductor entirely from the instrument, or ensure that the instrument itself is disconnected from the mains.

Bone conduction tests must be carried out under quiet conditions. Measurements made under noisy conditions will result in elevated threshold and inaccurate audiograms. This is especially true when testing the lower frequencies because of low frequency noise from the building or from air conditioning and so on. In bone conduction tests, masking is an absolute necessity independent of the hearing loss. The attenuation through the skull from one ear to the other is only a few decibels. Therefore, there is a great risk that one will get a response from the opposite ear if masking is not used.

**NOTE:** Contralateral, Ipsilateral and Insert Phone are all available masking sources in Bone Conduction tests.

## 6.5 BONE CONDUCTION USING MASKING AND A NORMAL HEADSET

First fit the headset so that the earphone covers the ear to be masked. Use L/R Shift to select the masking output required. The other earphone is placed on the temple region to leave the tested ear uncovered. This is an essential arrangement for accurate measurements. Then fit the bone vibrator to the mastoid, and arrange the headband so that it does not come into contact with the headset.

From the Select Function Menu, select the following setup: Tone, Bone, Air. The following display will appear:

<b>Freq.</b>	<b>Bone</b>	<b>Tone</b>	<b>Air</b>	<b>R:NBN</b>
<b>1000 Hz</b>	<b>C/P/W</b>	<b>20 dB</b>	<b>On/Off</b>	<b>20 dB</b>

Ascertain the most sensitive area of contact by probing the mastoid area with the bone vibrator. For this purpose, the level of pure tone should be about 10-20 dB above threshold. Thereafter, the bone vibrator should not be moved until the measurement is completed. Commence the test in the best ear. Set hearing level control to an intensity 15 dB higher than the previously determined air conduction threshold for the particular frequency. Then find the threshold for bone without masking.

When the threshold has been found, apply masking (Softkey 4).

**Softkey 4**

Then check and see if the threshold for bone conduction is still the same. If it is, the real bone conduction threshold has been found. If the patient does not hear the tone in the bone vibrator with masking in the opposite ear, the intensity in the bone vibrator is increased by 5 dB at a time until the tone can again be heard. When this new threshold, with masking, has been found, increase masking by 5 dB. Check again and see if the tone now can be heard from the bone vibrator. If the tone still cannot be heard, the intensity is again increased in the bone vibrator until the tone can be heard. Then the masking signal is again increased 5 dB and one continues in this manner until the increase of the masking intensity does not give any change in bone conduction threshold. The threshold for bone conduction can then be read on the display.

When the threshold for the good ear has been found for the frequencies in question, change bone vibrator and headphone to opposite ears and proceed to test as described for the better ear. In the course of measurement, quite high masking intensities may be reached. In case of doubt as to the validity of measurement, do not hesitate to re-check by re-commencing at the initial masking level.

## 6.6 BONE CONDUCTION AUDIOMETRY WITH MASKING/INSERT PHONE

As stated above, one gets a certain bone conduction effect from a normal receiver caused by vibration. This is especially true for the lower frequencies. In cases of a big difference of hearing loss in the two ears where one has to use high masking intensities, one can get false masking.

As mentioned previously, the receiver will produce a bone conduction effect with an intensity of approximately 40-60 dB below the air conduction effect. If, for example, one has a left ear with air conduction loss of 80 dB and a right ear with air conduction threshold at 20 dB at a specific frequency, and one wants to test the bone conduction threshold on the right ear, the masking intensity needed in the left ear would be 80 plus 15, equals 95 dB. This intensity will produce a bone conduction signal of approximately 35 dB in the right ear, and therefore a threshold measurement for bone conduction is impossible.

### *Insert Masking*

In cases like this it is necessary to use insert masking. The insert receiver produces less bone conduction than a normal TDH 39 receiver. The bone conduction from an insert receiver is about 90-100 dB below the air conduction level. In the described case, the insert will only produce about 0 dB in the right ear, and one will therefore be able to make a valid bone conduction test.

## 6.7 FREE-FIELD PURE TONE AUDIOMETRY

From the Select Function Menu, select: Tone, FF, Left, FF.

The following will be displayed:

Freq.	F.F.	L:Tone	F.F.	R:NBN
1000 Hz	C/P/W	20 dB	On/Off	20 dB

### *Default Warble Tone*

When free-field output is selected in pure tone audiometry, the tone mode is automatically set to warble tone ( $\pm 5\%$  frequency modulation). This reduces the effects of standing waves in the test chamber.

### **Softkey 4**

Alternatively, narrow-band noise may be used as a stimulus source by turning on the masking to the secondary channel (press Softkey 4 to activate this channel). However, when using narrow-band noise as stimulus, remember that this signal is calibrated to effective masking level, i.e. normally 3-6 dB higher than threshold.

Both the distance from the loudspeaker to the patient and the absorption of the sound room are very critical.

Free-field pure tone audiometry is essentially used when testing children.

**NOTE:** Contralateral, Ipsilateral and Insert are all available masking sources in Free-Field tests.

## 7. SPEECH AUDIOMETRY

Either live voice or speech from tape or CD can be used for speech audiometry and both measurements can be performed using the MIDIMATE 622. The audiometer has connections for microphone for live voice or tape recorder (or CD player), from which you can play back word lists for threshold and discrimination determination. The auxiliary tape channel (Tape 2) may be used for recorded masking.

Note that only recorded speech materials with a stated relationship with a calibration signal should be used.

---

### 7.1 SPEECH RECEPTION THRESHOLD

---

This threshold may be defined as the lowest SPL at which 50% or more of the spondaic test words are repeated correctly. Spondees are words of two syllables having equal stress, e.g. shotgun, airplane, workshop, etc.

*Spondees*

Threshold word lists are used for this test. Each ear is tested separately and the patient is requested to repeat the word he hears one at a time.

*Threshold  
Word Lists*

It is recommended to begin with the better ear, at 1000 Hz and with the hearing level set at approximately 20 dB above the threshold at 1000 Hz. The audiologist then begins to repeat the words reducing the intensity in 5 dB steps until the patient is only able to repeat about half the words.

In order to obtain an exact result, a complete word list must be presented to the patient (approximately 20 words). Under normal circumstances, it is possible after the presentation of only a few words to find the threshold and use the rest of the list is used for verifying the result. A descending, ascending and then descending again technique has been recommended for both recorded and live voice procedures (Norma T. Hopkinson).

This test may be performed using either live voice or recorded speech. In either case, it is of utmost importance that the patient be adequately instructed.

---

### 7.2 DISCRIMINATION TESTING

---

For this test, use word lists with phonetically balanced words. Each ear is tested separately and the patient is requested to repeat the words he hears. Using the discrimination test you investigate the patient's ability to discriminate speech at different intensities. In normal ears, the perception is 100% if the words are presented at a proper intensity. For certain types of hearing loss, the patient only perceives about 40 to 50% of the presented words, no matter what intensity is used.



*Discrimination Percentage*

Furthermore, you will find certain cases where the discrimination percentage is less when a certain intensity is exceeded. The discrimination percentages at different intensities are normally entered on a special speech audiogram which graphically shows the ratio between the intensity and the discrimination percentage.

Set hearing level so that the patient just hears the words above threshold level, thereafter present the complete word lists and observe the discrimination percentage. Increase the intensity 10 dB and present the new word lists and observe again the discrimination percentage. Continue in this way until the maximum intensity of the audiometer is reached. If the patient feels uncomfortable when presented with the higher intensity, the measurements will probably have to stop at an intensity lower than the maximum. By entering the results in the audiogram form you can read which intensities give the greatest discrimination percentage. The discrimination percentage can also be expressed as discrimination loss. This is simply the difference between maximum possible discrimination percentage of 100 and the discrimination found. For example, if the patient has discrimination percentage of about 75, he is said to have a discrimination loss of  $100 - 75 = 25\%$ .

---

### 7.3 SPEECH AUDIOMETRY WITH LIVE VOICE

---

Live voice examinations can only be carried out when the audiometer is used in connection with a sound room, so that the patient cannot hear the Audiologist's voice directly. With Audiologist and patient in the same room, especially in examinations of patients with normal or almost normal hearing, false results would be obtained.

Using a tape recorder to present word lists gives the advantage of always presenting the same program for the patient, even if there is a short or longer interval of time between the examinations. If live voice is used, there is the risk that it is not the same investigator each time and this can influence the results. However, the standardization of recorded tests has the disadvantage of lacking the flexibility of live voice testing, which enables the Audiologist to better fit the test to the patient's individual needs.

If a sound room is not used, varying background noise levels can also influence the results greatly. Speech audiometry, however, can be carried out if you have a comparatively quiet room and the audiometer is equipped with ME 70 noise-excluding headset. Either one or both channels can be used for speech audiometry.

---

#### 7.3.1 LIVE VOICE THRESHOLD MEASUREMENTS

---

Select the following setup: Speech, Air, Left, Micr., No Mask.

This gives the following display:

-Speech-	Air	L:Micr
-Test-		20 dB



Before commencing the test, adjust Microphone Level. Put on the monitor headset or place the microphone approximately 20 cm from your mouth, and read from the word list. At the same time adjust Microphone Level so that channel 1 VU meter gives peak deflection to 0 VU. The Microphone Level is adjusted by pressing the microphone pushbutton to display the VU meter and simultaneously turning one of the rotary knobs. The intensity of the speech presented to the patient can now be read on the stimulus LED. The intensities shown are dB re normal threshold. During the test the operator should speak with the same intensity and keep the same distance from the microphone in order to maintain deflections on the VU meter at zero.

Use a word list intended for threshold measurements. Test each ear in turn (use the L/R Shift pushbutton) and ask the patient to repeat the words he hears. Set stimulus Hearing Level so that the patient can just repeat the words with certainty. Then reduce intensity in 5 dB steps using Hearing Level until the patient can only repeat 50% of the presented words. Then read the hearing loss on the digital read out. In order to assure as valid a measurement as possible, 20 words should be presented to the patient. Under normal conditions the threshold can be found by using a few words and the rest are only used to confirm the test.

---

### 7.3.2 LIVE VOICE DISCRIMINATION TEST

---

Select the following setup:

Speech, Air, Left, Micr., No Mask.

This results in the following display:

<b>-Speech-</b>	<b>Air</b>	<b>L: Micr</b>
<b>-Test-</b>		<b>20 dB</b>

Before commencing the test, adjust Microphone Level. Put on the monitor headset or place the microphone approximately 20 cm from your mouth, and read from the word list. At the same time adjust Microphone Level so that channel 1 VU meter gives peak deflection to 0 VU. The Microphone Level is adjusted by pressing the microphone pushbutton to display the VU meter and then turning one of the rotary knobs. The intensity of the speech presented to the patient can now be read on the stimulus LED. The intensities shown are dB re normal threshold. During the test the operator should speak with the same intensity and keep the same distance from the microphone in order to maintain deflections on VU meter at zero.

*Adjust  
Microphone Level*

For this test, use word lists with phonetically balanced words. Each ear is tested in turn (use the L/R Shift pushbutton) and the patient is asked to repeat the words he hears.

The intensity is normally set at a level of 40 dB above the patient's threshold. Patients with normal hearing will be able to repeat 100% of the presented words. In some cases of hearing loss, the discrimination is only 40-50% or less, independent of intensity. There are cases where increase in intensity above a certain level gives a poorer discrimination.

## 7.4 SPEECH AUDIOMETRY WITH TAPE RECORDER OR CD INPUT

The procedure for speech audiometry with tapes is the same as that described for live voice examinations. For these examinations, tapes with recorded word lists for threshold determination as well as for discrimination determinations are available.

Note that only recorded speech materials with a stated relationship with a calibration signal should be used.

The tape recorder is connected to the socket marked "Tape 1". For thorough examinations, special noise, theatre noise, cocktail party noise and so on may be required. In addition, a stereo tape recorder can be connected to Tape 1 and 2 so that the stereo recording can be played back correctly with the correct intensities, as the intensity can be controlled for each ear separately.

It is very essential that the talk-back system is one of really good quality with little distortion, or the patient may show discrimination loss just because the repetition of the words lists cannot be heard clearly. The patient's microphone should also be of a really good quality and uni-directional. It should be placed very close to the patient. This is especially true when working with great intensities in free field.

### 7.4.1 RECORDED WORD LISTS (THRESHOLD)

Select the following setup sequence:

Speech, Air, Left, Tape, No Mask.

The following display appears:

<b>-Speech-</b>	<b>Air</b>	<b>L:Tape</b>
<b>-Test-</b>		<b>20 dB</b>

Start playback unit and make sure the VU meter gives deflection to 0 VU. If necessary, adjust Tape 1 level by pressing Tape 1 to display the VU meter and then turning one of the rotary knobs. The HTL level can then be read directly on the display.

Use a word list intended for threshold measurements. Test each ear in turn and ask the patient to repeat the words he hears. Set stimulus Hearing Level so that the patient can just repeat the words with certainty.

Next, reduce intensity in 5 dB steps using Hearing Level until the patient can only repeat 50% of the presented words. Then read the hearing loss on the display. In order to assure as valid a measurement as possible, 20 words should be presented to the patient. Under normal conditions the threshold can be found by using a few words and the rest are only used to confirm the test.

---

## 7.4.2 RECORDED WORD LISTS (DISCRIMINATION TEST)

---

Select the following setup:

Speech, Air, Left, Tape, No Mask.

The following display appears:

<b>-Speech-</b>	<b>Air</b>	<b>L:Tape</b>
<b>-Test-</b>		<b>20 dB</b>

Start playback unit and make sure the VU meter gives deflection to 0 VU. If necessary, adjust Tape 1 level by pressing Tape 1 to display the VU meter and then turning one of the rotary knobs. The HTL level can then be read directly on display.

For this test use word lists with phonetically balanced words. Each ear is tested in turn and the patient is asked to repeat the words he hears. The intensity is normally set at a level of 40 dB above the patient's threshold. Patients with normal hearing will be able to repeat 100% of the presented words. In some cases of hearing loss, the discrimination is only 40-50% or less, independent of intensity. There are cases where increase in intensity above a certain level gives a poorer discrimination.

---

## 7.5 SPEECH AUDIOMETRY AND MASKING

---

Masking is very important in speech audiometry as there is still the risk of response from the ear not being tested. In word discrimination testing, this danger is greater than in pure tone audiometry since the signal is presented to the test ear at a suprathreshold level. "Masking must be used whenever the presentation level for this suprathreshold task, minus the interaural attenuation, exceeds the bone conduction thresholds of the nontest ear" (Jean H. Lovrinic, in *Audiology for the Physician*, 1980).

Speech noise is generally recommended as the masking noise of choice but white noise is also favored by many-narrow-band noise, while used extensively in pure tone audiometry, is too narrow in frequency response for use in speech audiometry. Speech noise is actually white noise filtered to a low and middle frequency spectrum.

For speech audiometry, the Midimate 622 enables masking to be employed together with Air, Bone and F.F. outputs. Contralateral, ipsilateral and binaural routings are available just as in pure tone audiometry, and white noise, speech noise or external (Ext) may be selected. The External choice enables any type of prerecorded masking to be used via the Tape/CD input.

To select masking for speech audiometry, select the following setup from the Select Function Menu:

Speech, Air, Left, Micr., Air.

The following appears on the display:

<b>( Speech, Air, Left, Micr, Mask : Air,) Masking</b>				
<b>No Mask</b>	<b>WN</b>	<b>SN</b>	<b>Ext</b>	

From this display, you can select the required masking noise and (if speech noise is chosen) the following is displayed:

<b>-Speech-</b>	<b>Air</b>	<b>L: Micr</b>	<b>Air</b>	<b>R: SN</b>
<b>-Test-</b>		<b>20 dB</b>	<b>On/Off</b>	<b>20 dB</b>

**Softkey 4**

Press Softkey 4 to enable masking.

## 7.6 FREE-FIELD SPEECH AUDIOMETRY

The MIDIMATE 622 is designed so that it can be used for free-field speech audiometry in combination with suitable power amplifiers and loudspeakers. Different types of amplifiers may be used depending on the maximum intensity level required in the free field. These intensities can vary from 80-100 dB above threshold, corresponding to 100-120 dB sound pressure level.

Both distance from the loudspeaker to the patient and the degree of absorption of the sound room are very critical factors. Power free-field amplifier/loudspeaker units are specially designed to meet these requirements.

To select speech audiometry for free field, select the following setup from the Select Function Menu:

Speech, F.F., Left, Tape, No Mask

The following appears on the display:

-Speech-	F.F.	L:Tape
-Test-		20 dB

This setup selects Tape signal as input to the Left amplifier and disables the masking channel.

Alternatively, masking may be selected-the signal may be either white noise or speech noise or external, i.e. the masking signal may be selected from the Tape 2 input.

Pressing **L/R SHIFT** interchanges the signal to the loudspeakers in the same way as it shifts the signal between the earphones.

**L/R SHIFT**

The Tape 2 signal may be adjusted by pressing the Tape 2 pushbutton and turning one of the rotary knobs simultaneously. In this case, the Stimulus LED functions as a VU meter for the *masking* signal and the sensitivity of the Tape 2 signal may be adjusted until it deflects to zero.

When the Tape 2 pushbutton is released, the VU meter once again monitors the stimulus signal.

Free-field speech audiometry is especially used for fitting hearing aids, particularly for the perceptive type hearing loss where the hearing aid's frequency response, and setting of the AVC, is of great importance in order to obtain as good a discrimination percentage as possible (as little discrimination loss as possible).

Free field speech audiometry is also very useful in connection with examining children as many children dislike wearing headphones. By examining children with narrow-band noise masking in free field, a very good idea of their hearing ability is obtainable.

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## 8. SPECIAL TESTS

From the Select Function Menu, select:

Special

and the following display appears:

<b>Select special Test :</b> <b>SISI    Fowler   Stenger   Rainv.</b>
--

Select required test by pressing the appropriate softkey.

---

### 8.1 SHORT INCREMENT SENSITIVITY INDEX (SISI) TEST

---

Select the following setup:

Special, SISI, Left or Right.

The following display appears:

<b>Freq.</b>	<b>SISI (A)</b>	<b>L:Tone</b>	<b>Score</b>	<b>0 ( %)</b>
<b>1000 Hz</b>	<b>1-5dB</b>	<b>20 dB</b>	<b>Pres.:</b>	<b>0 Stop</b>

Softkey 2 = Intensity 1 dB/5 dB

Softkey 5 = Stop to reset or continue

The MIDIMATE 622 is able to perform automatic SISI tests with the standardized specifications for this test.

Explain to the patient that he will hear a continuous tone the intensity of which will be increased for a very short time (200 ms) every fifth second and that he should press the patient signal **immediately** each time he hears such a change. To demonstrate this, ensure that modulation is set at the default position 5 dB where it should be easy for the patient to hear the intensity changes and set HL at 40 dB or higher.

Press Tone Switch to start the test. The HL setting on the display will change each time the intensity is raised. Changing Frequency or Hearing Level will stop the SISI test-restart by pressing the Tone Switch.

**TONE**

The display will show the number of presentations, the patient's score and the score as a percentage of presentations.

When the patient has been instructed and is ready to begin the test, set modulation in position "1 dB" and press the Tone Switch to start the test proper. The presentation counter will now count the number of presentations to the patient and will automatically stop after 20 presentations. At the end of the test the score may be read off on the display.

*Note That The Modulation Cannot Be Heard Via Monitor Headset!*

To find out whether the patient really hears the intensity increments, one can push SISI stop and by this omit one or more presentations and at the same time see if the patient still indicates that he hears the intensity changes-press Softkey 5 to stop the test and then choose whether to reset (Softkey 1) or continue the test (Softkey 5).

Patients with normal hearing, middle ear diseases or nerve hearing loss will be able to hear from 0 - 20% of the increments at all frequencies.

Patients with cochlear disorders will respond to 60 - 100% of the increments for frequencies above 1000 Hz, and in some cases even down to 250 Hz.

The SISI test is not a recruitment test. It shows whether a patient is able to detect small variations in intensity. If a patient indicates that he hears 60% or more of the increments, it indicates that there may be cochlear problems.

## 8.2 FOWLER'S ALTERNATE BINAURAL LOUDNESS BALANCE TEST

From Select  
Function Menu

From the Select Function Menu, select Special and then Fowler and you will see the following display:

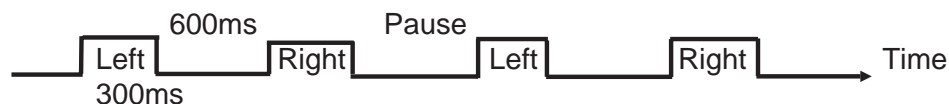
Freq.	Air	L:Tone	Air	R:Tone
1000 Hz	ABLB	20 dB	ABLB	20 dB

Fowler's test is practical when there is a difference in hearing loss of at least 20 dB between the two ears at the pure tone test frequency. Tone intensity is adjusted for the left ear using the stimulus hearing level control and for the right ear, the masking level control is used.

### TONE

The tone is presented automatically through the two ears by pressing the **TONE SWITCH**. On pressing the tone switch, a tone is presented first in the left ear, then in the right ear, then again in the left ear and finally in the right ear. The patient is thus presented with the tone twice in each ear. If a tone has to be presented again, press the tone switch and the same sequence will be repeated.

The tone sequence is illustrated in the following diagram:



The test can be performed on either of the two ears. If, for example, you wish to test the left ear for recruitment, one uses the right ear as the indicator ear. Choose the desired frequency. Adjust stimulus HL to 10 dB above the actual threshold for that frequency for left ear. In the same way adjust masking level control to a value of 10 dB above the actual threshold for right ear.

### TONE

Press **TONE SWITCH** for automatic presentation of the tone sequence. Ask the patient if the tone was heard with the same sensation in both ears. If not, adjust stimulus HL so that the tone gives the same sensation level in both ears.



When the exact balance has been found, record the intensities presented to the ears shown on the display. Thereafter, increase intensity in the right ear by 10 dB using masking level control and then find the intensity in the left ear at which the patient indicates that the tone was heard with the same sensation. Record again the values shown on the display. Continue in this way until maximum intensity on the audiometer has been reached, or until the patient indicates that the presentation of the tone has reached the pain level. Record the results from each test. In the absence of recruitment, the difference between the two hearing level readouts will be constant during the whole test. If the difference between the two readouts diminishes at increased intensities, it is an indication of recruitment.

A typical example of recruitment in the left ear is shown in the table on the next page.

Read Out 1 - Left	Read Out 2 - Right	Recruitment
40	20 (Threshold +10 dB)	
50	30	
57	40	
65	50	
72	60	
75	70	
80	80	

As shown, the difference between the two ears becomes smaller and smaller as the intensity is increased, and at 80 dB there is no difference at all. The degree of recruitment will vary in different cases and may be more marked than in the example given. In all cases, however, the recruitment reduces the hearing span, i.e. from threshold to the uncomfortable loudness level.

A normal ear has a wide hearing span and is able to perceive pure tones from the normal threshold of 0 dB to the upper limit of the audiometer without undue stress. The recruiting ear may only span 25 to 30 dB. Such a patient may find tones 25 to 30 dB above threshold unbearably loud. The pure tone test frequency to be used will depend upon the relative hearing losses of the two ears, and should always be chosen so that there is a difference in hearing loss of more than 20 dB. If there is no such difference, impedance audiometry will, in most cases, be able to diagnose recruitment objectively.

Press **MENU** to exit the ABLB Test.

**MENU**

---

### 8.3 STENGER TEST

---

The Stenger Test setup is similar to a normal pure tone test setup with Left+Right stimulus selected (Special, Stenger, Air, L + R, No Mask).

The display is as follows:

Freq.	Air	L:Tone	Air	R:Tone
1000 Hz	C/P/W	20 dB		20 dB

The Stenger principle states that when two tones of the same frequency are introduced simultaneously into both ears, only the louder tone will be perceived. The test is performed by introducing a tone of a particular frequency into the better ear at a level 10 dB above threshold. If the loss in the poorer ear is genuine the patient will be unaware of any signal in his poor ear and will respond to the tone in his good ear, since it is 10 dB above threshold. This is a negative Stenger result. If the patient does not respond, it is a positive Stenger. If the tone is above true threshold in the bad ear it will preclude hearing the tone in the good ear. As the patient does not want to admit hearing in the bad ear, and is unaware of the tone in the good ear, he does not respond.

The test is only valid if the difference between the two ears is 20 dB or more.

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## 8.4 RAINVILLE TEST

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The Rainville test is used to determine the bone conduction threshold without testing the other ear. The test consists basically of masking ipsilaterally by means of the bone vibrator.

If "Ma" is the masking level just necessary to mask the air tone threshold (Ta) on the same ear, and if "Mb" is the bone masking level just necessary to mask the pure tone bone conduction threshold (Tb), then  $Ta = Ma - X$  and  $Tb = Mb - X$ , where "X" equals the difference in intensity level in order to obtain effective masking. This difference is usually 3 dB.

It is known that, for threshold, the cochlea receives the same energy in both cases of air threshold and bone threshold, so Ta may be masked by Ma or Mb.

We can then obtain Mb versus Ta, because Mb is the quantity of masking necessary to mask Ta. Tb is then equal to Mb - X.

To access the Rainville test, select:

Special, Rainville

The following display appears:

<b>Freq.</b>	<b>Air</b>	<b>R:Tone</b>	<b>Bone</b>	<b>NBN</b>
<b>1000 Hz</b>	<b>C/P/W</b>	<b>20 dB</b>	<b>On/Off</b>	<b>20 dB</b>

This setup routes a pure tone signal in the stimulus channel to the right earphone, and selects narrow band noise to the bone vibrator in the masking channel.

Place the right earphone and the bone vibrator on the ear being tested.

Present a pure tone in the earphone and adjust to approx. 5 dB above threshold (pulsed tone may also be used).

Increase masking in bone vibrator until effective masking is obtained. The bone threshold may now be evaluated by subtracting 3 dB (or X depending on calibration) from the masking attenuator setting.

## 9. PATIENT COMMUNICATION AND MONITORING

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### 9.1 INTRODUCTION

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The MIDIMATE 622 Diagnostic Audiometer has a high-quality patient communication and monitoring system capable of satisfying the most demanding requirements for sound quality. The instrument features built-in talk-over and talk-back amplifiers with individually adjustable monitoring.

As previously mentioned in connection with speech audiometry (7.4), it is essential that the Talk-Back system be of excellent quality in order to avoid distortion increasing discrimination loss. However, it should be emphasized that it is equally essential the system used for delivering the live voice signal to the patient's ears be of equally high quality. Obviously one cannot make an objective measurement of a patient's ability to hear and understand words in speech audiometry if there is distortion in the presentation system!

The MIDIMATE 622 is supplied as standard with connections for a complete patient communication and monitoring system. This system consists mainly of optional accessories and comprises the following (part numbers in parentheses):

- electret Stetomike\_ monitoring headset with built-in pilot-style microphone (8-75-340)
- monitoring loudspeaker, Talk-Over/Live Voice microphone (8-72-240) and Adaptor Box (8-71-140)
- Talk-Back microphone (8-72-240)
- Patient response handswitch (standard accessory)
- TDH 39 earphones fitted onto either ME 70 Noise-Excluding Headset or TC 89 E headband (standard accessories)

It is essential that whatever microphones, etc., are used should be of high quality. The Madsen Stetomike\_ monitoring headset is strongly recommended, however, not only for its high quality specifications but also for its convenience and comfort. The microphone itself is located at an ideal distance from the mouth and it must be emphasized that no communication/monitoring system can adequately satisfy the requirements of speech audiometry if the operator or patient is too far away from the microphone!

---

## 9.2 TALK OVER

---

### OPERATOR TO PATIENT

The Talk-Over function enables the patient to receive verbal information from the operator via the output transducer in use, e.g. the headset, the bone conductor and the loudspeakers, but not the insert phone which is only intended for masking purposes. I.e. the operator may communicate with the patient.

This capability is not only needed when a sound cabin is employed, but also when the ME 70 Noise-Excluding headset is used as otherwise the patient would have great difficulty hearing the operator.

#### *Talk-Over & Live Voice Microphone*

In the MIDIMATE 622, the Talk-Over microphone is also the microphone used for live voice presentations and the Hearing Level presented may be precisely calibrated in dB HL (see below).

To present live voice, Speech must be selected in the test setup and the audiometer will always start the test in Reverse, i.e. the stimulus is continuously presented and the Tone Switch becomes an interrupter.

#### *To Access Talk-Over Mode*

Press the Talk-Over pushbutton (#16 in the pull-out drawing of the front panel located at the back of the manual) to access the Talk-Over Mode and interrupt the presentation of stimulus permitting communication with the patient.

#### *To Adjust the Talk-Over level*

This pushbutton also displays the Talk-Over Level in dB for the purposes of adjustment.

The display will show the level presented to the patient directly in dB HL and this level may be changed by turning any of the rotary knobs.

If using a Talk-Over microphone instead of the stetomike, ensure that the microphone is no more than 20-25 cm from your mouth while speaking into it. Adjust the Talk-Over Level so that it is comfortably audible for the patient.

The selected level will be stored, even after the audiometer has been powered off.

**NOTE:** The MIDIMATE 622 is supplied with the internal microphone selector set for electret. If you wish to connect a dynamic Talk-Over microphone, call your local service representative!

---

## 9.3 TALK BACK

---

### PATIENT TO OPERATOR

The Talk-Back function enables the operator to receive verbal response from the patient via a monitor phone or a loudspeaker. The patient communicates via a Talk-Back microphone (8-72-240) installed in the sound cabin.

**NOTE:** Please ensure that the patient's mouth is 20 to 25 cm from the microphone to ensure satisfactory sound quality.

If you have the optional Stetomike\_ monitoring headset (8-75-340), you will be able to hear the patient respond via this headset. Otherwise it is necessary to have a loudspeaker connected to the "Monitor" jack via an Adaptor Box (8-71-140).

Press the Talk-Back pushbutton to enable sensitivity adjustment of the Talk-Back microphone amplifier.

*To Adjust Talk-Back Level*

A bar-graph on the display shows the actual setting as a percentage of range. Level may be adjusted by turning any of the rotary control knobs-level is set electronically thus preventing accidental alteration.

Adjust the Talk-Back Level so that the monitor phone level is comfortable.

The selected level will be stored, even after the audiometer has been powered off.

**NOTE:** The standard MIDIMATE 622 is supplied set for use with an electret Talk-Back microphone. If you wish to connect a dynamic microphone, call your local service representative for adjustment!

---

## 9.4 MONITORING

---

Via the stetomike monitoring headset or loudspeakers, the operator has full monitoring facilities of all signals presented to the patient. The Talk-Back signal is also heard via the monitoring medium.

### Monitor Level

When this button is depressed, the Monitor level of the Stimulus signal may be adjusted.

The position of the “potentiometer” is shown as a bar-graph on the display as a percentage of range. Level may be adjusted by turning any of the rotary control knobs-level is set electronically thus preventing accidental alteration.

Adjust the level so that the monitor phone level is comfortable.

The selected level will be stored, even after the audiometer has been powered off.

**NOTE:** SISI modulation is not audible via the monitoring headset!

---

## 9.5 PATIENT SIGNAL

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A Patient Response Handswitch (Part no. 8-31-200) is supplied with the instrument as a standard accessory.

In addition to the customary visual signal light on the front panel, the MIDIMATE 622 features an audible patient response signal. This signal may be heard via the optional Stetomike\_monitoring headset or loudspeakers.

### *Options Menu*

Press Softkey 3 while in Test Mode to access the Options Menu and then Softkey 5 to toggle the patient signal on or off (PTS-On/Off).

### *PTS Potentiometer*

The level of the audible patient response signal may be adjusted by means of a potentiometer on the rear panel of the instrument.

## 10. POWER-ON OPTIONS

These options are intended to enable the user to customize the audiometer to his/her own special requirements.

The following functions may be controlled via the Power-On Options Menu:

- Enable User-Programming
- Define Pulsed Tone timing parameters
- Configure and test RS232C serial port and communication with PC
- Select Language
- Select and set up Printer

---

### 10.1 ACCESSING POWER-ON OPTIONS

---

To access the Power-On options, depress Softkey 3 while at the same time powering on the audiometer and hold the button down until the Power-On Options Menu appears on the display:

**SOFTKEY 3**

<b>User Progr. Parameters:</b>	<b>(Menu=Quit)</b>
<b>Pulsing RS232 Progr. Lang. Printer</b>	

Select the required option by pressing the corresponding softkey and continue as directed by the instructions on the display.

Return to the previous menu by pressing **MENU**.

**MENU**

Pressing **MENU** while the display shows the Power-On Options Menu returns the audiometer to normal operation.

Press **MENU** to Exit

---

### 10.2 PULSING

---

Select Pulsing by pressing Softkey 1 and the following menu will be displayed:

<b>Pulsing Parameters:</b>
<b>Rate      Duration</b>

**SOFTKEY 1**

---

### 10.2.1 PULSING RATE

---

**SOFTKEY 1**

To alter Pulsing Rate from the default value of 2.5 Hz, press Softkey 1 again to access the following menu:

<b>Select Pulsing Rate [Hz]: (Now: 2.5)</b>				
<b>1.5</b>	<b>2.0</b>	<b>2.5</b>	<b>3.0</b>	<b>3.5</b>

Press the corresponding softkey to select desired value and note that the selected value is instantly displayed in parentheses after "Now".

**MENU**

Press **MENU** once to revert to the Pulsing Parameter Menu, or twice to revert to the Power-On Options Menu.

---

### 10.2.2 PULSING DURATION

---

**SOFTKEY 2**

To alter Pulsing Duration from the default value of 200 mS, press Softkey 2 to access the following menu:

<b>Select Pulsing Duration [mS]: (Now: 200)</b>		
<b>140</b>	<b>200</b>	<b>240</b>

Press the corresponding softkey to select desired value and note that the selected value is instantly displayed in parentheses after "Now".

**MENU**

Press **MENU** once to revert to the Pulsing Parameter Menu, or twice to revert to the Power-On Options Menu.

---

## 10.3 RS232

---

**Softkey 2**

Pressing Softkey 2 accesses the following menu:

<b>RS-232 Functions: (Word = 8, N, 1)</b>		
<b>Baud</b>	<b>Echo</b>	<b>Receive</b>

*Transmission Parameters*

where Word = indicates the settings of the following transmission parameters (these settings are fixed):

Word Size:	8 Bits
Parity:	None
Stop Bits:	1

To select baud rate, press Softkey 1 and the following menu appears:

<b>Select Baudrate: (Now: 9600 Baud)</b>				
<b>9600</b>	<b>4800</b>	<b>2400</b>	<b>1200</b>	<b>600</b>

Press **MENU** to Exit

Press the appropriate softkey to select the required baud rate and exit by pressing **MENU**. 9600 is the default baud rate.



The audiometer has two test modes for assisting the application programmer in developing software and testing communication between the MIDIMATE 622 and a computer.

1. Echo Mode
2. Display Received message

Echo Mode enables the communication between the audiometer and a computer to be tested while “Receive” tests the interface by displaying a correctly formatted message from the PC on the audiometer.

Please refer to the Data Interface Operation Manual (Part No. 7-25-920) for further details.

---

## 10.4 PROGR.

---

From the Power-On Options Menu, select (User Test) Programming by pressing Softkey 3 and the following will be displayed:

**SOFTKEY 3**

**Enable User programming ?**  
**Yes      No**

Press Softkey 2 to revert to the Power-On Options Menu, and press Softkey 1 to proceed.

**SOFTKEY 1**

User Test Programming is now enabled (see chapter 11 for details on this option).

---

## 10.5 LANGUAGE

---

To alter Language from the default English, press Softkey 4 to access the following menu:

**SOFTKEY 4**

**Select Language:**  
**English   German   French   Italian   Spanish**

Press the corresponding softkey to select desired language and note that the display automatically reverts to the Power-On Options Menu **in the language selected**.

*Select Language*

**NOTE:** If you select the wrong language by mistake, simply press Softkey 4 again to return to the Select Language Menu. You may now select the desired language (the languages are always in the same order as above).

**MENU**

Press **MENU** to exit the Power-On Options Menu.

The selected language will be stored in memory, even after the audiometer is switched off, i.e. after power-off, the audiometer will start up in the last selected language when next switched on.

## 10.6 PRINTER

### *MIDIMATE 622 Printout Capability*

Your MIDIMATE 622 is equipped with a printout capability. This facility enables Air, Bone and Free-Field data for both ears to be memorized and printed out as audiograms to:

- a standard external printer (serial interface)
- ZODIAC 901's built-in printer (serial interface)
- ZODIAC 901's external printer (parallel interface)

Numerous setup options let you program the instrument for the following parameters:

- Hardware connection: baud rate and handshake
- Header: Madsen's logo and patient I.D. data
- Select printer: ZODIAC 901 or standard external printer
- Format: 110 mm (ZODIAC 901), A4: L,R or A4: R,L
- Threshold logging: each time a threshold is stored, data is printed out in tabular form
- Averaging values (with weighting) or masking shown on printout

### *Madsen Config. Program*

A Madsen configuration program enables the definition of: form feeds, left margin, line feeds, weighting factors, and printer driver.

### 10.6.1 PRINTER OPTION MENU

#### **SOFTKEY 5**

Select Printer by pressing Softkey 5 and the following menu will be displayed:

<b>Printer Options: 105</b>				
<b>Select</b>	<b>Format</b>	<b>Header</b>	<b>Ths.Log</b>	<b>Avg.</b>

All printer setup parameters can be selected from this sub-menu.

#### **MENU**

After selecting one of the 5 choices and setting up your printer, return to the Printer Option Menu by pressing **MENU**.

### *Current Setup Status Table In Appendix D*

It should be noted that the current printer setup status is not evident in any of the 5 sub-menus. However, the current status can be deduced from the number in the top line of the Printer Option Menu. Please refer to Appendix D for further details.

### *Press **MENU** to Exit*

Pressing **MENU** while the display shows the Power-On Options Menu returns the audiometer to normal operation.

---

## 10.6.2 SELECT

---

Pressing Softkey 1 accesses the following display:

**SOFTKEY 1**

<b>Select Printer:</b>			
<b>Disable</b>	<b>Zodiac</b>	<b>Std.H</b>	<b>Std.L</b>

Selecting "Disable" returns MIDIMATE to its default setting, i.e. data transfer is enabled instead of printout.

*To Disable Printout*

Selecting "Zodiac" enables printout to the ZODIAC 901 Middle-Ear Analyzer. ZODIAC 901 can either print out on its built-in printer or on an external printer. Your printout from MIDIMATE 622 will be made on whichever printer has been selected on ZODIAC 901 (please refer to the ZODIAC 901 Operation Manual). Connect your audiometer to the middle-ear analyzer by means of the special Madsen serial interface cable (Part No. 8-71-340).

*Printout To Or Via  
ZODIAC 901*

**NOTE: Baud rate for both instruments must be set to 9600 for successful communication. See Power-On Options, section 10.3.**

*Set Baud Rate  
At 9600*

When printing out via ZODIAC 901, your institution's name as well as the date and time, can be added to the printout as this data is in the middle-ear analyzer's own memory (please see section 1.3 on the next page).

*Institution's Name,  
Time & Date On  
Printout*

MIDIMATE 622 can be connected directly to a standard external printer by means of a serial interface cable to the "Data Interface" port on the instrument's rear panel (please refer to Chapter 14 for further details).

*Connection To  
External Printer*

To select a standard external printer, press Softkey 4 or 5. Check your printer's operation manual for details re DSR line; you can choose hardware flow control with busy high (**Std.H**) or busy low (**Std.L**) on the DSR line. Flow control can also be controlled by means of X-ON / X-OFF signals on the printer's RXD line, in which case the DSR line must be set at "NOTBUSY".

*Standard Printer  
Settings*

MIDIMATE 622 is delivered with a standard IBM Proprinter generic printer driver in its memory. Should you wish to connect a printer with a different driver, please contact your local distributor.

---

### 10.6.3 FORMAT

---

**SOFTKEY 2**

Pressing Softkey 2 accesses the following display:

<b>Select Format:</b> <b>A4:L,R    A4:R,L    110mm</b>
---

*Positioning Of Left  
& Right Audiograms*

Paper width may be selected here as well as positioning of left and right audiograms in A4\* format, i.e. pressing Softkey 1 selects A4 paper format and places the left ear's audiogram on the left of the printout and the right ear's on the right, and vice versa for Softkey 2. If 110 mm is selected, the left audiogram will be placed over the right audiogram.

**NOTE: If A4 is selected, a Form Feed will automatically be sent after each audiogram printout.**

When printing out to an external printer via ZODIAC 901, select left/right audiogram format, as desired. If printing out to ZODIAC 901's internal printer, you will automatically get a 110 mm format when you select internal printer on ZODIAC 901, i.e. MIDIMATE 622 detects the middle-ear analyzer's printer setting and follows the built-in printer's protocol.

\* A4 format: 210 x 297 mm.

---

### 10.6.4 HEADER

---

**SOFTKEY 3**

Pressing Softkey 3 accesses the following display:

<b>Header ?</b> <b>Yes    No</b>
-------------------------------------

Selecting "Header" means that the Madsen logo, patient information as well as time and date will appear at the top of each printout. Your instrument's serial number and date of last calibration will also be included.

It may be desirable to disable this function if printing out on preprinted paper where audiogram data only are required. Printout time will also be reduced without header.

---

### 10.6.5 THRESHOLD LOGGING

---

**SOFTKEY 4**

Pressing Softkey 4 accesses the following display:

<b>Threshold Logging ?</b> <b>Yes    No</b>
--

Selecting this function means that, whenever a threshold is stored in the instrument's memory, that threshold is also printed out immediately in tabular form, e.g.

<b>Air, Left</b>	<b>1000 Hz</b>	<b>20 dB</b>
<b>Air, Left</b>	<b>2000 Hz</b>	<b>30 dB</b>
<b>Air, Left</b>	<b>4000 Hz</b>	<b>35 dB</b>
<b>Air, Left</b>	<b>6000 Hz</b>	<b>40 dB</b>

If Threshold Logging is enabled, a Form Feed will be sent to the printer whenever printout of audiograms is selected. This ensures that this data does not appear on your audiogram printout.

*Form Feed*

---

### **10.6.6 AVERAGE VALUES (MASKING)**

---

Pressing Softkey 5 accesses the following display:

**SOFTKEY 5**

<b>Average Values ?</b>	
<b>Yes</b>	<b>No</b>

**NOTE: Selecting this function not only enables averaging of your threshold data, but also disables printout of masking values!**

*Masking Values  
Disabled*

When "Average" is selected, average values are calculated according to a predefined weighting formula. Weighting values are also indicated on the printout. Your own weighting formula may also be defined by means of Madsen's configuration program (please contact your local distributor).

*Averaging  
According To  
Predefined  
Weighting Formula*

If averaging is disabled, masking values for each frequency will be printed out instead of average values (assuming that the masking stimulus is selected when the threshold was stored).

*Masking Values*

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# 11. TEST SETUP PROGRAMMING

The MIDIMATE 622 enables up to five “User Tests” to be stored for instant one-key retrieval of your most frequently used test setups. As previously described on page 15, the MIDIMATE 622 is delivered with 3 of these tests preprogrammed at the factory but any or all of these tests as well as other parameters such as HL or Frequency settings may be changed by the user to any of the 142 possibilities listed in Appendix C.

*User Tests*

The expression “preprogrammed” may be a little misleading as it has nothing to do with “programming” in the normal sense of the word (preparing a set of instructions for a computer). In fact, once this function has been enabled from the Power-On Options Menu (see chapter 10), the process of saving the desired test in memory as a User Test is as simple as manual test setup via the select Function Menu. However, since existing test setups will be erased in this process, a number of safeguards have been built into the programming procedure as well as a number of opportunities to quit before finally overwriting an existing User Test.

---

## 11.1 ENABLE USER TEST PROGRAMMING

---

1. Switch on the audiometer while at the same time holding Softkey 3 down to access the Power-On Options Menu.

*Power-On Option*

<b>User Progr. Parameters:</b>	<b>(Menu=Quit)</b>
<b>Pulsing RS232 Progr.</b>	<b>Lang. Printer</b>

2. Press Softkey 3 to select the Programming mode.

**SOFTKEY 3**

<b>Enable User programming ?</b>
<b>Yes No</b>

3. Press Softkey 1 to enable User Test Programming.

**SOFTKEY 1**

4. The audiometer automatically reverts to the Power-On Options Menu. Press **MENU** to exit and the instrument will execute the normal startup procedure ending in User Test 1.

**MENU**

---

## 11.2 USER TEST PROGRAMMING

---

Exit User Test 1 by pressing **MENU** twice, and you will have accessed the Select Function Menu.

**MENU**

1. Set up whatever test you wish to save and remember that not only parameters such as output, stimulus side, input and masking are saved in this mode. Frequency, Masking and Hearing Level settings will also be saved as well as options such as Hearing level Lock and audible patient signal.

*From Select Function Menu*

**SOFTKEY 3**

- 2. From Test Mode (any test you have set up), press Softkey 3 to access the Options Menu and the following will be displayed (although the options available for Softkeys 4 and 5 will vary):

<b>Options Menu:</b> 1.5s On 1 dB Progr HLL-On PTS-On
--

**SOFTKEY 1**

- 3. Press Softkey 3 to start programming and the following appears on the display:

<b>Programming User Test !</b> Continue <span style="float: right;">Quit</span>
--

*Quit*

- 4. Pressing "Quit" takes you out of the programming procedure but the audiometer is still in the Programming Mode, i.e. Progr is still an option in the Options menu.

The programming option will be retained until the instrument is switched off.

**SOFTKEY 1**

- 5. Press Softkey 1 to continue and the following menu is displayed:

<b>Select Program No.:</b> Test1 Test2 Test3 Test4 Test5
---

**NOTE:** This display is your last opportunity to change your mind about overwriting a previously stored test! If you decide **NOT** to save your current test setup instead of the existing User Test, press **MENU**.

*Select & Save User Test*

- 6. Select whichever User Test you wish to overwrite and press the corresponding softkey. The audiometer will briefly display a message confirming that the test has been saved as Test No. 1 to 5 and then revert to Test Mode in the User Test selected.

<b>Setup saved as Test : X</b>
--------------------------------

*Check Test & Overwrite, If Necessary*

- 7. Check each test after having saved it to ensure that all test parameters have been set up as desired. If not, repeat the procedure described above.

*User Test Template*

- 8. A template for the purpose of hanging over the five softkeys is supplied with the audiometer-write the details of each test setup saved as a User Test next to the corresponding softkey.



## 12. CALIBRATION

The calibration of the MIDIMATE 622 is stored in a non-volatile memory EEPROM type, which requires no battery backup. In order to prevent unintentional alteration of calibration this function must be enabled separately before any changes can be made to calibration (please refer to Service Manual).

*Calibration Stored  
in Memory*

Calibration should be performed annually by suitably qualified personnel, using the appropriate equipment.

Your MIDIMATE 622 is dispatched from the factory in Denmark together with a Test Report (Calibration Certificate). The Test Report specifies which transducers have been calibrated (i.e. those which have been supplied together with the instrument), according to which standards, and what equipment was used for calibration. Results are listed for each transducer at all standard frequencies.

In general, the instrument is calibrated in dB HL using the stated reference equivalent thresholds, which are related to sound pressure levels (db SPL = dB re 20  $\mu$ PA), and force levels (dB re 1  $\mu$ N).

**Note that calibration has only been performed on the supplied transducers! If you wish to use any other transducer for testing with the MIDIMATE 622, please contact your local distributor first.**

---

### 12.1 ERROR CHECK

---

To ensure accurate measurements, all calibration locations are checked at power-on time and whenever a new location is accessed, i.e. when changing frequency or input/output routing.

*Calibration Check*

This means that if any errors are detected by the self-test, the error is indicated on the display. Furthermore, if a calibration error is detected during operation of the audiometer, then it is also indicated on the Test Mode display by blinking "Err" where "dB" is normally displayed.

*Calibration Errors*

---

### 12.2 CALIBRATION REFERENCE

---

After power-up, the audiometer displays the calibration reference currently valid for the instrument as well as the date and operator ID of the calibration currently installed.

*Power-Up*

#### FREE FIELD

*Free Field*

**Fixed output level for all signal sources (must be calibrated on site).**

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## 13. DATA INTERFACE

Following the implementation of the RS232C Data Interface in the MIDIMATE 622 (Version 2.0 and higher), two new functions were added as standard. From Version 3.0 and higher, the data interface functions have been extended to include printout to an external printer or to the ZODIAC 901 Middle-Ear Analyzer. Please refer to the next chapter for details about the printer function.

The functions described in this chapter comprise the following:

1. Entry of patient I.D. number from the audiometer's control panel.
2. Data transfer from the MIDIMATE 622 to a PC.

*Patient I.D. No.*

*Data Transfer to PC*

The RS232C Data Interface is also available as a retrofit kit (RS232C Update Kit 8-48-300) and consists of 1 EPROM, Operation Manual and a Test Program on diskettes.

*Available As Retrofit Kit*

Please refer to the Data Interface Operation Manual (7-25-920) for a detailed description of the interface functions.

*Data Interface Operation Manual*

---

### 13.1 ENTRY OF PATIENT I.D. NO.

---

This new feature enables the entry of a Patient Identification number, to be used when the audiometer is connected to a computer's database or to a printer. Thus, the patient's test data may be "tagged" for data transfer or printout. Alternatively, each patient may be given an incremental number for I.D. purposes, i.e. the first patient each day will be patient # 1, the second patient #2, and so on. The patient number will be included on the printout.

**NOTE! Entering new patient identification data automatically erases any thresholds stored for printout, i.e. changing I.D. has the same function as the Clear-All command in the Printer Menu.**

**CAUTION!**

The Patient Identification function can be accessed from the Select Function Menu by pressing Softkey 5:

**Softkey 5**

<b>Select Function:</b>			
<b>Tone</b>	<b>Speech</b>	<b>Special</b>	<b>Patient</b>

The following display appears:

<b>Patient :</b>	<b>*-----</b>	<b>( Frq./ HL )</b>
<b>Reset</b>	<b>Incr.</b>	

Pressing Softkey 1 will always reset the number to zero, i.e. erase it. Pressing Softkey 2 will add incrementally to the patient number.

*Reset & Increment*

The Patient Identification number is entered by using the Frequency and Hearing Level knobs on the Control Panel.

The cursor is represented by an asterisk ( \* ) and is moved by turning the Frequency knob. Turning the HL knob displays the digits and symbols available (space, 0-9, / and -). Enter desired number by means of the following procedure:

1. Use Frequency knob to position cursor ( \* ) over the desired space.
2. Use HL knob to display the desired digit or symbol.
3. Using the Frequency knob to position cursor over the next space in effect selects the displayed digit. Continue in the same way until the desired number has been entered.

**NOTE:** You may only change or delete one digit at a time (delete by entering a space over the digit to be deleted).

#### *Definable Length of I.D. Number*

The maximum length of the I.D. number is default defined as ten digits, but this may be changed via the interface to anywhere between 0 and 16 digits. If 0 (zero) is defined, the option "Patient" is removed from the Select Function Menu.

#### **MENU**

Press **MENU** to exit Patient I.D. Entry mode.

---

## 13.2 DATA TRANSFER

---

#### **Softkey 3**

In Test Mode, a new option has been added to the Options Menu, Data Transfer (Datrf.), assigned to Softkey 3.

Pressing Data Transfer saves all measuring parameters in a local buffer, and the contents of the buffer may be transferred to the computer via the interface.

#### **Softkey 3**

When the operator has obtained a hearing threshold for a given frequency, the information is saved by pressing the Option key (Softkey 3) and then selecting Datrf. (Softkey 3 again).

In practice, this simply means that, when a threshold is found, the operator presses the Option key twice to save the threshold.

After pressing Data Transfer, the audiometer automatically reverts to Test Mode.

## 14. PRINTOUT FUNCTION

From June 1991, your MIDIMATE 622 has been equipped with a printout capability. This facility enables Pure Tone air, bone and free-field data for both ears to be memorized and printed out as audiograms to:

*MIDIMATE 622  
Printout Capability*

a standard external printer (serial interface)

ZODIAC 901's built-in printer (serial interface)

ZODIAC 901's external printer (parallel interface)

A combination of increased memory and new software enables audiogram data and the driver for an external printer to be stored in the audiometer, and numerous setup options let you program the instrument for the following parameters (please refer to Power-On Options, chapter 10):

- Hardware connection: baud rate and handshake
- Header: Madsen's logo and patient I.D. data
- Select printer: ZODIAC 901 or standard (IBM Proprinter or Epson FX 80)
- Format: 110 mm (ZODIAC 901), A4: L,R or A4: R,L
- Threshold logging: each time a threshold is stored, data is printed out in tabular form
- Averaging values (with weighting) or masking shown on printout

A Madsen configuration program (MIDICON™) enables the definition of: form feeds, left margin, line feeds, weighting factors, and printer driver (please contact your local distributor if you want to change the default settings).

*Madsen Config.  
Program*

The printout function is to be found in the Options Menu (press Softkey 3), but only after the printer has been selected and set up (Power-On Option, see chapter 10); if not selected, the Options Menu will display Datrf. (for data transfer) over Softkey 3 instead of Store. The audiometer is delivered without any printer enabled. Selecting the printout function automatically disables data transfer-obviously, direct printout from the audiometer is not required when it is connected to a PC.

*Printout Enabled As  
Power-On Option*

## 14.1 PRINTERS & CONNECTIONS

*Choice Of Printer* As stated on the previous page, the Printout Function allows you to print out pure tone audiogram data on either a serial printer or on the ZODIAC 901 Middle-Ear Analyzer's own built-in printer. Alternatively, the audiograms can be printed out on a parallel printer connected to ZODIAC 901. These alternatives offer you maximum flexibility when deciding which printer to acquire or employ for audiogram printout from your MIDIMATE 622.

*Optional Accessories* Printers which support the IBM Proprinter or Epson FX80 printer drivers can be used together with both MIDIMATE 622 and ZODIAC 901 (a serial to parallel converter can be obtained from GN Otometrics as an option). Cables for connecting MIDIMATE 622 to a serial printer, a PC or to ZODIAC 901 are also available:

Optional Accessory	Part No.
Serial/Parallel Converter	N/A
Parallel Printer Cable	8-71-360
Serial Printer Cable	8-71-420
9/9-Pole Serial Data Interface Cable	8-71-340
9/25-Pole Serial Data Interface Cable	8-71-330

**CAUTION!** Note that all serial cables for connecting MIDIMATE 622 to PC, printer or ZODIAC 901 contain a zero modem! To avoid hardware damage, you are advised to make certain that you are using the correct cable before connecting the audiometer. Remember also to switch off both instruments before connection!

*Check Printer Setup* It is also advisable to check that MIDIMATE 622 is correctly set up (see Power-On Options, chapter 10) before attempting to print out (or transfer data).

*Standard Madsen Printer* If using a standard Madsen printer, set baud rate at 9600 and select "Std.L" (Busy Low). Consult the documentation for the printer and the printer's parallel/serial converter to ensure that both are correctly set up.

Please refer to Figure 4 for further details on connecting your MIDIMATE 622.

## 14.2 OPTIONS MENU

Press Softkey 3 to access the Options Menu. If no Power-On Options have been enabled, the following options will be displayed:

<b>Options Menu:</b>				
1.5s On	1 dB	Datrf.	HLL-Off	PTS-On

When the Printer Function has been enabled, Datrf. changes to Store:

<b>Options Menu:</b>				
1.5s On	1 dB	Store*	HLL-Off	PTS-On

### 14.2.1 STORE

This option is only present when printout has been enabled (please refer to section 10.6 Power-On Options for details about enabling printout).

*Printer Function*

The purpose of this option is to enable the user to store the current threshold for subsequent printout. However, if the softkey is held down for longer than 0.8 seconds, the Printer Menu appears enabling previously stored data to be cleared, viewed or printed out.

*Printer Menu*

In practice, pressing the option softkey twice in rapid succession stores the current threshold, whereas holding it down enables you to see the Printer Menu. And, if Threshold Logging has been enabled in the Printer Setup Menu, the printer will immediately print out each threshold, one at a time, e.g:

**SOFTKEY 3**

Air, Left    1000 Hz    20 dB

### 14.2.2 PRINTER MENU

Holding down Softkey 3 accesses the Printer Menu:

*Printer Menu*

<b>Printer Menu:</b>				
Clr-L	Clr-R	View	Plot	Clr-All

**Clr-L:** Pressing Softkey 1 clears (erases) all data for the left ear (Air, BC, F.F.).

**Softkey 1**

**Clr-R:** Pressing Softkey 2 clears (erases) all data for the right ear (Air, BC, F.F.).

**Softkey 2**

**Clr-All:** Pressing Softkey 3 clears (erases) all data for the both ears (Air, BC, F.F.).

**Softkey 5**

**NOTE!** Definition of a new patient I.D. number automatically performs the Clr-All function.

*Clear All*

**Softkey 4**

**Plot:** Pressing Softkey 4 starts audiogram printout (Pure Tone audiometry: Air, BC, F.F.). Printout format is predefined during setup as a power-on option. Note that the Ext. Range LED lights up during printout to indicate “busy” status (versions 3.0 and 3.1, only) while the display shows:

**Printing . . .**

**L/R Shift**

**View:** The view function shows the thresholds stored for the selected ear and transducer. Press **L/R Shift** to change ear, and use either the Frequency or Hearing Level rotary knob to display all frequencies. To change transducer, the relevant test setup must first be accessed.

*AC & BC  
Thresholds On  
Same Printout*

Air and bone conduction thresholds are always printed out on the same audiogram (if there is one). Consequently, if separate audiograms are required for air and bone, data must first be printed out and cleared before starting an examination with the new transducer.

**PLOT**

If an extra printout is required, repeat **PLOT**.

MIDIMATE 622 has sufficient memory to store Pure Tone Air, Bone and F.F. data for both ears. As specified above, threshold data for both ears may be erased via the Clr-All function, or by entering a new Patient I.D.

---

### **14.3 AVERAGE VALUES (MASKING)**

---

*Average Or  
Masking*

If Average has been selected in Printer Setup, average and weighting values will be included with your audiogram printout. If not, masking levels for each frequency will be printed out, provided that the masking stimulus was selected when the threshold was stored.

*Masking Values*

Masking values are displayed for both Air and Bone, but not with Free-Field audiograms. Masked thresholds are represented on the audiograms with ANSI symbols.

*Averaging  
According To  
Predefined  
Weighting Formula*

When “Average” is selected, average values are calculated according to a predefined weighting formula. Weighting values are also indicated on the printout. Your own weighting formula may also be defined by means of Madsen's configuration program MIDICON™ (please contact your local distributor).

*Default Weighting  
Values*

Default weighting values are linear averages calculated for the following frequencies: 500, 1000, 2000 and 4000 Hz. Average values are calculated in whole dB.

*ANSI Weighting  
Values*

ANSI speech-contribution weighting values are: 8% at 250 Hz, 14% at 500 Hz, 22% at 1000 Hz, 33% at 2000 Hz, and 23% at 4000 Hz.



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## 14.4 TROUBLESHOOTING

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If your stored data is not being printed out, check the following:

*Troubleshooting*

1. Connections: have you connected the correct cable to the Data Interface connector on the audiometer's rear panel?
2. Have you selected the correct printer (Power-On Option, Select Printer)?
3. If printing out directly to an external printer, check the printer's operation manual to ensure that both the audiometer and the printer are set up correctly with regard to baud rate and hardware flow control (Power-On Options).
4. If printing out directly to ZODIAC 901, check that instrument for paper jams, etc. If printing out to an external printer via ZODIAC 901, check that the external printer has been selected (PRINTER pushbutton, Softkey 4).
5. In case you still have any problems printing out audiological data, please contact your local distributor.

For further details re connecting MIDIMATE 622, please refer to the diagram on the next page.

*See Diagram On next Page*

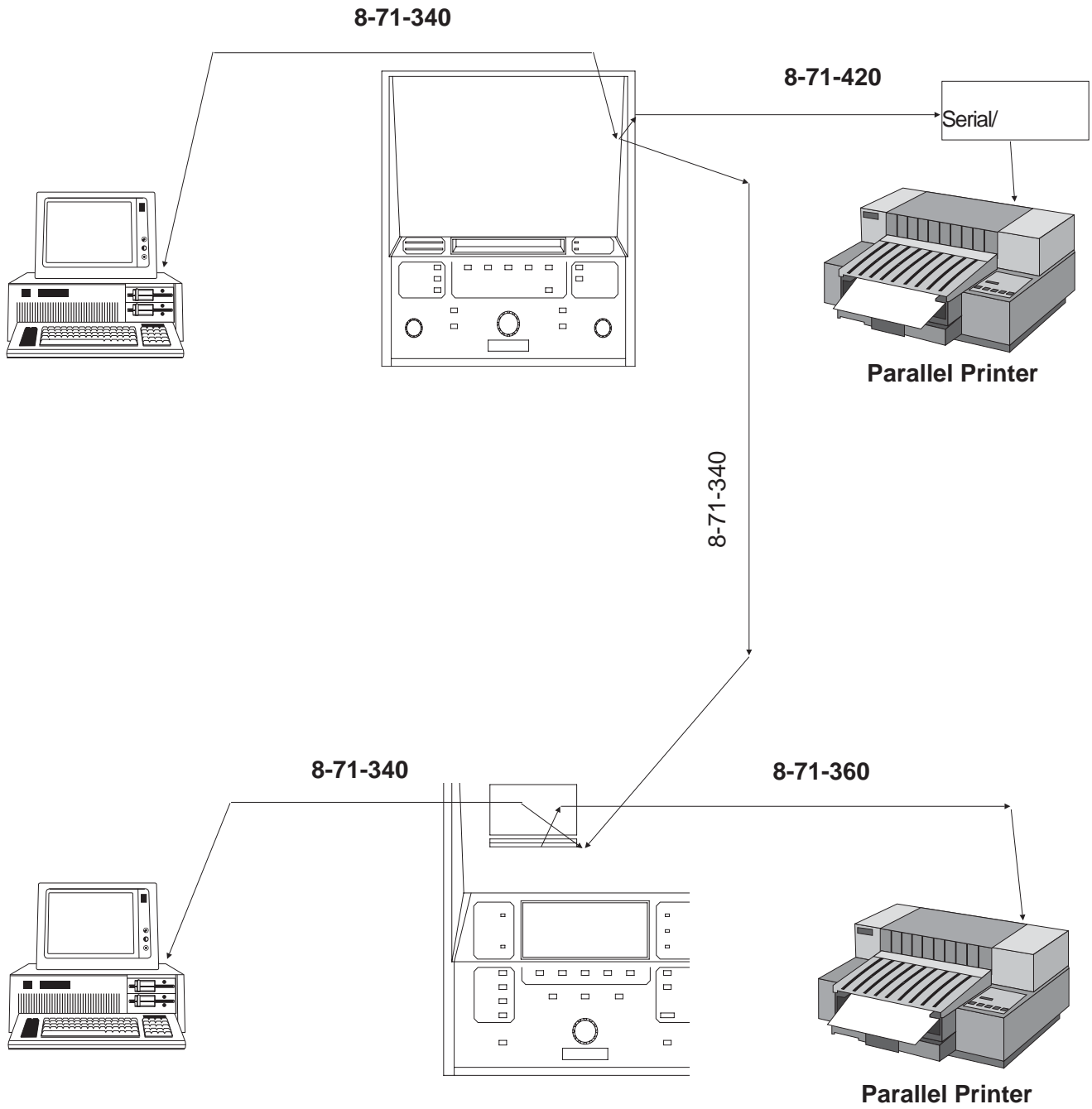


Fig. 4. Printer/PC Connections/Cables for MIDIMATE 622 & ZODIAC 901.

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**APPENDIX A: TECHNICAL SPECIFICATIONS**


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<b>Channels</b>	Two separate channels: one for stimulus and one for masking.	
<b>Frequencies</b>	Air, Free Field: 125-250-500-750-1000-1500-2000-3000-4000-6000-8000 Hz. Bone: 250-500-750-1000-1500-2000-3000-4000-6000 Hz.	
<b>Masking</b>	Contralateral and Ipsilateral. Binaural stimulus + masking. White Noise, Speech Noise and Narrow Band Noise.	
<b>Attenuator Range</b>	-10 to +149 dB in 5 dB steps with Range Extender function. Resolution: 1 dB or 5 dB steps. Fully clickfree operation over entire range.	
<b>Hearing Level Range</b>	Maximum output is limited by transducer capability. Typical values are: Air: -10 to 120-125 dB HL at 500-6000 Hz Bone: -10 to 70-80 dB HL at 500-4000Hz.	
<b>External Inputs</b>	Talkover Microphone: Patient Mic.: CD/Tape1: CD/Tape2:	Dynamic or electret, for speech audiometry or patient communication. Dynamic or electret. Sensitivity 0.1 - 3.0 VRMS, 47 kOhm. Sensitivity 0.1 - 3.0 VRMS, 47 kOhm.
<b>Outputs</b>	Phones: Bone: Insert: Free Field:	Air Conduction. Bone Conduction. Insert Phone for masking. F.F Loudspeaker via external Amplifier. Output Voltage:max. 3 Vrms. Source Impedance: 500 Ohm.
<b>Standard Functions</b>	Speech: Masking:  Tone Switch: Pure Tone: Pulsing Rate: Warble:  L/R Shift: HL Level Lock: Tone Lock:	Stimulus via Microphone or CD/Tape1. White Noise, Speech Noise or external CD/Tape2. Ipsi, Contra or Bin. S+M. Normal or Reverse operation. Manual or 1.5 sec. Tone Duration. User-programmable (Range: 1.5 to 3.5 Hz). Frequency Modulation 3.7 ± 5%. Modulation Waveform: triangular. Modulation Range: 5%. Automatic switching of all selected parameters from left to right channel and vice versa. Locking of masking level to stimulus level at any preselected interval. On/off, internal tone switch synchronization.
<b>Special Functions</b>	SISI Test:  Fowler Test: Stenger Test: Rainville Test:	Display shows: Presentation counter, Patient Score counter with current Score Percent constantly indicated. Increments of 1 or 5 dB. Interrupt/Reset function. Initiated by Tone Switch. Alternate Binaural Loudness Balance (ABLB) Test. Binaural Tone Stimulation. Bone Conduction Masking.
<b>User Functions</b>	5 user-programmable functions available for quick test retrieval. User setups are stored in a non-volatile memory (EEPROM).	
<b>Display</b>	Alphanumeric Transflective LCD with CFL Backlighting. 2 rows of 40 characters with Cursor. Screen dimensions 155x16 mm.	

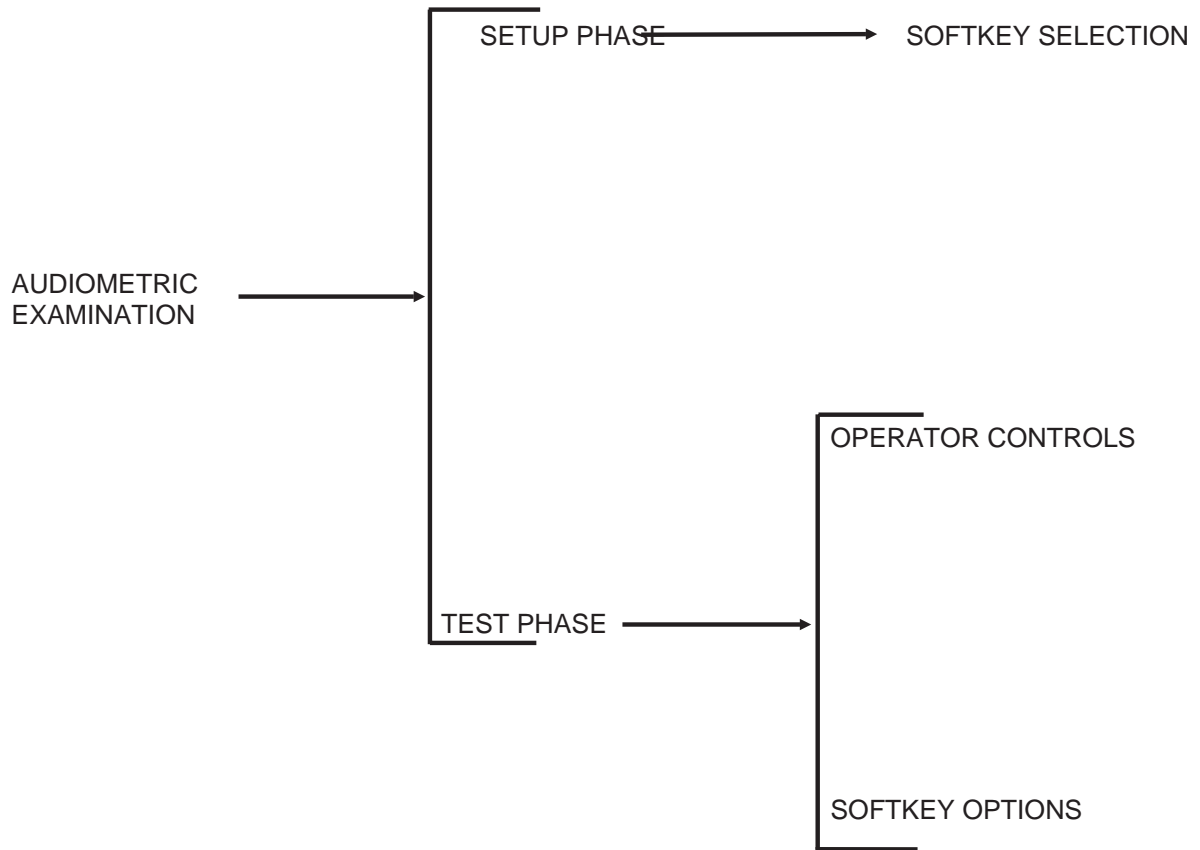
<b>Patient Communication</b>	Built-in Talk-Over and Talk-Back amplifiers with individually adjustable monitoring. The Monitoring signal is mixed with the Talk-Back signal. Visible Patient Response (LED indicator) supplemented by Audible Patient Response with a separate level control. LED bar-graph V.U. Meter provides visual indication of stimulus level as well as displaying level for sensitivity adjustment of Microphone/Tape/CD input signals.
<b>Patient Safety</b>	Complies with EN 60601-1. Approved by C.C.A. and DEMKO. The Range Extender is automatically disabled upon selection of new frequency or function.
<b>Distortion</b>	Tone: Less than 1% (T.H.D.). Speech: Less than 2.5% at 9 dB above 0 VU at 250, 500 and 1000 Hz.
<b>Accuracy</b>	Frequency: Better than $\pm 2\%$ . Hearing Level: Electrical: Within $\pm 1$ dB of indication. Acoustical: Within $\pm 3$ dB of indication.
<b>Standards</b>	EN 60645-1, -2 ANSI S3.6
<b>Calibration</b>	ISO 389, -3, -4, ANSI S3.6. Individual calibration of Phone, Bone, and Insert. Calibration data are stored in a programmable memory.
<b>Static Force of Transducer Headbands</b>	TDH 39: 4.5 N $\pm$ 0.5 N Bone: 5.4 N $\pm$ 0.5 N
<b>Data Interface</b>	RS232C Serial Interface for connection to PC/printer. Opto-insulation.
<b>Power Supply</b>	AC 50/60 Hz. 100-120 V $\pm$ 10%; 200-240 V $\pm$ 10%.
<b>Power Consumption</b>	Approx. 25 VA.
<b>Operating Environment</b>	Temperature: 15 - 35°C (32 - 95°F); Relative Humidity: 30 - 90%. (Operation in temperatures exceeding -20°C or + 60°C may cause permanent damage!)
<b>Construction</b>	Plastic cabinet with aluminium chassis.
<b>Dimensions &amp; Weight</b>	378(W) x 394(D) x 110(H) mm (14.9 x 15.5 x 4.3 in.). Net weight with standard accessories approx. 5.6 kg/12.3 lbs.
<b>Standard Accessories</b>	Headset: TDH39 Phones fitted with Noise-Excluding Headset ME70 or TC89E Headband, Bone Conductor B-71 with headband, Patient Response Handswitch, Template, 2 Roller Pens (blue and red), Audiogram Pad, Operation Manual, Data Interface incl. Operation Manual & Test Program, MateBasel Software.
<b>Optional Accessories</b>	Parallel Printer, Dust Cover, CD Player, Service Manual, Free Field Loudspeakers, Amplifiers and Speech Units, Talkover/Live Voice Microphone, Talkback Microphone, Masking Insert Phone, Monitor Headset with boom mic., Madsen Automatic Serial Switch Box, MIDICON Configuration Program, Hardwalled Carrying Case, Audi-Link PC Software for NOAH.

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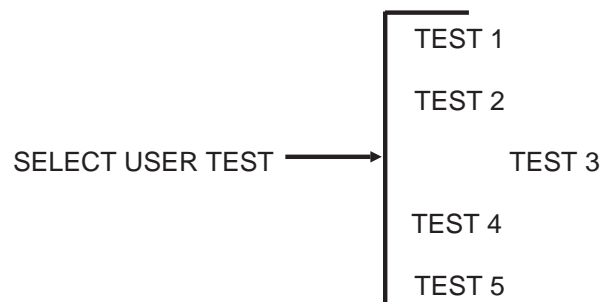
## APPENDIX B: SCHEMATIC OVERVIEW

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### AUDIOMETRIC EXAMINATION



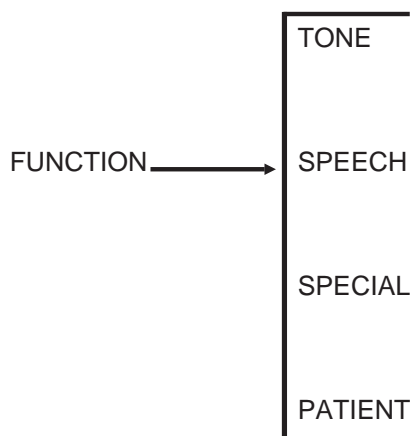
### PREPROGRAMMED TESTS



## STRUCTURE OF SETUP SEQUENCE

SETUP = FUNCTION, OUTPUT, STIMULUS, INPUT (optional), MASKING OUTPUT, MASKING INPUT

### SETUP PROCEDURE : FUNCTION

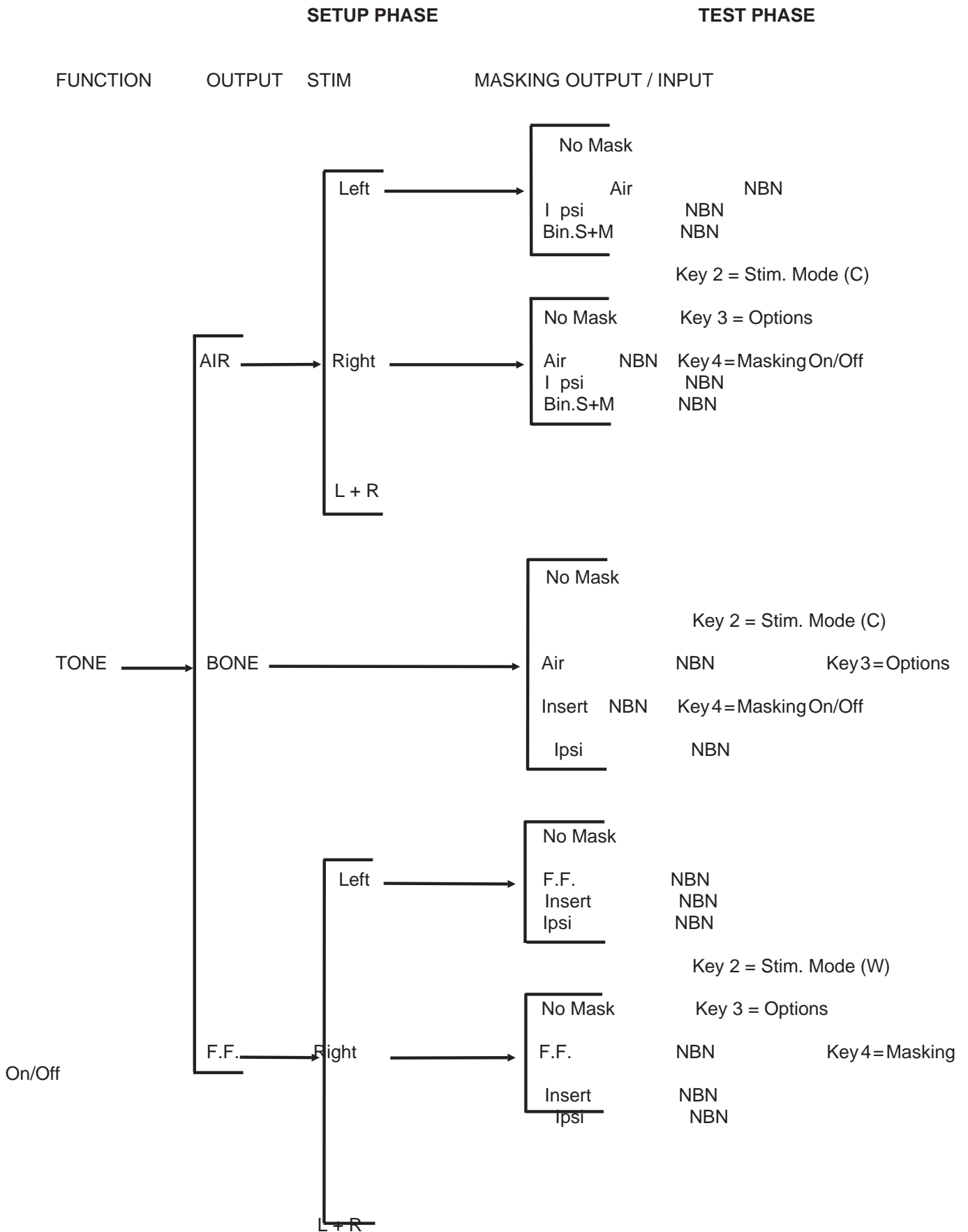


### TEST PHASE OPTIONS

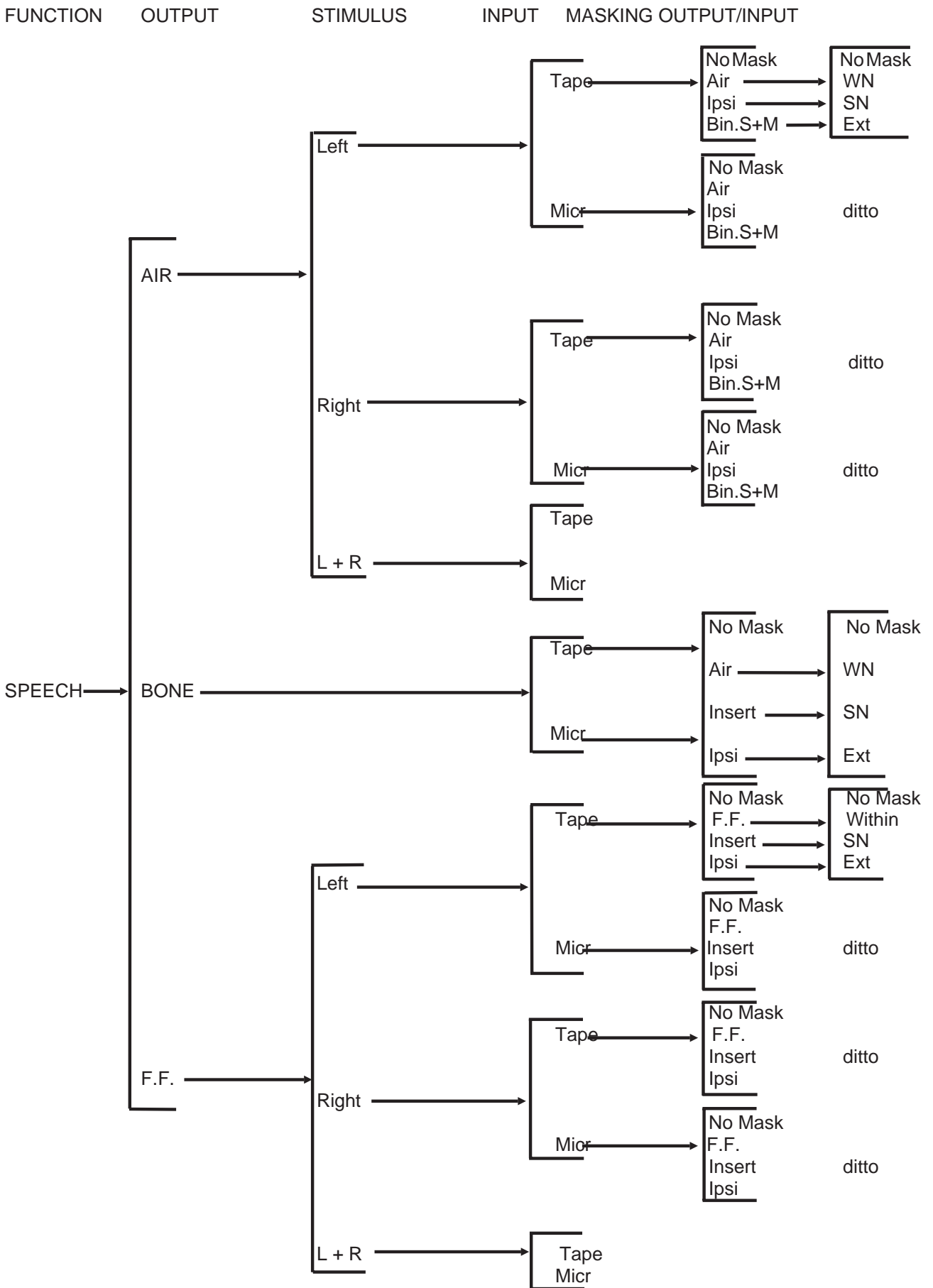
Options which can be invoked during Test Phase via Softkey 3:

<b>PROGR.</b>	To program current setup as User Test
<b>DATRF.</b>	To transfer Data via RS232C Interface Port
<b>STORE</b>	To store thresholds in memory prior to printout
<b>HLL-On/Off</b>	To toggle Hearing Level Lock on or off
<b>PTS-On/Off</b>	To toggle Audible Patient Signal on or off
<b>1 dB / 5 dB</b>	To toggle between 1 dB and 5 dB attenuator resolution
<b>1.5s On/Off</b>	To toggle 1.5 second tone stimulus on or off

**SETUP PROCEDURE: TONE**

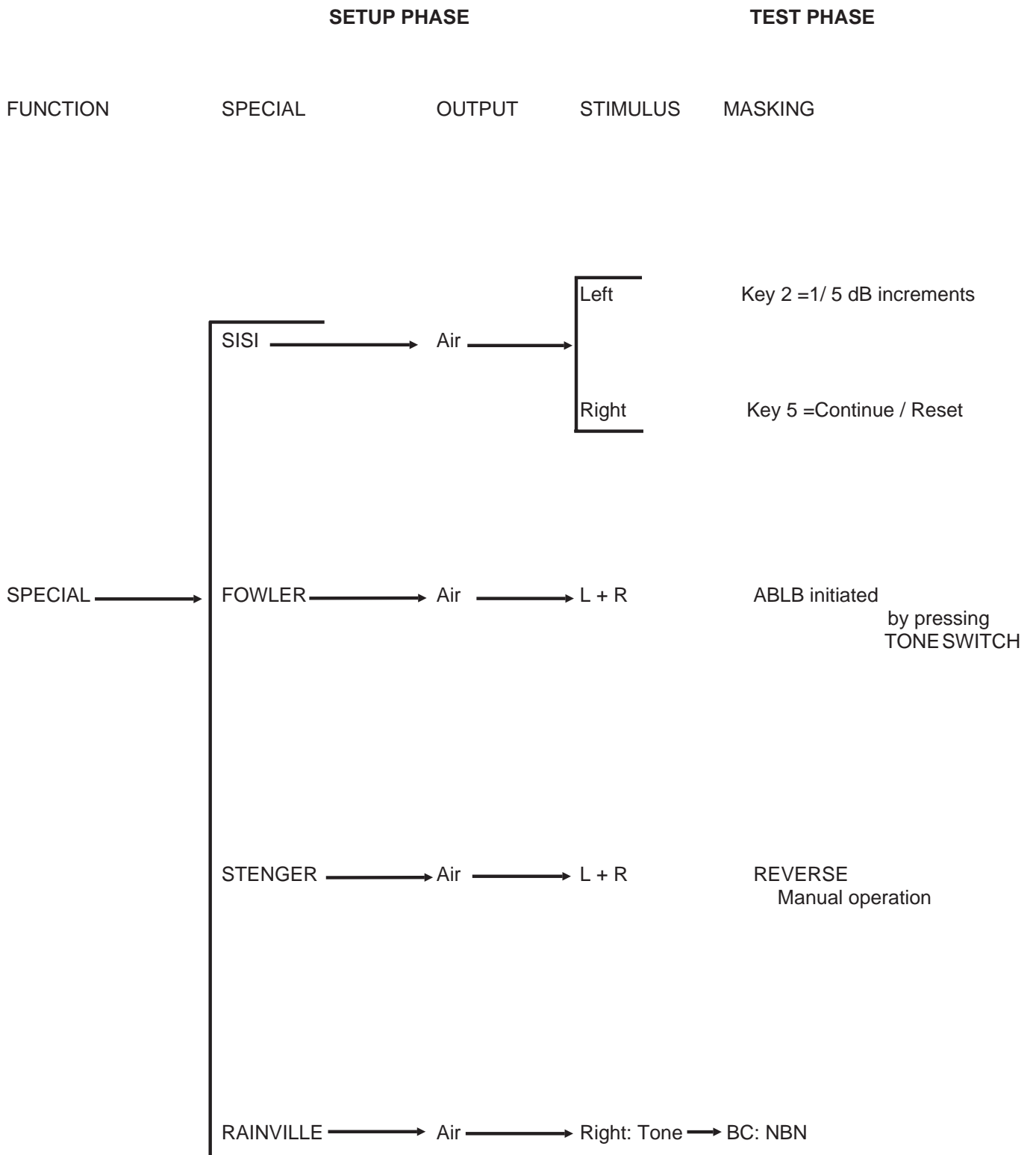


**SETUP PROCEDURE: SPEECH TEST**





**SETUP PROCEDURE : SPECIAL TESTS**



---

## APPENDIX C: AVAILABLE TEST SETUPS FOR MIDIMATE 622

---

### PURE TONE AUDIOMETRY

1	Tone, Air, Left
2	Tone, Air, Left, Mask: Air, NBN
3	Tone, Air, Left, Mask: Ipsi, NBN
4	Tone, Air, Left, Mask: Bin.S+M, NBN
5	Tone, Air, L + R
6	Tone, Air, Right
7	Tone, Air, Right, Mask: Air, NBN
8	Tone, Air, Right, Mask: Ipsi, NBN
9	Tone, Air, Right, Mask: Bin.S+M, NBN
10	Tone, Bone
11	Tone, Bone, Mask: Air, NBN
12	Tone, Bone, Mask: Ins, NBN
13	Tone, Bone, Mask: Ipsi, NBN
14	Tone, FF, Left
15	Tone, FF, Left, Mask: FF, NBN
16	Tone, FF, Left, Mask: Ins, NBN
17	Tone, FF, Left, Mask: Ipsi, NBN
18	Tone, FF, Right
19	Tone, FF, Right, Mask: FF, NBN
20	Tone, FF, Right, Mask: Ipsi, NBN
21	Tone, FF, L + R

### SPEECH AUDIOMETRY

22	Speech, Air, Left, Tape
23	Speech, Air, Left, Tape, Mask: Air, WN
24	Speech, Air, Left, Tape, Mask: Air, SN
25	Speech, Air, Left, Tape, Mask: Air, Ext
26	Speech, Air, Left, Tape, Mask: Ipsi, WN
27	Speech, Air, Left, Tape, Mask: Ipsi, SN
28	Speech, Air, Left, Tape, Mask: Ipsi, Ext
29	Speech, Air, Left, Tape, Mask: Bin.S+M, WN
30	Speech, Air, Left, Tape, Mask: Bin.S+M, SN
31	Speech, Air, Left, Tape, Mask: Bin.S+M, Ext
32	Speech, Air, Left, Mic
33	Speech, Air, Left, Mic, Mask: Air, WN
34	Speech, Air, Left, Mic, Mask: Air, SN
35	Speech, Air, Left, Mic, Mask: Air, Ext
36	Speech, Air, Left, Mic, Mask: Ipsi, WN
37	Speech, Air, Left, Mic, Mask: Ipsi, SN
38	Speech, Air, Left, Mic, Mask: Ipsi, Ext
39	Speech, Air, Left, Mic, Mask: Bin.S+M, WN
40	Speech, Air, Left, Mic, Mask: Bin.S+M, SN
41	Speech, Air, Left, Mic, Mask: Bin.S+M, Ext
42	Speech, Air, L+R, Tape
43	Speech, Air, L+R, Mic
44	Speech, Air, Right, Tape
45	Speech, Air, Right, Tape, Mask: Air, WN
46	Speech, Air, Right, Tape, Mask: Air, SN
47	Speech, Air, Right, Tape, Mask: Air, Ext

48	Speech, Air, Right, Tape, Mask: Ipsi, WN
49	Speech, Air, Right, Tape, Mask: Ipsi, SN
50	Speech, Air, Right, Tape, Mask: Ipsi, Ext
51	Speech, Air, Right, Tape, Mask: Bin.S+M, WN
52	Speech, Air, Right, Tape, Mask: Bin.S+M, SN
53	Speech, Air, Right, Tape, Mask: Bin.S+M, Ext
54	Speech, Air, Right, Mic
55	Speech, Air, Right, Mic, Mask: Air, WN
56	Speech, Air, Right, Mic, Mask: Air, SN
57	Speech, Air, Right, Mic, Mask: Air, Ext
58	Speech, Air, Right, Mic, Mask: Ipsi, WN
59	Speech, Air, Right, Mic, Mask: Ipsi, SN
60	Speech, Air, Right, Mic, Mask: Ipsi, Ext
61	Speech, Air, Right, Mic, Mask: Bin.S+M, WN
62	Speech, Air, Right, Mic, Mask: Bin.S+M, SN
63	Speech, Air, Right, Mic, Mask: Bin.S+M, Ext
64	Speech, Bone, Tape
65	Speech, Bone, Tape, Mask: Air, Right, WN
66	Speech, Bone, Tape, Mask: Air, Right, SN
67	Speech, Bone, Tape, Mask: Air, Right, Ext
68	Speech, Bone, Tape, Mask: Ins, Right, WN
69	Speech, Bone, Tape, Mask: Ins, Right, SN
70	Speech, Bone, Tape, Mask: Ins, Right, Ext
71	Speech, Bone, Tape, Mask: Ipsi, WN
72	Speech, Bone, Tape, Mask: Ipsi, SN
73	Speech, Bone, Tape, Mask: Ipsi, Ext
74	Speech, Bone, Mic
75	Speech, Bone, Mic, Mask: Air, Right, WN
76	Speech, Bone, Mic, Mask: Air, Right, SN
77	Speech, Bone, Mic, Mask: Air, Right, Ext
78	Speech, Bone, Mic, Mask: Ins, Right, WN
79	Speech, Bone, Mic, Mask: Ins, Right, SN
80	Speech, Bone, Mic, Mask: Ins, Right, Ext
81	Speech, Bone, Mic, Mask: Ipsi, WN
82	Speech, Bone, Mic, Mask: Ipsi, SN
83	Speech, Bone, Mic, Mask: Ipsi, Ext
84	Speech, FF, Left, Tape
85	Speech, FF, Left, Tape, Mask: FF, WN
86	Speech, FF, Left, Tape, Mask: FF, SN
87	Speech, FF, Left, Tape, Mask: FF, Ext
88	Speech, FF, Left, Tape, Mask: Ins, WN
89	Speech, FF, Left, Tape, Mask: Ins, SN
90	Speech, FF, Left, Tape, Mask: Ins, Ext
91	Speech, FF, Left, Tape, Mask: Ipsi, WN
92	Speech, FF, Left, Tape, Mask: Ipsi, SN
93	Speech, FF, Left, Tape, Mask: Ipsi, Ext
94	Speech, FF, Left, Mic
95	Speech, FF, Left, Mic, Mask: FF, WN
96	Speech, FF, Left, Mic, Mask: FF, SN
97	Speech, FF, Left, Mic, Mask: FF, Ext
98	Speech, FF, Left, Mic, Mask: Ins, WN
99	Speech, FF, Left, Mic, Mask: Ins, SN

100	Speech, FF, Left, Mic, Mask: Ins, Ext
101	Speech, FF, Left, Mic, Mask: Ipsi, WN
102	Speech, FF, Left, Mic, Mask: Ipsi, SN
103	Speech, FF, Left, Mic, Mask: Ipsi, Ext
104	Speech, FF, L+R, Tape
105	Speech, FF, L+R, Mic
106	Speech, FF, Right, Tape
107	Speech, FF, Right, Tape, Mask: FF, WN
108	Speech, FF, Right, Tape, Mask: FF, SN
109	Speech, FF, Right, Tape, Mask: FF, Ext
110	Speech, FF, Right, Tape, Mask: Ipsi, WN
111	Speech, FF, Right, Tape, Mask: Ipsi, SN
112	Speech, FF, Right, Tape, Mask: Ipsi, Ext
113	Speech, FF, Right, Mic
114	Speech, FF, Right, Mic, Mask: FF, WN
115	Speech, FF, Right, Mic, Mask: FF, SN
116	Speech, FF, Right, Mic, Mask: FF, Ext
117	Speech, FF, Right, Mic, Mask: Ipsi, WN
118	Speech, FF, Right, Mic, Mask: Ipsi, SN
119	Speech, FF, Right, Mic, Mask: Ipsi, Ext

**SPECIAL TESTS**

120	Special, SISI, Air, Left
121	Special, SISI, Air, Right
122	Special, Fowler
123	Special, Stenger
124	Special, Rainville
125	Vacant
126	Vacant
127	Vacant
128	Tone, Bone, Mask: Air, Left, NBN
129	Tone, FF, Right, Mask: Ins, NBN
130	Speech, Bone, Tape, Mask: Air, Left, WN
131	Speech, Bone, Tape, Mask: Air, Left, SN
132	Speech, Bone, Tape, Mask: Air, Left, Ext
133	Speech, Bone, Mic, Mask: Air, Left, WN
134	Speech, Bone, Mic, Mask: Air, Left, SN
135	Speech, Bone, Mic, Mask: Air, Left, Ext
136	Speech, FF, Right, Tape, Mask: Ins, WN
137	Speech, FF, Right, Tape, Mask: Ins, SN
138	Speech, FF, Right, Tape, Mask: Ins, Ext
139	Speech, FF, Right, Mic, Mask: Ins, WN
140	Speech, FF, Right, Mic, Mask: Ins, SN
141	Speech, FF, Right, Mic, Mask: Ins, Ext
142	Vacant

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**APPENDIX D: PRINTER OPTION TABLE**


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0: Printer Disabled	A4:L,R	No Header	No DataLog	No Averaging
1: Zodiac Printer	A4:L,R	No Header	No DataLog	No Averaging
2: Std. High	A4:L,R	No Header	No DataLog	No Averaging
3: Std. Low	A4:L,R	No Header	No DataLog	No Averaging
4: Printer Disabled	A4:R,L	No Header	No DataLog	No Averaging
5: Zodiac Printer	A4:R,L	No Header	No DataLog	No Averaging
6: Std. High	A4:R,L	No Header	No DataLog	No Averaging
7: Std. Low	A4:R,L	No Header	No DataLog	No Averaging
8: Printer Disabled	110 mm	No Header	No DataLog	No Averaging
9: Zodiac Printer	110 mm	No Header	No DataLog	No Averaging
10: Std. High	110 mm	No Header	No DataLog	No Averaging
11: Std. Low	110 mm	No Header	No DataLog	No Averaging
12: Printer Disabled	(110 mm)	No Header	No DataLog	No Averaging
13: Zodiac Printer	(110 mm)	No Header	No DataLog	No Averaging
14: Std. High	(110 mm)	No Header	No DataLog	No Averaging
15: Std. Low	(110 mm)	No Header	No DataLog	No Averaging
16: Printer Disabled	A4:L,R	Header On	No DataLog	No Averaging
17: Zodiac Printer	A4:L,R	Header On	No DataLog	No Averaging
18: Std. High	A4:L,R	Header On	No DataLog	No Averaging
19: Std. Low	A4:L,R	Header On	No DataLog	No Averaging
20: Printer Disabled	A4:R,L	Header On	No DataLog	No Averaging
21: Zodiac Printer	A4:R,L	Header On	No DataLog	No Averaging
22: Std. High	A4:R,L	Header On	No DataLog	No Averaging
23: Std. Low	A4:R,L	Header On	No DataLog	No Averaging
24: Printer Disabled	110 mm	Header On	No DataLog	No Averaging
25: Zodiac Printer	110 mm	Header On	No DataLog	No Averaging
26: Std. High	110 mm	Header On	No DataLog	No Averaging
27: Std. Low	110 mm	Header On	No DataLog	No Averaging
28: Printer Disabled	(110 mm)	Header On	No DataLog	No Averaging
29: Zodiac Printer	(110 mm)	Header On	No DataLog	No Averaging
30: Std. High	(110 mm)	Header On	No DataLog	No Averaging
31: Std. Low	(110 mm)	Header On	No DataLog	No Averaging
32: Printer Disabled	A4:L,R	No Header	DataLog On	No Averaging
33: Zodiac Printer	A4:L,R	No Header	DataLog On	No Averaging
34: Std. High	A4:L,R	No Header	DataLog On	No Averaging
35: Std. Low	A4:L,R	No Header	DataLog On	No Averaging
36: Printer Disabled	A4:R,L	No Header	DataLog On	No Averaging
37: Zodiac Printer	A4:R,L	No Header	DataLog On	No Averaging
38: Std. High	A4:R,L	No Header	DataLog On	No Averaging
39: Std. Low	A4:R,L	No Header	DataLog On	No Averaging
40: Printer Disabled	110 mm	No Header	DataLog On	No Averaging
41: Zodiac Printer	110 mm	No Header	DataLog On	No Averaging
42: Std. High	110 mm	No Header	DataLog On	No Averaging
43: Std. Low	110 mm	No Header	DataLog On	No Averaging
44: Printer Disabled	(110 mm)	No Header	DataLog On	No Averaging
45: Zodiac Printer	(110 mm)	No Header	DataLog On	No Averaging
46: Std. High	(110 mm)	No Header	DataLog On	No Averaging
47: Std. Low	(110 mm)	No Header	DataLog On	No Averaging
48: Printer Disabled	A4:L,R	Header On	DataLog On	No Averaging
49: Zodiac Printer	A4:L,R	Header On	DataLog On	No Averaging
50: Std. High	A4:L,R	Header On	DataLog On	No Averaging

51: Std. Low	A4:L,R	Header On	DataLog On	No Averaging
52: Printer Disabled	A4:R,L	Header On	DataLog On	No Averaging
53: Zodiac Printer	A4:R,L	Header On	DataLog On	No Averaging
54: Std. High	A4:R,L	Header On	DataLog On	No Averaging
55: Std. Low	A4:R,L	Header On	DataLog On	No Averaging
56: Printer Disabled	110 mm	Header On	DataLog On	No Averaging
57: Zodiac Printer	110 mm	Header On	DataLog On	No Averaging
58: Std. High	110 mm	Header On	DataLog On	No Averaging
59: Std. Low	110 mm	Header On	DataLog On	No Averaging
60: Printer Disabled	(110 mm)	Header On	DataLog On	No Averaging
61: Zodiac Printer	(110 mm)	Header On	DataLog On	No Averaging
62: Std. High	(110 mm)	Header On	DataLog On	No Averaging
63: Std. Low	(110 mm)	Header On	DataLog On	No Averaging
64: Printer Disabled	A4:L,R	No Header	No DataLog	Averaging On
65: Zodiac Printer	A4:L,R	No Header	No DataLog	Averaging On
66: Std. High	A4:L,R	No Header	No DataLog	Averaging On
67: Std. Low	A4:L,R	No Header	No DataLog	Averaging On
68: Printer Disabled	A4:R,L	No Header	No DataLog	Averaging On
69: Zodiac Printer	A4:R,L	No Header	No DataLog	Averaging On
70: Std. High	A4:R,L	No Header	No DataLog	Averaging On
71: Std. Low	A4:R,L	No Header	No DataLog	Averaging On
72: Printer Disabled	110 mm	No Header	No DataLog	Averaging On
73: Zodiac Printer	110 mm	No Header	No DataLog	Averaging On
74: Std. High	110 mm	No Header	No DataLog	Averaging On
75: Std. Low	110 mm	No Header	No DataLog	Averaging On
76: Printer Disabled	(110 mm)	No Header	No DataLog	Averaging On
77: Zodiac Printer	(110 mm)	No Header	No DataLog	Averaging On
78: Std. High	(110 mm)	No Header	No DataLog	Averaging On
79: Std. Low	(110 mm)	No Header	No DataLog	Averaging On
80: Printer Disabled	A4:L,R	Header On	No DataLog	Averaging On
81: Zodiac Printer	A4:L,R	Header On	No DataLog	Averaging On
82: Std. High	A4:L,R	Header On	No DataLog	Averaging On
83: Std. Low	A4:L,R	Header On	No DataLog	Averaging On
84: Printer Disabled	A4:R,L	Header On	No DataLog	Averaging On
85: Zodiac Printer	A4:R,L	Header On	No DataLog	Averaging On
86: Std. High	A4:R,L	Header On	No DataLog	Averaging On
87: Std. Low	A4:R,L	Header On	No DataLog	Averaging On
88: Printer Disabled	110 mm	Header On	No DataLog	Averaging On
89: Zodiac Printer	110 mm	Header On	No DataLog	Averaging On
90: Std. High	110 mm	Header On	No DataLog	Averaging On
91: Std. Low	110 mm	Header On	No DataLog	Averaging On
92: Printer Disabled	(110 mm)	Header On	No DataLog	Averaging On
93: Zodiac Printer	(110 mm)	Header On	No DataLog	Averaging On
94: Std. High	(110 mm)	Header On	No DataLog	Averaging On
95: Std. Low	(110 mm)	Header On	No DataLog	Averaging On
96: Printer Disabled	A4:L,R	No Header	DataLog On	Averaging On
97: Zodiac Printer	A4:L,R	No Header	DataLog On	Averaging On
98: Std. High	A4:L,R	No Header	DataLog On	Averaging On
99: Std. Low	A4:L,R	No Header	DataLog On	Averaging On
100: Printer Disabled	A4:R,L	No Header	DataLog On	Averaging On

101: Zodiac Printer	A4:R,L	No Header	DataLog On	Averaging On
102: Std. High	A4:R,L	No Header	DataLog On	Averaging On
103: Std. Low	A4:R,L	No Header	DataLog On	Averaging On
104: Printer Disabled	110 mm	No Header	DataLog On	Averaging On
105: Zodiac Printer	110 mm	No Header	DataLog On	Averaging On
106: Std. High	110 mm	No Header	DataLog On	Averaging On
107: Std. Low	110 mm	No Header	DataLog On	Averaging On
108: Printer Disabled	(110 mm)	No Header	DataLog On	Averaging On
109: Zodiac Printer	(110 mm)	No Header	DataLog On	Averaging On
110: Std. High	(110 mm)	No Header	DataLog On	Averaging On
111: Std. Low	(110 mm)	No Header	DataLog On	Averaging On
112: Printer Disabled	A4:L,R	Header On	DataLog On	Averaging On
113: Zodiac Printer	A4:L,R	Header On	DataLog On	Averaging On
114: Std. High	A4:L,R	Header On	DataLog On	Averaging On
115: Std. Low	A4:L,R	Header On	DataLog On	Averaging On
116: Printer Disabled	A4:R,L	Header On	DataLog On	Averaging On
117: Zodiac Printer	A4:R,L	Header On	DataLog On	Averaging On
118: Std. High	A4:R,L	Header On	DataLog On	Averaging On
119: Std. Low	A4:R,L	Header On	DataLog On	Averaging On
120: Printer Disabled	110 mm	Header On	DataLog On	Averaging On
121: Zodiac Printer	110 mm	Header On	DataLog On	Averaging On
122: Std. High	110 mm	Header On	DataLog On	Averaging On
123: Std. Low	110 mm	Header On	DataLog On	Averaging On
124: Printer Disabled	(110 mm)	Header On	DataLog On	Averaging On
125: Zodiac Printer	(110 mm)	Header On	DataLog On	Averaging On
126: Std. High	(110 mm)	Header On	DataLog On	Averaging On
127: Std. Low	(110 mm)	Header On	DataLog On	Averaging On



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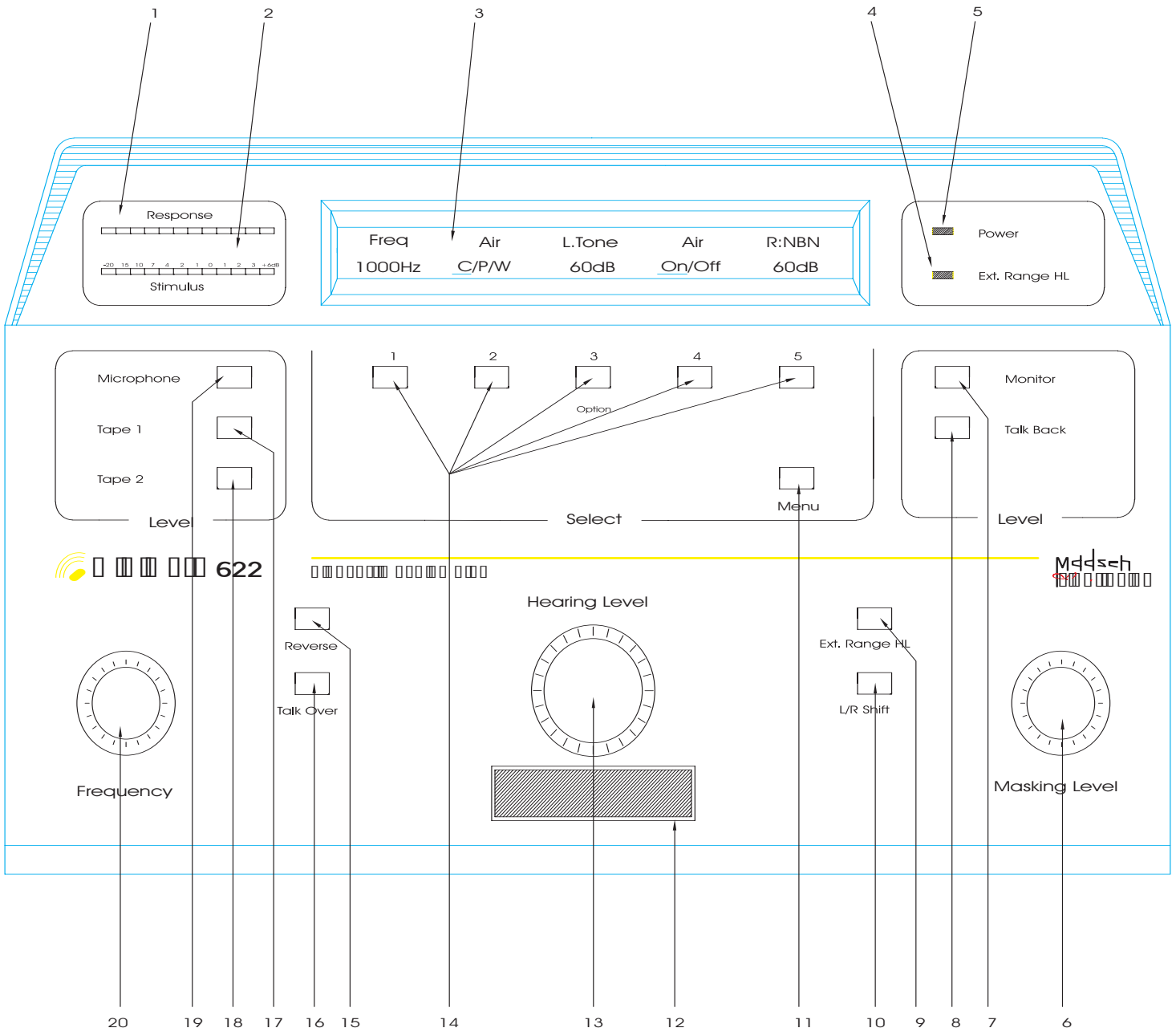


Fig. 5. Midimate 622 Front Panel Layout.