



# Operating Instructions MA 800

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## WARRANTY

This warranty is extended to the original purchaser of the MA 800 Audiometer by Maico through the authorized distributor from whom it was purchased and covers defects in material and workmanship for a period of one year from date of delivery of the audiometer to the original purchaser.

If the MA 800 Audiometer contains a defect in material or workmanship, Maico, at its option, will repair or replace the instrument at no charge except for transportation to and from the point of service. It is the purchaser's responsibility to return the audiometer to the Maico Special Instruments Distributor from whom it was purchased or directly to Maico after receiving authorization to return.

This warranty does not cover accessory cords and breakage or failure occasioned by tampering, misuse, carelessness, accident or modification. The warranty is void if the MA 800 Audiometer is repaired by other than an authorized Maico Special Instrument Service Center.

## NOTE:

Specifications in this manual were in effect at the time of printing. Maico, whose policy is one of continuing progress, reserves the right to discontinue or change specifications or design at any time without notice or incurring obligation.

## WARNING:

The Maico MA 800 is designed to be used with a hospital grade outlet. Injury to personnel or damage to equipment can result when a three-prong to two-prong adapter is connected between the power plug and an AC outlet or extension cord.



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## 1.0 SPECIFICATIONS

### AUDIOMETRIC

Test frequencies:	500, 1000, 2000, 3000, 4000, 6000, 8000 Hz $\pm$ 2%.
Attenuator range:	0-95 dB <sub>HL</sub> $\pm$ 3 dB, 5 dB steps.
Attenuator linearity:	$\pm$ .5 dB/step.
Stimulus:	Pulsed, 2.5 pulses/second or continuous selectable.
Rise/Fall time:	35 msec. typical.
Distortion:	.5% typical, 3% maximum.
Right/Left crosstalk:	-100 dB minimum.
Stimulus on/off ratio:	100 dB or -10 <sub>HL</sub> , whichever is lower.

### PRINTER

Print time:	Approximately 12 seconds.
Chart dimensions:	2.5" (6.35 cm) wide x 3.0" (7.62 cm) maximum diameter roll, thermal sensitive paper.

3M Type 1900 or equivalent, 3.0" (7.62 cm) maximum diameter roll. Printout, Labeled space for: Subject and Examiner. Printed data for: I.D. Number, Data, Job No., Noise Exposure, Hearing Protectors, Birth Date, Test Code Comments, Audiogram Results, Model and Serial Number, Calibration Date, and Calibration Specifications.

### CONTROLS

Front panel:	+5 dB, Stimulus, -10 dB, Left/Right, Save, Enter, Menu, Start, Stop, Print, and Data Entry/Frequency keys.
Rear panel:	Power Switch.

### MECHANICAL

Dimensions:	14.5" (37.5 cm) wide by 4" (10.2 cm) high by 13" (33 cm) deep.
Weight:	10 pounds (4.5 kg) with standard accessories.
Case:	Durable ABS housing.

### ELECTRICAL

Voltage:	117 or 234 VAC $\pm$ 10%, 50-60 Hz externally selectable.
Power consumption:	30 watts
Operation temp.:	60-100°F. (15° to 38°C).
Storage temp.:	0-120°F. (-18° to 49°C).
Test headset:	TDH-39P earphones.



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## 2.0 INTRODUCTION

Your Maico MA 800 Automatic Audiometer provides the latest in hearing evaluation technology. It is easy to use, reliable, and provides accurate testing in a fast, cost effective manner. It is flexible, so that it can be programmed to fit the needs of your particular testing program.

A microprocessor in the MA 800 automatically presents a pure tone stimulus in discrete 5 dB steps, at random intervals of 2 to 4 seconds. The stimulus consists of three pulses, or if continuous tone is selected the stimulus stays on continuously for 1.2 seconds. The hearing level ranges from 0-95 dB, and the frequency ranges from 500 Hz to 8000 Hz. The subject responds by pushing a hand-held switch each time the stimulus is heard. The presentation method program used is the familiar "down 10, up 5" sequence, normally employed in manual pure tone audiometry.

Test repeatability is established by the MA 800 at the beginning of each test to minimize unproductive test time. If the subject responds inappropriately before repeatability has been established by the instrument, the test will be terminated, a signal will sound and "Invalid Retest" message will be displayed on the screen. If, after repeatability has been established, the subject fails to establish a threshold at a given level, the audiometer will skip that frequency, and retest it one additional time after completion of the normal test procedure. When the automatic test procedure has been completed, a signal will sound to alert the operator that the test is finished, and the test results will be printed.

The MA 800 will detect the following inappropriate response:

**MR- Multiple Responses** to a pure tone stimulus presentation.

**NR- No Response**, failure to respond at 95 dB HL.

**SE- Subject Error**, failure to establish a threshold within 17 stimulus presentations.

The MA 800 also has the capability to complete a variety of hearing loss calculations, including Standard Threshold Shift. Important subject information, such as noise exposure level and type of protector can become a part of each subject's audiogram.

On-board memory allows the MA 800 to store 500 audiometric tests, including the patient information recorded at the time of the test. 500 baseline tests may also be stored and used to conduct STS calculations. These test results will remain in the audiometer's battery powered memory even if the instrument is turned off.

The tests stored in memory can be transmitted to an external computer through the audiometer's serial data port. Tests can also be transmitted immediately after the test under computer remote control. The MA 800 accepts many of the same commands from the keyboard panel through the serial interface.



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## 3.0 INSPECTION AND SET-UP

### 3.1 External Inspection

Your MA 800 was carefully inspected and packaged for shipping, however, it is a good practice to thoroughly inspect the outside of the shipping container for signs of damage. If any damage is noted after unpacking, notify your carrier immediately.

### 3.2 Unpacking

Open the top of the shipping carton and pull the foam packing from the top of the instrument. Remove the accessories and carefully remove your MA 800 from the shipping carton. Remove the plastic bag from the instrument and inspect the case for any damage. Notify the carrier immediately if any mechanical damage is noted. This will assure that a proper claim can be made. Save all packing material so the claim adjuster can inspect it as well. Notify Maico as soon as the adjuster has completed the inspection.

**SAVE ALL THE ORIGINAL PACKING MATERIAL AND THE SHIPPING CONTAINER SO THE INSTRUMENT CAN BE WELL-PACKAGED IF IT NEEDS TO BE RETURNED FOR SERVICING OR CALIBRATION.**

### 3.3 Standard Accessories

Please check to verify that all standard accessories listed below are received in good condition. If any accessories are missing or damaged, immediately notify your Maico Special Instrument Distributor or Maico.

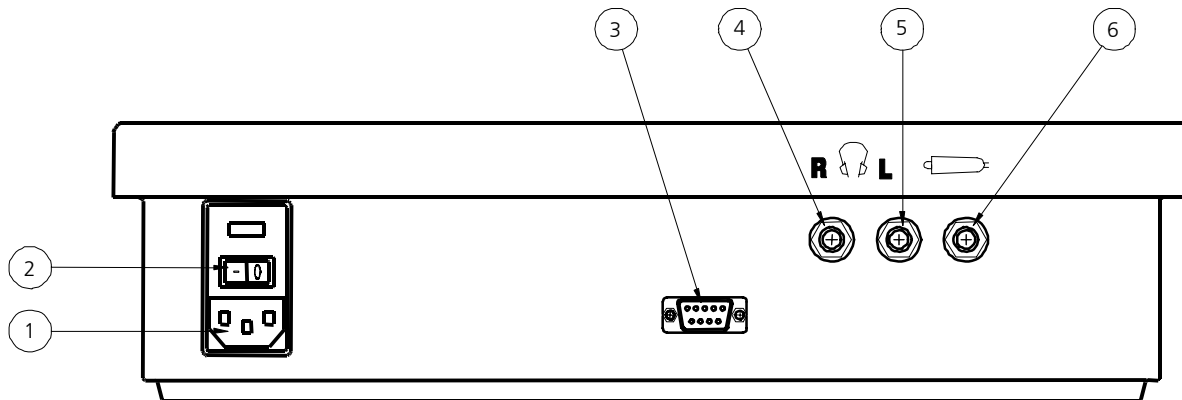
<u>Standard Accessories</u>	<u>Part Number</u>
Chart Paper	5496
Dust Cover	5516
Operating Manual	1162-9403
Patch Cords (2wire)	1025-352
Subject Response Switch	2169
Subject Dual Headset	4687

The earphones are color-coded to eliminate the possibility of incorrect positioning.

**NOTE:** One headset cord has a RED PLUG to identify the RIGHT EARPHONE CORD that connects to the RIGHT PHONE JACK. The BLUE PLUG connects the LEFT PHONE JACK. The SUBJECT RESPONSE CORD connects to the SUBJECT RESPONSE JACK. See Figure 2, below.



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**FIGURE 2**

## MA 800 Rear Description

- |                        |                     |
|------------------------|---------------------|
| 1. AC Power Connection | 5. Left Phone       |
| 2. On/Off Power Switch | 6. Subject Response |
| 3. RS-232 Connector    |                     |
| 4. Right Phone         |                     |

### 3.4 Optional Accessories

<u>Optional Accessories</u>	<u>Part Number</u>
Carrying Case	1035-3002
Audiocup Headset	4695

### 3.5 Sound Room Installation

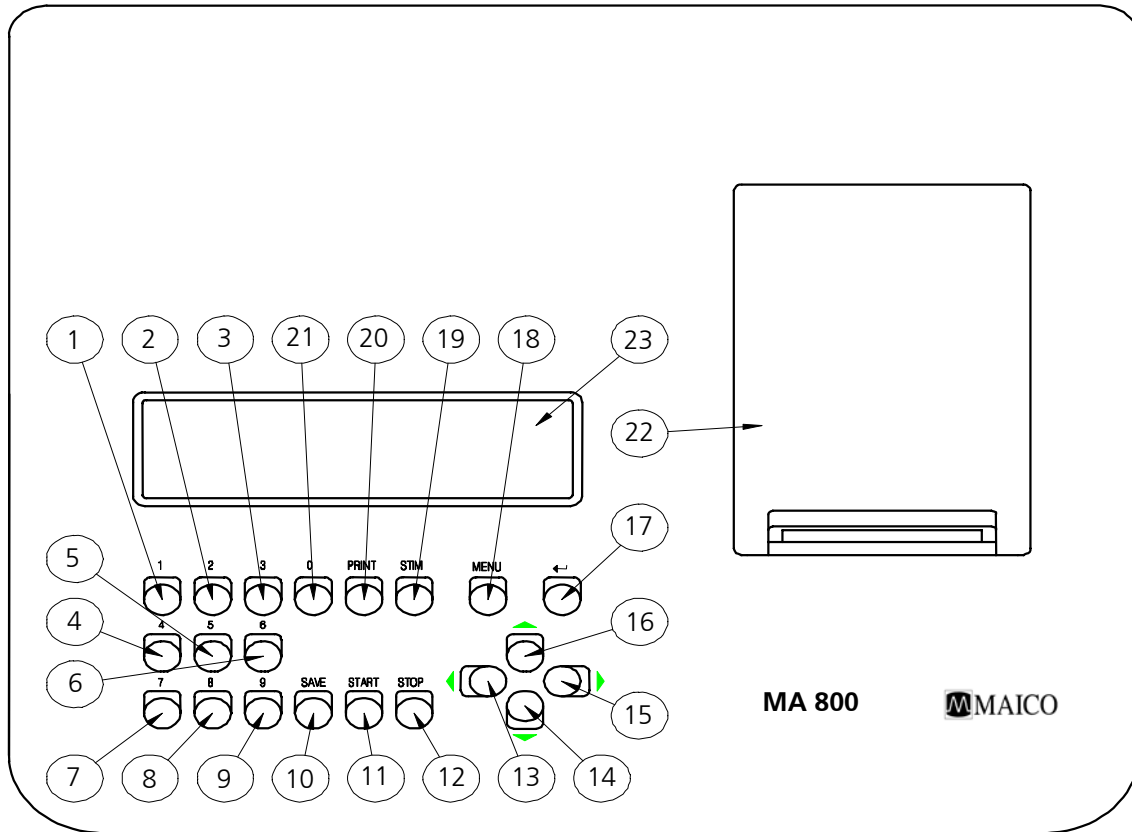
If the MA 800 is used in conjunction with a sound room, three patch cords are needed; two cords are needed for the headset and one is needed for the subject response switch. two-wire patch cords are used for the headset and the subject response switch. These patch cords are supplied with the MA 800.

If you have any questions while installing your MA 800, contact your authorized Maico Special Instrument Distributor.



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## 4.0 KEYPAD FUNCTION GUIDE



**FIGURE 3**

Many of the MA 800 keys have dual functions. The upper characters are used to enter data and set up the MA 800. The lower characters are used to operate the MA 800 audiometer. Instructions and key functions appear on the LCD screen.

### DATA ENTRY

<b>KEY</b>	<b>FUNCTION</b>	<b>AUDIOMETER FUNCTION</b>	
1.	1	Enters 1	Manual selection of 1000 Hz stimulus.
2.	2	Enters 2	Manual selection of 2000 Hz stimulus.
3.	3	Enters 3	Manual selection of 3000 Hz stimulus.
4.	4	Enters 4	Manual selection of 4000 Hz stimulus.
5.	5	Enters 5	Manual selection of 500 Hz stimulus
6.	6	Enters 6	Manual selection of 6000 Hz stimulus.
7.	7	Enters 7	
8.	8	Enters 8	Manual selection of 8000 Hz stimulus.
9.	9	Enters 9	



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## DATA ENTRY

	<u>KEY</u>	<u>FUNCTION</u>	<u>AUDIOMETER FUNCTION</u>
10.	SAVE	Saves data from manual testing and entered baselines.	
11.	START	Starts the automatic test.	
12.	STOP	Stops testing.	
13.	◀	Selects <b>LEFT</b> ear for automatic or manual testing..	Changes setting of highlighted items on the LCD screen
14.	▼	Lowers intensity of stimulus in 10 dB steps.	Moves the highlighted box on the LCD screen.
15.	▶	Selects <b>RIGHT</b> ear for automatic or manual testing.	Changes setting of highlighted items on the LCD screen.
16.	▲	Raises intensity of stimulus in 5 dB steps.	Moves the highlighted box on the LCD screen
17.	↵	ENTER	Enters completed data, selects item or moves to next screen
18.	MENU	Exits the current screen.	
19.	STIM	Enters a space.	Manually presents the stimulus
20.	PRINT	Initiates audiogram printout.	
21.	0	Enters 0	
22.	Print cover	Access to the printer to add or change paper.	
23.	LCD Display	Displays menu screen and test screen with patient information.	

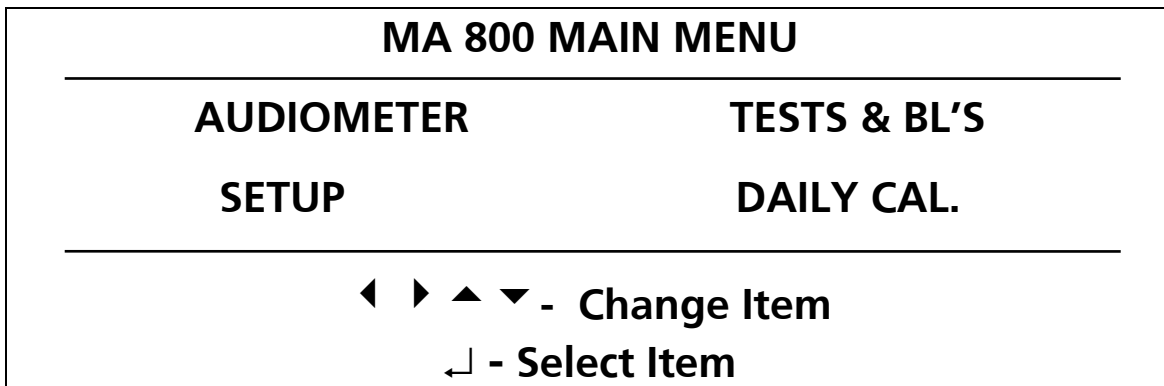


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## 5.0 OPERATION AND SETUP OF THE MA 800

The MA 800 can be customized to your particular testing requirements. There are many options you can select to create the type of test and printout that suits your testing needs.

### 5.1 Main Menu



Highlight the desired item and press ENTER to enter that mode:

AUDIOMETER - begins subject information entry and actual testing (see Section 5.2).

SETUP - allows customization of all aspects of the audiometer (see Section 5.3).

TESTS & BL'S - allows viewing, entering or clearing of tests and baselines stored in memory ( see Section 5.4).

DAILY CAL. - runs a fast daily calibration of the MA 800 (see Section 5.5).

### 5.2 Audiometer

To begin audiometric testing highlight AUDIOMETER in the MA 800 MAIN MENU screen. Press the ENTER key.

#### 5.2.1 Audiometer Subject Information Data Entry

You may desire to have identifying data become part of each subjects audiogram.

Data may include:

Subject ID number for Social Security number, up to 9 digits

Technician ID number, up to 9 digits\*

Job number, up to 6 digits

Department, up to 6 digits

Location, up to 6 digits\*

Exposure, up to 3 digits

Protector, up to 6 digits

Birth date

Sex, M or F; change using ◀ or ▶ keys

\*Data may be entered once, and until changed, is stored in memory permanently until changed.



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Employee data is stored in the MA 800 memory and appears at the top of the audiogram printout. Press the desired upper case characters on the data entry keyboard. When you have completed entering the employee data, press the ENTER key and the following screen will appear. If the individual has been previously stored in memory, once the ID number is entered all patient information entered from the last test will be displayed on the screen, saving time not having to re-enter the information. If the information field has not been turned on from the SETUP, PRINTOUT menu, that field will not be displayed.

<b>SUBJECT ID</b>	<b>11111111</b>	<b>JOB NUMBER</b>	<b>333333</b>
<b>BIRTH DATE</b>	<b>01/07/60</b>	<b>DEPARTMENT</b>	<b>444444</b>
<b>SEX</b>	<b>F</b>	<b>LOCATION</b>	<b>555555</b>
<b>TEST TYPE</b>	<b>ANNUAL</b>	<b>EXPOSURE</b>	<b>777</b>
<b>TECH. ID</b>	<b>123456789</b>	<b>PROTECTOR</b>	<b>888888</b>

---

▲ ▼ - Change Field

↵ - Next Screen MENU - Main Menu

The baseline information can now be entered or press the ENTER key to go to the audiometer testing mode.

<b>BASELINE TEST DATA</b>								
<b>DATE</b>	<b>08/27/96</b>							
<b>FREQ (Hz)</b>	<b>500</b>	<b>1K</b>	<b>2K</b>	<b>3K</b>	<b>4K</b>	<b>6K</b>	<b>8K</b>	
<b>LEFT (dB)</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>
<b>RIGHT (dB)</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>

---

▲ ▼ - Change Field

**ENTER - Manual Test** **MENU - Main Menu**



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Defined questions can be entered from SETUP, PRINTOUT menu and can be used to ask for added information. The answer to the question is a two digit code number.

<b>LISTENS TO LOUD MUSIC</b>	<b>01</b>
<b>HAD AN EAR ACHE</b>	<b>01</b>
<b>NOISY HOBBIES</b>	<b>01</b>
<b>DIFFICULT PATIENT</b>	<b>01</b>
<b>GUNFIRE EXPOSURE</b>	<b>01</b>

---

▲ ▼ - Change Field

↵ - Next Screen MENU – Prev. Screen

## 5.2.2 Audiometer Test Screen

<b>1000 Hz</b>	<b>RESPONSE</b>	<b>STIMULUS</b>	<b>40 dB HL</b>
<hr/>			
<b>FREQ (Hz)</b>	<b>500</b>	<b>1K</b>	<b>2K 3K 4K 6K 8K</b>
<b>LEFT (dB)</b>	<b>00</b>	<b>00</b>	<b>00 00 00 00 00</b>
<b>RIGHT (dB)</b>	<b>00</b>	<b>00</b>	<b>00 00 00 00 00</b>
<hr/>			
<b>START - Start Test</b>		<b>STOP - Stop Test</b>	
<b>MENU - Next Subject</b>			

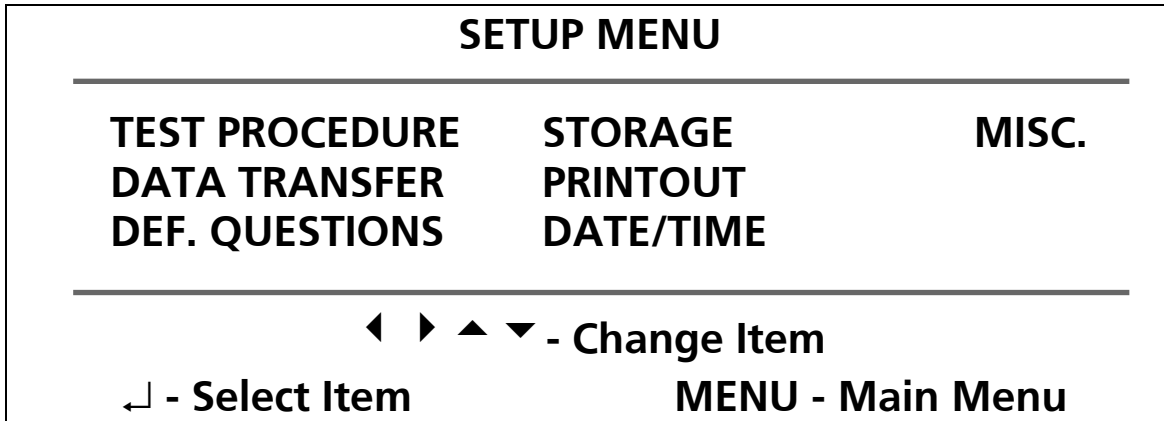
All keys now operate in the audiometric modes. A manual test can be performed at this time or an automatic test can be started by pressing the START key. The starting ear for the automatic test can be selected as right or left in the manual mode, then press START to start the test.



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## 5.3 Setup Menu

To access the screens which lists all of the setup options, move the highlight to SETUP in the MA 800 MAIN MENU screen and press the ENTER key. The following will appear:



Highlight the setup option that you want to change or look at and press the ENTER key.

TEST PROCEDURE allows changes to the type of test, or setting up of a custom test (User Defined).

DATA TRANSFER allows changes to the RS 232 protocol or data information.

DEFINED QUESTIONS allows setup of questions, like exposure to gun fire.

STORAGE allows automatic storage of tests to be turned ON or OFF.

PRINTOUT allows selecting what information is on the printout.

DATE/TIME allows changing the date and time.

MISC. allows changing the display contrast, the beep volume or setting up a password so that no changes can be made to the setup.

The following pages show the various screens that list the options.



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## 5.3.1 Test Procedure Menu's

Test procedure allows you to customize the test to your specific needs and has several sub screens which follow.

<b>CONTINUOUS TONE</b>	<b>ON</b>
<b>MANUAL TEST</b>	<b>ON</b>
<b>SETUP TYPE</b>	<b>STANDARD</b>
<hr/>	
◀ ▶ - <b>Change Setting</b>	▲ ▼ - <b>Change Field</b>
↵ - <b>Next Screen</b>	<b>MENU - Prev Screen</b>

CONTINUOUS TONE - selects pulsed when OFF, or continuous tone stimulus when ON.

MANUAL TEST ON – select to allow individual frequencies to be manually retested after a completed automatic test.

SETUP TYPE selects the type of test to be used in the automatic testing mode. There are four types of tests that have been stored for use, STANDARD, NO 8K, 10dB low, fast, and two user definable tests.

STANDARD test allows testing of all frequencies and 1 retest frequency at 1KHz in the left ear. Note that if the test is changed to start in the right ear the retest frequency also changes ears. The lower test limit is 00HL and the upper limit is 95HL. All start levels are set at VSL (variable start level, see below for an explanation) except for the first frequency in each ear which is set at 40HL.

NO 8K is the same type test except 8KHz is not tested.

10dB LOW is the same type test as the standard test except that the lower test limit is set at 10dB.

FAST test only tests 1, 4, 6KHz in each ear with the lower test limit at 10dB, upper limit is 95dB.



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User defined tests can be selected by changing the test type to USER1 or USER2 and pressing the ENTER key. Create your own test procedure using the following screens.

SECOND EAR SETUP								
	1	2	3	4	5	6	7	8
<b>FREQ</b>	500	1K	2K	3K	4K	6K	8K	
<b>START</b>	40	VSL	VSL	VSL	VSL	VSL	VSL	
<b>LOWER</b>	00	00	00	00	00	00	00	

◀ ▶ - Change Setting                      ▲ ▼ - Change Field  
 ↵ - Next Screen                              MENU - Prev Screen

<b>FIRST EAR:</b>	<b>LEFT</b>
<b>UPPER LIMIT</b>	<b>95</b>

◀ ▶ - Change Item  
 ↵ - Setup Menu                              MENU - Prev Screen

Up to 15 frequencies may be entered. If all frequencies are used this allows one retest frequency to establish repeatability. If fewer frequencies are used more retest frequencies can be used, one for each ear. The START LEVEL determines the level at which that frequency will start. If VSL (Variable Start Level) is selected the test will start at 10 dB above the previous threshold (Note: VSL may not be used for the first frequency).

LOWER sets the lower test limit for the test. This is the lowest possible dB level that the automatic test will reach if all responses are positive. It can be useful for screening tests to speed up test time. FIRST EAR is the starting ear selected at the beginning of each test. This can be changed at the beginning of each test by changing ears, and it also changes the retest ear. The UPPER LIMIT is the maximum level that the test will increase to. By setting this level low for screening tests test time will be reduced.



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## 5.3.2 Data Transfer Menu

<b>BAUD RATE</b>	<b>1200</b>	<b>HARDWARE HANDSHAKE</b>	<b>OFF</b>
<b>PARITY</b>	<b>EVEN</b>	<b>DELIMITED ASCII</b>	<b>OFF</b>
<b>STOP BITS</b>	<b>2</b>	<b>EXTENDED DATA</b>	<b>OFF</b>
<b>XON / OFF</b>	<b>OFF</b>		

---

◀ ▶ - Change Setting                      ▲ ▼ - Change Field  
↵ - Setup Menu                              EXIT - Setup Menu

The Computer Interface Connector is used to connect the MA 800 to any RS-232 standard data communication equipment. The data sent is serial ASCII, asynchronous, with selectable baud rates from 110-9600. Parity can be selected as even, odd or none. Stop bits can be selected as 1 or 2. XON/OFF selected ON inserts XON (DC2) and XOFF (DC4) characters at the beginning and end of each test (see section 12 for more information). Hardware handshaking ON or OFF activates or deactivates use of the CTS/RTS communication lines. Delimited ASCII selected ON inserts commas rather than spaces in between the data fields sent out the RS-232 port. Extended data transmits the baseline data along with all the other information out the RS-232 port.

## 5.3.3 Defined Questions Menu

<b>LISTENS TO LOUD MUSIC</b>	<b>ON</b>
<b>HAD AN EAR ACHE</b>	<b>ON</b>
<b>NOISY HOBBIES</b>	<b>OFF</b>
<b>DIFFICULT PATIENT</b>	<b>ON</b>
<b>GUNFIRE EXPOSURE</b>	<b>ON</b>

---

◀ ▶ - Change Char.                      ▲ ▼ - Next / Prev. Char.  
↵ - Setup Menu                              MENU - Setup Menu

Five questions can be entered onto the screen to be shown on the printout. The questions can be 20 characters long. Examples of possible questions are shown on the menu example.



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## 5.3.4 Storage Menu

Storage allows tests to be stored in internal memory for later recall automatically as tests are completed. Stored information includes Date and Time, ID#, Job #, Dept., Noise Exposure, Protector, Location, Technician ID#, Thresholds and the Baseline test, if entered. This information can then be printed out or transmitted through the RS-232 interface port to a computer (see Section 11).

<b>AUTOMATIC TEST STORAGE      OFF</b>	
<hr/>	
<b>◀ ▶ - Change Setting</b>	
<b>↵ - Setup Menu.</b>	<b>MENU - Prev. Screen</b>

## 5.3.5 Printout Menu

Printout allows customization of test results and subject information allowed on the printout; its sub-screens follow. Selecting items ON will allow them to be printed on the printout.

SUB. DATA is selection of subjective data, which is the actual response from the subject to every presentation or the stimulus.

<b>BIRTH DATE</b>	<b>ON</b>	<b>LOCATION</b>	<b>ON</b>
<b>SEX</b>	<b>ON</b>	<b>EXPOSURE</b>	<b>ON</b>
<b>TECH. ID</b>	<b>ON</b>	<b>PROTECTOR</b>	<b>ON</b>
<b>JOB NUMBER</b>	<b>ON</b>	<b>TEST TYPE</b>	<b>ON</b>
<b>DEPARTMENT</b>	<b>ON</b>	<b>SUB. DATA</b>	<b>ON</b>
<hr/>			
<b>◀ ▶ - Change Setting</b>		<b>▲ ▼ - Change Field</b>	
<b>↵ - Setup Menu</b>		<b>MENU - Prev. Screen</b>	



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CAL. DATE selected ON prints the calibration date. CAL. DUE DATE selected ON prints the calibration due date (usually one year from calibration date). AUDIOGRAM selected ON prints the X and O audiogram of the test results (Note: Only thresholds of 0-85dB appear on the audiogram).

<b>CAL. DATE</b>	<b>ON</b>	<b>AAO-1979</b>	<b>ON</b>
<b>CAL. DUE DATE</b>	<b>ON</b>	<b>AAO-1965</b>	<b>ON</b>
<b>AUDIOGRAM</b>	<b>ON</b>	<b>AMA-1947</b>	<b>ON</b>
<b>STS W-AGE COR.</b>	<b>ON</b>	<b>NY STATE</b>	<b>ON</b>
<b>STS W-O AGE COR.</b>	<b>ON</b>	<b>CHABA</b>	<b>ON</b>

---

◀ ▶ - **Change Setting**                      ▲ ▼ - **Change Field**  
 ↵ - **Next Screen**                                      MENU - **Prev. Screen**

STS W/AGE COR. selected ON prints STS with age correction formula, which is: 2K, 3K, 4K thresholds for each ear, minus the age correction for each threshold, minus the baseline test results for each threshold divided by three. If the result is equal to or greater than 10dB it's a standard threshold shift. STS W/O AGE COR. selected On prints the STS without age correction formula, which is the same as above except the age correction values are not subtracted. OSHA BASE is automatically put on the printout if either STS average is turned ON. It is the average of the baseline at 2, 3 and 4 Khz.

AAO-1979 selected ON prints the hearing impairment calculation established by the American Academy of Ophthalmology and Otolaryngology in 1979, which is: The average of .5K, 1K, 2K, 3K minus 25dB, multiplied by 1.5 for each ear, and the better ear weighted 5 to 1. AAO-1965 selected ON prints the hearing impairment calculation established by the American Academy of Ophthalmology and Otolaryngology in 1965, which is: The average of .5K, 1K, minus 25dB, multiplied by 1.5 for each ear, and the better ear weighted 5 to 1. AAO-1947 selected ON prints the hearing impairment calculation established by the American Medical Association in 1947, which is: The average of .5K, 1K, 2K, 3K, 4K minus 25dB, multiplied by 1.5 (monaural impairment). NY STATE selected ON prints the hearing impairment calculation for New York state which is: The average of 1K, 2K 3K minus 25dB, multiplied by 1.5 for each ear, and the better ear weighted 5 to 1. CHABA selected ON prints the hearing impairment calculation for the Committee on Hearing and Bioacoustics which is: The average of 1K, 2K, 3K minus 35dB, multiplied by 1.75 for each ear and the better ear weighted 5 to 1.



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<b>.5-1-2K AVG.</b>	<b>ON</b>	<b>.5-1-2-3K AVG.</b>	<b>ON</b>
<b>1-2-3K AVG.</b>	<b>ON</b>	<b>WISCONSIN</b>	<b>ON</b>
<b>2-3-4K AVG.</b>	<b>ON</b>	<b>PRINT AFTER TEST</b>	<b>ON</b>
<b>3-4-6K AVG.</b>	<b>ON</b>	<b>PRINT ON COMMAND</b>	<b>ON</b>
<b>4-6-8K AVG.</b>	<b>ON</b>	<b>PRINT NAME</b>	<b>ON</b>

◀ ▶ - Change Setting  
↵ - Next Screen

▲ ▼ - Change Field  
MENU - Prev. Screen

Selecting any of the AVERAGE ON will print the average of those frequencies for each ear. WISCONSIN selected ON prints the hearing impairment calculation for the state of Wisconsin which is: The average of .5K, 1K, 2K, 3K minus 30dB, multiplied by 1.6 for each ear, and the better ear weighted 5 to 1.

PRINT AFTER TEST selected ON prints the entire test results at the end of the test. PRINT ON COMMAND selected ON will only print the test results when the PRINT key is pressed. If both of these are off the test will print the subjective data as the test is in progress and complete the printout at the end of the test. PRINT NAME selected ON will print the company name doing the testing if so entered or any desirable name. The name can be entered from the screen below and can only be 60 characters long (3 lines of 20 each).

**NAME**     **Maico**

◀ ▶ - Change Char.  
↵ - Setup Menu

▲ ▼ - Next/Prev Char.  
EXIT - Prev. Screen



# Operating Instructions MA 800

## 5.3.6 Date/Time Menu

This screen enters a new date or time. To change the information highlight the field and use the change setting keys to change the data.

<b>YEAR</b>	<b>97</b>	<b>HOUR</b>	<b>2</b>
<b>MONTH</b>	<b>12</b>	<b>MINUTE</b>	<b>21</b>
<b>DAY</b>	<b>25</b>	<b>AM / PM</b>	<b>PM</b>
<hr/>			
◀ ▶ - Change Setting		▲ ▼ - Change Field	
↵ - Setup Menu		MENU - Setup Menu	

## 5.3.7 Misc. Menu

<b>DISPLAY CONTRAST</b>	<b>3</b>
<b>BEEP VOLUME</b>	<b>3</b>
<b>SETUP PASSWORD</b>	<b>OFF</b>
<hr/>	
◀ ▶ - Change Setting	
▲ ▼ - Change Field	
↵ - Setup Menu	MENU - Setup Menu

DISPLAY CONTRAST changes the contrast and brightness of the display (0 min. 15 max.).

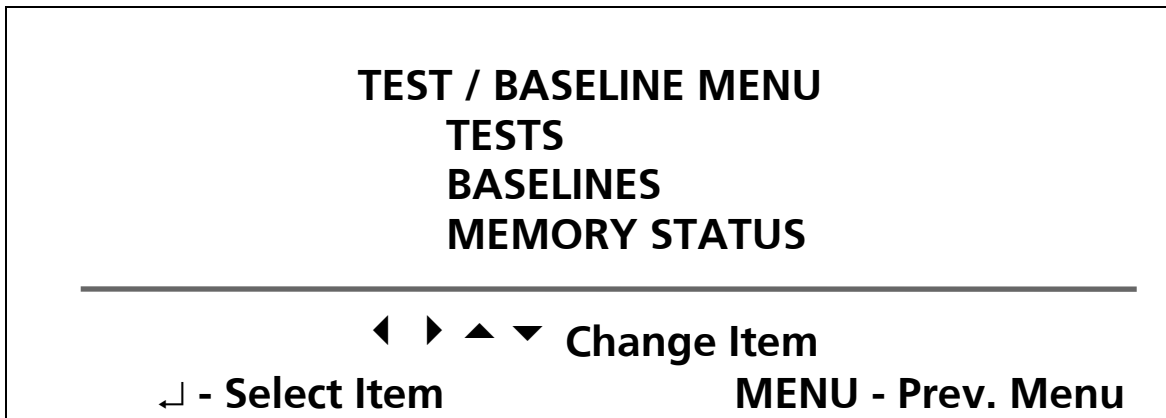
BEEP VOLUME changes the volume level of the keypad beep every time a key is pressed (0= off, 3= loudest). It also enables the "end of the test" or "test rejected alarm".

SETUP PASSWORD selected ON requires the user to enter a password to make changes in the setup screens. If SETUP PASSWORD is ON, changes to the MA 800 setup can only be achieved by entering the password, thereby entering setup mode. The password is 123.



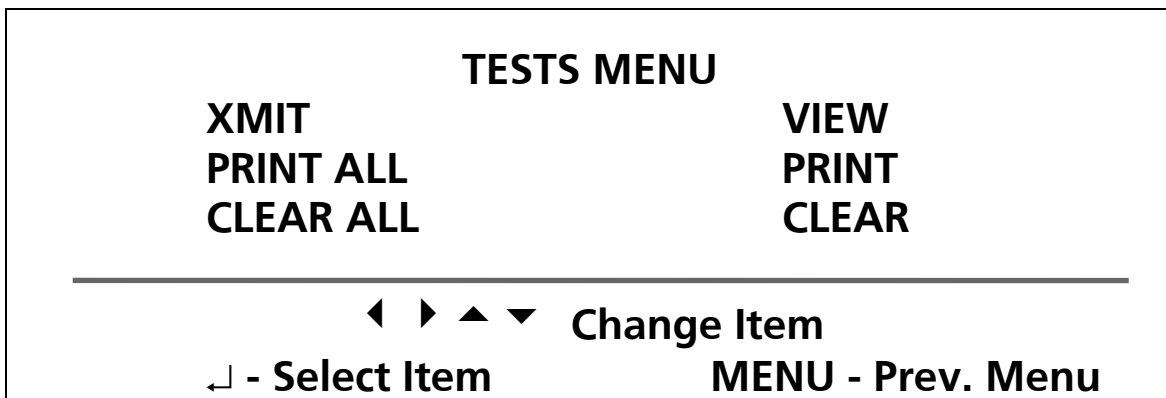
# Operating Instructions MA 800

## 5.4 Tests and Baselines Menu



To access the screens which list the options, highlight TEST & BL'S from the MA 800 MAIN MENU screen and press the ENTER key. The above screen shows the options available for the tests and baselines stored in memory. This screen also has many sub screens which follow. Selecting TESTS advances to the next screen to allow transmitting, printing or clearing of all tests or single tests. Selecting BASELINES advances to the screen to allow transmitting, receiving, printing, clearing or entering/editing of baseline tests. Selecting Memory Status displays the number of tests and baselines stored in memory and the room available.

### 5.4.1 Tests Menu



XMIT allows stored tests to be transmitted through the RS 232 serial interface to a computer (below is what the screen will look like). The number of tests being transmitted will be displayed and the movement of the two timers will indicate that data is being transferred. Tests stored in memory can also be cleared, viewed or printed. All tests stored in memory can also be cleared, or printed by highlighting CLEAR ALL or PRINT ALL. To do a single test option the patient's ID# must be entered to find the tests, then the tests are listed by date and time. Only the last eight tests for a subject may be selected; the others are still in memory, but are not viewable (to view a test that is not listed they must ALL be printed or transmitted). Baseline tests are included when viewed.



# Operating Instructions MA 800

## Transmitting Test 03 of 30

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**Press MENU to quit.**

The same screen is used when doing a PRINT ALL, except it says Printing Test XX of XX. Below is the screen used for the CLEAR ALL command. It gives a second chance in case the screen was entered by mistake. To cancel press the MENU key. To clear all tests in memory press the ENTER key.

## **WARNING: ALL TESTS WILL BE ERASED.**

---

**Press ↵ to continue**  
**Press MENU to quit**

To view, print or clear a test, enter in the patient's ID number. The last 8 tests stored in memory will be displayed by date and time. Highlight the test and press the ENTER key to view, print or clear the test depending on what option was selected from the TESTS menu.

<b>SUBJECT ID 123456789</b>			
<b>1. 8/13/96</b>	<b>10:48</b>	<b>5. 11/20/92</b>	<b>9:05</b>
<b>2. 8/ 7/95</b>	<b>3:36</b>	<b>6. 10/19/91</b>	<b>11.01</b>
<b>3. 10/27/93</b>	<b>9:25</b>	<b>7. 10/ 08/91</b>	<b>8:59</b>
<b>4. 9/ 04/93</b>	<b>3:23</b>	<b>8. 9/28/90</b>	<b>12:21</b>

---

↵ - List tests / Select test

▲ ▼ - Change Item

**MENU - Test Menu**



# Operating Instructions MA 800

## 5.4.2 Baseline Menu

**BASELINES MENU**

<b>XMIT / RCV</b>	<b>VIEW / ENTER / EDIT</b>
<b>PRINT ALL</b>	<b>PRINT</b>
<b>CLEAR ALL</b>	<b>CLEAR</b>

---

◀ ▶ ▲ ▼ **Change Item**

↵ - **Select Item.** **MENU- Prev. Menu.**

Selecting XMIT / RCV advances to the next screen to select transmission or receipt of the baselines (see following). All baselines stored in memory can also be cleared or printed by highlighting CLEAR ALL or PRINT ALL. Select VIEW / ENTER / EDIT to view, edit or enter a baseline test. The patient's ID number must be entered to find or store the test. Select PRINT or CLEAR and enter the patient's ID number to print or clear a single baseline test.

**TRANSMIT AND RECEIVE MENU**

**TRANSMIT**

**RECEIVE**

---

◀ ▶ ▲ ▼ **Change Item.**

↵ - **Select.** **MENU - Baseline Menu.**

TRANSMIT allows stored baselines to be transmitted through the RS-232 serial interface to a computer (following is what the screen will look like). The number of baselines being transmitted will be displayed and the movement of the two timers will indicate that data is being transferred. RECEIVE allows baselines to be downloaded from a computer into the MA 800 through the RS-232 serial interface ( following is what the screen will look like).

**Transmitting Test 03 of 30**

---

**Press MENU to quit**





# Operating Instructions MA 800

**SUBJECT ID 123456789**

**ENTER SUBJECT ID**

**↵ - Print Baseline.**

**MENU - Baseline Menu**

Press PRINT or CLEAR to print or clear a single baseline. The SUBJECT ID number must be entered to find the patient. The screen above is an example.

### 5.4.3 Memory Status Menu

<b>Tests stored</b>	<b>30</b>	<b>Baselines stored</b>	<b>30</b>
<b>Available</b>	<b>470</b>	<b>Available</b>	<b>470</b>

**Press any key to continue.**

The Memory Status Menu displays the number of tests and baselines stored in memory and the room available for more tests or baselines.

### 5.5 Daily Calibration Menu

To do daily calibration highlight DAILY CAL. from the MA 800 MAIN MENU and press the ENTER key. Make sure the artificial patient (bioacoustic calibrator) is connected properly or that the person to be tested is ready. Press the START key to begin the test. If a NR (no response) occurs on the first frequency being tested, the test will abort and instruct you to double check the cable connections plugged into the back of the MA 800.

<b>500 Hz</b>	<b>RESPONSE</b>	<b>STIMULUS</b>	<b>40 dB HL</b>
---------------	-----------------	-----------------	-----------------

<b>FREQ (Hz)</b>	<b>500</b>	<b>1K</b>	<b>2K</b>	<b>3K</b>	<b>4K</b>	<b>6K</b>	<b>8K</b>
<b>LEFT (dB)</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>
<b>RIGHT (dB)</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>

**-DAILY CALIBRATION -**

**START - Start Test**

**STOP - Main Menu**



# Operating Instructions MA 800

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## 6.0 TEST PROCEDURES

### 6.1 Environment

Proper test environment is essential for obtaining valid and reliable hearing thresholds. Ensure that your testing area is quiet and free from audible and visual distractions.

### 6.2 Pretest Preparation

- A. Seat your subject comfortably in a chair near the MA 800. To ensure that responses are based on the stimuli and not visual clues, face the subject away from the audiometer.
- B. Instruct your subject that a short series of three pulsing tones will be heard, i.e. "beep-beep-beep" or one long beep if using continuous tone. Each time the "beeps" are heard, the subject should press and then release the button on top of the patient response switch. Manual operation of the instrument may be used to familiarize the subject with the sound of the tone.

**IMPORTANT: STRESS THAT YOU ARE TRYING TO ASCERTAIN THE LEAST AUDIBLE SOUND THE SUBJECT CAN HEAR. IF THE SUBJECT THINKS A TONE IS HEARD, BUT IS NOT CERTAIN, A RESPONSE SHOULD BE MADE BY PRESSING AND RELEASING THE SWITCH RATHER THAN WAITING FOR THE TONE TO BECOME LOUDER.**

- C. If the subject is wearing glasses or hearing aids, remove them. Put on and adjust the earphones and headband carefully, making certain that the openings on the earphones are in line with ear canals of the subject. Be certain to put the **red** earphone on the **right** ear and the **blue** earphone on the **left** ear.
- D. To conduct an automatic test, see Section 7. To conduct a manual test, turn to Section 8



# Operating Instructions MA 800

## 7.0 AUTOMATIC TESTING

### 7.1 Test Procedure

When all informational data has been entered into the MA 800 and pretest instructions have been given, press the START key. The test will begin at the starting test frequency, at the starting level in the selected ear.

**To activate the talkover microphone, press the RIGHT and LEFT keys simultaneously. Press the STOP key when completed.**

The test will proceed as programmed and will continue unless the retest frequencies are not within 5 dB<sub>HL</sub> of each other. If they are, the better threshold will be recorded and the test will continue. If they are not within 5 dB of each other, the audiometer will sound the alarm and an invalid retest message will be displayed on the screen. Press any key to turn off the alarm.

Clarification of instructions should then be given to the subject. The test can then be continued or stopped.

The following is an example of an audiogram printout that was rejected because the 1000 Hz thresholds was not repeatable.

L 1K 40+30+20+10-15-20+	
10-15-20+	Thresholds at 1000 Hz are
L .5K 30+20+10+00+00	not within 5 dB of
L 1K 10+00-05+00+00+	each other.
TEST BASE SHIFT	
KHZ L R L R L R	
.5 00 NT 00 00 00 - -	Better of two 1KHZ threshold
1 00 NT 00 00 00 - -	is put on the printout.

Message "Invalid Retest" is displayed on the LCD with "Start to Continue" and "Stop to Quit".

The MA 800 Audiometer considers a threshold to have been established when the following steps have been accomplished in the order listed.

1. A positive response (subject response switch pushed within 2 seconds of the onset of the stimulus).
2. A negative response (subject response switch not pushed within 2 seconds of the onset of the stimulus).
3. At least two positive responses at one level. OHL requires two positive responses, all others require three.

(Because of the "down 10 up 5" nature of the test program, this test method requires several crossing of the threshold except at OHL.)



# Operating Instructions MA 800

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Once the retest frequencies have been matched within 5 dB of each other, the best level will be recorded and the test will continue. The remaining frequencies will be tested in the programmed order. Problems encountered during any of these threshold tests (see automatic test result codes) will cause the audiometer to test the next frequency and return to the problem frequency at the completion of the test. Only problems that are encountered twice will be reported in the final audiogram.

If variable start level (VSL) is programmed as the starting level the starting level will be 10 dB higher than the previous threshold. If the previous threshold was not established because of no responses or another error code, the starting level will be 40 HL.

In all tests, if the subject does not respond to the first stimulus by pressing the subject response switch, the stimulus will increase by 20 dB until the subject responds or 95 dBHL is reached. Following that response, all stimulus increases are in 5 dB steps, decreases in 10 dB steps. At the completion of each threshold determination, the printer is activated and prints a record of each stimulus presentation and the subject's response to that presentation. If Print After Test or Print On Command was selected in setup, then it stores all information till the end of the test. This important information provides a permanent record of the actual test procedure for medical/legal purposes.

The STOP key can be used at anytime during the test. Should an unexpected interruption occur, simply press the STOP key. This is indicated by the message "Automatic test paused" displayed on the display. The test will stop until you press the START key to resume testing. To abort the test press the STOP key twice.

Upon completion of the automatic test, an alarm is sounded, unless the alarm is turned off using SETUP options. Press any key to turn off the alarm. Test results will automatically be printed, unless Print On Command was selected in setup. Then the PRINT key must be pressed. For additional printouts, press the PRINT key.

## 7.2 Simplified Automatic Test Summary

- A. Turn rear panel power switch ON.
- B. Press ENTER at highlighted AUDIOMETER.
- C. Enter subject identification data by pressing the desired upper case characters.
- D. Press the up/down arrow keys to scroll through the selections in the subject identification data screen.
- E. Press ENTER again and the audiometer will show the Baseline Test Data screen. Enter this information if you wish. Press the up/down arrow keys to scroll through the selections.
- F. Press ENTER again and the audiometer will show the TEST screen. Conduct a manual test at this time, if desired.
- G. Press START to start the automatic test.  
If interruptions occur during testing, press STOP to pause the test. Press START to resume, or STOP again to abort the test.
- H. At the end of a test, press any key to turn the alarm off. The alarm function is a selectable option.



# Operating Instructions MA 800

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## 7.3 Test Result Codes

Below are examples of codes that may appear on an audiogram printout.

CODE	CAUSE	EXAMPLE
NT (Not Tested)	Frequency has not been tested	TEST BASE SHIFT KHZ L R L R L R .5 NT NT 1 NT NT
MR (Multiple Response)	Subject Response switch was pushed more than once between the onset of two adjacent stimulus presentations. A multiple response must occur twice at any frequency to become an error.	L 1K 40+30+20-25 25 TEST BASE SHIFT KHZ L R L R L R .5 NT NT 1 MR NT
NR (No Response)	Failure to respond at 95 dBHL, or failure to release the response switch.	L 1K 40-60-80-95-95- KHZ L R L R L R .5 NT NT 1 NR NT
SE (Subject Error)	Failure to establish threshold at a given frequency within 16 tone presentations.	L 1K 40+30+20+10+00+ 00-05-10-15-20- 25-30-30-40- KHZ L R L R L R .5 NT NT 1 SE NT

Any test result code (except "NT") which occurs prior to matching the retest frequency thresholds will sound the signal alarm and terminate the test. After matching the retest frequency thresholds, the codes "MR", "SE", OR "NR" will appear only if the subject responds incorrectly during the test and retest. The retest helps to ensure that the incomplete test was a true error, rather than an unintentional mistake by the subject.



# Operating Instructions MA 800

## 8.0 MANUAL TESTING

### 8.1 Test Procedure

Occasionally you will encounter a difficult-to test subject. It may be necessary to establish one or more thresholds or perform the entire test in the manual mode.

The test should be performed using the standard "Ascending/Descending" method.

After all the information data has been entered into the MA 800, and pretest instructions have been given proceed with the following steps to do manual testing.

**To activate the talkover microphone, press the RIGHT and LEFT keys simultaneously. Press the STOP key when completed.**

- A. Press ENTER from the Subject Information screen to enter the Baseline Screen. Press ENTER again to enter the AUDIOMETER test screen.

1000 Hz	RESPONSE	STIMULUS	40 dB HL					
FREQ (Hz)	500	1K	2K	3K	4K	6K	8K	
LEFT (dB)	00	00	00	00	00	00	00	
RIGHT (dB)	00	00	00	00	00	00	00	
<b>START - Start Test</b>				<b>STOP - Stop Test</b>				
<b>MENU - Next Subject</b>								

- B. Press desired **FREQUENCY** key. Note actual frequency on the LCD screen.
- C. Select desired intensity level. Increasing the intensity level is accomplished by pressing the ▲ key. The intensity will increase in 5 dB steps. To decrease the intensity level press the ▼ key. The level will decrease in 10 dB steps
- D. To present the test stimulus, momentarily press and release the **STIM** stimulus key. The tones will be presented to the subject.
- E. Watch the **RESPONSE** light to see if the subject has responded to the stimulus.

**IMPORTANT! DO NOT GIVE YOUR SUBJECT VISUAL CLUES WHEN TESTING OR PRESENTING THE STIMULUS BY MOVING YOUR HEAD, EYES, OR HANDS.**

- F. When the subject has met the threshold criteria, select the next desired intensity level and frequency. Continue testing both ears as required.
- G. When the test is completed, save desired threshold levels with the SAVE key. This stores the test in the audiometer's memory for later recall if Automatic Test Store is selected. Press the PRINT button and the results will be printed out. The printout will not contain the subjective data that appears in "Automatic" testing.

### 8.2 Simplified Manual Test Summary



# Operating Instructions MA 800

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- A. Turn rear panel power switch On.
- B. Press ENTER at the highlighted AUDIOMETER.
- C. Enter the subject identification data by pressing the desired characters. Press ENTER.
- D. Enter Baseline data, if desired. Press ENTER to enter Test Screen.
- E. Manual testing can now be started by selecting the desired phone, frequency and intensity.
- F. Present the stimuli by pressing the STIM switch and store the thresholds for each frequency by pressing the SAVE key when done.
- G. Press PRINT for copy of test results.
- H. Press ENTER to transmit the test results over the serial interface.



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## 8.3 Test Printout Example

ID# : 999999999  
  
SUBJECT:  
X\_\_\_\_\_

DATE: 1/23/98  
TIME: 8:53 AM  
BIRTH DATE: 8 /25/54  
SEX: M  
TECH. ID: 222222222  
JOB NUMBER: 333333  
DEPARTMENT: 444444  
LOCATION: 55555  
EXPOSURE: 666  
PROTECTOR: 777777  
TEST TYPE: ANNUAL  
BASE DATE: 1 /26/80  
SETUP TYPE: STANDARD

L 1K 40-60-80+70+60-65+55-60-65+  
L .5 75+65+55-60-65+55-60-65+  
L 1K 75+65+55-60-65+55-60-65+  
L 2K 75+65+55-60-65+55-60-65+  
L 3K 75+65+55-60-65+55-60-65+  
L 4K 75+65-70+60-65-70+  
L 6K 80+70+60-65-70+60-65-70+  
L 8K 80+70+60-65+55-60-65+  
R .5 40-60-80+70+60-65-70+60-65-70+  
R 1K 80+70+60-65-70+60-65-70+  
R 2K 80+70+60-65+55-

60-65-70+60-65-70+  
R 3K 80+70+60-65-70+60-65-70+  
R 4K 80+70+60-65-70+60-65-70+  
R 6K 80+70+60-65-70+60-65-70+  
R 8K 80+70+60-65+55-60-65+

### TEST RESULTS

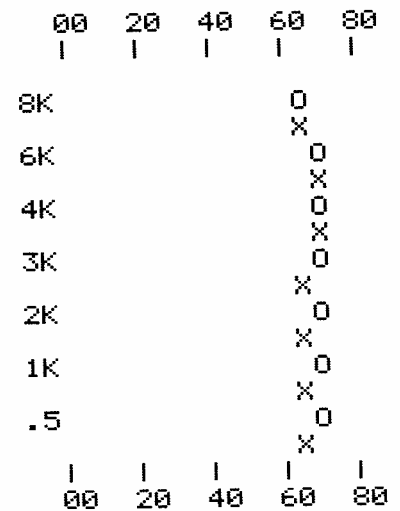
KHZ	TEST		BASE		SHIFT	
	L	R	L	R	L	R
.5	65	70	0	0	65	70
1	65	70	0	0	65	70
2	65	70	0	0	65	70
3	65	70	0	0	65	70
4	70	70	0	0	70	70
6	70	70	0	0	70	70
8	65	65	0	0	65	65

### THRESHOLD AVERAGES

	LEFT	RIGHT
.5-1-2K	65	70
1-2-3K	65	70
2-3-4K	67	70
3-4-6K	68	70
4-6-8K	68	68
.5-1-2-3K	65	70
STS	67	70
STS /P	60	63
OSHA BASE	0	0
AMA-1947	62%	68%
AAO-1979	61%	
AAO-1965	61%	

NY STATE 61%  
CHABA 54%  
WISCONSIN 57%

### AUDIOGRAM



LEFT-X RIGHT-O

MAICO MA800 SN 12345  
CALIBRATED 1-22-98  
CAL. DUE 1-22-99  
ANSI S3.6-1989

!!!!!!!!!!!!!!!!!!!!!!!!!!!!  
!!!!!!!!!!!!!!!!!!!!!!!!!!!!  
!!!!!!!!!!!!!!!!!!!!!!!!!!!!

EXAMINER

X\_\_\_\_\_



# Operating Instructions MA 800

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## 9.0 PRINTER

### 9.1 Operation

The quiet thermal printer of the MA 800 provides a convenient means of retaining a record of your test results. To obtain manual test results, depress PRINT when the test has been completed. Results from automatic testing can be selected to print automatically at the conclusion of a completed test. Additional copies may be obtained by pressing the print key.

### 9.2 Paper Installation

Remove the printer cover by pressing on the rear of the printer compartment door. The door will raise up when the latch is released, allowing access to the printer. Remove the spindle and insert the spindle into the paper roll. Replace the spindle so the paper unrolls from the **bottom side** of the roll. Insert the free end of the paper under the black rubber roller and press the PRINT key until the paper threads through. If additional paper centering on the roller is required, re-cut the paper and try again. Feed the end of the paper through the slot in the printer cover. Replace the printer cover and push down on the rear of the cover to lock it into position.

### 9.3 Paper Specification

The paper used in the MA 800 is thermal-sensitive. For best results use 3M type 1900 thermal paper or equivalent. The roll should be 2.5" wide, with a maximum diameter of 3.0". These rolls are available through your Maico Special Instrument Distributor, and can be ordered using Maico part number 5496. The readability of this paper will remain stable well in excess of ten years under normal storage conditions of 70°F and 50% relative humidity.



# Operating Instructions MA 800

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## 10.0 CARE AND MAINTENANCE

The MA 800 was designed and constructed to provide years of accurate audiometer testing. To ensure accurate performance, proper care must be given.

- A. Handle the headset carefully. If the receivers are snapped together or dropped, calibration can be affected.
- B. Remove cords by holding the base of the jacks. DO NOT DISCONNECT THEM BY PULLING ON THE CORDS.
- C. Have your MA 800 re-calibrated once a year by an authorized Maico Special Instrument Distributor. This is necessary to keep your warranty valid. More importantly, it protects your company, and it's employees through accurate testing.



# Operating Instructions MA 800

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## 11.0 MA 800 RS 232 COMPUTER INTERFACE INFORMATION

### 11.1 RS 232 Configuration and Operation

The computer interface connector is used to connect the MA 800 to any RS 232C standard data communication equipment. The data sent is serial, 7-bit ASCII, with user selectable baud rates from 300 to 9600, even, odd or no parity, and 1 or 2 stop bits all changed from a setup menu. Handshaking is also user selectable between Xon and Xoff handshaking or hardware handshaking (RTS, CTS). The audiometric data consists of all of the test data, and some of the associated data depending on data format. See MA 800 Data Output, Section 11.3 below.

### 11.2 Interface Configuration

The MA 800 is configured at the factory operating at 1200 baud, even parity, 7 data bits and 2 stop bits. The hardware signals used are listed below.

RS 232	
<u>PIN NO.</u>	<u>SIGNAL</u>
5	Chassis Ground (CG)
2	Transmit Data (TD)
3	Receive Data (RD)
8	Request to Send (RTS)
7	Clear To Send (CTS)
6	+12V (DSR)



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## 11.3 MA 800 Data Output

The results of each automatic test can be transmitted by the MA 800 to an external device. The audiometer can operate under local control (keyboard) or remote control (external computer), and each type of control has a different data format. The following is an explanation of the data output that can be selected out of the MA 800.

With Delimited ASCII option enabled the instrument will output data in comma delimited ASCII format (rather than space delimited) during a memory dump. This will place commas between each of the different data fields so that the datastream may be easily imported to database software packages. Tested databases include SC5, Lotus, and Dbase IV. If this option is not selected space delimited ASCII will be transferred instead. The only difference is there are no spaces between the data and time, and the thresholds (A's and B's below and JJ thru WW). Example; Xon AAAAAA, BBBB, CCCCCCCCC, DDDDDD, EEEEE, FFF, GGGGGG, HHHHHH, IHHHHHH, JJ, KK, LL, MM, NN, OO, PP, QQ, RR, SS, TT, UU, VV, WW, XXXXX, YYYYXoff LF CR

AAAAAA=Date=MMDDYY  
BBBB=Time=HHMM  
CCCCCCCC=ID number  
DDDDDD=Job number  
EEEEEE=Department number  
FFF=Noise exposure  
GGGGGG=Protector  
HHHHHH=Location  
IHHHHHH=Technician ID number  
JJ-WW=Hearing thresholds  
XXXXX=Serial number  
YYYY=Calibration date

The remote control commands are listed below.

1. The "D" command is used to get the test results from the MA 800 to the computer under remote control. This command works in the manual mode and at the end of completed test. If used at the end of a rejected test the MA 800 will send out the subjective data, (same format as on printout), so it can be determined from the keyboard why the test was rejected. The following data stream is the data sent when prompted to do so, from the manual or test complete mode.

ABCCCCDDDDDEEEEEEEEEFFFGGHHJJKLLMMNPPQRRSSTTUUVVWXY

The 23 fields are defined as follows:



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A:	Control R (ASCII DC2)
B:	Space
C:	Serial Number
D:	Date
E:	Employee Social Security Number
F:	Calibration Date, MMY Y
GG:	Threshold, Left Ear 500HZ
HH:	Threshold, Right Ear 500 HZ
JJ:	Threshold, Left ear 1KHZ
KK:	Threshold, Right Ear 1KHZ
LL:	Threshold, Left Ear 2KHZ
MM:	Threshold, Right Ear 2KHZ
NN:	Threshold, Left Ear 3KHZ
PP:	Threshold, Right Ear 3KHZ
QQ:	Threshold, Left Ear 4KHZ
RR:	Threshold, Right Ear 4KHZ
SS:	Threshold, Left Ear 6KHZ
TT:	Threshold, Right Ear 6KHZ
UU:	Threshold, Left Ear 8KHZ
VV:	Threshold, Right Ear 8KHZ
W:	Control T (ASCII DC4)
X:	Line Feed
Y:	Carriage Return

## 2. "O" - On Line

The "O" command is used to put the MA 800 under remote control. The instrument will respond by transmitting its serial number back to the computer.

## 3. "E" - Enter

The "E" command has exactly the same function as the ENTER key on the keyboard. It can be used to move from entering the date, ID number, or to start an automatic test, pause the test, or restart a rejected test.

## 4. "S" - Stop

The "S" command has the same function as the stop key on the keyboard. It can be used to stop a test in progress, go to manual retest mode, if manual retest option is selected, or ID mode. Can also used to clear ID# in ID mode.

## 5. "P" - Print

The "P" command is used to generate a printout of the test results on the MA 800 printer. This command may be used in the manual mode, after a rejected or completed test.

## 6. "Q" - Status



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The "Q" command causes the instrument to respond with a character which identifies the current machine status. The external computer can therefore use this command to monitor audiometer operation. The various responses to the "Q" command are as follows.

- a. "D" - ready for date and time entry, 10 characters.
  - b. "I" - ready for ID entry, 9 characters.
  - c. "M" - manual test mode.
  - d. "SE" - subject error in manual test mode.
  - e. "PR" - patient responded in manual mode.
  - f. "A" - automatic test in progress.
  - g. "H" - automatic test is paused.
  - h. "R" - rejected automatic test.
  - i. "C" - completed automatic test.
7. "X" - Sign Off
- The "X" command will abort any function in progress except printing, and return the MA 800 to the data entry mode. The audiometer can then be used under remote control by issuing serial commands or local control by using the keyboard.
8. "V" - Stimulus
- The "V" command has the same function as the stimulus key on the keyboard. It can be used to present the stimulus in the manual mode or the continue a rejected test.
9. "U" - +5dB
- The "U" command raises the HL level 5dB in the manual mode when entered.
10. "Y" - - 10dB
- The "Y" command lowers the HL level 10dB in the manual mode when entered.
11. "T" - Manual Mode Status
- The "T" command requests the status of the MA 800 in the manual mode. It sends to the computer the HL, ear and frequency.
12. "1" - 1KHZ
- When in the manual mode the "1" command changes the frequency to 1KHZ. In the date or ID entry mode it is a numerical value.
13. "2" - 2KHZ
- When in the manual mode the "2" command changes the frequency to 2KHZ. In the date or ID entry mode it is a numerical value.
14. "3" - 3KHZ
- When in the manual mode the "3" command changes the frequency to 3KHZ. In the date or ID entry mode it is a numerical value.
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15. "4" - 4KHZ

When in the manual mode the "4" command changes the frequency to 4KHZ. In the date or ID entry mode it is a numerical value.

16. "5" - 500HZ

When in the manual mode the "5" command changes the frequency to 500HZ. In the date or ID entry mode it is a numerical value.

17. "6" - 6KHZ

When in the manual mode the "6" command changes the frequency to 6KHZ. In the date or ID entry mode it is a numerical value.

18. "7" - R/L

When in the manual mode the "7" command has the same function as the "7" key on the keyboard; it changes phones. In the date or ID entry mode it is a numerical value.

19. "8" - 8KHZ

When in the manual mode the "8" command changes the frequency to 8KHZ. In the date or ID entry mode it is a numerical value.

20. "9" - Store

When in the manual mode the "9" command has the same function as the STORE key on the keyboard. In the date or ID entry mode it is a numerical value.

