

# **OSADA ENDEX-XV**

*Electronic Apex Sensor*

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***OPERATOR'S MANUAL***

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**OSADA INC**

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## **IMPORTANT MESSAGE**

*Read this manual thoroughly before using any part of the Endex XV (15), the latest model of Osada's third generation electronic apex sensor (wet canal measuring devise).*

*Osada Endex is the pioneer of the third generation apex sensor.*

**The principle of the Endex series is significantly different from the conventional apex locators (dry canal measuring devise).**

**Do not attempt to modify the procedures used for other apex locators to make them work for the Endex XV.**

**Use only the accessory parts made for the Endex XV.**

## **INTRODUCTION**

As the previous models *Endex and Endex Plus*, *Endex XV* is an apex sensor with the patented method that enables the users to obtain consistent and accurate readings of root canal length in wet environments (normal canal conditions).

*The Endex XV works as two apex locators built in one: You have options to perform the task of measuring the root canal length in the simpler Auto Reset Mode or in the highly accurate Manual Reset Mode (as in the original Endex) which is necessary in difficult cases.*

*FOR MORE INFORMATION, TECHNICAL ASSISTANCE AND SERVICES, CONTACT*

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*The Endex series are manufactured by*

### **OSADA ELECTRIC CO., LTD.**

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**OSADA ELECTRIC CO., LTD. also manufactures the APIT series (apex locators) marketed in Japan and other countries.**

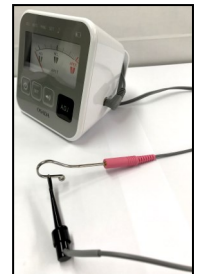
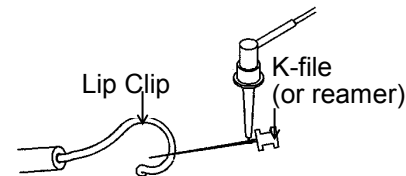
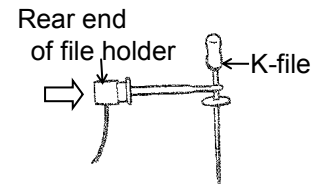
## SPECIFICATIONS OSADA ENDEX XV

<b>Device</b>	<b>Electronic Apex Sensor</b>
<b>Model</b>	<b>Endex XV (EM-S16 ); Apit 15</b>
<b>Console Dimensions</b>	<b>104 mm x 99 mm x 104 mm (h)</b>
<b>Console Weight</b>	<b>290 g excluding the batteries</b>
<b>Power Input (1) 35 mA</b>	<b>DC 6V 4 x AA-size alkaline dry batteries</b>
<b>Power Input (2) 51 mA</b>	<b>DC 4.8V 4 x AA-size rechargeable nickel hydride batteries</b>
<b>Environmental Conditions</b>	<b>Ambient Temperature ....10-40°C Relative Humidity.....30– 75% Atmospheric Pressure .....700—1060hPa Less than 2000 m altitude</b>
<b>Protection against electric shock &amp; Water permeability</b>	<b>Type BF applied part EN60601-1 IPXO</b>

### FEATURES

- **An extremely low current of 2 $\mu$ A (or 1/500 mA)** produces no patient discomfort.
- **Canals can contain blood, tissues, pulp, sodium hypochlorite, and other fluid, because the Endex XV reads under electrically conductive canal conditions.**
- **The large colored liquid crystal display is easy-to-read and the device conditions can be confirmed on the display icons.**
- The digital display shows you what you are sensing at the critical apical region (about 3 mm from the Anatomic Apex) of the canal with adjustable audio alarm.
- **Complete with accessories: Main Probe Cord , File End Probe Cord** (different from those used in Endex and Endex Plus), 2 lip clips and 4 x AA Alkaline batteries.
- **The Dual Mode Apex Sensor: Auto and Manual (as in the Endex Plus).** However, Endex XV has an added feature: while working on "Auto", you can turn to more advanced reading of "Manual" mode by simply touching the "Reset" button in the front.
- **Normal conversion from "Auto" to "Manual"** (or vice versa) can be done with depressing the Main switch and Reset switch at the same time.
- The battery-life of 4 x AA size alkaline dry battery: estimated about 150 hours of use. Replace as needed. **Automatic turn off occurs when the unit is unattended for 5 minutes.** Battery light is a warning that the battery power is getting weak; if no light, batteries are good and working.

## MISCELLANEOUS PICTURES



### MEASURING DIFFICULT CANALS

**When measuring the root canal length, the current must flow through the canal and reach the lip clip placed on the patient's mouth. If there exists electrical leakage (sometimes hard to detect) it is very difficult to measure.**

The **Endex XV** is capable of measuring difficult canals in the Manual Method, however, very small percentages of difficult canals are impossible to measure electronically; in such cases radiographic means must be taken.

Some modification samples of difficult cases are shown on the Page

## TROUBLE SHOOTING:

*continued*

### **BATTERIES:**

**Battery Light is a warning; light comes on when weak or bad battery condition occurs. Ready to be used when it is not lit.**

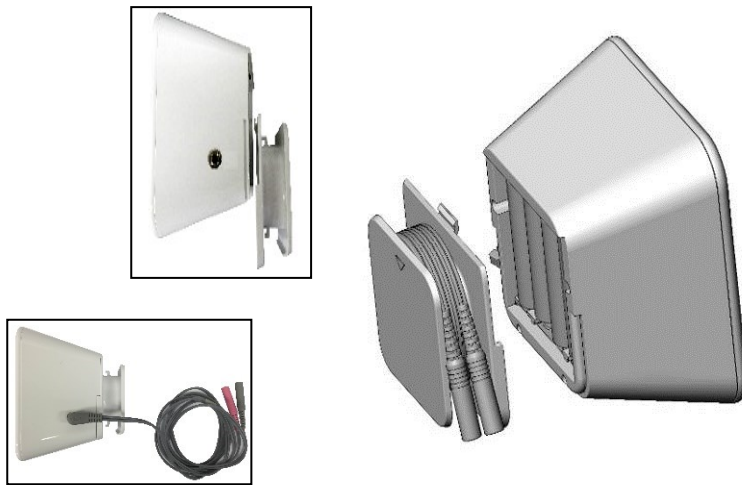
- ◆ 1) Detach the probe storage reel from the back of the console, by sliding down the outer cover in the direction of the arrow.
- ◆ 2) Load the dry batteries as shown in the battery compartment.
- ◆ 3) Return the probe reel to its original position by sliding to close until the audible sound is heard.

### **Checking before use:**

- ◆ 1) Confirm the connections of probe cord, file holder cord and lip clip; Confirm if the power switch works on and off
- ◆ 2) Confirm if the battery level icon is not lit (batteries are good) or lit or flickering (getting weak or time to replace).
- ◆ 3) Confirm the file end clip is not coated with debris.

### **Checking after every use:**

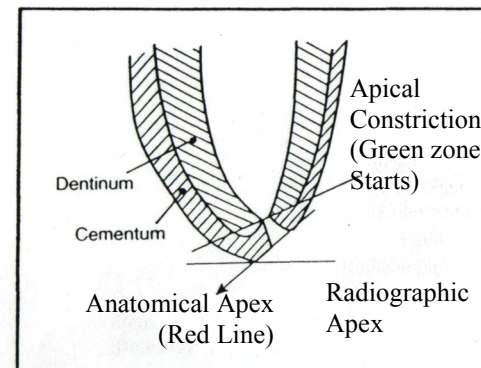
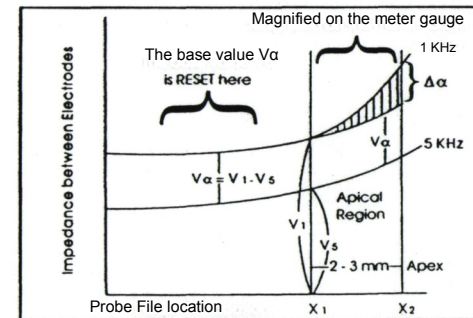
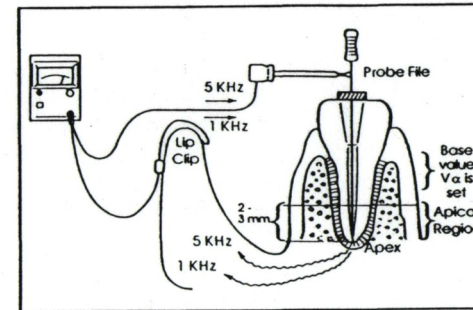
- ◆ Repeat the above steps after each use, to assure this apex sensor is in good condition.



## HERE IS HOW ENDEX WORKS:

### *THE PRINCIPLE OF THE ENDEX Series*

*The Endex operates on the principle that impedance measurements between electrodes differ depending on frequencies used, and differ significantly at apical constriction regions.*



**Utilizing the 1 KHz and 5-KHz frequencies, the Endex employs two major steps for measuring the root canal length in wet canal conditions:**

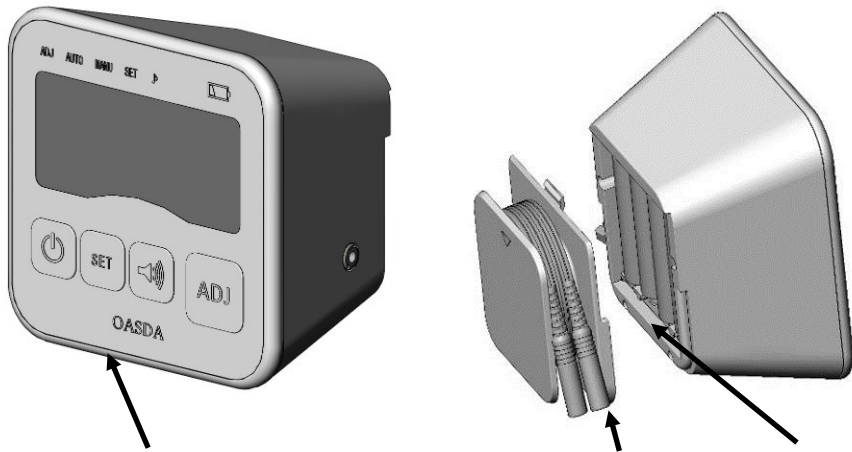
1. Take an initial reading to RESET.
2. Read the Apical Region on the meter as the probe approaches the Anatomical Apex.

***This unique approach has produced clinical accuracy of 96% to 98% (deviation less than 0.5 mm).***

This device uses an electrically conductive field; thus, the canal can contain sodium hypochlorite, saline, blood, tissues, pulp, etc.

# ENDEX XV NOMENCLATURE

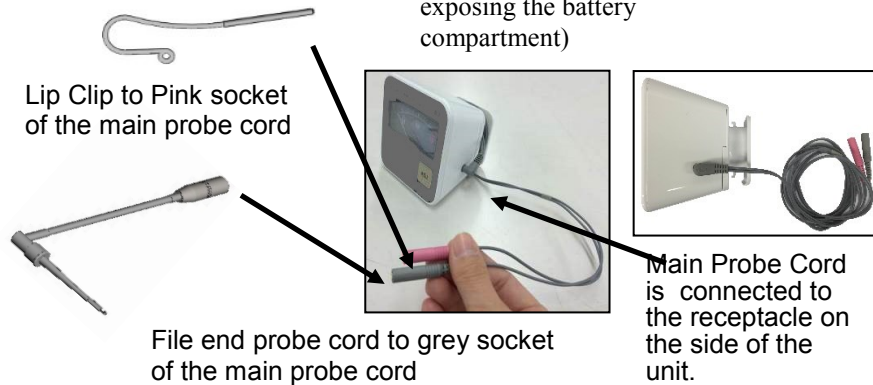
## CONTROL CONSOLE FRONT and REAR



Front Panel with control buttons and activity lights (top row)

Cord storage on the back cover of the unit (separated by pulling down to slide off exposing the battery compartment)

Back Panel with 4 AA batteries installed



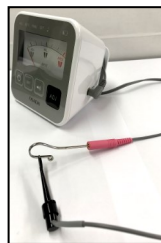
Lip Clip to Pink socket of the main probe cord

File end probe cord to grey socket of the main probe cord

Main Probe Cord is connected to the receptacle on the side of the unit.

### Parts for OSADA ENDEX XV

- Endex XV Control Console
- 4 AA Batteries (Power Supply)
- Main Probe Cord (grey long cord)
- File End Probe Cord
- Lip Clip



## MEASURING DIFFICULT CANALS

When measuring the root canal length, the current must flow through the canal and reach the lip clip placed on the patient's mouth. If there exists electrical leakage (sometimes hard to detect) it is very difficult to measure.

The **Endex XV** is capable of measuring difficult canals in the Manual Method, however, very small percentages of difficult canals are impossible to measure electronically; in such cases radiographic means must be taken.

## TROUBLE SHOOTING:

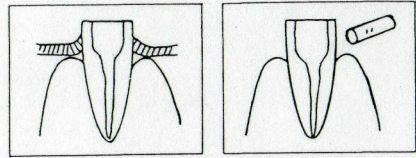
### THE CONSOLE AND THE SCREEN

Depress the <b>Main Switch</b>	Power turns ON and OFF	The screen shows icons.	Battery is good and ready, and replace as needed
To test the screen and confirm the reset mode is either Auto or Manual.	Test the RESET (Adjust) Switch AUTO default Or Manual	The Needle Icon moves to RESET LINE and drop down in Auto, stays on in Manual	<i>The position of the Reset Icon can be adjusted with the Set Switch and Alignment Switch near the batteries</i>
<b>The Alarm Volume Control</b>	Adjust the alarm volume by depressing the Switch at the side—3 stages.	<b>The Set Switch to adjust the Reset Line and Working Length Line</b>	<i>The position of the Reset Icon can be adjusted with the Set Switch and Alignment Switch near the batteries</i>

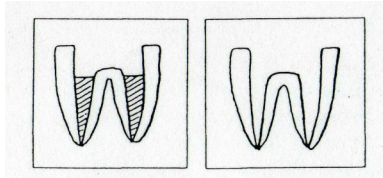
# OSADA ENDEX-XV faceplate

## MODIFICATIONS OF DIFFICULT CANALS

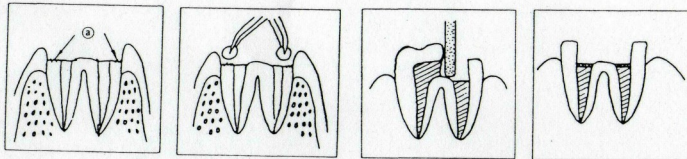
Remove or insulate conductive material.



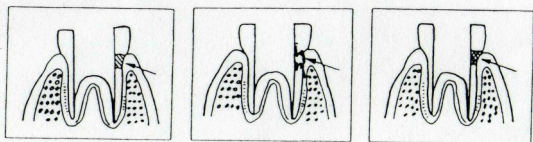
Remove non-conductive material such as gutta percha and clean the canal.



Blot excess blood bridging the canals. Rubber dam is another way to isolate the canal.

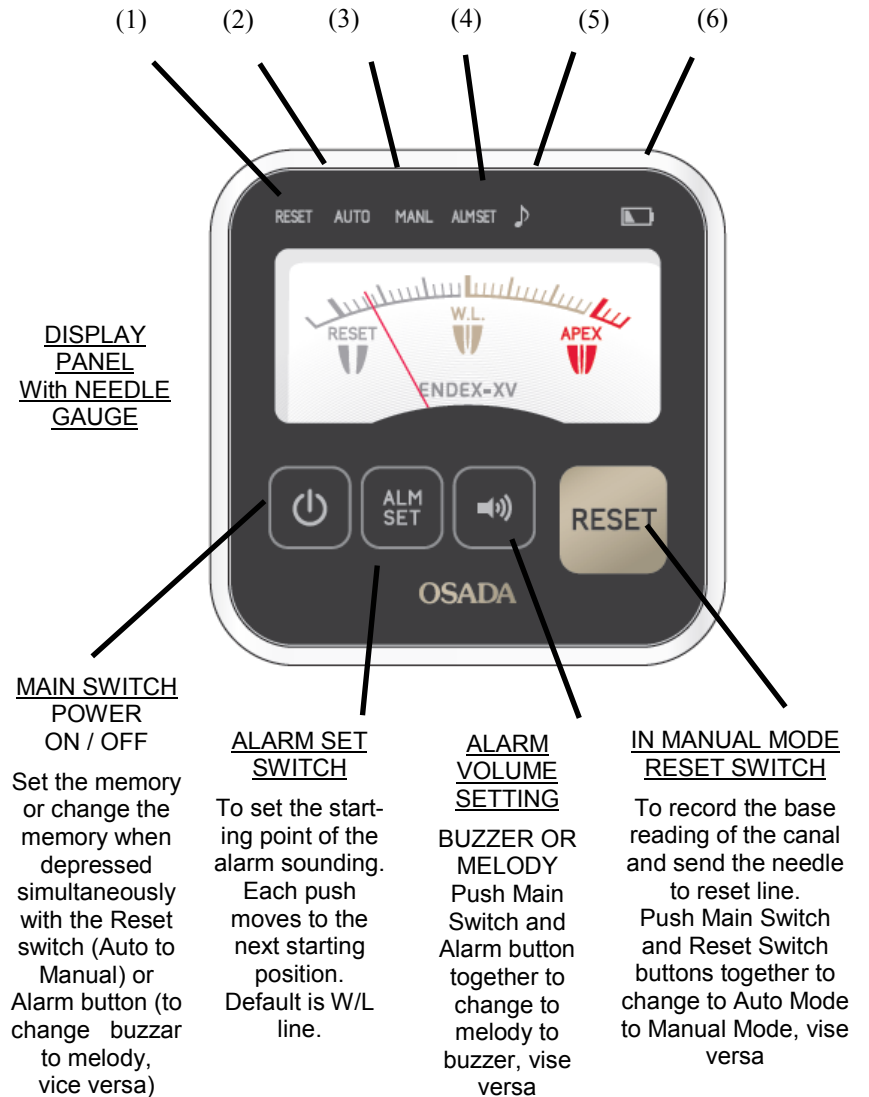


Treat inflammatory decay of bone tissue, fill perforation to seal the canal to prevent leakage.



## ACTIVITY LIGHTS

- (1) RESET (2) AUTO MODE (3) MANUAL MODE (4) ALARM RESET  
(5) MELODY ALARM (6) BATTERY WARNING



## SETTING UP

### THE POWER CONSOLE: FRAGILE! HANDLE WITH CARE!

<b>POWER CONSOLE</b>	<b>Location</b>	Comfortable Room Temperature & Humidity. Choose a safe flat surface, away from direct sunlight, fluid, excess moisture, or clutter.
	<b>Maintenance</b>	Use a cloth or paper towel moistened with ethanol to wipe clean and sanitize the surfaces. Do not use dangerous germicide or harsh chemical solution that will seep in and damage the switches and the screen.
ACCESSORIES	Probe Cords And Lip Clips	A part of the probe cord is hidden inside the Winding Cord Module on the back panel of the console. ES1 is the grey main probe cord for Endex XV. ES2A is also grey, short file end probe cord; to be connected to the grey socket of the ES1. ES3 the lip clip to be inserted into the pink socket. ES2A File End Probe Cord and DS3 Lip Clips are steam autoclavable; at 132°C for 5 min for example.
	Batteries	Need 4 AA Batteries to operate the Endex XV. Replace them as they become weak or empty. As shown in the Battery warning light on the top row.

## SWITCHES and LIGHT ICONS

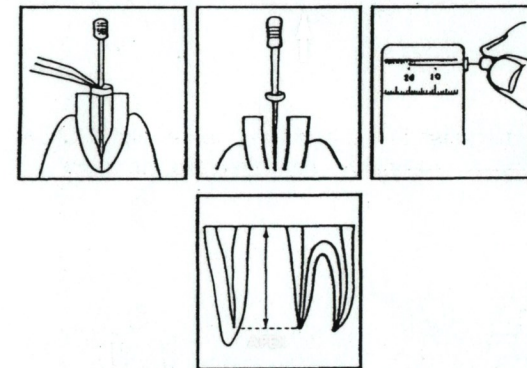
<p>Power Switch ***Change Auto Mode to Manual Mode</p> <p>Alarm Switch</p> <p>Buzzer Switch ***Change Buzzer to Melody</p> <p>Reset Switch ***Change Auto Mode to Manual Mode</p>	<p>Turns on or off the electric power. <u>Depress together Power Switch and Reset Switch</u> to change Auto Mode to Manual Mode, vise versa. Turn off once before each change.</p> <p>Allows the user to change the position where to start the alarm. Default is the WL line in the middle. Each depression will move to next position to sound the intermittent alarm.</p> <p>Adjusts the loudness of the alarm sound. <u>Depress together Power Switch and Buzzer Icon Switch</u> to change Buzzer to Melody, vise versa. Turn off once before each change.</p> <p>In the Manual Mode, When the K-file (or reamer) is inserted into the root canal and the Reset switch is depressed, the meter needle on the display panel falls on "Reset", it means, it has recorded the base reading of this canal.</p>
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### **CAUTION:**

*The meter gauge is a voltage reading and should not be interpreted as an actual linear measurement of distance. The meter response is closer to a logarithmic scale — the most sensitive in the smaller distances near the Apex. Calibration cannot be digitally indicated in millimeters on the meter panel because the condition of each canal varies.*

### WORKING LENGTH:

*Each endodontist must develop the method of determining the working length of the canal. It all depends upon the type of canals being worked on and also how the measurement is taken from the reading. Your experience is the key to success.*



### **WARNING**

- *In Manual Mode, when the RESET value is taken by depressing the RESET button, make sure that the probe file is close to the orifice, no deeper than the middle of the canal.*
- *If it is too close to the apex, working length and the apex reading will be off.*
- *If this occurs, adjust the file to the correct Reset position, and turn off the power and turn on again.*

When you complete the Reset procedure, the needle will settle at the Reset Line in either Auto or Manual mode with the pointer at the reset line. However, sometimes the needle settles slightly off the Reset Line, because the Anatomical Apex is the goal for the Endex.

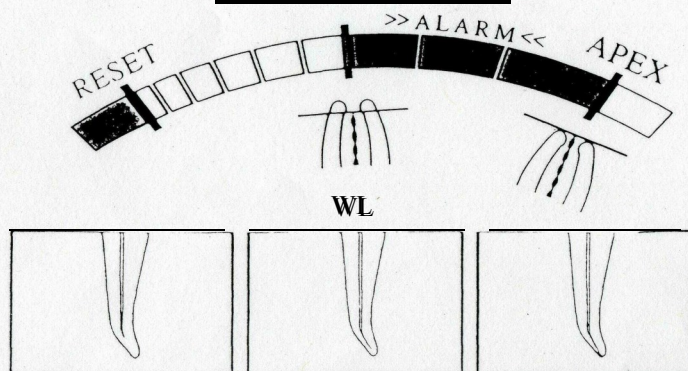
On Endex XV the Working Length Line where buzzer starts to sound, can be adjusted with the Alarm Set Switch; the default is at the middle WL line.

### (3) READING THE APICAL REGION AS THE FILE REACHES THE APEX

#### THE ENDEX SHOWS THE ANATOMICAL APEX ON THE METER GAUGE

Before the Reset Line is defined	<b>BLUE ZONE:</b> The Reset Value is defined and memorized at the Reset Line. < Magnified	<b>GREEN ZONE:</b> with intermittent alarm  <<< Highly Magnified	<b>RED ZONE:</b> with continuous alarm  <<<< The Most Magnified
No memory	<b>Apical Region</b> from 3 mm to the Apical Constriction (narrow foramen) about 0.7 mm	<b>From the Apical Constriction</b> (narrow foramen) about 0.7 mm to the Anatomical Apex	<b>The Anatomical Apex (wide foramen)</b> <b>The Red Line is our GOAL.</b>

#### APICAL REGION




★ RESET Line: about 3 mm from the Apex

GREEN LINE: about 0.7 mm from Apex Apical Constriction

RED LINE: Anatomical APEX

### THE PROBE CORD ASSEMBLY:

ES1	<b>MAIN PROBE CORD</b>	Do not autoclave. Installed in the probe winding module
ES1	Probe Winding Module	After installation of 4 x AA size battery in the back of the console, attach the module to the back of the console, matching the jack to the hole of the front half.
ES1	Split Ends: Grey & Pink	Grey Socket for short file end probe cord Pink Socket for D3 Lip Clip
ES2A	<b>FILE-END PROBE CORD</b> (Autoclavable)	Insert the covered PIN end to the GREY socket of the Main Cord. Make sure to push the sleeve over the connection.
ES2A	Probe File to File Holder Clip 	Depress the back of the probe, place a file in the clip and release the button to secure. Keep the clip free of coating (corrosion) for good contact (occasional filing may be needed).
ES2A	Probe File	K-file or reamer with a plastic handle. Place a marker on the file. File sizes are normally #8 to #15. Use #40 in case of larger canal foramen.
D3	<b>LIP CLIP</b> (Autoclavable)	Insert the straight end to the PINK socket of the Main Cord

#### THE CORD ASSEMBLY CONTINUITY TEST

Connect the L-shaped jack of the main probe cord to the receptacle at the side of the unit.

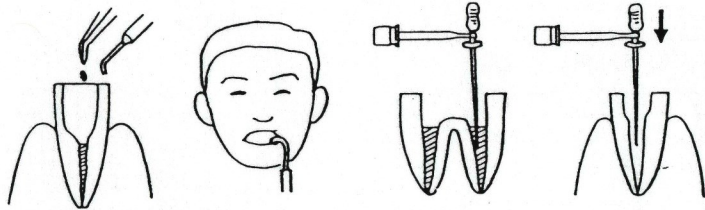


<b>Do The Touch Test</b> by connecting the two electrodes As pictured.	The needle should swing toward the red zone with continuous beep.	<i>If this Touch Test fails, there is a breakage in the cord assembly.</i>	<i>Follow the next steps to isolate the defective part.</i>
Wiggle several spots of the cord assembly.	If the needle moves back and forth, you can spot the damaged part.	Typical spots to check: the ends of the file holder, pink and grey sockets.	<i>Order and replace defective parts as needed.</i>
If no needle movement, remove the short cord from the long cord.	Touch the Grey Socket with the Lip Clip in the Pink Socket.	This touch test indicates that the main cord is OK. <i>Replace the short cord.</i>	<i>If this Touch Test fails, then the main cord is defective.</i>



## THE BASIC PROCEDURE

<p><b>(1) Preparation: add drops of fluid into canal. Place a lip clip (attached to probe cord) onto the patient's mouth.</b></p>	<p><b>(2) Obtain the the initial reading and RESET.</b></p> <p style="text-align: center;">★</p>	<p><b>(3) Read the apical region as you move the probe file.</b></p>
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### (1) PREPARATION OF THE CANAL

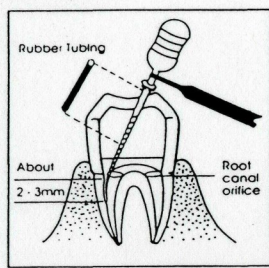
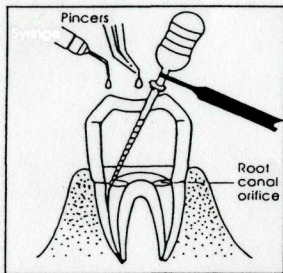
To obtain stable readings, modify the existing conditions containing pus, blood, tissue, pulp, etc. in the canal by adding a few drops of conductive fluid such as saline or sodium hypochlorite.

*Note that tap water is a better conductor than distilled water.*

*If high accuracy is desired, do not use Hydrogen peroxide which is a poor electrolyte.*

*Blot excess irrigant or blood over the canal to isolate the canal. Remove Gutta Percha (a non-electrolyte).*

*Preparations for diverse cases are discussed on page 12. Must use MANUAL MODE.*



### >>> **WARNING** <<<

**The Endex XV** is an electronic device and may cause adverse effects on patients or users with pace makers. Please check with the pace maker manufacturer.

### (2) TAKING THE INITIAL BASE READING BY RESET

The position of the probe file for Reset should be in the middle of the canal and should not be deep in the apical region.  
*The Probe File can be partially covered with a non-contacting material to help alleviate unwanted contact.*  
 When ready, place the Lip Clip on a corner of the patient's mouth.

### (2A) "AUTO" RESET MODE (default)

Place the Probe File in the middle of the canal (just below the orifice).	Attach the file clip on to the K-file (or Reamer) in the canal.	<b>Depress the MAIN SWITCH to turn on the power.</b>	Automatically lights "RESET" icon; needle swings a little and settles onto the Reset Line.
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### OSADA ENDEX-XV HAS A UNIQUE FACILITY!! (2A) to (2M)

*If the Auto Reset Mode cannot be automatically reset (no light on Reset Icon), it indicates that you must go to the Manual Mode to be able to successfully measure a canal with difficult conditions.*

*However, before converting to the Manual Mode, depress the RESET button to see if it turns the RESET icon ON. If successful, go ahead to proceed with the measurement in Auto mode.*

**ENDEX XV allows the user to convert the Auto Mode to Manual Mode:**  
**(1) Turn off the main switch; (2) depress simultaneously the Main Power button and Reset button—turning the Manual Icon on from default Auto.**  
*Repeat the above steps to change Auto to Manual, or Manual to Auto.*

### (2M) "MANUAL" RESET MODE

Attach the file clip on to the K-file and place the Probe File into the canal right below the orifice (before the middle of the canal).	<b>Depress the MAIN SWITCH to turn on the power.</b>	<b>While holding the Probe File in the middle of the canal, depress the RESET button to read the reset line.</b>	The needle swings a little and settles on to the Reset Line.
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