

*Cordless endodontic treatment motorized handpiece
with electronic canal measuring capability*

Tri Auto ZX®

Operation Instructions

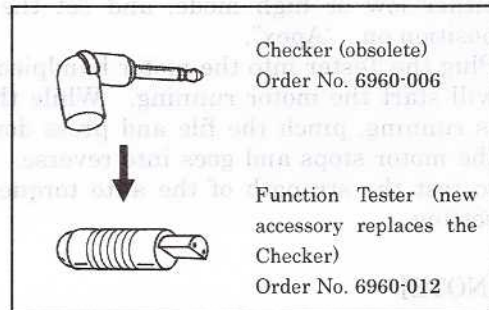
Thank you for purchasing the Tri Auto ZX, a cordless endodontic treatment motorized handpiece with electronic canal measuring capability.
For optimum safety and performance, read this manual thoroughly before using the unit and pay close attention to the warnings and notes.
Keep this manual in a handy place for ready reference.

Manufactured by **J. MORITA MFG. CORP.**
Sold by **J. MORITA EUROPE GMBH**

USP. 5096419
USP. 5211556
USP. 5295833
DBP. PAT. 4126753
DBP. PAT. 4139424
DBP. PAT. 4232487
JAPAN PAT. 2873722
JAPAN PAT. 2873725
JAPAN UM. 2097127
JAPAN DS. 886542

Function Tester Operation Instructions (new accessory)

The Checker used until now has been replaced by the Function Tester. Therefore, follow the instructions on this page instead of those on page 18, "5. Using the Checker" to use the Function Tester.



5. Using the Function Tester

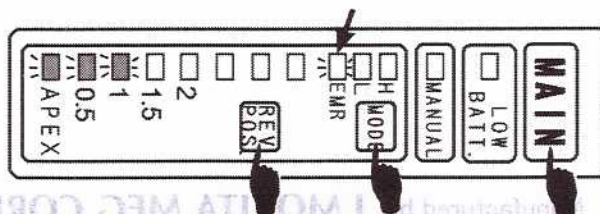
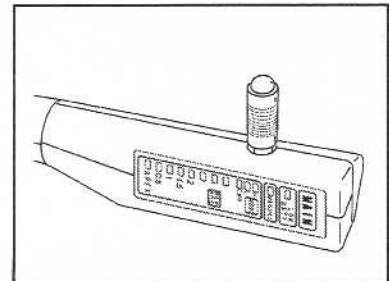
⚠ WARNING

- *Never use the handpiece for actual treatment with the Function Tester inserted. This will disable the auto apical reverse function and could result in a serious injury.*

Use the Function Tester to make sure the motor handpiece and its canal measurement function are working properly. To do this, the setting for reverse position must be Apex.

Test Handpiece's Canal Measurement Function

Turn the Tri Auto on, put the instrument into EMR mode, and set the reverse position on "Apex". Plug the Function Tester into the jack on the motor handpiece. If the instrument is working properly, the LED for Apex or 0.5 or 1 will light up or start blinking.



3. Set for Apex

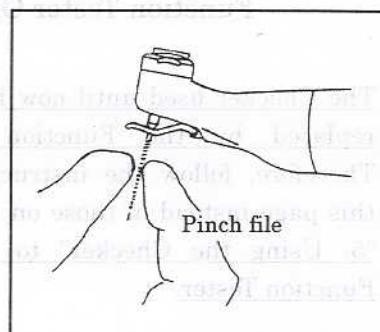
2. Set for
EMR mode

1. Press

Test Auto Torque Reverse

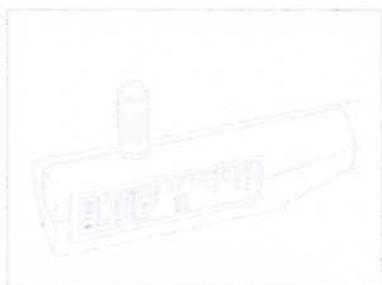
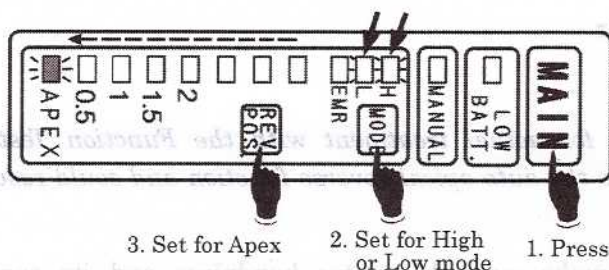
Turn the Tri Auto on, put the instrument into either low or high mode, and set the reverse position on "Apex".

Plug the Tester into the motor handpiece. This will start the motor running. While the motor is running, pinch the file and press down until the motor stops and goes into reverse. Do this to test the strength of the auto torque reverse setting.



[NOTE]

- The file could break if it is pinched too hard.



Manufactured by **J.MORITA MFG.CORP.**


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PREVENT ACCIDENTS

Most operation and maintenance problems result from insufficient attention being paid to basic safety precautions and not being able to foresee the possibilities of accidents.
Problems and accidents are best avoided by foreseeing the possibility of danger and operating the unit in accordance with the manufacturer's recommendations.

First thoroughly read all precautions and instructions pertaining to safety and accident prevention; then, operate the equipment with the utmost caution to prevent either damaging the equipment itself or causing bodily injury.

Note the meaning of the following symbols and expressions:

-  **WARNING** This warns the user of the possibility of bodily injury if the instructions are not followed properly.
- [NOTE]** This alerts the user to the possibility of damage to the equipment or important points concerning operation and performance.

The user (e.g. the hospital, clinic etc.) is the party responsible for the maintenance and proper operation of a medical device.

Medical devices must only be operated by dentists and other legally licensed professionals.

J. Morita provides service data for repair work only to service personnel certified by J. Morita.



The Tri Auto ZX conforms with the European Directive, 93 / 42 / EEC which includes the requirements for electromagnetic compatibility.

Disposal

The package should be recycled. Metal parts of the equipment are disposed as scrap metal. Synthetic materials, electrical components, and printed circuit boards are disposed as electrical scrap. The nickel-cadmium batteries are disposed as special refuse.

Material must be disposed according to the relevant national legal regulations. Consult specialized disposal companies for this purpose. Please inquire of the local city/community administrations concerning local disposal companies.

Transport and Storage Conditions

Ambient temperature range: - 10°C to + 40°C
Relative humidity: 10% to 100%
Atmospheric pressure range: 500 hPa to 1060 hPa

Do not use this equipment for anything other than its specified purpose.

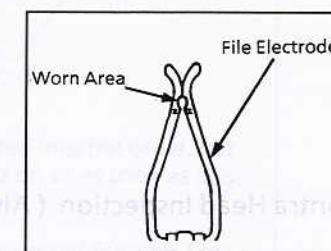
◇ATTENTION

1. The J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from repairs made by personnel not authorized by the J. Morita Mfg. Corp.
2. The J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from any changes, modifications, or alterations of its products.
3. The J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from the use of products or equipment made by other manufacturers, except for those procured by the J. Morita Mfg. Corp.
4. The J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from maintenance or repairs using parts or components other than those specified by the J. Morita Mfg. Corp. and in their original condition.
5. The J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from operating the equipment in ways other than the operating procedures described in this manual or resulting from not following the cautionary remarks and warnings in this manual.
6. The J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from workplace conditions and environment or installation conditions such as improper electrical power supply which do not conform to those stated in this manual.
7. The J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from fires, earthquakes, floods, lightning, natural disasters, or acts of God.

<For Safe Operation>

⚠ WARNING

- Do not use this unit in conjunction with an electric scalpel or on patients who have a pacemaker.
- This unit must not be connected to or used in combination with any other apparatus or system. It must not be used as an integral component of any other apparatus or system. The J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, bodily injury or any other trouble which results from ignoring this prohibition.
- Accurate canal measurement and enlargement is not always possible depending on the shape and condition of the tooth as well as a decline in the equipment's performance. Also nickel-titanium files can sometimes wear out rather quickly depending on the shape and the degree of curvature of the canal. Stop using this device immediately if tactile feedback suggests an abnormal condition.
- If the Tri Auto ZX is set for manual mode, it will start running as soon as the main switch is turned on. (See pages 4 and 15.)
- Always pull lightly on the contra head to make sure it is securely fastened to the motor handpiece. (See page 7.)
- Never put the contra head on or take it off while the motor handpiece is actually running. (See page 7.)
- Never use files which are elongated or damaged in any way. (See page 8.)
- Make sure the file is inserted all the way into the motor. Pull lightly on the file to make sure it is securely installed. (See page 8.)
- Never press the push button while the motor is actually running. (See page 8.)
- Do not injure your fingers when inserting or removing files. (See page 9.)
- Replace the file electrode when it is worn out to the extent indicated in the illustration to the right. It could break if used after reaching this point. (See page 19.)
- Dispose of old nickel-cadmium batteries in an environmentally safe way and in strict accordance with local regulations. (See page 20.)
- The user must not replace the power supply cord; this requires a special tool.



Autoclave Notice



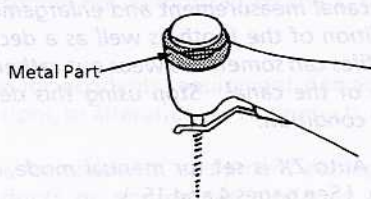
Wash all instruments thoroughly before autoclaving; malfunctions and discoloration can result if all chemicals and foreign debris are not completely removed.

- ※ It is highly recommended that instruments be autoclaved in a sterilization pouch or similar device.
- ※ Resin (plastic) instruments are especially subject to discoloration and shape distortions by chemicals and oils and should always be autoclaved separately from instruments which are used with chemical solutions, oils etc.
- ※ Autoclave and drying temperatures must not exceed 135°C.

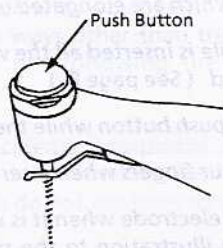
NOTE and WARNINGS

⚠ WARNING

- Do not inadvertently allow the file or the metal part on the top of the contra head to touch the patient's oral mucosa or teeth not being treated. This could automatically start the motor and result in injury to the patient.



- After considerable use, the electrical insulation used in the contra head could become worn. This can result in incorrect readings for the length of canals and other false readings as well as causing the motor to start up automatically when it should not. (Refer to the section below concerning inspection of the contra head.)
- Do not press the push button on the contra head up against the teeth opposite to the one being treated. This can result in incorrect readings or cause the motor to start automatically.

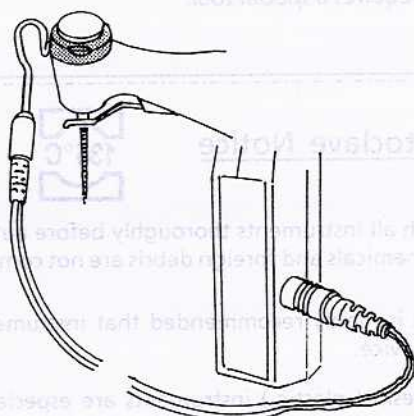


✱ Contra Head Inspection (Always inspect the head before use.)

After considerable use, the electrical insulation used in the contra head could become worn. Insert the plug for the probe cord into its jack on the handpiece.

Turn the main switch on and touch the metal part on the top of the contra head with the contrary electrode on the probe cord.

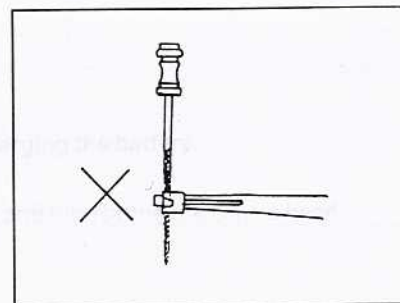
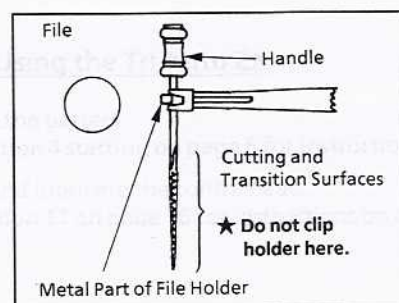
If this causes the canal length LEDs to light up or turns the motor on, the head's electrical insulation is worn, and it must be sent to J. Morita Europe GmbH for repairs.



<For Optimum Performance>

[NOTE]

- Never drop, bump or expose the unit to other kinds of impacts or shocks.
- Stainless steel files cannot be used with this device.
- Nickel-titanium files break rather easily; pay attention to the points listed below to avoid breakage:
 - Before using a nickel-titanium file penetrate the canal up to the apical constriction manually with an ordinary file first.
 - Never use excessive force to insert the file.
 - Completely remove any foreign matter such as cotton wadding before using the file.
 - Never use excessive force to advance the file down the canal.
 - Nickel-titanium files will eventually break due to metal fatigue; do not use the same file to treat more than about 10 canals.
 - Do not use the files on canals which have a high degree of curvature.
 - Try not to trigger the auto torque reverse mechanism when advancing the file down the canal.
 - Do not skip any sizes when moving up from smaller to larger files. Files which are too large for the canal break more easily.
 - Do not use a file to enlarge a canal continuously for more than 10 seconds.
- It takes some practice and experience to learn to use nickel-titanium files effectively. It is recommended that the dentist practice on extracted teeth or root canal models.
- Do not attach the file electrode to files with a shaft diameter of 1.2 mm or greater or large shafted tools such as a Largo burr. The file electrode cannot be attached to files and Gates-Glidden reamers which do not have circular shafts. (It is recommended that tools on which the file electrode cannot be attached be used by setting the handpiece for manual mode.)
- Always clip the file electrode onto the file. If the electrode is not clipped onto the file, the instrument cannot make an accurate measurement and the motor's rotation cannot be controlled.
- The file electrode eventually wears out and must be replaced about every 6 months. An accurate measurement cannot be made with a worn out file electrode.
- Do not set the file electrode into any of the grooves on the shaft of the file.
- When measuring the length of the canal, use a file or reamer with a plastic handle. Do not use files with metal handles; current leakage through the metal handle and the fingers will result in an inaccurate measurement. Even if the file has a plastic handle, do not touch the metal part of the file. Always attach the file holder to the upper part of the file near the handle. The metal and plastic parts of the file holder can be damaged if they are attached to the file's cutting part or the transition from round shaft to cutting part.



[NOTE]

- Do not use damaged file holders; an accurate measurement cannot be made with a damaged file holder.
- Clip the holder onto the file or reamer as shown in diagram 1 below. If the holder is crooked or forced into the position shown in diagram 2, the unit may not make an accurate measurement, and the end of the holder could be damaged.

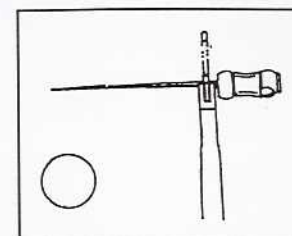


Diagram 1

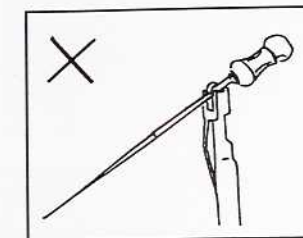
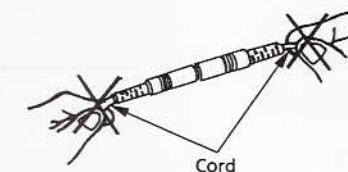
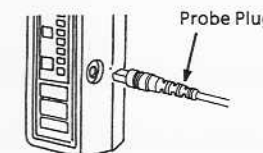


Diagram 2

- Make sure the probe plug is inserted all the way into its jack on the motor handpiece. The instrument cannot make a canal measurement if this plug is not all the way in. Do not drop or bang the plug.
- Plug the contrary electrode into the probe's white connector and the file holder into the gray one. The instrument cannot make a measurement if these are reversed.
- Do not pull the cords when unplugging the probes, file holder, or saliva ejector clip.
- An accurate measurement is not possible if the metal parts on the contra head make contact with the patient's oral mucosa.
- In low and high modes the motor will not rotate until the file has been inserted into the canal, but in the manual mode the motor starts up as soon as the main switch is turned on or as soon as it is put in manual mode.
- Sometimes the instrument will not operate properly if the settings for various special features (see page 21) have been changed, and the new settings conflict with each other. In this case, start over again with the original settings and try entering the new settings again. If the auto torque reverse setting is too weak, the motor will stop and reverse far too often; in this case increase the strength of the setting for the auto torque reverse.
- Do not get chemicals and medications like formalin cresol and hypochlorite on the handpiece. Many chemicals commonly used for treatment can discolor or deform the plastic and metals parts of the handpiece. Wipe off any chemicals that get on the handpiece immediately.
- Lubricate the contra head once a month.
- Always disconnect the battery during shipping or if the instrument will not be used for a relatively long time.



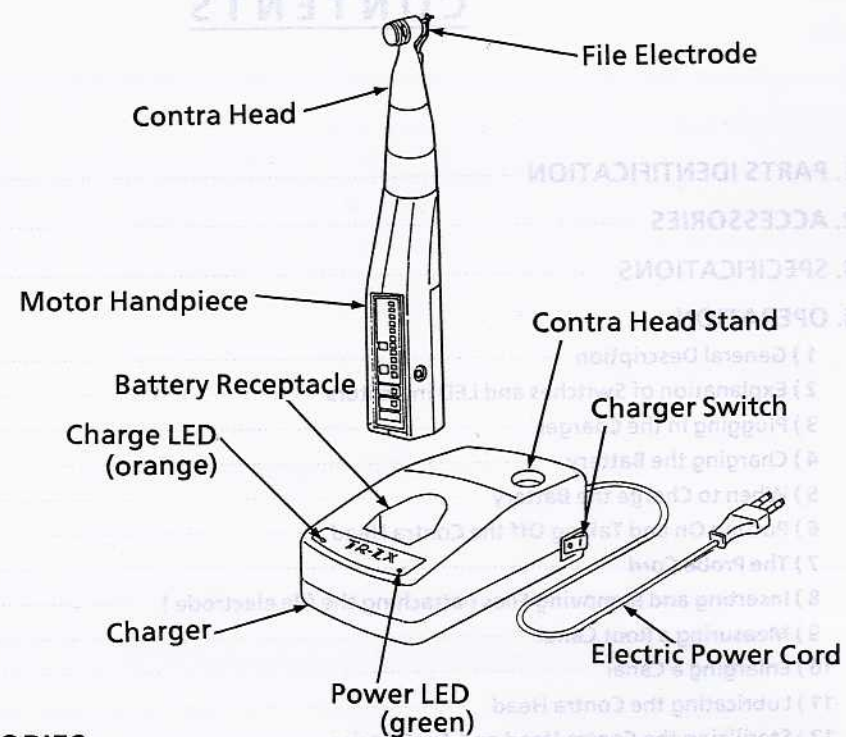
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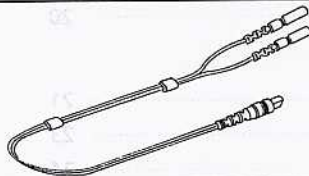
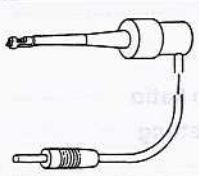
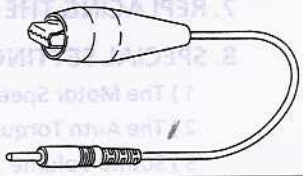


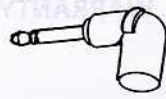
Before Using the Tri Auto ZX

- Charge the battery.
See section 4 starting on page 5 for instructions on charging the battery.
- Clean and lubricate the contra head.
See section 11 on page 16 for instructions on cleaning and lubricating the contra head.

1. PARTS IDENTIFICATION




2. ACCESSORIES


Probe Cord 	File Holder 	Saliva Ejector Clip 
Contrary Electrodes 	AR Oil 	Checker 

3. SPECIFICATIONS


Model	TR - ZX
Type	CE
Battery Charger	
Voltage	A.C. 230V
Frequency	50 / 60Hz
Power Consumption	5 VA
Type of Protection against Electric Shock	Class II Equipment
Degree of Protection against Electric Shock	Type B applied part
Handpiece	
Voltage	D. C. 3.6 ± 1V (nickel-cadmium 3-battery pack)
Power Consumption	2 VA
Type of Protection against Electric Shock	Internally Powered Equipment
Degree of Protection against Electric Shock	Type B applied part
Speed	280 ± 50 rpm (with no load at DC 3.6 V)
Chuck Type	Push Chuck
Outer Dimensions	Charger W 80 × D 123 × H 55 mm Handpiece W 30 × D 37 × L 212 mm
Handpiece Weight	Approx. 160g
Total Weight	Approx. 660g
Operating Conditions	
Ambient temperature range:	+ 10°C to + 40°C
Relative humidity:	30% to 75%
Atmospheric pressure range:	700 hPa to 1060 hPa

SYMBOLS

 : Class II Equipment, Type of Protection against Electric Shock

 : Type B applied part, Degree of Protection against Electric Shock

230V ~ : 230 volt , alternating current

 : Attention, Consult accompanying Operation Instructions

Main Switch Symbols:

○ : Off

| : On

4. OPERATION

1) General Description

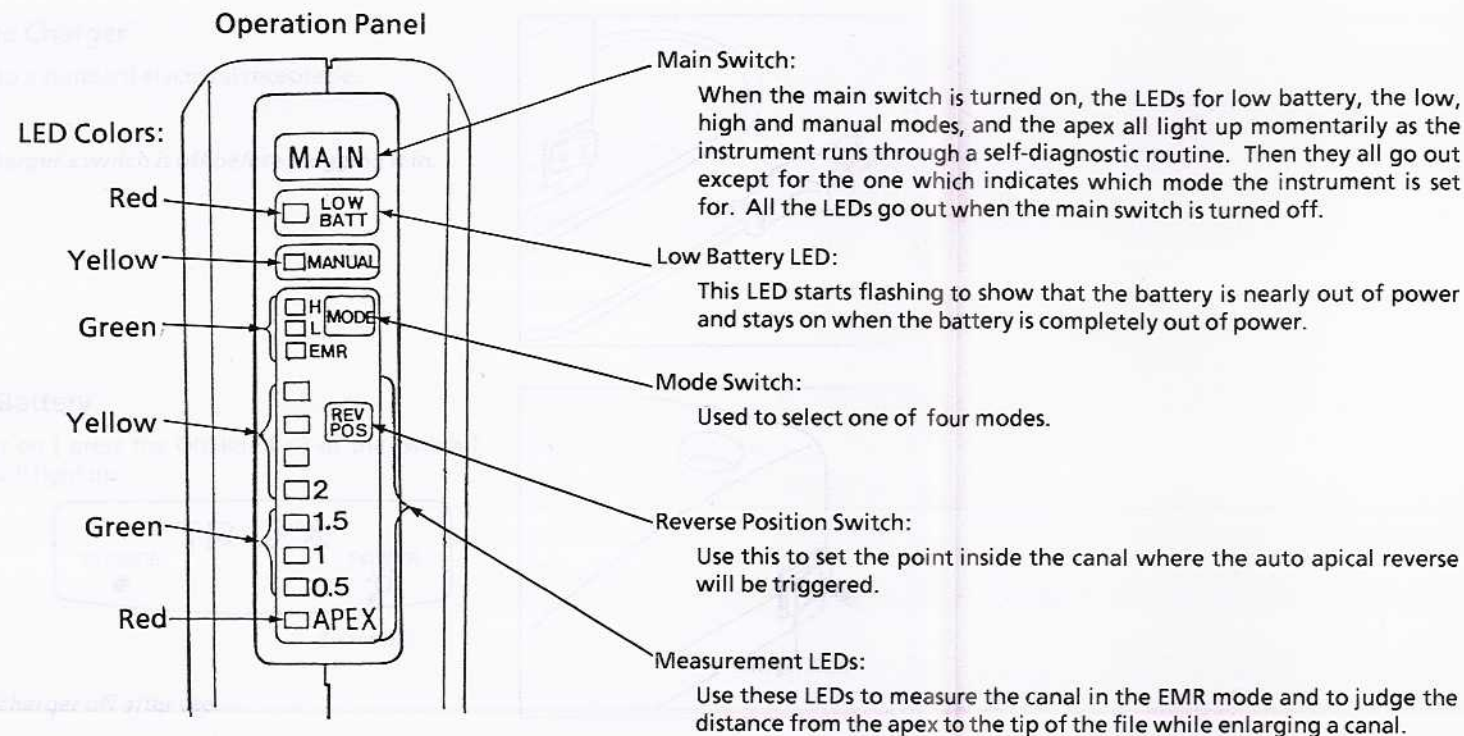
The Tri Auto ZX is an endodontic cordless motor with root canal measurement capability. It can be used to enlarge canals with nickel-titanium files while monitoring the position of the file tip inside the canal with its canal measurement function. It can be used to simply measure the length of the canal, and it can also be used as a low speed motor to work with a Lentulo etc.

The enlargement of curved canals is much easier with nickel-titanium files.

Features:

1. The position of the file tip is monitored and displayed while the canal is being enlarged.
2. **Auto Start and Stop.** The motor handpiece starts automatically when the file is inserted into the canal and a measurement of the canal becomes possible. It also stops automatically when it is taken out of the canal.
3. **Auto Apical Reverse.** When the tip of the file reaches a point inside the canal set by the dentist, the motor handpiece automatically stops and reverses its rotation. An audible signal tells the dentist that the motor handpiece has gone into reverse.
The reverse position switch is used to set the point inside the canal where the motor goes into reverse. This point can be set separately for the low and high modes. (Do not try to push the file down the canal when the motor reverses; the motor will return to forward rotation when the file is brought up towards the crown.)
4. With no load the motor runs at 200 to 300 rpm, the ideal speed for nickel-titanium files. The motor slows down as the load on the file increases. The rate at which the motor slows down can be controlled with the reduction ratio setting. (See page 21.) The factory setting for the low mode is slower than for the high mode. Including manual mode, which is not adjustable, this gives the user three speeds to choose from. Select a speed suitable for the size of the file being used.
5. **Auto Torque Reverse.** This causes the motor to stop and go into reverse if more than the specified degree of torque is applied to the file. The amount of torque required to trigger this function is adjustable (see page 23) ; the factory setting for this function in low mode is less than the one for high mode. A signal sounds when the motor reverses itself. (The auto torque reverse function does not work in manual mode.)
The file is under considerable stress when the auto torque reverse function kicks in; do not apply any force to it at this time. Trying to force the file down the canal could cause it to break.
6. The motor is easy to handle because it has no cord.
7. The contra head can be rotated so that the display is always easily seen regardless of the position of the tooth being treated.
8. Files are easy to replace in the push chuck.
9. An audible signal alerts the operator to the file's position in the canal. (The signal indicating the position of the file in the canal can be turned on and off and the volume can be adjusted. The signal for reverse rotation and the operation switches cannot be turned off.)
10. The motor turns itself off automatically after about 3 minutes if it is not used.
11. The contra head, file holder, and contrary electrode can be autoclaved as long as temperatures do not exceed 135°C.

2) Explanation of Switches and LED indicators



※ Whenever the motor reverses its rotation because the auto apical reverse or auto torque reverse functions have been triggered, the LEDs for the EMR, Low and High modes go out and the one for the Manual mode starts flashing.

Manual Mode [Manual LED lights up]

⚠ WARNING

- If the Tri Auto is set for manual mode, it will start running as soon as the main switch is turned on.
- The motor starts up as soon as the Tri Auto is put in manual mode. Use the main switch to turn the motor on and off in this mode.
- The auto start and stop and auto torque reverse functions do not work in this mode. However, the auto apical reverse works as long as the contrary electrode is hung in the corner of the patient's mouth, the file electrode is clipped on, and all other conditions for tooth measurement are satisfied.
- It is best not to use the Tri Auto in manual mode when working near the apex, mainly because the motor will continue to run if for some reason the canal is not being measured.
- Use this mode to make flares, to prepare the upper portion of the canal, or to use a lentulo to fill a canal with paste.
- Use this mode for tools with a shaft diameter of 1.2 mm or greater and for #8 or larger Pro-Files.
- Use this mode when the canal cannot be measured because of an overflow of blood or chemicals or because it is blocked. (The low and high modes cannot be used if the canal cannot be measured.)

[NOTE]

- Do not use the Tri Auto in manual mode when performing delicate operations near the apical foramen since the auto start and stop and auto torque reverse functions do not work.
- The auto apical reverse will not work if the contrary electrode is not hung in the corner of the patient's mouth, the file electrode is not clipped on, or other conditions for tooth measurement are not satisfied.
- The motor speed reduction ratio cannot be changed for this mode.

EMR Mode [Green EMR LED lights up]

- In this mode the instrument measures a canal using the file holder.
(The motor does not operate.)
- The following explanation of the indicators of the canal's length are estimates based on average canals.
APEX : This indicates the file tip has reached the anatomical apex.
0.5 : This indicates that the tip is 0.5mm away from the apex (towards the crown).
1 : This indicates that the tip is 1.0mm away from the apex (towards the crown).
- Use the 0.5 reading to estimate the length of the canal.
- Calculate the working length of the canal, i.e., the length of the filling material, by subtracting 0.5 mm to 1.0 mm from the length arrived at using the 0.5 reading.

Low Mode [The "L" LED lights up]

- A nickel-titanium file is used to enlarge a canal in low mode.
The motor starts and stops automatically, and the auto apical and auto torque reverse functions are active.
- There are eight possible settings for both the motor speed reduction ratio and the auto torque reverse function; the factory settings for these in low mode are weaker or slower than for the high mode. Change the settings if the auto torque reverse function is activated either too frequently or not often enough or if the motor is too fast or too slow. See pages 21 and 23 for how to do this.

High Mode [The "H" LED lights up]

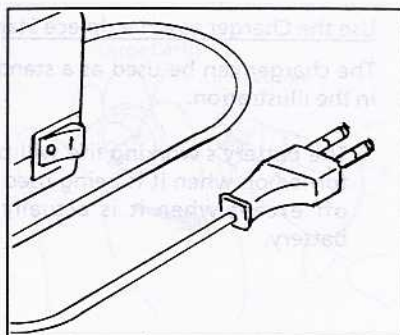
- A nickel-titanium file is used to enlarge a canal in high mode.
The motor starts and stops automatically, and the auto apical and auto torque reverse functions are active.
- The factory settings for the motor speed reduction ratio and the auto torque reverse function are stronger or faster than for the low mode. See pages 21 and 23 for how to adjust these settings if necessary.

3) Plugging In the Charger

Plug the charger into a standard electrical receptacle.

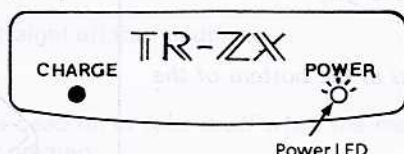
[NOTE]

- Make sure the charger's switch is off before plugging it in.



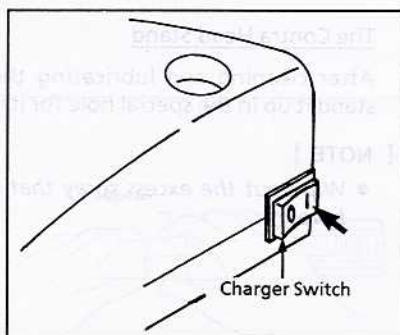
4) Charging the Battery

- ① Turn the charger on [press the ON side (I) of the switch].
The power LED will light up.

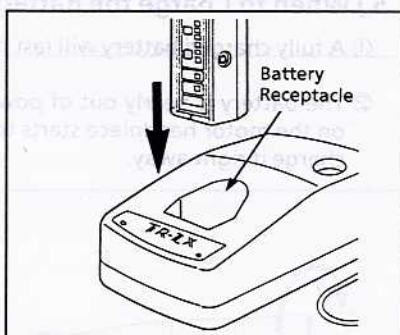
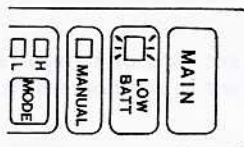
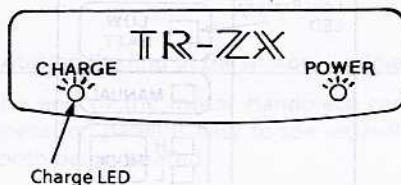


[NOTE]

- Always turn the charger off after use.



- ② Insert the motor handpiece into the charger. The orange charge LED will light up and the charger will start charging the battery. It takes about 60 minutes to charge the battery after the low battery LED on the handpiece has started to flash or stays on continuously.



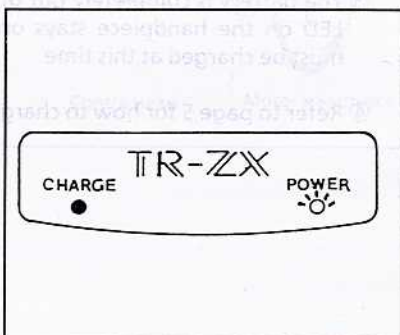
- ③ The charge LED will go out to indicate that the battery has been fully charged.

Cleaning the Charger

- Use a cotton swab or other soft material to wipe the charger's electrodes with disinfecting alcohol.

[NOTE]

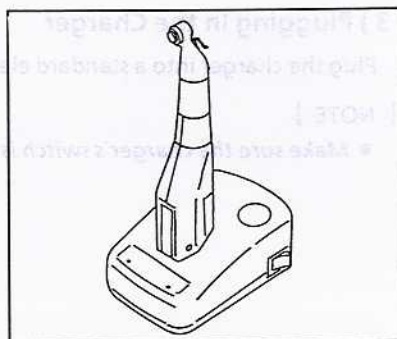
- Make sure metal objects like paper clips, water, or other fluids do not get into the aperture which receives the battery where the electrodes are located.



Use the Charger as a Handpiece Stand

The charger can be used as a stand for the handpiece as shown in the illustration.

- ✖ The battery's working life will be shortened if the charger is turned on when it is being used as a stand. Turn the charger off except when it is actually being used to charge the battery.

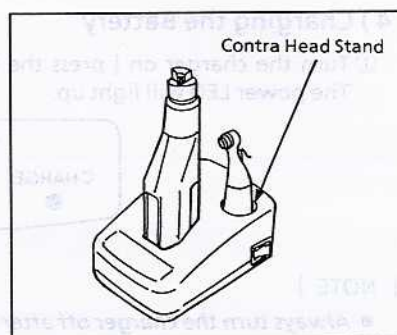


The Contra Head Stand

After cleaning and lubricating the contra head with AR Oil, stand it up in the special hole for it in the charger.

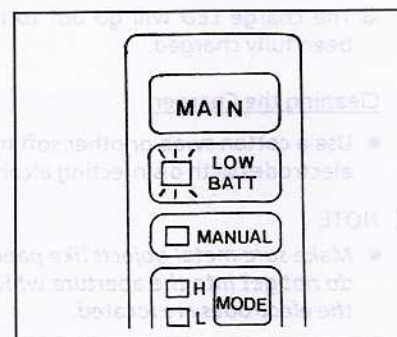
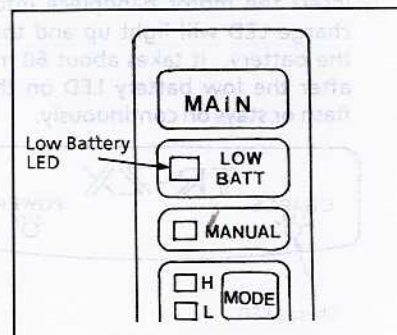
[NOTE]

- Wipe out the excess spray that collects in the bottom of the hole.



5) When to Charge the Battery

- ① A fully charged battery will last from 30 to 60 minutes.
- ② The battery is nearly out of power when the low battery LED on the motor handpiece starts to flash on and off. It's best to charge it right away.
- ③ The battery is completely out of power when the low battery LED on the handpiece stays on continuously. The battery must be charged at this time.
- ④ Refer to page 5 for how to charge the battery.



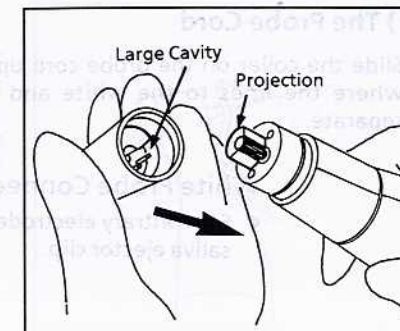
6) Putting On and Taking Off the Contra Head

[Putting the Head On]

Line up the large cavity inside the contra head with the projection on the handpiece and slide the head straight onto the handpiece until it clicks into place.

⚠ WARNING

- Always pull lightly on the contra head to make sure it is securely fastened to the motor handpiece.

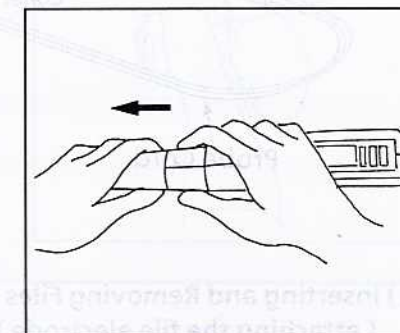


[Taking the Head Off]

Simply pull the head straight off the handpiece.

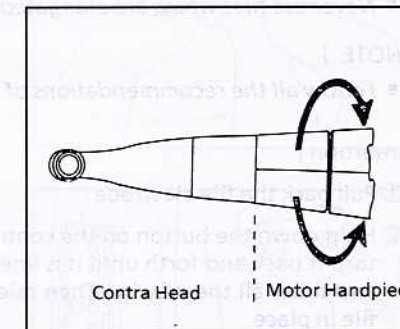
⚠ WARNING

- Never put the contra head on or take it off while the motor handpiece is actually running.



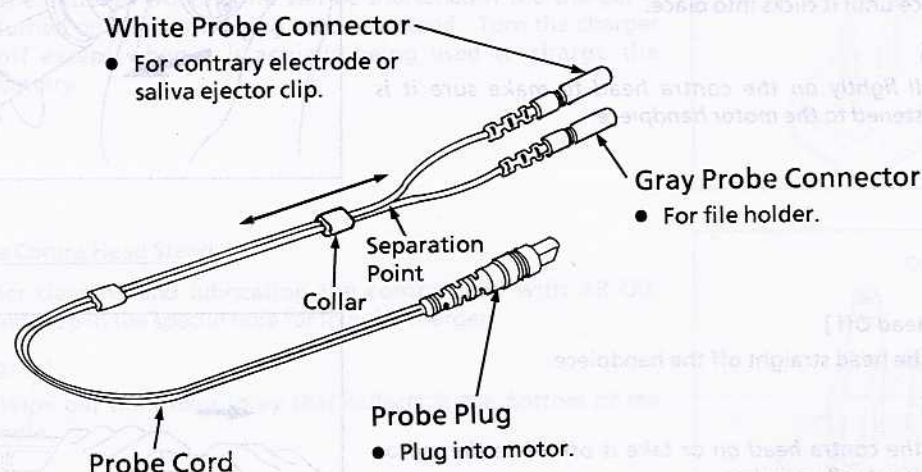
Rotating the End of the Motor Handpiece

The end of the motor handpiece can be rotated so that the operation panel is easy to see regardless of the position of the tooth being treated.



7) The Probe Cord

Slide the collar on the probe cord up or down to set the point where the lines to the white and grey connectors start to separate.



8) Inserting and Removing Files (attaching the file electrode)

Use nickel-titanium files.

⚠ WARNING

- Never use files which are elongated or damaged in any way.

[NOTE]

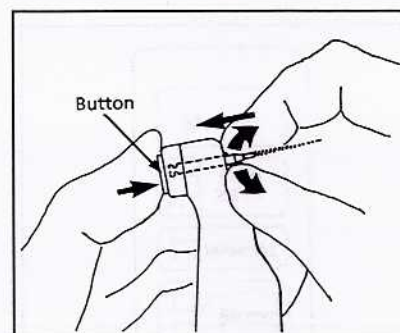
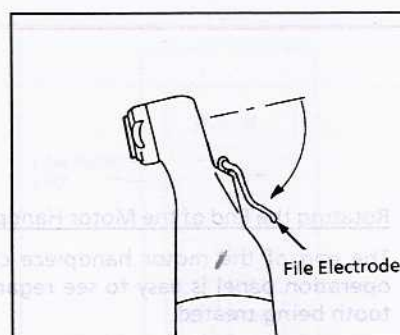
- Follow all the recommendations of the file's manufacturer.

[Insertion]

- ① Pull back the file electrode.
- ② Hold down the button on the contra head. Insert the file and turn it back and forth until it is lined up with the latch groove and slides all the way in. Then release the button to lock the file in place.

⚠ WARNING

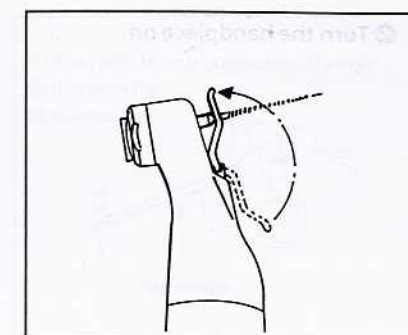
- Make sure the file goes all the way in. Give it a light tug to make sure it is securely held by the chuck.
- Never push the button down while the motor is actually running.



[NOTE]

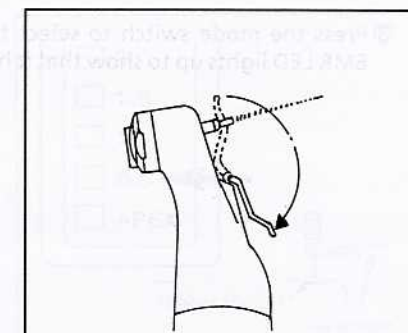
- Do not attach the file electrode to files with a shaft diameter of 1.2 mm or greater or large shafted tools such as a Largo burr. The file electrode cannot be attached to files and Gates-Glidden reamers which do not have circular shafts. (It is recommended that tools on which the file electrode cannot be attached be used by setting the handpiece for manual mode.)

- ③ Clip the file electrode securely onto the file.



[Removal]

- ① Unclip the file electrode.



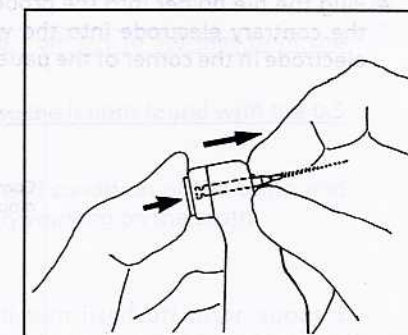
- ② Hold down the button on the contra head and pull the file straight out.

⚠ WARNING

- Do not injure your fingers when inserting and removing files.

[NOTE]

- Inserting or removing files without holding down the button will damage the chuck.



9) Measuring a Root Canal

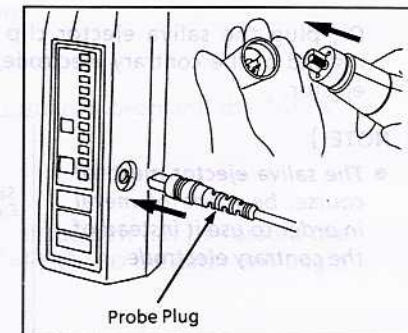
- ※ If measuring a canal results in inconsistent or unstable readings, the canal can probably not be accurately measured. In this case check the position of the file by taking an x-ray with the file inserted.

- ※ Take the contra head off the motor handpiece when measuring a canal.

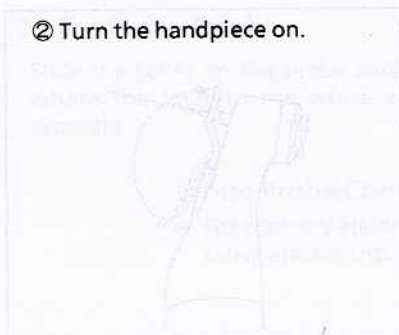
- ① Insert the probe cord's plug into its jack on the motor handpiece.

[NOTE]

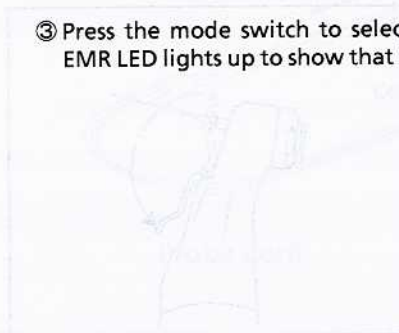
- Do not pull on the cord to unplug the cord. Always grip the connector itself.



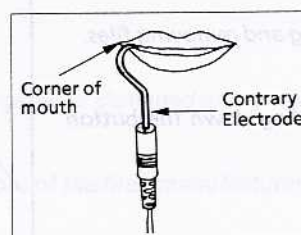
② Turn the handpiece on.



③ Press the mode switch to select the EMR mode. The green EMR LED lights up to show that it has been selected.



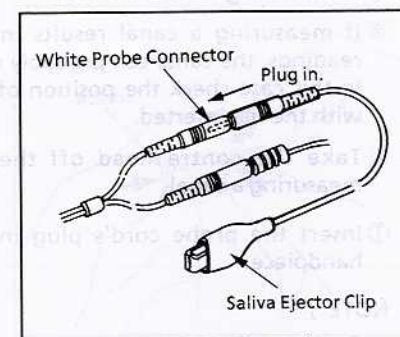
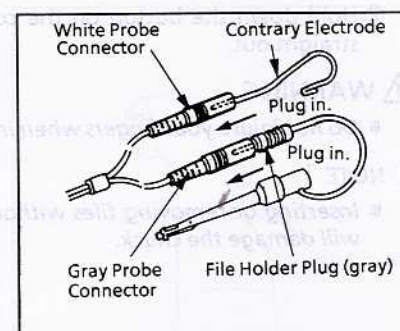
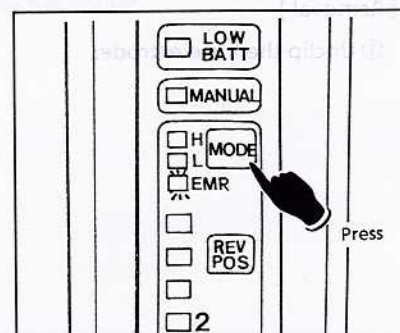
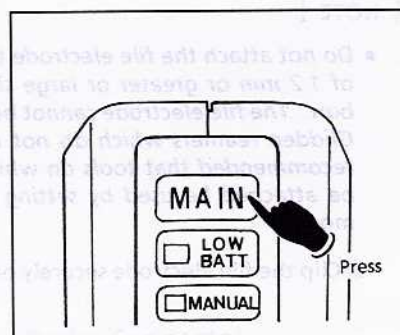
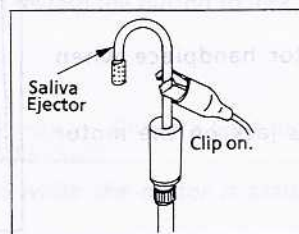
④ Plug the file holder into the probe cord's gray connector and the contrary electrode into the white connector. Hang the electrode in the corner of the patient's mouth.



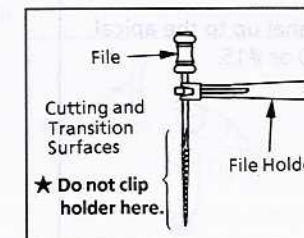
Or, plug the saliva ejector clip into the white connector instead of the contrary electrode, and clip it onto the saliva ejector.

[NOTE]

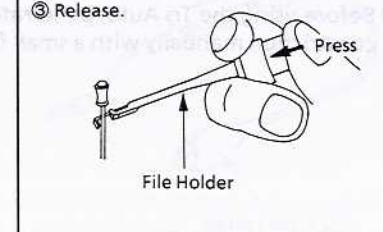
- The saliva ejector must, of course, be made of metal in order to use it instead of the contrary electrode.



⑤ Clip the file holder onto the shaft of the file.

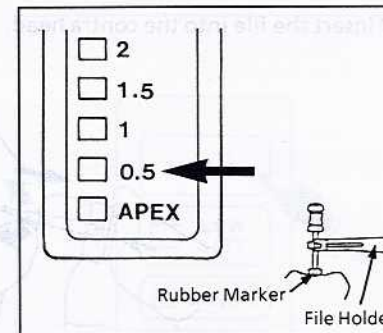


- ① Press with thumb in direction of arrow.
- ② Clip onto file.
- ③ Release.



⑥ Advance the file down the canal until the 0.5 measurement LED lights up, and then position a rubber marker on the surface of the tooth or other suitable point to serve as a measurement reference. (The position of the file tip can also be determined by the audible signal.) The tip of the file is now in the immediate vicinity of the apical foramen. (In an average canal, it will be 0.2 or 0.3 mm into the apical constriction.)

- The 0.5 reading is used to estimate the length of the canal.



⑦ Determine the Canal's Working Length

- The canal's working length can be estimated by subtracting from 0.5 to 1.0 mm from the length determined by using the 0.5 measurement LED.
- If the tip of the file has passed through the apical foramen, use the length found with the 0.5 measurement LED as the working length.
- ※ The exact working length depends somewhat on the shape and condition of the tooth and its canal and must be determined by the dentist as he is actually working on the tooth.

⑧ Turn off the main switch after finishing the measurement.

- ※ If you forget to turn off the main switch, the Tri Auto will turn itself off after about 3 minutes.

The Tri Auto can be used for purposes other than length determination.

- To detect apex perforation by the file.

If the file perforates the apex, the Tri Auto will sound a single sustained beep and the "APEX" LED indicator will begin flashing.

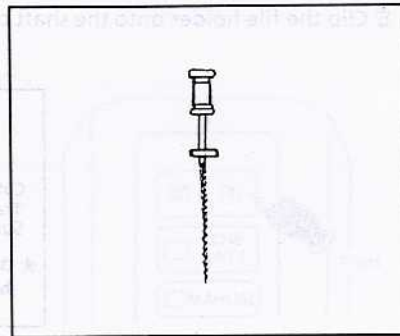
- To detect a post which has perforated the apex.

Clip a large file into the file holder and touch the post with it. If the post has perforated the apex, the Tri Auto will sound a single sustained beep and the "APEX" LED indicator will begin flashing.

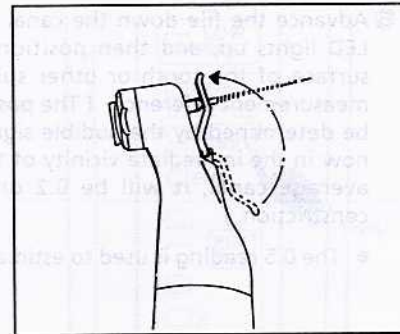
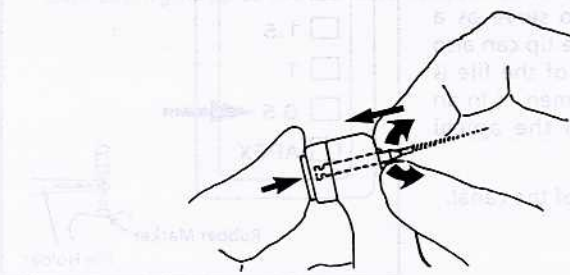
10) Enlarging a Canal

In Low or High Mode

- Before using the Tri Auto, penetrate the canal up to the apical constriction manually with a small file, #10 or #15.



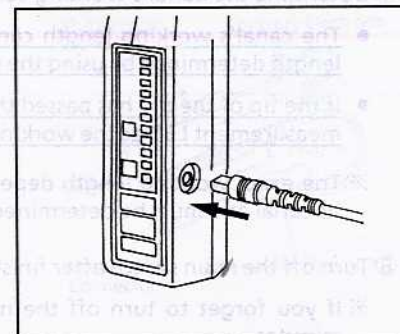
- Insert the file into the contra head.



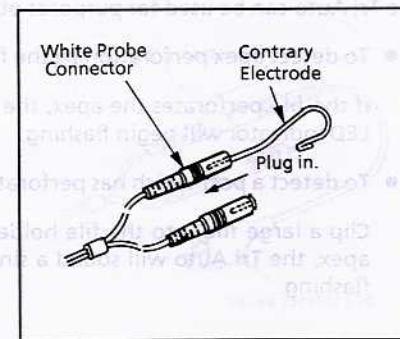
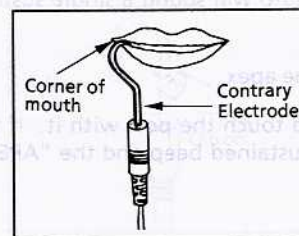
- Plug the probe cord into the motor handpiece.

[NOTE]

- Do not pull on the cord to unplug the cord. Always grip the connector itself.



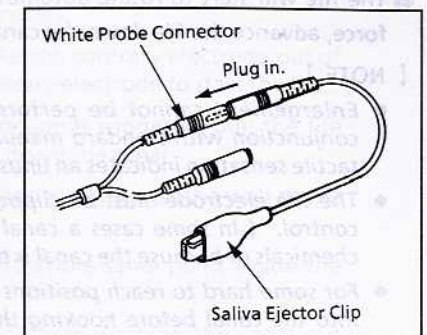
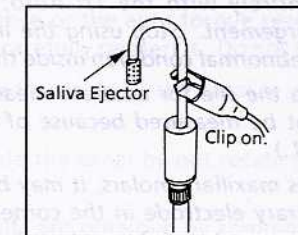
- Insert the contrary electrode into the probe cord's white connector and hang the electrode in the corner of the patient's mouth.



Or, plug the saliva ejector clip into the white connector and clip it onto the saliva ejector. Hang the saliva ejector in the corner of the patient's mouth.

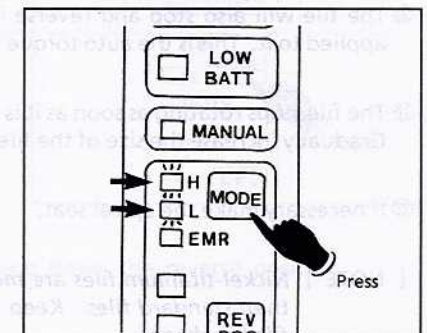
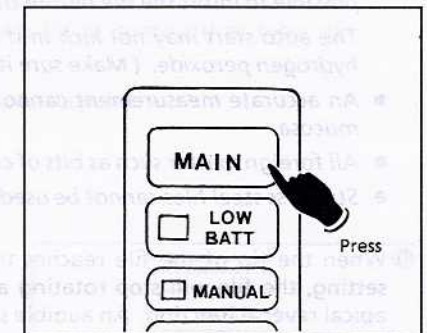
[NOTE]

- The saliva ejector must, of course, be made of metal in order to use it instead of the contrary electrode.

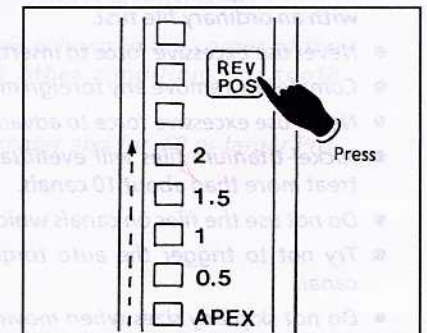


- Turn the handpiece on.

- Select either low or high mode.



- Set the position for the auto apical reverse function.



- ⑧ The file will start to rotate automatically when it is inserted into the canal. Without using excessive force, advance the file down the canal to enlarge it.

[NOTE]

- *Enlargement cannot be performed entirely with the Tri Auto; use this instrument in conjunction with standard manual enlargement. Stop using the instrument immediately if tactile sensation indicates an unusual or abnormal condition inside the canal.*
- *The file electrode must be clipped onto the file for accurate measurement and instrument control. (In some cases a canal cannot be measured because of an overflow of blood or chemicals or because the canal is blocked.)*
- *For some hard to reach positions such as maxillary molars, it may be easier to insert the file into the canal before hooking the contrary electrode in the corner of the patient's mouth. The file will start rotating as soon as the contrary electrode is hooked in place. It is also possible to insert the file before the main switch is turned on.*
The auto start may not kick in if the canal is too dry. In this case, fill the canal with a little hydrogen peroxide. (Make sure it does not overflow.)
- *An accurate measurement cannot be made if the file electrode makes contact with the oral mucosa.*
- *All foreign matter such as bits of cotton should be removed from the canal.*
- *Stainless steel files cannot be used.*

- ⑨ When the tip of the file reaches the point inside the canal specified by the reverse position setting, the file will stop rotating and then rotate in the opposite direction. This is the auto apical reverse function. An audible signal sounds when this happens.

- ⑩ The file will also stop and reverse its rotation if more than the specified amount of torque is applied to it. This is the auto torque reverse function.

- ⑪ The file stops rotating as soon as it is taken out of the canal. This is the auto stop function. Gradually increase the size of the file until the enlargement is completed.

- ⑫ If necessary make the apical seat.

[NOTE] *Nickel-titanium files are more easily broken by the amount of torque applied to them than standard files. Keep the following points in mind to minimize the possibility of file breakage.*

- *Before using a nickel-titanium file, penetrate the canal up to the apical constriction manually with an ordinary file first.*
- *Never use excessive force to insert the file.*
- *Completely remove any foreign matter such as cotton wadding before using the file.*
- *Never use excessive force to advance the file down the canal.*
- *Nickel-titanium files will eventually break due to metal fatigue; do not use the same file to treat more than about 10 canals.*
- *Do not use the files on canals which have a high degree of curvature.*
- *Try not to trigger the auto torque reverse mechanism when advancing the file down the canal.*
- *Do not skip any sizes when moving up from smaller to larger files. Files which are too large for the canal break more easily.*
- *Do not use a file to enlarge a canal for more than 10 seconds without stopping.*

- ⑬ • Twenty one (21) millimeter files are available for treating molars.

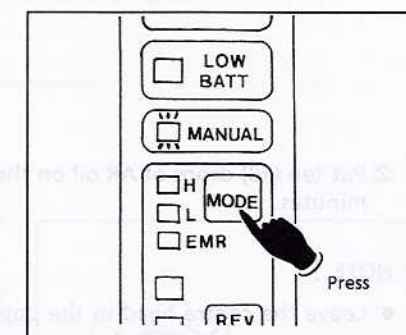
- If the file's rotation makes it hard to get it into the canal, take the contrary electrode out of the patient's mouth and insert the file. Then replace the contrary electrode to start the file.
- If there is unusual resistance or the auto torque reverse function is triggered, pull the file back 3 or 4 mm and then carefully reinsert it. Do not force it down the canal.
- The file could break if it is forced down the canal or pressed too hard against the wall of the canal.
- Avoid creating steps inside the canal by not rotating the file at the same point inside the canal for a long time.
- The most consistent results are obtained by combining filing with washing the canal out with hydrogen peroxide or some other suitable solution.
- After enlargement clean the canal out with the Solfy, Solfy ZX or some other type of ultrasonic scaler.
- If necessary shape the inside of the canal to match the gutta percha point.
- Prepare an apical seat if necessary.

Manual Mode

⚠ WARNING

- *If the Tri Auto is set for manual mode, it will start running as soon as the main switch is turned on.*

- ① Press the mode switch to set the instrument for manual mode. The LED for manual mode will light up.



- ② In manual mode, the file's rotation can be reversed by holding down the reverse position switch.

[NOTE]

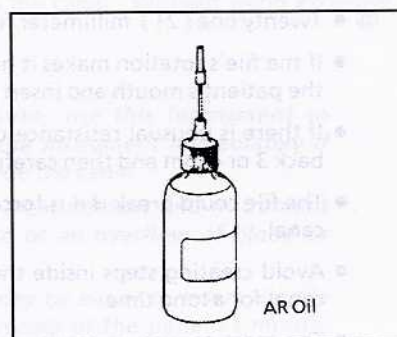
- *The auto start and stop and auto torque reverse functions do not work in manual mode.*
- *The auto apical reverse works as long as the contrary electrode is hung in the corner of the patient's mouth, the file electrode is clipped on, and all other conditions for tooth measurement are satisfied.*
- *Use this mode for tools with a shaft diameter of 1.2 mm or greater and for #8 or larger Pro-Files.*

11) Lubricating the Contra Head

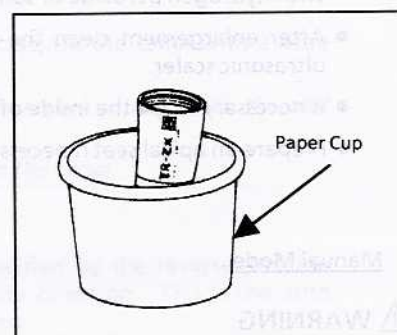
Lubricate the contra head with AR Oil once a month.

[NOTE]

- Use only AR oil.



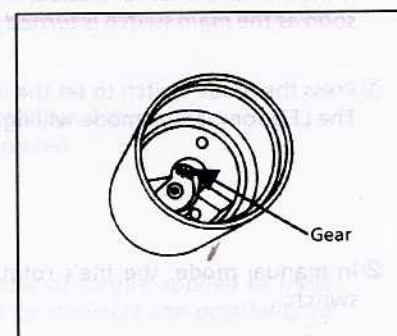
- ① Place the contra head in a paper cup with the connection end facing up.



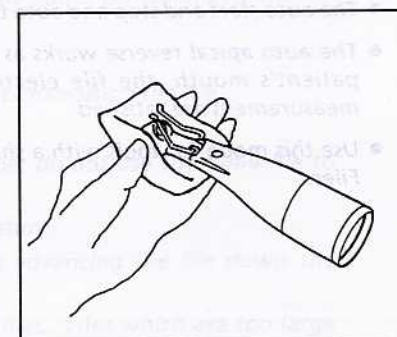
- ② Put ten (10) drops of AR oil on the gear and wait for ten (10) minutes.

[NOTE]

- Leave the contra head in the paper cup for at least ten (10) minutes so that the oil is thoroughly absorbed by the contra head mechanism.



- ③ Take the contra head out of the paper cup and wipe off any excess oil which may have seeped out.



12) Sterilizing the Contra Head and Accessories

Autoclavable Components

The contra head, file holder, and contrary electrode can be autoclaved up to 135°C.

All instruments, components etc. should be thoroughly washed and cleaned before autoclaving. Any chemicals or foreign debris left on instruments could cause them to malfunction or could cause discoloration.

- ※ It is highly recommended that instruments be autoclaved in a sterilization pouch or similar device.
- ※ Resin (plastic) instruments are especially subject to discoloration and shape distortions by chemicals and oils and should always be autoclaved separately from instruments which are used with chemical solutions, oils etc.
- ※ Sterilization and drying temperatures must not exceed 135°C.

[NOTE]

- The following components **CANNOT** be autoclaved: the motor handpiece, the charger, the probe cord, the saliva ejector clip, and the checker.
- Autoclave temperatures must not exceed 135°C.
- Do not use corrosive solutions such as chlorides to disinfect files.

※ Disinfect the handpiece by wiping it with gauze slightly dampened with alcohol.

[NOTE]

- Do not apply excessive alcohol; it could seep inside the case.

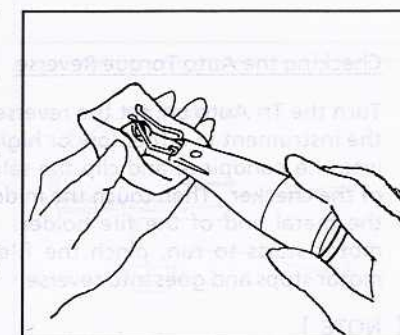
Autoclaving the Contra Head

- * It is not necessary to lubricate the contra head before autoclaving it.

- ① Use a piece of gauze or other suitable material to carefully wipe and clean the contra head with disinfecting alcohol.
- ② Place the contra head into a sterilization pouch. Autoclave it according to the autoclave manufacturer's instructions for sterilizing small instruments.
- ③ Autoclave the contra head for at least twenty (20) minutes at 135° C (275° F). The drying temperature must not exceed 135° C (275° F).
- ④ Remove the contra head from the sterilization pouch as soon as it has been sterilized and attach it to the cordless handpiece.

[NOTE]

- Do not wipe the contra head or motor handpiece with solutions containing formalin cresol or hypochlorite. These chemicals will damage plastic components. Immediately wipe these chemicals off if they get on the instrument.
- Do not use any type of alcohol except disinfecting alcohol.
- Use a disposable plastic sleeve to protect the cordless handpiece from exposure to chemical solutions.

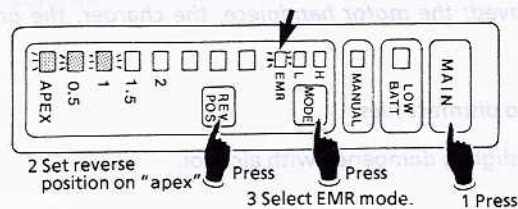


5. USING THE CHECKER

Use the checker to make sure the motor handpiece and its canal measurement function are working properly. To do this, the reverse position must be set on apex.

Checking the Motor Handpiece and its Canal Measurement Function

Turn the Tri Auto on, set the reverse position on "apex" and put the instrument into the EMR mode. Plug the probe cord into the handpiece and clip the saliva ejector clip onto the end of the checker. Then touch the middle of the checker's jack with the metal end of the file holder. (See diagrams.) If the instrument is working properly, the measurement LEDs will light up in order starting at the top. All the LEDs will stay on except the 0.5 LED (or occasionally the 1 LED) which will flash on and off.

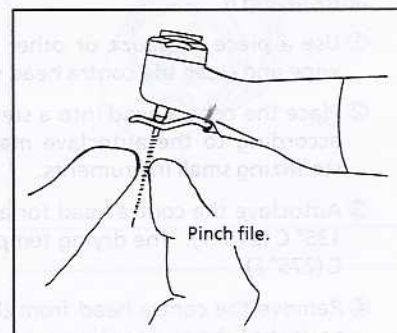
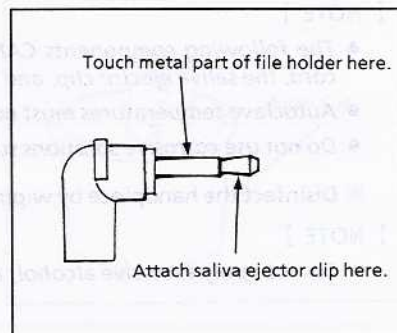
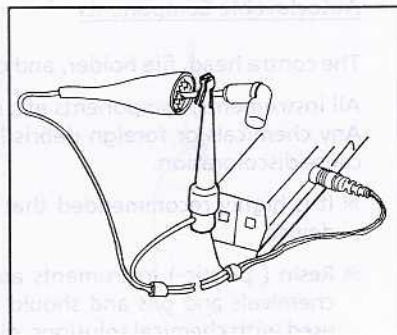
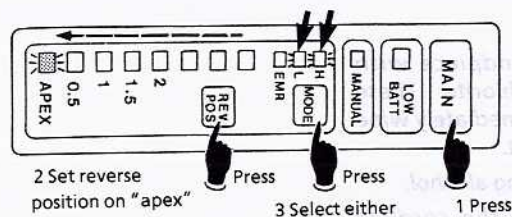


Checking the Auto Torque Reverse

Turn the Tri Auto on, set the reverse position on "apex" and put the instrument in either low or high mode. Plug the probe cord into the handpiece and clip the saliva ejector clip onto the end of the checker. Then touch the middle of the checker's jack with the metal end of the file holder. (See diagrams.) When the motor starts to run, pinch the file and press down until the motor stops and goes into reverse.

[NOTE]

- The file could break if it is pinched too hard.

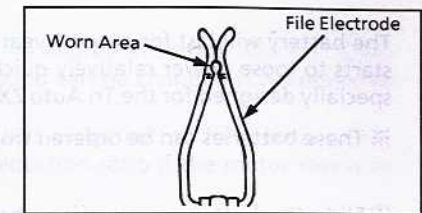


6. REPLACING THE FILE ELECTRODE

An accurate measurement cannot be made if the file electrode is worn out by prolonged use. Replace it about every 6 months, if it breaks, or if it shows excessive wear.

⚠ WARNING

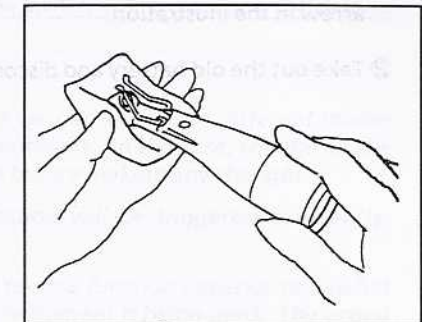
- Replace the file electrode when it is worn out to the extent indicated in the illustration to the right. It could break if used after reaching this point.



- ① Take the file out of the contra head.

- ② Clean the contra head by wiping it with disinfecting alcohol. Clean the place where the file electrode slides in and the screw which holds it in place especially carefully.

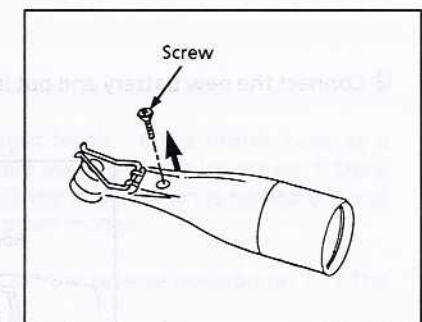
- ※ File electrodes can be ordered from your local dealer or from the J. Morita Corp.



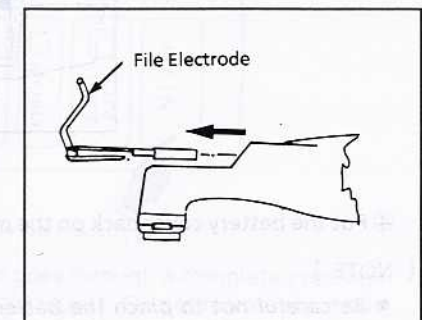
- ③ Take out the file electrode's retaining screw.

[NOTE]

- This requires a miniature phillips screwdriver.



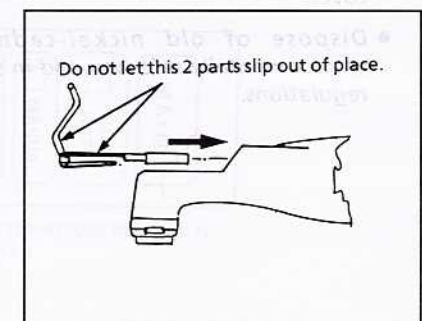
- ④ Pull the old file electrode straight out.



- ⑤ Position the new file electrode as shown in the illustration and slide it all the way into its attachment hole.

- ⑥ Replace the retaining screw and tighten it up.

- ⑦ Check that the new file electrode can be properly clipped onto a file.



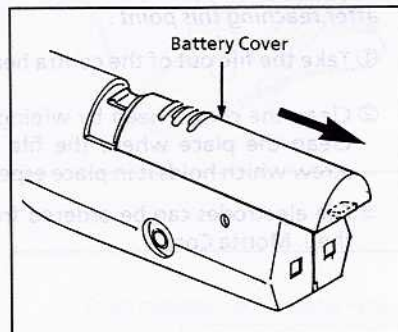
7. REPLACING THE BATTERY

The battery will last for about 1 year under normal circumstances and usage. Replace it when it starts to lose power relatively quickly after being fully charged. Use only batteries which are specially designed for the Tri Auto ZX.

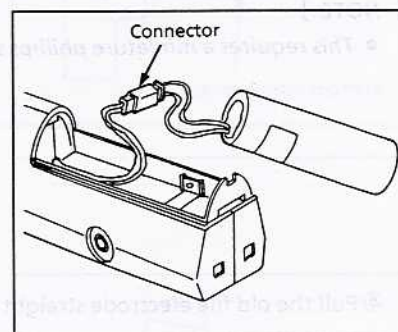
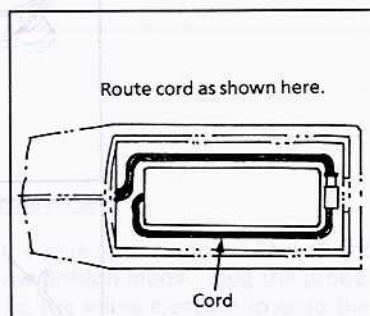
※ These batteries can be ordered from your local dealer or from the J. Morita Corp.

① Slide the battery cover off in the direction indicated by the arrow in the illustration.

② Take out the old battery and disconnect it.



③ Connect the new battery and put it in the battery case.



④ Put the battery cover back on the motor handpiece.

[NOTE]

- Be careful not to pinch the battery cord when replacing the cover.
- Dispose of old nickel-cadmium batteries in an environmentally safe way and in strict accordance with local regulations.

8. SPECIAL SETTINGS

The settings for the reduction ratio of the motor's speed, the degree of torque which triggers the auto torque reverse function and the volume of the sound can be changed if necessary or desirable.

Change the setting for the auto torque reverse function if it is triggered too frequently or not often enough. Change the setting for the motor's speed reduction ratio if the motor seems to be too slow or fast.

The basic procedure in every case is to hold down the mode switch while changing the setting with the reverse position switch.

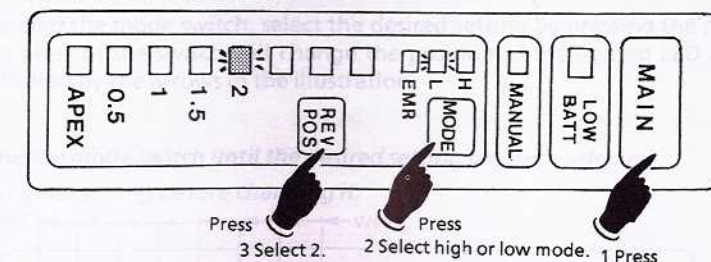
[NOTE]

- When settings are changed, the resulting combination of various settings in different modes may conflict and prevent the instrument from operating normally. In this case, change all the settings back to the original ones. Record original settings before making any changes.
- If the auto torque reverse setting is too weak, this function will be triggered constantly. Increase the strength of this setting in this case.
- The amount of torque which will trigger the auto torque reverse function depends somewhat on the motor speed, the size of the file, and the way the instrument is being used. The actual setting serves only as a general estimate.

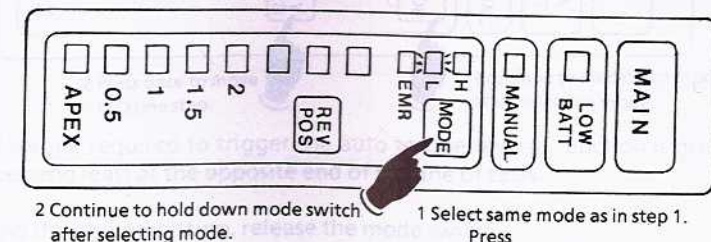
1) The Motor Speed Reduction Ratio

The motor speed's reduction ratio can be set at one of eight levels. (The motor runs at a constant speed if there is no load but slows down as the torque applied to it is increased.) Once a setting has been changed it will remain at that level even if the main switch is turned off and on. The setting in one mode does not have any effect on the other modes.

① Turn the Tri Auto on. Select either low or high mode and set the reverse position on 2. (The setting for manual mode cannot be changed.)



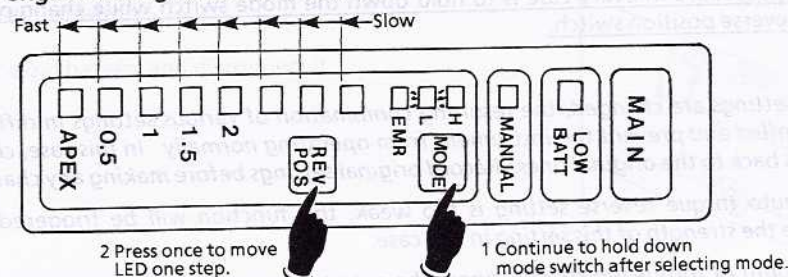
② Now press the mode switch 4 times so that mode selection goes through a complete cycle and returns to its starting point (i.e., the mode selected in the first step). Do not release the mode switch after completing the cycle; continue to hold it down.



- ③ Without releasing the mode switch, select the desired setting by pressing the reverse position switch. Each press of the switch will change the position of the lighted LED one step in the direction indicated by the arrows in the illustration.

[NOTE]

- Do not release the mode switch until the desired setting has been selected.
- Record the original setting before changing it.



The motor runs fastest when the setting is for apex and slowest at the opposite end of the line of LEDs.

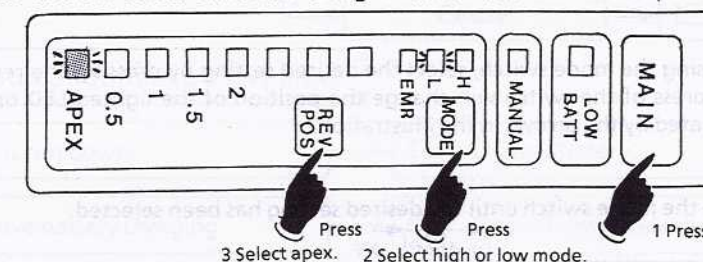
- ④ After selecting the desired setting, release the mode switch.

- ⑤ Turn the Tri Auto off.

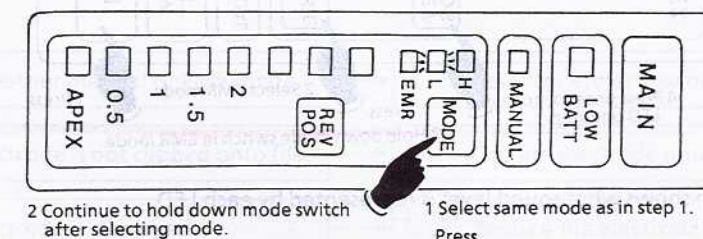
2) The Auto Torque Reverse Setting

The auto torque reverse setting can be set at one of eight levels. Once a setting has been changed it will remain at that level even if the main switch is turned off and on. The setting in one mode does not have any effect on the other modes.

- ① Turn the Tri Auto on. Select either low or high mode and set the reverse position on "apex".



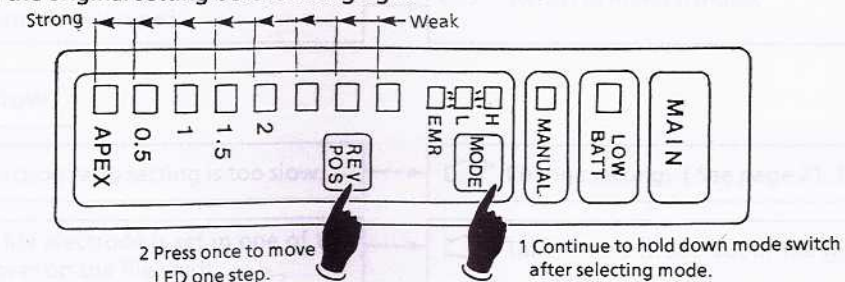
- ② Now press the mode switch 4 times so that mode selection goes through a complete cycle and returns to its starting point (i.e., the mode selected in the first step). Do not release the mode switch after completing the cycle; continue holding it down.



- ③ Without releasing the mode switch, select the desired setting by pressing the reverse position switch. Each press of the switch will change the position of the lighted LED one step in the direction indicated by the arrows in the illustration.

[NOTE]

- Do not release the mode switch until the desired setting has been selected.
- Record the original setting before changing it.



The amount of torque required to trigger the auto torque reverse function is greatest when the setting is for apex and least at the opposite end of the line of LEDs.

- ④ After selecting the desired setting, release the mode switch.

- ⑤ Turn the Tri Auto off.

3) Sound Volume

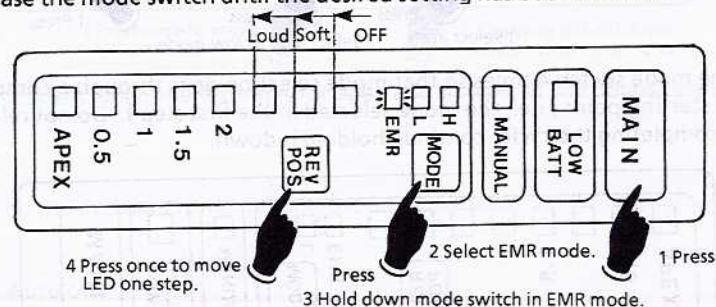
There are 3 settings for the sound volume: loud, soft, and off. Once the setting has been changed it stays as it is even if the main switch is turned off and on.

① Turn the Tri Auto on. Select EMR mode. Do not release the mode switch after selecting the EMR mode.

② Without releasing the mode switch, select the desired setting by pressing the reverse position switch. Each press of the switch will change the position of the lighted LED one step in the direction indicated by the arrows in the illustration.

[NOTE]

- Do not release the mode switch until the desired setting has been selected.



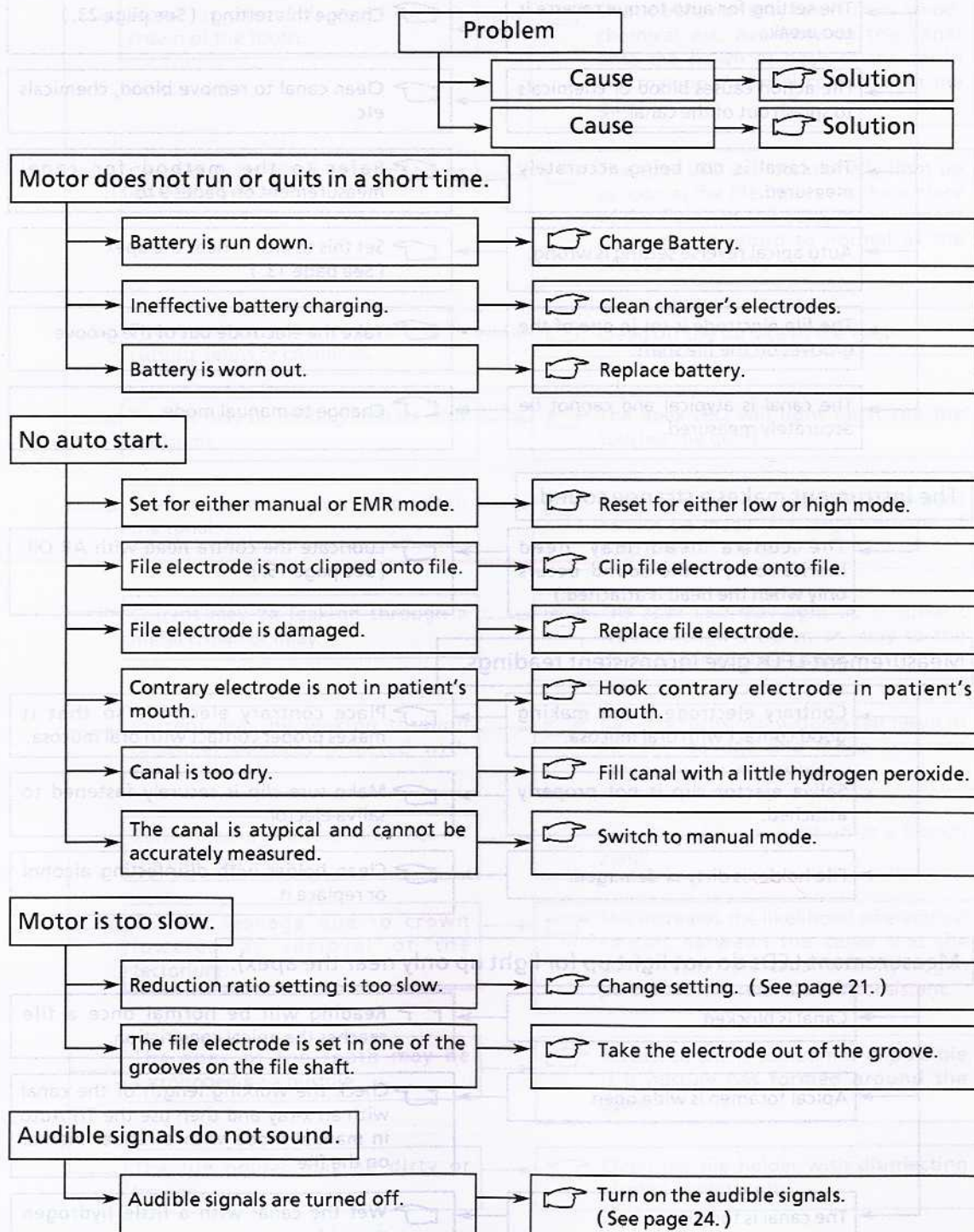
The illustration shows what sound level is represented by each LED.

③ After selecting the desired setting, release the mode switch.

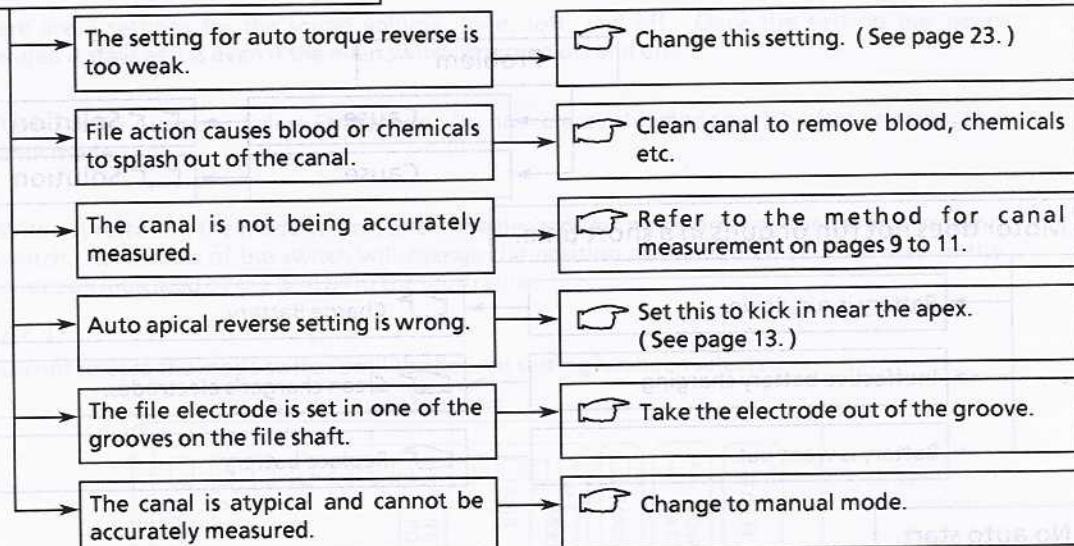
④ Turn the Tri Auto off.

9. TROUBLESHOOTING FLOWCHARTS

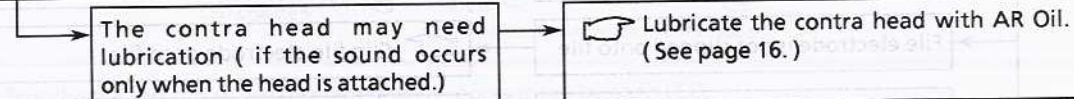
For optimum performance, refer to the flow charts below to solve operation problems.



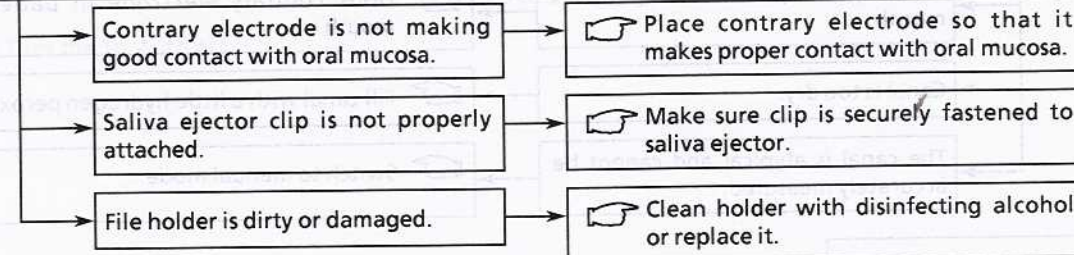
Motor keeps going into reverse.



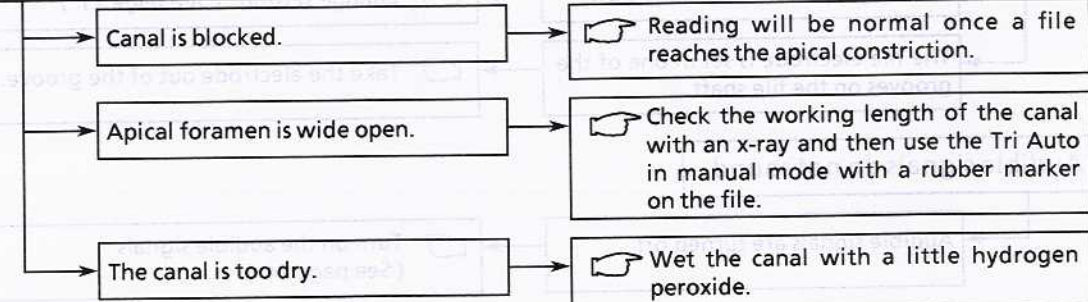
The instrument makes a strange sound.



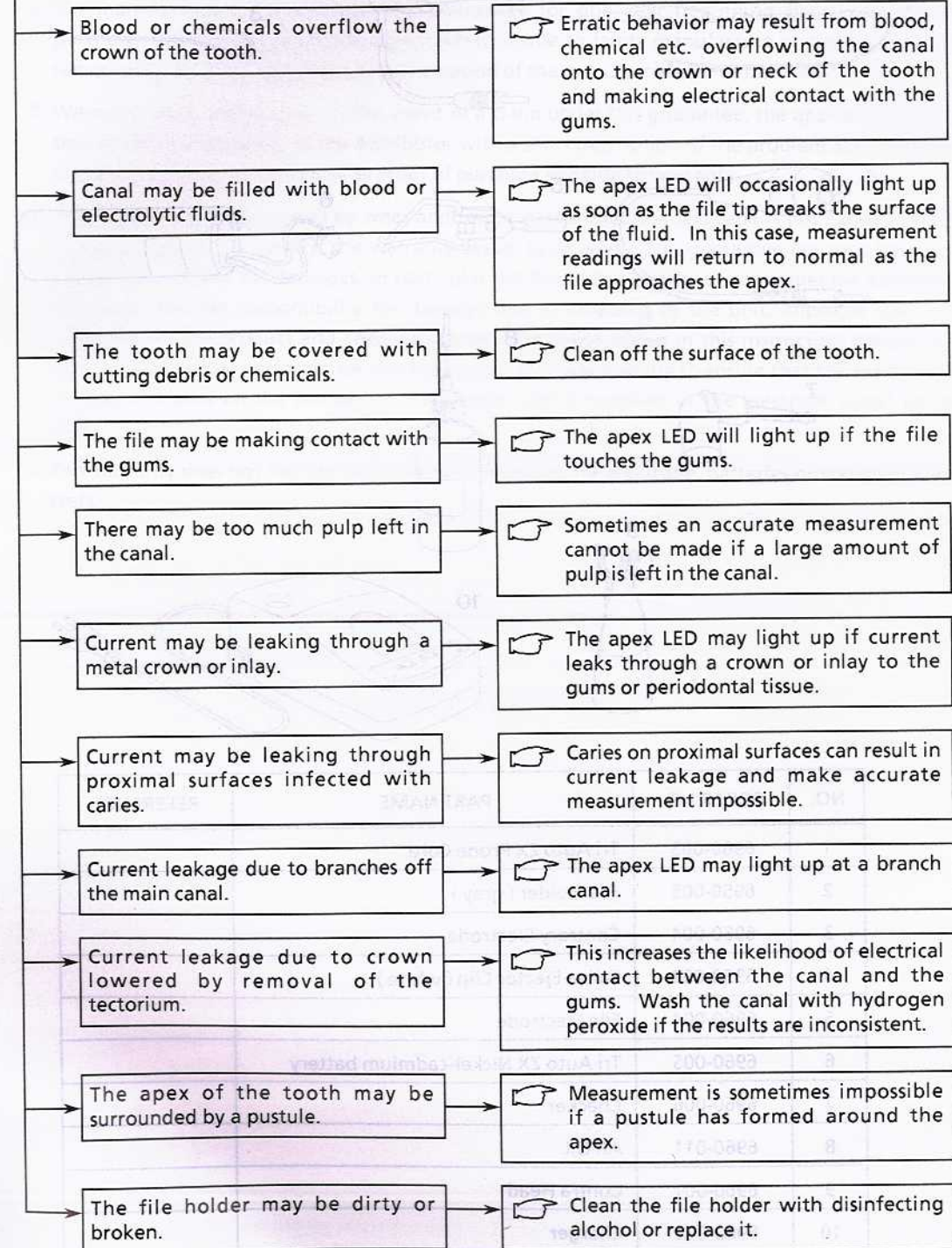
Measurement LEDs give inconsistent readings.



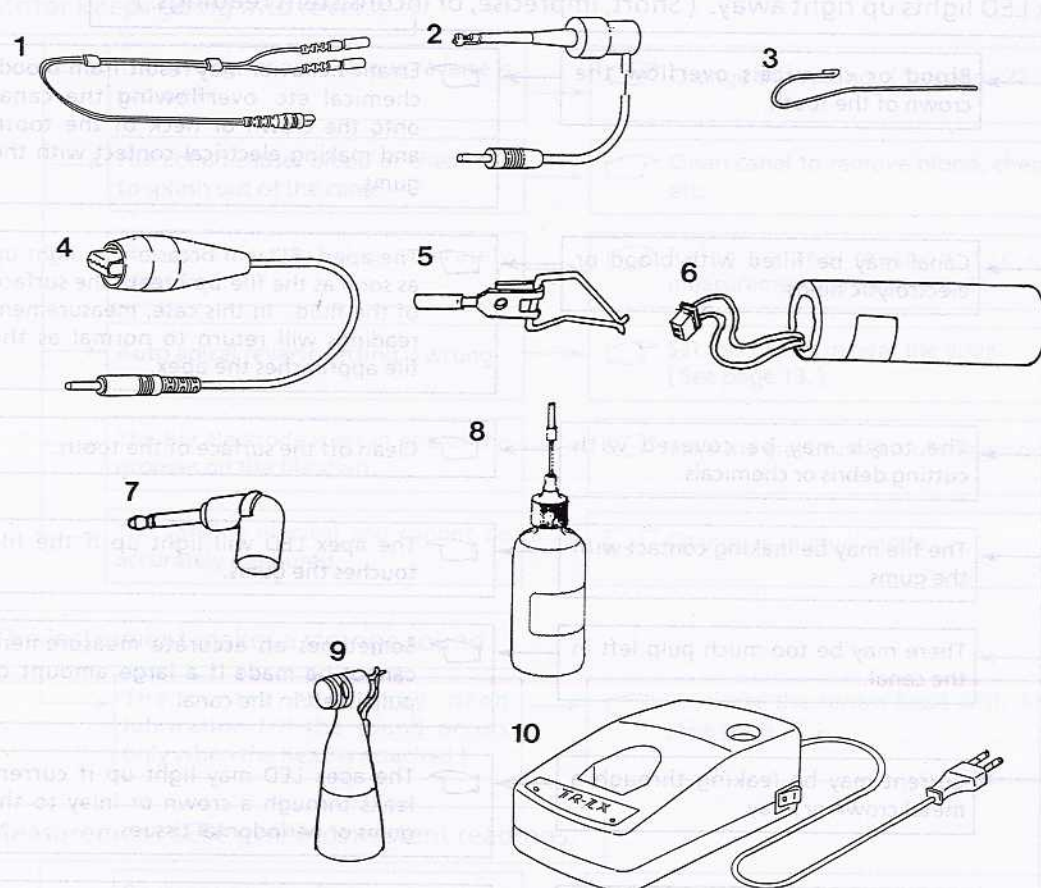
Measurement LEDs do not light up (or light up only near the apex).



Apex LED lights up right away. (Short, imprecise, or inconsistent readings.)



10. REPLACEMENT PARTS LIST



NO.	ORDER NO.	PART NAME	REFERENCE
1	6960-003	Tri Auto ZX Probe Cord	
2	6950-005	File Holder (gray)	
3	6950-004	Contrary Electrode	
4	6950-003	Saliva Ejector Clip (white)	
5	6960-004	File Electrode	
6	6960-005	Tri Auto ZX Nickel-cadmium battery	
7	6960-006	Checker	
8	6960-011	AR Oil	
9	6960-001	Contra Head	
10	6960-002	Charger	

11. WARRANTY

ONE YEAR LIMITED WARRANTY

1. The manufacturer gives a worldwide guarantee for one year beginning from the date of purchase. Within this period any defect which is due to faulty manufacture or material will be remedied by repair or replacement at the option of the manufacturer or its distributor.
2. Warranty repair and service: In the event of a claim under this guarantee, the appliance is to be sent to the service facility of the distributor with a short description of the problem and a copy of the sales receipt from the dealer as proof of purchase and title to warranty.
3. In the case of damage caused by wear and tear, careless handling and repairs not carried out by an authorized service facility, the warranty ceases to be valid. This guarantee may not form the basis for any claims for damages, in particular not for compensation of consequential damages. The buyer assumes responsibility for damage due to dropping of the unit, improper use and utilization of the product and chemicals other than those stated in this instruction manual for cleaning. For proper performance, it is the customer's responsibility to ensure that the exact rated voltage indicated on the bottom of the charger unit is supplied at the electrical outlet being used.
4. This warranty does not include the external accessories, file electrode, batteries or transportation costs.

10 REPLACEMENT PARTS LIST

11 WARRANTY

ONE YEAR LIMITED WARRANTY

1. The manufacturer gives a worldwide guarantee for one year beginning from the date of purchase. Within this period any defect which is due to faulty manufacture or material will be remedied by repair or replacement at the option of the manufacturer or distributor.
2. Warranty repair and service. In the event of a claim under this guarantee, the appliance is to be sent to the service facility of the distributor with a short description of the problem and a copy of the sales receipt from the dealer as proof of purchase and title to warranty.
3. In the case of damage caused by wear and tear, accidental handling and repair not caused out by an authorized service facility, the warranty ceases to be valid. This guarantee may not form the basis for any claim for damages in particular not for compensation of consequential damages. The buyer assumes responsibility for damage due to dropping of the unit, improper use and utilization of the product and chemicals other than those stated in the instruction manual for cleaning for proper performance. It is the customer's responsibility to ensure that the electrical voltage indicated on the bottom of the dryer unit is supplied at the electrical outlet being used.
4. This warranty does not include the external accessories, the electrode, batteries or transportation costs.

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