Since the introduction of the first Rocky Mountain Orthodontics welder more than 65 years ago, RMO has continuously provided engineering refinements which have substantially contributed to the development of modern appliance fabrication. We have a long line of fine equipment achievements and suggest that you become familiar with this unit’s functions and components so that you may achieve the greatest efficiency and time-and-motion savings. Your RMO 660-XP is a small, versatile, economical chairside unit created to fulfill the multi-purpose requirements of Orthodontic and Pedodontic appliance fabrication. It occupies minimum counter space and its light weight makes it appropriate for chairside or mobile use. Electrodes align automatically and accessories add versatility to appliance fabrication.

**FUNCTIONS:**
- Welds with four welding heats and self-centering electrodes.
- Electro-solders with turret carbon tip and cables.
- Anneals with plug-in jack.

**Auxiliary Function Outlets accept:**
- Annealing Jack (optional purchase)
- Auxiliary Cables (optional purchase)
- Plug-In Vise (optional purchase)
- Heat-Treat Table (optional purchase)
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The RMO 660 is engineered for fabricating Pedodontic and Orthodontic appliances of stainless steel and Elgiloy® materials. It is not designed for use with gold alloys, removable appliances, cast prosthetic appliances or continuous laboratory use.

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OPERATING CONTROLS

SELECT-A-MATIC TURRETS
Select working electrode combination by rotating turrets with finger pressure. Latching action automatically aligns and securely holds the electrodes.

LOCK NUT
Nut does not require adjustment for normal use. Used only to lock rotation of turrets (tighten) and for turret removal (loosen).

HEAT SELECTOR
Turns welder on and off and selects welding or auxiliary heats. When the Heat Selector knob is at the “0” position, the welder is off. The red line over the Heat Selector indicates the progressive heat setting for auxiliary functions.

Station “S” is for soldering with turret solder-electrodes. Stations “S” plus #1, 2, 3, stations provide progressively higher heats for auxiliary outlets, which are activated by depressing handrest/tray.

Station #4 is a welding heat only. It is NOT connected to the auxiliary function circuit.

OPERATE SWITCH
Lever-type switch operated by pressing down. Activates the solid-state circuitry, automatically releasing a time-controlled welding pulse.

HANDREST TRAY
Separates electrodes and activates auxiliary function switch. Tray is used to hold appliance parts.

HANDREST LOCK
Holds tray down in locked position, activating internal auxiliary function switch. Lock is actuated by pushing button “in” when tray is in “down” position. Releases automatically when tray is depressed.

TECHNICAL NOTE:
This unit is NOT designed to weld, heat-treat or stress-relieve gold or other precious metals. Nor is it designed to weld, heat-treat or solder wrought or cast steel or precious metal prosthetic appliances.

OPERATING CONTROLS

SELECT-A-MATIC TURRETS
Select working electrode combination by rotating turrets with finger pressure. Latching action automatically aligns and securely holds the electrodes.

LOCK NUT
Nut does not require adjustment for normal use. Used only to lock rotation of turrets (tighten) and for turret removal (loosen).

HEAT SELECTOR
Turns welder on and off and selects welding or auxiliary heats. When the Heat Selector knob is at the “0” position, the welder is off. The red line over the Heat Selector indicates the progressive heat setting for auxiliary functions.

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OPERATE SWITCH
Lever-type switch operated by pressing down. Activates the solid-state circuitry, automatically releasing a time-controlled welding pulse.

HANDREST TRAY
Separates electrodes and activates auxiliary function switch. Tray is used to hold appliance parts.

HANDREST LOCK
Holds tray down in locked position, activating internal auxiliary function switch. Lock is actuated by pushing button “in” when tray is in “down” position. Releases automatically when tray is depressed.

TECHNICAL NOTE:
This unit is NOT designed to weld, heat-treat or stress-relieve gold or other precious metals. Nor is it designed to weld, heat-treat or solder wrought or cast steel or precious metal prosthetic appliances.

*It is recommended that the annealing jack be used with the cable receptacles facing to the rear of the machine. This avoids cable entanglement with front operating controls.

OPERATING CONTROLS

SELECT-A-MATIC TURRETS
Select working electrode combination by rotating turrets with finger pressure. Latching action automatically aligns and securely holds the electrodes.

LOCK NUT
Nut does not require adjustment for normal use. Used only to lock rotation of turrets (tighten) and for turret removal (loosen).

HEAT SELECTOR
Turns welder on and off and selects welding or auxiliary heats. When the Heat Selector knob is at the “0” position, the welder is off. The red line over the Heat Selector indicates the progressive heat setting for auxiliary functions.

Station “S” is for soldering with turret solder-electrodes. Stations “S” plus #1, 2, 3, stations provide progressively higher heats for auxiliary outlets, which are activated by depressing handrest/tray.

Station #4 is a welding heat only. It is NOT connected to the auxiliary function circuit.

OPERATE SWITCH
Lever-type switch operated by pressing down. Activates the solid-state circuitry, automatically releasing a time-controlled welding pulse.

HANDREST TRAY
Separates electrodes and activates auxiliary function switch. Tray is used to hold appliance parts.

HANDREST LOCK
Holds tray down in locked position, activating internal auxiliary function switch. Lock is actuated by pushing button “in” when tray is in “down” position. Releases automatically when tray is depressed.

TECHNICAL NOTE:
This unit is NOT designed to weld, heat-treat or stress-relieve gold or other precious metals. Nor is it designed to weld, heat-treat or solder wrought or cast steel or precious metal prosthetic appliances.

OPERATING CONTROLS

SELECT-A-MATIC TURRETS
Select working electrode combination by rotating turrets with finger pressure. Latching action automatically aligns and securely holds the electrodes.

LOCK NUT
Nut does not require adjustment for normal use. Used only to lock rotation of turrets (tighten) and for turret removal (loosen).

HEAT SELECTOR
Turns welder on and off and selects welding or auxiliary heats. When the Heat Selector knob is at the “0” position, the welder is off. The red line over the Heat Selector indicates the progressive heat setting for auxiliary functions.

Station “S” is for soldering with turret solder-electrodes. Stations “S” plus #1, 2, 3, stations provide progressively higher heats for auxiliary outlets, which are activated by depressing handrest/tray.

Station #4 is a welding heat only. It is NOT connected to the auxiliary function circuit.

OPERATE SWITCH
Lever-type switch operated by pressing down. Activates the solid-state circuitry, automatically releasing a time-controlled welding pulse.

HANDREST TRAY
Separates electrodes and activates auxiliary function switch. Tray is used to hold appliance parts.

HANDREST LOCK
Holds tray down in locked position, activating internal auxiliary function switch. Lock is actuated by pushing button “in” when tray is in “down” position. Releases automatically when tray is depressed.

TECHNICAL NOTE:
This unit is NOT designed to weld, heat-treat or stress-relieve gold or other precious metals. Nor is it designed to weld, heat-treat or solder wrought or cast steel or precious metal prosthetic appliances.
OPERATING CONTROLS

ANNEALING Use black and white receptacles, annealing jack only, cables only, or with cables inserted in jack.

SOLDERING Use white and white receptacles, or with one cable through annealing jack in same position.

STRESS-RELIEVING Use black and white receptacles, or through both receptacles of the annealing jack.

HEAT-TREATING

LOW HEAT Black and white receptacles, or through both receptacles of annealing jack.

HIGH HEAT White and white receptacles, or with one cable through annealing jack in same position.

AUXILIARY FUNCTIONS

Auxiliary Plug-in vise A) can replace one cable and will fit directly into any welder receptacle. B) and C) electrodes are reversible combinations made to fit cables only.
WELDING

A resistance (spot) weld is made by passing an electrical charge of high amperage and very low voltage (safe to handle, no shock hazard) through the materials to be joined. The material must be electrically resistant. This resistance to the electrical charge causes a portion of the material to heat and melt in the small area between the electrodes during the brief weld pulse. The combination of heat and pressure causes the two surfaces to fuse into one. In a fraction of a second, the materials are joined and cooled. Most types of stainless steel and Elgiloy® are ideal materials for resistance welding. By making a series of welds, an extremely strong junction can be made between the two pieces. However, there are some so-called stainless steels that are so high in nickel content that they are not as electrically resistant and will not weld satisfactorily. The electrically conductive materials, such as aluminum, copper and precious metal alloys, do not lend themselves to resistance welding by dental welders.

HOW TO WELD WITH THE 660-XP

1. Separate the upper and lower electrodes by depressing the handrest/tray. Select the electrode combination most appropriate for the materials to be joined, using finger pressure to rotate the RMO Select-a-matic turrets. Electrodes will align automatically.

NOTE: Always use upper and lower pointed electrode combinations whenever possible. These electrodes confine the heat and pressure for maximum strength of weld. Other combinations are intended for specialized applications where use of the pointed electrodes would be difficult (such as on wires).

2. RECOMMENDED ELECTRODE COMBINATIONS:

- Attachments to bands, joining plier-formed bands and matrices.
- Attachments to bands too small to go over the pointed electrodes, like small size anterior and cuspid bands.
- Wires to bands or crowns, space maintainers, fixed linguals, etc.
- Wires to wires, finger springs to arch wires, wire cribs, occlusal rests, etc.

Surface Appearance
Correct electrode pressure is built into the machine. However, electrode length will affect the pressure. To determine proper pressure, deflect upper pointed electrode to one side, allowing lower pointed electrode to bypass upper pointed electrode. Bypass distance should be at least 2mm. If less than 2mm, replace both electrodes (Electrodes are inexpensive). The turrets are self-aligning and do not require further rotation adjustment. To prevent rotation of the turret, tighten the turret locknut. Back off the nut to regain rotation.

In normal usage, pointed electrodes will mushroom and must be recontoured by light filing. This shortens the electrodes slightly. The 660 automatically compensates for a reasonable amount of electrode shortening, but eventually they must be replaced when their length does not provide sufficient electrode pressure for a satisfactory weld.

Electrodes must be kept clean and free of dried flux and surface oxidation. When recontouring the pointed electrodes, use a fine flat metal file. Do not use the carbon file to contour the pointed electrodes (file is too coarse). The pointed electrodes should be about 1mm in diameter at the tips.

4.) With hands on handrest bar, depress to open electrodes, using thumb and forefinger to position the materials between the electrodes. Allow the handrest to raise and hold materials firmly between the electrodes. Check and adjust position of the materials, if necessary.

5.) Next, depress the Operate Switch. The Operate Light will flash, indicating that the weld has taken place. Do not tap or strike the switch since timing of the weld pulse is automatically controlled by the solid state electronic circuitry. If a series of welds is required, such as on an attachment, band seam or space maintainer, move the material to the next spot to be fastened and press the Operate Switch. One press, one weld.

Occasionally, the shape of the materials to be fastened together requires that the materials be held in position by your fingers. There is no danger of electric shock from the low voltage output of this equipment.

Some sparking is inherent in the welding process due to the minute irregularity of the surfaces being welded together. The electric current jumps across these irregularities resulting in visible sparks, which are harmless. Excessive sparking that results in burned areas of the material, or inadequate fastening, usually stems from inadequate pressure between the electrodes. Remove hands from handrest during welding process.

NOTE: When rotating turrets, especially the upper turret, do not lift or pull the turret. This may pull the turret away from the post and cause electrodes to be out of alignment.

For soldering with carbon electrode

3. SELECT PROPER WELDING HEAT ON HEAT SELECTOR

1. Small wires to arch, matrix material
2. Seating lugs, joining band material (.003, .004), medium diameter wires
3. Light or medium attachments to bands (such as anterior, posterior, canine and light wire brackets to bands), heavy band material (.005, .006), and lingual brackets
4. Buccal and lingual tubes and heavy attachments to molar bands and molar band material

S ELECT PROPER WELDING HEAT ON HEAT SELECTOR
Soldering with the RMO 660-XP Welder employs the heat-generating principle of electrical resistance of the materials to be joined, plus the externally applied heat from a carbon electrode. The heat build-up internally and applied externally (from the carbon tip) melts the solder, which flows over the area to be joined. The 660-XP provides two methods of electric soldering.

1. Using turret-mounted carbon electrode
   This procedure is especially suited for fabrication of space maintainers and fixed lingual arches. Bar solder, rather than wire solder, must be used with this technique.
   1. Position and weld the materials together as described in welding section. A single light weld is used to position the materials together and still permit minor repositioning without fracturing the weld.
   2. Rotate the Select-A-Matic Turrets to the carbon tip upper and soldering lower electrodes.
   3. Clean the carbon tip so all dried flux is removed and brighten the lower electrode with the carbon file. (Dried flux will insulate and prevent proper flow of electricity.)
   4. Turn the Heat Selector to “S” station. Before soldering, always test the operation of the carbon tip by depressing the “Operate” switch until the carbon starts to glow. If it does not glow, the electrodes are not clean and must be re-cleaned with the carbon file. Test again!

2. Welding Wires
   Small dimension wires fastened by welding only. .015, .016, .018 auxiliary spring wires (finger springs) to be welded to lingual arches should be first annealed approximately 4 mm at the end. Annealing Jack* performs this step quickly (See page 14 for annealing procedures.) Next, weld the annealed end of the wire to the lingual arch, using the blunt upper and grooved anvil lower electrode combination, with the Heat Selector at station #1. Wrap the wire tightly two or more turns in the direction that will apply a tightening force to the coil when the auxiliary spring is functioning. Larger wires may require an increase of the welding heat to station #2.
   Larger dimension wires or wire to wire fastening where wrapping is not practical. .020 and larger dimension wires, such as “studs” and “hooks”, should be welded with the Heat Selector at station #2 and the joint reinforced with solder. Auxiliary Cables, set up for soldering, provide a precise, quick method.

NOTE: When heat selector is in “S” position, the solid state circuitry is inoperative and soldering heat will be applied as long as the “Operate” switch is held down.

3. Clean the carbon tip so all dried flux is removed and brighten the lower electrode with the carbon file. (Dried flux will insulate and prevent proper flow of electricity.)
4.) Turn the Heat Selector to “S” station. Before soldering, always test the operation of the carbon tip by depressing the “Operate” switch until the carbon starts to glow. If it does not glow, the electrodes are not clean and must be re-cleaned with the carbon file. Test again!

* Annealing Wire
5.) Before cutting a piece of bar solder, contour the end into a "saddle" shape with a plier or by grasping with a cutter (this "shape" cradles the solder over the area to be joined, resisting displacement by electrode pressure).

6.) Cut a piece of the contoured bar solder large enough to keep the flux from contacting the carbon tip and sufficient to join the materials (at least as large as the end of the carbon tip).

7.) Next, apply RMO fluid flux to the area to be soldered, before placing the materials between the electrodes. Do not allow electrodes to contact flux. If the flux contacts the carbon tip, before the solder flows, the dried flux will insulate the carbon surface, disrupting the flow of current. (Flux must be liquid to conduct the electric current. If necessary, thin with tap water). Keep the flux from areas you do not wish soldered. We recommend our J00041 Liquid Flux in the plastic dispenser. The plastic dispenser must be thoroughly shaken each time you solder, since flux chemicals settle quickly in the water. NOTE: The turret-mounted carbon tip will best function with bar silver solder. (Do not attempt to use gold solder.)

9.) Depress "Operate" switch. Carbon tip will heat and glow, melting solder. Continue to heat without stopping until solder covers joint. Carbon should be heated only enough to flow solder. If carbon tip starts to get a bright red color, pulsate switch to maintain a dull red carbon tip so it will not overheat solder and joint (pulsating turns current on and off). Once solder is solidified, remove assembly from machine (water cooling is optional).

10.) For a very smooth joint, separate carbon tip from solder joint before solder solidifies (eliminates depressions in solder). Remove residue of dried flux with warm water.

SOLDERING WITH AUXILIARY CABLES

This method is recommended for soldering wire to wire, appliances fabricated on models, and for precise, delicate soldering of hooks, eyelets, etc.

1.) Weld materials together, if possible, to facilitate exact placement. When welding is not feasible, such as with fabrication of an appliance on a model, a small amount of acrylic, plaster, high temperature wax or Mortite may be used to stabilize the materials in position.

2.) Plug both cables in the white auxiliary cable receptacles. If the Annealing Jack is left in the outlets, you can either remove it or plug one cable into the Annealing Jack outlet (the outlet over the white machine outlet) and the other cable in the remaining white machine outlet.

3.) Equip cables for soldering (Electrodes are reversible. See illustration.) Prepare one cable with carbon tip and other with metal-pointed tip or vise tip. Retighten. For freehand soldering of wires, use carbon tip and vise tip (or Auxiliary Vise instead of one cable). For soldering on a model, the metal tip and carbon tip are best.

b.) Reversible metal tip/carbon tip. Note notch in knurling of metal tip to indicate tip on opposite end of electrode.

b.) Reversible metal tip/vise grip.

RMO Auxiliary Cables have reversible electrodes which screw into position. NOTE: RMO Cables are not engineered for heavy soldering to removable appliances or cast prosthetic appliances.
SOLDERING

4.) Clean the carbon tip with the carbon file (dried flux on the carbon tip will insulate and prevent good electrical contact). Either bar silver solder or wire silver solder may be used. The choice depends on the solder necessary to form a solid joint. If bar silver solder is used, flux the joint (flux should be fluid). Cut a piece of bar solder to fit the joint. Contour it into a "saddle" shape to help it stay in place on the joint under the pressure of the carbon tip. If more convenient, use wire silver solder (25 gauge is a convenient size). When soldering a light delicate wire, wrapping the silver solder could distort the joint. Therefore, form a tight solder loop around a similar sized piece of wire and slip on the wire to be soldered. The joint is now ready to use. The low voltage/high amperage output of the machine will not give you an electrical shock. Comfortable handle positions can be maintained. The cable handles as you would a pencil (touching the metal tips during this soldering operation is harmless).

6.) Touch the carbon tip to the solder. The carbon tip will heat and glow. When the solder flows around the joint, remove the tip. Some operators dip the carbon tip into water prior to soldering and immediately following soldering to float dried flux adhering (optional). Failure to remove the tip from the joint immediately following the flow of solder can overheat and destroy the temper of the wire beyond the solder joint. The joint may be air-cooled or dipped in water for more rapid cooling. When impractical to use the clip vise, substitute a grooved brass tip and hold it on the work as close to the joint as possible. Avoid getting it in the area to be covered with solder.

Soldering with the auxiliary vise
The Auxilary Vise may be substituted for the cable that normally will hold the vise tip or brass tip, and provides a stable platform for soldering. Follow the procedures described in the preceding paragraphs.

Using Brass Solder Electrodes
Hold brass wire in auxiliary vise grip, 2-3 mm from solder. Flux only part to be soldered. Hold part to be soldered in contact with silver solder. Place cable carbon tip on top of silver solder and maintain contact until solder flows.

Maintenance of Carbon Tips
1) Turret carbon tips
Carbon elements will wear. Replace when so short that they fail to heat sufficiently. The electrode carbon tip element is held in position by spring pressure of the split copper electrode. To change tips, slip the old, used tip off the copper electrode with finger pressure. Replace with a new element. If the carbon tip slides on loosely, spread the split electrode slightly with a knife blade to provide more spring pressure.

2) Cable carbon tips
The cable carbon tip element (for the auxiliary cables) needs to be dressed to a point as it becomes blunt through use and should be cleaned of flux before each use. Replace the worn element as needed. Use only copper plated carbons.

4.) Clean the carbon tip with the carbon file (dried flux on the carbon tip will insulate and prevent good electrical contact). Either bar silver solder or wire silver solder may be used. The choice depends on the solder necessary to form a solid joint. If bar silver solder is used, flux the joint (flux should be fluid). Cut a piece of bar solder to fit the joint. Contour it into a "saddle" shape to help it stay in place on the joint under the pressure of the carbon tip. If more convenient, use wire silver solder (25 gauge is a convenient size). When soldering a light delicate wire, wrapping the silver solder could distort the joint. Therefore, form a tight solder loop around a similar sized piece of wire and slip on the wire to be soldered. The joint is now ready to use. The low voltage/high amperage output of the machine will not give you an electrical shock. Comfortable handle positions can be maintained. The cable handles as you would a pencil (touching the metal tips during this soldering operation is harmless).

6.) Touch the carbon tip to the solder. The carbon tip will heat and glow. When the solder flows around the joint, remove the tip. Some operators dip the carbon tip into water prior to soldering and immediately following soldering to float dried flux adhering (optional). Failure to remove the tip from the joint immediately following the flow of solder can overheat and destroy the temper of the wire beyond the solder joint. The joint may be air-cooled or dipped in water for more rapid cooling. When impractical to use the clip vise, substitute a grooved brass tip and hold it on the work as close to the joint as possible. Avoid getting it in the area to be covered with solder.

Soldering with the auxiliary vise
The Auxilary Vise may be substituted for the cable that normally will hold the vise tip or brass tip, and provides a stable platform for soldering. Follow the procedures described in the preceding paragraphs.

Using Brass Solder Electrodes
Hold brass wire in auxiliary vise grip, 2-3 mm from solder. Flux only part to be soldered. Hold part to be soldered in contact with silver solder. Place cable carbon tip on top of silver solder and maintain contact until solder flows.

Maintenance of Carbon Tips
1) Turret carbon tips
Carbon elements will wear. Replace when so short that they fail to heat sufficiently. The electrode carbon tip element is held in position by spring pressure of the split copper electrode. To change tips, slip the old, used tip off the copper electrode with finger pressure. Replace with a new element. If the carbon tip slides on loosely, spread the split electrode slightly with a knife blade to provide more spring pressure.

2) Cable carbon tips
The cable carbon tip element (for the auxiliary cables) needs to be dressed to a point as it becomes blunt through use and should be cleaned of flux before each use. Replace the worn element as needed. Use only copper plated carbons.

4.) Clean the carbon tip with the carbon file (dried flux on the carbon tip will insulate and prevent good electrical contact). Either bar silver solder or wire silver solder may be used. The choice depends on the solder necessary to form a solid joint. If bar silver solder is used, flux the joint (flux should be fluid). Cut a piece of bar solder to fit the joint. Contour it into a "saddle" shape to help it stay in place on the joint under the pressure of the carbon tip. If more convenient, use wire silver solder (25 gauge is a convenient size). When soldering a light delicate wire, wrapping the silver solder could distort the joint. Therefore, form a tight solder loop around a similar sized piece of wire and slip on the wire to be soldered. The joint is now ready to use. The low voltage/high amperage output of the machine will not give you an electrical shock. Comfortable handle positions can be maintained. The cable handles as you would a pencil (touching the metal tips during this soldering operation is harmless).

6.) Touch the carbon tip to the solder. The carbon tip will heat and glow. When the solder flows around the joint, remove the tip. Some operators dip the carbon tip into water prior to soldering and immediately following soldering to float dried flux adhering (optional). Failure to remove the tip from the joint immediately following the flow of solder can overheat and destroy the temper of the wire beyond the solder joint. The joint may be air-cooled or dipped in water for more rapid cooling. When impractical to use the clip vise, substitute a grooved brass tip and hold it on the work as close to the joint as possible. Avoid getting it in the area to be covered with solder.

Soldering with the auxiliary vise
The Auxilary Vise may be substituted for the cable that normally will hold the vise tip or brass tip, and provides a stable platform for soldering. Follow the procedures described in the preceding paragraphs.

Using Brass Solder Electrodes
Hold brass wire in auxiliary vise grip, 2-3 mm from solder. Flux only part to be soldered. Hold part to be soldered in contact with silver solder. Place cable carbon tip on top of silver solder and maintain contact until solder flows.

Maintenance of Carbon Tips
1) Turret carbon tips
Carbon elements will wear. Replace when so short that they fail to heat sufficiently. The electrode carbon tip element is held in position by spring pressure of the split copper electrode. To change tips, slip the old, used tip off the copper electrode with finger pressure. Replace with a new element. If the carbon tip slides on loosely, spread the split electrode slightly with a knife blade to provide more spring pressure.

2) Cable carbon tips
The cable carbon tip element (for the auxiliary cables) needs to be dressed to a point as it becomes blunt through use and should be cleaned of flux before each use. Replace the worn element as needed. Use only copper plated carbons.
1.) Plug the cables into the black and white auxiliary receptacles (or into the annealing jack receptacles if the annealing jack is to be left on the machine).

2.) Set up the cables for grooved metal tip operation. Turn the Heat Selector to “S”. Lock the handrest in the “down” position to activate the internal auxiliary function switch.

3.) Place the metal tips of the cables on the wire with the tips as far apart as you wish to anneal the wire. When the wire becomes bright red, quickly remove the tips. If the wire does not heat to a bright red, advance the Heat Selector to a higher heat station. Generally, the smaller the wire, the higher the heat necessary. Moving the tips closer to one another during the operation will also allow the wire to heat more rapidly.

Resilient stainless steel wires can be softened (annealed) by heating to a temperature of about 2000°F (1095°C) (bright red). The temper that is removed by annealing cannot be restored by further heat treatment. Annealing is a practical method of removing the temper from sections of wire prior to forming loops for extra-oral appliances, plier-formed lingual arch posts, or hooks for elastics.

Using the 660-XP Annealing Jack

• Insert the Annealing Jack into the black and white receptacles.
• Set the Heat Selector to “S”. Place the section of the stainless steel wire to be annealed between the copper elements of the jack.
• Depress the handrest/tray to activate the internal auxiliary function switch (the handrest/tray may be “locked” down if more convenient). When the wire becomes bright red, release the handrest/tray or, if the handrest/tray is in “locked” position, remove the wire from the annealing jack. It will be annealed dead soft. If the wire does not become bright red with the “S” setting, advance the Heat Selector to #1 or #2 heat stations. Smaller wires generally require higher heat settings than larger wires. The red line over the Heat Selector indicates the progressively higher heat settings for the auxiliary functions. Number 4 setting is NOT connected for auxiliary functions.
HEAT-TEMPERING

HEAT-TEMPERING ELGILOY®
(Heat Hardening)
RMO Elgiloy® wire has proven very effective for lingual arches and high resiliency arch requirements as well as clasps and space maintainers. Its initial packaged softness allows fabrication of intricate shapes which can then be heat-treated (hardened) to a high resilient and stable form.

Using Auxiliary Cables
RMO Elgiloy® heat treating technique is similar to that used for stress relieving stainless steel. (See page 16.) However, the metallurgical difference between Elgiloy® wire and stainless steel makes it necessary for the Elgiloy® to absorb an additional 100ºF of heat and turn to a dark straw color. The straw color, in the case of stainless steel, indicates a stress-relieved wire without any appreciable change in resiliency, while a darker straw color, in the case of Elgiloy®, indicates a significant change to a higher degree of resiliency. Use heat selections “S” through “3”. Heat selection “4” will not operate for auxiliary functions. It is best to start with a low heat setting and increase to a higher heat setting if necessary. This will prevent overheating and give more even heat distribution, as well as more positive control.

Using Heat Treat Table
Plug the table into two white receptacles. Start with low heat setting “S”. Insert the distal ends of arch wire into the vise grips of the table. Depress handrest down until “operate light” glows. As wire begins to heat, release handrest and pulsate on and off slowly. If necessary, increase heat setting, however, it is best to start at a low heat setting to prevent overheating the arch wire. The heat setting necessary depends on the length and size of the arch wire. The longer and smaller wires will take a higher heat setting. The arch wire may heat in the middle first and the on-off pulsating motion will prevent overheating and allow the heat to be distributed over the entire arch wire. From the point where the arch wires is clamped in the vise grips for a distance of approximately 8mm, the wire will not be heat treated. Allow additional length on each side.

Special Heat-Tempering Aid
Elgiloy® Temper Indicating Paste may be used to acquaint the operator with the proper “straw” color. Place a spot of paste at intervals along the wire to be heat-treated. As the current passes through the wire and the resistance heat reaches 950ºF, the spots of paste will flash.

STRESS-RELIEVING
STRESS-RELIEVING (Thermo-Setting)
Internal stresses are created in stainless steel by bending and cold working. This causes the materials to try to “creep” or revert to their original position. Heating the material to 850º will relieve these internal stresses and the material will be “set” in its new position. The material should never be permitted to approach the annealing red temperature, since this will destroy its temper and resiliency. Most operators find the Auxiliary Cables the quickest and easiest method for Stress-Relieving (Thermo-setting).

Using the Auxiliary Cables
1.) Plug the cables into black and white receptacles.
2.) Prepare both cables for slotted metal tip operation.
3.) Turn the Heat Selector to “S”.
4.) Lock the handrest tray in the “down” position (this activates the internal auxiliary function switch and the cables are now ready to use).
5.) Place the metal tips on the wire to be stress-relieved with about 15-20mm between the tips.

Other methods: A dental furnace set to 850ºF (454ºC) can be used to stress-relieve as can a “brush flame”. The flame method is very difficult to control.
The RMO 660-XP is engineered for reliable high performance in fabricating Pedodontic and Orthodontic appliances of stainless steel and Elgiloy® materials as outlined in this manual. It is not designed for use with precious metals, heavy-gauge stainless steels and chrome cobalt alloys used in prosthodontic dentistry, as these metals require higher heats and circuitry specifically designed for their unique metallurgical characteristics.

Welding Electrodes
In normal use, electrode tips (especially pointed electrodes) roughen and spread, presenting a rough and larger surface. This causes excessive sparking, and the larger surface will destroy the welding charge over too great an area, resulting in an inadequate weld. Corrective maintenance is quick and simple. “Dress” (file) the pointed-tip electrodes with a fine flat steel file to approximately 1 mm diameter and level the surfaces so they meet evenly. Open the electrodes, assert the file between them, holding down the file level, and allow enough electrode pressure on the file to permit it to be pulled out horizontally but at the same time smoothing and correcting the two surfaces, pulling the file from the machine toward you. With the electrode tips level and in full contact, burnish the outside circumference of the two electrodes to remove horizontal burrs. Eventually, redepositing will shorten the electrodes. When electrodes become too short, remove and replace with new electrodes to maintain correct pressure for welding contact. Do not attempt to prolong the usefulness of an electrode by extending it from the turret socket, as it has been engineered for rigidity and stability with a precise socket depth. Replace with new electrode. Remove worn electrodes with the hex electrode wrench. Check occasionally for proper bypass of the upper and lower pointed electrodes (electrode pressure). Upper pointed electrodes should extend at least 2 mm beyond the top of the upturned lower pointed electrode when allowed to bypass. The other welding electrodes, which are designed for welding wires and other materials, normally require little maintenance, as the broader configuration distorts less than pointed electrodes. However, they should be kept clean and bright for good electrical conductivity. High humidity and coastal atmospheres tend to accelerate discoloration and decrease conductivity.

Soldering Electrodes
The upper carbon element is disposable. Clean with carbon file before each soldering operation to remove dried flux to restore full conductivity. Warning: Dried flux is not always visible as a white residue. It frequently is a clear coating that may deceive the user into attempting to solder without cleaning the carbon tip. When the carbon tip is worn and shortened so it does not heat satisfactorily, replace the tip. Finger pressure will slide the carbon element off the split copper electrode. Replace by slipping on a new carbon. If loose, spread the split electrode slightly with a knife blade to increase the spring action. The lower copper soldering electrode will accumulate dried flux, and oxide from the soldering heat. Use the smooth side of the carbon file to clean this electrode to ensure good electrical conductivity. This is essential to attain satisfactory results in soldering. Failure of the soldering element to heat is almost invariably due to incomplete removal of dried flux and oxidation from either or both of the soldering electrodes, which does not allow the electrical current to pass through this insulation.

Other commonplace disruptions of electrical current are:

• Tarnished solder. This represents a high electrical resistance and must be removed.
• Foreign materials or oxidation on the joint to be soldered. This must be removed and the materials must be brightened.
• Abnormally low voltages or intermittent current at the wall outlet. This will drastically diminish performance.
**Electrical Connection**

The welder is available for 115 volt, 60 Hz alternating current or 220-250 volt, 50-60 Hz alternating current. Check data plate on bottom of welder before attaching to power source. The line cord is equipped with a standard 3-prong grounding-type plug. The 660-XP should be grounded. If a 3-prong receptacle outlet is not available, use the grounding adapter plug, provided with the machine, in the regular 2-prong receptacle and connect (ground) the grounding pigtail to the wall outlet faceplate securing screw.

**IMPORTANT**

Special Lubricant

A special electrically conductive lubricant is used on the inner shaft of the turrets and should never be wiped off. It is also essential to the free rotation of the turrets.

**OTHER OPERATIONAL PROBLEMS**

Check fuse. If machine does not operate after checking all previous maintenance and trouble-shooting instructions, contact your nearest RMO representative for instructions.

Give model number of welder and nature of difficulty.

**HANDREST ASSEMBLY PIVOT**

If handrest assembly develops lateral movement preventing electrode alignment, adjust pivot bearing screw.

- Loosen top set screw one complete turn
- Tighten side pivot bearing screw to remove lateral movement. (Do not tighten.)
- Tighten top set screw

**CARE OF YOUR RMO 660-XP WELDER**

The housing of your RMO 660-XP Welder is a solid color plastic which can be cleaned with a cloth dampened with water and a light detergent. As with any plastic, the use of an abrasive cleaner will mar the surface. Care should also be exercised not to drop hot annealed wires or stress-relieved/heat-tempered materials on the housing, as such temperatures exceed the tolerance of the plastic. Do not use excessive spray cleaners around auxiliary receptacles and face of welder.

**SPECIFICATIONS**

**TYPE OF EQUIPMENT**

AC transformer-powered resistance (spot) welder with four welding heats and four auxiliary heats.

**WELDING CONTROL**

Finger-pressure switch automatically activates the solid state circuitry, releasing the welding energy.

**HEAT SELECTOR**

Rotary type switch with progressive heat stations for welding and auxiliary functions.

**TURRETS**

RMO Select-a-matic turrets with one soldering and four welding electrode combinations.

**AUXILIARY FUNCTIONS**

Controlled by rotary type selector switch with four progressive heat stations, activated by internal switch via handrest/tray with fingertip lock down.

- Electric Soldering
- Annealing
- Stress-Relieving
- Heat-Treating

**POWER**

J00059 100 volt, 50 Hz. Alternating current only. Overload protection: Fusetron MDX 3-2/10 amp.

J00060 115 volt, 60 Hz. Alternating current only. Overload protection: Fusetron MDX 3-2/10 amp.

J00061 230 volt, 60 Hz. Alternating current only. Overload protection: Fusetron MDX 1-6/10 amp.

J00064 220-250 volt, 50-60 Hz. Alternating current only. Overload protection. Fusetron MDX 1-6/10 amp.

**AUXILIARY FUNCTION RECEPTACLES**

Color-coded auxiliary receptacles to accept plug-in accessories.

**SIZE/COLOR**

Case: 61/2 wide x 5 high x 101/2 deep.

Weight: 8 lb 8oz.

International Measurements: 165mm wide x 127 mm high x267 mm high x 267mm deep.

Weight: 3.85 kilograms.

Color: Silver

**ALSO INCLUDED**

Carbon file, extra carbon tip, electrode hex wrench, extra fuse.
The RMO 660-XP welder is designed to work in a normal office environment. However, high humidity and coastal atmospheres tend to decrease conductivity and the life of the welder. This unit is designed for intermittent duty, low-power welding, soldering and annealing operations. When operated as instructed elsewhere in this Instruction Manual, reliable high performance fabrication can be achieved. This welder will normally generate heat during operation. Be careful not to touch the electrodes or optional cable tips immediately after use. They may still be hot enough to burn your finger. Always wear safety glasses when operating this welder. Hot energetic sparks may be generated during use.

**UNPACKING INFORMATION**

The packaging has been designed and tested to protect the welder during shipment. If there is damage to the package, examine the welder carefully for damage. If damage is found, save the packaging and shipping materials and request inspection by the transportation company. Have the inspection agent note the nature and extent of the damage on the shipping receipt. Send a copy of the receipt to RMO's Customer Service Department in the U.S.A. or RMO's nearest office. Proper action can be taken for settling the damage done and for repairing or replacing the welder.

**EQUIPMENT WARRANTY**

Rocky Mountain® Orthodontics, RMO®, warrants this machine to be free from electrical or mechanical defects for a period of ninety (90) days from date of purchase. This warranty covers only the cost of material and labor incidental to the repair of the machine should it fail as a result of electrical or mechanical defect during said ninety-day period. This warranty does not extend to any repairs if the machine has been altered, abused or damaged by improper use or by connection to any electrical current other than that designated.

The warranty provided herein is the only warranty granted, and all other warranties, expressed or implied, are specifically excluded. This warranty is exclusive of all other warranties granted by RMO® respecting other products sold by RMO®.

This machine has been registered for warranty and other purposes at time of shipment.

**WHAT TO DO IF MALFUNCTION OCCURS**

In the event of malfunction, contact your RMO® representative. While they do not have repair facilities, they can provide remedial instructions in most cases, thereby saving you shipping costs. If malfunction continues, your RMO® representative can advise you on procedures for shipping directly to the factory.