



NC-350II System

Ultimate Lab Engine

Pat. 043-4233

OM-EK166E Rev.B

Operating and Maintenance Instructions

Before operation

- The Patterson Brand NC-350II System is intended for use by qualified dental professionals only.
- Read this Operating and Maintenance Instructions carefully before using the Patterson Brand NC-350II System. Be sure to follow all the Operating and Maintenance Instructions, including all cautions, warnings, safety instructions, electrical instructions, etc.
- Keep this Operating and Maintenance Instructions in place for your future reference.



Attn: Central Repair
2930 Waters Road, Suite 150,
Eagan, MN 55121



1205 Henri Bourassa Blv.
W. Montréal, Québec H3M 3E6

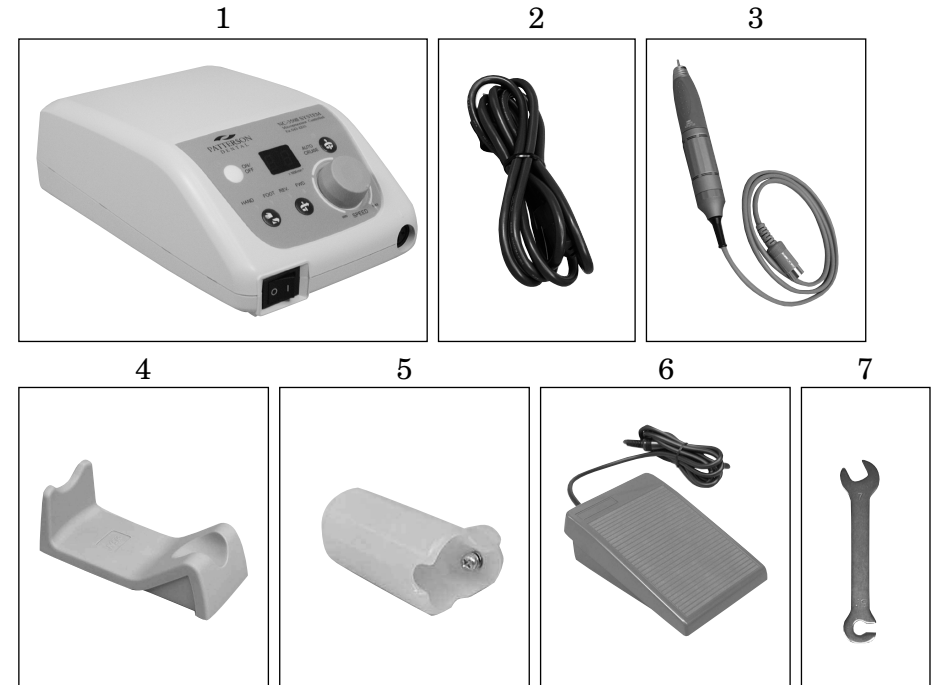
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Section A - Components

Unpack the Patterson Brand NC-350II System carefully. Make sure that the following components are included:

1. 1 - Patterson Brand control unit
2. 1 - 6.56ft (2.0m) power cord
3. 1 - Patterson Brand micro-motor handpiece with 3.93ft (1.2m) cable
4. 1 - Handpiece stand
5. 1 - Handpiece holder with one fixing screw
6. 1 - Foot control with 5.9ft (1.8m) cable
7. 1 - Chuck removal wrench
(Chuck removal wrench is located in the back side of the handpiece stand.)



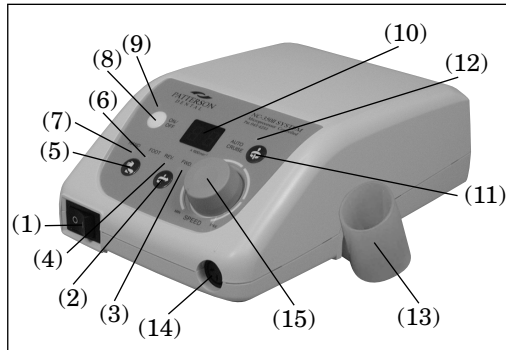
Note

In this operating and maintenance manual, the nose part of the handpiece is called the “nose cone”, the part where the micro-motor is housed is called the “motor”, and the nose cone connected with the motor is called the “handpiece”.

Section B - Part Description of Control Unit

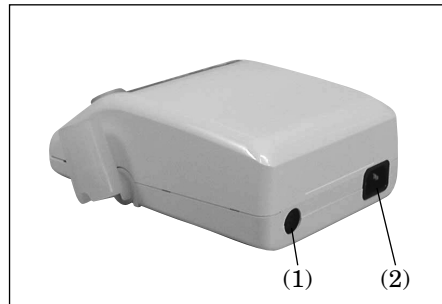
Front view

- (1) Main Switch
- (2) Selector Button for Forward/Reverse Rotation
- (3) Pilot Lamp for Forward Rotation
- (4) Pilot Lamp for Reverse Rotation
- (5) Selector Button for Hand/Foot Control
- (6) Pilot Lamp for Foot Control
- (7) Pilot Lamp for Hand (manual) Control
- (8) Motor Switch
- (9) Pilot Lamp for Motor Switch
- (10) Speed Indicator/Error Code Display
- (11) Auto Cruise Button
- (12) Pilot Lamp for Auto Cruise Button
- (13) Handpiece Holder
- (14) Socket for Handpiece Cable
- (15) Speed Control Knob



Back View

- (1) Socket for Foot Control Cable
- (2) Inlet Block for Power Cable



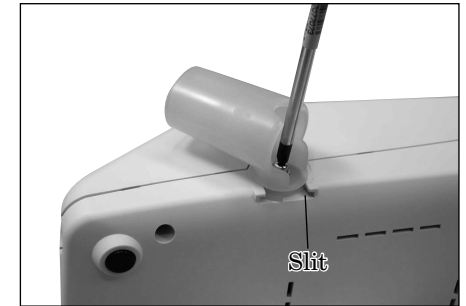
Section C - Component Installation

Operating environment: The control unit should be kept on a horizontal and stable table. The foot control should be placed on a non-rattle/non-slip surface and under a safe environment.

1. Installation of Handpiece Holder onto Control Unit

Handpiece holder is installed onto the right side of the control unit.

- Slide-insert the slit of the holder into the convex of the holder fixing part located on the right side of the control unit.
- Fix the handpiece holder with a screw.



2. Installation of Foot Control Cable

- Insert the foot control cable plug securely into the socket located in rear of the control unit, aligning the prongs on the plug with the slots in the socket.

3. Installation of Power Cord

- Insert the power cord socket securely into the inlet block located in rear of the control unit.
- Insert the power cord plug into a 115-volt 3-pole grounded wall socket.

⚠ Caution

- If the extension cord is needed, be sure to use only a 3-wire cord with a grounding conductor that has a 3-prong plug and a 3-pole socket for the power cord provided with the NC-350II System.

⚠ Warning

- Never use a 2-wire extension cord.
- Improper connection of the equipment grounding conductor may result in risk of electric shock. Before operation, Patterson recommends it should be confirmed by a qualified electrician that the grounding conductor has been properly equipped with the wall socket.

4. Installation of Handpiece Cable

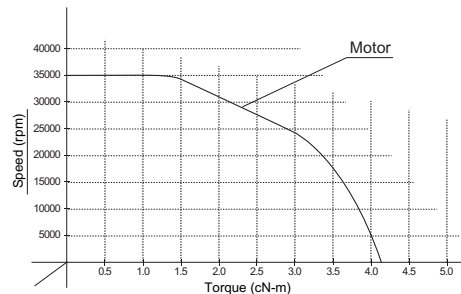
- Insert the connector of the handpiece cable securely into the socket on front of the control unit. Be sure to always keep the handpiece in the holder or on the handpiece stand whenever the handpiece is not in use.

Section D - Specifications and Technical Data

Handpiece	
P/N of motor	Pat. 043-4258 GX-35RM
P/N of nose cone	Pat. 043-4266 / UHR-35
Rotation Speed	1,000~35,000 rpm
Max. Output	71W
Max. Torque	4.1 cN-m
Weight w/o cord	6.95 oz
Total Dimensions	ø0.96" x L5.65"

Control Unit	
P/N of Control Unit	Patterson NE-165
Power Source	120VAC 50/60 Hz 30W
Output	35VDC
Weight	3.74 Lb
Total Dimensions	W5.9"xD8.74"xH3.23"

Torque Characteristics



Section E - Removal/Insertion of Cutting Instrument from/into Nose Cone

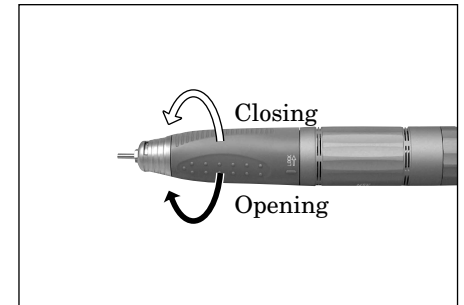
Cutting Instrument: The spindle of cutting instruments used with the nose cone should be an ISO standard 2.35 diameter HP bur.

1. Removal of Cutting Instrument

- Hold the motor, placing the nose cone upward.
- Twist the nose cone in the direction indicated by the black arrow until the chuck clicks open and pull the bur blank out.

2. Insertion of Cutting Instrument

- Place the nose cone upward, holding the motor.
- Insert the spindle of the cutting instrument all the way into the chuck hole until the spindle end touches the back of the chuck.
- Twist the nose cone back in the direction indicated by the white arrow until the chuck clicks shut.
- Make sure that the cutting instrument is securely installed into the chuck, pulling it gently with fingers.



⚠ Warning

- Never insert bent or worn-out cutting instruments including cracked or chipped grinding wheels into the nose cone.
- Never close the chuck without a cutting instrument, as the chuck holding intensity weakens.
- A partially closed chuck may allow the cutting instrument to work free while the motor is running and cause serious injury. Before operation, make sure that the cutting instrument is securely fixed into the chuck.

Section F- Operating Instructions

⚠ Caution

- Operating environment should be room temperature between -30°F and 100°F, humidity between 10% and 85% RH, atmospheric pressure between 500 hPa and 1060 hPa.
- Before turning the main switch ON, make sure that the speed control knob is set to the lowest speed position.

1. Power Switch

○ marked on the main switch indicates ON, and – indicates OFF. Turning the main switch ON on front of the control unit, the speed indicator will be illuminated.

2. Selection of Rotation Direction

On the front panel, FWD indicates the forward rotation and REV indicates the reverse rotation. Either direction of FWD or REV can be selected by pressing the selector button.

- Turning the main switch ON, the pilot lamp of the FWD preset will be lighted concurrently with the speed indicator.
- Select either direction of reverse rotation or forward rotation, pressing the REV/FWD selector button.

3. Selection of Operating Method for Handpiece

On the front panel, FOOT indicates the foot control operation and HAND indicates the manual operation. Either operating method of FOOT or HAND can be selected by pressing the selector button.

Foot Control Operation

- Turning the main switch ON, the pilot lamp of the FOOT preset will be lighted concurrently with the speed indicator.
- Hold the handpiece securely.
- Turn the motor switch ON on the front panel of the control unit and make sure that the pilot lamp is lighted.
- Preset the desired speed, rotating the speed control knob.
- Depress the foot pedal to run the motor. The speed can be adjusted within the range up to the preset speed shown in the speed indicator by depressing the foot pedal.
- To stop the motor, release the foot pedal and turn the motor switch OFF.

Auto Cruise function

Auto Cruise Function is available for the foot control operation. The desired speed can be fixed within a speed range preset by rotating the speed control knob.

- Press the auto cruise button when the motor reaches the desired speed, depressing the foot pedal. The pilot lamp blinks while the auto cruise function is in operation.
- The motor will run at the fixed speed without depressing the foot pedal.
- To release the auto cruise function, press the foot pedal once again.

Hand (Manual) Control Operation

- Select HAND by pressing the selector button.
- Hold the handpiece securely.
- Preset the desired speed, rotating the speed control knob.
- Turn the motor switch ON on the front panel of the control unit and make sure that the pilot lamp is lighted.
- Speed adjustment can be made by rotating the speed control knob while the motor is running, if need be.
- Turn the motor switch OFF to stop the motor and make sure that the pilot lamp is off.

Safety Device

- If the excessive torque beyond the motor's specified capacity is applied to the motor, the built-in detector for protecting the electrical circuit of the control unit and the motor activates the circuit breaker, and the motor automatically stops running. In such a case, resume operation at moderate torque that does not activate the circuit breaker, turning the motor switch ON and following the operating instructions.
- When the chuck is not in a closed or partially closed position, the motor does not run. In such a case, make sure that the cutting instrument is inserted securely into the chuck and that the chuck clicks shut. Resume operation, turning the motor switch ON and following the operating instructions.

⚠ Warning

- **Never autoclave the handpiece and other components.**
- **Never open the chuck while the motor is running.**

Section G - Error Code and Troubleshooting Guidance

When faulty operation or abnormality is detected in the handpiece, the rotation of the motor is automatically stopped by activating the self-stop function that protects the electrical circuit, and then the **error code display** comes on instead of the speed indicator. In such a case, resume operation after the trouble is solved in accordance with the troubleshooting guidance.

To release the self-stop function after the trouble is solved, resume operation, following **Section F - Operating Instructions**.

Error Code

Error code	Trouble detected	Possible cause	Countermeasure
E0	Malfunction of built-in EEPROM (memory chip)	<ul style="list-style-type: none"> Occurrence of abnormal current to EEPROM 	<ul style="list-style-type: none"> Turn the main switch ON. Repeat the motor's start/stop several times. If the control unit operates normally, there is no trouble with the EEPROM. If the control unit does not operate normally or if the same error code is still displayed, send the control unit to Patterson and ask for repair or replacement.
E1	Over-current to handpiece	<ul style="list-style-type: none"> Long-time use of handpiece at excessive torque A partial closed or opening chuck Failure of the chuck mechanism 	<ul style="list-style-type: none"> Turn the motor switch ON. Operate the handpiece at moderate torque that does not actuate the circuit breaker. Make sure that the chuck clicks shut securely. Rotate the cutting instrument manually. If it does not smoothly rotate, clean the chuck or replace it. If the motor does not run even after the chuck is cleaned or replaced, send the handpiece to Patterson and ask for repair or replacement.

Error code	Trouble detected	Possible cause	Countermeasure
E1	Over-current to handpiece	<ul style="list-style-type: none"> Shorted circuit of handpiece cable Shorted circuit of built-in winding of motor Failure of handpiece 	<ul style="list-style-type: none"> Remove the handpiece with the cable in question. If there is any other NC-350II system, remove the trouble-free handpiece with the cable from the control unit and install it onto the control unit in question. If the handpiece with the cable replaced operates normally with the control unit in question, send the handpiece with the cable removed in question to Patterson and ask for repair or replacement. If the same error code is still displayed even after the trouble-free handpiece with the cable is installed onto the control unit in question, send all the components in question to Patterson for over-all service and ask for repair or replacement.
E2	Over-voltage to electrical circuits in control unit	<ul style="list-style-type: none"> Breakdown of circuits caused by long-time use of handpiece at excessive torque 	<ul style="list-style-type: none"> Turn the motor switch ON. If the handpiece runs in a normal condition, the error code displayed is temporary due to the excessive torque temporarily detected. Operate the handpiece at moderate torque that does not actuate the circuit breaker. If the same error code is still displayed after the motor switch is turned ON, send the control unit to Patterson and ask for repair or replacement.
E3	NA		

Error code	Trouble detected	Possible cause	Possible cause
E4	Overheated control unit	<ul style="list-style-type: none"> Rise in temperature caused by long-time use of control unit at excessive torque 	<ul style="list-style-type: none"> Suspend operation for 10 minutes to cool down the control unit. Check the operating environment: Room Temperature : 30°F to 100°F. Humidity : 10% to 85% Atmospheric pressure: 500 hPa to 1060 hPa If operation is resumed normally after 10-minute cooling, there is no mechanical failure at all. Operate the handpiece at moderate torque, which does not actuate the circuit breaker. If the same overheating trouble frequently occurs, send the control unit to Patterson and ask for repair or replacement.
E5	Malfunction of break circuit in control unit	<ul style="list-style-type: none"> Occurrence of abnormal voltage to rotation start/stop circuit 	<ul style="list-style-type: none"> Turn the main switch ON. Repeat the motor's start/stop several times. If the control unit operates normally, there is no trouble with the circuit. If the same error code is frequently displayed, send the control unit to Patterson and ask for repair or replacement.
E6	Malfunction of chuck mechanism/rotor built to motor	<ul style="list-style-type: none"> A partial closed or opening chuck Failure of the chuck mechanism 	<ul style="list-style-type: none"> Make sure that the chuck clicks shut securely. Rotate the cutting instrument manually. If it does not smoothly rotate, clean the chuck or replace it. If the motor does not run even after the chuck is cleaned or replaced, send the handpiece to Patterson and ask for repair or replacement.

Error code	Trouble detected	Possible cause	Countermeasure
E7	Malfunction of speed control mechanism	<ul style="list-style-type: none"> Failure of speed control knob. Breakdown of control circuit 	<ul style="list-style-type: none"> Send the control unit to Patterson and ask for repair or replacement.
E8	Malfunction of foot control	<ul style="list-style-type: none"> Shorted circuit of foot control cable Failure of switch function Breakdown of control circuit 	<ul style="list-style-type: none"> Send the foot control to Patterson and ask for repair or replacement. Before sending the foot control to Patterson, make sure that the control unit and the handpiece operate normally, changing the operating method from FOOT to HAND.

Other Troubleshooting Guidance

Control Unit	Trouble	Possible cause	Countermeasure
Control Unit	Speed indicator does not illuminate when turning the main switch ON	Insecure connection of power cord	<ul style="list-style-type: none"> Make sure that both ends of the power cord are securely connected to the wall socket/control unit.
	<ul style="list-style-type: none"> Pilot lamps are not lighted up when turning the main switch ON 	<ul style="list-style-type: none"> Failure of main switch assembly/fuse 	<ul style="list-style-type: none"> Send the control unit to Patterson for repair.
Foot Control	Foot control does not function	Insecure connection of foot control cable	<ul style="list-style-type: none"> Make sure that the plug of the cable is connected to socket of the control unit.
Handpiece	Chuck does not click shut	Entry of foreign particles of ball bearing assembly or abrasion of ball bearings	<ul style="list-style-type: none"> Send the handpiece to Patterson for repair.
	Cutting instrument slips during operation	Insecure adjustment of chuck spring	Adjust the chuck spring.
		Defectiveness of chuck maintenance	Clean the chuck or replace it.
Cutting instrument vibrates during operation	Installation of bent cutting instrument	Replace the cutting instrument.	
	Noise occurs from handpiece during operation	Entry of foreign particles to ball bearing assembly or abrasion of ball bearings	<ul style="list-style-type: none"> Send the handpiece to Patterson for repair.

Section H - Maintenance

⚠ Caution

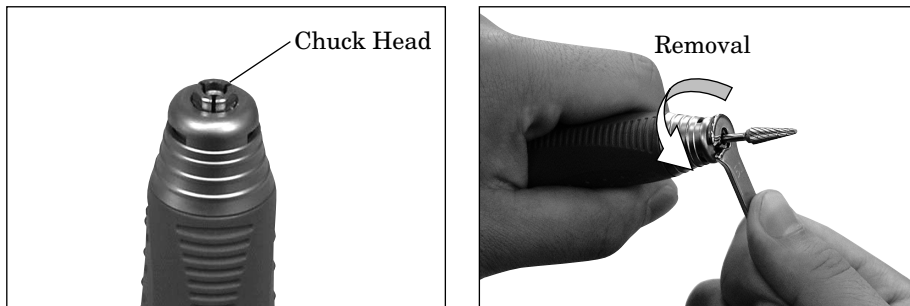
- Be sure to turn the main switch OFF before maintenance service.

1. Removal/Cleaning/Insertion of Chuck

- Chuck should be cleaned/lubricated at least once a week or more often. The chuck should always be kept clean.
- The worn-out chuck should be replaced immediately to maintain the original performance of the handpiece and for safety.

Removal of Chuck

- Open chuck, following **Section E - 1. Removal of Cutting Instrument**.
- The chuck's head is visible at the nose of the handpiece. Turn the chuck head counterclockwise using a chuck removal wrench as illustrated below:
- Pull the chuck out.



Cleaning of Chuck

- Clean the surface and the inside of the chuck using a brush or pin. Try not to scratch the chuck. Using a steam cleaner may be effective in cleaning the chuck.
- Coat the surface of the cleaned chuck lightly with a handpiece lubricating oil. This is required also for the replacement.

⚠ Warning

- Negligence in removing any wax, gypsum, dirt, etc., accumulated in the chuck reduces the chuck's retention intensity, and consequently the cutting instrument may become loose while the motor is running. This may result in serious injury. Be sure to always keep the chuck clean.
- For safety reasons, Patterson recommends the chuck should be replaced immediately after any deterioration of chuck performance is sensed.

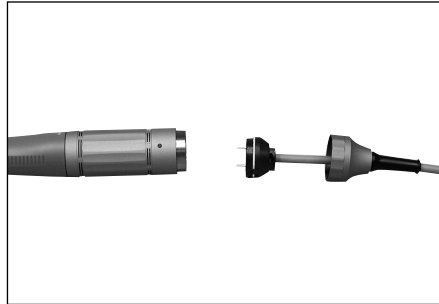
Insertion of Chuck

- Open chuck, following **Section E - 1. Removal of Cutting Instrument**.
- Insert chuck all the way into the nose of the handpiece.
- Insert a cutting instrument into the hole of the cleaned chuck or the replacement.
- Manually turn the chuck's head in a clockwise direction until it stops and then tighten the chuck head securely using a chuck removal wrench.
- Close the chuck, following **Section E - 2. Insertion of Cutting Instrument**.

2. Removal/Connection of Cable from/to Handpiece

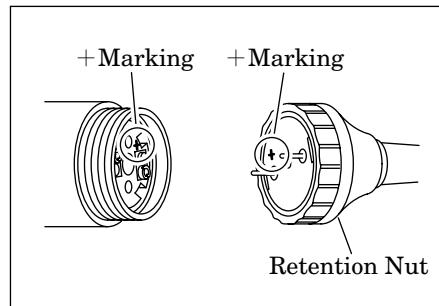
Removal

- Turn the retention nut for the plug counterclockwise, holding the motor.
- Pull the plug out from the motor, holding it with fingers.



Connection

- Insert the plug carefully into the back of the motor, aligning the + and - marked prong on the plug with the + and - marked hole on the motor.
- Fix the plug securely with the retention nut, turning it clockwise.



⚠ Caution

- Insert the plug of the cable carefully into the back of the motor so as not to damage the prongs.
- If the + and - prongs on the plug are inserted reversely into the + and - marked hole on the back of the motor, the motor runs in a reverse direction against the selected direction.

3. Removal/Connection of Nose Cone from/to Motor

Removal

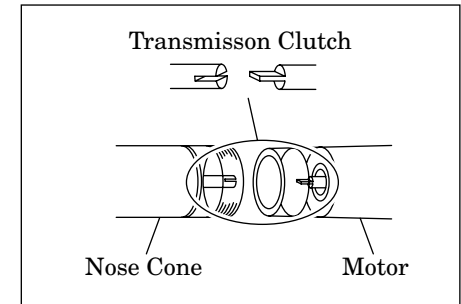
- Holding the motor, twist the nose cone with hand in the chuck opening direction. Turning the nose cone further in the direction, the turn-stopper will be released.
- Keep turning the nose cone in the same direction to remove the nose cone from the motor.

Connection

⚠ Caution

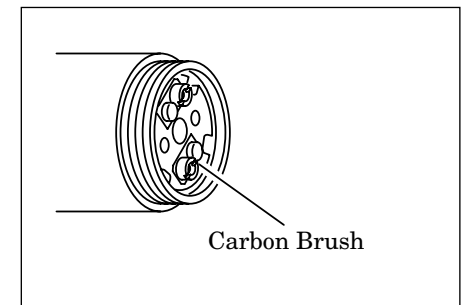
- Be sure to insert a cutting instrument or bur blank in the nose cone, as non-insertion may give damage to the chuck mechanism.
- The motor and the nose cone have to be connected carefully so as not to damage both the clutch of the motor and the nose cone.

- Insert a cutting instrument or bur blank into the nose cone.
- Holding the motor, screw the nose cone into the motor slowly and carefully. If it becomes hard to screw the nose cone smoothly into the motor, turn the chuck's head slightly so that both clutches engage without damage.
- Connect the nose cone to the motor until the chuck clicks shut.

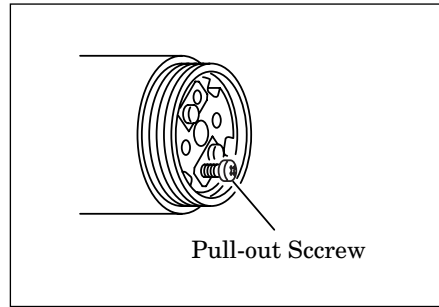


4. Replacement of Carbon Brush

- Remove the cable from the motor, referring to **Section H - 2. Removal/Connection of Cable from/to Handpiece.**
- Remove each screw with which carbon brush is fixed, using a flat-blade screwdriver.



- A screw for pulling the used-up carbon brush out from the hole is packed with a replacement. Screw the pull-out screw a few turns into the hole and pull it out without unscrewing. The used-up carbon brush can be removed with the pull-out screw.



- Insert the new carbon brush into each hole and fix it with each screw removed.
- Connect the cable to the motor, referring to **Section H - 2. Removal/Connection of Cable from/to Handpiece.**

Section - I-1 Safety Instructions, Daily Operating Environment

- Always keep the working area clean, uncluttered and well-lit.
- Always wear eye protection when working.
- Always wear protective hair covering to contain long hair when working.
- Never wear loose clothing or jewelry when working.

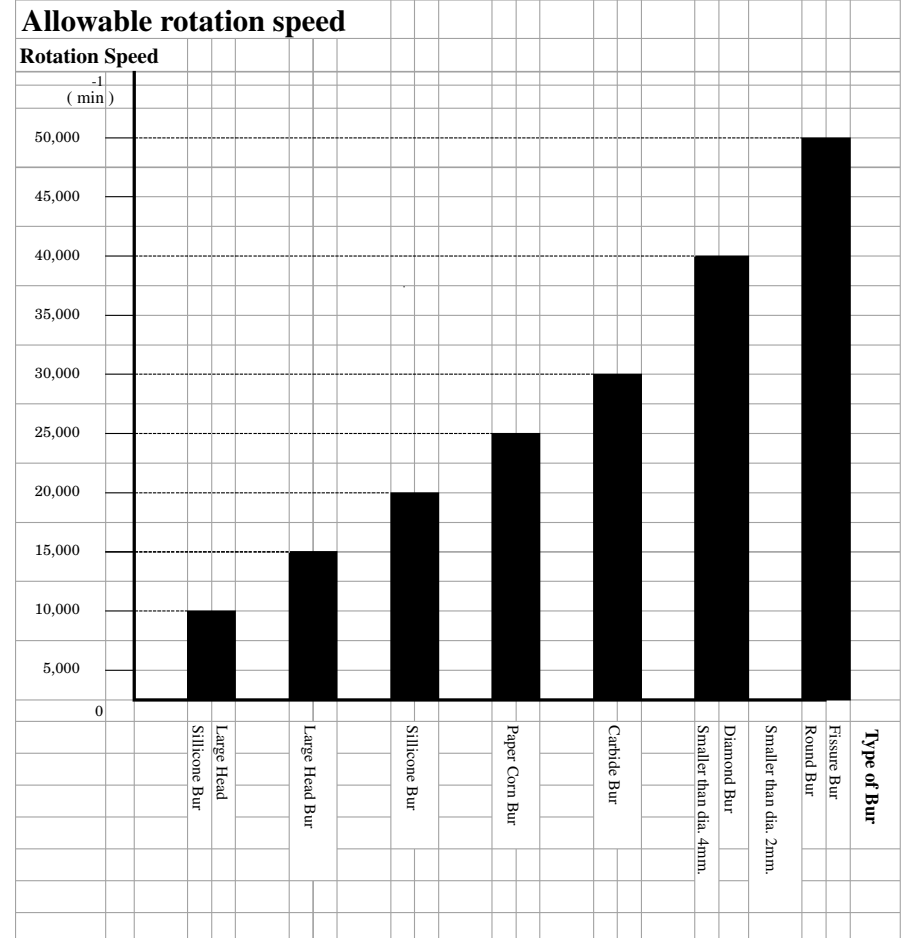
⚠ Caution

- Turn the main switch OFF and disconnect the plug of the power cord immediately from the wall socket when the NC-350II System emits smoke or an abnormal smell is sensed.
- Be sure to turn the main switch OFF after work.

Section - I-2 Safety Instructions, Cutting Instrument

- Use the cutting instrument at proper speed that does not exceed the maximum speed indicated by the manufacturer. Before use, be sure to set the motor speed within the allowable speed range.
- When the cutting instrument with a large head over diameter 4-mm is used, increase the motor speed gradually from low speed to high speed. When the shocking high speed at the startup is suddenly applied to such a cutting instrument, the spindle may bend and the cutting instrument may be damaged in use.

- When the cutting instrument with a large head such as heatless wheel, big point, etc., is used, release it from the cutting object after the motor speed is reduced. When the cutting instrument is released suddenly from the cutting object on which it is strongly pressed, the spindle may bend and the wheel, point, etc., may shatter due to a loss of balance.



Section - J Storage Instructions

- Keep all the components in a place where the environment keeps temperature between 14°F and 140°F, humidity between 10% and 85% RH, and atmospheric pressure between 100 hPa and 1060 hPa subject to clean air that does not contain dust, salinity, sulfur, etc.

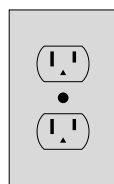
Section - K Electrical Instructions

- In the event of a malfunction or breakdown, a grounding conductor provides a path of least resistance for electric current to reduce the risk of electric shock. The NC-350II System is equipped with an electrical power cord that has an equipment grounding conductor and a grounding plug. The plug must be inserted into a matching wall socket that is properly installed and grounded in accordance with all local codes and ordinances. **Never insert the plug into a wall socket that does not have a grounding conductor.** If it is insecure that the NC-350II System is properly grounded, be sure to check with a qualified technician or service personnel.
- The plug of the power cord provided with the NC-350II System is intended for use on a 120v wall socket illustrated below:

Power Cord Plug



Wall Socket



- If the socket does not match the existing wall socket, have the properly matching socket installed by a qualified electrician. **Never modify the plug of the power cord provided with the NC-350II System.**

- If the extension cord is needed, use a 3-wire cord with a grounding conductor that has a 3-pole socket and a 3-prong plug. The 3-pole socket should properly match the plug of the power cord provided with the NC-350II, and the 3-prong socket should match the wall socket.
- The extension cord should be in good condition. Be sure to use a cord heavy enough to carry the current for the NC-350II System. An undersized cord will cause a drop in line voltage, resulting in not only loss of power but overheating. The following table shows the correct size of the wire to use depending on the length and the amperage rating.

Minimum gauge for extension cord

Amperage Rating		Voltage	Total length			
		120	25ft	50ft	100ft	50ft
More than	No more than					
0	6		18	16	16	14
6	10		18	16	14	12
10	12		16	16	14	12
12	16		14	12	Not recommended	

⚠ Warning

- **Never touch any part of the NC-350II System with a wet hand.**
- **Never place the power cord, handpiece cable or foot control cable near a gas burner.**
- **Never use worn-out, burned cable or cord, including the broken socket or plug.**

Section L - Spare Components and Parts

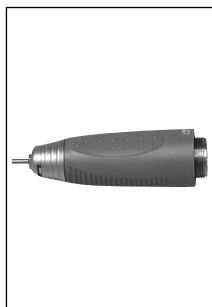
NE-165
Control Unit



U166-013
Power Cord



043-4266 UHR-35
Nose Cone



043-4258 GX-35RM
Motor



GX-35SCD
Handpiece Cable



FC-40
Foot Control



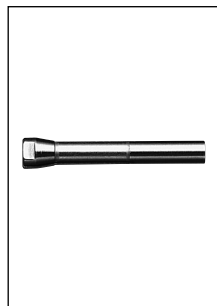
Z095-104
Handpiece Holder



Z095-204
Handpiece Stand



H203A180
Chuck



E023-011S
Carbon Brush



Section - M Guarantee

Paterson guarantees the handpiece for 3 months for the nose cone, the motor for 10 months and for the control unit 12 months including the power cable and the foot control subject to the observance of these operating and maintenance instructions and normal use.

Notes

- Patterson reserves the right to analyze and determine the cause of any failure.
- Guarantee is void, if the breakage, accident or any other issues are caused by the neglect of maintenance, cautions, warnings, instructions and common sense in use.
- Dismantling or reassembling by any third parties other than Patterson Service Center unless otherwise mentioned voids guarantee.