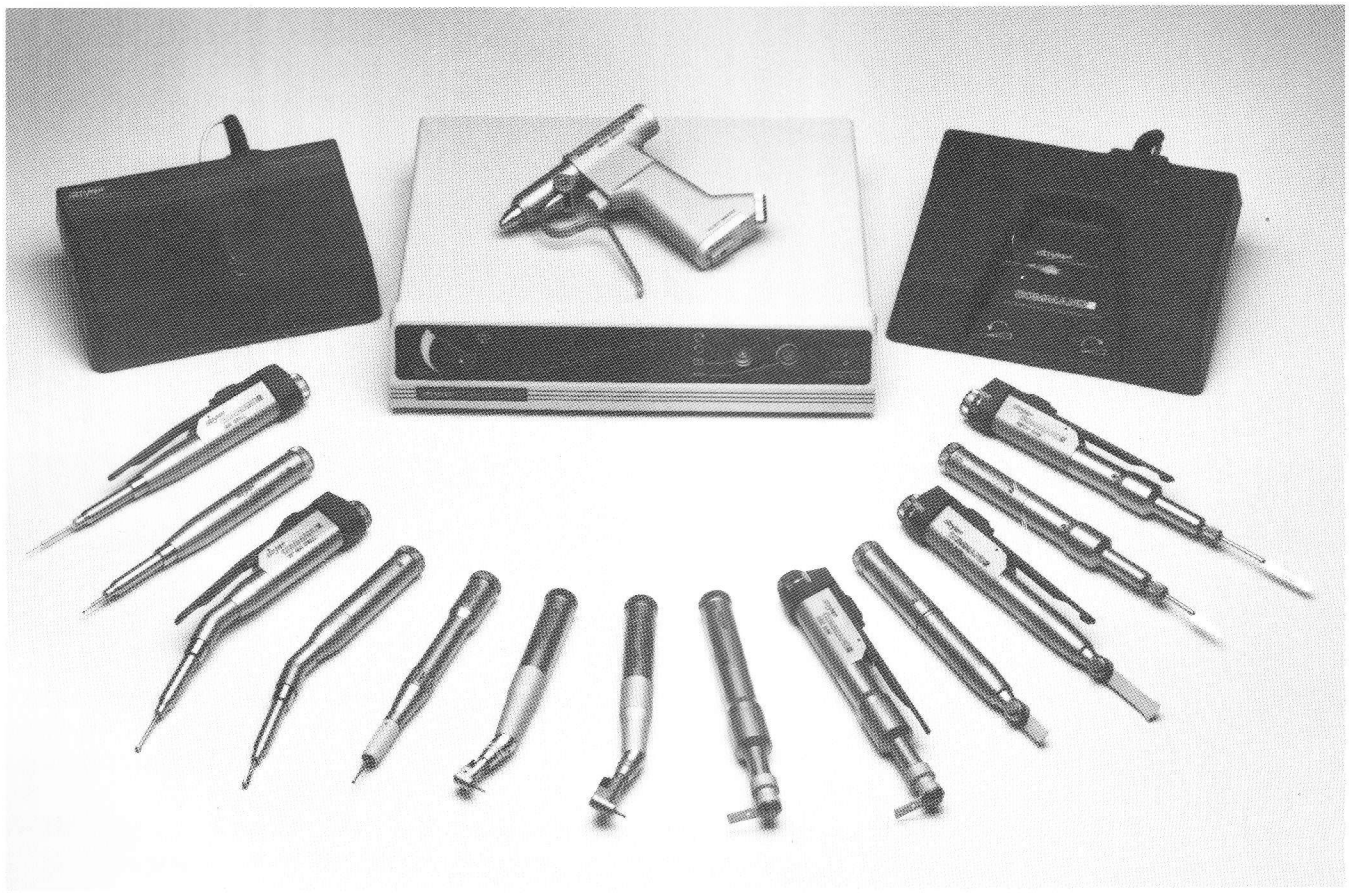
IMPORTANT INFORMATION: File in your maintenance records

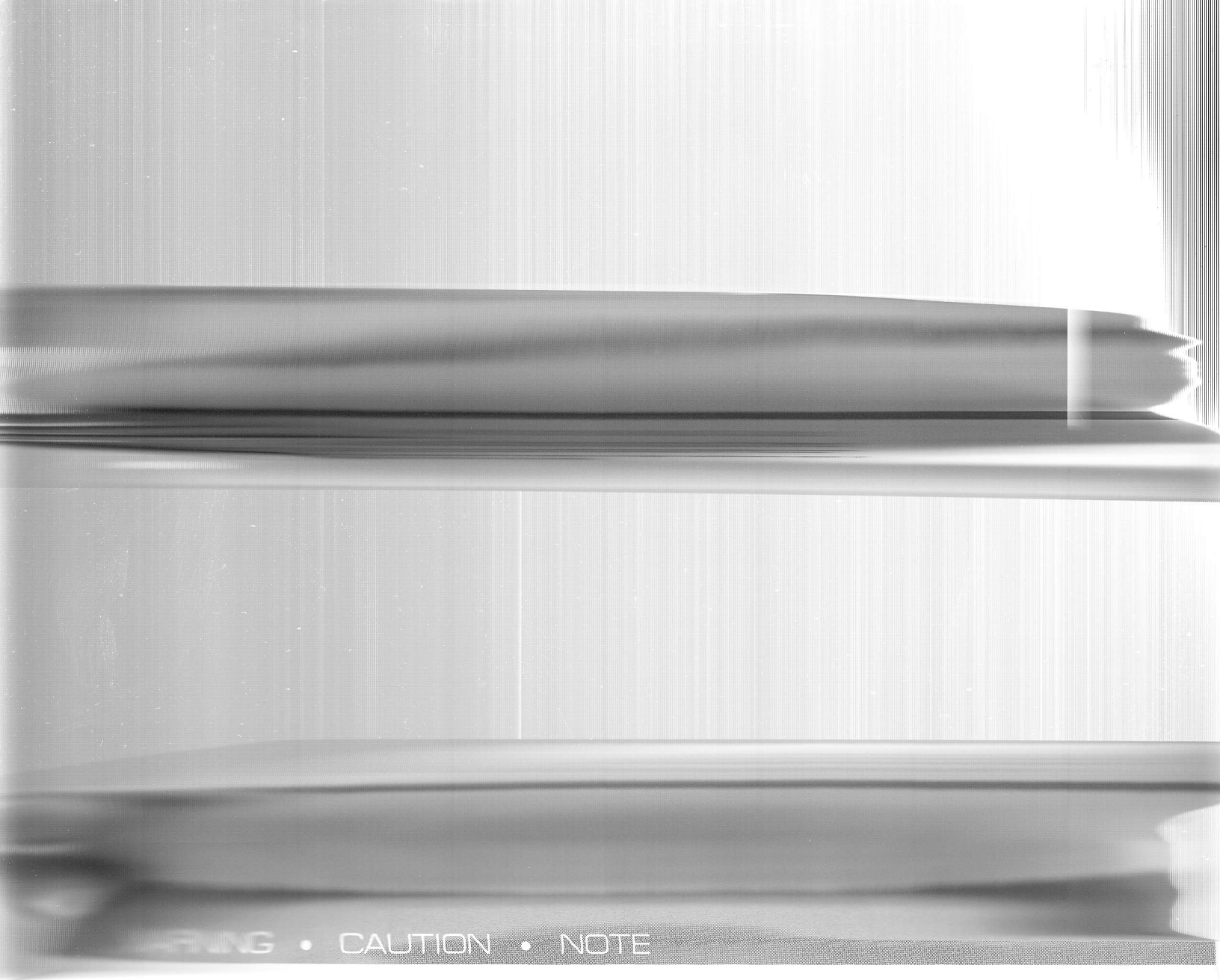
COMMAND2
MicroElectric System

Maintenance Manual & Operating Instructions



stryker®

INSTRUMENTS



Please read this manual and follow its instructions carefully. The words WARNING, CAUTION and NOTE carry special meanings and should be carefully reviewed.

WARNING: The personal safety of the patient may be involved. Disregarding this information could result in injury to the patient and/or O.R. staff.

CAUTION: These instructions point out special service procedures or precautions that must be followed to avoid damaging the instrument.

NOTE: This provides special information to make maintenance easier or important instructions more clear.

TABLE OF CONTENTS

WARNING • CAUTION • NOTE

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INTRODUCTION

Versatility and performance best describe Stryker's Command2 MicroElectric System*. A single console powers a wide range of saws, drills and the Command Wire and Pin driver. Best of all, this complete selection of powerful handpieces allows the physician to achieve a high level of precision and accuracy.

*Patents Pending. (100K motor, U.S. Patent 5093593)

SYSTEM FEATURES

CONTROL CONSOLE
Power switch (1A) - light illuminates to indicate system operation.
Footswitch and Handpiece connectors (1B) - lights illuminate to indicate component electrical connection.
Speed control (1C)- provides variable maximum speed setting ability. Scaled increments represents percentage of maximum handpiece speed.

FOOTSWITCHES
Bidirectional Footswitch (2A)- provides forward and reverse operational modes.
Unidirectional Footswitch (2B)- provides forward only operational mode.

HANDSWITCH CABLE (3)- slide bar can be adjusted to any position along length of handpiece by pushing slide bar forward or pulling it backward past its normal travel points.

HANDPIECE CABLE (4)- used in conjunction with footswitch or dedicated handswitch models.

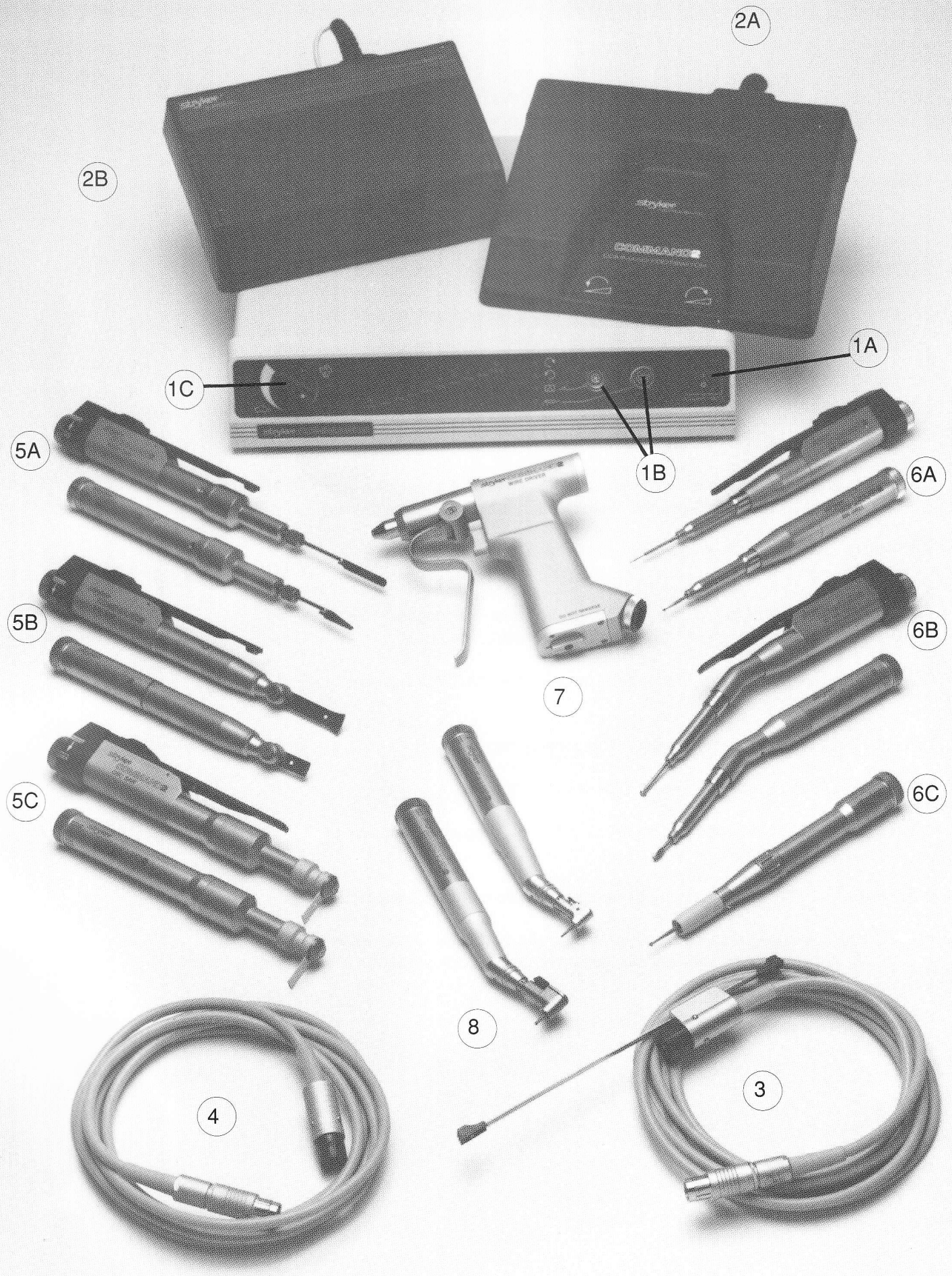
HANDPIECES - compact design allows visibility and control. (5A) Reciprocating Saws, (5B) Sagittal Saws, (5C) Oscillating Saws, (6A) 50K Straight Drills, (6B) 20° 50K Drills, (6C) 100K II Drill, (7) Wire and Pin Driver, (8) Low and High Speed Contra Angle Drills.

IRRIGATION TUBING - provides irrigation during surgical procedures. Choice of disposable PVC or reusable silicone tubing sets (not shown).

IRRIGATION TIPS - used with irrigation tubing sets (not shown).

PINCH VALVE ACCESSORY - used for ON/OFF irrigation flow control (not shown).

For a complete list of Command2 MicroElectric System accessories refer to product brochure, available from either your Stryker Representative or by calling Stryker Customer Service, 1-(800) 253-3210. (Outside the U.S.A., contact your local Stryker Subsidiary listed on the last page.)


2A
2B
1A
1C
1B
5A
6A
5B
6B
7
5C
6C
8
4
3

WARNING: Read and understand the information in this manual. Familiarization with Command2 MicroElectric System prior to use is important. For further information, contact your Stryker Representative.

WARNING: Prior to use, system components should be operated and inspected for any damage. DO NOT use if damage is apparent.

1. Plug console into wall outlet.
2. Attach handpiece to handpiece cable or handswitch cable. See section on Handpiece Cable Connections.
3. Connect handpiece cable, or handswitch cable, to appropriate console inputs. See section on Console Cable Connections.
4. Connect footswitch to appropriate console inputs. See section on Console Cable Connections.

NOTE: When using handpiece models with speed control lever or the handswitch cable, the footswitch does not need to be connected.

5. Insert cutting tool of choice into handpiece, make sure it is secure. See sections on MicroElectric Saws and MicroElectric Drills for complete details.

WARNING: Use only Stryker approved accessories for each handpiece.

6. Turn console on.
7. Set maximum handpiece speed with control knob on console. Scale increments represent percentage of maximum handpiece speed.

NOTE: Speed setting on console must be at least in the "10%" position for system operation.

CAUTION: DO NOT stall instruments. This may damage system.

CAUTION: DO NOT modify accessory for use in handpiece.

CAUTION: DO NOT pick up handpieces by cable. Damage to handpiece or cable may result.

WARNING: DO NOT attempt to change accessory while handpiece is running.

WARNING: Excessive pressure, such as bending and prying, will cause accessory to bend or break and cause harm to patient and operating room staff.

A lightning bolt within a triangle is intended to alert service personnel of the presence of high voltage, that may cause injury or fatal electrical shock.

An exclamation point within a triangle is intended to alert the user to the presence of important operating and maintenance (service instructions) in the literature accompanying the product.

VARIABLE SPEED

FORWARD

REVERSE

SLOW

FOOTSWITCH

FAST

HANDPIECE

VARIABLE SPEED

○ **OFF**

| **ON**

Handpieces with Speed Control Lever

CAUTION: These are PUSH/PULL connectors. DO NOT thread or twist for insertion or removal.

To insert cable into the handpiece:

1. Place handpiece safety lock in the SAFE position. See Figure 1.
2. Rotate handpiece collar fully counterclockwise to the INSERT position. See Figure 2.
3. Align orientation mark of handpiece with orientation mark of cable connector. See Figure 3.
4. Gently PUSH connectors together. DO NOT twist.
5. Rotate handpiece collar clockwise to secure in the LOCK position.
6. Plug other end of handpiece cable into console outlet marked HANDPIECE.
7. Slide handpiece safety lock to the RUN position.
8. Regulate handpiece speed from zero to maximum set on console by depressing the speed control lever.

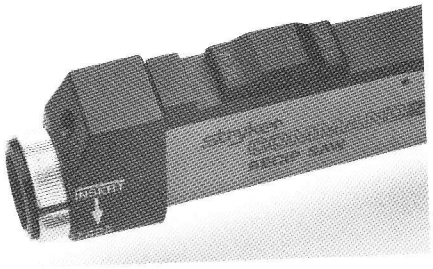


Figure 1

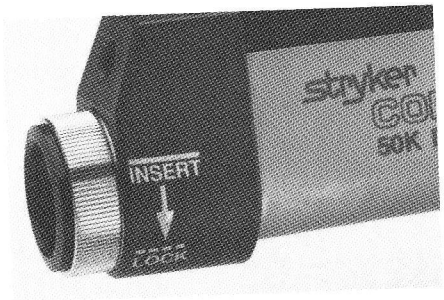


Figure 2

To remove cable from handpiece:

CAUTION: DO NOT pull cable from handpiece without properly aligning the handpiece collar. Failure to do so will damage the cable connector and cause a loose connection to the handpiece.

1. Rotate handpiece collar so that the orientation mark of the handpiece aligns with the orientation mark of the cable connector in the INSERT position. See Figure 1.

CAUTION: DO NOT twist the connector during removal of the cable. Twisting will cause damage to the connector portion of the cable which will result in a loose connection to the handpiece.

2. Gently Pull the cable from the handpiece by grasping the ribbed portion of the connector.

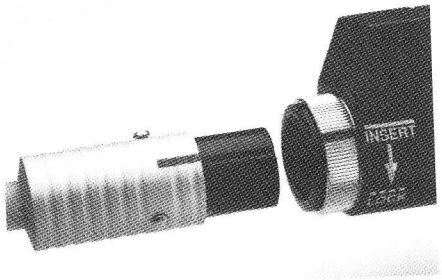


Figure 3

Handpiece/Standard Cable

CAUTION: These are PUSH/PULL connectors. DO NOT thread or twist for insertion or removal.

To insert cable into the handpiece:

1. Rotate handpiece collar fully counterclockwise to the INSERT position. See Figure 4.
2. Align orientation mark of handpiece with orientation mark of cable connector. See Figure 5.
3. Gently PUSH connectors together. DO NOT twist.
4. Rotate handpiece collar clockwise to secure in the LOCK position.
5. Plug other end of handpiece cable into console outlet marked HANDPIECE.
6. Regulate handpiece speed from zero to maximum set on console by depressing the footswitch.

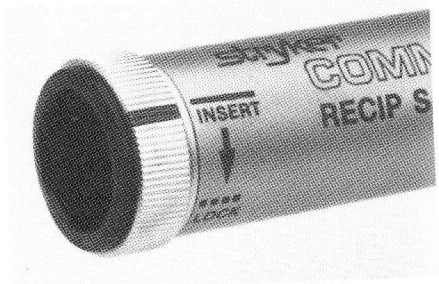


Figure 4

To remove cable from handpiece:

CAUTION: DO NOT pull cable from handpiece without properly aligning the handpiece collar. Failure to do so will damage the cable connector and cause a loose connection to the handpiece.

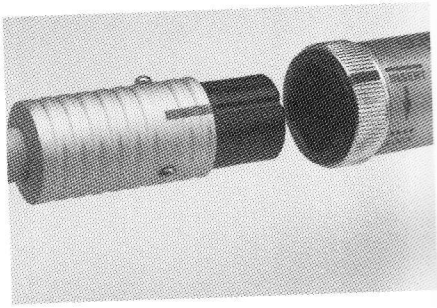


Figure 5

1. Rotate handpiece collar so that the orientation mark of the handpiece aligns with the orientation mark of the cable connector in the INSERT position. See Figure 4.

CAUTION: DO NOT twist the connector during removal of the cable. Twisting will cause damage to the connector portion of the cable which will result in a loose connection to the handpiece.

2. Gently Pull the cable from the handpiece by grasping the ribbed portion of the connector.

Handpiece/Handswitch Cable

CAUTION: These are PUSH/PULL connectors. DO NOT thread or twist for insertion or removal.

To insert cable into the handpiece:

1. Rotate handpiece collar fully counterclockwise to the INSERT position. See Figure 6.
2. Align orientation mark of handpiece with handswitch cable orientation mark under the slide bar. See Figure 7.
3. Gently PUSH connectors together. DO NOT twist.
4. Rotate handpiece collar clockwise to the LOCK position to secure.
5. Handswitch cable slide bar position on handpiece can be adjusted by pushing slide bar forward or pulling backward past its normal travel points.

NOTE: Position handswitch slide bar prior to connection to console.

6. Plug other end of handswitch cable into console outlet designated for HANDPIECE.
7. Align connector orientation marks. DO NOT thread or twist for insertion or removal.
8. Gently PUSH connectors together.
9. Regulate handpiece speed from zero to maximum set on console by pulling back on handswitch slide bar. See Figure 8.

To remove cable from handpiece:

CAUTION: DO NOT pull cable from handpiece without properly aligning the handpiece collar. Failure to do so will damage the cable connector and cause a loose connection to the handpiece.

1. Rotate handpiece collar so that the orientation mark of the handpiece aligns with the orientation mark of the cable connector in the INSERT position. See Figure 6.

CAUTION: DO NOT twist the connector during removal of the cable. Twisting will cause damage to the connector portion of the cable which will result in a loose connection to the handpiece.

2. Gently Pull the cable from the handpiece by grasping the ribbed portion of the connector.

Figure 6

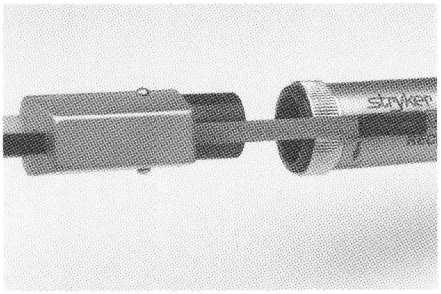


Figure 7

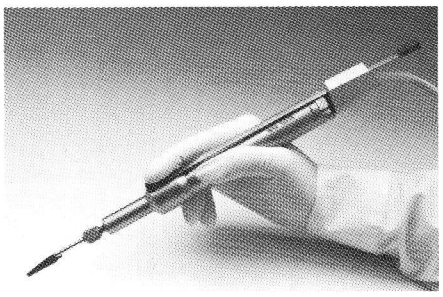


Figure 8

CAUTION: These are PUSH/PULL connectors. DO NOT thread or twist for insertion or removal.

Console/Handpiece Connection

1. Align connector orientation marks. See Figure 9.
2. Gently PUSH connectors together.
3. Remove by grasping cable connector as shown and pull.

CAUTION: DO NOT pull cord, damage will occur to cable.

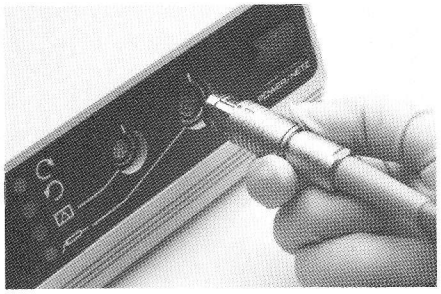


Figure 9

Console/Footswitch Connection

1. Align connector orientation marks. See Figure 10.
2. Gently PUSH connectors together.

CAUTION: DO NOT pick up footswitch by cable. Damage to cable may result.

3. Regulate handpiece speed from zero to maximum setting on console by depressing footswitch pedal.
4. Remove by grasping cable connector as shown and pull.

CAUTION: DO NOT pull cord, damage will occur to cable.

NOTE: The Stryker bidirectional footswitch (P/N 2296-8 allows the handpiece to operate in both forward and reverse directions.

- Right half of footswitch allows the handpiece to operate in the forward direction. Green FORWARD light, on console, will illuminate when forward mode is in operation and console is turned on.
- Left half of footswitch allows the handpiece to operate in the reverse direction. Amber REVERSE light, on console, will illuminate when reverse mode is in operation and console is turned on.

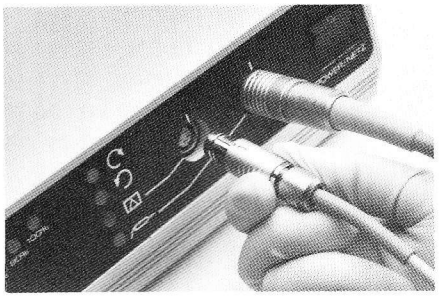


Figure 10

OSCILLATING SAW
Flat Blade Attachment

1. Pull back the spring-loaded lock collar to completely expose the drive fins. See Figure 11.
2. Insert the blade (oriented in the desired direction) so that the slots of the blade fit over the fins on the handpiece. See Figure 12.
3. Release the lock collar to secure the blade. Slight rotation of the blade and collar may help the blade seat in the handpiece.

WARNING: The lock collar must completely snap shut and contact the blade to hold it firmly in place.

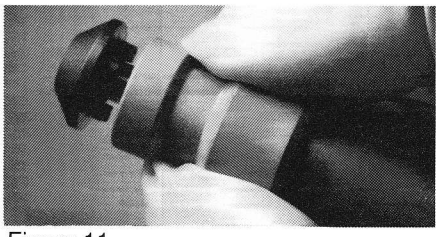


Figure 11

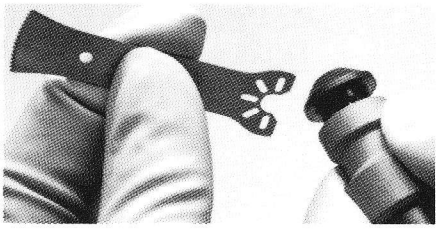


Figure 12

Intra-oral and Crescentic Blade Attachment

1. Pull back the spring-loaded lock collar to completely expose the drive fins.
2. Insert the oscillating saw adaptor (P/N 2296-3-402) (oriented in the desired direction) so that the slots of the adaptor fit over the fins on the handpiece. See Figure 13.
3. Release the lock collar to secure the adaptor. Slight rotation of the adaptor and collar may help the adaptor seat in the handpiece.

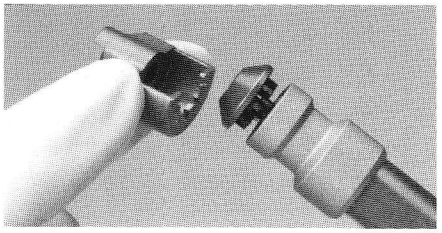


Figure 13

WARNING: The lock collar must completely snap shut and contact the adaptor to hold it firmly in place.

4. Loosen adaptor set screw and insert blade.
5. Tighten set screw firmly with adaptor wrench (P/N 2296-3-31). See Figure 14.

WARNING: Set screw must be fully tightened against blade arbor. Make sure the blade is secured by gently pushing the blade toward the handpiece. If secure, the lock collar will not move.

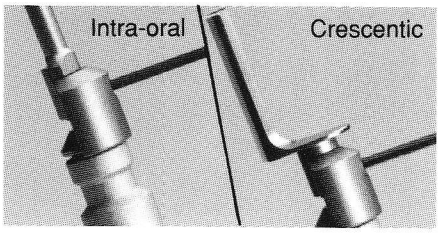


Figure 14

SAGITTAL SAW
Blade Attachment

1. Push lock button to expose drive fins. See Figure 15.
2. Insert the blade (oriented in the desired direction) so that the slots in the blade fit over the fins on the handpiece. See Figure 16.
3. Release the button to secure the blade. Slight rotation of the blade and button may help the blade seat in the handpiece.

WARNING: The lock collar must completely snap shut and contact the blade to hold it firmly in place. If the blade is over the fins but still loose, rotate the blade retaining dome until it snaps down on the blade.

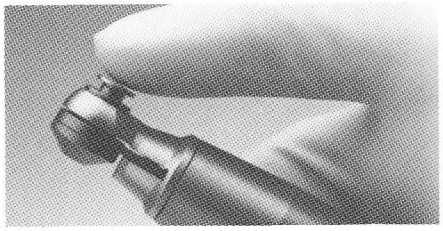


Figure 15

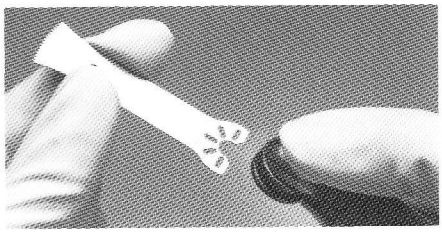


Figure 16

RECIPROCATING SAW
Blade and Rasp Attachment

1. Loosen locking nut, turn counter-clockwise. See Figure 17.
2. Insert blade or rasp. Twist until seated. Turn locking nut clockwise to tighten. See Figure 18.

NOTE: Special orientation of blade or rasp is not required.

WARNING: Before running instrument, make certain locking nut is tight and blade or rasp is securely retained. Pliers or a wrench can be used to turn the locking nut to ensure blade or rasp is secure. An improperly retained blade may become loose which could result in lost tactile control causing damage to tissue in the surgical site.

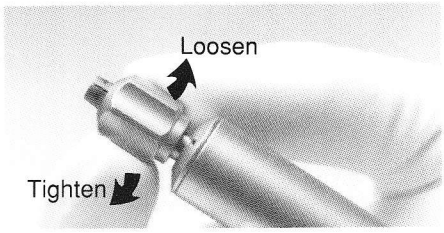


Figure 17

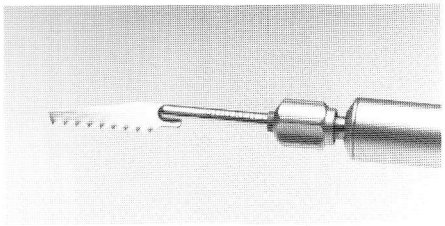


Figure 18

CAUTION: Based on the standards listed below, the Stryker Instruments recommends the following duty cycle to ensure safe handpiece operating temperatures.

WARNING: If the recommended duty cycle is not followed, handpiece may overheat and cause injury to patient and/or operating room staff.

Cycle Time		Cycle Frequency	Break Between Cycles
On	**Off**		
20 sec.	20 sec.	4	30 minutes

The following standards have been established by the various approval agencies as guidelines for handpiece temperature tolerances.

Agency	Temperature	Material	Definition
Canadian Standards	140˚F (60˚C)	Metal	Intermittent user contact
Underwriters Laboratories	122˚F (50˚C)	Metal	Casual patient contact
International Electrotechnical Commission	131˚F (55˚C)	Metal	Continuously held by user

100K II DRILL

WARNING: If the recommended duty cycle and maintenance schedule are not followed, the 100K II Drill may overheat and cause burn injury to patient and/or operating room staff. Refer to sections on Duty Cycle (Drills) and Periodic Maintenance Schedule.

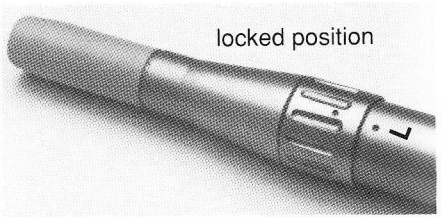


Figure 19

Bur Attachment

WARNING: Use only Stryker approved burs for each handpiece.

- Unapproved burs may be susceptible to increased bur whip. This may cause the bur head to fracture and become lodged in the surgical site and/or cause injury to patient or O.R. staff.
- Burs without the full insert line may dislodge from the hand piece causing loss of tactile control resulting in damage to tissue in the surgical site.
- DO NOT modify any burs to fit handpieces.

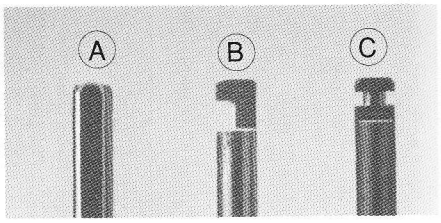


Figure 20 A) Flat shank, B) J-notch, C) R.A. (Right Angle) Dental

1. Twist lock collar to left until its orientation mark lines up with the "U" (unlock) orientation mark. See Figure 19.
2. Insert bur of choice into handpiece.

NOTE: When using Stryker 100K II Drill, select only Stryker flat shank burs. See Figure 20A.

3. Twist bur or handpiece until bur is seated.

WARNING: It is important that bur be fully seated in Stryker 100K II Drill before use. Each bur is marked with a SAFETY line. If line is visible, bur is NOT fully seated.

4. Return lock collar to "L" (lock) position. Orientation marks must align.
5. Pull on bur gently to insure that it is properly locked in place.

CAUTION: DO NOT remove bur from instrument while in "locked" position as damage to driveshaft and/or bur may result.

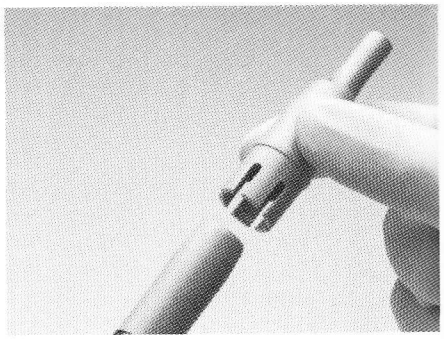


Figure 21

BUR GUARD

WARNING: The bur guard must be used with long burs (those prefixed with P/N 296-101).

- The bur guard supports the bur and minimizes bur whip, reduces overheating of the distal tip of the handpiece, and shields the bur shaft from incidental contact with tissue in the surgical site.
- Use of long burs without the bur guard may cause the bur to bend which could result in damage to tissue in the surgical site, handpiece vibration that causes lost tactile control, or breaking of the bur such that the broken piece would be ejected at a high velocity, endangering the patient and/or O.R. staff.

1. Slip bur guard over the distal tip of the 100K II Drill and twist. See Figure 21.
2. Bur guard is in position when the lip snaps into the groove located on handpiece.
3. Insert bur as described above.

50K DRILLS
Straight and 20° Bur Attachment

WARNING: Use only Stryker approved burs for each handpiece.
- Burs without the Stryker approved J-notch design may become lodged in the handpiece increasing the chance of heat rise and resultant injury to patient and/or damage to handpiece.
- DO NOT modify any burs to fit handpieces.

1. Pull back locking sleeve fully. See Figure 22.
2. Insert Stryker J-notched bur. See Figure 20B.
3. Twist bur until bur is seated.
4. Release locking sleeve.
5. Tug bur gently to insure that it is properly locked in place.

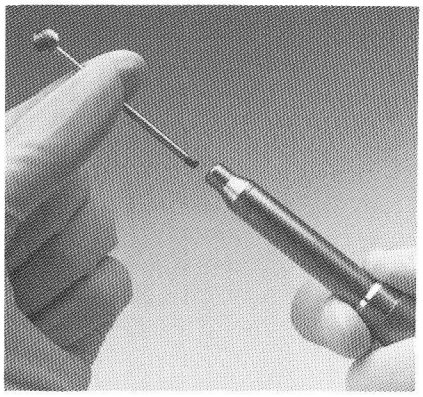


Figure 22

CONTRA ANGLE DRILLS
Head Attachment

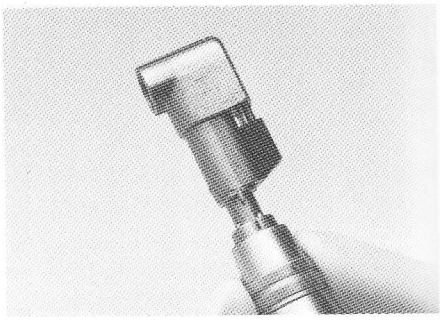


Figure 23

CAUTION: DO NOT attach Contra Angle head while motor is running.

1. Twist lock collar of handpiece open and hold in place.
2. Insert contra angle head into handpiece. Align flanges of head with grooves of handpiece lock collar. See Figure 23.
3. Rotate lock collar until it is securely seated in the lock position. Pull on head to insure proper attachment.

NOTE: Contra Angle Drill (P/N 2296-18), high speed ONLY: Head position adjustments can be made after attachment by twisting handpiece at neck.

WARNING:
- 10:1 heads (P/N 296-17-40 & P/N 296-17-200) are to be used in the Low Speed Contra Angle Drill (P/N 2296-17) only.
- If these heads are used in the High Speed Contra Angle Drill (P/N 2296-18), overheating will result and cause burns to patient and/or damage to instruments.

WARNING:
- 1:1 head (P/N 296-17-250 formerly P/N 296-18-200) is intended to be used with Low Speed Contra Angle Drill (P/N 2296-17) only.
- If used in the High Speed Contra Angle Drill (P/N 2296-18), overheating will result and cause burns to patient and/or damage to instrument.

Bur Attachment

WARNING: Use only Stryker approved burs for each handpiece. Other burs may cause injury to O.R. staff or damage drill. DO NOT modify any bur to fit the handpieces.

WARNING: When using large diameter dental implant reamers, trephines or cannon burs in the (P/N 2296-18) Contra Angle Drill, DO NOT set console speed above 20%. The increased rate of energy required to cut at higher speeds will cause the handpiece, head and bur to overheat resulting in burns to patient.

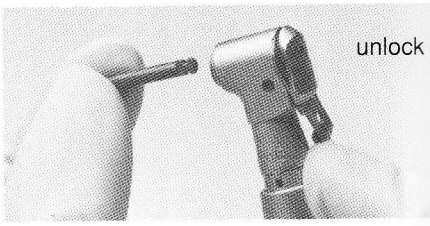


Figure 24

Bur Attachment for Kavo Heads

1. Push bur latch to right to open. See Figure 24.
2. Insert any R.A. (right angle) dental bur.
3. Twist bur until seated.
4. Return bur latch to center lock position.
5. Tug bur to insure that it is properly locked.

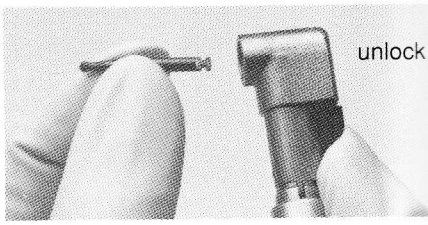


Figure 25

Bur Attachment for Stryker Heads

1. Push spring-loaded bur latch forward to open.
2. Insert any R.A. (right angle) dental bur into handpiece. See Figure 25.
3. Twist bur until seated.
4. Release the bur latch and it will automatically spring out to the locked position.
5. Tug bur to insure that it is properly locked.

DUTY CYCLE (DRILLS)

CAUTION: Based on these specifications listed below, Stryker Instruments recommends the following duty cycle to ensure safe handpiece operating temperatures.

WARNING: If the recommended duty cycle is not followed, handpiece may overheat and cause injury to patient and/or operating room staff.

Cycle Time		Cycle Frequency	Break Between Cycles
On	**Off**		
20 sec.	20 sec.	X10	30 minutes

The following standards have been established by the various approval agencies as guidelines for handpiece temperature tolerances.

Agency	Temperature	Material	Definition
Canadian Standards	140°F (60°C)	Metal	Intermittent user contact
Underwriters Laboratories	122°F (50°C)	Metal	Casual patient contact
International Electrotechnical Commission	131°F (55°C)	Metal	Continuously held by user

GENERAL INFORMATION (DRILLS)

Handpiece RPM (Maximum Driving Speed)		
Console Speed Control Setting	**High Speed Contra Angle Drill***	**Low Speed Contra Angle Drill***
1	4,000	160
2	8,000	320
3	12,000	480
4	16,000	640
5	20,000	800
6	24,000	960
7	28,000	1,120
8	32,000	1,280
9	36,000	1,440
10	40,000	1,600

*With 1:1 Contra Angle Head

Bur and Irrigation Accessory Style		
Handpiece	**Bur Lock Style**	**Irrg. Tip Style**
20° 50K Drill	J-Notch	External
50K Straight Drill	J-Notch	External
100K Drill	Flat Shank	External
Low Speed Contra Angle Drill	R.A. Dental	External/Internal
High Speed Contra Angle Drill	R.A. Dental	External/Internal

Follow Sterile Procedures.

CAUTION: Only silicone tubing set may be assembled onto handpiece and cable prior to system sterilization.

Irrigation Tip Attachment for Straight Drill, Sagittal and Reciprocating Saws

1. Slide the small front clip over the nose of the handpiece to the desired position.
2. Gently press the rear clip until it snaps onto the rear of the handpiece.

To remove:
1. Grasp the small front clip and slide it forward, off the nose of the handpiece.
2. Grasp both sides of the rear clip and pull until it snaps off of the rear of the handpiece.

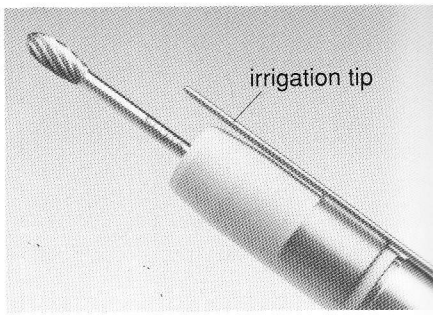


Figure 26 100K II Straight drill - externa irrigation

Irrigation Tip Attachment for 20° 50K Drill and Oscillating Saw

1. Position the irrigation tip in the desired location along the handpiece.
2 Gently press the front and rear clips until they snap onto the handpiece.

To remove:
1. Grasp both sides of the front clip and pull until it snaps off of the handpiece.
2. Grasp both sides of the rear clip and pull until it snaps off of the handpiece.

External Irrigation Tip Attachment for Contra Drills

Kavo and Stryker Heads
Tip snaps onto body of head as shown in Figure 27.
To remove: Grasp both sides of clip and pull until it snaps off the handpiece.

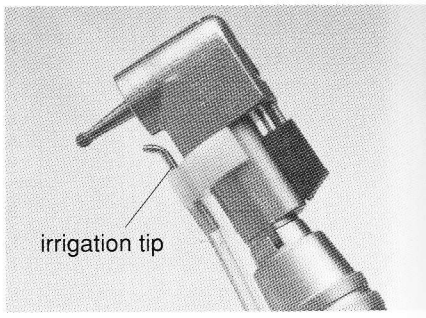


Figure 27 Contra Angle drill external irrigatio

Internal Irrigation Tip Attachment for Contra Drills

Kavo Heads only:
Tip secures onto latch of Kavo head. See Figure 28.
To remove: Grasp disk of irrigation tip and pull to release.

Stryker Heads only:
Tip secures into body of Stryker head.
To remove: Grasp disk of irrigation tip and pull to release.

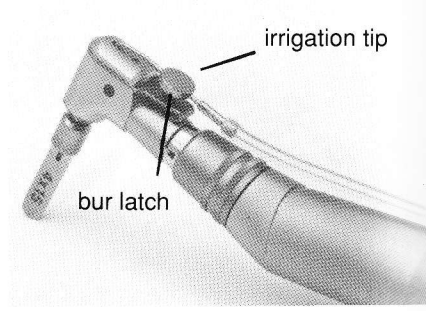


Figure 28 Contra Angle drill internal irrigatio

GRAVITY IRRIGATION

1. Install pinch valve assembly. See Figure 29.
2. Align pinch valve connector with console connector and push together.
3. Install screws.
4. Handswitch or footswitch activation actuates pinch valve allowing irrigation flow.
5. Actuate pinch valve and insert irrigation tubing. See Figure 30.

NOTE: Stretch tubing to assist installation.

6. Turn console off to avoid inadvertent irrigation.
7. Spike irrigation source.
8. Regulate flow rate of irrigation by adjusting height of irrigation source.

NOTE: A height of 3 feet above surgical site will provide 1.2 psi of water pressure.

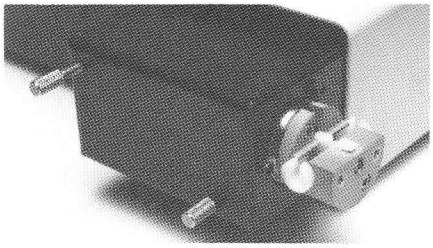


Figure 29

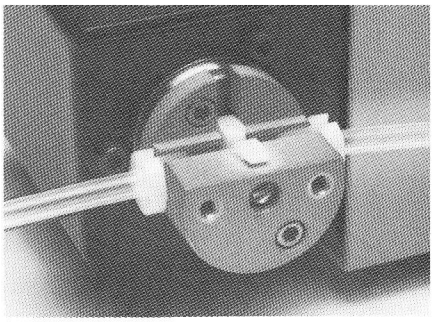


Figure 30

SYRINGE

1. Attach irrigation tip of choice to handpiece.
2. Attach any 1/32" (0.8mm) OD tubing to irrigation tip.
3. Connect other end of tubing to a prefilled syringe.
4. Irrigate surgical site as required by depressing syringe plunger.

PUMP

NOTE: Follow set-up procedures outlined in pump instructions.

Note the following features of the Wire and Pin Driver: See Figure 31.

Wire Advance Control:
Squeezing this control holds the wire or pin in the instrument. Releasing it allows movement of the wire or pin.

- Load the wire or pin into the nose of the collet or back cap of instrument. Squeeze the wire advance control against the instrument to hold the wire at the desired length exposed in the end of the instrument.

Trigger:
Depress the trigger to run the instrument. The trigger is pressure sensitive for variable speed operation.

Forward/Safe/Reverse Control:
Instrument can be set at these three positions.

1. Reverse by turning control dial until the "R" clicks into position at the orientation line.
2. Lock by aligning "SAFE" with orientation line. See Figure 32.
3. Forward by turning control dial to align the "F" with the orientation line.

WARNING: Always put Wire and Pin Driver in "SAFE" position to prevent inadvertent running of the instrument before attaching or removing any accessories or before passing the instrument to another person.

Release Button:
Sliding this button in the direction of the arrow releases attached accessory.

To Insert Accessories:
Align flats on shaft with flats in bore of handpiece. Rotate so J-slot in accessory aligns with button located on top of instrument. Insert accessory into handpiece until the accessory "snaps" into position. See Figure 33.

To Change Accessories:
Disengage accessory by sliding release button on handpiece and withdrawing accessory from instrument.

To Operate the Wire and Pin Driver:

1. Take the Forward/Safe/Reverse control dial out of the "SAFE" position.
2. Squeeze the wire advance control and hold it down.
3. Holding the wire or pin against the bone, depress the trigger to drive the wire or pin.
4. The instrument's pressure sensitive trigger allows variable speed operation.
5. To obtain additional wire length for inserting, release the wire advance control and pull back the instrument. Then squeeze the wire advance control and the trigger to drive more wire.
6. To withdraw threaded pins, put the instrument in reverse, squeeze the wire advance control and then depress the trigger.

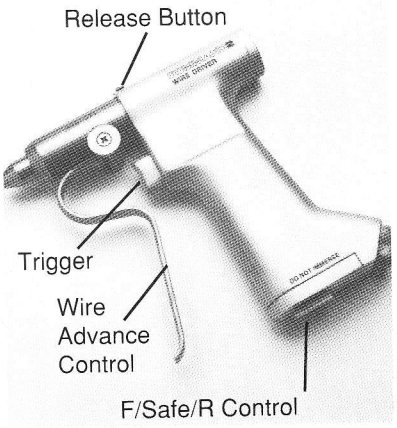


Figure 31

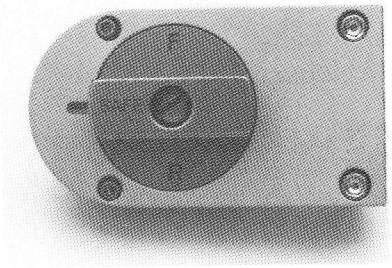


Figure 32 F/Safe/R Control shown in "Safe" position

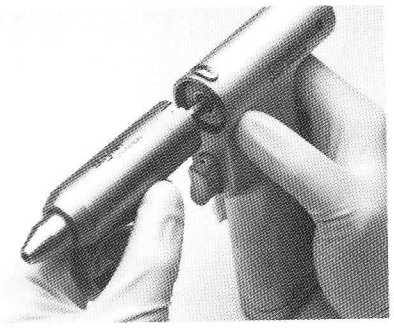


Figure 33

NOTE: The following table indicates the direction the Wire and Pin Driver turns based on the set-up of the instruments when using the Bidirectional Footswitch (P/N 2296-8).

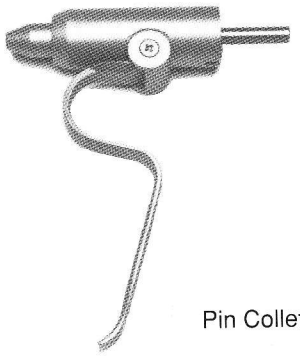
Instrument Settings:

Wire and Pin Driver Setting	Footswitch Setting	Handpiece Actually Operates:
Reverse	Reverse	Forward
Reverse	Forward	Reverse
Forward	Reverse	Reverse
Forward	Forward	Forward
Safe	Forward	Forward
Safe	Reverse	Reverse

Console Speed Control Setting	Handpiece RPM (Maximum Driving Speed)
1	90
2	180
3	270
4	360
5	450
6	540
7	630
8	720
9	810
10	900

Duty Cycle:

One minute on, one minute off.



Pin Collet

Wire Collet (included with instrument)
(P/N 296-80-62). This holds K-wires having diameters from .028" - .071" (0.71mm - 1.80mm).

Pin Collet
(P/N 296-80-125). This optional collet holds pins having diameters from .078" - .125" (1.98mm - 3.18mm).

5/32" Jacob's Chuck
(P/N 296-80-131). Handles wires, pins and drill bits up to 5/32" (4mm) diameter.

Synthes Chuck
(P/N 296-80-110). Accepts all Synthes drill bits, taps and automatic screwdrivers with the appropriate snap-lock shank.

Jacob's Chuck

Trinkle Chuck
(P/N 296-80-112). Accepts drill bits and automatic screwdrivers with Trinkle fitting.

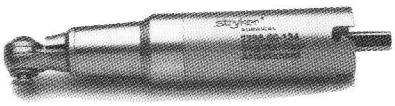
Sagittal Saw Head Attachment
(P/N 2296-80-134). Accepts a variety of Stryker Precision Thin Blades. Five blade angles provide control and visibility.

Synthes Chuck

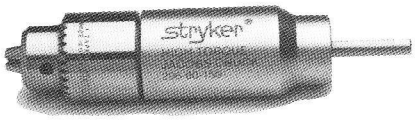
High Torque Jacob's Chuck
(P/N 296-80-150). Boosts torque for optimal cutting

Wire Guard
(P/N 296-80-118). Optional Wire Guard protects against wire whip. (Not Shown).

Trinkle Chuck



Sagittal Saw Head



High Torque Jacob's Chuck

Please note the following WARNINGS:

- DO NOT modify ground of power cord.
- Explosion hazard. Do not use in the presence of flammable anesthetics.
- The Stryker Command2 MicroElectric System is designed to be used by persons familiar with small bone surgical procedures. Misuse may cause damage to both patient and system components. Prior to use, system components should be inspected for damage. DO NOT use if damage is apparent.
- Confirm that the Command2 MicroElectric System is set up for power system to be used (i.e. 115 VAC or 230 VAC).
- Heavy sideloads and/or long operating periods occasionally will cause overheating of the distal tip and the body of the Stryker MicroElectric handpieces to the point where the handpiece is uncomfortable to hold or cause injury to the patient.
- If the recommended duty cycle is not followed, handpiece may overheat and cause injury to patient and/or operating room staff.
- The bur guard must be used with long burs (those prefixed with P/N 296-101). The bur guard supports the bur and minimizes bur whip, reduces overheating of the distal tip of the handpiece, and shields the bur shaft from incidental contact with tissue in the surgical site.
- Use of long burs without the bur guard may cause the bur to bend which could result in damage to tissue in the surgical site, handpiece vibration that causes lost tactile control, or breaking of the bur such that the broken piece would be ejected at a high velocity, endangering the patient and/or O.R. staff.
- The operation of Stryker J-notch burs and drills designated as *Limited Speed* (reference Stryker Cutting Accessories Guide) above the specified 60% maximum console setting (50 psi maximum input pressure in the case of pneumatic drills) may cause the bur/drill to bend or fracture. This could result in damage to tissue in the surgical site; handpiece vibration that causes lost tactile control; or breaking of the bur such that the broken piece would be ejected at a high velocity, endangering the patient and/or O.R. staff.
- Excessive pressure, such as bending and prying with bur, may cause bur to bend or fracture. If a bent bur is operated at the high speed of a Stryker rotary handpiece, it is possible that the bur will bend yet further. This could result in damage to tissue in the surgical site; handpiece vibration that causes lost tactile control; or breaking of the bur such that the broken piece would be ejected at a high velocity, thereby endangering the patient and O.R. staff.
- Excessive pressure, such as bending and prying with blade, may cause the blade to bend or fracture and could result in damage to tissue in the surgical site and/or loss of tactile control.
- If monthly lubrication of sagittal blade mount is not performed, the blade mount may develop excessive heat which may cause injury to patient.
- Use safety lock switch on handswitch models when not in use.

The Stryker Command2 MicroElectric System utilizes electronic feedback to hold the handpiece speed constant with the increasing load. As tool sideload increases in heavy cutting or with dull blades or burs, the power to the handpiece is increased to keep the speed constant. As neither feedback speed, stabilization control nor the high power levels available in the Stryker Command2 system are available in other micro pneumatic instruments, caution should be exercised when becoming familiar with the Stryker Command2 MicroElectric System.

During initial use of your Command2 MicroElectric System, monitor its heat response in relation to the type of surgical procedure you perform. Frequently check the distal tip and body until you are familiar with its temperature rise characteristics. Failure to pay close attention to handpiece overheating may cause burn injury to patient.

See Duty Cycle Pages 13, 17 & 21 for recommended operating specifications of Saws and Drills.

CAUTION: DO NOT immerse handpieces, console, footswitch, or power cord.

WARNING: DO NOT use solvents, lubricants, or other chemicals, unless otherwise specified. The use of such materials may cause the handpiece to malfunction or leak foreign materials during use resulting in contamination of the surgical site.

HANDPIECE AND ACCESSORIES

1. Wipe clean with a lint free-cloth, mild detergent, Ivory soap, or surgical instrument cleaning solution and water. A stiff bristle brush may be used to remove debris from the distal end of the straight drills.

2. Use a lint-free cloth and sterile water to wipe away cleaning agent.

CAUTION: DO NOT allow water to run into electrical connections or into the distal end of the handpiece.

3. Dry with lint free towel. Pay special attention to electrical connections, avoid bending. If available, forced air drying is preferred.

CONSOLE

Console may be wiped down with standard disinfectant or mild detergent and water.

FOOTSWITCH

Wipe outside of footswitch with mild detergent and water.

TUBING SETS

PVC Tubing Set (P/N 296-2-25) is a sterile disposable intended for single use only. DO NOT resterilize or reuse.

Silicone Tubing Set (P/N 296-2-20):

1. Outside of tubing may be cleaned with mild detergent and water.

2. Rinse with sterile water.

3. Dry with lint-free towel. If available, forced air is preferred.

WARNING: System components should be operated and inspected for any damage. DO NOT use if damage is apparent.

CAUTION: DO NOT attempt to service any of the MicroElectric System components. See section on Instrument Repair/Loaner Program.

Console, footswitch, handswitch cable and handpiece cable require no maintenance other than cleaning.

HANDPIECES

NOTE: Handpieces may be cooled by wrapping in sterilized damp sponge or cloth. DO NOT immerse handpiece to cool.

MicroElectric handpieces are permanently lubricated. For optimal performance, a yearly clean, lubricate and adjustment is suggested.

- Once a month, lubricate the bronze bushing in the blade mount housing of Sagittal Saw handpieces (P/N 2296-34 & 2296-234) and Sagittal Saw Head Attachment (P/N 2296-80-134), as follows:
  1. Apply a drop of light mineral oil (P/N 1605-10) as shown in Figure 34.
  2. Run the saw for 15 seconds with a blade installed.
  3. Wipe off excess oil.

WARNING: If monthly lubrication of sagittal blade mount is not performed, the blade mount may develop excessive heat which may cause injury to patient.

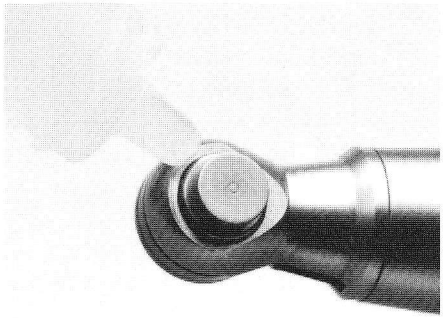


Figure 34

- Contra angle heads should be lubricated after final surgery of the day only. Clean as recommended. Remove head from handpiece and spray with C.R.C. cleaner/lubricant, Stryker (P/N 1605-8). Wipe all parts clean.

BLADES AND RASPS

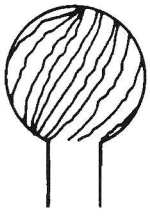
- The useful life of blades is significantly reduced if they are allowed to come into contact with each other and various objects in sterilization pans and trays.
- Inspect blade and rasp with care to confirm that it is not bent or cracked, that no teeth are missing, and that teeth are sharp.
- Disposal of blades is recommended after each use.
- Under regular use - 15 minutes maximum blade life can be expected.

BURS

Carbide burs are intended for single use only. DO NOT reuse.

Stainless Steel Burs

- The useful life of burs is significantly reduced if they are allowed to come into contact with each other and various objects in sterilizing pans and trays.
- Under regular use, 15 minutes maximum bur life can be expected, and never more than 3-4 surgical procedures.
- For more information, refer to the Worn Bur illustration.



Worn Bur
- Blunted flutes (cutting edges)
- Pitting and nicks in bur head
- Stains and metal discoloration (not harmful in themselves, but indicative of a bur that has been used and autoclave many times).

PERIODIC MAINTENANCE SCHEDULE FOR SAWS, DRILLS AND WIRE & PIN DRIVER		
ACTIVITY	**INTERVAL**	**TOOLS & EQUIPMENT REQUIRED**
Run handpiece for 1 minute to determine temperature. If the distal tip and body of the handpiece are uncomfortably hot to the touch (approximately 110°F), return the instrument for service.	3 Months	N/A
Check leakage current, ground impedance, and power draw to Page 32 specifications.	12 Months	True RMS digital multimeter and safety analyzer
Lubricate the blade locking mechanism of Sagittal Saw handpieces (P/N 2296-34 & 2296-234) and Sagittal Saw Head Attachment (P/N 2296-80-134). See Page 25 for details.	1 Month	Light mineral oil (P/N 1605-10)
Clean, lube and adjust for optimal performance.	12 Months	Return to Stryker

Inspect handpiece to assure that it is in proper working order and that there are no loose or missing components. Check all moving parts for free movement. Use one (1) drop of lubricant, as necessary, to ensure free movement.

Test handpiece by assembling system and running. Attach power source and assemble the accessories, then operate. Be aware of unusual sounds or vibrations and note operating speed. Be conscious of any overheating of Command2 MicroElectric System handpieces at the distal end after 1 minute of running without cutting. If overheating occurs, return the instrument to Stryker for service.

Refer calibration and operating difficulties not detailed in this manual to your Stryker Representative, distributor or Stryker Customer Service of the nearest subsidiary.

To ensure the longevity, performance, and safety of this equipment, package in original package materials when storing or transporting.

HANDPIECES, CABLES, AND ACCESSORIES

WARNING: Use sterilization methods listed below. Other methods can damage handpieces and cause instruments to overheat resulting in injury to patient and/or O.R. staff.

WARNING: Contra angle heads and drills must be separated during sterilization.

CAUTION: DO NOT sterilize console or footswitch.
CAUTION: DO NOT immerse console, footswitch, handpieces, or power cord.
CAUTION: DO NOT autoclave handpiece in sealed pouch. A sealed pouch traps moisture and can cause damage to the handpieces.

"Flash" Autoclave:
- Gravity displacement sterilizer
- 270-272°F (132-134°C)
- Unwrapped in an instrument tray
- 10 minute minimum exposure

Hi-Vac:
- Pre-vacuumed sterilizer
- 270-272°F (132-134°C)
- Wrapped or Unwrapped
- 4 minute minimum exposure
- 8 minute minimum dry time

ETO:
- 12% ETO, 88% Freon
- Wrapped in an instrument tray or fully perforated sterilization box
- 120-135°F (49-57°C)
- 1 hour 45 minute minimum exposure time
- 8 hour minimum aeration time

270°F Gravity:
- Gravity displacement sterilizer
- 270-272°F (132-134°C)
- Wrapped in an instrument tray or fully perforated sterilization box
- 35 minute minimum exposure time
- 8 minute minimum dry time

250°F Gravity:
- Gravity displacement sterilizer
- 250-254°F (121-123°C)
- Instruments wrapped in an instrument tray or fully perforated sterilization box
- 45 minute minimum exposure time
- 8 minute minimum dry time

CAUTION: DO NOT leave handpieces in steam sterilizer, remove from sterilizer immediately after sterilization.

TUBING SET

(P/N 296-2-25) PVC Tubing Set is a sterile disposable intended for single use only. DO NOT resterilize or reuse.

(P/N 296-2-20) Silicone Tubing Set to be "Flash" autoclaved ONLY.

"Flash" Autoclave:
- Gravity displacement sterilizer
- 270-272°F (132-134°C)
- Unwrapped in an instrument tray
- 10 minute minimum exposure

* Validation based on HIMA-AORN protocol.

Problem	Cause	Solution
Bur does not turn	Lock collar not in clockwise run position.	Turn lock collar to clockwise position.
	User placing excessive pressure on bur by prying with it.	Release pressure and allow handpiece and bur to do work.
Blade does not oscillate or reciprocate	Blade not seated properly.	Reseat blade.
	User placing excessive pressure on blade by prying with it.	Release pressure and allow handpiece and blade to do work.
Oscillating or Sagittal blade retained but loose	Blade mount not fully seated	Rotate collar or button until it snaps down on the blade.
Sagittal blade exhibits reduced cutting action under a light cutting load	Normal wear of internal Sagittal saw components.	Return Sagittal saw for repair, see section on Repair/Loaner Program.
Pin/Wire does not drive	Collet is wrong size.	Select proper collet.
Handpiece will not run 1. Console power light is not on	Power cord is not fully seated in wall socket or console.	Make sure power cord is fully seated
	Power cord is bad.	Replace power cord
2. Handpiece light is not on or flashes	Cable connector not fully seated in handpiece or console	Make sure cable Connectors are seated.
	Cable is bad.	Replace cable.
	Handpiece is bad.	Repair handpiece, see section on Instrument *Repair/Loaner Program.*
3. Footswitch light is not on	Cable connector not fully seated in console.	Make sure cable connector is is fully seated.
	Footswitch is bad.	Replace footswitch.
4. Wire Driver will not operate	Handpiece set in SAFE position	Set to "F" or "R".
5. Handswitch lever jammed	Handpiece in SAFE position	Slide selector on lever to RUN position by sliding toward the back of handpiece.

Problem	Cause	Solution
Handswitch will not operate	Maximum speed control knob on console is set too low	Set speed setting to at least "10%".
	Cable is bad.	Replace cable.
	Handpiece is bad.	Replace handpiece, see section on Repair/Loaner Program.
Footswitch will not operate	Maximum speed control knob on console is set too low.	Set speed setting to at least "10%".
	Footswitch is bad.	Replace footswitch, see section on Repair/Loaner Program.

SERVICE

In U.S.A., refer all other problems to your Stryker representative or call Stryker Customer Service at 1-(800)-253-3210.

Outside U.S.A., contact your nearest Stryker Subsidiary listed on Page 33.

Model No. 2296-100 Straight Drill
Size: 6.5 in. (165mm) Long
0.79 in. (20mm) Diameter
Weight: 0.36 lbs. (0.16 Kg)
Speed: 100K RPM

Model No. 2296-12 20° 50K Drill
Size: 7.5 in. (191mm) Long
0.79 (20mm) Diameter
Weight: 0.37 lbs. (0.17 Kg)
Speed: 50K RPM

Model No. 2296-212 20° 50K Drill with Speed Control Lever
Size: 8.25 in. (210mm) Long
0.79 in. (20mm) Diameter
1.2 in. (30mm) Height
Weight: 0.66 lbs. (0.30 Kg)
Speed: 50K RPM

Model No. 2296-10 50K Straight Drill
Size: 6.88 in. (175mm) Long
0.79 in. (20mm) Diameter
Weight: 0.38 lbs. (0.17 Kg)
Speed: 50K RPM

Model No. 2296-210 50K Straight Drill with Speed Control Lever
Size: 7.5 in. (191mm) Long
0.79 in. (20mm) Diameter
1.2 in. (30mm) Height
Weight: 0.65 lbs. (0.29 Kg)
Speed: 50K RPM

Model No. 2296-31 Oscillating Saw
Size: 7.2 in. (183mm) Long
0.90 in. (23mm) Diameter
Weight: 0.57 lbs. (0.26 Kg)
Speed: 19,500 CPM
Excursion: 7° ARC

Model No. 2296-231 Oscillating Saw with Speed Control Lever
Size: 8.0 in. (203mm) Long
0.90 in. (23mm) Diameter
1.2 in. Height
Weight: 0.80 lbs. (0.36 Kg)
Speed: 19,500 CPM
Excursion: 7° ARC

Model No. 2296-34 Sagittal Saw
Size: 6.7 in. (170mm) Long
0.79 in. (20mm) Diameter
Weight: 0.48 lbs. (0.22 Kg)
Speed: 23,000 CPM
Excursion: 4.5° ARC

Model No. 2296-234 Sagittal Saw with Speed Control Lever
Size: 7.5 in. (191mm) Long
0.79 in. (20mm) Diameter
1.2 in. Height
Weight: 0.71 lbs. (0.32 Kg)
Speed: 23,000 CPM
Excursion: 4.5° ARC

Model No. 2296-37 Reciprocating Saw
Size: 7.5 in. (191mm) Long
0.90 in. (23mm) Diameter
Weight: 0.47 lbs. (.21 Kg)
Speed: 17,000 CPM
Excursion: .106 in.

Model No. 2296-237 Reciprocating Saw with Speed Control Lever
Size: 8.1 in. (206mm) Long
0.90 in. (23mm) Diameter
1.2 in. (30mm) Height
Weight: 0.78 lbs. (0.35 Kg)
Speed: 17,000 CPM
Excursion: .106 in.

Model No.: 2296-17 Low Speed Contra Angle Drill
Size: 6.0 in. (152mm) Long
0.81 in. (21mm) Diameter
Weight: 0.47 lbs. (0.21 Kg)
Speed: 1.6K RPM

Model No.: 2296-18 High Speed Contra Angle Drill
Size: 6.0 in. (152mm) Long
0.81 in. (21mm) Diameter
Weight: 0.32 lbs. (015 Kg)
Speed: 40K RPM

Model No.: 2296-80 Wire and Pin Driver
Size: 5.337 (136mm) High
1.020 (26mm) Wide
5.467 (139mm) Long
Weight: 1.04 lbs. (0.47 Kg)
Speed: 800 RPM

Consoles
Electrical: Leakage Current: <=100µA
Ground Impedance: <0.1ohm @ 25.0A

Size: 13.0 in. (330mm) Wide
11.0 in. (279mm) Deep
2.5 in. (64mm) High
Weight: 8.23 lbs. (3.73 Kg)

Model No.: 2296-1 Console
Electrical: Primary: 100-240VAC 50-60Hz 200W
Approvals: Canadian Standards Association approved
ETL Testing Laboratories approved
Class 1
Type B

DUTY CYCLE:
See Page 13 for Command2 Saw Duty Cycle.
See Page 17 for Command2 Drill Duty Cycle.
See Page 21 for Command2 Wire and Pin Driver Duty Cycle.

Model No.: 2296-2 Pinch Valve
Electrical: Input = 24V DC, 5.3 watts
Size: 3.5 in. (89mm) Long
1.75 in. (44mm) Square
Weight: 0.70 lbs. (0.32 Kg)

Model No.: 2296-7 Unidirectional Footswitch
Model No.: 2296-8 Bidirectional Footswitch
Electrical: Input = 12.0VDC, 100mA
Output = 6VDC to 11VDC
Size: 8.25 in. (210mm) Wide
5.50 in. (140mm) Deep
1.38 in. (35mm) High

The following information pertains to Model No. 2296-1-220 Console.

CLASS 1 EQUIPMENT: Equipment in which the protection against electric shock does not rely on Basic Insulation only, but which includes an additional safety precaution in such a way that means are provided for the connection of Accessible Conductive Parts to Protective (Earth) Conductor in the fixed wiring of the installation in such a way that Accessible Conductive Parts cannot become Live in the event of a failure of the Basic Insulation.

TYPE B EQUIPMENT: Equipment that provides an adequate degree of protection against electric shock, particularly regarding:

Allowable Leakage Current: (In Milliamperes)

Current Path	Type	
	N.C.	S.F.C.
Earth Leakage Current	0.5	1.0
Enclosure Leakage Current	0.1	0.5
Patient Leakage Current	0.1	0.5
Patient Auxiliary Current	0.01	0.5

N.C. Normal Condition
S.F.C. Single Fault Condition

Type B Equipment is suitable for intentional external and internal application to the patient excluding Direct Cardiac Application.

Reliability of Protective Earth Connection: (<0.1 ohm @ 25.0A).

NOTE: Specifications listed are approximate and may vary slightly from unit to unit or by power supply fluctuations.

Stryker Instruments accepts full responsibility for the effects on safety, reliability, and performance of this equipment only if:

- Assembly operations, extensions, readjustments, modifications, or repairs are carried out by persons authorized by Stryker Instruments.
- The electrical installation of the relevant room complies with the IEC requirements.
- The equipment is used in accordance with the instructions for use.

2296-10 ..... Straight Drill, 50K
2296-210 ..... Straight Drill, 50K, with Speed Control Lever

2296-100 ..... Straight Drill, 100K II
2296-101 ..... Bur Guard for 100K Drill

2296-12 ..... 20° 50K Drill
2296-212 ..... 20° 50K Drill, with Speed Control Lever

2296-17 ..... Contra Angle Drill, Low Speed
2296-18 ..... Contra Angle Drill, High Speed
296-17-40 ..... Contra Angle Head, Reduction 10:1
296-17-200 ..... 10:1 Stryker Reduction Head
296-18-40 ..... Contra Angle Head, Transmission 1:1
296-18-200 ..... 1:1 Stryker Reduction Head

2296-31 ..... Oscillating Saw
2296-231 ..... Oscillating Saw, with Speed Control Lever
2296-3-400 ..... Oscillating Saw Adaptor Kit

2296-34 ..... Sagittal Saw
2296-234 ..... Sagittal Saw, with Speed Control Lever

2296-37 ..... Reciprocating Saw
2296-237 ..... Reciprocating Saw, with Speed Control Lever

2296-80 ..... Wire and Pin Driver
296-80-62 ..... Small Collet
296-80-125 ..... Large Collet
296-80-131 ..... 5/32" Jacob's Chuck
296-80-110 ..... Synthes Chuck
296-80-112 ..... Trinkle Chuck
2296-80-134 ..... Sagittal Saw Head
296-80-118 ..... Wire Guard
296-80-150 ..... High Torque Jacob's Chuck

2296-1 ..... Control Console, 120 VAC

2296-7 ..... Footswitch, Unidirectional
2296-8 ..... Footswitch, Bidirectional

296-4 ..... Handpiece Cable
296-9 ..... Handswitch

2296-2 ..... Pinch Valve Accessory
296-2-20 ..... Silicone Irrigation Tubing Set, Non Sterile, Quantity 1
296-2-25 ..... PVC Irrigation Tubing Set, Sterile, Quantity 10
296-17-41 ..... Internal Irrigation Tip, Contra Angle Drills
2296-10-200 ..... Irrigation Tip, 50K Straight Drill
2296-12-200 ..... Irrigation Tip, 20° 50K Drill
2296-31-200 ..... Irrigation Tip, Oscillating Saw
2296-34-200 ..... Irrigation Tip, Sagittal Saw
2296-37-200 ..... Irrigation Tip, Reciprocating Saw
2296-100-264 ..... Irrigation Tip, 100K II Straight Drill
2296-101-139 ..... Irrigation Tip, 100K II Straight Drill with Bur Guard
296-17-43 ..... External Irrigation Tip, Contra Angle Drills
296-2-30 ..... Tubing Clips for Handpiece and Cable

296-3 ..... I.V. Stand
2296-3-10 ..... Mounting Bracket and Console Base
2296-3-100 ..... Office Handpiece Holder/Sterilization Rack
2296-170 ..... Sterilization Basket

WARNING: Use only Stryker approved accessories. A complete list of accessories is available from your Stryker Sales Representative.