



FC-350EX Diamond / CBN Wheel Truing and Dressing Machine

Operation Manual & Parts List

Machine Serial No. RF9624

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Table of Contents

1. Safety	3
1.1 Preliminary Precautions	3
1.2 Maintenance and Repair Precautions	3
1.3 General Operating Precautions	3
2. Lifting	4
3. Leveling	5
4. Connecting Electrical Inputs	5
5. Safety Lockout	7
6. General Operating Conditions	7
7. Description of Major Components	7
7.1 Dressing Unit Assembly	7
7.2 Work Slide Assembly	8
7.3 Dust Removal	8
7.4 Video Camera System	8
8. Machine Diagram	8
8.1 Dressing Unit Assembly	8
8.2 Work Piece Slide Assembly	9
8.3 Machine Status Tower Light	10
8.4 Enclosure Door Safety Lock LED Lights (Optional)	11
8.5 Operator Control Station	12
9. Control Panel Components	13
10. Control Panel Precautions	14
10.1 Dressing Wheel Spindle Speed	14
10.2 Work Piece Spindle Speed	14
10.3 Emergency Stop Button	14
11. Sequence of Operations	14
11.1 Standard machines	14
11.2 Machines equipped with optional door locks	15
12. Automatic Truing on the 350EX	16
12.1 For dressing a wheel at 0° and no other features	16
12.2 For dressing a wheel with Angle form	17
12.3 For dressing a wheel with a radius	17

12.4 For dressing a wheel using the Side of Wheel (Z) Automated Program	18
13. Manual Truing on the 350EX	20
13.1 For dressing a wheel at 0° and no other features	20
14. Proper Wheel Speed Ratios (Unidirectional FWD Rotation).....	21
14.1 Creating Proper Grinding Conditions	21
14.2 Determining Proper Work Piece Wheel Speed.....	21
14.3 Determining the Proper Truing and Dressing Wheel	22
14.4 Rush Machinery Wheel Truing and Dressing Machines Wheel Dimensions:.....	22
14.5 Rush Machinery Dressing Wheels.....	22
15. Proper Care of the FC-350EX	23
15.1 Cleaning.....	23
15.2 Adjusting or Replacing the Belts	23
15.3 Adjusting Oscillation Ballscrew	24
15.4 Adjusting Dressing Wheel Infeed Ballscrew	26
15.5 Lubricating the FC-350EX	27
16. Rush Machinery Warranty.....	28
Appendix A: Optional Accessories	29
A.1 Adapters and Spindles	29
A.2 Dust Collection System.....	34
Appendix B: Parts Lists and Diagrams.....	35
Appendix C: Electrical Schematics	46
Appendix D: Unidirectional Wheel Speed Charts.....	51

1. Safety

Failure to read, understand, and follow any and all instructions and warnings in this or any section of the manual voids all manufacturer warranties. The makers of this product cannot be held responsible for damage or injury resulting from incorrect use or failure to observe all operating procedures and precautions contained herein.

1.1 Preliminary Precautions

Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Please read and understand this manual in its entirety before proceeding. The user is responsible for applicable local codes. Wiring, grounding, disconnects, and overcurrent protection are of particular importance. Failure to observe this precaution could result in severe bodily injury or loss of life.

NOTE: Customer must provide wiring and strain relief connector to provide power to the control panel. All wiring must be done in accordance with any applicable local electrical codes.

1.2 Maintenance and Repair Precautions

Turn off the power to the machine before checking or making any machine repairs or adjustments.

This equipment is at line voltage when AC power is connected to the machine. Verify that there is no voltage present at input leads. **Disconnect and lockout the power from the machine before repairing or adjusting anything on the machine.** Failure to observe this precaution could result in severe bodily injury or loss of life.

1.3 General Operating Precautions

Do not operate this machine without the dressing wheel guards and both belt guards in place at all times. It is strongly recommended to not operate the machine without the work piece guard in place. Under no circumstances should anyone place their hands or any part of their body into or near the spindles or wheel while the machine is running. Operator must wear proper eye protection and keep hands clear of all pinch points and moving parts. Operator must also not wear loose fitting clothing, jewelry, or anything else which could get caught on any part of the machine.

- ❖ Observe all points in the “Control Panel Precautions” and “Sequence of Operation” sections of the manual (and the rest of the manual in its entirety) before operating the machine.
- ❖ Do not exceed the maximum operating speed of a wheel (the maximum speed is listed on the side of the wheel). The wheel could explode, causing injury to the operator.
- ❖ When using unidirectional rotation, it is possible to loosen the wheel arbor retaining nut on the work piece arbor during dressing. To prevent this problem, be sure the wheel arbor nut is tight and do not overfeed the dressing wheel into the work piece.

- ❖ **The emergency stop button disconnects power to the control circuit only. Power is still retained within the machine.** Never attempt to perform repairs on the machine unless all power to the machine is disconnected.
- ❖ Use the emergency stop button to disconnect power to the control circuit when performing job setups or changeovers. **DO NOT** use the master start “OFF” button on the control panel for this purpose.
- ❖ Be sure the area is clear of all personnel and that nobody is standing in the line of either wheel during the starting up of the work or grinding spindle. The operator **must** observe that the maximum wheel speed is clearly marked and equals or exceeds the maximum operating speed of the spindle. Any new wheel should be speed tested by running at full spindle speed for at least one minute before applying any work to either spindle. Failure to do so can lead the wheel to explode causing serious injury to the operator or others in close vicinity of the machine and damage to the machine. All wheels should be mounted in accordance with all ANSI and OSHA standards.
- ❖ The operator must turn off the master disconnect before removing any guards from the machine.

2. Lifting

The machine should be lifted only using the fork pocket and angle brackets provided as shown:



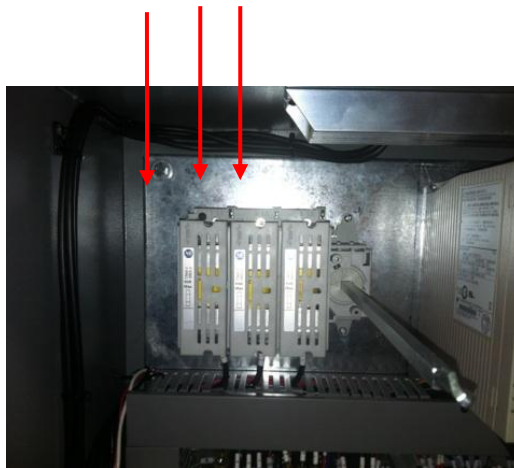
3. Leveling

To level the FC-350W & FC-350EX, do the following:

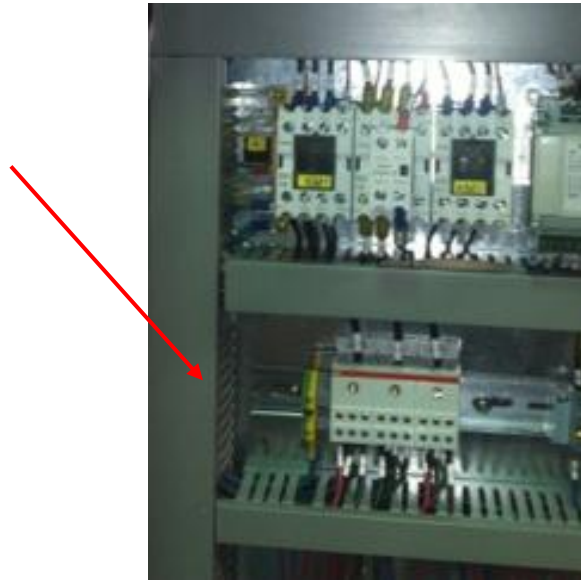
1. Place a precision level on top of the work piece spindle housing.
2. Adjust the leveling bolts until the machine is leveled in all directions. Be sure the ends of the leveling bolts are resting in the recessed center of the cast iron pads.
3. Check to be sure that the machine is level and that it does not rock or sway.
4. Tighten the leveling bolt jam nuts and double check the level.

4. Connecting Electrical Inputs

1. Verify that the input power to the machine corresponds to the machine's stated voltage and frequency and that the plant supply is of sufficient capacity to support the input current requirements of the machine.
2. Provide a transformer between the plant power supply and the machine if the correct input line voltage is not available.
3. Size upstream branch circuit protection (fuses) according to applicable local and federal standards.
4. Wire the input leads. Connect to the line terminals to the main control panel disconnect in the panel as shown:



5. Connect the incoming ground terminal to the terminal block supplied.



6. Check that there is adequate clearance to operate the machine safely.
7. Check and verify that the wiring to the line side of the terminal strip and the ground wire to the terminal strip is correct.
8. Check that the line wires are properly secured in the terminal strip.
9. Check that user-supplied branch circuit protection is installed and correctly rated.
10. Check that the incoming AC power is rated correctly.
11. Check that the rating of the transformer (if used) matches the machine's requirements, and is connected for the proper voltage.
12. Verify that a properly sized ground wire is installed and that a suitable earth ground is used. Verify that all ground leads are run unbroken.
13. With the incoming power turned on, use a voltmeter to verify that the supply voltage at the "disconnect" is within 10% of the supply voltage rating for the machine.
14. Close the main control panel door and wait for Rush Machinery personnel to complete setup and training.

5. Safety Lockout

The electrical safety lockout is provided on the main control panel door as shown:



6. General Operating Conditions

1. Optimum temperature range 40 to 104° F (5 to 40°C), during full or no load.
2. Electrical equipment capable of operating in humidity range of 20-95 percent.

7. Description of Major Components

Both spindles are powered by three-phase AC motors. Both motors have variable speed adjustments controlled by frequency inverters. The oscillating slide, dressing wheel infeed slide and dressing wheel swivel axis are controlled by servo motors with servo controllers. All functions of the servo motors are controlled by the operator from the PLC touch screen on the operator control panel

The FC-350EX comes standard with either a HSK-50 A/C type or ISO 40 Taper type work piece spindle. Special workpiece spindles are available. Adaptors can be provided to accommodate user's wheel arbors.

7.1 Dressing Unit Assembly

The dressing unit is mounted on large, precision ground ball bearings that are pre-loaded for maximum rigidity. The assembly can swivel up to 180+ degrees and locks via an adjustable locking lever on the base. Travel speed of the oscillating slide is fixed and the oscillation stroke length and position parameters are controlled from the PLC touch screen on the operator control panel and/or the handwheel control.

7.2 Work Slide Assembly

Both X and Y axis on the work slide move on frictionless linear slide assemblies and are driven by anti-backlash ball screws equipped with digital readouts for positioning accuracy.

7.3 Dust Removal

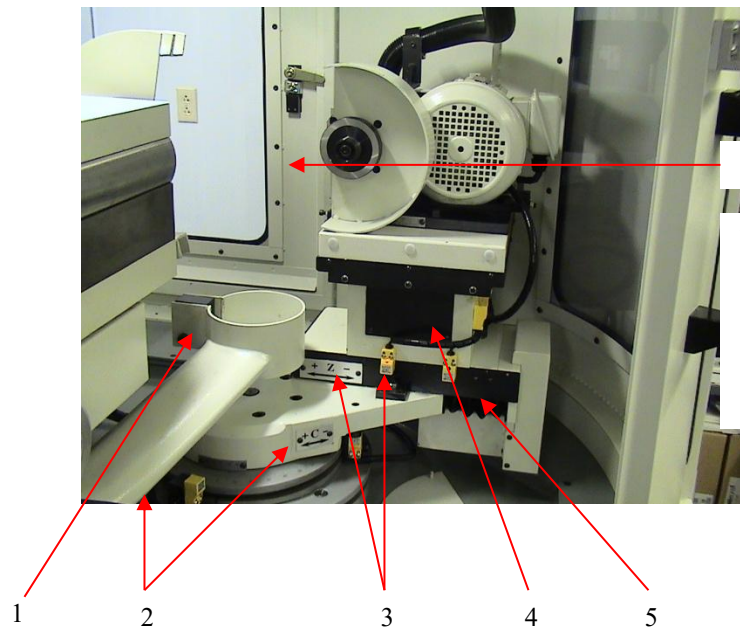
The FC-350EX has an efficient dust collection system to minimize exposure of machine components to harmful materials. Superior suction is attained by way of a 2-inch pipe connection.

7.4 Video Camera System

The video camera system zoom lens is computer-controlled thru the RushVision software using a stepper motor and drive.

8. Machine Diagram

8.1 Dressing Unit Assembly

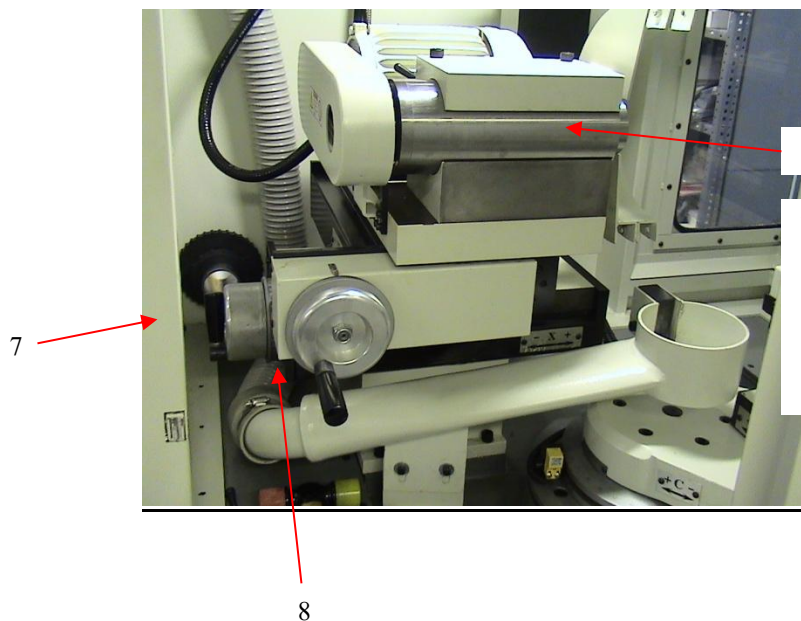


NOTICE: Machine shown with wheel guard removed for explanation purposes only. Never operate machine without wheel guard in place.

1. Dust collection cup and discharge pipe
2. Dressing unit swiveling limit sensors: These are used to limit angular travel of the dressing wheel (C Axis) and for home positioning. They should not be moved as damage to the machine and/or inaccurate performance may result.

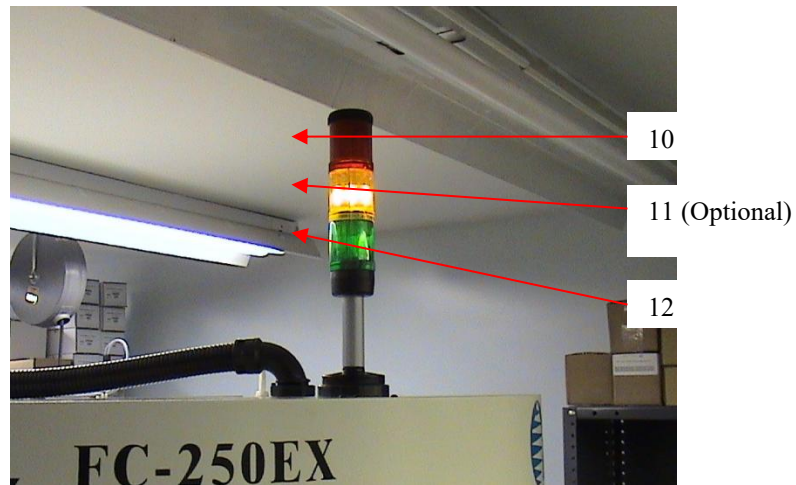
3. Dressing wheel infeed limit sensors: These are used to limit infeed (Z axis) travel of the dressing wheel and for home positioning. They should not be moved as damage to the machine and/or inaccurate performance may result.
4. Dressing wheel oscillation limit sensors: These sensors limit the position and the length of the oscillation travel (S Axis) and for home positioning. They should not be moved as damage to the machine and/or inaccurate performance may result.
5. Dressing wheel infeed axis (Z Axis)
6. Dressing wheel hub

8.2 Work Piece Slide Assembly



7. X-axis feed hand wheel: Moves the wheel being dressed along the X-axis (side to side).
8. Y-axis feed hand wheel: Moves the wheel being dressed along the Y-axis (in and out).
9. Work piece Spindle interface

8.3 Machine Status Tower Light



10. Red Indicator Lamp

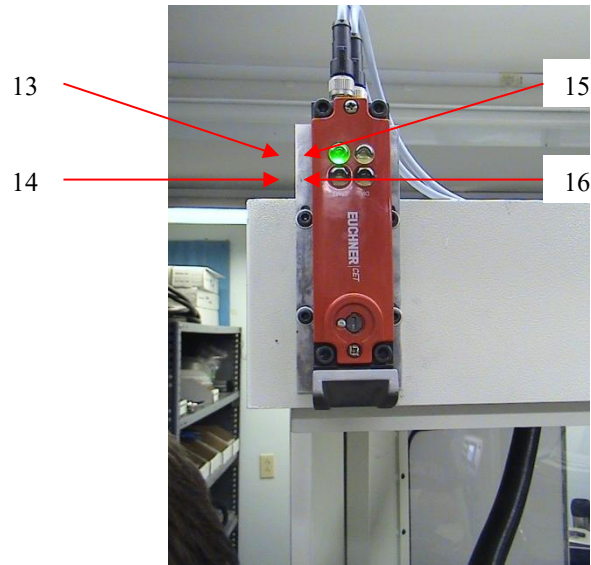
- a. *Standard machines*: Flashes on and off when an automatic cycle is complete and awaiting operator attention.
- b. *Machines equipped with door locks*: When lit, indicates that the emergency stop button is pushed in.

11. Yellow/Amber SR (Safety Reset) Lamp: Only present on machines equipped with door locks. When lit indicates that the machine is in operational mode. This will stay illuminated until the green RTE pushbutton is pushed.

12. Green Indicator Lamp

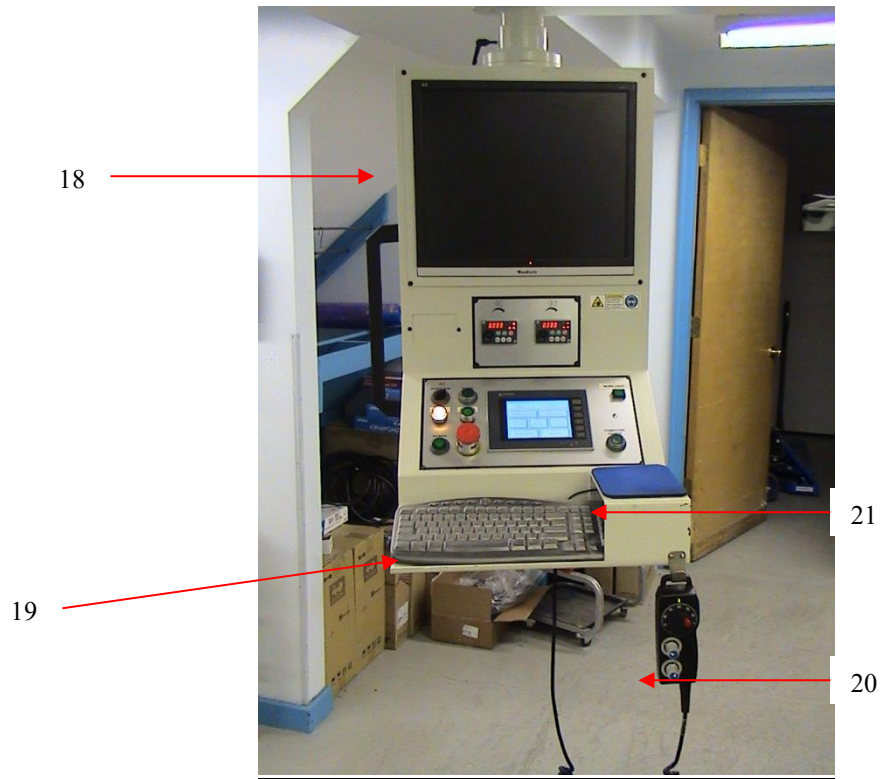
- a. *Standard machines*: Flashes on and off during an automatic cycle process.
- b. *Machines equipped with door locks*: When lit indicates that the machine is in a safe state and the operator can open the work area enclosure.

8.4 Enclosure Door Safety Lock LED Lights (Optional)



- 13. Upper Green LED Lamp: When lit indicates that the door is unlocked and it is safe to open.
- 14. Green STATE LED Lamp: Utilized for switch status and unit diagnosis. For normal operation, when glowing solid, door is locked. For normal operation when flashing one time in a repeating pattern, door is unlocked.
- 15. Upper Red LED Lamp: When lit indicates that the door is locked and the operator may not enter the machine enclosure.
- 16. Red DIA LED Lamp: Utilized for unit diagnosis. Will only illuminate when there is a system fault.

8.5 Operator Control Station



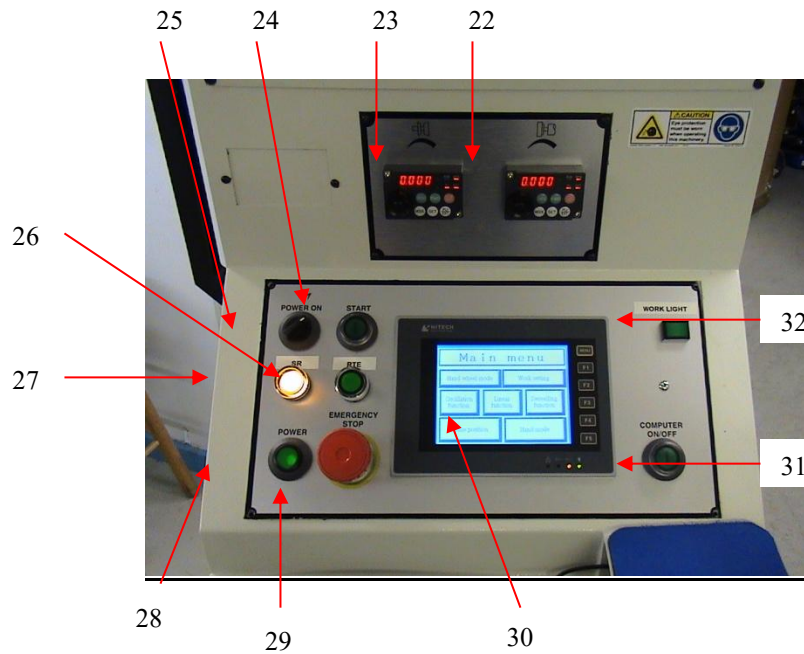
17. Monitor for the RushVision vision system.

18. Keyboard for the RushVision vision system.

19. Handwheel Axis controller. Used for setup and manual dressing functions.

20. Computer mouse station for the RushVision system.

9. Control Panel Components



21. Dressing wheel speed controller: Infinitely adjustable 200–2000 rpm.
22. Work piece wheel speed controller: Infinitely adjustable 100–1000 rpm.
23. Cycle start button: Used for starting automatic dressing cycles.
24. Main power on/off knob.
25. RTE (Request to Enter) (OPTIONAL) green illuminated push button: Push and hold until machine enclosure doors unlock. Pushing this button will stop and clear any automatic program that is running.
26. SR (Safety Reset) (OPTIONAL) yellow illuminated push button.: Push and hold for 1–2 seconds to lock machine enclosure doors and allow operation of the PLC touch screen. If the yellow lamp will not come on, verify that the emergency stop button is released and that both doors are fully closed. After pressing the SR button, the machine will need to be homed.
27. Power on indicator lamp: Illuminates when the main power knob is on.
28. Emergency stop button: Push to stop all machine functions. Twist to release. The machine will need to be homed before continuing operations.
29. PLC touch screen: Refer to separate operating manual for details on use.
30. Computer start button: Push to start the RushVision computer.
31. Work area lamp: Push to turn on or off the work area enclosure fluorescent lamp.

10. Control Panel Precautions

10.1 Dressing Wheel Spindle Speed

Do not exceed the maximum operating speed of a wheel (the maximum speed is listed on the side of the wheel). The wheel could explode, causing injury to the operator.

10.2 Work Piece Spindle Speed

Do not exceed the maximum operating speed of a wheel (the maximum speed is listed on the side of the wheel). The wheel could explode, causing injury to the operator.

10.3 Emergency Stop Button

The emergency stop button disconnects power to the control circuit only! Power is still retained within the machine. Never attempt to perform repairs on the machine unless all power to the machine is disconnected.

Use the emergency stop to disconnect power to the control circuit before performing job setups or changeovers.

11. Sequence of Operations

11.1 Standard machines

1. Turn on the main power knob on the control panel. The machine will power up and after a brief moment will become fully functional. The machine can now be operated from the PLC touch screen and/or the handwheel controller.
2. Select and mount wheels on the grinding and work spindles. This must be done in compliance with all applicable articles of the American National Standard safety requirements for the use, care, and protection of abrasive wheels.
3. With the wheels mounted, position the work piece to the proper location, using the video system as a visual guide.
4. With wheel guards and both belt guards in place, close the work area enclosure doors. Operator must wear proper eye protection and keep hands clear of all pinch points and moving parts. Operator must not wear loose fitting clothing, jewelry, or other articles that could get caught on any part of the machine.
5. Using the PLC control screen, set the operational parameters of the dressing unit. Refer to the directions in the PLC operator's manual. Be careful not to damage the wheels during setup.

6. When running an automatic cycle, the cycle is started by pressing the “Start” button on the control panel. Manual operations are started and stopped using the PLC control screen and/or the handwheel control.
7. Set the dressing wheel and work piece spindle speeds using the knobs on the control panel. Be sure to observe safe operating speed requirements when setting spindle RPMs. The operator **must** observe that the maximum wheel speed is clearly marked and equals or exceeds the maximum operating speed of the spindle. Any new wheel should be speed tested by running at full spindle speed for at least one minute before applying any work to either spindle. Failure to do so can lead the wheel to explode, causing damage to the machine and serious injury to the operator or others in close vicinity of the machine. All wheels should be mounted in accordance with all ANSI and OSHA standards.
8. Be sure that the work area is clear of all personnel and that nobody is standing in the line of either wheel before starting up the work piece or dressing wheel spindle.
9. When the part is finished, if an automatic cycle was utilized, the machine will return to its home position and power down. The part can be checked using the RushVision vision system (refer to separate manual). If access inside the work area enclosure is required, be sure that all motors, belts, wheels, slides, etc. have come to a full stop and are no longer in motion.
9. The operator must turn off the master disconnect before removing the guards from the machine.

11.2 Machines equipped with optional door locks

1. Turn on the main power knob on the control panel. The machine will power up and after a brief moment will become fully functional. If the work area enclosure doors are closed at the time of powering up, the machine will automatically go to the operational mode. When in the operational mode the yellow SR lights will be lit and the doors will be locked. The machine can now be operated from the PLC touch screen and/or the handwheel controller. To enter the work area enclosure, push and hold the green RTE button until the doors unlock. If the enclosure doors are open at the time of powering up, the machine will automatically go to a standby mode during which time the machine cannot be operated. The green RTE button may need to be pushed and held until both doors unlock to have full access inside the work area enclosure. The doors must be closed and the yellow SR button pushed and held for 1–2 seconds before the machine can be operated.
2. With the machine in a safe to enter mode (the green RTE and switch LED lights are illuminated), the operator selects and mounts wheels on the grinding and work spindles. This must be done in compliance with all applicable articles of the American National Standard safety requirements for the use, care, and protection of abrasive wheels.
3. With the wheels mounted, position the work piece to the proper location, using the video system as a visual guide.
4. With wheel guards and both belt guards in place, the operator closes the work area enclosure doors, and pushes and holds the yellow SR button for 1–2 seconds. Operator must wear proper

eye protection and keep hands clear of all pinch points and moving parts. Operator must not wear loose fitting clothing, jewelry, or other articles which could get caught on any part of the machine.

5. The operator now sets the operational parameters of the dressing unit. Refer to the directions in the PLC operator's manual. Be careful not to damage the wheels during setup.
6. When running an automatic cycle, the cycle is started by pressing the "Start" button on the control panel. Manual operations are started and stopped using the PLC control screen and/or the hand wheel control.
7. The operator now sets the dressing wheel and work piece spindle speeds, using the knobs on the control panel. Be sure to observe safe operating speed requirements when setting spindle RPMs. The operator **must** observe that the maximum wheel speed is clearly marked and equals or exceeds the maximum operating speed of the spindle. Any new wheel should be speed tested by running at full spindle speed for at least one minute before applying any work to either spindle. Failure to do so can lead the wheel to explode, causing damage to the machine and serious injury to the operator or others in close vicinity of the machine. All wheels should be mounted in accordance with all ANSI and OSHA standards.
8. Be sure that the work area is clear of all personnel and that nobody is standing in the line of either wheel before starting up the work piece or dressing wheel spindle.
9. When the part is finished, if an automatic cycle was utilized, the machine will return to its home position and power down. The part can be checked using the RushVision vision system (Refer to separate manual). If access inside the work area enclosure is required, push and hold the green RTE button until the doors unlock and the machine is in a safe condition to enter.
10. The operator must turn off the master disconnect before removing the guards from the machine.

12. Automatic Truing on the 350EX

Before truing, always begin at Home Position and open the drawing for the specific form that you are truing the wheel to. Do one feature at a time.

12.1 For dressing a wheel at 0° and no other features

1. Turn on hand wheel mode.
2. Move the dressing head near work.
3. Position the dressing wheel off to the right or left end of the desired stroke of S-axis oscillation. Touch either the right or left side confirmation for S-axis calibration. Repeat for the opposite end of the stroke.

4. Determine the amount to be removed and enter.
 - a. This can be approximated by using the mouse location on the monitor. Move the mouse to the edge of the drawing image and then to the edge of the dressing wheel and subtract to find the difference.
 - b. Enter the total infeed on the Linear Function Display Screen.
5. Enter the infeed per cycle (approximately 0.000X).
6. Enter oscillation times.
7. Press start.

12.2 For dressing a wheel with Angle form

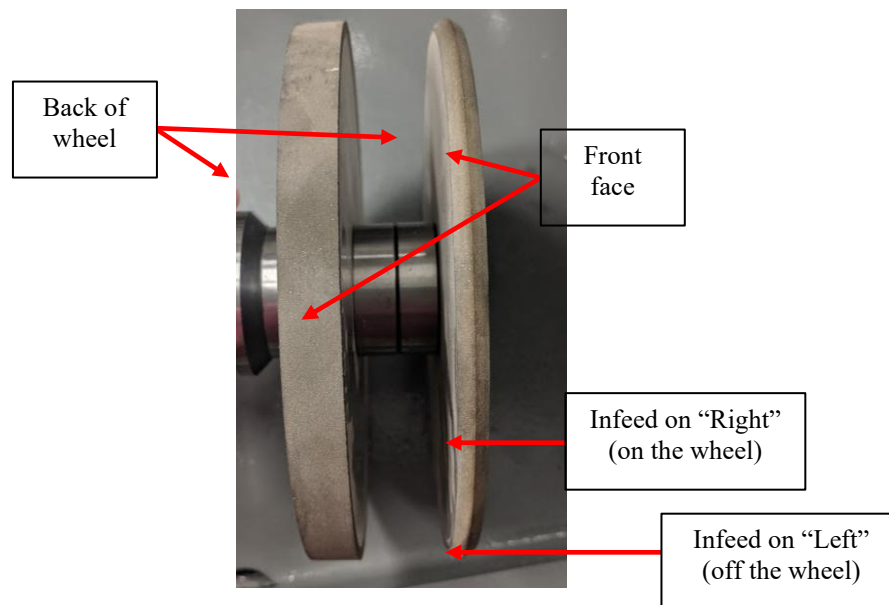
1. Turn on hand wheel mode.
2. Move the dressing wheel head near work.
3. Position the dressing head to the desired angle.
4. Position the dressing wheel off to the right or left end of the desired stroke of S-axis oscillation. Touch either the right or left side confirmation for S-axis calibration. Repeat for the opposite end of the stroke.
5. Determine the amount to be removed and enter.
 - a. This can be approximated by using the mouse location on the monitor. Move the mouse to the edge of the drawing image and then to the edge of the dressing wheel and subtract to find the difference.
 - b. Enter the total infeed on the Linear Function Display Screen.
6. Enter the infeed per cycle (approximately 0.000X).
7. Enter oscillation times.
8. Press start.

12.3 For dressing a wheel with a radius

1. Turn on hand wheel mode.
2. Move the dressing head near work.
3. Position the dressing wheel off to the right or left end of the desired stroke of S-axis oscillation. Touch either the right or left side confirmation for S-axis calibration. Repeat for the opposite end of the stroke.
4. Set Z-axis start position.
5. Determine the amount to be removed and enter.
 - a. This can be approximated by using the mouse location on the monitor. Move the mouse to the edge of the drawing image and then to the edge of the dressing wheel and subtract to find the difference.
 - b. Enter the total infeed on the Swiveling Function Display Screen.
6. Determine the angle at both ends of the radius. For Angle 1, enter the angle on the left side. For Angle 2, enter the angle on the right side.
7. Determine which side to have the infeed occur and set with the R & L infeed box.
8. Press “Start” to begin program and “Oscillation Start” to activate oscillation.

12.4 For dressing a wheel using the Side of Wheel (Z) Automated Program

1. Pivot the dressing head 10–15°.
2. Swing C-axis to run parallel with the side that is being dressed.
3. Turn on hand wheel mode.
4. Move the dressing head near work.
5. Position the dressing wheel at the beginning of Z-axis oscillation. In the Pendant/Manual mode on the next page (Z-axis, Side of Wheel dressing mode), enter the current value in the Swiveling (Z) right limit box if doing the left side of the wheel. If doing the right side of the wheel, enter the value in Swiveling (Z) left limit box.
6. Position the dressing wheel at the end of the Z-axis oscillation. In the Pendant/Manual mode on the next page (Z-axis, Side of Wheel Dressing Mode), enter the current value in the Swiveling (Z) right limit box if doing the right side of the wheel. If doing the left side of the wheel, enter the value in Swiveling (Z) left limit box.
7. Position the dressing wheel at the beginning of the infeed on the S-axis and enter the position value in the Oscillation Axis (S) start location.
8. The following steps take place on the Side of Wheel Dressing (Z-axis) Automatic Mode Settings.



For dressing the front face of the wheel infeeding on the left:

- a. Oscillations (S) Limit: Position value
- b. Oscillations (S) Increment: Position value
- c. Infeed Setting: Purple rectangle

SIDE OF WHEEL DRESSING (Z AXIS) AUTOMATIC MODE SETTINGS			
INFED AXIS (Z) LOCATION	0.0000	CURRENT ANGLE (G)	0.00
OSCILLATION AXIS (S) LOCATION	0.0000	OSCILLATION (S) STARTING LOCATION	1.5062
INFED (Z) LIMIT	LEFT (Z) LIMIT 2.0540	RIGHT (Z) LIMIT	1.8110
REMAINING INFED DISTANCE	1.7062	OSCILLATIONS PER INFED	0.0000
SWIVEL ANGLE (C) - LEFT LIMIT	0.00	OSCILLATIONS (S) LIMIT	0.2000
SWIVEL ANGLE (C) - RIGHT LIMIT	0.00	OSCILLATIONS (S) INCREMENT	0.0400
DUST COLLECTOR & COOLANT ON/OFF		PAUSE	

For dressing the front face of the wheel infeeding on the right:

- Oscillations (S) Limit: Negative value
- Oscillations (S) Increment: Positive value
- Infeed Setting: Left & Right Infeed

SIDE OF WHEEL DRESSING (Z AXIS) AUTOMATIC MODE SETTINGS			
INFEED AXIS (Z) LOCATION	0.0000	CURRENT ANGLE (C)	0.00
OSCILLATION AXIS (S) LOCATION	0.0000	OSCILLATION (S) STARTING LOCATION	1.5062
INFEED (Z) LIMIT	LEFT (Z) LIMIT 2.0540	RIGHT (Z) LIMIT	1.8110
REMAINING INFEED DISTANCE	1.7062	OSCILLATIONS PER INFEED	0.0000
SWIVEL ANGLE (C) - LEFT LIMIT	0.00	OSCILLATIONS (S) LIMIT	0.2000
SWIVEL ANGLE (C) - RIGHT LIMIT	0.00	OSCILLATIONS (S) INCREMENT	0.0400
DUST COLLECTOR & COOLANT ON/OFF		LEFT/RIGHT infeed	PAUSE

For dressing the back of the wheel infeeding on the left:

- Oscillations (S) Limit: Negative value
- Oscillations (S) Increment: Negative value
- Infeed Setting: Counterclockwise

SIDE OF WHEEL DRESSING (Z AXIS) AUTOMATIC MODE SETTINGS			
INFEED AXIS (Z) LOCATION	0.0000	CURRENT ANGLE (C)	0.00
OSCILLATION AXIS (S) LOCATION	0.0000	OSCILLATION (S) STARTING LOCATION	1.5062
INFEED (Z) LIMIT	LEFT (Z) LIMIT 2.0540	RIGHT (Z) LIMIT	1.8110
REMAINING INFEED DISTANCE	1.7062	OSCILLATIONS PER INFEED	0.0000
SWIVEL ANGLE (C) - LEFT LIMIT	0.00	OSCILLATIONS (S) LIMIT	-0.2000
SWIVEL ANGLE (C) - RIGHT LIMIT	0.00	OSCILLATIONS (S) INCREMENT	-0.0400
DUST COLLECTOR & COOLANT ON/OFF		COUNTERCLOCKWISE	PAUSE

For dressing the back of the wheel infeeding on the right:

- Oscillations (S) Limit: Negative value
- Oscillations (S) Increment: Negative value
- Infeed Setting: Clockwise

SIDE OF WHEEL DRESSING (Z AXIS) AUTOMATIC MODE SETTINGS			
INFEED AXIS (Z) LOCATION	0.0000	CURRENT ANGLE (C)	0.00
OSCILLATION AXIS (S) LOCATION	0.0000	OSCILLATION (S) STARTING LOCATION	1.5062
INFEED (Z) LIMIT	LEFT (Z) LIMIT 2.0540	RIGHT (Z) LIMIT	1.8110
REMAINING INFEED DISTANCE	1.7062	OSCILLATIONS PER INFEED	0.0000
SWIVEL ANGLE (C) - LEFT LIMIT	0.00	OSCILLATIONS (S) LIMIT	-0.2000
SWIVEL ANGLE (C) - RIGHT LIMIT	0.00	OSCILLATIONS (S) INCREMENT	-0.0400
DUST COLLECTOR & COOLANT ON/OFF		CLOCKWISE	PAUSE

13. Manual Truing on the 350EX

Before truing, always begin at Home Position and open the drawing for the specific form that you are truing the wheel to. Do one feature at a time.

13.1 For dressing a wheel at 0° and no other features

1. Turn on hand wheel mode.
2. Move the dressing head near work.
3. Position the dressing wheel off to the right or left end of the desired stroke of S-axis oscillation. Touch either the right or left side confirmation for S-axis calibration. Repeat for the opposite end of the stroke.
4. Press “Next” to bring up the next page.
5. Press “Spindle” to turn on the spindle.
6. Press “Grinding Wheel” to turn on the grinding wheel.
7. Press “Coolant” to turn on the coolant.
8. Press “Oscillation Start” to begin oscillation.
9. Make sure that the hand wheel controller is set for the smallest movement (x1).
10. Begin turning the hand wheel to feed grinding head into work piece.
11. When finished grinding, move grinding head away from work wheel and begin turning off. Press “Oscillation Stop”, “Coolant”, “Grinding Wheel”, and “Spindle” to shut everything down.

For dressing an angle, set the dressing head at the desired angle and follow the above steps.

For dressing a radius, follow the above steps. In addition, you will have to switch between Infeed axis and Swiveling axis. Be sure to swivel only to within half a degree of each end.

14. Proper Wheel Speed Ratios (Unidirectional FWD Rotation)

14.1 Creating Proper Grinding Conditions

Unidirectional (FWD) rotation is the ideal relationship between the work piece wheel and the dressing wheel. Unidirectional rotation allows the abrasive materials in the dressing wheel to infiltrate the work piece wheel's matrix, much like two gears meshing. This infiltration means the bond tail of the work piece wheel is dressed instead of just the diamond or CBN particles. Dressing the bond tail is the Key to good bond tail integrity.



Work Piece Wheel

Grinding Wheel

14.2 Determining Proper Work Piece Wheel Speed

It is important that the work piece wheel and the dressing wheel rotate in the same direction, unidirectionally, as shown on the previous page.

IMPORTANT: When using unidirectional rotation, it is possible to unintentionally loosen the wheel arbor retaining nut on the work piece arbor during dressing. To prevent this problem, be sure the wheel arbor nut is tight, and do not over feed the dressing wheel in to the work piece.

The circumferential speed of the work piece wheel should be approximately 70% of the surface speed of the dressing wheel.

When determining optimal wheel speed, it is best to start with a closer work piece to dressing wheel speed ratio and work your way up in speed until you get the results you want. Start out with the work piece wheel around 900 RPM and the dressing wheel around 1200 RPM. Work your way up in speed on the dressing wheel slowly (about 200 RPM intervals) until you get the ideal dressing speed and efficiency. Make the speeds closer for a slower but truer and more efficient dress and further apart for faster stock removal but less efficient/true edge.

Bear in mind that, while higher speeds increase the rate of stock removal and produce more immediate results, more material is wasted in the process. **NOTE: the speed ratio to efficiency is not a linear**

scale; i.e., doubling the speed will not produce twice the stock removal, etc. Also be aware that wheel speed is not directly proportional to wheel size either; do not try to double the speed for a wheel that's half the size of the other.

Adjusting for proper wheel speed ratios is not an exact science. Many factors such as hardness and composition of the diamond and abrasive wheel, oscillating speed, wheel temperature, etc. have an effect on the ideal operating speed ratios; thus it requires some trial and error. However, once you find the right speed ratio for a specific wheel of a given size you can consistently use it as a guideline for those wheels. Keeping a record is recommended.

14.3 Determining the Proper Truing and Dressing Wheel

Important factors for the proper truing and dressing of diamond or CBN wheels are grit size, hardness, and composition of the dressing wheel. Diamond or CBN wheels (with different grit size and composition) act differently when dressed; therefore, the use of different dressing wheels is needed to compensate. By varying the dressing wheel's grit size and hardness, you can accommodate for varying diamond and CBN wheels. The chart below demonstrates some standard wheels as a guideline for dressing wheel grit size.

14.4 Rush Machinery Wheel Truing and Dressing Machines Wheel Dimensions:

(Models FC-250W, FC_350W, FC-250EX and FC-350EX)

Type 1A1, 8" diameter, up to 1/2" wide, with a 1-1/4" bore.

14.5 Rush Machinery Dressing Wheels

Part Number	Dressing Wheel Type, Grit and Size	Use for Diamond Wheel (Bond, Grit):
Aluminum Oxide		
WTM08001	60 Grit – 8" X 1/2" X 1-1/4"	Resin & softer metal bonds, 80 - 150
WTM08002	80 Grit – 8" X 1/2" X 1-1/4"	Resin & softer metal bonds, 100 - 180
WTM08003	100 Grit – 8" X 1/2" X 1-1/4"	Resin & softer metal bonds, 120 - 220
WTM08035	100 Grit – 8" X 1/4" X 1-1/4"	Resin & softer metal bonds, 120 - 220
WTM08004	120 Grit – 8" X 1/2" X 1-1/4"	Resin & softer metal bonds, 150 - 320
WTM08014	120 Grit – 8" X 3/8" X 1-1/4"	Resin & softer metal bonds, 150 - 320
WTM08034	120 Grit – 8" X 1/4" X 1-1/4"	Resin & softer metal bonds, 150 - 320
WTM08005	150 Grit – 8" X 1/2" X 1-1/4"	Resin & softer metal bonds, 180 - 400
Silicon Carbide		
WTM08012	54 Grit – 8" X 1/2" X 1-1/4"	Hard metal & vitrified bond, 80 - 150
WTM08013	100 Grit – 8" X 1/2" X 1-1/4"	Hard metal & vitrified bond, 120 - 220
WTM08110	220 Grit – 8" X 3/8" X 1-1/4"	Hard metal & vitrified bond, 400 - 600
WTM08111	320 Grit – 8" X 5/16" X 1-1/4"	All bonds, 600 - 1200

Rules of thumb:

- The dressing wheel grit size is 1/3 to 2/3 the size of the diamond/CBN wheel grit size
- The finer the diamond/CBN wheel grit size, the more the dressing wheel doesn't matter.

15. Proper Care of the FC-350EX

15.1 Cleaning

Simply use a suction hose to remove any dust or other debris. This should be done daily. Also wipe the exposed machined surfaces down with a rust inhibitor during the summer months.

15.2 Adjusting or Replacing the Belts

Only light tension is required! To adjust, do the following:

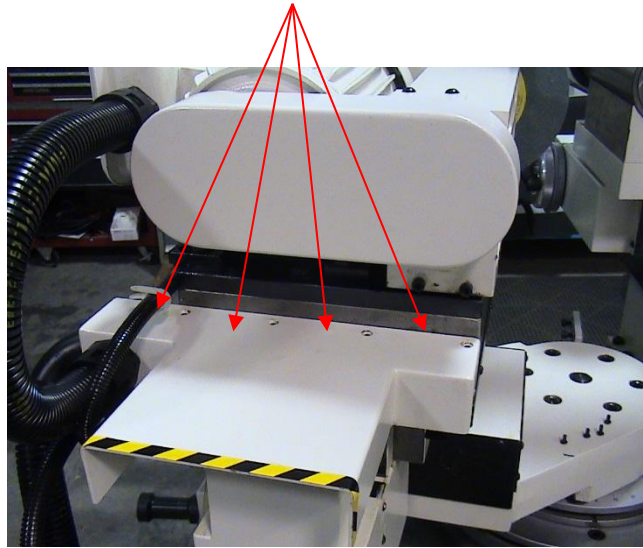
1. Disconnect power from machine.
2. Remove the screws from the belt safety guard cover.
3. Pull off the cover.
4. Loosen motor adjusting plate screws.
5. Pull the motor back until the belts are tight by using the adjusting screw.
6. Tighten the adjusting plate screw and replace the cover.
7. Check to see that the belts are clear of the guard.
8. Reconnect power to machine.

To replace a belt, do the following:

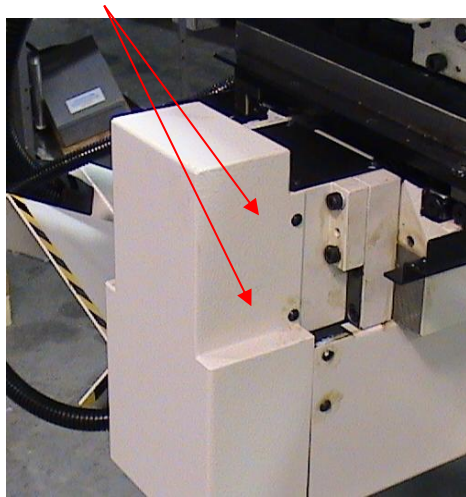
1. Disconnect the power from the machine.
2. Remove the screws from the belt safety guard cover.
3. Pull off the cover.
4. Loosen motor adjusting plate screws.
5. Loosen the adjusting screw and push motor forward until old belts are loose.
6. Remove the old belts.
7. Replace belts.
8. Follow steps #5 - #8, in the previous section, above.

15.3 Adjusting Oscillation Ballscrew

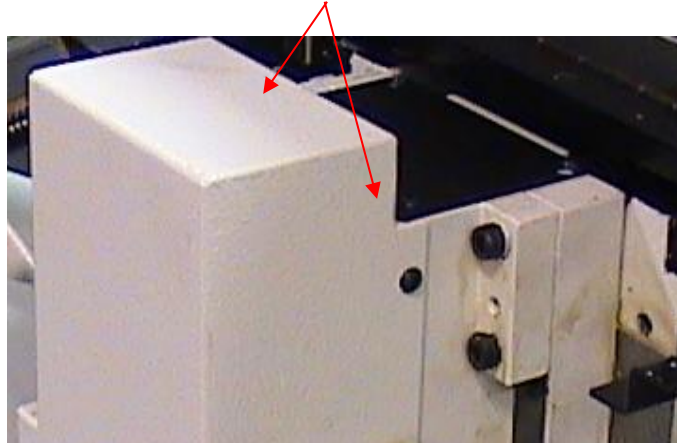
1. Remove (4) screws holding the upper shield in place.



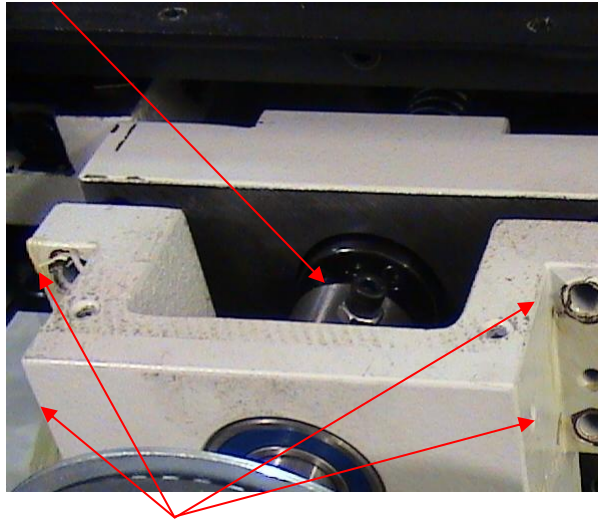
2. Remove (4) screws holding the outer shield in place.



3. Remove (2) screws holding shaft cover in place.



4. Loosen drive shaft screw.



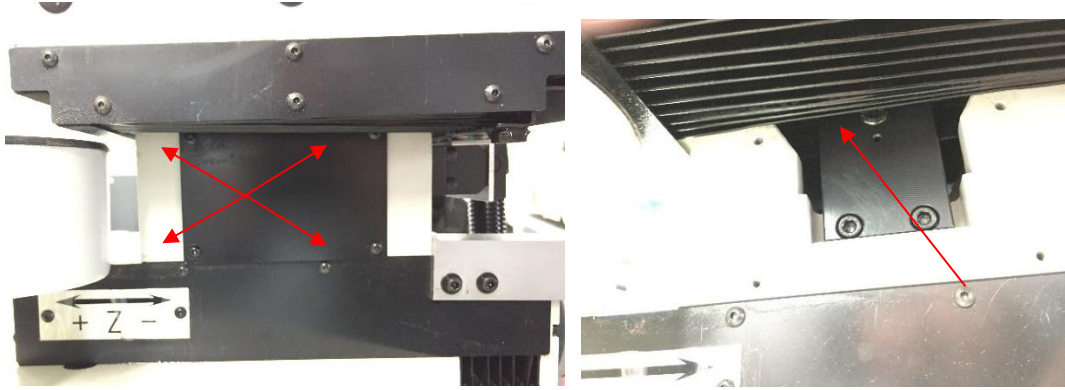
5. Remove (4) servo casting screws.

6. Slide away servo, casting, and coupler away from the ballscrew.

7. Loosen but do not remove the (4) ballscrew nut retaining screws



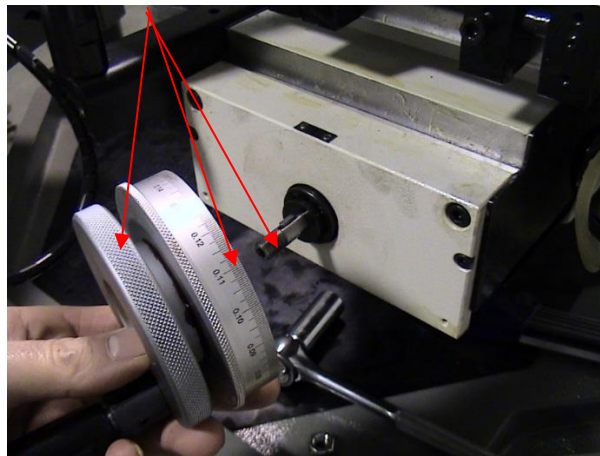
8. Remove plate on the z axis housing to expose the hex bolt on the end of the ball screw. Use a hex wrench to hold the ball screw while tightening the ballscrew nut with a spanner wrench. Back off the ballscrew nut slightly until all of the play is taken up but the ball screw still operates freely.



9. Tighten the ballscrew nut retaining screws loosened in step 7.
10. Reinstall servo / casting / shaft and all covers and check operation.

15.4 Adjusting Dressing Wheel Infeed Ballscrew

1. Remove dressing wheel infeed hand crank and washer.



2. Pull apart hand crank assembly. Be careful not to misplace the ball and spring that will come out when disassembled.



3. Loosen only (don't remove) (4) ballscrew nut retaining screws



4. Grip ballscrew shaft using the hand crank and key.
5. Tighten the ballscrew nut with a spanner wrench. Tighten the nut all the way, then back off slightly until all of the play is taken up but the ballscrew still operates freely.



Use hand crank to hold ballscrew shaft in place while tightening.

6. Tighten the (4) ballscrew nut retaining screws
7. Install thick spacer washer, shaft key and handwheel.

15.5 Lubricating the FC-350EX

The FC-350EX has a central oil lubricating system. Pull the lever on the oil pump 1 - 2 times, once a day. The recommended oil is Mobil Vactra No. 2, or the equivalent.

16. Rush Machinery Warranty

For one year from date of delivery of the FC-350EX Diamond / CBN Wheel Truing and Dressing Machine, provided that the machine is installed and operated in accordance with the instruction manual, Rush Machinery will repair or replace any mechanical or electrical part(s) for the machine, if defective in material or workmanship, at no charge. To obtain service under this warranty, contact Rush Machinery, and, at our option, the defective part(s) may have to be returned with shipping charge prepaid by the user. Rush Machinery will, without charge, repair or replace defective part(s). This warranty does not apply to the following: shipping damage, damage or problems caused by abuse, accident, alteration, negligence, or failure to follow operating instructions. In no event will Rush Machinery, Inc. be liable for incidental or consequential damages.

- ❖ The use of unapproved liquids, including the use of coolant oil or mixed coolants without proper fire suppression and mist collection, will void the warranty.

For any maintenance, service, or parts needs, please contact the service department at:

Rush Machinery, Inc.
4761 Route 364
Rushville, NY 14544 USA

Tel: 800-929-3070 (Toll Free - USA & Canada)
or 585-554-3070
Fax: 585-554-4077

Email: mail@rushmachinery.com
Website: www.rushmachinery.com

Appendix A: Optional Accessories

A.1 Adapters and Spindles

 WTM09001	ISO40 to 3" TPF Spindle (Sopko) with 1" opening Fits these models: Exaclibur E60, Harig, Parker-Majestic, Tru Tech: Revolution Revolution Auto, TT-8000, TT-8500, TT-9000, Unison: FGS Series
 WTM09002	Adapter, HSK50A/C to 3" TPF Spindle (Sopko) w/ 1" Opening
 WTM09003	Adapter, ISO40 to 4.5" TPF Spindle (Cincinnati #2) w/ 0.87" Opening
 WTM09005	Adapter, ISO40 to 7.5" TPF Spindle
 WTM09006	Adapter, HSK50A/C to 7.5" TPF Spindle

 WTM09007	Adapter, ISO40 To ANCA Taper Spindle (TG7/DM7)
 WTM09008	Adapter, HSK50A/C to ANCA TG7 Spindle
 WTM09009	Adapter, ISO40 to Schneeberger Spindle
 WTM09010	Adapter, HSK50A/C to Schneeberger Spindle
 WTM09011	ISO40 to Walter Power Spindle Fits these models: Mini Power, Power 400, Power 500, Power Basic
 WTM09012	Adapter, HSK50A/C to Walter Power Spindle

 WTM09014	Adapter, ISO40 to ANCA Small Taper Spindle (GX7/MG7/MGX/RG7/RGX/RX7)
 WTM09025	Adapter, ISO40 to HSK32E(HSK40F/FX7) Spindle
 WTM09027	Adapter, ISO40 to HSK40A/C Spindle
 WTM09036	Adapter, ISO40 to HSK40E / HSK50F Spindle
 WTM09051	ISO40 to Rollomatic Perfect Arbor Fits these models: 620, 528XS, 6000XL, 600X, 628Xi, 628XS, Nano 5, Nano 6, NP4, NP5, NP50, RPG
 WTM09052	Adapter, ISO50 Taper to ISO40 Taper, (M16 Thread)

 WTM09061	Adapter, ISO40 to HSK32E / HSK40F Spindle (ANCA Fastgrind - M8 screw in)
 WTM09064	Adapter, ISO40 to Monoset Spindle
 WTM09070	Adapter, ISO40 to 63mm/1:10 Taper Spindle
 WTM09117	Adapter, ISO40 to Makino/Kao Ming 18 deg. 54MIN Included Angle Taper
 WTM09185	Adapter, ISO40 to ANCA CPX
 WTM 01001	ISO40 Wheel Spindle This spindle has a #40 taper and is equivalent to BT40, SK40, and ISO40. The addition of an Imperial draw bar lets it accommodate CAT40 adapters, arbors and tool holders. Without any adapter, the spindle supports arbors for these models: ANCA: SBG, TapX, TX Cell, TX7, TX7+, TX7 Linear, Unison: FGS Series

 WTM01000	HSK 50 A/C
 WTM01112	Rollomatic Spindle Sleeve and Drive Assembly
 WTM01118	HSK40C spindle

A.2 Dust Collection System



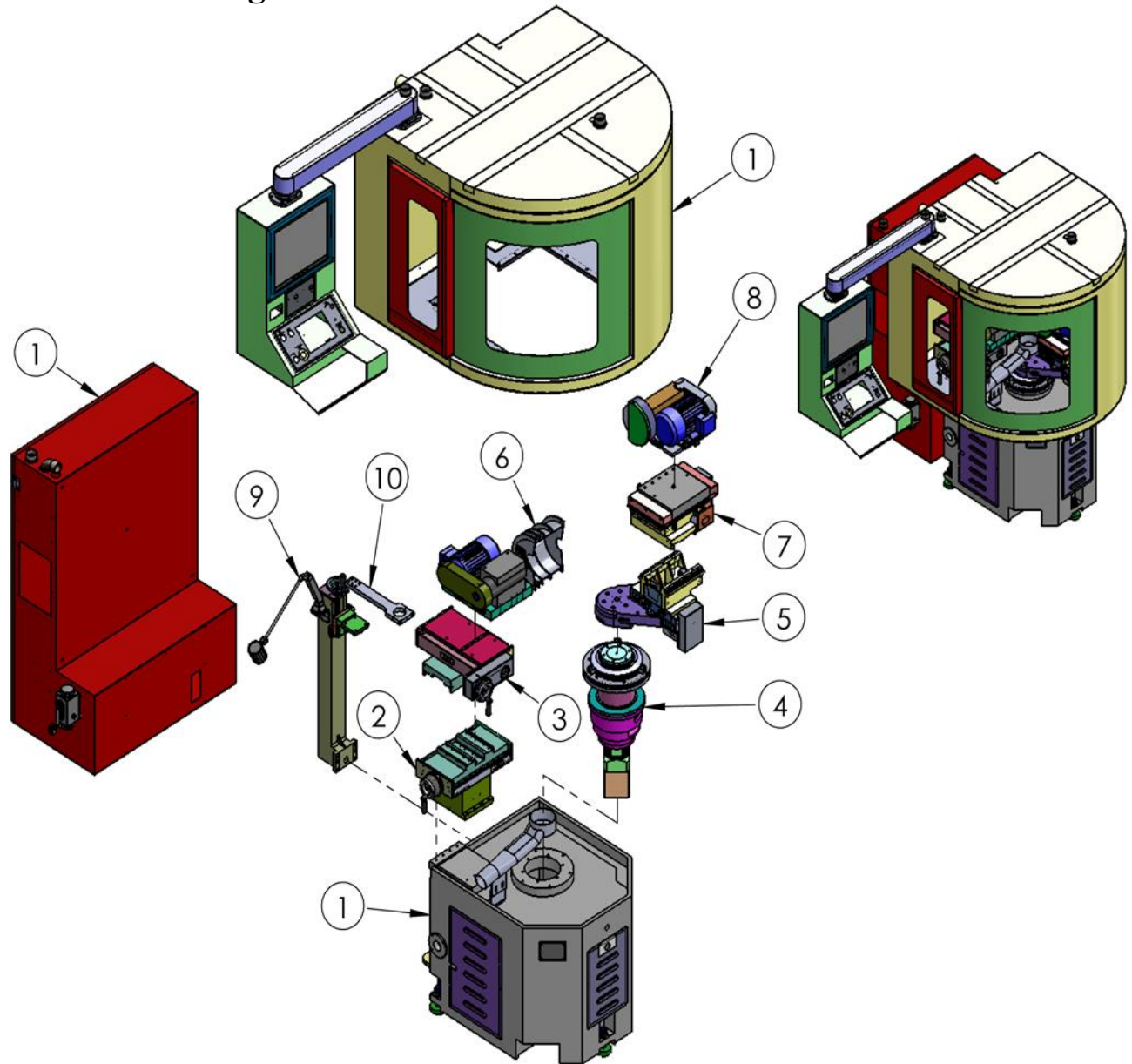
WTM07001

Includes the following features:

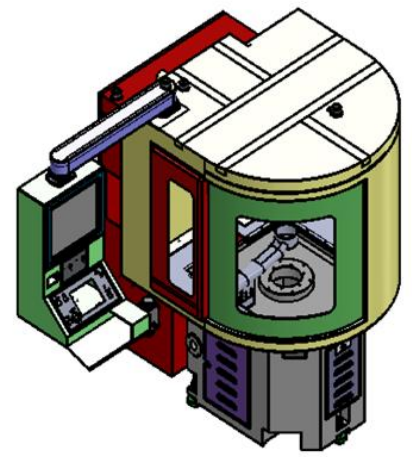
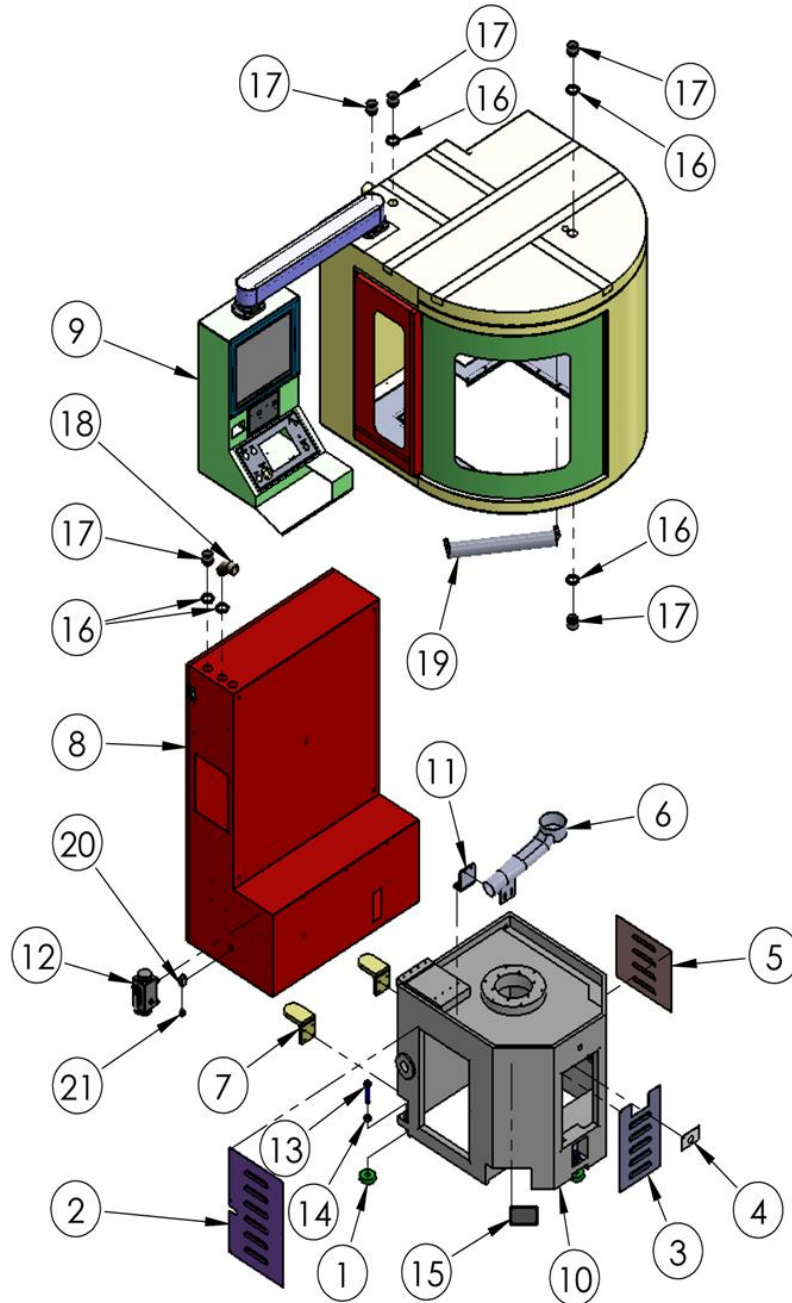
- $\frac{3}{4}$ hp TEFC motor with electrical cord and connector to match Rush Wheel Dresser
- Dust collection bin capacity of 3.4 cu. ft.
- 200cfm capacity at 5.3" external static pressure
- Primary filtration – Cyclone
- Secondary filtration – Fiberglass filter media
- Fiberglass filter area: 3.3 sq. ft.
- Manual shaker mechanism to remove accumulated dust from fiberglass media
- Inlet port: 5" (5" to 3" adapter included)
- Outlet port: Filter media
- Three phase, 230 volt, 60 Hz electrics
- Replaceable air exhaust filter
- Dimensions: 30" wide x 24" deep x 42" high

Appendix B: Parts Lists and Diagrams

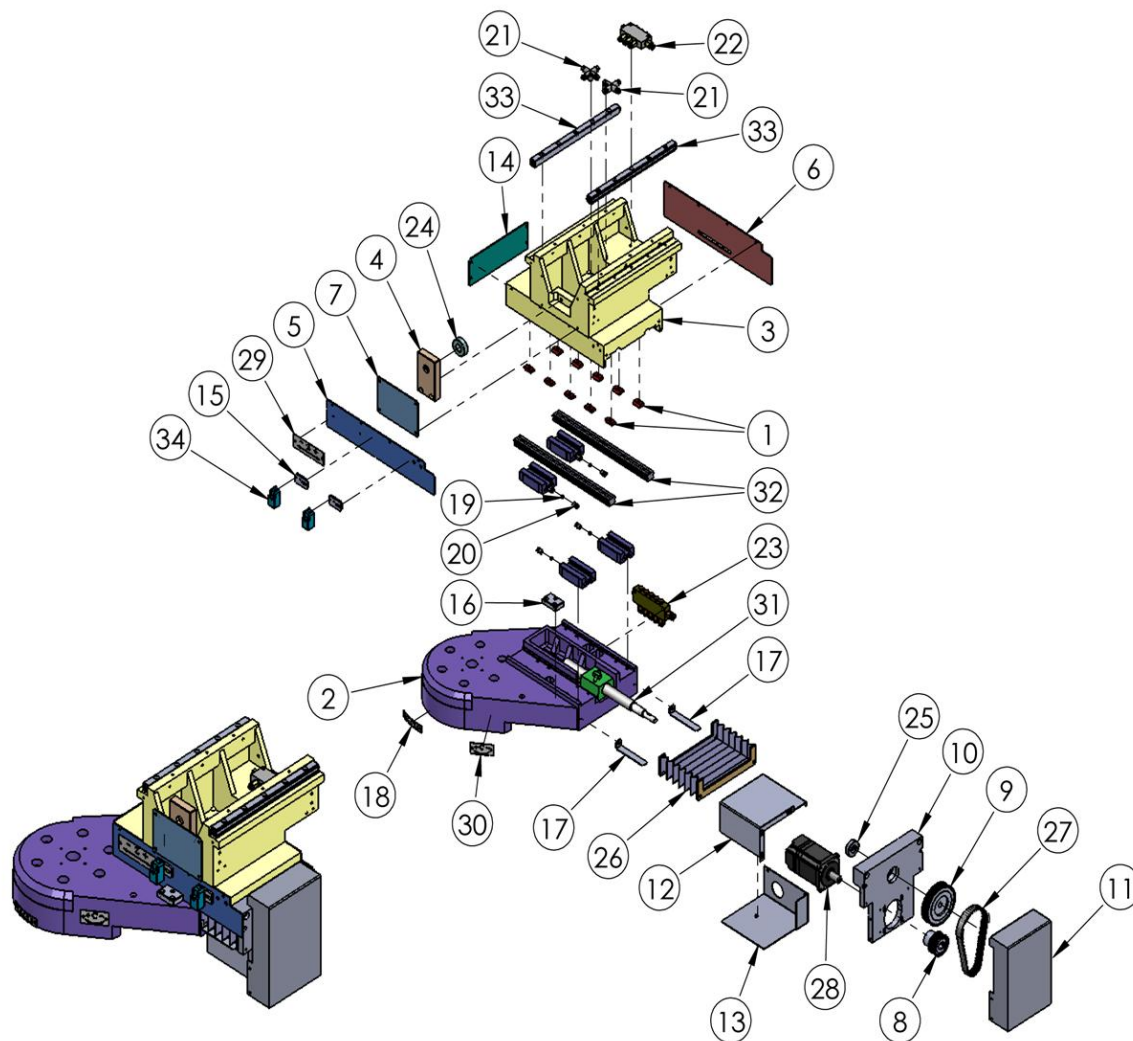
1FC-250		
ITEM	DRAWING NUMBER	DESCRIPTION
1	2F250-01-33	350 EX ELECTRIC PANEL ASSEMBLY OR WORK STATION SAFETY HOUSING
2	3F250-02-Y03	WORK X AXIS ASSEMBLY
3	3F250-02-Y04	WORK Y AXIS ASSEMBLY
4	2F250-04-03	C AXIS ASSEMBLY
5	2F250-03-02	OSCILLATION BOTTOM ASSEMBLY
6	2F250-05-015	WORK SPINDLE ASSEMBLY
7	2F250-06-05	OSCILLATION TOP ASSEMBLY
8	2F250-08-01	DRESSING HEAD SPINDLE ASSEMBLY
9	3F250-07-A01	HALOGEN LIGHT FOR 350 EX
10	2F250-09-08	CAMERA ARM FOR 350 EX



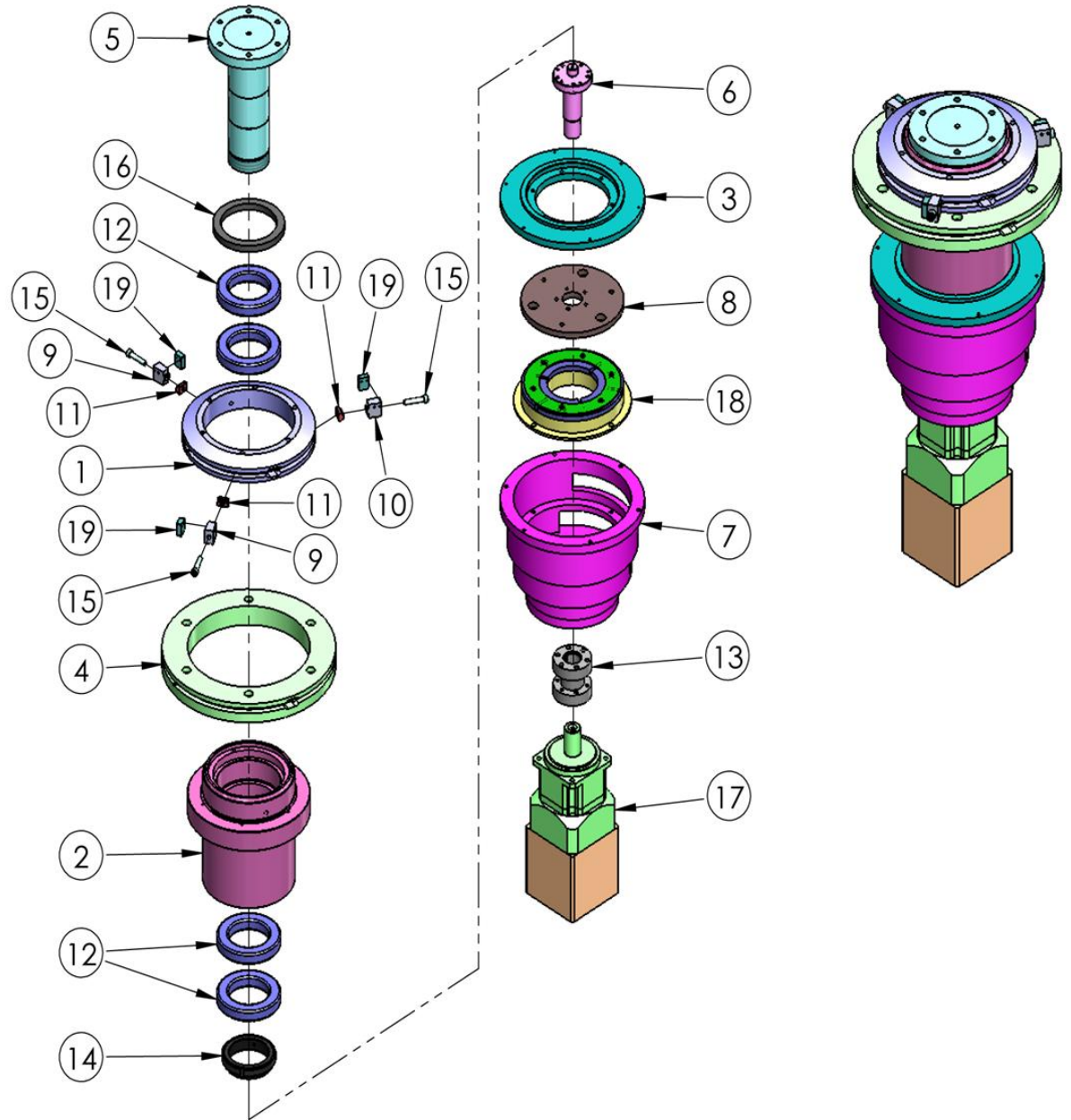
2F-250-01-33		
ITEM	PART NUMBER	DESCRIPTION
1	WTM00013	LEVELING PAD
2	WTM00011	LEFT COVER
3	WTM00010	FRONT COVER
4	WTM00017	FRONT CONDUIT PLATE
5	WTM00012	RIGHT COVER
6	WTM00028	DUST COLLECTOR CUP
7	WTM00009	FORK SUPPORT
10	WTM00008	BASE CASTING
11	WTM00027	DUST COLLECTOR CUP MOUNT
12	WTM00029	CENTRAL LUBRICATOR RESERVOIR
13	WTM00014	LEVELING SCREW
14	WTM00015	LEVELING SCREW NUT
19	WTM03018	FLOURESCENT LIGHT FIXTURE



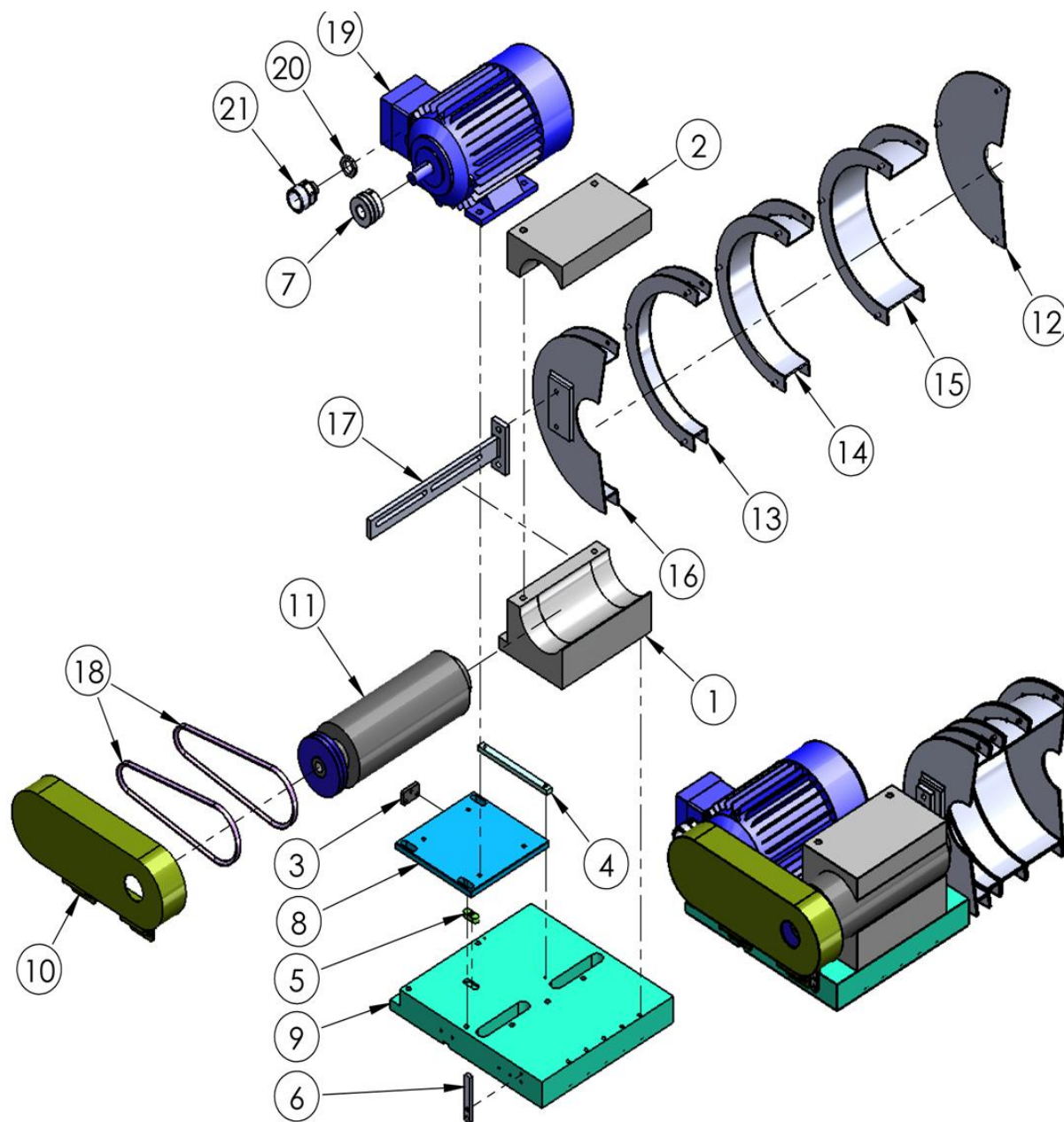
2F-250-03-02		
ITEM	PART NUMBER	DESCRIPTION
1	WTM01042	M5 CAM
2	WTM02080	C AXIS MAIN CASTING
3	WTM02046	INTERMEDIATE CASTING
4	WTM02047	LEFT INFEEED/OSC. B.S. BEARING SUPPORT PLATE
5	WTM02053	LEFT SIDE PANEL
6	WTM02049	RIGHT SIDE PANEL
7	WTM02052	LEFT INFEEED/OSCILLATION BALLSCREW COVER
8	WTM02072	INFEEED/OSCILLATION MOTOR PULLEY
9	WTM02122	INFEEED BALL SCREW PULLEY
10	WTM02107	SUPPORT PLATE FOR INFEEED BALL SREW AND MOTOR
11	WTM02123	INFEEED DRIVE COVER
12	WTM02124	INFEEED MOTOR COVER TOP
13	WTM02125	INFEEED MOTOR COVER BOTTOM
14	WTM02050	FRONT INFEEED SLIDE COVER
15	WTM02126	PROXIMITY SENSOR MOUNTING PLATE
16	WTM02127	SENSOR PICK UP BLOCK
17	WTM02128	BELLOWS SUPPORT BRACKET
18	WTM02129	ANGLE INDICATOR PLATE
19	WTM02130	INFEEED LUBRICATION FITTING 1
20	WTM02131	INFEEED LUBRICATION FITTING 2
21	WTM02132	INSIDE SMALL LUBE MANIFOLD
22	WTM02133	OUTSIDE LARGE LUBE MANIFOLD
23	WTM02134	MAIN LUBRICATION MANIFOLD
24	WTM02010	Rotary bearing for infeed/oscillation ball screw end - 6202
25	WTM02025	Rotary bearing set (Angular Contact) for infeed or oscillation ball screw
26	WTM02029	Infeed Way Cover - Bellows
27	WTM02135	INFEEED DRIVE BELT 140XL, 12MM
28	WTM02106	INFEEED/OSCILLATION MOTOR - Servo Motor
29	WTM02136	Z-AXIS DIRECTION PLATE
30	WTM02137	C-AXIS DIRECTION PLATE
31	WTM02024	INFEEED BALLSCREW AND NUT
32	WTM02018	INFEEED BEARING AND RAIL SET
33	WTM02008	INFEEED/OSCILLATION LINEAR BEARING SET
34	WTM02011	OSCILLATION PROXIMITY SWITCH



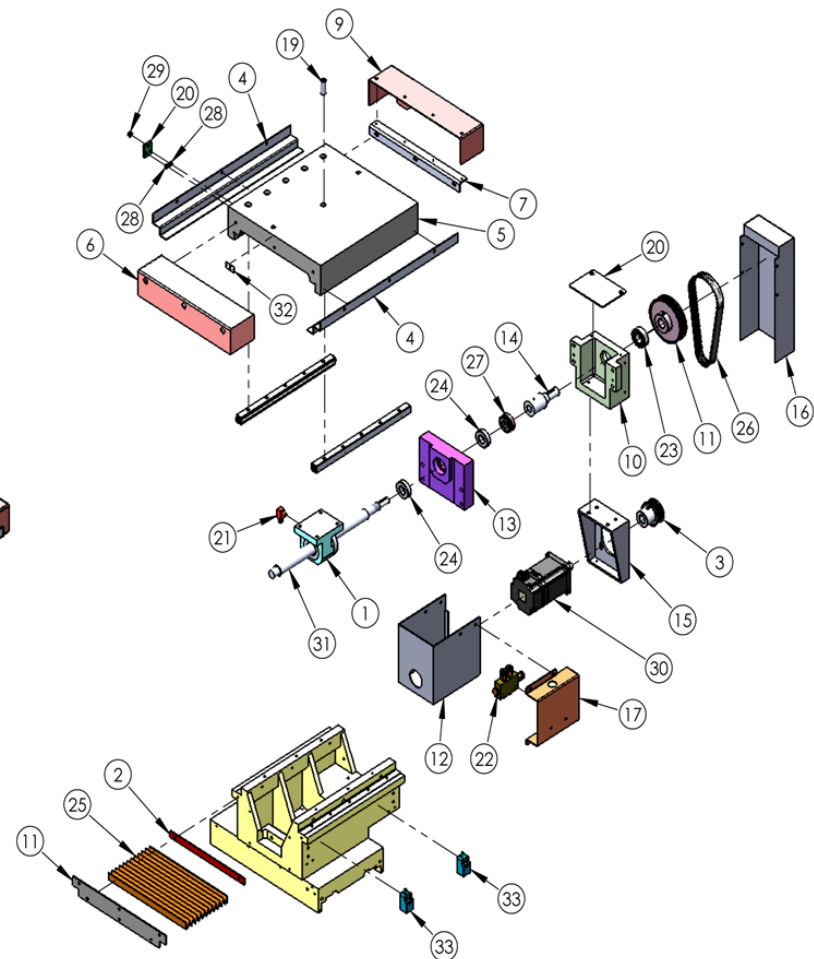
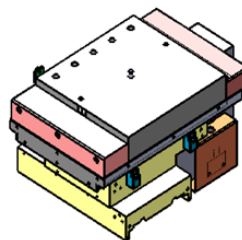
2F-250-04-03		
ITEM	PART NUMBER	DESCRIPTION
1	WTM02036	INDEX PLATE
2	WTM02035	BEARING SLEEVE
3	WTM02138	C-AXIS MOUNTING RING
4	WTM02037	COLLAR
5	WTM02038	SPINDLE
6	WTM02139	SERVO DRIVE SHAFT </td
7	WTM02140	SERVO BRAKE HOUSING
8	WTM02141	SERVO BRAKE DISK
9	WTM02142	SENSOR MOUNTING BLOCK LEFT
10	WTM02143	SENSOR MOUNTING BLOCK RIGHT
11	WTM02144	T-NUT M8
12	WTM02041	BEARING #7016CTYNSULP4
13	WTM02144	SERVO SHAFT COUPLER
14	WTM02040	M80 x 2 PRECISION NUT
15	WTM02145	M8 SOCKET HEAD CAP SCREW
16	WTM02039	110 x 140 x 14 SEAL
17	WTM02146	SERVO MOTOR
18	WTM02147	SERVOBRAKE MECHANISM
19	WTM02011	PROXIMITY SENSOR



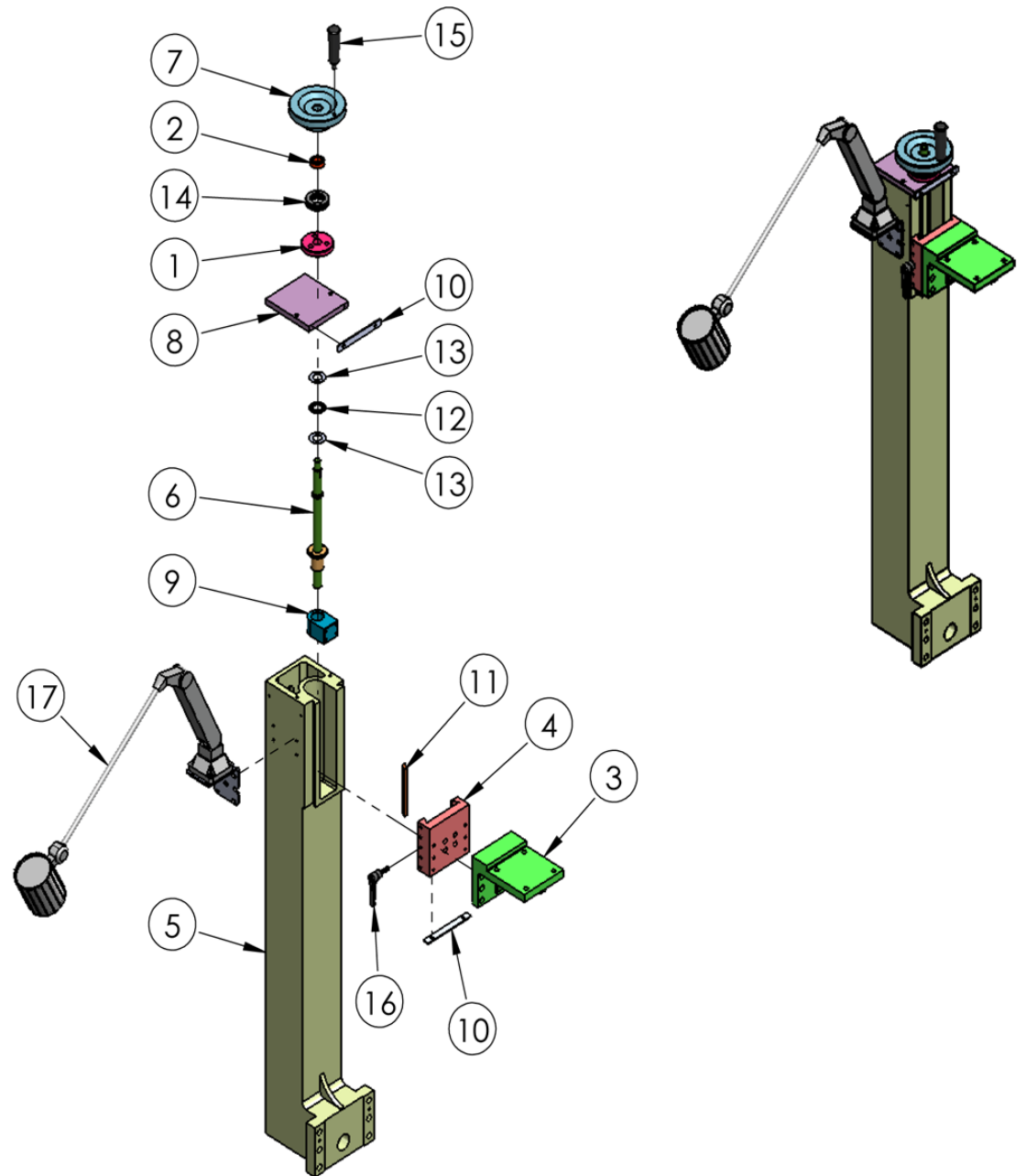
2F-250-05-15		
ITEM	PART NUMBER	DESCRIPTION
1	WTM01078	BOTTOM SPINDLE MOUNT
2	WTM01079	TOP SPINDLE MOUNT
3	WTM01084	MOTOR ADJUSTMENT BLOCK
4	WTM01086	PARALLEL PLATE
5	WTM01085	KEY
6	WTM01080	SPINDLE POSITIONING PLATE
7	WTM02090	MOTOR PULLEY
8	WTM01082	MOTOR MOUNT PLATE
9	WTM01077	SPINDLE MOUNTING CASTING
10	WTM01081	BELT GUARD
11	WTM01000 OR WTM01001	WORK SPINDLE
17	WTM01095	WHEEL GUARD MOUNTING BRACKET
18	WTM01002	7M630 BELT
19	WTM01087	WORK WHEEL MOTOR



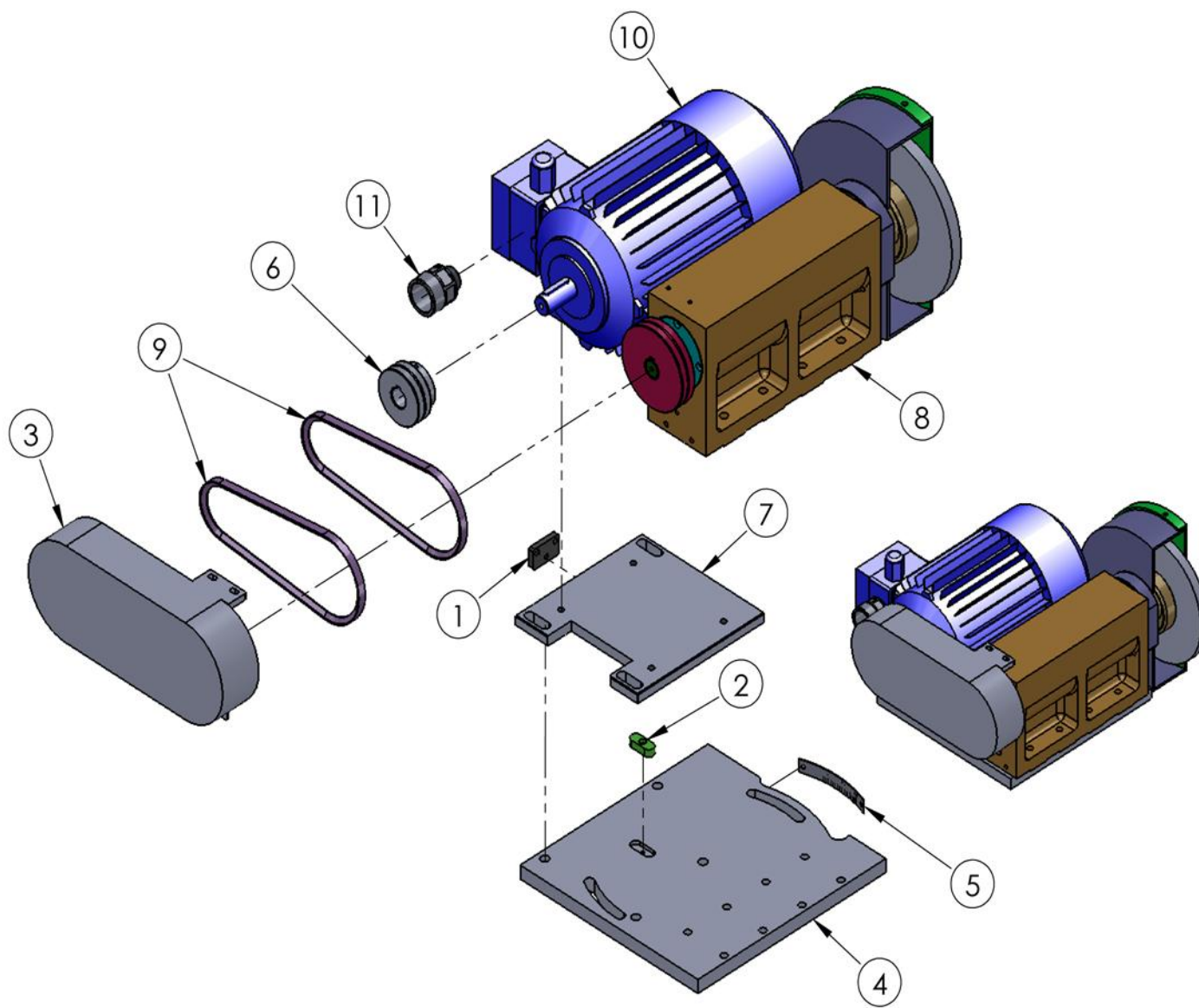
2F-250-06-03		
ITEM	PART NUMBER	DESCRIPTION
1	WTM02064	OSCILLATION BALLSCREW NUT MOUNT
2	WTM02051	OSCILLATION INSIDE SUPPORT BELLOWS
3	WTM02114	OSCILLATION SERVO MOTOR PULLEY-350EX
4	WTM02060	OSCILLATION BELLOWS REAR COVER
5	WTM02065	UPPER OSCILLATION SLIDE PLATE
6	WTM02061	OSCILLATION DUST COVER LEFT
7	WTM02063	OSCILLATION DUST COVER RIGHT MOUNTING PLATE
8	WTM02058	OSCILLATION BELLOWS OUTSIDE SUPPORT
9	WTM02115	OSCILLATION DUST COVER RIGHT MOUNTING PLATE
10	WTM02078	MOUNTING BRACKET
11	WTM02076	OSCILLATION BALLSCREW PULLEY
12	WTM02116	OSCILLATION MOTOR COVER
13	WTM02054	RIGHT OSC. B.S. BEARING SUPPORT PLATE
14	WTM02079	OSCILLATION PULLEY SHAFT
15	WTM02117	OSCILLATION MOTOR MOUNT BRACKET
16	WTM02060	OSCILLATION DRIVE COVER
17	WTM02071	LUBE MANIFOLD MOUNT
18	WTM02148	MOUNTING BRACKET COVER PLATE
19	WTM02057	CENTER PIVOT PIN
20	WTM02118	PIVOT STOP BRACKET
21		SCREW
22	WTM01038	LUBE MANIFOLD
23	WTM1076	OSCILLATION PULLEY SHAFT SUPPORT BEARING
24	WTM02025	INFEED/OSCILLATION SUPPORT BEARING
25	WTM01056	INFEED BELLOWS
26	WTM02119	172XL 12MM OSCILLATION DRIVE BELT
27	WTM02033	OSCILLATION BEARING LOCKNUT
28		SCREW
29		SCREW
30	WTM02106	OSCILLATION MOTOR
31	WTM02009	OSCILLATION BALLSCREW AND NUT
32	WTM01132	DIAL SCALE INDICATOR
33	WTM02011	PROXIMITY SENSOR



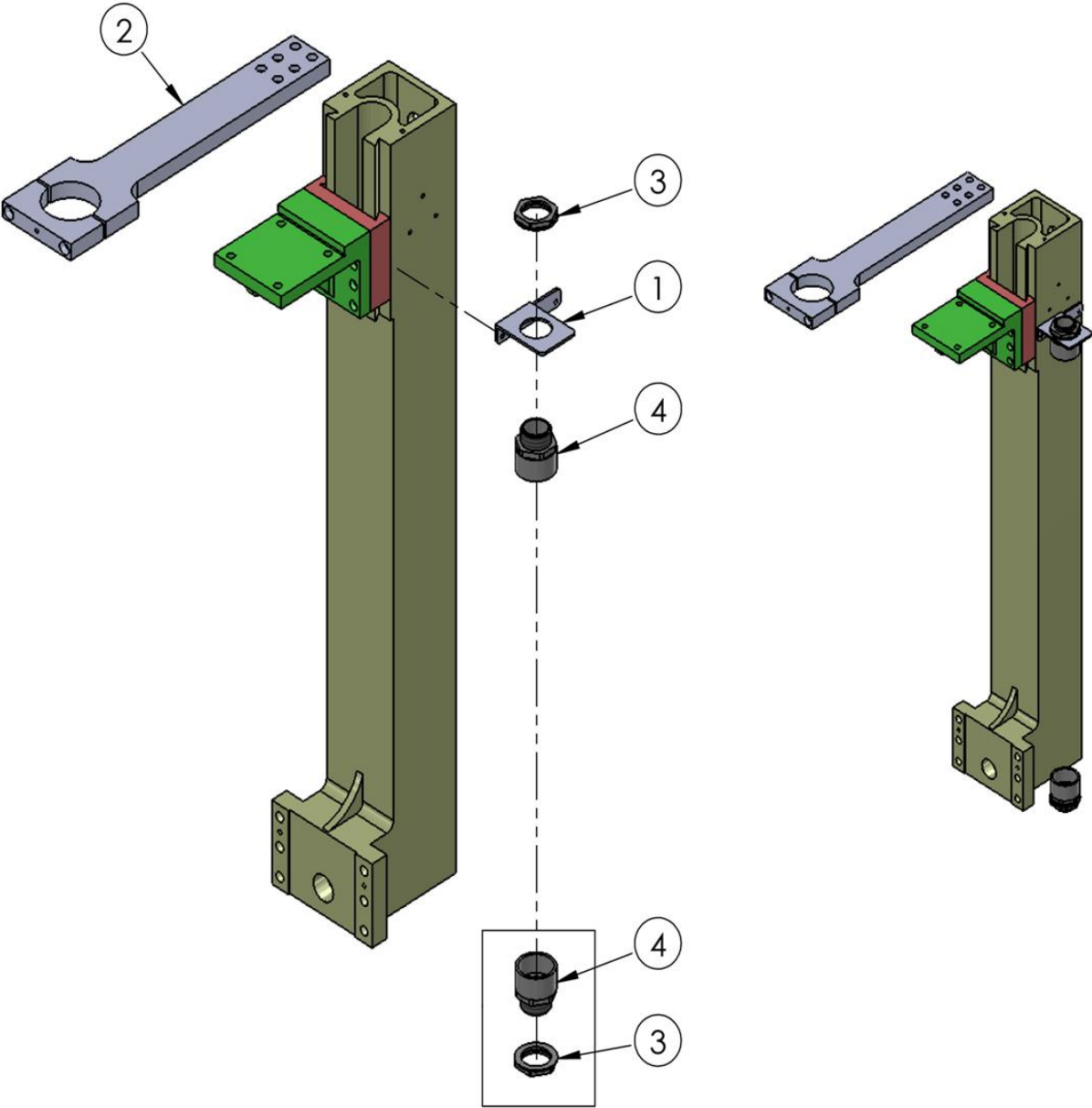
2F-250-07-07		
ITEM	PART NUMBER	DESCRIPTION
1	WTM00042	LEAD SCREW CAP
2	WTM00043	WASHER
3	WTM00037	CAMERA ARM MOUNTING BRACKET
4	WTM00035	VERTICAL SLIDE
5	WTM00034	CAMERA COLUMN
6	WTM00039	LEAD SCREW ASSEMBLY
7	WTM00041	HAND WHEEL
8	WTM00040	TOP PLATE
9	WTM00038	LEAD SCREW NUT
10	WTM00044	SLIDE COVER BRACKET
11	WTM00036	GIB
12	WTM00067	NEEDLE BEARING 17MM
13	WTM00068	NEEDLE BEARING RACE 17MM
14	WTM00045	BALL BEARING NJK51105
15	WTM00049	HANDLE
16	WTM00048	LOCKING LEVER
17	WTM00066	AUTOVIEW CAMERA MOUNTING ARM



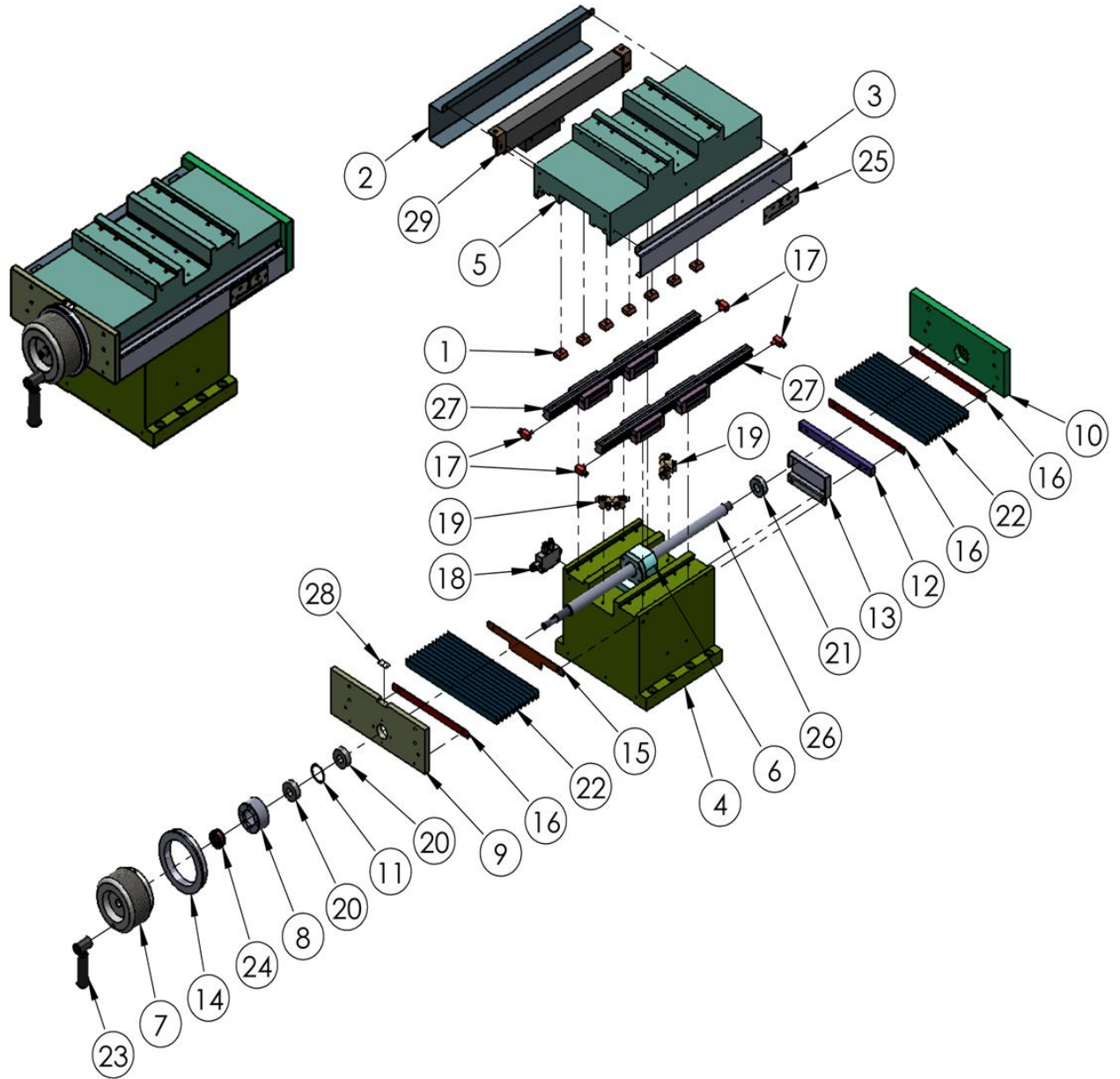
2F-250-08-01		
ITEM	PART NUMBER	DESCRIPTION
1	WTM01084	MOTOR ADJUSTMENT BLOCK
2	WTM01085	KEY
3	WTM02089	BELT GUARD
4	WTM02120	BASE PLATE (-10 TO 20 DEGREES)
5	WTM02121	ANGLE SCALE (-10 TO 20 DEGREES)
6	WTM02111	MOTOR PULLEY
7	WTM02092	MOTOR MOUNTING PLATE
8	WTM02112	DRESSING SPINDLE ASSEMBLY
9	WTM02004	Drive belts - Dressing wheel (1 pair) For 2000 RPM FC-350W and FC-350EX
10	WTM02113	DRESSING MOTOR



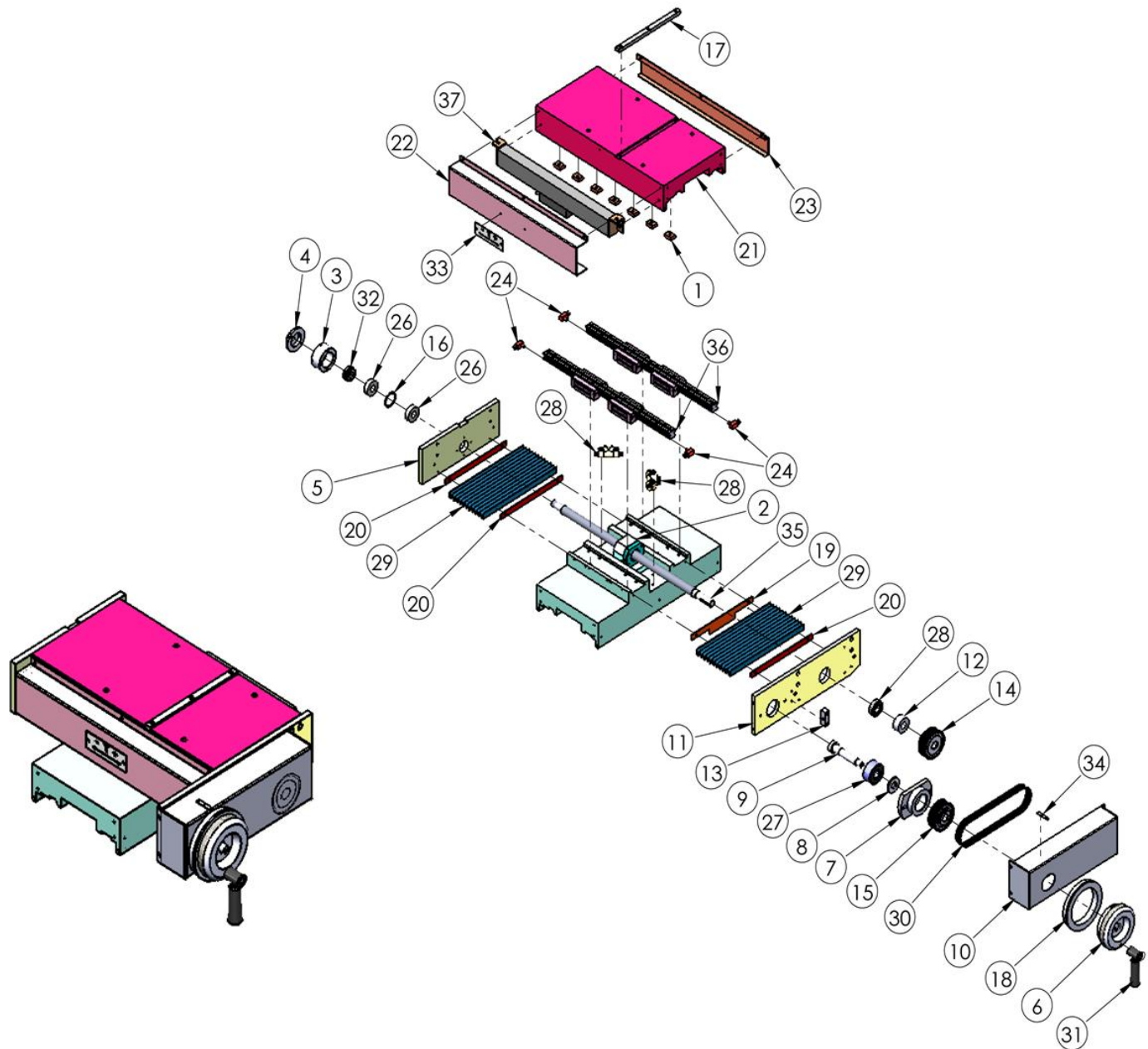
2F250-09-08		
ITEM	PART NUMBER	DESCRIPTION
1	N/A	CONDUIT MOUNTING BRACKET
2	WTM00066	AUTOVIEW CAMERA MOUNTING ARM
3	N/A	CONDUIT PARTS
4	N/A	CONDUIT PARTS



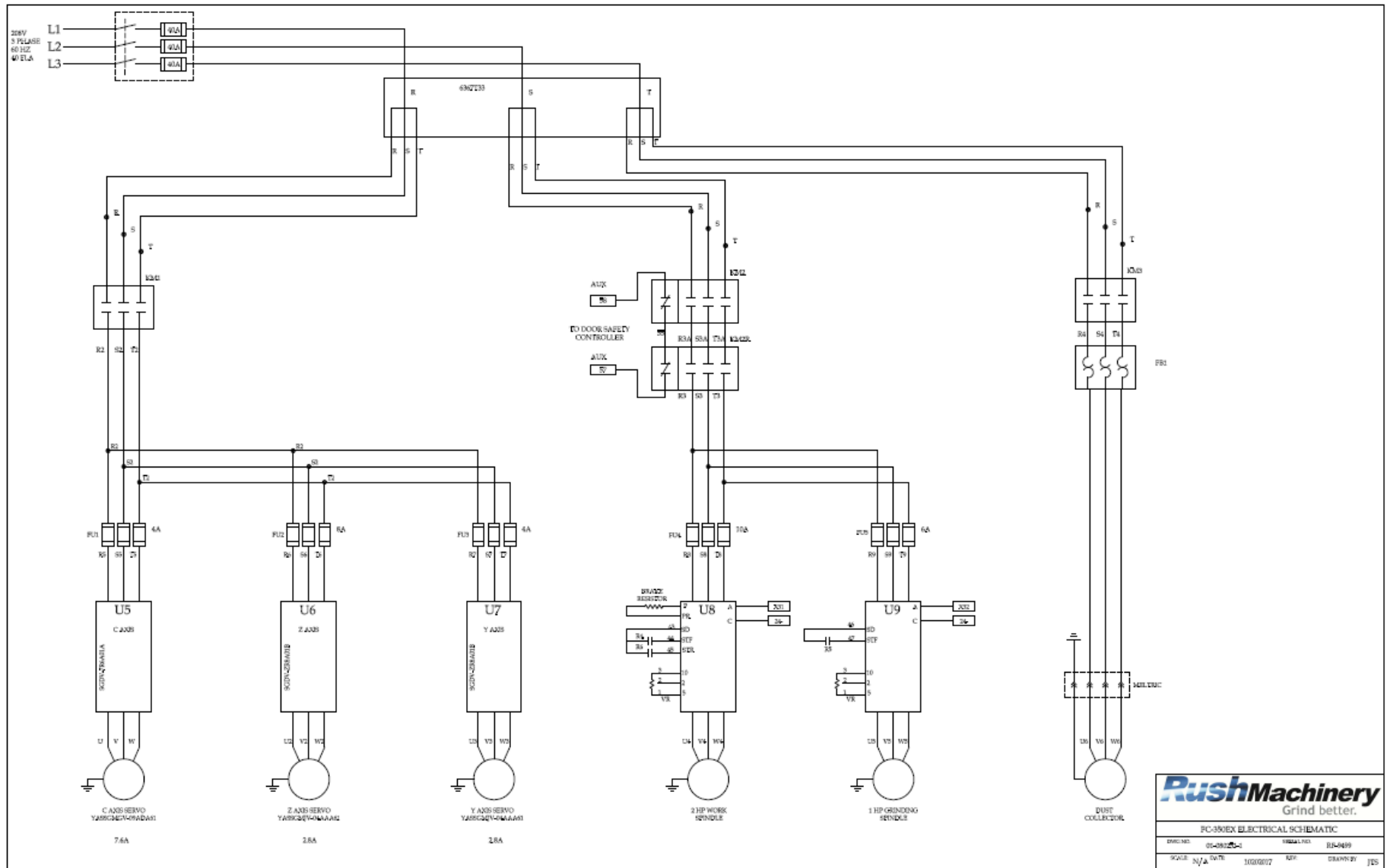
3F250-02-Y03		
ITEM	PART NUMBER	DESCRIPTION
1	WTM01042	M5 CAM
2	WTM01043	X AXIS LEFT DUST COVER
3	WTM01044	X AXIS RIGHT DUST COVER
4	WTM01033	BASE CASTING
5	WTM01040	X AXIS CASTING
6	WTM01034	BALLSCREW NUT MOUNT
7	WTM01051	X AXIS HAND WHEEL
8	WTM01052	X AXIS BEARING SLEEVE
9	WTM01049	X & Y-AXIS LEFT SIDE END PLATE
10	WTM01047	X & Y-AXIS RIGHT SIDE END PLATE
11	WTM01137	SHEET METAL SPACER
12	WTM01035	BELLOWS MOUNTING BLOCK
13	WTM01039	LUBE MANIFOLD DUST COVER
14	WTM01050	X AXIS FEED DIAL
15	WTM01037	PLATE
16	WTM01036	BELLOWS MOUNTING PLATE
17	WTM01136	LINEAR BEARINGLUBRICATION FITTING
18	WTM01133	OUTSIDE LUBE MANIFOLD
19	WTM01038	LUBE MANIFOLD
20	WTM01053	7202 BEARING
21	WTM01048	X AXIS BALL SCREW SUPPORT BEARING
22	WTM01056	X AND Y AXES BELLOWS
23	WTM01055	FOLDING HANDLE
24	WTM01054	X AXIS BALL SCREW NUT
25	WTM01134	X AXIS DIRECTION PLATE
26	WTM01046	X AXIS BALL SCREW
27	WTM01041	LINEAR BEARING SET
28	WTM01135	INDICATOR PLATE
29	WTM01045	OPTICAL SCALE



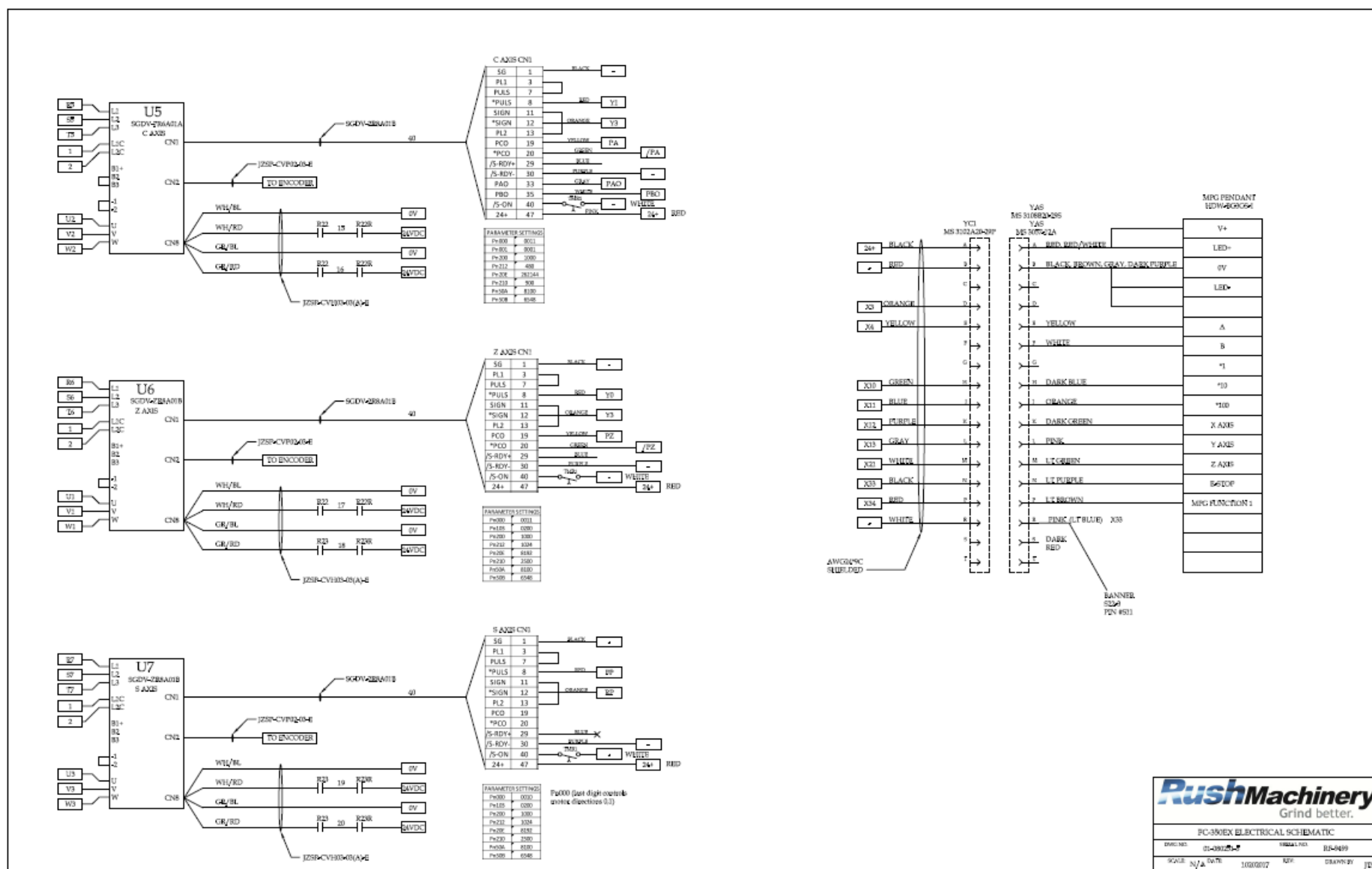
3F250-02-Y04		
ITEM	PART NUMBER	DESCRIPTION
1	WTM01042	M5 CAM
2	WTM01034	BALL SCREW NUT MOUNT
3	WTM01052	X AXIS BEARING SLEEVE
4	WTM01073	DUST CAP
5	WTM01049	Y AXIS END PLATE
6	WTM01060	Y AXIS HAND WHEEL
7	WTM01061	Y AXIS BEARING SLEEVE
8	WTM01062	WASHER
9	WTM01063	IDLER SHAFT
10	WTM01064	BELT GUARD
11	WTM01065	Y AXIS FRONT PLATE
12	WTM01066	BUSHING
13	WTM01067	ADJUSTING BLOCK
14	WTM01068	RIGHT PULLEY
15	WTM01069	LEFT PULLEY
16	WTM01137	SHEET METAL SPACER
17	WTM01075	KEY
18	WTM01129	Y AXIS FEED DIAL
19	WTM01037	PLATE
20	WTM02051	OSCILLATION BELLOWS INSIDE SUPPORT
21	WTM01057	Y AXIS CASTING
22	WTM01058	Y AXIS LEFT DUST COVER
23	WTM01059	Y AXIS RIGHT DUST COVER
24	WTM01136	LINEAR BEARING LUBRICATION FITTING
25	WTM01038	LUBE MANIFOLD
26	WTM01053	BEARING 72026
27	WTM01070	BEARING 520322
28	WTM01076	BEARING 600366
29	WTM01056	X AND Y AXIS BELLOWS
30	WTM01130	Y-AXIS INFEED BELT
31	WTM01055	FOLDING HANDLE
32	WTM01054	AXIS BALLSCREW LOCK NUT
33	WTM01131	Y AXIS DIRECTIONAL PLATE
34	WTM01132	DIAL SCALE POINTER
35	WTM01074	Y AXIS BALL SCREW AND NUT
36	WTM01072	Y AXIS RAIL & BEARING SET
37	WTM01071	OPTICAL SCALE



Appendix C: Electrical Schematics







Appendix D: Unidirectional Wheel Speed Charts

UNIDIRECTIONAL WHEEL SPEED CHART

RUSH MACHINERY INC.
www.rushmachinery.com
 1-585-554-3070
 1-800-929-3070

Page 1 of 3

Diamond Wheel RPM

	8 Inch Dressing Wheel RPM																		
	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Diamond Wheel Size	2.0	400	600	800	1000														
	2.5	320	480	640	800	960													
	3.0	267	400	533	667	800	933												
	3.5	229	343	457	571	686	800	914											
	4.0	200	300	400	500	600	700	800	900	1000									
	4.5	178	267	356	444	533	622	711	800	889	978								
	5.0	160	240	320	400	480	560	640	720	800	880	960							
	5.5	145	218	291	364	436	509	582	655	727	800	873	945						
	6.0	133	200	267	333	400	467	533	600	667	733	800	867	933	1000				
	6.5	123	185	246	308	369	431	492	554	615	677	738	800	862	923	985			
	7.0	114	171	229	286	343	400	457	514	571	629	686	743	800	857	914	971		
	7.5	107	160	213	267	320	373	427	480	533	587	640	693	747	800	853	907	960	
	8.0	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
	8.5	94	141	188	235	282	329	376	424	471	518	565	612	659	706	753	800	847	894
	9.0	89	133	178	222	267	311	356	400	444	489	533	578	622	667	711	756	800	844
	9.5	84	126	168	211	253	295	337	379	421	463	505	547	589	632	674	716	758	800
	10.0	80	120	160	200	240	280	320	360	400	440	480	520	560	600	640	680	720	760
	10.5	76	114	152	190	229	267	305	343	381	419	457	495	533	571	610	648	686	724
	11.0	73	109	145	182	218	255	291	327	364	400	436	473	509	545	582	618	655	691
	11.5	70	104	139	174	209	243	278	313	348	383	417	452	487	522	557	591	626	661
	12.0	67	100	133	167	200	233	267	300	333	367	400	433	467	500	533	567	600	633
	12.5	64	96	128	160	192	224	256	288	320	352	384	416	448	480	512	544	576	608
	13.0	62	92	123	154	185	215	246	277	308	338	369	400	431	462	492	523	554	585
	13.5	59	89	119	148	178	207	237	267	296	326	356	385	415	444	474	504	533	563
	14.0	57	86	114	143	171	200	229	257	286	314	343	371	400	429	457	486	514	543

Diamond Wheel RPM

		7 Inch Dressing Wheel RPM																		
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Diamond Wheel Size	2.0	350	525	700	875															
	2.5	280	420	560	700	840	980													
	3.0	233	350	467	583	700	817	933												
	3.5	200	300	400	500	600	700	800	900	1000										
	4.0	175	263	350	438	525	613	700	788	875	963									
	4.5	156	233	311	389	467	544	622	700	778	856	933								
	5.0	140	210	280	350	420	490	560	630	700	770	840	910	980						
	5.5	127	191	255	318	382	445	509	573	636	700	764	827	891	955					
	6.0	117	175	233	292	350	408	467	525	583	642	700	758	817	875	933	992			
	6.5	108	162	215	269	323	377	431	485	538	592	646	700	754	808	862	915	969		
	7.0	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
	7.5	93	140	187	233	280	327	373	420	467	513	560	607	653	700	747	793	840	887	933
	8.0	88	131	175	219	263	306	350	394	438	481	525	569	613	656	700	744	788	831	875
	8.5	82	124	165	206	247	288	329	371	412	453	494	535	576	618	659	700	741	782	824
	9.0	78	117	156	194	233	272	311	350	389	428	467	506	544	583	622	661	700	739	778
	9.5	74	111	147	184	221	258	295	332	368	405	442	479	516	553	589	626	663	700	737
	10.0	70	105	140	175	210	245	280	315	350	385	420	455	490	525	560	595	630	665	700
10.5	67	100	133	167	200	233	267	300	333	367	400	433	467	500	533	567	600	633	667	
11.0	64	95	127	159	191	223	255	286	318	350	382	414	445	477	509	541	573	605	636	
11.5	61	91	122	152	183	213	243	274	304	335	365	396	426	457	487	517	548	578	609	
12.0	58	88	117	146	175	204	233	263	292	321	350	379	408	438	467	496	525	554	583	
12.5	56	84	112	140	168	196	224	252	280	308	336	364	392	420	448	476	504	532	560	
13.0	54	81	108	135	162	188	215	242	269	296	323	350	377	404	431	458	485	512	538	
13.5	52	78	104	130	156	181	207	233	259	285	311	337	363	389	415	441	467	493	519	
14.0	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	

Diamond Wheel RPM

		6 Inch Dressing Wheel RPM																		
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Diamond Wheel Size	2.0	300	450	600	750	900														
	2.5	240	360	480	600	720	840	960												
	3.0	200	300	400	500	600	700	800	900	1000										
	3.5	171	257	343	429	514	600	686	771	857	943									
	4.0	150	225	300	375	450	525	600	675	750	825	900	975							
	4.5	133	200	267	333	400	467	533	600	667	733	800	867	933	1000					
	5.0	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960				
	5.5	109	164	218	273	327	382	436	491	545	600	655	709	764	818	873	927	982		
	6.0	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
	6.5	92	138	185	231	277	323	369	415	462	508	554	600	646	692	738	785	831	877	923
	7.0	86	129	171	214	257	300	343	386	429	471	514	557	600	643	686	729	771	814	857
	7.5	80	120	160	200	240	280	320	360	400	440	480	520	560	600	640	680	720	760	800
	8.0	75	113	150	188	225	263	300	338	375	413	450	488	525	563	600	638	675	713	750
	8.5	71	106	141	176	212	247	282	318	353	388	424	459	494	529	565	600	635	671	706
	9.0	67	100	133	167	200	233	267	300	333	367	400	433	467	500	533	567	600	633	667
	9.5	63	95	126	158	189	221	253	284	316	347	379	411	442	474	505	537	568	600	632
	10.0	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600
10.5	57	86	114	143	171	200	229	257	286	314	343	371	400	429	457	486	514	543	571	
11.0	55	82	109	136	164	191	218	245	273	300	327	355	382	409	436	464	491	518	545	
11.5	52	78	104	130	157	183	209	235	261	287	313	339	365	391	417	443	470	496	522	
12.0	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	
12.5	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	
13.0	46	69	92	115	138	162	185	208	231	254	277	300	323	346	369	392	415	438	462	
13.5	44	67	89	111	133	156	178	200	222	244	267	289	311	333	356	378	400	422	444	
14.0	43	64	86	107	129	150	171	193	214	236	257	279	300	321	343	364	386	407	429	