

Table of Contents

Title Page

Table of Contents Contents-1

List of Figures Figures-1

Welcome and Introduction Welcome-1

| | |
|--------------------------------------|-----------|
| Purpose of Manual | Welcome-1 |
| Audience | Welcome-2 |
| How the Manual Is Organized | Welcome-3 |
| How to Use This Manual | Welcome-4 |
| StingRay Technical Services | Welcome-4 |
| Other Resources | Welcome-5 |
| Vendor-supplied Manuals | Welcome-5 |
| Startup | Welcome-5 |
| HELP | Welcome-5 |
| Other Product-Support Services | Welcome-6 |

Important Safety Instructions and Warnings Safety-1

1 Overview 1-1

| | |
|---|-----|
| Purpose | 1-1 |
| Prerequisites | 1-1 |
| What You Will Learn In This Chapter | 1-1 |

| | |
|---|----------------|
| 1. Your New StingRay Parts Washer | 1-2 |
| 1.1. Getting Acquainted | 1-2 |
| 1.2. Major Components..... | 1-2 |
| 2. Materials and Components | 1-5 |
| 2.1. Electrical Standards | 1-5 |
| 2.2. Cabinet Construction | 1-5 |
| 3. Theory Of Operation | 1-6 |
| 3.1. How The Power Washer Works | 1-6 |
| 3.1.1. Power | 1-7 |
| Pressure and Flow = Power..... | 1-7 |
| Closed-Loop System And Grit-Blasting..... | 1-7 |
| 3.1.2. Temperature..... | 1-8 |
| 3.1.3. Chemical | 1-8 |
| Removal of Soils..... | 1-9 |
| Applications | 1-10 |
| Usage | 1-10 |
| 3.1.4. Time | 1-10 |
| 3.1.5. General Information and Conclusion..... | 1-11 |
| 3.2. Operating Principles Of Key Features..... | 1-11 |
| 3.2.1. Pumping System | 1-11 |
| 3.2.2. Power Blast Manifold (PBM) | 1-12 |
| 3.2.3. Door-Mounted Turntable | 1-13 |
| 3.2.4. Turntable Drive System..... | 1-13 |
| 3.2.5. Automatic Steam Exhaust (ASE) | 1-14 |
| 3.2.6. Automatic Rinse System (ARC) | 1-14 |
| 3.2.7. Heating System..... | 1-16 |
| 3.2.8. Water-Level Control System | 1-17 |
| 3.2.9. Power Washer Control System | 1-19 |
| Operator Controls | 1-20 |
| Major Components | 1-21 |
| Sequence of Washer Operation..... | 1-22 |
| Interdependent System Features..... | 1-23 |
| Electrical Schematics..... | 1-24 |
| 4. Washer Inspection | 1-25 |
| 2 Installation | 2-1 |
| <i>Purpose.....</i> | <i>2-1</i> |
| <i>Prerequisites.....</i> | <i>2-1</i> |
| <i>Results of Correct Installation</i> | <i>2-4</i> |
| <i>Safety/Precautions.....</i> | <i>2-4</i> |
| <i>What You Will Learn In This Chapter.....</i> | <i>2-6</i> |

| | |
|--|-------------|
| 1. Lifting and Moving..... | 2-7 |
| 2. Placement..... | 2-8 |
| 3. Unpacking | 2-9 |
| 4. Leveling and Anchoring | 2-11 |
| 4.1. Leveling..... | 2-11 |
| 4.2. Anchoring..... | 2-14 |
| 5. Services and Connections | 2-15 |
| 5.1. Introduction | 2-15 |
| 5.2. Connection Procedures - Input..... | 2-15 |
| 5.2.1. Heat Source | 2-16 |
| Gas & Oil Heat Source..... | 2-16 |
| Electric Heat Source | 2-20 |
| Steam Heat Source..... | 2-20 |
| 5.2.2. Water (Input) | 2-22 |
| 5.2.3. Compressed Air (Input) | 2-23 |
| 5.2.4. Electricity (Input)..... | 2-24 |
| Earthgrounding to Prevent Corrosion..... | 2-25 |
| 5.3. Connection Procedures - Output..... | 2-27 |
| 5.3.1. Steam Exhaust (Output)..... | 2-27 |
| Steam-Exhaust Pipe | 2-29 |
| Steam-Exhaust Blower..... | 2-30 |
| 5.3.2. Flue Pipe (Output) | 2-35 |
| 5.3.3. Drain (Output)..... | 2-37 |
| 5.4. Installation of Options..... | 2-38 |
| 5.4.1. Removable Door Position Lock Plate | 2-39 |
| 5.5. Inspection and Verification | 2-42 |
| 6. Startup Procedure | 2-43 |
| 6.1. Electrical Connections Inspection | 2-44 |
| 6.2. Lubrication Procedure | 2-44 |
| 6.3. Power-up Procedure | 2-45 |
| 6.3.1. 180,000 BTU Gas Burner..... | 2-51 |
| 6.3.2. 400,000 to 990,000 Gas Burner Procedure..... | 2-54 |
| 6.4. Chemical-Charging Procedure | 2-65 |
| 6.5. 7-Day Dual-Circuit Clock Initialization | 2-66 |
| 6.6. Rinse System Chemical Injector (optional) | 2-66 |
| 6.7. Startup Problems | 2-69 |
| | |
| 3 Basic Operations..... | 3-1 |
| <i>Purpose</i> | 3-1 |
| <i>Prerequisites</i> | 3-1 |
| <i>Safety/Precautions</i> | 3-1 |

| | |
|---|-----------------|
| <i>What You Will Learn In This Chapter</i> | 3-2 |
| 1. Control Panel | 3-3 |
| 2. Standard Cleaning Cycle | 3-4 |
| 2.1. Checking Water Temperature | 3-5 |
| 2.2. Using the Clock-Override Switch | 3-6 |
| 2.3. Opening the Door..... | 3-7 |
| 2.4. Loading and Securing Parts..... | 3-9 |
| 2.5. Closing and Locking the Door..... | 3-10 |
| 2.6. Verifying Wash Temperature | 3-10 |
| 2.7. Setting the Wash-Cycle Timer | 3-11 |
| 2.8. Setting the Rinse Cycle (optional)..... | 3-11 |
| 2.9. Starting the Washer | 3-11 |
| 2.10. Verifying Proper Function | 3-12 |
| 2.11. Opening the Door after a Cycle..... | 3-13 |
| 2.12. Unloading Parts | 3-13 |
| 3. Continuous Operation | 3-14 |
| 4 Advanced Operations: Process-Control | 4-1 |
| <i>Purpose</i> | 4-1 |
| <i>Prerequisites</i> | 4-1 |
| <i>Safety/Precautions</i> | 4-1 |
| <i>What You Will Learn In This Chapter</i> | 4-2 |
| 1. Chemical-Concentration Management | 4-3 |
| 1.1. Chemical: General | 4-3 |
| 1.2. Selecting the Right Chemical | 4-4 |
| 1.3. Selecting the Right Concentration..... | 4-5 |
| 1.4. Maintaining the Proper Chemical Charge | 4-6 |
| 1.5. Problems..... | 4-7 |
| 1.5.1. Foaming Related to Chemical Concentration..... | 4-7 |
| 1.5.2. Supersaturation of Solution | 4-8 |
| 1.6. Charging the Power Washer with Chemical..... | 4-9 |
| 1.7. Corrosion Protection..... | 4-9 |
| 1.8. StingRay Chemicals..... | 4-10 |
| 1.9. Recommended Chemicals..... | 4-10 |
| 2. Temperature Adjustment | 4-12 |
| 3. Rinse-System Control (optional ARC) | 4-15 |
| 3.1. Setting the Rinse Timer | 4-15 |
| 3.2. Rinse Injector Pump..... | 4-16 |
| 3.3. Rinse Water-Flow Adjustment | 4-19 |

| | |
|--|-------------|
| 4. Setting the 7-Day Dual-Circuit Clock | 4-21 |
| 4.1. 7-Day Dual-Circuit Clock and Optional Devices | 4-22 |
| 5. Steam-Exhaust Timer | 4-23 |
| 5.1. Setting the ASE Timer..... | 4-23 |
| 6. Monitoring | 4-25 |
| 6.1. Monitoring Lubrication | 4-25 |
| 6.2. Other Monitoring | 4-26 |
| | |
| 5 Maintenance | 5-1 |
| <i>Purpose</i> | 5-1 |
| <i>Prerequisites</i> | 5-1 |
| <i>Safety/Precautions</i> | 5-1 |
| <i>What You Will Learn In This Chapter</i> | 5-2 |
| | |
| 1. Service Schedule | 5-3 |
| | |
| 2. Performing Maintenance and Common Washer Adjustments | 5-5 |
| 2.1. Pumps and Power Blast Manifold (PBM) Assembly | 5-5 |
| 2.1.1. Wash Pump Intake Filter (Inspect/Clean) | 5-5 |
| 2.1.2. PBM Swivel Joint (Grease)..... | 5-6 |
| 2.1.3. PBM Nozzles (Inspect/Monitor) | 5-7 |
| 2.1.4. PBM Swivel (Inspect/Adjust) | 5-9 |
| 2.1.5. Amperage Draw at Wash Pump(s) (Measure)..... | 5-10 |
| 2.1.6. Upper Manifold Bearing (Grease)..... | 5-10 |
| 2.1.7. Wash Pump and Pump Motor (Grease) | 5-11 |
| 2.1.8. Wash Pump Couplings (Inspect) | 5-13 |
| 2.2. Heating System..... | 5-13 |
| 2.2.1. Air Intake - Burner Blower Motor (Clean)..... | 5-13 |
| 2.2.2. Burner Blower Motor (Oil)..... | 5-13 |
| 2.3. Water-Level Control System | 5-14 |
| 2.3.1. Float Assembly (Inspect/Clean)..... | 5-14 |
| 2.3.2. Water Solenoid Valves (Clean or Replace) | 5-16 |
| 2.4. Turntable and Drive Assembly | 5-17 |
| 2.4.1. Turntable Bearings (Grease) | 5-17 |
| 2.4.2. Turntable Drive Bearings (Grease)..... | 5-18 |
| 2.4.3. Slip Clutch/Torque Limiter (Inspect) | 5-18 |
| 2.4.4. Door Bearings (Grease) | 5-19 |
| 2.5. Auto Steam Exhaust (ASE) Assembly | 5-20 |
| 2.6. Chemical Concentration | 5-20 |
| 2.7. Voltage | 5-21 |
| 2.7.1. Voltage at Power Distribution Block (Measure) | 5-21 |

| | |
|--|-----------------|
| 3. Sludge Monitoring and Clean-Out | 5-22 |
| 3.1. Sludge Monitoring | 5-23 |
| 3.2. Sludge Clean-Out and Heat Exchanger/Suction Tube (Clean) | 5-23 |
| 3.3. Heating Elements (Clean - electric only)..... | 5-24 |
| 4. Maintenance of Options | 5-26 |
| 6 Troubleshooting | 6-1 |
| <i>Purpose</i> | 6-1 |
| <i>Prerequisites</i> | 6-1 |
| <i>Safety/Precautions</i> | 6-1 |
| <i>What You Will Learn In This Chapter</i> | 6-2 |
| 1. Startup..... | 6-3 |
| 2. Ineffective Cleaning | 6-4 |
| 3. Wash Pump System..... | 6-5 |
| 4. Heating System..... | 6-8 |
| 5. Turntable Drive | 6-12 |
| 6. Nozzles | 6-13 |
| 7. Foaming..... | 6-14 |
| 8. Power Blast Manifold (PBM) | 6-15 |
| 9. Solution-Level Control System | 6-16 |
| 10. Door Limit Switch | 6-17 |
| 11. Rinse System | 6-18 |
| 12. Automatic Steam Exhaust (ASE) | 6-19 |
| 13. Electrical Control System | 6-20 |
| 7 Options..... | 7-1 |
| <i>Purpose</i> | 7-1 |
| <i>Prerequisites</i> | 7-1 |
| <i>Safety/Precautions</i> | 7-1 |
| <i>What You Will Learn In This Chapter</i> | 7-2 |

| | |
|--|-------------|
| 1. Automatic Turntable/Swivel Bearings Lubrication..... | 7-3 |
| 1.1. Theory of Operation | 7-3 |
| 1.2. Installation | 7-5 |
| 1.3. Operations..... | 7-5 |
| 1.4. Maintenance..... | 7-7 |
| 1.5. Troubleshooting | 7-8 |
| 2. Center Manifold..... | 7-10 |
| 2.1. Theory of Operation | 7-10 |
| 2.2. Installation | 7-11 |
| 2.3. Operations..... | 7-13 |
| 2.4. Maintenance..... | 7-14 |
| Every 40 Hours of Operation..... | 7-14 |
| Every 250 Hours of Operation..... | 7-14 |
| 2.5. Troubleshooting | 7-14 |
| 3. Chemical Conductivity Controller | 7-16 |
| 3.1. Theory of Operation | 7-17 |
| 3.2. Installation | 7-19 |
| 3.3. Operations..... | 7-20 |
| 3.4. Maintenance..... | 7-20 |
| 3.5. Troubleshooting | 7-21 |
| 4. Internal Reservoir Cover | 7-23 |
| 4.1. Theory of Operation | 7-23 |
| 4.2. Installation | 7-23 |
| 4.3. Operations..... | 7-23 |
| 4.4. Maintenance..... | 7-24 |
| 4.5. Troubleshooting | 7-24 |
| 5. 50 Hertz Electrical Power | 7-25 |
| 5.1. Theory of Operation | 7-25 |
| 5.2. Installation | 7-25 |
| 5.3. Operations..... | 7-25 |
| 5.4. Maintenance..... | 7-25 |
| 5.5. Troubleshooting | 7-27 |
| 6. Filters..... | 7-29 |
| 6.1. Theory of Operation | 7-29 |
| 6.2. Installation | 7-30 |
| 6.3. Operations..... | 7-30 |
| 6.4. Maintenance..... | 7-31 |
| 6.5. Troubleshooting | 7-31 |
| 7. Variable Frequency Drive (VFD) | 7-33 |
| 7.1. Theory of Operation | 7-33 |
| 7.2. Installation | 7-33 |

| | |
|--|-------------|
| 7.3. Operations | 7-33 |
| 7.4. Maintenance | 7-36 |
| 7.5. Troubleshooting | 7-36 |
| 8. Hot-Air Blow-Off (HABO)..... | 7-37 |
| 8.1. Theory of Operation | 7-37 |
| Steam-Exhaust Fan | 7-37 |
| Controlling HABO Heat..... | 7-38 |
| 8.2. Installation..... | 7-38 |
| 8.3. Operations | 7-43 |
| 8.4. Maintenance | 7-44 |
| 8.5. Troubleshooting | 7-45 |
| 9. Jib Crane - Rear Mount..... | 7-46 |
| 9.1. Theory of Operation | 7-46 |
| 9.2. Installation..... | 7-46 |
| 9.3. Operations | 7-49 |
| 9.4. Maintenance | 7-50 |
| 9.5. Troubleshooting | 7-51 |
| 10. Jib Crane - Door Frame Mount..... | 7-52 |
| 10.1. Theory of Operation | 7-52 |
| 10.2. Installation..... | 7-52 |
| 10.3. Operations | 7-56 |
| 10.4. Maintenance | 7-56 |
| 10.5. Troubleshooting | 7-57 |
| 11. Oil Skimmer..... | 7-58 |
| 11.1. Theory of Operation | 7-58 |
| 11.2. Installation..... | 7-59 |
| 11.3. Operations | 7-59 |
| 11.4. Maintenance | 7-60 |
| 11.5. Troubleshooting | 7-60 |
| 12. Oil Coalescer..... | 7-62 |
| 12.1. Theory of Operation | 7-62 |
| 12.2. Installation..... | 7-62 |
| 12.3. Operations | 7-63 |
| 12.4. Maintenance | 7-64 |
| 12.5. Troubleshooting | 7-67 |
| 13. Power-Assisted Door..... | 7-69 |
| 13.1. Theory of Operation | 7-69 |
| 13.2. Installation..... | 7-69 |
| 13.3. Operations | 7-69 |
| 13.4. Maintenance | 7-70 |
| 13.5. Troubleshooting | 7-71 |

| | |
|---|-------------|
| 14. Pump Pressure Gauge | 7-72 |
| 14.1. Theory of Operation | 7-72 |
| 14.2. Installation | 7-72 |
| 14.3. Operations..... | 7-72 |
| 14.4. Maintenance..... | 7-72 |
| 14.5. Troubleshooting | 7-73 |
| | |
| 15. Rack and Fixture Set, or Small-Parts Basket..... | 7-74 |
| 15.1. Theory of Operation | 7-74 |
| 15.2. Installation | 7-74 |
| 15.3. Operations..... | 7-76 |
| 15.4. Maintenance..... | 7-77 |
| 15.5. Troubleshooting | 7-77 |
| | |
| 16. Remote Grease Fittings..... | 7-78 |
| 16.1. Theory of Operation | 7-78 |
| 16.2. Installation | 7-78 |
| 16.3. Operations..... | 7-78 |
| 16.4. Maintenance..... | 7-78 |
| 16.5. Troubleshooting | 7-78 |
| | |
| 17. Rinse Wand | 7-79 |
| 17.1. Theory of Operation | 7-79 |
| 17.2. Installation | 7-79 |
| 17.3. Operations..... | 7-79 |
| 17.4. Maintenance..... | 7-80 |
| 17.5. Troubleshooting | 7-80 |
| | |
| 18. Sludge Scraper | 7-82 |
| 18.1. Theory of Operation | 7-82 |
| 18.2. Installation | 7-83 |
| 18.3. Operations..... | 7-83 |
| 18.4. Maintenance..... | 7-83 |
| 18.5. Troubleshooting | 7-84 |
| | |
| 19. Airlift System | 7-86 |
| 19.1. Theory of Operation | 7-87 |
| 19.2. Installation | 7-87 |
| 19.3. Operations..... | 7-88 |
| 19.4. Maintenance..... | 7-88 |
| 19.5. Troubleshooting | 7-89 |
| | |
| 20. Short High Manifold (SHIM) System..... | 7-90 |
| 20.1. Theory of Operation..... | 7-90 |
| 20.2. Operations..... | 7-90 |
| 20.3. Maintenance..... | 7-93 |
| 20.4. Troubleshooting..... | 7-93 |

21. Pure Water/Pure Rinse: Integrated RO Water Fill and Rinse System.....7-94

- 21.1. Theory of Operation.....7-94
- 21.2. Installation..... 7-96
- 21.3 Operations7.98
- 21.3. Maintenance 7-98
- 21.4. Troubleshooting 7-100

7-Day Clock Manual Clock-1

Pump Manual Pump-1

Digital Temperature Control Digital Temperature Control-1

Index..... Index-1