# **TABLE OF CONTENTS**

#### **1- DESCRIPTION & OPERATION**

|    | BRIEF HISTORY                 | 1-1 |
|----|-------------------------------|-----|
|    | PRINCIPLES OF OPERATION       | 1-2 |
|    | ENGINE & JET DRIVE            | 1-3 |
|    | Cooling System                | 1-4 |
|    | Bilge Breather                | 1-5 |
|    | IMPELLERS                     | 1-6 |
|    | REPLACEMENT PARTS             | 1-6 |
|    | DEBRIS REMOVAL                | 1-6 |
|    | REVERSE CAPABILITY            | 1-7 |
|    | SPECIAL FEATURES              | 1-8 |
|    | RPM Limiter                   | 1-8 |
|    | Throttle Opening Limiter      | 1-8 |
|    | Self-Circling Mode            | 1-8 |
| 2- | SAFETY                        |     |
|    | INTRODUCTION                  | 2-1 |
|    | Craft Classification          | 2-1 |
|    | Information                   | 2-1 |
|    | <b>Regulation Enforcement</b> | 2-2 |
|    | MINIMUM LEGAL REQUIRE         |     |
|    | MENTS                         | 2-2 |
|    | Personal Flotation Devices    | 2-2 |
|    | Fire Extinguisher             | 2-4 |
|    | MINIMUM LĚGAL REGISTRA-       |     |
|    | TION REQUIREMENTS             | 2-5 |
|    | SAFETY PRACTICES              | 2-5 |
|    | MOST IMPORTANT WORDS          |     |
|    | IN THIS MANUAL                | 2-5 |
|    | Full Throttle Operation       | 2-5 |
|    | Jumping Waves                 | 2-6 |
|    | Alcohol & Substance Use       | 2-6 |
|    | Age Restrictions              | 2-6 |
|    | Speed Restrictions            | 2-6 |
|    | 1                             |     |

| Shallow Water Operation  | 2-6        |
|--------------------------|------------|
| Flame Arrestors          | 2-7        |
| Fuel System              | 2-7        |
| Excessive Noise          | 2-8        |
| Automotive Replacements  | <b>2-8</b> |
| BOATING ACCIDENT REPORTS | 2-8        |
| SECURITY                 | <b>2-8</b> |
|                          |            |

#### 3- TUNING

| INTRODUCTION                 | 3-1         |
|------------------------------|-------------|
| TUNE-UP SEQUENCE             | 3-1         |
| COMPRESSION CHECK            | 3-2         |
| SPARK PLUG INSPECTION        | 3-3         |
| ELECTRICAL POWER SUPPLY      | 3-3         |
| "Maintenance Free" Batteries | 3-4         |
| Standard Batteries           | 3-4         |
| Jumper Cables                | 3-4         |
| CARBURETOR ADJUSTMENT        | 3-5         |
| Fuel & Fuel Tanks            | 3-5         |
| Draining Fuel Tank           | 3-5         |
| Low Speed & Idle Adjustments | 3-6         |
| SPECIAL TACHOMETER WORDS     | 3-6         |
| FUEL PUMPS                   | 3-7         |
| Remote Fuel Pump             | 3-7         |
| Integral Fuel Pump           | 3-7         |
| CRANKING MTR. & SOLENOID     | 3-8         |
| Cranking Motor Test          | 3 <b>-8</b> |
| Solenoid test                | 3 <b>-8</b> |
| JET PUMP                     | <b>3-8</b>  |
| Gate Position                | 3-8         |
| Impeller                     | 3 <b>-8</b> |
|                              |             |

## **4- MAINTENANCE**

2-6

| INTRODUCTION    | 4-1 |
|-----------------|-----|
| After Use Tasks | 4-2 |

#### 4- MAINTENANCE (CONTINUED)

| Cooling                        | 4-2   |
|--------------------------------|-------|
| Flushing Cooling System        | 4-3   |
| Controlling Corrosion          | 4-3   |
| Pump Impeller                  | 4-3   |
| SERIAL NUMBERS                 | 4-4   |
| LUBRICATION                    | 4-4   |
| Throttle Cable                 | 4-5   |
| Steering Cable                 | 4-5   |
| Fuel/Oil Mixture               | 4-7   |
| "Break-in"                     | 4-7   |
| Jet Pump                       | 4-7   |
| INSPECTION & SERVICE           | 4-7   |
| Fuel Tank, Check Valve & Filte | er4-7 |
| Sediment Bowl                  | 4-8   |
| Fuel Tank Filters              | 4-8   |
| In-Line Filter                 | 4-8   |
| Oil Filter                     | 4-8   |
| Drain Plug                     | 4-8   |
| FLUSHING                       |       |
| Cooling System                 | 4-9   |
| Bilge System                   | 4-9   |
| IMPELLER CLEARANCE             | 4-9   |
| PRE-SEASON PREPARATION         | 4-10  |
| SEALANTS, LUBRICANTS, ETC.     | 4-13  |
| FIBERGLASS HULLS               | 4-14  |
| SUBMERGED ENGINE SERVICE       | 4-14  |
| Salt Water Submersion          | 4-14  |
| Submerged While Operating      | 4-15  |
| Fresh Water Submersion         | 4-15  |
| WINTER STORAGE                 | 4-16  |
| PRE-SEASON CHECK               | 4-17  |

# 5- TROUBLESHOOTING

| INTRODUCTION           | 5-1 |
|------------------------|-----|
| Lower than Normal RPM  | 5-1 |
| Higher than Normal RPM | 5-1 |
| Engine Troubleshooting | 5-2 |
| Cranking System Test   | 5-2 |
| Ignition System Test   | 5-2 |
| Compression Test       | 5-3 |
| LEAK DOWN PROCEDURE    | 5-5 |
| FUEL SYSTEM PROBLEMS   | 5-5 |
| Engine Surge           | 5-6 |
| Rough Engine Idle      | 5-7 |
| IGNITION SYSTEM FAULTS | 5-7 |
| Intermittent Problems  | 5-8 |

| Spark Plug Evaluation    | <b>5-8</b> |
|--------------------------|------------|
| CRANKING SYSTEM FAILURES | 5-9        |
| Faulty Symptoms          | 5-10       |
| Cranking Circuit Tests   | 5-10       |
| Cranking Motor Relay     | 5-12       |
| Relay Removal            | 5-13       |
| Relay Testing            | 5-13       |
| Relay Installation       | 5-14       |
| CHARGING SYSTEM          |            |
| MALFUNCTIONS             | 5-15       |
| TROUBLESHOOTING CHARTS   | 5-16       |

#### 6- FUEL AND OIL

| INTRODUCTION                | 6-1         |
|-----------------------------|-------------|
| GENERAL CARBURETION         |             |
| INFORMATION                 | 6-1         |
| FUEL COMPONENTS & AVAIL-    |             |
| ABLE GAS                    | 6-3         |
| Leaded Gasoline             | 6-3         |
| Fuel Filter & Sediment Bowl | 6-4         |
| In-Line Fuel Filter         | 6-4         |
| Fuel Tank Screen Filters    | 6-4         |
| Air/Fuel Mixture            | 6-5         |
| Throttle & Choke Valves     | 6-5         |
| FUEL PUMP                   | 6-5         |
| Remote Pump                 | 6-5         |
| Integral Fuel Pump          | 6-5         |
| OIL INJECTION               | 6-5         |
| Fuel/Oil Mixture            | 6-6         |
| "Break-in" Lubrication      | 6-6         |
| Removing Fuel from System   | 6-7         |
| ENGINE REVOLUTION           |             |
| LIMITER                     | 6-7         |
| TROUBLESHOOTING             | 6-7         |
| Fuel Problems               | 5-7         |
| Fuel Filter & Sediment Bowl | 6- <b>8</b> |
| "Sour" Fuel                 | 6 <b>-8</b> |
| Choke Problems              | 6-8         |
| Rough Engine Idle           | 6-8         |
| Excessive Fuel              | 6-9         |
| Engine Surge                | 6-9         |
| CARBURETOR MODELS           | 6-9         |
| SERVICE KEIHIN CDK-34       | 6-9         |
| Removal & Disassembling     | 6-10        |
| Cleaning & Inspecting       | 6-14        |
| Exploded Drawing            | 6-15        |
| Assembling                  | 6-16        |
| -                           |             |

| Installation                 | 6-19         |
|------------------------------|--------------|
| Priming                      | 6-21         |
| Mixture Screws w/Limiter Cap | s6-22        |
| Idle Adjustment Screw        | 6-22         |
| Low & High Speed Adjustmer   | nt6-22       |
| High Altitude Operation      | 6-22         |
| Choke Cable Adjustment       | 6-23         |
| Throttle Cable Adjustment    | 6-23         |
| SERVICE KEIHIN CDK-38 & 40   |              |
| CARBURETOR w/INTEGRAL        |              |
| FUEL PUMP                    | 6-25         |
| Disassembling                | 6-25         |
| "Front" Side                 | 6-25         |
| "Back" Side                  | 6-27         |
| Cleaning & Inspecting        | 6 <b>-28</b> |
| Exploded Drawing             | 6-29         |
| Assembling                   | 6-30         |
| Installation                 | 6-32         |
| Priming                      | 6-32         |
| Choke Cable Adjustment       | 6-32         |
| Throttle Cable Adjustment    | 6-33         |
| REMOTE FUEL PUMP             | 6-33         |
| Theory of Operation          | 6-33         |
| Pump Pressure Check          | 6-34         |
| Pump Volume Check            | 6-35         |
| Servicing Fuel Pump          | 6-36         |
| Removal & Disassembling      | 6-37         |
| Cleaning & Inspecting        | 6-37         |
| Assembling                   | 6-37         |
| OIL INJECTION                | 6-38         |
| Oil Mixture                  | 6-38         |
| "Break-in" Period            | 6-38         |
| System Components            | 6-39         |
| Oil Tank                     | 6-39         |
| Oil Injection Pump           | 6-39         |
| System Inspection            | 6-39         |
| Oil Pump Output Test         | 6-40         |
| Troubleshooting              | 6-41         |
| First Checks Delivery        | 6-41         |
| Purging Air from System      | 6-41         |
| Purging Air from Pump        | 6-42         |

#### 7- IGNITION

| INTRODUCTION & CHAPTER |     |
|------------------------|-----|
| COVERAGE               | 7-1 |
| SPARK PLUG EVALUATION  | 7-1 |
| Correct Color          | 7-2 |

| Rich Mixture                | 7-2    |
|-----------------------------|--------|
| Too Cool                    | 7-3    |
| Fouled                      | 7-3    |
| Carbon Deposits             | 7-3    |
| Overheating                 | 7-3    |
| Electrode Wear              | 7-3    |
| CDI (CAPACITOR DISCHARGE    |        |
| IGNITION) & CHARGING SYS    | 5. 7-4 |
| Description & Operation     |        |
| Ignition Circuit            | 7-4    |
| Operation                   | 7-5    |
| Special Timing Words        | 7-5    |
| Troubleshooting CDI         | 7-5    |
| Spark Plugs                 | 7-5    |
| Compression                 | 7-6    |
| Testing Ignition Components | 7-7    |
| Elec. Box Removal 550 & 65  |        |
| Elec. Box Removal All Other | rs 7-8 |
| Exciter Coil Test 550       | 7-9    |
| Pulser Coil Test 550        | 7-9    |
| Exciter Coil Test 650       | 7-9    |
| Igniter Test 550 & 650      | 7-10   |
| Igniter Removal 550 & 650   | 7-10   |
| Ign.Coil Winding Test 550 & | c      |
| 650 Secondary Winding       | 7-10   |
| Ign. Coil Winding Test 750, |        |
| 900 & 1100 Primary          | 7-11   |
| Secondary Winding           | 7-12   |
| CDI Igniters Removal,       |        |
| Installation                | 7-12   |
| Pickup Coil 750, 900 & 1100 | 7-12   |
| IGNITION TIMING ADJUST-     |        |
| MENTS                       | 7-14   |

| /-1-1 |
|-------|
| 7-14  |
| 7-15  |
| 7-15  |
| 7-16  |
| 7-17  |
|       |

Description & Operation7-17Troubleshooting7-19Testing Coil Output7-19Coil Resistance Test7-21Exciter Coil Test -- 7507-21Exciter Coil Test -- 9007-21Charging Coil Output -- 11007-21Charg. Coil Resistance -- 11007-21

#### 8- ENGINE

| INTRODUCTION & CHAPTER                     |              |
|--|--------------|
| ORGANIZATION                               | 8-1          |
| TWO-CYCLE ENGINE                           |              |
| <b>DESCRIPTION &amp; OPERATION</b>         | <b>N 8-2</b> |
| Intake/Exhaust                             | 8-2          |
| Lubrication                                | 8-2          |
| Physical Laws                              | 8-2          |
| Actual Operation                           | 8-3          |
| Timing                                     | 8-3          |
| SERVICE TWO-CYLINDER                       |              |
| ENGINES                                    | 8-3          |
| Preliminary Task Engine                    | 00           |
| Overhaul                                   | 8-4          |
| Removal                                    | 8-4          |
| Disassembling                              | 8-9          |
| -  | <b>8-10</b>  |
| Cranking Mtr. Removal                      |              |
| "Pulling" Flywheel                         | 8-11         |
| Magneto Assembly                           | 8-13         |
| Block Disassembling                        | 8-14         |
| Assembling & Installation                  | 8-20         |
| Exploded Drawings                          | 8-21         |
| Lower Half                                 | 8-26         |
| Piston Installation                        | 8-28         |
| <b>Block Installation</b>                  | 8-30         |
| Cylinder Head                              | 8-31         |
| Flywheel Installation                      | 8-34         |
| <b>Cranking Motor Installation</b>         | 8-37         |
| Engine Installation                        | 8-39         |
| Engine Alignment                           | 8-39         |
| Fuel Tank Installation                     | 8-41         |
| Oil Tank Installation                      | 8-42         |
| SERVICE THREE-CYLINDER                     |              |
| ENGINE                                     | <b>8-4</b> 5 |
| Engine Removal                             | 8-45         |
| Engine Removal<br>Exhaust Manifold Removal | <b>8-4</b> 5 |
|  | 8-47         |
| Engine Disassembling                       |              |
| Cranking Motor Removal                     | 8-48         |
| Pulling the Flywheel                       | 8-48         |
| Cylinder Head Removal                      | 8-50         |
| Exhaust Manifold Removal                   | 8-51         |
| Intake Manifold Removal                    | 8-51         |
| Block Disassembling                        | 8-52         |
| Crankcase Separation                       | 8-54         |
| Crankshaft Disassembling                   | 8-54         |
| ASSEMBLING & INSTALLATION                  | 1            |
| THREE-CYLINDER ENGINE                      | 8-54         |
|  |              |

|                               | 0            |
|-------------------------------|--------------|
| Assembling Continues          | 8-57         |
| Piston Installation           | 8-58         |
| Reed Block/Intake Manifold    | 8-61         |
| Exhaust Manifold Installation | 8-61         |
| Cylinder Head Installation    | 8-61         |
| Flywheel Installation         | <b>8-</b> 63 |
| Coupler Installation          | 8-63         |
| Flywheel Cover Installation   | <b>8-64</b>  |
| Oil Pump Installation         | <b>8-</b> 64 |
| Cranking Motor Installation   | 8-65         |
| ENGINE INSTALLATION           |              |
| THREE-CYLINDER SERIES         | <b>8-</b> 65 |
| Engine Support Equipment      | <b>8-6</b> 6 |
| CLEANING & INSPECTING         |              |
| ALL ENGINES                   | 8-67         |
| Reed Block Service            | 8-68         |
| Crankshaft Service            | 8-68         |
| Connecting Rod Service        | <b>8-7</b> 0 |
| Piston Service                | <b>8-7</b> 0 |
| Cylinder Block Service        | 8-74         |
| Piston Clearance              | 8-75         |
| Honing Cylinder Walls         | 8-75         |
| Block & Cyl. Head Warpage     | 8-77         |
| SEALANTS, LUBRICANTS, ETC.    | 8-78         |

### 9- ELECTRICAL

| INTRODUCTION                  | 9-1         |
|-------------------------------|-------------|
| BATTERIES                     | 9-1         |
| PWC Batteries                 | 9-1         |
| Construction                  | 9-1         |
| Battery Ratings               | 9-2         |
| Ampere-Hour                   | 9-2         |
| Cold Cranking Performance     | 9-2         |
| Reserve Capacity              | 9-2         |
| Watt-Hour                     | 9-2         |
| Installation                  | 9-2         |
| Service                       | 9-2         |
| Testing                       | 9-4         |
| Hydrometers                   | 9-5         |
| Charging                      | 9-6         |
| Installing                    | 9-6         |
| Jumper Cables                 |             |
| Storage                       | 9-7         |
| TACHOMETĔR                    | 9-7         |
| ELECTRICAL SYSTEM GEN-        |             |
| ERAL INFORMATION              | 9 <b>-8</b> |
| <b>Cranking Motor Circuit</b> | 9 <b>-8</b> |
| -                             |             |

| Ignition                  | 9-9  |
|---------------------------|------|
| CRANKING MOTOR CIRCUIT    | 9-9  |
| Theory of Operation       | 9-9  |
| Cranking Motor Noises     | 9-10 |
| Faulty Symptoms           | 9-11 |
| CRANKING MOTOR TROUBLE    | -    |
| SHOOTING                  | 9-11 |
| Circuit Tests             | 9-11 |
| Motor Relay Removal       |      |
| for Testing               | 9-12 |
| Relay Testing             | 9-14 |
| Relay Installation        | 9-14 |
| CRANKING MOTOR SERVICE    | 9-15 |
| Description               | 9-15 |
| Diagrams Inside Elec. Box | 9-16 |
| Motor Removal             | 9-18 |
| Disassembling             | 9-18 |
| Cleaning & Inspecting     | 9-21 |
| Testing Motor Parts       | 9-24 |
| Assembling                | 9-26 |
| Installation              | 9-27 |
| TESTING OTHER ELECTRICAL  |      |
| COMPONENTS                | 9-30 |
| Start Button Test         | 9-31 |
| Safety Switch             | 9-31 |
| Stop Switch               | 9-31 |
| Stop Switch Relay         | 9-31 |
| Electric Bilge Pump       | 9-32 |
| Electric Fan              | 9-32 |
| Temperature Warning Sys.  | 9-32 |
| Overheat Buzzer           | 9-33 |
| ELECTRIC TRIM SYSTEM      | 9-33 |

# 10 JET PUMP

| INTRODUCTION             | 10-1      |
|--------------------------|-----------|
| Model Identification and |           |
| Chapter Coverage         | 10-1      |
| Jet Pump Description     | 10-2      |
| Axial Flow               | 10-2      |
| Mixed Flow               | 10-2      |
| IMPELLERS                | 10-3      |
| <b>Cavitation Burns</b>  | 10-3      |
| Cooling Water and Bilge  | Hoses10-4 |

| IMPELLER-TO-PUMP CASE          |       |
|--------------------------------|-------|
| CLEARANCE                      | 10-5  |
| Axial Flow Pump                | 10-5  |
| Mixed Flow Pump                | 10-6  |
| JET PUMP SERVICĒ               | 10-6  |
| Removal                        | 10-7  |
| Impeller Alignment             | 10-9  |
| Disassembling                  | 10-10 |
| Impeller Removal               | 10-12 |
| Impeller Shaft Removal         | 10-13 |
| Cleaning & Inspecting          | 10-15 |
| Exploded Drawings              | 10-16 |
| Assembling                     | 10-20 |
| Shimming Procedures 550        | 10-21 |
| Impeller Installation550       | 10-23 |
| Impeller Installation All      |       |
| Others                         | 10-25 |
| Pump Installation              | 10-27 |
| <b>BEARING HOUSING SERVICE</b> | 10-30 |
| Removal                        | 10-30 |
| Disassembling                  | 10-31 |
| Cleaning & Inspecting          | 10-32 |
|                                |       |

# 11 CONTROL ADJUSTMENTS

| INTRODUCTION         | 11-1 |
|----------------------|------|
| STEERING CABLE       | 11-1 |
| <b>REVERSE CABLE</b> | 11-2 |
| TRIM CABLE           | 11-3 |

#### APPENDIX

| METRIC CONVERSION CHART   | A-1  |
|---------------------------|------|
| RECOMMENDED TORQUE        |      |
| VALUES                    | A-2  |
| ENGINE SPECIFICATIONS AND | )    |
| TUNE-UP ADJUSTMENTS       | A-4  |
| WIRING DIAGRAMS & COLOR   |      |
| CODE IDENTIFICATION       | A-6  |
| Model 550 Series          | A-6  |
| Model 650 Series          | A-7  |
| Model 750 Series          | A-8  |
| Model 750 Hi-Performance  | A-9  |
| Model 900 Hi-Performance  | A-10 |
| Model 1100 Hi-Performance | A-11 |