



GA Series

Pre-Engineered, Balanced Fire Suppression System

US Patent 7,353,881

1,600 – 3,000 Cubic Feet

Design, Installation, Operation, and Maintenance Manual
For All Fireboy GA Series Fire Systems

U.S. COAST GUARD AND FACTORY MUTUAL APPROVED.

READ AND COMPLY WITH ALL INSTRUCTIONS, WARNINGS AND
LIMITATIONS BEFORE INSTALLING, SERVICING, OR REMOVING
THIS DEVICE.

RETAIN THIS MANUAL FOR REFERENCE.



18001
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Foreword

This manual is written for those who certify, install, and maintain Fireboy GA series pre-engineered, balanced, fire suppression systems. It contains design, installation, operation, and maintenance information for the system. GA Series systems are to be installed by authorized personnel only.

This owner's manual is provided in English and is available in the language of destination upon request at an additional cost.

Important

Fireboy assumes no responsibility for application of any system other than those addressed in this manual. The technical data contained herein is limited strictly for informational purposes only.

Fireboy GA series pre-engineered, balanced, fire suppression systems are intended for normally unoccupied spaces and are for use on Class B (flammable liquid) and Class C (energized electrical equipment) fires. Each system is to be installed, inspected, maintained, tested, and recharged by qualified, trained personnel in accordance with the following:

- Standards of the National Fire Protection Association No. 2001, titled "Clean Agent." Fire Extinguishing Systems.
- All instructions, limitations, etc. contained in the manual.
- All information contained on the system container and nameplate.
- Storage, handling, transportation, service, maintenance, recharge, and test of agent storage containers shall be performed only by qualified and trained personnel in accordance with the information in this manual and Compressed Gas Association pamphlets C-1, C-6, and P-1.
C-1 "Methods for Hydrostatic Testing of Compressed Gas Cylinders"
C-6 "Standards for Visual Inspection of Compressed Gas Cylinders"
P-1 "Safe handling of Compressed gases in Containers"
CGA pamphlets are published by the Compressed Gas Association, Crystal Square Two, 1725 Jefferson Davis Highway, Arlington, VA 22202-4102

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1 System Description

1.1 General

Fireboy GA series systems are designed to suppress fires in specific applications where an electrically non-conductive agent is required, where agent clean up presents a problem, where agent can be contained within an enclosure to allow a total flooding agent to effectively combat fire, where flammable liquids are the source of fuel, and where automatic and manual operation is advantageous over portable extinguishers. The operating temperature range for all Fireboy GA series systems is 32°F to 130°F. Each system consists of two identical cylinders with temperature control and manual release control valves, two bulb type temperature sensors, one manual release cable, one engine shut down control, and one or more remote helm station discharge alarms.

1.2 Extinguishing Agent

Fireboy GA series systems are supplied with clean agent HFC-227ea, which is approved for normally occupied areas. The Material Safety Data Sheet (MSDS) for HFC-227ea is included in Appendix A of this manual.

1.3 Storage Cylinders

Fireboy cylinders are welded steel construction specifically designed for fire extinguisher applications, Department of Transportation (DOT) approved for the working pressure used and powder coated red for corrosion protection. Each cylinder has a large gold nameplate with technical information and a small green nameplate with specific size, weight, model code, United States Coast Guard (USCG) approval number, and DOT approval number (DOT-E-10180). The cylinders are charged with HFC-227ea extinguishing agent and super pressurized with nitrogen to 360 psi.

1.4 Mounting Brackets

All GA series system cylinders are furnished with three stainless steel mounting brackets. The brackets have been vibration tested by Factory Mutual and are heavy duty for high vibration applications and must be installed according to Fireboy installation instructions.

1.5 Control Valve

The Fireboy GA series control valve is a balanced poppet design to insure that the system does not discharge unless the release bulb breaks from either temperature or manual control. Leaks in the valve will not discharge the system. The valve is manufactured from marine brass and 316 stainless steel components for long life in harsh environments and is designed to release only upon venting of the bulb chamber. The GA Series valve includes the exclusive safety locking nut insuring that the system will not discharge during transportation and installation.

1.6 Bulb Type Temperature Sensors

Temperature sensors mounted in the enclosure (engine room) are identical to the sensors on each control valve. Each system will have a total of four bulb type sensors, one on each of the control valves on the two cylinders and one on each of the GA link manifolds.

1.7 Flexible GA Link

The GA series Fireboy system consists of two identical cylinders mounted at each end of the enclosure; the cylinders are connected with a 1/4" 316 stainless steel flexible high-pressure hose. This hose is designed for an operating pressure of 500 PSI at 850°F and 1500 PSI at 100°F.

1.8 Quick Disconnect Couplings

Quick disconnect couplings with zero leak check valves in each coupler end are supplied on each GA Link. The quick disconnect couplings allow the GA link to be removed and re-coupled at any time with no loss of cylinder pressure.

WARNING:

Only couple and re-couple the cylinders with the safety nut installed and tightened. System could discharge if safety nut is not installed.

1.9 Manual Release Cable

Each GA system will be supplied with a manual release cable kit that includes a tee handle, safety pin, and mounting ID plate. Manual release must be conveniently located outside fire protected space.

1.10 Nozzles

Each control valve is supplied with a discharge nozzle mounted on the valve. This nozzle is used to disperse the agent for maximum total flooding coverage.

1.11 Engine Shutdown Controls

All systems require a Fireboy ES or ELS series automatic engine shut down control. Main propulsion engines, generators, blowers, and inlet dampers must be shut down or closed when the system discharges. The ES and ELS series Fireboy engine shut down controls automatically perform this function.

1.12 Helm Station Discharge Alarm

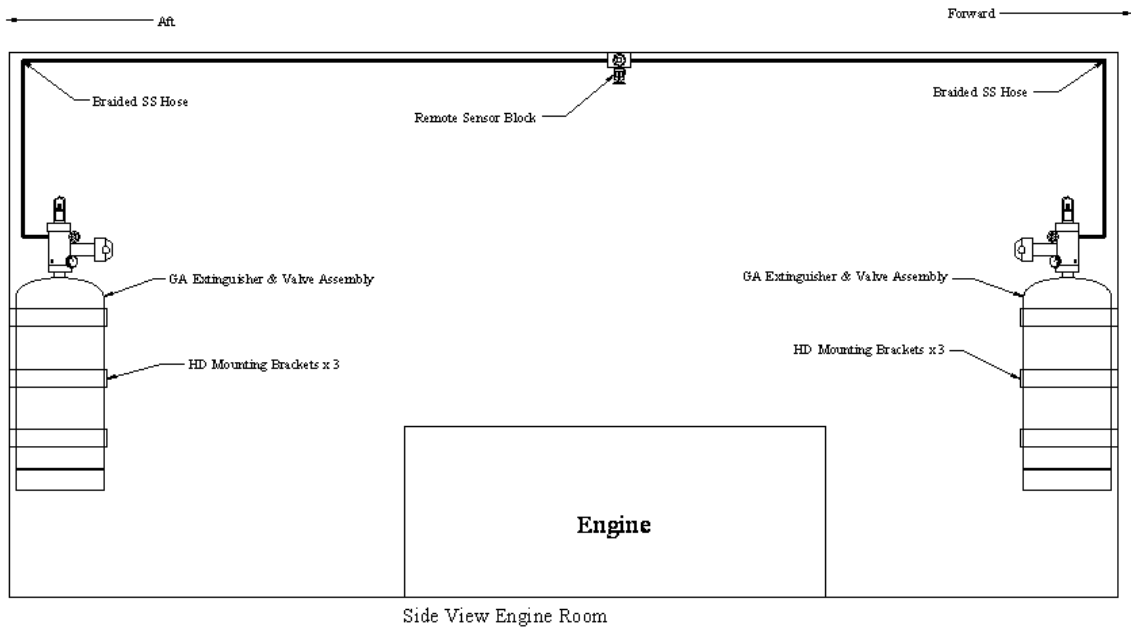
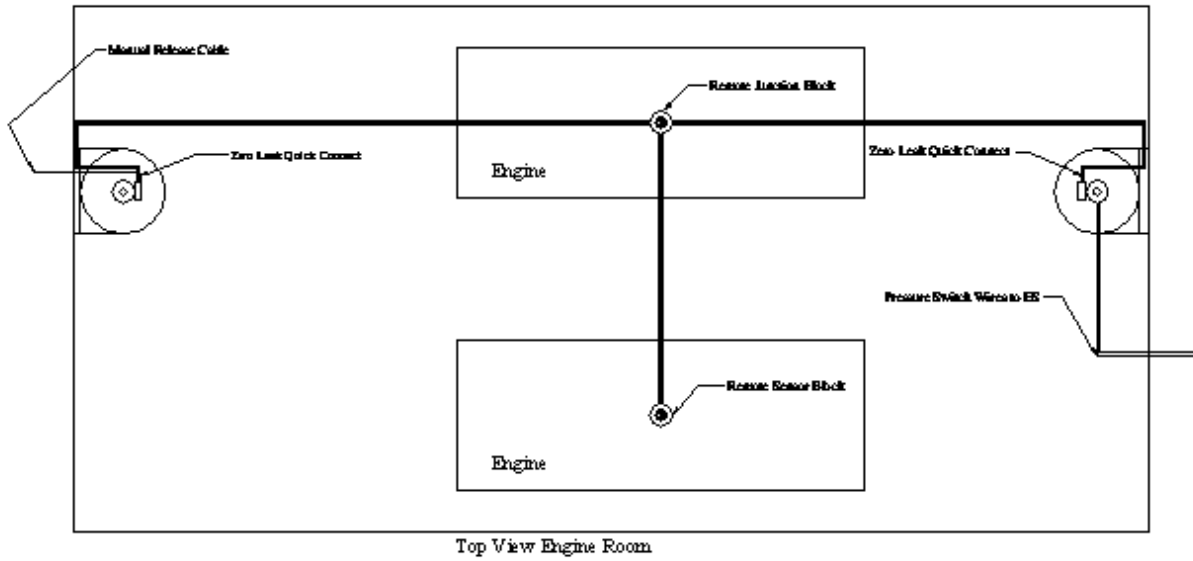
Each helm station must have a Fireboy deluxe discharge alarm and manual engine override control installed. This unit will sound an audible alarm, turn on a red light when the system discharges. The unit has a manual override selector switch to allow the operator to restart the engines after the fire is extinguished. The unit also has a green light that advises the operator of a charged and ready to operate system.

2 Design

2.1 General

The Fireboy GA series total flooding fire protection system is designed for installation in the engine room of boats and yachts with engine room's volumes of no more than 3000 cubic feet. Engine room volume should only be calculated with the assistance of an authorized Fireboy representative. Fireboy warranty and USCG approval requires that Fireboy approve and certify each installation in writing. This can be done by remote Fireboy personnel through drawings, sketches, digital emailed photos, and phone conversations. The GA series system is a two-cylinder design with a link hose connecting the two cylinders. This small connecting hose insures that the two cylinders will discharge simultaneously. Each cylinder has a control valve with a temperature control bulb and each system has two temperature control bulbs in the GA link assembly. These two bulbs should be mounted either directly over each engine or centrally in the engine room above the main engine or engines. Each system must have a manual release cable. Each system installation must include a Fireboy automatic engine shut down control.

Typical Installation



2.2 Extinguishing Agent

Fireboy GA series systems are supplied with clean agent HFC-227ea. HFC-227ea is the generic chemical name for Heptafluoropropane. It is on the EPA SNAP approved list, and is approved by the EPA and the USCG for use in normally occupied areas. HFC-227ea has an ODP of zero and is accepted by the European Union and most other countries. HFC-227ea is sold by Great Lakes Chemical under the trade name FM-200® and by Dupont under the trade name FE-227™.

2.3 Cylinder Size and Selection

The engine room volume should be calculated by carefully measuring the length, width, and height, including the vee portion of the bilge. The best way to calculate is to measure and determine the area of the forward bulkhead and multiply by the length. A Fireboy form is included in this manual in Appendix B. This form will assist in assuring an accurate calculation of the gross engine room volume. After the gross volume is determined, the volume of any “fixed tanks” should be calculated and deducted from the gross volume.

NOTE:

The gross volume MUST be used unless the boat manufacturer has attached a decal stating the volume of the fixed tanks to be deducted. The engines, generators, gearboxes, shafts, and other equipment cannot be deducted. A Fireboy authorized representative must be consulted and Fireboy must approve and certify the engine room volume. After the GA series system engine room volumes has been determined, use the chart from Section 6.1 to select the correct size system. Round up to the next size.

2.4 Manual Release Cable Selection

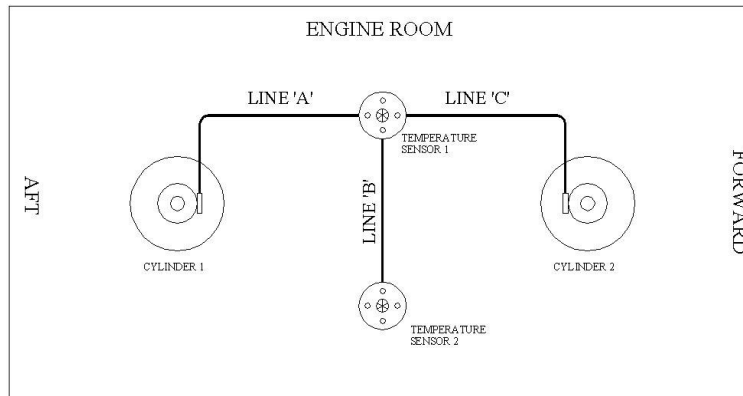
Fireboy manual release cable kits are available in lengths of six to 100 feet. Each kit contains the cable with special end to connect to the cylinder control valve, tee handle with safety pin, ID plate for helm station mounting. Measure the required length from the control valve to the mounting point of the tee handle, including the bends.

MANUAL RELEASE CABLES

| Model Number | Length | |
|--------------|---------|---------|
| E-4209-06 | 6 ft. | 1.83 m |
| E-4209-08 | 8 ft. | 2.44 m |
| E-4209-10 | 10 ft. | 3.05 m |
| E-4209-12 | 12 ft. | 3.66 m |
| E-4209-14 | 14 ft. | 4.27 m |
| E-4209-16 | 16 ft. | 4.88 m |
| E-4209-18 | 18 ft. | 5.49 m |
| E-4209-20 | 20 ft. | 6.10 m |
| E-4209-22 | 22 ft. | 6.71 m |
| E-4209-24 | 24 ft. | 7.32 m |
| E-4209-26 | 26 ft. | 7.92 m |
| E-4209-28 | 28 ft. | 8.53 m |
| E-4209-30 | 30 ft. | 9.14 m |
| E-4209-40 | 40 ft. | 12.19 m |
| E-4209-46 | 46 ft. | 14.02 m |
| E-4209-50 | 50 ft. | 15.24 m |
| E-4209-60 | 60 ft. | 18.29 m |
| E-4209-70 | 70 ft. | 21.34 m |
| E-4209-80 | 80 ft. | 24.38 m |
| E-4209-100 | 100 ft. | 30.48 m |

2.5 GA Link Dimensions and Temperature Bulb Location

The GA link hose is 316 flexible stainless steel with double check quick disconnects at each end. In the middle of the hose are two tee type manifolds on which are mounted bulb type temperature controls. Determine the length of each section as shown in the following sketch. Order the length in feet and inches (or meters) of each section, A, B, and C.



2.6 Engine Shut Down Control Selection

Fireboy offers three sizes of engine shut down controls in 12VDC and 12/24/32 VDC. All GA series systems with either diesel or gasoline engines must install a Fireboy engine shut down control. This control will shut down all main propulsion engines, auxiliary generators, blowers, and inlet dampers. See section 6.3 for available models.

3 Installation

3.1 General

Fireboy GA series systems are supplied with all of the mounting hardware required for installation. GA series systems typically require no piping and all hardware is to be carefully secured as described in Fireboy installation instructions. Each valve has a safety cover with a locking nut that will not allow the system to discharge until the installation is complete.

3.2 Installation and Location of Cylinders

GA series systems are shipped and carefully packaged with 2 cylinders factory pressurized to 360 psi. Cylinders should be handled with care, removed from their boxes, and mounted at once on the forward and aft bulkheads. Mount as high as possible in the protected area. Mount the cylinders in a vertical position only, do not tilt or mount horizontally!

CAUTION:

DO NOT ATTACH THE GA LINK HOSE UNTIL BOTH CYLINDERS ARE SECURELY MOUNTED!

3.3 Installation of Mounting Brackets

Each cylinder is supplied with (3) mounting brackets with mounting hole templates. Use the templates to drill mounting holes on each bulkhead. Mount the bracket first, and then use the main U bracket to mount the cylinder.

3.4 Installation of the GA Link and Temperature Bulbs

The GA link hose with the two temperature bulbs and quick disconnects will be shipped in one assembly and will not be under pressure. The A length hose and the B length hose should be tie wrapped and secured to the ceiling of the engine room, the bulb manifolds should be mounted in the ceiling in a central location above the engines. The manifolds have mounting

holes to secure them to the ceiling. The female end quick disconnect coupling on the GA link hose should be pushed and then snapped onto the male quick disconnect coupling located on the control valve. Do not connect GA link hose to control valve until both cylinders are securely mounted with provided mounting brackets and it has been verified that the safety nuts are installed and finger tight. After coupling both ends of the GA link hose, check the pressure gauge on the manifold to insure that the supercharge pressure is in the green section of the gauge.

3.5 Installation of Manual Release Cable

WARNING:

1. All Fireboy GA Systems installations must use only genuine Fireboy cables and associated components that are engineered specifically for this application.
2. Nothing else will provide the intended degree of safety and reliability inherent in these systems.
3. Any substitution will void all laboratory and Coast Guard approvals and Fireboy-Xintex warranties, and may result in an inoperative system, and unsafe and hazardous conditions.
4. Never install a manual release handle in the space to be protected.

NOTE:

DO NOT CONNECT CABLE TO CYLINDER AT THIS TIME!

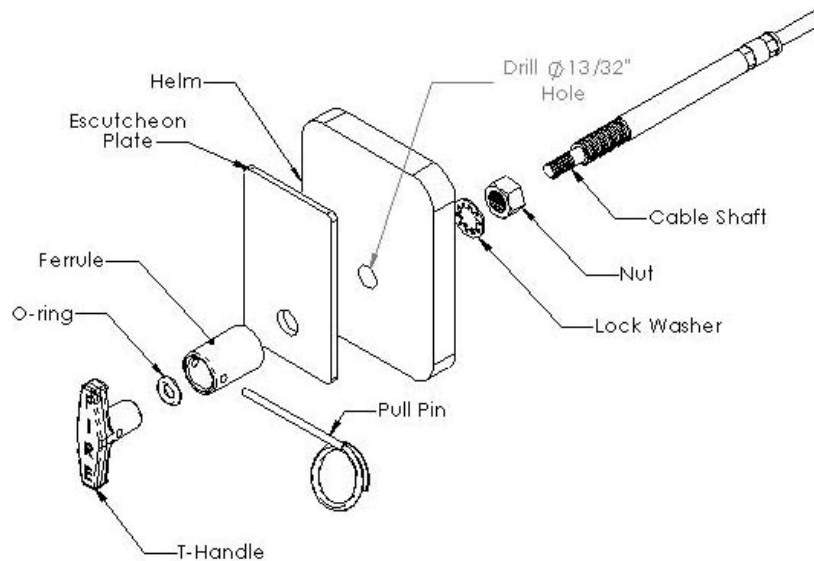
Routing the cable:

1. Locate the escutcheon plate (2 ½" x 4" with 13/32 hole) for the manual release handle.
 - On a firm support
 - In full view of the operator
 - With enough clearance for the cable ferrule to extend approximately 12 inches behind the panel
2. Using the escutcheon plate as a template, locate and drill a 13/32" hole.
3. Route the cable in the most direct manner, with as few bends as possible, to the cylinder location.
 - Do not bend in a radius of less than 6 inches (a 12 inch circle)
 - Follow the same route as manufacturer installed cables, if possible (Example: Steering, throttle, and transmission cables)
 - Do not subject cable to pinching or crushing, rubbing, extreme vibration, sharp bending or kinking, or extremes of heat or cold
 - Do not exceed 360° of bends (Example: Four 90° bends = 4 x 90° = 360°)
 - Use the shortest allowable cable whenever possible
4. Secure loose sections of the cable with the included clamps.
 - Do not clamp cable in a bend
 - Do not crush cable with clamps

Escutcheon Panel and T-Handle:

1. Ensure temperature is above +50°F (10°C) for proper adhesion.
2. Peel the release paper from the back of the escutcheon plate.
3. Align the larger hole with the 13/32 hole drilled in dash.
4. Press escutcheon plate down evenly to activate adhesive.
5. Following figure on following page, place nut on the cable and screw down until tight.
6. Place lock washer on the cable end and insert through 13/32" hole in the panel and escutcheon plate.
7. Pull cable to full extension.
8. Screw ferrule onto cable 3 complete revolutions.
9. Slide o-ring onto cable shaft.
10. Screw red T-handle onto cable shaft (Do not obstruct cross hole in T-handle).
11. Push red T-handle into ferrule firmly to seat o-ring.
12. Varrify that cable slides freely by moving T-handle in and out.
13. Align holes in ferrule and T-handle.
14. Align T-handle so the word "FIRE" is vertical.
15. Tighten the nut behind the panel.

16. Install pull pin.
17. Pass the red tamper proof seal through the ring of the pull pin and around the ferrule.
18. Insert the free end of the seal into the projecting portion of the tab end (marked "enter").
19. Pull seal snug to secure the pull pin from accidental release.



Connecting Cable to Cylinder

WARNING:

ACCIDENTAL DISCHARGE DURING HANDLING OR INSTALLATION MAY CAUSE SERIOUS INJURY. DO NO LIFT, CARRY, OR HANDLE BY ACTUATOR, PRESSURE SWITCH, OR CABLE. WEAR EYE PROTECTION WHEN INSTALLING OR SERVICING CYLINDER.

NOTE:

IF A DUAL RELEASE ADAPTER (DRA-1001) IS TO BE USED WITH THIS INSTALLATION, FOLLOW THE INSTRUCTIONS ENCLOSED WITH THAT UNIT AT THIS TIME.

With the cylinder mounted, insert cable end into hole in upper end of cylinder manifold. Depending on the model number of the system you are installing, the "S" hook of the cable is inserted on the right or left side of the manual actuator lever. Push the cable end through the hole in the cylinder manifold for enough to allow you to bend the flexible center from the proper side. Move the cable jacket ferrule back into the manifold and insert the wire-retaining clip provided, into the slot at the top of the manifold to secure the cable taking care to insure that the pin passes through the circular groove in the cable ferrule.

CAUTION:

WITH THE "S" HOOK IN PLACE, AND THE CABLE END RETAINING CLIP **NOT** INSTALLED, ANY PULL ON THE CABLE EXCEEDING 20 POUNDS WILL ACTUATE THE RELEASE MECHANISM. THE CABLE SHOULD NEVER BE INSTALLED OR REMOVED WITHOUT THE CYLINDER BEING SECURELY FASTENED IN ITS MOUNTING BRACKETS. ALWAYS WEAR EYE AND FACE PROTECTION EQUIPMENT WHILE PERFORMING THIS PROCEDURE.

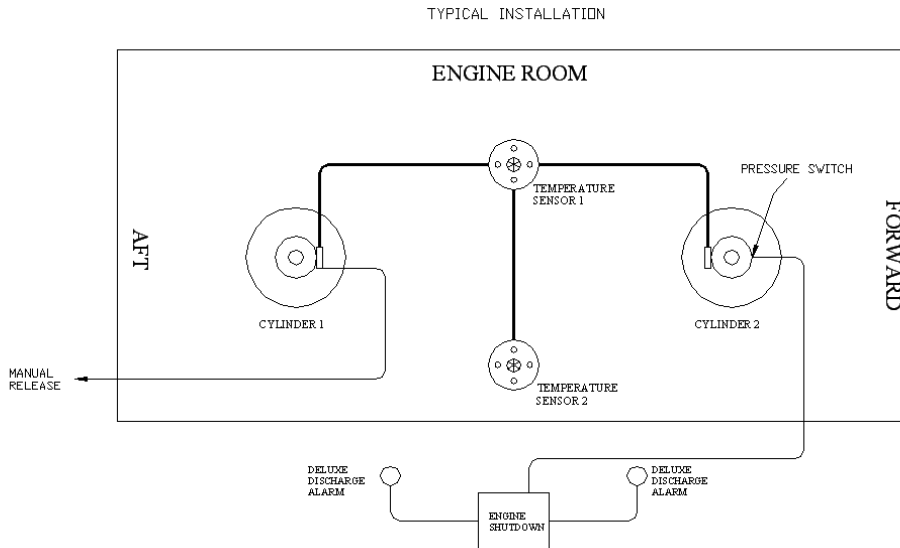
3.6 Installation of Helm Station Deluxe Discharge Alarm

A Deluxe Discharge Alarm must be mounted at each helm station. Wiring instructions are provided with the engine shut down control.

3.7 Installation of Engine Shut Down Control

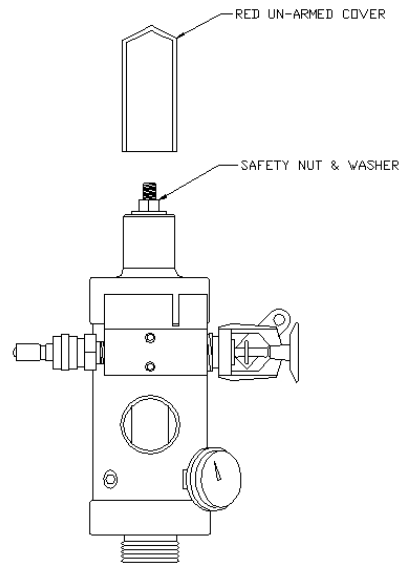
Engine shut down controls should not be installed in the engine room. Preferred mounting is in a helm station control panel.

3.8 Typical Installation Drawing:



3.9 Arming the System

After installation is complete, verify that the cylinders are linked by checking the pressure gauge on the temperature sensor. If the pressure gauge is in the green then both extinguishers are linked and the system is stable. If the pressure gauge is not in the green re-check the quick coupling connections to assure they are firmly connected. Once the system is stable, remove the "Red Un-Armed" vinyl cover from the top of each extinguisher. Then remove the nut & washer atop each unit. Once the nut & washer are removed the system is active and can be discharged. Place the included "Black Armed" vinyl cover atop each cylinder. See figure below for details.



4 Operation

4.1 General

The GA series Fireboy system is designed to operate both as an automatic temperature released system and a manually released system. When the temperature at any one of the four temperature bulbs reaches 175°F (79°C), the bulb will break venting the pressure in all areas of the GA link simultaneously discharging both cylinders. Pulling the T-handle of the manual cable will also break a temperature bulb releasing both cylinders simultaneously. The automatic engine shut down control will shut down the engines, generators, blowers, and other devices as the cylinders discharge.

4.2 Operating Procedures

In either manual or automatic mode, the pressure switch on the control valve will actuate the automatic engine shut down control and will shut down all engines, blowers, and inlet dampers. The horn and red light on the helm station deluxe discharge alarm will activate, alerting the operator or other personnel of the fire. If a fire is discovered while in the engine room, the person should leave the engine room at once and pull the manual release handle actuating the system. The engine room will totally flood with agent, which will completely extinguish the fire.

Do not open the engine room door or hatches for at least ten minutes after discharge.

4.3 Post Fire Operation

After determining that the fire has been extinguished the operator may restart the engines by moving the selector switch on the deluxe discharge alarm from automatic to manual. This will manually override the engine shut down control and allow the engines to restart.

Do not attempt to restart the engines until the fire is completely extinguished.

4.4 Cylinder Recharge

Empty cylinders should be returned to Fireboy for refilling and recharging. Address information can be found at the back of this manual. Do not attempt to have cylinders recharged by a local source.

4.5 Special Precautions

Do not allow unauthorized personnel to work on the GA series Fireboy system.

After initial installation, do not uncouple or re-couple GA link hose quick disconnects without first reinstalling the safety nut and washer.

Carefully open engine room door after not less than ten minutes to insure that the fire is out, before restarting engines.

5 Maintenance

5.1 General

The GA series system is designed to provide long life and low maintenance service. However, periodic inspection and minor maintenance will only improve the life of the system. It is not necessary to perform any specific inspections other than system pressure and cylinder weight.

5.2 Preventive Maintenance

Inspect the pressure gauge and the system every 6 months. Remove and weigh the cylinder (less brackets) annually. Do not use a hand held scale. Use an accurate scale that has been independently certified. Record results on tag provided. If weight is below that shown on each unit's nameplate, remove from service immediately. If leakage is suspected, brush liquid soap on all points of possible leaks, or submerge entire unit in clean water and watch

carefully for 5 to 10 minutes. Leaks will appear as tiny bubbles. If leakage is found, return the unit to manufacturer immediately for repair or replacement (See Section 7 for Limited Warranty information). Remember the two most important requirements to assure full charge and reliability of your Fireboy GA system are (1) visual inspection of the gauge and the actuator to determine if it has been actuated; (2) weighing the unit, the sure method of determining the contents of the agent in the system.

The DOT also requires either:

- a) A periodic 5-year visual inspection of the cylinders by someone with a current RIN.
- b) A 12-year hydrostatic cylinder test for re-qualification of the cylinders.

Contact Fireboy for details.

The manual release cable should be inspected annually for corrosion or contamination. Electrical engine shut down controls and discharge alarms should be visually inspected for damage or corrosion annually.

A summary of the inspection requirements can be reviewed in Appendix D

5.3 Post Fire Maintenance

After a fire is extinguished, the engines restarted, and the vessel is returned to port, an extensive search should be done in the engine room to locate the cause of the fire. Call your local fire department and ask them to inspect the damage. (Your insurance will most likely require this.) Locate the cause of the fire and have authorized repair personnel complete repairs and insure the cause of the fire has been corrected. If damage is beyond smoke, all GA series components should be removed and, if damaged, replaced. Check wiring carefully. Call in a Fireboy authorized representative to review the repaired installation of equipment. The fire system should be re-certified by Fireboy personnel.

5.4 Recharging Cylinders

After a fire, cylinders must be returned to the factory for inspection and possible refilling. If the heat of the fire has damaged the cylinder or control valve, it will be necessary to replace with new equipment.

5.5 Servicing the System

Always install safety lock nuts on each valve (finger tight) prior to uncoupling the quick disconnect hose connectors or performing any maintenance function.

6 List of Approved System Components

Cylinder and Valve Assemblies

| Model Code | Agent Weight (per cylinder) | | Number of Cylinders | Diameter (Inches) | Total Height (Inches) | Maximum Volume Protected | | Gross Weight (per cylinder) | | U.S. Coast Guard Approval No. |
|-------------|--------------------------------|--------|---------------------------|----------------------|--------------------------|--------------------------------|--------|--------------------------------|------|-------------------------------------|
| | (Lbs.) | (Kgs.) | | | | Cu. Ft. | Cu. M. | Lbs. | Kgs. | |
| GA-1600-227 | 34.6 | 15.7 | 2 | 10 | 26.2 | 1600 | 45.3 | 68.8 | 31.3 | 162.029/240/0 |
| GA-1700-227 | 36.7 | 16.7 | 2 | 10 | 26.2 | 1700 | 48.2 | 70.9 | 32.2 | 162.029/240/0 |
| GA-1800-227 | 38.9 | 17.7 | 2 | 10 | 26.2 | 1800 | 51.0 | 73.1 | 33.2 | 162.029/240/0 |
| GA-1900-227 | 41.0 | 18.7 | 2 | 10 | 26.2 | 1900 | 53.8 | 75.2 | 34.2 | 162.029/240/0 |
| GA-2000-227 | 43.2 | 19.6 | 2 | 10 | 26.2 | 2000 | 56.7 | 77.4 | 35.2 | 162.029/240/0 |
| GA-2100-227 | 45.4 | 20.6 | 2 | 10 | 32.4 | 2100 | 60.2 | 85.9 | 39.1 | 162.029/240/0 |
| GA-2200-227 | 47.5 | 21.6 | 2 | 10 | 32.4 | 2200 | 62.3 | 88.1 | 40.0 | 162.029/240/0 |

| | | | | | | | | | | |
|-------------|------|------|---|----|------|------|------|-------|------|---------------|
| GA-2300-227 | 49.7 | 22.6 | 2 | 10 | 32.4 | 2300 | 65.2 | 90.2 | 41.0 | 162.029/240/0 |
| GA-2400-227 | 51.8 | 23.6 | 2 | 10 | 32.4 | 2400 | 68.0 | 92.4 | 42.0 | 162.029/240/0 |
| GA-2500-227 | 54.0 | 24.5 | 2 | 10 | 32.4 | 2500 | 70.8 | 94.6 | 43.0 | 162.029/240/0 |
| GA-2600-227 | 56.2 | 25.5 | 2 | 10 | 32.4 | 2600 | 73.7 | 96.7 | 44.0 | 162.029/240/0 |
| GA-2700-227 | 58.3 | 26.5 | 2 | 10 | 32.4 | 2700 | 76.5 | 98.9 | 45.0 | 162.029/240/0 |
| GA-2800-227 | 60.5 | 27.5 | 2 | 10 | 32.4 | 2800 | 79.3 | 101.0 | 45.9 | 162.029/240/0 |
| GA-2900-227 | 62.6 | 28.5 | 2 | 10 | 32.4 | 2900 | 82.2 | 103.2 | 46.9 | 162.029/240/0 |
| GA-3000-227 | 64.8 | 29.5 | 2 | 10 | 32.4 | 3000 | 85.0 | 105.4 | 47.9 | 162.029/240/0 |

6.2 Fireboy Stainless Steel GA Link Assembly - (A Length) – (B Length) – (C Length).
GA Link – A-B-C, GA Link – A-B-C-90

6.3 Engine Shutdown Controls:

ES Model Engine Shutdown (10 amp engine contacts)

12 VDC Models:

ES-3000-01-12VDC
ES-3000-02-12VDC
ES-3000-30S-12VDC

3-Circuit

ES-5000-01-12VDC
ES-5000-02-12VDC
ES-5015-01-12VDC
ES-5015-02-12VDC

5-Circuit

ES-8000-01-12VDC
ES-8000-02-12VDC
ES-8015-01-12VDC
ES-8015-02-12VDC

8-Circuit

24/32 VDC Models:

ES-3000-01-24/32VDC
ES-3000-02-24/32VDC
ES-3000-30S-24/32VDC

ES-5000-01-24/32VDC
ES-5000-02-24/32VDC
ES-5015-01-24/32VDC
ES-5015-02-24/32VDC

ES-8000-01-24/32VDC
ES-8000-02-24/32VDC
ES-8015-01-24/32VDC
ES-8015-02-24/32VDC

ELS Model Engine Shutdown (2 amp engine contacts)

(All models will operate on 12/24/32 VDC)

3-Circuit: ELS-3510-01 or ELS-3510-02

5-Circuit: ELS-5510-01 or ELS-5510-02

8-Circuit: ELS-8510-01 or ELS-8510-02

6.4 Deluxe Discharge Alarm:

Model DA-1001-01I, Model DA-1001-02I

6.5 Mounting Brackets:

Bale - 100022

Base Bracket - 100023

7 Warranty

THREE (3) YEAR LIMITED WARRANTY

This warranty is in lieu of all other express or implied warranties

This warranty title, materials, and workmanship on equipment, except components manufactured by others for which Seller assigns, as permitted, the original manufacturer's warranty. Seller's warranty shall be for a period of (3) three years from the date of sale to the ORIGINAL CONSUMER PURCHASER, during which non-conforming equipment returned to Seller at Buyer's expense and risk be repaired or replaced at Seller's option. Fireboy-Xintex, Inc. will repair or replace products found to be defective in materials or workmanship within the period set forth above, provided that: (a) the product has not been subject to abuse, contamination, neglect, accident, incorrect wiring not our own, improper installation or servicing, or used in violation of instructions furnished by Fireboy-Xintex, Inc. and (b) as to any prior defects in materials or workmanship covered by this warranty, the product has not been repaired or altered by anyone except Fireboy-Xintex, Inc. and (c) the serial number has not been removed, defaced, or otherwise changed, and (d) examination discloses, in the judgment of Fireboy-Xintex, Inc. does not assume the costs of removal and/or installation of the product or any other incidental costs which may arise as a result of any defect in materials or workmanship, and (e) upon discovery of defect Buyer shall immediately cease use of and notify Fireboy-Xintex, Inc.

ANY WARRANTY IMPLIED BY LAW, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS, IS IN EFFECT ONLY FOR THE ABOVE DURATION OF THE EXPRESS WARRANTIES SET FORTH ABOVE; NO PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY, OR TO ASSUME FOR FIREBOY-XINTEX, INC. ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS. FIREBOY-XINTEX, INC. SHALL NOT BE LIABLE FOR THE LOSS OF USE, REVENUE, OR PROFIT OR FOR ANY INJURY, OR FOR ANY OTHER CONSEQUENTIAL OR INCIDENTAL DAMAGES, BUYER IS NOT RELYING ON SELLER'S JUDGEMENT REGARDING HIS PARTICULAR REQUIREMENTS, AND HAS HAD AN OPPORTUNITY TO INSPECT THE PRODUCT TO HIS SATISFACTION.

This warranty gives you specific legal rights, and you may also have other rights, which vary, from state to state.

FIREBOY - XINTEX

O-379 Lake Michigan Drive
Grand Rapids, Michigan 49534

Phone: 616-735-9380

Fax: 616-735-9381

Email: fireboy@fireboy-xintex.com

Web: www.fireboy-xintex.com 2006 Fireboy-Xintex, Inc.

The MSDS format adheres to U.S. standards and regulatory requirements and may not meet regulatory requirements in other countries. This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience are gained.

FE-227

6160 FR Revised 22-SEP-2000 Printed 30-MAR-2001

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

FE-227 is a registered trademark of DuPont.

CAS Number : 431-89-0

Formula : CF₃ CHF CF₃

Molecular Weight : 170.04

CAS Name : Propane, 1,1,1,2,3,3,3-Heptafluoro-

Tradenames and Synonyms

HFA 227ea

FC-227ea

Dymel 227 ea/p

2-Hydroperfluoropropane

Propane, 1,1,1,2,3,3,3-Heptafluoro-

HFC-227ea

2-Hydroheptafluoropropane

FM-200(tm) Great Lakes Chemical Corp.

Heptafluoropropane

Company Identification

MANUFACTURER/DISTRIBUTOR

DuPont

Fluoroproducts

1007 Market Street

Wilmington, DE 19898

PHONE NUMBERS

Product Information : 1-800-441-7515

Transport Emergency : CHEMTREC 1-800-424-9300

Medical Emergency : 1-800-441-3637

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material CAS Number %

1,1,1,2,3,3,3-Heptafluoropropane

HAZARDS IDENTIFICATION

Potential Health Effects

Symptoms similar to oxygen deprivation (headache, nausea, dizziness or loss of consciousness) may result from overexposure by inhalation. Gross overexposure by inhalation may cause irregular pulse, heart palpitations and potentially fatal cardiac sensitization. Cold, white or discolored skin or in severe cases blistering, can be a sign of frostbite caused by cold liquids or gases. Eyes: Direct eye contact with the liquid or cold gas can cause chilling or possibly frostbite of exposed tissues.

Skin: Direct skin contact with the liquid or cold gas can cause chilling or possibly frostbite of exposed tissues.

Ingestion: Not expected to be a hazard in normal industrial use.

Inhalation: Inhalation of high concentrations can be harmful or fatal due to oxygen deprivation and/or heart irregularities (arrhythmias). Misuse of product by deliberately inhaling high concentrations of this gas could cause death without warning.

Medical Conditions Aggravated by Exposure: Persons with pre-existing cardiac, respiratory or central nervous system disorders may be more susceptible to effects of an overexposure.

Notice to Physicians: Overexposure to this material may make the heart more susceptible to arrhythmias. Catecholamines such as adrenaline and other compounds having similar effects should be reserved for emergencies and then used only with special caution. Vapors are heavier than air and pose a hazard of suffocation if trapped in enclosed or low places.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

INHALATION

If inhaled, immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

Treat for frostbite if necessary by gently warming affected area.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not considered a potential route of exposure.

FIRE FIGHTING MEASURES

Flammable Properties

1,1,1,2,3,3,3-Heptafluoropropane is not flammable, however in the presence of a flame or ignition source it may decompose to form toxic hydrogen fluoride or carbonyl fluoride. Non-flammable.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

Self-contained breathing apparatus (SCBA) may be required if cylinders rupture or release under fire conditions. Keep cylinders cool with water spray applied from a safe distance.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE:

Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Evacuate personnel, thoroughly ventilate area, use self-contained breathing apparatus. Keep upwind of leak - evacuate until gas has dispersed.

Initial Containment

Use forced ventilation to disperse vapors.

HANDLING AND STORAGE

Handling (Personnel)

Do not breathe gas. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling. Wash clothing after use.

Storage

Store in a well ventilated place. Store in a cool, dry place. Keep container tightly closed.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use only with adequate ventilation. Keep container tightly closed.

Personal Protective Equipment

EYE/FACE PROTECTION

Wear safety glasses or coverall chemical splash goggles.

RESPIRATORS

Wear NIOSH approved respiratory protection, as appropriate.

PROTECTIVE CLOTHING

Where there is potential for skin contact have available and wear gas appropriate impervious gloves, apron, pants, and jacket.

Exposure Guidelines

Exposure Limits

FE-227

AEL * (DuPont) : 1000 ppm, 8 & 12 Hr. TWA

- AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point : -15.6 C (3.9 F)

Melting Point : -133 C (-207 F)

Vapor Pressure : 66.69 psia @ 25 C (77 F) (460.06 kPa)

Liquid Density : 1.386 g/cm³ @ 25 C (77 F) (86.53 lb/ft³)

Critical temperature : 101.6 C (214.9 F)

Critical pressure : 424.7 psia (2930 kPa)

Odor : Slight Ethereal

Form : Liquified Gas

STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Avoid sources of heat or open flame.

Incompatibility with other Materials

Incompatible with strong reducing agents such as alkali metals (e.g., sodium, potassium), alkali-earth metals (e.g., magnesium, calcium), and powdered aluminum or zinc.

Decomposition

Decomposes by reaction with high temperature (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid, carbonyl fluorides, carbon monoxide and carbon dioxide.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

Groups of six rats were exposed for four hours to 25,000 or 53,000 ppm of FC-227ea. No deaths occurred. Signs of toxicity during exposure included irregular breathing, slight lacrimation and red ears. No toxic signs were seen post exposure. Animal studies have found the rat four hour LC50 to be >788,696 ppm (80%), the highest level tested.

A cardiac sensitization study in dogs found the No Observable Adverse Effect Level (NOAEL) to be 9.0%. The Lowest Observable Adverse Effect Level (LOAEL) for this study was reported to be 10.5%. A 90 day inhalation study did not find any exposure related effects at 105,000 ppm (10.5% vol./vol.), the highest level tested. Tests have shown that this material does not cause genetic damage in bacterial and mammalian cell cultures. When evaluated by an in-vivo mouse micronucleus assay, no increase in micronuclei was observed.

DISPOSAL CONSIDERATIONS

Waste Disposal

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations. Incinerate material in accordance with Federal, State/Provincial and Local requirements.

TRANSPORTATION INFORMATION

Shipping Information

DOT

Proper Shipping Name : Heptafluoropropane

Hazard Class : 2.2

I.D. No. (UN/NA) : UN 3296

DOT Label(s) : Nonflammable Gas

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Listed.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes

Chronic : No

Fire : No

Reactivity : No

Pressure : No

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating

Health : 1

Flammability : 0

Reactivity : 1

NPCA-HMIS Rating

Health : 1

Flammability : 0

Reactivity : 0

Personal Protection rating to be supplied by user depending on use conditions.

Additional Information

Some of the health and toxicity information was provided from a Great Lakes Chemical Corporation MSDS.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS : MSDS Coordinator

> : DuPont Fluoroproducts

Address : Wilmington, DE 19898

Telephone : (800) 441-7515



Appendix B GA Series Design Guide and Form

_____ Date

Customer Name _____ Project Name, Boat Name _____ Date Installed _____

Engine Room, Length _____, Width _____, Height _____

Engine Room Gross Volume _____ ft³

Fixed Tanks Gross Volume (from decal provided by Boat Manufacturer) _____ ft³

Engine Room Volume _____ ft³
Less Fixed Tanks

Number of helm stations _____

GA Link Dimensions, A _____ ft., B _____ ft., C _____ ft.

Manual Cable Length, Helm Station A _____ ft., B _____ ft., Exit Door _____ ft.

Number of engines _____, generators _____, blowers _____, dampers _____

Make and model number of engines _____

Generators _____

Battery Voltage (Check one) 12Vdc _____ 24Vdc _____

| Product | Model Number | Quantity | Price Each | Extended Price |
|---|--------------|----------|------------|----------------|
| GA Series | | | | |
| GA-Link | | | | |
| Manual Release Cable | | | | |
| Manual Release Cable | | | | |
| Manual Release Cable | | | | |
| Dual Release Adapter | | | | |
| Engine Shutdown | | | | |
| Discharge Alarm – 2 nd Station | | | | |
| External Fire Bell | | | | |
| Total Price | - | - | - | \$ |

This form must be filled out and faxed to Fireboy-Xintex, Fax# 616-735-9381. Then telephone Fireboy-Xintex for installation discussion and certification. Fireboy must have this form signed and in our files for warranty to be applicable.

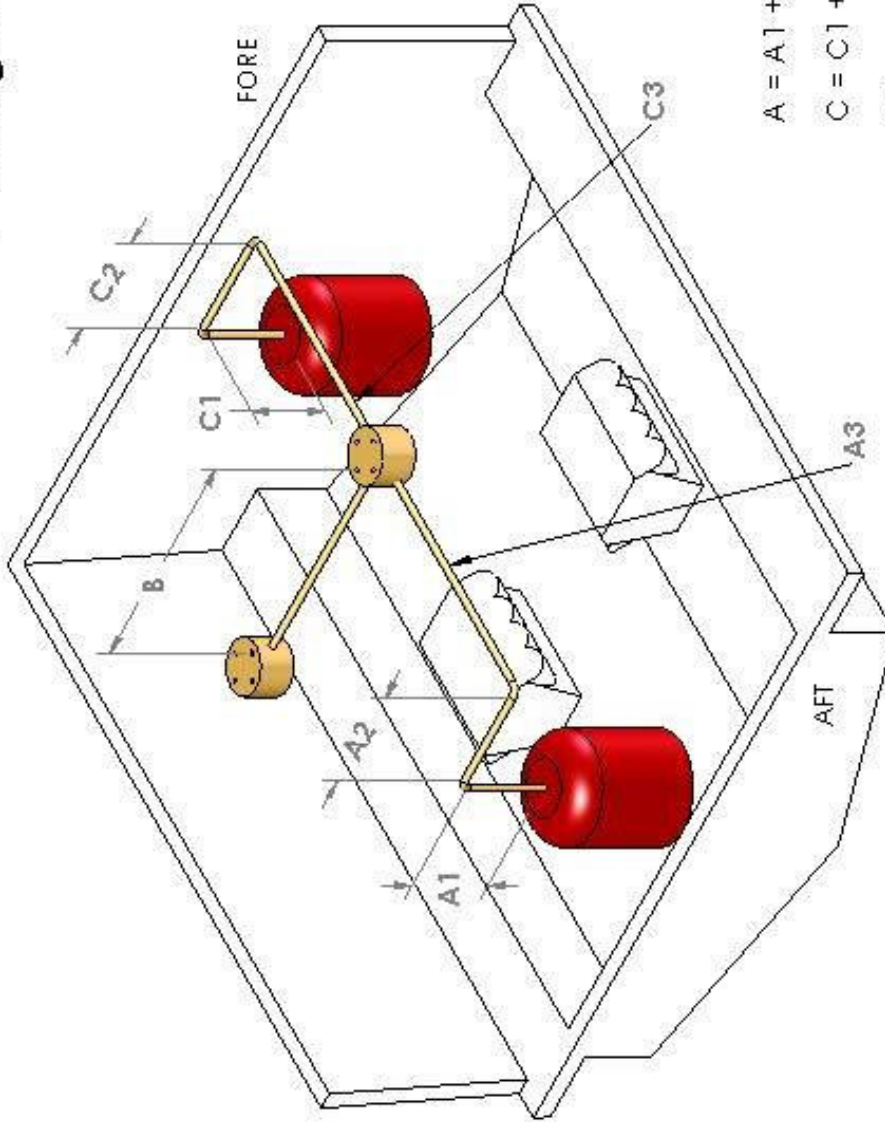
Certified by Installer

Certified by Fireboy-Xintex

Date _____

Date _____

APPENDIX B1: Please refer to the diagram below to determine GA Link Dimensions
"T" Configuration



- A1 = _____ ft
- A2 = _____ ft
- A3 = _____ ft
- C1 = _____ ft
- C2 = _____ ft
- C3 = _____ ft

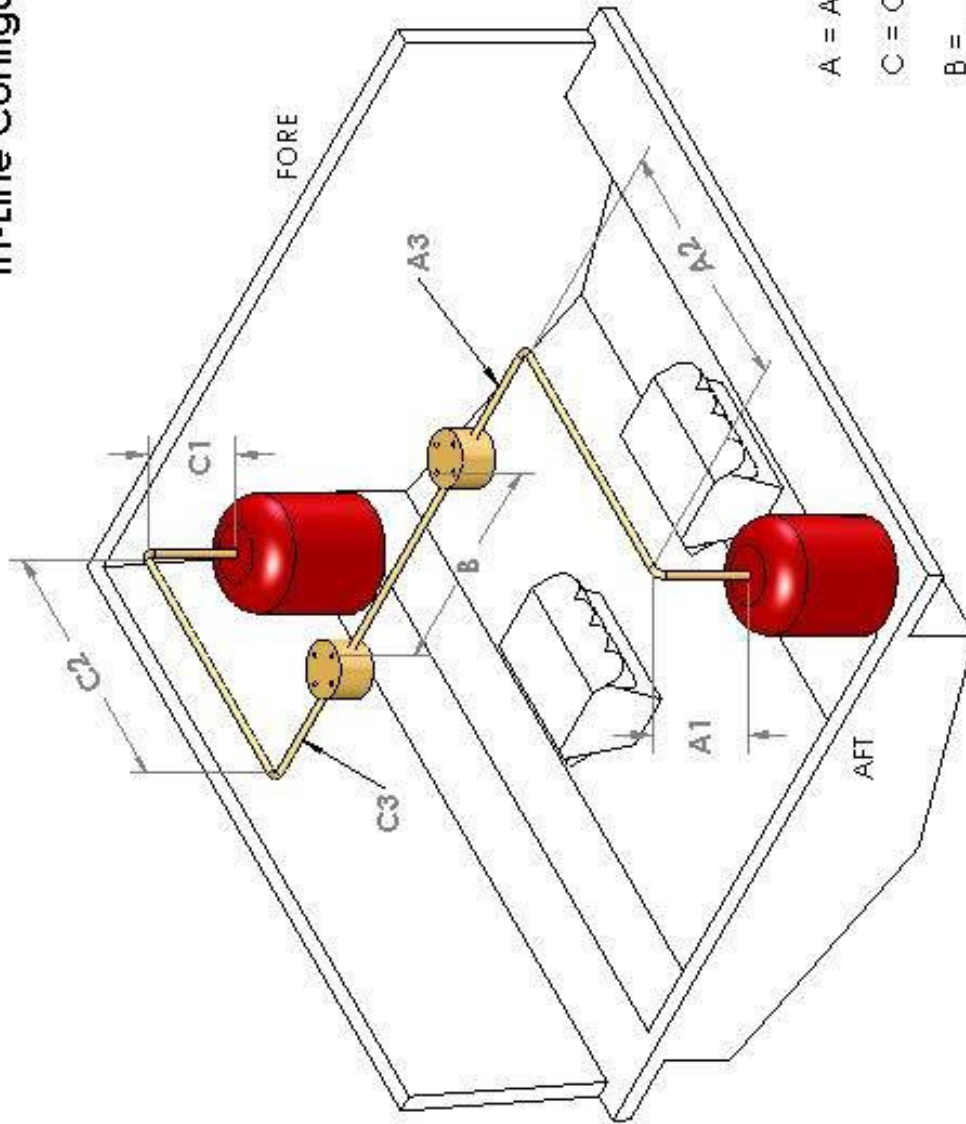
$$A = A1 + A2 + A3 + 1 = \text{_____ ft}$$

$$C = C1 + C2 + C3 + 1 = \text{_____ ft}$$

$$B = \text{_____ ft}$$



APPENDIX B2: Please refer to the diagram below to determine GA Link Dimensions
In-Line Configuration



A1 = ____ ft
 A2 = ____ ft
 A3 = ____ ft
 C1 = ____ ft
 C2 = ____ ft
 C3 = ____ ft

$A = A1 + A2 + A3 + 1 =$ ____ ft

$C = C1 + C2 + C3 + 1 =$ ____ ft

B = ____ ft



5 4 3 2 1

Appendix C



Shipping: 0-379 Lake Michigan Dr., N.W. Grand Rapids, MI 49534
Email: fireboy@fireboy-xintex.com Web Site: fireboy-xintex.com
TOLL FREE 1-866-350-9500, Phone 616 -735-9380, Fax 616 -735 -9381

Date: 08/14/07
To: All Fireboy fire extinguishing system users
From: Perry DeYoung – Fireboy-Xintex Inc. - Engineering Manager
RE: Periodic inspection and re-qualification of Fireboy clean agent shipboard fixed fire extinguishing systems.

Minimum Fireboy clean agent shipboard fixed fire extinguishing system testing and inspection requirements summarized as follows:

CFR, USCG and NFPA requirements:

| | | |
|--------------------------------------|----|-----------------------|
| Check pressure gauge | 6 | months ^a |
| Weigh cylinder(s) | 1 | year ^b |
| Link pressure test (GA systems only) | 5 | years ^c |
| Cylinder hydro test | 12 | years ^{e, g} |

CFR, USCG and NFPA alternative requirements:

| | | |
|--------------------------------------|---|-----------------------|
| Check pressure gauge | 6 | months ^a |
| Weigh cylinders | 1 | year ^b |
| Link pressure test (GA systems only) | 5 | years ^c |
| Visual external inspection | 5 | years ^{f, g} |

The results of inspections must be recorded on the tag attached to the cylinder

^a NFPA 2001 6.1.3

^b NFPA 2001 6.1

^c NFPA 2001 6.

^e 49 CFR 180.209

^f 49 CFR 180.209(g)

^g Testing must be completed by a person holding a current RIN (Re-qualification Identification Number) and results recorded in accordance with 49 CFR 180.215

Appendix D

Engine Shutdown Manual



Series 3000, 5000 & 8000 Engine Shutdown/Override System Installation & Owners Manual For Fireboy Automatic Extinguishing Systems

Round Bezel Part Numbers:

ES-3000-01, ES-5000-01, ES-8000-01, ELS-3510-01, ELS-5510-01, ELS-8510-01

Square Bezel Part Numbers:

ES-3000-02, ES-5000-02, ES-8000-02, ELS-3510-02, ELS-5510-02, ELS-8510-02



Warning!

This engine shutdown/override system is intended for use with Fireboy Fire Extinguisher systems only and must be installed by a qualified marine technician familiar with ABYC. This unit is not to be installed in engine, bilge or fuel storage compartments. Read this manual thoroughly before installing system, and comply with all installation instructions (See Sec. 6)

The engine shutdown system shall be installed by a qualified marine electrician.

Note: the display unit in these systems replaces the lamp and escutcheon plate provided with each Fireboy system.

1.0 Operation

In the event of a fire on board a vessel while underway, which is equipped with an automatic fire extinguisher system, it is important that engine, generator, and blower systems be shut down immediately upon discharge of the system so that:

- A. The fire cannot be fueled by the continued operation of engine systems. For example: fuel and injection pumps and engine operated generators and alternators;
- B. The agent concentration is allowed to remain in compartment and is not exhausted or depleted by the engine air intakes or ventilation blowers.

1.1

The Fireboy engine shutdown system provides this function by means of a pressure switch at the extinguisher (Fireboy CG, MA and GA models only), a relay-terminal box installed at the helm station, and an instrument display unit. The display unit provides system status (charged/discharged both visual and audible) and an override switch to allow restarting of the engine after a discharge or to prevent engine shutdown in a crowded water-way.

The operator should be aware that even though the override/normal switch is in the “override” position, the discharge from the Fireboy extinguisher system may cause gasoline engines to stall because of the effect of agent on the combustion process.

A second instrument display unit (optional) can be installed at a fly-bridge helm or other remote location.

1.2

In the event of a fire, the Fireboy extinguisher system will discharge, activating the shutdown/override system to interrupt the primary ignition circuit (gasoline engines), or the fuel solenoids of diesel engines.

Immediately after the Fireboy system discharges in response to a fire, and the shutdown/override system stops the engines, all engine/generator electrical and mechanical controls shall be turned to their “off” positions until determination of the cause of the fire has been made and corrected.

1.3

Two points must be noted with regard to the use of the engine shutdown system with Fireboy extinguisher system.

- A. The engine shutdown system will in no way effect the discharge operation of Fireboy extinguisher systems.
- B. Disconnecting the instrument display from the relay terminal board does not affect the shutdown function of the system, even though the override and indication functions of the instrument display are lost.

NOTE that circuits 1, 2 and 3 have common, normally open, and normally closed circuits that are isolated from each other and the shutdown/override control system. This facilitates hookup to gasoline or diesel engines.

1.4

The voltage required to operate the control circuit of the engine shutdown system can be located on the appropriate wiring diagram included with this owner’s manual. Each input contains a diode to prevent reverse feedback between ignition circuits.

1.5

The ground connection, (terminal 5) is made to the return buss, (battery, generator return). **DO NOT CONNECT TO ENGINE BLOCK!**

2.0 Mechanical Installation

The relay terminal box is intended to be installed at the helm station where convenient access to the ignition wiring is available. It should be installed with four #8 wood, sheet metal, or machine screws of appropriate length (not supplied) on a firm support within 24 inches of the instrument display unit. A 2-1/16 inch hole is required for the instrument display unit and it is mounted with the bracket and nuts supplied.

3.0 Wiring System

The wiring connection shall be made with #16 stranded copper wire conforming to ABYC Standards for Marine use, as a minimum. (SAE J378B & J1128). Use the schematics at the end of this manual for reference. The schematics shown are for our ELS models but wiring for the ES is identical.

3.1

Connection to the terminal box and Fireboy bottle switch shall be made with insulated crimp terminals, hooked or closed eye type only. Open spade terminals are not recommended. Terminal stud size is #6.

3.2

Connections to the instrument display unit are made with the plug-together insulated connectors. Optional 10' and 30' harnesses are available for connecting remote instrument display unit.

3.3

Gasoline engines should be shutdown by interrupting the primary ignition wire from the key switch to the ignition coil (Ref. Sec. 1.3). This can be implemented by utilizing the common (C) and normally closed (NC) connections of circuits 1, 2 or 3.

3.4

Diesel Engines commonly have two methods for shutdown:

- A. Fuel solenoid valves that are energized to open on start-up, and de-energized to close on shutdown. (fuel starvation) The normally closed (NC) and common (C) connections would be used to implement this method.
- B. Fuel solenoid valves that are normally open when de-energized and closed when energized for shutdown, (fuel starvation). The normally open (NO) and common (C) connections would be used to implement this method.

3.5

Two other less common methods of shutdown are used in diesel installations. These are mechanical air and mechanical fuel starvation. Contact the engine, and/or the boat manufacturer for advice in converting these to an electrical shutdown system.

3.6

Two separate wires from the relay terminal box (terminals 4 & 5) are to be connected the extinguisher pressure switch or switches. (Ref. 3.8)

3.7

In applications requiring multiple extinguisher systems (i.e. separate engine and generator compartments) the bottle switch must be wired in series. This allows either extinguisher to operate the shutdown/override system in the event of a fire in either compartment.

4.0 System Test

With all connections as noted in Section 3, and the normal/override switch on the instrument display unit in the normal position and power applied to the relay terminal box the green “charged” lamp on the instrument display unit will glow. The engines will start and operate normally.

4.1

Disconnect one of the two wires at the switch on the Fireboy extinguisher. With the normal/override switch in the “normal” position, the red “discharged” lamp will glow and the audible alarm will sound. The engines will not operate at this time.

4.2

Move the normal/override switch to the “override” position. The green lamp will not glow but the engines will again operate normally.

4.3

In multiple extinguisher systems the section 4.2 test should be repeated for each extinguisher.

5.0 Load limitations

ES models are capable of handling 10 amps DC continuous load. (30 amp available upon request).

ES models operate at 12Vdc. (24V & 32V models available upon request)

ELS models are capable of handling 10 amps DC continuous load on each of its auxiliary contacts and 2 amps DC continuous load on each of its engine relays.

ELS models operate at 11-32 Vdc.

6.0 Time delay mode for ELS models (ELS-5510 & ELS-8510 only)

It is possible to configure the ELS for timed relays on the engine circuits.

To configure for timed mode move the jumper between terminals 6 & 7 to 7 & 8.

With this configuration the engine relays will no longer be energized when power is applied to the ELS so the descriptions on the box will be reversed. (Example: NO will now become NC and NC will now become NO for the engine relay contacts only)

6.1 ELS Operation Time Delay Mode Operation (ELS-5510 & ELS-8510 only)

In the event of a discharge (loss of pressure switch ground) the engine contacts will switch state for approximately 15 seconds and then return to their resting state. (Example: Ground is lost, The C will switch from NO to NC. After 15 seconds The C will switch back from NC to NO. Again this is for the engine relay contacts only.)

See ES/ELS XX15 Wiring Schematic for instructions.

Time Delay Mode for ES

6.2 Time delay is available for the ES model as well but must be purchased as a separate p/n ES-XX15-12/24. See ES/ELS XX15 Wiring Schematic for instructions on installation

7.0 Applicable Specifications

ABYC (American Boat and Yacht Council)
190 Ketcham Avenue
Amityville, NY 11701

8.0 Application Assistance

Technical advice in the use, application, and installation of this device is available by contacting:

Fireboy-Xintex, Inc.

(616) 735-9380

www.fireboy-xintex.com

Mailing:

P.O. Box 152

Grand Rapids, MI 49501

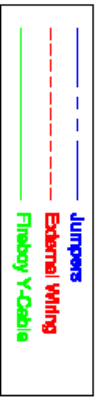
Shipping

O-379 Lake Michigan Dr. NW,

Grand Rapids, MI 49534

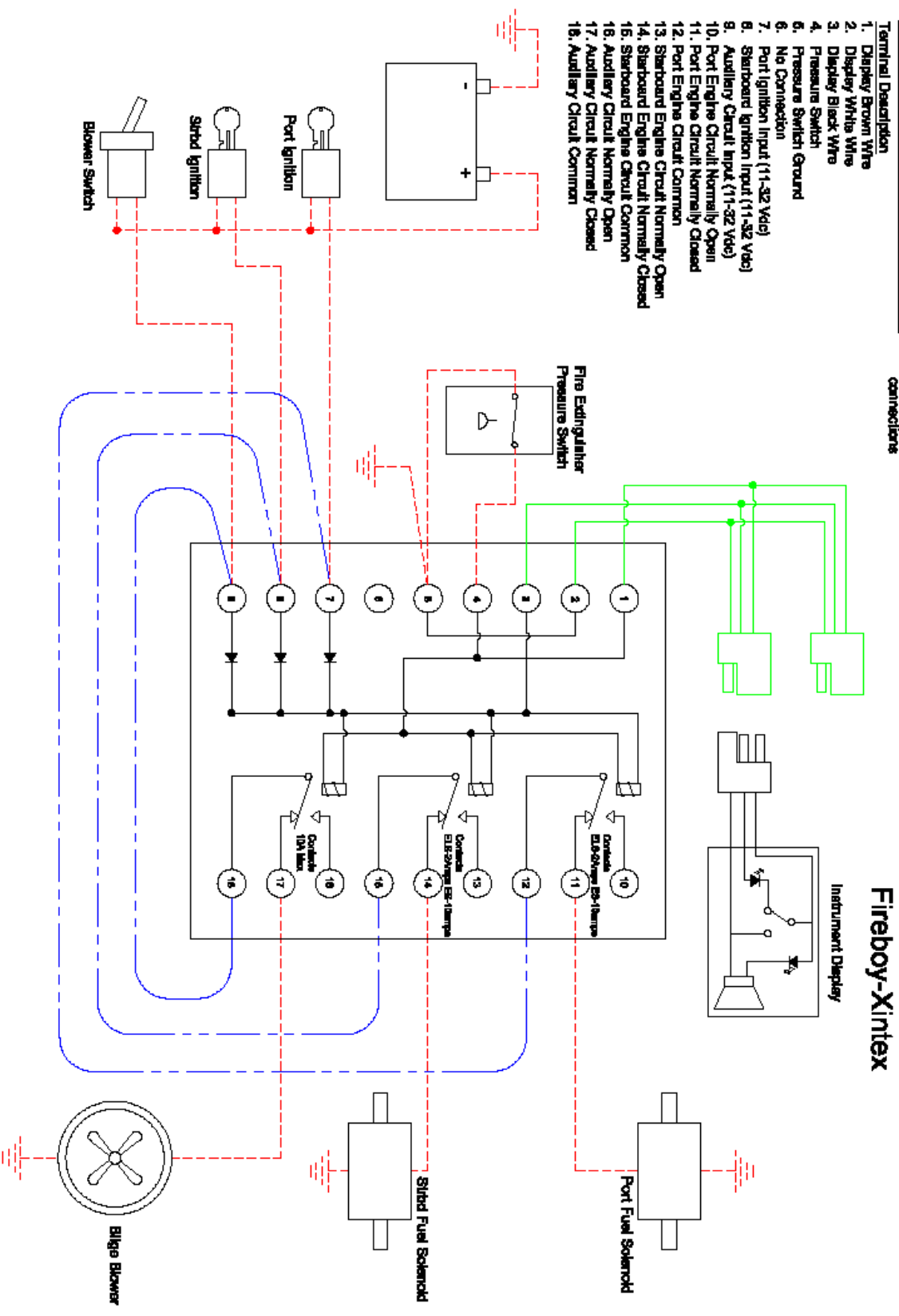
1 Year Limited Warranty

The Fireboy engine shutdown system is warranted, to the original purchaser, for a period of one (1) year against defects in materials and/or workmanship. Any system found to be defective within the warranty period will be replaced or repaired free of charge upon the prepaid return of the defective system. This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

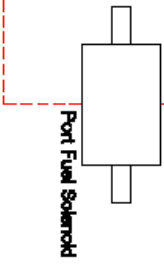
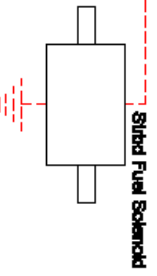
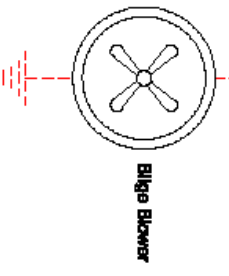
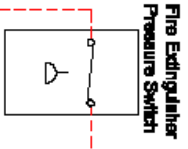
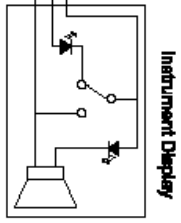


- Terminal Description**
1. Display Brown Wire
 2. Display White Wire
 3. Display Black Wire
 4. Pressure Switch
 6. Pressure Switch Ground
 - No Connection
 7. Port Ignition Input (11-32 Vdc)
 8. Starboard Ignition Input (11-32 Vdc)
 9. Auxiliary Circuit Input (11-32 Vdc)
 10. Port Engine Circuit Normally Open
 11. Port Engine Circuit Normally Closed
 12. Port Engine Circuit Common
 13. Starboard Engine Circuit Normally Open
 14. Starboard Engine Circuit Normally Closed
 15. Starboard Engine Circuit Common
 16. Auxiliary Circuit Normally Open
 17. Auxiliary Circuit Normally Closed
 18. Auxiliary Circuit Common

- Notes:**
1. Extinguisher pressure switch shown Pressurized.
 2. All relay contacts are shown in energized position.
 3. Use 18 Ga wire minimum for Jumpers and external connections



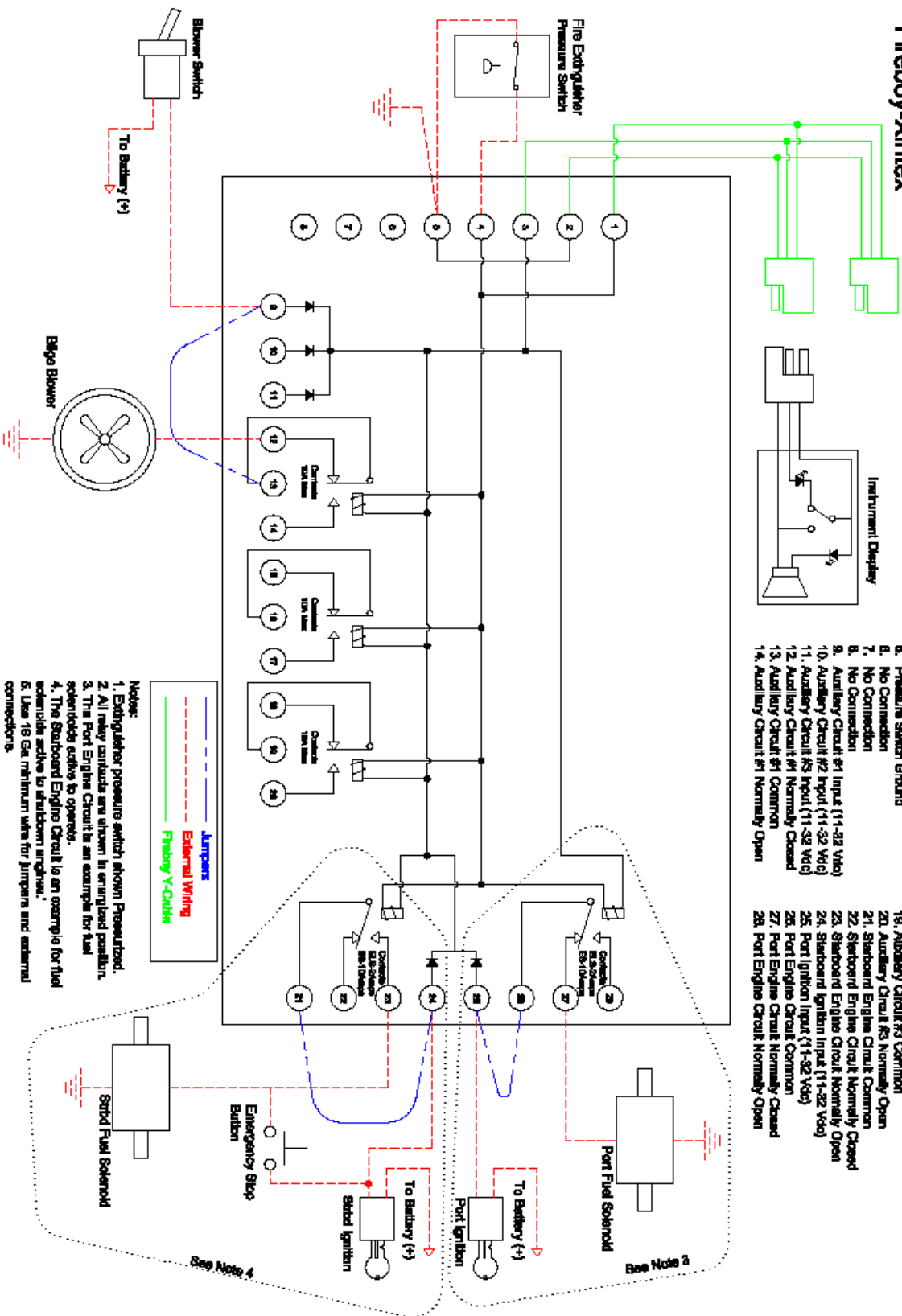
ELS-3510 & ES-3000 Wiring Schematic
Rev D 4/24/07
Fireboy-Xintex



ELS-5510 & ES-5000 Wiring Schematic

Rev. D 4/24/07

Fireboy-Xintex



1. Display Brown Wire
2. Display White Wire
3. Display Black Wire
4. Pressure Switch Ground
5. No Connection
6. No Connection
7. No Connection
8. No Connection
9. Auxiliary Circuit #1 Input (11-32 Vdc)
10. Auxiliary Circuit #2 Input (11-32 Vdc)
11. Auxiliary Circuit #3 Input (11-32 Vdc)
12. Auxiliary Circuit #4 Normally Closed
13. Auxiliary Circuit #1 Common
14. Auxiliary Circuit #1 Normally Open
15. Auxiliary Circuit #2 Normally Closed
16. Auxiliary Circuit #2 Common
17. Auxiliary Circuit #2 Normally Open
18. Auxiliary Circuit #3 Normally Closed
19. Auxiliary Circuit #3 Common
20. Auxiliary Circuit #3 Normally Open
21. Starboard Engine Circuit Common
22. Starboard Engine Circuit Normally Closed
23. Starboard Engine Circuit Normally Open
24. Starboard Ignition Input (11-32 Vdc)
25. Port Ignition Input (11-32 Vdc)
26. Port Engine Circuit Common
27. Port Engine Circuit Normally Closed
28. Port Engine Circuit Normally Open

- Notes:**
1. Extinguisher pressure switch shown Pressurized.
 2. All relay contacts are shown in energized position.
 3. The Port Engine Circuit is an example for fuel solenoids active to operate.
 4. The Starboard Engine Circuit is an example for fuel solenoids active to shutdown engines.
 5. Use 18 Ga minimum wire for jumpers and external connections.

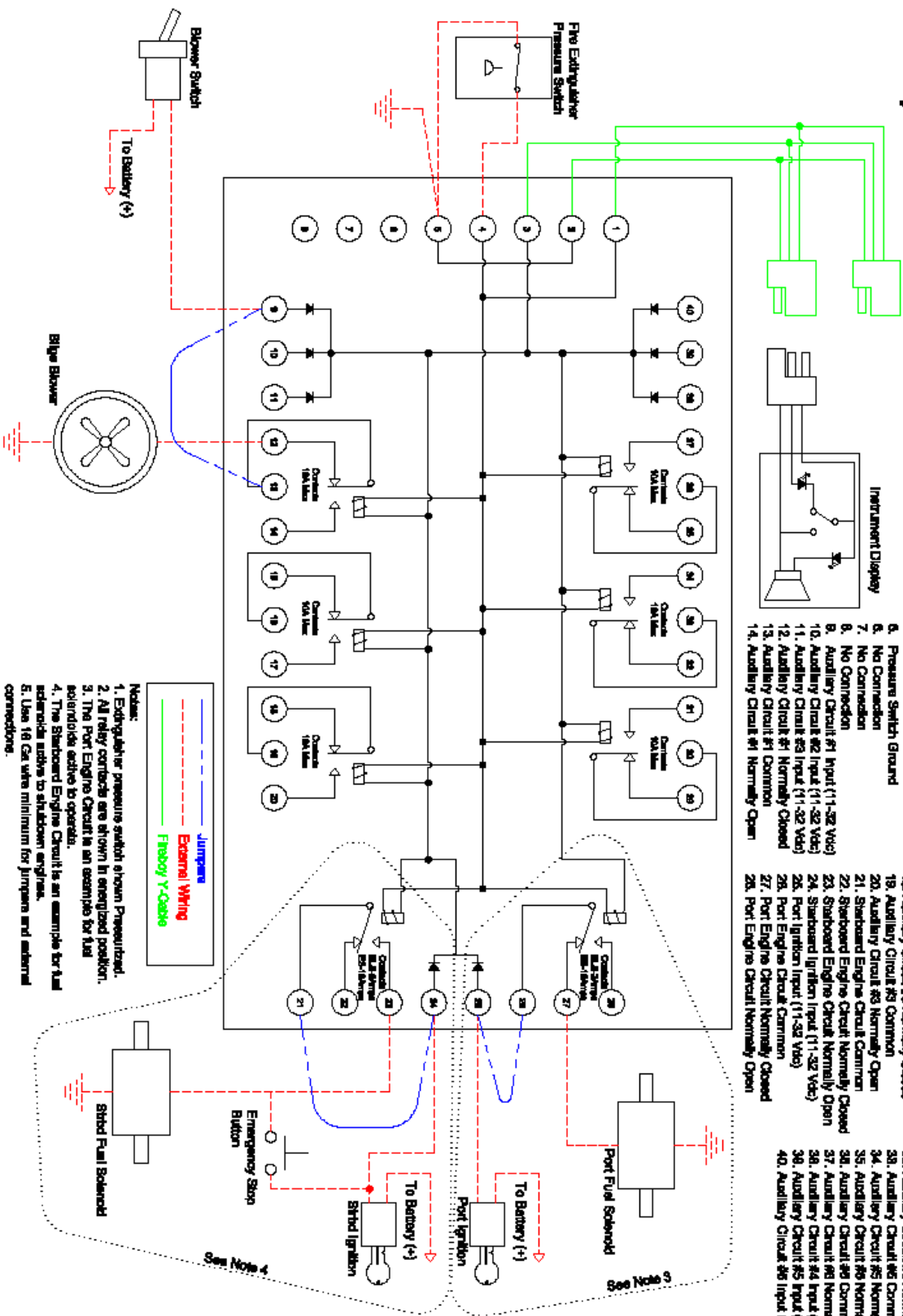
See Note 4

See Note 3

ELS-8510 & ES-8000 Wiring Schematic

Rev. D 4/24/07

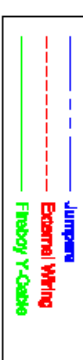
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1. Display Brown Wire
2. Display White Wire
3. Display Black Wire
4. Pressure Switch
5. Pressure Switch Ground
6. No Connection
7. No Connection
8. No Connection
9. Auditory Circuit #1 Input (11-32 Vdc)
10. Auditory Circuit #2 Input (11-32 Vdc)
11. Auditory Circuit #3 Input (11-32 Vdc)
12. Auditory Circuit #1 Normally Closed
13. Auditory Circuit #1 Common
14. Auditory Circuit #1 Normally Open
15. Auditory Circuit #2 Normally Closed
16. Auditory Circuit #2 Common
17. Auditory Circuit #2 Normally Open
18. Auditory Circuit #3 Normally Closed
19. Auditory Circuit #3 Common
20. Auditory Circuit #3 Normally Open
21. Standboard Engine Circuit Common
22. Standboard Engine Circuit Normally Closed
23. Standboard Engine Circuit Normally Open
24. Standboard Ignition Input (11-32 Vdc)
25. Port Ignition Input (11-32 Vdc)
26. Port Engine Circuit Common
27. Port Engine Circuit Normally Closed
28. Port Engine Circuit Normally Open
29. Auditory Circuit #4 Normally Closed
30. Auditory Circuit #4 Common
31. Auditory Circuit #4 Normally Open
32. Auditory Circuit #5 Normally Closed
33. Auditory Circuit #5 Common
34. Auditory Circuit #5 Normally Open
35. Auditory Circuit #6 Common
36. Auditory Circuit #6 Normally Closed
37. Auditory Circuit #6 Common
38. Auditory Circuit #4 Input (11-32 Vdc)
39. Auditory Circuit #5 Input (11-32 Vdc)
40. Auditory Circuit #6 Input (11-32 Vdc)

Notes:

1. Extinguisher pressure switch shown Pressurized.
2. All relay contacts are shown in energized position.
3. The Port Engine Circuit is an example for full solenoids active to operate.
4. The Standboard Engine Circuit is an example for full solenoids active to shutdown engine.
5. Use 18 Ga wire minimum for jumpers and external connections.



See Note 4

See Note 3

ES/EELS XX15 Wiring Schematic

Rev. A 5/9/07

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