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**PREMO FIRE IGNITION**

# ***PREMO MK III OPERATIONS & SERVICE MANUAL***

***2012 VERSION A***

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**PREMO MK III OPERATIONS AND SERVICE MANUAL - Version A**

**Issue Date: April 2012**

**PLEASE READ BEFORE USING.**

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**We Engineer Solutions**

**2011 Premo MK III Operations and Service Manual (Version A)**

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## Section 1: Premo MK III Overview

### Premo MK III Description

#### *Plastic Sphere Dispenser*

As a tool in forest management programs, the function of the Premo MK III Plastic Sphere Dispenser is to inject ethylene glycol into plastic spheres containing potassium permanganate and then immediately eject the activated sphere from the aircraft. The addition of ethylene glycol to potassium permanganate creates a rapid exothermic reaction that has sufficient intensity to ignite the plastic spheres and ignite the designated burn area. The dispenser is composed of a power train, glycol and water reservoirs, pumps, slipper blocks and an injection mechanism. Accessory components of the dispenser include the tie-down straps, power supply cable with breakaway connection and controls. In the event of a malfunction, the unit is fitted with a 3.25 litre (1 gallon) water reservoir to be used to extinguish any burning spheres that remain within the chamber.



***Aerial Ignition Device (Sphere)***

The spheres are 32 mm (1.25 in.) in diameter, containing approximately 3.0 grams of potassium permanganate. The rate of chemical reaction is dependent upon the particle size of the potassium permanganate and the concentration of the ethylene glycol. When the sphere is injected with approximately 1 ml of common automotive coolant (ethylene glycol), combustion occurs within approximately 20 seconds. The delayed chemical ignition time can be doubled by mixing glycol with water (50/50 mix).



Common reactive compounds include:

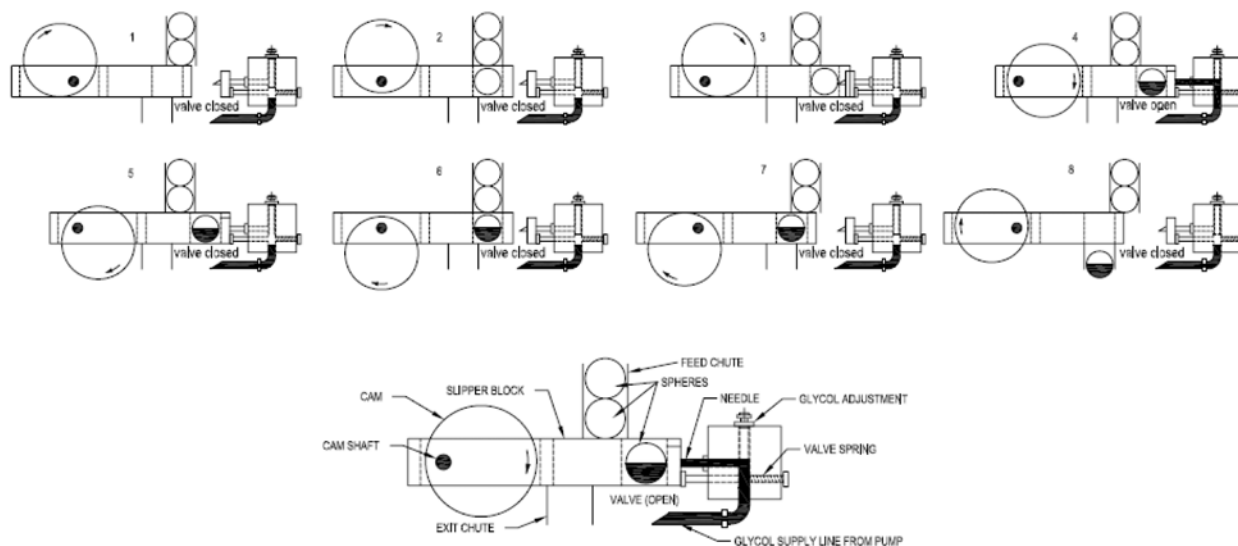
1. arsenic or antimony
2. glycerol
3. phosphorous
4. sulphur
5. sulphuric acid
6. hydrogen peroxide
7. aluminium carbide
8. titanium
9. hydrogen trisulphide
10. ethylene glycol

**CAUTION**

Reactive compounds must be isolated from potassium permanganate during shipping and storage.

**Dispenser Diagram**

The dispenser contains four slipper blocks and feed chutes.



*Schematic of slipper and valve block assembly with an eight step sequence of one revolution of a cam.*

Feed chutes may be used in alternate patterns to control the number of spheres dispensed and thus the spacing of ignition source to the ground (see Ignition Spacing table for operating guidelines).

**Ignition Spacing**

**Table 1:** Ignition spacing as a function of groundspeed, number of operative feed chutes and motor speed using a motor shaft sprocket with 13 teeth (standard).

Groundspeed in km/h (mph)	16 (10)	32 (20)	48 (30)	64 (40)	80 (50)
Camshaft speed of 23 rpm (slow)	Approximate distance between ignition points in meters (feet)				
Using 2 chutes	6 (20)	12 (40)	18 (60)	24 (80)	30 (100)
Using 4 chutes	3 (10)	6 (20)	9 (30)	12 (40)	15 (50)
Camshaft speed of 33 rpm (fast)					
Using 2 chutes	4 (13)	8 (26)	12 (39)	16 (52)	20 (65)
Using 4 chutes	2 (7)	4 (13)	6 (20)	8 (26)	10 (33)

**Table 2:** Ignition spacing as a function of groundspeed, number of operative feed chutes and motor speed using a motor shaft sprocket with 18 teeth (optional).

Groundspeed in km/h (mph)	16 (10)	32 (20)	48 (30)	64 (40)	80 (50)
Camshaft speed of 30 rpm (slow)	Approximate distance between ignition points in meters (feet)				
Using 2 chutes	4 (13)	8 (28)	12 (40)	16 (54)	29 (70)
Using 4 chutes	2 (7)	4 (14)	6 (20)	8 (27)	10 (35)
Camshaft speed of 45 rpm (fast)	Approximate distance between ignition points in meters (feet)				
Using 2 chutes	3 (10)	6 (20)	9 (30)	12 (40)	15 (50)
Using 4 chutes	1.5 (5)	3 (10)	4.5 (15)	6 (20)	7.5 (25)

### Important Note

To achieve continuous reliable feed when using two (2) chutes, it is imperative to operate the center ones only.

### Single Track Deflector

**Table 3:** Motor Shaft Sprocket (Three teeth, single track operation)

In certain burn applications, it may be desirable to increase the distance between ignition points greater than the 2-chute, slow speed maximum of 100 feet. This is easily achieved using the single-track deflector, which will consequently increase ignition spacing as indicated in the table below. No modifications to the existing machine are required.

	Ground speed in km/h (mph)				
	16 (10)	32 (20)	48 (30)	64 (40)	80 (50)
Motor speed	Approximate distance between ignitions points in meters (feet)				
Slow	12 (40)	24 (80)	36 (120)	48 (160)	60 (200)
Fast	8 (26)	16 (52)	24 (80)	32 (105)	40 (130)

For installation and removal of the Single Track Deflector, firmly hold the handlebar. Carefully position the single-track deflector in the extreme forward position, at the bottom of the hopper. Ensure that the agitator plate remains free floating. (For use on Premo MK III AF only.)

### ***Fire Extinguishing System***

Any interruption of operations caused by an obstruction, power or motor failure will result in a primed or activated sphere remaining inside the dispenser mechanism. To extinguish an internal fire, push the red “emergency water” button and hold for up to 30 seconds.



If necessary, use the canteen of additional water to extinguish the fire, by pouring down the feeder chutes through the hopper as shown.



To clear the machine manually, pull the assist wheel outward and rotate to dispose of any crushed or primed spheres.





### ***Electrical Specifications***

Power is supplied to the dispenser from the aircraft power supply (24V DC) through a quick-disconnect fitting. A central control panel contains all the electrical components and switches to operate the different stations such as the main drive, glycol pump, slow-fast speed and the emergency water supply. The switches are series wired so that the drive motor can be operated independently of the pump but the pump will not operate unless the drive motor is turned on. This allows cycling of unprimed spheres for testing. Caution however, should always be taken, as a small amount of glycol may enter a sphere even if the glycol pump is not on. Care should be taken to dispose of these test spheres appropriately. (See Section 6 for electrical schematics.)

**Table 4:** Electrical requirements.

Power requirements	24 V DC
Fusing: Main fuse	BUS AGC 5
Hopper feed	BUS AGC 2
Drive	2 amp circuit breaker
Glycol pump	2 amp circuit breaker
Emergency water	2 amp circuit breaker
Spheres diameter	32 mm (1.25 in.)
Material	High impact polystyrene

Note: May have been upgraded to circuit breakers.

### ***Dispenser Specifications***

**Table 5:** Dispenser dimensions and weights.

Mainframe mass, glycol tank full	27.5 kg	61.0 lbs
Hopper and chutes	10.5 kg	23.0 lbs
Emergency water tank full	3.8 kg	8.5 lbs
Hopper capacity (450 spheres)	2.7 kg	6.0 lbs
Approximate operational weight	44.5 kg	98.0 lbs
Volume glycol tank	9.0 liter	2.4 US gal
Volume emergency water tank	3.2 liter	0.8 US gal
Dispenser dimensions: length	68.5 cm	27.5 in.
width	27.0 cm	10.5 in.
height	66.0 cm	26.0 in.
Overall dimensions of crate: length	80.0 cm	31.5 in.
width	35.5 cm	14.0 in.
height	70.0 cm	27.5 in.
Total shipping weight	45.0 kg	98.5 lbs

A specially built crate, with hinged top, is provided with each machine for maximum protection during shipping and future use of the equipment in the field.

***Pilot Operator***

It is mandatory that the Premo MK III dispenser be operated only by trained personnel. The pilot must also be totally familiar with the system and its operation. The pilot shall have approval for aerial ignition operations and receive a briefing on the operational objective, ground and flight procedures. The pilot-in-command is responsible for all matters related to aircraft operations and safety, including installation and operation of the Premo MK III dispenser in the helicopter.

***Dispenser Operator***

The dispenser operator must be experienced in fire behavior and mechanically inclined with ability to handle several responsibilities (mentally and physically) simultaneously. The operator must also successfully complete required training course as a dispenser operator and have received training in helicopter safety.

The operator is responsible for the preparation, operation, maintenance and care of the dispenser. The operator must determine if prescribed spacing of ignition is occurring and make necessary adjustments. In addition, the operator must determine if an internal fire can be extinguished or if the dispenser needs to be jettisoned. The operator must also communicate with the pilot on all procedures associated with burning operation and any in-flight emergencies occurring during the burn mission.

***Operational Procedures and Restrictions***

In addition to the familiarization received during the pre-flight test, the pilot must be provided with specific instructions regarding destination, objective and general procedures. The pilot must also be informed or reminded of the appropriate air regulations and any restrictions governing the use of the Premo MK III Aerial Ignition System. It is also necessary to ensure compliance with any regulations regarding the transport of restricted goods.

**Dispenser Components**

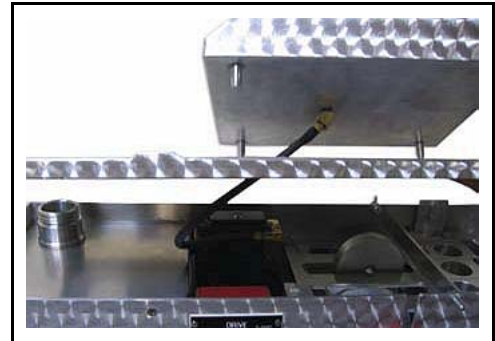


## Section 2: Operations

### Operating the Premo MK III

#### *Emergency Water Supply*

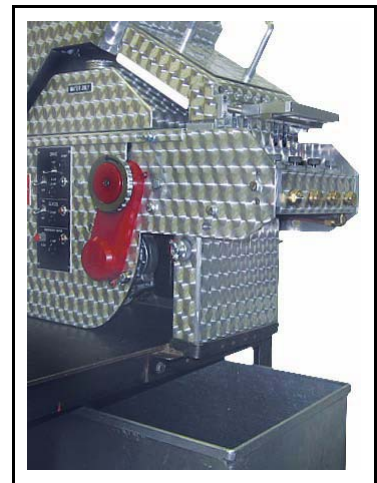
When connecting the water hose to the tank of the emergency water supply, note that the hose must be placed over top of the glycol tank to prevent kinking and bent gently upwards so that it can be fed through the slot in the lid. The hose is then fitted to the 45° nipple on the bottom of the emergency water tank and the tank positioning pins are carefully placed into the four corresponding holes on top of the machine lid.



#### *Bench Test Procedure*

The operator should wear gloves and goggles with breathing mask during this test. Review the applicable portion of operation checklist prior to beginning bench test.

- Mount the dispenser securely on a suitable table or bench approximately 30 inches high.
- Fill the dispenser with ethylene glycol and water in respective compartments.
- Connect the power cord to the proper power supply – one 24-volt battery or two 12-volt batteries connected in series. A special receptacle is required.



#### **CAUTION**

Ensure potassium permanganate does not come in contact with battery acid.

Place the metal bucket under the exit chute (about five gallon size). Ignition will occur in this test.

1. Ensure that the glycol tank is filled and its cap is securely fastened. Prime the pump.
2. From within the hopper, drop several EMPTY spheres into desired feed chutes.
3. Lift the feed control handles.
4. Pull out the manual assist and rotate until one sphere drops into the slipper block.



5. Turn on the drive and glycol pump allowing a few EMPTY spheres to be filled with glycol. Note that, if the glycol system has air trapped within it, the first several spheres may not produce an accurate reading until the air is fully bled from the glycol system. Bleed air.
6. Catch the spheres as they exit the dispenser. Spheres should be approximately 1/8 full with coolant for proper ignition to occur.



7. Turn off the drive and glycol pump. Repeat the procedure if required after adjusting the valve. Calibrate remaining chutes.





### Calibration

Calibration may be required to adjust for variations in the concentration of the glycol (depending upon the brand of automotive coolant being used) or to modulate the rate of the chemical reaction (alter fuse time).

Adjust the injector control valves by loosening the lock nuts and rotating the valve screw (new dispensers are preset). Test should be conducted prior to the adjustment of the needles.

After adjustments have been made, repeat the above procedure using spheres charged with potassium permanganate and allow them to fall into the metal container that has been placed under the exit chute. A stopwatch should be used to time the delay of the spheres from injection to ignition. Ignition delay should be approximately 20 seconds. Increase the amount of glycol by turning valve to the left (counter clockwise) until the desired delay is obtained. Continue with the adjustment for all four chutes. About 1 ml of coolant will give approximately 20 seconds of delay with the spheres.

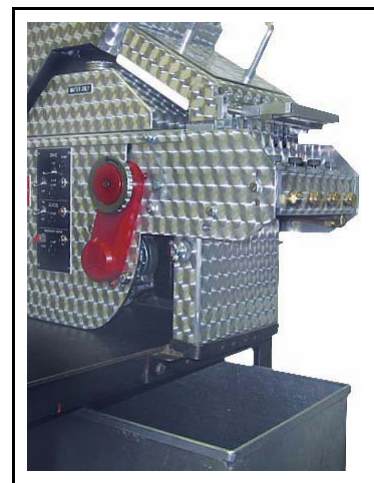


### Pre-Flight Equipment Test

The objective of this test is to determine the operability of the dispenser; preset the ignition timing delay of the plastic spheres and determine any variations in Glycol concentrations. The test should be performed daily prior to intended use.

#### CAUTION

Ignition will occur during this test.



A metal container (about two gallon size) is necessary to catch and remove primed spheres from the vicinity of the aircraft. Do not conduct this test near refuelling areas or where other combustibles can be ignited.

Deposit several spheres into the dispenser hopper and place the metal container under the dispenser exit chute.

1. Lift the feed control handles.



2. Turn on the hopper-feed switch. Ensure free movement of spheres in the feeder chutes and that the chutes are filled.



3. Pull out on the manual assist heel and rotate until one sphere drops into the slipper block. This procedure is a feel, as well as a visual process. The feed chute assembly has slots so that the operator can see the spheres as they move down into the slipper blocks. As the operator turns the assist wheel, a resistance pressure will be felt. This resistance is caused by a sphere being pushed against an injector needle. Any further rotation will inject the sphere and cause a possible fire in the dispenser. When released, the assist wheel may not always snap back to its retracted position because the drive slot and the assist wheel may not be aligned. Allow it to remain out as it will automatically align itself when the electric drive is turned on.



4. Turn on the drive (slow speed), ensure free movement of the slipper blocks and a steady progression of spheres down the feed chutes.
5. Turn on the glycol pump (spheres will now be primed), run a few spheres through the dispenser as follows:
  - Close the feed chute by lowering control handles.
  - Turn off the hopper feed.
  - After all spheres have cleared the dispenser, turn off the glycol pump and main drive.
  - Remove the metal container away from the aircraft.
  - Timing of ignition should begin when the spheres clear the dispenser exit chute.
  - All spheres should ignite in about 20 seconds. Any apparent discrepancy must be corrected by following bench test procedure to adjust glycol (coolant) metering.
  - Check the system for leaks.
  - Test the on-board fire extinguisher by pushing the red water button on the control panel. Ensure that it is full prior to take off.
6. Check the intercom communication and aircraft to ground communications.
7. To correct any malfunctions, see trouble shooting section.

The pre-flight test must have ensured the following:

- Installation as instructed with restraints in place.
- Mechanical operation is satisfactory.
- Extinguishing system is filled and operational.
- Additional one gallon of water is available.
- Glycol reservoir is filled and tightly capped.
- Sharp knife is readily available.
- Approximate 20-second ignition delay is achieved.
- Internal aircraft and aircraft to ground communications are operable.
- Operator must be well trained and qualified.
- Pilot has been briefed and agrees that all is in order.

**Hangfire Test Procedure****CAUTION**

A one-gallon canteen of water must be available for this test should the emergency water supply fail to extinguish the fire.

**Important Note**

Intentional fouling of machine should be accomplished with a sphere in the slipper block to test the emergency fire extinguisher and the operator's ability to remove broken spheres. The dispenser must be cleaned following the bench test.

1. Ensure that the emergency water tank is filled and its cap is securely fastened. Prime the pump. Run a few spheres charged with potassium permanganate through the dispenser. Turn off main drive, glycol pump and hopper feed while injected spheres are still within the slipper blocks. Do not remove hopper. A fire will (should) occur in the slipper blocks.
2. Activate the built-in emergency water supply.
3. Rotate manual assist wheel to clear machine. If machine will not clear, remove hopper and remove particles of unburned plastic from slipper blocks with screwdriver.
4. Turn on dispenser and observe to ensure machine is clean and working properly. Additional cleaning may be necessary.
5. Replace hopper and make short re-test.

**Cleaning and Storage**

Clean with water, CRC 656 or 666 and degreaser or equivalent. Lubricate the moving parts with "Tri-flow" lubricant. WD-40 is not recommended. Dry the machine before storage in shipping crate. Store with the glycol tank full of coolant and the water tank empty.

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## Section 3: Installation

### Installation in Helicopter

The dispenser is designed to be operated from the right rear door of a Bell 206 Jet Ranger helicopter. Other types of helicopters may require an auxiliary support bracket so that the exit chute clears the aircraft fuselage. Before installing the dispenser in the helicopter, the appropriate door must be removed and the cabin cleared of all cushions and other loose articles. Securely fastened extra cartons of spheres or a metal bulk container (securely fastened) may be carried in the cabin. Lead acid batteries and extra glycol must not be carried in the cabin when the dispenser is installed.

The dispenser must be readied for installation outside the safety circle of the helicopter by filling glycol tank with the recommended automotive coolant solution. Ensure that the glycol filler cap is securely fastened. The water storage tank is filled and the delivery hose is checked for kinks. Ensure the water filler cap is securely fastened. An additional one-gallon container (canteen) of water must be carried in the cabin and be immediately available to the operator in case a fire occurs in the dispenser during flight.

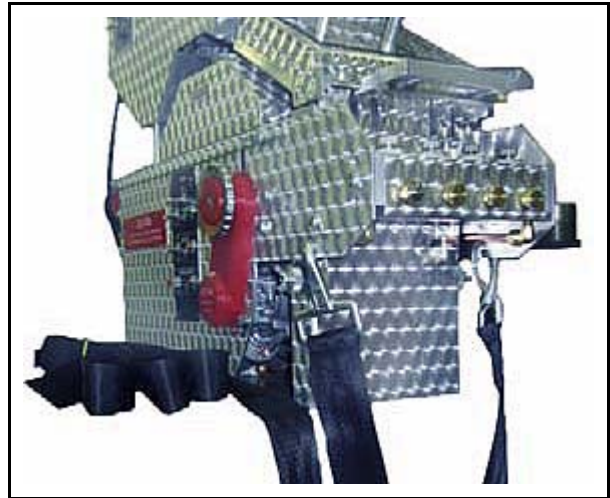
Please note the following:

- The glycol tank must be filled and tightly capped away from aircraft.
  - The fire extinguisher water tank must be filled.
  - An additional one-gallon container of water must be located in the cabin.
  - Lead acid batteries must NOT be carried in the cabin.
  - Extra supplies of glycol must NOT be carried in the aircraft.
  - A metal container must be on hand to test the dispenser after installation.
1. Install the dispenser in the door of the helicopter so that the exit chute overhangs the fuselage and the main frame sits on the rear cabin floor.





2. Attach the tie-down strap by snapping the “Y” end to the holes on each side of the outboard end of the dispenser.



3. The other end is passed under the fuselage, under the opposite door and fastened to the buckle on the inboard end of the dispenser. Check that the strap is free of any aircraft vents or antennas and cinch tightly (secure loose end). Attach the extension chute by sliding it up the exit chute until a stop is felt.



4. Hold against the stop and securely fasten with knurled nuts and wing nuts ensuring that the hubs on both knurled nuts fully enter the corresponding holes in the extension chute. A sharp knife must be readily available to the operator should the need to jettison the dispenser arise during flight.



Connect the dispenser power supply cord to a compatible electrical outlet in the helicopter. Ensure the outlet wiring is compatible with the dispenser and is a negative ground system.

Check the electrical connection by turning on the drive switch and the hopper-feed switch. The manual assist must rotate counter clockwise (direction of arrow). If electrical power is available, turn off both switches and prepare for pre-flight test.

#### Important Note

The pilot or helicopter engineer is responsible for the electrical connection to the helicopter.

## In-Flight Operation

1. Prior to take-off, the hopper should be filled with an appropriate number of plastic spheres and the transparent plastic lid closed and firmly attached.
2. A sharp knife must be securely located within reach of the dispenser operator.
3. Check the intercom and aircraft to ground communications.
4. A one-gallon container of water must be located in the rear cabin for emergency use in case the primary extinguisher fails to fully extinguish a malfunction related fire.
5. Make a dry run over burn area to ensure communication between all parties involved and to determine boundaries of burn area.
6. After a dry run over the planned area, pilot and operator should determine the firing pattern as instructed by burning boss or firing boss.

**WARNING**

Do not put excessive upward or downward force on the feed control assembly as damage to the mechanism may occur. To ensure smooth operation, slide the bars in the direction of arrows indicated and then lift upward to the complete vertical position.

Pre-start dispenser as follows:

7. Turn on the hopper-feed switch. Ensure that there is free movement of spheres in the feed chutes and that the chutes are filled.



8. Enter the first flight line at operation speed and turn on the drive switch. Ensure the steady progression of spheres down feed chutes.



9. Turn on the glycol switch.

10. Lift the feed control handles.

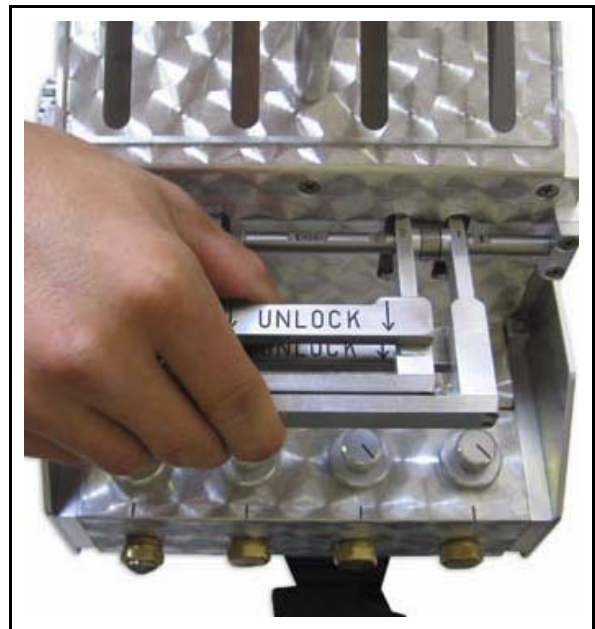


**Important Note**

Operational malfunctions are reduced if an uninterrupted flow of spheres is maintained.

To stop the dispenser, upon completion of the burn, the following steps should be taken:

1. Operate the aircraft inside the burn area.
2. Close feed control handles. Push downwards to the complete horizontal position to ensure proper engagement of the locking pins.
3. Ensure that all plastic spheres in the chutes have been dispensed into the burn area.
4. Turn off all switches.
5. Continue to monitor the dispenser to ensure no injected spheres remain in the dispenser.
6. Aircraft may then leave the burn area.
7. Follow malfunction procedure for a hang-up, etc.
8. Care should be taken to prevent contamination of streams and lakes.



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## Equipment Malfunction

Occasionally, a sphere or fragment will jam on entry or otherwise prevent movement of a slipper block causing the dispenser to stall. Immediately turn off the motor to prevent damage. Pull the manual assist wheel outward to disengage the motor and rotate forward and backward until the machine is clear, then restart the motor. Problems are minimized if starting instructions are followed.

**CAUTION**

Do not remove the hopper while the dispenser is operating.

Interruption of the operation caused by an obstruction, power or motor failure will result in a primed or activated sphere remaining within the dispenser. If this occurs:

1. Notify pilot.
2. Close feed control handles (completely horizontal position).
3. Turn off all switches.
4. Pull manual assist wheel outward and rotate forward then backward. If obstruction clears, turn on the motor and resume operations.
5. If internal fire starts, push the red “emergency water” button, and hold up to 30 seconds. If necessary, use the canteen of additional water to extinguish the fire, by pouring down feed chutes through the hopper. **IF PROBLEM PERSISTS – LAND AS SOON AS POSSIBLE.**
6. Remove the hopper and feed chutes.
7. Clear all chambers. Dispose of all debris overboard.
8. Check and reset the circuit breakers if necessary.



Emergency repairs may be done by the operator at a convenient landing spot, using the trouble-shooting guide, if the required tools and spare parts are available.

#### Important Note

In the event of an aircraft emergency, it is possible to jettison all items including the dispenser, unless the emergency occurs over a developed area. The pilot must be aware that the dispenser will be jettisoned.

To jettison the Premo MK III dispenser:

1. Cut the restraining belt on the LEFT side of the buckle with a knife.
2. Grasp the handle adjacent to the glycol tank with the left hand and the injection manifold with the right hand.
3. Lift and tip the dispenser clear of the aircraft.



## Section 4: Troubleshooting

### Troubleshooting the Dispenser

#### **Drive Motor**

The drive motor does not start:

1. Check the aircraft power supply connection; the aircraft main switch circuit breaker; the dispenser main circuit breaker and the drive motor circuit breaker. Also check the quick disconnect to the mainframe and control housing.
2. Check wiring to the motor. Repair the wiring or replace the motor if necessary.

The motor starts but the dispenser jams:

1. Turn off the motor switch and rotate the manual assist wheel back and forth. Switch on the motor.
2. If the problem persists, close the chute control, remove the chute assembly and check the chambers for plastic sphere fragment.
3. Check for a damaged needle. Replace using an appropriate open-end wrench to prevent damage. Crushed spheres will indicate damaged or dull needles.
4. Slipper blocks may seize and stop the motor, which will necessitate removal, cleaning and lubrication of the slipper blocks.

#### **Water System**

Water system does not function:

1. Check the reservoir.
2. Check the line for routing kinks or blockage.
3. Check the water ports in valve block.
4. Check the push-button, wiring, solenoid, circuit breaker and pump.

Repair and replace as necessary.

### Spheres

The spheres do not move freely in the chutes:

1. Check the position of the feed control handles.
2. Check if the hopper feed is operating and that no jam has occurred in the hopper.
3. Check that the recommended chutes are being used; either four or two center ones only (one shoot operation requires single track operation).

Incorrect amount of glycol:

1. Check glycol level in the tank and the operation of the pump.
2. Open or close the glycol adjustment valves on top of the valve block; **DO NOT OVERCLOSE**. Needle should supply approximately 1.0 ml of glycol with each activation of the valve stem.
3. Check the needles for blockage. Remove, clean or replace if necessary.
4. Remove coupling to the valve block. Check for obstruction and clear supply line. Replace the pump if necessary.

Leakage of glycol:

1. If a leak occurs during flight, land to make repairs.
2. Check the couplings for tightness.
3. Check the valve system and springs for obstruction in the valve block. Replace neoprene “O” rings on valve stems. Replace valve springs.

Plastic spheres do not ignite:

1. Check the fluid level in the glycol tank.
2. Taking precautions against delayed ignition, examine plastic spheres.
3. If the contents of primed spheres appear only partially wetted or dry, indicates insufficient glycol.
4. If the contents of primed spheres are soupy or liquid, indicates an excess of glycol. (See Bench Test Procedure.)
5. If the consistency of contents are satisfactory, check glycol concentration or glycol quality.

Ignition in less than 20 seconds:

1. Follow “Bench Test Procedure” to adjust concentration of the glycol. The delayed chemical ignition time can be doubled by mixing glycol with water (50/50 mix).

### *Pumps*

The pumps do not deliver fluid:

1. Ensure that both the glycol tank and the emergency water tank are filled with their appropriate liquid and that their caps are securely fastened.

Check for hose kinks, air in delivery lines, as well as the electrical supply and switches.

## Section 5: Maintenance and Repair

### Pump Repair and Replacement

#### *24V DC Premo Impeller Pump with Magnet Drive Model IP-G1*



To install a new pump, remove the existing pump by first disconnecting the two brass fittings and the wire to the positive terminal and then by unscrewing the two hex head screws that mount the pump to the dispenser body. Remove the two brass fittings from the old pump and insert and tighten them into the new pump. Install the new pump in reverse order of disassembly.

To ensure leak-free seals at the pump ports without stripping the plastics pipe threads, first tighten each fitting snugly by hand and then add two full turns using a wrench.

The pump can be used in either the glycol system or the emergency water system, but ensure the appropriate tank is filled with its specific liquid and that its cap is securely fastened before operating the pump.

#### **CAUTION**

Operating the pump dry will result in rapid damage to the pump impeller.

When preparing the dispenser for use, it is recommended to bleed the air from the pump before turning it on. This must be done with its tank full. This will prime the pump immediately and thus avoid possible damage to the pump impeller. If the pump is being used in the glycol system, tip the main frame of the dispenser up at an angle by lifting the handle adjacent to the glycol tank to allow access to the glycol pump.

Open the bleeder screw on the glycol pump two turns. When a steady flow of glycol is evident, re-tighten the bleeder screw securely without over-tightening and wipe up any excess glycol. If the pump is being used in the emergency water system, lift off the dispenser lid and emergency water pump. Ensure that the water hose remains connected between the pump and the tank. Open the bleeder screw on the emergency water two turns. When a steady flow of water is evident, re-tighten the bleeder screw securely without over-tightening and wipe up any excess water.

**CAUTION**

Do not run either pump dry.





**Replacement Parts List**

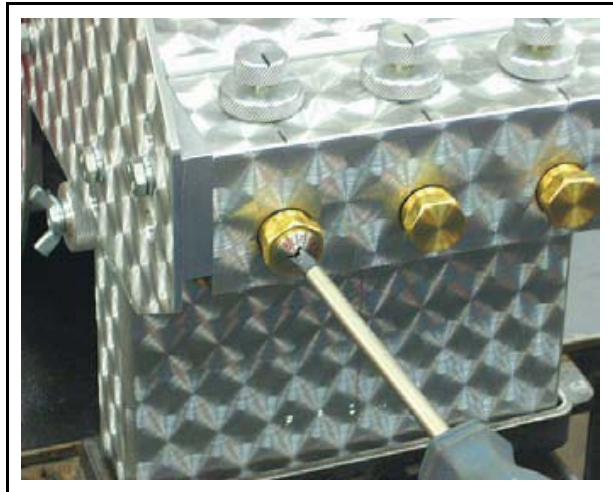
Item #	Code #	Description	Req.
1	IPG1-001	Bleeder screw S/S	1
2	IPG1-002	O-ring ORB-011	1
3	IPG1-003	Pump housing	1
4	IPG1-004	Stud S/S – connects to negative motor terminal	1
5	IPG1-005	Stud S/S	1
6	IPG1-006	4-40 x 3/8" socket head cap screw S/S	1
7	IPG1-007	1/4" locker washer pltd.	2
8	IPG1-008	1/4" NC x 1/2" hex head cap screw pltd.	2
9	IPG1-009	Impeller assembly	1
10	IPG1-010	Impeller housing cartridge	1
11	IPG1-011	Inner magnet coupling	1
12	IPG1-012	O-ring ORB-024	1
13	IPG1-013	#6 x 1/2" flat head screw Robertson S/S	4
14	IPG1-014	Canister	1
15	IPG1-015	Outer magnet coupling	1
16	IPG1-016	4-40 x 3/8" socket head cap screw Robertson S/S	1
17	IPG1-017	O-ring ORB-035	1
18	IPG1-018	#6 x 1" pan head screw Robertson S/S	4
19	IPG1-019	Motor mounting plate	1
20	IPG1-020	6-32 x 5/8" flat head screw Philips S/S	2
21	IPG1-021	O-ring ORB-035	1
22	IPG1-022	O-ring ORB-006	1
23	IPG1-022	Negative black wire with ring terminal	1
24	IPG1-024	6-32 x 7/8" socket head cap screw S/S	1
25	IPG1-025	8-32 molded-in brass terminal	1
26	IPG1-026	Positive red wire with plug-in terminal	1
27	IPG1-027	Motor 24V DC	1
28	IPG1-028	#6 x 1/2" flat head screw Robertson S/S	2
29	IPG1-029	Cover	1
30	IPG1-030	#8 flat washer S/S	2
31	IPG1-031	8-32 Hex, nut S/S	1

## Maintenance

### *Bleeding the Air from the Glycol System*

For reliable operation of the glycol injection system, it is recommended to bleed the air from the system using the bleeder screw in the brass nut located on the front of the manifold. This should only be required if the glycol tank has been emptied or the glycol system has been run dry. Bleed the air from the glycol system as follows:

1. Turn on the drive motor.
2. After ensuring that the glycol tank is full, turn on the glycol pump. This will protect the pump impeller from damage, which will occur if it is run dry.
3. Using a #2 or #3 Philips screwdriver, loosen the bleeder screw approximately  $\frac{1}{2}$  a turn until air and glycol begin to escape. After a few seconds, when a steady stream of glycol is evident, securely retighten the bleeder screw. It is recommended to wear safety glasses during this procedure as some glycol spraying may occur.
4. Turn off the glycol pump.
5. Turn off the drive motor.
6. Thoroughly wipe up any excess glycol that was bled from the glycol system.



### *Maintenance and Repair*

As soon as possible after operations are completed, the dispenser must be dismantled and cleaned thoroughly with CRC 656 and 666 cleanser and degreaser. All metal surfaces should be cleaned, dried and surfaced with a light oil, “Never Seize” or “Triflow” or equivalent. WD-40 should not be used, as it tends to accumulate Potassium dust, etc., and causes slipper block seizure. When extended storage is anticipated, the glycol tank and pump should be thoroughly flushed and the valve block cleaned and oiled. Use an appropriate open-end wrench to remove the needles and prevent damage to the valve stems.

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***Suggested Field Service Tools and Supplies***

- 1/8 and 3/16 Slot screwdrivers
- No.0, No.1 and No.2 Philips Screwdrivers
- No.1 Robertson screwdriver (square drive)
- Set of Imperial Allen keys
- Set of wrenches (5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 11/16)
- Adjustable pliers and adjustable wrench
- Wire cutters and wire strippers
- Soldering iron and solder
- Small smooth file for emergency touch up to the needles
- Cleaner or degreaser
- Small can of lubricant (Tri-Flow or Never-Seize)
- Permatex No.2 form-a-gasket sealant for all pipe threads (non-hardening)
- Brass wool for cleaning
- Small brush for cleaning
- Special rubber tool to remove light bulbs

***Suggested Spare Parts***

- Fuses 5A, 2A, 2 amp circuit breakers (Klixon)
- Needles (set of four)
- Valve springs (set of four)
- “O” rings for valve stems (set of four)
- Pump
- Drive motor
- Bulbs for indicator lights
- Solenoid

Note: The motors used for the main drive and the hopper are identical, however, the hopper motor uses the high-speed wire for its operation. The pumps used for the glycol and the emergency water are also identical. It is therefore only necessary to carry one of each to ensure rapid replacement. It is recommended to carry a supply of EMPTY spheres for bench test procedures.

***Service Centers***

Service, maintenance, repair and spare parts are available from:

**USA**

**Premo PSD Service Center**

Fire and Aviation Resource Services

200 Embler Two Road

Alexander, NC USA 28701

Tel: 828.775.1871

E-mail: [guyfire@aol.com](mailto:guyfire@aol.com)

Contact: Mike Maguire

**CANADA**

**SEI Industries Ltd.**

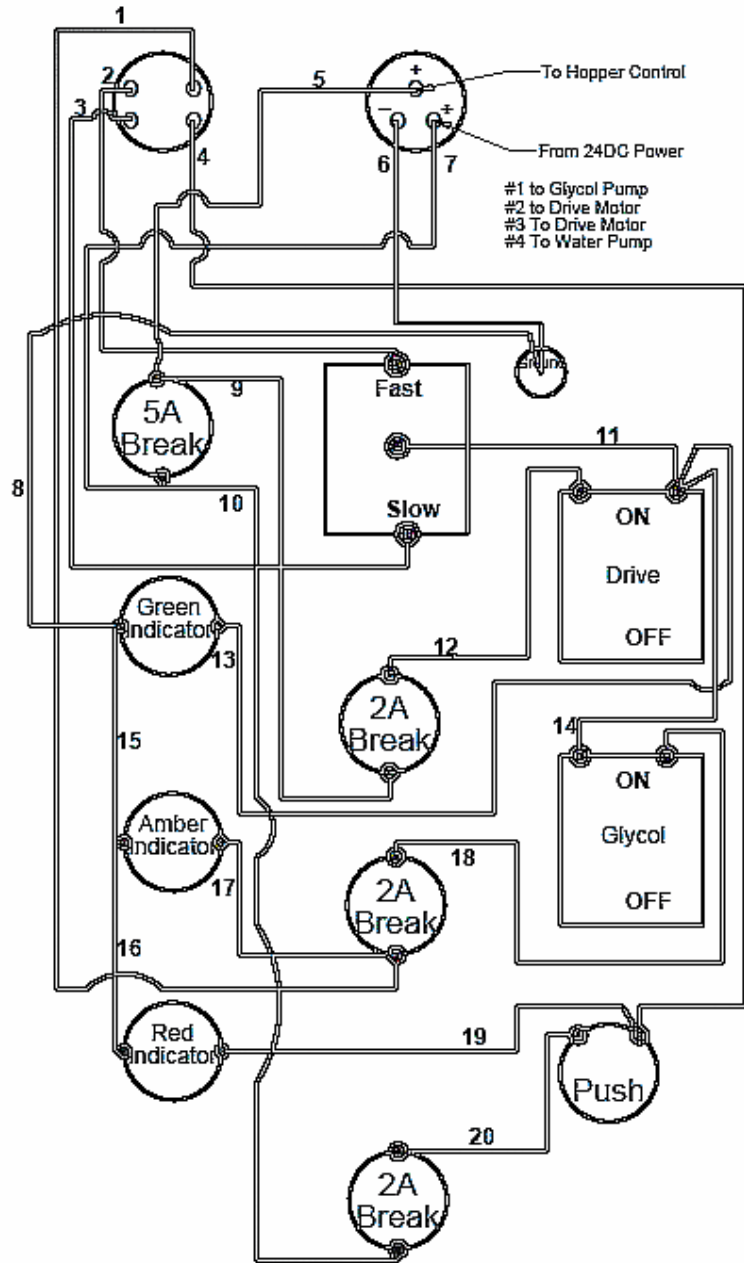
7400 Wilson Ave., Delta, BC, Canada V4G 1H3

Tel: 604.946.3131

E-mail: [seisales@sei-ind.com](mailto:seisales@sei-ind.com)

# Section 6: Electrical Schematics

**MKIII Electrical Schematic  
(Main Controls)**



No.	Length	Color
1	8400	Black
2	5200	Green
3	8400	Red
4	10400	White
5	5800	Green
6	4800	White
7	8200	Black
8	3850	White
9	4300	White
10	7500	White
11	2900	White
12	2900	White
13	5800	White
14	3100	White
15	2350	White
16	2350	White
17	2850	White
18	3900	White
19	2750	White
20	2800	White

**MKIII Electrical Schematic  
(Hopper Controls)**

