SureFly Ignition Modules

SIM4P, SIM4N, SIM6C & SIM6L

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

Document No. SF1005, Revision IR

Revision History

Revision:	Date:	Description:	Approved By:
IR	09/26/2018	Initial release.	RVC

Contents

1. Maintenance

1.1. Introduction - 14 CFR §33 Appendix A33.3(a)(1):

The **S**ureFly **I**gnition **M**odule (SIM) is a magneto replacement for Continental & Lycoming aircraft piston engines.

The SIM is available in 4 models:

1. SIM4P – replaces impulse coupled magnetos on Lycoming and Continental 4 cylinder engines,
2. SIM4N – replaces non-impulse coupled magnetos on Lycoming and Continental 4 cylinder engines,
3. SIM6C – replaces magnetos on Continental 6 cylinder engines,
4. SIM6L – replaces magnetos on Lycoming 6 cylinder engines.

All SIM models share the same design architecture but vary slightly to accommodate their intended installation.

The SIM is designed to use existing aviation spark plugs gapped to OEM specifications.

The SIM is designed to use a “Slick” style ignition harness.

The SIM is designed to use existing magneto-to-engine drive gears and interfaces.

1.2. Detailed Description - 14 CFR §33 Appendix A33.3(a)(2):

The SIM operates in one of two modes:

1. Advance timing mode – timing advances based on RPM and Manifold Absolute Pressure (MAP), or
2. Fixed timing mode – engine data-plate timing maintained throughout operational range.

When the SIM is configured to operate in advance timing mode, the SIM will only advance beyond fixed engine timing under specific RPM and MAP conditions. Up to 38° of advance may be reached by the SureFly SIM.

UNLIKE A MAGNETO, THE SUREFLY SIM IS TIMED (SYNCED) TO #1 CYLINDER COMPRESSION STROKE TDC (0°).

The SIM references #1 cylinder compression stroke TDC (0°) and advances timing within the unit based on its dip switch setting.

The installer sets the dip switch to configure the SIM to specific engine timing and to select whether the SIM operates in advance or fixed mode.

The SIM requires a constant, external supply of 8.5 – 30VDC power to operate.

1.3. Installation Instructions - 14 CFR §33 Appendix A33.3(a)(3):

Each SIM model has specific installation instructions:

1. SIM4P – SureFly Document No. SF1001,
2. SIM4N – SureFly Document No. SF1002,
3. SIM6C – SureFly Document No. SF1003,
4. SIM6L – SureFly Document No. SF1004.

Installation instructions may be found at www.surefly.aero/engine

1.4. Basic Control & Operating Information - 14 CFR §33 Appendix A33.3(a)(4):

The SIM operates and is controlled like the magneto it replaces.

1.5. Servicing Information - 14 CFR §33 Appendix A33.3(a)(5):

The SIM does not require any servicing or lubrication.

1.6. Scheduling Information - 14 CFR §33 Appendix A33.3(a)(6):

The SIM does not require any cleaning, adjusting or testing.

Inspection intervals and procedures:

1. Annually:
    a. Inspect all wires connected to the SIM,
    b. Inspect SIM for oil leaks,
    c. Inspect SIM manifold pressure connection (if applicable),
    d. Inspect ignition harness connection to SIM.

2. Upon propeller strike, engine overhaul or 2,400hours of SIM operation:
    a. Return SIM to factory for evaluation, or
    b. Replace SIM with new unit.

3. Upon lightning strike, fire damage or water damage:
    a. Return SIM to factory for evaluation if visible damage is evident or if engine fails magneto drop off check IAW engine operator's manual, or
    b. Replace SIM with new unit.

4. On condition:
    a. Verify SIM LED blinks out correct dip switch code (refer to installation instructions),
    b. Verify SIM is timed correctly to engine #1 cylinder TDC (refer to installation instructions),
    c. Return SIM to factory for evaluation if engine fails magneto drop off check IAW engine operator's manual.

1.7. Troubleshooting - 14 CFR §33 Appendix A33.3(a)(7):

SureFly's Troubleshooting guide may be found at www.surefly.aero/engine

Condition:					Probable Cause:	Remedy:
Unable to time ignition to engine	#1 cylinder verified @ TDC	LED timing light on (solid) but unable to find extinguished TDC marker point	4 cylinder engine		Timing gear installed upside down on ignition unit	Remove timing gear from ignition unit, rotate gear 180° axially, reinstall ignition unit
			6 cylinder engine		Timing gear tooth skipped over engine gear	Remove ignition from engine, turn gear to find ignition LED extinguished TDC marker point, reinstall ignition unit
			All engines		Turning ignition shaft too rapidly	Turn ignition shaft slower. Ignition LED extinguished TDC marker point has an easily missed ½° window
		LED timing light continuously extinguished	Ignition unit grounded to engine		No power at timing terminal	Verify power (8.5 to 30VDC) connected to timing terminal
					Insufficient case contact for ground or engine not grounded to airframe	Verify ignition unit is grounded though its case to unpainted surface engine. Verify engine is grounded to airframe.
			Ignition unit not grounded to engine		Insufficient case contact for ground	Ground ignition unit case to unpainted surface of engine
	Unable to verify #1 cylinder @ TDC				#1 cylinder not @ TDC	Verify location of engine #1 cylinder. Turn engine to #1 cylinder TDC, reinstall ignition unit
Engine will not start, kicks back during start or does not run on SureFly ignition	Power measured (8.5 to 30VDC) at power terminal	P-lead terminal grounded			P-lead wire is connected to ground	Check ignition switch
						Check integrity of p-lead wire for chaffing to ground
					Internal ignition fault if p-lead terminal is grounded with wire removed	Contact SureFly customer support 817-373-5161
		P-lead terminal not grounded (open)	Ignition verified as correctly timed to engine #1 cylinder TDC		Ignition harness wires connected to incorrect spark plugs	Check routing of harness wires
					Internal ignition fault	Contact SureFly customer support 817-373-5161
			Unable to verify ignition correctly timed to engine #1 cylinder TDC		Ignition not timed to engine correctly	Reinstall ignition unit in accordance with installation instructions
		LED blinks rapidly (12 times per second)			Internal ignition fault	Contact SureFly customer support 817-373-5161
	Unable measure power (8.5 to 30VDC) at power terminal				No power to ignition unit	Verify ignition power wire is connected to power source
						Check ignition power wire integrity, terminals & fuse
Engine runs rough	Isolate SureFly ignition causing roughness	Ignition verified as correctly timed to engine #1 cylinder TDC	Verify all spark plugs are firing using CHT	Verify ignition unit is configured correctly to engine base timing	Ignition harness wires connected to incorrect spark plugs	Check routing of harness wires
					Internal ignition fault	Contact SureFly customer support 817-373-5161
				Ignition unit is not configured correctly to engine base timing	Ignition unit not configured correctly to engine base timing	Reinstall ignition unit in accordance with installation instructions
			Various spark plugs are not firing	Single spark plug not firing	Bad spark plug or ignition harness	Replace spark plug or ignition harness
				Pair of spark plugs not firing (1&2, 3&4, 5&6)	Internal ignition fault	Contact SureFly customer support 817-373-5161
		Unable to verify ignition correctly timed to engine #1 cylinder TDC			Ignition not timed to engine correctly	Reinstall ignition unit in accordance with installation instructions
		LED blinks rapidly (12 times per second)			Internal ignition fault	Contact SureFly customer support 817-373-5161
	Roughness caused by magneto or ignition other than SureFly				Magneto problem	Contact magneto manufacturer
Engine runs with higher than normal cylinder head temps.	Ignition verified as correctly timed to engine #1 cylinder TDC	Verify ignition unit is configured correctly to engine base timing	Manifold pressure port connected to MP source	Verify correct engine baffling	Internal ignition fault	Contact SureFly customer support 817-373-5161
				Engine baffling deficiencies	Insufficient engine cooling	Correct baffling deficiencies in accordance with OEM specifications
			Manifold pressure port not connected to MP source		No manifold pressure reference	Reinstall ignition unit in accordance with installation instructions
		Ignition unit is not configured correctly to engine base timing			Ignition unit not configured correctly to engine base timing	Reinstall ignition unit in accordance with installation instructions
		LED blinks rapidly (12 times per second)			Internal ignition fault	Contact SureFly customer support 817-373-5161
	Unable to verify ignition correctly timed to engine #1 cylinder TDC				Ignition not timed to engine correctly	Reinstall ignition unit in accordance with installation instructions

1.8. Removal - 14 CFR §33 Appendix A33.3(a)(8):

Remove the SIM in reverse order of the Installation Instructions listed in Section 1.3 of this document.

1.9. List of Tools - 14 CFR §33 Appendix A33.3(a)(9):

The following tools may be required for maintenance:

1. Standard wrenches,
2. Standard screwdrivers,
3. Inspection mirror.

2. Overhaul

2.1. Disassembly - 14 CFR §33 Appendix A33.3(b)(1):

The SIM is factory sealed and not designed to be overhauled.

There are no re-useable components within the SIM.

2.2. Cleaning and Inspections - 14 CFR §33 Appendix A33.3(b)(2):

None.

2.3. Fits and Clearances - 14 CFR §33 Appendix A33.3(b)(3):

None.

2.4. Repair Methods - 14 CFR §33 Appendix A33.3(b)(4):

None.

2.5. Assembly At Overhaul - 14 CFR §33 Appendix A33.3(b)(5):

None.

2.6. Testing After Overhaul - 14 CFR §33 Appendix A33.3(b)(6):

None.

2.7. Storage Preparation and Limits - 14 CFR §33 Appendix A33.3(b)(7):

None.

2.8. List of Tools - 14 CFR §33 Appendix A33.3(b)(8):

None.

3. Airworthiness Limitations

3.1. Inspection Intervals and Mandatory Replacement Times - 14 CFR §33 Appendix A33.4(a)(1):

None.

3.2. FAA Approval - 14 CFR §33 Appendix A33.4(a)(2):

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of Title 14 of the Code of Federal Regulations unless an alternative program has been FAA approved.

None.