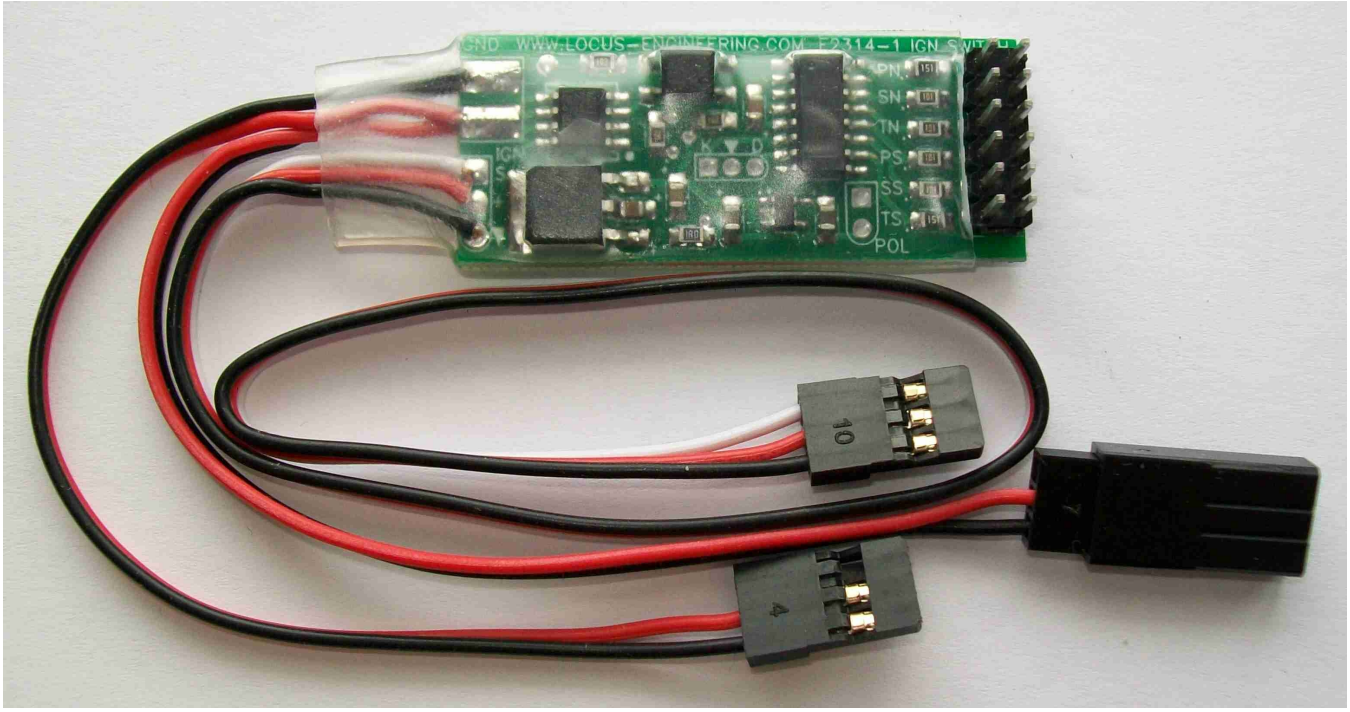
Locus Engineering Inc. E2314

RC Aircraft Ignition Switch & Navigation Light Controller



FEATURES

- 12Amp, 30V opto-isolated ignition switch
- Separate ignition power and ground from receiver circuit
- Ignition battery and ignition module cables with JR connectors
- Normally “ON” ignition switch
- Ignition switch turns “OFF” for servo pulse exceeding threshold
- Jitter-free on/off with 10ms hysteresis around servo switch point of 1.5msec
- Jumper to select decreasing or increasing servo pulse width for switching on
- Red & green wingtip & white tail static position light outputs, white & white wingtip & red tail strobed light outputs 20mA
- 4.0V to 12V power input
- 2.5” by 0.8” package incl. cable bend
- 12g weight

DESCRIPTION

The E2314 module is an ignition shutoff kill switch with a navigation light controller for gas powered R/C aircraft. The opto-isolated ignition kill switch is turned off if the servo pulse period exceeds a threshold after a 2 second delay. The ignition is switched off at the servo pulse period halfway point and a polarity jumper selects between decreasing servo pulse (jumper on) or increasing servo pulse (jumper off). The switch is rated at 12Amps, 30V while the module is powered from a 4V to 12V servo channel from the receiver. The light controller provides both static red & green wingtip and white & white wingtip and red tail strobed navigation light outputs powered through current limiting resistors matched to red, green, and white LEDs for 20mA @ 5V. The strobed outputs are switched on with the ignition for a realistic aircraft look. LEDs are easily connected to the paired male pins on the board periphery using 2 pin JR style connectors. LED cables are available separately at custom lengths.

APPLICATIONS

- R/C gas aircraft ignition kill switch

Table 1. Absolute Maximum Ratings

Parameter	Rating
Voltage Input to GND (servo connection)	-0.3 to +16V
Ignition Switch Voltage (battery input)	0.0 to +30V
Servo signal input voltage to GND	-0.3 to +5.8V
Operating temperature range	-40 to +85°C
Storage temperature range	-65 to +150°C
Maximum LED output (current limited)	50mA

Table 2. Electrical Characteristics

Test Conditions: Supply Voltage V_{dd} = +6.0V, $T_{ambient}$ = 25° C, unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{dd}	Supply voltage (servo)	4.0	5.0	12.0	V
I_{avg}	Switch continuous rated current		12		Amp
R_{on}	Switch "on" resistance		0.02	0.05	Ω
I_{avg}	Average operating current	15 (Tail Strobe)		80 (6 LEDs)	mA
I_{led}	Current available per LED		20		mA
V_{IL}	Digital low input voltage			0.6	V
V_{IH}	Digital high input voltage	2.5V			
PW_{servo}	Switch turn on/turn off servo pulse width	1.45		1.55	ms
F_{strobe}	Tail Strobe frequency		1.0		Hz

General Precautions

Charged devices and circuit boards can discharge without warning. Proper ESD precautions should be followed to avoid failure.

This device is not authorized for use in any product where the failure or malfunction of the product can reasonably be expected to cause failure in a life support system or to significantly affect its operation.

Locus Engineering Inc. reserves the right to make changes at any time without notice to improve product features or reliability.

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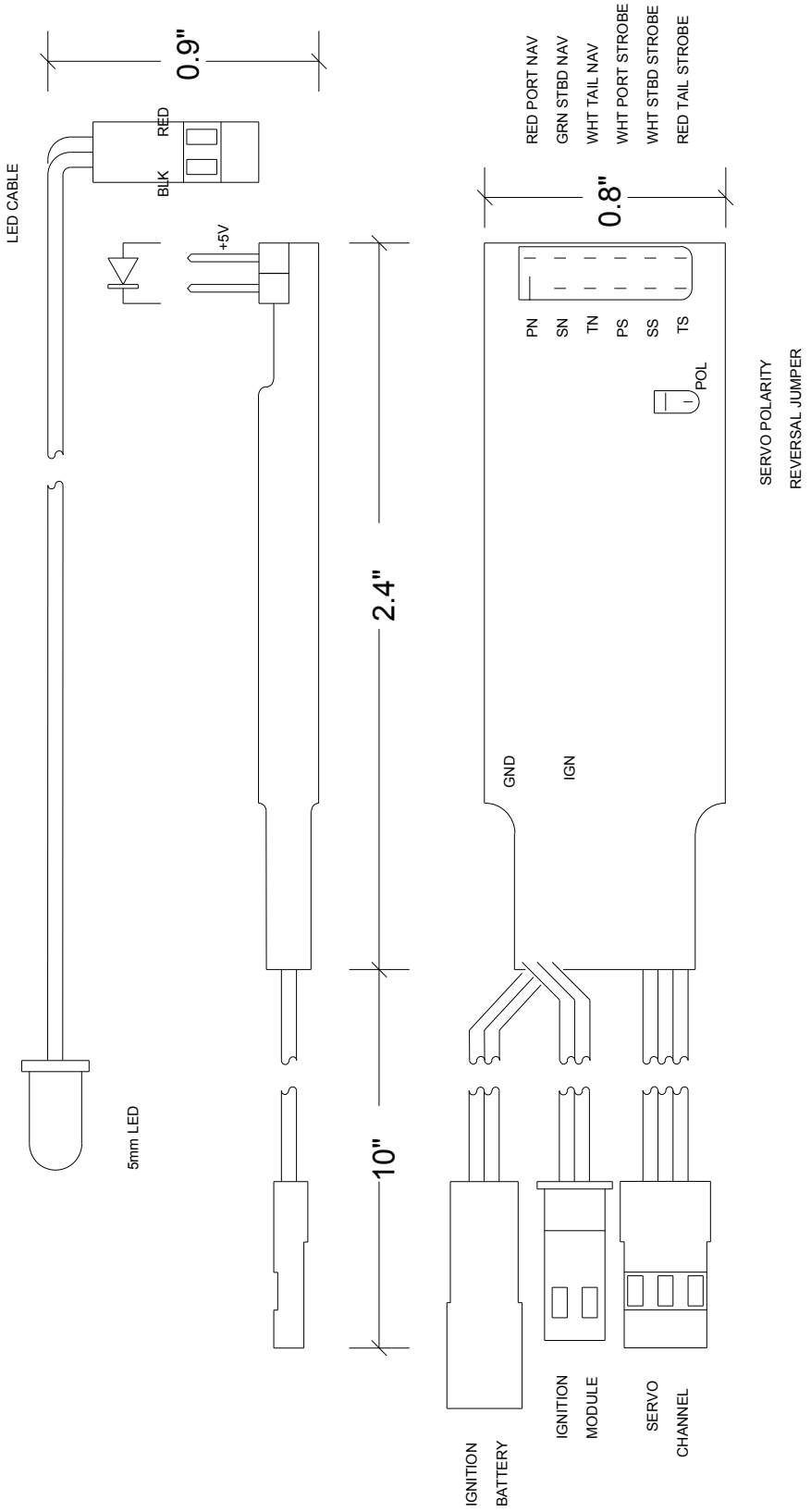

Figure 1. Module Dimensions

Description

The E2314 Ignition Cutoff Switch provides the operator with a safety feature to remotely shut off power to the ignition circuit in case of problems. The module includes an opto-isolated normally "on" power switch with separate ground from the servo connection for completely isolating the electrically noisy ignition circuit from the sensitive receiver circuit. The switch is rated at 12 Amps and presents less than 0.05 ohms series resistance. The ignition switch is normally "on" and a servo signal exceeding the pulse width threshold is needed to turn the ignition module "off". Without the polarity reversing jumper at the POL connector, an increasing servo pulse width turns on the ignition. With the polarity reversing jumper installed, a decreasing servo pulse width turns on the ignition. The servo pulse width needed to switch on or off is about 1.5 milliseconds which is the halfway point. To minimize jitter at the switching point, the E2314 uses +/- 0.05 msec of hysteresis, so the servo signal needs to be >1.55msec to turn on the ignition switch, and the servo signal needs to be <1.45msec to turn off the ignition switch (in the case of no polarity reversing jumper).
The servo connection allows voltages between 4V and up to 12V (3S LiPo) to operate the module due to an internal voltage regulator.

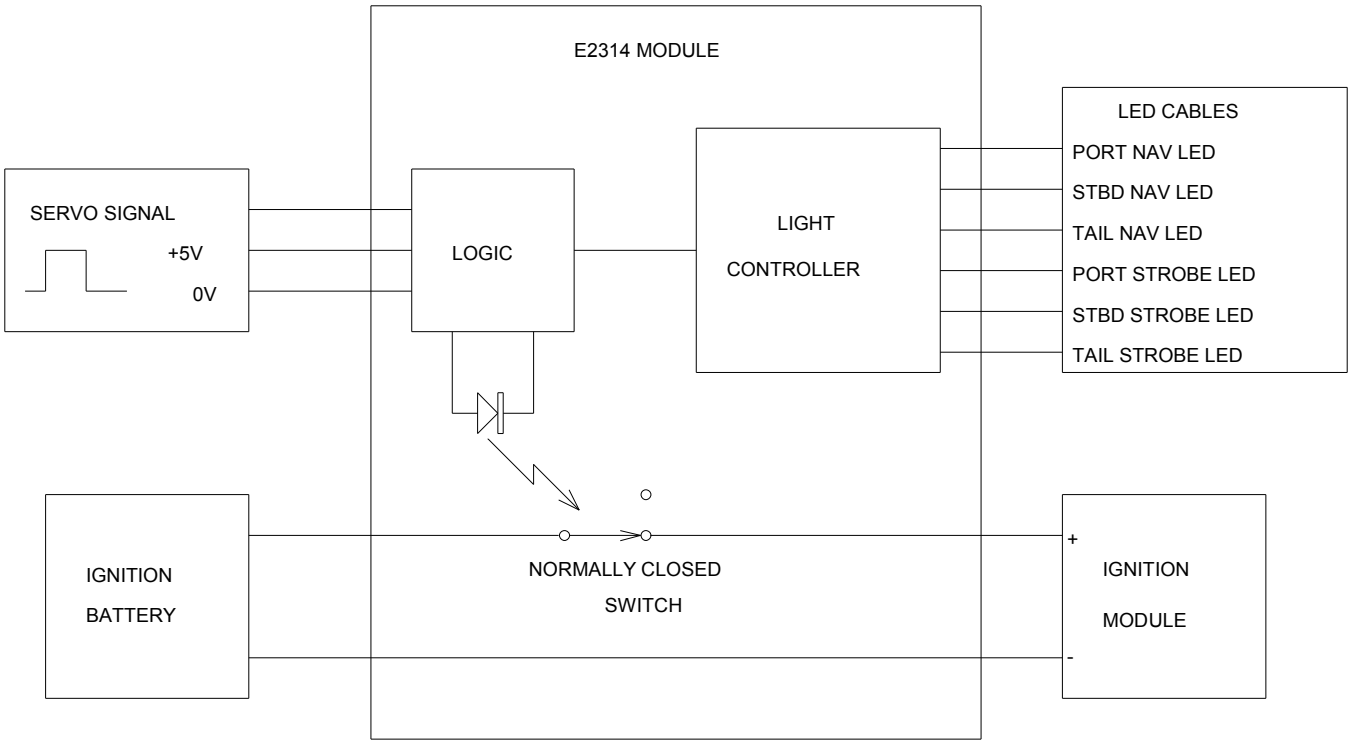

Figure 2. Module Block Diagram

Installation and Testing

Mount the E2314 Ignition Cutoff Switch in an accessible location between the receiver and ignition compartment containing the ignition battery and ignition module. Connect the ignition battery and ignition module to the E2314 module. Connect the servo cable to the receiver channel for the ignition cutoff. Connect the optional navigation position and strobe LEDs to the module so that red leads are connected to the outside pins and cover the unused LED outputs with insulating tape.

Bind the receiver to the transmitter and test the ignition cutoff as follows: With the ignition channel set to “on”, the LEDs should be on or flashing depending on which ones are connected. Turning the ignition channel “off” for at least two seconds will disconnect the ignition module and turn off the LEDs. This delay is to prevent accidental shutoffs due to operator or receiver errors. The ignition switch turn on is immediate.

If the ignition switch polarity is opposite to desired, reverse the channel polarity in the receiver or by shorting the POL connector on the E2314 module with a short piece of soldered wire.

Test the ignition cutoff with the engine on to verify that the control surfaces move properly without interference. Kill the engine by engaging the kill switch for at least two seconds until the engine quits.

Minimizing Electrical Interference

Presumably the ignition battery and ignition module are in a forward compartment away from the receiver and antenna. Locate the E2314 Ignition Cutoff Switch between the receiver and the ignition compartment.

Interfering signals are propagated by conduction or radiation. Conducted interference occurs when interfering signals travel on wires connecting separate circuits. Keep a potentially noisy circuit such as an ignition module on a separate battery and not connected to the receiver battery.

Radiated interference occurs when wires act as antennas and interfering signals are transmitted from one wire and received by another. Keep radiated interfering sources such as power cables physically away and preferably shielded from sensitive circuits such as radio receiver antennas. Shield the ignition compartment with adhesive muffler tape and ground this to the ignition battery ground. Antenna loops can be avoided by twisting the power and return leads on power cables such as for the ignition battery and the ignition module to help cancel out the radiated interference. Keeping these cables short also minimizes radiated interference. Please follow the ignition module manufacturer's recommendations.

Navigation Position and Strobe Lights

The E2314 Ignition Cutoff Switch includes navigation position and strobe LED outputs. These are optional and do not affect the operation of the kill switch. LED cables are available separately at custom lengths. Each LED cable includes a high intensity 5mm LED soldered to a custom length 26AWG servo cable with crimped two contact connector. The heatshrink on the soldered leads identifies the LED color. To order, specify the LED color, function, and cable length, e.g. White-landing- 54" or Red-tailstrobe-36".

Strobe Light Timing

The wingtip and tail strobe light timing is divided into 17 time slots adding up to one second.

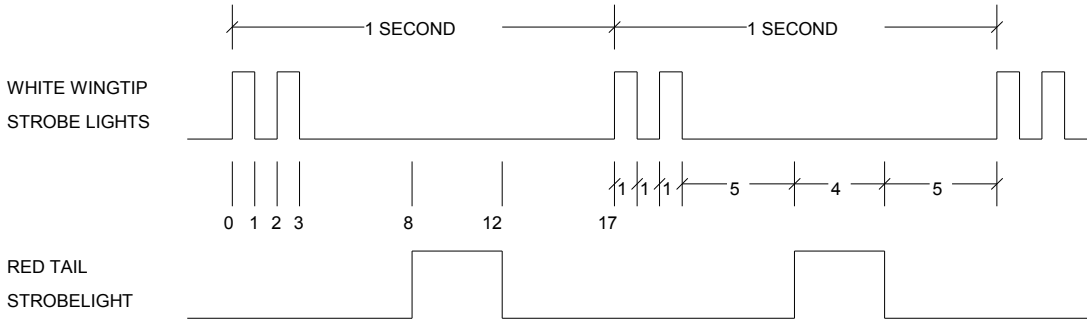

Figure 3. Strobe Light Timing

Operating Current vs Installed LEDs

The operating current will vary depending on the number of installed LEDs. The wingtip and tail position LEDs are always on, and contribute 60mA to the control board's operating current of 10mA for a total of 70mA if they are used. The tail strobe uses 20mA times the duty cycle of 4/17 or about 5mA. The wingtip strobes use 40mA times the duty cycle of 2/17 or about 5mA. If only the red tail strobe is used, the total operating current would be about 15mA. If only the red tail strobe and red & green wingtip position lights are installed, the total operating current would be 55mA. The following table summarizes the operating current when LEDs are added.

Table 3. Operating Current vs. Installed LEDs

E2314 Controller Board	10	mA
Red & Green Wingtip Position LEDs	+40	mA
White Tail Position LED	+20	mA
Red Tail Strobe	+4.7	mA
White & White Wingtip Strobe LEDs	+4.7	mA
Total maximum operating current	80	mA

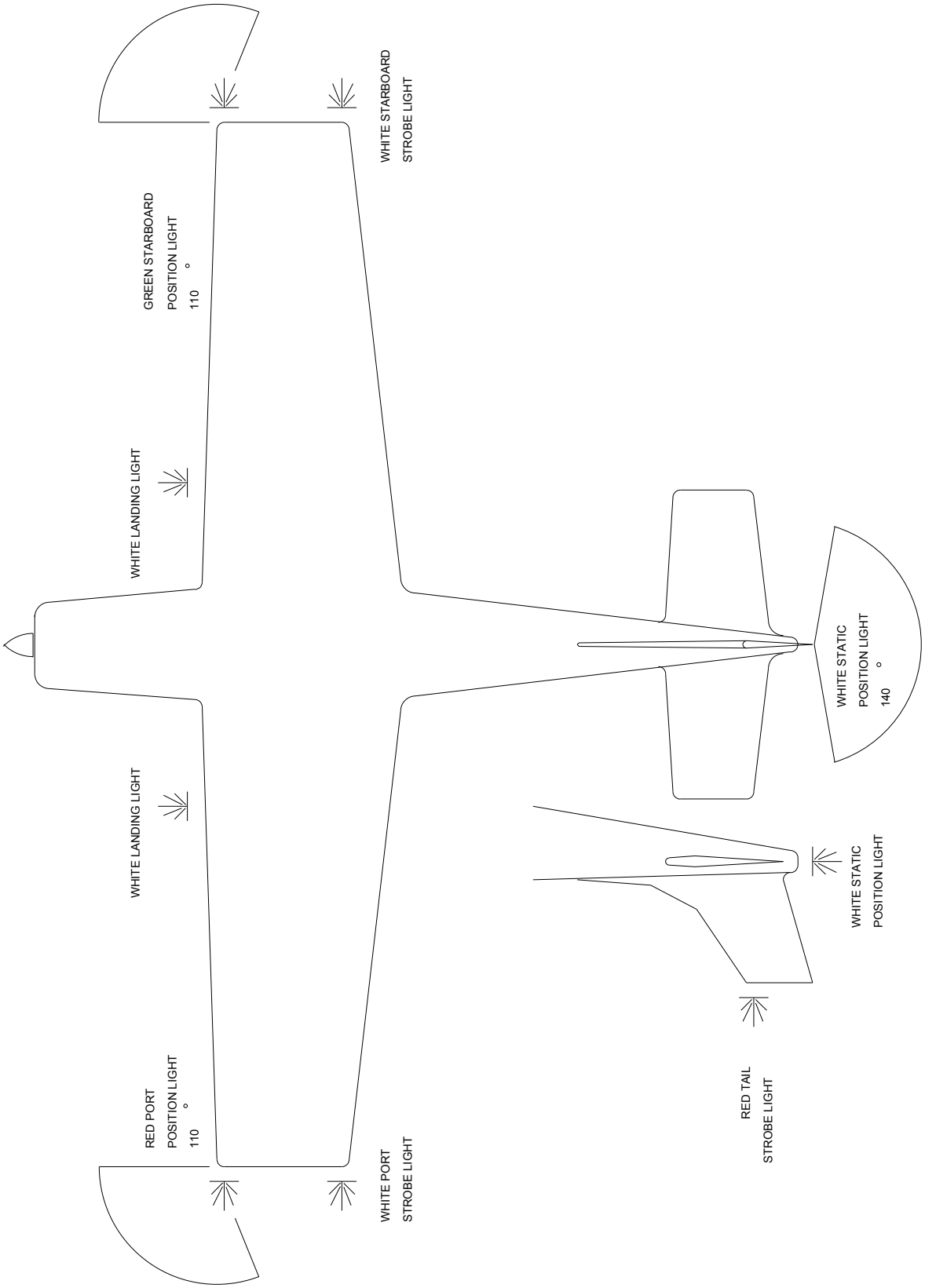

Figure 4. Suggested Navigation Light Placement