Lepton 5 HAM

L5H-OM-01

RC Receiver

RECEIVER OPERATION MANUAL

Sombra Labs Inc.

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TECHNICAL SPECIFICATIONS

- World's smallest, lightest 5-channel full-range receiver
- Quick-and-easy patented "1-Click™" programming technology
- Three failsafe modes featuring patented "1-Click Failsafe™" technology
- Complete control of pin/channel mapping
- DSP processing
- Microprocessor-based decoding and digital frame filtering
- Sensitivity: < 2µV
- Weight: ~ 6g (including antenna & packaging)
- Antenna impedance: 50Ω
- Operating voltage: 3.5V – 9.0V DC
- Operating temperature: -20°C to +80°C (-4°F to 176°F)

MOUNTING THE RECEIVER

- Mount the Lepton 5 Receiver in the model so it is protected from vibration or shock.
- Use double-sided tape or Velcro® to mount the Receiver in the model.
- Position the Receiver where it will not contact other solid components.
- Mount the Receiver away from moving parts, sharp corners, and possible contaminants (fuel, dirt, etc.).
- Position the Receiver so the Shadow Programmer can be easily connected to it.

Crystals

- Lepton 5 uses UM-1 crystals. We strongly recommend using Sombra Labs (or Sombra approved) crystal for best possible results.

Using the Shadow Programmer

The easy-to-use Shadow Programmer uses Sombra Labs' patented "1-Click™" programming technology to program the Lepton 5 Receiver.

1. Power up the Lepton 5 Receiver.

2. On the Programmer, turn the two rotary dials to set the 2-digit value. You can turn the rotary dials with your fingers or a small flat-blade screwdriver.
   For example, to set the value 71:
   Set the 1st dial (10's) to **7**
   Set the 2nd dial (1's) to **1**

1st Digit Rotary Dial   2nd Digit Rotary Dial
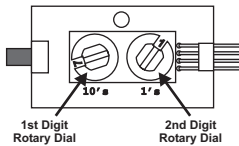
3. Plug the Programmer into the "Programmer Port" on the Lepton 5 Receiver as shown.

The Programmer only works properly when connected in the direction shown with all pins fully inserted.

4. Press the push button on the Programmer until the confirmation LED lights up.

5. Unplug the Programmer.

Plugging the Programmer in reverse will NOT damage the Receiver or Programmer. However, the Programmer will not operate properly.

If you are programming multiple values, you can leave the Programmer connected to the Receiver; you do not need to remove and re-connect the Programmer each time.

Push Button

Confirmation LED

Connection Pins

ALWAYS connect the Programmer in this direction!
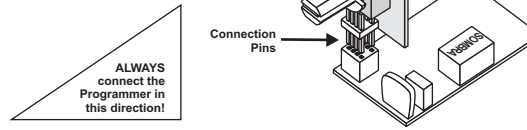
ANTENNA

The Lepton 5 receiver has a default antenna length of 39" that is optimized for full range application. However, the antenna can be shortened to 18" for indoor or surface use.

Always conduct a range change when you first use the receiver and after any changes to the antenna.

For models with primarily Carbon Fiber (CF) construction (for example, RC aircraft fuselage), we strongly recommend that the antenna exits the models as early as possible, with the least amount of antenna wire remaining close to or inside the model.

ADVANCED PROGRAMMING

You can use the Shadow Programmer, with Sombra Labs' patented "1-Click™" programming technology, for programming advanced functionality into the Lepton 5 Receiver:

- Factory reset
- Failsafe mode (patented "1-Click Failsafe™")
- Pin/channel mapping profile setup and recall

Factory Reset – Program Value 99

The Factory Reset feature brings the Lepton 5 to its factory default settings:

- **Failsafe mode:** Reset to Limited-Hold failsafe mode
- **Pin/channel mapping profile:** Reset to User Mode 1

User Mode 1 factory default pin/channel mapping is as follows:

Pin	1	2	3	4	5
Channel	1	2	3	4	6

- **User Mode 2 mapping profile:** User Mode 2 user-defined mapping profile is reset to "Master mode" settings.
- **DSP Mode:** Reset to DSP ON

To reset the Lepton 5 Receiver to factory defaults, program the value **99**.
For more information about programming a value, see "STEP 3: Using the Shadow Programmer."

Failsafe Modes

The failsafe mode determines the behaviour of the connected servos if the Lepton 5 Receiver loses the signal from your transmitter. There are three different failsafe modes: Limited-Hold, Permanent-Hold, and a user-defined failsafe mode.

> **IMPORTANT!**
> **Always check that the proper failsafe mode is set before each flight or use of your model.**
> **You can easily do this by turning off your transmitter (with the model still powered up) and observing the behaviour of the servos.**

Limited-Hold Failsafe Mode – Program Value 98

Upon loss of a Tx signal, the Receiver outputs the last known good frame on the servo wires for 1.5 sec, after which time it eliminates the control signal until a good Tx signal is re-acquired. Servos will remain in their last known good positions, but will have no torque; most ESCs will cut the throttle signal to the motor.

To set Limited-Hold failsafe mode, program the value **98**.

Permanent-Hold Failsafe Mode –Program Value 97

Upon loss of a Tx signal, the Receiver outputs the last known good frame on the servo wires indefinitely until a good Tx signal is re-acquired.

To set Permanent-Hold failsafe mode, program the value **97**.

User-defined Failsafe Mode – Program Value 96

Upon loss of a Tx signal, the Receiver outputs the last known good frame on the servo wires for 1.5 sec, after which time it puts the servos to their pre-defined positions indefinitely until a good Tx signal is re-acquired.

To set the servo failsafe positions **and** activate the user-defined failsafe mode:

1. Set all servos to their desired failsafe positions.
   (For example, in a nitro car, set steering to centered, and set throttle to full brake.)

2. Program the value **96**.

This stores the servo failsafe positions and puts the Receiver in the user-defined failsafe mode.

> **IMPORTANT!**
> **If the Receiver is changed from the user-defined failsafe mode to another failsafe mode, the user-defined servo failsafe settings are lost and must be set up again when returning to the user-defined failsafe mode.**

Pin / Channel Mapping Profiles

The Lepton 5 Receiver allows complete control over pin/channel mapping. There are four separate pin/channel mapping profiles that can be used to map pins to specific channels: two preset mapping profiles (Master Mode and Slave Mode) and two user-definable mapping profiles (User Mode 1 and User Mode 2.)

For more information about programming a value, see " Using the Shadow Programmer."

Master Mode – Program Value 02

Master Mode channel mapping profile supports up to 5 servos on channels 1–5. Master Mode is typically used when you are using a single Lepton 5 Receiver in a model with up to 5 servos (on channels 1–5).

In Master Mode, the pin/channel mapping is as follows:

Pin	1	2	3	4	5
Channel	1	2	3	4	5

To set the Lepton 5 Receiver to Master Mode, program the value 02.

Master Mode is a preset mapping profile and cannot be re-mapped like User Modes 1 & 2.
Master Mode can be recalled at any time using "1-Click™" Recall to make it the operational mapping profile in the Lepton 5 Receiver.

Slave Mode – Program Value 03

Slave Mode is a pin/channel mapping profile that supports up to 5 servos on channels 6–10.

In Slave Mode, the pin/channel mapping is as follows:

Pin	1	2	3	4	5
Channel	6	7	8	9	10

Using two Lepton 5 Receivers in the same model (one Receiver in "Master Mode" and the other in "Slave Mode") lets you "cascade" the Receivers, providing up to 10 channel operation. The 1st Receiver (in Master Mode) would control channels 1–5, and the 2nd Receiver (in Slave Mode) would control channels 6–10. Your transmitter must be capable of supporting the total number of connected servos.

To set the Lepton 5 Receiver to Slave Mode, program the value 03.

Slave Mode is a preset mapping profile and cannot be re-mapped like User Modes 1 & 2.
Slave Mode can be recalled at any time using "1-Click™" Recall to make it the operational mapping profile in the Lepton 5 Receiver.

WARNING: *If two Lepton 5 RX are used in the same model (one Receiver in "Master Mode" and the other in "Slave Mode") the receivers need to be at least 6 inches apart.*

User Mode 1 (User-defined Mapping Profile 1)

User Mode 1 factory default pin/channel mapping is as follows:

Pin	1	2	3	4	5
Channel	1	2	3	4	6

You can remap any of the 5 pins on the Lepton 5 Receiver to any servo channel from 1–14, and save this user-defined mapping profile as "User Mode 1." Sombra Labs' patented "1-Click™" programming technology makes this feature extremely quick and easy to perform.

User Mode 1 differs from Master Mode and Slave Mode in that you can change and save the pin/channel mapping profile for later use. You can then use "1-Click™" Recall to recall User Mode 1 to make it the operational mapping profile in the Lepton 5 Receiver.

STEP 5: Advanced Programming (cont'd)

For more information about programming a value, see " Using the Shadow Programmer."

Setting Up and Saving User Mode 1 – Program Value 91

Use the Shadow Programmer "1-Click™" Setup to set up and save the mapping profile
for User Mode 1 as follows:

1. Program the value 91. (This starts programming for User Mode 1.)

2. Program the value "2+*<pin number>*" for the pin you want to map. Acceptable values are 21–25 (for pins 1–5, respectively).

   For example, to map pin 5, program the value 25.

3. Program the value of the channel you want to map to the selected pin. Acceptable values are 01–14 (for channels 1–14, respectively).

   For example, to set the selected pin to channel 7, program the value 07.

4. Repeat steps 2–3 until you have completed all pin/channel mapping.

5. To save the setup and end the programming sequence, program the value 30.

Example of User Mode 1 Programming

In this example, the desired pin/channel mapping is the following:

Pin	1	2	3	4	5	
Channel	1	2	3	4	7	

To map the pins/channels as per the table above, program values in the following order:

02	(Sets Master Mode – since pins 1–4 already use that mapping)
91	(Start programming User Mode 1)
25	(Remaps pin 5…)
07	(… to channel 7)
30	(Ends programming)

Note that you do not need to re-define the mapping for ALL pins if the pin/channel mapping is already done. In this example, pins 1–4 are already mapped to the proper channels (channels 1–4, respectively) when Master Mode is initially set.

Recalling User Mode 1 – Program Value 00

User Mode 1 can be recalled at any time using "1-Click™" Recall.

To recall User Mode 1 to make it the operational mapping profile, program the value 00.

User Mode 2 (User-defined Mapping Profile 2)

User Mode 2 factory default pin/channel mapping is as follows:

Pin	1	2	3	4	5
Channel	1	2	3	4	5

You can remap any of the 5 pins on the Lepton 5 Receiver to any servo channel from 1–14, and save this user-defined mapping profile as "User Mode 2." User Mode 2 is set up, saved, and recalled in a similar manner to User Mode 1, although different program values are used.

Sombra Labs' patented "1-Click™" programming technology makes this feature extremely quick and easy to perform.

Like User Mode 1, User Mode 2 differs from Master Mode and Slave Mode in that you can change and save the mapping for later use. You can then use "1-Click™" Recall to recall User Mode 2 to make it the operational mapping profile in the Lepton 5 Receiver.

For more information about programming a value, see " Using the Shadow Programmer."

Setting Up and Saving User Mode 2 – Program Value 92

Use the Shadow Programmer "1-Click™" Setup to set up and save the mapping profile for
User Mode 2 as follows:

1. Program the value 92. (This starts programming for User Mode 2.)

2. Follow steps 2–5 in "Setting Up and Saving User Mode 1" for setting up and saving the mapping profile for User Mode 2.

Recalling User Mode 2 – Program Value 01

User Mode 2 can be recalled at any time using "1-Click™" Recall.
To recall User Mode 2 to make it the operational mapping profile, program the value 01.

DSP Functionality

The Lepton 5 allows the user to turn OFF the DSP functionality. Turning OFF the DSP will permit the use of a trainer setup. In addition, it can also help in locating the source of glitches in the model.

To turn OFF DSP, program the value 95.
To turn ON DSP, (factory default), program the value 94.

For more information about programming a value, see " Using the Shadow Programmer."

PROGRAMMING QUICK REFERENCE

Factory Reset

Feature	Program Value
Factory Reset	99

Failsafe Mode

Feature	Program Value
Limited-Hold Failsafe	98
Permanent-Hold Failsafe	97
User-defined Failsafe (setup and activation)	96

Pin/Channel Mapping Profiles – Preset Modes

Feature	Program Value
Master Mode (recall)	02
Slave Mode (recall)	03

Pin/Channel Mapping Profiles – User-defined Modes

Feature	Program Value
Start User Mode 1 Programming	91
Start User Mode 2 Programming	92
Identify Pin Number to Map	2 + {pin number}
Identify Channel Number to Map to Pin	01–14
End User Mode Programming Sequence	30
Recall User Mode 1	00
Recall User Mode 2	01

DSP Functionality

Feature	Program Value
DSP ON (Factory Default)	94
DSP OFF	95

CUSTOMER SERVICE

For technical assistance please contact the hobby dealer from which you purchased your
Sombra Labs product.

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COMPLIANCE

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada

This device is fully IC (Industry Canada) compliant.

AMA

This device meets all AMA-91 guidelines.