SPITFIRE 160

Specifications

Wing Span: 80 in / 2030 mm
Wing Area: 1138 sq in / 73.4 sq dm
Flying Weight: 13 lbs / 5850 g
Fuselage Length: 68 in / 1730 mm
Requires: 2-stroke 1.60 engine,
6-channel radio w/ 9 servos

Warning! This model is not a toy.

It is designed for maximum performance. Please seek advice if one is not familiar with this kind of engine powered precision model. Operating this model without prior preparation may cause injuries. Remember, safety is the most important thing. Always keep this instruction manual at hand for quick reference.

* Specifications are subject to change without notice.*

THE WINGS MAKER
FACTORY PRE-FABRICATED
ALMOST-READY-TO-FLY (ARF) SERIES
MADE IN CHINA
www.thewingsmaker.com
SPITFIRE 160

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BEFORE YOU BEGIN

1 Read through the manual before you begin, so you will have an overall idea of what to do.

2 Check all parts. If you find any defective or missing parts contact your local dealer. Please DRY FIT and check for defects for all parts that will require CA or Epoxy for final assembly. Any parts you find to be defective after the gluing process may be difficult to remove for warranty replacement. The manufacturer will replace any defective parts, but will not extend to the parts that are good before gluing to defective parts during assembly. Warranty will not cover any parts modified by customer.

3 Symbols used throughout this instruction manual comprise of the following : -

- **AB**: Apply epoxy glue.
- **CA**: Apply instant glue (C.A.glue, super glue.)
- **L/R**: Assemble left and right sides the same way.
- **C**: Ensure smooth non-binding movement while assembling.
- **\(3\text{mm}\)**: Drill holes with the specified diameter (here: 3mm).
- **N.I.**: Must be purchased separately!
- **!**: Pay close attention here!
- **! Warning!**: Do not overlook this symbol!
- **\(\text{Cut off shaded portion.}\)**: Cut off shaded portion.
- **\(\text{Peel off shaded portion covering film.}\)**: Peel off shaded portion covering film.
- **\(\text{Pierce the shaded portion covering film.}\)**: Pierce the shaded portion covering film.
<table>
<thead>
<tr>
<th>Parts List</th>
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<tr>
<td>1. MAIN WING -- 1 pair</td>
</tr>
<tr>
<td>2. RETRACTABLE LANDING GEAR -- 1 set</td>
</tr>
<tr>
<td>PUSHROD Ø1.8x45mm(For Retractable) -- 2 pcs</td>
</tr>
<tr>
<td>MAIN WHEEL Ø103mm -- 2 pcs</td>
</tr>
<tr>
<td>COLLAR Ø5.7mm w/set screw -- 2 sets</td>
</tr>
<tr>
<td>SCREW PM2x8mm -- 8 pcs</td>
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<tr>
<td>SCREW PWA2.3x8mm -- 8 pcs</td>
</tr>
<tr>
<td>M2 NUT -- 8 pcs</td>
</tr>
<tr>
<td>WASHER Ø2x0.5mm -- 16 pcs</td>
</tr>
<tr>
<td>COVERING FILM 45x75mm -- 2 pcs</td>
</tr>
<tr>
<td>PLYWOOD 3x28x62mm -- 2 pcs</td>
</tr>
<tr>
<td>3. SCREW PB2x14mm -- 6 pcs</td>
</tr>
<tr>
<td>SCREW PB2x25mm -- 6 pcs</td>
</tr>
<tr>
<td>SCREW PWA2x6mm -- 16 pcs</td>
</tr>
<tr>
<td>FUEL TUBE Ø6x5mm -- 8 pcs</td>
</tr>
<tr>
<td>CLEVIS PL4112103 -- 4 pcs</td>
</tr>
<tr>
<td>STRAPER PL4112102 -- 4 pcs</td>
</tr>
<tr>
<td>TRI-HORN M3x14mm/L PL4111185 -- 4 sets</td>
</tr>
<tr>
<td>PUSHROD Ø1.8x105 with Threads(For Aileron Servos) -- 2 pcs</td>
</tr>
<tr>
<td>PUSHROD Ø1.8x110 with Threads(For Flap Servos) -- 2 pcs</td>
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<tr>
<td>SERVO MOUNTING PANEL 2x68x78mm -- 2 pairs</td>
</tr>
<tr>
<td>4. STABILIZER &amp; ELEVATOR -- 1 set</td>
</tr>
<tr>
<td>FUSELAGE -- 1 pc.</td>
</tr>
<tr>
<td>SCREW PA3x12mm -- 2 pcs</td>
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<tr>
<td>WASHER Ø3x07mm -- 2 pcs</td>
</tr>
<tr>
<td>STABILIZER TUBE Ø9.5x257mm -- 1 pc.</td>
</tr>
<tr>
<td>5. VERTICAL FIN &amp; RUDDER -- 1 set</td>
</tr>
<tr>
<td>TAIL LANDING GEAR PL7100002 -- 1 set</td>
</tr>
<tr>
<td>TAIL WHEEL Ø30mm -- 1 pc.</td>
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<tr>
<td>COLLAR Ø2.6mm w/set screw -- 1 set</td>
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<tr>
<td>SCREW PA3x12mm -- 2 pcs</td>
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<tr>
<td>FUEL TUBE Ø6x5mm -- 2 pcs</td>
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<tr>
<td>CLEVIS PL4111203 -- 2 pcs</td>
</tr>
<tr>
<td>TRI-HORN M3x14mm(L) PL4111185 -- 2 sets</td>
</tr>
<tr>
<td>PUSHROD Ø1.8x778mm with Threads(For Elevator) -- 2 pcs</td>
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<tr>
<td>6. CANOPY -- 1 pc.</td>
</tr>
<tr>
<td>DOUBLE SIDED TAPE 6x400mm -- 1 pc.</td>
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<tr>
<td>SCREW PWA2.3x8mm -- 4 pcs</td>
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<tr>
<td>SCREW M4x60mm -- 2 pcs</td>
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<tr>
<td>SOCKET HEAD SCREW M3x15mm -- 2 pcs</td>
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<tr>
<td>NUT -- 2 pcs</td>
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<tr>
<td>WASHER Ø3x07mm -- 2 pcs</td>
</tr>
<tr>
<td>TUBE Ø25.4x670mm -- 1 pc.</td>
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<tr>
<td>7. LINKAGE CONNECTOR Ø2.1mm -- 3 sets</td>
</tr>
<tr>
<td>PLYWOOD 8x8x42mm(For Elevator &amp; Rudder Servos Stand) -- 4 pcs</td>
</tr>
<tr>
<td>SPONGE Ø6x70x125(For Radio Equipment) -- 1 pc.</td>
</tr>
<tr>
<td>FUEL TUBE Ø6x5mm -- 1 pc.</td>
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<tr>
<td>STRAPER PL4112102 -- 1 pc.</td>
</tr>
<tr>
<td>TRI-HORN M3x14mm(L) PL4111185 -- 2 sets</td>
</tr>
<tr>
<td>SOCKET HEAD SCREW M4x35mm -- 4 pcs</td>
</tr>
<tr>
<td>SCREW KM2x20mm -- 4 pcs</td>
</tr>
<tr>
<td>WASHER Ø4x12mm -- 8 pcs</td>
</tr>
<tr>
<td>NYLON INSERT LOCK NUT M3 -- 8 pcs</td>
</tr>
<tr>
<td>8. ENGINE MOUNT -- 1 pc.</td>
</tr>
<tr>
<td>9. ENGINE MOUNT PL511120 -- 1 set</td>
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</tbody>
</table>

### Covering

- TOUGHLON STL 203 LIGHT GRAY
- TOUGHLON STL 351 DARK BLUE
- TOUGHLON STL 304 OLIVE DRAB
1 Flap & Aileron

Bottom View

2 Landing gear & Retract Servos

Bottom View

Retract Servos

L/R

Covering Film

N.I.
Flap & Aileron Servos

PB2x14mm Screw 6
PB2x25mm Screw 6
PWA2x8mm Screw 16

Straper
Fuel Tube Ø6x5mm

PB2x25mm
Clevis
Fuel Tube Ø6x5mm
Tri-horn M3x14mm(L)

PB2x14mm
Clevis
Fuel Tube Ø6x5mm
Tri-horn M3x14mm(L)

PWA2x8mm
Push RodØ1.8x105mm
Push RodØ1.8x110mm

L/R

- Ø1mm pilot holes for World Models tri-horn are pre-drilled. Please look for pin-hole marks at underside of control surfaces.

The existing slots are for 2 channels (mixing) operation of the flaps.
4 Stabilizer & Elevator

PA3x12mm Screw 2

PA3x12mm Washer 2

Pre-glued

PA3x12mm

PA3x12mm Screw

d3x7mm Washer 2

Stabilizer Tube D9.5x257mm

Completed

5 Vertical Fin & Rudder

PA3x12mm d3x7mm

Pre-glued

Completed
6 Tail Landing Gear

- PA3x12mm Screw: 2
- 3mm Set Screw: 1
- 2.6mm Collar: 1

7 Elevator Pushrod

- PB 2x25 mm Screw: 6
- 3x3mm Set Screw: 1

* Ø1mm pilot holes for World Model tri-horn are pre-drilled. Please look for pin hole marks at undersides of control surfaces.
Blind nuts are off-centered to keep the spinner at the fuselage axis.

8 Rudder Pullwire

PM 2x30mm Screw
M2 Nut

Ø1mm pilot holes for World Models tri-horn are pre-drilled. Please look for pin-hole marks at side of control surfaces.

9 Engine Mount

M6x30mm Screw
d6xD15mm Washer
M6xD18mm Blind Nut

Apply thread locker to screws.

Blind nuts are off-centered to keep the spinner at the fuselage axis.
Engine

Illustration is for inverted mounting. You can mount the engine upright or sideways simply by rotation the engine mount. Thrust angles will not be affected.

ANTI-VIBRATION MOUNT INSTALLATION

Make sure the rounded edges are facing the shock absorbing SILICON PAD.

Fuel Tank

Install Plywood 3x41x125mm (For fixing fuel tank)

Fuel Tank 800cc

Bottom View

Install Engine position

152 mm
6.0 in

11 Engine

M4x35mm Screw
4
KM3x20mm Washer
8
M4 Nylon Insert Lock Nut
4
M3 Nylon Insert Lock Nut
8
d4x12mm Washer
8

Plastic Tube
d2xD3x170mm

Throttle Pushwire
Ø1.2x350mm

KM3x20mm

Counter Sink

4.1mm
2.1mm
3.2mm

M4x35mm

M4 Nylon Insert Lock Nut
d4xD12mm

Fuel Tank 800cc

Plywood
3x41x125mm

Balsa
8x8x41mm

10 Fuel Tank
12 Servo Set

Please refer to attached sheet for linkage connector installation.

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>SET SCREW</td>
<td>3</td>
</tr>
<tr>
<td>Linkage Connector</td>
<td>3</td>
</tr>
<tr>
<td>M2 Nut</td>
<td>3</td>
</tr>
<tr>
<td>2mm Washer</td>
<td>3</td>
</tr>
</tbody>
</table>

![Diagram of servo set components](image)

13 Servos

- Install and arrange the servo as shown in the diagram.

Front

- Plywood 3x12x119mm
- Throttle Servo
- Throttle Servo
- Plastic Tube d2xD3x170mm
- Battery
- Switch
- Balsa 6x62x125mm
- Balsa 8x8x62mm
- Balsa 6x62x125mm
- Balsa 8x8x62mm
- Elevator Servo
- Copper Tube
- Press down the center 1/3 portion

Bottom View

- Balsa 8x8x62mm
- Rudder Servo
- Elevator Servo
- Balsa 8x8x62mm
- Fuel Tube Ø6x5mm

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GA026PO29451405  P.9
14 Cowling

- **PWA2.6x12 mm Screw**: 4
- **d1.5xD6.5 mm Silicon Grommet**: 4
- **Quick Release Nylon Rivet**: 10
- **KA2.3x8mm Screw**: 10

First insert the grommet to the cowling then apply screw.

15 Main Wing

- **PM3x75mm Screw**: 2
- **d3xD7mm Washer**: 8
- **d4xD15mm Washer**: 2
- **HM4x40mm Screw**: 2
- **M3x15mm Screw**: 2
- **M3 Nylon Insert Lock Nut**: 2
- **M3 Nut**: 2

- **Bottom View**
- **Wing Tube D25.4x670mm**
- **Wing Tube D9.5x325mm**

- **Bottom View**
- **Wing Tube**
- **Wing Protection**
- **HM4x40mm**
- **d4xD15mm**
16 Canopy

- First insert the grommet to the canopy then apply screw.
- Apply double-sided tape

17 Wing Setting

- Adjust the wing and fuselage configuration as shown in the diagrams.
Control Throws

Adjust the control throws as shown in the diagram. These throws are good for general flying. You can adjust according to your personal preference.

- Elevator: 25mm, 25mm
- Rudder: 55mm, 55mm
- Flaps (near fuselage): 35mm
- Ailerons (away from fuselage): 20mm, 20mm

C.G.

116mm (4.6 in)

Elevator

Rudder

Flaps (near fuselage)

Ailerons (away from fuselage)

The ideal C.G. position is 116mm (4.6 in) behind the leading edge measured at where the wing meets the fuselage. In order to obtain the C.G. specified, add weight to the fuselage or move the battery position. Check the C.G. before flying.

If you are converting this model to electric, please move the C.G. forward 10% of current C.G. distance from leading edge to compensate for weight of fuel.

Measure C.G. with the wheels in retracted position.


Warning!

Important Safety Precautions

# First time flyer should never fly by himself/herself. Assistance from experienced flyer is absolutely necessary.

# Pre-flight adjustment must be done before flying, it is very dangerous to fly a badly pre-adjusted aircraft.

# SPITFIRE 160 is specially designed to be powered by 1.60 2-stroke glow engine, using a more powerful engine does not mean better performance. In fact, over powered engine may cause severe damage and injuries.

# Make sure the air field is spacious, never fly the plane too close to people and never get too close to a running propeller.

# If you find wrinkles on the covering as a result of weather changes, you can use hot iron to remove the wrinkles. Please begin with lower temperature setting and gradually raise the temperature until the wrinkles are gone. Too hot an iron may damage the covering.

# Check and re-tighten up all factory assembled screws, use thread locker if applicable.

# When Flaps are lowered, nose of model will rise. The nose-up varies with the speed at which the model is flying when you lower the flaps and the extent to which they are lowered. Check effect of flaps at higher altitude to avoid surprises during landing. You may apply down trim of the elevator to compensate for the nose-up effect when lowering the flaps. Taking off with flaps lowered is not recommended, as the increased drag may require a longer runway and more engine power for the model.
ADDENDUM

LINKAGE CONNECTOR
HW7111050 & HW7111060

Drill 2mm hole at servo horn.
Insert linkage connector into servo horn.
Make sure shoulder of screw is cleared from servo horn.
Add washer to reduce play if necessary.
Tighten up the round nut against the shoulder. Apply CA or permanent thread locker.

After fastening the round nut, make sure that the linkage connector can rotate freely.

Landing Gear
Should you need to bend the landing gear wire, use the radio control to open or close the gear to 25% from fully retracted position and switch off the receiver. It is safer to bend the wire in this position. Bending the wire in fully open position may damage the supporting structure.
Should you require to bend the landing gear wire, please insert a round metal bar into the spring coil and apply force there as leverage. Bending the wire directly may damage the mounting block structure.