

RV-10

N720AK

Pilot's Operating Handbook

Revision 1.0



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1 Introduction

This Pilot's Operating Handbook contains the information necessary for the safe and efficient operation of the RV-10 aircraft N720AK.

This handbook is divided into sections for quick reference:

1. **General** - Aircraft specifications and descriptive data
2. **Limitations** - Operating limitations, placards, and markings
3. **Engine Information** - Engine specifications and operating parameters
4. **Emergency Procedures** - Procedures for handling emergencies
5. **Abnormal Procedures** - Procedures for abnormal situations
6. **Normal Procedures** - Normal operating procedures and checklists
7. **Performance** - Performance charts and data
8. **Weight and Balance** - Weight and balance data and calculations
9. **System Descriptions** - Description of aircraft systems
10. **Handling, Servicing, and Maintenance** - Ground handling, servicing, and maintenance information

2 General

2.1 Introduction

The RV-10 is a four-place, single-engine aircraft powered by a [ENGINE MODEL] [CYLINDER COUNT]-cylinder reciprocating engine turning a [PROP TYPE] propeller. The aircraft is primarily constructed of alclad aluminum using flush rivets to the maximum extent possible.

2.2 Exterior Dimensions

Dimension	Value
Wing Span	32' 9"
Horizontal Stab Span	
Length	25'
Height	
Wheel Base	
Wing Area	147 sq. ft.

2.3 Interior Dimensions

2.4 General Specifications

Specification	Value
Wing Span	32' 9"
Length	25'
Height	
Wing Area	147 sq. ft.
Empty Weight	lbs
Gross Weight	2,700 lbs
Wing Loading – Gross	lbs/sq. ft.
Power Loading – Gross	lbs/HP
Engine	
Propeller	
Fuel Capacity	U.S. Gallons
Baggage Capacity	lbs

2.5 Performance Specifications

Performance	Light Weight	Gross Weight
Top Speed	KIAS	KIAS
Cruise (75% @ 8,000 ft)	KIAS	KIAS
Cruise (55% @ 8,000 ft)	KIAS	KIAS
Stall Speed	KIAS	KIAS
Rate of Climb	ft/min	ft/min
Ceiling	ft	ft
Takeoff Distance	ft	ft
Landing Distance	ft	ft
Range (75%)	SM	SM
Range (55%)	SM	SM

2.6 Engine

Parameter	Value
Manufacturer	Lycoming
Model	YIO-540-D4A5
Serial Number	
Rated Horsepower	260 HP
Rated Speed	2700 RPM
Bore	inches
Stroke	inches
Displacement	cubic inches
Compression Ratio	
Type	

2.7 Propeller

Parameter	Value
Manufacturer	Whirlwind Aviation
Model	RV-10
Serial Number	
Blades	
Low Pitch	degrees
High Pitch	degrees
Diameter (max)	inches
Diameter (min)	inches
Type	

2.8 Fuel

Parameter	Value
Fuel Capacity	U.S. gallons
Usable Fuel	U.S. gallons
Minimum Grade	100LL octane

2.9 Oil

Parameter	Value
Oil Capacity	quarts max, quarts min
Oil Specifications	
Oil Viscosity (All Temps)	SAE15W-50 or SAE20W-50

2.10 Maximum Weights

Weight	Value
Maximum Takeoff Weight	lbs
Maximum Ramp Weight	lbs
Maximum Landing Weight	lbs
Maximum Baggage Weight	lbs
Empty Weight	lbs
Gross Weight	lbs

2.11 Baggage Space

Dimension	Value
Entry Width	
Entry Height	
Volume	cubic feet

2.12 Specific Loadings

Loading	Value
Wing Loading	lbs/sq. ft.
Power Loading	lbs/HP

2.13 Symbols, Abbreviations and Terminology

2.13.1 Airspeed Terminology

Symbol	Definition
KIAS	Knots Indicated Airspeed
KCAS	Knots Calibrated Airspeed
KTAS	Knots True Airspeed
V_{S0}	Stall speed in landing configuration (flaps down)
V_{S1}	Stall speed in clean configuration (flaps up)
V_x	Best angle of climb speed
V_y	Best rate of climb speed
V_g	Best glide speed
V_{FE}	Maximum flap extended speed
V_{NO}	Maximum structural cruising speed
V_A	Design maneuvering speed
V_{NE}	Never exceed speed

2.13.2 Engine Terminology

Abbreviation	Definition
RPM	Revolutions Per Minute
MP	Manifold Pressure
CHT	Cylinder Head Temperature
EGT	Exhaust Gas Temperature
TIT	Turbine Inlet Temperature
FF	Fuel Flow
GPH	Gallons Per Hour
PSI	Pounds Per Square Inch

2.13.3 Navigation and Avionics

Abbreviation	Definition
EFIS	Electronic Flight Instrument System
PFD	Primary Flight Display
MFD	Multi-Function Display
AHRS	Attitude and Heading Reference System
GPS	Global Positioning System
VOR	VHF Omnidirectional Range
ILS	Instrument Landing System
ADS-B	Automatic Dependent Surveillance-Broadcast
AoA	Angle of Attack

2.13.4 Electrical

Abbreviation	Definition
VDC	Volts Direct Current
ECU	Engine Control Unit

2.13.5 Weight and Balance

Abbreviation	Definition
CG	Center of Gravity
MAC	Mean Aerodynamic Chord
ARM	Horizontal distance from datum to item CG
MOMENT	Weight multiplied by arm

2.13.6 General

Abbreviation	Definition
POH	Pilot's Operating Handbook
SM	Statute Miles
NM	Nautical Miles
ISA	International Standard Atmosphere
MSL	Mean Sea Level
AGL	Above Ground Level
OAT	Outside Air Temperature

3 Operating Limitations

3.1 General

This section provides the operating limitations, instrument markings, color coding and basic placards necessary for the safe operation of the airplane and its systems.

3.2 Airspeed Limitations

Type	Description	KIAS
V_{S0}	Stall, Flaps Down	
V_{S1}	Stall, Flaps Up	
V_x	Best Angle of Climb	
V_y	Best Rate of Climb	
V_g	Best Glide	
V_{FE}	Maximum Flap Extended	
V_{NO}	Maximum Structural Cruising	
V_A	Design Maneuvering	
V_{NE}	Never Exceed	

3.3 Power Plant Limitations

Parameter	Limit
Engine	
Maximum Horsepower	HP
Maximum Speed	RPM
Maximum Manifold Pressure	
Maximum CHT	°F
Maximum Oil Temperature	°F
Oil Pressure (Min)	PSI
Oil Pressure (Max)	PSI
Fuel Pressure (Min)	PSI
Fuel Pressure (Max)	PSI

3.4 Power Plant EFIS Markings

3.4.1 Tachometer

Arc	Range
Green Arc	0 – RPM
Red Line (Max)	RPM

3.4.2 Oil Temperature

Arc	Range
Green Arc	°F – °F
Yellow Arc	°F – °F
Red Line (Max)	°F

3.4.3 Oil Pressure

Arc	Range
Green Arc	– PSI
Yellow Arc	– PSI
Red Line (Min)	PSI
Red Line (Max)	PSI

3.4.4 Cylinder Head Temperature

Arc	Range
Green Arc	°F – °F
Yellow Arc	°F – °F
Red Line (Max)	°F

3.5 Weight Limits

Limit	Value
Maximum Takeoff Weight	lbs
Maximum Ramp Weight	lbs
Maximum Landing Weight	lbs
Maximum Baggage Weight	lbs

3.6 Center of Gravity Limits

Category	Range
Utility	" – " aft of datum

Note: Datum is located forward of the wing leading edge.

3.7 Flight Maneuvering Load Factors

Category	Positive	Negative
Utility	+G	-G

3.8 Types of Operations

The airplane is approved for the following operations when equipped in accordance with FAR 91:

- Day VFR
- Night VFR
- Day IFR
- Night IFR
- Non-Icing

3.9 Fuel Limitations

Parameter	Value
Fuel Capacity	U.S. gallons
Usable Fuel	U.S. gallons
Minimum Grade	100LL octane

3.10 Placards

Location	Placard
On baggage area	Maximum Baggage Capacity lbs
In view from entrance	EXPERIMENTAL
In view of occupants	PASSENGER WARNING: THIS AIRCRAFT IS AMATEUR BUILT AND DOES NOT COMPLY WITH FEDERAL SAFETY REGULATIONS FOR STANDARD AIRCRAFT.
At each fuel filler	100LL, XX Gal.

4 Additional Engine Information

4.1 General

Refer to your engine manufacturer's Operator's Manual for detailed performance charts and operating information.

4.1.1 Key Engine Data

Parameter	Value
Model	
Serial Number	
TBO	hours
Installed	
Hours at Installation	

5 Emergency Procedures

These procedures are derived from the efis-editor checklist file. Update the source JSON and regenerate to modify.

5.1 Engine Failures

5.1.1 Engine Failure During Takeoff Run

- Throttle ... **IDLE**
- Brakes ... **APPLY**
- Wing Flaps ... **RETRACT**
- Mixture ... **IDLE CUT-OFF**
- Ignition Switch ... **OFF**
- Master Switch ... **OFF**

5.1.2 Engine Failure Immediately After Takeoff

- Airspeed ... **75 KIAS (FLAPS UP)** 70 KIAS (flaps DOWN)
- Landing Area ... **WITHIN 30°**
- Fuel Selector Valve ... **OFF**
- Mixture ... **IDLE CUT-OFF**
- Ignition Switch ... **OFF**
- Wing Flaps ... **AS REQUIRED** 40° recommended
- Master Switch ... **OFF**

5.1.3 Engine Failure During Flight

- Airspeed ... **76 KIAS**
- Landing Area ... **LOCATE**
- Fuel Selector Valve ... **BOTH**
- Carburetor Heat ... **ON**
- Mixture ... **RICH**
- Ignition Switch ... **BOTH** or START if propeller is stopped
- Primer ... **IN AND LOCKED**
- Forced Landing ... **EXECUTE** as described in Emergency Landing Without Engine Power

5.2 Forced Landings

5.2.1 Emergency Landing Without Engine Power

- SQUAWK ... **7700**
- Airspeed ... **75 KIAS (FLAPS UP)** 70 KIAS (flaps DOWN)
- Fuel Selector Valve ... **OFF**

- Mixture ... **IDLE CUT-OFF**
- Ignition Switch ... **OFF**
- Wing Flaps ... **AS REQUIRED (40° RECOMMENDED)**
- Master Switch ... **OFF**
- Radio Call ... **MAYDAY 121.5** time permitting
- Doors ... **UNLATCH PRIOR TO TOUCHDOWN**
- Touchdown ... **SLIGHTLY TAIL LOW**
- Brakes ... **APPLY HEAVILY**

5.2.2 Precautionary Landing With Engine Power

- Airspeed ... **70 KIAS**
- Wing Flaps ... **20°**
- Selected Field ... **FLY OVER**
- Terrain And Obstructions ... **NOTE**
- Wing Flaps ... **RETRACT** at safe altitude and airspeed
- Electrical Switches ... **OFF**
- Wing Flaps (On Final) ... **40°**
- Airspeed ... **70 KIAS**
- Avionics Power and Master Switches ... **OFF**
- Doors ... **UNLATCH PRIOR TO TOUCHDOWN**
- Touchdown ... **SLIGHTLY TAIL LOW**
- Ignition Switch ... **OFF**
- Brakes ... **APPLY HEAVILY**

5.2.3 Ditching

- Transmit Mayday ... **121.5 MHZ, GIVING LOCATION**
- SQUAWK ... **7700**
- Heavy Objects ... **SECURE OR JETTISON**
- Flaps ... **20° - 40°**
- Power ... **SET ESTABLISH 300 FT/MIN DESCENT** at 60 KIAS High Winds, Heavy Seas – INTO THE WIND. Light Winds, Heavy Swells – PARALLEL TO SWELLS If no power is available, approach at 70 KIAS with flaps up or at 65 KIAS with 10° flaps.
- Cabin Doors ... **UNLATCH**
- Touchdown ... **LEVEL ATTITUDE AT ESTABLISHED DESCENT**
- Face ... **CUSHION AT TOUCHDOWN WITH FOLDED COAT**
- Airplane ... **EVACUATE**
- Life Vests and Raft ... **INFLATE**

5.2.4 Landing With A Flat Main Tire

- Approach ... **NORMAL**
- Wing Flaps ... **FULL DOWN**
- Touchdown ... **GOOD TIRE FIRST** hold airplane off flat tire as long as possible with aileron control

5.2.5 Landing Without Elevator Control

- Airspeed ... **80 KIAS**
- Elevator Trim ... **LEVEL FLIGHT**
- Elevator Trim ... **DO NOT CHANGE**
- Glide Angle ... **CONTROL** by adjusting power exclusively
- Elevator Trim ... **FULL NOSE UP**
- Power ... **ADJUST** so airplane will rotate to horizontal attitude for touchdown
- Throttle ... **CLOSE** at touchdown

5.3 Fires

5.3.1 Fire During Start On Ground

- Cranking ... **CONTINUE**
- Power ... **1700 RPM** for a few minutes
- Engine ... **SHUTDOWN**
- Throttle ... **FULL OPEN**
- Mixture ... **IDLE CUT-OFF**
- Cranking ... **CONTINUE** 2-3 min
- Fire Extinguisher ... **OBTAIN**
- Fuel Selector Valve ... **OFF**
- Master Switch ... **OFF**
- Ignition Switch ... **OFF**
- Fire ... **EXTINGUISH**
- Fire Damage ... **INSPECT**

5.3.2 Engine Fire In Flight

- Fuel Selector Valve ... **OFF**
- Mixture ... **IDLE CUT-OFF**
- Master Switch ... **OFF**
- Cabin Heat and Air ... **OFF** except overhead vents
- Airspeed ... **100 KIAS** If fire is not extinguished, increase glide speed to find an airspeed which will provide an incombustible mixture If fire goes out:
- Glide speed ... **76 KIAS**
- Landing Area ... **LOCATE**
- Forced Landing ... **EXECUTE** as described in Emergency Landing Without Engine Power

5.3.3 Electrical Fire In Flight

- Master Switch ... **OFF**
- Avionics Power Switch ... **OFF**
- All Other Switches ... **OFF** Except Ignition Switch
- Vents/Cabin Air/Heat ... **CLOSED**

- Fire Extinguisher ... **ACTIVATE** After discharging an extinguisher within a closed cabin, ventilate the cabin. and electrical power is necessary for continuance of flight:
- Master Switch ... **ON**

Note: monitor ammeter

- Circuit Breakers ... **CHECK** for faulty circuit, do not reset
- Radio Switches ... **OFF**
- Avionics Power Switch ... **ON**
- Radio/Electrical Switches ... **ON** one at a time, with delay after each until short circuit is localized
- Vents/Cabin Air/Heat ... **OPEN** when it is ascertained that fire is completely extinguished

5.3.4 Cabin Fire

- Master Switch ... **OFF**
- Vents/Cabin Air/Heat ... **CLOSED**
- Fire Extinguisher ... **ACTIVATE** After discharging an extinguisher within a closed cabin, ventilate the cabin
- Land ... **AS SOON AS POSSIBLE**
- Airplane ... **INSPECT FOR DAMAGE**

5.3.5 Wing Fire

- Navigation Light Switch ... **OFF**
- Strobe Light Switch ... **OFF**
- Pitot Heat Switch ... **OFF** Perform a sideslip to keep the flames away from the fuel tank and cabin, and land as soon as possible using flaps only as required for final approach and touchdown.

5.4 Icing

5.4.1 Inadvertent Icing Encounter

- Pitot Heat Switch ... **ON**
- Icing Conditions ... **EXIT** Turn back or change altitude to obtain an outside air temperature that is less conducive to icing
- Cabin Heat ... **ON**
- Defroster Control ... **MAX AIRFLOW**
- Engine Speed ... **INCREASE** to minimize build up on propeller blades
- Carb Heat ... **AS REQUIRED** Lean the mixture if carburetor heat is used continuously
- Land ... **NEAREST AIRPORT** With an extremely rapid ice build-up, select a suitable "off airport" landing site With an ice accumulation of 1/4 inch or more on the wing leading edges, be prepared for significantly higher stall speed

- Wing Flaps ... **LEAVE RETRACTED**
- Windshield Ice ... **REMOVE** Open left window and if practical scrape ice from a portion of the windshield for visibility in the landing approach
- Forward Slip ... **PERFORM** if necessary during landing approach, for improved visibility
- Approach ... **80 TO 90 KIAS** depending upon the amount of ice accumulation
- Land ... **AT LEVEL ATTITUDE**

5.4.2 Static Source Blockage

- Alternate Static Source Valve ... **PULL ON**
- Airspeed ... **REFERENCE** Consult appropriate table in Section 5
- Cruise ... **50 FT HIGHER THAN NORMAL**
- Approach ... **30 FT HIGHER THAN NORMAL**

5.4.3 Carburetor Icing

- Note RPM decrease ... **CHECK**
- Carburetor Heat ... **ON** monitor RPM for "decrease then increase" as carburetor ice melts
- Mixture ... **RE-LEAN**

5.5 Electrical / Oil Malfunctions

5.5.1 Ammeter Shows Excessive Rate Of Charge

- Alternator ... **OFF**
- Non-Essential Electrical Equipment ... **OFF**
- Flight ... **TERMINATE** as soon as practical

5.5.2 Ammeter Shows Discharge

- Avionics Power Switch ... **OFF**
- Master Switch ... **ALT OFF (LEFT)**
- Check ALT Breakers ... **RESET ONCE**
- Master Switch ... **ALT ON** attempt only one reset
- Master Switch ... **ALT OFF**
- Avionics Power Switch ... **ON**
- Electrical Equipment ... **MINIMIZE**
- Flight ... **TERMINATE** as soon as practical

5.5.3 Low-Voltage Light Illuminates During Flight

Illumination of the low-voltage light may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM. The master switch need not be recycled since an over-voltage condition has not occurred to deactivate the alternator system.

- Avionics Power Switch ... **OFF**
- Master Switch ... **OFF (BOTH SIDES)**
- Master Switch ... **ON**

- Low-Voltage Light ... **CHECK OFF**
- Avionics Power Switch ... **ON**
- Alternator ... **OFF**
- Non-Essential Radio and Electrical Equipment ... **OFF**
- Flight ... **TERMINATE** as soon as practical

5.5.4 High Oil Temperature

- Mixture ... **ENRICH**
- If Climbing ... **STOP CLIMB**
- RPM ... **DECREASE**
- Airspeed ... **INCREASE**

5.6 Emergency Operation In Clouds

5.6.1 Executing A 180° Turn In Clouds

- Compass Heading ... **NOTE**
- Time ... **NOTE**
- Standard Rate Turn ... **INITIATE** maintain for 60 seconds
- Level Flight ... **MAINTAIN**
- Turn Accuracy ... **CHECK** compass heading should be the reciprocal of the original heading
- Heading ... **ADJUST AS NECESSARY** Using rudder
- Altitude and Airspeed ... **MAINTAIN**

5.6.2 Emergency Descent Through Clouds

- Heading ... **EAST OR WEST** to minimize compass card swings due to changing bank angles In addition, keep hands off the control wheel and steer a straight course with rudder control by monitoring the turn coordinator. Occasionally check the compass heading and make minor corrections to hold an approximate course.
- Mixture ... **FULL RICH**
- Carb Heat ... **FULL**
- Power ... **REDUCE** for 500 to 800 FPM descent
- Elevator and Rudder Trim ... **ADJUST** for stabilized descent at 80 KIAS
- Turn Coordinator ... **MONITOR** Make corrections by rudder alone
- Normal Cruising Flight ... **RESUME**

5.6.3 Recovery From A Spiral Dive

- Throttle ... **CLOSE**
- Turn ... **STOP** by using coordinated aileron and rudder control
- Elevator ... **APPLY BACK PRESSURE** cautiously to slowly reduce the indicated airspeed to 80 KIAS
- Elevator Trim ... **ADJUST** to maintain an 86 KIAS glide Keep hands off the control wheel, using rudder control to hold straight heading. Use rudder trim to relieve unbalanced rudder force, if present.

- Carb Heat ... **APPLY**
- Engine ... **CLEAR OCCASIONALLY**
- Normal Cruising Flight ... **RESUME**
- Throttle ... **IDLE**
- Ailerons ... **NEUTRAL**
- Rudder ... **FULL OPPOSITE DIRECTION OF ROTATION**
- Elevator Control ... **FORWARD** Briskly to break stall
- Control Inputs ... **HOLD** Until Rotation Stops
- Normal Flight ... **RESUME**

6 Abnormal Procedures

These procedures are derived from the efis-editor checklist file.

6.1 Takeoff And Climb

6.1.1 Short Field Takeoff

- Wing Flaps ... **20°**
- Carburetor Heat ... **COLD**
- Brakes ... **APPLY**
- Power ... **FULL THROTTLE AND 2600 RPM**
- Brakes ... **RELEASE**
- Elevator Control ... **SLIGHTLY TAIL LOW**
- Climb Speed ... **59 KIAS** until all obstacles are cleared
- Wing Flaps ... **RETRACT** slowly after reaching 70 KIAS

6.1.2 Maximum Performance Climb

- Airspeed ... **78 KIAS TO 72 KIAS**
- Power ... **FULL THROTTLE AND 2600 RPM**
- Fuel Selector Valve ... **BOTH**
- Mixture ... **FULL RICH** mixture may be leaned above 5000 feet
- Cowl Flaps ... **FULL OPEN**

6.2 Landing

6.2.1 Short Field Landing

- Airspeed ... **70-80 KIAS (FLAPS UP)**
- Wing Flaps ... **40° below 95 KIAS**
- Airspeed ... **MAINTAIN 60 KIAS**
- Trim ... **ADJUST**
- Power ... **REDUCE TO IDLE** as obstacle is cleared
- Touchdown ... **MAIN WHEELS FIRST**
- Brakes ... **APPLY HEAVILY**
- Wing Flaps ... **RETRACT**

6.2.2 Go Around

- Power ... **FULL THROTTLE AND 2600 RPM**
- Carburetor Heat ... **COLD**
- Wing Flaps ... **RETRACT TO 20°**
- Climb Speed ... **61 KIAS** positive rate of climb

- Wing Flaps ... **RETRACT TO 10°**
- Climb Speed ... **77 KIAS**
- Wing Flaps ... **RETRACT** after reaching safe altitude
- Cowl Flaps ... **OPEN**

7 Normal Procedures

These procedures are derived from the efis-editor checklist file. Update the source JSON and regenerate to modify.

7.1 Preflight

7.1.1 Preflight Inspection

- Pilot's Operating Handbook ... **AVAILABLE IN THE AIRPLANE**
- Keys ... **CLIP TO THROTTLE**
- Control Wheel Lock ... **REMOVE**
- Ignition Switch ... **OFF**
- Avionics Power Switch ... **OFF**
- Master Switch ... **ON**
- Fuel Quantity Indicators ... **CHECK**
- Master Switch ... **OFF**
- Alternate Static Source Valve ... **OFF**
- Fuel Selector Valve ... **BOTH**
- Baggage Door ... **CHECK**
- Rudder Gust Lock ... **REMOVE**
- Tail Tie-Down ... **DISCONNECT**
- Control Surfaces ... **CHECK**
- Aileron ... **CHECK**
- Wing Tie-Down ... **DISCONNECT**
- Fuel Tank Vent Opening ... **CHECK**
- Main Wheel Tire ... **CHECK**
- Fuel Tank Sump ... **CHECK**
- Fuel Quantity ... **CHECK VISUALLY**
- Fuel Filler Cap ... **SECURE** and vent unobstructed
- Static Source Openings ... **CHECK**
- Propeller and Spinner ... **CHECK** for nicks, security, and oil leaks
- Landing Lights ... **CHECK**
- Carburetor Air Filter ... **CHECK**
- Nose Wheel, Strut and Tire ... **CHECK**
- Nose Tie-Down ... **DISCONNECT**
- Engine Oil Level ... **CHECK** Do not operate with less than nine quarts. Fill to twelve quarts for extended flight.
- Fuel Strainer ... **CHECK**
- Main Wheel Tire ... **CHECK**
- Fuel Tank Sump ... **CHECK**
- Fuel Quantity ... **CHECK VISUALLY**

- Fuel Filler Cap ... **SECURE** and vent unobstructed
- Pitot Tube Cover ... **REMOVE**
- Fuel Tank Vent Opening ... **CHECK**
- Stall Warning Vane ... **CHECK**
- Wing Tie-Down ... **DISCONNECT**
- Aileron ... **CHECK**

7.1.2 Before Starting Engine

- Preflight Inspection ... **COMPLETE**
- Seats, Belts, Shoulder Harnesses ... **ADJUST AND LOCK**
- Fuel Selector Valve ... **BOTH**
- Cowl Flaps ... **OPEN**
- Avionics Power Switch ... **OFF**
- Electrical Equipment ... **OFF**
- Circuit Breakers ... **CHECK IN**
- Brakes ... **TEST AND SET**

7.1.3 Starting Engine

- Mixture ... **RICH**
- Propeller ... **HIGH RPM**
- Carburetor Heat ... **COLD**
- Throttle ... **OPEN 1/2 INCH**
- Prime ... **AS REQUIRED** 3-6 strokes (none if engine is warm). Check in and locked
- Master Switch ... **ON**
- Beacon Light ... **ON**
- Propeller Area ... **CLEAR**
- Ignition Switch ... **START** release after engine starts If engine has been overprimed (2x):
 - place mixture idle
 - start with throttle 1/4 to 1/2 open.
 - Mixture full rich when engine fires and throttle to idle promptly.
- RPM ... **ADJUST TO 1,000** reset to 1000 RPM as engine warms up
- Oil Pressure ... **CHECK IN GREEN**
- Mixture ... **LEAN FOR TAXI** at least 3/4"

7.1.4 Before Taxi

- Avionics Power Switch ... **ON**
- Wing Flaps ... **RETRACT, VERIFY UP**
- Radios ON ... **BDU AWOS 118.825** obtain AWOS/ATIS
- Altimeter ... **SET**
- Heading indicator ... **SET**
- Lights ... **AS REQUIRED**
- Brakes ... **TEST ON ROLL**

7.1.5 Before Takeoff

- Brakes ... **HOLD**
- Cabin Doors and Windows ... **CLOSED AND LOCKED**
- Elevator and Rudder Trim ... **TAKEOFF**
- Flight Controls ... **FREE AND CORRECT**
- Flight Instruments ... **SET**
- Fuel Selector Valve ... **BOTH**
- Cowl Flaps ... **OPEN**
- Propeller Control ... **HIGH RPM**
- Mixture ... **RICH**
- Throttle ... **1700 RPM**
- Mixture Control ... **SET** lean => RPM drop, enrich to peak RPM, three 1/2 turns rich
- Propeller ... **CYCLE 2X** RPM dip, then oil pressure dip
- Carburetor Heat ... **CHECK RPM DROP**
- Magnetos ... **CHECK** L, Both, R, Both: ≤ 150 RPM drop ≤ 50 RPM difference
- Engine Instruments (Oil Pressure, Temp) ... **CHECK**
- Fuel Gauge ... **CHECK QUANTITY**
- Ammeter ... **CHECK**
- Suction Gage ... **CHECK**
- Throttle ... **IDLE, THEN 1000 RPM**
- Radios, Navigation ... **SET BDU CTAF 122.725**
- Transponder ... **ALT, 1200**
- Flashing Beacon ... **AS REQUIRED**
- Navigation Lights ... **AS REQUIRED**
- Strobe Lights ... **AS REQUIRED**
- Pitot Heat ... **AS REQUIRED**
- Wing Flaps ... **SET FOR TAKEOFF**
- Throttle Friction Lock ... **ADJUST**
- Radio Call ... **BDU CTAF 122.725**

7.1.6 Normal Takeoff

- Wing Flaps ... **0° - 20°**
- Carburetor Heat ... **COLD**
- Power ... **FULL THROTTLE AND 2600 RPM**
- Elevator Control ... **LIFT NOSE WHEEL AT 50 KIAS**
- Climb Speed ... **70 KIAS (FLAPS 20°)** 80 KIAS (flaps UP)

7.2 In Flight

7.2.1 Normal Climb

- Airspeed ... **85-95 KIAS**
 - Power ... **23" HG AND 2450 RPM**
 - Fuel Selector Valve ... **BOTH**
-

- Mixture ... **SET** mixture may be leaned above 5000 feet
- Engine Gauges ... **CHECK**
- Cowl Flaps ... **OPEN** as required

7.2.2 Cruise

- Power ... **15-23" HG AND 2200-2450 RPM** no more than 75%
- Elevator and Rudder Trim ... **ADJUST**
- Mixture ... **LEAN**
- Engine Gauges ... **CHECK**
- Lights ... **AS REQUIRED**
- Cowl Flaps ... **CLOSED**

7.2.3 Pre-Maneuver

- Fuel Selector Valve ... **BOTH**
- Mixture Control ... **SET** as needed
- Carburetor Heat ... **AS REQUIRED**
- Cowl Flaps ... **AS REQUIRED**
- Lights ... **AS REQUIRED**
- Clearing Turns ... **PERFORM** 90° L - 90° R / 180° turn
- Power ... **AS DESIRED**

7.2.4 Descent

- Fuel Selector Valve ... **BOTH**
- Mixture ... **ENRICHEN** as required
- AWOS/ATIS ... **BDU AWOS 118.825**
- Power ... **AS DESIRED**
- Carburetor Heat ... **AS REQUIRED** to prevent carburetor icing
- Cowl Flaps ... **CLOSED**
- Wing Flaps ... **AS DESIRED** 0° to 10° below 140 KIAS, 10° to 40° below 95 KIAS
- Lights ... **AS REQUIRED**

7.2.5 Before Landing

- Radio Call ... **BDU CTAF 122.725**
- Carburetor Heat ... **ON** apply full heat before closing throttle
- Cowl Flaps ... **CLOSED**
- Fuel Selector Valve ... **BOTH**
- Mixture ... **RICH**
- Propeller ... **HIGH RPM**
- Seats, Belts, Harnesses ... **ADJUST AND LOCK**

7.2.6 Normal Landing

- Airspeed ... **70-80 KIAS (FLAPS UP)**
 - Wing Flaps ... **AS DESIRED** 0° TO 10° below 140 KIAS, 10° TO 40° below 95 KIAS
-

- Airspeed ... **65-75 KIAS (FLAPS DOWN)**
- Trim ... **ADJUST**
- Touchdown ... **MAIN WHEELS FIRST**
- Landing Roll ... **LOWER NOSE WHEEL GENTLY**
- Braking ... **MINIMUM REQUIRED**

7.3 Postflight

7.3.1 After Landing

- Carburetor Heat ... **COLD**
- Cowl Flaps ... **OPEN**
- Wing Flaps ... **UP**
- Elevator and Rudder Trim ... **TAKEOFF**
- Lights ... **AS REQUIRED**
- Pitot Heat ... **AS REQUIRED**
- Transponder ... **ALT, 1200**
- Radio Call ... **BDU CTAF 122.725**

7.3.2 Securing Airplane

- Avionics Power Switch ... **OFF**
- Electrical Equipment ... **OFF**
- Ignition ... **GROUNDING CHECK L, R, then OFF, back R**
- Throttle ... **IDLE**
- Mixture ... **IDLE CUT-OFF**
- Lights ... **OFF** except beacon
- Ignition Switch ... **OFF**
- Master Switch ... **OFF**
- Fuel Selector Valve ... **RIGHT**
- Cowl Flaps ... **CLOSED**
- Control Lock ... **INSTALL**
- Hobbs + Tach Time ... **RECORD**

8 Performance

8.1 Stall and Approach Speeds

Speed	Weight	Flaps Up	Flaps Down
Stall	lbs	KIAS	KIAS
Approach ($1.3 \times V_S$)	lbs	KIAS	KIAS

8.2 Takeoff Performance

8.3 Climb Performance

8.4 Cruise Performance

8.5 Landing Performance

9 Weight and Balance

9.1 Airplane Weighing Procedure

The aircraft was weighed with the fuselage level. The aircraft was empty with the exception for oil located in the engine sump.

9.2 Empty Weight and Balance Data

The datum is located XX" forward of the wing leading edge.

Station	Weight (lbs)	Arm (inches)	Moment (lb-in)
Left Main			
Right Main			
Nose/Tail			
Total			
CG		"	

9.3 Allowable Weight and Balance Envelope

9.4 Sample Weight and Balance Calculation

Item	Weight (lbs)	Arm (in)	Moment (lb-in)
Empty Weight			
Pilot			
Front Passenger			
Rear Passengers			
Baggage			
Fuel (gal \times 6.0)			
Total			

CG = Total Moment / Total Weight = " aft of datum

10 System Descriptions

10.1 The Airplane

The RV-10 is a four-place, single-engine, low-wing aircraft with tricycle landing gear. The airframe is primarily aluminum alloy construction with flush rivets, except for some steel components including the engine mount, landing gear legs, control surface bellcranks, and miscellaneous hardware. Wing tips, tail fairings, cowling, and wheel fairings are fiberglass.

10.2 Engine and Components

The aircraft is powered by a Lycoming IO-540 series engine, fuel injected and normally aspirated, rated at 260 HP at 2700 RPM.

10.2.1 Electronic Engine Management

The EFII System32 provides:

- **Full Electronic Ignition:** Dual redundant ignition with individual coil packs for each cylinder
- **Electronic Fuel Injection:** Precise fuel metering with automatic mixture optimization
- **Redundant ECUs:** Two independent Engine Control Units; panel switch allows manual ECU selection if needed

The System32 controller on the panel provides mixture control through the electronic fuel injection system.

10.2.2 Fuel Pumps

Two electric fuel pumps (primary and backup) pressurize the fuel line to the engine. The system includes:

- **Automatic Switchover:** If fuel pressure drops below threshold, the System32 automatically activates the backup pump
- **Manual Selection:** Panel switch (PMP 2) allows manual pump selection
- **Fuel Return:** Excess fuel returns to the originating tank

10.3 Propeller

Parameter	Value
Manufacturer	
Model	
Type	Constant speed
Blades	
Diameter	

10.4 Landing Gear

The landing gear is a fixed tricycle configuration with:

- Steerable nose wheel
- Main gear with wheel fairings

Specification	Value
Main Tire Size	
Nose Tire Size	
Main Tire Pressure	PSI
Nose Tire Pressure	PSI

10.5 Brake System

Hydraulic disc brakes are operated by toe pedals on both pilot and copilot rudder pedals.

Specification	Value
Brake Fluid	Royco 782 (MIL-PRF-83282)
Brake Type	Hydraulic disc

10.6 Flight Control System

Dual controls are fitted. Primary flight controls:

- **Ailerons:** Operated through push-pull tubes
- **Elevator:** Operated through push-pull tubes
- **Rudder:** Cable operated, connected to rudder pedals

10.6.1 Trim Systems

- **Pitch Trim:** Electric servo-actuated trim tab on elevator, controlled by hat switch on stick grip
- **Roll Trim:** Electric servo in wing, controlled by hat switch on stick grip
- **Yaw Trim:** None installed

10.6.2 Co-Pilot Trim Enable

A panel switch enables or disables trim authority from the co-pilot stick grip. This allows the pilot to disable co-pilot trim inputs when desired.

10.6.3 Flaps

Electric flap motor with position indicator on EFIS. Controlled by:

- Panel-mounted flap switch
- Stick grip switch (both sticks)

Flap positions range from reflex (-3°) to full (40°).

10.7 Fuel System

Fuel is stored in two wing tanks with a selector valve on the center tunnel.

Parameter	Value
Left Tank Capacity	U.S. gallons
Right Tank Capacity	U.S. gallons
Total Capacity	U.S. gallons
Usable Fuel	U.S. gallons
Minimum Grade	100LL

10.7.1 Fuel System Components

- **Wing Tanks:** Integral tanks in wing leading edges
- **Fuel Selector:** Three-position valve (LEFT / RIGHT / OFF) on center tunnel
- **Fuel Pumps:** Primary and backup electric pumps (see Engine section)
- **Fuel Return:** Returns to selected tank
- **Fuel Strainer:** Drain before first flight of day

Note: The fuel system does not support inverted flight.

10.8 Electrical System

10.8.1 Power Sources

Component	Specification
Alternator	60 amp, 14 volt
Battery 1	EarthX ETX900
Battery 2	EarthX ETX900

10.8.2 Bus Architecture

The electrical system uses a dual-bus architecture managed by the flyEFII System32 Bus Manager:

- **Essential Bus:** Powers critical engine systems (ignition, fuel injection, fuel pumps)
- **Main Bus:** Powers avionics and other aircraft systems via VPX Sport

10.8.3 Emergency Endurance Bus

If a battery fails or bus voltage drops critically, the System32 Bus Manager automatically:

1. Disconnects non-essential loads from the main bus

-
2. Preserves all available power for the essential bus
 3. Maintains engine ignition and fuel injection

The **EMERGENCY POWER** switch on the panel manually activates this mode.

10.8.4 VPX Sport Power Distribution

The Vertical Power VPX Sport provides:

- Electronic circuit breaker protection
- Load monitoring and display on EFIS
- Automatic load shedding if needed
- No physical circuit breakers to reset

10.9 Pitot-Static System

10.9.1 Pitot

Component	Specification
Pitot Tube	Dynon heated pitot with AoA
Location	Under left wing
Heating	Activated by PITOT HEAT switch

The pitot tube incorporates a second orifice angled to measure differential pressure for Angle of Attack (AoA) display on the EFIS.

10.9.2 Static

Component	Specification
Static Ports	Two ports on aft fuselage sides
Alternate Static	Valve on upper left panel

The static system feeds:

- Dynon Skyview HDX AHRS
- Backup instruments (if installed)

10.10 Instrument Panel

10.10.1 Primary Flight Display

Dynon Skyview HDX provides:

- Primary Flight Display (PFD)
- Multi-Function Display (MFD)
- Engine monitoring

- Moving map with terrain
- Traffic display (ADS-B In)
- Autopilot interface

10.10.2 Navigation and Communication

Component	Function
Garmin GTN 650	IFR GPS/Nav/Com - certified for IFR approaches
Garmin GMA245	Audio panel with Bluetooth
Dynon Com Panel	Com radio control

10.10.3 Autopilot

Dynon 3-Axis Autopilot with:

- Roll servo (aileron)
- Pitch servo (elevator)
- Yaw damper

Controlled via:

- Dynon autopilot panel
- Stick grip disconnect button

10.10.4 Transponder and ELT

Component	Specification
Transponder	with ADS-B Out
ELT	Artex ELT 345 (406 MHz)

10.10.5 Panel Switches

Left Panel:

- Pitot Heat
- Landing Light
- Taxi Light
- Nav Lights
- Strobe Lights

Center Panel:

- Flap switch
- Alternator field
- Avionics power
- Emergency power

EFII System32 Switches:

- Ignition Select
- ECU Select
- Fuel Pump Mode
- Start Battery Select

Other:

- Master switch (keyed)
- O2 mode switch (pulse/constant)
- Co-pilot trim enable

10.11 Control Sticks

Both pilot and co-pilot have Tosten CS Military stick grips with identical button functions:

Button	Function
Trigger	Push-to-talk (PTT)
Top hat	Pitch/roll trim
	Flap up
	Flap down
Red button	Autopilot disconnect

10.12 Oxygen System

Mountain High EDS-4iP pulse-demand oxygen system:

Parameter	Specification
Type	Electronic pulse-on-demand
Bottle Location	
Capacity	cubic feet

10.12.1 Operating Modes

A panel switch selects between:

- **Pulse Mode:** Oxygen delivered in pulses synchronized with inhalation (normal operation, conserves oxygen)
- **Constant Flow:** Continuous oxygen flow (for high altitude or if pulse mode is insufficient)

10.13 Heating, Ventilation and Defrosting

10.13.1 Cabin Heat

Heat is provided from a heat muff on the exhaust system. Controlled by push-pull knob on panel.

10.13.2 Ventilation

Fresh air is supplied through:

- Eyeball vents under instrument panel (pilot and copilot)
- NACA ducts on fuselage sides

10.13.3 Defrost

Windshield defrost air from the heating system.

10.14 Cabin Features

10.14.1 Seating

Four-place seating:

- Front: Pilot and copilot, side-by-side
- Rear: Two passengers

10.14.2 Restraints

10.15 Baggage Area

Dimension	Value
Maximum Weight	100 lbs
Volume	cubic feet

Access through rear baggage door.

10.16 Exterior Lighting

10.16.1 Wing Tip Lights

Each wing tip contains:

- **AeroLEDs Pulsar (NSP/660):** 3-in-1 LED combining position light (red/green), strobe, and rear-facing white position light
- **AeroLEDs AeroSun VX:** Landing and taxi light with built-in wig-wag mode

10.16.2 Tail Light

- **AeroLEDs SunTail:** LED position light (white) and strobe

10.16.3 Lighting Controls

Switch	Function
NAV	Position lights (wing tips and tail)
STROBE	Strobe lights (wing tips and tail)
LANDING	Landing lights (wing tips)
TAXI	Taxi lights

11 Handling, Servicing and Maintenance

11.1 General

The airplane should be moved using a tow bar which connects to the nose wheel. The airplane may be pushed or pulled from the inboard portions of the prop blades. **Do not push on the spinner!**

11.2 Ground Handling

The airplane has three tie-down rings:

- One on each wing (near outboard bellcrank access panel)
- One on the tail

The tie-down rings are removable and may be kept inside the baggage compartment.

11.2.1 Jacking

The airplane can be jacked from:

- Tie-down ring locations
- Main spar just outboard of fuselage (protect with padded boards)

11.3 Engine Air Filter

Specification	Value
Filter Type	
Service	Clean/replace per manufacturer

11.4 Brake Service

Specification	Value
Brake Fluid	Royco 782 (MIL-PRF-83282)
Brake Type	Hydraulic disc
Brake Linings	

Warning: Use only MIL-PRF-83282 specification hydraulic fluid. Do not substitute automotive brake fluid.

11.5 Landing Gear Service

Item	Specification
Main Tire Pressure	PSI
Nose Tire Pressure	PSI
Main Tire Size	
Nose Tire Size	

11.5.1 Wheel Bearings

Rear main wheel bearings must be repacked with Aeroshell #5 grease at annual condition inspection.

11.6 Propeller Service

The propeller must be lubricated at intervals not to exceed 100 hours or 12 calendar months, whichever occurs first.

Specification	Value
Grease Type	
Interval	100 hours / 12 months

Note: If annual operation is significantly less than 100 hours, or if operated in high humidity or salty air conditions, reduce calendar interval to six months.

11.7 Oil System Service

Item	Specification
Oil Type	
Oil Capacity	quarts
Minimum Operating	quarts
Oil Filter	
Change Interval	50 hours

11.7.1 Oil Change Procedure

1. Change oil and filter every 50 hours
2. Remove and inspect oil pressure screen
3. Clean screen in solvent, dry with compressed air
4. Replace screen crush washer

11.8 Fuel System Service

11.8.1 Fuel Strainer

Drain fuel strainer:

- Before first flight of day
- After each refueling
- Check for water and sediment

11.8.2 Fuel Tank Sumps

Drain each tank sump and check for water/contamination:

- Before first flight of day
- After refueling

11.9 Battery Service

Battery	Location	Type
Battery 1		EarthX ETX900
Battery 2		EarthX ETX900

Both batteries may be charged and conditioned using their proprietary chargers.

Note: EarthX lithium batteries require specific charging procedures. Refer to EarthX documentation.

11.10 Lubrication Schedule

Item	Lubricant	Interval
Wheel Bearings	Aeroshell #5	Annual
Control Hinges	LPS-2 or equivalent	As needed
Nose Wheel Steering		Annual
Propeller		100 hrs/12 mo

11.11 Tire Replacement

Tire	Size	Ply
Main		
Nose		

11.12 Oxygen System Service

Mountain High EDS-4iP system:

- Refill oxygen per Mountain High procedures
- Inspect cannulas and tubing
- Verify pulse delivery operation

11.13 Pitot Heat Check

Verify pitot heat operation before flight into potential icing conditions:

1. Turn on PITOT HEAT switch
2. Verify pitot tube warms (carefully touch)
3. Monitor current draw on VPX display