Pilot Operating Handbook
N826ED

Zenith CH 601 XLB Manufactured by: Earl C Downs

Introduction

The purpose of this manual is to present the pilot with a document which serves both as a training aid and as an inflight tool for handling normal and non-normal situations.

This aircraft must be operated in compliance with information and limitations contained herein. This manual should remain with the aircraft at all times for quick reference.

This manual consists of eight sections.

Section 1 AIRCRAFT SYSTEMS
Section 2 TECHNICAL DATA / GENERAL INFO
Section 3 LIMITATIONS & OPERATING PARAMETERS
Section 4 NORMAL PROCEDURES & CHECKLISTS
Section 5 EMERGENCIES AND NON-NORMALS
Section 6 WEIGHT AND BALANCE
Section 7 HANDLING, CARE, MAINTENANCE
Section 8 FAA OPERATING LIMITATIONS
Addendum 1 FAA Letter of Deviation Authority (LODA) for commercial flight training.

All information presented in this manual applies only to this specific aircraft, the Zenith CH 601-XLB, N826ED, manufactured by Earl C. Downs.

Record of Changes

6/26/2012	Change 1,	Page 8.3
8/18/2012	Addendum 1 added	
9/20/2014	Weight and balance revised	Page 6.1
3/1/2018	Cockpit picture added to include autopilot installation	Page 1.2
3/1/2018	Autopilot circuit breaker info added	Page 1.3
3/1/2018	Flap motor circuit breaker location revised. Autopilot description added	Pages 1.4/1.5
3/1/2018	Empty weight and useful load revised	Pages 2.1/3.1
3/1/2018	Checklists revised to include autopilot functions	Pages 4.1/4.2
3/1/2018	Weight and Balance revised to include autopilot installation	Pages 6.1/6.2

SECTION 1
AIRCRAFT SYSTEMS

GENERAL DESCRIPTION

The CH-601 XLB is an experimental, amateur built, two place airplane that meets the definition in FAR part 1 as a light sport aircraft (LSA). It is eligible for the following types of operations when the required equipment is installed and maintained according to FAA regulations:

- **Visual flight only.**
- **Day or night operations**
- **It is not approved for flight into instrument meteorological conditions or flight into known icing conditions.**

AIRFRAME

This airplane is of all-metal construction, stressed skin, single curvature metal skins riveted to stiffeners. Construction is of 6061-T6 aluminum sheet metal riveted to aluminum angles with Avex rivets.

This high strength aluminum alloy construction provides long life and low maintenance costs due to its durability and corrosion resistance characteristics. The airframe has removable access panels along with an access door on the bottom of the fuselage to facilitate ease of maintenance.

The wing has a high lift airfoil with Hoerner wing tips to maximize the aircraft's effective wingspan. Wing flaps are electrically operated by a switch on the center console. There is no flap position indicator and the normal flaps positioning is either full up or full down. The wing structure complies with model "B" upgrade structural modifications.

ENGINE

The CH 601 XLB is powered by a six cylinder horizontally opposed, four stroke JABIRU model 3300 engine with a displacement of 3300 cc's (200 cubic inches). It has a pressure compensated carburetor that leans the fuel mixture automatically. Carburetor heat is provided from a heat muff on the exhaust system. The valves are pushrod operated with a single camshaft and hydraulic lifters. It is ram air cooled and wet sump lubricated. It has an electric starter and a mechanical fuel pump. The engine has a TBO of 2000 hours.

There is a single throttle with an adjustable friction clamp. The engine will revert to full power in the event of a throttle linkage failure

The propeller is wood; it has a fixed pitch, and is driven directly from the crankshaft in a clockwise rotation as seen from the pilot.

The engine has a dual transistorized magneto ignition built into the engine flywheel. There is no retarding capability and it requires 275 RPM supplied from the electric starter to start. This engine will not start by hand propping.

This engine is equipped with an integral 20 amp alternator. The alternator becomes effective above 1,400 RPM Avoid prolonged heavy electrical use on the ground at low RPMs.

The engine is equipped with a fuel enrichment circuit that acts similar to a choke for cold starts.

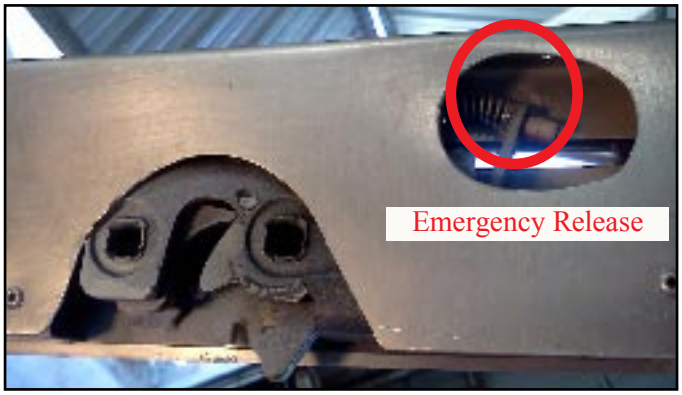
This engine uses aviation 100LL fuel or auto fuel with higher than 91 octane. Up to 10% ethanol is approved. Do not use 100% auto fuel if the OAT is above 90 degrees due to possible fuel vaporization in the fuel line. Aviation fuel and automotive fuel may be mixed.

CABIN

Access to the cabin is from both sides. The canopy hinges forward for entrace and latches on both sides when closed. A single latch release handle is located on the left side of the canopy.

Heating is provided by air routed around the muffler and is controlled by a push-pull knob at the bottom right of the instrument panel.

Cockpit ventilation is provided by two fresh air vents on the bottom left and right side of the instrument panel. Additional cooling can be obtained ON THE GROUND ONLY by taxiing with the canopy slightly open. **Opening the canopy in flight could cause loss of control of the airplane**.



The canopy is unlatched with a handle on the left side. If this latch release handles fails, the individual left and right latches can be released by direct operation from inside or outside the aircraft.

SEATS & SAFETY RESTRAINTS

Seat cushions are removable for ease of cleaning and aircraft inspection. Each seat is equipped with a seat belt and shoulder harness. The seat structure has access under and behind the sets for inspection and service. The seat pans can be raised and lowered 2.5 inches by removing and re-attaching the aft pan mounting screws.

FUEL SYSTEM

The fuel system consists of two aluminum fuel tanks (one in each wing) with a capacity of 15 gallons in each tank of which 14.5 gallons are usable. Each fuel tank is equipped with a fuel vent and a fuel screen. There is also a fuel strainer (gascolator), an in-line fuel filter, and the electric fuel pump located on the lower right side of the engine side of the firewall.

A fuel selector valve along with an electric fuel boost pump switch is located on the forward console. A green light above the fuel pump switch indicates power is applied to the fuel pump. The electric fuel pump provides back-up for the engine driven fuel pump. The electrically driven fuel boost pump is installed as a back up in the event that the engine driven pump fails. Fuel is supplied to the engine through rubber fuel lines, through the selector valve, then to the gascolator. The fuel gauges are located on page 1 of the EIS. These gauges only indicate a maximum quantity of 9 gallons and will accurately display the fuel quantity for levels of 9 gallons and less.

The fuel selector valve is shown in the off position.

LANDING GEAR & BRAKES

The aircraft has a tricycle landing gear with steerable nose wheel. The brake lines run from rudder pedal cylinders along the left side of the fuselage to under the seat and into the wing root. The lines are visible on the landing gear struts. Brakes are single disk dual caliper hydraulic with braking available only to the left seat position.

The wheels are 5 inch hubs with 500-5 size aircraft grade tires.

ELECTRICAL SYSTEM

A switch panel is located on the left side of the instrument panel. The switches are labeled. The AUX Power switch controls power to the auxiliary plugs located behind the seats in the forward baggage compartment. The radio master switch controls power to the avionics bus.

The engine ignition is controlled by a conventional five position ignition switch labeled OFF, LEFT, RIGHT, BOTH, START.

The 20 amp engine driven generator is built into the flywheel/ starter gear at the rear of the engine.

The airplane gel-cel battery is located on the right side of the outer firewall.

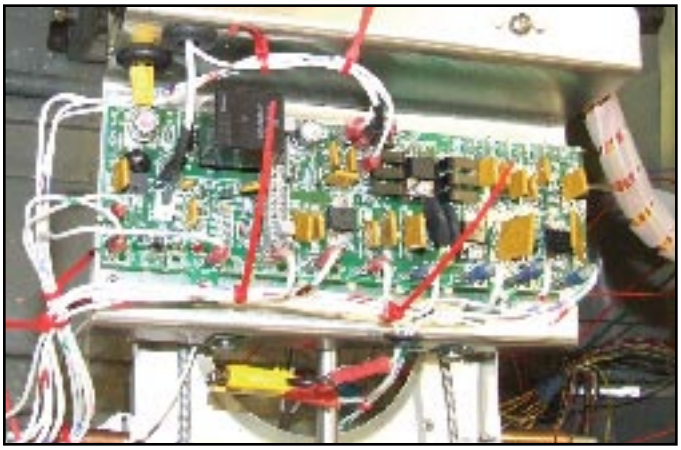
The electrical system is a 12 volt negative ground system. Power is supplied to a central power distribution locate behind the instrument panel directly under the magnetic compass. This distribution bus is called an XP Bus.

The XP Bus is switched on with the master switch. A green light to the left of the master switch indicates the bus is powered. The avionics portion of the XP bus is powered with the radio master switch.

The XP Bus uses solid state current limiting devices known as "PTC" current limiters. These limiters act like circuit breakers. If a limiter senses a current overload, it will open (remove power) from the offending circuit. The circuit may be reset by placing the appropriate switch off for a few minutes and then place the switch back on. This reset procedure should only be used if the reason for the overloaded circuit has been determined and removed.

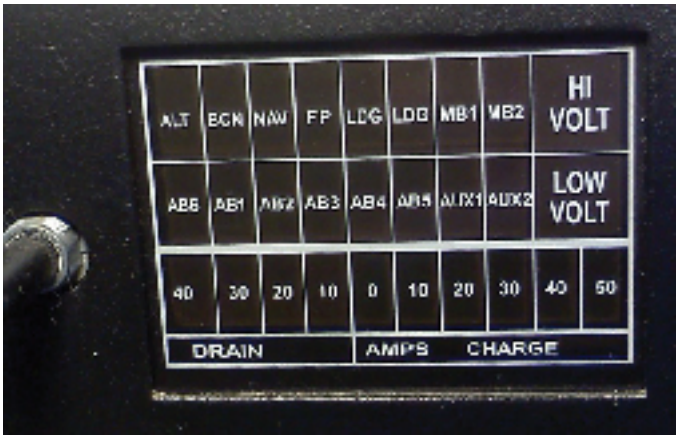
An XP Bus Load Center is provided on the co-pilot panel to allow monitoring of the circuit protection status and alternator operation. If a circuit overloads and cuts power, a red light will illuminate on load center panel.

The Load Center panel illuminates various indications to present electrical system status.



The XP bus located behind the instrument panel is the heart of the electrical system.

Hi



XP Load Bus Center

Hi Volt….. An overvoltage has disconnected the XP bus.
Low Volt... Generator voltage is below battery voltage.

Top Row

Alt…....This warning is not used.
BCN…. The 7 amp strobe lights circuit has opened.
NAV…. The 7amp navigation lights circuit has opened.
FP…..... The 7 amp fuel boost pump circuit has opened.
LDG…. The 9 amp outboard landing light circuit has opened.
LGG…. The 9 amp inboard landing light circuit has opened.
MB1…. The 5 amp starter relay circuit has opened.
MB2…. The 5 amp voltage regulator circuit has opened.

Middle row…These are all avionics bus (AB) bus circuits.

AB1…. The 3 amp rate-of-turn instrument circuit has opened
AB2 …The 3 amp GPS circuit has opened.
AB3…. The 3 amp intercom circuit has opened.
AB4…. The 5 amp communication radio circuit has opened.
AB5…. Autopilot and AP servo circuits have opened.
AB6…. Not used.
AUX1…The 11 amp aux plug circuit has opened.
AUX2...The 11 amp flap and trim circuits has opened.

The Bottom Row of lights indicate the charge or discharge rate of the generator.

Aditioanl Circuit protection

The XP Bus provides circuit protection for all wiring, but low current protection is provided by independent fuses for certain items. These fuses may not be replaced in flight. They are:

Communication radio, 3 amp. Located under the radio behind the panel.

Flaps, 5 amp. Located behind the left pilot seat adjacent to the flap motor.

Trim circuits, 1 amp. Located on the trim switch console.

GPS, 3 amp. Located behind the GPS mount.

ENGINE IGNITION and START SWITCH

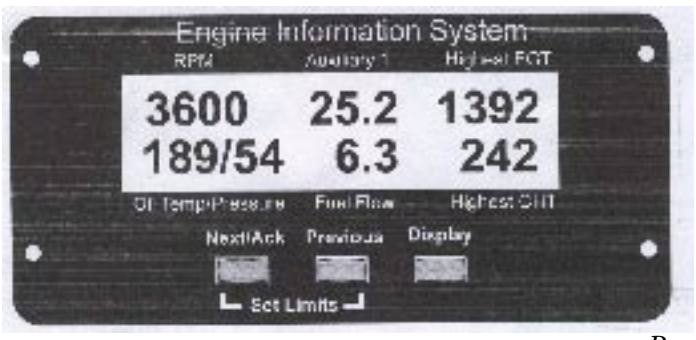
The engine ignition is controlled by a conventional five position ignition switch labeled OFF, LEFT, RIGHT, BOTH, START.

This switch is located on the switch panel

AVIONICS & INSTRUMENTS

The flight instruments in this plane are intended for VFR flight only.

The engine readings are displayed on the GRT engine indicating system (EIS) located on the right instrument panel. The EIS displays the engine RPM, oil pressure and temperature, cylinder and exhaust temperatures, battery voltage, outside air temperature, fuel quantity, and other indications. Refer to the EIS operating manual for full details of the indicating functions of the EIS.



The communication radio is powered through the radio master switch and is an FAA/FCC approved radio. Refer to the FL 760 operating manual for details of the radio operation. Push-to-talk switches are located on each control stick.

The intercom is powered through the radio master switch. It is voice activated and the squelch and volume can be adjusted by use of the controls located on the right instrument panel.

The GPS is powered through the radio master switch.

The only electrically powered flight instrument is the BeLite rate-of-turn indicator. It is powered through the radio master switch.

The EIS, EIS master warning light, communications radio, intercom control, and XP bus load indicator are located on the right instrument panel.

TruTrak Vizion 385 Autopilot

The TruTrak Vizion 385 Autopilot provides two-axis control of the aircraft. Its control functions affect role and pitch. It does not have control of the rudder. Its components include the Autopilot Control Module, an Automatic Pitch Trim Module, and electric Roll Servo attached to the aileron controls, and an electric Pitch Servo attached to the elevator controls.

The Roll Servo and Automatic Pitch Trim Module are located behind the pilot's seat. The Pitch Servo is attached to the underside of the baggage compartment floor. The autopilot trims the elevator through the normal aircraft electric trim system. When the autopilot is engaged, the pilot controlled elevator trim switch is deactivated.

The Autopilot Control Module and function switches are located centrally in the instrument panel. The function switches include the following:

Autopilot ON/OFF switch - this which supplies power from the radio bus which means the master radio switch must be in the on position for the autopilot to receive power. This single switch provides power to the autopilot controller, both servomotors, and the automatic pitch trim control.

AP Status Light - this light is used when adjusting the sensitivity of the pitch control. It is not used in the normal function of the autopilot.

Autopilot Control Wheels Steering (CWS) press-switch - this momentary switch can engage the autopilot, disengage the autopilot, or override the autopilot.

Autopilot Level press-switch - this momentary switch will engage the autopilot and command the aircraft to assume straight and level flight.

The autopilot can be coupled to GPS navigation. A GPS navigation source must be provided, and in this aircraft, the GPS source is attached to a mounting bracket located directly below the Autopilot Controller. The GPS used in this aircraft is an iFly 520. A power source cord and a USB data link cord are provided for the connection of the GPS to the Autopilot.

Complete operating instructions of the autopilot can be found in the Operating Handbook provided by TruTrak.

PITOT & STATIC PRESSURE

The pitot tube and static pressure tube is located under the left wing. The pitot tube provides total air pressure to the airspeed indicator. The static pressure provides ambient air pressure to the Airspeed, altimeter, and vertical speed indicators.

CONTROL SYSTEM

The CH 601 XLB is equipped with dual flight controls (brakes on the left side only). The rudder is controlled by pedals at each flight control station. The pedals are also connected to a steerable nose wheel operable from either pilot position. The elevator and ailerons are trimmed electrically by switches on the center console. All flight controls are cable operated and non-boosted.

Dual control sticks and rudder pedals. The brake pedals are only on the left side. Elevator and aileron trim is powered through the electrical master switch.

BAGGAGE COMPARTMENT

The main baggage compartment is located above and behind the seats. It can accommodate up to 40 pounds. A cargo net is installed to prevent forward cargo movement. A Halon portable fire extinguisher is installed in the forward part of the baggage compartment.

SECTION 2
TECHNICAL DATA / GENERAL INFO

DIMENSIONS

Length	20 ft
Wing Span	27 ft 3in
Wing Area	132 Sq ft
Cabin Width (at shoulders)	44 in.
Wing Loading	9.85 lbs per sq ft
Load Factor	+4g /-2g
Horizontal Tail Span	7ft 7in
Rudder Tip Height	6ft 7in

WEIGHTS

Empty Weight (See Sec 7)	782 pounds
Useful Load (See Sec 7)	538 pounds
CG range	20-30% MAC
Max Gross Takeoff Weight	1320 pounds
Rear baggage compartment cap.	40 pounds
Power Loading	11.8 pounds per HP

TAKEOFF and LANDINGS

Rate of Climb	700 fpm
Take Off Role	500 ft (Variable)
Landing Roll	500 ft (Variable)

Note: The takeoff and landing distances are estimates determined from Zenith Aircraft company documents. Actual phase 1 testing has proven these to be generally accurate but many condition variables have not been determined.

Phase 1 testing has led the builder to conclude that the minimum no obstacle field length should be 1,500 at sea level at 59 degrees F (ISA).

For every 500 feet of density altitude above sea level, increase the minimum field length 10%

FUEL/RANGE

Fuel Capacity	30 Gallons (29 useable)
Endurance	4.5 hours approx
Range	500 miles approx

SECTION 3
LIMITATIONS AND OPERATING PARAMETERS

GENERAL

VFR Flight	Day or Night
Flight into known icing is prohibited	
Max gross take off weight	1320 lbs
Empty weight	782 lbs
Useful load	538 lbs
CG Range	20-30% MAC
Maneuvering load factors	+4g / -2g
Maximum operating altitude	12500 ft

SPEEDS

Vne	Never Exceed	150 mph
Vh	Level flight, max continuous power	132 mph
Vno	Normal operating	130 mph
Va	Maneuvering	98 mph
Vsl	Stall speed (flaps up)	51 mph
Vso	Stall speed (flaps down)	44 mph
Vx	Best angle of climb	70 mph
Vy	Best rate of climb	80 mph
Vg	Best glide	70 mph
Vba	Maximum bank angle	60 deg
Vcw	Maximum cross wind	15 mph
Vfe	Maximum flaps extended (full flaps)	80 mph

MANEUVERS

Approved Maneuvers - Steep turns (60% bank max)
Lazy eights
Chandelles
Stalls
AEROBATICS & INTENTIONAL SPINS PROHIBITED

ENGINE

Use aircraft engine oil only. Refer to engine maintenance manual for specific information.

GROUND OPERATIONS

Idle		900 rpm
Oil Pressure (idle)	Minimum	11 PSI
	Maximum	76 PSI
Oil Temp	Maximum	212F
Cylinder Head Temp	Maximum	356F

Engine...continued

IN FLIGHT OPERATIONS

Idle		900 rpm
Maximum engine speed		3300 rpm
Maximum Continuous		3300 rpm
Oil Pressure	Minimum	31PSI
	Maximum	76 PSI
	Idle Minimum	11 PSI
Oil Temperature	Minimum	59F
	Maximum	244F
	Normal	176-212F
Cylinder Head Temp (climb)	Maximum	392F
Cylinder Head temp (cruise)	Maximum	356F

Exhaust Gas Temp:	
Mid range cruise	1256-1328F
Above 70% power	1184-1256F

TIME WITH CHT BETWEEN 356 & 392 F NOT TO EXCEED 5 MINUTES.

Fuel

Avgas 100LL or 91UL auto gas

MISCELLANEOUS

LIMITATION PLACARDS & LABELS

The aircraft must be placarded with:
* Registration number on instrument panel & outside fuselage
* All switches
* Choke
* Starter
* Elevator & aileron trim
* Maximum baggage weight at each baggage compartment
* Instruments
* Cockpit opening
* "Experimental" sign on top of fuselage aft of cabin
* Passenger "Experimental" placard.
* Fuel type & quantity at each fuel filler cap
* Identification plate on left rear of fuselage.
* "No Step" & "No Push" decals at appropriate locations.

No smoking in or around the aircraft.

SECTION 4
NORMAL PROCEDURES AND CHECKLISTS

INTRODUCTION

This section provides checklists and amplified procedures for the conduct of normal operation.

PREFLIGHT INSPECTION

Carry-out the preflight inspection every day prior to the first flight and after any maintenance. Conduct an abbreviated preflight inspection at each thru stop.

FIRST FLIGHT OF THE DAY

Aircraft exterior general condition	CHECKED
Tires, wheels & wheel fairings	CHECKED
Fuel & Oil Quantity	CHECKED
Fuel drains (3)	SUMPED
Engine Cowling	SECURED
Propeller & Engine Area	CHECKED
Tie downs & chocks	REMOVED

WARNING: Visually check the fuel & oil level before each flight to make sure that there is sufficient quantity for the planned flight. A wooden calibrated fuel DIP-stick is stored in the cockpit to be used to positively check fuel level.

NOTE: Maximum oil level should be **BETWEEN** the two marks, not to the top mark. Overfilling the oil can lead to low oil pressure when applying power and higher than normal oil temperatures.

BEFORE START

1. Passenger brief
2. Seatbelts on
3. Controls free
4. Fuel select left or right
5. Radio master and lights off
6. Autopilot power switch off
7. Master switch on
8. Clear EIS master warn
9. Select EIS start page
10. Choke as required
11. Throttle closed
12. Fuel pump on
13. Clear area
14. Start

CAUTION: The starter should be activated for a maximum of 10 seconds followed by a 2 minute cool down. After engine start, adjust throttle for smooth operation. Check oil pressure, which should increase with 10 seconds. Increase engine speed after the oil pressure has reached the normal range. To avoid shock loading, start the engine with the throttle set for idling. Always avoid rapid throttle movements.

AFTER START

1. Oil Pressure check
2. Fuel pump off
3. Choke off
4. Flaps up
5. Radio master switch on
6. Autopiot power on - Allow Autopilot to align

On cold days, the choke may have to be left on for the engine to continue idling. The choke is spring loaded to the off position and may need to be held on for continued operation. The oil temperature must be above 60 degrees F for the master EIS warning light to go out.

TAXIING

Apply power and brakes as needed. Avoid riding the brakes. The rudder pedals are connected directly to the nose wheel. Differential braking will reduce rudder pressure during taxi, but do not use hard braking to turn. Nose wheel travel is mechanically limited and hard differential braking will not make it turn tighter. In windy conditions position ailerons and elevator appropriately. It is acceptable to taxi with the canopy resting on the latches.

WARNING: Latch the canopy prior to performing the engine run-up. At run-up RPM, an unlatched canopy will float up and down causing damage to the canopy and latches.

PRE-TAKEOFF

1. Controls check
2. Flaps set for takeoff
3. Instruments check
4. Synch autopilot altitude
5. Fuel on fullest tank
6. Trim set
7. Engine check – 2000 RPM
   Mags
   Carb heat
   EIS – check pages
8. Idle check

Prior to the engine run-up, allow the engine to warm up to normal operating temperature. Check both magnetos with engine running at 2000 RPM. There should be no more than a 100 RPM drop in each magneto and no more than 50 RPM between each. Also at 2000 RPM, check that the carburetor heat is functioning by a drop in RPM. Check all engine (EIS) & flight instruments. Select EIS page number 2 and check that the generator is charging between 14 and 15 volts. Reduce power to idle.

CAUTION: The engine check should be performed with the aircraft facing into the wind as much as possible and NOT on loose terrain to avoid sucking debris into propeller.

BEFORE TAKEOFF

1. Canopy closed and latched
2. Fuel pump on
3. Strobes on
4. Seatbelts and shoulder harnesses secure
5. Emergency review

TAKEOFF AND CLIMB

Always takeoff and climb with full power. This airplane accelerates quickly and requires right rudder to maintain the runway center line. Apply stick back-pressure as the speed passes 50 mph. Firm back pressure is required to initiate rotation, but as the nose comes up, the back pressure may be reduce. Climb at Vy until at a safe altitude and then accelerate to 90 - 100 for better engine cooling and improved over-the-nose visibility.

For short and/or soft field operation use half flaps for takeoff. Start the takeoff roll with stick back-pressure and rotate the nose off the ground a little earlier than normal. After the nose comes up, reduce the back-pressure a bit to allow the airplane to roll on the main gear (**WARNING:** Do not "jerk" the airplane off the ground). It will smoothly lift off in ground effect. Allow the nose to drop a slightly after liftoff and accelerate to Vy or Vx as required.

During climb, if cylinder head or oil temperature approach limits, reduce the climb angle (increase airspeed) to improve cooling. If the highest EGT reading exceeds 1260 degrees F during full power operation, apply carburetor heat to enrich the mixture. Adjust the carb heat to maintain the EGT at about 1260 degrees F. This enrichment procedure is usually not needed above 3,500 feet.

CRUISE

Best cruise rpm is at a point where the EGT rises as the throttle is pulled back. This is the transition between the high power fuel rich circuit and the cruise lean circuit. This transition will occur at about 2800 rpm. Normal cruise power is between 2800 and 2850 RPM.

Because only one fuel tank at a time feeds the engine, keep the fuel tanks balanced by switching tanks every 30 minutes. The EIS is set to automatically provide a fuel time warning every 30 minutes. This warning will cause the EIS warning light to flash and the time annunciation will appear. The warning is reset by pressing the EIS warning light.

DESCENT

Any normal speed is acceptable but a cruise speed descent is preferred. A cruise descent can be established by reducing the power 500 RPM from the cruise power setting and dropping the nose to maintain cruise airspeed. During descent, avoid a closed throttle condition. Maintain sufficient power to avoid shock cooling the engine.

NOTE: At lower power settings, engine EGT may increase. If this is noted, apply carburetor heat to enrich the mixture.

BEFORE LANDING:

1. Select the fullest fuel tank
2. Fuel boost pump on

Normal final approach speed is 65-70 MPH. Use flaps only when below 80 MPH. Touch down on the main wheels by holding the nose off with the elevator. Apply the brakes as needed after the nose wheel touches down. Maintain back stick pressure during braking.

For a short field landing, the final approach speed may be lowered to 60-65 MPH. Use power as required to maintain an appropriate descent rate.

BALKED LANDING OR GO AROUND

Apply full throttle, establish an initial climb speed of 80 MPH, and raise the flaps. Be prepared for a strong pitch-up when power is applied. If trim has been run to the full up position for a full flap landing, the plane will pitch up as the flaps are retracted… firm forward elevator pressure will be required until the trim is reset. Accelerate to normal climb speed when a positive rate of climb is established.

AFTER LANDING

1. Flaps up
2. Fuel pump off
3. Strobes off

CAUTION: Allow the engine to cool down for approximately 30 seconds at 1500 RPM prior to shutdown if this did not occur during taxi

SHUTDOWN

1. Flaps down
2. Autopilot power switch off
3. Radio Master off
4. Magneto switch off
5. Master switch off

CAUTION: Use the tie-down eyes wings and aft fuselage to secure the aircraft. Lock control sticks in a full forward position. Make sure that canopy is closed and

SECTION 5
EMERGENCIES & NON-NORMALS

INTRODUCTION

Section 5 provides checklists and amplified procedures for coping with various emergencies and non-normal situations. Emergencies caused by aircraft or engine malfunction are rare if proper pre-flight inspections and maintenance are practiced. However, should an emergency arise, the basic guidelines described in this section should be considered and applied as necessary to correct the problem.

EMERGENCY PROCEDURES

ENGINE FAILURE

Engine failure or rough running during take-off run:

1. Throttle - Reduce to Idle
2. Clear the runway and investigate

Engine failure during initial climb-out and cruise:

Land straight ahead unless you are certain that you have enough altitude to perform a 180 degree turn back to the airport (1000 feet AGL minimum altitude). Set up a 70 mph glide; investigate whether a restart is possible. If not, fuel selector valve to OFF. Prior to touchdown, turn master switch off.

1. In-flight engine restart
2. Fuel boost pump ON
3. Fuel selector to fullest tank
4. Choke as needed
5. Attempt restart.

ENGINE SMOKE OR FIRE

Time is of the utmost importance. Do not spend extra time looking for a perfect place to land. Land immediately and evacuate the aircraft.

1. Fuel boost pump Off
2. Fuel Supply valve Off
3. Magneto switch Off
4. Master switch off prior to touchdown

COCKPIT SMOKE OR FIRE

Smoke and or fire in any aircraft are probably the most serious emergency that can happen aboard an aircraft. Any smell or sight of smoke or electrical burning should be taken seriously and the aircraft should be landed as soon as possible. The best time to isolate a problem is on the ground and not in the air. If an electrical burning smell is noticed in-flight, turn off the master switch. All essential flight instruments and the engine will operate normally with the master switch off. All avionics will lose power.

RECOVERY FROM UNINTENTIONAL SPIN

(WARNING: Intentional spins are prohibited)

There is no uncontrollable tendency of the aircraft to enter into a spin provided normal piloting techniques are used.

1. Throttle to Idle
2. Ailerons neutralized
3. Full opposite rudder rotation direction
4. Push control stick forward until rotation stops
5. Neutralize rudder pedals
6. Initiate dive recovery

CARBURETOR ICING

Carburetor icing can occur almost anytime, but especially when the outside air temperature is below 70 degrees F. and the temperature/dewpoint spread is small. Carburetor icing shows itself through a decrease in engine power and an increase in engine temperatures. Applying carburetor heat will usually correct the problem. Applying heat will sometimes temporarily aggravate the loss of power as the ice melts and is ingested into the engine.

NON-NORMAL PROCEDURES

DEAD BATTERY FOR STARTING

The engine requires the use of the electric starter for starting. This engine will not start by the use of hand propping. Recharge or replace the battery.

INFLIGHT GENERATOR FAILURE

The generator should supply about 14.5 volts to the battery when the engine is above 1400 RPM. A generator failure is indicated by a flashing warning light in the EIS and the EIS with switch to show the voltage. A red LOW VOLT light will also appear on the XP bus load center, and a flashing EIS warning light will be accompanied by the battery voltage being displayed on the EIS. If the indicated voltage is below 13 volts, turn off any high load electrical items. The radio should continue working for about 45 minutes on battery power only. The engine will continue to run with a dead battery.

OPEN CIRCUIT LIGHT ON THE EXP BUSS LOAD CENTER

Switch off the electrical appliance powered by the open circuit. After 5 minutes, placing the switch back on will reset the circuit.

WARNING: Do not reset the circuit unless the reason for the electrical overload has been determined and corrected.

SECTION 6
WEIGHT AND BALANCE

Revised 1/14/2018

The Earl C. Downs CH 601-XLB aircraft is designed in such a way that maintaining the center of gravity within the proper envelope is easy. The designed placement of fuel, pilot and passenger, and luggage assures the pilot that the center of gravity will remain within the proper envelope in the majority of instances. The only possibility of having the weight and balance outside of the envelope is when the passenger weight starts to exceed 200 lbs. Some restrictions of fuel and/or baggage will come into effect after that. The CG moves aft slightly as fuel is burned.

The following is the basic weight and balance data determined at the date of FAA certification.
Datum line is the tip of the prop spinner.
Empty weight is 766 pounds (Includes full oil).
Maximum weight is 1320 pounds.
Useful load is 554 pounds (Crew, fuel, and baggage)
Center of gravity range is 70.8 to 76.7 inches aft of datum

Revised on 9/20/2014 by addition of wheel fairings.

Original 8/28/2011	Weight	Arm	Moment inch/lbs
	766 lb	71.56	54,811.25
Revised 9/20/14			
Main gear total	+7 lb	88.75	+ 621.25
Nose LG fairing	+1 lb	37.5	+ 37.5
	–––––	–––––	–––––––
New Empt weight and momnet	774 lb	71.67	55,470.0

Revised on 1/14/2018 by addition of a TruTrak Vizion 380/385 series autopilot

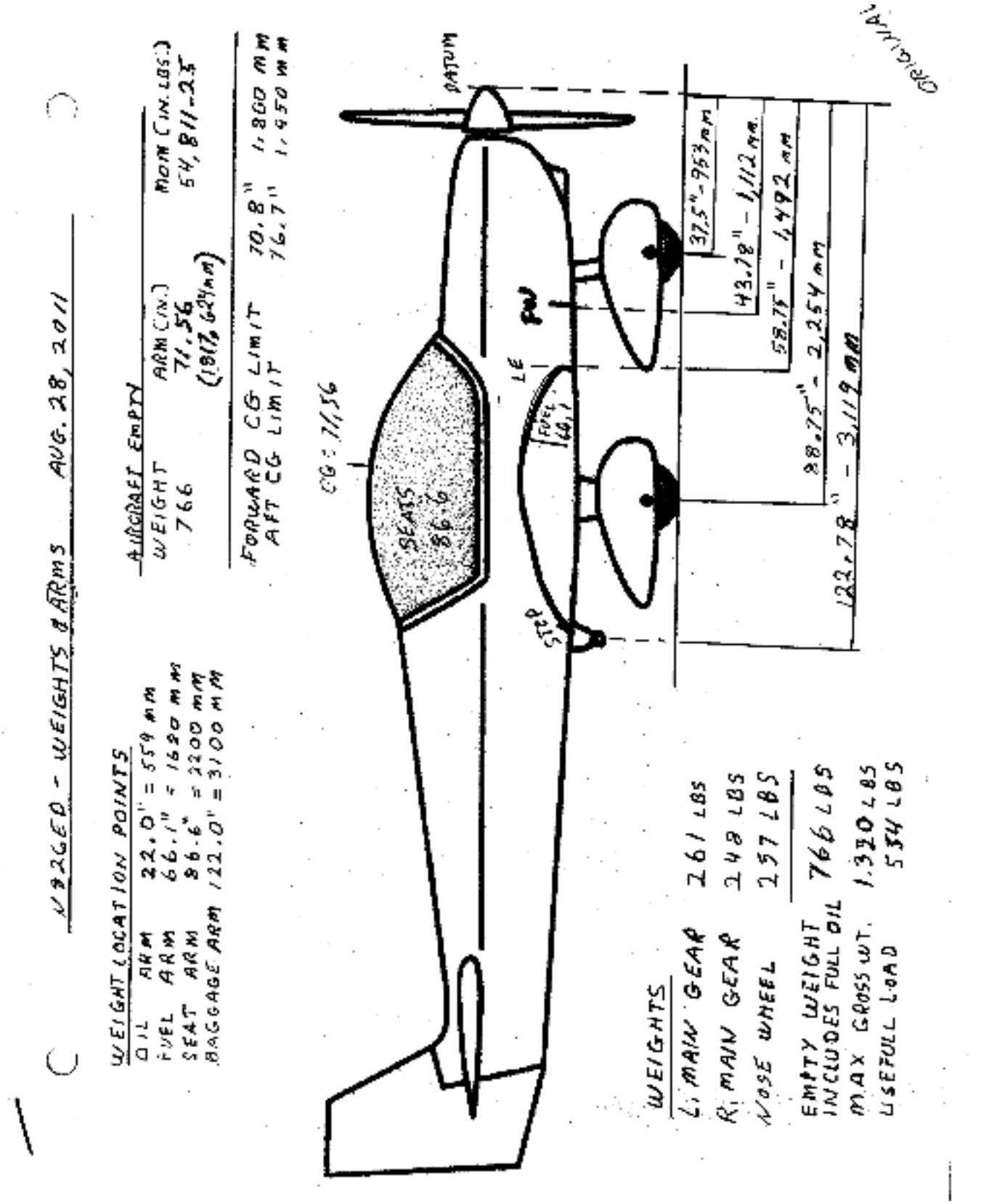
A TruTrak Vizion 380/385 series autopilot was installed in this aircraft by the owner. This installation involved locating autopilot components as follows; autopilot control unit at Sta.66, the roll servo and automatic trim module (ATP) at Sta.105, and the pitch servo at Sta.120.

Equiptment Weights added:
Autopilot control unit 1 Lb.
Roll servo/ATP 3.6 Lbs.
Pitch Servo 3.7 Lbs.

New Aircraft weights and CG:
Empty weight - 782 lbs. (rounded off to whole number)
CG location - 72.04 In.
Useful Load 538 Lbs.

Empty Weight Data and Measuring Points From Datum

Original certification data provided for measuring point reference. Current weights are found on page 6.1.



SECTION 7
HANDLING, CARE, MAINTANENCE

INTRODUCTION

This section contains procedures for proper ground handling and servicing of the aircraft. It also identifies certain inspection and maintenance requirements which must be followed if the aircraft is to remain airworthy and retain new aircraft performance and reliability.

AIRCRAFT INSPECTIONS

Periods of overall checks and maintenance depend on the condition of the operation and on overall condition of the aircraft. Inspections should be carried out in the following periods:

- After the first 25 hours
- After the first 50 flight hours
- After every 100 flight hours or the annual inspection.
- Maintain the propeller in according to it's manual.

GROUND HANDLING

TOWING
Always use the towbar to pull or push and steer the tow. Avoid using the propeller to push or pull. If the propeller must be used, use only the hub close to the spinner of the propeller; never use the outer part of the blades. Never push on the spinner.

PARKING
It is advisable to park the aircraft inside a hangar. If the aircraft must be parked outside, care should be taken to insure that it is tied down, chocked, and the controls locked. Cover the canopy if possible.

JACKING
The aircraft should only be raised and lowered with jacks designed for the CH 601 XLB. Never raise the nose by pushing down on the tail.

GENERAL MAINTENANCE GUIDENCE

Because this aircraft is certificated under a Special Airworthiness certificate as an amateur built experimental aircraft, FAR part 43 maintenance rules do not apply except as outlined in the operating limitations issued with the airworthiness certificate.

All maintenance, repairs, or alterations may be performed by anyone. The annual condition inspection must be performed by an FAA certificated A & P mechanic. The operating limitation list the requirements for re-entering phase 1 flight testing after major changes.

This aircraft was built from a kit provided from the Zenith Aircraft Company. For specific information about maintenance alterations, and component parts for the airframe, the following is contact information for the kit manufacturer.

Zenith Aircraft Company
Mexico Memorial Airport
P.O. Box 650
Mexico, MO 65265-0650
(573) 581-9000

The Jabiru Engine was provided by Jabiru U.S.A. The following is contact information.
Jabiru U.S.A.
2842 Highway 231 North
Shelbyville, TN 37160
(931) 680-2800

SECTION 8
OPERATING LIMITATIONS

INTRODUCTION

The Operating Limitations were issued by the FAA when the airworthiness certificate was issued. These Operating Limitation are part of the airworthiness certificate and must be onboard the airplane when it is being operated. These pages are a copy of the Operating Limitations that are attached to the airworthiness certificate.

US Department
of Transportation

Federal Aviation Administration

Oklahoma City Flight Standards District Office
1300 S. Meridian, Ste. 601
Oklahoma City, Oklahoma 73108
405-951-4200, Fax: 405-951-4282

EXPERIMENTAL OPERATING LIMITATIONS
Operating Amateur-Built Aircraft
PHASE 1/Phase 2
Operations Inside/Outside the Assigned Flight Test Area

(These limitations are derived from the general guidance contained in FAA Order 8130.2F, Chg 1.)

REG. NO.	MAKE:	MODEL:	SERIAL NO:
N826ED	Earl C Downs	CH 601XLB	001

NOTE: No person may operate outside the assigned flight test area prior to the completion of Phase 1 flight testing. This includes the entry in the aircraft maintenance records as required by Phase 1 limitation #4.

1. No person may operate this aircraft for other than the purpose of meeting the requirements of 14 CFR § 91.319(b) during phase 1 flight testing, and for recreation and education after meeting these requirements as stated in the program letter dated **09/05/2011** for this aircraft. In addition, this aircraft must be operated in accordance with applicable air traffic and general operating rules of Part 91 and all additional limitations herein prescribed under the provisions of § 91.319(e). These operating limitations are a part of FAA Form 8130-7 and are to be carried in the aircraft at all times and be available to the pilot in command of the aircraft.
2. During phase 1 flight testing to meet the requirements of §91.319(b) all flights shall be conducted within the geographical area described as follows: (Phase I)

   75 nautical mile radius of Cushing, Ok(CUH).
3. This aircraft must be operated for at least 40 hours in the assigned geographic area. (Phase I)
4. All test flights, as a minimum, must be conducted under VFR, day only. Guidance concerning the scope and detail of test flights can be found in AC 90-89. Following satisfactory completion of the required number of flight hours in the flight test area, the pilot must certify in the records that the aircraft has been shown to comply with §91.319(b). Compliance with §91.319(b) must be recorded in the aircraft records with the following or a similarly worded statement: **" I certify that the prescribed flight test hours have been completed and the aircraft is controllable throughout its normal range of speeds and throughout all maneuvers to be executed, has no hazardous operating characteristics or design features, and is safe for operation. The following aircraft operating data has been demonstrated during the flight testing: speeds Vso____, Vx_____, and Vy_____, and the weight _____and CG location_____ at which they were obtained".**
5. Except for takeoffs and landings, this aircraft may not be operated over densely populated areas or in congested airways.
6. This aircraft is prohibited from operating in congested airways or over densely populated areas unless directed by air traffic control or unless sufficient altitude is maintained to effect a safe emergency landing in the event of a power unit failure, without hazard to persons or property on the surface.
7. This aircraft is to be operated under VFR day only. (Phase I)

8. After completion of Phase 1 flight testing, unless appropriately equipped for night and/or instrument flight in accordance §91.205, this aircraft is to be operated under VFR, day only.
9. Aircraft instruments and equipment installed and used under §91.205 must be inspected and maintained in accordance with the requirements of part 91. Any maintenance or inspection of this equipment must be recorded in the aircraft maintenance records.
10. During the flight-testing phase, no person may be carried in this aircraft during flight unless that person is essential to the purpose of the flight. (Phase I)
11. No person may operate this aircraft for carrying persons or property for compensation or hire.
12. The pilot in command of this aircraft must advise each passenger of the experimental nature of this aircraft, and explain that it does not meet the certification requirements of a standard certificated aircraft.
13. The aircraft must contain the placards, markings, etc. as required by §91.9. In addition, the placards and markings must be inspected for legibility and clarity, and the associated systems inspected for easy access and operation, to ensure they function in accordance with the manufacturer's specifications during each condition inspection.
14. This aircraft must display the word **EXPERIMENTAL** in accordance with §45.23(B).
15. This aircraft is prohibited from aerobatic flight, that is, an intentional maneuver involving an abrupt change in the aircraft's attitude, an abnormal attitude, or abnormal acceleration not necessary for normal flight.
16. The pilot-in-command of this aircraft must hold a pilot certificate, or an authorized instructor's logbook endorsement. The pilot-in-command also must meet the requirements of §61.31(e), (f), (g), (h), (i) and (j) as appropriate.
19. After incorporating a major change as described in 14 CFR § 21.93, the aircraft owner is required to reestablish compliance with 14 CFR § 91.319(b) **and notify the geographically responsible FSDO of the location of the proposed test area. The aircraft owner must obtain concurrence from the FSDO as to the suitability of the proposed test area.** All operations must be conducted under day VFR conditions in a sparsely populated area. The aircraft must remain in flight test for a minimum of 5 hours or for the time the FSDO assigns. Persons nonessential to the flight must not be carried. The aircraft owner must make a detailed log book entry describing the change before the test flight. Following satisfactory completion of the required number of flight hours in the flight test area, the pilot must certify in the records that the aircraft has been shown to comply with § 91.319(b). Compliance with 14 CFR § 91.319(b) must be recorded in the aircraft records with the following, or a similarly worded, statement: **"I certify that the prescribed flight test hours have been completed and the aircraft is controllable throughout its normal range of speeds and throughout all maneuvers to be executed, has no hazardous operating characteristics or design features, and is safe for operation. The following aircraft operating data has been demonstrated during the flight testing: speeds Vso_____, Vx_____, and Vy_____, and weight_____, and CG location_____ at which they were obtained."**
20. This aircraft must not be used for glider towing, banner towing, or intentional parachute jumping.
21. This aircraft does not meet the requirements of the applicable, comprehensive, and detailed airworthiness code as provided by Annex 8 to the Convention on International Civil Aviation. The owner/operator of this aircraft must obtain written permission from another CAA prior to operating this aircraft in or over that country. That written permission must be carried aboard the aircraft together with the U.S. airworthiness certificate and upon request, be made available to an ASI or the CAA in the country of operation.
22. No person must operate this aircraft unless within the preceding 12 calendar months it has had a condition inspection performed in accordance with the scope and detail of appendix D to part 43, or other FAA approved programs, and was found to be in a condition for safe operation. As part of the condition inspection, cockpit instruments must be appropriately marked and needed placards installed in accordance with § 91.9. In addition, system-essential controls must be in good condition.

securely mounted, clearly marked, and provide for ease of operation. This inspection will be recorded in the aircraft maintenance records

23. Condition inspections must be recorded in the aircraft maintenance records showing the following, or similarly worded, statement:

> ***"I certify that this aircraft has been inspected on (insert date) in accordance with the scope and detail of Appendix D of Part 43 and found to be in a condition for safe operation."***

The entry will include the aircraft's total time-in-service, and the name, signature, certificate number, and type of certificate held by the person performing the inspection.

25. An experimental aircraft builder certificated as a Repairman for this aircraft under §65.104, or an appropriately rated FAA certificated mechanic may perform the condition inspection required by these operating limitations.

27. Application must be made to the geographically responsible FSDO or MIDO for any revision to these limitations.

28. The pilot in command of this aircraft must notify air traffic control of the experimental nature of this aircraft when operating into or out of airports with an operational control tower. When filing instrument flight rules (IFR), the experimental nature of this aircraft shall be listed in the remarks section of the flight plan.

Joseph R Broker
ASI

Date Issued: September 19, 2011

June 26, 2012
I certify that the prescribed flight test hours have been completed and the aircraft is controllable throughout its normal range of speeds and throughout all maneuvers to be executed, and has no hazardous operating characteristics or design features and is safe for operation. The following aircraft operating data has been demonstrated during the flight testing: Speeds, Vso- 44 mph, Vx-70 mph, Vy- 80 mph, and the weight- 1,125 lbs, and CG location of 72.9 at which they were obtained. A complete listing of operating parameters can be found in chapter 3 of the Pilot Operating Handbook for aircraft N826ED.

Earl C. Downs

Earl C. Downs

Addendum 1
Leter of Deviation Authority

U.S. Department of Transportation
Federal Aviation Administration

14 CFR Part 91 Operations

Table of Contents

Part A

U.S. Department of Transportation
Federal Aviation Administration

14 CFR Part 91 Operations

Waiver or Letter of Authorization
Issuance and Applicability

1 These documents are issued to Earl Downs, whose principal base of operation is located at:

Primary Business Address:	Mailing Address:
1919 East Dunkin Rd.	1919 East Dunkin Rd.
Cushing, Oklahoma 74023	Cushing, Oklahoma 74023

2. A change in the aircraft base of operations location constitutes an administrative change only to this Letter of Authorization (LOA) A001 and would not require nor preclude a new inspection.

a. The existing authorizations, deviations, waivers, etc., are still valid and not intended to be reissued due to a change in the operator's base of operations.

b. If the operator relocates its principal base of operations (address) listed in subparagraph 1 above, it must notify, in writing, the losing Flight Standards District Office (FSDO) of its new location and mailing address within 30 calendar days following relocation and, advise the losing FSDO of the receiving FSDO where the operator proposes to do business.

3. The attached waivers, authorizations, and/or deviations are effective as of the "Date Approval is Effective" listed in each authorizing document, and those issued without an expiration date shall remain in effect, as long as the party listed in subparagraph 1 above continues to meet all appropriate Parts of the CFR or until any of the following:

a. It is voluntarily surrendered by the operator,

b. The operator ceases to be the operator of the aircraft listed in the applicable authorization.

c. It is surrendered or revoked for cause by the FAA.

d. The person signing the authorizing document relinquishes responsibility,

e. The aircraft changes ownership and should be removed from the authorizing document,

f. An aircraft or listed equipment is no longer used for that operation and should be removed from the authorization.

g. An aircraft or other equipment needs to be added to the existing authorizing document,

h. An aircraft listed on the authorization changes nationality numbers,

i. An aircraft listed on the authorization is issued an experimental, special airworthiness certificate for research and development (R&D) or changes projects associated with an experimental, special airworthiness certificate for the purpose of R&D

U.S. Department of Transportation
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the operator should notify the issuing office of the change within 30 days and request an updated LOA.

NA

HQ Concur: 07/14/2011 HQ Revision: 020

This Waiver or Authorization is Issued by the Federal Aviation Administration and approved by direction of the Administrator.

Digitally signed by William A Smith, Manager (SW15)
[1] EFFECTIVE DATE: 8/14/2012, [2] AMENDMENT #: 0
DATE: 2012.08.14 08:38:38 -05'00'

I hereby accept and receive this Waiver or Authorization.

Earl C. Downs 8-18-2012

Downs, Earl C., Resp Person-91T Training Date

U.S. Department of Transportation
Federal Aviation Administration

14 CFR Part 91 Operations

Letter of Authorization

Summary of Authorizations

The operator, in accordance with the reference documents, is authorized to:

	Reference Paragraphs
Conduct flight training in experimental category aircraft with a Letter of Deviation Authority in accordance with 14 CFR Section 91.319 (h).	A115

HQ Control: 08/31/2004 HQ Revision: 000

This Waiver or Authorization is issued by the Federal Aviation Administration and approved by direction of the Administrator.

Digitally signed by William A Smith, Manager (SW15)
[1] EFFECTIVE DATE: 8/14/2012. [2] AMENDMENT #: 0
DATE: 2012.08.14 08:38:40 -05'00'

I hereby accept and receive this Waiver or Authorization.

Earl C. Downs 8-18-2012

Downs, Earl C., Resp Person-911 Training Date

U.S. Department of Transportation
Federal Aviation Administration

14 CFR Part 91 Operations

Letter of Deviation Authority

Deviation Authority for Conducting Flight Training in Experimental Category Aircraft (14 CFR Section 91.319 (h))

1. The Operator listed at the bottom of this document is authorized this Letter of Deviation Authority (LODA) in accordance with the provisions of Title 14 Code of Federal Regulations (CFR) Section 91.319(h) to the extent necessary to provide aircraft-specific training in an aircraft certificated in the experimental category in accordance with the limitations and provisions of this LODA.

2. Aircraft and Equipment. The Operator is authorized to use the following approved aircraft and equipment for this training program:

Table 1 – Aircraft and Equipment

A/C Reg. No.	A/C Serial No.	A/C M/M/S	Regulatory Experimental Certification Basis	Purpose of Training	Restrictions or Limitations	Date of Airworthiness Certificate & Operating Limitations
N826ED	001	HOME-AMTR-AMATEUR	14 CFR Section 21.191(h)	Other (cater) Transition training in this type. Preparation for first flight testing of this type. Training on the operation of the Jabiru 3300 engine and Grand Rapids Technology (GRT) Engine Information System (EIS) installed on this type of aircraft.	None	09/19/2011

3. Aircraft Inspection and Maintenance.

a. The aircraft listed in Table 1 above must

(1) Be inspected in accordance with an FAA-approved inspection program that includes provisions for ensuring continued airworthiness and recording time remaining on life-limited parts in accordance with the manufacturer's instructions, or

(2) Be inspected in accordance with the provisions of Section 91.409 (b) for a 100-hour condition inspection for ensuring continued airworthiness and recording time remaining on life-limited parts in accordance with the manufacturer's instructions, or

(3) For turbine-powered or large aircraft, in accordance with an FAA-approved inspection program that meets the scope and detail of the requirements of Section 91.409 (e), (f)(4), and (g) for ensuring continued airworthiness and recording time remaining on life-limited parts in accordance with the manufacturer's instructions, and

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(4) Have completed Phase I flight testing and be operating in Phase II in accordance with the operating limitations made a part of the airworthiness certificate issued for the aircraft, and

(5) Must have been granted an experimental certificate in accordance with the provisions of the appropriate regulatory basis as noted in Table 1 of this LODA.

b. Only an FAA-certificated mechanic with airframe and powerplant ratings, a certified repairman, or a certified repair station may perform this inspection and make the entry in the maintenance record.

c. If the aircraft is equipped with operable ejection seats and systems, such systems must be rigged, maintained, and inspected in accordance with the manufacturer's recommendations.

4. Operating Limitations. The Operator must operate the aircraft in accordance with the operating limitations made a part of the experimental airworthiness certificate, except for those limitations modified by this LODA. These operating limitations will be issued in accordance with the guidance provided in FAA Order 8130.2, as amended, Airworthiness Certification of Aircraft and Related Products, for the appropriate "Group" of aircraft and with experimental certificates issued for the purpose as listed in Table 1 above.

5. Training Requirements. The Operator must comply with the following training limitations and conditions for this LODA.

a. The Operator must use aircraft-specific flight and ground training outlines for the training specified in Table 1 authorized by this LODA. No demonstration flights are authorized.

b. Pilots participating in the training described in 5.a. above, nonstop programs must hold an appropriate category and class rating and must meet the requirements of 14 CFR Section 61.31(d), (e), (f), and (g).

c. The Operator must keep a record of the training given for a period of 3 years from the effective date of this LODA as documented on the bottom of this document.

d. Instructors used in the training program described in 5.a. above must hold an Authorized Instructor Certificate issued by the FAA for the specific aircraft to be used.

e. Before providing training in aircraft equipped with operable ejection systems, the trainee must complete an acceptable course of ejection seat training conducted under this LODA.

f. When conducting spin and upset training (rotorcraft excepted), the Operator must observe a minimum recovery altitude of 6,000 feet above ground level. Instructor pilots must be cautioned not to penetrate this minimum recovery altitude while performing upset maneuvers and training.

6. A copy of this LODA must be carried on board the aircraft during flight training conducted under this LODA.

7. Responsible Person. The Responsible Person for crew operations may be either an agent for service (who must be a U.S. citizen) or a person who is a U.S. citizen or holds a U.S. pilot certificate and accepts responsibility for complying with the stated regulations by signing this document.

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Federal Aviation Administration

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a. If the Responsible Person signing this LOA relinquishes responsibility, this LOA becomes invalid.

b. Enter the name, e-mail address, and telephone number in Table 2 of the Responsible Person signing this LOA:

Table 2 – Responsible Person

Name	E-mail Address	Telephone Number
Downs, Earl C.	oklahomaaviator@earthlink.net	918-840-2000

NA

HQ Control: 01/03/2006 HQ Revision: 10a

This Waiver or Authorization is Issued by the Federal Aviation Administration and approved by direction of the Administrator.

Digitally signed by William A Smith, Manager (SW15)
[1] EFFECTIVE DATE: 8/14/2012, [2] AMENDMENT #: 0
DATE: 2012.08.14 08:38:42 -05:00

I hereby accept and receive this Waiver or Authorization.

Earl C Downs 8-18-2012

Downs, Earl C., Resp Person-91J Training Date