FLIGHT MANUAL

AVID SPEEDWING

N97HD

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1. AIRCRAFT GENERAL INFORMATION

AVID MK4 Speedwing Aircraft flight characteristics are similar to the flight characteristics of other Standard Category aircraft.

Aeronautical skill and knowledge required to obtain FAA issued Private Pilot class license is sufficient, and required, for the operation of the Avid Mk4 aircraft. Of particular importance is the effect of temperature, atmospheric pressure, and density altitude on the aircraft's performance. The pilot must be aware of increased stall speed as related to angle of bank, "G" forces, and increases of operating weights. Also the increase of turning radius as related to increased airspeed.

Engine operating procedures, conditions, and instrument markings to be in accordance with the engine manufacturer's operating manual (summarized in this Flight Manual).

Operation of installed equipment, such as battery, lights, electronic equipment, etc. are to be in accordance with the equipment manufacturer's manuals and instructions.

2. OPERATING LIMITATIONS

THESE OPERATING LIMITATIONS SHALL BE ACCESSIBLE TO THE PILOT

EXPERIMENTAL OPERATING LIMITATIONS
OPERATING AMATEUR-BUILT AIRCRAFT

REG. NO.	MAKE	MODEL	SERIAL NO
N97HD	HARLAN D. HUFF	MKIV AVID	1396D

1. No person may operate this aircraft for other than the purpose for which the Special Purpose Airworthiness Certificate was issued. The aircraft shall be operated in accordance with the applicable FAA Air Traffic and General Operating Rules, FAR Part 91.42 and the additional limitations prescribed herein.
2. All flights shall be conducted within the following geographical area:
   25 NAUTICAL MILE RADIUS OF TRACY AIRPORT, TRACY, CA.
3. No operations, including takeoffs and landings, shall be conducted over densely populated areas or in congested airways, except at those airports authorized as follows:
   BYRON, CA; NEW JERUSALEM, CA ; LIVERMORE, CA
4. Operator of this aircraft shall notify the control tower of the experimental nature of this aircraft when operating into or out of airports with operating control towers.
5. This aircraft is approved for day VFR operation only.
6. This aircraft shall contain the placards, listings and instrument markings required by FAR 91.31
7. No person may operate this aircraft for carrying persons or property for compensation or hire.
8. No person may be carried in this aircraft during flight unless that person is required for the purpose of the flight. No passengers will be carried while undergoing flight tests.
9. Any major change to this aircraft, as defined by FAR 21.93, invalidates the Special Airworthiness Certificate issued for this aircraft.
10. 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. This aircraft may not be operated over any other country without the permission of that country.
11. These Operating Limitations may be amended subsequent to 40 hours by application for and issuance of a new Special Airworthiness Certificate.
12. These Operating Limitations expire on and may be amended by application for and issuance of a new Special Airworthiness Certificate.
13. An Experimental sign, letter size minimum 2 inches high, shall be displayed at each entrance to the aircraft.

Robert M Smedley Jr
Principal Maintenance Inspector
Date issues: 09/10/2002

3. DIMENSIONS AND SPECIFICATIONS:

POWER:

Engine	Jabiru 2200
Power	80 hp
Power Loading (with 80 HP) (1050 lbs.)	13.13 lb/HP

DIMENSIONS:

Wingspan	24 feet
Wing Chord	42 inches
Aspect Ratio	6.85
Fuselage Length	17' 11"
Height	71"
Wing Area	84 sq. ft.
Flaperon Area	sq. ft.
Stabilizer Area	sq. ft.
Fin Area	sq. ft.
Elevator Area	sq. ft.
Rudder Area	sq. ft.
Trim Tab Area (Elevator)	sq. ft.
Cabin Width	39.5 inches

WEIGHT:

Empty Weight	510 lb.
Maximum Takeoff Gross Weight	1,050 lb.
Useful Load (Maximum)	540 lb.
Main Baggage Compartment Capacity	lbs.

WING LOADING:

@ 1,050 lbs.	12.5 lb/sq. ft.

LOAD FACTORS:

@ 1,050 lb. Gross	+/- 5.0 G

CENTER OF GRAVITY LIMITS:

Station +11.185" to +16.5" (26.6% to 39.3% MAC) referenced to wing l/e

RIGGING:

Flaperon Travel	15 deg. Max DOWN
Elevator Travel	30 deg. UP, 17 deg. DOWN
Aileron Travel	deg. UP, deg. DOWN
Trim Tab Travel	deg. UP, deg. DOWN
Rudder Travel	deg. RIGHT, deg. LEFT
Wing Angle of Incidence	+ deg.
Stabilizer Angle of Incidence	- deg.
Wing Washout (Geometric Twist)	1.5 inches at tip.
Wing Dihedral	+ deg.

FUEL CAPACITY:

Wing Tank	17 gallons (Right wing only)
Header Tank	0.5 gallons (Fuselage)
Total Fuel Capacity	17.5 gallons
Minimum fuel for takeoff	2 gallons.

OPERATING SPEEDS

Never Exceed Speed	Vne	150 mph	Knots
Maneuvering Speed	Va	115 mph	Knots
Flap Extension Speed	Vfe	100 mph	Knots
Stall Speed (No Flap)	Vs	52 mph	Knots
Stall Speed (Full Flap)	Vso	50 mph	Knots
Stall Speed Relative to Angle of Bank (Accelerated Stalls):			
0		mph	Knots
30		mph	Knots
45		mph	Knots
60		mph	Knots
Best Angle of Climb Speed	Vx	65 mph	Knots
Best Rate of Climb Speed	Vy	70 mph	Knots
Normal Glide Speed		70 mph	Knots
Max Demonstrated Crosswind Velocity		mph	Knots

PERFORMANCE INFORMATION:

Range at 60% Power at 5000 feet altitude is	miles (no reserve).
Rate of Climb -	1200 FPM.
Service Ceiling -	Ft.
Take-Off Distance Ground Run -	Ft.
Take-Off Distance to Clear 50 Ft. Obstacle -	Ft.
Landing Distance Ground Run -	Ft.

4. CHECKLISTS

PREFLIGHT EXTERIOR CHECK

Check controls
Switches off
Check engine oil
Exhaust pipe covers removed
Check tire inflation and tread
Check wing pins installed and safetied
Fuel tank vent clear
Lift strut attach bolt tights and safetied.
Check flaperon hinges and linkages
Check removable panels (turtleback and baggage door)
Rudder cable bolted and safetied
Drain fuel tank and header tank
Pitot tube cover removed
Check propeller for nicks and cracks
Check mags & master switches off. Fuel on. Rotate propeller 5 turns.

BEFORE STARTUP

Logbook / Discrepancies
Radio antenna connected
Seat belts and shoulder straps secured
Flap up
Controls free
Check fuel quantity
Fuel valve OPEN
Master "ON"
Check Circuit Breakers
Throttle set to idle
Choke on (PULL) (if OAT below 5 degree C)
Both magneto switches on

BEFORE TAKEOFF

Check brakes
Engine run up
RPM to 1600
Mag check
RPM to 1000 – idle check
Altimeter set
Trim set for takeoff
Oil temp 60 deg. C
Strobe light "ON"
Seat belts fastened
Doors closed and locked

BEFORE LANDING

Carburetor heat on (out) as required
Altimeter set to area barometer pressure

AFTER LANDING

Flaps "UP"
Strobe "OFF

ENGINE SHUTDOWN

Radio "OFF"
GPS "OFF"
Intercom "OFF"
Position lights "OFF"
Engine monitor "OFF"
Throttle set to idle
Carb heat "OFF" (in)
Check mags
Mags "OFF"
Master "OFF"
Fuel "OFF"

ENGINE OUT

Establish ## mph.
Determine landing area
Fuel "ON"
Carb heat "ON"
Mag. Switch left and right check
Setup for emergency landing if all else fails
Shut "OFF" fuel and master switch before touchdown

INFLIGHT FIRE OR FUEL LEAK

Shut "OFF" fuel
Declare an emergency
Shut "OFF" master if danger from fuel leak exists
Apply Fire Extinguisher located behind passenger seat (if possible)

5. FLIGHT TEST PROGRAM

A Flight Test program has been developed for AVID IV N97HD. This program is fully documented in a document entitled “Flight Test Protocol”. The program consists of the following steps:

1. Low Speed Taxi Tests
2. High Speed Taxi Tests
3. Engine Reliability/Flight Controls
4. Envelope Expansion/Engine Performance
5. Air Speed Indicator Accuracy
6. One “G” Stalls
7. Power on Stalls
8. Power on Stalls at 10 Degree Flaps
9. Power on Stalls at 15 Degree Flaps
10. Best Rate of Climb Speed
11. Minimum Control Speed Handling
12. Static Longitudinal Stability
13. Dynamic Short and Long Period Longitudinal Stability
14. Lateral Directional Stability
15. Inadvertent Spin Entry
16. Stall Speed in 30 Degrees Bank
17. Stall Speed in 45 Degrees Bank
18. Stall Speed in 60 Degrees Bank
19. Stall Characteristics at Max Gross Weight and Fwd CG
20. Stall Characteristics at Max Gross Weight and Mid CG
21. Stall Characteristics at Max Gross Weight and Aft CG
22. Best Rate and Angle of Climb at Max Gross Weight
23. Lateral Directional Stability
24. Accelerated Stall (45 Degree Bank) at MGW mid CG
25. Accelerated Stall (60 Degree Bank) at MGW mid CG
26. Service Ceiling

6. MINIMUM EQUIPMENT LIST

GENERAL

This Minimum Equipment List is to be used prior to flight to determine if this aircraft is legal to fly with one or more components inoperative. Multiple inoperative components are permitted unless specifically prohibited in the text. Any component not included in this list must be operative for flight.

COMPONENT INDEX

Airspeed Indicator
Ammeter
Comm. Radio
ELT
Exhaust Gas Temperature Gauge
Fuel Flow Gauge
Hobbs Meter
Magnetic Compass
Oil Pressure Gauge
Outside Air Temperature Gauge
Tachometer
Vertical Speed Indicator
Altimeter
Clock
Cylinder Head Temperature Gauge
Encoding Altimeter
Fire extinguisher
GPS
Intercom
Magnetos
Oil Temperature Gauge
Strobes
Transponder

Required to be operative for ALL FLIGHTS:

Airspeed Indicator
Magnetic Compass
Oil Pressure Gauge
Magnetos (both must be operational)
Altimeter
Tachometer
Oil Temperature Gauge

Required for flight into Class B airspace (in addition to those items listed above):

Transponder
Encoding Altimeter
Comm. Radio

May Be Inoperative For ANY FLIGHT:

Cylinder Head Temperature Gauge
EGT Gauge

Vertical Speed Indicator
GPS
Intercom
Landing and Taxi lights
Fuel Flow Gauge
Ammeter OR Voltmeter ** One must be operative **
Outside Air Temperature Gauge
Hobbs Meter
Fire extinguisher

7. AIRCRAFT and SYSTEMS DESCRIPTION

GENERAL

The AVID Mk4 Speedwing is a side by side metal tube and fabric covered sport aircraft designed by Dean Wilson and first flown in the late 1980's. There are several hundred Avid Mk 4 aircraft in operation. Most are equipped with the Rotax 582 2-cycle engine. Others are equipped with Rotax 912, Jabiru and Subaru engines, among others.

The Aerobatic Speedwing version of the aircraft differs from others of the same model designation in its wingspan, wing area, wing aerofoil section and its wing structure. The Aerobatic Speedwing has an aluminium leading edge, a semi-symmetrical wing section and a 6' shorter wingspan than the standard Avid Mk4. Consequently, it cruises and stalls faster and is stressed to be fully aerobatic

When operated at a weight of 1050 pounds, the design is fully aerobatic to ?? G's positive and negative, ultimate strength is ?? G's. The roll rate is ???? degrees per second. However, the aircraft has no inverted fuel or oil systems and so inverted and sustained negative G maneuvers are no permitted.

ENGINE

The Jabiru 2200 engine is an 80 HP aviation engine manufactured in Australia and certified by the Australian Civil Aviation Safety Authority. The engine is a 4-cylinder 4-stroke horizontally opposed air-cooled engine. The engine is direct crankshaft driven and does not use a reduction gearbox. The crankshaft features a removable propeller flange, which enables the easy replacement of the front crankshaft seal and provides for a propeller shaft extension to be fitted, should this be required for particular applications.

The crankcase halves, cylinder, crankshaft, starter motor housings, gearbox cover (the gearbox powers the distributor rotors) and coil mounts together with many smaller components are machined using CNC machine tools. The sump (oil pan) is cast. The cylinders are machined from solid bar 4140 chrome molybdenum alloy steel, with the pistons running directly in the steel bores. The crankshaft is machined from solid bar 4140 chrome molybdenum alloy steel, the journals of which are precision ground prior to being Magnaflux inspected. Conrods are machined from 4130 alloy steel, the 45mm big end bearings are of the automotive slipper type.

Various components of the engines are sourced from Honda including camshaft followers, the Bendix gear in the starter motor and the ignition coils.

An integral alternator using rare earth magnets, provides alternating current for battery charging and electrical accessory drive. The alternator is attached to the flywheel and is driven directly by the crankshaft. The ignition system is a transistorised electronic system; two fixed coils mounted adjacent to the flywheel are energised by rare earth magnets attached to the flywheel. The passing of the coils by the magnets creates the high voltage current which is then transported by high tension leads to the center post of two automotive type distributors (which are simply rotors and caps) before distribution to automotive spark plugs, two in the top of each cylinder head. The ignition system is fixed timing and, therefore, removes the need for timing adjustment. It is suppressed to prevent radio interference. The ignition system is fully redundant, self-generating and does not depend on battery power.

The crankshaft is designed with a double bearing at the propeller flange end and a main bearing between each big end; it therefore does not have flying webs. 48mm main bearings are also of the automotive slipper type. Thrust bearings are located for and aft of the front double bearing allowing either tractor or pusher installation.

Pistons are General Motors aftermarket re-machined to include a piston pin circlip groove. They are fitted with 3 rings, the top rings being cast iron to complement the chrome molybdenum cylinder bores. Valves are 7mm (stem dia) which are purpose manufactured for the Jabiru engine.

The valve gear includes pushrods from the camshaft from the camshaft followers to valve rockers which are CNC machined from steel plate, induction hardened and polished on contact surfaces and mounted on a shaft through an aluminium bronze bush. Valve guides are manufactured from aluminium/bronze, as is found in larger aero engines and high performance racing engines. Replaceable valve seats are of nickel steel and are shrunk into the aluminium cylinder heads. The valve gear is lubricated from the oil gallery.

An internal gear pump, direct mounted on the camshaft and incorporating a small automotive spin-on filter, provides engine lubrication. An oil cooler adapter is provided.

The engine is fitted with a 1 kw starter motor, which is also manufactured by Jabiru and provides effective starting in all conditions. The engine has very low vibration levels, however it is also supported by four large rubber shock mounts attached to the engine mounts at the rear of the engine.

The fuel induction system comprises a BING pressure compensating carburetor. Following carburetion, the fuel/air mixture is transported to a small plenum chamber in the sump casting, in which the mixture is warmed prior to entering short induction tubes attached to the cylinder heads.

The engine is fitted with two RAMAIR cooling ducts, which have been developed by Jabiru to facilitate cooling using direct air from the propeller to the critical areas of the engine, particularly the cylinder heads and barrels.

A stainless steel exhaust and muffler system is fitted as standard equipment, and results in aircraft noise of approximately 62dB in a 1000' full power flyover.

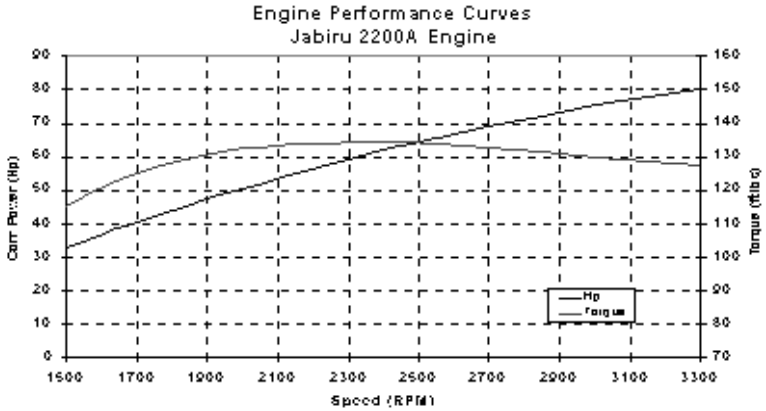
- ❑ 4 Stroke
- ❑ 4 Cylinder Horizontally Opposed
- ❑ 1 Central Camshaft
- ❑ Over Head Valves (OHV)
- ❑ Wet Sump Lubrication
- ❑ Dual Transistorized Magneto Ignition
- ❑ Electric Starter
- ❑ Push Rods
- ❑ Naturally Aspirated - Pressure Compensating
- ❑ 6 Bearing Crankshaft
- ❑ Ram Air Cooled
- ❑ Direct Propeller Drive
- ❑ Integrated AC Generator
- ❑ Mechanical Fuel Pump

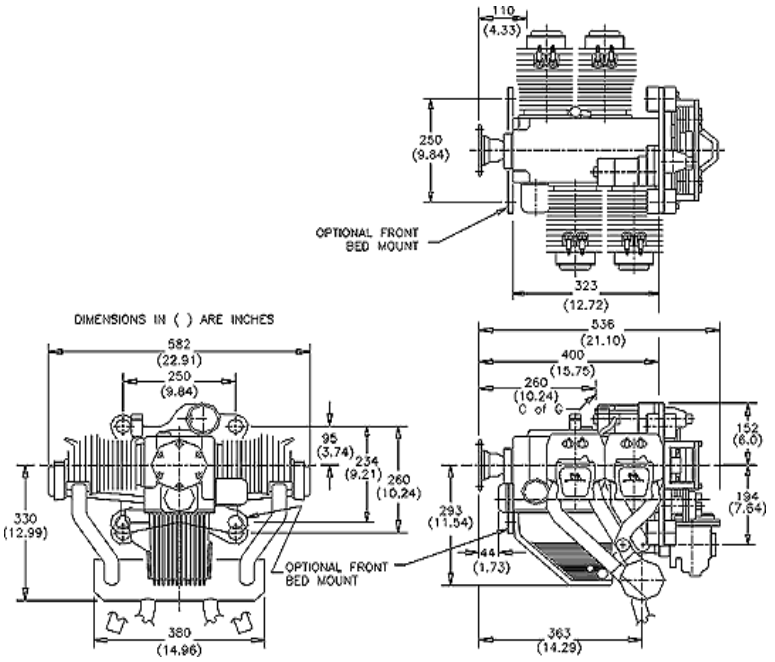
The engine is rated at 80 horsepower at 3200 RPM. Cylinders are numbered 1) right forward, 2) left forward, 3) right aft and 4) left aft. Each cylinder has a cylinder head temperature probe located under one of the two spark plugs in each cylinder. There are four exhaust gas temperature probes located in each exhaust pipes. The two transistorized magnetos are timed to fire at 25 degrees BTC. The timing is not adjustable.

The engine mount is of steel tube construction. Cooling air flows through the RAMAIR cylinder shrouds, over the cylinders and downward. Cooling air also flows through the converging space between the engine sump and oil cooler mounted below the sump.

Induction air is drawn through a hole in the lower cowling ahead of the left front cylinder through a combined alternate air box and air filter housing which is mounted on the firewall and into the carburetor. The alternate air may be manually selected by a push-pull control located in front of the instrument panel ahead of the pilot seat. Heated air enters the alternate air inlet from a shroud mounted behind the muffler.

Displacement	2210cc
Bore	97.5mm
Stroke	74mm
Compression Ratio	8.3
Rotation of Prop Shaft	Clockwise - Pilot's View – Tractor
Ramp Weight	60kg (132lb) inc. Exhaust, Carburetor, Starter Motor, Alternator & Ignition System & Accessory pack.
Ignition Timing	fixed @ 25° BTDC
Firing Order	1-3-2-4
DC Output	10amps - Single Phase
Power Rating	60kw (80hp) @ 3300rpm
Fuel Consumption	Cruse power 0.46 lbs per horsepower hour (274 grams/Kw-hour at cruse power.)
Fuel	AVGAS 100/130LL
Oil	AeroShell W100 or 15W50 or equivalent aircraft grade oil
Oil Capacity	2.3l (2.2 Quarts)
Oil filter	Ryco Z386 or FRAM PH4967
Spark Plugs	NGK D9EA – Automotive
CHT	Cruise 150°C / 300°F Climb 175°C / 350° F
EGT	Max (Climb) 750° C Normal (Cruise) 700 ° C
Oil Temp	Max 118°C / 244° F Continuous 100° C / 212° F
Oil Pressure	220 – 525 KPa / 31 – 76 PSI
Max RPM	3300
Idle RPM	900





CARBURETOR

The Bing pressure compensating carburetor is mounted at the rear of the engine. There is no mixture control and the carburetor automatically adjusts for altitude.

PROPELLER

The propeller is a 58 x 42" Jabiru fixed pitch wooden unit.

FUEL SYSTEM

The fuel system consists of a single wing tank located in the right hand wing with a vented fuel cap (and forward facing vent tube) running through a filter into a small header tank located behind the passenger seat. There is a quick drain valve at the bottom of the wing tank. Fuel is fed into the header tank through an inlet at its top. The header tank has a vent line with spring operated valve. This vent valve is depressed when the header tank is filled, and on a periodic basis to purge air from the header. There is a spring mounted fuel drain at the bottom of the header, exiting under the right side bottom of the fuselage. The fuel outlet is located several inches above the bottom of the header tank in order to trap water and debris. Fuel passes through a second filter under the seat and through an on-off valve mounted adjacent to the throttle control. From this valve, it passes through a fuel flow transducer and into the engine driven fuel pump. The fuel line then diverts into a main line into the carburetor and secondary line, which attaches to a fuel pressure transducer. In the case of a mechanical fuel pump failure, the system is will continue to feed due to gravity

The capacity of the fuel tank is 18 Gallons. At the inboard rib of the right wing is a clear fiberglass panel that displays the quantity of fuel remaining.

ELECTRICAL SYSTEM

A 12 volt, direct current system, supplies electrical power. The system includes a 12 volt 10 ampere alternator, regulator and 17 ampere hour battery to produce electrical power. The battery is located immediately behind the firewall.

The Rocky Mountains Engine Monitor indicates system voltage and amperage. A positive ammeter reading and a voltage between 13 and 14.5 volts indicate charging.

There is a single Master Switch located on the left half of the instrument panel, which energizes the master solenoid to provide power to the main bus and circuit breakers. There are five switches and six circuit breakers for lights, instruments and avionics. These switches control the aircraft [spare]; Transponder/Encoder/GPS; Radio; Strobe Light; [Position Lights]. Each circuit is protected by a circuit breaker. The sixth circuit breaker protects the Hobbs meter. The circuit breakers automatically break the electrical circuit if an overload should occur. To reset the circuit breaker simply push in the reset button. It may be necessary to allow approximately two minutes for cooling before resetting a circuit breaker. Corrective action should be taken in the event of continual circuit breaker popping or a circuit breaker that will not stay reset.

The magneto switches are located to the left of the master switch. The engine starter solenoid is located at the front of the firewall on the passenger side and is activated by a momentary push button switch.

PITOT and STATIC SYSTEM

Static air is provided from within the aircraft cabin. As such, it is sensitive to the effect of opening cabin cooling vents. Pitot pressure is supplied by the unheated pitot tube located under the left wing. Pitot pressure is provided to the airspeed indicator and static pressure is provided to the airspeed indicator, vertical speed indicator and encoding altimeter.

AVIONICS

An Icom A-22 is located centrally at the top front of the cabin and provided with power from the aircrafts electrical system. A spare battery should be carried to enable handheld operation. The radio has 720 communication channels (118.000 to 135.975) and a power output of ?? watts. The unit plugs into a Pilot intercom located centrally at the top rear of the cabin. The radio provides a basic CDI Navigation function with has ???? channels (108.00 to 117.95).

Up to 20 frequencies can be stored and the emergency frequency 121.?? can be obtained with a single button push. Frequencies are selected either directly using the front push button panel or by dialing the appropriate frequency using the knob located on the right top the unit. Memories can be scrolled and selected using the same controls. Volume and on/off is controlled using the knob located on the left top of the unit. A squelch knob is co-located with the volume control.

A 9 volt battery powers the intercom. It contains an on-off-volume knob and a squelch knob. Two headphone and mic jacks are available and a push to talk cable jack is also available. The associated push to talk buttons is on each pilot's control stick.

ENGINE MONITOR

The aircraft contains a Rocky Mountains Engine Monitor that displays a wide range of engine and other aircraft parameters. These include:

- CHT and EGT (cylinders 1-4 selected via rotary switch on the panel)
- Oil Temperature
- Fuel Pressure
- Outside Air Temperature (displayed in the MAP portion of the display)
- Clock – GMT/LMT/Flight Timer/Countdown Timer
- Oil Pressure
- Engine RPM
- Fuel consumption
- Fuel available

The operating controls are of two types, rotary switches and pushbutton switches. The power switch and the clock mode selector are rotary switches. The white pushbuttons are momentary switches that have to be held in to accomplish their function. The two yellow

pushbuttons are push-push switches that alternately lock in when pushed and then release when pushed again.

POWER (ROTARY) SWITCH

When the power switch is positioned at ON the unit is powered by the master bus. The monitor has a provision for an external gel-cell battery (which is not installed). The BAT position of the power switch is provided to power the unit be external battery, however, since no external battery is provided this position makes the unit inoperative.

CLOCK MODE (ROTARY) SWITCH

The clock mode switch selects which time related function is displayed in the clock portion of the display. The function selected can be changed using the setting pushbuttons as explained in the following sections.

GMT - When the clock mode switch is positioned to GMT, the clock portion of the display shows Greenwich Mean Time. The display is in a 24 hour mode and will roll over from 23 hours 59.9 minutes back to 0000.0. The smallest time division is one tenth of a minute, or six seconds. When the clock mode switch is in this position the [10] pushbutton will advance the hours and the [1] pushbutton will advance the minutes. If the [10] pushbutton is held down, the hours will continue to advance at a rate of one count per 1/2 second to the limit of 23 hours and then roll over to zero. If the [1] pushbutton is held down, the minutes will continue to advance at a rate of one count per ½ second to the limit of 59 minutes and then roll over to zero (does not increment hours). The tenths of minutes is reset to zero every time a one is added to the minutes. To accurately set the tenths, adjust the minutes using the [1] pushbutton until the minutes equal the reference clock minutes, then when the reference clock rolls over to the next minute, add a minute to the MONITOR. Adding the last minute will also reset the tenths to zero, which now matches the reference clock. No other pushbutton or pushbutton combination is effective in this mode. If the installation has provided for a direct connection to the aircraft battery for the internal clock, proper time will always be available.

LMT - When the clock mode switch is positioned to LMT, the clock portion of the display indicates Local Mean Time. The display is in a 24-hour mode and will roll over from 23 hours 59.9 minutes back to 0000.0. The smallest time division is one tenth of a minute, or six seconds. The computer only maintains one time... GMT. To display LMT the computer subtracts an hourly difference from GMT. When the clock mode switch is in this position, the [10] pushbutton changes this hourly difference. If the [10] pushbutton is held down, the hours will decrease at the rate of one count per 1/2 second until zero is reached and then roll under to 23 hours. No other pushbutton or pushbutton combination is effective in this mode. The hourly difference is stored in the nonvolatile memory of the unit.

TIMER - When the clock mode switch is positioned to TIMER, the clock portion of the display shows the value of the countdown timer. The display shows only minutes in the range of zero to 59.9. The smallest time division is one tenth of a minute, or six seconds.

Pressing [RST] stops the timer if it was running and resets it to 0.0.

Pressing [PRE] stops the timer and sets it to the preload value of 60 mins

Pressing [10] will add ten minutes to the value shown.

Pressing [l] will add one minute to the value shown.

Pressing [. l] will add 1/10 minute (6 seconds) to the value shown.

Holding down the [10], [l], or [. l] buttons will add it's respective value once every 1/2 second. Generally, it is usually best to reset the timer to zero by pressing [RST] and then setting the desired count down time with the [10], [1], and [0.1] pushbuttons.

Pressing the [START] combination starts the timer counting down. The timer won't change value for six seconds, so the audio emits a short beep to acknowledge that the computer received the start signal. When the timer reaches 0.0 the alarm will sound and the clock portion of the display will blink to indicate time-out. Then the timer will count up. Pressing the [SIL/V0LT] pushbutton will silence the alarm and stop the display from blinking but the timer will continue to run. Thereafter, every time the timer passes through zero (every hour) the alarm will sound, until the timer is stopped. When the timer reaches 0.0 the alarm will sound and the clock portion of the display will blink regardless where the clock mode switch is positioned.

The timer is intended primarily as an approach timer and a fuel tank change reminder. It can be used as an elapsed time clock (keeping in mind the 59.9 minute maximum and the alarm when the timer goes through 0.0). Set the start time to 0.0 using the [RST] pushbuttons and then start the timer. There is no provision for stopping the timer other than resetting back to 0.0, however. The timer value is stored in the nonvolatile memory on shutdown. However the computer flags that indicate that the timer is running and whether up or down are not stored. When the unit is turned back on, the timer value at tum-off is restored but the timer will be stopped. So if your using the timer for fuel tank changes and want to maintain the timing cycle after stopping for lunch, you merely switch the clock mode switch to TIMER and START the timer at takeoff.

FLG TIM SETTING - When the clock mode switch is positioned to FLG TIM, the clock portion of the display shows flight time. The display is in hours and 1/10's of hours and ranges from 0.0 to 25.5 hours. Pressing [RST] will reset the flight time readout to zero. The flight time clock only runs when there is oil pressure, which means the engine is running.

TACH/FUEL SETTING - When the clock mode switch is positioned at TACH/FUEL, the clock portion of the display shows tachometer hours. The display is in hours and 1/10's of hours and ranges from 0.0 to 6553.5 hours. The tachtime recorded is the same time based on RPM as shown on standard tachometers. No other pushbutton or pushbutton combination is effective in this mode.

When the clock mode switch is positioned at TACH/FUEL, the setting buttons are used to change the fuel quantity remaining since the tachometer hours are not changeable during normal operation The fuel remaining is displayed in the GAL section of the display when the [GPH] pushbutton is 'out'.

Pressing [RST] resets the fuel quantity to zero.

Pressing [PRE] sets the fuel quantity to the preload value which is set at 18 Gallons.

Pressing [10], [1] or [.1] will add that respective value of gallons to the value shown.

Holding down the [10], [l], or [. l] buttons will add it's value once every 1/2 second.

CAUTION: Pressing [10], [1] or [0.1] buttons while the clock mode switch is in the TACH/FUEL position will add to the value of the fuel quantity remaining even though the FUEL MODE switch is “in” and the fuel readout on the display is showing GPH. Always check the position of the clock mode switch before pressing any setting pushbuttons.

When the fuel quantity reaches the alarm value (3 GALLONS), the alarm will sound and the fuel portion of the display will blink to indicate low fuel (even if GPH is selected). The fuel portion of the display will blink even if the FUEL MODE switch is set to display GPH instead of fuel remaining. Pressing the [AUDIO SIL/VOLT] pushbutton will silence the audio. The display will continue to blink and will continue to indicate the correct fuel remaining.

Before engine start, the fuel quantity actually aboard the aircraft should be entered into the MONITOR. There are three different ways to enter the fuel amount. 1) If the actual amount of fuel in the aircraft is known by measurement or calculation, the fuel quantity remaining can be [RST] to zero and then changed to actual with the SETTING PUSHBUTTONS. 2) If the aircraft is partially refueled and the current quantity of fuel remaining is accurate, the amount delivered to the aircraft can be added to the current fuel quantity remaining. 3) If the tanks are topped off and the preload value is equal to the aircraft capacity, [PRE] can be pressed to change the fuel quantity remaining to indicate full tanks.

DISPLAYING ADDITIONAL FUNCTIONS

Pressing the [AUDIO SIL/VOLT] pushbutton displays the additional functions of VOLTAGE and ENDURANCE in place of other normal functions while the pushbutton is held in. When the pushbutton is released, the display will return to normal. The usual purpose of this pushbutton is to silence the audio alarm, but it also doubles for the following features:

Voltmeter - When the [SIL/VOLT] pushbutton is held in the GAL portion of the display changes to a readout of the system voltage with a resolution of 1/10 of a volt.

Endurance - When the [SIL/VOLT] pushbutton is held in, the clock portion of the display indicates the time to fuel exhaustion in hours and 1/10's. The endurance is calculated using the amount of fuel remaining and the fuel flow in gallons per hour - both of which can be displayed in the GAL portion of the display.

AUDIO (PUSHBUTTON) SWITCH

The MONITOR has both an audio and visual alarm indication for functions that are out of limits. The function that is out of limits will blink on the display, and an audio alarm will pulse. The audio alarm is a 90db+ unit mounted in the cockpit. The MONITOR also has a 600 ohm audio output for input to a headset or avionics mixer, however this output is not connected. The visual blinking will continue as long as the function is out of limits. The audio may be silenced by momentarily pressing the [AUDIO SIL/VOLT] button. Any further alarm conditions will again sound the audio. The [AUDIO OFF] pushbutton also disables the audio but has the feature of locking in. This pushbutton may be locked in before turning on the MONITOR and starting the engine because of the certainty of alarms before and during engine start. To reduce the possibility of an intermittent alarm, the unit will not activate the alarm for most functions unless the function has been continuously out of limits for 5 seconds.

FUEL MODE (PUSHBUTTON) SWITCH

The [GPH] pushbutton controls whether the fuel portion of the display shows GPH or fuel remaining. In the 'in' position the display will show gallons per hour, in the 'out' position the display will show fuel quantity remaining.

THE SETTING PUSHBUTTONS

The three setting pushbuttons change the current value of whatever mode is selected by the rotary CLOCK MODE switch. The pushbuttons are used singly or in various combinations to perform certain changes. The three pushbuttons are the ten [10], one [1], and tenth [0.1] buttons. The action performed by each depends on the mode selected and will be described in the instructions for each of the modes. The reset command [RST] can be activated by pushing both the [10] and [1] pushbuttons at the same time. The preload command [PRE] can be activated in the same manner by pushing the [1] and [0.1] buttons at the same time. The start command [START] is activated by pressing the [10] and [0.1] buttons at the same time.

ALARM and PRESET SETTINGS

The following alarm settings have been applied –

CHT	175 C
EGT	750 C
Oil Temp	?? C
Oil Pressure	??
RPM overspeed	??
Fuel Low	??

The following preset levels have been applies –

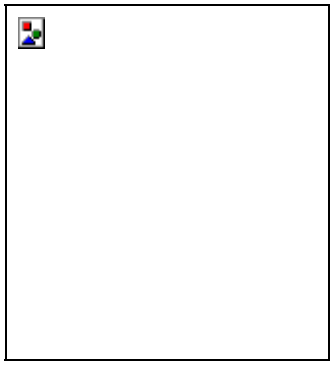
Timer	60 mins
Fuel	18 GALS

TRANSPONDER

The aircraft is equipped with a Microair Avionics T2000SFL transponder. Operation of the transponder is outlined below

CONTROLS -

1	ON Key
2	MODE Key
3	ENTER Key
4	IDENT Key
5	TOGGLE Key
6	CODE SELECT Knob
7	SELECTMODE Knob
8	VFR Key



TRANSPONDER OPERATION

The tranpsonder can be operated in the following modes:

ON Mode A where only the active code is sent

ALT Mode C where both the active code and altitude is sent

If requested by ATC the user can squawk ident (ID Key). The display can present the active and standby codes. The standby code can be changed at any time and then toggled to become the active code. The T2000 can replace the standby code in the display with the encoder altitude or supply voltage. The SFL is a dual line display of 8 characters each, with the active code on the top line, and the standby code on the bottom. The display is LCD, with preset backlighting.

When the altitude is displayed, the standby code is saved into memory. To display the standby code again, press the toggle key once to make it appear on the bottom line. Press the toggle key again to exchange the active and standby codes. After 10 seconds of inactivity, the lower line will revert to displaying the altitude. Pressure Altitude (PA) is the Encoder altitude. The encoder's barometric adjustment is preset to 1013 millibars (29.92HG). If the Encoder is not powered or not fitted, the message NO ALT will appear on the display. It is possible to input the QNH/Baro (barometric pressure) given by ATC, into the T2000 to adjust the displayed pressure altitude. This feature will allow the user to adjust the displayed altitude to read the same as the aircraft's altimeter. The T2000 will transmit the encoder altitude (pressure altitude) only, in accordance with normal mode C operation. The adjusted QNH/Baro altitude is never transmitted.

ON KEY

TURNING ON The T2000 is turned on by pressing the ON key. The T2000 will go through a start up routine displaying self-test messages, and ending with the operational display.

BACKLIGHTING The T2000SFL has an LCD display which is backlit. The backlighting has a low and a high brightness level to enhance the display in low light conditions. When the T2000 is first turned on there is no backlighting. Pressing the ON key multiple times cycles through the low level backlighting to high level backlighting to no backlighting

TURNING OFF The T2000 is turned off by holding down the ON Key. The word SHUT DOWN is displayed and the T2000 counts down from 3, then turns off. If the ON Key is lifted before the count is finished, the T2000 returns to the operational screen.

MODE KEY

The MODE key can be used to access two separate menus:

- If the transponder is turned OFF, by holding down the MODE key, and pressing the ON key the T2000 will start in PROGRAM MODE. The MODE key must be held down, until the start-up self-test messages have been displayed.
- If the transponder is ON and in normal operation, press the MODE key to access the MODE MENU The first item of the MODE MENU is displayed. Step through the MODE MENU by pressing the MODE key after the last menu item the T2000 returns to the operational display currently in use.

The MODE MENU is designed to allow the operator fast easy access to functions and parameters which may need to be adjusted in flight. Use MODE KEY to step though options. Use the TOGGLE KEY to return to the operational display at any time.

QNH or Baro	The altitude encoder outputs a pressure altitude fixed at an above mean sea level (AMSL) pressure of 1013mb or 29.92 HG. QNH/Baro can be entered to allow the T2000 to compensate the displayed altitude for surface pressure and hence read the same as the aircrafts altimeter. If the QNH/Baro, is set to a discrete value (normally provided by ATC) the encoder pressure altitude displayed will be adjusted for that QNH/Baro value. The barometric units are set in the BARO option of the PROGRAM MODE. When MB is selected the QNH screen is displayed, and when HG is selected the BARO screen is displayed. Press MODE key (once) to select QNH/Baro option Rotate CODE SELECT knob and scroll lower line to desired pressure. Press knob to move one place to left Press ENTER key to set default value (1013mb or 29.92HG)
Assigned (Altitude)	The user can input an assigned altitude given by ATC. When used with the altitude buffer value, an audio alert and display indicator advises when the aircraft has climbed or descended from the assigned altitude. When the Altitude option of the mode menu is set to Feet or Flight Level, the Assigned altitude is adjusted in feet. When the Altitude option of the mode menu is set to Metres, the Assigned altitude is adjusted in Metres. Press MODE key (2 times) to select Assigned option Press CODE SELECT knob to increment in units of 500 feet/100m Rotate CODE SELECT knob to increment in units of 100 feet/10m Press the ENTER key to return ASSIGNED ALTITUDE to 0 Press the TOGGLE key to save and return to operational display.

Buffer Altitude	The user can input a buffer altitude, above and below the assigned altitude, to define a height band in which to fly. When the aircraft exceeds the upper or lower limit, an indicator alert message will be displayed. The alert message advises the pilot of how far, above or below the assigned altitude the aircraft is. If the Alert Tone function is ON, an audio tone is heard as well. If the ALTITUDE option in the PROGRAM MODE is set to FEET or FL, the Buffer Alt increments are in feet. If ALTITUDE is set to METRES, the Buffer Alt increments are in metres. Press MODE key (3 times) to select Buffer Alt option Press CODE SELECT knob tn increment in units of 500 feet/100m Rotate CODE SELECT knob to increment in units of 100 feet/10m Press ENTER key to return display to current operational display For example, with the Assigned altitude set at 3500 feet, and the Buffer All set at 200 feet, the display alerts will occur over 3700 feet and under 3300 feet. If the aircraft climbs or descends outside the altitude buffer limits, a Hi / Lo warning is displayed on the lower line.
Altitude	The altitude data can be displayed as feet, flight level, or metres. Once the Altitude units are set, all altitude data is displayed in these units. The options are: F = FEET FL=FLIGHT LEVEL M = METRES The only exception is when the Altitude is set to FL, the Buffer Alt is still displayed and set in FEET. Press MODE key (4 times) to select Altitude option Rotate CODE SELECT knob and scroll to select desired units.
Voltage	The VOLTAGE function will display the aircraft's supply voltage, and rotating the CODE SELECT knob, display the over/under voltage alerts. Press MODE key (5 times) to select VOLTAGE option Rotate CODE SELECT knob aircraft volt is displayed Rotate CODE SELECT knob to display high set point Rotate CODE SELECT knob to display low set point Rotate CODE SELECT knob to display receive signal strength Rotate CODE SELECT knob to return display to input voltage When the transponder is operating in normal display operation mode, the over and under input voltage alert message is displayed on the lower line.
Alert Tone	The Alert Tone function is used by the T2000's altitude alert function. When set ON, the Alert can be heard from either the cabin speaker, or through the headphones, when amplified through an audio panel. Press MODE key (6 times) to select Alert Tone option Rotate CODE SELECT knob scroll lower line to select ON or OFF. The default is ON

ENTER KEY

The ENTER key is a confirmation key used to confirm information the user has input. After pressing the ENTER key, the display will typically give the message SAVED for a short period.

TOGGLE KEY

This key acts as a TOGGLE switch, exchanging the active and standby codes. When the transponder is operating in DISPLAY ALT the bottom line displays the Encoder altitude instead of the standby code. To toggle the active and standby codes in this mode, push the TOGGLE key once to display the standby code on the bottom line. The standby code is displayed for 10 seconds. Push the TOGGLE key again to exchange the active and standby codes. Once the codes have been exchanged, the display will revert back after 10 seconds to displaying altitude on the bottom line.

VFR – HOT KEY

THE VFR key will default the standby code (1200) .immediately to the stored VFR code. To transfer the VFR code to the active position, press the TOGGLE key. If no code is entered, after 10 seconds idle the standby position will revert back to the original VFR code.

ID KEY

The ID key (IDENT) sends additional code information to the transmission for ATC.

SELECTMODE KNOB

The SELECTMODE knob switches the transponder between the 4 operating modes

STANDBY	In standby the transponder is powered up, but will not transmit. *On the active display line the letter S appears on the left hand side.*
ON	Will reply to Mode A and C interrogations, but with no mode C encoder information. *On the active display line the letter A appears on the left hand side.*
ALT	Will reply to Mode A and C interrogations, with the mode C encoder information. *On the active display line the letter C appears on the left hand side.*
ALT DISPLAY	The standby code is replaced with the encoder altitude. If the pressure has been set via the QNH/Baro option of MODE MENU, the displayed altitude will be adjusted for barometric air pressure. Altitude will be displayed in units set in ALTITUDE option of MODE MENU. The DISPLAYALT only displays altitude if a valid encoder input is received. *On the active display line the letter C appears on the left hand side.*

CODE SELECT Knob

The CODE SELECT knob can be rotated clockwise to scroll upwards, and counter-clockwise to scroll downwards. Each digit of the code is adjusted separately. The adjust function starts with the left hand digit, and is moved across to the next digit by pushing the CODE SELECT knob inwards. After 10 seconds of inactivity the cursor will revert to the left hand digit.

8. FORMS

OIL CONSUMPTION LOG - N97HD

DATE	HOBBS	QTS. ADDED

SQUAWK and OPEN ITEMS LIST - N97HD

DATE	HOBBS	ITEM	CLEARED

9. CENTIGRADE TO FAHRENHEIT CONVERSION

°C to °F
(°C x 9/5)+32 = °F

°F to °C
(°F-32)/(9/5) = °C

°C	°F
-40	-40
-30	-22
-20	- 4
-10	14

0=32	100=212	200=392	300=572	400=752	600=1112	800=1472
10=50	110=230	210=410	310=590	420=788	620=1148	820=1508
20=68	120=248	220=428	320=608	440=824	640=1184	840=1544
30=86	130=266	230=446	330=626	460=860	660=1220	860=1580
40=104	140=284	240=464	340=644	480=896	680=1256	880=1616
50=122	150=302	250=482	350=662	500=932	700=1292	900=1652
60=140	160=320	260=500	360=680	520=968	720=1328	920=1688
70=158	170=338	270=518	370=698	540=1004	740=1364	940=1724
80=176	180=356	280=536	380=716	560=1040	760=1400	960=1760
90=194	190=374	290=554	390=734	580=1076	780=1436	980=1832

10. WEIGHT AND BALANCE

Avid Aircraft MK IV Weight and Balance Calculations

Gross Weight **1050** **Lbs.**
CG Limits Forward- **11.19** Aft- **16.5**

EMPTY WEIGHT		**Weight**		**Arm**		**Moment**		**CG**
Left Wheel		203		20.50		4161.50		
Right Wheel		210		20.50		4305.00		
Nose Wheel		161		-19.00		-3059.00		
Ballast		2		113		226.00		
		576				5633.50		**9.78**

Most Forward CG		**Weight**		**Arm**		**Moment**		**CG**
Aircraft		576		9.78		5633.50		
Pilot		170		16.00		2720.00		
Fuel	0.5	3		15.00		45.00		
		749				8398.50		**11.21**

Most Aft CG		**Weight**		**Arm**		**Moment**		**CG**
Aircraft		576		9.78		5633.50		
Pilot		170		16.00		2720.00		
Passenger		170		16.00		2720.00		
Fuel 17.5 Gal	17.5	105		15.00		1575.00		
Baggage		30		57.00		1710.00		
		1051				14358.50		**13.66**

Real Life CG Calculations

		Weight		**Arm**		**Moment**		**CG**
Aircraft		576		9.78		5633.50		
Pilot		170		16.00		2720.00		
Passenger				16.00		0.00		
Fuel:	9	54		15.00		810.00		
Baggage				57.00		0.00		
		800				9163.50		**11.45**