KIS4 Cruiser

AIRPLANE MANUAL

N819PR

S/N 4052

www.puertoricoflyer.com

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1. GENERAL

The KIS TR-4 Cruiser is a four seat low wing monoplane of composite fiberglass and carbon fiber construction. It has a fixed landing gear, fixed pitch propeller and a normally aspirated 180 horsepower engine. It is equipped for day, night and IFR flight.

OVERALL DIMENSIONS

Length	25.46 ft. (7.7m)
Wing Span	29 ft. (8.8m)
Height (Top of tail)	7.5 ft. (2.3m)
Height (Top of cockpit)	6.23 ft.(1.9m)

FUSELAGE DIMENSIONS

Frontal Area	10.02 sq. ft
Cockpit Width:	
Front Seats	44 in
Rear seats	42 in
Cockpit Height	46 in
Cockpit Length	78 in

WING DIMENSIONS

Wing Area	135 sq. ft
Chord	56 in
Aspect Ratio	7.2
Spar Locations	28% & 71% of chord
Airfoil	NACA 63_2-215
Dihedral (per panel)	2.5 degrees
Tip Wash Out	0 degrees
Wing Loading	18.5 lbs/sq ft

FLAPS

Type	Plain
Area/Wing	15%
Length (Each)	90 in
Chord	14 in @ 28%

TAIL DIMENSIONS

Horizontal Tail Span	8 ft 9 in (2.7 m)
Horz. Tail Chord	3.08 ft (.9 m)
Horz. Stab. Mean Chord	2.83 ft. (.85m)
Elevator Mean Chord	1.21 ft. (.37 cm)
Horz. Tail Area	19.3 sq.ft.
Horz. Tail Aspect Ratio	3.5
Horz. Tail Thickness	12 %
Vertical Tail Height	5.91 sq. ft.
Vertical Tail Mean Chord	2.35 ft.
Dorsal Fin	.033 x 2.5 ft.
Vertical Fin Thickness	10 %

CONTROL MOVEMENT

Elevator	+22 -17 degrees
Ailerons	+11 -10 degrees
Rudder	L 15 - R 18 degrees
Flaps	0 / 12 / 24 degrees

PLACARDED IAS LIMITS

Green Arc	50 to 143 Kts
Yellow Arc	143 to 188 Kts
White Arc	40 to 96 Kts
Red Line	188 Kts

LIMITATIONS

Limit Load Factor	+4.0 G
Design Limit Load Factor	-2.2 G
Va	126 Kts
Vfe	96 Kts
Vne	188 Kts

POWER PLANT

Type	Lycoming O-360 A4M
Serial No.	L-36720-36A
Horsepower	180 HP
Max RPM	2700
Fuel grade	100LL/100VLL/B91/115/UL91/91UL/96UL/93MOGAS*/EN 228-NB.3* ***=MOGAS MUST NOT CONTAIN ETHANOL**
Weight	295lbs

PROPELLER

Manufacturer:	CATTO
Model:	3-B, 68 in. Dia, Pitch 67 in.
SN:	08143625
Type:	3 Blade Composite, Fixed Pitch, Torque 40lbs, 7” crush plate

MAIN LANDING GEAR

Type	Single spring aluminum – fixed
Main Wheels	Two Piece fixed Alloy Aluminum
Tires	McCreary 15X6.00-6 (6 Ply) Inflate to 50psi (345 Kpa)
	Brakes MATCO – separate hydraulic systems for each wheel. Each pedal is a slave cylinder (MC-4A) with a reservoir on the front upper right of the firewall. The fluid goes from the reservoir to a tee which separates flow to the individual slave cylinders on the co-pilot side, continuing to the pilot side slave cylinders and then to the individual wheel. Toe Actuated Disk / Caliper Hyd.Piston

NOSE LANDING GEAR

Type	4130 steel castoring type with integral shock absorber and springs
Nose Wheel	Goodyear Flight Custom III 5.00-5 (6 Ply) Inflate to 25psi

PERFORMANCE

Top Speed (sea level)	178 Kts
Cruise Speed (75% sea level)	142 Kts
Stall Speed (No Flaps)	55 Kts
Stall Speed (Full Flaps)	50 Kts
Range with IFR reserve	1300 Nm
Rate of climb (S/L average)	1200 fpm
Take off roll	1100 ft (303m)
(Over 50 ft obstacle)	1300 ft (363 m)
Landing roll	1300 ft (394 m)
Absolute Ceiling	21,000 ft
Vx	80 Kts
Vy	90 Kts
Vfe	96 Kts
Vglide	85 Kts
Glide Ratio	1700ft/Nm

ENGINE SETTINGS

Best Power	100 degrees F rich of peak EGT
Best Economy	50 degrees F lean of peak EGT
CHT Temperature Range	150 - 400 degrees F
CHT Never Exceed	500 degrees F
EGT Temperature Range	1100 – 1450 degrees F
EGT Never Exceed	1600 degrees F
Oil Temperature Range	170 – 245 degrees F
Oil Never Exceed	250 degrees F

AIRCRAFT WEIGHTS

Max Gross Weight	2500lbs
Max Landing Weight	2300Lbs
Basic Empty Weight	1393lbs
Useful Load	1107lbs
Fuel Capacity	552lbs (92 Gal)
Max Baggage	65lbs

GENERAL MANEUVERS

This aircraft is designed to operate in NORMAL category. Design load factor is 4.0G positive and 2.2G negative. This category is applicable to airplanes intended for non-aerobatic operations. Maximum number of occupants is 4, and maximum gross take-off weight, with full fuel tanks (552Lbs) is 2500lbs. The maximum landing weight of the aircraft is 2300lbs.

Airspeed limitations

Never exceed (Vne): 188 kts (216 mph)
Maximum Flap Speed (Vfe): 96 kts (110 mph)

Maneuvering speed (Va): 126 Kts (145 mph)
Stall speed – no flaps: 55 Kts (63 mph)
Stall speed – full flaps: 50 Kts (56 mph)
Airspeed indicator markings
Green arc: 50 to 143 kts (45 to 164 mph)
Yellow arc: 143 to 188 kts (164 to 216 mph)
White arc: 50 to 96 kts (42 to 110 mph)
Red line: 188 kts (216 mph)

Engine operation limitations

Rated Maximum continuous operation	180 HP @ 2700 RPM
Recommended Max: For Cruising (75%)	135 HP @ 2450 RPM
Economy Cruise (65%)	117 HP @ 2350 RPM
Recommended Min for Idle:	725RPM
Maximum Take-off Full Throttle:	2700RPM
Maximum Continuous Full Throttle:	2700RPM

Oil Sump capacity: 9 Quarts
Normal capacity: 6 - 7 Quarts
Oil Pressure:
Idle, minimum 25 psi
Normal operation 55 to 95 psi
Maximum: 115 psi
Oil Temperature:
Normal: 180F – 245F (OAT above 30degrees F)
Minimum for Take-off 120F
Maximum allowable 245F (OAT above 30degrees F)
Cylinder Head Temperature:
Normal range: 200F – 400F
Minimum for Take-off 200 F
Maximum allowable 500 F
Fuel Pressure:
Max: 8.0psi
Normal: 3.0psi
Min: 0.5psi
EGT:
Best Power Cruise: (75% power max) 100F rich of peak EGT
Best Economy: (65% power max) 50F lean of peak EGT
Normal range: 1300F – 1500F
Maximum allowable 1500 F
Ignition spark advance: Variable

Weight and Balance limitations

Station Zero: Forward face of the firewall
Leading edge of the wing: STA 31.0” aft
Max forward c.g: STA 38.8” (14% of chord)
Max aft c.g: STA 46.1” (27% of chord)
Front Seat c.g: STA 43.0”
Rear Seats c.g: STA 78.0”
Fuel Tanks c.g: STA 48.1”

Baggage c.g: STA 98.0”

Cockpit Placards

The following placard is in full view on the instrument panel:

WARNING AMATEUR-BUILT-AIRCRAFT

This aircraft is not required to comply with all the safety regulations for type certified aircraft (It exceeds them). To be operated for sport or recreational purposes only. You fly in this aircraft at your own risk.

The following placard is in full view in 2” letters at each door:

EXPERIMENTAL

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2. TECHNICAL DATA

ENGINE

Type: Lycoming O-360 A4M
Serial No.: L-36720-36A
Rated Horsepower: 180 HP @ 2700 RPM
Oil cooler: Positech 4211
Oil Heater: Padheater 120v
Remote Oil Filter: Champion CH 48103-1
Electronic Fuel Boost Pump: Facet 40108
Mechanical Fuel pump: LW15472-0499A, SN: 05N017
Spark plugs: NGKBR8ES or NGKBR8EIX
Magneto (left): E-Mag P-114, Serial No. 2927 (1T, 2B, 3T, 4B)
Magneto (right): E-Mag P-114, Serial No. 2928 (1B, 2T, 3B, 4T)
Starter: KELLY AEROSPACE SRZ-9021 (MZ-4222), Serial No.K041060
Carburetor: Marvel-Schebler MA-4-5 PN:10-4164-1 SN: K58213
Carburetor Air Filter: Brackett BA 4108

PROPELLER

Manufacturer:	CATTO
Model:	3-B, 68 in. Dia, Pitch 67 in.
SN:	08143625
Type:	3 Blade Composite, Fixed Pitch

Diameter: 68 in. Pitch: 67”

LANDING GEAR / BRAKES / TIRES

Main landing gear: Single spring aluminum – fixed
Nose gear: 4130 steel castoring type with integral shock absorber and springs
Main tires: McCreary 15 X 6.00 – 6 (6 Ply) Inflate to 50psi
Nose tire: Goodyear Flight Custom III 5.00-5 (6 Ply) Inflate to 25psi
Brakes: MATCO – separate hydraulic systems for each wheel. A common reservoir is located in the engine bay on the top right of the firewall.

QUANTITIES – FUEL AND OIL

Fuel: 46.5 gallons (174.1 liters) in each wing tank. 93 gallons in total
92 gallons usable (340.6 liters) Use 100LL or UL91 **(DO NOT USE FUEL WITH ETHANOL)**
Oil: 9 U.S. quarts maximum, 6 - 8 quarts normal.
Use Shell Straight 100 for first 25 hours and Multi-grade after run-in

FUEL SYSTEM

The KIS-4 uses a “wet wing” design with the fuel tanks integrated into the wing structure. **DO NOT USE FUEL WITH ETHANOL.** Fuel is gravity fed and tapped off the lower edge of the R & L fuel tank just forward of the main spar at the wing root through a finger screen with a vent in each tank. A 3/8” rubber hose connects to a bulkhead fitting in the fuselage just aft of the aileron push rod. A 3/8” aluminum tube connects and runs slightly upward to a selector valve in the console. This valve allows fuel to be drawn from either tank or be closed. From the selector

valve the fuel flows through a 3/8" flexible hose to an Electronics International FT-60 Transducer (Red Cube SN 124925) then through a 3/8" aluminum tube to the firewall. The fuel continues through the firewall to a Facet electronic fuel pump and to a gascolator attached to the forward face of the firewall. The fuel pump is operated by the three position toggle switch on the pilot/co-pilot control sticks. The down position is not used, the middle position is OFF while the top position is ON. The electronic fuel pump is normally used only for priming and emergencies but can be run continuously.

The 1/8" copper primer line connects from the top of the gascolator to a solenoid valve operated by the blue primer switch on the instrument panel. The primer cannot be operated when the fuel pump is OFF. Fuel pressure is monitored by fire sleeved tubing from the carburetor to a sensor located on the forward face of the firewall.

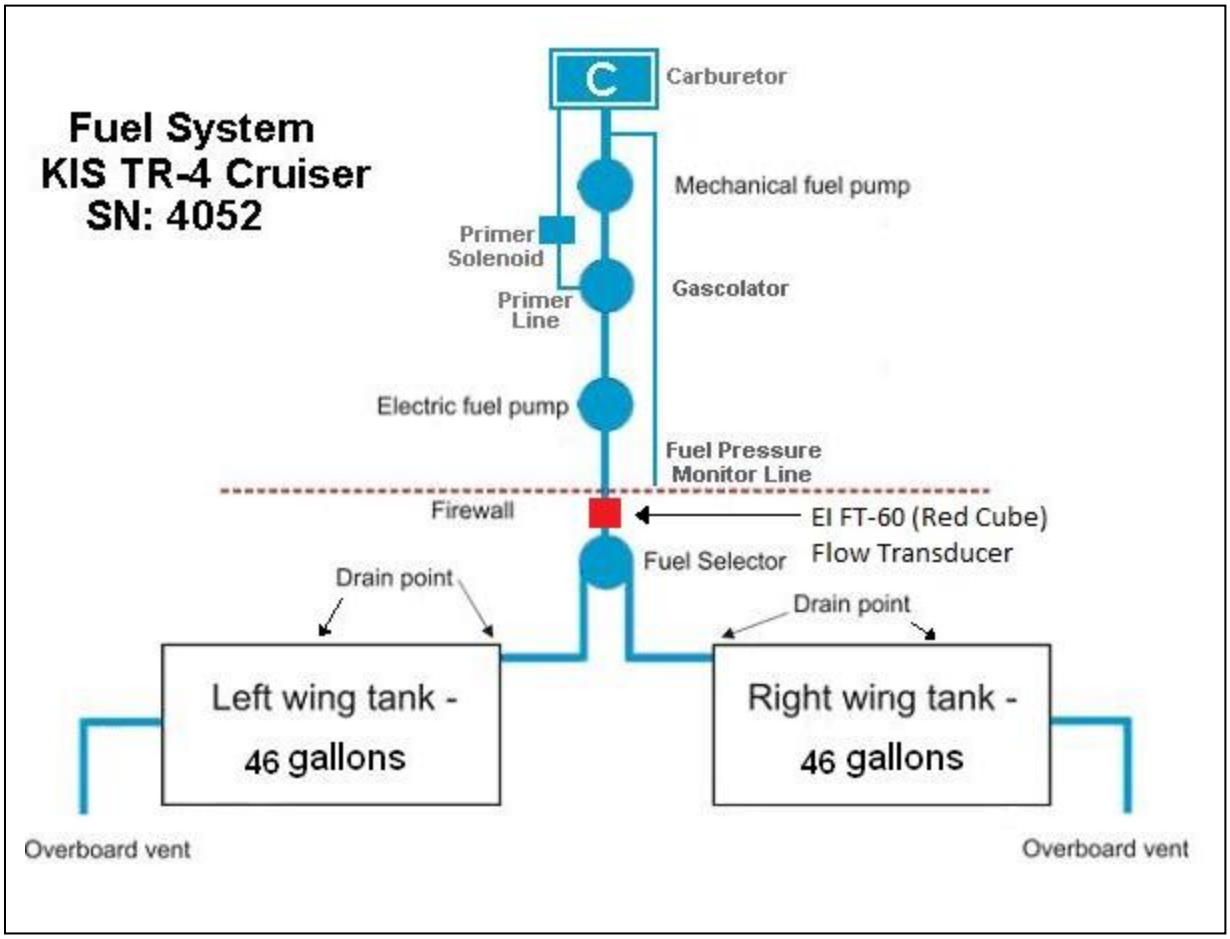

Figure #1 – Fuel System

FUEL GAUGES

The fuel gauges indicate the amount of fuel in each tank as provided by sensors within each wing tank. These sensors only indicate an approximate amount of fuel while in level flight and do not indicate an actual amount.

CONTROL SYSTEMS

All control surfaces are 100% balanced with counterbalance weights, with the exception of the flaps. They are all attached to their respective flying surfaces by aluminum piano hinges.

The rudder pedals are connected to a bell crank at the Station 189 bulkhead by stainless steel cables, and activate the rudder via a push rod connected to one side of the bell crank. The tension on the rudder pedal cables is maintained by a flat spring steel strip fastened to the rudder bar arm by an eye bolt and then turned back under the rudder bar. The rudder pedals are semi-fixed and cannot be adjusted in flight.

Elevator and aileron control is via push/pull tubes and bell cranks, operated from the control stick.

A "hand-lever" situated between the front seats manually activates the flaps. 1st detent = 12 degrees, 2nd detent = 24 degrees.

Control Movements:

Elevator	+22 -17 degrees
Ailerons	+11 -10 degrees
Rudder	L 15 - R 18 degrees
Flaps	0 / 12 / 24 degrees

ELECTRICAL SYSTEM

Battery: Concord 25XC sealed recombinant type - under the co-pilot seat. 12v, 26Ah
Alternator: ESI 32B19549 Serial No. 9020550 (70 Amps)
TJN80 extremely fast acting 80A fuse
Voltage regulator**:** B & C Specialty Products LR-3B
Electrical Noise Suppressors:

- Ameri-King AK-950-FTR SN: 507415 - on the engine side of the firewall.
- Smoothie Brickwall Active Noise Filter – on top of the Avionics stack.
- Alternator Capacitance Filter - on the engine side of the firewall.

Avionics Relays: RAYELEC L-44, 12v/40A – behind the instrument panel, Co-Pilot side.

The electrical circuits are controlled by a two position Master/Alternator switch on the pilot side of the instrument panel. The Master side of a two position switch places a ground signal on the master solenoid control terminal energizing the system. When energized, the master solenoid connects the battery +12v DC directly to the starter solenoid and to the main equipment bus through a TJN80 extremely fast acting 80A fuse, an Ameri-King AK-950-FTR filter and a DC Ammeter shunt, all located on the engine side of the firewall. Aircraft electrical load is monitored via a 50A Hall Effect Sensor (CS-02) connected to the DYNON EMS module.

The ESI 70A alternator connects to the electrical circuits through the Ameri-King AK-950 FTR filter. The B&C LR-3B voltage regulator controls the alternator output when the

ALTERNATOR side of the two position Master/Alternator switch is energized. This proves +12v DC to pin #6 (BUS) of the LR-3B regulator located on the engine side of the firewall. A 120VAC/150W inverter is connected to the battery via a 15A in-line fuse.

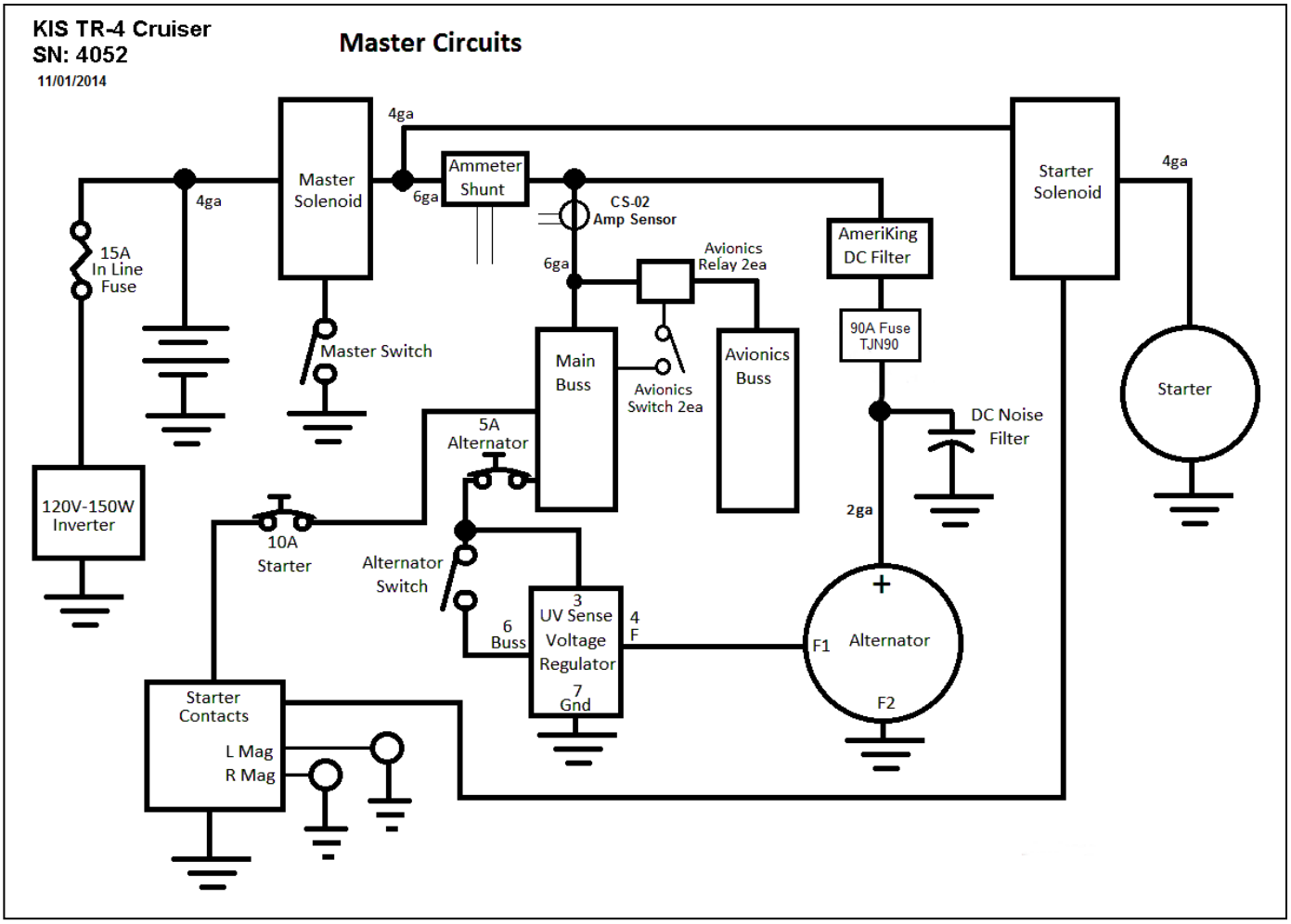

Figure #2 – Electrical System

The AVIONICS BUS connects to the MAIN BUS through two RAYELEC L-44, 12v 40amp relays each controlled by individual GREEN AVIONICS switches on the instrument panel. When either of the two GREEN Avionics switches are activated, +12v DC is applied to one of the RAYELEC Avionics Bus relays energizing the AVIONICS BUS. For redundancy, one GREEN Avionics switch is powered by the TRIM Circuit Breaker while the other GREEN Avionics Switch is powered by the STARTER Circuit Breaker. Either Avionics switch/RAYELEC combination will provide power to the AVIONICS BUS.

The AVIONICS BUS consists of an aluminum bar connecting 6 KLIXON 7277 circuit breakers just above the MAIN BUS circuit breaker location. The circuit breakers are labeled "AVIONICS BUS" on the top, while the bottom contains the individual circuit being protected.

CB	Name	Amps	MAIN BUS
1	TRIM	5	Trim control board and GREEN Avionics Switch #1
2	AUTO PILOT	10	TRIO Autopilot/Alt Hold and DYNON D6
3	EFIS	10	DYNON SkyView and Garmin AERA GPS

4	PITOT	10	BLUE Pitot Heat Switch
5	BEAC/LAND/REC	5	GREEN Beacon, YELLOW Landing & Recognition Switches
6	NAV	5	YELLOW NAV and Position Switches
7	FUEL PUMP	10	Fuel Pump Switch on Control Sticks
8	L – MAG	5	Right Magneto Power
9	R – MAG	5	Right Magneto Power
10	ALTERNATOR	5	Alternator Switch and Voltage Regulator Pin #3 (BUS)
11	STARTER	5	Starter Switch, BLUE Defrost Switch and GREEN Avionics Switch #2
12	12v AUX PWR	15	1ea 12V AUX PWR receptacle, 1ea Dual 5v USB Charger Port
			AVIONICS BUS
13	COM1	10	Garmin 430W Transceiver
14	COM2	10	Icom A210 Transceiver
15	GPS	5	Garmin 430W GPS
16	AUDIO/NAV	5	Smoothie DC Filter, VAL INS-429, Garmin G340, CO2 Detector
17	XPONDER	5	SkyView Transponder
18	ADSB / WX	5	SkyView ADS-B Module

Table # 1 – Circuit Breaker Panel

WING ROOT ELECTRICAL CONNECTORS

Wing Lights (L & R)

Pin #	Name	Wire
1	Position +12v	18 AWG
2	Position & Vent -12v	18 AWG
3	Landing +12v	18 AWG
4	Recognition +12v	18 AWG
5	Taxi and Recognition -12v	14 AWG
6		

Right Wing – Trim Servo

Pin #	Wire	
1	White	SERVO DC
2	White	SERVO DC
3	Blue	Trim Position
4	Green	Trim Position
5	Orange	Trim Position

Left Wing – Pitot Heat

Pin #		Wire
1	12v Positive	14 AWG
2	12v Ground	14 AWG
3	Pitot Heat Status	20 AWG

Wing Root Molex Connectors		
Pin 1		Pitot Heat ground (left wing only)
Pin 2		Nav. Lights ground
Pin 3		Fuel senders ground
Pin 4		Landing lights ground
Pin 5		-
Pin 6		-
Pin 7		Signal from fuel senders
Pin 8		Filler cap
Pin 9		Pitot Heat – positive (left wing only)
Pin 10		Nav. Lights – positive
Pin 11		Fuel senders – positive
Pin 12		Landing lights - positive

Table # 2 – Wiring Pin Configurations

*See Attachment K for wiring terminal board interconnectivity.

AVIONICS

Nav/Com: Garmin 430W s/n 23424266 (5.00 Main Software – 5.0 GPS Software)
Comm ICom IC-A210 s/n 2504099
Nav Indicator: VAL INS-429 s/n 001049
Audio Panel: Garmin 340 s/n 96292885
Transponder: DYNON SV-Xponder-261 s/n 00409
Transponder Antenna: AAE L-2 s/n 40241
ADSB: DYNON SV-ADSB-470 s/n 1314
ADS-B Antenna: AAE L-2 s/n XXXXX
ARINC-429: DYNON SV-ARINC s/n 1670
Trio EZ Pilot Autopilot: s/n 376
Trio Altitude Hold s/n 0655-1
G.P.S: Garmin AERA 500 s/n 1QN013170
Emergency Locator Transmitter: ACR Electronics Artex ELT-345 SN: 370824-024
15 Digit HEX ID: 2DC88 59758 FFBFF
Country: USA, 3-digit code: (366)

AVIONICS INTERCONNECTIVITY

Avionics interconnectivity is accomplished using a Fast Stack Avionics hub located inside the cockpit mounted on the co-pilot side of the firewall. All avionics and the Skyview EFIS modules plug in to the hub. See Attachment J for interconnectivity diagram details.

ANTENNAS

The aircraft radio, transponder and ADSB antennas are located internally and bonded to the aircraft structure behind the rear bulkhead. The Marker Beacon antenna is bonded to the bottom of the aircraft structure. Four Navigation antennas are bonded to the aircraft structure, 2 in each wing. An ELT antenna is located on the back part of the rear bulkhead divider. Both GPS antennas are located underneath the front glare shield. See attachment H for details.

INSTRUMENTS

Pilot DYNON SkyView, D700, SN: 1516
Co-Pilot DYNON SkyView, D700, SN: 2467
DYNON Engine Monitoring Module, SN: 2486
DYNON D-6 EFIS, PN: 101222-000, SN: 1519
DYNON SV-ADAHRS-200 SN: 2673
Elevator Trim Indicator N/A
Aileron Trim Indicator N/A
CO2 Guardian 353P-101

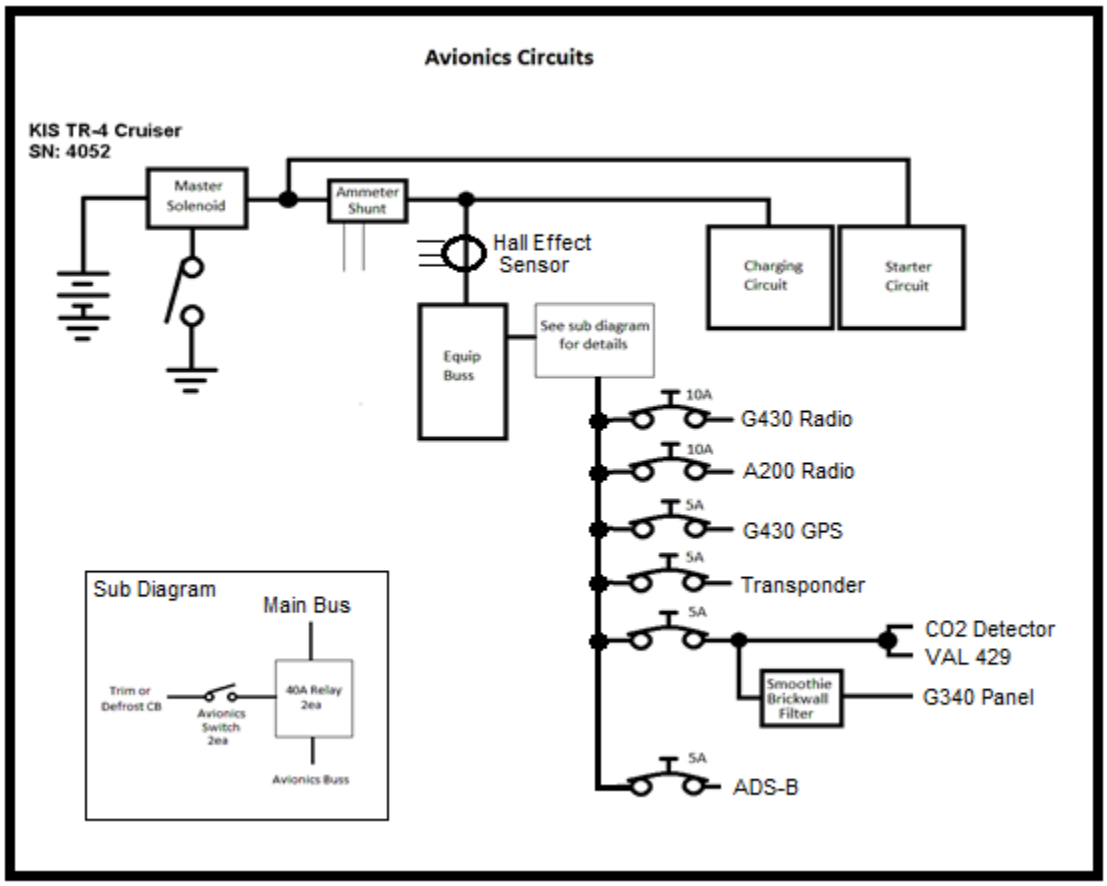

Figure # 3 – Avionics Power Wiring Diagram

LIGHTING

Strobe, Position and Navigation lights: One red LED (left) and one green LED (right) position light/strobe combination unit is installed on each wing tip (AVEO Engineering Powerburst LED units). **The nav/pos light switch must be on for the strobes to operate.** One EPL combination light/strobe LED unit is mounted on the tail and is controlled by the navigation/position switch. A Kuntzleman LED Red Aircraft Beacon is mounted to the top of the aircraft fuselage.

Landing and Recognition lights are situated just inboard of the wing tips, along each wing leading edge. These are BajaDesign S2 Pro (Spot) LED lights with a Bussmann 232 electronic blinker that enables the lights to flash.

Panel Switch lights are controlled by a rheostat on the instrument panel. Overhead lighting is provided by battery operate high intensity LED's. These units rotate 360 degrees, angle approximately 45degrees and have two intensity settings.

PAINT

This aircraft is painted with Dupont CHROMAPREMIUM paint. The fuselage is painted 2007 Harley Davidson White Gold Pearl (Base: 98609 CLL, Top: CGS). The tail numbers are painted 2003 Nissan Infiniti FX35 Liquid Copper Metallic (R12).

3. DESCRIPTIONS AND OPERATIONS

PITOT / STATIC SYSTEM:

A DYNON model number 100667-000 (SN: 6020) heated Pitot tube is situated under the left wing. The impact port is routed to the EFIS ADAHRS and the Dynon D6. A second AOA impact port is also connected to the EFIS ADAHRS and the Dynon D6. Two static ports are installed on each side of the fuselage behind the door. They are connected together and routed to the EFIS ADAHRS and the Dynon D6. An alternate static source is located on the left side of the instrument center console below the instrument panel. Prior to flight, it must be checked to make sure there are no blockages to the air inlet. Foreign particles can be prevented from entering the Pitot system by the use of the "Remove Before Flight" cover when the aircraft is not flying. This protective cover MUST be removed during the pre-flight inspection. Care must be taken not to block any of the ports, especially during washing or polishing the aircraft. A switch on the switch panel operates the Pitot heat. This feature should be used in icing conditions to prevent ice blockage of the Pitot inlet. The DYNON Pitot heat controller unit (SN: 1456) is located inside the left wing, mounted on one rib. Proper operation of the Pitot heat assembly is indicated by an AMBER indication on the Engine Monitoring System (EMS).

ELECTRICAL SYSTEM:

A 14-volt direct current system, powered by an engine-driven alternator, provides electrical power to the aircraft. A 12-volt battery is located under the co-pilot seat. Power is supplied to all electrical circuits via a bus bar, located on the far right of the instrument panel. A split-rocker type Master switch is located on the left side of the instrument panel. The right half of the switch (Battery) controls all electrical power to the aircraft via a master solenoid situated on the upper right front side of the firewall. The left half of the switch (Alternator) controls the Alternator field. Normally, both sides of the switch are used simultaneously, however, in the event of alternator failure it is possible to switch off the alternator field, while leaving the battery switched on. This means that the entire aircraft's electrical requirements are then placed upon the battery. Conversely, it is not possible to switch off the battery and leave the alternator in circuit.

The aircraft is equipped with an automatic over-voltage protection system. In the event of an over-voltage condition, the LR-3B voltage regulator shuts down the alternator field. Over and under voltage indications are provided via the EFIS EMS page. Electrical circuits in the aircraft are protected by circuit breakers on the far right side of the instrument panel.

FUEL SYSTEM

Each wing contains a "wet wing" type fuel tank susceptible to failure if exposed to ethanol. **DO NOT USE FUEL WITH ETHANOL.** Fuel exits the tanks through finger strainers and then flows to a LEFT-RIGHT-OFF selector valve situated in the cockpit. Depending upon the setting of the selector valve, fuel from the left or right tank flows through an Electronics International FT-60 flow transducer (Red Cube SN124925), to a low pressure electric fuel pump, to a gascolator en-route to an engine mounted mechanical fuel pump and fuel pressure sensor. The fuel flow transducer is mounted within the cockpit, just after the fuel selector valve. From here, fuel is distributed to the engine cylinders via the carburetor and manifold. Prior to take-off, it is wise to check that both the mechanical and electrical pumps are operational. During take-off / landing and whenever changing fuel tanks, the electric pump should be switched on to reduce the risk of fuel starvation in the event of a mechanical pump failure or in the event of air getting into

the fuel system. The electric fuel primer (RED panel switch) can only be operated when the electric fuel pump on the joy stick is ON.

Each tank has a capacity of 46.5 gallons, of which 46 gallons are usable. It is not practical to measure the time required to consume all the fuel in one tank, and, after switching to the opposite tank, expect equal duration from the remaining fuel. Each tank has a vent line that exits the underside of the wing, at each wing tip. To prevent fuel starvation, it is vital that these vents are confirmed to be clear of blockages during the pre-flight inspection. Each locking filler cap is grounded to the main ground buss and then to the engine case. It is not directly connected to the nose gear so the nose gear does not have a direct link to the filler cap. In order to ground the filler cap, a ground cable must be attached to the engine exhaust pipe to reduce the risk of static buildup and sparking during re-fuelling.

Capacitance type fuel sender units situated in each tank operate the fuel gauge. Due to the nature of their installation, they will tend to indicate "FULL" even when the tanks are only two-thirds full. Only then will they start indicating the dropping fuel level in each tank.

LIGHTING SYSTEMS

Strobe, Position and Navigation lights: One red LED (left) and one green LED (right) position light/strobe combination unit is installed on each wing tip (AVEO Engineering Powerburst LED units). **The nav/pos light switch must be on for the strobes to operate.** The high intensity strobe lights enhances anti-collision protection, however, they should be turned off when taxiing in the vicinity of other aircraft, or during flight through cloud, fog or haze.

One EPL combination light/strobe LED unit is mounted on the tail and is controlled by the navigation/position switch. A Kuntzleman LED Red Aircraft Beacon is mounted to the top of the aircraft fuselage. Landing and Recognition lights are BajaDesign S2 Pro (Spot) LED lights with a Bussmann 232 electronic blinker that enables the lights to flash.

Panel Switch lighting is controlled by a rheostat on the instrument panel. Overhead lighting is provided by battery operate high intensity LED's. These units rotate 360 degrees, angle approximately 45degrees and have two intensity settings.

CABIN HEATING / VENTILATION

Ventilation is provided by 2 eyeball vents one located on each side of the instrument panel.

Cabin Heat is supplied from a heat muff located on the exhaust pipe from cylinder #1. Warm air from this heat muff is routed to a heat box mounted on the forward left side of the firewall. A flapper valve in the heat box, operated by a push-pull knob on the center console, allows warm air to enter the cockpit. A second heat box located aft of the firewall is equipped with a flapper operated by a push-pull knob in the center console that diverts warm air to the windshield defroster vents and fans if needed. The fans are controlled by a BLUE switch on the instrument panel. Due to the fact that hot air is sourced from a heat muff on the exhausts, there is the risk of Carbon Monoxide entering the cabin should a hole develop in the exhaust. A CO2 Guardian 353P-101 Carbon Monoxide detector is installed on the right side of the instrument panel and is continuously monitored by the EFIS EMS. An audio/visual alert will occur if a dangerous CO2 level is detected. The monitoring system is tested upon initial power up of the CO2 sensor and indicated on the EMS.

SEATBELTS

All seats are equipped with adjustable 4-point lap and shoulder harnesses. Once the two parts of the seatbelts have been securely fastened (using the quick release buckles), the shoulder portions of the harnesses should be adjusted to permit the occupant to lean forward enough to sit completely erect, yet be tight enough to prevent excess forward movement and contact with objects during sudden deceleration. The pilot will want the freedom to easily reach all controls.

INSTRUMENT PANEL

The instrument panel is a one piece aluminum panel organized in to four distinct functional areas. The left hand area is the Pilot Control Area and contains a DYNON D-700 EFIS Display Unit, the combination Master/Alternator switch, the Engine Starter/Magneto switch, VAL INS-429 Navigation Unit, TRIO autopilot controller, Trim Control Status, External Alarm Indicator, ELT Remote Controller, Magneto Test Switches and the instrument panel switches.

The upper center portion of the instrument panel is the Communications Control Area containing a Garmin 340 audio panel, a Garmin 430W transceiver/GPS unit and an Icom IC-A210 transceiver. The Garmin 340 audio panel contains a 4-place intercom that provides means to switch audio signals to either headsets or cabin speaker from multiple audio inputs. All 4 headsets can be plugged into the aircraft system via the jacks situated either on the instrument panel, in the center support console between the front seats or the rear support console.

The lower center portion of the instrument panel is the Ancillary Control Area. It houses a DYNON D6 backup EFIS, an AERA 500 portable GPS, the altitude hold control, the auto pilot GPS source selector switch, the trim control selector switch, the panel lighting rheostat and a cutoff switch for both the autopilot and altitude hold.

The right hand area is the Co-Pilot Control Area and contains a DYNON D-700 EFIS Display Unit, a CO2 Guardian 353P-101 CO2 detector unit, the aircraft circuit breaker panel, the audio-1 input connector and two 12v DC auxiliary power source receptacles. The CO2 Guardian 353P-101 CO2 detector unit annunciates visual and audio warning messages both via the DYNON D-700 EFIS and on its front panel. This area also contains a location to mount a computer tablet if available.

PILOT CONTROL STICKS

Both pilot and co-pilot control sticks are Infinity Military Style with additional switches that control frequency changes, fuel pump and transponder IDENT features. A switch on the center console below the instrument panel determines which position (Pilot or Co-Pilot) controls the trim. If headphones with integrated PTT buttons are used, they need to be plugged in to either the pilot’s or the co-pilot’s jack points to enable this option. (See figure #4)

Figure # 4 – Control Sticks

AUTO PILOT

A TRIO EZ Pilot is a small, solid state aircraft autopilot system designed exclusively for experimental aircraft and is to be used for VFR operations only. The EZ Pilot is a single axis autopilot that controls the roll axis for aircraft attitude correction (wing leveling) and provides area navigation using signals provided by an external GPS receiver. It is composed of two units, the control/display unit and the roll servo. The EZ Pilot does not contain a built-in GPS or other navigation data source. The EZ Pilot installed is capable of accepting GPS source data from GARMIN GPS units using existing hard wired data cables. The GPS unit actually connected to the autopilot (Garmin 430W or Garmin AREA 500) is selected via a GPS selector switch located on the instrument panel next to the TRIO altitude hold display and cutoff switch.

FLAPS / TRIM

The flaps are manually operated by means of the "handbrake" style lever between the front seats. The full up position is 0 degrees, the second position is 12 degrees and full flaps are at 24 degrees. It is not required to use flaps for take-off. Maximum flap deployment speed is 96 Kts (white arc).

Electric aileron and elevator trim is controlled by the hat switch on the top of each pilot's stick. Indicators on the instrument panel display the trim tab position. A switch near the trim indicators selects which grip controls the trim. Trim control status is indicated by an LED above each display. A GREEN light indicates control of the trim while a RED light indicates no trim control.

BRAKES / STEERING/ LANDING GEAR

Ground steering is achieved by using differential braking to turn the aircraft. The castoring nose wheel simply follows the aircraft heading. It is important to check the castoring nose wheel friction nut on a regular basis to ensure that the pin holding the nut in place is not damaged or missing. This nut should always be tightened such that a force of between 20-30 lbs is required to move the nose wheel from side to side. The rod-end bearings on the "H" bracket at the lower mounting point should also be checked for security and for lubrication on a regular basis. There

is very little maintenance possible on the main landing gear, with the exception of the brake pads, discs and brake lines.

RUDDER PEDALS

The rudder pedals are semi-fixed and cannot be adjusted in flight. To adjust the rudder pedals while still on the ground. The tension on the rudder pedal cables is maintained by a flat spring steel strip fastened to the rudder bar arm by an eye bolt and then turned back under the rudder bar.

ENGINE

The Lycoming O-360 A4M is a carbureted, 4 cylinder, air-cooled aircraft engine. Fuel is supplied by a mechanical and electric pump system and ignition is taken care of by dual E-Mag P-144 Electronic magnetos, firing 2 spark plugs per cylinder. The engine is rated at 180 HP at 2700 RPM.

EGT: At a maximum of 75% cruise power, best power cruise is at 100F rich of peak EGT and best economy is achieved when operating at 50F lean of peak EGT setting with smooth engine operation.

CHT: Normal CHT values are between 350F and 410F. It is best to try and keep the CHT below 400F. Never exceed 500F.

Oil Temps: Normal oil temps are between 100F and 245F.

Engine performance, fuel flow and altitude performance charts are presented in the attachment "D" to this manual. The EMS calculates and continuously displays the approximate power generated by the engine. Refer to the Lycoming O360 A4M operator's manual for details on the engine description and operation.

IGNITION

The ignition consists of dual E-Mag P-144 electronic magnetos. These are initially powered by +12v from the aircraft battery via individual 5A circuit breakers. Once the engine is above 800 RPMs their internal generators maintain proper operating current and aircraft power is not required for operation. The magneto must be individually tested for proper operation using the test switches on the instrument panel prior to every flight. The magnetos are timed simultaneously and set approximately 1.5 degrees (1/2 tooth) after top dead center. The right magneto fires cylinders 1 Bottom, 2 Top, 3 Bottom and 4 Top. The left magneto fires cylinders 1 Top, 2 Bottom, 3 Top and 4 Bottom.

ELECTRONIC MODULES

The aircraft uses multiple electronic modules for different functions. These are located in different areas within the airframe to include within the engine side of the firewall, within the cockpit area and within the rear bulkhead area. Refer to Attachment "I" for the actual locations within the aircraft.

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4. NORMAL OPERATING PROCEDURES

PRE-FLIGHT INSPECTION

Visually check the aircraft for general condition during walk-around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also make sure that control surfaces contain no internal accumulations of ice or debris. If night flight is planned, check operation of all lights and make sure a flashlight is available.

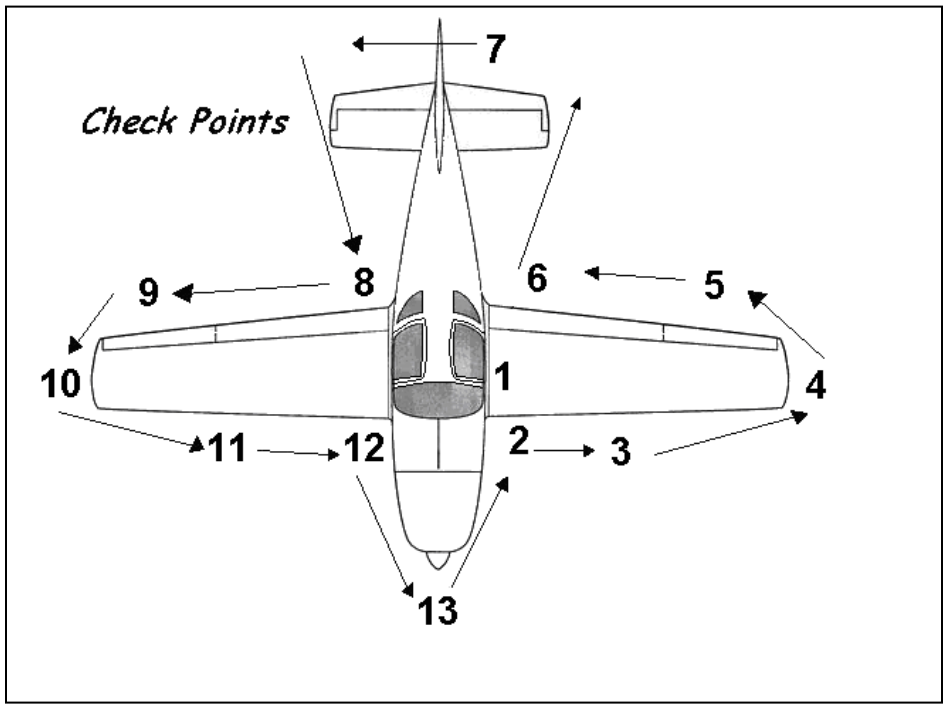

Figure # 5 – Pre Flight Check Points

Check Point 1 (Cabin)
Remove control stick lock
Check ignition switch "off"
Switch on and check all exterior lights and Pitot heat
Turn OFF Master Switch
Check that fuel selector valve is on fullest tank
Lower flaps
Retrieve fuel drainer

Check Point 2 (Left Wing Root)
Check door latches and movement
Check belly fairings for security and damage
Verify that there is no fluid leakage evident on the belly
Check main tire for inflation, wear and possible brake fluid leakage.

Check Point 3 (Left Mid Wing)
Check wing leading edge for damage
Remove tie down

Draw fuel from each drain and check for water contamination
Visually check fuel level in wing tank and secure filler cap
Check aileron bell crank inspection cover for damage and security
Remove Pitot tube cover and check for obstructions.

Check Point 4 (Left Wing Tip)
Check landing/recognition light lenses for security damage
Check Nav/Pos/Strobe unit for security and damage
Remove fuel tank vent tube cover and check for contamination or damage

Check Point 5 (Left Aileron)
Check for freedom of movement. Control stick and opposite aileron move accordingly
Check counterbalance weight and control surface security

Check Point 6 (Left Flap)
Check control surface movement and security
Check actuator arms for contamination, freedom of movement and security
En route to tail, check rear windows for damage and that the static port is unobstructed

Check Point 7 (Tail)
Remove tie down
Check control surfaces and trim tab for freedom of movement and security.
Check push rod attachments, including trim tab

Check Point 8 (Right Flap)
Check rear windows for damage and that the static port is unobstructed
Check control surface movement and security
Check actuator arms for contamination, freedom of movement and security

Check Point 9 (Right Aileron)
Check for freedom of movement. Control stick and opposite aileron move accordingly
Check counterbalance weight and control surface security

Check Point 10 (Right Wing Tip)
Check landing/recognition light lenses for security damage
Check Nav/Pos/Strobe unit for security and damage
Remove fuel tank vent tube cover and check for contamination or damage

Check Point 11 (Right Mid Wing)
Check wing leading edge for damage
Remove tie down
Draw fuel from each drain and check for water contamination
Visually check fuel level in wing tank and secure filler cap
Check aileron bell crank inspection cover for damage and security

Check Point 12 (Right Wing Root)
Check door latches and movement
Check belly fairings for security and damage
Verify that there is no fluid leakage evident on the belly
Check main tire for inflation, wear and possible brake fluid leakage

Check Point 13 (Nose)
Check NACA duct for contamination
Open oil inspection hatch, check oil level (4qt minimum) and re-secure dip stick
Check the brake hydraulic fluid level (top off if necessary).
Visually inspect under the cowl before closing the inspection cover.
Check propeller and spinner for nicks and security
Check air intake for contamination
Check nose wheel for security and inflation
Check exhaust for security and inspect under the cowl via the exhaust exit area
Check cowling fasteners
Check NACA duct for contamination
Check windscreen for damage and security

STARTING THE ENGINE

CAUTION… Release starter switch as soon as engine fires. Never engage the starter while the propeller is still turning. If the starter has been engaged for 30 seconds and the engine has not started, release the starter switch and allow the starter motor to cool for 3 to 5 minutes before another starting attempt is made.

Turn on both EFIS using their internal battery
Select fuel from tank with most fuel
Push in mixture control to fully rich
Open throttle control to 1/4" forward of fully closed position
Confirm both EFISs are operation and one is displaying the engine monitor systems page.
Engage master switch
Check indicated battery voltage
Verify magneto test switches remove aircraft power from each magneto (Indicators turn RED)
Engage the electrical fuel pump and verify fuel pressure is above 3psi (Green arc).
Engage the fuel primer for about 5 seconds then switch off depending on required priming
Ensure that propeller area is clear
Apply brakes
Engage starter until engine starts. If the engine was not primed enough, engage electrical fuel pump as required
Check that oil pressure is indicated within 30 seconds
CAUTION … Oil pressure indication must be noted within 30 seconds in normal weather. If no pressure is noted within the specified time, stop the engine and investigate the cause.
Place alternator switch to ON, and check that voltage increases to 13.8 - 14.8 Volt
Allow at least one minute warm up at below 1000 RPM. Do not exceed 1800 RPM with oil temperature less than 100F, and CHT less than 200 F
Place navigation lights as required
Before taxiing confirm fuel supply to fullest tank and set mixture for taxi

TAXIING

Check brakes and steer by use of differential braking with rudder deflection
Check instruments and avionics during taxiing.

ENGINE RUN UP

CAUTION….Oil temperature must be at least 100 F before engine run up.
Set brake

Select mixture for take-off
Set throttle to 1000 RPM
Press each Mag Test buttons and confirm engine RPM does not fluctuate and the indicator remain GREEN.
Set throttle to 1800 RPM
Check temps and pressures in the green and the alternator is charging.
Dead cut check on each magneto (50 RPM maximum differential between magnetos and a 200 RPM maximum drop per magneto) CAUTION … If the RPM does not drop, this is indicative of either a failure to ground the magneto, or a significant difference in timing between the magnetos, and must be rectified before flight. After noting the RPM drops and differential, place the magneto switch back to BOTH, and note the RPM increase to 1800.
Apply Carburetor heat and insure a 25RPM or greater drop. Pull throttle to idle and verify the engine continues to run.
Remove Carburetor heat and set idle RPM
Verify the Alternate Static Source is operational.

PRE-TAKE OFF CHECKS

Doors – closed and locked
Electrics – circuit breakers, alternator and switches checked and set as required
Foot Steps – insure they are pulled up
Harnesses – tight and locked
Throttle - set friction nut to finger tight
Trim Selector – Pilot flying
Trim – set for take-off
Test Controls – correct and free movement
Magnetos – both selected
Mixture – set for take-off
Master – battery and alternator on
Pressures and temps – in the green (Oil>140F and CHT>200F)
Fuel – correct tank selected, quantities checked, pump switched on and pressure checked
Flaps – set for take-off
Instruments – set and checked
Set transponder as required

TAKE-OFF

Passenger briefing
Confirm EFIS headings with runway heading
Check wind direction
Check temps and pressures
Apply full throttle and check RPM
Release brakes, and upon rolling, check airspeed indicators for operation
Rotate at 65 KIAS

CLIMB

Throttle – set climb power
Airspeed – climb at bottom of GREEN AOA indication. (Approximately 95Kts)
Mixture – set and fuel flow checked
Flaps – retract (if necessary)
Temps and pressures in the green

CRUISE

Fuel Pump OFF
Throttle – set to required power setting
Adjust elevator and aileron trim
Mixture – lean for cruise fuel flow
Change fuel tanks after 30 minutes and monitor fuel flow, fuel levels, temps and pressures and altitude. After that, change tanks every hour. Maintain a log of fuel tanks changes and times.

GLIDE

Avoid long descents at a low power setting, which can result in excessive engine cooling. Do not permit cylinder temperature to drop below 300 F for periods exceeding 5 minutes. Best glide is at top of the YELLOW AOA indication. (Approximately 85 KIAS)

PRIOR TO LANDING

Landing weight <2,300Lbs
Fuel – select fullest tank and switch pump on
Mixture – set rich as required
Throttle – set for speed as required
Full Flaps – check speed is below 96 KIAS and apply as required
Instruments – Check temps and pressures
Electrics – Switch on landing lights
Harnesses and hatches – tight and locked

BALKED LANDING (GO AROUND)

Power – full throttle
Flaps – retract to 1st notch
Speed – At 85 KIAS, retract flaps slowly and fully

AFTER LANDING – CLEAR OF RUNWAY

Electrics – strobes and landing lights off
Transponder - STBY
Mixture – set for taxi and fuel pump off
Flaps – retracted
Request Taxi instructions

SHUT DOWN

Brake set
Throttle – set holding RPM
Instruments – temps and pressures checked
ELT check – listen on 121.5MHz
Avionics – off
Magnetos – dead cut check
Mixture - idle cut off
Electrics – all switches off, magnetos off, master off
Secure aircraft – locks, chocks, tie downs and covers
Inspection – check for damages or leaks

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5. WEIGHT AND BALANCE

LOCATIONS OF LOAD:

Scale readings for N819PR under various configurations:

DATE AND PLACE OF WEIGHING: February 4, 2015 – KFIN Airport Flagler Beach Florida
SCALE TYPE: LONCARE digital scales SN: 0829MC07176.
CONDITION DURING WEIGHING: 7 quarts of oil and empty fuel tanks.
NOTE: Center of Gravity must be between 38.8 and 46.1 during all aspects of flight.

With Wheel Boots ON	Station (inches)	Empty (lbs)	MOM	+ Full fuel (lbs)	+ Pilot & Copilot (lbs)	+ Rear pass. (lbs)	+Baggage (lbs)
Nose Wheel	-9.0	310	-3330.00				
Right Main	55.75	532	29659.00				
Left Main	55.75	551	30718.25				
Total @ BEW	41.34	1393	57587.25				

CURRENT LOADING:

ITEM	WEIGHT (lbs)	STATION (inch)	MOMENT (inch-lb)
Empty aircraft	1393	41.34	57587.25
Pilot + co-pilot		43.0	
Rear passengers		74.0	
Fuel (6lbs/gal)		48.1	
Baggage (65lbs Max)		98.0	
Total			

6. AIRPLANE CARE

GROUND HANDLING

The airplane is most easily and safely maneuvered during ground handling by a tow-bar attached to nose gear bolts. A standard Cessna 100/200 series tow-bar mates with the nose gear bolts. However, due to the castoring nature of the nose wheel, it may be necessary to apply weight to the rear of the aircraft in order to lift the nose wheel off the ground if it is required to move the aircraft backwards.

Mooring

Proper tie-down procedure is the best precaution against damage to a parked airplane by wind. The mooring procedure is as follows:
Install gust lock
Install the tie down fittings into the receptacles under each wing and under the tail
Tie sufficiently strong ropes to these tie-down fittings and secure each rope to the ground
Install pitot tube, Cowl Plugs and fuel tank vent covers
Fit and secure aircraft cover

WINDOWS

The Acrylic windshield and windows should be cleaned with an aircraft windshield cleaner. Fine scratches can be polished out using Micromesh or a commercial wax. Never use gasoline, benzene, alcohol, acetone, carbon tetrachloride, lacquer thinners or glass cleaner to clean the acrylic as these materials may attack the plastic and cause it to craze.

PAINT

Generally, the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with a chamois. If desired, waxing can be done with a good automotive wax. Any touch-ups should be done before the waxing, but after washing.

PROPELLER

Small nicks, particularly near the tips and on the leading edges should be filled and sanded as soon as possible.

INTERIOR

Dust and loose dirt can be removed by regular cleaning with a vacuum cleaner. Soiled upholstery may be cleaned with foam-type detergent. Refrain from using any volatile solvents. Similar cleaning agents as used in the home/car can be used in the cockpit.

FLYABLE STORAGE

Aircraft that are not in daily flight should have the engine started and warmed at least once a week. This process replaces oil that has drained from internal surfaces while standing idle. Warm up should be in such a manner to produce oil temps in the region of 170F. Maximum CHT’s must never be exceeded in ground operation. Keep fuel tanks full to minimize condensation.

7. AIRFRAME AND SYSTEMS MAINTENANCE SCHEDULE

EVERY 50 HOURS

Remove upper and lower cowls
Remove seat bottoms
Remove wheel pants
Check brake fluid level
Inspect and lubricate all controls surface hinges
Check control surface movements
Inspect and lubricate door hinges, and door lock mechanism
Check brake pads for wear

Airframe
Inspect all control linkage rod ends for security and corrosion
Inspect rudder cable and cable feed-through
Inspect rudder pedals and brake cylinders
Inspect brake tubing
Inspect fuel tubing, and selector valve
Inspect door latch handle spring

Landing gear
Check tires for wear, and damage, rotate as needed.
Check brake pads for wear, and damage.
Inspect gear legs for cracks, damage, corrosion, and bending.

ANNUALLY (Conditional Inspection)

As per 50 hour check, and in addition:
Inspect wing fuel lines.
Remove inspection covers under wings – outboard wing bolt, aileron, landing light
Check landing gear attach points and bolts.
Inspect main and rear wing bolts
Inspect and lubricate all control linkage rod ends for security and corrosion
Inspect and lubricate rudder cable and cable feed-through
Inspect and lubricate rudder pedals and brake cylinders
Remove rear baggage bulkhead
Remove, clean and inspect fuel gascolator
Remove, clean and inspect fuel carburetor screen filter
Check carburetor for evidence of fuel stains and for for looseness relative to the throttle body.
Check ELT battery date and voltage. Replace batteries if date expires in less than one year.
When replacing the batteries mark the outside of the ELT battery case with the expiration date as indicated on the new batteries.
Replace overhead lighting batteries.
Grease (AEROSHELL 5) all wheel bearings, nose wheel pivot and “H” bracket rod end.
G430W- Inspect unit for security of attachment, knobs/buttons for legibility, wiring condition and visual inspection of the GPS antenna.
Complete DYNON SkyView 45min backup battery test.

EVERY TWO YEARS

As per Conditional Inspection, and in addition:
Functional test of altimeter and encoder
Functional test of airspeed indicator
Compass swing
IFR Pitot Static Check
IFR Transponder Check

EVERY TEN YEARS

As per Conditional Inspection, and in addition:
Change Brake Fluid
Replace wing fuel lines
Replace panel timer battery

Notes:

8. ENGINE & PROPELLER MAINTENANCE

Engine

EVERY 50 HOURS

Replace induction air filter, Wash in fuel and then apply K&N filter oil
Change engine oil, oil filter and clean filter screen.
Change engine oil at least every 6 months, regardless of hours.
Check general condition of the engine with emphasis on excessive leaks.

Every 100 HOURS

As per 50 Hour inspection, and in addition
Disassemble and clean fuel strainer.
Replace spark plugs (NGKBR8ES). Lubricate with C5 GOLD anti-seize compound.
Remove magnetos and verify no shaft binding or bearing wear. Reinstall and set timing approximately 1.5 degrees (1/2 tooth) ATDC.
Check engine compression
Check general condition of the engine with emphasis on excessive leaks.
NOTE: These can be accomplished during the Conditional Inspection without completing the 50 hour inspection requirements.

REFER TO LYCOMING O-360 A4M MAINTENANCE MANUAL FOR DETAILS

Propeller

ANNUALLY (Conditional Inspection)

Check general condition of the propeller with emphasis on cracks or deep nicks.
Check propeller bolt torque and safety wire
Inspect spinner condition
Check extension for security and cracks

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9. EMERGENCY PROCEDURES

ELECTRICAL SYSTEM MALFUNCTIONS:

Malfunctions in the electrical power supply system can be detected by periodic monitoring of the ammeter, however, the cause of these malfunctions is usually difficult to determine. A broken alternator drive belt or wiring is the most common cause of alternator failures, although other factors could cause the problem. A damaged or improperly adjusted voltage regulator can also cause malfunctions. All electrical problems of this nature constitute an electrical emergency and should be dealt with immediately. Electrical power malfunctions usually fall into two categories:

Overcharging

After periods of heavy electrical usage (such as starting and taxiing), the battery condition may be low enough to accept above than normal charging during initial flight. However, after 30 minutes of cruising flight, the ammeter should be reading normal. If the charging rate remains above normal on a long flight, it is possible that the battery will overheat. In addition, electronic components could be adversely affected by the higher than normal voltage if a faulty voltage regulator setting is causing the overcharging. To preclude these possibilities, the alternator side of the split Master switch should be turned "OFF". The flight should be terminated and/or the current drain on the battery minimized as soon as practical because the battery can supply the electrical system for only a limited period of time. If it becomes apparent that the battery voltage is getting too low to operate the electrical system, the alternator switch can be turned on for several minutes at a time until the battery is partially recharged. If the emergency occurs at night, the alternator switch should be returned to the "ON" position just before landing lights will be required for landing.

Undercharging

If the ammeter indicates a continuous discharge rate in flight, the alternator is not supplying power to the system and should be shut down, since the alternator field circuit may be placing an unnecessary load on the system. All non-essential equipment should be turned "OFF" and the flight terminated as soon as practical.

ELECTRIC TRIM MALFUNCTIONS:

In the event of an electric trim "runaway" malfunction, immediate corrective measures are required as follows:

Minimize the pitch attitude change of the aircraft by applying opposing pressure on the control stick as required. Assuming that a trim button is sticking, attempt to release the sticking as soon as possible. If necessary, disengage the electric trim circuit breaker and leave disconnected for the remainder of the flight.

ROUGH ENGINE OPERATION OR LOSS OF POWER:

Spark Plug fouling

A slight engine roughness in flight may be caused by one or more spark plugs becoming fouled by carbon or lead deposits. This may be verified by turning the ignition switch momentarily from "BOTH" to either "LEFT" or "RIGHT" position. An obvious power loss in single ignition operation is evidence of spark plug or magneto trouble. Assuming that spark plugs are the more

likely cause, lean the mixture to the normal lean setting for cruising flight. If the problem does not clear up in several minutes, determine if a richer mixture setting will produce smoother operation. If not, proceed to the nearest airport for repairs using the "BOTH" position of the ignition switch unless extreme roughness dictates the use of a single ignition position.

Magneto malfunction

A sudden engine roughness or misfiring is usually evidence of magneto problems. Switching from "BOTH" to either "LEFT" or "RIGHT" ignition switch position will identify which magneto is malfunctioning. Select different power settings and enrichen the mixture to determine if continued operation on "BOTH" magnetos is practical. If not, switch to the good magneto and proceed to the nearest airport for repairs.

ENGINE DRIVEN FUEL PUMP FAILURE

Failure of the engine-driven fuel pump will be evidenced by a sudden reduction in the fuel flow indication prior to a loss of power, while operating from a tank containing adequate fuel. In the event of a pump failure during take-off, immediately switch on the auxiliary fuel pump switch until the aircraft is well clear of obstacles, after which, maneuver the aircraft for landing.

LOW OIL PRESSURE

If low oil pressure is accompanied by normal temperature, there is a possibility that the oil pressure gauge or relief valve is malfunctioning. A leak in the line to the gauge sensor is not necessarily cause for an immediate pre-cautionary landing because an orifice in this line will prevent a sudden loss of oil from the engine sump. However, a landing at the nearest airport would be advisable to inspect source of the trouble.

If a total loss of oil pressure is accompanied by a rise in oil temperature, there is a good reason to suspect an engine failure is imminent. Reduce the engine power immediately and select a suitable forced landing field. Leave the engine running at low power during the approach, using only the minimum power required to reach the desired touch down spot.

PRECAUTIONARY LANDINGS

Before attempting an "off airport" landing, one should drag the landing area at low altitude to inspect the terrain for obstructions and surface conditions, proceeding as follows:

Drag over the selected field with 1st notch of flaps and 90 KIAS airspeed, noting the preferred area for touchdown for the next landing approach. Then, retract flaps upon reaching a safe altitude and airspeed.

On downwind leg, turn off all switches except the master and ignition switches.
Approach with flaps at 85 KIAS
Before touchdown, turn ignition and master switches "OFF"
Land in slightly tail-low attitude

FORCED LANDINGS

If an engine stoppage occurs, establish a flaps-up glide at the bottom of the YELLOW AOA indication (Approximately 85 KIAS). If time permits, attempt to restart the engine by checking for fuel quantities, proper fuel selector valve position and mixture control setting. Also check

that the ignition switch is in the correct position. If all attempts to restart the engine fails and a forced landing is imminent, select a suitable field and prepares for the landing as follows:

Pull mixture to idle cut-off position
Turn fuel selector valve to "OFF"
Turn all switches "OFF"
Approach at the bottom of the YELLOW AOA indication (Approximately 85 KIAS)
Extend wings flaps as necessary within gliding distance of the field
Hold firmly and unlock a cabin door just prior to landing so it does not open and aggravate the situation.
Land in a slightly tail-low attitude
Apply heavy braking

DISORIENTATION IN CLOUDS

Upon entering the clouds, and immediate plan should be made to turn back as follows:
Note the time on the clock and the compass heading
Initiate a standard rate left turn, holding the turn coordinator symbolic airplane wing opposite the lower left index mark for 60 seconds. Then roll back to level flight by leveling the turn coordinator.
Check accuracy of the turn by observing the compass heading which should be the reciprocal of the original heading.
Maintain altitude and airspeed by cautious application of elevator control. Avoid over controlling by keeping hands off the stick and steering only with the rudder.
If the autopilot is engaged, you can make a 180 degree RIGHT HAND TURN by pressing the MODE button for 3 seconds. To make a 180 degree LEFT HAND TURN with the autopilot engaged, hold the L – R Switch to the L while pressing the MODE button for 3 seconds.

RECOVERY FROM A SPIRAL DIVE

Close the throttle.
Stop the turn by using coordinated aileron and rudder control to align the airplane in the turn coordinator with the horizon reference line
Cautiously apply elevator back pressure to slowly reduce the indicated airspeed to 90 KIAS
Adjust the elevator trim control to maintain a 85 KIAS glide
Keep hands off the control stick, using rudder control to hold a straight heading
Check engine operation occasionally, but avoid using enough power to disturb the trimmed glide
Upon breaking out of cloud (assuming you're in it), apply normal cruising power and resume flight

ENGINE FIRE IN FLIGHT

Turn fuel selector valve to "OFF"
Pull mixture control to idle cut-off
Turn master switch "OFF"
Establish >120Kts glide
Close cabin heat control
Select a field suitable for a forced landing
If fire is not extinguished, increase the glide speed in an attempt to find an airspeed that will provide and incombustible mixture
Execute a forced landing

ELECTRICAL FIRE IN FLIGHT

The initial indication of an electrical fire is the odor of burning insulation. The immediate response is to turn the master switch "OFF". Then close off ventilating air as much as practical to reduce the chances of a sustained fire. If electrical power is indispensable for the flight, an attempt may be made to identify and cut off the defective circuit as follows:

Master switch "OFF"
All other switches (except ignition) "OFF"
Check condition of circuit breakers to identify faulty circuit. Leave faulty circuit deactivated
Master switch "ON"
Select switches successively, permitting a short time delay to elapse after each switch is turned on until the short circuit is localized
Make sure fire is completely extinguished before opening vents

INADVERTENT FLIGHT IN ICING CONDITIONS

NOTE: This aircraft is <u>NOT</u> approved for flight into known icing conditions (FIKI).
An unexpected icing encounter should be handled as follows:
Check Pitot heat "ON"
Turn back or change altitude to obtain an outside air temp that is less conducive to icing
Pull cabin heat air control to get maximum defroster heat and airflow
Increase engine speed to minimize ice build-up on the propeller blades
Watch for signs of induction air filter ice and regain power by increasing throttle setting
Plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable off airport landing site
With an ice accumulation of ¼" or more on the wing leading edges, be prepared for significantly higher stall speed
Leave the wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness
Approach at 90 to 100Kts, depending on the amount of ice accumulation
Perform a landing in level attitude.

OVERWEIGHT LANDING

If a landing must be done with the aircraft weighing over 2,300Lbs then inspect the main and nose landing gear attach points for any stress or damage prior to the next flight.

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ATTACHMENTS

ATTACHMENT A – COCKPIT PANEL LAYOUT

	USB Input Port		AUTOPILOT GPS Selector Switch
	L – R Magneto Test Switches		GPS#2 – Garmin AERA 500
	Electrical Switch Panel		USB Input Port
	DYNON D700 Skyview Display		External Chronometer / Stopwatch
	Pilot Trim Control Status		Electrical Circuit Breaker Panel
	External Alarm Indicator		DYNON D700 Skyview Display
	ELT Remote Controller		External Alarm Indicator
	VAL INS-429 Nav#2 Unit		Co-Pilot Trim Control Status
	TRIO Auto Pilot		Air Vent
	Audio Panel - Garmin 340		Guardian 353P-101 CO2 Detector
	NAV/COM/GPS #1 Radio- Garmin 430W		Audio Input #1
	COM #2 Radio – Icom IC-A210		12vDC Auxiliary Power Ports
	DYNON D6 EFIS		Tablet Mounting Bracket

Table # 3 – Instrument Panel Description

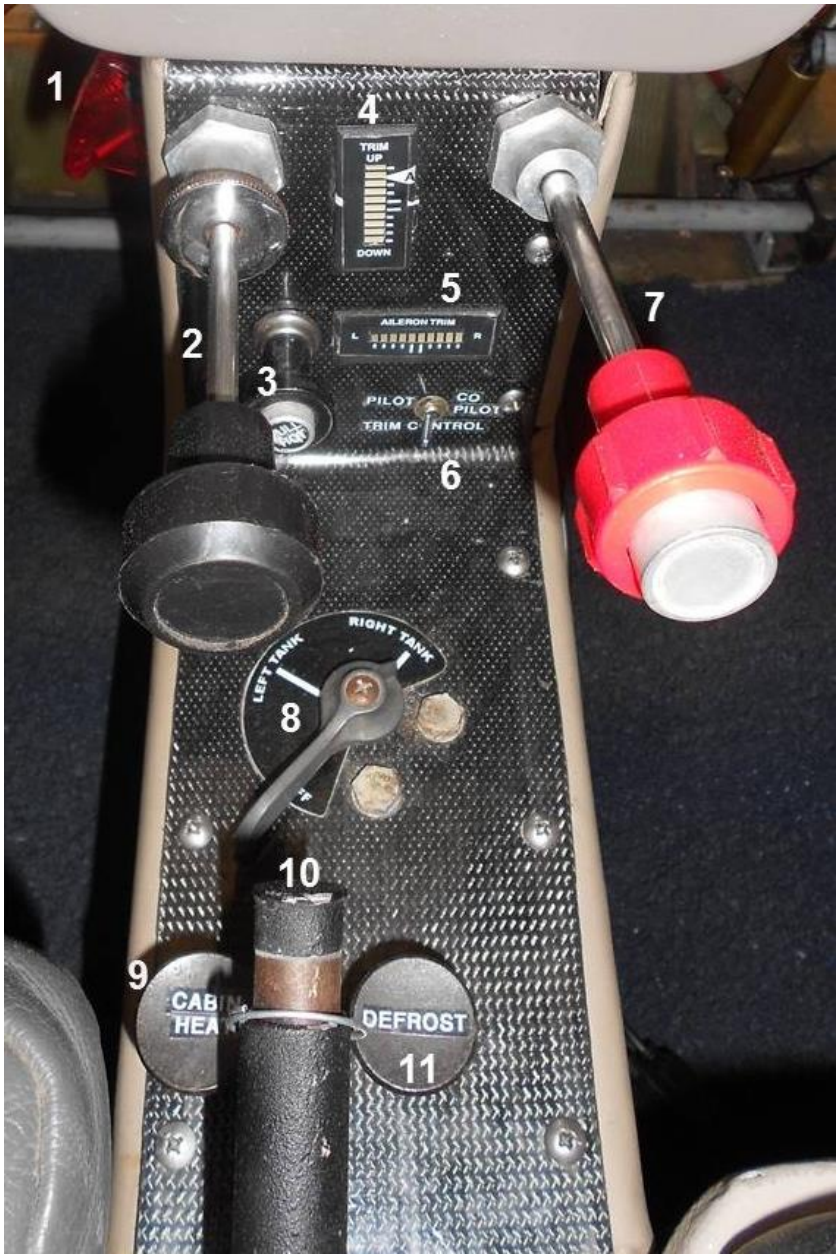


Figure # 7 – Center Console

1	Alternate Static Source	7	Fuel Mixture Control
2	Throttle Control	8	Fuel Selector Valve
3	Carburetor Heat	9	Cabin Heat Selector
4	Elevator Trim Indicator	10	Manual Flap Lever
5	Aileron Trim Indicator	11	Defrost Selector
6	Joystick Trim Control Selector		

Table # 4 – Center Console Description

ATTACHMENT B - WEIGHT & BALANCE GRAPHS

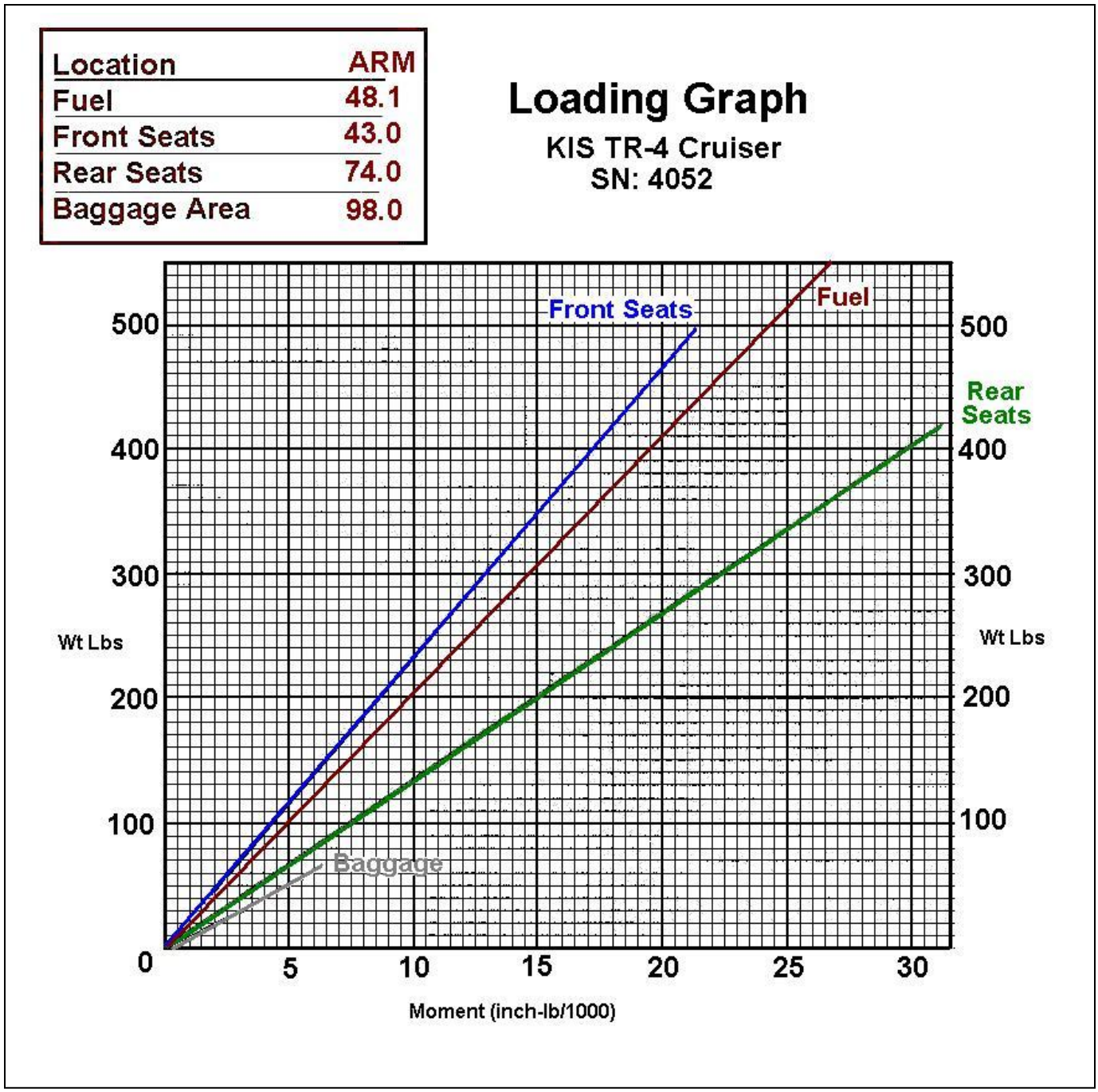


Figure # 8 – Loading Graph

Aircraft Loading Table for KIS TR-4 Cruiser SN: 4052

Total arm must remain between 38.8 and 46.1 during all aspects of the flight.

	Weight (lbs)	Arm (in)	Moment (Wt x Arm)
Basic Empty Weight	1393	41.34	57,587.25
Fuel (92 gallons x 6lbs)		48.1	
Front Seats		43.0	
Rear Seats		74.0	
Baggage (65lb Max)		98.0	
TOTAL			

Table # 5 – Aircraft Loading

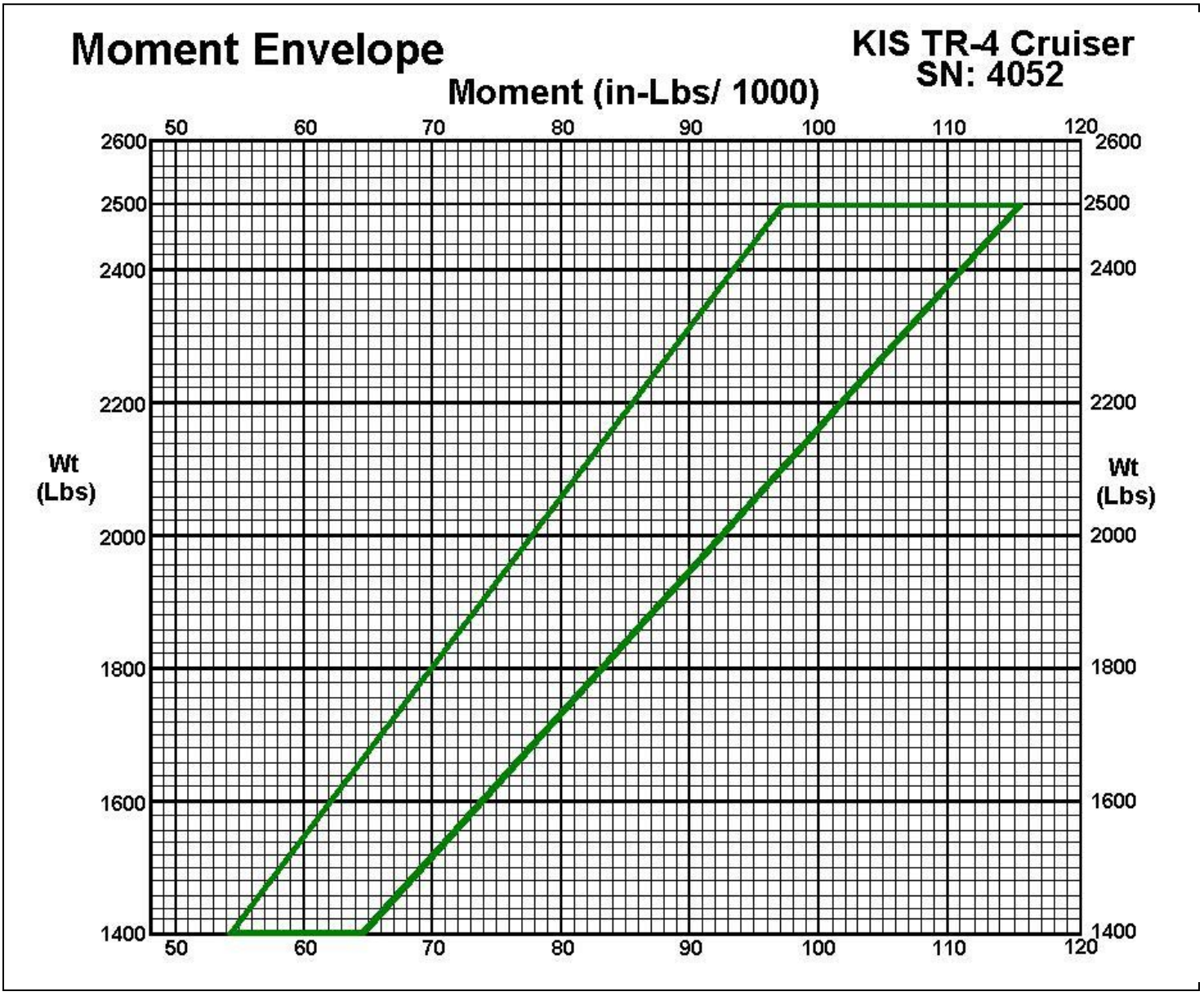


Figure # 9 – Moment Envelope Chart

ATTACHMENT C – FUEL LEVEL CHARTS

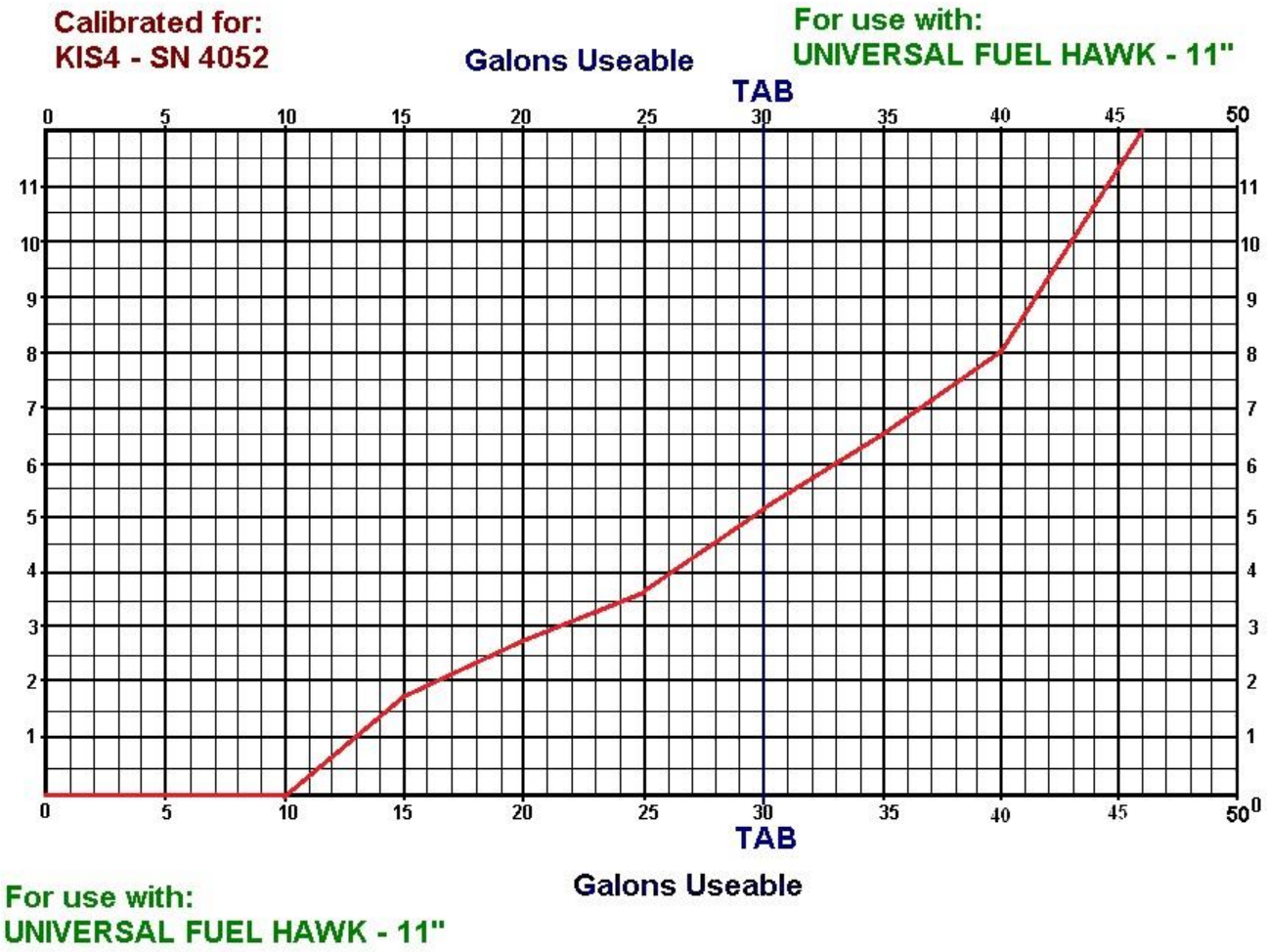


Figure #10 – Fuel Quantity Chart

ATTACHMENT D – LYCOMING O-360 A4M PERFORMANCE CHARTS

TEXTRON LYCOMING OPERATOR'S MANUAL

SECTION 3 O-360 and ASSOCIATED MODELS

FUEL FLOW VS. PERCENT RATED POWER
LYCOMING O-360, 180 HP SERIES
COMPRESSION RATIO 8.50:1
SPARK ADVANCE 25°BTC

CURVE NO.13357

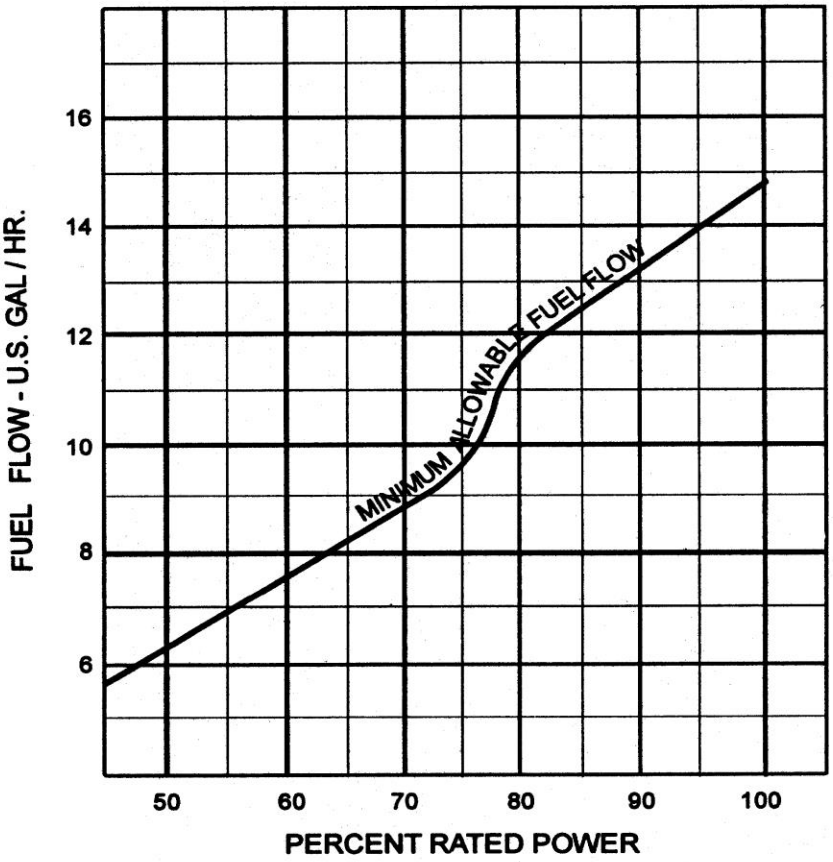


Figure 3-34. Fuel Flow vs Percent Rated Power
O-360-A, -C, -F, -G Series; HO-360-C1A

3-50 Revised May 1996

Figure # 11 – Fuel Flow vs Rated Power

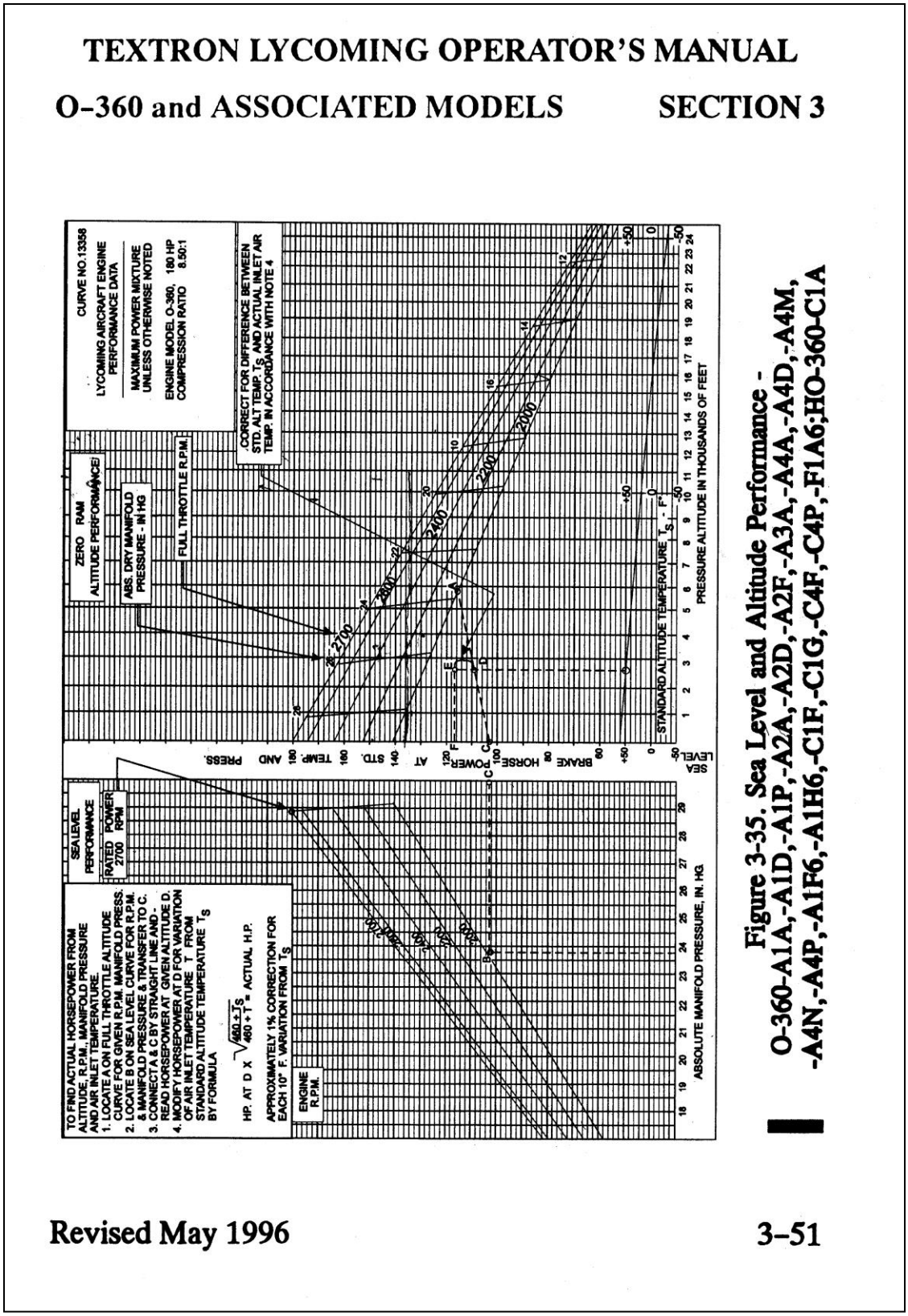


Figure # 12 – Lycoming O360 Engine Performance Chart

ATTACHMENT E – BASIC INTERCEPT PROCEDURES

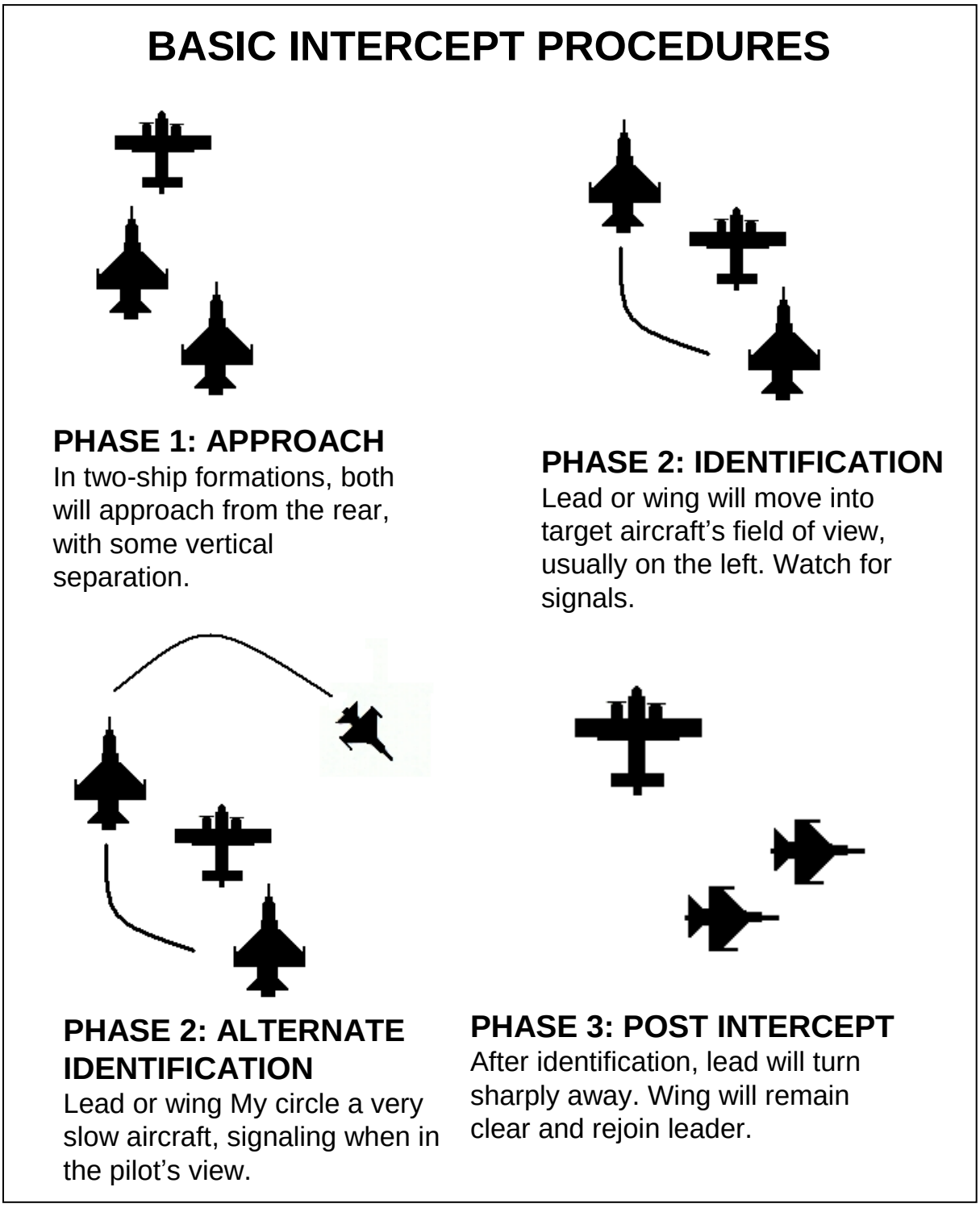


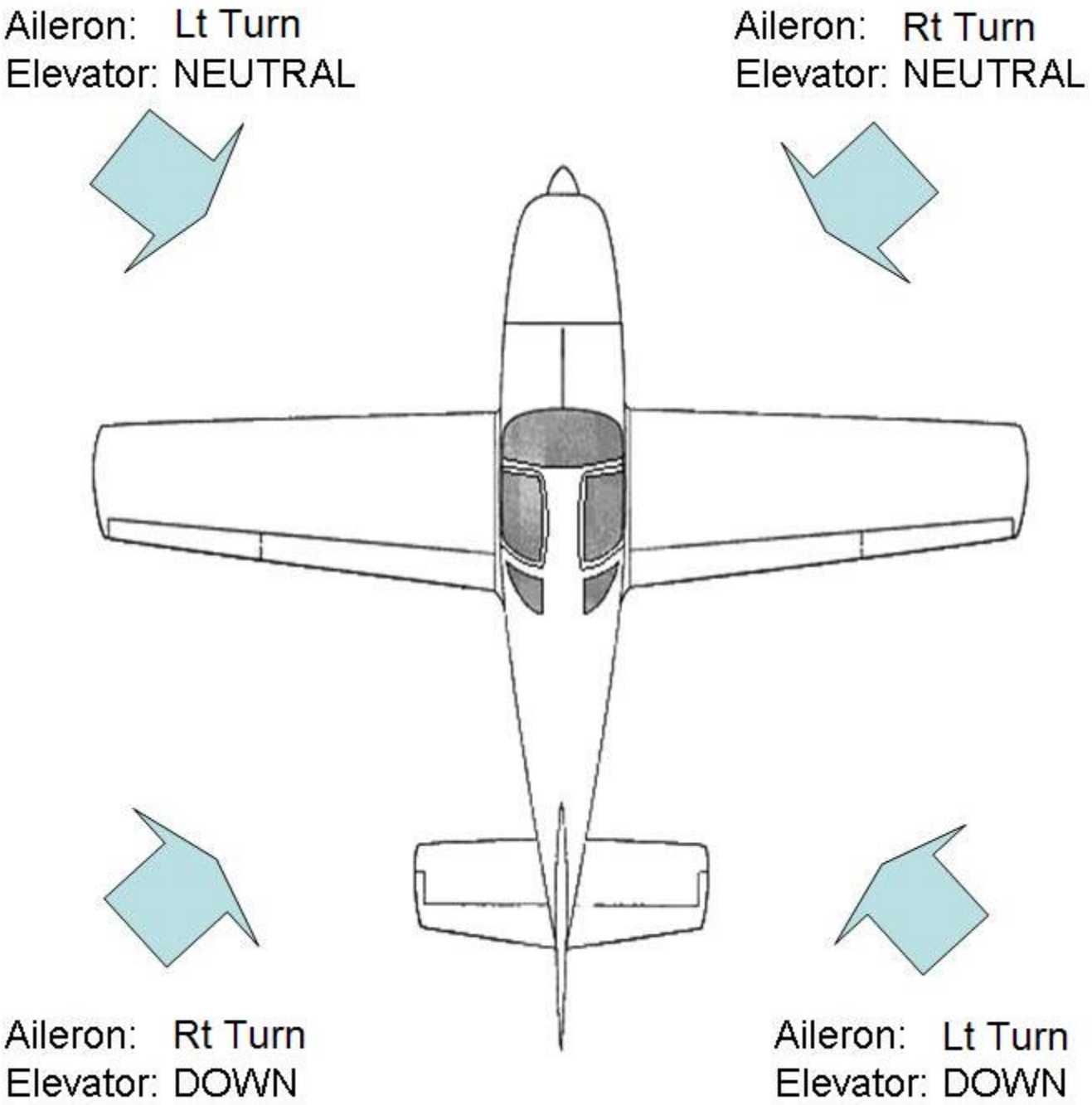
Figure # 13 – Intercept Procedures

BASIC INTERCEPT PROCEDURE SIGNALS		
Signal	**Means**	**Response**
DAY: Rocking Wings **NIGHT:** Same but with flashing nav lights	You've been intercepted, follow me	**DAY:** Rock wings, tune 121.5MHz **NIGHT:** Flash Nav Lights
DAY OR NIGHT: Abrupt break-away from target aircraft	You may proceed	Rock Wings
DAY: Circling airport overflying in direction of landing with gear down. **NIGHT:** Same but with landing lights on.	Land here	Lower gear, follow intercepting aircraft

Table # 6 – Intercept Signals

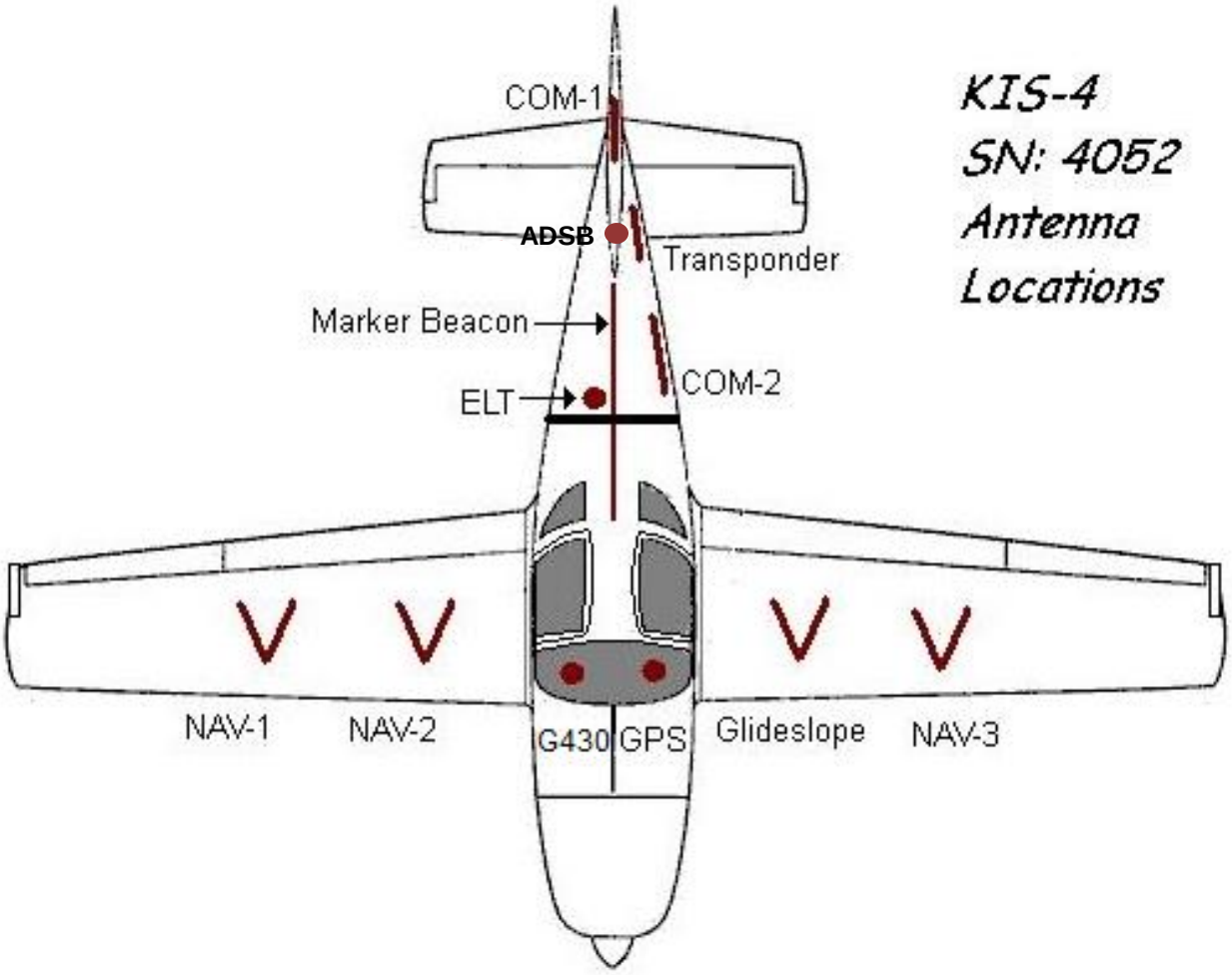
ATTACHMENT F – AIRPORT SIGNS & MARKINGS

ATTACHMENT G – FLIGHT CONTROL POSITION DURING TAXI



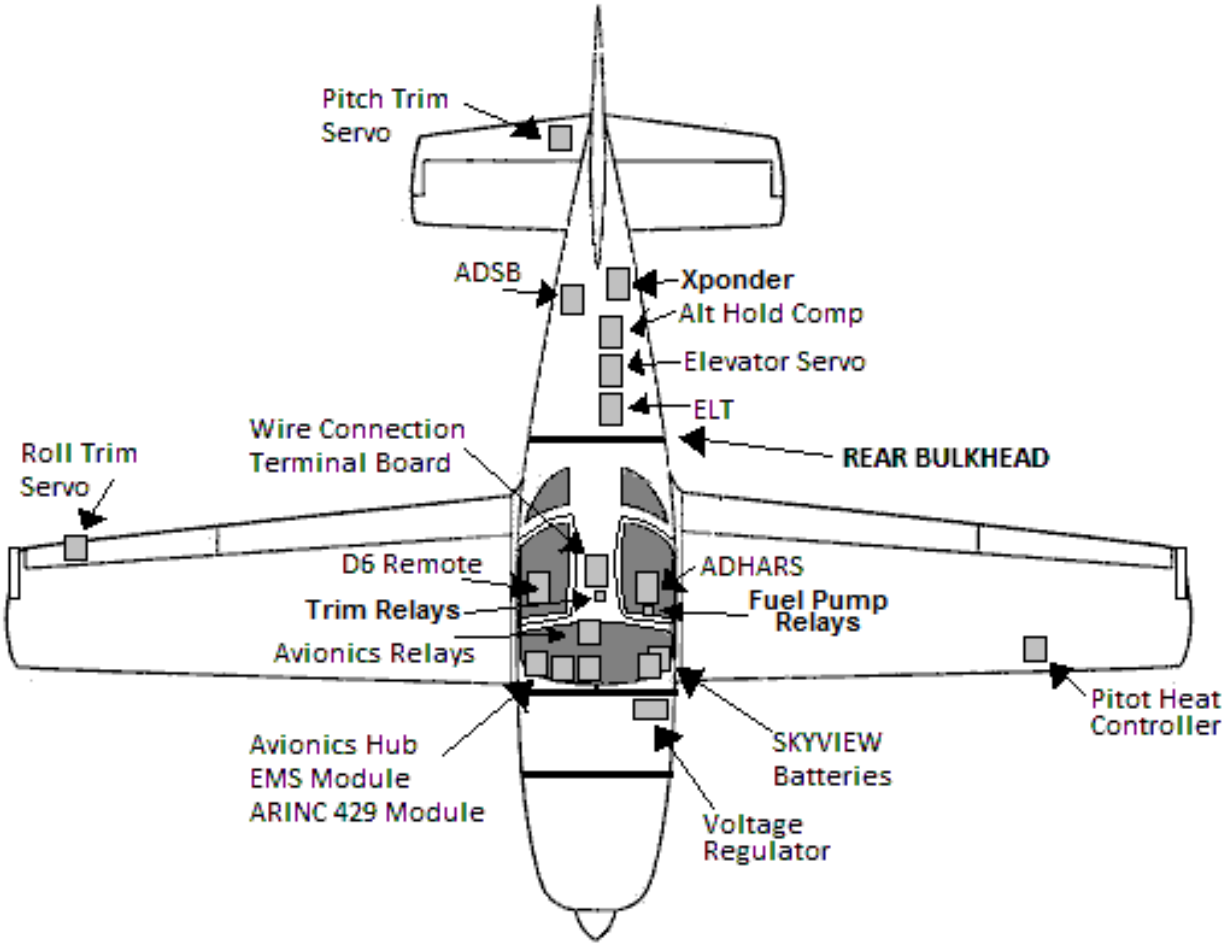
ATTACHMENT H – N819PR Antenna Locations

The aircraft radio antennas are located internally and bonded to the aircraft structure. The ELT antenna is located on the back part of the rear bulkhead divider. The GPS and Garmin 430W antennas are located underneath the front glare shield.

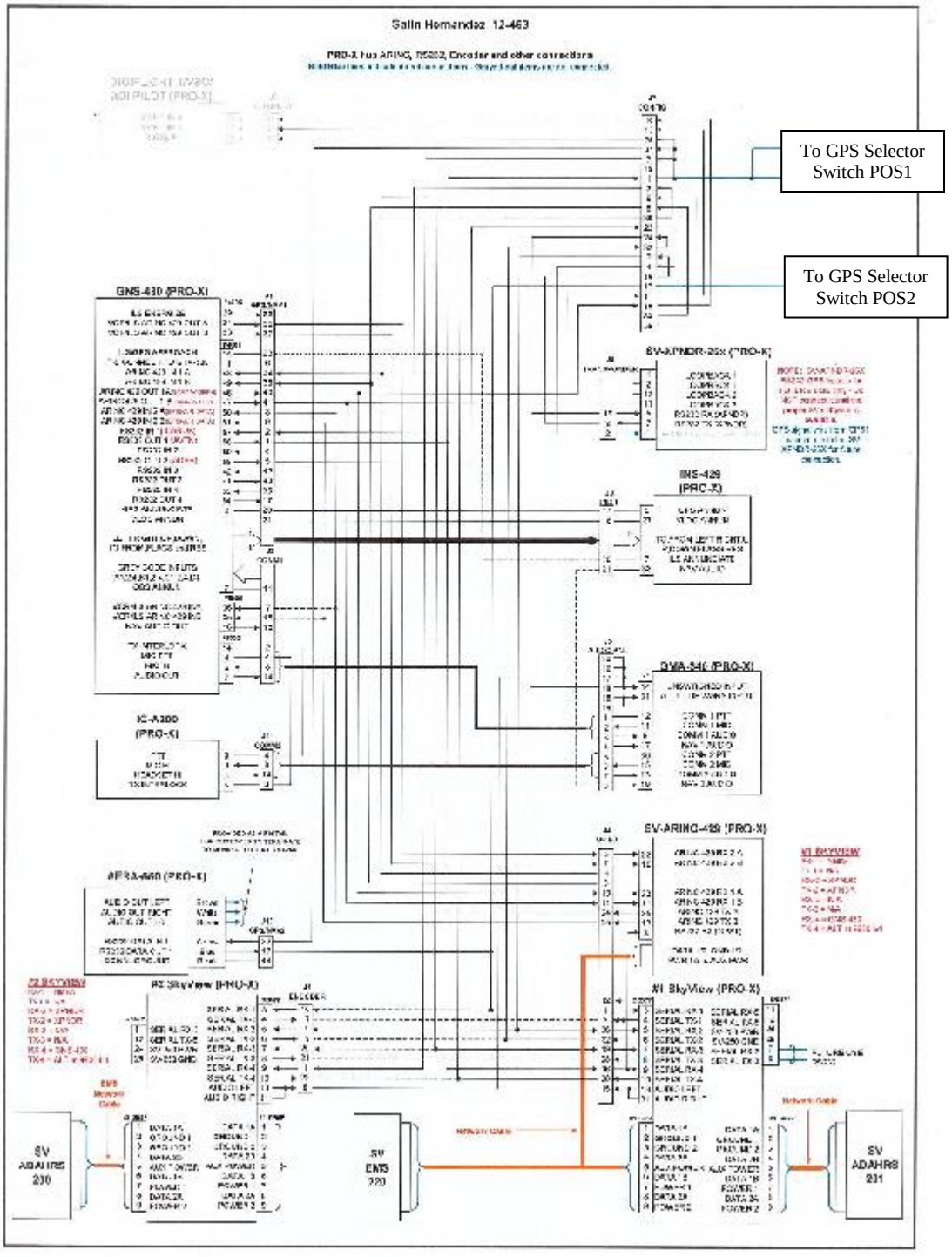


ATTACHMENT I – N819PR Electronic Module Locations

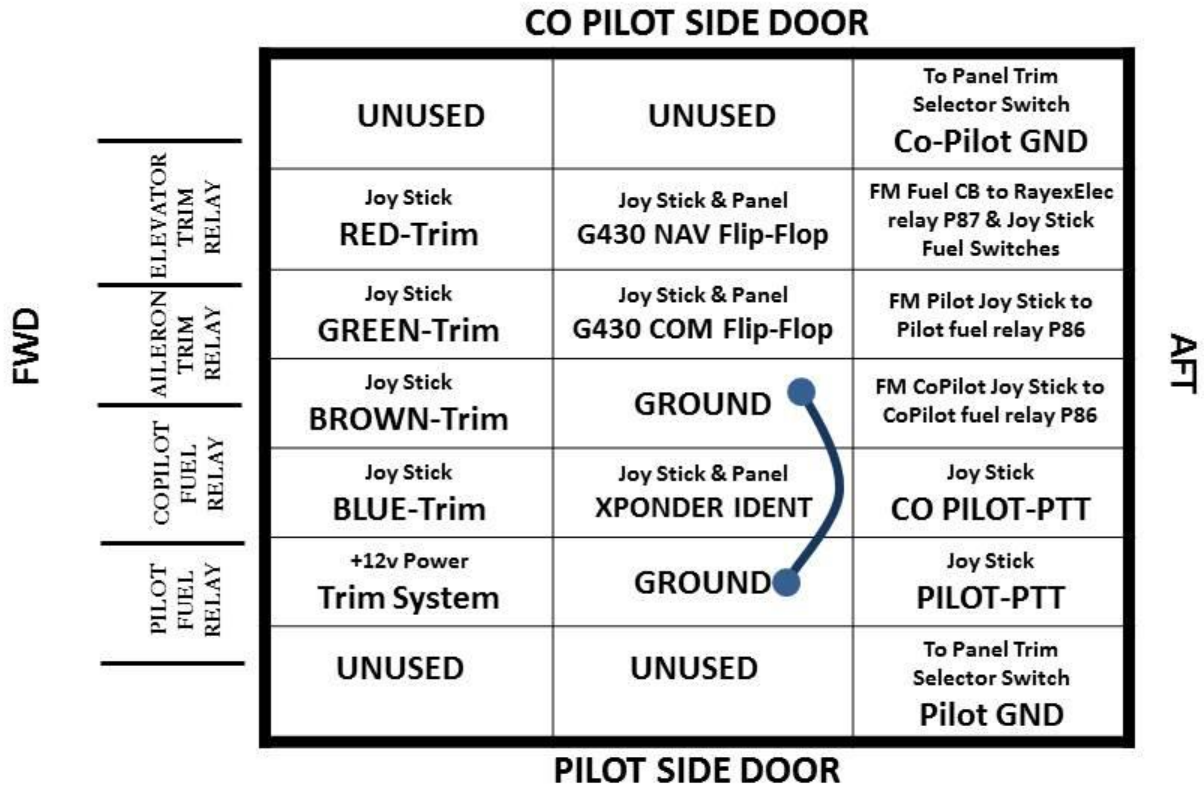
All aircraft electronic modules antennas are located internally within the aircraft structure.



ATTACHMENT J – N819PR Avionics Interconnectivity Diagram



ATTACHMENT K – N819PR Wire Connection/Terminal Board Layout



N819PR Terminal Board Layout
3/30/2014

NOTE: The terminal board is located on the floor between the front seats.

ATTACHMENT L – Modules, Serial Numbers and SV Serial Ports

DEVICE	SERIAL NUMBER
SV-D700	1516/2467
SV-BAT-320	2095/4927
SV-ADAHRS-200	2673
SV-ADAHRS-201	4955
SV-EMS-220	2486
SV-ARINC-429	1670
SV-GPS-250	101242-000
SV-XPNDR-261	00409
SV-ADSB-472	4989
ADSB Hex Code	AB2C20
ADSB Octal Code	52626040
SkyView Navigation Mapping Software	59AA59
D-6 EFIS	1519
AVEO Powerburst RED Wing Light (AVE-WPSTR-20D)	A43-1505-03399
AVEO Powerburst GREEN Wing Light (AVE-WPSTG-20D)	A43-1505-03354
CO2 Guardian 353P-101	
Artex ELT-345	267-09005
ELT 15 Digit HEX ID:	ADC64 98C74 3B6A1
LMag	2927
RMag	2928
TRIO EZ-Pilot	
TRIO EZ-Hold1	
TRIO Gold Standard Servo - Roll	
TRIO Gold Standard Servo - Pitch	

GPS-1 = ARINC G430W Connection

Serial Port	Device	Name
1	AERA	POS 3
2	SV-Xponder	
3	SV-ADSB	
4	G430W	GPS 2
5	SV-GPS	POS 1

ATTACHMENT M – Brake System