All of us at TEAM sincerely hope you enjoy your TEAM aircraft.

The *United States Ultralight Association* can help you enjoy your aircraft or ultralight by keeping you informed about current events in our community. If you have never flown an ultralight or ultralight type vehicle, take advantage of the experience of USUA Flight Instructors and **receive proper training** or check ride. Ensure your ability to get years of safe and enjoyable flying.

TEAM strongly supports the United States Ultralight Association. We urge you to become a member of **the** USUA and participate in the pilot and vehicle registration programs they offer.

Especially if this is your first venture into aviation, the wealth of information available from the USUA is time and time again well worth being a member.

USUA P.O. BOX 667 FREDERICK, MD 21705 Ph: 301-695-9100

or call TEAM or your Dealer for details.

Other helpful resources: EAA P.O. BOX 3086 OSHKOSH, WI 54903

Federal Aviation Administration P.O. BOX 25082 OKLAICITY, OK 73125

FLY SAFELY!

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TABLE OF CONTENTS

It is the responsibility of the pilot to be aware of the E.A.A. Classification under which any aircraft or ultralight is to be flown. Check with the F.A.A, U.S.U.A., or A.A. to obtain current information regarding the status of *ultralight* or *experimental* configuration. (Addresses on front page).

REVISED 9/98

SPECIFICATIONS

MODEL	1O3OR	11O0R	1200Z
ENGINE	ROTX 277	ROTX 447	ZEN G50
EMPTY WEIGHT	240 #	257 #	278 #
GROSS WEIGHT	500 #	560 #	560 #
HEIGHT	60"	60"	60"
LENGTH	16'	15'6"	16'
WINGSPAN	25'	25'	25'
WING AREA sq.fi.	112.5	112.5	112.5
WING LOADING[1]	3.9	4	4.2
POWR LOADING[2]	15.7	10.9	11.4
Vso stall flaps down[3]	27	28	28
Vs1 stall flaps up[3]	32	33	34
Vx best climb angle[3]	40	41	42
Vy best climb rate[3]	43	44	45
Vf max. flap	55	60	60
Va maneuvering	64	72	72
Vne never exceed	90	100	100
CLIMB RATE fpm	650	1200+	1200+
SERV. CEILING ft[4]	10,000	12,500	12,500
TAKEOFF ROLL[5]	150'	< 100'	< 100'
LANDING ROLL	180'	200'	210'

[1] Lbs. per sq. ft. at empty wl., std. pilot, 5 gals, fuel.

[2] Lbs. per hp. at empty wt., std. pilot, 5 gals, fuel.

[3] Mph. at empty wt., std. pilot, 5 gals, fuel.

[4] Altitude at empty wl., std. pilot. 5 gals. fuel.

[5] Takeoff and landing roll on grass.

SPECIFICATIONS

MODEL	1300Z	1400Z	1500R
ENGINE	ZEN G50	ZEN G50	ROTX 447
EMPTY WEIGHT	310#	323 #	269 #
GROSS WEIGHT	560 #	560 #	560 #
HEIGHT	60"	66"	60"
LENGTH	16'	16'	16'
WINGSPAN	25'	25'	25'
WINGAREAsq ft.	112.5	112.5	112.5
WING LOADING[1]	4.5	4.6	4.2
POWR LOADING[2]	12.4	12.5	11.2
Vso stall flaps down[3]	29	30	28
Vs1 stall flaps up[3]	35	35	33
Vx best climb angle[3]	43	44	41
Vy best climb rate[3]	46	47	44
Vf max. flap	60	60	60
Va maneuvering	72	72	72
Vne never exceed	100	100	100
CLIMB RATE fpm	1200+	1200+	1200+
SERV. CEILING ft[4]	12,500	12,500	12,500
TAKEOFF ROLL[5]	< 100'	< 100'	< 100'
LANDING ROLL	210'	210'	210"

---

[1] Lbs. per sq. fl. at empty wt., std. pilot, 5 gals. fuel.

[2] Lbs. per hp. at emply wt., sld. pilot, 5 gals. fuel.

[3] Mph. at empty wt., std. pilot, 5 gals. fuel.

[4] Altitude at empty wt., sld. pilot, 5 gals. fuel.

[5] Takeoff and landing roll on grass.

SPECIFICATIONS

1550V	1600R	1650	1700R
VW1600	ROTX 447	ROTX 503	ROTX 447
400 #	301 #	345 #	319#
700 #	560 #	625 #	560 #
60"	60"	60"	66"
16'	16'	16'	16'
26'5"	25'	26'5"	25'
118	112.5	118	112.5
5.3	4.5	5.3	4.6
12.6	11.9	12	12.4
33	29	33	30
38	34	38	35
48	43	48	44
51	46	51	46
66	60	60	60
78	72	78	72
110	100	110	100
900	1200+	1200+	1200+
10,000	12,500	12,500	12,500
150'	< 100'	< 100'	< 100'
250'	210'	250'	210'

---

[1] Lbs. per sq. ft. at empty wt., std. pilot, 5 gals. fuel.

[2] Lbs. per hp. at empty wl., std. pilot, 5 gals. fuel.

[3] Mph. at empty wt., std. pilot, 5 gals. fuel.

[4] Altitude at empty wt., std. pilot, 5 gals. fuel.

[5] Takeoff and landing roll on grass.

DESCRIPTION

General Configuration:

MINIMAX midwings arc conventional configuration, strut braced, shoulder wing aircraft. Landing gear is the conventional type, with two main wheels located ahead of the center of gravity and a steerable tailwheel. The landing gear is rigid, with low pressure tires absorbing the landing loads. The wing struts attach at the outboard end of the landing gear axle, and all landing and flight loads pass through the landing gear structure. The cockpits are open or enclosed with the exception of the *Vmax* and *MAX-103* which are *not designed for enclosed cockpit or high wing conversion.*

HiMAX high wing aircraft are derived from the *MINIMAX*. The primary difference is the high mounted wing and the strut is attached to the lower fuselage instead of to the landing gear. The enclosed cockpit provides more protection from the elements and better downward visibility, at the expense of visibility into the direction of turn. Since the flight loads no longer pass through the landing gear structure, an aluminum member within the fuselage connects the lower strut fittings.

Structure:

The airframes are of conventional all wood structure, with Sitka spruce or Northern white pine, and birch or mahogany plywood used where appropriate. Covering material is Dacron® fabric and the final finish is the builder's choice. Wings are of two spar construction, with a plywood D-section leading edge, and are braced with struts to the front and rear spars. The tail is strut braced.

Controls:

Conventional 3-axis controls are fitted with the elevator operated by a push-pull actuator cable. Full span ailerons are operated by push-pull actuator cables and are provided with differential movement to reduce adverse yaw. The optional flap function is achieved by moving the lower aileron cable housing fitting via a torque tube attached to the flap handle. Ailerons and elevator are actuated from the cockpit via a conventional control stick. The rudder and steerable tail wheel are actuated from conventional rudder pedals via cables.

DESCRIPTION

Engines;

Any of a variety of engines may be installed.

Factory approved installations include:

MAX-103 model 1030R ultralight is designed specifically to accept lightweight powerplants of up to 65 pounds weight, producing up to 30 horsepower, with the Rotax 277 being the original base engine.

Rotax 277: two cycle, single cylinder engine with 28 horsepower *(may also be installed in the MIN1MAX model 1100 if the MAX-103 model 1030R tail is installed).*

Standard engine controls are the throttle and magneto switch in the cockpit, and the choke, with the choke control located either on the carburetor or in the cockpit. Starting is by hand propping, or by the standard pull starter, or with optional electric start.

MINIMAX AND HiMAX models 1100R, 1500R, 1600R,and 1700R are designed specifically to accept two cylinder-in-line engines (for horizontal bed mounting) of up to 90 pounds weight, producing up to 45 horsepower, with the Rotax 447 being the recommended engine.

Rotax 447: two cycle, two cylinder in-line engine rated at 42 horsepower with dual carburetors or 40 horsepower with a single carburetor.

Standard engine controls are the throttle and magneto switch in the cockpit, and the choke, with the choke control located either on the carburetor or in the cockpit. Starting is by handing propping, or by the standard pull starter or with optional electric start.

DESCRIPTION

Z-MAX and Z-HiMAX models 1200Z, 13(K)Z. 1400Z are designed specifically to accept two cylinder-opposed engines (for vertical firewall mounting) of up to 100 pounds weight, producing up to 45 horsepower, with the Zenoah G50 being the recommended engine.

Zenoah G50: two cylinder opposed engine rated at 45 horsepower. Electric start is standard.

Standard engine controls are the throttle, choke and magneto switch in the cockpit. Starting is by hand propping or by the standard pull starter or with the standard electric starter.

VMAX model 1550V is designed specifically to accept Volkswagen derivative powerplants of up to 150 pounds weight, producing up to 60 horsepower, with the VW 1600cc engine (producing 50 horsepower) being the recommended powerplant.

VW 1600 Type 1: fourcycle, four cylinder flat opposed engine. 1600 cc rated at 50 horsepower.

Slandard engine controls are the throttle, choke, magneto switch and master switch in the cockpit. Starting is by hand propping.

Other engines not exceeding the specified parameters can be utilised but TEAM cannot provide mounting and installation information for these.

OPERATING LIMITATIONS

MAX-103

MAX-103 can be built as either an ultralight vehicle, subject to limita-tions of Federal Aviation Regulations, part 103, or as an experimental category aircraft. FAR part 23 was used as a guide in designing the aircraft, to ensure more than adequate strength for normal operations. As such, the aircraft essentially meets the requirements for a utility category aircraft.

Specific limitations afe as follows:

Maximum design gross weight	500 lbs.
Maximum design positive load factor	4.4 G.
Maximum design negative load factor	-1.8 G.
Maneuvering speed	64 mph (cas)
Maximum allowable speed (red line)	90 mph (cas)
Center of gravity range (% of chord) (see appendix A for details)	21 to 30 percent

All airspeeds given in calibrated airspeed, cas.

Although all of the TEAM aircraft and ultralights are very agile and re-sponsive vehicles, they are not intended in any way for aerobatics. Maneuvers which result in nose up or down attitudes of greater than 30 degrees, or bank angles of greater than 60 degrees are prohibited. Intentional spins are likewise prohibited.

OPERATING LIMITATIONS

VMAX and EROS

The *VMAX* and *EROS* must be certified as an experimental category aircraft. FAR part 23 was used as a guide in designing the aircraft, to ensure more than adequate strength for normal operations. As such, the aircraft essentially meets the requirements for a utility category aircraft.

Specific limitations arc as follows;

Maximum design gross weight	**700 lbs.**
Maximum design positive load factor	**+4.0 G.**
Maximum design negative load factor	**-2.0 G.**
Design maneuvering speed	**78 mph (cas)**
Maximum allowable speed (red line)	**110 mph (cas)**
Center of gravity range (% of chord)	**21 to 30 percent**

(see appendix A for details)

All airspeeds given in calibrated airspeed, cas.

Although all of the TEAM aircraft and ultralights are very agile and responsive vehicles, they are not intended in any way for aerobatics. Maneuvers which result in nose up or down altitudes of greater than 30 degrees, or bank angles of greater than 60 degrees are prohibited. Intentional spins are likewise prohibited.

OPERATING LIMITATIONS

Instrument required

For experimental registration with the F.A.A., the following instruments must be installed and operational:

Two Stroke	Four Stroke
Airspeed Indicator	Airspeed Indicator
Altimeter	Altimeter
Magnetic Compass	Magnetic Compass
Tachometer	Tachometer
Cylinder Head Temperature	Oil Temperature
Fuel Gauge	Oil Pressure
	Fuel Gauge

Documents required

For experimental registration with the F.A.A., the following must in the aircraft at all times:

F.A.A. Registration
F.A.A. Certificate of Airworthiness
Weight and Balance
Equipment List (for weight and balance)
Required Placards

Placards

The F.A.A. Requires several placards and labels to be displayed in experimental category aircraft. Reference FAR Parts 23, 45, and 91 or contact the F.A.A. for the exact requirements.

OPERATING LIMITATIONS

Instrument markings

The following information is provided as a reference. It is up to the builder/ pilot to incorporate these markings.

AIRSPEED IDICATOR — refer to the performance specifications section of this manual for figures.

The **green arc** represents the *normal operating range.* The *lower limit is **Vs1*** (stall). The *upper limit is **Va*** (maneuvering speed).

The **yellow arc** is the *caution range.* The *lower limit* is ***Va*** (maneuvering speed). The *upper limit* is *Vne* (never exceed). Operations must be conducted with caution and only in smooth air.

The **red line** is the *maximum speed* - ***Vne***. This speed shouid never be exceeded, regardless of circumstance.

ENGINE INSTRUMENTS - refer to the specific engine manual figures for tach, temperatures and pressures.

The **lower red line** indicates the *minimum operating limit.*

The **green area** indicates the *normal operating range.*

The **yellow area** indicates the *caution range.*

The **upper red line** indicates the *maximum operating limit.*

NORMAL PROCEDURES

Preflight:

A thorough preflight inspection is necessary for any aircraft, but even more so for a homebuilt aircraft. As you gain experience, you will evolve your own technique. The following is a guideline for a minimum recommended pre-flight checklist:

1. Ensure that the magneto switch is off and the control stick is free.
2. Aileron and elevator fittings at control stick for security.
3. Wing pins and safety catches (front and rear) for security.
4. Left aileron hinges and actuating fitting for integrity.
5. Pilot and static tubes clear.
6. Outer strut attach bolts and fittings for looseness and wear.
7. Inboard strut attach bolt and fitting at axle on midwings, inboard strut attach bolt and fitting at fuselage on highwings.
8. Landing gear for security.
9. Tires inflated to 8 psi. (10 psi. for VMAX and EROS) and wheel bearings for excessive play.
10. Fuel quantity adequate, fuel caps tight, fuel fittings secure.
11. Engine: spark plugs, fuel lines, carburetor secure. Oil quantity adequate on VMAX.
12. Propeller for cracks, gouges, secure bolts.
13. Exhaust system for security.
14. Right side struts and landing gear.
15. Right side aileron.
16. Stabilizer forward attach fittings.
17. Fin attachment to stabilizer.
18. Bracing struts for security.
19. Rudder cables and rudder hinges.
20. Elevator hinges and actuating rod attachment.
21. Stabilizer rear attach bolts.
22. Tailwheel for security, steering.
23. Overall aircraft for fabric wrinkles

NORMAL PROCEDURES <u>Engine</u>

Starting:

Caution: *An assistant is required for safe starting.*

1. Assure area around propeller and in front of aircraft is clear of debris and people.
2. Fuel valve on (if installed).
3. Wheels chocked or assistant standing by (if no brakes installed).
4. Check that throttle is achieving full open and closed settings.
5. Shout 'CLEAR PROP" loudly. Look around.
6. Use starting procedure recommended with engine manual.
7. Allow several minutes for engine to warm up before flying.
8. Ensure choke is off before taxiing for takeoff.

Pre-Take Off:

1. Mag check (is engine running smoothly?).
2. Check engine instruments, cht, oil pressure and temperature within limits (as applicable).
3. Check carburetor heat, if installed.
4. Check elevator full up movement.
5. Check elevator full down movement.
6. Check control stick for comfortable neutral position.
7. Check aileron deflection (amount) for smooth positive action in proper direc tion.
8. Check rudder, rudder pedals for complete and smooth positive action.
9. Seat belt and shoulder harness adjusted and secure.
10. Helmet on and secured.
11. Clear for traffic.

NORMAL PROCEDURES

Take Off:

1. Taxi into position, center rudder.
2. *Plan what you will do at any point during takeoff if the engine fails.*
3. Smoothly open throttle, correcting directional control with rudder for engine torque.
4. Raise tail when controls are effective.
5. Lift off at 30-35 mph (cas).
6. Max rate climb at 43-51 mph (cas) depending on model.
7. Recommend maintain 50 mph until safe altitude is reached.

Landing:

1. Clear the engine often (rev it up momentarily) during long descents to avoid spark plug fouling and excessive cooling.
2. Recommended minimum approach speed 50 mph.
3. Use slips and throttle to control descent.
4. Land with stick full back to ensure directional control.

Securing Aircraft:

1. Shut engine down with mag switch, throttle at idle.
2. Fuel valve off (if installed), ensure prop is horizontal.
3. Tie aircraft down securely attaching tie down ropes from **the** top of the wing struts and from the tail spring.

EMERGENCY PROCEDURES

Engine Failure

About the only failure you can have in planes as simple as the MAX' is an engine failure, and since you are flying an uncertified engine, that occurrence is not too unlikely. Unless the failure is a result of inadvertently switching off the magneto, a restart is unlikely, therefore, begin planning immediately for a forced landing.

Establish a glide at a minimum airspeed at least 45 (cas). If you are climb-ing, immediately lower the nose to the glide altitude. Pick a landing spot (you should already have one in mind). The MAX glides at about a 6/1 angle, but any turbulence will strongly effect this. Also, keep in mind wind shear (gradient) as you approach the ground, and keep your airspeed up in a strong wind.

Perform a normal power off landing (you should have practiced this many times). Minimum airspeed as you begin your flare should be approximately 40 mph. Any *lower airspeed and you may not have enough energy to arrest your sink rate.*

Spin Recovery:

The MAX are not intended to be spun intentionally, although spins have been performed in testing.

Spin recovery from an unintentional spin is conventional. Full rudder opposite the spin direction is applied concurrently with forward stick to break the stall. The throttle should be at idle.

The engine may stop from fuel starvation, and if the propeller stops due to the low airspeed, a restart may be impossible, therefore plan for a forced landing.

MAINTENANCE AND PERIODIC INSPECTION

MAX' arc very simple aircraft and require little maintenance compared to a certified aircraft, however this little **maintenance is still very important**.

Engine

As any one of several types of engine are installed in the *MAX,* it is recommended that you refer to the engine operating manual for routine maintenance and inspection requirements.

Your engine will come with a recommended break-in procedure, as well as a maintenance schedule, which should be carefully followed. This should reduce your engine problems to a minimum.

Propeller

Wooden propellers are not subject to fatigue, however they should be inspected before each flight for nicks, cracks, etc. Nicks or gouges should be carefully sanded out and the finish re-applied. The propeller should be re-balanced after any such work.

The polyurethane coating on the propeller may deteriorate with age, exposure to sunlight, and normal erosion. The propeller should be re-balanced after refinishing.

Prop bolts should be re-torqued every 25 hours.

MAINTENANCE AND PERIODIC INSPECTION __Airframe__

The wooden airframe is not subject to fatigue failure, but should be in-spected at least every 25 hours for any damage or failures. Careful observation of the fabric covering will reveal most breakage of ribs, fuselage members, or tail surface members that may occur due to mis-handling, hanger rash, or enthusiastic onlookers.

More careful examination should include removing the seat back and the tail section to examine the fuselage to detect any broken or loose members or components.

Removing the wings will allow inspecting the wing through the openings in the root ribs.

The strut fittings and control fittings should be examined for hole en-largement or cracks, since metal parts do fatigue.

The landing gear and fuselage area around the landing gear should be examined for wrinkles or breakage, since the flight and landing loads pass through this area.

All control cable ends and attachments should be carefully inspected **for** wear.

__**See Appendix E for an Airframe Maintenance Schedule. Covering**__

The polyester fabric used for covering is subject to deterioration from exposure to sunlight. The aircraft should be finished with a process which includes an ultraviolet shield coat. Also, the aircraft should be hangared out of the sun. it possible. The fabric should be inspected annually with a commercial aircraft fab-ric tester to ensure its strength.

APPENDIX A

WEIGHT AND BALANCE

Once your TEAM aircraft is fully assembled for the first time, the initial order of business (before flying) must be to determine the weight and balance of the aircraft.

This is not just an academic exercise - *the location of the center of gravity is critical to the handling of the aircraft.*

The process is very simple, if you have access to a couple of accurate scales which will measure up to about half the aircraft weight each.

1. Place the aircraft on scales in a level flight position, longerons level to the hori zon (spanwise and chordwise).

2. Drop a plumb bob over the leading edge of the wing near the wing root and mark location on the floor.

3. Locate a second point on the floor directly below the centerline of the front axle tube.

4. Also locate a third point on the floor using the plumb bob or equivalent, directly under the centerline of the tailwheel.

5. The distance in inches between points located in Step #2 and Step #3 can be called **DM** (Distance Main wheels).

6. The distance in inches between points located in Step #2 and Step #4 can be called **DT** (Distance Tail wheel).

7. With the pilot seated in the cockpit, record the total weight on the scales of both front wheels. This can be called **WM** (Weight Main wheels).

8. With pilot still on board, record weight on the tail wheel. This can be called **WT** (Weight Tail wheel).

9. Next, multiply (**WM**) x (**DM**). This figure is called a *Moment* **MMW** (Moment Main Wheels).

10. Do the same for (**WT**) x (**DT**) to get **MTW** (Moment Tail Wheel).

APPENDIX A

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7. With the pilot seated in the cockpit, record the total weight on the scales of both front wheels. This can be called WM (Weight Main wheels).

8. With pilot still on board, record weight on the tail wheel. This can be called **WT** (Weight Tail wheel).

9. Next, multiply (WM) x (DM). This figure is called a *Moment* **MMW** (Moment Main Wheels).

10. Do the same for (WT) x (DT) to get **MTW** (Moment Tail Wheel).

WEIGHT AND BALANCE

11. Now add together (**WM**) + (**WT**). This is the **TAW** or *total aircraft weight.*

12. Add the two moments determined in Steps #9 and 10 **(MMW** + **MTW)** to get **TM** (Total Moment).

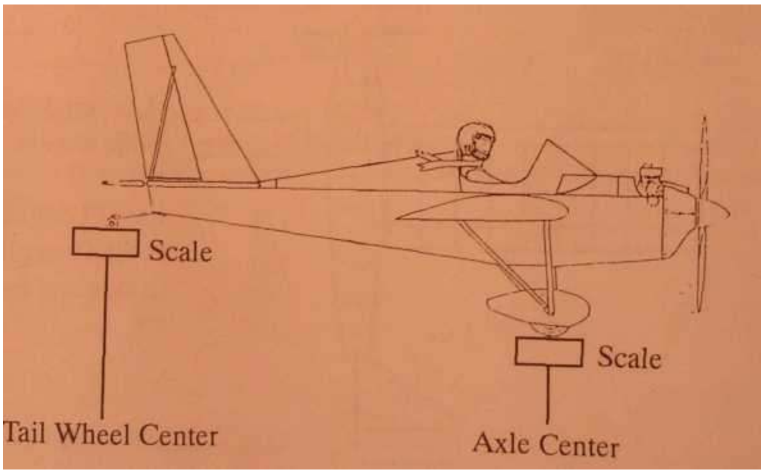
13. Divide this figure. **TM,** by the total aircraft weight **TAW** (from Step #11).

14. The answer will be the distance in inches from the wing leading edge to the *Center of Gravity* (C.G.).

15. To find the C.G. in percent of the wing chord, divide this answer by the chord (54 inches).

<u>For all TEAM aircraft, the C.G. should be between 11.3 and 16.2 inches, or 21 % to 30%.</u> Optimum flight characteristics have been obtained with the C.G. at approximately 28-29%.

Fuel weight will have a slight effect as it burns off, and you **may wish to calculate** the C.G. location with both empty and full tank(s).



WEIGHT AND BALANCE

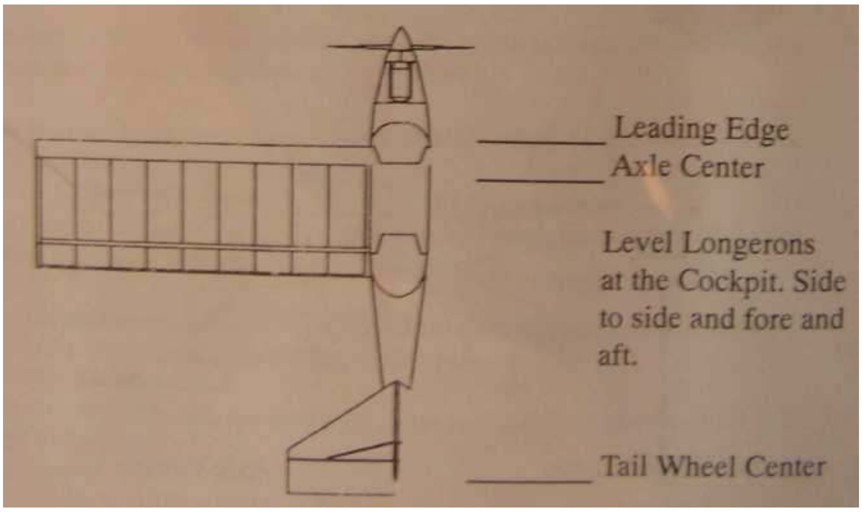
Now refer to the correct weight and balance envelope for your model Draw a line straight up from the "total weight." and a horizontal line straight across from the C.G. location.

If these lines intersect in area "A." your aircraft falls into the equivalent "utility" category, and is safe for maneuvers not exceeding a load factor of +4 4 and -1.8 G`s.

If you fall within area "B." your aircraft falls within the "Standard" cat-egory, and is good to +3.8 and -1.5 G's.

In many cases, you may find that, with empty tanks you fall within one category and with full tanks, the other. If this is so you may need to experiment with partially filled tanks to determine your actual limits.

If you have installed optional tanks (for example an additional 5 gallon tank behind the seat), you may fall within the proper weight and balance envelope with tanks empty and full, but the center of gravity may actually be too far aft with the forward tanks empty and the rear tank full. In this case, you should always use fuel from the rear tank first.



LOADED WEIGHT AND BALANCE CHART

DM=________ DT= _________WM= _________ WT= ________

Main Wheel Moment:

WM________ x DM _________=MMW_________

Tail Wheel Moment:

WT ________x DT _________=MTW _________

Total Aircraft Weight:

WM ________ + WT__________=TAW_________

Next, add the two moments:

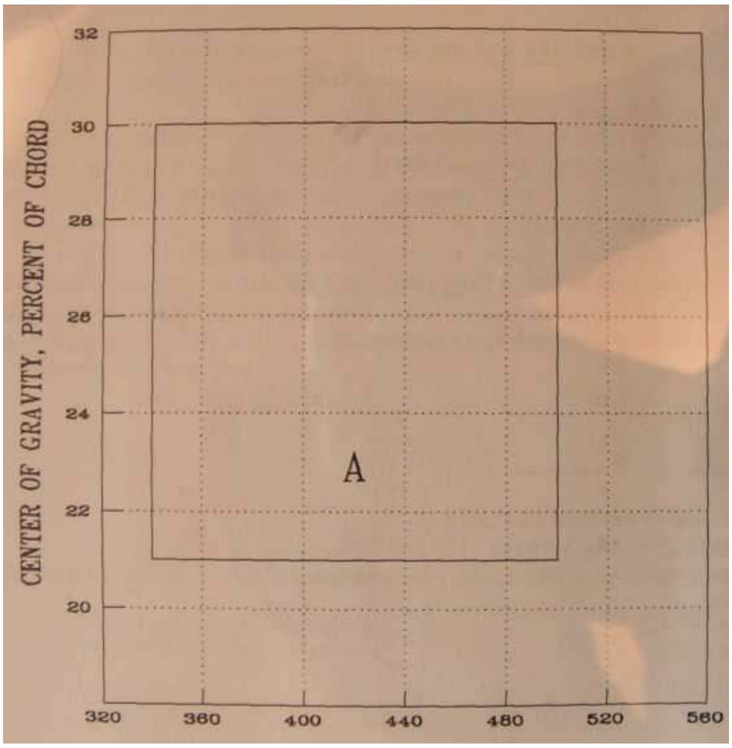
MMW_________+MTW _________ =_________ TM

Next, divide total moment by total weight:

TM________ / TAW_________ = _________ " CG.

CG ________ /54 _________ % Chord.

CG should be between 11.3" and 16.2"
% Chord should be between 21% and 30%.
Optimum flight characteristics have been obtained with the C.G. at approximately 28-29%.

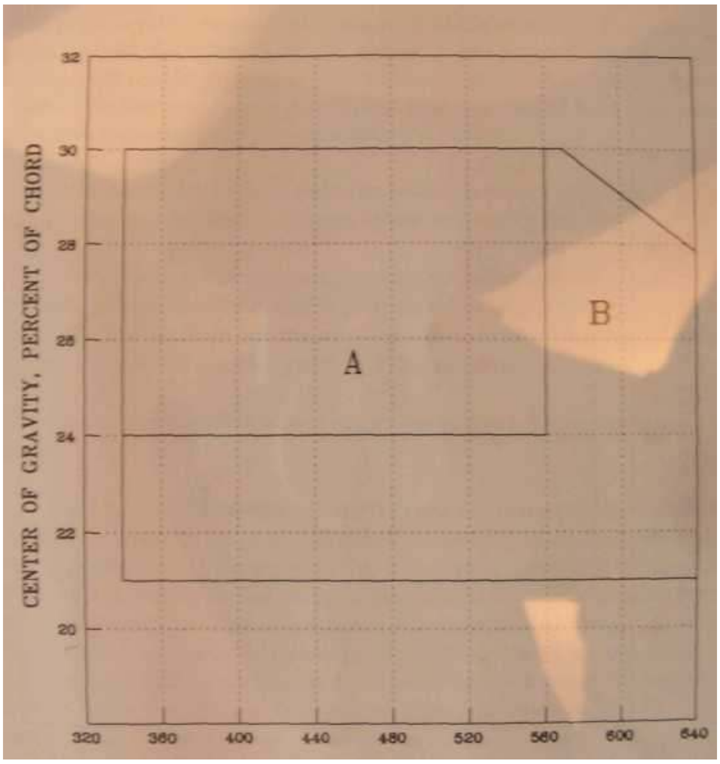


TOTAL WEIGHT, INCLUDING PILOT, LBS MAX-103

WEIGHT AND BALANCE

WEIGHT AND BALANCE ENVELOPE *MINIMAX*
ZMAX. HiMAX

SEPTEMBER 1998

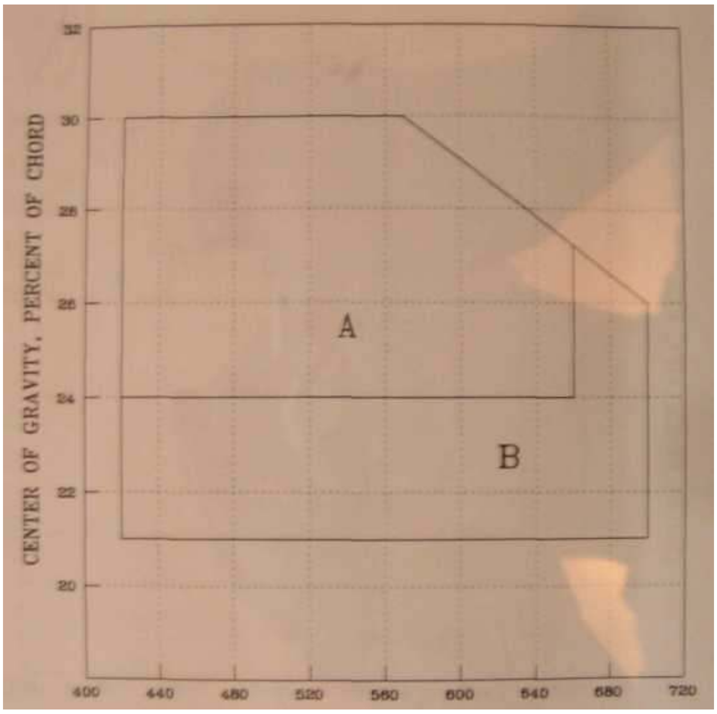


TOTAL WEIGHT. INCLUDING PILOT. LBS

MINIMAX, HIMAX, ZMAX WEIGHT AND BALANCE

WEIGHT AND BALANCE ENVELOPE VMAX, EROS

SEPTEMBER 1998



TOTAL WEIGHT, INCLUDING PILOT, LBS

TEAM V-MAX AND EROS WEIGHT AND BALANCE

APPENDIX B

FLIGHT TEST PROCEDURES

Flight test of your new TEAM aircraft must be preceded by a verv care-ful preparation.

First, prepare yourself. You should have a reasonable proficiency in flying *taildragger* airplanes such as Piper Cubs. Aeronca Champs, or the like. Ultralight experience would also be very valuable. At least some of your flight time in such airplanes should be at least proficient to solo these airplanes. Also read the following section "Reflections on your first flight." to get an idea of what your fellow builders have learned from their experiences.

Next, perform the weight and balance calculations of appendix A. *Do not attempt any flights, even high speed taxi, before completing this step!*

Now perform the most thorough preflight you have ever done. Have your pilot friends, and any one else available perform a thorough preflight. At least one of you should find the loose nut, the empty gas tank, loose prop bolts, unsafetied wing pins, or other discrepancies you forgot during assembly.

Engine run-in should have been performed per the engine manual instructions.

The first order of business is simply to practice taxiing the aircraft, which will familiarize you with the ground attitude and handling characteristics. A grass runway is preferable for the early testing and flights, especially for low time taildragger pilots. Tail down and tail up taxiing should be done, with several runs up and down the runway. Note the tachometer and airspeed readings. You should probably burn at least one-half a tank of gasoline during this phase. Just in case, be mentally prepared to fly, since the aircraft is probably much lighter than anything else you've flown, and *you will be airborne <u>before</u> you expect it.*

Now. repeat the thorough preflight to detect any looseness that developed during the taxi runs. Vibration may have loosened any improper glue joints or improperly tightened or safetied fittings by this time.

Refill the gas tank, and prepare for your first flight!

FLIGHT TEST PROCEDURES

There are two common approaches to the first flight. One approach is to make a series of "crow hops", where you fly a short distance at just a few feet of altitude and then land straight ahead before reaching the end of the runway. This is advantageous in case anything goes wrong (such as an engine failure), but has the disadvantage of keeping the aircraft in the most hazardous regime (close to the ground at low speed) for a relatively long time. We would recommend this approach if you arc an experienced pilot with a long runway available.

The other approach is to make the first flight a complete circuit of the pattern. The disadvantage is, of course, that if anything goes wrong (again, such as an engine failure or missing nut or bolt), you are further from mother earth. The advantage is that you have more space to learn the feel of the airplane without worrying about inadvertently contacting something hard (like the ground).

Whichever approach you choose, you eventually have to get away from the runway! Plan your first flight so as to *have a place to land at all times* if the engine fails.

Again, a grass runway, if you have one available, is more forgiving of a taildragger aircraft. If not, remember that TEAM aircraft without the optional brakes tend to roll freely on pavement. Perform your take-off checks using the printed list as a guideline. Taxi to the runway centerline, just as you did on the taxi runs or your "crow hops", but-tis time you fly!!

Smoothly add power until the throttle is fully open, correcting for "torque" effects (note that left - not right - rudder will probably be required with the *V-MAX* and Rotax powered models).

Note that *TEAM* aircraft are lighter than most other experimental, and accelerate very rapidly. Use forward stick to raise the tail (if you are not already airborne!) for your first few flights. At an airspeed of 30-35 mph (calibrated air speed) raise the nose to lift off.

Allow the aircraft to accelerate to about 45-50 mph for a normal climb. This will allow adequate energy for a power off landing if the engine fails. *Remember - normal engine out approach speed is minimum 45 mph.*

Once you achieve several hundred feet of altitude, you may begin experimenting with the controls. When you are comfortable with plenty of altitude, you should try a few stalls. Power off, you probably will not get a good stall break, since the windmilling propeller reduces the elevator effectiveness. In this "mushing" mode, the ailerons should remain effective, although more rudder will be required for coordination.

FLIGHT TEST PROCEDURES

We have down the aircraft to speeds just above stall with full power. In this condition, vigorous use of the ailerons may result in the wing with the "down" aileron stalling and a roll opposite aileron deflection. Relaxation of the back pressure on the stick and use of rudder and aileron will result in rapid recovery.

Slips are effective in increasing drag and steepening the glide angle. Experiment first with plenty of altitude to get accustomed to slip characteristics.

The first landing should be performed with no flaps and a little power since the MAXes have a fairly steep glide angle. Maintain an approach speed of 50-55 mph and an approach path similar to a Champ or Cub.

For the first few landings, continue to fly the airplane on with a little power and a slightly nose up attitude as you near the ground. After touchdown, hold the stick full back to keep the tailwheel on the ground for steering and close the throttle.

As you get accustomed to the characteristics, try power off landings, maintaining an airspeed of at least 50 mph into the flare. Note that this airplane is not a floater, and once you flare, you are down.

Congratulations, you are now a proud *TEAM Aircraft* owner and pilot! Many more hours of pleasurable flying await you, providing you exercise the *proper care and good judgment* as "pilot-in-command".

Reflections on Your First Flight

With many TEAM aircraft now flying, we have had an opportunity to receive feedback about many of your fellow builders first flights and how they went. Some of this accumulated wisdom may help you on your first flight.

1. If a soft grass area is available for first flights, by all means use it. The aircraft (and any light taildragger) will handle much more smoothly and be more docile on grass, whereas on pavement, it can be much more sensitive.

2. Very little forward stick is needed to raise the tail on takeoff. For a pilot accus tomed to flying a Champ or Piper Cub, the tail of a MAX will come up much faster than you think, in fact, just about everything will happen much faster than you expect! Stick slightly forward is sufficient, and *apply power slowly.*

FLIGHT TEST PROCEDURES

3. After your initial take-off and climb-out, if the cylinder head temperature is OK and the engine is running smoothly, take your time and don't be in a rush to land. Get some altitude and feel out the airplane's handling.

Shoot two or three long, leisurely approaches to accustom yourself to how the aircraft responds to the controls and the throttle.

The elevator trim tab will need to be adjusted (unless you have the optional electric adjustable tab), and you will need time to relax in the air and evaluate your specific needs.

4. Even high time pilots accustomed to flying heavier, faster airplanes will need to re-adjust their reactions in ultralight aircraft.

First of all, the plane will react faster to changes in the throttle, and will slow down faster than anything else you have flown. The power off glide will be much steeper than you think, and you will need extra airspeed to have enough energy to flare for the landing - and when you begin to flare, you will slow down very quickly!

5. From our experience and feedback we have received, we recommend you do not use flaps (if installed) for your initial flights, and never for a power off landing, since there is insufficient elevator power to overcome the nose down pitching ten dency with the flaps lowered.

The only reason flaps were included in the original design was to meet the requirements of the Federal Aviation Regulations, part 103, specifically the minimum stall speed.

The only time we recommend using the flaps is for soft field take-offs and possibly for soft field landings, when you can make a long, shallow power-on approach.

6. Many of you have called after your first flights and commented on how strong the landing gear is. In our conversations with you, we have found several common reasons for frequent hard landings:

First, many of you tend to use flaps for your first landings, perhaps from previous habits learned in "regular" airplanes. As mentioned above, flaps cause a nose down pitch, and you slow down to flare, you run out of elevator power and can't get the nose up to complete the flare.

Second, many people are making their approach *too slow,* resulting in, again, running out of elevator power in the flare. One reason for this might be an erroneous airspeed indication, since in many of these cases, the pilot claimed a top speed, with a Rotax 277 engine, of about 85 mph! You can certainly rest assured that such an airspeed is incorrect, since the top speed of a 277 powered MAX-103 should be about 70 mph. The cause of the inaccuracy is probably the location of the static pressure pick-up. The section labeled "STATIC PRESSURE MEASUREMENT" may enlighten you on improving this situation.

Third, the *MAX* planes, being small and light, have a relatively *sleep glide angle with power off.* For example, a Cessna 150 will glide about 10 feet forward for each foot of altitude loss, whereas a *MAX* will only manage about 6.5 feet forward for each foot of altitude.

If you are accustomed to typical light planes, you may be fooled into flying a too shallow approach and getting too slow. To avoid this, make your first approaches with power on at an airspeed of about 50-55 mph. Make a few practice approaches first a high altitude so you will have a chance to evaluate the glide and airspeed control without worrying about contacting the ground.

After you have made a few power on landings, try a power off (or idle) glide at altitude to see what nose down attitude is necessary to maintain an airspeed of about 60 mph (which is a good airspeed for your initial power off approaches). It *will probably be a lot steeper than you expect.*

Incidentally, don't perform power off glides for more than 20-30 seconds at a time without adding power, otherwise, you may load up the engine and have to shoot a real power off approach before you really want to!

APPENDIX C

STATIC PRESSURE MEASUREMENT

Errors in airspeed measurement are usually caused by an inaccurate static pressure measurement. If you just leave the static port on the airspeed indicator open to cockpit air, this will probably give a very optimistic airspeed reading.

A simple and reasonably accurate position for the static ports has been found to be on the fuselage sides along the diagonal braces between the top and bottom longerons in the fuselage bay just forward of the front horizontal stabilizer attach points (both sides). These diagonals are easily reached with the tail removed, so it is a simple retrofit.

The following figure shows how we have installed the static ports on our factory airplanes. You can probably find all the materials in your scrap box.

Just glue a 3/4 inch square by 1-1/2 inch long pine block to a 1-1/2 inch square piece of 1/8 inch plywood. Drill a 3/16 or 1/4 inch hole in which to glue a short piece of tubing of the same outside diameter and about 1-1/2 inch long, as shown. Make one for each side, of course.

Then glue these assemblies to the above mentioned diagonal braces on both sides, being sure to also glue the fabric to the plywood. Glue a 1 inch (approximate) disk of thin aluminum or plastic to the fabric covering right over the plywood, and, once the glue has cured, drill a 1/16 inch hole through the center of the disk and the plywood.

Connect a piece of plastic or rubber tubing between the static port on your airspeed indicator and the tubes that you just installed protruding into the fuselage, using a plastic "T" as shown, being sure to route the tubing so that it is clear of the control cables and will not chafe through the fabric.

STATIC PRESSURE MEASUREMENT

You should then calibrate your system by flying a known distance in two directions for several airspeeds, ranging from your normal landing approach speed up to maximum level speed, timing the passes. Convert the time and distance into speed and you have an airspeed indicator calibration.

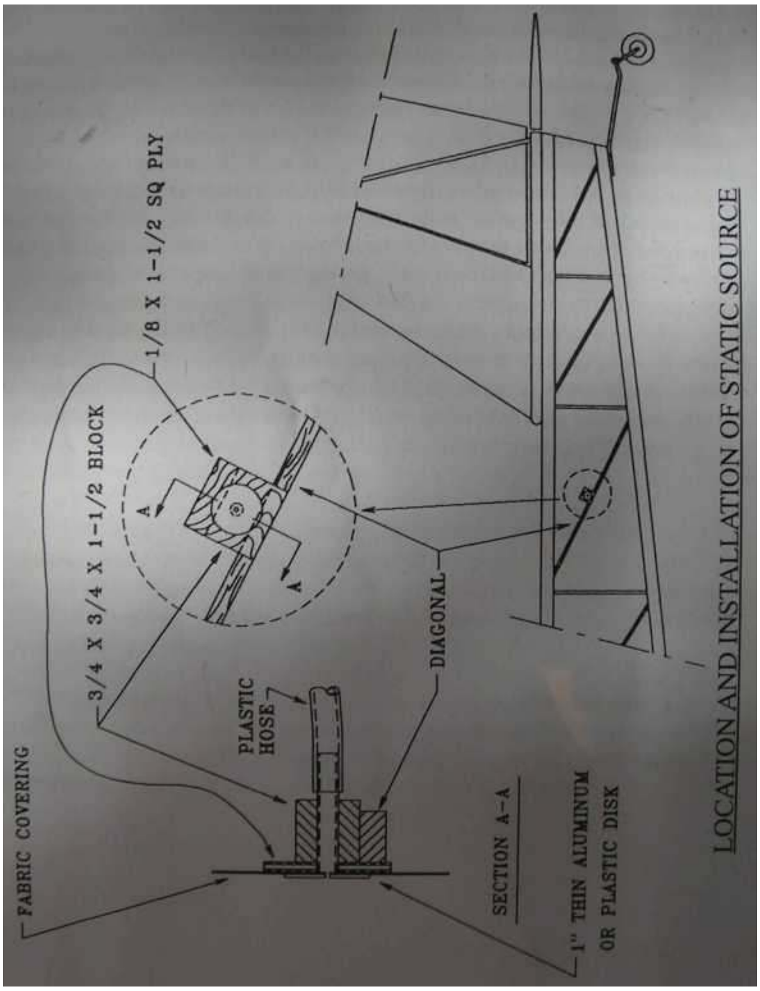
For further details on airspeed and other calibrations, see the article written by TEAM for the November 1987 issue of the EXPERIMENTER (back copies available from the EAA).

Airspeed errors can also be caused by an improperly located pitot tube. We usually attach the pitot tube to the wing strut (either side will do), but you have to be careful. If you locate the pitot too far inboard (close to the fuselage), it will be influenced by the high speed prop wash, giving a high airspeed indication.

Likewise, locating it too far outboard (resulting in the pitot being too close to the wing) can result in an improper reading. We have found the best location to be just below the strut about 12 inches from the outboard strut-to-wing bolt. This should put the pitot tube about 8-9 inches below the lower wing surface.

STATIC PRESSURE MEASUREMENT

Static Port Installation:



APPENDIX D

ELEVATOR TRIM TABS

In order to trim your MAX for hands off flight in level flight, an elevator trim tab is required. If you have installed the optional electric trim tab. this is all you require. If not. a ground adjustable tab is needed. This is due to two things: First, the wide chord wing and highly cambered airfoil cause a large nose down pitching moment; and second, the elevator is relatively large and heavy and tends to droop.

A simple trim tab can be mounted as follows: Cut the tab from 0.020 inch aluminum sheet, approximately 3" by 24" (actually, we usually use aluminum siding - which has the additional advantage of a 10 year warranty!). Make a 10 degree bend 3/4" from one (long) edge. Bolt or pop rivet about every 3 inches to the trailing edge of the elevator, with the tab deflected down. This 10 degree bend is preliminary, and can be adjusted as needed until you can fly hands-off.

APPENDIX E

AIRFRAME MAINTENANCE SCHEDULE

Hours	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400
<u>Component</u>																
Seat *																2
Seat Belt								2								2
Spar Carry Through				2				2				2				2
Wing Root Fittings				2				2				2				2
Tail Braces								2								2
Tail Spring*								2&4								2&4
Wing Struts								2								2
Fuselage Strut Fittings†				2				3				2				3
Landing Gear Leg Hinges*								2&4								2&4
Push Pull Cable Fittings*		1		1		1		2		1		1		1		2
Elevator Horn								2								2
Push Pull Cables*				2				2				2				3
Rudder Horn								2								2

LEGEND:

1. Lubricate or service
2. Inspect (remove if necessary), replace if necessary.
3. Recommended replacement.
4. Check: nut or bolt tension.

† HiMAX only.

* Inspect closely after any hard landing.

NOTE: When maintenance is performed, check it off on chart above and make your log book entry.

AIRFRAME MAINTENANCE SCHEDULE

Hours	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400
Component																
Control Stick*				2&4				2&4				2&4				2&4
Control Stick Brackets*				2				2				2				3
Rudder Pedals & Hdwe.*								2&4								2&4
Control Surface Hinges		1&4		1,2&4		1&4		1,2&4		1&4		1,2&4		1&4		3
Wheel Bushings				1&2				1&2				1&2				1&2
All Channels, Brackets				2				2				2				2
Strut to Axle Bolts*		4		2&4		4		3		4		2&4		4		3
Spar Pins (or bolts)				2				2				2				2
Prop Bolts	4	4	4	2&4	4	4	4	2&4	4	4	4	2&4	4	4	4	3
All Other Bolts				2				2				2				2&4
All Other Hardware				2&4				2				2&4				2&4
Wheel Parts*								2								2
Fabric								2								2

LEGEND:

1. Lubricate or service
2. Inspect (remove if necessary), replace if necessary.
3. Recommended replacement.
4. Check: nut or bolt tension; pin wear.

† HiMAX only.

* Inspect closely after any hard landing.

NOTE: When maintenance is performed, check it off on chart above and make your log book entry.