

SHIRL DICKEY ENTERPRISES

Home of the 'E-RACER'

8631 W. College Drive
Phoenix, AZ 85037
(602) 691-0515
(602) 639-2314

The E-Racer (MK-I) is a high speed, cross country aircraft designed around the proven aerodynamics of the Rutan Long EZ. It is unique in that it uses an automotive V-8 engine, a marine adapted gear reduction unit, a fully retractable landing gear, and two place, side by side seating. The main objective of this design was to build a fast, safe, comfortable and low cost aircraft that would be easy to build using proven composite construction materials and methods. The Long EZ was chosen as the basis for this design because of its well established flying qualities and stall proof safety. The E-Racer (MK-II) has the added flexibility to handle an aircraft engine located in the standard Long EZ location. The recommended engine for this application is the Lycoming O-320. The following is a brief list of E-Racer statistics:

AIRFRAME:	Wing span;	26.2 feet
	Canard span;	147 inches plus tips.
	Landing gear;	Hydraulic, fully retractable
	Empty weight;	1127 lbs MK-I, 1000 Lbs MK-II
	Gross weight;	1800 lbs. (MK-I & MK-II)
	Fuel capacity;	46 U.S. gallons

ENGINE, MK-I:	Aluminum Buick V8	266 CID, 225 hp
	Engine weight;	285 lbs.
	Reduction drive;	1.75:1, helical gears

ENGINE, MK-II Lycoming O-320, 320 CID, 160 hp, direct drive.

PERFORMANCE;	MK-I	MK-II
Top speed (est.):	240 mph @ sea level	222 mph @ sea level
Take off speed:	70 mph	70 mph
Take off dist.:	1000 feet	1400 ft
Landing dist.:	1500 feet	1500 feet
Climb rate:	2500 fpm, gross wt.	1600 fpm, gross wt.
Range:	1000 S.M. @ 65%	1155 S.M. @ 65%
Fuel burn:	7 to 12 gph	6 to 9 gph
Prop, wood:	68 X 88 fixed pitch	68 X 70 fixed pitch

The E-Racer is available only as a plans built aircraft in either the MK-I or MK-II configuration. The following prices are in effect at this time;

AIRFRAME PLANS (MK-I or MK-II)	\$250.00
QUARTERLY NEWSLETTER	\$12.00
INFORMATION PACK	\$9.00
E-RACER VIDEO	\$20.00

For more information contact Shirl Dickey at the address listed above.

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DEAR E-RACER INFORMATION PACK PURCHASER:

THANK YOU FOR YOUR INTEREST IN THE E-RACER FOR A POSSIBLE HOMEBUILT AIRCRAFT PROJECT. YOU HAVE SELECTED ONE OF THE FINEST AIRCRAFT DESIGNS ON THE HOMEBUILT MARKET.

THE E-RACER HAS BEEN ENGINEERED TO BE A SAFE, STALL RESISTANT AIRCRAFT THAT ALSO OFFERS A HIGH LEVEL OF PERFORMANCE. A MAJOR FEATURE OF THIS DESIGN IS THE SIMPLE WEIGHT AND BALANCE MANAGEMENT PROCEDURE. NO RE-BALLASTING IS REQUIRED IN ORDER TO REMAIN WITHIN THE C.G. ENVELOPE WHEN THE AIRCRAFT IS FLOWN EITHER SOLO, OR TWO PLACE. NO OTHER RUTAN DERIVATIVE CAN MAKE THAT CLAIM. ONLY THE LONG EZ HAS THE SAME (NO NEED TO RE-BALLAST) WEIGHT AND BALANCE SIMPLICITY.

THE E-RACER IS A VERY VERSATILE DESIGN. IT CAN BE BUILT USING EITHER AN AUTOMOTIVE ENGINE (THE MK-I) OR AN AIRCRAFT ENGINE (THE MK-II). EACH VERSION HAS ITS OWN UNIQUE FEATURES. THE MK-I USES A LOW COST, MORE POWERFUL AUTO ENGINE BUT HAS LESS BAGGAGE VOLUME. THE MK-II USES A MORE EXPENSIVE, LESS POWERFUL AIRCRAFT ENGINE BUT HAS SUBSTANTIAL VOLUME FOR BAGGAGE OR IN SOME CASES, ROOM FOR A CHILD BEHIND THE TWO FRONT SEATS. BOTH VERSIONS BENEFIT FROM THE SIMPLE, LOW DRAG RETRACTABLE LANDING GEAR. YOU, AS THE BUILDER CAN SELECT THE VERSION THAT BEST MEETS YOUR NEEDS.

THE FLYING QUALITIES ARE ONE OF THE BEST FEATURES OF THE AIRCRAFT. IT IS A DELIGHT TO FLY WITH ITS PRECISE CENTER CONTROL STICK. THE CONTROLS ARE LIGHT, WELL BALANCED AND RESPONSIVE. THE LANDING IS NOT LIMITED TO A PRECISE LANDING SPEED, IT WILL TOUCH DOWN SOLIDLY BETWEEN 70 MPH AND 100 MPH. IT ALSO HAS EXCELLENT CROSS WIND CAPABILITY.

THE PROVEN COMPOSITE CONSTRUCTION IS THE FASTEST, SIMPLEST MEDIUM FOR A HOMEBUILT AIRCRAFT AND IS ALSO THE MOST DURABLE. CONSTRUCTION TIME SHOULD BE BETWEEN 1500 AND 2000 MAN HOURS. MANY PREFAB COMPONENTS ARE AVAILABLE THAT CAN REDUCE YOUR BUILD TIME SUBSTANTIALLY. EXPERIENCE HAS SHOWN THAT THE HIGH DOLLAR AIRCRAFT KITS CAN NOT BE COMPLETED ANY FASTER THAN THE SCRATCH BUILT RUTAN TYPES INCLUDING THE E-RACER.

IN SHORT, WHEN YOU CONSIDER THE LOW COST TO BUILD AND THE HIGH LEVEL OF PERFORMANCE AND VERSATILITY THAT IS DELIVERED, THE E-RACER IS THE BEST HIGH SPEED, EFFICIENT, CROSS COUNTRY AIRCRAFT ON THE HOMEBUILT MARKET TODAY.

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KING RACER CONVERSION DETAILS

This option consists of the following configuration changes to the basic E-Racer fuselage:

A. The cockpit is moved aft in the fuselage four inches. This positions the front seat occupants closer to the center of gravity allowing a greater weight change before C.G. range limits are exceeded. A weight change from one occupant (pilot) to two occupants (pilot and passenger) in the standard E-Racer is 200 lb., and with the King Racer this goes up to 240 lb. The E-Racer front seat max. weight (pilot and passenger) is 400 lb, the King Racer is 460 lbs.

B. The cockpit is widened an additional two inches, from 42 inches to 45 inches at the shoulder. This produces additional comfort for larger occupants.

To implement these configuration changes the following items must be modified:

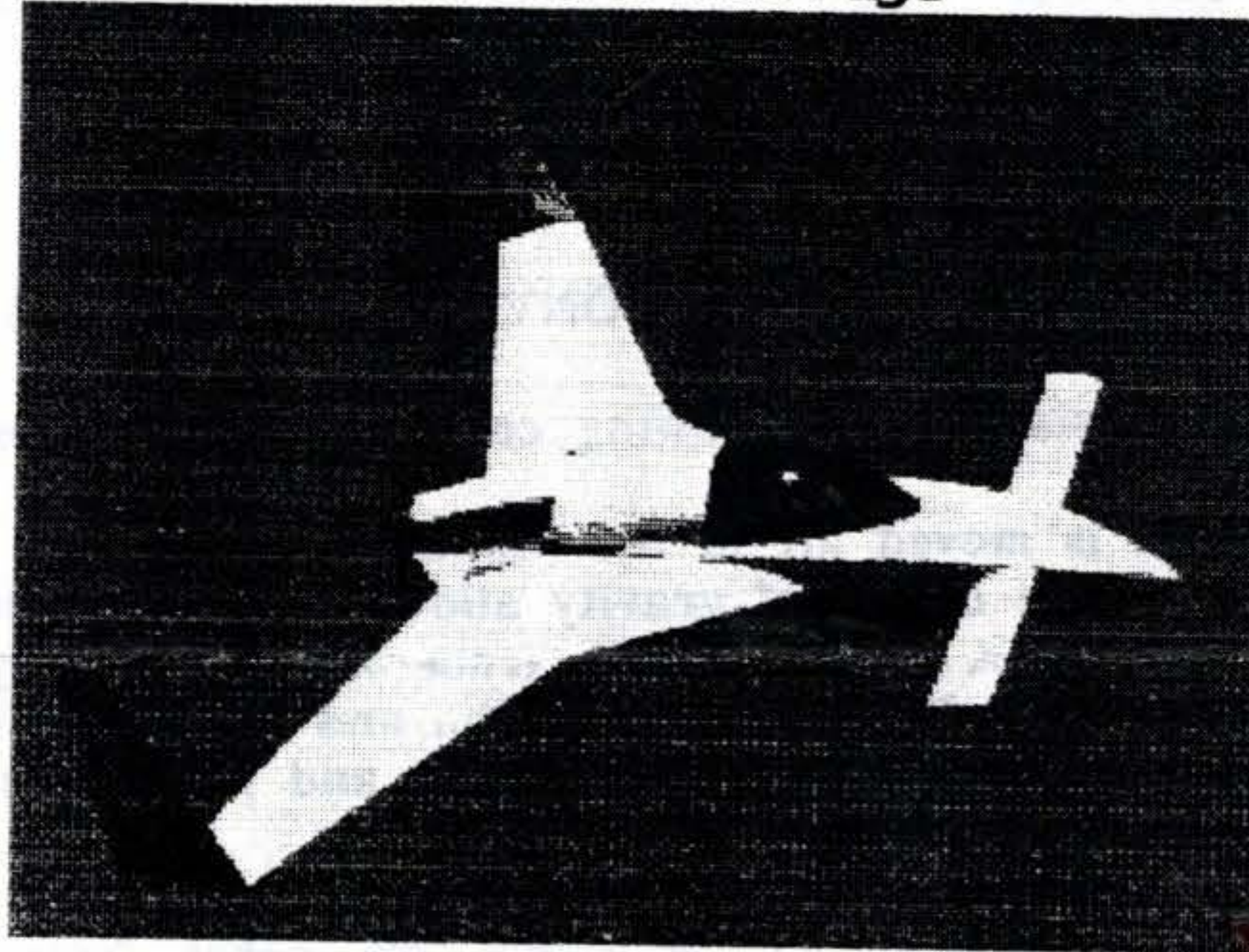
1. On drawing ER 1-1. Move the instrument panel from FS-50 to FS-54.
2. On drawing ER 1-1. Move the seat back bulkhead aft four inches so that the aft surface of the headrest moves from FS-88.5 to FS-92.5. Seat back angle remains the same.
3. The seat back bulkhead in Chapter 2 must be modified to add one inch to each side for a two inch overall increase in width. Note that the seat back bulkhead is not square, it is narrower at the bottom than it is at the top due to fuselage taper.
4. The instrument panel must be modified to add one half inch to each side for a one inch overall increase in width.
5. The canopy bulkhead uses exactly the same rear canopy contour as the standard E-Racer. You must flair the canopy frame below the Plexiglas to match the outer edge of the longeron at WL-23. This will look similar to the original E-Racer prototype canopy frame shape, only it will be two inches wider.
6. These are the major changes to the standard E-Racer to convert it to the King Racer. You may find some minor interface details that will be effected by this option as you go through the construction process, but there should be nothing too serious. Contact me if you have any questions.

Additional Notes:

1. For additional hip and leg room in either the standard E-Racer or the King Racer consider using narrower consoles, or consoles with narrow bases and wider pedestals on top for arm rests.
2. You can also gain one inch of shoulder width by increasing the depth of the shoulder area in each fuselage side from one inch as shown in the plans to one and a half inches deep. This would leave a one half inch thick fuselage wall in this area. Add one additional ply of BID locally over this area on the inside surface only if you choose to do this.

The E-Racer Hangar

World Wide Web Page



The E-Racer Hangar is a collection of E-Racer related information, products, and builder status and pilot reports. This page is maintained by Rick Pellicciotti aka eracer@magibox.net. (E-Racer S/N 128)

What's New (Updated 05/2/96)

E-Racer Information

E-Racer Kits and Components

E-Racer and Canard Accessories (Coming Soon!!)

Newsletters and Helpful Builder's hints and tips

Pilot Reports

Project Status Reports from Builders

Look at the E-Racer Interest List (its growing!!)

Add to our E-Racer Guest List

R.A.C.E. Info and Schedules

Other Related Sites

Web page visitors from 11-13-95 to 4-30-96, over **5000!**

Since 5-1-96: **584**

E-mail me for Information or Comments: eracer@magibox.net

This page last updated on 5 May 96 by jrp

<http://www.he.net/~eracer>

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E-RACER NEWSLETTER #26 MAY 1996

It is mandatory that all E-Racer builders subscribe to this newsletter as this is the only formal system I have to communicate information and plans updates to the builders.

The copying and re-distribution of this newsletter to other interested persons by subscribers is authorized and encouraged.

When writing to SDE with questions, please send along a stamped, self-addressed envelope if you wish a personal reply. If you call, you can usually reach me during normal business hours at the above listed number.

The following prices for SDE supplied items are in effect as of the date of this newsletter:

Information kit	\$9.00
Newsletter.....	\$12.00
Airframe Plans, MK-I & MK-II	\$250.00
E-Racer Video (refundable w/plans purchase)	\$20.00

I am now releasing plans to builders who wish to build the E-Racer Mk-I, Mk-II or the King Racer configurations. I am also supporting Mk-I builders with technical support on the Buick V-8 and Chevrolet V6 versions. If you wish to discuss other engine options please contact me for my specific recommendations.

E-RACER PROTOTYPE ACTIVITIES

I have made two flights on the E-Racer Prototype with the new turbo charger installed on the Chevy V6. These flights have been very promising with regards to the performance this combination will offer. I have not made any full power sustained speed runs as yet. I am still evaluating the cooling and thermal protection while gaining confidence and understanding of this new system. I can say that on the second flight, at 5000 feet ASL I was cruising at 4000 RPM and 28.5 inches of manifold pressure and recorded a speed of just over 200 mph. This represents a slight increase in speed over the previous (naturally aspirated) configuration. The increase in speed under these conditions means that the airframe drag is less than it was before. This is because I have sealed up the cowl where the old dual exhaust headers exited the engine bay in the forward cowl, and replaced them with a single turbo exhaust pipe located just forward of the prop in the aft cowl. In other words, the new configuration has less airframe drag than the old configuration. This is true since the thrust with the same prop at the same speed is the same in both cases and since the speed is higher in the second case with the same thrust, it can only be the result of lower airframe drag. This is just one of the smaller benefits of the turbo installation. I also added power on this run, bringing the manifold pressure up to 30 inches. This only took a small

increase in throttle position (about half throttle). The result was an engine speed of 4700 rpm which was the highest I have ever seen at this altitude with any previous engine or configuration. The speed was climbing briskly through 230 mph when I backed off due to oil temperatures approaching red line. I wanted to cool things off and so I returned for a landing to evaluate plug readings and thermal protection performance. It should be noted that 30 in. manifold pressure is no more than sea level power. I have designed the turbo system to deliver an additional 10 psi above sea level. I can see from this flight that it will not be long before I change my PSRU gearing to prevent overspeeding the engine when I move to the higher power levels that are as yet unexplored. I have a 1.56:1 gear set that I will use to replace the 1.75:1 gear ratio currently in the box. This change will allow me to drive the prop to faster speeds that can absorb the higher power while holding the engine speed to acceptable levels. I can do this because my prop has excess speed margin before it goes into an inefficient (trans-sonic) speed range. If I still have too much power I will have to install a heftier prop that will be able to dissipate the available horsepower, but that is still to be determined.

Needless to say, I am extremely pleased with the potential that this combination has demonstrated to date. It will take some time and testing to optimize this configuration. I need to get my oil temperatures down and the under cowl temperatures and pressures are higher than I like and will also require improvements. I also plan to immediately add a cold air (ram air) induction system to reduce turbo inlet temperatures. This will result in lower EGT's and increased detonation margin. I am also assembling an electronic fuel injection system that will further optimize the engines efficiency and performance through very precise control of fuel delivery and mixture ratios under variable boost and altitude conditions. The biggest benefit of EFI is not the efficiency, but peace of mind knowing that the engine will never run in a lean condition that could damage the engine. The system I now have is a Marvel-Schebler HA-6 aircraft carburetor mounted ahead of the turbo which has worked extremely well, nevertheless, the mixture is manually controlled by the pilot, and a mixture mistake under boost conditions could spoil my whole day. The computer is always in control and never makes a mistake, right? Just in case the computer ever does fail, I am leaving the HA-6 in place in the induction system during EFI operation with its mixture control at idle cut off. A computer failure would only require me to push the carburetor mixture to full rich and it would take over the fuel delivery function and fly me home with a dead EFI. I like this because the carburetor provides a mechanical back up to an electronic system with little or no penalty to weight or system performance. I am now offering this Electronic Fuel Injection system to you the builder. It is a proven system that is currently flying on over 30 other aircraft. More on this in the new products section of this newsletter.

SUGGESTIONS FROM THE DESIGNER

1) I have always recommended that the brake master cylinders for the E-Racer be located on the FS-125 bulkhead like the long EZ. The E-Racer prototype has this arrangement and it has worked well for me. The usual reason given for mounting them forward has been to shift weight forward. This always seemed like a lame reason since they weigh only pound or so and the A/C empty CG shift that resulted did not justify the effort. I now believe there is a much better reason to locate them forward. With the brake master cylinders located on FS-125 all of the braking forces must be reacted through the rudder peddle assembly and the rudder cables that run aft. This causes some pretty severe torque loads to be placed on the rudder peddle cross tubes

and the cable loads in the plastic conduit could cause early internal conduit wear and possible failure. These loads and wear can be almost completely eliminated by mounting the master cylinders forward of the rudder peddles and actuated directly from the peddles. Only the rudder deployment loads would be seen in the rudder peddle cross tubes and cables and these loads are much lower than the braking loads exerted from the application of the brakes. For this reason I now strongly support locating the brake master cylinders in the forward location.

2) Those of you who are using the electro-hydraulic pump to actuate the main gear hydraulic system need the following information:

A really good landing gear switch can be purchased from Flame Industries, Van Nuys, CA. (818) 700-2905. This is the same switch used in a Cutlass RG. The part number is MS-25127-E3, and it sells for about \$40.00

An excellent pressure switch is available from Lancair which is used on the Lancair 320. Contact them for more information on this product.

If you use relay solenoids in your system, do not use the cheap Ford starter solenoids. They are not rated for continuous duty and will fail. You must use a relay that is rated for at least 30 amp continuous duty.

NEW E-RACER COMPONENTS AND SERVICES AVAILABLE

* **ELECTRONIC FUEL INJECTION.** As mentioned above, I am building up an EFI system for my turbo Chevy V6 that can be custom tailored for any application. It can be customized for any 2, 4, 6 or 8 cylinder air cooled or liquid cooled, boosted or naturally aspirated engine. It is a 'speed-density' based system. This type of EFI is emerging as the preferred system for the newest automobiles available today. It has a number of features that make it desirable for aircraft use... It will continue to operate (at reduced efficiency) even if most of the sensors are lost. This provides a limp home mode in case of a partial failure. This system has been under development for over 10 years and is currently flying on over 30 different aircraft including aircraft and auto engines. It is based on an ECM made by Motorola that is used extensively by the auto industry. I will test fly this system on my aircraft and then make it available to you the builder. Basically, I buy all the hardware components including all sensors, harnesses and ECM computer as well as cover all software programming charges and machine work. I build or modify the induction system to accommodate the fuel injectors, injector mounts, fuel rails, fuel pumps and regulators, which are custom made for your specific application. My supplier does the custom programming that tailors the computer to your specific engine and he provides me with a high quality custom harness to fit your installation. We even have an O2 sensor that is compatible with leaded aircraft fuels designed by NASA (an extra \$250 charge) or the system can be designed to operate normally without an O2 sensor. I can offer this to E-Racer builders at substantially reduced prices as compared with what the after market EFI suppliers charge the auto industry. I plan to operate this system in conjunction with an aircraft carburetor as a last ditch back up in case of a total electrical failure. I will provide the Engineering to include this feature in your system as well. I am introducing this system for a base price of \$1800.00 for the EFI system complete for a 4 cylinder engine. Other engines

will be slightly higher. Additional features including ignition control and leaded fuel O2 sensors would be extra. Contact me for a customized quote for your engine. Note: This is the same EFI system that is included with the 3.1 L and 3.4 L Chevy V6's offered elsewhere in this newsletter.

* **E-RACER ELECTRIC NOSE GEAR LIFT.** The E-Racer has the great feature that it does not need to kneel on its nose when left unattended or tied down. This is nice except for when you have to get in or out of the A/C. I am so used to just bounding into my E-Racer that I did not pay much attention to the needs of others who might not find this so easy. Jack Morrison's E-Racer (ER-113) is equipped with an electric nose lift that can lower or raise the A/C easily with two people in the front seats. He has made his system available to me so that I can offer it to E-Racer builders and pilots that would also like this feature. I think that anyone who might have difficulty entering the A/C or has a passenger that would like an easier entry to consider this option on his E-Racer. It also has the advantage that it can be manually cranked down from the instrument panel using a small 1/4" ratchet handle in case of a loss of electric power. In an emergency, the main gear will free fall down and locked (if equipped with a spring) but the nose gear will not fully deploy unless it has an over ride feature like the one included with this nose lift device. I have put together a kit that includes the electric nose gear lift and mounting brackets, the main gear over center springs and hardware including installation instructions. This kit gives the E-Racer pilot the ability to raise and lower the A/C with two people on board and to safely deploy all three landing gear in case of an emergency. The price for this kit is \$895.00.

Note: Since the components in the Nose Lift Kit replaces several items in the Landing Gear Kit worth \$380, selecting this option in conjunction with an order for the Landing Gear Kit reduces the price by this amount. Therefore, the Landing Gear Kit w/ Nose Lift option would cost only \$3810.00. Anyone wanting the Nose Lift Kit who has already received the Landing Gear Kit can send back his nose gear parts (the NG-20 link and the Nose actuator) with his order and the exchange cost would be only \$515.00.

* **E-RACER WING JACKS.** I have built a really neat set of wing and fuselage jack stands for my E-Racer. They are light weight and require only one hydraulic jack which means less weight and complexity to transport or store. They have a 14 inch triangular base of square tubing with a sturdy 2 inch diameter center support. They make swinging the gear a snap and you can have the A/C up on the jacks in 5 minutes or less. They could also be used by any Long EZ derivative that has retractable gear. I will build you a set for \$195.00 including one short and two tall jack stands with lock pins and a new hydraulic jack w/ handle. I wonder why I waited 10 years to do this but that's another story.

* **E-RACER / MATCO WHEELS, BRAKES AND TIRES.** I am now a distributor for Matco Mfg. Co. I can supply Matco items direct to E-Racer builders at a slightly lower price than through regular suppliers. I have assembled an E-Racer wheel kit consisting of (2) Matco W50LD wheels and dual caliper brakes, (2) axles, (2) MC-4 master cylinders, (2) 8 ply Lamb tires with tubes for a package price of \$740.00

* **E-RACER WING AND CANARD SPECIAL.** I am now taking orders for E-Racer Wing and Canard assemblies. These wings are precision built using the proven

and flight tested solid core method. The Wings include glassed and mounted Winglets, Ailerons glassed, balanced and mounted, Rudders glassed and mounted. The Canard includes the elevators glassed and mounted. Both the Wing assemblies and Canard assembly are complete less surface finish. The price for both assemblies is \$7400.

E-RACER BUILDERS GROUP. If you are an E-Racer builder or enthusiast and have not joined Randy Goeke's builders support group, you should take advantage of this excellent opportunity to expand your E-Racer knowledge through his organization and newsletter. If you are interested in joining, contact Randy at: 2511 Darling Dr. NW, Alexandria, MN 56308, (612) 846-0463.

WITHDRAWAL OF APPROVAL. Due to my severe personal disappointment with the business ethics of Glassic Composites of Sale Creek, TN, I must withdraw my approval and support of their products. I no longer consider them worthy to be a supplier of quality E-Racer components.

Be well and fly safe.... Shirl

PS: If you get in bed with snakes, don't be surprised when you get bitten....

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The following items are now available from S. D. E.:

** E-Racer complete Wing and Canard assemblies	\$7400
** Electronic Fuel Injection System, 4 cyl.	\$1800
** E-Racer Electric Nose Lift & Main gear spring kit	\$895
** E-Racer/Matco Wheels, Brakes, Axels, master cylinders & tire Kit.	\$740
** E-Racer wing & fuselage jack stands w/ jack	\$195
* 3.1 or 3.4 L Chevy V6/60 engine w/ EFI (180 hp)	\$5,995
* E-Racer aileron control cable kit.	\$145
* E-Racer rudder peddle assembly	\$240
* Mk-II Engine Cowlings	\$395
* Buick V8 engine, 266 cid, (225 hp), all aluminum	\$4,995
* Holley carburetor mixture control device	\$195
* E-Racer reduction gear drive complete	\$2895
* E-Racer Landing Gear Kit	\$3295
** E-Racer Landing Gear Kit w/ Nose Lift option	\$3810
* E-Racer/Lycoming engine mount (dynafocal or square)	\$385
* E-Racer wing, winglet and aileron pre-cut foam cores	\$1200
* E-Racer canard and elevator pre-cut foam cores	\$200
* E-Racer T-shirts, m, l, xl	\$12
* E-Racer MK-I and MK-II Oil Cooler	\$180