Electric Nose Lift

Vance Atkinson (TX) - I thought this project would take a week, but you know how that goes. The Cozy seems to get heavier and heavier each year, or my back is getting weaker. I decided to put in an electric nose lift mechanism. There is one already on the market for commercial consumption sold by Bill Oertel in Palmdale, CA, 909-734-7569. It costs $1000-$1200 and is ready made. Since I'm basically a masochist at heart I thought I'd try and make my own. Here's how it went.

Parts Required:

Gear Actuator - about $180: Thompson Saginaw order from local bearing or electric motor shop, PN 781190.

Shock or Spring - about $20 order from Danley Die Co, PN 9-3216-26 800-243-2659 Spring slider Mechanism from Tom Ellis 812-867-2275.

Electrical stuff, relays, wiring, switches, etc. about $50.
1/4" thick bracket to hold gear actuator - about $30 for material.

As usual, this is more work as a retrofit than incorporating it during the original building process. Fitting the actuator in goes pretty smoothly if you don't have anything in the center of your instrument panel. I had a stack of radios so had to look closely at the clearance between the top of the nose wheel cover and the bottom of what ever hangs lowest under the panel. You can adjust the angle of the bracket that holds the actuator by moving the set of gearbox mounting holes holes in the aluminum bracket very slightly to accommodate any angle you want.

The next concern is an emergency extension of the unit. **THERE IS NO PROVISION FOR ONE!** You can go along with that or do what I did. Take the actuator apart (don't ya love tearing brand new stuff apart?) and weld a like diameter, 3" extension stud on to the existing shaft. Don't forget to drill out the top cover to accommodate your new stud. After looking at the unit torn apart, I suspect there will be no failures of the actuator in my lifetime. The relays and switches are another matter, however. You can now hook a 1/4" drive universal and extension to that shaft so you can ratchet the gear down in case of panic. The end of the shaft comes out behind the instrument panel and I just plug in the ratchet which I keep in a side pocket.

Lastly, the matter of the foot! Yes, the foot. The little device that sticks out from the nose gear strut about 10" down from the strut pivot point. Bad enough it attaches out there but it also sticks out about 5" or so. Really **UGLY!** I made mine short, an inch and a half high, and attached it to the plate that clamps the nose wheel assembly to the fiberglass strut. When the gear is extended you don't even see it as it becomes part of the nose gear swivel mechanism. With gear retracted it looks like a small exotic antenna.

The pivot point for attaching the actuator to the nose strut remains stock. I have gear doors and they work the same as before with the addition of a small notch in each door half for the foot.

SOME THINGS I'VE FOUND OUT

If you built the nose gear box, as I did, and you bought the gears from Brock, you would think that assembly would be square. Well mine's not and I suspect a lot of them are not. Therefore, when installing the aluminum brackets you should butter them with flox before bolting them on to the NG 30s. Make sure they are parallel and true for the actuator. Don't use much flox here. 1/8" is plenty, squeezing that down to half when bolted together. Cure before torquing bolts. Don't forget to sand dull the contact area where the NG-30s bolt to the aluminum bracket.

The up lock switches are no problem to mount. Mine are just forward of the nose wheel cover. The down lock switch was a real head scratcher. I finally attached a piece of semi stiff music wire, 8" long, to a pivot point just above where the actuator attaches to the nose strut. This rod goes into the nose box cavity and bumps up against the down lock switch and activates the down/stop relay. It is not a good looking aircraft installation but it gets you to testing.

You can not find switches rated for the amp load of this motor so you must use two relays to activate the system, like production aircraft do. I used two small Potter-Brumfield 30 amp relays from Chief Auto parts at $12 each. Due to close tollerance of the down lock system rod and switch, you will taxi along hitting bumps and hear the actuator start to cycle occasionally as strut flex causes it to come off the switch.

If, for some reason, the up or down lock switches fail, the actuator has an overriding clutch mechanism. This engages at both ends of the travel limits. It is useful in that it is a backup for up or down limits for the gear. If the actualtor goes into the safety clutch override it will not damage your airframe or nose gear as it extends to its limits. The electric system takes three times as long to extend as the stock manual system. I can always tell when the gear is in transit because of a very faint "whine" in the headset. Also, when the actuator goes into clutch limits you definitely feel and hear that mode. My particular light presentation for gear status is amber arrow pointing up for "GEAR UP", a red arrow pointing both directions for "GEAR IN TRANSIT", and finally a green arrow pointing down for "GEAR DOWN". You need something like this 3 light system because an un-noticed stuck relay, with the motor drawing current, could ruin your whole day or airplane.

When assembling the spring I used a piece of wood with the actuator bolted to it on one end and the spring on the other. A simple engagement of the motor compressed the spring so I could bolt it together. Preload on the spring is around 300 lbs.

The foot is made of 1/8" stainless

FOOT !

ATTACHES TO NG 15

SIDE VIEW

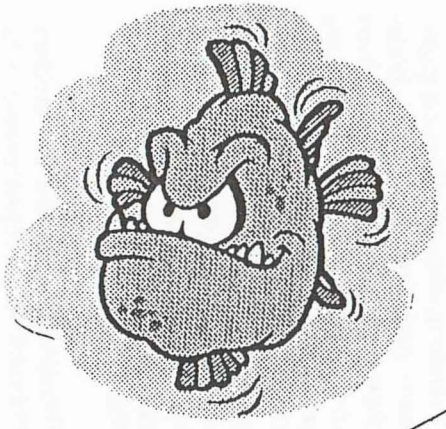
GRIND TO SHAPE

1.5"

MOTOR FITS INSIDE OF STRAPS

1/4" THICK 2024 T3 STOCK

ATTACH TO OUTSIDE OF NG 30's



ABOUT 3"

UNIVERSAL JOINT

1/4" RATCHET EXTENSION

THOMPSON SAGINAW PN 782190

POSITION OF DOWNLOCK SW.

TO DOWN LOCK SWITCH

NOSE WHEEL COVER

INST PANEL

POSITION OF UP LOCK SW.

SPRING + SLIDER MECH.
CALL TOM ELLIS 812-867-2275

ELECTRICAL

RELAY

+12V

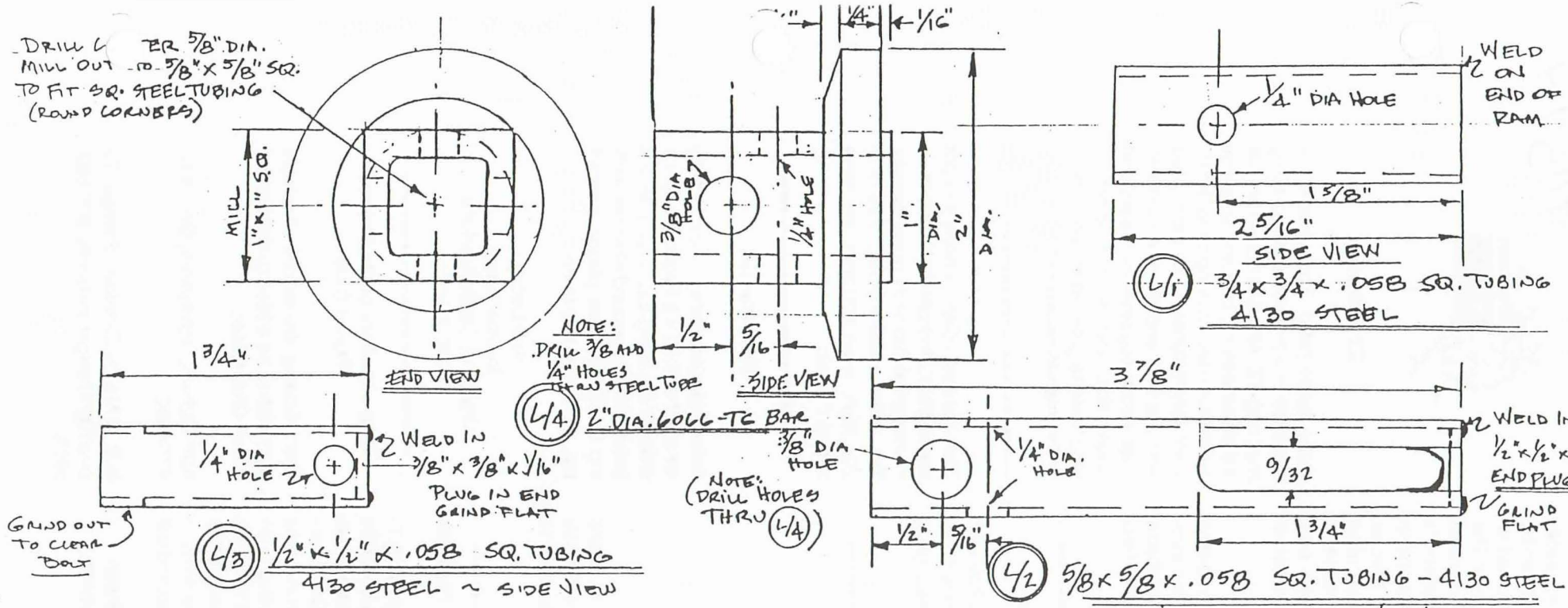
MOTOR

RELAY

+12V

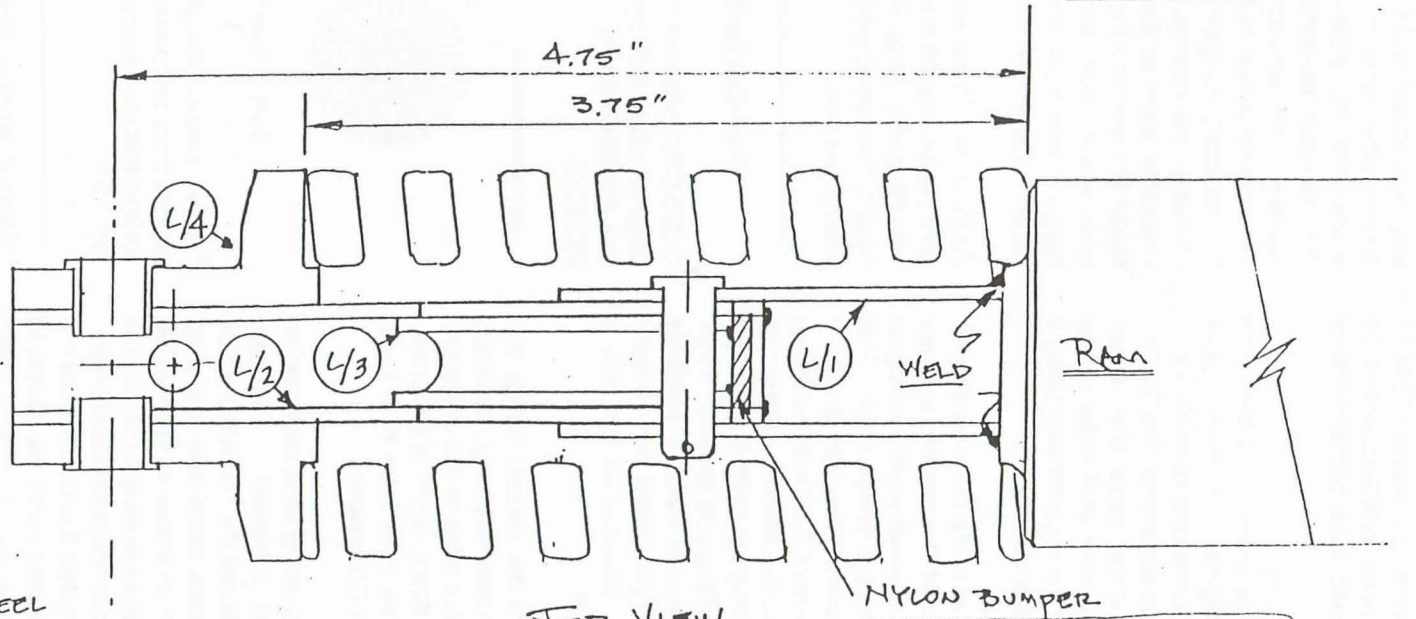
DN. LIMIT SW.

UP LIMIT SW.



PARTS LIST

L/1 - 3/4 x 3/4 x .058 - 4130 STEEL SQ. TUBE
L/2 - 5/8 x 5/8 x .058 - 4130 STEEL SQ. TUBE
L/3 - 1/2 x 1/2 x .058 - 4130 STEEL SQ. TUBE
L/4 - 2" DIA - 6066 T6 ALUM. BAR
CLEVIS PIN - MS 20392-3C25 (1/4 x 25/32)
FLANGE BEARINGS - 5/16 x 3/8 NOMINAL
#FFB56-3 .3140 ID/.3770 OD. x 3/8" L.
FLANGE 1/2" DIA x 3/64
SPRING - DANLEY # 9-321L-26
(2" O.D. x 1" ID x 4")
1-800-243-2659 ORD DEPT.
BOLT - AN4-12A
NUT - MS 21042-4
PLUGS - 1/2 x 1/2 x 1/16 & 3/8 x 3/8" x 1/16 STEEL
BUMPER - 1/2" x 1/2" x 1/16" NYLON



TOP VIEW
FULL SIZE

PURUS BRGS
3000 AIRPORT FWY
PO BOX 7705
F.W TX 76111
831 4581
PN 7821190
TEMP STAINING
FIG. 9

REV. 1

steel. Replace your present 2024-T3 plate that bolts to NG-15 with 4130 steel and weld "foot" to the middle of it.

The actuator attaches at the same point the original spring does. I put a bolt through the strut to make sure it doesn't slide anywhere. The COZY 4 uses a thicker plate that wraps around the strut and bolts to the spring and I'd recommend using it instead of the stock unit.

You will have to cut the mounting nib off the end of the electric actuator and weld a piece of square tubing on it if you want a shock strut. That tubing becomes the spring end. I have flown my COZY with no spring attached to the electric retract unit and found there is quite a difference in feel of taxiing and take-off! I suspect you would have to **carefully** watch what you taxied over to avoid nose gear damage as the ride is **QUITE** stiff!!

Removal of the canard makes this installation relatively easy. My COZY gained about 8 lbs on the swap and lost about $2000 worth of chiropractic bills. The 8 lbs does help if you have an aft CG problem.

Relays and wiring were mounted on the canard bulkhead. The gear switch replaced the crank handle on the instrument panel with a 20 amp circuit breaker above it. The first set of mounting arms weighed 3 lbs. The second set only a pound and a half. I have not raised the COZY from the kneeling position with two people in the front seat as I feel the 3-place nose fork is not designed for that kind of load. It has been reported that a COZY 3 in CA broke its nose fork trying to lift two front seat males. I have lifted one person and full fuel repeatedly with no noticeable effects.

My aluminum arms are fancier than the plain old piece of quarter inch strap. Mine are tapered with numerous lightening holes. You can make this actuator mounting stuff without any high dollar tools. The spacer blocks at the end of the arms can be made from .75" material instead of .74. They don't have to be fancy. The spacing of the actuator trunions to the original 4 bolt hole pattern is perfect, don't change it. You can and probably will change the bracket mounting angle as the motor must nestle between the top of the nose gear wheel cover and what ever hangs down from the instrument panel. **Have fun!**

Editor note: There wasn't room to print the full size drawing of the trunions/brackets. If you want a full size copy of them send me a SASE. I will send you a copy.

Vari-Eze for Sale

O-235-C2C powered Vari-Eze with baggage pods, built by Vance Atkinson. $11,000 Call Phil Chase: (916) 363-5375.

Sun n' Fun 96

For you people who plan to attend next spring's celebration of flight be advised that the dates will be April 14 - 20, 1996.

"Glass Overcast" Shirts For Sale

Rob Martinson (CO) - Light blue T-shirts with many Ezes and a Defiant in formation. A dark blue circular logo with: Oshkosh 95 - Glass Overcast - 20 years of EZs is lettered over the left breast. The same printing is on both the front and back of the shirt. The shirts are $15 each or two for $28 plus postage for one or two shirts. I will have the shirts at Jackpot and will bring any left to Oshkosh.

Contact: Rob Martinson
(303) 670-0799.