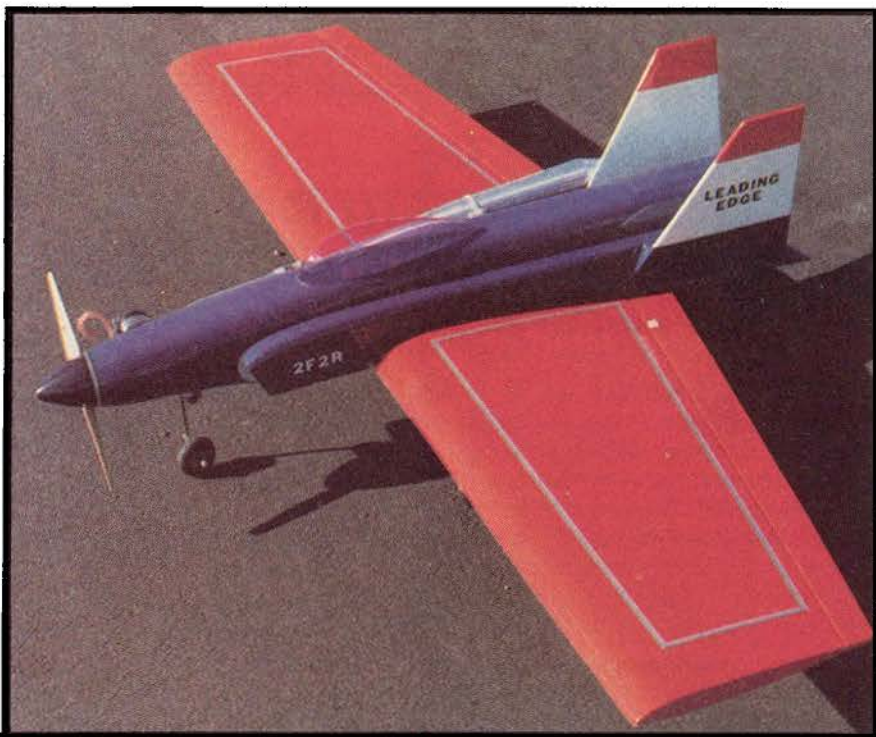


The latest design
of Bill Evan's Simitar
Series for a hot
.40-.45 engine.

LEADING EDGE

By Bill Evans



Aft view showing twin fin set-up.

FOREWARD to the Twenty-First Century. Yes, we are the fortunate ones. For countless years man has looked to the sky with visions of mastering the art of flight; and, we, in our time, merely the blink of an eye in terms of man's time on earth, have witnessed astounding progress. Including flight!

From that moment at Kitty Hawk when it became a reality that man could fly, aircraft development raged at a staggering pace. Throughout the years, improved performance to fly faster, higher, and farther has been the key thrust of those involved with the development of flight.

The performance of the Space Shuttle has made it possible to go into space and return. The Concorde's performance as the fastest people mover is incredible, and the performance of the SR-71 Blackbird makes it possible to travel from

Edwards to Chicago in less than one hour, at more than three times the speed of sound.

Many times it has been said to me, "Why do you fly Simitar Series aircraft? Must be because you designed them." My answer is, **performance!**

Yes, performance. First, no stall; reduce power and gradually feed in up on the elevator and the nose will automatically drop a bit, this reduces the angle of attack, therefore **no stall**. Next, the wide speed range; no matter how much power you put to a ship of the Simitar Series, it just goes faster (no Dutch roll). It also slows down to a crawl (effect of no stall) and sets down like a hang glider. Finally, a Simitar is directional in it's flight in that it will remain in any attitude which it is set in, blip a little left aileron and it will hold in a left turn, barring severe wind it will do 360's, one after the

other.

Though this series of aircraft operate on the concept of a flying wing, it doesn't really look like a flying wing, neither does it appear to be conventional in nature. So, what is it? An aircraft of the Simitar Series!

So, if you are futuristic minded and have had it with the thirty year old type of aircraft and construction; you are eligible to become a **Simitar** pilot with a cause!

Project Leading Edge

The idea of another project was not easily accepted until Richard Verano of Futaba unraveled some of the performance data about the YS-45, so strong running it's unbelievable, and it turns an 11 x 7 like a 60. The new Futaba PCM 8 ch. would be a great match with the YS-45, but what to put them in? Austin Bremmer of Florida was in the process of finishing his Desperado 40 and had been touting me about a multi-finned variant, so I was hooked!

First came the wing. I knew a 50" ply sheeted structure like the Simitar 540 would fill the bill. The fuselage should be something like the 540, but much larger; air ducts (for aesthetics) with length to allow for the twin verticals to extend beyond the trailing edge of the wing. A small lip at the top rear of the fuse, for appearance. As the fuse took shape, mocking-up and trying various size fins for best function and fit began. At this time, the idea of tilted fins and small sub fins were also included. Just as the air frame was about to be covered, the YS-45 RE with pipe arrived, and I just had to run it. Rich Verano, said to use

a Hayes tank, silicone in the nipple, and tape the tank with filament tape (this is to help hold the pressure produced by the pump system). I opened the carb one turn, turned the prop a few times (to get the pressure going), put a few drops of fuel into the carb, lit the plug, a few flips, and **wow!** Out of the box it turned an 11 x 7 like a sixty. Throttle response is super from idle to wide open. Each click gives a perceptible change in rpm and engine control on approach is ideal.

Flight performance of the first Leading Edge was so smooth and clean that a second version, the Leading Edge "D" model was soon flying. The "D" version has shorter air scoops, right angle fins (with rudders), and a Top Gun type front end. Flies like the



"D" version with rudders and short scoop.

first one but has a bit more kick (from the rudder).

Construction of any of the Simitar Series is a plus. Typical construction time is six hours, that's the air frame ready to cover. Using Hot Stuff the fuse will build in 12 to 15 minutes. The following construction instructions are simple and will help save time.

To help those who may not cut foam, you may order cores for the Leading Edge from Soaring Research, 454 Wildrose Ln., Bishop, California 93514. Phone (619) 873-4932. Cores @ \$12.00, 1/64th ply shtg. @ \$14.00, shipping is \$6.00.

CONSTRUCTION

□ Glue and pin the 1/8" leading edge and 1/4" trailing edge balsa to the foam cores, be sure not to warp the cores, set aside to dry.

□ Mark location of firewall and

former on fuse sides and bottom front.

□ Pin fuse bottom front and bottom rear down on work surface, set these pieces in line and separate them by the width of the airfoil cutout as on the fuse side.

□ Pin right fuse side onto rear fuse bottom and front fuse bottom. The fuse side is flush with the outside edge of these pieces. Pin in place front bottom 1/2" triangle as well as firewall and former. Then apply Hot Stuff.

□ Pin left fuse side and front bottom triangle into place and apply Hot Stuff.

□ Pin rear 1/4" sheet rear cap, 1/2" top triangles into place, also 1/4" sheet to fill for nose to spinner ring. Cement all into place.

□ Cement front and rear top 1/4" sheet into place.

□ Sand front square and cement 1/8" spinner ring to front of fuse.

LEADING EDGE

Designed By:

Bill Evans

TYPE AIRCRAFT

21st Century Simitar Series

WINGSPAN

50 Inches

WING CHORD

11 Inches

TOTAL WING AREA

540 Sq. In.

WING LOCATION

Bottom of Fuselage

AIRFOIL

Semi-Symmetrical Reflexed

WING PLANFORM

Tapered Trailing Edge

DIHEDRAL EACH TIP

Flat on Top

OVERALL FUSELAGE LENGTH

33 Inches

RADIO COMPARTMENT SIZE

(L) 19" x (W) 2 1/2" x (H) 2 1/2"

STABILIZER SPAN

NA

STABILIZER CHORD (incl. elev.)

NA

STABILIZER AREA

NA

STAB AIRFOIL SECTION

NA

STABILIZER LOCATION

NA

VERTICAL FIN HEIGHT

8 Inches (Twin Fins)

VERTICAL FIN WIDTH (incl. rud.)

5 1/2 Inches (Avg.)

REC. ENGINE SIZE

40-45

FUEL TANK SIZE

6-8 Oz.

LANDING GEAR

Tricycle

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Elevons, Throt., Steerable Nose Gear

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa & Ply

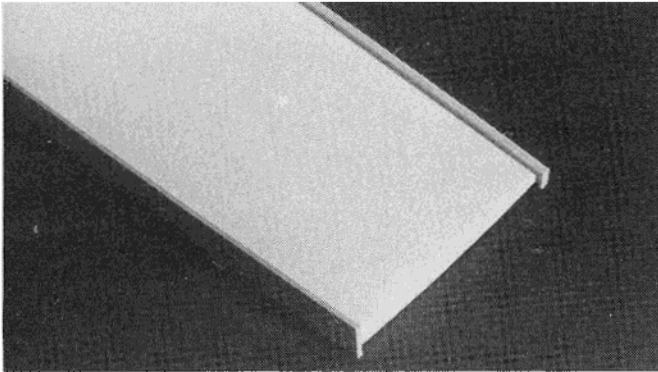
Wing Balsa, Ply & Foam

Empennage Balsa (Fin)

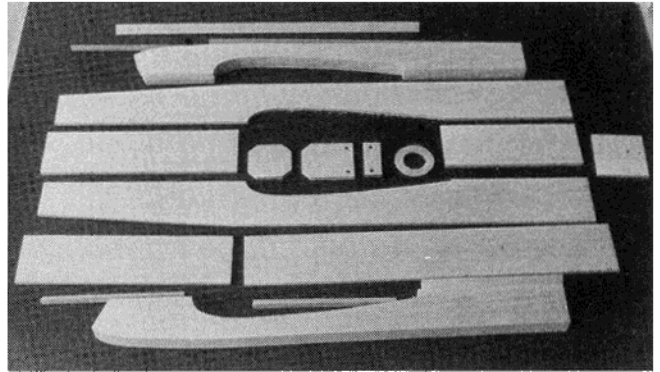
Wt. Ready To Fly 72-80 Ozs.

(4 1/2- 5 Lbs.)

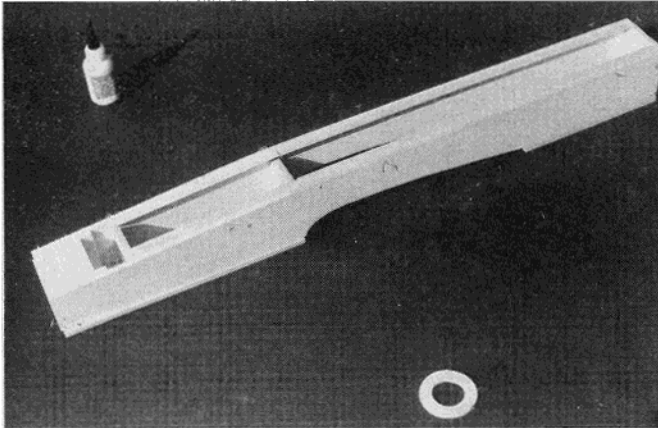
Wing Loading 19-20 Oz./Sq. Ft.



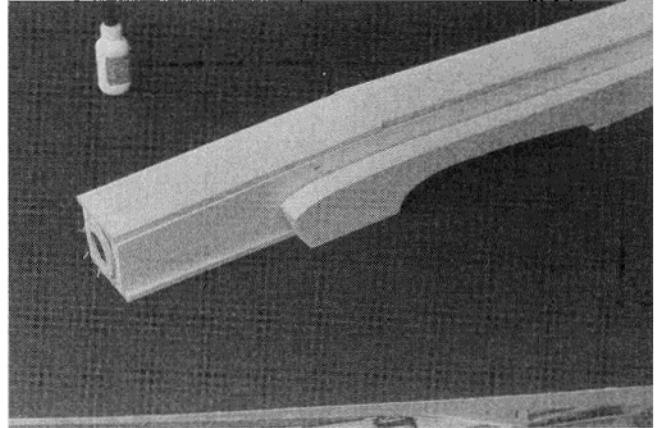
Leading and trailing edge 1/8" and 1/4" balsa pinned in place onto cores. (Set aside to dry.)



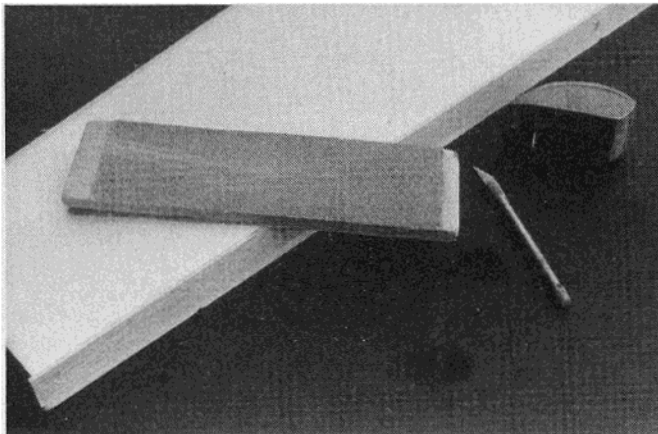
Fuse parts cut, ready for assembly.



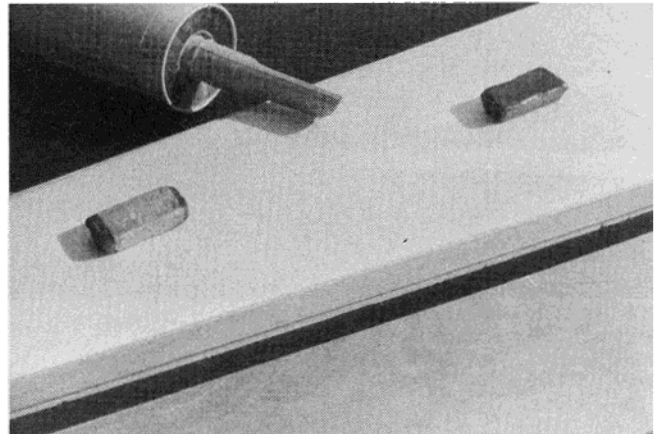
Firewall, former, and 1/2" tri. rear cap, and nose fill all in place.



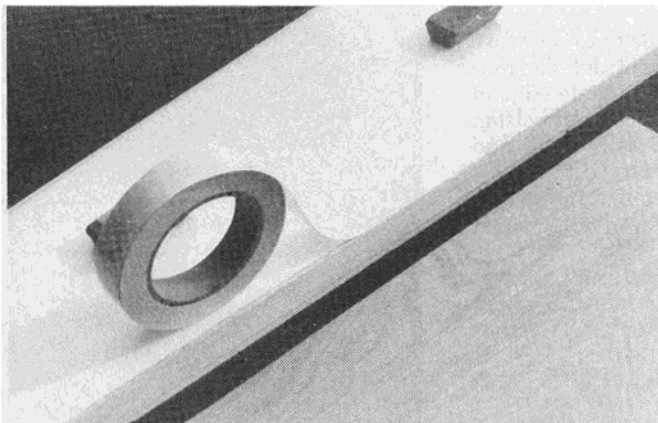
Top sheeting and spinner ring in place.



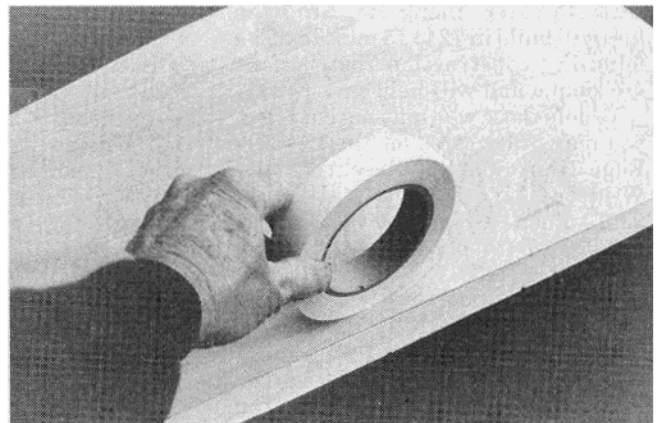
Carve, plane, and sand spars flush with cores.



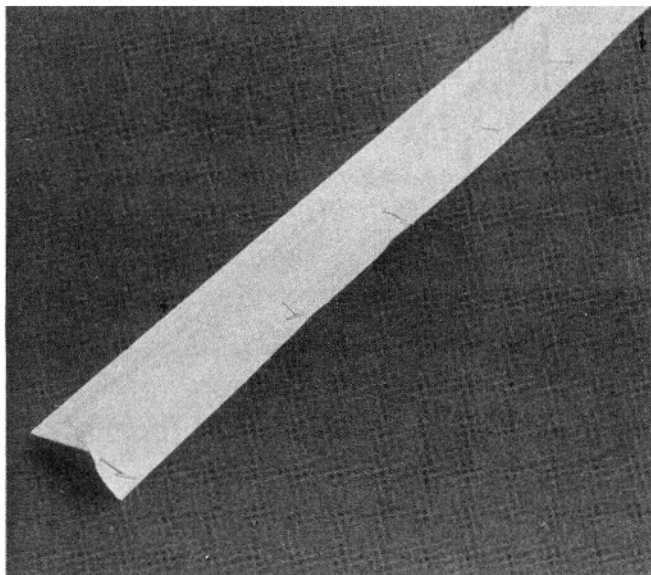
Vacuum cores and sheeting before bonding sheeting to cores.



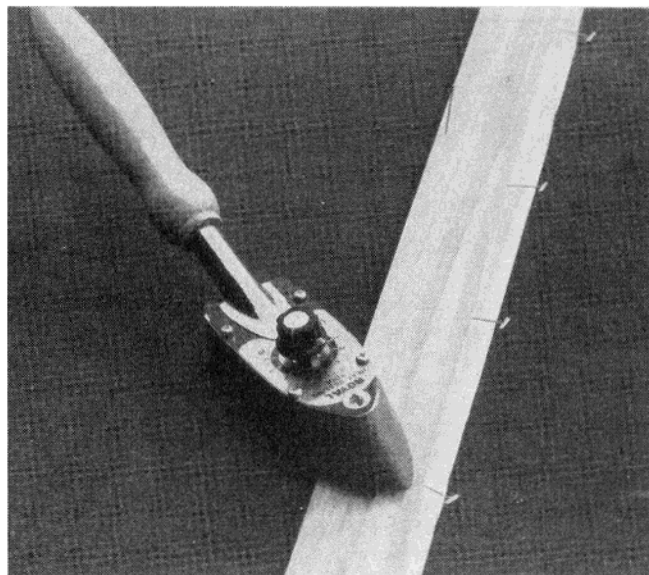
We used Corefilm (two sided tape made for bonding cores to sheeting) applied to foam cores. Avoid bending cores by letting Corefilm lay flat as you apply, do not stretch Corefilm when applying to core.



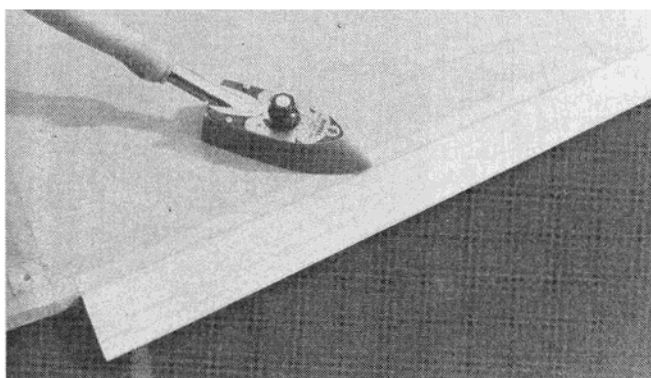
Using roll as burnishing tool to gently press sheeting to core.



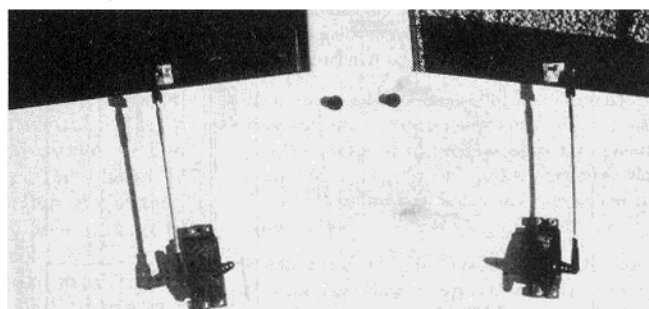
X-hinge pinned to elevon.



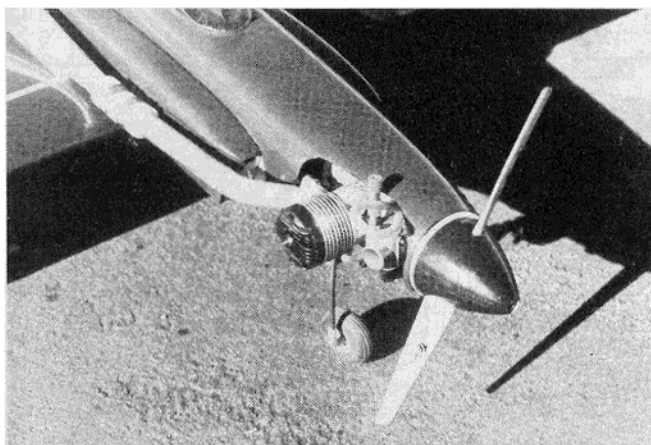
Using iron to attach X-hinge to elevon.



After pinning elevon into place on wing, iron down X-hinge to attach elevon to wing.



Use of electronic mixer permits mounting the elevon servos as shown on the bottom of the wing. A 1/8" ply servo tray is mounted flush with the ply sheeting. Location is 4" from the root and 5" forward from the hinge line.



Front end treatment showing installation of YS 45 with pipe.



Charter members of the Sierra Simitar Squadron with Leading Edge and other Simitars yet to come. Left to Right: Henry Bishop, Dale Dibble, Bill Evans, John Ludwig, and Roger Haley.

- Fuse is ready to carve/sand for fit and finish.
- Carve, plane, and sand the 1/8" and 1/4" wing L.E. and T.E. spars so that the sheeting will fit flat over them.
- Apply wing sheeting. We used 1/64" ply and Corefilm.
- Cement 1/4" leading cap into place on wing.
- Cut and trim to shape the air scoops and vertical fins.

- Sand leading edge of wing to shape, note how bottom is fairly flat and top is steep.
- Join wings with 5-minute epoxy and add 1/4" wing tip plates.
- Fit wing to fuse, use 1/4" ply plate to attach wing via 1/4" dowels. Use 5-minute to float ply plate into place.
- Cut and fit fuse front end to accept engine and install nylon hold-down bolts.
- Final sand and prepare for

- covering. We covered the fuse, air scoops, and fins fit to fuse, installed with 5-minute epoxy.
- Set elevator function so that the elevons are 1/8" above what is normally considered neutral (level), this is to provide necessary reflex.
- Set nose wheel height so that while setting on a flat surface (ground) the leading edge of the wing is 1/4" higher than the trailing edge (measured at the hinge line).

From RCModeler Jan. 1 1990

□ Check all surfaces for proper movement (remember left aileron command results in the left aileron going up and the right going down).

For those new to the concept of the Simitar Series, an explanation of the control surface function and installation will be helpful.

First a Simitar requires only pitch (elevator) and roll (aileron) functions for perfect flight. Rudder is not required; however, there are some variations in the Simitar Series that will easily fly on rudder and elevator.

The controlling surfaces for the Leading Edge are the **elevons** which serve as ailerons and elevators. In essence, consider the control surfaces as full strip ailerons which counter actuate to provide aileron control and also actuate simultaneously to provide elevator control. This means some form of mixing is required.

Mixing can be accomplished by mechanical or electrical means. The best mechanical method is to use my sliding tray, which works as follows: The servo in the tray is the aileron servo; set it up as you would for strip ailerons. The second servo is the elevator servo. Its control arm is attached to the front edge of the tray and will slide the tray fore and aft to provide elevator control.

Electronic elevon mixing is included in several radios via the transmitter. The Futaba 7UAP, 7UAF and 9VA-1024 do an excellent job of electronic mixing. Mixing electronically at the receiver is also possible by using Ace's Christy Mixer which plugs in-between the receiver and the aileron and elevator servo leads. The Christy is about \$30.00 and works very well.

Electronic mixing makes it possible to mount the two servos on the bottom of the wing, on the outside (as shown in text photo). This method gives a more rigid actuator rod set-up.

Ah, yes, flight performance of the Leading Edge. Typical Simitar, no stall, wide speed range, and goes exactly where it's pointed. Very smooth flying and graceful; gives the feeling that it's an extension of yourself in air. Seems to always do the right thing, often before you think of it.

Are the thumbs quicker than the eye?

Reference material: For more information about the development of the Simitar Series, refer to the following listing. Radio Control Modeler — March '88, Desperado 60 & 3000; August '86, Tracer 40 & 60; March '85, Skywalker 1/2A, 40 & 60; November '79, Astron 40; October '79, Simitar 540.