

climbing angle, the loading and RPM of the winch may vary or oscillate. However, the operator should religiously maintain his predetermined power setting. Any attempt to follow a transient glider loading invariably aggravates the situation.

#### *Pilot Technique*

The pilot has by far the easiest job during the tow. He merely maintains an elevator setting consistent with the power output of the winch. In general, this would be the steepest climb at which he can maintain a safe flying speed. If the winch operator is adjusting the RPM properly, the air speed will remain constant throughout the tow and the pilot has only to choose the point of release. The tow should never continue beyond a  $\beta$  of  $70^\circ$ .

There are two bench marks for determining the safe flying speed. First and foremost is for the glider to be able to effect a safe recovery should the towline break during any position in the launch. Secondly, that the glider should not stall during the tow. It is important to remember that the stalling speed must be based on the gross weight of the glider which includes the weight of the towline. In addition, the stalling speed increases as the square of the G loading, so that a glider which stalls at 28 mph in level flight will stall at 34 mph at 1.5 G's, 40 mph at 2.0 G's and 48.5 mph at 3.0 G's.

#### *Flight Path and Effect of Wind*

The still air flight paths of 4000 ft tows are shown in figure (4). Corresponding altitudes for any other length would simply be proportional to 4000 ft with an allowance for the initial takeoff and acceleration.

All that has been said applies to no wind conditions. However, a stiff breeze will considerably increase the altitude of the launch. The wind decreases the reeling speed required for a given glider speed and has much the same effect as increasing the available length of towline. If the wind velocity is considerably greater than the stalling speed, the winch does not have to run at all and the glider can rise to nearly the full length of the line.

The Mohawk Soaring Club with 4000 ft of wire has been able to achieve consistent tows of 1200 to 1500 ft in still air and up to 1800 ft in 20 mph winds. A 1935 Cadillac engine drives a 20" diameter steel drum connected directly to the drive shaft. First speed of the transmission is used throughout the tow. This arrangement is adequate during low winds, although the loading which can be imposed upon the glider, is definitely limited by the output of the engine, estimated as 60 hp to the wire. At winds above 15 mph a lower gear ratio drive could be used to advantage. Oil tempered steel wire, 93 thousandths of an inch in diameter has been found to be very satisfactory tow line. It has a breaking strength of about 1400 lbs which will permit up to about a 2 G climb.

The details of winch towing equipment may be presented in a forthcoming article by Hal Bovenkerk, who has been the mechanical engineering expert for the club.

If you have any questions concerning winch towing equipment or dynamics, kindly address your inquiries to Hal Bovenkerk or myself care of Mohawk Soaring Club, Box 157, Schenectady County Airport, Schenectady, New York. We will be glad to provide what information we can.

## TWO-WAY BUSINESS FLIGHT

Another chapter in the history of aviation was enacted May 22 and 23 when for the first time a two-way business trip was made via sailplane. Stanley W. (Stan) Smith, Chief Aircraft Engineer of Bell Aircraft Corp., Buffalo, N. Y. flew his Schweizer 1-21 sailplane from Batavia, N. Y. to Elmira, N. Y. on May 22, returning via the same means of transportation the next day.

Stan took off from Batavia Airport—the center of activity for Buffalo and Rochester area soaring pilots—at 3:10 P.M., Saturday, May 22, and landed at Elmira Airport at 5:00 P.M. He conferred with Schweizer Aircraft Corp. officials on arrangements for the American Glider Team's participation in the International Soaring Contest to be held this Summer in England.

After staying overnight in Elmira, Smith took off from Elmira Airport the next afternoon for the return trip to Batavia, which took longer than the previous day's flight because of head winds. However, by soaring on thermals and gliding from one to another, the pilot negotiated the 90 miles successfully, completing the first round-trip business flight ever made via glider according to a pre-arranged schedule. A one-way business flight via sailplane had been made last Summer by Paul A. Schweizer, vice president of Schweizer Aircraft Corp., and secretary of the Soaring Society of America, who flew from Elmira to Bethpage, Long Island, N. Y. to visit Gruman Aircraft Corp., one of the company's customers.

The ship used by Smith in his two-way flight is the same one which he flew as a contestant in the 1952 International Soaring Contest at Madrid, Spain. He is top-seeded pilot in the two-place sailplane category on this year's American team which will compete for the world soaring championship this Summer. The Internationals will be held July 20 to August 4 at the Derbyshire and Lancashire Soaring Club at Hucklow in the English Midlands.

Stan Smith has been an outstanding soaring pilot consistently for about 25 years, and was the 1933 U. S. National Soaring Champion.

