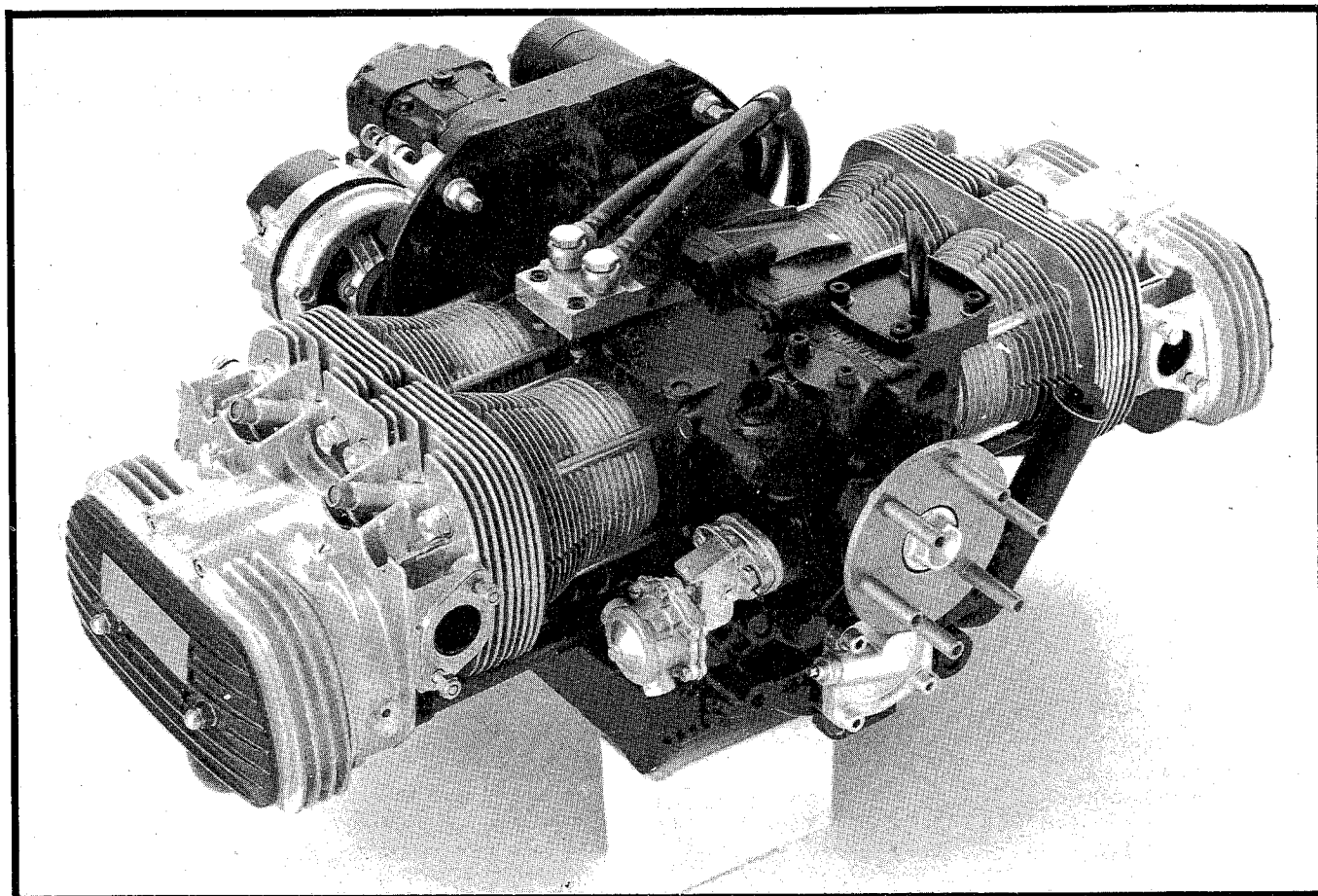


LIMBACH AIRCRAFT ENGINES - AN UPDATE



A typical certified Limbach aircraft engine. This one can be configured as a SL1700D (65 hp) or as a SL1900D (74 hp).

By J. C. Treager (EAA 17584)

IN THE AUGUST 1974 issue of *SPORT AVIATION*, a very fine article appeared that told, in considerable detail, the story of Herr Peter Limbach (EAA 75951) and his unique little aircraft engine factory located in West Germany. That article was written by my good friend, U. S. Army Colonel Jack Crater (EAA 65356). Now, with this article, I will try to bring everyone in the sport aviation community up to date about the Limbachs and their aircraft engine business. The intervening ten years have been filled with success for the "little 'ol German engine maker", Peter Limbach. That success may just portend good news for the sport aviation community in the North American markets.

With the petro-linked, and other economic pressures of the past few years has come a serious slowdown in the general aviation light aircraft industry. Much of the light aircraft activity during the past few years has been spawned by EAAers and others in the sport aviation community. It seems likely that if and when a recovery takes place, the sport aviation community will lead the way.

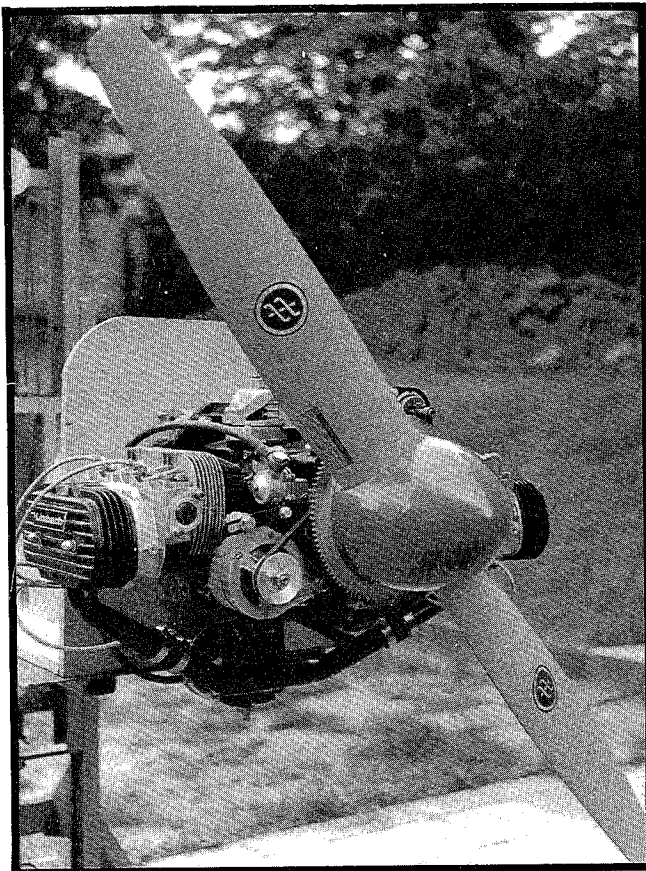
But also apparent is the perennial nagging problem of a dwindling supply of light aircraft engines. The counterbalancing good news is that Peter Limbach seems to be ready with the "right products for the times". His German certified aircraft engines have earned a worldwide reputation for quality and fuel efficiency. As this article will reveal in more detail later, the Limbach engines may soon be available here. That has to be good news for a sport

aviation community sorely in need of a dependable supply of affordable, user proven, **certified** aircraft engines in the 60 to 100 horsepower range.

When *SPORT AVIATION* editor, Jack Cox, learned I would be going to Germany in early February 1984, he suggested I gather information to prepare this update article. Before we proceed with the nuts and bolts aspects of this story, it seems appropriate to note that the Limbachs have been active EAAers for many years. And, as



Shown in front of their engine factory at Sassenberg, West Germany (near Bonn) are the Limbachs - Peter, Sr. and Peter, Jr.



Limbach SL1900D with all its accessories and a Hoffmann propeller.

might be expected, they were eager supporters of last year's "100% For Aviation" bandwagon. They were very generous in their contribution to the EAA Aviation Foundation's Capital Campaign for our new World Aviation Center at Oshkosh. Their interest in supporting the EAA Aviation Foundation will continue this year. We will soon be hearing about a gift of a new Limbach aircraft engine to the Foundation which will ultimately become the property of a lucky EAAer via the sweepstakes process. And for you EAA Museum experts, you know that the original Pober Pixie airplane on display in our Museum has a Limbach engine mounted as a result of their generosity when they visited at Oshkosh '74.

Many changes have taken place since Jack Crater wrote his Limbach article ten years ago. Jack, instead of being stationed in Germany as he was in 1974, is now serving a "hardship" tour in Hawaii and is unable to write his own update article! One very obvious change, for those of you who recall the 1974 story, is a name change - from Limbach Motoreubau (motor works) to Limbach Flugmotoren (aircraft engines) - to better reflect a shift to the production of aircraft engines as the priority business activity. Many of you might recall visiting with the Limbach family at Oshkosh '74; if so, you will recall their young son, Peter, Jr. Peter, Jr. has matured into a highly skilled engine designer with an advanced degree in mechanical engineering from a German university. Peter, Jr.'s role in the company is as Chief Engineer. In him resides one of the key strengths of their growing business.

The success of the Limbach aircraft engine business can be directly traced to the almost exponential interest in and demand for the type of light aircraft generally referred to as motorgliders. The Limbach powerplants dominate the motorglider markets. The evolving motorglider movement is an interesting story that we need to try to summarize here if we are to understand the genesis, and current success, of the Limbach aircraft engine business.

In the United States, motorglider interest has been mostly confined to the soaring community. That seems logical because most of us here usually think of motorgliders as self-launching sailplanes. The current crop of available motorgliders have traditionally (since WW II) been products of the European aviation industry. Though recently we have seen one U. S. manufacturer enter the motorglider market. While the post-WW II era development of motorgliders did start with the self-launching concept to make sailplane training more economical, the worldwide petro-crunch that started in the mid-1970s has subtly but surely changed the markets for motorgliders. It is true, some high performance sailplanes equipped with small self-launching engines are being made, but the hottest sellers are the two-place, soarable motorgliders that are used primarily in the powered mode.

While we here in the United States are just beginning to put real pressures on our government aviation bureaucrats to stimulate the light/sport aviation industry by devising relaxed certification procedures for a new class of "primary aircraft", the Europeans (and recently other governments) have beat us in that regard. Their answer to the need for simpler, easier to certify sport and private transportation light aircraft is the obvious (to them at least) motorglider category. Without compromising strength or other safety considerations, most of the European (and now other) governments regularly certify motorglider type aircraft to simpler standards. This relatively large and fast growing fleet of "simple" aircraft has an outstanding safety record despite being flown by mostly low-time student pilots and sport flying enthusiasts who fly relatively low hourly totals each year.

During my recent trip to Germany, I was surprised to learn that very, very few of the motorgliders now in use are actually flown with the basic objective of having a self-launching sailplane. Most of the hours being accumulated on the motorgliders are as powered airplanes being flown for sport and/or private transportation. Motorgliders are very popular as club and rental aircraft. It would not be stretching facts to say that without the availability of the efficiently operating motorglider fleet, fun flying for the "little guy" in Europe would be almost impossible.

The point was made by my German hosts that a club or rental motorglider operation can easily offset a major portion of the cost of a motorglider in a few years of active operations by reaping the cost reductions from using auto fuel instead of aviation fuel. At a cost of about \$3 per gallon for aviation fuel vs about \$2 per gallon for auto fuel, the payoff is obvious. Most certified motorgliders are powered by certified Limbach aircraft engines, all of which can safely and legally use auto fuel (also avgas). And nearly all motorgliders have folding wings which permit various types of low-cost storage arrangements to further enhance operating efficiencies.

These points were vividly and enjoyably driven home to me when my German host took me flying in an older, but immaculately maintained Limbach powered motorglider. The two-place motorglider, with two somewhat "over-standard" weight pilots, climbed out smartly at a solid 700 fpm. After leveling-off and leveraging the three-position Hoffmann propeller into cruise pitch, I was amazed at the performance. The low drag motorglider, besides being a delightfully fun flying machine, was motoring along at about 120 mph and burning about 2.5 gallons of auto fuel per hour. I grimaced a little when I reflected that my relatively late model U. S. made, two-place production airplane (at home in its expensive hangar) normally cruises at no more than that speed on twice the horsepower while burning three times that amount of . . . not auto fuel . . . but avgas! At that point I was ready to send my For Sale ad to Trade-A-Plane and start looking for a motorglider.

I guess the bottom line to these revelations is that maybe we here in the U. S. ought to realize that most of the rest of the world has discovered the way, or at least a way, to diminish the economic pressures on flying without at all compromising safety, fun or even utility, of light, two-place aircraft. The motorglider concept is here and now. Maybe the FAA officials that are now pondering how to approach the (crying!) need for a way to certify simpler airplanes would be well advised to merely copy the motorglider standards proven so successful elsewhere. At least it would be an expedient good start.

Over the years, the Limbach aircraft engine product line has expanded to accommodate the powerplant needs of the growing list of motorglider manufacturers. Essentially all of the current aircraft engine production is sold directly to motorglider airframe manufacturers. A very few of these type of engines have found their way into U.S. and other custom built aircraft as a result of Limbach's friends, acquaintances and referrals asking for a single engine. There have been no sustaining attempts to market the Limbach aircraft engines for non-certified airframe uses. However, that situation will likely change during the coming months because marketing plans are being formulated to establish in the U. S. a Limbach sales and service organization to meet the needs of the custom built and other markets.

The Limbach factory is currently producing two general types of aircraft powerplants and one industrial, ground-power unit that is sold to the German government to power portable, fire-fighting water pumps. The two general types of aircraft powerplants fall in either a category of four-stroke, light aircraft engines in the 60-100 horsepower range, or in a category of two-stroke, lightweight engines in the 22-50 horsepower range. The latter

two-stroke engines are sold to several governments for military use to power Remotely Piloted Vehicles (RPVs). If you are thinking that maybe those small RPV engines could have potential for use as powerplants for ultralight flying machines - you're right! In fact, about 150 of the RPV type engines were bought and distributed in this country by an independent firm for ultralight use. However, Herr Limbach reports that no further sales of that nature are contemplated until, and if, he is able to establish a formal Limbach Flugmotoren presence here such that a full range of sales, parts and service operations can be offered.

One chart shown with this article details the Limbach aircraft (and RPV) engines currently being produced or ready for production. The second chart will give you some idea of the numerous applications for the Limbach aircraft engines. It might help to review the alpha-numeric code used to name and catalog the Limbach engines. The earlier design motorglider type engines carry the prefix "SL". The "S" refers to "SPORTAVIA" in recognition of the French airframe manufacturer that cooperated with Peter Limbach to develop his first aircraft engine. Of course, the "L" refers to Limbach (Flugmotoren). Later model engines are of exclusive Limbach design and carry only the "L" prefix. The following number is the approximate engine displacement given in cubic centimeters. The suffix coding is somewhat more involved. To keep it simple, suffice it to know that "E" means the engine has a single ignition and "D" means it has dual ignition. The other letters and numbers refer to the many carburetor, propeller and other miscellaneous accessory combinations possible.

The in-depth "nuts and bolts" details reported in the August 1974 article in *SPORT AVIATION* have not changed much, so they will not be rehashed here. Another good reference article that detailed the mechanical innards of the Limbach engines was written by Robert Cumberford and appeared in the May 1974 issue of *AIR PROG-*

The Limbach L275E 22 hp engine developed primarily for military RPV uses. A 50 hp version will soon be available.

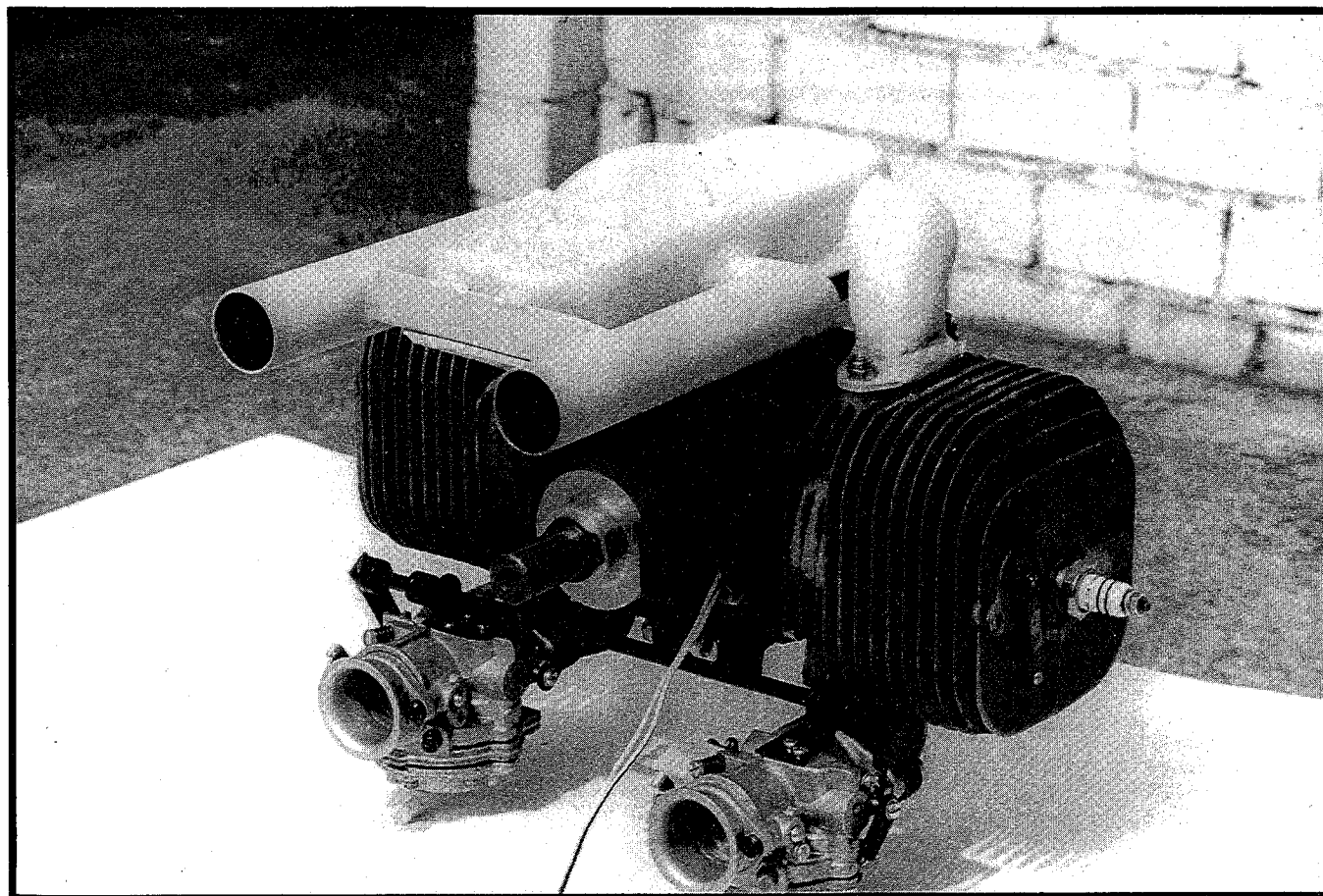


CHART 1 LIMBACH ENGINES IN (OR READY FOR) PRODUCTION

MODEL	HORSEPOWER/RPM	WEIGHT
(Certificated engines in production)		
SL1700E & EI	68/3600	73.0 Kg.
SL1700EA & EAI	60/3550	70.0 Kg.
SL1700EB & EBI	72/3600	72.5 Kg.
SL1700EC & ECI	68/3600	73.0 Kg.
L1700EAA & EAA1	56/3550	60.0-68.5 Kg.
L2000E01	80/3400	72.5 Kg.
L2000EA & EAI	80/3400	69.0 Kg.
L2000EB1 A, B, C	80/3400	73.0 Kg.
L2000EAB 1	80/3400	73.0 Kg.
L2000EC 1	80/3400	72.5 Kg.
L275E (RPV)	22/7200	6.5 Kg.
(Non-certificated engines ready for production)		
L1700D & DA & DD	65/3600	76.0 Kg.
L2000D & DA & DD	76/3400	75.0 Kg.
L2100E 1X	74/3200	72.5 Kg.
L2300EB 1	85/3200	81.0 Kg.
L2300D & DA & DD	86/3200	87.0 Kg.
L2500EB 1	90/3200	81.0 Kg.
L2500D & DA & DD	90/3200	87.0 Kg.
L2700E & D & DD	90/3000	93.0-96.0 Kg.
L3000E & D & DD	100/3200	93.0-96.0 Kg.
L90E (Prototype)	6/8500	4.5 Kg.
L550E (RPV; design in process)	50/7200	16.0-17.0 Kg.

CHART 2 MOTORGLIDERS USING LIMBACH ENGINES

MANUFACTURER	COUNTRY	MODEL(S)
Grob	Germany	G - 109
Hoffman	Germany (Austria)	H - 36 Dimona
Scheibe	Germany	SF25C-Falke 82; SF25C-2000 SF25E-Super Falke; SF28A-Tandem Falke; SF36
Schleicher	Germany	ASK - 16
Sportavia-Putzer	Germany	RF-5; RF-7; RF-5B Sperber
Valentin	Germany	Taifun 17E
Aero-Structure	France	RF-10
Fournier	France	RF-4; RF-5; RF-5 B Sperber; RF-7; RF-9; RF-10
Alpha Airplane	Austria	AVo 68 Samburo
Central National		
Aeronautic	Rumania	IAR IS-28M2
Pezetel	Poland	Ogar
(TBA)	Spain	RF-5
(TBA)	Yugoslavia	(TBA)
Aero-mot	Brazil	RF-10
Columbia Canard		
Composite	Columbia	Colibri C-2
(TBA)	Egypt	RF-5 B Sperber
(TBA)	China	(TBA)

RESS magazine. For more information about the use of motorgliders in this country, you might want to refer to an article written by Dennis Shattuck that appeared in the September 1983 issue of PRIVATE PILOT magazine.

If you previously have heard about the Limbach aircraft engines, you probably heard them call VW engines. That reference is not entirely wrong . . . or right. Because VW engines have earned a worldwide reputation for being smooth running, reliable and long lasting, the Limbach-VW link has been a marketing plus. Certainly the early Limbach engines were built from mostly VW parts and the finished engines were unmistakably VW (aircooled) in appearance. Peter Limbach continues to enjoy a very unique relationship with the top management of the German VW auto-making giant.

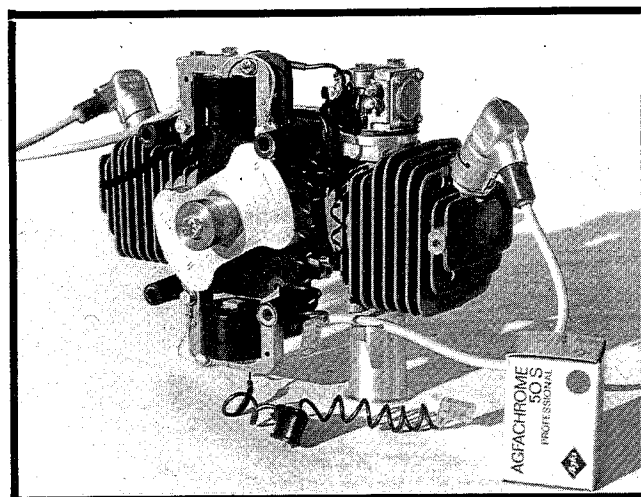
When it makes sense, the Limbachs, still use certain parts furnished directly by VW. But over the years Limbach engines have been changed to meet the unique demands of aircraft use such that it is largely inaccurate and unfair to the Limbach engine design team to call their engines VWs. Certainly no Limbach aircraft engine was ever produced by converting a previously assembled VW auto engine.

Most of the Limbach aircraft engines have been certified for aircraft use by the German government's equivalent of our FAA. Limbach aircraft engines routinely operate successfully to their prescribed TBO time. Many of those engines achieve their lifecycles in the unusually harsh environment of motorgliders used for glider pilot training. Yes, there is a proud heritage linking VW and Limbach, but now it is only proper that the Limbach engines have earned a place on the list of bonafide, user-proven, uniquely designed, aircraft engines. Herr Limbach was recently honored when he was asked to display one of his powerplants in the aircraft engine display at the German Museum of Science at Munich.

You can safely assume that the Limbach father and son team are not resting on their laurels. Their small but prolific design/R&D department is busy proofing several

new engines for light aircraft and military applications. They are in the process of doubling the size of their production facilities near Bonn, Germany. And as alluded earlier, plans are being developed to formally enter the United States (and other North American) markets.

To give us a chance to see their engines first hand, and to meet with them personally, the Limbachs will have an exhibit booth in one of the commercial display buildings at Oshkosh '84. If you cannot wait until then, or you will not be attending the "Big One" this year and you want to inquire about their aircraft engine products or any related matter, Peter Limbach has advised he now has a U. S. contact office. Send all your comments, inquiries, etc. to Limbach Aircraft Engines, P. O. Box 1201, Tulsa, OK 74101.



The small prototype L90E Limbach engine. This experimental engine produces about 6 horsepower. Note the film box shown for scale comparison. Maybe the jumbo-scale radio control modelers could use this engine?