21 November 1951

#2028 or RD-13

I. Characteristics

A. Starting

The RD-13 started very easily even on cold mornings, and this was done with one or two cranks on the cord.

B. Running

The unit was tested under two conditions; first with the dust cover off, and second with the dust cover on.

1. Dust cover off.

All tests were made with a load on the ~~altinator~~ alternator and the following temptures resulted.

Carburetor	Cylinder Head	Exhaust	Cooling Air
6000 --- 120 F.	390 F.	540F.	280 F.
4000 --- 180 F.	400 F.	500 F.	220 F.

The engine would run at 6000 RPM until throughly warm and then would retard to 4000 RPM. A large fan was placed directly in line with the carburetor and after about 30 seconds the engine advanced to 6000 RPM. The fan was then turned off and a few minutes later the engine would again retard to 4000 RPM. There were two ways to get the engine up to speed without using the fan. 1. by removing the entire load from the alternator, or running the engine at even a slower RPM until the engine cooled off enough, and then 6000 RPM could be obtained, but after several minutes running time it would then retard to 4000. It must be noted that this happened only on full or over 100% loads. On lights loads there was excellent speed regulation, but on full load or over, the engine ran with the throttle wide open. This condition acts much like the SSP-12.

It was noted that the engine performed much better with a load than without, but never could get the engine to run perfectly smooth. There would always be a slight variation in the RPM, which could be detected by the sound. There seemed to be a lot of mechanical noise in the engine.

2. Dust Cover On.

The following temperatures resulted with the cover on.

Intake Air	Cylinder Head	Exhaust	Cooling Air
6000-- 85 F.	460 F.	530 F.	340 F.
5000 110 F.	410 F.	390 F.	260 F.
4000 100 F.	400 F.	370 F.	260 F.

Started to test unit on cold morning and ran at 6000 RPM for 15 min. then retarded to 4000RPM putting out 50 W at 78 V. with the throttle and choke wide open. The temperatures were then taken and recorded as follows , exhaust 410 F. , cylinder head 450 F. , cooling air 330 F., and air intake 100 F. Under these conditions a full load was on the alternator ~~altinator~~. It was noted that when the unit was running at 6000 RPM the cylinder head temperature was 460 F. the unit continued to run at this speed, but the temperature continued to increase until 480 F. was reached, then the engine would retard to 4000 F. Engine continued to vary slightly in RPM as stated before, but ran much better with a load.

A time test was taken with full load. Result, two and one quarter (2¼) hours per tank of fuel.

II. Breakdown

A. Cylinder and head

When the unit was run for the first time it was noted that the cylinder head was leaking, so the same was removed before any tests were made. Considerable carbon was found, thus indicating many hours of ruuning time. The carbon was removed and the head was replaced, but leakage still occured. After running most of the tests this way the cylinder head was removed again, and a gasket made of .005" thick aluminum was used, but leakage still occured. When the head was removed the first time the pistons which have two rings, were nice and tight, but after about five hours running time, the pistons had considerable play, thus the writer agrees fully with the manufactures' statement that the life of this engine is fifty (50) hours. The cylinder is made of a steel barrel, around which the cooling fins are placed. The cooling fins are cast in two parts lenghtwise, thus almost requiring a hand fit for every engine built this way. The top ~~the~~ of the cylinder was not machined evenly, thus causing much of the leakage.

B. Carburetor.

From looking at the fittings on the carburator one could tell that the same had been removed many times. The fittings were not tight and the carburator was disassembled three times , using new gaskets and permatex, but some leakage still occured. The carburator is the updraft type, which adds considerable height to the engine. After mast of the leakage was stopped the unit was run for about one half hour, and a new leak started in the crankcase casting right next to the carburetor.

C. General

The only part of the unit that can be removed readily is the spark plug. In order to remove the cylinder head, almost the entire unit had to be disassembled, which took four hours, and the same time to assemble. The unit is hard to work on as everything is so jammed together, for example, in order to remove the carburator, the bottom cover had to be removed, but to get the intake pipe off the carburator, the points had to be removed along with the frontplate se as to loosen the sealed box containing the ingition system. After doing this the clips holding the carburator to the crankcase could be reached. In order to remove the cylinder head, even more extensive disassembly had to be encountered.

There seemed to be considerable engine noise coming from the carburator; however this was noticed more with the cover off. During the testing of the ~~altinator~~ alternator which lasted about five hours running time, the exhaust manifold had come loose, and when it was repaired new threads had to be made in the casting.

One nice feature of the RD-13 was the speed regulation on light loads, but the engine had a tendency to increase in RPM; however, with full load on the ~~altinator~~ alternator there was no speed regulation to speak of. When the short circuit test was made on the ~~altinator~~ alternator the engine would drop in RPM and then after several seconds it would stop.

Conclusion

The entire unit is too hard to get at readily, this is especially poor [redacted]. The ~~altinator~~ alternator is too large, and the engine could be shortened by means of a different type carburator.

STAT