T H E S I S

TESTS TO DETERMINE RELATIVE VALUES OF ALCOHOL, GASOLINE, AND KEROSENE AS FUEL FOR INTERNAL COMBUSTION ENGINES.

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The object of this series of tests was to determine the relative value of gasoline, denatured alcohol, and kerosene as fuel for an internal combustion engine designed and built for the use of gasoline.

The fuels were tested under practically the same conditions, the only changes made in the engine were such that were necessary for obtaining the greatest brake horse power possible.

The first or trial tests were made with a strap brake but it was soon found that this was not suitable for engines or motors above five horse power. We also found that oil was the best for cooling a brake of this type. After proving that the strap brake was insufficient, a wooden Prony brake was constructed and used throughout the remaining tests. With this brake a constant supply of water proved better for cooling, but there was a small amount of chattering which could not be avoided on account of the engine being of the four cycle type.

The engine used was a ten horse power Witte Gasoline using the "hammer break" type of igniter.

The fuel tank was placed on the wall above the engine so the supply did not depend on the pump. This tank was fitted with a gage glass so the amount of fuel at the start could be marked and at the end of the test, the overflow was put back and the tank filled to the point marked at the start. The amount required to fill the tank to the starting point, after putting back the overflow, was what the engine had used during the test.

The cooling water for the cylinder was taken from the laboratory supply which had an average pressure of forty pounds. The flow was regulated so as to have the out-flowing water as near boiling point as possible and still maintain a steady supply.

The engine as built gave fifty pounds compression and this was used throughout all the tests made with gasoline.

Two grades of gasoline were used, the ordinary "tank" gasoline and a grade which cost five cents more per gallon. There was no noticeable increase of brake horse power per gallon in the better grade but the engine cylinder and valves were more free from soot. The longer the duration in hours of the best, the less fuel required per brake horse power per hour. When running at full load, the amount of fuel used was .09222 gallon per brake horse power hour, and at half load .2059 gallon or there would be a loss of .1137 gallon for every horse power hour when running at half load.

In using alcohol the first two tests were made with the engine the same as for the gasoline, but for the remainder a one and three-eights inch plate was put on the piston head, which increased the compression to seventy-five pounds. This is found to be all the compression that is advisable to use as the engine would run for a number of explosions at a time, with the batteries cut out, igniting from high compression and temperature after the cylinder became hot.

The second test was made to find if an increase of temperature of the cooling water would decrease the amount of fuel required, but the only change noticeable was that the engine ran at a more constant speed. The average amount of fuel used per brake horse power hour before increasing the compression, was .1822 gallon and after increasing compression, .09877 gallon. The increase of compression did not give a corresponding increase in horse power.

For the burning of kerosene a drum was placed around the exhaust pipe through which the air for each charge was drawn. The air was thus heated, by coming in contact with the hot exhaust pipe, sufficiently to bring the oil in the cylinder up to the flash point. The drum consisted of a sheet iron casing one inch larger in diameter than the outside diameter of the exhaust pipe, with connections for attaching to the air supply pipe between the heater and the mixing chamber so any amount of cold air could be supplied to be used for starting the engine on gasoline or obtaining the proper temperature of the supply air for the kerosene. The engine and exhaust became hot before the kerosene was turned on.

The first test (K - 1) was made with the engine the same as during the gasoline test and the remainder of the tests after a one-half inch plate had been put on the piston head, bringing the compression to sixty pounds.

The amount of oil used per brake horse power hour in the first test was .1894 gallons, and the average of the last two, those with higher compression, .04629 gallons.

The engine would not develop satisfactorily more than one-half of its rated horse power when using kerosene. The cylinder and valves soon became foul with soot and the exhaust gases were very disagreeable.

The last test (K - 3) was made with the batteries cut out after starting and the engine developed an average brake horse power of 5.735. The explosions caused by the compression and high temperature came early, making a very noticeable knock in the cylinder. Of the fuel, the alcohol gave the best power and left the engine in the cleanest condition at the end of the run, while the exhaust was clear and had but a slight odor. When using this the supply of fuel can be easily increased over the amount required without causing the engine to stop or slow up due to clogging the exhaust. In order for alcohol to be used in a gasoline engine economically, a higher compression in the cylinder must be arranged for than is necessary for the use of gasoline.

For the use of kerosene a gasoline engine of double the nominal horse power required should be installed. The air supply will require closer regulation than with gasoline or alcohol, for as the conditions of the atmosphere change the temperature of the air supplied must be changed or the engine will not develop the required power. If for any reason a number of the charges fail to ignite, the cylinder becomes foul on account of the fuel being heavy. The same engine run with gasoline or alcohol and developing the same power would be wasteful of fuel as shown by the tests and for this reason the kerosene might appear to be the more economical if the fact that the engine was running at one-half the horse power it would develop with gasoline or alcohol was not taken into account.

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K.S.A.C.

ON Gasolene. G-1

DATE

BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

CONSTANTS OF ENGINE.

Diam. of cylinder 7.250 in. Area of piston 41.28 sq. in.

Length of stroke 1.166 ft. Engine constant .001459

Brake constant .0010

OBSERVERS:

B.S. Orr.

S.R. Tilbury.

E. Johnson.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per ...... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	3:00									
1	3:10	263	32#	8.416		130	47.71	9.0492	.8882	
2	3:20	284	32	9.088		140	50.51	10.32	.8800	
3	3:30	280	32	8.960		140	47.69	9.741	.9199	50#" Compression.
4	3:40	256	32	8.192		128	54.77	10.23	.8008	
5	3:50	256	32	8.192		128	47.97	8.900	.9205	2.147 Gallons Oil Used.
6	4:00	260	32	8.320		128	49.23	9.047	.8802	
7	4:10	262	32	8.324		130	47.81	9.068	.9246	.1272 Gallons Per B.H.P. Hr.
8	4:20	258	32	8.356		128	48.08	8.979	.9195	
9	4:30	268	32	8.576		120	54.92	10.26	.8358	
10	4:40	252	32	8.064		120	51.92	9.090	.8871	
11	4:50	270	32	8.640		128	51.92	9.695	.8912	
12	5:00	265	32	8.380		134	51.01	9.972	.8404	
	Maximum.	284	32	9.088		140	54.92	10.3200	.9199	
	Minimum.	252	32	8.064		120	47.69	8.9000	.8008	
	Total.	3172	384	101.268		1562	603.54	115.352	10.5882	
	Average.	264	32	8.439		131	50.295	9.613	.8824	

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

LOG OF GASOLINE ENGINE TRIAL.

TEST MADE AT K.S.A.C.
ON GASOLENE. G-2
DATE
BAROMETER IN LBS.

CONSTANTS OF ENGINE.

Diam. of cylinder 7.250 in. Area of piston 41.28 sq. in.
Length of stroke 1.166 ft. Engine constant .001459
Brake constant .0010

OBSERVERS:
B.S. ORR.
S.R. TILBURY.
E. JOHNSON.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per ... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	2:—									
1	2:10	270	32#	8.640		134	47.83	9.351	.9240	
2	2:20	255	32	8.160		128	49.74	9.289	.8785	
3	2:30	272	32	8.704		132	51.38	9.895	.8796	50#/" COMPRESSION.
4	2:40	268	32	8.376		134	49.23	9.625	.8910	
5	2:50	272	32	8.800		136	46.68	9.263	.9500	3.576 GALLONS OIL USED.
6	3:—	277	32	8.864		134	49.10	9.599	.9234	
7	3:10	270	32	8.640		134	48.06	9.396	.9195	.1424 GAL. PER B.H.P. HR.
8	3:20	256	32	8.192		128	46.88	8.755	.9357	
9	3:30	252	32	8.064		126	49.22	9.048	.8913	
10	3:40	250	32	8.000		125	51.54	9.400	.8509	
11	3:50	250	32	8.000		125	50.25	9.164	.8730	
12	4:—	262	32	8.384		130	49.23	9.338	.8978	
13	4:10	262	32	8.384		131	47.33	9.123	.9190	
14	4:20	252	32	8.064		126	46.94	8.701	.9268	
15	4:30	269	32	8.608		134	47.60	9.306	.9250	
16	4:40	250	32	8.000		125	48.35	8.818	.9072	
17	4:50	269	32	8.608		134	47.21	9.230	.9326	
18	5:—	250	32	8.000		125	46.38	8.459	.9457	
	Maximum.	277	32	8.860		136	51.54	9.895	.9500	
	Minimum,	255	32	8.000		125	46.38	8.459	.8509	
	Total,	4609	576	150.688		2341	873.05	165.86	16.371	
	Average,	256	32	8.372		130	48.50	9.214	.9095	

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K.S.A.C.

ON GASOLENE. G-3.

DATE

BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

CONSTANTS OF ENGINE.

Diam. of cylinder....... 7.250 in. Area of piston...... 41.28 sq. in.
Length of stroke........ 1.166 ft. Engine constant..... .001459
Brake constant...... .0010

OBSERVERS:

B.S. ORR.
S.R. TILBURY.
E. JOHNSON.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per .... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	8 : 50									
1	9 : —	260	32#	8.320		130	49.49	9.387	.8871	
2	9 : 10	265	32	8.480		132	47.18	9.086	.9333	
3	9 : 20	262	32	8.384		133	50.88	9.505	.8823	50#/□" COMPRESSION.
4	9 : 30	270	32	8.640		135	48.86	9.840	.8781	
5	9 : 40	252	32	8.364		124	51.32	9.285	.9008	3.981 GAL. OIL USED.
6	9 : 50	270	32	8.640		134	51.66	10.10	.8554	
7	10 —	264	32	8.448		130	45.96	8.717	.9691	.09222 GAL. PER B.H.P. HR.
8	10 — 10	280	32	8.960		136	50.32	9.985	.8973	
9	10 — 20	260	32	8.320		126	53.20	9.786	.8502	
10	10 — 30	275	32	8.800		136	52.83	10.48	.8397	
11	10 — 40	271	32	8.672		135	52.44	10.33	.8395	
12	10 — 50	272	32	8.704		136	51.94	10.46	.8321	
13	11 —	265	32	8.480		128	49.83	9.444	.8982	
14	11 — 10	270	32	8.640		132	47.41	9.055	.9482	
15	11 — 20	270	32	8.640		132	50.49	9.644	.8959	
16	11 — 30	262	32	8.384		128	52.47	9.718	.8627	
17	11 — 40	275	32	8.800		136	50.25	9.889	.8899	
18	11 — 50	280	32	8.960		136	51.63	10.16	.8816	
19	12 —	280	32	8.960		134	52.30	10.22	.8767	
20	12 — 10	270	32	8.640		130	52.59	9.975	.8668	
21	12 — 20	260	32	8.320		128	47.93	8.951	.9295	
22	12 — 30	275	32	8.800		136	53.10	10.54	.8349	
23	12 — 40	270	32	8.640		130	52.59	9.975	.8662	
24	12 — 50	273	32	8.736		130	50.90	9.654	.9049	
25	1 —	276	32	8.832		132	56.63	10.79	.8185	
26	1 — 10	275	32	8.800		132	58.40	11.25	.7822	
27	1 — 20	272	32	8.704		130	52.71	9.986	.8716	
28	1 — 30	273	32	8.736		132	49.34	9.524	.9173	
29	1 — 40	268	32	8.576		130	51.93	9.850	.8707	
30	1 — 50	270	32	8.640		132	51.66	9.727	.8855	
	Maximum.	280	32	8.960		136	58.40	11.25	.9482	
	Minimum,	252	32	8.320		124	45.96	8.717	.7822	
	Total,	8172	960	259.020		3950	1428.75	295.345	263.769	
	Average,	272.2	32	8.634		131.6	47.605	9.0844	.87925	

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K.S.A.C.

ON GASOLINE. G-4

DATE

BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

CONSTANTS OF ENGINE.

Diam. of cylinder 7.250 in. Area of piston 41.28 sq. in.

Length of stroke 1.166 ft. Engine constant .001459

Brake constant .0010

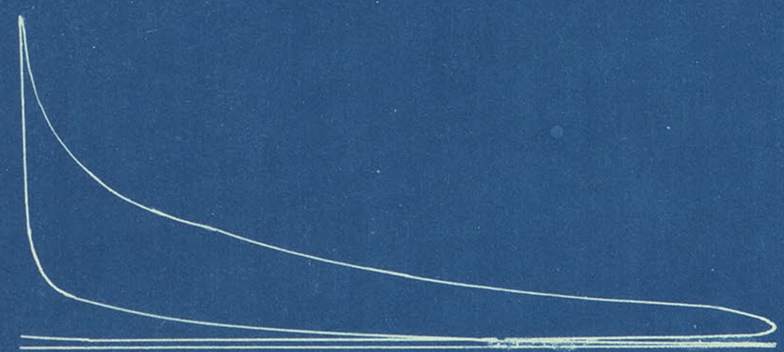
OBSERVERS:

B.S. ORR.
S. R. TILBURY.
E. JOHNSON.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per ... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	3 : —									
1	3 : 10	290	20#	5.800		122	39.97	7.115	.8153	
2	3 : 20	284	20#	5.680		103	50.63	7.608	.7466	
3	3 : 30	290	20#	5.800		110	45.76	7.344	.7898	50#□" COMPRESSION.
4	3 : 40	288	20#	5.760		105	47.91	7.340	.7847	
5	3 : 50	289	20#	5.780		116	46.88	7.934	.7285	2.356 GALLONS OIL USED.
6	4 : —	282	20#	5.640		115	45.52	7.638	.7384	
7	4 : 10	290	20#	5.800		90	56.48	7.416	.7821	.2059 GAL. PER B.H.P. HR.
8	4 : 20	287	20#	5.740		112	44.33	7.244	.7824	
9	4 : 30	286	20#	5.720		117	41.28	7.014	.8155	
10	4 : 40	285	20#	5.700		120	44.93	7.866	.7246	
11	4 : 50	281	20#	5.620		105	47.78	7.320	.7678	
12	5 : —	280	20#	5.600		105	46.88	7.182	.7797	
	Maximum.	290	20	5.800		122	56.48	7.934	.8155	
	Minimum,	280	20	5.600		90	39.97	7.014	.7246	
	Total,	3432	2400	68640		1321	558.35	89.021	9.2654	
	Average,	280	20	5.720		110	46.52	7.418	.7121	

GASOLINE

No. 7. G-2.



No. 22. G-3.

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K.S.A.C.

ON ALCOHOL. A-1

DATE

BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

CONSTANTS OF ENGINE.

Diam. of cylinder 7.250 in. Area of piston 41.28 sq. in.

Length of stroke 1.166 ft. Engine constant .001459

Brake constant

OBSERVERS:

B. S. ORR.
S. R. TILBURY.
E. JOHNSON.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per ...... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	2:50									
1	3:	285	34#	8.772		128	50.51	9.433	.9299	
2	3:10	272	34	9.248		134	47.09	9.206	.9817	
3	3:20	276	34	9.384		136	48.24	9.572	.9826	50#" COMPRESSION.
4	3:30	278	34	9.452		132	51.12	10.07	.9386	
5	3:40	264	34	8.976		132	51.64	9.945	.9025	3.375 GAL. OIL USED.
6	3:50	278	34	9.452		132	53.03	10.37	.9115	
7	4:00	278	34	9.452		134	49.87	9.604	.9842	.1828 GAL. PER B.H.P. HR.
8	4:10	276	34	9.384		132	50.13	9.655	.9719	
9	4:20	270	34	9.180		132	47.72	9.190	.9989	
10	4:30	272	34	9.248		130	51.38	9.745	.9490	
11	4:40	271	34	9.212		130	62.43	11.84	.7780	
12	4:50	273	34	9.282		130	53.88	10.22	.9082	
	Maximum.	278	34	9.452		136	53.88	11.840	.9989	
	Minimum,	258	34	8.772		128	47.09	9.190	.7780	
	Total,	3266	408	111.044		1582	617.03	118.85	11.237	
	Average,									

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K. S. A. C.
ON ALCOHOL A-2
DATE
BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

CONSTANTS OF ENGINE.

Diam. of cylinder 7.250 in. Area of piston 41.28 sq. in.
Length of stroke 1.166 ft. Engine constant .001458
Brake constant .0010

OBSERVERS:
B. S. ORR.
S. R. TILBURY.
E. JOHNSON.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per ... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	2 —									
1	2:10	268	34#	9.112		134	52.44	10.25	.8890	
2	2:20	284	34	9.656		138	49.13	9.892	.9762	
3	2:30	282	34	9.588		134	50.13	9.801	.9783	50#/□" COMPRESSION.
4	2:40	276	34	9.384		130	52.29	9.918	.9462	
5	2:50	284	34	9.656		132	51.38	9.895	.9758	3.432 GALLONS OIL USED
6	3:00	273	34	9.282		134	50.25	9.824	.9448	
7	3:10	280	34	9.520		134	51.26	10.02	.9501	.1815 GAL. PER B.H.P. HR.
8	3:20	278	34	9.452		136	47.01	9.328	1.0130	
9	3:30	282	34	9.588		140	50.63	10.340	.9273	
10	3:40	284	34	9.656		140	52.02	10.630	.9084	
11	3:50	268	34	9.112		134	50.12	9.799	.9299	
12	4:00	278	34	9.452		136	49.37	9.796	.9649	
	Maximum.	284	34	9.656		140	52.44	10.63	1.013	
	Minimum,	268	34	9.112		130	47.01	9.328	.8890	
	Total,	3277	408	113.458		1642	606.05	119.493	11.4059	
	Average,	273	34	9.455		136	50.54	9.959	.9505	

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K.S.A.C.

ON ALCOHOL A—3

DATE

BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

CONSTANTS OF ENGINE.

Diam. of cylinder 7.250 in. — Length of stroke 1.166 ft.

Area of piston 41.28 sq. in. — Engine constant .001459 — Brake constant .0010

OBSERVERS:

B. S. ORR.
S. R. TILBURY.
E. JOHNSON.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per ... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	9:10									
1	9:20	274	33#	9.040		138	45.075	9.077	.9961	
2	9:30	273	33	9.009		138	48.106	9.685	.9303	
3	9:40	280	33	9.240		138	54.375	10.95	.8498	75#/□" COMPRESSION.
4	9:50	276	33	9.108		138	53.117	10.70	.8512	
5	10:00	276	33	9.108		136	54.887	10.89	.8558	2.730 GALLONS OIL USED
6	10:10	280	33	9.240		136	55.875	11.09	.8332	
7	10:20	276	33	9.108		136	53.007	10.52	.8658	.09856 GAL. PER B.H.P. HR.
8	10:30	280	33	9.240		137	55.964	11.19	.8257	
9	10:40	280	33	9.280		134	59.469	11.63	.7945	
10	10:50	286	33	9.438		130	53.482	10.14	.9308	
11	11:00	288	33	9.504		140	53.409	10.91	.8711	
12	11:10	274	33	9.042		136	54.608	10.83	.8349	
13	11:20	286	33	9.438		133	52.386	10.26	.9199	
14	11:30	286	33	9.438		137	51.246	10.24	.9217	
15	11:40	285	33	9.405		136	51.111	10.14	.9275	
16	11:50	275	33	9.075		136	49.995	9.92	.9148	
17	12:	280	33	9.240		136	51.000	10.12	.9130	
18	12:10	281	33	9.273		133	50.37	9.77	.9488	
						.140	59.469	11.63	.9961	
	Maximum,	288	33	9.438		128	45.075	9.077	.7945	
	Minimum,	273	33	9.009		2432	910.357	188.066	15.9789	
	Total,	5036	594	166.188		135	50.575	10.448	.8877	
	Average,	280	33	9.233						

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K.S.A.C.
ON ALCOHOL A—4
DATE
BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

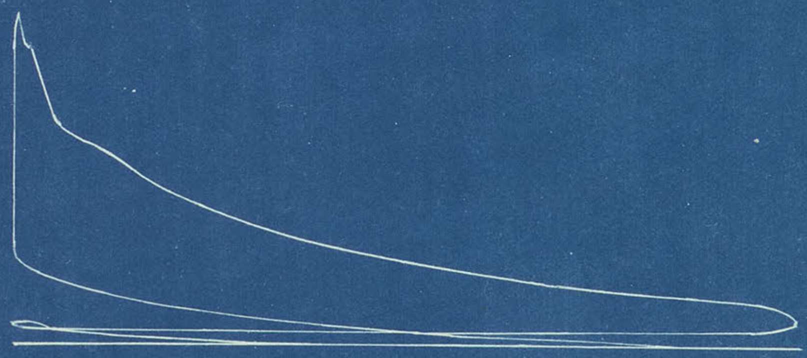
CONSTANTS OF ENGINE.

Diam. of cylinder 7.250 in. Area of piston 41.28 sq. in.
Length of stroke 1.166 ft. Engine constant .001458
Brake constant .0010

OBSERVERS:
B. S. Orr.
S. R. Tilbury.
E. Johnson.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per ..... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	1—20									
1	1:30	270	34#	9.180		134	53.85	10.53	.8718	
2	1:40	276	34	9.384		136	52.81	10.48	.8954	
3	1:50	272	34	9.248		136	58.48	11.60	.7972	75#" Compression.
4	2:00	285	34	9.690		138	55.47	11.07	.8753	
5	2:10	286	34	9.724		140	57.69	11.78	.8254	4.758 Gallons Oil Used.
6	2:20	280	34	9.520		140	56.89	11.62	.8193	
7	2:30	276	34	9.384		134	58.50	11.44	.8203	.09898 Gal. Per B.H.P. Hr.
8	2:40	280	34	9.520		140	53.28	10.88	.8750	
9	2:50	281	34	9.554		140	56.61	11.57	.8258	
10	3:00	282	34	9.588		141	57.04	11.73	.8178	
11	3:10	288	34	9.792		140	57.08	11.66	.8398	
12	3:20	281	34	9.554		140	56.86	11.72	.8157	
13	3:30	285	34	9.690		139	54.74	11.10	.8730	
14	3:40	282	34	9.588		140	55.55	11.34	.8455	
15	3:50	286	34	9.724		140	56.27	11.49	.8463	
16	4:00	290	34	9.860		141	59.17	12.17	.8102	
17	4:10	288	34	9.792		138	50.97	10.26	.9544	
18	4:20	282	34	9.588		140	54.24	11.08	.8653	
19	4:30	282	34	9.588		140	54.06	11.04	.8687	
20	4:40	284	34	9.656		140	58.87	12.02	.8033	
21	4:50	281	34	9.554		140	60.07	12.27	.7787	
22	5:00	282	34	9.588		140	58.58	11.97	.8010	
23	5:10	282	34	9.588		140	58.29	11.90	.8057	
24	5:20	276	34	9.584		136	57.48	11.40	.8232	
25	5:30	285	34	9.690		140	58.37	11.92	.8129	
26	5:40	286	34	9.724		140	54.85	11.20	.8682	
27	5:50	286	34	9.724		140	54.98	10.97	.8864	
28	6:00	289	34	9.826		140	53.84	11.00	.8933	
29	6:10	289	34	9.826		144	50.25	10.56	.9305	
30	6:20	292	34	9.928		144	48.00	10.08	.9849	
	Maximum.	292	34	9.928		144	60.07	12.27	.9849	
	Minimum,	270	34	9.180		134	48.00	10.08	.7787	
	Total,	8484	1020	288.454		4179	1673.12	338.82	25.4594	
	Average,	282	34	9.615		139.3	55.71	11.326	.8486	

ALCOHOL.



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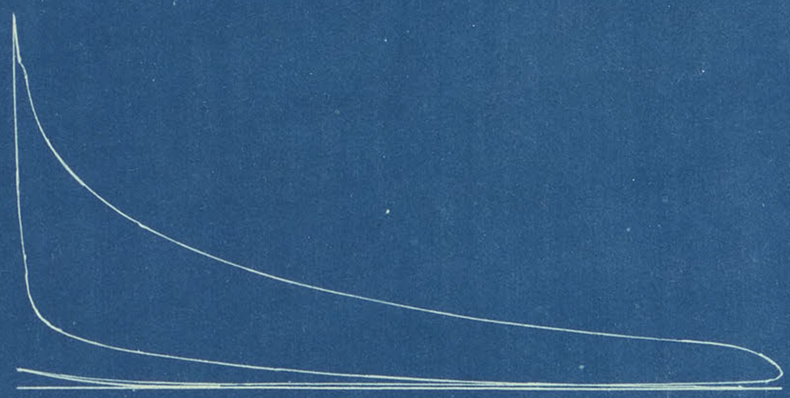


No 11. A—1.

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K. S. A. C.

ON KEROSENE, K—1

DATE

BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

CONSTANTS OF ENGINE.

Diam. of cylinder....... 7.250 in. Area of piston..... 41.28 sq. in.

Length of stroke........ 1.166 ft. Engine constant..... .001459

Brake constant...... .0010

OBSERVERS:

B. S. ORR.

S. R. TILBURY.

F. JOHNSON.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per ...... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	4 : —									
1	4 : 10	268	20#	5.360		134	39.29	7.681	.6978	
2	4 : 20	286	20	5.720		142	37.04	7.674	.7454	
3	4 : 30	290	20	5.800		140	38.54	7.872	.7368	50#/" COMPRESSION.
4	4 : 40	275	22	6.050		138	36.07	7.261	.8332	
5	4 : 50	270	20	5.400		136	33.58	6.663	.8104	2.130 GALLONS OIL USED.
6	5 : —	276	20	5.520		138	30.78	6.198	.8906	
7	5 : 10	280	20	5.600		136	37.59	7.459	.7508	.1894 GAL. PER B.H.P. HR.
8	5 : 20	270	20	5.400		136	35.53	7.050	.7660	
9	5 : 30	285	20	5.700		138	40.68	8.191	.6959	
10	5 : 40	286	20	5.720		136	29.63	5.879	.9733	
11	5 : 50	280	20	5.600		136	38.23	7.586	.7382	
12	6 : —	280	20	5.600		138	35.09	7.065	.7927	
	Maximum.	290	20	5.800		142	40.68	8.191	.9732	
	Minimum,	270	20	5.400		134	35.09	5.879	.6959	
	Total,	3346	2400	67.470		1648	432.05	86.579	94.311	
	Average,	278.8	20	5.6225		137.3	36.00	7.214	.7859	

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K. S. A. C.

ON KEROSENE K—2

DATE

BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

CONSTANTS OF ENGINE.

Diam. of cylinder....... 7.250 in.
Length of stroke........ 1.166 ft.
Area of piston...... 41.28 sq. in.
Engine constant..... .001459
Brake constant...... .0010

OBSERVERS:

B. S. ORR.
S. R. TILBURY.
E. JOHNSON.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per .... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
	9—40									
1	9—50	279	20#	5.580		140	36.55	7.449	.7491	
2	10—	280	20	5.600		140	39.09	7.985	.7029	
3	10—10	285	20	5.700		142	37.50	9.781	.5828	60#/□" COMPRESSION.
4	10—20	285	20	5.700		142	29.63	6.052	.8418	
5	10—30	270	20	5.400		136	25.19	4.998	1.080	.1397 GALLONS OIL USED.
6	10—40	283	20	5.660		140	29.62	6.050	.9334	
7	10—50	285	20	5.700		142	37.22	7.711	.7392	.04660 GAL. PER. B.H.P. HR.
8	11—	286	20	5.720		130	34.07	6.462	.8852	
9	11—10	276	20	5.520		128	41.49	7.748	.7124	
10	11—20	287	20	5.740		132	35.36	6.810	.8429	
11	11—30	288	20	5.760		130	34.01	6.451	.8929	
12	11—40	278	20	5.560		128	33.42	6.241	.8909	
13	11—50	280	20	5.600		126	44.77	6.538	.8370	
14	12—	286	20	5.720		132	33.69	6.488	.8616	
15	12—10	286	20	5.720		132	33.78	6.657	.8593	
16	12—20	288	20	5.760		140	20.12	4.110	1.4010	
17	12—30	287	20	5.740		140	37.96	7.754	.7402	
18	12—40	289	20	5.780		142	35.03	7.257	.7965	
	Maximum,	289	20	5.780		142	44.77	9.781	1.401	
	Minimum,	276	20	5.400		126	33.69	4.110	.7029	
	Total,	5008	360	101.960		2440	648.89	722.542	15.459	
	Average,	278	20	5.664		135.5	34.04	6.808	85.88	

DEPARTMENT OF MECHANICAL ENGINEERING, K. S. A. C.

TEST MADE AT K.S.A.C.
ON KEROSENE. K—3
DATE
BAROMETER IN LBS.

LOG OF GASOLINE ENGINE TRIAL.

CONSTANTS OF ENGINE.

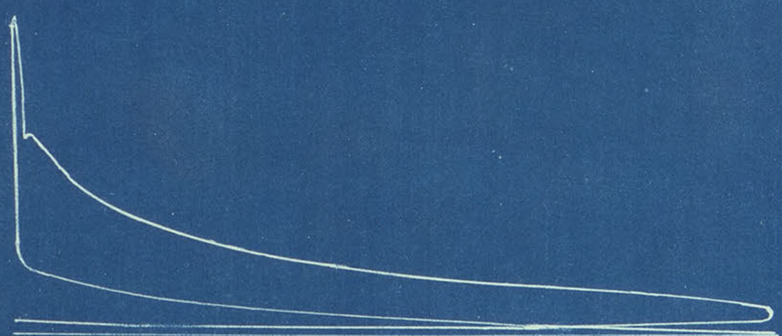
Diam. of cylinder....... 7.250 in.
Length of stroke........ 1.166 ft.
Area of piston...... 41.28 sq. in.
Engine constant..... .001458
Brake constant....... .0010

OBSERVERS:
B.S. ORR.
S. R. TILBURY.
E. JOHNSON.

No. Card.	Time.	R. P. M.	Brake Load	B. H. P.	Explosions per ...... Mins.	Explosions per Minute.	M. E. P.	I. H. P.	Eff.	Remarks.
1	9 : 15	290	20	5.800						
2	9 : 30	285	20	5.700						60# COMPRESSION.
3	9 : 45	288	20	5.760						.2638 GALLONS OIL USED
4	10 : —	284	20	5.680						.04599 GAL. PER B. HP. HR.
	Maximum.	290	20	5.800						
	Minimum,	284	20	5.680						
	Total,	1147	80	22.940						
	Average,	287	20	5.735						

KEROSENE

No. 9. K-1



No. 3. K-2.